

Facility: Kewaunee Scenario No.: 1 Op-Test No.: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
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Initial Conditions: IC-12, 100% power, Middle of Cycle (MOC)  
 Motor Driven AFW A Pump is in PULLOUT.  
 SI Pump A is in PULLOUT.

Turnover: The plant is at 100% power. AFW Pump A has been out of service for 8 hours due to inboard bearing replacement. SI Pump A has been out of service for 4 hours after an inspection of the breaker cubicle indicated the lugs on one of the supply line connectors is loose.  
 At turnover, the Equipment Operator reported Steam Traps 23 and 24 on the lines from the individual steam header supplies to the TD AFW Pump, and Steam Trap 25 and 26 on the common steam line to the Turbine-Driven AFW Pump are cold. The Shift Manager has just declared the TD AFW Pump inoperable and directs the crew to remove it from service as soon as turnover is complete. (No action taken yet.)

Event No.	Malf. No.	Event Type*	Event Description
Preload	CC04B		Failure to Auto Start CC Pump B
1	—	N BOP SRO	Power backdown to less than 1673 MWt (~94% power)
		R RO	Maintain ΔI and RCS Tave using rods and boron addition.
2	RX211, 100	I BOP SRO	Controlling SG A level channel (LT461) fails high over 10 seconds.
3	SW05C, 100 DI-46528-CLOSE ON	C BOP SRO	Running Service Water Pump 1B1 trips on overcurrent. Standby Pump auto starts. SW-3A header isolation valve closes improperly.
4	CC03B, 1.0 DI-46332-OPEN ON RC03B	C RO SRO	RXCP B Thermal Barrier leak with failure of automatic isolation of CC cooling from thermal barrier. This will eventually lead to a manual reactor trip directed due to RXCP parameters exceeding limits or the RXCP will trip. (EOP entry)
5	AI-4301-02-R1, 0	C BOP SRO	SG B PORV Controller fails giving PORV open signal. Manual control available.
6	SG01B, 7 10:00	M BOP RO SRO	SG B tube rupture of ~ 250 gpm ramped in over 10 minutes starting 2:00 minutes after the reactor trip.
7	CC05A CC04B	C RO SRO	Component Cooling Water Pump trips on overcurrent. Component Cooling Pump B fails to auto start. Manual start available.

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

Event 1 - The plant is at 100% power. SI Pump A and AFW Pump A are inoperable. At turnover, the Turbine-Driven AFW Pump is determined to be inoperable due to the failure of steam traps on the steam lines to the TD AFW Pump. The CRS will direct removal from service (Placing TD AFW Pump in PULLOUT, and possible closing the Steam Supply valves from the SGs MS-10A and MS-10B). Technical Specification 3.4.b will be addressed and LCO 3.4.b.3 requires reactor power be reduced to less than or equal to 1673 MWt within 2 hours. Operations Management will inform the crew that power reduction needs to begin as soon as possible. 1673 MWt corresponds to 94.4% power. Crew will use N-O-03 and N-TB-54 to reduce load.

Event 2 - Following clearly observable plant response from the reactivity changes during the load reduction, the controlling level channel for SG A will fail high. The actual level will begin to lower due to FW-7A closing in response to the high level. The BOP will take FW-7A Controller to MANUAL and verify that SG level recovers toward program level. Procedure A-FW-5A and A-MI-87 will be used to address the failure. The failed instrument will be removed from service using A-MI-87. The SRO will address Technical Specification 3.5.b to ensure continued plant operation is allowed with the failed channel.

Event 3 - After the operator actions are completed for removal of the failed SG Level channel from service, the running Service Water Pump 1B1 will trip on overcurrent. This will result in automatic start of the standby SW Pump 1B2 when SW header pressure drops below 72 psig. Train B Header Isolation valve SW-3A will inadvertently close. It normally closes on SI signal or on sensed low pressure in the associated header. Train A pressure will remain above the closure setpoint. The crew will respond by taking actions directed in A-SW-02, and re-open SW-3A when SW Header A Operating is checked. The SRO will address Technical Specification 3.3.e.2 for actions associated with the loss of the SW Pump. Also by direction of N-SW-02 Precaution and Limitation 2.2, the SRO will determine in accordance with this item that with SI Pump B also inoperable, Technical Specification 3.0.c is applicable requiring plant shutdown.

Event 4 - Once the requirement for plant shutdown is reviewed, a leak will develop in RXCP B Thermal Barrier. This will result in leakage of RCS water into the Component Cooling System. CC radiation levels will rise and be detected on process monitor R17, Component Cooling Surge Tank level will rise and CC-610B, RXCP B Thermal Barrier Comp Cooling Return, that normally closes on high flow, will fail to close. The crew will address the problem by entering A-RC-36C, A-RM-45, and/or A-CC-31. The actions are expected to identify RXCP B thermal barrier leakage and result in closing the isolation valve CC-610B. RXCP conditions deteriorate for bearing temperature and may require the RXCP be stopped. The CRS should then direct a manual reactor trip and stopping of RXCP B when the immediate operator actions of E-0, Reactor Trip Or Safety Injection, are complete. If the actions to close CC-610B are completed prior to the parameters reaching a required trip condition, then RXCP B will trip (breaker opens) two minutes after the valve is closed.

Event 5 - At the time of the reactor trip (based on NI power) SG B PORV Controller will fail so that SD-2B, SG B PORV fully opens. Manual control is available and when the open SG PORV is identified by the BOP, the Controller will be placed to MAN.

Event 6 & 7 - Associated with the transient placed on SG B, a SG tube rupture will occur in SG B. The rate will increase to a value of 250 gpm over a ten-minute period. The crew will recognize conditions requiring a Safety Injection and manually initiate SI (if required). Five minutes following SI actuation, Component Cooling Pump A trips. Component Cooling Pump B fails to automatically start and should be manually started after verification that SI sequencer completes its sequence. The scenario ends following cooldown and depressurization of the RCS, and if possible, termination of SI flow, OR at the discretion of the Chief Examiner.

## **Critical Tasks**

1. E-0 K - Manually start at least one CCW pump required to provide adequate component cooling for the operating safeguards trains before transition out of E-0. [Event 7]

2. E-3 A – Isolate feedwater flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs [Event 6]
  
3. E-3 B – Establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions: [Event 6]
  - Too high to maintain 50°F [85°F for adverse Containment] subcooling
  - OR
  - Below 270°F.
  
4. E-3 C – Depressurize RCS until either 1) PRZR level is > 74%, 2) RCS subcooling based on CETs is < 30°F [65°F for adverse containment], or 3) RCS pressure is < S/G pressure and PRZR level is > 5% [30% for adverse containment] before 96% level is exceeded in the ruptured S/G. [Event 6]

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<p>Event Description: Power backdown to less than 1673 MWt.</p> <p>Turnover indicates that Shift Manager has just declared TD AFW Pump inoperable due to failure of the steam line drains to operate properly. AFW Pump A is already OOS.</p> <p>ACTION is based on LCO for AFW (TS 3.4.b. 3) with two of three AFW trains inoperable, within two hours, reduce reactor power to less than or equal to 1673 MWt.</p> <p>Additionally, another LCO (TS 3.4.4.B) allows for two AFW trains to be inoperable for 4 hours when the RCS temperature is greater than 350°F</p>								
Time	Position	Applicant's Actions or Behavior						
	<b>CUE:</b>	<b>Entry into LCO for two AFW Pumps inoperable.</b> <b>(If necessary (once the LCO is discussed) a cue may be provided to the crew that Operations Management has directed an immediate downpower at normal rate (1/4%/min) to the lower thermal rating as result of the Operational Decision-Making process.)</b>						
	CRS	Implement actions of N-0-03 Plant Operation Greater Than 35% Power, step 4.2, Power Reduction:						
	CREW	Review applicable Precautions, and Limitations and Actions.						
	CRS	Determine that transition to A-O-03 is NOT required since power reduction rate is less than 1%/min.						
	CRS	Direct that reactivity estimate be performed based on power reduction.						
	RO	Perform reactivity estimate: Current load: 100% (1772 MWt); Projected load: 94.4% (1673 MWt) [MINIMUM REQUIRED] <b>NOTE: Load may be reduced further but given values are based on reduction to 94% power.</b> Use the Reactivity Placard (or Reactor Data Manual) to perform reactivity balance: Final Rod position: > 220 ( <b>226 is projected final position</b> ) Given Borate: % pwr 7.5 gallons boron/%pwr Power decrease of 6% will require 45 gallons of boron with rods ending at 226 steps.						

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Event Description:

Power backdown to less than 1673 MWt.

Turnover indicates that Shift Manager has just declared TD AFW Pump inoperable due to failure of the steam line drains to operate properly. AFW Pump A is already OOS.

ACTION is based on LCO for AFW (TS 3.4.b. 3) with two of three AFW trains inoperable, within two hours, reduce reactor power to less than or equal to 1673 MWt.

Additionally, another LCO (TS 3.4.4.B) allows for two AFW trains to be inoperable for 4 hours when the RCS temperature is greater than 350°F

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Reduce load per N-TB-54, Turbine and Generator Operation, section 4.3, Shutdown:</p> <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations</li> <li>• Determine maximum load rate per Figures 2 &amp; 3 and Attachment C</li> <li>• Take Turbine off VPL (preferred method) <ul style="list-style-type: none"> <li>▪ Press REFERENCE CONTROL “DOWN” pushbutton until SETTER value reads less than 103%.</li> <li>▪ Set Loading Rate to value less than or equal to 5%/min.</li> <li>▪ Press GO button.</li> <li>▪ When the VALVE POS LIMIT green light extinguishes, press HOLD button.</li> </ul> </li> <li>• Press REFERENCE CONTROL “DOWN” pushbutton until SETTER value is at desired load.</li> <li>• Verify/set loading rate to ¼%/min.</li> <li>• Inform (telephone) Energy Supply &amp; Control of rate and amount of load reduction.</li> <li>• Depress GO</li> <li>• Verify load increases</li> <li>• Verify Reactive Load remains within Figure 5, Generator Capability Curve, limits <ul style="list-style-type: none"> <li>▪ If required, adjust Generator #1 Voltage Adjuster switch to change VARs (REACT PWR meter 4460104)</li> </ul> </li> <li>• When required load is reached, verify GO button not lit, or press HOLD pushbutton.</li> <li>• If desired set Valve Position Limit: <ul style="list-style-type: none"> <li>▪ Adjust Valve Position Limit DOWN button in tiny increments until VALVE POS LIMIT light lit.</li> <li>▪ Press REFERENCE CONTROL “UP” pushbutton to increase SETTER value by 3%.</li> <li>▪ Press GO button.</li> </ul> </li> </ul>

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Event Description:

Power backdown to less than 1673 MWt.

Turnover indicates that Shift Manager has just declared TD AFW Pump inoperable due to failure of the steam line drains to operate properly. AFW Pump A is already OOS.

ACTION is based on LCO for AFW (TS 3.4.b. 3) with two of three AFW trains inoperable, within two hours, reduce reactor power to less than or equal to 1673 MWt.

Additionally, another LCO (TS 3.4.4.B) allows for two AFW trains to be inoperable for 4 hours when the RCS temperature is greater than 350°F

Time	Position	Applicant's Actions or Behavior
	RO	<p>Perform reactivity adjustments:</p> <p>Rod Control (outward motion at 1.5°F difference Tref-Tave)</p> <p>AND/OR</p> <p>Boron Concentration Control per N-CV-35A, Boron Concentration Control, section 4.5, Normal Boration During At Power Evolutions:</p> <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations.</li> <li>• Determine rate and magnitude of boration (total amount from above reactivity calculations)</li> <li>• Adjust CVC-403/CV-31092, Blender Control BA Flow, to required flow rate.</li> <li>• Set Rx Make-up Totalizer to required quantity.</li> <li>• Position Reactor Makeup Mode Selector to BORATE.</li> <li>• Position Reactor Makeup Control switch to START</li> <li>• Verify required change has been achieved by monitoring: <ul style="list-style-type: none"> <li>▪ Rod Position</li> <li>▪ Boron Concentration</li> <li>▪ Tave</li> </ul> </li> </ul> <p>When boration is complete:</p> <ul style="list-style-type: none"> <li>• At Boric Acid Totalizer: <ul style="list-style-type: none"> <li>▪ Verify the correct quantity added.</li> <li>▪ Reset the BA Totalizer by pressing the black button.</li> <li>▪ Verify BA Totalizer indicating all ZEROs in window by black button.</li> </ul> </li> <li>• Verify CVC-403/CV-31092 set to current RCS boron concentration using Oper Aid 96-3.</li> <li>• Place CVC-406/CV31094, BA Blender to VCT, to CLOSE position.</li> <li>• Perform a 20-gallon Alternate Dilute (section 4.4).</li> </ul>

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Event Description:

Power backdown to less than 1673 MWt.

Turnover indicates that Shift Manager has just declared TD AFW Pump inoperable due to failure of the steam line drains to operate properly. AFW Pump A is already OOS.

ACTION is based on LCO for AFW (TS 3.4.b. 3) with two of three AFW trains inoperable, within two hours, reduce reactor power to less than or equal to 1673 MWt.

Additionally, another LCO (TS 3.4.4.B) allows for two AFW trains to be inoperable for 4 hours when the RCS temperature is greater than 350°F

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"> <li>▪ Set Rx Makeup Totalizer to "20".</li> <li>▪ Position Reactor Makeup Mode Selector to ALT DIL.</li> <li>▪ Position Reactor Makeup Control switch to START.</li> <li>▪ When dilution is complete: <ul style="list-style-type: none"> <li>○ Verify MU-1022/CV-31095, Blender Control Rx Mu Flow, is set to 60 gpm.</li> <li>○ Verify correct quantity added at Rx Makeup Totalizer.</li> <li>○ Reset Rx Makeup Totalizer by pressing the black button.</li> <li>○ Verify BA Totalizer indicating all ZEROs in window by black button.</li> </ul> </li> <li>• Place CVC-406 to AUTO position.</li> <li>• Position Reactor Makeup Mode Selector to AUTO.</li> <li>• Position Reactor Makeup Control switch to START.</li> </ul>
<b>NOTE: Following the required reactivity change of ~ 5% power, Event 2 may be started.</b>		

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>1</u>	Event No.:	<u>2</u>	Page	of	<u>1</u>
Event Description:		<p>Controlling SG A level channel (LT461) fails high over 10 seconds.</p> <p>The controlling SG A level channel, LI-461, normally reading 44% will fail up to 100% over a 10-second ramp. The BOP will recognize the failure by comparing SG A level on the other channels LI-462 and LI463, which will show a lowering level. The actual level will be lowering due to the response of FW-7A, Main FW Flow Control Valve, closing due to the controlling channel high level. The BOP will take manual control of FW-7A and adjust as necessary to maintain SG A level within normal operating band (39%-49%).</p>						
Time	Position	Applicant's Actions or Behavior						
	<b>CUES:</b>	<p><b>Annunciator Alarms:</b>  <b>47062-A, S/G A PROGRAM LEVEL DEVIATION</b>  <b>47062-B, S/G A BYPASS CV LEVEL DEVIATION</b>  <b>47064-B, S/G A LEVEL HIGH, (at &gt; 67%)</b>  <b>TLA-10 SG TILTS</b></p> <p><b>PPCS Alarms:</b>  <b>L0461A S/G A Chan 1 Level (H-4)</b>  <b>L0403D S/G A Lo Lo Level Chan 1 Trip [When bistable is tripped]</b></p> <p><b>LI-461 S/G A level rising or at top of scale (100%) with LI-462 and LI-463 lowering.</b>  <b>FW-7A Valve Position Demand and Actual (Position) Indication lowering.</b>  <b>FI-466 and FI-467, S/G A Feed Flow indications lowering.</b></p>						
	BOP	<p><b>Identify and report LI-461 failed high.</b></p> <p>Take FW-7A controller to MANUAL.</p>						
	CREW	<p>Address Annunciator Response for 47062-A and/or 47062-B.</p> <p><b>Report that if the alarm is due to a failed instrument:</b></p> <ul style="list-style-type: none"> <li>• Verify the alarm was caused by failure of S/G A Level LI-461 AND position FW-7A to MANUAL.</li> <li>• Go To A-MI-87</li> </ul> <p>Go to A-FW-5A</p> <p><b>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</b></p>						

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Event Description: Controlling SG A level channel (LT461) fails high over 10 seconds.

The controlling SG A level channel, LI-461, normally reading 44% will fail up to 100% over a 10-second ramp. The BOP will recognize the failure by comparing SG A level on the other channels LI-462 and LI463, which will show a lowering level. The actual level will be lowering due to the response of FW-7A, Main FW Flow Control Valve, closing due to the controlling channel high level. The BOP will take manual control of FW-7A and adjust as necessary to maintain SG A level within normal operating band (39%-49%).

Time	Position	Applicant's Actions or Behavior
	CRS	Direct the BOP to control SG A level with FW-7A in MANUAL.
<b>NOTE: Although AFW-05A is identified in the Alarm Response, the procedure only provides direction for restoring the FW-7A/B, FW Control Valves, to automatic operation. No actions would be directed from this procedure in response to this event.</b>		
	CRS	Direct actions of A-MI-87, Bistable Tripping for Failed Reactor Protection or Safeguards Inst.
	CRS	Check Technical Specifications for instruments with bistable tripping requirements [TS 3.5.b]: TS Table 3.5-2, item No. 12 (Lo-lo SG water level reactor trip) – 3/loop with 2/loop required. TS Table 3.5-3, item No. 4.a (MD AFW Pumps, Either SG lo-lo level) – 3/loop with 2/loop required. TS Table 3.5-3, item No. 5.a (TD AFW Pump, Both SG lo-lo level) – 3/loop with 2/loop required. TS Table 3.5-4, No. 4.a (Main FW Isol, Hi-hi SG level) – 3/loop with 2/loop required.
	CRS	Ensure I&C (Work Control/Work Week Coordinator) is notified of status of LT461.
	CRS	Declare LT461 channel out-of-service (OOS).
	CRS	Ensure bistables for LT461 are to be tripped within 6 hours of declaring OOS.
	CRS	Direct I&C to check for redundant channel bistable status by performing SP 47-316E, Channel 1 (Red) Reactor Protection Logic Test.

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Event Description: Controlling SG A level channel (LT461) fails high over 10 seconds.

The controlling SG A level channel, LI-461, normally reading 44% will fail up to 100% over a 10-second ramp. The BOP will recognize the failure by comparing SG A level on the other channels LI-462 and LI463, which will show a lowering level. The actual level will be lowering due to the response of FW-7A, Main FW Flow Control Valve, closing due to the controlling channel high level. The BOP will take manual control of FW-7A and adjust as necessary to maintain SG A level within normal operating band (39%-49%).

Time	Position	Applicant's Actions or Behavior
<b>NOTE: Time Warp may be used at this point to have the check of redundant bistables complete.</b> <b>CUE: SP 47-316E is complete and no bistables were detected that would cause a reactor trip.</b>		
	CRS	Direct the crew to perform/verify Prerequisite Alignment of Attachment I for LT461.
	BOP	Ensure FW-7A, S/G A Main FW Flow Control Auto/Manual switch in MAN.  Ensure FW-10A, S/G A Bypass FW Flow Control Auto/Manual switch in MAN.
	RO	Act as SECOND OPER for verification of position for FW-7A and FW-10A in MAN.
	CRS	Direct I&C to trip bistables per Attachment I section 2.0 and 3.0  <b>(NOTE: The COMMUNICATOR is set report &amp; to receive direction from CRS, and will perform actions for tripping bistables from the Simulator Booth.)</b>
	CRS	Direct crew to verify control room indications per Attachment I.
	BOP	Verify following lit: <ul style="list-style-type: none"> <li>▪ Annunciator 47064-A, S/G A LEVEL LOW LOW</li> <li>▪ Annunciator 47064-B, S/G A LEVEL HIGH</li> <li>▪ Status Light 44907-1101, S/G A Low-Low Level</li> <li>▪ Status Light 44908-0801, S/G A Hi-Hi Level</li> </ul>
	CREW	Complete PERFORMED BY and VERIFICATION BY sections of Attachment I.

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Event Description: Controlling SG A level channel (LT461) fails high over 10 seconds.

The controlling SG A level channel, LI-461, normally reading 44% will fail up to 100% over a 10-second ramp. The BOP will recognize the failure by comparing SG A level on the other channels LI-462 and LI463, which will show a lowering level. The actual level will be lowering due to the response of FW-7A, Main FW Flow Control Valve, closing due to the controlling channel high level. The BOP will take manual control of FW-7A and adjust as necessary to maintain SG A level within normal operating band (39%-49%).

Time	Position	Applicant's Actions or Behavior
	CRS	Direct status control for LI-461 indication (OOS sticker).

**AT THIS TIME the crew will be informed that the Turbine Drive AFW Pump steamline traps have been warmed, and the T/D AFW Pump may be returned to service. As Shift Manager, a cue is provided to the crew to remove any Status Control and restore the T/D AFW Pump to service.**

**NOTE: At Chief Examiner direction, Event 3 may be initiated.**

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>1</u>	Event No.:	<u>3</u>	Page	of	<u>1</u>
Event Description:		<p>Service Water Pump 1B1 trips on overcurrent. SW-3A, SW header A Isolation inadvertently closes.</p> <p>Running SW Pump 1B1 trips, reducing the overall SW header pressure. When pressure drops to 78 psig, SW Pump 1B2 automatically starts. SW-3A and SW-3B, the SW Header Isolation valves are designed to close on a lowering header pressure at 72 psig on their associated header. Pressure does not drop this low; however, SW-3A will go closed.</p>						
Time	Position	Applicant's Actions or Behavior						
	<b>CUES:</b>	<p><b>Annunciator Alarms:</b></p> <p><b>47093-L, BUS 6 FEEDER BKR OVERLOAD</b></p> <p><b>47092-L, BUS 6 FEEDER BKR TRIP</b></p> <p><b>47051-P, SW HEADER PRESSURE LOW</b></p> <p><b>47052-Q, TURBINE BLDG SW ISOLATION ALERT</b></p> <p><b>The WHITE light for SW Pump 1B1 will be lit.</b></p> <p><b>SWW Pump 1B2 auto starts (red light).</b></p> <p><b>FW-3A green light lit and SW-3B red light lit.</b></p>						
	BOP	<p><b>Identify and report trip of SW Pump 1B1.</b></p> <p><b>Report SW Pump 1B2 start.</b></p>						
	CREW	<p>Address Annunciator Response.</p> <p>47092-L and 47093-L:</p> <p>If alarm is activated by SW Pump B1 Breaker 1-608 Overcurrent trip:</p> <ul style="list-style-type: none"> <li>• Start additional SW Pumps as required.</li> <li>• Refer to Technical Specification 3.3</li> <li>• Dispatch NAO to investigate Timed Overcurrent relays on Bus 6.</li> <li>• Notify Plant Electricians.</li> </ul> <p>47051-P and 47051-Q:</p> <ul style="list-style-type: none"> <li>• Go to A-SW-02</li> </ul>						

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Event Description: Service Water Pump 1B1 trips on overcurrent. SW-3A, SW header A Isolation inadvertently closes.

Running SW Pump 1B1 trips, reducing the overall SW header pressure. When pressure drops to 78 psig, SW Pump 1B2 automatically starts. SW-3A and SW-3B, the SW Header Isolation valves are designed to close on a lowering header pressure at 72 psig on their associated header. Pressure does no drop this low; however, SW-3A will go closed.

Time	Position	Applicant's Actions or Behavior
	CREW (cont.)	<p>When IPEOPs are NOT in effect:</p> <ul style="list-style-type: none"> <li>If Turbine Bldg SW header is isolated [SW-4A and SW-4B closed], restore SW headers to normal per A-SW-02.</li> <li>If Turbine Building SW header is not isolated AND SW ESF Isolation signal is present, SER 839(840), THEN depress SW ESF Isol Reset pushbutton.</li> </ul> <p>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.) (47051-P AND 47052-Q should reset after the standby SW Pump starts.)</p>
	CRS	Direct actions of A-SW-02, Abnormal Service Water System Operation.
	BOP	Check Forebay Level LI-41551 > 42%.
	CREW	Dispatch Operator to monitor SW Loads (Check SW Pumps and breakers).
	BOP	<p>Check both SW header pressures &gt; 72 psig on PI-41503 and PI-41506.</p> <p>Check SW Header Isolation Valves SW-3A and SW-3b open.</p> <ul style="list-style-type: none"> <li>Report SW-3A closed.</li> <li>Verify all available SW Pumps running.</li> </ul>

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

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Event Description: Service Water Pump 1B1 trips on overcurrent. SW-3A, SW header A Isolation inadvertently closes.

Running SW Pump 1B1 trips, reducing the overall SW header pressure. When pressure drops to 78 psig, SW Pump 1B2 automatically starts. SW-3A and SW-3B, the SW Header Isolation valves are designed to close on a lowering header pressure at 72 psig on their associated header. Pressure does no drop this low; however, SW-3A will go closed.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	Check if SW to Turbine Bldg should be isolated. <ul style="list-style-type: none"> <li>Annunciator 47051-N CW PUMPS FLOOD LEVEL TRIP not lit.</li> </ul>
	CREW	Determine IPEOPS are not in affect.
	BOP	Check SW header pressure supplying Turbine Building > 60 psig on PI-41503 for header A.  Check SW-4A OPEN.  Check PI-41503 SW Header A pressure > 60 psig on PI-41503.  Check SW-10A, Aux Bldg SW Header A Isol, open.  Check PI-41506 SW Header B pressure > 60 psig on PI-41506.  Check SW-10B, Aux Bldg SW Header B Isol, open.
<b>NOTE: The following indications are associated with the RO portion of then boards and may be addressed by either operator, although most likely by the RO.</b>		
	CREW	Check SW Header in Containment intact: <ul style="list-style-type: none"> <li>Normal Containment sump levels <ul style="list-style-type: none"> <li>Annunciators for sumps OFF: 47031-P, 47031-Q and 47031-R</li> <li>Containment Level Wide Range Channel A, 4131703 AND Containment Level Wide Range Channel B, 4131704 NORMAL at ZERO.</li> </ul> </li> </ul>

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

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Event Description: Service Water Pump 1B1 trips on overcurrent. SW-3A, SW header A Isolation inadvertently closes.

Running SW Pump 1B1 trips, reducing the overall SW header pressure. When pressure drops to 78 psig, SW Pump 1B2 automatically starts. SW-3A and SW-3B, the SW Header Isolation valves are designed to close on a lowering header pressure at 72 psig on their associated header. Pressure does no drop this low; however, SW-3A will go closed.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check Containment FCU outlet temperatures approximately equal on Omniguard 41507, points 15127 through 15130.</p> <p>Check both SW header pressures &gt; 86 psig on PI-41503 and PI-41506.</p> <p>Check annunciator 47052-P off, and SER points 240 and 241 on Alarm Screen or Alarm Printer are off.</p> <p>Verify SW Header A operating:</p> <ul style="list-style-type: none"> <li>• SW Header A intact.</li> <li>• Check PI-41503 SW Header A pressure &gt; 60 psig.</li> <li>• Check SW-10A, Aux Bldg SW Header A Isol, open</li> <li>• Check SW-3A, SW Header A Isolation open</li> </ul> <p><b>Report SW-3A closed.</b></p>
	Crew	Verify SI is reset (not active) [Annunciators 47021-A and 47021B off].
	CRS	Direct BOP to open SW-3A.
	BOP	Open SW-3A.

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

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Event Description: Service Water Pump 1B1 trips on overcurrent. SW-3A, SW header A Isolation inadvertently closes.

Running SW Pump 1B1 trips, reducing the overall SW header pressure. When pressure drops to 78 psig, SW Pump 1B2 automatically starts. SW-3A and SW-3B, the SW Header Isolation valves are designed to close on a lowering header pressure at 72 psig on their associated header. Pressure does no drop this low; however, SW-3A will go closed.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	<p>Verify SW Header B operating:</p> <ul style="list-style-type: none"> <li>• SW Header B intact.</li> <li>• Check PI-41506 SW Header B pressure &gt; 60 psig.</li> <li>• Check SW-10B, Aux Bldg SW Header B Isol, open.</li> <li>• Check SW-3B, SW Header B Isolation open</li> </ul> <p>Verify Turbine Bldg Header operating:</p> <ul style="list-style-type: none"> <li>• Turbine Bldg Header intact.</li> <li>• SW-4A open.</li> </ul> <p><b>[END OF PROCEURE STEPS]</b></p>
	CRS	<p>Check Technical Specifications for SW, TS 3.3.e.2 72-hour LCO with ONE SW Train inoperable.</p> <p>Determine plant shutdown is required due to inoperability of SI Pump B based on inoperable SW Train B. Entry into TS 3.0.c Standard Shutdown Sequence. (Reference TS 3.7.c for electrical equipment operability)</p> <p><b>NOTE: The affect on SI Pump B and other equipment dependent on SW is addressed in N-SW-02, Service Water System, Precautions and Limitations:</b></p> <p>2.2 WHEN one train of Service Water is inoperable, components supported by that train are inoperable. Apply T.S. LCO for Service Water System.</p> <ol style="list-style-type: none"> <li>1. Test other Diesel Generator daily to ENSURE OPERABILITY.</li> <li>2. VERIFY engineered safety features associated with other Diesel Generator OPERABLE.</li> </ol>

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

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Event Description: Service Water Pump 1B1 trips on overcurrent. SW-3A, SW header A Isolation inadvertently closes.

