

INITIAL SUBMITTAL OF THE SCENARIOS

FOR THE D. C. COOK EXAMINATION - NOV/DEC 2002

Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK02-02Op-Test No.: Set 1Examiners: _____

_____Operators: _____

Initial Conditions: IC 36, 81% power Xenon Equilibrium, Tave 567°F, 790ppm Boron, 8GWD

Turnover: 2CD DG is tagged out for governor replacement. NRV-152 PZR PORV is isolated for leakage.

Event No.	Malf. No.	Event Type*	Event Description
0	RCR19 to 10		PORV NRV-152 leaks 10 gpm
1	CV16A 100%	I-RO	QLC-451 VCT Level Transmitter fails high
2	RX17J to 0%	I-BOP	SG Pressure Channel MPP-240 Fails Low
3a	FW38 to 45%	C-BOP	Loss of condenser vacuum Ramp in over 15 minutes to 45%
4		R	Power reduction
5		N	Reduce Turbine Load
3b	FW38 to 100%		Condenser vacuum degrades requiring a Reactor Trip. Ramp in over 5 minutes to 100%
6	ED01 ED25	Major	Loss of all AC power (345kv & 765kv lines) causing entry into ECA-0.0
6a	EG08A - Preload		2 AB DG Speed Governor failure; DG will not reach rated speed resulting in Incomplete Sequence.
7	FW48C - Preload	C-BOP	Turbine Driven AFW pump Fails to Auto Start
8	RC17A to 50%	C-RO	Pressurizer PORV (NRV-151 will stick open @ 50% upon reactor trip.)

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

Summary

VCT Level Control channel QLC-451 will fail high causing a failure of auto makeup and the divert valve to fully divert to the HUT. The RO will need to reposition The divert valve and manually maintain VCT level. The crew will address the failure with an Abnormal Operating Procedure and trip associated bistables.

When the VCT is stabilized, 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, trip associated bistables, select an operable channel, and restore automatic control.

After SG level is restored a loss of Condenser Vacuum will occur. The crew will take actions to stabilize vacuum but will need to reduce power due to loss Feedwater Pump capacity.

After power has been reduced, the vacuum leak will worsen, requiring a reactor trip.

Upon the reactor trip a loss of all AC power will occur. The crew will enter ECA-0.0, Loss of All AC Power and take action to stabilize the plant. The BOP will need to manually start the TD AFW pump. A failed open (50%) Pressurizer PORV (NRV-151) will result in a Safety Injection Actuation.

The crew should proceed through ECA-0.0. and take actions to restore power. Power will be made available via Emergency Power (Supplement 9). The crew will energize the vital buses, isolate the stuck PORV, and transition ECA-0.2, Loss of All AC Power Recovery with SI. The scenario ends after a CCP has been started or seal injection has been isolated.

Critical Tasks	Establish AFW (Start TDAFWP) Isolate Pressurizer PORV Restore Emergency Power
Procedures	E-0 Reactor Trip or Safety Injection ECA-0.0 Loss of All AC Power ECA-0.2 Loss of All AC Power Recovery with SI

Op-Test No.: Set 1 Scenario No.: Cook 02-02 Event No.: 1 Page 1 of 9

Event Description: **QLC-451, VCT Level Transmitter Fails High**

Time	Position	Applicant's Actions or Behavior
	RO	Acknowledges and reports annunciator Panel #209, Drop 47, VCT LEVEL HI DIVERT TO HOLDUP TANKS.
	US	Enters and directs actions of 02-OHP 4022.013.017, VCT Instrument Malfunction procedure.
	RO	Performs the following as directed: <ol style="list-style-type: none"> 1. Places 2-QRV-303, VCT/Holdup tank inlet selector in the VCT position 2. Identifies 2-QLC-451 failure 3. Maintains VCT level >15% using boric acid blender in manual
	US	Initiates actions to energize interposing relay associated with 2-QLC-451 failure per Attachment A of 02-OHP 4022.013.017.
	US	Refers to Tech Specs 3.1.2.2.b. <u>Boration Systems Flow Paths – Operating</u> (Action b). Identifies requirement to restore RWST flowpath (energize interposing relay) within 1 hour of 2-QLC-451 failure.

Op-Test No.: Set 1 Scenario No.: Cook 02-02 Event No.: 2 Page 2 of 9

Event Description: **SG Pressure Channel MPP-240 Fails Low**

Time	Position	Applicant's Actions or Behavior
	BOP	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).
	BOP	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 Δ P controller in manual at this time).
	US	Enters and directs actions of 02-OHP 4022.013.012, Steam Generator Pressure Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> 1. Restores SG 24 level using manual control of 2-FRV-240 2. Checks SG PORVs closed 3. Places MFP ΔP controller in manual 4. Reports 2-MPP-240 has failed 5. Places 2-FS-542C selector switch in channel 2 position 6. Declares steam flow channel 2-MFC-140 inoperable 7. Nulls and returns 2-FRV-240 controller to auto 8. Returns MFP ΔP controller to auto
	US	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.
	US	Refers to the following Tech Specs (TS): <ul style="list-style-type: none"> · TS 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, *Action 7) · TS 3.3.2.1 <u>ESFAS Instrumentation</u> (Table 3.3-3, *Action 14) *Identifies requirement to trip associated bistables within 1 hour of steam pressure channel failure.

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Event Description: **Loss of Condenser Vacuum
Condenser Vacuum Degrades Requiring A Reactor Trip**

Time	Position	Applicant's Actions or Behavior
	BOP	Acknowledges and reports annunciators on Panel #218, Drops 12/13/14, CONDENSER A/B/C VACUUM LOW
	US	Directs actions per 02-OHP 4024.218 Drops 12/13/14.
	BOP	Places the start-up steam jet air ejectors (SJAEs) in service: <ol style="list-style-type: none"> 1. Opens 2-SMO-401, steam to the start-up SJAEs 2. Opens start-up SJAE air off-takes: <ul style="list-style-type: none"> · 2-SMO-405 · 2-SMO-406 · 2-SMO-407
	US	Directs actions to reduce turbine load by using <u>either</u> : (see NOTE) <ul style="list-style-type: none"> · 02-OHP 4021.001.003, Power Reduction · 02-OHP 4022.001.006, Rapid Power Reduction Response
<p>NOTE: See either page 4 or 5 of 9 for actions associated with power / turbine load reduction</p>		
	BOP	Dispatches operator to check the alignment of: <ul style="list-style-type: none"> · Steam Seals · Air Ejectors · Circulating Water · Vacuum Breakers (including seal water flow) · Condenser Water Boxes (vented)
	RO/BOP	Monitors secondary plant parameters including: <ul style="list-style-type: none"> · Main condenser vacuum · Main turbine load (MWe) · Main feedpumps condenser vacuum · Main feedwater pump flow capability
	CREW	Manually trips the reactor when condenser vacuum approaches 21" Hg.

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Event Description: **Power Reduction / Reduce Turbine Load**

Time	Position	Applicant's Actions or Behavior
Turbine Load Reduction per 02-OHP 4021.001.003, Power Reduction		
	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"> • Lowers turbine load (reactor power) using the load limiter. • Maintains Tave/Tref deviation within limits by boration and turbine load adjustments. • Ensures Axial Flux Difference (AFD) is maintained within target band by manual control rod movement as needed.
	US	Acts as reactivity manager by peer checking RO during blender operations and by verifying appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> • 02-OHP 4021.059.001, Generator Stator Cooling Water System • 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: <u>Set 1</u> Scenario No.: <u>Cook 02-02</u> Event No.: <u>4/5</u> Page <u>5</u> of <u>9</u>		
Event Description: Power Reduction / Reduce Turbine Load		
Time	Position	Applicant's Actions or Behavior
Turbine Load Reduction per 02-OHP 4022.001.006, Rapid Power Reduction Response		
	US	Directs RO to commence Rapid Power Reduction in accordance with 02-OHP 4022.001.006.
	RO	Commences power reduction: <ul style="list-style-type: none"> · Ensures control rods in auto or manually inserts rods. · Lowers turbine load (reactor power) using the load limiter or operating device.
	US	Acts as reactivity manager by peer checking RO and verifying appropriate reactivity feedback.

