

**Form 3.3-1 Scenario Outline**

Facility:	DC COOK 1 & 2	Scenario #:	NRC2022-1
Scenario Source:	New	Op. Test #:	Cook 2022
Examiners:	_____	Applicants/ Operators:	_____
Initial Conditions:	99% Power		
Turnover:	The plant is at 99% power and the crew is directed to maintain power at 99% and swap Stator Cooling Water Pumps for maintenance when clearance is ready.		
Critical Tasks**:	<ol style="list-style-type: none"> <li>1. Manually start at least one RHR pump</li> <li>2. Establish Cold Leg Recirculation</li> </ol>		
Event No.	Malf. No.	Event Type*	Event Description**
1	U2_QLC451	I-RO TS	QLC-451, VCT Level Transmitter, fails Low
2	U2_FFC210	I-BOP MC-BOP TS	FFC-210, Feed Water Flow Instrument, SG #21 Channel 1, fails High
3		N-BOP	Swap Stator Cooling Water Pumps
4	U2_TP03	C-BOP R-RO MC-RO	Stator Water Cooling leak Perform 2%/min Rapid Power Reduction Control VCT level in manual
5	U2_NPP151 U2_RP16A	I-RO	Pressurizer pressure controlling channel fails high with mechanical failure of one spray valve open (EOP entry)
6	U2_RCO1A	M-CREW	LBLOCA following Rx trip
	U2_101TD6 U2_101TA4	C-CREW	RHR Pumps Auto Start failure  Transfer to Cold Leg Recirculation
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			
** Details on subsequent pages			

## Critical Task Details:

### CT1: Manually start at least one RHR Pump

- **Initiating Cue:** Both of the following:
  - Indication that RHR pumped injection is required (SI actuated status light lit and RCS pressure indicating below shutoff head of the RHR pumps)
  - Indication that no RHR pump flow is injecting into the core (Pump breaker indicating lights and RHR flow indication)
- **Performance Feedback:** Indication that at least one RHR pump is injecting (Breaker indicating lights and RHR flow indication).
- **Success Path:** Both RHR pumps are available for manual start. Pumps may be started as a backup action for a failed automatic action or as directed in E-0 Attachment A.
- **Measurable Performance Standard:** Manually start at least one RHR pump before transition out of E-0 and completion of E-0 Attachment A.
- **Safety Significance:** Failure to manually start at least one RHR pump under the postulated conditions constitutes improper operation or incorrect crew performance in which the crew does not prevent “degraded emergency core cooling system (ECCS) ...capacity.” Additionally, under the postulated plant conditions, failure to manually start an RHR pump (when it is possible to do so) is a “violation of the facility license condition.” The acceptable results obtained in the FSAR analysis of a large-break LOCA are predicated on the assumption of minimum ECCS pumped injection. The analysis assumes that a minimum pumped ECCS flow rate, which varies with RCS pressure, is injected into the core. The flow rate values assumed for minimum pumped injection are based on operation of one each of the following ECCS pumps: high-head pump (CCP), intermediate-head pump (SI Pump), and low-head pump (RHR Pump). Operation of this minimum required complement of ECCS injection pumps is consistent with the FSAR assumption that only minimum safeguards are actuated. If the assumed single active failure was one RHR pump, starting an RHR pump would be required to establish minimum assumed ECCS flow. Failure to perform the critical task means that the plant is needlessly left in an unanalyzed condition. Performance of the critical task would return the plant to a condition for which analysis shows acceptable results. Because compliance with the assumptions of the FSAR is part of the facility license condition, failure to perform the critical task (under the postulated plant conditions) constitutes a violation of the license condition.

## CT2: Transfer to cold leg recirculation

- **Initiating Cue:** All of the following:
  - Indication/annunciation that SI is actuated (SI actuated status light lit)
  - Indication that RWST level is at or below 20% (Control Board level indication)
  - Indication that containment sump level is at or above the minimum level required for transfer to cold leg recirculation (Containment Water Level Minimum Recirculation Level status lights lit)
- **Performance Feedback:** Flow indication of the recirculation of containment sump water through the RHR heat exchangers and into the RCS
- **Success Path:** Both trains of RHR and CTS pumps are available for transfer to recirculation as directed by ES-1.3. No additional malfunctions are included that would impact on the ability to accomplish the transfer within the stated time limits.
- **Measurable Performance Standard:** Transfer at least one train of ECCS to cold leg recirculation prior to indications of cavitation/loss of flow from SI, CTS, or Charging Pumps AND without interruption of at least one train of RHR and CTS flow for more than 5 minutes AND while maintaining one available CCP and SI pump in service at all times
- **Safety Significance:** Improper performance by the operator will result in a significant degradation in the mitigating capability of the plant. Failure to complete actions within the specified time of Operator Time Critical Action E01 represents a challenge to plant safety. The procedural limit requirement for stopping RHR/CTS pumps with suction aligned to the RWST is 11%. Stopping the pumps when this level is reached does not necessarily result in failure of the critical task, as the pumps would still be available to restart once the suction source has been aligned to the containment sump. At RWST level of ~9.1%, the RHR pumps will automatically trip to protect the pump from low suction flow. In order to successfully transfer to recirculation without interrupting ECCS flow to the core, at least one SI and Charging Pump must remain in operation. Loss of RWST level would eventually result in cavitation of these pumps and resultant loss of flow. If CTS pumps cavitate, they might be unavailable for recirculation operation. The requirement to re-start the RHR and CTS pumps within 5 minutes of stopping the last pump to transfer to recirculation mode is contained in plant procedure 12-EHP-4075-TCA-001. From that procedure, "This procedure provides a reference document for Time Critical Actions. These are actions, or a series of actions, that must be completed within a specified time to ensure compliance with safety analyses, or other licensing basis assumptions." The specific safety analyses related to this requirement are the Post LOCA Long Term Cooling and Subcriticality Analysis, Long Term Post LOCA Containment Analysis, LOCA Radiological Consequences analysis, and Containment Sump Level analysis. Failure to operate within the five minute time limit places the plant outside an analyzed condition, which represents a challenge to plant safety.

## Event Description Details:

Event 1: QLC-451, VCT Level Instrument will fail low, resulting in VCT makeup. The RO will take actions per 2-OHP-4022-IFR-001 to stop the auto makeup by placing the Reactor Coolant Blend Control switch in STOP and establish manual control bands for control VCT level and pressure. The Crew will transition to 2-OHP-4022-013-017, VCT Instrument Malfunction.

Event 2: Feed Flow Channel FFC-210 will fail high, resulting in lowering S/G levels in #21 SG. The BOP will take manual control of #21 FRV to stabilize levels per 2-OHP-4022-IFR-001. The crew will transition to 2-OHP-4022-013-015, Feed Water Flow Instrument Malfunction, for a Feed Flow channel failure to return level control to auto. The US should identify entry into the following Technical Specification conditions/actions: 3.3.1. Condition A Required Action A.1, 3.3.1. Condition D Required Action D.1 (Based on Table 3.3.1-1 Function 15).

Event 3: The crew will receive a phone call from Work Control that the clearance is ready for the running Stator Cooling Water Pump. The BOP will swap Stator Cooling Water Pumps per 2-OHP-4021-059-001, Generator Stator Cooling System Operation.

Event 4: After several minutes, a small leak will occur on the Stator Cooling Water system caused by the pressure transient when the Stator Water Cooling pumps were swapped, and a phone call will be received from the field reporting a crack on a Stator water system pipe that cannot be isolated. The BOP will respond to the Stator Cooling Water Tank low pressure alarm per the ARP. The SM will direct a plant shut down at 2% / minute using the Rapid Load Reduction Response procedure, 2-OHP-4022-001-006. After initiation of normal boration, the RO will be required to take manual action to control VCT level to maintain VCT level and pressure within previously established manual control bands.

Event 5: During the power reduction Pressurizer Pressure instrument NPP-151 fails upscale causing both spray valves to open. The crew should diagnose the instrument failure, perform immediate actions for 2-OHP-4022-IFR-001, Instrument Failure Response, and attempt to take manual control of pressurizer spray to stabilize the plant. One PZR spray valve will fail open and will not close when attempts are made via 2-OHP-4022-IFR-001 actions. The crew will take actions to trip the reactor and stop #22, 23 & 24 RCPs per IFR-001.

Event 6: The major event will begin once OHP-4023-E-0 immediate actions are complete and transition is made to ES-0.1. A LBLOCA will occur requiring transition back to E-0. Auto RHR pump start will fail to occur requiring manual actuation. The Crew will complete E-0, transition to 2-OHP-4023-E-1, Loss of Reactor or Secondary Coolant, and transition to 2-OHP-4023-ES-1-3, Transfer to Cold Leg Recirculation. The Crew will transfer both trains of CTS and RHR pumps to recirculation mode.

The scenario will terminate when RHR and CTS pumps are transferred to recirculation lineup, or at Lead Evaluator discretion.

**Target Quantitative Attributes per Scenario (Ref ES-3.4 Table 3.4-1)**

Quantitative Attribute	Target per scenario	Actual Number/ scenario	How Met
Events after EOP Entry	1-2	2	LBLOCA after reactor trip RHR Pump auto start failure on SI
Abnormal Events	2-4	4	VCT level instrument failure Feed Flow instrument failure Stator Cooling System Leak PZR pressure instrument failure/spray valve fails open
Major Transients	1-2	1	LBLOCA
EOPs entered requiring substantive action	1-2	2	E-0, ES-1.3
Entry into contingency EOP with substantive actions	1 per set	0	
Pre-identified CTs	2 or more	2	Manually start at least one RHR pump Establish Cold Leg Recirculation

**Form 3.3-2 Required Operator Actions**

Op. Test No.: Cook 2022 Scenario No.: NRC2022-1 Event No.: 1

Event Description:  
 QLC-451 will fail low resulting in VCT makeup. The RO will take actions per 2-OHP-4022-IFR-001 to stop the auto makeup by placing the Reactor Coolant Blend Control switch in STOP and manually control VCT level. The Crew will transition to 2-OHP-4022-013-017, VCT Instrument Malfunction.

Event Termination: When actions of 2-OHP-4022-013-017 are complete up to energizing the RWS relay, and TRM has been referenced, or at Lead Evaluator discretion, the event is complete.

Symptoms/Cues:  
 VCT Level 2-QLC-451 fails to 0%  
 Annunciator 209-49, VCT LEVEL LOW  
 Automatic VCT makeup starts

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports instrument failure/annunciator on Panel #209 indicative of a VCT Level instrument failure (Drop 49).
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response
	RO	Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory: <ol style="list-style-type: none"> <li>1. Determines a VCT Level Control issue exists</li> <li>2. Determines both VCT level channels indicate &lt;78%</li> <li>3. Determines an automatic VCT makeup is in progress</li> <li>4. Stops VCT makeup by placing the Reactor Coolant Makeup Blend Control Switch in STOP/NEUTRAL</li> </ol>
	Crew	Performs plant stability checks. (Order not important) RO <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> BOP <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>

Time	Position	Applicant's Actions or Behavior
	US	Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure: <ol style="list-style-type: none"> <li>1. Verifies RO immediate actions taken from memory</li> <li>2. Assigns manual control bands for VCT level and pressure (nominal 15-78% Level and 15-35 psig Pressure)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-013-017, VCT Instrument Malfunction</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-013-017, VCT Instrument Malfunction: <ol style="list-style-type: none"> <li>1. Determine 2-QLC-451 is failed</li> <li>2. Direct RO to operate the Boric Acid Blender in Manual as required to maintain VCT level greater than 15%</li> <li>3. Notify SM/MTI to initiate actions to energize associated RWS Relay in accordance with Attachment A.</li> <li>4. Direct Work Control to prepare Caution tags as directed in 2-OHP-4022-013-017</li> </ol>
NOTE: Action to energize the RWS relay requires access to the SSPS Engineering Work Station which is not physically modeled in the simulator and will not be performed during the scenario.		
	US	Refers to TRM 8.1.1, Boration Systems – Operating: <ul style="list-style-type: none"> <li>• Condition A Required Action A.1.               <ul style="list-style-type: none"> <li>○ Enters action statement to restore to operable status within 72 hours.</li> </ul> </li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-1 Event No.: 2

**Event Description:**

Feed Flow Channel FFC-210 will fail high, resulting in lowering S/G levels in #21 SG. The BOP will take manual control of #21 FRV to stabilize levels per 2-OHP-4022-IFR-001. The crew will transition to 2-OHP-4022-013-015, Feed Water Flow Instrument Malfunction, for a Feed Flow channel failure to return level control to auto. The US should identify entry into the following Technical Specification conditions/actions: 3.3.1. Condition A Required Action A.1, 3.3.1. Condition D Required Action D.1 (Based on Table 3.3.1-1 Function 15).

**Event Termination:** When actions of 2-OHP-4022-013-015 are complete up to bistable tripping and #21 SG FRV is in automatic or at Lead Evaluator discretion, the event is complete.

**Symptoms/Cues:**

2-FFC-210, 21 SG Channel 1 Feed Flow failed to 4E6 pph  
 2-FRV-210, 21 SG Feed Water Regulating Valve, throttles closed  
 Feed Flow indication lowers on 2-FFC-211  
 21 SG level lowers

**Annunciators:**

- 213-3, SG1 WATER LEVEL LOW DEVIATION (possible based on timing of Crew actions)
- 212-23, CG1 CONTROLLER FAILURE (After ~3 minutes)
- 212-33, CONTROL GROUP 1 TROUBLE (After ~3 minutes)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports instrument or control system failure/annunciator on Panel #213 <ul style="list-style-type: none"> <li>• Drop 3, SG1 WATER LEVEL LOW DEVIATION</li> </ul>
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response



Time	Position	Applicant's Actions or Behavior
	BOP	<p>Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory:</p> <ul style="list-style-type: none"> <li>• Determines a SG Level Control condition exists</li> <li>• Determines #21 SG NR level is not stable at or trending to 44% and places FRV-210, SG #21 MFW Reg. Valve controller in manual</li> <li>• Raises controller output to match the operable feed flow channel with steam flow.</li> <li>• Restores SG #21 level to program.</li> <li>• Determines SG PORVs all closed</li> <li>• Determines MFP Differential Pressure is controlling at appropriate differential pressure for current actual steam flow.</li> </ul>
	Crew	<p>Performs plant stability checks. (Order not important)</p> <p>RO</p> <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> <p>BOP</p> <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	<p>Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure:</p> <ol style="list-style-type: none"> <li>1. Verifies BOP immediate actions taken from memory</li> <li>2. Assigns manual control band for #21 SG level (nominal 40-48%)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-013-015, Feed Water Flow Instrument Malfunction</li> </ol>
	US	<p>Enters and direct actions of 2-OHP-4022-013-015, Feed Water Flow Instrument Malfunction</p>

Time	Position	Applicant's Actions or Behavior
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Determines 2-FFC-210 is failed</li> <li>2. Places feed water flow selector switch 2-FS-510-C in CHAN 2 position</li> <li>3. Manually adjusts #21 SG FRV to null the controller (control level at 44%)</li> <li>4. Place #21 SG FRV in automatic</li> </ol>
	US	Identify entry into Technical Specification/Technical Requirements Manual Conditions <ul style="list-style-type: none"> <li>• T.S 3.3.1 Condition A Required Action A.1</li> <li>• T.S 3.3.1 Condition D Required Action D.1 (Based on Table 3.3.1-1, Function 15).</li> <li>• TRO 8.3.6 Condition A Required Action A.1</li> </ul>
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies management and WCSRO</li> <li>b. Directs RO/BOP to generate work request</li> </ol>
	US	Notifies SM/MTI to Initiate actions to trip Bi-stables associated with FFC-210 FW Flow Failure per Attachment A-1 of 2-OHP-4022-013-015.

Op. Test No.: Cook 2022 Scenario No.: NRC2022-1 Event No.: 3

**Event Description:**

The crew will receive a phone call from Work Control that the clearance is ready for the running Stator Cooling Water Pump. The BOP will swap Stator Cooling Water Pumps per 2-OHP-4021-059-001, Generator Stator Cooling System Operation.

**Event Termination:** When actions of 2-OHP-4021-059-001 are completed, the event is complete.

**Symptoms/Cues:**

Time	Position	Applicant's Actions or Behavior
	BOP	Direct an AEO to be stationed at the Stator Cooling Water Pumps to monitor for equipment start
	BOP	Verify the Stator Cooling Water System is in normal operation
	BOP	Start the West Stator Cooling Water Pump 2-PP-113W
	BOP	Verify system flow has stabilized and stop the East Stator Cooling Water Pump
	BOP	Place the control switch for the East Stator Cooling Water Pump in AUTO
	BOP	Verify stable system flow by checking Deionizer flow on 2-CFI-630 is 0-80 GPM and Stator Cooling Water flow on 2-CFC-610 is $\geq 845$ GPM

Op. Test No.: Cook 2022 Scenario No.: NRC2022-1 Event No.: 4

**Event Description:**

After several minutes, a small leak will occur on the Stator Cooling Water system, and a phone call will be received from the field reporting a crack on a Stator water system pipe that cannot be isolated. The BOP will respond to the Stator Cooling Water Tank low pressure alarm per the ARP. The SM will direct a plant shut down at 2% / minute using the Rapid Power Reduction Response procedure, 2-OHP-4022-001-006. After initiation of normal boration, the RO will be required to take manual action to control VCT level to maintain VCT level and pressure within previously established manual control bands.

**Event Termination:** When power has been reduced sufficiently at Lead Evaluator discretion, the event is complete.

**Symptoms/Cues:**

2-GPI-263, Stator Cooling Water Tank Pressure lowers slowly  
 Annunciator 221-39, STATOR CLG WATER TANK PRESS HI OR LO after 2-3 minutes  
 Stator Cooling Water Tank makeup valve 2-CRV-630 opens and will restore level in the tank

Time	Position	Applicant's Actions or Behavior
<b>NOTE: Not all actions listed below may be performed based on the amount of load reduction required to evaluate Crew competency based on Lead Evaluator discretion.</b>		
	BOP	Recognizes and reports annunciator on Panel #221 <ul style="list-style-type: none"> <li>• Drop 39, STATOR CLG WATER TANK PRESS HI OR LO</li> </ul>

Time	Position	Applicant's Actions or Behavior
	BOP	<p>NOTE: The BOP should determine based on makeup valve operation that pressure reduction is caused by water leakage and that adding hydrogen is not required. If the BOP determines that pressure should be raised, actions listed below will be performed.</p> <p>Adjust Stator Cooling Water Tank pressure to ~20.5 psia using 2-OHP-4021-059-001, Generator Stator Cooling Water System Operation using one or both of the following options:</p> <ol style="list-style-type: none"> <li>1. Raise pressure in batches <ol style="list-style-type: none"> <li>a. Verify stator cooling water system is in service and a hydrogen atmosphere has been previously established</li> <li>b. Direct AEO to open 2-H-159, Pressure Regulator GRV-256 inlet valve and to throttle open 2-SCS-171, Generator Hydrogen &amp; Carbon Dioxide to Generator Stator Cooling Water Storage Tank Shutoff valve</li> <li>c. May also direct AEO to adjust 2-GRV-256 regulator</li> <li>d. When desired pressure is reached, direct AEO to close 2-SCS-171 and 2-H-159</li> </ol> </li> <li>2. Control pressure automatically: <ol style="list-style-type: none"> <li>a. Verify stator cooling water system is in service and a hydrogen atmosphere has been previously established</li> <li>b. Direct AEO to open 2-H-159, Pressure Regulator GRV-256 inlet valve and to open 2-SCS-171, Generator Hydrogen &amp; Carbon Dioxide to Generator Stator Cooling Water Storage Tank Shutoff valve</li> <li>c. Direct the AEO to adjust 2-GRV-256 to maintain the desired pressure.</li> </ol> </li> </ol>
	US	Enters 2-OHP-4022-001-006, Rapid Power Reduction
	US	<p>Conduct Control Room Brief for the Rapid Power Reduction utilizing Attachment C, Rapid Power Reduction Briefing Guide:</p> <ul style="list-style-type: none"> <li>• Direct power reduction at a rate of 2%/minute to a final power of 17% (or shut down)</li> <li>• Direct initial boration rate of 20 GPM</li> <li>• Direct initial turbine unloading rate of 25.1 MW/minute</li> <li>• Direct final turbine load target of 213 MW</li> <li>• Direct total amount of boric acid of ~800 to ~1000 gallons</li> <li>• Direct contingency actions</li> </ul>
	US	Direct RO to initiate boration using Attachment D, Borating the RCS using the Normal Boration flow path

Time	Position	Applicant's Actions or Behavior																																									
	RO	<p>Initiates boration using Attachment D:</p> <ul style="list-style-type: none"> <li>• Verify charging is &gt; 75 gpm on 2-QFI-200</li> <li>• CLOSE 2-QMO-225, EAST CCP Mini-Flow (CCP ELO)</li> <li>• Verify Boric Acid Blender is aligned for Automatic</li> <li>• Determine RC Makeup Blend control switch is in STOP (NOTE: Switch placed in stop due to VCT level channel failure event).</li> <li>• Place RC Makeup Blend Control Mode switch in BORATE.</li> <li>• Adjust BA Controller/Totalizer to the desired flow rate and amount.</li> <li>• Place RC Makeup Blend control switch in START.</li> <li>• Divert letdown flow by performing one of the following: <ul style="list-style-type: none"> <li>○ Manually adjust 2-RU-28, VCT Level Control to divert some or all letdown flow to the CVCS Holdup Tank (as required) to maintain VCT level and pressure.</li> <li>○ Place 2-QRV-303, VCT/Holdup Tank Inlet Selector, in the CVCS HU Tank position</li> </ul> </li> </ul> <p>2-OHP 4022-001-006 Attachment D Table (for evaluator reference):</p> <table border="1" data-bbox="581 989 1026 1497"> <thead> <tr> <th>Change in Power Level (%)</th> <th>Amount of Boric Acid Required (gals)</th> <th>Volume change expected in BAST (%)</th> </tr> </thead> <tbody> <tr><td>10</td><td>100</td><td>1.0</td></tr> <tr><td>20</td><td>200</td><td>2.0</td></tr> <tr><td>30</td><td>300</td><td>3.0</td></tr> <tr><td>40</td><td>400</td><td>4.0</td></tr> <tr><td>50</td><td>500</td><td>5.0</td></tr> <tr><td>60</td><td>600</td><td>6.0</td></tr> <tr><td>70</td><td>700</td><td>7.0</td></tr> <tr><td>80</td><td>800</td><td>8.0</td></tr> <tr><td>90</td><td>900</td><td>9.0</td></tr> <tr><td>100</td><td>1000</td><td>10.0</td></tr> </tbody> </table> <table border="1" data-bbox="1058 989 1377 1260"> <thead> <tr> <th>Desired Rate of Change in Reactor Power(%/min)</th> <th>Boration Rate (gpm)</th> </tr> </thead> <tbody> <tr><td>1</td><td>10</td></tr> <tr><td>2</td><td>20</td></tr> <tr><td>3</td><td>30</td></tr> </tbody> </table>	Change in Power Level (%)	Amount of Boric Acid Required (gals)	Volume change expected in BAST (%)	10	100	1.0	20	200	2.0	30	300	3.0	40	400	4.0	50	500	5.0	60	600	6.0	70	700	7.0	80	800	8.0	90	900	9.0	100	1000	10.0	Desired Rate of Change in Reactor Power(%/min)	Boration Rate (gpm)	1	10	2	20	3	30
Change in Power Level (%)	Amount of Boric Acid Required (gals)	Volume change expected in BAST (%)																																									
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1	10																																										
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	BOP	Check both Main Feed Pumps operating in D/P control																																									
	RO/BOP	Verify all Pressurizer Backup heaters energized																																									

