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

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 2 hours, with light wind from the North at 2-5 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The C SI Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C1, "REGULATOR REF VOLT FAILURE," has failed to the EXTINGUISHED condition (I&C is investigating).
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	MALF CRF03A	C-RO C(TS)-SRO	Dropped Control Rod, Rod F-4
2	N/A	R-RO N-BOP N-SRO	Lower Power for Dropped Rod Recovery
3	OVR TURXMT PT_447	I-BOP I(TS)-SRO	Turbine 1st Stage Pressure Transmitter PT-447 fails LOW
4	MALF CVC05A	C-RO C-SRO	Charging Pump A Trip
5	MALF RPS01A/B CRF04A CRF05A	M-RO M-BOP M-SRO	ATWS/Rod J-11 Stuck Out/Ejected Control Rod J-11/SBLOCA
6	MALF SIS028	C-RO C-SRO	A SI Pumps fail to AUTO Start
7	OVR SIS034 SIS035	C-RO C-SRO	SI-870 A & B fail to Auto Open on SI

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

HB Robinson 2018 Re-Take NRC Scenario #1

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

The following equipment is Out-Of-Service: The C SI Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C1, "REGULATOR REF VOLT FAILURE," has failed to the EXTINGUISHED condition (I&C is investigating).

Shortly after taking the watch, Control Bank C Rod F-4 will drop into the core. The operator will enter AOP-001, "Malfunction of the Reactor Control System," to reduce reactor power to less than or equal to 70% using Attachment 1, "Secondary Load Adjustment," of AOP-001. The operator will address Technical Specification LCO 3.1.4, "Rod Group Alignment Limits."

During the power reduction, Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW. The operator will respond in accordance with AOP-025, "RTGB Instrument Failure." The operator will restore all Steam Generators to the programmed level with Feed Reg Valves in Manual. The operator will remove the failed instrument from service in accordance with OWP-033, "First Stage Pressure (FSP)," and restore the Feed Regulating Valves to AUTO control. The operator will address Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation," Technical Specification LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," and Technical Specification LCO 3.3.6, "Containment Ventilation Isolation Instrumentation."

Following that, the "A" Charging Pump will trip due to an overcurrent condition. The operator will respond in accordance with APP-003-F5, CHG PMP MOTOR OVLD/TRIP and start either the "B" or "C" Charging Pump. The operator may enter AOP-018, "Reactor Coolant Pump Abnormal Conditions," or AOP-003-1, "Loss of Charging or Letdown." The operator will address 3.4.17, "Chemical and Volume Control System."

A short time after that, an inadvertent Turbine Trip will occur, without a Reactor Trip. The operator will attempt to trip the reactor manually; however, both automatic and manual reactor trips have failed. The operator will enter EOP-E-0, "Reactor Trip or Safety Injection," and transition immediately to FRP-S.1, "Response to Nuclear Power Generation - ATWS." The operator will be required to insert control rods and direct that the reactor be tripped locally in order to make the reactor subcritical. Additionally Control Rod J-11 will be stuck out of the core once the reactor is tripped locally.

Once the local trip of the reactor occurs, the operator will transition back to EOP-E-0. On the transition, Control Rod J-11 will eject from the core and a SBLOCA will result. Upon Safety Injection actuation the A SI Pump will fail to automatically start and the SI Injection Valves will fail to open. The operator will need to manually start these pumps and open the valves. Ultimately the operator will transition to EOP-E-1, "Loss of Reactor or Secondary Coolant."

Upon completion of EOP-E-1 the operator will transition to EOP-ES-1.2, "Post-LOCA Cooldown and Depressurization."

The scenario will terminate at Step 12 of EOP-ES-1.2, after the operator has determined the appropriate SI Pump alignment and adjusted accordingly.

Critical Tasks:

Insert Negative Reactivity into the Core by Inserting Control Rods Manually Prior to Locally Tripping the Reactor.

Safety Significance: Failure to insert negative reactivity, under the postulated plant conditions, results in an unnecessary situation in which the reactor remains critical or returns to a critical condition. Performance of the critical task would make the reactor subcritical and provide sufficient shutdown margin to prevent (or at least minimize the power excursion associated with) any subsequent return to criticality. Failure to insert negative reactivity constitutes mis-operation or incorrect operator performance which fails to prevent incorrect reactivity control. In the scenario postulated by the plant conditions, failure to insert negative reactivity by inserting control rods can result in the needless continuation of an extreme or a severe challenge to the subcriticality CSF. Although the challenge was not initiated by the operator (was not initiated by operator error), continuation of the challenge is a result of the operator's failure to insert negative reactivity.

Establish flow from at least one high-head SI pump upon completion of the EOP-E-0 Attachment 1, AUTO ACTION VERIFICATION.

Safety Significance: Failure to manually start at least one high-head SI pump under the postulated conditions constitutes mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity. In this case, at least one high-head SI pump can be manually started from the control room. Therefore, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario. Additionally, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Finally, under the postulated plant conditions, failure to manually start a high-head SI pump (when it is possible to do so) is a violation of the facility license condition.

Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (BOTH of the following satisfied: SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW AND RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F [32°F]) so that CET temperatures do not become superheated when forced circulation in the RCS stops. (EOP-Based)

Safety Significance: Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents mis-operation or incorrect operator performance in which the operator has failed to prevent degradation of the fuel cladding barrier to fission product release and which leads to a violation of the facility license condition.

ROBINSON *Nuclear Training*

Committed to Excellence

OPERATIONS TRAINING

N18-1RT-1

Initial Licensed Operator Training

Rev 180327

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Training Class 18-1

TOPIC: NRC Simulator Exam

Scenario N18-1RT-1

REFERENCES:

1. Technical Specification LCO 3.5.2, “Containment Spray and Cooling System” (Amendment 176)
2. AOP-001, “Malfunction of the Reactor Control System” (Rev 34)
3. Technical Specification LCO 3.1.4, “Rod Group Alignment Limits;” (Amendment 233)
4. AOP-025, “RTGB Instrument Failure” (Rev 27)
5. OWP-33 “First Stage Pressure (FSP-2)” (Rev 13)
6. Technical Specification Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation” (Amendment 210)
7. Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation” (Amendment 196)
8. Technical Specification LCO 3.3.6, “Containment Ventilation Isolation Instrumentation” (Amendment 225)
9. APP-003-F5, “CHG PMP MOTOR OVLD/TRIP” (Rev 54)
10. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 8)
11. FRP-S.1, “Response to Nuclear Power Generation/ATWS” (Rev 24)
12. EOP-E-1, “Loss of Reactor or Secondary Coolant” (Rev 6)
13. EOP-ES-1.2, “Post-LOCA Cooldown and Depressurization” (Rev 1)

Validation Time: 135 minutes

HB Robinson 2018 NRC RT Scenario #1 Objectives:

Given the simulator at an initial condition of 75% 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. each crew member's ability to effectively diagnose a dropped control rod, and the RO and BOP's ability to respond to such an event in accordance with AOP-001, "Malfunction of the Reactor Control System."

4. each crew member's ability to effectively diagnose Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW, and the RO and BOP's ability to respond to such an event in accordance with AOP-025, "RTGB Instrument Failure."

5. each crew member's ability to effectively diagnose the "A" Charging Pump trip due to a Motor overload failure, and the RO and BOP's ability to respond to such an event in accordance with APP-003-F5, "CHG PMP MOTOR OVLD/TRIP" alarm response procedure.

6. each crew member's ability to effectively diagnose a failure of the Reactor Protection System to trip the reactor due to an inadvertent Turbine Trip while >P-8, and the RO and BOP's ability to respond to such an event in accordance with EOP-E-0, "Reactor Trip or Safety Injection," and FRP- S.1, "Response to Nuclear Power Generation - ATWS."

7. each crew member's ability to effectively diagnose an ejected rod, and the RO and BOP's ability to respond to such an event in accordance with EOP-E-1, "Loss of Reactor of Secondary Coolant."

8. each crew member's ability to effectively diagnose a failure of the high head SI Injection system to inject flow into the RCS when required, and the RO and BOP's ability to respond to such an event in accordance with plant Emergency Operating and Functional Response Procedures.

Scenario Event Description
NRC Scenario 1

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

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 2 hours, with light wind from the North at 2-5 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The C SI Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C1, "REGULATOR REF VOLT FAILURE," has failed to the EXTINGUISHED condition (I&C is investigating).
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1	MALF CRF03A	C-RO C(TS)-SRO	Dropped Control Rod, Rod F-4
2	N/A	R-RO N-BOP N-SRO	Lower Power for Dropped Rod Recovery
3	OVR TURXMT PT_447	I-BOP I(TS)-SRO	Turbine 1st Stage Pressure Transmitter PT-447 fails LOW
4	MALF CVC05A	C-RO C-SRO	Charging Pump A Trip
5	MALF RPS01A/B CRF04A CRF05A	M-RO M-BOP M-SRO	ATWS/Rod J-11 Stuck Out/Ejected Control Rod J-11/SBLOCA
6	MALF SIS028	C-RO C-SRO	A SI Pumps fail to AUTO Start
7	OVR SIS034 SIS035	C-RO C-SRO	SI-870 A & B fail to Auto Open on SI

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

HB Robinson 2018 NRC Scenario #1

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

The following equipment is Out-Of-Service: The C SI Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.5.2 ACTION A.1. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C1, "REGULATOR REF VOLT FAILURE," has failed to the EXTINGUISHED condition (I&C is investigating).

Shortly after taking the watch, Control Bank C Rod F-4 will drop into the core. The operator will enter AOP-001, "Malfunction of the Reactor Control System," to reduce reactor power to less than or equal to 70% using Attachment 1, "Secondary Load Adjustment," of AOP-001. The operator will address Technical Specification LCO 3.1.4, "Rod Group Alignment Limits."

During the power reduction, Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW. The operator will respond in accordance with AOP-025, "RTGB Instrument Failure." The operator will restore all Steam Generators to the programmed level with Feed Reg Valves in Manual. The operator will remove the failed instrument from service in accordance with OWP-033, "First Stage Pressure (FSP)," and restore the Feed Regulating Valves to AUTO control. The operator will address Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation," Technical Specification LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," and Technical Specification LCO 3.3.6, "Containment Ventilation Isolation Instrumentation."

Following that, the "A" Charging Pump will trip due to an overcurrent condition. The operator will respond in accordance with APP-003-F5, CHG PMP MOTOR OVLD/TRIP and start either the "B" or "C" Charging Pump. The operator may enter AOP-018, "Reactor Coolant Pump Abnormal Conditions," or AOP-003-1, "Loss of Charging or Letdown." The operator will address 3.4.17, "Chemical and Volume Control System."

A short time after that, an inadvertent Turbine Trip will occur, without a Reactor Trip. The operator will attempt to trip the reactor manually; however, both automatic and manual reactor trips have failed. The operator will enter EOP-E-0, "Reactor Trip or Safety Injection," and transition immediately to FRP-S.1, "Response to Nuclear Power Generation - ATWS." The operator will be required to insert control rods and direct that the reactor be tripped locally in order to make the reactor subcritical. Additionally Control Rod J-11 will be stuck out of the core once the reactor is tripped locally.

Once the local trip of the reactor occurs, the operator will transition back to EOP-E-0. On the transition, Control Rod J-11 will eject from the core and a SBLOCA will result. Upon Safety Injection actuation the A SI Pump will fail to automatically start and the SI Injection Valves will fail to open. The operator will need to manually start these pumps and open the valves. Ultimately the operator will transition to EOP-E-1, "Loss of Reactor or Secondary Coolant."

Upon completion of EOP-E-1 the operator will transition to EOP-ES-1.2, "Post-LOCA Cooldown and Depressurization."

The scenario will terminate at Step 12 of EOP-ES-1.2, after the operator has determined the appropriate SI Pump alignment and adjusted accordingly.

Critical Tasks:

Insert Negative Reactivity into the Core by Inserting Control Rods Manually Prior to Locally Tripping the Reactor.

Safety Significance: Failure to insert negative reactivity, under the postulated plant conditions, results in an unnecessary situation in which the reactor remains critical or returns to a critical condition. Performance of the critical task would make the reactor subcritical and provide sufficient shutdown margin to prevent (or at least minimize the power excursion associated with) any subsequent return to criticality. Failure to insert negative reactivity constitutes mis-operation or incorrect operator performance which fails to prevent incorrect reactivity control. In the scenario postulated by the plant conditions, failure to insert negative reactivity by inserting control rods can result in the needless continuation of an extreme or a severe challenge to the subcriticality CSF. Although the challenge was not initiated by the operator (was not initiated by operator error), continuation of the challenge is a result of the operator's failure to insert negative reactivity.

Establish flow from at least one high-head SI pump upon completion of the EOP-E-0 Attachment 1, AUTO ACTION VERIFICATION.

Safety Significance: Failure to manually start at least one high-head SI pump under the postulated conditions constitutes mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity. In this case, at least one high-head SI pump can be manually started from the control room. Therefore, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario. Additionally, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Finally, under the postulated plant conditions, failure to manually start a high-head SI pump (when it is possible to do so) is a violation of the facility license condition.

Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (BOTH of the following satisfied: SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW AND RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F [32°F]) so that CET temperatures do not become superheated when forced circulation in the RCS stops. (EOP-Based)

Safety Significance: Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents mis-operation or incorrect operator performance in which the operator has failed to prevent degradation of the fuel cladding barrier to fission product release and which leads to a violation of the facility license condition.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Reset to Temp IC 404**	
☐	**T = 0 Malfunctions:** **C SI Pump OOS:** • **IRF EPSV480E2_153 f:RACK_OUT** **Place RED Cap over C SI Pump Control Switch** **LI-928, 'C' SI Accumulator Level, OOS** • **IOR aoSISAOD021A f:0** **Place WHITE DOT on LI-928** **RTGB Annunciator APP-009-C1 failed OFF** • **IMF ANNXN09C01 f:ALARM_OFF** **Place WHITE DOT on APP-009-C1** **Insert the following:** • **IMF RPS01A f:FAILURE_TO_OPEN,BOTH (ATWS, RX TRIP Signals fail)** • **IMF RPS01B f:FAILURE_TO_OPEN,BOTH (ATWS, RX TRIP Signals fail)** • **IRF SIS028 f:NO_AUTO ("A" SI Pump fails to AUTO Start)** • **IRF SIS034 f:NO_AUTO (SI-870A fails to Auto OPEN)** • **IRF SIS035 f:NO_AUTO (SI-870B fails to Auto OPEN)** **Place the Simulator in RUN and ACKNOWLEDGE all alarms.**		
☐	**Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.**		
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with the following: • OST-947, Operations Reactivity Plan • Copy of Technical Specifications/Basis 4. Direct the crew to Review the Control Boards taking note of present conditions, alarms.		
☐	T-0	Begin Familiarization Period	

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario A18-1RT-1.**	
☐	At direction of examiner	**Event 1** **IMF CRF03A f:F-4**	Dropped Rod
☐	Crew Progression in AOP-001	**Event 2**	Power Reduction IAW AOP-001 to less than 70%
☐	At direction of examiner	**Event 3** **ICO TURXMTPT_447 r:30 f:0**	Turbine 1st Stage Pressure Transmitter PT-447 fails LOW
☐	At direction of examiner	**Event 4** **IMF CVC05A**	"A" Charging Pump Trips
☐	At direction of examiner	**Event 5** **IMF TUR01** **IMF CRF04A f:UNTRIPPABLE,J-11**	Inadvertent Turbine Trip/ATWS/Rod J-11 Stuck Out
☐	On transition from FRP-S.1 back to EOP-E-0	**Event 6** **IMF CRF05A f:900,J-11**	Ejected Control Rod, Rod J-11
☐	Post-Rx Trip	**Event 7** **IRF SIS028 f:NO_AUTO**	A SI Pumps fail to AUTO Start **NOTE: Failure is inserted at T=0**
☐	Post-Rx Trip	**Event 8** **IRF SIS034 f:NO_AUTO** **IRF SIS035 f:NO_AUTO**	SI-870 A & B fail to Auto Open on SI **NOTE: Failure is inserted at T=0**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.: N18-1RT Scenario # 1 Event # 1 & 2 Page 9 of 70

Event Description: **Dropped Rod**

Shortly after taking the watch, Control Bank C Rod F-4 will drop into the core. The operator will enter AOP-001, "Malfunction of the Reactor Control System," to reduce reactor power to less than or equal to 70% using Attachment 1, "Secondary Load Adjustment," of AOP-001. The operator will address Technical Specification LCO 3.1.4, "Rod Group Alignment Limits."

Booth Operator Instructions: **IMF CRF03A f:F-4**

Indications Available:

- Control Rod F-4 Rod Bottom light is LIT
- RTGB Annunciator APP-005-A3, PR DROPPED ROD
- RTGB Annunciator APP-005-C3, PR CHANNEL DEV
- RTGB Annunciator APP-005-F2, ROD BOTTOM ROD DROP
- RTGB Annunciator APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT
- RTGB Annunciator APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT
- Power Range N42/44 lower than N41/43
- NR-45 indicates a prompt drop in neutron flux
- Tavg TR-408 starts to lower

Time	Pos.	Expected Actions/Behavior	Comments
AOP-001, MALFUNCTION OF REACTOR CONTROL SYSTEM			
NOTE Steps 1 through 3 are Immediate Action Steps			
	RO	(Step 1) CHECK Number of Dropped Rods - LESS THAN TWO	**Immediate Action**
	RO	(Step 2) PLACE ROD BANK SELECTOR Switch – MANUAL	**Immediate Action**
	RO	(Step 3) CHECK Rod Motion - STOPPED	**Immediate Action**
	CRS	(Step 4) NOTIFY Plant Personnel Of Procedure Entry Using PA System	**NOTE:** The CRS may ask the SM to make this announcement. If so, **Floor Instructor** acknowledge as SM.

Op Test No.: N18-1RT Scenario # 1 Event # 1 & 2 Page 10 of 70

Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 5) GO TO Section / Step Based On Reason For Procedure Entry: Dropped Rod - GO TO SECTION A, Dropped Rod	
			NOTE: The CRS will transition to Section A of AOP-001.
AOP-001, MALFUNCTION OF REACTOR CONTROL SYSTEM SECTION A, DROPPED ROD			
	RO	(Step 1) STABILIZE The Plant:	
		• STOP any power changes not directed by this procedure	
		• ADJUST secondary load to Match Tave and Tref within -1.5 to +1.5°F using Attachment 1, Secondary Load Adjustment	**Examiner NOTE:** The BOP will need to adjust Turbine load per Attachment 1 **(See Page 13)**.
	RO	(Step 2) DETERMINE The Status Of Rods:	
		• ANALYZE the below indications for a dropped rod:	
		• APP-005-A3, PR DROP ROD - ILLUMINATED	
		• APP-005-F2, ROD BOTTOM ROD DROP - ILLUMINATED	
		• Rod Bottom Light for affected rod - ILLUMINATED	
		• Indication of Prompt Drop - PRESENT	
		• AFD Changes – MINIMAL (For Fully Dropped Rod)	
		• Quadrant Power Tilt indications - PRESENT	
		• APP-005-F3, PR UPPER CH HI FLUX DEV/AUTO DEFEAT - ILLUMINATED	

Op Test No.: N18-1RT Scenario # 1 Event # 1 & 2 Page 11 of 70

Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
		• APP-005-F4, PR LOWER CH HI FLUX DEV/AUTO DEFEAT - ILLUMINATED	
		• APP-005-C3, PR CHANNEL DEV - ILLUMINATED	
		• Power Range Drawer Indications	
		• CHECK Dropped Rod – PRESENT	
	RO	(Step 3) CHECK Plant Status - MODE 1	
NOTE Key #13 is required to open the Lift Coil Disconnect Panel Door.			
	RO	(Step 4) PLACE Lift Coil Disconnect Switch For The Dropped Rod In OFF	**NOTE:** The CRS/BOP may request a peer check from WCC for the switch manipulation. If so, **Booth Instructor** inform the crew as **WCC** that there is no one available at this time.
CAUTION • Equipment repairs or manipulations to correct the cause of the dropped rod prior to procedural direction could inadvertently withdraw the dropped rod. • Troubleshooting and repair activities have the potential to impact up to two additional rods powered by the same power supply node.			
	CRS	(Step 5) Notify Reactor Engineering AND I&C Personnel To Perform the following:	**NOTE:** The CRS may call WCC/RE/I&C to address the dropped rod. If so, **Booth Instructor** acknowledge as **WCC/RE/I&C**.
		• DETERMINE the status of the dropped rod	
		• INVESTIGATE the cause of the dropped rod	
		• AVOID ANY action that could cause inadvertent withdrawal of the affected rod	

Op Test No.: N18-1RT Scenario # 1 Event # 1 & 2 Page 12 of 70

Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
		• AVOID ANY action that could adversely affect other rods associated with the same Power Supply as the affected rod	
		• DETERMINE appropriate recovery actions	**Booth Instructor:** After 10 minutes, as RE request that the CRS lower power such that all NIS Power Range instruments are < 65%.
NOTE The following step addresses the 1 hour SDM actions of TS 3.1.4, 3.1.5, and 3.1.6			
	RO/ BOP	(Step 6) CHECK SDM - WITHIN THE LIMITS SPECIFIED BY THE COLR	
		• Using FMP-012, Manual Determination of Shutdown Margin Boron Concentration	**NOTE:** It is likely that the crew will contact the WCC SRO to calculate SDM. If so, **Booth Instructor** acknowledge as **WCC.** Within **1 hour** call the CR and report that the SDM calculation was satisfactory.
NOTE While an Urgent Failure exists, Control Rods are NOT available during subsequent Power Reductions.			
	RO	(Step 7) CHECK APP-005-E2, ROD CONT SYSTEM URGENT FAILURE - EXTINGUISHED	
NOTE TS 3.1.4 Action B.2.2 requires a power reduction to below 70% power when rods are misaligned greater than TS limits.			
	RO	(Step 8) ESTABLISH AND MAINTAIN Stable Conditions Below 70% Reactor Power as follows:	
		• REDUCE Reactor Power to less than or equal to 70% using the following as available:	

Op Test No.: N18-1RT Scenario # 1 Event # 1 & 2 Page 13 of 70

Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
		• Attachment 1, Secondary Load Adjustment	
		• Control Rods	
		• Boration	
		• OST-947, Operations Reactivity Plan	
			Examiner NOTE: The BOP will adjust load per Attachment 1. **BOP Examiner** follow actions of Attachment 1. The RO may BORATE or Manually insert control rods. If the RO borates, **RO Examiner** follow OP-301-1 Actions, Section 6.2.2, on **Page 14.** The CRS will continue with Step 9 of Section A of AOP-001. **CRS Examiner** follow AOP-001 Actions on **Page 16.**
AOP-001, MALFUNCTION OF REACTOR CONTROL SYSTEM ATTACHMENT 1, TURBINE LOAD ADJUSTMENT			
NOTE The actions in this attachment are performed and repeated as necessary to obtain the required secondary load and to maintain Tave / Tref within -1.5 to +1.5°F in conjunction with Primary-side Reactivity changes.			
	BOP	(Step 1) IF The Turbine Is NOT On-Line, THEN …..	
	BOP	(Step 2) IF EH Turbine Control Is In TURB MANUAL, THEN …..	
	BOP	(Step 3) IF EH Turbine Control Is In OPER AUTO, THEN ADJUST Turbine Load:	
		• PLACE the EH Turbine Control in the desired position:	

Op Test No.: N18-1RT Scenario # 1 Event # 1 & 2 Page 14 of 70

Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
		• IMP IN (preferred)	
		• OR	
		• IMP OUT (if required for plant conditions)	
		• SET the desired load in the SETTER.	
		• SELECT the desired Load Rate.	
		• DEPRESS the GO pushbutton.	
	BOP	(Step 4) IF Desired For RCS Pressure Control, THEN ENERGIZE Pressurizer Backup Heaters	**NOTE**: Group B Backup Heaters are in Auto. The crew may elect to place them in ON.
	BOP	(Step 5) IF Power Has Changed 15% Or More In A One Hour Period, THEN NOTIFY Chemistry To PERFORM Sampling For SR 3.4.16.2	
	BOP	(Step 6) IF Overall Power Reduction Is Greater Than 20%, THEN NOTIFY Chemistry To Shutdown The RCS Zinc Injection Skid	
OP-301-1, CHEMICAL AND VOLUME CONTROL SYSTEM BORATION AND DILUTION OPERATIONS SECTION 6.2.2, RCS BORATION QUICK CHECKLIST			
	RO	(Step 1) Determine amount of Boric Acid to add to RCS and if applicable, expected change in RCS temperature and Reactor Power.	**NOTE:** The RO will determine that ~90 (Or Equivalent) gallons of boric acid must be added.
	RO	(Step 2) Obtain an independent check of volume of Boric Acid required.	
	RO	(Step 3) Obtain permission from CRS or SM to add amount of boric acid previously determined, including expected change in RCS temperature and Reactor Power.	

