Facility:	**H B Robinson**	Scenario No.: **1**	Op Test No.: **N16-1**
Examiners:	______	Operators:	______ (SRO)
	______		______ (RO)
	______		______ (BOP)

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The SDAFW Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.7.4 ACTION A. FI-613, CCW System Flow is OOS (I&C Investigating). RTGB Annunciator APP-010-B3, "EDG B START AIR LO PRESS," has failed to the ILLUMINATED condition (I&C is investigating).

Event No.	Malf. No.	Event Type*	Event Description
1	1	I-RO N-BOP I(TS)-SRO	Pzr Level Transmitter LT-459 Fails LOW
2	2	I-BOP I(TS)-SRO	"C" Steam Flow Transmitter FT-494 Fails LOW
3	3	R-RO N-BOP N-SRO	Tube Leak in Feedwater Heater 4A/Downpower
4	4	C-BOP C-SRO	CRDM Fan "A" Failure
5	5	C-RO C-SRO	Continuous Inward Rod Motion
6	6	M-RO M-BOP M-SRO	"C" Steam Generator Tube Rupture
7	7	C-BOP	Loss of Off-Site Power

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

<u>H B Robinson 2016 NRC Scenario #1</u>

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

The following equipment is Out-Of-Service: The SDAFW Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.7.4 ACTION A. FI-613, CCW System Flow is OOS (I&C Investigating). RTGB Annunciator APP-010-B3, “EDG B START AIR LO PRESS,” has failed to the ILLUMINATED condition (I&C is investigating).

Shortly after taking the watch, Pressurizer Level Transmitter, LT-459 will fail LOW causing normal letdown to isolate, de-energizing of pressurizer control group heaters and charging pump speed to rise for the pump in AUTO. The operator will respond in accordance APP-003-E8, “PZR CONTROL HI/LO LVL,” and AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-030, “Pressurizer Level Transmitters.” The operator will address Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation.”

Following this, the controlling steam flow channel for S/G “C”, FT-494, will fail LOW, causing FRV-498 to start to CLOSE. The operator will respond in accordance with AOP-010, “Main Feedwater/Condensate Malfunction,” and/or AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-034, “Steam Flow.” The operator will address Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation.”

Next, a tube leak will develop in Feed Water Heater 4A. The operator will respond in accordance with APP-007-E7, HTR 4A HI/LO LVL, identifying the leak. The operator may enter AOP-010, “Main Feedwater/Condensate Malfunction.” Ultimately, the operator will use OP-407, “Heater Drain and Vents,” to remove Feedwater Heaters 5A, 4A, and 3A from Service. This will require a power decrease. The operator will use either AOP-038, “Rapid Downpower,” or OP-105, “Maneuvering the Plant When > 25% Power,” and OP-301, “Chemical and Volume Control System (CVCS),” to lower plant power.

During the downpower, the “A” CRDM Fan will trip. The operator will address APP-010-A6, HVH-5A/B AIR FLOW LOST/OVLD, and manually start the “B” CRDM Fan.

Shortly afterwards, a continuous control rod insertion will occur. The operator will respond in accordance with AOP-001, “Malfunction of Reactor Control System.” The operator will be unable to control the rod insertion and will manually trip the reactor.

On the reactor trip, a 500 gpm Steam Generator Tube Rupture will occur (over 10 minutes) on the “C” Steam Generator. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection.” After the Immediate Actions are complete, it is likely that the operator will determine that SI is NOT actuated nor required, and transition to EOP-ES-0.1, “Reactor Trip Response.” While in this procedure the operator will determine that SI is required, manually actuate SI, and return to EOP-E-0. 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 “C” Steam Generator and then conduct a cooldown of the RCS.

Upon transition into EOP-E-3, a Loss of Off-Site Power will occur. Both EDGs will start and re-power Buses E-1 and E-2. With SI previously reset, the operator will need to address a re-

initiation of AFW flow to all Steam Generators, and the restart of the ECCS Pumps. The operator will continue with EOP-E-3 and conduct the RCS cooldown using the “A” and “B” Steam Generator PORVs.

During the RCS depressurization, the Pzr Spray Valves will not be available. The operator will be required to conduct the depressurization using an available Pzr PORV.

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

Critical Tasks:

Manually control “C” S/G Narrow Range Level before a Reactor Trip occurs on low S/G level.

Safety Significance: failure to take manual control of the “C” S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs (EOP-Based)

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) (EOP-Based)

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 before Steam Generator Overfill is reached based on Water in the Steam Lines. (EOP-Based)

Safety Significance: Failure to stop reactor coolant leakage into a ruptured SG by depressurizing the RCS (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.

Facility:	**H B Robinson**	Scenario No.: **2**	Op Test No.: **N16-1**
Examiners:	______________	Operators:	______________ (SRO)
	______________		______________ (RO)
	______________		______________ (BOP)

Initial Conditions:	The plant is at 75% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "A" SI Pump is OOS. The "B" SI Pump has been aligned to 480 VAC ESF Bus E-1. The "C" Charging Pump is also OOS. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C3, "AIR SIDE SEAL OIL BU PMP OVLD," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1	-	R-RO N-BOP N-SRO	Raise Power
2	1	I-RO I-SRO	VCT Level Transmitter LT-115 fails HIGH
3	2	C-BOP C-SRO	"C" FRV Controller fails HIGH in AUTO
4	3	C-RO C(TS)-SRO	"B" Charging Pump Trip
5	4	I-BOP I(TS)-SRO	Turbine 1st Stage Pressure Transmitter PT-447 fails LOW
6	5	M-RO M-BOP M-SRO	Cold Leg SBLOCA
7	6/7	NA	480 VAC Bus E-1 De-energizes
8	6	C-RO	"C" SI Pump fails to Auto Start
9	7	C-RO	CV Spray Valves SI-880C and D fail to OPEN Automatically

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

H B Robinson 2016 NRC Scenario #2

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

The following equipment is Out-Of-Service: The "A" SI Pump is OOS. The "B" SI Pump has been aligned to 480 VAC ESF Bus E-1. The "C" Charging Pump is also OOS. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C3, "AIR SIDE SEAL OIL BU PMP OVLD," 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, "Chemical and Volume Control System (CVCS)."

During the power increase, VCT Level Transmitter LT-115 will fail HIGH causing all letdown to be diverted to the CVCS HUTs. This failure will result in VCT level lowering without automatic makeup. The operator will respond in accordance with AOP-003, "Malfunction of Reactor Makeup Control." After this, the power increase will continue.

Next, the "C" Feed Regulating Valve Controller will fail such that the valve starts to OPEN. The operator will respond in accordance with AOP-010, "Main Feedwater/Condensate Malfunction," and control the "C" S/G level manually throughout the remainder of the scenario.

Following this, the "B" Charging Pump will trip. The operator will respond in accordance with APP-003-F5, CHG PMP MOTOR OVLD/TRIP and/or APP-001-B6, LP LTDN LN HI TEMP, and raise speed of the "A" Charging Pump and reduce Letdown flow. The operator may enter AOP-018, "Reactor Coolant Pump Abnormal Conditions." The operator will address 3.4.17, "Chemical and Volume Control System."

Shortly afterwards, Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW. The operator will respond in accordance with AOP-025, "RTGB Instrument Failure, and place all Feed Regulating Valves in MANUAL" The operator will remove the failed instrument from service in accordance with OWP-033, "First Stage Pressure (FSP)," and restore the "A" and "B" Feed Regulating valves to AUTO control. The operator will address 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."

Subsequently, a Cold Leg Small Break LOCA will occur (over 5 minutes) on the B Loop. The operator will enter AOP-016, "Excessive Primary Plant Leakage." Ultimately, the operator will enter EOP-E-0, "Reactor Trip or Safety Injection." When the reactor trips, the normal supply breaker to Bus E-1 will trip OPEN, and the "A" EDG Output Breaker will fail to CLOSE either automatically or manually; and Train "A" equipment will remain unavailable throughout the event. Additionally, the "C" SI Pump will fail to automatically start on SI, and the operator will be required to manually start this pump.

Upon completion of EOP-E-0, the operator will transition to EOP-E-1, "Loss of Reactor or Secondary Coolant," and the break size will become larger. Containment pressure will exceed 10 psig creating an Orange Path condition on the Containment Critical Safety Function. When this occurs, the "B" CV Spray will automatically start on HI-HI Containment Pressure, however, both

SI-880C&D ("B" CV Spray Pump Discharge Valves) will fail to open automatically, and the operator will be required to manually open these valves.

The scenario will terminate in EOP-E-1 after Containment pressure has been lowered to less than 10 psig, or at Step 9 of FRP-J.1, "Response to High Containment Pressure," after the operator has taken all necessary steps to reduce Containment pressure.

<u>Critical Tasks:</u>

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (Containment Isolation Phase B - ACTUATED, OR 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.

Establish flow from at least one high-head SI pump before transition out of E-0. (EOP-Based)

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.

Manually actuate at least one CV Spray Train before Transitioning to EOP-ES-1.2. (EOP-Based)

Safety Significance: Failure to manually actuate the minimum required complement of containment cooling equipment under the postulated conditions demonstrates the inability of the crew to “recognize a failure or an incorrect automatic actuation of an ESF system or component. In this case, the minimum required complement of containment cooling equipment can be manually actuated from the control room. Therefore, failure to manually actuate the minimum required complement of containment cooling equipment also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS) capacity). Additionally, under the postulated plant conditions, failure to manually actuate the minimum required complement of containment cooling equipment (when it is possible to do so) results in a failure to prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario.

Facility:	**H B Robinson**	Scenario No.: **3**	Op Test No.: **N16-1**
Examiners:		Operators:	(SRO)
			(RO)
			(BOP)

Initial Conditions:	The plant is at 68% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The SDAFW Pump is OOS, and has been for 7 days. Technical Specification LCO 3.7.4 ACTION C has just been entered. Maintenance reports that this pump will be OPERABLE in 2 hours, and station management has directed that the initiation of the shutdown be delayed 2 hours. TI-471, PRT Temperature is OOS (I&C Investigating). RTGB Annunciator APP-008-C3, "EMERG OIL PMP OVLD," has failed to the ILLUMINATED condition (I&C is investigating).

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-RO C-BOP C(TS)-SRO	Loss of Instrument Bus 3
2	2	I-BOP I-SRO	"B" Feed Flow Transmitter FT-487 Fails LOW
3	NA	R-RO N-BOP N-SRO	Load Decrease
4	3	C-RO C-SRO	Letdown Line Pressure Control Valve Controller fails CLOSED
5	4	I-RO I(TS)-SRO	PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE
6	5	M-RO M-BOP M-SRO	Inadvertent FWIS
7	6	C-BOP	Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate
8	7	NA	"A" & "B" MDAFW Pump Trip

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

H B Robinson 2016 NRC Scenario #3

The plant is at 68% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service: The SDAFW Pump is OOS, and has been for 7 days. Technical Specification LCO 3.7.4 ACTION C has just been entered. Maintenance reports that this pump will be OPERABLE in 2 hours, and station management has directed that the initiation of the shutdown be delayed 2 hours. TI-471, PRT Temperature is OOS (I&C Investigating). RTGB Annunciator APP-008-C3, “EMERG OIL PMP OVLD,” has failed to the ILLUMINATED condition (I&C is investigating).

Shortly after taking the watch, Instrument Bus 3 will de-energize. The operator will respond in accordance with AOP-024, “Loss of Instrument Bus,” and restore power to the Bus. The operator will address Technical Specification LCO 3.8.7, “AC Instrument Bus Sources – Operating,” and Technical Specification LCO 3.8.9, “Distribution Systems-Operating.”

Following this, the controlling feed flow channel for S/G “B”, FT-487, will fail LOW, causing FRV-498 to start to OPEN. The operator will respond in accordance with AOP-010, Main Feedwater/Condensate Malfunction,” and/or AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-026, “Feed Flow (FWF).”

Next, the WCCS will call and inform the operator that it has been determined that the SDAFW Pump will not be restored to OPERABLE status within the next two hours as expected, and that station management has directed that the plant be brought to Mode 3 within the next four hours using AOP-038, “Rapid Downpower.”

During the downpower, the Letdown Pressure Control Valve (PCV-145) controller will fail such that the valve will fail closed. The operator will respond in accordance with APP-001-D6, LP LTDN LN HI PRESS, and ultimately take manual control of the valve.

Shortly afterwards, PZR Pressure transmitter PT-444 will fail HIGH causing the Pzr Spray valves and Pzr PORV to OPEN. The operator will respond in accordance with AOP-019, “Malfunction of RCS pressure Control,” and/or AOP-025, “RTGB Instrument Failure.” RCS pressure control will remain in MANUAL for the remainder of the scenario. The operator will address Technical Specification LCO 3.3.4, “Remote Shutdown System,” Technical Specification LCO 3.4.1, “RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits,” and Technical Specification LCO 3.4.11, “Pressurizer Power Operated Relief Valves (PORVs).”

After the Pressure Transmitter has been removed from service, an inadvertent FWIS will occur. Simultaneously with the Rx Trip, the Turbine will fail to TRIP, the Governor Valves will fail to CLOSE manually, and the Main Steamline Isolation signal will fail to auto actuate. The operator will be required to manually CLOSE the MSIVs. Additionally the “A” and “B” MDAFW Pumps will trip immediately after auto start. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection.”

Upon completion of EOP-E-0, the operator will transition to EOP-ES-0.1, “Reactor Trip Response.” However, this transition will be delayed due to a RED condition on the Heat Sink CSF. The operator will perform FRP-H.1, “Response to Loss of Secondary Heat Sink.” The operator will direct that AFW Pump “C” be placed in service in accordance with OP-402, “Auxiliary Feedwater System,” however, the AFW Pump “C” Diesel will fail to start.

The scenario will terminate at Step 7 RNO 2.b of FRP-H.1, after the operator has restored feedwater flow from the Main Feedwater System.

Critical Tasks:

Manually control “B” S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the “B” S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Manually close the OPEN Pzr Spray Valve(s) and PORV before the Reactor trips based on low pressurizer pressure.

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

Manually Close the MSIVs Before an ORANGE Path Challenge Develops to Either the Subcriticality or the Integrity CSF or Before Transition to ECA-2.1, Whichever Happens First (EOP-Based)

Safety Significance: Failure to trip the main turbine under the postulated plant conditions causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Additionally, such an omission constitutes a failure by the operator to “demonstrate the ability to take one or more actions that would prevent a challenge to plant safety. The situation described in the plant conditions is effectively a large steamline break downstream of the MSIVs. This “effective steamline break” is also located downstream of the main turbine stop valves, which cannot be closed by manually tripping the turbine. Failure to perform the critical task results in uncontrolled depressurization of all SGs and in uncontrolled cooldown of the RCS, both of which are unnecessary.

Establish Feedwater Flow Into at Least One S/G Before RCS Bleed and Feed is Required (EOP-Based)

Safety Significance: Failure to establish feedwater flow to any SG results in the operator’s having to rely upon the lower-priority action of establishing RCS bleed and feed to minimize core uncovery. This constitutes incorrect performance that fails to prevent degradation of any barrier to fission product release.

Facility:	**H B Robinson**	Scenario No.: **4**	Op Test No.: **N16-1**
Examiners:	________	Operators:	________ (SRO)
	________		________ (RO)
	________		________ (BOP)

Initial Conditions:	The plant is at 25% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The “A” SI Pump is OOS. The “B” SI Pump has been aligned to 480 VAC ESF Bus E-1. PI-1616, SW North Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-C3, “FW PMP A LO FLOW TRIP,” has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N-SRO	Raise Power
2	1	C-RO C-SRO	Letdown Temperature Controller TCV-144 fails CLOSED/Divert Valve TCV-143 Fails to DIVERT
3	2	I-BOP I(TS)-SRO	Main Steam Line “C” Pressure Transmitter Fails LOW
4	3	N-BOP I(TS)-SRO	Power Range NI-44 Upper Detector fails HIGH
5	4	C-RO C-BOP C-SRO	Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO
6	5/6	M-RO M-BOP M-SRO	ATWS/“B” SG SLB Inside CV
7	7	C-BOP	MOV-350 fails to OPEN

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

H B Robinson 2016 NRC Scenario #4

The plant is at 25% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service: The "A" SI Pump is OOS. The "B" SI Pump has been aligned to 480 VAC ESF Bus E-1. PI-1616, SW North Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-C3, "FW PMP A LO FLOW TRIP," 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, "Chemical and Volume Control System (CVCS)."

During the power increase Letdown Temperature Controller, TCV-144, will fail CLOSED causing letdown temperature to rise above 135°F. Simultaneously, Divert Valve TCV-143, will fail to divert letdown flow to the VCT. The operator will respond in accordance with APP-001-A6, "LTDN FLOW HI TEMP DEMIN BYPD," divert letdown flow to the VCT, take MANUAL control of TCV-144 to stabilize letdown temperature, and return letdown to the VCT.

Following this, Main Steam Line "C" Pressure Transmitter, PT-495, will fail LOW. The operator will respond in accordance with AOP-025, "RTGB Instrument Failure." The operator will remove the failed instrument from service in accordance with OWP-025, "Steam Generator Pressure (SGP)." The operator will address Technical Specification LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation," Technical Specification LCO 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," and Technical Specification LCO 3.3.6, "Containment Ventilation Isolation Instrumentation."

Next, Power Range, NI-44, Upper Detector will fail HIGH. The operator will remove the failed instrument from service in accordance with OWP-011, "Nuclear Instrumentation (NI)." The operator will address Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation."

Shortly afterwards, an oil leak will develop on the Main Turbine. The operator will respond in accordance with various APP-008, SW, CW & TURB GEN AUX, alarms, and ultimately enter AOP-007, "Turbine Trip Below P-8." When the Main Turbine Trips one Turbine Stop Valve and one Turbine Governor Valve will remain OPEN, and the operator will need to manually TRIP the Turbine. The Control Rods will fail to operate in AUTO and the operator will need to insert rods in MANUAL.

Subsequently, the "B" Steam Line will rupture inside Containment (over 10 minutes). Simultaneously, the Reactor will fail to TRIP both automatically and manually (ATWS). The operator will enter EOP-E-0, "Reactor Trip or Safety Injection," and attempt to manually trip the reactor. When this fails, the operator will enter FRP-S.1, "Response to Nuclear Power Generation-ATWS." While in FRP-S.1, Boric Acid to Charging Pump Suction Valve MOV-350 will fail CLOSED. The operator will direct a local trip of the reactor, drive rods in manually, and align the suction of the Charging Pumps to the RWST.

Upon completion of FRP-S.1, the operator will return to EOP-E-0. Ultimately, the operator will transition to EOP-E-2, "Faulted Steam Generator Isolation," to isolate the flow into and out of the B Steam Generator and then terminate Safety Injection.

The scenario will terminate at Step 16.b of EOP-E-2, when the operator prepares to restore normal letdown.

Critical Tasks:

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Insert Negative Reactivity into the Core by Inserting Control Rods Manually Prior to Locally Tripping the Reactor (EOP-Based)

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.

Isolate Feedwater Flow Into and Steam Flow From the Faulted S/G Before a Transition Out of E-2 Occurs (EOP-Based)

Safety Significance: Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Also, depending upon the plant conditions, it could constitute a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Failure to isolate a faulted SG can result in challenges to the Integrity, Subcriticality and Containment CSFs.

Facility:	**H B Robinson**	Scenario No.: **5**	Op Test No.: **N16-1**
Examiners:		Operators:	(SRO)
			(RO)
			(BOP)

Initial Conditions:	The plant is at 3-5% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "B" Condensate Pump is OOS. LI-1417A, Hotwell Level Indication is OOS (I&C Investigating). RTGB Annunciator APP-006-F7, "PWST HI/LO LVL," has failed to the ILLUMINATED condition (I&C is investigating). The crew will be directed to raise power to 30%.

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N-SRO	Roll Turbine
2	1	C-BOP C-SRO	High Turbine Eccentricity
3	2	I-BOP I(TS)-SRO	Loss of Compensation Voltage to Intermediate Range N-35
4	3	I-RO I-SRO	VCT Level transmitter LT-112 fails HIGH
5	4	C-RO C(TS)-SRO	"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE
6	5	M-RO M-BOP M-SRO	Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE
7	6	C-RO	Failure of Automatic Rx Trip

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

H B Robinson 2016 NRC Scenario #5

The plant is at 3-5% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service: The “B” Condensate Pump is OOS. LI-1417A, Hotwell Level Indication is OOS (I&C Investigating). RTGB Annunciator APP-006-F7, “PWST HI/LO LVL,” has failed to the ILLUMINATED condition (I&C is investigating). The crew will be directed to raise power to 30%.

Shortly after taking the watch, the operator will raise power to 5-8% and startup the Turbine using GP-005, “Power Operation.”

When the Turbine is rolling, a HIGH Eccentricity condition will develop on the Main Turbine. The operator will respond using AOP-006, “Turbine Eccentricity/Vibration,” and place the Turbine startup on HOLD.

Shortly afterwards, the compensating voltage on Intermediate Range Channel N-35 will fail. The operator will remove the instrument from service using OWP-011, “Nuclear Instrumentation (NI).” The failed channel will require that the Source Range instruments be manually re-energized in the subsequent post-trip conditions. The operator will address Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation,” and determine to continue with the power increase.

Following this, VCT Level Transmitter LT-112 will fail HIGH causing LCV-115A to divert all letdown flow to the CVCS HUTs and result in an automatic makeup to the VCT. The operator will respond in accordance with AOP-003, “Malfunction of Reactor Makeup Control.” After this, the power increase will continue.

Next, a Thermal barrier leak will develop on the “B” RCP and Flow Control Valve FCV-626 will fail to CLOSE. The operator will respond in accordance with APP-001-C1, “RCP THERM BAR COOL WTR HI FLOW,” and AOP-014, “Component Cooling Water Malfunction.” The operator will address Technical Specification LCO 3.6.1, “Containment,” and Technical Specification LCO 3.6.3, “Containment Isolation Valves.”

Subsequently, a Steam Rupture will occur downstream of the MSIVs and the MSIVs will fail to CLOSE automatically and manually. Simultaneously, the Reactor will fail to TRIP automatically. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection,” and manually trip the reactor.

Upon completion of EOP-E-0, the operator will transition to EOP-E-2, “Faulted Steam Generator Isolation,” and then when it is realized that all Steam Generators are faulted, transition to EOP-ECA-2.1, Uncontrolled Depressurization of All Steam Generators,” and lower AFW flow to each Steam Generator to 60 gpm.

While terminating Safety Injection in EOP-ECA-2.1, the “A” MSIV will close and the “A” S/G pressure is expected to rise higher than that of the “B” and “C” S/G’s. Since the crew will be in the process of terminating SI in EOP-ECA-2.1, the crew will continue to complete the SI termination steps before transitioning back to EOP-E-2.

The scenario will terminate at Step 4.c of EOP-E-2, after the operator has closed the AFW Discharge valves to the “B” and “C” Steam Generators. Depending on the timing of the actions

taken by the crew when the “A” MSIV is closed, the “A” S/G pressure may not rise significantly higher than that of the “B” and “C” S/Gs, and the crew will remain in EOP-ECA-2.1 past the SI termination steps (i.e. Step 19). If this situation occurs, the scenario will terminate at Step 20 of EOP-ECA-2.1.

Critical Tasks:

Manually trip the reactor from the control room before entry into FRP-S.1

Safety Significance: Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an incorrect performance that necessitates the operator taking compensating action that would complicate the event mitigation strategy and demonstrates the inability of the operator to recognize a failure or an incorrect automatic actuation of an ESF system or component. The ERG Background Document for E-0 states that one function of E-0 is to verify that all required automatic protective actions occur before transitioning the crew to the appropriate ORG. The verification is important because the subsequent ORGs are based on the assumption that protective systems will protect all CSFs while the ORG is implemented. Not tripping the reactor when it is possible to do so (as in the postulated conditions) forces an immediate extreme challenge to the subcriticality CSF. Additionally, the incorrect performance of failing to trip the reactor necessitates the operator taking compensating action that seriously complicates the event mitigation strategy. This mis-operation constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario.

Control the AFW flow rate to not less than 60 gpm per SG in order to minimize the RCS cooldown rate before an EXTREME (Red Path) challenge develops to the RCS Integrity CSF

Safety Significance: Failure to control the AFW flow rate to the SGs leads to an unnecessary and avoidable extreme challenge to the integrity CSF. Also, failure to perform the critical task increases the challenges to the subcriticality CSF beyond which is irreparably introduced by the postulated plant conditions. Thus, failure to perform the critical task constitutes a demonstrated inability by the operator to take one or more actions that would prevent a challenge to plant safety. It also fails to prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario.

Facility:	**H B Robinson**	Scenario No.: **6**	Op Test No.: **N16-1**
Examiners:	____________	Operators:	____________ (SRO)
	____________		____________ (RO)
	____________		____________ (BOP)

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "A" EDG is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.8.1 ACTION B.1, B.2, B.3.2.1 and B.3.2.2, and B.4. R-15, Condenser Air Ejector Gas Radiation Monitor is OOS (I&C Investigating). RTGB Annunciator APP-002-F8, "STA AIR HDR LO PRESS," has failed to the ILLUMINATED condition (I&C is investigating). The "B" MFWP has experienced high noise/vibration over the last two hours (Maintenance is investigating).

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-BOP C-SRO	Feedwater Heater Bypass Valve fails OPEN
2	NA	R-RO N-BOP N-SRO	Lower Power
3	2	C-BOP C(TS)-SRO	"C" Service Water Pump Trips
4	3	C-RO C(TS)-SRO	DS Bus De-energizes/"C" CCW Pump Trips on Start
5	4	C-RO C-SRO	"A" RCP Seal Failure
6	5	M-RO M-BOP M-SRO	Loss of Offsite Power
7	5	C-BOP	"B" EDG Fails to Start
8	6	NA	DSDG Trips
9	7	C-BOP	"D" Service Water Pump fails to Auto Start

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

<u>H B Robinson 2016 NRC Scenario #6</u>

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

The following equipment is Out-Of-Service: The following equipment is Out-Of-Service: The “A” EDG is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.8.1 ACTION B.1, B.2, B.3.2.1 and B.3.2.2, and B.4. R-15, Condenser Air Ejector Gas Radiation Monitor is OOS (I&C Investigating). RTGB Annunciator APP-002-F8, “STA AIR HDR LO PRESS,” has failed to the ILLUMINATED condition (I&C is investigating). The “B” MFWP has experienced high noise/vibration over the last two hours (Maintenance is investigating).

Shortly after taking the watch, HCV-1459, Heater Bypass Valve will fail OPEN. The crew will implement AOP-010, “Main Feedwater/Condensate Malfunction,” and close the valve.

After the overpower transient is stabilized, the WCCS will call the control room and direct that reactor power be lowered to 50% for the purpose of removing the “B” Main Feedwater Pump from service. The operator will lower power in accordance with AOP-038, “Rapid Downpower.”

After the power reduction is in progress, the “C” Service Water Pump will trip on overload. This will cause the running Service Water Booster Pump to trip as well. The operator will respond in accordance with various APP-008 annunciators and start a standby Service Water Pump; and then respond in accordance with APP-002-A through D8, “HVH WTR OUTLET LO FLOW,” and re-start a Service Water Booster Pump. The operator will address Technical Specification LCO 3.7.7, “Service Water System (SWS),” and Technical Specification LCO 3.6.6, “Containment Spray and Cooling Systems.”

Following this, Breaker 52/32A will Trip de-energizing the DS Bus, and stopping the only running Charging Pump and CCW Pump. The operator may address AOP-018, “Reactor Coolant Pump Abnormal Conditions,” or various APP’s to restore Charging and Seal Injection flow; and then APP-001-F5, CCW PMP LO PRESS, and ensure that the standby CCW Pump started. 10 seconds after the Standby CCW Pumps start, the “C” CCW Pump will trip, and only the “B” CCW will be left running. The operator will address Technical Specification LCO 3.7.6, “Component Cooling Water (CCW) System,” and Technical Specification LCO 3.4.17, “Chemical and Volume Control System (CVCS).”

Next, a #1 Seal Failure will occur on the “A” RCP. The crew will implement AOP-018, Reactor Coolant Pump Abnormal Conditions,” trip the reactor, stop the pump, and three minutes after the pump is stopped, CLOSE the Seal Leakoff Valve. The crew will enter EOP-E-0, “Reactor Trip or Safety Injection.” Simultaneously, a Loss of Offsite Power will occur on the reactor trip, and the “B” Emergency Diesel Generator will fail to automatically start. Additionally, the DS DG will trip.

Upon entry into EOP-E-0, the operator will determine that both ESF buses are de-energized and transition to EOP-ECA-0.0, “Loss of All AC Power.” The operator will subsequently start the “B” EDG by depressing the SI Actuate Pushbutton, restore power to Bus E-2, and transition back to EOP-E-0. When Bus E-2 is re-energized, the “D” Service Water Pump will fail to sequence automatically and will need to be manually started.

Upon transition back to EOP-E-0, the crew will complete the immediate actions of EOP-E-0, and continue with AOP-018.

The scenario will terminate when the crew has terminated Safety Injection and re-established Charging/Seal Injection in Step 6 of ES-1.1.

Critical Tasks:

Energize at Least One AC Emergency Bus Before Defeating the Auto Loading of the Safeguards Equipment in EOP-ECA-0.0

Safety Significance: Failure to energize an ac emergency bus constitutes mis-operation or incorrect crew performance in which the crew does not prevent degraded emergency power capacity. Failure to perform the critical task also results in needless degradation of any barrier to fission product release, specifically of the RCS barrier at the point of the RCP seals. Additionally, failure to perform the critical task results in the unnecessary continuation of a situation in which RCS inventory is being lost uncontrollably and cannot be replaced. This situation is equivalent to mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity at a time when a small-break LOCA is in progress. In this case, at least one ac emergency bus can be energized from the control room. Failure to perform the critical task means that RCS inventory lost through the RCP seals cannot be replaced. It also means that the RCP seals remain without cooling and gradually deteriorate. As the seals deteriorate the rate of RCS inventory loss increases.

Manually Start SW Pump for EDG Cooling Prior to the EDG Failing Due to Overheating

Safety Significance: Failure to manually start the SW pump under the postulated plant conditions means that the EDG is running without SW cooling. Running the EDG without SW cooling leads to a high-temperature condition that can result in EDG failure due to damage caused by engine overheating. Under the postulated plant conditions, the running EDG is the only operable EDG. Thus, failure to perform the critical task constitutes mis-operation or incorrect crew performance in which the crew does not prevent "degraded… emergency power capacity." Even if the crew does not start the SW pump until receipt of engine high temperature alarm(s), the critical task is performed satisfactorily, provided that the EDG does not fail because of damage caused by engine overheating.

ROBINSON Nuclear Training

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OPERATIONS TRAINING

N16-1-1

Initial Licensed Operator Training

Rev 111615

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

Developed By:	____________________	**Date:**	__________
	Instructor/Developer		
Concurred By:	____________________	**Date:**	__________
	Line Superintendent/Supervisor/SRO		
Approved By:	____________________	**Date:**	__________
	Superintendent/Supervisor Training		

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Training Class 15-1

TOPIC: NRC Simulator Exam

Scenario N16-1-1

REFERENCES:

1. Technical Specification LCO 3.7.4, “Auxiliary Feedwater (AFW) System” (Amendment 203)
2. APP-003, “RCS & Makeup Systems” (Rev 54)
3. AOP-025, “RTGB Instrument Failure” (Rev 24)
4. OWP-030, “Pressurizer Level Transmitters (PLT)” (Rev 11)
5. Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation” (Amendment 176)
6. AOP-010, “Main Feedwater/Condensate Malfunction” (Rev 33)
7. OWP-034, “Steam Flow (SF)” (Rev 19)
8. Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation” (Amendment 176)
9. APP-007, “Condensate & Feedwater” (Rev 44)
10. OP-407, “Heater Drain and Vents” (Rev 51)
11. AOP-038, “Rapid Downpower” (Rev 3)
12. OP-105, “Maneuvering the Plant When > 25% Power” (Rev 62)
13. OP-301, “Chemical and Volume Control System (CVCS)” (Rev 112)
14. APP-010, “HVAC-Emerg. Generators & Misc. Systems” (Rev 81)
15. AOP-001, “Malfunction of Reactor Control System” (Rev 33)
16. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 6)
17. EOP-ES-0.1, “Reactor Trip Response” (Rev 7)
18. EOP-E-3, “Steam Generator Tube Rupture” (Rev 7)

Validation Time: 131 minutes

Facility:	**H B Robinson**	Scenario No.: **1**	Op Test No.: **N16-1**
Examiners:	____________	Operators:	____________ (SRO)
	____________		____________ (RO)
	____________		____________ (BOP)

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The SDAFW Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.7.4 ACTION A. FI-613, CCW System Flow is OOS (I&C Investigating). RTGB Annunciator APP-010-B3, "EDG B START AIR LO PRESS," has failed to the ILLUMINATED condition (I&C is investigating).

Event No.	Malf. No.	Event Type*	Event Description
1	1	I-RO N-BOP I(TS)-SRO	Pzr Level Transmitter LT-459 Fails LOW
2	2	I-BOP I(TS)-SRO	"C" Steam Flow Transmitter FT-494 Fails LOW
3	3	R-RO N-BOP N-SRO	Tube Leak in Feedwater Heater 4A/Downpower
4	4	C-BOP C-SRO	CRDM Fan "A" Failure
5	5	C-RO C-SRO	Continuous Inward Rod Motion
6	6	M-RO M-BOP M-SRO	"C" Steam Generator Tube Rupture
7	7	C-BOP	Loss of Off-Site Power

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

H B Robinson 2016 NRC Scenario #1

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

The following equipment is Out-Of-Service: The SDAFW Pump is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.7.4 ACTION A. FI-613, CCW System Flow is OOS (I&C Investigating). RTGB Annunciator APP-010-B3, “EDG B START AIR LO PRESS,” has failed to the ILLUMINATED condition (I&C is investigating).

Shortly after taking the watch, Pressurizer Level Transmitter, LT-459 will fail LOW causing normal letdown to isolate, de-energizing of pressurizer control group heaters and charging pump speed to rise for the pump in AUTO. The operator will respond in accordance APP-003-E8, “PZR CONTROL HI/LO LVL,” and AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-030, “Pressurizer Level Transmitters.” The operator will address Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation.”

Following this, the controlling steam flow channel for S/G “C”, FT-494, will fail LOW, causing FRV-498 to start to CLOSE. The operator will respond in accordance with AOP-010, “Main Feedwater/Condensate Malfunction,” and/or AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-034, “Steam Flow.” The operator will address Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation.”

Next, a tube leak will develop in Feed Water Heater 4A. The operator will respond in accordance with APP-007-E7, HTR 4A HI/LO LVL, identifying the leak. The operator may enter AOP-010, “Main Feedwater/Condensate Malfunction.” Ultimately, the operator will use OP-407, “Heater Drain and Vents,” to remove Feedwater Heaters 5A, 4A, and 3A from Service. This will require a power decrease. The operator will use either AOP-038, “Rapid Downpower,” or OP-105, “Maneuvering the Plant When > 25% Power,” and OP-301, “Chemical and Volume Control System (CVCS),” to lower plant power.

During the downpower, the “A” CRDM Fan will trip. The operator will address APP-010-A6, HVH-5A/B AIR FLOW LOST/OVLD, and manually start the “B” CRDM Fan.

Shortly afterwards, a continuous control rod insertion will occur. The operator will respond in accordance with AOP-001, “Malfunction of Reactor Control System.” The operator will be unable to control the rod insertion and will manually trip the reactor.

On the reactor trip, a 500 gpm Steam Generator Tube Rupture will occur (over 10 minutes) on the “C” Steam Generator. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection.” After the Immediate Actions are complete, it is likely that the operator will determine that SI is NOT actuated nor required, and transition to EOP-ES-0.1, “Reactor Trip Response.” While in this procedure the operator will determine that SI is required, manually actuate SI, and return to EOP-E-0. 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 “C” Steam Generator and then conduct a cooldown of the RCS.

Upon transition into EOP-E-3, a Loss of Off-Site Power will occur. Both EDGs will start and re-power Buses E-1 and E-2. With SI previously reset, the operator will need to address a re-

initiation of AFW flow to all Steam Generators, and the restart of the ECCS Pumps. The operator will continue with EOP-E-3 and conduct the RCS cooldown using the “A” and “B” Steam Generator PORVs.

During the RCS depressurization, the Pzr Spray Valves will not be available. The operator will be required to conduct the depressurization using an available Pzr PORV.

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

Critical Tasks:

Manually control “C” S/G Narrow Range Level before a Reactor Trip occurs on low S/G level.

Safety Significance: failure to take manual control of the “C” S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs (EOP-Based)

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) (EOP-Based)

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 before Steam Generator Overfill is reached based on Water in the Steam Lines. (EOP-Based)

Safety Significance: Failure to stop reactor coolant leakage into a ruptured SG by depressurizing the RCS (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.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Reset to Temp IC 608**	
☐	**T = 0 Malfunctions:** **SDAFW Pump OOS:** • **irf EPSMCC5_189 f:RACK_OUT (V1-8A, “A” S/G supply to SDAFW)** • **irf EPSMCC6_226 f:RACK_OUT (V1-8B, “B” S/G supply to SDAFW)** • **irf EPSMCC6_227 f:RACK_OUT (V1-8C, “C” S/G supply to SDAFW)** • **irf EPSMCC10_262 f:RACK_OUT (V2-14A, SDAFW discharge to “A” S/G)** • **irf EPSMCC9_254 f:RACK_OUT (V2-14B, SDAFW discharge to “B” S/G)** • **irf EPSMCC10_267 f:RACK_OUT (V2-14C, SDAFW discharge to “C” S/G)** **PLACE RED CAPS on the RTGB Control Switches for the Valves ABOVE** **Place GREEN CAPS on the RTGB Control Switches BELOW (See OMM-048, Attachment 9):** • **“A” MDAFW RTGB Switch** • **“B” MDAFW RTGB Switch** • **AFW Valve V2-16A RTGB Switch** • **AFW Valve V2-16B RTGB Switch** • **AFW Valve V2-16C RTGB Switch** • **AFW Valve V2-20A RTGB Switch** • **AFW Valve V2-20B RTGB Switch** • **Protected Switchyard** **FI-613 CCW System Flow OOS** • **IOR aoCCWAOD010B f:0** **Place WHITE DOT on FI-613** **RTGB Annunciator APP-010-B3 failed ON** • **IMF ANNXN10B03 f:ALARM_ON** **Place WHITE DOT on APP-010-B3** **Place the Simulator in RUN and ACKNOWLEDGE all alarms.**		
☐	**Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.**		

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with 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	
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario N16-1-1.**	
☐	At direction of examiner	**Event 1** **ICO PRSXMTLT_459 r:15 f:0**	Pzr Level Transmitter LT-459 Fails LOW
☐	At direction of examiner	**Event 2** **ICO SGNXMTFT_494 r:01:00 f:0**	“C” Steam Flow Transmitter FT-494 Fails LOW
☐	At direction of examiner	**Event 3** **IMF CFW14G r:02:00 f:800000**	Tube Leak in Feedwater Heater 4A/Downpower
☐	At direction of examiner	**Event 4** **IMF HVA05A f:MOTOR_SHORT**	CRDM Fan “A” Failure
☐	At direction of examiner	**Event 5** **IMF CRF06A** **IMF CRF06B**	Continuous Inward Rod Motion **NOTE: This will occur on a Rod Inward signal ($006_RODS_INCRF07 r:5 f:72)**
☐	At direction of examiner	**Event 6** **IMF SGN02F** **r:10:00 f:500**	“C” Steam Generator Tube Rupture **NOTE: The SGTR will occur on Rx Trip ($006_N16-1-1_SGTR_ON_TRIP)**

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Post-Rx Trip Upon Transition to EOP-E-3	**Event 7** **IMF EPS13**	Loss of Off-Site Power
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	9 of 68
Event Description:		**Pzr Level Transmitter LT-459 Fails LOW**					

Shortly after taking the watch, Pressurizer Level Transmitter, LT-459 will fail LOW causing normal letdown to isolate, de-energizing of pressurizer control group heaters and charging pump speed to rise for the pump in AUTO. The operator will respond in accordance APP-003-E8, “PZR CONTROL HI/LO LVL,” and AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-030, “Pressurizer Level Transmitters.” The operator will address Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation.”

Booth Operator Instructions: **ICO PRSXMTLT_459**
r:15 f:0

Indications Available:

- RTGB Annunciator APP-003-F4, CHG PMP HI SPEED
- RTGB Annunciator APP-003-E8, PZR CONTROL HI/LO LVL
- PZR Level LI-459A lowering
- PZR Level LI-460/461 stable
- “C” Charging Pump speed rising
- Normal Letdown isolates

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS may enter AOP-025 directly.
		APP-003-E8, PZR CONTROL HI/LO LVL	
	RO	(Step 1) IF Letdown is isolated, THEN ensure one Charging Pump running at minimum.	**NOTE:** The RO will take Charging Pump to MANUAL and adjust to MINIMUM speed.
	CRS	(Step 2) IF a load rejection has occurred, THEN ……	
	CRS	(Step 3) IF excessive RCS leakage exists, THEN…..	
	RO	(Step 4) IF a level controller has failed, THEN manually adjust Charging and/or Letdown to maintain PZR level	**NOTE:** The RO will control Charging flow as needed. The RO will adjust Seal Injection flow by controlling HIC-121.

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	10 of 68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 5) IF a level channel failure has occurred, THEN refer to AOP-025, RTGB Instrument Failure	**NOTE:** The CRS will transition to AOP-025.
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 1) GO TO Appropriate Section For Failed Instrument:	**NOTE:** The CRS will select Section B of AOP-025.
		• PZR LEVEL (LT-459, 460, 461) - SECTION B	
AOP-025, RTGB INSTRUMENT FAILURE **SECTION B, PZR LEVEL TRANSMITTER FAILURE**			
	RO	(Step 1) CHECK Failed Instrument ‑ FAILED LOW	
	RO	(Step 2) PLACE LCV‑460 A&B Control Switch In CLOSE	**NOTE:** The RO may re-positioned the Control Switch earlier based on Step 5.3.7.5 of OMM-22.
	RO	(Step 3) CHECK Charging Pumps ‑ ONLY ONE PUMP RUNNING IN MANUAL CONTROL	
	RO	(Step 3 RNO) ENSURE only one charging pump is running in manual control.	
	RO	(Step 4) ADJUST Charging Pump Speed To Control PZR LEVEL Between 22% And 53%	**NOTE:** Pzr level will rise, and may exceed TS LCO 3.4.9 (63.3%).
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using PA System	**NOTE:** The BOP will most likely make this announcement.

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	11 of 68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) CHECK RCP Seal Injection Flow - BETWEEN 8 GPM AND 13 GPM	
	RO	(Step 6 RNO) Locally THROTTLE RCP SEAL WATER FLOW CONTROL VALVE(s) to obtain flow to each RCP between 8 gpm and 13 gpm.	**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
		• CVC-297A	
		• CVC-297B	
		• CVC-297C	
		• IF required to maintain 8 GPM flow, THEN THROTTLE HIC-121, CHARGING FLOW, while maintaining charging pump discharge pressure less than 2500 psig.	
		• REVIEW TS LCO 3.4.17 for applicability.	
	RO	(Step 7) CHECK Controlling Channel - FAILED	**NOTE:** LT-459 has failed LOW.
	RO	(Step 8) CHECK LT-461 - OPERABLE	
	RO	(Step 9) PLACE LM-459 In 461 REPL 459	
	RO	(Step 10) PLACE LR-459 In REC 461	
	RO	(Step 11) CHECK Normal Letdown - IN SERVICE	

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	12 of 68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 11 RNO) IF normal letdown is desired, THEN RESTORE normal letdown using Attachment 1, Restoration of Normal Letdown.	**NOTE:** The CRS will hand off the restoration of Letdown to the BOP.
AOP-025, RTGB INSTRUMENT FAILURE ATTACHMENT 1, RESTORATION OF NORMAL LETDOWN			
	BOP	(Step 1) ENSURE Normal Charging Flow Through The Regenerative Heat Exchanger Is In Service.	
	BOP	(Step 2) ENSURE Phase A Containment Isolation Signal NOT Present.	
	BOP	(Step 3) NOTIFY RC That Normal Letdown Flow Will Be Restored And The Affected Areas Should Be Monitored For Changing Radiological Conditions.	**NOTE:** The BOP will call RC to address the potential changing radiological conditions. If so, **Booth Instructor** acknowledge as RC.
	BOP	(Step 4) ENSURE The Following Valves Are Closed:	
		• CVC-204A, LETDOWN LINE ISO • CVC-204B, LETDOWN LINE ISO • LCV-460A, LTDN LINE STOP • LCV-460B, LTDN LINE STOP • CVC-200A, LETDOWN ORFICE ISOLATION • CVC-200B, LETDOWN ORFICE ISOLATION • CVC-200C, LETDOWN ORFICE ISOLATION	
	BOP	(Step 5) ENSURE HIC-121, CHARGING FLOW, Is Set For Full Open.	

Op Test No.: N16-1	Scenario # 1	Event # 1	Page 13 of 68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6) ENSURE PZR Level Is Greater Than Or Equal To Program Level.	**NOTE:** Pzr Level will likely be above program.
	BOP	(Step 7) IF Desired, THEN PLACE TCV-143, VCT/DEMIN In The VCT Position.	
	BOP	(Step 8) PLACE PCV-145, PRESSURE, In MAN.	
	BOP	(Step 9) ADJUST PC-145 To Throttle PCV-145 To 45% To 55% Open.	
	BOP	(Step 10) OPEN The Following:	
		• CVC-204A, LETDOWN LINE ISO	
		• CVC-204B, LETDOWN LINE ISO	
	BOP	(Step 11) OPEN LCV-460A&B:	
		• PLACE LTDN LINE STOP LCV-460 A&B switch to OPEN.	
		• PLACE LTDN LINE STOP LCV-460 A&B switch to AUTO.	
	BOP	(Step 12) ESTABLISH Cooling To NON-REGEN HX:	
		• PLACE TC-144, NON-REGEN HX OUTLET TEMP in MANUAL.	
		• ADJUST TC-144 NON-REGEN HX OUTLET TEMP as necessary to ensure letdown temperature does not rise above 127°F when letdown is reestablished.	

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	14 of	68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**							

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 13) While MAINTAINING Charging Pump Discharge Pressure As Indicated On PI-121 Less Than 2500 psig, ADJUST Charging Pump Speed To The Expected Letdown Flow To Be Established In The Next Step.	
	BOP	(Step 14) OPEN One LTDN ORIFICE Valve:	**NOTE:** Pzr Level will likely be above program, and the BOP may place a 60 gpm orifice in service.
		• CVC-200A, LETDOWN ORFICE ISOLATION	
		• CVC-200B, LETDOWN ORFICE ISOLATION	
		• CVC-200C, LETDOWN ORFICE ISOLATION	
	BOP	(Step 15) PLACE PC-145 In AUTO And CHECK Letdown Pressure As Indicated On PI-145, LOW PRESS LTDN PRESS, Is Being Maintained Between 300 Psig And 320 Psig.	
	BOP	(Step 16) PLACE TC-144, NON-REGEN HX OUTLET TEMP, In AUTO.	
	BOP	(Step 17) IF TCV-143 Was Selected To VCT, THEN POSITION TCV-143 As Directed By The CRS/SM.	