Time	Position	Applicant's Actions or Behavior																																
		<p>NOTE: At a power reduction rate of 2%/minute, it is expected that AFD will remain within the acceptable region during the power reduction. The Crew should discuss prior to initiating the load decrease the US expectations for maintaining AFD in the target band during the load decrease. If AFD moves outside the target band with power &gt;90%, the US should enter T.S. 3.2.3 Condition A Required Action A.1. If AFD is not within acceptable operation limits with power between 50% and 90%, the US should enter T.S. 3.2.3 Condition C Required Action C.1.</p>																																
	US	Direct BOP to initiate power reduction using Attachment F, Adjusting Main Turbine Load																																
	BOP	<p>Performs Attachment F Adjusting Main Turbine Load</p> <ul style="list-style-type: none"> <li>• Places MW feedback IN</li> <li>• Enters TARGET Load into HMI (Selected value from Attachment C brief)</li> <li>• Enters RAMP RATE into HMI (Selected value from Attachment C brief)</li> <li>• Depresses GO to Lower Turbine load using HMI.</li> <li>• Adjust Tavg and Tref inhibit setpoints as desired, not to exceed +/- 5 °F</li> </ul> <p>Attachment F tables (for evaluator reference):</p> <table border="1" data-bbox="574 1087 912 1474"> <thead> <tr> <th>Final PWR Level (%)</th> <th>Final Turbine Load (MW)</th> </tr> </thead> <tbody> <tr><td>90</td><td>1129</td></tr> <tr><td>80</td><td>1003</td></tr> <tr><td>70</td><td>878</td></tr> <tr><td>60</td><td>752</td></tr> <tr><td>50</td><td>627</td></tr> <tr><td>40</td><td>502</td></tr> <tr><td>30</td><td>376</td></tr> <tr><td>20</td><td>251</td></tr> <tr><td>10</td><td>125</td></tr> </tbody> </table> <table border="1" data-bbox="1010 1087 1422 1352"> <thead> <tr> <th>Rate of change (%/min)</th> <th>Turbine Unloading Rate (MW/min)</th> </tr> </thead> <tbody> <tr><td>1</td><td>12.5</td></tr> <tr><td>2</td><td>25.1</td></tr> <tr><td>3</td><td>37.6</td></tr> <tr><td>4</td><td>50.2</td></tr> <tr><td>5</td><td>62.7</td></tr> </tbody> </table>	Final PWR Level (%)	Final Turbine Load (MW)	90	1129	80	1003	70	878	60	752	50	627	40	502	30	376	20	251	10	125	Rate of change (%/min)	Turbine Unloading Rate (MW/min)	1	12.5	2	25.1	3	37.6	4	50.2	5	62.7
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	RO	Check Control Rods in Automatic to maintain Tavg																																
	BOP	<p>Transfer MFPs steam supply to Main Steam:</p> <ul style="list-style-type: none"> <li>• Determine MFPs running on Reheat Steam</li> <li>• Raise Main Steam Supply Pressure to running MFPs until pressure is 15 psig above Reheat Steam Pressure</li> </ul>																																

Time	Position	Applicant's Actions or Behavior
	CREW	May place a MFP in Speed Control and ramping down the speed as necessary to maintain DP as required (Procedurally allowed but not expected).
	US	Notify Load Dispatcher of final projected power level
	BOP	Remove Moisture Separator Reheaters from service using Attachment A: <ul style="list-style-type: none"> <li>• Close MSR Bundle isolation valves</li> <li>• Close MSR steam supply valves</li> <li>• Open reheater startup drains</li> <li>• Close Reheater Coil Drain Isolations to No. 6 heaters</li> </ul>
	BOP	Initiate actions of Attachment G, Operation of Secondary Plant Equipment, as Control Room staffing allows
	RO	Monitor AFD during power reduction and report if AFD is outside the target band



Op. Test No.: Cook 2022 Scenario No.: NRC2022-1 Event No.: 5

**Event Description:**

During the power reduction Pressurizer Pressure instrument NPP-151 fails upscale causing both spray valves to open. The crew should diagnose the instrument failure, perform immediate actions for 2-OHP-4022-IFR-001, Instrument Failure Response, and attempt to take manual control of pressurizer spray to stabilize the plant. One PZR spray valve will fail open and will not close when attempts are made via 2-OHP-4022-IFR-001 actions. The crew will take actions to trip the reactor and stop #22, 23 & 24 RCPs per IFR-001.

**Event Termination:**

When the Crew transitions to 2-OHP-4023-ES-0.1, Reactor Trip Response (if SI not actuated), or completes step 4 of E-0 (if SI actuated), the event is complete.

**Symptoms/Cues:**

Controlling Pressurizer Pressure channel 2-NPP-151 fails high  
 Pressurizer heaters de-energize  
 2-NRV-163 & 2-NRV-164, Pressurizer Spray Valves, indicate full open (Red light on, Green light off)

- 2-NRV-163 will remain open regardless of operator actions

Pressurizer pressure lowers  
 CH 1 PRESSURE HIGH-HIGH status light ENERGIZED on 2-SML-14

**Annunciators:**

- 208-6, PRZ PRESS HIGH-HIGH
- 208-7, PRZ PRESS HIGH DEV

After RCPs 22, 23, & 24 are stopped, 21 SG level will lower and steam flow will rise when steam dump valves open since it is the only active loop.

NOTE: If the Crew delays response to the failed open spray valve to trip the reactor and trip 22, 23, and 24 RCPs, an automatic SI may actuate on low pressurizer pressure.

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports instrument failure/Annunciator Panel 208 alarms and identifies that both spray valves are open
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response

Time	Position	Applicant's Actions or Behavior
	RO	Reports instrument malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response from memory: <ul style="list-style-type: none"> <li>• Determines pressurizer pressure is not stable at or trending to 2235 psig</li> <li>• Places PRZ pressure master controller OR both spray valve controllers to manual and attempts to lower controller output to close spray valves.</li> <li>• Determine that one spray valve cannot be closed and inform the US that a reactor trip is required</li> </ul>
	US	Directs RO to trip the reactor and direct the RO and BOP to perform immediate actions of E-0, Reactor Trip or Safety Injection
	RO	Performs a manual reactor trip, verifies reactor trip, and then trip #22, #23, and #24 RCPs
	RO/BOP	Performs the immediate actions of E-0 from memory: <ol style="list-style-type: none"> <li>1. Checks reactor trip – Determines reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – Determines Turbine Stop Valve Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – Determines all emergency buses T21A, T21B, T21C, and T21D energized and both annunciators clear for Open Phase</li> <li>4. Checks safety injection status – Determine SI Status Lights – SI Status Lights NOT Lit (QMO-225/226 white lights NOT Lit) and SI not required based on:               <ul style="list-style-type: none"> <li>• PZR Pressure &gt; 1775#</li> <li>• CNTMNT Pressure &lt; 1.0#</li> <li>• SG Pressure &gt; 500#</li> <li>• STM Line DP &lt; 100psid</li> </ul> </li> </ol>
	US	Verify performance of immediate actions using procedure 2-OHP-4023-E-0 and direct action for AFW flow control if SI did not actuate
	BOP	Throttle AFW flow to maintain flow between 240E3 PPH and 450E3 PPH per E-0 step 4 RNO if SI did not actuate.
	US	Transition to 2-OHP-4023-ES-0.1, Reactor Trip Response, if SI did not actuate, or continues with E-0 step 5 if SI is actuated.

Op. Test No.: Cook 2022 Scenario No.: NRC2022-1 Event No.: 6

**Event Description:**

The major event will begin once OHP-4023-E-0 immediate actions are complete and transition is made to ES-0.1. A LBLOCA will occur requiring transition back to E-0. Auto RHR pump start will fail to occur requiring manual actuation. The Crew will complete E-0, transition to 2-OHP-4023-E-1, Loss of Reactor or Secondary Coolant, and transition to 2-OHP-4023-ES-1-3, Transfer to Cold Leg Recirculation.

**Event Termination:** When both RHR pumps and both CTS pumps have been transferred to recirculation mode, the event is complete.

**Symptoms/Cues:**

- RCS pressure and pressurizer level lower rapidly
- Containment pressure rises rapidly to >2.8 psig
- Automatic SI/CI Phase A actuates
- Automatic CTS/CI Phase B actuates
- Automatic Steam Line isolation actuates
- Neither RHR pump auto starts
- All other equipment operates as expected

Time	Position	Applicant's Actions or Behavior
	US	Direct transition back to 2-OHP-4023-E-0 Ensures immediate actions of 2-OHP-4023-E-0 are completed Directs subsequent actions of 2-OHP-4023-E-0.
	RO/BOP	Performs the immediate actions of E-0 from memory: <ol style="list-style-type: none"> <li>1. Checks reactor trip – Determines reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – Determines Turbine Stop Valve Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – Determines all emergency buses T21A, T21B, T21C, and T21D energized and both annunciators clear for Open Phase</li> <li>4. Checks safety injection status – Determine SI Status Lights Lit (QMO-225/226 white lights Lit)</li> </ol>
	US/RO	Foldout Page – RCP Trip Criteria: <ul style="list-style-type: none"> <li>• Stop all running RCPs based on Containment Isolation Phase B actuated OR RCS is &lt; 1300 psig and CCP/SI pump running</li> </ul>

Time	Position	Applicant's Actions or Behavior
<p><b>CT1: Manually start at least one RHR Pump</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Both of the following: <ul style="list-style-type: none"> <li>○ Indication that RHR pumped injection is required (SI actuated status light lit and RCS pressure indicating below shutoff head of the RHR pumps)</li> <li>○ Indication that no RHR pump flow is injecting into the core (Pump breaker indicating lights and RHR flow indication)</li> </ul> </li> <li>▪ <b>Performance Feedback:</b> Indication that at least one RHR pump is injecting (Breaker indicating lights and RHR flow indication).</li> <li>▪ <b>Success Path:</b> Both RHR pumps are available for manual start. Pumps may be started as a backup action for a failed automatic action or as directed in E-0 Attachment A.</li> <li>▪ <b>Measurable Performance Standard:</b> Manually start at least one RHR pump before transition out of E-0 and completion of E-0 Attachment A.</li> </ul>		
	RO/BOP	Any time after completion of immediate actions from memory: Determine both RHR Pumps should have automatically started and manually start both RHR pumps. <b>(CT1 related action)</b>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Complete actions of E-0 through steps 5-19 as directed:</p> <ol style="list-style-type: none"> <li>5. Check if Main Steam line isolation is required-Determine isolation is required based on containment pressure &gt;2.8 psig and determine all SG stop valves are closed.</li> <li>6. Check if CTS is required-Determine containment pressure has not remained below 2.8 psig and perform the following: <ol style="list-style-type: none"> <li>a. Determine CTS is actuated, CTS Monitor Lights lit on 2-SML-9A and 2-SML-9B, and spray additive tank flow is indicated on 2-IFI-200</li> <li>b. Determine CI Phase B is actuated</li> <li>c. Stop all RCPs if not previously stopped</li> <li>d. Place lower containment vent unit fans in OFF</li> <li>e. Place control rod drive mech fans in STOP</li> </ol> </li> <li>7. Implement Attachment A while continuing with E-0 (actions listed below)</li> <li>8. Check if ruptured SG is suspected-Determine no SG NR levels rising in an uncontrolled manner</li> <li>9. Check AFW pumps running-Determine all three AFW pumps are running</li> <li>10. Check total AFW flow &gt;240 x10<sup>3</sup> PPH</li> <li>11. Minimize unnecessary RCS cooldown-Determine SG NR levels are not &gt;13% and reduce total AFW flow to between 240 x10<sup>3</sup> PPH and 450 x10<sup>3</sup> PPH and control NR level between 13% and 50%</li> <li>12. Check AFW pump discharge valves-Determine valves are throttled</li> <li>13. Check FW isolation-Determine both MFPs tripped, both MFP discharge valves closed, all four FRVs closed, and all four feed water isolation valves closed</li> <li>14. Check RCS temperature-Determine RCS temperature is lowering, no dumping of steam is occurring, 2-DRV-407 is closed, AFW flow is &gt;240 x10<sup>3</sup> PPH, and SG stop valves are already closed.</li> <li>15. Check pressurizer PORVs and spray valves-Determine PORVs closed, one spray valve is open with all RCPs off, and PORV block valves are all energized.</li> <li>16. Check if RCPs should be stopped-Determine criteria are satisfied to stop RCPs and stop RCPs is not previously secured.</li> <li>17. Check if SG secondary pressure boundaries are intact-Determine no SG pressure is lowering in an uncontrolled manner nor completely depressurized</li> <li>18. Check if SG tubes are intact-Determine no SG NR levels rising in an uncontrolled manner and no abnormal secondary radiation</li> <li>19. Check if RCS is intact-Determine RCS is not intact based on abnormal containment radiation, pressure, and sump levels</li> </ol>

Time	Position	Applicant's Actions or Behavior
		<p><b>CT1: Manually start at least one RHR Pump</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Both of the following: <ul style="list-style-type: none"> <li>○ Indication that RHR pumped injection is required (SI actuated status light lit and RCS pressure indicating below shutoff head of the RHR pumps)</li> <li>○ Indication that no RHR pump flow is injecting into the core (Pump breaker indicating lights and RHR flow indication)</li> </ul> </li> <li>▪ <b>Performance Feedback:</b> Indication that at least one RHR pump is injecting (Breaker indicating lights and RHR flow indication).</li> <li>▪ <b>Success Path:</b> Both RHR pumps are available for manual start. Pumps may be started as a backup action for a failed automatic action or as directed in E-0 Attachment A.</li> <li>▪ <b>Measurable Performance Standard:</b> Manually start at least one RHR pump before transition out of E-0 and completion of E-0 Attachment A.</li> </ul>
	RO/BOP	<p>Perform actions of Attachment A as follows:</p> <ol style="list-style-type: none"> <li>1. Check ECCS pumps all running-Determine CCPs and SI pumps are running, start RHR pumps if not previously started. <b>(CT1 related action).</b> <ol style="list-style-type: none"> <li>a. Determine East CCP emergency leak off valve 2-QMO-225 is open and cannot be closed (NOTE: This is due to the pressurizer pressure instrument failure in Event 6.)</li> </ol> </li> <li>2. Check ECCS flow-Determine flow is indicated for BIT flow, SI pump flow, and RHR HX flow.</li> <li>3. Check ECCS valves in proper alignment-Determine ECCS alignment is correct using status lights on 2-SML-12A, 2-SML-12B, 2-SML-12C, 2-SML-11A, 2-SML-11B, and 2-SML-11C with the following exception: <ol style="list-style-type: none"> <li>a. SML-11B drop 2, 2-QMO-225 CL EAST CCP LEAKOFF (Note: Valve cannot be positioned properly with SI actuated due to pressurizer pressure instrument failure)</li> </ol> </li> <li>4. Check CCW status-Determine both CCW pumps running, CCW surge tank stable, and CCW monitor lights in proper status using 2-SML-8B.</li> <li>5. Check ESW status-Determine both ESW pumps running, both discharge valves open, and proper status lights on 2-SML-7</li> </ol>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Continue Attachment A actions: <ol style="list-style-type: none"> <li>6. Check if containment recirculation fans should be running-Determine containment pressure &gt;1 psig, both CEQ fans running, both CEQ fan suction dampers open, all CEQ fan CCW valves open</li> <li>7. Place DIS in service by directing local action to stop all ice condenser air handling units and turning on all hydrogen ignitors when local action is reported complete</li> <li>8. Check containment vent and Phase A isolation-Determine Containment Vent Isolation and Phase A isolation are actuated and completed on both trains, and direct actions to periodically monitor SFP radiation, SFP cooling, and SFP level</li> <li>9. Check ESF fans both running-Determine both fans are running</li> <li>10. Align control room ventilation by checking both pressurization fans are running, stopping one pressurization fan, checking cable vault hatch closed, checking control room dampers aligned for SI, and checking at least one control room air handling unit is running</li> <li>11. Align PACHMS for service by momentarily placing containment hydrogen sample bypass switches in BYPASS</li> <li>12. Request Unit 1 perform actions</li> <li>13. Check generator trip-Determine generator output breakers are both open and main generator excitation control is OPEN</li> <li>14. Check Load Conservation status-Determine AC buses T21B and T21C are energized by offsite power</li> <li>15. Check NESW pressure is &gt;65 psig on 2-WPI-901</li> <li>16. Check Containment Isolation Phase B status-Determine Containment Isolation Phase B is actuated and completed on both trains.</li> <li>17. Report completion of Attachment A and report any unexpected conditions or actions taken</li> </ol>
	US	Announces transition to 2-OHP-4023-E-1, Loss of Reactor or Secondary Coolant and directs operator actions.  Checks Status Trees for Red Path
<p style="text-align: center;"><b>NOTE:</b></p> Momentary entry into FR-P.1 will be required until crew verifies RHR flow (>400 gpm) sufficient to indicate a LB LOCA has occurred.		

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Reviews E-1 Foldout Page Criteria When RWST level lowers to < 30% then the crew must immediately transition to 2-OHP-4023-ES-1.3, Transfer To Cold Leg Recirculation.
	RO/BOP	Completes steps of 2-OHP-4023-E-1, Loss of Reactor or Secondary Coolant, as directed until criteria satisfied to transition to ES-1.3: <ol style="list-style-type: none"> <li>1. Check if RCPs should be stopped-Determine criteria are satisfied to stop RCPs and verify RCPs are stopped.</li> <li>2. Check if SG secondary pressure boundaries are intact-Determine no SG pressure is lowering in an uncontrolled manner nor completely depressurized.</li> <li>3. Check intact SG levels-Maintain AFW flow &gt;240 x10<sup>3</sup> PPH until NR level is &gt;13%, then control intact SG levels 27-50%</li> <li>4. Check secondary radiation-Reset containment isolation phase A, Direct Chemistry to sample SGs for activity, and determine secondary radiation is normal.</li> <li>5. Check pressurizer PORVs and block valves-Determine all PORV block valves are energized, all PORVs are closed, and block valves are all energized.</li> <li>6. Check if ECCS flow should be reduced-Determine RCS subcooling is not &gt;40°F and go to step 7</li> <li>7. Check if containment spray should be stopped-Determine spray pumps need to run for 24 hours based on RCS pressure &lt;300 psig</li> <li>8. Check if RHR pumps should be stopped-Determine RCS pressure is not &gt;300 psig, leave RHR pumps running, and got to step 10</li> <li>10. Check if DGs should be stopped-Determine AC buses energized from offsite power, reset SI, stop both EDGs, and direct local action to stop jacket water pumps and place in AUTO.</li> </ol>
	RO/BOP	Report when RWST level is <30%
	US	Announces transition to 2-OHP-4023-ES-1.3, Transfer To Cold Leg Recirculation when RWST level < 30% per: <ul style="list-style-type: none"> <li>• E-0, Foldout Page, Criteria 3</li> <li>• E-1, Foldout Page, Criteria 5</li> <li>• E-1, Step 13</li> </ul>



Time	Position	Applicant's Actions or Behavior
	RO/BOP	Review 2-OHP-4023-ES-1.3 Fold Out Page
	US	Direct actions of 2-OHP-4023-ES-1.3, Transfer To Cold Leg Recirculation
	US	Monitors CSF Status Trees for information only
	RO/BOP	Reset SI if not previously performed
	RO/BOP	Check CCW Return Flow for each in service RHR HX between 3000 and 3500 gpm-Throttle RHR HX outlet valves as necessary to establish required flow
	US	Wait until RWST level is <20% before continuing
	RO/BOP	Check containment water level greater than minimum recirc level-Determine status lights 2-NLI-330 and 2-NLI-331 are lit
<p><b>CT2: Transfer to cold leg recirculation</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> All of the following: <ul style="list-style-type: none"> <li>○ Indication/annunciation that SI is actuated (SI actuated status light lit)</li> <li>○ Indication that RWST level is at or below 20% (Control Board level indication)</li> <li>○ Indication that containment sump level is at or above the minimum level required for transfer to cold leg recirculation (Containment Water Level Minimum Recirculation Level status lights lit)</li> </ul> </li> <li>▪ <b>Performance Feedback:</b> Flow indication of the recirculation of containment sump water through the RHR heat exchangers and into the RCS</li> <li>▪ <b>Success Path:</b> Both trains of RHR and CTS pumps are available for transfer to recirculation as directed by ES-1.3. No additional malfunctions are included that would impact on the ability to accomplish the transfer within the stated time limits.</li> <li>▪ <b>Measurable Performance Standard:</b> Transfer at least one train of ECCS to cold leg recirculation prior to indications of cavitation/loss of flow from SI, CTS, or Charging Pumps AND without interruption of at least one train of RHR and CTS flow for more than 5 minutes AND while maintaining one available CCP and SI pump in service at all times.</li> </ul>		

Time	Position	Applicant's Actions or Behavior
<p>Evaluator Note:            In the following step, record the time when the West CTS Pump is stopped and the time the West RHR pump is stopped. Record the time the East RHR pump is subsequently started and the time the East CTS pump is subsequently started. In order to satisfy the Critical Task, both of these times must be ≤5 minutes. In addition, at least one Charging Pump and at least one SI pump must remain in operation with no signs of pump cavitation during the time RHR and CTS pumps are off.</p>		
	RO/BOP	<p>Transfer RHR/CTS to Recirculation Mode per step 6 (<b>CT2 related actions, steps 6a-6m</b>):</p> <ol style="list-style-type: none"> <li>a. Stop and lockout East CTS pump</li> <li>b. Stop and lockout East RHR pump</li> <li>c. Determine both pumps stopped</li> <li>d. Initiate valve closure of 2-IMO-310, East RHR pump suction, and 2-IMO-215, East CTS pump suction from RWST</li> <li>e. Stop and lockout West CTS pump TIME Stopped: _____</li> <li>f. Stop and lockout West RHR pump TIME Stopped: _____</li> <li>g. Determine both pumps stopped</li> <li>h. Initiate valve closure of 2-IMO-320, West RHR pump suction, and 2-IMO-225, West CTS pump suction from RWST</li> <li>i. Restore control power to ICM-305, recirc sump to East RHR/CTS pumps</li> <li>j. Check 2-ICM-305 open interlock met (2-IMO-215 and 2-IMO-310 both full closed)</li> <li>k. When 2-ICM-305 interlock is met, open 2-ICM-305</li> <li>l. Check 2-ICM-305 full open</li> <li>m. Start East RHR Pump and East CTS pump Time RHR started: _____ Time CTS Started: _____</li> <li>n. Restore control power to 2-ICM-306, recirc sump to West RHR/CTS pumps</li> <li>o. Check 2-ICM-306 open interlock met (2-IMO-225 and 2-IMO-320 both full closed)</li> <li>p. Open 2-ICM-306</li> <li>q. Check 2-ICM-306 full open</li> <li>r. Start the West RHR and CTS pumps Time Completed: _____</li> <li>s. Reset CTS actuation</li> <li>t. Close spray additive tank valves 2-IMO-202 &amp; 2-IMO-204 within 5 minutes of completion of Cold Leg Recirculation for RHR and CTS pumps Time Completed: _____</li> <li>u. Check at least RHR pump running on recirculation sump- Determine both RHR pumps are operating properly on the recirculation sump</li> </ol>

<b>Time</b>	<b>Position</b>	<b>Applicant's Actions or Behavior</b>
		The scenario will terminate when RHR and CTS pumps are transferred to recirculation lineup (ES-1.3 step 6 complete), or at Lead Evaluator discretion.