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Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) Place RCS Makeup Mode selector switch in BORATE position.	
	RO	(Step 5) Set YIC-113 (Boric Acid Totalizer) to desired quantity.	
	RO	(Step 6) IF it is desired to operate FCV-113A (Boric Acid Flow) in manual, THEN place FCV-113A in MAN.	
		• Adjust flow rate controller FCV-113A (Boric Acid Flow) using UP and DOWN pushbuttons.	
	RO	(Step 7) Momentarily place RCS Makeup System switch to START position.	
	RO	(Step 8) IF AT ANY TIME any of following conditions occur:	
		• Rod Motion is blocked	
		• Rod Motion is in wrong direction	
		• TAVG goes up	
		• Boric Acid addition exceeds desired value	
		THEN momentarily place RCS Makeup System switch in STOP position:	
	RO	(Step 9) WHEN desired amount of Boric Acid has been added to RCS, THEN ensure the following occur:	
		• FCV-113A (BA To Blender) closes.	
		• FCV-113B (Blended MU To Chg Suct) closes.	
		• IF operating Boric Acid Pump is in Auto, THEN check operating Boric Acid Pump stops	

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Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
		• RCS Makeup System is off.	**NOTE:** The RO may need to repeat this process during the downpower.
AOP-001, MALFUNCTION OF REACTOR CONTROL SYSTEM SECTION A, DROPPED ROD			
			Examiner NOTE: Examiner following the **CRS** continue **HERE**.
NOTE • Quadrant Power Tilt information may be obtained from ERFIS Group Display 'QPTR LOG' or Turn On Code 'TILT' • FMP-007, Quadrant Power Tilt provides instruction for manual QPTR calculation if ERFIS is unavailable			
	RO	(Step 9) DETERMINE If Further Power Reduction Is Required:	
		• CHECK AFD:	
		• AFD – WITHIN ACCEPTABLE OPERATION LIMITS	
		AND	
		• Cumulative Penalty Deviation Time During The Previous 24 Hours - EXPECTED TO REMAIN ≤ 1 HOUR	
		• CHECK SDM - WITHIN THE LIMITS SPECIFIED BY THE COLR	
		• Using FMP-012, Manual Determination of Shutdown Margin Boron Concentration	
		• CHECK QPTR - LESS THAN OR EQUAL TO 1.02	
	CRS	(Step 10) NOTIFY Load Dispatcher Of The Unit's Load Capability	**NOTE:** The BOP will likely call Load Dispatch **Booth Instructor:** as **Load Dispatch**, acknowledge.
	RO	(Step 11) CHECK IRPI For The Dropped Rod - INDICATES ROD FULLY INSERTED	

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Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ CRS	(Step 12) CONTACT Reactor Engineering To Obtain The Following:	**NOTE:** The CRS has previously been requested by RE to stabilize power at <65%.
		• Power level at which recovery is to be performed	**Booth Instructor,** respond as WCC, that an engineering evaluation is in progress and you will contact the CR when complete.
		• Rate at which rod should be withdrawn	
		• Reactivity associated with rod recovery	
	CRS	(Step 13) CHECK Cause Of Dropped Rod - FOUND AND CORRECTED	
	CRS	(Step 13 RNO) WHEN cause is found AND corrected, THEN GO TO Step 14.	
			NOTE: The CRS will address the Technical Specifications.
TECHNICAL SPECIFICATION LCO 3.1.4, ROD GROUP ALIGNMENT LIMITS			
	CRS	LCO 3.1.4 All shutdown and control rods shall be OPERABLE AND Individual indicated rod positions shall be as follows: • For bank demand positions ≥200 steps, each rod shall be within 15 inches of its bank demand position • For bank demand positions < 200 steps, each rod shall be within 7.5 inches of the average of the individual rod positions in the bank.	
	CRS	APPLICABILITY: MODES 1 and 2.	
	CRS	ACTIONS:	

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Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior		Comments
CONDITON			REQUIRED ACTION	COMPLETION TIME
B. One rod not within alignment limits			B.1 Restore rod to within alignment limits OR B.2.1.1 Verify SDM is within the limits provided in the COLR. OR B.2.1.2 Initiate boration to restore SDM to within limit AND B.2.2 Reduce THERMAL POWER to ≤70% RTP AND B.2.3 Verify SDM is within the limits provided 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
				NOTE: The CRS will determine that ACTION B.1 or B.2.1.1 or B.2.1.2, AND B.2.2, B.2.3, B.2.4, B.2.5 and B.2.6 must be entered.
TECHNICAL SPECIFICATION LCO 3.2.4, QUADRANT POWER TILT RATIO (QPTR)				
	CRS	LCO 3.2.4 The QPTR shall be ≤ 1.02.		
	CRS	APPLICABILITY: MODE 1 with THERMAL POWER > 50% RTP.		
	CRS	ACTIONS		

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Event Description: **Dropped Rod**

Time	Pos.	Expected Actions/Behavior	Comments
CONDITION		REQUIRED ACTION	COMPLETION TIME
A. QPTR not within limit.		A.1 Reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00. AND A.2 Determine QPTR and reduce THERMAL POWER ≥ 3% from RTP for each 1% of QPTR > 1.00. AND A.3 Perform SR 3.2.1.1 and SR 3.2.2.1. AND A.4 Reevaluate safety analyses and confirm results remain valid for duration of operation under this condition. AND A.5 NOTE: Perform Required Action A.5 only after Required Action A.4 is completed. Normalize excore detectors to show zero QPTR. AND A.6 NOTE: Perform Required Action A.6 only after Required Action A.5 is completed. Perform SR 3.2.1.1 and SR 3.2.2.1.	2 hours Once per 12 hours 24 hours AND Once per 24 hours thereafter Prior to increasing THERMAL POWER above the limit of Required Action A.1 Prior to increasing THERMAL POWER above the limit of Required Action A.1or A.2 Within 24 hours after reaching RTP OR Within 48 hours after increasing THERMAL POWER above the limit of Required Action A.1 or A.2
			NOTE: The CRS will determine that ACTION A.1, A.2, A.3, A.4, A.5 and A.6 must be entered.
TECHNICAL SPECIFICATION LCO 3.4.1, RCS PRESSURE, TEMPERATURE, AND FLOW DEPARTURE FROM NUCLEATE BOILING (DNB) LIMITS			

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Event Description: **Dropped Rod**

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 below: • Pressurizer pressure is greater than or equal to the limit specified in the COLR; • RCS average temperature is less than or equal to the limit specified in the COLR • RCS total flow rate ≥ 97.3 x 10^6 lbm/hr and greater than or equal to the limit specified in the COLR	From COLR: Indicated Pressurizer Pressure: meter 3 ≥ 2218.00 psig meter 2 ≥ 2223.17 psig computer 3 ≥ 2212.41 psig computer 2 ≥ 2216.33 psig
	CRS	APPLICABILITY: MODE1	
	CRS	ACTIONS:	
CONDITON		REQUIRED ACTION	COMPLETION TIME
A. One or more RCS DNB parameters not within limits.		A.1 Restore RCS DNB parameter(s) to within limit.	2 hours
			NOTE: If PZR pressure lowers to < 2218 psig (By meter), the CRS will determine that ACTION A.1 must be entered. (Section 2.10 of FMP-001)
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.: N18RT-1 Scenario # 1 Event # 3 Page 21 of 70

Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

During the power reduction, Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW. The operator will respond in accordance with AOP-025, "RTGB Instrument Failure." The operator will restore all Steam Generators to the programmed level with Feed Reg Valves in Manual. The operator will remove the failed instrument from service in accordance with OWP-033, "First Stage Pressure (FSP)," and restore the Feed Regulating Valves to AUTO control. The operator will address Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation," Technical Specification LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," and Technical Specification LCO 3.3.6, "Containment Ventilation Isolation Instrumentation."

Booth Operator Instructions: **ICO TURXMTPT_447 r:30 f:0**

Indications Available:

- RTGB Annunciator APP-005-F5, AMSAC TROUB/BYPD
- RTGB Annunciator APP-006-D4, S/G A STMLINE HI FLOW
- RTGB Annunciator APP-006-E4, S/G B STMLINE HI FLOW
- RTGB Annunciator APP-006-F4, S/G C STMLINE HI FLOW
- RTGB Annunciator APP-006-F5, STEAM DUMP ARMED
- PI-447, 1st Stage Pressure starts to lower
- PI-446, 1st Stage Pressure remains constant
- Tref is failing low

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the BOP will place the Turbine in HOLD.
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 1) GO TO Appropriate Section For Failed Instrument:	**NOTE:** The CRS will select Section E of AOP-025.
		• TURBINE FIRST STAGE PRESSURE, (PT-446, 447) - SECTION E	
AOP-025, RTGB INSTRUMENT FAILURE **SECTION E, TURBINE FIRST STAGE PRESSURE TRANSMITTER FAILURE**			

NOTE

- Steps 1 through 4 are Immediate Action Steps.
- A 100% load rejection can be distinguished from a turbine first stage pressure failure by zero MW net generation and S/G PORV operation during a 100% load rejection.

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Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1) CHECK Turbine Load Rejection -	**Immediate Action**
		• IN PROGRESS	
		OR	
		• HAS OCCURRED	
	CRS	(Step 1 RNO) GO TO Step 3.	**Immediate Action**
	BOP	(Step 3) CHECK S/G Level Trend - CONTROLLING IN AUTO TO 39%	**Immediate Action**
	RO	(Step 4) CONTROL Reactor Power:	**Immediate Action**
		• PLACE rod bank selector switch in M (Manual)	**NOTE:** The control rods are in Manual already from the previous failure.
		• OPERATE rods to maintain reactor power less than or equal to 100%	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using PA System	**NOTE:** The CRS may ask the SM to make this announcement. If so, **Floor Instructor** acknowledge as SM.
	BOP	(Step 6) PERFORM The Following:	
		a. CHECK S/G Level - STABILIZED BETWEEN 39% AND 52%	**NOTE:** It may take a few minutes for S/G levels to stabilize at 39%. Step 6.b. is a WHEN/THEN and will be completed at that time.
	BOP	b. CHECK FRV Controllers - ALL IN MAN:	**NOTE:** All FRV controllers are expected to be in AUTO.
		• FCV-478	
		• FCV-488	
		• FCV-498	

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Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6.b RNO) PLACE all FRV controllers in MAN.	**NOTE:** The BOP will place all FRVs in MANUAL.
	BOP	(Step 7) SELECT Alternate Channel For 1st Stage Pressure Input:	
		• Failed Channel – PT-447, Alternate Channel – PT-446	
	BOP	(Step 8) ADJUST Each S/G Level To Program Level	**NOTE:** The BOP will need to restore S/G levels to 52%.
	RO	(Step 9) ADJUST Tavg To Within -1.5 TO +1.5°F Of Tref	**NOTE:** The RO may need to adjust control rods and/or boron concentration to restore Tavg-Tref deviation.
	RO	(Step 10) CHECK Reactor Power - GREATER THAN OR EQUAL TO 15%	
	BOP	(Step 11) RESTORE Each S/G FRV To Automatic:	**NOTE:** The BOP will need to restore S/G levels to 52%.
		• CHECK S/G level - WITHIN ±1% OF PROGRAMMED LEVEL	
	BOP	(Step 11 RNO) WHEN S/G level is within ±1% of programmed level, THEN PLACE affected controller in AUTO.	**NOTE:** The BOP will place all FRVs in AUTO.
	CRS	• GO TO Step 12.	
	RO	(Step 12) RESTORE Rod Control To Automatic:	**NOTE:** Since the crew is still in AOP-001, the RO/CRS should discuss leaving the Rods in MANUAL. If the CRS requests a 2nd SRO concurrence, **Floor Instructor** concur as SM.

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Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	• CHECK Tavg - WITHIN -0.5 to +0.5°F OF Tref.	
		• Place Rod Control Selector Switch in AUTO	
	CRS	(Step 13) REMOVE Affected Transmitter From Service Using OWP-033:	
		• Channel – PT-447, OWP-FSP-2	
			NOTE: The CRS will address OWP-033.
OWP-033, FIRST STAGE PRESSURE (FSP) FSP-2, FIRST STAGE PRESSURE TRANSMITTER PT-447			
	CRS	Address FSP-2	
	BOP	Place the STEAM DUMP MODE SELECTOR SWITCH in the STEAM PRESSURE CONTROL position.	**NOTE:** APP-006-F5 STEAM DUMP ARMED will alarm.
	BOP	Place the 1ST STAGE PRESSURE SELECTOR SWITCH 446/447 in the “446” position.	
	BOP	Insert Trip Signals	**NOTE:** The CRS will dispatch the BOP to the Hagan Racks. **Booth Instructor** coordinate with BOP to insert Trip Signals: OPEN Protection Racks Door: IRF BST101 f:D_OPEN • IRF BST100 f:TRIP • IRF BST092 f:TRIP • IRF BST017 f:TRIP • IRF BST019 f:TRIP • IRF BST021 f:TRIP CLOSE Protection Racks Door: IRF BST101 f:D_CLOSED

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Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
		• B/S 447-2 HAGAN RACK #25 (70% TURBINE LOAD LIMIT)	**NOTE:** B/S STATUS LIGHT TURB POW LOAD LIMIT PC-447-E2 will ILLUMINATE.
		• B/S 447-1 HAGAN RACK #25 (PERMISSIVE P-7)	**NOTE:** B/S STATUS LIGHT TURBINE POWER P-7 PC-447-E1 will ILLUMINATE.
		• B/S 475, HAGAN RACK #24 (LOOP 1 HI STM FLOW)	**NOTE:** B/S STATUS LIGHT LOOP 1 HI STM FLOW FC-475 will ILLUMINATE.
		• B/S 485 HAGAN RACK #25 (LOOP 2 HI STM FLOW)	**NOTE:** B/S STATUS LIGHT LOOP 2 HI STM FLOW FC-485 will ILLUMINATE.
		• B/S 495 HAGAN RACK #25 (LOOP 3 HI STM FLOW)	**NOTE:** B/S STATUS LIGHT LOOP 3 HI STM FLOW FC-495 will ILLUMINATE.
	BOP	Place AMSAC Bypass Switch POWER 2, PROCESSOR "A", and AMSAC Bypass Switch POWER 2, PROCESSOR "B" in the BYPASSED position.	**NOTE:** The CRS will dispatch the BOP. **Booth Instructor:** Coordinate with **BOP** to **re-position switches** using: **IRF RPS012 f:BYPASS** **NOTE:** APP-005-F5, AMSAC TROUB/BYPD will ILLUMINATE.
AOP-025, RTGB INSTRUMENT FAILURE SECTION E, TURBINE FIRST STAGE PRESSURE TRANSMITTER FAILURE			
	CRS	(Step 14) CHECK TS LCO 3.3.1 And 3.3.2 For Applicability	**NOTE:** The CRS will address Technical Specifications.
	CRS	(Step 15) GO TO Procedure Main Body, Step 2	
TECHNICAL SPECIFICATION LCO 3.3.1, REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION			

Op Test No.: N18RT-1 Scenario # 1 Event # 3 Page 26 of 70

Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior		Comments
	CRS	LCO 3.3.1 The RPS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.		
	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
T. One channel inoperable			T.1 Verify interlock is in required state for existing unit conditions. OR T.2 Be in MODE 2.	1 hour 7 hours
				NOTE: The CRS will determine that Function **17.e** (Turbine Impulse Pressure, P-7 Input) is affected; and that Action T.1 or T.2 is required.
TECHNICAL SPECIFICATION LCO 3.3.2, ENGINEERED SAFETY FEATURE ACTUATION SYSTEM (ESFAS) INSTRUMENTATION				
	CRS	LCO 3.3.2 The ESFAS instrumentation for each Function in Table 3.3.2-1 shall be OPERABLE.		
	CRS	APPLICABILITY: According to Table 3.3.2-1.		
	CRS	ACTIONS		

Op Test No.: N18RT-1 Scenario # 1 Event # 3 Page 27 of 70

Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
CONDITION		REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more required channels or trains inoperable.		A.1 Enter the Condition referenced in Table 3.3.2-1 for the channel(s) or train(s).	Immediately
D. One channel inoperable		NOTE For Function 4.c, a channel may be taken out of the trip condition for 6 hours for maintenance. D.1 Place channel in trip. OR D.2.1 Be in MODE 3. AND D.2.2 Be in MODE 4.	 6 hours 12 hour 18 hours
			NOTE: The CRS will determine that Functions **1.f** (SI-High Steam Flow in Two Steam Lines), **1.g** (SI- High Steam Flow in Two Steam Lines Coincident with Steam Line Pressure Low), **4.d** (MSI - High Steam Flow in Two Steam Lines Coincident with Tavg LOW) and **4.e** (MSI - High Steam Flow in Two Steam Lines Coincident with Steam Line Pressure Low), are affected; and that Actions D.1, or D.2.1 and D.2.2.
TECHNICAL SPECIFICATION LCO 3.3.6, CONTAINMENT VENTILATION ISOLATION INSTRUMENTATION			
	CRS	LCO 3.3.6 The Containment Ventilation Isolation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.	

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Event Description: **Turbine First Stage Pressure Transmitter PT-447 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	APPLICABILITY: According to Table 3.3.6-1.	
	CRS	ACTIONS	
CONDITION		REQUIRED ACTION	COMPLETION TIME
A. One or more Functions with one or more manual or automatic actuation trains inoperable. OR One or more radiation monitoring channels inoperable.		A.1 Place and maintain containment purge supply and exhaust valves in closed position. AND A.2 Enter applicable Conditions and Required Actions of LCO 3.9.3, "Containment Penetrations," for containment ventilation isolation valves made inoperable by isolation instrumentation.	Immediately Immediately
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #4.			

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Event Description: **"A" Charging Pump Trip**

Following that, the "A" Charging Pump will trip due to an overcurrent condition. The operator will respond in accordance with APP-003-F5, CHG PMP MOTOR OVLD/TRIP and start either the "B" or "C" Charging Pump. The operator may enter AOP-018, "Reactor Coolant Pump Abnormal Conditions," or AOP-003-1, "Loss of Charging or Letdown." The operator will address 3.4.17, "Chemical and Volume Control System."