Running SW Pump 1B1 trips, reducing the overall SW header pressure. When pressure drops to 78 psig, SW Pump 1B2 automatically starts. SW-3A and SW-3B, the SW Header Isolation valves are designed to close on a lowering header pressure at 72 psig on their associated header. Pressure does not drop this low; however, SW-3A will go closed.

Time	Position	Applicant's Actions or Behavior
	CRS	<p>Inform Operations Management of plant conditions and Technical Specification requirement to shutdown.</p> <p>If not contacted earlier, ensure Electrical Maintenance (Work Control/Work Week Coordinator) contacted to address overcurrent for beaker for SW Pump 1B1.</p>

**NOTE: At Chief Examiner direction, Event 4 may be initiated.**

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Op-Test No.: 1 Scenario No.: 1 Event No.: 4

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47014-L, RXCP B LABRYNTH SEAL DP LOW</b> <b>47014-I, RXCP B LABRYNTH SEAL DP LOW</b> <b>47024-H, CC SURGE TANK LEVEL HIGH/LOW</b> <b>47012/11-B, RADIATION INDICATION ALERT; RADIATION INDICATION HIGH</b> <b>TLA-15 RMS ABOVE NORMAL</b>  <b>PPCS Alarms:</b> <b>P0129 RCP B Labyrinth Seal Water DP L-1</b> <b>P0429A Przr pressure Channel 1 low L-1</b> <b>P0430A Przr pressure Channel 2 low L-1</b> <b>P0431A Przr pressure Channel 3 low L-1</b> <b>P0449A Przr pressure Channel 4 low L-1</b> <b>G00017A Radiation Monitor R-17 H-1</b>  <b>RXCP B PI-131B Labyrinth seal delta-P drops to ZERO in.</b> <b>RXCP B FI-116 #1 Seal Injection Flow rises to top of scale.</b> <b>Charging Pump A speed increases (in AUTO).</b> <b>Pressurizer pressure and level drop.</b> <b>CC Surge Tank level LI-618 rises</b> <b>R-17, CC Radiation Monitor value rising.</b>
	RO	<b>Identify and report RXCP problem</b> (RXCP Labyrinth seal DP low; seal injection flow higher; CC Surge Tank level rising).

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Op-Test No.: 1 Scenario No.: 1 Event No.: 4Page of 1

Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Address Annunciator Response.</p> <p>For 47014-L and/or 47014-I:</p> <ul style="list-style-type: none"><li>Go to A-RC-36C</li></ul> <p>For 47024-H:</p> <ul style="list-style-type: none"><li>If an increase in level is noted that is not attributable to system makeup or temperature increase, then go to A-CC-31.</li></ul> <p>For 47011-B or 47012-B:</p> <ul style="list-style-type: none"><li>If alarm is NOT due to planned evolution, then inform Radiation Protection and request assistance in identifying and isolating radiation source.</li><li>Go to A-RM-45</li></ul> <p>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</p>
<b>NOTE: The crew may address one or more of the procedures in any order based on crew-determined priority. Each of these procedures is addressed below.</b>		
	CRS	Direct the actions of A-RC-36C.

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Op-Test No.: 1 Scenario No.: 1 Event No.: 4Page of 1

Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	CREW	If any RXCP monitored parameter exceeds the allowed maximum value, then trip the reactor and got to E-0.
	RO	<p>Check if RXCP should remain operating:</p> <ul style="list-style-type: none"> <li>• #1 seal leakoff flow &lt; 8.0 gpm on recorder 42588.</li> <li>• #1 seal outlet temperature &lt; 125°F on TI-181/TI-182.</li> <li>• Bearing Water temperature &lt; 225°F on T-132/T-125.</li> <li>• Motor vibration &lt; 5 mils on RXCP Vibration monitors.</li> <li>• Pump vibrations &lt; 20 mils RXCP Vibration monitors.</li> <li>• PPCS CC temperature T0621A &lt; 120°F.</li> <li>• PPCS motor Bearing temperatures T0413A-T0416A/T0433A-T0436A &lt; 195°F.</li> <li>• PPCS Motor stator temperature T0417A/T0437A &lt; 155°F</li> </ul> <p>(NOTE: Values may also be read from RXCP Graphic Display on PPCS. The above is a Continuous Action Step.)</p>
	RO	<p>Check CC flow to RXCPs Motor Bearing Oil Coolers;</p> <ul style="list-style-type: none"> <li>• At least one CC pump running.</li> <li>• Valves CC-600, CC-601A/B and CC-612A/B open.</li> <li>• RXCP CC FLOW LOW annunciator 47021-I off.</li> </ul> <p>Check #1 seal ΔP greater than 200 psid on PI-173/PI-174.</p>

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Op-Test No.: 1 Scenario No.: 1 Event No.: 4

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<p>Check RXCP Pump vibration &lt; 15 mil.</p> <p>Check #1 Seal leakoff flow &lt; 6.0 gpm.</p> <p>Verify CC flow to RXCP Thermal Barriers intact:</p> <ul style="list-style-type: none"> <li>• CC-610A/B, RXCP Thermal Barrier CC Return open</li> <li>• Component Cooling radiation levels R-17 normal.</li> <li>• CC Surge Tank level normal.</li> </ul> <p><b>Report R-17 radiation levels elevated and/or CC Surge Tank level rising.</b></p>
	CREW	<p>Determine RXCP Thermal Barrier is leaking.</p> <p>(NOTE: It is expected that the parameters will be sufficient to allow determination that RXCP B thermal barrier is leaking; however, the crew may elect to isolate both until an evaluation is performed.)</p>
	CRS	Direct closing CC-610B and/or CC-610A.
	RO	<p><b>Close CC-610B.</b></p> <p>(NOTE: The closure of the valve will initiate 2-minute timer leading to trip of RXCP B.)</p>

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	CREW	Verify thermal barrier leak has been stopped: <ol style="list-style-type: none"> <li>1. Monitor R-17</li> <li>2. Monitor CC Surge Tank level.</li> </ol>
	CREW	<ul style="list-style-type: none"> <li>• Trend RXCP parameters on PPCS.</li> <li>• Do not open CC-610A/B on affected RXCPs during subsequent recovery steps.</li> </ul> <p>If any thermal barrier is intact, reestablish CC flow to thermal barrier:</p> <ul style="list-style-type: none"> <li>• Place CC-610A/CV31127, RXCP A Thermal Barr CC Alternate Control in OPEN position.</li> <li>• Open CC-610A, if closed.</li> </ul>
<b>NOTE: It is expected that RXCP B conditions may require or may have required a reactor trip and RXCP B shutdown by this point. If not, RXCP B will trip at this point. A-CC-31 actions are covered below.</b>		
	CRS	Direct the actions of A-CC-31.
	RO	Verify flow to CC Header: <ul style="list-style-type: none"> <li>• At least one CC Pump running.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Verify Comp Cooling Heat Exchanger A/B outlet, CC-6A AND/OR CC-6B, at least one open.</li> </ul>

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	RO	<ul style="list-style-type: none"> <li>Check CC Flow return normal (1000 - 1500 gpm) on FI-619.</li> </ul> <p>Maintain CC System Inventory:</p> <ul style="list-style-type: none"> <li>Surge Tank Level &lt; 52% on LI-618</li> </ul> <p><b>Report CC Surge Tank level rising.</b></p> <p>Isolate Surge Tank makeup:</p> <ul style="list-style-type: none"> <li>Verify SW-1400, Emergency Makeup to CC, closed</li> </ul>
	CREW	<ul style="list-style-type: none"> <li>Direct NAO to locally verify DW-161, makeup Supply from Demin Water, closed.</li> </ul>
	RO	<p>Check CC Surge tank level &gt; 45% on LI-618.</p> <p>Check both CC Pumps running</p> <p><b>Report CC Pump A running.</b></p> <ol style="list-style-type: none"> <li>Check CC Pump A discharge pressure &gt; 90 psig on PI-4130202.</li> <li>Monitor temperature and flow to components in operation.</li> </ol>

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

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Time	Position	Applicant's Actions or Behavior
	RO	<p>Check if RXCP should remain operating:</p> <p>Check RXCP operating</p> <p>Check RXCP parameters</p> <ul style="list-style-type: none"> <li>• #1 seal outlet temperature &lt; 125°F on TI-181/TI-182.</li> <li>• Bearing Water temperature &lt; 225°F on T-132/T-125.</li> <li>• Motor vibration &lt; 5 mils on RXCP Vibration monitors.</li> <li>• Pump vibrations &lt; 20 mils RXCP Vibration monitors.</li> <li>• PPCS CC temperature T0621A &lt; 120°F.</li> <li>• PPCS motor Bearing temperatures T0413A-T0416A/T0433A-T0436A &lt; 195°F.</li> <li>• PPCS Motor stator temperature T0417A/T0437A &lt; 155°F</li> </ul> <p>(NOTE: Values may also be read from RXCP Graphic Display on PPCS. The above is a Continuous Action Step.)</p>
	CREW	If any RXCP monitored parameter exceeds the allowed maximum value, then trip the reactor and got to E-0.
	RO	Stop the affected RXCPs and close its associated Spray valve.

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

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Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<p>Check CC flow to RXCPs Motor Bearing Oil Coolers;</p> <ul style="list-style-type: none"> <li>At least one CC pump running.</li> <li>Valves CC-600, CC-601A/B and CC-612A/B open.</li> <li>RXCP CC FLOW LOW annunciator 47021-I off.</li> </ul> <p>Check CC Hx Outlet temperature on PPCT0621A &lt; 120°F and stable.</p> <p>If temperature is high or rising:</p> <ul style="list-style-type: none"> <li>Direct NAO to locally place SW-1306A/B controller in manual and operate to regain control of CC temperature.</li> <li>Open SW-1300A/B CC Hx A/B Outlet as necessary to maintain CC temperature &lt; 120°F.</li> <li>Cool down CC temperature: <ul style="list-style-type: none"> <li>Verify proper cooling established to CC heat exchanger.</li> <li>Shut down unnecessary loads supplied by CC.</li> </ul> </li> </ul> <p>Verify CC flow to letdown HX</p> <ul style="list-style-type: none"> <li>At least one CC Pump running</li> <li>Letdown HX Outlet temperature stable or decreasing on TI-130.</li> </ul> <p>Verify CC flow to letdown HX</p> <ul style="list-style-type: none"> <li>At least one CC Pump running</li> <li>VCT Outlet temperature stable or decreasing on TI-140.</li> </ul>

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Op-Test No.: 1 Scenario No.: 1 Event No.: 4

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<p>Check if CC System is intact:</p> <ol style="list-style-type: none"> <li>CC radiation level R-17 normal</li> </ol> <p><b>Report R-17 radiation level elevated.</b></p>
	CREW	<p>Try to identify location of leak:</p> <ul style="list-style-type: none"> <li>Abnormal CC flow through components</li> <li>Abnormal CC temperatures</li> <li>Abnormal temperatures on components</li> <li>Abnormal Sump level changes</li> <li>Local visual inspection</li> <li>Selective isolation of Heat Exchangers</li> </ul> <p>Check CC Hxs intact.</p> <p>Check CC to RXCPs intact:</p> <ul style="list-style-type: none"> <li>Containment sump alarms clear.</li> <li>RXCP motor bearing oil coolers intact.</li> <li>CC piping to/from RXCP inside containment intact.</li> </ul>
	RO	<p>Verify CC flow to RXCP Thermal Barriers:</p> <ul style="list-style-type: none"> <li>RXCP A/B Therm Barr temperature between 105-120°F</li> <li>CC-610A/B, RXCP Thermal Barrier CC Return open</li> <li>RXCP Thermal Barrier Return flow, FI-614/FI-610 normal</li> </ul>

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Op-Test No.: 1 Scenario No.: 1 Event No.: 4Page of 1

Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

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Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<b>Report thermal barrier temperature on TI-610 elevated.</b>
	CREW	If Thermal Barrier return flow is checked, direct NAO to locally read FI-614/FI-610.  When NAO responds, <b>report elevated flow on FI-610.</b>
	RO	Isolate any leaking thermal barrier: <ul style="list-style-type: none"> <li>• <b>Close CC-610B.</b></li> </ul> (NOTE: The closure of the valve will initiate 2-minute timer leading to trip of RXCP B.)
	CREW	Place computer points for RXCP B on trend.
	RO	Maintain seal injection flow to RXCPs 6-13 gpm.
<b>NOTE: It is expected that RXCP B conditions may require or may have required a reactor trip and RXCP B shutdown by this point. If not, RXCP B will trip at this point. A-RM-45 actions are covered below.</b>		
	CRS	Direct the actions or performance of A-RM-45.

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Event Description: RXCP B Thermal Barrier leak reactor coolant into Component Cooling (CC) System. CC Isolation valve, CC-610B, fails to close. RXCP B trip (if required).

Leak of ~ 65 gpm from the RCS into the CC System initially. CC610B, RXCP B Thermal Barr Rtn, fails to close. Normally when the sensed CC return flow on FI609 exceeds 260 gpm, CC-610B will close isolating the cooling flow to the thermal barrier. RXCPB parameters degrade as the RCS coolant flows up the labyrinth seals feeding the thermal barrier leak. Component Cooling system shows indications of RCS leak with CC Surge Tank level rising and R-17, CC Radiation Monitor upward trend. Eventually worsening conditions for the RXCP should require a reactor trip so the RXCP can be stopped. If not stopped at the time the thermal barrier leak has been addressed, then RXCP B will trip.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Check if personnel should be evacuated:</p> <p>Determine monitor indications for R-2 through R-10 are normal.</p> <p>Check for radiation monitors failed downscale.</p> <p>Go to step 18 for R-17 response.</p> <p>Check R-17 operating properly.</p> <p>Check R-17 radiation levels elevated:</p> <ul style="list-style-type: none"> <li>• Direct contact/Contact Chemistry to determine sampling requirements.</li> <li>• With indications of leakage into CC System, Go to A-CC-31.</li> </ul> <p><b>NOTE:</b> Actions of A-CC-31 are listed above.</p>

**NOTE: When the reactor is tripped (manual or automatic due to RXCP trip), Events 5, 6 & 7 are initiated.**

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Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>various</b>  <b>SD-3B, SG B PORV, red light lit, green light out</b> <b>SG B pressure &lt; 1000 psig and lowering.</b> <b>Steam Flow indicated on FI474 &amp; FI-475 for SG B, with steam dumps closed.</b> <b>Przr pressure lowering.</b>  <b>Przr pressure and level dropping.</b> <b>Charging flow increasing.</b> <b>TLA-15 Alarm RMS ABOVE NORMAL</b> <b>Radiation trend rising for R-15, Air Ejector Exhaust, and R-19SG Blowdown Liquid.</b> <b>Automatic SI actuation.</b> <b>SG B level rising faster than SG A level / SG B level rising with feed isolated.</b>  <b>47103-F, BUS 51 FEEDER BKR TRIP (SER0746)</b> <b>Various CC flow low annunciators</b> <b>CC Pump A green and white lights lit.</b> <b>CC Header pressure falling below 35 psig on 4130202 without start of CC Pump B</b>
	RO	[E-0, step 1] Verify reactor trip: <ul style="list-style-type: none"> <li>Reactor Trip and Bypass Breakers OPEN [Green lights lit for RTBs A &amp; B]</li> <li>All Rod Position indicator <math>\leq 7.5</math> steps</li> <li>All Rod Bottom (red) lights lit</li> <li>Neutron flux decreasing [4122601-4122604 or Power Range NIS Panel A drawers]</li> </ul>

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Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

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Time	Position	Applicant's Actions or Behavior
	BOP	[E-0 steps 2 & 3] Verify turbine trip: <ul style="list-style-type: none"> <li>HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>Turbine Stop Valve green CLOSE indications lit.</li> </ul> Verify power to either Bus 5 or Bus 6 (White voltage lights lit).
	CREW	[E-0 step 4] Check if SI is actuated: Annunciator 47021-A and 47021-B – SI Train A(B) ACTUATED – either lit.  If not, Check if SI is required: <ul style="list-style-type: none"> <li>Przr pressure &lt; 1815 psig</li> <li>Przr level &lt; 5%</li> <li>RCS subcooling &lt;30°F</li> <li>SG pressure &lt; 500 psig</li> <li>CNTMT pressure &gt; 4 psig.</li> </ul> If SI is not required announce reactor trip.
	RO	<b>Take Przr Spray Control LOOP B to MAN and verify closed.</b>

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Time	Position	Applicant's Actions or Behavior
	CREW	Identify steam release: <ul style="list-style-type: none"> <li>• Przr pressure lowering</li> <li>• Steam flow indicated from SGs with steam dumps closed</li> <li>• RED light lit for SD-3B</li> </ul>
	BOP	<b>Report SD-3B open (with SG B pressure less than setpoint).</b>  Take SD-3B controller to manual and verify SD-3B closed.
	CRS	Direct actions of E-0  Verify immediate actions.  If SI has not occurred or is not required, inform crew of transition to ES-0.1
<b>NOTE:</b> it is expected that the SGTR malfunction will be active before the crew does transition to ES-0.1 or performs actions in ES-0.1. If the transition is made to ES-0.1, then upon actuation of SI, transition to E-0 step 1 will be made and the immediate operator actions reperformed.		
	RO	<b>Report indications of RCS leak:</b> <ul style="list-style-type: none"> <li>• Lowering RCS pressure</li> <li>• Lowering Przr level</li> <li>• Charging flow rising.</li> </ul>
	CREW	<b>Report secondary radiation indication.</b>
	CRS	If SI has not occurred, direct SI actuation (E-0 QRF):

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Time	Position	Applicant's Actions or Behavior
	CRS (cont.)	<ul style="list-style-type: none"> <li>• Przr level cannot be maintained &gt; 5%</li> <li>• Przr pressure is trending toward 1815 psig and actions have not stabilized pressure.</li> <li>• RCS subcooling &lt;30°F</li> </ul>
	RO	If directed, <b>actuate SI by pressing both SI Train A and Train B INITIATE pushbuttons.</b>
	CREW	Check both trains of SI actuated: Annunciator 47021-A and 47021-B – SI Train A(B) ACTUATED lit.
	CRS	Evaluate E-0 QRF, Ruptured SG Isolation Criteria.
	CREW	When determined that SG B is ruptured, then apply ruptured SG Isolation Criteria: If any SG level rises in an uncontrolled manner OR any SG has abnormal radiation AND Narrow range level in the affected SG [B] is > 4% , THEN feed flow may be isolated to SG B.
	BOP	When directed, <b>isolate feed flow to SG B by closing AFW-2B and AFW-10B.</b>

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Time	Position	Applicant's Actions or Behavior
	BOP	Verify FW Isolation <ul style="list-style-type: none"> <li>FW-7A/B, SG A &amp; B Main Feed Control Valves, closed</li> <li>FW-10A/B, SG A &amp; B Bypass Flow Control valves, closed.</li> <li>FW 12 A/B, Feedwater to SG A &amp; B Isolation, closed.</li> </ul>
	CREW	Make plant announcement that Safety Injection has occurred.
	CREW	Dispatch EO/AO to Locally monitor AFW Pump operation: <ul style="list-style-type: none"> <li>AFW Pump B and TD AFW Pump running.</li> </ul>
	BOP	Check if steamline isolation is required: <ul style="list-style-type: none"> <li>High steam flow (<math>&gt;0.75E6</math>) and low RCS Tavg (<math>&lt;540^{\circ}\text{F}</math>) for SG A.</li> <li>Containment pressure <math>&gt; 17</math> psig.</li> </ul>
	CREW	Verify Containment Spray not required: Check containment pressure (Cntmt Wide Range Pressure recorders 42597 & 42598) have remained below 23 psig.
	BOP	Verify Containment Fan Coil Units running.  Verify SW-903 A, B, C & D CNTMT Fan Coil Unit SW Return valves open.

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Time	Position	Applicant's Actions or Behavior
	BOP	<p>Verify Aux Bldg Special Ventilation running:</p> <ul style="list-style-type: none"> <li>Annunciator 47052-G NOT lit.</li> <li>Zone SV Fans A and B running.</li> </ul> <p>Verify Service Water alignment:</p> <ul style="list-style-type: none"> <li>Verify all SW Pumps running</li> <li>Verify SW header selected on Turbine Bldg SW switch &gt; 82.5 psig [Train A hdr-PI-41503]</li> </ul> <p>Verify AFW Pumps running:</p> <ol style="list-style-type: none"> <li>Check AFW Pump A running</li> </ol> <p><b>Report AFW Pump A OOS</b></p> <ul style="list-style-type: none"> <li>Close AFW-2A, AFWP A Flow Control.</li> </ul> <ol style="list-style-type: none"> <li>Check AFW Pump B running</li> <li>Check TD AFW Pump running (red light lit for MS-102, T/D AFW Pump Main Steam Isol, and discharge pressure on 41040)</li> </ol> <p><b>Throttle AFW Pump Disch valves (AFW-2B):</b></p> <ol style="list-style-type: none"> <li>Maintain running AFW Pump Disch Pressure &gt; 1000 psig</li> <li>Maintain either 1) Total AFW flow &gt; 205 gpm OR 2) SG narrow range level in at least one SG &gt; 4% [15% ADVERSE].</li> </ol>

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Time	Position	Applicant's Actions or Behavior
<p><b>NOTE:</b> If SG B feed flow has been isolated IAW E-0 QRF for ruptured SG actions, then the TD AFW pump will be aligned and operated as necessary to feed SG A only.</p>		
	RO	<p>Verify CI Active Status Panel Lights lit.</p> <p>Verify ESF Equipment running:</p> <ol style="list-style-type: none"> <li>SI Pumps</li> </ol> <p><b>Report SI Pump A not running – OOS</b></p> <ol style="list-style-type: none"> <li>RHR Pumps</li> <li>CC Pumps Check</li> </ol>
	<p>RO</p> <p><b>CRITICAL TASK</b></p>	<p>When CC Pump A trips, <b>report trip of CC Pump A.</b></p> <p><b>Start CC Pump B.</b></p> <ol style="list-style-type: none"> <li>SI Active Panel lights lit [SI Pump A, AFW Pump A and SW Pump B1 not lit.]</li> </ol>

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Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<p>Verify SI flow on F925.</p> <p>Check RXCP cooling:</p> <ul style="list-style-type: none"> <li>• CC valves to RXCPs open – CC-600, CC-601A/B, CC610A/B &amp; CC-612A/B.</li> <li>• RXCP Thermal Barrier temperatures normal, T614 &amp; T610. [Normal is 60°F to 95°F.]</li> <li>• RXCP bearing temperatures normal, T132 &amp; T125. [Normal is Ambient to 150°F.]</li> </ul> <p><b>Report CC-610B closed.</b></p>
	CRS	<b>Direct starting one Charging Pump.</b>
	RO	<p>Ensure Charging Pump to be started is in MAN.</p> <p>Rotate Charging Pump pot fully counter-clockwise to minimum.</p> <p>Start one Charging Pump.</p>
	CREW	Check RCS average temperature stable at or trending to 547°F:

**NOTE: If feed to SG B was isolated due to the action of the E-0 QRF, then the crew may not stop the TD AFW Pump since it is the only source of feed to SG A.**

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Time	Position	Applicant's Actions or Behavior
	BOP	<p>If Tave is not stable or trending to 547°F:</p> <ul style="list-style-type: none"><li>• Transfer Steam Dumps to Pressure Control Mode.</li><li>• If at least one MD AFW Pump is running, place TD AFW Pump in PULLOUT</li><li>• Control feed flow. Maintain total feed &gt; 205 gpm until narrow range in at least one SG &gt; 4% [15% ADVERSE]</li><li>• If cooldown continues, close MS-1A &amp; B.</li></ul>
	RO	<p>Check Przr PORVS closed.</p> <p>Check Przr Spray Valves closed.</p> <p>Check CV-15, Aux Spray Valve closed.</p> <p>Check if RXCPs should be tripped:</p> <ul style="list-style-type: none"><li>• RCS injection flow indicated on F925</li></ul> <p>AND</p> <ul style="list-style-type: none"><li>• RCS subcooling &lt;15°F [45°F]</li></ul> <p>If both conditions exist, THEN stop both RXCPs and place the control switches in PULLOUT.</p>

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Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>Any SG pressure decreasing in uncontrolled manner.</li> <li>OR</li> <li>Any SG completely depressurized</li> </ul> <p>Report NO SGs depressurizing uncontrolled or depressurized.</p>
	CREW	<p>Check SG Tubes not ruptured:</p> <ul style="list-style-type: none"> <li>R-15 Air Ejector Exhaust monitor panel &amp; recorder 45716 normal</li> <li><b>R-19</b> SG Blowdown liquid monitor panel &amp; recorder 45716 normal</li> <li>R-31&amp; R-33, Steamline monitors, on SPDS normal</li> </ul> <p><b>Report indications for secondary radiation (R-19 reading elevated).</b></p>
	CRS	<p>Inform crew of transition to E-3, Steam Generator Tube Rupture.</p> <p>Direct monitoring of Critical Safety Function Status Trees.</p>
	CRS	<p>Direct actions of E-3</p> <p>Refer to E-3 QRF.</p> <p>Inform Shift Manager to contact personnel for initiating of surveys and sampling and to review EPIPs.</p>

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Time	Position	Applicant's Actions or Behavior
	RO	Check if RXCPs should be tripped: <ul style="list-style-type: none"><li>• RCS injection flow indicated on F925</li></ul> AND <ul style="list-style-type: none"><li>• RCS subcooling &lt;15°F [45°F]</li></ul> <p>If both conditions exist, THEN stop both RXCPs and place the control switches in PULLOUT.</p>
	CREW	Dispatch an operator to locally monitor AFW Pump operation.
	BOP	Report SG B level rising faster than expected or rising with feed flow isolated. Report secondary radiation indications that may identify the ruptured SG: <ul style="list-style-type: none"><li>• R-33 on SPDS</li><li>• R-43 on recorder 42562</li></ul>
	CREW	Direct Radiation Protection/Chemistry to check for indications of radiation or secondary conductivity to confirm ruptured SG.  <b>Identify ruptured SG B.</b>  <b>NOTE:</b> It is expected SG B will be identified with narrow range level rising and feed stopped to SG.