Reset to a ~99% IC, MOL, with East Stator Cooling Water Pump in service, Auxiliary Steam on Unit 1. Verify deionizer flow =80 gpm (IC-950).

Verify thermal power is ~99%.

Setup Items:

Set up failure of both RHR pumps to auto start:

<b>trg= 1 "dmf u2_101td6"</b>	<b>trg= 1 "dor an06_u2(043)"</b>	
<b>ET1 when ERHR pump in CLOSE</b>	<b>U2_101TD6</b>	<b>an06_u2(043) ALARM OFF</b>
<b>trg= 2 "dmf u2_101ta4"</b>	<b>trg= 2 "dor an06_u2(048)"</b>	
<b>ET2 when WRHR pump in CLOSE</b>	<b>U2_101TA4</b>	<b>AN06_U2(048) ALARM OFF</b>

Enter a failure of pressurizer pressure channel NPP-151 high and failure of pressurizer spray valve NRV-163 full open on ET3:

<b>U2_NPP151 2500 ET3</b>	<b>U2_RC15A 100 ET3</b>
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Set up a stator cooling water leak when the East Stator Cooling Pump is stopped:

<b>U2_EastSWCPump_STOP</b>	<b>U2_TP03 1 ET4</b>
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Event 1:

When the Crew has assumed responsibility for the Unit, and with Lead Evaluator concurrence, enter the low failure of QLC-451, VCT Level:

<b>U2_QLC451 0</b>
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When contacted as MTI to energize the RWS relay, inform the Crew that two technicians will be briefed and sent to the Control Room within 2 hours.

Event 2:

When the QLC-451 event is complete, and with Lead Evaluator concurrence, enter the high failure of 2-FFC-210, #21 Feed Water Flow:

<b>U2_FFC210 3.75E6-4.35E6 3 min ramp</b>
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When contacted as MTI to trip bistables, inform the Crew that two technicians will be briefed and sent to the Control Room within 2 hours.

Event 3:

When the NFP-210 event is complete, and with Lead Evaluator concurrence, call as the Work Control SRO and inform the Crew that the clearance for the East Stator Cooling Water Pump is ready and request the Crew swap Stator Cooling Water pumps. Report that the Turbine AEO has been briefed.

Event 4:

This event is automatically triggered when the East Stator Cooling Water Pump is stopped.

When directed to locally investigate the Stator Cooling Water system, wait 3 minutes and report the following:

“There is a leak on the Stator Cooling Water system supply line from a flange just upstream of the flow orifice for 2-CFS-610. The leak is approximately 5 GPM. The leakage is not affecting any other plant equipment.”

If directed to check level in the Stator Cooling Water Tank, report that level is at the height of the lower viewing window.

When the Shift Manager is notified of the leak, direct the US to perform a unit shut down using the Rapid Power Reduction Response AOP at a rate of 2%/minute.

If directed to open 2-H-159, GRV-256 inlet shutoff valve, wait 1 minute and report completion.

If subsequently directed to throttle open 2-SCS-171, perform the following to open the valve to 15% open, then adjust the remote from the Instructor Station as necessary based on direction from the Crew:

**U2\_TPR20 15**

Event 5:

When directed by the Lead Evaluator, actuate ET3 to cause a failure of pressurizer pressure channel NPP-151 high and pressurizer spray valve 2-NRV-163 full open:

**TRG! 3**

Event 6:

When the Crew has transitioned to ES-0.1 (SI not actuated) or completed E-0 step 4 (SI actuated), insert the following to cause a LBLOCA:

**U2\_RC01A 100**

Perform the following actions as directed during performance of E-0:

- Stop ice condenser air handling units and report completion in ~5 minutes:  
**U2\_CHR01 OFF After 5 Min Delay**
- When directed to perform Unit 1 actions per E-0 Att. A:
  1. Report chemistry has been directed to place Train A PACHMS in service, Unit 1 control room pressurization is aligned for a Unit 2 SI, 2-HV-AS-1 is in service
  2. Place PACHMS Train A in service (30 minute delay):  
**U2\_CHR02 ON After 30 Min Delay**

**Form 3.3-1 Scenario Outline**

Facility:	<u>DC COOK 1 &amp; 2</u>	Scenario #:	<u>NRC2022-2</u>
Scenario Source:	<u>New</u>	Op. Test #:	<u>Cook 2022</u>
Examiners:	_____	Applicants/ Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:	100% Power, breaker T21C3 is OOS due to control power failure, T.S. 3.8.1.B in effect.		
Turnover:	As part of Post Maintenance testing for breaker T21C3, DG2CD output breaker to Bus T21C, perform a slow start of DG2CD per marked up copy of 2-OHP-4021-032-001CD, run loaded on Bus T21C at 900-1100 KW for 10 minutes, then shut down the DG per the NOP.		
Critical Tasks**:	<ol style="list-style-type: none"> <li>1. Manually trip the reactor</li> <li>2. Energize at least one AC emergency Bus</li> </ol>		
Event No.	Malf. No.	Event Type*	Event Description**
1		N-BOP	Perform DG2CD start per NOP
2	U2_EG14O ZG1101WMO726_U2 ZG1101WMO728_U2	C-BOP TS	Failure of DG2CD ESW Supply
3	U2_RD07H	C-US R-RO MC-RO	Uncontrolled automatic Control Rod Insertion Restore control rod position
4	U2_NLP151	I-RO MC-RO TS	Controlling Pressurizer Level Channel fails High
5	U2_SW09	C-BOP TS	Loss of Containment Cooling
6	RP01A RP01B U2_RCP1	C-RO	21 RCP Trip with Automatic Reactor Trip Failure (EOP entry)
7	U2_ED05E U12_ED25B U12_ED25C	M-CREW	Loss of Bus T21A/Loss of Offsite Reserve Power
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control  ** Details on subsequent pages</p>			

Critical Task Details:

**CT1: Manually Trip the Reactor**

- **Initiating Cue:** Indications and/or annunciators indicating an automatic reactor trip is required due to loss of reactor coolant loop 1 flow (Reactor Coolant Status Lights on 2-SML-13, Annunciator 207 Drop 1, 21 SG Level Lo-Lo status lights on 2-SML-19B, Annunciator 213 Drop 5), but the reactor does not automatically trip
- **Performance Feedback:** Reactor trip breaker indicates open, control rod position indicates rods inserted, neutron flux lowers
- **Success Path:** Either control room reactor trip switch will cause the associated breaker to open and insertion of all control rods
- **Measurable Performance Standard:** Manually open at least one reactor trip breaker using control board switches within one minute of the trip condition.
- **Safety Significance:** Failure to manually trip the reactor causes a challenge to the subcriticality CSF beyond that irreparably introduced by the postulated conditions. Additionally, it constitutes an incorrect performance that “necessitates the crew taking compensating action that would complicate the event mitigation strategy” and demonstrates the inability of the crew to “recognize a failure or an incorrect automatic actuation of an RPS system or component.” This improper operation constitutes a “significant reduction of safety margin beyond that irreparably introduced by the scenario.” From the Cook Plant UFSAR, Chapter 14: “If the reactor is at full power at the time of the accident, the immediate effect of a loss of coolant flow is a rapid increase in coolant temperature which is magnified by a positive MTC. This increase could result in DNB with subsequent adverse effects to the fuel if the reactor were not tripped promptly.” The Cook Plant UFSAR does not give a specific time requirement, only that the reactor should be “tripped promptly”. The analysis assumes success of the automatic reactor trip for low RCS flow. Since there is no specific time listed in the analysis, or any other means to establish a preferred boundary condition, a time of one minute was chosen as an alternative boundary condition of “the expiration of a reasonable amount of time, as agreed upon by the NRC Chief Examiner and the facility licensee.” as described in NUREG 1021 ES-3.3.

## CT2: Energize at least one AC emergency bus

- **Initiating Cue:** Both of the following:
  - Indication/annunciation that all AC emergency buses are de-energized (Bus Energized indicating lights, Bus Voltage meter indications)
  - Indication/annunciation/or other information that an AC source is available or can be made available (EP Red Status light lit, EP voltage meter indication, Standby Reserve Power Transformer #4 red indicating light)
- **Performance Feedback:** Indication that at least one AC emergency bus (T21D) is energized.
- **Success Path:** Emergency Power 69 KV (EP) transformer is unaffected by the loss of 345KV power that de-energizes Reserve Power transformers #5 and #9. EP is the first procedurally preferred offsite power source. Transformer #4 could also be made available, with action by the Switchyard Operator, to re-energize from Reserve Power.
- **Measurable Performance Standard:** Energize at least one ac emergency bus (T21D) prior to direction to perform the Deep Load Shed by implementing 2-OHP-4027-FSG-4, ELAP Power Management.
- **Safety Significance:** Failure to energize an AC emergency bus constitutes improper operation or incorrect crew performance in which the crew does not prevent “degraded ... emergency power capacity.” Additionally, failure to perform the critical task results in the unnecessary continuation of a situation in which RCS inventory is being lost uncontrollably and cannot be replaced. This situation is equivalent to improper operation or incorrect crew performance in which the crew does not prevent “degraded emergency core cooling system (ECCS)...capacity” at a time when a small-break LOCA is in progress due to possible RCP seal failure. Once ELAP strategies are implemented, the time to restart ECCS pumps to restore pressurizer level will be extended. If the Crew fails to successfully restore power as expected in the scenario, they will perform step 11 of ECA-0.0 as follows: “Check if AC Emergency Buses can be restored within 4 hours of the SBO event.” If all attempts at power restoration have been unsuccessful, the Crew will conclude that 4 hour restoration is not possible. A Note prior to this step states that DC Bus deep load shedding must be completed within one hour of the ELAP event. Thus, the Crew cannot wait for 4 hours before exercising the RNO action for step 11, which is “Consult with the SM to declare ELAP event.” Once an ELAP is declared, the Crew will perform the Deep Load Shed by implementing 2-OHP-4027-FSG-4, ELAP Power Management. Performance of this procedure will result in local action to remove DC control power from the breakers necessary to restore AC power to any of the safety buses. Therefore, once direction is given to perform this procedure, power restoration will not be possible in the scenario.



## Event Description Details:

Event 1: As part of post maintenance testing for the DG2CD output breaker to bus T21C, the Crew will start the EDG and load the EDG on to bus T21C.

Event 2: The event starts with failure of a DG run relay for DG2CD concurrent with the valve control circuit for 2-WMO-726, Normal Supply to DG2CD. This results in a loss of Essential Service Water cooling to DG2CD. High and High-High temperature alarms will be received. The Crew should respond per annunciator response procedures to trip DG2CD. The US should identify entry into the following Technical Specification condition/action: 3.7.8. Condition A, Required Action A.1. NOTE: T.S. 3.8.1 Condition B is already in effect as a scenario initial condition, so entry is not required based on Note 1 for 3.7.8.

Event 3: The event starts with an uncontrolled automatic control rod insertion on control bank D. The Crew should diagnose uncontrolled rod motion, perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, place control rods in manual to stop rod movement, and then transition to 2-OHP-4022-012-003, Continuous Control Bank Movement. The RO should develop and implement a reactivity plan to withdraw control rods to match Tavg with Tref.

Event 4: Pressurizer Level Channel NLP-151 fails high. This results in automatic closure of 2-QRV-251, Charging Flow Control Valve. The RO should take manual control of charging flow per immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, and stabilize pressurizer level. The Crew will complete IFR-001 actions and transition to 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction, complete AOP actions to restore pressurizer level to automatic, and identify required Technical Specification actions to trip bistables. The US should identify entry into the following Technical Specification conditions/actions: 3.3.1 Condition A Required Action A.1, 3.3.1 Condition D Required Action D.1 (Due to Table 3.3.1-1, Function 9), 3.3.4 Condition A Required Action A.1 (NLP-151 is the only channel that provides Remote Shutdown Monitoring).

Event 5: The Unit 2 Containment Cooling system will fail due electrical fault on the supply bus. Containment pressure will increase. The Crew will enter 2-OHP-4022-028-001, Loss of Containment Chilled Water, initiate a containment pressure relief, and restore containment cooling by local alignment for open loop cooling using Non-Essential Service Water. The US should identify entry into the following Technical Specification condition/action: 3.6.4. Condition A Required Action A.1.

Event 6: A locked rotor will occur on 21 RCP. Automatic reactor trip will fail. The Crew should recognize the failure of automatic trip and perform a manual reactor trip, perform immediate actions of 2-OHP-4023-E-0, Reactor Trip or Safety Injection, and transition to 2-OHP-4023-ES-0.1, Reactor Trip Response.

Event 7: After transition to ES-0.1, a fault will cause a loss of T21A, followed shortly by a loss of both Reserve Power transformers. DG2AB will start, load on to the faulted bus T21A, and trip. DG2CD is previously tripped. The Crew should enter ECA-0.0. Power restoration will be performed using the Emergency Power (EP) source. After power restoration, the Crew will complete ECA-0.0 actions and transition to ECA-0.1 or ECA-0.2, depending on pressurizer level.

The scenario terminates after the Crew has transitioned out of ECA-0.0.

**Target Quantitative Attributes per Scenario (Ref ES-3.4 Table 3.4-1)**

Quantitative Attribute	Target per scenario	Actual Number/ scenario	How Met
Events after EOP Entry	1-2	1	Loss of Bus T21A/Loss of Offsite Reserve Power
Abnormal Events	2-4	5	Failure of DG2CD ESW Supply Uncontrolled automatic Control Rod Insertion Controlling Pressurizer Level Channel fails High Loss of Containment Cooling 21 RCP Trip with Automatic Reactor Trip Failure
Major Transients	1-2	1	Loss of All AC Power
EOPs entered requiring substantive action	1-2	1	ECA-0.0
Entry into contingency EOP with substantive actions	1 per set	1	ECA-0.0
Pre-identified CTs	2 or more	2	Manually trip the reactor Energize at least one AC emergency Bus

**Form 3.3-2 Required Operator Actions**

Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 1

Event Description: As part of post maintenance testing for the DG2CD output breaker to bus T21C, the Crew will start the EDG and load the EDG on to bus T21C.

Event Termination: When DG2CD is started and loaded to 900-1100 KW, the event is complete.

Symptoms/Cues:  
 When the EDG is started, the following annunciators are expected:

- 212-14, OSCILLOGRAPH OPERATED
- 220-2, DG2CD COMPR AIR RECEIVER PRESSURE LOW
- 220-13, DG2CD FUEL OIL MANIFOLD PRESSURE LOW (in and clear)
- 220-23, DG2CD LUBE OIL PRESSURE LOW (in and clear)

When breaker T21C3 is closed, the following annunciator is expected:

- 220-76, 4KV BUS T21C PARALLEL OPERATION

Time	Position	Applicant's Actions or Behavior
	BOP	Perform actions of 2-OHP-4021-032-001CD section 4.3 to start DG2CD: <ul style="list-style-type: none"> <li>• Start DG2CD by placing the DG2CD STOP-RUN control switch in RUN</li> <li>• Determine DG2CD has started and reached 514 RPM on local tachometer and that generator output voltage on the control board meter is 119-124 volts</li> <li>• Determine annunciators 220-13 and 220-23 are not lit</li> <li>• Determine red light lit at DG2CD STOP-RUN control switch indicating DG2CD has reached 95% rated speed</li> <li>• Direct local action to align a single Jacket Water pump for standby service</li> <li>• Direct local verification of proper governor oil level and DG2CD room ventilation fans running</li> <li>• Initiate data collection on appropriate data sheets</li> </ul>

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Perform actions of Attachment 2 to parallel and load DG2CD on bus T21C:</p> <ul style="list-style-type: none"> <li>• Verify DG2CD START GEN &amp; 69/4KV voltmeter selector switch is in a DG OUTPUT position</li> <li>• Verify POTENTIAL DG2CD RUN &amp; BUS T21C &amp; T21D SELECTOR in a Bus T21C position</li> <li>• Adjust DG2CD start voltage 2 to 3 volts higher than T21C run voltage</li> <li>• Place DG2CD Start Voltmeter and DG2CD Run Voltmeter in OFF</li> <li>• Place 2-T21C3 Synch Selector in MANUAL</li> <li>• Adjust DG2CD speed using DG2CD GOVERNOR CONTROL so DG2CD synchro scope is rotating slowly in the fast direction</li> <li>• When DG2CD synchro scope is between 5 minutes till 12 o'clock and 12 o'clock, then place DG2CD 4KV CB T21C3 control switch in CLOSE</li> <li>• Check white light, Synch Permissives Met, illuminated for T21C3</li> <li>• When DG2CD synchro scope is between 5 minutes till 12 o'clock and 12 o'clock, then place DG2CD Synchronize Master Close switch to CLOSE</li> <li>• When T21C3 closes, then without delay raise load with DG2CD GOVERNOR CONTROL to 900-1100 kw load</li> <li>• Place T21C3 Synch Selector to OFF</li> <li>• Minimize circulating current by slowly adjusting Auto Volt Adjust</li> <li>• Place voltmeters in the desired position</li> <li>• Maintain 900-1100 kw for ~10 minutes</li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 2

Event Description: The event starts with failure of a DG run relay for DG2CD concurrent with the valve control circuit for 2-WMO-726, Normal Supply to DG2CD. This results in a loss of Essential Service Water cooling to DG2CD. High and High-High temperature alarms will be received. The Crew should respond per annunciator response procedures to trip DG2CD. The US should identify entry into the following Technical Specification condition/action: 3.7.8. Condition A, Required Action A.1. NOTE: T.S. 3.8.1 Condition B is already in effect as a scenario initial condition, so entry is not required based on Note 1 for 3.7.8.

Event Termination: When the EDG has been tripped and Tech Spec actions identified, the event is complete.

Symptoms/Cues:

Annunciator 212-14, OSCILLOGRAPH OPERATED, clears

2-WMO-726, Normal Supply to DG2CD, closes

DG2CD Return Flow, 2-WFI-726, lowers to zero

Annunciators:

- 220-32, DG2CD JACKET WATER TEMP HIGH (After time delay of ~45 seconds)
- 220-31, DG2CD JACKET WATER TEMP HI-HI (After time delay of ~90 seconds)
- 220-22, DG2CD LUBE OIL TEMP HIGH (After time delay of ~4 minutes if EDG is still running)
- 220-21, DG2CD LUBE OIL TEMP HI-HI (After time delay of ~6 minutes if EDG is still running)

DG2CD will trip after ~7 minutes if not manually tripped by the Crew

Time	Position	Applicant's Actions or Behavior
	BOP	Diagnose loss of ESW cooling to DG2CD
<p>NOTE: If the BOP attempts to manually open 2-WMO-726 or 2-WMO-728 to restore ESW cooling, these actions will not be successful.</p> <p>If the Crew performs a normal shutdown of the EDG, they may subsequently determine the EDG should be disabled from auto start. Alternatively, they may set a contingency to trip the EDG if it starts later in the scenario if cooling water has not been restored.</p>		
	BOP	<p>Respond per ARP for 220-32:</p> <ul style="list-style-type: none"> <li>• Direct local check of jacket water temperature on CTI-305</li> <li>• Determine the EDG is not required for emergency situation and shut down the EDG</li> </ul> <p>Respond per ARP for 220-31:</p> <ul style="list-style-type: none"> <li>• Direct local check of jacket water temperature on CTI-305</li> <li>• Determine the EDG is not required for emergency situation and trip the EDG</li> </ul>
	US	<p>Identify entry into T. S. 3.7.8 Condition A Required Action A.1, One ESW train inoperable, due to failure of required automatic valves to actuate properly (2-WMO-726).</p> <p>NOTE: T.S. 3.8.1 Condition B is already in effect as a scenario initial condition, so entry is not required based on Note 1 for 3.7.8.</p>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 3

Event Description: The event starts with an uncontrolled automatic control rod insertion on control bank D. The Crew should diagnose uncontrolled rod motion, perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, place control rods in manual to stop rod movement, and then transition to 2-OHP-4022-012-003, Continuous Control Bank Movement. The RO should develop and implement a reactivity plan to withdraw control rods to match Tavg with Tref.

Event Termination: When actions of 2-OHP-4022-012-003 are complete, including restoration of control rods to match Tavg and Tref, the event is complete.

Symptoms/Cues:

Control Bank D control rods will insert at 72 steps per minute

Reactor power lowers

Tavg lowers

NOTE: When control rods are placed in Manual, rod motion will stop and the switch will fail in the Manual position.

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports inward rod motion with no turbine runback in progress
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response
	RO	Reports uncontrolled rod motion and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory: <ul style="list-style-type: none"><li>• Determines load rejection or runback is not in progress</li><li>• Place rod control in MANUAL</li><li>• Verify rod motion is stopped</li></ul>

Time	Position	Applicant's Actions or Behavior
	Crew	Performs plant stability checks. (Order not important) RO <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> BOP <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure: <ol style="list-style-type: none"> <li>1. Verifies RO immediate actions taken from memory</li> <li>2. Assigns manual control band for Tavg (nominal <math>\pm 2</math> °F from Tref)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-012-003, Continuous Control Bank Movement</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-012-003, Continuous Control Bank Movement
<p>NOTE: It is expected that action to place control rods in MANUAL will have been early enough to preclude either rod insertion below the low insertion limit or AFD out of band. If this did not occur, the Crew will perform actions per the RNO steps for step 1 of 2-OHP-4022-012-003.</p>		

Time	Position	Applicant's Actions or Behavior
	RO/BOP RO  RO  RO  BOP RO  RO  RO RO US/BOP	Perform actions of 2-OHP-4022-012-003 as directed: <ul style="list-style-type: none"> <li>• Determine rod position is above the low insertion limit and AFD is within the target band</li> <li>• Determine Power Range Nuclear Instrumentation channels are operable</li> <li>• Develop and implement a reactivity plan to minimize Tavg-Tref deviation by adjusting main turbine load, adjusting RCS boron concentration, or adjusting control rod position (expected)</li> <li>• Provide peer check for reactivity manipulation</li> <li>• Determine no instrumentation malfunction occurred on Turbine First Stage Pressure, Tavg, or Power Range NI channels</li> <li>• Determine inadvertent boration or dilution is not occurring</li> <li>• Determine cause of rod motion has not been identified and perform the following:               <ul style="list-style-type: none"> <li>○ Verify Tavg and Tref matched by restoring control rods to the pre-malfunction height</li> <li>○ Verify Rod Control in MANUAL</li> <li>○ Inform SM/duty staff supervisor of the situation</li> </ul> </li> </ul> <p>NOTE: If the Crew completes actions of 2-OHP-4022-012-003 and has determined to not withdraw control rods to pre-malfunction height, with the concurrence of the Lead Evaluator, direct the US as Shift Manager to restore control rod position. This will enable evaluation of the reactivity manipulation by the RO.</p>



Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 4

**Event Description:**

Pressurizer Level Channel NLP-151 fails high. This results in automatic closure of 2-QRV-251, Charging Flow Control Valve. The RO should take manual control of charging flow per immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, and stabilize pressurizer level. The Crew will complete IFR-001 actions and transition to 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction, complete AOP actions to restore pressurizer level to automatic, and identify required Technical Specification actions to trip bistables. The US should identify entry into the following Technical Specification conditions/actions: 3.3.1 Condition A Required Action A.1, 3.3.1 Condition D Required Action D.1 (Due to Table 3.3.1-1, Function 9), 3.3.4 Condition A Required Action A.1 (NLP-151 is the only channel that provides Remote Shutdown Monitoring).