Booth Operator Instructions: **IMF CVC05B**

Indications Available:

- RTGB Annunciator APP-003-F5, CHG PMP MOTOR OVLD/TRIP
- RTGB Annunciator APP-001-B4, RCP SEAL INJ HI/LO FLOW
- 'A' Charging Pump GREEN and RED lights LIT
- FR-124 RCP Seal Injection Flow has lowered to less than Tech Spec value

Time	Pos.	Expected Actions/Behavior	Comments
APP-003-F5, CHG PMP MOTOR OVLD/TRIP			
	RO	(Step 1) Ensure at least one Charging Pump running supplying adequate RCP Seal Injection flow.	**NOTE:** The RO will start either the 'B' or 'C' Charging Pump
	CRS	(Step 2) Dispatch Operator to check the Charging Pump breaker(s):	**NOTE:** The CRS will dispatch an AO. **Booth Instructor:** as O**AO**, acknowledge and report **within 1 minute** that "**there is an acrid odor at 480V DS Bus."**
		• Dispatch Operator to check the Charging Pump(s).	
	CRS	(Step 3) Dispatch Operator to check the Charging Pump(s).	**NOTE:** The CRS will dispatch an AO. **Booth Instructor:** as **AO**, acknowledge and report **within 1 minute** that "**the___ Charging Pump is operating normally." (depends on which they start)**

Op Test No.: N18-1RT Scenario # 1 Event # 4 Page 30 of 70

Event Description: **"A" Charging Pump Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) IF Seal Injection is lost to any RCP, THEN…..	
	RO	(Step 5) IF a single-phase open circuit condition is suspected, THEN…..	
			NOTE: The CRS will address the Technical Specifications.
			NOTE: The CRS may call WCC/I&C to address the Charging Pump Trip. If so, **Booth Instructor** acknowledge as **WCC**. If asked, report that the **"A" Charging Pump will be restored in 12 hours.**
TECHNICAL SPECIFICATION 3.4.17, CHEMICAL AND VOLUME CONTROL SYSTEM (CVCS)			
	CRS	LCO 3.4.17 Reactor Coolant Pump (RCP) seal injection shall be OPERABLE with:	**NOTE:** TS LCO will NOT be met due to Seal Injection flow is < 6 gpm to each RCP during the time that NO charging pumps are running.
		Two Charging Pumps shall be OPERABLE; and	**NOTE:** "B" and "C" charging pumps are OPERABLE. Due to the transient nature of this failure and APP response, it is likely that the crew would have entered, and already complied with CONDITION E, when they reach the step to analyze ITS.
		Two makeup water pathways from the Refueling Water Storage Tank (RWST) shall be OPERABLE.	
	CRS	APPLICABILITY: Modes 1, 2, 3 and 4	
	CRS	ACTIONS	
CONDITION		REQUIRED ACTION	COMPLETION TIME

Op Test No.: N18-1RT Scenario # 1 Event # 4 Page 31 of 70

Event Description: **"A" Charging Pump Trip**

Time	Pos.	Expected Actions/Behavior	Comments
E. Seal injection to any RCP not within limit. AND At least one charging pump operable.		E.1 Initiate action to restore seal injection to affected RCP(s) AND E.2 Be in MODE 3. AND E.3 Be in MODE 5.	24 hours 6 hours 36 hours
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #5.			

Op Test No.: N18-1RT	Scenario # 1	Event # 5, 6, & 7	Page 32 of 70
Event Description:	**ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**		

A short time after that, an inadvertent Turbine Trip will occur, without a Reactor Trip. The operator will attempt to trip the reactor manually; however, both automatic and manual reactor trips have failed. The operator will enter EOP-E-0, "Reactor Trip or Safety Injection," and transition immediately to FRP-S.1, "Response to Nuclear Power Generation - ATWS." The operator will be required to insert control rods and direct that the reactor be tripped locally in order to make the reactor subcritical. Additionally Control Rod J-11 will be stuck out of the core once the reactor is tripped locally.
Once the local trip of the reactor occurs, the operator will transition back to EOP-E-0. On the transition, Control Rod J-11 will eject from the core and a SBLOCA will result. Upon Safety Injection actuation the A SI Pump will fail to automatically start and the SI Injection Valves will fail to open. The operator will need to manually start these pumps and open the valves. Ultimately the operator will transition to EOP-E-1, "Loss of Reactor or Secondary Coolant."
Upon completion of EOP-E-1 the operator will transition to EOP-ES-1.2, "Post-LOCA Cooldown and Depressurization."
The scenario will terminate at Step 12 of EOP-ES-1.2, after the operator has determined the appropriate SI Pump alignment and adjusted accordingly.

Booth Operator Instructions: **IMF TUR01**
IMF CRF04A f:UNTRIPPABLE,J-11

Indications Available:
- Turbine Trip with Power > P-8, NO Reactor Trip

Time	Pos.	Expected Actions/Behavior	Comments
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION			
NOTE Steps 1 through 4 are IMMEDIATE ACTION steps.			
	RO	(Step 1) CHECK Reactor Trip:	**Immediate Action**
		• Reactor Trip AND Bypass Breakers - OPEN	
		• Rod position indicators - FULLY INSERTED	
		• Rod Bottom Lights - ILLUMINATED	
	RO	(Step 1 RNO) Manually TRIP Reactor	**Immediate Action**

Op Test No.: N18-1RT Scenario # 1 Event # 5, 6, & 7 Page 33 of 70

Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		IF reactor power is GREATER THAN OR EQUAL TO 5% OR Intermediate Range SUR is positive, THEN GO TO FRP-S.1, Response to Nuclear Power Generation 0 ATWS, Step 1.	
			NOTE: The CRS will transition to FRP-S.1.
CAUTION RCPs should NOT be tripped with reactor power GREATER THAN 5%.			
NOTE Steps 1 and 2 are IMMEDIATE ACTION steps.			
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS			
			NOTE: The CRS will dispatch both the Inside and Outside AO to locally trip Rx (**Booth Instructor See Page 34**).
	RO	(Step 1) CHECK Reactor Trip:	**Immediate Action**
		• Reactor Trip AND Bypass Breakers - OPEN	
		• Rod position indicators - FULLY INSERTED	
		• Rod Bottom Lights - ILLUMINATED	
		• Neutron flux - LOWERING	
	RO	(Step 1 RNO) PERFORM the following:	**Immediate Action**
		• Manually TRIP Reactor.	
		• IF Reactor will NOT trip, THEN INSERT Control Rods.	**NOTE:** If the RO places the Control Rods to AUTO, auto rod insertion will occur.

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
Critical Tasks: **Insert Negative Reactivity into the Core by Inserting Control Rods Manually Prior to Locally Tripping the Reactor.** Safety Significance: Failure to insert negative reactivity, under the postulated plant conditions, results in an unnecessary situation in which the reactor remains critical or returns to a critical condition. Performance of the critical task would make the reactor subcritical and provide sufficient shutdown margin to prevent (or at least minimize the power excursion associated with) any subsequent return to criticality. Failure to insert negative reactivity constitutes mis-operation or incorrect operator performance which fails to prevent incorrect reactivity control. In the scenario postulated by the plant conditions, failure to insert negative reactivity by inserting control rods can result in the needless continuation of an extreme or a severe challenge to the subcriticality CSF. Although the challenge was not initiated by the operator (was not initiated by operator error), continuation of the challenge is a result of the operator's failure to insert negative reactivity.			
		• DISPATCH operator to locally open the following breakers:	**NOTE:** The CRS will dispatch both the Inside and Outside AO. **Booth Instructor:** Acknowledge as **each AO**, and after **2 minutes** use: **IRF EPSV480B3_438 f:TRIP** **IRF EPSV480B2B_437 f:TRIP** **DMF RPS01A** **DMF RPS01B** **IOR diRPSBBI001 f:ON** **DOR diRPSBBI001** then report that **the Rx has been locally tripped**.
		• Reactor Trip breakers	
		• Reactor Trip Bypass breakers	
		• BOTH MG Set Generator Output breakers	
		• BOTH MG Set Motor Input breakers	
	BOP	(Step 2) CHECK Turbine Trip:	**Immediate Action**
		• Both Turbine Stop Valves - CLOSED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CLOSE MSR Purge and Shutoff valves	
	BOP	(Step 3) CHECK AFW Pumps Running:	
		• CHECK Motor Driven AFW Pumps – BOTH RUNNING	**NOTE:** The MD AFW Pumps may not be running due to S/G levels being high.
	BOP	(Step 3.a RNO) Manually START pump(s).	
		• (Step 3.b) CHECK S/G Narrow Range levels – TWO S/Gs LESS THAN 16%	**NOTE:** The S/G levels are likely higher than 16%.
		• CHECK Steam Driven AFW Pump - RUNNING	**NOTE:** It is likely that the SD AFW Pump is NOT running.
	BOP	(Step 3.c RNO) Manually OPEN Steam Driven AFW Pump Steam Shutoff Valve(s) as necessary.	**NOTE:** It will NOT be necessary to start the SD AFW Pump.
	BOP/ RO	(Step 4) INITIATE Emergency Boration:	
		• START two Charging Pumps at maximum speed	
		• ALIGN Boration Flow Path:	
		• OPEN MOV-350, BA TO CHARGING PMP SUCT	
		• START Boric Acid Pump ALIGNED for BLEND	
	BOP/ RO	(Step 4.b.3) CHECK for Boric Acid flow on FI-110 GREATER THAN 30 gpm.	
	BOP/ RO	(Step 4.c) ALIGN Charging flow path:	
		• OPEN CVC-310B, LOOP 2 COLD LEG CHG Valve	

Op Test No.: N18-1RT Scenario # 1 Event # 5, 6, & 7 Page 36 of 70

Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• ADJUST the following as necessary to maintain proper Seal Injection and MAXIMUM Charging flow:	
		• Charging Pump Speed Controller(s)	
		• HIC-121, CHARGING FLOW Controller	
		• Seal Water Flow Control Valves	**NOTE:** The RO may contact the AO to adjust Seal Injection flows. If so, **Booth Instructor** acknowledge as AO; and use: IRF CVC030 f: variable IRF CVC031 f: variable IRF CVC032 f: variable
		• MAINTAIN Seal Injection flow between 6 gpm and 20 gpm per RCP UNLESS Seal Injection isolated	
		• MAINTAIN Charging flow on FI-122A – GREATER THAN BORIC ACID FLOW	
		• CHECK PZR pressure – LESS THAN 2335 PSIG	
	BOP/ RO	(Step 5) CHECK CV Ventilation Isolation Valves - CLOSED	
	BOP/ RO	(Step 6) CHECK NO SI Signal Exists	**NOTE:** It is likely that a Safety Injection has occurred and the CRS will direct the BOP to complete Attachment 3 IAW Step 6 RNO.
		(Step 6 RNO) PERFORM Attachment 3, Auto Action Verification while CONTINUING WITH this procedure.	**Examiner NOTE:** The CRS will assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Attachment 3. **Other Examiners** follow **FRP-S.1** Actions, on **Page 41**.

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS ATTACHMENT 3, AUTO ACTION VERIFICATION			
	BOP	(Step 1) CHECK ECCS Pumps Running:	**NOTE:** The SI Pumps have failed to auto start. However, the RO may have previously started the pumps.
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	BOP	(Step 1 RNO) Manually START pump(s) as necessary.	**NOTE:** If the A SI Pump has not been previously started they will be started here.
	BOP	(Step 2) CHECK ECCS Valves In Proper Emergency Alignment	**NOTE:** The SI injection valves are CLOSED.
	BOP	(Step 2 RNO) Manually ALIGN valve(s) as necessary.	

Critical Tasks:

Establish flow from at least one high-head SI pump upon completion of the EOP-E-0 Attachment 1 (or FRP-S.1 Attachment 3), AUTO ACTION VERIFICATION.

Safety Significance: Failure to manually start at least one high-head SI pump under the postulated conditions constitutes mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity. In this case, at least one high-head SI pump can be manually started from the control room. Therefore, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario. Additionally, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Finally, under the postulated plant conditions, failure to manually start a high-head SI pump (when it is possible to do so) is a violation of the facility license condition.

	BOP	(Step 3) CHECK CCW Pumps - AT LEAST ONE RUNNING	**NOTE:** The "A" CCW Pump is running.

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 4) CHECK Containment Isolation Phase A:	
		• CHECK Containment Isolation Phase A - ACTUATED	
		• CHECK Containment Isolation Phase A Valves - CLOSED	
		• CHECK Excess Letdown - ISOLATED	
		• CVC-387, EXCESS LTDN STOP VALVE - CLOSED	
		• HIC-137, EXCESS LTDN FLOW CONTROLLER - AT 0% DEMAND	
	BOP	(Step 5) CHECK Feedwater Isolation:	
		• CHECK Main Feed Pumps - BOTH TRIPPED	
		• CHECK Main Feedwater isolated:	
		• Feedwater Reg Valves - CLOSED	
		• Feedwater Reg Bypass Valves - CLOSED	
		• Feedwater Header Section Valves - CLOSED	
	BOP	(Step 6) CHECK If Main Steam Lines Should Be Isolated:	
		• CHECK Main Steam Line Isolation - REQUIRED	
		• CHECK Containment pressure - GREATER THAN 10 PSIG	
		OR	
		• High steam flow with:	**NOTE:** The Safety Injection signal **IS** APP-004-E1, HI STM FLO LO TAVG/LO SLP SFGRD/TRIP
		• S/G pressure - LESS THAN 614 PSIG	
		OR	
		• Tavg - LESS THAN 543°F	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6.b) CHECK MSIVs AND MSIV Bypass Valves - CLOSED	
	BOP	(Step 7) CHECK Proper Service Water System Operation:	
		• CHECK SW Pumps - ALL RUNNING	
		• CHECK SW Booster Pumps - BOTH RUNNING	
		• CHECK Both SW Header Low Pressure Alarms - EXTINGUISHED	
		• APP-008-F7, SOUTH SW HDR LO PRESS	
		• APP-008-F8, NORTH SW HDR LO PRESS	
	BOP	(Step 8) CHECK BOTH EDGs - RUNNING	
	BOP	(Step 9) CHECK ECCS Flow:	
		• CHECK RCS pressure - LESS THAN 1650 PSIG [1725 PSIG]	
	BOP	(Step 9.a RNO) GO TO Step 10.	
	BOP	(Step 10) CHECK CV Recirculation Fans - ALL RUNNING	
	BOP	(Step 11) CHECK IVSW System Actuated:	
		• PCV-1922A, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
		• PCV-1922B, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
	BOP	(Step 12) CHECK CV Ventilation Isolation:	
		• CV Ventilation Isolation Valves - CLOSED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 13) CHECK Control Room Ventilation Aligned For Pressurization Mode:	
		• HVA-1A OR HVA-1B,CONTROL ROOM AIR HANDLING FAN - RUNNING	
		• HVE-19A OR HVE-19B,CONTROL ROOM AIR CLEANING FAN - RUNNING	
		• HVE-16, CONTROL ROOM AIR EXHAUST FAN - STOPPED	
		• Control Room HVAC Outside Air Damper A OR B - OPEN	
		• CR-D1A-SA, CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER - CLOSED	
		• CR-D1B-SB, CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER - CLOSED	
	BOP	(Step 14) CHECK DS Bus - ENERGIZED	
	BOP	(Step 15) CHECK Battery Chargers ENERGIZED:	
		• APP-036-D1, BATT CHARGER A/A-1 TROUBLE Alarm - EXTINGUISHED	
		• APP-036-D2, BATT CHARGER B/B-1 TROUBLE Alarm - EXTINGUISHED	
	BOP	(Step 16) STOP R-11/12 Sample Pump	
	BOP	(Step 17) Locally RESET AND LOAD Instrument Air Compressor(s) As Necessary (38 KW each):	**NOTE:** This action is NOT required.
		• Compressor A (MCC-5 CMPT 7M)	
		• Compressor B (MCC-6 CMPT 3G)	
	BOP	(Step 18) PERFORM Crew Update To Include The Following:	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• Attachment completion	
		• Manual actions taken	
		• Failed equipment status	
		• SW status per Step 7.c	
		• If applicable, PERFORM Supplement M, Component Alignment For Loss Of SW To Turbine Building, as time permits	**NOTE:** This action is NOT required.
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS			
	RO	(Step 7) CHECK IF the Following Trips Have Occurred:	
		• Reactor - TRIPPED	**NOTE:** If the Rx is NOT locally tripped, the Step 7.a RNO will be performed.
	CRS	(Step 7 RNO) ENSURE operator is dispatched to locally open the following breakers:	
		• Reactor Trip breakers	
		• Reactor Trip Bypass breakers	
		• BOTH MG Set Generator Output breakers	
		• BOTH MG Set Motor Input breakers	
	BOP	(Step 7.b) Turbine - TRIPPED	
	RO	(Step 8) CHECK IF Reactor is Subcritical:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• Power Range channels – LESS THAN 5%	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• Intermediate Range channels - NEGATIVE STARTUP RATE	
		• OBSERVE CAUTION prior to Step 18 and GO TO Step 18	
CAUTION Boration should continue to obtain adequate shutdown margin during subsequent actions.			
	RO	(Step 18) CHECK ARPI – LESS THAN TWO RODS STUCK OUT	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware. Only Rod J-11 is Stuck Out.
CAUTION Performance of Attachment 4 MUST NOT delay the mitigation strategy of the EOP Network Procedures. Attachment 4 is used to address RNP Site Specific configuration control and administration items that are NOT listed in the PWROG Emergency Response Guidelines (ERG) Generic Technical Guidance (GTG).			
	RO	(Step 19) STOP RCS Boration IAW Attachment 4, Restoration of RCS/VCT Make-up Controls and Administrative Actions, while continuing with this procedure	**Examiner NOTE:** The CRS may assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Attachment 4. **Other Examiners** follow **FRP-S.1** Actions, **Step 20**, on **Page 45**.
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS **ATTACHMENT 4, RESTORATION OF RCS/VCT MAKE-UP CONTROLS AND ADMINISTRATIVE ACTIONS**			
			Examiner NOTE: Follow the actions associated with Attachment 4 if BOP is assigned by CRS to perform.
CAUTION Performance of this Attachment MUST NOT delay the mitigation strategy of the EOP Network Procedures. This attachment is used to address RNP Site Specific configuration control and administration items that are NOT listed in the PWROG Emergency Response Guidelines (ERG) Generic Technical Guidance (GTG).			

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		NOTE • The performance of some steps in this Attachment may not be necessary if a Safety Injection (SI) Signal has occurred. This attachment assumes FRP-S.1 will return to EOP-E-0, Reactor Trip or Safety Injection, with no other events in progress. • Performance of this Attachment is done in parallel with the other restoration steps in FRP-S.1. It is acceptable to exit FRP-S.1 as described in Main Body Step 20 while this attachment is still in progress.	
	RO	(Step 1) STOP RCS Boration as follows:	
		• CHECK that the Reactor is SUB-CRITICAL with at least one of the below conditions satisfied:	
		• RCS Boron concentration is EQUAL TO OR GREATER THAN 1950 PPM	
		OR	
		• ONLY one Control Rod is stuck out	
		OR	
		• ALL Control Rods are fully inserted	
		• Align the RCS/VCT Make-up Controls as follows:	
		• ENSURE Boric Acid Pump Control Switch aligned for blend - IN AUTO	
		• ENSURE a PRIMARY WATER PUMP Control Switch - IN AUTO	
		• ENSURE MOV-350, BA TO CHARGING PMP SUCT - CLOSED	
		• ENSURE Control Switch for FCV-113A, BA TO BLENDER - IN AUTO	
		• ENSURE Control Switch for FCV-113B, BLENDED MU TO CHG SUCT - IN AUTO	
		• ENSURE Control Switch for FCV-114A, BA TO BLENDER - IN AUTO	
		• ENSURE Control Switch for FCV-114B, BLENDED MU TO VCT - IN AUTO	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• ENSURE FCV-114A, PRIMARY WTR FLOW DILUTE MODE, Auto-Manual Controller – IN AUTO	
		• ENSURE FCV-113A, BORIC ACID FLOW, Auto-M	
		• ENSURE FCV-113A potentiometer is set for greater than 4.0 (40%) to achieve blended VCT Auto Make-up of at least 1950 ppm	
		• ENSURE RCS MAKEUP MODE Control Switch – IN AUTO	
		• Momentarily place the RCS MAKEUP SYSTEM Control Switch in the ON position	
		• CHECK that the RCS MAKEUP SYSTEM indicates ON	
		• CHECK VCT Level – GREATER THAN 20 INCHES	
		• CHECK Emergency Boration from the RWST WAS NOT USED	
NOTE Normal NO LOAD Pressurizer Level is approximately 22%. The intent of this control band is to allow for the expected, elevated, Pressurizer Level that will occur due to the rapid boration. Reduction to 22% will be accomplished in subsequent procedures.			
	RO	(Step 2) REDUCE Charging Pump Speed as necessary while maintaining the following parameters:	
		• RCP Seal Injection Flows between 6 gpm and 20 gpm per RCP UNLESS Seal Injection isolated	
		• Pressurizer Level between 22% and 50%	
NOTE It is possible that entry into this procedure will also required the activation of the Emergency Response Organization (ERO). Informing the Technical Support Center (TSC) Accident Assessment Team (AAT) will satisfy the intent of Steps 3 and 4.			

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) NOTIFY Engineering to evaluate the following to determine if RCP seal inspection is required:	
		• RCP Bearing temperatures	
		• No. 1. Seal Leakoff temperatures	
		• No. 1 Seal Leakoff flow rates	
	RO	(Step 4) NOTIFY Reactor Engineering to perform an analysis of the event IAW AD-PI-ALL-0100, Corrective Action Program, and AD-OP-ALL-0203, Reactivity Management, for an SL-1 Severe Reactivity Management Event	**NOTE:** This Attachment may not be finished because of the SBLOCA (Rod Ejection).
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS			
CAUTION DO NOT delay the exit of this procedure to address any potentially open or incomplete Continuous Action Steps. The overall mitigation strategy of the EOP Network assumes that FRP-S.1 Step 20 is accomplished as soon as reasonably possible once the Reactor is sub-critical.			
	RO/ CRS	(Step 20) PERFORM the following:	
		• RESET SPDS	
		• COMMENCE MONITORING CSFST, Critical Safety Function Status Trees	
		• RETURN TO Procedure AND Step in Effect	

BOOTH INSTRUCTOR: **IMF CRF05A f:900,J-11**

NOTE: Rod J-11 Ejects, SBLOCA event

Indications:

- Lowering RCS Pressure
- Rising Containment Sump Level
- Rising Containment Pressure
- Control Rod J-11 IRPI indication blank, & J-11 Rod Bottom light now LIT

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION			
	RO	(Step 1) CHECK Reactor Trip:	**Immediate Action**
		• Reactor Trip AND Bypass Breakers - OPEN	
		• Rod position indicators - FULLY INSERTED	
		• Rod Bottom Lights - ILLUMINATED	
		• Neutron Flux - LOWERING	
	BOP	(Step 2) CHECK Turbine Trip:	**Immediate Action**
		• Both Turbine Stop Valves - CLOSED	
		• All MSR Purge AND Shutoff Valves - CLOSED	
	BOP	(Step 3) CHECK Power To AC EMERGENCY BUSSES:	**Immediate Action**
		• CHECK Bus E-1 OR E-2 - AT LEAST ONE ENERGIZED	
		• CHECK Bus E-1 AND E-2 - BOTH ENERGIZED	
	RO/ BOP	(Step 4) CHECK SI Status:	**Immediate Action**
		CHECK if SI is actuated:	
		• SI annunciators - ANY ILLUMINATED	**NOTE:** SI may not have actuated. The operators may recognize degrading plant conditions and Manually SI
		OR	
		• SI equipment - AUTO STARTED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	Foldout Page:	
		FAULTED S/G AFW ISOLATION CRITERIA	
		RCP TRIP CRITERIA	**NOTE:** The RCP Trip Criteria will apply in this event, when Adverse Containment is reached. This will occur while in EOP-E-0.
		AFW SUPPLY SWITCHOVER CRITERIA	
		DC BUS, INSTRUMENT BUS, OR MCC-5 FAILURE CRITERIA	
		SPENT FUEL POOL COOLING CRITERIA	

Critical Tasks:

Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (BOTH of the following satisfied: SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW AND RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F [32°F]) so that CET temperatures do not become superheated when forced circulation in the RCS stops. (EOP-Based)

TIME START _____ TIME COMPLETE _____

Safety Significance: Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents mis-operation or incorrect operator performance in which the operator has failed to prevent degradation of the fuel cladding barrier to fission product release and which leads to a violation of the facility license condition.

