

Facility: DC COOK 1 & 2 Scenario No.: NRC2020-1 Op-Test No.: \_\_\_\_\_

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

Initial Conditions: 80 % Power

Turnover: Restore power to 100% following Turbine Valve testing

Critical Tasks: Stabilize SG Level on MPP230 Failure, Manually Actuate SI

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Swap #1 Control Fluid Pump for #3 Control Fluid Pump
2		R-RO	Commence raising Reactor Power to 100%
3	U1_101PW2N	C-RO	PW Pump Trips \ Fails to Auto Start
4	MPP230 to 1 over 30 Sec	I-BOP TS	SG Pressure Channel MPP-230 Fails Low
5	U1_NLP152 to 0%	I-RO TS	Pressurizer Level Control Bi-stable channel fails Low
6	U1_HWPS U1_CPS101N U1_CPS103S	C – BOP	Hotwell Pump Trip – Standby Fails to Start (Adjust Hotwell Bypass flow to lower pressure post trip)
7	U1_RC19A @ 7%	C- CREW	Pressurizer Safety Starts leaking
8	U1_RP10A	M- CREW	Pressurizer Safety progresses to full open Train A Safety Injection signal failure to actuate in AUTO
	U1_RP10B U1_RP11B		Train B Safety Injection signal failure to actuate in AUTO or Manual on the PRZ panel only
	U1_RP19D		RPS Relay Failure Train A equipment fails to start (CV, SI, RHR, CC & Control Room Ventilation)

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

NOTE: Blue text indicates changes made to reflect as-administered scenario.

### Event Summary

The crew is directed to swap Control Fluid pumps due to potential problem with the running pump.

The plant is at 80% power and the crew is directed to commence raising power to 100%.

Once a Dilution is begun the PW pump will trip and the standby pump will fail to start. The RO will be required to start the standby pump to continue the dilution.

After the crew completed the PW pump actions and began to change power, SG Pressure Channel MPP-230 fails low. The BOP will be required to take manual control of SG 3 Feedwater Regulating Valve FRV-230 to stabilize level. The crew will address the failure with the Abnormal Operating Procedure, address Technical Specifications, select an operable channel, and restore automatic control.

A Low failure of the Pressurizer Level Control Bi-stable channel will occur. The RO should identify the channel failure. The crew will need to address this failure with the Abnormal Operating Procedure and address Technical Specifications. This will also cause an isolation of normal Letdown. The crew will select an Operable Bi-stable channel and restore Letdown.

The South Hotwell Pump will trip requiring the BOP to manually start the Middle Hotwell pump.

The major event will start with a leaking Pressurizer Safety Valve. The crew may enter 4022-002-020, Excessive Reactor Coolant Leakage procedure. A unit trip will be required. This will lead to SV-45A PRZ Safety Valve failing full open. As the crew performs the actions of E-0, the Safety Injection will fail to automatically actuate. The Crew must manually actuate SI (Train B from SI panel only works) and/or align ECCS Pumps and Equipment as required. The crew will transition to E-1. The scenario will terminate when the crew has transitioned to ES-1.2 for Post LOCA cooldown.

#### Critical Tasks

- Stabilize SG Level on MPP-230 Failure
- Manually Actuate SI

#### Procedures

- E-0, Reactor Trip or Safety Injection
- E-1, Loss of Reactor or Secondary Coolant

Op-Test No.: Cook 2020      Scenario No.: NRC2020-1      Event No.: 1

Event Description: **Swap #1 Control Fluid Pump for #3 Control Fluid Pump**

Time	Position	Applicant's Actions or Behavior
	US	Directs use of 1-OHP-4021-050-006, Main and MFP Turbine Control Fluid Operation, Attachment 1, Control Fluid System Operation, Section 4.2, for swapping Control Fluid Pumps.
	BOP	Places Control Fluid Pump #1 in RUN.
	BOP	Acknowledges Alarms on MT DCS Ann. Panel: <ul style="list-style-type: none"> <li>• Drop 179, No Ctrl Fluid Pump in Auto 2</li> <li>• Drop 208, More than 1 CTRL FLD Pump in Manual and Running</li> </ul>
	BOP	Places Control Fluid Pump #3 in OFF.
	BOP	Places Control Fluid Pump #3 in AUTO 2.
	BOP	Acknowledges Alarms clearing on MT DCS Panel.
	RO	Provides peer checks during evolution as appropriate.
When pump swap is complete or at Lead Evaluators direction commence the next event		

Op-Test No.: Cook 2020      Scenario No.: NRC2020-1      Event No.: 2

Event Description: **Raise Turbine and Reactor Power**

**NOTE: Place Event 3 Failure In prior to Crew starting dilution for Power Change**

Time	Position	Applicant's Actions or Behavior
	Crew	Reactivity brief for reactivity plan for power escalation.
	US	Directs RO to commence Power Escalation in accordance with OHP-4021-001-006, Power Escalation (at step 4.80)
<p>NOTE Event #3 will be initiated when the dilution is started</p>		
	RO	<p>Performs DILUTION (batch add OR Continuous):</p> <ul style="list-style-type: none"> <li>• Place RC Makeup Blend control switch in STOP</li> <li>• Place RC Makeup Blend Control Mode switch in DILUTE or ALT DILUTE</li> <li>• Adjust PW to the desired flow rate and/or amount.</li> <li>• May close QRV-451, Blender to VCT if aligning to CCP Suction Only (if using Alt Dilute)</li> <li>• Place RC Makeup Blend control switch in START (<b>Event 3 initiator</b>)</li> <li>• May take QRV-303, VCT/Holdup Tk Inlet Selector to Manual and Open as required to maintain VCT Level and Pressure.</li> </ul>
	RO	<p>Commences escalation:</p> <ul style="list-style-type: none"> <li>• Raises turbine load (reactor power) using the DCS HMI. <ul style="list-style-type: none"> <li>• Places MT in MW <b>INOUT</b></li> <li>• Sets Turbine Load Target</li> <li>• Sets Turbine Ramp Rate</li> <li>• Selects Go</li> </ul> </li> <li>• Maintains Tavg / Tref deviation within limits (+/- 2F or as designated by US) by dilution and turbine load adjustments.</li> <li>• Ensures Axial Flux Difference (AFD) is maintained within target</li> </ul>
	RO	RO verifies appropriate reactivity feedback.
	BOP	Acts as peer checker for RO during blender operations.

Op-Test No.: <u>Cook 2020</u> Scenario No.: <u>NRC2020-1</u> Event No.: <u>3</u>		
Event Description: <b><u>North PW Pump trip / Failure to Start of Standby Pump</u></b>		
Time	Position	Applicant's Actions or Behavior
	RO	Identifies that the North PW pump has tripped and a dilution is not occurring. ANN panel 109 Drops 28 and 29
NOTE		
RO may stop attempted dilution and address the tripped pump using the ARP. May Place North PW pump in stop		
	RO	Places South PW in Start and verifies that PW flow is available for dilution.
	BOP	Dispatch AEO to investigate North PW pump and/or breaker
NOTE		
Report from field: Thermal overloads are tripped and cannot be reset		
	SM	If required have the Shift Manager direct crew to continue with Power Escalation / dilution
	US	Initiates corrective action for failed pump <ul style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ul>

Op-Test No.: <u>Cook 2020</u> Scenario No.: <u>NRC2020-1</u> Event No.: <u>4</u>		
Event Description: <b><u>SG Pressure Channel MPP-230 Fails low</u></b>		
Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel 114 which are indicative of a steam generator #3 water level control / pressure instrument failure (Drops 3, 12, 13, 14).
	<b>BOP</b> <b>Critical Task #</b>	Reports instrument malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: <b>Places FRV-230, SG 3 MFW Reg. Valve controller to MANUAL, lowers controller output and restores SG 3 level to program</b> (may also place MFP ΔP controller in MANUAL or Speed control at this time).
	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 OHP-4022-IFR-001, Instrument Failure Response procedure. <ol style="list-style-type: none"> <li>1. Check Steam Generator Narrow Range Level - STABLE OR TRENDING to 44%</li> <li>2. Check Steam Generator PORVs – CLOSED</li> <li>3. Check MFP Differential Pressure - Controlling At Appropriate Differential Pressure For Current Actual Steam Flow</li> </ol>
	US	Enters and directs actions of 1-OHP-4022-013-012, Steam Generator Pressure Instrument Malfunction procedure.

	BOP	<p>Performs the following actions as directed:</p> <ol style="list-style-type: none"> <li>1. Reports MPP-230 has failed.</li> <li>2. Places / verifies FRV-230 controller in MANUAL.</li> <li>3. Places / verifies MFP <math>\Delta</math>P controller in MANUAL.</li> <li>4. Checks SG PORVs closed.</li> <li>5. Places 1-FS-532C selector switch in channel 2 position.</li> <li>6. Restores SG 3 level using manual control of FRV-230.</li> <li>7. Nulls and returns FRV-230 controller to AUTO.</li> <li>8. Returns MFP <math>\Delta</math>P controller to auto.</li> </ol>
	US	<p>Refers to Tech Specs (TS):</p> <ul style="list-style-type: none"> <li>• TS 3.3.1 <u>RTS Instrumentation</u> Condition A – Check Table 3.3.1-1 Function: Function 15 – Cond. D Trip Bi-stables in 6 Hours</li> <li>• TS 3.3.2 <u>ESFAS Instrumentation</u> Condition A – Check Table 3.3.2-1 Functions: Function 1e(2) &amp; 4e – Cond. D - Trip Bi-stables in 6 Hours</li> <li>• TS 3.3.4 <u>Remote Shutdown Instrumentation</u> - Condition A – Restore within 30 Days</li> <li>• <del>TRM 8.7.14 <u>PPC Derived Thermal Power – Condition B – Maintain Power &lt;100% on highest reading NI – Immediately</u></del></li> <li>○ TRM 8.7.14 <u>PPC Derived Thermal Power</u> – Recognizes that TRM 8.7.14 requirements are not APPLICABLE at the current power level.</li> </ul>
	US	<p>Initiates corrective action for failed channel</p> <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
	US	<p>Initiates actions to trip bi-stables associated with MPP-230 per Attachment C-1 of 1-OHP-4022-013-012.</p>
<p>When SM notification is made or at Lead Evaluators direction commence the next event</p>		

Op-Test No.: <u>Cook 2020</u> Scenario No.: <u>NRC2020-1</u> Event No.: <u>5</u>		
Event Description: <b><u>NLP-152, Pressurizer Level Control Bi-stable channel fails low</u></b>		
Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #108 (Drop 5, 50). Reports instrument malfunction indicative of a Pressurizer Level instrument failure.
	RO	Reports instrument malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: <ul style="list-style-type: none"> <li>• Close 1-QRV-200, using Charging Flow to Regen HX Controller</li> <li>• Places 1-QRV-251, Charging Flow Controller in manual and manually adjusts output to minimum amount required for seal injection (~35 gpm).</li> </ul>
	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 OHP-4022-IFR-001, Instrument Failure Response procedure. <ol style="list-style-type: none"> <li>1. Check Pressurizer Level - Stable or Trending to Program Level.</li> <li>2. Check Letdown – in service</li> </ol>



Op-Test No.: Cook 2020Scenario No.: NRC2020-1Event No.: 5Event Description: **NLP-152, Pressurizer Level Control Bi-stable channel fails low**

	US	<p>Enters and directs actions of OHP-4022-013-010, Pressurizer Level Instrument Malfunction procedure.</p> <ol style="list-style-type: none"> <li>1. IF -1-NLP-152 is the bi-stable channel THEN verify PZR level control is in manual using one of the following: <ul style="list-style-type: none"> <li>PRZ Level Control (master controller)</li> <li>-OR-</li> <li>1-QRV-251, CCP Discharge Flow Controller</li> </ul> </li> <li>2. Verify PRZ Level CTRL selector switch in Channels 1&amp;3 position.</li> <li>3. Verify PRZ Level Rec selector switch in Chan 1 or 3 position</li> <li>4. Check 1-NLP-152, PRZ Pressure Channel 2 for failure</li> </ol>
	US	<p>Directs RO / BOP to restore normal letdown (using QRV-161, 75 gpm letdown orifice) per 1-OHP-4021-003-001, Letdown, Charging, and seal water Operation, Attachment 13.</p>
	RO	<p>Performs the following actions as directed:</p> <ol style="list-style-type: none"> <li>1. Restores PRZ level using 1-QRV-251 or level controller</li> <li>2. Reports 1-NLP-152 has failed</li> <li>3. Ensures PRZ level control is in manual</li> <li>4. Places PRZ Level CTRL selector switch in Ch 1 &amp; 3 position</li> <li>5. Places PRZ Level REC selector switch in 1 or 3 position</li> <li>6. Resets PRZ Heaters to restore control</li> </ol> <p>Actions for restoring Letdown and returning Pressurizer Level Control to automatic are contained on the following page</p>
	US	<p>Initiates corrective action for failed instrument</p> <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>

Op-Test No.: <u>Cook 2020</u> Scenario No.: <u>NRC2020-1</u> Event No.: <u>5</u>		
Event Description: <b><u>NLP-152, Pressurizer Level Control Bi-stable channel fails low</u></b>		
	US	Initiates actions to trip bi-stables associated with 1-NLP-152 PZR Level Failure per Attachment B of OHP-4022-013-010.
	US	Refers to Tech Specs (TS): <ul style="list-style-type: none"> <li>• TS 3.3.1 RTS Instrumentation (Condition A Table 3.3-1, Function 9 Cond. D Trip Bi-stables in 6 Hours)</li> <li>○ TS 3.3.3 Post Accident (Minimum channels met)</li> <li>○ <del>TRM 8.7.14 PPC Derived Thermal Power Condition B – Maintain Power &lt;100% on highest reading NI – Immediately (Already entered from event 4)</del></li> <li>○ TRM 8.7.14 PPC Derived Thermal Power – Recognizes that TRM 8.7.14 requirements are not APPLICABLE at the current power level.</li> </ul>
	RO/BOP	Restores normal letdown per Attachment 13, Section 4.1 as follows: <ol style="list-style-type: none"> <li>1. Places QRV-302, Cold Letdown Path Select in divert position.</li> <li>2. Verifies orifice isolations closed (QVR-160, 161 and 162).</li> <li>3. Adjusts CRV-470, Letdown HX Temp Ctrl controller to <math>\geq 50\%</math> output.</li> <li>4. Verifies open letdown isolation valves: <ol style="list-style-type: none"> <li>a. QCR-300, CVCS letdown Cntmt isol</li> <li>b. QCR-301, CVCS letdown Cntmt isol</li> <li>c. QRV-111, RC letdown to Regen hx</li> <li>d. QRV-112, RC letdown to Regen hx</li> </ol> </li> <li>5. Adjusts QRV-301, Letdown Press Ctrl controller to 50% output.</li> <li>6. Checks/adjusts charging flow to &gt; 75 gpm.</li> <li>7. Opens QRV-161, 75 gpm letdown orifice isolation.</li> <li>8. Adjusts QRV-301 to maintain 160 – 350 psig on QPC-301.</li> <li>9. Places QRV-301 in auto (if desired).</li> <li>10. Nulls and returns CRV-470 controller to auto.</li> <li>11. Adjusts charging flow as required to maintain PRZ level.</li> <li>12. Places PRZ level control in automatic (if desired).</li> <li>13. Places QRV-302 in normal (demin) position when letdown temperature is stable.</li> </ol>
With letdown restored, SM notification made, and pressurizer level is being restored to setpoint or at Lead Evaluators direction commence the next event		