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Time	Position	Applicant's Actions or Behavior
	BOP  <b>CRITICAL TASKs</b>	Isolate SG B: <ul style="list-style-type: none"> <li>BT-2B and BT-3B closed</li> <li>SD-3B Controller set to 1050 psig</li> </ul> <b>Report SG B PORV controller in MANUAL and closed</b> <ul style="list-style-type: none"> <li><i>Close MS-100B, SG B Steam Supply to T/D AFW Pump.</i></li> </ul>
	CREW <b>CRITICAL TASK</b>	<i>Direct AO to locally close TD-1-9 &amp; TD-3-9, Main Steam Header B, Trap 9 Inlet and Bypass valves.</i>
	BOP  <b>CRITICAL TASKs</b>	<i>Close MS-1B, SG B MSIV, by pressing Main Steam Isolation Initiate Train B pushbutton.</i>  Verify MS-2B, SG B MSIV Bypass, closed.  <i>Check SG B level &gt; 4% narrow range, and if so stop feed flow to SG B by closing AFW-2B and AFW-10B.</i>  If < 4%, maintain feed flow to ruptured SG until narrow range level indicates > 4%, THEN stop feed flow to ruptured SG.  <b>NOTE: The isolation of feed flow may have already occurred as directed by E-0 QRF. Those actions also satisfy the Critical Task above for closing AFW-2B (or stopping AFW Pump B) and closing AFW-10B.</b>

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Time	Position	Applicant's Actions or Behavior
	BOP	Check SG B pressure > 550 psig.
	RO	Reset SI by pressing SI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"> <li>Verify annunciators 47021-A and 47021-B clear.</li> </ul>
	CREW	Determine required CET temperature based on SG B pressure. <p><b>NOTE:</b> Value will be based on SG B at the time this step is performed. SG B press _____ CET desired temp _____</p>
	BOP	Maintain running AFW Pump Disch Pressure > 1000 psig <ul style="list-style-type: none"> <li>Direct NAO to locally throttle AFW-2C, T/D AFW Pump Discharge as necessary to maintain &gt; 1000 psig discharge pressure.</li> </ul>
	BOP	Dump steam to condenser or atmosphere from SG A. If dumping steam to condenser: <ul style="list-style-type: none"> <li>Set steam dump to STM PRESS mode</li> <li>Dump steam at maximum rate <ul style="list-style-type: none"> <li>Take Steam Dump Control to MAN and rotate pot clockwise to open dumps</li> </ul> or <ul style="list-style-type: none"> <li>Rotate setpoint dial clockwise to lower setpoint until dumps fully open.</li> </ul> </li> </ul>

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On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	<ul style="list-style-type: none"> <li>When RCS falls below 540°F, then take both Trains of Steam Dump Control to BYPASS INTLK.</li> </ul> <p>If dumping steam using SG A PORV:</p> <ul style="list-style-type: none"> <li>Take SD-3A controller to MAN and rotate pot clockwise to open valve.</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>Rotate SD-3A setpoint dial clockwise to lower setpoint until SD-3A fully opens.</li> </ul>
<b>NOTE: While the cooldown is in progress, the procedure directs continuing the actions with step 11 until the required temperature is reached. These steps that may be performed during this time are noted below [STEP #].</b>		
	CREW	Cooldown RCS Core Exit Thermocouples read less than CET value determined above.
	BOP	<p>Stop RCS cooldown: Close steam dumps or SG A PORV.</p> <p>Operate steam dumps or SG A PORV to maintain RCS Tave less than CET value determined above.</p>
	BOP	<p><b>[11]</b> Check SG A level: &gt; 4% narrow range.</p> <p>If not, maintain AFW feed &gt; 205 gpm until narrow range level is &gt; 4%, THEN control feed to maintain SG A level between 4% and 50%.</p>

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

Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	RO	<b>[12]</b> Check Prvr PORVs and Block Valves: <ul style="list-style-type: none"><li>• Power available to Block Valves by indicating lights lit.</li><li>• PORVs closed</li><li>• At least one PORV Block Valve open.</li></ul>
	RO	<b>[13, 14, 15]</b> Place LD-4A to CLOSE.  If not performed earlier, reset SI.  Reset Containment Isolation by pressing CI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"><li>• Verify annunciators 47021-C and 47021-D clear.</li></ul>
	BOP	<b>[16]</b> Verify Instrument Air to Containment established: <ul style="list-style-type: none"><li>• IA-101, Instr Air to Containment Isol, open</li><li>• Containment Air Pressure header &gt; 40 psig on 4150103.</li></ul>
	RO	<b>[17]</b> Check if RHR Pumps should be stopped: <ul style="list-style-type: none"><li>• RCS pressure &gt; 150 psig</li></ul> Stop RHR Pumps and place in AUTO.

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

Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	RO	<p>[18] Establish Charging flow:</p> <p>If Charging Pump is running then continue with action. If no charging pump is running, check CC flow to RXCP B thermal barrier is isolated (CC-610-B closed), and then proceed to next step</p> <ul style="list-style-type: none"> <li>• Open CVC-301, RWST Supply to Charging Pumps</li> <li>• Close CVC-1, VCT Supply to Charging Pumps</li> <li>• Start a second charging pump and establish maximum charging flow. (CVC-7 open and Charging Pumps demand &gt; 90%)</li> </ul>
	CREW	<p>[19] Check if cooldown should be stopped:</p> <ul style="list-style-type: none"> <li>• Cooldown RCS Core Exit Thermocouples read less than CET value determined above.</li> </ul> <p style="text-align: right;">CET temperature _____</p>
	BOP	<p>Stop RCS cooldown: Close steam dumps or SG A PORV.</p> <p>Operate steam dumps or SG A PORV to maintain RCS Tave less than CET value determined above.</p>

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

Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	BOP <b>CRITICAL TASK</b>	<b><i>Check SG B pressure stable or increasing.</i></b>  If SG B pressure continues to decrease to less than 250 psi above SG A pressure, then transition to ECA-3.1, SGTR With Loss of Reactor Coolant Subcooled Recovery Desired.  <b>(See NOTE below for possible conditions that may affect this Critical Task)</b>
	CRS	If conditions required, inform crew of transition to ECA-3.1.
<p><b>NOTE: It is not expected that conditions for transition will occur here. However, with RXCP B stopped and cooler SI injection flow to loop B, the reduced loop flow may result in unanticipated reduction of SG B pressure. If the conditions do warrant transfer, the Chief Examiner will terminate the scenario here. [“Training has the shift.”]</b> This is done since ECA-3.1 provides no further additional actions for the crew to be evaluated on until step 14, which initiates the RCS cooldown (already performed to the initial plateau). The critical task is valid for evaluation if actions the operator took during the cooldown resulted in the plant conditions that require transition to ECA-3.1. Critical Task reads, “Establish/maintain an RCS temperature so that transition from E-3 does not occur because the RCS temperature...” Post scenario review of this task would then be required.</p>		
	CREW <b>CRITICAL TASK</b>	<b><i>Check RCS subcooling &gt; 50°F.</i></b>
	RO	Depressurize the RCS to minimize break flow and refill Przr:  Determine normal Przr spray is available using PS-1A.  Energize/deenergize Przr heaters as necessary to maintain saturated conditions in Przr.

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

Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	RO (cont.) <b>CRITICAL TASK</b>	<ul style="list-style-type: none"> <li>• <b><i>Fully open PS-1A to depressurize RCS until a stopping condition is met:</i></b> <ol style="list-style-type: none"> <li>1. <i>Przr level &gt;74%</i></li> </ol> <b>OR</b> <ol style="list-style-type: none"> <li>2. <i>RCS subcooling &lt;30°F</i></li> </ol> <b>OR</b> <ol style="list-style-type: none"> <li>3. <i>RCS pressure &lt; SG B pressure AND Przr level &gt; 5%</i></li> </ol> </li> </ul> <p><b><i>When one of the conditions above is met, close PS-1A.</i></b></p>
NOTE: The Contingency Action of step 22.c allows for faster depressurization to prevent SG overfill. The crew may evaluate conditions and chose to use more rapid depressurization using a Przr PORV. If so the next section covers those actions.		
	RO  <b>CRITICAL TASK</b>	<p>Determine one Przr PORV is available.</p> <p>Energize/deenergize Przr heaters as necessary to maintain saturated conditions in Przr.</p> <ul style="list-style-type: none"> <li>• <b><i>Open either PR-2A OR PR-2B to depressurize RCS until a stopping condition is met:</i></b> <ol style="list-style-type: none"> <li>1. <i>Przr level &gt;74%</i></li> </ol> <b>OR</b> <ol style="list-style-type: none"> <li>2. <i>RCS subcooling &lt;30°F</i></li> </ol> <b>OR</b> <ol style="list-style-type: none"> <li>3. <i>RCS pressure &lt; SG B pressure AND Przr level &gt; 5%</i></li> </ol> </li> </ul> <p><b><i>When one of the conditions above is met, close the open Przr PORV.</i></b></p>

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

Event Description: Reactor trip actions with failed SG B PORV controller. Steam Generator Tube Rupture. Trip of running Component Cooling (CC) Water Pump (A) with failure of CC Pump B to auto start.

On the reactor trip, SG B PORV, SD-3B, setpoint input fails to ZERO resulting in SD-3A opening in AUTO. Manual control of the PORV is available. The reduction in SG B pressure due to the open PORV results in initiation of SGTR. The 250 gpm rupture results in SI actuation. During the actions of E-0, the running CC Pump trips, and the standby pump fails to auto start. The operator must manually start CC Pump B to ensure cooling to ECCS components.

Time	Position	Applicant's Actions or Behavior
	RO	If PORV was opened to reduce RCS pressure, check RCS pressure increasing.
	RO	Check if SI flow should be terminated: 1. RCS subcooling greater than 30°F.  2. RCS pressure stable or increasing.  3. Przr level greater than 5%.
	BOP	Check if SI flow should be terminated: 4. Secondary heat sink: • Total feed flow greater than 205 gpm available. [TD AFW Pump available] OR • Narrow range level in SG A greater than 4%.
	RO	If the above conditions are met, stop SI Pump B and place in AUTO.

**Following actions to terminate SI flow, the Chief Examiner will terminate the scenario. ["Training has the shift."]**

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Facility: Kewaunee Scenario No.: 2 Op-Test No.: 1

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
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Initial Conditions: IC-10; 49% power, Beginning of cycle (BOC)  
 Ready to start Feedwater Pump B and continue power increase.  
 Motor Driven AFW A Pump is in PULLOUT.  
 SI Pump A is in PULLOUT.

Turnover: The plant is at 49% power. Currently at step 4.1.9.d of N-O-03, Plant Operation Greater Than 35% Power and step 4.1.8.b (4.1.4.i) of N-FW-05A, Feedwater System Normal Operation. The EO is standing by at Feedwater Pump B, ready for pump starting. Once FW Pump B is started, the crew is directed to continue power increase to 100% power. All fuel pre-conditioning requirements for normal power increase have been met. AFW Pump A has been out of service for 5 hours due to inboard bearing vibration. SI Pump A has been out of service for 2 hours due to failing to develop the minimum dP during IST surveillance.

Event No.	Malf. No.	Event Type*	Event Description
Preload	RD11 RP03		Reactor Trip Breakers Fail to Open on TRIP Signal AMSAC Actuation Override
Preload	DI-46624-CLOSE ON DI-46624-TRIP & PTL OFF		Bkr 13301 Bus 33 Supply fails to trip. (CRD MG Set A power source)
Preload	DI-46621-CLOSE ON DI-46621-TRIP & PTL OFF		Bkr 1-308 Bus 33 Supply fails to trip. (CRD MG Set A power source)
Preload	SI05B		SI Pump B fails to automatically start. Manual start is available.
Preload	DI-40015-CLOSE ON DI-40016-CLOSE ON		RBV-150C and RBV-150D fail to open on high containment pressure.
1	—	N BOP SRO	Start FW Pump B and resume power increase.
		R RO	Follow turbine load increase using rods and/or dilution.
2	RX217 100	I BOP SRO	SG B controlling steam flow channel fails high.
3	NI05D 100	I RO SRO	Power Range Nuclear Instrument channel fails high.
4	DI-46155-TRIP ON	M BOP RO SRO	Turbine trips without reactor trip. Operation of (Rod Drive MG Set) supply breakers to Bus 33 fails.
5	MS02A 75	M RO BOP SRO	SG A steam line rupture inside containment. Delayed for 3 minutes following opening of the reactor trip breakers, and ramped over 5 minutes.
6	DI-40015-CLOSE ON DI-40016-CLOSE ON	C BOP SRO	Train B Containment Fan Coil Units Emergency Dampers fail to auto open. Manual control is available.
7	SI05B	C RO SRO	SI Pump B fails to auto start. Manual start available. (Only SI Pump)

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



## **SCENARIO 1-2 OVERVIEW**

Event 1 - The plant is at 49% power during a startup. Feedwater Pump B is to be started using N-FW-05A, Feedwater System Normal Operation. The Equipment Operator (EO) is standing by following turnover and has completed local checks of the pump. Once the FW Pump is started the crew should resume the normal power increase to 100% at the rate of ¼ %/minute, as allowed by fuel pre-conditioning.

Event 2 - Following clearly observable plant response from the reactivity changes, the controlling channel for SG B steam flow will fail high. The BOP will take manual control of FW-7B, Main Feed Control Valve, and restore SG level to normal. The channel will be removed from service using A-MI-87. The CRS will address Technical Specification requirements for steam flow channels (TS 3.5.b) in Table TS 3.5-2 and Table TS 3.5-4

Event 3 - Following completion of the removal of service and Technical Specification review for the failed steam flow channel, Power Range NI channel N-44 will fail high. This will cause control rods to insert in AUTO, and will generate a rod withdrawal rod stop. The RO will respond, after identifying the failed channel, by taking rod control to MANUAL. A-NI-48 will be used to identify and respond to the failure, and A-MI-87 will be entered to remove the failed NI channel from service. The CRS will address Technical Specification requirement for the failed channel (TS 3.5.b) in Table TS 3.5-2.

Event 4 - Following completion of the removal of service and Technical Specification review for the failed NI channel, an inadvertent turbine trip signal will be generated. The turbine will trip; however, the reactor will not trip. The crew will enter E-0 and during the immediate operator actions take actions to manually trip the reactor and deenergize the buses supply the rod drive MG sets. Neither action will be successful, and the CRS will direct transition to FR-S.1. The immediate actions will be performed including dispatching the Auxiliary Operator (AO to locally trip the reactor trip breakers. Following the completion of step 2 (Verify Turbine Trip) and no sooner than 2 minutes after being notified, the AO will locally trip the reactor trip breakers and stop both MG sets. The AO will then inform the Control Room of actions completed. The crew will continue with actions of FR-S.1, including establishing charging flow and boration flow path. The crew should transition to E-0 at step 19 of FR-S.1.

Event 5, 6 & 7 – Four minutes following the opening of the reactor trip breakers, a steam line break on SG A will initiate and worsen over the next 5 minutes. The crew should recognize the conditions for Safety Injection and manually actuate SI, if it has not automatically occurred. The BOP will report that RBV-150C and RBV-150D, Containment Fan Coil Unit Emergency Dampers (Train B), have not opened when Containment pressure has risen above 4 psig. The SRO will direct the dampers be opened manually (Control Room switch). The RO will recognize that no SI Pumps are running, and after SI sequencing is complete, start SI Pump B. The crew will recognize the conditions indicating SG A is faulted inside containment. (NOTE: Depending on the maximum value for containment pressure and transition time from E-0, entry may be made into FR-Z.1 Response to Containment High Pressure, on an ORANGE path for Containment CSF.) Transition will be made to E-2 to isolate the faulted SG. Following isolation and check of secondary radiation indication, transition will be made to E-1. The scenario terminates following transition to E-1 if SG A has completed blowdown, or after evaluation of SI termination criteria in step 12 of E-1, OR at the discretion of the Chief Examiner.

### **Critical Tasks**

1. FR-S.1 C – Insert negative reactivity into the core by at least one of the following methods before completing the immediate-action steps of FR-S.1: [Event 4]
  - Open the Bus 33 and Bus 43 supply breakers to de-energize the Rod Drive MG sets
  - Manually insert Control Rods
2. E-0 I – Establish flow from at least one SI pump before transition out of E-0. [Event 7]
3. E-2 A – Isolate the faulted SG before transition out of E-2. [Event 5]

Op-Test No.: 1 Scenario No.: 2 Event No.: 1 Page of 30

Event Description:

Start Feedwater Pump B and initiate load increase to 100%.

Start FW Pump B using N-FW-05, Feedwater System Normal Operation. Crew directs EO to complete checks for pump when running. The crew will initiate a load increase to 100% power using N-O-03, Plant Operation Greater Than 35% Power, N-TB-54, Turbine and Generator Operation, and N-CVC-35A, Boron concentration Control.

Time	Position	Applicant's Actions or Behavior
	<b>CUE:</b>	<b>Provided in Turnover.</b>
	CRS	Direct actions of N-0-03 Plant Operation Greater Than 35% Power, step 4.1.9.d.
	BOP	<p>(Step 4.1.4.i of N-FW-05) Start of FW Pump B</p> <ul style="list-style-type: none"> <li>• Direct EO to verify C-17B, Feedwater Pump B Suction, open.</li> <li>• Take FW-2B, Feedwater Pump B and Discharge Valve, to START.</li> <li>• Check PPCS FW Pump Group Output parameters (Group 26 – Feedwater Pump B Temperatures or Graphic Display – Feedwater Pumps) stabilize.</li> <li>• Check SG levels stable.</li> <li>• Direct EO to locally verify proper FW conditions (step 4.1.4.k), and perform actions to ensure proper FW operation (step 4.1.4.l).</li> </ul>
	CRS	Direct (Continuous Action Step) SG Blowdown be shifted to Mode II with condensate to Heater Drain Tank (HDT) per N-BT-07A.
	CREW	Direct EO to align SG blowdown with Condensate to HDT per N-BT-07A. (step 4.1.2.q)
	CREW	Contact Chemistry for instructions regarding chemical injection per N-CI-28, Chemical Injection System.

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Event Description:

Start Feedwater Pump B and initiate load increase to 100%.

Start FW Pump B using N-FW-05, Feedwater System Normal Operation. Crew directs EO to complete checks for pump when running. The crew will initiate a load increase to 100% power using N-O-03, Plant Operation Greater Than 35% Power, N-TB-54, Turbine and Generator Operation, and N-CVC-35A, Boron concentration Control.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct that reactivity estimate be performed based on power loading
	RO	Perform reactivity estimate for power increase: Use the Reactivity Plan to plan dilutions and rod movement for power increase from 50% to 100% power. Final Rod position: <b>226</b>
	BOP	Raise load per N-TB-54, Turbine and Generator Operation, section 4.1.19: <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations</li> <li>• Determine maximum load rate % per minute based on fuel performance limit: 40 Mw/hr</li> <li>• Determine maximum load rate % per minute based on Turbine Operating Limits using figure 1 and Attachment A steps A.7 through A.10</li> <li>• Take turbine off Valve Position Limiter: <ul style="list-style-type: none"> <li>▪ Lower the SETTER to less than or equal to the value on the EH Panel Plaque [43.6] using REFERENCE CONTROL "DOWN" pushbutton.</li> <li>▪ Set Loading Rate to a rate less than or equal to 5% /min</li> <li>▪ Press GO pushbutton</li> <li>▪ When the VALVE POS LIMIT green light goes out, press the HOLD pushbutton</li> </ul> </li> <li>• Set valve Position Limit to 100%.</li> <li>• Press REFERENCE CONTROL "UP" pushbutton until SETTER value is at desired load (~ 100%)</li> <li>• Verify/set loading rate to 1/4%/min.</li> <li>• Inform (telephone) ATC of rate and amount of load pickup.</li> <li>• Depress GO</li> <li>• Verify load increases</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 1 Page of 30

Event Description:

Start Feedwater Pump B and initiate load increase to 100%.

Start FW Pump B using N-FW-05, Feedwater System Normal Operation. Crew directs EO to complete checks for pump when running. The crew will initiate a load increase to 100% power using N-O-03, Plant Operation Greater Than 35% Power, N-TB-54, Turbine and Generator Operation, and N-CVC-35A, Boron concentration Control.

Time	Position	Applicant's Actions or Behavior
	BOP (cont)	<p>(N-TB-54 cont.)</p> <ul style="list-style-type: none"> <li>• Verify Reactive Load remains within Figure 5, Generator Capability Curve, limits <ul style="list-style-type: none"> <li>▪ If required, adjust Generator #1 Voltage Adjuster switch to change VARs (REACT PWR meter 4460104)</li> </ul> </li> <li>• Verify and maintain turbine and auxiliaries operating conditions: <ul style="list-style-type: none"> <li>▪ Turbine Lube Oil Cooler outlet temperature 106-110°F. (PPCS T2165A, Group 28 Turbine Bearings/Oil Temperatures)</li> <li>▪ Exciter air temperature 108-112°F. (PPCS T2121A, T2122A, T2123A)</li> <li>▪ EH oil temperature 110-120°F. (Local)</li> <li>▪ Hydrogen seal oil temperature 112-120°F (Local)</li> <li>▪ Generator Hydrogen temperatures 30-35°C; 86-95°F on Gen Stator Temp recorder. (PPCS T0397, Group 34 Generator Slot Temperatures 2; Recorder 42525)</li> </ul> </li> </ul>
	RO	<p>Perform reactivity adjustments:</p> <p>Rod Control (outward motion at - 1.5°F difference Tref-Tave)</p> <p>AND/OR</p> <p>Boron Concentration Control per N-CV-35A, Boron Concentration Control, section 4.4, Dilute or Alternate Dilute:</p>

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Event Description:

Start Feedwater Pump B and initiate load increase to 100%.

Start FW Pump B using N-FW-05, Feedwater System Normal Operation. Crew directs EO to complete checks for pump when running. The crew will initiate a load increase to 100% power using N-O-03, Plant Operation Greater Than 35% Power, N-TB-54, Turbine and Generator Operation, and N-CVC-35A, Boron concentration Control.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations.</li> <li>• Determine rate and magnitude of dilution(s) (total amount from above reactivity calculations)</li> <li>• Adjust MU-1022/CV-31095, Blender Control Rx Mu Flow, to required flow rate.</li> <li>• Set Rx Makeup Totalizer to required quantity.</li> <li>• Position Reactor Makeup Mode Selector to DILUTE or ALT DIL.</li> <li>• If ALT DIL is selected, place CVC-406/CV31094, BA Blender to VCT, to CLOSE position.</li> <li>• Position Reactor Makeup Control switch to START</li> <li>• Verify required change has been achieved by monitoring: <ul style="list-style-type: none"> <li>▪ Rod Position</li> <li>▪ Boron Concentration</li> <li>▪ Tave</li> </ul> </li> </ul> <p>When dilution is complete:</p> <ul style="list-style-type: none"> <li>• Use Oper Aid 96-3 to verify CVC-403/CV-31092, Blender Control BA Flow, set at current RCS boron concentration.</li> <li>• Verify MU-1022/CV-31095, Blender Control Rx Mu Flow, is set to 60 gpm.</li> <li>• Verify CVC-406 to AUTO position.</li> <li>• Position Reactor Makeup Mode Selector to AUTO.</li> <li>• Position Reactor Makeup Control switch to START.</li> <li>• At Rx Makeup Totalizer: <ul style="list-style-type: none"> <li>▪ Verify correct quantity added.</li> <li>▪ Reset Rx Makeup Totalizer by pressing the black button.</li> <li>▪ Verify BA Totalizer indicating all ZEROs in window by black button.</li> </ul> </li> <li>• If RCS boron has been changed by &gt; 50 ppm, the operate Przr heaters as necessary to equalize RCS and Przr boron.</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 1

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Event Description:

Start Feedwater Pump B and initiate load increase to 100%.

Start FW Pump B using N-FW-05, Feedwater System Normal Operation. Crew directs EO to complete checks for pump when running. The crew will initiate a load increase to 100% power using N-O-03, Plant Operation Greater Than 35% Power, N-TB-54, Turbine and Generator Operation, and N-CVC-35A, Boron concentration Control.

Time	Position	Applicant's Actions or Behavior
<b>NOTE: Following the required reactivity change of ~ 5% power, Event 2 may be started.</b>		

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>2</u>	Event No.:	<u>2</u>	Page	of <u>30</u>
Event Description:		<p>SG B controlling steam flow channel (FT-474) fails high.</p> <p>The controlling Steam Flow channel for SG B fails high indicating 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7B, Main Feed Control Valve, will open. SG B inventory will rise until the operator takes manual control of FW-7B. The other Steam Flow channel will indicate normal flow (~ 2.0E6 PPH/HR) .The operator will adjust FW-7B as necessary to maintain SG B level within normal operating band (39%-49%).</p>					
Time	Position	Applicant's Actions or Behavior					
	<b>CUES:</b>	<p><b>Annunciator Alarms:</b>  <b>47061-E, S/G B SF&gt;FF</b>  <b>47061-F, S/G B FEEDFLOW EXCESSIVE</b>  <b>47062-D, S/G B PROGRAM LEVEL DEVIATION</b>  <b>47062-E, S/G B BYPASS CV LEVEL DEVIATION</b>  <b>47062-J, STEAM HEADER B ISOLATION ALERT</b>  <b>47063-J, MAIN STEAM HEADER B FLOW HI-HI</b>  <b>TLA-10 SG TILTS</b></p> <p><b>PPCS Alarms:</b>  <b>L0461A S/G A Chan 1 Level</b></p> <p><b>FI-474, S/G B Steam Flow at top of scale; FI-475, S/G B Steam Flow stable at ~2E6 PPB/HR</b>  <b>LI-471, LI-472 and LI-473 S/G B level rising.</b>  <b>FW-7B Valve Position Demand and Actual (Position) Indication rising.</b>  <b>FI-476 and FI-477, S/G B Feed Flow indications rising.</b></p>					
	BOP	<p><b>Identify and report FI-474 failed high.</b></p> <p><b>Take FW-7B controller to MANUAL.</b></p>					
	CREW	<p>Address Annunciator Response for 47061-E, 47061-F, 47062-E and/or 47062-F.</p> <p><b>Report that if the alarm is due to a failed instrument:</b></p> <ul style="list-style-type: none"> <li>• Verify the alarm was caused by failure of S/G B Steam Flow FT-474 AND position FW-7B to MANUAL.</li> <li>• Go To A-MI-87.</li> <li>• Refer to A-FW-05, Abnormal Feedwater System Operation, when returning FW-7B to AUTO.</li> </ul>					

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Op-Test No.: 1 Scenario No.: 2 Event No.: 2Page of 30

Event Description: SG B controlling steam flow channel (FT-474) fails high.

The controlling Steam Flow channel for SG B fails high indicating 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7B, Main Feed Control Valve, will open. SG B inventory will rise until the operator takes manual control of FW-7B. The other Steam Flow channel will indicate normal flow (~ 2.0E6 PPH/HR). The operator will adjust FW-7B as necessary to maintain SG B level within normal operating band (39%-49%).

Time	Position	Applicant's Actions or Behavior
		<b>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</b>
	CRS	Direct the BOP to control SG B level with FW-7B in MANUAL.
	CRS	Direct actions of A-MI-87, Bistable Tripping for Failed Reactor Protection or Safeguards Inst.
	CRS	Check Technical Specifications for instruments with bistable tripping requirements [TS 3.5.b]: TS Table 3.5-2, item No. 16 (Steam Flow/Feedwater Flow Mismatch) – 2 with 1 required. TS Table 3.5-4, No. 2.a (Hi-Hi Steam Flow with SI) – 2/loop with 1 required. TS Table 3.5-4, No. 2.b (Hi Steam Flow and 2 of 4 Lo-Lo T <sub>avg</sub> with SI) – 2/loop with 1 required.
	CRS	Ensure I&C (Work Control/Work Week Coordinator) is notified of status of FT474.
	CRS	Declare FT474 channel out-of-service (OOS).
	CRS	Ensure bistables for FT474 are to be tripped within 6 hours of declaring OOS.
	CRS	If desired, direct I&C to check for redundant channel bistable status by performing SP 47-316G, Channel 3 (Blue) Reactor Protection Logic Test.
<b>NOTE:</b> Time Warp may be used at this point to have the check of redundant bistables complete. <b>CUE:</b> SP 47-316G is complete and no bistables were detected that would cause a reactor trip.		
	CRS	Direct the crew to perform/verify Prerequisite Alignment of Attachment I for FT474.

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Op-Test No.: 1 Scenario No.: 2 Event No.: 2Page of 30

Event Description: SG B controlling steam flow channel (FT-474) fails high.

The controlling Steam Flow channel for SG B fails high indicating 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7B, Main Feed Control Valve, will open. SG B inventory will rise until the operator takes manual control of FW-7B. The other Steam Flow channel will indicate normal flow (~ 2.0E6 PPH/HR) .The operator will adjust FW-7B as necessary to maintain SG B level within normal operating band (39%-49%).

Time	Position	Applicant's Actions or Behavior
	BOP	Position Steam Flow Channel Selector switch for S/G B 46549/HFC-475 to 475/YELLOW (Channel IV).  <b>NOTE:</b> The FW Flow Channel Selector switch for S/G B 46550/HFC-476 may also be placed to the 477/YELLOW (Channel IV) position, as it is standard practice that the corresponding control channels be powered from the same Instrument Bus in the event of a bus failure.
	RO	Act as SECOND OPER for verification of position 46549/HFC-476 in 475/YELLOW.
	CRS	Direct I&C to trip bistables per Attachment I section 2.0 and 3.0  <b>(NOTE: The COMMUNICATOR is set report &amp; to receive direction from CRS, and will perform actions for tripping bistables from the Simulator Booth.)</b>
	CRS	Direct crew to verify control room indications per Attachment I.
	BOP	Verify following lit: <ul style="list-style-type: none"> <li>▪ Annunciator 47063-J, MAIN STEAM HEADER B FLOW HI-HI</li> <li>▪ Annunciator 47062-J, STEAM HEADER B ISOLATION ALERT</li> <li>▪ Annunciator 47061-F, S/G B FEED FLOW EXCESSIVE</li> <li>▪ Annunciator 47061-E, S/G B SF&gt;FF</li> <li>▪ Status Light 44908-0507, MS Hdr B Hi Flow</li> <li>▪ Status Light 44908-0607, MS Hdr B Hi-Hi Flow</li> <li>▪ Status Light 44907-1003, S/G B SF&gt; FF</li> </ul>
	CREW	Complete PERFORMED BY and VERIFICATION BY sections of Attachment I.

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Event Description: SG B controlling steam flow channel (FT-474) fails high.

The controlling Steam Flow channel for SG B fails high indicating 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7B, Main Feed Control Valve, will open. SG B inventory will rise until the operator takes manual control of FW-7B. The other Steam Flow channel will indicate normal flow (~ 2.0E6 PPH/HR) .The operator will adjust FW-7B as necessary to maintain SG B level within normal operating band (39%-49%).