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	15 of 68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 18) IF Charging Flow Is Changed, THEN ESTABLISH RCP Seal injection Flow Between 8 GPM and 13 GPM By Throttling The Following: • CVC-297A, RCP A SEAL WATER FLOW CONTROL VALVE • CVC-297B, RCP B SEAL WATER FLOW CONTROL VALVE • CVC-297C, RCP C SEAL WATER FLOW CONTROL VALVE	**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
	BOP	(Step 19) IF Additional Letdown Flow Is Desired,….	**NOTE:** Pzr Level will likely be above program, and the BOP may discuss with the CRS/RO about additional Letdown flow.
	BOP	(Step 20) NOTIFY Chemistry That Normal Letdown Has Been Restored.	**NOTE:** The BOP will call Chemistry to notify that normal letdown is back in service. If so, **Booth Instructor** acknowledge as Chemistry.
AOP-025, RTGB INSTRUMENT FAILURE SECTION B, PZR LEVEL TRANSMITTER FAILURE			
	RO	(Step 12) RESTORE PZR Level Control To Automatic:	**Examiner Note:** Pzr Level may require additional adjustment prior to restoring the controller to AUTO. The crew may complete the event with Level control still in MANUAL.
		• CHECK PZR level - WITHIN ± 1% OF PROGRAMMED REFERENCE LEVEL	
		• RESTORE PZR level control to automatic	
	RO	(Step 13) RESET PZR Heaters:	

Op Test No.: N16-1	Scenario # 1	Event # 1	Page 16 of 68
Event Description:	**Pzr Level Transmitter LT-459 Fails LOW**		

Time	Pos.	Expected Actions/Behavior	Comments
		• PLACE PZR HTR CONTROL GROUP control switch in OFF and return to ON	
		• PLACE PZR HTR BACK-UP GROUP A control switch in OFF and return to AUTO or ON as desired	
		• PLACE PZR HTR BACK-UP GROUP B control switch in OFF and return to AUTO or ON as desired	
	RO	(Step 14) CHECK RCP Seal Injection Flow - BETWEEN 8 GPM AND 13 GPM	
	RO	(Step 14 RNO) Locally THROTTLE RCP SEAL WATER FLOW CONTROL VALVE(s) to obtain flow to each RCP between 8 gpm and 13 gpm:	**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
		• CVC-297A	
		• CVC-297B	
		• CVC-297C	
	CRS	(Step 15) REMOVE Failed Transmitter From Service Using OWP-030	**NOTE:** The CRS will address OWP-030.
OWP-030, PRESSURIZER LEVEL TRANSMITTERS (PLT) **PLT-1, PRESSURIZR LEVEL TRANSMITTER LT-459**			
	CRS	Address PLT-1	

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	17 of	68
Event Description:		**Pzr Level Transmitter LT-459 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	Insert Trip Signals	**NOTE:** The will enter the Simulator Booth (Simulating the Hagan Room). **Booth Instructor** coordinate with BOP to insert Trip Signals: OPEN Protection Racks Door: IRF BST101 f:D_OPEN • BST058 TRIP • BST001 TRIP CLOSE Protection Racks Door: IRF BST101 f:D_CLOSED
		• B/S 459A-1, Hagan Rack #2 (PZR Hi Level)	
		• B/S 459A-2, Hagan Rack #2 (PZR Lo Level)	
AOP-025, RTGB INSTRUMENT FAILURE **SECTION B, PZR LEVEL TRANSMITTER FAILURE**			
	CRS	(Step 16) GO TO Procedure Main Body, Step 2	**NOTE:** The CRS will address Technical Specifciations.
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 2) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 3) RETURN TO Procedure And Step In Effect	
TECHNICAL SPECIFICATION 3.3.1, REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION			

Op Test No.:	N16-1	Scenario #	1	Event #	1	Page	18 of 68

Event Description: **Pzr Level Transmitter LT-459 Fails LOW**

<table>
<tr><th>Time</th><th>Pos.</th><th>Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td></td><td>CRS</td><td>LCO 3.3.1 The RPS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>APPLICABILITY: According to Table 3.3.1-1.</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td><table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>M. One channel inoperable.</td><td>M.1 Place channel in trip.
OR
M.2 Reduce THERMAL POWER to < P-7.</td><td>6 hours

12 hours</td></tr></table></td><td>NOTE: The CRS will determine that Function 8, Pressurizer Water Level – High, is affected and that Action M.1 or M.2 must be entered.</td></tr>
<tr><td></td><td></td><td></td><td>NOTE: The CRS will likely conduct an Alignment Brief.</td></tr>
<tr><td colspan="4">At the discretion of the Lead Examiner move to Event #2.</td></tr>
</table>

Op Test No.:	N16-1	Scenario #	1	Event #	2	Page	19 of 68
Event Description:	**"C" Steam Flow Transmitter FT-494 Fails LOW**						

Following this, the controlling steam flow channel for S/G "C", FT-494, will fail LOW, causing FRV-498 to start to CLOSE. The operator will respond in accordance with AOP-010, "Main Feedwater/Condensate Malfunction," and/or AOP-025, "RTGB Instrument Failure." The operator will remove the failed instrument from service in accordance with OWP-034, "Steam Flow." The operator will address Technical Specification LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation."

Booth Operator Instructions: **ICO SGNXMTFT_494 r:01:00 f:0**

Indications Available:

- RTGB Annunciator APP-006-C3, S/G C LVL DEV
- Lowering demand on FCV-498 ("C" S/G Feedwater Reg Valve)
- Narrow Range Level in "C" S/G lowering
- FR-498 indicates that the gap between Feedwater and Steam flow to and from "C" S/G is rising

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner Note: It is most likely that the CRS will respond to the symptoms and enter AOP-010 first. However, the crew may recognize the failure and respond by entering AOP-025 first. If so, proceed to AOP-025 section below.
		AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION	
	BOP	(Step 1) CHECK FRVs - OPERATING PROPERLY (MANUAL OR AUTO):	**Immediate Action** **NOTE:** The BOP will control FCV-498 in MANUAL.
		• FCV-478	
		• FCV-488	
		• FCV-498	
	RO/ BOP	(Step 2) CHECK Reactor Trip Setpoint - BEING APPROACHED	**NOTE:** A Power Limit Warning is possible during this event which will require a reduction in power.

Op Test No.:	N16-1	Scenario #	1	Event #	2	Page	20 of 68
Event Description:	**"C" Steam Flow Transmitter FT-494 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 2 RNO) IF a reactor trip setpoint is approached, THEN….	
		GO TO Step 4.	
	RO	(Step 4) CHECK Reactor Power - LESS THAN OR EQUAL TO 100%	

Critical Task:

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 6) GO TO Appropriate Step From Table Below:	
		FRV Failure To Control - OBSERVE NOTE 58	
	BOP	(Step 58) CHECK S/G Level - AT OR TRENDING TO PROGRAM	**NOTE:** The CRS will likely transition to AOP-025 based on the Note prior to Step 58.
		AOP-025, RTGB INSTRUMENT FAILURE	
	CRS	(Step 1) GO TO Appropriate Section For Failed Instrument:	**NOTE:** The CRS will select Section D of AOP-025.

Op Test No.:	N16-1	Scenario #	1	Event #	2	Page	21 of 68
Event Description:	**"C" Steam Flow Transmitter FT-494 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
		• S/G Steam Flow (FT-476, 477, 484, 485, 494, 495) - SECTION D	
		AOP-025, RTGB INSTRUMENT FAILURE SECTION D, S/G FEED FLOW, STEAM FLOW OR STEAM PRESSURE TRANSMITTER FAILURE	
	BOP	(Step 1) CHECK Affected FRV In MAN:	**Immediate Action** **NOTE:** The BOP will control FCV-498 in MANUAL.
		• FCV‑478 (FRV "A")	
		• FCV‑488 (FRV "B")	
		• FCV‑498 (FRV "C")	
	BOP	(Step 2) RESTORE Affected S/G Level To Program	**Immediate Action**
<u>Critical Tasks:</u> **Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level.** Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.			
	BOP	(Step 3) CHECK Reactor Trip Setpoint ‑ BEING APPROACHED	
	CRS	(Step 3 RNO) IF a reactor trip setpoint is approached, THEN….	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		GO TO Step 5.	

Op Test No.:	N16-1	Scenario #	1	Event #	2	Page	22 of 68
Event Description:	**"C" Steam Flow Transmitter FT-494 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using PA System	**NOTE:** The CRS will most likely make this announcement.
	BOP	(Step 6) CHECK Failure ‑ FEED FLOW INSTRUMENT FAILURE	
	CRS	(Step 6 RNO) IF failure was a steam flow instrument, THEN GO TO Step 12.	
	BOP	(Step 12) PLACE Affected S/G Steam Flow Selector Switch To The Alternate Channel:	
		• S/G "C" STEAM FLOW ‑ FR‑498	
		• Failed Channel FT-494 – Position CH495	
	BOP	(Step 13) RESTORE Affected Controller To Automatic:	
		• CHECK S/G level ‑ WITHIN ±1% OF PROGRAMMED LEVEL	
		• PLACE affected controller in AUTO	
	BOP	(Step 14) REMOVE Affected Transmitter From Service Using OWP‑034:	**NOTE:** The CRS will address OWP-034.
		Channel FT-494 – OWP SF-5	
OWP-034, STEAM FLOW (SF) SF-5, STEAM FLOW TRANSMITTER FT-494			
	CRS	Address SF-5	
	BOP	DELETE INPUT FT-494 (MSF0445A) FROM CALO PROCESSING IAW OMM-007.	

Op Test No.:	N16-1	Scenario #	1	Event #	2	Page	23 of 68
Event Description:	“C” Steam Flow Transmitter FT-494 Fails LOW						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	Insert Trip Signals	**NOTE:** The will enter the Simulator Booth (Simulating the Hagan Room). **Booth Instructor** coordinate with BOP to insert Trip Signals: OPEN Protection Racks Door: IRF BST101 f:D_OPEN • BST020 TRIP CLOSE Protection Racks Door: IRF BST101 f:D_CLOSED
		• B/S 494, HAGAN RACK #16 (LOOP 3 HI STM FLOW)	
AOP-025, RTGB INSTRUMENT FAILURE **SECTION D, S/G FEED FLOW, STEAM FLOW OR STEAM PRESSURE TRANSMITTER FAILURE**			
	CRS	(Step 15) REVIEW TS LCOs for applicability:	
		• TS LCO 3.3.1	
		• TS LCO 3.3.2	
	CRS	(Step 16) GO TO Procedure Main Body, Step 2	
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 2) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 3) RETURN TO Procedure And Step In Effect	

Op Test No.:	N16-1	Scenario #	1	Event #	2	Page	24 of 68
Event Description:	**"C" Steam Flow Transmitter FT-494 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
TECHNICAL SPECIFICATION 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	
		<table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>D. One channel inoperable</td><td>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.</td><td>6 hours 12 hour 18 hours</td></tr></table>	**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 Action D.1 of D2.1 and D.2.2 must be entered .
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	25 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Next, a tube leak will develop in Feed Water Heater 4A. The operator will respond in accordance with APP-007-E7, HTR 4A HI/LO LVL, identifying the leak. The operator may enter AOP-010, "Main Feedwater/Condensate Malfunction." Ultimately, the operator will use OP-407, "Heater Drain and Vents," to remove Feedwater Heaters 5A, 4A, and 3A from Service. This will require a power decrease. The operator will use either AOP-038, "Rapid Downpower," or OP-105, "Maneuvering the Plant When > 25% Power," and OP-301, "Chemical and Volume Control System (CVCS)," to lower plant power.
Booth Operator Instructions: **IMF CFW14G r:02:00 f:800000** **(NOTE: This Malfunction requires 3 minutes to generate APP-007-E7)**
Indications Available: • RTGB Annunciator APP-007-E7, HTR 4A HI/LO LVL • Feed Flow lowering on all three S/Gs • Narrow Range Level lowering on all three S/Gs

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner Note: When this alarm occurs the crew may address AOP-010 or use APP-007 E7 to direct entry into OP-407. If the crew uses **APP-007-E7**, continue below. If the crew enters **AOP-010**, proceed to **Step 1** on **Page 26.**
		APP-007-E7, HTR 4A HI/LO LVL	
	CRS	(Step 1) IF level alarm is due to low power maneuvering, THEN…..	
	BOP	(Step 2) IF required, THEN dispatch an Operator to check:	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as AO, and report after 1 minute that the 4A FWH sightglass is FULL and the LCV is FULL OPEN.
		• Sightglass level	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	26 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Level Control Valve position	
	BOP/ CRS	(Step 3) IF a level control valve has malfunctioned, THEN….	
	CRS	(Step 4) IF tube leakage is occurring, THEN bypass the affected string of Heaters for repair of defective tubes using OP-407, Heater Drains and Vents	**Examiner NOTE:** The CRS will transition to OP-407 to remove Heaters 5A, 4A and 3A from service. If so, proceed to **OP-407** actions on **Page 29.**
AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION			
	BOP	(Step 1) CHECK FRVs - OPERATING PROPERLY (MANUAL OR AUTO):	**Immediate Action**
		• FCV-478	
		• FCV-488	
		• FCV-498	
	RO/ BOP	(Step 2) CHECK Reactor Trip Setpoint - BEING APPROACHED	
	CRS	(Step 2 RNO) IF a reactor trip setpoint is approached, THEN….	
		GO TO Step 4.	
	RO	(Step 4) CHECK Reactor Power - LESS THAN OR EQUAL TO 100%	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.

Op Test No.: N16-1	Scenario # 1	Event # 3	Page 27 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**		

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 6) GO TO Appropriate Step From Table Below:	**NOTE:** The CRS go to Step 33 based on a known tube leak in the A Train FWHs, or Step 35 based on other malfunctions
		Known Leak - 33	
		Other - 35	
	BOP	(Step 33) REDUCE Turbine Load Using Attachment 1 To Match Feedwater And Steam Flows WHILE CONTINUING WITH This Procedure	**NOTE:** The CRS may address Step 33 of AOP-010. Steam flow and Feed flow are matched.
	CRS	(Step 34) OBSERVE NOTE Prior To Step 41 And GO TO Step 41	**NOTE:** If the CRS entered at Step 33 of AOP-010, they will move forward to Step 41.
	CRS	(Step 35) REDUCE Turbine Load Using Attachment 1 To Match Feedwater And Steam Flows WHILE CONTINUING WITH This Procedure	**NOTE:** The CRS may address Step 35 of AOP-010. Steam flow and Feed flow are matched.
	CRS/ BOP	(Step 36) DISPATCH An Operator To Observe Valve Positions:	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as AO, and report after 1 minute that the both valves are operating properly.
		• LCV-1530A, HDT LEVEL CONTROL VALVE	
		• LCV-1530B, HEATER DRAIN PUMPS SUCTION DUMP TO CONDENSER	
	CRS	(Step 37) DETERMINE If A Heater Drain Tank Level Control Valve Has Failed:	
		• CHECK HDT level control valve or controller - HAS MALFUNCTIONED	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	28 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 37.a RNO) IF HDT Level is controlling correctly, THEN OBSERVE NOTE prior to Step 40 and GO TO Step 40.	
	CRS	(Step 40) CHECK For Leak - CAUSING FW TRANSIENT	**NOTE:** The crew may determine that a FWH Tube Leak exists and that the Train A FWH string must be bypassed/isolated.
		• Visual indication of leak	
		• FW Heater level alarms FW Heater normal and alternate drain valve positions level dump valve positions	
		• FW Heater #1 & #2 emergency dump valve positions	
		• Gland Steam Condenser abnormal indications/alarms	
	CRS	(Step 41) ISOLATE Leak:	
		CONSULT with Operations to determine leak isolation strategy	
		• Isolate in current plant condition	
		OR	
		• Repair on-line	
		OR	
		• Shutdown to repair	
		OR	
		• Trip Unit	
			Examiner NOTE: The crew should address OP-407 to remove the 5A, 4A, and 3A FWHs from service.

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	29 of 68
Event Description:		**Tube Leak in Feedwater Heater 4A/Downpower**					

Time	Pos.	Expected Actions/Behavior	Comments
		OP-407, HEATER DRAINS AND VENTS SECTION 6.4.5 REMOVING HEATERS 5A, 4A, AND 3A FROM SERVICE	
	CRS	(Step 1) To remove Heater 4A from service, perform the following:	
		• Ensure power is reduced to 659 Mwe gross (maximum of 20% power reduction)	**Examiner NOTE:** The CRS conduct a downpower to 659 MWe using AOP-038 or OP-105. If **AOP-038** is selected, continue below. If **OP-105** is selected, proceed to **Page 34.**
		AOP-038, RAPID DOWNPOWER	
	CRS	(Step 1) NOTIFY Plant Personnel Of Procedure Entry Using The Plant Page System	**NOTE:** The CRS will most likely make this 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	
		• Target Power Level ___	
		• Target Rod Height ___	**NOTE:** The RO will determine 130 Steps.
		• Corrected Boration ___	**NOTE:** The RO will determine 306 gallons.
	CRS	(Step 3) PERFORM Brief Of Control Room Personnel To Include The Following:	
		• Reason for downpower	
		• Target Power Level	
		• Target Rod Height	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	30 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Rate of load reduction	
		• Amount of boric acid addition	
	RO	(Step 4) CHECK Required Power Reduction Rate - LESS THAN OR EQUAL TO 5%/MINUTE	
	RO	(Step 5) ENERGIZE All Available PZR Heaters	
		• PZR HTR CONTROL GROUP	
		• PZR HTR BACK-UP GROUP A	
		• PZR HTR BACK-UP GROUP B	
	RO	(Step 6) CHECK Rod Control - IN AUTO	
	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 31**.
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.	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	31 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

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	
		• CHECK EH Turbine Control - IN OPER AUTO	
		• PREPARE For Turbine Load Reduction As Follows:	
		• CHECK IMP IN - ILLUMINATED	
		• SELECT the desired Load Rate	

Op Test No.: N16-1 Scenario # 1 Event # 3

Event Description: **Tube Leak in Feedwater Heater 4A/Downpower**

Time	Pos.	Expected Actions/Behavior	Comments
		• 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:	
		• ADJUST Load Rate	
		OR	
		• DEPRESS GO and HOLD pushbuttons	
	CRS/ BOP	(Step 10) INITIATE Notification of The Following:	**NOTE:** The CRS may ask SM/WCC/Communicator to address. If so, **Floor Instructor** acknowledge.
		• 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	
	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.

Op Test No.: N16-1	Scenario # 1	Event # 3	Page 33 of 68			
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**					

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 12) CHECK Tavg - WITHIN 5°F OF Tref	
	RO	(Step 13) CHECK Axial Flux Distribution - WITHIN TARGET BAND	
	BOP	(Step 14) CHECK APP-006-F5, STEAM DUMP ARMED - EXTINGUISHED	
	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	**NOTE:** The target load is 659 MWe.
		• Load reduction is no longer required	
		• 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%	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	34 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Time	Pos.	Expected Actions/Behavior	Comments
	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: If the crew decides to reduce power using OP-105, Examiners continue **HERE**.
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	CRS	(Step 6.1.1.1) Check that an EOOS Risk Assessment has been performed	
	CRS	(Step 6.1.1.2) IF an EOOS Risk Assessment has NOT been performed for this Power Reduction, THEN perform one of the following actions:	
		• Direct the STA or the Work Week Coordinator (WWC) to perform an EOOS Risk Assessment	**NOTE:** The CRS may ask STA to address. If so, **Floor Instructor** acknowledge as STA.
		OR	
		• Perform a qualitative Risk Assessment per OMM-048, Work Coordination and Risk Assessment	
	BOP	(Step 6.1.1.3) Notify the Load Dispatcher that unit load will be reduced.	**NOTE:** The BOP will call Load Dispatcher. If so, **Booth Instructor** acknowledge as Load Dispatcher
	BOP	(Step 6.1.1.4) Notify RC that higher radiation levels should be expected in the CV Pump Bays and in Pipe Alley due to normal shutdown crud bursts	**NOTE:** The BOP will call RC. If so, **Booth Instructor** acknowledge as RC

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	35 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6.1.1.5) IF this is a Power Reduction greater than 20%, THEN notify Chemistry to shutdown the RCS Zinc Injection Skid	**NOTE:** The BOP may call Chemistry. If so, **Booth Instructor** acknowledge as Chemistry
	RO	(Step 6.1.1.6) Monitor the highest operable Power Range Channel and the highest operable Intermediate Range Channel on NR-45	
	CRS	(Step 6.1.1.7) IF this will be a planned power reduction of greater than 10% power, THEN…..	
	CRS/ BOP	(Step 6.1.1.8) IF Reactor Engineering has NOT provided technical guidance, THEN use the most recent OST-947, Operations Reactivity Plan data to determine the reactivity change required	
	RO	(Step 6.1.2.1) IF additional letdown flow is desired, THEN perform the following:	**NOTE:** The RO may place additional Letdown in service.
		• Start additional Charging Pumps per OP-301, Chemical and Volume Control System	
		• Place additional letdown orifice in service per OP-301	
	RO	(Step 6.1.2.2) IF a significant change in RCS Boron concentration is expected or occurs (10 ppm or more), THEN energize additional PZR heaters	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	36 of 68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6.1.2.3) Maintain Tave within 5°F of Tref using a combination of Control Rods and Boron Concentration changes.	**NOTE:** The RO will start a boration per Section 8.2.8 of OP-301. **Examiner Note:** **RO Examiner** follow actions of OP-301. **CRS/BOP Examiners** follow **OP-105** Actions, **Step 6.1.2.4**, on **Page 38**.
OP-301, CHEMICAL AND VOLUME CONTROL SYSTEM (CVCS)			
	RO	(Step 8.2.8.1) This revision has been verified to be the latest revision available.	
	RO	(Step 8.2.8.2) DETERMINE the amount of Boric Acid to add to the RCS and if applicable, the expected change in RCS temperature AND Reactor Power	**NOTE:** The RO will use Attachment 10.4 of OST-947 and determine that the Target Rod Height is 191 and 53.76 gallons of BA will need to be added.
	RO	(Step 8.2.8.3) OBTAIN an independent check of the volume of Boric Acid required.	
	RO	(Step 8.2.8.4) OBTAIN permission from the CRS OR SM to add the amount of boric acid previously determined, including the expected change in RCS temperature AND Reactor Power.	
	RO	(Step 8.2.8.5) PLACE the RCS MAKEUP MODE selector switch in the BORATE position.	
	RO	(Step 8.2.8.6) SET YIC-113, BORIC ACID TOTALIZER to the desired quantity.	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	37 of	68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**							

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 8.2.8.7) IF desired, THEN PLACE FCV-113A, BORIC ACID FLOW, in MAN AND ADJUST controller FCV-113A, BORIC ACID FLOW, using the UP and DOWN pushbuttons flow rate.	
	RO	(Step 8.2.8.8) Momentarily PLACE the RCS MAKEUP SYSTEM switch to the START position.	
	RO	(Step 8.2.8.9) IF any of the below conditions occur, THEN momentarily place the RCS MAKEUP SYSTEM switch in the STOP position:	
		• Rod Motion is blocked	
		• Rod Motion is in the wrong direction	
		• Tavg goes up	
		• Boric Acid addition exceeds the desired value	
	RO	(Step 8.2.8.10) WHEN the desired amount of Boric Acid has been added to the RCS, THEN ENSURE the following:	
		• FCV-113A, BA TO BLENDER, closes.	
		• FCV-113B, BLENDED MU TO CHG SUCT, closes.	
		• IF in Auto, THEN the operating Boric Acid Pump stops.	
		• The RCS MAKEUP SYSTEM is OFF.	
	RO	(Step 8.2.8.11) IF desired, THEN FLUSH the Boric Acid flow…..	
	RO	(Step 8.2.8.12) RETURN the RCS Makeup System to automatic as follows:	
		ENSURE FCV-114A, PRIMARY WTR FLOW DILUTE MODE is in AUTO.	

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	38	of 68
Event Description:		Tube Leak in Feedwater Heater 4A/Downpower						

Time	Pos.	Expected Actions/Behavior	Comments
		PLACE FCV-114B, BLENDED MU TO VCT to the AUTO position.	
		PLACE the RCS MAKEUP MODE switch in the AUTO position.	
		ENSURE FCV-113A, BORIC ACID FLOW, is in AUTO.	
		Momentarily PLACE the RCS MAKEUP SYSTEM switch in the START position.	
	RO	(Step 8.2.8.13) RECORD, in AUTO LOG, as indicated by PRIMARY WATER TOTALIZER, YIC-114 AND Boric Acid TOTALIZER, YIC 113 the total amount of Primary Water AND Boric Acid added during the boration.	
	RO	(Step 8.2.8.14) MONITOR parameters for the expected change in reactivity AND inform the CRS OR SM the results of the boration.	**Examiner NOTE:** If AOP-038 was used to downpower the plant, move forward to Event 4.
			Examiner NOTE: Examiners following the **CRS/BOP** continue **HERE.**
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	BOP	(Step 6.1.2.4) IF EH Turbine Control is in OPER AUTO, THEN reduce turbine load as follows:	
		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 BOP will use Attachment 6 of OP-105 to transfer Turbine Control Mode from IMP OUT to IMP IN
		• IMP IN (preferred)	
		OR	
		• IMP OUT (if required for plant conditions)	

Op Test No.:	N16-1	Scenario #	1	Event #	3
Page	39	of	68		
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**				

Time	Pos.	Expected Actions/Behavior	Comments
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER ATTACHMENT 6, TRANSFERRING CONTROL MODE BETWEEN IMP-IN AND IMP-OUT			
	BOP	(Step 1) Record the Valve Position Limit reading:	
	BOP	(Step 2) Lower the limiter setting until the turbine is on the limiter	
	BOP	(Step 3) Check that the Tracking Meter indicates a nulled condition. (approximately zero)	
	BOP	(Step 4) Press the appropriate pushbutton to change sensing modes:	
		IMP IN (preferred for load changes)	
		OR	
		IMP Out (preferred for steady state)	
	BOP	(Step 5) Wait for the Tracking Meter to indicate a nulled condition	
	BOP	(Step 6) Return the limiter setting to the value recorded in Step 1 or as directed by CRS/SM.	
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	BOP	(Step 6.1.2.4) IF EH Turbine Control is in OPER AUTO, THEN reduce turbine load as follows:	
		• Set the desired load in the SETTER	
		• Select the desired Load Rate	**NOTE:** The BOP will select 1-2%/Minute

Op Test No.:	N16-1	Scenario #	1	Event #	3	Page	40	of	68
Event Description:	**Tube Leak in Feedwater Heater 4A/Downpower**								

Time	Pos.	Expected Actions/Behavior	Comments
		• Depress the GO pushbutton	
	BOP	(Step 6.1.2.5) IF EH Turbine Control is in TURB MANUAL, THEN….	**NOTE:** The Turbine is in OPER AUTO.
	BOP	(Step 6.1.2.6) Maintain Gland Seal Steam Header Pressure (PI-4004, PI-1382 or ERFIS Point GSP2095A) in the normal operating band (3 to 6 psig)	
	RO	(Step 6.1.2.7) WHEN Reactor Power is less than 90% as indicated on NR-45, THEN check that APP-005-D6 is received.	
After a load reduction of 15-20 MWe, or at the discretion of the Lead Examiner move to Event #4.			

Op Test No.:	N16-1	Scenario #	1	Event #	4	Page	41	of 68
Event Description:	**CRDM Fan "A" Failure**							

During the downpower, the "A" CRDM Fan will trip. The operator will address APP-010-A6, HVH-5A/B AIR FLOW LOST/OVLD, and manually start the "B" CRDM Fan.
Booth Operator Instructions: **IMF HVA05A f:MOTOR_SHORT**
Indications Available: • RTGB Annunciator, APP-009-E7, 480V GRD FAULT • RTGB Annunciator, APP-010-A6, HVH-5A/B AIR FLOW LOST/OVLD • CRDM Fan HVH-5A Green status light LIT, Red status light OFF

Time	Pos.	Expected Actions/Behavior	Comments
		APP-010-A6, HVH-5A/B AIR FLOW LOST/OVLD	
	BOP	(Step 1) EVALUATE CRDM indicating lights to determine affected fan:	
		• HVH-5A, CRDM COOLING FAN	
		• HVH-5B, CRDM COOLING FAN	
	BOP	(Step 2) MONITOR the following ERFIS points to determine if a single-phase open circuit is present:	
		• ERFIS point ELV3020A, BUS E1 VOLTAGE.	
		• ERFIS point ELV3021A, BUS E2 VOLTAGE.	
	CRS	(Step 3) IF a single-phase open circuit condition is suspected, THEN GO TO AOP-026, Grid Instability	**NOTE:** This will require additional assessment.
	BOP	(Step 4) IF a CRDM COOLING FAN has tripped, THEN ENSURE the Standby CRDM COOLING FAN is running.	**NOTE:** The BOP will start HVH-5B.

Op Test No.:	N16-1	Scenario #	1	Event #	4	Page	42 of 68
Event Description:	**CRDM Fan “A” Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 5) DISPATCH Operator to evaluate affected CRDM COOLING FAN supply breaker status:	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as AO, and report after 1 minute that there was no apparent reason for the Fan failure.
		• Breaker MCC-5(5M), CONTROL ROD DRIVE MECHANISM COOLING FAN, HVH-5A.	
		• Breaker MCC-6(4M), CONTROL ROD DRIVE MECHANISM COOLING FAN, HVH-5B.	
	CRS	(Step 6) INITIATE a Work Request to investigate the cause of the affected CRDM COOLING FAN alarm.	**NOTE:** The CRS may call WCC to address the Fan failure. If so, **Booth Instructor** acknowledge as WCC.
	CRS	(Step 7) IF RCS temperature is greater than or equal to 350ºF AND both CRDM COOLING FANs are unavailable, THEN…..	**NOTE:** The HVH-5B Fan is running.

At the discretion of the Lead Examiner move to Event #5.

Op Test No.:	N16-1	Scenario #	1	Event #	5	Page	43 of 68
Event Description:	**Continuous Inward Rod Motion**						

Shortly afterwards, a continuous control rod insertion will occur. The operator will respond in accordance with AOP-001, "Malfunction of Reactor Control System." The operator will be unable to control the rod insertion and will manually trip the reactor.
Booth Operator Instructions: **IMF CRF06A** **IMF CRF06B**
Indications Available: • Rod Inward Arrow Indicating Light is LIT • The Tavg-Tref deviation is inconsistent with the control rod movement • Group Steps Counters and IRPI indication inward control rod motion

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-001, MALFUNCTION OF REACTOR CONTROL SYSTEM	
	RO	(Step 1) Check Unexpected Rod Motion - IN PROGRESS	**Immediate Action**
	RO	(Step 2) Check Reactor Power - GREATER THAN 15%	**Immediate Action**
	BOP	(Step 3) Check Turbine Load -	**Immediate Action**
		• CONTROL RODS STEPPING IN	
		AND	
		• UNEXPECTED LOAD REDUCTION IN PROGRESS	
		OR	
		• UNEXPECTED LOAD REDUCTION HAS OCCURRED	
	RO	(Step 3 RNO) Attempt To Stop Rod Motion As Follows:	**Immediate Action**
		• IF ROD BANK SELECTOR Switch position in A (AUTO), THEN Place the ROD BANK SELECTOR Switch in M (Manual)	**NOTE:** When the RO places control rods in MANUAL, the rod motion will continue.

Op Test No.:	N16-1	Scenario #	1	Event #	5	Page	44 of 68
Event Description:	**Continuous Inward Rod Motion**						

Time	Pos.	Expected Actions/Behavior	Comments
		• IF ROD BANK SELECTOR Switch in M (Manual) OR Individual Bank Select, THEN Place the ROD BANK SELECTOR Switch in A (Auto).	**NOTE:** Although control rods are expected to be in AUTO, if the control rods are in MANUAL the RO will take this action.
		• IF Rod Motion does NOT stop, THEN Trip the Reactor and Go To EOP-E-0, Reactor Trip or Safety Injection.	
			NOTE: The CRS will enter EOP-E-0
Upon Rx Trip, move to Events #6-7.			

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	45 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

On the reactor trip, a 500 gpm Steam Generator Tube Rupture will occur (over 10 minutes) on the "C" Steam Generator. The operator will enter EOP-E-0, "Reactor Trip or Safety Injection." After the Immediate Actions are complete, it is likely that the operator will determine that SI is NOT actuated nor required, and transition to EOP-ES-0.1, "Reactor Trip Response." While in this procedure the operator will determine that SI is required, manually actuate SI, and return to EOP-E-0. 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 "C" Steam Generator and then conduct a cooldown of the RCS.
Upon transition into EOP-E-3, a Loss of Off-Site Power will occur. Both EDGs will start and re-power Buses E-1 and E-2. With SI previously reset, the operator will need to address a re-initiation of AFW flow to all Steam Generators, and the restart of the ECCS Pumps. The operator will continue with EOP-E-3 and conduct the RCS cooldown using the "A" and "B" Steam Generator PORVs. During the RCS depressurization, the Pzr Spray Valves will not be available. The operator will be required to conduct the depressurization using an available Pzr PORV. The scenario will terminate at Step 23 of EOP-E-3, after the operator has stopped the SI Pumps.

Booth Operator Instructions: **IMF SGN02F**

r:10:00 f:500

Indications Available:

- All control rods on the bottom
- RCS pressure is lowering
- RCS Tavg is trending to no load
- RTGB Annunciator APP-036-C7, R24 MONITOR HIGH
- R24 Leakage Recorder indicating S/G leakage greater than TS Limit

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**

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	46 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	(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:	
		• RESET SPDS AND INITIATE monitoring of Critical Safety Functions Status Trees.	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	47	of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**							

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	• GO TO EOP‑ES‑0.1, Reactor Trip Response, Step 1.	
			NOTE: It is expected that SI will not be required, and the CRS will transition to EOP-ES-0.1 **NOTE:** The CRS will likely conduct an Alignment Brief.
EOP-ES-0.1, REACTOR TRIP RESPONSE			
			Examiner NOTE: A large SGTR is occurring. It is expected that the crew will transition back to EOP-E-0. Because of this, only 5 steps are scripted. When the crew re-enters EOP-E-0, move forward to **EOP-E-0** steps on **Page 49.**
	RO/ BOP	Foldout Page	
		SI ACTUATION CRITERIA	**NOTE:** The crew will subsequently transition back to EOP-E-0 based on this criteria.
		LOSS OF POWER CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	
		DC BUS, INSTRUMENT BUS, OR MCC‑5 FAILURE CRITERIA	
		LOSS OF ULTIMATE HEAT SINK CRITERIA	
	RO	(Step 1) CHECK RCS Temperature Control:	
		• CHECK RCPs ‑ ANY RUNNING	
		• CHECK RCS temperatures:	
		• With ANY RCP running, CHECK RCS Average temperature ‑ STABLE AT OR TRENDING TO 547°F	
	BOP	(Step 2) CHECK Feedwater Status:	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	48 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK RCS average temperatures - LESS THAN 554°F	
		• CHECK Main Feedwater Reg Valves - CLOSED	
		• CHECK Total feed flow to S/Gs - GREATER THAN 300 gpm (0.2x106 PPH)	
	BOP	(Step 3.a) CHECK S/G Levels:	
		• CHECK S/G Narrow Range levels - GREATER THAN 9%	
	BOP	(Step 3.a RNO) MAINTAIN total feed flow GREATER THAN 300 gpm AFW OR 0.2x106 pph Main Feedwater UNTIL S/G Narrow Range level is GREATER THAN 9% in at least one S/G.	
	BOP	(Step 3.b) CONTROL feed flow to maintain S/G Narrow Range levels BETWEEN 9% AND 50%	
	BOP	(Step 4) CHECK All AC Busses - ENERGIZED BY OFFSITE POWER	
	RO	(Step 5) CHECK PZR Level Control:	
		• CHECK PZR level - GREATER THAN 14%	
	RO	(Step 5 RNO) PERFORM the following:	
		ISOLATE Letdown by closing the following valves:	
		• CLOSE LCV-460 A & B, LETDOWN LINE STOP Valves.	
		CLOSE LTDN LINE ISO Valves:	
		• CVC-204A	

Op Test No.: N16-1	Scenario # 1	Event # 6 & 7	Page 49 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**		

Time	Pos.	Expected Actions/Behavior	Comments
		• CVC-204B	
		CLOSE LTDN ORIFICE Valves:	
		• CVC-200A - 45 gpm	
		• CVC-200B - 60 gpm	
		• CVC-200C - 60 gpm	
		CLOSE CVC-387, EXCESS LETDOWN STOP Valve.	
		TURN OFF ALL PZR Heaters.	
		WHEN charging is available, THEN CONTROL charging to restore PZR level to GREATER THAN 14%.	**NOTE:** The crew will likely manual actuate SI and the CRS will transition to EOP-E-0.
			Examiner NOTE: If the crew proceeds past Step 5 of EOP-ES-0.1, wait here until the crew decides to re-enter EOP-E-0.
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**

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	50	of	68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**								

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
		CHECK BOTH trains of SI actuated:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	RO/ BOP	Foldout Page:	
		RCP TRIP CRITERIA	
		FAULTED S/G AFW ISOLATION 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	
			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 54**.

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Event Description: **"C" Steam Generator Tube Rupture/Loss of Off-Site Power**

Time	Pos.	Expected Actions/Behavior	Comments
		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	
	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	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	52	of	68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**								

Time	Pos.	Expected Actions/Behavior	Comments
		• 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]	
	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	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	53 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
	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	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	54 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 17) Locally RESET AND LOAD Instrument Air Compressor(s) As Necessary (38 KW each):	**NOTE:** The BOP may (If the LOOP has occurred) contact the Inside AO. **If so, Booth Instructor:** as **AO**, acknowledge **IRF EPSMCC5_ 187** **f: RACK_IN** **IRF EPSMCC6_ 218** **f: RACK_IN**
		• 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%	
		• CHECK Steam Driven AFW Pump - RUNNING	**NOTE:** The SDAFW Pump is OOS.

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	55	of	68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**								

Time	Pos.	Expected Actions/Behavior	Comments
	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 "C" 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	
	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:	
		• CHECK Containment Pressure - HAS REMAINED LESS THAN 10 PSIG	
		• CHECK CV Spray - NOT ACTUATED	
	RO	(Step 10) CHECK RCP Seal Cooling:	
		• 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	
		OR	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	56 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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:	
		• With ANY RCP running, RCS average temperature - STABLE AT OR TRENDING TO 547°F	
		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	
	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.	

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Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
	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	
	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.	
		• GO TO EOP-E-3, Steam Generator Tube Rupture, Step 1.	
Booth Instructor: Upon transition to EOP-E-3, IMF EPS13 (Loss of Offsite Power)			
			Examiner NOTE: The LOOP will cause the AFW valves to fully open and re-initiate AFW flow to all S/Gs.
EOP-E-3, STEAM GENERATOR TUBE RUPTURE			

Op Test No.: N16-1	Scenario # 1	Event # 6 & 7	Page 58 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**		

Time	Pos.	Expected Actions/Behavior	Comments
	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:** The RCPs will NOT be running.
		• CHECK RCPs - ANY RUNNING	
	CRS	(Step 1 RNO) GO TO Step 2.	
	BOP	(Step 2) IDENTIFY Ruptured S/G(s):	**NOTE:** The crew will identify the "C" S/G as the ruptured S/G.
		• CHECK for ANY of the following indications:	
		• Unexpected rise in ANY S/G Narrow Range level	
		OR	
		• R-31s Steamline Radiation Monitors - ANY INDICATE HIGH RADIATION	
		OR	
		• R-19s SG Blowdown Radiation - ANY INDICATE HIGH RADIATION	
		OR	
		• High radiation reported from ANY S/G sample	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	59	of	68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**								

Time	Pos.	Expected Actions/Behavior	Comments
		• CONTACT Chemistry to periodically sample ALL S/Gs for activity.	**NOTE:** The CRS may call WCC/Chemistry to address the samples. If so, **Booth Instructor** acknowledge as WCC/Chemistry.
	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	
		• RV1-3	**NOTE:** The crew will ensure that the "C" S/G PORV is CLOSED.
		• CLOSE Ruptured S/G(s) Steam Driven AFW Pump Steam Shutoff Valves:	
		• V1-8C	**NOTE:** Since the SDAFW Pump is OOS, this valve will already be CLOSED.
		• Locally CLOSE Ruptured S/G(s)Bypass Drn AND Warmup Line To AFW Pump Valve(s)While CONTINUING WITH this procedure:	
		• MS-38 (S/G C)(Pipe Jungle above/right of V1-8C)	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **5 minutes** that the **MS-38** is **CLOSED**. **IRF MSS051 f:0**
		• CHECK Ruptured S/G(s) S/G Blowdown AND Blowdown Sample Valves - CLOSED	
		• CLOSE Ruptured S/G(s) MSIV AND MSIV Bypass Valves:	
		• S/G C:	
		• V1-3C	
		• MS-353C	
	BOP	(Step 4) CHECK Ruptured S/G	

Op Test No.: N16-1	Scenario # 1	Event # 6 & 7	Page 60 of 68
Event Description:	**“C” Steam Generator Tube Rupture/Loss of Off-Site Power**		

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK Ruptured S/G - FAULTED	
	CRS	(Step 4 RNO) GO TO Step 5.	
	BOP	(Step 5) CHECK Ruptured S/G(s) Level:	
		• CHECK S/G Narrow Range level - GREATER THAN 9% [18%]	
	RO	• RESET SI	
		• STOP feed Flow to ruptured S/G(s):	
		• CLOSE Steam Driven AFW Pump Discharge Valve(s):	
		• V2-14C	**NOTE:** Since the SDAFW Pump is OOS, this valve will already be CLOSED.
		• CLOSE AFW Header Discharge Valve(s):	
		• V2-16C	
		• 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 EPSMCC9_256 f:0** (Other breakers are already Racked 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.

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	61	of	68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**								

Time	Pos.	Expected Actions/Behavior	Comments
	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	
		• MSIVs	
		• MSIV Bypass Valves	
		• S/G Steam Line PORVs	
		• Steam Driven AFW Pump Steam Shutoff Valves	
	BOP	(Step 8) INITIATE RCS Cooldown:	
		• DETERMINE required Core Exit temperature:	**NOTE:** The CRS will determine the Target temperature to 519°F.
		• DUMP steam to Condenser from intact S/G(s) at MAXIMUM rate:	
		• CHECK Condenser - AVAILABLE	
	BOP	(Step 8.b RNO) DUMP steam at MAXIMUM rate from Intact S/G(s) using S/G Steam Line PORV(s).	**NOTE:** The crew will dump steam using the "A" and the "B" S/G PORVs.
		• IF S/G Steam Line PORV(s) can NOT be opened from the Control Room, THEN....	
		• IF NO intact S/G available, THEN...	
	BOP	(Step 8.c-f) 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	**NOTE:** This Annunciator is extinguished (Steam Dumps not available).

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	62 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		CHECK Core Exit T/Cs ‑ LESS THAN REQUIRED TEMPERATURE	
	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:	
		• CHECK S/G Narrow Range levels ‑ GREATER THAN 9%[18%]	**NOTE:** Narrow Range levels may be greater than 9%. If so, perform Step 9.b.
	BOP	(Step 9.a RNO) MAINTAIN total feed flow GREATER THAN 300 gpm UNTIL S/G Narrow Range level is GREATER THAN 9% [18%] in at least one S/G.	
	BOP	(Step 9.b) CONTROL feed flow to maintain S/G Narrow Range levels ‑ BETWEEN 21% [21%] AND 50%	
	RO	(Step 10) CHECK PZR PORVs AND Block Valves:	
		• CHECK Power to PZR PORV Block Valves ‑ AVAILABLE	
		• CHECK PZR PORVs ‑ CLOSED	
		• CHECK PZR PORV Block valves ‑ AT LEAST ONE OPEN	
	RO	(Step 11) RESET SI	
	RO	(Step 12) RESET Containment Isolation Phase A	
	RO	(Step 13) ESTABLISH Instrument Air To CV:	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	63 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK APP-002-F7, INSTR AIR HDR LO PRESS alarm - EXTINGUISHED	
	RO	(Step 13 RNO) PERFORM the following:	
		• Locally RESET AND LOAD Instrument Air Compressor(s)as necessary (38 KW each):	**NOTE:** If not already done, the BOP will contact the Inside AO. **Booth Instructor:** as **AO**, acknowledge **IRF EPSMCC5_ 187** **f: RACK_IN** **IRF EPSMCC6_ 218** **f: RACK_IN**
		• Compressor A (MCC-5 CMPT 7M)	
		• Compressor B (MCC-6 CMPT 3G)	
		• WHEN Instrument Air is established, THEN PERFORM Steps 13.b AND 13.c.	
	CRS	• CONTINUE WITH Step 14.	
	RO	(Step 13.b-c) RESET IA PCV-1716, INSTRUMENT AIR ISOLATION TO CV	
		• CHECK IA PCV-1716 - OPEN	
	RO	(Step 14) CHECK If RHR Pumps Should Be Stopped:	
		• 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]	

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Event Description: **“C” Steam Generator Tube Rupture/Loss of Off-Site Power**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 15) ESTABLISH Charging Flow:	
		• CHECK Charging Pumps - AT LEAST ONE RUNNING	**NOTE:** All Charging Pumps are OFF.
	CRS	(Step 15.a RNO) IF CCW flow to RCP(s) Thermal Barrier is lost, THEN GO TO Step 16.	**NOTE:** CCW flow was momentarily lost on the LOOP, but exists now.
	RO	(Step 15.b) 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:	
		• 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	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	65	of	68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**								

Time	Pos.	Expected Actions/Behavior	Comments
	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	

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	
	CRS	(Step 19.a RNO) OBSERVE CAUTIONS and NOTE prior to Step 20 AND GO TO Step 20.	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	66 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 20) DEPRESSURIZE RCS Using PZR PORV To Minimize Break Flow AND Refill PZR:	
		• CHECK PZR PORV - AT LEAST ONE AVAILABLE	
		• OPEN one PZR PORV until ANY of the following conditions satisfied:	
		• BOTH of the following:	
		• RCS pressure - LESS THAN RUPTURED S/G(s) PRESSURE	
		• PZR level - GREATER THAN 14% [31%]	
		OR	
		• PZR level - GREATER THAN 73% [66%]	
		OR	
		• RCS Subcooling based on Core Exit T/Cs - LESS THAN 18°F [37°F]	
		• CLOSE PZR PORV	
	RO	(Step 21) CHECK RCS Pressure - RISING	
	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:	
		• 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%]	

Op Test No.:	N16-1	Scenario #	1	Event #	6 & 7	Page	67 of 68
Event Description:	**"C" Steam Generator Tube Rupture/Loss of Off-Site Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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 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 (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.

At the discretion of the Lead Examiner terminate the exam.

NRC SCENARIO N16 1-1 TURNOVER SHEET

1. INITIAL CONDITIONS

a)	Time in Core Life:	MOL
b)	Reactor Power:	100% Mode 1
c)	Turbine Load:	770 MWe
d)	Boron Concentration:	853 ppm
e)	Rod Height:	218 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
LCO 3.7.4 A	Restore AFW pump or flow path(s) to OPERABLE status within 7 days AND 8 days from discovery of failure to meet the LCO

3. CLEARANCES IN EFFECT

a) SDAFW Pump

4. CAUTION CAPS IN EFFECT

a) None

5. PROTECTED EQUIPMENT

a) “A” MDAFW Pump and flowpath
b) “B” MDAFW Pump and flowpath

6. DEGRADED EQUIPMENT

a) FI-613, CCW System Flow is OOS (I&C Investigating).
b) RTGB Annunciator APP-010-B3, “EDG B START AIR LO PRESS,” has failed to the ILLUMINATED condition (I&C is investigating).

7. SWITCHYARD ACCESS

a) PROTECTED

8. PLANNED EVOLUTIONS

a) Maintain Steady-State conditions
b) Monitor the completion of Maintenance of the SDAFW Pump

9. TURNOVER INFORMATION

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

10. REACTIVITY INFORMATION

a) Review the OST-947 MOL charts for BA and PW additions

11. RISK

a) GREEN

ROBINSON Nuclear Training

Committed to Excellence

OPERATIONS TRAINING

N16-1-2

Initial Licensed Operator Training

Rev 111615

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

Developed By:	______________________	**Date:**	__________
	Instructor/Developer		
Concurred By:	______________________	**Date:**	__________
	Line Superintendent/Supervisor/SRO		
Approved By:	______________________	**Date:**	__________
	Superintendent/Supervisor Training		

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Training Class 15-1

TOPIC: NRC Simulator Exam

Scenario N16-1-2

REFERENCES:

1. Technical Specification LCO 3.5.2, “ECCS - Operating” (Amendment 176)
2. OP-105, “Maneuvering the Plant When Greater than 25% Power” (Rev 62)
3. OP-301, “Chemical and Volume Control System (CVCS)” (Rev 112)
4. AOP-003, “Malfunction of Reactor Makeup Control” (Rev 20)
5. AOP-010, “Main Feedwater/Condensate Malfunction” (Rev 33)
6. APP-003, “RCS & Makeup Systems” (Rev 54)
7. APP-001, “Miscellaneous NSSS” (Rev 60)
8. AOP-018, “Reactor Coolant Pump Abnormal Conditions” (Rev 31)
9. Technical Specification LCO 3.4.17, “Chemical and Volume Control System (CVCS)” (Amendment 223)
10. AOP-025, “RTGB Instrument Failure” (Rev 24)
11. OWP-033, “First Stage Pressure (FSP)” (Rev 13)
12. Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation” (Amendment 176)
13. Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation” (Amendment 176)
14. Technical Specification LCO 3.3.6, “Containment Ventilation Isolation Instrumentation” (Amendment 176)
15. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 6)
16. CSFST, “Critical Safety Function Status Trees” (Rev 7)
17. EOP-E-1, “Loss of Reactor or Secondary Coolant” (Rev 4)
18. FRP-J.1, “Response to High Containment Pressure” (Rev 10)
19. EOP-ES-1.2, “Post-LOCA Cooldown and Depressurization” (Rev 1)

Validation Time: <u>104 minutes</u>

Facility:	**H B Robinson**	Scenario No.:	**2**	Op Test No.:	**N16-1**
Examiners:	____________	Operators:		____________	(SRO)
	____________			____________	(RO)
	____________			____________	(BOP)

Initial Conditions:	The plant is at 75% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "A" SI Pump is OOS. The "B" SI Pump has been aligned to 480 VAC ESF Bus E-1. The "C" Charging Pump is also OOS. LI-928, "C" SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C3, "AIR SIDE SEAL OIL BU PMP OVLD," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1	-	R-RO N-BOP N-SRO	Raise Power
2	1	I-RO I-SRO	VCT Level Transmitter LT-115 fails HIGH
3	2	C-BOP C-SRO	"C" FRV Controller fails HIGH in AUTO
4	3	C-RO C(TS)-SRO	"B" Charging Pump Trip
5	4	I-BOP I(TS)-SRO	Turbine 1st Stage Pressure Transmitter PT-447 fails LOW
6	5	M-RO M-BOP M-SRO	Cold Leg SBLOCA
7	6/7	NA	480 VAC Bus E-1 De-energizes
8	6	C-RO	"C" SI Pump fails to Auto Start
9	7	C-RO	CV Spray Valves SI-880C and D fail to OPEN Automatically

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

H B Robinson 2016 NRC Scenario #2

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

The following equipment is Out-Of-Service: The “A” SI Pump is OOS. The “B” SI Pump has been aligned to 480 VAC ESF Bus E-1. The “C” Charging Pump is also OOS. LI-928, “C” SI Accumulator Level, is OOS (I&C Investigating). RTGB Annunciator APP-009-C3, “AIR SIDE SEAL OIL BU PMP OVLD,” 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, “Chemical and Volume Control System (CVCS).”