Op-Test No.: Cook 2020Scenario No.: NRC2020-1Event No.: 6Event Description: **South Hotwell Pump Trip – Middle (Standby) Fails to Start**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes Feedwater control problem and reports alarms: Panel #116 Drop 63 – Hotwell Pump Disch Pressure Low Drop 61 – Hotwell Pump Motor Instant Trip Drop 73 - Cndst Booster Pump Disch Pressure Low Panel #122 Drop 96 - Turb Aux Clg Water Pump Auto Start Up
	US	Directs operator actions to stabilize the unit and restore Hotwell pump flow.
	RO	Monitor RCS & Secondary parameters during transient.
	BOP	<ul style="list-style-type: none"> <li>• Manually start the Middle Hotwell pump.</li> <li>• <b>May</b> Place South Hotwell pump control switch to TRIP and back to NEUTRAL (Clear Alarms).</li> <li>• Monitor Secondary parameters for normal operations.</li> </ul>
	US/RO	Stabilize Power, if desired: (May be held from first event) <ul style="list-style-type: none"> <li>• Verify Reactor Stable</li> <li>• Verify SG levels Stable</li> </ul>
	US	Initiates corrective action for failed pump <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
When secondary plant is stable or at Lead Evaluators direction commence the next event		

Op-Test No.: Cook 2018Scenario No.: NRC2020-1Event No.: 7, 8

Event Description: **Pressurizer Safety Leak Progressing to Full Open, Train A & B Auto Safety Injection failure with Train A Relay Failure (CV, SI, RHR,CCW & Control Room Ventilation fails to auto start)**

Time	Position	Applicant's Actions or Behavior
	RO	Recognize and reports abnormal RCS leakage: <ul style="list-style-type: none"> <li>• RCS pressure lowering with PZR Heaters ON</li> <li>• PRZ Safety Valve SV-45A indicates open</li> <li>• Panel #108:               <ul style="list-style-type: none"> <li>Drop 8 - Pressurizer Press Low Dev Backup Htrs On</li> <li>Drop 29 - PRZ SV A Disch Temp Hi</li> <li>Drop 31 - Prz Relief Tk Pressure High Or Low</li> <li>Drop 45 - Acoustic Monit Flow Detected Or Volt Fail</li> </ul> </li> </ul>
<b>NOTE</b> US may order a reactor trip based on safety valve leakage being unisolable. If not crew should enter 1-4022-002-020, Excessive Reactor Coolant Leakage procedure.		
	US	Enters 1-4022-002-020, Excessive Reactor Coolant Leakage
	RO	Monitor PZR Level <ol style="list-style-type: none"> <li>1. Maintain PZR level by adjusting QRV-251 and QRV-200 as necessary</li> <li>2. # Monitor Containment Pressure – if approaching 1psig then perform the following: Trip the Reactor, Go to 1-OHP-4023-E0, Reactor Trip or Safety Injection, when the Reactor is verified Tripped, THEN initiate Safety Injection.</li> </ol>
	RO/BOP	Monitor Containment Pressure
	RO	Monitor VCT Level
	RO	Determine RCS Leak Rate

Op-Test No.: Cook 2018Scenario No.: NRC2020-1Event No.: 7, 8

Event Description: **Pressurizer Safety Leak Progressing to Full Open, Train A & B Auto Safety Injection failure with Train A Relay Failure (CV, SI, RHR,CCW & Control Room Ventilation fails to auto start)**

Time	Position	Applicant's Actions or Behavior
	US	Check Unit Status <ul style="list-style-type: none"> <li>• TS 3.4.13 RCS Operational Leakage –Cond. A -4 hours (may not refer to until asked at end of scenario due to time restraints)</li> <li>○ TS 3.4.1 RCS Pressure, Temperature, and Flow DNB Limits (Condition A) if Pressure lowers to &lt;2168 psig. (2200 psig admin limit) (may use PPC times to track TS entry/exit times)</li> </ul>
	US	Identify Source of Primary Leak
	US	Directs RO to Perform a Reactor Trip based on Low RCS Pressure or High Containment Pressure leading to Safety Injection Directs RO/BOP to perform the immediate actions of 1-OHP-4023-E-0, Reactor Trip or Safety Injection.
	RO/BOP	Performs the immediate actions of E-0: <ol style="list-style-type: none"> <li>1. Checks reactor trip – reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – MTSV Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – T11A or T11D at least one energized</li> <li>4. Checks safety injection status – SI Status Light Lit (QMO-225/226 white lights Lit) Required if:               <ol style="list-style-type: none"> <li>a. PZR Pressure &lt; 1775#</li> <li>b. CNTMNT Pressure &gt; 1.0#</li> <li>c. SG Pressure &lt; 500#</li> <li>d. STM Line DP &gt; 100psid</li> </ol> </li> </ol>

Op-Test No.: Cook 2018Scenario No.: NRC2020-1Event No.: 7, 8

Event Description: **Pressurizer Safety Leak Progressing to Full Open, Train A & B Auto Safety Injection failure with Train A Relay Failure (CV, SI, RHR,CCW & Control Room Ventilation fails to auto start)**

Time	Position	Applicant's Actions or Behavior
	RO/BOP  Critical Task #2	<p>Check Safety Injection Actuated:            Manually Actuate SI (From SI Panel for Train B) to establish High Head Injection Flowpath</p> <p>-OR-</p> <p>NOTE: May be performed in E-0, Attachment A.  <b>Manually Align Valves</b></p> <ul style="list-style-type: none"> <li>• BIT Inlet Valves ICM-255 -AND/OR ICM-256 - OPEN</li> <li>• BIT Outlet Valves ICM-250 -AND/OR ICM-251 - OPEN</li> <li>• RWST to CCP Valves IMO-910 -AND/OR IMO-911 - OPEN</li> <li>• VCT to CCP Valves QMO-451 -AND/OR QMO-452 - CLOSED</li> </ul> <ul style="list-style-type: none"> <li>• Manually Start/Align ECCS Equipment and Actuate Phase A (Train A)               <ul style="list-style-type: none"> <li>• SI</li> <li>• RHR</li> </ul> </li> </ul>
	RO/BOP	Reviews E-0 Foldout Page Criteria.
	US/RO	Foldout Page – RCP Trip Criteria: <ul style="list-style-type: none"> <li>• Stop all RCPs when RCS is &lt; 1300 psig and CCP/SI pump running</li> </ul>
	BOP	Manually controls AFW flow to > 240,000 to < 450,000 pph to maintain SG narrow range levels 13% - 50% once one SG narrow range level is greater than 13%.
	US	Ensures immediate actions of E-0 are completed <ul style="list-style-type: none"> <li>• Directs subsequent actions of E-0.</li> </ul>

Op-Test No.: Cook 2018Scenario No.: NRC2020-1Event No.: 7, 8

Event Description: **Pressurizer Safety Leak Progressing to Full Open, Train A & B Auto Safety Injection failure with Train A Relay Failure (CV, SI, RHR,CCW & Control Room Ventilation fails to auto start)**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Completes actions of E-0 through step 19 as directed.</p> <p>Step 5 – Check Main Steamline Isolation NOT required (Steamline pressure &gt; 500 #, flow &lt; 1.42x10<sup>6</sup> PPH, Containment &lt; 2.8#)</p> <p>#Step 6 -Check CTS NOT required (Containment &lt; 2.8#)</p> <p>Step 7 – Implement Attachment A while continuing</p> <p>#Step 8 – Check if Ruptured SG is Suspected (No NR level rising in uncontrolled manner)</p> <p>Step 9 – Check AFW Pumps running (MDAFPs and TDAFP running)</p> <p>Step 10 – Check total AFW flow &gt; 240 x 10<sup>3</sup> PPH</p> <p>Step 11 – Minimize Unnecessary RCS Cooledown (NR level &gt; 13%, control flow to maintain NR level between 13 – 50%)</p> <p>Step 12 – Check AFW Discharge valves Open or Throttled</p> <p>Step 13 – Check FW Isolation (MFPs tripped, Discharge valves closed, FRVs closed, FW Isolation valves closed)</p> <p>#Step 14 - Check RCS Temperature (RCP running – RCS T<sub>avg</sub> 547F)</p> <p>Step 15 – Check PZR PORVs and Spray Valves</p> <p>Step 16 – Check if RCPs should be Stopped (RCS Pressure &lt; 1300# and 1 CCP or SI pump running)</p> <p>Step 17 – Check if SG Secondary Boundaries are Intact (No SG Pressure lowering in Uncontrolled manner or completely Depressurized)</p> <p>Step 18 – Check if SG Tubes are Intact (NO NR level Rising in uncontrolled manner)</p> <p>Step 19 – Check if RCS is Intact (CNTMNT Radiation, Pressure, Water Levels Normal)</p>
	RO/BOP	<p>Performs manual actions of E-0, Attachment A as directed by US.</p> <ul style="list-style-type: none"> <li>• Verifies CEQ Fans and CCW to CEQ</li> <li>• Place DIS in Service – Turn on Igniters</li> <li>• Verify Train A Control Room Pressurization aligned</li> <li>• Reset Bypass switches for PACHMS</li> <li>• Verifies Containment Ventilation &amp; Phase A Isolations</li> </ul>

Op-Test No.: Cook 2018Scenario No.: NRC2020-1Event No.: 7, 8

Event Description: **Pressurizer Safety Leak Progressing to Full Open, Train A & B Auto Safety Injection failure with Train A Relay Failure (CV, SI, RHR,CCW & Control Room Ventilation fails to auto start)**

Time	Position	Applicant's Actions or Behavior
	US/RO	Checks if RCS is Intact – NO.
	US	Evaluates Critical Safety Function Status
	US	Announces transition to 1-OHP-4023-E-1, Loss of Reactor or Secondary Coolant and directs operator actions.
	RO/BOP	Reviews E-1 Foldout Page Criteria.



Op-Test No.: Cook 2018Scenario No.: NRC2020-1Event No.: 7, 8

Event Description: **Pressurizer Safety Leak Progressing to Full Open, Train A & B Auto Safety Injection failure with Train A Relay Failure (CV, SI, RHR,CCW & Control Room Ventilation fails to auto start)**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Completes actions of OHP-4023-E-1 through step 12 (Check if RCS Cooldown and Depressurization is required) as directed.</p> <ol style="list-style-type: none"> <li>1. Check if RCP's should be stopped – RCS Pressure &lt; 1300#</li> <li>2. Check if SG Secondary Pressure Boundaries are Intact – No pressure lowering in uncontrolled manner or completely depressurized</li> <li>3. Check intact SG levels – NR level &gt; 13%</li> <li>4. Check Secondary Radiation – Rest Phase A and direct Chemistry to sample SG's for activity</li> <li>5. Check PZR PORV's and Block valve – Block valves energized and at least one open, PORV's closed</li> <li>6. Check if ECCS flow should be reduced – RCS subcooling &gt; 40F, Secondary Heat Sink, RCS Pressure stable or rising, and PZR level &gt; 16% - Go to ES-1.1</li> <li>7. Check if CTS should be stopped – CTS running, RCS Pressure &gt; 300#, Containment Pressure &lt; 2.0#</li> <li>8. Check if RHR pumps should be stopped - RCS Pressure &gt; 300#, RCS Pressure stable or rising, RHR pump running aligned to RWST</li> <li>9. Check RCS and SG Pressures – Pressure in all SG's Stable or rising, RCS Pressure Stable or Lowering</li> <li>10. Check if EDG's should be stopped – Emergency busses Energized by Off-Site</li> <li>11. Initiate evaluation of plant status – check Cold Leg Recir Capability</li> <li>12. Check if RCS Cooldown and Depressurization is required – RCS Pressure &gt; 300#</li> </ol>
	US	Announces transition to 1-OHP-4023-ES-1.2, Post LOCA Cooldown and Depressurization (at step 12).
<b>At transition or Lead Evaluators discretion Terminate Scenario</b>		

**Critical Task Summary**

Task	Elements	Results
<p align="center"><b>#1</b></p> <p align="center"><b>Manually Control SG#13 Level on MPP- 230 Failure</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>• Panel #114 Drops 3,12,13,14</li> <li>• MFC-131 Indication Lowering</li> <li>• FRV-230 closing</li> </ul> <p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>• Place FRV-230 in Manual and control SG #13 Level to maintain it 15% - 67% preventing a Reactor Trip. (May Select MFC-130 as Controlling Channel and Place\Leave FRV-230 In Auto)</li> </ul> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>• SG FW Flow raises (FRV-230 opens)</li> <li>• SG Level Stabilizes and returns to band</li> </ul>	<p align="center"><b>SAT / UNSAT</b></p>
<p align="center"><b>#2</b></p> <p align="center"><b>Manually Actuate/Align one train of Safety Injection to establish HIGH Head Injection Flow</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>• Check SI Actuated "Safety Injection Actuated" Status Light LIT (E-0, Step 4.a) -OR-</li> <li>• Check BOTH CCP leakoff valve "Safety Injection Signal" white lights - LIT</li> </ul> <p><b><u>Performance Indicators:</u></b> Before transitioning from E-0 and reaching a Valid Orange Path in FR-C series Core Cooling</p> <ul style="list-style-type: none"> <li>• Actuate 1 Train of SI -OR-</li> <li>• Manually Start/Align ECCS Equipment and Actuate Phase A (Train B) Manually Align Valves (<i>Train A</i> listed First, <i>Train B</i>)</li> <li>• BIT Inlet Valves <u>IMO-255</u> -AND/OR <u>IMO-256</u> - OPEN</li> <li>• BIT Outlet Valves <u>ICM-250</u> -AND/OR <u>ICM-251</u> - OPEN</li> <li>• RWST to CCP Valves <u>IMO-910</u> -AND/OR <u>IMO-911</u> - OPEN</li> <li>• VCT to CCP Valves <u>QMO-451</u> -AND/OR <u>QMO-452</u> - CLOSED</li> <li>• Ensure 1 CCP and SI running</li> </ul> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>• ECCS flow is indicated from at least one train (as indicated by flow on cold leg BIT injection flowmeters 1-IFI-51 thru 1-IFI-54)</li> <li>• One Train of Phase A Isolation is complete per E-0, Attachment A</li> </ul>	<p align="center"><b>SAT / UNSAT</b></p>

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## Scenario Instructor Actions

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Setup:

1. Reset to IC-303 MOL; 80% power, 850 MW, 799.86 ppm, 565.5 F 194 Steps on D
2. Place ALL Pressurizer Heaters In ON
3. Reset control rods and check group step counters.
4. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position.
5. Advance chart recorder paper & clear chart recorder memory.
6. Activate the following (pre-load) malfunctions:

1. Set Up South PW pump fail to Auto Start

- South PP in run on Trigger
- Global on South PW & Turn on Light
- Clear Global and Light on Start

**U1 South PW In Run Trg 1**

**U1\_101PW2S**

**ZLO101PW2S\_U1[GRN]**

**U1\_101PW2S**

**ZLO101PW2S\_U1[GRN]**

2. Set Up North PW pump trip on Auto Start

- PW flow on Trigger 4
- Trip North PW Pump on Trg 4

**QFC412 PW Flow >.003 Trg 4**

**U1\_101PW2N**

Hotwell Pump 1N Pressure Switch

**U1\_CPS101N**

Hotwell Pump 1S Pressure Switch

**U1\_CPS103S**

Train A Safety Injection Auto Failure

**U1\_RP10A**

Train B Safety Injection Auto Failure

**U1\_RP10B**

Train B Safety Injection Manual on the PRZ panel only

**U1\_RP11D**

RPS Relay Failure Train A

Equipment fails to start  
(CV, SI, RHR,CC & Control Room Ventilation)

**U1\_RP19D**

Setup trigger for reactor trip

**Reactor trip on Trigger 6**

Modify Safety valve leak

**Safety valve to 100%**

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## Scenario Instructor Actions

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### Scenario Events:

**NOTE: Verify Event 3 Failure In prior to Crew Starting Dilution**

### **EVENT #1**

If required, Local Control Fluid Temperature is 124°F

### **EVENT #2**

Respond as required to power change notifications and requests

### **EVENT #3**

(Entered in Setup)

If dispatched, report that the North PW pump breaker appears to be tripped and will not reclose

Report from field: Thermal overloads are tripped and cannot be reset

### **EVENT #4**

After crew changes power, insert **ICF U1\_MPP230** final value **1** over 30 seconds (MPP-230 fails low).