Time	Position	Applicant's Actions or Behavior
	CRS	If desired, direct status control for FI-474 indication (OOS sticker) and switch 46549/HFC in 475/YELLOW (CAUTION tag).
<b>NOTE: At Chief Examiner direction, Event 3 may be initiated.</b>		

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Op-Test No.: 1 Scenario No.: 2 Event No.: 3

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Event Description: Power Range Nuclear Instrument channel N44 fails high.

Power range NIS output fails to 100% of scale or 120% indicated power for this channel. Control Rods in AUTO will begin to step IN due to turbine power – auctioneered high nuclear power mismatch. The RO will be required to take manual control of rods.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47031-L, POWER RANGE OVERPOWER ROD STOP</b> <b>47031-M, POWER RANGE HIGH FLUX</b> <b>47032-K, POWER RANGE POSITIVE RATE CHANNEL ALERT</b> <b>47033-K, POWER RANGE CHANNEL DEVIATION</b> <b>TLA-6, POWER RANGE RADIAL FLUX TILT</b>  <b>Various PPCS Alarms associated with N44 channel</b>  <b>Control Rods stepping IN in AUTO.</b>
	RO	<b>Identify and report trip failure of Power Range NI channel N44 high.</b>
	CREW	Determine no valid signal for rods stepping (Tave-Tref within 1.5°F initially and NO turbine runback in progress, load stable and RUNBACK VPL and RUNBACK REF lights not lit on Turbine Control Panel Limits section.)
	RO	Place Control Rod Bank Selector in MAN.
	CREW	Address Annunciator Response.  47031-L and 47031-M: (The other AR Sheets also address the actions below) <ul style="list-style-type: none"> <li>• Stop any positive reactivity additions</li> <li>• Reduce load until alarm clears</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 3Page of 30

Event Description: Power Range Nuclear Instrument channel N44 fails high.

Power range NIS output fails to 100% of scale or 120% indicated power for this channel. Control Rods in AUTO will begin to step IN due to turbine power – auctioneered high nuclear power mismatch. The RO will be required to take manual control of rods.

Time	Position	Applicant's Actions or Behavior
	CREW (cont.)	<ul style="list-style-type: none"> <li>If alarm is caused by instrument failure: <ul style="list-style-type: none"> <li>Position Control Rod Bank Selector switch to MAN.</li> <li>Go to A-NI-48</li> </ul> </li> <li>If alarm is caused by boron dilution, Go To A-RC-36F.</li> </ul> <p>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</p>
	RO	If Dilution is in progress, stop dilution by placing Reactor Makeup Control Switch to STOP.
	CRS	Direct actions of A-NI-48, Abnormal Nuclear Instrumentation.
	RO	<p>Check Control rod motion stopped.</p> <p>If NOT stopped and moving due to Power Range channel failure, position Control Rod Bank Selector in MAN.</p>
	RO	<p>Check 4 Power Range channels operable.</p> <p><b>Report N44 NOT operable.</b></p>
	CREW	Determine with a single Power Range channel inoperable, remove the channel from service per A-MI-87.

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Op-Test No.: 1 Scenario No.: 2 Event No.: 3Page of 30

Event Description: Power Range Nuclear Instrument channel N44 fails high.

Power range NIS output fails to 100% of scale or 120% indicated power for this channel. Control Rods in AUTO will begin to step IN due to turbine power – auctioneered high nuclear power mismatch. The RO will be required to take manual control of rods.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct actions of A-MI-87, Bistable Tripping for Failed Reactor Protection or Safeguards Inst.
	CRS	Check Technical Specifications for instruments with bistable tripping requirements [TS 3.5.b]: TS Table 3.5-2, item No. 2 (Nuclear Flux Power Range) (Low Setting) – 4 with 3 required. Permissible Bypass – P-10 [Currently BYPASSED]. (High Setting) – 4 with 3 required. (Positive Rate) – 4 with 3 required. (Negative Rate) – 4 with 3 required.  TS Table 3.5-2, item No. 5 (Overtemperature $\Delta T$ ) – 4 with 3 required.
	CRS	Ensure I&C (Work Control/Work Week Coordinator) is notified of status of N44.
	CRS	Declare N44 channel out-of-service (OOS).
	CRS	Ensure bistables for N44 are to be tripped within 6 hours of declaring OOS.
	CRS	Direct I&C to check for redundant channel bistable status by performing SP 47-316H, Channel 4 (YELLOW) Reactor Protection Logic Test.
<p><b>NOTE:</b> Time Warp may be used at this point to have the check of redundant bistables complete. CUE: SP 47-316G is complete and no bistables were detected that would cause a reactor trip.</p>		
	CRS	Direct the crew to perform/verify Prerequisite Alignment of Attachment I for Power Range N44.
	RO	<ul style="list-style-type: none"> <li>Position UPPER SECTION switch on Detector Current Comparator to PR N44.</li> <li>Position UPPER SECTION switch on Detector Current Comparator to PR N44.</li> </ul>

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Event Description: Power Range Nuclear Instrument channel N44 fails high.

Power range NIS output fails to 100% of scale or 120% indicated power for this channel. Control Rods in AUTO will begin to step IN due to turbine power – auctioneered high nuclear power mismatch. The RO will be required to take manual control of rods.

Time	Position	Applicant's Actions or Behavior
	RO (cont)	<ul style="list-style-type: none"> <li>• Position ROD STOP BYPASS switch on Miscellaneous Control and Indication Panel to BYPASS PR N44.</li> <li>• Position POWER MISMATCH BYPASS switch on Miscellaneous Control and Indication Panel to BYPASS PR N44.</li> <li>• Position COMPARATOR CHANNEL DEFEAT switch on Comparator and Rate drawer to BYPASS N44.</li> <li>• Position N44A drawer CONTROL POWER breaker to OFF.</li> </ul>
	BOP	Act as SECOND OPER for verification of actions performed above.
	CRS	Direct I&C to trip bistables per Attachment I section 3.0 and 4.0  <b>(NOTE: The COMMUNICATOR is set report &amp; to receive direction from CRS, and will perform actions for tripping bistables from the Simulator Booth.)</b>
	CRS	Direct recover of rod control operation.
	RO	As directed by CRS, withdraw Control Bank D in 5 step increments to order to match Tave-Tref.  <b>NOTE:</b> The limit on 5-step withdrawals in MAN is specified in GNP-03.17.10, Reactivity Management.
	CRS	When conditions permit, direct positioning Control Rod Bank Selector to AUTO.

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Op-Test No.: 1 Scenario No.: 2 Event No.: 3Page of 30

Event Description: Power Range Nuclear Instrument channel N44 fails high.

Power range NIS output fails to 100% of scale or 120% indicated power for this channel. Control Rods in AUTO will begin to step IN due to turbine power – auctioneered high nuclear power mismatch. The RO will be required to take manual control of rods.

Time	Position	Applicant's Actions or Behavior
	RO	When directed and conditions permit (Tave-Tref within 1°F and no rod control step demand), place Control Rod Bank Selector in AUTO.
	CRS	Direct crew to verify control room indications per Attachment I.
	BOP	Verify following lit: <ul style="list-style-type: none"> <li>▪ Annunciator 47033-C, OTΔT HIGH</li> <li>▪ Annunciator 47041-R, OTΔT CHANNEL RNBACK/RDSTP ALERT</li> <li>▪ Annunciator 47032-K, POWER RANGE POSITIVE RATE CHANNEL ALERT</li> <li>▪ Annunciator 47032-J, POWER RANGE NEGATIVE RATE CHANNEL ALERT</li> <li>▪ Annunciator 47031-M, POWER RANGE HIGH FLUX</li> <li>▪ Annunciator 47033-J, POWER RANGE DETECTOR VOLTAGE LOW</li> <li>▪ Status Light 44907-0404, PR N44 P8</li> <li>▪ Status Light 44907-0504, PR N44 P10</li> <li>▪ Status Light 44907-0604, PR N44 LOW RANGE HI FLUX</li> <li>▪ Status Light 44907-0704, PR N44 HI RANGE HI FLUX</li> <li>▪ Status Light 44907-0508, LOOP A OTΔT</li> <li>▪ Status Light 44907-0804, PR N44 HI FLUX RATE</li> <li>▪ Status Light 44906-0602, N44 ROD STOP BYPASSED</li> <li>▪ Status Light 44904-0201, LOOP A CHAN 4 OTΔT</li> </ul>
	CREW	Complete PERFORMED BY and VERIFICATION BY sections of Attachment I.
	CRS	If desired, direct status control for N-44 indications (OOS stickers) and N44 drawer (power switch) (CAUTION tag).

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Op-Test No.: 1 Scenario No.: 2 Event No.: 3

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Event Description: Power Range Nuclear Instrument channel N44 fails high.

Power range NIS output fails to 100% of scale or 120% indicated power for this channel. Control Rods in AUTO will begin to step IN due to turbine power – auctioneered high nuclear power mismatch. The RO will be required to take manual control of rods.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct remaining actions of A-NI-48.
	RO	<p>Verify annunciator 47032-L clear OR on Detector Current Comparator drawer, check under Upper Section ALL CHANNELS BELOW 50% F.P. light lit.</p> <p>Verify annunciator 47032-M clear OR on Detector Current Comparator drawer, check under Lower Section ALL CHANNELS BELOW 50% F.P. light lit.</p> <p>Check both Intermediate Range channels operable.</p> <p>Check both Source Range channels operable.</p> <p><b>[END OF A-NI-48 PROCEURE STEPS]</b></p>
	RO	<p>If dilution was secured due to N44 failure, restore Reactor makeup to AUTO per N-CVC-35A: Obtain current RCS boron concentration.</p> <p>If required use Oper Aid 96-3 and adjust CVC-403/CV31092, Blender Control BA Flow, to provide makeup at current RCS boron concentration.</p> <p>Position Reactor Makeup Mode Selector to AUTO.</p> <p>Position Reactor makeup Control Switch to START.</p> <p>Observe VCT level to verify proper automatic control operation.</p>

**NOTE: At Chief Examiner direction, Event 4 may be initiated.**

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47051-S, TURBINE TRIP</b> <b>47032-A, TURBINE TRIP REACTOR TRIP [First Out Annunciator]</b>  <b>Turbine trip indications:</b> <b>HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</b> <b>Turbine Stop Valve green CLOSE indications lit.</b>  <b>Reactor Trip Breaker A and B red lights lit.</b> <b>Power Range Instruments indicating above 5% power</b> <b>Control Rod Position indications at 226 for Shutdown Banks And Control Banks A &amp; B and above ZERO for Control Banks C &amp; D.</b>
	CREW	Identify turbine trip.  <b>Report failure of reactor to trip.</b>
	CRS	Direct manual reactor trip.
	CREW	Perform Immediate Actions of E-0 (first 4 steps are so designated):
	RO	Verify reactor trip.  <b>Report failure of reactor to trip.</b> <ul style="list-style-type: none"> <li>• Reactor trip breakers NOT open</li> <li>• Rod Positions indications greater than 7.5 steps</li> <li>• Rod Bottom lights NOT lit</li> <li>• Neutron flux not less than 5%.</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 4

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	Manually trip the reactor (press the Reactor Trip button on panel with Rod Controls)
	BOP	Manually trip the reactor (press the Reactor Trip button on panel with Turbine Controls)
	RO	<p><b>Report failure of reactor trip.</b></p> <p>Drive rods IN.</p> <p><b>NOTE:</b> Rods may be left in AUTO to drive in as long as inward rod motion is apparent. If rod motion stops rods are to be taken to MAN and inserted.</p>
	BOP	<p>Take the following breakers to TRIP position:</p> <ul style="list-style-type: none"> <li>• BKR 13301, Bus 33 SUPPLY (Red label)</li> <li>• BKR 14301, Bus 43 SUPPLY (red label)</li> </ul> <p><b>Report failure of breakers to open and deenergize Bus 33.</b></p> <p>Verify turbine trip:</p> <ul style="list-style-type: none"> <li>• HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>• Turbine Stop Valve green CLOSE indications lit.</li> </ul> <p>Verify power to either Bus 5 or Bus 6 (White voltage lights lit)</p>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 4

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
<p>NOTE: The above actions may be taken by the BOP as part of his immediate actions of E-0, prior to the determination of the need to go to FR-S.1.</p>		
<p><b>NOTE: Depending on timing for performing the Immediate Actions, reactor power may be below 5% due to the operator driving in rods, if so transition to FR-S.1 is NOT required.</b></p>		
	RO	<b>Report reactor power is GREATER THAN 5%.</b>
	CRS	<p>Verify actions of E-0.</p> <p>Read step 1 and check actions taken.</p> <p>If reactor power is greater than 5%, announce transition to FR-S.1, Response to Nuclear Power Generation/ATWS. (Sep 1.c CA)</p>
	CREW	PERFORM Immediate Actions of FR-S.1
	RO	<p>Verify reactor trip.</p> <p><b>Report failure of reactor to trip.</b></p> <ul style="list-style-type: none"> <li>Reactor trip breakers NOT open</li> <li>Rod Positions indications greater than 7.5 steps</li> <li>Rod Bottom lights NOT lit</li> <li>Neutron flux not less than 5%.</li> </ul> <p>Manually trip the reactor (press the Reactor Trip button on panel with Rod Controls)</p>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 4Page of 30

Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	<b>CRITICAL TASK</b> (if in FR-S.1)	<b><i>Manually insert Control Rods</i></b>  (NOTE: The insertion performed as directed in E-0, CA step 1.b.1) also counts for this Critical Task.)
<b>NOTE:</b> The steps for deenergizing Bus 33 and Bus 43 need not be performed again since the Breaker controls are in the TRIP position.		
	CREW	Dispatch AO to locally open the Reactor Trip breakers and to Position the Rod Drive MG Set Motor and Generator Circuit Breaker Control Switches to TRIP.  (NOTE: The COMMUNICATOR is set receive direction from crew, and will perform actions above from the Simulator Booth 2 minutes after receiving direction AND FR-S.1. step 3 is initiated.)
	BOP	Verify turbine trip: <ul style="list-style-type: none"> <li>• HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>• Turbine Stop Valve green CLOSE indications lit.</li> </ul> <b>[This completes the Immediate Actions of FR-S.1]</b>
	BOP	Check both MD AFW Pumps running; if NOT, manually start pumps. [NOTE: AFW Pump A is OOS]  Check TD AFW Pump running OR start TD AFW Pump.

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Op-Test No.: 1 Scenario No.: 2 Event No.: 4

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
NOTE: The next malfunction (Steam line break in Containment) is set to occur 3 minutes following the opening of the reactor trip breakers. This may occur while still performing actions of FR-S.1. The actions here will also include those actions for the condition if SI is actuated.		
	RO (cont.)  <i>Starting the SI Pump here, if conditions warrant, will satisfy the Critical Task identified in E-0 below.</i>	<p>Check SI Pumps stopped.</p> <p>If any SI Pump is running, open Przr PORVs to obtain SI flow greater than 100 gpm.</p> <p>If SI flow is greater than 100 gpm AND additional charging flow is NOT desired then do NOT establish charging flow &amp; boration path, otherwise establish charging flow.</p> <p><b>NOTE:</b> The Charging Pumps are load shed when SI actuates.</p> <p>Establish Charging flow:</p> <ul style="list-style-type: none"> <li>• Start charging pumps as necessary to establish 2 running.</li> <li>• Verify CVC-11/CV31229, Charging Line Isolation open.</li> <li>• Fully open CVC-7/CV-31103, Charging Control Chg Line.</li> <li>• Increase charging pump speed as necessary to establish maximum available charging flow (~ 75 gpm indicated FI-128)</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 4Page of 30

Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	Align boration path: <ul style="list-style-type: none"> <li>• Start both Boric Acid Transfer Pumps in FAST speed</li> <li>• Open CVC-440, Emergency Boration valve.</li> <li>• Check Przr pressure less than 2335 psig</li> <li>• Verify charging flow greater then 40 gpm.</li> </ul> Continue boration until Cold Shutdown Boron Concentration is achieved (RD-6.7) [~1795 ppm @ 2000 MWD/MTU burnup)
	BOP	Verify Containment Ventilation Isolation: <ul style="list-style-type: none"> <li>• Cnmt Purge/Vent Supply &amp; Exhaust closed – RBV-1, RBV-2, RBV-3, RBV-4, RBV-5 TAV-12.</li> <li>• Post LOCA H<sub>2</sub> valves closed – LOCA-2B, LOCA-100B, LOCA-201B, SA-7003B</li> </ul>
<p><b>NOTE:</b> If SI has actuated at this point, steps 3 through 16 of E-0 should be performed as time permits. The CRS will usually direct the BOP to perform these actions while continuing in FR-S.1 with the RO.</p> <p>The actions for the operator performing the steps of E-0 are located under the next event.</p>		
	RO	Check that reactor is tripped.

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	BOP (RO)	Check that turbine is tripped.
	BOP	<p>Check SG narrow range level in at least one SG greater than 4% [15% for ADVERSE Containment].</p> <p>If NOT, verify total feed flow greater than 410 gpm (sum of indicated flow 414107 AFW Hdr A Flow and 4104202 AFW Hdr B Flow).</p> <p>Control feed flow to maintain SG narrow range level between 4% [15%] and 50%.</p> <p><b>NOTE:</b> Adverse Containment occurs when containment pressure is above 4 psig or containment radiation is above 1E5 R/hr.</p>
	RO	<p>Verify all dilution paths isolated:</p> <ul style="list-style-type: none"> <li>• MU-1022, Reactor makeup Water to Blender</li> <li>• Direct the AO to locally verify the following are closed: MU-1025, MU-1024, CVC-423, MU-1031A and MU-1031B</li> </ul>
	CREW	<p>Check for reactivity insertion from uncontrolled cooldown:</p> <ul style="list-style-type: none"> <li>• RCS temperature decreasing in uncontrolled manner</li> <li>• Any SG pressure decreasing in uncontrolled manner</li> </ul> <p>If no uncontrolled cooldown, then stop any uncontrolled cooldown and continue actions for checking Core Exit TCs; otherwise continue with attempts to isolate cooldown source.</p> <p>NOTE: These actions will be performed if the next event is active.</p>

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	BOP (RO)	<p>Check Main Steamline Isolation and Bypass valves closed [MS-1A/B and MS-2A/B; MS-2A/B are normally closed at power].</p> <p>If required, Actuate Main Steam Line Isolation train A and Train B to close MS-1A and MS-1B respectively.</p> <p>Check if TD AFW should be stopped.</p> <ul style="list-style-type: none"> <li>• Check both MD AFW Pumps running</li> </ul> <p><b>Report AFW Pump A not running or available.</b></p>
	BOP (RO)  <i>Performing the actions here satisfy the Critical Tasks identified in E-2</i>	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>• Any SG pressure decreasing in uncontrolled manner</li> <li>• Any SG completely depressurized</li> </ul> <p>Isolate faulted SG [which will be SG A, if event 5 active]</p> <ul style="list-style-type: none"> <li>• Verify BT-2A and BT-3A closed</li> <li>• Verify SG PORVs closed (SD-3A)</li> <li>• Close AFW-2A, AFW Pump A Flow Control Valve</li> <li>• <b>Close MS-100A, SG A Steam Supply to T/D AFW Pump</b></li> <li>• Verify BT-31A and BT-32A, SG Sample Isol, closed [dual lights]</li> <li>• Close FW-12A, SG A FW isol valve</li> <li>• <b>Close AFW-10A, AFW Train A Crossover valve</b></li> </ul>

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Event Description: Turbine Trip with ATWS.

A turbine trip signal is generated and the turbine trips. The reactor trip does not occur and the manual actuation of a reactor trip from the control room will also fail. The crew will attempt to remove power to the Rod Drive MG set buses, allowing the rods to drop; however, the breakers to Rod Drive MG Set A will not open (Bkr 13301 Bus 33 Supply Breaker and Bkr1-308 Bus 33 Supply fail to trip.). When an operator is dispatched to open the Reactor Trip Breakers locally, the reactor trip breakers will open.

Time	Position	Applicant's Actions or Behavior
	RO	Check Core Exit TCs less than 1200°F.  Verify Reactor subcritical: 1. Power Range channels (N41-N43) less than 5%. 2. Intermediate Range channels negative SUR.
	CRS	Ensure CAUTION is read and understood by crew to continue boration to obtain Cold Shutdown Boron Concentration.  Transition to E-0 step 1.
	CREW	Monitor Critical Safety Function Status Trees.
<b>NOTE: Continued under Event 5, 6 &amp; 7.</b>		

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47021-A, SI TRAIN A ACTUATED</b> <b>47021-B, SI TRAIN B ACTUATED</b> <b>47021-C, CI TRAIN A ACTUATED</b> <b>47021-D, CI TRAIN B ACTUATED</b> <b>47022-D, CONTAINMENT HIGH PRESSURE SI</b> <b>47022-B, MAIN STEAM HEADER A LOW PRESSURE SI</b>  <b>S/G A pressure lowering.</b> <b>Containment humidity and pressure rising.</b> <b>RCS pressure, temperature and Przr level lowering.</b> <b>ECCS/ESF equipment started.</b>  <b>Containment Fan Coil Unit (CFCU) Emergency Damper position indication green light lit when Containment pressure is greater than 4 psig. (RBV150C &amp; RBV-150D). RBV-10A/B red lights lit.</b>  <b>SI Pump B NOT running (green light lit / no SI flow indicated) following sequencing of ECCS /ESFAS equipment. (Step 1 of SI sequence)</b>
<b>Note:</b> If one of the operators was assigned to perform E-0 steps 3-16 while performing FR-S.1, the CRS may choose to review the actions taken and conditions noted and begin actions where the operator stopped.		
	RO	Verify reactor trip.

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP	Verify turbine trip: <ul style="list-style-type: none"> <li>• HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>• Turbine Stop Valve green CLOSE indications lit.</li> </ul> Verify power to either Bus 5 or Bus 6 (White voltage lights lit)
	CREW	Check both trains of SI actuated: Annunciator 47021-A and 47021-B – SI Train A(B) ACTUATED lit.
	CREW	<b>NOTE: This action may be performed at any time based on judgment of CRS and CREW. (and earlier actions taken)</b>  Implement E-0 QRF Item 3 FAULTED SG ISOLATION CRITERIA: If any SG pressure decreasing in an uncontrolled manner OR any SG completely depressurized, AND remaining SG is intact, THEN the following may be performed: <ul style="list-style-type: none"> <li>• Isolate feed flow to faulted SG. [Close AFW-10A, AFW Train A Crossover.]</li> <li>• Maintain total feed flow greater than 205 gpm until narrow range level in at least one SG is greater than 4% [15% ADVERSE] [4104202 AFW HDR B FLOW]</li> </ul>

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP	Verify FW Isolation <ul style="list-style-type: none"> <li>FW-7A/B, SG A &amp; B Main Feed Control Valves, closed</li> <li>FW-10A/B, SG A &amp; B Bypass Flow Control valves, closed.</li> <li>FW 12 A/B, Feedwater to SG A &amp; B Isolation, closed.</li> </ul>
	CREW	Make plant announcement that Safety Injection has occurred.  Dispatch EO/AO to Locally monitor AFW Pump operation: <ul style="list-style-type: none"> <li>AFW Pump B and TD AFW Pump, if running.</li> </ul>
	BOP	Check if steamline isolation is required: <ul style="list-style-type: none"> <li>High steam flow (&gt;0.75E6) and low RCS Tavg (&lt;540°F) for SG A.</li> <li>Containment pressure &gt; 17 psig.</li> </ul> Verify MS-1A, SG A Main Steam Isolation, closed. If NOT and conditions required it closed, press Main Steam Line Isol Train A pushbutton.  Verify MS-2A, SG A MSIV Bypass, closed.  NOTE: If Containment pressure is > 17 psig, both steamlines should be isolated, so MS-1B and MS-2B will be verified closed.

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Verify Containment Spray not required: Check containment pressure (Cntmt Wide Range Pressure recorders 42597 &amp; 42598) have remained below 23 psig.</p> <p>If NOT, verify containment spray initiated. [Annunciator 47021-F CONTAINMENT SPRAY ACTUATED lit and Panel 44910, SI ACTIVE, Row 10 Status Lights lit)</p>
	BOP	<p>Verify Containment fan Coil Units running</p> <p>Verify SW-903 A, B, C &amp; D CNTMT Fan Coil Unit SW Return valves open.</p> <p>When containment pressure exceeds 4 psig, verify RBV-150A, B, C &amp; D, CNTMT Fan Coil Unit Emergency Dampers open</p> <p><b>Report RBV-150C &amp; D NOT open.</b></p> <p><b>Manually open RBV-150C &amp; D.</b></p> <p>Verify Aux Bldg Special Ventilation running:</p> <ul style="list-style-type: none"> <li>• Annunciator 47052-G NOT lit.</li> <li>• Zone SV Fans A and B running.</li> </ul>

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	<p>Verify Service Water alignment:</p> <ul style="list-style-type: none"><li>• Verify all SW Pumps running</li><li>• Verify SW header selected on Turbine Bldg SW switch &gt; 82.5 psig [Train A hdr-PI-41503]</li></ul> <p>Verify AFW Pumps running:</p> <ol style="list-style-type: none"><li>1. Check AFW Pump A running</li></ol> <p><b>Report AFW Pump A OOS</b></p> <ul style="list-style-type: none"><li>• Close AFW-2A, AFWP A Flow Control.</li></ul> <ol style="list-style-type: none"><li>2. Check AFW Pump B running</li><li>3. Check TD AFW Pump running (red light lit for MS-102, T/D AFW Pump Main Steam Isol, and discharge pressure on 41040.</li></ol> <p>Throttle AFW Pump Disch valves:</p> <ol style="list-style-type: none"><li>1. Maintain running AFW Pump Disch Pressure &gt; 1000 psig</li><li>2. Maintain either 1) Total AFW flow &gt; 205 gpm OR 2) SG narrow range level in at least one SG &gt; 4% [15% ADVERSE].</li></ol>
	RO	Verify CI Active Status Panel Lights lit.

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)  <b>CRITICAL TASK</b>	Verify ESF Equipment running: 1. SI Pumps  <b>Report SI Pump B NOT started.</b> [SI Pump A not running – OOS]  <b>Manually start SI Pump B.</b>  2. RHR Pumps  3. CC Pumps  4. Check SI Active Panel lights lit [SI Pump A not lit.]  Verify SI flow on F925 if RCS pressure is < 2200 psig [2000 psig ADVERSE].  Check RXCP cooling: <ul style="list-style-type: none"> <li>• CC valves to RXCPs open – CC-600, CC-601A/B, CC610A/B &amp; CC-612A/B.</li> <li>• RXCP Thermal Barrier temperatures normal, T614 &amp; T610. [Normal is 60°F to 95°F.]</li> <li>• RXCP bearing temperatures normal, T132 &amp; T125. [Normal is Ambient to 150°F.]</li> </ul>
	CREW	Check RCS average temperature stable at or trending to 547°F:

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
NOTE: If blowdown of SG A is complete at this time, the RCS temperature may be trending up and the following action step would not be performed. Also for the following step, the PORVs may be cycling and passing water due to heatup and injection refill of Przr.		
	BOP	<ul style="list-style-type: none"> <li>Transfer Steam Dumps to Pressure Control Mode.</li> <li>If at last one MD AFW Pump is running, place TD AFW Pump in PULLOUT</li> <li>Control feed flow. Maintain total feed &gt; 205 gpm until narrow range in at least one SG &gt; 4% [15% ADVERSE]</li> <li>If cooldown continues, close MS-1A &amp; B.</li> </ul>
	RO	Check Przr PORVS closed Check Przr Spray Valves closed. Check CV-15, Aux Spray Valve, closed. Check if RXCPs should be tripped: <ul style="list-style-type: none"> <li>RCS injection flow indicated on F925</li> </ul> AND <ul style="list-style-type: none"> <li>RCS subcooling &lt;15°F [45°F]</li> </ul>

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	If both conditions exist, THEN stop both RXCPs and place the control switches in PULLOUT.
	BOP	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>Any SG pressure decreasing in uncontrolled manner.</li> <li>OR</li> <li>Any SG completely depressurized</li> </ul> <p><b>Report SG A depressurizing uncontrolled or depressurized.</b></p>
<b>NOTE: Transition may be made to FR-P.1 if the cooldown is such that the INTEGRITY status tree indicates a RED or ORANGE Path. The steps to be performed are covered further down after the E-2 &amp; E-1 actions.</b>		
	CRS	<p>Inform crew of transition to E-2, Faulted SG Isolation.</p> <p>Direct actions of E-2.</p> <p>Inform Shift Manager to review EIPs.</p> <p>Read CAUTIONS to crew:</p> <ul style="list-style-type: none"> <li>At least one SG must be maintained available for RCS cooldown.</li> </ul> <p>Any faulted SG or secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown</p>

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP <b>CRITICAL TASK</b>	<b><i>Verify Steamline Isolation For SG A – MS-1A and MS-2 A Closed.</i></b>
	CREW	Dispatch Operator For AFW Operation.
	BOP	Check if any SG NOT faulted: Check pressure in SG any stable or increasing.  <b>Report SG B pressure stable (or increasing).</b>  [ <b>NOTE:</b> Pressure in SG B may be decreasing, but is considered stable if the pressure is approximately the saturation pressure for the RCS Loop B cold leg temperature. Cold leg temperature may be depressed due to the SI injection water.]
	BOP	Identify SG A as faulted.