	CRS	(Step 5) PERFORM Attachment 1, Auto Action Verification, While CONTINUING WITH This Procedure	**Examiner NOTE:** This is identical to the Attachment 3 of FRP-S.1. If the Attachment 3 has already been completed, this attachment is not required.

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
			The CRS will likely assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Attachment 1. **CRS/RO** follow **E-0** Actions, **Step 6**, on **Page 52**.
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION ATTACHMENT 1, AUTO ACTION VERIFICATION			
	BOP	(Step 1) CHECK ECCS Pumps Running:	**NOTE:** The SI Pumps have failed to auto start. However, the RO may have previously started the pumps.
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	BOP	(Step 1 RNO) Manually START pump(s) as necessary.	**NOTE:** If the A SI Pump has not been previously started they will be started here.
	BOP	(Step 2) CHECK ECCS Valves In Proper Emergency Alignment	**NOTE:** The SI injection valves are CLOSED.
	BOP	(Step 2 RNO) Manually ALIGN valve(s) as necessary.	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
Critical Tasks: **Establish flow from at least one high-head SI pump upon completion of the EOP-E-0 Attachment 1 (or FRP-S.1 Attachment 3), AUTO ACTION VERIFICATION.** Safety Significance: Failure to manually start at least one high-head SI pump under the postulated conditions constitutes mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity. In this case, at least one high-head SI pump can be manually started from the control room. Therefore, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario. Additionally, failure to manually start a high-head SI pump also represents a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Finally, under the postulated plant conditions, failure to manually start a high-head SI pump (when it is possible to do so) is a violation of the facility license condition.			
	BOP	(Step 3) CHECK CCW Pumps - AT LEAST ONE RUNNING	**NOTE:** The "A" CCW Pump is running.
	BOP	(Step 4) CHECK Containment Isolation Phase A:	
		• CHECK Containment Isolation Phase A - ACTUATED	
		• CHECK Containment Isolation Phase A Valves - CLOSED	
		• CHECK Excess Letdown - ISOLATED	
		• CVC-387, EXCESS LTDN STOP VALVE - CLOSED	
		• HIC-137, EXCESS LTDN FLOW CONTROLLER - AT 0% DEMAND	
	BOP	(Step 5) CHECK Feedwater Isolation:	
		• CHECK Main Feed Pumps - BOTH TRIPPED	
		• CHECK Main Feedwater isolated:	
		• Feedwater Reg Valves - CLOSED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• Feedwater Reg Bypass Valves - CLOSED	
		• Feedwater Header Section Valves - CLOSED	
	BOP	(Step 6) CHECK If Main Steam Lines Should Be Isolated:	
		• CHECK Main Steam Line Isolation - REQUIRED	
		• CHECK Containment pressure - GREATER THAN 10 PSIG	
		OR	
		• High steam flow with:	
		• S/G pressure - LESS THAN 614 PSIG	
		OR	
		• Tavg - LESS THAN 543°F	
	BOP	(Step 6.a) GO TO Step 7.	
	BOP	(Step 7) CHECK Proper Service Water System Operation:	
		• CHECK SW Pumps - ALL RUNNING	
		• CHECK SW Booster Pumps - BOTH RUNNING	
		• CHECK Both SW Header Low Pressure Alarms - EXTINGUISHED	
		• APP-008-F7, SOUTH SW HDR LO PRESS	
		• APP-008-F8, NORTH SW HDR LO PRESS	
	BOP	(Step 8) CHECK BOTH EDGs - RUNNING	
	BOP	(Step 9) CHECK ECCS Flow:	
		• CHECK RCS pressure - LESS THAN 1650 PSIG [1725 PSIG]	
		• CHECK SI Pumps – FLOW INDICATED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK RCS pressure – LESS THAN 275 PSIG [325 PSIG]	
	BOP	(Step 9.c RNO) GO TO Step 10.	
	BOP	(Step 10) CHECK CV Recirculation Fans - ALL RUNNING	
	BOP	(Step 11) CHECK IVSW System Actuated:	
		• PCV-1922A, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
		• PCV-1922B, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
	BOP	(Step 12) CHECK CV Ventilation Isolation:	
		• CV Ventilation Isolation Valves - CLOSED	
	BOP	(Step 13) CHECK Control Room Ventilation Aligned For Pressurization Mode:	
		• HVA-1A OR HVA-1B,CONTROL ROOM AIR HANDLING FAN - RUNNING	
		• HVE-19A OR HVE-19B,CONTROL ROOM AIR CLEANING FAN - RUNNING	
		• HVE-16, CONTROL ROOM AIR EXHAUST FAN - STOPPED	
		• Control Room HVAC Outside Air Damper A OR B - OPEN	
		• CR-D1A-SA, CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER - CLOSED	
		• CR-D1B-SB, CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER - CLOSED	
	BOP	(Step 14) CHECK DS Bus - ENERGIZED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 15) CHECK Battery Chargers ENERGIZED:	
		• APP-036-D1, BATT CHARGER A/A-1 TROUBLE Alarm - EXTINGUISHED	
		• APP-036-D2, BATT CHARGER B/B-1 TROUBLE Alarm - EXTINGUISHED	
	BOP	(Step 16) STOP R-11/12 Sample Pump	
	BOP	(Step 17) Locally RESET AND LOAD Instrument Air Compressor(s) As Necessary (38 KW each):	**NOTE:** This action is NOT required.
		• Compressor A (MCC-5 CMPT 7M)	
		• Compressor B (MCC-6 CMPT 3G)	
	BOP	(Step 18) PERFORM Crew Update To Include The Following:	
		• Attachment completion	
		• Manual actions taken	
		• Failed equipment status	
		• SW status per Step 7.c	
		• If applicable, PERFORM Supplement M, Component Alignment For Loss Of SW To Turbine Building, as time permits	**NOTE:** This action is NOT required.
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION			
	RO	(Step 6) CHECK AFW Pumps Running:	
		• CHECK Motor Driven AFW Pumps - BOTH RUNNING	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK S/G Narrow Range levels - TWO S/Gs LESS THAN 16%	
		• CHECK Steam Driven AFW Pump - RUNNING	**NOTE:** The SDAFW Pump is running.
	RO	(Step 7) CHECK AFW Valves In Proper Emergency Alignment:	
		• AFW Header Discharge Valves - FULL OPEN	
		• AFW Header Section Valves - FULL OPEN	
		• Steam Driven AFW Pump Discharge Valves - FULL OPEN IF PUMP RUNNING	
	RO	(Step 8) CHECK Total AFW Flow:	
		• RESET SI	
		• CONTROL AFW flow to maintain Intact S/G Narrow Range level between 9%[18%] AND 50%	
		• CHECK total AFW flow - GREATER THAN 300 GPM	
	RO	(Step 9) CHECK CV Spray NOT Required:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK Containment Pressure - HAS REMAINED LESS THAN 10 PSIG	**NOTE:** Containment pressure is rising but has remained < 10 psig.
		• CHECK CV Spray - NOT ACTUATED	
	RO	(Step 10) CHECK RCP Seal Cooling:	
		• CCW flow to RCP(s) Thermal Barriers - NORMAL	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• APP-001-C1,RCP THERM BAR COOL WTR HI FLOW ALARM - EXTINGUISHED	
		• APP-001-D1,RCP THERM BAR COOL WTR LO FLOW alarm - EXTINGUISHED	
		OR	
		• Seal Injection flow - ADEQUATE	
		• Seal Injection flow - GREATER THAN 6 GPM PER RCP	
		OR	
		• Thermal Barrier ΔPs - GREATER THAN 5 INCHES WATER PER RCP	
	RO	(Step 11) CHECK RCS Temperatures:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• With ANY RCP running, RCS average temperature - STABLE AT OR TRENDING TO 547°F	**NOTE:** The LOCA may be causing a cooldown. If so, the RNO will be performed. Otherwise proceed to Step 12.
		OR	
		• With NO RCPs running, RCS Cold Leg temperatures - STABLE AT OR TRENDING TO 547°F	
	RO	(Step 11 RNO) IF temperature is LESS THAN 547°F AND lowering, THEN PERFORM the following:	
		• STOP dumping steam.	
		• IF RCS cooldown continues, THEN REDUCE total AFW flow to minimum for decay heat removal.	
		• MAINTAIN total AFW flow GREATER THAN 300 gpm UNTIL S/G Narrow Range level is GREATER THAN 9%[18%] in at least one S/G.	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF RCS cooldown continues, THEN CLOSE MSIVs AND MSIV Bypass Valves.	
	RO	(Step 12) CHECK PZR PORVs AND Spray Valves:	
		• CHECK PZR PORVs - CLOSED	
		• CHECK Normal PZR Spray Valves - CLOSED	
		• CHECK Aux PZR Spray Valve - CLOSED	
	RO	(Step 13) CHECK If RCPs Should Be Stopped:	
		• CHECK RCPs - ANY RUNNING	
		• CHECK SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW	
		• CHECK RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F[32°F]	**NOTE:** It is likely that the RCP Trip criteria will be met when Adverse Containment is reached.
	CRS	(Step 13.c RNO) GO TO Step 14.	
	RO	(Step 14) CHECK If S/G Secondary Pressure Boundaries Are Intact:	
		• NONE LOWERING IN AN UNCONTROLLED MANNER	
		• NONE COMPLETELY DEPRESSURIZED	
	RO	(Step 15) CHECK If S/G Tubes Are Intact:	
		• Secondary Radiation Monitors - HAVE REMAINED NORMAL	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• R-15, CONDENSER AIR EJECTOR GAS	
		• R-19s, S/G Blowdown Radiation	
		• R-31s, STEAMLINE RADIATION MONITORs	
		• S/G levels - NONE RISING IN AN UNCONTROLLED MANNER	
	CRS	(Step 16) PERFORM the following:	
		• CHECK If RCS Is Intact:	
		• CV radiation - NORMAL	
		• R-2, CV AREA	
		• R-32A, CV HIGH RANGE	
		• R-32B, CV HIGH RANGE	
		• CV pressure - NORMAL	
		• CV Sump level - NORMAL	
			NOTE: The CRS will transition to EOP-E-1.
EOP-E-1, LOSS OF REACTOR OR SECONDARY COOLANT			
	RO/ BOP	FOLDOUT PAGE:	
		RCP TRIP CRITERIA	**NOTE:** The RCP Trip Criteria will apply in this event.
		SI TERMINATION CRITERIA	
		SI REINITIATION CRITERIA	
		SECONDARY INTEGRITY CRITERIA	
		EOP-E-3 TRANSITION CRITERIA	
		COLD LEG RECIRCULATION SWITCHOVER CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 1) CHECK If RCPs Should Be Stopped:	
		• CHECK RCPs - ANY RUNNING	
		• CHECK SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW	
		• CHECK RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F [32°F]	**NOTE:** It is likely that the RCP Trip criteria will have been met.
	CRS	(Step 1 RNO) GO TO Step 2.	
	BOP	(Step 2) CHECK If S/G Secondary Pressure Boundaries Are Intact:	
		• NONE LOWERING IN AN UNCONTROLLED MANNER	
		• NONE COMPLETELY DEPRESSURIZED	
	BOP	(Step 3) CHECK Intact S/G Levels:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		CHECK S/G Narrow Range levels - GREATER THAN 9% [18%]	**NOTE:** Adverse Containment Numbers will be required after CV pressure rises to greater than 4 psig.
		CONTROL feed flow to maintain S/G Narrow Range levels - BETWEEN 9% [18%] AND 50%	
	RO	(Step 4) RESET SI	
	RO	(Step 5) RESET Containment Isolation Phase A	
	BOP	(Step 6) CHECK Secondary Radiation:	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK Secondary Radiation Monitors - HAVE REMAINED NORMAL	
		• R-15, CONDENSER AIR EJECTOR GAS	
		• R-19s, S/G Blowdown Radiation	
		• R-31s, STEAMLINE RADIATION MONITORs	
		• PERFORM the following:	
		• REQUEST Chemistry periodically sample ALL S/Gs for activity.	**NOTE:** The CRS may call Chemistry to address the samples. If so, **Booth Instructor** acknowledge as Chemistry.
		• Secondary sample results - NORMAL (WHEN RESULTS AVAILABLE)	
	RO	(Step 7) CHECK PZR PORVs AND Block Valves:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK Power to PZR PORV Block Valves - AVAILABLE	
		• CHECK PZR PORVs - CLOSED	
		• CHECK PZR PORV Block valves - AT LEAST ONE OPEN	
	RO	(Step 8) ESTABLISH Instrument Air To CV:	
		• CHECK APP-002-F7, INSTR AIR HDR LO PRESS alarm - EXTINGUISHED	
		• RESET IA PCV-1716, INSTRUMENT AIR ISOLATION TO CV	
		• CHECK IA PCV-1716 - OPEN	
	BOP	(Step 9) CHECK Power Supply To Charging Pumps - OFFSITE POWER AVAILABLE	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 10) CHECK If Charging Flow Has Been Established:	
		• CHECK Charging Pumps - AT LEAST ONE RUNNING	
		• ESTABLISH desired Charging flow:	
		• START additional Charging Pump(s) as necessary	**NOTE:** The third Charging Pump is OOS due to an earlier failure.
		• ADJUST the following as necessary to maintain proper Seal Injection AND desired Charging flow:	
		• Charging Pump Speed Controller(s)	
		• HIC-121, CHARGING FLOW Controller	
		• Seal Water Flow Control Valves	**NOTE:** The BOP may contact the AO to adjust Seal Injection flows. If so, **Booth Instructor** acknowledge as AO; and use: IRF CVC030 f: variable IRF CVC031 f: variable IRF CVC032 f: variable
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	
	RO	(Step 11) CHECK If ECCS Flow Should Be Terminated:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK RCS Subcooling based on Core Exit T/Cs - GREATER THAN 18°F [37°F]	**NOTE:** Adverse Containment Numbers will be required after CV pressure rises to greater than 4 psig.

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 11 RNO) GO TO Step 12.	
	RO	(Step 12) CHECK If Containment Spray Should Be Stopped:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK CV Spray Pumps - ANY RUNNING	
	CRS	(Step 12.a RNO) GO TO Step 13.	
	RO	(Step 13) CHECK If RHR Pumps Should Be Stopped:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK RCS pressure:	
		• Pressure - GREATER THAN 275 PSIG [325 PSIG]	**NOTE:** Adverse Containment Numbers will be required after CV pressure rises to greater than 4 psig.
		• Pressure - STABLE OR RISING	
		• CHECK RHR Pumps - ANY RUNNING WITH SUCTION ALIGNED TO RWST	
		• STOP RHR Pumps	
		• CHECK RCS pressure remains GREATER THAN 275 PSIG [325 PSIG]	
	CRS	(Step 14) CHECK RCS And S/G Pressures:	
		• CHECK pressure in ALL S/Gs - STABLE OR RISING	
		• CHECK RCS pressure - STABLE OR LOWERING	
	BOP	(Step 15) CHECK If Diesel Generators Should Be Stopped:	
		• CHECK AC Emergency Busses - ENERGIZED BY OFFSITE POWER	
		• Bus E-1,BKR 52/18B CLOSED	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• Bus E-2,BKR 52/28B CLOSED	
		• CHECK Emergency Diesel Generator(s) Starting Air annunciators - EXTINGUISHED	
		• APP-010-B2, EDG A START AIR LO PRESS	
		• APP-010-B3, EDG B START AIR LO PRESS	
		• STOP ANY unloaded Emergency Diesel Generator(s)	
	CRS	(Step 16) INITIATE Evaluation Of Plant Status:	
		• CHECK Cold Leg Recirculation capability:	
		• Train A:	
		• CHECK the following pumps - AVAILABLE	
		• RHR Pump A	
		• ANY CCW Pump	
		• ANY two SW Pumps	
		• CHECK the following valves - AVAILABLE	
		• SI-860A, CV SUMP TO RHR	
		• SI-861A, CV SUMP TO RHR	
		• SI-862A, RWST TO RHR	
		• CC-749A, CCW FROM RHR HX	
		• Train B:	
		• CHECK the following pumps - AVAILABLE	
		• RHR Pump B	
		• ANY CCW Pump	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• ANY two SW Pumps	
		• CHECK the following valves - AVAILABLE	
		• SI-860B, CV SUMP TO RHR	
		• SI-861B, CV SUMP TO RHR	
		• SI-862B, RWST TO RHR	
		• CC-749B, CCW FROM RHR HX	
		• CHECK Auxiliary Building Conditions - NORMAL	
		• R-3, PASS PANEL AREA	
		• R-4, CHARGING PUMP ROOM	
		• R-6, SAMPLING ROOM	
		• RI-14C, Plant Effluent NG-LO	
		• LI-615A, RHR PIT "A" LEVEL INDICATOR	
		• LI-615B, RHR PIT "B" LEVEL INDICATOR	
		• Aux Bldg Sump Tank "A" level	
		• Aux Bldg Sump Tank "B" level	
		• OBTAIN samples:	
		• CONTACT Chemistry to obtain the following samples:	**NOTE:** The CRS may call WCC/Chemistry to address the sampling requirements. If so, **Booth Instructor** acknowledge as WCC/Chemistry.
		• RCS boron concentration	
		• RCS activity	
		• CV atmosphere	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CONSULT Plant Operations Staff as necessary to assess additional sampling requirements for fuel damage	**NOTE:** The CRS may call WCC/Plant Management to address the sampling requirements. If so, **Booth Instructor** acknowledge as WCC/ Plant Management.
		• EVALUATE plant equipment to support long term recovery:	**NOTE:** It is likely that the CRS will conduct a Crew Focus Brief at this point.
		• RHR Pumps	
		• SI Pumps	
		• CV Spray Pumps	
		• CV Fans	
		• AFW Pumps	
		• SW System	
		• CCW System	
		• IVSW System	
		• EDG Fuel and Auxiliaries	
		• START additional plant equipment to assist in recovery as necessary:	
		• Aux Boiler	**NOTE:** The CRS will dispatch an AO to start the Aux Boiler. If so, **Booth Instructor** acknowledge as AO.
		• Other plant equipment needed during RCS cooldown to Cold Shutdown	
	RO	(Step 17) CHECK If RCS Cooldown AND Depressurization Is Required:	
		• CHECK RCS pressure - GREATER THAN 275 PSIG [325 PSIG]	**NOTE:** Adverse Containment Numbers will be required after CV pressure rises to greater than 4 psig.
		• RESET SPDS.	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• GO TO EOP-ES-1.2, Post LOCA Cooldown And Depressurization, Step 1.	
			NOTE: The CRS will transition to EOP-ES-1.2.
EOP-ES-1.2, POST-LOCA COOLDOWN AND DEPRESSURIZATION			
	RO/ BOP	Foldout Page:	**NOTE:** The RCP Trip Criteria no longer applies.
		SI TERMINATION CRITERIA	
		SI REINITIATION CRITERIA	
		SECONDARY INTEGRITY CRITERIA	
		EOP-E-3 TRANSITION CRITERIA	
		COLD LEG RECIRCULATION SWITCHOVER CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	
	RO	(Step 1) CHECK If RHR Pumps Should Be Stopped:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK RHR Pumps - ANY RUNNING WITH SUCTION ALIGNED TO RWST	**NOTE:** It is most likely that the RHR Pumps were stopped in EOP-E-1.
	CRS	(Step 1.a RNO) GO TO Step 2.	
	BOP	(Step 2) CHECK ALL AC Busses - ENERGIZED BY OFFSITE POWER	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	RO	(Step 3) ESTABLISH Charging Flow:	
		• CHECK Charging Pumps - AT LEAST ONE RUNNING	
		• ALIGN Charging Pump Suction To RWST:	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• OPEN LCV-115B, EMERG MU TO CHG SUCT	
		• CLOSE LCV-115C, VCT OUTLET Valve	
		• PLACE RCS Makeup System Switch to STOP	
		• ESTABLISH MAXIMUM Charging flow:	
		• START additional Charging Pump(s) as necessary	**NOTE:** The CRS may direct that the third Charging Pump be started.
		• ADJUST the following as necessary to maintain proper Seal Injection AND MAXIMUM Charging flow:	
		• Charging Pump Speed Controller(s)	
		• HIC-121, CHARGING FLOW Controller	
		• Seal Water Flow Control Valves	**NOTE:** The BOP may contact the AO to adjust Seal Injection flows. If so, **Booth Instructor** acknowledge as AO; and use: IRF CVC030 f: variable IRF CVC031 f: variable IRF CVC032 f: variable
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	
	BOP	(Step 4) CHECK Intact S/G Levels:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK S/G Narrow Range levels - GREATER THAN 9% [18%]	**NOTE:** Adverse Containment Numbers will be required after CV pressure rises to greater than 4 psig.