During the power increase, VCT Level Transmitter LT-115 will fail HIGH causing all letdown to be diverted to the CVCS HUTs. This failure will result in VCT level lowering without automatic makeup. The operator will respond in accordance with AOP-003, “Malfunction of Reactor Makeup Control.” After this, the power increase will continue.

Next, the “C” Feed Regulating Valve Controller will fail such that the valve starts to OPEN. The operator will respond in accordance with AOP-010, “Main Feedwater/Condensate Malfunction,” and control the “C” S/G level manually throughout the remainder of the scenario.

Following this, the “B” Charging Pump will trip. The operator will respond in accordance with APP-003-F5, CHG PMP MOTOR OVLD/TRIP and/or APP-001-B6, LP LTDN LN HI TEMP, and raise speed of the “A” Charging Pump and reduce Letdown flow. The operator may enter AOP-018, “Reactor Coolant Pump Abnormal Conditions.” The operator will address 3.4.17, “Chemical and Volume Control System.”

Shortly afterwards, Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW. The operator will respond in accordance with AOP-025, “RTGB Instrument Failure, and place all Feed Regulating Valves in MANUAL” The operator will remove the failed instrument from service in accordance with OWP-033, “First Stage Pressure (FSP),” and restore the “A” and “B” Feed Regulating valves to AUTO control. The operator will address 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.”

Subsequently, a Cold Leg Small Break LOCA will occur (over 5 minutes) on the B Loop. The operator will enter AOP-016, “Excessive Primary Plant Leakage.” Ultimately, the operator will enter EOP-E-0, “Reactor Trip or Safety Injection.” When the reactor trips, the normal supply breaker to Bus E-1 will trip OPEN, and the “A” EDG Output Breaker will fail to CLOSE either automatically or manually; and Train “A” equipment will remain unavailable throughout the event. Additionally, the “C” SI Pump will fail to automatically start on SI, and the operator will be required to manually start this pump.

Upon completion of EOP-E-0, the operator will transition to EOP-E-1, “Loss of Reactor or Secondary Coolant,” and the break size will become larger. Containment pressure will exceed 10 psig creating an Orange Path condition on the Containment Critical Safety Function. When this occurs, the “B” CV Spray will automatically start on HI-HI Containment Pressure, however,

both SI-880C&D ("B" CV Spray Pump Discharge Valves) will fail to open automatically, and the operator will be required to manually open these valves.

The scenario will terminate in EOP-E-1 after Containment pressure has been lowered to less than 10 psig, or at Step 9 of FRP-J.1, "Response to High Containment Pressure," after the operator has taken all necessary steps to reduce Containment pressure.

Critical Tasks:

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (Containment Isolation Phase B - ACTUATED, OR 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.

Establish flow from at least one high-head SI pump before transition out of E-0. (EOP-Based)

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.

Manually actuate at least one CV Spray Train before Transitioning to EOP-ES-1.2. (EOP-Based)

Safety Significance: Failure to manually actuate the minimum required complement of containment cooling equipment under the postulated conditions demonstrates the inability of the crew to "recognize a failure or an incorrect automatic actuation of an ESF system or component. In this case, the minimum required complement of containment cooling equipment can be manually actuated from the control room. Therefore, failure to manually actuate the minimum required complement of containment cooling equipment also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS) capacity). Additionally, under the postulated plant conditions, failure to manually actuate the minimum required complement of containment cooling equipment (when it is possible to do so) results in a failure to prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario.

SIMULATOR OPERATOR INSTRUCTIONS

<table>
<tr><th></th><th>Bench Mark</th><th>ACTIVITY</th><th>DESCRIPTION</th></tr>
<tr><td>☐</td><td>Sim. Setup</td><td>Reset to Temp IC 609</td><td></td></tr>
<tr><td>☐</td><td colspan="3">T = 0 Malfunctions:

“A” SI Pump OOS:
• IRF EPS480E1_130 f: RACK_OUT (“A” SI Pump OOS)
• IRF EPS480E1_124 f: RACK_IN (“B” SI Pump Racked IN to E-1)

PLACE Red Cap over “A” SI Pump Control Switch

“C” Charging Pump OOS:
• IRF EPSV480E2_152 f:RACK_OUT

PLACE Red Cap over “C” Charging Pump Control Switch
PLACE Green Cap over “A” and “B” Charging Pump Control Switch

LI-928 “C” SI Accumulator Level indication OOS
• IOR aoSISAOD021A f:0

Place WHITE DOT on LI-928

RTGB Annunciator APP-009-C3 failed OFF
• IMF ANNXN09C03 f:ALARM_OFF

Place WHITE DOT on APP-009-C3

Insert the following:
• IRF SIS029 f: NO_AUTO (“C” SI Pumps fails to AUTO start)
• IRF CNS010 f:NO-AUTO (SI-880C fails to OPEN in AUTO)
• IRF CNS011 f:NO-AUTO (SI-880C fails to OPEN in AUTO)
• $006_RTA_TRIP IMF EPS05A (Normal Supply Breaker to E-1 trips on Rx Trip)
• $006_RTA_TRIP IMF EDG03A (Diesel Output Breaker to E-1 fails to CLOSE)

Place the Simulator in RUN and ACKNOWLEDGE all alarms.

Adjust Steam Dump Potentiometer to 7.28 (Per OP-105)

Ensure “B” Charging Pump operating AUTO, “A” Charging Pump operating in MANUAL</td></tr>
<tr><td>☐</td><td colspan="3">Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.</td></tr>
</table>

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with the following: • Copy of OP-105 marked up for power increase • 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	
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario N16-1-2.**	
☐	At direction of examiner	**Event 1**	Raise Power
☐	At direction of examiner	**Event 2** **ICO CVCXMTLT_115 r:00:30 f:60**	VCT Level Transmitter LT-115 fails HIGH
☐	At direction of examiner	**Event 3** **IMF CFW17C r:15 f:100**	"C" FRV Controller fails HIGH in AUTO
☐	At direction of examiner	**Event 4** **IMF CVC05B**	"B" Charging Pump Trip
☐	At direction of examiner	**Event 5** **ICO TURXMTPT_447 r:30 f:0**	Turbine 1st Stage Pressure Transmitter PT-447 fails LOW
☐	At direction of examiner	**Event 6** **IMF RCS01C** **r:5:00 f:1000**	Cold Leg SBLOCA

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Post-Rx Trip	**Event 7** **IMF EPS05A** **IMF EDG03A**	480 VAC Bus E-1 De-energizes **NOTE: E-1 will de-energize on Rx Trip** **$006_RTA_TRIP IMF EPS05A (Normal Supply Breaker to E-1 trips on Rx Trip)** **$006_RTA_TRIP IMF EDG03A (Diesel Output Breaker to E-1 fails to CLOSE)**
☐	Post-Rx Trip	**Event 8** **IRF SIS029** **f:NO_AUTO**	"C" SI Pump fails to Auto Start **NOTE: Failure is inserted at T=0**
☐	Post-Rx Trip	**Event 9** **IRF CNS010** **f:NO_AUTO** **IRF CNS011** **f:NO_AUTO**	CV Spray Valves SI-880C and D fail to OPEN Automatically **NOTE: Failure is inserted at T=0**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N16-1	Scenario #	2	Event #	1	Page	10 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, "Chemical and Volume Control System (CVCS)."
Booth Operator Instructions: **NA**
Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	RO	(Step 5) Maintain Tave within 5°F of Tref using a combination of Control Rods and Boron Concentration changes.	
OP-301, CHEMICAL AND VOLUME CONTROL SYSTEM (CVCS) SECTION 8.2.7, RCS QUICK DILUTION CHECKLIST			
	RO	(Step 1) This revision has been verified to be the latest revision available.	
	RO	(Step 2) DETERMINE the amount of water to add to the RCS and if applicable, the expected change in RCS temperature AND Reactor Power.	
	RO	(Step 3) OBTAIN an independent check of the volume of water required.	
	RO	(Step 4) OBTAIN permission from the CRS OR the SM to add the amount of water previously determined, including the expected change in RCS temperature AND Reactor Power.	

Op Test No.:	N16-1	Scenario #	2	Event #	1	Page	11 of 61
Event Description:	**Raise Power**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5) IF flow adjustment is desired, THEN adjust FCV-114A, PRIMARY WTR FLOW DILUTE MODE, potentiometer to obtain desired flow rate.	
	RO	(Step 6) PLACE the RCS MAKEUP MODE selector switch in the DILUTE position.	
	RO	(Step 7) SET YIC-114, PRIMARY WTR TOTALIZER to the desired quantity.	
	RO	(Step 8) IF two letdown orifices are in service and it is desired to divert flow to the HUT, THEN…	
	RO	(Step 9) Momentarily PLACE the RCS MAKEUP SYSTEM switch to the START position.	
	RO	(Step 10) IF LCV-115A is in AUTO, THEN ENSURE proper operation of LCV-115A, VCT/HLDP TK DIV valve.	
	RO	(Step 11) IF any of the following conditions occur, THEN momentarily PLACE the RCS MAKEUP SYSTEM switch in the STOP position:	
		• Unanticipated Rod Motion	
		• Primary Water addition exceeds the desired value	
	RO	(Step 12) WHEN the desired amount of Primary Water has been added to the RCS, THEN ENSURE the following:	
		• FCV-114A, PW TO BLENDER, closes.	
		• FCV-114B, BLENDED MU TO VCT, closes.	

Op Test No.:	N16-1	Scenario #	2	Event #	1	Page	12 of 61
Event Description:	Raise Power						

Time	Pos.	Expected Actions/Behavior	Comments
		• IF in Auto, THEN the operating Primary Water Pump stops.	
		• The RCS MAKEUP SYSTEM is OFF.	
		• IF desired, THEN ENSURE LCV-115A, VCT/HLDP TK DIV valve control switch in AUTO.	
	RO	(Step 13) RETURN the RCS Makeup System to automatic as follows:	
		• ENSURE FCV-114A, PRIMARY WTR FLOW DILUTE MODE is in AUTO.	
		• PLACE the RCS MAKEUP MODE switch in the AUTO position.	
		• Momentarily PLACE the RCS MAKEUP SYSTEM switch in the START position.	
	RO	(Step 14) RECORD, in AUTO LOG, as indicated by PRIMARY WATER TOTALIZER, YIC-114 total amount of Primary Water added during the dilution.	
	RO	(Step 15) MONITOR parameters for the expected change in reactivity AND inform the CRS OR the SM the results of the dilution.	
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	BOP	(Step 6) IF EH Turbine Control is in OPER AUTO, THEN raise turbine load as follows:	**NOTE:** Since power is stabilized at 75%, the BOP will perform Step 6 to initiate the load increase. The next applicable Step in Section 6.2.2 of OP-105 is Step 22.
		• Adjust the SETTER indication using the REF ▼ or REF ▲ pushbuttons to the desired load.	

Op Test No.:	N16-1	Scenario #	2	Event #	1	Page	13 of 61
Event Description:	**Raise Power**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Use the GO, HOLD, REF ▼, and REF ▲ pushbuttons as necessary to continue the rise in load.	
	BOP	(Step 22) WHEN average Reactor Power crosses greater than 90% by Power Range Indications, THEN check that APP-005-D6 is received.	**NOTE:** The Turbine is in OPER AUTO.
After the 1st Dilution and MWe raised by 15-20 MWe, and at the discretion of the Lead Examiner move to Event #2.			

Op Test No.:	N16-1	Scenario #	2	Event #	2	Page	14 of 61
Event Description:	**VCT Level Transmitter LT-115 fails HIGH**						

During the power increase, VCT Level Transmitter LT-115 will fail HIGH causing all letdown to be diverted to the CVCS HUTs. This failure will result in VCT level lowering without automatic makeup. The operator will respond in accordance with AOP-003, "Malfunction of Reactor Makeup Control." After this, the power increase will continue.

Booth Operator Instructions: **ICO CVCXMTLT_115 r:00:30 f:60**

Indications Available:

- RTGB Annunciator APP-003-E3, VCT HI/LO LVL
- VCT Level LI-115 indicates HIGH
- LCV-115 diverting to CVCS HUT
- VCT Level LI-112 on ERFIS indicates lowering VCT Level

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the BOP will go to HOLD on the Turbine.
		AOP-003, MALFUNCTION OF REACTOR MAKEUP CONTROL	
			NOTE: The crew could refer to APP-003-E3 before entering AOP-003.
	RO	(Step 1) Check For Failure Of A Level Transmitter As Follows:	
		• Obtain a VCT level for LT-115 using ERFIS	
		• PT ID CHL0115A	
		• Obtain a VCT level for LT-112 using ERFIS	
		• PT ID CHL0112A	
		• Check VCT level indicators - OSCILLATING LEVEL DEVIATION OBSERVED	
	CRS	(Step 1.c RNO) Go To Step 1.e	
	RO	(Step 1.e) Check VCT level deviation between LT-112 and LT-115 - GREATER THAN 8 INCHES (13%)	

Op Test No.:	N16-1	Scenario #	2	Event #	2	Page	15 of 61
Event Description:		**VCT Level Transmitter LT-115 fails HIGH**					

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2) Check LT-115 - FAILED	**NOTE:** LT-115 has failed HIGH.
	RO	(Step 3) Stabilize The RCS Makeup System As Follows:	
		• Check LT-115 - FAILED HIGH	
		• Place LCV-115A, VCT/HLDP TK DIV, Control Switch to VCT	
		• Obtain Hagan Racks Key number 10	
		• Place VCT Level Transmitter Selector Switch located in Hagan Rack #19, IN LT-112 POSITION	**NOTE:** The CRS will dispatch the BOP to the Hagan Racks. **Booth Instructor:** use IRF CVC 067 f:LT-112.
		• Check LT-115 - FAILED HIGH	
		• Place the LCV-115A Control Switch to AUTO	
	CRS	• Contact I&C to repair fail channel	**NOTE:** The CRS may call WCC/I&C to address the VCT Transmitter failure. If so, **Booth Instructor** acknowledge as WCC.
	CRS	• Go To Step 6	
	CRS	(Step 6) Make PA Announcement For Procedure Entry	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 7) Implement The EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	RO	(Step 8) Check VCT Level - LESS THAN 12.5 INCHES (21%)	

Op Test No.:	N16-1	Scenario #	2	Event #	2	Page	16 of 61
Event Description:	**VCT Level Transmitter LT-115 fails HIGH**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 8 RNO) IF VCT level lowers to less than 12.5 inches (21%), THEN perform Steps 9 and 10.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	Go To Step 11.	
	RO	(Step 11) Check VCT Level - LESS THAN 20 INCHES (33%)	
	CRS	(Step 11 RNO) Go To Step 21.	
	RO	(Step 21) Check VCT Level - LESS THAN 51.5 INCHES (86%)	
	RO	(Step 22) Verify Charging And Letdown Flows Are Normal For Plant Conditions	
	RO	(Step 23) Check APP-003-D5, BA FLOW DEV - ILLUMINATED	
	CRS	(Step 23 RNO) Go To Step 28.	
	RO	(Step 28) Check APP-003-E5, MAKEUP WATER DEV - ILLUMINATED	
	CRS	(Step 28 RNO) Go To Step 34.	
	RO	(Step 34) Check Boration - REQUIRED	**NOTE:** The decision point for the CRS is based on the LT-115 failure and its resulting effects, NOT based on the fact that there is an on-going power ascension.
	CRS	(Step 34 RNO) Go To Step 37.	

Op Test No.:	N16-1	Scenario #	2	Event #	2	Page	17 of 61
Event Description:	**VCT Level Transmitter LT-115 fails HIGH**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 37) Check Dilution - REQUIRED	**NOTE:** The decision point for the CRS is based on the LT-115 failure and its resulting effects, NOT based on the fact that there is an on-going power ascension.
	CRS	(Step 37 RNO) Go To Step 40.	
	CRS	(Step 40) Check Technical Specifications, Section 3.4.17, Chemical and Volume Control System (CVCS), For Applicable LCO	**NOTE:** Technical Specification LCO 3.4.17 is MET.
	CRS	(Step 41) Return To Procedure And Step In Effect	
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.: N16-1 Scenario # 2 Event # 3	Page 18 of 61
Event Description:	**"C" FRV Controller fails HIGH in AUTO**

Next, the "C" Feed Regulating Valve Controller will fail such that the valve starts to OPEN. The operator will respond in accordance with AOP-010, "Main Feedwater/Condensate Malfunction," and control the "C" S/G level manually throughout the remainder of the scenario.

Booth Operator Instructions: **IMF CFW17C r:15 f:100**

Indications Available:

- "C" S/G Narrow Range level is rising on FR-498
- "C" S/G Feed Flow level is rising on FR-498
- FCV-498 Controller Output is rising
- RTGB Annunciator APP-006-C1, S/G C FW > STM FLOW

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION	
	BOP	(Step 1) CHECK FRVs - OPERATING PROPERLY (MANUAL OR AUTO):	**Immediate Action** **NOTE:** FCV-498 in NOT operating properly in AUTO.
		• FCV-478	
		• FCV-488	
		• FCV-498	
	BOP	(Step 1 RNO) PERFORM the following:	**Immediate Action** **NOTE:** The BOP will control FCV-498 in MANUAL.
		• ENSURE FRV for affected S/G(s) in manual control.	
		• ATTEMPT to stabilize S/G level using FRV and/or FRV Bypass Valves by matching steam flow with feed flow.	
		• STOP any load change in progress.	
		• If unable to control S/G level, THEN……	

Op Test No.: N16-1	Scenario # 2	Event # 3	Page 19 of 61
Event Description:	**"C" FRV Controller fails HIGH in AUTO**		

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.** Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.			
	RO/ BOP	(Step 2) CHECK Reactor Trip Setpoint - BEING APPROACHED	
	CRS	(Step 2 RNO) IF a reactor trip setpoint is approached, THEN….	
		GO TO Step 4.	
	RO	(Step 4) CHECK Reactor Power - LESS THAN OR EQUAL TO 100%	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 6) GO TO Appropriate Step From Table Below:	
		FRV Failure To Control - OBSERVE NOTE 58	
	BOP	(Step 58) CHECK S/G Level - AT OR TRENDING TO PROGRAM	
	RO	(Step 59) CHECK Tavg - AT OR TRENDING TO Tref	

Op Test No.:	N16-1	Scenario #	2	Event #	3	Page	20 of	61
Event Description:	**"C" FRV Controller fails HIGH in AUTO**							

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 60) CONTACT Maintenance To Troubleshoot And Correct The Feedwater Problem	**NOTE:** The CRS may call WCC/I&C to address the FRV Controller failure. If so, **Booth Instructor** acknowledge as WCC.
	CRS	(Step 61) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 62) CHECK Total Reactor Power Change - LESS THAN 15%	**NOTE:** The power change associated with the FRV Failure is less than 15%.
	RO	(Step 63) CHECK APP-005-B5, ROD BANKS A/B/C/D LO LIMIT - EXTINGUISHED	
	RO	(Step 64) MONITOR Axial Flux Difference To Ensure Compliance With TS 3.2.3	
	BOP	(Step 65) NOTIFY Load Dispatcher Of Unit's Load Capability	**NOTE:** The CRS/BOP will contact the Load Dispatcher. **Booth Instructor** acknowledge as Load Dispatcher.
	CRS	(Step 66) RETURN TO Procedure And Step In Effect	
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #4.			

Op Test No.:	N16-1	Scenario #	2	Event #	4	Page	21 of 61
Event Description:	**"B" Charging Pump Trip**						

Following this, the "B" Charging Pump will trip. The operator will respond in accordance with APP-003-F5, CHG PMP MOTOR OVLD/TRIP and/or APP-001-B6, LP LTDN LN HI TEMP, and raise speed of the "A" Charging Pump and reduce Letdown flow. The operator may enter AOP-018, "Reactor Coolant Pump Abnormal Conditions." 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 • "B" Charging Pump Green status light 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 raise the speed of the "A" Charging Pump.
	CRS	(Step 2) Dispatch Operator to check the Charging Pump breaker(s):	**NOTE:** The CRS will dispatch an AO. **Booth Instructor:** as **AO**, acknowledge and report **within 1 minute** that "**there is an acrid odor at E-1.**"
		• 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 "A" Charging Pump is operating normally.**"
	RO	(Step 4) IF Seal Injection is lost to any RCP, THEN…..	

Op Test No.:	N16-1	Scenario #	2	Event #	4	Page	22 of 61
Event Description:		**“B” Charging Pump Trip**					

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5) IF a single-phase open circuit condition is suspected, THEN…..	
			NOTE: Because letdown flow is higher than Charging flow, it is expected that APP-001-B6 will alarm within 1 minute of the “B” Charging Pump trip.
APP-001-B6, LP LTDN LN HI TEMP			
	RO	(Step 1) IF Charging Flow is low, THEN RAISE Charging Flow OR LOWER Letdown Flow to clear alarm.	**NOTE:** The RO will reduce letdown flow to control Pressurizer Level.
	RO	(Step 2) IF PT-145 has failed, THEN….	**NOTE:** PT-145 has NOT failed.
	RO	(Step 3) IF PC-145 has failed, THEN…..	**NOTE:** PC-145 has NOT failed.
	CRS	(Step 4) IF required, THEN DISPATCH an operator to adjust RCP SEAL WATER FLOW CONTROL VALVEs CVC-297A, CVC-297B, and CVC-297C per requirements of OP-301.	**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
			NOTE: The CRS will address the Technical Specifications.
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:	
		Two Charging Pumps shall be OPERABLE; and	

Op Test No.: N16-1 Scenario # 2 Event # 4 Page 23 of 61

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

<table>
<tr><th>Time</th><th>Pos.</th><th>Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td></td><td></td><td>Two makeup water pathways from the Refueling Water Storage Tank (RWST) shall be OPERABLE.</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>APPLICABILITY: Modes 1, 2, 3 and 4</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td><table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>A. One required charging pump inoperable.</td><td>A.1 Restore required charging pump to OPERABLE status.</td><td>24 hours</td></tr></table></td><td>NOTE: The CRS will determine that the "B" Charging Pump is one of the two required to be OPERABLE, and enter Condition A.</td></tr>
<tr><td></td><td></td><td></td><td>NOTE: The CRS will likely conduct an Alignment Brief.</td></tr>
<tr><td colspan="4">At the discretion of the Lead Examiner move to Event #5.</td></tr>
</table>

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	24 of	61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**							

Shortly afterwards, Turbine 1st Stage Pressure Transmitter PT-447 will fail LOW. The operator will respond in accordance with AOP-025, "RTGB Instrument Failure, and place all Feed Regulating Valves in MANUAL" The operator will remove the failed instrument from service in accordance with OWP-033, "First Stage Pressure (FSP)," and restore the "A" and "B" Feed Regulating valves to AUTO control. The operator will address 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
- PT-447, 1st Stage Pressure starts to lower
- PT-446, 1st Stage Pressure remains constant
- "A" and "B" S/G Narrow Range levels will lower

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: With the "C" FRV in Manual, the "C" S/G level will remain stable. However, with this failure, the "A" and "B" FRVs will auto respond to the failure, and trend toward 39% NR level. After stabilized there, the BOP will take MANUAL control of both the "A" and "B" FRVs and restore S/G level to the normal band.
APP-005-F5, AMSAC TROUB/BYPD			
			NOTE: The CRS may enter AOP-025 directly (If so, See BELOW).
	RO/ BOP	(Step 1) CHECK AMSAC Switch position per current plant procedures	
	BOP	(Step 2) MONITOR the following parameters:	
		• PI-446, TURBINE FIRST STAGE PRESS	
		• PI-447, TURBINE FIRST STAGE PRESS	**NOTE:** The BOP will notice that PT-447 has failed LOW, the CRS may enter AOP-025.

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	25 of 61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
		• LI-474, CH I SG 1 NAR RANGE LEVEL	
		• LI-485, CH I SG 2 NAR RANGE LEVEL	
		• LI-496, CH I SG 3 NAR RANGE LEVEL	
	BOP	(Step 3) IF the difference between SG level indicators (LI-474, LI-485, LI-496) is greater than or equal to 25%, THEN…..	
	BOP	(Step 4) IF the difference between 1st stage pressure indicators (PI-446, PI-447) is greater than or equal to 150 psig, THEN:	**NOTE:** The BOP will notice that PT-447 has failed LOW, and the CRS will likely enter AOP-025, rather than OWP-033.
		• DETERMINE which pressure indicator is suspect.	
		• REMOVE affected pressure channel from service per OWP-033, First Stage Pressure (FSP).	
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			
	BOP	(Step 1) CHECK Turbine Load Rejection -	
		• IN PROGRESS	
		OR	
		• HAS OCCURRED	
	CRS	(Step 1 RNO) GO TO Step 3.	

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	26 of 61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3) CHECK S/G Level Trend ‑ CONTROLLING IN AUTO TO 39%	**NOTE:** FCV-498 is in MANUAL, and the failure has NOT caused "C" S/G level to change.
	BOP	(Step 3 RNO) PERFORM the following:	
		• ENSURE affected FRV controllers are in MAN:	
		• FCV‑478	**NOTE:** The BOP will place FCV-478 in MANUAL after level reaches 39%.
		• FCV‑488	**NOTE:** The BOP will place FCV-488 in MANUAL after level reaches 39%.
		• FCV‑498	**NOTE:** FCV-498 is already in MANUAL.
		• CONTROL S/G level between 39% and 52%.	
	RO	(Step 4) CONTROL Reactor Power:	
		PLACE rod bank selector switch in M (Manual)	**NOTE:** The RO already has the control rods in MANUAL.
		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 will most likely make this announcement.
	BOP	(Step 6) PERFORM The Following:	**NOTE:** The "C" S/G Level is likely stabilized.
		• CHECK S/G Level ‑ STABILIZED BETWEEN 39% AND 52%	

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	27 of 61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6.a RNO) WHEN S/G level is stabilized between 39% and 52%, THEN CONTINUE WITH Step 6.b.	**NOTE:** The BOP will be in the process of raising and stabilizing the “A” and “B” S/G Levels.
	BOP	(Step 6.b) CHECK FRV Controllers ‑ ALL IN MAN:	**NOTE:** All FRV controllers are expected to be in MANUAL.
		• FCV‑478	
		• FCV‑488	
		• FCV‑498	
	CRS	(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	
	RO	(Step 9) ADJUST Tavg To Within ‑1.5 TO +1.5°F Of Tref	
	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 NOT restore previously failed FRV-498 to AUTO.
		• 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.	
	CRS	• GO TO Step 12.	

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	28 of 61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 12) RESTORE Rod Control To Automatic:	**NOTE:** Since the power increase is likely suspended, the RO/CRS may discuss placing the control rods back in AUTO.
		• 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	Insert Trip Signals	**NOTE:** The will enter the Simulator Booth (Simulating the Hagan Room). **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

Op Test No.: N16-1 Scenario # 2 Event # 5	Page 29 of 61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
		• B/S 447-2 HAGAN RACK #25 (70% TURBINE LOAD LIMIT)	
		• B/S 447-1 HAGAN RACK #25 (PERMISSIVE P-7)	
		• B/S 475, HAGAN RACK #24 (LOOP 1 HI STM FLOW)	
		• B/S 485 HAGAN RACK #25 (LOOP 2 HI STM FLOW)	
		• B/S 495 HAGAN RACK #25 (LOOP 3 HI STM FLOW)	
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 3.3.1, REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION			
	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	

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	30 of 61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
		CONDITION / REQUIRED ACTION / COMPLETION TIME T. One channel inoperable / T.1 Verify interlock is in required state for existing unit conditions. / 1 hour OR T.2 Be in MODE 2. / 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 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	
		CONDITION / REQUIRED ACTION / COMPLETION TIME D. One channel inoperable / NOTE For Function 4.c, a channel may be taken out of the trip condition for 6 hours for maintenance. / 6 hours D.1 Place channel in trip. / 12 hour OR D.2.1 Be in MODE 3. / 18 hours AND D.2.2 Be in MODE 4.	**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.

Op Test No.:	N16-1	Scenario #	2	Event #	5	Page	31 of	61
Event Description:	**Turbine 1st Stage Pressure Transmitter PT-447 fails LOW**							

Time	Pos.	Expected Actions/Behavior	Comments
TECHNICAL SPECIFICATION 3.3.6, CONTAINMENT VENTILATION ISOLATION INSTRUMENTATION			
	CRS	The Containment Ventilation Isolation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.	
	CRS	APPLICABILITY: According to Table 3.3.6-1.	
	CRS	ACTIONS	
		CONDITION / REQUIRED ACTION / COMPLETION TIME: Required Action: Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.	**NOTE:** The CRS will determine that Function 4 (Safety Injection), is affected, which requires the Action of LCO 3.3.2.
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner, move to Events #6-9.			

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	32 of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**						

Subsequently, a Cold Leg Small Break LOCA will occur (over 5 minutes) on the B Loop. The operator will enter AOP-016, "Excessive Primary Plant Leakage." Ultimately, the operator will enter EOP-E-0, "Reactor Trip or Safety Injection." When the reactor trips, the normal supply breaker to Bus E-1 will trip OPEN, and the "A" EDG Output Breaker will fail to CLOSE either automatically or manually; and Train "A" equipment will remain unavailable throughout the event. Additionally, the "C" SI Pump will fail to automatically start on SI, and the operator will be required to manually start this pump. Upon completion of EOP-E-0, the operator will transition to EOP-E-1, "Loss of Reactor or Secondary Coolant," and the break size will become larger. Containment pressure will exceed 10 psig creating an Orange Path condition on the Containment Critical Safety Function. When this occurs, the "B" CV Spray will automatically start on HI-HI Containment Pressure, however, both SI-880C&D ("B" CV Spray Pump Discharge Valves) will fail to open automatically, and the operator will be required to manually open these valves. The scenario will terminate in EOP-E-1 after Containment pressure has been lowered to less than 10 psig, or at Step 9 of FRP-J.1, "Response to High Containment Pressure," after the operator has taken all necessary steps to reduce Containment pressure.

Booth Operator Instructions: **IMF RCS01C r:5:00 f:1000**

Indications Available:

- Pressurizer level is lowering
- Pressurizer pressure is lowering
- Charging Pump is rising
- Containment pressure is rising

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: If a reactor trip occurs move forward to **EOP-E-0** actions on **Page 35.**
		AOP-016, EXCESSIVE PRIMARY PLANT LEAKAGE	
	RO	(Step 1) DETERMINE If Reactor Trip Needed As Follows:	
		• CHECK RCS Pressure - GREATER THAN 1000 PSIG	
		• CHECK the following:	
		• PZR Level - LESS THAN 14% AND LOWERING IN AN UNCONTROLLED MANNER	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	33 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		OR	
		• RCS Subcooling ‑ LESS THAN 18°F	
	RO	(Step 1.b RNO) IF PZR Level can NOT be maintained greater than 14% OR Subcooling can NOT be maintained greater than 18°F, THEN trip the Reactor and GO TO EOP‑E‑0, Reactor Trip or Safety Injection.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	• GO TO Step 2.	
	CRS	(Step 2) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.
	RO	(Step 3) CONTROL Charging Flow To Maintain Desired RCS Level.	**NOTE:** The “A” Charging Pump is running a maximum speed.
	RO	(Step 4) CHECK VCT Level ‑ LESS THAN 12.5 INCHES	
	RO	(Step 4 RNO) IF VCT level lowers to less than 12.5 inches, THEN OBSERVE the Note prior to Step 5 AND PERFORM Step 5.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	• GO TO Step 6.	
	RO	(Step 6) CHECK Charging Pump Status ‑ LESS THAN TWO RUNNING	**NOTE:** Only one Charging Pump is available.
	RO	(Step 7) CHECK Charging Pump Status ‑ NONE RUNNING	
	RO	(Step 7 RNO) IF an additional Charging Pump is available, THEN….	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	34	of	61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**								

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	• GO TO Step 11.	
	RO	(Step 11) PLACE Running Charging Pump Speed Controller(s) In MAN AND ADJUST Output To Maximum	
	RO	(Step 12) CHECK RCS Level - LOWERING IN AN UNCONTROLLED MANNER	
	RO	(Step 13) CHECK Any Letdown - IN SERVICE	
	RO	(Step 14) ENSURE All Letdown Flowpaths Isolated As Follows:	
		• LCV-460A & B, LTDN LINE STOP Valves - CLOSED	
		• HIC-142, PURIFICATION FLOW Controller - ADJUSTED TO 0%	
		• HIC-137, EXCESS LTDN FLOW Controller - ADJUSTED TO 0%	
		• CVC-387, EXCESS LTDN STOP - CLOSED	
	RO	(Step 15) CHECK RCS Level - LOWERING IN AN UNCONTROLLED MANNER	**NOTE:** By this time it is likely that Przr level is lowering uncontrollably.
	RO	(Step 16) CHECK RCS Pressure - GREATER THAN 1000 PSIG	
	RO/ CRS	(Step 17) TRIP The Reactor AND GO TO EOP-E-0, Reactor Trip or Safety Injection	

EOP-E-0, REACTOR TRIP OR SAFETY INJECTION

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	35 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	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** **NOTE:** Bus E-1 is NOT energized.
		• CHECK Bus E-1 OR E-2 - AT LEAST ONE ENERGIZED	
		• CHECK Bus E-1 AND E-2 - BOTH ENERGIZED	
	BOP	(Step 3) WHEN time permits, THEN TRY to restore power to deenergized AC Emergency Bus.	**Immediate Action**
	RO	(Step 4) CHECK SI Status:	**Immediate Action**
		CHECK if SI is actuated:	
		• SI annunciators - ANY ILLUMINATED	
		OR	
		• SI equipment - AUTO STARTED	

Op Test No.: N16-1	Scenario # 2	Event # 6, 7, 8 & 9	Page 36 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		CHECK BOTH trains of SI actuated:	
		• SI Pumps - TWO RUNNING	**NOTE:** The operator has to manually start the "C" SI Pump.
		• RHR Pumps - BOTH RUNNING	
	RO/ BOP	Foldout Page:	
		RCP TRIP CRITERIA	**NOTE:** The RCP Trip Criteria will apply in this event.
		FAULTED S/G AFW ISOLATION CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	
		DC BUS, INSTRUMENT BUS, OR MCC-5 FAILURE CRITERIA	**NOTE:** The Instrument Bus/MCC-5 Criteria will apply in this event requiring performance of Attachment 2, and will likely be performed prior to Attachment 1.
		SPENT FUEL POOL COOLING CRITERIA	
			Examiner NOTE: The CRS will likely assign the BOP to perform Attachment 2 with the AO, and then perform Attachment 1. If so, **BOP Examiner** follow actions of Attachment 2 and 1. **CRS/RO** follow **E-0** Actions, **Step 6**, on **Page 43**.
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION ATTACHMENT 2, DC BUS OR INSTRUMENT BUS FAILURE			
	BOP	(Step 1) IF DC Bus Failure Has Occurred, THEN…	**NOTE:** A DC Bus failure has NOT occurred.

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	37 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 2) IF MCC-5 Is NOT Energized, THEN PERFORM The Following:	**NOTE:** The CRS will dispatch an AO, and direct that the AO perform Step 2 of Attachment 2 of EOP-E-0. If so, **Booth Instructor** acknowledge as AO, and **report after 2 minutes** that this action is complete. **IRF EPSL005 f:SHDN_BUS** **IRF EPMSMCC5_187 f: RACK_IN**
		• ENSURE DS Bus is ENERGIZED	
		• TRANSFER power source to DS Bus using the posted instructions at the Kirk Key Interlocked Breakers	
		• Locally RESET AND LOAD Instrument Air Compressor A (MCC-5 CMPT 7M)	
	BOP	(Step 3) IF Instrument Bus Failure Has Occurred,…..	**NOTE:** The failure of Instrument Bus 1 will be resolved with the restoration of power to MCC-5 (Step 2).
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION			
	CRS	(Step 5) PERFORM Attachment 1, Auto Action Verification, While CONTINUING WITH This Procedure	
			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**			

Op Test No.: N16-1	Scenario # 2	Event # 6, 7, 8 & 9	Page 38 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1) CHECK ECCS Pumps Running:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	BOP	(Step 1 RNO) Manually START pump(s) as necessary.	**NOTE:** There is no power to the "A" SI Pump, and the "C" SI had to be started manually.

Critical Task:

Establish flow from at least one high-head SI pump before transition out of E-0

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.

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 2) CHECK ECCS Valves In Proper Emergency Alignment	
	BOP	(Step 3) CHECK CCW Pumps - AT LEAST ONE RUNNING	
	BOP	(Step 4) CHECK Containment Isolation Phase A:	
		• CHECK Containment Isolation Phase A - ACTUATED	

Op Test No.: N16-1 Scenario # 2 Event # 6, 7, 8 & 9	Page 39 of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK Containment Isolation Phase A Valves - CLOSED	**NOTE:** Some valves will not have power. The BOP may dispatch an AO. If so, **Booth Instructor** acknowledge as AO.
	BOP	(Step 4.b RNO) Manually CLOSE valve(s) as necessary.	**NOTE:** Some valves will NOT have power to CLOSE, however all CV penetrations will be isolated.
		• IF ANY Containment penetration can NOT be isolated, THEN...	
	BOP	• 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:	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	40 of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**						

Time	Pos.	Expected Actions/Behavior	Comments
		• S/G pressure - LESS THAN 614 PSIG	
		OR	
		• Tavg - LESS THAN 543°F	
	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	
	BOP	(Step 7.a RNO) Manually START pump(s) as necessary.	**NOTE:** The “C” and “D” SW Pumps will be running. The “A” and “B” SW Pumps do NOT have power.
	BOP	(Step 7.b) CHECK SW Booster Pumps - BOTH RUNNING	
	BOP	(Step 7.b RNO) Manually START pump(s) as necessary.	**NOTE:** The “B” SW Booster Pump will be running. The “A” SW Pump does NOT have power.
	BOP	(Step 7.c) 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	**NOTE:** BOTH EDGs are running however, the “A” EDG Output Breaker cannot be CLOSED.
	BOP	(Step 9) CHECK ECCS Flow:	

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Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK RCS pressure - LESS THAN 1650 PSIG [1725 PSIG]	
		• CHECK SI Pumps – FLOW INDICATED	
		• 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	**NOTE:** The "3" and "4" CV Recirc Fans will be running. The "1" and "2" SW Fans do NOT have power.
	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 12 RNO) DEPRESS H.V. OFF on R-11 OR R-12 to initiate Containment Ventilation Isolation.	
		• IF ANY Containment Ventilation Isolation valve does NOT close, THEN manually OR locally ISOLATE AFFECTED penetration outside Containment while CONTINUING WITH this procedure.	**NOTE:** The BOP may contact an AO to locally close valves. If so, **Booth Instructor** acknowledge as AO, and report after 5 minutes that all valves are CLOSED.

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Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 13) CHECK Control Room Ventilation Aligned For Pressurization Mode:	**NOTE:** If the AO has restored power to Instrument Bus 1 (Via restoration of MCC-5), each of these valves will be CLOSED.
		• 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:	**NOTE:** If the AO has restored power to MCC-5, each of these will be extinguished.
		• 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	

Op Test No.: N16-1	Scenario # 2	Event # 6, 7, 8 & 9	Page 43 of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 17) Locally RESET AND LOAD Instrument Air Compressor(s) As Necessary (38 KW each):	**NOTE:** The BOP may contact the Inside AO. **Booth Instructor:** as **AO**, acknowledge and report that the "B" IA Compressor is running, and the "A" IA Compressor is NOT running.
		• 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	
		(Step 6.a) Manually START pump(s).	**NOTE:** The "B" MDAFW Pump will be running. The "A" MDAFW Pump does NOT have power.

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Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

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	**NOTE:** The “A” and “C” valves are CLOSED, the “B” Valve is OPEN.
	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:	
		• CHECK Containment Pressure - HAS REMAINED LESS THAN 10 PSIG	**NOTE:** Containment pressure has remained < 10 psig.
	CRS	OBSERVE CAUTION prior to Step 10 AND GO TO Step 10.	
	RO	(Step 10) CHECK RCP Seal Cooling:	
		• CCW flow to RCP(s) Thermal Barriers - NORMAL	

Op Test No.: N16-1 Scenario # 2 Event # 6, 7, 8 & 9	Page 45 of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

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:** The LOCA may be causing a cooldown. If so, the RNO will be performed. Otherwise proceed to Step 12.
		• With ANY RCP running, RCS average temperature ‐ STABLE AT OR TRENDING TO 547°F	
		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.	

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Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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.	
		• 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:** Adverse Containment Numbers may be required.
		• STOP ALL RCPs	**NOTE:** Depending on the timing of mitigation actions, the RCP trip criteria may or may not be met. If the criteria is NOT met here, the leak degrades after entry into EOP-E-1.

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Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**		

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (Containment Isolation Phase B ‑ ACTUATED, OR 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.** 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.			
	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	
	CRS	(Step 16) PERFORM the following:	
		• CHECK If RCS Is Intact:	

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Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• 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.
Booth Instructor: The Cold Leg break will degrade IMF RCS01C r:2:00 f:3			
			NOTE: Shortly after entry into EOP-E-1, it is expected that an Orange path will occur on the **Containment CSFST**. When the CRS transitions to **FRP-J.1**, continue with the below actions.
FRP-J.1, RESPONSE TO HIGH CONTAINMENT PRESSURE			
	CRS	(Step 1) CHECK CV Spray Operation - CONTROLLED BY EOP-ECA-1.1, Loss Of Emergency Coolant Recirculation	
	CRS	(Step 1 RNO) GO TO Step 2.	
	RO	(Step 2.a) CHECK Containment Spray Status:	**NOTE:** The "A" CV Spray Pump has no power.
		• CHECK CV Spray pumps - BOTH RUNNING	
	RO	(Step 2.a RNO) PERFORM the following:	
		• ENSURE CV Spray Pump Inlet Valves are OPEN:	

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Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• SI-844A	
		• SI-844B	
		• Manually START CV Spray Pump(s).	**NOTE:** The "A" CV Spray Pump has no power.
	RO	(Step 2.b.1) CHECK CV Spray System - PROPER VALVE ALIGNMENT	
		• CHECK CV Spray Pump Discharge valves - OPEN	
		• SI-880A	**NOTE:** SI-880A and B have no power.
		• SI-880B	
		• SI-880C	**NOTE:** SI-880A and B have failed to Auto Open.
		• SI-880D	
	RO	(Step 2.b.1 RNO) Manually OPEN valve(s) as necessary.	
	RO	(Step 2.b.2) CHECK CV Spray Additive Tank Discharge Valves - OPEN	**NOTE:** SI-845A has no power and B has failed to Auto Open.
		• SI-845A	
		• SI-845B	
	RO	(Step 2.b.2 RNO) IF Spray Additive Tank level is GREATER THAN 0%, THEN manually OPEN valve(s) as necessary.	**NOTE:** The operator will manually open SI-845B.
	RO	(Step 2.b.3) CHECK Spray Additive Tank flow - APPROXIMATELY 12 GPM	

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Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2.b.3 RNO) IF Spray Additive Tank level is GREATER THAN 0%, THEN ADJUST SI-845C, SAT THROTTLING VALVE, as necessary.	**NOTE:** SI-845B will be adjusted such that flow is 12 gpm.

Critical Task:

Manually actuate at least one CV Spray Train before Transitioning to EOP-ES-1.2

Safety Significance: Failure to manually actuate the minimum required complement of containment cooling equipment under the postulated conditions demonstrates the inability of the crew to "recognize a failure or an incorrect automatic actuation of an ESF system or component. In this case, the minimum required complement of containment cooling equipment can be manually actuated from the control room. Therefore, failure to manually actuate the minimum required complement of containment cooling equipment also represents a failure by the operator to demonstrate the ability to effectively direct or manipulate engineered safety feature (ESF) controls that would prevent (degraded emergency core cooling system (ECCS) capacity). Additionally, under the postulated plant conditions, failure to manually actuate the minimum required complement of containment cooling equipment (when it is possible to do so) results in a failure to prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario.

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2.c) CHECK Containment Isolation Phase B Valves - CLOSED	**NOTE:** Some valves will NOT have power.
	RO	(Step 2.c RNO) Manually CLOSE valve(s) as necessary.	**NOTE:** The RO may dispatch an AO to locally check the position of the "A" Train valves. If so, **Booth Instructor** acknowledge as AO.
		• IF ANY Containment Isolation Phase B valve can NOT be closed, THEN locally ISOLATE AFFECTED penetration outside Containment while CONTINUING WITH this procedure.	
	RO	(Step 2.d) STOP ALL RCPs	

Op Test No.: N16-1	Scenario # 2	Event # 6, 7, 8 & 9	Page 51 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments

<u>Critical Task:</u>

Trip all RCPs within 6 minutes of meeting the EOP-E-0/E-1 RCP Trip Criteria (Containment Isolation Phase B - ACTUATED, OR 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.

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.

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) MONITOR Spray Additive Tank level - GREATER THAN 0%	
	BOP	(Step 4) CHECK MSIVs AND MSIV Bypass Valves - CLOSE	**NOTE:** depending on the timing of mitigation actions, the MSIVs may be open or closed. If the MSIVs are OPEN, the BOP will perform the Step 4 RNO.
	BOP	(Step 4 RNO) Manually CLOSE valve(s) as necessary.	
	RO	(Step 5) CHECK Containment Isolation Phase A Valves - CLOSED	**NOTE:** Some valves will NOT have power to CLOSE, however all CV penetrations will either be isolated, or in the process of being isolated from the performance of Attachment 1 of EOP-E-0.

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	52	of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**							

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5 RNO) IF valve(s) are NOT CLOSED AND associated flow path(s) are NOT necessary, THEN manually CLOSE AFFECTED valve(s).	
		• IF AFFECTED valve(s) can NOT be CLOSED, THEN locally ISOLATE affected penetration outside Containment while CONTINUING WITH this procedure.	
	BOP	(Step 6) CHECK CV Ventilation Isolation - VALVES CLOSED	**NOTE:** Some valves will NOT have power.
	BOP	(Step 6 RNO) DEPRESS H.V. OFF on R-11 OR R-12 to initiate Containment Ventilation Isolation.	
		• IF ANY Containment Ventilation Isolation Valve does NOT CLOSE, THEN manually OR locally ISOLATE AFFECTED penetration outside Containment while CONTINUING WITH this procedure.	**NOTE:** The BOP may dispatch an AO to locally check the position of the "A" Train valves. If so, **Booth Instructor** acknowledge as AO.
	RO	(Step 7) CHECK CV Recirculation Fans - ALL RUNNING	**NOTE:** The "A' Train HVH Fans do not have power.
	RO	(Step 7 RNO) Manually START fan(s) as necessary.	
	BOP	(Step 8) CHECK If Feed Flow Should Be Isolated To ANY S/G:	
		• CHECK pressures in ALL S/Gs:	
		• ANY S/G pressure lowering in an uncontrolled manner	
		OR	
		• ANY S/G completely depressurized	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	53	of	61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 8 RNO) GO TO Step 9.	
	CRS	(Step 9) PERFORM The Following:	
		• RESET SPDS	
		• RETURN TO Procedure AND Step In Effect	**Examiner NOTE:** The CRS will transition back to EOP-E-1 (Go to step that was in effect at the time that FRP-J.1 was entered).
EOP-E-1, LOSS OF REACTOR OR SECONDARY COOLANT			
			Examiner NOTE: Terminate the exam AT ANY TIME after Containment pressure has been lowered to less than 10 psig.
	RO/ BOP	FOLDOUT PAGE:	
		RCP TRIP CRITERIA	
		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 RCPs Should Be Stopped:	**NOTE:** The RCPs are OFF.
		CHECK RCPs - ANY RUNNING	
	CRS	(Step 1.a RNO) GO TO Step 2.	

