Facility: **McGuire**	Scenario No.: **1** Op Test No.: **N18-1**
Examiners:	Operators: (SRO)
	(RO)
	(BOP)

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B MDCA Pump is OOS due to a Control Power Fuse failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.5 ACTION B.1. The 1B EDG is OOS due to Fuel Pump replacement. ACTION has been taken in accordance with Technical Specification LCO 3.8.1 ACTION B.1, B.2, B.3.1 and B.4. Maintenance has been completed on the 1B EDG, and it has been started for retest. NVP-5230, NCP 1A #1 Seal Differential Pressure indicator, failed last shift (IAE is investigating). MCB Annunciator 1AD-9, C-8, "CONT HI-HI PRESS ALERT," will not ILLUMINATE (IAE is investigating). The BOP will synch the 1B EDG to 1ETB and complete the post-maintenance testing.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	N-BOP N(TS)-SRO	1B EDG Surveillance/1C Cold Leg Accumulator Boron Concentration Low
2	REM HS0179 MAL DEH008A	C-RO C-BOP C-SRO	MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL
3	MAL SG001A	R-RO C-BOP C(TS)-SRO	Steam Generator Tube Leak
4	MAL IRE009	C-RO C-SRO	Control Rods fail to MOVE in AUTO
5	MAL ISE007A/B EP002A/B DG004B DG001A	M-RO M-BOP M-SRO	Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start
6	MAL CA005	NA	TDCA Pump trips on Overspeed
7	MAL CA004A	C-BOP C-SRO	1A MDCA Pump fails to start

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

McGuire 2018 NRC Scenario #1

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Shortly after taking the watch, the operator will continue with Enclosure 13.2, “1B D/G Fast Start” of PT/1/A/4350/002B, “Diesel Generator 1B Operability Test,” and parallel the 1B EDG with Bus 1ETB. This test will continue throughout the remainder of the scenario. During this surveillance, Chemistry will call and report the results of a periodic sample of the Cold Leg Accumulators. The 1C Cold Leg Accumulator Boron concentration will be low. The operator will address Technical Specification LCO 3.5.1, “Accumulators.”

Following this, MSR Relief Valve 1HS179 will fail open causing a loss of turbine efficiency and an increase in reactor power. The operator will implement AP/1/A/5500/01, “Steam Leak.” The operator will recognize the failure, and perform a rapid downpower in accordance with AP/1/A/5500/04, “Rapid Downpower,” attempting to, and eventually shutting the valve. Just prior to the downpower being stopped the Turbine Control will fail to MANUAL (This is done to set up RO action on subsequent SGTL).

Subsequently, a 30 gpm Steam Generator Tube Leak will occur (no build-in) on the 1A Steam Generator. The operator will enter AP/1/A/5500/10, “NC System Leakage Within the Capacity of Both NV Pumps.” The operator will address Technical Specification LCO 3.4.13, “RCS Operational Leakage”, LCO 3.4.18 "SG Tube Integrity", and SLC 16.9.7, “Standby Shutdown System.” The crew will be directed by AP/1/A/5500/10 to reduce plant power to Mode 3 within 3 hours. The operator will perform a rapid downpower in accordance with AP/1/A/5500/04, “Rapid Downpower.”

During the downpower, the Control Rods fail to move in AUTO. The operator will enter AP/1/A/5500/14, “Rod Control Malfunction,” and take manual control of the rods.

After this, a Loss of Off-Site Power will occur, along with an inadvertent Feedwater Isolation Signal. Simultaneously, the 1B EDG will trip on overspeed. The 1A EDG will fail to start both automatically and manually and a station blackout will exist. The operator will enter EP/1/A/5000/E-0, “Reactor Trip or Safety Injection,” and then EP/1/A/5000/ECA-0.0, “Loss of All AC Power;” or enter ECA-0.0 directly. Simultaneously, the TDCA Pump will start but trip on overspeed.

The operator will start the 1A EDG by manually actuating Safety Injection, and power will be restored to Bus 1ETA. However, the 1A MDCA Pump will fail to start (All other equipment will sequence as expected); and the operator will need to manually start the pump. This pump will fail to manually start until the crew has addressed the Red Path on the Heat Sink Critical Safety Function.

With Bus 1ETA re-energized the operator will return to, or go to, EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” However, shortly after entry and progression through E-0, a Red Path will develop on the Heat Sink Critical Safety Function Status Tree. The operator will implement EP/1/A/5000/ FR-H.1, “Response to Loss of Secondary Heat Sink,” and direct evaluation of the 1A MDCA Pump failure and replacement of the breaker. Ultimately, the operator will manually start the 1A MDCA Pump and restore the Secondary Heat Sink.

The scenario will terminate at step 7.e of FR-H.1 after Secondary Heat Sink has been restored.

<u>Critical Tasks:</u>

Energize at least one AC Emergency Bus within 15 minutes of the Total Loss of AC Power.

Safety Significance: Failure to energize an AC Emergency Bus when able to do so constitutes “mis-operation” or incorrect performance which leads to degraded emergency power capacity. Failure to perform the Critical Task may result in a needless challenge and/or degradation of a fission product barrier at the point of the RCP Seals, and will result in the inability to add inventory through the ECCS during a subsequent small break LOCA. 15 minutes is chosen as the Measurable Performance Standard because if the operator fails to start the Emergency Diesel Generator (EDG), when able to do so within 15 minutes, the required Emergency Classification will be a Site Area Emergency when it would have been limited to an Alert if the operator had started the EDG within 15 minutes.

Restore a Secondary Heat Sink before required to establish NCS Bleed and Feed in FR-H.1 [W/R level in at least 3 S/Gs - LESS THAN 24% (36% ACC)].

Safety Significance: Failure to restore a Secondary Heat Sink with AFW flow, when able to do so under the postulated plant conditions, results in “adverse consequence or a significant degradation in the mitigative capability of the plant.” In this case, the minimum required AFW flow rate can be established by manually starting the 1A MDCA Pump (After Breaker Replacement). Therefore, failure to do so represents a failure by the crew to “demonstrate the following abilities: (1) Effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS) … capacity), (2) Recognize a failure or an incorrect automatic actuation of an ESF system or component, and (3) Take one or more actions that would prevent a challenge to plant safety.”

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class ILT 18-1

TOPIC: NRC Simulator Exam

Scenario N18-1-1

REFERENCES:

1. Technical Specification LCO 3.8.1, “AC Sources - Operating” (Amendment 221/203)
2. Technical Specification LCO 3.7.5, “Auxiliary Feedwater (AFW) System” (Amendment 282/261)
3. PT/1/A/4350/002B, “Diesel Generator 1B Operability Test” (Rev 107)
4. Technical Specification LCO 3.5.1, “Accumulators” (Amendment 218/200)
5. MCEI -0400-349, “McGuire Cycle 26 Core Operating Limits Report” (Rev 0)
6. OMP 4-3, “Use of Emergency and Abnormal Procedures and FLEX Support Guidelines” (Rev 46)
7. AP/1/A/5500/01, “Steam Leak” (Rev 18)
8. AP/1/A/5500/04, “Rapid Downpower” (Rev 30)
9. AP/1/A/5500/10, “NC System Leakage Within the Capacity of Both NV Pumps” (Rev 23)
10. OP/0/A/6450/011, “Control Area Ventilation/Chilled Water System” (Rev 105)
11. Technical Specification LCO 3.4.13, “RCS Operational Leakage” (Amendment 237/219)
12. SLC 16.9.7, “Standby Shutdown System” (Rev 153)
13. AP/1/A/5500/14, “Rod Control Malfunction” (Rev 16)
14. EP/1/A/5000/E-0, “Reactor Trip or Safety Injection” (Rev 36)
15. EP/1/A/5000/ECA-0.0, “Loss of All AC Power” (Rev 40)
16. EP/1/A/5000/E-3, “Steam Generator Tube Rupture” (Rev 26)
17. EP/1/A/5000/FR-H.1, “Response to Loss of Secondary Heat Sink” (Rev 20)

Validation Time: 120 minutes

Author: David Lazarony, Essential Training & Consulting, LLC

Facility Review: ________________________

Rev. 031918

McGuire 2018 NRC Scenario #1 Objectives:

Given the simulator at an initial condition of 100% power evaluate:

1. the SRO's ability to supervise the control room team during the normal, abnormal, and emergency situations that arise, including compliance with all facility procedures, Technical Specifications, and other commitments.

2. each crew member's ability to effectively communicate as part of a control room team during the normal, abnormal, and emergency situations that arise.

3. the BOP's ability to effectively parallel and load an Emergency Diesel Generator onto an Emergency ESF Bus in accordance with Enclosure 13.2, "1B D/G Fast Start" of PT/1/A/4350/002B, "Diesel Generator 1B Operability Test."

4. each crew member's ability to effectively diagnose a failed open MSR Relief Valve and the RO and BOP's ability to respond to such an event in accordance with AP/1/A/5500/01, "Steam Leak."

5. each crew member's ability to effectively diagnose a Turbine Control System that has failed to MANUAL.

6. each crew member's ability to effectively diagnose a Steam Generator Tube Leak and the RO and BOP's ability to respond to such an event in accordance with AP/1/A/5500/10, "NC System Leakage Within the Capacity of Both NV Pumps;" including the performance of a rapid downpower using manual turbine control in accordance with AP/1/A/5500/04, "Rapid Downpower."

7. each crew member's ability to effectively diagnose a failure of the control rods to move in AUTO during a rapid downpower, and the RO's ability to respond to such an event in accordance with AP/1/A/5500/14, "Rod Control Malfunction," including coordinating manual turbine and rod control during the downpower.

8. each crew member's ability to effectively diagnose a Station Blackout and the RO and BOP's ability to respond to such an event in accordance with EP/1/A/5000/ECA-0.0, "Loss of All AC Power."

9. each crew member's ability to effectively diagnose a Loss of Secondary Heat Sink and the RO and BOP's ability to respond to such an event in accordance with EP/1/A/5000/FR-H.1, "Response to Loss of Secondary Heat Sink."

Facility:	**McGuire**	Scenario No.:	**1**	Op Test No.:	**N18-1**
Examiners:	____________	Operators:	____________ (SRO)		
	____________		____________ (RO)		
	____________		____________ (BOP)		

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SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Reset to Temp IC 225** **(Base IC-39 [Swapped to A Train])**	**T = 0 Malfunctions:** **Insert LOA-CA010A=1; (1B MDCA Pump Control Power Racked Out)** **Insert LOA-CA010=1; (1B MDCA Pump Main Breaker Racked Out)** **Insert XMT_NV_INVPT5230 = Fail LO (NCP 1A #1 Seal Differential Pressure indicator Failure)** **Insert OVR-1AD9_C08 = OFF (MCB Annunciator 1AD9/C8)** **Insert MAL-DG001A = 1 (1A EDG Fails to Start)**
☐		**RUN** **Reset all SLIMs**	**Place Tagout/O-Stick on:** • **1B MDCA Pump** • **PNV-5230, NCP 1A #1 Seal Differential Pressure indicator** • **MCB Annunciator 1AD-9, C-8**
☐		**Update** Status Board, **Setup OAC**	**NOTE:** RMWST DO = <1000 ppb.
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	
☐		**Fill out the AO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide a copy of Enclosure 13.2 of PT/1/A/4350/002B marked up through Step 2.31. 4. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**Execute Simulator Scenario N18-1-1.**	
☐	At direction of examiner	**Event 1** **NA**	1B EDG Surveillance/1C Cold Leg Accumulator Boron Concentration Low
☐	At direction of examiner	**Event 2** **insert REM-HS0179 = 0.5** **insert MAL-DEH008A**	MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL **Note: The Turbine will fail to manual as the downpower is concluding.**
☐	At direction of examiner	**Event 3** **insert MAL-SG001A = 30 ramp=0**	Steam Generator Tube Leak
☐	At direction of examiner	**Event 4** **Insert MAL-IRE009 = FAIL_OF_AUTO**	Control Rods fail to MOVE in AUTO

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 5** **Insert:** **MAL-ISE007A** **MAL-ISE007B** **MAL-EP002A** **MAL-EP002B** **MAL-DG004B** **MAL-DG001A**	Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start **NOTE: MALF-DG001A is inserted at T=0.**
☐	Post-Rx Trip	**Event 6** **Insert MAL-CA005=1**	TDCA Pump trips on Overspeed **NOTE: This event will occur on LOOP**
☐	Post-Rx Trip	**Event 7** **Insert:** **MAL-CA004A = 2**	A MDCA Pump fails to start **NOTE: This event will occur on LOOP, MALF-CA004A will be removed after the crew directs that the breaker for the 1A MDCA Pump is replaced and Racked In, in FR-H.1.**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N18-1	Scenario #	1	Event #	1	Page	9 of 73
Event Description:	**1B EDG Surveillance/1C Cold Leg Accumulator Boron Concentration Low**						

Shortly after taking the watch, the operator will continue with Enclosure 13.2, “1B D/G Fast Start” of PT/1/A/4350/002B, “Diesel Generator 1B Operability Test,” and parallel the 1B EDG with Bus 1ETB. This test will continue throughout the remainder of the scenario. During this surveillance, Chemistry will call and report the results of a periodic sample of the Cold Leg Accumulators. The 1C Cold Leg Accumulator Boron concentration will be low. The operator will address Technical Specification LCO 3.5.1, “Accumulators.”

Booth Operator Instructions: **NA**

Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
		PT/1/A/4350/002 B, DIESEL GENERATOR 1B OPERABILITY TEST ENCLOSURE 13.2, 1B D/G FAST START	
		CAUTION Frequency should be maintained less than 64 Hz.	
	BOP	(Step 2.32) Raise frequency by depressing "RAISE" on "1B D/G Gov Cntrl" until mechanical governor takes control. (This will occur between 62 - 64 Hz. D/G speed will reduce to approximately 61 Hz.)	
	BOP	(Step 2.33) Record frequency at which mechanical governor controlling frequency, after it takes control, per M1A1617 (1B D/G Frequency) or local control panel meter if OAC unavailable:	
	BOP	(Step 2.34) IF frequency recorded in Step 2.33 is NOT 60.5 - 61.2 Hz THEN……	
	BOP	(Step 2.35) Ensure frequency 60 Hz using "1B D/G Gov Cntrl".	

Op Test No.:	N18-1	Scenario #	1	Event #	1	Page 10 of 73

Event Description: **1B EDG Surveillance/1C Cold Leg Accumulator Boron Concentration Low**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 2.36) Record 1EQCME1BCAMP (1B D/G Voltage Regulator Control Ammeter) (on 1B D/G Voltage Regulator Panel): ___________ amps.	**NOTE:** The BOP will contact the AO. **Booth Instructor:** as **AO**, acknowledge and report **1.4 AMPs.**
	BOP	(Step 2.37) Check "Line Volts" 3960 - 4360 V.	
	BOP	(Step 2.38) Check 1AD-11, E1 (Seq B In Test) dark.	
	BOP	(Step 2.39) Adjust D/G voltage 50 – 100 V higher than line voltage using "1B D/G Voltage Adjust".	
CAUTION Failure of the Droop Permissive could result in erratic D/G operation while paralleled to the bus.			
	BOP	(Step 2.40) IF OAC available, THEN check M1D3356 (1B D/G Droop Permissive) indicates "COMPLETE".	
	BOP	(Step 2.41) Place "1B D/G Sync" to "ON".	
NOTE As a guide, have synchroscope traveling no faster than one revolution in 20 seconds.			
	BOP	(Step 2.42) Using "1B D/G Gov Cntrl", adjust D/G speed to allow synchroscope to move slowly and smoothly in "FAST" (clockwise) direction.	

Op Test No.:	N18-1	Scenario #	1	Event #	1	Page	11 of 73

Event Description: **1B EDG Surveillance/1C Cold Leg Accumulator Boron Concentration Low**

Time	Pos.	Expected Actions/Behavior	Comments
NOTE • D/G load should be increased quickly after closing breaker to prevent reverse power condition. If a reverse power condition occurs, the D/G Emergency Breaker will trip open after a short time delay. • Steps 2.43 - 2.44 may be completed and then signed off as time allows.			
	BOP	(Step 2.43) HOLD until synchroscope pointer is within 3 minutes before 12 o'clock position, THEN firmly depress AND release "CLOSE" for "1ETB Emerg Breaker".	
	BOP	(Step 2.44) Perform the following concurrently:	
		• Quickly raise D/G load to 1000 kW using "1B D/G Gov Cntrl"	
		• Maintain power factor 0.90 - 0.92 lagging using "1B Volt Adjust"	
BOOTH INSTRUCTOR:	**When the BOP has started the EDG Surveillance procedure, as Chemistry Technician, call the Control Room and report that the recently taken samples of the CLA Accumulators indicates that the boron concentration is as follows:** **1A CLA – 2712 ppm** **1B CLA – 2731 ppm** **1C CLA – 2450 ppm** **1D CLA – 2763 ppm**		
			NOTE: The CRS will evaluate this condition.
			NOTE: The CRS may call WCC to address the low boron concentration. If so, **Booth Instructor** acknowledge as WCC.
	BOP	(Step 2.45) Place "1B D/G Sync" to "OFF".	
	BOP	(Step 2.46) Record date/time 1B D/G loaded to 1000 kW:	

Op Test No.:	N18-1	Scenario #	1	Event #	1	Page	12 of	73

Event Description: **1B EDG Surveillance/1C Cold Leg Accumulator Boron Concentration Low**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will evaluate the 1C Accumulator Boron Concentration.
TECHNICAL SPECIFICATION LCO 3.5.1, ACCUMULATORS			
	CRS	LCO 3.5.1 Four ECCS accumulators shall be OPERABLE.	**NOTE:** According to SR 3.5.1.4 the operator must verify that boron concentration in each accumulator is within the limits specified in the COLR.
			NOTE: According to Section 2.11.1of the COLR, when EFPD is between 250.1 and 300, the minimum CLA boron concentration is 2475 ppm. Since boron concentration has been reported to be 2450 ppm, the 1C boron concentration is too low.
	CRS	APPLICABILITY: MODES 1 and 2, MODE 3 with RCS pressure > 1000 psig.	
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One accumulator inoperable due to boron concentration not within limits.	A.1 Restore boron concentration to within limits.	72 Hours

			NOTE: The CRS will determine that Condition A is required and that ACTION A.1 must be taken.

When the 1B EDG is loaded to 1000kW move to Event #2.

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	13 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**						

Following this, MSR Relief Valve 1HS179 will fail open causing a loss of turbine efficiency and an increase in reactor power. The operator will implement AP/1/A/5500/01, "Steam Leak." The operator will recognize the failure, and perform a rapid downpower in accordance with AP/1/A/5500/04, "Rapid Downpower," attempting to, and eventually shutting the valve. Just prior to the downpower being stopped the Turbine Control will fail to MANUAL.

Booth Operator Instructions: **insert REM-HS0179 = 0.5**

Indications Available:

- Turbine MWe lowers
- Rx power rises (TPBE)
- Steam pressure starts to lower
- OAC Alarm: 1C1 L/P TURBINE CROSSOVER STEAM TEMP RATE
- OAC Alarm: 1C2 L/P TURBINE CROSSOVER STEAM TEMP RATE

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The crew may diagnose an overpower condition and adjust turbine load per OMP 4-3.
		OMP 4-3, USE OF EMERGENCY AND ABNORMAL PROCEDURES AND FLEX SUPPORT GUIDELINES **ATTACHMENT 10.1, PRUDENT OPERATOR ACTIONS**	
	RO	Transient Load Changes	
		• Manual is preferred - Immediately reduce up to 20 MWe and then reduce as needed to maintain reactor power less than pre-transient condition. After the initial load reduction, the operators should use multiple and diverse indications to determine any additional load reduction.	
		• TPBE on the OAC updates once per minute. Other indications (PR meters and Delta T meters) will indicate reactor response more quickly and will enable the operators to control the plant more precisely. (This combines the Operator Fundamentals of Conservatism and Controlling Plant Evolutions Precisely.)	

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	14 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**						

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/01, STEAM LEAK	
			NOTE: The CRS may dispatch AOs to look for steam leaks. If so, **Booth Instructor** as AO, respond back in 3-5 minutes per script (See **Page 16**). After 3-5 minutes of Non-investigatory Action, Call as Security and report **Steam Release to atmosphere on U1 TB Roof**.
	RO/ BOP	(Step 1) Monitor Foldout page.	
		Manual Reactor Trip Criteria: (IF any of the following occur: (1) Steam leak is jeopardizing personnel safety or plant equipment, (2) T-Avg is less than 551°F AND going down, or (3) UST level is less than 1 ft – NOT Expected).	
	RO	(Step 2) Reduce turbine load to maintain the following:	**NOTE:** The RO may take the Turbine Control to MANUAL.
		• Excore NI's – LESS THAN OR EQUAL TO 100%	**NOTE:** Per OMP 4-3, the RO has the authority to remove ≈20 Mwe initially, and then additional load as needed to stabilize temperature.
		• NC Loop D/T's – LESS THAN 60ºF D/T	
		• T-Avg – AT T-REF.	
	CRS/ BOP	(Step 3) Check containment entry – IN PROGRESS.	**NOTE:** There is no Containment Entry in progress.
	CRS	(Step 3 RNO) GO TO Step 5.	

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	15 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 5) Check Pzr pressure prior to event – GREATER THAN P-11 (1955 PSIG)	
	BOP	(Step 6) Check Pzr level – STABLE OR GOING UP	**NOTE:** If Pzr level is lowering the crew will perform the RNO prior to performing Step 7.
	CRS	(Step 7) IF AT ANY TIME while in this procedure Pzr level cannot be maintained stable, THEN RETURN TO Step 6.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	(Step 8) GO TO Step 12.	
	CRS	(Step 12) Announce occurrence on paging system.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 13) Identify and isolate leak on Unit 1 as follows:	
		• Check SM PORVs – CLOSED.	
		• Check condenser dump valves – CLOSED.	
	BOP	• Check containment conditions – NORMAL:	
		• Containment temperature	
		• Containment pressure	
		• Containment humidity	
		• Containment floor and equipment sump level.	
		• Check TD CA pump – OFF.	
		• Check valves on "STEAM LINE DRAIN VALVES" board (1MC-9) - CLOSED.	**NOTE:** The BOP may need to perform the RNO and close valves.

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	16 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	• Check opposite Unit (Unit 2) “STEAM HEADER PRESSURE” – GREATER THAN 200 PSIG.	**NOTE:** The CRS will ask U2 RO. If so, **Floor Instructor** acknowledge as U2 RO, and report U2 Steam Header Pressure is ≈1000 psig.
	CRS	• Dispatch operator to check for leaks.	**NOTE:** If not already done, the CRS will dispatch AOs to look for steam leaks. After **2-3 minutes**, **Booth Instructor,** as **AO**, report that **MSR 1C1 Shell Side Relief Valve (1HS179) is lifting.**
	BOP	(Step 14) Check UST level – STABLE OR GOING UP.	**NOTE:** The UST level may be rising or lowering. If rising go to Step 15.
	BOP	(Step 14 RNO) Makeup to UST as required to maintain level.	
	CRS	(Step 15) Evaluate unit shutdown as follows:	
		• Check unit status – IN MODE 1 OR 2.	
		• Determine if unit shutdown or load reduction is warranted based on the following criteria:	
		• Size of leak	
		• Location of leak	
		• Rate of depletion of secondary inventory	
		• IF steam is leaking from a secondary heater relief OR MSR relief valve, THEN reducing turbine load may reduce pressure enough to close relief valve.	**NOTE:** Steam is leaking from an MSR relief valve.

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	17 of 73

Event Description: **MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF turbine trip will isolate steam leak (such as feedwater heater leak or MSR leak), THEN it may be desirable to perform an orderly shutdown of the turbine and maintain reactor power in Mode 1.	**NOTE:** It is NOT necessary to trip the Turbine.
	CRS	• Check unit shutdown or load reduction – REQUIRED.	**NOTE:** It is necessary to reduce load in an attempt to close the lifting relief valve.
	CRS	• Check reactor trip – REQUIRED.	**NOTE:** A reactor trip is NOT required.
	CRS	(Step 15.d RNO) GO TO Step 15.h.	
	CRS	• (Step 15.h) Determine if turbine trip is desired to isolate steam leak:	
		• Check steam leak location – KNOWN TO BE ISOLABLE BY TURBINE TRIP	
		• Turbine trip – DESIRED.	**NOTE:** A turbine trip is NOT desired.
	CRS	(Step 15.h RNO) Perform the following:	
		• Reduce load as necessary PER one of the following:	
		• OP/1/A/6100/003	
		OR	
		• AP/1/A/5500/04 (Rapid Downpower).	**NOTE:** The CRS will transition to AP-4. **Booth Instructor:** If it appears likely that the crew will use the OP rather than the AP, state as the Operations Manager that it is desired to use AP-4.
AP/1/A/5500/04, RAPID DOWNPOWER			

Op Test No.: N18-1	Scenario # 1	Event # 2	Page 18 of 73

Event Description: **MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 1) Monitor Foldout page.	
		Uncontrolled Cooldown (If Tavg < 551°F and lowering…..Not Expected)	
		Power Factor (Adjust power factor during load reduction to maintain power factor between 0.9 to 1.0 lagging, using "VOLTAGE ADJUST" pushbutton)	**NOTE:** The RO will adjust MVARS as needed.
		Manual Rx Power Control (< C-5, Not Expected)	
		Turbine Shutdown (Turbine Load < 15 MWe Not Expected)	
	CRS	(Step 2) Announce occurrence on page.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 3) Check turbine control – IN AUTO.	**NOTE:** The Turbine may be in MANUAL. If so, the RO will place the Turbine in AUTO.
	RO	(Step 4) Check “MW LOOP” – IN SERVICE.	**NOTE:** If MW LOOP is NOT in service, the RO will place MW LOOP in service per RNO.
	RO	(Step 4 RNO) Depress "MW IN/MW OUT" pushbutton.	
	CRS	(Step 5) Check shutdown to Mode 3 – DESIRED.	
	CRS	(Step 5 RNO) Observe Note prior to Step 8 and GO TO Step 8.	

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	19 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**						

Time	Pos.	Expected Actions/Behavior	Comments
NOTE The following table can be used to determine unloading rates. Rates other than specified are acceptable.			
	CRS	(Step 8) Determine the required power reduction rate (MW/min).	**NOTE:** The CRS will reduce load at ≈10-20 MWe/minute.
	BOP	(Step 9) Notify SOC of load reduction (red dispatcher phone).	**Booth Instructor:** as **SOC**, acknowledge.
	RO	(Step 10) Check control rods – IN AUTO.	
	BOP	(Step 11) Borate NC System as follows:	
		• Energize all backup Pzr heaters.	
		• Check unit to be shutdown – VIA REACTOR TRIP FROM 15% POWER.	**NOTE:** It is normal practice to shut down the reactor by driving rods, rather than tripping from 15%.
	CRS	(Step 11.b RNO) GO TO Step 11.d.	
	BOP	(Step 11.d) Determine boration amount based on the following:	
		• Power Reduction Rate (MW/min)	
		• Present NC System Boron Concentration (ppm)	
		• Total Power change (%).	**NOTE:** The total power change will be determined by the CRS and will affect the amount of boron inserted by the BOP. (Expected 300-500 gallons)
		• Record calculated boration amount:	
	RO	• Check auto or manual rod control – AVAILABLE.	

Op Test No.: N18-1	Scenario # 1	Event # 2	Page 20 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**		

Time	Pos.	Expected Actions/Behavior	Comments
NOTE If load reduction of greater than 60% is planned and Unit 1 is to remain in Mode 1, the final (1/4) addition of boron may not be required based on rate of Xenon production and control rod response.			
	BOP	• Perform boration in four equal additions during load reduction PER Enclosure 2 (Emergency Boration).	
			NOTE: The CRS may assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Enclosure 2. **Other Examiners** follow **AP-4** Actions, **Step 12**, on **Page 21**.
AP/1/A/5500/04, RAPID DOWNPOWER ENCLOSURE 2, EMERGENCY BORATION			
	BOP	(Step 1) Check OAC - AVAILABLE.	
	BOP	(Step 2) Use OAC point M1P0785 to monitor boric acid gallons added while 1NV-265B (U1 NV Pump Boric Acid Sup Isol) is open.	
	BOP	(Step 3) GO TO Step 5.	
	BOP	(Step 5) Check boric acid transfer pump - RUNNING.	**NOTE:** The 1B Boric Acid Transfer Pump is running.
	BOP	(Step 6) OPEN 1NV-265B (U1 NV Pump Boric Acid Sup Isol).	
	BOP	(Step 7) Do not continue until desired amount of boric acid has been added.	

Op Test No.: N18-1	Scenario # 1	Event # 2		Page 21 of 73	
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**				

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 8) CLOSE 1NV-265B (U1 NV Pump Boric Acid Sup Isol).	
	BOP	(Step 9) IF boric acid transfer pump was started in Step 5 RNO, THEN ….	**NOTE:** The 1B Boric Acid Transfer Pump was running initially.
	BOP	(Step 10) Repeat enclosure as required.	
AP/1/A/5500/04, RAPID DOWNPOWER			
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.
	RO	(Step 12) WHEN boration commenced, THEN initiate turbine load reduction to desired load at desired rate.	
	BOP	(Step 13) Display Rod Insertion Limits on OAC by entering turn on code "RIL."	
NOTE Control Rods may approach rod insertion limits during load reduction.			
	CRS	(Step 14) IF AT ANY TIME "CONTROL ROD BANK LO LO LIMIT" alarm (1AD-2, B-9) is lit, THEN perform one of the following to comply with Tech Spec 3.1.6 (Control Bank Insertion Limits):	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• Ensure alarm clears within one hour as Xenon builds in.	
		OR	
		• Initiate boration as necessary within one hour to restore control rods above insertion limits.	

Op Test No.: N18-1	Scenario # 1	Event # 2	Page 22 of 73

Event Description: **MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**

Time	Pos.	Expected Actions/Behavior	Comments
		NOTE Unloading rates greater than 55 MW/min will meet C-7A interlock.	
	CRS	(Step 15) IF AT ANY TIME during this procedure C-7A is received, THEN ensure Transient Monitor freeze is triggered.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	(Step 16) REFER TO the following:	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
		• RP/0/A/5700/000 (Classification of Emergency)	
		• RP/0/A/5700/010 (NRC Immediate Notification Requirements).	
	CRS	(Step 17) Notify Reactor Engineer on duty of load reduction.	**NOTE:** The CRS may call WCC/RE. If so, **Booth Instructor** acknowledge.
	RO	(Step 18) Check target load - LESS THAN 1000 MW.	**NOTE:** The CRS may have selected a target load greater than 1000 MWe. If so, the crew will perform the RNO and wait until target load is reached. If not, continue to Step 19
Booth Operator Instructions:			**Insert REM-HS0179 = 0 (Remove 1HS179 Relief Valve Failure – At direction of Lead Examiner and after the 1st boration is complete.)** **insert MAL-DEH008A (Turbine to MANUAL)**

Op Test No.:	N18-1	Scenario #	1	Event #	2	Page	23 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**						

Time	Pos.	Expected Actions/Behavior	Comments
			Booth Instructor: as **AO**, report that 1HS179 Relief Valve has reseated.
			NOTE: The CRS will direct the RO to go to HOLD on the Turbine. The BOP may adjust boron concentration as needed to stabilize the plant.
	CRS	(Step 19) Check Unit 2 available to supply aux steam as follows:	**NOTE:** The CRS will ask U2 RO. **Floor Instructor:** As U2 RO report "All these conditions are met."
		• Unit 2 Reactor power - GREATER THAN 15%	
		• Unit 2 2AS-12 (U2 SM to AS Hdr Control Inlet Isol) - OPEN	
		• Unit 2 - AVAILABLE TO SUPPLY AS HEADER.	
	RO	(Step 20) Check SM flow on all S/Gs – GREATER THAN 25%.	
	RO	(Step 21) WHEN all SM flows are less than 75%, THEN ensure the following valves ramp CLOSED:	**NOTE:** This is a conditional step. The CRS will make the RO aware of this action, if NOT already done.
		• 1CF-104AB (1A S/G CF Control Bypass)	
		• 1CF-105AB (1B S/G CF Control Bypass)	
		• 1CF-106AB (1C S/G CF Control Bypass)	
		• 1CF-107AB (1D S/G CF Control Bypass)	**Examiner NOTE:** It may be necessary to allow the crew to stabilize the plant prior to moving to Event 3.

Op Test No.: N18-1	Scenario # 1	Event # 2	Page 24 of 73
Event Description:	**MSR Relief Valve fails OPEN/Downpower/Turbine Control fails to MANUAL**		

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may continue beyond this step in AP-4, however, it is expected that the plant will be stabilizing, and Event 3 is imminent.
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	25 of 73
Event Description:		**Steam Generator Tube Leak**					

Subsequently, a 30 gpm Steam Generator Tube Leak will occur (no build-in) on the 1A Steam Generator. The operator will enter AP/1/A/5500/10, "NC System Leakage Within the Capacity of Both NV Pumps." The operator will address Technical Specification LCO 3.4.13, "RCS Operational Leakage," LCO 3.4.18 "SG Tube Integrity", and SLC 16.9.7, "Standby Shutdown System." The crew will be directed by AP/1/A/5500/10 to reduce plant power to Mode 3 within 3 hours. The operator will perform a rapid downpower in accordance with AP/1/A/5500/04, "Rapid Downpower."
Booth Operator Instructions: **insert MAL-SG001A 30 ramp=0 (S/G 1A Tube Leak)**
Indications Available: • Pzr level is lowering • Charging flow starts to rise • MCB Annunciator 1AD-6/E-7, PZR LO LEVEL DEVIATION • Trip 2 on EMF 71, 72, 73, and 74 • EMF 24 in Trip 2

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/10, NC SYSTEM LEAKAGE WITHIN THE CAPACITY OF BOTH NV PUMPS **CASE I, STEAM GENERATOR TUBE LEAKAGE**	
	BOP	(Step 1) Check Pzr level – STABLE OR GOING UP.	**NOTE:** Pzr Level will be slowly lowering.
	BOP	(Step 1 RNO) Perform the following as required to maintain level:	
		• Maintain charging flow less than 200 GPM at all times in subsequent steps.	
		• Ensure 1NV-238 (U1 Charging Hdr Control) – OPENING.	**NOTE:** The BOP will take manual control of 1NV-238.
		• OPEN 1NV-241 (U1 Seal Water Inj Flow Control) while maintaining NC pump seal flow greater than 6 GPM.	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	26 of 73	
Event Description:		**Steam Generator Tube Leak**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Reduce or isolate letdown.	**NOTE:** The BOP may reduce letdown flow to 45 gpm.
		• Start additional NV pump.	**NOTE:** The BOP will NOT need to start an additional NV Pump, initially but will after the leak degrades in the Major Event.
		• IF CLAs are isolated, ….	**NOTE:** The CLAs are NOT isolated.
		• IF Pzr level cannot be maintained greater than 4% ….	**NOTE:** The Pzr level is NOT < 4%, or decreasing with maximum Charging flow.
	RO/ BOP	(Step 2) IF AT ANY TIME Pzr level goes down in an uncontrolled manner OR cannot be maintained greater than 4%, THEN perform Step 1.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
NOTE In subsequent steps "affected S/G" is considered the S/G with primary to secondary leakage requiring unit shutdown.			
	RO/ BOP	(Step 3) Identify affected S/G as follows:	
		• Any S/G N/R level – GOING UP IN AN UNCONTROLLED MANNER.	
		OR	
		• Check any of the following EMFs – ABOVE NORMAL:	
		• 1EMF-24 (S/G A Steamline Hi Rad)	**NOTE:** 1EMF-24 is in TRIP 2.
		• 1EMF-25 (S/G B Steamline Hi Rad)	
		• 1EMF-26 (S/G C Steamline Hi Rad)	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	27 of 73
Event Description:	Steam Generator Tube Leak						

Time	Pos.	Expected Actions/Behavior	Comments
		• 1EMF-27 (S/G D Steamline Hi Rad)	
		• 1EMF-71 (S/G A Leakage Hi Rad)	**NOTE:** This rad monitor will be rising, and could be in either Trip 1 or TRIP 2.
		• 1EMF-72 (S/G B Leakage Hi Rad)	
		• 1EMF-73 (S/G C Leakage Hi Rad)	
		• 1EMF-74 (S/G D Leakage Hi Rad)	
		OR	
		• Check CF Flow – LOWER IN ANY S/G COMPARED TO ALL.	
		OR	
		• Secondary Chemistry or RP has determined affected S/G by sampling or evaluation of available EMF data.	
		OR	
		• Notify RP to frisk all Unit 1 S/G cation columns (CT Lab) to determine if activity level is significantly higher for any S/G.	
	CRS	(Step 4) Announce occurrence on page.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that AP-10 has been entered. If so, **Floor Instructor** acknowledge as U2 RO.
	CRS	(Step 5) REFER TO the following:	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
		• RP/0/A/5700/000 (Classification of Emergency)	

Op Test No.: N18-1	Scenario # 1	Event # 3	Page 28 of 73
Event Description:	**Steam Generator Tube Leak**		

Time	Pos.	Expected Actions/Behavior	Comments
		• RP/0/A/5700/010 (NRC Immediate Notification Requirements).	
	CRS	(Step 6) IF AT ANY TIME NC leakage exceeds Tech Spec limits, THEN perform the following:	**NOTE:** The CRS will determine that Leakage has exceeded the TS Limits.
		• Ensure Outside Air Pressure Filter train in service PER OP/0/A/6450/011 (Control Area Ventilation/Chilled Water System), Enclosure 4.4 (Control Room Atmosphere Pressurization During Abnormal Conditions).	**NOTE:** The CRS may ask U2 BOP to take this action. If so, **Floor Instructor** acknowledge as U2 BOP (However No Actions Required).
		• Have another SRO evaluate if leakage exceeds SLC 16.9.7 condition C limits and immediately notify security if SSF is inoperable.	**NOTE:** The CRS may ask OSM, STA, or Plant SRO to perform this action. If so, **Floor Instructor** acknowledge accordingly. **Examiner NOTE:** If the CRS does not identify that Security must be notified, follow-up after the scenario **(See Page 33).**
			NOTE: The CRS may assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Enclosure 4.4. **Other Examiners** follow **AP-10** Actions, **Step 7**, on **Page 30**.
OP/0/A/6450/011, CONTROL AREA VENTILATION/CHILLED WATER SYSTEM ENCLOSURE 4.4, CONTROL ROOM ATMOSPHERE PRESSURIZATION DURING ABNORMAL CONDITIONS			
			Examiner NOTE: Follow the actions associated with Enclosure 4.4 if BOP is assigned by CRS to perform.

Op Test No.: N18-1	Scenario # 1	Event # 3	Page 29 of 73
Event Description:	**Steam Generator Tube Leak**		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.1) Evaluate all outstanding Clearances that may impact performance of this procedure.	
	BOP	(Step 3.2) Perform the following sections as applicable:	
		• Section 3.3, Pressurize Control Room Using Outside Air Pressure Fans	
		• Section 3.4, Securing Pressurization of Control Room	
	BOP	(Step 3.3) Pressurize Control Room using Outside Air Pressure Fans as follows:	
	BOP	(Step 3.3.1) Ensure at least one of the following groups of intake valves open:	
		• 1VC-1A (VC Outside Air Intake From Unit 1 Isol)	
		• 1VC-2A (VC Outside Air Intake From Unit 1 Isol)	
		• 1VC-3B (VC Outside Air Intake From Unit 1 Isol)	
		• 1VC-4B (VC Outside Air Intake From Unit 1 Isol)	
		OR	
	BOP	• 1VC-9A (VC Outside Air Intake From Unit 2 Isol)	
		• 1VC-10A (VC Outside Air Intake From Unit 2 Isol)	
		• 1VC-11B (VC Outside Air Intake From Unit 2 Isol)	
		• 1VC-12B (VC Outside Air Intake From Unit 2 Isol)	
	BOP	(Step 3.3.2) IF A Train VC/YC operating, place “A Train CR Outside Air Press Fan” to “ON”.	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	30 of 73
Event Description:		**Steam Generator Tube Leak**					

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.3.3) IF B Train VC/YC operating, place “B Train CR Outside Air Press Fan” to “ON”.	
	BOP	(Step 3.3.4) Depress "MAN" for the following (to ensure fans off):	
		• #1 CRA Otsd Air Fan	
		• #2 CRA Otsd Air Fan	
	BOP	(Step 3.3.5) Depress “OFF” for the following:	
		• CRA-OAD-4 (CR Area Otsd Air Fans Damper)	
		• CRA-OAD-3 (CR Area Otsd Air Fans Damper)	
	RO/ BOP	(Step 3.3.6) Check the following dark:	
		• CRA-OAD-4 (CR Area Otsd Air Fans Damper) “OPEN” light.	
		• CRA-OAD-3 (CR Area Otsd Air Fans Damper) “OPEN” light.	
AP/1/A/5500/10, NC SYSTEM LEAKAGE WITHIN THE CAPACITY OF BOTH NV PUMPS CASE I, STEAM GENERATOR TUBE LEAKAGE			
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE.**
	BOP	(Step 7) Check if unit shutdown or reactor trip required as follows:	
		• Check VCT makeup – IN PROGRESS.	**NOTE:** A VCT makeup may be in progress.
		• Check VCT level – GOING UP.	

Op Test No.: N18-1	Scenario # 1	Event # 3	Page 31 of 73
Event Description:	**Steam Generator Tube Leak**		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	• Check S/G tube leak size – LESS THAN 90 GPM.	**NOTE:** The CRS will determine the SGTL to be about 10-60 gpm.
		• Leakage in one S/G – GREATER THAN 125 GPD (GALLON PER DAY).	
	CRS	• Observe the following limits while reducing load in Step 8:	
		• Ensure reactor power is less than 50% within 1 hour of exceeding 125 GPD.	
		• Be in Mode 3 within 3 hours of exceeding 125 GPD.	
NOTE If load reduction less than 10 MW/min is planned once below 50% power, the OP below is the optimal procedure to use. If load reduction greater than or equal to 10 MW/min all the way to mode 3 is planned, AP04 is the optimal procedure to use. A more rapid shutdown is prudent for larger leaks.			
	CRS	(Step 8) Reduce load PER one of the following, while continuing with this AP as time allows beginning at Step 9.	
	CRS	• AP/1/A/5500/04 (Rapid Downpower)	**NOTE:** The CRS will implement AP-4, and may continue with these actions after the downpower is started. **(Examiner Move forward to Page 34)**
		OR	
		• OP/1/A/6100/003 (Controlling Procedure For Unit Operation). Enclosure 4.2 (Power Reduction).	
	RO	(Step 9) Minimize secondary side contamination as follows:	**NOTE:** The following actions are scripted because as the plant power is reduced, the CRS may continue to perform actions within AP-10.

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	32 of 73
Event Description:	**Steam Generator Tube Leak**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Check affected S/G – IDENTIFIED.	
		• CLOSE the blowdown throttle control valve for affected S/G.	
		• 1A: 1BB-123 (1A S/G Blowdown Throttle Control)	
		• 1B: 1BB-124 (1B S/G Blowdown Throttle Control)	
		• 1C: 1BB-125 (1C S/G Blowdown Throttle Control)	
		• 1D: 1BB-126 (1D S/G Blowdown Throttle Control)	
		• Perform EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 15 (Minimizing Secondary Side Contamination).	**NOTE:** The CRS may ask the U2 BOP to perform this action. If so, **Floor Instructor:** acknowledge as **U2 BOP**.
	RO	(Step 10) Check reactor trip breakers – OPEN.	
	CRS	(Step 10 RNO) Do not continue in the procedure until the reactor is tripped PER Step 8.	
			Examiner NOTE: Based on the transient nature of evaluating this TS, the Examiner may need to question the CRS after the scenario.
TECHNICAL SPECIFICATION 3.4.13, RCS OPERATIONAL LEAKAGE			
	CRS	LCO 3.4.13 RCS operational LEAKAGE shall be limited to:	
		• 389 gallons per day total primary to secondary LEAKAGE through all steam generators (SGs): and	
		• 135 gallons per day primary to secondary LEAKAGE through any one steam generator (SG)	

Tech Spec 3.4.18 (SG Tube Integrity) Condition ‘B’ is also applicable

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	33 of 73
Event Description:	**Steam Generator Tube Leak**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	APPLICABILITY: MODES 1, 2, 3 and 4	
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met. OR Pressure boundary LEAKAGE exists. OR Primary to secondary LEAKAGE not within limits.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition B is required and that ACTION B.1 and B.2 must be taken.
SELECTED LICENSEE COMMITMENT 16.9.7, STANDBY SHUTDOWN SYSTEM			
	CRS	COMMITMENT The Standby Shutdown System (SSS) shall be operable.	
	CRS	APPLICABILITY: MODES 1, 2, and 3.	
	CRS	REMEDIAL ACTIONS	
		The SRO should ensure that security is notified 10 minutes prior to declaring the SSS inoperable. Immediately upon discovery of the SSS inoperability, Security must be notified to implement compensatory measures within 10 minutes of discovery.	**Examiner NOTE:** The CRS may have handed this notification off to another individual during the performance of AP10. If so, the CRS must identify in follow-up questioning, that this notification was required.

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	34 of 73
Event Description:	Steam Generator Tube Leak						

Time	Pos.	Expected Actions/Behavior	Comments
CONDITION		REQUIRED ACTION	COMPLETION TIME
C. Total Unidentified LEAKAGE, Identified LEAKAGE, and reactor coolant pump seal leakoff > 20 gpm. OR Total reactor coolant pump seal leakoff > 16.3 gpm. OR Any reactor coolant pump No. 1 seal leakoff > 4.0 gpm.		C.1 Declare the Standby Makeup Pump inoperable. AND C.2 Enter Condition A.	Immediately
NOTE: Not applicable to the SSS Diesel Generator or 24 V Battery Bank and Charger. A. One or more required SSS components identified in Table 16.9.7-1 non-functional.		A.1 Verify the FUNCTIONALITY of fire detection and suppression systems in the associated areas identified in Table16.9.7-1. AND A.2 Restore the component to FUNCTIONAL status.	1 Hour 7 days
			NOTE: The CRS will determine that Condition C is required and that ACTION C.1 and C.2, as well as A.1 and A.2, must be taken. **NOTE:** Technical Specifications defines IDENTIFIED LEAKAGE as including SG tube leakage.
AP/1/A/5500/04, RAPID DOWNPOWER			
	RO/ BOP	(Step 1) Monitor Foldout page.	
		Uncontrolled Cooldown (If Tavg < 551°F and lowering…..Not Expected)	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	35 of 73
Event Description:		**Steam Generator Tube Leak**					

Time	Pos.	Expected Actions/Behavior	Comments
		Power Factor (Adjust power factor during load reduction to maintain power factor between 0.9 to 1.0 lagging, using "VOLTAGE ADJUST" pushbutton)	**NOTE:** The RO will adjust MVARS as needed.
		Manual Rx Power Control (< C-5, Not Expected)	
		Turbine Shutdown (Turbine Load < 15 MWe Not Expected)	
	CRS	(Step 2) Announce occurrence on page.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that AP-4 has been entered. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 3) Check turbine control – IN AUTO.	**NOTE:** Turbine Control has failed to MANUAL, and the RO will need to adjust Turbine load in MANUAL.
	CRS	(Step 3 RNO) Perform the following:	
		• IF auto turbine control not available, THEN GO TO Step 5.	
	CRS	(Step 5) Check shutdown to Mode 3 – DESIRED.	**NOTE:** The CRS will determine that TS LCO 3.4.13 requires a plant shutdown.

NOTE

- Shutdown via reactor trip from 15% power may be desired if Mode 3 is time critical. This method requires two CA pumps to be functional since CF pumps will go to rollback speed when reactor trip breakers are opened.
- If time allows, shutdown via manually inserting control rods is the preferred method since a CF pump will remain in service. It may take approximately 45 minutes to reach Mode 3 once turbine load reduction is complete.

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 6) Check if "Shutdown Via Reactor Trip from 15% Power" appropriate:	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	36 of 73
Event Description:	**Steam Generator Tube Leak**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Shutdown Via Reactor Trip from 15% Power – DESIRED.	**NOTE:** It is normal practice to shut down the reactor by driving rods, rather than tripping from 15%.
		• At least two CA pumps - FUNCTIONAL	
	BOP	(Step 7) Enter target load of 180 MWE in turbine control panel	**NOTE:** With the Turbine Control System failed to MANUAL, the crew will NOT be able to perform this step.
NOTE The following table can be used to determine unloading rates. Rates other than specified are acceptable.			
	CRS	(Step 8) Determine the required power reduction rate (MW/min).	**NOTE:** The CRS will reduce load at ≈10-20 MWe/minute.
	BOP	(Step 9) Notify SOC of load reduction (red dispatcher phone).	**Booth Instructor:** as **SOC**, acknowledge.
	RO	(Step 10) Check control rods – IN AUTO.	
	BOP	(Step 11) Borate NC System as follows:	
		• Energize all backup Pzr heaters.	
		• Check unit to be shutdown – VIA REACTOR TRIP FROM 15% POWER.	**NOTE:** It is normal practice to shut down the reactor by driving rods, rather than tripping from 15%.
	CRS	(Step 11.b RNO) GO TO Step 11.d.	
	BOP	(Step 11.d) Determine boration amount based on the following:	
		• Power Reduction Rate (MW/min)	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	37 of 73
Event Description:	**Steam Generator Tube Leak**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Present NC System Boron Concentration (ppm)	
		• Total Power change (%).	**NOTE:** The total power change will be determined by the CRS and will affect the amount of boron inserted by the BOP (Expected 700-900 gallons)
		• Record calculated boration amount:	
	RO	• Check auto or manual rod control – AVAILABLE.	
NOTE If load reduction of greater than 60% is planned and Unit 1 is to remain in Mode 1, the final (1/4) addition of boron may not be required based on rate of Xenon production and control rod response.			
	BOP	• Perform boration in four equal additions during load reduction PER Enclosure 2 (Emergency Boration).	
			NOTE: The CRS may assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Enclosure 2. **Other Examiners** follow **AP-4** Actions, **Step 12**, on **Page 38**.
AP/1/A/5500/04, RAPID DOWNPOWER **ENCLOSURE 2, EMERGENCY BORATION**			
	BOP	(Step 1) Check OAC ‑ AVAILABLE.	
	BOP	(Step 2) Use OAC point M1P0785 to monitor boric acid gallons added while 1NV‑265B (U1 NV Pump Boric Acid Sup Isol) is open.	
	BOP	(Step 3) GO TO Step 5.	

Op Test No.:	N18-1	Scenario #	1	Event #	3
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Event Description:	**Steam Generator Tube Leak**				

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 5) Check boric acid transfer pump - RUNNING.	**NOTE:** The 1B Boric Acid Transfer Pump is running.
	BOP	(Step 6) OPEN 1NV-265B (U1 NV Pump Boric Acid Sup Isol).	
	BOP	(Step 7) Do not continue until desired amount of boric acid has been added.	
	BOP	(Step 8) CLOSE 1NV-265B (U1 NV Pump Boric Acid Sup Isol).	
	BOP	(Step 9) IF boric acid transfer pump was started in Step 5 RNO, THEN …..	**NOTE:** The 1B Boric Acid Transfer Pump is running.
	BOP	(Step 10) Repeat enclosure as required.	
			Examiner NOTE: When the crew recognizes that the rods have failed to move in AUTO, move to Event 4.
AP/1/A/5500/04, RAPID DOWNPOWER			
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.
	RO	(Step 12) WHEN boration commenced, THEN initiate turbine load reduction to desired load at desired rate.	**NOTE:** Due to a previous failure, the RO will lower Turbine Load in MANUAL.
			Examiner NOTE: The RO should lower Turbine Load 20-40 MWe before moving to Event 4. Once Turbine load has been lowered in MANUAL, and an AUTO Rod signal is present, MOVE to Event 4.
	RO	(Step 13) Display Rod Insertion Limits on OAC by entering turn on code "RIL".	

Op Test No.:	N18-1	Scenario #	1	Event #	3
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Event Description:	**Steam Generator Tube Leak**				

Time	Pos.	Expected Actions/Behavior	Comments
		NOTE Control Rods may approach rod insertion limits during load reduction.	
	RO	(Step 14) IF AT ANY TIME "CONTROL ROD BANK LO LO LIMIT" alarm (1AD-2, B-9) is lit THEN comply with Tech Spec 3.1.6 (Control Bank Insertion Limits):	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		NOTE Unloading rates greater than 55 MW/min will meet C-7A interlock.	
	RO	(Step 15) IF AT ANY TIME during procedure C-7A is received, THEN insure Transient Monitor freeze is triggered.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	(Step 16) REFER TO the following:	
		• RP/0/A/5700/000 (Classification of Emergency)	
		• RP/0/A/5700/010 (NRC Immediate Notification Requirements).	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
	CRS	(Step 17) Notify Reactor Engineer on duty of load reduction.	**NOTE:** The CRS may call WCC/RE to address the switch position. If so, **Booth Instructor** acknowledge as WCC/RE as appropriate.
	RO	(Step 18) Check target load - LESS THAN 1000 MW.	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	40 of 73
Event Description:		**Steam Generator Tube Leak**					

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 19) Check Unit 2 available to supply aux steam as follows:	**NOTE:** The CRS will ask U2 RO. **Floor Instructor:** As U2 RO report "All these conditions are met."
		• Unit 2 Reactor power - GREATER THAN 15%	
		• Unit 2 2AS-12 (U2 SM to AS Hdr Control Inlet Isol) - OPEN	
		• Unit 2 - AVAILABLE TO SUPPLY AS HEADER.	
	RO	(Step 20) Check SM flow on all S/Gs – GREATER THAN 25%.	
	RO	(Step 21) WHEN all SM flows are less than 75%, THEN ensure the following valves ramp CLOSED:	**NOTE:** This is a conditional step. The CRS will make the RO aware of this action, if NOT already done.
		• 1CF-104AB (1A S/G CF Control Bypass)	
		• 1CF-105AB (1B S/G CF Control Bypass)	
		• 1CF-106AB (1C S/G CF Control Bypass)	
		• 1CF-107AB (1D S/G CF Control Bypass)	
	CRS	(Step 22) WHEN reactor power is less than 60%, THEN dispatch operator to stop G Heater Drain Tank pumps one at a time PER OP/1/B/6250/004 (Feedwater Heater Vents, Drains and Bleed System), Enclosure 4.2 (System Shutdown).	
	RO	(Step 23) Check the following:	**NOTE:** It is most likely that the power level is above 55%.
		• P/R meters indicate reactor power - LESS THAN 55%	
		• All CF flows - LESS THAN 55%	

Op Test No.:	N18-1	Scenario #	1	Event #	3	Page	41 of 73
Event Description:	**Steam Generator Tube Leak**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Turbine inlet pressure - LESS THAN 500 PSIG.	
	CRS	(Step 23 RNO) IF target load is less than 55%, THEN perform the following:	
		• Do not continue with this procedure until:	
		• P/R instruments indicate reactor power is less than 55%	
		• All CF flows are less than 55%	
		• Turbine inlet pressure is less than 500 PSIG.	
		• WHEN all parameters above are met, THEN GO TO Step 24.	
After the RO has lowered Turbine Load by 20-40MWe in MANUAL, AND an AUTO Rod motion signal exists, at the discretion of the Lead Examiner, move to Event #4.			

Op Test No.:	N18-1	Scenario #	1	Event #	4	Page	42 of 73
Event Description:		**Control Rods fail to MOVE in AUTO**					

During the downpower, the Control Rods fail to move in AUTO. The operator will enter AP/1/A/5500/14, "Rod Control Malfunction," and take manual control of the rods.
Booth Operator Instructions: **While Control Rods are moving in AUTO insert MAL-IRE009 = FAIL_OF_AUTO**
Indications Available: • Auto rod motion prematurely stops • White "RODS IN" Rod Control Status light is LIT • OAC Alarm M1P1367, U1 TAVG-Tref HI 1.5°F

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/14, ROD CONTROL MALFUNCTION	
	RO	(Step 1) IF two or more rods are either dropped OR misaligned by greater than 24 steps, THEN……	**Immediate Action** **NOTE:** No control rods dropped or misaligned during this event.
	RO	(Step 2) Place control rods in manual.	**Immediate Action** **NOTE:** The RO placed the rods in manual during the downpower when the malfunction occurred.
	RO	(Step 3) Check rod movement – STOPPED.	**Immediate Action**
	RO	(Step 4) Check all rods – ALIGNED WITH ASSOCIATED BANK.	
	RO	(Step 5) Check "ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) – DARK.	
	RO	(Step 6) Check "T-AVG/T-REF FAILURE ROD STOP" alarm (1AD-2, B-7) – DARK.	

Op Test No.:	N18-1	Scenario #	1	Event #	4	Page	43 of	73
Event Description:	**Control Rods fail to MOVE in AUTO**							

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 7) IF this AP entered due to unwarranted rod insertion or withdrawal, THEN….	**NOTE:** The CRS entered AP14 because the Rods were NOT moving when required.
	CRS	(Step 8) IF this AP entered due to a failure of rods to withdraw or insert when required, THEN GO TO Enclosure 2 (Failure Of Rods To Move On Demand).	
			NOTE: The CRS will transition to AP-14, Enclosure 2.
AP/1/A/5500/14, ROD CONTROL MALFUNCTION ENCLOSURE 2, FAILURE OF RODS TO MOVE ON DEMAND			
	CRS	(Step 1) Announce occurrence on paging system.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 2) Maintain T-Avg within 1°F of T-Ref using any of the following methods:	**NOTE:** The RO will adjust Turbine Load to maintain Temperature and/or perform additional Alternate Dilutions.
		• Borate/dilute NC System	
		OR	
		• Adjust Turbine load.	
	CRS	(Step 3) Notify IAE to investigate problem.	**NOTE:** The CRS may call WCC/IAE to address the Rod Control malfunction. If so, **Booth Instructor** acknowledge as WCC.
	RO	(Step 4) Check if rod control system failure has occurred as follows:	
		• 'ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) – LIT.	**NOTE:** The Urgent Failure light is DARK.

Op Test No.:	N18-1	Scenario #	1	Event #	4	Page	44 of 73
Event Description:	**Control Rods fail to MOVE in AUTO**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4 RNO) Perform the following:	
NOTE There is minimal risk of positioning control rods in manual when "ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) is dark.			
		• If Manual Rod Control available, THEN rods can be used to maintain T-avg within 1°F of T-Ref.	**Booth Instructor:** as **IAE**, report that the use of Manual Rod Control ONLY is permitted.
		• IF AT ANY TIME control rods do not move correctly in manual, THEN GO TO Step 5.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	• GO TO Step 8.	
	CRS	(Step 8) Check if reactor control system failure has occurred as follows:	
		• "T-AVG/T-REF FAILURE ROD STOP" alarm (1AD-2, B-7) – LIT.	
	CRS	(Step 8.a RNO) GO TO Step 9.	
	CRS	(Step 9) WHEN rod control problem is repaired, OR Engineering determines that rod control malfunction will not affect auto rod motion, THEN ……	
At the discretion of the Lead Examiner, move to Events #5-7.			

Op Test No.: N18-1 Scenario # 1 Event # 5, 6 & 7	Page 45 of 73
Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

After this, a Loss of Off-Site Power will occur, along with an inadvertent Feedwater Isolation Signal. Simultaneously, the 1B EDG will trip on overspeed. The 1A EDG will fail to start both automatically and manually and a station blackout will exist. The operator will enter EP/1/A/5000/E-0, "Reactor Trip or Safety Injection," and then EP/1/A/5000/ECA-0.0, "Loss of All AC Power;" or enter ECA-0.0 directly. Simultaneously, the TDCA Pump will start but trip on overspeed. The operator will start the 1A EDG by manually actuating Safety Injection, and power will be restored to Bus 1ETA. However, the 1A MDCA Pump will fail to start (All other equipment will sequence as expected); and the operator will need to manually start the pump. This pump will fail to manually start until the crew has addressed the Red Path on the Heat Sink Critical Safety Function. With Bus 1ETA re-energized the operator will return to, or go to, EP/1/A/5000/E-0, "Reactor Trip or Safety Injection." However, shortly after entry and progression through E-0, a Red Path will develop on the Heat Sink Critical Safety Function Status Tree. The operator will implement EP/1/A/5000/FR-H.1, "Response to Loss of Secondary Heat Sink," and direct evaluation of the 1A MDCA Pump failure and replacement of the breaker. Ultimately, the operator will manually start the 1A MDCA Pump and restore the Secondary Heat Sink. The scenario will terminate at step 7.e of FR-H.1 after Secondary Heat Sink has been restored.

Booth Operator Instructions: **Insert MAL-ISE007A, MAL-ISE007B, MAL-EP002A, MAL-EP002B, MAL-DG004B and MAL-DG001A**

Indications Available:

- Main Control Room lights DIM
- 1SI-14 Status Light for ETB LOSS/UNDERVOLTAGE PHASE X is LIT
- 1SI-14 Status Light for ETB LOSS/UNDERVOLTAGE PHASE Y is LIT
- 1SI-14 Status Light for ETB LOSS/UNDERVOLTAGE PHASE Z is LIT
- 1A EDG not running
- 1B EDG not running
- Both Trains of DRPI DARK

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: The CRS may enter ECA-0.0 directly. If so, proceed to **Page 47.**
		EP/1/A/5000/E-0, REACTOR TRIP OR SAFETY INJECTION	
	RO/ BOP	(Step 1) Monitor Foldout page.	**NOTE:** Crew will carry out Immediate Actions of E-0, prior to the CRS addressing the EP.
		NC Pump Trip Criteria (Not expected)	

Op Test No.:	N18-1	Scenario #	1	Event #	5, 6 & 7	Page	46	of	73

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
		CA Suction Sources (CA storage tank (water tower) goes below 1.5 ft – Not expected)	
		Position Criteria for 1NV-150B and 1NV-151A (U1 NV Pump Recirc Isol)	**NOTE:** The BOP will monitor these conditions.
		• IF NV S/I flowpath aligned AND NC pressure is less than 1500 PSIG, THEN CLOSE 1NV-150B and 1NV-151A.	
		• IF NC pressure is greater than 2000 PSIG, THEN OPEN 1NV-150B and 1NV-151A.	
		Ruptured S/G Aux Feedwater Isolation Criteria (Not Expected)	
		Faulted S/G Aux Feedwater Isolation Criteria (Not Expected)	
	RO	(Step 2) Check Reactor Trip:	**Immediate Action**
		• All rod bottom lights – LIT	
		• Reactor trip and bypass breakers – OPEN	
		• I/R power – GOING DOWN.	
	RO	(Step 3) Check Turbine Trip:	**Immediate Action**
		• All throttle valves – CLOSED.	
	BOP	(Step 4) Check 1ETA and 1ETB – ENERGIZED.	**Immediate Action**
	BOP	(Step 4 RNO) Perform the following after allowing time for D/G(s) to energize bus(s) and sequencer(s) to apply loads:	
		• IF both busses de-energized, THEN GO TO EP/1/A/5000/ECA-0.0 (Loss of All AC Power).	

Op Test No.: N18-1	Scenario # 1	Event # 5, 6 & 7	Page 47 of 73
Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**		

Time	Pos.	Expected Actions/Behavior	Comments
		EP/1/A/5000/ECA-0.0, LOSS OF ALL AC POWER	
	CRS	(Step 1) CSF Status trees should be monitored for information only. EPs referenced by them should not be implemented.	**NOTE:** The crew will carry out Immediate Actions of ECA-0.0, prior to the CRS addressing the EP.
	RO	(Step 2) Check Reactor Trip:	**IMMEDIATE ACTION**
		• All rod bottom lights – LIT	**NOTE:** DRPI is NOT available on the LOOP.
		• Reactor trip and bypass breakers – OPEN	
		• I/R power – GOING DOWN.	
	RO	(Step 2 RNO) Trip reactor.	**IMMEDIATE ACTION** **NOTE:** other indications are used to determine that the reactor has tripped.
	RO	(Step 3) Check Turbine Trip:	**IMMEDIATE ACTION**
		• All throttle valves – CLOSED.	
	CRS	(Step 4) Establish NC pump seal injection from the SSF as follows:	
	CRS	• Immediately dispatch operator to SSF to perform the following:	**NOTE:** The CRS will dispatch an AO to complete Enclosure 2. **Floor/Booth Instructor** acknowledge as appropriate, however, do not take actions (It is expected that these directions will be subsequently stopped).

Op Test No.:	N18-1	Scenario #	1	Event #	5, 6 & 7	Page	48 of 73
Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Obtain Brown Folder at SSF and complete Enclosure 2 (Unit 1 SSF - ECA-0.0 Actions).	
NOTE The fastest pathway to 1ETA room is to emergency egress into the aux bldg from the Unit 1 MG set room.			
	CRS	• Dispatch operator to 1ETA room as follows:	
		• Check if operator will enter aux bldg – FROM MG SET ROOM.	
	CRS	(Step 4.b.1 RNO) Perform the following:	
		• Dispatch operator to obtain Brown Folder at 1EMXA4 (north wall of 1ETA room) and complete Enclosure 3 (Unit 1 ETA And ETB Rooms - ECA-0.0 Actions).	**NOTE:** The CRS will dispatch an AO to complete Enclosure 3. **Floor/Booth Instructor** acknowledge as appropriate, however, do not take actions (It is expected that these directions will be subsequently stopped).
		• GO TO Step 4.c.	
	CRS	• Use any of the following to notify security to immediately dispatch officer with key to SSF to ensure operator can access SSF:	**NOTE:** The CRS will dispatch a Security Officer to the SSF. **Booth Instructor:** Acknowledge as Security.
		• Security ringdown phone (located on Unit 2 SRO desk)	
		• 1941 (same line as ringdown phone)	
		• 4900.	**Floor Instructor:** If asked, U2 does NOT have normal power, and both DGs are running.

Op Test No.:	N18-1	Scenario #	1	Event #	5, 6 & 7	Page	49	of	73

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 5) Monitor Foldout Page.	
		Alternate Low Pressure Feedwater (applies after Step 8 in body of the procedure):	
		Loss of Vital Instrumentation or Control Power:	
		Low Decay Heat Temperature Control:	
		CA Suction Sources (applies after Step 11 in body of the procedure):	
	BOP	(Step 6) Check NC System – ISOLATED:	
		• Check the following letdown orifice isolation valves – CLOSED.	
		• 1NV-458A (U1 75 GPM L/D Orifice Outlet Cont Isol).	
		• 1NV-457A (U1 45 GPM L/D Orifice Outlet Cont Isol).	
		• 1NV-35A (U1 Variable L/D Orifice Outlet Cont Isol).	
		• CLOSE the following valves:	
		• 1NV-1A (U1 NC L/D Isol To Regenerative Hx)	
		• 1NV-2A (U1 NC L/D Isol To Regenerative Hx).	
		• Check Pzr PORVs – CLOSED.	
		• Check the following excess letdown isolation valves – CLOSED:	
		• 1NV-24B (1C NC Loop To Excess L/D Hx Isol)	
		• 1NV-25B (1C NC Loop To Excess L/D Hx Isol).	
		• Check 1NV-121 (U1 ND Letdown Control) – CLOSED.	