**U1\_MPP230**

### **EVENT #5**

Insert **U1\_NLP152**, final value **0** NLP-152 fails low to cause Letdown isolation, heater isolation, and alarm.

**U1\_NLP152**

### **EVENT #6**

**IMF U1\_HWPS** to cause a South Hotwell Pump to Trip (Switches to failure auto start already in)

**U1\_HWPS**

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## Scenario Instructor Actions

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### **EVENT #7**

IMF U1\_RC19A to 7 from .1 over 10 Minutes to simulate the PZR Safety leak

**U1\_RC19A**

Malfunctions for Train A & B SI Auto Failure, Train B from PRZ Panel, and Train A Slave Relay have already been Entered.

**Perform Local actions after entry into E-0 as requested:**

- Locally stop U1 Ice Condenser AHUs MRF **CHR01** to OFF

**U1\_CHR01**

- Aux Tour will monitor Spent Fuel Pool Level and Temperatures
- Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.

**U1\_CHR02**

OR

**U1\_CHR03**

(both have 10 minute delay built in)

- U2 has aligned CR vent for U1 SI, Fan **2-HV-AS-2** is running.

If directed to secure EDG jacket water pumps select **OFF** then **AUTO**

Remote	OFF	AUTO
<i>EGR 03A</i>	<b>U1_EGR03A</b>	<b>U1_EGR03A</b>
<i>EGR 03B</i>	<b>U1_EGR03B</b>	<b>U1_EGR03B</b>
<i>EGR 04A</i>	<b>U1_EGR04A</b>	<b>U1_EGR04A</b>
<i>EGR 04B</i>	<b>U1_EGR04B</b>	<b>U1_EGR04B</b>

Facility: DC COOK 1 & 2 Scenario No.: NRC2020-2 Op-Test No.: \_\_\_\_\_

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

Initial Conditions: 4 % Power

Mode change approved. Plant startup, raise power to ~ 10% to warm and roll Main Turbine.

**Critical Tasks:** Stabilize PZR Pressure following NPP-151 failure, Insert Negative Reactivity.

Event No.	Malf. No.	Event Type*	Event Description
1		R- RO	Raise power
2	U1_TACSE Stator Short	C-BOP	East Turbine Aux Cooling Water pump trip
3		N-BOP	Control SG Level in manual
4	U1_NPP151 to 2500	I-RO TS	Controlling Pressurizer Pressure Channel Fails High
5	U1_MPP212 to 1500	I-BOP TS	SG PORV Pressure Transmitter Failure
6	U1_ECP short circuit	C-RO <del>TS</del> *	Trip of 1E CCP
7	U1_RP08B U1_NI06  U1_RP03A U1_RP03B  U1_WMDAF P Short	M-Crew	Intermediate Range Failure and Reactor Trip Breakers fail to open  Inadvertent FW Isolation  West MDAFW Pump trip

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

\*Applicable Tech Spec (TS) Limiting Conditions for Operation (LCO) were addressed during event 4. No new TS LCO applications were generated by Event 6.

NOTE: Blue text indicates changes made to reflect as-administered scenario.

### Event Summary

The Crew is directed to commence raising power to ~10% for Main Turbine Start-up. The RO will withdraw rods to raise power while the BOP has Manual Control of Feed Reg Valves for SG level.

A trip of the East Turbine Aux Cooling Water pump occurs. This will result in reduced cooling capability for the Main Generator. BOP will be required to manually start the West Turbine Aux Cooling Water pump. Crew will be required to stabilize the plant.

The controlling Pressurizer Pressure Channel NPP-151 Fails High, Pressurizer spray valves will go full open. The crew will need to take manual control of pressurizer pressure and enter an Abnormal Operating Procedure, defeat the failed channel, address Technical Specifications, and then restore pressurizer pressure control to auto.

A failure of SG #11 Pressure Channel (MPP-212) fails high causing SG #11 PORV to fully open. This will also cause Reactor power to slightly rise. The BOP will need to take manual action to close the PORV, the crew will implement Abnormal Operating Procedure actions, and the US will need to declare the associated radiation monitor inoperable.

A Loss of the East CCP will require the RO to Start the West CCP. Letdown will be lost on the loss of the running CCP and will be addressed by the crew. The US will need to address Technical Specifications.

A failure of the Intermediate Range N36 will generate a Reactor Trip signal along with an inadvertent Feedwater Isolation causing the crew to identify a need for a manual Reactor Trip. The West MDAFW pump will not start to prevent the crew from attempting to lower power and stay on line using Aux feed. Crew should enter E-0 and perform the immediate actions. The crew will attempt to manually trip the reactor. Reactor trip breakers will not open causing the crew to enter 4023-FR-S.1, Response to Nuclear Power Generation / ATWS.

#### Critical Tasks

Stable PZR pressure following NPP-151 failure  
Insert Negative Reactivity in FR-S.1

#### Procedures

E-0, Reactor Trip or Safety Injection  
FR-S.1, Response to Nuclear Power Generation / ATWS

Op-Test No.: Cook 2020Scenario No.: NRC2020-2

Event No.: 1

Event Description: **Raise Power to 10% Power**

Time	Position	Applicant's Actions or Behavior
	RO	Briefs crew on reactivity plan for power rise.
	US	Reviews reactivity plan.
	US	Directs RO to commence Power Escalation in accordance with OHP-4021-001-006, Power Escalation procedure, step 20.
	RO	Commences escalation: <ul style="list-style-type: none"> <li>• Withdraws rods in 3 Step Increments while monitoring Delta T Power, NI Power and Steam Dumps</li> </ul>
<p>Note</p> <p>Insert event 2 after first rod withdrawal</p>		
	RO	RO verifies appropriate reactivity feedback. <ul style="list-style-type: none"> <li>○ RCS Temp rise</li> <li>○ Steam Dump Demand signal increase</li> <li>○ Reactor Delta T Power indication rise</li> <li>○ Reactor Delta Flux becoming more positive</li> </ul>



Op-Test No.: <u>Cook 2020</u>			Scenario No.: <u>NRC2020-2</u>			Event No.: 2		
Event Description: <b>East Turbine Aux Cooling Water Pump Trip</b>								
Time	Position	Applicant's Actions or Behavior						
	BOP	Recognizes problem and reports annunciator: Panel #122 <ul style="list-style-type: none"> <li>Drop 97 Turbine Aux CLG Motor Failure</li> </ul>						
	US	Directs operator actions to stabilize the unit and restore Turbine Aux Cooling Water capacity.						
	BOP	<ul style="list-style-type: none"> <li>Manually start the West Turbine Aux Cooling Water Pump</li> <li><u>May</u> Place East Turbine Aux Cooling Water Pump switch to TRIP and back to NEUTRAL (Clear Alarms)</li> <li>Monitor Secondary parameters for normal operations</li> </ul>						
	BOP	Dispatch AEO to investigate East Turbine Aux Cooling Water Pump and/or breaker						
	US	Initiates corrective action for failed pump <ol style="list-style-type: none"> <li>Shift Manager</li> <li>Asks SM to make notifications including Work Control</li> </ol>						
Note								
If crew delays continuation of power ascension, then step in as Shift Manager and direct continuing power ascension								
Note								
Transition to event 4 @ 6-7% and Steam Generator levels being controlled in manual (Event 3) or at lead examiners direction								

Op-Test No.: Cook 2020Scenario No.: NRC2020-2Event No.: 3Event Description: **Control Feedwater Flow in Manual**

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"><li>• Adjust FRV210 – 240 to Maintain SG levels within Designated band</li><li>• Adjust Main FW Pump Speed / DP target to ensure adequate FW Discharge to SG DP</li><li>• Place FW Regulating Valves in Auto if FRVs will control based on power</li></ul>

Op-Test No.: <u>Cook 2020</u> Scenario No.: <u>NRC2020-2</u> Event No.: <u>4</u>		
Event Description: <b><u>Pressurizer Pressure Channel NPP 151 Fails High</u></b>		
Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #108 indicative of a pressurizer (PRZ) pressure instrument failure (Drops 6, 7, 8).
	<b>RO</b> <b>Critical Task #1</b>	Reports instrument malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: <b>Places PRZ pressure master controller OR both PRZ spray valve controllers (1-NRV-163 and 164) to manual and lowers controller output to close spray valves</b>
	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 OHP-4022-IFR-001, Instrument Failure Response procedure.
	US	Enters and directs actions of 01-OHP-4022-013-009, Pressurizer Pressure Instrument Malfunction procedure.  May enter Technical Specification 3.4.1 <u>RCS Pressure, Temperature, and Flow DNB Limits</u> if Pressure lowers to <2168 psig. (2200 psig admin limit)
	US	Declares the 1E Centrifugal Charging Pump inoperable. (NPP-151 is the input pressure signal to the East CCP Emergency Leak-off Valve.)

Op-Test No.: Cook 2020Scenario No.: NRC2020-2Event No.: 4Event Description: **Pressurizer Pressure Channel NPP 151 Fails High**

Time	Position	Applicant's Actions or Behavior
	RO	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Restores PRZ pressure (~ 2235#) using manual control of EITHER:               <ul style="list-style-type: none"> <li>• PRZ pressure master controller</li> <li>• Both PRZ spray valve controllers</li> </ul> </li> <li>2. Reports 1-NPP-151 has failed HIGH</li> <li>3. Ensures PRZ pressure master controller is in manual</li> <li>4. Places PRZ Press Ctrl selector switch in Ch 2 &amp; 3 position</li> <li>5. Places the following recorder switches in Ch 2, 3 or 4 position:               <ul style="list-style-type: none"> <li>• PRZ Press Rec selector</li> <li>• Delta T selector</li> <li>• Overpower Delta T selector</li> <li>• Overtemp Delta T selector</li> </ul> </li> </ol>
	RO	Performs the following actions as directed: <ol style="list-style-type: none"> <li>6. Verifies 1-QMO-225, E CCP Leakoff is open <i>NOTE: (May place QRV251 in Manual while opening Leakoff – Letdown may also be reduced – QRV-251 should be returned to Auto)</i></li> <li>7. Dispatches Aux operator to open breaker for 1-QMO-225 (1-ABV-D-5C)</li> <li>8. Checks 1-NLP-151, PRZ Level Channel 1 and 1-NLI-151, PRZ Level Cold Calibration instruments for failure</li> <li>9. Ensures PRZ pressure master controller is in manual</li> <li>10. Nulls and returns the following controllers to auto:               <ul style="list-style-type: none"> <li>• Both PRZ spray valve controllers</li> <li>• PRZ pressure master controller</li> </ul> </li> </ol>

Op-Test No.: Cook 2020Scenario No.: NRC2020-2Event No.: 4Event Description: **Pressurizer Pressure Channel NPP 151 Fails High**

Time	Position	Applicant's Actions or Behavior
	US	Refers to Tech Specs (TS): <ul style="list-style-type: none"> <li>• TS 3.3.1 <u>RTS Instrumentation</u> (Condition A Table 3.3.1-1, Function 6, 8a, 8b Cond. D Trip Bi-stables in 6 Hours)</li> <li>• TS 3.3.2 <u>ESFAS Instrumentation</u> (Condition A Table 3.3.2-1, Function 1d Condition D -6 hours, 8b Condition G – 1 hour *)</li> <li>• TS 3.3.4 <u>Remote Shutdown Instrumentation</u> (Condition A – 30 days)</li> <li>• TS 3.5.2 <u>ECCS Subsystems</u> Condition A – 72 hours (E CCP)</li> <li>• TRM 8.1.1 <u>Rx Control Systems Charging Pumps – Operating</u> (Action A – 72 hours)               <ul style="list-style-type: none"> <li>○ TRM 8.7.14, <u>LEFM</u>, (N/A - Applicable above 3250 MW)</li> <li>○ <u>TRM 8.1.3, Boration Systems – Hot Shutdown (N/A in Mode 1)</u></li> </ul> </li> </ul> *=Identifies requirement to verify the status of Permissive P-11 Bi-stables within 1 hour of pressurizer pressure channel failure.
	US	Initiates actions to trip Bi-stables associated with 1-NPP-151 PZR Pressure Failure per Attachment A of 1-OHP-4022-013-009.
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
When PZR pressure is restored and controlled at ~ 2235# and Tech Specs are addressed or at Lead Evaluators direction proceed to next event		

Op-Test No.: Cook 2020Scenario No.: NRC2020-2Event No.: 5Event Description: **SG Pressure Channel MPP-212 Fails HIGH – SG 1 PORV Opens**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize and reports Annunciator Panel #114, Drop 21, 1-MRV-213 OP OR HSD1 PANEL OVERRIDE alarm that indicates SG #1 PORV (MRV-213) has opened.
	BOP	Reports MPP-212 has failed high.
	BOP	Place SG PORV #1 in Manual and Closes #1 PORV.
	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 OHP-4022-IFR-001, Instrument Failure Response procedure.
	BOP	For a Steam Generator Pressure OR Level Control OR Main Feed Pump D/P Issue OR any failure that affects these parameters perform the following: <ol style="list-style-type: none"> <li>a. Check Steam Generator Narrow Range Level - STABLE OR TRENDING to 44%</li> <li>b. Check Steam Generator PORVs - CLOSED: MRV-213               <ul style="list-style-type: none"> <li>• Manually close any Steam Generator PORV which is open due to an instrument OR control system malfunction</li> </ul> </li> <li>c. Check MFP Differential Pressure - CONTROLLING AT APPROPRIATE DIFFERENTIAL PRESSURE for CURRENT ACTUAL STEAM FLOW</li> </ol>