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Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)  <b>CRITICAL TASK</b>	Isolate SG A: <ul style="list-style-type: none"> <li>• BT-2A &amp; BT-3A, SG A Blowdown Isol, closed.</li> <li>• SD-3A, SG A PORV, closed.</li> <li>• AFW-2A, AFWP A Flow Control Valve closed. [This is not critical as the Pump is not running.]</li> <li>• <b>MS-100A, SG A Steam Supply to T/D AFW Pump, closed.</b></li> <li>• BT-31A &amp; BT-31B, SG Sample Isol, closed.</li> <li>• FW-12A, Feedwater Isol, closed</li> <li>• <b>AFW-10A, AFW Train A Crossover Valve, closed.</b></li> </ul> Check CST level > 20% on 4102901 & 4102902.
	CREW	Check secondary radiation normal: <ul style="list-style-type: none"> <li>• Request Chemistry provide periodic activity samples and Radiation Protection conduct radiation surveys of both SGs</li> <li>• Check unisolated secondary rad monitors – normal               <ul style="list-style-type: none"> <li>▪ R-31&amp; R-33, Steamline monitors, on SPDS.</li> <li>▪ SG A &amp; SG B N-16 monitors, recorders 42506 and 42562.</li> <li>▪ R-15, Condenser Air Ejector monitor, panel &amp; recorder 45716.</li> <li>▪ R-19, SG Blowdown monitor, panel &amp; recorder 45716.</li> </ul> </li> </ul>

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Set steam dump to minimize heatup:</p> <p>If condenser steam dumps available, SG B MSIV (MS-1A) open and CDSR AVAIL DUPM PERM status light (44905-0301) lit, Then:</p> <ul style="list-style-type: none"> <li>• Set Steam Dump Control Mode to STM PRESS.</li> <li>• Verify Steam Dump Pressure Setpoint controller in AUTO.</li> <li>• Set Steam Release Control Steam Dump Pressure to saturation pressure for RCS Loop B Cold Leg temperature.</li> <li>• When RCS temperature is less than 540°F, set Main Steam Dump Train A and B Interlock Selector to BYPASS INTLK.</li> </ul> <p>If MS-1A and MS-1B closed OR steam dumps not available (as indicated above):</p> <ul style="list-style-type: none"> <li>• Verify SG B PORV controller in AUTO. (SD-3B)</li> <li>• Set SG B PORV controller to saturation pressure for RCS Cold leg temperature.</li> </ul>
	CRS	<p>Inform crew of transition to E-1, Loss of Reactor Or Secondary Coolant.</p> <p>Direct actions of E-1.</p> <p>Refer to E-1 QRF.</p>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check if RXCPs should be tripped:</p> <ul style="list-style-type: none"> <li>RCS injection flow indicated on F925</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>RCS subcooling &lt;15°F [45°F]</li> </ul> <p>If both conditions exist, THEN stop both RXCPs and place the control switches in PULLOUT.</p> <p>Check RWST level &gt; 37% on LI-920 &amp; LI-921.</p>
	BOP	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>Any SG pressure decreasing in uncontrolled manner.</li> <li>OR</li> <li>Any SG completely depressurized</li> </ul> <p>If so, verify steamlines and feedlines isolated.</p> <p>Check level in at least one SG &gt; 4% [15% ADVERSE].</p> <ul style="list-style-type: none"> <li>If so, control feed flow to maintain narrow range level between 4% [15% ADVERSE] and 50%.</li> <li>If NOT, maintain total feed &gt; 205 gpm until narrow range in at least one SG &gt; 4% [15% ADVERSE].</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	CREW	Check Main Steamline rad monitors – normal <ul style="list-style-type: none"> <li>• R-31&amp; R-33, Steamline monitors, on SPDS.</li> <li>• SG A &amp; SG B N-16 monitors, recorders 42506 and 42562.</li> </ul>
	RO	Check Przr PORVs and Block valves: <ul style="list-style-type: none"> <li>• PR-1A and PR-1B, Przr PORV Block Valves have power available.</li> <li>• PORVS closed.</li> <li>• At least one Block Valve open.</li> </ul> Isolate letdown: <ul style="list-style-type: none"> <li>• Place LD-4A, Letdown Orifice Valve, switch in CLOSE; verify LD-4B &amp; LD-4C switches in CLOSE position.</li> </ul>
	RO	Reset SI by pressing SI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"> <li>• Verify annunciators 47021-A and 47021-B clear.</li> </ul> Reset Containment Isolation by pressing CI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"> <li>• Verify annunciators 47021-C and 47021-D clear.</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	BOP	Verify Instrument Air to Containment established: <ul style="list-style-type: none"> <li>• IA-101, Instr Air to Containment Isol, open</li> <li>• Containment Air Pressure header &gt; 40 psig on 4150103.</li> </ul>
	RO	Establish Charging flow:  <b>Report no charging pump running.</b> <ul style="list-style-type: none"> <li>• Check that CC flow has not been lost the RXCP Thermal Barriers (CC-610A 7 B open)</li> <li>• Reduce demand on charging pump to be started to ZERO</li> <li>• Start the selected Charging Pump.</li> <li>• Raise charging pump speed to establish charging flow.</li> <li>• Monitor Przr level for &gt; 5% [30% ADVERSE]</li> </ul>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7Page of 30

Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	CREW	Check if SI should be terminated 1. RCS subcooling > 30°F [65°F ADVERSE]. 2. RCS pressure > 2200 psig [2000 psig ADVERSE] and stable or increasing. 3. Przr level > 5% [30% ADVERSE] 4. Secondary heat sink: <ul style="list-style-type: none"> <li>Total flow to SG B &gt; 205 gpm</li> <li>Narrow range level in at least one SG &gt;4% [15% ADVERSE].</li> </ul>
	CRS	If all conditions for SI termination are met, inform crew of transition to ES-1.1, SI Termination. If conditions not met then continue.
<b>The Chief Examiner will terminate the scenario at this point. ["Training has the shift."]</b> <b>NOTE: The steps of FR-P.1 are included below, if CSFTs dictate transition for INTEGRITY path.</b>		
	CRS	Inform crew of transition of FR-P.1, Response To Imminent Pressurized Thermal Shock Condition. Direct actions of FR-P.1.

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7Page of 30

Event Description: SG A steam line ruptures inside containment.  
 Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
 SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	CRS (cont.)	Check if FR-P.1 implementation required.
	RO	<ul style="list-style-type: none"> <li>Check RCS pressure &gt; 150 psig on PI419 or PI420, or recorder 42556.</li> </ul>
	CREW	Check Cold Leg temperatures stable or increasing on recorder 42555.
	BOP	If NOT, stop RCS cooldown: <ul style="list-style-type: none"> <li>Verify MS-1A closed on faulted SG</li> <li>Close MS-100A from faulted SG</li> <li>Isolate feedwater to SG A, unless needed for RCS cooldown.</li> </ul>
	RO	Check Przr PORVs and Block valves: <ul style="list-style-type: none"> <li>PR-1A and PR-1B, Przr PORV Block Valves have power available.</li> <li>PORVS closed.</li> <li>At least one Block Valve open.</li> </ul> Check if any SI Pump running.  Identify SI Pump B running.

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Check if SI should be terminated</p> <ol style="list-style-type: none"> <li>1. RCS subcooling &gt; 80°F [115°F ADVERSE].</li> </ol> <p>If so, Reset SI by pressing SI Train A and Train B RESET pushbuttons.</p> <ul style="list-style-type: none"> <li>• Verify annunciators 47021-A and 47021-B clear.</li> </ul> <p>Reset Containment Isolation by pressing CI Train A and Train B RESET pushbuttons.</p> <ul style="list-style-type: none"> <li>• Verify annunciators 47021-C and 47021-D clear.</li> </ul>
	BOP	<p>Verify Instrument Air to Containment established:</p> <ul style="list-style-type: none"> <li>• IA-101, Instr Air to Containment Isol, open</li> <li>• Containment Air Pressure header &gt; 40 psig on 4150103.</li> </ul>
	RO	<p>Stop SI Pump A and place in AUTO</p> <p>Stop RHR Pump A and B and place in AUTO.</p>

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Op-Test No.: 1 Scenario No.: 2 Event No.: 5, 6 & 7

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Event Description: SG A steam line ruptures inside containment.  
Train B Containment Fan Coil Unit dampers fail to shift to accident mode.  
SI Pump B fails to auto start on SI sequencer.

Three minutes following the opening of the reactor trip breakers, SG A steamline will rupture in containment result in full shear over a 5-minute ramp. Containment pressure will rise and Przr pressure, Przr pressure and RCS temperature will lower resulting in SI actuation, Main Steamline Isolation and Containment Spray actuation. During the event the Train B CFCU dampers which open on 4 psig pressure in Containment will fail to open, requiring the operator to manually open them. SI Pump B will fail to auto start and must be manually started.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Establish Charging flow:</p> <p><b>Report no charging pump running.</b></p> <ul style="list-style-type: none"> <li>• Check that CC flow has not been lost the RXCP Thermal Barriers (CC-610A 7 B open)</li> <li>• Reduce demand on charging pump to be started to ZERO</li> </ul> <p>Start the selected Charging Pump.</p> <p>Establish 20 gpm charging flow (FI-128).</p>
<p><b>If transition was made to FR-P.1, The Chief Examiner will terminate the scenario at this point. [“Training has the shift.”]</b></p>		

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Facility: Kewaunee Scenario No.: 3 Op-Test No.: 1

Examiners: \_\_\_\_\_ Operators: SRO  
 \_\_\_\_\_ RO  
 \_\_\_\_\_ BOP

Initial Conditions: IC-14; 85% power, Beginning of Cycle (BOC)

Motor Driven AFW A Pump is in PULLOUT.

Turbine First Stage Pressure channel PT-486 has failed high. Steam Dump Control is in STM PRESS mode.

Turnover: The plant is at 85% power, returning to 100% power following successful completion of SP-54-086, Turbine Stop and Governor Valve Operability Test. Turbine First Stage Pressure PT-486 failed high about 1-hour ago. The actions for A-TB-54, Abnormal Turbine Generator Operation Section 4.12 are complete. Steam Dumps are in STEAM PRESSURE mode. Continue load increase to 100% at ¼% per minute load rate. AFW Pump A has been out of service for 25 hours due to inboard bearing vibration.

Event No.	Malf. No.	Event Type*	Event Description
Preload	CS03A		Failure to Auto Start ICS Pump A (Containment Spray)
Preload	RX223, 600		Turbine Impulse Pressure Channel PT-486 fails high. (OOS)
1	—	N BOP SRO	Resume power increase.
		R RO	Follow turbine load increase using rods and/or dilution.
2	RX213, 1400	I BOP SRO	SG A Pressure Controlling channel PT-468 fails high. Affects feed flow and SG A PORV opens.
3	RC10B, 2	C RO SRO	Pressurizer PORV PR-2B fails off its seat.
4	DI-46663-CLOSE OFF DI-46663-TRIP ON	C RO BOP SRO	ESF 480V Bus 61 Supply Breaker 16101 trips open and fails.
5	SER0680, SER0456 SER0409, SER658 SER0392, SER528 SER0398, SER0604	C BOP SRO	Circulating Water condenser bellows failure flooding Turbine Building Basement. Circulating Water Pump fails to auto trip. (Also requires reactor trip.)
6	RC04A 100	M RO BOP SRO	Cold Leg A LOCA increasing to loop shear over 10 minutes. (Delayed 4 minutes following reactor trip.)
7	CS03A	C RO SRO	Failure to Auto Start ICS Pump A. Must be manually started.

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

## **SCENARIO 1-3 OVERVIEW**

Event 1 – The plant is at 85% power. Load increase is in progress to 100% power. Crew will resume load increase following turnover.

Event 2 – Following clearly observable plant response from the reactivity changes, the SG A controlling pressure channel will fail high. This will affect the controlling steam flow channel (density compensation) for the SG, increasing level as the Feed Control valve FW-7A stokes open. Also the SG A PORV SD-3A will open in automatic. The BOP will take manual control of FW-7A and stabilize level. The BOP will also take manual control of SD-3A and observe that the valve shuts. A-MI-87 will be entered to remove the failed channel from service and place control to an operable steam flow channel. Once this is completed, the BOP may place FW-7A in AUTO. The CRS will address Technical Specification requirement for the failed channel (TS 3.5.b) in Table TS 3.5-2, Table TS 3.5-3 and Table TS 3.5-4.

Event 3 – After the SG pressure and steam flow channel has been addressed, Pressurizer PORV PR-2B fails 2% open giving dual light indication. The RO will close the associated PORV Block valve PR-1B. A-RC-36D will be entered to address the RCS leakage. The CRS will address Technical Specification 3.1.a.5 for PORV operability.

Event 4 – After the SG pressure and steam flow channel has been addressed, Bus 61 Supply Breaker will fail and trip open, resulting in a loss of power to the bus. ESF equipment affected include Component Cooling Pump B (standby), Containment Fan Coil Unit C, Containment Fan Coil Unit D and ICS (Containment Spray) Pump B. The crew will respond with actions of A-ELV-40, placing the opening the feeder breakers to the affected equipment (place their control switches in PULLOUT). The CRS will address the affected equipment in Technical Specifications 3.3.c.1.A.3 (ICS Pump and CFCUs), and 3.3.d.2 (CC Pump). The most limiting LCO is 72-hours.

Event 5 – Once the electrical bus issues have been addressed, a failure of one of the bellows from Circulating Water (CW) to the Condenser will occur. This will result in flooding in the Turbine Building basement and should trip any running CW Pumps. The BOP is expected to check the Alarm Response procedures, and manually trip CW Pump B to minimize flooding. The crew is directed to verify both CW Pumps tripped and to manually trip the reactor. They are to stabilize the plant per E-0 and continue with actions of the ARP. These actions include isolating SW to turbine building, placing the secondary pumps in PULLOUT. Further actions are directed in A-MDS-30.

Event 6 & 7 – Four minutes after the reactor trip, a LOCA will occur in RCS Cold Leg A. The LOCA will progress to a loop shear over ten minutes. The crew should return to Step 1 of E-0 and verify Safety Injection actuation. Following completion of sequencing of the ESF equipment, and with containment pressure rising above 23 psig, the RO will report the failure of ICS Pump A to start and will manually start the pump. Transition from E-0 is made to E-1. The operators should stop the RXCPs when SI flow and RCS subcooling conditions are met. The operators should establish charging flow, evaluate conditions for SI termination, and verify recirculation capability. At step 19, the crew will be directed back to step 17 to check conditions for recirculation capability, until RWST level lowers to 37%. If RWST level lowers to 37%, transition is made to ES-1.3, Transfer To Containment Sump Recirculation, and recirculation is established with Train B RHR. The scenario is terminated following verification of Train B RHR Recirculation flow, Step 12 of ES-1.3, or at the completion of the second evaluation of the recirculation capability in E-1 if RWST does not lower to 37%, OR at the discretion of the Chief Examiner.

### **Critical Tasks**

1. RCS A – Close the block MOV upstream of the stuck-open PZR PORV prior to reaching reactor trip conditions.
2. E-0 N – Establish at least one Train of Containment Spray before transition out of E-0.

If transition to ES-1.3 occurs

3. ES-1.3 A – Transfer to containment sump recirculation and establish recirculation flow with at least one train prior to reaching 4% RWST level.

Op-Test No.: <u>1</u>		Scenario No.: <u>3</u>	Event No.: <u>1</u>	Page of <u>48</u>
Event Description:		Initiate load increase to 100%.		
		Increase load to 100%. At step 4.1.11 of N-0-03. CAS steps in effect include 4.1.4, 4.1.5 7 4.1.6.		
Time	Position	Applicant's Actions or Behavior		
	<b>CUE:</b>	<b>Provided in Turnover.</b>		
	CRS	Direct actions of N-0-03 Plant Operation Greater Than 35% Power, step 4.1.11.		
	BOP	<p>Raise load per N-TB-54, Turbine and Generator Operation, section 4.1.19:</p> <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations</li> <li>• Determine maximum load rate % per minute based on fuel performance limit: 40 Mw/hr</li> <li>• Determine maximum load rate % per minute based on Turbine Operating Limits using figure 1 and Attachment A steps A.7 through A.10</li> <li>• Verify valve Position Limit to 100%.</li> <li>• Press REFERENCE CONTROL “UP” pushbutton until SETTER value is at desired load (~ 100%)</li> <li>• Verify/set loading rate to ¼%/min.</li> <li>• Inform (telephone) Energy Supply &amp; Control of rate and amount of load pickup.</li> <li>• Depress GO</li> <li>• Verify load increases</li>   <li>• Verify Reactive Load remains within Figure 5, Generator Capability Curve, limits <ul style="list-style-type: none"> <li>▪ If required, adjust Generator #1 Voltage Adjuster switch to change VARs (REACT PWR meter 4460104)</li> </ul> </li> <li>• Verify and maintain turbine and auxiliaries operating conditions: <ul style="list-style-type: none"> <li>▪ Turbine Lube Oil Cooler outlet temperature 106-110°F. (PPCS T2165A, Group 28 Turbine Bearings/Oil Temperatures)</li> <li>▪ Exciter air temperature 108-112°F. (PPCS T2121A, T2122A, T2123A)</li> <li>▪ EH oil temperature 110-120°F. (Local)</li> <li>▪ Hydrogen seal oil temperature 112-120°F (Local)</li> <li>▪ Generator Hydrogen temperatures 30-35°C; 86-95°F on Gen Stator Temp recorder. (PPCS T0397, Group 34 Generator Slot Temperatures 2; Recorder 42525)</li> </ul> </li> </ul>		

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Op-Test No.: 1 Scenario No.: 3 Event No.: 1 Page of 48

Event Description: Initiate load increase to 100%.

Increase load to 100%. At step 4.1.11 of N-0-03. CAS steps in effect include 4.1.4, 4.1.5 7 4.1.6.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Perform reactivity adjustments:</p> <p>Rod Control (outward motion at - 1.5°F difference Tref-Tave)</p> <p>AND/OR</p> <p>Boron Concentration Control per N-CV-35A, Boron Concentration Control, section 4.4, Dilute or Alternate Dilute:</p> <ul style="list-style-type: none"> <li>• Review applicable Precautions &amp; Limitations.</li> <li>• Determine rate and magnitude of dilution(s) (total amount from above reactivity calculations)</li> <li>• Adjust MU-1022/CV-31095, Blender Control Rx Mu Flow, to required flow rate.</li> <li>• Set Rx Makeup Totalizer to required quantity.</li> <li>• Position Reactor Makeup Mode Selector to DILUTE or ALT DIL.</li> <li>• If ALT DIL is selected, place CVC-406/CV31094, BA Blender to VCT, to CLOSE position.</li> <li>• Position Reactor Makeup Control switch to START</li> <li>• Verify required change has been achieved by monitoring: <ul style="list-style-type: none"> <li>▪ Rod Position</li> <li>▪ Boron Concentration</li> <li>▪ Tave</li> </ul> </li> </ul> <p>When dilution is complete:</p> <ul style="list-style-type: none"> <li>• Use Oper Aid 96-3 to verify CVC-403/CV-31092, Blender Control BA Flow, set at current RCS boron concentration.</li> <li>• Verify MU-1022/CV-31095, Blender Control Rx Mu Flow, is set to 60 gpm.</li> <li>• Verify CVC-406 to AUTO position.</li> <li>• Position Reactor Makeup Mode Selector to AUTO.</li> <li>• Position Reactor Makeup Control switch to START.</li> </ul>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 1 Page of 48

Event Description: Initiate load increase to 100%.

Increase load to 100%. At step 4.1.11 of N-0-03. CAS steps in effect include 4.1.4, 4.1.5 7 4.1.6.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"><li>• At Rx Makeup Totalizer:<ul style="list-style-type: none"><li>▪ Verify correct quantity added.</li><li>▪ Reset Rx Makeup Totalizer by pressing the black button.</li><li>▪ Verify BA Totalizer indicating all ZEROs in window by black button.</li></ul></li><li>• If RCS boron has been changed by &gt; 50 ppm, the operate Przr heaters as necessary to equalize RCS and Przr boron.</li></ul>
<b>NOTE: Following the required reactivity change of ~ 5% power, Event 2 may be started.</b>		

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Op-Test No.: 1 Scenario No.: 3 Event No.: 2

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Event Description: SG A pressure channel (PT-468) fails high.

The density compensating pressure channel for the controlling Steam Flow channel for SG A fails high causing that channel of steam pressure to indicate 1400 psig and the steam flow channel to indicate near top of scale 4.3E6 to 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7A, Main Feed Control Valve, will open. SG A inventory will rise until the operator takes manual control of FW-7A. The other Steam Flow channel will indicate normal flow (~ 3.4E6 PPH/HR) .The operator will adjust FW-7A as necessary to maintain SG A level within normal operating band (39%-49%).  
Additionally, the pressure channel provides the input to the SG A PORV (SD-3A). SD-3A will go fully open in automatic further reducing actual SG pressure and cooling the RCS.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47061-B S/G A SF&gt;FF</b> <b>47062-A, S/G A PROGRAM LEVEL DEVIATION</b> <b>47062-B, S/G A BYPASS CV LEVEL DEVIATION</b> <b>47043-C, PRESSURIZER CONTROL PRESS ABNORMAL</b> <b>TLA-10 SG TILTS</b> <b>TLA-9 CORE EXIT T/C TILTS</b>  <b>PPCS Alarms:</b> <b>P0468A S/G A Chan 1 STMP P [high]</b> <b>P0429A (9431A, 0449) Pzr Press Low</b> <b>F0404D S/G A FF/SF Mismatch Signal</b>  <b>PI-468 at top of scale; PI-469 &amp; PI-482 at approximately 800 psig and lowering.</b> <b>FI-464, S/G A Steam Flow near top of scale; FI-475, S/G B Steam Flow stable at ~2E6 PPB/HR</b> <b>LI-461, LI-462 and LI-463 S/G A level rising.</b> <b>FW-7A Valve Position Demand and Actual (Position) Indication rising.</b> <b>FI-466 and FI-467, S/G B Feed Flow indications rising.</b>
	BOP	Identify and report PI-468 (Red Channel) failed high.  Report Steam Flow FI-464 indicating high due to failed pressure channel input (density compensation).  Take FW-7A controller to MANUAL.  Identify and report SD-3A, SG A PORV open.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 2

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Event Description: SG A pressure channel (PT-468) fails high.

The density compensating pressure channel for the controlling Steam Flow channel for SG A fails high causing that channel of steam pressure to indicate 1400 psig and the steam flow channel to indicate near top of scale 4.3E6 to 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7A, Main Feed Control Valve, will open. SG A inventory will rise until the operator takes manual control of FW-7A. The other Steam Flow channel will indicate normal flow (~ 3.4E6 PPH/HR) .The operator will adjust FW-7A as necessary to maintain SG A level within normal operating band (39%-49%).  
Additionally, the pressure channel provides the input to the SG A PORV (SD-3A). SD-3A will go fully open in automatic further reducing actual SG pressure and cooling the RCS.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	Take SG A PORV controller to MANUAL and verify valve closes.
	CREW	<p>Address Annunciator Response for 47061-B, 47062-A, and/or 47062-B.</p> <p>Report that if the alarm is due to a failed instrument:</p> <ul style="list-style-type: none"> <li>• Verify the alarm was caused by failure of S/G A Pressure channel PT-468 affecting Steam Flow FT-474 AND position FW-7A to MANUAL.</li> <li>• Go To A-MI-87.</li> <li>• Refer to A-FW-05, Abnormal Feedwater System Operation, when returning FW-7A to AUTO.</li> </ul> <p>Address Annunciator Response for 47043-C</p> <ul style="list-style-type: none"> <li>• Verify PS-1A &amp; PS-1B, Przr Spray Control Loop A (B), closed</li> <li>• Verify all Przr Heaters ON</li> <li>• Check RCS subcooling based on CETs <math>\geq 30^{\circ}\text{F}</math>. If NOT, trip the reactor and go to E-0.</li> <li>• Check Przr level <math>&gt; 5\%</math>.</li> </ul> <p>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</p>
	CRS	Direct the BOP to control SG A level with FW-7A in MANUAL.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 2

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Event Description: SG A pressure channel (PT-468) fails high.

The density compensating pressure channel for the controlling Steam Flow channel for SG A fails high causing that channel of steam pressure to indicate 1400 psig and the steam flow channel to indicate near top of scale 4.3E6 to 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7A, Main Feed Control Valve, will open. SG A inventory will rise until the operator takes manual control of FW-7A. The other Steam Flow channel will indicate normal flow (~ 3.4E6 PPH/HR). The operator will adjust FW-7A as necessary to maintain SG A level within normal operating band (39%-49%). Additionally, the pressure channel provides the input to the SG A PORV (SD-3A). SD-3A will go fully open in automatic further reducing actual SG pressure and cooling the RCS.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct actions of A-MI-87, Bistable Tripping for Failed Reactor Protection or Safeguards Inst.
	CRS	Check Technical Specifications for instruments with bistable tripping requirements [TS 3.5.b]: TS Table 3.5-2, item No. 16 (Steam Flow/Feedwater Flow Mismatch) – 2 with 1 required. TS Table 3.5-3, No. 1.C (Low Steam Pressure/Line) – 3/(line) with 2 required. TS Table 3.5-4, No. 2.a (Hi-Hi Steam Flow with SI) – 2/loop with 1 required. TS Table 3.5-4, No. 2.b (Hi Steam Flow and 2 of 4 Lo-Lo T <sub>avg</sub> with SI) – 2/loop with 1 required.
	CRS	Ensure I&C (Work Control/Work Week Coordinator) is notified of status of PT468.
	CRS	Declare PT468 channel out-of-service (OOS).
	CRS	Ensure bistables for PT468 are to be tripped within 6 hours of declaring OOS.
	CRS	Direct I&C to check for redundant channel bistable status by performing SP 47-316E, Channel 1 (Red) Reactor Protection Logic Test.
<p><b>NOTE:</b> Time Warp may be used at this point to have the check of redundant bistables complete. CUE: SP 47-316E is complete and no bistables were detected that would cause a reactor trip.</p>		
	CRS	Direct the crew to perform/verify Prerequisite Alignment of Attachment I for PT468.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 2

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Event Description: SG A pressure channel (PT-468) fails high.

The density compensating pressure channel for the controlling Steam Flow channel for SG A fails high causing that channel of steam pressure to indicate 1400 psig and the steam flow channel to indicate near top of scale 4.3E6 to 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7A, Main Feed Control Valve, will open. SG A inventory will rise until the operator takes manual control of FW-7A. The other Steam Flow channel will indicate normal flow (~ 3.4E6 PPH/HR). The operator will adjust FW-7A as necessary to maintain SG A level within normal operating band (39%-49%). Additionally, the pressure channel provides the input to the SG A PORV (SD-3A). SD-3A will go fully open in automatic further reducing actual SG pressure and cooling the RCS.

Time	Position	Applicant's Actions or Behavior
	BOP	Position Steam Flow Channel Selector switch for S/G A 46547/HFC-465 to 465/WHITE (Channel II).  <b>NOTE:</b> The FW Flow Channel Selector switch for S/G A 46548/HFC-466 may also be placed to the 467/WHITE (Channel II) position, as it is standard practice that the corresponding control channels be powered from the same Instrument Bus in the event of a bus failure.
	RO	Act as SECOND OPER for verification of position 46547/HFC-465 in 465/WHITE.
	CRS	Direct I&C to trip bistables per Attachment I section 2.0 and 3.0  <b>(NOTE: The COMMUNICATOR is set report &amp; to receive direction from CRS, and will perform actions for tripping bistables from the Simulator Booth.)</b>
	CRS	Direct crew to verify control room indications per Attachment I.
	BOP	Verify following lit: <ul style="list-style-type: none"> <li>▪ Annunciator 47064-I, STEAM GEN A PRESSURE LOW</li> <li>▪ Annunciator 47061-I, STEAM GEN A LO-LO- PRESS SI CHANNEL ALERT</li> <li>▪ Annunciator 47061-C, S/G A FEED FLOW EXCESSIVE</li> <li>▪ Annunciator 47061-B, S/G A SF&gt;FF</li> <li>▪ Status Light 44908-0701, MS Hdr A Low-Low Press</li> <li>▪ Status Light 44907-0901, S/G A SF&gt; FF</li> </ul>
	CREW	Complete PERFORMED BY and VERIFICATION BY sections of Attachment I.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 2 Page of 48

Event Description: SG A pressure channel (PT-468) fails high.