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 7) Check total CA flow – GREATER THAN 450 GPM.	
	RO	(Step 7 RNO) Perform the following:	
		• Ensure TD CA pump on.	**NOTE:** The TDCA Pump is NOT running.
		• IF flow is less than 450 GPM due to operator action to control CA flow, THEN…	**NOTE:** CA flow is NOT <450 gpm due to operator action.
		• Ensure all TD CA pump flow control valves are fully OPEN.	
		• IF "TD CA PUMP STOP VLV NOT OPEN" alarm (1AD-5, F-3) is lit, THEN dispatch operator to reset stop valve PER EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 24 (Resetting TD CA Stop Valve).	**NOTE:** The CRS will dispatch an AO. **Floor Instructor:** Acknowledge as AO. **Booth Instructor:** Wait **five minutes** and **report back** that the **TDCA Turbine has overspeed and will NOT reset**.
		• IF CA flow is less than 450 GPM AND reason not known, THEN…..	**NOTE:** CA flow is <450 gpm because there are no CA Pumps operating.
	BOP	(Step 8) Try to restore power to 1ETA or 1ETB as follows:	
		• Check both D/Gs – RUNNING.	**NOTE:** Neither D/G is running.
	BOP	(Step 8.a RNO) Perform the following:	
		• Initiate S/I	**NOTE:** Upon actuation of SI the A EDG will start.
		• Notify Unit 2 to immediately ensure flow path for 2B RN pump PER Enclosure 5 (Unit 2 Actions).	**NOTE:** The CRS will notify U2. **Floor Instructor:** Acknowledge as U2 RO.

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	• IF at least one D/G starts, THEN GO TO Step 8.b.	
	BOP	• (Step 8.b). Check D/G sequencer for all running D/G(s) - AUTOMATICALLY LOADING BUS.	**NOTE:** The 1A Sequencer will be applying loads automatically, however, the 1A MDCA Pump will fail to start.
			NOTE: The CRS may dispatch an AO to the 1A MDCA Pump and/or breaker. **If so, Floor/Booth Instructor:** Acknowledge as AO. After **Two Minutes** report: • **Pump off for no apparent reason.** • **Pump Breaker Charging Motor is continuously running and the Charging Springs are NOT indicating charged.** **NOTE:** The CRS may call WCC/IAE to address the failed Pump. If so, **Booth Instructor** acknowledge as WCC/IAE.
		• Notify dispatched operators at 1EMXA-4 and SSF to stop where they are at.	**NOTE:** The CRS will contact both previously dispatched AOs. **Booth Instructor:** Acknowledge as AOs.
		• Check status of the following local actions:	

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Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**							

Time	Pos.	Expected Actions/Behavior	Comments
<u>Critical Task:</u> **Energize at least one AC Emergency Bus within 15 minutes of the Total Loss of AC Power.** Safety Significance: Failure to energize an AC Emergency Bus when able to do so constitutes "mis-operation" or incorrect performance which leads to degraded emergency power capacity. Failure to perform the Critical Task may result in a needless challenge and/or degradation of a fission product barrier at the point of the RCP Seals, and will result in the inability to add inventory through the ECCS during a subsequent small break LOCA. 15 minutes is chosen as the Measurable Performance Standard because if the operator fails to start the Emergency Diesel Generator (EDG), when able to do so within 15 minutes, the required Emergency Classification will be a Site Area Emergency when it would have been limited to an Alert if the operator had started the EDG within 15 minutes.			
		• SSF D/G - OFF	**NOTE:** The CRS will contact the previously dispatched AO. **Booth Instructor:** Acknowledge as **AO**, and report that **SSF D/G is OFF**.
		• 1 EMXA-4 normal incoming breaker – CLOSED.	**NOTE:** The CRS will contact the previously dispatched AO. **Booth Instructor:** Acknowledge as **AO**, and report that **Normal Incoming Breaker is CLOSED**.
		• Notify dispatched operators that actions at SSF and 1EMXA-4 are not required.	
	CRS	• Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	
	CRS	• RETURN TO procedure and step in effect.	
			NOTE: The CRS will transition to E-0.
EP/1/A/5000/E-0, REACTOR TRIP OR SAFETY INJECTION			

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: It is expected that during the performance of E-0, a **Red Path Condition** will develop on the Heat Sink Critical Safety Function. When this occurs, follow the actions of **Step 1 of FR-H.1** on **Page 61.**
	RO/ BOP	(Step 1) Monitor Foldout page.	**NOTE:** Crew will carry out Immediate Actions of E-0, prior to the CRS addressing the EP.
		NC Pump Trip Criteria (Not expected)	
		CA Suction Sources (CA storage tank (water tower) goes below 1.5 ft – Not expected)	
		Position Criteria for 1NV-150B and 1NV-151A (U1 NV Pump Recird Isol)	**NOTE:** The BOP will monitor these conditions.
		• IF NV S/I flowpath aligned AND NC pressure is less than 1500 PSIG, THEN CLOSE 1NV-150B and 1NV-151A.	
		• IF NC pressure is greater than 2000 PSIG, THEN OPEN 1NV-150B and 1NV-151A.	
		Ruptured S/G Aux Feedwater Isolation Criteria (Not Expected)	
		Faulted S/G Aux Feedwater Isolation Criteria (Not Expected)	
	RO	(Step 2) Check Reactor Trip:	**Immediate Action**
		• All rod bottom lights – LIT	
		• Reactor trip and bypass breakers – OPEN	
		• I/R power – GOING DOWN.	
	RO	(Step 3) Check Turbine Trip:	**Immediate Action**
		• All throttle valves – CLOSED.	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 4) Check 1ETA and 1ETB – ENERGIZED.	**Immediate Action**
	BOP	(Step 4 RNO) Perform the following:	
		• IF both busses de-energized, THEN…..	
		• WHEN time allows, THEN try to restore power to de-energized bus PER AP/1/A/5500/07 (Loss of Electrical Power) while continuing with this procedure.	**NOTE:** 1ETB is de-energized and the crew will address AP-07 as able.
	RO/ BOP	(Step 5) Check if S/I is actuated:	**Immediate Action** **NOTE:** SI was manually actuated to start the 1A EDG.
		• "SAFETY INJECTION ACTUATED" status light (1SI-18) – LIT.	
		• Both LOCA Sequencer Actuated status lights (1SI-14) – LIT.	
	CRS	(Step 6) Announce "Unit 1 Safety Injection".	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that a U1 Safety Injection has occurred. If so, **Floor Instructor** acknowledge as U2 RO.
	BOP	(Step 7) Check all Feed Water Isolation status lights (1SI-4) – LIT.	
	BOP	(Step 8) Check Phase A "RESET" lights – DARK.	
	BOP	(Step 9) Check ESF Monitor Light Panel on Energized train(s):	
		• Groups 1, 2, 5 – DARK.	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
		• Group 3 – LIT.	
		• Group 4 – LIT AS REQUIRED.	
		• Group 6 – LIT.	
	CRS	• GO TO Step 10.	
	RO/ BOP	(Step 10) Check proper CA pump status:	
		• MD CA pumps – ON.	**NOTE:** The 1B MDCA is OOS, and the 1A MDCA Pump is NOT running.
			NOTE: The CRS may dispatch an AO to the 1A MDCA Pump and/or breaker. **If so, Floor/Booth Instructor:** Acknowledge as AO. After **Two Minutes** report: • **Pump off for no apparent reason.** • **Pump Breaker Charging Motor is continuously running and the Charging Springs are NOT indicating charged.** **NOTE:** The CRS may call WCC/IAE to address the failed Pump. If so, **Booth Instructor** acknowledge as WCC/IAE.
	RO/ BOP	(Step 10.a RNO) Start pumps.	**NOTE:** The RO/BOP will attempt to start the pump, however, it will not start. **NOTE:** The CRS may call WCC/IAE to address the failed pump. If so, **Booth Instructor** acknowledge as WCC.

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	• (Step 10.b) N/R level in at least 3 S/Gs – GREATER THAN 17%.	
	BOP	(Step 11) Check all KC pumps – ON.	
	BOP	(Step 11.a RNO) Perform the following:	
		Start pumps.	**NOTE:** The Train B KC Pumps do NOT have power.
		IF all KC pumps running, THEN….	
		IF any NC pump KC low flow annunciator lit on 1AD-6, THEN….	
	BOP	(Step 12) Check both RN pumps – ON.	**NOTE:** The Train B RN Pump does NOT have power.
	BOP	(Step 12.a RNO) IF any RN pump off, THEN perform the following:	
		IF 1A RN pump is off, THEN …..	**NOTE:** The 1A RN Pump is running.
		IF affected train is deenergized, AND its D/G is off, THEN GO TO Step 13.	**NOTE:** 1ETB is de-energized and the 1B EDG is OFF.
	CRS	(Step 13) Notify Unit 2 to perform the following:	**Floor Instructor:** As U2 RO report "2A RN Pump is running."
		• Start 2A RN pump.	
		• THROTTLE Unit 2 RN flow to minimum for existing plant condition.	**Booth Instructor:** **insert LOA-RN087 (Start 2A RN Pump)** **insert LOA-RN083 8050.000000 delay=0 ramp=10 (Unit 2 Train A Demand Flow)**
	RO	(Step 14) Check all S/G pressures – GREATER THAN 775 PSIG.	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 15) Check Containment Pressure – HAS REMAINED LESS THAN 3 PSIG.	**NOTE:** Containment Pressure is normal.
	BOP	(Step 16) Check S/I flow:	
		• Check "NV PMPS TO COLD LEG FLOW" gauge – INDICATING FLOW.	
		• Check NC pressure – LESS THAN 1600 PSIG.	
	BOP	(Step 16b RNO) Perform the following:	
		• Ensure ND pump miniflow valve on running pump(s) OPEN:	
		• 1ND-68A (1A ND Pump & Hx Mini Flow Isol)	
	CRS	• IF valve(s) open on all running ND pumps, THEN GO TO Step 17.	
	CRS	(Step 17) Notify OSM or other SRO to perform EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 22 (OSM Actions Following an S/I) within 10 minutes.	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
	RO/ BOP	(Step 18) Check CA flow:	
		• Total CA flow – GREATER THAN 450 GPM.	**NOTE:** There is no CA flow.

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Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**							

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may dispatch an AO to the 1A MDCA Pump and/or breaker. **If so, Floor/Booth Instructor:** Acknowledge as AO. After **Two Minutes** report: • **Pump off for no apparent reason.** • **Pump Breaker Charging Motor is continuously running and the Charging Springs are NOT indicating charged.** **NOTE:** The CRS may call WCC/IAE (Maintenance) to address the failed Pump. If so, **Booth Instructor** acknowledge as WCC/IAE.
	RO/ BOP	(Step 18.a RNO) Perform the following:	
		• IF N/R level in all S/Gs is less than 11% (32% ACC), THEN…..	
		• IF N/R level in all S/Gs is less than 11% (32% ACC) AND feed flow greater than 450 GPM cannot be established, THEN…..	
	BOP	• (Step 18.b) Check VI header pressure – GREATER THAN 60 PSIG.	
	RO/ BOP	• WHEN each S/G N/R level is greater than 11% (32% ACC), THEN control CA flow to maintain that S/G N/R level between 11% (32% ACC) and 50%.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	RO	(Step 19) Check NC temperatures:	
		• IF all NC pumps off, THEN check NC T-Colds - STABLE OR TRENDING TO 557°F.	**NOTE:** All NCPs are OFF.

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Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**						

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is most likely that the cooldown will be under control. If NOT, the CRS will assign the RO (BOP) to perform Enclosure 3 (Not Scripted), and continue the performance of E-0 with the BOP (RO).
	BOP (RO)	(Step 20) Check Pzr PORV and spray valves:	
		• All Pzr PORVs – CLOSED.	
		• Normal Pzr spray valves – CLOSED.	**NOTE:** It is most likely that the Normal Pzr spray valves are OPEN.
	BOP (RO)	(Step 20.b RNO) IF Pzr pressure is less than 2100 PSIG, THEN…….	**NOTE:** It is most likely that the Pzr Pressure is greater than 2100 psig.
	BOP (RO)	• (Step 20.c) At least one Pzr PORV isolation valve-OPEN.	
	BOP (RO)	(Step 21) Check NC subcooling based on core exit T/Cs – GREATER THAN 0°F.	
	BOP (RO)	(Step 22) Check if main steamlines intact:	
		• All S/G pressures – STABLE OR GOING UP	
		• All S/Gs – PRESSURIZED.	
	BOP (RO)	(Step 23) Check if S/G tubes intact:	**NOTE:** A 30 gpm SGTL is occurring in the 1A SG.
		• The following secondary EMFs – NORMAL:	
		• 1EMF-33 (Condenser Air Ejector Exhaust)	

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Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 1EMF-34(L) (S/G Sample (Lo Range))	**NOTE:** 1EMF-34 is in TRIP 2.
		• 1EMF-24 (S/G A)	**NOTE:** 1EMF-24 is in TRIP 2.
		• 1EMF-25 (S/G B)	
		• 1EMF-26 (S/G C)	
		• 1EMF-27 (S/G D).	
		• S/G levels – STABLE OR GOING UP IN A CONTROLLED MANNER.	
	CRS	(Step 23 RNO) IF S/G levels going up in an uncontrolled manner OR any EMF abnormal, THEN perform the following:	**NOTE:** A 30 gpm SGTL is occurring in the 1A SG.
		• Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	
		• GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).	
			Examiner NOTE: The CRS may transition to E-3. However, it is expected that a Red Path Condition will exist on the Heat Sink Critical Safety Function, shortly. When this occurs, continue below.
EP/1/A/5000/FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK			

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may dispatch an AO to the 1A MDCA Pump and/or breaker. **If so, Floor/Booth Instructor:** Acknowledge as AO. After **Two Minutes** report: • **Pump off for no apparent reason.** • **Pump Breaker Charging Motor is continuously running and the Charging Springs are NOT indicating charged.** **NOTE:** The CRS may call WCC/IAE (Maintenance) to address the failed Pump. If so, **Booth Instructor** acknowledge as WCC/IAE.
	CRS	(Step 1) IF total feed flow is less than 450 GPM due to operator action, THEN…	**NOTE:** This condition is NOT met, and the crew will remain in FR-H.1.
CAUTION If a non-faulted S/G is available, then feed flow should only be established to non-faulted S/G(s) in subsequent steps.			
	RO/ BOP	(Step 2) Check if secondary heat sink is required:	
		• NC pressure – GREATER THAN ANY NON-FAULTED S/G PRESSURE.	
		• Any NC T-Hot – GREATER THAN 350°F (347°F ACC).	**NOTE:** A Secondary Heat Sink is required.
	RO/ BOP	(Step 3) Monitor Foldout Page.	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
		NC System Feed and Bleed Criteria (Applies after Step 2 in the body of the procedure) (3 S/Gs goes below 24% (36% ACC) – Not expected)	
		Cold Leg Recirc Switchover Criteria (FWST level reaches 95 inches – Not expected)	
		CA Suction Sources (CA storage tank (water tower) goes below 1.5 ft – Not expected)	
	BOP	(Step 4) Check at least one of the following NV pumps – AVAILABLE:	
		• 1A NV pump	
		OR	
		• 1B NV pump.	
	RO	(Step 5) Check if NC System feed and bleed should be initiated:	
		• Check W/R level in at least 3 S/Gs – LESS THAN 24% (36% ACC).	
	RO/ BOP	(Step 5.a RNO) Perform the following:	
		• Monitor feed and bleed initiation criteria.	
		• WHEN criteria satisfied, THEN GO TO Step 22.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	• GO TO Step 6.	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6) Ensure S/G BB and NM valves CLOSED PER Enclosure 3 (S/G BB and Sampling Valve Checklist).	**Examiner NOTE:** The CRS may assign the BOP (RO) to perform this action. If so, **BOP (RO) Examiner** follow actions of **Enclosure 3**. **Others** should move ahead to Step 7 on **Page 64** to continue in FR-H.1.
EP/1/A/5000/FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK ENCLOSURE 3, S/G BB AND SAMPLING VALVE CHECKLIST			
	BOP (RO)	(Step 1) Check the following valves – CLOSED.	**Examiner NOTE:** Follow the actions associated with Enclosure 3 if BOP is assigned by CRS to perform.
		• 1BB-1B (1A S/G Blowdown Cont Outside Isol Control) - CLOSED	
		• 1BB-2B (1B S/G Blowdown Cont Outside Isol Control) - CLOSED	
		• 1BB-3B (1C S/G Blowdown Cont Outside Isol Control) - CLOSED	
		• 1BB-4B (1D S/G Blowdown Cont Outside Isol Control) - CLOSED	
		• 1BB-5A (A S/G BB Cont Inside Isol) - CLOSED	
		• 1BB-6A (B S/G BB Cont Inside Isol) - CLOSED	
		• 1BB-7A (C S/G BB Cont Inside Isol) - CLOSED	
		• 1BB-8A (D S/G BB Cont Inside Isol) - CLOSED	
		• 1NM-187A (1A S/G Upper Shell Sample Cont Inside Isol) - CLOSED	
	BOP (RO)	• 1NM-190A (1A S/G Blowdown Sample Cont Inside Isol) - CLOSED	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
		• 1NM-201A (1B S/G Blowdown Sample Hdr Cont Outside Isol) - CLOSED	
		• 1NM-207A (1C S/G Upper Shell Sample Cont Inside Isol) - CLOSED	
		• 1NM-210A (1C S/G Blowdown Sample Cont Inside Isol) - CLOSED	
		• 1NM-221A (1D S/G Blowdown Sample Hdr Cont Outside Isol) - CLOSED	
		• 1NM-191B (1A S/G Blowdown Sample Hdr Cont Outside Isol) - CLOSED	
		• 1NM-197B (1B S/G Upper Shell Sample Cont Inside Isol) - CLOSED	
		• 1NM-200B (1B S/G Blowdown Sample Cont Inside Isol) - CLOSED	
		• 1NM-211B (1C S/G Blowdown Sample Hdr Cont Outside Isol) - CLOSED	
		• 1NM-217B (1D S/G Upper Shell Sample Cont Inside Isol) - CLOSED	
		• 1NM-220B (1D S/G Blowdown Sample Cont Inside Isol) - CLOSED	
EP/1/A/5000/FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK			
	RO (BOP)	(Step 7) Attempt to establish CA flow to at least one S/G as follows:	**Examiner NOTE:** Examiners NOT following BOP (RO) actions in Enclosure 3, continue **HERE**.
		• Check power to both MD CA pumps – AVAILABLE.	**NOTE:** The 1B MDCA Pump is OOS, and the 1A MDCA Pump has failed upon Auto Start.

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may dispatch an AO to the 1A MDCA Pump and/or breaker. **If so, Floor/Booth Instructor:** Acknowledge as AO. After **Two Minutes** report: • **Pump off for no apparent reason.** • **Pump Breaker Charging Motor is continuously running and the Charging Springs are NOT indicating charged.** **NOTE:** The CRS may call WCC/IAE (Maintenance) to address the failed Pump. If so, **Booth Instructor** acknowledge as WCC/IAE.
	RO (BOP)	(Step 7.a RNO) Perform the following:	
		• IF 1ETA OR 1ETB deenergized, THEN restore power to the affected essential bus PER AP/1/A/5500/07 (Loss of Electrical Power).	**NOTE:** 1ETB is de-energized and the crew will address AP-07 as able.
		• IF the essential bus is energized, THEN dispatch operator to determine cause of breaker failure.	**NOTE:** The CRS will dispatch an AO. **Floor/Booth Instructor:** as **AO**, acknowledge.
	RO (BOP)	• Ensure control room CA valves aligned PER Enclosure 4 (CA Valve Alignment).	**Examiner NOTE:** The CRS may assign the RO (BOP) to perform this action. If so, RO (**BOP) Examiner** follow actions of **Enclosure 4**. **Others** should move ahead to Step 7.c on **Page 69** to continue in FR-H.1.

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Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**						

Time	Pos.	Expected Actions/Behavior	Comments
		EP/1/A/5000/FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK ENCLOSURE 4, CA VALVE ALIGNMENT	
			Examiner NOTE: Follow the actions associated with Enclosure 4 if RO (BOP) is assigned by CRS to perform.
	RO (BOP)	(Step 1) Check the following valves - OPEN	
		• 1CA-66AC (U1 TD CA Pump Disch To 1A S/G Isol) - OPEN	
		• 1CA-62A (1A CA Pump Disch To 1A S/G Isol) - OPEN	
		• 1CA-54AC (U1 TD CA Pump Disch To 1B S/G Isol) - OPEN	
		• 1CA-58A (1A CA Pump Disch To 1B S/G Isol) - OPEN	
		• 1CA-50B (U1 TD CA Pump Disch To 1C S/G Isol) - OPEN	
		• 1CA-46B (1B CA Pump Disch To 1C S/G Isol) - OPEN	
		• 1CA-38B (U1 TD CA Pump Disch To 1D S/G Isol) - OPEN	
		• 1CA-42B (1B CA Pump Disch To 1D S/G Isol) - OPEN	
	RO (BOP)	(Step 2) Check the following valves - OPEN	
		• 1CA-64AB (U1 TD CA Pump Disch To 1A S/G Control) – OPEN	
		• 1CA-60A (1A CA Pump Disch To 1A S/G Control) - OPEN	
		• 1CA-52AB (U1 TD CA Pump Disch To 1B S/G Control) - OPEN	
		• 1CA-56A (1A CA Pump Disch To 1B S/G Control) - OPEN	

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Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
		• 1CA-48AB (U1 TD CA Pump Disch To 1C S/G Control) - OPEN	
		• 1CA-44B (1B CA Pump Disch To 1C S/G Control) - OPEN	
		• 1CA-36AB (U1 TD CA Pump Disch To 1D S/G Control) - OPEN	
		• 1CA-40B (1B CA Pump Disch To 1D S/G Control) - OPEN	
	RO (BOP)	(Step 3) Check CA Storage Tank (water tower) level – GREATER THAN 1.5 FT.	
	RO (BOP)	(Step 4) Check the following valves - CLOSED	
		• 1RN-69A (1A RN Assured Supply TO U1 CA Isol) - CLOSED	
		• 1CA-86A (U1 TD CA Pump Suction From 1A RN Isol) - CLOSED	
		• 1CA-15A (1A CA Pump Suction From 1A RN Isol) - CLOSED	
		• 1RN-162B (1B RN Assured Supply To U1 CA Isol) - CLOSED	
		• 1CA-116B (U1 TD CA Pump Suction From 1B RN Isol) - CLOSED	
		• 1CA-18B (1B CA Pump Suction From 1B RN Isol) - CLOSED	
	RO (BOP)	(Step 5) Check the following valves – OPEN:	
		• 1CA-11A (1A CA Pump Suction Isol) - OPEN	
		• 1CA-7AC (U1 TD CA Pump Suction Isol) - OPEN	
		• 1CA-9B (1B CA Pump Suction Isol) - OPEN	

Op Test No.: N18-1 Scenario # 1 Event # 5, 6 & 7	Page 68 of 73
Event Description:	**Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	RO (BOP)	(Step 6) GO TO Step 8.	
	RO (BOP)	(Step 8) Check the following valves - OPEN:	
		• 1CA-2 (U1 CA Pumps Suct From CA Storage Tank Isol)	
		• 1CA-6 (U1 CA Pumps Suct From CACST Isol).	
	RO (BOP)	(Step 9) Check CA pump suction from UST and CA Condensate Storage Tank (service bldg roof tank) valves – CLOSED:	
		• 1CS-18 (U1 UST To CA Pump Suct Hdr Isol) - CLOSED	
		• 1CA-4 (U1 CA Pumps Suct From SUT Isol) - CLOSED	
EP/1/A/5000/FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK			
			Examiner NOTE: Examiners NOT following RO (BOP) actions in Enclosure 4, continue **HERE**.

Op Test No.:	N18-1	Scenario #	1	Event #	5, 6 & 7	Page	69 of 73

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP (RO)	(Step 7.c) Start all available CA pumps.	**NOTE:** The crew may attempt to start the 1A CA Pump. If so, it will NOT start. **NOTE:** If the CRS has not previously dispatched an AO to the 1A MDCA Pump, an AO will be dispatched now. **Floor/Booth Instructor:** as **AO**, acknowledge **Booth Instructor:** If the CRS has **previously called WCC/IAE (Maintenance)** to address the failed pump, after **Two Minutes** report that the **1A MDCA Pump Breaker Charging Motor is continuously running and the Charging Springs are NOT indicating charged**. Report that **a spare breaker can be placed into the 1A MDCA Pump at Bus 1ETA**. If the **CRS agrees**, perform the following: • **Insert LOA-CA009A=1** • **WAIT Four Minutes** • **DEL MAL-CA004A** • **Insert LOA-CA009A=0** **NOTE:** If the CRS has NOT previously called the WCC/IAE (Maintenance) to address the failed pump, the CRS will call. If so, **Booth Instructor** acknowledge as WCC/IAE, wait two minutes and follow the Cue above.

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: The CRS will continue in FR-H.1 while waiting for the actions associated with the 1A MDCA Pump to occur.
	BOP (RO)	(Step 7.d) Check TD CA pump – RUNNING.	**NOTE:** The TDCA Pump is NOT running.
	BOP (RO)	(Step 7.d RNO) Perform the following as necessary:	
		• IF 1SA-48BC (SM From S/G C To TD CA Pump Isol) is closed, THEN…	**NOTE:** 1SA-48BC indicates OPEN.
		• IF 1SA-49AB (SM From S/G B to TD CA Pump Isol) is closed, THEN…	**NOTE:** 1SA-49AB indicates OPEN.
	CRS	• IF "TD CA PUMP STOP VLV NOT OPEN" alarm (1AD-5, F-3) is lit, THEN dispatch operator to reset 1SA-3 (Unit 1 TD CA Pump Turb Stop Valve) PER EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 24 (Resetting TD CA Stop Valve).	**NOTE:** The CRS will dispatch an AO. **Booth Instructor:** Acknowledge as AO. Wait **five minutes** and **report back** that the **TDCA Turbine has overspeed and will NOT reset**.
	CRS	• IF reason for loss of steam supply to TD CA pump not determined,…	**NOTE:** The CRS will determine from the AO report that the TDCA Pump is unavailable.
	RO/ BOP	(Step 7.e) Check total flow to S/G(s) – GREATER THAN 450 GPM.	**Examiner NOTE:** If the 1A MDCA Pump has been started, 450 gpm will exist, and the CRS will continue with **Step 7.f on Page 72**. If NOT, the CRS will continue with the Step 7.e RNO FR-H.1.
	RO/ BOP	(Step 7.e RNO 1) IF only one MD CA pump is on, ……	**NOTE:** No MDCA Pump is running.

Op Test No.:	N18-1	Scenario #	1	Event #	5, 6 & 7	Page	71	of	73

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 7.e RNO 2) IF any CA pump is running,….	**NOTE:** No MDCA Pump is running.
	RO/ BOP	(Step 7.e RNO 3) IF any feed flow to at least one S/G is indicated, THEN…..	**NOTE:** No Feed flow is indicated.
	RO/ BOP	(Step 7.e RNO 4) IF no feed flow indicated, THEN perform the following:	
		• IF no CA pump can be started, THEN dispatch operator and maintenance to CA pumps to try to restore one CA pump to service.	**NOTE:** The CRS will dispatch an AO and Maintenance. **Floor/Booth Instructor:** as **AO/Maintenance**, acknowledge; and perform cue shown on **Page 69**.
		• Dispatch operator to ensure CA valves aligned PER Enclosure 6 (Local CA Valve Alignment).	**NOTE:** The CRS will dispatch an AO. **Floor/Booth Instructor:** as **AO, acknowledge.**
		• IF AT ANY TIME CA pump is restored, THEN RETURN TO Step 7.e.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• GO TO Step 8.	**Examiner NOTE:** The CRS may continue beyond Step 7 (Not Scripted). Actions are in place to restore the 1A MDCA Pump. Wait here until the 1A MDCA Pump is started, and then continue.

Op Test No.:	N18-1	Scenario #	1	Event #	5, 6 & 7	Page	72	of	73

Event Description: **Inadvertent FWIS/Loss of Offsite Power/1B EDG Trips/1A EDG fails to start/TDCA Pump trips on Overspeed/1A MDCA Pump fails to start**

Time	Pos.	Expected Actions/Behavior	Comments
<u>Critical Task:</u> **Restore a Secondary Heat Sink before required to establish NCS Bleed and Feed in FR-H.1 [W/R level in at least 3 S/Gs - LESS THAN 24% (36% ACC)].** Safety Significance: Failure to restore a Secondary Heat Sink with AFW flow, when able to do so under the postulated plant conditions, results in “adverse consequence or a significant degradation in the mitigative capability of the plant.” In this case, the minimum required AFW flow rate can be established by manually starting the 1A MDCA Pump (After Breaker Replacement). Therefore, failure to do so represents a failure by the crew to “demonstrate the following abilities: (1) Effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS) … capacity), (2) Recognize a failure or an incorrect automatic actuation of an ESF system or component, and (3) Take one or more actions that would prevent a challenge to plant safety.”			
	RO/ BOP	(Step 7.f) Check feed and bleed - ESTABLISHED PER STEPS 23 through 27.	**NOTE:** The Bleed and Feed steps have NOT been implemented.
	CRS	(Step 7.f RNO) RETURN TO procedure and step in effect.	
			NOTE: The CRS will transition to E-0.
At the discretion of the Lead Examiner terminate the exam.			

UNIT 1 STATUS:

Power Level: 100% NCS [B] 955 ppm Pzr [B]: 955 ppm Xe: Per OAC

Power History: At this power level for 78 days Core Burnup: 251 EFPDs

UNIT 2 STATUS:

Power Level: 100%

CONTROLLING PROCEDURE:

- OP/1/A/6100/003 (Controlling Procedure for Unit Operation)
- Enclosure 13.2 (1B Fast Start) of PT/1/A/4350/002B (Diesel Generator 1B Operability Test)

OTHER INFORMATION NEEDED TO ASSUME THE SHIFT:

- The B EDG is undergoing post-maintenance testing. Enclosure 13.2 (1B Fast Start) of PT/1/A/4350/002B (Diesel Generator 1B Operability Test) is complete through Step 2.31. The B EDG is running and ready for loading. The Licensed operator performing this surveillance needed to be excused for personal reasons. The BOP must continue with this procedure.
- PT/1/A/4350/025, Essential Auxiliary Power System Power Source Verification, (SR 3.8.1.1) was completed two hours ago.
- The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service:

- The 1B MDCA Pump is OOS due to a Control Power Fuse failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.5 ACTION B.1.
- The 1B EDG is OOS due to Fuel Pump replacement. ACTION has been taken in accordance with Technical Specification LCO 3.8.1 ACTION B.1, B.2, B.3.1 and B.4. Maintenance has been completed on the 1B EDG, and it has been started for retest.
- NVP-5230, NCP 1A #1 Seal Differential Pressure indicator, failed last shift (IAE is investigating).
- MCB Annunciator 1AD-9, C-8, “CONT HI-HI PRESS ALERT,” will not ILLUMINATE (IAE is investigating).

Crew Directions:

- The BOP will continue with Enclosure 13.2, “1B D/G Fast Start” of PT/1/A/4350/002B, “Diesel Generator 1B Operability Test,” and parallel the B EDG with Bus 1ETB, starting with Step 2.32.

Work Control SRO/Offsite Communicator **Jim**

Plant SRO **Joe (FB)**

AO's AVAILABLE

Unit 1		**Unit 2**	
Aux Bldg.	**John**	**Aux Bldg.**	**Chris**
Turb Bldg.	**Bob (FB)**	**Turb Bldg.**	**Mike (FB)**
5th Rounds.	**Carol**		

Extra(s) **Bill (FB)** **Ed (FB)** **Wayne (FB)** **Tanya** **Gus (RW)**

Facility: **McGuire**		Scenario No.: **2**	Op Test No.: **N18-1**
Examiners: ____________		Operators:	____________ (SRO)
____________			____________ (RO)
____________			____________ (BOP)

Initial Conditions:	The plant is at 75% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B NS Pump is OOS due to a Main Breaker failure. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. CAP-5320, CA Condensate Storage Tank Level Indicator, failed last shift (IAE is investigating). MCB Annunciator 1AD-10, B-1, “NCDT HX OUTLET HI FLO,” has failed ILLUMINATED (IAE is investigating). It is planned to raise power on this shift to 100%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N-SRO	Power Increase w/Dilute
2	MAL IRE003A	C-RO C-SRO	Control Rods insert uncontrollably in AUTO
3	MAL DCSSLIM 07D/G	C-BOP C(TS)-SRO	Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)
4	MAL RN007B	C-BOP C(TS)-SRO	1B RN Pump Trip
5	MAL DCSSLIM 21E/G	C-RO C-SRO	SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN
6	MAL CF004D	M-RO M-BOP M-SRO	1D Feedline Break in Containment
7	MAL ISE007A ISE007B	C-BOP C-SRO	FWIS fails to AUTO ACTUATE

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

<u>McGuire 2018 NRC Scenario #2</u>

The plant is at 75% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.

The following equipment is Out-Of-Service: The 1B NS Pump is OOS due to a Main Breaker failure. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. CAP-5320, CA Condensate Storage Tank Level Indicator, failed last shift (IAE is investigating). MCB Annunciator 1AD-10, B-1, “NCDT HX OUTLET HI FLO,” has failed ILLUMINATED (IAE is investigating). It is planned to raise power on this shift to 100%.

Shortly after taking the watch, the operator will commence a load increase to 100% starting with Step 3.36.11 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” The operator will dilute the NC System Boron concentration in accordance with Enclosure 4.3, “Dilute,” of OP/1/A/6150/009, “Boron Concentration Control,” and raise Turbine load in accordance with OP/1/A/6300/001 A, “Turbine-Generator Load Change.” During the load change, an AO will report that the operating-air line to the 1B S/G PORV has been damaged requiring that the instrument air isolation valve be closed. The operator will address Technical Specification LCO 3.7.4, “Steam Generator Power Operated Relief Valves (SG PORVs).”

During the power change, the Control Rods will fail such that they continuously insert in AUTO. The operator will enter AP/1/A/5500/14, “Rod Control Malfunction,” and take manual control of the rods.

Following this, the Pzr Spray Valve Controller, 1NC-29C B Spray, demand will fail to full output. The operator will enter AP/1/A/5500/11, “Pressurizer Pressure Anomalies.” The operator will address Technical Specification LCO 3.4.1, “RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits.”

Subsequently, the 1B RN Pump will trip on overcurrent. The operator will enter AP/1/A/5500/20, “Loss of RN.” The operator will address Technical Specification LCO 3.7.7, “Nuclear Service Water System (NSWS),” Technical Specification LCO 3.8.1, “AC Sources-Operating,” and SLC 16.9.9, “Boration Systems – Flow Path (Operating).”

Next, the 1D SG FCV Controller will fail to MANUAL and the FCV Bypass valve will fail fully open causing SG Level to rise. The operator will respond in accordance with AP/1/A/5500/06, “S/G Feedwater Malfunction,” and control the 1D SG Level manually.

After this, a catastrophic Feedline Break will occur on the 1D Main Feedline inside the Containment. The operator will enter EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” Simultaneously the Feedwater Isolation Signal will fail to automatically actuate. The operator will need to take manual action to isolate the Main Feedwater System to the SGs.

Upon completion of E-0, the operator will transition to EP/1/A/5000/E-2, “Faulted Steam Generator Isolation,” to isolate the flow into and out of the 1D Steam Generator. The operator will then transition to EP/1/A/5000/ES-1.1, “Safety Injection Termination.”

The scenario will terminate at Step 8.a of ES-1.1, after the crew has established charging flow and is attempting to stabilize Pressurizer Level.

<u>Critical Tasks:</u>

Manually close the Failed OPEN Pzr Spray Valve before an automatic Reactor Protection System actuation occurs.

Safety Significance: failure to close the Spray Valve and stop the pressure transient, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the pressure transient. A failure to stabilize the pressure transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect NCS pressure control.

After a failure of the 1D SG FCV Controller in AUTO, manually control and stabilize the 1D SG Narrow Level before an automatic Reactor Protection System actuation occurs.

Safety Significance: failure to manually control and stabilize the SG Narrow Level before a Reactor Protection System actuation occurs, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the SG Narrow Level. A failure to stabilize the SG Narrow Range Level, when able to do so, constitutes a mis-operation or incorrect performance which could lead to incorrect NCS temperature control and an unnecessary challenge to the NCS Heat Sink Critical Safety Function.

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class ILT 18-1

TOPIC: NRC Simulator Exam

Scenario N18-1-2

REFERENCES:

1. Technical Specification LCO 3.6.6, "Containment Spray System" (Amendment 285/264)
2. OP/1/A/6100/003, "Controlling Procedure for Unit Operation" (Rev 201)
3. OP/1/A/6150/009, "Boron Concentration Control" (Rev 134)
4. OP/1/A/6300/001 A, "Turbine-Generator Load Change" (Rev 13)
5. Technical Specification LCO 3.7.4, "Steam Generator Power Operated Relief Valves (SG PORVs)" (Amendment 221/203)
6. AP/1/A/5500/14, "Rod Control Malfunction" (Rev 16)
7. AP/1/A/5500/11, "Pressurizer Pressure Anomalies" (Rev 11)
8. Technical Specification LCO 3.4.1, "RCS Pressure, Temperature and Flow Departure From Nucleate Boiling (DNB) Limits" (Amendment 219/201)
9. MCEI -0400-349, "McGuire Cycle 26 Core Operating Limits Report" (Rev 0)
10. AP/1/A/5500/20, "Loss of RN" (Rev 36)
11. Technical Specification LCO 3.7.7, "Nuclear Service Water System (NSWS)" (Amendment 282/261)
12. Technical Specification LCO 3.8.1, "AC Sources-Operating" (Amendment 221/203)
13. SLC 16.9.9, "Boration Systems – Flow Path (Operating)" (Rev 154)
14. AP/1/A/5500/06, "S/G Feedwater Malfunction" (Rev 20)
15. EP/1/A/5000/E-0, "Reactor Trip or Safety Injection" (Rev 36)
16. EP/1/A/5000/E-2, "Faulted Steam Generator Isolation" (Rev 10)
17. EP/1/A/5000/ES-1.1, "Safety Injection Termination" (Rev 29)

Validation Time: 105 minutes

Author: David Lazarony, Essential Training & Consulting, LLC

Facility Review: ________________________

Rev. 032718

McGuire 2018 NRC Scenario #2 Objectives:

Given the simulator at an initial condition of 75% power with a normal power increase planned evaluate:

1. the SRO's ability to supervise the control room team during the normal, abnormal, and emergency situations that arise, including compliance with all facility procedures, Technical Specifications, and other commitments.

2. each crew member's ability to effectively communicate as part of a control room team during the normal, abnormal, and emergency situations that arise.

3. the RO and BOP's ability to effectively raise power in accordance with Enclosure 4.1, Power Increase, of OP/1/A/6100/003, "Controlling Procedure for Unit Operation."

4. each crew member's ability to effectively diagnose an uncontrolled insertion of the Control Rods when operating in AUTO, and the RO's ability to respond to such an event in accordance with AP/1/A/5500/14, "Rod Control Malfunction."

5. each crew member's ability to effectively diagnose a failure of a Pressurizer Spray Valve controller when operating in AUTO, and the BOP's ability to respond to such an event in accordance with AP/1/A/5500/11, "Pressurizer Pressure Anomalies."

6. each crew member's ability to effectively diagnose a failure of an RN Pump, and the BOP's ability to respond to such an event in accordance with AP/1/A/5500/20, "Loss of RN."

7. each crew member's ability to effectively diagnose a failure of an FCV Controller, and the RO's ability to respond to such an event in accordance with AP/1/A/5500/06, "S/G Feedwater Malfunction."

8. each crew member's ability to effectively diagnose a catastrophic Main Feedwater Line Break inside Containment and the RO and BOP's ability to respond to such an event in accordance with EP/1/A/5000/E-0, "Reactor Trip or Safety Injection," and EP/1/A/5000/E-2, "Faulted Steam Generator Isolation."

9. each crew member's ability to effectively diagnose a failure of the Feedwater Isolation Signal to Auto actuate when called upon to do so and the RO and/or BOP's ability to actuate it when required.

10. each crew member's ability to effectively determine when Safety Injection can be terminated during implementation of the EOP network; and the RO and BOP's ability to effectively terminate Safety Injection in accordance with EP/1/A/5000/ES-1.1, "Safety Injection Termination."

Facility: **McGuire**		Scenario No.: **2**	Op Test No.: **N18-1**
Examiners:	____________	Operators:	____________ (SRO)
	____________		____________ (RO)
	____________		____________ (BOP)

Initial Conditions:	The plant is at 75% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B NS Pump is OOS due to a Main Breaker failure. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. CAP-5320, CA Condensate Storage Tank Level Indicator, failed last shift (IAE is investigating). MCB Annunciator 1AD-10, B-1, "NCDT HX OUTLET HI FLO," has failed ILLUMINATED (IAE is investigating). It is planned to raise power on this shift to 100%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N-SRO	Power Increase w/Dilute
2	MAL IRE003A	C-RO C-SRO	Control Rods insert uncontrollably in AUTO
3	MAL DCSSLIM 07D/G	C-BOP C(TS)-SRO	Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)
4	MAL RN007B	C-BOP C(TS)-SRO	1B RN Pump Trip
5	MAL DCSSLIM 21E/G	C-RO C-SRO	SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN
6	MAL CF004D	M-RO M-BOP M-SRO	1D Feedline Break in Containment
7	MAL ISE007A ISE007B	C-BOP C-SRO	FWIS fails to AUTO ACTUATE

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

McGuire 2018 NRC Scenario #2

The plant is at 75% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.

The following equipment is Out-Of-Service: The 1B NS Pump is OOS due to a Main Breaker failure. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. CAP-5320, CA Condensate Storage Tank Level Indicator, failed last shift (IAE is investigating). MCB Annunciator 1AD-10, B-1, “NCDT HX OUTLET HI FLO,” has failed ILLUMINATED (IAE is investigating). It is planned to raise power on this shift to 100%.

Shortly after taking the watch, the operator will commence a load increase to 100% starting with Step 3.36.11 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” The operator will dilute the NC System Boron concentration in accordance with Enclosure 4.3, “Dilute,” of OP/1/A/6150/009, “Boron Concentration Control,” and raise Turbine load in accordance with OP/1/A/6300/001 A, “Turbine-Generator Load Change.” During the load change, an AO will report that the operating-air line to the 1B S/G PORV has been damaged requiring that the instrument air isolation valve be closed. The operator will address Technical Specification LCO 3.7.4, “Steam Generator Power Operated Relief Valves (SG PORVs).”

During the power change, the Control Rods will fail such that they continuously insert in AUTO. The operator will enter AP/1/A/5500/14, “Rod Control Malfunction,” and take manual control of the rods.

Following this, the Pzr Spray Valve Controller, 1NC-29C B Spray, demand will fail to full output. The operator will enter AP/1/A/5500/11, “Pressurizer Pressure Anomalies.” The operator will address Technical Specification LCO 3.4.1, “RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits.”

Subsequently, the 1B RN Pump will trip on overcurrent. The operator will enter AP/1/A/5500/20, “Loss of RN.” The operator will address Technical Specification LCO 3.7.7, “Nuclear Service Water System (NSWS),” Technical Specification LCO 3.8.1, “AC Sources-Operating,” and SLC 16.9.9, “Boration Systems – Flow Path (Operating).”

Next, the 1D SG FCV Controller will fail to MANUAL and the FCV Bypass valve will fail fully open causing SG Level to rise. The operator will respond in accordance with AP/1/A/5500/06, “S/G Feedwater Malfunction,” and control the 1D SG Level manually.

After this, a catastrophic Feedline Break will occur on the 1D Main Feedline inside the Containment. The operator will enter EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” Simultaneously the Feedwater Isolation Signal will fail to automatically actuate. The operator will need to take manual action to isolate the Main Feedwater System to the SGs.

Upon completion of E-0, the operator will transition to EP/1/A/5000/E-2, “Faulted Steam Generator Isolation,” to isolate the flow into and out of the 1D Steam Generator. The operator will then transition to EP/1/A/5000/ES-1.1, “Safety Injection Termination.”

The scenario will terminate at Step 8.a of ES-1.1, after the crew has established charging flow and is attempting to stabilize Pressurizer Level.

Critical Tasks:

Manually close the Failed OPEN Pzr Spray Valve before an automatic Reactor Protection System actuation occurs.

Safety Significance: failure to close the Spray Valve and stop the pressure transient, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the pressure transient. A failure to stabilize the pressure transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect NCS pressure control.

After a failure of the 1D SG FCV Controller in AUTO, manually control and stabilize the 1D SG Narrow Level before an automatic Reactor Protection System actuation occurs.

Safety Significance: failure to manually control and stabilize the SG Narrow Level before a Reactor Protection System actuation occurs, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the SG Narrow Level. A failure to stabilize the SG Narrow Range Level, when able to do so, constitutes a mis-operation or incorrect performance which could lead to incorrect NCS temperature control and an unnecessary challenge to the NCS Heat Sink Critical Safety Function.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Reset to Temp IC 226** **(Base IC-37)**	**T = 0 Malfunctions:** **Insert LOA-NS006 = 1; (Rackout of the 1B NS Pump Breaker)** **Insert LOA-NS006A = 1; (Rackout of the 1B NS Pump Control Power Breaker)** **insert XMT-CA_0CALT5320 = 0 (CA Condensate Storage Tank Level Indicator Failure)** **insert OVR-1AD10_B01 = ON (1) (MCB Annunciator 1AD10/B1)** **Insert:** • **MAL-ISE007A = 3** • **MAL-ISE007B = 3** **(FWIS fails to Auto Actuate)**
☐		**RUN** **Reset all SLIMs**	**Place Tagout/O-Stick on:** • **1B NS Pump** • **CA_0CALT5320, CA Condensate Storage Tank Level Indicator** • **MCB Annunciator 1AD-10, B-1**
☐		**Update** Status Board, **Setup OAC**	**NOTE:** RMWST DO = >1000 ppb.
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	
☐		**Fill out the AO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Provide the crew with a marked up copy of Enclosure 4.1 (Through Step 3.36.10), a copy of Enclosure 4.3 of OP/1/A/6150/009 marked up through step 3.5, and a blank copy of OP/1/A/6300/001 A. 3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**Execute Simulator Scenario N18-1-2.**	
☐	At direction of examiner	**Event 1**	Power Increase w/Dilute
☐	At direction of examiner (When Control Rods are Moving in AUTO)	**Event 2** **Insert MAL-IRE003A = IN**	Control Rods insert uncontrollably in AUTO **NOTE: If needed (i.e. No current Rod Demand) insert MAL-DCS1213 =TRUE**
☐	At direction of examiner	**Event 3** **Insert MAL-DCSSLIM07G BUTTON_DEPRESSED** **Insert MAL-DCSSLIM07D BUTTON_DEPRESSED** **Delete MAL-DCSSLIM07G = 2, delay 10 seconds** **DeleteMAL-DCSSLIM07D = 2, delay = 30 seconds**	Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)
☐	At direction of examiner	**Event 4** **Insert MAL-RN007B = TRUE**	1B RN Pump Trip

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 5** **Insert MAL-DCSSLIM21G BUTTON_ DEPRESSED** **Delete 1A MAL-DCSSLIM21G = 2 (1 second delayed)** **Insert MAL-DCSSLIM21E BUTTON_ DEPRESSED** **Delete 1A MAL-DCSSLIM21E = 2 (1 second delayed)** **Insert REM-CF0107AB = 1**	SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN
☐	At direction of examiner	**Event 6** **insert MAL-CF004D =2.2E+7**	1D Feedline Break in Containment
☐	Post-Rx Trip during depress.	**Event 7** **Insert:** **MAL-ISE007A = 3** **MAL-ISE007B = 3**	FWIS fails to AUTO ACTUATE **NOTE: This event is inserted at T=0 and will occur on Rx Trip**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N18-1	Scenario #	2	Event #	1	Page	9	of 62
Event Description:		**Power Increase w/Dilute**						

Shortly after taking the watch, the operator will commence a load increase to 100% starting with Step 3.36.11 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” The operator will dilute the NC System Boron concentration in accordance with Enclosure 4.3, “Dilute,” of OP/1/A/6150/009, “Boron Concentration Control,” and raise Turbine load in accordance with OP/1/A/6300/001 A, “Turbine-Generator Load Change.” During the load change, an AO will report that the operating-air line to the 1B S/G PORV has been damaged requiring that the instrument air isolation valve be closed. The operator will address Technical Specification LCO 3.7.4, “Steam Generator Power Operated Relief Valves (SG PORVs).”
Booth Operator Instructions: **NA**
Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
OP/1/A/6100/003, CONTROLLING PROCEDURE FOR UNIT OPERATION ENCLOSURE 4.1, POWER INCREASE			
	CRS	(Step 3.36.11) Prior to increasing to greater than 75% RTP, check all governor valves open.	**NOTE:** The power increase will be at 2 MWe/minute.
	RO/ BOP	(Step 3.36.12) WHEN 77-80% RTP, THEN enable OTDT DCS alarming as follows:	**NOTE:** Based on the extent of the power increase, this action may or may not be taken.
		• On DCS graphics, select “MAINTENANCE MENU”.	
		• Select “TAVG, DELTA T INPUTS & ALARM CHECKING” graphic.	
		• Select “ON” for the following:	
		• NCAA 5422	
		• NCAA 5462	
		• NCAA 5502	
		• NCAA 5542	
		• OTDELTAT-FAIL	

Op Test No.:	N18-1	Scenario #	2	Event #	1	Page	10 of 62
Event Description:	**Power Increase w/Dilute**						

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 3.36.13) IF startup from refueling outage…..	
		(Step 3.36.14) IF performing Generator/Automatic Voltage Regulator (AVR) testing at 78% RTP…	
OP/1/A/6150/009, BORON CONCENTRATION CONTROL ENCLOSURE 4.3, DILUTE			
	BOP	(Step 3.5) Determine amount of reactor makeup water needed to obtain desired boron concentration using McGuire Data Book, OAC, Reactor Group Guidance, or plant parameters (T-Ave. Steam Pressure, Xenon worth, etc.). (R.M.)	**NOTE:** The BOP will add 400 gallons of MU Water.
		• Total Reactor Makeup Water:	
	BOP	(Step 3.6) Ensure the following reset to zero: (R.M.)	
		• Total Make Up Flow Counter	
		• Boric Acid Flow Counter	
	BOP	(Step 3.7) Set Total Make Up Flow Counter to value determined in Step 3.5.	
	BOP	(Step 3.8) Select “DILUTE” on “NC Sys M/U Controller”.	
NOTE Rapidly changing reactor makeup water flow can cause a Rx Makeup Flow Deviation Annunciator Alarm.			
	BOP	(Step 3.9) IF AT ANY TIME it is desired to adjust reactor makeup water flow, adjust “Rx M/U Water Flow Control” setpoint to achieve desired flowrate.	**NOTE:** Typically, it is NOT desired to adjust reactor makeup water flow.

Op Test No.:	N18-1	Scenario #	2	Event #	1	Page	11 of	62
Event Description:		Power Increase w/Dilute						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.10) IF AT ANY TIME it is desired to manually adjust reactor makeup water flow, perform the following:	
		• Place “Rx M/U Water Flow Control” in manual.	
		• Adjust “Rx M/U Water Flow Control” output to control reactor makeup water flowrate.	
NOTE IF desired to dilute with a constant flow rate as advised by engineering to minimize VCT temperature decrease, it is preferred to allow 1NV-137A (U1 NC Filter Otlt to VCT 3-Way Diversion Cntrl) to auto divert on high level.			
	BOP	(Step 3.11) IF AT ANY TIME it is desired to lower VCT level, perform the following:	
		• Monitor Letdown Pressure.	
NOTE An increase in Letdown Pressure greater than 20 psig during diverts may be indicative of excessive NB Feed Filter DP. {NCR 01597088}			
		• Select “HUT” on 1NV-137A (U1 NC Filter Otlt to VCT 3-Way Diversion Cntrl).	**NOTE:** The BOP may do this at any time to lower VCT level.
		• IF Letdown Pressure increases greater than 20 psig, notify CRS.	
		• AFTER desired level achieved, select “AUTO” on 1NV-137A (U1 NC Filter Otlt to VCT 3-Way Diversion Cntrl).	
NOTE Steps 3.12 - 3.20 may be completed and then checked off as time allows.			

Op Test No.:	N18-1	Scenario #	2	Event #	1	Page	12 of 62
Event Description:	**Power Increase w/Dilute**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.12) IF AT ANY TIME plant parameters require termination of dilution, perform the following:	
		• Place "NC System Make Up" to "STOP". (R.M.)	
		• IF 1NV-137A (U1 NC Filter Otlt to VCT 3-Way Diversion Cntrl) placed to HUT, place to "AUTO".	
	BOP	(Step 3.13) Momentarily select "START" on "NC System Make Up". (R.M.)	
	BOP	(Step 3.14) Check "NC System Make Up" red light lit.	
BOOTH INSTRUCTOR:		**AFTER the BOP has started the dilution, as an AO, call the Control Room and report that the operating-air line to the 1B S/G PORV has been damaged requiring that the instrument air isolation valve be closed.**	
			NOTE: The CRS will evaluate this condition. TS LCO 3.7.4 is met (SG PORV is OPERABLE by Handwheel).
			NOTE: The CRS may call WCC/IAE to address the valve failure. If so, **Booth Instructor** acknowledge as WCC.
	BOP	(Step 3.15) Check 1NV-171A (U1 Boric Acid Blender to VCT Inlet Control) open.	
	BOP	(Step 3.16) Check 1NV-252A (Rx M/U Water Supply To U1 BA Blender Cntrl) open or throttled as required.	

Op Test No.:	N18-1	Scenario #	2	Event #	1	Page	13 of 62
Event Description:	**Power Increase w/Dilute**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.17) Check Rx M/U Water Pump start.	
	BOP	(Step 3.18) Monitor Total Make Up Flow Counter. (R.M.)	
	BOP	(Step 3.19) HOLD until one of the following occurs:	
		• Amount of reactor makeup recorded per Step 3.5 added	
		OR	
		• Reactor makeup water addition manually terminated	
	BOP	(Step 3.20) Ensure dilution terminated as follows: (R.M.)	
		• IF in “AUTO”, ensure the following off:	
		• 1A Rx M.U Water Pump	
		• 1B Rx M/U Water Pump	
		• Ensure the following closed:	
		• 1NV-171A (U1 Boric Acid Blender to VCT Inlet Control)	
		• 1NV-252A (Rx M/U Water Supply To U1 BA Blender Cntrl)	
	BOP	(Step 3.21) Ensure “Rx M/U Water Flow Control” in auto. (R.M.)	

NOTE

- OAC point M1P5614 (Unit 1 Effective Boron Concentration) may be used as the desired boron concentration in the following calculations. Use of Effective Boron Concentration will account for B-10 depletion. {NCR 01641629}
- Results of Boron Concentration makeups have been consistently lower than desired. To compensate it may be necessary to use actual Boron Concentration (instead of Effective Boron Concentration) or adjustment of the "desired" Boron Concentration to obtain a desired resultant Boron Concentration. {NCR 01682204}

Op Test No.: N18-1	Scenario # 2	Event # 1	Page 14 of 62
Event Description:	**Power Increase w/Dilute**		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.22) IF "Rx M/U Water Flow Control" adjusted per Step 3.9 OR Step 3.10…	**NOTE:** Typically, the Rx M.U Water Flow Control was NOT adjusted.
	BOP	(Step 3.23) Ensure 1NV-137A (U1 NC Filter Otlt to VCT 3-Way Diversion Cntrl) in "AUTO".	
NOTE CRS concurrence required if flush of blender NOT performed.			
	BOP	(Step 3.24) IF desired to flush blender, go to…	**NOTE:** The BOP will likely request that the flush NOT be performed.
	BOP	(Step 3.25) Select "AUTO" for "NC Sys M/U Controller".	
	BOP	(Step 3.26) Momentarily select "START" on "NC System Make Up".	
	BOP	(Step 3.27) Check "NC System Make Up" red light lit.	
	BOP	(Step 3.28) Ensure the following reset to zero:	
		• Total Make Up Flow Counter	
		• Boric Acid Flow Counter	
	BOP	(Step 3.29) Record in Narrative Log that final blender content is Rx Makeup Water.	
			NOTE: The BOP may repeat this task as needed during the power increase.

Op Test No.:	N18-1	Scenario #	2	Event #	1	Page	15 of 62
Event Description:	**Power Increase w/Dilute**						

Time	Pos.	Expected Actions/Behavior	Comments
OP/1/A/6300/001A, TURBINE-GENERATOR STARTUP/SHUTDOWN ENCLOSURE 4.1, TURBINE-GENERATOR LOAD CHANGE			
NOTE If reducing power to a level greater than 50%, it is preferable to reduce power at a rate less than 12% per hour in order to minimize sodium peaks. [NCR01574291]			
	RO	(Step 3.4.1) IF Turbine in "OPERATOR AUTO", perform the following:	
		(Step 3.4.1.1) Ensure desired change within "Calculated Capability Curve".	
		(Step 3.4.1.2) IF turbine load will increase or decrease more than 10 MWs, notify Dispatcher of expected load change.	
		(Step 3.4.1.3) IF desired to change the load rate, THEN perform the following:	
		• Depress "LOAD RATE".	
		• Enter desired load rate in "VARIABLE DISPLAY".	**NOTE:** the RO will select 2 MWe/Min loading rate.
		• Depress "ENTER".	
		(Step 3.4.1.4) IF desired to change desired load, THEN perform the following:	
		• Depress "REFERENCE".	
		• Enter desired load in "VARIABLE DISPLAY".	
		• Depress "ENTER".	
		• Depress "GO"	
		(Step 3.4.1.5) IF desired to pause load change, THEN perform the following:	
		• Depress "HOLD".	
		• WHEN desired to resume load change, THEN depress "GO".	
OP/1/A/6100/003, CONTROLLING PROCEDURE FOR UNIT OPERATIONS ENCLOSURE 4.1, POWER INCREASE			

Op Test No.:	N18-1	Scenario #	2	Event #	1
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Event Description:	**Power Increase w/Dilute**				

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 3.36.15) Continue power increase to 95% RTP.	**NOTE:** The power increase will be at 2 MWe/minute.
At the discretion of the Lead Examiner move to Event #2.			

Op Test No.:	N18-1	Scenario #	2	Event #	2	Page	17 of 62
Event Description:	**Control Rods insert uncontrollably in AUTO**						

During the power change, the Control Rods will fail such that they continuously insert in AUTO. The operator will enter AP/1/A/5500/14, "Rod Control Malfunction," and take manual control of the rods.
Booth Operator Instructions: **insert MAL-IRE003A (IN)** **NOTE: If needed (i.e. No current Rod Demand) insert MAL-DCS1213 =TRUE**
Indications Available: • Control Rods are moving inward in AUTO without a proper signal.

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The RO may place the Turbine in HOLD.
		AP/1/A/5500/14, ROD CONTROL MALFUNCTION	
	RO	(Step 1) IF two or more rods are either dropped OR misaligned by greater than 24 steps…	**Immediate Action** **NOTE:** No Rods have dropped in this event.
	RO	(Step 2) Place control rods in manual.	**Immediate Action** **NOTE:** The RO will place the rods in MANUAL.
	RO	(Step 3) Check rod movement – STOPPED.	**Immediate Action** **NOTE:** When the RO places the Rods to MANUAL, continual inward Rod Motion will stop.
	RO	(Step 4) Check all rods – ALIGNED WITH ASSOCIATED BANK.	
	RO	(Step 5) Check "ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) – DARK.	

Op Test No.:	N18-1	Scenario #	2	Event #	2	Page	18 of 62
Event Description:	**Control Rods insert uncontrollably in AUTO**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) Check "T-AVG/T-REF FAILURE ROD STOP" alarm (1AD-2, B-7) – DARK.	
	CRS	(Step 7) IF this AP entered due to unwarranted rod insertion or withdrawal, THEN GO TO Enclosure 3 (Response To Continuous Rod Movement).	**NOTE:** The CRS will transition to Enclosure 3 of AP-14.
ROD CONTROL MALFUNCTION ENCLOSURE 3 – RESPONSE TO CONTINUOUS ROD MOVEMENT			
	CRS	(Step 1) Announce occurrence on paging system.	**NOTE:** CRS may ask U2 RO to make Plant Announcement that AP-14 has been entered. If so, **Floor Instructor** acknowledge as U2 RO.
	CRS	(Step 2) Notify IAE to investigate problem.	**NOTE:** The CRS may call WCC/IAE to address the Control Rod failure. If so, **Booth Instructor** acknowledge as WCC.
	CRS	(Step 3) Evaluate the following prior to any control rod withdrawal:	
		• Ensure no inadvertent mode change will occur.	
		• Ensure control rods are withdrawn in a deliberate manner, while closely monitoring the reactor's response.	
	RO	(Step 4) Check T-Ref indication - NORMAL	
	CRS/ RO	(Step 5) Do not move rods until IAE determines rod motion in permissible.	**Booth Instructor:** after **2 minutes,** as **IAE**, report that MANUAL rod control only is permissible.

Op Test No.:	N18-1	Scenario #	2	Event #	2	Page	19 of 62	
Event Description:	**Control Rods insert uncontrollably in AUTO**							

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) Maintain T-Avg within 1°F of T-Ref as follows:	
		• Adjust Turbine load	
		OR	
		• Borate/dilute NC System.	
	RO	(Step 7) IF AT ANY TIME a runback occurs while in this procedure,…	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	RO/ BOP	(Step 8) IF AT ANY TIME while in this procedure a unit shutdown is required AND rods cannot be moved, THEN perform the following:	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• Borate as required during shutdown to maintain T-Avg at T-Ref.	
		• Monitor AFD during load reduction.	
		• IF AT ANY TIME AFD reaches Tech Spec limit AND reactor power is greater than 50%, …	
		• IF entry into Mode 3 is desired, THEN perform the following:	
		• WHEN the turbine is tripped OR at desired power level, THEN perform the following:	
		• Trip Reactor.	
		• GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).	
	CRS	(Step 9) WHEN problem is repaired…	
			NOTE: The CRS will likely conduct a Focus Brief.

At the discretion of the Lead Examiner move to Event #3.

Op Test No.:	N18-1	Scenario #	2	Event #	3	Page	20 of 62
Event Description:	**Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)**						

Following this, the Pzr Spray Valve Controller, 1NC-29C B Spray, demand will fail to full output. The operator will enter AP/1/A/5500/11, “Pressurizer Pressure Anomalies.” The operator will address Technical Specification LCO 3.4.1, “RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits.”

Booth Operator Instructions:

insertMAL-DCSSLIM07G BUTTON_DEPRESSED

insertMAL-DCSSLIM07D BUTTON_DEPRESSED

deleteMAL-DCSSLIM07G = 2, delay 10 seconds

deleteMAL-DCSSLIM07D = 2, delay 30 seconds

Indications Available:

- NCS/Pzr pressure lowers
- OAC Alarm: U1 PZR PRESS I through IV
- 1NC-29C SLIMs LS indication 50 or 100%
- MCB Annunciator 1AD6/C-6 PZR LO PRESS CONTROL

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The BOP may take all the necessary actions in the Immediate Actions, before CRS reads AOP.
AP/1/A/5500/11, PRESSURIZER PRESSURE ANOMALIES			
	BOP	(Step 1) Check Pzr pressure – HAS GONE DOWN.	**Immediate Action**
	BOP	(Step 2) Check Pzr PORVs – CLOSED.	**Immediate Action**
	BOP	(Step 3) Check Pzr spray valves - CLOSED	**Immediate Action** **NOTE:** 1NC-29C is OPEN.
	BOP	(Step 3 RNO) CLOSE Pzr spray valve(s).	

Op Test No.: N18-1	Scenario # 2	Event # 3		Page 21 of 62	
Event Description:	**Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)**				

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Manually close the Failed OPEN Pzr Spray Valve before an automatic Reactor Protection System actuation occurs.** Safety Significance: failure to close the Spray Valve and stop the pressure transient, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the pressure transient. A failure to stabilize the pressure transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect NCS pressure control.			
	BOP	(Step 4) Check Pzr PORVs – CLOSED.	
	BOP	(Step 5) Check Pzr spray valves – CLOSED.	**NOTE:** IF the BOP has already used the EMERG SWITCH, the CRS may answer YES, and continue to Step 6. If NOT, the Step 5 RNO will be performed.
	BOP	(Step 5 RNO) IF NC pressure below desired pressure, THEN perform the following:	
		• Ensure Pzr spray emergency close switch on 1MC-10 is in the "CLOSE" position for failed spray valve.	
		• IF Pzr spray valve closed, THEN GO TO Step 6.	
	CRS	(Step 6) Announce occurrence on page.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	BOP	(Step 7) Check 1NV-21A (NV Spray to PZR Isol) – CLOSED.	
	BOP	(Step 8) Check the following Pzr heaters – ON:	

Op Test No.: N18-1	Scenario # 2	Event # 3	Page 22 of 62
Event Description:	**Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)**		

Time	Pos.	Expected Actions/Behavior	Comments
		• 1A	
		• 1B	
		• 1D	
	BOP	(Step 9) Check 1C Pzr heaters – ON.	
	BOP	(Step 10) Check "PZR PRESS MASTER" – IN AUTO.	
	BOP	(Step 11) Check "1NC-27 PRESSURIZER SPRAY EMERGENCY CLOSE" switch – SELECTED TO "NORMAL".	
	BOP	(Step 12) Check "1NC-29 PRESSURIZER SPRAY EMERGENCY CLOSE" switch – SELECTED TO "NORMAL".	**NOTE:** In order to close the malfunctioning Spray Valve, the BOP had to take the EMERG SWITCH to CLOSE.
	CRS	(Step 12 RNO) Notify station management to ensure switch restored to "NORMAL" once spray valve is repaired.	**NOTE:** The CRS may call WCC/Station Management to address the switch position. If so, **Booth Instructor** acknowledge as WCC.
	BOP	(Step 13) Check Pzr pressure – GOING UP TO DESIRED PRESSURE.	
	CRS	(Step 14) Exit this procedure.	**NOTE:** The CRS may call WCC/IAE to address the valve failure. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: The CRS will likely conduct a Focus Brief.
TECHNICAL SPECIFICATION 3.4.1, RCS PRESSURE, TEMPERATURE, AND FLOW DEPARTURE FROM NUCLEATE BOILING (DNB) LIMITS			

Op Test No.:	N18-1	Scenario #	2	Event #	3	Page 23 of 62
Event Description:	**Pzr Spray Valve Controller fails to FULL OUTPUT (Valve Open)**					

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified in Table 3.4.1-1.	**NOTE:** According to Table 3.4.1-1, Parameter 2, indicated Pressurizer Pressure will be ≥ The limit specified in the COLR.
	CRS	APPLICABILITY: MODE 1.	**NOTE:** According to Table 4 of the COLR, indicated Pressurizer Pressure (with four channels available) must be ≥ 2212.3 psig via the meter indication and ≥ 2209.1 psig via the OAC. During this failure Pressurizer Pressure will lower below these values.
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Pressurizer pressure or RCS average temperature DNB parameters not within limits.	A.1 Restore DNB parameter(s) to within limit.	2 hours

			NOTE: When Pressurizer Pressure drops to < 2209.1 psig (OAC) on the failure, the CRS will determine that Condition A is required and that ACTION A.1 must be taken.

At the discretion of the Lead Examiner, move to Event #4.

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	24 of 62
Event Description:	**1B RN Pump Trip**						

Subsequently, the 1B RN Pump will trip on overcurrent. The operator will enter AP/1/A/5500/20, "Loss of RN." The operator will address Technical Specification LCO 3.7.7, "Nuclear Service Water System (NSWS)," Technical Specification LCO 3.8.1, "AC Sources-Operating," and SLC 16.9.9, "Boration Systems – Flow Path (Operating)."