**Event Termination:** When the Crew has completed actions of 2-OHP-4022-013-010 up to bistable tripping, pressurizer level control is in automatic, and Technical Specifications have been identified, the event is complete.

**Symptoms/Cues:**

Pressurizer level channel 2-NLP-151 fails to 100%  
 Charging flow and seal injection flow lowers as 2-QRV-251 throttles closed  
 Pressurizer backup heaters energize

**Annunciators:**

- 208-1, PRESSURIZER LEVEL HIGH HIGH
- 208-3, PRESSURIZER LEVEL HIGH DEV BACKUP HTRS ON
- 207-9, 29, 69, 89, RCP (1,2,3,4) THERM BARRIER DP LOW (Possible based on initial seal injection flow and timing of crew actions)
- 207-18, 38, 78, 98, RCP (12,3,4) SEAL WTR INJ FLOW LOW (Possible based on initial seal injection flow and timing of crew actions)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports pressurizer level instrument failure based on control board indications and annunciators
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response

Time	Position	Applicant's Actions or Behavior
	RO	<p>Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory:</p> <ul style="list-style-type: none"> <li>• Determines a pressurizer level instrument or control system issue exists</li> <li>• Determines pressurizer level is not stable at or trending to program</li> <li>• Places pressurizer level control in manual by taking manual control of 2-RU-23, PZR LEVEL CONTROL, or taking manual control of 2-QRV-251 using 2-RU-29, CCP DISCH FLOW CTRL and restore pressurizer level to program level</li> </ul>
	Crew	<p>Performs plant stability checks. (Order not important)</p> <p>RO</p> <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> <p>BOP</p> <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	<p>Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure:</p> <ol style="list-style-type: none"> <li>1. Verifies RO immediate actions taken from memory</li> <li>2. Assigns manual control band for pressurizer level (nominal program level <math>\pm 5\%</math>)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction</li> </ol>
	US	<p>Enters and directs actions of 2-OHP-4022-013-010, Pressurizer Level Instrument Malfunction</p>

Time	Position	Applicant's Actions or Behavior
	RO	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Determines 2-NLP-151 is failed</li> <li>2. Determine 2-NLP-151 is the controlling channel and verify level control is in manual</li> <li>3. Place Pressurizer Level Control Selector Switch 2-LS-459-D in CHANNELS 2&amp;3 position</li> <li>4. Place Pressurizer Level Recorder selector switch in CHAN 2 or CHAN 3 position</li> <li>5. Determine 2-NPP-151 and 2-NLI-151 are not failed</li> <li>6. Verify pressurizer level is &gt;17%, letdown is in service, and pressurizer heaters are not tripped</li> <li>7. If 2-QRV-251 is not in Auto (expected), verify pressurizer level master control 2-RU-23, PZR LEVEL CONTROL is in Manual, adjust 2-RU-23 to null 2-QRV-251 controller, and place 2-QRV-251 controller 2-RU-29 in Auto</li> <li>8. Place 2-RU-23, PZR LEVEL CONTROL in Auto by verifying 2-QRV-251 in Auto, verify pressurizer level stable on program, and place 2-RU-23 in Auto</li> </ol>
	US	Identify applicable Technical Specification /Technical Requirements Manual conditions <ul style="list-style-type: none"> <li>• 3.3.1, Condition A Required Action A.1</li> <li>• 3.3.1 Condition D Required Action D.1 (Due to Table 3.3.1-1, Function 9)</li> <li>• T.S. 3.3.4 Condition A Required Action A.1 (NLP-151 is the only channel that provides Remote Shutdown Monitoring)</li> </ul> NOTE: TRM 8.7.14 is listed in the procedure but would only apply if letdown isolation had occurred.
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies management and WCSRO</li> <li>b. Directs RO/BOP to generate work request</li> </ol>
	US	Notifies SM/MTI to Initiate actions to trip Bi-stables associated with 2-NLP-151 Pressurizer Level failure per Attachment A-1 of 2-OHP-4022-013-010.

Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 5

**Event Description:**

The Unit 2 Containment Cooling system will fail due electrical fault on the supply bus. Containment pressure will increase. The Crew will enter 2-OHP-4022-028-001, Loss of Containment Chilled Water, initiate a containment pressure relief, and restore containment cooling by local alignment for open loop cooling using Non-Essential Service Water. The US should identify entry into the following Technical Specification condition/action: 3.6.4. Condition A Required Action A.1.

**Event Termination:** When the Crew has directed AEO action to establish to open loop containment cooling, the event is complete.

**Symptoms/Cues:**

2-WFI-901, NESW FROM CNTMT VT, lowers to zero

On PPC screen from Containment Cooling:

- Main Breaker 2-12CCB2-5C opens
- Tie breaker 2-12CCB2-5B opens
- Alarms:
  - Tie Breaker overcurrent
  - Main breaker overcurrent
  - Bus 1 under voltage
  - 48V DC Bus trouble

Containment pressure rises

Containment temperature rises

**Annunciators:**

- 204-5, CNTMT CHILLERS SYS TROUBLE
- 204-15, CNTMT CHILLERS SYS FAIL
- 204-41, CNTMT AIR TEMP REC HIGH OR ABNORMAL (After ~2 minutes)
- 205-31, UPPER CNTMT ORIENT 0 DEG PRESS HI OR LO (After ~1.5 minutes)
- 205-32, UPPER CNTMT ORIENT 180 DEG PRESS HI OR LO (After ~1.5 minutes)

**NOTE:** This malfunction will also cause a loss of containment chilled water on Unit 1, but these indications will not be available on Unit 2.

Time	Position	Applicant's Actions or Behavior
	BOP	Report annunciators on Panels 204 and 205 and indications of chiller failure
	BOP	Respond to alarms 204-5 and 204-15: <ul style="list-style-type: none"> <li>• Dispatch an operator to the Unit 2 Containment Chilled Water System skid to respond per 2-OHP-4024-CHW-WS (Local Annunciator Response Procedure)</li> </ul>

Time	Position	Applicant's Actions or Behavior
	US	Determine that containment pressure is > than tech spec maximum with instrument inaccuracies (0.2 psig) and direct a containment pressure relief NOTE: If a containment pressure relief is initiated prior to performing the AOP step, containment pressure may not rise above the Tech Spec limit.
	US	Direct performance of 2-OHP-4022-028-001, Loss of Containment Chilled Water
	BOP	Perform the following actions of 2-OHP-4022-028-001 as directed: <ul style="list-style-type: none"> <li>• Determine the containment chilled water system has failed based on eDNA displays of Electrical and Flow diagrams</li> <li>• Determine containment air temperatures and pressures are rising</li> </ul>
		NOTE: T.S. 3.6.5 for Containment Air Temperature is referenced as a possible Tech Spec entry per the AOP. Calculation of average containment temperature requires access to an Excel spreadsheet which is maintained in a public directory which should not be accessed to maintain exam security. If desired by the Lead Evaluator, the US may be given the following values to determine if required conditions of T.S. 3.6.5 are satisfied. (These values were previously calculated for this event. These values would not require entry into T.S. 3.6.5 conditions): <ul style="list-style-type: none"> <li>• Upper Containment Average: 94 °F</li> <li>• Lower Containment Average: 106 °F</li> </ul>
	US	May identify entry into T.S. 3.6.4. Condition A Required Action A.1 if required. NOTE: The Tech Spec limit with instrument uncertainties is 0.2 psig (Ref. 2-OHL-4030-SOM-042)
	US	Direct performance of 2-OHP-4021-028-004, Operation of the Containment Pressure Relief System

Time	Position	Applicant's Actions or Behavior
	BOP	Initiates Containment Pressure Relief per 2-OHP-4021-028-004, Operation of the Containment Pressure Relief System: <ul style="list-style-type: none"> <li>• Determine Radiation Monitoring System channels are all operable</li> <li>• Complete required sections of Data Sheet 1</li> <li>• Verify the daily source checks have been performed or perform source checks</li> <li>• Verify proper TRIP/BLOCK switch alignment</li> <li>• Review contingencies as listed in the procedure</li> <li>• Open Containment Isolation valves 2-VCR-107 and 2-VCR-207</li> <li>• Start 2-HV-CPR-1, Containment Pressure Relief Fan or open 2-HV-CDP-2, 2-HV-CPR-1 bypass volume damper</li> </ul>
	BOP	Continue actions of 2-OHP-4022-028-001 as directed: <ul style="list-style-type: none"> <li>• Determine power is not available to the Unit 2 Chilled Water System</li> <li>• Go to Attachment E, Restore Electric Power</li> <li>• Determine Unit 2 Bus is faulted</li> <li>• Verify breaker 2-12CCB2-5C is open</li> <li>• Verify both cross-tie breakers are open</li> <li>• Direct AEO performance of Attachment C, Swapping Containment Chill Water to Open Loop</li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 6

Event Description:

A locked rotor will occur on 21 RCP. Automatic reactor trip will fail. The Crew should recognize the failure of automatic trip and perform a manual reactor trip, perform immediate actions of 2-OHP-4023-E-0, Reactor Trip or Safety Injection, and transition to 2-OHP-4023-ES-0.1, Reactor Trip Response.

Event Termination: When the Crew has completed immediate actions of E-0 and transitioned to ES-0.1, the event is complete.

Symptoms/Cues:

- 21 RCP pump amps peg high
- 21 RCS Loop Flow lowers to zero
- 21 SG level and Steam Flow lower to zero
- 22, 23, & 24 SG steam flows increase
- Automatic turbine runback occurs due to OTΔT
- Multiple annunciators associated with RCS flow, RCS temperatures, and SG parameters
- 21 RCP breaker will trip in ~1 minute if not tripped by the RO

Time	Position	Applicant's Actions or Behavior
<p><b>CT1: Manually Trip the Reactor</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Indications and/or annunciators indicating an automatic reactor trip is required due to loss of reactor coolant loop 1 flow (Reactor Coolant Status Lights on 2-SML-13, Annunciator 207 Drop 1, 21 SG Level Lo-Lo status lights on 2-SML-19B, Annunciator 213 Drop 5), but the reactor does not automatically trip</li> <li>▪ <b>Performance Feedback:</b> Reactor trip breaker indicates open, control rod position indicates rods inserted, neutron flux lowers</li> <li>▪ <b>Success Path:</b> Either control room reactor trip switch will cause the associated breaker to open and insertion of all control rods</li> <li>▪ <b>Measurable Performance Standard:</b> Manually open at least one reactor trip breaker using control board switches within one minute of the trip condition.</li> </ul>		
	RO	Report loss of 21 RCP with reactor trip failure and perform a manual reactor trip by opening at least on Reactor Trip breaker <b>(CT1 related action)</b>
	US	Direct RO to perform a manual reactor trip

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Performs the immediate actions of E-0 from memory: <ol style="list-style-type: none"> <li>1. Checks reactor trip – Determines reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – Determines Turbine Stop Valve Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – Determines all emergency buses T21A, T21B, T21C, and T21D energized and both annunciators clear for Open Phase</li> <li>4. Checks safety injection status – Determine SI Status Lights – SI Status Lights NOT Lit (QMO-225/226 white lights NOT Lit) and SI not required based on:               <ul style="list-style-type: none"> <li>• PZR Pressure &gt; 1775#</li> <li>• CNTMNT Pressure &lt; 1.0#</li> <li>• SG Pressure &gt; 500#</li> <li>• STM Line DP &lt; 100psid</li> </ul> </li> </ol>
	RO	After completion of immediate actions from memory, trip 21 RCP breaker
	US	Verify performance of immediate actions using procedure 2-OHP-4023-E-0 and direct action for AFW flow control.
	BOP	Throttle AFW flow to maintain flow between 240E3 PPH and 450E3 PPH per E-0 step 4 RNO.
	US	Transition to 2-OHP-4023-ES-0.1, Reactor Trip Response.



Op. Test No.: Cook 2022 Scenario No.: NRC2022-2 Event No.: 7

**Event Description:**

After transition to ES-0.1, a fault will cause a loss of T21A, followed shortly by a loss of both Reserve Power transformers. DG2AB will start, load on to the faulted bus T21A, and trip. DG2CD is previously tripped. The Crew should enter ECA-0.0. Power restoration will be performed using the Emergency Power (EP) source. After power restoration, the Crew will complete ECA-0.0 actions and transition to ECA-0.1 or ECA-0.2, depending on pressurizer level.

**Event Termination:** The scenario terminates after the Crew has transitioned out of ECA-0.0.

**Symptoms/Cues:**

4.16 KV Bus T21A de-energizes

600V Bus 21A de-energizes

Multiple annunciators associated with loss of power, including:

- 219-75, 4KV BUS T21A CB T21A9 TRIP

DG2AB starts, output breaker closes to 4.16 KV Bus T21A, and then DG2AB trips and locks out

Reserve Power transformers #5 and #9 de-energize

Switchyard circuit breakers BE and BG open

All 4.16 KV and 600V buses de-energize

All 4.16 KV loads are lost, including but not limited to the following:

- Both Motor Driven AFW pumps
- Charging Pumps
- Running Reactor Coolant Pumps
- CCW Pumps
- ESW pumps

**NOTE:** If the Crew tripped the DG2CD in Event 2 using the STOP-RUN switch, the EDG will start and re-energize buses T21C and T21D. If this occurs, the Crew should follow the ARP for Hi-Hi Jacket Water temperature and attempt to establish ESW cooling by manually opening ESW supply valve. When this is unsuccessful, the Crew should trip the EDG and enter ECA-0.0 as described below.

Time	Position	Applicant's Actions or Behavior
	CREW	Diagnose a Loss of All AC Power
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4023-ECA-0.0, Loss of All AC Power

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Perform immediate actions of ECA-0.0 from memory <ol style="list-style-type: none"> <li>1. Checks reactor trip – Determines reactor Trip and Bypass breakers Open, neutron flux lowering</li> <li>2. Checks turbine trip – Determines Turbine Stop Valve Closed Status Lights Lit</li> </ol>
	US	Direct actions of 2-OHP-4023-ECA-0.0, Loss of All AC Power
	CREW	Verify correct performance of immediate actions using the procedure
	RO	Check if RCS is isolated: <ul style="list-style-type: none"> <li>• Close letdown isolation valves 2-QRV-111 and 2-QRV-112</li> <li>• Determine pressurizer PORVs and excess letdown isolation valves closed</li> </ul>
	BOP	Determine TDAFP is running and AFW flow is $>240 \times 10^3$ pph but less than $470 \times 10^3$ pph per Step 4 caution.  Control SG level based on previously established control bands
	RO/BOP	Perform the following actions from 2-OHP-4023-ECA-0.0 as directed: <ul style="list-style-type: none"> <li>• Determine no EDG is available</li> <li>• Determine EP supply to AC emergency buses is energized from offsite EP and implement Attachment D</li> <li>• Direct local action to close RCP seal injection filter isolation valves 2-CS-311N, 2-CS-311S, and 2-CS-307</li> <li>• Determine there is no running emergency DG</li> <li>• Direct local action to close 2-QCM-350, RCP Seal Water Return</li> <li>• Place equipment switches in PULL TO LOCKOUT: MDAFPs, CCPs, RHR pumps, SI pumps, CTS pumps, CCW pumps, ESW pumps, NESW pumps</li> <li>• Open 4KV supply breakers to pressurizer heaters, T21A6 &amp; T21D9</li> <li>• Determine EP 4KV Bus 1 is properly energized from offsite EP power</li> <li>• Select Train A bus for restoration based on lockout of Train B buses</li> </ul>

Time	Position	Applicant's Actions or Behavior
<p><b>CT2: Energize at least one AC emergency bus</b></p> <ul style="list-style-type: none"> <li>• <b>Initiating Cue:</b> Both of the following: <ul style="list-style-type: none"> <li>○ Indication/annunciation that all AC emergency buses are de-energized (Bus Energized indicating lights, Bus Voltage meter indications)</li> <li>○ Indication/annunciation/or other information that an AC source is available or can be made available (EP Red Status light lit, EP voltage meter indication, Standby Reserve Power Transformer #4 red indicating light)</li> </ul> </li> <li>• <b>Performance Feedback:</b> Indication that at least one AC emergency bus (T21D) is energized.</li> <li>• <b>Success Path:</b> Emergency Power 69 KV (EP) transformer is unaffected by the loss of 345KV power that de-energizes Reserve Power transformers #5 and #9. EP is the first procedurally preferred offsite power source. Transformer #4 could also be made available, with action by the Switchyard Operator, to re-energize from Reserve Power.</li> <li>• <b>Measurable Performance Standard:</b> Energize at least one ac emergency bus (T21D) prior to direction to perform the Deep Load Shed by implementing 2-OHP-4027-FSG-4, ELAP Power Management.</li> </ul>		
	BOP	<p>Energize Train A buses from EP as directed (<b>CT2 related actions</b>):</p> <ul style="list-style-type: none"> <li>• Determine bus T21D is available based on trip annunciators clear</li> <li>• Place breaker T21D8, DG2CD Supply to Bus T21D in PULL TO LOCKOUT</li> <li>• Place Train A Load Conservation switch to LOAD CON</li> <li>• Close breaker T21D1, 4KV EP Supply to Bus T21D and check the bus energized on all phases</li> </ul>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Perform the following actions from 2-OHP-4023-ECA-0.0 as directed:</p> <ul style="list-style-type: none"> <li>• Close 2-QCM-250, RCP Seal Water Return Isolation Valve</li> <li>• Close 2-CCM-453, CCW from RCP thermal barrier valve</li> <li>• Determine bus T21C is not energized but is available based on trip annunciators clear</li> <li>• Place breaker T21C3, DG2CD Supply to Bus T21C in PULL TO LOCKOUT</li> <li>• Close breaker T21C2, 4KV EP Supply to Bus T21C</li> <li>• Check if RCS cold leg temperatures are stable at or trending to 547 °F and take actions to minimize cool down as necessary: <ul style="list-style-type: none"> <li>○ Verify 2-DRV-407 is closed</li> <li>○ Control AFW flow</li> <li>○ If cool down continues, trip closed all SG Stop valves</li> </ul> </li> <li>• Determine SDGs are not connected to EP Bus 1 and place SDG Master Mode Selector Switch in MANUAL on the SDG System Control Screen</li> <li>• Start the East ESW pump and verify discharge valve 2-WMO-703 is open.</li> </ul>
	RO/BOP	<p>Perform the following actions from 2-OHP-4023-ECA-0.0 as directed:</p> <ul style="list-style-type: none"> <li>• Return Train A Load Conservation switch to NORMAL</li> <li>• Reset and start the North control room air handling unit 2-HV-ACRA-1</li> <li>• Verify non running equipment switches in PULL TO LOCKOUT: MDAFPs, CCPs, RHR pumps, SI pumps, CTS pumps, CCW pumps, ESW pumps, NESW pumps</li> <li>• Verify 4KV supply breakers to pressurizer heaters open with green target</li> </ul>

Time	Position	Applicant's Actions or Behavior
	CREW	Select recovery procedure: <ul style="list-style-type: none"> <li>• If RCS subcooling based on core exit thermocouples is &gt;40 °F and pressurizer level is &gt;20%, transition to 2-OHP-4023-ECA-0.1, Loss of All AC Power Recovery Without SI Required</li> <li>• If RCS subcooling based on core exit thermocouples is ≤40 °F or pressurizer level is ≤20%, transition to 2-OHP-4023-ECA-0.2, Loss of All AC Power Recovery With SI Required</li> </ul> When the Crew has restored AC power and transitioned out of ECA-0.0, the event is complete.

Simulator Instructions:

**SETUP:**

Reset to a MOL IC at 100% power (IC-950)

Verify DG2CD start lineup complete per 2-OHP-4021-032-001CD is complete per steps 4.1 and 4.2. Provide a marked of copy of 2-OHP-4021-032-001CD showing completion of sections 4.1 and 4.2, as well as marked up procedure steps to shut down the EDG after 10 minute run at 900-1100 KW.

Verify Containment Cooling supply for both units is on the Unit 2 source

Set up a failure of the Normal and Alternate ESW supply valves to DG2CD on ET1 with a two minute delay after DG load >600KW:

**ET1 when DG2CD > 800**      **U2\_EG140 ET1**  
**ZGI101WMO726\_U2 CLOSE ET1**      **ZGI101WMO728\_U2 CLOSE ET1**

Set up continuous inward rod motion at control rod speed of 72 steps per minutes on ET2:

**trg= 2 "set u2\_rdkrate2 72"**      **U2\_RD07H ET2**

Set up manual rod control to stop rod motion and failure of the bank selector switch in Manual on ET3:

**TRG= 3 "dmf u2\_rd07h"**      **ET3 when rods not in auto**  
**ZGI43CRDS12\_U2 Manual ET3**      **TRG= 3 "set u2\_rdkrate2 48"**

Set up a loss of Bus T21A and a loss of Transformers 5 and 9 on ET4:

**U2\_ED05E ET4**      **U12\_ED25B ET4 5 sec delay**      **U12\_ED25C ET4 5 sec delay**

Set up failure of automatic reactor trip:

**U2\_RP01A**      **U2\_RP01B**

Set up field flash of EDG for slow start:

**U2\_EGR18 ON**

**Event 1:**

Report oil governor level at 50%

**Event 2:**

When DG2CD is loaded to >800 KW, verify ET1 activates to cause loss of ESW to DG2CD after 2 minute delay:

**TRG! 1**

If asked to report local jacket water temperature on CTI-305, report the value of simulator variable U2\_EGTDGcdJW.

If asked to report local lube oil temperature on LTI-225, report the value of simulator variable U2\_EGTDGCDLO.

If AT ANY TIME DURING THE SCENARIO, the AEO is directed to locally open either 2-WMO-726 or 2-WMO-728, wait 4 minutes and report the valve actuator will not move the valve shaft.

If directed as AEO, perform the following to stop jacket water pumps and return to automatic:

**U2\_EGR04A STOP**

**U2\_EGR04A AUTO**

**U2\_EGR04B STOP**

**U2\_EGR04B AUTO**

**Event 3:**

When the Crew has tripped DG2CD and identified Technical Specification actions, and with the concurrence of the Lead Evaluator, activate ET2 to cause continuous inward rod motion:

**TRG! 2**

If the Crew completes actions of 2-OHP-4022-012-003 and has determined to not withdraw control rods to pre-malfunction height, with the concurrence of the Lead Evaluator, direct the US as Shift Manager to restore control rod position. This will enable evaluation of the reactivity manipulation by the RO.

**Event 4:** When the Crew has restored control rod position and completed actions of 2-OHP-4022-012-003, and with the concurrence of the Lead Evaluator, enter a failure of the controlling pressurizer level channel high:

**U2\_NLP151 100**

When contacted as MTI to trip bistables, inform the Crew that two technicians will be briefed and sent to the Control Room within 2 hours.