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CONTROL feed flow to maintain S/G Narrow Range levels - BETWEEN 9% [18%] AND 50%	
	RO	(Step 5) BLOCK SI Actuation:	
		• CHECK PZR pressure - LESS THAN 1950 PSIG	
		• DEFEAT Low Pressure Safety Injection signal as follows:	
		• Momentarily PLACE PZR PRESS/HI STM LINE DP Switch to BLOCK position.	
		• CHECK LO PRESS SAFETY INJECTION BLOCKED status light - ILLUMINATED	
		• CHECK RCS Tavg - LESS THAN 543°F	**NOTE:** If the RCS is >543°F, the CRS will continue with Step 6, and return to Steps 5.d-f after the cooldown.
	CRS	(Step 5.c RNO) WHEN Tavg is LESS THAN 543°F, THEN PERFORM Step 5.d.	
		• CONTINUE with Step 6.	
	RO	• (Step 5.d) DEFEAT Low Temperature Safety Injection signal as follows:	**NOTE:** These steps will be performed once RCS Temperature is less than 543°F.
		• Momentarily PLACE Safety Injection T-AVG Switch to BLOCK position	
		• CHECK LO TEMP SAFETY INJECTION BLOCKED Status Light - ILLUMINATED	
	RO	(Step 6) DEENERGIZE PZR Heaters:	
		• PLACE ALL PZR Heater Switches in OFF position	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• CONSULT Plant Operations Staff for a recommended indicated PZR water level that will ensure PZR Heaters are covered	**NOTE:** The CRS may have the SM contact Plant OPS staff for this.
	CRS	(Step 7) INITIATE RCS Cooldown To Cold Shutdown:	
		a. MAINTAIN cooldown rate in RCS Cold Legs - LESS THAN 100°F in the last 60 minutes	
		b. CHECK RHR System - IN SERVICE	**NOTE:** RHR is not in service.
	CRS	(Step 7.b RNO) GO TO Step 7.c.	
	BOP	(Step 7.c) DUMP steam to Condenser from Intact S/G(s):…	**NOTE:** The Condenser is not available.
	BOP	(Step 7.c RNO) DUMP steam from Intact S/G(s) using S/G Steam Line PORV(s).	
	BOP	d. CHECK RCS Tavg - LESS THAN 543°F	
		e. Momentarily PLACE STEAM DUMP MODE Control Switch to BYPASS TAVG INTLK position	
		f. CHECK APP-006-F5, STEAM DUMP ARMED alarm - ILLUMINATED	
	RO	(Step 8) CHECK RCS Subcooling Based On Core Exit T/Cs - GREATER THAN 18°F [37°F]	
		(Step 9) CHECK ECCS Pump Status:	
		• SI Pumps - ANY RUNNING	
		OR	

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Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• RHR Pumps - ANY RUNNING IN INJECTION MODE	
	RO	(Step 10) DEPRESSURIZE RCS To Refill PZR:	
		• USE Normal PZR Spray	**NOTE:** The RCPs are most likely running. One PZR PORV will need to be used per the Step 10.a RNO).
		• CHECK PZR level - GREATER THAN 27% [44%]	
		• STOP RCS depressurization	
	RO	(Step 11) CHECK If An RCP Should Be Started:	
		• CHECK ALL RCPs - STOPPED	**NOTE:** The RCPs are most likely running. If NOT, the CRS will attempt to start RCP C per Steps 11.b-d.
	RO	(Step 11.a RNO) PERFORM the following:	
		• STOP RCP(s) NOT required for Normal PZR Spray.	**NOTE:** If all RCPs are running, the operator will stop the A and B RCP.
	CRS	• OBSERVE NOTES prior to Step 12 AND GO TO Step 12.	
	CRS/ RO	• (Step 11.b) CHECK RCS Subcooling based on Core Exit T/Cs - GREATER THAN 18°F [37°F]	**NOTE:** These actions will only be performed if all RCPs had been off at the start of Step 11.
		• CHECK PZR level - GREATER THAN 27% [44%]	
		• TRY to start RCP to provide Normal PZR Spray:	

Op Test No.: N18-1RT Scenario # 1 Event # 5, 6, & 7 Page 69 of 70

Event Description: **ATWS/ROD J-11 Stuck Out/Ejected Control Rod J-11/A SI Pump fails to AUTO Start/SI-870 A & B fail to Auto Open on SI**

Time	Pos.	Expected Actions/Behavior	Comments
		• ESTABLISH conditions for starting RCP(s) using OP-101, Reactor Coolant System And Reactor Coolant Pump Startup And Operation	**IRF EPSL007 f:DEFEAT** **IRF EPSL008 f:DEFEAT** **Degraded Grid Protection for the ESF Buses.** **Prior to starting RCPs. Both to f: NORMAL after starting C RCP.**
		• START RCP C	
	RO	(Step 12) CHECK If One SI Pump Should Be Stopped:	
		• CHECK ANY SI Pumps - RUNNING	
		• DETERMINE required RCS Subcooling from table:	
		• CHECK RCS Subcooling based on Core Exit T/Cs - GREATER THAN REQUIRED SUBCOOLING	
		• CHECK PZR level - GREATER THAN 27% [44%]	
		• STOP one SI Pump	**Examiner NOTE:** Based on the plant conditions, the crew may determine that the SI Pumps must stay running. If so, Terminate the exam.
		• RETURN TO Step 12.a	
At the discretion of the Lead Examiner terminate the exam.			

AUDIT SCENARIO N18-1RT-1 TURNOVER SHEET

1. INITIAL CONDITIONS

a)	Time in Core Life:	MOL
b)	Reactor Power:	100%
c)	Turbine Load:	775 MWe
d)	Boron Concentration:	770 ppm
e)	Rod Height:	218 Steps CB 'D'
f)	RCS Pressure:	2235 psig
g)	PZR Level:	53.3 %
h)	Xenon:	Equilibrium

2. TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT

T.S. #	Description
3.5.2	A.1 (Restore ECCS train to OPERABLE status within 72 hours)

3. CLEARANCES IN EFFECT

a) C SI Pump is OOS for motor coupling replacement for 6 hours. Expected return is in 12 or more hours.

4. CAUTION CAPS IN EFFECT

a) None

5. PROTECTED EQUIPMENT

a) Per Attachment of OMM-048-1

6. DEGRADED EQUIPMENT

a) LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating).

b) RTGB Annunciator APP-009-C1, "REGULATOR REF VOLT FAILURE," has failed to the EXTINGUISHED condition (I&C is investigating).

7. SWITCHYARD ACCESS

a) Unrestricted

8. PLANNED EVOLUTIONS

a) Maintain Plant conditions

9. TURNOVER INFORMATION

a) The area has experienced steady light rain for the past 2 hours, with light wind from the North at 2-5 mph, and this is expected to continue throughout the shift.

10. REACTIVITY INFORMATION

a) Per OST-947

11. RISK

a) GREEN

Facility:	**HB Robinson**	Scenario No.:	**2**	Op Test No.:	**N18-1RT**
Examiners:		Operators:			(SRO)
					(RO)
					(BOP)

Initial Conditions:	The plant is at 75% power (BOL). The area has experienced steady light rain for the past 2 hours, with light wind from the North at 2-5 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The B CV Spray Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. PI-1684, SW South Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-E8, "HTR 4B HI/LO LVL," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1		R-RO N-BOP N-SRO	Raise Power
2	MALF HVA07C	C-RO C(TS)-SRO	Containment Cooling Fan HVH-3 HIGH Vibration
3	MALF SGN02B	C-RO C-BOP C(TS)-SRO	Steam Generator Tube Leak in B Steam Generator
4	OVR TUREHI001	C-BOP C-SRO	Turbine EH Control Fails to Manual
5	OVR RCSXMTTT417,8,9	C-RO C-SRO	Loss of CCW flow to the A RCP
6	MALF SGN02E	M-RO M-BOP M-SRO	B Steam Generator Tube Rupture
7	OVR PRSAAA089A	C-RO C-SRO	Pzr Spray Valve PCV-455B fails OPEN

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

HB Robinson 2018 Re-Take NRC Scenario #2

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

The following equipment is Out-Of-Service: The B CV Spray Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. PI-1684, SW South Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-E8, "HTR 4B HI/LO LVL," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.

Shortly after taking the watch, the operator will raise power to 100% using OP-105, "Maneuvering the Plant When Greater than 25% Power," and OP-301-1, "Chemical and Volume Control System Boration and Dilution Operations."

During the power increase, a HIGH vibration condition will develop on HVH-3. The operator will respond in accordance with APP-002-A7, HVH-1/2/3/4 HI VIB, and APP-002-C5, "HVH-1 AIR FLOW LOST," and stop HVH-3. The operator will address Technical Specification LCO 3.6.6, "Containment Spray and Cooling Systems."

Next, a 30 gpm Steam Generator Tube Leak will develop in the "B" Steam Generator. The operator will respond in accordance with AOP-005, "Radiation Monitoring System," AOP-016, "Excessive Primary Plant Leakage" and/or AOP-035, "S/G Tube Leak." The operator will initiate a load reduction in accordance with GP-006-1, "Normal Plant Shutdown From Power Operation to Hot Shutdown," or AOP-038, "Rapid Downpower." The operator will address Technical Specification LCO 3.4.13, "RCS Operational Leakage," and Technical Specification LCO 3.4.18, "Steam Generator (SG) Tube Integrity."

During the downpower, the Turbine EH control system will fail to Manual. The operators will respond using the guidance in either GP-006-1, "Normal Plant Shutdown From Power Operation to Hot Shutdown," or AOP-038, "Rapid Downpower" dependent on which was chosen for the downpower. The BOP will need to reduce Turbine Load in MANUAL.

Subsequently, a blockage will occur in the CCW piping leading to the A RCP motor bearing oil cooler. The operator will respond in accordance with APP-001-B1, "RCP BRG COOL WTR LO FLOW," and APP-001-B3, "RCP A BEARING HI TEMP," and enter AOP-014, "Component Cooling Water System Malfunction." Ultimately, the operator will determine that the plant must be tripped and the RCP stopped. The crew will enter EOP-E-0, "Reactor Trip or Safety Injection."

On the reactor trip, an 800 gpm Steam Generator Tube Rupture will occur (over two minutes) on the "B" Steam Generator. The operator will continue in EOP-E-0, and after the Immediate Actions are complete, trip the A RCP (It will trip in ten minutes if not manually tripped). Upon completion of EOP-E-0, the operator will transition to EOP-E-3, "Steam Generator Tube Rupture," to isolate the flow into and out of the "B" Steam Generator and then conduct a cooldown of the RCS.

The RCS cooldown will be conducted using the Steam Dumps to the Condenser, and the subsequent RCS depressurization will be conducted using normal pressurizer spray. Upon completion of the RCS depressurization, Pressurizer Spray Valve PCV-455C will fail in the OPEN position. The operator will be required to stop the C RCP.

The scenario will terminate at Step 23 of EOP-E-3, after the operator has stopped the SI Pumps.

Critical Tasks:

Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

Safety Significance: Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. The fact that the operator allows the differential pressure to dissipate and, as a result, are then forced to transition to a contingency procedure constitutes an incorrect performance that necessitates the operator taking compensating action that would unnecessarily complicate the event mitigation strategy.

While in EOP-E-3, establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either (1) Too high to maintain 38°F of RCS Subcooling OR (2) below 295°F (RCS Integrity Red Path Limit).

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

Depressurize the RCS to meet SI termination criteria, and terminate SI so that primary and secondary inventory are stable before Steam Generator Overfill is reached based on Water in the Steam Lines.

Safety Significance: Failure to stop reactor coolant leakage into a ruptured SG by depressurizing the RCS and terminating SI flow during a SGTR (when it is possible to do so) needlessly complicates mitigation of the event. It also constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario. A SGTR allows radioactive RCS inventory to leak into the SG. As a result, SG inventory, radioactivity, and pressure increase. If primary-to-secondary leakage is not stopped, SG pressure increases until either the SG PORV or the safety valve(s) opens, releasing radioactivity to the environment. If leakage continues, SG inventory increase leads to water release through the PORV or safety valve(s) or to SG overfill, which could cause an unisolable fault in the ruptured SG, greatly complicating mitigation.

ROBINSON *Nuclear Training*

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OPERATIONS TRAINING

N18-1RT-2

Initial Licensed Operator Training

Rev 180327

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Re-Take Exam

TOPIC: NRC Simulator Exam

Scenario N18-RT-2

REFERENCES:

1. Technical Specification LCO 3.6.6, “Containment Spray and Cooling Systems” (Amendment 176)
2. OP-105, “Maneuvering the Plant When Greater than 25% Power” (Rev 64)
3. OP-301-1, “Chemical and Volume Control System Boration and Dilution Operations” (Rev 67)
4. APP-002, “Engineering Safeguards” (Rev 70)
5. AOP-005, “Radiation Monitoring System” (Rev 35)
6. AOP-016, “Excessive Primary Plant Leakage” (Rev 27)
7. AOP-035, “S/G Tube Leak” (Rev 30)
8. GP-006-1, “Normal Plant Shutdown From Power Operation to Hot Shutdown” (Rev 15)
9. AOP-038, “Rapid Downpower” (Rev 3)
10. Technical Specification LCO 3.4.13, “RCS Operational Leakage” (Amendment 212)
11. Technical Specification LCO 3.4.18, “Steam Generator (SG) Tube Integrity” (Amendment 235)
12. APP-001, “Miscellaneous NSSS” (Rev 65)
13. AOP-014, “Component Cooling Water System Malfunction” (Rev 39)
14. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 8)
15. EOP-E-3, “Steam Generator Tube Rupture” (Rev 10)

Validation Time: 100 minutes

HB Robinson 2018 NRC Re-Take Scenario #2 Objectives:

Given the simulator at an initial condition of 75% 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 RO and BOP's ability to effectively raise power in accordance with OP-105, "Maneuvering the Plant When Greater than 25% Power," and OP-301-1, "Chemical and Volume Control System Boration and Dilution Operations."

4. each crew member's ability to effectively diagnose a HIGH vibration condition on Containment Fan HVH-3, and the RO and BOP's ability to respond to such an event in accordance with various Annunciator Panel Procedures.

5. each crew member's ability to effectively diagnose a 20 gpm Steam Generator Tube Leak, and the RO and BOP's ability to respond to such an event in accordance with AOP-005, "Radiation Monitoring System," AOP-016, "Excessive Primary Plant Leakage" and/or AOP-035, "S/G Tube Leak."

6. each crew member's ability to effectively diagnose the Turbine failing to MANUAL.

7. each crew member's ability to lower reactor power from 75% using AOP-038, "Rapid Downpower," including the BOP's ability to unload the Turbine using MANUAL control.

8. each crew member's ability to effectively diagnose a blockage in the CCW piping leading to the A RCP motor bearing oil cooler, and the RO and BOP's ability to respond to such an event in accordance with various Annunciator Panel Procedures, AOP-014, "Component Cooling Water System Malfunction," and EOP-E-0, "Reactor Trip or Safety Injection."

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

Scenario Event Description
NRC Scenario 2

Facility:	**HB Robinson**		Scenario No.:	**2**	Op Test No.: **N18-1RT**
Examiners:			Operators:		(SRO)
					(RO)
					(BOP)

Initial Conditions:	The plant is at 75% power (BOL). The area has experienced steady light rain for the past 2 hours, with light wind from the North at 2-5 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The B CV Spray Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. PI-1684, SW South Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-E8, "HTR 4B HI/LO LVL," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.
Critical Tasks:	See Below

Event No.	Malf. No.	Event Type*	Event Description
1		R-RO N-BOP N-SRO	Raise Power
2	MALF HVA07C	C-RO C(TS)-SRO	Containment Cooling Fan HVH-3 HIGH Vibration
4	MALF SGN02B	C-RO C-BOP C(TS)-SRO	Steam Generator Tube Leak in B Steam Generator
3	MALF TUREHI001	C-BOP C-SRO	Turbine EH Control fails to MANUAL
5	OVR RCSXMTTT417,8,9	C-RO C-SRO	Loss of CCW flow to the A RCP
6	MALF SGN02E	M-RO M-BOP M-SRO	B Steam Generator Tube Rupture
7	OVR PRSAAA089A	C-RO C-SRO	Pzr Spray Valve PCV-455B fails OPEN

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

HB Robinson 2018 NRC Re-Take Scenario #2

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

The following equipment is Out-Of-Service: The B CV Spray Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.6.6 ACTION A.1. PI-1684, SW South Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-E8, "HTR 4B HI/LO LVL," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.

Shortly after taking the watch, the operator will raise power to 100% using OP-105, "Maneuvering the Plant When Greater than 25% Power," and OP-301-1, "Chemical and Volume Control System Boration and Dilution Operations."

During the power increase, a HIGH vibration condition will develop on HVH-3. The operator will respond in accordance with APP-002-A7, HVH-1/2/3/4 HI VIB, and APP-002-C5, "HVH-1 AIR FLOW LOST," and stop HVH-3. The operator will address Technical Specification LCO 3.6.6, "Containment Spray and Cooling Systems."

Next, a 30 gpm Steam Generator Tube Leak will develop in the "B" Steam Generator. The operator will respond in accordance with AOP-005, "Radiation Monitoring System," AOP-016, "Excessive Primary Plant Leakage" and/or AOP-035, "S/G Tube Leak." The operator will initiate a load reduction in accordance with GP-006-1, "Normal Plant Shutdown From Power Operation to Hot Shutdown," or AOP-038, "Rapid Downpower." The operator will address Technical Specification LCO 3.4.13, "RCS Operational Leakage," and Technical Specification LCO 3.4.18, "Steam Generator (SG) Tube Integrity."

During the downpower, the Turbine EH control system will fail to Manual. The operators will respond using the guidance in either GP-006-1, "Normal Plant Shutdown From Power Operation to Hot Shutdown," or AOP-038, "Rapid Downpower" dependent on which was chosen for the downpower. The BOP will need to reduce Turbine Load in MANUAL.

Subsequently, a blockage will occur in the CCW piping leading to the A RCP motor bearing oil cooler. The operator will respond in accordance with APP-001-B1, "RCP BRG COOL WTR LO FLOW," and APP-001-B3, "RCP A BEARING HI TEMP," and enter AOP-014, "Component Cooling Water System Malfunction." Ultimately, the operator will determine that the plant must be tripped and the RCP stopped. The crew will enter EOP-E-0, "Reactor Trip or Safety Injection."

On the reactor trip, an 800 gpm Steam Generator Tube Rupture will occur (over two minutes) on the "B" Steam Generator. The operator will continue in EOP-E-0, and after the Immediate Actions are complete, trip the A RCP (It will trip in ten minutes if not manually tripped). Upon completion of EOP-E-0, the operator will transition to EOP-E-3, "Steam Generator Tube Rupture," to isolate the flow into and out of the "B" Steam Generator and then conduct a cooldown of the RCS.

The RCS cooldown will be conducted using the Steam Dumps to the Condenser, and the subsequent RCS depressurization will be conducted using normal pressurizer spray. Upon completion of the RCS depressurization, Pressurizer Spray Valve PCV-455C will fail in the OPEN position. The operator will be required to stop the C RCP.

The scenario will terminate at Step 23 of EOP-E-3, after the operator has stopped the SI Pumps.

Critical Tasks:

Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

Safety Significance: Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. The fact that the operator allows the differential pressure to dissipate and, as a result, are then forced to transition to a contingency procedure constitutes an incorrect performance that necessitates the operator taking compensating action that would unnecessarily complicate the event mitigation strategy.

While in EOP-E-3, establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either (1) Too high to maintain 38°F of RCS Subcooling OR (2) below 295°F (RCS Integrity Red Path Limit).

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

Depressurize the RCS to meet SI termination criteria, and terminate SI so that primary and secondary inventory are stable before Steam Generator Overfill is reached based on Water in the Steam Lines.

Safety Significance: Failure to stop reactor coolant leakage into a ruptured SG by depressurizing the RCS and terminating SI flow during a SGTR (when it is possible to do so) needlessly complicates mitigation of the event. It also constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario. A SGTR allows radioactive RCS inventory to leak into the SG. As a result, SG inventory, radioactivity, and pressure increase. If primary-to-secondary leakage is not stopped, SG pressure increases until either the SG PORV or the safety valve(s) opens, releasing radioactivity to the environment. If leakage continues, SG inventory increase leads to water release through the PORV or safety valve(s) or to SG overfill, which could cause an unisolable fault in the ruptured SG, greatly complicating mitigation.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Reset to Temp IC 405**	
☐	**T = 0 Malfunctions:** **B CV Spray Pump OOS:** • **EPSV480E2_150 f:RACK_OUT** **Place RED Cap over B CV Pump Control Switch** **Place GREEN Cap over A CV Pump Control Switch** **PI-1684, SW South Header Pressure, OOS** • **IOR aoSWSDOD025A f:0** **Place WHITE DOT on PI-1684** **RTGB Annunciator APP-007-E8 failed OFF** • **ANNXN09C01 f:ALARM_OFF** **Place WHITE DOT on APP-007-E8** **Place the Simulator in RUN and ACKNOWLEDGE all alarms.** **ENSURE Turbine Control in IMP IN**		
☐	**Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.**		
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with the following: • Blank Copy of OP-105 • Blank Copy of OP-301-1 • Copy of Section 6.2.1 & 6.2.2 of OP-105 marked up for power increase 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 Lesson Plan for Simulator Scenario N18-1RT-2.**	
☐	At direction of examiner	**Event 1** **NA**	Raise Power

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 2** **IMF HVA07C f:SHAFT_SHEAR**	Containment Cooling Fan HVH-3 HIGH Vibration/Turbine Control fails to MANUAL
☐	At direction of examiner	**Event 3** **IMF SGN02B r:01:00 f:46**	Steam Generator Tube Leak in B Steam Generator
☐	At direction of examiner	**Event 4** **IOR TUREHI001 f:ON**	Turbine EH Control Fails to Manual
☐	At direction of examiner	**Event 5** **ICO BSTJFB629 f:Set** **ICO RCSXMTTT_418A d:1 r:07:00 f:221.744** **ICO RCSXMTTT_419 d:2 r:07:00 f:217.992** **ICO RCSXMTTT_417B d:3 r:07:00 f:216.652** **ICO RCSXMTTT_417A d:4 r:07:00 f:219.332**	Loss of CCW flow to the A RCP
☐	At direction of examiner	**Event 6** **$004_RTA_TRIP IMF SGN02E r:2:00 f:800**	B Steam Generator Tube Rupture
☐	After Depress is complete in E-3	**Event 7** **IOR aiPRSAAA089A r:0 f:0** **IMF PRS02B f:100**	Pzr Spray Valve PCV-455B fails OPEN
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.: N18-1RT Scenario # 2 Event # 1 Page 9 of 61

Event Description: **Raise Power**

Shortly after taking the watch, the operator will raise power to 100% using OP-105, "Maneuvering the Plant When Greater than 25% Power," and OP-301-1, "Chemical and Volume Control System Boration and Dilution Operations."