Booth Operator Instructions: **insert MAL-RN007B = TRUE (1B RN Pump trips)**

Indications Available:

- 1B RN Pump Motor breaker Green status light is LIT
- 1B RN Pump Motor amps indicating 0
- MCB Annunciator 1AD-12/A-3 A RN PMP DISCHARGE LO PRESS
- MCB Annunciator 1AD-12/A-4 B RN PMP DISCHARGE LO PRESS

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/20, LOSS OF RN **CASE I, LOSS OF OPERATING RN TRAIN**	
	BOP	(Step 1) Check both D/Gs - OFF.	
	BOP	(Step 2) Check for potential loss of LLI as follows:	
		• Check Unit 2 RN pump(s) that are aligned to LLI – OPERATING PROPERLY.	**Floor Instructor:** If asked, As **U2 RO** report "2B RN Pump is running properly."
		• Check suction flowpath – AVAILABLE.	
	CRS	(Step 3) Announce occurrence on page.	**NOTE:** CRS may ask U2 RO to make Plant Announcement that AP-20 has been entered. If so, **Floor Instructor** acknowledge as U2 RO.
	BOP	(Step 4) Check any RN pump - ON.	**NOTE:** Both RN Pumps are OFF.
	CRS	(Step 4 RNO) Perform the following:	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	25 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• IF strainer fouling has not occurred, THEN GO TO Step 7.	**NOTE:** Strainer fouling has NOT occurred, the operating RN Pump has tripped.
	BOP	(Step 7) Place RN train in service as follows:	
		• Check both RN pumps - OFF.	
		• Check RN train – AVAILABLE TO START.	
		• Start one train of RN as follows:	
		• To start 1A RN pump perform the following:	
		• Ensure flowpath available.	
		• Place manual loader for 1RN-89A (RN to A KC Hx Control) to 10% OPEN.	
		• Start 1A RN pump.	**NOTE:** The BOP will start the 1A RN Pump. **NOTE:** The BOP/CRS may dispatch an AO. **Floor/Booth Instructor:** After 5 minutes, as AO, report that the pump is operating normally.
		• Ensure the following valve for train being started – OPEN.	
		• 1RN-86A (A KC Hx Inlet Isol).	
		• Check the following cross-tie valves – OPEN:	
		• 1RN-40A (Train A To Non Ess Hdr Isol)	
		• 1RN-41B (Train B TO Non Ess Hdr Isol)	
		• 1RN-43A (Train B To Non Ess Hdr Isol).	
		• Ensure malfunctioning RN pump is off.	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	26 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Check if local venting of RN pump has been performed PER one of the following:	**NOTE:** Local venting of RN pump has NOT been performed.
		• Enclosure 5 (1A RN Pump Venting)	
		OR	
		• Enclosure 6 (1B RN Pump Venting).	
	CRS	(Step 7.f RNO) GO TO Step 7.i.	
	BOP	• (Step 7.i) Check Enclosure 7 (NV Pump Cooling Via Gravity Drain To Sump) – HAS BEEN PERFORMED.	**NOTE:** Enclosure 7 has NOT been performed.
	CRS	(Step 7.i RNO) GO TO Step 7.k.	
	BOP	• (Step 7.k) Check Case II (Loss of Low Level or RC Supply Crossover) – HAS BEEN IMPLEMENTED.	**NOTE:** Case II has NOT been performed.
	CRS	(Step 7.k RNO) GO TO Step 8.	
	BOP	(Step 8) Ensure cooling to KC as follows:	
		• Check 1A KC pump(s) – RUNNING.	**NOTE:** The B Train of KC is operating.
	CRS	(Step 8.a RNO) GO TO Step 8.h.	
	BOP	• (Step 8.h) Check 1B KC pump(s) – RUNNING.	
	BOP	• Ensure 1B KC pumps aligned to reactor bldg non essential header as follows:	
		• OPEN the following valves:	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	27 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 1KC-18B (Trn B Rx Bldg Non Ess Ret Isol).	
		• 1KC-228B (Trn B Rx Bldg Non Ess Sup Isol).	
		• CLOSE the following valves:	
		• 1KC-230A (Trn A Rx Bldg Non Ess Sup Isol).	
		• 1KC-3A (Trn A Rx bldg Non Ess Ret Isol).	
	BOP	• Check 1B RN pump – OFF.	
	BOP	• Check 1RN-187B (B KC Hx Inlet Isol) – LOCALLY THROTTLED DURING THIS PROCEDURE.	**NOTE:** 1RN-187B has NOT been locally throttled.
	BOP	(Step 8.k RNO) Perform the following:	
		• IF VI header pressure is less than 60 PSIG, THEN…..	**NOTE:** VI Header pressure is > 60 psi.
		• Place 1RN-187B “MODE SELECT” switch to manual.	
		• OPEN 1RN-187B (B KC Hx Inlet Isol).	
		• THROTTLE 1RN-89A (RN to A KC Hx Control) to maintain 1A RN pump discharge pressure greater than 50 PSIG.	
		• IF 1A RN pump discharge pressure is greater than 50 PSIG, THEN GO TO Step 9.	
	BOP	(Step 9) Maintain RN flow within operating limits as follows:	
		• Check VI header pressure - GREATER THAN 60 PSIG.	**NOTE:** VI Header pressure is > 60 psi.

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	28 of	62
Event Description:	**1B RN Pump Trip**							

Time	Pos.	Expected Actions/Behavior	Comments
		• Check 1A RN pump - RUNNING.	**NOTE:** If not previously done, the BOP/CRS may dispatch an AO. **Floor/Booth Instructor:** After 5 minutes, as AO, report that the pump is operating normally.
		• THROTTLE 1RN-89A (RN to A KC Hx Control) to maintain 1A RN pump discharge pressure greater than 50 PSIG.	
		• Check 1A RN pump flow – LESS THAN 14,000 GPM.	
		• Check 1B RN pump - RUNNING.	**NOTE:** The 1B RN Pump has tripped.
	CRS	(Step 9.e RNO) GO TO Step 10.	
	BOP/ CRS	(Step 10) Investigate reason for loss of RN train as follows:	
		• Dispatch operator to check RN pump.	**NOTE:** The BOP/CRS will dispatch an AO. **Floor/Booth Instructor:** After 5 minutes, as AO, report that the pump is off and the motor casing is hot to the touch.
		• Dispatch operator to check RN pump breaker.	**NOTE:** The BOP/CRS will dispatch an AO. **Booth Instructor:** After 5 minutes, as AO, report that the 51 Relay on the 1B RN Pump breaker has operated.
		• Check suction flowpath alignment.	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	29 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Check discharge flowpath alignment.	**NOTE:** The CRS may call WCC/IAE to address the Pump malfunction. If so, **Booth Instructor** acknowledge as WCC.
	CRS	(Step 11) Ensure Control Room Area Chiller in service PER Enclosure 2 (VC/YC Operation).	**NOTE:** The CRS may assign the **RO** to perform this action, or have the **BOP** perform these actions prior to continuing with Step 11. If actions are performed in parallel, **Appropriate Examiner** follow actions of Enclosure 2. **Other Examiners** follow **AP-20** Actions, **Step 12**, below.
AP/1/A/5500/20, LOSS OF RN ENCLOSURE 2, VC/YC OPERATION			
			Examiner NOTE: Follow the actions associated with Enclosure 2 if RO is assigned by CRS to perform.
	RO/ BOP	(Step 1) Check train selected Control Room Area Chiller – ON.	**NOTE:** The Chiller is expected to be ON. If not, the RO/BOP will take action per the RNO to restart the Chiller.
AP/1/A/5500/20, LOSS OF RN CASE I, LOSS OF OPERATING RN TRAIN			
			Examiner NOTE: Examiners following the **CRS/BOP** continue **HERE**.
	BOP	(Step 12) Align operating train of equipment with running RN pump as follows:	
		• Check 1A RN pump – ON.	
		• Check the following equipment – ON:	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	30 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 1A1 and 1A2 KC pumps - ON	
	CRS	(Step 12.b RNO) GO TO Step 12.i	
	BOP	(Step 12.i) Perform one of the following as necessary to align operating RN train with train of equipment cooled by RN:	
		• Swap operating equipment to opposite train as follows:	
		• IF desired to swap KC trains, THEN perform Enclosure 1 (Shifting KC Trains).	
			NOTE: The CRS will transition to Enclosure 1.
AP/1/A/5500/20, LOSS OF RN ENCLOSURE 1, SHIFTING KC TRAINS			
	BOP	(Step 1) Limit KC flow to 4000 GPM per operating KC pump in subsequent steps.	
	BOP	(Step 2) Check the following:	
		• 1RN-40A (Train A To Non Ess Hdr Isol) - OPEN	
		• 1RN-41B (Train B To Non Ess Hdr Isol) - OPEN	
		• 1RN-43A (Train B To Non Ess Hdr Isol) - OPEN	
		• Any KC pump – RUNNING.	**NOTE:** The B Train KC Pumps are operating.
	CRS	(Step 3) GO TO Step 5.	
	BOP	(Step 5) Check both ND pumps - OFF.	
	CRS	(Step 6) Perform the following:	

Op Test No.: N18-1	Scenario # 2	Event # 4		Page 31 of 62		
Event Description:	**1B RN Pump Trip**					

Time	Pos.	Expected Actions/Behavior	Comments
		• IF shifting from 1A KC Train to 1B KC Train,…	**NOTE:** The crew will be shifting from 1B KC Train to 1A KC Train.
		OR	
		• IF shifting from 1B KC Train to 1A KC Train, THEN GO TO Step 22.	
	BOP	(Step 22) THROTTLE OPEN 1RN-89A (RN to A KC Hx Control) to establish desired flow to 1A KC Hx, while maintaining 1A RN pump discharge pressure greater than 50 PSIG.	
	BOP	(Step 23) Place control switch for 1KC-51A (Train A Recirc Isol) in the "AUTO" position.	
	BOP	(Step 24) Ensure 1KC-51A OPENS.	
	BOP	(Step 25) Start 1A1 KC pump.	**NOTE:** The BOP/CRS may dispatch an AO. **Floor/Booth Instructor:** After 5 minutes, as AO, report that the KC pumps are operating normally.
	BOP	(Step 26) Start 1A2 KC pump.	
	BOP	(Step 27) Align Reactor Bldg header to 1A Train as follows:	
		• OPEN the following valves:	
		• 1KC-3A (Trn A Rx Bldg Non Ess Ret Isol)	
		• 1KC-230A (Trn A Rx Bldg Non Ess Sup Isol).	
		• CLOSE the following valves:	
		• 1KC-228B (Trn B Rx Bldg non Ess Sup Isol)	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	32 of 62
Event Description:		**1B RN Pump Trip**					

Time	Pos.	Expected Actions/Behavior	Comments
		• 1KC-18B (Trn B Rx Bldg Non Ess Ret Isol).	
	BOP	(Step 28) Check both ND pumps – OFF.	
	BOP	(Step 29) Place 1RN-187B "MODE SELECT" switch to auto.	
	BOP	(Step 30) Check 1RN-187B (B KC Hx Inlet Isol) – CLOSED.	
	BOP	(Step 31) WHEN RN flow through the 1B KC Hx begins to go down, THEN THROTTLE OPEN 1RN-89A (RN to A KC Hx Control) to achieve desired flow rate while maintaining the following:	
		• 1A RN pump discharge pressure - GREATER THAN 50 PSIG	
		• 1A RN pump flow - LESS THAN 14,000 GPM.	
	BOP	(Step 32) Place 1KC-54B (Train B Recirc Isol) in "CLOSE".	
	BOP	(Step 33) Ensure 1KC-54B is CLOSED.	
	BOP	(Step 34) Stop the following pumps:	**NOTE:** The BOP/CRS may dispatch an AO. **Floor/Booth Instructor:** After 5 minutes, as AO, report that the R Train KC pumps shutdown.
		• 1B1 KC pump	
		• 1B2 KC pump.	

Op Test No.: N18-1	Scenario #	2	Event #	4	Page	33 of 62
Event Description:	**1B RN Pump Trip**					

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 35) Ensure NC pump thermal barrier isolation valves are OPEN.	
	BOP	(Step 36) RETURN TO step in effect in body of this procedure.	
			NOTE: The CRS will return to the main body of AP-20. **Examiner NOTE:** Because there are still AP-related actions to take with this procedure, the CRS may NOT address the TS at the time. Consequently, it may be necessary to move to next event, and address the TS after the scenario. **The CRS MUST direct that ACTION B.1 of TS LCO 3.8.1 be performed within 1 hour of the pump trip. This is accomplished by directing either the BOP or the RO to perform PT/1/A/4350/025.** **Floor/Booth Instructor:** IF the **U2 BOP or the WCC** is asked to perform this procedure acknowledge and indicate that **no operator is available to perform this procedure**.
PT/1/A/4350/025, ESSENTIAL AUXILIARY POWER SYSTEM SOURCE VERIFICATION			
NOTE If a D/G is inoperable for a short period of time for planned activities, performance of this procedure may be suspended for up to 30 minutes with LCOTR Conditional Surveillance alarm capability available.			
	RO/ BOP	(Step 12.1) IF a D/G inoperable for less than 30 minutes THEN……	**NOTE:** The D/G will be inoperable for > 30 minutes.

Op Test No.: N18-1	Scenario # 2	Event # 4	Page 34 of 62
Event Description:	**1B RN Pump Trip**		

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 12.2) Record the following:	
		• LCOTR Item #:	
		• Inoperable Date:	
		• Inoperable Time:	
		• Required Operable Date:	
		• Required Operable Time:	
	RO/ BOP	(Step 12.3) IF 1A OR 1B busline out of service, THEN…..	**NOTE:** The 1A and 1B busline are BOTH in service.
	RO/ BOP	(Step 12.4) Complete Enclosure 13.1 (Essential Power Source Verification Data Sheet) to determine:	**NOTE:** Either the RO or the BOP will complete Page 1 of Enclosure 13.1.
		• Paths through which Onsite Essential Auxiliary Buses 1ETA and 1ETB are being powered from Offsite Transmission Network.	
		• If circuits supplying power from Offsite Transmission Network to Onsite Essential Auxiliary Busses 1ETA and 1ETB are independent.	
PT/1/A/4350/025, ESSENTIAL AUXILIARY POWER SYSTEM SOURCE VERIFICATION ENCLOSURE 13.1, ESSENTIAL POWER SOURCE VERIFICATION DATA SHEET			
	RO/ BOP	1ETA Offsite Power Supply Circuit Verification	**NOTE:** All alignments and voltages will meet acceptance criteria.
		1) Busline Supplying 1ETA	
		2) Busline Low Side Volt (From MCB)	
		3) 6.9 KV Swgr Supplying 1ETA	
		4) 6.9 KV Voltage 6113 - 7590 Volts	

Op Test No.: N18-1	Scenario # 2	Event # 4	Page 35 of 62
Event Description:	**1B RN Pump Trip**		

Time	Pos.	Expected Actions/Behavior	Comments
		5) 4 KV XFMR Supplying 1ETA	
		6) 4 KV Bus Voltage 3685 - 4580 Volts	
	RO/ BOP	1ETB Offsite Power Supply Circuit Verification	**NOTE:** All alignments and voltages will meet acceptance criteria.
		1) Busline Supplying 1ETB	
		2) Busline Low Side Volt (From MCB)	
		3) 6.9 KV Swgr Supplying 1ETB	
		4) 6.9 KV Voltage 6113 - 7590 Volts	
		5) 4 KV XFMR Supplying 1ETB	
		6) 4 KV Bus Voltage 3685 - 4580 Volts	
	RO/ BOP	Offsite Power Supply Circuit Independent Verification	**NOTE:** Independence will exist.
		Does independence exist?	
	RO/ BOP	Acceptance Criteria 11.2 met (IF Acceptance Criteria 11.2 NOT met, THEN evaluate TS/SLC)	**NOTE:** Acceptance Criteria 11.2 is met.
		• Performed by (Initials) (Shall be initialed each time surveillance is completed)	**NOTE:** The RO or BOP will Initial the Enclosure.
		• Reviewed by (CRS Initials) (Shall be initialed each time surveillance is completed)	**NOTE:** The CRS will Initial the Enclosure.
TECHNICAL SPECIFICATION 3.7.7, NUCLEAR SERVICE WATER SYSTEM			
	CRS	LCO 3.7.7 Two NSWS trains shall be OPERABLE.	
	CRS	APPLICABILITY: MODES 1, 2, 3, and 4.	
	CRS	ACTIONS	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	36	of	62
Event Description:		**1B RN Pump Trip**							

Time	Pos.	Expected Actions/Behavior	Comments

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One NSWS train inoperable.	Notes: • Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources— Operating," for emergency diesel generator made inoperable by NSWS. • Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops—MODE 4," for residual heat removal loops made inoperable by NSWS. A.1 Restore NSWS train to OPERABLE status.	 72 hours

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition A is required and that ACTION A.1 must be taken; and that TS LCO 3.8.1 must be evaluated for the 1B EDG.
TECHNICAL SPECIFICATION 3.8.1, AC SOURCES - OPERATING			
	CRS	3.8.1 AC Source - Operating	
	CRS	LCO 3.8.1 The following AC electrical sources shall be OPERABLE:	

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	37 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Two qualified circuits between the offsite transmission network and the Onsite Essential Auxiliary Power System AND • Two diesel generators (DGs) capable of supplying the Onsite Essential Auxiliary Power Systems AND • The automatic load sequencers for Train A and Train B shall be OPERABLE.	
	CRS	APPLICABILITY: MODES 1, 2, 3, and 4.	
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One DG inoperable.	B.1 Perform SR 3.8.1.1 for the offsite circuit(s). AND B.2 Declare required feature(s) supported by the inoperable DG inoperable when its required redundant feature(s) is inoperable. AND B.3.1 Determine OPERABLE DG is not inoperable due to common cause failure. OR B.3.2 Perform SR 3.8.1.2 for OPERABLE DG. AND B.4 Restore DG to OPERABLE status.	1 hour AND Once per 8 hours thereafter 4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s) 24 hours 24 hours 72 hours AND 6 days from discovery of failure to meet LCO

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	38 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition B is required and that ACTION B.1, B.2, B3.1 or B.3.2, and B.4 must be taken.
SELECTED LICENSEE COMMITMENT 16.9.9, BORATION SYSTEMS – FLOW PATH (OPERATING)			
	CRS	16.9.9 Boration Systems – Flow Path (Operating)	
	CRS	Commitment Two of the following three boron injection flow paths shall be OPERABLE:	
		• The flow path from a boric acid tank via a boric acid transfer pump and a charging pump to the reactor coolant system, and • Two flow paths from the refueling water storage tank via charging pumps to the reactor coolant system. Note: An OPERABLE charging pump used to satisfy OPERABILITY requirements of one boration flow path may not be used to satisfy OPERABILITY requirements for a second boration flow path.	
	CRS	APPLICABILITY: MODES 1, 2, and 3.	
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required boron injection flow path inoperable.	A.1 Restore the required boron injection flow path to OPERABLE status.	72 hours

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition A is required and that ACTION A.1 must be taken.

Op Test No.:	N18-1	Scenario #	2	Event #	4	Page	39 of 62
Event Description:	**1B RN Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
At the discretion of the Lead Examiner, move to Event #5.			

Op Test No.:	N18-1	Scenario #	2	Event #	5	Page	40 of 62
Event Description:	**SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN**						

Next, the 1D SG FCV Controller will fail to MANUAL and the FCV Bypass valve will fail fully open causing SG Level to rise. The operator will respond in accordance with AP/1/A/5500/06, "S/G Feedwater Malfunction," and control the 1D SG Level manually.

Booth Operator Instructions:

PRIOR TO INSERTING MALFUNCTION: As SOC Operator, call Control Room SOC Phone and state, "Due to increased demand on the system, we are evaluating everyone's voltage schedules. We will contact you with further information as we have it." (This will ensure that the OATC responds to the event).

Insert MAL-DCSSLIM21G BUTTON_ DEPRESSED
Delete 1A MAL-DCSSLIM21G = 2
Insert MAL-DCSSLIM21E BUTTON_DEPRESSED
Delete 1A MAL-DCSSLIM21E = 2
Insert REM-CF0107AB = 1

Indications Available:

- DCS Computer Alarm: S/G D FCV IN MANUAL MODE
- 1D SG Feed Flow rises
- 1D FCV starts to open
- 1D FCV Bypass Valve fully opens

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/06, S/G FEEDWATER MALFUNCTION	
	RO	(Step 1) Check all CF control and bypass valves – OPERATING PROPERLY.	**NOTE:** The 1D FCV is NOT operating properly in AUTO.
	RO	(Step 1 RNO) IF valve has failed, THEN perform the following:	**NOTE:** The RO will place the 1D FCV in MANUAL and restore level to program.
		• Place affected valve(s) in manual.	
		• Restore S/G level to program.	
		• IF CF control bypass valve has failed closed…..	**NOTE:** The 1D FCV Bypass Valve has fully opened.

Op Test No.:	N18-1	Scenario #	2	Event #	5	Page	41 of 62
Event Description:	**SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
<u>Critical Task:</u> **After a failure of the 1D SG FCV Controller in AUTO, manually control and stabilize the 1D SG Narrow Level before an automatic Reactor Protection System actuation occurs.** Safety Significance: failure to manually control and stabilize the SG Narrow Level before a Reactor Protection System actuation occurs, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the SG Narrow Level. A failure to stabilize the SG Narrow Range Level, when able to do so, constitutes a mis-operation or incorrect performance which could lead to incorrect NCS temperature control and an unnecessary challenge to the NCS Heat Sink Critical Safety Function.			
	RO	(Step 2) Check both CF pumps – OPERATING PROPERLY.	
	RO	(Step 3) Check unit status as follows:	
		• Reactor trip breakers - CLOSED	
		• Pzr pressure – GREATER THAN P-11 (1955 PSIG).	
	CRS	(Step 4) IF AT ANY TIME S/G N/R level approaches 17% OR 83%, THEN perform the following:	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• Trip reactor	
		• GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).	
	CRS	(Step 5) Announce occurrence on page.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 6) Check reactor power – GREATER THAN 3%.	

Op Test No.:	N18-1	Scenario #	2	Event #	5	Page	42 of	62

Event Description: **SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 7) Check CM/CF – PRESENTLY FEEDING S/Gs.	
NOTE W/R S/G level indication will indicate changes in actual level trends before N/R level.			
	RO	(Step 8) Check S/G levels – STABLE OR TRENDING TO PROGRAM LEVEL.	
	RO	(Step 9) Check NC temperature as follows:	
		• IF any NC pump on, THEN check NC T-Avg – STABLE OR TRENDING TO DESIRED TEMPERATURE.	
	RO	(Step 10) Check all S/G CF control valves – IN AUTO.	**NOTE:** The 1D FCV will be in MANUAL.
	CRS	(Step 10 RNO) Perform the following:	
		• IF CF control valve has failed AND will not respond in manual, THEN……	**NOTE:** The 1D FCV will respond in MANUAL.
		• WHEN automatic control desired AND affected S/G level(s) at program level, THEN place affected CF control valve(s) in automatic.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	RO	(Step 11) Check all S/G CF control bypass valves – IN AUTO.	**NOTE:** Although failed OPEN, the 1D FCV Bypass Valve is likely in AUTO. If the RO places the valve in MANUAL, the RNO may be attempted, however, the valve will NOT move from the OPEN position.
	RO	(Step 12) Check the following on running CF pumps:	

Op Test No.: N18-1	Scenario # 2	Event # 5	Page 43 of 62

Event Description: **SG 1D FCV Controller fails to MANUAL/FCV Bypass Valve fails fully OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• On DCS workstation, Feedpump Overview graphic, check "AUTO" (located below "AUTO/SPD" select button on running CF pump(s)) - INDICATED	
		• CF pump low pressure governor control - • IN AUTO	
		• CF pump high pressure governor control • - IN AUTO.	
	RO	(Step 13) Check all CA pumps - OFF.	
			NOTE: The CRS may call WCC/IAE to address the failed controller. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: The CRS will likely conduct a Focus Brief.

At the discretion of the Lead Examiner move to Events #6-7.

Op Test No.: N18-1	Scenario # 2	Event # 6 & 7			Page 44	of 62	
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

After this, a catastrophic Feedline Break will occur on the 1D Main Feedline inside the Containment. The operator will enter EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” Simultaneously the Feedwater Isolation Signal will fail to automatically actuate. The operator will need to take manual action to isolate the Main Feedwater System to the SGs. Upon completion of E-0, the operator will transition to EP/1/A/5000/E-2, “Faulted Steam Generator Isolation,” to isolate the flow into and out of the 1D Steam Generator. The operator will then transition to EP/1/A/5000/ES-1.1, “Safety Injection Termination.” The scenario will terminate at Step 8.a of ES-1.1, after the crew has established charging flow and is attempting to stabilize Pressurizer Level.
Booth Operator Instructions: **insert MAL-CF004D = 2.2E+7**
Indications Available: • Containment pressure rises to > 1 psig • Automatic Rx Trip occurs • Automatic Safety Injection occurs

Time	Pos.	Expected Actions/Behavior	Comments
		EP/1/A/5000/E-0, REACTOR TRIP OR SAFETY INJECTION	
	RO/ BOP	(Step 1) Monitor Foldout page.	**NOTE:** Crew will carry out Immediate Actions of E-0, prior to the CRS addressing the EP.
		NC Pump Trip Criteria (Not expected)	
		CA Suction Sources (CA storage tank (water tower) goes below 1.5 ft – Not expected)	
		Position Criteria for 1NV-150B and 1NV-151A (U1 NV Pump Recird Isol)	**NOTE:** The BOP will monitor these conditions.
		• IF NV S/I flowpath aligned AND NC pressure is less than 1500 PSIG, THEN CLOSE 1NV-150B and 1NV-151A.	
		• IF NC pressure is greater than 2000 PSIG, THEN OPEN 1NV-150B and 1NV-151A.	
		Ruptured S/G Aux Feedwater Isolation Criteria (Not expected)	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	45 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
		Faulted S/G Aux Feedwater Isolation Criteria (Expected)	**NOTE:** The BOP will monitor these conditions, and isolate CA flow to the 1D SG when met.
		• IF all of the following conditions met, THEN stop CA flow to affected S/G:	
		• S/G pressure going down in an uncontrolled manner or completely depressurized	
		• Only one S/G is diagnosed as faulted	
		• Secondary heat sink:	
		• N/R level in at least one S/G - GREATER THAN 11%(32% ACC)	
		OR	
		• Total feed flow to S/Gs - GREATER THAN 450 GPM.	
	RO	(Step 2) Check Reactor Trip:	**Immediate Action**
		• All rod bottom lights – LIT	
		• Reactor trip and bypass breakers – OPEN	
		• I/R power – GOING DOWN.	
	RO	(Step 3) Check Turbine Trip:	**Immediate Action**
		• All throttle valves – CLOSED.	
	BOP	(Step 4) Check 1ETA and 1ETB – ENERGIZED.	**Immediate Action**
	RO/ BOP	(Step 5) Check if S/I is actuated:	**Immediate Action**
		• “SAFETY INJECTION ACTUATED” status light (1SI-18) – LIT.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	46	of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**							

Time	Pos.	Expected Actions/Behavior	Comments
		• Both LOCA Sequencer Actuated status lights (1SI-14) – LIT.	
	CRS	(Step 6) Announce "Unit 1 Safety Injection".	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that a U1 Safety Injection has occurred. If so, **Floor Instructor** acknowledge as U2 RO.
	BOP	(Step 7) Check all Feed water Isolation status lights (1SI-4) – LIT.	**NOTE:** FWIS has failed to AUTO Actuate.
	RO/ BOP	(Step 7 RNO) Initiate Feedwater Isolation.	**NOTE:** The RO/BOP will depress the FWI INITIATE Train A and B pushbuttons.
	BOP	(Step 8) Check Phase A "RESET" lights – DARK.	
	BOP	(Step 9) Check ESF Monitor Light Panel on Energized train(s):	
		• Groups 1, 2, 5 – DARK.	
		• Group 3 – LIT.	
		• Group 4 – LIT AS REQUIRED.	
		• Group 6 – LIT.	**NOTE:** The RNO will need to be performed.
	CRS	(Step 9.d RNO) GO TO Step 9.f.	
	BOP	(Step 9.f) Check the following:	
		• OAC - IN SERVICE	
		• LOCA Sequencer Actuated status light (1SI-14) on energized train(s) - LIT.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	47	of	62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**								

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 9.g) Perform the following on energized train(s):	
		• Check OAC Monitor Light Program ("MONL") for Group 6 windows that are dark.	
		• Align valves as required, while continuing in this EP.	
	RO	(Step 10) Check proper CA pump status:	
		• MD CA pumps – ON.	
		• N/R level in at least 3 S/Gs – GREATER THAN 17%.	
	BOP	(Step 11) Check all KC pumps – ON.	
	BOP	(Step 12) Check both RN pumps – ON.	**NOTE:** The 1B RN Pump has previously failed.
	BOP	(Step 12 RNO) Perform the following:	
		• Start pump(s).	**NOTE:** The 1B RN Pump cannot be started.
		• IF any RN pump off, THEN perform the following:	
		• IF 1A RN pump is off, THEN …...	**NOTE:** The 1A RN Pump is running.
		• IF affected train is deenergized, AND its D/G is off, THEN…..	**NOTE:** The 1B EDG is running.
		• Reset the following on affected train:	
		• S/I.	
		• Sequencer.	
		• Dispatch operator to stop affected D/G using emergency stop pushbutton.	**NOTE:** The CRS will dispatch an AO. **Floor/Booth Instructor: Acknowledge** as **AO** and after **two minutes insert OVR-XDGB_047_1=1.**

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	48 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Monitor affected RN cooled components and shut down as necessary.	
	CRS	(Step 13) Notify Unit 2 to perform the following:	**Floor Instructor:** As U2 RO report "2A RN Pump is running."
		• Start 2A RN pump.	
		• THROTTLE Unit 2 RN flow to minimum for existing plant condition.	**Booth Instructor:** **insert LOA-RN087 (Start 2A RN Pump)** **insert LOA-RN083 8050.000000 delay=0 ramp=10 (Unit 2 Train A Demand Flow)**
	RO	(Step 14) Check all S/G pressures – GREATER THAN 775 PSIG.	
	RO	(Step 14 RNO) Perform the following:	**NOTE:** 1D SG Pressure is decreasing uncontrollably.
		• Check the following valves closed:	
		• All MSIVs	
		• All MSIV Bypass Valves	
		• All SM PORVs	
		• If any valve open,…..	**NOTE:** All valves are CLOSED.
	RO/ BOP	(Step 15) Check containment pressure – HAS REMAINED LESS THAN 3 PSIG.	**NOTE:** Containment Pressure is > 3 psig.
	BOP	(Step 15 RNO) Perform the following:	
		• Check Monitor Light Panel Group 7 lit.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	49 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
		• IF Group 7 window is dark on energized train(s)…	**NOTE:** Group 7 status lights are LIT.
		• Stop all NC pumps while maintaining seal injection flow.	
		• Ensure all RV pumps are in manual and off.	
		• Energize H_2 Igniters by depressing “ON” and “OVERRIDE”.	
	CRS	• Dispatch operator to stop all Unit 1 NF AHUs PER EP/1/A/5000/G-1 (Generic Enclosures) Enclosure 28 (De-energizing Ice Condenser AHUs).	**NOTE:** The CRS will dispatch AO. **Floor/Booth Instructor:** Acknowledge as appropriate. **Booth Instructor:** **insert LOA-NF016 STOP (Ice Condenser AHU Start/Stop)** And then, report as AO that **breakers are closed**.
	BOP	• WHEN time allows, THEN check Phase B HVAC equipment PER Enclosure 2 (Phase B HVAC Equipment).	**NOTE:** The CRS may ask U2 BOP to address. If so, **Floor Instructor** acknowledge as U2 BOP. **Examiner NOTE:** The CRS may assign the RO (BOP) to perform this action. If so, **RO (BOP) Examiner** follow actions of Enclosure 2. **Other Examiners** follow **E-0** Actions, **Step 16**, on **Page 51**.
E-0, REACTOR TRIP OR SAFETY INJECTION **ENCLOSURE 2, PHASE B HVAC EQUIPMENT**			
			Examiner NOTE: Follow the actions associated with Enclosure 2 if RO (BOP) is assigned by CRS to perform.

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	50	of	62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**								

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 1) Check VE System in operation as follows:	
		• VE Fans - ON.	
		• Ensure all damper mode select switches in "AUTO":	
		• 1AVS-D-7 Mode Select	
		• 1AVS-D-8 Mode Select	
		• 1AVS-D-2 Mode Select	
		• 1AVS-D-3 Mode Select	
		• Annulus pressure being maintained - NEGATIVE.	
	RO/ BOP	(Step 2) Check VX System in operation as follows:	
		• Time since Phase B actuation - GREATER THAN 10 MINUTES.	
	RO/ BOP	(Step 2 RNO) WHEN 10 minutes has expired, THEN perform rest of this enclosure.	
	RO/ BOP	(Step 2.b) Check the following dampers - OPEN:	
		• 1RAF-D-4 (1B Cont Air Ret Fan To Lwr Cont Test A)	
		• 1VX-2B (1B H2 Skimmer Fan Isol Test A)	
		• 1RAF-D-2 (1A Cont Air Ret Fan To Lwr Cont Test A)	
		• 1VX-1A (1A H2 Skimmer Fan Isol Test A).	
	RO/ BOP	(Step 2.c) Check Containment Air Return fans - ON	
	RO/ BOP	(Step 2.d) Check H_2 Skimmer fans - ON.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	51 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
		E-0, REACTOR TRIP OR SAFETY INJECTION	
			Examiner NOTE: Examiners following the **CRS/BOP (RO)** continue **HERE**.
	BOP	(Step 16) Check S/I flow:	
		• Check "NV PMPS TO COLD LEG FLOW" gauge – INDICATING FLOW.	
		• Check NC pressure – LESS THAN 1600 PSIG.	
	BOP	(Step 16.b RNO) Perform the following:	
		• Ensure ND pump miniflow valve on running pump(s) OPEN:	
		• 1ND-68A (1A ND Pump & Hx Mini Flow Isol)	
		• 1ND-67B (1B ND Pump & Hx Mini Flow Isol).	
	CRS	• IF valve(s) open on all running ND pumps, THEN GO TO Step 17.	
	CRS	(Step 17) Notify OSM or other SRO to perform EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 22 (Shift Manager Actions Following an S/I) within 10 minutes.	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
	RO/ BOP	(Step 18) Check CA flow:	
		• Total CA flow – GREATER THAN 450 GPM.	
	BOP	• Check VI header pressure – GREATER THAN 60 PSIG.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	52 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	• WHEN each S/G N/R level is greater than 11% (32% ACC), THEN control CA flow to maintain that S/G N/R level between 11% (32% ACC) and 50%.	**NOTE:** Adverse Containment numbers will need to be used. **NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	RO	(Step 19) Check NC temperatures:	
		• IF all NC pumps off, THEN check NC T-Colds – STABLE OR TRENDING TO 557°F.	**NOTE:** All NC Pumps will be OFF.
		OR	
		• IF all NC pumps off, THEN check NC T-Colds - STABLE OR TRENDING TO 557°F.	
		(Step 19 RNO) Perform the following based on plant conditions:	
		• IF temperature less than 557°F AND going down, THEN attempt to stop cooldown PER Enclosure 3 (Uncontrolled NC System Cooldown).	**Examiner NOTE:** The CRS may assign the RO to perform this action. If so, **RO Examiner** follow actions of **Enclosure 3**. **Others** should move ahead to Step 20 on **Page 54** to continue in E-0.
E-0, REACTOR TRIP OR SAFETY INJECTION ENCLOSURE 3, UNCONTROLLED NC SYSTEM COOLDOWN			
	RO	(Step 1) Check steam dump valves – CLOSED.	**Examiner NOTE:** Follow the actions associated with Enclosure 3 if RO is assigned by CRS to perform.
	RO	(Step 2) Check all SM PORVs – CLOSED.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	53	of	62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**								

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) Check MSR “RESET” light – LIT.	
	RO	(Step 4) Check any NC pump – ON.	**NOTE:** All NC Pumps will be OFF.
	RO	(Step 4 RNO) Perform the following:	
		• IF any NC T-Cold is still going down, THEN GO TO Step 6.	
		• IF cooldown stopped, THEN exit this enclosure.	
	RO	(Step 6) Control feed flow as follows:	
		• IF S/G N/R level is less than 11% (32% ACC) in all S/Gs, THEN THROTTLE feed flow to achieve the following:	**NOTE:** Adverse Containment numbers will need to be used.
		• Minimize cooldown	
		• Maintain total feed flow greater than 450 GPM.	
		• WHEN N/R level is greater than 11% (32% ACC) in at least one S/G, THEN THROTTLE feed flow further to:	**NOTE:** Adverse Containment numbers will need to be used.
		• Minimize cooldown	
		• Maintain at least one S/G N/R level greater than 11% (32% ACC).	**NOTE:** The RO may stop feed flow to 1D SG.
	RO	(Step 7) Check MSIVs – ANY OPEN.	**NOTE:** All MSIVs will be closed.
	RO	(Step 7 RNO) Perform the following:	
		• Close MSIV bypass valves.	
		• Exit this enclosure.	
E-0, REACTOR TRIP OR SAFETY INJECTION			

Op Test No.: N18-1	Scenario # 2	Event # 6 & 7	Page 54 of 62
Event Description:	1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE		

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: Examiners NOT following RO actions in Enclosure 3, continue **HERE**.
	BOP	(Step 20) Check Pzr PORV and spray valves:	
		• All Pzr PORVs – CLOSED.	**NOTE:** With VI isolated to the Containment, the Pzr Safety Valves may be lifting.
		• Normal Pzr spray valves – CLOSED.	
		• At least one Pzr PORV isolation valve – OPEN.	
	BOP	(Step 21) Check NC subcooling based on core exit T/Cs – GREATER THAN 0°F.	
	BOP	(Step 22) Check if main steamlines intact:	
		• All S/G pressures – STABLE OR GOING UP	**NOTE:** The 1D SG is Faulted.
		• All S/Gs – PRESSURIZED.	
	BOP	(Step 22 RNO) IF any S/G is faulted, THEN perform the following:	
	CRS	• Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	
	CRS	• GO TO EP/1/A/5000/E-2 (Faulted Steam Generator Isolation).	
			NOTE: The CRS will transition to E-2.
EP/1/A/5000/E-2, FAULTED STEAM GENERATOR ISOLATION			
	RO/ BOP	(Step 1) Monitor Foldout page.	
		Cold Leg Switchover Criteria (< 95 INCHES in FWST – Not expected)	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	55	of	62

Event Description: **1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**

Time	Pos.	Expected Actions/Behavior	Comments
		CA Suction Sources (<1.5 feet – Not expected)	
		Position Criteria for 1NV-150B and 1NV-151A (NV Pumps Recirculation)	
		• IF NV S/I flowpath aligned AND NC pressure is less than 1500 PSIG, THEN CLOSE 1NV-150B and 1NV-151A.	**NOTE:** The BOP will monitor these conditions.
		• IF NC pressure is greater than 2000 PSIG, THEN OPEN 1NV-150B and 1NV-151A.	
	CRS	(Step 2) Maintain any faulted S/G or secondary break isolated during subsequent recovery actions unless needed for NC System cooldown.	
	RO	(Step 3) Check the following – CLOSED:	
		• All MSIVs	
		• All MSIV bypass valves.	
	RO	(Step 4) Check at least one S/G pressure – STABLE OR GOING UP.	**NOTE:** Although all SG pressures may be decreasing slowly, the operator will report stable based on plant conditions (i.e. faulted SG). Otherwise a transition to ECA-2.1 will be made.
	RO/ BOP	(Step 5) Identify faulted S/G(s):	**NOTE:** The 1D SG is Faulted.
		• Any S/G pressure – GOING DOWN IN AN UNCONTROLLED MANNER	
		OR	
		• Any S/G – DEPRESSURIZED.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	56 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) Maintain at least one S/G available for NC System cooldown in subsequent steps.	
	RO	(Step 7) Check faulted S/G(s) SM PORV – CLOSED.	
	BOP	(Step 8) Reset CA modulating valves.	
	RO/ BOP	(Step 9) Isolate faulted S/G(s) as follows:	
		• For 1D S/G:	
		• Check “S/G D FDW ISOLATED” status light (1SI-4) – LIT.	**NOTE:** The 1D FCV Bypass Valve is still OPEN.
	RO/ BOP	(Step 9.d.1 RNO) Perform the following:	
		• Ensure the following valve(s) - CLOSED:	
		• CLOSE 1CF-26AB (1D S/G CF Cont Outside Isol).	
		• CLOSE 1CF-17AB (1D S/G CF Control).	
		• CLOSE 1CF-107AB (1D S/G CF Control Bypass).	**NOTE:** The 1D FCV Bypass Valve will NOT be able to be CLOSED.
		• CLOSE 1CF-129B (1D S/G CF To CA Nozzle Isol).	
		• IF more than one Feedwater Isolation valve above is open, AND…….	
	RO/ BOP	• (Step 9.d.2) CLOSE 1CA-38B (U1 TD CA Pump Disch To 1D S/G Isol).	
		• CLOSE 1CA-42B (1B CA Pump Disch To 1D S/G Isol).	
		• Check BB valves – CLOSED:	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	57 of 62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 1BB-4B (1D S/G Blowdown Cont Outside Isol Control).	
		• 1BB-8A (D S/G BB Cont Inside Isol).	
		• Close 1SM-101 (D SM Line Drain Isol).	
	RO	(Step 10) Close 1AS-12 (U1 SM To AS Hdr Control Inlet Isol).	
	RO/ BOP	(Step 11) Check S/G tubes intact as follows:	
		• Check the following EMF's – NORMAL:	
		• 1EMF-33 (Condenser Air Ejector Exhaust)	
		• 1EMF-24 (S/G A)	
		• 1EMF-25 (S/G B)	
		• 1EMF-26 (S/G C)	
		• 1EMF-27 (S/G D).	
		• IF any S/G has previously been identified as ruptured…..	**NOTE:** There have been no SGTRs identified.
		• Notify RP to perform the following:	**NOTE:** The CRS may call RP to perform surveys. If so, **Booth Instructor** acknowledge as RP.
		• IF S/G(s) fault known to be outside containment, THEN monitor area of steam fault for radiation.	
		• Frisk all Unit 1 S/G cation columns to determine if activity level is significantly higher for any S/G.	
		• Notify Control Room of any abnormal radiation conditions.	
		• WHEN activity results reported, THEN notify station management to evaluate S/G activity.	

Op Test No.: N18-1	Scenario # 2	Event # 6 & 7			Page 58 of 62		
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 12) Check S/I termination criteria:	
		• NC subcooling based on core exit T/Cs – GREATER THAN 0°F.	
		• Secondary heat sink:	
		• N/R level in at least one intact S/G – GREATER THAN 11% (32% ACC)	**NOTE:** Adverse Containment numbers will need to be used.
		OR	
		• Total feed flow to intact S/Gs – GREATER THAN 450 GPM.	
		• NC pressure – STABLE OR GOING UP.	
		• Pzr level – GREATER THAN 11% (29% ACC).	**NOTE:** Adverse Containment numbers will need to be used.
	CRS	(Step 12.d RNO) GO TO Step 13.	**Examiner NOTE:** Because of the Adverse Containment condition, the crew may NOT meet the Pzr Level threshold to terminate SI. If **NOT**, the crew will go to **E-1**, continue to refill the PZR, and will transition to ES-1.1.
	CRS	(Step 12.e) GO TO EP/1/A/5000/ES-1.1 (Safety Injection Termination).	**NOTE:** The crew may NOT meet the Pzr Level threshold to terminate SI. If so, the CRS will transition to E-1, and then ES-1.1 (Either directly at Step 7.e or based on Continuous Action Step 7.f) when the SI Termination criteria are met.
EP/1/A/5000/ES-1.1, SAFETY INJECTION TERMINATION			

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	59	of	62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**								

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 1) Monitor Foldout page.	
		S/I Reinitiation Criteria (Applies after Step 10 in body of this procedure) (Not expected)	
		Secondary Integrity Criteria (Not expected)	
		Cold Leg Switchover Criteria (< 95 INCHES in FWST – Not expected)	
		CA Suction Sources (<1.5 feet – Not expected)	
	BOP	(Step 2) Reset the following:	
		• S/I.	
		• Sequencers.	
		• Phase A Isolation.	
		• Phase B Isolation.	
		• IF AT ANY TIME a B/O signal occurs, THEN restart S/I equipment previously on.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	BOP	(Step 3) Establish VI to containment as follows:	
		• Open the following valves:	
		• 1VI-129B (VI Supply to A Cont Ess VI Hdr Outside Isol)	
		• 1VI-160B (VI Supply to B Cont Ess Hdr Outside Isol)	
		• 1VI-150B (Lwr Cont Non-Ess Cont Outside Isol).	
		• Check VI header pressure – GREATER THAN 85 PSIG.	
	BOP	(Step 4) Stop all but one NV pump.	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	60 of 62
Event Description:	1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5 Check NC pressure – STABLE OR GOING UP.	**NOTE:** If NC Pressure is lowering the CRS will perform the RNO.
	BOP	(Step 6) Isolate NV S/I flowpath as follows:	
		• Check the following valves – OPEN:	
		• 1NV-221A (U1 NV Pumps Suct From FWST Isol)	
		• 1NV-222B (U1 NV Pumps Suct From FWST Isol)	
		• Check the following valves - OPEN	**NOTE:** Both valves are open.
		• 1NV-150B (U1 NV Pump Recirc Isol)	
		• 1NV-151A (U1 NV Pump Recirc Isol).	
	BOP	• CLOSE the following valves:	
		• 1NI-9A (NC Cold Leg Inj From NV)	
		• 1NI-10B (NC Cold Leg Inj From NV).	
	BOP	(Step 7) Establish charging as follows:	
		• Check NC pump seal injection flow - GREATER THAN OR EQUAL TO 6 GPM TO EACH NC PUMP.	
		• Check VI header pressure - GREATER THAN 60 PSIG.	
		• THROTTLE 1NV-238 (U1 Charging Hdr Control) to maintain 6-10 GPM seal injection flow to each NC pump.	
		• CLOSE 1NV-241 (U1 Seal Water Inj Flow Control).	
		• Check one of the following valves - OPEN:	
		• 1NV-13B (U1 NV Supply To 1A NC Loop Isol)	
		OR	

Op Test No.:	N18-1	Scenario #	2	Event #	6 & 7	Page	61	of	62
Event Description:	**1D Feedline Break in Containment/FWIS fails to AUTO ACTUATE**								

Time	Pos.	Expected Actions/Behavior	Comments
		• 1NV-16A (U1 NV Supply To 1D NC Loop Isol).	
		• Check 1NV-21A (U1 NV Supply to U1 Aux PZR Spray Isol) - CLOSED.	
		• OPEN the following valves:	
		• 1NV-244A (U1 Charging Hdr Cont Outside Isol)	
		• 1NV-245B (U1 Charging Hdr Cont Outside Isol).	
		• WHEN controlling NV flow in subsequent steps, THEN maintain flow within the following limits while THROTTLING charging and seal injection control valves:	
		• Charging flow - LESS THAN 200 GPM	
		• Seal injection flow to each NC pump - 6-10 GPM.	
	BOP	(Step 8.a) Control charging flow as follows:	
		• Control charging flow as required to maintain Pzr level stable.	
At the discretion of the Lead Examiner terminate the exam.			

UNIT 1 STATUS:

Power Level: 75% NCS [B] 1061 ppm Pzr [B]: 1061 ppm Xe: Per OAC

Power History: At this power level for 24 hours Core Burnup: 251 EFPDs

UNIT 2 STATUS:

Power Level: 100%

CONTROLLING PROCEDURE: OP/1/A/6100/003 Controlling Procedure for Unit Operation

OTHER INFORMATION NEEDED TO ASSUME THE SHIFT:

- The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service:

- The 1B NS Pump is OOS due to a Main Breaker failure. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1.
- CAP-5320, CA Condensate Storage Tank Level Indicator, failed last shift (IAE is investigating.
- MCB Annunciator 1AD-10, B-1, “NCDT HX OUTLET HI FLO,” has failed ILLUMINATED (IAE is investigating).

Crew Directions:

- The crew will raise power to 100% after taking the shift, starting from Step 3.36.11 of Enclosure 4.1 of OP/1/A/6100/003.
- Raise power at 2MWe/minute.
- The RE recommends 100% Control Rod position of 216 steps on Control Bank D.
- The RE recommends that the BOP perform a 400 gallon Dilute to initiate the power increase.
- RMWST Dissolved O_2 is greater than 1000 ppb.
- Blender content is Reactor Makeup Water.

Work Control SRO/Offsite Communicator **Jim**

Plant SRO **Joe (FB)**

AO's AVAILABLE

Unit 1	**Unit 2**
Aux Bldg. John	**Aux Bldg. Chris**
Turb Bldg. Bob (FB)	**Turb Bldg. Mike (FB)**
5th Rounds. Carol	

Extra(s) Bill (FB) Ed (FB) Wayne (FB) Tanya Gus (RW)

Facility: **McGuire**	Scenario No.: **3**	Op Test No.: **N18-1**	
Examiners:		Operators:	(SRO)
			(RO)
			(BOP)

Initial Conditions:	The plant is at 55% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B ND Pump is OOS due to an oil leak. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. 1EMF46A, Train A KC Radiation Monitor, failed last shift (IAE is investigating) and MCB Annunciator 1AD-12, C-3, "A RN PUMP SUCTION LO PRESS," will not ILLUMINATE (IAE is investigating). It is planned to raise power on this shift to 100%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N(TS)-SRO	Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low
2	MALF IRE006H8	C-RO C(TS)-SRO	Dropped Control Rod (H-8)
3	XMT LF TSI4-6, 8 & 4	C-BOP C-SRO	1A Feedpump Hi Vibrations
4	REM NV0035A	C-BOP C-SRO	Letdown Valve 1NV-35A fails CLOSED
5	MALF IRE006M4	C-RO C-SRO	2nd Dropped Control Rod (M-4)
6	REM NC0034A MALF NC002B	M-RO M-BOP M-SRO	Pzr PORV 1NC-34A fails OPEN/Block Valve fails OPEN
7	MAL DEH003A	C-RO C-SRO	Turbine fails to Automatically Trip
8	MAL NI009AB NI001A/B ND012A	C-BOP C-SRO	SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips
9	DEL REM NC0034A	NA	Pzr PORV 1NC-34A reseats

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

McGuire 2018 NRC Scenario #3

The plant is at 55% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.

The following equipment is Out-Of-Service: The 1B ND Pump is OOS due to an oil leak. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. 1EMF46A, Train A KC Radiation Monitor, failed last shift (IAE is investigating) and MCB Annunciator 1AD-12, C-3, “A RN PUMP SUCTION LO PRESS,” will not ILLUMINATE (IAE is investigating). It is planned to raise power on this shift to 100%.

Shortly after taking the watch, the operator will commence a load increase to 100% starting with Step 3.36.10 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” The operator will dilute the NC System Boron concentration in accordance with Enclosure 4.4, “Alternate Dilute,” of OP/1/A/6150/009, “Boron Concentration Control,” and raise Turbine load in accordance with OP/1/A/6300/001 A, “Turbine-Generator Load Change.” During the power increase, Chemistry will call and report the results of a periodic sample of the Spent Fuel Boron concentration. The operator will address Technical Specification LCO 3.7.14, “Spent Fuel Pool Boron Concentration,” and Selected Licensee Commitment 16.9.7, “Standby Shutdown System.”

During the power increase, one Control Bank D Control Rod will drop into the core. The operator will respond in accordance with ARP1AD-2/D-9, “RPI at Bottom Rod Drop” and will implement AP/1/A/5500/14, “Rod Control Malfunction.” The operator will address Technical Specification LCO 3.1.4, “Rod Group Alignment Limits.” IAE will determine that manual rod movement is available. Because Xenon is building-in, the operator will need to manually adjust control rod position throughout the remainder of the scenario, to maintain Tavg-Tref within the allowable band.

Subsequently, the 1A CF pump will develop high vibrations on its shaft bearings. The operator will use Enclosure 4.3, “CF Pump(s) Shutdown,” of OP/1/A/6250/001, “Condensate and Feedwater System,” to remove the pump from service.

When the 1A CF Pump is tripped and power is stabilized, 1NV-35, Variable Flow Letdown Orifice Isolation Valve, will fail Closed. The operator will enter AP/1/A/5500/12, “Loss of Letdown, Charging or Seal Injection,” and establish Excess Letdown.

When the plant is stabilized, a second Control Rod will drop into the core. The operator will re-enter AP-14, manually trip the reactor, and go to EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.”

On the reactor trip, the turbine will fail to automatically trip, requiring the operator to manually trip the turbine. Additionally, Pressurizer PORV 1NC-34A will open and stick fully open. When the operator attempts to close the Block Valve, the Block Valve will fail to move.

The operator will perform the Immediate Actions of EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” Eventually Safety Injection (SI) will actuate, however, NC Cold Leg Injection Valves from NV, 1NI-9/10, will fail to automatically open; and the operator will need to manually open at least one of these valves. Additionally, both the 1A and 1B NI Pumps will fail to automatically start and the operator will need to manually start these pumps. Finally, the 1A ND Pump will trip.

At the E-0 Step 20.a RNO, when the operator aligns nitrogen to Pressurizer PORV 1NC-34A, the valve will re-seat. The operator will continue in E-0 until an SI reduction is initiated. Eventually, the operator will transition to Step 9 of EP/1/A/5000/ES-1.1, “Safety Injection Termination,” and complete the SI termination.

The scenario will terminate upon the completion of Step 12 of ES-1.1.

<u>Critical Tasks:</u>

Establish Excess Letdown before an automatic Reactor Protection System actuation occurs.

Safety Significance: failure to establish Excess Letdown and stop the NCS Inventory control transient, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the NCS Inventory control transient. A failure to stabilize the NCS Inventory control transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to a high Pressurizer level condition, and an unintentional Reactor Trip.)

Close the failed open PORV before an Orange Path develops on the Core Cooling Critical Safety Function Status Tree.

Safety Significance: Failure to close a failed Pzr PORV using the nitrogen supply system in the Step 20 of E-0, when able to do so, when coupled with a failure of Safety Injection to automatically actuate, constitutes a degraded fission product barrier that would not have otherwise occurred if the task were performed correctly (Performance of the task will effectively stop the on-going LOCA). The inaction by the operator constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario and will ultimately result in a Severe challenge to the Core Cooling Critical Safety Function.

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class ILT 18-1

TOPIC: NRC Simulator Exam

Scenario N18-1-3

REFERENCES:

1. Technical Specification LCO 3.5.2, “ECCS-Operating” (Amendment 282/261)
2. OP/1/A/6100/003, “Controlling Procedure for Unit Operation” (Rev 201)
3. OP/1/A/6150/009, “Boron Concentration Control” (Rev 134)
4. OP/1/A/6300/001 A, “Turbine-Generator Load Change” (Rev 13)
5. Technical Specification LCO 3.7.14, “Spent Fuel Pool Boron Concentration” (Amendment 261/241)
6. Selected Licensee Commitment 16.9.7, “Standby Shutdown System” (Rev 164)
7. MCEI-0400-349, “Unit 1 Cycle 26 Core Operating Limits Report” (Rev 0)
8. AP/1/A/5500/14, “Rod Control Malfunction” (Rev 16)
9. Technical Specification LCO 3.1.4, “Rod Group Alignment Limits” (Amendment 184/166)
10. OP/1/A/6250/001, “Condensate and Feedwater System” (Rev 210)
11. AP/1/A/5500/12, “Loss of Letdown, Charging or Seal Injection” (Rev 24)
12. EP/1/A/5000/E-0, “Reactor Trip or Safety Injection” (Rev 36)
13. EP/1/A/5000/ES-1.1, “Safety Injection Termination” (Rev 29)

Validation Time: 120 minutes

Author: David Lazarony, Essential Training & Consulting, LLC

Facility Review: ________________________

Rev. 032018

McGuire 2018 NRC Scenario #3 Objectives:

Given the simulator at an initial condition of 55% power with a normal power increase planned evaluate:

1. the SRO's ability to supervise the control room team during the normal, abnormal, and emergency situations that arise, including compliance with all facility procedures, Technical Specifications, and other commitments.

2. each crew member's ability to effectively communicate as part of a control room team during the normal, abnormal, and emergency situations that arise.

3. the RO and BOP's ability to effectively raise power in accordance with Enclosure 4.1, Power Increase, of OP/1/A/6100/003, "Controlling Procedure for Unit Operation."

4. each crew member's ability to effectively diagnose a dropped Control Rod, and the RO's ability to respond to such an event in accordance with AP/1/A/5500/14, "Rod Control Malfunction."

5. each crew member's ability to effectively diagnose high vibrations on a Main Feedwater Pump, and the RO and BOP's ability to respond to such an event in accordance with OP/1/A/6250/001, "Condensate and Feedwater System."

6. each crew member's ability to effectively diagnose an inadvertent closure of 1NV-35, Variable Flow Letdown Orifice Isolation Valve, and the BOP's ability to respond to such an event in accordance with AP/1/A/5500/12, "Loss of Letdown, Charging or Seal Injection."

7. each crew member's ability to effectively diagnose a Dropped Control Rod after one has previously dropped (i.e. 2^{nd} Dropped Rod), and the RO's ability to respond to such an event in accordance with AP/1/A/5500/14, "Rod Control Malfunction."

8. each crew member's ability to effectively diagnose a Pressurizer Steam Space Small Break LOCA and the RO and BOP's ability to respond to such an event in accordance with EP/1/A/5000/E-0, "Reactor Trip or Safety Injection."

9. each crew member's ability to effectively diagnose a failure of the Main Turbine to automatically trip when called upon to do so and the RO's ability to manually trip it when required.

10. each crew member's ability to effectively diagnose a failure of the NC Cold Leg Injection Valves from NV to automatically open when called upon to do so and the BOP's ability to open one or both when required.

11. each crew member's ability to effectively diagnose failure of both NI Pumps to automatically start when called upon to do so and the BOP's ability to start one or both when required.

12. each crew member's ability to effectively determine when Safety Injection can be terminated during implementation of the EOP network; and the RO and BOP's ability to effectively terminate Safety Injection in accordance with EP/1/A/5000/ES-1.1, "Safety Injection Termination."

Facility: **McGuire**		Scenario No.: **3**	Op Test No.: **N18-1**
Examiners:		Operators:	(SRO)
			(RO)
			(BOP)

Initial Conditions:	The plant is at 55% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B ND Pump is OOS due to an oil leak. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. 1EMF46A, Train A KC Radiation Monitor, failed last shift (IAE is investigating) and MCB Annunciator 1AD-12, C-3, "A RN PUMP SUCTION LO PRESS," will not ILLUMINATE (IAE is investigating). It is planned to raise power on this shift to 100%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N(TS)-SRO	Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low
2	MALF IRE006H8	C-RO C(TS)-SRO	Dropped Control Rod (H-8)
3	XMT LF TSI4-6, 8 & 4	C-BOP C-SRO	1A Feedpump Hi Vibrations
4	REM NV0035A	C-BOP C-SRO	Letdown Valve 1NV-35A fails CLOSED
5	MALF IRE006M4	C-RO C-SRO	2nd Dropped Control Rod (M-4)
6	REM NC0034A MALF NC002B	M-RO M-BOP M-SRO	Pzr PORV 1NC-34A fails OPEN/Block Valve fails OPEN
7	MAL DEH003A	C-RO C-SRO	Turbine fails to Automatically Trip
8	MAL NI009AB NI001A/B ND012A	C-BOP C-SRO	SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips
9	DEL REM NC0034A	NA	Pzr PORV 1NC-34A reseats

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

McGuire 2018 NRC Scenario #3

The plant is at 55% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.

The following equipment is Out-Of-Service: The 1B ND Pump is OOS due to an oil leak. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. 1EMF46A, Train A KC Radiation Monitor, failed last shift (IAE is investigating) and MCB Annunciator 1AD-12, C-3, “A RN PUMP SUCTION LO PRESS,” will not ILLUMINATE (IAE is investigating). It is planned to raise power on this shift to 100%.

Shortly after taking the watch, the operator will commence a load increase to 100% starting with Step 3.36.10 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” The operator will dilute the NC System Boron concentration in accordance with Enclosure 4.4, “Alternate Dilute,” of OP/1/A/6150/009, “Boron Concentration Control,” and raise Turbine load in accordance with OP/1/A/6300/001 A, “Turbine-Generator Load Change.” During the power increase, Chemistry will call and report the results of a periodic sample of the Spent Fuel Boron concentration. The operator will address Technical Specification LCO 3.7.14, “Spent Fuel Pool Boron Concentration,” and Selected Licensee Commitment 16.9.7, “Standby Shutdown System.”

During the power increase, one Control Bank D Control Rod will drop into the core. The operator will respond in accordance with ARP1AD-2/D-9, “RPI at Bottom Rod Drop” and will implement AP/1/A/5500/14, “Rod Control Malfunction.” The operator will address Technical Specification LCO 3.1.4, “Rod Group Alignment Limits.” IAE will determine that manual rod movement is available. Because Xenon is building-in, the operator will need to manually adjust control rod position throughout the remainder of the scenario, to maintain Tavg-Tref within the allowable band.

Subsequently, the 1A CF pump will develop high vibrations on its shaft bearings. The operator will use Enclosure 4.3, “CF Pump(s) Shutdown,” of OP/1/A/6250/001, “Condensate and Feedwater System,” to remove the pump from service.

When the 1A CF Pump is tripped and power is stabilized, 1NV-35, Variable Flow Letdown Orifice Isolation Valve, will fail Closed. The operator will enter AP/1/A/5500/12, “Loss of Letdown, Charging or Seal Injection,” and establish Excess Letdown.

When the plant is stabilized, a second Control Rod will drop into the core. The operator will re-enter AP-14, manually trip the reactor, and go to EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.”

On the reactor trip, the turbine will fail to automatically trip, requiring the operator to manually trip the turbine. Additionally, Pressurizer PORV 1NC-34A will open and stick fully open. When the operator attempts to close the Block Valve, the Block Valve will fail to move.

The operator will perform the Immediate Actions of EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” Eventually Safety Injection (SI) will actuate, however, NC Cold Leg Injection Valves from NV, 1NI-9/10, will fail to automatically open; and the operator will need to manually open at least one of these valves. Additionally, both the 1A and 1B NI Pumps will fail to automatically start and the operator will need to manually start these pumps. Finally, the 1A ND Pump will trip.

At the E-0 Step 20.a RNO, when the operator aligns nitrogen to Pressurizer PORV 1NC-34A, the valve will re-seat. The operator will continue in E-0 until an SI reduction is initiated. Eventually, the operator will transition to Step 9 of EP/1/A/5000/ES-1.1, “Safety Injection Termination,” and complete the SI termination.

The scenario will terminate upon the completion of Step 12 of ES-1.1.

Critical Tasks:

Establish Excess Letdown before an automatic Reactor Protection System actuation occurs.

Safety Significance: failure to establish Excess Letdown and stop the NCS Inventory control transient, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the NCS Inventory control transient. A failure to stabilize the NCS Inventory control transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to a high Pressurizer level condition, and an unintentional Reactor Trip.)

Close the failed open PORV before an Orange Path develops on the Core Cooling Critical Safety Function Status Tree.

Safety Significance: Failure to close a failed Pzr PORV using the nitrogen supply system in the Step 20 of E-0, when able to do so, when coupled with a failure of Safety Injection to automatically actuate, constitutes a degraded fission product barrier that would not have otherwise occurred if the task were performed correctly (Performance of the task will effectively stop the on-going LOCA). The inaction by the operator constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario and will ultimately result in a Severe challenge to the Core Cooling Critical Safety Function.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Reset to Temp IC 227** **(Base IC-19)**	**T = 0 Malfunctions:** **Insert LOA-ND003 = 1; (Rackout of the 1B ND Pump Breaker)** **Insert LOA-ND003A = 1; (Rackout of the 1B ND Pump Control Power Breaker)** **Insert MAL-EMF-46A=10 (EMF-46A Fails Low)** **Insert H_X09_001C03_1 = 0 (MCB Annunciator 1AD12/C3)** **Insert:** **insert MAL-DEH003A = True (Failure of Auto Turbine Trip Signal)** **MAL-NI009A = TRUE (1NI-9A Fails to Auto OPEN)** **MAL-NI009B = TRUE (1NI-10B Fails to Auto OPEN)** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)** **Insert:** **MAL-NI001A (1A NI Pump fails to Auto Start)** **MAL-NI001B (1B NI Pump fails to Auto Start)** **MAL-ND012A (1A ND Pump trips)** **Insert:** **REM NC-0034A=1 (Pzr PORV 1NC-34A fails OPEN)** **MAL-NC002B=100 (Block Valve fails OPEN)** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)**
☐		**RUN** **Reset all SLIMs**	**Place Tagout/O-Stick on:** • **1B ND Pump** • **1EMF-46A, Train A KC Radiation Monitor** • **MCB Annunciator 1AD-12, C-3**
☐		**Update** Status Board, **Setup OAC**	**NOTE:** RMWST DO = <1000 ppb.
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Fill out the AO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Provide the crew with a marked up copy of Enclosure 4.1 (Through Step 3.36.9), a copy of Enclosure 4.4 of OP/1/A/6150/009 marked up through step 3.7, and a blank copy of OP/1/A/6300/001 A. 3. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**Execute Simulator Scenario N18-1-3.**	
☐	At direction of examiner	**Event 1** **NA**	Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low
☐	At direction of examiner	**Event 2** **insert MAL IRE006H8 = STATIONARY _GRPPR**	Dropped Control Rod (H-8)
☐	At direction of examiner	**Event 3** **Insert XMT-LF_TSI4-6 = 7.5 Ramp = 120 seconds** **Insert XMT-LF_TSI4-8 = 2.5 Ramp = 120 seconds** **Insert XMT-LF_TSI4-4 = 2.9 Ramp = 120 seconds**	1A Feedpump Hi Vibrations **NOTE: The Floor Instructor will need to provide the BOP with a copy of Enclosure 4.3 of OP/1/A/6250/001 (Handout 4) when it is desired to print a copy of this procedure.**

	Bench Mark	ACTIVITY	DESCRIPTION
☐	After the 1A CF Pump is tripped and the plant power is stable	**Event 4** **insert REM-NV0035A = 0.0 Ramp = 10 seconds**	Letdown Valve 1NV-35A fails CLOSED
☐	At direction of examiner	**Event 5** **insert MAL IRE006M4 = STATIONARY _GRPPR**	2nd Dropped Control Rod (M-4)
☐	Upon Rx Trip	**Event 6** **Insert:** **REM NC-0034A=1** **MAL-NC002B=100** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)**	Pzr PORV 1NC-34A fails OPEN/Block Valve fails OPEN **NOTE: This event will occur on Rx Trip, and is inserted at T=0.**
☐	Post-Rx Trip	**Event 7** **Insert:** **MAL-DEH003A = TRUE**	Turbine fails to Automatically Trip **NOTE: These events will occur on Rx Trip, and are inserted at T=0.**
☐	Post-Rx Trip	**Event 8** **Insert:** **MAL-NI009A = TRUE** **MAL-NI009B = TRUE** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)** **Insert:** **MAL-NI001A** **MAL-NI001B** **MAL-ND012A**	SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips **NOTE: These events will occur on Rx Trip, and are inserted at T=0.**
☐	Post-Rx Trip at E-0 Step 20	**Event 9** **REM NC-0034A=0**	Pzr PORV 1NC-34A reseats **NOTE: This event will occur when N2 is aligned to the PORV at Step 20 of E-0.**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	9 of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**						

Shortly after taking the watch, the operator will commence a load increase to 100% starting with Step 3.36.10 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, "Controlling Procedure for Unit Operation." The operator will dilute the NC System Boron concentration in accordance with Enclosure 4.4, "Alternate Dilute," of OP/1/A/6150/009, "Boron Concentration Control," and raise Turbine load in accordance with OP/1/A/6300/001 A, "Turbine-Generator Load Change." During the power increase, Chemistry will call and report the results of a periodic sample of the Spent Fuel Boron concentration. The operator will address Technical Specification LCO 3.7.14, "Spent Fuel Pool Boron Concentration," and Selected Licensee Commitment 16.9.7, "Standby Shutdown System."