Op Test No.: N16-1 Scenario # 2 Event # 6, 7, 8 & 9	Page 54 of 61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	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:** Adverse Containment Numbers will be required.
		CHECK S/G Narrow Range levels - GREATER THAN 9% [18%]	
		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:	
		• 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:	**NOTE:** The CRS may call Chemistry to address the samples. If so, **Booth Instructor** acknowledge as Chemistry.
		• REQUEST Chemistry periodically sample ALL S/Gs for activity.	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	55	of	61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• Secondary sample results - NORMAL (WHEN RESULTS AVAILABLE)	
	RO	(Step 7) CHECK PZR PORVs AND Block Valves:	**NOTE:** The “A” Train Block Valve does NOT have power.
		• 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	
	RO	(Step 10) CHECK If Charging Flow Has Been Established:	
		• CHECK Charging Pumps - AT LEAST ONE RUNNING	**NOTE:** The “A” Charging Pump is the only Charging Pump available.
		• ESTABLISH desired Charging flow:	
		• START additional Charging Pump(s) as necessary	
		• ADJUST the following as necessary to maintain proper Seal Injection AND desired Charging flow:	
		• Charging Pump Speed Controller(s)	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	56 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• 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:	
		• CHECK RCS Subcooling based on Core Exit T/Cs - GREATER THAN 18°F [37°F]	**NOTE:** Adverse Containment Numbers will be required.
	CRS	(Step 11 RNO) GO TO Step 12.	
	RO	(Step 12) CHECK If Containment Spray Should Be Stopped:	
		• CHECK CV Spray Pumps - ANY RUNNING	
		• CHECK Containment pressure - LESS THAN 4 PSIG	**NOTE:** CV pressure will likely be lowering, and may be below 4 psig. If so, move forward to Step 13.
	CRS	(Step 12.b) WHEN Containment pressure is LESS THAN 4 psig, THEN PERFORM Steps 12.e.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		• OBSERVE CAUTION prior to Step 13 AND CONTINUE WITH Step 13.	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	57 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
	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.
	CRS	(Step 13.a RNO) GO TO Step 15.	
	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	**NOTE:** Bus E-1 is de-energized. The CRS may stop here and address the possibility of restoring power to Bus E-1.
		• 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:	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	58	of	61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /“C” SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
		• 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	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	59 of 61

Event Description: **Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
		• 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:	
		• RHR Pumps	
		• SI Pumps	
		• CV Spray Pumps	
		• CV Fans	
		• AFW Pumps	
		• SW System	
		• CCW System	
		• IVSW System	
		• EDG Fuel and Auxiliaries	

Op Test No.:	N16-1	Scenario #	2	Event #	6, 7, 8 & 9	Page	60	of	61
Event Description:	**Cold Leg SBLOCA/480 VAC Bus E-1 De-energizes /"C" SI Pump fails to Auto Start/ CV Spray Valves SI-880C and D fail to OPEN Automatically**								

Time	Pos.	Expected Actions/Behavior	Comments
		• 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.
	RO	(Step 17.a RNO) IF RHR Pump flow is GREATER THAN 1500 gpm, THEN ...	
		• IF RHR Pump flow is LESS THAN 1500 gpm, THEN PERFORM the following:	
		• RESET SPDS.	
		• GO TO EOP-ES-1.2, Post LOCA Cooldown And Depressurization, Step 1.	
At the discretion of the Lead Examiner terminate the exam.			

NRC SCENARIO N16 1-2 TURNOVER SHEET

1. **INITIAL CONDITIONS**

a)	Time in Core Life:	BOL
b)	Reactor Power:	75%
c)	Turbine Load:	543 MWe
d)	Boron Concentration:	1476 ppm
e)	Rod Height:	172 CB ‘D’
f)	RCS Pressure:	2235 psig
g)	PZR Level:	44.2%
h)	Xenon:	Equilibrium

2. **TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT**

T.S. #	Description
None	

3. **CLEARANCES IN EFFECT**
   a) The “A” SI Pump is OOS. The “B” SI Pump has been aligned to 480 VAC ESF Bus E-1.
   b) The “C” Charging Pump is also OOS.
4. **CAUTION CAPS IN EFFECT**
   a) None
5. **PROTECTED EQUIPMENT**
   a) “B” SI Pump from E-1
6. **DEGRADED EQUIPMENT**
   a) LI-928, “C” SI Accumulator Level, is OOS (I&C Investigating).
   b) RTGB Annunciator APP-009-C3, “AIR SIDE SEAL OIL BU PMP OVLD,” has failed to the EXTINGUISHED (i.e. OFF) 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 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
10. **REACTIVITY INFORMATION**
    a) The Reactor Engineer (RE) will be available in the Control Room
    b) The RE recommends a 2100 gallon dilution, made in several 200-300 gallon batch dilutions
    c) The RE recommends that Control Bank D be approximately 200 steps upon achieving 100% power
11. **RISK**
    a) GREEN

ROBINSON Nuclear Training

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OPERATIONS TRAINING

N16-1-3

Initial Licensed Operator Training

Rev 111115

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

Developed By:	______________________ **Instructor/Developer**	**Date:**	__________
Concurred By:	______________________ **Line Superintendent/Supervisor/SRO**	**Date:**	__________
Approved By:	______________________ **Superintendent/Supervisor Training**	**Date:**	__________

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Training Class 15-1

TOPIC: NRC Simulator Exam

Scenario N16-1-3

REFERENCES:

1. Technical Specification LCO 3.7.4, “Auxiliary Feedwater (AFW) System” (Amendment 203)
2. AOP-024, “Loss of Instrument Bus” (Rev 41)
3. Technical Specification LCO 3.8.7, “AC Instrument Bus Sources – Operating” (Amendment 176)
4. Technical Specification LCO 3.8.9, “Distribution System - Operating” (Amendment 176)
5. AOP-010, “Main Feedwater/Condensate Malfunction” (Rev 33)
6. AOP-025, “RTGB Instrument Failure” (Rev 24)
7. OWP-026, “Feed Flow (FWF)” (Rev 14)
8. AOP-038, “Rapid Downpower” (Rev 3)
9. APP-001 “Miscellaneous NSSS” (Rev 60)
10. AOP-019, “Malfunction of RCS Pressure Control” (Rev 20)
11. Technical Specification LCO 3.3.4, “Remote Shutdown System” (Amendment 203)
12. Technical Specification LCO 3.4.1, “RCS Pressure, Temperature and Flow Departure From Nucleate Boiling (DNB) Limits” (Amendment 176)
13. Technical Specification LCO 3.4.11, “Pressurizer Power Operated Relief Valve (PORVs)” (Amendment 203)
14. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 6)
15. EOP-ES-0.1, “Reactor Trip Response” (Rev 7)
16. CSFST, “Critical Safety Function Status Trees” (Rev 7)
17. FRP-H.1, “Response to Loss of Secondary Heat Sink” (Rev 29)
18. OP-402, “Auxiliary Feedwater System” (Rev 96)

Validation Time: <u>72 minutes</u>

Facility:	**H B Robinson**	Scenario No.: **3**	Op Test No.: **N16-1**
Examiners:	______	Operators:	______ (SRO)
	______		______ (RO)
	______		______ (BOP)

Initial Conditions:	The plant is at 68% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The SDAFW Pump is OOS, and has been for 7 days. Technical Specification LCO 3.7.4 ACTION C has just been entered. Maintenance reports that this pump will be OPERABLE in 2 hours, and station management has directed that the initiation of the shutdown be delayed 2 hours. TI-471, PRT Temperature is OOS (I&C Investigating). RTGB Annunciator APP-008-C3, “EMERG OIL PMP OVLD,” has failed to the ILLUMINATED condition (I&C is investigating).

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-RO C-BOP C(TS)-SRO	Loss of Instrument Bus 3
2	2	I-BOP I-SRO	“B” Feed Flow Transmitter FT-487 Fails LOW
3	NA	R-RO N-BOP N-SRO	Load Decrease
4	3	C-RO C-SRO	Letdown Line Pressure Control Valve Controller fails CLOSED
5	4	I-RO I(TS)-SRO	PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE
6	5	M-RO M-BOP M-SRO	Inadvertent FWIS
7	6	C-BOP	Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate
8	7	NA	“A” & “B” MDAFW Pump Trip

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

H B Robinson 2016 NRC Scenario #3

The plant is at 68% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service: The SDAFW Pump is OOS, and has been for 7 days. Technical Specification LCO 3.7.4 ACTION C has just been entered. Maintenance reports that this pump will be OPERABLE in 2 hours, and station management has directed that the initiation of the shutdown be delayed 2 hours. TI-471, PRT Temperature is OOS (I&C Investigating). RTGB Annunciator APP-008-C3, “EMERG OIL PMP OVLD,” has failed to the ILLUMINATED condition (I&C is investigating).

Shortly after taking the watch, Instrument Bus 3 will de-energize. The operator will respond in accordance with AOP-024, “Loss of Instrument Bus,” and restore power to the Bus. The operator will address Technical Specification LCO 3.8.7, “AC Instrument Bus Sources – Operating,” and Technical Specification LCO 3.8.9, “Distribution Systems-Operating.”

Following this, the controlling feed flow channel for S/G “B”, FT-487, will fail LOW, causing FRV-498 to start to OPEN. The operator will respond in accordance with AOP-010, Main Feedwater/Condensate Malfunction,” and/or AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-026, “Feed Flow (FWF).”

Next, the WCCS will call and inform the operator that it has been determined that the SDAFW Pump will not be restored to OPERABLE status within the next two hours as expected, and that station management has directed that the plant be brought to Mode 3 within the next four hours using AOP-038, “Rapid Downpower.”

During the downpower, the Letdown Pressure Control Valve (PCV-145) controller will fail such that the valve will fail closed. The operator will respond in accordance with APP-001-D6, LP LTDN LN HI PRESS, and ultimately take manual control of the valve.

Shortly afterwards, PZR Pressure transmitter PT-444 will fail HIGH causing the Pzr Spray valves and Pzr PORV to OPEN. The operator will respond in accordance with AOP-019, “Malfunction of RCS pressure Control,” and/or AOP-025, “RTGB Instrument Failure.” RCS pressure control will remain in MANUAL for the remainder of the scenario. The operator will address Technical Specification LCO 3.3.4, “Remote Shutdown System,” Technical Specification LCO 3.4.1, “RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits,” and Technical Specification LCO 3.4.11, “Pressurizer Power Operated Relief Valves (PORVs).”

After the Pressure Transmitter has been removed from service, an inadvertent FWIS will occur. Simultaneously with the Rx Trip, the Turbine will fail to TRIP, the Governor Valves will fail to CLOSE manually, and the Main Steamline Isolation signal will fail to auto actuate. The operator will be required to manually CLOSE the MSIVs. Additionally the “A” and “B” MDAFW Pumps will trip immediately after auto start. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection.”

Upon completion of EOP-E-0, the operator will transition to EOP-ES-0.1, “Reactor Trip Response.” However, this transition will be delayed due to a RED condition on the Heat Sink CSF. The operator will perform FRP-H.1, “Response to Loss of Secondary Heat Sink.” The

operator will direct that AFW Pump “C” be placed in service in accordance with OP-402, “Auxiliary Feedwater System,” however, the AFW Pump “C” Diesel will fail to start.

The scenario will terminate at Step 7 RNO 2.b of FRP-H.1, after the operator has restored feedwater flow from the Main Feedwater System.

Critical Tasks:

Manually control “B” S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the “B” S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Manually close the OPEN Pzr Spray Valve(s) and PORV before the Reactor trips based on low pressurizer pressure.

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

Manually Close the MSIVs Before an ORANGE Path Challenge Develops to Either the Subcriticality or the Integrity CSF or Before Transition to ECA-2.1, Whichever Happens First (EOP-Based)

Safety Significance: Failure to trip the main turbine under the postulated plant conditions causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Additionally, such an omission constitutes a failure by the operator to “demonstrate the ability to take one or more actions that would prevent a challenge to plant safety. The situation described in the plant conditions is effectively a large steamline break downstream of the MSIVs. This “effective steamline break” is also located downstream of the main turbine stop valves, which cannot be closed by manually tripping the turbine. Failure to perform the critical task results in uncontrolled depressurization of all SGs and in uncontrolled cooldown of the RCS, both of which are unnecessary.

Establish Feedwater Flow Into at Least One S/G Before RCS Bleed and Feed is Required (EOP-Based)

Safety Significance: Failure to establish feedwater flow to any SG results in the operator’s having to rely upon the lower-priority action of establishing RCS bleed and feed to minimize core uncovery. This constitutes incorrect performance that fails to prevent degradation of any barrier to fission product release.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Reset to Temp IC 610**	

☐ **T = 0 Malfunctions:**

SDAFW Pump OOS:

- **irf EPSMCC5_189 f: RACK_OUT (V1-8A, A S/G supply to SDAFW)**
- **irf EPSMCC6_226 f: RACK_OUT (V1-8B, B S/G supply to SDAFW)**
- **irf EPSMCC6_227 f: RACK_OUT (V1-8C, C S/G supply to SDAFW)**
- **irf EPSMCC10_262 f: RACK_OUT (V2-14A, SDAFW discharge to A S/G)**
- **irf EPSMCC9_254 f: RACK_OUT (V2-14B, SDAFW discharge to B S/G)**
- **irf EPSMCC10_267 f: RACK_OUT (V2-14C, SDAFW discharge to C S/G)**

PLACE RED CAPS on the RTGB Control Switches for the Valves ABOVE

Place GREEN CAPS on the RTGB Control Switches BELOW (See OMM-048, Attachment 9):

- **A MDAFW RTGB Switch**
- **B MDAFW RTGB Switch**
- **AFW Valve V2-16A RTGB Switch**
- **AFW Valve V2-16B RTGB Switch**
- **AFW Valve V2-16C RTGB Switch**
- **AFW Valve V2-20A RTGB Switch**
- **AFW Valve V2-20B RTGB Switch**
- **Protected Switchyard**

TI-471 PRT Temperature indication OOS

- **IOR aoPRTAOD30A f:50**

Place WHITE DOT on TI-471

RTGB Annunciator APP-008-C3 failed on

- **IMF ANNXN08C03 f:ALARM_ON**

Place WHITE DOT on APP-008-C3

Insert the following:

- **IMF TUR02A (Turbine fails to AUTO Trip)**
- **IMF TUR02B (Turbine fails to AUTO Trip)**
- **IMF TUR02C (Turbine fails to AUTO Trip)**
- **$006_RTA_TRIP IOR diTUREHI029 f:AS-IS (Turbine Fails to Runback on Reactor Trip)**
- **IRF SGN023 f:NO_AUTO (Auto MSI Fails)**
- **IRF SGN024 f:NO_AUTO (Auto MSI Fails)**
- **IRF SGN025 f:NO_AUTO (Auto MSI Fails)**
- **$006_RTA_TRIP IMF CFW1A d:45 (A MDAFW Pump Trips after Auto Start)**
- **$006_RTA_TRIP IMF CFW1B d:45 (B MDAFW Pump Trips after Auto Start)**

Place the Simulator in RUN and ACKNOWLEDGE all alarms.

☐ **Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.**

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with 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	
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario N16-1-3.**	
☐	At direction of examiner	**Event 1** **IRF EPSIB3_600 f:OPEN**	Loss of Instrument Bus 3
☐	At direction of examiner	**Event 2** **ICO CFWXMTFT_487 r:00:30 f:0**	"B" Feed Flow Transmitter FT-487 Fails LOW
☐	At direction of examiner	**Event 3** **NA**	Load Decrease **NOTE: to initiate this event, the WCCS will call and inform the operator that "It has been determined that the SDAFW Pump will not be restored to OPERABLE status within the next two hours as expected, and that station management has directed that the plant be brought to Mode 3 within the next four hours using AOP-038, "Rapid Downpower."**
☐	At direction of examiner	**Event 4** **IMF CVC07 r:30 f:100** **IOR aoCVCAAD046A r:30 f:100** **$006_PCV-145_MAN** **DMF CVC07** **$_PCV-145_MAN DOR aoCVCAAD046A**	Letdown Line Pressure Control Valve Controller fails CLOSED

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 5** **ICO RPSXMTPT_444 r:01:00 f:2500** **IMF PRS03D f:10 when $006_PCV-455C_OPEN**	PZR Pressure transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE
☐	At direction of examiner	**Event 6** **IMF CFW20A c:20** **IMF CFW20B c:20** **IMF CFW20C c:20**	Inadvertent FWIS
☐	Post-Rx Trip	**Event 7**	Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate **NOTE: Failure is inserted at T=0**
☐	Post-Rx Trip	**Event 8**	A & B MDAFW Pump Trip **NOTE: Failure is inserted at T=0**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.: N16-1	Scenario # 3	Event # 1	Page 9 of 46
Event Description:	**Loss of Instrument Bus 3**		

Shortly after taking the watch, Instrument Bus 3 will de-energize. The operator will respond in accordance with AOP-024, "Loss of Instrument Bus," and restore power to the Bus. The operator will address Technical Specification LCO 3.8.7, "AC Instrument Bus Sources – Operating," and Technical Specification LCO 3.8.9, "Distribution Systems-Operating."

Booth Operator Instructions: **IRF EPSIB3_600 f:OPEN**

Indications Available:

- "C" Feed Regulating Valve Controller in MANUAL
- FR-498 Stem/Feed Flow Recorder for "C" S/G is de-energized
- Bistable Panel "A" is de-energized
- PT-445, Pzr Pressure has failed LOW

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-024, LOSS OF INSTRUMENT BUS	
	BOP	(Step 1) Place The Main Turbine in Manual	**Immediate Action**
	BOP	(Step 2) Verify S/G(s) Maintained At Program Level	**Immediate Action**
	RO	(Step 3) Place Rods in M (Manual)	**Immediate Action**
	RO	(Step 4) Maintain Reactor Power Less Than OR Equal To 100%	
	RO	(Step 5) Determine If RCS Makeup Needs To Be Stopped:	
		• Check Auto Makeup, Boration OR Dilution - IN PROGRESS	
		OR	
		• Check Instrument Bus 2 AND Instrument Bus 7 - DE-ENERGIZED	
	RO	(Step 5 RNO) IF Auto Makeup is received, THEN Check Auto Makeup, Boration	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	10 of 46
Event Description:	**Loss of Instrument Bus 3**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	• Go To Step 7	
	RO	(Step 7) Control PZR Heaters And Sprays To Restore RCS Pressure To The Desired Control Band	
	CRS	(Step 8) Make PA Announcement For Procedure Entry	**NOTE:** The CRS will most likely make this announcement.
	RO	(Step 9) Control Charging And Letdown Flow To Maintain PZR Level	
	RO	(Step 10) Check RCP Seal Injection Flow Between 8 GPM and 13 GPM	
	BOP	(Step 11) Determine Failed Instrument Bus (IB) From Any Of The Following:	
		• Available indications	
		OR	
		• Table Below	
		• 3, FR-498, "C" S/G Level	
	BOP	(Step 12) Check Emergency Busses E-1 AND E-2 - ENERGIZED FROM THE 4160V BUSSES	
	RO/ BOP	(Step 13) Check Affected Instrument Bus - ENERGIZED	
	CRS	(Step 13 RNO) WHEN affected Instrument Bus is Energized, THEN observe the NOTE prior to Step 14 and perform Step 14	**NOTE:** Step 14 will be performed when power to IB-3 is restored.
	CRS	• Go To Step 15.	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	11 of 46
Event Description:	**Loss of Instrument Bus 3**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 15) Check LCV-460A & B, LTDN LINE STOP - CLOSED	
	RO	(Step 16) Place The Selector Switch For LCV -460A & B In The Closed Position	
	RO	(Step 17) Verify only ONE Charging Pump running at minimum speed	
	RO	(Step 18) Check RCP Seal Injection Flow Between 8 GPM and 13 GPM	
	RO/ BOP	(Step 19) Check Affected Instrument Bus - ENERGIZED	
	RO/ BOP	(Step 19 RNO) Locally perform the applicable step below:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that **the IB-3 Feeder breaker has tripped, and that there is no apparent reason for the trip** (i.e. no acrid odor).
		• IB-1 through IB-4	
		• IF the cause is known OR NOT a fault OR suspected damage, THEN attempt to reset and close the open	**NOTE:** The CRS will direct the AO to attempt to re-close the IB-3 Feeder Breaker. **Booth Instructor** acknowledge as **AO,** use: **IRF EPSIB3_600 f:CLOSE** and report after **1 minute** that **the IB-3 is re-energized.**
	BOP	(Step 20) Stop All Radioactive Batch Releases	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	12 of	46
Event Description:		Loss of Instrument Bus 3						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 21) Check Status Of Local Actions:	
		• Check Local Actions Of Step 19 RNO - REQUIRED	
		• Check Local Actions Of Step 19 RNO - ATTEMPTED	
	RO/ BOP	(Step 22) Check Affected Instrument Bus - ENERGIZED	**NOTE:** IB-3 is energized.
	RO	(Step 23) Restore RCS Makeup Control To AUTO	
		• Place the RCS MAKEUP SYSTEM Switch in STOP	
		• Verify the RCS MAKEUP MODE Switch in AUTO	
		• Momentarily place the RCS MAKEUP SYSTEM Switch to START	
	RO	(Step 24) Restore Rod Control To Automatic As Follows:	
		• Check Power - GREATER THAN 15%	
		• Check Automatic Rod Control - AVAILABLE	
		• Place the Rod Control Selector Switch to A (Automatic)	
	BOP	(Step 25) Check Emergency Busses E-1 AND E-2 - ENERGIZED	
	BOP	(Step 26) Check Emergency Busses E-1 AND E-2 - ENERGIZED FROM THEIR 4160V BUSSES	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	13 of 46
Event Description:	**Loss of Instrument Bus 3**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 27) Implement The EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	RO/ BOP	(Step 28) Check Status Of Instrument Bus 4 - ENERGIZED:	
	BOP	(Step 29) Place Turbine Controls In Automatic	
	RO	(Step 30) Determine CCW Pump Status As Follows:	
		• Check CCW Pumps - MORE THAN ONE RUNNING	
		• Check CCW Pumps - MORE THAN ONE REQUIRED	
		• Stop CCW Pumps as necessary using OP-306 Section, Operating CCW Pumps, to obtain desired CCW pump status	
	BOP	(Step 31) Check RMS-1, RMS-2, RMS-3, AND RMS-4 - ALL OPEN	
	BOP	(Step 32) Check Affected Instrument Bus - ENERGIZED	
	RO	(Step 33) Check PZR Heater Status - DEENERGIZED	
	RO	(Step 34) Reset PZR Heaters As Follows:	
		• Place PZR HTR CONTROL GROUP Control Switch to OFF position AND return to ON position	

Op Test No.:	N16-1	Scenario #	3	Event #	1
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Event Description:	**Loss of Instrument Bus 3**				

Time	Pos.	Expected Actions/Behavior	Comments
		• Place PZR HTR BACK-UP GROUP A Control Switch to OFF position AND return to AUTO OR ON position as desired	
		• Place PZR HTR BACK-UP GROUP B Control Switch to OFF position AND return to AUTO OR ON position as desired	
	RO	(Step 35) Check Normal Letdown - ISOLATED	
	CRS	(Step 35 RNO) Go To Step 37.	
	BOP	(Step 37) Check All Radiation Monitor Alarms - EXTINGUISHED	
	BOP	(Step 37 RNO) Reset Radiation Monitor alarms that are illuminated due to loss of Instrument Bus as follows:	
		• For RMS 11-12, 15-18, OR 20-31, momentarily depress ALARM/RESET Pushbutton.	
		• For RMS 1-9 OR 33, momentarily depress the RESET Pushbutton.	
		• For RMS 14 OR 19, contact E&C personnel to reset the monitor(s).	**NOTE:** The CRS may call WCC/Chemistry to address resetting R-14s. If so, **Booth Instructor** acknowledge as WCC/Chemistry and use: IRF RMS067 f:RESET IRF RMS068 f:RESET IRF RMS069 f:RESET And report that the R-14 monitors have been reset.
		• For RMS-32, momentarily depress SAFE/RESET Pushbutton.	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	15 of 46
Event Description:	**Loss of Instrument Bus 3**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 38) Check R-11 OR R-12 - IN SERVICE	
		• RMS-1, RMS-2, RMS-3, and RMS-4 - OPEN	
		AND	
		• R-11 and R-12 Vacuum Pump Operating	
	BOP	(Step 39) Check R-20, Fuel Handling Bldg Lower Level Low Range - IN SERVICE	
	BOP	(Step 40) Check R-21, Fuel Handling Bldg Upper Level - IN SERVICE	
	BOP	(Step 41) Check Control Room Ventilation - ALIGNED FOR PRESSURIZATION MODE	
	CRS	(Step 41 RNO) Go To Step 43.	
	RO	(Step 43) Check PZR PRV Safety Acoustic Monitor Lights - ILLUMINATED	
	CRS	(Step 43 RNO) Go To Step 45.	
	RO/ BOP	(Step 45) Check Instrument Busses 1, 2, 3, AND 4 - ENERGIZED FROM THEIR NORMAL SOURCE (As Indicated Below):	
		• IB-1: MCC-5 (Via E-1)	
		• IB-2: INVERTER A	
		• IB-3: INVERTER B	
		• IB-4: MCC-6	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	16 of 46
Event Description:	**Loss of Instrument Bus 3**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 46) Check Status of EDGs - START SIGNAL RECEIVED	
	CRS	(Step 46 RNO) Observe the NOTE prior to Step 65 and Go To Step 65.	
	BOP	(Step 65) Check ALL Safety Related Electrical Buses - ENERGIZED	
	CRS	(Step 66) Check Technical Specifications For Applicable LCOs	**NOTE:** The CRS will address the Technical Specifications.
		• ITS LCO 3.8.1, AC Sources - Operating	
		• ITS LCO 3.8.7, AC Instrument Bus Sources - Operating	
		• ITS LCO 3.8.9, Distribution Systems - Operating	
	RO	(Step 67) Check Annunciator APP-005-A3, PR DROP ROD - ILLUMINATED	
	RO	(Step 68) Reset Dropped Rod Alarm By Performing The Following:	
		• Place DROPPED ROD MODE switch for the affected Power Range Drawer to RESET Position	
		• Place DROPPED ROD MODE switch for the affected Power Range Drawer to NORMAL Position	
		• Check Annunciator APP-005-A3, PR DROP ROD - EXTINGUISHED	
	RO	(Step 69) Check APP-006-F5, STEAM DUMP ARMED - ILLUMINATED	
	CRS	(Step 69 RNO) Go To Step 71	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	17 of 46
Event Description:	**Loss of Instrument Bus 3**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 71) Check APP-005-F5, AMSAC TROUB/BYPD - ILLUMINATED	
	BOP	(Step 72) Reset AMSAC TROUB/BYPD Alarm By Depressing The SYSTEM RESET Pushbutton On AMSAC Front Panel.	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as WCC/Chemistry and use: IRF RPS005 f:RESET And report that AMSAC have been reset.
		(Step 73) Return To Procedure And Step In Effect	
TECHNICAL SPECIFICATION 3.8.7, AC INSTRUMENT BUS SOURCES - OPERATING			
	CRS	LCO 3.8.7 The following AC Instrument Bus Power Sources shall be OPERABLE: • Inverters A and B, and • Constant Voltage Transformers (CVT) 1 and 2.	
	CRS	APPLICABILITY: MODES 1, 2, 3, and 4.	
	CRS	ACTIONS	

Op Test No.:	N16-1	Scenario #	3	Event #	1	Page	18 of 46
Event Description:		Loss of Instrument Bus 3					

<table>
<tr><th>Time</th><th>Pos.</th><th colspan="3">Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that ACTION A.1 is required (When Inverter is NOT powering IB-3).</td></tr>
<tr><td>A. One AC Instrument Bus power source inoperable.</td><td>NOTE: Enter applicable Conditions and Required Actions of LCO 3.8.9, "Distribution Systems - Operating" with any instrument bus de-energized.

A.1 Restore AC Instrument Bus Power Source to OPERABLE status.</td><td>24 hours</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td colspan="6">TECHNICAL SPECIFICATION 3.8.9, DISTRIBUTION SYSTEMS - OPERATING</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">LCO 3.8.9 Train A and Train B AC, DC, and AC instrument bus electrical power distribution subsystems shall be OPERABLE.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">APPLICABILITY: MODES 1, 2, 3, and 4.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that ACTION B.1 is required (When IB-3 is de-energized).</td></tr>
<tr><td>B. One AC instrument bus subsystem inoperable.</td><td>B.1 Restore AC instrument bus subsystem to OPERABLE status.</td><td>2 hours
AND
16 hour from discovery of failure to meet LCO</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td colspan="6">At the discretion of the Lead Examiner move to Event #2.</td></tr>
</table>

Op Test No.:	N16-1	Scenario #	3	Event #	2	Page	19 of 46
Event Description:	**"B" Feed Flow Transmitter FT-487 Fails LOW**						

Following this, the controlling feed flow channel for S/G "B", FT-487, will fail LOW, causing FRV-498 to start to OPEN. The operator will respond in accordance with AOP-010, Main Feedwater/Condensate Malfunction," and/or AOP-025, "RTGB Instrument Failure." The operator will remove the failed instrument from service in accordance with OWP-026, "Feed Flow (FWF)."

Booth Operator Instructions: **ICO CFWXMTFT_487 r:00:30 f:0**

Indications Available:

- RTGB Annunciator APP-006-B1, S/G B FW > STM FLOW
- RTGB Annunciator APP-006-B2, S/G B STM > FW FLOW
- "B" S/G Feed flow lower than Steam flow on FR-488
- FRV-488 controller output at 100%
- FRV-488 Red status light is LIT, Green status light is OFF

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the CRS will place the Turbine in HOLD.
			Examiner Note: It is possible that the CRS will respond to the symptoms and enter AOP-010 first. However, the crew may recognize the failure and respond by entering AOP-025 first. If so, proceed to AOP-025 section below.
AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION			
			NOTE: The BOP will take Immediate Actions to control FCV-488 in MANUAL prior to procedure implementation.
	BOP	(Step 1) CHECK FRVs - OPERATING PROPERLY (MANUAL OR AUTO):	**Immediate Action** **NOTE:** The BOP will control FCV-488 in MANUAL.
		• FCV-478	
		• FCV-488	
		• FCV-498	

Op Test No.:	N16-1	Scenario #	3	Event #	2	Page	20 of 46
Event Description:	**"B" Feed Flow Transmitter FT-487 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1 RNO) PERFORM the following:	**Immediate Action**
		• ENSURE FRV for affected S/G(s) in manual control.	
		• ATTEMPT to stabilize S/G level using FRV and/or FRV Bypass Valves by matching steam flow with feed flow.	
		• STOP any load change in progress.	
		• If unable to control S/G level, THEN…..	

<u>Critical Task:</u>

Manually control "B" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "B" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 2) CHECK Reactor Trip Setpoint - BEING APPROACHED	
	CRS	(Step 2 RNO) IF a reactor trip setpoint is approached, THEN….	
		GO TO Step 4.	
	RO	(Step 4) CHECK Reactor Power - LESS THAN OR EQUAL TO 100%	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.

Op Test No.:	N16-1	Scenario #	3	Event #	2	Page	21 of	46
Event Description:	**“B” Feed Flow Transmitter FT-487 Fails LOW**							

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 6) GO TO Appropriate Step From Table Below:	
		FRV Failure To Control - OBSERVE NOTE 58	
	BOP	(Step 58) CHECK S/G Level - AT OR TRENDING TO PROGRAM	**NOTE:** The CRS will likely transition to AOP-025 based on the Note prior to Step 58.
AOP-025, RTGB INSTRUMENT FAILURE			
			NOTE: The BOP will take Immediate Actions to control FCV-488 in MANUAL prior to procedure implementation.
	CRS	(Step 1) GO TO Appropriate Section For Failed Instrument:	**NOTE:** The CRS will select Section D of AOP-025.
		• S/G Feed Flow (FT-487) - SECTION D	
		(Step 2) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
		(Step 3) RETURN TO Procedure and Step in Effect	
AOP-025, RTGB INSTRUMENT FAILURE SECTION D, S/G FEED FLOW, STEAM FLOW OR STEAM PRESSURE TRANSMITTER FAILURE			
	BOP	(Step 1) CHECK Affected FRV In MAN:	**Immediate Action** **NOTE:** The BOP will control FCV-488 in MANUAL.
		• FCV-488 (FRV "B")	

Op Test No.:	N16-1	Scenario #	3	Event #	2	Page	22	of	46
Event Description:	**"B" Feed Flow Transmitter FT-487 Fails LOW**								

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1 RNO) PLACE affected FRV in manual.	**Immediate Action**
	BOP	(Step 2) RESTORE Affected S/G Level To Program	**Immediate Action**

<u>Critical Task:</u>

Manually control "B" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "B" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3) CHECK Reactor Trip Setpoint - BEING APPROACHED	
	CRS	(Step 3 RNO) IF a reactor trip setpoint is approached, THEN TRIP the reactor, Reactor Trip or Safety Injection.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		GO TO Step 5.	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using PA System	**NOTE:** The CRS will most likely make this announcement.
	BOP	(Step 6) CHECK Failure - FEED FLOW INSTRUMENT FAILURE	
	CRS	(Step 7) PLACE Affected S/G Feed Flow Selector Switch to the Alternate Channel:	
		• S/G "B" FEED FLOW – FR-488	

Op Test No.:	N16-1	Scenario #	3	Event #	2	Page	23 of 46
Event Description:	**"B" Feed Flow Transmitter FT-487 Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Failed Channel FT-487 – Position CH486	
	BOP	(Step 8) RESTORE Affected Controller to Automatic:	
		• CHECK S/G level – WITHING ±1% OF PROGRAMMED LEVEL	**NOTE:** The BOP may not have S/G level at programmed, and perform the RNO (Placing affected controller in AUTO when at programmed level).
		• PLACE affected controller in AUTO.	
	BOP	(Step 9) REMOVE Affected Transmitter from Servicing Using OWP-026:	**NOTE:** The CRS will address OWP-026.
		• CHANNEL FT-487 – OWP FWF-4	
OWP-026, FEEDWATER FLOW (FWF) FWF-4, STEAM GENERATOR "B" FEEDWATER FLOW TRANSMITTER FT-487			
	CRS	Address FWF-4	
	BOP	FR-488 FEEDWATER FLOW SELECTOR SWITCH – Selected to 486	
	BOP	DELETE INPUT FT-487 FROM CALO PROCESSING. (FWF0424A)	
			NOTE: The CRS will return to AOP-025, Section D.
AOP-025, RTGB INSTRUMENT FAILURE SECTION D, S/G FEED FLOW, STEAM FLOW OR STEAM PRESSURE TRANSMITTER FAILURE			
	BOP	(Step 10) REVIEW TS LCOs for applicability:	
		• TS LCO 3.3.1	
		• TS LCO 3.3.2	

Op Test No.: N16-1 Scenario # 3 Event # 2	Page 24 of 46
Event Description:	**"B" Feed Flow Transmitter FT-487 Fails LOW**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 11) GO TO Procedure Main Body, Step 2	
			NOTE: The CRS will return to the main body of AOP-025.
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 2) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 3) RETURN TO Procedure And Step In Effect	**NOTE:** The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.:	N16-1	Scenario #	3	Event #	3	Page	25 of 46
Event Description:	**Load Decrease**						

Next, the WCCS will call and inform the operator that it has been determined that the SDAFW Pump will not be restored to OPERABLE status within the next two hours as expected, and that station management has directed that the plant be brought to Mode 3 within the next four hours using AOP-038, "Rapid Downpower."	
Booth Operator Instructions:	**Call as the WCCS and state "It has been determined that the SDAFW Pump will not be restored to OPERABLE status within the next two hours as expected, and station management has directed that the plant be brought to Mode 3 within the next four hours using AOP-038, "Rapid Downpower.""**
Indications Available:	**NA**

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-038, RAPID DOWNPOWER	
	BOP	(Step 1) NOTIFY Plant Personnel Of Procedure Entry Using The Plant Page System	
	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	
		• Target Power Level ___	
		• Target Rod Height ___	**NOTE:** The RO will determine 130 Steps.
		• Corrected Boration ___	**NOTE:** The RO will determine 350 gallons.
	RO	(Step 3) CHECK Required Power Reduction Rate - LESS THAN OR EQUAL TO 5%/MINUTE	
	CRS	(Step 4) PERFORM Brief Of Control Room Personnel To Include The Following:	

Op Test No.:	N16-1	Scenario #	3	Event #	3	Page	26 of 46
Event Description:		**Load Decrease**					

Time	Pos.	Expected Actions/Behavior	Comments
		• Reason for downpower	
		• Target Power Level	
		• Target Rod Height	
		• Rate of load reduction	
		• Amount of boric acid addition	
	RO	(Step 5) ENERGIZE All Available PZR Heaters	
		• PZR HTR CONTROL GROUP	
		• PZR HTR BACK-UP GROUP A	
		• PZR HTR BACK-UP GROUP B	
	RO	(Step 6) CHECK Rod Control - IN AUTO	
	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 27**.
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.	

Op Test No.: N16-1 Scenario # 3 Event # 3	Page 27 of 46
Event Description:	**Load Decrease**

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	
		• CHECK EH Turbine Control - IN OPER AUTO	
		• PREPARE For Turbine Load Reduction As Follows:	
		• CHECK IMP IN - ILLUMINATED	

Op Test No.:	N16-1	Scenario #	3	Event #	3	Page	28 of 46
Event Description:	**Load Decrease**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 8.b.1 RNO 1) IF Turbine Load reduction is available using IMP IN, THEN PERFORM the following:	
		• DEPRESS IMP IN pushbutton	
		• CHECK IMP IN light illuminated	
		• CHECK IMP OUT light extinguished	
	BOP	(Step 8.b) SET desired load in the SETTER	
		• SELECT the desired Load Rate	
		• 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:	
		• ADJUST Load Rate	
		OR	
		• DEPRESS GO and HOLD pushbuttons	
	CRS/ BOP	(Step 10) INITIATE Notification of The Following:	**NOTE:** The CRS may ask SM/WCC/Communicator to address. If so, **Floor Instructor** acknowledge.
		• 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	

Op Test No.:	N16-1	Scenario #	3	Event #	3
Page	29 of 46				
Event Description:	**Load Decrease**				

Time	Pos.	Expected Actions/Behavior	Comments
		• NRC within 4 hours	
	BOP	(Step 11) CHECK Auxiliary Boilers - AT LEAST ONE OPERATING	
	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	
	RO	(Step 13) CHECK Axial Flux Distribution - WITHIN TARGET BAND	
	BOP	(Step 14) CHECK APP-006-F5, STEAM DUMP ARMED - EXTINGUISHED	
	RO	(Step 15) CHECK Any Of The Following Conditions - MET:	
		• 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	

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

Op Test No.:	N16-1	Scenario #	3	Event #	4	Page	30 of 46
Event Description:	**Letdown Line Pressure Control Valve Controller fails CLOSED**						

During the downpower, the Letdown Pressure Control Valve (PCV-145) controller will fail such that the valve will fail closed. The operator will respond in accordance with APP-001-D6, LP LTDN LN HI PRESS, and ultimately take manual control of the valve.

Booth Operator Instructions:

IMF CVC07 r:30 f:100
IOR aoCVCAAD046A r:30 f:100
$006_PCV-145_MAN DMF CVC07
$_PCV-145_MAN DOR aoCVCAAD046A

Indications Available:

- RTGB Annunciator APP-001-E6, LP LTDN LN HI PRESS
- PCV-145 CLOSES
- Normal Letdown flow indicates “0”

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the CRS will place the Turbine in HOLD.
		APP-001-D6, LP LTDN LN HI PRESS	
	RO	(Step 1) IF controller PC-145 has malfunctioned, THEN TAKE manual control of PC-145.	**NOTE:** The RO will take Manual control of PC-145 and control letdown pressure manually.
	RO	(Step 2) IF PT-145 has failed, THEN ……	**NOTE:** PT-145 has NOT failed.
	RO	(Step 3) IF PCV-145 failed, THEN …….	**NOTE:** PCV-145 has NOT failed.
	RO	(Step 4) IF Letdown is required AND PCV-145 failed, THEN …….	**NOTE:** PCV-145 has NOT failed.
	RO	(Step 5) IF too many orifices are in service, THEN …….	
			NOTE: The CRS will likely conduct an Alignment Brief.
		At the discretion of the Lead Examiner move to Event #5.	

Op Test No.:	N16-1	Scenario #	3	Event #	5	Page	31 of	46

Event Description: **PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**

Shortly afterwards, PZR Pressure transmitter PT-444 will fail HIGH causing the Pzr Spray valves and Pzr PORV to OPEN. The operator will respond in accordance with AOP-019, "Malfunction of RCS pressure Control," and/or AOP-025, "RTGB Instrument Failure." RCS pressure control will remain in MANUAL for the remainder of the scenario. The operator will address Technical Specification LCO 3.3.4, "Remote Shutdown System," Technical Specification LCO 3.4.1, "RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits," and Technical Specification LCO 3.4.11, "Pressurizer Power Operated Relief Valves (PORVs)."

Booth Operator Instructions:

ICO RPSXMTPT_444 r:01:00 f:2500

IMF PRS03D f:10 when $006_PCV-455C_OPEN

Indications Available:

- RTGB Annunciator APP-003-C7, PZR PRESS CONTROLLER HI OUTPUT
- Narrow Range Pressurizer Pressure rising on PR-444
- Master Pressure controller PC-444J demand rising to 100%
- Both Pressurizer Spray valves indicate fully OPEN
- Pressurizer PORV PCV-455C Red status light is LIT

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the CRS will place the Turbine in HOLD.
			Examiner Note: It is possible that the CRS will respond to the symptoms and enter **AOP-019** first. However, the crew may recognize the failure and respond by entering **AOP-025** first. If so, proceed to **AOP-025**, **Step 1**, actions on **Page 33.**
			NOTE: The RO will likely take action, including closing the PORV Block before the CRS enters the procedure.
AOP-019, MALFUNCTION OF RCS PRESSURE CONTROL			

Op Test No.: N16-1	Scenario # 3	Event # 5	Page 32 of 46
Event Description:	**PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**		

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 1) CHECK Both LTOPP Arming Switches Selected to NORMAL	**Immediate Action**
	RO	(Step 2) Determine If PZR PORVs should be closed:	**Immediate Action**
		• Check PZR pressure – LESS THAN 2335 PSIG	
		• ENSURE both PZR PORVs - CLOSED	
	RO	(Step2b RNO) IF any PZR PORV can NOT be closed THEN close its PORV BLOCK Valve.	**Immediate Action** **NOTE:** PCV-455C will OPEN in about 1 minute.
	RO	(Step 3) Control the Normal PZR Spray Valves AND PZR Heaters to Restore RCS Pressure to the desired control Band.	**Immediate Action**
	CRS	(Step 4) Make PA Announcement for Procedure Entry	**NOTE:** The CRS will most likely make this announcement.
	RO	(Step 5) Check PZR Pressure – UNDER OPERATOR CONTROL	

Critical Task:

Manually close the OPEN Pzr Spray Valve(s) and PORV before the Reactor trips based on low pressurizer pressure.

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

Op Test No.:	N16-1	Scenario #	3	Event #	5	Page	33 of 46

Event Description: **PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) Check Pressurizer Pressure Transmitter PT-444 OR PT-445 – FAILED.	
	CRS	(Step 7) Go To AOP-025, RTGB Instrument Failure	**NOTE:** The CRS will transition to AOP-025.
			Examiner Note: If the CRS addresses AOP-025 rather than AOP-019, follow actions here.
		AOP-025, RTGB INSTRUMENT FAILURE	
	CRS	(Step 1) GO TO Appropriate Section For Failed Instrument:	
		• PZR PRESSURE (PT-444) – Section C	**NOTE:** The CRS will transition to Section C of AOP-025.
		AOP-025, RTGB INSTRUMENT FAILURE **SECTION C, PZR PRESSURE TRANSMITTER FAILURE**	
	RO	(Step 1) CHECK Both LTOPP Arming Switches – SELECTED TO NORMAL	**Immediate Action**
	RO	(Step 2) DETERMINE If PZR PORVs should be closed:	**Immediate Action**
		• CHECK PZR pressure – LESS THAN 2335 PSIG	
		• CHECK both PZR PORVs CLOSED	
	RO	(Step 2b RNO) IF any PZR PORV can NOT be closed, THEN CLOSE associated PORV BLOCK valve.	**Immediate Action** **NOTE:** The RO will have previously determined that PCV-455C has failed to CLOSE, and Close the Block Valve.

Op Test No.:	N16-1	Scenario #	3	Event #	5	Page	34 of 46
Event Description:	**PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) CONTROL PZR Heaters and Spray to restore RCS Pressure to desired Control Band	**Immediate Action**
	CRS	(Step 4) NOTIFY Plant Personnel of Procedure Entry Using PA System	**NOTE:** The CRS will most likely make this announcement.
	RO	(Step 5) CHECK PT-445 - FAILED	
	RO	(Step 5 RNO) PERFORM the following:	
		• ENSURE PC-444J in MAN.	
		• ENSURE PZR SPRAY VALVEs are in AUTO.	
		• CONTROL PZR pressure with PC-444J.	

Critical Task:

Manually close the OPEN Pzr Spray Valve(s) and PORV before the Reactor trips based on low pressurizer pressure.

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

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 6) CHECK Selector Switch PM-444 – SELECTED TO THE OPERABLE CHANNEL	
		• REC 445	
	RO	(Step 6 RNO) SELECT operable channel	

Op Test No.: N16-1	Scenario # 3	Event # 5	Page 35 of 46

Event Description: **PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 7) REVIEW TS LCOs for applicability:	**NOTE:** The CRS may call WCC/I&C to address the instrument failure. If so, **Booth Instructor** acknowledge as WCC/I&C.
		• TS LCO 3.3.4	
		• TS LCO 3.4.1	
		• TS LCO 3.4.11	
	CRS	(Step 8) GO TO Procedure Main Body, Step 2	**NOTE:** The CRS will return to the main body of AOP-025.
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 2) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 3) RETURN TO Procedure and Step in Effect	
			NOTE: The CRS will address Technical Specifications.
TECHNICAL SPECIFICATION 3.3.4, REMOTE SHUTDOWN SYSTEM			
	CRS	LCO 3.3.4 The Remote Shutdown System Function shall be OPERABLE.	
	CRS	APPLICABILITY: MODES 1, 2, and 3.	**NOTE:** The CRS will determine that only one Pressurizer Pressure instrument is required, and that the other channel is OPERABLE.

Op Test No.: N16-1 Scenario # 3 Event # 5 Page 36 of 46

Event Description: **PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**

<table>
<tr><th>Time</th><th>Pos.</th><th>Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td colspan="4">TECHNICAL SPECIFICATION 3.4.1, RCS PRESSURE, TEMPERATURE AND FLOW DEPARTURE FROM NUCLEATE BOILING (DNB) LIMITS</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>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 ≥2205 psig</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>APPLICABILITY: Mode 1</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td><table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>A. One or more RCS DNB parameters not within limits.</td><td>A.1 Restore RCS DNB parameter(s) to within limit.</td><td>2 hours</td></tr></table></td><td>NOTE: If RCS pressure lowered to less than 2205 psig, the CRS will determine that ACTION A.1 is required.</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">TECHNICAL SPECIFICATION 3.4.11, PRESSURIZER POWER OPERATED RELIEF VALVES (PORVS)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>LCO 3.4.11 Each PORV and associated block valve shall be OPERABLE</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>APPLICABILITY: MODES 1, 2 and 3.</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

Op Test No.:	N16-1	Scenario #	3	Event #	5	Page	37 of 46

Event Description: **PZR Pressure Transmitter PT-444 Fails HIGH/PCV-455C fails to fully CLOSE**

<table>
<tr><th>Time</th><th>Pos.</th><th colspan="3">Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that ACTION B.1, B.2 and B.3 is required.</td></tr>
<tr><td>B. One PORV inoperable and not capable of being manually cycled.</td><td>B.1 Close associated block valve.

AND

B.2 Remove power from associated bock valves.

AND

B.3 Restore PORV to OPERABLE status.</td><td>1 hour

1 hour

72 hours</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td>NOTE: The CRS will likely conduct an Alignment Brief.</td></tr>
<tr><td colspan="6">At the discretion of the Lead Examiner, move to Events #6-8.</td></tr>
</table>

Op Test No.:	N16-1	Scenario #	3	Event #	6, 7 & 8	Page	38 of 46
Event Description:	**Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**						

After the Pressure Transmitter has been removed from service, an inadvertent FWIS will occur. Simultaneously with the Rx Trip, the Turbine will fail to TRIP, the Governor Valves will fail to CLOSE manually, and the Main Steamline Isolation signal will fail to auto actuate. The operator will be required to manually CLOSE the MSIVs. Additionally the “A” and “B” MDAFW Pumps will trip immediately after auto start. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection.” Upon completion of EOP-E-0, the operator will transition to EOP-ES-0.1, “Reactor Trip Response.” However, this transition will be delayed due to a RED condition on the Heat Sink CSF. The operator will perform FRP-H.1, “Response to Loss of Secondary Heat Sink.” The operator will direct that AFW Pump “C” be placed in service in accordance with OP-402, “Auxiliary Feedwater System,” however, the AFW Pump “C” Diesel will fail to start. The scenario will terminate at Step 7 RNO 2.b of FRP-H.1, after the operator has restored feedwater flow from the Main Feedwater System.

Booth Operator Instructions:

IMF CFW20A c:20
IMF CFW20B c:20
IMF CFW20C c:20

Indications Available:

- All Feed Regulating Valves have CLOSED
- The “A” and “B” Main Feedwater Pumps have tripped
- The AFW Pumps have started

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	
	BOP	(Step 2a RNO) Manually TRIP Turbine.	**Immediate Action**

Op Test No.: N16-1 Scenario # 3 Event # 6, 7 & 8 Page 39 of 46

Event Description: **Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**

Time	Pos.	Expected Actions/Behavior	Comments
		• IF Turbine will NOT trip, THEN manually RUNBACK Turbine at maximum rate UNTIL ALL Governor valves are CLOSED.	
		• IF Turbine can NOT be runback, THEN manually CLOSE MSIVs AND MSIV Bypass Valves.	
	BOP	(Step 2.b) All MSR Purge AND Shutoff Valves - CLOSED	

Critical Task:

Manually Close the MSIVs Before an ORANGE Path Challenge Develops to Either the Subcriticality or the Integrity CSF or Before Transition to ECA-2.1, Whichever Happens First

Safety Significance: Failure to trip the main turbine under the postulated plant conditions causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Additionally, such an omission constitutes a failure by the operator to "demonstrate the ability to take one or more actions that would prevent a challenge to plant safety. The situation described in the plant conditions is effectively a large steamline break downstream of the MSIVs. This "effective steamline break" is also located downstream of the main turbine stop valves, which cannot be closed by manually tripping the turbine. Failure to perform the critical task results in uncontrolled depressurization of all SGs and in uncontrolled cooldown of the RCS, both of which are unnecessary.