**Event 5:**

When the Crew has completed actions of 2-OHP-4022-013-010 up to bistable tripping, pressurizer level control is in automatic, and Technical Specifications have been identified, and with the concurrence of the Lead Evaluator, enter a loss of the Unit 2 Containment Cooling bus:

**U2\_SW09**

Role play as **AEO**: Three minutes after being dispatched to the Unit 2 Containment Chilled Water skid, call the Control Room and report the following:

Unit 2 containment chillers are not running

The following alarms are actuated:

- Drop 6, CHILLER FAILURE
- Drop 13, 480V COOLING CONTAINMENT BUS 2 UV
- Drop 14, 48 VDC TROUBLE ALARM

ARP, 4024-CHW-WS for Drop 13 directs performance of 2-OHP-4022-028-001, Loss of Containment Chilled Water

If directed to report status of the Chilled Water system based on local HMI, use the PPC display for Containment Chilled Water to report status as requested.

If asked as Unit 1, report that the Unit 1 cross-tie breaker is open.

When directed to swap to open loop cooling per Attachment C, perform the following:

**APP! U2\_CHW\_NESW\_OPEN\_LOOP.app**

When the file is complete (after ~8 minutes), report completion.

**Event 6:**

When the Crew has shifted to open loop containment cooling and secured the containment pressure relief, and with the concurrence of the Lead Evaluator, enter a locked rotor of 21 RCP:

**U2\_RCP1 Shaft Seizure**

**Event 7:**

When the Crew has tripped the reactor, completed immediate actions of E-0, and transitioned to ES-0.1, and with the concurrence of the Lead Evaluator, activate ET4 to cause a loss of bus T21A and both Reserve Power transformers:

**TRG! 4**

If DG2CD starts and re-energizes the buses, wait 15 minutes, or as directed by the Lead Evaluator, and trip DG2CD due to simulated bearing failure:

**ZGI5DGCDT\_U2 TRIP**

When directed to locally isolate RCP seal injection, wait 6 minutes and perform the following:

**U2\_CVR20 0**

**U2\_CVR21 0**

When directed to locally close 2-QCM-350, wait 5 minutes and perform the following:

**set U2\_CVVQCM350 0**

If asked as Unit 1, report annunciator 121-65 is clear.



**Form 3.3-1 Scenario Outline**

Facility:	DC COOK 1 & 2	Scenario #:	NRC2022-3
Scenario Source:	New	Op. Test #:	Cook 2022
Examiners:	_____	Applicants/ Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:	100% Power		
Turnover:	After crew turnover, swap NESW pumps and place the currently running pump in standby mode. After NESW pumps are swapped, reduce load to 95% in preparation for turbine valve testing.		
Critical Tasks**:	<ol style="list-style-type: none"> <li>1. Isolate ruptured SG</li> <li>2. Control initial RCS cool down</li> <li>3. Depressurize RCS to E-3 SI Termination criteria</li> <li>4. Terminate ECCS flow</li> </ol>		
Event No.	Malf. No.	Event Type*	Event Description**
1		N-BOP	Start South NESW Pump and Stop the North NESW pump.
2		R-RO	Commence power reduction to 95%
3	U1_NPP151	I-RO MC-RO TS	Pressurizer Pressure Channel Fails Low
4	U2_101GLC2	C-BOP MC-BOP	Bus Duct Cooling Fan Failure with failure of the standby fan to auto start
5	U2_SW07A	C-BOP MC-BOP	Main Turbine Oil Temperature Controller Failure
6	U2_RC23B @1%	C-RO TS MC-RO	SG Tube Leak
7	U2_RC23B	M-CREW	Steam Generator Tube Rupture (EOP entry)
	ZGI43SDI_U2	C-CREW	Steam Dump System failure
	U2_RC15A	C-CREW	Pressurizer spray valve NRV-163 fails open during RCS depressurization
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			
** Details on subsequent pages			

## Critical Task Details:

### CT1: Isolate ruptured SG

- **Initiating Cue:** Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection
- **Performance Feedback:** Indication of stable or increasing pressure in the ruptured SG (SG Stop Valves closed) and indication of zero feed water flow rate and lowered SG level rise in the ruptured SG (Auxiliary Feed Flow isolated).
- **Success Path:** No malfunctions are part of the scenario which would complicate procedurally directed action to isolate the ruptured SG.
- **Measurable Performance Standard:** Isolate feed water flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs by:
  - Isolating feed water flow into the ruptured SG by closing AFW supply valves
  - Isolating flow from the ruptured SG by completing applicable actions listed in E-3 step 3.
- **Safety Significance:** Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. The fact that the crew allows the differential pressure to dissipate and, as a result, are then forced to transition to a contingency ERG constitutes an incorrect performance that “necessitates the crew taking compensating action that would complicate the event mitigation strategy...” and a “significant reduction of safety margin beyond that irreparably introduced by the scenario”.

### CT2: Control initial RCS cool down

- **Initiating Cue:** Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection AND indication of ruptured SG pressure >450 psig
- **Performance Feedback:** Indication of intact SG PORV position, steam flow rate greater than zero, indication of RCS temperature decreasing.
- **Success Path:** RCS cool down will be performed by the second priority action in E-3 to use intact SG PORVs due to malfunction of the Steam Dump system.
- **Measurable Performance Standard:** Establish/maintain RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions:
  - Too high to maintain minimum required sub-cooling (requiring transition to ECA-3.1); OR
  - Too low as to cause a challenge to sub-criticality or integrity CSF (red or orange path requiring transition to the applicable CSF recovery procedure.)
- **Safety Significance:** Failure to establish and maintain the correct RCS temperature during a SGTR leads to a transition from E-3 to a contingency ERG. This failure constitutes an incorrect performance that “necessitates the crew taking compensating action that would complicate the event mitigation strategy...” and a “significant reduction of safety margin beyond that irreparably introduced by the scenario”

Continued on next page

**CT3: Depressurize RCS to E-3 SI termination criteria**

- **Initiating Cue:** Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection AND indication that the RCS is cooled down to target temperature.
- **Performance Feedback:** Indication of Spray Valve open position, RCS pressure decreasing, and pressurizer level rising.
- **Success Path:** Procedurally directed RCS depressurization will be performed using manual control of both pressurizer spray valves which are not affected by selected simulator malfunctions.
- **Measurable Performance Standard:** Depressurize RCS to meet SI termination criteria before water release from the ruptured SG PORV or safety valve as indicated by SG NR level indicating 100% with SG WR level stable and a SG PORV or Safety Valve not fully closed.
- **Safety Significance:** Failure to stop reactor coolant leakage into a ruptured SG by depressurizing the RCS (when it is possible to do so) needlessly complicates mitigation of the event. It also constitutes a “significant reduction of safety margin beyond that irreparably introduced by the scenario.” In addition, overfill of a SG tube rupture with a release path to the environment also increases radiation dose to the public.

**CT4: Terminate ECCS Flow**

- **Initiating Cue:** Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection, indication that the RCS is cooled down to target temperature, indication that RCS depressurization is complete, AND indications that SI termination criteria are met.
- **Performance Feedback:** Indication of decreasing SI pump flow, decreasing BIT flow
- **Success Path:** The delay in completing RCS depressurization steps is not significant due to clear procedural actions to stop RCPs to stop depressurization. Thus, procedurally directed actions to terminate SI flow can be performed in a timely manner from the Control Room.
- **Measurable Performance Standard:** Terminate ECCS flow before water release from the ruptured SG PORV or safety valve as indicated by SG NR level indicating 100% with SG WR level stable and a SG PORV or Safety Valve not fully closed by:
  - Stopping both SI pumps AND
  - Stopping all but one running CCP AND
  - Isolating BIT flow
- **Safety Significance:** Failure to terminate ECCS flow during a SGTR (when it is possible to do so) needlessly complicates the mitigation strategy. It also constitutes a “significant reduction of safety margin beyond that irreparably introduced by the scenario. In addition, overfill of a SG tube rupture with a release path to the environment also increases radiation dose to the public.

## Event Description Details:

Event 1: The crew is directed to start the South NESW Pump and shutdown the North NESW pump per 12-OHP-4021-020-002. An AEO has been briefed and is ready for the pump start. After NESW Pumps have been swapped, the crew is directed to lower power.

Event 2: The Crew will perform a power reduction to 95% using the normal operating procedure 2-OHP-4021-011-001, At Power Operation Including Load Swings.

Event 3: Controlling Pressurizer Pressure channel 2-NPP-151 fails downscale causing both spray valves to close. The crew should implement 2-OHP-4022-IFR-001, Instrument Failure Response, perform immediate actions from memory, take manual control of pressurizer pressure, and then implement 2-OHP 4022-013-009, Pressurizer Pressure Instrument Malfunction. The Crew will disable the failed channel and return pressurizer pressure control to automatic. The US should identify entry into the following Technical Specification conditions/actions:

- 3.3.1 Condition A Required Action A.1
- 3.3.1 Condition D Required Action D.1
- 3.3.2 Condition A Required Action A.1
- 3.3.2 Condition D Required Action D.1
- 3.3.2 Condition G Required Action G.1
- 3.3.4 Condition A Required Action A.1
- 3.5.2 Condition A Required Action A.1

Event 4: The running Generator Bus Duct Cooling fan will trip, and the standby fan will fail to automatically start. The Crew should manually start the standby Bus Duct Cooling Fan as a backup to a failed automatic action or per the Annunciator Response Procedure.

Event 5: The event is a failure of the controller for 2-WRV-970, Main Turbine Lube Oil Temperature Control full closed in automatic. Main Turbine lube oil and bearing temperatures will rise and several alarms will actuate. The crew should respond per 2-OHP-4022-IFR-001 and take manual control of 2-WRV-970 to return oil temperatures to normal.

Event 6: A ~8 gpm SG tube leak is initiated on 22 SG. The crew should diagnose SG tube leakage based on pressurizer level changes and radiation monitor indications and enter AOP 2-OHP-4022-002-021, Steam Generator Tube Leak. The Crew should stabilize pressurizer level with manual control, determine leak rate, and determine a reactor shutdown is required. The US should identify entry into the following Technical Specification condition/actions: 3.4.13 Condition B Required Action B.1 & B.2.

Event 7: The SG Tube leak will increase to a tube rupture of ~400 gpm. The Crew should determine that leak rate has increased to >100 gpm and perform a manual reactor trip and actuate safety injection. The Crew will complete actions of 2-OHP-4023-E-0, Reactor Trip or Safety Injection and transition to 2-OHP-4023-E-3, Steam Generator Tube Rupture. Failure of the Steam Dump system will require RCS Cool down using SG PORVs. RCS depressurization will be performed using pressurizer spray. One pressurizer spray valve will stick open, requiring the Crew to stop 23 and 24 RCPs when depressurization is complete. ECCS flow will be terminated.

The scenario may be terminated any time after ECCS flow is stopped.

**Target Quantitative Attributes per Scenario (Ref ES-3.4 Table 3.4-1)**

Quantitative Attribute	Target per scenario	Actual Number/ scenario	How Met
Events after EOP Entry	1-2	2	Steam Dump System failure PZR spray valve failure
Abnormal Events	2-4	4	Pressurizer Pressure Channel Fails Low Bus Duct Cooling Fan Failure Main Turbine Oil Temperature Controller Failure SG Tube Leak
Major Transients	1-2	1	SG Tube Rupture
EOPs entered requiring substantive action	1-2	1	E-3
Entry into contingency EOP with substantive actions	1 per set	0	
Pre-identified CTs	2 or more	4	Isolate ruptured SG Control initial RCS cool down Depressurize RCS to E-3 SI Termination criteria Terminate ECCS flow

**Form 3.3-2 Required Operator Actions**

<p>Op. Test No.: <u>Cook 2022</u> Scenario No.: <u>NRC2022-3</u> Event No.: 1</p> <p>Event Description: The crew is directed to start the South NESW Pump and shutdown the North NESW pump per 12-OHP-4021-020-002. An AEO has been briefed and is ready for the pump start.</p> <p>Event Termination: When NESW pumps have been swapped to the South pump in service and the North pump off, the event is complete.</p> <p>Symptoms/Cues: N/A</p>
--

Time	Position	Applicant's Actions or Behavior
	BOP	Direct AEO to verify South NESW pump is ready for start
	BOP	Start the Unit 2 South NESW pump per 12-OHP-4021-020-002 Attachment 1: <ul style="list-style-type: none"> <li>• Verify that 2-WMO-902, Unit 2 South NESW Pump discharge valve is open using valve position indicating lights</li> <li>• Start the South NESW pump using the control board switch</li> <li>• Direct AEO to verify the Backwash Selector switch in AUTO</li> </ul>
	BOP	Stop the Unit 2 North NESW pump per 12-OHP-4021-020-002 Attachment 1: <ul style="list-style-type: none"> <li>• Close 2-WMO-901, North NESW Pump Discharge valve using control board switch</li> <li>• Stop the Unit 2 North NESW pump using the control board switch</li> <li>• Open 2-WMO-901, North NESW Pump Discharge valve using control board switch</li> <li>• Place 2-PP-8N control board switch in AUTO</li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-3 Event No.: 2

**Event Description:**

The Crew will perform a power reduction to 95% using the normal operating procedure 2-OHP-4021-011-001, At Power Operation Including Load Swings.

**Event Termination:** When the Crew has completed the power reduction and restored systems to Automatic, the event is complete.

**Symptoms/Cues:**

N/A

Time	Position	Applicant's Actions or Behavior
	RO	Prepare a reactivity plan for the 5% power reduction  NOTE: This may have been performed during the scenario pre-brief)
	US	Direct actions of 2-OHP-4021-011-001, Attachment 2, Power Reductions Between 89% and 100%.
	US	Confirm load reduction is approved by the Shift Manager
	RO	If the Crew determines that MANUAL rod control is required: <ul style="list-style-type: none"> <li>• Place Full Length Bank Selector Switch in MANUAL</li> <li>• Perform rod motion to adjust AFD or RCS temperature</li> <li>• Place rod control in AUTO when desired</li> </ul>
	RO/BOP	Reduce turbine load per 2-OHP-4021-050-001, Attachment 5, Turbine Control Operation, using the Main Turbine HMI: <ul style="list-style-type: none"> <li>• Adjust Tavg and Tref inhibit setpoints as desired, not to exceed ±5 °F</li> <li>• Place Megawatt Control in 'IN'</li> <li>• Select desired MW 'Target'</li> <li>• Select desired MW 'Ramp Rate'</li> <li>• Select 'GO'</li> <li>• When evolution is complete, place Megawatt Control in 'OUT'</li> </ul>

Time	Position	Applicant's Actions or Behavior
	RO	<p>NOTE: Boration may be performed using Attachment 2, Boric Acid Blender Operation in Manual Mode, Attachment 3, Boric Acid Blender Operation in the Borate Mode, Attachment 14 Blender Operation Short Form-Borate Mode, or Attachment 17, Blender Operation Short Form-Manual Mode. Actions listed below are from Attachment 3, which is the expected response.</p> <p>Maintain Tav<sub>g</sub> by boration as necessary per 2-OHP-4021-005-002, Operation of the Unit 2 Boric Acid Blender:</p> <ul style="list-style-type: none"> <li>• If desired, verify charging header flow is &gt;75 gpm and close the East CCP Emergency Leak Off valve 2-QMO-225</li> <li>• Verify the Boric Acid Blender is aligned for automatic</li> <li>• Determine desired boration batch (may have been performed as part of scenario debrief)</li> <li>• Place Reactor Control Makeup Blend Control Switch in STOP</li> <li>• Place RC Makeup Blend Control Mode Selector Switch in BORATE</li> <li>• Set desired batch on BA flow totalizer: <ul style="list-style-type: none"> <li>○ Depress PRE A and verify display reads PRE A</li> <li>○ Depress PRE A again to display last requested batch amount preset</li> <li>○ Depress an arrow to change value of associated decimal place</li> <li>○ When new batch amount is preset, depress ENTER button twice</li> </ul> </li> <li>• Adjust 2-RU-33, Blender BA Flow Control to desired flow</li> <li>• Place Reactor Coolant Makeup Blend Control switch in START and verify automatic actions: <ul style="list-style-type: none"> <li>○ BA Pump(s) selected to RUN shift to FAST</li> <li>○ 2-QRV-400, BLENDER TO CHG PUMPS SUCT, opens</li> <li>○ 2-QRV-421, BORIC ACID TO BLENDER, throttles open to selected flow</li> </ul> </li> <li>• Divert letdown flow if desired using 2-RU-28 in manual or place 2-QRV-303 in the CVCS HU Tank position</li> </ul>



Time	Position	Applicant's Actions or Behavior
	RO	<p>If desired to clear the Boric Acid Blender Line when the boration is complete per 2-OHP-4021-005-002 Attachment 5, Boric Acid Blender Operation in Alternate Dilute Mode (expected and listed below) or Attachment 16, Blender Operation Short Form-Alternate Mode.:</p> <ul style="list-style-type: none"> <li>• Determine ~27 gallons is required</li> <li>• Place Reactor Control Makeup Blend Control Switch in STOP</li> <li>• Place RC Makeup Blend Control Mode Selector Switch in ALT DILUTE</li> <li>• Set desired batch on PW flow totalizer: <ul style="list-style-type: none"> <li>○ Depress PRE A and verify display reads PRE A</li> <li>○ Depress PRE A again to display last requested batch amount preset</li> <li>○ Depress an arrow to change value of associated decimal place</li> <li>○ When new batch amount is preset, depress ENTER button twice</li> </ul> </li> <li>• Adjust 2-RU-34, Blender PW Flow Control to desired flow</li> <li>• If desired to make up only to CCP suction, place control switch for 2-QRV-451 in CLOSE</li> <li>• Place Reactor Coolant Makeup Blend Control switch in START and verify automatic actions: <ul style="list-style-type: none"> <li>○ 2-QRV-400, BLENDER TO CHG PUMPS SUCT, opens</li> <li>○ 2-QRV-422, PRIM WATER TO BLENDER, throttle open</li> <li>○ Primary Water flow indication on 2-QFC-422, PRI WATER FLOW, and 2-QRV-422 HMI</li> </ul> </li> </ul>
	RO	<p>When desired to align the boric acid blender for Automatic per 2-OHP-4021-005-002 Attachment 1, Boric Acid Blender Operation in Automatic Mode:</p> <ul style="list-style-type: none"> <li>• Verify Reactor Coolant Makeup Blend control switch in STOP</li> <li>• Align boric acid blender control valves to Auto and Verify 2-RU-33 flow control is set for required flow rate</li> <li>• Place RC Makeup Blend Control Mode Select Switch in AUTO</li> <li>• Place Reactor Coolant Makeup Blend Control switch in START</li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-3 Event No.: 3

**Event Description:**

Controlling Pressurizer Pressure channel 2-NPP-151 fails downscale causing both spray valves to close. The crew should implement 2-OHP-4022-IFR-001, Instrument Failure Response, perform immediate actions from memory, take manual control of pressurizer pressure, and then implement 2-OHP 4022-013-009, Pressurizer Pressure Instrument Malfunction. The Crew will disable the failed channel and return pressurizer pressure control to automatic. The US should identify entry into the following Technical Specification conditions/actions:

- 3.3.1 Condition A Required Action A.1
- 3.3.1 Condition D Required Action D.1
- 3.3.2 Condition A Required Action A.1
- 3.3.2 Condition D Required Action D.1
- 3.3.2 Condition G Required Action G.1
- 3.3.4 Condition A Required Action A.1
- 3.5.2 Condition A Required Action A.1

**Event Termination:** When the Crew has completed 2-OHP 4022-013-009 actions to defeat the failed channel and return pressurizer pressure control to Automatic, the event is complete.

**Symptoms/Cues:**

2-NPP-151 fails low to 1700 psig

Both spray valves close

Actual RCS pressure begins to rise

Panel SML-14 Status Lights energize:

- CH I PRESS LOW-LOW
- CH I PRESS EXT LOW
- CH I PRESS LOW PERM P-11

Panel SML-17 Status Lights:

- LP 1 CH 1 OTΔT RX TRIP
- LP 1 CH 1 OTΔT BLK ROD WDR

ANN Panel 208 alarms:

- Drop 8, PRZ PRESS LOW DEV BACKUP HTRS ON
- Drop 9, PRZ PRESS LOW-LOW
- Drop 10, PRZ PRESS EXT LOW

ANN Panel 211 alarms:

- Drop 5, LOOPS 1,2,3,4 OVERTEMP ΔT AT TRIP SP
- Drop 10, LOOPS 1,2,3,4 OVERTEMP ΔT AT C3

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports pressurizer pressure instrument failure based on control board indications and annunciators

Time	Position	Applicant's Actions or Behavior
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response
	RO	<p>Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory:</p> <ul style="list-style-type: none"> <li>• Determines a pressurizer pressure instrument or control system issue exists</li> <li>• Determines pressurizer pressure is not stable at or trending to program</li> <li>• Places pressurizer pressure control in manual by taking manual control of 2-RU-27, PRZ PRESS CONTROL, 2-RU-24 AND 2-RU-25, PZR SPRAY CONTROL, or Pressurizer Heaters as desired and restore pressurizer pressure to program pressure</li> <li>• Determine pressurizer PORVs are closed</li> </ul>
	Crew	<p>Performs plant stability checks. (Order not important)</p> <p>RO</p> <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> <p>BOP</p> <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	<p>Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure:</p> <ol style="list-style-type: none"> <li>1. Verifies RO immediate actions taken from memory</li> <li>2. Assigns manual control band for pressurizer pressure</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-013-009, Pressurizer Pressure Instrument Malfunction</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-013-009, Pressurizer Pressure Instrument Malfunction

Time	Position	Applicant's Actions or Behavior
	CREW RO  RO RO  RO/BOP  US RO RO/BOP	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Determine 2-NPP-151 is the failed channel and is also the controlling channel</li> <li>2. Verify pressure control is in Manual</li> <li>3. Place PRESS CTRL SLECTOR switch 2-PS-455-F in Channels 2&amp;3 position</li> <li>4. Verify recorder selector switches 2-PS-455-G, 2-43-DT, 2-43-OPDT, and 2-43-OTDT are selected to channel 2, 3, or 4</li> <li>5. Declare East CCP inoperable</li> <li>6. Verify 2-QMO-225, East CCP Leak Off valve is open</li> <li>7. Direct local action to open 2-QMO-225 breaker, 2-ABV-D-5C</li> </ol>
	RO	Performs the following actions as directed to restore pressure control to automatic: <ul style="list-style-type: none"> <li>• Verify 2-RU-27, PRZ PRESS CONTROL, in MANUAL</li> <li>• If either spray valve controller is in manual, null the controller and return to auto</li> <li>• Adjust pressurizer pressure to 2235 psig to null 2-RU-27</li> <li>• Place 2-RU-27 in AUTO</li> </ul>
	RO	Verify P-11 interlock is in the correct status (Status light on 2-SML-14 not lit)
	US	Identify entry into the following Technical Specification & /Technical Requirements Manual conditions/actions: <ul style="list-style-type: none"> <li>• 3.3.1 Condition A Required Action A.1</li> <li>• 3.3.1 Condition D Required Action D.1 (Due to Table 3.3.1-1, Functions 6, 8a, 8b)</li> <li>• 3.3.2 Condition A Required Action A.1</li> <li>• 3.3.2 Condition D Required Action D.1 (Due to Table 3.3.2-1, Function 1d)</li> <li>• 3.3.2 Condition G Required Action G.1 (Due to Table 3.3.2-1, Function 8b)</li> <li>• 3.3.4 Condition A Required Action A.1</li> <li>• 3.5.2 Condition A Required Action A.1</li> <li>• TRM 8.1.1 Condition A Required Action A.1</li> <li>• TRM 8.7.14 Condition B Required Actions B.1 &amp; B.2</li> </ul>

Time	Position	Applicant's Actions or Behavior
	US	Initiates corrective action for failed channel <ul style="list-style-type: none"> <li>a. Notifies management and WCSRO</li> <li>b. Directs RO/BOP to generate work request</li> </ul>
	US	Notifies SM/MTI to Initiate actions to trip Bi-stables associated with 2-NPP-151 Pressurizer Pressure failure per 2-OHP-4022-013-009.