Booth Operator Instructions: **NA**

Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER, SECTION 6.2.2			
	RO	(Step 5) Maintain Tave within 5°F of Tref using a combination of Control Rods and Boron Concentration changes.	**EXAMINER NOTE:** OP-105 actions continue on **Page 12.**
OP-301-1, CHEMICAL AND VOLUME CONTROL SYSTEM BORATION AND DILUTION OPERATIONS SECTION 6.2.1, RCS DILUTION QUICK CHECKLIST			
NOTE This section is for normal plant operations (MODE 1) to compensate for fuel depletion, small changes in RCS temperature, load changes and Xenon transients or at times prior to MODE 1 when subsequent dilution is desired following initial system operation for dilution per Section 6.1.2, Dilution.			
	RO	(Step 1) Determine amount of water to add to RCS and if applicable, expected change in RCS temperature and Reactor Power.	**NOTE:** The RO will determine that several 500 gallon batches of water must be added.
	RO	(Step 2) Obtain an independent check of volume of water required.	
	RO	(Step 3) Obtain permission from CRS or SM to add amount of water previously determined, including expected change in RCS temperature and Reactor Power.	

Op Test No.: N18-1RT Scenario # 2 Event # 1 Page 10 of 61

Event Description: **Raise Power**

Time	Pos.	Expected Actions/Behavior	Comments
NOTE Potentiometer setting for FCV-114A (Primary Wtr Flow Dilute Mode) may be obtained from Curve-Station Curvebook, Station Curve Book, Curve 4.1, Boric Acid Blender Control Settings, or table in Attachment 2, Primary Water Flow Rate vs. FCV-114A Potentiometer Setting.			
	RO	(Step 4) IF flow adjustment is desired, THEN……	
	RO	(Step 5) Place RCS Makeup Mode selector switch in DILUTE position.	
	RO	(Step 6) Set YIC-114 (Primary Wtr Totalizer) to desired quantity.	
NOTE • Normal dilution coordinated with system conditions will minimize potential for relief valve actuation. ..... ☐ • The following may reduce letdown pressure during normal dilution: ..... ☐ ◊ Perform evolution with a single letdown orifice in service. ..... ☐ ◊ Divert flow to HUT during two orifice operation. ..... ☐ ◊ Minimize normal dilution rate to less than 76 gpm during two orifice operation..... ☐ • These actions reduce total flow rate in common piping to VCT which reduces system resistance and back pressure. RCP Seal Leakoff flow perturbation may be an indication of relief valve CVC-209 discharge. [8.7.16] .... ☐			
CAUTION When fuel defect is evident, preferred letdown configuration is two orifices operation. This is necessary to mitigate effects of failed fuel by removing released radioisotopes from RCS via demineralization. [8.7.16]			
	RO	(Step 7) IF two letdown orifices are in service and it is desired to divert flow to HUT, THEN…..	**NOTE:** Two Orifices will be in service. The operator will likely determine that diverting flow to the HUT is not desired.
	RO	(Step 8) Momentarily place RCS Makeup System switch to START position.	
	RO	(Step 9) IF LCV-115A is in AUTO, THEN check proper operation of LCV-115A (VCT/HLDP Tk Div) valve.	

Op Test No.: N18-1RT Scenario # 2 Event # 1 Page 11 of 61

Event Description: **Raise Power**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 10) IF AT ANY TIME any of the following conditions occur:	
		• Unanticipated Rod Motion	
		• Primary Water addition exceeds desired value	
		THEN momentarily place RCS Makeup System switch in STOP position:	
	RO	(Step 11) WHEN desired amount of Primary Water has been added to RCS, THEN ensure the following:	
		• FCV-114A (PW To Blender) closes.	
		• FCV-114B (Blended MU To VCT) closes.	
		• IF operating Primary Water Pump is in Auto, THEN check operating Primary Water Pump stops.	
		• RCS Makeup System is off.	
	RO	(Step 12) IF desired, THEN ensure LCV-115A (VCT/HLDP Tk Div) valve control switch in AUTO	
	RO	(Step 13) Return RCS Makeup System to automatic as follows:	
		a. Ensure FCV-114A (Primary Wtr Flow Dilute Mode) in AUTO.	
		b. Place RCS Makeup Mode switch in AUTO position	
		c. Momentarily place RCS Makeup System switch in START position.	
			NOTE: The RO may perform these actions several times during the power increase.

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Event Description: **Raise Power**

Time	Pos.	Expected Actions/Behavior	Comments
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
NOTE • Balance of Plant operations are typically related to specific turbine loads. Due to the unavailability of "% Turbine Load" indications, BOP operations are related to Reactor Power and assume that Tavg is maintained on program. • During the load changes, GS-36 (Manual Gland Seal Dump) may require throttling to maintain Gland Seal Pressure in the normal operating band of 3 to 6 psig.			

CAUTION
• The SETTER and REFERENCE displays should not be used as acceptable indicators of load or power.
• Power Ramp Rate Limits are restricted after core fuel movement to:
  • 30% RTP/hr when below or equal to 50% power
  • 5% RTP/hr when above 50% and below or equal to 90% power
  • 3% RTP/hr when above 90% power
• If Power Ramp Rate Restrictions are in effect, power is raised based on the highest indication of Reactor Power.
• During subsequent power escalations, this ramp limit may apply depending on the maximum power level achieved and length of operation at that power level. UFSAR Section 4.2.1.2.2 may be referenced for information on these limitations. {8.1.1}, [8.3.1], [8.7.18]
• During power ascension, all indications of reactor power level listed on Attachment 1, Reactor Power Redundant Indications should be monitored and compared. Indications such as core ΔT and turbine first-stage pressure should be compared to NI indications at least once per 10% during the power ascension. If all indications do not agree within 5% of each other, Reactor Power should be stabilized and OST-010 performed. {8.1.2}			

			NOTE: The Turbine is in OPER AUTO.
	BOP	(Step 10) Raise Turbine Load using Attachment 8, Turbine Load Changes	
			NOTE: Since power is stabilized at 75%, the BOP will perform Step 10 to initiate the load increase. The next applicable Step in Section 6.2.2 of OP-105 is Step 20.
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER **Attachment 8, Turbine Load Changes**			

Op Test No.: N18-1RT Scenario # 2 Event # 1 Page 13 of 61

Event Description: **Raise Power**

Time	Pos.	Expected Actions/Behavior	Comments
NOTE • This attachment contains a common sequence of control manipulation used to change Turbine Load when directed in this and other routine (OP/GP/OST) and non-routine (EOP/AOP) procedures. • Holding the GV ▼/▲ button in for 1 second will result in approximately a 10 MWe change in load with the governor valves off the limiter. • With the EH Control Panel is in TURB MANUAL and IMP OUT with an OCB closed, the REFERENCE and SETTER indications will track % governor valve position. • When the Impulse Chamber Pressure Control is out of service (IMP OUT), the REFERENCE display indicates percent of effective Governor Valve opening. When the Impulse Chamber Pressure Control is in service (IMP IN), the REFERENCE display indicates percent of maximum guaranteed load.			
	BOP	(Step 1) IF Turbine Load is being controlled with the Valve Position Limiter…	**NOTE:** The turbine load is not being controlled on the Valve Position Limiter.
	BOP	(Step 2) IF EH Turbine Control is in TURB MANUAL…	**NOTE:** The turbine is in OPER AUTO.
NOTE The load change can be stopped at any time by pressing the HOLD pushbutton. The HOLD lamp should illuminate, the GO lamp should extinguish, and load change should stop.			
	BOP	(Step 3) IF EH Turbine Control is in OPER AUTO, THEN perform the following to change Turbine load:	**NOTE:** The turbine is in OPER AUTO.
		a. Ensure the EH Turbine Impulse Pressure Control in the desired position using Attachment 6, Transferring Control Mode Between IMP-IN and IMP-OUT	**NOTE:** The turbine is already in IMP IN.
		• IMP IN (preferred)…	
		b. Set the desired load in the SETTER.	
		c. Select the desired Load Rate.	
		d. Depress the GO pushbutton.	
		e. WHEN load change is complete, THEN perform the following….	
NOTE APP-005-D6 (Δ Flux Warning / Status), will alarm within approximately 1 minute of average Power Range Power on ERFIS reading greater than 90% Power. ERFIS will give a printout of the current conditions.			

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Event Description: **Raise Power**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 20) WHEN average Reactor Power crosses greater than 90% by Power Range Indications, THEN check that APP-005-D6 is received.	
After the 1st Dilution and MWe raised by 15-20 MWe, and at the discretion of the Lead Examiner move to Event #2.			

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Event Description: **Containment Cooling Fan HVH-3 HIGH Vibration**

During the power increase, a HIGH vibration condition will develop on HVH-3. The operator will respond in accordance with APP-002-A7, HVH-1/2/3/4 HI VIB, and APP-002-C5, "HVH-1 AIR FLOW LOST," and stop HVH-3. The operator will address Technical Specification LCO 3.6.6, "Containment Spray and Cooling Systems."

Booth Operator Instructions: **IMF HVA07C f:SHAFT_SHEAR**

Indications Available:

- RTGB Annunciator APP-002-A7, HVH-1/2/3/4 HI VIB
- Hi Vibration Amber status light is LIT
- RTGB Annunciator APP-002-C5, HVH-3 AIR FLOW LOST

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The BOP may place the Turbine in HOLD.
APP-002-A7, HVH-1/2/3/4 HI VIB			
	RO	(Step 1) IF the "AIR FLOW LOST" annunciator is also illuminated, THEN stop the affected fan	**NOTE:** The RO will stop HVH-3.
	RO	(Step 2) Attempt to reset High Vibration alarm	
		• IF the alarm will NOT RESET….	
		• IF the fan is NOT required for plant operation THEN stop the affected fan	
	RO	(Step 3) IF available, THEN start a standby Containment Recirc Cooler Fan	
	CRS	(Step 4) IF local checks confirm high vibration, THEN contact Engineering for investigation.	
APP-002-C5, HVH-3 AIR FLOW LOST			

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Event Description: **Containment Cooling Fan HVH-3 HIGH Vibration**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 1) IF the Hi Vibration alarm (APP-002-A7) is also received for HVH-3, THEN stop HVH-3	**NOTE:** The RO will stop HVH-3.
	RO	(Step 2) IF available, THEN start a standby Containment Recirc Cooler Fan	**NOTE:** All remaining HVH fans are running.
	CRS	(Step 3) Initiate actions to determine cause/validity of alarm	
	CRS	(Step 4) IF fan is inoperable, THEN refer to ITS LCO 3.6.6	**NOTE:** The CRS will address Technical Specifications.
			NOTE: The CRS may contact the WCC to remove HVH-3 from service. If so, **Booth Instructor** acknowledge and Use **IRF EPSV480E2_146 f: RACK_OUT**. Then report the unit removed from service.
TECHNICAL SPECIFICATION LCO 3.6.6, CONTAINMENT SPRAY AND COOLING SYSTEMS			
	CRS	LCO 3.6.6 Two containment spray trains and two containment cooling trains shall be OPERABLE	
	CRS	APPLICABILITY: MODE 1, 2, 3 and 4	
	CRS	ACTIONS	

Op Test No.: N18-1RT Scenario # 2 Event # 2 Page 17 of 61

Event Description: **Containment Cooling Fan HVH-3 HIGH Vibration**

Time	Pos.	Expected Actions/Behavior		Comments
CONDITION			REQUIRED ACTION	COMPLETION TIME
C. One containment cooling train inoperable			C.1 Restore containment cooling train to OPERABLE status	7 hours AND 10 days from discovery of failure to meet the LCO
				NOTE: The CRS will determine that Condition C is required and that ACTION C.1 is must be taken.
				NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #3.				

Op Test No.: N18-1RT Scenario # 2 Event # 3 Page 18 of 61

Event Description: **Steam Generator Tube Leak in B Steam Generator**

Next, a 30 gpm Steam Generator Tube Leak will develop in the "B" Steam Generator. The operator will respond in accordance with AOP-005, "Radiation Monitoring System," AOP-016, "Excessive Primary Plant Leakage" and/or AOP-035, "S/G Tube Leak." The operator will initiate a load reduction in accordance with GP-006-1, "Normal Plant Shutdown From Power Operation to Hot Shutdown," or AOP-038, "Rapid Downpower." The operator will address Technical Specification LCO 3.4.13, "RCS Operational Leakage," and Technical Specification LCO 3.4.18, "Steam Generator (SG) Tube Integrity."

Booth Operator Instructions: **IMF SGN02B r:01:00 f:46**

Indications Available:

- RTGB Annunciator APP-036-C7, R-24 MONITOR HI
- R-24B, Steam Line Rad Monitor, in ALARM
- R-15, Air Ejector Rad Monitor, in ALARM (1-2 minutes)
- R-31B, S/G Blowdown Rad Monitor, rises (5-6 minutes)

Time	Pos.	Expected Actions/Behavior	Comments
APP-036-C7, R-24 MONITOR HI			
NOTE • R-24 information is useful only for trending if power is less than 40%. Also, the information is not likely to be accurate on the initial alarm at any power level prior to unit adjustment for the leakage location. • No further actions are required in the event the cause of the alarm is known to be the movement of radioactive material, such as a loaded spent fuel cask.			
	BOP	(Step 1) OBSERVE monitor trends for leak rate and evidence of short term spiking.	
	BOP	(Step 2) IF short term spiking is evidenced, THEN….	
	CRS	(Step 3) IF trends from R-15 OR R-19 confirm evidence of primary to secondary leakage, THEN refer to AOP-035.	**NOTE:** The CRS will transition to AOP-035.
AOP-035, S/G TUBE LEAK			

Op Test No.: N18-1RT Scenario # 2 Event # 3 Page 19 of 61

Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 1) DETERMINE If Reactor Trip Needed:	
		• CHECK the following:	
		• PZR Level - LESS THAN 7%	
		OR	
		• RCS Subcooling - LESS THAN 18°F	
	RO	(Step 1 RNO) IF PZR level can NOT be maintained greater than 7% OR subcooling can NOT be maintained greater than 18°F, THEN PERFORM the following:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• TRIP the Reactor.	
		• INITIATE SI.	
		• GO TO EOP-E-0, Reactor Trip or Safety Injection.	
	CRS	GO TO Step 2.	
	CRS	(Step 2) NOTIFY Plant Personnel Of Procedure Entry Using PA System	**NOTE:** The CRS may direct the SM to make the PA announcement.
NOTE Use of RWST for RCS makeup will add negative reactivity.			
	RO	(Step 3) CHECK VCT Level - LESS THAN 12.5 INCHES	
	RO	(Step 3 RNO) IF VCT level lowers to less than 12.5 inches, THEN PERFORM Step 4.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	• GO TO Step 5.	

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5) CHECK PZR Level - LOWERING IN AN UNCONTROLLED MANNER	**NOTE:** The RO may answer this in the "positive" even though Charging Pump speed has been manually adjusted to stabilize Pzr level. If so, the CRS may read step 6.
	RO	(Step 5 RNO) IF PZR level lowers in an uncontrolled manner, THEN PERFORM Step 6.	
		• CONTROL charging flow to maintain PZR level between 22% and 53%.	
	CRS	• GO TO Step 7.	
	CRS/ BOP	(Step 7) NOTIFY Chemistry Personnel To Periodically Sample All S/Gs For Activity And Boron Concentration	**NOTE:** The CRS may call WCC/Chemistry to address the sampling requirements. If so, **Booth Instructor** acknowledge as WCC/Chemistry.
	CRS	(Step 8) CHECK Assistance To Open S/G Sample Valves- NEEDED	
	CRS	(Step 8 RNO) IF assistance to open S/G Sample valves is needted, THEN OBSERVE NOTE prior to Step 9 and GO TO Step 9.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• OBSERVE the NOTE prior to Step 10 and GO TO Step 10.	
NOTE Radiation Monitor R-24 does not provide an accurate determination of leakage until S/G samples have been obtained and the monitor has been calibrated for the optimal node for leakage location.			
	CRS/ RO	(Step 10) DETERMINE Leak Rate Using At Least One Of The Following Methods:	
		• EVALUATE R-24 Recorder	

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
		• PERFORM OST-051, Reactor Coolant System Leakage Evaluation	
		• PERFORM a Charging versus Letdown balance	**NOTE:** The will most likely attempt to stabilize PZR Level and conduct an inventory balance; and determine that the SGTL is between 25-35 gpm.
		• NOTIFY Chemistry personnel to perform isotopic analysis of S/G samples for leak rate determination	
		• MONITOR R-15 for low level Primary-to-Secondary leakage using the OP-504, Condenser Air Removal section "Using R-15 to Monitor for Low Level Primary to Secondary Leakage"	
		• USE CP-014 Conversion Factors to correlate R-15 to leakage	
	CRS	(Step 11) CHECK Leak Rate Determination - COMPLETE	
NOTE • TS LCO 3.4.13 provides a primary to secondary leakage limit of 75 gpd through any one S/G. • Total leakage is assumed to be coming from a single S/G when unable to determine leakage from the individual S/Gs. • Normally performed steps in GP-006-1 or AOP-038, Rapid Downpower, such as placing S/G blowdown to the Flash Tank may require release permits. • During a S/G tube leak, ERFIS Feedflow and FWUFM Calorimetric (CALO) calculations will be non-conservative. Simulator testing has shown that for a single S/G tube leak of approximately 95 gpm, the FWUFM CALO will be approximately 1 to 1.5% below actual core power.			
	CRS	(Step 12) CHECK Leak Rate - GREATER THAN OR EQUAL TO 100 GPD FOR A SINGLE S/G	**NOTE:** The SGTL is greater than 100 GPD.
NOTE It is important to perform GP-006-1 or AOP-038, Rapid Downpower, and AOP-035 concurrently to the extent possible in order to minimize secondary contamination.			

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 13) PERFORM The Following Power Reduction:	
		• NOTIFY Chemistry that a PSAL-3 event has occurred	**NOTE:** The CRS may call WCC/Chemistry to address the sampling requirements. If so, **Booth Instructor** acknowledge as WCC/Chemistry.
		• CHECK Reactor Status - MODE 1 OR MODE 2	
		• INITIATE Plant Shutdown To Mode 3 using one of the following WHILE CONTINUING WITH this Procedure	**NOTE:** The CRS will likely choose AOP-038 to conduct the downpower. If NOT, **Booth Instructor** as WCCS/Station Management call the Control Room and direct the CRS to reduce power using AOP-038 until reactor power is < 50%.
		• GP-006-1, Normal Plant Shutdown From Power Operation To Hot Shutdown	
		OR	
		• AOP-038, Rapid Downpower	
		• ADHERE to the following time limits:	
		• Be less than 50% power within 1 hour of declaring PSAL-3	
		• Be in Mode 3 within 3 hours of declaring PSAL-3	
		• OBSERVE the NOTE prior to Step 16 and GO TO Step 16	
NOTE Radiation Monitor R-24 does not provide an accurate determination of leakage until S/G samples have been obtained and the monitor has been calibrated for the optimal node for leakage location.			
	CRS/ BOP	(Step 16) IDENTIFY Leaking S/G Using At Least One Of The Following Methods:	**NOTE:** There are sufficient indications to identify the "B" S/G as the leaking S/G.

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
		• EVALUATE indications on R-24 Recorder	
		OR	
		• EVALUATE indications on RI-19A, RI-19B, and RI-19C, STM GEN BLOW DN Radiation Monitors	
		OR	
		• EVALUATE indications on R-31A, R-31B, and R-31C, STEAMLINE RADIATION MONITORs	
		OR	
		• Chemistry analysis of S/G samples for boron and activity	
	CRS	(Step 17) IMPLEMENT EALs	
	CRS	(Step 18) REVIEW Technical Specification LCOs	**Examiner NOTE:** The CRS knows that the SGTL is greater than that allowed by Technical Specification LCO 3.4.13 (**See Page 27**).
		• ITS LCO 3.4.13	
		• ITS LCO 3.4.18	
		• ITS LCO 3.7.15	
		• ITS LCO 3.6.3	
			NOTE: The CRS may assign the RO or the BOP to continue in AOP-035. **Booth Instructor** acknowledge as **AO**, use **IRF MSS048 f:0** and report after **5 minutes** that the **MS-29** is **CLOSED**; and use IRF RMF054 f:PWR_OFF and report after **5 minutes** that the **power to R19B has been turned off.**

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
AOP-038, RAPID DOWNPOWER			
	CRS	(Step 1) NOTIFY Plant Personnel Of Procedure Entry Using The Plant Page System	**NOTE:** The CRS will likely have the SM make the PA announcement.
	RO	(Step 2) DETERMINE Corrected Boration And Target Rod Height For Target Power Level Using Most Recently Performed OST-947, OPERATIONS REACTIVITY PLAN	
		• Target Load Reduction Rate __%/min	1%/minute
		• Target Power Level ___	30%-50%
		• Target Rod Height ___	**NOTE:** The RO will determine ≈130-144 Steps.
		• Corrected Boration ___	**NOTE:** The RO will determine ≈156-75 gallons. (~90 gal)
	CRS	(Step 3) PERFORM Brief Of Control Room Personnel To Include The Following:	
		• Reason for downpower	
		• Target Power Level	
		• Target Rod Height	
		• Rate of load reduction	
		• Amount of boric acid addition	
	RO	(Step 4) CHECK Required Power Reduction Rate - LESS THAN OR EQUAL TO 5%/MINUTE	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	RO	(Step 5) ENERGIZE All Available PZR Heaters	
		• PZR HTR CONTROL GROUP	
		• PZR HTR BACK-UP GROUP A	
		• PZR HTR BACK-UP GROUP B	

Op Test No.: N18-1RT Scenario # 2 Event # 3 Page 25 of 61

Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) CHECK Rod Control - IN AUTO	
	RO	(Step 6 RNO) PERFORM one of the following:	**NOTE:** The RO will likely place the Control Rods back to AUTO.
		• PLACE Rod Control Switch in AUTO.	
		OR	
		• POSITION Control Rods in MANUAL to maintain Tavg within 5°F of Tref.	
	RO	(Step 7) INITIATE Boration Using Attachment 1, RCS Boration, While Continuing With This Procedure	
			Examiner NOTE: The CRS will assign the RO to perform this action. **RO Examiner** follow actions of Attachment 1. **Other Examiners** follow **AOP-038** Actions, **Step 8**, on **Page 24**.
AOP-038, RAPID DOWNPOWER ATTACHMENT 1, RCS BORATION			
	RO	(Step 1) PLACE The RCS MAKEUP MODE Selector Switch In BORATE	
	RO	(Step 2) IF Frequent Boric Acid Transfer Pump Starts Are Anticipated, THEN PLACE Boric Acid Transfer Pump Switch Aligned To BLEND To ON.	
NOTE Due to RCS leak rates, batch additions may NOT be possible. FCV-113A, BORIC ACID FLOW, may be adjusted to compensate for RCS leakage.			