	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:	

Op Test No.:	N16-1	Scenario #	3	Event #	6, 7 & 8	Page	40 of 46
Event Description:	**Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• SI annunciator – ANY ILLUMINATED	
		OR	
		• SI equipment – AUTO STARTED	
		(Step 4a RNO) CHECK if SI is required:	**Immediate Action**
		• PZR pressure LESS THAN 1715 PSIG	
		OR	
		• Containment pressure GREATER THAN 4 PSIG	
		OR	
		• Steam Line ∆P bistables ILLUMINATED	
		OR	
		• High Steam Flow with Low Tavg OR Low Steam Pressure bistables ILLUMINATED	
		• IF SI is required, THEN manually ACUTATE BOTH Trains of SI.	
		• IF SI is NOT required, THEN PERFORM the following:	
		• RESET SPDS AND INITIATE monitoring of Critical Safety Function Status Trees.	
		• GO TO EOP-ES-0.1, Reactor Trip Response, Step 1.	**NOTE:** The CRS will transition to FRP-H.1 due to the Red Path on Heat Sink.
FRP-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK			
	RO/ BOP	(Step 1) CHECK If Secondary Heat Sink is required:	
		• CHECK RCS pressure – GREATER THAN ANY NON-FAULTED S/G PRESSURE	
		• CHECK RCS Hot Leg temperatures – GREATER THAN 350°F	

Op Test No.:	N16-1	Scenario #	3	Event #	6, 7 & 8	Page	41	of	46

Event Description: **Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 2) CHECK If RCS Bleed AND Feed is required:	
		• CHECK S/G Wide Range level in ANY TWO S/Gs –LESS THAN 13% [16%]	
	CRS	(Step 2a RNO) OBSERVE CAUTION prior to Step 3 AND GO TO Step 3.	
	BOP	(Step 3) TRY to establish AFW Flow to at least one S/G:	
		• CHECK S/G(s) Blowdown AND Blowdown Sample Valves - CLOSED	
		• CHECK Control Room indications for cause of AFW failure:	
		• CST level	
		• Steam Driven AFW pump, Steam Shutoff valves	
		• Motor Driven AFW pump	
		• AFW valve alignment	
	BOP	(Step 3.c) TRY to restore AFW flow:	
		• CHECK CST level – AVAILABLE AND GREATER THAN 13%	
		• CHECK Steam Driven AFW Pump - RUNNING	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as AO. The SDAFW Pump will **NOT** be restored. Provide cues as required.
	BOP	(Step 3.c.2 RNO) Manually OPEN Steam Driven AFW Pump Steam Shutoff valve(s):	
		• V1-8A	
		• V1-8B	

Op Test No.: N16-1	Scenario # 3	Event # 6, 7 & 8	Page 42 of 46
Event Description:	**Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**		

Time	Pos.	Expected Actions/Behavior	Comments
		• V1-8C	
		If Steam Driven AFW Pump Steam Shutoff valves can NOT be opened manually, THEN locally OPEN valves while CONTINUING WITH this procedure.	
	BOP	(Step 3.c.3) CHECK Motor Driven AFW Pump(s) - RUNNING	
	BOP	(Step 3.c.3 RNO) IF power is available, THEN PERFORM the following:	
		• RESET SI.	
		• IF SI will NOT RESET, THEN…	**NOTE:** SI will RESET.
		• PLACE available Motor Driven AFW Pump control switch(es) to STOP.	
		• START available Motor Driven AFW Pump(s).	
		• IF available Motor Driven AFW Pump(s) is NOT running, THEN DISPATCH Operator to perform Attachment 2, Local Start of Motor Driven AFW Pump.	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as AO. The MDAFW Pump will **NOT** be restored. Provide cues as required.
		• IF pump(s) NOT available, THEN TRY to restore Motor Driven AFW Pump(s) while CONTINUING WITH this procedure.	
	BOP	(Step 3.c.4) CHECK AFW Valves – 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	

Op Test No.:	N16-1	Scenario #	3	Event #	6, 7 & 8	Page	43	of 46
Event Description:	**Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**							

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3.c.5) CHECK total feed flow to S/Gs – GREATER THAN 300 GPM	
	CRS	(Step 3.c.5 RNO) GO TO Step 3.c.7	
	CRS/ BOP	(Step 3.c.7) PLACE AFW Train C in service using OP-402, Auxiliary Feedwater System, Section titled Rapid Alignment of AFW Pump C as Directed by FRP-H.1	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as AO. Wait **5 minutes** and report that the **Train C AFW Diesel Generator** will **NOT** start.
	BOP	(Step 3.d) CHECK total feed flow to S/Gs – GREATER THAN 300 GPM	
	BOP	(Step 3.d RNO) IF ANY feed flow to at least one S/G is verified, THEN….	
	CRS	IF feed flow is NOT verified, THEN GO TO Step 4.	
	RO	(Step 4) STOP ALL RCPs	
	RO	(Step 5) ESTABLISH Instrument Air to CV:	
		• CHECK APP-002-F7, INSTR AIR HDR LO PRESS alarm - EXTINGUISHED	
		• RESET IA PCV-1716, INSTRUMENT AIR ISO TO CV	
		• CHECK IA PCV-1716 - OPEN	
	RO	(Step 5 RNO) PLACE IA PCV-1716 in OVERRIDE.	

Op Test No.: N16-1	Scenario # 3	Event # 6, 7 & 8	Page 44 of 46
Event Description:	**Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6) TRY to establish Main Feedwater Flow to at least one S/G:	
		• CHECK Condensate System – IN SERVICE	
		• CHECK Feed Reg Bypass Valves - OPEN	
		• FCV-479	
		• FCV-489	
		• FCV-499	
	BOP	(Step 6.b RNO) PERFORM the following:	
		• RESET Feedwater Isolation:	
		• RESET SI.	
		• IF SI will NOT RESET, THEN…	
		• PLACE ALL Feedwater Isolation Key Switches to OVRD/RESET.	
		• OPEN Feed Reg Bypass Valves:	
		• FCV-479	
		• FCV-489	
		• FCV-499	
	BOP	IF Feed Reg Bypass valves can NOT be OPENED, THEN…	
		(Step 6.c) ESTABLISH Main Feedwater flow:	
		• CHECK FW HDR SECTION valves - CLOSED	
		• V2-6A	
		• V2-6B	
		• V2-6C	
	BOP	(Step 6.c.1 RNO) Manually CLOSE valve(s) as necessary.	

Op Test No.:	N16-1	Scenario #	3	Event #	6, 7 & 8	Page	45 of 46
Event Description:	**Inadvertent FWIS/ Turbine fails to Trip/GV Valves fail to Runback/MSI fails to AUTO Actuate/ A & B MDAFW Pump Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		(Step 6.c.2) START one Main Feedwater Pump	
		• CHECK Feedwater Flow – ESTABLISHED TO AT LEAST ONE S/G	
	BOP	(Step 7) CHECK S/G Levels:	
		• CHECK S/G Narrow Range level in at least one S/G – GREATER THAN 9% [18%]	
	BOP	(Step 7.a RNO) IF feed flow to at least on S/G is established, THEN PERFORM the following:	
		• MAINTAIN feed flow to restore S/G Narrow Range level to GREATER THAN 9% [18%].	
		• PERFORM the following:	
		• RESET SPDS.	
		• RETURN TO procedure AND step in effect.	
Critical Task: **Establish Feedwater Flow Into at Least One S/G Before RCS Bleed and Feed is Required** Safety Significance: Failure to establish feedwater flow to any SG results in the operator's having to rely upon the lower-priority action of establishing RCS bleed and feed to minimize core uncovery. This constitutes incorrect performance that fails to prevent degradation of any barrier to fission product release.			
At the discretion of the Lead Examiner terminate the exam.			

NRC SCENARIO N16-1-3 TURNOVER SHEET

1. **INITIAL CONDITIONS**

a)	Time in Core Life:	EOL
b)	Reactor Power:	68% for the past 13 hours
c)	Turbine Load:	502 MWe
d)	Boron Concentration:	144 ppm
e)	Rod Height:	135 CB 'D'
f)	RCS Pressure:	2235 psig
g)	PZR Level:	41.8%
h)	Xenon:	Peak

2. **TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT**

T.S. #	Description
LCO 3.7.4	Condition C

3. **CLEARANCES IN EFFECT**
   a) The SDAFW Pump is OOS. Maintenance reports that this pump will be OPERABLE in 2 hours, and station management has directed that the initiation of the shutdown be delayed 2 hours.
4. **CAUTION CAPS IN EFFECT**
   a) None
5. **PROTECTED EQUIPMENT**
   a) "A" & "B" MDAFW pump
6. **DEGRADED EQUIPMENT**
   a) TI-471, PRT Temperature is OOS (I&C Investigating).
   b) RTGB Annunciator APP-008-C3, "EMERG OIL PMP OVLD," has failed to the ILLUMINATED condition (I&C is investigating).
7. **SWITCHYARD ACCESS**
   a) PROTECTED
8. **PLANNED EVOLUTIONS**
   a) Maintain Steady-State conditions
   b) Monitor the completion of Maintenance of the SDAFW Pump
9. **TURNOVER INFORMATION**
   a) The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
10. **REACTIVITY INFORMATION**
    a) IAW OST-947 data
11. **RISK**
    a) GREEN

ROBINSON Nuclear Training

Committed to Excellence

OPERATIONS TRAINING

N16-1-4

Initial Licensed Operator Training

Rev 111815

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

Developed By:	______________________ **Instructor/Developer**	**Date:**	__________
Concurred By:	______________________ **Line Superintendent/Supervisor/SRO**	**Date:**	__________
Approved By:	______________________ **Superintendent/Supervisor Training**	**Date:**	__________

PROGRAM: Robinson Operations Training

MODULE: Initial License Operator Training Class 15-1

TOPIC: NRC Simulator Exam

Scenario N16-1-4

REFERENCES:

1. OP-105, "Maneuvering the Plant When Greater than 25% Power" (Rev 62)
2. OP-301, "Chemical and Volume Control System (CVCS)" (Rev 112)
3. APP-001, "Miscellaneous NSSS" (Rev 60)
4. AOP-025, "RTGB Instrument Failure" (Rev 24)
5. OWP-025, "Steam Generator Pressure (SGP)" (Rev 15)
6. Technical Specification LCO 3.3.2, "Engineered Safety Feature Actuation System (ESFAS) Instrumentation" (Amendment 176)
7. Technical Specification LCO 3.3.3, "Post Accident Monitoring (PAM) Instrumentation" (Amendment 203)
8. Technical Specification LCO 3.3.6, "Containment Ventilation Isolation Instrumentation" (Amendment 176)
9. OWP-011, "Nuclear Instrumentation (NI)" (Rev 24)
10. Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation" (Amendment 176)
11. AOP-007, "Turbine Trip Below P-8" (Rev 16)
12. EOP-E-0, "Reactor Trip or Safety Injection" (Rev 6)
13. CSFST, "Critical Safety Function Status Trees" (Rev 7)
14. FRP-S.1, "Response to Nuclear Power generation- ATWS" (Rev 22)
15. EOP-E-2, "Faulted Steam Generator Isolation" (Rev 3)

Validation Time: 84 minutes

Facility:	**H B Robinson**	Scenario No.:	**4**	Op Test No.:	**N16-1**
Examiners:	______	Operators:		______	(SRO)
	______			______	(RO)
	______			______	(BOP)

Initial Conditions:	The plant is at 25% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "A" SI Pump is OOS. The "B" SI Pump has been aligned to 480 VAC ESF Bus E-1. PI-1616, SW North Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-C3, "FW PMP A LO FLOW TRIP," has failed to the EXTINGUISHED condition (I&C is investigating). The crew will be directed to raise power to 100%.

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N-SRO	Raise Power
2	1	C-RO C-SRO	Letdown Temperature Controller TCV-144 fails CLOSED/Divert Valve TCV-143 Fails to DIVERT
3	2	I-BOP I(TS)-SRO	Main Steam Line "C" Pressure Transmitter Fails LOW
4	3	N-BOP I(TS)-SRO	Power Range NI-44 Upper Detector fails HIGH
5	4	C-RO C-BOP C-SRO	Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO
6	5/6	M-RO M-BOP M-SRO	ATWS/"B" SG SLB Inside CV
7	7	C-BOP	MOV-350 fails to OPEN

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

H B Robinson 2016 NRC Scenario #4

The plant is at 25% power (BOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service: The “A” SI Pump is OOS. The “B” SI Pump has been aligned to 480 VAC ESF Bus E-1. PI-1616, SW North Header Pressure, is OOS (I&C Investigating). RTGB Annunciator APP-007-C3, “FW PMP A LO FLOW TRIP,” 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, “Chemical and Volume Control System (CVCS).”

During the power increase Letdown Temperature Controller, TCV-144, will fail CLOSED causing letdown temperature to rise above 135°F. Simultaneously, Divert Valve TCV-143, will fail to divert letdown flow to the VCT. The operator will respond in accordance with APP-001-A6, “LTDN FLOW HI TEMP DEMIN BYPD,” divert letdown flow to the VCT, take MANUAL control of TCV-144 to stabilize letdown temperature, and return letdown to the VCT.

Following this, Main Steam Line “C” Pressure Transmitter, PT-495, will fail LOW. The operator will respond in accordance with AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-025, “Steam Generator Pressure (SGP).” The operator will address Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” Technical Specification LCO 3.3.3, “Post Accident Monitoring (PAM) Instrumentation,” and Technical Specification LCO 3.3.6, “Containment Ventilation Isolation Instrumentation.”

Next, Power Range, NI-44, Upper Detector will fail HIGH. The operator will remove the failed instrument from service in accordance with OWP-011, “Nuclear Instrumentation (NI).” The operator will address Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation.”

Shortly afterwards, an oil leak will develop on the Main Turbine. The operator will respond in accordance with various APP-008, SW, CW & TURB GEN AUX, alarms, and ultimately enter AOP-007, “Turbine Trip Below P-8.” When the Main Turbine Trips one Turbine Stop Valve and one Turbine Governor Valve will remain OPEN, and the operator will need to manually TRIP the Turbine. The Control Rods will fail to operate in AUTO and the operator will need to insert rods in MANUAL.

Subsequently, the “B” Steam Line will rupture inside Containment (over 10 minutes). Simultaneously, the Reactor will fail to TRIP both automatically and manually (ATWS). The operator will enter EOP-E-0, “Reactor Trip or Safety Injection,” and attempt to manually trip the reactor. When this fails, the operator will enter FRP-S.1, “Response to Nuclear Power Generation- ATWS.” While in FRP-S.1, Boric Acid to Charging Pump Suction Valve MOV-350 will fail CLOSED. The operator will direct a local trip of the reactor, drive rods in manually, and align the suction of the Charging Pumps to the RWST.

Upon completion of FRP-S.1, the operator will return to EOP-E-0. Ultimately, the operator will transition to EOP-E-2, "Faulted Steam Generator Isolation," to isolate the flow into and out of the B Steam Generator and then terminate Safety Injection.

The scenario will terminate at Step 16.b of EOP-E-2, when the operator prepares to restore normal letdown.

<u>Critical Tasks:</u>

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Insert Negative Reactivity into the Core by Inserting Control Rods Manually Prior to Locally Tripping the Reactor (EOP-Based)

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.

Isolate Feedwater Flow Into and Steam Flow From the Faulted S/G Before a Transition Out of E-2 Occurs (EOP-Based)

Safety Significance: Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Also, depending upon the plant conditions, it could constitute a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Failure to isolate a faulted SG can result in challenges to the Integrity, Subcriticality and Containment CSFs.

SIMULATOR OPERATOR INSTRUCTIONS

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Sim. Setup	**Reset to Temp IC 611**	
☐	**T = 0 Malfunctions:** **"A" SI Pump Pump OOS:** • **IRF EPS480E1_130 f: RACK_OUT ("A" SI Pump OOS)** • **IRF EPS480E1_124 f: RACK_IN ("B" SI Pump Racked IN to E-1)** **PLACE CAPs as follows:** • **RED Cap over "A" SI Control Switch** • **GREEN Cap over "C" SI Pump Control Switch** **PI-1616 SW North Header Pressure indication OOS** • **IOR aoSWSDOD024A f:0** **Place WHITE DOT on PI-1616** **RTGB Annunciator APP-007-C3 failed OFF** • **IMF ANNXN07C03 f:ALARM_OFF** **Place WHITE DOT on APP-007-C3** **Insert the following:** • **$006_MANUAL_TURB_TRIP DMF TUR05B (Stop Valve closes on Manual Turb Trip)** • **$006_MANUAL_TURB_TRIP DMF TUR05C (Gov Valve closes on Manual Turb Trip)** • **$006_TURBINE_TRIP IMF CRF02 (Rods Fail in AUTO on Turbine Trip)** • **IMF ANNXN05E02 f:ALARM_OFF (Rods Fail in AUTO on Turbine Trip)** • **$006_RODS_IN_MAN DMF CRF02 (Rods Fail in AUTO on Turbine Trip)** • **$006_RODS_IN_MAN IOR diRPSBOI063 c:1 f:DE_PRSSD (Rods Fail in AUTO on Turbine Trip)** • **IMF RPS01A f:FAILURE_TO_OPEN, BOTH (ATWS on SLB)** • **IMF RPS01B f:FAILURE_TO_OPEN, BOTH (ATWS on SLB)** • **IOR diCVCAOI731 f:AS-IS (MOV-350 fails to OPEN)** **Place the Simulator in RUN and ACKNOWLEDGE all alarms.**		
☐	**Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.**		

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with the following: • Copy of OP-105 marked up for power increase • 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	
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario N16-1-4.**	
☐	At direction of examiner	**Event 1**	Raise Power
☐	At direction of examiner	**Event 2** **IMF CCW08 r:01:00 f:85** **IOR diCVCAAI047 f:DEMIN** **$006_TC-144_MAN** **DMF CCW08**	Letdown Temperature Controller TCV-144 fails CLOSED/Divert Valve TCV-143 Fails to DIVERT **Note: The Booth Instructor will need to DOR diCVCAAI047 when the operator places TCV-143 Control Switch to VCT.**
☐	At direction of examiner	**Event 3** **ICO SGNXMTPT_495 r:01:15 f:0**	Main Steam Line "C" Pressure Transmitter Fails LOW
☐	At direction of examiner	**Event 4** **IMF NIS07G f:70**	Power Range NI-44 Upper Detector fails HIGH
☐	At direction of examiner	**Event 5** **IMF TUR14** **r:01:00 f:100** **IMF TUR05B f:100** **IMF TUR05C f:AS-IS**	Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 6** **IMF MSS01B** **r:10:00 f:9.95E6**	ATWS/"B" SG SLB Inside CV **NOTE: The ATWS is inserted at T=0**
☐	Post-Rx Trip	**Event 7** **IOR diCVCAOI731 f:AS-IS**	MOV-350 fails to OPEN **NOTE: Failure is inserted at T=0**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N16-1	Scenario #	4	Event #	1	Page	9	of 51
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, "Chemical and Volume Control System (CVCS).""
Booth Operator Instructions: **NA**
Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	RO	(Step 5) Maintain Tave within 5°F of Tref using a combination of Control Rods and Boron Concentration changes.	**NOTE:** The RO will likely place Control Rods in MANUAL.
OP-301, CHEMICAL AND VOLUME CONTROL SYSTEM (CVCS) **SECTION 8.2.7, RCS QUICK DILUTION CHECKLIST**			
	RO	(Step 1) This revision has been verified to be the latest revision available.	
	RO	(Step 2) DETERMINE the amount of water to add to the RCS and if applicable, the expected change in RCS temperature AND Reactor Power.	**NOTE:** The RO will determine that several 200-300 gallon batches of water must be added.
	RO	(Step 3) OBTAIN an independent check of the volume of water required.	
	RO	(Step 4) OBTAIN permission from the CRS OR the SM to add the amount of water previously determined, including the expected change in RCS temperature AND Reactor Power.	

Op Test No.:	N16-1	Scenario #	4	Event #	1	Page	10 of 51
Event Description:	**Raise Power**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5) IF flow adjustment is desired, THEN adjust FCV-114A, PRIMARY WTR FLOW DILUTE MODE, potentiometer to obtain desired flow rate.	
	RO	(Step 6) PLACE the RCS MAKEUP MODE selector switch in the DILUTE position.	
	RO	(Step 7) SET YIC-114, PRIMARY WTR TOTALIZER to the desired quantity.	
	RO	(Step 8) IF two letdown orifices are in service and it is desired to divert flow to the HUT, THEN…	**NOTE:** Two orifices will be in service.
	RO	(Step 9) Momentarily PLACE the RCS MAKEUP SYSTEM switch to the START position.	
	RO	(Step 10) IF LCV-115A is in AUTO, THEN ENSURE proper operation of LCV-115A, VCT/HLDP TK DIV valve.	
	RO	(Step 11) IF any of the following conditions occur, THEN momentarily PLACE the RCS MAKEUP SYSTEM switch in the STOP position:	
		• Unanticipated Rod Motion	
		• Primary Water addition exceeds the desired value	
	RO	(Step 12) WHEN the desired amount of Primary Water has been added to the RCS, THEN ENSURE the following:	
		• FCV-114A, PW TO BLENDER, closes.	
		• FCV-114B, BLENDED MU TO VCT, closes.	

Op Test No.:	N16-1	Scenario #	4	Event #	1	Page	11 of 51
Event Description:	Raise Power						

Time	Pos.	Expected Actions/Behavior	Comments
		• IF in Auto, THEN the operating Primary Water Pump stops.	
		• The RCS MAKEUP SYSTEM is OFF.	
		• IF desired, THEN ENSURE LCV-115A, VCT/HLDP TK DIV valve control switch in AUTO.	
	RO	(Step 13) RETURN the RCS Makeup System to automatic as follows:	
		• ENSURE FCV-114A, PRIMARY WTR FLOW DILUTE MODE is in AUTO.	
		• PLACE the RCS MAKEUP MODE switch in the AUTO position.	
		• Momentarily PLACE the RCS MAKEUP SYSTEM switch in the START position.	
	RO	(Step 14) RECORD, in AUTO LOG, as indicated by PRIMARY WATER TOTALIZER, YIC-114 total amount of Primary Water added during the dilution.	
	RO	(Step 15) MONITOR parameters for the expected change in reactivity AND inform the CRS OR the SM the results of the dilution.	
OP-105, MANEUVERING THE PLANT WHEN GREATER THAN 25% POWER			
	BOP	(Step 6) IF EH Turbine Control is in OPER AUTO, THEN raise turbine load as follows:	
		• Adjust the SETTER indication using the REF ▼ or REF ▲ pushbuttons to the desired load.	
		• Use the GO, HOLD, REF ▼, and REF ▲ pushbuttons as necessary to continue the rise in load.	

Op Test No.:	N16-1	Scenario #	4	Event #	1	Page 12 of 51
Event Description:	**Raise Power**					

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 7) IF EH Turbine Control is in TURB MANUAL, THEN…..	**NOTE:** The Turbine is in OPER AUTO.
	CRS	(Step 8) IF Heater Drain Tank suspended solids are greater than 25 ppb, THEN…..	**NOTE:** From Turnover it is noted that HDT Suspended Solids are < 25 ppb.
	CRS	(Step 9) WHEN Heater Drain Tank suspended solids are less than or equal to 25 ppb, THEN perform the following while continuing with this procedure:	
	BOP	• Start a Heater Drain Pump.	**NOTE:** The BOP will start one HDP.
		• Ensure Quenching Valve control switches on QUENCHING VALVES CONTROL PANEL are placed in AUTO:	**NOTE:** The CRS/BOP may contact an AO. If so, **Booth Instructor** acknowledge as **AO**, use **IRF CFW102 f:AUTO** and report after **1 minute** that the **BOTH valves are in AUTO**.
		• FCV-1597	
		• FCV-1596	
		• Locally check Quenching Valves are CLOSED:	**NOTE:** The CRS/BOP may contact an AO. If so, **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that the **BOTH valves are CLOSED**.
		• FCV-1597	
		• FCV-1596	
		• Check proper operation of the following:	**NOTE:** The CRS/BOP may contact an AO. If so, **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that the **ALL valves are operating properly**.
		• LC-1530	
		• LCV-1530A	

Op Test No.:	N16-1	Scenario #	4	Event #	1	Page	13 of	51
Event Description:	**Raise Power**							

Time	Pos.	Expected Actions/Behavior	Comments
		• LCV-1530B	
After the 1st Dilution and MWe raised by 15-20 MWe, and at the discretion of the Lead Examiner move to Event #2.			

Op Test No.:	N16-1	Scenario #	4	Event #	2	Page	14 of 51
Event Description:	**Letdown Temperature Controller TCV-144 fails CLOSED/Divert Valve TCV-143 Fails to DIVERT**						

During the power increase Letdown Temperature Controller, TCV-144, will fail CLOSED causing letdown temperature to rise above 135°F. Simultaneously, Divert Valve TCV-143, will fail to divert letdown flow to the VCT. The operator will respond in accordance with APP-001-A6, "LTDN FLOW HI TEMP DEMIN BYPD," divert letdown flow to the VCT, take MANUAL control of TCV-144 to stabilize letdown temperature, and return letdown to the VCT.

Booth Operator Instructions:

IMF CCW08 r:01:00 f:85
IOR diCVCAAI047 f:DEMIN
$006_TC-144_MAN DMF CCW08

NOTE: The malfunction takes 2-3 minutes to fully develop

NOTE: The Booth Instructor will need to DOR diCVCAAI047 when the operator places TCV-143 Control Switch to VCT.

Indications Available:

- RTGB Annunciator APP-001-A6, LTDN FLOW HI TEMP DEMIN BYPD
- TCV-144 Controller demand is rising
- NRHX Outlet Temperature (TI-144) is rising
- TCV-143 Red status light is LIT with Control Switch in AUTO

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the BOP will go to HOLD on the Turbine.
		APP-001-A6, LTDN FLOW HI TEMP DEMIN BYPD	
	RO	(Step 1) IF Letdown Temperature is greater than 135°F, THEN ENSURE controller TC-143 is diverted to the VCT.	**NOTE:** The RO will divert TCV-143 to the VCT. **Booth Instructor** use **DOR diCVCAAI047 WHEN** the operator **places TCV-143 Control Switch to VCT.**
	RO	(Step 2) IF CCW flow to the Non-regenerative Heat Exchanger is low, THEN RAISE Component Cooling Water flow using TC-144.	**NOTE:** The RO will manually adjust controller to maintain temperature at 105-110°F on TI-143.

Op Test No.: N16-1	Scenario # 4	Event # 2	Page 15 of 51

Event Description: **Letdown Temperature Controller TCV-144 fails CLOSED/Divert Valve TCV-143 Fails to DIVERT**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 3) IF letdown flow is high, THEN REDUCE Letdown flow.	**NOTE:** It is likely that control of control of TCV-144 will stabilize the event, and Letdown will NOT need to be reduced.
			NOTE: The CRS may call WCC/Chemistry to request a Demin effluent sample prior to placing TCV-143 back to the DEMIN position. If so, **Booth Instructor** acknowledge as **WCC/CHEMISTRY**, wait **20 minutes** and report that the **Demin effluent is acceptable to be placed in operation**.
			NOTE: The CRS may call WCC/I&C to address the Controller failure. If so, **Booth Instructor** acknowledge as WCC/I&C.
			NOTE: The CRS will likely conduct an Alignment Brief, and THEN re-commence the up-power.
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.:	N16-1	Scenario #	4	Event #	3	Page	16 of 51
Event Description:	**Main Steam Line “C” Pressure Transmitter Fails LOW**						

Following this, Main Steam Line “C” Pressure Transmitter, PT-495, will fail LOW. The operator will respond in accordance with AOP-025, “RTGB Instrument Failure.” The operator will remove the failed instrument from service in accordance with OWP-025, “Steam Generator Pressure (SGP).” The operator will address Technical Specification LCO 3.3.2, “Engineered Safety Feature Actuation System (ESFAS) Instrumentation,” Technical Specification LCO 3.3.3, “Post Accident Monitoring (PAM) Instrumentation,” and Technical Specification LCO 3.3.6, “Containment Ventilation Isolation Instrumentation.”

Booth Operator Instructions: **ICO SGNXMTPT_495 r:01:15 f:0**

Indications Available:

- RTGB Annunciator APP-006-A4, STM LINE HI ΔP
- Main Steam Pressure indicator PI-945 is lowering
- “C” FRV controller output is lowering
- Feed Flow to “C” S/G is lowering
- Steam Flow to “C” S/G is lowering
- “C” S/G Narrow Range Level is lowering

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the BOP will go to HOLD on the Turbine.
		AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION	
			Examiner NOTE: The CRS go to AOP-025 directly. If so, go to **AOP-025** Step 1 actions on **Page 18**.
	BOP	(Step 1) CHECK FRVs - OPERATING PROPERLY (MANUAL OR AUTO):	**Immediate Action** **NOTE:** FCV-498 in NOT operating properly in AUTO.
		• FCV-478	
		• FCV-488	
		• FCV-498	
	BOP	(Step 1 RNO) PERFORM the following:	**Immediate Action** **NOTE:** The BOP will control FCV-498 in MANUAL.
		• ENSURE FRV for affected S/G(s) in manual control.	

Op Test No.: N16-1	Scenario # 4	Event # 3	Page 17 of 51
Event Description:	Main Steam Line "C" Pressure Transmitter Fails LOW		

Time	Pos.	Expected Actions/Behavior	Comments
		• ATTEMPT to stabilize S/G level using FRV and/or FRV Bypass Valves by matching steam flow with feed flow.	
		• STOP any load change in progress.	
		• If unable to control S/G level, THEN……	

Critical Task:

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 2) CHECK Reactor Trip Setpoint - BEING APPROACHED	
	CRS	(Step 2 RNO) IF a reactor trip setpoint is approached, THEN….	
		GO TO Step 4.	
	RO	(Step 4) CHECK Reactor Power - LESS THAN OR EQUAL TO 100%	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 6) GO TO Appropriate Step From Table Below:	
		• FRV Failure To Control - OBSERVE NOTE 58	

Op Test No.: N16-1	Scenario # 4	Event # 3	Page 18 of 51
Event Description:	Main Steam Line "C" Pressure Transmitter Fails LOW		

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 58) CHECK S/G Level - AT OR TRENDING TO PROGRAM	**NOTE:** The CRS go to AOP-025 based on the Note prior to Step 58.
AOP-025, RTGB INSTRUMENT FAILURE			
	CRS	(Step 1) GO TO Appropriate Section For Failed Instrument:	**NOTE:** The CRS will select Section D of AOP-025.
		• S/G STEAM PRESSURE, (PT-495) - SECTION D	
AOP-025, RTGB INSTRUMENT FAILURE SECTION D, S/G FEED FLOW, STEAM FLOW OR STEAM PRESSURE TRANSMITTER FAILURE			
	BOP	(Step 1) CHECK affected FRV in MAN:	**Immediate Action** **NOTE:** FCV-498 will likely be in MANUAL by this Step.
		• FCV-498 (FRV "C")	
	BOP	(Step 2) RESTORE affected S/G level to program	**Immediate Action** **NOTE:** The "C" S/G Narrow Range level will likely be at programmed level by this Step.

Critical Task:

Manually control "C" S/G Narrow Range Level before a Reactor Trip occurs on low S/G level or a Protective Action occurs on high S/G Level.

Safety Significance: failure to take manual control of the "C" S/G Feed Reg Valve and control Narrow Range S/G level, under the postulated plant conditions, results in an unnecessary transient to the plant and challenge to the Reactor Protection/Engineered Safeguards Actuation System. Performance of the critical task would stabilize the S/G level transient. A failure to stabilize the S/G level transient, when able to do so, constitutes a mis-operation or incorrect crew performance which leads to incorrect RCS temperature/pressure control.

Op Test No.:	N16-1	Scenario #	4	Event #	3	Page 19 of 51
Event Description:		Main Steam Line "C" Pressure Transmitter Fails LOW				

Time	Pos.	Expected Actions/Behavior	Comments
	BOP/ CRS	(Step 3) CHECK Reactor Trip Setpoint – BEING APPROACHED	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	(Step 3 RNO) IF a reactor trip setpoint is approached, THEN…	
		GO TO Step 5	
	CRS	(Step 5) NOTIFY Plant Personnel of Procedure Entry Using PA System	**NOTE:** The CRS will most likely make this announcement.
	BOP	(Step 6) CHECK Failure – FEED FLOW INSTRUMENT FAILURE	
	BOP	(Step 6 RNO) IF failure was a steam flow instrument, THEN…	**NOTE:** The BOP/CRS could go to Step 12 incorrectly believing that it is the Steam Flow instrument that has failed.
	CRS	IF failure was a steam pressure instrument, THEN GO TO Step 17.	
	BOP	(Step 17) PLACE S/G Steam Flow Selector Switch affected by Failed Pressure Instrument to Alternate Channel Below:	
		• S/G "C" STEAM FLOW – FR-498	
		• FAILED CHANNEL (PT-495) AFFECTED CHANNEL (FI-494) SELECTED POSITION (CH 495)	
	BOP	(Step 18) RESTORE affected Controller to Automatic:	
		• CHECK S/G level – WITHIN ±1% OF PROGRAMMED LEVEL	
		• PLACE affected controller in AUTO	

Op Test No.:	N16-1	Scenario #	4	Event #	3	Page	20 of 51
Event Description:	**Main Steam Line "C" Pressure Transmitter Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 19) REMOVE affected Transmitter from Servicing Using OWP-025:	
		CHANNEL (PT-495) OWP (SGP-12)	**NOTE:** The CRS will address OWP-025.
OWP-025, STEAM GENERATOR PRESSURE (SGP) **SGP-11, MAIN STEAM LINE "C" PRESSURE TRANSMITTER PT-495**			
	BOP	FR-498 (STM) – SELECTED TO 495	
	BOP	DELETE INPUT PT-495 FROM CALO PROCESSING. (MSP0441A)	
	BOP	BISTABLE SWITCH B/S 495 RACK #17	**NOTE:** The will enter the Simulator Booth (Simulating the Hagan Room). **Booth Instructor** coordinate with BOP to insert Trip Signals: OPEN Protection Racks Door: IRF BST101 f:D_OPEN • IRF BST014 f:TRIP CLOSE Protection Racks Door: IRF BST101 f:D_CLOSED
			NOTE: The CRS will return to Section D of AOP-025.
AOP-025, RTGB INSTRUMENT FAILURE **SECTION D, S/G FEED FLOW, STEAM FLOW OR STEAM PRESSURE TRANSMITTER FAILURE**			
	CRS	(Step 20) REVIEW TS LCOs for applicability:	**NOTE:** The CRS will address Technical Specifications.
		• TS LCO 3.3.1	
		• TS LCO 3.3.2	

Op Test No.:	N16-1	Scenario #	4	Event #	3	Page	21 of 51
Event Description:	**Main Steam Line "C" Pressure Transmitter Fails LOW**						

Time	Pos.	Expected Actions/Behavior	Comments
		• TS LCO 3.3.3	
		• TS LCO 3.3.4	
	CRS	(Step 21) GO TO Procedure Main Body, Step 2	
TECHNICAL SPECIFICATION 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	
		<table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>D. One channel inoperable</td><td>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.</td><td>6 hours 12 hour 18 hours</td></tr></table>	**NOTE:** The CRS will determine that **Function 1.e** (Steam Line High Differential Pressure Between Steam Header and Steam Lines) is affected, and **ACTION D.1 or D.2 and D.3 are required**.
TECHNICAL SPECIFICATION 3.3.3, POST ACCIDENT MONITORING (PAM) INSTURMENTATION			

Op Test No.:	N16-1	Scenario #	4	Event #	3	Page 22 of 51
Event Description:	**Main Steam Line "C" Pressure Transmitter Fails LOW**					

Time	Pos.	Expected Actions/Behavior			Comments
	CRS	LCO 3.3.3 The PAM instrumentation for each Function in Table 3.3.3-1 shall be OPERABLE.			
	CRS	APPLICABILITY: MODES 1, 2 and 3.			
	CRS	ACTIONS			
		CONDITON	REQUIRED ACTION	COMPLETION TIME	
		F. As required by Required Action E.1 and referenced in Table 3.3.3-1	F.1 Be in MODE 3. AND F.2 Be in MODE 4.	6 hours 12 hours	**NOTE:** The CRS will determine that **Function 20** (Steam Generator Pressure) is affected, and **ACTION F.1 and F.2 are required**.
TECHNICAL SPECIFICATION 3.3.6, CONTAINMENT VENTILATION ISOLATION INSTRUMENTATION					
	CRS	The Containment Ventilation Isolation instrumentation for each Function in Table 3.3.6-1 shall be OPERABLE.			
	CRS	APPLICABILITY: According to Table 3.3.6-1.			
	CRS	ACTIONS			

Op Test No.:	N16-1	Scenario #	4	Event #	3	Page	23 of 51
Event Description:	**Main Steam Line “C” Pressure Transmitter Fails LOW**						

<table>
<tr><th>Time</th><th>Pos.</th><th colspan="3">Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that Function 4 (Safety Injection), is affected.</td></tr>
<tr><td></td><td>Refer to LCO 3.3.2, "ESFAS Instrumentation," Function 1, for all initiation functions and requirements.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td>NOTE: The CRS will likely conduct an Alignment Brief, and THEN re-commence the up-power.</td></tr>
<tr><td colspan="6">At the discretion of the Lead Examiner move to Event #4.</td></tr>
</table>

Op Test No.:	N16-1	Scenario #	4	Event #	4	Page	24 of 51
Event Description:	**Power Range NI-44 Upper Detector fails HIGH**						

Next, Power Range, NI-44, Upper Detector will fail HIGH. The operator will remove the failed instrument from service in accordance with OWP-011, "Nuclear Instrumentation (NI)." The operator will address Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation."

Booth Operator Instructions: **IMF NIS07G f:70**

Indications Available:

- RTGB Annunciator APP-005-C3, PR CHANNEL DEV
- Power Range N44 is indicating Off-Scale HIGH
- Delta-Flux Power Range N44 is Off-Scale HIGH
- RTGB Annunciator APP-005-D6, ΔFLUX WARNING/STATUS (30 seconds delayed)

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: It is likely that the BOP will go to HOLD on the Turbine.
		APP-005-C3, PR CHANNEL DEV	
	RO	(Step 1) MONITOR the following parameters:	
		• Reactor power	
		• Control rod position	
	RO	(Step 2) IF a Control Rod is misaligned, THEN….	**NOTE:** There is NO misaligned Control Rod.
	RO	(Step 3) IF indications of a radial flux tilt are present, THEN PERFORM a Quadrant Power Tilt Ratio per FMP-007, Quadrant Power Tilt.	
	RO/ CRS	(Step 4) IF a Power Range detector has failed, THEN REMOVE failed Power Range Detector from service per OWP-011, Nuclear Instrumentation (NI).	
	CRS	(Step 5) REFER TO TS:	
		• 3.2.4, Quadrant Power Tilt Ratio (QPTR) .	

Op Test No.:	N16-1	Scenario #	4	Event #	4	Page	25 of 51
Event Description:	**Power Range NI-44 Upper Detector fails HIGH**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Table 3.3.1-1, Reactor Protection System Instrumentation.	**NOTE:** The CRS will address OWP-011.
		OWP-011, NUCLEAR INSTRUMENTATION (NI)	
	BOP	REMOVE NI-44 from ERFIS SCAN: NIN0044A	
	BOP	DROPPED ROD MODE Switch	
	BOP	NI-44 OUT OF SERVICE TRIP SWITCH	
	BOP	ROD STOP BYPASS Switch	
	BOP	COMPARATOR CHANNEL DEFEAT Switch	
	BOP	DETECTOR CURRENT COMPARATOR Drawer:	
		• UPPER SECTION Switch	
		• LOWER SECTION Switch	
			NOTE: The CRS will address the Technical Specifications.
		TECHNICAL SPECIFICATION 3.3.1, REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION	
	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	
		NOTE: Separate Condition entry is allowed for each Function.	

Op Test No.: N16-1	Scenario # 4	Event # 4	Page 26 of 51
Event Description:	**Power Range NI-44 Upper Detector fails HIGH**		

Time	Pos.	Expected Actions/Behavior			Comments
		CONDITION	REQUIRED ACTION	COMPLETION TIME	**NOTE:** The CRS will determine that **Functions 2** (Power Range Neutron Flux, a. High, b. Low), **17.c (RPS Interlocks – P8)** and **17.d (RPS Interlocks – P10)** are affected, and: **ACTION D.1.1 and D.1.2 or D.2.1 and D.2.2 or D.3 are required**; **ACTION E.1 or E.2 is required;** **ACTION S.1 or S.2 is required;** **ACTION T.1 or T.2 is required.**
		D. One Power Range Neutron Flux-High channel inoperable.	D.1.1 Place channel in trip. AND D.1.2 Reduce THERMAL POWER to ≤ 75% RTP. OR D.2.1 Place channel in trip. AND NOTE: Only required to be performed when the Power Range Neutron Flux input to QPTR is inoperable. D.2.2 Perform SR 3.2.4.2. OR D.3 Be in MODE 3.	6 hours 12 hours 6 hours Once per 12 hours 12 hours	
		E. One channel inoperable.	E.1 Place channel in trip. OR E.2 Be in MODE 3.	6 hours 12 hours	
		S. One channel inoperable.	S.1 Verify interlock is in required state for existing unit conditions. OR S.2 Be in MODE 3.	1 hour 7 hours	
		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 likely conduct an Alignment Brief.

At the discretion of the Lead Examiner move to Event #5.

Op Test No.:	N16-1	Scenario #	4	Event #	5	Page	27 of 51
Event Description:	Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO						

Shortly afterwards, an oil leak will develop on the Main Turbine. The operator will respond in accordance with various APP-008, SW, CW & TURB GEN AUX, alarms, and ultimately enter AOP-007, "Turbine Trip Below P-8." When the Main Turbine Trips one Turbine Stop Valve and one Turbine Governor Valve will remain OPEN, and the operator will need to manually TRIP the Turbine. The Control Rods will fail to operate in AUTO and the operator will need to insert rods in MANUAL.

Booth Operator Instructions:

IMF TUR14 r:01:00 f:100
IMF TUR05B f:100
IMF TUR05C f:AS-IS

NOTE: The malfunction takes ≈1 minute to fully develop

Indications Available:

- Turbine Bearing Oil pressure is lowering
- RTGB Annunciator APP-008-A4, TURB BRG OIL LO PRESS
- RTGB Annunciator APP-008-B4, LO BRG OIL PRESS TURB TRIP

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-007, TURBINE TRIP BELOW P-8	
	BOP	(Step 1) CHECK turbine stop valves – CLOSED	
		• BOTH turbine stop valves - CLOSED	
		OR	
		• ALL governor valves - CLOSED	
	BOP	(Step 1 RNO) PERFORM the following:	
		• Manually TRIP the turbine by simultaneously depressing the THINK and TURBINE TRIP pushbuttons.	
	BOP	(Step 2) CHECK MSR PURGE and SHUTOFF VALVES - CLOSED	
	BOP	(Step 3) CHECK Steam Dump Control – IN PRESSURE MODE	

Op Test No.:	N16-1	Scenario #	4	Event #	5	Page	28 of 51
Event Description:	Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3 RNO) PLACE steam dumps in pressure control mode:	
		• ENSURE STEAM HEADER PRESS Controller PC-464B is in AUTO.	
		• ENSURE PC-464B pot setting is 7.28.	
		• IF PC-464B has a demand output greater than 1, THEN PERFORM the following:	
		• PLACE PC-464B in MAN.	
		• SET PC-464B demand output to 0.	
		• PLACE PC-464B in AUTO.	
		• SELECT STEAM DUMP MODE Switch to STEAM PRESS.	
		• Slowly ADJUST PC-464B pot setting to 7.17.	
	BOP	(Step 4) CHECK Steam Dump Operation – STEAM DUMP OPEN	
	RO	(Step 5) ENERGIZE All Available PZR Heaters	
	RO	(Step 6) CHECK Control Rods – INSERTING IN AUTO	**NOTE:** The rods will fail to insert in AUTO, however, it is likely that the Control Rods would have been in MANUAL for the up-power.
	RO	(Step 6 RNO) Manually INSERT control rods to achieve Tavg between 547^{0}F and 551^{0}F AND reactor power between 5 and 10%.	
	BOP	(Step 7) CHECK Main FW Status:	
		• CHECK MFPs – ANY RUNNING	**NOTE:** The “A’ MFWP is RUNNING.

Op Test No.:	N16-1	Scenario #	4	Event #	5	Page	29 of 51
Event Description:	Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO						

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK FRVs – IN SERVICE	
		• CHECK FRVs – IN AUTOMATIC	
	RO	(Step 8) CHECK Reactor Power – LESS THAN 15%	
	BOP	(Step 9) PLACE FRV Bypass Valves in Service:	
		• MAINTAIN S/G level between 35 to 44%	
		• Slowly OPEN FRV bypass valves	
		• CHECK FRVs – INDICATE CLOSED	
		• PLACE FRV controllers in MAN	
		• FCV-478	
		• FCV-488	
		• FCV-498	
		• CLOSE FW HDR SECTION valves	
		• V2-6A	
		• V2-6B	
		• V2-6C	
	RO	(Step 10) CHECK PZR PORVs - CLOSED	
	BOP	(Step 11) CHECK the following Breakers - OPEN	
		• NORTH OCB BKR 52/9	
		• SOUTH OCB BKR 52/8	
		• EXCITER FIELD BREAKER	

Op Test No.: N16-1	Scenario # 4	Event # 5	Page 30 of 51

Event Description: Low Turbine Oil Pressure/Failure of Auto Turbine Trip/Control Rods Fail in AUTO

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 12) CHECK Reactor - CRITICAL	**Examiner NOTE:** Because of the development time for Event 6, direct the Booth operator to move to Event 6 now.
	RO	(Step 13) STABILIZE Reactor Power Below 10% By One Or Both Of The Following:	
		• Manual control of control rods	
		• Adjusting Boron concentration using OP -301, Chemical and Volume Control System (CVCS) Section "RCS Boration Quick Checklist" or "RCS Dilution Quick Checklist"	
	BOP	(Step 14) STABILIZE Plant Conditions:	
		• ADJUST PC-464B to maintain Tavg 547°F to 551°F	
		• CONTROL feedwater (AFW or MFW) to maintain S/G levels 35 to 44%	
		• CONTROL PZR heaters and sprays to maintain PZR pressure between 2225 psig and 2250 psig	
		• CONTROL charging and letdown flows to maintain PZR level within 5% of program level	

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

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7			Page 31	of 51	
Event Description:	ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN						

Subsequently, the "B" Steam Line will rupture inside Containment (over 10 minutes). Simultaneously, the Reactor will fail to TRIP both automatically and manually (ATWS). The operator will enter EOP-E-0, "Reactor Trip or Safety Injection," and attempt to manually trip the reactor. When this fails, the operator will enter FRP-S.1, "Response to Nuclear Power Generation- ATWS." While in FRP-S.1, Boric Acid to Charging Pump Suction Valve MOV-350 will fail CLOSED. The operator will direct a local trip of the reactor, drive rods in manually, and align the suction of the Charging Pumps to the RWST. Upon completion of FRP-S.1, the operator will return to EOP-E-0. Ultimately, the operator will transition to EOP-E-2, "Faulted Steam Generator Isolation," to isolate the flow into and out of the B Steam Generator and then terminate Safety Injection. The scenario will terminate at Step 16.b of EOP-E-2, when the operator prepares to restore normal letdown.
Booth Operator Instructions: **IMF MSS01B r:10:00 f:9.95E6**
Indications Available: • Rx Trip First Out LIT, without Rx Trip • Pressurizer level is lowering • Pressurizer pressure is lowering • Charging Pump speed is rising • Containment pressure is rising

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	
	RO	(Step 1 RNO) Manually TRIP Reactor	**Immediate Action**
		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.

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	32	of 51
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**							

Time	Pos.	Expected Actions/Behavior	Comments
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS			
	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.	
Critical Task: **Insert Negative Reactivity into the Core by Inserting Control Rods Manually Prior to Locally Tripping the Reactor (EOP-Based)** 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.			

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	33	of 51
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**							

Time	Pos.	Expected Actions/Behavior	Comments
		• 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 report after **2 minutes** use: **IRF EPSV480B3_104 f:RACK_OUT** **IRF EPSV480B2B_097 f:RACK_OUT** and 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	
		• CLOSE MSR Purge and Shutoff valves	
			NOTE: With the Immediate Actions complete the BOP may take Prompt/Prudent action to Close the "B" MSIV and/or stop AFW flow to the "B" S/G.
	BOP	(Step 3) CHECK AFW Pumps Running:	
		• CHECK Motor Driven AFW Pumps – BOTH RUNNING	
		• CHECK S/G Narrow Range levels – TWO S/Gs LESS THAN 16%	
	BOP/ CRS	(Step 3b RNO) IF S/G Narrow Range level lowers to less than 16% on two S/Gs THEN PERFORM Step3.c.	
		CONTINUE WITH Step 4.	