The density compensating pressure channel for the controlling Steam Flow channel for SG A fails high causing that channel of steam pressure to indicate 1400 psig and the steam flow channel to indicate near top of scale 4.3E6 to 4.5E6 PPH/HR flow. Input to the control circuit demands additional feedwater flow, so FW-7A, Main Feed Control Valve, will open. SG A inventory will rise until the operator takes manual control of FW-7A. The other Steam Flow channel will indicate normal flow (~ 3.4E6 PPH/HR) .The operator will adjust FW-7A as necessary to maintain SG A level within normal operating band (39%-49%).  
Additionally, the pressure channel provides the input to the SG A PORV (SD-3A). SD-3A will go fully open in automatic further reducing actual SG pressure and cooling the RCS.

Time	Position	Applicant's Actions or Behavior
	CRS	Direct status control for PI-464 & FI-464 indication (OOS sticker) and switch 46547/HFC-465 in 465/WHITE (CAUTION tag).

**NOTE: At Chief Examiner direction, Event 3 may be initiated.**

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>3</u>	Event No.:	<u>3</u>	Page	of <u>48</u>
Event Description:		Pressurizer PORV PR-2B fails off its seat (open).  PR-2B will display dual indication as the valve fails 25 open. Przr pressure will drop and the Przr Relief Tank (PRT) will show indications of discharge into the PRT.					
Time	Position	Applicant's Actions or Behavior					
	<b>CUES:</b>	<b>Annunciator Alarms:</b> 47042-A, PRESSURIZER PORV OPEN 47042-B, PRESSURIZER PORV DISCHARGE TEMP HIGH 47041-B, PRESSURIZER SAFETY DISCH TEMP HIGH  <b>Przr pressure lowering.</b> <b>PR-2B, PORV, red light lit.</b>					
	RO	Identify and report PORV PR-2B open.					
	CREW	Address Annunciator Response.  47042-A, 47042-B and 47041-B: If RCS subcooling based on Core Exit TCs is < 20°F, THEN trip the reactor and GO TO E-0.  If conditions do not require Przr PORV to be open, THEN close PR/2B/CV-31109, Przr PORV, OR PR-1B/MV-32090, Pressurizer PORV Block valve.  Determine conditions does NOT exist for PORV to be open: <ul style="list-style-type: none"> <li>• Przr pressure is less than 2300 psig on PI-429 (Przr pressure RED channel)</li> </ul> Go to A-RC-36D, Reactor Coolant Leak.  <b>NOTE:</b> Action may be taken to close and isolate the PORV prior reference to procedure.					
	RO	Take PR-2B control switch to CLOSE position.  Report failure of valve to close  Take PR-1B control switch to CLOSE.					

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Op-Test No.: 1 Scenario No.: 3 Event No.: 3 Page of 48

Event Description: Pressurizer PORV PR-2B fails off its seat (open).

PR-2B will display dual indication as the valve fails 25 open. Przr pressure will drop and the Przr Relief Tank (PRT) will show indications of discharge into the PRT.

Time	Position	Applicant's Actions or Behavior
		Report PR-1B closed.
	CRS	<p>Direct actions of A-RC-36D, Reactor Coolant Leak.</p> <p>Note that section 2.3 is appropriate as it addresses leakage for Przr Safeties, PORVs or leakoff on PORV isol valves.</p> <p>If RCS subcooling based on Core Exit TCs is &lt; 20°F, THEN trip the reactor and GO TO E-0.</p> <p><b>NOTE:</b> The CRS may choose to address section 4.1 on Unidentified Leakage, but since the PORV is the most likely cause the CRS may proceed directly to section 4.3</p>
Section 4.1 responses		
	RO	<p>As directed, increase charging flow to maintain Przr level.</p> <ul style="list-style-type: none"> <li>• If required, take controller for Charging Pump A to MANUAL.</li> <li>• Rotate the pot control for Charging Pump B (and Charging Pump A if in MAN) to raise pump speed.</li> </ul> <p>As directed, place Przr backup heater control switches to ON.</p> <p>Verify Reactor makeup System operating.</p>
	CREW	<p>Use Section 2.0 information to determine leak is from PORV PR-2B opening/leaking.</p> <p>Determine PORV leakage with TI-438, PORV Outlet temperature rising [Step 4.3.2]</p> <p>Maintain PRT level per N-RC-36B, Pressurizer Relief Tank Operation.</p>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 3 Page of 48

Event Description: Pressurizer PORV PR-2B fails off its seat (open).

PR-2B will display dual indication as the valve fails 25 open. Przr pressure will drop and the Przr Relief Tank (PRT) will show indications of discharge into the PRT.

Time	Position	Applicant's Actions or Behavior
		NOTE: Action is not expected to be required for PRT.
	RO  <b>CRITICAL TASK</b>	Identify leaking PORV PR-2B.  <ul style="list-style-type: none"> <li>• <i>Close PR-1B, PORV Isol, to isolate leaking PORV.</i></li> <li>• Open and Close PR-2B in an attempt to improve valve seating and stop leakage.</li> </ul> Report dual red/green light indication remains when switch for PR-2B is taken to CLOSE.
	CREW	Determine if PR-1B should be reopened to see if leakage exists.
	CRS	Declare PR-2B, Przr PORV, inoperable  Check Technical Specifications for PORV requirements: 3.1.a.5.A.1 – With one or both PORVs inoperable because of excessive seat leakage, within one hour either restore the PORV(s) to OPERABLE status or close the associated Block valve(s) with power maintained to the Block valves... OR 3.1.a.5.A.2 – With one PORV inoperable due to causes other than excessive seat leakage, within ONE hour either restore the PORV to OPERABLE status or close its associated Block Valve and remove power from the Block Valve. Restore the PORV to OPERABLE status within the following 72 hours...
	CREW	(Within one hour) Direct AO to open the breaker for PR-1B PORV Block valve, MCC-62B cubicle D3.

**NOTE: At Chief Examiner direction, Event 4 may be initiated.**

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>3</u>	Event No.:	<u>4</u>	Page	of <u>48</u>
Event Description:		<p>Bus 61 supply Breaker 16101 trips open. Bus 61 deenergized.</p> <p>A faulty relay for breaker 16101 causes the breaker to trip open, removing power to the bus. Affected loads include Containment Fan Coil Units C &amp; D (running), Internal Containment Spray Pump B and Component Cooling Pump B (both in standby).</p>					
Time	Position	Applicant's Actions or Behavior					
	<b>CUES:</b>	<p><b>Annunciator Alarms:</b> 47102-I, BUS 61 VOLTAGE LOW</p> <p>Bus 61 480V Light off. Beaker 16101 green light on; red light off</p>					
	CREW	<p>Identify loss of power to Bus 6 / opening of breaker 16101.</p> <p>Report Bus 61 deenergized.</p>					
	CREW	<p>Address Annunciator Response.</p> <p>47102-I:</p> <p>Go to A-ELV-40, 480V AC Supply Distribution System Abnormal.</p> <p>Dispatch AO/EO to check Bus 61.</p>					
	CRS	<p>Direct actions of A-ELV-40.</p> <p>Determine that there are No automatic or operator immediate actions (section 3.0)</p> <p>Direct action for Bus 1-61 undervoltage.</p>					
	BOP	<p>Determine/Report Bus 6 voltage normal.</p> <p>Verify open supply breaker (16101) [May also check that Bus 52/62 cross-tie is open (breaker 16111.)</p>					

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Op-Test No.: 1 Scenario No.: 3 Event No.: 4 Page of 48

Event Description: Bus 61 supply Breaker 16101 trips open. Bus 61 deenergized.

A faulty relay for breaker 16101 causes the breaker to trip open, removing power to the bus. Affected loads include Containment Fan Coil Units C & D (running), Internal Containment Spray Pump B and Component Cooling Pump B (both in standby).

Time	Position	Applicant's Actions or Behavior
	CREW	Determine loads affected by loss of Bus. <ul style="list-style-type: none"> <li>Internal Containment Spray (ICS) Pump B</li> <li>Component Cooling (CC) Pump B</li> <li>Containment Fan Coil Unit (CFCU) C</li> <li>Containment Fan Coil Unit (CFCU) D</li> </ul>
	RO	When directed place Control Switch in TRIP or PULLOUT: <ul style="list-style-type: none"> <li>ICS Pump B</li> <li>CC Pump B</li> </ul>
	BOP	When directed place Control Switch in PULLOUT: <ul style="list-style-type: none"> <li>CFCU C</li> <li>CFCU D</li> </ul>
	CREW	Determine conditions do not allow cross-connecting Bus 61 to Bus 51.
	CRS	Check Technical Specifications for affected equipment requirements: <ul style="list-style-type: none"> <li>3.7.b.6 – (Bus 61) One 4160-V or 480-V ESF Bus may be out of service for 24 hours provide the redundant bus and its loads remain OPERABLE.</li> </ul> <p>Determine Bus 51, ICS Pump A, CC Pump A and CFCUs A &amp; B are currently OPERABLE.</p>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 4 Page of 48

Event Description: Bus 61 supply Breaker 16101 trips open. Bus 61 deenergized.

A faulty relay for breaker 16101 causes the breaker to trip open, removing power to the bus. Affected loads include Containment Fan Coil Units C & D (running), Internal Containment Spray Pump B and Component Cooling Pump B (both in standby).

Time	Position	Applicant's Actions or Behavior
	CRS (cont.)	<p>Check Technical Specifications for affected equipment requirements (cont.):</p> <ul style="list-style-type: none"><li>• 3.3.c.3.(iii) – The same containment fan coil unit and containment spray trains may be out of service for 72 hours provided there opposite fancoil unit and containment spray trains remain OPERABLE. (See above.)</li><li>• 3.3.d.2 – One Component Cooling Water train may be inoperable for a period of 72 hours.</li></ul> <p>Determine limiting LCO is 24 hours for Bus 61, and 72 hour LCO exist for ICS/CFCUs and CC Systems.</p> <p>Report system status to Operations Management.</p> <p>Direct Status Control for equipment:</p> <ul style="list-style-type: none"><li>• ICS Pump B (CAUTION Tag).</li><li>• CC Pump B (CAUTION Tag).</li><li>• CFCU C (CAUTION Tag).</li><li>• CFCU D (CAUTION Tag).</li></ul>

**NOTE: At Chief Examiner direction, Event 5 may be initiated.**

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Op-Test No.: 1 Scenario No.: 3 Event No.: 5 Page of 48

Event Description: Circulating Water condenser bellows break. Flooding of Turbine Building basement.

One of the bellows at the condenser for Circulating Water system fails. Water begins to flood the Turbine Bldg Basement. The flood detection system detects the water level rise but fails to actuate the tripping of the running Circulating Water Pumps. The crew must trip the Circulating Water Pump and also trip the reactor. Other actions are required to be taken to limit flooding from other potential sources such as Service Water, the Condensate/Feedwater, Heater Drains, and Fire Water.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> 47052-N, TURBINE BLDG. FLOOD LEVEL ALERT 47051-N, CW PUMPS FLOOD LEVEL TRIP 47053-N, COND, TRENCH WATER LEVEL HIGH
	CREW	Identify flood in Turbine Building.  Report failure of Circulating Water Pump to trip.
	CREW	Address Annunciator Response.  47052-N & 47051-N (actions of 47053-N are covered by these):  Dispatch Operator to determine source of water to Turbine Bldg.  Verify both Circulating Water Pumps tripped.
	BOP	Place Circ water Pump B control switch to STOP (or PULLOUT).
	CREW	(Address Annunciator Response continued)  If reactor is critical, THEN manually trip the reactor and stabilize the plant per E-0 while continuing in this procedure.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 5 Page of 48

Event Description: Circulating Water condenser bellows break. Flooding of Turbine Building basement.

One of the bellows at the condenser for Circulating Water system fails. Water begins to flood the Turbine Bldg Basement. The flood detection system detects the water level rise but fails to actuate the tripping of the running Circulating Water Pumps. The crew must trip the Circulating Water Pump and also trip the reactor. Other actions are required to be taken to limit flooding from other potential sources such as Service Water, the Condensate/Feedwater, Heater Drains, and Fire Water.

Time	Position	Applicant's Actions or Behavior
<p><b>NOTE:</b> The reactor trip will occur here. The remaining directions of the ARP are included below for reference. These actions may not be performed OR may only be performed in part since the ensuing events (LOCA) may prevent the plant from stabilizing, such that the actions can be taken.</p>		
	CREW	<p>(Address Annunciator Response continued)</p> <p>Position Turbine Bldg SW Header Selector to ISOL.</p> <p>Stop following pumps and place control switches in PULLOUT:</p> <ul style="list-style-type: none"> <li>• Feedwater Pumps.</li> <li>• Heater Drain Pumps</li> <li>• Condensate Pumps</li> </ul> <p>If either Fire Pump is running AND fire pump operation is NOT required for an actual fire, then shut down both Fire Pumps per N-FP-08.</p> <p>If not done previously, Dispatch Operator to determine source of water to Turbine Bldg.</p> <p>GO TO A-MDS-30, Miscellaneous Drains and Sumps (MDS) Abnormal Operation.</p>
<p>NOTE: the A-MDS-30 actions repeat, in part, the actions of the ARP and additionally direct local actions to monitor the water level and take actions to prevent flooding of Safeguards Alley if water begins to enter. This can only occur if the circ Water Pump is not tripped.</p>		
	CRS	Direct tripping the reactor.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 5 Page of 48

Event Description: Circulating Water condenser bellows break. Flooding of Turbine Building basement.

One of the bellows at the condenser for Circulating Water system fails. Water begins to flood the Turbine Bldg Basement. The flood detection system detects the water level rise but fails to actuate the tripping of the running Circulating Water Pumps. The crew must trip the Circulating Water Pump and also trip the reactor. Other actions are required to be taken to limit flooding from other potential sources such as Service Water, the Condensate/Feedwater, Heater Drains, and Fire Water.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Press the Reactor Trip pushbutton.</p> <p>Verify reactor trip:</p> <ul style="list-style-type: none"> <li>Reactor Trip and Bypass Breakers OPEN [Green lights lit for RTBs A &amp; B]</li> <li>All Rod Position indicator <math>\leq 7.5</math> steps</li> <li>All Rod Bottom (red) lights lit</li> <li>Neutron flux decreasing [4122601-4122604 or Power Range NIS Panel A drawers]</li> </ul>
	BOP	<p>Verify turbine trip:</p> <ul style="list-style-type: none"> <li>HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>Turbine Stop Valve green CLOSE indications lit.</li> </ul> <p>Verify power to either Bus 5 or Bus 6 (White voltage lights lit).</p>
<p><b>An SI is expected to occur shortly after the LOCA occurs (4-minutes after trip). The actions of E-O may or may not be completed to this point when the SI occurs (or is required). However the steps below are written assuming the SI has not occurred. When it does occur, proceed to the next event for actions.</b></p>		
	CREW	<p>Check SI status:</p> <p>Annunciator 47021-A OR 47021-B, SI TRAIN A(B) ACTUATED lit.</p>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 5 Page of 48

Event Description: Circulating Water condenser bellows break. Flooding of Turbine Building basement.

One of the bellows at the condenser for Circulating Water system fails. Water begins to flood the Turbine Bldg Basement. The flood detection system detects the water level rise but fails to actuate the tripping of the running Circulating Water Pumps. The crew must trip the Circulating Water Pump and also trip the reactor. Other actions are required to be taken to limit flooding from other potential sources such as Service Water, the Condensate/Feedwater, Heater Drains, and Fire Water.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>If NOT, Check if SI required:</p> <ul style="list-style-type: none"> <li>• Przr pressure less than 1815 psig.</li> <li>• Przr level less than 5%.</li> <li>• RCS subcooling less than 30°F</li> <li>• SG pressure less than 500 psig</li> <li>• Containment pressure greater than 4 psig.</li> </ul>
<p><b>NOTE: If any parameter is trending towards its setpoint and the crew recognizes this trend, a manual Safety Injection may be ordered and actuated. If so, proceed to the next event for actions.</b></p>		
	CREW	If SI is not required, announce reactor trip.
	CRS	Inform crew of transition to ES-0.1, Reactor Trip Response.
<p><b>NOTE: Continued under Event 6 &amp; 7.</b></p>		

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> 47021-A, SI TRAIN A ACTUATED 47021-B, SI TRAIN B ACTUATED 47021-C, CI TRAIN A ACTUATED 47021-D, CI TRAIN B ACTUATED 47022-D, CONTAINMENT HIGH PRESSURE SI 47021-F, CONTAINMENT SPRAY ACTUATED  Przr level lowering. RCS pressure lowering. Containment humidity and pressure rising. ECCS/ESF equipment started.  Green light for ICS Pump A lit; red light not lit after Containment pressure exceeds 21 psig. No Containment Spray flow on 41340 ICS Pump A Discharge Pressure reading ~ 30 psig on 4313701

**Note:** If transition has been made from E-0, then crew should return to E-0 and initiate actions at Step 1 (included below). If the crew has NOT completed the actions of E-0, step 4, then actions may begin at step 4.b.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Recognize conditions requiring Safety Injection actuation, and manually actuate SI by pressing both SI Train A and Train B INITIATE pushbuttons.</p> <ul style="list-style-type: none"> <li>• Przr level decreasing below 17% and trending down</li> <li>• Przr pressure below 2200 psig and trending down.</li> <li>• Subcooling less than 30°F.</li> </ul> <p>OR</p> <p>Recognize Safety Injection has actuated.</p>
	RO	<p>[E-0, step 1] Verify reactor trip:</p> <ul style="list-style-type: none"> <li>• Reactor Trip and Bypass Breakers OPEN [Green lights lit for RTBs A &amp; B]</li> <li>• All Rod Position indicator <math>\leq 7.5</math> steps</li> <li>• All Rod Bottom (red) lights lit</li> <li>• Neutron flux decreasing [4122601-4122604 or Power Range NIS Panel A drawers]</li> </ul>
	BOP	<p>[E-0 steps 2 &amp; 3] Verify turbine trip:</p> <ul style="list-style-type: none"> <li>• HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>• Turbine Stop Valve green CLOSE indications lit.</li> </ul> <p>Verify power to either Bus 5 or Bus 6 (White voltage lights lit).</p>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CREW	Check both trains of SI actuated: Annunciator 47021-A and 47021-B – SI Train A(B) ACTUATED lit.
	CREW	Implement E-0 QRF Item 1 RXCP TRIP CRITERIA: If both conditions occur, THEN trip RXCPs: 1. RCS Injection flow verified: <ul style="list-style-type: none"> <li>SI Pump flow indicated on F925</li> </ul> OR <ul style="list-style-type: none"> <li>RHR Pump flow greater than 375 gpm indicated on F626 or F928</li> </ul> 2. RCS Subcooling is less than 15°F [45°F ADVERSE]  <b>Note:</b> Adverse Containment occurs when containment pressure is above 4 psig OR containment radiation is above 1E5 R/hr.
	BOP	Verify FW Isolation <ul style="list-style-type: none"> <li>FW-7A/B, SG A &amp; B Main Feed Control Valves, closed</li> <li>FW-10A/B, SG A &amp; B Bypass Flow Control valves, closed.</li> <li>FW 12 A/B, Feedwater to SG A &amp; B Isolation, closed.</li> </ul>
	CREW	Make plant announcement that Safety Injection has occurred.

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
		Dispatch EO/AO to Locally monitor AFW Pump operation: <ul style="list-style-type: none"> <li>AFW Pump B and TD AFW Pump running.</li> </ul>
	BOP	Check if steamline isolation is required: <ul style="list-style-type: none"> <li>High steam flow (&gt;0.75E6) and low RCS Tav<sub>g</sub> (&lt;540°F) for SG A.</li> <li>Containment pressure &gt; 17 psig.</li> </ul> <p>Verify MS-1A, SG A Main Steam Isolation, and MS-1B, SG B Main Steam Isolation closed. If NOT and conditions required it closed, press Main Steam Line Isol Train A/B pushbuttons.</p> <p>Verify MS-2A, SG A MSIV Bypass, and MS-2B, SG B MSIV Bypass closed.</p> <p>NOTE: If Containment pressure is &gt; 17 psig, both steamlines should be isolated.</p>
	CREW	Verify Containment Spray not required: Check containment pressure (Cntmt Wide Range Pressure recorders 42597 & 42598) have remained below 23 psig.  If NOT, verify containment spray initiated. [Annunciator 47021-F CONTAINMENT SPRAY ACTUATED lit and Panel 44910, SI ACTIVE, Row 10 Status Lights lit)

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO <b>CRITICAL TASK</b>	Report ICS Pump A not running.  <i>When directed manually start ICS Pump A.</i>
	BOP	Verify Containment Fan Coil Units running.  Report CFCUs C & D not available.  Verify SW-903 A, B, C & D CNTMT Fan Coil Unit SW Return valves open.  When containment pressure exceeds 4 psig, verify RBV-150A, B, C & D, CNTMT Fan Coil Unit Emergency Dampers open  Verify Aux Bldg Special Ventilation running: <ul style="list-style-type: none"><li>• Annunciator 47052-G NOT lit.</li><li>• Zone SV Fans A and B running.</li></ul> Verify Service Water alignment: <ul style="list-style-type: none"><li>• Verify all SW Pumps running</li><li>• Verify SW header selected on Turbine Bldg SW switch &gt; 82.5 psig [Train A hdr-PI-41503]</li></ul>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	<p>Verify AFW Pumps running:</p> <ol style="list-style-type: none"> <li>1. Check AFW Pump A running</li> </ol> <p>Report AFW Pump A OOS</p> <ul style="list-style-type: none"> <li>• Close AFW-2A, AFWP A Flow Control.</li> </ul> <ol style="list-style-type: none"> <li>2. Check AFW Pump B running</li> <li>3. Check TD AFW Pump running (red light lit for MS-102, T/D AFW Pump Main Steam Isol, and discharge pressure on 41040)</li> </ol> <p>Throttle AFW Pump Disch valves:</p> <ol style="list-style-type: none"> <li>1. Maintain running AFW Pump Disch Pressure &gt; 1000 psig</li> <li>2. Maintain either 1) Total AFW flow &gt; 205 gpm OR 2) SG narrow range level in at least one SG &gt; 4% [15% ADVERSE].</li> </ol>
	RO	Verify CI Active Status Panel Lights lit.

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<p>Verify ESF Equipment running:</p> <ol style="list-style-type: none"> <li>1. SI Pumps</li> <li>2. RHR Pumps</li> <li>3. CC Pumps Check</li> </ol> <p>Report CC Pump B OOS</p> <ol style="list-style-type: none"> <li>4. SI Active Panel lights lit [AFW Pump A &amp; CFCUs C &amp; D not lit.]</li> </ol> <p>Verify SI flow on F925.</p> <p>Check RXCP cooling:</p> <ul style="list-style-type: none"> <li>• CC valves to RXCPs open – CC-600, CC-601A/B, CC610A/B &amp; CC-612A/B.</li> <li>• RXCP Thermal Barrier temperatures normal, T614 &amp; T610. [Normal is 60°F to 95°F.]</li> <li>• RXCP bearing temperatures normal, T132 &amp; T125. [Normal is Ambient to 150°F.]</li> </ul>
	CREW	Check RCS average temperature stable at or trending to 547°F:

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"><li>• <b>Report Steam Dumps are in Stm Pressure Control Mode.</b></li><li>• If at last one MD AFW Pump is running, place TD AFW Pump in PULLOUT</li><li>• Control feed flow. Maintain total feed &gt; 205 gpm until narrow range in at least one SG &gt; 4% [15% ADVERSE]</li><li>• If cooldown continues, close MS-1A &amp; B.</li></ul>
	RO	<p>Check Przr PORVS closed.</p> <p><b>Report PR-2B indicates partially open, but PR-1B Block Valve is closed.</b></p> <p>Check Przr Spray Valves closed.</p> <p>Check CV-15, Aux Spray Valve, closed.</p>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check if RXCPs should be tripped:</p> <ul style="list-style-type: none"> <li>• RCS injection flow indicated on F925</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>• RCS subcooling &lt;15°F [45°F]</li> </ul> <p>If both conditions exist, THEN stop both RXCPs and place the control switches in PULLOUT.</p>
	BOP	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>• Any SG pressure decreasing in uncontrolled manner.</li> <li>• OR</li> <li>• Any SG completely depressurized</li> </ul> <p>Report NO SGs depressurizing uncontrolled or depressurized.</p>
	CREW	<p>Check SG Tubes not ruptured:</p> <ul style="list-style-type: none"> <li>• R-15 Air Ejector Exhaust monitor panel &amp; recorder 45716 normal</li> <li>• R-19 SG Blowdown liquid monitor panel &amp; recorder 45716 normal</li> <li>• R-31 &amp; R-33, Steamline monitors, on SPDS normal</li> </ul>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CREW (cont.)	<ul style="list-style-type: none"> <li>SG A &amp; SG B N-16 monitors, recorders 42506 and 42562 normal.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Steam flow / feed flow and narrow range SG level response before trip normal</li> </ul>
	RO	<p>Check if RCS is intact:</p> <ul style="list-style-type: none"> <li>Containment pressure (PI-945 – 950; recorders 42597 7 42598) normal</li> </ul> <p>Report containment pressure is high.</p> <ul style="list-style-type: none"> <li>Containment Sump A level normal (annunciators 47031-P &amp; 47031-Q)</li> </ul> <p>Report Containment A Sump level high. (annunciators 47031-P &amp; 47031-Q lit)</p> <ul style="list-style-type: none"> <li>Wide Range Containment Level (4131703 &amp; 413704) normal</li> </ul> <p>Report Wide Range level rising.</p> <ul style="list-style-type: none"> <li>Containment radiation R-2, R-7 (Panel &amp; recorder 45716), R-40 &amp; R-41 (recorder 42599 7 42600) normal</li> </ul> <p>Report elevated radiation levels on containment monitors.</p>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CRS	Inform crew of transition to E-1, Loss of Reactor Or Secondary Coolant.  Direct monitoring of Critical Safety Function Status Trees.
<p><b>NOTE: An ORANGE Path may exist for the Containment CSF at this point, if containment pressure remains above 23 psig. If so transition will be made to FR-Z.1 Response to High Containment Pressure. These actions are covered later (at ^^) marking.</b></p> <p><b>An ORANGE or RED path may exist for the INTEGRITY CSF here or in the future, if RCS cold leg temperatures rapidly drop due to SI injection flow. If so transition will be made to FR-P.1, Response to Imminent Pressured Thermal Shock. The crew will return to procedure and step in affect at the first step: Check RCS pressure &gt; 150 psig. Since it will not be &gt; 150 psig, flow will be checked for RHR (P626 &amp; P928) for total flow &gt; 375 gpm. Transition occurs upon this verification of flow. (The steps of FR-P.1 are not addressed elsewhere.)</b></p>		
	CRS	Direct actions of E-1  Refer to E-1 QRF.  Inform Shift Manager to review EPIPs.