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) SET YIC-113, BORIC ACID TOTALIZER to amount determined in Main Body Step 2	
	RO	(Step 4) Momentarily PLACE the RCS MAKEUP SYSTEM switch to START	
	RO	(Step 5) IF Boric Acid flow is NOT achieving the desired effect, THEN PLACE FCV-113A, BORIC ACID FLOW, in MAN AND manually Adjust controller FCV-113A, BORIC ACID FLOW, using the UP and DOWN pushbuttons	
	RO	(Step 6) WHEN the desired amount of Boric Acid has been added to the RCS OR the RCS MAKEUP SYSTEM Switch is placed in STOP, THEN ENSURE the following:	
		• FCV-113A, BA TO BLENDER, closes.	
		• FCV-113B, BLENDED MU TO CHG SUCT, closes.	
		• IF in AUTO, THEN operating Boric Acid Pump stops.	
		• RCS MAKEUP SYSTEM is OFF.	
AOP-038, RAPID DOWNPOWER			
			Examiner NOTE: Examiners following the **CRS/BOP** continue **HERE**.
	BOP	(Step 8) INITIATE Turbine Load Reduction While Continuing With This Procedure	
		a. CHECK EH Turbine Control - IN OPER AUTO	**NOTE:** The Turbine is in OPER AUTO.
		b. Prepare the Turbine Load Redution As Follows:	
		1) Check IMP IN- ILLUMINATED	
		2) SET desired load in the SETTER	

Op Test No.: N18-1RT Scenario # 2 Event # 3 Page 27 of 61

Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	3) SELECT the desired Load Rate	
		c. DEPRESS the GO pushbutton to initiate Turbine Load reduction.	
	BOP	(Step 9) ADJUST Turbine Load To Control Tavg Within 5°F Of Tref Using One Of The Following:	**NOTE:** This is a continuous action step, the CRS will make both operators aware.
		• ADJUST Load Rate	
		OR	
		• DEPRESS GO and HOLD pushbuttons	
NOTE Four hour NRC notification is only required if the Shutdown was required by ITS.			
	CRS/ BOP	(Step 10) INITIATE Notification of The Following:	
		• Load Dispatcher of load reduction	
		• E&C to control secondary chemistry	
		• RC for elevated radiation levels in CV Pump Bays and Pipe Alley	
		• On-call Duty Manager to activate the Event Response Team	
		• E&C for impending 15% power change for I-131 sampling within 2 to 6 hours	
		• E&C for impending power reduction greater than 20% terminate zinc injection	
		• NRC within 4 hours	
	BOP	(Step 11) CHECK Auxiliary Boilers - AT LEAST ONE OPERATING	

Op Test No.: N18-1RT Scenario # 2 Event # 3 Page 28 of 61

Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 11 RNO) IF Plant Shutdown is required, THEN NOTIFY AO to start at least one Auxiliary Boiler per OP-401, AUXILIARY HEATING SYSTEM.	**NOTE:** The BOP will dispatch an AO. **Booth Instructor** acknowledge as AO.
	RO	(Step 12) CHECK Tavg - WITHIN 5°F OF Tref	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
NOTE Termination of the load reduction is not necessary due to Axial Flux Distribution deviation from the target band. Axial Flux Distribution will be restored in Attachment 3, Termination Of Rapid Downpower.			
	RO	(Step 13) CHECK Axial Flux Distribution - WITHIN TARGET BAND	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	BOP	(Step 14) CHECK APP-006-F5, STEAM DUMP ARMED - EXTINGUISHED	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	RO	(Step 15) CHECK Any Of The Following Conditions - MET:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• Target load/power has been reached	
		• Load reduction is no longer required	
		• CRS/SM directs termination of load reduction	
		• STOP Rapid Downpower using Attachment 3, Termination Of Rapid Downpower	
	CRS	(Step 15 RNO) WHEN any of the following conditions are met:	
		• Target load/power has been reached	
		• Load reduction is no longer required	

Op Test No.: N18-1RT Scenario # 2 Event # 3 Page 29 of 61

Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior	Comments
		• CRS/SM directs termination of load reduction	
		• THEN STOP Rapid Downpower using Attachment 3, Termination Of Rapid Downpower.	
	CRS	• GO TO Step 16.	
	RO	(Step 16) CHECK Reactor Power - LESS THAN 85%	
	BOP	(Step 17) CHECK Heater Drain Pumps - TWO RUNNING	
		• STOP one Heater Drain Pump	
	RO	(Step 18) CHECK Reactor Power - LESS THAN 70%	
			Examiner NOTE: The CRS may address Technical Specifications, however it is more likely that because of transitory nature of the event, these Tech Specs will need to be evaluated after the Scenario. If so, proceed to Event 4.
TECHNICAL SPECIFICATION LCO 3.4.13, RCS OPERATIONAL LEAKAGE			
	CRS	LCO 3.4.13 RCS operational LEAKAGE shall be limited to: 75 gallons per day primary to secondary LEAKAGE through any one steam generator (SG).	
	CRS	APPLICABILITY: MODES 1, 2, 3 and 4	
	CRS	ACTIONS	

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

Time	Pos.	Expected Actions/Behavior		Comments
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 limit.			B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours
				NOTE: The CRS will determine that Condition B is required and that ACTION B.1 and B.2 must be taken.
TECHNICAL SPECIFICATION LCO 3.4.18, STEAM GENERATOR (SG) TUBE INTEGRITY				
	CRS	LCO 3.4.18 SG tube integrity shall be maintained. AND All SG tubes satisfying the tube plugging criteria shall be plugged in accordance with the Steam Generator Program.		
	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 SG tube integrity not maintained.			B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 36 hours

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Event Description: **Steam Generator Tube Leak in B Steam Generator**

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. **NOTE:** Entry in to TS LCO 3.4.18, Condition B is appropriate although complying with actions of TS LCO 3.4.13 Condition B will meet the required actions of TS LCO 3.4.18 Condition B.
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #4.			

Op Test No.: N18-1RT Scenario # 2 Event # 4 Page 32 of 61

Event Description: **Turbine EH Control Fails to Manual**

During the downpower, the Turbine EH control system will fail to Manual. The operators will respond using the guidance in either GP-006-1, "Normal Plant Shutdown From Power Operation to Hot Shutdown," or AOP-038, "Rapid Downpower" dependent on which was chosen for the downpower. The BOP will need to reduce Turbine Load in MANUAL.

Booth Operator Instructions: IOR diTUREHI001 f:ON

Indications Available:

- The Red GO light will be EXTINGUISHED
- The Red TURBINE MANUAL light is LIT
- GV UP and DOWN lights will be LIT
- REF UP and DOWN lights will be EXTINGUISHED
- Turbine Reference and Setter Matched

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The BOP will recognize that the Turbine EH Controls now indicate Manual and that the Turbine load reduction has ceased.
AOP-38, RAPID DOWNPOWER			
	BOP	(STEP 9) (Continuous Action) ADJUST Turbine Load to Tavg Within 5°F Of Tref Using One Of The Following:	
		• ADJUST Load Rate	
		OR	
		• DEPRESS GO and HOLD pushbuttons	**NOTE:** The BOP will recognize that neither of these methods will work with the Turbine now in Manual and Inform the CRS.
			NOTE: It is likely that the CRS will conduct a Crew Focus Brief to address the method of Turbine Control with it now in Manual, and return to Step 8 in AOP-038.
	CRS	(STEP 8) INITIATE Turbine Load Reduction While Continuing With This Procedure	

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Event Description: **Turbine EH Control Fails to Manual**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	a. CHECK EH Turbine Control - IN OPER AUTO	**NOTE:** The Turbine Control is now in Manual.
	BOP	(Step 8.a.RNO) IF EH Turbine Control is in TURB MANUAL, THEN DEPRESS the GV ↓ or GV ↑ button as necessary to control Tavg within 5°F of Tref.	**NOTE:** The BOP will now be required to perform this action to continue the load reduction.
	CRS	(STEP 8.a. RNO cont) OBSERVE the Note before Step 10 and GO TO Step 10.	**NOTE:** It is likely that the CRS will return to Step in AOP-038 and or AOP-035 that the crew was on prior to the Turbine Control Failure.
When directed by the Lead Examiner move to Events #5.			

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Event Description: **Loss of CCW flow to the A RCP**

Subsequently, a blockage will occur in the CCW piping leading to the A RCP motor bearing oil cooler. The operator will respond in accordance with APP-001-B1, "RCP BRG COOL WTR LO FLOW," and APP-001-B3, "RCP A BEARING HI TEMP," and enter AOP-014, "Component Cooling Water System Malfunction." Ultimately, the operator will determine that the plant must be tripped and the RCP stopped. The crew will enter EOP-E-0, "Reactor Trip or Safety Injection."

Booth Operator Instructions:

ICO BSTJFB629 f:Set
ICO RCSXMTTT_418A d:1 r:07:00 f:221.744
ICO RCSXMTTT_419 d:2 r:07:00 f:217.992
ICO RCSXMTTT_417B d:3 r:07:00 f:216.652
ICO RCSXMTTT_417A d:4 r:07:00 f:219.332

Indications Available:

- RTGB Annunciator APP-001-B1, RCP BRG COOL WTR LO FLOW, alarms.
- RTGB Annunciator APP-001-B3, RCP A BRG HI TEMP, alarms. (~4 minutes)
- A RCP bearing temperatures on ERFIS rising.
- A RCP bearing temperatures on Recorder rising.

Time	Pos.	Expected Actions/Behavior	Comments
APP-001-B1, RCP BRG COOL WTR LO FLOW			
NOTE • If more than 15 minutes elapses without RCP Seal Cooling, then Seal Cooling must be isolated before starting CCW OR Charging to prevent Seal damage. • If Loss of All RCP Seal Cooling exists, then rapid RCP trip is required to allow coastdown prior to Safe Shutdown Seal actuation.			
	RO	(Step 1) IF CCW AND Seal Injection are lost to any RCP, THEN……	**NOTE:** Seal Injection flow to the RCPs is NOT lost.
	RO	(Step 2) IF a loss of CCW to RCPs has occurred, THEN REFER TO AOP-014.	**NOTE:** The indications indicate that CCW to the A RCP Motor Bearing Cooler has been lost.
APP-001-B3, RCP A BEARING HI TEMP			

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Event Description: **Loss of CCW flow to the A RCP**

Time	Pos.	Expected Actions/Behavior	Comments
NOTE • If more than 15 minutes elapses without RCP Seal Cooling, then Seal Cooling must be isolated before starting CCW OR Charging to prevent Seal damage. • If Loss of All RCP Seal Cooling exists, then rapid RCP trip is required to allow coastdown prior to Safe Shutdown Seal actuation.			
	RO	(Step 1) IF CCW AND Seal Injection are lost to any RCP, THEN…..	**NOTE:** Seal Injection flow to the RCPs is NOT lost.
	RO	(Step 2) IF CCW is lost to the motor bearing oil coolers, THEN REFER TO AOP-014.	**NOTE:** The indications indicate that CCW to the A RCP Motor Bearing Cooler has been lost.
			NOTE: The CRS will transition to AOP-014.
AOP-014, COMPONENT COOLING WATER SYSTEM MALFUNCTION			
	CRS	(Step 1) IMPLEMENT EALs	
	CRS	(Step 2) NOTIFY Plant Personnel Of Procedure Entry Using PA System	
NOTE • A CCW System leak may be indicated by a report of leakage or lowering of CCW Surge Tank level. It may cause a sustained loss of pressure and takes priority over other events. • CCW pressure less than 78 psig will cause an alarm and auto-start the standby pumps which should have restored pressure.			
	CRS	(Step 3) GO TO Appropriate Section For Indicated Malfunction:	
		• Section D - CCW System high temperature or loss of flow to RCPs/CRD Coolers	**NOTE:** The CRS will address Section D of AOP-014.
AOP-014, COMPONENT COOLING WATER SYSTEM MALFUNCTION **SECTION D, CCW SYSTEM HIGH TEMPERATURE OR LOSS OF FLOW TO RCP'S/CRD COOLERS**			

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Event Description: **Loss of CCW flow to the A RCP**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 1) MONITOR RCP Temperatures Using One Of The Following:	
		• ERFIS group display RCP LOG	
		OR	
		• RCP temperature recorder, TR-448	
	RO	(Step 2) CHECK Annunciator Status:	
		• APP-001-B1, RCP BRG COOL WTR LO FLOW – EXTINGUISHED	
		AND	
		• APP-001-A8, CCW TO CRDM LOW FLOW – EXTINGUISHED	
	RO	(Step 2 RNO) ENSURE the following are open:	
		• CC-716A, CCW TO RCP ISO	
		• CC-716B, CCW TO RCP ISO	
		• CC-730, BRG OUTLET ISO	
		IF CCW can NOT be restored to RCPs/CRDM Coolers, THEN GO TO Step 4.	
	RO	(Step 3) CHECK RCP Motor Bearing Temperatures - ANY GREATER THAN 200°F	
	RO	(Step 3 RNO) IF any RCP motor bearing temperature exceeds 200°F, THEN GO TO Step 4.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	• GO TO Step 11.	**NOTE:** The blockage will result in the A RCP bearing temperatures rising to above 200°F.
	RO	(Step 4) CHECK Reactor – CRITICAL	

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Event Description: **Loss of CCW flow to the A RCP**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5) TRIP The Reactor	
	RO	(Step 6) STOP Affected RCPs	**NOTE:** The RO will stop the A RCP.
	CRS	(Step 7) GO TO EOP-E-0, Reactor Trip or Safety Injection, WHILE CONTINUING WITH This Procedure	
	RO	(Step 8) CHECK RCPs - B OR C RUNNING	
	RO	(Step 9) CHECK RCP B – RUNNING	
	RO	(Step 10) CHECK RCP C - RUNNING	
When the crew enters EOP-E-0, Lead Examiner move to Events #6-7.			

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

On the reactor trip, an 800 gpm Steam Generator Tube Rupture will occur (over two minutes) on the "B" Steam Generator. The operator will continue in EOP-E-0, and after the Immediate Actions are complete, trip the A RCP (It will trip in ten minutes if not manually tripped). Upon completion of EOP-E-0, the operator will transition to EOP-E-3, "Steam Generator Tube Rupture," to isolate the flow into and out of the "B" Steam Generator and then conduct a cooldown of the RCS. The RCS cooldown will be conducted using the Steam Dumps to the Condenser, and the subsequent RCS depressurization will be conducted using normal pressurizer spray. Upon completion of the RCS depressurization, Pressurizer Spray Valve PCV-455C will fail in the OPEN position. The operator will be required to stop the C RCP. The scenario will terminate at Step 23 of EOP-E-3, after the operator has stopped the SI Pumps.

Booth Operator Instructions: **$004_RTA_TRIP IMF SGN02E r:2:00 f:800**

Indications Available:

- RTGB Annunciator APP-003-E8, PZR CONTROL HI/LO LVL
- PZR Level LR-459 is lowering
- PZR Pressure PR-444 is lowering
- B S/G Narrow Range level starts to rise

