

Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK07-01

Op-Test No.: \_\_\_\_\_

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

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

Initial Conditions: IC 977 (from IC35) 53%power, 8 GWD, 1139 ppm Boron, CBD @ 177.5 Steps, Unit 1 is at 100%. Tave-559.9, Tref 560.0, Blender Setting 14.8

Turnover: Shutdown #21 CW Pump for Oil Leak repairs and then Perform Power Reduction to less than 50% to allow for Waterbox cleaning

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Shutdown the #21 Circulating Water Pump
2		R-RO	Perform Power Reduction
3	CV016B to 100	I-RO TS	VCT Level Channel QLC 452 fails High
4	SW07A to 0	C-BOP	Main Turbine Oil Cooler Controller (WRV-970) fails LOW
5	CV13A	C-RO TS	East CCP pump trips
6	RX23H to 103 over 2 min	I-BOP TS	S/G 23 Level instrument (BLP-131) failing High
7	RC01A at 50%	Major	Large Break Loss of Coolant Accident on Loop 1
8	RP19D - Preload	C-RO	Slave Relay Failure: 2E RHR and 2N SI pumps Fail to Auto Start
9	RH01B	C-RO	2W RHR Pump Trips (at 35% RWST level ~15 minutes after SI)

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

## Summary

The Crew is directed to Shutdown the #21 CW Pump. The Operator will be required to throttle CW Waterbox Outlets, the pump discharge and then shutdown the pump. After the CW pump is shutdown, the crew will perform a short power ramp.

The first failure involves the VCT Level Channel QLC-452 failing high. This will cause the QRV-303 VCT Divert valve to fully divert letdown flow to the HUT. The Operator is required to Take Manual control of QRV-303 and direct letdown flow back to the VCT. Crew will be required to implement AOP actions to stabilize the plant and address Technical Specifications (TRM).

The next event involves the failure of the Main Turbine Oil Cooler Control Valve. This valve fails closed in Auto causing a rising Turbine Oil Temperature. The BOP will be required to take manual control of the WRV-970 controller and position the valve to supply the required cooling.

The third event will involve the East Charging Pump trip. This will result in the loss of charging and letdown. RO will be required to manually start the West Charging Pump to restore charging flow. Crew will be required to take manual control of charging and restore letdown to stabilize the plant.

After the crew has stabilized the plant from the CCP trip, the #23 Steam Generator Level instrument (BLP-131) fails High. This results in a feedwater flow and Steam Generator level lowering. BOP will be required to take manual control and restore normal level. FW Control must remain in Manual. Crew will be required to implement AOP actions to stabilize the plant and address Technical Specifications.

A large break LOCA will cause the plant to trip with a Safety Injection and Containment Spray actuation signal present. As the crew performs the actions of E-0 they will note that the 2E RHR and 2N SI pumps failed to auto start on the SI due to a slave relay K610 failure. The crew will transition to E-1 and to ES-1.3 to align for cold leg recirculation. The 2W RHR will trip as the RWST level lowers to < 35% (~15 minutes into the event.) The crew will have to align ECCS to the recirculation sump without the 2W RHR pump. The scenario will terminate when the crew has aligned ECCS for cold leg injection.

Failure of the K610 coil prevents the following equipment from operating automatically during a Safety Injection: (2-98367)

1. Safety Injection Pump 2N Will Not Automatically Start
2. Residual Heat Removal Pump 2E Will Not Automatically Start
3. Charging Pump 2E Will Not Automatically Start
4. Component Cooling Pump 2E Will Not Automatically Start
5. Will Not Energize K610-X1 & K610-X2 which:
  - Prevents ESW Pump 1W From Automatically Starting
  - Prevents Damper HV-ACRDA4 From Automatically Closing
  - Prevents Fans HV-AES1, 2HV-ACRF1 & 1HV-ACRF1 From Automatically Starting

### Critical Tasks

Establish Low Pressure SI (RHR)  
Establish Cold Leg Recirculation  
(RHR & CTS only)

### Procedures

E-0 Reactor Trip or Safety Injection  
E-1 Loss of Reactor or Secondary Coolant  
ES-1.3 Transfer to Cold Leg Recirculation

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 1Event Description: **Shutdown #21 Circulating Water Pump**

Time	Position	Applicant's Actions or Behavior
	US	Directs BOP to Shutdown #21 CW pump using 02-OHP-4021-057-001, CW System Operation Attachment 3
	BOP	Throttle condenser outlet valves closed to raise CW pp Discharge Pressure 3-4 psig (close valves & then pull to Stop)
	BOP	Give CW Pump Discharge Valve 2-WMO-21 a close signal & Stop CW pump #21 when it is reported that 2-WMO-21 is <20% open.
	Crew	Verify Adequate CW Discharge Pressure and Adjust Outlets as required.
<p style="text-align: center;"><b>NOTE:</b></p> <p style="text-align: center;">May receive TACW DP High Alarm During pump shutdown.</p> <p style="text-align: center;">Crew may elect to return #21 CW pump Control Switch to Auto until the clearance arrives.</p>		

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 2Event Description: **Reduce Turbine Load / Reduce Reactor Power**

Time	Position	Applicant's Actions or Behavior
	RO	Calculates boric acid addition per 02-OHP 4021.005.001, Attachment 6, Boration or Dilution Volume Determination.
	RO	Briefs crew on reactivity plan for power reduction.
	US	Reviews reactivity plan.
	US	Directs RO to commence Power Reduction in accordance with 02-OHP 4021.001.003.
	RO	Performs BORATION batch add: <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 BORATE</li> <li>▪ Set desired batch on BA batch controller</li> <li>▪ Place RC Makeup Blend control switch in START</li> </ul>
	RO	Commences power reduction: <ul style="list-style-type: none"> <li>· Lowers turbine load (reactor power) using the load limiter.</li> <li>· Maintains Tave/Tref deviation within limits by boration 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>
	BOP/RO	Acts as peer checker for RO during blender operations and RO verifies appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> <li>· 02-OHP 4021.059.001, Generator Stator Cooling Water System</li> <li>· 02-OHP 4021.080.003, Generator Hydrogen Gas System</li> </ul>

Op-Test No.: _			Scenario No.: <u>COOK07-01</u>			Event No.: <u>3</u>		
Event Description: <b>VCT Level Transmitter (QLC-452) fails HIGH</b>								
Time	Position	Applicant's Actions or Behavior						
	RO	Recognizes indication of VCT Level problem and reports annunciators: Panel #209 Drop 49 (if VCT level Lowers to 14%)						
	US	Directs operator action per 02-OHP-4022-013-017, VCT Level Malf: <ul style="list-style-type: none"> <li>Restores Divert valve (QRV-303) to VCT position (with QRV-303 or QLC-452)</li> <li>May Elect to Trip Interposing Relay in accordance with Attachment A</li> </ul>						
	RO	Recognizes and reports failure of VCT Level Transmitter (QLC-452). <ul style="list-style-type: none"> <li>Place Divert valve (QRV-303) in VCT position</li> </ul>						
	US	Refers to the following Tech Requirements: <ul style="list-style-type: none"> <li>TRM 8.1.1, Boration Systems Operating – Condition A</li> </ul> Interposing Relay may be tripped for Refueling Water Sequence						

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 4Event Description: **Main Turbine Oil Cooler Controller (WRV-970) fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports Main Turbine annunciators on Panel #218 indicative of oil temperature problem (Drops 9).
	BOP	Recognizes and reports that 2-WRV-970 failed CLOSED in AUTO.
	US	Enters annunciator response action, and directs operator actions to place 2-WRV-970 controller to manual and restore cooling.
	BOP	Takes manual control of 2-WRV-970 and stabilizes MT temperatures. (May elect to throttle 2-WMO-970 [WRV-970 bypass] to control temperature)
	US	Directs operator to monitor turbine temperatures for signs of bearing damage.