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check if RXCPs should be tripped:</p> <ul style="list-style-type: none"> <li>RCS injection flow indicated on F925</li> </ul> <p>AND</p> <ul style="list-style-type: none"> <li>RCS subcooling &lt;15°F [45°F]</li> </ul> <p>If both conditions exist, THEN stop both RXCPs and place the control switches in PULLOUT.</p> <p>Check RWST level &gt; 37% on LI-920 &amp; LI-921.</p>
	BOP	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>Any SG pressure decreasing in uncontrolled manner.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>Any SG completely depressurized.</li> </ul> <p>If so, verify steamlines and feedlines isolated.</p> <p>Check level in at least one SG &gt; 4% [15% ADVERSE].</p> <ul style="list-style-type: none"> <li>If so, control feed flow to maintain narrow range level between 4% [15% ADVERSE] and 50%.</li> <li>If NOT, maintain total feed &gt; 205 gpm until narrow range in at least one SG &gt; 4% [15% ADVERSE].</li> </ul>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CREW	Check Main Steamline rad monitors – normal <ul style="list-style-type: none"> <li>• R-31&amp; R-33, Steamline monitors, on SPDS.</li> <li>• SG A &amp; SG B N-16 monitors, recorders 42506 and 42562.</li> </ul>
	RO	Check Przr PORVs and Block valves: <ul style="list-style-type: none"> <li>• PR-1A and PR-1B, Przr PORV Block Valves have power available.</li> <li>• PORVS closed.</li> </ul> Report PR-2B indicates partially open, but PR-1B Block Valve is closed. <ul style="list-style-type: none"> <li>• At least one Block Valve open.</li> </ul> <b>Report PR-1A is open. (PR-1B is closed)</b> Isolate letdown: <ul style="list-style-type: none"> <li>• Place LD-4A, Letdown Orifice Valve, switch in CLOSE; verify LD-4B &amp; LD-4C switches in CLOSE position.</li> </ul> Reset SI by pressing SI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"> <li>• Verify annunciators 47021-A and 47021-B clear.</li> </ul>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	Reset Containment Isolation by pressing CI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"> <li>Verify annunciators 47021-C and 47021-D clear.</li> </ul>
	BOP	Verify Instrument Air to Containment established: <ul style="list-style-type: none"> <li>IA-101, Instr Air to Containment Isol, open</li> <li>Containment Air Pressure header &gt; 40 psig on 4150103.</li> </ul>
	RO	Establish Charging flow: <p><b>Report no charging pump running.</b></p> <ul style="list-style-type: none"> <li>Check that CC flow has not been lost the RXCP Thermal Barriers (CC-610A 7 B open)</li> <li>Reduce demand on charging pump to be started to ZERO</li> <li>Start the selected Charging Pump.</li> <li>Raise charging pump speed to establish charging flow.</li> <li>Monitor Przr level for &gt; 5% [30% ADVERSE]</li> </ul>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Check if SI should be terminated</p> <ol style="list-style-type: none"> <li>1. RCS subcooling &gt; 30°F [65°F ADVERSE].</li> <li>2. RCS pressure &gt; 2200 psig [2000 psig ADVERSE] and stable or increasing.</li> <li>3. Przr level &gt; 5% [30% ADVERSE]</li> <li>4. Secondary heat sink: <ul style="list-style-type: none"> <li>• Total flow to SG B &gt; 205 gpm</li> <li>• Narrow range level in at least one SG &gt;4% [15% ADVERSE].</li> </ul> </li> </ol> <p>Determine SI termination is NOT allowed.</p>
	RO	<p>Check if Containment Spray should be stopped:</p> <ul style="list-style-type: none"> <li>• Check any ICS pump running</li> <li>• Check Containment pressure &lt; 4 psig</li> </ul> <p>If Containment pressure is ≥ 4 psig, ICS Pump A will be left running AND actions below are directed to be performed when pressure falls below 4 psig.</p>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"> <li>Reset ICS signal by pressing both Internal Containment Spray Train A and Train B RESET pushbuttons [Annunciator will 47021-F clear].</li> <li>Stop ICS Pump A and place control switch in AUTO.</li> <li>Close ICS-5A and ICS-5B, ICS Pump Discharge Isol.</li> <li>Close CI-1001A and CI-1001B, Caustic Additive to CNTMT Spray</li> <li>Check RHR-400A and RHR-400B, RHR Pump Supply to ICS Pumps A and B closed.</li> </ul>
	RO	Check if RHR Pumps should be stopped: <ul style="list-style-type: none"> <li>RCS pressure &gt; 150 psig</li> </ul> OR <ul style="list-style-type: none"> <li>Stable or increasing</li> </ul> Report RCS pressure below 150 psig.
	BOP	Report pressure in both SGs stable or increasing.  NOTE: If crew determines this condition does not exist, then the CRS will return to step 1 of E-1.

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO	Report RCS pressure stable or decreasing (PI-419, PI-420 wide/narrow range or recorder 42556).
	BOP	<p>Check if DGs should be stopped:</p> <ul style="list-style-type: none"> <li>• Bus 5 and Bus 6 energized from offsite power <ul style="list-style-type: none"> <li>▪ Bus 5 and Bus 6 white Bus Voltage lights lit.</li> <li>▪ DG supply breakers to buses open (1-509 and 1-603)</li> <li>▪ TAT supply to Bus 5 breaker 1-501 closed with TAT energized; RAT supply to Bus 6 breaker 1-601 closed with RAT energized.</li> </ul> </li> <li>• Stop DG A and DG B and place control to AUTO, 30 seconds apart.</li> </ul>
	RO	<p>[STEP 17 begins]Evaluate Plant status:</p> <ul style="list-style-type: none"> <li>• Verify both RHR Pumps OPERABLE</li> <li>• Open CC-400A, CC to RHR Hx A.</li> <li>• Verify CC-400B, CC to RHR Hx B, Operable (power to valve – Green light lit)</li> <li>• Verify SI-300A and SI-300B, RWST Supply to RHR Pump A &amp; B, operable (power to valves)</li> <li>• Verify SI-350A and SI-350B, CNTMT Sump A/B Supply to RHR Pump A/B, operable (power to valves)</li> <li>• Verify SI-351A and SI-351B, CNTMT Sump A/B Supply to RHR Pump A/B, operable (power to valves)</li> </ul>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CREW	<p>Direct EO/AO to locally place the breakers for the following valves to ON: SI-9A, SI-11A, SI-11B, SI-20A &amp; SI-20B.</p> <p>Check Aux Bldg radiation levels normal – R-13, R-14, Aux Bldg Vent Exhaust monitor &amp; R-22, RHR Pits monitor (monitor panel &amp; recorder 45716)</p>
	CREW	<p>Consult with Technical Support Staff to determine if E-MDS-30, Post Accident Leakage Control, should be implemented.</p> <p><b>NOTE: The Communicator will acknowledge request and indicate that the Control Room will be contacted as soon as decision to implement E-MDS-30 is made.</b></p> <p>Contact/direct contact of Chemistry start up Containment Hydrogen Monitoring System.</p> <p>Contact/direct contact of Chemistry to obtain primary and secondary samples per EIPs.</p> <p>Determine if any additional equipment needs to be started to support recovery.</p>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check if RCS Cooldown &amp; Depressurization is required:</p> <ul style="list-style-type: none"> <li>Check RCS pressure &gt; 150 psig. If so, transition is made to ES-1.2, Post LOCA Cooldown and Depressurization.</li> </ul> <p>Otherwise continue in E-1.</p>
	CREW	<p>Check if transfer to Containment sump Recirc is required:</p> <ul style="list-style-type: none"> <li>Check RWST level &lt; 37% on L920 and L921; Annunciator 47023-B, RWST LEVL LOW lit</li> </ul> <p>If so transition to ES-1.3, Transfer To Containment Sump Recirculation.</p> <p>If not, continue in E-1 by returning to Step 17</p>
<p><b>If transition is NOT imminent to ES-1.3, the Chief Examiner will terminate the scenario at this point. [“Training has the shift.”]</b></p> <p><b>The actions of ES-1.3 are below.</b></p>		
	CRS	Inform crew of transition to ES-1.3, Transfer To Containment Sump Recirculation.

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Check Containment Sump B level &gt; 2.0 feet on 4131703 / 4131704</p> <p>If not already performed, Reset SI by pressing SI Train A and Train B RESET pushbuttons.</p> <ul style="list-style-type: none"><li>• Verify annunciators 47021-A and 47021-B clear.</li></ul> <p>If not already performed, Reset ICS signal by pressing both Internal Containment Spray Train A and Train B RESET pushbuttons [Annunciator will 47021-F clear].</p> <p>Establish one train of injection:</p> <ul style="list-style-type: none"><li>• Check SI Pump A flow indications on F925</li><li>• Check RHR Pump A running and F626 indicates flow</li><li>• Stop SI Pump B and RHR Pump B</li></ul>
	RO	<p>Check if ONE ICS Pump should be stopped:</p> <ul style="list-style-type: none"><li>• Check 2 ICS Pumps running</li></ul> <p>If not previously stopped, report ICS Pump A only running (ICS Pump B deenergized.)</p>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO	Establish CC flow to RHR HXs: <ul style="list-style-type: none"><li>• Verify both CC Pumps running</li></ul> Report CC Pump A running and no power to CC Pump B.
	BOP	<ul style="list-style-type: none"><li>• Verify open SW-1300A &amp; B, CC Hx A/B Outlet.</li></ul>
<b>NOTE:</b> If RWST level drops to 4%, as indicated by RWST Lo-Lo Level alarm 47023-A, the crew is expected to stop all pumps taking suction from RWST.		
	RO	<ul style="list-style-type: none"><li>• If not done previously, Open CC-400A, CC to RHR Hx A.</li><li>• Open CC-400B, CC to RHR Hx B.</li></ul> Verify LD-6, Letdown Line Isolation closed. Align charging Pumps to VCT <ul style="list-style-type: none"><li>• Establish Normal VCT makeup:<ul style="list-style-type: none"><li>▪ Set makeup Boric Acid Controller to 11.0 on dial.</li><li>▪ Verify Makeup Mode Selector in AUTO</li><li>▪ Verify VCT level on LI-112/LI-141 &gt; 5%</li></ul></li></ul>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"> <li>If required, align Charging Pump suction to VCT by taking CVC-1 to OPEN and, when verified open, taking CVC-301, Refueling Water Emergency Makeup to Charging Pmp, to CLOSE.</li> </ul> <p>Check any charging Pumps running.</p> <p>If Charging Pump(s) running, Adjust pump speed and CVC-7 to establish charging plus seal injection flow less than VCT makeup flow of 60 gpm.</p>
	CREW	Check RCS pressure less than 2100 psig [1900 psig ADVERSE].
	RO	<p>Close both SI Recirculation to RWST valves, SI-208 and SI-209.</p> <p>Verify Train A injection flow:</p> <ul style="list-style-type: none"> <li>SI Pump A running and flow indicated on F925</li> <li>RHR Pump A running and flow indicated on F626.</li> </ul> <p>Align Train B RHR Pump for Recirculation:</p> <ul style="list-style-type: none"> <li>Open SI-350B, CNTMT Sump B Supply to RHR Pump B.</li> <li>Close SI-300B, RWST Supply to RHR Pump A &amp; B.</li> </ul> <p>NOTE: Procedure step directs NOT to continue until SI-300B has stroked fully closed. This prevents draining RWST to Containment Sump.</p>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)       <b>CRITICAL TASK</b>	<ul style="list-style-type: none"> <li>• Open SI-351B, CNTMT Sump B Supply to RHR Pump B.</li> <li>• Close RHR-8B, RRHR Hx B Flow CV by rotating controller dial counter-clockwise to ZERO.</li> <li>• Start RHR Pump B.</li> </ul> <p>Verify Train B RHR Recirculation:</p> <ul style="list-style-type: none"> <li>• Check RCS pressure &lt; 150 psig</li> <li>• <i>Throttle RHR-8B to maintain RHR to maintain RHR recirculation flow at 1500 gpm (F928).</i></li> </ul> <p>Check running RHR Pumps not cavitating:</p> <ul style="list-style-type: none"> <li>• Pump flow stable and consistent with RCS pressure.</li> <li>• Discharge pressure stable and consistent with RHR flow</li> <li>• RHR Pump motor current stable and consistent with RHR flow.</li> </ul>

**The Chief Examiner will terminate the scenario at this point. ["Training has the shift."]**

**The actions of FR-Z.1, Response to High Containment Pressure, are below.**

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CRS	Inform crew of transition to FR-Z.1, Response to High Containment Pressure.  Direct actions of FR-Z.1
	CREW	Verify Containment Isolation Active Status panel lights lit.
	BOP	Verify Containment ventilation Isolation Dampers/Valves: <ul style="list-style-type: none"> <li>TAV-12, RBV-5, LOCA-201B, LOCA 100B, RBV-1, RBV-4, SA7003B, LOCA-2B, RBV-2 and RBV-3.</li> </ul>
	CREW	Verify RCS Injection flow (F626 plus F928 plus F925) greater than that determined from Figure FR-Z.1-1, Required SI Flowrate VS Time After Trip.
	RO	Check if Containment Spray is Required: <ul style="list-style-type: none"> <li>Containment pressure has increased to &gt; 23 psig on recorders 42597 and 42598.</li> </ul>

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Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<ul style="list-style-type: none"> <li>Verify Spray System alignment per table: <ul style="list-style-type: none"> <li>RHR-400A/B, RHR Pump A/B Supply to ICS Pump A/B, closed.</li> <li>ICS-2A ICS Pump A/B Suction from RWST, open.</li> <li>ICS-5A/B Containment Spray Pump 1A/1B Discharge, open.</li> <li>ICS-6A/B, Containment Spray Pump 1A/1B Discharge, open.</li> <li>ICS-201, ICS Recirculation to RWST, closed.</li> <li>ICS-202, ICS Recirculation to RWST, closed.</li> <li>CI-1001A/B, Caustic Additive to CNTMT Spray, open.</li> </ul> </li> </ul> <p>Verify ICS Pumps running.</p> <p>If not started previously, start ICS Pump A. Report ICS (Spray) Pump B has no power.</p> <p>Check RHR Pumps not cavitating:</p> <ul style="list-style-type: none"> <li>Pump flow stable and consistent with RCS pressure.</li> <li>Discharge pressure stable and consistent with RHR flow</li> <li>RHR Pump motor current stable and consistent with RHR flow.</li> </ul> <p>Check RHR Pumps not in runout:</p> <ul style="list-style-type: none"> <li>RHR Pump motor amps &lt; 24 on 41335 and 41336.</li> </ul>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Verify Service Water alignment:</p> <ul style="list-style-type: none"> <li>• Service Water Pumps running.</li> <li>• Verify SW Header A pressure &gt; 82.5 psig on 41503.</li> </ul> <p>Verify CFCUs running in Emergency Mode:</p> <ul style="list-style-type: none"> <li>• CFCUs running</li> </ul> <p>Report CFCUs C and D do not have power.</p> <ul style="list-style-type: none"> <li>• Verify SW-903A, B, C &amp; D, CNTMT Fan Coil Unit SW Return Isol, open.</li> <li>• Verify RBV-150A, B, C &amp; D, CNTMT Fan Coil Unit Emergency Discharge Dampers open.</li> </ul> <p>Verify MS-1A/B, MSIVs, and MS-2A/B, MSIV Bypass valves, closed.</p> <p>Check if feed flow should be isolated to any SG;</p> <ul style="list-style-type: none"> <li>• Check pressure in both SGs: <ul style="list-style-type: none"> <li>▪ Any SG pressure decreasing in uncontrolled manner.</li> </ul> OR <ul style="list-style-type: none"> <li>▪ Any SG completely depressurized.</li> </ul> </li> </ul>

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Op-Test No.: 1 Scenario No.: 3 Event No.: 6 & 7 Page of 48

Event Description: RCS Cold Leg A LOCA.

Internal Containment Spray Pump A fails to auto start when containment pressure exceeds 21 psig.

Four minutes following the opening of the reactor trip breakers, RCS Cold Leg will develop a leak that grows to a loop shear over a ten-minute period. RCS pressure and inventory drops, and containment pressure rises. A Safety Injection will occur, if not manually actuated by the crew when RCS leak conditions develop. The Containment Spray system actuates when containment pressure reaches or exceeds 21 psig; however, Containment Spray Pump A will not auto start and must be manually started. This is significant since the earlier failure of Bus 61 has removed ICS Pump B from service and the CFCUs C & D.

Time	Position	Applicant's Actions or Behavior
	CRS	Inform crew of transition to procedure and step in effect.

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Facility: Kewaunee Scenario No.: 4 (SPARE) Op-Test No.: 1

Examiners: \_\_\_\_\_ Operators: SRO

\_\_\_\_\_ RO

\_\_\_\_\_ BOP

Initial Conditions: IC-12; 100% power, middle of cycle (MOC).

Motor Driven AFW A Pump is in PULLOUT.

Turnover: The plant is at 100% power. Continue normal operation.

Event No.	Malf. No.	Event Type*	Event Description
Preload	DI-46983-NA-STOP OFF DI-46983-STOP ON DI-46980-TRIP ON DI-46980-NA-TRIP OFF		Bus 46 lockout condition for TSC DG and Supply breaker 14604.
1	RM01A, 100	I RO SRO	R-11 Containment Air Particulate Radiation Monitor fails high.
2	DI-46978-TRIP ON DI-46978-NA-CLOSE OFF SER0823 CRYWOLF SER1031 BLOCK	C BOP SRO	Bus 46 overcurrent lockout. Breaker 14601 opens. (Loss of TSC/SBO capability)
3	FW17B, 2	C BOP SRO	Feedwater Pump B bearing failure (vibrations) leading to pump trip. Rapid power reduction
		R RO	Follow rapid power reduction with auto rods and boration.
4	FW17A, 100	M BOP RO SRO	Feedwater Pump A trips resulting in turbine trip/reactor trip.
5	RC10A, 100	C RO	PORV PR-2A fails open on reactor trip.
6	MS07 FW15B, 100	C BOP SRO	Steam supply piping to turbine driven AFW fails. AFW Pump B subsequently trips on overcurrent.

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

Event 1 – Containment Air Particulate radiation monitor R-11 fails high resulting in a Containment Ventilation Isolation signal. The crew will respond using A-RM-45, Abnormal Radiation Monitoring System. The crew will verify automatic actions have occurred and determine the channel has failed. The channel will then be removed from service using N-RM-45. The CRS will address Technical Specification 3.1.d.5 to ensure adequate containment leak detection channels remain operable.

Event 2 – Following the addressing of Technical Specification requirements for RCS leak detection systems, Bus 46 will lockout. This will lock out the breakers supplying the bus and prevent the load restoration sequence for the TSC DG from actuating. The crew will address the actions of A-ELV-40, 480V AC Supply Distribution System Abnormal, and place the TSC DG control switch to PULLOUT. The CRS will address the actions of the Technical Requirements Manual (TRM) 3.7.1, and apply the Administrative LCO (ALCO) actions of 3.7.1.b.

Event 3 – After the ALCOs for loss of Bus 46 are addressed, Feedwater Pump B bearing will begin to fail. This will be show by increasing fluctuations in pump amps and by high vibration alarms. The crew will respond using A-FW-05A, Abnormal Feedwater System Operation. Based on pump conditions and filed reports, the crew should initiate a rapid power reduction to approximately 56% power to remove the feedwater pump from service. The crew should use A-O-03, Rapid Power Reduction, to perform the power reduction. If the power is reduced to the above value before the pump trips (approximately 18 minutes), the crew will stop Feedwater Pump B. If the pump trips during the power reduction, the crew will determine if it can reduce power and stabilize plant conditions or if a reactor trip is required. (NOTE: If the plant trips or the crew determines a reactor trip is required when Feedwater Pump B trips, the following Feedwater Pump A trip will be initiated upon the trip).

Event 4 & 5 – After the plant is stabilized (or tripped), Feedwater Pump A will trip on overcurrent. This will generate a turbine trip/reactor trip signal. When the reactor trips, PORV PR-2A will fail open lowering Pressurizer pressure, with SI likely unless the RO recognizes and closes PR-1A prior to reaching the auto SI actuation setpoint.

Event 6 – Approximately five minutes following the trip, the steam line supplying the turbine driven AFW pump will break resulting in high Steam Exclusion Area actuation. The crew should isolate the steam supply to the TDAFW Pump (MS-100A and MS-110B). Subsequently (2½ minutes later), AFW Pump B will trip resulting in a loss of all feed to the SGs. If a Safety Injection has occurred due the failure of the turbine trip, the crew will transition to FR-H.1, Response to Loss of Secondary Heat Sink, at step 14 of E-0, or if SI has not occurred, FR-H.1 will be entered upon transition from E-0 to ES-0.1, Reactor Trip Recovery, on a RED PATH condition with less than total flow of 205 gpm to the SGs and level less than 4% in both SGs. The crew will perform the action of FR-H.1 to attempt to restore feed flow using a Condensate Pump. The scenario will end upon the establishment of feed flow to at least one SG, OR at the discretion of the Chief Examiner.

## **Critical Tasks**

E-0 M – Close the block MOV upstream of the stuck-open PZR PORV by completion of the first step in the ERG network that directs the crew to close the block MOV. (This is expected to occur in E-0 at step 20.)

FR-H.1 A – Establish feedwater flow into at least one SG before either S/G wide range level is < 15% and before RCS pressure increases to > 2335 psig due to Loss of Secondary Heat Sink

Op-Test No.: 1    Scenario No.: 4    Event No.: 1    Page    of    1

Event Description:    R-11 Containment Air Particulate Monitor fails high.

Time	Position	Applicant's Actions or Behavior
	<b>CUE:</b>	<b>Annunciator Alarms:</b> <b>47012-B, HIGH RADIATION INDICATION ALARM</b> <b>47011-B, RADIATION INDICATION HIGH</b> <b>47051-A, PBX TELEPHONE POWER SUPPLY NORMAL</b> <b>TLA-15 RMS ABOVE NORMAL</b>  <b>PPCS Alarms:</b> <b>G0011G R11 CNTMT AIR PART (B) Hi</b>  <b>R-11 monitor panel Yellow (ALERT) and Red (ALARM) lights lit.</b> <b>R-11 monitor panel reading high (5.00 E+7) and flashing “HI”.</b>
	RO	<b>Report R-11 monitor reading high.</b>
	CREW	Address Annunciator Response for 47011-B, 47012-B and/or TLA-15. <ul style="list-style-type: none"> <li>• Inform Radiation Protection and request assistance in identifying and isolating radiation source</li> <li>• Go To A-RM-45</li> </ul> Address Annunciator Response for 47065-W: <ul style="list-style-type: none"> <li>• Dispatch a NAO to locally check MCC-46C and LPB-15 distribution panel.</li> </ul> <b>Radiation Protection will acknowledge report and return call one minute later reporting condition is not valid, and instrument failure is suspected.</b> <b>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</b>
	CRS	Direct actions of A-RM-45  Review Automatic Actions. [3.2.1]

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Op-Test No.: 1 Scenario No.: 4 Event No.: 1 Page of 1

Event Description: R-11 Containment Air Particulate Monitor fails high.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Verify automatic actions:</p> <ul style="list-style-type: none"> <li>• TAV-12, Cntmt Purge /Vent Supply, closed.</li> <li>• RBV-2, Cntmt Purge/Vent Supply B, closed.</li> <li>• RBV-5, Cntmt Purge/Vent Exhaust, closed.</li> <li>• RBV-3, Cntmt Purge/Vent Exhaust B, closed.</li> <li>• SA-7003B, Hydrogen Dilution to Cntmt, closed.</li> <li>• LOCA-2B, Post LOCA H<sub>2</sub> Cntmt Vent Isol B, closed.</li> </ul> <p>• <b>NOTE:</b> These valves/damper indications are located on the BOP vertical back panel. All are normally closed.</p>
	CREW	<p>Check if personnel should be evacuated:</p> <p>Determine R-1 through R-10 monitors are not in ALERT or HIGH Alarm.</p>
	RO	Check no radiation monitors have failed downscale indication or FAIL alarm.
	CREW	Determine R-11 is the only affected monitor.
	RO	<p>Check R-11 operating properly:</p> <ol style="list-style-type: none"> <li>1. Position Paper Drive to FAST for 15 seconds and verify red FAST light illuminates.</li> <li>2. Position Paper Drive to OPERATE and verify red OPERATE light illuminates.</li> <li>3. Check R-11 indication lowering.</li> </ol> <p><b>Report R-11 indication still high and not lowering.</b></p> <p>Remove R-11 from service per N-RM-45:</p> <ol style="list-style-type: none"> <li>1. Check Containment Purge/Vent not in progress.</li> <li>2. Align R-21 to sample Containment (Step 4.2.9)</li> </ol>

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Op-Test No.: 1 Scenario No.: 4 Event No.: 1 Page of 1

Event Description: R-11 Containment Air Particulate Monitor fails high.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>Notify Radiation Protection to change fixed filters in R-12.</li> </ul> <p><b>NOTE: Cue is required for TIME WARP to allow change of filters. CUE: TIME WARP, Radiation Protection reports that filters on R-21 have been changed.</b></p>
	RO (cont.)	<ul style="list-style-type: none"> <li>Stop R-11/12 Sample Pump by taking R-11/R-12 Pump Control to OFF/RESET, and verify the green light lit and Flow High/Low amber light lit. (Annunciator 47013-B alarms)</li> <li>Stop R-21 Sample Pump by taking R-21 Pump Control to OFF/RESET, and verify the green light lit and Flow High/Low amber light lit. (Annunciator 47013-B alarms)</li> <li>Direct NAO to locally perform steps 4.2.9.d through 4.2.9.i to align valves for R-21 Containment gaseous monitoring.</li> </ul> <p><b>NOTE: CUE: TIME WARP, the NAO reports the valves in steps 4.2.9.d through 4.2.9.i of N-RM-45 have been aligned for containment gaseous monitoring using R-21. The BOOTH OPERATOR will enter Remote Function to align R-21 to sample Containment.</b></p> <ul style="list-style-type: none"> <li>Start R-21 Sample Pump, and verify red light lit.</li> <li>Verify R-21 Flow High/Low light off.</li> </ul>
	CREW	Notify Radiation Protection of R-11 removal from service.
	CRS	<p>Refer to Technical Specification 3.1.d.</p> <p>Determine with R-11 out of service, one of the two reactor coolant leak detection system depending on radiation is affected per TS 3.1.d.5.</p> <ul style="list-style-type: none"> <li>Verify R-12/R-21 (Backup leak detection channel to R-11) is operating.</li> </ul>

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>4</u>	Event No.:	<u>1</u>	Page	of	<u>1</u>
Event Description: R-11 Containment Air Particulate Monitor fails high.								
Time	Position	Applicant's Actions or Behavior						
	CRS (cont.)	<b>NOTE:</b> Technical Specifications Basis TS 3.1.d.5 identifies the following leak detection systems: Containment Air Particulate monitor (R-11). Containment Radiogas monitor. (R-12 & R-21, when aligned to sample Containment). Humidity detection (backup to rad monitors). Leakage Detection System using Containment Sump A and Sump Pumps.						
<b>NOTE: The operator will need to obtain the Radiation Monitor Keyswitch Key (Key 291-294). The key will be in the Evaluator's possession prior to scenario initiation. When crew member request, provide the key.</b>								
	RO	5. If not already performed, position R-11/12 Pump Control switch to OFF/RESET.  Obtain Radiation Monitor Key.  6. Position Keyswitch to KEYPAD to defeat automatic actions.						
	CREW	Notify I&C (Work Week Coordinator) to initiate corrective actions to repair R-11.						
	CREW	Direct Shift Manager to review EPIP AD-02 Chart B for affect on Emergency Plan classifications.						
	RO	Check R-11 Radiation levels not normal.						
	CREW	If not performed previously, verify automatic actions.						
<b>NOTE: At Chief Examiner direction, Event 2 may be initiated.</b>								

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>4</u>	Event No.:	<u>2</u>	Page	of	<u>1</u>
Event Description:		Bus 46 Lockout.  Bus 46 has an overcurrent lockout condition occur. This will remove power to the bus and prevent automatic operation of the TSC Diesel Generator, which is the emergency power supply to Bus 46. This affects the ability to respond to a loss of all AC power event/ Station Black Out (SBO). Operability of Bus 46 and the TSC DG are addressed in the KPS Technical Requirements Manual.						
Time	Position	Applicant's Actions or Behavior						
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47085-H, BUS 46 LOCKOUT</b> <b>47086-H, BUS 46 VOLTAGE LOW</b>  <b>Loss of power indication on Bus 46 (WHITE light extinguished).</b> <b>Bus 46 voltage indication of ZERO volts.</b> <b>TSC DG not running.</b>						
	BOP	<b>Identify and report loss of power for Bus 46 / Bus 46 lockout.</b>						
	CREW	Address Annunciator Response for 47085-H and/or 470862-H:  Go to A-ELV-40.  Refer to Technical Requirements manual Section 3.7.1  <b>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</b>						
	CRS	Direct actions of A-ELV-40, 480V AC Supply Distribution System Abnormal.  In Immediate Actions, Automatic notes Bus 46 Overcurrent lockout: <ul style="list-style-type: none"> <li>• Source breaker to Bus 46 (brkr 14601) trips and locks out</li> <li>• Voltage Restoring and TSC Diesel supply breaker locks out</li> </ul>						

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Op-Test No.: 1 Scenario No.: 4 Event No.: 2

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Event Description: Bus 46 Lockout.

Bus 46 has an overcurrent lockout condition occur. This will remove power to the bus and prevent automatic operation of the TSC Diesel Generator, which is the emergency power supply to Bus 46. This affects the ability to respond to a loss of all AC power event/ Station Black Out (SBO). Operability of Bus 46 and the TSC DG are addressed in the KPS Technical Requirements Manual.

Time	Position	Applicant's Actions or Behavior
	CREW	Direct the NOA to locally open all feeder breakers supplied from affected bus.  <b>NOTE: CUE: After ONE minute, the NAO reports breakers on Bus 46 open. (14602, 14603, 14605, 14606, and 14607 (normally open)).</b>
	BOP	Position TSC Diesel Generator Control Switch to PULLOUT and verify green light out.
	CRS	Check Technical Requirements manual for administrative actions with TSC Out of Service [TRM 3.7.1]:  3.7.1.b If TSC/SBO DG is made not to be OPERABLE, the following actions shall be initiated immediately: <ol style="list-style-type: none"> <li>1. A PRA evaluation will be performed to determine the TSC/SBO DG allowed configuration time, and to verify a core damage probability of less than <math>10^{-6}</math>.</li> <li>2. Emergency Preparedness (EP) will be notified, and a 10CFR50.54(q) evaluation will be performed by EP to determine and document the affect on EP program.</li> <li>3. Appropriate compensatory/mitigating measures are to be initiated, as determined by the 10CFR50.54(q) evaluation. These measures are to remain in-place while TSC/SBO DG is not OPERABLE.</li> </ol> Direct Shift Manager to contact or contact departments above for appropriate response to TSC/SBO DG inoperable ( PRA Engineering Group and Emergency Preparedness)
	CRS	Ensure Maintenance (Work Control/Work Week Coordinator) is notified of status of Bus 46.