Booth Operator Instructions: **NA**

Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: Per Limit and Precaution 1.4 of Enclosure 4.1 of OP/1/A/6100/003 the operator will control Tavg-Tref at ±2°F.
OP/1/A/6100/003, CONTROLLING PROCEDURE FOR UNIT OPERATIONS ENCLOSURE 4.1, POWER INCREASE			
			NOTE: The power increase will be at 2 MWe/minute.
	BOP	(Step 3.36.10) WHEN 70% RTP or as directed by Secondary Chemistry, THEN perform the following:	
		• Begin placing C HDT Pumps in service per OP/1/B/6250/004 (Feedwater Heater Vents, Drains, and Bleed System).	
		• WHEN C HDT Pumps are in service, THEN ensure one Hotwell Pump secured per OP/1/B/6250/004 (Feedwater Heater Vents, Drains, and Bleed System).	
OP/1/A/6150/009, BORON CONCENTRATION CONTROL ENCLOSURE 4.4, ALTERNATE DILUTE			

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	10 of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**						

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The BOP may repeat this task as needed during the power increase.
	BOP	(Step 3.6) Determine amount of reactor makeup water needed to obtain desired boron concentration using McGuire Data Book, OAC, Reactor Group Guidance, or plant parameters (T-Ave, Steam Pressure, Xenon worth, etc.). (R.M.)	
		• Total Reactor Makeup Water:	**NOTE:** The BOP will add 200 gallons of MU Water.
	BOP	(Step 3.7) Determine current blender contents and evaluate any potential Reactivity effects prior to performing this enclosure:	
		• Rx Makeup Water	
		• Blend	
		• Boron	
	BOP	(Step 3.8) Ensure the following reset to zero: (R.M.)	
		• Total Make Up Flow Counter	
		• Boric Acid Flow Counter	
	BOP	(Step 3.9) Set Total Make Up Flow Counter to value determined in Step 3.6. (R.M.)	
	BOP	(Step 3.10) Select “ALTERNATE DILUTE” on “NC Sys M/U Controller”.	
	BOP	(Step 3.11) IF desired to makeup only through 1NV-175A (U1 Boric Acid Blender To VCT Outlet Control), select “CLOSED” on 1NV-171A (U1 Boric Acid Blender to VCT Inlet Control).	

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	11	of	55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**								

Time	Pos.	Expected Actions/Behavior	Comments
NOTE Rapidly changing reactor makeup water flow can cause a Rx Makeup Flow Deviation Annunciator Alarm.			
	BOP	(Step 3.12) IF AT ANY TIME it is desired to adjust reactor makeup water flow, adjust "Rx M/U Water Flow Control" setpoint to achieve desired flowrate.	**NOTE:** Typically, it is NOT desired to adjust reactor makeup water flow.
	BOP	(Step 3.13) IF AT ANY TIME it is desired to manually adjust reactor makeup water flow, perform the following:	
		(Step 3.13.1) Place "Rx M/U Water Flow Control" in manual.	
		(Step 3.13.2) Adjust "Rx M/U Water Flow Control" output to control reactor makeup water flowrate.	
NOTE IF desired to dilute with a constant flow rate as advised by engineering to minimize VCT temperature decrease, it is preferred to allow 1NV-137A (U1 NC Filter Otlt to VCT 3-Way Diversion Cntrl) to auto divert on high level.			
	BOP	(Step 3.14) IF AT ANY TIME it is desired to lower VCT level, perform the following:	
		(Step 3.14.1) Monitor Letdown Pressure.	
NOTE An increase in Letdown Pressure greater than 20 psig during diverts may be indicative of excessive NB Feed Filter DP. {NCR 01597088}			
		(Step 3.14.2) Select "HUT" on 1NV-137A (U1 NC Filters Otlt to VCT 3-Way Diversion Contrl).	**NOTE:** The BOP may do this at any time to lower VCT level.
		(Step 3.14.3) IF Letdown Pressure increases greater than 20 psig, notify CRS.	

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	12 of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**						

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 3.14.4) AFTER desired level achieved, select “AUTO” on 1NV-137A (U1 NC Filters Otlt to VCT 3-Way Diversion Cntrl).	
NOTE Steps 3.15 - 3.24 may be completed and then checked off as time allows.			
	BOP	(Step 3.15) IF AT ANY TIME plant parameters require termination of dilution, perform the following:	
		(Step 3.15.1) Place “NC System Make Up” to “STOP”. (R.M.)	
		(Step 3.15.2) IF 1NV-137A (U1 NC Filters Otlt to VCT 3-Way Diversion Cntrl) was placed to HUT, place to “AUTO”.	
	BOP	(Step 3.16) Momentarily select “START” on “NC System Make Up”. (R.M.)	
	BOP	(Step 3.17) Check “NC System Make Up” red light lit.	
BOOTH INSTRUCTOR: **AFTER the BOP has started the alternate dilution, as Chemistry, call the Control Room and report that periodic boron sample of the Spent Fuel Pool is 2654 ppm.**			
			NOTE: The CRS will evaluate this condition. **EXAMINER NOTE:** Examiner following the CRS, proceed to **Page 17** for this evaluation.

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	13	of	55

Event Description: **Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may call WCC to address the low boron concentration. If so, **Booth Instructor** acknowledge as WCC.
	BOP	(Step 3.18) Check 1NV-175A (U1 Boric Acid Blender To VCT Outlet Control) open.	
	BOP	(Step 3.19) Check 1NV-252A (Rx M/U Water Supply To U1 BA Blender Cntrl) open or throttled as required.	
	BOP	(Step 3.20) IF 1NV-171A (U1 Boric Acid Blender To VCT Inlet Control) in "AUTO", check 1NV-171A (U1 Boric Acid Blender to VCT Inlet Control) open.	**NOTE:** 1NV-171A is NOT in AUTO.
	BOP	(Step 3.21) Check Rx M/U Water Pump starts.	
	BOP	(Step 3.22) Monitor Total Make Up Flow Counter. (R.M.)	
	BOP	(Step 3.23) HOLD until one of the following occurs:	
		• Amount of reactor makeup water recorded per Step 3.6 added	
		OR	
		• Reactor makeup water addition manually terminated	
	BOP	(Step 3.24) Ensure dilution terminated as follows: (R.M.)	
		(Step 3.24.1) IF in "AUTO", ensure the following off:	

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	14 of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 1A Rx M/U Water Pump	
		• 1B Rx M/U Water Pump	
	BOP	(Step 3.24.2) Ensure the following closed:	
		• 1NV-175A (U1 Boric Acid Blender To VCT Outlet Control)	
		• 1NV-252A (RX M/U Water Supply To U1 BA Blender Cntrl)	
		• 1NV-171A (U1 Boric Acid Blender To VCT Inlet Control)	
	BOP	(Step 3.25) Ensure 1NV-171A (U1 Boric Acid Blender to VCT Inlet Control) in "AUTO".	
	BOP	(Step 3.26) Ensure "Rx M/U Water Flow Control" in "AUTO". (R.M.)	

NOTE

- OAC point M1P5614 (Unit 1 Effective Boron Concentration) may be used as the desired boron concentration in the following calculations. Use of Effective Boron Concentration will account for B-10 depletion. {NCR 01641629}
- Results of Boron Concentration makeups have been consistently lower than desired. To compensate it may be necessary to use actual Boron Concentration (instead of Effective Boron Concentration) or adjustment of the "desired" Boron Concentration to obtain a desired resultant Boron Concentration. {NCR 01682204}

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.27) IF "Rx M.U Water Flow Control" adjusted per Step 3.12 or 3.13…	**NOTE:** Typically, the Rx M.U Water Flow Control was NOT adjusted.
	BOP	(Step 3.28) Ensure 1NV-137A (U1 NC Filters Otlt to VCT 3-Way Diversion Cntrl) in "AUTO".	

NOTE

CRS concurrence required if flush of blender NOT performed.

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	15	of	55

Event Description: **Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.29) IF desired to flush blender….	**NOTE:** The BOP will likely request that the flush NOT be performed.
	BOP	(Step 3.30) Select “AUTO” for “NC Sys M/U Controller”.	
	BOP	(Step 3.31) Momentarily select “START” on “NC System Make Up”.	
	BOP	(Step 3.32) Check “NC System Make Up” red light lit.	
	BOP	(Step 3.33) Ensure the following reset to zero: (R.M.)	
		• Total Make Up Flow Counter	
		• Boric Acid Flow Counter	
	BOP	(Step 3.34) Record in Auto Log that final blender content is Rx Makeup Water.	
OP/1/A/6300/001A, TURBINE-GENERATOR STARTUP/SHUTDOWN ENCLOSURE 4.1, TURBINE-GENERATOR LOAD CHANGE			
NOTE If reducing power to a level greater than 50%, it is preferable to reduce power at a rate less than 12% per hour in order to minimize sodium peaks. [NCR01574291]			
	RO	(Step 3.4.1) IF Turbine in “OPERATOR AUTO”, perform the following:	
		(Step 3.4.1.1) Ensure desired change within “Calculated Capability Curve”.	

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	16 of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**						

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 3.4.1.2) IF turbine load will increase or decrease more than 10 MWs, notify Dispatcher of expected load change.	
		(Step 3.4.1.3) IF desired to change the load rate, THEN perform the following:	
		• Depress “LOAD RATE”.	
		• Enter desired load rate in “VARIABLE DISPLAY”.	**NOTE:** the RO will select 2-3 MWe/Min loading rate.
		• Depress “ENTER”.	
		(Step 3.4.1.4) IF desired to change desired load, THEN perform the following:	
		• Depress “REFERENCE”.	
		• Enter desired load in “VARIABLE DISPLAY”.	
		• Depress “ENTER”.	
		• Depress “GO”	
		(Step 3.4.1.5) IF desired to pause load change, THEN perform the following:	
		• Depress "HOLD".	
		• WHEN desired to resume load change, THEN depress "GO".	
OP/1/A/6100/003, CONTROLLING PROCEDURE FOR UNIT OPERATIONS ENCLOSURE 4.1, POWER INCREASE			
	BOP	(Step 3.36.10) WHEN 70% RTP or as directed by Secondary Chemistry, THEN perform the following:	
		• Begin placing C HDT Pumps in service per OP/1/B/6250/004 (Feedwater Heater Vents, Drains, and Bleed System).	
		• WHEN C HDT Pumps are in service, THEN ensure one Hotwell Pump secured per OP/1/B/6250/004 (Feedwater Heater Vents, Drains, and Bleed System).	

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	17	of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**							

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will evaluate the SFP Boron Concentration.
TECHNICAL SPECIFICATION 3.7.14, SPENT FUEL POOL BORON CONCENTRATION			
	CRS	LCO 3.7.14 The spent fuel pool boron concentration shall be within the limit specified in the COLR.	**NOTE:** According to Section 2.13.1of the COLR, the minimum SFP boron concentration is 2675 ppm. Since boron concentration has been reported to be 2654 ppm, the SFP boron concentration is too low.
	CRS	APPLICABILITY: When fuel assemblies are stored in the spent fuel pool.	
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Spent fuel pool boron concentration not within limit.	NOTE: LCO 3.0.3 is not applicable. A.1 Suspend movement of fuel assemblies in the spent fuel pool. AND A.2 Initiate action to restore spent fuel pool boron concentration to within limit.	Immediately Immediately

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition A is required and that ACTION A.1 and A.2 must be taken.
SELECTED LICENSEE COMMITMENT 16.9.7, STANDBY SHUTDOWN SYSTEM			

Op Test No.:	N18-1	Scenario #	3	Event #	1	Page	18 of 55
Event Description:	**Power Increase w/Alternate Dilute/ Spent Fuel Pool Boron Concentration Low**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	COMMITMENT: The Standby Shutdown System (SSS) shall be FUNCTIONAL.	
	CRS	APPLICABILITY MODES 1, 2, and 3.	
	CRS	REMEDIAL ACTIONS	
		NOTE: 1. The SRO should ensure that security is notified 10 minutes prior to declaring the SSS nonfunctional. Immediately upon discovery of SSS non-functionality, Security must be notified to implement compensatory measures within 10 minutes of the discovery. 2. If a non-functional SSS component is located inside containment, repairs shall be made at the first outage which permits containment access.	

CONDITION	REQUIRED ACTION	COMPLETION TIME
NOTE: Not applicable to the SSS Diesel Generator or 24 V Battery Bank and Charger. A. One or more required SSS components identified in Table 16.9.7-1 non-functional.	A.1 Verify the FUNCTIONALITY of fire detection and suppression systems in the associated areas identified in Table16.9.7-1. AND A.2 Restore the component to FUNCTIONAL status.	1 hour 7 days

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition A is required (Because the SFP Boron Concentration is too low) and that ACTION A.1 and A.2 must be taken.

At the discretion of the Lead Examiner move to Event #2.

Op Test No.:	N18-1	Scenario #	3	Event #	2	Page	19 of	55
Event Description:	**Dropped Control Rod (H-8)**							

During the power increase, one Control Bank D Control Rod will drop into the core. The operator will respond in accordance with ARP1AD-2/D-9, "RPI at Bottom Rod Drop" and will implement AP/1/A/5500/14, "Rod Control Malfunction." The operator will address Technical Specification LCO 3.1.4, "Rod Group Alignment Limits." IAE will determine that manual rod movement is available. Because Xenon is building-in, the operator will need to manually adjust control rod position throughout the remainder of the scenario, to maintain Tavg-Tref within the allowable band.

Booth Operator Instructions: **insert MALF = IRE006H8 = STATIONARY_GRPPR**

Indications Available:
- DRPI for Control Rod H-8 indicates Rod on Bottom
- MCB Annunciator 1AD-2/B-10, ROD CONTROL NON URGENT FAILURE
- MCB Annunciator 1AD-2/D-9, RPI AT BOTTOM ROD DROP
- Tref > Tavg

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/14, ROD CONTROL MALFUNCTION	
	RO	(Step 1) IF two or more rods are either dropped OR misaligned by greater than 24 steps,…	**Immediate Action** **NOTE:** Only one Rod Dropped during this event.
	RO	(Step 2) Place control rods in manual.	**Immediate Action** **NOTE:** The RO will place the rods in Manual.
	RO	(Step 3) Check rod movement – STOPPED.	**Immediate Action**
	RO	(Step 4) Check all rods – ALIGNED WITH ASSOCIATED BANK.	
	RO	(Step 4 RNO) Perform the following.	
		NOTE DRPI problems are not addressed by this AP.	

Op Test No.:	N18-1	Scenario #	3	Event #	2	Page	20 of 55
Event Description:	**Dropped Control Rod (H-8)**						

Time	Pos.	Expected Actions/Behavior	Comments
		• IF misaligned rod(s) due to DRPI indication failure only,…	**NOTE:** The misaligned rod is NOT a DRPI indication failure.
		• IF T-Avg has gone down, THEN lower Turbine load as necessary to restore T-Avg to T-Ref.	**NOTE:** The RO may adjust load on the Turbine to maintain Tavg-Tref = 1ºF.
		• GO TO Enclosure 1 (Response To Dropped or Misaligned Rod)	
			NOTE: The CRS will transition to Enclosure 1.
AP/1/A/5500/14, ROD CONTROL MALFUNCTION ENCLOSURE 1, RESPONSE TO DROPPED OR MISALIGNED ROD			
	CRS	(Step 1) Announce occurrence on paging system.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	CRS	(Step 2) Dispatch rod control system qualified IAE to perform the following:	**NOTE:** The CRS may call WCC/IAE to address. If so, **Booth Instructor** acknowledge as WCC/IAE as appropriate. After **3 Minutes Report as IAE** that **Control Rods can be moved in MANUAL.**
			Examiner NOTE: Because Xenon is building in, the RO will be required to adjust Control Rod position throughout the remainder of the scenario, in order to maintain Tavg/Tref within band.
		• Correct cause of misaligned rod.	
		• Notify Control Room operators when auto or manual rod motion is available for reactivity control.	

Op Test No.: N18-1	Scenario # 3	Event # 2		Page 21 of 55	
Event Description:	**Dropped Control Rod (H-8)**				

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) Do not move rods until IAE determines rod movement is available.	
	RO	(Step 4) IF AT ANY TIME a runback occurs while in this procedure, THEN observe the following guidance:	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• IF IAE has determined that it is permissible to move rods, THEN respond to the runback PER AP/1/A/5500/03 (Load Rejection).	
		• For all other circumstances, assume rod control is not available and respond to the runback as follows:	
		• Trip Reactor.	
		• GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection.	
	RO	(Step 5) Check "ROD CONTROL URGENT FAILURE" alarm (1AD-2, A-10) – DARK.	
	RO	(Step 6) Use OAC point M1P1385 (Reactor Thermal Power, Best Estimate) to determine reactor power in subsequent steps.	
	RO	(Step 7) Check AFD (Tech Spec 3.2.3) – WITHIN TECH SPEC LIMITS.	
NOTE If any control rod is misaligned more than 12 steps, Step 15 will provide guidance for performing any Tech Spec required power reduction.			
	CRS	(Step 8) REFER TO the following Tech Specs while continuing in the enclosure:	
		• Tech Spec 3.1.4 (Rod Group Alignment Limits).	**NOTE:** The CRS may check the TS now and conclude that LCO 3.1.4 must be entered.

Op Test No.:	N18-1	Scenario #	3	Event #	2	Page	22 of 55
Event Description:		**Dropped Control Rod (H-8)**					

Time	Pos.	Expected Actions/Behavior	Comments
		• Tech Spec 3.1.5 (Shutdown Bank Insertion Limits).	The CRS may check the TS now and conclude that LCO 3.1.5 is NOT required to be entered.
		• Tech Spec 3.1.6 (Control Bank Insertion Limits).	**NOTE:** The CRS may check the TS now and conclude that LCO 3.1.6 is NOT required to be entered.
		• Tech Spec 3.2.4 (QPTR)	**NOTE:** The CRS may check the TS now and conclude that LCO 3.2.4 is NOT required to be entered.
		• Ensure shutdown margin calculation is performed within 1 hour.	**NOTE:** The CRS may call WCC or the U2 BOP to perform SDM calculation. If so, **Floor/Booth Instructor** acknowledge as WCC as appropriate.
	CRS	(Step 9) Contact Reactor Engineering for instructions.	**NOTE:** The CRS may call WCC/RE to address. If so, **Booth Instructor** acknowledge as WCC/RE as appropriate.
			Examiner NOTE: The CRS may continue in Enclosure 1 of AP-14, however, there are no substantial actions (Not Scripted).
			NOTE: The CRS will check the Tech Specs.
TECHNICAL SPECIFICATION 3.1.4, ROD GROUP ALIGNMENT LIMITS			
	CRS	LCO 3.1.4 All shutdown and control rods shall be OPERABLE, with all individual indicated rod positions within 12 steps of their group step counter demand position.	
	CRS	APPLICABILITY: MODES 1 and 2.	

Op Test No.:	N18-1	Scenario #	3	Event #	2	Page	23 of 55
Event Description:	**Dropped Control Rod (H-8)**						

Time	Pos.	Expected Actions/Behavior	Comments
		ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One rod not within alignment limits.	B.1Restore rod to within alignment limits. <u>OR</u> B.2.1.1 Verify SDM is within the limit specified in the COLR. <u>OR</u> B.2.1.2 Initiate boration to restore SDM to within limit. AND B.2.2 Reduce THERMAL POWER to ≤ 75% RTP. AND B.2.3 Verify SDM is within the limit specified in the COLR. AND B.2.4 Perform SR 3.2.1.1. AND B.2.5 Perform SR 3.2.2.1. AND B.2.6 Re-evaluate safety analyses and confirm results remain valid for duration of operation under these conditions.	1 hour 1 hour 1 hour 2 hours Once per 12 hours 72 hours 72 hours 5 days

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition B is required and that ACTION B.1 or B.2.1.1 and B.2.1.2 and B.2.2, B.2.3, B.2.4, B.2.5 and B.2.6 must be taken.
			NOTE: The CRS may check TS LCO 3.2.4, however, QPTR is <1.02 on all quadrants.
			Examiner NOTE: Step 15 of AP14 will direct the CRS to lower power to less than 50%. However, subsequent events will limit the crew's ability to perform this downpower.

At the discretion of the Lead Examiner move to Event #3.

Op Test No.:	N18-1	Scenario #	3	Event #	3	Page	24 of 55
Event Description:	**1A Feedpump Hi Vibrations**						

Subsequently, the 1A CF pump will develop high vibrations on its shaft bearings. The operator will use Enclosure 4.3, "CF Pump(s) Shutdown," of OP/1/A/6250/001, "Condensate and Feedwater System," to remove the pump from service.

Booth Operator Instructions: **Insert XMT-LF_TSI4-6 = 7.5 Ramp = 120 sec**
Insert XMT-LF_TSI4-8 = 2.5 Ramp = 120 sec
Insert XMT-LF_TSI4-4 = 2.9 Ramp = 120 sec

Indications Available:

- OAC Alarm M1A1158: 1A CFPT LP BEARING 2 VIBRATION

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may enter AP-6 at any time during the removal of the 1A CF Pump from service. This procedure is not scripted, nor will it perform any substantive actions.
OAC ALARM M1A1158, 1A CFPT LP BEARING 2 VIBRATION			
	CRS	(Hi-Hi Step 1) Remove affected CF Pump from service using OP/1/A/6250/001 (Condensate and Feedwater)	
			NOTE: The CRS will enter the OP. **Floor Instructor:** When the CRS/BOP seeks to obtain the OP, provide the BOP with a copy of Enclosure 4.3 of OP/1/A/6250/001 (Handout 4).
			NOTE: The CRS may call WCC to address. If so, **Booth Instructor** acknowledge as WCC as appropriate.

Op Test No.:	N18-1	Scenario #	3	Event #	3	Page	25 of 55
Event Description:	1A Feedpump Hi Vibrations						

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may dispatch an AO to the 1A CF Pump. If so, **Floor/Booth Instructor** acknowledge as **AO**, and after 2 Minutes report that local indications show that there are **elevated vibrations on the 1A CF Pump High Pressure, Low Pressure and Inboard Pump bearings**.
OP/1/A/6250/001, CONDENSATE AND FEEDWATER ENCLOSURE 4.3, CF PUMPS(S) SHUTDOWN			
	CRS/ BOP	(Step 3.1) Evaluate all outstanding Clearances that may impact performance of this procedure.	**NOTE:** The CRS/BOP may call WCC to address the R&Rs. If so, **Booth Instructor** acknowledge as WCC, and report none.
	BOP	(Step 3.2) Perform the following sections, as applicable:	
		• Section 3.3, Shutdown 1A CF Pump	
	BOP	(Step 3.3) Shutdown 1A CF Pump	
		• IF this is the last CF Pump to be tripped during plant shutdown,…	**NOTE:** The 1B CF Pump is running.
		• On DCS Workstation Feedpump Overview Graphic, ensure 1CF-76 (1A CF Pump Recirc Control) is in auto.	
	BOP	• Notify OPS Secondary to perform the following:	**NOTE:** The CRS may call WCC/Chemistry to address the CM System operation. If so, **Booth Instructor** acknowledge as WCC/OPS Secondary.
		• Monitor Condensate Polisher flow	

Op Test No.:	N18-1	Scenario #	3	Event #	3	Page	26 of 55
Event Description:		**1A Feedpump Hi Vibrations**					

Time	Pos.	Expected Actions/Behavior	Comments
		• Notify Control Room to adjust 1CM-422/423 (Cond Polish Demin Bypass) to provide adequate Condensate Polisher flow	
	BOP	• On DCS Workstation Feedpump Overview Graphic, select “AUTO SET” for 1A CF Pump Turbine.	
		• On “AUTO/SPD SETTER SEL” pop-up (7076), select “SPD SET” for 1A CF Pump Turbine.	
		• Check “SPEED SET” indicated in window below “AUTO/SPD” select box for button for 1A CF Pump Turbine.	
		• IF 1B CF Pump in service, monitor 1B CF Pump to ensure it maintains expected CF flow.	**NOTE:** The CRS may enter AP-6 at any time during the removal of the 1A CF Pump from service. This procedure is not scripted, nor will it perform any substantive actions.

NOTE

- WHEN both Gov Cntrl's are in auto, the "LP GOV CNTRL" will also lower the "HP GOV CNTRL "if open.
- Decreasing CF Pump speed will cause a decrease in feedwater flow to the steam generators and result in an NC system temperature increase. (R.M.)
- CF Pumps have critical vibration ranges in the 4000 - 4200 rpm range, at 2700 rpm and 1900 - 2100 rpm range. Minimize the time the pumps are operated in these ranges.

CAUTION

IF CF Pump is removed from service too rapidly, feedwater flow oscillations may occur.

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	• Using the “LP GOV CNTRL” decrease pushbutton, slowly lower 1A CF Pump Turbine speed until 1A CF Pump is out of the CF Header (speed should be less than 2000 rpm).	

NOTE

CF Pump should be recirculating 4000 - 8000 gpm.

Time	Pos.	Expected Actions/Behavior	Comments

Op Test No.:	N18-1	Scenario #	3	Event #	3	Page	27 of 55
Event Description:	**1A Feedpump Hi Vibrations**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	• Check 1A CF Pump NOT adding water to system.	
		• Ensure 1CF-76 (1A CF Pump Recirc Control) manual loader fully open.	
NOTE CF Pump removed from service should be "tripped" to ensure immediate CA System auto start on loss of operating CF Pump.			
		• Depress and hold “RESET” on “A or B CF Pump Recirc Valve Closure Circuit”.	
		• Trip “1A CF Pump Turbine”.	
	BOP	• Check the following lit:	
		• “Trip” on 1A CF Pump Turbine	**Booth Instructor: When the 1A CF Pump is tripped remove all vibration malfunctions.**
		• “MIN” on 1SP-15 (1A CFPT Hi Press Stop Valve)	
		• “MIN” on 1HM-157 (1A CFPT Lo Press Stop Valve)	
		• Check “RESET” on “A or B CF Pump Recirc Valve Closure Circuit” lit.	
		• Release “RESET” on “A or B CF Pump Recirc Valve Closure Circuit”.	
		• IF desired to shutdown AC Oil Pumps, perform….	**NOTE:** The CRS will likely leave the AC Oil Pumps running.
		• IF this enclosure was used to secure 1A CF Pump during CF Pump swap, exit this enclosure.	
NOTE Maintaining vacuum and steam supplied to seals while CF Pump is shutdown may result in excessive water accumulation in oil reservoir.			

Op Test No.:	N18-1	Scenario #	3	Event #	3	Page	28	of 55
Event Description:	**1A Feedpump Hi Vibrations**							

Time	Pos.	Expected Actions/Behavior	Comments
		• Evaluate placing 1A CF Pump Turbine Oil Reservoir in purification.	
		• WHEN high pressure steam no longer required, close 1SP-1 (Main Steam to 1A CF Pump Turb. Isol.).	
		• IF CF Pump Turbine 1A AND 1B shutdown…	
		• IF removing 1A CF Pump from service for maintenance, go to Enclosure 4.29 (Removing/Returning 1A CF Pump From/To Service For Maintenance).	**NOTE:** The CRS may call WCC and report that the 1A CF Pump has been removed from service. If so, **Booth Instructor** acknowledge as WCC.
When the 1A CF Pump is tripped and the plant power is stable, move to Event #4.			

Op Test No.:	N18-1	Scenario #	3	Event #	4	Page	29 of 55
Event Description:	**Letdown Valve 1NV-35A fails CLOSED**						

When the 1A CF Pump is tripped and power is stabilized, 1NV-35, Variable Flow Letdown Orifice Isolation Valve, will fail Closed. The operator will enter AP/1/A/5500/12, "Loss of Letdown, Charging or Seal Injection," and establish Excess Letdown.

Booth Operator Instructions: **insert REM-NV0035A = 0.0 (Ramp = 10 seconds)**

Indications Available:
- Letdown flow (1NVP5530) indicates 0 gpm.
- 1NV-35A Green status light is LIT.
- Pzr Level trending upward.
- Charging flow (1NVP5630) starts to lower.

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will enter AP-12.
AP/1/A/5500/12, LOSS OF LETDOWN, CHARGING OR SEAL INJECTION			
	BOP	(Step 1) Check if charging is aligned to Regenerative Hx as follows:	
		• Charging flow – GREATER THAN 20 GPM	**NOTE:** The BOP may take MANUAL control of 1NV-238 to control Charging flow.
		• 1NV-241 (U1 Seal Water Inj Flow Control) – THROTTLED OPEN	
		• 1NV-244A (U1 Charging Hdr Cont Outside Isol) - OPEN	
		• 1NV-245B (U1 Charging Hdr Cont Outside Isol) – OPEN.	
	BOP	(Step 2) Check Pzr Level – LESS THAN 96%.	
	CRS	(Step 3) Stop any power or temperature changes in progress.	

Op Test No.:	N18-1	Scenario #	3	Event #	4	Page	30 of 55
Event Description:	**Letdown Valve 1NV-35A fails CLOSED**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 4) Announce occurrence on paging system.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	CRS	(Step 5) IF this AP entered due to loss of letdown only, THEN GO TO Step 37.	
	BOP	(Step 37) Ensure the following valves are CLOSED:	
		• 1NV-458A (U1 75 GPM L.D Orifice Otlt Cont Isol)	
		• 1NV-457A (U1 45 GPM L/D Orifice Otlt Cont Isol)	
		• 1NV-35A (U1 Variable L/D Orifice Otlt Cont Isol).	**NOTE:** 1NV-35 has failed CLOSED.
	BOP	(Step 38) Ensure NC System makeup controller is auto.	
	BOP	(Step 39) Ensure charging flow going down to maintain Pzr at program level.	**NOTE:** The BOP may take MANUAL control of 1NV-238 to control Charging flow.
	BOP	(Step 40) Check "LETDN RELIEF HI TEMP" alarm (1AD-7, I-4) – HAS REMAINED DARK.	
	BOP	(Step 41) Check 1NV-21A (U1 NV Supply to U1 Aux PZR Spray Isol) – CLOSED.	
	BOP	(Step 42) Operate Pzr heaters as follows:	
		• Check A, B, and D Pzr heater group supply breakers on vertical board – CLOSED.	
		• Check normal Pzr spray – AVAILABLE.	

Op Test No.: N18-1 Scenario # 3 Event # 4 Page 31 of 55

Event Description: **Letdown Valve 1NV-35A fails CLOSED**

Time	Pos.	Expected Actions/Behavior	Comments
		Place the following Pzr heater groups in manual and "ON" to maximize spray flow:	
		• A	
		• B	
		• D	
	BOP	(Step 43) Check the following valves – OPEN:	
		• 1NV-1A (U1 NC L/D Isol To Regenerative Hx)	
		• 1NV-2A (U1 NC L/D Isol To Regenerative Hx).	
	CRS	(Step 44) GO TO Step 49.	
	BOP	(Step 49) Establish normal letdown as follows:	**Examiner NOTE:** Although attempts will be made, Normal Letdown will NOT be able to be established. The CRS may recognize that Normal Letdown cannot be established and perform the RNO. If so, go to **Step 52** on **Page 32.**
		• Ensure 1NV-459 (U1 Variable L/D Orifice Outlet Flow Cntrl) is CLOSED.	
		• Place 1NV-124 (U1 Letdown Press Control) in manual with output between 40-45% OPEN.	
		• Check OAC – IN SERVICE.	
		• Check valve position on OAC for 1NV-124 – INDICATING THROTTLED.	
		• Check the following valves – OPEN:	
		• 1NV-1A (U1 NC L/D Isol To Regenerative Hx)	
		• 1NV-2A (U1 NC L/D Isol To Regenerative Hs).	

Op Test No.:	N18-1	Scenario #	3	Event #	4	Page	32 of 55	
Event Description:	**Letdown Valve 1NV-35A fails CLOSED**							

Time	Pos.	Expected Actions/Behavior	Comments
CAUTION A Pzr insurge will occur when charging flow is raised in next step. Letdown should be established without delay to limit the amount of insurge.			
		• Establish cooling to Regenerative Hx by performing the following concurrently:	
		• Establish at least 65 GPM charging flow by THROTTLING OPEN 1NV-238 (U1 Charging Hdr Control) or raising PD pump speed.	**NOTE:** The BOP will take MANUAL control of 1NV-238 to control Charging flow.
		• THROTTLE 1NV-241 (U1 Seal Water Inj Flow Control) to establish approximately 8 GPM seal injection flow to each NC pump.	
		• OPEN letdown line isolation valves as follows:	
		• OPEN 1NV-7B (U1 Letdown Cont Outside Isol).	
		• OPEN 1NV-1A (U1 NC L/D Isol To Regenerative Hx).	
		• OPEN 1NV-2A (U1 NC L/D Isol To Regenerative Hx).	
		• OPEN 1NV-35A (U1 Variable L/D Orifice Otlt Cont Isol).	**NOTE:** 1NV-35A cannot be opened.
	CRS	(Step 49g RNO) GO TO Step 52	**NOTE:** Although attempts will be made, Normal Letdown will NOT be able to be established.
	BOP	(Step 52) Establish excess letdown as follows:	
		• Adjust charging to minimum while maintaining the following:	**NOTE:** The BOP will take MANUAL control of 1NV-238 to control Charging flow.
		• NC pump seal injection flow greater that 6 GPM.	

Op Test No.:	N18-1	Scenario #	3	Event #	4	Page	33 of 55
Event Description:	**Letdown Valve 1NV-35A fails CLOSED**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Pzr level at program level.	
	BOP	• IF AT ANY TIME excess letdown cannot be established, THEN observe Note prior to Step 53 and GO TO Step 53 to establish letdown using Rx Vessel Head Vents.	
	BOP	• OPEN the following valves:	
		• 1KC-315B (U1 Excess L/D Hx KC Ret Hdr Cont Otsd Isol).	
		• 1KC-305B (U1 KC To Excess L/D Hx Cont Outside Isol).	
	BOP	• Ensure 1NV-27B (U1 Excess L/D Hx Outlet 3-Way Cntrl) selected to "VCT" position.	
NOTE Opening and then closing 1NV-26B (U1 Excess L/D Hx Outlet Cntrl) in the next steps will reduce the possibility of water hammer by ensuring that the excess letdown line is filled with water.			
	BOP	• OPEN 1NV-26B (U1 Excess L/D Hx Outlet Cntrl	
		• Wait 2 minutes.	
		• CLOSE 1NV-26B (U1 Excess L/D Hx Outlet Cntrl).	
	BOP	• Check the following valves – OPEN:	
		• 1NV-94AC (U1 NC Pumps Seal Water Return Cont Inside Isol)	
		• 1NV-95B (U1 NC Pumps Seal Water Return Cont Outside Isol).	
	BOP	• OPEN 1NV-24B (1C NC Loop To Excess L/D Hx Isol).	
		• OPEN 1NV-25B (1C NC Loop To Excess L/D Hx Isol).	
	BOP	• Check the following:	
		• Reactor - CRITICAL	
		• 1NV-27B – ALIGNED TO VCT.	

Op Test No.:	N18-1	Scenario #	3	Event #	4	Page	34 of 55
Event Description:	**Letdown Valve 1NV-35A fails CLOSED**						

Time	Pos.	Expected Actions/Behavior	Comments
CAUTION The Excess Letdown Hx and associated piping contain approximately 30 gallons of water that is at a different boron concentration than the NC System.			
	RO	• Closely monitor reactor response once excess letdown is in service.	
		• Slowly OPEN 1NV-26B while maintaining excess letdown Hx temperature less than 200°F.	
Critical Task: **Establish Excess Letdown before an automatic Reactor Protection System actuation occurs.** Safety Significance: failure to establish Excess Letdown and stop the NCS Inventory control transient, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the NCS Inventory control transient. A failure to stabilize the NCS Inventory control transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to a high Pressurizer level condition, and an unintentional Reactor Trip.)			
	CRS	• GO TO Step 52.r.	
		• Notify Primary Chemistry that excess letdown is in service.	**NOTE:** The CRS may call Chemistry. If so, **Booth Instructor** acknowledge as Chemistry.
	BOP	• Adjust charging flow as desired while maintaining the following:	
		• NC pump seal injection flow greater than 6 GPM	
		• Pzr level at program level.	
		• Operate Pzr heaters as desired.	

Op Test No.:	N18-1	Scenario #	3	Event #	4	Page	35 of 55
Event Description:	**Letdown Valve 1NV-35A fails CLOSED**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	• WHEN time allows, THEN notify engineering to document the following transients:	**NOTE:** The CRS may call Engineering. If so, **Booth Instructor** acknowledge as Engineering.
		• Letdown isolation	
		• Potential charging nozzle transient	
		• IF NV Aux Spray was in service…	
	BOP	• Check 1NV-27B (U1 Excess L/D Hx Outlet 3-Way Cntrl) = ALIGNED TO "VCT".	
NOTE With normal letdown secured, 1NV-137A (U1 NC Filter Otlt To VCT 3-Way Diversion Cntrl) is unavailable to lower VCT level.			
		• IF AT ANY TIME VCT level needs to be lowered….	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• WHEN normal letdown available…	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• WHEN desired to isolate excess letdown…	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• RETURN TO procedure and step in effect.	
			NOTE: The CRS may call WCC/IAE to address the failed valve. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: The CRS will likely conduct a Focus Brief.
At the discretion of the Lead Examiner move to Event #5.			

Op Test No.:	N18-1	Scenario #	3	Event #	5	Page	36	of	55
Event Description:	**2nd Dropped Control Rod (M-4)**								

When the plant is stabilized, a second Control Rod will drop into the core. The operator will re-enter AP-14, manually trip the reactor, and go to EP/1/A/5000/E-0, "Reactor Trip or Safety Injection."

Booth Operator Instructions: **insert MALF = IRE006M4 = STATIONARY_GRPPR**

Indications Available:

- MCB Annunciator 1AD-2, B-10, ROD CONTROL NON-URGENT FAILURE, alarms.
- MCB Annunciator 1AD-2, D-9, RPI AT BOTTOM ROD DROP, alarms.
- MCB Annunciator 1AD-2, D-10, RPI URGENT FAILURE, alarms.
- MCB Annunciator 1AD-2, E-9, RPI AT BOTTOM > 1 ROD DROPPED, alarms.
- DRPI indication that Control Rod M4 is on the bottom.

Time	Pos.	Expected Actions/Behavior	Comments
		AP/1/A/5500/14, ROD CONTROL MALFUNCTION	
	RO	(Step 1) IF more than one rod dropped, OR misaligned by greater than 24 steps, THEN perform the following:	**Immediate Action**
		• Trip Reactor.	
		• GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).	
		On the Manual Rx Trip move to Events #6-9.	

Op Test No.:	N18-1	Scenario #	3	Event #	6, 7, 8 & 9	Page	37 of 55
Event Description:	**Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**						

On the reactor trip, the turbine will fail to automatically trip, requiring the operator to manually trip the turbine. Additionally, Pressurizer PORV 1NC-34A will open and stick fully open. When the operator attempts to close the Block Valve, the Block Valve will fail to move. The operator will perform the Immediate Actions of EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.” Eventually Safety Injection (SI) will actuate, however, NC Cold Leg Injection Valves from NV, 1NI-9/10, will fail to automatically open; and the operator will need to manually open at least one of these valves. Additionally, both the 1A and 1B NI Pumps will fail to automatically start and the operator will need to manually start these pumps. Finally, the 1A ND Pump will trip. At the E-0 Step 20.a RNO, when the operator aligns nitrogen to Pressurizer PORV 1NC-34A, the valve will re-seat. The operator will continue in E-0 until an SI reduction is initiated. Eventually, the operator will transition to Step 9 of EP/1/A/5000/ES-1.1, “Safety Injection Termination,” and complete the SI termination. The scenario will terminate upon the completion of Step 12 of ES-1.1.

Booth Operator Instructions:	**Insert REM NC-0034=1 and MAL-NC002B=100;** **Insert MAL-DEH003A** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)**

Indications Available:

- 1NC-34A Red Status light is LIT.
- Pzr pressure lowers uncontrollably.

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: Crew will carry out Immediate Actions of E-0, prior to the CRS addressing the EP.
		EP/1/A/5000/E-0, REACTOR TRIP OR SAFETY INJECTION	
	RO/ BOP	(Step 1) Monitor Foldout page.	
		NC Pump Trip Criteria	**NOTE:** It is expected that NCP Trip Criteria will apply.

Op Test No.:	N18-1	Scenario #	3	Event #	6, 7, 8 & 9	Page	38	of	55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		IF all the following conditions are satisfied, THEN trip all NC pumps while maintaining seal injection flow: (1) At least one NV or NI pump on, (2) NC subcooling based on core exit T/Cs less than or equal to 0°F, (3) Reactor power less than 5%.	
		CA Suction Sources (CA storage tank (water tower) goes below 1.5 ft – Not expected)	
		Position Criteria for 1NV-150B and 1NV-151A (U1 NV Pump Recird Isol)	
		• IF NV S/I flowpath aligned AND NC pressure is less than 1500 PSIG, THEN CLOSE 1NV-150B and 1NV-151A.	**NOTE:** The BOP will monitor these conditions.
		• IF NC pressure is greater than 2000 PSIG, THEN OPEN 1NV-150B and 1NV-151A.	
		Ruptured S/G Aux Feedwater Isolation Criteria (Not expected)	
		Faulted S/G Aux Feedwater Isolation Criteria (Not expected)	
	RO	(Step 2) Check Reactor Trip:	**Immediate Action**
		• All rod bottom lights – LIT	
		• Reactor trip and bypass breakers – OPEN	
		• I/R power – GOING DOWN.	
	RO	(Step 3) Check Turbine Trip:	**Immediate Action**
		• All throttle valves – CLOSED.	**NOTE:** The turbine has failed to trip.
	RO	(Step 3 RNO) Perform the following:	**Immediate Action**
		• Trip turbine.	

Op Test No.: N18-1	Scenario # 3	Event # 6, 7, 8 & 9	Page 39 of 55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF turbine will not trip, THEN…	
	BOP	(Step 4) Check 1ETA and 1ETB – ENERGIZED.	**Immediate Action**
	RO/ BOP	(Step 5) Check if S/I is actuated:	**Immediate Action**
		• “SAFETY INJECTION ACTUATED” status light (1SI-18) – LIT.	
		• Both LOCA Sequencer Actuated status lights (1SI-14) – LIT.	
	CRS	(Step 6) Announce “Unit 1 Safety Injection”.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that U1 Safety Injection has been actuated. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 7) Check all Feedwater Isolation status lights (1SI-4) – LIT.	
	BOP	(Step 8) Check Phase A “RESET” lights – DARK.	
	BOP	(Step 9) Check ESF Monitor Light Panel on energized train(s):	
		• Groups 1, 2, 5 – DARK.	
		• Group 3 – LIT.	
		• Group 4 – LIT AS REQUIRED.	**NOTE:** NI-9/10 failed to OPEN, and the 1A/1B NI Pumps failed to start.

Op Test No.:	N18-1	Scenario #	3	Event #	6, 7, 8 & 9	Page	40	of	55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 9d RNO) Align or start components as required.	**NOTE:** The BOP will need to manually open NI-9/10, and start the 1A/1B NI Pumps.
		• Group 6 – LIT.	
		• GO TO Step 10.	
	RO/ BOP	(Step 10) Check proper CA pump status:	
		• MD CA pumps – ON	
		• N/R level in at least 3 S/Gs – GREATER THAN 17%.	
	BOP	(Step 11) Check all KC pumps - ON	
	BOP	(Step 12) Check both RN pumps – ON.	
	CRS	(Step 13) Notify Unit 2 to perform the following:	**Floor Instructor:** As U2 RO report “2A RN Pump is running.”
		• Start 2A RN pump.	
		• THROTTTLE Unit 2 RN flow to minimum for existing plant conditions.	**Booth Instructor:** **insert LOA-RN087 (Start 2A RN Pump)** **insert LOA-RN083 8050.000000 delay=0 ramp=10 (Unit 2 Train A Demand Flow)**
	RO	(Step 14) Check all S/G pressures – GREATER THAN 775 PSIG.	

Op Test No.:	N18-1	Scenario #	3	Event #	6, 7, 8 & 9	Page	41	of	55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 15) Check Containment Pressure – HAS REMAINED LESS THAN 3 PSIG.	**NOTE:** Containment pressure is ≈0.2 psig, and slowly rising due to the PRT Rupture Disc rupturing.
	BOP	(Step 16) Check S/I flow:	
	BOP	• Check “NV PMPS TO COLD LEG FLOW” gauge – INDICATING FLOW.	**NOTE:** 1NI-9/10 may still be closed. If so, the RNO will be performed.
		(Step 16.a RNO) Start NV pump(s) and align valves.	
		• (Step 16.b) Check NC pressure – LESS THAN 1600 PSIG.	
		• Check NI pumps – INDICATING FLOW.	**NOTE:** Both NI Pumps may still be OFF. If so, the RNO will be performed.
	BOP	(Step 16.c RNO) Start NI pumps and align valves.	
	RO	• (Step 16.d) Check NC pressure – LESS THAN 275 PSIG.	
	BOP	(Step 16.d RNO) Perform the following:	
		• Ensure ND pump miniflow valve on running pump(s) OPEN:	
		• 1ND-68A (1A ND Pump & Hx Mini Flow Isol)	
	CRS	• IF valve(s) open on all running ND pumps, THEN GO TO Step 17.	

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 17) Notify OSM or other SRO to perform EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 22 (OSM Actions Following an S/I) within 10 minutes.	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
	RO/ BOP	(Step 18) Check CA flow:	
		• Total CA flow – GREATER THAN 450 GPM.	
		• Check VI header pressure – GREATER THAN 60 PSIG.	
		• WHEN each S/G N/R level is greater than 11% (32% ACC), THEN control CA flow to maintain that S/G N/R level between 11% (32% ACC) and 50%.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
			NOTE: The use of adverse Containment numbers is required if Containment Pressure is > 3 psig.
	RO	(Step 19) Check NC temperatures:	
		• IF all NC pumps on, THEN check NC T-Avg – STABLE OR TRENDING TO 557°F.	**NOTE:** The NC Pumps are likely OFF.
		OR	
		• IF all NC pumps off, THEN check NC T-Colds – STABLE OR TRENDING TO 557°F.	**NOTE:** Tavg and/Tcolds may be < 557°F, but also stable. If so, **Examiners** move to **Step 20 of E-0**.
	RO	(Step 19 RNO) Perform the following based on plant conditions:	

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF temperature less than 557°F AND going down, THEN attempt to stop cooldown PER Enclosure 3 (Uncontrolled NC System Cooldown).	**NOTE:** The cooldown may be under control, and Enclosure 3 may NOT be needed. **NOTE:** If needed, the CRS may assign the RO to perform this action. If so, **RO Examiner** follow actions of Enclosure 3. **Other Examiners** follow **E-0** Actions, **Step 20**, on **Page 45**.
E-0, REACTOR TRIP OR SAFETY INJECTION ENCLOSURE 3, UNCONTROLLED NC SYSTEM COOLDOWN			
	RO	(Step 1) Check steam dump valves – CLOSED.	**Examiner NOTE:** Follow the actions associated with Enclosure 3 if RO is assigned by CRS to perform.
	RO	(Step 1 RNO) CLOSE steam dump valves as follows:	
		• Place “STM PRESS CONTROLLER” in manual.	
		• Adjust “STM PRESS CONTROLLER” output to 0%.	
		• Place “STEAM DUMP SELECT” in steam pressure mode.	
		• IF steam dumps still open…	**NOTE:** The Steam Dump Valves will be CLOSED.
	RO	(Step 2) Check all SM PORVs – CLOSED.	
	RO	(Step 3) Check MSR “RESET” light – LIT.	

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) Check any NC pump – ON.	**NOTE:** It is likely that the NCPs will be OFF.
	RO	(Step 4 RNO) Perform the following:	
		• IF any NC T-Cold is still going down, THEN GO TO Step 6.	
	RO	(Step 6) Control feed flow as follows:	**NOTE:** The use of adverse Containment numbers is required if Containment Pressure is > 3 psig.
		• IF S/G N/R level is less than 11% (32% ACC) in all S/Gs…	
		• WHEN N/R level is greater than 11% (32% ACC) in at least one S/G, THEN THROTTLE feed flow further to:	
		• Minimize cooldown	
		• Maintain at least one S/G N/R level greater than 11% (32% ACC).	
	RO	(Step 7) Check MSIVs – ANY OPEN.	**NOTE:** All MSIVs may be CLOSED. If so, Enclosure 3 will be exited.
	RO	(Step 8) CLOSE 1SM-15 (U1 SM TO MSR 2nd Stg Tube Bundles Isol).	
	RO	(Step 9) Check any NC pump - ON	**NOTE:** It is likely that the NCPs will be OFF.
	RO	(Step 9 RNO) Perform the following:	
		• IF any NC T-Cold is still going down,…	**NOTE:** It is expected that NC Tcolds will be stabilized.

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF cooldown stopped, THEN exit this enclosure.	
		E-0, REACTOR TRIP OR SAFETY INJECTION	
			Examiner NOTE: Examiners following the **CRS/BOP** continue **HERE**.
	BOP	(Step 20) Check Pzr PORV and spray valves:	
		• All Pzr PORVs – CLOSED.	**NOTE:** 1NC-34A is OPEN.
	BOP	(Step 20.a RNO) IF Pzr pressure less than 2315 PSIG, THEN perform the following:	
		• CLOSE Pzr PORV(s)	**NOTE:** All attempts to Close 1NC-34A have failed.
		• IF any Pzr PORV cannot be closed, THEN perform the following:	
		• CLOSE its isolation valve.	**NOTE:** All attempts to Close the 1NC-34A Block Valve have failed.
		• CLOSE the following valve(s):	
		• IF 1NC-34A (U1 Pzr PORV) failed, THEN CLOSE 1NC-270 (PZR PORV Drn Isol For 1NC-34A).	
		• IF PORV isolation valve cannot be closed, THEN perform the following:	
		• Align N2 to all Pzr PORVs as follows:	
		• OPEN 1NI-430A (Emerg N2 From CLA To 1NC-34A).	
		• OPEN 1NI-431B (Emerg N2 From CLA To 1NC-32B & 36B).	
		• CLOSE Pzr PORV.	**NOTE:** When N2 is aligned the PORV will Close.

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
Booth Operator Instructions:			**Modify REM NC-0034A = 0 (1NC-34A will CLOSE)**
		• IF any Pzr PORV cannot be closed or isolated, THEN……	
Critical Task: **Close the failed open PORV before an Orange Path develops on the Core Cooling Critical Safety Function Status Tree.** Safety Significance: Failure to close a failed Pzr PORV using the nitrogen supply system in the Step 20 of E-0, when able to do so, when coupled with a failure of Safety Injection to automatically actuate, constitutes a degraded fission product barrier that would not have otherwise occurred if the task were performed correctly (Performance of the task will effectively stop the on-going LOCA). The inaction by the operator constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario and will ultimately result in a Severe challenge to the Core Cooling Critical Safety Function.			
	BOP	(Step 20.b) Normal Pzr spray valves - CLOSED	
	BOP	(Step 20.c) At least one Pzr PORV isolation valve – OPEN.	
	RO	(Step 21) Check NC subcooling based on core exit T/Cs – GREATER THAN 0ºF.	**NOTE:** NCS Subcooling is ≈ NEGATIVE 15°F.
	BOP	(Step 21 RNO) IF at least one NV or NI pump on, THEN stop all NC pumps while maintaining seal injection flow.	**NOTE:** The NC Pumps are OFF.
	RO	(Step 22) Check if main steamlines intact:	

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• All S/G pressures – STABLE OR GOING UP	
		• All S/Gs – PRESSURIZED.	
	RO/ BOP	(Step 23) Check if S/G tubes intact:	
		• The following secondary EMFs – NORMAL:	
		• 1EMF-33 (Condenser Air Ejector Exhaust)	
		• 1EMF-34(L) (S/G Sample (Lo Range))	
		• 1EMF-24 (S/G A)	
		• 1EMF-25 (S/G B)	
		• 1EMF-26 (S/G C)	
		• 1EMF-27 (S/G D)	
		• S/G levels – STABLE OR GOING UP IN A CONTROLLED MANNER.	
	BOP	(Step 24) Check if NC System intact as follows:	
		• 1EMF-38(L) (Containment Particulate (LR)) - NORMAL	
		• 1EMF-39(L) (Containment Gas (Lo Range)) - NORMAL	
		• 1EMF-40 (Containment Iodine) - NORMAL	
		• Check containment pressure – LESS THAN 1 PSIG.	**NOTE:** Containment pressure is likely less than 1 psig.
		• Check containment sump level – NORMAL.	

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 25) Check S/I termination criteria:	
		• NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	
		• Secondary heat sink:	
		• N/R level in at least one S/G - GREATER THAN 11%	
		OR	
		• Total feed flow to S/Gs – GREATER THAN 450 GPM.	
		• NC pressure - STABLE OR GOING UP.	
		• Pzr level - GREATER THAN 11%.	
	BOP	(Step 26) Reset the following:	
		• S/I.	
		• Sequencers.	
	BOP	(Step 27) Stop all but one NV pump.	
	RO/ BOP	(Step 28) Check NC pressure - STABLE OR GOING UP.	
	BOP	(Step 29) Isolate NV S/I flowpath as follows:	
		• Check NV pumps miniflow valves - OPEN:	**NOTE:** The CRS may perform the RNO if these valves are closed. Otherwise, perform Step 29.b.
		• 1NV-150B (U1 NV Pump Recirc Isol)	
		• 1NV-151A (U1 NV Pump Recirc Isol).	
	BOP	(Step 29 RNO) Perform the following:	

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Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• OPEN valves.	
	CRS	• IF both valves open, THEN GO TO Step 29.b.	
	BOP	(Step 29.b) CLOSE the following valves:	
		• 1NI-9A (NC Cold Leg Inj From NV)	
		• 1NI-10B (NC Cold Leg Inj From NV).	
	BOP	(Step 30) Establish charging as follows:	
		• Check VI header pressure - GREATER THAN 60 PSIG.	
		• THROTTLE 1NV-238 (U1 Charging Hdr Control) to maintain 6-10 GPM seal injection flow to each NC pump.	
		• CLOSE 1NV-241 (U1 Seal Water Inj Flow Control).	
		• Check one of the following valves - OPEN:	
		• 1NV-13B (U1 NV Supply To 1A NC Loop Isol)	
		OR	
		• 1NV-16A (U1 NV Supply To 1D NC Loop Isol).	
		• Check 1NV-21A (U1 NV Supply to U1 Aux PZR Spray Isol) - CLOSED.	
		• OPEN the following valves:	
		• 1NV-244A (U1 Charging Hdr Cont Outside Isol)	
		• 1NV-245B (U1 Charging Hdr Cont Outside Isol).	

Op Test No.:	N18-1	Scenario #	3	Event #	6, 7, 8 & 9	Page	50 of 55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• WHEN controlling NV flow in subsequent steps, THEN maintain flow within the following limits while THROTTLING charging and seal injection control valves:	
		• Charging flow - LESS THAN 200 GPM	
		• Seal injection flow to each NC pump - 6-10 GPM.	
	BOP	(Step 31) Control charging flow as follows:	
		• Control charging flow as required to maintain Pzr level stable.	
		• Check Pzr level - STABLE OR GOING UP.	
	BOP	(Step 32) Reset the following:	
		• Phase A Isolation.	
		• Phase B Isolation.	
	BOP	(Step 33) Establish VI to containment as follows:	
		• OPEN the following valves:	
		• 1VI-129B (VI Supply to A Cont Ess VI Hdr Outside Isol).	
		• 1VI-160B (VI Supply to B Cont Ess VI Hdr Outside Isol).	
		• 1VI-150B (Lwr Cont Non-Ess Cont Outside Isol).	
		• Check VI header pressure - GREATER THAN 85 PSIG.	
	RO/ BOP	(Step 34) Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	

Op Test No.: N18-1 Scenario # 3 Event # 6, 7, 8 & 9	Page 51 of 55
Event Description:	**Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 35) WHEN EP/1/A/5000/ES-1.1 (Safety Injection Termination) is implemented in next step, THEN monitor its Foldout page.	
		S/I Reinitiation Criteria (Applies after Step 10 in body of this procedure): (Not Expected)	
		Secondary Integrity Criteria: (Not Expected)	
		Cold Leg Recirc Switchover Criteria: (Not Expected)	
		CA Suction Sources: (Not Expected)	
	CRS	(Step 36) GO TO Step 9 of EP/1/A/5000/ES-1.1 (Safety Injection Termination).	
			NOTE: The CRS will transition to ES-1.1.
EP/1/A/5000/ES-1.1, SAFETY INJECTION TERMINATION			
	RO/ BOP	(Step 9) Check if NI pumps should be stopped:	
		• Check NC pressure –	
		• STABLE OR GOING UP	
		• GREATER THAN 1600 PSIG.	
		• Stop NI pumps.	
	CRS	• GO TO Step 10.	
	BOP	(Step 10) Check if ND pumps should be stopped:	**NOTE:** The 1B ND Pump is OOS and the 1A ND Pump tripped on startup.
		• Check any ND pump - ON.	
	CRS	(Step 10.a RNO) GO TO Step 11.	

Op Test No.: N18-1	Scenario # 3	Event # 6, 7, 8 & 9	Page 52 of 55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 11) Check S/I flow not required:	
		• NC subcooling based on core exit T/Cs - GREATER THAN 0°F.	
		• Pzr level - GREATER THAN 11% (29% ACC).	
	RO	(Step 12) Check steam dumps:	
		• Check condenser available as follows:	
		• "C-9 COND AVAILABLE FOR STEAM DUMP" status light (1SI-18) - LIT.	
		• MSIVs on intact S/Gs - OPEN.	**Examiner NOTE:** The MSIVs may be CLOSED. If so, go to **Step 12.a RNO** on **Page 53**.
		• Perform the following to place steam dumps in steam pressure mode:	
		• Place "STM PRESS CONTROLLER" in manual.	
		• Adjust "STM PRESS CONTROLLER" output to equal "STEAM DUMP DEMAND" signal.	
		• Place "STEAM DUMP SELECT" in steam pressure mode.	
		• Check "P-12 LO-LO TAVG" status light (1SI-18) - DARK.	
	RO	(Step 12.c RNO) Place steam dumps in bypass interlock.	**NOTE:** The CRS may perform the RNO if P-12 is LIT. Otherwise, perform Step 12.d.
	RO	• (Step 12.d) Control steam dumps to maintain NC T-Hots - STABLE.	

Op Test No.:	N18-1	Scenario #	3	Event #	6, 7, 8 & 9	Page	53	of	55

Event Description: **Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF AT ANY TIME "STEAM HEADER PRESSURE" is between 1090-1095 PSIG AND auto control desired, THEN perform the following:	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• Ensure "STM PRESS CONTROLLER" setpoint at 1090-1095 PSIG.	
		• Place "STM PRESS CONTROLLER" in auto.	
		• Ensure steam dumps control steam header pressure between 1090-1095 PSIG.	
	CRS	• GO TO Step 13.	
	RO	(Step 12.a RNO) Perform the following:	**Examiner NOTE:** This Step will be performed if the MSIVs are CLOSED.
		• CLOSE 1AS-12 (U1 SM To AS Hdr Control Inlet Isol).	
		• IF SM PORV Reset lights are lit, THEN perform the following substeps in rapid succession to limit risk of opening SM safeties:	
		• CLOSE SM PORV manual loaders.	
		• Select "MANUAL" on "SM PORV MODE SELECT".	
		• THROTTLE SM PORVs as necessary to stabilize S/G pressure.	
		• GO TO Step 12.g.	
		• (Step 12.g) Place "STM PRESS CONTROLLER" in manual.	
		• Adjust "STM PRESS CONTROLLER" output to 0%.	

Op Test No.: N18-1 Scenario # 3 Event # 6, 7, 8 & 9	Page 54 of 55
Event Description:	**Pzr PORV 1NC-34A fails OPEN/Turbine fails to Automatically Trip/Block Valve fails OPEN/SI Injection Valves NI-9/10 fail to AUTO OPEN/Both NI Pumps fail to AUTO Start/1A ND Pump trips/ Pzr PORV 1NC-34A reseats**

Time	Pos.	Expected Actions/Behavior	Comments
		• Place "STEAM DUMP SELECT" in steam pressure mode.	
At the discretion of the Lead Examiner terminate the exam.			

UNIT 1 STATUS:

Power Level: 55% NCS [B] 1814 ppm Pzr [B]: 1814 ppm Xe: Per OAC

Power History: Reduced from 100% power to support Transformer Maintenance Core Burnup: 25 EFPDs

UNIT 2 STATUS:

Power Level: 100%

CONTROLLING PROCEDURE: OP/1/A/6100/003 Controlling Procedure for Unit Operation

OTHER INFORMATION NEEDED TO ASSUME THE SHIFT:

- The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
- It is planned to raise power on this shift to 100%.

The following equipment is Out-Of-Service:

- The 1B ND Pump is OOS due to an oil leak. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1.
- 1EMF46A, Train A KC Radiation Monitor, failed last shift (IAE is investigating).
- MCB Annunciator 1AD-12, C-3, "A RN PUMP SUCTION LO PRESS," will not ILLUMINATE (IAE is investigating).

Crew Directions:

- The crew will raise power to 100% on this shift, starting with Step 3.36.10 of Enclosure 4.1 of OP/1/A/6100/003 Controlling Procedure for Unit Operation.
- The loading rate will be 2-3 MWe/minute.
- The RE recommends 100% Control Rod position of 215 steps on Control Bank D.
- RE has recommended a 200-gallon initial dilution using Enclosure 4.4 (Alternate Dilute) of OP/1/A/6150/009 (Boron Concentration Control).
- RMWST Dissolved O_2 is less than 1000 ppb.
- Blender content is Reactor Makeup Water.

Work Control SRO/Offsite Communicator **Jim**

Plant SRO **Joe (FB)**

AO's AVAILABLE

Unit 1	**Unit 2**
Aux Bldg. John	**Aux Bldg. Chris**
Turb Bldg. Bob (FB)	**Turb Bldg. Mike (FB)**
5th Rounds. Carol	

Extra(s) Bill (FB) Ed (FB) Wayne (FB) Tanya Gus (RW)

Facility: **McGuire**		Scenario No.: **4**	Op Test No.: **N18-1**
Examiners:	____________________	Operators:	____________________ (SRO)
	____________________		____________________ (RO)
	____________________		____________________ (BOP)

Initial Conditions:	The plant is at $4x10^{-3}$ RTP (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B OAPT Fan is OOS due to a Motor failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.9 ACTION A.1. 1KFT-5130, Spent Fuel Pool Temperature, failed last shift (IAE is investigating) and MCB Annunciator 1AD-1, B-9, “TURBINE OVER SPEED (111%) TURB TRIP,” has failed ILLUMINATED (IAE is investigating). An Ice Condenser Intermediate Door Inspection is on-going. It is planned to raise power on this shift to 3.5-4%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N(TS)-SRO	Raise Power to 3.5-4%/Ice Condenser Door Failure
2	MAL ENB009A	I-BOP I(TS)-SRO	N31/N35 High Voltage failure
3	MAL EMF-34L LOA BB019	I-RO I-SRO	1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE
4	MAL SM001A	C-BOP C-SRO	1A SG PORV fails OPEN (No Manual Control)
5	MAL NCP012D NCP013G/H NCP014G/H NCP015G/H NCP016G/H	C-RO C-BOP C-SRO	High Vibration on 1D NCP
6	MAL SG001C	M-RO M-BOP M-SRO	1C Steam Generator Tube Rupture
7	REM NC0027C NC0029C	C-BOP C-SRO	Pzr Spray Valves fail to CLOSE (After Manual Opening)

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

McGuire 2018 NRC Scenario #4

The plant is at $4x10^{-3}$ RTP (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.

The following equipment is Out-Of-Service: The 1B OAPT Fan is OOS due to a Motor failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.9 ACTION A.1. 1KFT-5130, Spent Fuel Pool Temperature, failed last shift (IAE is investigating) and MCB Annunciator 1AD-1, B-9, “TURBINE OVER SPEED (111%) TURB TRIP,” has failed ILLUMINATED (IAE is investigating). An Ice Condenser Intermediate Door Inspection is on-going. It is planned to raise power on this shift to 3.5-4%.

Shortly after taking the watch, the operator will raise power to 3.5-4% in accordance with Step 3.16 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” While raising power the operator will start a Steam Generator Blowdown Pump in accordance with OP/1/A/6250/008, “Steam Generator Blowdown.” During the power change, operators in Containment will report that three Ice Condenser Intermediate Doors are blocked closed and inoperable. The operator will address Technical Specification LCO 3.6.13, “Ice Condenser Doors.”

Following this, the Channel N31/N35 high voltage will fail. The operator will enter AP/1/A/5500/16, “Malfunction of Nuclear Instrumentation,” and perform Case II, “Intermediate Range Malfunction,” and then Case I, “Source Range Malfunction.” The operator will address Technical Specification LCO 3.3.1, “Reactor Trip Instrumentation.”

Subsequently, 1EMF-34, S/G Sample Radiation Monitor, will fail HIGH, however, one of the SG Blowdown Control Valves will NOT automatically close. The operator will respond in accordance with OP/1/A/6100/010 Q, “Annunciator Response for 1RAD-1,” C3, 1EMF 34 S/G SAMPLE HI RAD, and manually close the valve. The operator may enter Case I of AP/1/A/5500/10, “NC System Leakage Within the Capacity of Both NV Pumps.” The crew will determine that the alarm is due to a failure, and NOT an actual high radioactivity condition.

Afterwards, the 1A Steam Generator PORV will fail OPEN. The operator will respond in accordance with AP/1/A/5500/01, “Steam Leak,” to isolate the PORV and maintain reactor power stable.

After this, a high vibration condition will develop on the 1D NCP. The operator will respond in accordance with OAC Alarm M1D3041, 1D NC PUMP VIBRATION (HALM), and enter AP/1/A/5500/08, “Malfunction of NC Pump.” Ultimately, the vibration condition will rise above the Hi-Hi threshold requiring tripping of the reactor and stopping the NCP. The operator will manually trip the reactor and enter EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.”

Upon the reactor trip, a 350 gpm Steam Generator Tube Rupture will occur on the 1C SG and the operator will actuate Safety Injection. Upon completion of E-0, the operator will transition to EP/1/A/5000/E-3, “Steam Generator Tube Rupture,” to isolate the flow into and out of the 1C Steam Generator and then conduct a cooldown and depressurization of the NC System.

While performing an NCS depressurization using normal spray, both Pzr Spray Valves will stick OPEN on completion of the depressurization; and the operator will be required to stop both the 1A and 1B NCPs.

The scenario will terminate at Step 22.c of E-3, after the crew has closed the Cold Leg Isolation Valves from the NV System.