Op-Test No.: \_\_\_\_

Scenario No.: Cook07-01Event No.: 5Event Description: **2E Centrifugal Charging Pump (CCP) Trips**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports multiple annunciators on Panel #207, #208 and #209 which are indicative of a loss of charging capability. <ul style="list-style-type: none"> <li>• Loss of charging flow</li> <li>• Loss of letdown flow</li> <li>• Loss of RCP seal injection flow</li> </ul>
	RO	Recognizes and reports that running (2E) CCP has tripped.
	US	Directs RO to start the 2W CCP per annunciator response(s): <ul style="list-style-type: none"> <li>• 02-OHP 4024.208 Drop 20, Charging Flow &lt; Min Set Point</li> <li>• 02-OHP 4024.209 Drop 12, East CCP Motor Overload Trip</li> </ul>
	RO	Performs the following as directed: <ul style="list-style-type: none"> <li>• Starts 2W CCP</li> <li>• Adjusts QRV-200 and QRV-251 flow to maintain RCP seal flow and Pressurizer level.</li> </ul>
<p style="text-align: center;"><b>NOTE:</b></p> <p style="text-align: center;">If Boron is in the blender it may have a significant effect on RCS Tave. May use turbine load to maintain Tave-Tref.</p> <p>Due to the significant time that may be required to restore PRZ Level to Auto, the scenario may continue prior to placing QRV-302 to the Demin Position.</p>		
	RO/BOP	Places normal letdown back in service in accordance with 02-OHP 4021.003.001, Attachment 13. <ul style="list-style-type: none"> <li>• Place QRV-302 to DIVERT</li> <li>• Adjust Charging (QRV-251) and CCW Flow (CRV-470)</li> <li>• Adjust QRV-301 to 50% output demand</li> <li>• Open QRV-161 or 162 75 GPM Letdown Orifice.</li> <li>• Adjust QRV-301 as required.</li> <li>• Open RV-160 (if 120 gpm letdown is desired)</li> <li>• Adjust QRV-301 and place in Auto at 350 psig.</li> <li>• Place QRV-302 to NORMAL when Letdown temperature is stable.</li> </ul>
	US	Declares 2E CCP inoperable and refers to Tech Specs (TS): <ul style="list-style-type: none"> <li>• TRM 8.1.1, <u>Boration Systems Operating</u></li> <li>• TS 3.5.2, <u>ECCS Operating</u></li> </ul> <p>Enters action statements to restore 2E CCP to operable status within 72 hours.</p>

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 6Event Description: **23 SG Level Channel BLP-131 Fails HIGH**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes failure of BLP-131 High and reports associated alarms: Panel #214 Drops 1 and 2 – Level Deviation
	BOP	Places controller for 2-FRV-230 in manual, raises controller output to match feed flow with steam flow and stabilizes SG 23 level, as required.
	US	Directs actions of 02-OHP 4022.013.013, Steam Generator Level Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: 1. Restores SG 23 level to program (44%), as required 2. Reports 2-BLP-131 has failed
	US	Direct actions to trip bistables per Attachment C-2 of 02-OHP 4022.013.013. Declares level channel input inoperable
	US	Refers to the following TS LCOs: · 3.3.1 <u>RTS Instrumentation</u> (Table 3.3.1-1, Function 14 & 15 – Cond D) · 3.3.2 <u>ESFAS Instrumentation</u> (Table 3.3.2-1, Function 5b & 6c – Cond D )



Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 7/8/9

Event Description:

**Large Break LOCA**  
**2E RHR Pump and 2N SI Pump Fails to Auto Start**  
**2W RHR Pump Trips (after 15 minutes)**

Time	Position	Applicant's Actions or Behavior
	US	Recognizes automatic reactor trip/safety injection and directs RO/BOP to perform the immediate actions of E-0, Reactor Trip and Safety Injection.
	RO/BOP	Perform the immediate actions of E-0: 1. Checks reactor trip 2. Checks turbine trip 3. Checks power to AC emergency buses 4. Checks safety injection status
	US	Ensures immediate actions of E-0 are completed
	RO/BOP	Reviews E-0 Foldout Page Criteria.
	US	Directs subsequent actions of E-0.
	RO	Performs the following actions as directed: <ul style="list-style-type: none"> <li>• Checks CTS actuated</li> <li>• Checks Cntmt isol phase B actuated</li> <li>• Stops all RCPs</li> <li>• Verifies Cntmt Lower Vent Fans OFF</li> <li>• Verifies CRDM Fans OFF</li> </ul>
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% [28%] - 50% once one SG narrow range level is > 13% [28%].

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 7/8/9

Event Description:

**Large Break LOCA**  
**2E RHR Pump and 2N SI Pump Fails to Auto Start**  
**2W RHR Pump Trips (after 15 minutes)**

Time	Position	Applicant's Actions or Behavior
	BOP/RO <b>Critical Task #1</b>	Obtains Attachment A of E-0 and performs the following: Checks all ECCS pumps running and <b>manually starts</b> : (Pumps may be started prior to Att A) <ul style="list-style-type: none"> <li>• <b>2E RHR pump</b></li> <li>• 2N SI pump</li> <li>• Places 2-HV-ACR-DA-1, c/r vent intake damper to ISOL</li> <li>• Places cntmt hydrogen sample bypass switches to bypass: (Lights may Not be Lit) <ul style="list-style-type: none"> <li>· Train A</li> <li>· Train B</li> </ul> </li> </ul>
	CREW	Completes all actions of E-0 through step 23 (Check If RCS Is Intact).
	US	May transition to P.1, Response to PTS but should exit after verifying RCS pressure and RHR Flow.
	US	Announces transition to E-1, Loss Of Reactor Or Secondary Coolant (at step 23 of E-0).
	RO/BOP	Reviews E-1 Foldout Page Criteria (see <b>NOTE</b> regarding cold leg switchover criteria).

**NOTE:**

When RWST level lowers to < 30% then the crew must immediately Transition to ES-1.3, Transfer To Cold Leg Recirculation.

See Page 12 for applicants actions or behavior associated with ES-1.3, Transfer To Cold Leg Recirculation.

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 7/8/9

Event Description:

**Large Break LOCA  
2E RHR Pump and 2N SI Pump Fails to Auto Start  
2W RHR Pump Trips (after 15 minutes)**

Time	Position	Applicant's Actions or Behavior
	US	Directs actions of E-1, Loss Of Reactor Or Secondary Coolant.
	RO/BOP	Acknowledges Annunciator 206, Drop 50, RHR PUMPS MOTOR OVERLOAD TRIP and reports 2W RHR pump trip.
	BOP	Maintains SG narrow range levels 27% - 50%.
	RO/BOP	Performs the following as directed: <ol style="list-style-type: none"> <li>1. Resets both trains of Safety Injection</li> <li>2. Stops running Emergency Diesel Generators (EDGs)</li> <li>3. Dispatches operator to secure EDG jacket water pumps</li> </ol>
	US/RO	Identifies and reports that the 2W RHR pump has tripped: <ul style="list-style-type: none"> <li>• Recognizes Train B has lost recirculation capability</li> <li>• Verifies at least one train of cold leg recirculation capability exists</li> <li>• May attempt 1 restart of 2W RHR per the ARP.</li> </ul>
	RO/BOP	Performs the following as directed <ol style="list-style-type: none"> <li>1. Opens control air valves to containment</li> <li>2. Directs chemistry to initiate post accident sampling</li> </ol>
	US	Check if transfer to cold leg recirculation is required (RWST <30%)

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 7/8/9

Event Description:

**Large Break LOCA  
2E RHR Pump and 2N SI Pump Fails to Auto Start  
2W RHR Pump Trips (after 15 minutes)**

Time	Position	Applicant's Actions or Behavior
<b><u>Applicants actions or behavior associated with</u></b> <b>ES-1.3, Transfer To Cold Leg Recirculation.</b>		
	US	Announces transition to ES-1.3, Transfer To Cold Leg Recirculation when RWST level < 30% per: <ul style="list-style-type: none"> <li>• E-0, Foldout Page, Criteria 3</li> <li>• E-1, Foldout Page, Criteria 5</li> <li>• E-1, Step 13</li> </ul>
	US	Directs actions of ES-1.3,. Transfer To Cold Leg Recirculation
	RO/BOP	Checks CCW return flow on each RHR Hx at 3000-3500 gpm.
	RO/BOP	Checks the following prior to switching over to cold leg recirc: <ul style="list-style-type: none"> <li>• RWST level &lt; 20%</li> <li>• Cntmt water level &gt; MIN RECIRC LEVEL</li> </ul>
	<b><u>US/RO</u></b>  <b>Critical Task #2</b>	<b>Directs/Performs switchover as follows: (only 1 train of CTS required)</b> <ol style="list-style-type: none"> <li><b>1. Stops and locks out East CTS pump</b></li> <li><b>2. Stops and locks out East RHR pump</b></li> <li>3. Checks East CTS and East RHR pumps stopped</li> <li><b>4. Initiates valve closure:</b> <ul style="list-style-type: none"> <li>• <b>2-IMO-310, East RHR pump suction</b></li> <li>• <b>2-IMO-215, East CTS pump suction from RWST</b></li> </ul> </li> <li><b>5. Stops and locks out West CTS pump</b></li> <li>6. Stops and locks out West RHR pump</li> <li>7. Checks West CTS and West RHR pumps stopped</li> <li><b>8. Initiates valve closure:</b> <ul style="list-style-type: none"> <li>• 2-IMO-320, West RHR pump suction</li> <li>• 2-IMO-225, West CTS pump suction from RWST</li> </ul> </li> </ol>