Op-Test No.: Cook 2020Scenario No.: NRC2020-2Event No.: 5Event Description: **SG Pressure Channel MPP-212 Fails HIGH – SG 1 PORV Opens**

Time	Position	Applicant's Actions or Behavior
	US	Enters and directs actions of 1-OHP-4022-013-012, Steam Generator Pressure Instrument Malfunction procedure. <ol style="list-style-type: none"> <li>1. Identifies 1-MPP-212 as failed channel               <ol style="list-style-type: none"> <li>a) If selected for PORV control – Verify PORV in manual</li> <li>b) Declare 1-MRA -1601 inoperable due to PORV being in Manual (Procedurally required)</li> <li>c) Select an Operable channel using 1-PS-514F</li> <li>d) Place PORV in AUTO and declare 1-MRA-1601 Operable</li> </ol> </li> <li>2. Check SG Water Level Control in AUTO (FRV's remain in manual due to low power)</li> <li>3. Check MFP Differential Control in AUTO</li> <li>4. Refer to Tech Spec (see below)</li> <li>5. Trip Bi-stables for malfunctioning instrument</li> </ol>
	US	Refers to TS / TRM: <ul style="list-style-type: none"> <li>• TS 3.3.2 <u>ESFAS Instrumentation</u> (Condition A Table 3.3.2-1, Function 1.e (1&amp;2) &amp; 4.d – all Condition D) Trip Bi-stables in 6 hours</li> <li>• TS 3.7.4 <u>Steam Generator PORV</u> (Condition A May be referenced but PORV is Operable since it can be manually operated) Restore in 7 days</li> <li>• TRM 8.3.8. <u>Radiation Monitoring Instrumentation</u> (Condition A Table 8.3.8-1, Function 2.b – Condition C)               <ul style="list-style-type: none"> <li>• Declares MRA-1601 inoperable</li> <li>• Restore in 7 days</li> </ul> </li> </ul>
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>c. Notifies Shift Manager</li> <li>a. Asks SM to make notifications including Work Control Work Control</li> </ol>

Op-Test No.: Cook 2020Scenario No.: NRC2020-2Event No.: 5Event Description: **SG Pressure Channel MPP-212 Fails HIGH – SG 1 PORV Opens**

Time	Position	Applicant's Actions or Behavior
	US	Notifies SM/MTI to Initiate actions to trip Bi-stables associated with MPP-212 Steam Generator Pressure Instrument Failure per Attachment A-3 of 1-OHP-4022-013-012.
When Steam Generator PORV is closed and SG pressure is stabilized and Tech Specs are addressed, or at Lead Evaluators direction proceed to next event.		



Op-Test No.: <u>Cook 2020</u> Scenario No.: <u>NRC2020-2</u> Event No.: <u>6</u>		
Event Description: <b>Trip of 1E CCP</b>		
Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators that are indicative of a trip of the East Charging Pump: Annunciator 108 Drop – 20 Charging Flow Less Than Min Set Point Annunciator 109 Drop – 11 East CCP Motor Instant Trip
	US	Directs RO to Start CCP for Seal Injection.
	RO	Recognizes and reports that running (East) CCP pump has tripped Manually starts 1W CCP pump in accordance with CCP ARP's <ol style="list-style-type: none"> <li>1. Start West CCP Aux Lube Oil pump</li> <li>2. Verify the West CCP has a suction (QMO-451 &amp; 452 – Open)</li> <li>3. Start the West CCP</li> </ol>
	RO/BOP	Restores normal letdown per Attachment 13, Section 4.1 as follows: <ol style="list-style-type: none"> <li>1. Places QRV-302, Letdown Divert Valve in divert position.</li> <li>2. Verifies orifice isolations closed (QRV-160, 161 and 162).</li> <li>3. Adjusts CRV-470, Letdown Temperature Control Valve controller to <math>\geq 50\%</math> output.</li> <li>4. Verifies open letdown isolation valves: <ol style="list-style-type: none"> <li>a. QCR-300, CVCS letdown Cntmt isol</li> <li>b. QCR-301, CVCS letdown Cntmt isol</li> <li>c. QRV-111, RC letdown to Regen hx</li> <li>d. QRV-112, RC letdown to Regen hx</li> </ol> </li> <li>5. Adjusts QRV-301, Letdown Pressure Control Valve controller to 50% output.</li> </ol>

		<ol style="list-style-type: none"> <li>6. Checks/adjusts charging flow to &gt; 75 gpm.</li> <li>7. Opens QRV-161, 75 gpm letdown orifice isolation.</li> <li>8. Adjusts QRV-301 to maintain 160 – 350 psig on QPC-301.</li> <li>9. Places QRV-301 in auto (if desired).</li> <li>10. Nulls and returns CRV-470 controller to auto.</li> <li>11. Adjusts charging flow as required to maintain PRZ level.</li> <li>12. Places PRZ level control in automatic (if desired).</li> <li>13. Places QRV-302 in normal (demin) position when letdown temperature is stable.</li> </ol>
	US	<p>Initiates corrective action for tripped pump</p> <ol style="list-style-type: none"> <li>a. Notifies shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
	US	<p>Refers to TS / TRM:</p> <ul style="list-style-type: none"> <li>○ TS 3.5.2 ECCS - Operating Condition A – Restore train to Operable Status in 72 hours (<a href="#">LCO Actions entered in Event 4</a>)</li> <li>○ TRM 8.1.1 Boration System – Operating Condition A - Restore in 72 hours (<a href="#">LCO Actions entered in Event 4</a>)</li> </ul>
<p>When Letdown flow is restored and crew is stabilizing Letdown temperature, Tech Specs are addressed or at Lead Evaluators discretion proceed to next event.</p>		

Op-Test No.:			Scenario No.: <u>NRC2020-2</u>			Event No.: <u>7</u>		
Event Description: <b>Intermediate Range Failure, Reactor Trip Breakers fail to Open, Inadvertent FW Isolation</b>								
Time	Position	Applicant's Actions or Behavior						
	CREW	Recognizes the IRNI failure and need for a reactor trip. West MDAFW pump will not start. FW Isolation prevents crew's efforts to stay online.						
	<b>NOTE</b>	FW Isolation prevents crew's efforts to stay online due to power being above AFW capacity.  West MDAFW pump will not start to further limit their ability to remain on line						
	US	Directs RO to manually trip the reactor  Directs RO/BOP to perform the immediate actions of 1-OHP-4023-E-0, Reactor Trip or Safety Injection.						
	RO	Recognizes and reports failure of reactor to manually trip- Rx Trip breakers closed after actuating Manual trip switches (twice).						
	US	Directs actions of 1-OHP-4023-FR-S.1, Response to Nuclear Power Generation/ATWS:						
	<b>RO Critical Task #2</b>	Performs the immediate actions of FR-S.1: 1. Checks reactor trip (RX Trip Bkrs Open, Rod Bottom Lights Lit, All Rods, <10 steps, Neutron Flux Lowering) <b>Automatically/Manually insert control rods (must Insert Negative Reactivity through Inserting Control Rods or Emergency Boration)</b>						
	BOP	Performs the immediate actions of FR-S.1: 1. Manually actuate AMSAC 2. Checks Turbine Trip (MT Stop Valve Closed Status Lights LIT)						

Op-Test No.:			Scenario No.: <u>NRC2020-2</u>			Event No.: <u>7</u>		
Event Description: <b>Intermediate Range Failure, Reactor Trip Breakers fail to Open, Inadvertent FW Isolation</b>								
Time	Position	Applicant's Actions or Behavior						
	US	Ensures immediate actions of FR-S.1 are completed						
	<b>RO Critical Task #2</b>	<b>Initiate Emergency Boration of RCS (must Insert Negative Reactivity through Inserting Control Rods or Emergency Boration)</b> <ol style="list-style-type: none"> <li>1. Check CCPs at least one running</li> <li>2. Start both boric acid transfer pumps in fast speed</li> <li>3. Open 1-QMO-410</li> <li>4. Check Emergency Boration flow &gt; 44 gpm on QFI-410</li> <li>5. Check PZR Pressure &lt; 2335#</li> </ol>						
	US	Directs subsequent actions of FR-S.1: <ul style="list-style-type: none"> <li>• Check Containment Vent Isolation Valves Closed – VCR-101 thru 107 and VCR-201 thru 207</li> <li>• Check SI Status – Safety Injection Actuated Status Light NOT Lit</li> <li>• Check Reactor Tripped - Local operation of reactor trip breakers or MG set output breakers</li> <li>• Verify Reactor subcritical – WR log power &lt; 5% &amp; negative SUR (Go to Step 20) Continue Boration to Maintain Adequate Shutdown Margin</li> <li>• Return to Procedure and Step in Effect – E-0</li> </ul>						
	US	Verify Reactor subcritical – WR log power < 5% & negative SUR						
	US	Announces transition to OHP-4023-E-0, Reactor Trip or Safety Injection.						

Op-Test No.:			Scenario No.: <u>NRC2020-2</u>			Event No.: <u>7</u>		
Event Description: <b>Intermediate Range Failure, Reactor Trip Breakers fail to Open, Inadvertent FW Isolation</b>								
Time	Position	Applicant's Actions or Behavior						
	RO/BOP	Performs the immediate actions of E-0: <ol style="list-style-type: none"> <li>1. Checks reactor trip – reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – MTSV Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – T11A or T11D at least one energized</li> <li>4. Checks safety injection status – SI Status Light Lit (QMO-225/226 white lights Lit) Required if:             <ol style="list-style-type: none"> <li>a. PZR Pressure &lt; 1775#</li> <li>b. CNTMNT Pressure &gt; 1.0#</li> <li>c. SG Pressure &lt; 500#</li> <li>d. STM Line DP &gt; 100psid</li> </ol> </li> </ol>						
	BOP	Manually controls AFW flow between 240,000 to 450,000 pph until one SG narrow range level is greater than 13%.						
	US	Announces transition to OHP-4023-ES-0.1, Reactor Trip Response						
When feed flow < 450,000 pph or at Lead Evaluators discretion TERMINATE SCENARIO								

**Critical Task Summary**

Task	Elements	Results
<p align="center"><b>#1</b></p> <p align="center"><b>Stabilize PZR Pressure Prior to Reactor Trip with failure of NPP-151</b></p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> <li>• Panel 108 Drop 6 Pressurizer Pressure High-High</li> <li>• Pressurizer Pressure NPP-151 failed High with actual Pressure Lowering</li> </ul> <p><u>Performance Indicators:</u></p> <p>Takes Manual Control of Pressurizer Master Controller or Spray Valve Controllers and Closes NRV-163 and NRV-164:</p> <ul style="list-style-type: none"> <li>• NRV-163 and NRV-164 Closed Indications</li> <li>• May place to auto after Operable Channel is selected (</li> <li>• Pressurizer Pressure Stabilizes</li> <li>• Prior to reaching 1950 psig - Pressurizer Low Pressure Reactor trip</li> </ul> <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> <li>• RCS pressure stabilizing</li> </ul>	<p align="center"><b>SAT / UNSAT</b></p>
<p align="center"><b>#2</b></p> <p align="center"><b>Insert negative reactivity into the core</b></p>	<p><u>Cueing:</u></p> <p>Challenge to RCS cooling with FW Isolation</p> <ul style="list-style-type: none"> <li>• Identification that RX breakers have failed to OPEN (On NI 36 trip signal)</li> <li>• RX TRIP BKR TRAIN A/B UV TRIP (ATWS) alarms</li> </ul> <p><u>Performance Indicators:</u></p> <p>Insert Negative Reactivity through:</p> <ul style="list-style-type: none"> <li>• Inserting Control Rods (Manually or Auto at &gt;48 steps per minute) – OR -</li> <li>• Emergency Boration is initiated</li> </ul> <p>Must be performed prior to:</p> <ul style="list-style-type: none"> <li>• SRO Reaching Step 8 of FR-S.1</li> </ul> <p><u>Performance Feedback:</u></p> <p><u>RODS</u></p> <ul style="list-style-type: none"> <li>• RPIs indicate rods - inserting</li> <li>• Rod bottom lights – lit</li> <li>• Neutron flux – lowering</li> </ul> <p><u>BORATION (any of the following)</u></p> <ul style="list-style-type: none"> <li>• Boration Flow QFI-410 &gt; 44 gpm</li> <li>• IMO-910 or IMO-911 open</li> <li>• Boration Flow QFC-421 &gt; 36 gpm</li> </ul>	<p align="center"><b>SAT / UNSAT</b></p>

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## Scenario Instructor Actions

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### Setup:

1. Reset to IC-856 MOL; 4% power, 1180.64 ppm, 550.62 F, 171 Steps on D
2. Place ALL Pressurizer Heaters In ON, Remove SFR-402 from PPC alarm.
3. Reset control rods and check group step counters.
4. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position.
5. Advance chart recorder paper & clear chart recorder memory.
6. Activate the following (pre-load) malfunctions:

- Reactor Trip Breaker A Fails
- Reactor Trip Breaker B Fails

**U1\_RP03A**

**U1\_RP03B**

- TACW Pressure Switch
- West AFW Pump Trip

**U1\_CPS603**

**U1\_WMDAFP**

### Set Up on Trigger 1:

- Spurious FW Isolation Train B
- N36 IR to Fail High
- Ensure IR can't block

**U1\_RP08B**

**U1\_NI06B**

**U1 IR Train B Block**

Override SFR402 and  
sfr201 to hold air inleakage

**U1\_SFR402**

**U1\_SFR201**

Disable AFD at low power

**AN10\_U1(044)**

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## Scenario Instructor Actions

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### Scenario Events:

#### **EVENT #1**

IMF U1\_TACSE to cause the east TACW Pump to Trip

U1\_TACSE

#### **EVENT #2**

Respond as required to power change notifications and requests

#### **EVENT #3**

Respond as required to power change notifications and requests

#### **EVENT #4**

ICF U1\_NPP151 to 2500 over 30 seconds cause the Pressurizer Pressure Channel to fail High

U1\_NPP151

When Requested to De-energize Power for QMO-225 (1-ABV-D-5C)

U1\_EDPR10J

#### **EVENT #5**

ICF U1\_MPP212 to 1200 over 4 seconds to cause the SG Pressure Channel MPP-212 to Fail High  
(SG11 PORV Opens in Auto)

U1\_MPP212

#### **EVENT #6**

IMF U1\_ECP to cause a Charging Pump Short Circuit

U1\_ECP



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## Scenario Instructor Actions

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### **EVENT #7 – 9**

Activate **Trigger 1** to cause a Spurious Train B FW Isolation and N36 IR to Fail High requiring a Reactor Trip signal

**Activate Trigger 1**

If Dispatched to Open the Reactor Trip Breakers then turn off the MG Sets

**U1\_RDR01**

**U1\_RDR03**

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### Scenario Instructor Actions

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Reactivity Guide			
CBD	Power	Delta I	Tave
165	3.3	0	550.6
168	3.8	0	551.0
171	5.2	+0.5	551.9
174	6.4	+1.0	552.6
177	8.0	+1.1	553.4
180	9.3	+2.0	554.1
183	10.5	+2.5	554.9

Facility: DC COOK 1 & 2 Scenario No.: NRC2020-3 Op-Test No.: \_\_\_\_\_

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

Initial Conditions: 50 % Power, WMFP is spinning ~ 3800 rpm

Turnover: Restore power to 100% following previous down power for MFP repairs

Critical Tasks: Stabilize SG Level on MFC140 Failure, Throttle AFW to prevent a PTS challenge

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Place an Additional Main FW Pump in Service
2	U1_NTP240 to 650	I-RO TS	Loop 4 Tc fails high
3		R-RO	Commence raising Reactor Power to 100%
4	U1_MFC140 @ 0	I-BOP TS	#14 SG Controlling Steam Flow Channel Fails Low
5	U1_ED07B	C-RO TS	PZR HTR Transformer Fails (11PHC Fails)
6	Set U1_MSVMR V210 .94	C-BOP	Main Steam Stop Valve Comes Off Detent (Open Limit Switch)
7	U1_MS01D @ 20 over 2 min U1_RP07A U1_RP07B U1_MS22A - D	M-CREW	Steam Line Break Outside Containment (#14 SG) (Steam Line Isolation fails to AUTO actuate, MSIVs fail to close Manually)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

NOTE: Blue text indicates changes made to reflect as-administered scenario.