Op. Test No.: Cook 2022 Scenario No.: NRC2022-3 Event No.: 4

**Event Description:**

The running Generator Bus Duct Cooling fan will trip, and the standby fan will fail to automatically start. The Crew should manually start the standby Bus Duct Cooling Fan as a backup to a failed automatic action or per the Annunciator Response Procedure.

**Event Termination:** When the standby Bus Duct Cooling fan has been started and Bus Duct temperature returned to normal, the event is complete.

**Symptoms/Cues:**

East Bus Duct fan stops

- Pump Control Switch green light and red light de-energized

**Alarms:**

- 221-19, GEN DUCT COOLING FAN FAILURE
- 221-18, GEN DUCT COOLING AIR TEMP HIGH (possible after short delay based on timing of crew response)

Time	Position	Applicant's Actions or Behavior
	BOP	Identify and report annunciators on Panel 221
	BOP	Perform applicable annunciator response procedures: <ul style="list-style-type: none"> <li>• Place standby fan switch (West fan) in RUN</li> <li>• Place failed fan switch (East fan) in STOP</li> <li>• Dispatch AEO to investigate reason for loss of the East fan</li> <li>• Determine power reduction for inoperable bus duct cooling is not required</li> </ul> NOTE: The BOP may start the West Bus Duct fan prior to referring to the ARP as a backup manual action for a failed automatic action

Op. Test No.: Cook 2022 Scenario No.: NRC2022-3 Event No.: 5

**Event Description:**

The event is a failure of the controller for 2-WRV-970, Main Turbine Lube Oil Temperature Control full closed in automatic. Main Turbine lube oil and bearing temperatures will rise and several alarms will actuate. The crew should respond per 2-OHP-4022-IFR-001 and take manual control of 2-WRV-970 to return oil temperatures to normal.

**Event Termination:**

When the crew has taken manual control of 2-WRV-970 and returned oil temperatures to normal, the event is complete.

**Symptoms/Cues:**

2-WRV-970, Main Turbine Lube Oil Temperature Control Valve, closes fully  
 MT lube oil temperatures and bearing temperatures rise on recorder SG4

**Alarms (Possible based on timing of Crew actions):**

- 218-8, MAIN TURBINE THRUST BRG REC TEMP HIGH
- 218-9, MAIN TURBINE OIL CLR DISCH REC TEMP HIGH
- 218-30, MAIN TURB BRG 9 LUBE OIL TEMP HIGH

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports automatic failure of 2-WRV-970, Main Turbine Lube Oil Temperature Control Valve based on control board indications and annunciators
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response
	BOP	Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory: <ul style="list-style-type: none"> <li>• Determines a lube oil temperature control system issue exists</li> <li>• Determines Main Turbine Lube Oil controller is not controlling properly in AUTOMATIC</li> <li>• Places controller for 2-WRV-970 in HAND and open the valve as necessary to stabilize temperature in desired band</li> <li>• Establish manual control band for Main Turbine Lube Oil temperature (110-120 °F nominal)</li> <li>• Determine that Main Turbine Lube Oil Temperature is under control</li> </ul>

Time	Position	Applicant's Actions or Behavior
	Crew	Performs plant stability checks. (Order not important) RO <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> BOP <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure: <ol style="list-style-type: none"> <li>1. Verifies BOP immediate actions taken from memory</li> <li>2. Assigns manual control band for main turbine lube oil</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Initiate repair for failed controller</li> </ol>



Op. Test No.: Cook 2022 Scenario No.: NRC2022-3 Event No.: 6

**Event Description:**

A ~8 gpm SG tube leak is initiated on 22 SG. The crew should diagnose SG tube leakage based on pressurizer level changes and radiation monitor indications and enter AOP 2-OHP-4022-002-021, Steam Generator Tube Leak. The Crew should stabilize pressurizer level with manual control, determine leak rate, and determine a reactor shutdown is required. The US should identify entry into the following Technical Specification condition/actions: 3.4.13 Condition B Required Action B.1 & B.2.

**Event Termination:** When the Crew has stabilized pressurizer level, quantified the leak rate, and identified the Tech Spec required shut down, the event is complete.

**Symptoms/Cues:**

Pressurizer level lowers

Charging flow rises

VCT Level lowers

The following Rad Monitor readings will rise:

- SRA-2805, Gland Steam Condenser Vent
- SRA-2905, Steam Jet Air Ejector

The following ANN Panel 211 alarms actuate:

- Drop 48, PPC-RMS U1 CT ALARM OR ABNORMAL
- Drop 49, PPC-RMS U2 CT ALARM OR ABNORMAL

Time	Position	Applicant's Actions or Behavior
	CREW	Diagnose SG Tube Leakage based on lowering pressurizer level with stable Tavg and secondary radiation monitor alarms
	US	Enter and direct actions of 2-OHP-4022-002-021, Steam Generator Tube Leak  NOTE: If the Crew fails to diagnose SG Tube Leakage, they may enter 2-OHP-4022-002-020, Excessive Reactor Coolant Leakage, and perform actions of this procedure until SG Tube Leakage is identified
	US	Inform the Shift Manager of event in progress to determine if Emergency Classification is required  NOTE: Leak rate of ~8 gpm will not exceed the 25 gpm limit for identified leakage required to declare an Unusual Event

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Perform actions of 2-OHP-4022-002-021 as directed: <ul style="list-style-type: none"> <li>• Identify the Unit is in Mode 1</li> <li>• Determine pressurizer level is not stable or trending to program level</li> <li>• Raise charging flow to maintain pressurizer level by manual control of 2-QRV-251 and 2-QRV-200 while maintaining seal injection flow at 6-12 gpm per RCP</li> <li>• Determine further steps to stabilize pressurizer level are not required</li> <li>• Determine VCT makeup not initially required and monitor automatic makeup when it occurs</li> <li>• Perform Attachment B:               <ul style="list-style-type: none"> <li>○ Determine Auxiliary Steam is on Unit 1</li> <li>○ Direct local action to place 12-DRV-710, Turbine Room Sump Pumps Discharge control valve control switch in RECIRC</li> <li>○ Direct Chemistry to sample SGs for activity</li> <li>○ Direct Chemistry to monitor Turbine Room Sump compositor samples more frequently</li> <li>○ Notify RP to monitor turbine building leaks for contamination</li> <li>○ Notify RP to survey main steam lines for activity</li> </ul> </li> <li>• Determine leak rate is ~8 gpm</li> <li>• Determine primary to secondary leak rate exceeds 75 gallons per day and contact Duty Staff Supervisor to determine if shutdown is prudent</li> <li>• Continue to monitor leak rate for possible implementation of continuous actions steps for reactor trip/SI if leakage increases above limits</li> </ul>
	US	Determine entry into T.S. 3.4.13 Condition B Required Actions B.1 & B.2

Op. Test No.: Cook 2022 Scenario No.: NRC2022-3 Event No.: 7

**Event Description:**

The SG Tube leak will increase to a tube rupture of ~400 gpm. The Crew should determine that leak rate has increased to >100 gpm and perform a manual reactor trip and actuate safety injection. The Crew will complete actions of 2-OHP-4023-E-0, Reactor Trip or Safety Injection and transition to 2-OHP-4023-E-3, Steam Generator Tube Rupture. Failure of the Steam Dump system will require RCS Cooldown using SG PORVs. RCS depressurization will be performed using pressurizer spray. One pressurizer spray valve will stick open, requiring the Crew to stop 23 and 24 RCPs when depressurization is complete. ECCS flow will be terminated.

**Event Termination:** The scenario may be terminated any time after ECCS flow is stopped.

**Symptoms/Cues:**

Pressurizer level lowers rapidly  
 Pressurizer pressure lowers  
 22 SG NR level rises slightly, 22 SG FRV throttles closed

**When Steam Dump is transferred to Steam Pressure Mode in E-3:**

- Steam Dump valves close
- Condenser Vacuum Permissive C9 status light on 2-SML-18 de-energizes

**When pressurizer spray valves are manually opened in E-3**

- 2-NRV-164 fails full open
- Red Open position light remains on when control signal is reduced
- RCS depressurization continues

Time	Position	Applicant's Actions or Behavior
	RO	Identify increase in leak rate to >100 gpm
	US	Direct performance of a manual reactor trip and safety injection per 2-OHP-4022-002-021 continuous action step  Ensures immediate actions of 2-OHP-4023-E-0 are completed  Directs subsequent actions of 2-OHP-4023-E-0.

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Performs the immediate actions of E-0 from memory:  Perform a manual reactor trip using control board switches</p> <ol style="list-style-type: none"> <li>1. Checks reactor trip – Determines reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – Determines Turbine Stop Valve Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – Determines all emergency buses T21A, T21B, T21C, and T21D energized and both annunciators clear for Open Phase</li> </ol> <p>Manually initiates SI using control board switches</p> <ol style="list-style-type: none"> <li>4. Checks safety injection status - Determines 2-QMO-225 white light is not lit and actuates SI using both sets of switches</li> </ol>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Complete actions of E-0 through steps 5-18 as directed:</p> <ol style="list-style-type: none"> <li>5. Check if Main Steam line isolation is required-Determine isolation is not required based on containment pressure &lt;2.8 psig SG pressures and steam flows at normal post trip value.</li> <li>6. Check if CTS is required-Determine containment pressure has remained below 2.8 psig:</li> <li>7. Implement Attachment A while continuing with E-0 (actions listed below)</li> <li>8. Check if ruptured SG is suspected-When 22 SG narrow range level is greater than 13%, then close AFW valves to 22 SG 2-FMO-221 and 2-FMO-222 <b>(CT1 related action)</b></li> <li>9. Check AFW pumps running-Determine all three AFW pumps are running</li> <li>10. Check total AFW flow &gt;240 x10<sup>3</sup> PPH</li> <li>11. Minimize unnecessary RCS cooldown-Reduce total AFW flow to between 240 x10<sup>3</sup> PPH and 450 x10<sup>3</sup> PPH and control NR level between 13% and 50%</li> <li>12. Check AFW pump discharge valves-Determine valves are throttled</li> <li>13. Check FW isolation-Determine both MFPs tripped, both MFP discharge valves closed, all four FRVs closed, and all four feed water isolation valves closed</li> <li>14. Check RCS temperature-Determine RCS temperature is stable, or if lowering, no dumping of steam is occurring, 2-DRV-407 is closed, AFW flow is &gt;240 x10<sup>3</sup> PPH, and SG stop valves should remain open.</li> <li>15. Check pressurizer PORVs and spray valves-Determine PORVs closed, spray valves are closed, and PORV block valves are all energized.</li> <li>16. Check if RCPs should be stopped-Determine criteria are not satisfied to stop RCPs.</li> <li>17. Check if SG secondary pressure boundaries are intact-Determine no SG pressure is lowering in an uncontrolled manner nor completely depressurized</li> <li>18. Check if SG tubes are intact-Determine 22 SG NR level rising in an uncontrolled manner and transition to 2-OHP-4023-E-3, Steam Generator Tube Rupture</li> </ol>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Perform actions of Attachment A as follows:</p> <ol style="list-style-type: none"> <li>1. Check ECCS pumps all running-Determine CCPs, SI pumps, and RHR pumps are all running.</li> <li>2. Check ECCS flow-Determine flow is indicated for BIT flow; Determine no SI pump flow or RHR HX flow.</li> <li>3. Check ECCS valves in proper alignment-Determine ECCS alignment is correct using status lights on 2-SML-12A, 2-SML-12B, 2-SML-12C, 2-SML-11A, 2-SML-11B, and 2-SML-11C.</li> <li>4. Check CCW status-Determine both CCW pumps running, CCW surge tank stable, and CCW monitor lights in proper status using 2-SML-8B.</li> <li>5. Check ESW status-Determine both ESW pumps running, both discharge valves open, and proper status lights on 2-SML-7</li> <li>6. Check if containment recirculation fans should be running-Determine containment pressure &lt;1 psig</li> <li>7. Place DIS in service by directing local action to stop all ice condenser air handling units and turning on all hydrogen ignitors when local action is reported complete</li> <li>8. Check containment vent and Phase A isolation-Determine Containment Vent Isolation and Phase A isolation are actuated and completed on both trains, and direct actions to periodically monitor SFP radiation, SFP cooling, and SFP level</li> <li>9. Check ESF fans both running-Determine both fans are running</li> <li>10. Align control room ventilation by checking both pressurization fans are running, stopping one pressurization fan, checking cable vault hatch closed, checking control room dampers aligned for SI, and checking at least one control room air handling unit is running</li> <li>11. Align PACHMS for service by momentarily placing containment hydrogen sample bypass switches in BYPASS</li> <li>12. Request Unit 1 perform actions</li> <li>13. Check generator trip-Determine generator output breakers are both open and main generator excitation control is OPEN</li> <li>14. Check Load Conservation status-Determine all AC buses T21B and T21C are energized by offsite power</li> <li>15. Check NESW pressure is &gt;65 psig on 2-WPI-901</li> <li>16. Check Containment Isolation Phase B status-Determine Containment Isolation Phase B is not actuated.</li> <li>17. Report completion of Attachment A and report any unexpected conditions or actions taken</li> </ol>

Time	Position	Applicant's Actions or Behavior
	US	Announces transition to OHP-4023-E-3, Steam Generator Tube Rupture and directs operator actions.  Checks Status Trees for Red Path
	RO/BOP	Reviews E-3 Foldout Page Criteria and perform steps of E-3 as directed
	RO	Determine RCPs should not be stopped based on RCS pressure
	RO/BOP	Direct Chemistry to sample all SGs for activity using 12-THP-4030-002-208, Primary to Secondary Leak Rate
	BOP	Identify 22 SG as ruptured based on unexpected rise in narrow range SG level
<p><b>CT1: Isolate ruptured SG:</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection</li> <li>▪ <b>Performance Feedback:</b> Indication of stable or increasing pressure in the ruptured SG (SG Stop Valves closed) and indication of zero feed water flow rate and lowered SG level rise in the ruptured SG (Auxiliary Feed Flow isolated).</li> <li>▪ <b>Success Path:</b> No malfunctions are part of the scenario which would complicate procedurally directed action to isolate the ruptured SG.</li> <li>▪ <b>Measurable Performance Standard:</b> Isolate feed water flow into and steam flow from the ruptured SG before a transition to ECA-3.1 occurs by: <ul style="list-style-type: none"> <li>○ Isolating feed water flow into the ruptured SG by closing AFW supply valves</li> <li>○ Isolating flow from the ruptured SG by completing applicable actions listed in E-3 step 3.</li> </ul> </li> </ul>		
	BOP	Isolate flow from ruptured SG: <ul style="list-style-type: none"> <li>• Adjust 22 SG PORV controller to 1040 psig and check PORV closed</li> <li>• Close 2-MCM-221, SG2 MAIN STEAM TO AUX FP TURB <b>(CT1 related action)</b></li> <li>• Determine blowdown isolation and blowdown sample valves for 22 SG are closed</li> <li>• Place 2-DRV-407 in CLOSE and check closed</li> <li>• Determine steam line warming valves are closed</li> <li>• Trip closed 22 SG stop valve 2-MRV-220 <b>(CT1 related action)</b></li> <li>• Verify ruptured SG stop valve dump valves 2-MRV-221 and 2-MRV-222 closed</li> </ul>
	BOP	When 22 SG narrow range level is greater than 13%, then close AFW valves to 22 SG 2-FMO-221 and 2-FMO-222 if not previously performed <b>(CT1 related action)</b>

Time	Position	Applicant's Actions or Behavior
	BOP	Determine 22 SG is isolated from intact SGs based on differential pressure
	BOP	Determine 22 SG pressure is >450 psig
	CREW	Determine required core exit temperature (488.2 expected)
	RO	Determine RCPs are running and condenser steam dump is available
	RO/BOP	Attempt to transfer steam dump to steam pressure mode: <ul style="list-style-type: none"> <li>Place steam pressure controller in MANUAL</li> <li>Match controller output to valve demand signal meter</li> <li>Place steam dump mode control in STEAM PRESSURE</li> <li>Determine steam dump valves are failed closed</li> </ul>
<p><b>CT2: Control initial RCS cool down</b></p> <ul style="list-style-type: none"> <li><b>Initiating Cue:</b> Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection AND indication of ruptured SG pressure &gt;450 psig</li> <li><b>Performance Feedback:</b> Indication of intact SG PORV position, steam flow rate greater than zero, indication of RCS temperature decreasing.</li> <li><b>Success Path:</b> RCS cool down will be performed by the second priority action in E-3 to use intact SG PORVs due to malfunction of the Steam Dump system.</li> <li><b>Measurable Performance Standard:</b> Establish/maintain RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions: <ul style="list-style-type: none"> <li>Too high to maintain minimum required sub-cooling (requiring transition to ECA-3.1); OR</li> <li>Too low as to cause a challenge to sub-criticality or integrity CSF (red or orange path requiring transition to the applicable CSF recovery procedure.)</li> </ul> </li> </ul>		
	BOP	Manually dump steam from 21, 23, & 24 SGs at the maximum rate by fully opening the PORVs ( <b>CT2 related action</b> )
	RO/BOP	When Tavg Lo-Lo Perm P12 status light 2-SML-17 Drop 30 is lit, block steam line break SI and bypass steam dump low-low Tavg interlock
	RO/BOP	WHEN core exit thermocouples are less than target temperature, stop the RCS cool down ( <b>CT2 related action</b> )
	RO/BOP	After stopping cool down, maintain core exit thermocouples 10-20 °F less than target temperature
	BOP	Control NR level in 21, 23, & 24 SGs between 27% and 50%
	RO	Determine pressurizer PORVs closed and PORV block valves are energized and open
	RO/BOP	Reset SI and CI Phase A
	BOP	Determine control air pressure >85 psig and open control air valves to containment 2-XCR-100, 2-XCR-101, 2-XCR-102, and 2-XCR-103
	RO/BOP	Stop both RHR pumps
	US	Do not proceed with E-3 actions until RCS cool down is complete



Time	Position	Applicant's Actions or Behavior
	CREW	Determine ruptured SG pressure is stable or rising and RCS subcooling is >60 °F
<p><b>CT3: Depressurize RCS to E-3 SI termination criteria</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection AND indication that the RCS is cooled down to target temperature.</li> <li>▪ <b>Performance Feedback:</b> Indication of Spray Valve open position, RCS pressure decreasing, and pressurizer level rising.</li> <li>▪ <b>Success Path:</b> Procedurally directed RCS depressurization will be performed using manual control of both pressurizer spray valves which are not affected by selected simulator malfunctions.</li> <li>▪ <b>Measurable Performance Standard:</b> Depressurize RCS to meet SI termination criteria before water release from the ruptured SG PORV or safety valve as indicated by SG NR level indicating 100% with SG WR level stable and a SG PORV or Safety Valve not fully closed.</li> </ul>		
	RO	Depressurize RCS to minimize break flow and refill pressurizer <b>(CT3 related actions):</b> <ul style="list-style-type: none"> <li>• Determine normal pressurizer spray is available</li> <li>• Open both spray valves using manual control of master controller 2-RU-27 or both spray valve controllers 2-RU-24 and 2-RU-25</li> <li>• When depressurization criteria are satisfied, attempt to close both spray valves</li> <li>• Determine pressurizer spray valve failed to close and stop RCP 23 and 24</li> </ul>
	CREW	Check if ECCS flow should be terminated: <ul style="list-style-type: none"> <li>• Determine RCS subcooling is &gt; 40 °F</li> <li>• Determine secondary heat sink exists based on minimum AFW flow or intact NR SG level</li> <li>• Determine RCS pressure stable or rising</li> <li>• Determine pressurizer level &gt;20%</li> </ul>

Time	Position	Applicant's Actions or Behavior
<p><b>CT4: Terminate ECCS Flow</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Indication/annunciation of a SGTR in one SG (Increasing SG water level, increased secondary radiation) with indications of a reactor trip and safety injection, indication that the RCS is cooled down to target temperature, indication that RCS depressurization is complete, AND indications that SI termination criteria are met.</li> <li>▪ <b>Performance Feedback:</b> Indication of decreasing SI pump flow, decreasing BIT flow</li> <li>▪ <b>Success Path:</b> The delay in completing RCS depressurization steps is not significant due to clear procedural actions to stop RCPs to stop depressurization. Thus, procedurally directed actions to terminate SI flow can be performed in a timely manner from the Control Room.</li> <li>▪ <b>Measurable Performance Standard:</b> Terminate ECCS flow before water release from the ruptured SG PORV or safety valve as indicated by SG NR level indicating 100% with SG WR level stable and a SG PORV or Safety Valve not fully closed by: <ul style="list-style-type: none"> <li>○ Stopping both SI pumps AND</li> <li>○ Stopping all but one running CCP AND</li> <li>○ Isolating BIT flow</li> </ul> </li> </ul>		
	RO/BOP	Stop both SI pumps and one CCP ( <b>CT4 related actions</b> )
	RO/BOP	Isolate BIT flow: <ul style="list-style-type: none"> <li>• Determine CCP suction aligned to RWST</li> <li>• Reset and open CCP leak-off valve 2-QMO-226 and determine 2-QMO-225 is open with breaker OFF from previous event</li> <li>• Close BIT inlet valves (<b>CT4 related actions</b>)</li> <li>• Close BIT outlet valves (<b>CT4 related actions</b>)</li> </ul>

Simulator Instructions:

**SETUP:**

Reset the simulator to a MOL 100% IC with the North NESW Pump in service.  
Place all backup heaters on and allow pressure to stabilize (IC-956).

Mark up 2-OHP-4021-011-001 Attachment 2 to show completion of prerequisites.

Verify the East Bus Duct Fan is running and the West Bus Duct Fan is in Auto  
Enter the following items to simulate failure of the West Bus Duct Fan to auto start:

**U2\_101GLC1**      **ZLO101GLC1\_U2[GRN]**      **TRG= 5 "dmf u2\_101glc1"**

**TRG= 5 "dlo ZLO101GLC1\_U2[GRN]"**      **TRG 5 on West Bus Duct Fan in RUN**

Set up failure of the steam dump system when control is transferred to steam pressure:

**U2\_SD\_StmPress ET10**      **ZGI43SD2A\_U2 OFFRST**      **ZLOSTMC2\_U2[15] OFF**

**Event 1:**

If asked, report the South NESW pump is ready for start and personnel are clear of the area.  
When directed, report the Backwash Selector switch in AUTO

**Event 2:**

If asked as Shift Manager, inform the Crew that load reduction is approved.