Op-Test No.: \_\_\_\_\_

Scenario No.: COOK07-01Event No.: 7/8/9

Event Description:

**Large Break LOCA**  
**2E RHR Pump and 2N SI Pump Fails to Auto Start**  
**2W RHR Pump Trips (after 15 minutes)**

Time	Position	Applicant's Actions or Behavior
	<u><b>US/RO</b></u>  <b>Critical Task #2</b>	<p><b>Continues to direct/perform switchover as follows:</b></p> <p><b>9. Restores control power to 2-ICM-305, Recirc sump to east RHR/CTS pumps</b></p> <p>10. Checks 2-ICM-305 open interlock:</p> <ul style="list-style-type: none"> <li>• 2-IMO-310 fully closed</li> <li>• 2-IMO-215 fully closed</li> </ul> <p><b>11. Opens 2-ICM-305</b></p> <p><b>12. Starts:</b></p> <ul style="list-style-type: none"> <li>• East RHR pump</li> <li>• East CTS pump</li> </ul> <p><b>13. Restores control power to 2-ICM-306, Recirc sump to west RHR/CTS pumps</b></p> <p>14. Checks 2-ICM-306 open interlock:</p> <ul style="list-style-type: none"> <li>• 2-IMO-320 fully closed</li> <li>• 2-IMO-225 fully closed</li> </ul> <p><b>15. Opens 2-ICM-306</b></p> <p>16. May attempt to start the West RHR pump (1 restart allowed)</p> <p><b>17. Starts the West CTS pump</b></p> <p>18. Checks at least one RHR pump running on the recirc sump</p> <p>19. Resets CTS actuation</p> <p>20. Closes spray additive tank valves:</p> <ul style="list-style-type: none"> <li>• 2-IMO-202, outlet valve</li> <li>• 2-IMO-204, outlet valve</li> <li>• 2-IMO-212, eductor supply valve</li> <li>• 2-IMO-222, eductor supply valve</li> </ul>
<b><u>TERMINATE SCENARIO</u></b>		

**CRITICAL TASK SUMMARY  
(COOK07-01)**

Task	Elements	Results
<p style="text-align: center;"><b>#1</b></p> <p><b>Manually starts 2E RHR pump (one low-head ECCS pump)</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>• Check ECCS Pumps ALL running (E-0, Step 11)</li> <li>• Check RHR Hx Flow Indicated (E-0, Step 12.e)</li> <li>• Check Cold Leg Recirc Capability (E-1, Step 11)</li> </ul> <p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>• Starts the 2E RHR pump and ensures at least one train of low-head ECCS available for cold leg recirculation.</li> <li>• Must be performed prior to ES-1.3, Step 6.g “Check At Least One RHR Pump – Running On Recirculation Sump.”</li> </ul> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>• 2E RHR pump red run light lit</li> <li>• 2E RHR pump current indicated</li> <li>• 2E RHR pump flow indicated</li> </ul>	<p><b>SAT / UNSAT</b></p>
<p style="text-align: center;"><b>#2</b></p> <p><b>Establish Cold Leg Recirculation Flow (RHR &amp; CTS only)</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>• E-0 Foldout Page, Criteria 3 (switchover criteria)</li> <li>• E-1 Foldout Page, Criteria 5 (switchover criteria)</li> <li>• E-1, Step 13, Check For Transfer To CL Recirc.</li> </ul> <p><b><u>Performance Indicators:</u></b></p> <ul style="list-style-type: none"> <li>• At least one train of RHR/CTS running aligned to the containment sump.</li> <li>• CTS and RHR pumps stopped for no longer than 5 minutes during switchover.</li> <li>• No total interruption of ECCS flow (CHG and SI) to the RCS during switchover.</li> </ul> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>• At least one train of RHR/CTS pumps running / indicating flow with suction aligned to Recirc Sump.</li> </ul>	<p><b>SAT / UNSAT</b></p>

## SIMULATOR INSTRUCTIONS (COOK07-01)

### Setup:

1. Reset to IC 977 (IC 35 with Summary file)
2. Reset control rods and check group step counters
3. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
4. Advance chart recorder paper & clear chart recorder memory
5. Update PPC Chart Recorders VCT 20-70, PWR 45-55%, Tave/Tref 555-565°F
6. Start Data Collection Program Save to file \_\_\_\_\_
7. Go to **RUN** and acknowledge/clear alarms
8. Activate the following pre-load override/malfunction:
  - **RP19D** (ECCS slave relay failure)
9. Assign file **rwst low** {cslrwst < 0.35} to trigger **E13**
  - Assign Malfunction **RH01B** to trigger **E13**

## SIMULATOR INSTRUCTIONS

(COOK07-01)

### Scenario Events:

#### Event #3

1. Trigger (3) **IMF CV16B**, final value **100** (QLC-452 fails HIGH) after crew has performed a short ramp.

#### Event #4

2. Trigger (5) **IMF SW07A**, final value **0** (Main Turbine Oil Cooler Temperature Controller) when crew has recovered from the VCT Level failure.

#### Event #5

3. Trigger (7) **IMF CV13A** (East CCP trip) when crew has recovered from the Turbine Oil Cooler Temperature Controller failure.

#### Event #6

4. Trigger (9) **IMF RX23H**, final value **103** with **2 minute** ramp (BLP-131 fails hi) after crew has recovered from the CCP trip.

#### Event #7

1. Trigger (11) **IMF RC01A**, final value **50** (LB LOCA – loop 1) after crew has recovered from the failed SG Level Channel.

#### Event #9

2. Verify Trigger (13) malfunction **RH01B** (2W RHR pump trip) actuates when RWST level lowers to <35%.

(continued on next page)



## SIMULATOR INSTRUCTIONS (COOK07-01)

### Response to Crew's Requests:

1. If Directed to Adjust NARPI, Report that NARPI adjustments have been completed.
2. If requested to locally monitor CW Pump Shutdown, report WMO-21 position as the valve closes (MPP **CWVWMO21**). (~25 Seconds to 20% open)
3. If directed to energize interposing relay for QLC-452 then use:  
Remote Function **RPR158** to Trip LBX-185XB
4. If contacted as MTI investigate the Turbine Oil Temp controller, report back after some 5 min. delay that additional testing will be required to identify the problem.
5. If contacted as AEO or Maintenance to evaluate East CCP operations, report back after some 5 min. delay that motor/pump coupling damage is evident.
6. If directed to trip bistables for BLP-131 use:  
**Override ZLOSTMC2[6] to ON** to simulate opening cabinet Door  
(Override Lights/Relays – RX Flux panel)

Remote	Bistable
<b>RPR066</b>	LS-539A
<b>RPR067</b>	LS-539B

**Override ZLOSTMC2[1] to ON** to simulate lifting Test Rack

**Delete Override ZLOSTMC2[6]** to simulate closing cabinet Door

7. Local actions after entry into E-0:
  - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
  - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
  - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.
8. If directed to secure EDG jacket water pumps then modify remote functions as follows:
  - **MRF EGR 03 A & B**, select **OFF** then **AUTO**
  - **MRF EGR 04 A & B**, select **OFF** then **AUTO**

Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK07-02

Op-Test No.:

Examiners: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_Operators: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial Conditions: IC-35 (979), MOL; 53% power, 1139 ppm Boron, 8 GWD, Equilibrium Xenon, CBD@177.5 steps, Tave & Tref -560.0 °F

Turnover: The 2W MFP has been returned to service following work on its Oil Cooler. Shift Hotwell Pumps and raise Power to 80% for next hold point

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Start South Hotwell pump and Stop North Hotwell Pump
2		R-RO	Raise Reactor Power and Turbine Load
3	RX05A @ 0	I-RO TS	Controlling Pressurizer Level Channel (NLP-151) fails LOW
4	RX20G @ 5E6 over 20 sec	I-BOP TS	#24 SG Steam Flow Transmitter (MFC-140) fails HIGH
5	RX09A @ 0 over 2 min.	C-RO	Pressurizer Master Pressure Controller fails LOW
6	FW05A	C-BOP	East Main Feed Pump Trip
7	FW05B	M	West Main Feed Pump Trip
8	RP03A RP03B	C-RO	AUTO/MANUAL Reactor trip actuation failure (ATWS)
9	TC04C TC05C	C-BOP	Main Turbine Stop & Control Valve Sticks Open
10	RP12A RP12B	C-ALL	Inadvertent SI on the reactor Trip

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

## **Summary**

The Crew is directed to start South Hotwell pump and stop North Hotwell Pump and perform a power escalation to 80%.