### Event Summary

The Crew is directed to Place an Additional Main FW Pump in Service. 1-OHP-4021-055-003, Attachment 4, West Feed Pump Startup As Second Feed Pump is complete up to step 4.6 and the pump is spinning ~ 3800 rpm.

The Loop #4 Tc RTD will fail high. This will require the RO to place rods in manual to stop rod movement. The crew will implement Abnormal Operating Procedure actions to stabilize the plant.

The plant is at 50% power and the crew is directed to commence raising power to 100%.

The #14 SG Controlling Steam Flow Channel will fail low causing the FRV to close and SG level to Lower. The BOP will need to establish manual control of #14 FRV and MFP DP control to stabilize SG level. The Crew will need to enter the Abnormal Operating Procedure and select an operable channel, restore SG level control to auto, and address Technical Specifications.

A failure of the PZR HTR Bus 11PHC will occur. The PZR SCR heater control will need to be transferred to 11PHA using the Annunciator Response procedure. The crew should also refer to Technical Specifications.

The #1 SG Main Steam Stop Valve will come off the open limit switch/detent. The crew will need dispatch an operator to check the status and then reopen the Stop Valve using the Annunciator Response procedure to continue on.

The major event will involve a Main Steamline Break outside containment on the #14 SG. The crew will trip the reactor and a Safety Injection will actuate. As the crew performs the actions of E-0, they should identify the Main Steamline Break outside containment on the #14 SG. A failure of the Main Steamline Isolation actuation circuit will require a manual actuation which will be unsuccessful. The crew will transition to E-2 to isolate SG. The crew will then transition to ECA-2.1 when steam lines will not isolate. The scenario will terminate when the crew has Reset SI for ECCS Flow Reduction steps.

#### **Critical Tasks**

Stabilize SG Level on MFC140 Failure  
Throttle AFW prior to PTS concern

#### **Procedures**

E-0, Reactor Trip or Safety Injection  
E-2, Faulted Steam Generator Isolation  
ECA-2.1 Uncontrolled Depressurization of All Steam Generators

Op-Test No.: Cook 2020      Scenario No.: NRC2020-3      Event No.: 1

Event Description: **Place Main Feedwater Pump in Service**

Time	Position	Applicant's Actions or Behavior
	US	Directs actions of 1-OHP-4021-055-003, Placing a Main Feed Pump in Service Attachment 4, West Feed Pump Startup As Second Feed Pump.
	BOP	<p><u>External comms are included on Scenario Instructor Action Sheet at back</u></p> <p>Performs the following to place the MFP in Service as directed from step 4.6:</p> <ul style="list-style-type: none"> <li>• Raises speed in Speed Control by selecting a higher value</li> <li>• When speed is ~ 3850 to 4200 rpm inform US T.S. 3.3.2 Condition H may be exited.</li> <li>• Verify operation of shaft driven oil pump – Stop the Aux Oil pump and place in Auto (Check oil pressures stable on HMI and Annunciator 115 drop 81 (West FPT AC Aux Oil Pp Running – NOT Lit)</li> <li>• Check lube oil and bearing temps on recorder within limits</li> <li>• Place pump in DP Control               <ol style="list-style-type: none"> <li>1. Raise speed until West MFP is feeding S/G's</li> <li>2. Press "West DP Control" Pushbutton on HMI</li> <li>3. Verify "Load Sharing Active" light lit</li> </ol> </li> <li>• Enable Auto bias operation               <ol style="list-style-type: none"> <li>1. Verify Auto Bias is selected</li> <li>2. Observe Loadsharing adjusts Bias value and both MFP speeds until suction flows are matched</li> </ol> </li> <li>• When FPT Control Valve &lt; 30% open close 1-HPD-104W</li> <li>• If desired, realign seal water by stopping Seal water pump and place it in auto</li> </ul>
	US/BOP	Notify chemistry of FW Pump configuration change.

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 2Event Description: **Loop #4 Tc Fails high.**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel 111 which are indicative of a RTD instrument failure (Drops 14, 15).
	RO	Reports malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: <ul style="list-style-type: none"> <li>• Identifies failure of Loop #4 RTD</li> <li>• Ensures control rods are in manual with no rod motion</li> <li>• Places Pressurizer level control in Manual</li> </ul>
	US / 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 OHP-4022-IFR-001, Instrument Failure Response procedure.

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 2Event Description: **Loop #4 Tc Fails high.**

	RO	<p>For a PRZ Level Instrument OR Control System Issue perform the following:</p> <ol style="list-style-type: none"> <li>a. Place PRZ Level control in Manual using one of the following AND restore PRZ Level to Program Level: <ul style="list-style-type: none"> <li>• PRZ Level Master Controller</li> <li>-OR-</li> <li>• 1-QRV-251, CCP Discharge Flow Controller</li> </ul> </li> <li>b. Establish manual control band</li> </ol> <p>For Unexpected Control Rod Motion perform the following:</p> <ol style="list-style-type: none"> <li>a. Check Load Rejection OR Runback - NOT IN PROGRESS</li> <li>b. Check Rod Control in manual : Place Rod Control in manual and verify rod motion has stopped</li> <li>c. Establish manual temperature control band</li> <li>d. IF Unexpected Rod Motion Occurred, THEN transition to</li> <li>e. 1-OHP-4022-012-003, Continuous Control Bank Movement.</li> </ol>
	US	<p>Enters and directs actions of 1-OHP-4022-012-003, Continuous Control Bank Movement procedure.</p> <ul style="list-style-type: none"> <li>• Check Rod Control <ol style="list-style-type: none"> <li>1) Check Rod position above RIL</li> <li>2) Check AFD within target</li> </ol> </li> <li>• Check Power Range Channels – Operable</li> <li>• Restore Equilibrium Conditions</li> <li>• Check for Instrument Malfunction <ol style="list-style-type: none"> <li>1) Check MPC-253 Operable</li> <li>2) Check Tave Channels – Operable <b>(NO)</b></li> </ol> </li> </ul>
	US	<p>Enters and directs actions of 1-OHP-4022-013-007, RCS RTD Instrument Malfunction procedure.</p>

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 2Event Description: **Loop #4 Tc Fails high.**

RO / BOP

Performs the following as directed:

- Verify Control Rods – MANUAL
- Check for Failed Temperature Channel
- Align following switches:
  - Tavg Defeat to loop4
  - Delta T Defeat to loop 4
  - Delta T Recorder to loop 1, 2, or 3
  - OPDT Recorder to loop 1, 2, or 3
  - OTDT Recorder to loop 1, 2, or 3
- Check PZR Level Control in Auto (No)
  - Place 1-QRV-251 CCP Discharge Flow Control in Auto as follows:
    - a. Verify PRZ Level Master Controller in Manual
      - 1) Adjust PRZ Level Master Controller to null 1-QRV-251 Controller
      - 2) Place 1-QRV-251 in Auto
  - PRZ Level Control (Master Controller) in Auto as follows
    - a. Verify 1-QRV-251, CCP Discharge Flow Control in Auto
    - b. Verify PRZ Level at programmed level AND stable
    - c. Place PRZ Level Master Controller in Auto.



Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 2Event Description: **Loop #4 Tc Fails high.**

	RO / BOP	Recover Rods to restore Tave and Flux
	US	<p>Refers to the following Tech Specs (TS):</p> <ul style="list-style-type: none"> <li>▪ TS 3.3.1 RTS Instrumentation (Table 3.3.1-1) <ul style="list-style-type: none"> <li>▪ Condition A – Refer to Table</li> <li>▪ Function 6 Condition D - Trip Bi-stables in 6 Hours</li> <li>▪ Function 7 Condition D - Trip Bi-stables in 6 Hours</li> </ul> </li> <li>▪ TS 3.3.2 ESFAS Instrumentation (Table 3.3.2-1) <ul style="list-style-type: none"> <li>▪ Condition A – Refer to Table</li> <li>▪ Function 4e Condition D – Place channel in trip in 6 Hours</li> <li>▪ Function 8c Condition D – Place channel in trip in 6 Hours</li> </ul> </li> <li>○ TRM 8.7.14 (PPC) Derived Reactor Thermal Power (MODE 1 greater than 3250 MWt power)</li> </ul>
	US	Initiates actions to trip Bi-stables associated with 1-NPP-151 PZR Pressure Failure per Attachment A of 1-OHP-4022-013-009.
	US	<p>Initiates corrective action for failed channel</p> <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
When failed instrument has been removed from service or at Lead Evaluators discretion commence the next event		

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 3Event Description: **Raise Turbine and Reactor Power**

Time	Position	Applicant's Actions or Behavior
	RO	Calculates the dilution required per OHP-4021-005-002, Attachment 9, Boration or Dilution Volume Determination.
	RO	Briefs crew on reactivity plan for power escalation.
	US	Reviews / concurs with reactivity plan.
	US	Directs RO to commence Power Escalation in accordance with OHP-4021-001-006, Power Escalation (at step 4.74)
	RO	Performs DILUTION (batch add OR Continuous): <ul style="list-style-type: none"> <li>• Place RC Makeup Blend control switch in STOP</li> <li>• Place RC Makeup Blend Control Mode switch in DILUTE or ALT DILUTE</li> <li>• Adjust PW to the desired flow rate and/or amount.</li> <li>• May close QRV-451 if aligning to CCP Suction Only</li> <li>• Place RC Makeup Blend control switch in START</li> <li>• May take QRV-303 to Manual and Open as required to maintain VCT Level and Pressure.</li> </ul>
	RO	Commences escalation: <ul style="list-style-type: none"> <li>• Raises turbine load (reactor power) using the DCS HMI. <ol style="list-style-type: none"> <li>1. Selects Load Target and Ramp Rate on MT HMI</li> <li>2. Selects GO</li> </ol> </li> <li>• Maintains Tavg/Tref deviation within limits (+/- 2F or as designated by US) by dilution and turbine load adjustments.</li> <li>• Ensures Axial Flux Difference (AFD) is maintained within target band by manual control rod movement as needed.</li> </ul>

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 3Event Description: **Raise Turbine and Reactor Power**

Time	Position	Applicant's Actions or Behavior
	RO	RO verifies appropriate reactivity feedback. <ul style="list-style-type: none"><li>○ RCS Temp rise</li><li>○ Steam Dump Demand signal increase</li><li>○ Reactor Delta T Power indication rise</li><li>○ Reactor Delta Flux becoming more positive</li></ul>
	BOP	Acts as peer checker for RO during blender operations.

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 4Event Description: **#14 SG Controlling Steam Flow Channel MFC-140 Fails Low**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #114 (Drops 33, 42, 43) which are indicative of a steam flow instrument failure.
	<b>BOP</b> <b>Critical Task #1</b> <b>Manually Control SG#14 Level on MFC-140 Failure</b>	<p>Reports instrument malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: Determine SG 4 level is lowering and that it's Feedwater Regulating Valve (FRV-240) is not responding as expected.</p> <ul style="list-style-type: none"> <li>• <b>Notify US and takes manual control of FRV-240.</b></li> <li>• Determine failure affects MFPs, and take <math>\Delta P</math> controller to MANUAL or may go to Speed Control.</li> <li>• <b>Stabilize SG 4 level in manual.</b></li> </ul>
	US / 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	Enters and directs actions of OHP-4022-IFR-001, Instrument Failure Response procedure.
	BOP	<ol style="list-style-type: none"> <li>a. Check Steam Generator Narrow Range Level - STABLE OR TRENDING to 44% <ul style="list-style-type: none"> <li>• Restore Steam Generator Narrow Range Level using Manual control of the appropriate Feedwater Regulating Valve: 1-FRV-240</li> </ul> </li> <li>b. Check Steam Generator PORVs - CLOSED: MRV-243</li> <li>c. Check MFP Differential Pressure - CONTROLLING AT APPROPRIATE DIFFERENTIAL PRESSURE for CURRENT ACTUAL STEAM FLOW</li> </ol>

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 4Event Description: **#14 SG Controlling Steam Flow Channel MFC-140 Fails Low**

Time	Position	Applicant's Actions or Behavior
	US	Enters and directs actions of 1-OHP-4022-013-014, Steam Flow Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: <ul style="list-style-type: none"> <li>• Restores SG 4 level using MANUAL control of FRV-240.</li> <li>• Places MFP <math>\Delta</math>P controller in MANUAL and maintains pressure. May place MFP in Speed Control.</li> <li>• Reports MFC-140 has failed low.</li> <li>• Places 1-FS-542C selector switch in channel 2 position.</li> <li>• Nulls and returns FRV-240 controller to AUTO.</li> <li>• Returns MFP <math>\Delta</math>P controller to AUTO.</li> </ul>
	US	Refers to the following Tech Specs (TS): <ul style="list-style-type: none"> <li>▪ TS 3.3.1 <u>RTS Instrumentation</u> (Table 3.3.1-1) <ul style="list-style-type: none"> <li>▪ Condition A – Refer to Table</li> <li>▪ Function 15 Condition D - Trip Bi-stables in 6 Hours</li> </ul> </li> <li>▪ TS 3.3.2 <u>ESFAS Instrumentation</u> (Table 3.3.2-1) <ul style="list-style-type: none"> <li>▪ Condition A – Refer to Table</li> <li>▪ Function 4e Condition D – Place channel in trip in 6 Hours</li> </ul> </li> </ul>
	US	Initiates actions to trip bi-stables associated with MFC-140 failure per Attachment D-1 of 1-OHP-4022-013-014
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
When secondary plant is stable or at Lead Evaluators discretion commence the next event		