Op-Test No.: <u>Set 1</u> Scenario No.: <u>Cook 02-02</u> Event No.: <u>6/7/8</u> Page <u>6</u> of <u>9</u>		
Event Description: Loss of All AC Power / 2AB Emergency Diesel Generator Failure Turbine Driven AFW Pump Fails to Auto Start Pressurizer PORV (NRV-151) Sticks Open		
Time	Position	Applicant's Actions or Behavior
	US	Directs RO/BOP to perform the immediate actions of E-0, Reactor Trip or Safety Injection.
	RO	Performs the (primary) immediate actions of E-0: 1. Checks reactor trip 2. Checks safety injection status
	RO	Performs the (secondary) immediate actions of E-0: 1. Checks turbine trip 2. Checks power to AC emergency buses: · Reports that all AC emergency buses are de-energized
	US	Announces transition to ECA-0.0, Loss Of All AC Power and directs RO/BOP to perform immediate actions for ECA-0.0.
	RO/BOP	Performs the immediate actions of ECA-0.0: · Checks reactor trip / turbine trip
	US	Ensures immediate actions are completed and directs subsequent actions of ECA-0.0.
	RO	Checks RCS isolated: 1. Checks PRZ PORVs closed: · Attempts to manually close 2-NRV-151 (stuck open) 2. Checks letdown isolation valves closed · 2-QRV-111 · 2-QRV-112 3. Checks excess letdown isolation valves closed · 2-QRV-113 · 2-QRV-114 4. Places nuclear sampling isolate switches to ISOLATE: · Train A · Train B

Time	Position	Applicant's Actions or Behavior
Op-Test No.: <u>Set 1</u> Scenario No.: <u>Cook 02-02</u> Event No.: <u>6/7/8</u> Page <u>7</u> of <u>9</u>		
Event Description: Loss of All AC Power / 2AB Emergency Diesel Generator Failure Turbine Driven AFW Pump Fails to Auto Start Pressurizer PORV (NRV-151) Sticks Open		
	BOP Critical Task #1	Checks AFW flow > 240,000 PPH: · Manually starts the Turbine Driven AFW Pump
	US	Recognizes that both EDGs are not running and dispatches an operator to locally close 2-QCM-350, RCP seal water return outside containment.
	RO/BOP	Resets SI
	RO/BOP	Places the following equipment in pull to lock: · MDAFPs · CCPs · RHR pumps · SI pumps · CTS pumps · CCW pumps · NESW pumps
	US	Dispatches an operator to locally establish vital cabinet cooling using Attachment C of ECA-0.0.
	US	Identifies the status of the following off-site power sources: · Reserve power – UNAVAILABLE · Emergency power (EP) – AVAILABLE
	US	Directs Restoration of 4KV Power From EP using SUP.009 attachments to energize <u>either</u> pump bus first: · Attachment A - to energize Bus T21A from EP · Attachment D - to energize Bus T21D from EP NOTE: Bus T21A is preferred (MCC EZC-A) provides power to the stuck open PRZ PORV's block valve (2-NMO-151).

Op-Test No.: Set 1 Scenario No.: Cook 02-02 Event No.: 6/7/8 Page 8 of 9

Event Description: **Loss of All AC Power / 2AB Emergency Diesel Generator Failure
Turbine Driven AFW Pump Fails to Auto Start
Pressurizer PORV (NRV-151) Sticks Open**

Time	Position	Applicant's Actions or Behavior
	BOP Critical Task #2	Energizes T21A (T21D) emergency bus from EP as directed: <ol style="list-style-type: none"> 1. Checks T21A (T21D) bus – <u>not</u> faulted 2. Places DG2AB(CD) supply to bus T21A(D) in pull to lock 3. Verifies breakers open with green targets: <ul style="list-style-type: none"> · Bus 2A(D) supply to bus T21A(D) · 4KV supply to TR21PHA(PHC) 4. Places the west (east) ESW pump in pull to lock 5. Closes 4KV EP supply to bus T21A(D) 6. Ensures EP supply current to Unit 2 remains < 600 AMPS
	US	Directs BOP to energize the remaining emergency buses from EP (using SUP.009) while US and RO continue recovery actions of ECA-0.0.
	CREW Critical Task #3	Closes 2-NMO-151, PORV Block Valve when power is available (to stop LOCA to PRT)
	BOP	Energizes the remaining emergency buses from EP: <ul style="list-style-type: none"> · T21A(D) · T21B · T21C
	RO	Performs the following recovery actions of ECA-0.0 as directed: <ol style="list-style-type: none"> 1. Controls SG PORVs to stabilize SG pressures 2. Checks the following equipment energized: <ul style="list-style-type: none"> · 600V bus(es) associated with energized emergency bus · Control room AHU · Battery charger · CRID inverters 3. Starts available ESW pump (unless header supplied from U-1)

Op-Test No.: Set 1 Scenario No.: Cook 02-02 Event No.: 6/7/8 Page 9 of 9

Event Description: **Loss of All AC Power / 2AB Emergency Diesel Generator Failure
Turbine Driven AFW Pump Fails to Auto Start
Pressurizer PORV (NRV-151) Sticks Open**

Time	Position	Applicant's Actions or Behavior
	US	Announces transition to ECA-0.2 , Loss Of All AC Power Recovery With SI Required.
	RO/BOP	Performs the following actions of ECA-0.2 as directed: <ol style="list-style-type: none"> 1. Checks SI reset 2. Checks emergency valve alignment: <ul style="list-style-type: none"> · ESW · CCW · ECCS 3. Closes <u>either</u> RCP thermal barrier isolation valve: <ul style="list-style-type: none"> · 2-CCM-453 (Train A) · 2-CCM-454 (Train B) 4. Establishes CCW: <ul style="list-style-type: none"> · Checks CCW Hx outlet valves closed · Starts CCW pump · Checks CCW Hx outlet valve for running pump open 5. Starts RHR pump 6. Starts SI pump 7. Dispatches operator to locally close RCP seal injection filter isolation valves outside containment. 8. Starts CCP
TERMINATE SCENARIO		

**CRITICAL TASK SUMMARY
(S02-02)**

Task	Elements	Results
<p align="center">#1</p> <p align="center">Manually Starts Turbine Driven AFW Pump</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> • Check AFW Flow...Verify TDAFP Running (ECA-0.0, Step 4, RNO) <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Manually starts the TDAFP from the control room. • AFW flow must be established before SG dryout occurs (<15% WR level). <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> • TDAFP speed rising • AFW flow > 240E3 PPH 	<p align="center">SAT / UNSAT</p>
<p align="center">#2</p> <p align="center">Restore Emergency Power</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> • Restore AC Power (ECA-0.0, Step 9.a, RNO a.2) <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Restores emergency power (EP) to at least one 4KV emergency (pump) bus (i.e., T21A or T21D). • Power should be restored prior to depressurizing intact SGs to 190 psig (ECA-0.0, Step 19). <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> • T21A or T21D bus energized • Power available to safeguards equipment. 	<p align="center">SAT / UNSAT</p>

**CRITICAL TASK SUMMARY (Cont.)
(S02-02)**

Task	Elements	Results
<p align="center">#3 Isolate PRZ PORV</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> • Check If RCS Is Isolated, PRZ PORVs – Closed (ECA-0.0, Step 3.a) <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Closes 2-NMO-151, PORV Block Valve when power is available. • PORV must be isolated prior to transitioning to E-1 (from ECA-0.2). <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> • RCS pressure stabilizes • PORV block valve indicates closed 	<p align="center">SAT / UNSAT</p>

SIMULATOR INSTRUCTIONS
(S02-02)

Setup:

1. Reset to 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
5. Tagout CD EDG as follows:
 - imf EG10B (start failure)
 - mrf EGR14 (RO)
 - mrf EGR15 (RO)
 - mrf EGR02 (RO)
 - imf EG06B
 - ior AN: AP01[64] CRYWOLF
 - Place clearance tags on control switches
6. Close NMO-152 and caution tag control switch
7. Go to **RUN** and acknowledge/clear alarms
8. Activate the following pre-load malfunctions:
 - **RCR19**, final value **10** (NRV-152 leaks 10 gpm)
 - **EG08A** (AB EDG failure)
 - **FW48C** (TDAFP fails to auto start)