The first event will involve the controlling Pressurizer Level channel instrument (NLP-151) failing LOW. This results in charging flow rising, Pressurizer level rising, Pressurizer heaters OFF, and letdown isolation. RO will be required to restore normal letdown and charging flow conditions. Crew will be required to implement AOP actions to stabilize the plant and trip bistables.

The second event will involve the #24 SG Steam Flow instrument (MFC-140) failing HIGH. This will result in the opening of #24 SG FWRV (FRV-240) to raise feedwater flow. BOP will be required to take manual control and regulate FRV-240. Crew will be required to implement AOP actions to stabilize the plant and trip bistables.

The third event will involve the Pressurizer Master Pressure Controller failing low. This results in Actual RCS pressure rising with Pressurizer heaters ON, and Spray valves closed. The RO will be required to take manual control to restore normal pressure conditions.

The fourth event will involve a trip of the East Main Feed Pump. This will result in a rapid power reduction to less than 60%. RO will be required to control reactivity while BOP monitors the SG levels.

The main event will involve a Failure of the RPS function (ATWS) following a trip of the remaining FW pump. The RPS failure also results in an Inadvertent SI. The reactor must be locally tripped. The crew will implement FR-S.1 actions until reactor is subcritical. The Turbine will fail to trip (Stop & Control Valve Stuck open). The BOP will be required to isolate the main steam lines. After the reactor is subcritical, the crew will perform the actions of E-0 to verify the SI is not required and then transition to ES-1.1. The scenario will terminate when the crew has transitioned to ES-1.1.

## **Critical Tasks**

Insert Negative Reactivity  
Manually Isolate the Main Steam Lines

## **Procedures**

E-0, Reactor Trip or Safety Injection  
FR-S.1, Response to Anticipated Trip without Scram

Op-Test No.: _____			Scenario No.: <u>Cook07-02</u>			Event No.: <u>1</u>		
Event Description: <b>Swap Hotwell Pumps (Start South and Stop North)</b>								
Time	Position	Applicant's Actions or Behavior						
	US	Directs actions of 02-OHP 4021.054.001, Attachment 2, Operation of Hotwell (HW) and Condensate Booster (CB) Pumps to start the South and stop the North HW pumps.						
	BOP	Performs the following to swap HW pumps as directed: Directs AEO to close South HW pump Seal Quench throttle valve (2-C-119S) Starts the South HW pump Monitors HW discharge pressure and flow Directs AEO to close South HW pump disch vent valve (2-C-117S) Places the following switches in neutral: <ul style="list-style-type: none"> <li>· Standby CB pump</li> <li>· Standby TACW pump</li> </ul> Stops the North HW pump Directs AEO to open North HW pump disch vent valve (2-C-117N) Directs AEO to throttle North HW pump seal package quench valve (2-C-119N) Places the following control switches in auto: <ul style="list-style-type: none"> <li>· Standby CB pump</li> <li>· Standby TACW pump</li> </ul>						
<p style="text-align: center;">NOTE:</p> <p>Annunciator Panel 216 Hotwell Pump Discharge Pressure Low may alarm during pump swap. Alarm should be cleared when task is completed.</p>								
	US	Directs the following actions to realign condensate system: Start the South HW pump Stop the North HW pump Notify chemistry of condensate system configuration change.						

Op-Test No.: \_\_\_\_\_

Scenario No.: Cook07-02Event No.: 2Event Description: **Raise Turbine and Reactor Power (If required)**

Time	Position	Applicant's Actions or Behavior
	RO	Calculates primary water addition per 02-OHP 4021.005.001, Attachment 6, Boration or Dilution Volume Determination.
	RO	Briefs crew on reactivity plan for power escalation.
	US	Reviews reactivity plan
	US	Directs RO to commence Power Escalation in accordance with 02-OHP 4021.001.006.
	RO	Performs DILUTION batch add: <ul style="list-style-type: none"> <li>Place RC Makeup Blend control switch to STOP</li> <li>Place RC Makeup Blend Mode switch in DILUTE/ALT DILUTE</li> <li>Set desired batch on PW batch controller</li> <li>Place PW pump in RUN</li> <li>Place RC Makeup Blend control switch in START</li> </ul>
	RO	Commences power escalation: <ul style="list-style-type: none"> <li>Raises turbine load (reactor power) using the load limiter.</li> <li>Maintains Tave/Tref deviation within limits 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>
	US/BOP	Acts as peer check for RO during blender operations and by verifying appropriate reactivity feedback.

Op-Test No.: \_\_\_\_\_

Scenario No.: Cook07-02Event No.: 3Event Description: **Pressurizer Level Channel (NLP-151) Fails LOW**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 (Drops 4 and 5) indicative of a pressurizer (PRZ) level instrument failure.
	RO	Places 2-QRV-251, Charging Flow Controller OR PRZ Level Controller to manual and manually adjusts output to restore charging header flow and seal injection to normal.
	US	Enters and directs actions of 02-OHP 4022.013.010, Pressurizer Level Instrument Malfunction procedure.
	RO	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Restores PRZ level using 2-QRV-251 or level controller</li> <li>2. Reports 2-NLP-151 has failed</li> <li>3. Ensures PRZ level control is in manual</li> <li>4. Places PRZ Level CTRL selector switch in Ch 2 &amp; 3 position</li> <li>5. Places PRZ Level REC selector switch in 2 or 3 position</li> <li>6. Restore Letdown per 02-OHP-4021-003-001</li> <li>7. Cycle PRZ Heaters to restore control</li> <li>8. Nulls and returns 2-QRV-251 and PRZ Level Controller back to auto</li> </ol>
	US	Initiates actions to trip bistables associated with 2-NLP-151 PZR Level Failure per Attachment A of 02-OHP 4022.013.010.
	US	Refers to Tech Specs (TS): <ul style="list-style-type: none"> <li>• TS 3.3.1 <u>RTS Instrumentation</u> (Table 3.3.1-1, Function 9 Condition D)</li> <li>• TS 3.3.4 <u>Remote Shutdown Instrumentation</u></li> <li>• TS 3.3.3 <u>Post Accident</u> (Minimum channels met)</li> </ul>

Op-Test No.: \_\_\_\_\_

Scenario No.: Cook07-02Event No.: 4Event Description: **SG #24 Main Steam Flow Transmitter (MFC-140) Fails High**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #214 which are indicative of a steam flow instrument failure (Drop 41).
	BOP	Places 2-FRV-240, SG 24 MFW Reg. Valve controller to manual, lowers controller output to match feed flow with operable steam flow channel, and restores SG 24 level to program.
	US	Enters and directs actions of 02-OHP 4022.013.014, Steam Flow Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Restores SG 24 level using manual control of 2-FRV-240</li> <li>2. Places MFP <math>\Delta</math>P controller in manual and maintains pressure</li> <li>3. Reports 2-MFC-140 has failed</li> <li>4. Places 2-FS-542C selector switch in channel 2 position</li> <li>5. Nulls and returns 2-FRV-240 controller to AUTO</li> <li>6. Returns MFP <math>\Delta</math>P controller to auto</li> </ol>
	US	Directs actions to trip bistables associated with 2-MFC-140 Steam Flow Failure per Attachment D-1 of 02-OHP 4022.013.014.
	US	Refers to Tech Specs: <ul style="list-style-type: none"> <li>▪ 3.3.1 <u>RTS Instrumentation</u> (Table 3.3.1-1, Function 15 Condition D)</li> <li>▪ 3.3.2 <u>ESFAS Instrumentation</u> (Table 3.3.2-1, Function 4e Condition D)</li> </ul>

Op-Test No.: _____		Scenario No.: <u>Cook07-02</u>	Event No.: <u>5</u>
Event Description: <b>Pressurizer Master Pressure Controller fails LOW</b>			
Time	Position	Applicant's Actions or Behavior	
	RO	Recognizes and reports annunciator on Panel #208 indicative of a pressurizer (PRZ) Master Controller failure (Drop 8).	
	US	Directs operator actions to take manual control of PRZ Press. Master Controller and restore normal pressure control (approx. 2235 psig)	
	RO	Performs the following actions as directed: <ol style="list-style-type: none"> <li>1. Restores PRZ pressure 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 PRZ pressure master controller has failed</li> <li>3. Ensures PRZ pressure master controller is in manual</li> </ol>	
	US	Directs RO to restore RCS Pressure to 2235 psig and provides a control band.	