Critical Tasks:

Isolate feedwater flow into and steam flow from the ruptured SG so that minimum ΔP between ruptured Steam Generator and intact Steam Generators is not less than 250 psid once target temperature is reached (Entry into ECA-3.1).

Safety Significance: Failure to isolate the ruptured SG causes a loss of ΔP between the ruptured SG and the intact SGs. Upon a loss of ΔP, the crew must transition to a contingency procedure that constitutes an incorrect performance that "necessitates the crew taking compensating action which complicates the event mitigation strategy." If the crew fails to isolate steam from the SG, or feed flow into the SG the ruptured SG pressure will tend to decrease to the same pressures as the intact SGs, requiring a transition to a contingency procedure, and delaying the stopping of RCS leakage into the SG.

Establish/maintain an NCS temperature so that transition from E-3 does not occur because the RCS temperature is either too high to maintain minimum required subcooling of 20°F or too low creating an Orange Path condition on the NCS Integrity Critical Safety Function.

Safety Significance: Failure to establish and maintain the correct NCS temperature during a SGTR leads to a transition from E-3 to a contingency ERG. This failure constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy."

Depressurize the NCS to meet SI termination criteria before the Quality of the steam exiting the SG exceeds 80% (≤0.8 on Void Fraction SGINFO.cts).

Safety Significance: Failure to stop the reactor coolant leakage into a ruptured SG by depressurizing the RCS (when it is possible to do so) needlessly complicates the mitigation of the event. It also constitutes a "significant reduction of Safety Margin beyond that irreparably introduced by the scenario. If RCS depressurization does NOT occur, the inventory in the secondary side of the ruptured SG will rise to the level of the Main Steam Lines leading to water release through the SG PORV or Safety Valve, which could cause and unisolable fault in the ruptured SG.

PROGRAM: McGuire Operations Training

MODULE: Initial License Operator Training Class ILT 18-1

TOPIC: NRC Simulator Exam

Scenario N18-1-4

REFERENCES:

1. Technical Specification LCO 3.7.9, “Control Room Area Ventilation System (CRAVS)” (Amendment 282/261)
2. PT/1/A/4200/014 A, “Ice Condenser Intermediate Deck Door and Monitoring System Inspection” (Rev 19)
3. OP/1/A/6100/003, “Controlling Procedure for Unit Operation” (Rev 201)
4. OP/1/A/6250/008, “Steam Generator Blowdown” (Rev 90)
5. Technical Specification LCO 3.6.13, “Ice Condenser Doors” (Amendment 292/271)
6. AP/1/A/5500/16, “Malfunction of Nuclear Instrumentation” (Rev 15)
7. Technical Specification LCO 3.3.1, “Reactor Trip Instrumentation” (Amendment 184/166)
8. AP/1/A/5500/10, “NC System Leakage Within the Capacity of Both NV Pumps” (Rev 23)
9. OP/1/A/6100/010 Q, “Annunciator Response for 1RAD-1” (Rev 67)
10. AP/1/A/5500/01, “Steam Leak” (Rev 18)
11. AP/1/A/5500/08, “Malfunction of NC Pump” (Rev 17)
12. EP/1/A/5000/E-0, “Reactor Trip or Safety Injection” (Rev 36)
13. EP/1/A/5000/E-3, “Steam Generator Tube Rupture” (Rev 26)

Validation Time: 150 minutes

Author: David Lazarony, Essential Training & Consulting, LLC

Facility Review: ________________________

Rev. 032118

McGuire 2018 NRC Scenario #4 Objectives:

Given the simulator at an initial condition of $4x10^{-3}$ % RTP power with a power increase to 3.5-4% planned, evaluate:

1. the SRO's ability to supervise the control room team during the normal, abnormal, and emergency situations that arise, including compliance with all facility procedures, Technical Specifications, and other commitments.

2. each crew member's ability to effectively communicate as part of a control room team during the normal, abnormal, and emergency situations that arise.

3. the RO and BOP's ability to effectively raise power in accordance with Enclosure 4.1, Power Increase, of OP/1/A/6100/003, "Controlling Procedure for Unit Operation."

4. each crew member's ability to effectively diagnose an Intermediate/Source Range Nuclear Instrumentation Channel, and the BOP's ability to respond to such an event in accordance with AP/1/A/5500/16, "Malfunction of Nuclear Instrumentation."

5. each crew member's ability to effectively diagnose a high failure of Radiation Monitor 1EMF-34 and an accompanying failure of its automatic functions to occur; and the RO's ability to respond to such an event in accordance with Annunciator Response Procedures.

6. each crew member's ability to effectively diagnose a Stuck OPEN SG PORV with no manual control; and the RO's ability to respond to such an event in accordance with AP/1/A/5500/01, "Steam Leak."

7. each crew member's ability to effectively diagnose a high vibration condition occurring on an NC Pump requiring a pump trip; and the RO's and BOP's ability to respond to such an event in accordance with AP/1/A/5500/08, "Malfunction of NC Pump."

8. each crew member's ability to effectively diagnose a Steam Generator Tube Rupture, and the RO and BOP's ability to respond to such an event in accordance with EP/1/A/5000/E-0, "Reactor Trip or Safety Injection," and EP/1/A/5000/E-3, "Steam Generator Tube Rupture."

9. each crew member's ability to effectively diagnose a failure of the Pressurizer Spray Valves to close after the NCS depressurization during a SGTR, and the BOP's ability to respond to such an event in accordance with EP/1/A/5000/E-3, "Steam Generator Tube Rupture."

Facility:	**McGuire**	Scenario No.: **4**	Op Test No.: **N18-1**
Examiners:		Operators:	(SRO)
			(RO)
			(BOP)

Initial Conditions:	The plant is at 4×10^{-3} RTP (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.
Turnover:	The following equipment is Out-Of-Service: The 1B OAPT Fan is OOS due to a Motor failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.9 ACTION A.1. 1KFT-5130, Spent Fuel Pool Temperature, failed last shift (IAE is investigating) and MCB Annunciator 1AD-1, B-9, “TURBINE OVER SPEED (111%) TURB TRIP,” has failed ILLUMINATED (IAE is investigating). An Ice Condenser Intermediate Door Inspection is on-going. It is planned to raise power on this shift to 3.5-4%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N(TS)-SRO	Raise Power to 3.5-4%/Ice Condenser Door Failure
2	MAL ENB009A	I-BOP I(TS)-SRO	N31/N35 High Voltage failure
3	MAL EMF-34L LOA BB019	I-RO I-SRO	1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE
4	MAL SM001A	C-BOP C-SRO	1A SG PORV fails OPEN (No Manual Control)
5	MAL NCP012D NCP013G/H NCP014G/H NCP015G/H NCP016G/H	C-RO C-BOP C-SRO	High Vibration on 1D NCP
6	MAL SG001C	M-RO M-BOP M-SRO	1C Steam Generator Tube Rupture
7	REM NC0027C NC0029C	C-BOP C-SRO	Pzr Spray Valves fail to CLOSE (After Manual Opening)

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

McGuire 2018 NRC Scenario #4

The plant is at $4x10^{-3}$ RTP (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift. Unit 2 is at 100% power.

The following equipment is Out-Of-Service: The 1B OAPT Fan is OOS due to a Motor failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.9 ACTION A.1. 1KFT-5130, Spent Fuel Pool Temperature, failed last shift (IAE is investigating) and MCB Annunciator 1AD-1, B-9, “TURBINE OVER SPEED (111%) TURB TRIP,” has failed ILLUMINATED (IAE is investigating). An Ice Condenser Intermediate Door Inspection is on-going. It is planned to raise power on this shift to 3.5-4%.

Shortly after taking the watch, the operator will raise power to 3.5-4% in accordance with Step 3.16 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, “Controlling Procedure for Unit Operation.” While raising power the operator will start a Steam Generator Blowdown Pump in accordance with OP/1/A/6250/008, “Steam Generator Blowdown.” During the power change, operators in Containment will report that three Ice Condenser Intermediate Doors are blocked closed and inoperable. The operator will address Technical Specification LCO 3.6.13, “Ice Condenser Doors.”

Following this, the Channel N31/N35 high voltage will fail. The operator will enter AP/1/A/5500/16, “Malfunction of Nuclear Instrumentation,” and perform Case II, “Intermediate Range Malfunction,” and then Case I, “Source Range Malfunction.” The operator will address Technical Specification LCO 3.3.1, “Reactor Trip Instrumentation.”

Subsequently, 1EMF-34, S/G Sample Radiation Monitor, will fail HIGH, however, one of the SG Blowdown Control Valves will NOT automatically close. The operator will respond in accordance with OP/1/A/6100/010 Q, “Annunciator Response for 1RAD-1,” C3, 1EMF 34 S/G SAMPLE HI RAD, and manually close the valve. The operator may enter Case I of AP/1/A/5500/10, “NC System Leakage Within the Capacity of Both NV Pumps.” The crew will determine that the alarm is due to a failure, and NOT an actual high radioactivity condition.

Afterwards, the 1A Steam Generator PORV will fail OPEN. The operator will respond in accordance with AP/1/A/5500/01, “Steam Leak,” to isolate the PORV and maintain reactor power stable.

After this, a high vibration condition will develop on the 1D NCP. The operator will respond in accordance with OAC Alarm M1D3041, 1D NC PUMP VIBRATION (HALM), and enter AP/1/A/5500/08, “Malfunction of NC Pump.” Ultimately, the vibration condition will rise above the Hi-Hi threshold requiring tripping of the reactor and stopping the NCP. The operator will manually trip the reactor and enter EP/1/A/5000/E-0, “Reactor Trip or Safety Injection.”

Upon the reactor trip, a 350 gpm Steam Generator Tube Rupture will occur on the 1C SG and the operator will actuate Safety Injection. Upon completion of E-0, the operator will transition to EP/1/A/5000/E-3, “Steam Generator Tube Rupture,” to isolate the flow into and out of the 1C Steam Generator and then conduct a cooldown and depressurization of the NC System.

While performing an NCS depressurization using normal spray, both Pzr Spray Valves will stick OPEN on completion of the depressurization; and the operator will be required to stop both the 1A and 1B NCPs.

The scenario will terminate at Step 22.c of E-3, after the crew has closed the Cold Leg Isolation Valves from the NV System.

Critical Tasks:

Isolate feedwater flow into and steam flow from the ruptured SG so that minimum ΔP between ruptured Steam Generator and intact Steam Generators is not less than 250 psid once target temperature is reached (Entry into ECA-3.1).

Safety Significance: Failure to isolate the ruptured SG causes a loss of ΔP between the ruptured SG and the intact SGs. Upon a loss of ΔP, the crew must transition to a contingency procedure that constitutes an incorrect performance that "necessitates the crew taking compensating action which complicates the event mitigation strategy." If the crew fails to isolate steam from the SG, or feed flow into the SG the ruptured SG pressure will tend to decrease to the same pressures as the intact SGs, requiring a transition to a contingency procedure, and delaying the stopping of RCS leakage into the SG.

Establish/maintain an NCS temperature so that transition from E-3 does not occur because the RCS temperature is either too high to maintain minimum required subcooling of 20°F or too low creating an Orange Path condition on the NCS Integrity Critical Safety Function.

Safety Significance: Failure to establish and maintain the correct NCS temperature during a SGTR leads to a transition from E-3 to a contingency ERG. This failure constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy."

Depressurize the NCS to meet SI termination criteria before the Quality of the steam exiting the SG exceeds 80% (≤0.8 on Void Fraction SGINFO.cts).

Safety Significance: Failure to stop the reactor coolant leakage into a ruptured SG by depressurizing the RCS (when it is possible to do so) needlessly complicates the mitigation of the event. It also constitutes a "significant reduction of Safety Margin beyond that irreparably introduced by the scenario. If RCS depressurization does NOT occur, the inventory in the secondary side of the ruptured SG will rise to the level of the Main Steam Lines leading to water release through the SG PORV or Safety Valve, which could cause and unisolable fault in the ruptured SG.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐		**Reset to Temp IC 228** **(Base IC-13)**	**Load Simulator File SGINFO.cts (This file will be used to assess the performance of Ruptured SG Overfill Critical Task)** **T = 0 Malfunctions:** **Insert XHV_086_1 = 0 (Override 1B OAPT Fan Breaker Status lights OFF)** **Insert XMT-KF_1KFTT5130 =0 (1KFT-5130, Spent Fuel Pool Temperature)** **Insert OVR-1AD1_B09 = ON (MCB Annunciator 1AD1/B9)** **Insert MAL-SG001C=350** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)**
☐		**RUN** **Reset all SLIMs**	**Place Tagout/O-Stick on:** • **1B OAPT Fan** • **1KFTT5130, SFP Temperature Monitor** • **MCB Annunciator 1AD-1, B-9**
☐		**Update** Status Board, **Setup OAC**	**NOTE:** RMWST DO = <1000 ppb.
☐		**Freeze.**	
☐		**Update Fresh Tech. Spec. Log.**	
☐		**Fill out the AO's Available section of Shift Turnover Info.**	
☐	Prior to Crew Briefing	**RUN**	

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with a marked-up copy (Through Step 3.15) of Enclosure 4.1 (Handout 1), a blank copy of Enclosure 4.8 (Handout 4) and a blank copy of Enclosure 4.14 of OP/1/A/6100/003 (Handout 2). 4. Provide the crew with a marked-up copy (Through Step 3.4.5) of Enclosure 4.1 (Handout 3) of OP/1/A/6250/008. 5. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	
☐	At direction of examiner	**Execute Simulator Scenario N18-1-4.**	
☐	At direction of examiner	**Event 1** **NA**	Raise Power to 3.5-4%/Ice Condenser Door Failure
☐	At direction of examiner	**Event 2** **insert MALF-ENB009A = LOSS**	N31/N35 High Voltage failure
☐	At direction of examiner	**Event 3** **insert MAL-EMF-34L = 10^7** **insert LOA-BB019 = TRUE** **insert:** **REM-BB0123=0 delay = 2 seconds** **REM-BB0124=0 delay = 2 seconds** **REM-BB0125=0 delay = 2 seconds**	1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 4** **Insert MAL-SM001A = 100**	1A SG PORV fails OPEN (No Manual Control)
☐	At direction of examiner	**Event 5** **Insert MAL:** **NCP014G=4.6** **NCP014H=4.6** **(320 Second Ramp to 5.0)** **Insert MAL:** **NCP012D=13** **NCP013G=13** **NCP013H=13** **NCP015G=14.5** **NCP015H=14.5** **NCP016G=12** **NCP016H=12**	High Vibration on 1D NCP **NOTE: All Malfunctions must be deleted when the 1D NCP is stopped.**
☐	At direction of examiner	**Event 6** **Insert MAL-SG001C=350 (No Delay or Ramp)** **cd=H_X01_094_2 = 1 (1A RTB Open indicating lamp ON)**	1C Steam Generator Tube Rupture **NOTE: This event will occur on Rx Trip.**
☐	Post-Rx Trip during NCS depress.	**Event 7** **Insert:** **REM-NC0027C = 1** **REM-NC0029C = 1**	Pzr Spray Valves fail to CLOSE (After Manual Opening) **NOTE: This event will occur when valves are fully opened during NCS depressurization in E-3.**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.: N18-1 Scenario # 4 Event # 1	Page 9 of 57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**

Shortly after taking the watch, the operator will raise power to 3.5-4% in accordance with Step 3.16 of Enclosure 4.1, Power Increase, of OP/1/A/6100/003, "Controlling Procedure for Unit Operation." While raising power the operator will start a Steam Generator Blowdown Pump in accordance with OP/1/A/6250/008, "Steam Generator Blowdown." During the power change, operators in Containment will report that three Ice Condenser Intermediate Doors are blocked closed and inoperable. The operator will address Technical Specification LCO 3.6.13, "Ice Condenser Doors."

Booth Operator Instructions: **NA**

Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
OP/1/A/6100/003, CONTROLLING PROCEDURE FOR UNIT OPERATION ENCLOSURE 4.1, POWER INCREASE			
	BOP	(Step 3.16) Perform the following to control NC System temperature until Turbine Generator is paralleled to the grid:	
NOTE Steps 3.16.1 - 3.16.2 should be performed concurrently.			
		• Maintain the following by adjusting setpoint on "STM PRESS CONTROLLER":	
		• Tcold 557 - 559°F	
		• SM Pressure 1060 - 1110 psig	
NOTE • While maintaining Tcold at 557 - 559°F using Steam Dumps, Table 4.14-1 should be used to approximate Tavg for a given Reactor Power level. • Increasing Reactor Power while Turbine Power remains constant will result in Tavg exceeding Program Tref (557°F). (Turbine Inlet Pressure Channels will **NOT** increase until Turbine Generator is paralleled to the grid.)			

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	10	of	57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**								

Time	Pos.	Expected Actions/Behavior	Comments
		• Refer to Enclosure 4.14 (Reactor Power/Expected Tavg), Table 4.14-1 (Reactor Power/Expected Tavg) for expected Tavg for a given Reactor Power level.	
	BOP	(Step 3.17) IF feedwater flow aligned to CA nozzles, THEN …..	**NOTE:** Feedwater flow is NOT aligned to CA nozzles.
	BOP	(Step 3.18) Ensure in service CF Pump Turbine "LP GOV CNTRL" and "HP GOV CNTRL" in auto.	
NOTE Due to inherent design of BWI S/Gs, S/G WR level will decrease as Reactor Power is increased through 3% RTP.			
	BOP	(Step 3.19) IF AT ANY TIME S/G N/R Level decreases to 28% OR exceeds 52%, THEN perform the following:	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• IF individual S/G level control problem, THEN perform the following:	
	BOP	• Place affected S/G CF Control Bypass and/or CF Control Valve in manual.	
		• Adjust affected S/G CF Control Bypass or CF Control Valve as required to return affected S/G N/R level to setpoint.	
		• Place affected S/G CF Control Bypass and/or CF Control Valve in auto.	
		• IF all S/G's indicate level control problems, THEN perform either Step 3.19.2.1 or Step 3.19.2.2:	
		• To operate the in service CF Pump Turbine in manual, perform the following:	

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	11 of 57
Event Description:	Raise Power to 3.5-4%/Ice Condenser Door Failure						

Time	Pos.	Expected Actions/Behavior	Comments
		• Place operating CF Pump Turbine "LP GOV CNTRL" and "HP GOV CNTRL" in manual.	
		• Use CF Pump Turbine "LP GOV CNTRL" increase/decrease pushbuttons to restore associated S/G NR levels to setpoint.	
		• WHEN S/G NR levels normal, THEN place operating CF Pump Turbine "HP GOV CNTRL" in auto.	
		• WHEN in service CF Pump Turbine speed within 50 - 100 rpm of "AUTO SPT" on DCS Feedpump Overview graphic, THEN place "LP GOV CNTRL" in auto.	
		• To operate the in service CF Pump Turbine in "Speed Set" mode, perform the following:	
		• On DCS Feedpump Overview graphic, select "AUTO/SPD" for the in service CF Pump Turbine.	
	BOP	• Select "SPD/SET" in the "AUTO/SPD SETTER SEL" box.	
		• On the in service CF Pump Turbine, adjust "LP GOV CNTRL" auto increase/decrease pushbuttons as required to restore S/G NR levels to setpoint.	
		• WHEN S/G NR levels normal, on DCS Feedpump Overview graphic, THEN select "AUTO/SPD" on the in service CF Pump Turbine.	
		• Select "AUTO" in the "AUTO/SPD SETTER SEL" box to return the in service CF Pump Turbine to auto.	

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	12 of 57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3.20) Increase Reactor Power to 2% RTP (2.0 - 2.5%).	**NOTE:** The RO will manually withdrawal Control Rods to raise power.
	CRS	(Step 3.21) WHEN at 2% RTP (2.0 - 2.5%), THEN perform the following:	
		• Evaluate if plant conditions are stable to continue in procedure.	
		• IF plant conditions determined NOT stable, THEN HOLD for a minimum of 10 minutes.	**NOTE:** Plant conditions are expected to be stable.
	RO	(Step 3.22) Ensure BB Pump in service per OP/1/A/6250/008 (Steam Generator Blowdown).	**NOTE:** The BOP will perform Section 3.4 of Enclosure 4.1 of OP/1/A/6250/008 to place the 1A BB Pump in service.
OP/1/A/6250/008, STEAM GENERATOR BLOWDOWN ENCLOSURE 4.1, ESTABLISHING BLOWDOWN			
NOTE BB System conditions at Rx Power less than 1% may prevent proper BB Pump operation.			
	BOP	(Step 3.4.6) IF Reactor Power less than 1%,….	**NOTE:** Rx power is stable at 2.0-2.5%
	BOP	(Step 3.4.7) Check the following:	
		• 1AD-4, A5 (BB Blowoff Tank Lo Level) dark	
		• BB flow indicated on OAC (evidence no Hi Level in BB Tank exists)	
NOTE 1MBBSS5160 (BB Flow Selector Station) is located on BB Demin Panel (near KG Panel). Controller operates 1BB-88 (CM Polish Demin) or 1BB-238 (S/G BB Demineralizers) as determined by path select switch on Main Control Board.			

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	13 of 57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.4.8) Perform the following at 1MBBSS5160 (BB Flow Selector Station):	**NOTE:** The BOP will contact AO John. **Booth Instructor** acknowledge and report that Step 3.4.8 is complete.
		• Place Controller in "M" (Manual).	
		• Adjust output demand to 30% using "VALVE" knob.	
NOTE BB pumps will trip on the following: • BB Tank level less than 8 inches • BB Pump ΔP greater than 311 psid			
	BOP	(Step 3.4.9) Perform the following to slowly fill piping to prevent BB pump from tripping on BB Tank low level:	**NOTE:** The BOP will contact AO John. **Booth Instructor** acknowledge and report that Steps 3.4.9.1 and 2 are complete.
		• Close 1BB-199 (U1 BB Regen Hx Inlet Isol) (Located TB1, 760 + 20, 1H25)	
		• Open 1BB-199 (U1 BB Regen Hx Inlet Isol) 1 1/2 turn.	
		• WHEN BB Pump is started in next step, throttle as necessary in 1/2 turn increments 1BB-199 (U1 BB Regen Hx Inlet Isol) to maintain the following:	**NOTE:** The BOP will contact AO John. **Booth Instructor** acknowledge and report that you are ready to perform Steps 3.4.9.3 when the pump is started.
		• BB tank level 50% - 65% Tank level as indicated on 1BBP5160 (U1 BB Tank Level) (Elev. 760, 1G-26)	
		• BB Pump DP less than 300 psid as indicated on 1BBPS5820 (1A BB Pump D/P) or 1BBPS5830 (1B BB Pump D/P) (located at base of pump)	

Op Test No.: N18-1	Scenario # 4	Event # 1		Page 14 of 57	
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**				

Time	Pos.	Expected Actions/Behavior	Comments
		CAUTION Minimum Blowdown flow rate of 8000 - 12000 lbs/hr per loop required to prevent tripping BB Pump on BB Tank lo level {PIP M97-3291}	
	BOP	(Step 3.4.10) IF 1A BB Pump is to be started, perform the following:	**NOTE:** The BOP will contact AO John. **Booth Instructor** acknowledge and report that Step 3.4.10.1 Bullet 1 is complete.
		• Throttle 1BB-322 (1A BB Blowoff Tank Pump Seal Flow Manual Control Valve) to obtain one of the following:	
		• 2 - 3 gpm on 1BBFG5750 (1A BB Pump Mech Seal Cooler BB Outlet Flow)	
		OR	
		• 100 - 200 psig on 1BBPG5770 (1A BB Pump Mech Seal Cooler BB Outlet Press) Start 1A BB Pump.	
		• Start 1A BB Pump.	**NOTE:** The BOP will start the 1A BB Pump.
		CAUTION Minimum Blowdown flow rate of 8000 - 12000 lbs/hr per loop required to prevent tripping BB Pump on BB Tank lo level {PIP M97-3291}	
	BOP	(Step 3.4.11) IF 1B BB Pump is to be started,…..	**NOTE:** The 1B BB Pump is NOT intended to be started.
	BOP	(Step 3.4.12) Ensure 1BB-199 (U1 BB Regen Hx Inlet Isol) full open.	**NOTE:** The BOP will contact AO John. **Booth Instructor** acknowledge and report that Step 3.4.12 is complete.

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	15 of 57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
NOTE • 1MBBSS5160 (BB Flow Selector Station) is located on BB Demin Panel (near KG Panel). Controller operates 1BB-88 (CM Polish Demin) or 1BB-238 (S/G BB Demineralizers) as determined by path select switch on Main Control Board. • Valve 1BB-238 opens at 25% on manual loader. Until 1BB-238 opens, flow is still on 1BB-44 (Unit 1 BB Blowoff Tank Recirc Control) and BB Pump pressure is close to high DP trip setpoint. {PIP-98-2656}			
	BOP	(Step 3.4.13) Perform the following at 1MBBSS5160 (BB Flow Selector Station):	**NOTE:** The BOP will contact AO John. **Booth Instructor** acknowledge and report that Step 3.4.13 is complete.
		• Adjust BB tank level to 50 - 65% by slowly adjusting "VALVE" knob.	
		• Place Controller in "A" (Auto).	
		• Adjust BB Tank setpoint to control level at 50 - 65% using "SET".	
		• Check auto control maintaining desired tank level.	
	BOP	(Step 3.4.14) IF desired to adjust BB flow,…..	**NOTE:** The BOP may contact AO John. **Booth Instructor** acknowledge and report that Step 3.4.14 is NOT needed.
OP/1/A/6100/003, CONTROLLING PROCEDURE FOR UNIT OPERATION ENCLOSURE 4.1, POWER INCREASE			
	RO	(Step 3.23) Increase Rx Power to 4% RTP (3.5 - 4.0%) as follows:	**NOTE:** The RO will manually withdrawal Control Rods to raise power.
		• Begin power increase to 4% RTP (3.5 - 4.0%).	

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	16 of 57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
BOOTH INSTRUCTOR:		**AFTER the RO has begun rod withdrawal, as an operator in Containment, call the Control Room and report that the Bay 7 Ice Condenser Intermediate Deck Doors 2, 4 and 6 have failed to open freely with reasonable pull force, and per step 12.3.3 of PT/1/A/4200/014 A must be declared inoperable.**	
			NOTE: The CRS will evaluate this condition. **EXAMINER NOTE:** Examiner following the CRS, proceed to **Page 17** for this evaluation.
			NOTE: The CRS may call WCC to address the door inoperability. If so, **Booth Instructor** acknowledge as WCC.
	BOP	• WHEN greater than 3% RTP, THEN perform the following:	
		• Open:	
		• 1SM-83 (A SM Line Drain)	
		• 1SM-89 (B SM Line Drain)	
		• 1SM-95 (C SM Line Drain)	
		• 1SM-101 (D SM Line Drain)	
NOTE IF the Turbine is placed in manual in the following step, 1AD-1, F4 (Turbine in Manual) will alarm. This is an expected alarm.			
	BOP	• Ensure Turbine in "MANUAL".	
		• Close Governor Valves using "GV Lower".	
NOTE Mode 1 is entered at 5% RTP.			
	CRS	(Step 3.24) WHEN at 4% RTP, THEN perform the following:	

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	17	of	57

Event Description: **Raise Power to 3.5-4%/Ice Condenser Door Failure**

Time	Pos.	Expected Actions/Behavior	Comments
		• Evaluate if plant conditions are stable to continue in procedure.	
		• IF plant conditions determined NOT stable, THEN HOLD for a minimum of 10 minutes.	**NOTE:** Plant conditions are expected to be stable.
	BOP	• Using "Plant Mode Change & Alarm Look Ahead", change the OAC to "Mode 1".	
	BOP	• On the DCS Work Station, change the DCS Modal Alarming to Mode 1 as follows:	
		• Access DCS "PLANT MODE SELECTION" Screen (6012).	
		• Select "MODE 1".	
		• Select "ACCEPT MODE".	
		• Check "MODE" 1 is displayed in "CURRENT PLANT MODE".	
			NOTE: The CRS will evaluate the Ice Condenser Door inoperability.
TECHNICAL SPECIFICATION 3.6.13, ICE CONDENSER DOORS			
	CRS	LCO 3.6.13 The ice condenser lower inlet doors, intermediate deck doors, and top deck doors shall be OPERABLE and closed.	
	CRS	APPLICABILITY: MODES 1, 2, 3, and 4.	
	CRS	NOTE:	
		• Separate Condition entry is allowed for each ice condenser door.	
		• Entry into Condition B is not required due to personnel standing on or opening an intermediate deck or top deck door for short durations to perform required surveillances, minor maintenance such as ice removal or routine tasks such as system walkdowns.	

Op Test No.:	N18-1	Scenario #	4	Event #	1	Page	18 of 57
Event Description:	**Raise Power to 3.5-4%/Ice Condenser Door Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One or more ice condenser doors inoperable for reasons other than Condition A or not closed.	B.1 Verify maximum ice bed temperature is ≤ 27°F. AND NOTE: Required Action B.2.1 applies only when one or more ice condenser lower inlet doors are inoperable due to having an invalid open alarm. B.2.1 Verify affected lower inlet door is closed. OR B.2.2 Restore ice condenser door to OPERABLE status and closed positions.	Once per 4 hours Once per 14 days 14 days

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will determine that Condition B is required and that ACTION B.1 AND B.2.2 must be taken.

At the discretion of the Lead Examiner move to Event #2.

Op Test No.:	N18-1	Scenario #	4	Event #	2	Page	19 of 57
Event Description:		**N31/N35 High Voltage failure**					

Following this, the Channel N31/N35 high voltage will fail. The operator will enter AP/1/A/5500/16, "Malfunction of Nuclear Instrumentation," and perform Case II, "Intermediate Range Malfunction," and then Case I, "Source Range Malfunction." The operator will address Technical Specification LCO 3.3.1, "Reactor Trip Instrumentation."

Booth Operator Instructions: **insert MAL-ENB009A = LOSS**

Indications Available:

- MCB Annunciator, 1AD2 C2, IR/SR AMPLIFIER NON-OPERATE
- N31 off scale LOW
- N35 off scale LOW

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will enter to AP-16 Case II.
AP/1/A/5500/16, MALFUNCTION OF NUCLEAR INSTRUMENTATION CASE II, INTERMEDIATE RANGE MALFUNCTION			
CAUTION If either I/R drawer shows evidence of damage due to overheating (i.e. visible smoke or flame), the following enclosure will quickly deenergize the channel. A reactor trip will occur unless the signal has been blocked in SSPS ("I/R TRAIN (A/B) TRIP BLOCKED" status lights on 1SI-18 lit).			
	CRS	(Step 1) IF AT ANY TIME I/R drawer shows evidence of damage (i.e. visible smoke or flame), THEN evaluate deenergizing affected drawer PER Enclosure 2 (Removal of Damaged I/R Channel from Service).	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
NOTE S/R and I/R channels share common detectors and electronics. If symptoms apply for both Case I and Case II, the two cases may be performed concurrently or in any order.			
	RO	(Step 2) Check one I/R channel – OPERABLE.	**NOTE:** N-36 is OPERABLE.
	CRS	(Step 3) Announce occurrence on paging system.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.

Op Test No.:	N18-1	Scenario #	4	Event #	2	Page	20 of 57
Event Description:	**N31/N35 High Voltage failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 4) Place failed or channel "LEVEL TRIP" switch on I/R Drawer to "BYPASS".	
	BOP	(Step 5) Check the following – LIT:	
		• "LEVEL TRIP BYPASS" indicating light on failed I/R drawer.	
		• "S/R OR I/R TRIP BYPASS" alarm (1AD-2, E-2).	
		• The failed channel's status light on 1SI-19:	
		• "1/N-35A I/R CHANNEL I TRIP BYPASS"	
		OR	
		• "1/N-36A I/R CHANNEL II TRIP BYPASS".	

CAUTION

- Opening I/R control power breaker or a loss of power to the I/R channel will result in a reactor trip unless the affected channel is blocked in SSPS ("I/R TRAIN (A/B) TRIP BLOCKED" status light on 1SI-18 is lit).
- Opening I/R instrument power breaker will result in a reactor trip unless:
  - Affected channel "LEVEL TRIP" switch is in "BYPASS"

  OR
  - Affected channel is blocked in SSPS ("I/R TRAIN (A/B) TRIP BLOCKED" status light on 1SI-18 is lit).
- Closing either I/R control power breaker or instrument power breaker with any P/R channel inoperable or in tripped condition may result in a reactor trip on P/R rate trip due to voltage spikes.

Time	Pos.	Expected Actions/Behavior	Comments
	CRS/ RO/ BOP	(Step 6) IF AT ANY TIME I/R control power breaker is opened above P-10, THEN breaker should be closed prior to lowering power below P-10 (to prevent a reactor trip).	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	RO	(Step 7) Check I/R channel – FAILED LOW.	

Op Test No.:	N18-1	Scenario #	4	Event #	2	Page	21 of 57
Event Description:	**N31/N35 High Voltage failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 8) Evaluate performing Case I (Source Range Malfunction) based on symptoms while continuing in this case.	**NOTE:** CASE I should also be performed.
	RO	(Step 9) WHEN malfunctioning I/R channel repaired, THEN….	**NOTE:** The channel will remain OOS.
			NOTE: The CRS may call WCC/IAE to address the malfunction. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: The CRS will likely conduct a Focus Brief.
AP/1/A/5500/16, MALFUNCTION OF NUCLEAR INSTRUMENTATION CASE I, SOURCE RANGE MALFUNCTION			
CAUTION If either S/R drawer shows evidence of damage due to overheating (i.e. visible smoke or flame), the following enclosure will quickly deenergize the channel. A reactor trip will occur unless the signal has been blocked in SSPS ("S/R TRAIN (A/B) TRIP BLOCKED" status lights on 1SI-18 lit).			
	CRS	(Step 1) IF AT ANY TIME S/R drawer shows evidence of damage (i.e. visible smoke or flame), THEN evaluate deenergizing affected drawer PER Enclosure 1 (Removal of Damaged S/R Channel from Service).	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
NOTE S/R and I/R channels share common detectors and electronics. If symptoms apply for both Case I and Case II, the two cases may be performed concurrently or in any order.			
	RO	(Step 2) Check at least one of the following S/R Channels - OPERABLE.	
		• N-31	
		OR	
		• N-32	

Op Test No.:	N18-1	Scenario #	4	Event #	2	Page	22 of 57
Event Description:		**N31/N35 High Voltage failure**					

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3) Announce occurrence on paging system.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	CRS/ RO	(Step 4) Check unit status - IN MODE 6.	
	CRS	(Step 4 RNO) GO TO Step 7.	
	CRS/ RO	(Step 7) Check "S/R HI FLUX AT SHUTDOWN" alarm (1AD-2, D-3) - DARK.	
	CRS/ RO	(Step 8) Monitor available I/R Channels and W/R Neutron Flux Monitors.	
	RO/ BOP	(Step 9) Check if failure has occurred on any of the following S/R Channels:	
		• N-31	
		OR	
		• N-32	
	RO	(Step 10) Check at least one of the following S/R Channels - OPERABLE:	**NOTE:** N-32 is OPERABLE.
		• N-31	
		OR	
		• N-32	
	CRS/ RO	(Step 11) Check unit status - IN MODE 3, 4, 5, 6, OR NO MODE.	
	CRS	(Step 11 RNO) IF in Mode 2 below P-6, THEN…..	**NOTE:** The plant is in Mode 2, but above P-6.

Op Test No.:	N18-1	Scenario #	4	Event #	2	Page	23 of 57
Event Description:	**N31/N35 High Voltage failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 12) Perform the following actions on the failed S/R drawer:	
		• Place the "LEVEL TRIP" switch to "BYPASS".	
		• Check "LEVEL TRIP BYPASS" light - LIT.	
		• Place the "HIGH FLUX AT SHUTDOWN" switch to "BLOCK".	
	RO/ BOP	(Step 13) Check the following S/R indications:	
		• Check "S/R OR I/R TRIP BYPASS" alarm (1AD-2, E-2) - LIT.	
		• Check the failed channel's status light on 1SI-19:	
		• "1/N-31B S/R CHANNEL I TRIP BYPASS" - LIT	
		• OR	
		• "1/N-32B S/R CHANNEL II TRIP BYPASS" - LIT.	
	CRS/ RO	Check unit status - IN MODE 3, 4, 5, 6, OR NO MODE.	
	CRS	(Step 13.c RNO) Perform the following:	
		• IF unit status in Mode 2 below P-6, THEN……	**NOTE:** The plant is in Mode 2, but above P-6.
		• Observe Cautions prior to Step 14 and GO TO Step 14.	

Op Test No.: N18-1	Scenario # 4	Event # 2	Page 24 of 57
Event Description:	**N31/N35 High Voltage failure**		

Time	Pos.	Expected Actions/Behavior	Comments
CAUTION • Opening S/R control power breaker will result in a reactor trip unless the affected channel is blocked in SSPS ("S/R TRAIN (A/B) TRIP BLOCKED" status light on 1SI-18 is lit). • Opening S/R instrument power breaker will result in a reactor trip unless: • Affected channel "LEVEL TRIP" switch is in "BYPASS" OR • Affected channel is blocked in SSPS ("S/R TRAIN (A/B) TRIP BLOCKED" status light on 1SI-18 is lit).			
	CRS	(Step 14) IF AT ANY TIME S/R control power breaker is opened above P-6, THEN breaker should be closed prior to lowering power below P-6 (to prevent a reactor trip).	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	(Step 15) Evaluate performing Case II (Intermediate Range Malfunction) based on symptoms while continuing in this case.	**NOTE:** It is likely that Case II has already been performed.
	CRS	(Step 16) WHEN malfunctioning S/R channel repaired, THEN…….	**NOTE:** The CRS may call WCC/IAE to address the malfunction. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: The CRS will likely conduct a Focus Brief.
TECHNICAL SPECIFICATION 3.3.1, REACTOR TRIP SYSTEM INSTRUMENTATION			
	CRS	LCO 3.3.1 The RTS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE (Function 4).	
	CRS	APPLICABILITY: According to Table 3.3.1-1	
	CRS	ACTIONS	

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels inoperable.	A.1 Enter the Condition referenced in Table 3.3.1-1 for the channel(s).	IMMEDIATELY

Op Test No.:	N18-1	Scenario #	4	Event #	2
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Event Description:	**N31/N35 High Voltage failure**				

Time	Pos.	Expected Actions/Behavior	Comments
F. THERMAL POWER >P-6 and <P-10, one IR Neutron Flux channel inoperable		F.1 Reduce THERMAL POWER to <P-6. OR F.2 Increase THERMAL POWER to >P-10.	24 hours 24 hours
			NOTE: The CRS will determine that Condition A is required and that ACTION A.1 must be taken. The CRS will determine that Function 4 is affected by the failure. The CRS will determine that Condition F is required and that ACTION F.1 or F.2 must be taken.

At the discretion of the Lead Examiner move to Event #3.

Op Test No.:	N18-1	Scenario #	4	Event #	3	Page	26 of 57
Event Description:	**1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE**						

Subsequently, 1EMF-34, S/G Sample Radiation Monitor, will fail HIGH, however, one of the SG Blowdown Control Valves will NOT automatically close. The operator will respond in accordance with OP/1/A/6100/010 Q, "Annunciator Response for 1RAD-1," C3, 1EMF 34 S/G SAMPLE HI RAD, and manually close the valve. The operator may enter Case I of AP/1/A/5500/10, "NC System Leakage Within the Capacity of Both NV Pumps." The crew will determine that the alarm is due to a failure, and NOT an actual high radioactivity condition.

Booth Operator Instructions:

insert MAL-EMF-34L = 10^7
insert LOA-BB019 = TRUE
insert:

- **REM-BB0123=0 delay = 2 seconds**
- **REM-BB0124=0 delay = 2 seconds**
- **REM-BB0125=0 delay = 2 seconds**

Indications Available:

- MCB Annunciator 1RAD1/C-3, 1EMF SG SAMPLE HI RAD, alarms
- MCB Annunciator 1RAD1/F-2, 1EMF34 LOSS OF S/G SAMPLE FLOW, alarms
- 1EMF 34 Amber TRIP 1 light is LIT
- 1EMF 34 Red TRIP 2 light is LIT
- 1EMF 34 indication off-scale high

Time	Pos.	Expected Actions/Behavior	Comments
		OP/1/A/6100/010 Q, ANNUNCIATOR RESPONSE FOR 1RAD-1 C-3, 1EMF 34 S/G SAMPLE HI RAD	
	RO	(IA Step 1) Ensure blowdown flow secured.	**NOTE:** The 1D S/G Blowdown Throttle Valve has remained OPEN.
	RO	(IA Step 2) Close the following manual loaders:	
		• 1BB-123 (1A S/G BB Flow Control)	
		• 1BB-124 (1B S/G BB Flow Control)	
		• 1BB-125 (1C S/G BB Flow Control)	
		• 1BB-126 (1D S/G BB Flow Control)	**NOTE:** The RO will close the Manual Loader to stop Blowdown flow.

Op Test No.: N18-1	Scenario # 4	Event # 3	Page 27 of 57
Event Description:	**1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE**		

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(IA Step 3) Notify the following of possible S/G Tube Leakage. Inform them of EMF in alarm and to implement their Response Procedure.	
		• RP Shift	**NOTE:** The CRS may call RP to address the Rad Monitor failure. If so, **Booth Instructor** acknowledge as RP. After **ten minutes** report back that **there is no abnormal radiation and that it is believed that 1EMF-34 has failed high.**
		• Primary Chemistry	**NOTE:** The CRS may call Primary Chemistry to address the Rad Monitor failure. If so, **Booth Instructor** acknowledge as Primary Chemistry.
		• Secondary Chemistry	**NOTE:** The CRS may call Secondary Chemistry to address the Rad Monitor failure. If so, **Booth Instructor** acknowledge as Secondary Chemistry. After **5 minutes** report back that **there is no abnormal radiation and that it is believed that 1EMF-34 has failed high.**
	CRS	(IA Step 4) Contact Secondary Chemistry to secure blowdown to HR Tank by closing 1BB-194 (1BB Flow to Heater Tank).	**NOTE:** The CRS may call Secondary Chemistry to secure blowdown. If so, **Booth Instructor** acknowledge as Secondary Chemistry.
			NOTE: The CRS may enter AP-10 believing that a SGTL exists.

Op Test No.:	N18-1	Scenario #	4	Event #	3	Page	28 of 57
Event Description:	**1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE**						

Time	Pos.	Expected Actions/Behavior	Comments
AP/1/A/5500/10, NC SYSTEM LEAKAGE WITHIN THE CAPACITY OF BOTH NV PUMPS, CASE I			
	BOP	(Step 1) Check Pzr level - STABLE OR GOING UP.	**NOTE:** Pzr level will be stable.
	CRS/ BOP	(Step 2) IF AT ANY TIME Pzr level goes down in an uncontrolled manner OR cannot be maintained greater than 4%, THEN perform Step 1.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
NOTE In subsequent steps "affected S/G" is considered the S/G with primary to secondary leakage requiring unit shutdown.			
	RO/ BOP	(Step 3) Identify affected S/G as follows:	
		• Any S/G N/R level - GOING UP IN AN UNCONTROLLED MANNER.	**NOTE:** No SG level will be rising uncontrollably.
		OR	
		• Check any of the following EMFs- ABOVE NORMAL:	**NOTE:** No increase in radiation level will be indicated on any of these radiation monitors.
		• 1EMF-24 (S/G A Steamline Hi Rad)	
		• 1EMF-25 (S/G B Steamline Hi Rad)	
		• 1EMF-26 (S/G C Steamline Hi Rad)	
		• 1EMF-27 (S/G D Steamline Hi Rad)	
		• 1EMF 71 (S/G A Leakage Hi Rad)	
		• 1EMF 72 (S/G B Leakage Hi Rad)	
		• 1EMF 73 (S/G C Leakage Hi Rad)	
		• 1EMF 74 (S/G D Leakage Hi Rad)	
		OR	
		• Check CF Flow - LOWER IN ANY S/G COMPARED TO ALL.	**NOTE:** No SGTL will be indicated.

Op Test No.:	N18-1	Scenario #	4	Event #	3	Page	29 of 57

Event Description: **1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE**

Time	Pos.	Expected Actions/Behavior	Comments
		OR	
		• Secondary Chemistry or RP has determined affected S/G by sampling or evaluation of available EMF data.	**NOTE:** The CRS may call Secondary Chemistry/RP to evaluate data. If so, **Booth Instructor** acknowledge as Secondary Chemistry and RP.
		OR	
		• Notify RP to frisk all Unit 1 S/G cation columns (CT Lab) to determine if activity level is significantly higher for any S/G.	**NOTE:** The CRS may call RP to evaluate data. If so, **Booth Instructor** acknowledge as RP. After 2 minutes report that there is no higher radioactivity on any cation column.
	CRS	(Step 4) Announce occurrence on page.	**NOTE:** CRS may ask U2 RO to make Plant Announcement. If so, **Floor Instructor** acknowledge as U2 RO.
	CRS	(Step 5) REFER TO the following:	
		• RP/0/A/5700/000 (Classification of Emergency)	
		• RP/0/A/5700/010 (NRC Immediate Notification Requirements).	
	CRS	(Step 6) IF AT ANY TIME NC leakage exceeds Tech Spec limits, THEN perform the following:	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
		• Ensure Outside Air Pressure Filter Train in service PER OP/0/A/6450/011 (Control Area Ventilation/Chilled Water System), Enclosure 4.4 (Control Room Atmosphere Pressurization During Abnormal Conditions).	

Op Test No.: N18-1	Scenario # 4	Event # 3	Page 30 of 57

Event Description: **1EMF-34 fails HIGH/Failure of SG Blowdown Flow Control Valve to Auto CLOSE**

Time	Pos.	Expected Actions/Behavior	Comments
		• Have another SRO evaluate if leakage exceeds SLC 16.9.7 condition C limits and immediately notify Security if SSF is inoperable.	
	CRS	(Step 7) Check if unit shutdown or reactor trip required as follows:	
		• Check VCT makeup - IN PROGRESS.	
	CRS	(Step 7.a RNO) GO TO Step 7.c.	
	BOP	(Step 7.c) Check S/G tube leak size - LESS THAN 90 GPM.	
		• Leakage in one S/G - GREATER THAN 125 GPD (GALLON PER DAY).	
	CRS	(Step 7.d RNO) Perform the following:	
		• IF unit shutdown required per PT/1/A/4150/001C (Primary to Secondary Leakage Monitoring), THEN……	
		• IF station management desires to exit procedure, THEN exit procedure at this time.	**NOTE:** The CRS may call WCCS/SM to evaluate the plant data. If so, **Booth Instructor** acknowledge as WCCS/SM, and report that AP10 should be exited.
At the discretion of the Lead Examiner, move to Event #4.			

Op Test No.:	N18-1	Scenario #	4	Event #	4	Page	31 of 57
Event Description:		**1A SG PORV fails OPEN (No Manual Control)**					

Afterwards, the 1A Steam Generator PORV will fail OPEN. The operator will respond in accordance with AP/1/A/5500/01, “Steam Leak,” to isolate the PORV and maintain reactor power stable.
Booth Operator Instructions: **Insert MALF-SM001A=100**
Indications Available: • OAC Alarm: 1SV19 1A SM PORV OPEN • 1SV-19 Red status light is LIT

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the operator will take actions to isolate the 1A SG PORV prior to being directed by the CRS. (Step 13)
		AP/1/A/5500/01, STEAM LEAK	
	CRS	(Step 1) Monitor Foldout page.	
		Manual Reactor Trip Criteria: (IF any of the following occur: (1) Steam leak is jeopardizing personnel safety or plant equipment, (2) T-Avg is less than 551°F AND going down, or (3) UST level is less than 1 ft – NOT Expected).	**NOTE:** Manual Reactor Trip Criteria is NOT expected to be utilized.
	RO	(Step 2) Reduce turbine load to maintain the following:	**NOTE:** The Turbine is NOT latched. The RO will be expected to manual adjust control rods so that Rx power remains between 3.5-4%.
		• Excore NI’s – LESS THAN OR EQUAL TO 100%.	
		• NC Loop D/T’s – LESS THAN 60°F D/T	
		• T-Avg – AT T-REF.	
	CRS	(Step 3) Check containment entry – IN PROGRESS.	

Op Test No.:	N18-1	Scenario #	4	Event #	4	Page	32 of 57
Event Description:	**1A SG PORV fails OPEN (No Manual Control)**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 4) Check steam leak - KNOWN TO BE OUTSIDE CONTAINMENT.	**NOTE:** The leak is outside the Containment.
	BOP	(Step 5) Check Pzr pressure prior to event – GREATER THAN P-11 (1955 PSIG).	
	BOP	(Step 6) Check Pzr level – STABLE OR GOING UP.	**NOTE:** If Pzr level is lowering the crew will address the RNO.
	BOP	(Step 7) IF AT ANY TIME while in this procedure Pzr level cannot be maintained stable, THEN RETURN TO Step 6.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	(Step 8) GO TO Step 12.	
	CRS	(Step 12) Announce occurrence on paging system.	**NOTE:** CRS may ask U2 RO to make Plant Announcement that AP-1 has been entered. If so, **Floor Instructor** acknowledge as U2 RO.
	RO	(Step 13) Identify and isolate leak on Unit 1 as follows:	
		• (Step 13a) Check SM PORVs – CLOSED.	**NOTE:** The 1A SG PORV is Open.
	RO	(Step 13a RNO) IF S/G pressure is less than 1092 PSIG, THEN perform the following:	
		• Close affected S/G SM PORV manual loader.	**NOTE:** Closing the Manual Loader will have no effect.
		• IF SM PORV is still open, THEN perform the following:	**NOTE:** The 1A SG PORV Isolation Valve will need to be closed.

Op Test No.:	N18-1	Scenario #	4	Event #	4	Page	33 of 57
Event Description:	**1A SG PORV fails OPEN (No Manual Control)**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Close SM PORV isolation valve.	
		• IF SM PORV isolation valve still open……	**NOTE:** The PORV Isolation valve is closed.
	BOP	• (Step 13.b) Check condenser dump valves – CLOSED.	**NOTE:** The Steam Dumps are expected to be OPEN.
	BOP	• (Step 13.b RNO) IF steam dumps required to be closed, THEN…..	**NOTE:** The Steam Dumps are required to be OPEN.
	BOP	• (Step 13.c) Check containment conditions – NORMAL:	
		• Containment temperature	
		• Containment pressure	
		• Containment humidity	
		• Containment floor and equipment sump level.	
	RO / BOP	• (Step 13.d) Check TD CA pump – OFF.	
	BOP	• (Step 13.e) Check valves on "STEAM LINE DRAIN VALVES" board (1MC-9) – CLOSED.	**NOTE:** One or more of these valves may be cycling. The RNO will direct closing the valves.
	CRS	• (Step 13.f) Check opposite Unit (Unit 2) "STEAM HEADER PRESSURE" – GREATER THAN 200 PSIG.	**NOTE:** CRS may ask U2 RO for AS Header pressure. If so, **Floor Instructor** report as **U2 RO that U2 Steam Header pressure** is **≈1000 psig**.
	CRS	• (Step 13.g) Dispatch operator to check for leaks.	**NOTE:** The CRS may dispatch an AO to look for leaks. If so, **Floor Instructor:** acknowledge. **Booth Instructor:** Report back in 3-5 minutes that there are no leaks.

Op Test No.:	N18-1	Scenario #	4	Event #	4	Page	34 of 57
Event Description:	**1A SG PORV fails OPEN (No Manual Control)**						

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may NOT dispatch AOs to look for leaks because it is understood that the SM PORV opening was the reason that AP-1 was entered.
	BOP	(Step 14) Check UST level – STABLE OR GOING UP.	**NOTE:** If the UST level is lowering, the BOP may perform the RNO and initiate makeup to the UST.
	CRS	(Step 15) Evaluate unit shutdown as follows:	
		• Check unit status – IN MODE 1 OR 2.	
		• Determine if unit shutdown or load reduction is warranted based on the following criteria:	**NOTE:** CRS may call WCC/Management to address the failure. If so, **Booth Instructor** acknowledge as WCC.
		• Size of leak	
		• Location of leak	
		• Rate of depletion of secondary inventory	
		• IF steam is leaking from a secondary heater relief OR MSR relief valve…	
		• IF turbine trip will isolate steam leak (such as feedwater heater leak or MSR leak…	
		• Check unit shutdown or load reduction – REQUIRED.	**NOTE:** Shutdown/Load Reduction will NOT be required.
	CRS	(Step 15.c RNO) Perform the following:	
		• Maintain present plant conditions until leak can be isolated or repaired.	
		• Exit this procedure.	
			NOTE: The CRS will likely conduct a Focus Brief.
At the discretion of the Lead Examiner, move to Event #5.			

Op Test No.:	N18-1	Scenario #	4	Event #	5	Page	35 of 57
Event Description:	**High Vibration on 1D NCP**						

After this, a high vibration condition will develop on the 1D NCP. The operator will respond in accordance with OAC Alarm M1D3041, 1D NC PUMP VIBRATION (HALM), and enter AP/1/A/5500/08, "Malfunction of NC Pump." Ultimately, the vibration condition will rise above the Hi-Hi threshold requiring tripping of the reactor and stopping the NCP. The operator will manually trip the reactor and enter EP/1/A/5000/E-0, "Reactor Trip or Safety Injection."

Booth Operator Instructions: **Insert MAL: NCP014G=4.6 and NCP014H=4.6 (320 Second Ramp to 5.0)**
Insert MAL: NCP012D=13, NCP013G=13, NCP013H=13, NCP015G=14.5, NCP015H=14.5, NCP016G=12, NCP016H=12

NOTE: All Malfunctions must be deleted when the 1D NCP is stopped.

Indications Available:

- OAC Alarm: 1D NC Pump Vibration
- MCB Annunciator 1AD-6/E-11 NC Pump Hi Vibration
- 1D NC Pump hi vibration on NC Pump Vibration Monitor

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The performance of Step 5 of AP8 will be dependent upon the timing of addressing the procedure (i.e. Step 5 may be performed when Hi-Hi Vibration exceeds setpoint).
AP/1/A/5500/08, MALFUNCTION OF NC PUMP CASE III, EXCESSIVE VIBRATION			
NOTE Step 1 RNO should be used to validate the vibration problem unless it has been previously validated or is clearly known to be valid.			
	BOP	(Step 1) Check NC Pump vibration problem – KNOWN TO BE VALID.	**NOTE:** The BOP will use the Step 1 RNO to determine that the Vibration Alarm is valid.

Op Test No.:	N18-1	Scenario #	4	Event #	5	Page	36 of 57
Event Description:	**High Vibration on 1D NCP**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1 RNO) Perform the following:	
		• REFER TO appropriate annunciator response:	
		• "NC PUMP HI VIBRATION" (1AD-6, E-11)	**NOTE:** The BOP will use 1AD-6/E-11 ARP to determine if alarm is valid (Place GAP switch left or right to determine if vibration probe reliable. IF gap indicates less than 4 OR greater than 19 volts/mils, vibration output is unreliable.).
		• "NC PUMP HI-HI VIBRATION" (1AD-6, F-11).	
	CRS	• IF vibration alarm valid, THEN GO TO Step 2.	
	BOP	(Step 2) Check affected NC pump vibration indication within operating limits:	
		• Motor frame vibration – LESS THAN 5 MILS • All of the following - LESS THAN 20 MILS • Motor shaft vibration • Pump shaft vibration • Motor axial vibration • Motor flywheel vibration	**NOTE:** The Motor Frame Vibration will be rising.
	CRS	(Step 3) IF AT ANY TIME vibration exceeds operating limits, THEN GO TO Step 5	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	CRS	(Step 4) GO TO Step 6	
	CRS	(Step 6) Announce occurrence on the paging system.	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that AP-8 has been entered. If so, **Floor Instructor** acknowledge as U2 RO.

Op Test No.:	N18-1	Scenario #	4	Event #	5	Page	37 of 57
Event Description:	**High Vibration on 1D NCP**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 7) Check NC pumps - ANY RUNNING	**NOTE:** All 4 NCPs are currently running. The CRS will direct the crew to continue monitoring NCP vibrations until the Hi-Hi Vibration alarm actuates. When alarm occurs, the crew will go to Step 5.
	BOP	(Step 5) Stop affected NC pump as follows:	
		• IF A or B NC pump is the affected pump, Then CLOSE associated spray valve:	
	BOP	• 1NC-27C (1A NC Loop PZR Spray Control).	**NOTE:** The 1A RCP is NOT affected.
		• 1NC-29C (1B NC Loop PZR Spray Control).	**NOTE:** The 1B RCP is NOT affected.
		• Check unit status – IN MODE 1 OR 2.	
	RO	• Trip reactor	
	BOP	• WHEN reactor power less than 5%, THEN stop affected NC pump.	
Booth Operator Instructions:		**Delete All Vibration Malfunctions when the 1D NCP is stopped.**	
	CRS	• GO TO EP/1/A/5000/E-0 (Reactor Trip or Safety Injection).	
When the crew trips the reactor move to Events #6-7.			

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	38 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Upon the reactor trip, a 350 gpm Steam Generator Tube Rupture will occur on the 1C SG and the operator will actuate Safety Injection. Upon completion of E-0, the operator will transition to EP/1/A/5000/E-3, "Steam Generator Tube Rupture," to isolate the flow into and out of the 1C Steam Generator and then conduct a cooldown and depressurization of the NC System. While performing an NCS depressurization using normal spray, both Pzr Spray Valves will stick OPEN on completion of the depressurization; and the operator will be required to stop both the 1A and 1B NCPs. The scenario will terminate at Step 22.c of E-3, after the crew has closed the Cold Leg Isolation Valves from the NV System.

Booth Operator Instructions: **insert MAL-SG001C 350 delay=0 ramp=0 (Occurs on Rx Trip)**

Indications Available:
- Pzr level lowers uncontrollably
- Pzr pressure lowers consistently with Pzr level
- Narrow Range Level in the 1C SG starts to rise

Time	Pos.	Expected Actions/Behavior	Comments
		EP/1/A/5000/E-0, REACTOR TRIP OR SAFETY INJECTION	
			NOTE: Crew will carry out Immediate Actions of E-0, prior to the CRS addressing the EP.
	RO/ BOP	(Step 1) Monitor Foldout page.	
		NC Pump Trip Criteria (Not expected)	
		CA Suction Sources (CA storage tank (water tower) goes below 1.5 ft – Not expected)	
		Position Criteria for 1NV-150B and 1NV-151A (U1 NV Pump Recird Isol)	**NOTE:** The BOP will monitor these conditions.
		• IF NV S/I flowpath aligned AND NC pressure is less than 1500 PSIG, THEN CLOSE 1NV-150B and 1NV-151A.	
		• IF NC pressure is greater than 2000 PSIG, THEN OPEN 1NV-150B and 1NV-151A.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	39	of	57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**								

Time	Pos.	Expected Actions/Behavior	Comments
		Ruptured S/G Aux Feedwater Isolation Criteria (Expected)	**NOTE:** The BOP will monitor these conditions, and isolate CA flow to the 1C SG when met.
		• IF both of the following conditions met, THEN stop CA flow to affected S/G:	
		• Level going up in an uncontrolled manner or radiation level in that S/G is abnormal	
		• N/R level - GREATER THAN 11% (32% ACC).	
		Faulted S/G Aux Feedwater Isolation Criteria (Not expected)	
	RO	(Step 2) Check Reactor Trip:	**Immediate Action**
		• All rod bottom lights – LIT	
		• Reactor trip and bypass breakers – OPEN	
		• I/R power – GOING DOWN.	
	RO	(Step 3) Check Turbine Trip:	**Immediate Action**
		• All throttle valves – CLOSED.	
	BOP	(Step 4) Check 1ETA and 1ETB – ENERGIZED.	**Immediate Action**
	RO/ BOP	(Step 5) Check if S/I is actuated:	**Immediate Action**
		• “SAFETY INJECTION ACTUATED” status light (1SI-18) – LIT.	
	RO/ BOP	(Step 5.a RNO) Perform the following:	
		• Check if S/I is required:	
		• Pzr pressure less than 1845 PSIG	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	40 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
		OR	
		• Containment pressure greater than 1 PSIG.	
		• IF S/I is required, THEN initiate S/I.	
		• IF S/I is not required, THEN perform the following:	**Examiner NOTE:** The CRS may make the transition to ES-0.1 and/or concurrently perform AP-10 (Not Scripted). If so, wait HERE until the crew actuates Safety Injection, and returns to E-0.
		• Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	
		• GO TO EP/1/A/5000/ES-0.1 (Reactor Trip Response).	
	RO	• (Step 5.b) Both LOCA Sequencer Actuated status lights (1SI-14) – LIT.	
	CRS	(Step 6) Announce "Unit 1 Safety Injection".	**NOTE:** The CRS may ask U2 RO to make Plant Announcement that a U1 Safety Injection has occurred. If so, **Floor Instructor** acknowledge as U2 RO.
	BOP	(Step 7) Check all Feed water Isolation status lights (1SI-4) – LIT.	
	BOP	(Step 8) Check Phase A "RESET" lights – DARK.	
	BOP	(Step 9) Check ESF Monitor Light Panel on Energized train(s):	
		• Groups 1, 2, 5 – DARK.	
		• Group 3 – LIT.	
		• Group 4 – LIT AS REQUIRED.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	41	of	57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**								

Time	Pos.	Expected Actions/Behavior	Comments
		• Group 6 – LIT.	
	CRS	• GO TO Step 10.	
	RO	(Step 10) Check proper CA pump status:	
		• MD CA pumps – ON.	
		• N/R level in at least 3 S/Gs – GREATER THAN 17%.	
	BOP	(Step 11) Check all KC pumps – ON.	
	BOP	(Step 12) Check both RN pumps – ON.	
	CRS	(Step 13) Notify Unit 2 to perform the following:	**Floor Instructor:** As U2 RO report "2A RN Pump is running."
		• Start 2A RN pump.	
		• THROTTLE Unit 2 RN flow to minimum for existing plant condition.	**Booth Instructor:** **insert LOA-RN087 (Start 2A RN Pump)** **insert LOA-RN083 8050.000000 delay=0 ramp=10 (Unit 2 Train A Demand Flow)**
	RO	(Step 14) Check all S/G pressures – GREATER THAN 775 PSIG.	
	BOP	(Step 15) Check Containment Pressure – HAS REMAINED LESS THAN 3 PSIG.	**NOTE:** Containment Pressure is normal.
	BOP	(Step 16) Check S/I flow:	
		• Check "NV PMPS TO COLD LEG FLOW" gauge – INDICATING FLOW.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	42 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Check NC pressure – LESS THAN 1600 PSIG.	
	BOP	(Step 16b RNO) Perform the following:	
		• Ensure ND pump miniflow valve on running pump(s) OPEN:	
		• 1ND-68A (1A ND Pump & Hx Mini Flow Isol)	
		• 1ND-67B (1B ND Pump & Hx Mini Flow Isol).	
	CRS	• IF valve(s) open on all running ND pumps, THEN GO TO Step 17.	
	CRS	(Step 17) Notify OSM or other SRO to perform EP/1/A/5000/G-1 (Generic Enclosures), Enclosure 22 (OSM Actions Following an S/I) within 10 minutes.	**NOTE:** The CRS may ask OSM to address. If so, **Floor Instructor** acknowledge as OSM.
	RO/ BOP	(Step 18) Check CA flow:	
		• Total CA flow – GREATER THAN 450 GPM.	**NOTE:** The crew may have throttled CA flow to < 450 gpm because NR S/G levels are > 11%. If so, the RNO will be performed.
	BOP	• Check VI header pressure – GREATER THAN 60 PSIG.	
	RO/ BOP	• WHEN each S/G N/R level is greater than 11% (32% ACC), THEN control CA flow to maintain that S/G N/R level between 11% (32% ACC) and 50%.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
	RO	(Step 19) Check NC temperatures:	
		• IF any NC pumps on, THEN check NC T-Avg – STABLE OR TRENDING TO 557°F.	**NOTE:** The 1A, 1B and 1C NCPs will be running.

Op Test No.: N18-1	Scenario # 4	Event # 6 & 7	Page 43 of 57

Event Description: **1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is most likely that the cooldown will be under control. If NOT, the CRS will assign the RO (BOP) to perform Enclosure 3 (Not Scripted), and continue the performance of E-0 with the BOP (RO).
	BOP (RO)	(Step 20) Check Pzr PORV and spray valves:	
		• All Pzr PORVs – CLOSED.	
		• Normal Pzr spray valves – CLOSED.	**NOTE:** The Pzr Spray Valves may be OPEN. If so, the RNO will be performed.
		• At least one Pzr PORV isolation valve- OPEN.	
	BOP (RO)	(Step 21) Check NC subcooling based on core exit T/Cs – GREATER THAN 0°F.	
	BOP (RO)	(Step 22) Check if main steamlines intact:	
		• All S/G pressures – STABLE OR GOING UP	
		• All S/Gs – PRESSURIZED.	
	BOP (RO)	(Step 23) Check if S/G tubes intact:	
		• The following secondary EMFs – NORMAL:	
		• 1EMF-33 (Condenser Air Ejector Exhaust)	
		• 1EMF-34(L) (S/G Sample (Lo Range))	**NOTE:** 1EMF-34 is in TRIP 2.
		• 1EMF-24 (S/G A)	
		• 1EMF-25 (S/G B)	
		• 1EMF-26 (S/G C)	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	44	of	57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**								

Time	Pos.	Expected Actions/Behavior	Comments
		• 1EMF-27 (S/G D).	
		• S/G levels – STABLE OR GOING UP IN A CONTROLLED MANNER.	**NOTE:** The 1C SG Level is increasing in an uncontrolled manner.
	CRS	(Step 23 RNO) IF S/G levels going up in an uncontrolled manner OR any EMF abnormal, THEN perform the following:	
		• Implement EP/1/A/5000/F-0 (Critical Safety Function Status Trees).	
		• GO TO EP/1/A/5000/E-3 (Steam Generator Tube Rupture).	
			NOTE: The CRS will transition to E-3.
EP/1/A/5000/E-3, STEAM GENERATOR TUBE RUPTURE			
	RO/ BOP	(Step 1) Monitor Foldout page.	
		NC Pump Trip Criteria (Not expected)	
		S/I Reinitiation Criteria (SI On – Not expected)	
		Secondary Integrity Criteria (Not expected)	
		Cold Leg Switchover Criteria (< 95 INCHES in FWST – Not expected)	
		CA Suction Sources (<1.5 feet – Not expected)	
		Multiple Tube Rupture Criteria (Not expected)	
	BOP	(Step 2) Identify ruptured S/G(s):	
		• Any S/G N/R level – GOING UP IN AN UNCONTROLLED MANNER	**NOTE:** The 1C SG Level is increasing in an uncontrolled manner.
		OR	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	45 of 57

Event Description: **1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**

Time	Pos.	Expected Actions/Behavior	Comments
		• Primary Chemistry or RP has determined ruptured S/G.	**NOTE:** The CRS may contact Chemistry for sampling. **Booth Instructor:** Acknowledge as appropriate.
		OR	
		• Any of the following EMFs – ABOVE NORMAL:	
		• 1EMF-24 (S/G A)	
		• 1EMF-25 (S/G B)	
		• 1EMF-26 (S/G C)	
		• 1EMF-27 (S/G D)	
	RO	(Step 3) Check at least one S/G – AVAILABLE FOR NC SYSTEM COOLDOWN.	
	RO	(Step 4) Isolate flow from ruptured S/G(s) as follows:	
		• Check ruptured S/G(s) PORV – CLOSED.	
		• Check S/Gs 1B and 1C – INTACT.	**NOTE:** The 1C SG is NOT Intact.
	CRS	(Step 4b RNO) Isolate TD CA pump steam supply from ruptured S/G as follows:	
		• IF TD CA pump is the only source of feedwater….	**NOTE:** The TD CA Pump is NOT the ONLY CA Source.
		• Ensure operators dispatched in next step immediately notify Control Room Supervisor when valves are closed.	**NOTE:** It is likely that these actions have already been performed.