(Continued on next page)

SIMULATOR INSTRUCTIONS
(S02-02)

Scenario:

1. Trigger malfunction **CV16A**, final value **100** (QLC-451 fails hi) shortly after the crew accepts the watch.
2. Trigger malfunction **RX17J**, final value **0** (MPP-240 fails lo) when the crew has recovered from VCT level instrument failure.
3. Trigger malfunction **FW38**, final value **45**, ramp **15:00** (loss of condenser vacuum to 45% over 15 min.) when MTI is called to trip bistables for MPP-240..
4. Modify malfunction **FW38**, final value **100**, ramp **5:00** (loss of condenser vacuum to 100% over 5 min.) when crew has demonstrated ability to reduce power.
5. Trigger malfunctions upon reactor trip:
 - **ED01** (loss of offsite 345KV lines)
 - **ED25** (loss of offsite 765KV lines)
 - **RC17A**, final value **50** (NRV-151 sticks 50% open)

(Continued on next page)

**SIMULATOR INSTRUCTIONS
(S02-02)**

Response to Crew's Requests:

1. If directed to energize interposing relay for QLC-451 then activate remote function **CVR72**
2. If directed to trip bistables for MPP-240 use:

Remote	Bistable
RPR105	PS-534B
RPR104	PS-534A
RPR035	FS-540A
RPR036	FS-540B

3. If directed to locally close 2-QCM-350 then
"SET CVVQCM350 0"
4. If directed to locally close 2-CCM-453 then
"SET CCVCCM453 0"
5. If directed to locally close seal injection valves (2-CS-311N, 311S and 307) then activate remote functions:
 - **CVR20** final value **CLOSE**
 - **CVR21** final value **CLOSE**

Facility: Cook Plant Unit 1 & Unit 2 Scenario No.: COOK02-03 Op-Test No.: Set 1

Examiners: _____ Operators: _____

Initial Conditions: IC 35, 49% power, 3GWD burnup, Xenon Building, 558°F, 1572 ppm Boron
 2E MDAFW OOS

Turnover: The 2W TDFP has just been returned following work on its condenser. Increase
 Power to 80% for next hold point.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Raise Turbine Power
2		R	Raise Reactor Power
3	CC01A, CC02B - Preload	C-BOP	2E CCW pump Trips (2W CCW [Standby] Fails to Auto Start)
4	RX02B to 650°F	I-RO	Loop 2 Hot Leg NTP-121 Temperature Transmitter Fails High
5	RX20A to 100%	I-BOP	MFC-110 Main Steam Flow Transmitter Fails High on 21 SG
6	CV13A	C-RO	2E Charging Pump Trip
7	RC10D to 60%	Major	Loop 4 Cold Leg Primary Coolant System 600gpm Leak inside Containment over 5 minutes
8	RP13A, RP13B - Preload	C- BOP	Failure of Automatic Phase A Actuation
9	RP19G, RP20G - Preload	C-RO	Slave Relay failures: High Head Charging SI valves fail to align
10	RP20B - Preload	C- BOP	Slave Relay failure: DG 2AB fails to auto start (& High Head Charging Valve)

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

Summary

Plant is at 50% power on way back to 100% after a short outage on the 2W TDFP Condenser. After a short ramp, the Component Cooling Water (CCW) pump will trip. The BOP will have to start the standby pump manually (auto start failure).

After the Crew has addressed the Tech Specs for CCW, the Loop 2 Hot Leg NTP-121 Temperature Transmitter fails high. The rods will be in manual but the Pressurizer Level control will be affected. The crew will need to enter an Abnormal Operating Procedure, defeat the failed channel, trip bistables, and restore Pressurizer Level control to auto.

When the RCS Temperature channel has been defeated, MFC-110, the #22 S/G Main Steam Flow transmitter will fail high. The BOP will need to take manual control of the Feedwater Regulating Valve FRV-220 and restore level. This failure will also increase FW pump speed (apparent steam flow increase tries to maintain a higher DP). The crew will need to enter an Abnormal Operating Procedure, trip bistables, and transfer to operable channel, and return to the FRV-220 to auto.

When the SG level has stabilized, the East CCP will trip, requiring the RO start the West CCP. After Charging has restored a 600 gpm Primary System Leak in Containment will occur requiring a Reactor Trip and SI.

On the SI, various slave relay failures will cause the High Head Charging SI injection flowpath to fail to align and the 2AB DG to fail to auto start. The RO will need to manually align the High Head Injection Valves and the BOP will need to manually start the 2AB DG. The auto Phase A Isolation will also fail requiring manual actuation to align Phase A equipment. The crew should progress through E-0 to E-1 to ES-1.2. The scenario will terminate once a cooldown is started per ES-1.2.

RP20B - Failure of the K609 coil prevents

1. Emergency diesel generator 2AB auto start
2. SI blackout interlock
3. K609-X1 prevents QMO-226 from auto close, and prevents IMO-256 from auto open.
4. K609-X2 prevents IMO-140 from auto open and prevents NESW pump 2S from starting.

RP19G/RP20G - Failure of the K608-X1 coil prevents

1. ICM-250/ICM-251 will not automatically open
2. IMO-110/IMO-120 will not automatically open

Critical Tasks

Restore High Head Injection
Trip RCPs

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.: Set 1 Scenario No.: Cook 02-03 Event No.: 1/2 Page 1 of 9

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

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	Commences power escalation: <ul style="list-style-type: none"> · Raises turbine load (reactor power) using the load limiter. · Maintains Tave/Tref deviation within limits by dilution and turbine load adjustments. · Ensures Axial Flux Difference (AFD) is maintained within target band by manual control rod movement as needed.
	US	Acts as reactivity manager by peer checking RO during blender operations and by verifying appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 3 Page 2 of 9

Event Description: **2E CCW Pump Trips (Standby CCW Pump 2W Fails to Auto Start)**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports CCW annunciators on Panel #204 indicative of CCW pump trip (Drops 84, 93).
	BOP	Recognizes and reports that running (2E) CCW pump has tripped and standby (2W) CCW pump failed to auto start.
	BOP	Manually starts 2W CCW pump in accordance with CCW ARPs.
	US	Enters and directs actions of 02-OHP4-22.016.001, CCW Malfunction procedure.
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> 1. Ensures at least one CCW pump is running 2. Checks CCW surge tank level stable 3. Checks CCW flow to RCPs normal 4. Checks CCW Hx outlet temperature normal
	SRO	Declares 2E CCW Pump inoperable and refers to Tech Spec 3.7.3.1, <u>Component Cooling Water System</u> . Enters action statement to restore 2E CCW pump to operable status within 72 hours (or be in HSB w/i next 6 hrs and CSD w/i following 30 hrs).

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 4 Page 3 of 9Event Description: **Loop 2 RCS Hot Leg Temperature Transmitter (NTP-121) Fails High**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #211 which are indicative of a RCS RTD failure.
	US	Enters and directs actions of 02-OHP 4022.013.007, RCS RTD Instrument Malfunction procedure.
	RO	<ol style="list-style-type: none"> 1. Ensures control rods are in manual. 2. Checks and reports the following conditions: <ul style="list-style-type: none"> • Reactor critical • Tavg > 551°F • Tavg-Tref deviation alarm reset 3. Reports Loop 2 as failed RCS temperature channel and aligns the following switches: <ul style="list-style-type: none"> • Tavg defeat switch to Loop 2 position • ΔT defeat switch to Loop 2 position • ΔT/OPΔT/OTΔT recorder switch to Loop 1, 3, or 4
	US	Initiates actions to trip bistables associated with RCS loop 2 RTD failure per Attachment B of 02-OHP 4022.013.007.
	US	Refers to Tech Specs 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, Action 6) and 3.3.2.1 <u>ESFAS Instrumentation</u> (Table 3.3-3, Action 14). Identifies requirement to trip associated bistables within 1 hour of Loop 2 RCS RTD failure.