Op-Test No.: \_\_\_\_\_

Scenario No.: Cook07-02Event No.: 6Event Description: **East Main Feed Pump Trip**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes indication of MFP trip and reports annunciators: Panel #215 Drop 11 & 12 – East MFP Emergency System Tripped.
<p style="text-align: center;">Note:</p> <p>Crew may elect not to enter 02-OHP-4022-055-001 since power is low enough to require only 1 FW pump. Actions to take manual control of FW pump Speed and DP will still be required.</p>		
	US	<p>Directs operator actions per 02-OHP-4022-055-001, Loss of One MFP:</p> <ul style="list-style-type: none"> <li>• Verify Turbine Load to &lt; 60%</li> <li>• Verify Rod Control in AUTO</li> <li>• Start AFW pumps</li> <li>• Verify Standby Condensate Pumps running</li> <li>• Raise FW Pump speed</li> <li>• Initiate Boration to maintain rods above RIL</li> </ul>
	RO	<p>Verify rod control switch in AUTO and functioning properly.</p> <p>Initiate normal or emergency boration flow (if required).</p>
	BOP	<p>Manually runback turbine load to &lt; 60% if required.</p> <p>Start All AFW pumps.</p> <p>Verify Standby Condensate Booster and Hotwell pumps are running.</p> <p>Raise FW Pump speed</p> <p>Raise West MFP Steam supply to Main Steam (2-ARV-12) controller to 95 psig.</p> <p>Verify SG levels are stable at or returning to normal (44%).</p>
	US	<p>Direct operator actions to restore normal system alignment: (as Desired)</p> <ul style="list-style-type: none"> <li>• Stop running AFW pumps and align for standby condition</li> <li>• Align Condensate system for current plant conditions</li> </ul>
<p style="text-align: center;">NOTE:</p> <p>Crew May enter TS 3.4.1 for RCS DNB if Pressurizer Pressure lowers to &lt; 2200 psig</p>		

Op-Test No.: _____		Scenario No.: <u>Cook07-02</u>	Event No.: <u>7/8/9/10</u>
Event Description: <b>West Main Feed Pump Trip</b> <b>RPS Reactor Trip – Failure</b> <b>Inadvertent Safety Injection</b> <b>Main Turbine Stop &amp; Control Valve Sticks Open</b>			
Time	Position	Applicant's Actions or Behavior	
	RO/US	Determines that a loss of feedwater is occurring based on the following: <ul style="list-style-type: none"> <li>· Both FW pumps tripped</li> <li>· SG level change</li> <li>· FW &amp; Steam flow mismatch</li> </ul>	
	US	Directs RO to manually trip the reactor Directs RO/BOP to perform the immediate actions of E-0, Reactor Trip or Safety Injection	
	RO	Recognizes and reports failure of reactor to manually trip	
	US	Directs actions of FR-S.1, Response to Nuclear Power Generation/ATWS:	
	<b>RO</b>  <b>Critical Task #1</b>	Performs the immediate actions of FR.S-1: 1. Checks reactor trip <b>Manually insert control rods(must Insert Negative Reactivity through Inserting Control Rods or Emergency Boration)</b>	
	<b>BOP</b>  <b>Critical Task #2</b>	Performs the immediate actions of FR.S-1: 2. Manually actuate AMSAC 3. Checks check Turbine Trip <ul style="list-style-type: none"> <li>• Determines that ALL Turbine Stop Valves are NOT Closed.</li> <li>• Attempts to manually reduce turbine load.</li> </ul> 4. Determines that Turbine Control Valve is stuck at ~25% open. <b>5. Isolates SG Stop Valves and Stop Valve Dump Valves</b>	
	US	Ensures immediate actions of FR.S-1 are completed	
	<b>RO</b> <b>Critical Task #1</b>	<b>Initiate Emergency Boration of RCS(must Insert Negative Reactivity through Inserting Control Rods or Emergency Boration)</b>	

Op-Test No.: \_\_\_\_\_

Scenario No.: Cook07-02Event No.: 7/8/9/10

Event Description: **West Main Feed Pump Trip**  
**RPS Reactor Trip – Failure**  
**Inadvertent Safety Injection**  
**Main Turbine Stop & Control Valve Sticks Open**

Time	Position	Applicant's Actions or Behavior
	US	Directs subsequent actions of FR.S-1: Local operation of reactor trip breakers or MG set output breakers Local turbine Trip Verify Reactor subcritical – WR log power < 5% & negative SUR
	US	Performs transition to 2-OHP-4023-E.0, Reactor Trip or Safety Injection
	US	Ensures immediate actions of E-0 are completed
	Crew	Determines that a Safety Injection has Actuated
	RO/BOP	Report immediate actions complete and review foldout pages.
	RO/BOP	Performs manual actions of E-0 Attachment A as directed by US.
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% - 50% once one SG narrow range level is greater than 13%.
	US	Directs Actions of E-0 to verify equipment is aligned as required and determine if SI is valid.
	Crew	Performs actions of E-0 as required.
	US	Announces transition to ES-1.1, SI Termination

**TERMINATE SCENARIO**

**CRITICAL TASK SUMMARY  
(COOK07-02)**

Task	Elements	Results
<p style="text-align: center;"><b>#1</b></p> <p style="text-align: center;"><b>Manually Trip Reactor</b></p>	<p><u><b>Cueing:</b></u></p> <ul style="list-style-type: none"> <li>• Challenge to multiple reactor trip setpoints: <ul style="list-style-type: none"> <li>· Low PRZ pressure reactor trip</li> <li>· Low PRZ pressure safety injection</li> </ul> </li> <li>• RX TRIP BKR TRAIN A/B UV TRIP (ATWS) alarms</li> </ul> <p><u><b>Performance Indicators:</b></u></p> <ul style="list-style-type: none"> <li>• Insert Negative Reactivity through: Inserting Control Rods (Manually or Auto at &gt;48 steps per minute) – OR - Emergency Boration</li> <li>• Must be performed prior to: <ul style="list-style-type: none"> <li>· SG Dryout (&lt;15% wide range level)</li> <li>· SRO Reaching Step 8 of FR-S.1</li> </ul> </li> </ul> <p><u><b>Performance Feedback:</b></u></p> <p><u><b>RODS</b></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><b>BORATION (any one of following)</b></u></p> <ul style="list-style-type: none"> <li>• Boration Flow QFI-420 &gt; 44 gpm</li> <li>• IMO-910 or IMO-911 open</li> <li>• Boration Flow QFC-421 &gt; 36 gpm</li> </ul>	<p style="text-align: center;"><b>SAT / UNSAT</b></p>
<p style="text-align: center;"><b>#2</b></p> <p style="text-align: center;"><b>Manually Isolate Steam Lines</b></p>	<p style="text-align: center;"><b>Cueing:</b></p> <ul style="list-style-type: none"> <li>· Turbine Stop Valve Status Light – NOT LIT (FR-S.1 step 3)</li> <li>· Turbine Control Valve Indicator – NOT at Zero</li> <li>· SG Stop Valves – NOT Closed</li> <li>· Steam generator pressure lowering</li> <li>· RCS temperature lowering</li> </ul> <p style="text-align: center;"><b>Performance Indicators:</b></p> <ul style="list-style-type: none"> <li>• Isolate SG Steam Lines by closing SG Stop valve</li> <li>· Must be performed before transitioning to E-2.</li> </ul> <p style="text-align: center;"><b>Performance Feedback:</b></p> <ul style="list-style-type: none"> <li>· SG Stop Valve Closed Lights – LIT</li> <li>· SG Steam Flow at 0 lbm/hr</li> </ul>	<p style="text-align: center;"><b>SAT / UNSAT</b></p>



## SIMULATOR INSTRUCTIONS (COOK07-02)

### Setup:

1. Reset to IC 35 (979)
2. Reset control rods and check group step counters
3. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
4. Advance chart recorder paper & clear chart recorder memory
5. Update PPC Chart Recorders VCT 20-70, PWR 45-55%, Tave/Tref 555-565°F
6. Start Data Collection Program Save to file \_\_\_\_\_
7. Go to **RUN** and acknowledge/clear alarms
8. Activate the following (pre-load) malfunctions:
  - **RP03A**, Train A RPS Reactor Trip Breaker fails to open
  - **RP03B**, Train B RPS Reactor Trip Breaker fails to open
  - **TC04C**, Turbine Stop Valve sticks open

(continued on next page)

## SIMULATOR INSTRUCTIONS

(COOK07-02)

### Scenario Events:

#### Event #3

1. Trigger (1) **IMF RX05A**, final value **0** (NLP-151 fails LOW) after crew has raised power between 3 to 5%.

#### Event #4

2. Trigger (3) **IMF RX20G**, final value **5E6** ramped over 20 seconds (MFC-140 fails HIGH) after crew has stabilized the plant from the PRZ level.