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7			Page 34	of 51	
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	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	
	BOP/ RO	(Step 4.b.1 RNO) ALIGN suction from RWST:	
		• OPEN LCV-115B, EMERG MU TO CHG SUCT. IF LCV-115B can NOT be opened THEN…	
		• CLOSE LCV-115C, VCT OUTLET Valve.	
	BOP/ RO	(Step 4.b.2) START Boric Acid Pump ALIGNED for BLEND	
	BOP/ RO	(Step 4.b.3) CHECK for Boric Acid flow on FI-110	
	BOP/ RO	(Step 4.c) ALIGN Charging flow path:	
		• OPEN CVC-310B, LOOP 2 COLD LEG CHG Valve	
		• 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	
		• MAINTAIN Seal Injection flow between 6 gpm and 20 gpm per RCP UNLESS Seal Injection isolated	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	35 of 51
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
	BOP/ RO	(Step 6 RNO) PERFORM Attachment 3, Auto Action Verification 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 3. **Other Examiners** follow **FRP-S.1** Actions, **Step 7**, on **Page 39**.
FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS ATTACHMENT 3, 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	
	BOP	(Step 4) CHECK Containment Isolation Phase A:	
		• CHECK Containment Isolation Phase A - ACTUATED	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	36 of 51
Event Description:	**ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
		• 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	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	37	of	51
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**								

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 9) CHECK ECCS Flow:	
		• CHECK RCS pressure - LESS THAN 1650 PSIG [1725 PSIG]	**NOTE:** Adverse Containment Numbers will be required.
		• CHECK SI Pumps – FLOW INDICATED	
		• CHECK RCS pressure – LESS THAN 275 PSIG [325 PSIG]	**NOTE:** Adverse Containment Numbers will be required.
	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	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	38	of	51
Event Description:		**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**							

Time	Pos.	Expected Actions/Behavior	Comments
		• 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:** The BOP may contact the Inside AO. **Booth Instructor:** as **AO**, acknowledge and report that the "B" IA Compressor is running, and the "A" IA Compressor is NOT running.
		• 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	

FRP-S.1, RESPONSE TO NUCLEAR POWER GENERATION-ATWS

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7			Page 39	of 51	
Event Description:	**ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE.**
	RO	(Step 7) CHECK IF the Following Trips Have Occurred:	
		• Reactor - TRIPPED	
		• Turbine - TRIPPED	
	RO	(Step 8) CHECK IF Reactor is Subcritical:	
		• Power Range channels – LESS THAN 5%	
		• Intermediate Range channels - NEGATIVE STARTUP RATE	
		• OBSERVE CAUTION prior to Step 18 and GO TO Step 18	
	RO	(Step 18) CHECK ARPI – LESS THAN TWO RODS STUCK OUT	
	RO	(Step 19) STOP RCS Boration:	
		• CHECK MOV-350, BA TO CHARGING PMP SUCT - CLOSED	
		• CHECK Boric Acid Pump Control Switch aligned for blend – IN AUTO	
		• CHECK Emergency Boration – PERFORMED USING MOV-350 FLOWPATH	
	CRS	(Step 19.c RNO) GO TO Step 19e)	
	RO	(Step 19.c) CHECK BOTH of the following conditions – EXIST:	
		• Emergency Boration performed using RWST flowpath	
		AND	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	40	of	51
Event Description:		**ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN**							

Time	Pos.	Expected Actions/Behavior	Comments
		• Charging Pump suction aligned to the VCT is desired	
		• CHECK VCT Level – GREATER THAN 20 INCHES	
		• OPEN LCV-115C, VCT OUTLET	
		• CLOSE the RWST supply valve previously opened:	
		• LCV-115B, EMERG TO CHG SUCT	
		• REDUCE Charging Pump speed as desired	
	RO/ CRS	(Step 20) PERFORM the following:	
		• RESET SPDS	
		• RETURN TO Procedure AND Step in Effect	
			NOTE: The CRS will transition to EOP-E-0.
		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	

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7	Page 41 of 51
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**		

Time	Pos.	Expected Actions/Behavior	Comments
	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**
	RO	CHECK if SI is actuated:	
		• SI annunciators - ANY ILLUMINATED	
		OR	
		• SI equipment - AUTO STARTED	
	RO	CHECK BOTH trains of SI actuated:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	RO/ BOP	Foldout Page:	
		RCP TRIP CRITERIA	**NOTE:** The condition is MET, and the RCPs have been tripped.
		FAULTED S/G AFW ISOLATION CRITERIA	**NOTE:** The condition is MET, and the AFW flow to the "B" S/G is isolated.
		• PERFORM Supplement D, De-energizing AFW Valves For AFFECTED S/G.	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as AO, and use: **IRF EPSMCC9_254** **f: RACKED_OUT** **IRF EPSMCC10_266** **f: RACKED_OUT** As **AO**, report after **3 minutes** that the **Supplement D** is complete.
		AFW SUPPLY SWITCHOVER CRITERIA	

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7		Page 42	of 51		
Event Description:	ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN						

Time	Pos.	Expected Actions/Behavior	Comments
		DC BUS, INSTRUMENT BUS, OR MCC-5 FAILURE CRITERIA	
		SPENT FUEL POOL COOLING CRITERIA	
		EOP-E-0, REACTOR TRIP OR SAFETY INJECTION	
	CRS	(Step 5) PERFORM Attachment 1, Auto Action Verification, While CONTINUING WITH This Procedure	**NOTE:** It is likely that this will NOT be completed because the equivalent Attachment (Attachment 3) in FRP-S.1 has already been completed.
	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%	
	BOP	(Step 6b RNO) IF S/G Narrow Range level lowers to LESS THAN 16% on Two S/Gs, THEN PERFORM Step 6.c.	
	CRS	CONTINUE WITH Step 7	
	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	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	43	of	51
Event Description:	ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN								

Time	Pos.	Expected Actions/Behavior	Comments
		• CONTROL AFW flow to maintain Intact S/G Narrow Range level between 9%[18%] AND 50%	**NOTE:** Adverse Containment Numbers will be required.
		• CHECK total AFW flow ‑ GREATER THAN 300 GPM	
	RO	(Step 9) CHECK CV Spray NOT Required:	
		• CHECK Containment Pressure ‑ HAS REMAINED LESS THAN 10 PSIG	
	RO	(Step 9 RNO) PERFORM the following:	
		• CHECK CV Spray actuated.	
		• IF CV Spray is NOT actuated, THEN….	
		• ENSURE BOTH CV Spray Pumps are running.	
		• ENSURE CV Spray Pump Discharge Valves are OPEN:	
		• SI‑880A	
		• SI‑880B	
		• SI‑880C	
		• SI‑880D	
		• ENSURE CV Spray Additive Tank Discharge Valves are OPEN:	
		• SI‑845A	
		• SI‑845B	
		• ADJUST Spray Additive Tank flow using SI‑845C,SAT THROTTLING VALVE to approximately 12 gpm.	
		• ENSURE Containment Isolation Phase B Valves are closed.	
		• STOP ALL RCPs.	
	CRS	• OBSERVE CAUTION prior to Step 10 AND GO TO Step 10.	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	44 of 51
Event Description:	**ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 10) CHECK RCP Seal Cooling:	
		• 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	
	RO	(Step 10 RNO) IF CCW to ANY RCP Motor OR ALL Seal Cooling to ANY RCP has been lost, THEN…	
		• IF ALL Charging Pumps are STOPPED, THEN…	
	RO	(Step 11) CHECK RCS Temperatures:	
		• With ANY RCP running,…..	
		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.	**NOTE:** Adverse Containment Numbers will be required.
		• IF RCS cooldown continues, THEN CLOSE MSIVs AND MSIV Bypass Valves.	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	45 of 51
Event Description:	ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN						

Time	Pos.	Expected Actions/Behavior	Comments
	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:	**NOTE:** It is likely that the RCPs are already OFF.
		• CHECK RCPs - ANY RUNNING	
	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	
	CRS	(Step 14 RNO) PERFORM the following:	
		• RESET SPDS AND INITIATE monitoring of Critical Safety Functions Status Trees.	
		• GO TO EOP-E-2, Faulted Steam Generator Isolation, Step 1.	
EOP-E-2, FAULTED STEAM GENERATOR ISOLATION			
	BOP	(Step 1) CHECK MSIVs AND MSIV Bypass valves for Faulted S/G(s) – CLOSED	
		• S/G B	
		• V1-3B	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	46 of 51
Event Description:	ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN						

Time	Pos.	Expected Actions/Behavior	Comments
		• MS-353B	
	BOP	(Step 2) CHECK IF ANY S/G Secondary Pressure Boundary is Intact	
		• CHECK pressures in ALL S/Gs – ANY STABLE OR RISING	
	BOP	(Step 3) IDENTIFY Faulted S/G(s):	**NOTE:** The “B” S/G is Faulted.
		• CHECK pressures in ALL S/Gs	
		• ANY S/G PRESSURE LOWERING IN AN UNCONTROLLED MANNER	
		OR	
		• ANY S/G COMPLETELY DEPRESSURIZED	
		(Step 4) ISOLATE Faulted S/G(s):	
		• CHECK Main Feedwater Reg Valve, Reg Bypass Valve AND Header Section Valve to Faulted S/G(s) shut:	
		• S/G B valves - CLOSED	
		• FCV-488	
		• FCV-489	
		• V2-6B	
		• RESET SI	
		• CLOSE AFW Discharge Valve(s) to Faulted S/G(s):	
		• S/G B valves – CLOSED	
		• V2-14B	
		• V2-16B	
		• CLOSE Steam Driven AFW Pump Steam Shutoff valve(s) from Faulted S/G(s);	
		• V1-8B	
		• CHECK Faulted S/G(s) Steam Line PORV - CLOSED	

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7	Page 47 of 51
Event Description:	ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN		

Time	Pos.	Expected Actions/Behavior	Comments
		• RV1-2	
		• PERFORM Supplement D, De-energizing AFW Valves for AFFECTED S/G	**NOTE:** If not already done, the CRS will dispatch an AO. **Booth Instructor** acknowledge as AO, and use: **IRF EPSMCC9_254** **f: RACKED_OUT** **IRF EPSMCC10_266** **f: RACKED_OUT** As **AO**, report after **3 minutes** that the **Supplement D** is complete.
		• Locally CLOSE Faulted S/G(s) Bypass Drn AND Warmup line to AFW Pump Valve(s) while CONTINUING WITH this procedure:	
		• 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 use: **IRF MSS048, f: 0** As **AO**, report after **3 minutes** that MS-29 IS closed.
		• CHECK Faulted S/G(s) Blowdown AND Blowdown Sample Valves - CLOSED	

Critical Task:

Isolate Feedwater Flow Into and Steam Flow From the Faulted S/G Before a Transition Out of E-2 Occurs (EOP-Based)

Safety Significance: Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Also, depending upon the plant conditions, it could constitute a failure by the operator to demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component. Failure to isolate a faulted SG can result in challenges to the Integrity, Subcriticality and Containment CSFs.

	RO	(Step 5) CHECK CST Level – GREATER THAN 13%	

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	48 of 51
Event Description:	**ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6) CHECK Secondary Radiation:	
		• REQUEST Chemistry periodically sample ALL S/Gs for activity	**NOTE:** The CRS may call Chemistry to request samples. If so, **Booth Instructor** acknowledge as Chemistry.
		• CHECK unisolated Secondary Radiation Monitors – HAVE REMAIND NORMAL	
		• R-15, CONDENSER AIR EJECTOR RADIATON	
		• R-19s, S/G Blowdown Radiation	
		• R-31s, STEAMLINE RADIATION MONITORs	
	CRS	• CHECK Secondary sample results – NORMAL (WHEN RESULTS AVAILABLE)	
	RO/ BOP	(Step 7) Check If ECCS Flow Should Be Terminated	
		• CHECK RCS Subcooling based on Core Exit T/Cs – GREATER THAN 18°F [37°F]	**NOTE:** Adverse Containment Numbers will be required.
		• CHECK Secondary Heat Sink - AVAILABLE	
		• Total AFW flow to Intact S/G(s) – AT LEAST 300 GPM	
		OR	
		• S/G Narrow Range level in at least one Intact S/G – GREATER THAN 9% [18%]	**NOTE:** Adverse Containment Numbers will be required.
		• CHECK RCS pressure:	
		• RCS Pressure – GREATER THAN 1650 PSIG [1725 PSIG]	
		AND	
		• RCS Pressure – STABLE OR RISING	
		• CHECK PZR level – GREATER THAN 14% [31%]	**NOTE:** Adverse Containment Numbers will be required.

Op Test No.:	N16-1	Scenario #	4	Event #	6 & 7	Page	49 of 51
Event Description:	ATWS/“B” SG SLB Inside CV/ MOV-350 fails to OPEN						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 8) RESET SI	
	RO	(Step 9) RESET Phase A Containment Isolation	
	RO	(Step 10) 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	
	RO	(Step 11) STOP ECCS Pumps:	
		• STOP SI Pumps	
		• CHECK RHR Pumps – ANY RUNNING WITH SUCTION ALIGNED TO RWST	
		• STOP RHR Pumps	
	RO	(Step 12) CHECK Charging Flow Established:	**NOTE:** There are two Charging Pumps running.
		• CHECK Charging Pumps – AT LEAST ONE RUNNING	
		• ESTABLISH desired Charging flow:	
		• START additional Charging Pump(s) as necessary	
		• ADJUST the following a 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	
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	

Op Test No.: N16-1	Scenario # 4	Event # 6 & 7	Page 50 of 51
Event Description:	**ATWS/"B" SG SLB Inside CV/ MOV-350 fails to OPEN**		

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 13) CHECK ECCS Flow NOT Required:	**NOTE:** Adverse Containment Numbers will be required.
		• RC Subcooling based on Core Exit T/Cs – GREATER THAN 18°F [37°F]	
		• PZR level – GREATER THAN 14% [31%]	
	BOP	(Step 14) TRANSFER Steam Dumps to Pressure Control Mode:	
		• CHECK Condenser - AVAILABLE	**NOTE:** The Condenser is NOT available.
	BOP	(Step 14a RNO) If Condenser Steam Dumps are NOT available, THEN USE S/G Steam Line PORVs.	
	RO	(Step 15) CHECK RCS Hot Let Temperatures - STABLE	
	RO	(Step 16) CHECK if Letdown Can Be Established:	
		• PZR Level – GREATER THAN 27% [44%]	
		• ESTABLISH Letdown using Supplement L, Establishing Letdown	
At the discretion of the Lead Examiner terminate the exam.			

NRC SCENARIO N16-1-4 TURNOVER SHEET

1. **INITIAL CONDITIONS**

a)	Time in Core Life:	BOL
b)	Reactor Power:	25%
c)	Turbine Load:	129 MWe
d)	Boron Concentration:	1598 ppm
e)	Rod Height:	147 CB ‘D’
f)	RCS Pressure:	2235 psig
g)	PZR Level:	28.5%
h)	Xenon:	Equilibrium

2. **TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT**

T.S. #	Description
None	

3. **CLEARANCES IN EFFECT**
   a) The “A” SI Pump is OOS. The “B” SI Pump has been aligned to 480 VAC ESF Bus E-1.
4. **CAUTION CAPS IN EFFECT**
   a) None
5. **PROTECTED EQUIPMENT**
   a) “C” SI Pump
6. **DEGRADED EQUIPMENT**
   a) PI-1616, SW North Header Pressure, is OOS (I&C Investigating).
   b) RTGB Annunciator APP-007-C3, “FW PMP A LO FLOW TRIP,” has failed to the EXTINGUISHED condition (I&C is investigating).
7. **SWITCHYARD ACCESS**
   a) Unrestricted (NOT-PROTECTED)
8. **PLANNED EVOLUTIONS**
   a) Raise power to 100% at 1%/minute.
9. **TURNOVER INFORMATION**
   a) The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
   b) Chemistry reports that Heater Drains tank suspended solids is < 25 ppb.
10. **REACTIVITY INFORMATION**
    a) The Reactor Engineer (RE) is available in the Control Room
    b) The RE recommends a 6300 gallon dilution, made in several 200-300 gallon batch additions
    c) The RE recommends that Control Bank D be at approximately 200 steps upon achieving 100%
11. **RISK**
    a) GREEN

ROBINSON Nuclear Training

Committed to Excellence

OPERATIONS TRAINING

N16-1-5

Initial Licensed Operator Training

Rev 111915

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

Developed By:	______________________	**Date:**	__________
	Instructor/Developer		
Concurred By:	______________________	**Date:**	__________
	Line Superintendent/Supervisor/SRO		
Approved By:	______________________	**Date:**	__________
	Superintendent/Supervisor Training		

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Training Class 15-1

TOPIC: NRC Simulator Exam

<u>Scenario N16-1-5</u>

<u>REFERENCES</u>:

1. GP-005, “Power Operation” (Rev 128)
2. AOP-006, “Turbine Eccentricity/Vibration” (Rev 21)
3. APP-005, “NIS & Reactor Control” (Rev 39)
4. OWP-011, “Nuclear Instrumentation (NI)” (Rev 24)
5. Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation” (Amendment 176)
6. AOP-003, “Malfunction of Reactor Makeup Control” (Rev 20)
7. APP-001, “Miscellaneous NSSS” (Rev 60)
8. AOP-014, “Component Cooling Water Malfunction” (Rev 37)
9. Technical Specification LCO 3.6.1, “Containment” (Amendment 176)
10. Technical Specification LCO 3.6.3, “Containment Isolation Valves” (Amendment 176)
11. OMM-001, “RNP Conduct of Operations” (Rev 67)
12. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 6)
13. EOP-E-2, “Faulted Steam Generator Isolation” (Rev 3)
14. EOP-ECA-2.1, “Uncontrolled Depressurization of All Steam Generators” (Rev 1)

Validation Time: <u>117 minutes</u>

Facility:	**H B Robinson**	Scenario No.:	**5**	Op Test No.:	**N16-1**
Examiners:	____________	Operators:		____________	(SRO)
	____________			____________	(RO)
	____________			____________	(BOP)

Initial Conditions:	The plant is at 3-5% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "B" Condensate Pump is OOS. LI-1417A, Hotwell Level Indication is OOS (I&C Investigating). RTGB Annunciator APP-006-F7, "PWST HI/LO LVL," has failed to the ILLUMINATED condition (I&C is investigating). The crew will be directed to raise power to 30%.

Event No.	Malf. No.	Event Type*	Event Description
1	NA	R-RO N-BOP N-SRO	Roll Turbine
2	1	C-BOP C-SRO	High Turbine Eccentricity
3	2	I-BOP I(TS)-SRO	Loss of Compensation Voltage to Intermediate Range N-35
4	3	I-RO I-SRO	VCT Level transmitter LT-112 fails HIGH
5	4	C-RO C(TS)-SRO	"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE
6	5	M-RO M-BOP M-SRO	Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE
7	6	C-RO	Failure of Automatic Rx Trip

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

H B Robinson 2016 NRC Scenario #5

The plant is at 3-5% power (EOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.

The following equipment is Out-Of-Service: The “B” Condensate Pump is OOS. LI-1417A, Hotwell Level Indication is OOS (I&C Investigating). RTGB Annunciator APP-006-F7, “PWST HI/LO LVL,” has failed to the ILLUMINATED condition (I&C is investigating). The crew will be directed to raise power to 30%.

Shortly after taking the watch, the operator will raise power to 5-8% and startup the Turbine using GP-005, “Power Operation.”

When the Turbine is rolling, a HIGH Eccentricity condition will develop on the Main Turbine. The operator will respond using AOP-006, “Turbine Eccentricity/Vibration,” and place the Turbine startup on HOLD.

Shortly afterwards, the compensating voltage on Intermediate Range Channel N-35 will fail. The operator will remove the instrument from service using OWP-011, “Nuclear Instrumentation (NI).” The failed channel will require that the Source Range instruments be manually re-energized in the subsequent post-trip conditions. The operator will address Technical Specification LCO 3.3.1, “Reactor Protection System (RPS) Instrumentation,” and determine to continue with the power increase.

Following this, VCT Level Transmitter LT-112 will fail HIGH causing LCV-115A to divert all letdown flow to the CVCS HUTs and result in an automatic makeup to the VCT. The operator will respond in accordance with AOP-003, “Malfunction of Reactor Makeup Control.” After this, the power increase will continue.

Next, a Thermal barrier leak will develop on the “B” RCP and Flow Control Valve FCV-626 will fail to CLOSE. The operator will respond in accordance with APP-001-C1, “RCP THERM BAR COOL WTR HI FLOW,” and AOP-014, “Component Cooling Water Malfunction.” The operator will address Technical Specification LCO 3.6.1, “Containment,” and Technical Specification LCO 3.6.3, “Containment Isolation Valves.”

Subsequently, a Steam Rupture will occur downstream of the MSIVs and the MSIVs will fail to CLOSE automatically and manually. Simultaneously, the Reactor will fail to TRIP automatically. The operator will enter EOP-E-0, “Reactor Trip or Safety Injection,” and manually trip the reactor.

Upon completion of EOP-E-0, the operator will transition to EOP-E-2, “Faulted Steam Generator Isolation,” and then when it is realized that all Steam Generators are faulted, transition to EOP-ECA-2.1, Uncontrolled Depressurization of All Steam Generators,” and lower AFW flow to each Steam Generator to 60 gpm.

While terminating Safety Injection in EOP-ECA-2.1, the “A” MSIV will close and the “A” S/G pressure is expected to rise higher than that of the “B” and “C” S/G’s. Since the crew will be in the process of terminating SI in EOP-ECA-2.1, the crew will continue to complete the SI termination steps before transitioning back to EOP-E-2.

The scenario will terminate at Step 4.c of EOP-E-2, after the operator has closed the AFW Discharge valves to the “B” and “C” Steam Generators. Depending on the timing of the actions taken by the crew when the “A” MSIV is closed, the “A” S/G pressure may not rise significantly higher than that of the “B” and “C” S/Gs, and the crew will remain in EOP-ECA-2.1 past the SI termination steps (i.e. Step 19). If this situation occurs, the scenario will terminate at Step 20 of EOP-ECA-2.1.

Critical Tasks:

Manually trip the reactor from the control room before entry into FRP-S.1

Safety Significance: Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an incorrect performance that necessitates the operator taking compensating action that would complicate the event mitigation strategy and demonstrates the inability of the operator to recognize a failure or an incorrect automatic actuation of an ESF system or component. The ERG Background Document for E-0 states that one function of E-0 is to verify that all required automatic protective actions occur before transitioning the crew to the appropriate ORG. The verification is important because the subsequent ORGs are based on the assumption that protective systems will protect all CSFs while the ORG is implemented. Not tripping the reactor when it is possible to do so (as in the postulated conditions) forces an immediate extreme challenge to the subcriticality CSF. Additionally, the incorrect performance of failing to trip the reactor necessitates the operator taking compensating action that seriously complicates the event mitigation strategy. This mis-operation constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario.

Control the AFW flow rate to not less than 60 gpm per SG in order to minimize the RCS cooldown rate before an EXTREME (Red Path) challenge develops to the RCS Integrity CSF

Safety Significance: Failure to control the AFW flow rate to the SGs leads to an unnecessary and avoidable extreme challenge to the integrity CSF. Also, failure to perform the critical task increases the challenges to the subcriticality CSF beyond which is irreparably introduced by the postulated plant conditions. Thus, failure to perform the critical task constitutes a demonstrated inability by the operator to take one or more actions that would prevent a challenge to plant safety. It also fails to prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario.

SIMULATOR OPERATOR INSTRUCTIONS

<table>
<tr><th></th><th>Bench Mark</th><th>ACTIVITY</th><th>DESCRIPTION</th></tr>
<tr><td>☐</td><td>Sim. Setup</td><td>Reset to Temp IC 612</td><td></td></tr>
<tr><td>☐</td><td colspan="3">T = 0 Malfunctions:

“B” Condensate Pump OOS:
• IRF EPSV4160B4_069 f: RACK_OUT (“B” Condensate Pump Breaker Racked Out)

PLACE RED CAP on the RTGB Control Switch for the “B” Condensate Pump
PLACE GREEN CAP on the RTGB Control Switch for the “A” Condensate Pump

LI-1417A Hotwell Level Indication OOS
• IOR aoCFWDOD035B f:2

Place WHITE DOT on LI-1417A

RTGB Annunciator APP-006-F7 failed ON
• IMF ANNXN06f07 f:ALARM_ON

Place WHITE DOT on APP-006-F7

Insert the following:
• $006_FCV_626_TRIP IOR diCVCAAI103 d:9 f:OPEN (FCV-626 fails to auto CLOSE)
• $006_FCV_626_TRIP IOR doCVCAAO103O d:10 f:ON (FCV-626 fails to auto CLOSE)
• $006_FCV_626_TRIP IOR doCVCAAO103S d:10 f:ON (FCV-626 fails to auto CLOSE)
• $006_FCV_626_TRIP IRF EPSMCC6_221 d:11 f:RACK_OUT (FCV-626 fails to auto CLOSE)
• IMF MSS03A f:FAIL_TO_CLOSE (“A” MSIV fails to CLOSE)
• IMF MSS03B f:FAIL_TO_CLOSE (“B” MSIV fails to CLOSE)
• IMF MSS03C f:FAIL_TO_CLOSE (“C” MSIV fails to CLOSE)
• IOR diMSSDDI049 f:OPEN (“A” MSIV fails to CLOSE)
• IOR diMSSDDI050 f:OPEN (“B” MSIV fails to CLOSE)
• IOR diMSSDDI051 f:OPEN (“C” MSIV fails to CLOSE)
• IMF RPS01A f:FAILURE_TO_OPEN, AUTO
• IMF RPS01B f:FAILURE_TO_OPEN, AUTO

Place the Simulator in RUN and ACKNOWLEDGE all alarms.</td></tr>
<tr><td>☐</td><td colspan="3">Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.</td></tr>
</table>

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with the following: • Copy of OP-105 marked up for power increase • Attachment 8, Turbine Recommended Start-Up and Loading Times, of GP-005 • Attachment 10, Condenser Backpressure Limit Curve, of GP-005 • 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	
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario N16-1-5.**	
☐	At direction of examiner	**Event 1**	Roll Turbine
☐	Turbine RPM reaches 150 RPM	**Event 2** **$006_ECC_RPM ICO TURXMTET_HP r:15 f:3.3**	High Turbine Eccentricity **NOTE: This malfunction will occur when the Turbine speed reaches 150 RPM**
☐	At direction of examiner	**Event 3** **IMF NIS06A f:4.4E-7**	Loss of Compensation Voltage to Intermediate Range N-35
☐	At direction of examiner	**Event 4** **ICO CVCXMTLT_112 r:01:00 f:100**	VCT Level transmitter LT-112 fails HIGH
☐	At direction of examiner	**Event 5** **IMF RCS12B r: 01:00 f:40**	"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE

	Bench Mark	ACTIVITY	DESCRIPTION
☐	At direction of examiner	**Event 6** **IMF MSS09 f:855700**	Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE
☐	Post-Rx Trip Signal	**Event 7** **IMF RPS01A f:FAILURE_TO_OPEN, AUTO** **IMF RPS01B f:FAILURE_TO_OPEN, AUTO**	Failure of Automatic Rx Trip **NOTE: These malfunctions are inserted at T=0**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N16-1	Scenario #	5	Event #	1	Page	9 of 54
Event Description:	Roll Turbine						

Shortly after taking the watch, the operator will raise power to 5-8% and startup the Turbine using GP-005, "Power Operation."
Booth Operator Instructions: **NA**
Indications Available: **NA**

Time	Pos.	Expected Actions/Behavior	Comments
		GP-005, POWER OPERATION **SECTION 6.3, ROLLING THE TURBINE**	
			Examiner NOTE: Procedure Steps are NOT numbered in a continuous manner because some Steps in GP-005 have been previously signed off/completed.
	RO	(Step 8) WHEN Reactor Power approaches 5% THEN perform the following:	
		• Make a plant announcement that MODE 1 has been entered	
		• Record time MODE 1 entered	
		• Change ERFIS Mode Indication to display MODE 1	
	RO	(Step 9) Adjust Control Rods to maintain Reactor Power between 5% and 8% while continuing with this procedure	
	RO/ BOP	(Step 10) Ensure the ERFIS Calorimetric (CALO) program is properly configured for the current plant operation:	
		• Current Excess Letdown operation	
		• Current AFW Pump operation	
		• Current Steam Generator Blowdown (SGBD) operation.	

Op Test No.:	N16-1	Scenario #	5	Event #	1	Page	10 of 54
Event Description:	**Roll Turbine**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 11) Ensure cooling water is being supplied to the following components per OP-903, Placing Secondary Coolers in Service:	
		• Generator Hydrogen Coolers.	
		• H2 Seal Oil Coolers.	
		• Turbine Lube Oil Coolers.	
		• Exciter Air Coolers.	
	BOP	(Step 12) Equalize hydrogen and air side seal oil temperatures per OP-505, Hydrogen Seal Oil System, Section titled “Equalizing Hydrogen Side and Air Side Seal Oil Temperatures Prior to Rolling Turbine”.	
	BOP	(Step 13) IF the Generator Temperature Recorder is shutdown, THEN…..	
	BOP	(Step 14) Ensure the following recorders and associated instruments monitoring the Turbine Generator are energized and functional to the point necessary to support Turbine operation:	
		• Turbine Generator Supervisory Recorder.	
		• Turbine MSR Temperature Recorder (MSR-TEMP-REC).	
		• Turbine Supervisory Alarm Mimic Display.	
		• Generator Temperature Recorder.	
	BOP	(step 15) Record the As Found turbine eccentricity (ECC) as indicated on the Turbine Supervisory Instrument Recorder.	

Op Test No.: N16-1 Scenario # 5 Event # 1 Page 11 of 54

Event Description: **Roll Turbine**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 16) IF turbine rotor eccentricity (ECC) is greater than or equal to three mils (0.003 inches) as indicated on the Turbine Supervisory Instrument Recorder OR is in alarm on the RTGB Mimic Display, THEN……	
	BOP	(Step 17) Using Curve 7.8 or Attachment 8, Turbine Recommended Start-Up And Loading Times, determine the Time Required to Accelerate to Sync Speed based on point TC-MTL-IMP-CHMBR indicated temperature and record.	
	BOP	(Step 18) Depress the Valve Position Limit ∇ (lower) pushbutton until the Valve Position Limit indicator registers 0% Valve Limit Position.	
	BOP	(Step 19) IF this is a turbine startup following replacement OR repair of any turbine shaft components or bearings, THEN…..	
	BOP	(Step 20) IF AT ANY TIME during turbine startup it is required to stop turbine rolling activities, THEN perform Attachment 6, Securing Turbine During Startup	**NOTE:** This Attachment provides steps for securing the Turbine Startup.
	BOP	(Step 21) Monitor EH oil pressure during latching using ERFIS	
	BOP	(Step 22) Latch the Turbine using one of the following methods:	
		• Depress and hold the Turbine pushbutton until local indication PI-63ASO (Auto Stop Oil Press) is greater than 80 psig	**NOTE:** The BOP will contact the AO at the Turbine Standard, and direct that pressure on PI-63ASO be reported. **Booth Instructor** acknowledge as AO, and report > 80 psig.

Op Test No.:	N16-1	Scenario #	5	Event #	1	Page	12 of 54
Event Description:		**Roll Turbine**					

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 23) WHEN PI-63ASO (Auto Stop Oil Press) is greater than 80 psig, THEN perform the following:	
		• Ensure SL and SR Turbine Stop Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure 1RL, 2RL, 1RR, 2RR, Reheat Stop Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure 1IL, 2IL, 1IR, 2IR, Intercept Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure GLU, GLL GRU, GRL Governor Valves indicate CLOSED on the EH Turbine Control Panel	
		• Check green Latch Light is ILLUMINATED	
		• Ensure Unit Trip Light is EXTINGUISHED	
	BOP	(Step 24) Record the following data from the EH Pump (Governor Fluid Pump) local flow indications	**NOTE:** The BOP will contact the AO, and direct that the EH Pump local flow indications be reported. **Booth Instructor** acknowledge as AO, and report: FI-4428A – 5 gpm FI-4427A – 3 gpm FI-4428B – 5 gpm FI-4427B – 3 gpm
	BOP	(Step 25) IF either EH Pump Discharge Flow reads greater than 6 gpm OR IF either Eh Pump Drain Flow indicated greater that 4 gpm, THEN…	**NOTE:** No EH Pump Discharge Flow is greater than 6 gpm.

Op Test No.:	N16-1	Scenario #	5	Event #	1	Page	13 of 54
Event Description:		**Roll Turbine**					

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 26) IF the Turbine has rolled off the Turning Gear AND it is desired to place the Turbine back on the Turning Gear, THEN…	**NOTE:** The Turbine has NOT rolled off the Turning Gear.
	BOP	(Step 27) PERFORM the Turbine Valve/Trip Test	
		• Trip the Turbine by simultaneously depressing the Thing and Turbine Trip pushbuttons	
		• CHECK the following Valves:	
		• SL and SR, Turbine Stop Valves - CLOSED	
		• 1RL, 2RL, 1RR, 2RR, Reheat Stop Valves - CLOSED	
		• 1IL, 2IL, 1IR, 2IR, Intercept Valves - CLOSED	
		• Monitor EH pressure during latching using ERFIS	
		• Latch the Turbine using one of the following methods:	
		• Depress and hold the Turbine Latch pushbutton until local indication PI-63ASO (Auto Stop Oil Press) is greater than 80 psig	**NOTE:** The BOP will contact the AO at the Turbine Standard, and direct that pressure on PI-63ASO be reported. **Booth Instructor** acknowledge as AO, and report > 80 psig.
		• WHEN PI-63ASO (Auto Stop Oil Press) is greater than 80 psig THEN perform the following:	
		• Ensure SL and SR, Turbine Stop Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure 1RL, 2RL, 1RR, 2RR, Reheat Stop Valves indicate OPEN on the EH Turbine Control Panel	

Op Test No.:	N16-1	Scenario # 5	Event # 1	Page	14 of 54
Event Description:		**Roll Turbine**			

Time	Pos.	Expected Actions/Behavior	Comments
		• Ensure 1IL, 2IL, 1IR, 2IR, Intercept Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure GLU, GLL GRU, GRL Governor Valves indicate CLOSED on the EH Turbine Control Panel	
		• Check green Latch Light is ILLUMINATED	
		• Ensure Unit Trip Light is EXTINGUISHED	
		• Direct an Operator to trip the Turbine locally at the Turbine Front Standard by positioning the Turbine Trip Lever to the TRIP Position	**NOTE:** The BOP will contact the AO at the Turbine Standard, and direct that the Turbine be tripped. **Booth Instructor** acknowledge as **AO**, and use: **IRF TUR004 f:TRIPPED** and report that the **Turbine has been tripped**.
		• Check the following:	
		• SL and SR, Turbine Stop Valves - CLOSED	
		• 1RL, 2RL, 1RR, 2RR, Reheat Stop Valves - CLOSED	
		• 1IL, 2IL, 1IR, 2IR, Intercept Valves - CLOSED	
		• Direct the Operator at the Turbine Front Standard to reset the Turbine locally by placing the Turbine Trip Lever to RESET and holding (lever will be released in Section 6.3 Step 27.j)	**NOTE:** The BOP will contact the AO at the Turbine Standard, and direct that the Turbine be latched. **Booth Instructor** acknowledge as **AO**, and use: **IRF TUR004 f:RESET_HOLD** And report that the Turbine has been reset.
		• Check the following:	
		• Ensure SL and SR, Turbine Stop Valves indicate OPEN on the EH Turbine Control Panel	

Op Test No.:	N16-1	Scenario #	5	Event #	1	Page	15 of 54
Event Description:		**Roll Turbine**					

Time	Pos.	Expected Actions/Behavior	Comments
		• Ensure 1RL, 2RL, 1RR, 2RR, Reheat Stop Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure 1IL, 2IL, 1IR, 2IR, Intercept Valves indicate OPEN on the EH Turbine Control Panel	
		• Ensure GLU, GLL GRU, GRL Governor Valves indicate CLOSED on the EH Turbine Control Panel	
		• Check green Latch Light is ILLUMINATED	
		• Ensure Unit Trip Light is EXTINGUISHED	
		• (Operator at the Front Standard) WHEN PI-63ASO (Auto Stop Oil Press) indicates greater than 80 psig, THEN position the Turbine Trip Lever to NORMAL.	**NOTE:** The BOP will contact the AO at the Turbine Standard, and direct that the Turbine Trip Lever to Normal when PI-63ASO is greater than 80 psig. **Booth Instructor** acknowledge as AO, and use: **IRF TUR004 f:NORMAL** And report the Turbine Trip Lever has been returned to Normal.
	BOP	(Step 30) Depress the Valve Position Limit Δ (raise) pushbutton until the Valve Position Limit indicator stops rising.	
	BOP	(Step 31) Depress the Oper Auto pushbutton	
	BOP	(Step 33) Set a speed of 490 rpm to 510 rpm in the Setter display using the REF ↓ and/or REF ↑ pushbuttons.	
	BOP	(Step 34) Set the Acceleration Rate thumbwheel to 50 rpm/minute	

Op Test No.: N16-1 Scenario # 5 Event # 1 Page 16 of 54

Event Description: **Roll Turbine**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 35) Record steam inlet pressure as indicated on PI-1304 (HP Turb Throttle Press)	
	BOP	(Step 36) Record Condenser back pressure as indicated on PI-1310 (LP Turb A Cond Press Indicator) and PI-1311 (LP Turb B Cond Press Indicator)	
	BOP	(Step 37) WHEN steam inlet pressure is at least 600 psig as indicated on PI-1304 (HP Turb Throttle Press) [Step 35] AND Condenser back pressure is less than or equal to 3.8 inches Hg Abs on PI-1310 (LP Turb 'A' Cond Press Indicator) and PI-1311 (LP Turb 'B' Cond Press Indicator) [Step 36] THEN depress the Go pushbutton to raise speed.	
	BOP	(Step 38) Perform the following as turbine speed raises;	
		• Ensure turning gear disengages	
		• IF governor valve leakage is causing turbine speed to raise above the speed into the Setter, THEN…	
		• IF Turbine speed stabilizes in resonant speed range, THEN…	
		• IF Turbine speed exceeds 1395 rpm AND is NOT under positive control of the Operator, THEN…	
When the Turbine Eccentricity Alarms move to Event #2.			

Op Test No.:	N16-1	Scenario #	5	Event #	2	Page	17 of 54
Event Description:	**High Turbine Eccentricity**						

When the Turbine is rolling, a HIGH Eccentricity condition will develop on the Main Turbine. The operator will respond using AOP-006, "Turbine Eccentricity/Vibration," and place the Turbine startup on HOLD.

Booth Operator Instructions: **$006_ECC_RPM ICO**
TURXMTET_HP r:15 f:3.3

Indications Available:

- RTGB Annunciator APP-008-A8, TURBINE SUPERVISORY INSTRUMENT
- Red ECC status light on Turbine Status Light Panel is LIT
- Turbine Supervisory Instrumentation Recorder indicates Turbine Eccentricity at 3.3 mils (If/When selected)

Time	Pos.	Expected Actions/Behavior	Comments
		APP-008-A8, TURBINE SUPERVISORY INSTRUMENT	
	BOP	(Step 1) IF caused by High Rotor Eccentricity, THEN REFER TO AOP-006	
		AOP-006, TURBINE ECCENTRICITY/VIBRATION	
	BOP	(Step 1) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	
	BOP	(Step 2) CHECK Turbine Speed - LESS THAN OR EQUAL TO 600 RPM	
	BOP	(Step 3) CHECK Turbine Eccentricity On TURBINE SUPERVISORY INSTRUMENT RECORDER - LESS THAN 3 MILS	
	BOP	(Step 3 RNO) PERFORM the following:	
		• DEPRESS turbine HOLD pushbutton.	
		• CONTACT Engineering to evaluate conditions and to provide recommended actions.	

Op Test No.: N16-1	Scenario # 5	Event # 2		Page 18 of 54	
Event Description:	**High Turbine Eccentricity**				

Time	Pos.	Expected Actions/Behavior	Comments
		• MAINTAIN turbine speed less than 600 rpm until Engineering provides recommended actions.	**NOTE:** The BOP will suspend the Turbine Startup.
			NOTE: The CRS may call WCC to address the abnormal Turbine condition. If so, **Booth Instructor** acknowledge as WCC.
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.:	N16-1	Scenario #	5	Event #	3	Page	19 of 54
Event Description:	**Loss of Compensation Voltage to Intermediate Range N-35**						

Shortly afterwards, the compensating voltage on Intermediate Range Channel N-35 will fail. The operator will remove the instrument from service using OWP-011, "Nuclear Instrumentation (NI)." The failed channel will require that the Source Range instruments be manually re-energized in the subsequent post-trip conditions. The operator will address Technical Specification LCO 3.3.1, "Reactor Protection System (RPS) Instrumentation," and determine to continue with the power increase.

Booth Operator Instructions: **IMF NIS06A**
f:4.4E-7

Indications Available:

- RTGB Annunciator APP-005-B2, N-35 LOSS OF COMP VOLT
- N35 indication changed slightly on NR-45

Time	Pos.	Expected Actions/Behavior	Comments
		APP-005-B2, N-35 LOSS OF COMP VOLT	
	RO	(Step 1) MONITOR Intermediate Range amps.	
	RO	(Step 2) IF NI-35 has failed, THEN REMOVE NI-35 from service per OWP-011, Nuclear Instrumentation (NI).	
	RO	(Step 3) IF a Reactor shutdown occurs, THEN manually ACTIVATE Source Range NIS.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	(Step 4) REFER TO TS Table 3.3.1-1, Reactor Protection System Instrumentation.	
		OWP-011, NUCLEAR INSTRUMENTATION (NI) **NI-7, NI-35 INTERMEDIATE RANGE**	
	BOP	REMOVE NI-35 from ERFIS SCAN: NIN0035A	
	BOP	START UP RATE CHANNEL SELECT Switch – N36	

Op Test No.:	N16-1	Scenario #	5	Event #	3	Page	20 of 54
Event Description:	**Loss of Compensation Voltage to Intermediate Range N-35**						

<table>
<tr><th>Time</th><th>Pos.</th><th colspan="3">Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>BOP</td><td colspan="3">LEVEL TRIP Switch - Bypass</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td colspan="6">TECHNICAL SPECIFICATION 3.3.1, REACTOR PROTECTION SYSTEM (RPS) INSTRUMENTATION</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">LCO 3.3.1: The RPS instrumentation for each Function in Table 3.3.1-1 shall be OPERABLE.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">APPLICABILITY: According to Table 3.3.1-1.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">NOTE: Separate Condition entry is allowed for each Function.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that ACTION F.1or F.2 must be entered.</td></tr>
<tr><td>F. THERMAL POWER > P-6 and < P-10, one Intermediate Range Neutron Flux channel inoperable.</td><td>F.1 Reduce THERMAL POWER to < P-6.

OR

F.2 Increase THERMAL POWER to > P-10.</td><td>2 hours

2 hours</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td colspan="6">At the discretion of the Lead Examiner move to Event #4.</td></tr>
</table>

Event Description: **VCT Level transmitter LT-112 fails HIGH**

Following this, VCT Level Transmitter LT-112 will fail HIGH causing LCV-115A to divert all letdown flow to the CVCS HUTs and result in an automatic makeup to the VCT. The operator will respond in accordance with AOP-003, "Malfunction of Reactor Makeup Control." After this, the power increase will continue.

Booth Operator Instructions: **ICO CVCXMTLT_112 r:01:00 f:100**

Indications Available:

- RTGB Annunciator APP-003-E3, VCT HI/LO LVL
- LT-112 indicates HIGH on ERFIS
- LCV-115 Amber status light is LIT (indicating full divert to CVC HUT)
- Auto Makeup occurs

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-003, MALFUNCTION OF REACTOR MAKEUP CONTROL	
	RO	(Step 1) Check for Failure of A Level Transmitter as follows:	**NOTE:** An Auto Makeup is likely to occur due to Letdown being diverted to the radwaste system.
		• Obtain a VCT level for LT-115 using ERFIS	
		• PT ID CHL0115A	
		• Obtain a VCT level for LT-112 using ERFIS	
		• PT ID CHL0112A	
		• Check VCT level indicator – OSCILLATING LEVEL DEVIATION OBSERVED	
	CRS	(Step 1.c RNO) GO to Step 1.e	
	RO	• CHECK VCT level deviation between LT-112 and LT-115 – GREATER THAN 8 INCHES (13%)	
	CRS	(Step 2) CHECK LT-115 - FAILED	**NOTE:** LT-115 is NOT failed.

Op Test No.:	N16-1	Scenario #	5	Event #	4	Page	22 of 54
Event Description:	**VCT Level transmitter LT-112 fails HIGH**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 2 RNO) GO to Step 4	
	RO	(Step 4) CHECK LT-112 - FAILED	
	RO	(Step 5) Stabilize the RCS Makeup System as follows:	
		• Check LT-112 – FAILED HIGH	
		• Place LCV-115A, VCT/HLDP TK DIV, Control Switch to VCT	
		• Obtain Hagan Racks Key number 10	
		• Place VCT Level Transmitter Selector Switch located in Hagan Rack #19, IN LT-115 POSITION	**NOTE:** The BOP will go to the Hagan Room. **Booth Instructor** use IRF CVC067 f:LT-115.
		• Place the LCV-115A Control Switch to AUTO	
		• Contact I&C to repair failed channel	**NOTE:** The CRS may call WCC/I&C to address the failed channel. If so, **Booth Instructor** acknowledge as WCC/I&C.
	CRS	(Step 6) Make PA Announcement for Procedure Entry	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 7) Implement the EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	RO	(Step 8) Check VCT Level – LESS THAN 12.5 INCHES (21%)	**Examiner NOTE:** All required actions have been completed for this failure. Move to the next event as desired.

Op Test No.:	N16-1	Scenario #	5	Event #	4	Page	23 of 54
Event Description:	**VCT Level transmitter LT-112 fails HIGH**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 8 RNO) IF VCT level lowers to less than 12.5 inches (21%) THEN perform Steps 9 and 10.	
	CRS	• Go to Step 11.	
	RO	(Step 11) Check VCT Level – LESS THAN 20 INCHES (33%)	
	CRS	(Step 11 RNO) Go to Step 21	
	RO	(Step 21) Check VCT Level – LESS THAN 51.5 INCHES (86%)	
	RO	(Step 22) Verify Charging and Letdown Flows are Normal for Plant Conditions	
	RO	(Step 23) Check APP-003-D5, BA FLOW DEV - ILLUMINATED	
	CRS	(Step 23 RNO) Go to Step 28.	
	RO	(Step 28) Check APP-003-E5, MAKEUP WATER DEV - ILLUMINATED	
	CRS	(Step 28 RNO) Go to Step 34	
	RO	(Step 34) Check Boration - REQUIRED	
	CRS	(Step 34 RNO) GO to Step 37	
	RO	(Step 37) Check Dilution - REQUIRED	

Event Description: **VCT Level transmitter LT-112 fails HIGH**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 37 RNO) Go to Step 40.	
	CRS	(Step 40) Check Technical Specifications, Section 3.4.17, Chemical and Volume Control System (CVCS), For Applicable LCO	
	CRS	(Step 41) Return to Procedure and Step in Effect	
At the discretion of the Lead Examiner move to Event #5.			

Op Test No.:	N16-1	Scenario #	5	Event #	5	Page	25 of	54
Event Description:	**"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE**							

Next, a Thermal barrier leak will develop on the "B" RCP and Flow Control Valve FCV-626 will fail to CLOSE. The operator will respond in accordance with APP-001-C1, "RCP THERM BAR COOL WTR HI FLOW," and AOP-014, "Component Cooling Water Malfunction." The operator will address Technical Specification LCO 3.6.1, "Containment," and Technical Specification LCO 3.6.3, "Containment Isolation Valves."

Booth Operator Instructions: **IMF RCS12B**
r: 01:00 f:40

Indications Available:

- RTGB Annunciator APP-001-C1, RCP THERM BAR COOL WTR HI FLOW
- RTGB Annunciator APP-001-B2, RCP LABYRTH LO ΔP
- Seal Injection flow on "B" RCP rising
- "B" RCP Thermal Barrier ΔP, PI-123A indicating 0"
- CCW Surge Tank Level rising
- RTGB Annunciator APP-036-D8, PROCESS MONITOR HI RAD

Time	Pos.	Expected Actions/Behavior	Comments
		APP-001-C1, RCP THERM BAR COOL WTR HI FLOW	
	RO	(Step 1) IF CCW AND Seal Injection are lost to any RCP, THEN…	
	RO	(Step 2) IF result of CCW Pump start only, THEN…	
	CRS	(Step 3) IF a failure of an RCP Thermal Barrier has occurred, THEN REFER to AOP-014.	**NOTE:** The CRS will transition to AOP-014.
	RO	(Step 4) IF a RCP Number 1 Seal failure has occurred, THEN…	
		AOP-014, COMPONENT COOLING WATER MALFUNCTION	

Op Test No.:	N16-1	Scenario #	5	Event #	5	Page	26 of	54

Event Description: **"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 1) IMPLEMENT The EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 2) NOTIFY Plant Personnel of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 3) GO TO Appropriate Section for Indicated Malfunction:	
		• Rising CCW inventory OR R-17 Alarming – Go to Section B	**NOTE:** The CRS will address Section B of AOP-014.
AOP-014, COMPONENT COOLING WATER MALFUNCTION SECTION B, RISING CCW INVENTORY OR R-17 ALARMING			
	RO	(Step 1) CHECK FCV-626, THERM BAR FLOW CONT – AUTO CLOSED	
	RO	(Step 1 RNO) PERFORM the following:	
		IF APP-001-C1, RCP THERM BAR COOL WTR HI FLOW, is ILLUMINATED, THEN PERFORM ONE of the following:	
		• ENSURE FV-626 is CLOSED AND GO TO Step 2. (RTGB)	**NOTE:** FCV-626 will fail to CLOSE.
		OR	
		• IF FCV-626 will NOT close, THEN COSE CC-735, THERM BAR OUT ISO, AND GO TO Step 2.	**NOTE:** CC-735 will be CLOSED.
	RO	(Step 2) CHECK RCP Seal Leakoff – ANY GREATER THAN 5 GPM	
	CRS	(Step 2 RNO) GO TO Step 4.	