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 5 Page 4 of 9

Event Description: **SG #21 Main Steam Flow Transmitter (MFC-110) Fails High**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #213 which are indicative of a steam flow instrument failure (Drop 11, 13).
	BOP	Places 2-FRV-210, SG 21 MFW Reg. Valve controller to manual, lowers controller output to match feed flow with operable steam flow channel, and restores SG 21 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"> 1. Restores SG 21 level using manual control of 2-FRV-210 2. Places MFP ΔP controller in manual and maintains pressure 3. Reports 2-MFC-110 has failed 4. Places 2-FS-512C selector switch in channel 2 position 5. Nulls and returns 2-FRV-210 controller to auto 6. Returns MFP ΔP controller to auto
	US	Initiates actions to trip bistables associated with 2-MFC-110 Steam Flow Failure per Attachment A-1 of 02-OHP 4022.013.014.
	US	Refers to Tech Specs 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, Action 7) and 3.3.2.1 <u>ESFAS Instrumentation</u> (Table 3.3-3, Action 14). Identifies requirement to trip associated bistables within 1 hour of steam flow channel failure.

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 6 Page 5 of 9

Event Description: 2E Centrifugal Charging Pump (CCP) Trip

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #207, #208 and #209 which are indicative of a charging pump failure.
	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"> • 02-OHP 4024.208 Drop 20, Charging Flow < Min Set Point • 02-OHP 4024.209 Drop 12, E CCP Motor Overload Trip
	RO	Performs the following as directed: <ul style="list-style-type: none"> • Starts 2W CCP • Adjusts charging and seal injection flow as necessary • Starts to place normal letdown back in service in accordance with 02-OHP 4021.003.001, Attachment 13.
	US	Declares 2E CCP inoperable and refers to Tech Specs (TS): <ul style="list-style-type: none"> • TS 3.1.2.4, <u>Charging Pumps – Operating</u> • TS 3.5.2, <u>ECCS Subsystems – Tavg > 350°F</u> Enters action statements to restore 2E CCP to operable status within 72 hours.

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 7/8/9/10 Page 6 of 9

Event Description: **Small Break LOCA inside Containment
Containment Isolation Phase A – Auto Failure
ECCS Slave Relay Failures
2AB EDG Slave Relay Failure**

Time	Position	Applicant's Actions or Behavior
	RO/US	Determines that a loss of reactor coolant is occurring based on the following: <ul style="list-style-type: none"> · Pressurizer and VCT level change · Charging and letdown flow mismatch · Containment radiation monitoring trend · Containment pressure rise · Containment sump level rise
	US	Enters and directs actions of 02-OHP 4022.002.020, Excessive Reactor Coolant Leakage procedure.
	RO	Performs the following actions as directed: <ol style="list-style-type: none"> 1. Manually raises charging flow to maintain pressurizer level 2. Manually adjusts seal injection flow (6–12 gpm / each RCP) 3. Reduces/isolates letdown flow to maintain pressurizer level 4. Attempts to determine RCS leak rate
	US	Directs RO/BOP to manually trip the reactor and initiate safety injection and perform the immediate actions of E-0, Reactor Trip or Safety Injection (based on RCS leak rate beyond charging system capability per 02-OHP 4022.002.020).
	RO/BOP	Performs the immediate actions of E-0: <ol style="list-style-type: none"> 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

Op-Test No.: <u>Set 1</u> Scenario No.: <u>Cook 02-03</u> Event No.: <u>7/8/9/10</u> Page <u>7</u> of <u>9</u>		
Event Description: Small Break LOCA inside Containment Containment Isolation Phase A – Auto Failure ECCS Slave Relay Failures 2AB EDG Slave Relay Failure		
Time	Position	Applicant's Actions or Behavior
	US	Directs subsequent actions of E-0.
	RO/BOP	Reviews E-0 Foldout Page Criteria.
	BOP	Manually starts 2AB Emergency Diesel Generator.
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% - 50% once one SG narrow range level is > 13%.
	RO	Reports that <u>not</u> all ECCS pumps are running – 2E CCP off due to previous failure.
	RO	Reports that <u>both</u> CCW pumps are <u>not</u> running – 2E CCW pump off due to previous failure.
	US/RO Critical Task #1	Manually opens high head safety injection valves: <ul style="list-style-type: none"> · 2-IMO-256, BIT Inlet · 2-ICM-250, BIT Outlet · 2-ICM-251, BIT Outlet
	US/RO	Manually actuates Containment Isolation - Phase A.
	CREW Critical Task #2	Manually stops all Reactor Coolant Pumps (RCPs) when RCS pressure is less than 1300 psig.

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 7/8/9/10 Page 8 of 9

Event Description: **Small Break LOCA inside Containment
Containment Isolation Phase A – Auto Failure
ECCS Slave Relay Failures
2AB EDG Slave Relay Failure**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Performs manual actions of E-0 Attachment A (for Train A components which failed to start/reposition) as directed by US.
	CREW	Completes all actions of E-0 through step 23 (Check If RCS Is Intact).
	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.
	US	Directs actions of E-1, Loss Of Reactor Or Secondary Coolant.
	BOP	Maintains SG narrow range levels 26% - 50%.
	RO/BOP	Performs the following as directed: <ol style="list-style-type: none"> 1. Resets both trains of Safety Injection 2. Stops RHR pumps if RCS pressure is stable or rising 3. Stops running Emergency Diesel Generators (EDG) 4. Dispatches operator to secure EDG jacket water pumps 5. Opens control air valves to containment 6. Directs chemistry to initiate post accident sampling
	US	Announces transition to ES-1.2, Post LOCA Cooldown And Depressurization (at step 12 of E-1).

Op-Test No.: Set 1 Scenario No.: Cook 02-03 Event No.: 7/8/9/10 Page 9 of 9

Event Description: **Small Break LOCA inside Containment**
Containment Isolation Phase A – Auto Failure
ECCS Slave Relay Failures
2AB EDG Slave Relay Failure

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Reviews ES-1.2 Foldout Page Criteria.
	RO	Trips all pressurizer heaters
	CREW	Initiate RCS cooldown to cold shutdown.
TERMINATE SCENARIO		

**CRITICAL TASK SUMMARY
(S02-03)**

Task	Elements	Results
<p align="center">#1</p> <p>Manually open high head safety injection valves</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> · Check ECCS Flow: BIT - Flow Indicated (E-0, Step 12.a) <p align="center">-OR-</p> <ul style="list-style-type: none"> · Check Systems In Proper Emergency Alignment: ECCS Monitor lights – Proper Status (E-0, Step 15.c) <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> · Manually open BIT (outlet/inlet) valves to establish at least one train of high head safety injection flow. · Must be performed while in E-0 before transitioning to E-1. <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> · BIT flow is indicated to at least one train (as indicated by flow on two cold leg BIT injection flowmeters) 	<p align="center">SAT / UNSAT</p>
<p align="center">#2</p> <p>Manually trip all Reactor Coolant Pumps</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> • RCS pressure – less than 1300 psig AND CCPs or SI pumps – at least one running <ul style="list-style-type: none"> · E-0, Foldout Page, Step 1 · E-0, Step 19 · E-1, Foldout Page, Step 1 · E-1, Step 1 <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> · Manually stop all Reactor Coolant Pumps (RCPs) when RCS pressure is less than 1300 psig. · RCPs must be tripped within 5 minutes of the trip criteria being met. <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> · RCP ammeters – zero current · RCP trip low flow alarms – lit · RCS loop flow meters – flow lowering 	<p align="center">SAT / UNSAT</p>

SIMULATOR INSTRUCTIONS (S02-03)

Setup:

1. Reset to IC 35
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
5. Tagout 2E MDAFP as follows:
 - Place control switch in pull-to-lock
 - Place clearance tag on control switch
 - Activate remote function **FWR61**, final value **RO**
6. Go to **RUN** and acknowledge/clear alarms
7. Activate the following pre-load malfunctions:
 - **CC02B** (2W CCW pump fails to auto start)
 - **RP13A** (phase A isol./ train A auto failure)
 - **RP13B** (phase A isol./ train B auto failure)
 - **RP19G** (ECCS slave relay failure)
 - **RP20G** (ECCS slave relay failure)
 - **RP20B** (AB EDG slave relay failure)

(continued on next page)

SIMULATOR INSTRUCTIONS (S02-03)

Scenario:

1. Trigger malfunction **CC01A** (2E CCW pump trip) after crew has demonstrated ability to raise power and RO is still actively engaged in power escalation (BOP event).
2. Trigger malfunction **RX02B**, final value **650** (NTP-121 fails hi) after crew has recovered from CCW pump trip.
3. Trigger malfunction **RX20A**, final value **100** (MFC-110 fails hi) after crew has recovered from L-2 RTD instrument failure.
4. Trigger malfunction **CV13A** (2E CCP trip) after crew has recovered from steam flow instrument failure.
5. Trigger malfunction **RC10D**, final value **60**, ramp **5:00** (SB LOCA) after crew has restored charging flow.