#### Event #5

3. Trigger (5) **IMF RX09A**, final value **0** ramped over 2 minutes (PRZ Master Controller fails LOW) after crew has raised power between 3 to 5%.

#### Event #6

4. Trigger (7) **IMF FW05A** (East MFP trip) when crew has recovered from the PRZ Master Controller failure.
  - Prior to trigger activation, call control room and report oil spray (unisolable) coming from West MFP oil pump of approximately 10 gpm.

#### Event #7

5. Trigger (9) **IMF FW05B** (West MFP trip)
  - **IMF TC05C** (Turbine Control Valve) at **29%**
  - **RP12A**, Train A Inadvertent Safety Injection
  - **RP12B**, Train B Inadvertent Safety Injection

Already entered

- RPS Reactor Trip fails to actuate
- TC04C Turbine Stop Valve

(continued on next page)

## SIMULATOR INSTRUCTIONS (COOK07-02)

### Response to Crew's Requests:

1. If directed, to align Hotwell Pump Seal Quench valves report back that the South Hotwell Pump 2-C-119S Seal Quench Throttle Valve and South HW pump disch vent valve (2-C-117S) are CLOSED.
2. When Directed (After North Pump Shutdown) report that the North HW pump disch vent valve (2-C-117N) is OPEN and North Hotwell Pump 2-C-119N is Throttled.

3. If directed, to trip bistables for **NLP-151** use:

**IOV ZLOSTMC2[6] to ON** to simulate opening CH 1 cabinet Door  
(Override Lights/Relays – RX Flux panel)

Remote	Bistable
<b>RPR041</b>	LS/459A

**IOV ZLOSTMC2[1] to ON** to simulate lifting Test Rack

**DOV ZLOSTMC2[6]** to simulate closing cabinet Door

4. If directed, to trip bistables for **MFC-140** use:

**IOV ZLOSTMC2[6] to ON** to simulate opening cabinet Door  
(Override Lights/Relays – RX Flux panel)

Remote	Bistable
<b>RPR039</b>	FS/542B
<b>RPR035</b>	FS/540A
<b>RPR036</b>	FS/540B

**IOV ZLOSTMC2[1] to ON** to simulate lifting Test Rack

**DOV ZLOSTMC2[6]** to simulate closing cabinet Door

5. When directed as AEO to locally trip reactor, wait 2 minutes then insert **IRF RPR145 RO** and **IRF RPR146 RO** to open trip breakers.
6. When Directed to locally trip the Main Turbine, wait 1 minute<sup>1</sup> then insert **IRF TCR01 TRIP**
7. Local actions after entry into E-0:
  - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
  - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
  - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.
8. If directed to secure EDG jacket water pumps then modify remote functions as follows:
  - **MRF EGR 03**, select **OFF** then **AUTO**
  - **MRF EGR 04**, select **OFF** then **AUTO**



Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK07-03Op-Test No.: 2007301Examiners: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_Operators: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Initial Conditions: IC978 (IC-36), 78%power, 8 GWD, 1069 ppm Boron, CBD @ 191 Steps, Unit 1 is at 100%.  
Previous shift experiences a 0.3°F change for 1 step rod motion.

Turnover: Reduce Power to 60% for Waterbox cleaning.

Event No.	Malf. No.	Event Type*	Event Description
1	ED07A	<del>C-RO</del> TS	<del>PZR-HTR Transformer Fails (21PHA fails)</del>
2	NI10B @ 200	I-RO TS	Power Range NI42 fails HIGH
3		R	Power reduction / Reduce Turbine Load
4	FW34A FW58B	<del>C-</del> BOP	<del>North CB pump trip; Middle CB pump fails to start in AUTO</del>
5	RX17J to 0% over 10 Sec	<del>I-BOP</del> TS	<del>SG Pressure Channel MPP-240 Fails Low</del>
6	FW01D @ 20 2 min Ramp	M	Feed Line Break inside Containment (#24 SG)
7	RP07A RP07B	C- BOP	Steam Line Isolation fails to AUTO actuate
8	RP16B RP17B RP19J	C-RO	CTS Train B - fails to actuate (AUTO/MANUAL) RPS relay K626-X3 failure (2East CTS pump fails to start)

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

## **Summary**

The Crew is directed to perform a power reduction. (This may be allowed to begin or credit for the NI failure may be used for the Reactivity Change)

The first event will involve a failure of the PZR HTR Bus T21PHA will occur. The PZR SCR heater control will need to be transferred to T21PHC. The crew should also refer to Technical Specifications.

The second event will occur as the RO is addressing the Heater breaker failure. This event will involve the Power Range N42 detector failing HIGH. This results in automatic control rod insertion. RO will be required to place the rod control switch in MANUAL. Crew will be required to implement AOP actions to stabilize the plant, trip Bistables, and perform actions to restore power/temperature.

The crew will then be given time to complete the required power change

The fourth event a trip of the North Condensate Booster pump. This will result in reduced feedwater capability. BOP will be required to manually start the Middle Condensate Booster pump. Crew will be required to implement compensatory actions to stabilize the plant.

The fifth event will involve the SG Pressure Channel MPP-240 fails low. The BOP will be required to take manual control SG 24 Feedwater Regulating Valve FRV-240 to stabilize level. The crew will address the failure with an Abnormal Operating Procedure, address Technical Specifications, select an operable channel, and restore automatic control.

The main event will involve a Feedline Break inside containment on the #24 SG. The unit will trip and a Safety Injection will actuate. Failure of the Main Steamline Isolation actuation circuit will require a manual actuation. As the crew performs the actions of E-0, they should identify the Main Steamline Break inside containment on the #24 SG. The crew will transition to E-2 to isolate #24 SG. Containment Pressure will raise and CTS fails to Actuate. The scenario will terminate when the crew has transitioned to ES-1.1.

## **Critical Tasks**

Isolate #24 Steam Generator  
Actuate/Align CTS

## **Procedures**

E-0, Reactor Trip or Safety Injection  
E-2, Faulted Steam Generator Isolation

Op-Test No.: <u>Spare</u>			Scenario No.: <u>Cook07-03</u>			Event No.: <u>1</u>		
Event Description: <b>Pressurizer Heater Transformer (TR21PHA) Fails</b>								
Time	Position	Applicant's Actions or Behavior						
	RO	<del>Recognizes and reports annunciators on Panel #208 (Drops 41 and 50) indicative of a pressurizer (PRZ) heater power supply failure.</del>						
	US/RO	<del>Reenergizes PRZ control (cycling) group heaters per OHP-4024.208 Drop 41 annunciator response, as follows:</del> Opens breaker CB21PHA6 <del>Closes breaker CB21PHG6</del>						
	RO	<del>Monitors PRZ pressure response and ensures normal PRZ heater operations for PHG-supplied heaters.</del>						
	US	<del>Refers to Tech Specs (TS):</del> TS 3.4.9.b <u>Pressurizer</u> (Condition B) due to a loss of 1 train of pressurizer heaters.  <del>Enters action statement that requires 72 hours to restore.</del>						