Op-Test No.: Cook 2020 Scenario No.: NRC2020-3

Event No.: 5

Event Description: **PZR HTR Transformer Fails (11PHC Fails).**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel 108, Drops 46 and 50, indicative of a pressurizer (PRZ) heater power supply failure. (Breaker T11D9 on Electrical Panel)
	RO	Reenergizes PRZ control (cycling) group heaters per 1-OHP-4024-108, Drop 50 annunciator response, as follows: <ul style="list-style-type: none"> <li>• Opens breaker CB11PHC6</li> <li>• Closes breaker CB11PHA6 (Drop 50 clears)</li> </ul>
	RO	Monitors PRZ pressure response and ensures normal PRZ heater operations for PHA supplied heaters.
	US	Refers to Tech Specs (TS): <ul style="list-style-type: none"> <li>• TS 3.4.9.b <u>Pressurizer</u> - (Condition B.1) due to a loss of 1 train of pressurizer heaters. Restore B/U heaters to operable within 72 Hours. 11PHC failing results in a loss of the A train of PZR backup Heaters.</li> </ul>
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
When the primary plant is stable or at Lead Evaluators discretion commence the next event		

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 6Event Description: **Main Steam Stop Valve Comes Off Detent (Open Limit Switch)**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciator on Panel #113 indicative of a Stop Valve misalignment  Drop 6 SG 1 STOP VLV1-MRV-210 ABNORMAL
	US	Directs BOP to review ARP for annunciators and dispatch operator to Investigate.
NOTE  Crew may wait for AEO report that valve is off detent before opening		
	BOP	Determines Main Steam Stop Valve 1-MRV-210 has come off the open detent.
	US	Directs BOP to re-open Main Steam Stop Valve 1-MRV-210.
	BOP	Re-open Main Steam Stop Valve 1-MRV-210 by placing Control Switch to open.  May Refer to 1-OHP-4021-051-003 Removing a SG Stop Valve MMO or MRV from Service.
	US	May Refer to Technical Specification 3.7.2 Steam Generator Stop Valves (SGSVs)
When the Stop valve is re-opened or at Lead Evaluators discretion commence the next event		

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 7

Event Description: **Steam Line Break outside Containment (#14 SG) – Auto Steam Line Isolation fails and MSIV's won't close**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Recognize RCS Temp / Pressure lowering. MT Megawatts will lower as well. Reactor Power may rise slightly.
	US	Recognize need for a reactor trip and directs RO/BOP to trip the reactor and perform the immediate actions of 01-OHP-4023-E-0, Reactor Trip or Safety Injection.
	RO/BOP	Performs the immediate actions of E-0: 1. Checks reactor trip – reactor Trip and Bypass breakers Open, all rods < 10 steps, neutron flux lowering 2. Checks turbine trip – MTSV Closed Status Lights Lit 3. Checks power to AC emergency buses – T11A or T11D at least one energized 4. Checks safety injection status – SI Status Light Lit (QMO-225/226 white lights Lit) Required if: a. PZR Pressure < 1775# b. CNTMNT Pressure > 1.0# c. SG Pressure < 500# d. STM Line DP > 100psid
	US	Ensures immediate actions of E-0 are completed
	RO/BOP	Reviews E-0 Foldout Page Criteria.
	US/BOP	Identify Main Steamline Isolation is required and has not occurred based on SG pressure < 500psig.
	US/BOP	Verify MSLI requirement met: 1. Attempts to Manually closes Main Steam Line Isolation (SG Stop) valves <ul style="list-style-type: none"> <li>• MRV-240 (Faulted SG #14)</li> <li>• MRV-210</li> <li>• MRV-220</li> <li>• MRV-230</li> </ul>



Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 7

Event Description: **Steam Line Break outside Containment (#14 SG) – Auto Steam Line Isolation fails and MSIV's won't close**

Time	Position	Applicant's Actions or Behavior
	Crew	<p>Completes actions of E-0 through step 17 as directed.</p> <p>Step 5 – Check Main Steamline Isolation NOT required (Steamline pressure &gt; 500 #, flow &lt; 1.42x10<sup>6</sup> PPH, Containment &lt; 2.8#)</p> <p>#Step 6 -Check CTS NOT required (Containment &lt; 2.8#)</p> <p>Step 7 – Implement Attachment A while continuing</p> <p>#Step 8 – Check if Ruptured SG is Suspected ( No NR level rising in uncontrolled manner)</p> <p>Step 9 – Check AFW Pumps running (MDAFPs and TDAFP running)</p> <p>Step 10 – Check total AFW flow &gt; 240 x 10<sup>3</sup> PPH</p> <p>Step 11 – Minimize Unnecessary RCS Cooldown (NR level &gt; 13%, control flow to maintain NR level between 13 – 50%)</p> <p>Step 12 – Check AFW Discharge valves Open or Throttled</p> <p>Step 13 – Check FW Isolation (MFPs tripped, Discharge valves closed, FRVs closed, FW Isolation valves closed)</p> <p>#Step 14 - Check RCS Temperature (RCP not running – RCS T<sub>c</sub> 547F)</p> <p>Step 15 – Check PZR PORVs and Spray Valves</p> <p>Step 16 – Check if RCPs should be Stopped (RCS Pressure &lt; 1300# and 1 CCP or SI pump running)</p> <p>Step 17 – Check if SG Secondary Boundaries are Intact (No SG Pressure lowering in Uncontrolled manner or completely Depressurized)</p> <ul style="list-style-type: none"> <li>Identifies a Faulted SG exists and MSIV's cannot be closed.</li> </ul>
	US	Evaluates Critical Safety Function Status
	US	Announces transition to 01-OHP-4023-E-2, Faulted Steam Generator Isolation, for a SG depressurized (at step 17 of E-0).
	US	Directs actions of E-2, Faulted Steam Generator Isolation.
	RO/BOP	Check SGSV closed - NO

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 7

Event Description: **Steam Line Break outside Containment (#14 SG) – Auto Steam Line Isolation fails and MSIV's won't close**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Check SGSV Dump valves closed
	RO/BOP	Check if Any SG Pressure Boundary is Intact – NO, all lowering in uncontrolled manner
	US	Announces transition to 01-OHP-4023-ECA-2.1, Uncontrolled Depressurization of All Steam Generators (RNO for step 3 of E-2).
	US	Directs actions of ECA-2.1, Uncontrolled Depressurization of All Steam Generators
	US/BOP	Check Secondary Pressure Boundary <ul style="list-style-type: none"> <li>• SG Stop Valves – Closed – NO (<i>RNO IF valves can NOT be manually closed, THEN locally close valve(s) or associated isolation valve(s), ONE loop at a time using Attachment A</i>)</li> <li>• Feed Reg Valves and FW Isolations</li> <li>• TDAFP Steam Supply</li> <li>• SG PORV's</li> <li>• Blowdown valves and Sample valves</li> <li>• DRV-407</li> </ul>
	<b>BOP/RO Critical Task #2 Control AFW flow to minimize RCS cooldown during uncontrolled depressurization of all SGs</b>	Manually controls AFW flow to minimize RCS Cooldown <ul style="list-style-type: none"> <li>• Check cooldown rate in RCS Cold legs &lt; 100F in any 60-minute period - reduce feed flow not less than 25,000 pph to each SG (Step 2 RNO)</li> </ul> <p style="text-align: center;"><b>NOTE</b></p> A momentary drop below 25,000 pph is acceptable as valves are throttled to achieve this rate
	US	Recognizes the throttling of AFW above will give Red Status to Heat Sink CSFST and may enter FR-H-1 Response To Loss Of Secondary Heat Sink

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 7

Event Description: **Steam Line Break outside Containment (#14 SG) – Auto Steam Line Isolation fails and MSIV's won't close**

Time	Position	Applicant's Actions or Behavior
	US	Reads CAUTION prior to step 1 <ul style="list-style-type: none"> <li>If total feed flow is less than 240.x103 pph due to operator action, this procedure should not be performed.</li> </ul> Exits and returns to procedure in effect
	BOP/RO	Check RCS Hot Leg temperatures – Stable or Lowering <ul style="list-style-type: none"> <li>Control Feed flow to stabilize temperature</li> </ul>
	US/RO	Monitor RCS Boron concentration – Greater than Required <ul style="list-style-type: none"> <li>Direct Chemistry to periodically sample the RCS</li> <li>Refers to OHP-4023-SUP-013 for required boron</li> </ul>
	US/RO	Check if RCP's should be stopped <ul style="list-style-type: none"> <li>RCS temperature Stable or Rising</li> </ul>
	US/RO	Check PORV's and Block Valves
	US/BOP	Checks Secondary Radiation <ul style="list-style-type: none"> <li>Resets containment isolation phase A</li> <li>Directs chemistry to sample all SGs for activity</li> <li>Check SG PORV Rad. Monitors</li> <li>Check Secondary Radiation</li> </ul>
	US/RO	Check if RHR pumps should be stopped <ul style="list-style-type: none"> <li>RCS &gt; 300 psig</li> <li>Pressure stable or rising</li> <li>Reset SI</li> <li>Stop RHR pumps</li> </ul>
	US/RO	Check if CTS should be stopped <ul style="list-style-type: none"> <li>None running</li> </ul>
	CREW	Check RWST level > 30%

Op-Test No.: Cook 2020Scenario No.: NRC2020-3Event No.: 7

Event Description: **Steam Line Break outside Containment (#14 SG) – Auto Steam Line Isolation fails and MSIV's won't close**

Time	Position	Applicant's Actions or Behavior
	CREW	Check if Accumulators should be Isolated (2 RCS Hot legs < 422.8 F) <ul style="list-style-type: none"> <li>• Locally restore power to Accumulator Outlet valves</li> <li>• Close Accumulator Outlet valves</li> </ul>
	CREW	Check If ECCS Flow Should Be Reduced <ul style="list-style-type: none"> <li>• Subcooling &gt; 40 F</li> <li>• RCS pressure Stable or Rising</li> <li>• PZR Level &gt; 16%</li> </ul>
	CREW	Reset SI
When crew resets SI or at Lead Evaluators direction TERMINATE SCENARIO		

**Critical Task Summary**

Task	Elements	Results
<p align="center"><b>#1</b></p> <p><b>Manually Control SG#14 Level on MFC-140 Failure</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>• Panel #114 Drops 42,43, &amp; 33</li> <li>• MFC-140 Indication Lowering</li> <li>• FRV-240 closing</li> </ul> <p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>• Place FRV-240 in Manual and control SG #14 Level to maintain it 15% - 67% preventing a Reactor Trip.</li> </ul> <p><b>(May Select MFC-141 as Controlling Channel and Place\Leave FRV-240 In Auto)</b></p> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>• SG FW Flow raises (FRV-240 opens)</li> <li>• SG Level Stabilizes and returns to band</li> </ul>	<p align="center"><b>SAT / UNSAT</b></p>
<p align="center"><b>#2</b></p> <p><b>Control the AFW flow to minimize RCS cooldown during uncontrolled depressurization of all SGs</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>· Indication of uncontrolled depressurization of all SGs</li> <li>· RCS cold leg cooldown rate exceeds 100F per hour</li> <li>· Valve position and flow rate indication that AFW continues to be delivered to the faulted SGs at a rate in excess of 25,000 pph per SG</li> </ul> <p><b><u>Performance Indicators:</u></b></p> <p><b>Control the AFW flow rate to not less than 25,000 pph per SG in order to minimize the RCS cooldown rate before a severe (ORANGE path) challenge develops to the integrity CSF. A momentary drop below 25,000 pph is acceptable as valves are throttled to achieve this rate.</b></p> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>· RCS cooldown stops</li> <li>· Severe (Orange path) challenge to integrity CSF does not develop</li> </ul>	<p align="center"><b>SAT / UNSAT</b></p>

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## Scenario Instructor Actions

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Setup:

1. Reset to IC- 859 MOL; 50% power, 481 MW, 889 ppm, 558.2 F 173 Steps on D
2. Place ALL Pressurizer Heaters In ON
3. Reset control rods and check group step counters.
4. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position.
5. Advance chart recorder paper & clear chart recorder memory.
6. Activate the following (pre-load) malfunctions:
7. RP07A, Train A Steamline Isolation fails to AUTO actuate **U1\_RP07A**
8. RP07B, Train B Steamline Isolation fails to AUTO actuate **U1\_RP07B**
9. MS22 (B), MSIV MRV-220 MECHANICAL BINDING **U1\_MS22B**
10. MS22 (C), MSIV MRV-230 MECHANICAL BINDING **U1\_MS22C**
11. MS22 (D), MSIV MRV-240 MECHANICAL BINDING **U1\_MS22D**
12. MS22 (A) MSIV MRV-210 MECHANICAL BINDING ON TRG 2 **U1\_MS04D**
13. MS04D TO 20% #14 SG Steamline Break on trg 2 **U1\_MS22A**

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## Scenario Instructor Actions

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### Scenario Events:

#### **EVENT #1**

Respond to Fw Pump Bearing pressure request – 16.3 psig  
Respond as required Close HPD-140W

#### **EVENT #2**

ICF U1\_NTP240 to 650 to fail Loop 4 Tcold High

**U1\_NTP240**

#### **EVENT #3**

Respond as required to power change notifications and requests

#### **EVENT #4**

IMF U1\_MFC140 to the #14 SG Steam Flow Channel to fail Low over 1 minute

**U1\_MFC140**

#### **EVENT #5**

IMF U1\_ED07B to cause the PZR HTR Transformer Failure (11PHC Fails).

**U1\_ED07B**

If contacted as AEO to investigate the PZR HTR Transformer Failure, report back after ~ 2 min. delay that  
Breaker T11D9 has an OC trip.

#### **EVENT #6**

Set the Main Steam Stop Valve to 94% to simulate valve off open detent.

**set u1\_MSVMRV210 0.94**

If contacted as AEO report MRV-210 is open but off the OPEN Detent

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## Scenario Instructor Actions

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### EVENTS #7

Activate trigger 2 to Insert malfunction **U1\_MS04D**, final value **20** (#14 SG Steamline Break downstream of MSIV) ramped over 2 minutes. Insert U1\_MS22A, MSIV MRV-210 MECHANICAL BINDING

**Activate Trigger 2 Events**

**Perform Local actions after entry into E-0 as requested:**

- Locally stop U1 Ice Condenser AHUs MRF **CHR01** to OFF

**U1\_CHR01**

- Aux Tour will monitor Spent Fuel Pool Level and Temperatures
- Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.

**U1\_CHR02**

OR

**U1\_CHR03**

(both have 10 minute delay built in)

- U2 has aligned CR vent for U1 SI, Fan **2-HV-AS-2** is running.

If directed to secure EDG jacket water pumps select **OFF** then **AUTO**

Remote	OFF	AUTO
<i>EGR 03A</i>	<b>U1_EGR03A</b>	<b>U1_EGR03A</b>
<i>EGR 03B</i>	<b>U1_EGR03B</b>	<b>U1_EGR03B</b>
<i>EGR 04A</i>	<b>U1_EGR04A</b>	<b>U1_EGR04A</b>
<i>EGR 04B</i>	<b>U1_EGR04B</b>	<b>U1_EGR04B</b>



Facility: DC COOK 1 & 2 Scenario No.: NRC2020-5 Op-Test No.: \_\_\_\_\_

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

Initial Conditions: 80 % Power

Turnover: Maintain power stable at 80% following Turbine Valve testing

Critical Tasks: Stabilize SG#12 Level following FFC-220 Failure, Manually actuate safety Injection

Event No.	Malf. No.	Event Type*	Event Description
1	U1_FFC220 @ 0 over 20 sec	I-BOP TS	Feed Flow Channel Fails low on SG #12
2	U1_NI10B 200 over 1 min	I-RO TS	Power range detector (NI-42) fails high
3	U1_FW05A	C-BOP	East Main Feed Pump Trip
4		R-RO	Stabilize Plant And Recover AFD from FW Pump Trip
5		N-BOP	Secure AFW and additional Pumps started from FW Pump Trip
6	U1_RC11A ramps 8-15	C-RO	#11 RCP vibrations, Manual Reactor Trip (E-0)
7	U1_RC16	Major - CREW	Pressurizer Steam Space Rupture on Reactor Trip
8	U1_RP10A U1_RP10B	C-CREW	Auto SI fails

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

NOTE: Blue text indicates changes made to reflect as-administered scenario.