(continued on next page)

**SIMULATOR INSTRUCTIONS
(S02-03)**

Response to Crew's Requests:

1. If directed to trip bistables for NTP-121 (L2 RTD) use:

Remote	Bistable
RPR123	TS-421C
RPR124	TS-421D
RPR125	TS-421G
RPR126	TS-421H
RPR127	TS-422D
RPR128	TS-422G

2. If directed to trip bistables for MFC-110 use:

Remote	Bistable
RPR021	FS-512B
RPR017	FS-510A
RPR018	FS-510B

3. If directed to stop all ice condenser AHUs then activate remote function:
- **CHR01**, final value **OFF**
4. If directed to secure EDG jacket water pumps then modify remote functions as follows:
- **EGR 03**, select **OFF** then **AUTO**
 - **EGR 04**, select **OFF** then **AUTO**

Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK02-04Op-Test No.: Set 2Examiners: _____

_____Operators: _____

Initial Conditions: IC 37, 100% power, 8GWD, 750 ppm Boron, Equilibrium Xenon, 2E MDAFW OOS,

Turnover: Plant is at 100% reducing power to remove 2E TDFP from service due to oil leak.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Reduce Turbine Load
2		R	Reduce Reactor Power
3	RX05A to 100%	I-RO	PZR Level Channel NLP-151 Fails High (fail to 100% over 5 minutes)
4	ED07B	C-RO	PZR HTR Transformer Fails (21PHC fails)
5	RX21C to 4E+6	I-BOP	SG 22 FW Flow Transmitter FFC-220 Fails High
6	ED0827	C-BOP	Loss of 600 V MCC 2-EZC-C (Containment Cooling Failure)
7	ED10A	C-BOP	Loss of Instrument Bus CRID I (Disable Train A SSPS)
8	RP01A RP01B	C-RO	Failure of Reactor to Automatically Trip
9	FW01B at 20%	Major	SG 22 FW Line Rupture Inside Containment (ramp to 20% over 5 minutes – 4M lbm/hr)
10	RP16B preload	C-BOP	Containment Spray Failure to Auto Actuate

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

Summary

Plant is at 100% reducing power to remove 2E TDFP from service due to oil leak.

After a short ramp, the Pressurizer Level Controlling Channel NLP-151 will fail high. The RO will have to manually control level. The crew will need to implement an Abnormal Operating Procedure, trip bistables, select an operable channel, and restore Pressurizer Level controller to auto.

When the operable channel is selected, a failure of the PZR HTR Bus T21PHC will occur. The PZR SCR heater control will need to be transferred to T21PHA.

After the crew has addressed the failed Pressurizer channel, the #22 S/G FW Flow Transmitter FFC-220 will slowly fail high. The BOP will need to take manual control of the Feedwater Regulating Valve FRV-220 to restore level. The crew will need to implement an Abnormal Operating Procedure, trip bistables, transfer to operable channel, and return FRV-220 to auto.

The 600V MCC 2-EZC-C will trip causing the loss of several Containment Fans requiring the BOP to take action to restore cooling. Several other components will lose power requiring Technical Specification Action statements.

(Ref. 02-OHP-4021-082-023 Figure 1 Page 37 & 38)

IMO-316 RHR to Cold leg,
ICM-129 RCS HL to RHR,
IMO-51 BIT to CL,
IMO -110 SI ACC Discharge,
ICM-111 RHR to RCS CL 2&3,
Hydrogen Recombiner &
Containment Fans

After the loss of the MCC is addressed, Instrument Bus CRID I trips causing a loss of instrumentation, Train A SSPS Output, a FW Isolation and a subsequent Reactor Trip signal. The Reactor will not automatically trip and must be tripped by the RO.

The trip will cause a FW line break on the #22 SG requiring a Safety Injection. All Train A SSPS equipment will need to be manually started or repositioned due to the loss of the CRID. Additionally, Train B Containment Spray actuation will fail requiring manual initiation. The crew should progress from E-0 to E-2. The scenario will terminate once a transition is made to ES-1.1 SI Termination.

Critical Tasks	Trip Reactor Actuate Containment Spray Isolate Faulted Steam Generator
Procedures	E-0 Reactor Trip or Safety Injection E-2 Faulted Steam Generator Isolation

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 1/2 Page 1 of 9

Event Description: Reduce Turbine Load and 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	Commences power reduction: <ul style="list-style-type: none"> · Lowers turbine load (reactor power) using the load limiter. · Maintains Tave/Tref deviation within limits by boration and turbine load adjustments. · Ensures Axial Flux Difference (AFD) is maintained within target band by manual control rod movement as needed.
	US	Acts as reactivity manager by peer checking RO during blender operations and by verifying appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 3 Page 2 of 9

Event Description: **Pressurizer Level Channel (NLP-151) Fails High**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 (Drops 3 and 1) 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"> 1. Restores PRZ level using 2-QRV-251 or level controller 2. Reports 2-NLP-151 has failed 3. Ensures PRZ level control is in manual 4. Places PRZ Level CTRL selector switch in Ch 2 & 3 position 5. Places PRZ Level REC selector switch in 2 or 3 position 6. Nulls and returns 2-QRV-251 and PRZ Level Controller back to auto
	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"> • TS 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, *Action 7) • TS 3.3.3.5 <u>Remote Shutdown Instrumentation</u> *Identifies requirement to trip associated bistables within 1 hour of pressurizer level channel failure.

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 4 Page 3 of 9

Event Description: **Pressurizer Heater Transformer (TR21PHC) Fails**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 (Drops 46 and 50) indicative of a pressurizer (PRZ) heater power supply failure.
	US/RO	Reenergizes PRZ control (cycling) group heaters per OHP 4024.208 Drop 46 annunciator response, as follows: <ul style="list-style-type: none">• Opens breaker CB21PHC6• Closes breaker CB21PHA6
	RO	Monitors PRZ pressure response and ensures normal PRZ heater operations for PHA supplied heaters.

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 5 Page 4 of 9

Event Description: **SG 22 Feedwater Flow Transmitter (FFC-220) Fails High**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #213 (Drop 34) which are indicative of a feedwater flow instrument failure.
	BOP	Places 2-FRV-220, SG 22 MFW Reg. Valve controller to manual, raises controller output to match the operable feed flow channel with steam flow, and restores SG 22 level to program.
	US	Enters and directs actions of 02-OHP 4022.013.015, Feedwater Flow Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> 1. Restores SG 22 level using manual control of 2-FRV-220 2. Reports 2-FFC-220 has failed 3. Places 2-FS-520-C selector switch in channel 2 position. 4. Nulls and returns 2-FRV-220 controller to auto.
	US	Initiates actions to trip bistables associated with 2-FFC-220 FW Flow Failure per Attachment B-1 of 02-OHP 4022.013.015.
	US	Refers to Tech Specs 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, Action 7). Identifies requirement to trip associated bistables within 1 hour of steam flow channel failure.