Appendix D Operator Actions Form ES-D-2

Op-Test No.: <u>Spare</u> Scenario No.: <u>Cook07-03</u> Event No.: <u>2</u>		
Event Description: <b>Power Range NI42 fails HIGH.</b>		
Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #210 which are indicative of a NI instrument failure (Drop 16, 18).
	US	Enters and directs actions of 02-OHP 4022.012.003, Continuous Control Bank Movement procedure.
	RO	Performs the following as directed: 1. Checks for no turbine runback 2. Ensures control rods are in manual with no rod motion 3. Checks rod position above low-low rod insertion limit 4. Checks axial flux difference (AFD) within target band 5. Initiates restoration of equilibrium conditions using either: Control rod movement Turbine load adjustment 1. Identifies failed power range channel
	US	Enters and directs actions of 02-OHP 4022.013.004, Power Range Malfunction procedure.
NOTE: Crew May enter/refer to DNB Technical Specification 3.4.1.a		
	US	Directs operator actions per 02-OHP-4022-013-004, Power Range Malf: Verify Rod Control switch in MANUAL Places Rod Stop Bypass selector in N-I42 position Reduce turbine load to minimize Tave/Tref difference Remove NI-42 channel from service
	RO/BOP	Performs actions as directed to remove NI-42 from service Place Channel Defeat selector to NI-42 Place Upper Section Channel Current Comparator Defeat Selector to NI-42 Place Lower Section Channel Current Comparator Defeat Selector to NI-42 Place Power Mismatch Bypass selector to NI-42 Verify Delta-T Recorder Selector NOT in Channel 2 Verify Overtemperature Delta-T Recorder Selector NOT in Channel 2 Restore Rod Control to Automatic
(continued on next page)		



Op-Test No.: <u>  Spare  </u> Scenario No.: <u>Cook07-03</u> Event No.: <u>  2  </u>		
Event Description: <b>Power Range NI42 fails HIGH.</b>		
Time	Position	Applicant's Actions or Behavior
	US	Directs actions to trip bistables associated with NI-42 Power Range Malfunction per Attachment B of 02-OHP 4022.013.004.
	US	Refers to Tech Specs: ▪ <u>3.3.1 RTS Instrumentation</u> (Table 3.3.1-1, Functions 2a,2b, 3, 6, 18c&d Conditions C, D, & L) P-8 & P-10 must be verified in Correct Condition within 1 hour of channel failure.  Enters action statements that requires bistables to be tripped within 6 hours.

Op-Test No.: <u>  Spare  </u>		Scenario No.: <u>Cook07-03</u>	Event No.: <u>  3  </u>
Event Description: <b>Power Reduction / Reduce Turbine Load</b>			
Time	Position	Applicant's Actions or Behavior	
<b><u>Turbine Load Reduction per 02-OHP 4021.001.003, Power Reduction</u></b>			
	US	Directs RO to commence Power Reduction in accordance with 02-OHP 4021.001.003.	
	RO	Commences power reduction: <ul style="list-style-type: none"> <li>· Lowers turbine load (reactor power) using the load limiter.</li> <li>· Maintains Tave/Tref deviation within limits by boration 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>	
	RO/BOP	BOP acts as peer checker for RO during blender operations and RO verifies appropriate reactivity feedback.	
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> <li>· 02-OHP 4021.059.001, Generator Stator Cooling Water System</li> <li>· 02-OHP 4021.080.003, Generator Hydrogen Gas System</li> </ul>	

Op-Test No.: <u>_ Spare</u>			Scenario No.: <u>Cook07-03</u>			Event No.: <u>4</u>		
Event Description: <del>North CB pump trip; Middle CB pump fails to start in AUTO</del>								
Time	Position	Applicant's Actions or Behavior						
	BOP	<del>Recognizes feedwater control problem and reports annunciators: Panel #216 Drop 72 and 73 – CB pump trip and discharge press low</del>						
	US	<del>Directs operator actions to stabilize the unit and restore Condensate Booster pump capacity.</del>						
	RΘ	<del>Monitor RCS &amp; Secondary parameters for normal operations.</del>						
	BOP	Manually start the Middle CB pump May Place North CB pump switch to TRIP and back to NEUTRAL (Clear Alarms) Monitor Secondary parameters for normal operations						



Op-Test No.: \_ SpareScenario No.: Cook07-03Event No.: 5Event Description: **~~SG Pressure Channel MPP-240 Fails Low~~**

Time	Position	Applicant's Actions or Behavior
	BOP	<del>Recognizes and reports annunciators on Panel #214 which are indicative of a steam generator #24 water level control / pressure instrument failure (Drops 44, 42, 33).</del>
	BOP	<del>Places 2-FRV-240, SG 24 MFW Reg. Valve controller to manual; raises controller output to match feed flow with operable steam flow channel, and restores SG 24 level to program (may also place MFP—P controller in manual at this time).</del>
	US	<del>Enters and directs actions of 02-OHP 4022.013.012, Steam Generator Pressure Instrument Malfunction procedure.</del>
	BOP	<p><del>Performs the following actions as directed:</del></p> <ol style="list-style-type: none"> <li><del>1. Restores SG 24 level using manual control of 2-FRV-240</del></li> <li><del>2. Checks SG PORVs closed</del></li> <li><del>3. Places MFP—P controller in manual</del></li> <li><del>4. Reports 2-MPP-240 has failed</del></li> <li><del>5. Places 2-FS-542C selector switch in channel 2 position</del></li> <li><del>6. Declares steam flow channel 2-MFC-140 inoperable</del></li> <li><del>7. Nulls and returns 2-FRV-240 controller to auto</del></li> <li><del>8. Returns MFP—P controller to auto</del></li> </ol>
	US	<del>Initiates actions to trip bistables associated with 2-MPP-240 Steam Generator Pressure Instrument Failure per Attachment D-1 of 02-OHP 4022.013.012.</del>
	US	<p>Refers to ITS LCO:</p> <ul style="list-style-type: none"> <li>· 3.3.1 <u>RTS Instrumentation</u> (Table 3.3.1-1, Function 15 – Cond D)</li> <li>· 3.3.2 <u>ESFAS Instrumentation</u> (Table 3.3.2-1, Function 1e(2) &amp; 4d, 4e – Cond D)</li> <li>· 3.3.4 <u>Remote Shutdown Instrumentation</u> (Condition A) [02-OHP-4030-214-031 pg. 40]</li> </ul> <p><del>Enters action statement that requires bistables to be tripped within 6 hours.</del></p>

Op-Test No.: <u>_ Spare</u>		Scenario No.: <u>Cook07-03</u>	Event No.: <u>6/7/8</u>
Event Description: <b>Feed Line Break inside Containment (#24 SG) – CTS Actuation Failure</b>			
Time	Position	Applicant's Actions or Behavior	
	RO	Annunciator Panel 222 Drop 84 LIT – ICE COND DOORS OPEN  Recognizes and reports rising containment pressure.	
	US	Directs RO/BOP to perform the immediate actions of E-0, Reactor Trip or Safety Injection.	
	RO/BOP	Performs the immediate actions of E-0: 1. Checks reactor trip 2. Checks turbine trip 3. Checks power to AC emergency buses 4. Checks safety injection status	
	US	Ensures immediate actions of E-0 are completed	
	<b>US/BOP</b>  <b>Critical Task #1</b>	<b>Verify MSI requirement met:</b> Manually closes Main Steam Isolation (SG Stop) valves <b>MRV-240 (for Faulted SG #24)</b>  (Also closes Intact SG Isolation Valves – Not Critical) MRV-210 MRV-220 MRV-230	
	RO	Identifies and reports Phase B – Containment Isolation Actuation	
	US	Identifies that Containment Pressure is > 2.8 psig and directs actions to Stop RCPs and align containment systems as required per Step 6 RNO of E-0	

Op-Test No.: <u>  Spare  </u>			Scenario No.: <u>Cook07-03</u>			Event No.: <u>6/7/8</u>		
Event Description: <b>Feed Line Break inside Containment (#24 SG) – CTS Actuation Failure</b>								
Time	Position	Applicant's Actions or Behavior						
	<b>US/RO</b>  <b>Critical Task #2</b>	1. Manually aligns/starts CNTMT Spray Train A/B : <b>Opens 2W CTS Pump Discharge Valves:</b> 2-IMO-220 –AND/OR- 2-IMO-221 <b>Opens 2-IMO-204, Spray Additive Tank Outlet Valve</b> <b>Starts 2W Containment Spray Pump</b> -AND/OR- <b>Starts 2E Containment Spray Pump</b>						
	RO	Stops all Reactor Coolant Pumps						
	RO/BOP	Places lower Cntmt vent unit fans in OFF Places CRDM fans in STOP						
	RO/BOP	Performs manual actions of E-0 Attachment A as directed by US.						
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% - 50% once one SG narrow range level is greater than 13%.						
	CREW	Completes all actions of E-0 through step 17 (Check If SG Secondary Pressure Boundaries Are Intact).						
	US	Announces transition to 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.						
	BOP	Checks closed - SGSV Dump valves						
	US/BOP	Identifies #24 steam generator as faulted						