**Event 3:**

When the Crew has completed the power reduction, or at the direction of the Lead Evaluator, enter the pressurizer pressure instrument low failure:

**U2\_NPP151 1700**

5 minutes after being directed to open the breaker for 2-QMO-225 (East CCP ELO, ABV-D-5C), insert the following global malfunction and report completion:

**U2\_101QMO225**

**Event 4:**

When the Crew has completed 2-OHP 4022-013-009 actions to defeat the failed channel and return pressurizer pressure control to Automatic, and with the concurrence of the Lead Evaluator, enter a loss of the East Bus Duct Cooling Fan:

**U2\_101GLC2**

If asked to report bus duct temperatures, wait three minutes and report the following, based on status of the standby fan:

- If West Bus Duct fan is running and Panel 121 Drop 19 is clear, report bus duct temperature is 77 degrees C and lowering
- If West Bus Duct fan is running and Panel 121 Drop 19 is NOT clear, report bus duct temperature is 85 degrees C and lowering
- If the West Bus Duct fan has not yet been started and Panel 121 Drop 19 is lit, report bus duct temperature is 95 C degrees and rising

If asked to report cooling water flow, report cooling water flow is normal

If asked to check the breaker for the East Bus Duct fan, wait three minutes and report the breaker is tripped.

**Event 5:** When the standby Bus Duct Cooling fan has been started and Bus Duct temperature returned to normal, enter a failure of the Main Turbine Lube Oil temperature controller:

**U2\_SW07A 0**

**Event 6:**

When the crew has taken manual control of 2-WMO-970 and returned oil temperatures to normal, enter a tube leak in 22 SG:

**U2\_RC23B 1**

**U2\_RCR44 3**

If asked as Unit 1 to assume the Auxiliary Steam loads, reply that 50# and 150# auxiliary steam headers are already on Unit 1

When directed to place 12-DRV-710 in RECIRC, wait one minute and report completion.

**Event 7:**

**Modify U2\_RC23B 40**

**When pressurizer spray valves are opened in E-3,** insert a failure of pressurizer spray valve 2-NRV-163 full open:

**U2\_RC15A 100**

Perform the following actions as directed during performance of E-0:

- Stop ice condenser air handling units and report completion in ~5 minutes:

**U2\_CHR01 OFF After 5 Min Delay**

- When directed to perform Unit 1 actions per E-0 Att. A:
  1. Report chemistry has been directed to place Train A PACHMS in service, Unit 1 control room pressurization is aligned for a Unit 2 SI, 2-HV-AS-1 is in service
  2. Place PACHMS Train A in service (30 minute delay):

**U2\_CHR02 ON After 30 Min Delay**

When requested, run the following file to sample SGs, 22 last:

**app! SAMPLSG3142\_U2.app**

**Form 3.3-1 Scenario Outline**

Facility:	<u>DC COOK 1 &amp; 2</u>	Scenario #:	<u>NRC2022-4</u>
Scenario Source:	<u>New</u>	Op. Test #:	<u>Cook 2022</u>
Examiners:	_____	Applicants/ Operators:	_____
	_____		_____
	_____		_____
Initial Conditions:	80% power. The South Condensate Booster Pump is running with slightly elevated temperatures.		
Turnover:	After turnover, shift the Condensate Booster Pumps to the Middle Pump in service and the South Pump in standby. Then, continue power increase to 100% power.		
Critical Tasks**:	<ol style="list-style-type: none"> <li>1. Isolate Main Turbine from SGs during ATWS.</li> <li>2. Start AFW Pumps during ATWS.</li> </ol>		
Event No.	Malf. No.	Event Type*	Event Description**
1		N-BOP	Shift Condensate Booster Pumps
2		R-RO	Raise reactor power
3	U2_QFI200	I-RO MC-RO TS	Charging Flow Instrument QFI-200 fails low
4	U2_ECC short U2_CC02B	C-BOP MC-BOP TS	Running CCW pump failure, CCW pump Auto start fails
5	U2_QLC452	I-RO TS	VCT Level channel 2-QLC-452 Fails High
6	U2_BLP141	I-BOP MC-BOP TS	Controlling SG Level Channel fails high
7	U2_RP12A U2_RP12B U2_RP03A U2_RP03B  U2_TC02 U2_RP07A U2_RP07B  U2_FW48A U2_FW48B U2_FW48C	M-CREW     C-CREW   C-CREW	Inadvertent SI/Loss of Feed ATWS (EOP entry)     Auto & Manual turbine trip failure Auto Main Steam Isolation failure  AFWP auto start failures
8			SI Termination
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control			
** Details on subsequent pages			

## Critical Task Details:

### CT1: Isolate main turbine from SGs during ATWS

- **Initiating Cue:** Indication of loss of main feed water (MFP status on Main Feed Pump HMI, feed water flow indication), indication that automatic and manual reactor trip are ineffective (Reactor trip breaker position), and indication that the main turbine is not tripped (Main Turbine stop valve status light, Main Turbine valve position on Main Turbine HMI).
- **Performance Feedback:**
  - Valve status lights that isolate main turbine from SGs indicate closed
  - Main Turbine speed and MW load lowering
- **Success Path:** The expected and procedurally preferred success path will be by closing Main Turbine Control Valves using the ATWS runback on the Main Turbine HMI or manually closing SG Stop Valves. These actions are all designated as immediate action steps (performed from memory prior to referencing the procedure.)
- **Measurable Performance Standard:** Isolate the main turbine from the SGs prior to dry out conditions in all steam generators as indicated by SG WR levels <17% by performing one or more of the following:
  - Initiation of ATWS turbine runback
  - Manual steam line isolation
- **Safety Significance:** Failure to trip the main turbine under the postulated plant conditions can lead to violation of the RCS emergency stress limit. If the main turbine is not tripped, the SG U-tubes uncover sooner and faster. Thus, primary-to-secondary heat transfer starts to deteriorate earlier in the transient and deteriorates more rapidly. According to the WOG ATWS analysis, the result is that once SG tubes are uncovered, RCS temperature and pressure increase more rapidly and reach higher values. Delay in tripping the turbine until after actual SG dry out occurs results in a “significant reduction of safety margin beyond that irreparably introduced by the scenario.”

## CT2: Start AFW pumps during ATWS

- **Initiating Cue:** Both of the following:
  - Indication of a condition requiring reactor trip and automatic/manual reactor trip have failed
  - Indication and/or annunciation that <3 AFW pumps are running
- **Performance Feedback:** Pump indicating lights indicate pumps running and AFW flow rate increases
- **Success Path:** AFW pumps can be started by manual AMSAC initiation or by manually starting each individual AFW pump using the control switch
- **Measurable Performance Standard:** Start all available AFW pumps prior to all SG WR levels lowering below 17% by performing one of the following:
  - Manual AMSAC initiation
  - Manual start of AFW pumps
- **Safety Significance:** Failure to start at least the minimum required number of AFW pumps under the postulated plant conditions can lead to violation of the RCS emergency stress limit. Failure to start at least the minimum required number of AFW pumps when it is possible to do so (as it is in the postulated plant conditions) leaves the plant in a condition outside the bounds of the ATWS analyses and can cause RCS pressure to exceed the emergency stress limit. Continued operation with SG WR levels <17% with no AFW flow represents a potential loss of fuel clad and RCS fission product barriers.

## Event Description Details:

Event 1: The BOP will start the Middle Condensate Booster Pump and then stop the South Condensate Booster pump per the normal operating procedure 2-OHP-4021-054-001, Operation of Condensate System.

Event 2: The Crew will initiate a load increase from 80% using the normal operating procedure 2-OHP-4021-001-006, Power Escalation.

Event 3: The event is a failure of QFI-200, Charging Flow detector. The low flow signal results in the output of 2-QRV-251, Charging Flow controller, to fail to 100%. This results in a high charging flow and rising pressurizer level. The Crew should perform immediate actions for 2-OHP-4022-IFR-001, Instrument Failure Response, diagnose unexpected charging flow reduction from an instrument failure, and restore charging flow using 2-QRV-251 in manual to maintain pressurizer level.

Event 4: The event is a loss of the East CCW pump, with an auto start failure of the West CCW pump. The Crew should diagnose a loss of CCW and manually start the West CCW pump as a backup to a failed automatic action or per the Annunciator Response Procedure. The US should identify entry into the following Technical Specification condition/action: 3.7.7 Condition A Required Action A.1.

Event 5: The event is a high failure (in range) of VCT Level channel 2-QLC-452. The Letdown Divert valve will reposition to the CVCS Holdup Tank, resulting in lowering VCT level. This will be a "silent" failure, with the only initial indications being the level meter and the divert valve position. After several minutes, VCT level on the operable VCT level channel 2-QLC-451 will lower to the point where an automatic makeup will start. The crew should perform immediate actions for 2-OHP-4022-IFR-001, Instrument Failure Response, diagnose VCT Level Instrument failure and take divert valve QRV-303 to VCT position to stabilize the plant. The Crew should then perform actions of 2-OHP-4022-013-017, VCT Instrument Malfunction.

Event 6: SG 24 level channel will slowly fail high. SG 24 feed water regulating valve 2-FRV-240 will slowly close, causing reduction in actual level indicated on the two operable channels. The crew should diagnose the instrument failure, implement 2-OHP-4022-IFR-001, Instrument Failure Response, perform immediate actions, take manual control of the feed regulating valve for SG 24 to stabilize level, and then perform actions of 2-OHP-4022-013-013, Steam Generator Level Instrument Malfunction. The US should identify entry into the following Technical Specification conditions/actions:

- 3.3.1 Condition A Required Action A.1
- 3.3.1 Condition D Required Action D.1
- 3.3.2 Condition A Required Action A.1
- 3.3.2 Condition D Required Action D.1

Event 7: The event starts with an inadvertent SI which will cause a trip of both Main Feed Water Pumps. The crew should respond by attempting a manual reactor trip and then entering 2-OHP-4023-FR-S.1, Response to Nuclear Generation/ATWS. The crew will perform actions in FR-S.1 including manual AMSAC initiation, manual turbine trip, and initiation of emergency boration. The crew will transition out of FR-S.1 when conditions are satisfied. After completion of FR-S.1, the crew will transition to 2-OHP-4023-E-0, Reactor Trip or Safety Injection.



Event 8: The Crew will perform actions of E-0, and ES-1.1 to terminate SI.

The scenario will terminate when the Crew stops ECCS flow per ES-1.1, or at Lead Evaluator discretion.

**Target Quantitative Attributes per Scenario (Ref ES-3.4 Table 3.4-1)**

Quantitative Attribute	Target per scenario	Actual Number/ scenario	How Met
Events after EOP Entry	1-2	2	Auto turbine trip/Main Steam Isolation failures AFW pump auto start failures
Abnormal Events	2-4	4	Charging Flow Instrument QFI-200 fails low Running CCW pump failure/CCW pump Auto start fails VCT Level Channel QLC-452 fails high Controlling SG Level Channel fails high
Major Transients	1-2	1	ATWS
EOPs entered requiring substantive action	1-2	2	FR-S.1 ES-1.1
Entry into contingency EOP with substantive actions	1 per set	1	FR-S.1
Pre-identified CTs	2 or more	2	Isolate Main Turbine from SGs during ATWS Start AFW Pumps during ATWS

### Form 3.3-2 Required Operator Actions

Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 1

**Event Description:**

The Crew will start the Middle Condensate Booster Pump and then stop the South Condensate Booster pump per 2-OHP-4021-054-001 Attachment 2, Operation of the Hotwell and Condensate Booster Pumps

**Event Termination:** When the Middle Condensate Booster Pump is in service and the South Condensate Booster Pump is stopped, the event is complete.

**Symptoms/Cues:**

N/A

Time	Position	Applicant's Actions or Behavior
	BOP	Determine that reactor power is low enough to compensate for a power transient during pump swap
	BOP	Shift Condensate Booster Pumps per 2-OHP-4021-054-001 Attachment 2 step 4.7: <ul style="list-style-type: none"> <li>• Determine maintenance has not been performed on the Condensate Booster Pump oil system</li> <li>• Place the standby North Hotwell Pump control switch in NEUT</li> <li>• Place the standby Middle Condensate Booster Pump control switch in NEUT</li> <li>• Place the standby West TACW Pump control switch in NEUT</li> <li>• Determine the Middle Condensate Booster Pump ELO is not failed open</li> <li>• Determine Bus 2A voltage is &gt;117.6V</li> <li>• Start the Middle Condensate Booster Pump               <ul style="list-style-type: none"> <li>○ Report annunciator 216 drop 73 if not previously identified as an expected alarm</li> </ul> </li> <li>• Direct AEO to report local Condensate Booster Pump oil pressure and determine it is <math>\geq 2</math> psig</li> <li>• Determine total condensate flow is <math>&gt;2.0E6</math> pph and that the Middle Condensate Booster Pump recirc valve should be closed</li> <li>• Stop the South Condensate Booster Pump and place the control switch in AUTO</li> <li>• Determine ELO was not previously failed open</li> <li>• Direct AEO to locally verify 2-CRV-224, Low Pressure Heaters Condensate Bypass control valve is closed</li> <li>• Notify Chemistry of Condensate Booster Pump configuration change</li> <li>• Place standby Hotwell Pump, Condensate Booster Pump, and TACW Pump control switches in AUTO</li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 2

Event Description: The Crew will initiate a load increase from 80% using the normal operating procedure 2-OHP-4021-001-006, Power Escalation.

Event Termination: When the Crew has raised turbine load sufficiently as determined by the Lead Evaluator, the event is complete.

Symptoms/Cues: N/A

Time	Position	Applicant's Actions or Behavior
	CREW	Develop a reactivity plan for power increase to 100% (May have been performed prior to entry into the simulator)
		NOTE: It is expected the RO will place rod control in Manual per 2-OHP-4021-001-006, Power Escalation.
		NOTE: It is expected the RO will choose to perform dilution using the Alternate Dilute mode with makeup to the CCP suction only. It is procedurally allowed to use either normal or alternate dilute modes. The expected actions for alternate dilute are listed below.
	RO	<p>NOTE: Dilution may be performed using Attachment 5, Boric Acid Blender Operation in Alternate Dilute Mode, or Attachment 16 Blender Operation Short Form-Alternate Mode. Actions listed below are from Attachment 5.</p> <p>Initiate boron dilution per reactivity plan per 2-OHP-4021-005-002, Operation of the Unit 2 Boric Acid Blender:</p> <ul style="list-style-type: none"> <li>• If desired, verify charging header flow is &gt;75 gpm and close the East CCP Emergency Leak Off valve 2-QMO-225</li> <li>• Verify Boric Acid Blender is aligned for Automatic</li> <li>• Verify Reactor Coolant Makeup Blend Control Switch in STOP</li> <li>• Verify RC Makeup Blend Control Switch in ALT DILUTE</li> <li>• Set desired batch on the PW Flow Integrator               <ul style="list-style-type: none"> <li>○ Depress PRE A and verify display reads PRE A</li> <li>○ Depress PRE A again to display last requested batch amount preset</li> <li>○ Depress an arrow to change value of associated decimal place</li> <li>○ When new batch amount is preset, depress ENTER button twice</li> </ul> </li> <li>• Adjust 2-RU-34, Blender PW Flow Control to desired flow rate</li> <li>• If desired to makeup to the CCP suction only, then close 2-QRV-451, Blender to VCT</li> </ul>

Time	Position	Applicant's Actions or Behavior
	RO	<p>Continue actions to initiate dilution::</p> <ul style="list-style-type: none"> <li>• Place Reactor Coolant Makeup Blend Control Switch in START and verify automatic actions: <ul style="list-style-type: none"> <li>○ PW pump(s) selected to AUTO start</li> <li>○ 2-QRV-422, Primary Water to Blender, throttles open to selected flow</li> <li>○ 2-QRV-400, Blender to Charging Pump Suction, opens</li> <li>○ If in AUTO, 2-QRV-451, Blender to VCT, opens</li> </ul> </li> <li>• If desired to divert letdown flow, perform one of the following: <ul style="list-style-type: none"> <li>○ Manually adjust 2-RU-28, VCT Level Control</li> <li>○ Place 2-QRV-303, VCT/Holdup Tank Inlet Selector in the CVCS HU Tank position</li> </ul> </li> <li>• When desired to restore VCT level control to AUTO, then perform the following: <ul style="list-style-type: none"> <li>○ Verify 2-RU-28, VCT Level Control in AUTO</li> <li>○ Verify 2-QRV-303, VCT/Holdup Tank Inlet Selector in AUTO</li> </ul> </li> <li>• When the selected batch is complete or when desired, place the Reactor Coolant Makeup Blend Control Switch in STOP</li> <li>• Verify the PW Flow Totalizer is set to '0'</li> <li>• Verify 2-QRV-451, Blender to VCT in AUTO</li> <li>• Align the Boric Acid Blender to Automatic</li> </ul>
	RO/BOP	<p>Raise turbine load per 2-OHP-4021-050-001, Attachment 5, Turbine Control Operation, using the Main Turbine HMI:</p> <ul style="list-style-type: none"> <li>• Adjust Tave and Tref inhibit setpoints as desired, not to exceed <math>\pm 5</math> °F</li> <li>• Place Megawatt Control in 'IN'</li> <li>• Select desired MW 'Target'</li> <li>• Select desired MW 'Ramp Rate'</li> <li>• Select 'GO'</li> <li>• When evolution is complete, place Megawatt Control in 'OUT'</li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 3

Event Description: The event is a failure of QFI-200, Charging Flow detector. The low flow signal results in the output of 2-QRV-251, Charging Flow controller, to fail to 100%. This results in a high charging flow and rising pressurizer level. The Crew should perform immediate actions for 2-OHP-4022-IFR-001, Instrument Failure Response, diagnose unexpected charging flow reduction from an instrument failure, and restore charging flow using 2-QRV-251 in manual to maintain pressurizer level.

Event Termination: When actions of 2-OHP-4022-IFR-001 have been completed, the event is complete. Note that 2-QRV-251 will remain in Manual for the duration of the scenario

Symptoms/Cues:

Indicated charging flow 2-QFI-200 fails low

Charging flow control valve 2-QRV-251 fails to 100% open

Indicated Seal Injection flow rises

Pressurizer level rises slowly

Annunciator 208-20, CHARGING FLOW LESS THAN MIN SET POINT

NOTE: It is likely the Crew will stop the power ascension to respond to the instrument failure.

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports charging flow instrument failure based on control board indications and annunciators
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response
	RO	Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory: <ul style="list-style-type: none"> <li>• Determines a pressurizer level control system issue exists</li> <li>• Determines pressurizer level is not stable at or trending to program</li> <li>• Places pressurizer level control in manual by taking manual control of 2-QRV-251 using 2-RU-29, CCP DISCH FLOW CTRL and restore pressurizer level to program level</li> </ul>

Time	Position	Applicant's Actions or Behavior
	Crew	Performs plant stability checks. (Order not important) RO <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> BOP <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure: <ol style="list-style-type: none"> <li>1. Verifies RO immediate actions taken from memory</li> <li>2. Assigns manual control band for pressurizer level (nominal program level <math>\pm 5\%</math>)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Initiates corrective action for instrument failure</li> </ol>
	US	Determine entry is required for Technical Requirements Manual TRO 8.7.14 Condition B Required Actions B.1 & B.2

Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 4

Event Description: The event is a loss of the East CCW pump, with an auto start failure of the West CCW pump. The Crew should diagnose a loss of CCW and manually start the West CCW pump as a backup to a failed automatic action or per the Annunciator Response Procedure. The US should identify required Technical Specification actions for one inoperable CCW train.

Event Termination: When the crew has started the West CCW pump and identified applicable Tech Spec actions, the event is complete.

Symptoms/Cues:

East CCW pump breaker trips

The West CCW pump does not auto start

Annunciators:

- 204-83, CCW PUMP MOTOR INSTANT TRIP
- 204-84, EAST CCW PUMP DISCHARGE PRESSURE LOW

Multiple additional annunciators due to loss of CCW flow which clear on start of the West CCW pump

Time	Position	Applicant's Actions or Behavior
	CREW	Diagnose a Loss of ALL Component Cooling Water due to trip of the East CCW pump.
	BOP	Determine the West CCW failed to auto start and manually start the West CCW pump as a backup to a failed automatic action.  NOTE: This action should be taken without referencing a procedure. The ARP for 204-84 and the AOP for CCW Malfunction also direct this action.
	BOP	Respond per ARP for 204-83: <ul style="list-style-type: none"> <li>• Place East CCW pump in LOCKOUT</li> </ul>
	US	Identify entry into the following Technical Specification condition/action: 3.7.7 Condition A Required Action A.1. <ul style="list-style-type: none"> <li>• Identify that entry into support system conditions and required actions is not required per T.S. LCO 3.0.6</li> </ul>



Op. Test No.: Cook 2022 Scenario No.: NRC2022- Event No.: 5

**Event Description:**

The event is a high failure (in range) of VCT Level channel 2-QLC-452. The Letdown Divert valve will reposition to the CVCS Holdup Tank, resulting in lowering VCT level. This will be a “silent” failure, with the only initial indications being the level meter and the divert valve position. After several minutes, VCT level on the operable VCT level channel 2-QLC-451 will lower to the point where an automatic makeup will start. The crew should perform immediate actions for 2-OHP-4022-IFR-001, Instrument Failure Response, diagnose VCT Level Instrument failure and take divert valve QRV-303 to VCT position to stabilize the plant. The Crew should then perform actions of 2-OHP-4022-013-017, VCT Instrument Malfunction.

**Event Termination:** When actions of 2-OHP-4022-013-017 are complete up to energizing the RWS relay, and TRM has been referenced, or at Lead Evaluator discretion, the event is complete.

**Symptoms/Cues:**

QLC-452 VCT level indication rises to 100%.  
 QRV-303, Letdown diversion, will fully open.  
 Actual VCT level will lower due to diversion of QRV-303, causing QLC-451 to lower, and VCT pressure, (QPI-451), to lower.  
 Annunciator 209-49, VOLUME CONTROL TANK LEVEL LOW (possible based on timing of crew actions)

Time	Position	Applicant’s Actions or Behavior
	RO	Recognizes and reports instrument failure/annunciator on Panel #209 indicative of a VCT Level instrument failure (Drop 49, if actuated).
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response
	RO	Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory: <ol style="list-style-type: none"> <li>1. Determines a VCT Level Control issue exists</li> <li>2. Determines one VCT level channels indicate &lt;78% and lowering with the other channel failed high</li> <li>3. Stop letdown diversion by placing VCT/HOLDUP TK INLET SELECTOR 2-QRV-303 in VCT</li> </ol>

Time	Position	Applicant's Actions or Behavior
	Crew	Performs plant stability checks. (Order not important) RO <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> BOP <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure: <ol style="list-style-type: none"> <li>1. Verifies RO immediate actions taken from memory</li> <li>2. Assigns manual control bands for VCT level and pressure (nominal 15-78% Level and 15-35 psig Pressure)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-013-017, VCT Instrument Malfunction</li> </ol>
	US	Enters and directs actions of 2-OHP-4022-013-017, VCT Instrument Malfunction: <ol style="list-style-type: none"> <li>1. Determine 2-QLC-452 is failed</li> <li>2. Direct RO to operate the Boric Acid Blender in Manual as required to maintain VCT level greater than 15%</li> <li>3. Notify SM/MTI to initiate actions to energize associated RWS Relay in accordance with Attachment B.</li> <li>4. Direct Work Control to prepare Caution tags as directed in 2-OHP-4022-013-017</li> </ol>
NOTE: Action to energize the RWS relay requires access to the SSPS Engineering Work Station which is not physically modeled in the simulator and will not be performed during the scenario.		
	US	Refers to TRM 8.1.1, Boration Systems – Operating: <ul style="list-style-type: none"> <li>• Condition A Required Action A.1.               <ul style="list-style-type: none"> <li>○ Enters action statement to restore to operable status within 72 hours.</li> </ul> </li> </ul>

Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 6

**Event Description:**

SG 24 level channel will slowly fail high. SG 24 feed water regulating valve 2-FRV-240 will slowly close, causing reduction in actual level indicated on the two operable channels. The crew should diagnose the instrument failure, implement 2-OHP-4022-IFR-001, Instrument Failure Response, perform immediate actions, take manual control of the feed regulating valve for SG 24 to stabilize level, and then perform actions of 2-OHP-4022-013-013, Steam Generator Level Instrument Malfunction. The US should identify entry into the following

**Technical Specification conditions/actions:**

- 3.3.1 Condition A Required Action A.1
- 3.3.1 Condition D Required Action D.1
- 3.3.2 Condition A Required Action A.1
- 3.3.2 Condition D Required Action D.1

Event termination: When actions of 2-OHP-4022-013-013 are complete up to bistable tripping, the event is complete.