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 6 Page 5 of 9Event Description: **Loss of Vital 600VAC MCC (2-EZC-C) – Containment Cooling Failure**

Time	Position	Applicant's Actions or Behavior
	US/BOP	Performs the following per 02-0HP-4024-220 Drop 10, BATTERY CHARGER 2CD2 FAILURE alarm: <ul style="list-style-type: none"> · Dispatches Aux. Operator to place 2CD1 charger in service. · Dispatches Aux. Operator to check 2CD2 charger status. · Requests MTE (Electricians) to check 2CD2 charger. · Refers to Tech Spec 3.8.2.3 <u>DC Distribution - Operating</u>
	US/BOP	Performs the following per 02-0HP-4024-220 Drop 29, CRID I INVERTER ABNORMAL alarm: <ul style="list-style-type: none"> · Dispatch Aux. Operator to check status of CRID I Inverter · Refers to Tech Spec 3.8.2.1 <u>AC Distribution - Operating</u>
	US/BOP	Performs the following per 02-0HP-4024-203 Drop 2, UPPER CNTMT VENT FANS FAILURE alarm: <ul style="list-style-type: none"> · Starts 2-HV-CUV-1, Upper Cntmt Vent Unit #1 · Monitors upper containment temperature
	US/BOP	Performs the following per 02-0HP-4024-203 Drop 3, LOWER CNTMT VENT FANS FAILURE alarm: <ul style="list-style-type: none"> · Starts 2-HV-CUV-4B, Lower Cntmt Vent Unit #4B · Monitors lower containment temperature
	US/BOP	Performs the following per 02-0HP-4024-203 Drop 15, CRDM EXHAUST FAN FAILURE alarm: <ul style="list-style-type: none"> · Starts 2-HV-CRD-4B, Control Rod Drive Mechanism Fan 4B
	US	Time permitting, may refer to the following Tech Specs (TS) due to loss of power (see 02-OHP-4021-082-023, Fig. 1 Load List): <ul style="list-style-type: none"> · TS 3.5.2 <u>ECCS Subsystems – Tavg ≥ 350°F</u> · TS 3.6.4.2 <u>Electric Hydrogen Recombiners</u> · TS 3.6.5.6 <u>Containment Air Recirculation Systems</u> · TS 3.8.2.3 <u>D.C. Distribution - Operating</u>

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 7/8 Page 6 of 9

Event Description: **Loss of Instrument Bus (CRID I) / Failure of Automatic Reactor Trip**

Time	Position	Applicant's Actions or Behavior
	CREW	Recognizes the need to manually trip the reactor (feedwater isolation occurs on SGs 21 and 24).
	CREW Critical Task #1	Manually opens reactor trip breakers in response to (either): <ul style="list-style-type: none">• Multiple parameters approaching reactor trip setpoint• Failure of reactor to trip automatically (ATWS alarms)

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 9/10 Page 7 of 9

Event Description: **Feed Line Rupture Inside CNTMT / Automatic CNTMT Spray Failure**

Time	Position	Applicant's Actions or Behavior
	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: <ol style="list-style-type: none"> 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
	US	Directs subsequent actions of E-0.
	CREW	If the crew identifies the faulted SG prior to entering E-2, Faulted Steam Generator Isolation they may take the following actions in accordance with OHI-4023, EOP Users Guide: <ul style="list-style-type: none"> • Isolates feedwater to 22 Steam Generator • Closes Steam Generator Stop Valves
	US/RO Critical Task #2	<ol style="list-style-type: none"> 1. Manually actuates CNTMT Spray (Train B will actuate) 2. Manually aligns/starts CNTMT Spray Train A : <ul style="list-style-type: none"> • Opens 2-IMO-210, 2E CTS Pump Discharge Valve • Opens 2-IMO-211, 2E CTS Pump Discharge Valve • Opens 2-IMO-202, Spray Additive Tank Outlet Valve • Starts 2E Containment Spray Pump
	RO	Stops all Reactor Coolant Pumps
	RO/BOP	Places Distributed Ignition System (DIS) in service: <ol style="list-style-type: none"> 1. Dispatches operator to stop all ice condenser AHUs 2. Starts all hydrogen igniters

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 9/10 Page 8 of 9Event Description: **Feed Line Rupture Inside CNTMT / Automatic CNTMT Spray Failure**

Time	Position	Applicant's Actions or Behavior
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% - 50% once one SG narrow range level is greater than 13%.
	RO	Manually starts ECCS pumps (Train A): <ul style="list-style-type: none"> • 2E RHR pump • 2N SI pump
	RO	Manually aligns Train A emergency safeguard systems: <ul style="list-style-type: none"> • CCW • ECCS
	RO	Attempts to manually actuate Train A – Phase A Containment / Containment Ventilation Isolation
	RO/BOP	Performs manual actions of E-0 Attachment A (for Train A components which failed to start/reposition) as directed by US.
	BOP	Closes all Train A - SGSV Dump valves
	CREW	Completes all actions of E-0 through step 21 (Check If SG Secondary Pressure Boundaries Are Intact).
	US	Announces transition to E-2, Faulted Steam Generator Isolation (at step 21 of E-0).
	US	Directs actions of E-2, Faulted Steam Generator Isolation.
	US/BOP	Identifies 22 steam generator as faulted

Op-Test No.: Set 2 Scenario No.: Cook 02-04 Event No.: 9/10 Page 9 of 9

Event Description: **Feed Line Rupture Inside CNTMT / Automatic CNTMT Spray Failure**

Time	Position	Applicant's Actions or Behavior
	US/BOP Critical Task #3	<p>Manually closes the following valves for SG 22:</p> <ul style="list-style-type: none"> • 2-FMO-221, TDAFP discharge • 2-FMO-222, MDAFP discharge • 2-MCM-221, TDAFP steam supply • 2-DCR-302, blowdown sample valve <p>NOTE: The following should be checked closed</p> <ul style="list-style-type: none"> • 2-FRV-220, feedwater reg. Valve • 2-FMO-202, feedwater isolation valve • 2-MRV-223, PORV • 2-DCR-320, blowdown isolation valve
	BOP	Closes 2-DRV-407, SG stop valve drain valve
	RO/BOP	<p>Performs the following as directed:</p> <ul style="list-style-type: none"> • 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).
TERMINATE SCENARIO		

**CRITICAL TASK SUMMARY
(S02-04)**

Task	Elements	Results
<p align="center">#1</p> <p>Manually Trip Reactor</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> · Symptoms which require a reactor trip (i.e., loss of feedwater flow to SGs) · Challenge to multiple reactor trip instrumentation setpoints (i.e.): <ul style="list-style-type: none"> · Lo SG Level with FF/SF mismatch · Lo-Lo SG level · RX TRIP BKR TRAIN A/B UV TRIP (ATWS) alarms <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> · Manually open at least one reactor trip breaker from the control room. · Reactor trip breaker must be opened prior to exceeding the RCS pressure safety valve limit of 2485 psig). <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> · RPIs indicate rods - fully inserted · Rod bottom lights – lit · Neutron flux - lowering 	<p align="center">SAT / UNSAT</p>
<p align="center">#2</p> <p>Actuate Containment Spray</p>	<p><u>Cueing:</u></p> <p>Containment pressure > 2.9 psig:</p> <ul style="list-style-type: none"> • CNTMT SPRAY ACTUATED alarm • LOWER CNTMT PRESS HI-HI alarm • E-0, step 5, Check CTS not required <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Manually actuate Train B CTS or manually align and start Train A CTS. • One train of CTS must be in service prior to exceeding a Red Path on the Containment (Z) CSFST (containment pressure of 12 psig). <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> • Flow is indicated on at least one train of Containment Spray 	<p align="center">SAT / UNSAT</p>

**CRITICAL TASK SUMMARY (Cont.)
(S02-04)**

Task	Elements	Results
<p align="center">#3</p> <p align="center">Isolate Faulted Steam Generator</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> · E-2, steps 1, 2 and 5 · Steam generator pressure lowering · RCS temperature lowering <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Isolate SG 22 by closing: <ul style="list-style-type: none"> · <i>MFW valves**</i> · <i>AFW valves**</i> · <i>TDAFP steam supply valves**</i> · <i>SGBD sample valves**</i> • SG 22 must be isolated before transitioning out of E-2 <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> · RCS cooldown stops · Depressurization of intact SGs stop · Feedwater flow to affected SG stops 	<p align="center">SAT / UNSAT</p>