Op-Test No.: <u>  Spare  </u>			Scenario No.: <u>Cook07-03</u>			Event No.: <u>6/7/8</u>								
Event Description: <b>Feed Line Break inside Containment (#24 SG) – CTS Actuation Failure</b>														
Time	Position	Applicant's Actions or Behavior												
	<b>US/BOP</b>  <b>Critical Task #1</b>	<b>Manually closes the following valves for SG 24:</b> 2-FMO-241, TDAFP discharge <b>2-FMO-242, MDAFP discharge</b>  NOTE: The following should be checked closed (not part of Critical Task – Already Closed) 2-FRV-240, feedwater reg. Valve 2-FMO-204, feedwater isolation valve 2-MRV-240, SG Stop Valve 2-MRV-243, PORV 2-DCR-304, blowdown sample valve 2-DCR-340, blowdown isolation valve												
	BOP	Closes 2-DRV-407, SG stop valve drain valve												
	RO/BOP	Performs the following as directed: Resets containment isolation phase A Directs chemistry to sample all SGs for activity												
	CREW	Determines that ECCS flow should be reduced												
	US	Announces transition to ES-1.1 SI Termination (at step 8 of E-2).												
	US	Direct Actions to Reset SI and Terminate ECCS Flow per ES-1.1.												
	RO	Perform actions as directed to Reset SI and terminate ECCS Flow: 1. Reset SI 2. Stop 1 CCP (Charging Pump)												
	BOP	Perform actions as directed to Restore Control Air to Containment 1. Reset Containment Isolation Phase A and Phase B 2. Verify Spray Valve Controllers in Manual at Zero Demand. 3. Check Air Pressure 4. Open Control Air Containment Isolation Valves												

Op-Test No.:   Spare  Scenario No.: Cook07-03Event No.: 6/7/8Event Description: **Feed Line Break inside Containment (#24 SG) – CTS Actuation Failure**

Time	Position	Applicant's Actions or Behavior
	US	Check if Normal Charging can be restored Verify RCS Press Stable or Rising (if Lowering, transition to ES-1.2)
	RO	Perform actions as directed to Establish Charging Flow: 1. Reset and open CCP Leakoff Valves 2. Close BIT Inlet and Outlet Valves 3. Establish Charging and Seal Injection Flow with QRV-251 and QRV-200 4. Control Charging Flow to Stabilize Pressurizer Level
	US	Check if Safety Injection Pumps can be secured Pressure > 1650 psig Verify RCS Press Stable or Rising (if Lowering, transition to ES-1.2)

**TERMINATE SCENARIO**

**CRITICAL TASK SUMMARY  
(COOK07-03)**

Task	Elements	Results
<p style="text-align: center;"><b>#1</b></p> <p style="text-align: center;"><b>Isolate Faulted Steam Generator</b></p>	<p><b><u>Cueing:</u></b></p> <ul style="list-style-type: none"> <li>· E-2, steps 1, 2 and 5</li> <li>· <b>Steam generator pressure lowering</b></li> <li>· <b>RCS temperature lowering</b></li> </ul> <p><b><u>Performance Indicators:</u></b></p> <p>Isolate SG 24 by closing:</p> <ul style="list-style-type: none"> <li>· <b>AFW valves</b></li> <li>· <b>SG Stop valve</b></li> </ul> <p><b>SG 24 must be isolated before transitioning out of E-2</b></p> <p><b><u>Performance Feedback:</u></b></p> <ul style="list-style-type: none"> <li>· RCS cooldown stops</li> <li>· <b>Depressurization of intact SGs stop</b></li> <li>· <b>Feedwater flow to affected SG stops</b></li> </ul>	<p><b>SAT / UNSAT</b></p>
<p style="text-align: center;"><b>#2</b></p> <p style="text-align: center;"><b>Actuate Containment Spray</b></p>	<p><b><u>Cueing:</u></b></p> <p><b>Containment pressure &gt; 2.9 psig:</b></p> <p>CNTMT SPRAY ACTUATED alarm</p> <p><b>LOWER CNTMT PRESS HI-HI alarm</b></p> <p><b>E-0, step 5, Check CTS not required</b></p> <p><b><u>Performance Indicators:</u></b></p> <p>Manually align Train B CTS or manually start Train A CTS.</p> <p><b>One train of CTS must be in service prior to exceeding a Red Path on the Containment (Z) CSFST (containment pressure of 12 psig).</b></p> <p><b><u>Performance Feedback:</u></b></p> <p>Flow is indicated on at least one train of Containment Spray</p>	<p><b>SAT / UNSAT</b></p>

## SIMULATOR INSTRUCTIONS (COOK07-03)

### Setup:

1. Reset to IC 978 (IC 36)
2. Reset control rods and check group step counters
3. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
4. Advance chart recorder paper & clear chart recorder memory.
5. Update PPC Chart Recorders VCT 20-70, PWR 70-80%, Tave/Tref 560-570 F
6. Start Data Collection Program Save to file \_\_\_\_\_
7. Verify the following (pre-load) malfunctions:
  - **RP07A**, Train A Steamline Isolation fails to AUTO actuate
  - **RP07B**, Train B Steamline Isolation fails to AUTO actuate
  - **RP16B**, Train B Containment Spray fails to AUTO actuate
  - **RP17B**, Train B Containment Spray MANUAL Actuation Failure
  - **RP19J**, Train A RPS Relay K626-X3 Fails
  - **FW58B**, Middle CB pump fails to start in AUTO
5. Verify the following is assigned to Trigger 13:
  - Assign Trigger file **ContPressHihi** (chp300>3.0)
  - Link Command "**mmf fw01d 3 10:00**"

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## SIMULATOR INSTRUCTIONS (COOK07-03)

### **Scenario Events:**

#### **Event #1**

Trigger (1) malfunction **ED07A** (PZR heater transformer fails).

#### **Event #2**

Trigger (3) **IMF NI10B**, final value **200** (Power Range NI42 fails HIGH) as the RO is monitoring pressure.

#### **Event #4**

Trigger (5) **IMF FW34A** (North CB pump trip) when crew has recovered from the Power Range channel failure.

#### **Event #5**

Trigger (7) malfunction **RX17J**, final value **0** over 10 seconds (MPP-240 fails lo) when the crew has recovered from CB pump failure.

#### **Event #6**

Trigger (9) **IMF FW01D**, final value **20** (#24 SG Feedline Break) after 2 mins:  
(continued on next page)



**SIMULATOR INSTRUCTIONS**  
**(COOK07-03)**

**Response to Crew's Requests:**

1. If directed, to trip bistables for **NI-42** use:

**IOV ZLOSTMC2[7] to ON** to simulate opening cabinet Door  
(Override Lights/Relays – RX Flux panel)

Remote	Bistable
<b>RPR123</b>	TS/421C
<b>RPR124</b>	TS/421D

**IOV ZLOSTMC2[2] to ON** to simulate lifting Test Rack

**DOV ZLOSTMC2[7]** to simulate closing cabinet Door

Modify remote Function **NIR09** to **Tripped** to simulate removing power/plug p312

2. If contacted as AEO to investigate Condensate Booster pump operations, report back after some 3 min. delay that all parameters are in the normal band and stable. Report OL trip on North CB pump breaker.

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**SIMULATOR INSTRUCTIONS**  
**(COOK07-03)**

(continued)

**Response to Crew's Requests:**

3. If directed to trip bistables for MPP-240 use:

**Override ZLOSTMC2[6] to ON to simulate opening CH 1 cabinet Door**

**(Override Lights/Relays – RX Flux panel)**

Remote	Bistable
<b>RPR105</b>	PS-534B
<b>RPR104</b>	PS-534A
<b>RPR035</b>	FS-540A
<b>RPR036</b>	FS-540B
<b>RPR039</b>	<b>FS-542B</b>

**Override ZLOSTMC2[1] to ON to simulate lifting Test Rack**

**Delete Override ZLOSTMC2[6] to simulate closing cabinet Door**

4. Local actions after entry into E-0:  
Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF  
Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.  
U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.
7. If directed to secure EDG jacket water pumps then modify remote functions as follows:  
**MRF EGR 03A & B, select OFF then AUTO**  
**MRF EGR 04 A & B, select OFF then AUTO**