### Event Summary

The plant is at 80% power and the crew is directed to maintain power at 80%.

The #12 SG Feed Flow instrument (FFC-220) fails LOW. This will result in the opening of #12 SG FWRV (FRV-220) to raise feedwater flow. The BOP will be required to take manual control and regulate FRV-220. The Crew will be required to implement Abnormal Operating Procedure actions to stabilize the plant.

Power range NI detector (N-42) will fail high. The crew will stop rod movement using OHP-4022-IFR-001, transition to Uncontrolled Rod Movement Abnormal Operating Procedure and then to PR NI Abnormal Operating Procedure to remove failed NI from service. The RO will develop a reactivity plan to restore rods, temperature, and flux.

A trip of the East Main Feed Pump will result in a rapid power reduction to less than 60% if not already performed. The BOP will start additional pumps as required and stabilize FW pump speed control.

The RO will be required to monitor reactivity while the BOP monitors the SG levels and secures AFW pumps. Following the turbine runback the RO will develop a reactivity plan to restore Tave and reactor flux to normal values.

The next event will involve elevated vibrations on #11 RCP. The crew will implement Abnormal Operating Procedure actions until vibrations rise to Fold Out Page criteria requiring the RO to manually trip the reactor and the crew will implement OHP-4023-E-0. The crew will complete E-0 IA's and then use the RCP Malfunction Abnormal Operating Procedure to isolate the RCP.

The Major event will begin with a Pressurizer Steam Space Break (Small RCS Leak) upon the reactor Trip. Auto SI will fail to occur requiring crew actuation.

Critical Tasks Stabilize SG#12 Level following FFC-220 Failure  
Manually actuate safety Injection

Procedures E-0 Reactor Trip or Safety Injection  
E-1 Loss Of Reactor Or Secondary Coolant  
ES-1.2 Post LOCA Cooldown and Depressurization

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 1Event Description: **Feed Flow Channel (FFC-220) Fails low on SG 2**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #113 <ul style="list-style-type: none"> <li>• Drop 32, Steam Generator 2 Water LVL HI Deviation</li> <li>• Drop 43, Steam Generator 2 SF &gt; FWF Mismatch</li> </ul>
	<b>BOP</b>  <b>Critical Task #1</b>	Reports instrument malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: <ul style="list-style-type: none"> <li>• <b>Places FRV-220, SG #2 MFW Reg. Valve controller in manual</b> Lowers controller output to match the operable feed flow channel with steam flow.</li> <li>• <b>Restores SG #2 level to program.</b></li> <li>• Performs Stability Checks</li> </ul>
	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 OHP-4022-IFR-001, Instrument Failure Response procedure.

Op-Test No: Cook 2020 Scenario No.: NRC2020-5 Event No: 1Event Description: **Feed Flow Channel (FFC-220) Fails low on SG 2**

Time	Position	Applicant's Actions or Behavior
	BOP	For a Steam Generator Pressure OR Level Control OR Main Feed Pump D/P Issue OR any failure that affects these parameters perform the following: <ol style="list-style-type: none"> <li>a. Narrow Range Level - STABLE OR TRENDING to 44%               <ul style="list-style-type: none"> <li>• Restore Steam Generator Narrow Range Level using manual control of the appropriate Feedwater Regulating Valve: FRV-220</li> </ul> </li> <li>b. Check Steam Generator PORVs - CLOSED: MRV-223</li> <li>c. Check MFP Differential Pressure - CONTROLLING AT APPROPRIATE DIFFERENTIAL PRESSURE for CURRENT ACTUAL STEAM FLOW (yes)</li> </ol>
	US	Enters and directs actions of OHP-4022-013-015, Feedwater Flow Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Reports FFC-220 has failed low</li> <li>2. Places FS-520-C selector switch in channel 2 position.</li> <li>3. Nulls and returns FRV-220 controller to auto.</li> </ol>
	US	Refers to Tech Specs 3.3.1 <u>RTS Instrumentation</u> (Condition A Table 3.3.1-1, Function 15, Condition D. Trip Bi-stables in 6 Hr)
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies management and WCSRO</li> <li>b. Directs BOP to generate work request</li> </ol>
	US	Notifies SM/MTI to Initiate actions to trip Bi-stables associated with FFC-220 FW Flow Failure per Attachment B-1 of OHP-4022-013-015.
When FRV is in auto or at Lead Evaluators direction commence next event.		

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 2Event Description: **Power Range Channel N42 Control Power fails/ Power Restoration**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel 110 which are indicative of a NI instrument failure (Drops 11, 13, 18, & 19).
	RO	Reports malfunction and performs the immediate actions of OHP-4022-IFR-001, Instrument Failure Response: <ul style="list-style-type: none"> <li>• Checks for no turbine runback</li> <li>• Ensures control rods are in manual with no rod motion</li> </ul>
	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 OHP-4022-IFR-001, Instrument Failure Response procedure.
	RO	For Unexpected Control Rod Motion perform the following: <ol style="list-style-type: none"> <li>a. Check Load Rejection OR Runback - NOT IN PROGRESS</li> <li>b. Check Rod Control in manual : Place Rod Control in manual and verify rod motion has stopped</li> <li>c. Establish manual temperature control band</li> <li>d. IF Unexpected Rod Motion Occurred, THEN transition to 1-OHP-4022-012-003, Continuous Control Bank Movement.</li> </ol>
	US	Enters and directs actions of OHP-4022-012-003, Continuous Control Bank Movement procedure.

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 2Event Description: **Power Range Channel N42 Control Power fails/ Power Restoration**

Time	Position	Applicant's Actions or Behavior
	RO	Performs the following as directed: <ul style="list-style-type: none"> <li>• Checks rod position above low-low rod insertion limit</li> <li>• Checks axial flux difference (AFD) within target band</li> <li>• Identifies failed power range channel               <ol style="list-style-type: none"> <li>1) Place Rod Stop Bypass Selector in the Failed Channel</li> <li>2) Verify P-7, P-8, P-10 in correct state</li> </ol> </li> </ul>
	RO	Develops reactivity plan to restore power and AFD to required conditions. Initiates restoration of equilibrium conditions (power) using either: <ul style="list-style-type: none"> <li>• Control rod movement</li> <li>• Turbine load adjustment</li> </ul>
	US	Checks for Instrument Failure – N42
	US	Enters and directs actions of OHP-4022-013-004, Power Range Malfunction procedure.

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 2Event Description: **Power Range Channel N42 Control Power fails/ Power Restoration**

Time	Position	Applicant's Actions or Behavior
	RO /BOP	<p>Performs the following as directed:</p> <ul style="list-style-type: none"> <li>• Verify Control Rods – MANUAL</li> <li>• Place Rod Stop Bypass Selector In Failed Channel Position</li> <li>• Remove Affected Channel From Service By Placing Selector Switches To Failed Channel Position: <ul style="list-style-type: none"> <li>• Comparator Channel Defeat Selector</li> <li>• Upper Section Detector Current Comparator Defeat Selector</li> <li>• Lower Section Detector Current Comparator Defeat Selector</li> <li>• Power Mismatch Bypass Selector</li> </ul> </li> <li>• Check The Following Interlocks Are In The Required State For Existing Conditions: <ul style="list-style-type: none"> <li>• P-7 (Not LIT)</li> <li>• P-8 (Not LIT)</li> <li>• P-10 (LIT)</li> </ul> </li> <li>• Check AFD - WITHIN TARGET BAND</li> <li>• Verify Recorder Inputs - SELECTED TO AN UNAFFECTED CHANNEL POSITION: <ul style="list-style-type: none"> <li>• Delta-T</li> <li>• Overtemperature Delta-T</li> </ul> </li> </ul> <p>Caution - Control Rods should not be placed in automatic until at least 5 minutes have elapsed after placing Power Mismatch Bypass Selector to failed channel.</p> <ul style="list-style-type: none"> <li>• Place Control Rods In AUTOMATIC If Applicable</li> </ul>
	US	Directs actions to trip Bi-stables associated with NI-42 Power Range Malfunction per Attachment D of 1-OHP-4022-013-004.

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 2Event Description: **Power Range Channel N42 Control Power fails/ Power Restoration**

Time	Position	Applicant's Actions or Behavior
	US	Refers to Tech Specs: <ul style="list-style-type: none"> <li>▪ 3.3.1 <u>RTS Instrumentation</u> (Table 3.3.1-1, Functions 2a,2b, 3, 6 18c&amp;d Conditions A, C, D, &amp; L Place channel in trip – 6 hours) P-8 &amp; P-10 must be verified in Correct Condition within 1 hour of channel failure.</li> <li>○ 3.3.2 AFD Only applicable if Rods drive AFD outside of target band Restore AFD to within target band – 15 minutes</li> <li>○ 3.2.4 QPTR May be referenced.</li> </ul>
	US	Initiates corrective action for failed channel <ol style="list-style-type: none"> <li>a. Notifies Shift Manager</li> <li>b. Asks SM to make notifications including Work Control</li> </ol>
When failed NI has been removed from service or at Lead Evaluators direction commence the next event		



Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 3Event Description: East Main Feed Pump Trip

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes indication of MFP trip and reports annunciator Panel #115, Drop 1, East FPT DCS Trouble, DCS Screen East FW Pump Tripped Status
	US	Directs operators to perform the immediate actions per OHP-4022-055-001, Loss of One MFP.
	RO	Performs the following immediate actions: <ol style="list-style-type: none"> <li>1. Verify Turbine Load is automatically reduced to &lt; 60%. Returns MT control to MW Out following runback</li> <li>2. Verifies rod control switch in AUTO and functioning properly.</li> </ol>
	BOP	Performs the following immediate actions: <ol style="list-style-type: none"> <li>1. Close the East FW Pump Emergency Leakoff Valves FRV-251 &amp; 252</li> <li>2. Adjust West FW Pump speed/integration as required to prevent overfeeding SG</li> <li>3. Start Standby Hotwell &amp; Condensate Booster Pumps as required [The need to start these pumps is dependent on plant conditions and may be dependent upon if a trip of one of these pumps caused the MFP trip.]</li> <li>4. Start AFW pumps as required. [At the current power level, start of the AFW pumps is unnecessary.]</li> </ol>
	US	Checks the immediate actions and directs operators to perform the subsequent actions of OHP-4022-055-001, Loss of One MFP.
	BOP	Verify SG levels are stable at or returning to normal (44%).
	RO	Initiate normal or emergency boration flow (if required) to maintain rods above the RIL (~1.89 * % power) using Attachment C or D of OHP-4022-055-001

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 3Event Description: **East Main Feed Pump Trip**

Time	Position	Applicant's Actions or Behavior
	CREW	<ul style="list-style-type: none"> <li>○ 3.4.1_RCS Pressure, Temperature, and Flow DNB Limits (Condition A) if Pressure lowers to &lt;2168 psig. (2200 psig admin limit) (may use PPC times to track TS entry/exit times)</li> <li>○ <del>3.3.2</del> 3.2.3 AFD Only applicable if Rods drive AFD outside of target band Restore AFD to within target band – 15 minutes</li> </ul>

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 4,5Event Description: **Stabilize Plant And Recover AFD from FW Pump Trip**

Time	Position	Applicant's Actions or Behavior
	US	Direct operator actions to restore normal system alignment: (as required) OHP-4022-055-001 (Steps 8-16) <ul style="list-style-type: none"> <li>• Restore AFD to required Band               <ul style="list-style-type: none"> <li>➤ If AFD was outside the acceptable region, THEN transition to OHP-4022-001-006 Rapid Power Reduction, to lower power &lt; 50%, while continuing on with this procedure</li> </ul> </li> <li>• Restore Megawatt Control to OUT</li> <li>• Return W MFP to DP control using Attachment A               <ul style="list-style-type: none"> <li>➤ Verify "Auto Perm Met" light lit</li> <li>➤ Press the "DP Target Selector" Auto Button</li> </ul> </li> <li>• Check ALL PRZ Backup Heaters on</li> <li>• Reset Steam Dump Load Rejection               <ul style="list-style-type: none"> <li>➤ Momentarily place Steam Dump Mode Control switch in RESET</li> </ul> </li> <li>• Stop running AFW pumps and align for standby condition (Attachment B)</li> <li>• Complete FW Pump Shutdown</li> <li>• Align Condensate system for current plant conditions</li> </ul>
	RO	Borate to position rods to restore AFD to within Target Band (Attachment C or D of OHP-4022-055-001)
	BOP	Stop AFW Pumps and Place in Standby (Attachment B) <ul style="list-style-type: none"> <li>➤ MDAFP's – close FMO's, turn pumps off, open FMO's</li> <li>➤ TDAFP – close FMO's Trip pump, throttle FMO's to required position (requires report from field), close Trip and Throttle valve to relatch,</li> </ul> Stabilize West FW pump speed and restore required DP

When secondary plant is stable or at Lead Evaluators direction commence the next event

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 6Event Description: **#11 RCP vibrations that require a manual Reactor Trip**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes indication of RCP vibes and reports Annunciator Panel 107 <ul style="list-style-type: none"> <li>• Drop 52 RCP VIBRATION HIGH</li> </ul>
	US	Enters OHP-4022-002-001, Malfunction of a Reactor Coolant Pump  1. Checks for RCP Trip Criteria <ol style="list-style-type: none"> <li>a. Complete Loss of RCP Seal Cooling</li> <li>b. #1 Seal leakoff temp &gt; 185°F and a loss of seal injection</li> <li>c. #1 Seal leakoff temp &gt; 200°F coincident with low seal leakoff flow or lowering seal injection or rising bearing temp</li> <li>d. Lower Bearing Water temp &gt; 225°F with rising seal leakoff temps</li> <li>e. Upper RCP MTR bearing temp &gt; 200°F with low oil level alarm</li> <li>f. RCP vibration &gt; 20 mils</li> </ol>
	BOP	Reports #11 RCP vibes are 15 mils and rising
	US / RO	Check RCP conditions: <ul style="list-style-type: none"> <li>• RCP Seal Leakoff normal</li> <li>• RCP Seal Injection normal</li> <li>• VCT Temp normal</li> </ul>

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 6Event Description: **#11 RCP vibrations that require a manual Reactor Trip**

Time	Position	Applicant's Actions or Behavior
	BOP	Reports #11 RCP vibes have reached 20 mils and FOP criteria requires going to step 15.a Reactor Trip
	US	Performs Step 15 RNO and directs RO to Trip the Reactor