SIMULATOR INSTRUCTIONS (S02-04)

Setup:

1. Reset to IC 37
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
5. Tagout 2E MDAFP as follows:
 - Place control switch in pull-to-lock
 - Place clearance tag on control switch
 - Activate remote function **FWR61**, final value **RO**
6. Go to **RUN** and acknowledge/clear alarms
7. Activate the following pre-load malfunctions:
 - **RP01A** (Reactor Trip / Train A auto failure)
 - **RP01B** (Reactor Trip / Train B auto failure)
 - **RP16B** (CTS / Train B auto failure)

Scenario:

1. Trigger malfunction **RX05A**, initial value **54**, final value **100**, ramp **5:00** (NLP-151 fails hi over 5 min.) after crew has demonstrated ability to raise power.
2. Trigger malfunction **ED07B** (PZR heater transformer fails) when an operable PZR level channel is selected.
3. Trigger malfunction **RX21C**, final value **4,000,000** (FFC-220 fails hi) after crew has recovered from the PZR level instrument and heater power supply failure.
4. Trigger malfunction **ED0827** (Loss of 600V MCC EZC-C) after the crew has recovered from the feedwater flow instrument failure.
5. Trigger malfunction **ED10A** (Loss of CRID 1) after crew has placed an operable CD battery charger to service and restored containment ventilation.
6. Trigger malfunction **FW01B**, final value **20**, ramp **5:00** (SG22 FW line rupture over 5 min.) upon reactor trip.

(continued on next page)

SIMULATOR INSTRUCTIONS
(S02-04)

Response to Crew's Requests:

1. If directed to trip bistables for NLP-151 use:

Remote	Bistable
RPR041	LS-459A

2. If directed to trip bistables for FFC-220 use:

Remote	Bistable
RPR023	FS-520A
RPR024	FS-520B

3. If contacted to locally check CRID I inverter, then report CRID I is on alternate (DC) power supply.
4. If contacted to locally place 2CD1 battery charger in service then activate remote function **EDR75**, final value **2CD1**.
5. If contacted to locally check 2CD2 battery charger, then report charger has lost power supply.
6. If directed to stop all ice condenser AHUs then activate remote function **CHR01** to **OFF**.
7. If directed to secure EDG jacket water pumps then modify remote functions as follows:
- **EGR 03**, select **OFF** then **AUTO**
 - **EGR 04**, select **OFF** then **AUTO**

Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK02-05Op-Test No.: Set 2Examiners: _____

_____Operators: _____

Initial Conditions: IC37, 100% power, 8GWD, 750 ppm Boron, Equilibrium Xenon, 2W MDAFW OOS

Turnover: Plant is at 100% Decreasing to remove 2W TDFP from service due to a clogging waterbox.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Reduce Turbine Load
2		R	Reduce Reactor Power
3	SW08A[B] to 75%	C- BOP	2E Essential Service Water Pump Strainer Clogged (fails to auto backwash) {ZDI101S2E to Manual}
4	RX17C to 100%	I-BOP	S/G 21 Pressure Transmitter MPP-212 Fails High
5	RX04A to 100%	I-RO	Pressurizer Pressure Channel NPP-151 Fails High
6	RC17C to 50%	C-RO	Pressurizer PORV NRV-153 Fails Open.
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 SI Pumps Fail to Auto Start
9	RH01B	C- BOP	2W RHR Pump Trips 15 minutes after SI

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

Summary

The crew is required to reduce power due to a clogging condenser on the West TDFWP.

The first event will be a clogged strainer on the 2E Essential Service Water Pump. The Strainer will fail to swap to automatically the standby strainer and backwash. The BOP will be required to select the correct strainer and manually backwash.

Next SG 21 Pressure Channel MPP-212 will fail high, requiring the BOP to take manual control and close the SG PORV valve. The crew should implement an Abnormal Operating Procedure, stabilize the plant, trip bistables, and declare SG PORV Radiation Monitor Inoperable.

The controlling Pressurizer Pressure channel NPP-151 will fail high. The RO will need to take manual control of the Pressurizer Pressure controller and restore pressure. The crew should implement an Abnormal Operating Procedure, stabilize the plant, trip bistables, select an operable channel, and restore pressure control to auto.

A short time later Pressurizer PORV NRV-152 will open and fail to fully close. The block valve for NRV-152 will need to be manually closed.

Shortly after the PORV failure, a LOCA will develop resulting in a large break LOCA. The plant will trip and Safety Injection will actuate. As the crew performs the actions of E-0 they will note that the 2E RHR and 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 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

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.: Set 2 Scenario No.: Cook 02-05 Event No.: 1/2 Page 1 of 13

Event 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	Commences power reduction: <ul style="list-style-type: none"> · Lowers turbine load (reactor power) using the load limiter. · Maintains Tave/Tref deviation within limits by boration and turbine load adjustments. · Ensures Axial Flux Difference (AFD) is maintained within target band by manual control rod movement as needed.
	US	Acts as reactivity manager by peer checking RO during blender operations and by verifying appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 3 Page 2 of 13Event Description: **2E ESW Pump Strainer Clogged (fails to auto backwash)**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports Panel #204, Drop 55, EAST ESW PUMP STRAINER DP HIGH alarm.
	US/BOP	Identifies that the 2E ESW pump strainer failed to automatically backwash.
	BOP	Manually backwashes the 2E ESW pump strainer per 02-OHP-4024-204, Drop 55: <ul style="list-style-type: none">• Places strainer control in MANUAL• Places backwash selector in RIGHT STN GATE CLOSED• Depresses manual BACKWASH pushbutton
	US/BOP	Ensures DP high alarm clears and initiates/discusses need for a condition report to address failure of auto backwash.

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 4 Page 3 of 13

Event Description: SG 21 Pressure Transmitter (MPP-212) Fails High

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #214 which are indicative of a steam pressure instrument failure and a SG PORV being open (Drops 21, 44).
	BOP	Manually closes 2-MRV-213, SG 21 PORV.
	RO	Monitors thermal/reactor power indications to detect potential effects of additional steam flow.
	US	Enters and directs actions of 02-OHP 4022.013.012, Steam Generator Pressure Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: <ol style="list-style-type: none"> 1. Checks SG PORVs closed 2. Reports 2-MPP-212 has failed 3. Ensures 2-MRV-213, SG 21 PORV in manual
	US	Declares 2-MRA-2601, Loop 1 Steam Line Radiation Monitor inoperable.
	US	Initiates actions to trip bistables associated with 2-MPP-212 Steam Generator Pressure Instrument Failure per Attachment A-3 of 02-OHP 4022.013.012.
	US	Refers to Tech Specs 3.3.2.1 <u>ESFAS Instrumentation</u> (Table 3.3-3, *Action 14) and 3.3.3.1 <u>Radiation Monitoring Instrumentation</u> (table 3.3-6, Action 22B) *Identifies requirement to trip associated bistables within 1 hour of steam pressure channel failure.

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 5 Page 4 of 13

Event Description: Pressurizer Pressure Channel (NPP-151) Fails High

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 indicative of a pressurizer (PRZ) pressure instrument failure (Drops 6, 7, 8).
	RO	Places PRZ pressure master controller OR both PRZ spray valve controllers (2-NRV-163 and 164) to manual and lowers controller output to close spray valves.
	US	Enters and directs actions of 02-OHP 4022.013.009, Pressurizer Pressure Instrument Malfunction procedure.
	RO	<p>Performs the following actions as directed:</p> <ol style="list-style-type: none"> 1. Restores PRZ pressure using manual control of EITHER: <ul style="list-style-type: none"> • PRZ pressure master controller • Both PRZ spray valve controllers 2. Reports 2-NPP-151 has failed 3. Ensures PRZ pressure master controller is in manual 4. Places PRZ Press Ctrl selector switch in Ch 2 & 3 position 5. Places the following recorder switches in Ch 2, 3 or 4 position: <ul style="list-style-type: none"> • PRZ Press Rec selector • Delta T selector • Overpower Delta T selector • Overtemp Delta T selector 6. Verifies 2-QMO-225, E CCP Leakoff is open 7. Dispatches Aux operator to open breaker from 2-QMO-225 8. Checks 2-NLP-151, PRZ Level Channel 1 and 2-NLI-151, PRZ Level Cold Calibration instruments for failure 9. Nulls and returns the following controllers to auto: <ul style="list-style-type: none"> • Both PRZ spray valve controllers • PRZ pressure master controller
	US	Declares the 2E Centrifugal Charging Pump inoperable.
	US	Initiates actions to trip bistables associated with 2-NPP-151 PZR Pressure Failure per Attachment A of 02-OHP 4022.013.009.