**Symptoms/Cues:**

SG 24 Channel 2 level indicator (2-BLP-141) fails full scale high over 2 minutes.  
Feed flow to SG 24 lowers, causing actual level as indicated on SG 24 channels 3 & 4 to lower.

Controller output for SG 24 Feed Water Regulating valve lowers.

Reactor will trip on low SG level without operator action.

**Annunciators:**

- 214-31, STEAM GEN 4 WATER LEVEL HIGH-HIGH
- 214-32, STEAM GEN 4 WATER LVL HIGH DEVIATION

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #214
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response

Time	Position	Applicant's Actions or Behavior
	BOP	<p>Reports instrument malfunction and performs the immediate actions of 2-OHP-4022-IFR-001, Instrument Failure Response, from memory:</p> <ul style="list-style-type: none"> <li>• Determines a SG Level Control condition exists</li> <li>• Determines #24 SG NR level is not stable at or trending to 44% and places FRV-240, SG #24 MFW Reg. Valve controller in manual</li> <li>• Raises controller output to match the operable feed flow channel with steam flow.</li> <li>• Restores SG #24 level to program.</li> <li>• Determines SG PORVs all closed</li> <li>• Determines MFP Differential Pressure is controlling at appropriate differential pressure for current actual steam flow.</li> </ul>
	Crew	<p>Performs plant stability checks. (Order not important)</p> <p>RO</p> <ol style="list-style-type: none"> <li>1. Rx Power</li> <li>2. RCS Temp</li> <li>3. RCS Pressure</li> <li>4. Pressurizer level</li> <li>5. AFD</li> </ol> <p>BOP</p> <ol style="list-style-type: none"> <li>1. Turbine Load</li> <li>2. SG Level</li> <li>3. MFP DP</li> </ol>
	US	<p>Enters and directs actions of 2-OHP-4022-IFR-001, Instrument Failure Response procedure:</p> <ol style="list-style-type: none"> <li>1. Verifies BOP immediate actions taken from memory</li> <li>2. Assigns manual control band for #24 SG level (nominal 40-48%)</li> <li>3. Verifies no unexpected control rod motion occurred</li> <li>4. Transitions to 2-OHP-4022-013-013, Steam Generator Level Instrument Malfunction</li> </ol>
	US	<p>Enters and direct actions of 2-OHP-4022-013-013, Steam Generator Level Instrument Malfunction</p>

Time	Position	Applicant's Actions or Behavior
	US	Identify entry into the following Technical Specification conditions/actions: <ul style="list-style-type: none"> <li>• 3.3.1 Condition A Required Action A.1</li> <li>• 3.3.1 Condition D Required Action D.1 (Due to Table 3.3.1-1, Function 14).</li> <li>• 3.3.2 Condition A Required Action A.1</li> <li>• 3.3.2 Condition D Required Action D.1 (Due to Table 3.3.2-1, Functions 5b and 6c).</li> </ul>
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies management and WCSRO</li> <li>b. Directs RO/BOP to generate work request</li> </ol>
	US	Notifies SM/MTI to Initiate actions to trip Bi-stables associated with per Attachment D-2 of 2-OHP-4022-013-013.

Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 7

Event Description: The event starts with a trip of both Main Feed Water Pumps due to a failed SSPS relay. The crew should respond by attempting a manual reactor trip and then entering 2-OHP-4023-FR-S.1, Response to Nuclear Generation/ATWS. The crew will perform actions in FR-S.1 including manual AMSAC initiation, manual turbine trip, and initiation of emergency boration. The crew will transition out of FR-S.1 when conditions are satisfied. After completion of FR-S.1, the crew will transition to 2-OHP-4023-E-0, Reactor Trip or Safety Injection.

Event Termination: When the Crew transitions to E-0, the event is complete.

Symptoms/Cues:

Both Main Feed Pumps trip

SG level lowers on all Steam Generators

Reactor fails to trip automatically or manually

Automatic Turbine trip does not occur

Automatic AFW pump start does not occur

Automatic SI actuation is likely when local reactor trip actions are completed

Time	Position	Applicant's Actions or Behavior
		NOTE: It is expected that control rods will have been placed in automatic after stopping the power escalation earlier in the scenario. Actions listed below assume rod control is in automatic.
	CREW	Diagnose a loss of all feed water flow
	US	Direct the RO to perform a manual reactor trip
	RO	Attempt to manually trip the reactor using control board switches to open reactor trip breakers (unsuccessful)
	US	Direct RO and BOP to perform immediate actions of 2-OHP-4023-FR-S.1, Response to Nuclear Power Generation/ATWS
	RO	From memory, determine reactor is not tripped based on reactor trip breakers CLOSED and attempt manual reactor trip using both reactor trip switches.
		NOTE: Plant Specific Background Document 12-OHP-4023-FR-S.1 states that "If RCS temperature is above the current reference temperature, then the rods should automatically be driven in by the Rod Control system. This actions satisfies the intent of the contingency requirement to manually insert control rods as long as rod speed is $\geq 48$ steps per minute."
	RO	From memory, manually insert control rods or verify automatic control rod insertion is $> 48$ steps per minute.

Time	Position	Applicant's Actions or Behavior
<p><b>CT2: Start AFW pumps during ATWS</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Both of the following: <ul style="list-style-type: none"> <li>○ Indication of a condition requiring reactor trip and automatic/manual reactor trip have failed</li> <li>○ Indication and/or annunciation that &lt;3 AFW pumps are running</li> </ul> </li> <li>▪ <b>Performance Feedback:</b> Pump indicating lights indicate pumps running and AFW flow rate increases</li> <li>▪ <b>Success Path:</b> AFW pumps can be started by manual AMSAC initiation or by manually starting each individual AFW pump using the control switch</li> <li>▪ <b>Measurable Performance Standard:</b> Start all available AFW pumps prior to all SG WR levels lowering below 17% by performing one of the following: <ul style="list-style-type: none"> <li>○ Manual AMSAC initiation</li> <li>○ Manual start of AFW pumps</li> </ul> </li> </ul>		
	BOP	From memory, manually actuate AMSAC by placing control switch 2-101-AM-1 in TRIP ( <b>CT2 related action</b> )
<p><b>CT1: Isolate main turbine from SGs during ATWS</b></p> <ul style="list-style-type: none"> <li>▪ <b>Initiating Cue:</b> Indication of loss of main feed water (MFP status on Main Feed Pump HMI, feed water flow indication), indication that automatic and manual reactor trip are ineffective (Reactor tip breaker position), and indication that the main turbine is not tripped (Main Turbine stop valve status light, Main Turbine valve position on Main Turbine HMI).</li> <li>▪ <b>Performance Feedback:</b> <ul style="list-style-type: none"> <li>○ Valve status lights that isolate main turbine from SGs indicate closed</li> <li>○ Main Turbine speed and MW load lowering</li> </ul> </li> <li>▪ <b>Success Path:</b> The expected and procedurally preferred success path will be by closing Main Turbine Control Valves using the ATWS runback on the Main Turbine HMI or manually closing SG Stop Valves. These actions are all designated as immediate action steps (performed from memory prior to referencing the procedure.)</li> <li>▪ <b>Measurable Performance Standard:</b> Isolate the main turbine from the SGs prior to dry out conditions in all steam generators as indicated by SG WR levels &lt;17% by performing one or more of the following: <ul style="list-style-type: none"> <li>○ Initiation of ATWS turbine runback</li> <li>○ Manual steam line isolation</li> </ul> </li> </ul>		
	BOP	From memory, determine turbine stop valve status lights are not lit and perform the following: <ul style="list-style-type: none"> <li>• Attempt a manual turbine trip by placing the SOLENOID TRIP switch in SOL TRIP (unsuccessful)</li> <li>• Actuate the ATWS TURBINE RUNBACK button on the HMI (<b>CT1 related action</b>)</li> </ul>
	US	Direct actions of 2-OHP-4023-FR-S.1 using procedure  Verify proper performance of RO and BOP immediate action steps 1-3
	RO/BOP	Perform actions of 2-OHP-4023-FR-S.1 as directed.

Time	Position	Applicant's Actions or Behavior
	BOP	Check AFW pumps running <ul style="list-style-type: none"> <li>• If AMSAC was not manually initiated, the BOP should perform the following:               <ul style="list-style-type: none"> <li>○ Manually start both Motor Driven AFW pumps (<b>CT2 related action</b>)</li> <li>○ Verify TDAFP steam supply valves are open</li> <li>○ Manually start the TDAFP (<b>CT2 related action</b>)</li> </ul> </li> </ul>
	RO	Initiate Emergency Boration of the RCS: <ul style="list-style-type: none"> <li>• Determine at least one CCP is running</li> <li>• Start both Boric Acid Transfer pumps in FAST speed</li> <li>• Open 2-QMO-420 emergency boration to CCP suction valve</li> <li>• Determine emergency boration flow is &gt;44 gpm on 2-QFI-420</li> <li>• Determine pressurizer &lt;2335 psig</li> </ul>
	BOP	Check containment ventilation isolation valves closed: <ul style="list-style-type: none"> <li>• Containment pressure relief system valves 2-VCR-107 &amp; 2-VCR-207</li> <li>• Containment instrument room purge system valves 2-VCR-101, 2-VCR-102, 2-VCR-201, &amp; 2-VCR-202</li> <li>• Containment Purge System valves 2-VCR-103, 2-VCR-203, 2-VCR-104, 2-VCR-204, 2-VCR-105, 2-VCR-205, 2-VCR-106, 2-VCR-206</li> </ul>
	RO US	Check if "Safety Injection Actuated" status light is lit If SI actuated, direct performance of steps 5-13 of E-0 as time permits.
	US	Direct local action to open reactor trip breakers
	CREW	Determine WR log power <5% with negative SUR
	US	Transition back to procedure and step in effect (2-OHP-4023-E-0)



Op. Test No.: Cook 2022 Scenario No.: NRC2022-4 Event No.: 8

Event Description: The Crew will perform actions of E-0 and ES-1.1 to terminate SI.

Event Termination: When the Crew has stopped all but one Charging Pump, isolated BIT flow, stopped SI pumps, and stopped RHR pumps, the event is complete.

Symptoms/Cues:  
N/A

Time	Position	Applicant's Actions or Behavior
	US	Direct transition back to 2-OHP-4023-E-0 Ensures immediate actions of 2-OHP-4023-E-0 are completed Directs subsequent actions of 2-OHP-4023-E-0.
	RO/BOP	Performs the immediate actions of E-0 from memory: <ol style="list-style-type: none"><li>1. Checks reactor trip – Determines reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li><li>2. Checks turbine trip – Determines Turbine Stop Valve Closed Status Lights Lit</li><li>3. Checks power to AC emergency buses – Determines all emergency buses T21A, T21B, T21C, and T21D energized and both annunciators clear for Open Phase</li><li>4. Checks safety injection status – Determine SI Status Lights Lit (QMO-225/226 white lights Lit)</li></ol>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Complete actions of E-0 through steps 5-19 as directed:</p> <ol style="list-style-type: none"> <li>5. Check if Main Steam line isolation is required-Close all SG stop valves if SG pressures did not remain above 500 psig. <ol style="list-style-type: none"> <li>a. NOTE: SG Stop Valves may have been previously isolated due to low-low SG pressure with failure of automatic isolation</li> </ol> </li> <li>6. Check if CTS is required-Determine containment pressure has remained below 2.8 psig</li> <li>7. Implement Attachment A while continuing with E-0 (actions listed below)</li> <li>8. Check if ruptured SG is suspected-Determine no SG NR levels rising in an uncontrolled manner</li> <li>9. Check AFW pumps running-Determine all three AFW pumps are running</li> <li>10. Check total AFW flow <math>&gt;240 \times 10^3</math> PPH</li> <li>11. Minimize unnecessary RCS cooldown-Determine SG NR levels are not <math>&gt;13\%</math> and reduce total AFW flow to between <math>240 \times 10^3</math> PPH and <math>450 \times 10^3</math> PPH and control NR level between <math>13\%</math> and <math>50\%</math></li> <li>12. Check AFW pump discharge valves-Determine valves are throttled</li> <li>13. Check FW isolation-Determine both MFPs tripped, both MFP discharge valves closed, all four FRVs closed, and all four feed water isolation valves closed</li> <li>14. Check RCS temperature-Determine RCS temperature is lowering, no dumping of steam is occurring, 2-DRV-407 is closed, AFW flow is <math>&gt;240 \times 10^3</math> PPH, and SG stop valves should not be closed.</li> <li>15. Check pressurizer PORVs and spray valves-Determine PORVs and spray valves are operating properly to control pressure and PORV block valves are all energized.</li> <li>16. Check if RCPs should be stopped-Determine criteria are not satisfied to stop RCPs.</li> <li>17. Check if SG secondary pressure boundaries are intact-Determine no SG pressure is lowering in an uncontrolled manner nor completely depressurized</li> <li>18. Check if SG tubes are intact-Determine no SG NR levels rising in an uncontrolled manner and no abnormal secondary radiation</li> <li>19. Check if RCS is intact-Determine RCS is NOT intact based on abnormal containment radiation and pressure and transition to 2-OHP-4023-E-1, Response to Loss of Reactor or Secondary Coolant (E-1 actions listed on subsequent pages).</li> </ol>

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Perform actions of Attachment A as follows:</p> <ol style="list-style-type: none"> <li>1. Check ECCS pumps all running-Determine CCPs, SI pumps, and RHR pumps running.</li> <li>2. Check ECCS flow-Determine flow is indicated for BIT flow.</li> <li>3. Check ECCS valves in proper alignment-Determine ECCS alignment is correct using status lights on 2-SML-12A, 2-SML-12B, 2-SML-12C, 2-SML-11A, 2-SML-11B, and 2-SML-11C.</li> <li>4. Check CCW status-Determine one CCW pump running, CCW surge tank stable, and CCW monitor lights in proper status using 2-SML-8B.</li> <li>5. Check ESW status-Determine both ESW pumps running, both discharge valves open, and proper status lights on 2-SML-7</li> <li>6. Check if containment recirculation fans should be running-Determine containment pressure &lt;1 psig.</li> <li>7. Place DIS in service by directing local action to stop all ice condenser air handling units and turning on all hydrogen ignitors when local action is reported complete</li> <li>8. Check containment vent and Phase A isolation-Determine Containment Vent Isolation and Phase A isolation are actuated and completed on both trains, and direct actions to periodically monitor SFP radiation, SFP cooling, and SFP level</li> <li>9. Check ESF fans both running-Determine both fans are running</li> <li>10. Align control room ventilation by checking both pressurization fans are running, stopping one pressurization fan, checking cable vault hatch closed, checking control room dampers aligned for SI, and checking at least one control room air handling unit is running</li> <li>11. Align PACHMS for service by momentarily placing containment hydrogen sample bypass switches in BYPASS</li> <li>12. Request Unit 1 perform actions</li> <li>13. Check generator trip-Determine generator output breakers are both open and main generator excitation control is OPEN</li> <li>14. Check Load Conservation status-Determine AC buses T21B and T21C are energized by offsite power</li> <li>15. Check NESW pressure is &gt;65 psig on 2-WPI-901</li> <li>16. Check Containment Isolation Phase B status-Determine Containment Isolation Phase B is not actuated.</li> <li>17. Report completion of Attachment A</li> </ol>

Time	Position	Applicant's Actions or Behavior
	US	Announces transition to 2-OHP-4023-E-1, Response to Loss of Reactor or Secondary Coolant and direct actions. Checks Status Trees for Red Path
	RO/BOP	Perform actions of E-1 as directed
	RO	Determine RCPs should not be stopped due to RCS pressure >1300 psig
	BOP	Determine secondary pressures are intact based on rising SG pressures
	BOP	Control AFW flow to intact Steam Generators >240E3 pph until level >13% in at least one SG
	BOP	Check Secondary Radiation: <ul style="list-style-type: none"> <li>• Reset CI Phase A</li> <li>• Direct Chemistry sample Steam Generators for activity</li> <li>• Determine all secondary radiation monitors normal</li> </ul>
	RO	Determine pressurizer PORV block valves energized and open and PORVs closed or cycling to maintain pressure
	CREW	Determine criteria satisfied for ECCS termination: <ul style="list-style-type: none"> <li>• Subcooling &gt;40°F</li> <li>• AFW flow to intact Steam Generators &gt;240E3</li> <li>• RCS pressure stable or rising</li> <li>• Pressurizer level &gt;20%</li> </ul>
	US	Announces transition to 2-OHP-4023-ES-1.1, SI Termination, and directs operator actions. Checks Status Trees for Red Path

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Performs actions of 2-OHP-4023-ES-1.1, SI Termination as directed:</p> <ul style="list-style-type: none"> <li>• Reset SI</li> <li>• Stop all but one CCP</li> <li>• Reset Containment Isolation</li> <li>• Establish Control Air to containment: <ul style="list-style-type: none"> <li>○ Place pressurizer spray valve controllers in MANUAL at zero demand</li> <li>○ Determine control air pressure is &gt;85 psig</li> <li>○ Open control air to containment valves 2-XCR-100, 2-XCR-101, 2-XCR-102, &amp; 2-XCR-103.</li> <li>○ Determine annunciator 204-33 clear</li> </ul> </li> <li>• Determine RCS pressure is stable or rising</li> <li>• Isolate BIT: <ul style="list-style-type: none"> <li>○ Determine CCP suction is aligned to the RWST</li> <li>○ Reset and open both CCP leak off valves 2-QMO-225 and 2-QMO-226</li> <li>○ Close BIT inlet valves 2-IMO-255 and 2-IMO-256</li> <li>○ Close BIT outlet valves 2-ICM-250 and 2-ICM-251</li> </ul> </li> <li>• Establish Charging flow: <ul style="list-style-type: none"> <li>○ Close 2-QRV-200, charging header pressure control valve</li> <li>○ Open charging flow to regen heat exchanger valves</li> <li>○ Establish minimum charging flow using 2-QRV-200 and 2-QRV-251 to maintain 6 to 12 gpm seal injection flow to each RCP</li> </ul> </li> </ul> <p>NOTE: 2-QFI-200, Charging Flow instrument, is failed from a previous event.</p> <ul style="list-style-type: none"> <li>• Control charging flow to maintain pressurizer level stable or rising</li> <li>• Determine RCS pressure is &gt;1650 psig and stable or rising and stop SI pumps</li> <li>• Stop both RHR pumps</li> </ul>

Simulator Instructions:

**SETUP:**

Reset to an 80% IC with the Middle Condensate Booster Pump in standby, MSRs in service, and all pressurizer backup heaters are energized with pressure stabilized (IC-952).

Provide a marked up copy of 2-OHP-4021-001-006, Power Escalation, completed through step 4.87 (When approximately 80% power, then compare power indications and record on Data Sheet 9”).

Enter a failure of the West CCW pump to auto start:

**U2\_CC02B**

Enter the following to disable automatic and manual reactor trip:

**U2\_RP03A**

**U2\_RP03B**

Enter the following to disable automatic AMSAC actuation:

**U2\_PB505E1 Not Tripped**

**U2\_PB506E1 Not Tripped**

Enter the following to disable automatic start of AFW pumps:

**U2\_FW48A**

**U2\_FW48B**

**U2\_FW48C**

Enter the following to enable AFW pump start when AMSAC is manually initiated:

**U2\_AMSAC ET1**

**trg= 1 "dmf u2\_fw48a"**

**trg= 1 "dmf u2\_fw48b"**

**trg= 1 "dmf u2\_fw48c"**

Enter the following to disable all automatic and manual turbine trips:

**U2\_TC02**

Enter the following to disable automatic steam line isolation:

**U2\_RP07A**

**U2\_RP07B**

Enter the following to set up inadvertent SI actuation of SI on ET2:

**U2\_RP12A ET2**

**U2\_RP12B ET2**

**Event 1:**

AEO Role Play:

- If requested, report the Middle Condensate Booster Pump is ready for start and personnel are clear of the area.
- After pump start, report that Condensate Booster Pump oil pressure is 4 psig.
- When requested, report 2-CRV-224 is verified closed by local indication.

**Event 2:**

No action required

**Event 3:**

When directed by the Lead Evaluator, insert the following malfunction:

**U2\_QFI200 0**

**Event 4:**

NOTE: The following event is required for the BOP. It should be inserted when the RO is engaged with manual control of 2-QRV-251 to ensure the BOP is the person who responds to the event.

When the Crew has completed actions of IFR-001, and with the concurrence of the Lead Evaluator, insert the following malfunction to fail the East CCW pump:

**U2\_ECC Stator Short Circuit**

**Event 5:**

When the crew has started the West CCW pump and identified applicable Tech Spec actions, and with the concurrence of the Lead Evaluator, enter the following to cause a failure of VCT level channel QLC-452:

**U2\_QLC452 100**

**Event 6:**

When the Crew has completed actions of IFR-001, actions of 2-OHP-4022-013-017 are complete up to energizing the RWS relay, and with the concurrence of the Lead Evaluator, enter the following to cause a failure of 24 SG level to 100%:

**U2\_BLP141 45-100%, 2 Min Ramp**

**Event 7:**

When actions of 2-OHP-4022-013-013 are complete up to bistable tripping, and with the concurrence of the Lead Evaluator, enter the following to cause an inadvertent SI on both trains:

**TRG! 2**

When directed, wait 2 minutes and open reactor trip breakers locally:

**Delete RP03A**

**Delete RP03B**

When directed, wait 2 minutes and locally trip the turbine:

**U2\_TCR01 TRIP**

**Event 8:**

Perform the following actions as directed during performance of E-0:

- Stop ice condenser air handling units and report completion in ~5 minutes:

**U2\_CHR01 OFF After 5 Min Delay**

- When directed to perform Unit 1 actions per E-0 Att. A:
  1. Report chemistry has been directed to place Train A PACHMS in service, Unit 1 control room pressurization is aligned for a Unit 2 SI, 2-HV-AS-1 is in service
  2. Place PACHMS Train A in service (30 minute delay):

**U2\_CHR02 ON After 30 Min Delay**