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Op-Test No.: 1 Scenario No.: 4 Event No.: 2

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Event Description: Bus 46 Lockout.

Bus 46 has an overcurrent lockout condition occur. This will remove power to the bus and prevent automatic operation of the TSC Diesel Generator, which is the emergency power supply to Bus 46. This affects the ability to respond to a loss of all AC power event/ Station Black Out (SBO). Operability of Bus 46 and the TSC DG are addressed in the KPS Technical Requirements Manual.

Time	Position	Applicant's Actions or Behavior
	CRS	Declare TSC DG inoperable.

**NOTE: At Chief Examiner direction, Event 3 may be initiated.**

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Op-Test No.: 1 Scenario No.: 4 Event No.: 3 Page of 1

Event Description: Feedwater Pump B bearing failure.

FW pump B experiences a slow bearing failure resulting in rising vibrations. Approximately 18 minutes from the first vibration alarm, the pump will trip.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<b>Annunciator Alarms:</b> <b>47064-F, FEEDWATER PUMP B VIBRATION</b> <b>TLA-20, 4160V STATOR TEMPERATURE HOT</b>  <b>PPCS Alarms:</b> <b>T2838A, FW P B MTR BRG METAL T H-1</b> <b>T2829A, FW B MTR STATOR TEMP</b>  <b>Fluctuating amps reading on 4105402 FW Pump B Mtr Current.</b>  <b>Trip of FW Pump B breaker</b>
	BOP	<b>Identify and report vibration alarm for FW Pump B.</b>  <b>Report fluctuating amps for FW Pump B.</b>
	CREW	Address Annunciator Response. <ul style="list-style-type: none"> <li>Go to A-FW-05A.</li> </ul> <p>(NOTE: Addressing the Annunciator Response is normally done by the “off” operator, but may be performed by the “involved” operator if conditions dictate.)</p>
	CRS	Direct actions of A-FW-05A, Abnormal Feedwater System Operation. <ul style="list-style-type: none"> <li>Cover automatic actions, including feedwater pump trips and consequences.</li> <li>Above ~ 67% power a trip of FW Pump will cause a VPL runback to ~ 56% load.</li> <li>Both FW Pump tripping results in a turbine trip.</li> </ul> <p>Cover operator actions, if turbine trips and PR Perm P-10 (44905-0201) is ON, go to E-0.</p>

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>4</u>	Event No.:	<u>3</u>	Page	of	<u>1</u>
Event Description:      Feedwater Pump B bearing failure.  FW pump B experiences a slow bearing failure resulting in rising vibrations. Approximately 18 minutes from the first vibration alarm, the pump will trip.								
Time	Position	Applicant's Actions or Behavior						
	CRS (cont.)	Direct plant reduction to less than 56% before stopping FW Pump B. (step 4.1)						
	CREW	Dispatch Operator to monitor Feedwater Pump B.						
	BOP	Verify indications normal for existing conditions: <ul style="list-style-type: none"> <li>• Lube oil temperatures</li> <li>• Bearing temperatures</li> <li>• Suction pressure</li> <li>• Discharge flow</li> <li>• Suction temperature</li> <li>• Discharge temperature</li> </ul> <b>NOTE:</b> The easiest way to monitor most of these is to call up the Graphic Display for FW Pumps on PPCS. Suction pressure and temperature and discharge temperature and flows may also be obtained from meters on the control board.  <b>Report bearing temperature rising.</b>  Verify FW-101A/B, Feedwater Pump A/B Recirculation CV, closed on vertical panel (green lights lit).						
	CREW	Direct the NAO to locally monitor FW Pump vibrations at MFP cabinet. <ul style="list-style-type: none"> <li>• Have operator check Monitors 1-8 against setpoints provided from Annunciator Response Alert Setpoints.</li> <li>• Have operator check Monitor #10 (1B Thrust) against 15 mils (ALERT) and 20 mils (DANGER).</li> </ul>						

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>4</u>	Event No.:	<u>3</u>	Page	of	<u>1</u>
Event Description:      Feedwater Pump B bearing failure.  FW pump B experiences a slow bearing failure resulting in rising vibrations. Approximately 18 minutes from the first vibration alarm, the pump will trip.								
Time	Position	Applicant's Actions or Behavior						
	CREW (cont.)	Ensure Maintenance (Work Control/Work Week Coordinator) is contacted to perform GMP-131 for FW Pump B.						
	CRS	Direct reduction in plant load until alarm clears.  Direct actions of A-O-03, Rapid Power Reduction.						
	CREW	Perform plant announcement, Attention all personnel, commencing rapid power reduction.  Inform GENCO of expected MWE reduction to approximately 298 MWe (50% power) over the next 15–30 minutes.						
	RO	Place Przr Heater Groups A, B, D, and E control switches to ON.						
	BOP	Come off VPL: 1. Verify CV tracking meter is nulled. 2. Depress Turbine Modes TURBINE MANUAL pushbutton and verify Reference and Setter values equal. 3. Depress OPER AUTO. 4. Set SETTER to desired turbine load. (~ 50%) 5. Set load rate to desired value (1% to 3%, as directed) 6. Depress GO pushbutton  <b>Report turbine load lowering.</b>						
	RO	Control Tavg/Tref deviation:  1. Verify control rods move in as necessary to restore Tavg within 1.5°F.						

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Op-Test No.: <u>  1  </u> Scenario No.: <u>  4  </u> Event No.: <u>  3  </u>		Page of <u>  1  </u>
Event Description:      Feedwater Pump B bearing failure.  FW pump B experiences a slow bearing failure resulting in rising vibrations. Approximately 18 minutes from the first vibration alarm, the pump will trip.		
Time	Position	Applicant's Actions or Behavior
	CREW	2. Check Load Loss 10 PCT Rate (44905-0801) lit If lit, verify steam dumps modulate as necessary to restore Tavg within 2°F of Tref.  4. Check Tavg greater than 540°F.
	RO	Monitor ΔI and Rod Insertion: 1. Determine ΔI limits from COLR Figure 7 2. Verify ΔI limits satisfied AND Control rods above RIL (Annunciator 47042-R) If NOT, borate RCS in less than or equal to 20 gpm increments as necessary to restore ΔI and RIL requirements.  Verify Przr pressure control and Przr level control operating correctly in AUTO.
	BOP	Verify SG Water Level Control operating correctly in AUTO.  Adjust Heater Drain Pump B speed as necessary to balance with Heater Drain Pump operating in AUTO.  Maintain generator Reactive Load within limits of ATTACHMENT B, and adjust Generator #1 Voltage Adjust switch as necessary.

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Op-Test No.:	<u>1</u>	Scenario No.:	<u>4</u>	Event No.:	<u>3</u>	Page	of	<u>1</u>
Event Description:      Feedwater Pump B bearing failure.  FW pump B experiences a slow bearing failure resulting in rising vibrations. Approximately 18 minutes from the first vibration alarm, the pump will trip.								
Time	Position	Applicant's Actions or Behavior						
<p><b>NOTE: If the FW Pump trips with load above 67%, a VPL runback of the turbine will occur to approximately 56% load.</b></p> <p><b>If the FW pump trips above 80% power, the next event, FW Pump A trip will be immediately entered. This is done because recovery from the loss of the FFW Pump is unlikely and in order to maintain conditions for a RED path in Heat Sink. Above 80%, the trip of the FW Pump, along with actions to lower load, will result in a swing of SG levels that will result in reactor trip on high SG levels (turbine trip) or low Przr pressure. With SG levels that high, a Red Path condition will not occur.</b></p>								
	BOP	<p>If FW Pump trips above 67% load (350 psig on turbine 1<sup>st</sup> stage pressure PI-485), then verify VPL runback reduces load to approximately 56%.</p> <p>Check if FW Pumps should be stopped: Check turbine load less than 56% (375 MWe).</p> <p><b>Report when turbine load is below 375 MWe.</b></p> <p>Check both FW Pumps running.</p> <p>Stop FW Pump B per N-FW-05A:</p> <ul style="list-style-type: none"> <li>• Verify turbine power is less than 56%.</li> <li>• Position FW-2B, Feedwater Pump B and Discharge Valve C/S, to STOP/PULLOUT.</li> <li>• Verify FW-101B Feedwater Pump B Recirculation CV closed.</li> <li>• Direct NAO to locally verify FW-2B closed; FW-1B actuator is FULLY RETRACTED; FW Pump B Aux Lube Oil Pump is ON; FW Pmp B Oil Pmp Disch PI-11224 is 21-33 psig; FW Pmp B Brg Oil Inlet PI-11098 is 8-17 psig; and, FW Pump B coasts to a stop.</li> </ul>						

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Op-Test No.: 1 Scenario No.: 4 Event No.: 3

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Event Description: Feedwater Pump B bearing failure.

FW pump B experiences a slow bearing failure resulting in rising vibrations. Approximately 18 minutes from the first vibration alarm, the pump will trip.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	<ul style="list-style-type: none"><li>• Direct NAO to throttle SW-2102B, Oil Cooler B Outlet, to maintain lube oil outlet temperature 100-104°F.</li></ul> <p><b>NOTE: Booth</b> Communicator as NAO will report completion of verification and actions to maintain lube oil temperature.</p>
	CREW	Check turbine load is less than or equal to desired final value.

**NOTE: If conditions are stabilized at ~56% power following the trip of FW Pump B or the shut down of FW Pump B, then the next event, trip of the second FW Pump will result in the plant trip (turbine trip – reactor trip).**

**At Chief Examiner direction, Event 4 may be initiated.**

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Op-Test No.: 1 Scenario No.: 4 Event No.: 4, 5 & 6 Page of 1

Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	<b>CUES:</b>	<p><b><u>TRIP OF FW PUMP A</u></b>  <b>Annunciator Alarms:</b>  <b>47061-A, FEEDWATER PUMP A TRIP</b>  <b>47022-A, TURBINE TRIP REACTOR TRIP</b>  <b>47051-S, TURBINE TRIP</b>  <b>47051-T, AUTO STOP OIL STOP VALVES ABNORMAL</b></p> <p><b>Green and White light lit for FW Pump A</b>  <b>Feedwater flow indication dropping to ZERO</b></p> <p><b><u>PR-2A OPEN</u></b>  <b>Annunciator Alarms:</b>  <b>47042-A, PRESSURIZER PORV OPEN</b>  <b>47042-B, PRESSURIZER PORV DISCHARGE TEMP HIGH</b>  <b>47043-C, PRESSURIZER CONTROL PRESS ABNORMAL</b>  <b>47043-B, PRESSURIZER RELIEF TANK ABNORMAL</b></p> <p><b>Red light lit for PR-2A when Przr pressure is below 2300 psig.</b>  <b>RCS pressure lowering.</b></p>

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Op-Test No.: 1 Scenario No.: 4 Event No.: 4, 5 & 6

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	<b>CUES: (cont.)</b>	<p><b><u>TD AFW Steam Line Break</u></b>  <b>Annunciator Alarms:</b>  <b>47052-F, STM EXCLUSION AREA TEMP HIGH</b></p> <p><b>Rising Steam Exclusion Area temperature on TI-41584, TI-41585 and TI-41586 – Zone SV TD AFW Pump Room Temp Channels 1, 2 &amp; 3.</b></p> <p><b><u>Trip of AFW Pump B</u></b>  <b>Annunciator Alarms:</b>  <b>47092-L, BUS 6 FEEDER BKR TRIP</b>  <b>47093-L, BUS 6 FEEDER BKR OVERLOAD</b></p> <p><b>Green and white light lit for AFW Pump B.</b>  <b>AFW header flow indication ZERO.</b></p>
	<b>CREW</b>	<b>Report reactor trip (turbine trip).</b>

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Op-Test No.: 1 Scenario No.: 4 Event No.: 4, 5 & 6

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	RO	[E-0, step 1] Verify reactor trip: <ul style="list-style-type: none"> <li>Reactor Trip and Bypass Breakers OPEN [Green lights lit for RTBs A &amp; B]</li> <li>All Rod Position indicator ≤ 7.5 steps</li> <li>All Rod Bottom (red) lights lit</li> <li>Neutron flux decreasing [4122601-4122604 or Power Range NIS Panel A drawers]</li> </ul>
	BOP	[E-0 steps 2 & 3] Verify turbine trip: <ul style="list-style-type: none"> <li>HP Impulse pressure trending to ZERO (PI-485 &amp; PI-486).</li> <li>Turbine Stop Valve green CLOSE indications lit.</li> </ul> Verify power to either Bus 5 or Bus 6 (White voltage lights lit).
	CREW	[E-0 step 4] Check if SI is actuated: Annunciator 47021-A and 47021-B – SI Train A(B) ACTUATED – either lit.  If not, Check if SI is required: <ul style="list-style-type: none"> <li>Przr pressure &lt; 1815 psig</li> </ul>

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Op-Test No.: 1 Scenario No.: 4 Event No.: 4, 5 & 6

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
		<ul style="list-style-type: none"> <li>• Przr level &lt; 5%</li> <li>• RCS subcooling &lt;30°F</li> <li>• SG pressure &lt; 500 psig</li> <li>• CNTMT pressure &gt; 4 psig.</li> </ul> <p>If SI is not required announce reactor trip.</p>
<p><b>SI will be actuated if the open PRZR PORV has not been closed by the time for verification of Immediate Actions is complete. The actions of E-0 for SI actuation are covered below. The actions in the event SI is NOT actuated (ES-0.1) are covered below following the transition from E-0.</b></p> <p><b>NOTE: It is expected that the open PORV will be closed as soon as it is noted OPEN. Critical Action is not required until the step in the first IPEOP where PORVs are addressed (E-0 step 20)</b></p>		
	RO	<p><b>Report Przr pressure lowering.</b></p> <p><b>Report Przr PORV PR-2A open.</b></p>

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Op-Test No.: 1 Scenario No.: 4 Event No.: 4, 5 & 6

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)  <b>CRITICAL TASK</b>	Place PR-2A control switch to CLOSE.  <b>Report failure of PR-2A to close.</b>  <b>CLOSE PR-1A.</b>
	CRS	Direct actions of E-0  Verify immediate actions.  If SI has not occurred or is not required, inform crew of transition to ES-0.1
	CREW	<b>(If PORV has not been closed)</b> Check conditions for RXCP Trip Criteria (on E-0 QRF): If both conditions occur , then trip RXCPs: 1. SI flow indicated on F925 AND 2. RCS subcooling is less than 15°F.

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Op-Test No.: 1 Scenario No.: 4 Event No.: 4, 5 & 6Page of 1

Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	RO	If SI has NOT actuated but conditions require Safety Injection, when directed, actuate SI by pressing both SI Train A and Train B INITIATE pushbuttons.
	CREW	Check both trains of SI actuated: Annunciator 47021-A and 47021-B – SI Train A(B) ACTUATED lit.
	BOP	Verify FW Isolation <ul style="list-style-type: none"> <li>FW-7A/B, SG A &amp; B Main Feed Control Valves, closed</li> <li>FW-10A/B, SG A &amp; B Bypass Flow Control valves, closed.</li> <li>FW 12 A/B, Feedwater to SG A &amp; B Isolation, closed.</li> </ul>
	CREW	Make plant announcement that Safety Injection has occurred.
	CREW	Dispatch EO/AO to Locally monitor AFW Pump operation: <ul style="list-style-type: none"> <li>AFW Pump B and TD AFW Pump running.</li> </ul>
	BOP	Check if steamline isolation is required: <ul style="list-style-type: none"> <li>High Steam Flow (&gt;4.4.35E6).</li> <li>High steam flow (&gt;0.75E6) and low RCS Tavg (&lt;540°F) for SG A.</li> <li>Containment pressure &gt; 17 psig.</li> </ul>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	CREW	Verify Containment Spray not required: Check containment pressure (Cntmt Wide Range Pressure recorders 42597 & 42598) have remained below 23 psig.
	BOP	Verify Containment Fan Coil Units running.  Verify SW-903 A, B, C & D CNTMT Fan Coil Unit SW Return valves open.  If containment pressure exceeds 4 psig, verify CFCU Emergency Dampers Open (RBV-150A, B, C & D).  Verify Aux Bldg Special Ventilation running: <ul style="list-style-type: none"> <li>• Annunciator 47052-G NOT lit.</li> <li>• Zone SV Fans A and B running.</li> </ul> Verify Service Water alignment: <ul style="list-style-type: none"> <li>• Verify all SW Pumps running</li> <li>• Verify SW header selected on Turbine Bldg SW switch &gt; 82.5 psig [Train A hdr-PI-41503]</li> </ul>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
<b>It is expected that the failure associated with the Turbine Driven AFW Pump will have initiated by this time, the expected actions are covered below. The next four steps are expected to be performed whenever the event occurs.</b>		
	CREW	<b>Report high temperatures in TD AFW Pump Area</b> (Steam Exclusion Zone).  <b>NOTE:</b> About 30 seconds after alarm has actuated for high temperature, the <b>BOOTH COMMUNICATOR</b> , as the NAO, will report large amount of steam in Safeguards Alley area venting into Turbine Bldg through blowout panel.
	CRS	Direct isolation of steam to TD AFW Pump.
	BOP	Close MS-100A, SG A Steam Supply to T/D AFW Pump.  Close MS-100B, SG B Steam Supply to T/D AFW Pump.
	CREW	<b>Report trip of AFW Pump B.</b>  Direct NAO to check Bus 6 feeder breaker to AFW Pump B.

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
<b>NOTE: The actions of E-0 resume below. This step is the first transition step from E-0 to FR-H.1. If the AFW pumps have not been stopped or tripped at this point, then remaining actions of E-0, as listed, will be performed until transition is made from E-0. The crew should then respond to the Heat Sink CSF Status Tree RED Path.</b>		
	BOP	Verify AFW Pumps running: 1. Check AFW Pump A running  <b>Report AFW Pump A OOS</b>  <ul style="list-style-type: none"> <li>Close AFW-2A, AFWP A Flow Control.</li> </ul> 2. Check AFW Pump B running  3. Check TD AFW Pump running (red light lit for MS-102, T/D AFW Pump Main Steam Isol, and discharge pressure on 41040)
	BOP	<b>Throttle AFW Pump Disch valves (AFW-2B):</b> 1. Maintain running AFW Pump Disch Pressure > 1000 psig  2. Maintain either 1) Total AFW flow > 205 gpm OR 2) SG narrow range level in at least one SG > 4% [15% ADVERSE].

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	If AFW Pumps have stopped, <b>Report conditions NOT met.</b>
	CRS	If AFW flow cannot be established greater than 205 gpm, Inform crew of transition to FR-H.1, Response to Loss of Secondary Heat Sink, Step 1.
<b>NOTE: The steps below continue the actions of E-0 until the next transition point is met. This path will occur only if the loss of all AFW has not occurred by the time the crew reaches this step.</b>		
	RO	Verify CI Active Status Panel Lights lit.  Verify ESF Equipment running: <ol style="list-style-type: none"> <li>1. SI Pumps</li> <li>2. RHR Pumps</li> <li>3. CC Pumps Check</li> <li>4. SI Active Panel lights lit [AFW Pump A not lit.]</li> </ol>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	RO (cont.)	<p>Verify SI flow on F925.</p> <p>Check RCS pressure greater than 150 psig.</p> <p>Check RXCP cooling:</p> <ul style="list-style-type: none"> <li>• CC valves to RXCPs open – CC-600, CC-601A/B, CC-610A/B &amp; CC-612A/B.</li> <li>• RXCP Thermal Barrier temperatures normal, T614 &amp; T610. [Normal is 60°F to 95°F.]</li> <li>• RXCP bearing temperatures normal, T132 &amp; T125. [Normal is Ambient to 150°F.]</li> </ul>
	CREW	Check RCS average temperature stable at or trending to 547°F:
	BOP	<p>If Tave is not stable or trending to 547°F:</p> <ul style="list-style-type: none"> <li>• Transfer Steam Dumps to Pressure Control Mode.</li> <li>• If at least one MD AFW Pump is running, place TD AFW Pump in PULLOUT</li> <li>• Control feed flow. Maintain total feed &gt; 205 gpm until narrow range in at least one SG &gt; 4% [15% ADVERSE]</li> <li>• If cooldown continues, close MS-1A &amp; B.</li> </ul>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Check if SGs are faulted:</p> <ul style="list-style-type: none"> <li>Any SG pressure decreasing in uncontrolled manner.</li> <li>OR</li> <li>Any SG completely depressurized.</li> </ul> <p>Report NO SGs depressurizing uncontrolled or depressurized.</p>
	CREW	<p>Check SG Tubes not ruptured:</p> <ul style="list-style-type: none"> <li>R-15 Air Ejector Exhaust monitor panel &amp; recorder 45716 normal</li> <li>R-19 SG Blowdown liquid monitor panel &amp; recorder 45716 normal</li> <li>R-31&amp; R-33, Steamline monitors, on SPDS normal</li> </ul>

**NOTE: If the open PORV was closed early after SI was actuated, conditions at this time may indicate an intact RCS. If so transition from E-0 to E-1 may not occur. The transition is then likely to occur at the next step for SI termination with transition being made to ES-1.1**

**Also it is expected that the loss of AFW flow will have occurred by this point, then at transition from E-0, OR at the next step of E-0 (Initiate monitoring of CSF Status Trees) the crew should transition to FR-H.1.**

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	RO	Check if RCS is Intact <ul style="list-style-type: none"> <li>• Containment pressure normal.</li> <li>• Containment Sump A level normal.</li> <li>• Wide Range Containment Level normal.</li> <li>• Containment Radiation monitors, R-2, R-7, R-40 (RE-29064) &amp; R-41 (RE-29065) normal</li> </ul> If PRT rupture disc ruptured, <b>Report conditions for radiation in containment.</b>
	CRS	If RCS is report NOT intact, <b>Inform crew of transition to E-1, Loss of Reactor Or Secondary Coolant.</b>  Direct monitoring of Critical Safety Function Status Trees.
	CREW	Identify RED path for Heat Sink CSF Status Tree.
	CRS	Inform crew of transition to FR-H.1, Response to Loss of Secondary Heat Sink, Step 1.

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
<b>NOTE: Actions below address the condition if the RCS is found to be intact (PORV closed), and continued steps of E-0.</b>		
	CREW	If RCS is determined to be intact, check if SI should be terminated: <ol style="list-style-type: none"> <li>1. RCS subcooling greater than 30°F</li> <li>2. RCS pressure greater than 2200 psig and stable or rising</li> <li>3. Pressurizer level greater than 5%.</li> <li>4. Secondary heat sink:             <ul style="list-style-type: none"> <li>• Total feed flow to SGs greater than 205 gpm.</li> </ul> </li> </ol> OR <ul style="list-style-type: none"> <li>• Narrow range level in at least one SG greater than 4%.</li> </ul>
	CRS	If all above conditions met, <b>Inform crew of transition to ES-1.1, SI Termination.</b>  If any of the conditions are NOT met, <b>Direct crew to initiate monitoring of CSF Status Trees.</b>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
<b>NOTE: Performance of either step would result in identification of the RED path for Heat Sink CSF Status Tree.</b>		
	CREW	Identify RED path for Heat Sink CSF Status Tree.
	CRS	Inform crew of transition to FR-H.1, Response to Loss of Secondary Heat Sink, Step 1.
<b>NOTE: The steps of FR-H.1 are covered below.</b>		
	CRS	Direct actions of FR-H.1
	CREW	<p>Check if Secondary heat sink is required:</p> <ul style="list-style-type: none"> <li>RCS pressure is greater than any SG pressure.</li> <li>Hottest RCS Wide range temperature greater than 400°F.</li> </ul> <p><b>Report current RCS pressure and SG pressures.</b></p> <p><b>Report RCS Hot Leg temperature. [Recorder 42501]</b></p>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Establish AFW flow to at least one SG:</p> <ol style="list-style-type: none"> <li>BT-2A/B and BT-3A/B, SG Blowdown Isolation valves, closed. BT-31A/B and BT-32A/B, SG Sample Isol valves, closed.</li> <li>Check for cause of AFW failure               <ul style="list-style-type: none"> <li>AFW Pump A out for maintenance.</li> <li>AFW Pump B overcurrent trip.</li> <li>TD AFW Pump steamline break.</li> <li>AFW Valve alignment correct</li> <li>CST level greater than 20%</li> </ul> </li> <li>Check total flow to SGs greater than 205 gpm</li> </ol> <p><b>Report flow to SGs is ZERO.</b></p>
	RO	If not stopped previously, stop both RXCPs.
	BOP	<ol style="list-style-type: none"> <li>Check Condensate System in service with at least one Condensate Pump running.</li> <li>Check FW-12A and FW-12B, SG A &amp; B Feedwater Isolation valves open.</li> </ol>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	If SI has occurred, <b>Report FW-12 A &amp; B closed.</b>
	RO	If SI actuated: Reset SI by pressing SI Train A and Train B RESET pushbuttons. <ul style="list-style-type: none"> <li>• Verify annunciators 47021-A and 47021-B clear.</li> </ul>
	BOP	Reset FW Isolation by depressing both Main Feedwater Isolation Train A and Train B RESET pushbuttons.  Take control switch FW-12A and FW-12B, Feedwater to SG A/B Isolation to OPEN, and verify valve(s) open.  Check at least one Condensate Pump has remained running .  Report Condensate Pumps A & B running.  <b>Report no Feedwater Pump available.</b>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	RO	<p>Depressurize the RCS to less than 1950 psig:</p> <ul style="list-style-type: none"> <li>• Check letdown in service</li> </ul> <p><b>Report letdown is NOT in service.</b></p> <p>If directed place letdown in service per N-CVC-35B.</p> <p><b>Report charging pumps are stopped.</b> [due to SI]</p> <p>If directed, Open Przr PORV PR-2B.</p> <p>Block SI signal when RCS pressure is less than 1950 psig by taking both Safety Injection Train A/B Block/Unblock switches to the BLK position</p> <p>Verify Permissive Status Light (05-1102) PRESSURIZER SI BLOCKED lit.</p>
	BOP	<p>Depressurize at least one SG to less than 340 psig using steam dumps or SG PORV(s).</p> <p>If steam Dumps used and when RCS temperature lowers below 540°F, Take both Main Steam Train A/B Interlock Selectors to BYPASS INTLK.</p>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	<p>Verify both Start Up Steam Dump valves open.</p> <p>Establish feed flow from Condensate System:</p> <ol style="list-style-type: none"> <li>1. Verify Condensate Pump on.</li> <li>2. Verify FW Pump seal water operable</li> <li>3. Verify FW Pump Oil Pump running</li> </ol> <p><b>NOTE:</b></p> <ol style="list-style-type: none"> <li>4. If not done previously, Reset FW Isolation by depressing both Main Feedwater Isolation Train A and Train B RESET pushbuttons.</li> <li>5. Direct NAO to locally open FW-2A or FW-2B, FW Discharge Valve.</li> </ol> <p><b>NOTE:</b> The <b>BOOTH OPERATOR</b> will insert Remote Function FW171 or FW172 to open the respective FW-2A or FW-2B. The <b>BOOTH COMMUNICATOR</b> will report valve open as NAO.</p> <ol style="list-style-type: none"> <li>6. If not done previously, Open FW-12 A or FW-12B, SG A/B Feedwater Isolation.</li> </ol>

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Event Description: Feedwater Pump A trip.  
 PORV PR-2A fails open.  
 Loss of all auxiliary feedwater.

Feedwater Pump A will trip on overcurrent, resulting in a turbine trip-reactor trip. Following the trip one Przr PORV will fail open dumping reactor coolant (steam) to the PRT. Lowering RCS pressure will result in Safety Injection actuation if the PORV Block Valve is not shut quickly. Five minutes after the trip the steam supply piping to the TD AFW will rupture in the Safeguards Alley area, requiring the steam supply to the TD AFW Pump to be isolated. Subsequent to the isolation of steam (2½ minutes), AFW Pump B will trip on overcurrent resulting in a loss of all feed to the SGs, and RED Path in Heat Sink. Transition will occur to FR-H.1, and actions taken will attempt to restore feed capability to the SGs using the Condensate System.

Time	Position	Applicant's Actions or Behavior
	BOP (cont.)	7. Slowly open FW-10A or FW-10B, Main Feedwater Bypass Flow Control, to flow to at least one SG.
	CREW  <b>CRITICAL TASK</b>	Check for indications of feed flow established to the SG(s): <ul style="list-style-type: none"> <li>• Core exit TC lowering and/or</li> <li>• SG Wide Range level rising</li> </ul> <b>Report feed flow established to SG(s).</b>

**When actions have been completed to establish Condensate flow to at least one SG, the Chief Examiner will terminate the scenario. ["Training has the shift."]**

Comments: \_\_\_\_\_  
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