Op Test No.:	N16-1	Scenario #	5	Event #	5	Page	27 of 54	
Event Description:	**"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE**							

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 4) CHECK the following indications of an RCP Thermal Barrier Failure – BOTH EXIST	
		• RCP Thermal Barrier Cooling – ISOLATED DUE TO HIGH FLOW	**NOTE:** Thermal Barrier is isolated by CC-735.
		AND	
		• R-17, COMPONENT COOLING WATERRADIOACTIVE LIQUID – RISING TREND OR ALARM	**NOTE:** R-17 is in alarm.
	RO	(Step 5) CHECK Seal Injection Flow to the Affected RCP(s) - LOST	
	CRS	(Step 5 RNO) GO TO Step 7.	
	CRS	(Step 7) DISPATCH Operator to Containment to Perform Attachment 6, RCP Thermal Barrier Isolation	**NOTE:** The CRS may call WCC to address the performance of Attachment 6. If so, **Booth Instructor** acknowledge as WCC.
	RO	(Step 8) CHECK RCP Status as follows:	
		• CHECK RCP B OR C - RUNNING	
		• CHECK RCP B - RUNNING	
		• CHECK RCP C - RUNNING	
	CRS	(Step 9) WHEN Attachment 6 is completed, THEN GO TO Step 23	**NOTE:** This Attachment will require a Containment Entry, and will not be completed within the remainder of the Scenario.

Op Test No.:	N16-1	Scenario #	5	Event #	5	Page	28 of 54
Event Description:	**"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE**						

Time	Pos.	Expected Actions/Behavior	Comments
			Examiner NOTE: Because of the dynamic nature of the this event , and the response, the CRS may NOT check the Tech Specs. If not, evaluate the Technical Specification after the Scenario is complete.
TECHNICAL SPECIFICATION 3.6.3, CONTAINMENT ISOLATION VALVES			
	CRS	LCO 3.6.3 Each containment isolation valve shall be OPERABLE	
	CRS	APPLICABILITY: MODES 1, 2, 3 AND 4.	
	CRS	ACTIONS	
		NOTES	
		1. Penetration flow path(s) may be unisolated intermittently under administrative controls.	
		2. Separate Condition entry is allowed for each penetration flow path.	
		3. Enter applicable Conditions and Required Actions for systems made inoperable by containment isolation valves.	
		4. Enter applicable Conditions and Required Actions of LCO 3.6.1, "Containment", when isolation valve leakage results in exceeding the overall containment leakage rate acceptance criteria.	**NOTE:** When FCV-626 is unisolated and failed OPEN, Technical Specification LCO 3.6.1 is NOT met.
		5. Enter applicable Conditions and Required Actions of LCO 3.6.8, "Isolation Valve seal Water (IVSW) System" when required IVSW supply to a penetration flowpath is isolated.	

Op Test No.:	N16-1	Scenario #	5	Event #	5	Page	29 of 54

Event Description: **"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE**

Time	Pos.	Expected Actions/Behavior			Comments
		CONDITION	REQUIRED ACTION	COMPLETION TIME	**NOTE:** The CRS will determine that ACTION A.1, and A.2 must be entered.
		A. One or more penetration flow paths with one containment isolation valve inoperable.	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured. AND A.2 NOTE: Isolation devices in high radiation areas may be verified by use of administrative means. Verify the affected penetration flow path is isolated.	4 hours Once per 31 days for isolation devices outside containment AND Prior to entering MODE 4 from MODE 5 if not performed within the previous 92 days for isolation devices inside containment.	
TECHNICAL SPECIFICATION 3.6.1, CONTAINMENT					
	CRS	LCO 3.6.1: Containment shall be OPERABLE.			
	CRS	APPLICABILITY: MODES 1, 2, 3, and 4.			
	CRS	ACTIONS			

Op Test No.:	N16-1	Scenario #	5	Event #	5	Page	30	of	54
Event Description:	**"B" RCP Thermal Barrier Leak/Flow Control Valve FCV-626 fails to CLOSE**								

Time	Pos.	Expected Actions/Behavior			Comments
		CONDITION	REQUIRED ACTION	COMPLETION TIME	**NOTE:** The CRS will determine that ACTION A.1 must be entered until FCV-626 is isolated.
		A. Containment inoperable.	A.1 Restore containment to OPERABLE status.	1 hour	
At the discretion of the Lead Examiner move to Events #6-7.					

Op Test No.: N16-1 Scenario # 5 Event # 6 & 7	Page 31 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Subsequently, a Steam Rupture will occur downstream of the MSIVs and the MSIVs will fail to CLOSE automatically and manually. Simultaneously, the Reactor will fail to TRIP automatically. The operator will enter EOP-E-0, "Reactor Trip or Safety Injection," and manually trip the reactor. Upon completion of EOP-E-0, the operator will transition to EOP-E-2, "Faulted Steam Generator Isolation," and then when it is realized that all Steam Generators are faulted, transition to EOP-ECA-2.1, Loss of Reactor or Secondary Coolant," and lower AFW flow to each Steam Generator to 60 gpm. While terminating Safety Injection in EOP-ECA-2.1, the "A" MSIV will close and the "A" S/G pressure will rise higher than that of the "B" and "C" S/G's. Since the crew will be in the process of terminating SI in EOP-ECA-2.1, the crew will continue to complete the SI termination steps before transitioning back to EOP-E-2. The scenario will terminate at Step 4.c of EOP-E-2, after the operator has closed the AFW Discharge valves to the "B" and "C" Steam Generators.

Booth Operator Instructions: **IMF MSS09 f:855700**

Indications Available:
- Steam noise heard in the Control Room
- Lowering pressure in all Steam Generators
- Rising level in all Steam Generators
- Rising steam flowing all Steam Generators
- RCS pressure is lowering

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	**NOTE:** The operator will need to trip the Reactor Manually.
		• Rod position indicators - FULLY INSERTED	
		• Rod Bottom Lights - ILLUMINATED	
		• Neutron Flux - LOWERING	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	32 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Manually trip the reactor from the control room before entry into FRP-S.1** Safety Significance: Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an incorrect performance that necessitates the operator taking compensating action that would complicate the event mitigation strategy and demonstrates the inability of the operator to recognize a failure or an incorrect automatic actuation of an ESF system or component. The ERG Background Document for E-0 states that one function of E-0 is to verify that all required automatic protective actions occur before transitioning the crew to the appropriate ORG. The verification is important because the subsequent ORGs are based on the assumption that protective systems will protect all CSFs while the ORG is implemented. Not tripping the reactor when it is possible to do so (as in the postulated conditions) forces an immediate extreme challenge to the subcriticality CSF. Additionally, the incorrect performance of failing to trip the reactor necessitates the operator taking compensating action that seriously complicates the event mitigation strategy. This mis-operation constitutes a significant reduction of safety margin beyond that irreparably introduced by the scenario.			
	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	
		OR	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	33 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• SI equipment - AUTO STARTED	
		CHECK BOTH trains of SI actuated:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	RO/ BOP	Foldout Page:	
		RCP TRIP CRITERIA	
		FAULTED S/G AFW ISOLATION 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	
			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 37**.
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	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	34 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	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	
	BOP	• 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	
		• High steam flow with:	**NOTE:** The High Steam Flow criteria will be met.
		• S/G pressure - LESS THAN 614 PSIG	
		OR	
		• Tavg - LESS THAN 543°F	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	35 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6.b) CHECK MSIVs AND MSIV Bypass Valves ‑ CLOSED	**NOTE:** The valves have failed OPEN and cannot be CLOSED from the RTGB.
	BOP	(Step 6.b RNO) Manually CLOSE valve(s) as necessary.	
	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	**NOTE:** Based on event timing the SI Pumps may or may not be indicating flow.
		• 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	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	36 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	
	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	

Op Test No.: N16-1	Scenario # 5	Event # 6 & 7	Page 37 of 54				

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 17) Locally RESET AND LOAD Instrument Air Compressor(s) As Necessary (38 KW each):	**NOTE:** This step is NOT necessary.
	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:	**NOTE:** Based on timing of events, and response actions to these events, the operator may not perform the RNO.
		• CHECK Motor Driven AFW Pumps – BOTH RUNNING	
		• CHECK S/G Narrow Range levels – TWO S/Gs LESS THAN 16%	
	RO	(Step 6b RNO) IF S/G Narrow Range level lowers to LESS THAN 16% on Two S/Gs, THEN PERFORM Step 6.c. CONTINUE WITH Step 7.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	RO	(Step 7) CHECK AFW Valves In Proper Emergency Alignment:	
		• AFW Header Discharge Valves - FULL OPEN	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	38	of	54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
		• AFW Header Section Valves - FULL OPEN	
		• Steam Driven AFW Pump Discharge Valves - FULL OPEN IF PUMP RUNNING	**NOTE:** it is likely that the SDAFW Pump is 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:	
		• CHECK Containment Pressure - HAS REMAINED LESS THAN 10 PSIG	
		• CHECK CV Spray – NOT ACTUATED	
	RO	(Step 10) CHECK RCP Seal Cooling:	
		• 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:** APP-001-D1 is LIT because CC-735 is CLOSED.
		OR	
		• Seal Injection flow - ADEQUATE	
		• Seal Injection flow - GREATER THAN 6 GPM PER RCP	
	RO	(Step 11) CHECK RCS Temperatures:	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	39 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• With ANY RCP running, RCS average temperature - STABLE AT OR TRENDING TO 547°F	
	RO	(Step 11 RNO) IF temperature is LESS THAN 547°F AND lowering, THEN PERFORM the following:	**NOTE:** Due to the unisolable Steam Rupture the RCS temperature is lowering.
		• 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.	
		• IF RCS cooldown continues, THEN CLOSE MSIVs AND MSIV Bypass Valves.	**NOTE:** The valves have failed OPEN and cannot be CLOSED from the RTGB.
	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]	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	40 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 13.c RNO) GO TO Step 14.	
	RO	(Step 14) CHECK If S/G Secondary Pressure Boundaries Are Intact:	**NOTE:** All Steam Generator pressures are lowering uncontrollably.
		• NONE LOWERING IN AN UNCONTROLLED MANNER	
		• NONE COMPLETELY DEPRESSURIZED	
	CRS	(Step 14 RNO) PERFORM the following:	
		• RESET SPDS AND INITIATE monitoring of Critical Safety Functions Status Trees.	**NOTE:** The Red Path on Subcriticality is due to the IR failure.
		• GO TO EOP-E-2, Faulted Steam Generator Isolation, Step 1.	**NOTE:** The CRS will transition to EOP-E-2.
EOP-E-2, FAULTED STEAM GENERATOR ISOLATION			
	BOP	(Step 1) CHECK MSIVs AND MSIV Bypass valves For Faulted S/G(s) CLOSED:	
		• S/G A:	
		• V1-3A	
		• MS-353A	
		• S/G B:	
		• V1-3B	
		• MS-353B	
		• S/G C:	
		• V1-3C	
		• MS-353C	

Op Test No.: N16-1	Scenario # 5 Event # 6 & 7 Page 41 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1 RNO) Manually CLOSE valve(s) as necessary.	**NOTE:** The valves have failed OPEN and cannot be CLOSED from the RTGB.
	BOP	(Step 2) CHECK If ANY S/G Secondary Pressure Boundary Is Intact	
		• CHECK pressures in ALL S/Gs - ANY STABLE OR RISING	**NOTE:** All Steam Generator pressures are lowering uncontrollably.
	BOP	(Step 2 RNO) IF ALL S/G pressures are lowering in an uncontrolled manner, THEN PERFORM the following:	
		• RESET SPDS.	
		• GO TO EOP-ECA-2.1, Uncontrolled Depressurization Of All Steam Generators, Step 1.	
			NOTE: The CRS will transition to EOP-ECA-2.1.
EOP-ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS			
	RO/ BOP	Foldout Page:	
		SI REINITIATION CRITERIA	
		EOP-E-2 TRANSITION CRITERIA	
		• IF ANY S/G pressure rises at ANYTIME, EXCEPT while performing SI Termination in Steps 10 THROUGH 19, THEN GO TO EOP-E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.	**NOTE:** This criteria is expected to be applicable while in EOP-ECA-2.1.
		EOP-E-3 TRANSITION CRITERIA	
		COLD LEG RECIRCULATION SWITCHOVER CRITERIA	
		AFW SUPPLY SWITCHOVER CRITERIA	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	42	of	54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 1) CHECK Secondary Pressure Boundary:	**NOTE:** The valves have failed OPEN and cannot be CLOSED from the RTGB.
		• CHECK MSIVs AND MSIV Bypass Valves - CLOSED	
	BOP/ CRS	(Step 1.a RNO) Manually OR locally CLOSE valve(s) as necessary, ONE S/G loop at a time:	
		• S/G A	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO. This action will NOT be taken until Step 11 of EOP-ECA-2.1**, **AFTER Phase "A" Containment Isolation is RESET.**
		• V1-3A	
		• MS-353A	
		• S/G B	
		• V1-3B	
		• MS-353B	
		• S/G C	
		• V1-3C	
		• MS-353C	
	BOP	• CHECK Feedwater Isolation:	
		• FW Reg valves – CLOSED	
		• FW Reg Bypass valves – CLOSED	
		• FW Header Section valves - CLOSED	
	BOP	• CHECK Steam Driven AFW Pump Steam Shutoff Valves – CLOSED:	
		• V1-8A, SDAFW PUMP STEAM ISOLATION (MCC-5, CMPT-16F)	

Op Test No.: N16-1	Scenario # 5	Event # 6 & 7	Page 43 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
		• V1-8B, SDAFW PUMP STEAM ISOLATION (MCC-6, CMPT-16M)	
		• V1-8C, SDAFW PUMP STEAM ISOLATION (MCC-6, CMPT-18M)	
	BOP	• CHECK S/G Steam Line PORVs - CLOSED	
	BOP	• CHECK Faulted S/G(s) Blowdown AND Blowdown Sample Valves - CLOSED	
		• CHECK valve status using ERFIS/SPDS.	
	BOP	• Locally ENSURE the following valves CLOSED: (pipe jungle above/right of associated V1-8 valves):	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as AO, and report after 1 minute that the area has too much steam, and that entry cannot be made.
		• BYPASS DRN & WARM-UP LINE TO AFW PUMP	
		• MS-20	
		• MS-29	
		• MS-38	
		• STEAM LINE BEFORE SEAT DRAIN ROOT ISOL	
		• MS-19	
		• MS-28	
		• MS-37	
		• STEAM LINE AFTER SEAT DRAIN ROOT ISOL	
		• MS-21	
		• MS-30	
		• MS-39	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	44 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP/ CRS	(Step 2) CHECK for adequate Shutdown Margin:	**NOTE:** The CRS may call WCC/Chemistry to address the samples. If so, **Booth Instructor** acknowledge as WCC/Chemistry.
		• SAMPLE RCS for boron	
		• SAMPLE PZR for boron	
		• CHECK Shutdown Margin – ADEQUATED FOR COLD SHUTDOWN (When results available)	
	RO/ BOP	(Step 3) CONTROL Feed Flow to MINIMIZE RCS Cooldown:	
		• CHECK cooldown rate in RCS Cold Legs – LESS THAN 100°F in the last 60 minutes	
	BOP	(Step 3.a RNO) LOWER feed flow to 60 gpm to each S/G.	**NOTE:** The crew may take various actions to reduce FW flow to 60 gpm to each S/G, including stopping AFW Pump(s), adjusting Pump discharge valves and/or directing that the AO locally adjust flow (If so, **Booth Instructor** use codes listed BELOW).
	BOP	(Step 3.b) CHECK S/G Narrow Range level in ALL S/Gs – LESS THAN 50%	
		• CHECK RCS Hot Leg temperatures – STABLE OR LOWERING	
		• CHECK ANY S/G Narrow Range Level – LESS THAN 9% [18%]	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	45	of	54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP/ CRS	• OPEN MDAFW HEADER DISCHARGE Valve breakers:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and **use codes** listed **BELOW**.
		• V2-16A, MCC-9, CMPT-2ML	**IRF EPSMCC9_255 f:RACK_OUT**
		• V2-16C, MCC-9, CMPT-3J	**IRF EPSMCC9_256 f:RACK_OUT**
		• V2-16A, MCC-10, CMPT-4C	**IRF EPSMCC10_264 f:RACK_OUT**
		• V2-16B,MCC-10, CMPT-4F	**IRF EPSMCC10_266 f:RACK_OUT**
	BOP/ CRS	• THROTTLE AFFECTED S/G MDAFW HDR DISCH valve to establish a MINIMUM of 60 gpm to the AFFECTED S/G	**NOTE:** The CRS will dispatch an AO.
		• S/G A – V2-16A	**IRF CFW009 r: 35 f:2.2**
		• S/G B – V2-16B	**IRF CFW010 r: 33 f:2**
		• S/G C – V2-16C	**IRF CFW011 r: 31 f:2**
			Examiner NOTE: When AFW flow is throttled to 60 gpm to each S/G a Red Path will exists on the HEAT SINK CSFST. The operator will address FRP-H.1 and immediately return to EOP-ECA-2.1.

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	46 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Control the AFW flow rate to not less than 60 gpm per SG in order to minimize the RCS cooldown rate before an EXTREME (Red Path) challenge develops to the RCS Integrity CSF** Safety Significance: Failure to control the AFW flow rate to the SGs leads to an unnecessary and avoidable extreme challenge to the integrity CSF. Also, failure to perform the critical task increases the challenges to the subcriticality CSF beyond which is irreparably introduced by the postulated plant conditions. Thus, failure to perform the critical task constitutes a demonstrated inability by the operator to take one or more actions that would prevent a challenge to plant safety. It also fails to prevent a significant reduction of safety margin beyond that irreparably introduced by the scenario.			
	RO	(Step 4) 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 4.c RNO) OBSERVE CAUTION prior to Step 5 AND GO TO Step 5	
	RO	(Step 5) CHECK PZR PORVs AND Block Valves:	
		• CHECK power to PORV Block Valves - AVAILABLE	
		• CHECK PORVs - CLOSED	
		• CHECK PORV Block Valves – AT LEAST ONE OPEN	
	BOP	(Step 6) Check Secondary Radiation:	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	47 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
		• REQUEST periodic activity samples of ALL S/Gs	**NOTE:** The CRS may call RP/Chemistry to address the samples. If so, **Booth Instructor** acknowledge as **RP/Chemistry**.
		• CHECK unisolated secondary radiation monitors – HAVE REMAINED NORMAL	
		• R-15, CONDENSER AIR EJECTOR GAS	
		• R-19s S/G Blowdown Radiation	
		• R-31s, STEAMLINE RADIATION MONITORS	
	CRS	• CHECK secondary sample results – NORMAL (When results available)	
	RO	(Step 7) CHECK If RHR Pumps Should Be Stopped:	
		• CHECK RHR pumps – ANY RUNNING WITH SUCTION ALIGNED TO RWST	
		• CHECK RCS pressure:	
		• Pressure – GREATER THAN 275 PSIG [325 PSIG]	
		• Pressure – STABLE OR RISING	
		• RESET SI	
		• STOP RHR pumps	
		• CHECK RCS pressure remains – GREATER THAN 275 PSIG [325 PSIG]	
	RO	(Step 8) CHECK IF CV Spray Should Be Stopped:	
		• CHECK CV Spray Pumps – ANY RUNNING	
	CRS	(Step 8.a RNO) GO TO Step 9.	

Op Test No.: N16-1	Scenario # 5	Event # 6 & 7		Page 48	of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 9) CHECK RWST Level – GREATER THAN 27%	
	RO	(Step 10) RESET SI	
	RO	(Step 11) RESET Containment Isolation:	
		• PHASE A	**NOTE:** The CRS has previously dispatched an AO to locally CLOSE an MSIV. **Booth Instructor: AFTER Phase "A" Containment Isolation is RESET in Step 11**, use: **DMF MSS03A** **DOR diMSSDDI049** To **locally CLOSE the "A" MSIV**. **30 seconds later report that the "A" MSIV has been CLOSED**. **NOTE:** The "A' S/G will rise in comparison to the "B" and "C" S/G's and the criteria for item #2 on the Foldout Page will be met. However, the transition back to EOP-E-2 cannot take place until the SI Termination Step is complete (Step 19).
		• PHASE B	

Op Test No.: N16-1 Scenario # 5 Event # 6 & 7	Page 49 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 12) RESET IVSW System:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and use: **IRF SIS026 f:RESET** **IRF SIS027 f:RESET** and report **after 1 minute** that the **IVSW System has been reset**.
		• IVSW RESET PCV-1922A (In Relay Cabinet ARP-1)	
		• IVSW RESET PCV-1922B (In Relay Cabinet ARP-2)	
	RO	(Step 13) ESTABLISH Instrument Air To CV:	
		• CHECK APP-002-F7, INSTR AIR HDR O PRESS alarm - EXTINGUISHED	
		• RESET IA PCV-1716, INSTRUMENT AIR ISOLATION TO CV	
		• CHECK IA PCV-1716 - OPEN	
	RO	(Step 14) CHECK if SI Accumulators Should Be Isolated:	
		• CHECK at least two RCS Hot Leg temperatures –LESS THAN 430°F	
		• CHECK power to Accumulator Discharge Valves - ENERGIZED	

Op Test No.: N16-1	Scenario # 5	Event # 6 & 7	Page 50 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**		

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 14.b RNO) RESTORE power to Accumulator Discharge Valves by closing the following:	**NOTE:** The CRS/RO will dispatch an AO to CLOSE the Accumulator Isolation Valve motor breakers. **Booth Instructor** acknowledge as **AO**, and use: **IRF EPSMCC5_204 f:RACK_IN** **IRF EPSMCC5_205 f:RACK_IN** **IRF EPSMCC6_232 f:RACK_IN** report after **2 minutes** that the breakers are **CLOSED**.
		• MCC-5 CMPT 9F (SI-865C)	
		• MCC-5 CMPT 14F (SI-865A)	
		• MCC-6 CMPT 10J (SI-865B)	
		• CLOSE ALL Accumulator Discharge Valves	
	BOP	(Step 15) CHECK Power Supply to Charging Pumps - OFFSITE POWER AVAILABLE	
	RO	(Step 16) ESTABLISH Charging Flow:	
		• CHECK Charging Pumps – AT LEAST ONE RUNNING	
		• ESTABLISH desired charging flow:	
		• START additional 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	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	51 of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**						

Time	Pos.	Expected Actions/Behavior	Comments
		• Seal Water Flow Control Valves	
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	
	RO	(Step 17) CHECK If ECCS Flow Should Be Terminated:	
		• CHECK SI pumps – ANY RUNNING	
		• CHECK RCS Subcooling based on Core Exit T/Cs – GREATER THAN 18°F [37°F]	
		• Pressure – GREATER THAN 1650 PSIG	
	CRS	(Step 17.c RNO) OBSERVE CAUTION prior to STEP 3 AND RETURN TO Step 3.	**NOTE:** Based on the EOP-ECA-2.1 Foldout Page criteria being met, the CRS will transition back to EOP-E-2, and isolate the "B" and "C" S/Gs.
EOP-E-2, FAULTED STEAM GENERATOR ISOLATION			
	BOP	(Step 1) CHECK MSIVs AND MSIV Bypass valves For Faulted S/G(s) CLOSED:	
		• S/G A:	**NOTE:** The "A" MSIV and Bypass Valves are CLOSED.
		• V1-3A	
		• MS-353A	
		• S/G B:	**NOTE:** The "B" MSIV is failed OPEN.
		• V1-3B	
		• MS-353B	
		• S/G C:	**NOTE:** The "C" MSIV is failed OPEN.

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	52	of 54
Event Description:	**Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**							

Time	Pos.	Expected Actions/Behavior	Comments
		• V1-3C	
		• MS-353C	
	BOP	(Step 1 RNO) Manually CLOSE valve(s) as necessary.	**NOTE:** The valves have failed OPEN and cannot be CLOSED from the RTGB.
			The CRS may dispatch an AO to locally CLOSE one of the two failed OPEN MSIVs. If so, **Booth Instructor** acknowledge as **AO**.
	BOP	(Step 2) CHECK If ANY S/G Secondary Pressure Boundary Is Intact	
		• CHECK pressures in ALL S/Gs - ANY STABLE OR RISING	**NOTE:** The "A" S/G pressure is stable for plant conditions.
	BOP	(Step 3) IDENTIFY Faulted S/G(s):	
		• CHECK pressures in ALL S/Gs -	
		• ANY S/G PRESSURE LOWERING IN AN UNCONTROLLED MANNER	**NOTE:** The "B" and "C" S/Gs are still faulted.
		OR	
		• ANY S/G COMPLETELY DEPRESSURIZED	
	BOP	(Step 4) ISOLATE Faulted S/G(s):	
		• CHECK Main Feedwater Reg Valve, Reg Bypass Valve AND Header Section Valve to Faulted S/G(s) shut:	
		• S/G B valves - CLOSED	
		• FCV-488	
		• FCV-489	
		• V2-6B	
		• S/G C valves - CLOSED	

Op Test No.:	N16-1	Scenario #	5	Event #	6 & 7	Page	53 of 54

Event Description: **Steam Rupture downstream of the MSIVs w/failure of the MSIVs to CLOSE/ Failure of Automatic Rx Trip**

Time	Pos.	Expected Actions/Behavior	Comments
		• FCV-498	
		• FCV-499	
		• V2-6C	
		• RESET SI	
		• CLOSE AFW Discharge Valve(s) to Faulted S/G(s):	
		• S/G B valves - CLOSED	
		• V2-14B	
		• V2-16B	**NOTE:** The BOP will contact the AO and direct that V2-16B be locally CLOSED. **Booth Instructor** acknowledge as **AO**, and use **IRF CFW010 f:0**.
		• S/G C valves - CLOSED	
		• V2-14C	
		• V2-16C	**NOTE:** The BOP will contact the AO and direct that V2-16C be locally CLOSED. **Booth Instructor** acknowledge as **AO**, and use **IRF CFW011 f:0**.
At the discretion of the Lead Examiner terminate the exam.			

NRC SCENARIO N16-1-5 TURNOVER SHEET

1. **INITIAL CONDITIONS**

a)	Time in Core Life:	EOL
b)	Reactor Power:	3%
c)	Turbine Load:	0 MWe
d)	Boron Concentration:	158 ppm
e)	Rod Height:	127 CB ‘D’
f)	RCS Pressure:	2235 psig
g)	PZR Level:	22.2%
h)	Xenon:	Equilibrium

2. **TECHNICAL SPECIFICATION LCO ACTIONS STATEMENTS IN EFFECT**

T.S. #	Description
None	

3. **CLEARANCES IN EFFECT**
   a) The “B” Condensate Pump is OOS.
4. **CAUTION CAPS IN EFFECT**
   a) None
5. **PROTECTED EQUIPMENT**
   a) “A” Condensate Pump
6. **DEGRADED EQUIPMENT**
   a) LI-1417A, Hotwell Level Indication is OOS (I&C Investigating).
   b) RTGB Annunciator APP-006-F7, “PWST HI/LO LVL,” has failed to the ILLUMINATED condition (I&C is investigating).
7. **SWITCHYARD ACCESS**
   a) Unrestricted (NOT-PROTECTED)
8. **PLANNED EVOLUTIONS**
   a) Raise power to 30% IAW GP-005 starting with Section 6.3
9. **TURNOVER INFORMATION**
   a) The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
10. **REACTIVITY INFORMATION**
    a) The Reactor Engineer (RE) is available in the Control Room
    b) The RE recommends a __00 gallon dilution, made in several 200-300 gallon batch additions
    c) The RE recommends that Control Bank D be at approximately __ steps upon achieving 30%
11. **RISK**
    a) GREEN

Nuclear Training

Committed to Excellence

OPERATIONS TRAINING

N16-1-6

Initial Licensed Operator Training

Rev 111915

THIS EXERCISE GUIDE DOES NOT IMPLEMENT ANY COMMITMENTS

Developed By: ______________________ **Date:** __________

Instructor/Developer

Concurred By: ______________________ **Date:** __________

Line Superintendent/Supervisor/SRO

Approved By: ______________________ **Date:** __________

Superintendent/Supervisor Training

PROGRAM: H B Robinson Operations Training

MODULE: Initial License Operator Training Class 15-1

TOPIC: NRC Simulator Exam

Scenario N16-1-6

REFERENCES:

1. Technical Specification LCO 3.8.1, “AC Sources - Operating” (Amendment 203)
2. AOP-010, “Main Feedwater/Condensate Malfunction” (Rev 33)
3. OP-105, “Maneuvering the Plant When Greater Than 25% Power” (Rev 62)
4. OP-301, “Chemical And Volume Control System” (Rev 112)
5. APP-008 “SW, CW, & TURB GEN AUX” (Rev 67)
6. Technical Specification LCO 3.7.7, “Service Water System (SWS)” (Amendment 176)
7. Technical Specification LCO 3.6.6, “Containment Spray and Cooling Systems” (Amendment 176)
8. AOP-018, “Reactor Coolant Pump Abnormal Conditions” (Rev 31)
9. Technical Specification LCO 3.7.6, “Component Cooling Water (CCW) System” (Amendment 176)
10. Technical Specification LCO 3.4.17, “Chemical and Volume Control System (CVCS)” (Amendment 223)
11. EOP-E-0, “Reactor Trip or Safety Injection” (Rev 6)
12. EOP-ECA-0.0, “Loss of All AC Power” (Rev 4)
13. EOP-ES-1.1, SI Termination” (Rev 2)
14. EOP-ES-0.1, “Reactor Trip Response” (Rev 7)

Validation Time: 100 minutes

Facility:	**H B Robinson**	Scenario No.: **6**	Op Test No.: **N16-1**
Examiners:	______	Operators:	______ (SRO)
	______		______ (RO)
	______		______ (BOP)

Initial Conditions:	The plant is at 100% power (MOL). The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
Turnover:	The following equipment is Out-Of-Service: The "A" EDG is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.8.1 ACTION B.1, B.2, B.3.2.1 and B.3.2.2, and B.4. R-15, Condenser Air Ejector Gas Radiation Monitor is OOS (I&C Investigating). RTGB Annunciator APP-002-F8, "STA AIR HDR LO PRESS," has failed to the ILLUMINATED condition (I&C is investigating). The "B" MFWP has experienced high noise/vibration over the last two hours (Maintenance is investigating).

Event No.	Malf. No.	Event Type*	Event Description
1	1	C-BOP C-SRO	Feedwater Heater Bypass Valve fails OPEN
2	NA	R-RO N-BOP N-SRO	Lower Power
3	2	C-BOP C(TS)-SRO	"C" Service Water Pump Trips
4	3	C-RO C(TS)-SRO	DS Bus De-energizes/"C" CCW Pump Trips on Start
5	4	C-RO C-SRO	"A" RCP Seal Failure
6	5	M-RO M-BOP M-SRO	Loss of Offsite Power
7	5	C-BOP	"B" EDG Fails to Start
8	6	NA	DSDG Trips
9	7	C-BOP	"D" Service Water Pump fails to Auto Start

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

H B Robinson 2016 NRC Scenario #6

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

The following equipment is Out-Of-Service: The following equipment is Out-Of-Service: The "A" EDG is OOS. ACTION has been taken in accordance with Technical Specification LCO 3.8.1 ACTION B.1, B.2, B.3.2.1 and B.3.2.2, and B.4. R-15, Condenser Air Ejector Gas Radiation Monitor is OOS (I&C Investigating). RTGB Annunciator APP-002-F8, "STA AIR HDR LO PRESS," has failed to the ILLUMINATED condition (I&C is investigating). The "B" MFWP has experienced high noise/vibration over the last two hours (Maintenance is investigating).

Shortly after taking the watch, HCV-1459, Heater Bypass Valve will fail OPEN. The crew will implement AOP-010, "Main Feedwater/Condensate Malfunction," and close the valve.

After the overpower transient is stabilized, the WCCS will call the control room and direct that reactor power be lowered to 50% for the purpose of removing the "B" Main Feedwater Pump from service. The operator will lower power in accordance with AOP-038, "Rapid Downpower."

After the power reduction is in progress, the "C" Service Water Pump will trip on overload. This will cause the running Service Water Booster Pump to trip as well. The operator will respond in accordance with various APP-008 annunciators and start a standby Service Water Pump; and then respond in accordance with APP-002-A through D8, "HVH WTR OUTLET LO FLOW," and re-start a Service Water Booster Pump. The operator will address Technical Specification LCO 3.7.7, "Service Water System (SWS)," and Technical Specification LCO 3.6.6, "Containment Spray and Cooling Systems."

Following this, Breaker 52/32A will Trip de-energizing the DS Bus, and stopping the only running Charging Pump and CCW Pump. The operator may address AOP-018, "Reactor Coolant Pump Abnormal Conditions," or various APP's to restore Charging and Seal Injection flow; and then APP-001-F5, CCW PMP LO PRESS, and ensure that the standby CCW Pump started. 10 seconds after the Standby CCW Pumps start, the "C" CCW Pump will trip, and only the "B" CCW will be left running. The operator will address Technical Specification LCO 3.7.6, "Component Cooling Water (CCW) System," and Technical Specification LCO 3.4.17, "Chemical and Volume Control System (CVCS)."

Next, a #1 Seal Failure will occur on the "A" RCP. The crew will implement AOP-018, Reactor Coolant Pump Abnormal Conditions," trip the reactor, stop the pump, and three minutes after the pump is stopped, CLOSE the Seal Leakoff Valve. The crew will enter EOP-E-0, "Reactor Trip or Safety Injection." Simultaneously, a Loss of Offsite Power will occur on the reactor trip, and the "B" Emergency Diesel Generator will fail to automatically start. Additionally, the DS DG will trip.

Upon entry into EOP-E-0, the operator will determine that both ESF buses are de-energized and transition to EOP-ECA-0.0, "Loss of All AC Power." The operator will subsequently start the "B" EDG by depressing the SI Actuate Pushbutton, restore power to Bus E-2, and transition back to EOP-E-0. When Bus E-2 is re-energized, the "D" Service Water Pump will fail to sequence automatically and will need to be manually started.

Upon transition back to EOP-E-0, the crew will complete the immediate actions of EOP-E-0, and continue with AOP-018.

The scenario will terminate when the crew has terminated Safety Injection and re-established Charging/Seal Injection in Step 6 of ES-1.1.

Critical Tasks:

Energize at Least One AC Emergency Bus Before Defeating the Auto Loading of the Safeguards Equipment in EOP-ECA-0.0

Safety Significance: Failure to energize an ac emergency bus constitutes mis-operation or incorrect crew performance in which the crew does not prevent degraded emergency power capacity. Failure to perform the critical task also results in needless degradation of any barrier to fission product release, specifically of the RCS barrier at the point of the RCP seals. Additionally, failure to perform the critical task results in the unnecessary continuation of a situation in which RCS inventory is being lost uncontrollably and cannot be replaced. This situation is equivalent to mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity at a time when a small-break LOCA is in progress. In this case, at least one ac emergency bus can be energized from the control room. Failure to perform the critical task means that RCS inventory lost through the RCP seals cannot be replaced. It also means that the RCP seals remain without cooling and gradually deteriorate. As the seals deteriorate the rate of RCS inventory loss increases.

Manually Start SW Pump for EDG Cooling Prior to the EDG Failing Due to Overheating

Safety Significance: Failure to manually start the SW pump under the postulated plant conditions means that the EDG is running without SW cooling. Running the EDG without SW cooling leads to a high-temperature condition that can result in EDG failure due to damage caused by engine overheating. Under the postulated plant conditions, the running EDG is the only operable EDG. Thus, failure to perform the critical task constitutes mis-operation or incorrect crew performance in which the crew does not prevent “degraded… emergency power capacity.” Even if the crew does not start the SW pump until receipt of engine high temperature alarm(s), the critical task is performed satisfactorily, provided that the EDG does not fail because of damage caused by engine overheating.

SIMULATOR OPERATOR INSTRUCTIONS

<table>
<tr><th></th><th>Bench Mark</th><th>ACTIVITY</th><th>DESCRIPTION</th></tr>
<tr><td>☐</td><td>Sim. Setup</td><td>Reset to Temp IC 613</td><td></td></tr>
<tr><td>☐</td><td colspan="3">T = 0 Malfunctions:

EDG “A” OOS:
• IRF EPSV480E1_120, d:0 f: RACK_OUT (EDG BKR Racked Out)
• IRF EDG01A, d:0 (EDG “A” OOS)
• IRF EDG003, d:0 f: Local (EDG “A” OOS)

PLACE RED CAP on the RTGB Control Switch for EDG “A”

Place GREEN CAPS on the RTGB Control Switches BELOW (See OMM-048, Attachment 9):
• HVS-5 RTGB Switch
• HVE-17 RTGB Switch
• 52/27B RTGB Switch
• 52/28B RTGB Switch
• “B” EDG RTGB Switch
• V1-8A RTGB Switch
• V1-8B RTGB Switch
• V1-8C RTGB Switch
• V2-14A RTGB Switch
• V2-14B RTGB Switch
• V2-14C RTGB Switch
• Protected Switchyard

Place WHITE DOT on APP-010-D2

R-15 OOS
• IRF RMS049 f:PWR_OFF

Place WHITE DOT on R-15
Place WHITE DOT on APP-036-D8
Place WHITE DOT on APP-036-E7

RTGB Annunciator APP-002-F8 failed ON
• IMF ANNXN02F08 f:ALARM_ON

Place WHITE DOT on APP-002-F8

Insert the following:
• $006_RTA_TRIP IMF EDG01B (“B” EDG fails to START on Rx Trip)
• IMF EDG04E f:TRAIN_B (“D” SW Pump fails to Sequence ON when E-2 re-energized)

Verify that the “A” Charging Pump is RUNNING and the “B” and “C” Charging Pumps are OFF.

Place the Simulator in RUN and ACKNOWLEDGE all alarms.</td></tr>
<tr><td>☐</td><td colspan="3">Perform Attachment 2 (Simulator Setup For Exams) of TAP-411.</td></tr>
</table>

	Bench Mark	ACTIVITY	DESCRIPTION
☐	**Crew Briefing** 1. Assign Crew Positions based on evaluation requirements 2. Review the Shift Turnover Information with the crew. 3. Provide the crew with the following: • 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	
☐	At direction of examiner	**Execute Lesson Plan for Simulator Scenario N16-1-6.**	
☐	At direction of examiner	**Event 1** **IMF CFW36**	Feedwater Heater Bypass Valve fails OPEN
☐	At direction of examiner	**Event 2**	Lower Power **NOTE: to initiate this event, the WCCS will call and inform the operator that reactor power be lowered to 50% for the purpose of removing the "B" Main Feedwater Pump from service.**
☐	At direction of examiner	**Event 3** **IMF SWS01C**	"C" Service Water Pump Trips
☐	At direction of examiner	**Event 4** **IRF EPSV480DS_063 f:TRIP** **IMF CCW01C d:10**	DS Bus De-energizes/"C" CCW Pump Trips on Start
☐	At direction of examiner	**Event 5** **IMF RCS13A r:2:00 f:50**	"A" RCP Seal Failure
☐	Post-Rx Trip	**Event 6** **IMF EPS13**	Loss of Offsite Power **NOTE: This event occurs on the Rx Trip**

	Bench Mark	ACTIVITY	DESCRIPTION
☐	Post-Rx Trip	**Event 7**	"B" EDG Fails to Start **NOTE: Failure is inserted at T=0**
☐	Post-Rx Trip	**Event 8** **IMF EDG01C d:2**	DSDG Trips **NOTE: This event occurs on the Rx Trip**
☐	Post-Rx Trip	**Event 9**	"D" Service Water Pump fails to Auto Start **NOTE: Failure is inserted at T=0**
☐	**Terminate the scenario upon direction of Lead Examiner**		

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	9 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**						

Shortly after taking the watch, HCV-1459, Heater Bypass Valve will fail OPEN. The crew will implement AOP-010, "Main Feedwater/Condensate Malfunction," and close the valve.

Booth Operator Instructions: **IMF CFW36**

Indications Available:

- Rx Power starts to RISE
- RTGB Annunciator APP-007-D7, HTR 3A HI/LO LVL
- RTGB Annunciator APP-007-D8, HTR 3B HI/LO LVL
- HCV-1459 Red and Green status lights are LIT

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION	
	BOP	(Step 1) CHECK FRVs - OPERATING PROPERLY (MANUAL OR AUTO):	
		• FCV-478	
		• FCV-488	
		• FCV-498	
	RO/ BOP	(Step 2) CHECK Reactor Trip Setpoint - BEING APPROACHED	**NOTE:** A Power Limit Warning is possible during this event which will require a reduction in power.
	CRS	(Step 2 RNO) IF a reactor trip setpoint is approached, THEN TRIP the reactor and GO TO EOP-E-0, Reactor Trip Or Safety Injection.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
		GO TO Step 4.	
	RO	(Step 4) CHECK Reactor Power - LESS THAN OR EQUAL TO 100%	

Op Test No.: N16-1	Scenario # 6	Event # 1	Page 10 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**		

Time	Pos.	Expected Actions/Behavior	Comments
	RO/ BOP	(Step 4 RNO) IF reactor power exceeds 100%, THEN REDUCE turbine load as necessary using turbine valve limiter to maintain reactor power less than or equal to 100%.	
	CRS	(Step 5) NOTIFY Plant Personnel Of Procedure Entry Using Plant Page System	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 6) GO TO Appropriate Step From Table Below:	
		• Other –Step 35	
	BOP	(Step 35) REDUCE Turbine Load Using Attachment 1 to Match Feedwater And Steam Flows WHILE CONTINUING WITH This Procedure.	**NOTE:** The CRS may assign the BOP to perform this action. **BOP Examiner** follow actions of Attachment 1. **Other Examiners** follow **AOP-010** Actions, **Step 36**, on **Page 11**.
AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION ATTACHMENT 1, REDUCING TURBINE LOAD			
	BOP	(Step 1) REDUCE Turbine Load at 1%/MIN to 5%/ MIN to achieve Goal Specified in Procedure Body:	
		• CHECK control rods – IN AUTOMATIC	
		• CHECK turbine mode - AUTOMATIC	
		• DEPRESS IMP IN pushbutton	
		• SET desired load rate	
		• DEPRESS GO or HOLD pushbutton as needed to reduce turbine load	
		• BORATE using OP-301, RCS Boration Quick Checklist, as necessary to maintain AFD within the operating band	

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	11 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 2) CHECK Goal of Load Reduction - REACHED	
		• To achieve a target power level	
		OR	
		• To match steam flow with feed flow	
		OR	
		• To raise MFP suction pressure	
	BOP	(Step 3) CHECK Current Loading for the following Pumps – LESS THAN MAXIMUM	**NOTE:** The BOP will contact the Outside AO to check associated parameters. **Booth Instructor** report data from Attachment 10.2 of OST-013 **(See Below)**.
		• MFP – 0.710 KILOAMPS	**"A" MFP - .60 KAMPs** **"B" MFP - .59 KAMPs**
		• Condensate Pump – 370 AMPS	**"A" MCP - 360 AMPs** **"B" MCP - 350 AMPs**
		• HDP – 90 AMPS	**"A" HDP - 79 AMPs** **"B" HDP - 78 AMPs**
	BOP	(Step 4) Stop Load Reduction	
	BOP	(Step 5) NOTIFY CRS/SM that Load Reduction is Complete	
AOP-010, MAIN FEEDWATER/CONDENSATE MALFUNCTION			
			Examiner NOTE: Examiners following the **CRS/RO** continue **HERE**.

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	12 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 36) DISPATCH an Operator to Observe Valve positions:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as AO, and report after **1 minute** that the **LCV-1530A and B are operating normally**.
		• LCV-1530A, HDT LEVEL CONTROL VALVE	
		• LCV-1530B, HEATER DRAIN PUMPS SUCTION DUMP TO CONDENSER	
	BOP	(Step 37) DETERMINE If a Heater Drain Tank Level Control Valve has Failed:	
		• CHECK HDT level control valve or controller – HAS MALFUNCTIONED	
	CRS	(Step 37.a RNO) IF HDT Level is controlling correctly, THEN OBSERVE NOTE prior to Step 40 and GO TO Step 40.	
	CRS	(Step 40) CHECK for Leak – CAUSING FW TRANSIENT	**NOTE:** The CRS may dispatch an AO to look for leaks, however, the reason for being in the AOP is because the Heater Bypass valve has opened.
		• Visual indication of leak	
		• FW Heater level alarms	
		• FW Heater normal and alternate drain valve positions level dump valve positions	
		• FW Heater #1 & #2 emergency dump valve positions	
		• Gland Steam Condenser abnormal indications/alarms	

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	13 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 40 RNO) OBSERVE NOTE prior to Step 43 and GO TO Step 43.	
	CRS	(Step 43) DETERMINE If a HDP has malfunctioned:	
		• DISPATCH an operator to evaluate HDPs for damage:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that the **HDPs** are **operating normally**.
		• LISTEN for unusual noise	
		• OBSERVE pump shaft for breakage	
		• OBSERVE for abnormal running current:	
		• A - 4KV Bus 1 CMPT-5	
		• B – 4KV Bus 4 CMPT-25	
		• CHECK pump damage - INDICATED	
	CRS	(Step 43.b RNO) OBSERVE NOTE prior to Step 46 and GO TO Step 46.	
	CRS	(Step 46) DETERMINE if a Condensate Pump has malfunctioned:	
		• DISPATCH an operator to evaluate Condensate Pumps for damage:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that the **Condensate Pumps are operating normally**.
		• LISTEN for unusual noise	
		• OBSERVE pump shaft for breakage	
		• OBSERVE for abnormal running current:	
		• A - 4KV Bus 1 CMPT-6	

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	14 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
		• B – 4KV Bus 4 CMPT-22	
		• CHECK pump damage - INDICATED	
	CRS	(Step 46.b RNO) OBSERVE CAUTION and NOTE prior to Step 49 and GO TO Step 49.	
	BOP	(Step 49) CHECK for HCV-1459 Failure:	
		• CHECK HCV-1459, LP HEATERS BYP - OPEN	
	CRS/ BOP	(Step 50) DISPATCH an Operator to monitor MFP Suction Pressures:	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, read indications from CFW3 and after **1 minute** report the suction pressure for **both pumps**.
		• PI-1433 – "A" FW PUMP SUCTION PRESSURE	
		• PI-1434 – "B" FW PUMP SUCTION PRESSURE	
	CRS/ BOP	(Step 51) CHECK MFP Suction Pressures – LESS THAN 400 PSIG	
	CRS	(Step 51 RNO) GO TO Step 54.	
	BOP	(Step 54) CLOSE HCV-1459	
	CRS	(Step 55) CONTACT I&C to Troubleshoot and Correct HCV-1459 Problem	**NOTE:** The CRS may call WCC/I&C to address the Valve failure. If so, **Booth Instructor** acknowledge as WCC/I&C.

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	15 of	57
Event Description:		**Feedwater Heater Bypass Valve fails OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 56) GO TO Step 58	
	BOP	(Step 58) CHECK S/G Level – AT OR TRENDING TO PROGRAM	
	RO	(Step 59) CHECK Tavg – AT OR TRENDING TO Tref	
	CRS	(Step 60) CONTACT Maintenance to Troubleshoot and Correct the Feedwater Problem	**NOTE:** The CRS may call WCC/I&C to address the Valve failure. If so, **Booth Instructor** acknowledge as WCC/I&C.
	CRS	(Step 61) IMPLEMENT EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	RO	(Step 62) CHECK Total Reactor Power Change – LESS THAN 15%	
	RO	(Step 63) CHECK APP-005-B5, ROD BANDS A/B/C/D LO LIMIT - EXTINGUISHED	
	RO	(Step 64) MONITOR Axial Flux Difference to Ensure Compliance with TS 3.2.3	
	BOP	(Step 65) NOTIFY Load Dispatcher of Unit's Load Capability	**NOTE:** The BOP will call Load Dispatcher. If so, **Booth Instructor** acknowledge as Load Dispatcher.
	CRS	(Step 66) RETURN TO Procedure and Step In Effect	

Op Test No.:	N16-1	Scenario #	6	Event #	1	Page	16 of 57
Event Description:	**Feedwater Heater Bypass Valve fails OPEN**						

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will likely conduct an Alignment Brief.
At the discretion of the Lead Examiner move to Event #2.			