Op-Test No: <u>Cook 2020</u> Scenario No.: <u>NRC2020-5</u> Event No: <u>7/8</u>		
Event Description: <b><u>Pressurizer Steam Space Rupture, Auto SI Failure</u></b>		
Time	Position	Applicant's Actions or Behavior
	US	Recognize need for a reactor trip and directs RO/BOP to trip the reactor and perform the immediate actions of 01-OHP-4023-E-0, Reactor Trip or Safety Injection.
	RO	Performs the immediate actions of OHP-4022-002-001 Step 15 RNO: <ul style="list-style-type: none"> <li>• Verifies reactor trip– reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>• Stop RCP # 11</li> </ul>
	RO/BOP	Performs the immediate actions of E-0: <ol style="list-style-type: none"> <li>1. Checks reactor trip – reactor Trip and Bypass breakers Open, all rods &lt; 10 steps, neutron flux lowering</li> <li>2. Checks turbine trip – MTSV Closed Status Lights Lit</li> <li>3. Checks power to AC emergency buses – T11A or T11D at least one energized</li> <li>4. Checks safety injection status – SI Status Light Lit (QMO-225/226 white lights Lit) Required if: <ol style="list-style-type: none"> <li>a. PZR Pressure &lt; 1775#</li> <li>b. CNTMNT Pressure &gt; 1.0#</li> <li>c. SG Pressure &lt; 500#</li> <li>d. STM Line DP &gt; 100psid</li> </ol> </li> </ol>
	RO/BOP	Reviews E-0 Foldout Page Criteria.
	RO	Receives Alarms on Panel 104 Drop 41, 105 Drops 31 / 32 due to Containment Temperature and Pressure Recognize and reports abnormal RCS leakage: <ul style="list-style-type: none"> <li>• RCS pressure lowering with PZR Heaters ON.</li> <li>• Rising Containment dew point, pressure, and radiation.</li> </ul>

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 7/8Event Description: Pressurizer Steam Space Rupture, Auto SI Failure

Time	Position	Applicant's Actions or Behavior
	CREW Critical Task #2	<p><b>Check SI Actuated</b></p> <ul style="list-style-type: none"> <li>• "Safety Injection Actuated" Status Light - NOT LIT</li> <li>• Identifies That BOTH CCP leakoff valve "Safety Injection Signal" white lights – NOT LIT</li> </ul> <p><b>Determines that SI is Required due to Pressurizer Pressure Lowering and Containment Pressure Rising</b></p> <p><b>Manually Actuate Safety Injection to establish High Head Injection Flowpath</b></p> <p><b>-OR-</b></p> <p>NOTE: May be performed in E-0, Attachment A.</p> <p><b>Manually Start SI and CCP pumps</b></p> <p><b>Manually Align Valves</b></p> <ul style="list-style-type: none"> <li>• BIT Inlet Valves ICM-255 -AND/OR ICM-256 - OPEN</li> <li>• BIT Outlet Valves ICM-250 -AND/OR ICM-251 - OPEN</li> <li>• RWST to CCP Valves IMO-910 -AND/OR IMO-911 – OPEN</li> <li>• VCT to CCP Valves QMO-451 -AND/OR QMO-452 - CLOSED</li> </ul>
	US	Ensures immediate actions of OHP-4023-E-0 are completed Directs subsequent actions of OHP-4023-E-0.
	US/RO	Foldout Page – RCP Trip Criteria: <ul style="list-style-type: none"> <li>• Stop all RCPs when RCS is &lt; 1300 psig and CCP/SI pump running</li> </ul>
	BOP	Manually controls AFW flow > 240,00 to < 450,000pph to maintain SG narrow range levels 13% - 50% once one SG narrow range level is greater than 13%.

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 7/8Event Description: **Pressurizer Steam Space Rupture, Auto SI Failure**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Completes actions of E-0 through step 19 as directed.</p> <p>Step 5 – Check Main Steamline Isolation NOT required (Steamline pressure &gt; 500 #, flow &lt; 1.42x10<sup>6</sup> PPH, Containment &lt; 2.8#)</p> <p>#Step 6 -Check CTS NOT required (Containment &lt; 2.8#)</p> <p>Step 7 – Implement Attachment A while continuing</p> <p>#Step 8 – Check if Ruptured SG is Suspected (No NR level rising in uncontrolled manner)</p> <p>Step 9 – Check AFW Pumps running (MDAFPs and TDAFP running)</p> <p>Step 10 – Check total AFW flow &gt; 240 x 10<sup>3</sup> PPH</p> <p>Step 11 – Minimize Unnecessary RCS Cooldown (NR level &gt; 13%, control flow to maintain NR level between 13 – 50%)</p> <p>Step 12 – Check AFW Discharge valves Open or Throttled</p> <p>Step 13 – Check FW Isolation (MFPs tripped, Discharge valves closed, FRVs closed, FW Isolation valves closed)</p> <p>#Step 14 - Check RCS Temperature (RCP running – RCS T<sub>avg</sub> 547F)</p> <p>Step 15 – Check PZR PORVs and Spray Valves</p> <p>Step 16 – Check if RCPs should be Stopped (RCS Pressure &lt; 1300# and 1 CCP or SI pump running)</p> <p>Step 17 – Check if SG Secondary Boundaries are Intact (No SG Pressure lowering in Uncontrolled manner or completely Depressurized)</p> <p>Step 18 – Check if SG Tubes are Intact (NO NR level Rising in uncontrolled manner, secondary rad monitors normal)</p> <p>Step 19 – Check if RCS is Intact (CNTMNT Radiation, Pressure, Water Levels Normal)</p>
	RO/BOP	Performs manual actions of OHP-4023-E-0, Attachment A as directed by US.
	US/RO	Checks if RCS is Intact – NO
	US	Evaluates Critical Safety Function Status
	US	Announces transition to OHP-4023-E-1, Loss of Reactor or Secondary Coolant and directs operator actions. Directs Fold Out Page Review



Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 7/8Event Description: Pressurizer Steam Space Rupture, Auto SI Failure

Time	Position	Applicant's Actions or Behavior
	RO/BOP	<p>Completes actions of OHP-4023-E-1 through step 12 (Check if RCS Cooldown and Depressurization is required) as directed.</p> <ol style="list-style-type: none"> <li>1. Check if RCP's should be stopped – RCS Pressure &lt; 1300#</li> <li>2. Check if SG Secondary Pressure Boundaries are Intact – No pressure lowering in uncontrolled manner or completely depressurized</li> <li>3. Check intact SG levels – NR level &gt; 13%</li> <li>4. Check Secondary Radiation – Rest Phase A and direct Chemistry to sample SG's for activity</li> <li>5. Check PZR PORV's and Block valve – Block valves energized and at least one open, PORV's closed</li> <li>6. Check if ECCS flow should be reduced – RCS subcooling &gt; 40F, Secondary Heat Sink, RCS Pressure stable or rising, and PZR level &gt; 16% - Go to ES-1.1 See page 19</li> <li>7. Check if CTS should be stopped – CTS running, RCS Pressure &gt; 300#, Containment Pressure &lt; 2.0#</li> <li>8. Check if RHR pumps should be stopped - RCS Pressure &gt; 300#, RCS Pressure stable or rising, RHR pump running aligned to RWST</li> <li>9. Check RCS and SG Pressures – Pressure in all SG's Stable or rising, RCS Pressure Stable or Lowering</li> <li>10. Check if EDG's should be stopped – Emergency busses Energized by Off-Site</li> <li>11. Initiate evaluation of plant status – check Cold Leg Recir Capability</li> <li>12. Check if RCS Cooldown and Depressurization is required – RCS Pressure &gt; 300#</li> </ol>
	BOP	Restore SG narrow range levels >20%, but < 50%.
	US/RO	<p>Checks if SI Termination Criteria is MET:</p> <ul style="list-style-type: none"> <li>▪ RCS Subcooling &gt;40°F</li> <li>▪ Secondary Heat Sink (SG &gt;13% or AFW Flow &gt;240x10<sup>3</sup>)</li> <li>▪ RCS Pressure rising or stable – <i>NO (May be Rising See next Step)</i></li> <li>▪ Pressurizer Level &gt;16%</li> </ul>

Op-Test No: Cook 2020Scenario No.: NRC2020-5Event No: 7/8Event Description: **Pressurizer Steam Space Rupture, Auto SI Failure**

Time	Position	Applicant's Actions or Behavior
	Crew	Transition to OHP-4023-ES-1.1, Safety Injection Termination if criteria is met. <ul style="list-style-type: none"> <li>OHP-4023-ES-1.1 Actions are listed on Page 19.</li> </ul>
	US/RO	Check if RHR can be stopped: <ul style="list-style-type: none"> <li>Check RCS Pressure &gt; 300 psig and stable</li> <li>Reset SI</li> <li>Shutdown RHR and place in Standby</li> </ul>
	BOP	Shutdown Unloaded EDGs.
	US	Announces transition to OHP-4023-ES-1.2, Post LOCA Cooldown and Depressurization (at step 12).
	CREW	Check if transition is made to OHP-4023-ES-1.2, then perform the following: <ul style="list-style-type: none"> <li>Reset SI</li> <li>Reset Containment Isolation:</li> <li>Establish Control Air To Containment</li> </ul>
When transition is made or at Lead Evaluators direction TERMINATE SCENARIO		

<b>ES-1.1 Steps</b>		
<b>Note:</b>		
<b>Crew may transition to SI termination if criteria are met. This may involve stopping ECCS pumps and realigning charging until parameters change causing them to restart equipment and return to E-1 or ES-1.2. There are several points of transition to ES-1.2 from ES-1.1. The ES-1.1 Steps are listed below. The Scenario may be terminated upon transition to ES-1.2</b>		
	US	Announces transition to OHP-4023-ES-1.1, Safety Injection Termination (step 6 of OHP-4023-E-1).
	RO/BOP	Reviews OHP-4023-ES-1.1, Foldout Page Criteria. Monitors RCS Subcooling >40°F and PZR Level >16%, if NOT realign ECCS and GO TO OHP-4023-E-1
	US	Directs Actions of OHP-4023-ES-1.1
	RO/BOP	Performs the following as directed: <ul style="list-style-type: none"> <li>• Resets both trains of Safety Injection</li> <li>• Resets both trains of Phase A</li> <li>• Establishes Control Air to Containment</li> </ul>
	CREW	Check if RCS Pressure is stable or Rising If Lowering, Transition to OHP-4023-ES-1.2
	RO/BOP	Performs the following as directed: <ul style="list-style-type: none"> <li>• Establish Normal Charging Flowpath</li> <li>• Isolate BIT Injection</li> </ul>
	CREW	Check if: Pressurizer Level is stable and RCS Pressure is Stable or Rising <b>If NOT, Transition to OHP-4023-ES-1.2</b>
	CREW	<b>Check if transition is made to OHP-4023-ES-1.2, then perform the following:</b> Reset SI Reset Containment Isolation: Establish Control Air To Containment
When transition is made or at Lead Evaluators direction TERMINATE SCENARIO		

Task	Elements	Results
<p>#1</p> <p>Manually Control SG#12 Level on FFC-220 Failure</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> <li>• Panel #113 Drops 43 &amp; 32</li> <li>• FFC-220 Indication Lowering</li> <li>• FRV-220 opening</li> </ul> <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> <li>• Place FRV-220 in Manual and control SG #12 Level to maintain it 15% - 67% preventing a Reactor Trip. (May Select FFC-221 as Controlling Channel and Place\Leave FRV-220 In Auto)</li> </ul> <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> <li>• SG FW Flow raises (FRV-220 opens)</li> <li>• SG Level Stabilizes and returns to band</li> </ul>	SAT / UNSAT
<p>#2</p> <p>Manually Actuate Safety Injection</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> <li>• Pressurizer Pressure &lt; 1775 psig</li> <li>• Pressurizer Pressure Extreme Low PNL 108 Drop 10</li> <li>• Check SI Actuated "Safety Injection Actuated" Status Light – NOT LIT (E-0, Step 4.a) -AND-</li> <li>• Check BOTH CCP leakoff valve "Safety Injection Signal" white lights – NOT LIT</li> </ul> <p><u>Performance Indicators:</u></p> <p>Before transitioning from E-0:</p> <ul style="list-style-type: none"> <li>• Actuate 1 Train of SI by turning the SI actuation Switch on PZR Panel or SI Panel</li> </ul> <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> <li>• ECCS flow is indicated from at least one train (as indicated by flow on cold leg BIT injection flowmeters IFI-51 thru 54)</li> <li>• One Train of Phase A Isolation is complete per E-0, Attachment A</li> </ul>	SAT / UNSAT

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## Scenario Instructor Actions

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Setup:

1. Reset to IC-303 MOL; 79% power, 850 MW, 799.86 ppm, 565.51 F 194 Steps on D
2. Place ALL Pressurizer Heaters In ON
3. Reset control rods and check group step counters.
4. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position.
5. Advance chart recorder paper & clear chart recorder memory.
6. Activate the following (pre-load) malfunctions:

Train A Safety Injection Auto Failure

**U1\_RP10A**

Train B Safety Injection Auto Failure

**U1\_RP10B**

Set Reactor Trip on ET1

**Reactor Trip on ET1**

**U1\_RC16**

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## Scenario Instructor Actions

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### Scenario Events:

#### **EVENT #1**

ICF U1\_FFC220 to 0 over 120 Seconds to cause Feed Flow Channel FFC-220 to fail low on SG 2

U1\_FFC220

#### **EVENT #2**

IMF U1 NI10B to cause a NI42 Power Range to fail High

U1\_NI10B

#### **EVENT #3**

IMF U1\_FW05A to cause the East Main Feed Pump Trip

U1\_FW05A

#### **EVENT #4**

No additional Actions

#### **EVENT #5**

No additional Actions

#### **EVENT #6**

IMF U1\_RC11A ramp from 8-15 to cause RCP #1 Vibration Rise

U1\_RC11A

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## Scenario Instructor Actions

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### **EVENTS #7& 8**

IMF RC16 to cause a Pressurizer Steam Space Break (Auto SI Failure already entered)

**U1\_RC16**

**Perform Local actions after entry into E-0 as requested:**

- Locally stop U1 Ice Condenser AHUs MRF **CHR01** to OFF

**U1\_CHR01**

- Aux Tour will monitor Spent Fuel Pool Level and Temperatures
- Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.

**U1\_CHR02**

OR

**U1\_CHR03**

(both have 10 minute delay built in)

- U2 has aligned CR vent for U1 SI, Fan **2-HV-AS-2** is running.

If directed to secure EDG jacket water pumps select **OFF** then **AUTO**

Remote	OFF	AUTO
<i>EGR 03A</i>	<b>U1_EGR03A</b>	<b>U1_EGR03A</b>
<i>EGR 03B</i>	<b>U1_EGR03B</b>	<b>U1_EGR03B</b>
<i>EGR 04A</i>	<b>U1_EGR04A</b>	<b>U1_EGR04A</b>
<i>EGR 04B</i>	<b>U1_EGR04B</b>	<b>U1_EGR04B</b>