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	46 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Immediately dispatch two operators to concurrently verify (CV), unlock and CLOSE valves on ruptured S/G(s):	**NOTE:** It is likely that these actions have already been performed. If NOT, the CRS will dispatch two AOs. **Floor Instructor:** Acknowledge as AOs.
		• For 1C S/G:	
		• 1SA-77 (1C S/G SM Supply to Unit 1 TD CA Pump Turb Loop Seal Isol) (Unit 1 interior doghouse, 767+10, FF-53).	**Booth Instructor**: **Insert REMSA0001 = 0** **Insert REMSA0077 = 0** Within **3 minutes,** as **AO** report that **steam has been isolated to the TD CA Pump from the 1C SG.**
		• 1SA-1 (1C S/G SM Supply to Unit 1 TD CA Pump Turb Maint Isol) (Unit 1 interior doghouse, 767+10, FF-53, above ladder).	
	CRS	• IF AT ANY TIME local closure of SA valves takes over 8 minutes, THEN isolate TD CA pump steam supply PER Enclosure 2 (Tripping TD CA Pump Stop Valve or Alternate Steam Isolation).	**NOTE:** Eight minutes will NOT elapse before the valves are closed.
	RO	• Check blowdown isolation valves on ruptured S/G/(s) – CLOSED.	
		• For 1C S/G:	
		• 1BB-3B (1C S/G Blowdown Cont Outside Isol Control)	
		• 1BB-7A (C S/G BB Cont Inside Isol).	
	BOP	• CLOSE steam drain on ruptured S/G(s)	
		• 1SM-95 (C SM Line Drain Isol)	
	RO	• CLOSE the following valves on ruptured S/G(s):	
		• MSIV	
		• MSIV bypass valve.	

Op Test No.: N18-1	Scenario # 4	Event # 6 & 7			Page 47 of 57		
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5) Control ruptured S/G(s) level as follows:	
		• Check ruptured S/G(s) N/R level – GREATER THAN 11% (32% ACC).	
	BOP	• Isolate feed flow to ruptured S/G(s):	
		• For 1C S/G:	
		• CLOSE 1CA-50B (U1 TD CA Pump Disch TO 1C S/G Isol).	
		• CLOSE 1CA-46B (1B CA Pump Disch To 1C S/G Isol).	
	RO	(Step 6) Check ruptured S/G(s) pressure – GREATER THAN 350 PSIG.	

<u>Critical Task:</u>

Isolate feedwater flow into and steam flow from the ruptured SG so that minimum ΔP between ruptured Steam Generator and intact Steam Generators is not less than 250 psid once target temperature is reached (Entry into ECA-3.1).

Safety Significance: Failure to isolate the ruptured SG causes a loss of ∆P between the ruptured SG and the intact SGs. Upon a loss of ∆P, the crew must transition to a contingency procedure that constitutes an incorrect performance that "necessitates the crew taking compensating action which complicates the event mitigation strategy." If the crew fails to isolate steam from the SG, or feed flow into the SG the ruptured SG pressure will tend to decrease to the same pressures as the intact SGs, requiring a transition to a contingency procedure, and delaying the stopping of RCS leakage into the SG.

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 7) Check any NC pump – RUNNING.	**NOTE:** The 1A, 1B and 1C NCPs will be running.
	BOP	(Step 8) Check Pzr pressure – GREATER THAN 1955 PSIG.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	48	of	57

Event Description: **1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9) Initiate NC System cooldown as follows:	
	CRS	• Determine required core exit temperature based on lowest ruptured S/G pressure:	
		>1099 psig - 515°F/485-505°F	**NOTE:** The CRS will determine the target temperature to be 515°F, and the desired control band to be 485-505°F.
	RO	• Check the following valves on ruptured S/G(s) – CLOSED:	
		• MSIV	
		• MSIV bypass valve.	
	RO	• Check ruptured S/G(s) SM PORV – CLOSED.	
	RO	• Check S/G(s) 1B and 1C – INTACT.	**NOTE:** The 1C SG is ruptured.
	RO	(Step 9.d RNO) IF 1B OR 1C S/G is ruptured, THEN perform the following:	
		• Ensure steam to TDCA pump is isolated from ruptured S/G per one of the following:	**NOTE:** It is likely that these actions have already been performed.
		• Local isolation of SA line (per Step 4.b)	
		• OR	
		• Tripping TD CA pump stop valve (per Step 4.b).	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	49	of	57

Event Description: **1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: If NOT already done, the CRS will direct two AOs to CLOSE 1SA-1 and 77. **Booth Instructor**: **insertREMSA0001 = 0** **insertREMSA0077 = 0** Within **3 minutes,** as **AO** report that **steam has been isolated to the TD CA Pump from the 1C SG.**
		• Do not continue until affected TDCA pump steam supply is either:	
		• Isolated	
		OR	
		• Determined to be unisolable.	

NOTE

- NC pump trip criteria based on subcooling does not apply after starting a controlled cooldown.
- After the Low Pressure Steamline Isolation signal is blocked, maintaining steam pressure negative rate less than 2 PSIG per second will prevent a Main Steam Isolation.

Time	Pos.	Expected Actions/Behavior	Comments
	RO	• (Step 9e) Check condenser available as follows:	
	RO	• “C-9 COND AVAILABLE FOR STEAM DUMP” status light (1SI-18) – LIT	
		• MSIV on intact S/G(s) - OPEN.	
		• (Step 9.f) Place steam dumps in steam pressure mode as follows:	
		• Place "STM PRESS CONTROLLER" in manual.	
		• Adjust "STM PRESS CONTROLLER" output to equal "STEAM DUMP DEMAND" signal.	
		• Place "STEAM DUMP SELECT" in steam pressure mode.	

Op Test No.: N18-1	Scenario # 4	Event # 6 & 7	Page 50 of 57				
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	• (Step 9.g) WHEN "P-12 LO-LO TAVG" status light (1SI-18) lit, THEN place steam dumps in bypass interlock.	
CAUTION After initiating cooldown in next step, continue with subsequent steps without delay.			
	RO	• (Step 9.h) Dump steam from intact S/G(s) to condenser at maximum rate while attempting to avoid a Main Steam Isolation.	**Examiner NOTE:** If an MSI occurs (Not Expected), the CRS will need to return to this step in progress and initiate a cooldown using SG PORVs B and D (A SG PORV has previously failed). This is NOT scripted. **When cooldown is started, continue with Step 10 on Page 51.**
		• (Step 9.i) Check Low Pressure Steamline Isolation - BLOCKED.	**NOTE:** If the Low Pressure Steamline Isolation signal is NOT blocked, the Step 9.i RNO will be performed. Otherwise, continue to Step 9.j.
	RO	(Step 9.i RNO) Depressurize Pzr to less than 1955 PSIG using one of the following:	
		• Maximum available Pzr spray	
		OR	
		• IF normal Pzr spray is not available, THEN use Pzr PORV.	
		• Do not continue until Pzr pressure is less than 1955 PSIG.	
		• Depress "BLOCK" on Low Pressure Steamline Isolation block switches.	
		• CLOSE Pzr spray valve(s) and Pzr PORVs.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	51	of	57

Event Description: **1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**

Time	Pos.	Expected Actions/Behavior	Comments
		• (Step 9.j) Check core exit T/Cs - LESS THAN REQUIRED TEMPERATURE.	**NOTE:** It is likely that when the CRS arrives at this step, that the target temperature will NOT be reached.
	RO	(Step 9.j RNO) Perform the following:	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware.
		• WHEN core exit T/Cs are less than required temperature, THEN stabilize core exit T/Cs in desired control band, 10°F to 30°F less than required temperature.	**NOTE:** The CRS will determine use the desired control band to be 485-505°F.
	CRS	• GO TO Step 10.	
	RO	(Step 10) Control intact S/G levels:	
		• Check N/R level in any intact S/G – GREATER THAN 11% (32% ACC).	
		• Throttle feed flow to maintain all intact S/G N/R levels between 22% (32% ACC) and 50%.	
	BOP	(Step 11) Check Pzr PORVs and isolation valves:	
		• Power to all Pzr PORV isolation valves – AVAILABLE.	
		• All Pzr PORVs – CLOSED.	
		• At least one Pzr PORV isolation valve – OPEN.	
	BOP	(Step 12) Reset the following:	
		• S/I	
		• Sequencers	
		• Phase A Isolation	
		• Phase B Isolation	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	52 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 13) Establish VI to containment as follows:	
		• Open the following valves:	
		• 1VI-129B (VI Supply to A Cont Ess VI Hdr Outside Isol))	
		• 1VI-160B (VI Supply to B Cont Ess VI Hdr Outside Isol))	
		• 1VI-150B (Lwr Cont Non Ess Cont Outside Isol).	
		• Check VI header pressure – GREATER THAN 85 PSIG.	
	RO	(Step 14) Check if NC System cooldown should be stopped as follows:	
		Check cooldown – INITIATED PER STEP 9.	
		• Check Core exit T/Cs – LESS THAN REQUIRED TEMPERATURE.	**NOTE:** It is likely that when the CRS arrives at this step, that the target temperature will NOT be reached.
	CRS	(Step 14b RNO) Perform the following:	
NOTE The following step only applies during performance of this RNO. It may be performed more than once if ruptured S/G pressure continues to rise.			
		• IF ruptured S/G pressure goes up by over 50 PSIG since required temperature was selected, AND ruptured S/G pressure is greater than 400 PSIG, THEN select a new required temperature from table in Step 9.a.	**NOTE:** This is a Continuous Action. The CRS will make one or more board operators aware, and HOLD.
		• Do not continue until core exit T/Cs are less than target temperature.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	53 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	• (Step 14c) Stabilize core exit T/Cs in desired control band, 10°F to 30°F less than required temperature.	
	RO	(Step 15) Check ruptured S/G(s) pressure – STABLE OR GOING UP.	
	RO	(Step 16) Check NC subcooling based on core exit T/Cs – GREATER THAN 20°F.	

Critical Tasks:

Establish/maintain an NCS temperature so that transition from E-3 does not occur because the RCS temperature is either too high to maintain minimum required subcooling of 20°F or too low creating an Orange Path condition on the NCS Integrity Critical Safety Function.

Safety Significance: Failure to establish and maintain the correct NCS temperature during a SGTR leads to a transition from E-3 to a contingency ERG. This failure constitutes an incorrect performance that "necessitates the crew taking compensating action that would complicate the event mitigation strategy."

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 17) Depressurize NC System using Pzr spray as follows:	
		• Check normal Pzr spray flow – AVAILABLE.	**NOTE:** Normal Pzr Spray will be available with the 1A, 1B and 1C NCPs will be running.
		• Initiate NC depressurization using maximum available spray.	**NOTE:** The BOP will manually open both Pzr Spray Valves.

BOOTH OPERATOR INSTRUCTIONS: **After both Pzr Spray Valves have been FULLY OPENED, Insert:**
REM-NC0027C = 1
REM-NC0029C = 1

Time	Pos.	Expected Actions/Behavior	Comments
		• IF AT ANY TIME during this step, spray valves are not effective in reducing NC pressure, OR ruptured S/G(s) NR level goes above 83% (73% ACC), THEN GO TO Step 18.	**NOTE:** It will likely be determined that the NC Spray Valves are NOT effective in reducing NC pressure, and the CRS will proceed to Step 18.

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	54 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 18) Depressurize NC System using Pzr PORV as follows:	
		• Check at least one Pzr PORV - AVAILABLE.	
		• OPEN one Pzr PORV.	
		• Do not continue until any of the following conditions satisfied:	
		• NC subcooling based on core exit T/Cs - LESS THAN 0°F	
		OR	
		• Pzr level - GREATER THAN 76% (58% ACC)	
		OR	
		• Both of the following:	
		• NC pressure - LESS THAN RUPTURED S/G(s) PRESSURE.	
		• Pzr level - GREATER THAN 11% (29% ACC).	
		• CLOSE Pzr PORV.	
		• CLOSE Pzr spray valves.	**NOTE:** The Pzr Spray Valves will fail in the Full OPEN position.
	BOP	(Step 18.e RNO) IF spray valve(s) cannot be closed, THEN perform the following:	**NOTE:** The BOP will stop both the 1A and 1B NCP, and leave the 1C NCP running..
		• Stop 1A and 1B NC pumps.	
		• IF both 1C AND 1D NC pumps on, THEN…..	
	RO	(Step 19) Check NC pressure - GOING UP.	

Op Test No.:	N18-1	Scenario #	4	Event #	6 & 7	Page	55 of 57
Event Description:	**1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**						

Time	Pos.	Expected Actions/Behavior	Comments
CAUTION S/I must be terminated when termination criteria are satisfied to prevent overfilling the ruptured S/G(s).			
	RO/ BOP	(Step 20) Check S/I termination criteria:	
		• NC subcooling based on core exit T/Cs – GREATER THAN 0°F.	
		• Secondary heat sink:	
		• N/R level in at least one intact S/G – GREATER THAN 11% (32% ACC)	
		• OR	
		• Total feed flow available to S/G(s) - GREATER THAN 450 GPM.	
		• NC pressure – STABLE OR GOING UP.	
		• Pzr level – GREATER THAN 11% (29% ACC)	
	BOP	(Step 21) Stop S/I pumps as follows:	
		• NI pumps.	
		• All but one NV pump.	
	BOP	(Step 22) Isolate NV S/I flowpath as follows:	
		• Check the following valves - OPEN	
		• 1NV-221A (U1 NV Pumps Suct From FWST Isol)	
		• 1NV-222B (U1 NV Pumps Suct From FWST Isol).	
		• Check the following valves - OPEN	
		• 1NV-150B (U1 NV Pump Recirc Isol).	
		• 1NV-151A (U1 NV Pump Recirc Isol).	
	BOP	• Close the following valves:	

Event Description: **1C Steam Generator Tube Rupture/ Pzr Spray Valves fail to CLOSE (After Manual Opening)**

Time	Pos.	Expected Actions/Behavior	Comments
		• 1NI-9A (NC Cold Leg Inj From NV)	
		• 1NI-10B (NC Cold Leg Inj From NV).	

Critical Task:

Depressurize the NCS to meet SI termination criteria before the Quality of the steam exiting the SG exceeds 80% (≤0.8 on Void Fraction SGINFO.cts).

Safety Significance: Failure to stop the reactor coolant leakage into a ruptured SG by depressurizing the RCS (when it is possible to do so) needlessly complicates the mitigation of the event. It also constitutes a "significant reduction of Safety Margin beyond that irreparably introduced by the scenario. If RCS depressurization does NOT occur, the inventory in the secondary side of the ruptured SG will rise to the level of the Main Steam Lines leading to water release through the SG PORV or Safety Valve, which could cause and unisolable fault in the ruptured SG.

At the discretion of the Lead Examiner terminate the exam.

UNIT 1 STATUS:

Power Level: 0%   NCS [B] 1966 ppm   Pzr [B]: 1966 ppm   Xe: Per OAC

Power History: At this power level for 1 hour   Core Burnup: 25.1 EFPDs

UNIT 2 STATUS:

Power Level: 100%

CONTROLLING PROCEDURE: OP/1/A/6100/003 Controlling Procedure for Unit Operation
OP/1/A/6250/008 Steam Generator Blowdown

OTHER INFORMATION NEEDED TO ASSUME THE SHIFT:

- The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
- Three operators are in Containment completing the weekly surveillance on the Ice Condenser Intermediate Deck Doors (PT/1/A/4200/14A).

The following equipment is Out-Of-Service:

- The 1B OAPT Fan is OOS due to a Motor failure. ACTION has been taken in accordance with Technical Specification LCO 3.7.9 ACTION A.1.
- 1KFT-5130, Spent Fuel Pool Temperature, failed last shift (IAE is investigating).
- MCB Annunciator 1AD-1, B-9, "TURBINE OVER SPEED (111%) TURB TRIP," has failed ILLUMINATED (IAE is investigating).

Crew Directions:

- It is planned to raise power on this shift to 3.5-4%, and stabilize power.
- When directed, start the 1A BB Pump per Section 3.4 of Enclosure 4.1 of OP/1/A/6250/008 (AO John is standing by at the Local BB Panel)

Work Control SRO/Offsite Communicator   **Jim**

Plant SRO   **Joe (FB)**

AO's AVAILABLE

Unit 1	**Unit 2**
Aux Bldg. John	**Aux Bldg. Chris**
Turb Bldg. Bob (FB)	**Turb Bldg. Mike (FB)**
5th Rounds. Carol	

Extra(s) Bill (FB) Ed (FB) Wayne (FB) Tanya Gus (RW)

SIM JPM A

Facility:	McGuire	Task No.:	
Task Title:	Respond to High VCT Temperature	JPM No.:	2018 Systems - Control Room JPM A (Alternate Path)
K/A Reference:	APE 026 AA1.02 (3.2/3.3)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: ___X___

Classroom ______ Simulator ___X___ Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Ensure Handout 1 is placed on CRS Desk.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 2.

Initial Conditions:

- Unit 1 was at 100% power when a leak developed in the KC System.
- The crew entered AP/1/A/5500/21 (Loss of KC or KC System Leakage).
- The crew has completed actions through Step 12.
- MCB Annunciator 1AD-7, D1, VCT HI TEMP, has just alarmed, and Foldout Page item #5 now applies.
- The leak is suspected to be on the aux building non-essential header, and this header is NOT likely to be restored within 15 minutes.

Initiating Cue: The CRS has directed you to perform the actions of Enclosure 6 of AP/1/A/5500/21 (Loss of KC or KC System Leakage), while the crew continues with AP-21.

Task Standard: The operator will isolate Letdown, and attempt to start the PD Pump. When the PD Pump fails to start, the operator will align the suction of the NV Pumps to the FWST.

Required Materials: None

General References: AP/1/A/5500/21 (Loss of KC or KC System Leakage), Rev 10
OP/1/A/6100/010 H (Annunciator Response For Panel 1AD-7), Rev 66
OMP 4-3 (Use of Emergency And Abnormal Procedure and FLEX Support Guidelines), Rev 46

Handouts: Handout 1: AP/1/A/5500/21 (Loss of KC or KC System Leakage) marked up for place-keeping through Step 12.
Handout 2: Enclosure 6 (VCT High Temperature Actions) of AP/1/A/5500/21 (Loss of KC or KC System Leakage).

Time Critical Task: NO

Validation Time: 12 minutes

Critical Step Justification	
Step 1	This step is critical because rotating the 1NV-35A Control Switch to the CLOSE position is necessary to isolate Letdown and stop VCT heat-up due to the loss of KC flow to the LDHX.
Step 13	This step is critical because pressing the 1RN-64A OPEN pushbutton is necessary to attempt to start the PD Pump.
Step 16	This step is critical because pressing the 1NV-1047A OPEN pushbutton is necessary to attempt to start the PD Pump.
Step 17	This step is critical because the response to this event is normally to start the PD Pump because it does not recirc to the VCT, and remove the NV Pumps from service (The operator does not know that this pump will fail to operate).
Alternate Path Critical Step Justification	
Step 21	This step is critical because opening one of two available suction paths from the FWST to the Charging Pump suction is necessary under the current plant conditions (i.e. PD Pump has failed) to maintain charging flow.
Step 22	This step is critical because closing one of two valves needed to isolate the suction path from the VCT to the Charging Pump suction is necessary under the current plant conditions (i.e. PD Pump has failed) to maintain charging flow.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset simulator to IC-39 (100%).
2. Place in RUN
3. Insert MALF-NV006C = TRUE (PD Pump fails to start manually).
4. Insert REM-KC139 = 15% (Reduce Seal Water HX Cooling)
5. Insert REM-KC130 = 0.01 until VCT hi temp alarm occurs. This is done to simulate a leak in the Letdown Heat Exchanger KC flow which robs flow from LDHX and causes Letdown temperature to rise.
6. Ensure MCB Annunciator 1AD-7 D1, HI VCT TEMP, has alarmed.
7. Perform actions of AP/1/A/5500/21 through Step 12. Ensure AP/1/A/5500/21 marked up for place-keeping through Step 12 is available at the CRS Desk.
8. Acknowledge the alarms.
9. Freeze the Simulator

<u>OR</u>

1. Reset to IC-232 (October, 2017)
2. Momentarily go to RUN to acknowledge Alarms then place Simulator in FREEZE.
3. Leave Simulator in FREEZE until operator is ready to begin.

NOTE: Simulator Instructor will need to remain available to respond to alarms that are not related to the task.

(Denote Critical Steps with an asterisk)*

Ensure Handout 1 is placed on CRS Desk.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 2.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin.				
Examiner NOTE: The Critical nature of Step 1 is to close 1NV-35A. IF this valve is NOT closed, the Critical nature of the Step can be satisfied by closing either 1NV-1A or 1NV-2A in Step 2.				
1 *	(Step 1) Isolate letdown as follows: (Step 1.a) CLOSE the following valves: • 1NV-458A (U1 75 GPM L/D Orifice Otlt Cont Isol) • 1NV-457A (U1 45 GPM L/D Orifice Otlt Cont Isol) • 1NV-35A (U1 Variable L/D Orifice Otlt Cont Isol).	The operator observes the 1NV-458A Green status light LIT, Red status light OFF. The operator observes the 1NV-457A Green status light LIT, Red status light OFF. The operator rotates the 1NV-35A Control Switch to the CLOSE position, allowing it to return to AUTO, and observes the Green status light LIT, Red status light OFF. **NOTE:** **MCB Annunciators 1AD-7, G2 (**CHARGING LINE ABNORMAL FLOW**), F2 (**CHARGING LINE DEMAND LO FLOW**) and J1 (**NC PUMP SEAL INJ LO FLOW**) may alarm.** The operator will adjust the 1NV-241 Controller knob to address annunciators.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
2	(Step 1.b) CLOSE the following valves: • 1NV-1A (U1 NC L/D Isol To Regenerative Hx) • 1NV-2A (U1 NC L/D Isol To Regenerative Hx).	The operator rotates the 1NV-1A Control Switch to the CLOSE position, allowing it to return to AUTO, and observes the Green status light LIT, Red status light OFF. The operator rotates the 1NV-2A Control Switch to the CLOSE position, allowing it to return to AUTO, and observes the Green status light LIT, Red status light OFF.		
3	(Step 1.c) Check ND - IN SERVICE PRIOR TO EVENT.	The operator observes the plant operating at power, recognizes that ND is NOT in operation, and proceeds to the Step 1.c RNO.		
4	(Step 1.c RNO) GO TO Step 2.	The operator proceeds to Step 2.		
5	(Step 2) Check NV pumps suction - ALIGNED TO VCT.	The operator observes the 1NV-141A Red status light LIT, Green status light OFF. The operator observes the 1NV-142B Red status light LIT, Green status light OFF. (Or Equivalent)		
6	(Caution prior to Step 3) VCT high temperature will degrade NC pump seal cooling and NV pump operation.	The operator reads the Caution and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
7	(Note prior to Step 3) A loss of KC cooling to KC Aux Building Non-essential Header causes VCT temperature to rise, primarily due to NV pump recirc flow.	The operator reads the Note and proceeds.		
8	(Step 3) IF restoration of KC cooling to Aux Building Non-essential Header is expected within next 15 minutes, THEN exit this enclosure.	The operator requests this information from the CRS. **Cue:** **IF required, as the CRS, report that the leak is suspected to be on the aux building non-essential header, and this header is NOT likely to be restored within 15 minutes.**		
9	(Step 4) Check excess letdown - ISOLATED.	The operator observes the 1NV-24B Green status light LIT, Red status light OFF. The operator observes the 1NV-25B Green status light LIT, Red status light OFF. The operator determines that Excess letdown is isolated.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
		Examiner NOTE: **About 4-5 minutes from the start of the JPM, it is expected that 1AD-6, C-7 will alarm, and an AUTO Makeup will occur.**		
10	(Step 5) IF AT ANY TIME excess letdown must be established, AND KC cooling still lost to KC aux building non-essential header, THEN excess letdown must be aligned to NCDT instead of VCT.	The operator reads the conditional step and proceeds.		
11	(Notes prior to Step 6) PD pump will not heat up VCT since it does not recirc water to VCT. Running PD pump instead of swapping NV to FWST will prevent thermal transient on NC pumps, and allow continued operation of unit. 1A and 1B NV pumps will be stopped to prevent VCT overheating.	The operator reads the Notes and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
12	(Step 6) Check the following: PD pump - AVAILABLE TO RUN 1ETA - ENERGIZED 1RN-42A (AB Non Ess Supply Isol) - OPEN.	The operator observes the PD Pump breaker Green status light is LIT. The operator observes the voltage on 1ETA to be ≈ 4171 volts. The operator observes 1RN-42A red status light LIT, Green status light OFF, and recognizes that the PD Pump is available.		
13 *	(Step 7) Start PD Pump as follows: (Step 7.a) Open the following valves: • 1RN-63B (AB Non Ess Return Isol). • 1RN-64A (AB Non Ess Return Isol).	The operator observes the 1RN-63B Red status light LIT, Green status light OFF. The operator presses the 1RN-64A OPEN pushbutton, and observes the Red status light LIT, Green status light OFF.		
14	(Step 7.b) Ensure Charging flow - LESS THAN 90 GPM.	The operator observes 1NVP5630, and determines that Charging flow is <90 gpm, and lowering.		
15	(Step 7.c) Adjust PD Pump speed controller output to 0%.	The operator observes the PD Pump Speed Control SLIMs MAN light LIT, and the controller output and setpoint indicate 0.		
*16	(Step 7.d) OPEN 1NV-1047A (U1 PD Pump Recirc Isol).	The operator presses the 1NV-1047A OPEN pushbutton, and observes the Red status light is LIT, Green status light OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*17	(Step 7.e) Start the PD pump.	The operator presses the PD Pump START pushbutton, and observes the Green status light LIT, Red status light OFF; and recognizes that the PD Pump has failed to start **(Alternate Path)**. The operator proceeds to the Step 7 RNO.		
18	(Step 7 RNO) GO TO Step 15.	The operator proceeds to Step 15.		
19	(Step 15) Check Reactor - TRIPPED.	The operator observes the plant operating at power, recognizes that the plant is NOT tripped, and proceeds to the Step 15 RNO.		
20	(Step 15 RNO) Perform the following: (Step 15 RNO a) Reduce turbine load as required to maintain T-Ave at T-Ref in subsequent steps. (Step 15 RNO b) REFER TO AP/1/A/5500/04 (Rapid Downpower) as required.	The operator reads the step to reduce Turbine Load. **Cue:** **As the CRS, indicate that the OATC will maintain Tavg-Tref.** The operator reads the step to refer to AP-4. **Cue:** **As the CRS, indicate that the crew will address AP-4.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*21	(Step 16) Swap NV suction to FWST as follows: (Step 16.a) OPEN the following valves: • 1NV-221A (U1 NV Pump Suct From FWST Isol). • 1NV-222B (U1 NV Pump Suct From FWST Isol).	The operator presses the 1NV-221A OPEN pushbutton, and observes the Red status light LIT, Green status light OFF. OR The operator presses the 1NV-222B OPEN pushbutton, and observes the Red status light LIT, Green status light OFF. The operator will acknowledge an expected alarm on Group 3 of the ESF Monitor Panel (Not Critical).		
*22	(Step 16.b) CLOSE the following valves: • 1NV-141A (U1 VCT Outlet Isol) • 1NV-142B (U1 VCT Outlet Isol).	The operator presses the 1NV-141A CLOSE pushbutton, and observes the Green status light LIT, Red status light OFF. OR The operator presses the 1NV-142B CLOSE pushbutton, and observes the Green status light LIT, Red status light OFF. The operator will acknowledge an expected alarm on Group 4 of the ESF Monitor Panel (Not Critical).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
23	(Step 17) WHEN KC cooling is restored to KC aux building non-essential header, THEN NV suction may be realigned to VCT as follows: OPEN the following valves: • 1NV-141A (U1 VCT Outlet Isol) • 1NV-142B (U1 VCT Outlet Isol). CLOSE the following valves • 1NV-221A (U1 NV Pump Suct From FWST Isol) • 1NV-222B (U1 NV Pump Suct From FWST Isol).	The operator reads the conditional Step and proceeds.		
24	(Step 18) RETURN TO step in effect in body of this procedure.	The operator informs the CRS that Enclosure 6 is complete.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems - Control Room JPM A

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

INITIAL CONDITIONS:

- Unit 1 was at 100% power when a leak developed in the KC System.
- The crew entered AP/1/A/5500/21 (Loss of KC or KC System Leakage).
- The crew has completed actions through Step 12.
- MCB Annunciator 1AD-7, D1, VCT HI TEMP, has just alarmed, and Foldout Page item #5 now applies.
- The leak is suspected to be on the aux building non-essential header, and this header is NOT likely to be restored within 15 minutes.

INITIATING CUE:

The CRS has directed you to perform the actions of Enclosure 6 of AP/1/A/5500/21 (Loss of KC or KC System Leakage), while the crew continues with AP-21.

SIM JPM B

Facility:	McGuire	Task No.:	
Task Title:	Align the Containment Spray System to Cold Leg Recirculation	JPM No.:	2018 Systems - Control Room JPM B (Alternate Path)
K/A Reference:	026 A4.01 (4.5/4.3)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom ______ Simulator X Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- A High Energy Line Break has occurred inside Containment.
- EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirc) has been implemented and completed through step 6.
- FWST Level is approximately 80 inches and lowering.

Initiating Cue: The CRS has directed you to perform Steps 7 and 8 of EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirc).

Task Standard: The operator will attempt to align the 1A NS Pump for operation until it is observed that 1NS-18A has failed to open. The operator will then align the 1B NS Train for operation, and secure the 1A NS Train operation.

Required Materials: None

General References: EP/1/A/5000/E-0 (Reactor Trip or Safety Injection), Rev 36
EP/1/A/5000/E-2 (Faulted Steam Generator Isolation), Rev 10
EP/1/A/5000/E-1 (Loss of Reactor or Secondary Coolant), Rev 18

	EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirc), Rev 28
	EP/1/A/5000/F-0 (Critical Safety Function Status Trees (Containment), Rev 6
	OMP 4-3 (Use of Emergency And Abnormal Procedure and FLEX Support Guidelines), Rev 46
Handouts:	Handout 1: ES-1.3 (Transfer to Cold Leg Recirc) marked up for this JPM.
Time Critical Task:	NO
Validation Time:	12 minutes

Critical Step Justification	
Step 2	This step is critical because pressing the 1NS-20A CLOSE pushbutton and the 1NS-3B CLOSE pushbutton is necessary to attempt to align the 1A NS Pump for operation until it is observed that 1NS-18A has failed to open.
Step 9	This step is critical because pressing the 1NS-32A OPEN pushbutton is necessary to attempt to align the 1A NS Pump for operation until it is observed that 1NS-18A has failed to open.
Step 10	This step is critical because pressing the 1NS-29A OPEN pushbutton is necessary to attempt to align the 1A NS Pump for operation until it is observed that 1NS-18A has failed to open.
Step 12	This step is critical because pressing the 1NS-18A OPEN pushbutton is necessary to attempt to align the 1A NS Pump for operation until it is observed that 1NS-18A has failed to open.
Alternate Path Critical Step Justification	
Step 13	This step is critical because correctly implementing Step 8.e.7 of the procedure is necessary to align the 1B NS Train for operation, and secure the 1A NS Train operation.
Step 17	This step is critical because pressing the 1NS-12B OPEN pushbutton is necessary to align the 1B NS Train for operation.
Step 18	This step is critical because pressing the 1NS-15B OPEN pushbutton is necessary to align the 1B NS Train for operation.
Step 20	This step is critical because pressing the 1NS-1B OPEN pushbutton is necessary to align the 1B NS Train for operation.
Step 22	This step is critical because pressing the 1B NS Pump START pushbutton is necessary to align the 1B NS Train for operation.
Step 23	This step is critical because pressing the 1RN-235 OPEN pushbutton is necessary to align the 1B NS Train for operation.
Step 24	This step is critical because pressing the 1RN-238 OPEN pushbutton as necessary the 1RN-238 OPEN pushbutton as necessary to establish 3600 ±200 gpm is necessary to align the 1B NS Train for operation and secure the 1A NS Train operation.
Step 30	This step is critical because pressing the 1NS-32A CLOSE pushbutton, and the 1NS-29A CLOSE pushbutton is necessary to secure the 1A NS Train operation.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset Simulator to IC-39 (100% power)

2. Insert LOA-NS009 (1NS-18A Racked Out), Insert H_X11_394_3=1 (Override Green status light ON)

3. Insert MALF NC008D = 1 (Loop D Cold Leg LOCA) and MALF SM007A-D = 4125000 (Steam Line D Break in Containment) (OR as many as are needed to raise Containment Pressure to greater than 3 psig at start of JPM, and keep it above 3 psig by the time the operator starts the 1B NS Pump at Step 22 of the JPM).

4. Carry out E-0, E-2 and E-1.

5. Allow FWST Level to lower to 95 inches and perform ES-1.3 up to Step 7.

6. Check FWST Level at approximately 80 inches.

7. Ensure Containment pressure is greater than 3.

8. Check CONT SUMP LEVEL GREATER THAN 3 FT alarm LIT on either 1AD-14 or 1AD-15 and Freeze Simulator.

OR

1. Reset Simulator to Temporary Snap IC-233 (October, 2017).

Simulator Instructor NOTE:

- **Remain available to silence alarms NOT related to the Task.**
- **Leave Simulator in FREEZE until the operator is ready to start (Containment Pressure must be greater than 3 psig at Step 3 of the JPM).**

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin OR Containment Pressure may drop to less than 3 psig.				
1	(Step 7) Check both NS pumps - OFF.	The operator observes the 1A NS Pump Green status light is LIT, and the Red status light is OFF. The operator observes the 1B NS Pump Green status light is LIT, and the Red status light is OFF.		
*2	(Step 8) Align NS for recirc as follows: (Step 8.a) CLOSE the following valves: 1NS-20A (1A NS Pump Suction From FWST Isol) 1NS-3B (1B NS Pump Suction From FWST Isol).	The operator presses the 1NS-20A CLOSE pushbutton and observes the Green status light is LIT, and the Red status light is OFF. The operator presses the 1NS-3B CLOSE pushbutton and observes the Green status light is LIT, and the Red status light is OFF.		
3	(Step 8.b) Check containment pressure - GREATER THAN 3 PSIG.	The operator observes Containment pressure to be greater than 3 psig, and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
4	(Step 8.c) Check at least one of the following alarms - LIT: "CONT SUMP LEVEL GREATER THAN 3 FT" on 1AD-14 – LIT OR "CONT SUMP LEVEL GREATER THAN 3 FT" on 1AD-15 – LIT	The operator observes that both "CONT SUMP LEVEL GREATER THAN 3 FT" alarms on 1AD-14 and 1AD-15 are LIT.		
5	(Step 8.d) Check 1A NS pump - AVAILABLE TO RUN.	The operator observes the 1A NS Pump Green status light is LIT, and the Red status light is OFF, and determines that it is available to run.		
6	(Step 8.e) Align A Train NS to containment sump as follows: (Step 8.e.1) Check 1NI-185A (1A ND Pump Suction From Cont Sump Isol) - OPEN.	The operator observes the 1NI-185A Red status light is LIT, and the Green status light is OFF.		
7	(Step 8.e.2) Check 1B NS pump - OFF.	The operator observes the 1B NS Pump Green status light is LIT, and the Red status light is OFF.		
8	(Step 8.e.3) Check 1A RN pump - ON.	The operator observes the 1A RN Pump Red status light is LIT, and the Green status light is OFF.		
*9	(Step 8.e.4) OPEN 1NS-32A (1A NS Hx Outlet Cont Outside Isol).	The operator presses the 1NS-32A OPEN pushbutton, and observes the Red status light LIT, and the Green status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*10	(Step 8.e.5) OPEN 1NS-29A (1A NS Hx Outlet Cont Outside Isol).	The operator presses the 1NS-29A OPEN pushbutton, and observes the Red status light LIT, and the Green status light is OFF.		
11	(Step 8.e.6) Check 1NS-20A (1A NS Pump Suction From FWST Isol) - CLOSED.	The operator observes the 1NS-20A Green status light is LIT, and the Red status light is OFF.		
*12	(Step 8.e.7) OPEN 1NS-18A (1A NS Pump Suction From Cont Sump Isol).	The operator presses the 1NS-18A OPEN pushbutton and observes the Green status light is LIT, and the Red status light is OFF. **(Alternate Path)**		
*13	(Step 8.e.7 RNO) GO TO Step 8.f.	The operator proceeds to Step 8.f.		
14	(Step 8.f) Align B Train NS to containment sump as follows: (Step 8.f.1) Check 1NI-184B (1B ND Pump Suction From Cont Sump Isol) - OPEN.	The operator observes the 1NI-184B Red status light is LIT, and the Green status light is OFF.		
15	(Step 8.f.2) Check 1A NS pump - OFF.	The operator observes the 1A NS Pump Green status light is LIT, and the Red status light is OFF.		
16	(Step 8.f.3) Check 1B RN pump - ON.	The operator observes the 1B RN Pump Red status light is LIT, and the Green status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*17	(Step 8.f.4) OPEN 1NS-12B (1B NS Hx Outlet Cont Outside Isol).	The operator presses the 1NS-12B OPEN pushbutton, and observes the Red status light LIT, and the Green status light is OFF.		
*18	(Step 8.f.5) OPEN 1NS-15B (1B NS Hx Outlet Cont Outside Isol).	The operator presses the 1NS-15B OPEN pushbutton, and observes the Red status light LIT, and the Green status light is OFF.		
19	(Step 8.f.6) Check 1NS-3B (1B NS Pump Suction From FWST Isol) - CLOSED.	The operator observes the 1NS-3B Green status light is LIT, and the Red status light is OFF.		
*20	(Step 8.f.7) OPEN 1NS-1B (1B NS Pump Suction From Cont Sump Isol).	The operator presses the 1NS-1B OPEN pushbutton, and observes the Red status light LIT, and the Green status light is OFF.		
21	(Step 8.f.8) Wait up to 30 seconds for the following valves to open: 1NS-12B 1NS-15B 1NS-1B	The operator observes the 1NS-12B OPEN Red status light LIT, and the Green status light is OFF. The operator observes the 1NS-15B OPEN Red status light LIT, and the Green status light is OFF. The operator observes the 1NS-1B OPEN Red status light LIT, and the Green status light is OFF.		
*22	(Step 8.f.9) Start 1B NS pump.	The operator presses the 1B NS Pump START pushbutton and observes Red status light is LIT, Green status light is OFF; and running amps are approximately 42 amps.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*23	(Step 8.f.10) OPEN 1RN-235B (B NS HX Inlet Isol).	The operator presses the 1RN-235B OPEN pushbutton, and observes the Red status light LIT, and the Green status light is OFF.		
*24	(Step 8.f.11) WHEN 1RN-235B begins to open, THEN THROTTLE OPEN 1RN-238B (B NS Hx Outlet Isol) to establish 3600 GPM to 1B NS Hx.	The operator observes the 1RN-235B position, and presses the 1RN-238 OPEN pushbutton as necessary to establish 3600 ±200 gpm (1RNP-5880).		
25	(Step 8.g) Check NS alignment as follows: (Step 8.g.1) Check 1NS-18A (1A NS Pump Suction From Cont Sump Isol) - OPEN.	The operator observes the 1NS-18A Green status light is LIT, and the Red status light is OFF, and proceeds to the RNO.		
26	(Step 8.g.1 RNO) Perform the following: (Step 8.g.1 RNO a) IF 1NI-185A is open, AND 1NS-20A is closed, THEN OPEN 1NS-18A.	The operator presses the 1NS-18A OPEN pushbutton and observes the Green status light is LIT, and the Red status light is OFF.		
27	(Step 8.g.1 RNO b) IF 1NS-18A is closed, THEN place INFO sticker on 1A NS pump switch stating "Do not start until aligned to sump".	The operator observes the 1NS-18A Green status light is LIT, and the Red status light is OFF, and seeks to place an INFO Tag on the valve. **Cue:** **Another operator will hang this Sticker.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
28	(Step 8.g.2) Check 1NS-1B (1B NS Pump Suction From Cont Sump Isol) - OPEN.	The operator observes the 1NS-1B OPEN Red status light LIT, and the Green status light is OFF.		
29	(Step 8.g.3) Check 1A NS pump - ON.	The operator observes the 1A NS Pump Green status light is LIT, and the Red status light is OFF.		
*30	(Step 8.g.3 RNO) CLOSE the following valves: 1NS-32A (1A NS Hx Outlet Cont Outside Isol) 1NS-29A (1A NS Hx Outlet Cont Outside Isol).	The operator presses the 1NS-32A CLOSE pushbutton, and observes the Green status light LIT, and the Red status light is OFF. The operator presses the 1NS-29A CLOSE pushbutton, and observes the Green status light LIT, and the Red status light is OFF.		
31	(Step 8.g.4) Check 1B NS pump - ON.	The operator observes the 1B NS Pump Red status light is LIT, Green status light is OFF; and running amps are approximately 42 amps.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems - Control Room JPM B

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

INITIAL CONDITIONS:

- A High Energy Line Break has occurred inside Containment.
- EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirc) has been implemented and completed through step 6.
- FWST Level is approximately 80 inches and lowering.

INITIATING CUE: The CRS has directed you to perform Steps 7 and 8 of EP/1/A/5000/ES-1.3 (Transfer To Cold Leg Recirc).

SIM JPM C

Facility:	McGuire	Task No.:	
Task Title:	Emergency Borate in Mode 6	JPM No.:	2018 Systems - Control Room JPM C (Alternate Path)
K/A Reference:	APE 024 AA1.17 (3.9/3.9)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: ___X___

Classroom ______ Simulator ___X___ Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM) and Handout 1.

Initial Conditions:	• The plant is in Mode 6 with Core Alterations in progress. • Chemistry has just reported that a boron sample taken 30 minutes ago indicates that the RCS boron concentration is less than that required for Mode 6 indicating an NCS boron dilution may be occurring. • MCB Annunciator 1AD-2/D3, S/R HI FLUX AT SHUTDOWN, has just alarmed.

Initiating Cue:	• The CRS has directed you to perform AP/1/A/5500/38, (Emergency Boration and Response to Inadvertent Dilution). • The 1B BA Transfer Pump is available, however, due to elevated vibration levels, the 1A BA Transfer Pump is preferred.

Task Standard: The operator will perform steps 1-12 of AP/1/A5500/38, initiate emergency boration using the 1A BA Transfer Pump, and reinitiate emergency boration using the 1B BA Transfer Pump when 1ELXA de-energizes.

Required Materials: None

General References: OP/1/A/6100/010 C (Annunciator Response For Panel 1AD-2), Rev 69
AP/1/A/5500/38 (Emergency Boration and Response to Inadvertent Dilution), Rev 11
OMP 4-3 (Use of Emergency And Abnormal Procedure and FLEX Support Guidelines), Rev 46

Handouts: Handout 1: Blank copy of AP/1/A/5500/38.

Time Critical Task: NO

Validation Time: 8 minutes

Critical Step Justification	
Step 4	This step is critical because ensuring both RMUW Pumps are OFF is necessary to isolate dilution sources per AP/1/A/5500/38.
Step 5	This step is critical because closing 1NV-171A, 175A and 252A is necessary to isolate dilution sources per AP/1/A/5500/38.
Step 8	This step is critical because ensuring that 1NV-127A is aligned to the VCT is necessary to avoid an unsaturated Demineralizer from diluting the NCS boron concentration.
Step 11	This step is critical because ensuring that 1NV-250 is CLOSED is necessary to avoid diluting the NCS boron concentration.
Step 19	This step is critical because opening 1NV-265B is necessary to initiate emergency boration per AP/1/A/5500/38.
Step 20	This step is critical because ensuring that the 1A BA Transfer Pump is running is necessary to initiate emergency boration per AP/1/A/5500/38.
Alternate Path Critical Step Justification	
Step 22	This step is critical because ensuring that the 1B BA Transfer Pump is running is necessary to re-initiate emergency boration per AP/1/A/5500/38 after the failure of the 1A BA Transfer Pump.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset simulator to IC-1 (Mode 6).

2. Place in RUN

3. Set the High Flux at Shutdown Alarms as follows:
   - N-31 163 cps
   - N-32 187 cps

4. Ensure the following:

   - ND Letdown is in service A Train ND
   - The A Train of ND is in service with the 1A RHR running
   - RCS temperature is stable < 140°F
   - One NV Pump is in operation
   - The A RMUW Pump is running
   - Information Sticker on 1B BA Transfer Pump indicating that pump is available but 1A BA Transfer Pump is preferred

5. Insert the following malfunctions:

   - PLP-086 [Variable RCS Boron Concentration] = 1357 ppm (Inadvertent NCS Dilution causing MCB Annunciator 1AD-2/D3, S/R HI FLUX AT SHUTDOWN)
   - MAL-EDA002A (Loss of Source Voltage Data A)
   - MAL-EDA002B (Loss of Source Voltage Data B)

6. Insert LOA-EP045 = OPEN_BOTH, delay = 2 Seconds, cd = X10_239_3 = 1 (after the operator starts the 1A BA Transfer Pump) 1ELXA De-energizes causing a loss of the 1A BA Transfer Pump [Via 1EMXA])

7. Acknowledge all alarms.

8. Freeze the Simulator

<u>**OR**</u>

1. Reset to IC-234 (October, 2017)

2. Verify that LOA-EP045 is PENDING.

3. Information Sticker on 1B BA Transfer Pump indicating that pump is available but 1A BA Transfer Pump is preferred

4. Momentarily go to RUN to acknowledge Alarms then place Simulator in FREEZE.

5. Leave Simulator in FREEZE until operator is ready to begin.

NOTE: The Booth instructor will need to verify that when the operator starts the 1A BA Transfer Pump LOA-EP045 is ACTIVE at Step 20.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM) and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin.				
1	(AP/1/A/5500/38, Step 1) Check if boron dilution - SUSPECTED.	The operator recognizes that with the RCS boron concentration less than the Refueling concentration, a dilution event is suspected.		
2	(Step 2) Maintain reactor power less than or equal to 100%.	The operator recognizes the plant is in Mode 6 and continues.		
3	(Step 3) Announce occurrence on paging system.	The operator makes an announcement that AP/1/A/5500/38 has been entered.		
*4	(Step 4/4.a) Isolate reactor makeup water to VCT as follows: • Ensure both reactor makeup water pumps are off.	The operator rotates the 1A RMUW Pump Control Switch to the STOP position and observes the Green status light is LIT, and the Red status light is OFF. The operator rotates the 1B RMUW Pump Control Switch to the STOP position and observes the Green status light is LIT, and the Red status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*5	(Step 4.b) Select "CLOSE" on the following valve switches: • 1NV-171A (U1 Boric Acid Blender To VCT Inlet Control) • 1NV-175A (U1 Boric Acid Blender to VCT Outlet Control) • 1NV-252A (Rx M/U Water Supply To U1 BA Blender Cntrl).	The operator places the 1NV-171A control switch to CLOSED, and observes the Green status light is LIT, and the Red status light is OFF. The operator places the 1NV-175A control switch to CLOSED, and observes the Green status light is LIT, and the Red status light is OFF. The operator places the 1NV-252A control switch to CLOSED, and observes the Green status light is LIT, and the Red status light is OFF.		
6	(Step 5) Check reactor status at time of dilution - CRITICAL.	The operator observes Source Range SUR meters at 0, with all Control Rods disconnected and concludes the reactor is not critical.		
7	(Step 5 RNO) IF any control rod withdrawn, THEN……	The operator recognizes the plant is in Mode 6 and continues.		
*8	(Step 6) Place 1NV-127A (U1 L/D Hx 3-Way Temp Control) in the "VCT" position.	The operator places the 1NV-127A control switch to the VCT position and observes the White status light is LIT, and the Red status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
9	(Step 7) Notify OSM or another SRO to perform the following while continuing with this procedure: Evaluate ongoing or recent plant evolutions for potential dilution sources. • IF source of dilution cannot readily be determined or isolated, THEN perform the following: • Evaluate dispatching an operator to CLOSE 1NB-256 (Unit 1 RMWST Outlet Isol) (East Side of RMWST, 760+2). • IF 1NB-256 is closed, THEN notify Radwaste that the Reactor Makeup Water flush header is isolated.	The operator requests the CRS to perform Step 7. **Cue:** **As the CRS, state that you will perform Step 7 of AP/1/A/5500/38.**		
10	(Step 8) Check unit status - IN MODE 1 OR 2.	The operator recognizes the plant is in Mode 6 and continues.		
*11	(Step 8 RNO a) Perform the following: IF in Mode 6, THEN dispatch operator to ensure 1NV-250 (Rx Makeup Water Supply to Unit 1 NV Isol) (aux bldg, 733, JJ-54, 25 ft north of KC pumps) is CLOSED.	The operator dispatches an AO to perform Step 8 RNO a. **Cue:** **As the AO, acknowledge.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
12	(Step 8 RNO b) IF fuel handling activities in progress, THEN stop fuel handling PER Enclosure 2 (Actions To Stop Fuel Handling).	The operator addresses Enclosure 2. **Cue:** **State that the Refueling SRO is performing Enclosure 2 of AP/1/A/5500/38.**		
13	(Step 8 RNO c) Evaluate need to evacuate Containment PER RP/0/A/5700/011 (Conducting a Site Assembly, Site Evacuation, or Containment Evacuation).	The operator addresses RP/0/A/5700/011. **Cue:** **State that the SM will conduct the evacuation.**		
14	(Step 8 RNO d) Evaluate stopping any heatup or cooldown in progress to minimize reactivity changes.	The operator observes NC temperature to be stable at ≈130°F, and continues.		
15	(8 RNO e) GO TO Step 12.	The operator proceeds to Step 12.		
16	(Step 12/12.a) Initiate emergency boration as follows: • Check 1A or 1B NV pump - AVAILABLE.	The operator observes that the 1A NV Pump Red status light is LIT, and the Green status light is OFF.		
17	(Step 12.b) Check any NV pump - ON.	The operator observes that the 1A NV Pump Red status light is LIT, and the Green status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
18	(Step 12.c) Check the following boric acid system components - AVAILABLE. • Boric Acid Storage Tank • Boric Acid Transfer pump.	The operator observes 1NVP-5740 and determines that 1 BAT level is 61%. (Or equivalent, i.e. observes the OAC) The operator observes 1NVP-6070 and determines that 2 BAT level is 60%. (Or equivalent, i.e. observes the OAC) The operator observes Green status light LIT, Red status light OFF for the 1A BA Transfer Pump. The operator observes Green status light LIT, Red status light OFF for the 1B BA Transfer Pump. The operator observes the Information Sticker on the 1B BA Transfer Pump Control Switch indicating that the pump is available but the 1A BA Transfer Pump is preferred pump.		
*19	(Step 12.d) OPEN 1NV-265B (U1 NV Pump Boric Acid Sup Isol).	The operator presses the 1NV-265B OPEN pushbutton and observes the Red status light is LIT, and the Green status light is OFF.		
*20	(Step 12.e) Ensure a boric acid transfer pump is running.	The operator rotates the Control Switch to START for the 1A BA Transfer Pump, and observes Red status light LIT, Green status light OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor: **ENSURE LOA is ACTIVE** **Insert LOA-EP045 = OPEN_BOTH, delay = 2 Seconds, cd = X10_239_3 = 1 (after the operator starts the 1A BA Transfer Pump) 1ELXA De-energizes causing a loss of the 1A BA Transfer Pump [Via 1EMXA]) (ALTERNATE PATH)** **NOTE: 1AD-11, A2 and A3 will alarm on the loss of 1ELXA.**				
		Cue: **If the operator announces these alarms to the CRS, as the CRS, state that another operator will address the ARPs.**		
21	(Step 12.f) Check boration flow using one of the following methods: • IF 1NV-265B is open, THEN check "EMERGENCY BORATION FLOW" - ESTABLISHED. OR • IF 1NV-269 is open, THEN check "BORIC ACID FLOW" on chart recorder 1MNVCR5450 - ESTABLISHED.	The operator observes 1NVP-5440 (Or equivalent, i.e. OAC) indicating 0 gpm, and determines that Emergency Boration Flow is NOT established, and proceeds to RNO. **Examiner Note:** **The operator may start the 1B BA Transfer Pump in Step 12.e (ENSURE BA Transfer Pump is RUNNING). If so, after verifying flow is greater than 0 gpm (≈70 gpm), terminate the JPM.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*22	(Step 12.f RNO) Perform the following: • Start second boric acid transfer pump • IF boration flow cannot be established, THEN……..	The operator rotates the Control Switch to START for the 1B BA Transfer Pump, and observes Red status light LIT, Green status light OFF. The operator observes 1NVP-5440 (Or equivalent, i.e. OAC) 70 gpm, and determines that Emergency Boration Flow is established.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems - Control Room JPM C

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

INITIAL CONDITIONS:

- The plant is in Mode 6 with Core Alterations in progress.
- Chemistry has just reported that a boron sample taken 30 minutes ago indicates that the RCS boron concentration is less than that required for Mode 6 indicating an NCS boron dilution may be occurring.
- MCB Annunciator 1AD-2/D3, S/R HI FLUX AT SHUTDOWN, has just alarmed.

INITIATING CUE:

- The CRS has directed you to perform AP/1/A/5500/38, (Emergency Boration and Response to Inadvertent Dilution).
- The 1B BA Transfer Pump is available, however, due to elevated vibration levels, the 1A BA Transfer Pump is preferred.

SIM JPM D

Facility:	McGuire	Task No.:	
Task Title:	Remove Pressurizer Heaters from Service	JPM No.:	2018 Systems - Control Room JPM D (Alternate Path)
K/A Reference:	010 A4.02 (3.6/3.4)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom ______ Simulator X Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- Unit 1 has just increased reactor power to 100% per OP/1/A/6100/003 (Controlling Procedure for Unit Operation).
- Chemistry has confirmed that the Boron Concentration difference between the Pzr and the NC System is 4 ppm.

Initiating Cue:

- The CRS has directed you to remove Pzr Heater Groups A, B and D from service per Enclosure 4.6 (Operation of Pzr Heaters) of OP/1/A/6100/003, and ensure that NC System pressure is being controlled normally at 2235 psig.
- All outstanding Clearances that may impact performance of Enclosure 4.6 have been evaluated.

Task Standard: The operator will remove the A, B and D Pzr Heater Groups from service in accordance with Step 3.4.4 of Enclosure 4.6, and then after responding to the failure of the C Pzr Heater Group, manually control pressure by re-energizing at least one heater group. The operator will operate Pzr Heater Group(s) as needed before MCB Annunciator 1AD-6, C6 alarms.

Required Materials: None

General References: OP/1/A/6100/003 (Controlling Procedure for Unit Operation), Rev 201
OP/1/A/6100/010G (Annunciator Response for Panel 1AD-6), Rev 73
AD-HU-ALL-004 (Procedure And Work Instruction Use and Adherence), Rev 9
OMP 4-3 (Use of Emergency And Abnormal Procedure and FLEX Support Guidelines), Rev 46

Handouts: Handout 1: Blank Copy of Enclosure 4.6 (Operation of Pzr Heaters) of OP/1/A/6100/003 (Controlling Procedure for Unit Operation)

Time Critical Task: NO

Validation Time: 17 minutes

Critical Step Justification	
Step 7	This step is critical because rotating either the A, B or D Pzr Htr Mode Select Switch counter - clockwise to AUTO is necessary to remove the A, B and D Pzr Heater Groups from service.
Step 10	This step is critical because rotating either the A, B or D Pzr Htr Mode Select Switch counter - clockwise to AUTO is necessary to remove the A, B and D Pzr Heater Groups from service.
Step 16	This step is critical because rotating either the A, B or D Pzr Htr Mode Select Switch counter - clockwise to AUTO is necessary to remove the A, B and D Pzr Heater Groups from service.
Step 18	This step is critical because selecting Pzr Pressure Master and selects "M" (Turns RED) is necessary to remove the A, B and D Pzr Heater Groups from service (Establishes Cycling Heaters in AUTO).
Step 19	This step is critical because adjusting the Pzr Press Master output is necessary to remove the A, B and D Pzr Heater Groups from service (Establishes Cycling Heaters in AUTO).
Step 20	This step is critical because selects Pzr Pressure Master and selects "A" is necessary to remove the A, B and D Pzr Heater Groups from service (Establishes Cycling Heaters in AUTO).
Alternate Path Critical Step Justification	
Step 21	This step is critical because determining that Pzr Pressure is lowering with only the cycling heaters on is necessary to manually control pressure by re-energizing at least one heater group.
Step 23	This step is critical because re-energizing at least one group of Pressurizer Heaters is necessary to manually control pressure.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset simulator to IC-39 (100%)

2. Ensure Simulator reflects having been completed through Step 3.37.10.4 of OP/1/A/6100/003, Enclosure 4.1 (Power Increase).

3. Ensure that Pzr Heaters groups A, B, and D are energized.

4. Acknowledge Alarms and Freeze Simulator

5. Create Scenario Manager File NRC JPM D (Failure of Pzr Variable Heaters).
(ANN) 1AD6-D06 = ON
Insert X10_190_1 = False (0) (C heaters energize/de-energize Red Status light – OFF)
Insert X10_186_2 (PZR HTR C Supply Breaker Open)

<u>OR</u>

1. Reset Simulator to Temporary Snap IC-235 (October, 2017).
2. Load Scenario Manager File NRC JPM D (Failure of Pzr Variable Heaters).
3. Momentarily place Simulator in Run to acknowledge alarms.
4. Leave Simulator in FREEZE until operator is ready to begin.

NOTE: **During the performance of this JPM, the simulator operator will need to execute failure at Step 20 of the JPM.**

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin.				
1	(Enclosure 4.6, Step 3.1) Evaluate all outstanding Clearances that may impact performance of this procedure.	The operator recognizes that this step has already been performed (Initial Conditions), and proceeds.		
2	(Note prior to Step 3.2) During steady state conditions, Pzr Htr Groups are normally OFF and in AUTO.	The operator reads the Note and proceeds.		
3	(Step 3.2) Perform the following sections as applicable: • Section 3.3, Placing A, B, D Pzr Heater Groups in Service. • Section 3.4, Removing A, B, D Pzr Heater Groups from Service. • Section 3.5, Placing C Pzr Heater Group in Service. • Section 3.6, Removing C Pzr Heater Group from Service. • Section 3.7, Manual Operation of A, B, D Pzr Heater Groups	The operator recognizes that Section 3.4 is the applicable section and proceeds to Section 3.4.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
4	(Step 3.4) Removing A, B, D Pzr Heater Groups From Service (Caution prior to Step 3.4.1) Pzr Htr Groups and Pzr Spray Controls should be operated with extreme caution to prevent NC System pressure transients. (Step 3.4.1) Ensure Boron Concentration difference between Pzr and NC System less than 50 ppm.	The operator reads the Caution and proceeds. The operator recognizes that this condition is already met (Initial Conditions), and proceeds.		
5	(Step 3.4.2) IF three Pzr Htr Groups in service AND desire to operate with two Pzr Htr Groups in service…..	The operator recognizes that this step is NOT applicable and proceeds.		
6	(Step 3.4.3) IF three Pzr Htr Groups in service AND desire to operate with one Pzr Htr Group in service…..	The operator recognizes that this step is NOT applicable and proceeds.		
*7	(Step 3.4.4) IF three Pzr Htr Groups in service AND desire to remove all Pzr Htr Groups from service, perform the following: (Step 3.4.4.1) Place one of the following in AUTO: A Pzr Htr Mode Select B Pzr Htr Mode Select D Pzr Htr Mode Select	The operator rotates either the A, B or D Pzr Htr Mode Select Switch counter - clockwise to AUTO.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
8	(Step 3.4.4.2) Check associated Pzr Htr Group in OFF. A Pzr Htr Group B Pzr Htr Group D Pzr Htr Group	The operator observes the Green status light LIT and the Red status light OFF for the heater group, whose Mode Select Switch was moved to AUTO in the previous step.		
9	(Step 3.4.4.3) Monitor Pzr pressure for 2 minutes.	The operator observes actual Pressurizer Pressure and Spray Valve position (Or equivalent) for 2 minutes and determines that Pzr Pressure has stabilized.		
*10	(Step 3.4.4.4) Place second Pzr Htr Mode Select Switch in AUTO: A Pzr Htr Mode Select B Pzr Htr Mode Select D Pzr Htr Mode Select	The operator rotates either the A, B or D Pzr Htr Mode Select Switch counter-clockwise to AUTO.		
11	(Step 3.4.4.5) Check associated Pzr Htr Group in OFF. A Pzr Htr Group B Pzr Htr Group D Pzr Htr Group	The operator observes the Green status light LIT and the Red status light OFF for the heater group, whose Mode Select Switch was moved to AUTO in the previous step.		
12	(Step 3.4.4.6) Monitor Pzr pressure for 2 minutes.	The operator observes actual Pressurizer Pressure and Spray Valve position (Or equivalent) for 2 minutes and determines that Pzr Pressure has stabilized.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
13	(Note prior to Step 3.4.4.7) Placing Pzr Press Master in manual makes automatic operation of 1NC-34A (Pzr PORV) unavailable and should be evaluated using Electronic Risk Assessment Tool. This assessment should be performed prior to placing Pzr Press Master in manual.	The operator reads the Note and proceeds.		
14	(Step 3.4.4.7) IF time allows AND Unit 1 in Modes 1-4, evaluate unavailability of 1NC-34A (Pzr PORV) using Electronic Risk Assessment Tool.	The operator informs the CRS. **Examiner Cue:** **As the CRS, indicate that the ERAT has been used, and the Pzr Press Master may be placed in MAN.**		
15	(Note prior to Step 3.4.4.8) Steps 3.4.4.8 – 3.4.4.10C should be performed without delay.	The operator reads the Note and proceeds.		
*16	(Step 3.4.4.8) Place third Pzr Htr Mode Select in AUTO: A Pzr Htr Mode Select B Pzr Htr Mode Select D Pzr Htr Mode Select	The operator rotates either the A, B or D Pzr Htr Mode Select Switch counter-clockwise to AUTO.		
17	(Step 3.4.4.9) Check associated Pzr Htr Group in OFF. A Pzr Htr Group B Pzr Htr Group D Pzr Htr Group	The operator observes the Green status light LIT and the Red status light OFF for the heater group, whose Mode Select Switch was moved to AUTO in the previous step.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*18	(Step 3.4.4.10) On the DCS Work Station, Pressurizer and PRT graphic, perform the following: (Step 3.4.4.10 A) Place PZR PRESS MASTER in manual.	The operator observes the NC-Pressurizer and PRT DCS Screen and observes Pressurizer pressure. The operator selects Pzr Pressure Master and selects “M” (Turns RED).		
*19	(Step 3.4.4.10 B) Adjust PZR PRESS MASTER output until the following occurs: C Pzr Htr Group begins cycling 1NC-27C (A Loop Pzr Spray Control) Closes 1NC-29C (B Loop Pzr Spray Control) Closes	Using the NC-Pressurizer and PRT DCS Screen, the operator adjusts until Pzr Press Master output (**DOWN**) until the error signal is < 15 psig. The operator observes C Pzr Heater Group Red Status light cycling ON and OFF, and determines that the C Pzr Htr Group is cycling. The operator observes the 1NC-27C SLIMs Limit Switch and determines that 1NC-27C is CLOSED. The operator observes the 1NC-29C SLIMs Limit Switch and determines that 1NC-29C is CLOSED.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*20	(Step 3.4.4.10 C) Place PZR PRESS MASTER in auto.	Using the NC-Pressurizer and PRT DCS Screen, the operator selects Pzr Pressure Master and selects "A" (Turns GREEN).		
Simulator Instructor NOTE: Execute & Activate Lesson Plan (Failure of Pzr Variable Heaters) (Alternate Path) **It is expected that MCB Annunciator 1AD6/D6 (PZR HTR CONTROLLER TROUBLE) will alarm.**				
*21	(Step 3.4.4.11) Monitor Pzr pressure for 2 minutes.	The operator observes actual Pressurizer Pressure and Spray valve Position (Or equivalent) and determines that Pzr Pressure is lowering. **(Alternate Path)** The operator observes MCB Annunciator 1AD6/D6 and addresses ARP.		
22	(OP/1/A/6100/010 G, Immediate Action 1) Remove Group C Heater Group from automatic control by opening supply breaker.	The operator observes the C Pzr Heater Group Green Status light is LIT, and determines that the Group C Heater supply breaker is OPEN.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*23	(OP/1/A/6100/010 G, Immediate Action 2) Manually control pressure using other heater groups.	The operator recognizes that no Pzr htrs are energized and proceeds to Enclosure 4.6, Step 3.3.1 (Or Equivalent) to place one Pzr Htr Group in service. **Examiner Note:** **The operator may use one or more Pzr Heater Groups to maintain NC System Pressure within the normal band.** **The operator MUST place at least one Pzr Htr Group in service to complete the Critical nature of this task.** **The operator should realize the need to get one set of htrs on for pressure control and MAY start at least one set of htrs based on ARP guidance to manually control pressure. If NOT, the required OP Steps of Section 3.3.1 are scripted.** **However, Section 3.7 of Enclosure 4.6 may be used as well.** **Additionally, the operator may use an Operator Prudent Action per Attachment 10.1 of OMP 4-3 to re-energize at least one Group of Pzr Heaters.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
		Examiner Note: **IF MCB Annunciator 1AD-6, C6, alarms the Critical Step is Failed.**		
24	(Enclosure 4.6, Step 3.3) Placing A, B, D Pzr Heater Groups in service. (Caution prior to Step 3.3.1) Pzr Htr Groups and Pzr Spray Controls should be operated with extreme caution to prevent NC System pressure transients. (Step 3.3.1) IF desired to operate with one Pzr Htr group in service, perform the following: (Step 3.3.1.1) Place of the following in MAN: A Pzr Htr Mode Select B Pzr Htr Mode Select D Pzr Htr Mode Select	The operator reads the Caution, and proceeds. The operator rotates either the A, B or D Pzr Htr Mode Select Switch clockwise to MAN.		
25	(Step 3.3.1.2) Place the associated Pzr Htr Group in ON: A Pzr Htr Group B Pzr Htr Group D Pzr Htr Group	The operator depresses the ON pushbutton for the heater group, whose Mode Select Switch was moved to MAN in the previous step, and observes the Red status light LIT and the Green status light OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
26	(Step 3.3.1.3) Monitor Pzr pressure for 2 minutes.	The operator observes Pressurizer Pressure and Spray valve Position (Or equivalent) for 2 minutes and determines that Pzr Pressure has stabilized at 2235 ±15 psig.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems - Control Room JPM D

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- Unit 1 has just increased reactor power to 100% per OP/1/A/6100/003 (Controlling Procedure for Unit Operation).
- Chemistry has confirmed that the Boron Concentration difference between the Pzr and the NC System is 4 ppm.

INITIATING CUE:

- The CRS has directed you to remove Pzr Heater Groups A, B and D from service per Enclosure 4.6 (Operation of Pzr Heaters) of OP/1/A/6100/003, and ensure that NC System pressure is being controlled normally at 2235 psig.
- All outstanding Clearances that may impact performance of Enclosure 4.6 have been evaluated.