Op Test No.:	N16-1	Scenario #	6	Event #	2	Page	17 of 57
Event Description:		**Lower Power**					

After the overpower transient is stabilized, the WCCS will call the control room and direct that reactor power be lowered to 50% for the purpose of removing the "B" Main Feedwater Pump from service. The operator will lower power in accordance with AOP-038, "Rapid Downpower."	
Booth Operator Instructions:	**As WCCS, call Control Room and state the following:** **"A step change has occurred on the "B" Main Feedwater Pump vibrations, and station management has directed that reactor power be lowered to 50% using AOP-038 at 1-2%/minute for the purpose of removing the "B" Main Feedwater Pump from service.**
Indications Available:	**NA**

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-038, RAPID DOWNPOWER	
	BOP	(Step 1) NOTIFY Plant Personnel Of Procedure Entry Using The Plant Page System	
	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	
		• Target Power Level ___	
		• Target Rod Height ___	**NOTE:** The RO will determine __ Steps.
		• Corrected Boration ___	**NOTE:** The RO will determine __ gallons.
	RO	(Step 3) CHECK Required Power Reduction Rate - LESS THAN OR EQUAL TO 5%/MINUTE	
	CRS	(Step 4) PERFORM Brief Of Control Room Personnel To Include The Following:	

Op Test No.:	N16-1	Scenario #	6	Event #	2	Page	18 of 57
Event Description:		**Lower Power**					

Time	Pos.	Expected Actions/Behavior	Comments
		• Reason for downpower	
		• Target Power Level	
		• Target Rod Height	
		• Rate of load reduction	
		• Amount of boric acid addition	
	RO	(Step 5) ENERGIZE All Available PZR Heaters	
		• PZR HTR CONTROL GROUP	
		• PZR HTR BACK-UP GROUP A	
		• PZR HTR BACK-UP GROUP B	
	RO	(Step 6) CHECK Rod Control - IN AUTO	
	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 19**.
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.	

Op Test No.:	N16-1	Scenario #	6	Event #	2	Page	19 of 57
Event Description:		**Lower Power**					

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	
		• CHECK EH Turbine Control - IN OPER AUTO	
		• PREPARE For Turbine Load Reduction As Follows:	
		• CHECK IMP IN - ILLUMINATED	

Op Test No.:	N16-1	Scenario #	6	Event #	2	Page	20 of 57
Event Description:	**Lower Power**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 8.b.1 RNO 1) IF Turbine Load reduction is available using IMP IN, THEN PERFORM the following:	
		• DEPRESS IMP IN pushbutton	
		• CHECK IMP IN light illuminated	
		• CHECK IMP OUT light extinguished	
	BOP	(Step 8.b) SET desired load in the SETTER	
		• SELECT the desired Load Rate	
		• 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:	
		• ADJUST Load Rate	
		OR	
		• DEPRESS GO and HOLD pushbuttons	
	CRS/ BOP	(Step 10) INITIATE Notification of The Following:	**NOTE:** The CRS may ask SM/WCC/Communicator to address. If so, **Floor Instructor** acknowledge.
		• 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	

Op Test No.:	N16-1	Scenario #	6	Event #	2	Page	21 of 57
Event Description:		Lower Power					

Time	Pos.	Expected Actions/Behavior	Comments
		• NRC within 4 hours	
	BOP	(Step 11) CHECK Auxiliary Boilers - AT LEAST ONE OPERATING	
	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	
	RO	(Step 13) CHECK Axial Flux Distribution - WITHIN TARGET BAND	
	BOP	(Step 14) CHECK APP-006-F5, STEAM DUMP ARMED - EXTINGUISHED	
	RO	(Step 15) CHECK Any Of The Following Conditions - MET:	
		• 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	
At the discretion of the Lead Examiner move to Event #3.			

Op Test No.:	N16-1	Scenario #	6	Event #	3	Page	22 of 57
Event Description:	**“C” Service Water Pump Trips**						

After the power reduction is in progress, the “C” Service Water Pump will trip on overload. This will cause the running Service Water Booster Pump to trip as well. The operator will respond in accordance with various APP-008 annunciators and start a standby Service Water Pump; and then respond in accordance with APP-002-A through D8, “HVH WTR OUTLET LO FLOW,” and re-start a Service Water Booster Pump. The operator will address Technical Specification LCO 3.7.7, “Service Water System (SWS),” and Technical Specification LCO 3.6.6, “Containment Spray and Cooling Systems.”

Booth Operator Instructions: **IMF SWS01C**

Indications Available:

- RTGB Annunciator APP-008-F4, SW PMP A/B/C/D OVLD
- RTGB Annunciator APP-008-F7, SOUTH SW HDR LO PRESS
- RTGB Annunciator APP-008-F8, NORTH SW HDR LO PRESS
- SW North Header Pressure PI-1616 indicating ≈12 psig
- SW South Header Pressure PI-1684 indicating ≈13 psig
- “C” SW Pump Green and Red status lights LIT
- “A’ SW Booster Pump trips
- RTGB Annunciator APP-002-A8 THROUGH D8, HVH-1(2-4) WTR OUTLET LO FLOW

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The crew will likely place the Turbine in HOLD.
		APP-008-F4, SW PMP A/B/C/D OVLD	
	BOP	(Step 1) IF an operating SW Pump has tripped, THEN PERFORM the following:	
		• START a Standby Pump.	
		• DISPATCH operator to check breaker(s) AND Current Limiter Fuses: SW Pump C - 480V Bus E2 (CMP 24A)	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as **AO**, and report after **10 minutes** that the **“C” SW Pump motor is “Hot to the touch.”**
		• THROTTLE CCW Heat Exchanger Return Valves, as necessary, to maintain 40 to 50 psig in the SW Headers.	**NOTE:** This action is NOT needed (Starting the “D” SW Pump will restore system pressure).

Op Test No.:	N16-1	Scenario #	6	Event #	3	Page	23 of 57
Event Description:	**“C” Service Water Pump Trips**						

Time	Pos.	Expected Actions/Behavior	Comments
	CRS	(Step 2) IF a single-phase open circuit condition is suspected ENTER AOP-026.	**NOTE:** This action will need further investigation.
		APP-002-A8, HVH-1 WTR OUTLET LO FLOW	
	BOP	(Step 1) IF the operating Service Water Booster Pump has tripped, THEN start Standby Service Water Booster Pump.	
	BOP	(Step 2) IF no Service Water Booster Pump can be started, THEN…..	**NOTE:** The Standby SW Booster Pump will start.
	BOP	(Step 3) IF V6-33A (SW Booster Pump 'A' Supply to HVH-1) has closed, THEN….	**NOTE:** V6-33A has NOT CLOSED.
	BOP	(Step 4) IF a Service Water rupture outside of the HVH boundaries is indicated, THEN…..	**NOTE:** There is no SW Piping Rupture.
	BOP	(Step 5) IF required, THEN dispatch personnel to check local indications:	**NOTE:** The CRS/BOP may dispatch an AO. If so, **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that the **system flows/pressures are normal and that the standby SW Booster Pump is NOT rotating in reverse**.
		• FI-1698A (HVH-1 Outlet Flow).	
		• PI-1646A (HVH-1 Outlet Pressure).	
		• Standby Service Water Booster Pump rotation.	
	BOP	(Step 6) IF standby Service Water Booster Pump check valve is stuck open, THEN…..	**NOTE:** The standby SW Booster Pump Check Valve is NOT stuck OPEN.

Op Test No.:	N16-1	Scenario #	6	Event #	3	Page	24 of 57
Event Description:	**"C" Service Water Pump Trips**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 7) IF a SW leak exists inside the CV, THEN…..	**NOTE:** There is no SW leak in the CV.
	CRS	(Step 8) IF at least 800 gpm flow through HVH-1 can NOT be established, THEN declare HVH-1 inoperable and refer to ITS LCO 3.6.6.	**NOTE:** Once the standby SW Booster Pump is started LCO 3.6.6 will be met.
	BOP	(Step 9) IF required, THEN ensure correct valve alignment in accordance with OP-903, Service Water System.	**NOTE:** This action will not be required.
	BOP	(Step 10) IF alarm is invalid, THEN ….	**NOTE:** The alarm is valid.
			NOTE: The CRS may call WCC to address the "C" SW Pump failure. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: The CRS may address Technical Specifications.
TECHNICAL SPECIFICATION 3.7.7, SERVICE WATER SYSTEM (SWS)			
	CRS	LCO 3.7.7: Two SWS trains and the Turbine Building loop isolation valves shall be OPERABLE.	
	CRS	APPLICABILITY: MODES 1, 2, 3, and 4.	
	CRS	ACTIONS	

Op Test No.: N16-1	Scenario # 6	Event # 3		Page 25 of 57	
Event Description:	**"C" Service Water Pump Trips**				

<table>
<tr><th>Time</th><th>Pos.</th><th colspan="3">Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td></td><td></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that ACTION A.1 must be entered.

NOTE: The "A" and "B" SW Pumps must declared inoperable within 4 hours because the "A" EDG is inoperable.</td></tr>
<tr><td></td><td></td><td>A. One SWS train inoperable.</td><td>A.1 NOTES: Enter applicable Conditions and Required Actions of LCO 3.8.1, "AC Sources-Operating," for emergency diesel generator made inoperable by SWS.

Restore SWS train to OPERABLE status.</td><td>72 hours</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td colspan="6">TECHNICAL SPECIFICATION 3.6.6, CONTAINMENT SPRAY AND COOLING SYSTEMS</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">LCO 3.6.6: Two containment spray trains and two containment cooling trains shall be OPERABLE.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">APPLICABILITY: MODES 1, 2, 3, and 4.</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td>CRS</td><td colspan="3">ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td colspan="3"></td><td></td></tr>
<tr><td></td><td></td><td>CONDITION</td><td>REQUIRED ACTION</td><td>COMPLETION TIME</td><td rowspan="2">NOTE: The CRS will determine that ACTION D.1 must be entered.</td></tr>
<tr><td></td><td></td><td>D. Two containment cooling trains inoperable.</td><td>D.1 Restore one containment cooling train to OPERABLE status.</td><td>72 hours</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td>NOTE: The CRS will likely conduct an Alignment Brief.</td></tr>
<tr><td></td><td></td><td colspan="3"></td><td>NOTE: The crew will likely continue to down power.</td></tr>
<tr><td colspan="6">At the discretion of the Lead Examiner move to Event #4.</td></tr>
</table>

Op Test No.:	N16-1	Scenario #	6	Event #	4	Page	26	of 57
Event Description:		**DS Bus De-energizes/"C" CCW Pump Trips on Start**						

Following this, Breaker 52/32A will Trip de-energizing the DS Bus, and stopping the only running Charging Pump and CCW Pump. The operator may address AOP-018, "Reactor Coolant Pump Abnormal Conditions," or various APP's to restore Charging and Seal Injection flow; and then APP-001-F5, CCW PMP LO PRESS, and ensure that the standby CCW Pump started. 10 seconds after the Standby CCW Pumps start, the "C" CCW Pump will trip, and only the "B" CCW will be left running. The operator will address Technical Specification LCO 3.7.6, "Component Cooling Water (CCW) System," and Technical Specification LCO 3.4.17, "Chemical and Volume Control System (CVCS)."

Booth Operator Instructions: **IRF EPSV480DS_063 f:TRIP**

IMF CCW01C d:10

Indications Available:

- RTGB Annunciator APP-001-B4, RCP SEAL INJ HI/LO FLOW
- "A" Charging Pump trips
- FR-124 indicates no Seal Injection flow
- RTGB Annunciator APP-001-F4, CCW PMP MOTOR OVLD/TRIP
- "A" CCW Pump trips
- "B" and "C" CCW Pump auto start
- "C" CCW Pump trips 10 seconds after start (Green and Red status lights are LIT)
- RTGB Annunciator APP-036-H6, DS BUS SUPPLY BKR 52/32A TRIP
- RTGB Annunciator APP-036-H8, DS BUS UNDER VOLT

Time	Pos.	Expected Actions/Behavior	Comments
			NOTE: The CRS will enter AOP-018.
		AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS	
	CRS	(Step 1) MAKE PA announcement for Procedure Entry	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 2) EVALUATE Plant Conditions AND GO to the Appropriate Section for RCP Malfunction Not Yet Addressed:	
		• Loss of Seal Injection – Section C	**NOTE:** The CRS will transition to Section C of AOP-018.

Op Test No.:	N16-1	Scenario #	6	Event #	4	Page	27 of 57
Event Description:	**DS Bus De-energizes/"C" CCW Pump Trips on Start**						

Time	Pos.	Expected Actions/Behavior	Comments
AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS SECTION C, LOSS OF SEAL INJECTION			
			NOTE: Power will be automatically restored to the DS Bus in ≈95 seconds.
	RO	(Step 1) CHECK APP-001-D1, RCP THERM BAR COOL WTR LO FLOW alarm - ILLUMINATED	
	RO	(Step 1 RNO) IF APP-001-D1 ILLUMINATES, THEN GO TO Step 2.	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	• OBSERVE the NOTE prior to Step 11 AND GO TO Step 11.	
	RO	(Step 11) DETERMINE if a Charging Pump Can be Started:	
		• CHECK Charging System Piping - RUPTURED	
	CRS	(Step 11.a RNO) GO TO Step 12	
	RO	(Step 12) CHECK SI - INITIATED	
	CRS	(Step 12 RNO) GO TO Step 14	
	RO	(Step 14) ENSURE at Least ONE Charging Pump - RUNNING	**NOTE:** The RO will start the "B" and/or the "C" Charging Pump.
	RO	(Step 15) CHECK Seal Injection to RCPs:	
		• ANY Seal Injection flow – LESS THAN 6 GPM	
		AND	

Op Test No.:	N16-1	Scenario #	6	Event #	4	Page	28	of	57
Event Description:	**DS Bus De-energizes/"C" CCW Pump Trips on Start**								

Time	Pos.	Expected Actions/Behavior	Comments
		• ANY Thermal Barrier ΔP – LESS THAN 5 inches	
	CRS	(Step 15 RNO) GO TO Step 47	
		(Step 47) ESTABLISH Charging Flow on FI-122A, CHARGING LINE FOW- GREATER THAN 40 GPM	
	RO	(Step 48) CHECK Normal Letdown – IN SERVICE	
	RO	(Step 49) CONTROL charging and Letdown Flow to Maintain Pressurizer Level as follows:	
		• Within ± 5% Of Reference Level	
	RO	(Step 50) ESTABLISH Normal Seal Injection	
		• CHECK RCP Seal Injection - ALIGNED	
		• CHECK RCP Seal Injection Flow – BETWEEN 8 GPM AND 13 GPM	
	RO	(Step 51) CHECK Seal Injection Flow – ESTABLISH TO ALL RCPs	
	CRS	(Step 52) IMPLEMENT the EALs	**NOTE:** The CRS may ask SM to address. If so, **Floor Instructor** acknowledge as SM.
	CRS	(Step 53) REFER to Technical Specification for any applicable LCOs	
		• 3.4.13 – RCS Operational Leakage	
		• 3.4.17 - CVCS	
		• 3.4.9 – PZR Level	

Op Test No.: N16-1	Scenario # 6	Event # 4	Page 29 of 57
Event Description:	**DS Bus De-energizes/"C" CCW Pump Trips on Start**		

Time	Pos.	Expected Actions/Behavior	Comments
		• 3.4.4, 3.4.5, & 3.4.6 – RCS Loops	
	RO	(Step 54) CHECK RCP Seal Cooling - ISOLATED	
	CRS	(Step 54 RNO) OBSERVE the NOTE prior to Step 2 AND GO To the Main Body, Step 2 of this procedure.	
AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS			
	CRS	(Step 2) EVALUATE Plant Conditions AND GO to the Appropriate Section for RCP Malfunction Not Yet Addressed:	
	CRS	(Step 2 RNO) RETURN TO procedure and step in effect.	
			NOTE: The CRS may call WCC to address the failure of the DS Bus normal supply breaker. If so, **Booth Instructor** acknowledge as WCC.
			NOTE: While both the "B" and the "C" CCW Pump started on low system pressure, the "C" CCW Pump has tripped shortly after start. The CRS will address the APP.
APP-001-F4, CCW PMP MOTOR OVLD/TRIP			
	RO	(Step 1) IF alarm is due to intentional operator action, THEN…	

Op Test No.:	N16-1	Scenario #	6	Event #	4	Page	30 of 57
Event Description:	**DS Bus De-energizes/"C" CCW Pump Trips on Start**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 2) IF the running CCW Pump has tripped, THEN ENSURE Standby CCW Pump STARTED	**NOTE:** Both the "B" and the "C" CCW Pump started on low system pressure, however, the "C" CCW Pump has tripped shortly after start.
	RO	(Step 3) IF Standby CCW Pump can NOT be started, THEN…	
	RO	(Step 4) IF FCV-626, THERM BAR FLOW CONT, closes due to pump start, THEN…	**NOTE:** FCV-626 is OPEN.
		(Step 5) IF CCW Pump tripped due to electrical fault, THEN DISPATCH an operator to check breaker and Current Limiter Fuses (E-1/E-2 breakers only)	**NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **1 minute** that the "C" CCW **Pump** motor has an acrid smell.
	CRS	(Step 6) IF a single phase open circuit condition is suspected ENTER AOP-026	**NOTE:** This action will need further investigation.
			NOTE: The CRS may call WCC to address the "C" CCW Pump failure. If so, **Booth Instructor** acknowledge as WCC.
TECHNICAL SPECIFICATION 3.7.6, COMPONENT COOLING WATER (CCW) SYSTEM			
	CRS	LCO 3.7.6 Two CCW trains powered from emergency power supplies shall be OPERABLE	
	CRS	APPLICABILITY: MODES 1, 2, 3 and 4.	
	CRS	ACTIONS	

Op Test No.:	N16-1	Scenario #	6	Event #	4	Page	31 of 57
Event Description:	**DS Bus De-energizes/"C" CCW Pump Trips on Start**						

<table>
<tr><th>Time</th><th>Pos.</th><th>Expected Actions/Behavior</th><th>Comments</th></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td><table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>A. One required CCW train inoperable.</td><td>NOTE: Enter applicable Conditions and Required Actions of LCO 3.4.6, "RCS Loops – MODE 4, for residual heat removal loops made inoperable by CCW.

A.1 Restore required CCW train to OPERABLE status.</td><td>72 hours</td></tr></table></td><td>NOTE: The CRS will determine that ACTION A.1 must be entered.

NOTE: The "B" CCW Pump must declared inoperable within 4 hours because the "A" EDG is inoperable.</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">TECHNICAL SPECIFICATION 3.4.17, CHEMICAL AND VOLUME CONTROL SYSTEM (CVCS)</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>LCO 3.4.17 Reactor Coolant Pump (RCP) seal injection shall be OPERABLE, with :
• Two charging pumps shall be OPERABLE
• Two Makeup Water Pathways from the Refueling Water Storage Tank (RWST) shall be OPERABLE</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>APPLICABILITY: MODES 1, 2, 3 and 4</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>CRS</td><td>ACTIONS</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

Op Test No.:	N16-1	Scenario #	6	Event #	4	Page	32 of 57
Event Description:	**DS Bus De-energizes/"C" CCW Pump Trips on Start**						

Time	Pos.	Expected Actions/Behavior			Comments
		CONDITION	REQUIRED ACTION	COMPLETION TIME	**NOTE:** The CRS will determine that because all Charging Pumps were OFF, ACTION E.1, E.2 and E.3 were entered; and that these ACTIONS were exited upon restoration of Seal Injection Flow.
		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.	Immediately 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.: N16-1	Scenario # 6	Event # 5	Page 33 of 57
Event Description:	**"A" RCP Seal Failure**		

Next, a #1 Seal Failure will occur on the "A" RCP. The crew will implement AOP-018, Reactor Coolant Pump Abnormal Conditions," trip the reactor, stop the pump, and three minutes after the pump is stopped, CLOSE the Seal Leakoff Valve. The crew will enter EOP-E-0, "Reactor Trip or Safety Injection." Simultaneously, a Loss of Offsite Power will occur on the reactor trip, and the "B" Emergency Diesel Generator will fail to automatically start. Additionally, the DS DG will trip.

Booth Operator Instructions: **IMF RCS13A r:2:00**

Indications Available:

- RTGB Annunciator APP-001-B4, RCP SEAL INJ HI/LO FLOW
- RTGB Annunciator APP-001-D2, RCP #1 SEAL LEAKOFF HI FLOW
- FR-124 indicates that "A" RCP Seal injection flow is rising
- FR-124 indicates that "B" and "C" RCP Seal injection flow is lowering
- FR-154 indicates that "A" RCP seal leakoff flow is rising
- Charging Pump speed is increasing

Time	Pos.	Expected Actions/Behavior	Comments
		AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS	
	CRS	(Step 1) MAKE PA announcement for Procedure Entry	**NOTE:** The CRS will most likely make this announcement.
	CRS	(Step 2) EVALUATE Plant Conditions AND GO to the Appropriate Section for RCP Malfunction Not Yet Addressed:	
		• Reactor Coolant Pump Seal Failure – Section A	**NOTE:** The CRS will transition to Section A of AOP-018.
		AOP-018, REACTOR COOLANT PUMP ABNORMAL CONDITIONS **SECTION A, REACTOR COOLANT PUMP SEAL FAILURE**	
	RO	(Step 1) CHECK Any RCP #1 Seal Leakoff Flow – GREATER THAN 5.7 GPM	
	RO	(Step 2) CHECK Either of the following Conditions Exist:	

Op Test No.:	N16-1	Scenario #	6	Event #	5	Page	34 of 57
Event Description:	**“A” RCP Seal Failure**						

Time	Pos.	Expected Actions/Behavior	Comments
		• RCP #1 Seal Leakoff Flow On Unaffected RCP(s) - REDUCED	
		OR	
		• RCP Thermal Barrier ∆P On Affected RCP(s) - REDUCED	
	RO	(Step 3) CHECK Plant Status – MODE 1 OR MODE 2	
	RO	(Step 4) PERFORM the following:	
		• TRIP the reactor	
		• TRIP the affected RCP(s)	
		• GO TO EOP-E-0, Reactor Trip or Safety Injection, while continuing with this procedure.	
	RO	(Step 5) CHECK Time Elapsed Since Stopping the Affected RCP(s) – GREATER THAN 3 MINUTES.	**NOTE:** This action will be taken post-reactor trip.
	RO	(Step 6) CLOSE Seal Leakoff Valve(s) for Affected RCP(s):	
		• RCP – A, VALVE – CVC-303A	
	RO	(Step 7) CHECK SI ACTUATED	
	CRS	(Step 7 RNO) GO TO Step 30	**NOTE:** The CRS will likely perform this procedure concurrently with the EOPs.
When the Operator Trips the Reactor, move to Events #6-9.			

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	35	of	57
Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**								

Upon entry into EOP-E-0, the operator will determine that both ESF buses are de-energized and transition to EOP-ECA-0.0, "Loss of All AC Power." The operator will subsequently start the "B" EDG by depressing the SI Actuate Pushbutton, restore power to Bus E-2, and transition back to EOP-E-0. When Bus E-2 is re-energized, the "D" Service Water Pump will fail to sequence automatically and will need to be manually started. Upon transition back to EOP-E-0, the crew will complete the immediate actions of EOP-E-0, and continue with AOP-018. The scenario will terminate when the crew has terminated Safety Injection and re-established Charging/Seal Injection in Step 6 of ES-1.1.

Booth Operator Instructions:

IMF EPS13
IMF EDG01C d:2
(Occurs on Rx Trip)

Indications Available:

- Indications of Reactor Trip
- Control Room lights dim
- Bus E-1 is de-energized
- Bus E-2 is de-energized
- DS Bus is de-energized
- "B" EDG RUNNING

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	
	BOP	(Step 2.a RNO) Manually TRIP Turbine.	**Immediate Action** **NOTE:** No power to the Turbine Control status lights.

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	36	of 57
Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**							

Time	Pos.	Expected Actions/Behavior	Comments
		• IF Turbine will NOT trip, THEN manually RUNBACK Turbine at maximum rate UNTIL ALL Governor valves are CLOSED.	
		• IF Turbine can NOT be runback, THEN manually CLOSE MSIVs AND MSIV Bypass Valves.	
	BOP	(Step 2.b) All MSR Purge AND Shutoff Valves - CLOSED	**Immediate Action**
	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	
	CRS	(Step 3 RNO) GO TO EOP-ECA-0.0, Loss Of All AC Power, Step 1	**Immediate Action**
		• WHEN time permits, THEN TRY to restore power to de-energized AC Emergency Bus.	
			NOTE: The CRS will transition to EOP-ECA-0.0.
EOP-ECA-0.0, TOTAL LOSS OF AC POWER			
	RO	(Step 1) CHECK Reactor Trip:	**Immediate Action**
		• Reactor Trip AND Bypass breakers - OPEN	
		• Neutron flux - LOWERING	
	BOP	(Step 2) CHECK Turbine Trip:	**Immediate Action**
		• BOTH Turbine Stop Valves - CLOSED	
		• MSR Purge AND Shutoff Valves - CLOSED	

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	37 of 57
Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 2 RNO) Manually TRIP Turbine.	**Immediate Action** **NOTE:** No power to the Turbine Control status lights.
		• If Turbine will NOT trip, THEN CLOSE MSIV AND MSIV Bypass Valves.	
	CRS/ BOP	(Step 3) DISPATCH an Operator to Perform Attachment 1, Restoring AC Power From The DSDG	**Immediate Action** **NOTE:** The CRS will dispatch an AO. **Booth Instructor** acknowledge as **AO**, and report after **5 minutes** that the **DSDG will NOT start**.
	RO	(Step 4) CHECK if RCS is isolated:	
		CHECK LTDN LINE STOP Valves - CLOSED	
		• LCV-460A	
		• LCV-460B	
		CHECK PRZR PORVs - CLOSED	
		CHECK CVC-387, EXCESS LTDN STOP Valve - CLOSED	
		CHECK RCS Vent System Valves – CLOSED OR DEENERGIZED	
		• RC-567, HEAD VENT	
		• RC-568, HEAD VENT	
		• RC-569, PZR VENT	
		• RC-570, PZR VENT	
		• RC-571, PRT ISO	
		• RC-572, CV ATMOS	
	RO	(Step 5) CHECK CCW Pump Running for RCP Seal Cooling	

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	38 of 57
Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**						

Time	Pos.	Expected Actions/Behavior	Comments
	RO	(Step 5 RNO) IF LESS THAN 15 minutes elapsed since RCP SEAL Cooling lost, THEN START CCW Pump A.	**NOTE:** The DS Bus is de-energized.
		IF RCP SEAL Cooing can NOT be restored WITHING 15 minutes, THEN PERFORM the following prior to starting a CCW Pump	
		• OPEN breaker for FCV-626, THERM BAR FLOW CONT Valve (MCC-6 CMPT 8F)	
		• Locally CLOSE FCV-626, THERM BAR FLOW CONT Valve.	
	BOP	(Step 6) CHECK AFW Flow	
		• CHECK AFW flow- GREATER THAN 300 GPM	
		• DISPATCH an Operator to locally perform Attachment 4, Local Control Of S/G Level and Pressure	**NOTE:** The CRS will dispatch an AO. If so, **Booth Instructor** acknowledge as **AO**, and use: **IRF CFW 012, f:100** **IRF CFW 013, f:100** **IRF CFW 014, f:100** And report after **5 minutes** that the **Attachment 4 is complete**.
		• CONTROL S/G WR level BETWEEN 60% and 67%	
	BOP	(Step 7) TRY To Restore Power to ANY AC Emergency Bus:	
		• Energize AC Emergency Bus with EDG:	
		• CHECK EDG-A AND EDG-B - RUNNING	**NOTE:** The "A" EDG is OOS. The "B" EDG is NOT running.
	BOP	(Step 7.a.1 RNO) DEPRESS BOTH SAFETY INJECTION pushbuttons	

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	39	of	57
Event Description:	**Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**								

Time	Pos.	Expected Actions/Behavior	Comments
		• If NO EDG started, THEN……	
		• IF ANY EDG is running AND its output breaker is open, THEN ……	**NOTE:** The “B” EDG will start and close in on Bus E-2.
	BOP	(Step 7.a.2) CHECK BOTH AC Emergency Busses - AUTOMATICALLY ENERGIZED	**NOTE:** Bus E-2 is energized.
		• E-1	
		• E-2	
	BOP	(Step 7.a.2 RNO) IF ANY EDG is running AND its output breaker is open, THEN……	
		• If ANY EDG is running AND its output breaker can NOT be closed from the Control Room, THEN…	
		• If an AC Emergency Bus can NOT be energized OR SW Cooling is NOT available to ANY running EDG, THEN….	**NOTE:** The “D’ SW Pump has failed to auto-start; and the BOP will need to start this pump manually.
	BOP	• CHECK AC Emergency Busses – AT LEAST ONE ENERGIZED	
		• E-1	
		OR	
		• E-2	**NOTE:** E-2 is energized.

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	40 of 57
Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**						

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Energize at Least One AC Emergency Bus Before Defeating the Auto Loading of the Safeguards Equipment in EOP-ECA-0.0** Safety Significance: Failure to energize an ac emergency bus constitutes mis-operation or incorrect crew performance in which the crew does not prevent degraded emergency power capacity. Failure to perform the critical task also results in needless degradation of any barrier to fission product release, specifically of the RCS barrier at the point of the RCP seals. Additionally, failure to perform the critical task results in the unnecessary continuation of a situation in which RCS inventory is being lost uncontrollably and cannot be replaced. This situation is equivalent to mis-operation or incorrect operator performance in which the operator does not prevent degraded emergency core cooling system (ECCS) capacity at a time when a small-break LOCA is in progress. In this case, at least one ac emergency bus can be energized from the control room. Failure to perform the critical task means that RCS inventory lost through the RCP seals cannot be replaced. It also means that the RCP seals remain without cooling and gradually deteriorate. As the seals deteriorate the rate of RCS inventory loss increases.			
	RO	• Establish Seal Injection flow	
		• CHECK adequate DSDG OR EDG capacity to run one Charging Pump (108 KW each) (DSDG preferred)	
		• RESET SI	
		• ESTABLISH Charging flow	**NOTE:** The RO will start the "C" Charging Pump.
		• CHECK Charging Pumps – ANY RUNNING	
	RO	(Step 7.c.3.a RNO) IF RCP Seal Cooling has been lost for LESS THAN 15 minutes, THEN START Charging Pumps as necessary	**NOTE:** It is expected that RCP Seal Cooling will be lost for less than 15 minutes.
		• If ALL Seal Cooling to ANY RCP can NOT be restored within 15 minutes, THEN…	
	RO	(Step 7.c.3.b) DISPATCH an operator to perform the following:	**NOTE:** These valves can be controlled from the RTGB.

Op Test No.:	N16-1	Scenario #	6	Event #	6, 7, 8 & 9	Page	41	of 57
Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**							

Time	Pos.	Expected Actions/Behavior	Comments
		• OPEN CVC-358, RWST TO CHARGING PUMP SUCTION Valve	**NOTE:** The CRS may dispatch an AO. If so, **Booth Instructor** acknowledge as **AO**, use: IRF CVC048 f:100 IRF CVC059 f:0 and report after **3 minutes** that the **Charging Pump suction is aligned to the RWST**.
		• CLOSE LCV-115C, VCT OUTLET Valve	
	RO	(Step 7.c.3.c) ADJUST the following as necessary to maintain proper Seal Injection AND Charging flow:	
		• Charging Pump Speed Controller(s)	
		• HIC-121, CHARGING FLOW Controller	
		• Sea Water Flow Control Valves	
	RO/ BOP	(Step 7.c.3.d) MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated CHECK the applicable EDG has loaded required equipment	
		• SW Pumps	**NOTE:** The "D" SW Pump had to be manually started.
		• MDAFW Pump	**NOTE:** The "B" MDAFW Pump is running.
		• CCW Pump (as needed)	**NOTE:** The "C" CCW Pump has previously failed.
		• SW Booster Pump	**NOTE:** The "B" SW Booster Pump has started on the SI.

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Event Description:	**Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**		

Time	Pos.	Expected Actions/Behavior	Comments
Critical Task: **Manually Start SW Pump for EDG Cooling Prior to the EDG Failing Due to Overheating** Safety Significance: Failure to manually start the SW pump under the postulated plant conditions means that the EDG is running without SW cooling. Running the EDG without SW cooling leads to a high-temperature condition that can result in EDG failure due to damage caused by engine overheating. Under the postulated plant conditions, the running EDG is the only operable EDG. Thus, failure to perform the critical task constitutes mis-operation or incorrect crew performance in which the crew does not prevent “degraded… emergency power capacity.” Even if the crew does not start the SW pump until receipt of engine high temperature alarm(s), the critical task is performed satisfactorily, provided that the EDG does not fail because of damage caused by engine overheating.			
	RO	(Step 7.c.3.e) PERFORM the following:	
		• RESET SPDS AND Initiate MONITORING Critical Safety Function Status Trees.	
		• IMPLEMENT FRPs as necessary	
	CRS	• RETURN TO procedure AND step in effect	**NOTE:** The CRS will transition to EOP-E-0.
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	

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Event Description: **Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**

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	**NOTE:** Bus E-2 is energized.
		• CHECK Bus E-1 AND E-2 - BOTH ENERGIZED	
	CRS	(Step 3 RNO) WHEN time permits, THEN TRY to restore power to de-energized AC Emergency Bus.	
	RO	(Step 4) CHECK SI Status:	**Immediate Action**
		CHECK if SI is actuated:	**NOTE:** SI was manually actuated in EOP-ECA-0.0.
		• SI annunciators - ANY ILLUMINATED	
		OR	
		• SI equipment - AUTO STARTED	
	RO	CHECK BOTH trains of SI actuated:	
		• SI Pumps - TWO RUNNING	
		• RHR Pumps - BOTH RUNNING	
	RO	(Step 4.b) Manually ACTUATE SI by depressing BOTH SI pushbuttons.	**NOTE:** Bus E-1 is de-energized and the "A" Train ECCS Pumps cannot be started.
	RO/ BOP	Foldout Page:	
		RCP TRIP CRITERIA	

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Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**							

Time	Pos.	Expected Actions/Behavior	Comments
		FAULTED S/G AFW ISOLATION 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	
			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 50**.
EOP-E-0, REACTOR TRIP OR SAFETY INJECTION ATTACHMENT 1, AUTO ACTION VERIFICATION			
	BOP	(Step 1) CHECK ECCS Pumps Running:	
		• SI Pumps - TWO RUNNING	
	BOP	(Step 1 RNO) Manually START pump(s) as necessary	**NOTE:** Bus E-1 is de-energized and the "A" Train ECCS Pumps cannot be started.
	BOP	(Step 2) CHECK ECCS Valves In Proper Emergency Alignment	
	BOP	(Step 2 RNO) Manually ALIGN valve(s) as necessary.	**NOTE:** "A" Train valves cannot be aligned from the RTGB.
	BOP	(Step 3) CHECK CCW Pumps - AT LEAST ONE RUNNING	**NOTE:** The only available CCW Pump has previously tripped.

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Event Description: **Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 3 RNO) PERFORM the following:	
		• IF NO CCW Pump is RUNNING AND CV Spray is NOT actuated, THEN START one CCW Pump on Emergency Bus energized by EDG (246 Kw)	
		• IF NO CCW Pump can be started, THEN TRIP ALL RCPs.	
	BOP	(Step 4) CHECK Containment Isolation Phase A:	
		• CHECK Containment Isolation Phase A - ACTUATED	
		• CHECK Containment Isolation Phase A Valves - CLOSED	
	BOP	(Step 4.b RNO) Manually CLOSE valve(s) as necessary	**NOTE:** Some valves will need to be closed manually.
	BOP	(Step 4.c) 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	**NOTE:** V2-6A has no indication no power.
	BOP	(Step 5.b RNO) Manually CLOSE valve(s) as necessary	

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Event Description: **Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 6) CHECK If Main Steam Lines Should Be Isolated:	
		• CHECK Main Steam Line Isolation - REQUIRED	
		• High steam flow with:	
		• S/G pressure - LESS THAN 614 PSIG	
		OR	
		• Tavg - LESS THAN 543°F	
		• CHECK MSIVs AND MSIV Bypass Valves - CLOSED	**NOTE:** The MSIVs are already CLOSED.
	BOP	(Step 7) CHECK Proper Service Water System Operation:	
		• CHECK SW Pumps - ALL RUNNING	**NOTE:** The “A” and “B” SW Pumps have no power, the “C” Pump has previously tripped, and the “D” SW Pump has failed to auto start.
	BOP	(Step 7.a RNO) Manually START pump(s) as necessary	**NOTE:** If the “D” SW Pump has NOT been manually started, it will be started here.
	BOP	(Step 7.b) CHECK SW Booster Pumps - BOTH RUNNING	**NOTE:** The “B” SW Booster Pump has started on the SI, the “A” SW Booster Pump has no power.
	BOP	(Step 7.b RNO) Manually START pump(s) as necessary	
		• CHECK Both SW Header Low Pressure Alarms - EXTINGUISHED	**NOTE:** BOTH alarms will be LIT.
		• APP-008-F7,SOUTH SW HDR LO PRESS	
		• APP-008-F8,NORTH SW HDR LO PRESS	
	BOP	(Step 7.c RNO) PERFORM the following:	

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Event Description: **Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**

Time	Pos.	Expected Actions/Behavior	Comments
		• ISOLATE SW to the Turbine Building:	**NOTE:** BOTH valves are already CLOSED.
		• CLOSE V6-16C, SW Turbine Building Isolation valve.	
		OR	
		• CLOSE V6-16A and V6-16B, SW Turbine Building Supply valves	
		• WHEN this Attachment is complete, THEN PERFORM Supplement M, Component Alignment For Loss Of SW To Turbine Building, as time permits.	**NOTE:** The BOP will contact an AO and direct performance of Supplement M. **Booth Instructor** acknowledge as AO.
	BOP	(Step 8) CHECK BOTH EDGs - RUNNING	**NOTE:** The “B” EDG is running.
	BOP	(Step 8 RNO) Manually START Emergency Diesel(s) as necessary.	**NOTE:** The “A” EDG is OOS.
	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	**NOTE:** The “3” and “4” HVH Fans are running (With Hi Vibration).
	BOP	(Step 10 RNO) Manually START fan(s).	**NOTE:** The “1” and “2” HVH Fans are unavailable (No power).
	BOP	(Step 11) CHECK IVSW System Actuated:	
		• PCV-1922A, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	

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Event Description:	**Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**						

Time	Pos.	Expected Actions/Behavior	Comments
		• PCV-1922B, AUTOMATIC HEADER PRESSURE CONTROL VALVE - OPEN	
	BOP	(Step 12) CHECK CV Ventilation Isolation:	
		• CV Ventilation Isolation Valves - CLOSED	**NOTE:** The “A” Train valves have no power or indication.
	BOP	(Step 12 RNO) DEPRESS H.V. OFF on R-11 OR R-12 to initiate Containment Ventilation Isolation.	
		• IF ANY Containment Ventilation Isolation valve does NOT close, THEN manually OR locally ISOLATE AFFECTED penetration outside Containment while CONTINUING WITH this procedure.	**NOTE:** The BOP will contact an AO and direct local action. **Booth Instructor** acknowledge as AO.
	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	**NOTE:** No Indication. The BOP will take the Control Switch to STOP
		• 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	

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Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**						

Time	Pos.	Expected Actions/Behavior	Comments
	BOP	(Step 14) CHECK DS Bus - ENERGIZED	**NOTE:** The DS Bus is NOT energized. An attempt has already been made to start the DSDG and re-energize the DS Bus.
	BOP	(Step 14 RNO) Locally PLACE DSDG in service using EPP-25, Energizing Supplemental Plant Equipment Using the DSDG.	
	BOP	(Step 15) CHECK Battery Chargers ENERGIZED:	
		• APP-036-D1, BATT CHARGER A/A-1 TROUBLE Alarm - EXTINGUISHED	**NOTE:** The "A" Train DC Bus is on the Battery.
		• APP-036-D2, BATT CHARGER B/B-1 TROUBLE Alarm - EXTINGUISHED	
	BOP	(Step 15 RNO) RESTART Battery Chargers within 30 minutes of power loss using OP-601, DC Supply System. (46 KW each)	**NOTE:** The "B" Train DC Bus is on the Battery Chargers.
	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:** The BOP will contact the Inside AO about locally resetting and starting the "B" IA Compressor. **Booth Instructor:** as **AO**, acknowledge **IRF EPSMCC6_ 218** **f: RACK_IN**
		• Compressor A (MCC-5 CMPT 7M)	
		• Compressor B (MCC-6 CMPT 3G)	
	BOP	(Step 18) PERFORM Crew Update To Include The Following:	
		• Attachment completion	

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Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**							

Time	Pos.	Expected Actions/Behavior	Comments
		• 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	**NOTE:** The "B" MDAFW Pump is likely running.
		(Step 6.a RNO) Manually START pump(s).	**NOTE:** The "A" MDAFW Pump is unavailable (No power).
	RO	(Step 6.b) CHECK S/G Narrow Range levels - TWO S/Gs LESS THAN 16%	
	RO	(Step 6.b RNO) IF S/G Narrow Range level lowers to LESS THAN 16% on Two S/Gs, THEN PERFORM Step 6.c	**NOTE:** This is a Continuous Action. The CRS will make both board operators aware.
	CRS	• CONTINUE WITH Step 7.	
	RO	(Step 7) CHECK AFW Valves In Proper Emergency Alignment:	**NOTE:** These valves are under local control.
		• AFW Header Discharge Valves - FULL OPEN	
		• AFW Header Section Valves - FULL OPEN	

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Event Description: **Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**

Time	Pos.	Expected Actions/Behavior	Comments
		• Steam Driven AFW Pump Discharge Valves - FULL OPEN IF PUMP RUNNING	**NOTE:** The SDAFW Pump is likely to be NOT 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	**NOTE:** It is likely the S/G levels are high, and that AFW flow has been throttled to little or no flow.
	RO	(Step 8.c RNO) IF S/G Narrow Range level is GREATER THAN 9% [18%] in ANY S/G, THEN CONTROL AFW flow to maintain S/G Narrow Range level.	**NOTE:** S/G levels are likely high in the band, but under operator control.
		• IF S/G Narrow Range level is LESS THAN 9% [18%] in ALL S/Gs, THEN…	
	RO	(Step 9) CHECK CV Spray NOT Required:	
		• CHECK Containment Pressure - HAS REMAINED LESS THAN 10 PSIG	
		• CHECK CV Spray - NOT ACTUATED	
	RO	(Step 10) CHECK RCP Seal Cooling:	
		• 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:** The LO Flow alarm will be LIT.
		OR	

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Event Description: **Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**

Time	Pos.	Expected Actions/Behavior	Comments
		• Seal Injection flow - ADEQUATE	
		• Seal Injection flow - GREATER THAN 6 GPM PER RCP	**NOTE:** It is likely that Seal Injection flow is > 6 to each RCP.
		OR	
		• Thermal Barrier ΔPs - GREATER THAN 5 INCHES WATER PER RCP	**NOTE:** Thermal Barrier flow is NOT > 5 inches H_2O to each RCP.
	RO	(Step 11) CHECK RCS Temperatures:	
		• With NO RCPs running, RCS Cold Leg temperatures - STABLE AT OR TRENDING TO 547°F	**NOTE:** It is likely that Tcolds are >547°F.
	RO	(Step 11 RNO) IF temperature is LESS THAN 547°F AND lowering, THEN…	
		IF temperature is GREATER THAN 547°F AND rising THEN…	**NOTE:** Although Tcolds are >547°F, they are most likely stable. If Tcolds are rising, the CRS will contact the AO to locally dump steam steam using the S/G Steam Line PORVs. If so, **Booth Instructor** use: IRF MSS097 f:15:00 IRF MSS091 f:DEFEAT IRF MSS094 f:MANUAL IRF MSS098 f:15:00 IRF MSS092 f:DEFEAT IRF MSS095 f:MANUAL IRF MSS099 f:15:00 IRF MSS093 f:DEFEAT IRF MSS096 f:MANUAL IRF AIR027 f:N2_SUPPLY IRF MSS099 r:25 f:1022 IRF MSS098 r:25 f:1022 IRF MSS097 r:25 f:1022

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Event Description:	**Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**						

Time	Pos.	Expected Actions/Behavior	Comments
	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	**NOTE:** All RCPs are OFF.
	CRS	(Step 13.a 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	**NOTE:** R-15 is OOS.
		• R-19s, S/G Blowdown Radiation	**NOTE:** R-19 is de-energized.
		• R-31s, STEAMLINE RADIATION MONITORs	
		• S/G levels - NONE RISING IN AN UNCONTROLLED MANNER	
	RO	(Step 16) CHECK if RCS is Intact:	
		• CV radiation - NORMAL	

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Event Description: **Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**

Time	Pos.	Expected Actions/Behavior	Comments
		• R-2,CV AREA	
		• R-32A, CV HIGH RANGE	
		• R-32B, CV HIGH RANGE	
		• CV pressure - NORMAL	
		• CV Sump level - NORMAL	
	RO/ BOP	(Step 17) CHECK If ECCS Flow Should Be Terminated:	
		• CHECK RCS Subcooling based on Core Exit T/Cs – GREATER THAN 18°F	
		• CHECK Secondary Heat Sink level	
		• Total AFW flow to S/G(s) – GREATER THAN 300 GPM	
		OR	
		• S/G Narrow Range level in at least one S/G – GREATER THAN 9%	**NOTE:** It is likely that all S/G Narrow Range levels are > 9%.
		• CHECK RCS pressure:	
		• Pressure – GREATER THAN 1650 PSIG	
		• Pressure – STABLE OR RISING	
		• CHECK PZR level – GREATER THAN 14%	
		• RESET SPDS AND INITIATE monitoring of Critical Safety Functions Status Trees.	
		• GO TO EOP-ES-1.1, SI Termination, Step 1	**NOTE:** The CRS will transition to EOP-ES-1.1.
EOP-ES-1.1, SI TERMINATION			
	RO/ BOP	Foldout Page:	
		• SI REINITIATION CRITERIA	
		• SECONDARY INTEGRITY CRITERIA	

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Event Description:	**Loss of Offsite Power/"B" EDG Fails to Start/DSDG Trips/"D" Service Water Pump fails to Auto Start**							

Time	Pos.	Expected Actions/Behavior	Comments
		• AFW SUPPLY SWITCHOVER CRITERIA	
	RO	(Step 1) RESET SI	
	RO	(Step 2) RESET Containment Isolation PHASE A	
	RO	(Step 3) ESTABLISH Instrument Air To CV:	
		• CHECK APP-002-F7, INSTR AIR HDR LO PRESS alarm - EXTINGUISHED	**NOTE:** If not previously done, the BOP will contact the Inside AO about locally resetting and starting the "B" IA Compressor. **Booth Instructor:** as **AO**, acknowledge **IRF EPSMCC6_ 218** **f: RACK_IN**
		• RESET IA PCV-1716, INSTRUMENT AIR ISOLATION TO CV	
		• CHECK IA PCV-1716 - OPEN	
	BOP	(Step 4) CHECK DC Busses A AND B - ENERGIZED	**NOTE:** Both DC Busses are energized, although the "A" DC Bus is on the Battery.
	RO	(Step 5) STOP ECCS Pumps:	
		• STOP SI Pumps	
		• CHECK RHR Pumps - ANY RUNNING WITH SUCTION ALIGNED TO RWST	
		• STOP RHR Pumps	
	RO	(Step 6) CHECK Charging Flow Has Been - ESTABLISHED	

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Event Description:	**Loss of Offsite Power/“B” EDG Fails to Start/DSDG Trips/“D” Service Water Pump fails to Auto Start**							

Time	Pos.	Expected Actions/Behavior	Comments
		• CHECK Charging Pumps - AT LEAST ONE RUNNING	
		• ESTABLISH desired Charging flow:	
		• START additional Charging Pump(s) as necessary	
		• ADJUST the following as necessary to maintain Charging flow AND Seal Injection:	
		• Charging Pump speed controller	
		• HIC-121, CHARGING FLOW Controller	
		• RCP Seal Water Flow Control Valve	**NOTE:** The RO may contact the AO to adjust Seal Injection flows. If so, **Booth Instructor** acknowledge as AO; and use: IRF CVC030 f: 100 IRF CVC031 f: 100 IRF CVC032 f: 100
		• MAINTAIN Seal Injection flow between 6 gpm AND 20 gpm per RCP UNLESS Seal Injection isolated	
At the discretion of the Lead Examiner terminate the exam.			

NRC SCENARIO N16 1-6 TURNOVER SHEET

1. **INITIAL CONDITIONS**
   a) Time in Core Life: MOL
   b) Reactor Power: 100%
   c) Turbine Load: ____ MWe
   d) Boron Concentration: ____ ppm
   e) Rod Height: ____ 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
LCO 3.8.1	Condition B1, B.2, B.3.2.2 and B4

3. **CLEARANCES IN EFFECT**
   a) The "A" EDG is OOS.
4. **CAUTION CAPS IN EFFECT**
   a) None
5. **PROTECTED EQUIPMENT**
   a) "B" EDG
6. **DEGRADED EQUIPMENT**
   a) R-15, Condenser Air Ejector Gas Radiation Monitor is OOS (I&C Investigating).
   b) RTGB Annunciator APP-002-F8, "STA AIR HDR LO PRESS," has failed to the ILLUMINATED condition (I&C is investigating).
7. **SWITCHYARD ACCESS**
   a) PROTECTED
8. **PLANNED EVOLUTIONS**
   a) Maintain Steady-State conditions
9. **TURNOVER INFORMATION**
   a) The area has experienced steady light rain for the past 6 hours, with light wind from the South at 5-10 mph, and this is expected to continue throughout the shift.
   b) The "B" MFWP has experienced high noise/vibration over the last two hours (Maintenance is investigating).
   c) SR 3.8.1.1, Offsite Power Checks were last completed 2 hours ago.
10. **REACTIVITY INFORMATION**
    a) IAW OST-947 data
11. **RISK**
    a) GREEN