Time	Pos.	Expected Actions/Behavior	Comments
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION			
NOTE Steps 1 through 4 are IMMEDIATE ACTION steps.			
	RO	(Step 1) CHECK Reactor Trip:	**Immediate Action**
		• Reactor Trip AND Bypass Breakers - OPEN	
		• Rod position indicators - FULLY INSERTED	
		• Rod Bottom Lights - ILLUMINATED	
		• Neutron Flux - LOWERING	
	BOP	(Step 2) CHECK Turbine Trip:	**Immediate Action**
		• Both Turbine Stop Valves - CLOSED	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• All MSR Purge AND Shutoff Valves - CLOSED	
	BOP	(Step 3) CHECK Power To AC EMERGENCY BUSSES:	**Immediate Action**
		• CHECK Bus E-1 OR E-2 - AT LEAST ONE ENERGIZED	
		• CHECK Bus E-1 AND E-2 - BOTH ENERGIZED	
	RO	(Step 4) CHECK SI Status:	**Immediate Action**
		CHECK if SI is actuated:	
		• SI annunciators - ANY ILLUMINATED	
		OR	
		• SI equipment - AUTO STARTED	
	RO	(Step 4.a RNO) CHECK if SI is required:	**Immediate Action**
		• PZR pressure LESS THAN 1715 PSIG	
		OR	
		• Containment pressure GREATER THAN 4 PSIG	
		OR	
		• Steam Line ΔP bistables ILLUMINATED	
		OR	
		• High Steam Flow with Low Tavg OR Low Steam Pressure bistables ILLUMINATED	
		IF SI is required, THEN manually ACTUATE BOTH Trains of SI.	
		IF SI is NOT required, THEN PERFORM the following:	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• RESET SPDS AND INITIATE monitoring of Critical Safety Functions Status Trees.	
	CRS	• GO TO EOP-ES-0.1, Reactor Trip Response, Step 1.	
			NOTE: It is expected that SI will be required, and the CRS will remain in EOP-E-0. If the CRS transitions to EOP-ES-0.1, the crew will eventually return to EOP-E-0.
	RO	CHECK BOTH trains of SI actuated:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
NOTE FOLDOUT for EOP-E-0 is in effect.			
	RO/ BOP	Foldout Page:	
		FAULTED S/G FEED WATER ISOLATION CRITERIA	
		RCP TRIP CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	
		DC BUS, INSTRUMENT BUS, OR MCC-5 FAILURE CRITERIA	
		SPENT FUEL POOL COOLING CRITERIA	
	CRS	(Step 5) PERFORM Attachment 1, Auto Action Verification, While CONTINUING WITH This Procedure	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: The CRS will likely assign the BOP to perform this action. If so, **BOP Examiner** follow actions of Attachment 1. **CRS/RO** follow **E-0** Actions, **Step 6**, on **Page 43**.
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION ATTACHMENT 1, AUTO ACTION VERIFICATION			
	BOP	(Step 1) CHECK ECCS Pumps Running:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	BOP	(Step 2) CHECK ECCS Valves In Proper Emergency Alignment	
	BOP	(Step 3) CHECK CCW Pumps - AT LEAST ONE RUNNING	**NOTE:** The A CCW Pump is running.
	BOP	(Step 4) CHECK Containment Isolation Phase A:	
		• CHECK Containment Isolation Phase A - ACTUATED	
		• CHECK Containment Isolation Phase A Valves - CLOSED	
		• CHECK Excess Letdown - ISOLATED	
		• CVC-387, EXCESS LTDN STOP VALVE - CLOSED	
		• HIC-137, EXCESS LTDN FLOW CONTROLLER - AT 0% DEMAND	
	BOP	(Step 5) CHECK Feedwater Isolation:	
		• CHECK Main Feed Pumps - BOTH TRIPPED	
		• CHECK Main Feedwater isolated:	
		• Feedwater Reg Valves - CLOSED	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• Feedwater Reg Bypass Valves - CLOSED	
		• Feedwater Header Section Valves - CLOSED	
	BOP	(Step 6) CHECK If Main Steam Lines Should Be Isolated:	
		• CHECK Main Steam Line Isolation - REQUIRED	
		• CHECK Containment pressure - GREATER THAN 10 PSIG	
		OR	
		• High steam flow with:	
		• S/G pressure - LESS THAN 614 PSIG	
		OR	
		• Tavg - LESS THAN 543°F	
	BOP	(Step 6.a RNO) GO TO Step 7.	
	BOP	(Step 7) CHECK Proper Service Water System Operation:	
		• CHECK SW Pumps - ALL RUNNING	
		• CHECK SW Booster Pumps - BOTH RUNNING	
		• CHECK Both SW Header Low Pressure Alarms - EXTINGUISHED	
		• APP-008-F7,SOUTH SW HDR LO PRESS	
		• APP-008-F8,NORTH SW HDR LO PRESS	
	BOP	(Step 8) CHECK BOTH EDGs - RUNNING	
	BOP	(Step 9) CHECK ECCS Flow:	
		• CHECK RCS pressure - LESS THAN 1650 PSIG [1725 PSIG]	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 9.a RNO) GO TO Step 10.	
	BOP	(Step 10) CHECK CV Recirculation Fans - ALL RUNNING	**NOTE:** HVH-3 was previously stopped due to high vibration.
	BOP	(Step 11) CHECK IVSW System Actuated:	
		• PCV-1922A, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
		• PCV-1922B, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
	BOP	(Step 12) CHECK CV Ventilation Isolation:	
		• CV Ventilation Isolation Valves - CLOSED	
	BOP	(Step 13) CHECK Control Room Ventilation Aligned For Pressurization Mode:	
		• HVA-1A OR HVA-1B,CONTROL ROOM AIR HANDLING FAN - RUNNING	
		• HVE-19A OR HVE-19B,CONTROL ROOM AIR CLEANING FAN - RUNNING	
		• HVE-16, CONTROL ROOM AIR EXHAUST FAN - STOPPED	
		• Control Room HVAC Outside Air Damper A OR B - OPEN	
		• CR-D1A-SA, CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER - CLOSED	
		• CR-D1B-SB, CONTROL ROOM AIR EXHAUST FAN DISCHARGE DAMPER - CLOSED	
	BOP	(Step 14) CHECK DS Bus - ENERGIZED	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 15) CHECK Battery Chargers ENERGIZED:	
		• APP-036-D1, BATT CHARGER A/A-1 TROUBLE Alarm - EXTINGUISHED	
		• APP-036-D2, BATT CHARGER B/B-1 TROUBLE Alarm - EXTINGUISHED	
	BOP	(Step 16) STOP R-11/12 Sample Pump	
	BOP	(Step 17) Locally RESET AND LOAD Instrument Air Compressor(s) As Necessary (38 KW each):	
		• Compressor A (MCC-5 CMPT 7M)	
		• Compressor B (MCC-6 CMPT 3G)	
	BOP	(Step 18) PERFORM Crew Update To Include The Following:	
		• Attachment completion	
		• Manual actions taken	
		• Failed equipment status	
		• SW status per Step 7.c	
		• If applicable, PERFORM Supplement M, Component Alignment For Loss Of SW To Turbine Building, as time permits	
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION			
	RO	(Step 6) CHECK AFW Pumps Running:	
		• CHECK Motor Driven AFW Pumps - BOTH RUNNING	
		• CHECK S/G Narrow Range levels - TWO S/Gs LESS THAN 16%	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK Steam Driven AFW Pump - RUNNING	
	RO	(Step 7) CHECK AFW Valves In Proper Emergency Alignment:	**NOTE:** The RO/BOP may take a Prudent Action (OMM-22) to throttle AFW flow to the "B" S/G and control Narrow Range level between 9-50%.
		• AFW Header Discharge Valves - FULL OPEN	
		• AFW Header Section Valves - FULL OPEN	
		• Steam Driven AFW Pump Discharge Valves - FULL OPEN IF PUMP RUNNING	
CAUTION During this procedure if Offsite Power is lost after SI reset, manual action may be required to restart safeguards equipment.			
	RO	(Step 8) CHECK Total AFW Flow:	
		• RESET SI	
		• CONTROL AFW flow to maintain Intact S/G Narrow Range level between 9%[18%] AND 50%	
		• CHECK total AFW flow - GREATER THAN 300 GPM	
	RO	(Step 9) CHECK CV Spray NOT Required:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK Containment Pressure - HAS REMAINED LESS THAN 10 PSIG	
		• CHECK CV Spray - NOT ACTUATED	
	RO	(Step 10) CHECK RCP Seal Cooling:	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• CCW flow to RCP(s) Thermal Barriers - NORMAL	
		• APP-001-C1,RCP THERM BAR COOL WTR HI FLOW ALARM - EXTINGUISHED	
		• APP-001-D1,RCP THERM BAR COOL WTR LO FLOW alarm - EXTINGUISHED	**NOTE:** CCW flow has been blocked to the A RCP Motor Bearing Oil Cooler.
		OR	
		• Seal Injection flow - ADEQUATE	
		• Seal Injection flow - GREATER THAN 6 GPM PER RCP	
		OR	
		• Thermal Barrier ΔPs - GREATER THAN 5 INCHES WATER PER RCP	
	RO	(Step 11) CHECK RCS Temperatures:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• With ANY RCP running, RCS average temperature - STABLE AT OR TRENDING TO 547°F	**NOTE:** Both the B and the C RCPs are running.
		OR	
		• With NO RCPs running, RCS Cold Leg temperatures - STABLE AT OR TRENDING TO 547°F	
	RO	(Step 12) CHECK PZR PORVs AND Spray Valves:	
		• CHECK PZR PORVs - CLOSED	
		• CHECK Normal PZR Spray Valves - CLOSED	
		• CHECK Aux PZR Spray Valve - CLOSED	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 13) CHECK If RCPs Should Be Stopped:	
		• CHECK RCPs - ANY RUNNING	
		• CHECK SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW	
		• CHECK RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F[32°F]	
	CRS	(Step 13.c RNO) GO TO Step 14.	
	RO	(Step 14) CHECK If S/G Secondary Pressure Boundaries Are Intact:	
		• NONE LOWERING IN AN UNCONTROLLED MANNER	
		• NONE COMPLETELY DEPRESSURIZED	
	RO	(Step 15) CHECK If S/G Tubes Are Intact:	
		• Secondary Radiation Monitors - HAVE REMAINED NORMAL	
		• R-15, CONDENSER AIR EJECTOR GAS	
		• R-19s, S/G Blowdown Radiation	
		• R-31s, STEAMLINE RADIATION MONITORs	
		• S/G levels - NONE RISING IN AN UNCONTROLLED MANNER	**NOTE:** The B S/G level is rising in an uncontrolled manner.
	CRS	(Step 15 RNO) PERFORM the following:	**NOTE:** The CRS will transition to EOP-E-3.
		• RESET SPDS AND INITIATE monitoring of Critical Safety Functions Status Trees.	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• GO TO EOP-E-3, Steam Generator Tube Rupture, Step 1.	
EOP-E-3, STEAM GENERATOR TUBE RUPTURE			
NOTE • FOLDOUT for EOP-E-3 is in effect. • Step 1 RCP Trip criteria applies UNTIL an operator controlled RCS Cooldown is initiated.			
	RO/ BOP	(Foldout Page)	
		SI REINITIATION CRITERIA	
		SECONDARY INTEGRITY CRITERIA	
		MULTIPLE TUBE RUPTURE CRITERIA	
		COLD LEG RECIRCULATION SWITCHOVER CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	
	RO	(Step 1) CHECK If RCPs Should Be Stopped:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK RCPs - ANY RUNNING	**NOTE:** Both the B and the C RCPs are running.
		• CHECK SI Pumps - AT LEAST ONE RUNNING AND CAPABLE OF DELIVERING FLOW	
		• CHECK RCS Subcooling based on Core Exit T/Cs - LESS THAN 13°F [32°F]	
	CRS	(Step 1.c RNO) GO TO Step 2.	
	BOP	(Step 2) CHECK Ruptured S/G(s) – IDENTIFIED	**NOTE:** The crew will identify the B S/G as the ruptured S/G.

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• Unexpected rise in ANY S/G Narrow Range level	
		OR	
		• Any R-19 SG Blowdown Radiation monitor indicates high radiation	
		OR	
		• Any R-19 SG Blowdown Radiation monitor indicates high radiation	
		OR	
		• High radiation reported from any S/G sample	
CAUTION • If the Steam Driven AFW Pump is the only available source of feed flow, steam supply to the Steam Driven AFW Pump should be maintained from at least one S/G. • At least one S/G must be maintained available for RCS cooldown.			
	BOP	(Step 3) ISOLATE Flow From Ruptured S/G(s):	
		• ADJUST Ruptured S/G(s)Steam Line PORV Controller to 1060 psig	
		• CHECK Ruptured S/G(s) Steam Line PORV - CLOSED	
		• RV1-2	**NOTE:** The crew will ensure that the B S/G PORV is CLOSED.
		• CLOSE Ruptured S/G(s) Steam Driven AFW Pump Steam Shutoff Valves:	
		• V1-8B	
		• Locally CLOSE Ruptured S/G(s)Bypass Drn AND Warmup Line To AFW Pump Valve(s)While CONTINUING WITH this procedure:	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• MS-29 (S/G B)(Pipe Jungle above/right of V1-8B)	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **5 minutes** that the **MS-29** is **CLOSED**. **IRF MSS048 f:0**
		• CHECK Ruptured S/G(s) S/G Blowdown AND Blowdown Sample Valves - CLOSED	
		• CHECK Ruptured S/G(s) MSIV Before AND After Seat Drain valves - CLOSED	
		• CLOSE Ruptured S/G(s) MSIV AND MSIV Bypass Valves:	
		• S/G B:	
		• V1-3B	
		• MS-353B	
CAUTION If ANY Ruptured S/G is Faulted, feed flow to that S/G should remain isolated during subsequent recovery actions UNLESS needed for RCS cooldown.			
	BOP	(Step 4) CHECK Ruptured S/G	
		• CHECK Ruptured S/G - FAULTED	
	CRS	(Step 4 RNO) GO TO Step 5.	
CAUTION If Offsite Power is lost AFTER SI reset, manual action may be required to restart safeguards equipment.			
	BOP	(Step 5) CHECK Ruptured S/G(s) Level:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK S/G Narrow Range level - GREATER THAN 9% [18%]	
	RO	• RESET SI	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• STOP feed Flow to ruptured S/G(s):	
		• CLOSE Steam Driven AFW Pump Discharge Valve(s):	
		• V2-14B	
		• CLOSE AFW Header Discharge Valve(s):	
		• V2-16B	
		• PERFORM Supplement D, Deenergizing AFW Valves For AFFECTED S/G	**NOTE:** The BOP will use Attachment D, and call AO for local Actions. **Booth Instructor** acknowledge as **AO**, and report after **10 minutes** that actions are complete. **IRF EPSMCC6_226 f:RACK_OUT** **IRF EPSMCC9_254 f:RACK_OUT** **IRF EPSMCC10_266 f:RACK_OUT**

Critical Task:

Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.

Safety Significance: Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. The fact that the operator allows the differential pressure to dissipate and, as a result, are then forced to transition to a contingency procedure constitutes an incorrect performance that necessitates the operator taking compensating action that would unnecessarily complicate the event mitigation strategy.

	BOP	(Step 6) CHECK Ruptured S/G(s) Pressure - GREATER THAN 500 PSIG	
	BOP	(Step 7) CHECK The Following Valves For Ruptured S/G- CLOSED	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• MSIVs	
		• MSIV Bypass Valves	
		• S/G Steam Line PORVs	
		• Steam Driven AFW Pump Steam Shutoff Valves	
CAUTION If RCPs are NOT running, the following steps may cause a false CSF-4, Integrity Status Tree, indication for the Ruptured Loop. Disregard the Ruptured Loop T-cold indication UNTIL after performing Step 31.			
NOTE Main Steam Line Isolation may occur if the high steam flow setpoint is exceeded. The RCS cooldown should be continued using the S/G Steam Line PORV(s) if MSIV closure occurs.			
	BOP	(Step 8) INITIATE RCS Cooldown:	
		• DETERMINE required Core Exit temperature:	**NOTE:** The CRS will determine the Target temperature to 513-519°F.
		• DUMP steam to Condenser from intact S/G(s) at MAXIMUM rate:	
		• CHECK Condenser - AVAILABLE	
		• PLACE STEAM DUMP MODE Control Switch in STEAM PRESS position	
		• ADJUST PC-464B, STEAM HEADER PRESS Controller as necessary to initiate AND maintain RCS cooldown	
		• CHECK RCS Tavg - LESS THAN 543°F	
		• Momentarily PLACE STEAM DUMP MODE Control Switch to BYPASS TAVG INTLK position	
		• CHECK APP-006-F5, STEAM DUMP ARMED alarm - ILLUMINATED	
		• CHECK Core Exit T/Cs - LESS THAN REQUIRED TEMPERATURE	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 8.f RNO) WHEN Core Exit T/Cs are LESS THAN required temperature, THEN PERFORM Steps 8.g and 8.h.	
	CRS	CONTINUE WITH Step 9.	
	BOP	(Step 9) CHECK Intact S/G Levels:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK S/G Narrow Range levels - GREATER THAN 9%[18%]	
		• CONTROL feed flow to maintain S/G Narrow Range levels - BETWEEN 21% [21%] AND 50%	
CAUTION If ANY PZR PORV opens because of high PZR pressure, Step 10.b should be repeated AFTER pressure lowers to LESS THAN 2335 PSIG.			
	RO	(Step 10) CHECK PZR PORVs AND Block Valves:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK Power to PZR PORV Block Valves - AVAILABLE	
		• CHECK PZR PORVs - CLOSED	
		• CHECK PZR PORV Block valves - AT LEAST ONE OPEN	
CAUTION If Offsite Power is lost AFTER SI reset, manual action may be required to restart safeguards equipment.			
	RO	(Step 11) RESET SI	
	RO	(Step 12) RESET Containment Isolation Phase A	
	RO	(Step 13) ESTABLISH Instrument Air To CV:	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK APP-002-F7, INSTR AIR HDR LO PRESS alarm - EXTINGUISHED	
		• RESET IA PCV-1716, INSTRUMENT AIR ISOLATION TO CV	
		• CHECK IA PCV-1716 - OPEN	
	RO	(Step 14) CHECK If RHR Pumps Should Be Stopped:	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• CHECK RHR Pumps - ANY RUNNING WITH SUCTION ALIGNED TO RWST	
		• CHECK RCS pressure:	
		• Pressure - GREATER THAN 275 PSIG [325 PSIG]	
		• Pressure - STABLE OR RISING	
		• STOP RHR Pumps	
		• CHECK RCS pressure remains GREATER THAN 275 PSIG [325 PSIG]	
	RO	(Step 15) ESTABLISH Charging Flow:	
		• CHECK Charging Pumps - AT LEAST ONE RUNNING	**NOTE:** There are two Charging Pumps running.
		• ALIGN Charging Pump suction to RWST:	
		• OPEN LCV-115B, EMERG MU TO CHG SUCTION	
		• CLOSE LCV-115C, VCT OUTLET Valve	
		• PLACE RCS MAKEUP SYSTEM Control Switch to STOP	
		• ESTABLISH MAXIMUM charging flow:	**NOTE:** Maximum charging is defined as two Charging Pumps running when PZR level is in-band, and three Charging Pumps running when PZR level is off-scale low.

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• START additional Charging Pump(s) as necessary	
		• ADJUST the following as necessary to maintain proper Seal Injection AND MAXIMUM Charging flow:	
		• Charging Pump Speed Controller(s)	
		• HIC-121, CHARGING FLOW Controller	
		• Seal Water Flow Control Valves	**NOTE:** The BOP may contact the AO to adjust Seal Injection flows. If so, **Booth Instructor** acknowledge as AO; and use: IRF CVC030 f: variable IRF CVC031 f: variable IRF CVC032 f: variable
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	
	BOP	(Step 16) CHECK If RCS Cooldown Should Be Stopped:	
		• CHECK Core Exit T/Cs - LESS THAN REQUIRED CORE EXIT T/C TEMPERATURE FROM STEP 8	
		• STOP RCS cooldown	
		• MAINTAIN Core Exit T/Cs - LESS THAN REQUIRED TEMPERATURE	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **While in EOP-E-3, establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either (1) Too high to maintain 38°F of RCS Subcooling OR (2) below 295°F (RCS Integrity Red Path Limit).** Safety Significance: Failure to establish and maintain the correct RCS temperature during a SGTR leads to a transition from E-3 to a contingency procedure. This failure constitutes an incorrect performance that necessitates the operator taking compensating action that would unnecessarily complicate the event mitigation strategy.			
	BOP	(Step 17) CHECK Ruptured S/G(s) Pressure - STABLE OR RISING	
	RO	(Step 18) CHECK RCS Subcooling Based On Core Exit T/Cs - GREATER THAN 38°F [57°F]	
	RO	(Step 19) DEPRESSURIZE RCS To MINIMIZE Break Flow AND Refill PZR:	
		• CHECK Normal PZR Spray - AVAILABLE	
		• ESTABLISH MAXIMUM available PZR Spray UNTIL ANY of the following conditions satisfied:	
Booth Instructor: **IOR aiPRSAAA089A r:0 f:0** **IMF PRS02B f:100**			
		• BOTH of the following:	
		• RCS pressure – LESS THAN RUPTURED S/G(s) PRESSURE	
		• PZR level – GREATER THAN 14% [31%]	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		OR	
		• BOTH of the following:	
		• RCS pressure – WITHIN 300 PSI OF RUPTURED S/G(s) PRESSURE	
		• PZR level – GREATER THAN 44% [50%]	
		OR	
		• PZR level – GREATER THAN 73% [66%]	
		OR	
		• RCS Subcooling based on Core Exit T/Cs – LESS THAN 18°F [37°F]	
		• CLOSE Normal PZR Spray Valve(s):	
		• Normal PZR Spray Valves – CLOSED	**NOTE:** Due to the failure, the operator will not be able to close PCV-455B.
	RO	(Step 19.c.1 RNO) STOP RCP(s) as necessary to stop Normal PZR Spray flow:	
		• IF PCV-455B can NOT be closed, THEN STOP RCP C.	**NOTE:** The RO will stop the C RCP.
	CRS	• (Step 19.d) OBSERVE CAUTION prior to Step 22 AND GO TO Step 22	
CAUTION SI MUST BE TERMINATED WHEN termination criteria are satisfied to prevent overfilling the Ruptured S/G(s).			
	RO/ BOP	(Step 22) CHECK If ECCS Flow Should Be Terminated:	
		• CHECK RCS Subcooling based on Core Exit T/Cs - GREATER THAN 18°F [37°F]	
		• CHECK Secondary Heat Sink:	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• Total feed flow to S/G(s) - GREATER THAN 300 GPM AVAILABLE	
		OR	
		• S/G Narrow Range level in at least one Intact S/G - GREATER THAN 9% [18%]	
		• CHECK RCS pressure - STABLE OR RISING	
		• CHECK PZR level - GREATER THAN 14% [31%]	
	RO	(Step 23) STOP SI Pumps	

Critical Task:

Depressurize the RCS to meet SI termination criteria, and terminate SI so that primary and secondary inventory are stable before Steam Generator Overfill is reached based on Water in the Steam Lines.

Safety Significance: Failure to stop reactor coolant leakage into a ruptured SG by depressurizing the RCS and terminating SI flow during a SGTR (when it is possible to do so) needlessly complicates mitigation of the event. It also constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario. A SGTR allows radioactive RCS inventory to leak into the SG. As a result, SG inventory, radioactivity, and pressure increase. If primary-to-secondary leakage is not stopped, SG pressure increases until either the SG PORV or the safety valve(s) opens, releasing radioactivity to the environment. If leakage continues, SG inventory increase leads to water release through the PORV or safety valve(s) or to SG overfill, which could cause an unisolable fault in the ruptured SG, greatly complicating mitigation.

NOTE: This will only be needed if NR/WR level is > 100%. Check Monitored Parameter: thlecell (192) [Throughout the scenario it will be very low (3.26E-6). If water is in the steam lines, the value will change markedly (approaches 0)]

	RO	(Step 24) ESTABLISH Charging Flow:	
		• CHECK Charging Pumps – AT LEAST ONE RUNNING	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
		• ESTABLISH Charging flow as necessary to maintain PZR level:	
		• OPERATE Charging Pump(s) as necessary	
		• ADJUST the following as necessary to maintain proper Seal Injection AND desired Charging flow:	
		• Charging Pump Speed Controller(s)	
		• HIC-121, CHARGING FLOW Controller	
		• Seal Water Flow Control Valves	**NOTE:** The BOP may contact the AO to adjust Seal Injection flows. If so, **Booth Instructor** acknowledge as AO; and use: IRF CVC030 f: variable IRF CVC031 f: variable IRF CVC032 f: variable
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	
	RO	(Step 25) CHECK Adequate RCS Depressurization	**NOTE:** The B RCP is the only RCP running and this pump produces minimal spray flow.
		• CHECK Normal PZR Spray - AVAILABLE	
	CRS	(Step 25 RNO) GO TO Step 26.	
	RO	(Step 26) CHECK SI Flow Not Required:	
		CHECK RCS Subcooling based on Core Exit T/Cs – GREATER THAN 18°F [37°F]	
		CHECK PZR level – GREATER THAN 14% [31%]	

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Event Description: **B Steam Generator Tube Rupture/ Pzr Spray Valve PCV-455B fails OPEN**

Time	Pos.	Expected Actions/Behavior	Comments
At the discretion of the Lead Examiner terminate the exam.			

NRC SCENARIO N18-RT-2 TURNOVER SHEET

1. INITIAL CONDITIONS

a)	Time in Core Life:	BOL
b)	Reactor Power:	75%
c)	Turbine Load:	546.8 MWe
d)	Boron Concentration:	1470 ppm
e)	Rod Height:	175 Steps CB 'D'
f)	RCS Pressure:	2235 psig
g)	PZR Level:	44.2 %
h)	Xenon:	Building In

2. TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT

T.S. #	Description
3.6.6	A.1 (Restore containment spray train to OPERABLE status within 72 hours AND 10 days from discovery of failure to meet the LCO)

3. CLEARANCES IN EFFECT

a) B CV Spray Pump is OOS

4. CAUTION CAPS IN EFFECT

a) None

5. PROTECTED EQUIPMENT

a) Per Attachment 25 of OMM-048-1

6. DEGRADED EQUIPMENT

a) PI-1684, SW South Header Pressure (I&C Investigating).

b) RTGB Annunciator APP-007-E8, "HTR 4B HI/LO LVL," has failed to the EXTINGUISHED condition (I&C is investigating).

7. SWITCHYARD ACCESS

a) Unrestricted

8. PLANNED EVOLUTIONS

a) Raise power to 100% in accordance with Reactivity Plan

9. TURNOVER INFORMATION

a) The area has experienced steady light rain for the past 2 hours, with light wind from the North at 2-5 mph, and this is expected to continue throughout the shift.

b) OP-105 has been in progress for the past three days as power has risen to 75%.

10. REACTIVITY INFORMATION

a) The Reactor Engineer (RE) will be available in the Control Room

b) The RE recommends a 1900 gallon dilution, made in several 500 gallon batch dilutions

c) The RE recommends that Control Bank D be approximately 190 steps upon achieving 100% power

11. RISK

a) GREEN