SIM JPM E

Facility:	McGuire	Task No.:	
Task Title:	Isolate the SI Accumulators during Degraded Core Cooling	JPM No.:	2018 Systems - Control Room JPM E (Alternate Path)
K/A Reference:	006 A4.02 (4.0/3.8)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom ______ Simulator X Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Ensure Handout 1 is placed on CRS Desk.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- A loss of coolant accident has occurred.
- Multiple equipment failures resulted in an ORANGE Path on CORE COOLING.
- The crew has completed Steps 1 through 16 of EP/1/A/5000/FR-C.2 (Response to Degraded Core Cooling).
- You are the BOP.

Initiating Cue: The CRS has directed you to perform Step 17 of EP/1/A/5000/FR-C.2 (Response to Degraded Core Cooling) to isolate the Cold Leg Accumulators.

Task Standard: The operator will isolate Accumulators A, B and C; and vent Accumulator D per Step 17 of FR-C.2 when it is determined that it cannot be isolated.

Required Materials: None

General References:	EP/1/A/5000/FR-C.2 (Response to Degraded Core Cooling), Rev 10 EP/1/A/5000/F-0 (Critical Safety Function Status Trees), Rev 6 OMP 4-3 (Use of Emergency And Abnormal Procedure and FLEX Support Guidelines), Rev 46 OP/1/A/6200/009 (Accumulator Operation), Rev 110
Handouts:	Handout 1: Pages 17-22 of EP/1/A/5000/FR-C.2 with Step 16 marked as complete.
Time Critical Task:	NO
Validation Time:	6 minutes

Critical Step Justification	
Step 3	This step is critical because rotating the 1NI-54A power disconnect switch to ENABLE position and pressing the 1NI-54A CLOSE pushbutton is necessary to isolate Accumulator A.
Step 4	This step is critical because rotating the 1NI-76A power disconnect switch to ENABLE position and pressing the 1NI-76A CLOSE pushbutton is necessary to isolate Accumulator B.
Step 5	This step is critical because rotating the 1NI-65B power disconnect switch to ENABLE position and pressing the 1NI-65B CLOSE pushbutton is necessary to isolate Accumulator C.
Alternate Path Critical Step Justification	
Step 6	This step is critical because rotating the 1NI-88B power disconnect switch to ENABLE position and pressing the 1NI-88B CLOSE is necessary to determine that the 1D CLA cannot be isolated and must be vented.
Step 7	This step is critical because pressing the Train A&B Phase B RESET Pushbutton is necessary to vent the 1D CLA.
Step 8	This step is critical because pressing the 1VI-150B OPEN pushbutton is necessary to vent the 1D CLA.
Step 9	This step is critical because pressing the 1NI-84 OPEN pushbutton is necessary to vent the 1D CLA.
Step 10	This step is critical because adjusting the 1NI-83 controller to open the valve is necessary to vent the 1D CLA.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset simulator to IC-70 (Degraded Core Cooling EP/1/A/5000/FR-C.2).
2. Insert the following to restore power to 1ETB and prevent pump restarts:
   - MAL-ND001B = BOTH (Failure of ND Pump B to Start)
   - LOA-NI015A = RACK_OUT (NI Pump 1B Control Power Rackout)
   - MAL-NV006B = BOTH (Failure of Charging Pump B to Start)
   - LOA-EP173 = RESET (In-Plant Lockout Reset)
   - LOA-DG014 = RESET (1B DSG 86D Lockout Reset)
3. Delete MAL-EP008B (Loss of 4160V Bus 1ETB)
4. Place in RUN
5. Start and stop the 1A NV Pump as needed to maintain RVLIS level while establishing the initial conditions.
6. Rack in the Breaker for the 1A ND Pump to gain control of the ND Pump (LOA-ND0002_RACKED_IN (Use 1A ND Pump as needed to maintain RVLIS level while establishing the above conditions).
7. Perform Steps 1-16 of EP/1/A/5000/FR-C.2, and ENSURE the following conditions exist:
   - CETs are between 200-1200°F
   - NC Subcooling is 0°F or negative
   - All NC Pumps are OFF
   - RVLIS is greater than ≈39%
   - FWST level > 95 inches
   - S/G pressures < 190 psig
   - Thots less than 388°F
8. Insert MAL-ND001A = BOTH (Failure of ND Pump A to start) and MAL-NV006A = BOTH (Failure of Charging Pump A to start)
9. Insert REM-NI0088B = 1 (D CLA Discharge Isolation [Fails to CLOSE])
10. Acknowledge all alarms.
11. Freeze the Simulator

<u>OR</u>

1. Reset to IC-236 (October, 2017)

2. Momentarily go to RUN to acknowledge Alarms then place Simulator in FREEZE.

3. Leave Simulator in FREEZE until operator is ready to begin.

(Denote Critical Steps with an asterisk)*

Ensure Handout 1 is placed on CRS Desk.
Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin.				
1	(Step 17) Check if CLAs should be isolated: (Step 17.a) Check at least two NC T- Hots - LESS THAN 388°F.	The operator observes INCCR5850 and 5900 (Or Equivalent) and determines that at least two Thots are less than 388°F.		
2	(Step 17.b.1-2) Reset the following: • S/I. • Sequencers.	The operator observes the Train A S/I Yellow S/I RESET light is LIT. The operator observes the Train B S/I RESET Yellow S/I RESET light is LIT. The operator observes the Train A Yellow Sequencer RESET light is LIT. The operator observes the Train B Yellow Sequencer RESET light is LIT. **Note:** **The operator may press the RESET pushbuttons, however, SI and the Sequencers are already reset.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	(Step 17.c Bullet 1) Place the power disconnect switches to "ENABLE" and CLOSE the following valves: • 1NI-54A (A CL Accum Disch Isol)	The operator rotates the 1NI-54A power disconnect switch to ENABLE. The operator presses the 1NI-54A CLOSE pushbutton and observes the Green status light is LIT, and the Red status light is OFF. **Examiner Note:** **The CLA isolation can be completed in any order.**		
*4	(Step 17.c Bullet 2) Place the power disconnect switches to "ENABLE" and CLOSE the following valves: • 1NI-76A (C CL Accum Disch Isol)	The operator rotates the 1NI-76A power disconnect switch to ENABLE. The operator presses the 1NI-76A CLOSE pushbutton and observes the Green status light is LIT, and the Red status light is OFF.		
*5	(Step 17.c Bullet 3) Place the power disconnect switches to "ENABLE" and CLOSE the following valves: • 1NI-65B (B CL Accum Disch Isol)	The operator rotates the 1NI-65B power disconnect switch to ENABLE. The operator presses the 1NI-65B CLOSE pushbutton and observes the Green status light is LIT, and the Red status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*6	(Step 17.c Bullet 4) Place the power disconnect switches to "ENABLE" and CLOSE the following valves: • 1NI-88B (D CL Accum Disch Isol).	The operator rotates the 1NI-88B power disconnect switch to ENABLE. The operator presses the 1NI-88B CLOSE pushbutton and observes the Red status light remains LIT, and the Green status light is OFF. **(Alternate Path)**		
*7	(Step 17.c RNO c/c.1) Vent any unisolated CLA as follows: • Ensure Phase B reset.	The operator presses the Train A Phase B RESET Pushbutton and observes the Yellow Phase B RESET light is LIT. The operator presses the Train B Phase B RESET Pushbutton and observes the Yellow Phase B RESET light is LIT.		
*8	(Step 17.c RNO c.2) OPEN 1VI-150B (Lwr Cont Non-Ess Cont Outside Isol).	The operator presses the 1VI-150B OPEN pushbutton and observes the Red status light is LIT, and the Green status light is OFF.		
*9	(Step 17.c RNO c.3) OPEN isolation valve on affected CLA: • IF 1NI-88B did not close, THEN OPEN 1NI-84 (D CL Accum N2 Supply Isol).	The operator presses the 1NI-84 OPEN pushbutton and observes the Red status light is LIT, and the Green status light is OFF.		
*10	(Step 17.c RNO c.4) OPEN 1NI-83 (CL Accum N2 Hdr Atmos Vent Isol).	The operator rotates the 1NI-83 controller adjust knob and observes the controller output at 100%.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
11	(Step 17.c RNO c.5) IF CLA cannot be isolated OR vented, THEN…..	The operator recognizes that Accumulators A, B and C are isolated, and Accumulator D is vented; and proceeds.		
12	(Step 17.c RNO c.6) IF 1VI-150B was opened in step above, THEN perform the following: • WHEN CLA venting complete, THEN RECLOSE 1VI-150B.	The operator observes the NI Screen on the OAC and observes Accumulator D pressure slowly lowering. **CUE:** **Another operator will continue with this procedure.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

Job Performance Measure No.: 2018 Systems - Control Room JPM E

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ________________________ Date: ______________

INITIAL CONDITIONS:

- A loss of coolant accident has occurred.
- Multiple equipment failures resulted in an ORANGE Path on CORE COOLING.
- The crew has completed Steps 1 through 16 of EP/1/A/5000/FR-C.2 (Response to Degraded Core Cooling).
- You are the BOP.

INITIATING CUE:

The CRS has directed you to perform Step 17 of EP/1/A/5000/FR-C.2 (Response to Degraded Core Cooling) to isolate the Cold Leg Accumulators.

SIM JPM F

Facility:	McGuire	Task No.:	
Task Title:	Control Room Air Intake High Radiation Alarms	JPM No.:	2018 Systems - Control Room JPM F
K/A Reference:	061 AA2.01 (3.5/3.7)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom ______ Simulator X Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM).

Initial Conditions:	• Units 1 and 2 are operating at 100% power. • Annunciator 1RAD-2 B2, EMF 43B CR AIR INTAKE B HI RAD, alarmed 45 seconds ago. • Annunciator 1RAD-1 B2, EMF 43A CR AIR INTAKE A HI RAD, alarmed 15 seconds ago.
Initiating Cue:	The CRS has directed you to perform the Annunciator Response Procedures for both alarms.
Task Standard:	The operator will determine that the Unit 2 intake presents a greater threat than Unit 1, and align the VC inlet to take suction on Unit 1 only; and then pressurize the Control Room from the B Train Outside Air Pressure Fan.
Required Materials:	None
General References:	OP/1/A/6100/010 Q (Annunciator Response for Panel 1RAD-1), Rev 67 OP/1/A/6100/010 R (Annunciator Response for Panel 1RAD-2), Rev 41

OP/0/A/6450/011 (Control Area Ventilation / Chilled Water System), Rev 105

AD-HU-ALL-004 (Procedure And Work Instruction Use and Adherence), Rev 9

Handouts: Handout 1: Enclosure 4.14 (Response When EMF43A or 43B In Trip 2 or Non-Functional) of OP/0/A/6450/011 (Control Area Ventilation / Chilled Water System)

Handout 2: Enclosure 4.4 (Control Room Atmosphere Pressurization During Abnormal Conditions) of OP/0/A/6450/011 (Control Area Ventilation / Chilled Water System)

Time Critical Task: NO

Validation Time: 10 minutes

Critical Step Justification	
Step 8	This step is critical only if JPM Step 8 is performed in lieu of JPM Step 10. This step is critical because observing EMF 43A and EMF 43B and determining that EMF 43B has the highest reading is necessary to determine that the operator must align the VC inlet to take suction on Unit 1 only.
Step 13	This step is critical because pressing the 1VC-9A, 10A, 11B and 12B CLOSE pushbutton is necessary to align the VC inlet to take suction on Unit 1 only.
Step 14	This step is critical because determining that both EMF 43A and EMF 43B are valid alarms is necessary to pressurize the Control Room from the B Train Outside Air Pressure Fan.
Step 21	This step is critical because rotating the B Train CR Outside Air Press Fan Control Switch to the ON position is necessary to pressurize the Control Room from the B Train Outside Air Pressure Fan.
Step 22	This step is critical because presses the MAN pushbutton for #1 & #2 CRA Otsd Air Fan is necessary to pressurize the Control Room from the B Train Outside Air Pressure Fan.
Step 23	This step is critical because pressing the OFF pushbutton for CRA-OAD-3 and 4 is necessary to pressurize the Control Room from the B Train Outside Air Pressure Fan.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset simulator to IC-39 (100%).
2. Place in RUN
3. Adjust the output of EMF 43B to greater than the Trip II setpoint (Insert MAL-EMF-43B = 5400).
4. Adjust the output of EMF 43A to greater than the Trip II setpoint, but less than the value of EMF 43B (Insert MAL-EMF-43A = 4100).
5. Ensure 1RAD-1 B2 and 1RAD-2 B2 are both LIT.
6. Ensure Air Intake Valves from BOTH Units are OPEN.
7. Ensure that the B Train of VC/YC is operating.
8. Acknowledge all alarms.
9. Freeze the Simulator

OR

1. Reset to IC-237 (October, 2017)
2. Momentarily go to RUN to acknowledge Alarms then place Simulator in FREEZE.
3. Leave Simulator in FREEZE until operator is ready to begin.

(Denote Critical Steps with an asterisk)*

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM).

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin.				
1	(OP/1/A/6100/010 Q, 1RAD-1 B2 IA) Perform OP/0/A/6450/011 (Control Area Ventilation / Chilled Water System) Enclosure 4.14 (Response When EMF 43A and/or EMF 43B In Trip 2 or Non-Functional).	After checking the other ARP, the operator proceeds to OP/0/A/6450/011 Enclosure 4.14. **Examiner Note:** **The Immediate Actions for both ARPs are the same. The operator can address in either order (Step 1 and 2 can be done in any order).** **When operator seeks Enclosure 4.14, provide Handout 1.**		
2	(OP/1/A/6100/010 R, 1RAD-2 IA) Perform OP/0/A/6450/011 (Control Area Ventilation / Chilled Water System) Enclosure 4.14 (Response When EMF 43A and/or EMF 43B In Trip 2 or Non-Functional).	After checking the other ARP, the operator proceeds to OP/0/A/6450/011 Enclosure 4.14.		
3	(OP/0/A/6450/011 Enclosure 4.14, Step 2.1) EMF43A or EMF43B in Trip 2 Alarm or Non-Functional.	The operator observes that EMF-43A is in TRIP II. The operator observes that EMF-43B is in TRIP II.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
4	(Step 3.1) Evaluate all outstanding Clearances that may impact performance of this procedure.	The operator requests this information from the CRS. **Cue:** **There are no outstanding Clearances on this equipment.**		
5	(Step 3.2) Perform the following sections, as applicable: • Section 3.3, Response for EMF43A or EMF43B Non Functional • Section 3.4, Response for Trip 2 on EMF43A (Control Rm Air Intake Loc A) • Section 3.5, Response for Trip 2 on EMF43B (Control Rm Air Intake Loc B) • Section 3.6, Response for Trip 2 on EMF43A (Control Rm Air Intake Loc A) AND EMF43B (Control Rm Air Intake Loc B)	The operator observes that EMF-43A is in TRIP II. The operator observes that EMF-43B is in TRIP II. The operator proceeds to Section 3.6. **Examiner Note:** **The operator may go to Section 3.4 or 3.5. If so, the first step of both sections will direct the use of Section 3.6.**		
6	(Step 3.6) Response for Trip 2 on EMF43A (Control Rm Air Intake Loc A) AND EMF43B (Control Rm Air Intake Loc B) (Step 3.6.1) Notify RP of Trip 2 on both EMF43A and EMF43B.	The operator calls and notifies RP of the situation, and records. **Cue:** **RP Technician Don Smith acknowledges.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
7	(Note prior to Step 3.6.2) Both sets of air intakes should never be closed at same time.	The operator reads the Note and proceeds.		
*8	(Step 3.6.2) IF both Unit 1 and Unit 2 intake valves open, perform the following: (Step 3.6.2.1) Determine location with highest radiation hazard per one or both of the following: (Step 3.6.2.1.A) Check EMF readings in Control Room and determine location with highest radiation hazard.	The operator observes that both Unit 1 and Unit 2 intake valves are OPEN. The operator observes EMF 43A and EMF 43B and determines that EMF 43B has the highest reading.		
9	(Note prior to Step 3.6.2.1.B) Each unit's intake can be accessed from associated unit's D/G building roof. The intake is 2 candy cane shaped 18" pipes on Aux building roof, next to Reactor building.	The operator reads the Note and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
10	(Step 3.6.2.1.B) Notify RP to check VC intake radiation and determine location with highest radiation hazard.	The operator calls requests RP to survey the areas. **Cue:** **The CRS directs you to continue with your task.**		
11	(Step 3.6.2.2) IF both intake radiation hazards are the same,…..	The operator recognizes that the threat at Unit 2 is higher and that this step is NA.		
12	(Step 3.6.2.3) IF Unit 1 intake (monitored by EMF43A) is intake with highest radiation hazard….	The operator recognizes that the threat at Unit 2 is higher and that this step is NA.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*13	(Step 3.6.2.4) IF Unit 2 intake (monitored by EMF43B) is intake with highest radiation hazard ensure the following closed: • 1VC-9A (VC Outside Air Intake From Unit 2 Isol) • 1VC-10A (VC Outside Air Intake From Unit 2 Isol) • 1VC-11B (VC Outside Air Intake From Unit 2 Isol) • 1VC-12B (VC Outside Air Intake From Unit 2 Isol)	The operator presses the 1VC-9A CLOSE pushbutton, and observes the Green status light LIT, Red status light OFF. The operator presses the 1VC-10A CLOSE pushbutton, and observes the Green status light LIT, Red status light OFF. The operator presses the 1VC-11B CLOSE pushbutton, and observes the Green status light LIT, Red status light OFF. The operator presses the 1VC-12B CLOSE pushbutton, and observes the Green status light LIT, Red status light OFF. **Cue:** **If asked, indicate that a Concurrent Verification (CV) has been completed.** **Examiner NOTE:** **HVAC OAD-11 H-8 and H-9 are expected alarms.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*14	(Step 3.6.3) IF EMF43A (Control Rm Air Intake Loc A) AND EMF43B (Control Rm Air Intake Loc B) Trip 2 alarm valid (no loss of power), perform the following: (Step 3.6.3.1) Pressurize Control Room per Enclosure 4.4 (Control Room Atmosphere Pressurization During Abnormal Conditions).	The operator observes both instruments and determines that both EMF 43A and EMF 43B are valid alarms; and proceeds to Enclosure 4.4. **Examiner Note:** **When operator seeks Enclosure 4.4, provide Handout 2.**		
15	(OP/0/A/6450/011 Enclosure 4.4, Step 2.1) Control Room atmosphere has been determined to be in need of pressurization to protect Control Room personnel.	The operator recognizes that this Initial Condition has been satisfied during the performance of the Immediate Actions.		
16	(Step 2.2) VC / YC Train A OR B is selected and is in operation per this procedure.	The operator observes that the VC/YC Train B Mode Select Switch is in “B,” and that the VC/YC Train A Mode Select Switch is in “OFF,” and determines that the Train B is selected and in operation.		
17	(Step 3.1) Evaluate all outstanding Clearances that may impact performance of this procedure.	The operator requests this information from the CRS. **Cue:** **There are no outstanding Clearances on this equipment.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
18	(Step 3.2) Perform the following sections as applicable: • Section 3.3, Pressurize Control Room Using Outside Air Pressure Fans • Section 3.4, Securing Pressurization Of Control Room	The operator recognizes that Section 3.3 is required and proceeds.		
19	(Step 3.3) Pressurize Control Room using Outside Air Pressure Fans (Step 3.3.1) Ensure at least one the following groups of intake valves open: • 1VC-1A (VC Outside Air Intake From Unit 1 Isol) • 1VC-2A (VC Outside Air Intake From Unit 1 Isol) • 1VC-3B (VC Outside Air Intake From Unit 1 Isol) • 1VC-4B (VC Outside Air Intake From Unit 1 Isol) OR • 1VC-9A (VC Outside Air Intake From Unit 2 Isol) • 1VC-10A (VC Outside Air Intake From Unit 2 Isol) • 1VC-11B (VC Outside Air Intake From Unit 2 Isol) • 1VC-12B (VC Outside Air Intake From Unit 2 Isol)	The operator observes the Red status lights LIT for the Unit 1 valves. **Cue:** **If asked, indicate that a Concurrent Verification (CV) has been completed.**		
20	(Step 3.3.2) IF A Train VC/YC operating, …..	The operator observes that the A Train of VC/YC is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*21	(Step 3.3.3) IF B Train VC / YC operating, place "B" Train CR Outside Air Press Fan" to "ON".	The operator rotates the B Train CR Outside Air Press Fan Control Switch to the ON position. The operator will observe the Red B Train CR Outside Air Press Fan status light is LIT. (Not Critical) The operator will observe the White B Train CR Filter Preheat Enabled status light is LIT. (Not Critical) The operator observes the CRA-OAPFT-2 Dampers Red status light is LIT, and the Green status light is OFF. (Not Critical) **Cue:** **If asked, indicate that a Concurrent Verification (CV) has been completed.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
22 *	(Step 3.3.4) Depress "MAN" for the following (to ensure fans off): • #1 CRA Otsd Air Fan • #2 CRA Otsd Air Fan	The operator presses the MAN pushbutton for #1 CRA Otsd Air Fan, and observes the Green status light is LIT, Red status light is OFF. The operator presses the MAN pushbutton for #2 CRA Otsd Air Fan, and observes the Green status light is LIT, Red status light is OFF. **Cue:** **If asked, indicate that a Concurrent Verification (CV) has been completed.**		
*23	(Step 3.3.5) Depress "OFF" for the following: • CRA-OAD-4 (CR Area Otsd Air Fans Damper) • CRA-OAD-3 (CR Area Otsd Air Fans Damper)	The operator presses the OFF pushbutton for CRA-OAD-4, and observes the Red status light is OFF. The operator presses the OFF pushbutton for CRA-OAD-3, and observes the Red status light is OFF.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
24	(Step 3.3.6) Check the following dark: • CRA-OAD-4 (CR Area Otsd Air Fans Damper) "OPEN" light • CRA-OAD-3 (CR Area Otsd Air Fans Damper) "OPEN" light	The operator observes CRA-OAD-4 light is OFF. The operator observes CRA-OAD-3 light is OFF. **Cue:** **Another operator will complete this procedure**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems - Control Room JPM F

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

INITIAL CONDITIONS:

- Units 1 and 2 are operating at 100% power.
- Annunciator 1RAD-2 B2, EMF 43B CR AIR INTAKE B HI RAD, alarmed 45 seconds ago.
- Annunciator 1RAD-1 B2, EMF 43A CR AIR INTAKE A HI RAD, alarmed 15 seconds ago.

INITIATING CUE:

The CRS has directed you to perform the Annunciator Response Procedures for both alarms.

SIM JPM G

Facility:	McGuire	Task No.:	
Task Title:	Synchronize the Main Turbine Generator to the Grid	JPM No.:	2018 Systems - Control Room JPM G
K/A Reference:	045 A4.02 (2.7/2.6)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: __X__

Classroom ______ Simulator __X__ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts 1-2.

Initial Conditions:

- Unit 1 is at 15% power.
- A plant startup is in progress in accordance with Enclosure 4.1 (Power Increase) of OP/1/A/6100/003 (Controlling Procedure For Unit Operation); and the crew is currently at Step 3.32.17.
- All Clearances have been evaluated and will NOT impact Turbine Generator startup.
- The Main Turbine is operating at 1800 RPM.
- The crew is implementing OP/1/A/6300/001 (Turbine Generator Startup/Shutdown), and is currently at Step 3.16.
- The System Operation Center has been notified that Unit 1 will be paralleled to the grid.

Initiating Cue:

- The CRS has directed you to synchronize the Main Turbine Generator with the Electrical Grid via the 1A Generator Breaker, and load it to 50 MWe per Step 3.16 of Enclosure 4.1 (Startup with Turbine Control in "Operator Auto") of OP/1/A/6300/001 (Turbine Generator Startup/Shutdown), and then complete Step 3.16.
- A peer-checking operator has been assigned to push and hold the SYNC pushbutton under your direction.

Task Standard: The operator will adjust the controls of the Turbine Generator and synchronize it to the Electrical Grid, load it to 50 MWe in Operator Auto, and complete Step 3.16 of Enclosure 4.1 (Startup with Turbine Control in "Operator Auto") of OP/1/A/6300/001 (Turbine Generator Startup/Shutdown).

Required Materials: None

General References: OP/1/A/6100/003 (Controlling Procedure For Unit Operation), Rev 201
OP/1/A/6300/001 (Turbine Generator Startup/Shutdown), Rev 107
OP/1/A/6300/001 A (Turbine-Generator Load Change), Rev 13
OP/1/A/6100/010 B (Annunciator Response For Panel 1AD-1), Rev 50
AD-HU-ALL-004 (Procedure And Work Instruction Use and Adherence), Rev 9

Handouts: Handout 1: Enclosure 4.1 (Startup with Turbine Control in "Operator Auto") of OP/1/A/6300/001 (Turbine Generator Startup/Shutdown) marked up for this JPM.
Handout 2: OP/1/A/6300/001 A (Turbine-Generator Load Change)

Time Critical Task: NO

Validation Time: 14 minutes

Note: The JPM should be pre-briefed in the Briefing Room. The Facility normally uses a Peer Checker (Surrogate) who is available push and hold the SYNC pushbutton, when directed by the operator.

Critical Step Justification	
Step 7	This step is critical because pressing and holding the 1A "SYNC" pushbutton is necessary to adjust the controls of the Turbine Generator and synchronize it to the Electrical Grid.
Step 8	This step is critical because adjusting Generator voltage such that "Station Run Voltage" is slightly higher than "Gen Incoming Voltage" is necessary to adjust the controls of the Turbine Generator and synchronize it to the Electrical Grid.
Step 10	This step is critical because adjusting Generator speed until Synchroscope hand moves smoothly and slowly in "FAST" direction is necessary to adjust the controls of the Turbine Generator and synchronize it to the Electrical Grid.

Critical Step Justification	
Step 14	This step is critical because pressing the 1A Breaker CLOSE pushbutton when the synchroscope indicates within 5 minutes before the 12 o'clock position is necessary to adjust the controls of the Turbine Generator and synchronize it to the Electrical Grid, and adjust the Turbine controls to load it to 50 MWe in Operator Auto,.
Step 16	This step is critical because pressing the "MW IN" pushbutton is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 17	This step is critical because pressing the "LOAD RATE" pushbutton is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 18	This step is critical because entering 25 in "VARIABLE DISPLAY" is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 19	This step is critical because pressing the "ENTER" pushbutton is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 20	This step is critical because pressing the "REFERENCE" pushbutton is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 21	This step is critical because entering 50 in "VARIABLE DISPLAY" is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 22	This step is critical because pressing the "ENTER" pushbutton is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 23	This step is critical because pressing the "GO" pushbutton is necessary to load the Turbine to 50 MWe in Operator Auto.
Step 25	This step is critical because pressing the Voltage Adjust RAISE/LOWER pushbutton as needed is necessary to load the Turbine to 50 MWe in Operator Auto while maintaining the appropriate power factor.
Step 26	This step is critical because pressing and holding the 1B "SYNC" pushbutton is necessary to complete Step 3.16 of Enclosure 4.1 (Startup with Turbine Control in "Operator Auto") of OP/1/A/6300/001 (Turbine Generator Startup/Shutdown).
Step 27	This step is critical because pressing the 1B Breaker CLOSE pushbutton when the synchroscope indicates within 5 minutes before the 12 o'clock position is necessary to complete Step 3.16 of Enclosure 4.1 (Startup with Turbine Control in "Operator Auto") of OP/1/A/6300/001 (Turbine Generator Startup/Shutdown).

SIMULATOR OPERATIONAL GUIDELINES

1. Reset Simulator to IC-15 (15% power Ready to Synchronize the Main Turbine with the Electrical Grid)

2. Complete Enclosure 4.1 of OP/1/A/6100/003 through Step 3.32.16.

3. Complete Enclosure 4.1 of OP/1/A/6300/001 through Step 3.15.

4. Ensure the following:

   - "Station Run Voltage" is slightly higher than "Gen Incoming Voltage".
   - Turbine Acceleration Rate is 10 RPM/Minute

5. Freeze Simulator.

OR

1. Reset Simulator to Temporary Snap IC-238 (October, 2017).

NOTE: During the performance of the JPM, the Simulator Instructor will be required to acknowledge spurious alarms unrelated to the task being performed.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts 1-2.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
Simulator Instructor NOTE: Leave Simulator in FREEZE until operator is ready to begin.				
1	(Step 3.16) Perform manual synchronization of Generator to grid as follows: (Step 3.16.1) Obtain a copy of OP/1/A/6300/001 A (Turbine-Generator Load Change).	The operator recognizes that they have this procedure, and proceeds.		
2	(Step 3.16.2) Notify SOC (System Operation Center) Unit 1 to be paralleled to the grid. (704-382-4413 or dispatcher phone)	The operator recognizes that SOC has been notified, and proceeds.		
3	(Step 3.16.3) Perform the following to limit Governor Valves travel: (Step 3.16.3.1) Depress "Valve Position Limit Display".	The operator presses the "Valve Position Limit Display" pushbutton.		
4	(Step 3.16.3.2) Check "Valve Position Limit Display" lit.	The operator observes the "Valve Position Limit Display" light is LIT.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
5	(Step 3.16.3.3) Depress "Valve Position Limit Lower" until "Variable Display" indicates 21%.	The operator presses the "Valve Position Limit Lower " pushbutton until the "Variable Display" indicates 21% (0021). **NOTE:** **The operator may need to press the "Valve Position Limit Raise" pushbutton if overshoot occurs.**		
6	(Note prior to Step 3.16.4) "SYNC" must be depressed for indication on Synchroscope and "Station Run Voltage"/"Gen Incoming Voltage".	The operator reads the Note, and proceeds.		
*7	(Step 3.16.4) Depress AND hold "SYNC" for breaker to be closed.	The operator presses and holds the 1A "SYNC" pushbutton. **NOTE:** **The Surrogate operator may press and hold the SYNC pushbutton under the direction of the operator.**		
*8	(Step 3.16.5) Using "Voltage Adjust", ensure "Station Run Voltage" is slightly higher than "Gen Incoming Voltage".	The operator adjusts Generator voltage such that "Station Run Voltage" is slightly higher than "Gen Incoming Voltage".		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
9	(Notes prior to Step 3.16.6) Synchroscope hand should be moving less than 1 revolution in 20 seconds. Adjusting Generator speed in 1 rpm increments with Turbine in "Operator Auto" will result in Synchroscope hand moving smoothly and slowly. Synchroscope should be allowed to make at least one complete revolution.	The operator reads the Notes, and proceeds.		
*10	(Step 3.16.6) Adjust Generator speed per OP/1/A/6300/001 A (Turbine-Generator Load Change) until Synchroscope hand moves smoothly and slowly in "FAST" direction. (OP/1/A/6300/001 A, Step 3.3.1.2) • Depress “REFERENCE” • Enter desired Speed in “VARIABLE DISPLAY” • Depress “ENTER” • Depress “GO.”	The operator: • Depresses the REFERENCE pushbutton • Enters 1801 on the VARIABLE DISPLAY • Presses ENTER pushbutton The operator observes Demand at 1801. The operator depresses the GO pushbutton.		
11	(Note prior to Step 3.16.7) The following step prevents any "leading power factor" causing voltage transient to the Generator and Grid. [NCR01636240]	The operator reads the Note, and proceeds.		
12	(Step 3.16.7) IF a significant time delay (greater than 5 minutes) has occurred since performing Step 3.16.5, THEN…..	The operator recognizes that five minutes has NOT passed since the Generator voltage has been adjusted, and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
13	(Caution prior to Step 3.16.8) Step 3.16.10 should be performed without delay following Generator Breaker closure to prevent motoring the Generator. [NCR01649117]	The operator reads the Caution, and proceeds.		
*14	(Step 3.16.8) WHEN synchroscope indicates within 5 minutes before 12 o'clock position, THEN depress "CLOSE" for selected breaker until "CLSD" is lit.	When the synchroscope indicates within 5 minutes before the 12 o'clock position, the operator presses the 1A Breaker CLOSE pushbutton and observes the Red status light is LIT.		
15	(Step 3.16.9) Release "SYNC".	The operator releases the "SYNC" pushbutton.		
*16	(Step 3.16.10) WHEN the selected Generator Breaker closes, THEN immediately load Generator by performing the following: [NCR01665384] (Step 3.16.10.1) Depress "MW IN".	The operator presses the "MW IN" pushbutton.		
*17	(Step 3.16.10.2) Depress "LOAD RATE".	The operator presses the "LOAD RATE" pushbutton.		
*18	(Step 3.16.10.3) Enter a Load Rate of 25 in "VARIABLE DISPLAY".	The operator enters 25 in "VARIABLE DISPLAY".		
*19	(Step 3.16.10.4) Depress "ENTER".	The operator presses the "ENTER" pushbutton.		
*20	(Step 3.16.10.5) Depress "REFERENCE".	The operator presses the "REFERENCE" pushbutton.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*21	(Step 3.16.10.6) Enter a Load of 50 in "VARIABLE DISPLAY".	The operator enters 50 in "VARIABLE DISPLAY".		
*22	(Step 3.16.10.7) Depress "ENTER".	The operator presses the "ENTER" pushbutton.		
*23	(Step 3.16.10.8) Depress "GO".	The operator presses the "GO" pushbutton, and observes Demand MWe rising to the Reference setpoint of 0050, and then stopping at 0050.		
24	(Step 3.16.10.9) Check Generator loaded by comparing actual load to "Demand" and "Reference" windows.	The operator observes and compares the "Demand" and "Reference" windows, and determines that the Generator is loaded to 50 MWe.		
*25	(Step 3.16.10.10) Using "Voltage Adjust", maintain Pwr Fact 0.90 - 0.95 (Lag).	The operator presses the Voltage Adjust RAISE/LOWER pushbutton as needed to maintain power factor between 0.9 and 0.95 (Lagging).		
*26	(Step 3.16.11) IF other Generator Breaker available, THEN place in service as follows: (Step 3.16.11.1) Depress AND hold "SYNC" for selected breaker.	The operator presses and holds the 1B "SYNC" pushbutton. **NOTE:** **The Surrogate operator may press and hold the SYNC pushbutton under the direction of the operator.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*27	(Step 3.16.11.2) WHEN Synchroscope for selected breaker in 12 o'clock position, THEN depress "CLOSE" for selected breaker until "CLSD" light is lit.	The operator observes that the synchroscope indicates the 12 o'clock position and presses the 1B Breaker CLOSE pushbutton and observes the Red status light is LIT.		
28	(Step 3.16.11.3) Release "SYNC".	The operator releases the "SYNC" pushbutton.		
29	(Step 3.16.12) Perform the following to allow full Governor Valve travel: (Step 3.16.12.1) Depress "Valve Position Limit Display" and check "Valve Position Limit Display" lit.	The operator presses the Valve Position Limit Display pushbutton and observes the White light is LIT.		
30	(Step 3.16.12.2) Depress "Valve Position Limit Raise" until "Variable Display" indicates 120%.	The operator presses the Valve Position Limit Raise pushbutton until the Variable Display indicates 120. **NOTE:** **Another operator will continue with this procedure.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: _______________

Job Performance Measure No.: 2018 Systems - Control Room JPM G

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________________ Date: ____________________

INITIAL CONDITIONS:

- Unit 1 is at 15% power.
- A plant startup is in progress in accordance with Enclosure 4.1 (Power Increase) of OP/1/A/6100/003 (Controlling Procedure For Unit Operation); and the crew is currently at Step 3.32.17.
- All Clearances have been evaluated and will NOT impact Turbine Generator startup.
- The Main Turbine is operating at 1800 RPM.
- The crew is implementing OP/1/A/6300/001 (Turbine Generator Startup/Shutdown), and is currently at Step 3.16.
- The System Operation Center has been notified that Unit 1 will be paralleled to the grid.

INITIATING CUE:

- The CRS has directed you to synchronize the Main Turbine Generator with the Electrical Grid via the 1A Generator Breaker, and load it to 50 MWe per Step 3.16 of Enclosure 4.1 (Startup with Turbine Control in "Operator Auto") of OP/1/A/6300/001 (Turbine Generator Startup/Shutdown), and then complete Step 3.16.
- A peer-checking operator has been assigned to push and hold the SYNC pushbutton under your direction.

SIM JPM H

Facility:	McGuire	Task No.:	
Task Title:	Align Alternate Makeup During Inadequate Core Cooling Conditions	JPM No.:	2018 Systems - Control Room JPM H
K/A Reference:	074 EA1.09 (3.7/3.8)		

Examiner: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: __X__

Classroom ______ Simulator __X__ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Ensure Handout 1 is placed on CRS Desk.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 2.

Initial Conditions:

- Unit 1 has had a LOCA.
- 1ETB is de-energized.
- All NV, NI and ND Pumps are either OOS, unavailable or have failed.
- A Red Path exists on the Core Cooling Critical Safety Function.
- The crew has entered EP/1/A/5000/FR-C.1, Response to Inadequate Core Cooling.
- You are an available operator in the Control Room.
- AO John is standing by to assist with in-plant operations if needed.
- The Standby Makeup Pump is NOT running.

Initiating Cue: The CRS has directed you to try to establish flow from all available sources per Enclosure 3 (Alternate Makeup Sources) of FR-C.1, while the crew continues in the body of the procedure.

Task Standard: The operator will initiate Enclosure 3 of FR-C.1 and start the Standby Makeup Pump per Enclosure 6 of FR-C.1.

Required Materials: None

General References: EP/1/A/5000/FR-C.1 (Response to Inadequate Core Cooling), Rev 10

OMP 4-3 (Use of Emergency And Abnormal Procedures And FLEX Support Guidelines), Rev 46

Handouts: Handout 1: EP/1/A/5000/FR-C.1 (Response to Inadequate Core Cooling) marked up for place-keeping through Step 3 RNO e.2.

Handout 2: Enclosure 3 (Alternate Makeup Sources) of FR-C.1.

Handout 3: Enclosure 6 (Standby Makeup Pump Startup) of FR-C.1.

Time Critical Task: NO

Validation Time: 3 minutes

Critical Step Justification	
Step 4	This step is critical because Phase A CIS must be reset to permit certain CIVs to be opened (Standby Makeup System valves).
Step 5	This step is critical because depressing the 1NV-842AC and 1NV-849AC OPEN pushbutton is necessary to coordinate with the AO to start the Standby Makeup Pump.
Step 7	This step is critical because it is necessary to coordinate with the AO to start the Standby Makeup Pump.

SIMULATOR OPERATIONAL GUIDELINES

1. Reset the Simulator to IC-69, Implementing FR-C.1

2. Place the 1A NI Pump OOS.

3. Simultaneously insert MALF NC008D = 1 (LB LOCA), MALF EP008B = 1 (1ETB Lockout), MALF NV029A (1A NV Pump Trips on overcurrent), and MALF ND001A (1A ND Pump fails to START).

4. Perform E-0 and Transition to E-1. Transition to FR-C.1 when Core Cooling CSFST turns Red.

5. Freeze the Simulator.

OR

1. Reset to IC-239 (October, 2017)

(Denote Critical Steps with an asterisk*)

Ensure Handout 1 is placed on CRS Desk.
Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 2.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Enclosure 3, Step 1) Check Standby Makeup pump - KNOWN TO BE RUNNING.	The operator recognizes that the Standby Makeup Pump is NOT running, and proceeds.		
2	(Enclosure 3, Step 1 RNO) Start Standby Makeup pump PER Enclosure 6 (Standby Makeup Pump Startup).	The operator proceeds to Enclosure 6 of FR-C.1. **Cue:** **When the operator locates the Enclosure, provide Handout 3 to the operator.**		
3	(Enclosure 6, Step 1) Ensure S/I is reset.	The operator observes the Yellow Train A S/I RESET light is LIT. The operator observes the Train B S/I RESET light is LIT. **Note:** **The operator may press the RESET pushbuttons, however, SI is already reset.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*4	(Enclosure 6, Step 2) Ensure Phase A Isolation is reset.	The operator presses the Train A Phase A RESET Pushbutton and observes the Yellow Phase A RESET light is LIT. The operator presses the Train B Phase A RESET Pushbutton and observes the Yellow Phase A RESET light is LIT.		
*5	(Enclosure 6, Step 3) OPEN the following valves: 1NV-842AC (U1 Standby Makeup Pump Suction Isol) 1NV-849AC (U1 Standby Makeup Pump Cont Outside Isol).	The operator depresses the 1NV-842AC OPEN pushbutton and observes Red status light LIT, Green status light OFF. The operator depresses the 1NV-849AC OPEN pushbutton and observes Red status light LIT, Green status light OFF.		
6	(Enclosure 6, Step 4) Check 6900V bus 1TC - ENERGIZED.	The operator observes the UNIT 1 ELECTRICAL SYSTEMS MENU screen on the OAC (Or Equivalent), and determines that Bus 1TC is energized (Indicates 6.84 KV and Bus Bar is RED.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*7	(Enclosure 6, Step 5) Dispatch operator to SSF control panel to depress "ON" on Unit 1 Standby Makeup pump switch.	The operator contacts the AO and directs that they start the Standby Makeup Pump. **Booth Instructor:** **As AO, Acknowledge.** **Insert XSF_019_1, and report that the Standby Makeup Pump is running with 26 gpm.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems - Control Room JPM H

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________________ Date: ____________________

INITIAL CONDITIONS:

- Unit 1 has had a LOCA.
- 1ETB is de-energized.
- All NV, NI and ND Pumps are either OOS, unavailable or have failed.
- A Red Path exists on the Core Cooling Critical Safety Function.
- The crew has entered EP/1/A/5000/FR-C.1, Response to Inadequate Core Cooling.
- You are an available operator in the Control Room.
- AO John is standing by to assist with in-plant operations if needed.
- The Standby Makeup Pump is NOT running.

INITIATING CUE:

The CRS has directed you to try to establish flow from all available sources per Enclosure 3 (Alternate Makeup Sources) of FR-C.1, while the crew continues in the body of the procedure.

IN-PLANT JPM I

Facility:	McGuire	Task No.:	
Task Title:	<u>Swap Battery Charger EVCA Power Supply from Unit 1 to Unit 2</u>	JPM No.:	<u>2018 Systems – In-Plant JPM I</u>
K/A Reference:	APE 058 AA1.03 (3.1/3.3)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

<u>Method of testing:</u>

Simulated Performance: X Actual Performance: _______

Classroom _______ Simulator _______ Plant X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- Unit 1 has just experienced a LOOP (Loss of Offsite Power).
- The 1A D/G will not start.
- 1ETA is de-energized.
- AP/1/A/5500/07 (Loss of Electrical Power), Case 1 has been entered.
- While performing Enclosure 7 (DC Bus Alignment), the RO notices that Vital Battery Charger EVCA is de-energized.

Initiating Cue: The CRS directs you to swap power supplies to the EVCA Battery Charger from Unit 1 to Unit 2 in accordance with Enclosure 22 (Swapping Battery Charger Power Supplies) of AP/1/A/5500/07 (Loss of Electrical Power).

THIS IS A TIME CRITICAL JPM

Task Standard: The operator aligns power to Battery Charger EVCA from Unit 2 within 15 minutes of dispatch.

Required Materials: PPE (Hardhat, Safety Glasses, Hearing Protection, Safety Shoes etc.)
Dosimetry

General References: AP/1/A/5500/07 (Loss of Electrical Power), Rev 38
PT/0/A/4600/113 (Operator Time Critical Task Verification), Enclosure 13.14 (Essential Battery Charger Power Supply), Rev 25
OMP 4-3 (Use Of Emergency And Abnormal Procedures And FLEX Support Guidelines), Rev 46

Handouts: Handout 1: Blank Copy of Enclosure 22 (Swapping Battery Charger Power Supplies) of AP/1/A/5500/07 (Loss of Electrical Power).

Time Critical Task: YES-15 Minutes
UFSAR 8.3.2.1.4.2 states that "should a loss of battery charger or an AC power source occur, a single battery is capable of supplying two channels for 1-hour while maintaining sufficient terminal voltage".
To ensure that the assumed battery life expectancy is not exceeded, AP-07 (along with other loss of power procedures) contains requirements to restore the associated battery charger to service within 1 hour of a loss of power.
PT/0/A/4600/113, Enclosure 13.15 (Essential Battery Charger Power Supply) is performed periodically to ensure that this time-critical time can be met and assumes that it takes 45 minutes to dispatch an operator and 15 minutes to complete the local actions.

Validation Time: 10 minutes

Notes: Start this JPM from the hallway outside of the Ops kitchen area. Record the Time Critical Completion Time (in JPM step number 10) when the Charger "DC Output" Breaker is closed in and DC volts are verified to be greater than or equal to 115 volts.

Critical Step Justification	
Step 6	This step is critical because opening the Normal breaker is necessary to align power to Battery Charger EVCA from Unit 2.
Step 7	This step is critical because rotating and removing the kirk key from breaker ECB1-1B is necessary to align power to Battery Charger EVCA from Unit 2.
Step 9	This step is critical because inserting the key into the Unit 2 supply breaker and closing it is necessary to align power to Battery Charger EVCA from Unit 2.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Caution prior to Step 1) This enclosure should be performed without delay to limit time battery is supplying DC bus.	The operator reads the Caution and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
2	(Step 1) Perform applicable section(s) as specified in Enclosure 7 (DC Bus Alignment): To swap power supplies to EVCA Battery Charger, perform Step 2. To swap power supplies to EVCB Battery Charger, perform Step 3. To swap power supplies to EVCC Battery Charger, perform Step 4. To swap power supplies to EVCD Battery Charger, perform Step 5. To swap power supplies to EVCS Battery Charger, perform one of the following: IF 1EMXH is aligned to EVCS, THEN swap power supplies to 1EMXH PER Step 6. OR IF 2EMXH is aligned to EVCS, THEN swap power supplies to 2EMXH PER Step 7.	The operator determines from initial conditions that Battery Charger EVCA is the desired charger and proceeds to step 2.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
3	(Step 2/2.a) To swap power supplies to EVCA Battery Charger, perform the following: Determine which unit is desired to supply EVCA: Unit 1 OR Unit 2	The operator determines from initial conditions that it is desired to supply Battery Charger EVCA from Unit 2, and places a check mark in front of Unit 2.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
4	(Steps 2.b.1-2) Have Control Room perform the following: IF Unit 1 ETA is energized, THEN……. IF Unit 2 ETA is energized, THEN:	The operator determines from initial conditions that 1ETA is NOT energized and proceeds to step 2.b.2. The operator contacts to Control Room and asks if 2ETA is energized.		
		Cue: **2ETA is energized.**		
	Ensure 2A D/G load sequencer reset.	The operator contacts the Control Room and directs RO to ensure 2A D/G Sequencer is reset and EVCA stop button on 2MC-8 is depressed.		
	Depress "STOP" for "EVCA Batt Charger" on 2MC-8.	**Cue:** **2A D/G sequencer is reset, AND STOP Pushbutton has been depressed.**		
5	(Note prior to Step 2.c) It may be necessary to apply pressure on the breaker rotary switch in the counterclockwise direction while operating kirk key device(s).	The operator reads the Note and proceeds to Step 2.c		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*6	(Step 2.c) OPEN the following breakers:			
	ECB1-1B (Normal Inc Supply From MCC 1EMXA)	The operator opens the Normal breaker.		
		Cue: **“Normal Supply” breaker handle rotated counter clockwise to the “OFF” position.**		
	ECB1-1C (Alt Inc Supply From MCC 2EMXA)	The operator observes the Alternate breaker.		
		Cue: **Breaker handle is indicating “OFF”.**		
*7	(Step 2.d) Remove kirk key from breaker in step above.	The operator rotates and removes the kirk key from breaker ECB1-1B.		
		Cue: **Kirk key rotated and removed.**		
8	(Step 2.e) IF Unit 1 to supply EVCA, ……	The operator determines from initial conditions that it is <u>NOT</u> desired to supply power to EVCA from Unit 1 and proceeds to step 2.f.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*9	(Step 2.f) IF Unit 2 to supply EVCA, THEN perform the following: Use kirk key and CLOSE ECB1-1C (Alt Inc Supply From MCC 2EMXA).	The operator inserts key into the Unit 2 supply breaker and closes it. **Cue:** **Kirk Key inserted. "Alternate Supply" breaker handle rotated clockwise to the "ON" position.**		
	Have Unit 2 Control Room operator start Battery Charger EVCA on 2MC-8.	The operator contacts the Control Room and requests that they start the Battery Charger EVCA on 2MC-8. **Cue:** **Unit 2 RO has started EVCA Batt. Charger from 2MC-8.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
10	(Step 2.g) IF EVCA battery charger DC volts are greater than or equal to 115 volts, THEN GO TO Step 2.i.	The operator checks EVCA battery charger DC output voltage. **Cue:** **Charger DC output voltage is 132 volts.** The operator proceeds to Step 2.i. **Stop Time for Time Critical Task:** ____________________		
11	(Step 2.i) Notify Control Room of status of EVCA Battery Charger.	The operator contacts the Control Room and informs the RO that the EVCA Battery Charger is running. **Cue:** **The RO acknowledges.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
12	(Step 2.j) IF another battery charger needs to be swapped, THEN perform the applicable step as directed in Step 1.	The operator recognizes that no other battery Chargers need to be re-energized. **Cue:** **No other chargers need to be swapped.**		
13	(Step 2.k) Exit this enclosure.	The operator exits the procedure.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ________________ **TIME CRITICAL STOP TIME:** ________________

VERIFICATION OF COMPLETION

Job Performance Measure No.: <u>2018 Systems – In-Plant JPM I</u>

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

<u>Question Documentation:</u>

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- Unit 1 has just experienced a LOOP (Loss of Offsite Power).
- The 1A D/G will not start.
- 1ETA is de-energized.
- AP/1/A/5500/07 (Loss of Electrical Power), Case 1 has been entered.
- While performing Enclosure 7 (DC Bus Alignment), the RO notices that Vital Battery Charger EVCA is de-energized.

INITIATING CUE:

The CRS directs you to swap power supplies to the EVCA Battery Charger from Unit 1 to Unit 2 in accordance with Enclosure 22 (Swapping Battery Charger Power Supplies) of AP/1/A/5500/07 (Loss of Electrical Power).

THIS IS A TIME CRITICAL JPM

NOTE: No plant equipment should be operated during the performance of this JPM. All actions must be SIMULATED.

IN-PLANT JPM J

Facility: McGuire

Task No.:

Task Title: Start # 1 Turbine Driven CA Pump

JPM No.: 2018 Systems – In-Plant JPM J

K/A Reference: 061 A2.04 (3.4/3.8)

Examinee:

NRC Examiner:

Facility Evaluator:

Date:

Method of testing:

Simulated Performance: X

Actual Performance: ______

Classroom ______ Simulator ______ Plant X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- Unit 1 is at 98% power when the OAC alarm M1A1276 (U1 CA Temp at Chk Vlv 1CA-37) is received.
- The RO reports that the temperature in the TD CA Pump discharge to 1D S/G is 223°F.
- The CRS has determined the #1 Turbine Driven CA Pump should be started to cool the piping to 1D S/G.

Initiating Cue:

- The CRS directs you to locally start Unit 1 Turbine Driven CA Pump per OP/1/A/6250/002, Enclosure 4.4 using a "Normal" start.
- The Initial Conditions have been met and all Clearances have been evaluated.
- A Pre-job Brief discussing reactivity management concerns has been performed.

Task Standard: The operator will start the Unit 1 TDCA Pump and align valves to provide cooling in accordance with Enclosure 4.4 of OP/1/A/6250/002.

Required Materials: PPE (Hardhat, Safety Glasses, Hearing Protection, Safety Shoes etc.)
Dosimetry

General References:	OP/1/A/6250/002 (Auxiliary Feedwater System), Rev 132 AD-HU-ALL-0004 (Procedure And Work Instruction Use and Adherence), Rev 9
Handouts:	Handout 1: Enclosure 4.4 (Manual Operation of #1 TD CA Pump) of OP/1/A/6250/002 (Auxiliary Feedwater System), marked up so that steps 3.1 and 3.2 are complete.
Time Critical Task:	NO
Validation Time:	11 minutes

Critical Step Justification	
Step 6	This step is critical because rotating the C/R LOCAL Switch for the “#1 TD CA Pump” clockwise, and moving the “M-Local” switch for each valve downward is necessary to will start the Unit 1 TDCA Pump and align valves to provide cooling in accordance with Enclosure 4.4 of OP/1/A/6250/002.
Step 7	This step is critical because rotating the control knob for each valve counter-clockwise is necessary to will start the Unit 1 TDCA Pump and align valves to provide cooling in accordance with Enclosure 4.4 of OP/1/A/6250/002.
Step 13	This step is critical because rotating the “#1 TD CA Pump” control switch is necessary to will start the Unit 1 TDCA Pump and align valves to provide cooling in accordance with Enclosure 4.4 of OP/1/A/6250/002.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Step 3.3) IF #1 TD CA Pump to be operated locally, obtain key #172.	The operator should go to the Work Control Center to obtain a key, or will describe where to obtain the key. **Cue:** **Key 172 has been obtained.** **NOTE:** **Key 172 will not be needed to complete this JPM due the clear plexiglass cover on the Control Panel.**		
2	(Note prior to Step 3.4) If U1 TD CA Pump to be operated locally a Licensed Operator is required to perform all manipulations at the CA Pump Panel(s).	The operator reads the NOTE, and proceeds.		
3	(Step 3.4) Perform the following sections as applicable: • Section 3.5, Starting #1 TD CA Pump. • Section 3.6, Stopping #1 TD CA Pump.	The operator proceeds to Section 3.5.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
4	(Step 3.5) Starting #1 TD CA Pump (Step 3.5.1) Notify RP of #1 TD CA Pump start.	The operator notifies RP. **Cue:** **RP John Stover has been contacted.** The operator documents the name, current date & time.		
5	(Step 3.5.2) IF in Modes 1-3, declare #1 TD CA Pump INOPERABLE.	The operator calls the CR or WCC to inform the CRS of TD CA Pump inoperability. **Cue:** **The CRS reports that the TD pump has been declared inoperable.** **Initials DD**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
6	(Step 3.5.3) IF operating #1 TD CA Pump locally, perform the following at "Turbine Driven CA Pump Control Panel":			
*	• (Step 3.5.3.1) Place "#1 TD CA Pump" in "LOCAL".	The operator rotates the C/R LOCAL Switch for the "#1 TD CA Pump" clockwise.		
		Cue: **The Switch is in the LOCAL position and the White LOCAL light is LIT.**		
*	• (Step 3.5.3.2) Place the following in "M-Local": • 1CA-64 (TD CA Pump to S/G A) • 1CA-52 (TD CA Pump to S/G B) • 1CA-48 (TD CA Pump to S/G C) • 1CA-36 (TD CA Pump to S/G D)	The operator moves the "M-Local" switch for each valve downward.		
		Cue: **The Switch for each valves controller is in the M-LOCAL position.**		
* 7	(Step 3.5.4) Close the following: • 1CA-64AB (U1 TD CA Pump Disch to 1A S/G Control) • 1CA-52AB (U1 TD CA Pump Disch to 1B S/G Control) • 1CA-48AB (U1 TD CA Pump Disch to 1C S/G Control) • 1CA-36AB (U1 TD CA Pump Disch to 1D S/G Control)	The operator rotates the control knob for each valve counter-clockwise.		
		Cue: **Knob rotation counter-clockwise and the black needle indicates 0%, and that the Green "Closed" light is LIT for each valve.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
8	(Step 3.5.5) Drain moisture from #1 CA Pump Turbine stop valve as follows: (Step 3.5.5.1) Slowly open the following: • 1SA-39 (Unit 1 TD CA Pump Turb Stop Valve Above Seat Drn) • 1SA-40 (Unit 1 TD CA Pump Turb Stop Valve Below Seat Drn)	The operator rotates the handwheel counterclockwise for each valve. **Cue:** **The hand wheel has been rotated fully counter-clockwise.**		
	(Step 3.5.5.2) HOLD for at least 30 seconds, THEN close the following: • 1SA-39 (Unit 1 TD CA Pump Turb Stop Valve Above Seat Drn) • 1SA-40 (Unit 1 TD CA Pump Turb Stop Valve Below Seat Drn)	After 30 seconds, the operator rotates the handwheel clockwise for each valve. **Cue:** **The hand wheel has been rotated fully clockwise for each valve.**		
	(Step 3.5.5.3) IF water hammer occurred while draining moisture from #1 CA Pump Turbine Stop Valve…...	**Cue:** **If asked, indicate that no unusual noises, popping, or vibration occurred during draining.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
9	(Step 3.5.6) Check the following open: • 1CA-2 (U1 CA Pumps Suct From CA Storage Tank Isol) • 1CA-7AC (U1 TD CA Pump Suction Isol)	The operator observes the 1CA-2 status light. **Cue:** **The RED "Open" light is LIT.** The operator observes the 1CA-7A status light. **Cue:** **The RED "Open" light is LIT.**		
10	(Caution prior to Step 3.5.7) Starting the TD CA Pump will increase Rx Power due to increased steam flow. Reducing turbine generator load may be required to maintain power level.	The operator reads the Caution and proceeds.		
11	(Notes prior to Step 3.5.7) • It is preferred to perform a normal start of the TD CA Pump • IF a slow start of the TD CA Pump is to be performed, Engineering should be available to provide guidance.	The operator reads the Notes and proceeds.		
12	(Step 3.5.7) Start #1 TD CA Pump per Step 3.5.7.1 or 3.5.7.2 (N/A step NOT performed)	Operator recognizes (from initial conditions) that a Normal start is desired and proceeds to step 3.5.7.1		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
13 *	(Step 3.5.7.1) IF normal start desired, perform the following: • (Step 3.5.7.1.A) Place "#1 TD CA Pump" in "START".	The operator rotates the "#1 TD CA Pump" control switch clockwise. **Cue:** **The Switch is in the "START" position.**		
	• (Step 3.5.7.1.B) Check the following open: • 1SA-48ABC (1C S/G SM Supply to U1 TD CA Pump Turb Isol)	The operator observes the 1SA-48ABC status light. **Cue:** **The RED "Open" light is LIT.**		
	• 1SA-49AB (1B S/G SM Supply to U1 TD CA Pump Turb Isol)	The operator observes the 1SA-49AB status light. **Cue:** **The RED "Open" light is LIT.**		
	• (Step 3.5.7.1.C) Check recirc valve opens by "FLOW" lit.	The operator observes the recirc valve status light. **Cue:** **The RED "Flow" status light is LIT.**		
	• (Step 3.5.7.1.D) IF operating CA Pump to cool piping, allow pump to run for at least 10 minutes	**Cue:** **Another Operator will complete this procedure.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

Job Performance Measure No.: 2018 Systems – In-Plant JPM J

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- Unit 1 is at 98% power when the OAC alarm M1A1276 (U1 CA Temp at Chk Vlv 1CA-37) is received.
- The RO reports that the temperature in the TD CA Pump discharge to 1D S/G is 223°F.
- The CRS has determined the #1 Turbine Driven CA Pump should be started to cool the piping to 1D S/G.

INITIATING CUE:

- The CRS directs you to locally start Unit 1 Turbine Driven CA Pump per OP/1/A/6250/002, Enclosure 4.4 using a “Normal” start.
- The Initial Conditions have been met and all Clearances have been evaluated.
- A Pre-job Brief discussing reactivity management concerns has been performed.

NOTE: No plant equipment should be operated during the performance of this JPM. All actions must be SIMULATED.

IN-PLANT JPM K

Facility:	McGuire	Task No.:	
Task Title:	Makeup to the Unit 1 KC Surge Tanks	JPM No.:	2018 Systems – In-Plant JPM K
K/A Reference:	008 A2.02 (3.2/3.5)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: X Actual Performance: ______

Classroom ______ Simulator ______ Plant X

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- The plant YM system is out of service to allow major modifications to be incorporated.
- Unit 1 is operating at 100% power when the KC Surge Tank A and B lo level computer alarms are received.
- The surge tank levels are 3.9 feet and decreasing.
- The operating crew has implemented AP/1/A/5500/21 (Loss of KC or KC System Leakage).
- Several operators have been dispatched to attempt to locate the leak.
- RN Pumps 1A and 1B are in service.

Initiating Cue: The CRS directs you to align makeup to both Unit 1 KC Surge Tanks per AP/1/A/5500/21 (Loss of KC or KC System Leakage), Enclosure 3 (Aligning RN Makeup to KC Surge Tank).

THIS IS A TIME CRITICAL JPM

Task Standard: The operator will manipulate valves and communicate with the Control Room to restore KC Surge Tank level to the allowable band in accordance with Enclosure 3 of AP/1/A/5500/21 within 10 minutes.

Required Materials: PPE (Hardhat, Safety Glasses, Hearing Protection, Safety Shoes etc.)
Dosimetry

General References: AP/1/A/5500/21 (Loss of KC or KC System Leakage), Rev 10
PT/0/A/4600/113 (Operator Time Critical Task verification) Enclosure 13.16 (Initiating Makeup to the KC Surge Tank or Isolate KC Header Leak), Rev 25
OMP 4-3 (Use Of Emergency And Abnormal Procedures And FLEX Support Guidelines), Rev 46

Handouts: Handout 1: AP/1/A/5500/21 (Loss of KC or KC System Leakage), Enclosure 3 (Aligning RN Makeup to KC Surge Tank).

Time Critical Task: YES – 10 Minutes
The operator is expected to locally initiate makeup within 10 minutes of dispatch using either YM or RN, or gets leak isolated prior to emptying surge tank for design basis leak of 50 gpm. If makeup is initiated in time to stabilize tank level prior to emptying, the time critical action is also met. This requires 20 minutes to dispatch operator to initiate makeup after going below 3 feet in surge tank, allowing 10 minutes for local action. (YM will be used if available, or RN makeup (credited) if told YM makeup is unavailable.)

Validation Time: 8 minutes

NOTE: This JPM should be started from just inside the RCA Entry Point.

Critical Step Justification	
Step 3	This step is critical because rotating the 1KC-494 and the 1KC-496 handwheel in the counter-clockwise direction is necessary to restore KC Surge Tank level in accordance with Enclosure 3 of AP/1/A/5500/21 within 10 minutes.
Step 5	This step is critical because rotating the 1KC-497 and the 1KC-499 handwheel in the counter-clockwise direction is necessary to restore KC Surge Tank level in accordance with Enclosure 3 of AP/1/A/5500/21 within 10 minutes.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Caution prior to Step 1) RN pump must be running while RN to KC emergency makeup is open, to prevent draining KC surge tank back to RN.	The operator reads the Caution and proceeds.		
2	(Step 1) Align one or both of the following flowpaths (Step 1.a or 1.b) as required: (Step 1.a) IF 1A RN Train to 1A KC Surge Tank makeup is desired, THEN perform the following: (Step 1.a.1) Ensure 1A RN Pump is on.	The operator recognizes that the 1A RN Pump is ON (Initial Condition).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	(Step 1.a.2) Dispatch operator to perform the following: Unlock and open 1KC-494 (Unit 1 RN Assured Supply to 1A KC Surge Tank Compartment Isol) (aux. bldg, 733 + 10, HH-56, in corner west of 1B1 KC Pump) Open 1KC-496 (1A KC Surge Tank Compartment RN Assured Supply Isol) (aux. bldg, 733 + 10, HH-56, in corner west of 1B1 KC Pump).	The operator removes the lock on 1KC-494. **Cue:** **The Lock is removed.** The operator rotates the 1KC-494 handwheel in the counter-clockwise direction. **Cue:** **The handwheel rotates, the Stem rises out of the valve and then stops.** The operator rotates the 1KC-496 handwheel in the counter-clockwise direction. **Cue:** **The handwheel rotates, the Stem rises out of the valve and then stops.**		
4	(Step 1.b) IF 1B RN Train to 1B KC Surge Tank makeup is desired, THEN perform the following: (Step 1.b.1) Ensure 1B RN Pump is on.	The operator recognizes that the 1B RN Pump is ON (Initial Condition).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*5	(Step 1.b.2) Dispatch operator to perform the following: Unlock and open 1KC-497 (Unit 1 RN Assured Supply to 1B KC Surge Tank Compartment Isol) (aux. bldg, 733 + 10, HH-56, in corner west of 1B1 KC Pump) Open 1KC-499 (1B KC Surge Tank Compartment RN Assured Supply Isol) (aux. bldg, 733 + 10, HH-56, in corner west of 1B1 KC Pump)	The operator removes the lock on 1KC-497. **Cue:** **The Lock is removed.** The operator rotates the 1KC-497 handwheel in the counter-clockwise direction. **Cue:** **The handwheel rotates, the Stem rises out of the valve and then stops.** The operator rotates the 1KC-499 handwheel in the counter-clockwise direction. **Cue:** **The handwheel rotates, the Stem rises out of the valve and then stops.** **NOTE Time Critical STOP Time:** ___________		
6	(Step 2) IF AT ANY TIME an RN pump trips, THEN dispatch operator to isolate affected trains RN to KC makeup line opened in step 1.	The operator reads the Step and proceeds.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
7	(Step 3) Adjust makeup rate as required to prevent overflow of KC Surge Tank (approximately 8.5 Ft)	The operator calls the Control Room and asks for the 1A KC Surge Tank level.		
		Cue: **The 1A KC Surge Tank level is 4 Ft. and slowly increasing.**		
		The operator calls the Control Room and asks for the 1B KC Surge Tank level.		
		Cue: **The 1B KC Surge Tank level is 4 Ft. and slowly increasing.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________ **TIME CRITICAL STOP TIME:** ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Systems – In-Plant JPM K

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- The plant YM system is out of service to allow major modifications to be incorporated.
- Unit 1 is operating at 100% power when the KC Surge Tank A and B lo level computer alarms are received.
- The surge tank levels are 3.9 feet and decreasing.
- The operating crew has implemented AP/1/A/5500/21 (Loss of KC or KC System Leakage).
- Several operators have been dispatched to attempt to locate the leak.
- RN Pumps 1A and 1B are in service.

INITIATING CUE: The CRS directs you to align makeup to both Unit 1 KC Surge Tanks per AP/1/A/5500/21 (Loss of KC or KC System Leakage), Enclosure 3 (Aligning RN Makeup to KC Surge Tank).

THIS A TIME CRITICAL JPM

NOTE: No plant equipment should be operated during the performance of this JPM. All actions must be SIMULATED.

JPM A1a RO

Facility:	McGuire	Task No.:	
Task Title:	Perform an Estimated Critical Boron Concentration	JPM No.:	2018 Admin – JPM A1a RO
K/A Reference:	2.1.25 (3.9)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:

- Unit 1 startup in progress per OP/1/A/6100/001 (Controlling Procedure for Unit Startup).
- All steps are complete up to determining the desired estimated critical rod height.
- Performance of the estimated critical rod height determination has resulted in the need to perform Enclose 4.1 (Estimated Critical Boron Concentration) of OP/0/A/6100/006 (Reactivity Balance Calculation).
- The Unit tripped from 30% power, 70 hours ago.
- The following Cycle 26 conditions exist:
  - EFPD = 4
  - NC Boron = 1863 PPM
  - Xenon Worth = 0 PCM
- Samarium = - 150 PCM
- It is intended to pull rods to criticality with criticality achieved in 1 hour.
- The desired critical rod position is Bank C at 100 Steps.
- The OAC and REACT Program are unavailable.

Initiating Cue:	• The CRS has directed you to perform an Estimated Critical Boron Concentration per Enclosure 4.1 (Estimated Critical Boron Concentration) of OP/0/A/6100/006 (Reactivity Balance Calculation). • If there is a delay of 1.5 hours past the current anticipated time of criticality, is the Estimated Critical Position valid?
Task Standard:	The operator determines that the Measured Critical Boron is 1839 PPM (See attached KEY); and then identifies that the delay will not invalidate the ECP.
Required Materials:	Calculator
General References:	OP/1/A/6100/001 (Controlling Procedure for Unit Startup), Rev 185 OP/0/A/6100/006 (Reactivity Balance Calculation), Rev 80 OP/1/A/6100/022 (Unit 1 Data Book), Rev 481 MCEI-0400-301 (Startup and Operational Report - Control Room Data), Rev 0 MCEI-0400-349 (Unit 1 Cycle 26 Core Operating Limits Report), Rev 0
Handouts:	Handout 1: OP/0/A/6100/006 (Reactivity Balance Calculation)
Time Critical Task:	NO
Validation Time:	20 minutes

Critical Step Justification	
Step 12	This step is critical because determining that the all rods out (ARO), hot zero power (HZP), no xenon, equilibrium samarium boron concentration for 4 EFPD is 2064 PPMB [2050-2100] is necessary to complete the assigned task.
Step 13	This step is critical because determining that the integral rod worth at HZP, no xenon for 4 EFPD with Bank C withdrawn to 100 Steps is 1252 PCM is necessary to complete the assigned task.
Step 14	This step is critical because determining that the integral rod worth at HZP, peak xenon for 4 EFPD with Bank C withdrawn to 100 Steps is 1224 PCM is necessary to complete the assigned task.
Step 15	This step is critical because determining that ARO differential boron worth for for 4 EFPD is -6.23 PCM/PPMB is necessary to complete the assigned task.
Step 16	This step is critical because determining that peak xenon worth for 4 EFPD is 3909 pcm is necessary to complete the assigned task.
Step 18	This step is critical because determining that the Measured Critical Boron is 1839 PPM [1825-1875] is necessary to complete the assigned task.
Step 19	This step is critical because determining that the ECP is still valid at the time of criticality is necessary to complete the assigned task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ___________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Note prior to Step 3.1) All curves/tables used in this procedure are found in the Control Room Data section of each units Startup and Operational Report (SOR)"	The operator reads the NOTE and obtains the Control Room Data section of the SOR.		
2	(Step 3.1) Record the following: (Step 3.1.1) Unit ___ Cycle ___	The operator records Unit 1 and Cycle 26, and proceeds.		
3	(Step 3.1) Record the following: (Step 3.1.2) Date/Time of Shutdown _____/_____	The operator records Date/Time (70 hours ago) from current Date/Time.		
4	(Step 3.1) Record the following: (Step 3.1.3) Anticipated Date/Time of Criticality _____/_____	The operator records today's date and 1 hour from the time calculation is started as the time of criticality.		
5	(Step 3.1) Record the following: (Step 3.1.4) Burnup: _____ EFPD (P1457)	The operator records 4 EFPD.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
6	(Step 3.1) Record the following: (Step 3.1.5) NC System Effective Boron concentration: (Step 3.1.5.1) IF OAC is unavailable, record the current NC Boron Concentration: (Step 3.1.5.2) IF OAC is available…. (Step 3.1.5.3) Record the Effective Boron Concentration: (Step 3.1.5.1A or Step 3.1.5.2C) =	The operator recognizes from initial conditions that OAC is unavailable and records 1863 in Step 3.1.5.1A. The operator places NA in Step 3.1.5.2. The operator records 1863 in Step 3.1.5.3.		
7	(Step 3.1) Record the following: (Step 3.1.6) Desired critical rod position: Bank ____ Steps W/D.	The operator recognizes from initial conditions that the desired critical rod position is Bank C at 100 Steps and records Bank C, 100 Step W/D in Step 3.1.6.		
8	(Step 3.1) Record the following: (Step 3.1.7) Xenon worth at anticipated time of criticality (from OAC program Xenon Samarium - XESM or REACT program).	The operator records 0 from initial conditions.		
9	(Step 3.1) Record the following: (Step 3.1.8) IF burnup from step 3.1.4 is > 0 EFPD, record the difference between equilibrium and present samarium worth (P1475, OAC Program Xenon Samarium-XESM, or REACT program). {MCEI-0400-150}	The operator recognizes that burnup is > 0 EFPD and records -150 from initial conditions.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
10	(Step 3.1) Record the following: (Step 3.1.9) IF burnup from step 3.1.4 is > 12 EFPD,……	The operator recognizes that burnup is < 12 EFPD and that fission product correction is NOT needed, The operator places NA in Step 3.1.9.		
11	(Step 3.2) IF desired, perform automated calculations using REACT (Reactivity Balance – ECB module)…..	The operator recognizes from the initial conditions that the REACT Program is NOT available, and places NA in Step 3.2.		
*12	(Step 3.3) Manual Calculations: (Step 3.3.1) Boron Concentration: (Step 3.3.1.1) Determine the Hot Zero Power (HZP) critical boron concentration with All Rods Out (ARO), no xenon, and equilibrium samarium at the burnup recorded in step 3.1.4 (Figure 1 in the SOR). (Step 3.3.1.2) Record value in Table 4.1 Line A	The operator uses Figure 1 in the SOR and determines that the all rods out (ARO), hot zero power (HZP), no xenon, equilibrium samarium boron concentration for 4 EFPD is 2064 PPMB [2050-2100]. The operator records 2064 on Line A of Table 4.1.		
*13	(Step 3.3) Manual Calculations: (Step 3.3.2) No xenon rod worth: (Step 3.3.2.1) Determine the integral rod worth at HZP, no xenon from step 3.1.6 (Table 5 in the SOR). (Step 3.3.2.2) Record value in Table 4.1 Line B.	The operator uses Table 5 in the SOR and determines that the integral rod worth at HZP, no xenon for 4 EFPD with Bank C withdrawn to 100 Steps is 1252 PCM. The operator records1252 on Line B of Table 4.1.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*14	(Step 3.3) Manual Calculations: (Step 3.3.3) Peak xenon rod worth: (Step 3.3.3.1) Determine the integral rod worth at HZP, peak xenon, and equilibrium samarium with the rod configuration recorded in step 3.1.6 (Table 6 in the SOR). (Step 3.3.3.2) Record value in Table 4.1 Line C.	The operator uses Table 6 in the SOR and determines that the integral rod worth at HZP, peak xenon for 4 EFPD with Bank C withdrawn to 100 Steps is 1224 PCM. The operator records1224 on Line C of Table 4.1.		
*15	(Step 3.3) Manual Calculations: (Step 3.3.4) Differential Boron Worth: (Step 3.3.4.1) Determine the HZP, ARO, no xenon, and equilibrium samarium differential boron worth at the burnup recorded in step 3.1.4 (Table 2 in the SOR). (Step 3.3.4.2) Record value in Table 4.1 Line D	The operator uses Table 2 in the SOR and determines that ARO differential boron worth for for 4 EFPD is -6.23 PCM/PPMB. The operator records -6.23 on Line D of Table 4.1.		
*16	(Step 3.3) Manual Calculations: (Step 3.3.5) Peak Xenon Worth (Step 3.3.5.1) Determine the HZP, peak xenon worth at the burnup recorded in step 3.1.4 (Table 16 in the SOR). (Step 3.3.5.2) Record value in Table 4.1 Line E.	The operator uses Table 16 in the SOR and determines that peak xenon worth for 4 EFPD is 3909 pcm. The operator records 3909 on Line E of Table 4.1.		
17	(Step 3.3) Manual Calculations: (Step 3.3.6) Calculations: (Step 3.3.6.1) Record values from Steps 3.1.7 - 3.1.9 in Table 4.1	The operator records 0 on Line F of Table 4.1. The operator records -150 on Line G of Table 4.1. The operator records 0 on Line H of Table 4.1.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*18	(Step 3.3) Manual Calculations: (Step 3.3.6) Calculations: (Step 3.3.6.2) Complete Table 4.1, recording 0 for any N/A'd Reference Steps.	The operator performs the calculations required of Table 4.1 and determines that the Measured Critical Boron is 1839 PPM [1825-1875] (See attached KEY).		
*19	If there is a delay of 1.5 hours past the current anticipated time of criticality, is the Estimated Critical Position valid? (Directed Action)	The operator reviews OP/0/A/6100/006 L&P 2.12 and determines the ECP is valid for ±2 hours from the time of the previously anticipated time of criticality. The operator recognizes that the previously anticipated time of criticality is 1 hour from now. Applying L&P 2.12 permits the Rx criticality to occur from now until 3 hours from now. Consequently, if the Rx is made critical at 2.5 hours from now, the ECP is still valid.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A1a RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- Unit 1 startup in progress per OP/1/A/6100/001 (Controlling Procedure for Unit Startup).
- All steps are complete up to determining the desired estimated critical rod height.
- Performance of the estimated critical rod height determination has resulted in the need to perform Enclose 4.1 (Estimated Critical Boron Concentration) of OP/0/A/6100/006 (Reactivity Balance Calculation).
- The Unit tripped from 30% power, 70 hours ago.
- The following Cycle 26 conditions exist:
  - EFPD = 4
  - NC Boron = 1863 PPM
  - Xenon Worth = 0 PCM
- Samarium = - 150 PCM
- It is intended to pull rods to criticality with criticality achieved in 1 hour.
- The desired critical rod position is Bank C at 100 Steps.
- The OAC and REACT Program are unavailable.

INITIATING CUE:

- The CRS has directed you to perform an Estimated Critical Boron Concentration per Enclosure 4.1 (Estimated Critical Boron Concentration) of OP/0/A/6100/006 (Reactivity Balance Calculation).
- If there is a delay of 1.5 hours past the current anticipated time of criticality, is the Estimated Critical Position valid?

JPM A1b RO

Facility:	McGuire	Task No.:	
Task Title:	Calculate QPTR with an Inoperable Power Range Instrument	JPM No.:	2018 Admin – JPM A1b RO
K/A Reference:	2.1.7 (4.4)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: __X__

Classroom __X__ Simulator ______ Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts 1-2.

Initial Conditions:

- At 0000 the Unit 1 OAC failed and is not operating.
- The vendor is being consulted concerning repairs.
- It is estimated it will take approximately 15 hours to complete repairs.
- On unit 1 at 0600 Power Range N41 upper detector failed.
- An attempt to use the Moveable Incore Detector System to determine QPTR has failed due to a failure of the main incoming breaker.
- A breaker is on order and will not be on site for seven to ten days.
- Unit 1 power has been reduced to 74%.
- Power Range N41 has been declared inoperable and removed from service by procedure.

Initiating Cue:

- The CRS has directed you to calculate QPTR in accordance with Step 12.16 of PT/1/A/4600/21A, Loss of Operator Aid Computer while in Mode 1. (Determine all calculations to two (2) decimal places)
- Based on your calculation, identify all additional Technical Specification LCOs, if any, that are NOT met.

Task Standard:	The operator will calculate the QPTR (Per Attached Key) and determine that Technical Specification LCO 3.2.4 is not met.
Required Materials:	Calculator McGuire Technical Specifications should be available to the operator
General References:	PT/1/A/4600/021A (Loss of Operator Aid Computer while in Mode 1), Rev 41 OP/1/A/6100/022 (Unit 1 Data Book), Rev 481 McGuire Technical Specifications (LCO 3.2.4/Amendment 184/166)
Handouts:	Handout 1: PT/1/A/4600/021A (Loss of Operator Aid Computer while in Mode 1) marked up to step 12. Handout 2: OP/1/A/6100/022 (MNS Unit #1 Data Book), Enclosure 4.3, Table 2.2 (Excore Currents and Voltages Correlated to 100% Full Power at Various Axial Offsets) – Unit 1 Cycle 26
Time Critical Task:	NO
Validation Time:	20 minutes

Critical Step Justification	
Step 4	This step is critical because recording the correct amperage reading for each detector is necessary to calculate the QPTR.
Step 5	This step is critical because recording the correct calibration current is necessary to calculate the QPTR.
Step 6	This step is critical because calculating and recording the average RF is necessary to calculate the QPTR.
Step 7	This step is critical because calculating and recording the average RF for the A Detectors is necessary to calculate the QPTR.
Step 8	This step is critical because calculating and recording the average RF for the B Detectors is necessary to calculate the QPTR.
Step 9	This step is critical because calculating the PR-42A Tilt is necessary to calculate the QPTR.
Step 10	This step is critical because calculating the PR-42B Tilt is necessary to calculate the QPTR.
Step 11	This step is critical because calculating the PR-43A Tilt is necessary to calculate the QPTR.
Step 12	This step is critical because calculating the PR-43B Tilt is necessary to calculate the QPTR.
Step 13	This step is critical because calculating the PR-44A Tilt is necessary to calculate the QPTR.
Step 14	This step is critical because calculating the PR-44B Tilt is necessary to calculate the QPTR.
Step 15	This step is critical because comparing each Detector's calculated Tilt to the TS LCO limit of $\leq$ 1.02 and determining that at least one quadrant is >1.02 is necessary determine that Technical Specification LCO 3.2.4 is not met.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts 1-2.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
1	(Step 12.16) IF QPTR Alarm inoperable AND greater than 50% RTP, perform the following: (Step 12.16.1) If all Power Range (PR) channel inputs to QPTR operable, ……	The operator determines from initial conditions QPTR Alarm is inoperable, Unit 1 is at 100% power and all PR channels are NOT operable. The operator recognizes that this is not the case and continues.		
2	(Step 12.16.2) IF input from one PR channel is inoperable, perform the following: (Step 12.16.2.1) IF less than 75% RTP, perform the following: Calculate QPTR on Enclosure 13.5 (Calculation Sheet For Quadrant Power Tilt) Part B using other 3 PR channels. Record PR channels used within 12 hours and every 12 hours thereafter until QPTR Alarm operable or inoperable PR input operable.	The operator proceeds to Enclosure 13.5 (Calculation Sheet for Quadrant Power Tilt) Part B.		
3	(Enclosure 13.5 Part B) Complete the Form	The operator enters the current Date and Time at the top of the form.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*4	(Enclosure 13.5 Part B) Measured Current - From NI cabinet's current meter (located on respective PRB Drawers). Ensure Detector Milliamp Range Switches are in "0.5" position and read 0-500 microamp scale.	The operator identifies the three operable Power Range Instruments as PR-42, PR-43 and PR-44 on Enclosure 13.5, Part B. The operator records the correct amperage reading for each detector (From the JPM Cue Page) in the **Measured Current** row for each of the six (6) detectors as follows: PR-42A = **296** PR-42B = **312** PR-43A = **299** PR-43B = **315** PR-44A = **299** PR-44B = **308**		
*5	(Enclosure 13.5 Part B) Calibration Current - From most recent calibration data using "0" Incore Axial Offset Current in Data Book, Table 2.2 ("IT" for detector "A", "IB" for detector "B").	The operator locates OP/1/A/6100/022, Enclosure 4.3, Table 2.2, Excore Currents and Voltages Correlated to 100% Full Power at Various Axial Offsets. The operator records the correct calibration current (Table 2.2) in the **Calibration Current** row for each of the six (6) detectors as follows: PR-42A = **135.2** PR-42B = **150.9** PR-43A = **141.5** PR-43B = **164.8** PR-44A = **137.7** PR-44B = **164.6**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*6	(Enclosure 13.5 Part B) Relative Flux (RF) – Divide line 1 by line 2 to calculate Relative Flux (RF) for each upper (A) and lower (B) detector.	The operator correctly calculates the average RF and records the in the **Relative Flux (RF)** row for each of the six (6) detectors as follows: PR-42A = 296/135.2 = **2.19** (2.18-2.19) PR-42B = 312/150.9 = **2.07** (2.06-2.07) PR-43A = 299/141.5 = **2.11** (2.11-2.12) PR-43B = 315/164.8 = **1.91** (1.91-1.92) PR-44A = 299/137.7 = **2.17** (2.17-2.18) PR-44B = 308/164.6 = **1.87** (1.87-1.88)		
*7	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. Avg RF of A Detectors	The operator records the RF of each of the three (3) A detectors and calculates the Avg RF of A Detectors as follows: **(2.19+2.11+2.17)/3 = 2.16** (2.153-2.163)		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*8	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. Avg RF of B Detectors	The operator records the RF of each of the three (3) B detectors and calculates the Avg RF of B Detectors as follows: **(2.07+1.91+1.87)/3 = 1.95** (1.946-1.957)		
*9	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. PR-42A Tilt	The operator calculates the PR-42A Tilt as follows: **2.19/2.16 = 1.01** (1.007-1.017) And records this value.		
*10	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. PR-42B Tilt	The operator calculates the PR-42B Tilt as follows: **2.07/1.95 = 1.06** (1.052-1.064) And records this value.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*11	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. PR-43A Tilt	The operator calculates the PR-43A Tilt as follows: **2.11/2.16 = 0.98** (0.975-0.985) And records this value.		
*12	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. PR-43B Tilt	The operator calculates the PR-43B Tilt as follows: **1.91/1.95 = 0.98** (0.975-0.987) And records this value.		
*13	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. PR-44A Tilt	The operator calculates the PR-44A Tilt as follows: **2.17/2.16 = 1.00** (1.005-1.013) And records this value.		
*14	(Enclosure 13.5 Part B) Quadrant Power Tilts: Calculate by dividing each upper relative flux by the average upper relative flux and dividing each lower relative flux by the average lower relative flux. PR-44B Tilt	The operator calculates the PR-44B Tilt as follows: **1.87/1.95 = 0.96** (0.950-0.966) And records this value.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*15	(Technical Specification 3.2.4) The QPTR shall be ≤ 1.02.	The operator compares each Detector's calculated Tilt to the TS LCO limit of ≤ 1.02 and determines that at least one quadrant is >1.02 and • Refers to LCO 3.2.4 OR • Informs the CRS of the condition.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A1b RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

KEY:

Part B Page 3 of 4

	PR-42		PR-43		PR-44	
	A	**B**	**A**	**B**	**A**	**B**
Measured Current	296	312	299	315	299	308
Calibration Current	135.2	150.9	141.5	164.8	137.7	164.6
Relative Flux (RF)	2.19 (2.18-2.19)	2.07 (2.06-2.07)	2.11 (2.11-2.12)	1.91 (1.91-1.92)	2.17 (2.17-2.18)	1.87 (1.87-1.88)

Part B Page 4 of 4

Avg RF of A Detectors = 2.19 (2.18-2.19) + 2.11 (2.11-2.12) + 2.17 (2.17-2.18) = 2.16 (2.153-2.163)

Avg RF of B Detectors = 2.07 (2.06-2.07) + 1.91 (1.91-1.92) + 1.87 (1.87-1.88) = 1.95 (1.946-1.957)

PR-42A Tilt RFA = RF of PR-42A = $\frac{2.19}{2.16}$ 1.01 (1.007-1.017)

PR-42B Tilt RFB = RF of PR-42B = $\frac{2.07}{1.95}$ 1.06 (1.052-1.064)

PR-43A Tilt RFA = RF of PR-43A = $\frac{2.11}{2.16}$ .98 (0.975-0.985)

PR-43B Tilt RFB = RF of PR-43B = $\frac{1.91}{1.95}$ 0.98 (0.975-0.987)

PR-44A Tilt RFA = RF of PR-44A = $\frac{2.17}{2.16}$ 1.00 (1.005-1.013)

PR-44B Tilt RFB = RF of PR-44B = $\frac{1.87}{1.95}$ 0.96 (0.950-0.966)

INITIAL CONDITIONS:

- At 0000 the Unit 1 OAC failed and is not operating.
- The vendor is being consulted concerning repairs.
- It is estimated it will take approximately 15 hours to complete repairs.
- On unit 1 at 0600 Power Range N41 upper detector failed.
- An attempt to use the Moveable Incore Detector System to determine QPTR has failed due to a failure of the main incoming breaker.
- A breaker is on order and will not be on site for seven to ten days.
- Unit 1 power has been reduced to 74%.
- Power Range N41 has been declared inoperable and removed from service by procedure.

INITIATING CUE:

- The CRS has directed you to calculate QPTR in accordance with Step 12.16 of PT/1/A/4600/21A, Loss of Operator Aid Computer while in Mode 1. (Determine all calculations to two (2) decimal places)
- Based on your calculation, identify all additional Technical Specification LCOs, if any, that are NOT met.

The following Detector Currents are observed on the NI cabinet current meters:

NI-41 detector:

A (left) 0

B (right) 0

NI-42 detector:

A (left) 296

B (right) 312

NI-43 detector:

A (left) 299

B (right) 315

NI-44 detector:

A (left) 299

B (right) 308

JPM A2 RO

Facility:	McGuire	Task No.:	
Task Title:	Determine Leak Isolation Boundaries	JPM No.:	2018 Admin – JPM A2 RO
K/A Reference:	2.2.41 (3.5)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:	• Unit 1 is operating at 100% power. • The A Train of KC is operating. • Suspecting a KC System leak the crew entered AP/1/A/5500/21, Loss of KC or KC System Leakage. • An AO has just reported that there is a piping leak on the pressure side of 1KC-858 (Train A Surge Tank Riser Line Vent).

Initiating Cue:	The CRS has directed you to: • Identify the closest leak isolation boundary valves for this leak. • Identify which, if any, of these valves need to be re-positioned from their current position. • Identify the Breaker for any electrically operated leak isolation boundary valve that may need to be operated.

Task Standard: The operator will review the Flow Diagram of Component Cooling System (KC) and determine the closest leak isolation boundary valves for this leak, locate and review OP/1/A/6400/005A and determine the boundary valves that need to be re-positioned and identify the Breaker for 1KC-1A and 3A in accordance with the Attached KEY.

Required Materials: None

General References: AP/1/A/5500/21 (Loss of KC or KC System Leakage), Rev 10

OP/1/A/6200/005 (Component Cooling Water System), Rev 105

OP/1/A/6200/005 A (Component Cooling Water System Valve and Power Supply Checklists), Rev 31

MNS Drawing MCFD-1573-01.00 (Flow Diagram of Component Cooling System (KC)), Rev 13

MNS Drawing MCFD-1573-01.01 (Flow Diagram of Component Cooling System (KC)), Rev 12

MNS Drawing MCFD-1573-02.00 (Flow Diagram of Component Cooling System (KC)), Rev 6

MNS Drawing MCFD-1573-02.01 (Flow Diagram of Component Cooling System (KC)), Rev 1

MNS Drawing MCFD-1573-02.02 (Flow Diagram of Component Cooling System (KC)), Rev 4

MNS Drawing MCFD-1573-03.00 (Flow Diagram of Component Cooling System (KC)), Rev 12

MNS Drawing MCFD-1573-03.01 (Flow Diagram of Component Cooling System (KC)), Rev 8

MNS Drawing MCFD-1573-04.00 (Flow Diagram of Component Cooling System (KC)), Rev 15

Handouts: Handout 1: Series of MNS Drawings - Flow Diagram of Component Cooling System (KC)

Time Critical Task: NO

Validation Time: 15 minutes

Critical Step Justification	
Step 1	This step is critical because reviewing the KC Flow Diagram and determining the closest leak isolation boundary valves is necessary to complete the task.
Step 2	This step is critical because determining that all leak isolation valves must be re-positioned is necessary to complete the task.
Step 3	This step is critical because identifying the electrical breakers for valves requiring re-positioning is necessary to complete the task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(Directed Action) Identify the closest leak isolation boundary valves for this leak.	The operator will review the Flow Diagram of Component Cooling System (KC) and determine the closest leak isolation boundary valves for this leak are: • 1KC-1A, Trn 1A To AB Non Ess Ret Isol • 1KC-3A, Rx Bldg Non Ess Return Isol • 1KC-80, Essential Return Hdr 1A Block • 1KC-4, KC Pump 1A1 Suction • 1KC-7, KC Pump 1A2 Suction • 1KC-115, KC Surge Tank 1A Riser Lower Isolation See attached KEY		
*2	(Directed Action) Identify which, if any, of these valves need to be re-positioned from their current position.	The operator will review the Flow Diagram of Component Cooling System (KC) and/or locate and review OP/1/A/6400/005 A and determine that of these leak isolation boundary valves all of them must be re-positioned. See attached KEY		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	(Directed Action) Identify the Breaker for any electrically operated leak isolation boundary valve that may need to be operated.	The operator will locate and review OP/1/A/6400/005 A and determine that the Breaker for 1KC-1A is 1EMXA-F8A and 1KC-3A is 1EMXA-F8B. See attached KEY		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A2 RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

KEY:

Closest leak isolation boundary valves for this leak.	• **1KC-1A, Trn 1A To AB Non Ess Ret Isol** • **1KC-3A, Rx Bldg Non Ess Return Isol** • **1KC-80, Essential Return Hdr 1A Block** • **1KC-4, KC Pump 1A1 Suction** • **1KC-7, KC Pump 1A2 Suction** • **1KC-115, KC Surge Tank 1A Riser Lower Isolation**
Which, if any, leak isolation boundary valves need to be re-positioned from their current position.	• **1KC-1A, Trn 1A To AB Non Ess Ret Isol** • **1KC-3A, Rx Bldg Non Ess Return Isol** • **1KC-80, Essential Return Hdr 1A Block** • **1KC-4, KC Pump 1A1 Suction** • **1KC-7, KC Pump 1A2 Suction** • **1KC-115, KC Surge Tank 1A Riser Lower Isolation**
Breaker for any electrically operated leak isolation boundary valve that may need to be operated.	• **1KC-1A is 1EMXA-F8A** • **1KC-3A is 1EMXA-F8B**

INITIAL CONDITIONS:

- Unit 1 is operating at 100% power.
- The A Train of KC is operating.
- Suspecting a KC System leak the crew entered AP/1/A/5500/21, Loss of KC or KC System Leakage.
- An AO has just reported that there is a piping leak on the pressure side of 1KC-858 (Train A Surge Tank Riser Line Vent).

INITIATING CUE:

The CRS has directed you to:

- Identify the closest leak isolation boundary valves for this leak.
- Identify which, if any, of these valves need to be re-positioned from their current position.
- Identify the Breaker for any electrically operated leak isolation boundary valve that may need to be operated.

Closest leak isolation boundary valves for this leak.	
Which, if any, leak isolation boundary valves need to be re-positioned from their current position.	
Breaker for any electrically operated leak isolation boundary valve that may need to be operated.	

JPM A3 RO

Facility:	McGuire	Task No.:	
Task Title:	Determine Allowable Exposure	JPM No.:	2018 Admin – JPM A3 RO
K/A Reference:	2.3.4 (3.2)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM).

Initial Conditions:

- Following a LOCA, the plant has established Cold Leg Recirculation.
- You an available operator assigned to the Operational Support Center (OSC).
- Your current Annual Total Effective Dose Equivalent (TEDE) is 1742 mrem.
- 688 mrem was received at Oconee Nuclear Plant supporting a Refueling Outage earlier this year.
- You have not received any dose limit extensions.
- Normal dose limitations are in effect.
- You have been assigned a task that will take you into a High Radiation Area for 10 minutes to perform a repetitive task.
- The general area dose rate in the area where the task must be performed is 130 mrem/hour.
- It is estimated that 5 mrem round-trip exposure would be received per transit in and out of the repetitive task area.

Initiating Cue:	The Shift Manager has directed you to: • Determine the estimated exposure each time the repetitive task is performed, including estimated transit exposure; and • Based on your above answer, determine the maximum number of times you can perform the repetitive task without requiring an exposure limit extension. • If an exposure extension is required and accumulated dose will not exceed 4500 mrem TEDE, identify which position(s) (i.e. who?) is required to approve the extension.
Task Standard:	The operator will determine that 26.66 [+0.33, -0] mrem will be obtained each time the task is performed and predict that the assigned task can be performed no more than 9 times without requiring an exposure limit extension. Then, the operator will determine that an extension to 4500 mrem must be approved by the Shift Manager and the RPM.
Required Materials:	Calculator
General References:	TE-RP-ALL-4000 (Exposure Extension and Reduction), Rev 2 PD-RP-ALL-0001 (Radiation Worker Responsibilities), Rev 7
Handouts:	None
Time Critical Task:	NO
Validation Time:	15 minutes

Critical Step Justification	
Step 1	This step is critical because determining the exposure received while performing the task once is necessary to correctly complete the assigned task.
Step 2	This step is critical because determining the number of times that the task can be performed without requiring an exposure extension is necessary to correctly complete the assigned task.
Step 3	This step is critical because identifying that the SM and RPM approval is required to extend dose limits to 4500 mrem is necessary to correctly complete the assigned task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM).

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	Determine the estimated exposure each time the repetitive task is performed, including estimated transit exposure. (Directed Action)	The operator recognizes that the general area doserate in the area where the task is to be performed is 130 mrem/hour. The operator recognizes that the task to be performed will require entry into the High Radiation Area for 10 minutes. The operator recognizes that the dose accrued while transiting to and from the area to perform the task is 5 mrem. The operator calculates that the exposure received in performing the task once is 26.66 [+.33, -0] mrem. *([130 mrem/hour 1 hour/60 minutes x 10 minutes/task] + 5mrem transit exposure = 26.66 mrem per task performance)*		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*2	Based on your above answer, determine the maximum number of times you can perform the repetitive task without requiring an exposure limit extension. (Directed Action)	The operator recognizes that the current TEDE includes all Duke and non-Duke current year occupational radiation exposure (Definition 3.1 of TE-RP-ALL-4000). The operator recognizes that their current Annual Total Effective Dose Equivalent (TEDE) is 1742 mrem and that 258 mrem is available without requesting and approving an exposure limit extension (Definition 3.3 of TE-RP-ALL-4000). The operator calculates that the task can be performed a MAXIMUM of 9 times without requesting an exposure limit extension. *([258 mrem available ÷ 26.66 [+.33, -0] mrem per task performance = 9.59 tasks)*		
*3	If an exposure extension is required and accumulated dose will not exceed 4500 mrem TEDE, identify which position(s) (i.e. who?) is required to approve the extension. (Directed Action)	The operator determines that all dose extensions beyond 2000 mrem but less than 4500 mrem require the Requesting (SM) Manager and the RPM approval. (Section 7.1.6 of TE-RP-ALL-4000)		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

Job Performance Measure No.: 2018 Admin – JPM A3 RO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- Following a LOCA, the plant has established Cold Leg Recirculation.
- You an available operator assigned to the Operational Support Center (OSC).
- Your current Annual Total Effective Dose Equivalent (TEDE) is 1742 mrem.
- 688 mrem was received at Oconee Nuclear Plant supporting a Refueling Outage earlier this year.
- You have not received any dose limit extensions.
- Normal dose limitations are in effect.
- You have been assigned a task that will take you into a High Radiation Area for 10 minutes to perform a repetitive task.
- The general area dose rate in the area where the task must be performed is 130 mrem/hour.
- It is estimated that 5 mrem round-trip exposure would be received per transit in and out of the repetitive task area.

INITIATING CUE:

The Shift Manager has directed you to:

- Determine the estimated exposure each time the repetitive task is performed, including estimated transit exposure; and
- Based on your above answer, determine the maximum number of times you can perform the repetitive task without requiring an exposure limit extension.
- If an exposure extension is required and accumulated dose will not exceed 4500 mrem TEDE, identify which position(s) (i.e. who?) is required to approve the extension.

<u>JPM A1a SRO</u>

Facility:	McGuire	Task No.:	
Task Title:	Perform/Review a Manual NC Leakage Calculation	JPM No.:	2018 Admin – JPM A1a SRO
K/A Reference:	2.1.25 (4.2)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ________

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue, and associated Datasheet (Last two (2) Pages of this JPM); and Handouts 1-4.

Initial Conditions:

- Unit 1 is at 100% power.
- The Unit 1 OAC point M1L4554 (U1 Unidentified Leakage > 1 GPM in CONT) is out of service.
- PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that total NCS Leakage is 1.6 gpm.
- A manual NC System leakage calculation is in progress in accordance with PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
- Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) has been completed through Step 1.9.
- The NI to NV Bleed line is NOT in service.

Initiating Cue:

- Using Enclosure 13.2 (NC Leakage Determination Using Manual Calculations), AND the attached Datasheet, complete the NC System Leakage Calculation, through Step 1.11.
- Identify all required action(s), if any, that apply as a result of the NC Leakage Calculation.

Task Standard:	The operator will complete all calculations in accordance with the provided Key, identify that the Unidentified RCS Leakage Technical Specification has been exceeded, and the required ACTION.
Required Materials:	Calculator
General References:	PT/1/A/4200/040 (Reactor Coolant Leakage Detection), Rev 15 OP/1/A/6150/004 (Pressurizer Relief Tank), Rev 58 OP/1/A/6500/001 (Liquid Waste System), Rev 99 PT/1/A/4150/001B (Reactor Coolant Leakage Calculation), Rev 97 McGuire Unit 1 Technical Specifications (LCO 3.4.13, Operational Leakage), Amendment 237
Handouts:	Handout 1: PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) marked up for this JPM. Handout 2: PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) Enclosure 13.2 (NC Leakage Determinations Using Manual Calculations) marked up for this JPM. Handout 3: Enclosure 13.3 (NCDT Volume) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) Handout 4: Enclosure 13.4 (PRT Volume) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
Time Critical Task:	NO
Validation Time:	40 minutes
NOTE:	An Answer KEY is provided as a separate document.

Critical Step Justification	
Step 1	This step is critical because recording the correct plant data is necessary to complete all calculations in accordance with the provided Key.
Step 2	This step is critical because determining that the change in NCS Tave during the surveillance is < 0.25°F is necessary to determine that the surveillance is valid.
Step 3	This step is critical because determining the correct VCT leakage Rate is necessary to determine Total NCS Leakage.
Step 4	This step is critical because determining the correct PZR leakage Rate is necessary to determine Total NCS Leakage.
Step 5	This step is critical because determining the Total NCS Leakage is necessary to complete all calculations in accordance with the provided Key.
Step 6	This step is critical because determining the change in PRT volume is necessary to determine Total PRT Leakage.
Step 7	This step is critical because determining the correct PRT leakage Rate is necessary to complete all calculations in accordance with the provided Key.
Step 8	This step is critical because determining the change in NCDT volume is necessary to determine Total NCDT Leakage.
Step 9	This step is critical because determining the correct NCDT leakage Rate is necessary to complete all calculations in accordance with the provided Key.
Step 10	This step is critical because calculating the Identified Leakage is necessary to complete all calculations in accordance with the provided Key.
Step 11	This step is critical because calculating the Unidentified Leakage is necessary to complete all calculations in accordance with the provided Key.
Step 12	This step is critical because calculating the Total NC Pumps #1 Seal Leakoff is necessary to complete all calculations in accordance with the provided Key.
Step 13	This step is critical because calculating the Total Accumulative Leakage is necessary to complete all calculations in accordance with the provided Key.
Step 15	This step is critical because reporting that LCO 3.4.13 has been exceeded and identifying that Condition A of TS LCO 3.4.13 is met, is necessary to identify that the Unidentified RCS Leakage Technical Specification has been exceeded, and the required ACTION.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue, and associated Datasheet (Last two (2) Pages of this JPM); and Handouts 1-4.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(Enclosure 13.2, Steps 1.10.1 through 6, 8 through 13, 22, 23, 26 and 1.11.1) Record raw data.	The operator transposes raw data from the Data Sheet provided.		
*2	(Enclosure 13.2, Step 1.10.14) Calculate change in NC System Tave:	The operator calculates the change in NC System Tave to be -**0.1ºF**, and records.		
*3	(Enclosure 13.2, Step 1.10.15) Calculate VCT Leakage Rate:	The operator calculates the VCT Leakage Rate to be **4.37 (4.3-4.4) gpm**, and records.		
*4	(Enclosure 13.2, Step 1.10.16) Calculate PZR Leakage Rate:	The operator calculates the PZR Leakage Rate to be **0.99 (0.9-1.0) gpm**, and records.		
*5	(Enclosure 13.2, Step 1.10.17) Calculate Total Leakage:	The operator calculates the Total Leakage to be **5.36 (5.2-5.4) gpm**, and records.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*6	(Enclosure 13.2, Step 1.10.18) Using Enclosure 13.4 (PRT Volume), record the following: Initial PRT Volume Final PRT Volume	The operator uses Enclosure 13.4 and an initial PRT Level of 79.0 %, and determines that initial PRT Volume is **11034.1 gal**, and records. The operator uses Enclosure 13.4 and a final PRT Level of 80.0 %, and determines that final PRT Volume is **11163.3 gal**, and records.		
*7	(Enclosure 13.2, Step 1.10.19) Calculate PRT Leakage Rate:	The operator calculates the PRT Leakage Rate to be **1.79 (1.7-1.8) gpm**, and records.		
*8	(Enclosure 13.2, Step 1.10.20) Using Enclosure 13.3 (NCDT Volume), record the following: Initial NCDT Volume Final NCDT Volume	The operator uses Enclosure 13.3 and an initial NCDT Level of **51%**, and determines that initial NCDT Volume is **180.2 gal**, and records. The operator uses Enclosure 13.3 and a final NCDT Level of **56%**, and determines that final NCDT Volume is **198.2 gal**, and records.		
*9	(Enclosure 13.2, Step 1.10.21) Calculate NCDT Leakage Rate:	The operator calculates the NCDT Leakage Rate to be **.25 (0.2-0.3) gpm**, and records.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*10	(Enclosure 13.2, Step 1.10.24) Calculate Corrected Identified Leakage:	The operator calculates the Identified Leakage to be **2.04 (1.9-2.1) gpm**, and records.		
*11	(Enclosure 13.2, Step 1.10.25) Calculate Unidentified Leakage:	The operator calculates the Unidentified Leakage to be **3.32 (3.1-3.5) gpm**, and records.		
*12	(Enclosure 13.2, Step 1.10.26) Determine Total NC Pump #1 Seal Leakoff flow:	The operator calculates the Total NC Pumps #1 Seal Leakoff to be **13.75 (13.70-13.80) gpm**, and records.		
*13	(Enclosure 13.2, Step 1.10.27) Calculate Total Accumulative Leakage:	The operator calculates the Total Accumulative Leakage to be **18.86 (18.5-19.2) gpm**, and records. **Examiner NOTE:** **The allowable band is 18.5-19.2. Although the Acceptance Criteria is listed as 19 gpm, this criteria is modified by Note 3 to 20 gpm since the NI to NV Bleed line is NOT in service.**		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
14	(Enclosure 13.2) Calculated By/ Date/Time:	The operator places their name in the Calculated by BLOCK, and signs. The operator enters the Date and Time.		
*15	Technical Specification LCO 3.4.13: RCS operational LEAKAGE shall be limited to: a. No pressure boundary LEAKAGE; b. 1 gpm unidentified LEAKAGE; c. 10 gpm identified LEAKAGE; d. 389 gallons per day total primary to secondary LEAKAGE through all steam generators (SGs); and e. 135 gallons per day primary to secondary LEAKAGE through any one steam generator (SG). APPLICABILITY: MODES 1, 2, 3, and 4.	The operator returns the completed Enclosure 13.2 and reports that LCO 3.4.13 has been exceeded because there is greater than 1 gpm unidentified LEAKAGE. The operator identifies that CONDITION A is met, RCS Operational LEAKAGE not within limits for reasons other than pressure boundary LEAKAGE or primary to secondary LEAKAGE; AND that the REQUIRED ACTION is to Reduce LEAKAGE to within limits, within 4 hours. **Examiner NOTE:** **See provided KEY.**		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A1a SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

Data Sheet

Start Time	**0900**	[redacted]
Stop Time	**1012**	
[redacted]		
	Initial	**Final**
VCT Level	**57.6**	**41.3**
Pzr Level	**55.2**	**54.3**
NC Tave (From OAC)	**585.1**	**585.0**
PRT Level	**79.0**	**80.0**
NCDT Level	**51**	**56**
[redacted]		
NC Sample Purge Flow value recorded in Narrative Log		**0**
Any quantified (measured) leakage that has been identified		**0**
[redacted]		
NC Pump 1A #1 Seal Leakoff Flow		**3.1**
NC Pump 1B #1 Seal Leakoff Flow		**3.4**
NC Pump 1C #1 Seal Leakoff Flow		**3.8**
NC Pump 1D #1 Seal Leakoff Flow		**3.2**
[redacted]		
1EMF71 Reading		**1.5**
1EMF72 Reading		**1.3**
1EMF73 Reading		**1.7**
1EMF74 Reading		**1.1**

INITIAL CONDITIONS:

- Unit 1 is at 100% power.
- The Unit 1 OAC point M1L4554 (U1 Unidentified Leakage > 1 GPM in CONT) is out of service.
- PT/1/A/4200/040 (Reactor Coolant Leakage Detection) has been completed showing that total NCS Leakage is 1.6 gpm.
- A manual NC System leakage calculation is in progress in accordance with PT/1/A/4150/001B (Reactor Coolant Leakage Calculation)
- Enclosure 13.2 (NC Leakage Determination Using Manual Calculations) of PT/1/A/4150/001B (Reactor Coolant Leakage Calculation) has been completed through Step 1.9.
- The NI to NV Bleed line is NOT in service.

INITIATING CUE:

- Using Enclosure 13.2 (NC Leakage Determination Using Manual Calculations), AND the attached Datasheet, complete the NC System Leakage Calculation, through Step 1.11.
- Identify all required action(s), if any, that apply as a result of the NC Leakage Calculation.

JPM A1b SRO

Facility:	McGuire	Task No.:	
Task Title:	Determine License Status	JPM No.:	2018 Admin – JPM A1b SRO
K/A Reference:	2.1.4 (3.8)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM).

Initial Conditions:

- You are evaluating the work histories of three Licensed Senior Reactor Operators.
- All three have off-shift assignments at the plant, are current in License Operator Requalification Training, and have had a medical examination in the past 2 years.
- None of the 3 has worked any shift since 3/1/18.
- Active/Inactive status and time on shift since January 1, 2018 is as follows for each of the Senior Reactor Operators:
  (Work History Table Provided)

Initiating Cue:

- Determine if each of the Senior Reactor Operators is eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018.
- Record your answer below (yes or no). If no, explain why.

Task Standard: The operator will determine that SROs Tom Perry and Andy Miller are eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018; while SRO Charlie Ribal is NOT eligible because he did NOT work the required 5 complete twelve hour shifts in a qualifying license position during the previous quarter.

Required Materials: Calculator

General References: AD-OP-ALL-1000 (Conduct of Operations), Rev 9
NSD-512 (Maintenance of RO/SRO NRC Licenses), Rev 7

Handouts: None

Time Critical Task: NO

Validation Time: 15 minutes

Critical Step Justification	
Step 1	This step is critical because determining that Tom Perry is eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018 is necessary to complete the assigned Task.
Step 2	This step is critical because determining that Charlie Ribal is NOT eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018 is necessary to complete the assigned Task.
Step 3	This step is critical because determining that Andy Miller is eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018 is necessary to complete the assigned Task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM).

START TIME: ___________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	Determine the Active / Inactive status of Tom Perry's SRO License.	The operator locates and reviews the requirements of Section 512.7 of NSD 512, and determines that the license is <u>Active</u> because the operator worked the required 5 complete twelve hour shifts in a qualifying license position, including one as the CRS or SM, during the previous quarter (1/2, 1/3, 1/5, 1/6 and 2/14), and that **YES,** he is eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018.		
*2	Determine the Active / Inactive status of Charlie Ribal's SRO License.	The operator locates and reviews the requirements of Section 512.7 of NSD 512, and determines that the license is <u>Inactive</u> because the operator did NOT work the required 5 complete twelve hour shifts in a qualifying license position during the previous quarter (1/1, 1/3, 1/5, 1/14 ONLY), and that **NO,** he is NOT eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	Determine the Active / Inactive status of Andy Miller's SRO License.	The operator locates and reviews the requirements of Section 512.8 of NSD 512, and determines that the license is <u>active</u> because activation occurred in the previous quarter; and that **YES,** he is eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A1b SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT ______

Examiner's Signature: ______________________ Date: ______________

INITIAL CONDITIONS:

- You are evaluating the work histories of three Licensed Senior Reactor Operators.
- All three have off-shift assignments at the plant, are current in License Operator Requalification Training, and have had a medical examination in the past 2 years.
- None of the 3 has worked any shift since 3/1/18.
- Active/Inactive status and time on shift since January 1, 2018 is as follows for each of the Senior Reactor Operators:

Tom Perry	**License was active on January 1, 2018.**	
	1/2/18	Worked 0700-1900 shift as CRS.
	1/3/18	Worked 0700-1900 shift as the Unit 1 OATC.
	1/4/18	Worked 0700-1900 shift as Unit 1 Plant SRO
	1/5/18	Worked 0700-1900 shift as the Unit 2 BOP.
	1/6/18	Worked 0700-1900 shift as Unit 2 OATC.
	2/14/18	Worked 1900-0700 shift as Unit 2 BOP.
	2/17/18	Worked 1900-0700 shift as Unit 2 STA.
Charlie Ribal	**License was active on January 1, 2018.**	
	1/1/18	Worked 0700-1900 shift as CRS.
	1/2/18	Worked 0700-1500 shift as CRS.
	1/3/18	Worked 0700-1900 shift as CRS.
	1/5/18	Worked 0700-1900 shift as CRS.
	1/14/18	Worked 1900-0700 shift as SM.
	2/2/18	Worked 0700-1900 shift as Unit 1 Plant SRO
Andy Miller	**License was inactive on January 1, 2018.**	
	1/5/18 thru 1/9/18 worked 40 hours under the direction of the CRS and completed all requirements for license reactivation.	
	2/12/18	Worked 0700-1900 shift as Unit 2 BOP.
	2/13/18	Worked 0700-1900 shift as Unit 2 BOP.
	2/15/18	Worked 0700-1900 shift as Unit 2 OATC.
	2/16/18	Worked 1900-0700 shift as Unit 1 BOP.
	2/21/18	Worked 1900-0700 shift as Unit 1 OATC.

INITIATING CUE:

- Determine if each of the Senior Reactor Operators is eligible to work the CRS position on the 0700 - 1900 shift on April 30, 2018.
- Record your answer below (yes or no). If no, explain why.

Tom Perry: ______________________

Charlie Ribal: ______________________

Andy Miller: ______________________

<u>JPM A2 SRO</u>

Facility:	McGuire	Task No.:	
Task Title:	Determine Leak Isolation Boundaries	JPM No.:	2018 Admin – JPM A2 SRO
K/A Reference:	2.2.41 (3.9)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handout 1.

Initial Conditions:	• Unit 1 is operating at 100% power. • The A Train of KC is operating. • Suspecting a KC System leak the crew entered AP/1/A/5500/21, Loss of KC or KC System Leakage. • An AO has just reported that there is a piping leak on the pressure side of 1KC-858 (Train A Surge Tank Riser Line Vent).

Initiating Cue:	The CRS has directed you to: • Identify the closest leak isolation boundary valves for this leak. • Identify which, if any, of these valves need to be re-positioned from their current position. • Identify the Breaker for any electrically operated leak isolation boundary valve that may need to be operated. • Assuming the leak has been isolated, identify any required Technical Specification ACTION.

Task Standard:	The operator will review the Flow Diagram of Component Cooling System (KC) and determine the closest leak isolation boundary valves for this leak, locate and review OP/1/A/6400/005A and determine the boundary valves that need to be re-positioned, identify the Breaker for 1KC-1A and 3A, and identify that ACTION A.1 of Technical Specification LCO 3.7.6 must be taken in accordance with the Attached KEY.
Required Materials:	None
General References:	AP/1/A/5500/21 (Loss of KC or KC System Leakage), Rev 10 OP/1/A/6200/005 (Component Cooling Water System), Rev 105 OP/1/A/6200/005 A (Component Cooling Water System Valve and Power Supply Checklists), Rev 31 MNS Drawing MCFD-1573-01.00 (Flow Diagram of Component Cooling System (KC)), Rev 13 MNS Drawing MCFD-1573-01.01 (Flow Diagram of Component Cooling System (KC)), Rev 12 MNS Drawing MCFD-1573-02.00 (Flow Diagram of Component Cooling System (KC)), Rev 6 MNS Drawing MCFD-1573-02.01 (Flow Diagram of Component Cooling System (KC)), Rev 1 MNS Drawing MCFD-1573-02.02 (Flow Diagram of Component Cooling System (KC)), Rev 4 MNS Drawing MCFD-1573-03.00 (Flow Diagram of Component Cooling System (KC)), Rev 12 MNS Drawing MCFD-1573-03.01 (Flow Diagram of Component Cooling System (KC)), Rev 8 MNS Drawing MCFD-1573-04.00 (Flow Diagram of Component Cooling System (KC)), Rev 15 Technical Specification LCO 3.7.6, Component Cooling Water (CCW) System
Handouts:	Handout 1: Series of MNS Drawings - Flow Diagram of Component Cooling System (KC)
Time Critical Task:	NO
Validation Time:	20 minutes

Critical Step Justification	
Step 1	This step is critical because reviewing the KC Flow Diagram and determining the closest leak isolation boundary valves is necessary to complete the task.
Step 2	This step is critical because determining that all leak isolation valves must be re-positioned is necessary to complete the task.
Step 3	This step is critical because identifying the electrical breakers for valves requiring re-positioning is necessary to complete the task.
Step 4	This step is critical because recognizing that LCO 3.7.6 is NOT met and applying the required ACTION is necessary to complete the task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM) and Handout 1.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(Directed Action) Identify the closest leak isolation boundary valves for this leak.	The operator will review the Flow Diagram of Component Cooling System (KC) and determine the closest leak isolation boundary valves for this leak are: • 1KC-1A, Trn 1A To AB Non Ess Ret Isol • 1KC-3A, Rx Bldg Non Ess Return Isol • 1KC-80, Essential Return Hdr 1A Block • 1KC-4, KC Pump 1A1 Suction • 1KC-7, KC Pump 1A2 Suction • 1KC-115, KC Surge Tank 1A Riser Lower Isolation See attached KEY		
*2	(Directed Action) Identify which, if any, of these valves need to be re-positioned from their current position.	The operator will review the Flow Diagram of Component Cooling System (KC) and/or locate and review OP/1/A/6400/005 A and determine that of these leak isolation boundary valves all of them must be re-positioned. See attached KEY		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	(Directed Action) Identify the Breaker for any electrically operated leak isolation boundary valve that may need to be operated.	The operator will locate and review OP/1/A/6400/005 A and determine that the Breaker for 1KC-1A is 1EMXA-F8A and 1KC-3A is 1EMXA-F8B. See attached KEY		
*4	(Directed Action) Assuming the leak has been isolated, identify any required Technical Specification ACTION.	The operator recognizes that the valves required to be re-positioned will render the A Train of KC inoperable requiring that LCO 3.7.6 be evaluated. The operator reviews TS LCO 3.7.6 and recognizes that two CCW Trains must be OPERABLE in Modes 1-4. The operator recognizes that with the plant in Mode 1, and the A Train of KC inoperable, Condition A of TS LCO 3.7.6 is met; and that ACTION A.1 is required to be met within 72 hours. See attached KEY		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A2 SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

KEY:

Closest leak isolation boundary valves for this leak.	• **1KC-1A, Trn 1A To AB Non Ess Ret Isol** • **1KC-3A, Rx Bldg Non Ess Return Isol** • **1KC-80, Essential Return Hdr 1A Block** • **1KC-4, KC Pump 1A1 Suction** • **1KC-7, KC Pump 1A2 Suction** • **1KC-115, KC Surge Tank 1A Riser Lower Isolation**
Which, if any, leak isolation boundary valves need to be re-positioned from their current position.	• **1KC-1A, Trn 1A To AB Non Ess Ret Isol** • **1KC-3A, Rx Bldg Non Ess Return Isol** • **1KC-80, Essential Return Hdr 1A Block** • **1KC-4, KC Pump 1A1 Suction** • **1KC-7, KC Pump 1A2 Suction** • **1KC-115, KC Surge Tank 1A Riser Lower Isolation**
Breaker for any electrically operated leak isolation boundary valve that may need to be operated.	• **1KC-1A is 1EMXA-F8A** • **1KC-3A is 1EMXA-F8B**
Assuming the leak has been isolated, identify any required Technical Specification ACTION.	**Condition A of TS LCO 3.7.6 is met; and that ACTION A.1 is required to be met within 72 hours.**

INITIAL CONDITIONS:

- Unit 1 is operating at 100% power.
- The A Train of KC is operating.
- Suspecting a KC System leak the crew entered AP/1/A/5500/21, Loss of KC or KC System Leakage.
- An AO has just reported that there is a piping leak on the pressure side of 1KC-858 (Train A Surge Tank Riser Line Vent).

INITIATING CUE:

The CRS has directed you to:

- Identify the closest leak isolation boundary valves for this leak.
- Identify which, if any, of these valves need to be re-positioned from their current position.
- Identify the Breaker for any electrically operated leak isolation boundary valve that may need to be operated.
- Assuming the leak has been isolated, identify any required Technical Specification ACTION.

Closest leak isolation boundary valves for this leak.	
Which, if any, leak isolation boundary valves need to be re-positioned from their current position.	
Breaker for any electrically operated leak isolation boundary valve that may need to be operated.	
Assuming the leak has been isolated, identify any required Technical Specification ACTION.	

JPM A3 SRO

Facility:	McGuire	Task No.:	
Task Title:	Approve a Liquid Release Permit	JPM No.:	2018 Admin – JPM A3 SRO
K/A Reference:	2.3.6 (3.8)		

Examinee: NRC Examiner:

Facility Evaluator: Date:

Method of testing:

Simulated Performance: ______ Actual Performance: X

Classroom X Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue and List of Out-of-Service Equipment (Last Two Pages of this JPM), and Handouts 1-2.

Initial Conditions:	• Unit 1 and Unit 2 are in Mode 1 at 100% power. • There are no on-going liquid radiation releases. • Attachment 1 ('B' WMT Release Using 'B' WMT Pump) of OP/0/B/6200/607 (Liquid Waste Release – WMT 'B' with WMT Pump 'B') is in progress in preparation for release of the B Waste Monitor Tank. • Attachment 10 ('B' WMT Release Authorization) has been initiated. • RP has just delivered the LWR package # 2018067 to the Control Room. • All available RC Pumps are running.

Initiating Cue:	• You are directed to review and approve LWR Package # 2018067 by performing Steps 9-12 of Attachment 10 ('B' WMT Release Authorization) of OP/0/B/6200/607. • If LWR Package # 2018067 cannot be approved, identify why not.

Task Standard:	The operator will determine that LWR Package # 2018067 cannot be approved because the recommended Release Rate is GREATER THAN the Allowable Release Rate and 0EMF49 has NOT been source checked.
Required Materials:	Calculator
General References:	OP/0/B/6200/607 (Liquid Waste Release – WMT B With WMT Pump B), Rev 11 OP/1/A/6500/001 (Liquid Waste System), Rev 99
Handouts:	Handout 1: Attachment 10 (‘B’ WMT Release Authorization) of OP/0/B/6200/607 (Liquid Waste Release – WMT ‘B’ With WMT Pump ‘B’) marked up through Step 8. Handout 2: LWR Discharge Document (Adjusted such that Recommended Release Rate is > Allowable Release Rate (Reversed), and 0EMF49 Source Check Block is BLANK).
Time Critical Task:	NO
Validation Time:	15 minutes

Critical Step Justification	
Step 1	This step is critical because determining the operability/functionality of release instrumentation is necessary to determine whether or not LWR Package # 2018067 can be approved.
Step 3	This step is critical because evaluating LWR 2018067 is necessary to determine whether or not LWR Package # 2018067 can be approved.
Step 4	This step is critical because identifying the reasons why LWR 2018067 cannot be approved is necessary to complete the task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue and List of Out-of-Service Equipment (Last Two Pages of this JPM), and Handouts 1-2.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(Attachment 10, Step 9) Determine functionality status of the following components: 0WMLP5140 (B WMT Pump Disch Flow) Yes ☐ No ☐ 1WP-35 (WMT & VUCDT to RC Cntrl) Yes ☐ No ☐ 1WP-37 (Liquid Waste to RC Cntrl) Yes ☐ No ☐ 0EMF-49 (Liquid Waste Disch Radiation Monitor) Yes ☐ No ☐ 0WMFS5440 (0EMF49 Outlet Flow) [8.7.4] Yes ☐ No ☐	The operator reviews the equipment OOS List and determines that 0WMLP5140 is OPERABLE and checks YES. The operator reviews the equipment OOS List and determines that 1WP-35 is OPERABLE and checks YES. The operator reviews the equipment OOS List and determines that 1WP-37 is OPERABLE and checks YES. The operator reviews the equipment OOS List and determines that 0EMF49 is OPERABLE and checks YES. The operator reviews the equipment OOS List and determines that 0WMFS5440 is OPERABLE and checks YES.		
2	(Step 10) IF any component listed in Step 9 is NON-FUNCTIONAL, THEN…..	The operator recognizes that all required equipment is OPERABLE, and that this step is NA.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*3	(Step 11) Ensure the following items on LWR Document are complete: • Number of "RC Pumps Running" is greater than OR equal to "RC Pumps Assigned To This Release • "Number of "RC Pumps Running" is greater than OR equal to "Total RC Pumps Required (all concurrent releases)" • "Recommended Release Rate (GPM)" is less than "Allowable Release Rate (GPM)" • 0EMF-49L (Waste Liquid Low Range Radiation Monitor Module) is FUNCTIONAL AND in service. • 0EMF-49 (Liquid Waste Disch Radiation Monitor) source check performed. • "Expected CPM" is less than "TRIP 1 SETPOINT" AND "TRIP 2 SETPOINT". • Review of Special Instructions provided on LWR Permit. [8.7.12]	The operator recognizes that there are 7 RC Pumps operating which is greater than the 1RC pump required by LWR Package # 2018067. The operator recognizes that there are NO concurrent releases. The operator recognizes that the "Recommended Release Rate (gpm)" is **GREATER THAN** "Allowable Release Rate (gpm)" and determines that this must be corrected. The operator reviews the equipment OOS List and determines that 0EMF49 is OPERABLE, and in service. The operator reviews LWR paperwork and determines that 0EMF49 has **NOT** been source checked. The operator observes that the "Expected CPM" is less than "Trip 1 Setpoint" and "Trip 2 Setpoint". The operator reviews the Special Instructions provided on the LWR Permit, and determines that all Special Instructions are met (None).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*4	(Step 12) WHEN approved for release, THEN place signature, date, AND time of Control Room Supervisor authorization on LWR Document.	The operator does NOT initial Step 12, and identifies that LWR Package # 2018067 can **NOT** be approved until the "Recommended Release Rate (gpm)" is less than the "Allowable Release Rate (gpm)" and 0EMF49 has been source checked.		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A3 SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

Out-of-Service Equipment

Common Unit Equipment:

Fire Alarm Control Panel (FACP) – 2 (Admin Building) – Ongoing Testing
'A' NB Evaporator Feed Pump – Failed Bearing
0EMF43A (CR Air Intake A Rad Monitor) – Circuit Failure
SKSS Inverter – Ongoing Maintenance
0WMFT5130 (A Waste Monitor Tank Pump Disch Flow) – Failed transmitter
Fire Hydrant 10 (W of Main Shop) – Will Not Operate
0VSWT0001 (A VS Compressor Water Separator Water Trap) – Leaking Petcock

Unit 1:

Glycol Pump B – Ongoing Maintenance
MCB Annunciator 1AD-2, A8 (OTDT Runback / Rod Stop Alert) – Alarm does NOT function
1RNP 5360 (1A Component Cooling HX Outlet Flow) – Failed High
1B LLI Pump – Oil Level in Reduction Gear Low

Unit 2:

2RWS-13 (Raw Water Skid Coupon Rack A Influent) – Packing Leak
Fireworks FDS Zone 24 Smoke Detector (Unit 2 Seal Oil System) – Failed
2EMF44 (Cont Vent Drn Tank Rad Monitor) – Detector Failure
2C RC Pump – Motor Replacement
2TLP5010 (Stm Seal Header Press) – Failed Low

Note: All other equipment is OPERABLE/FUNCTIONAL.

INITIAL CONDITIONS:

- Unit 1 and Unit 2 are in Mode 1 at 100% power.
- There are no on-going liquid radiation releases.
- Attachment 1 ('B' WMT Release Using 'B' WMT Pump) of OP/0/B/6200/607 (Liquid Waste Release – WMT ‘B’ with WMT Pump ‘B’) is in progress in preparation for release of the B Waste Monitor Tank.
- Attachment 10 ('B' WMT Release Authorization) has been initiated.
- RP has just delivered the LWR package # 2018067 to the Control Room.
- All available RC Pumps are running.

INITIATING CUE:

- You are directed to review and approve LWR Package # 2018067 by performing Steps 9-12 of Attachment 10 (‘B’ WMT Release Authorization) of OP/0/B/6200/607.
- If LWR Package # 2018067 cannot be approved, identify why not.

JPM A4 SRO

Facility: McGuire

Task No.:

Task Title: <u>Provide an Updated PAR</u>

JPM No.: <u>2018 Admin – JPM A4 SRO</u>

K/A Reference: 2.4.44 (4.4)

Examinee:

NRC Examiner:

Facility Evaluator:

Date:

<u>Method of testing:</u>

Simulated Performance: ______ Actual Performance: __X__

Classroom __X__ Simulator ______ Plant ______

READ TO THE EXAMINEE

I will explain the initial conditions, which steps to simulate or discuss, and provide initiating cues. When you complete the task successfully, the objective for this Job Performance Measure will be satisfied.

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts 1-3.

Initial Conditions:

- Unit 1 is at 100% power.
- A LOCA inside containment has occurred on Unit 2.
- The Emergency Coordinator declared a General Emergency per RP/0/A/5700/000 (Classification of Emergency).
- An Emergency Release from Containment is in progress due to a piping penetration failure.
- An Emergency Notification Form, along with the initial PAR was sent at the appropriate time.
- This is NOT a Rapidly Progressing Severe Accident (RPSA)
- The following conditions exist 30 minutes after the start of the event:
    - The wind speed is 5 mph.
    - The wind direction is 291.6°.
- An RP Dose Assessment will be completed in 20 minutes.
- Security Reports that there are no security related events in progress, and site evacuation is progressing as expected.
- The Communicator is reporting that off-site agencies are reporting that evacuations are proceeding as expected.

Initiating Cue:	Due to a change in meteorological conditions, prepare an EXPANDED PAR and submit the Emergency Notification Form to the Emergency Coordinator for approval. **THIS IS A TIME CRITICAL JPM**

Task Standard: The operator will determine the Expanded PAR for the current conditions and complete the Emergency Power Plant Emergency Notification Form per the provided KEY within 15 minutes.

Required Materials: None

General References: RP/0/A/5700/000 (Classification of Emergency), Rev 29

RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room), Rev 23

McGuire Nuclear Station Classification of Emergency EAL Wallchart, Rev 29

Nuclear Power Plant Emergency Notification Form

Handouts: Handout 1: Blank Nuclear Power Plant Emergency Notification Form

Handout 2: RP/0/B/5700/029 (Notifications to Offsite Agencies from the Control Room)

Handout 3: Initial Emergency Notification Form previously completed to declare General Emergency based on EAL # FG1.1

Time Critical Task: YES-15 Minutes: According to Step 4.2.a of RP/0/B/5700/029, “Initial notifications to the State(s) AND counties must be made within 15 minutes of the event declaration using the ENF.” According to Step 4.2.b of RP/0/B/5700/029, any change in PAR is considered an Initial Notification.

Validation Time: 14 minutes

Critical Step Justification	
Step 1	This step is critical because determining that an Expanded PAR is required is necessary to complete the assigned task.
Step 2	This step is critical because determining that a Hostile Action Based event is NOT in progress is necessary to complete the assigned task.
Step 3	This step is critical because determining that a known offsite impediment to evacuation is NOT in progress is necessary to complete the assigned task.
Step 4	This step is critical because determining that a short-term release is NOT in progress is necessary to complete the assigned task.
Step 5	This step is critical because determining that GE Conditions still exist is necessary to complete the assigned task.
Step 6	This step is critical because using Table 1 with a wind direction of 291.6^{o} is necessary to complete the assigned task.
Step 7	This step is critical because determining that Offsite Projected Dose projections or field measurements that exceeded PAGs, have NOT been made is necessary to complete the assigned task.
Step 8	This step is critical because completing the ENF is necessary to complete the assigned task.

(Denote Critical Steps with an asterisk*)

Provide Candidate with Initial Conditions/Cue (Last Page of this JPM), and Handouts 1-3.

START TIME: ____________

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*1	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) Continuous Assessment Evaluate PAR based on changes in any of the following: • Increase in dose assessment projected values • Increase in field team measured values • Shift in 15-minute average wind direction resulting in additional sectors being affected (Table 3 on page 3) • Offsite Agencies provides information that offsite impediments no longer exist • Hostile action based event has been terminated • IF RPSA, when safer to do so consider evacuation of SIP PAZs based upon radiological assessment and discussions with Offsite Agencies	Using Page 2 of 4 of Attachment 3, the operator enters the Flowchart from the Initial PAR. By comparing the sectors evacuated during the initial PAR, and the sectors required for wind direction 291.6, the operator recognizes that there has been a shift in the 15-minute average wind direction resulting in additional sectors being affected.		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*2	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) Is this a Hostile Action Based event in progress?	The operator recognizes that there is NOT a Hostile Action Based event in progress, and proceeds (Initial Conditions).		
*3	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) Is there a known offsite impediment to evacuation? (See Note 2: Offsite Agencies have provided prior knowledge of offsite impediments to evacuation (such as flooding, bridge/road closure, adverse weather, traffic control not in place, etc.) AND specifically requested that the site NOT issue an evacuation PAR)	The operator recognizes that there is NOT a known offsite impediment to evacuation, and proceeds (Initial Conditions).		
*4	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) Is this a short-term release in progress? (See Note 3: A short-term release is one that can be accurately projected to be < three hours and controlled by the licensee. This consideration would typically apply to controlled venting of containment).	The operator recognizes that there is NOT a short-term release in progress, and proceeds (Initial Conditions).		

STEPS	ELEMENTS	STANDARD	S/U	COMMENTS REQUIRED FOR UNSAT
*5	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) GE Conditions? (See Note 4: Plant conditions exist which would require the classification of a General Emergency per the EALs. This does NOT include consideration of offsite dose-base EALs.)	The operator recognizes that a General Emergency has been declared (Initial Conditions).		
*6	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) (See Note 1: Protective Action Zones (PAZs) are defined in Table 1 on page 3. SIP is Shelter in Place. (IF a PAZ has been accurately selected for evacuation, it shall remain selected)) Evacuate 2-mile Radius Evacuate 2-5 miles Downwind.	The operator uses Table 1, and a Wind Direction of 291.6^{o}, determines that PAZ A, B, C, D, L, and M must be evacuated. The operator recognizes that PAZ R has already been evacuated, and cannot be removed.		
*7	(RP/0/B/5700/029, Attachment 3, Expanded PAR Determination) Offsite Projected Dose projections or field measurements exceeded PAGs? Table 2	The operator recognizes that the RP Dose Projected Dose Assessments are still about 20 minutes away.		
*8	(Directed Action) Submit the Emergency Notification Form to the Emergency Coordinator for approval.	The operator submits the ENF to the Examiner in accordance with the provided KEY (Separate document).		

Terminating Cue: **Evaluation on this JPM is complete.**

STOP TIME: ______________

VERIFICATION OF COMPLETION

Job Performance Measure No.: 2018 Admin – JPM A4 SRO

Examinee's Name:

Date Performed:

Facility Evaluator:

Number of Attempts:

Time to Complete:

Question Documentation:

Result: SAT ______ UNSAT _______

Examiner's Signature: ________________________________ Date: ____________________

INITIAL CONDITIONS:

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INITIATING CUE:

Due to a change in meteorological conditions, prepare an EXPANDED PAR and submit the Emergency Notification Form to the Emergency Coordinator for approval.

THIS IS A TIME CRITICAL JPM