Event Description: Pressurizer Pressure Channel (NPP-151) Fails High

Time	Position	Applicant's Actions or Behavior
	US	<p>Refers to Tech Specs (TS):</p> <ul style="list-style-type: none"> • TS 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, *Action 6) • TS 3.3.2.1 <u>ESFAS Instrumentation</u> (Table 3.3-3, *Action 14) • TS 3.3.3.5 <u>Remote Shutdown Instrumentation</u> • TS 3.5.2 <u>ECCS Subsystems</u> • TS 3.1.2.4 <u>Rx Control Systems Charging Pumps - Operating</u> <p>*Identifies requirement to trip associated bistables within 1 hour of pressurizer pressure channel failure.</p>

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 6 Page 6 of 13

Event Description: **Pressurizer PORV (NRV-153) Fails Open**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 (Drop 23, 24, 45 and 8) indicative of a pressurizer PORV opening.
	US/RO	Isolates failed open PORV per 02-OHP 4024.208, Drop 23: <ul style="list-style-type: none"> • Attempts to manually close 2-NRV-153 PRZ PORV • Manually closes 2-NMO-153, 2-NRV-153 PRZ PORV Block Valve
	US	Declares 2-NRV-153 inoperable, refers to Tech Spec 3.4.11 <u>RCS Relief valves – Operating</u> and complies with Action b: <ul style="list-style-type: none"> • Within 1 hour close and remove power from the PORV block valve (2-NMO-153).
	RO	Monitors PRZ pressure control system and ensures pressure returns to normal conditions (~2235 psig).

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 7 of 13

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"> • Checks CTS actuated • Checks cntmt isol phase B actuated • Stops all RCPs • Verifies CEQ fans running • Verifies CEQ fan suction dampers open • Verifies CEQ fan CCW valves open • Dispatches operator to locally secure ice condenser AHUs • Starts all hydrogen igniters (after AHUs are secure)
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% [24%] - 50% once one SG narrow range level is > 13% [24%].

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 8 of 13

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
	RO Critical Task #1	Checks all ECCS pumps running and manually starts : <ul style="list-style-type: none"> • 2E RHR pump • 2N SI pump
	BOP/RO	Obtains Attachment A of E-0 and performs the following: <ul style="list-style-type: none"> • Places 2-HV-ACRF-1, (non-running) control room pressurization fan in stop • Places 2-HV-ACR-DA-1, c/r vent intake damper to ISOL • Places cntmt hydrogen sample bypass switches to bypass: <ul style="list-style-type: none"> · Train A · Train B
	CREW	Completes all actions of E-0 through step 23 (Check If RCS Is Intact).
	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 NOTE regarding cold leg switchover criteria).

NOTE:

When RWST level lowers to < 25% then the crew must immediately Transition to ES-1.3, Transfer To Cold Leg Recirculation.

See Page 10 of 13 for applicants actions or behavior associated with ES-1.3, Transfer To Cold Leg Recirculation.

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 9 of 13

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 26% - 50%.
	RO/BOP	Performs the following as directed: <ol style="list-style-type: none"> 1. Resets both trains of Safety Injection 2. Stops running Emergency Diesel Generators (EDGs) 3. Dispatches operator to secure EDG jacket water pumps
	US/RO	Identifies and reports that the 2W RHR pump has tripped: <ul style="list-style-type: none"> • Recognizes Train B has lost recirculation capability • Verifies at least one train of cold leg recirculation capability exists
	RO/BOP	Performs the following as directed <ol style="list-style-type: none"> 1. Opens control air valves to containment 2. Directs chemistry to initiate post accident sampling
	US	Check if transfer to cold leg recirculation is required (RWST <25%)

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 10 of 13

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
Applicants actions or behavior associated with ES-1.3, Transfer To Cold Leg Recirculation.		
	US	Announces transition to ES-1.3, Transfer To Cold Leg Recirculation when RWST level < 25% per: <ul style="list-style-type: none"> • E-0, Foldout Page, Criteria 3 • E-1, Foldout Page, Criteria 5 • E-1, Step 13
	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"> • RWST level < 20% • Cntmt water level > MIN RECIRC LEVEL
	US/RO Critical Task #2	Directs/Performs switchover as follows: NOTE: If RWST level < 9% then stop CCPs and SI pumps. <ol style="list-style-type: none"> 1. Stops and locksout East CTS pump 2. Stops and locksout East RHR pump 3. Checks East CTS and East RHR pumps stopped 4. Initiates valve closure: <ul style="list-style-type: none"> • 2-IMO-310, East RHR pump suction • 2-IMO-215, East CTS pump suction from RWST 5. Stops and locksout West CTS pump 6. Stops and locksout West RHR pump 7. Checks West CTS and West RHR pumps stopped 8. Initiates valve closure: <ul style="list-style-type: none"> • 2-IMO-320, West RHR pump suction • 2-IMO-225, West CTS pump suction from RWST

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 11 of 13

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
	<p>US/RO</p> <p>Critical Task #2</p>	<p>Continues to direct/perform switchover as follows:</p> <p>9. Restores control power to 2-ICM-305, Recirc sump to east RHR/CTS pumps</p> <p>10. Checks 2-ICM-305 open interlock:</p> <ul style="list-style-type: none"> • 2-IMO-310 fully closed • 2-IMO-215 fully closed <p>11. Opens 2-ICM-305</p> <p>12. Starts:</p> <ul style="list-style-type: none"> • East RHR pump • East CTS pump <p>13. Restores control power to 2-ICM-306, Recirc sump to west RHR/CTS pumps</p> <p>14. Checks 2-ICM-306 open interlock:</p> <ul style="list-style-type: none"> • 2-IMO-320 fully closed • 2-IMO-225 fully closed <p>15. Opens 2-ICM-306</p> <p>16. May attempt to start the West RHR pump (1 restart allowed)</p> <p>17. Starts the West CTS pump</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"> • 2-IMO-202, outlet valve • 2-IMO-204, outlet valve • 2-IMO-212, eductor supply valve • 2-IMO-222, eductor supply valve
	<p>US</p>	<p>Directs BOP to perform Attachment A, Splitting CCW Trains while continuing with ES-1.3 procedure body steps.</p>

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 12 of 13

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	<p>Independently performs the following actions of Attachment A:</p> <ol style="list-style-type: none"> 1. Checks both CCW pumps running 2. Closes CCW discharge header crosstie valves: <ul style="list-style-type: none"> • 2-CMO-412 • 2-CMO-414 3. Checks east CCW pump running 4. Splits CCW trains with the misc. header on the east train: <ul style="list-style-type: none"> • Checks east CCW train valves open: <ul style="list-style-type: none"> • 2-CMO-415, east CCW hx outlet to misc services • 2-CMO-411, CCW suction header crosstie • Closes west CCW train valves: <ul style="list-style-type: none"> • 2-CMO-416, west CCW hx outlet to misc services • 2-CMO-413, CCW suction header crosstie • Throttles CCW return flow for each RHR Hx to 5250 gpm: <ul style="list-style-type: none"> • 2-CMO-419 (EAST Hx) • 2-CMO-429 (WEST Hx)
	<p>US/RO</p> <p>Critical Task #2</p>	<p>Continues to direct/perform switchover as follows:</p> <ol style="list-style-type: none"> 21. Checks CTS Hx - ESW valves open: <ul style="list-style-type: none"> • 2-WMO-712, to east hx • 2-WMO-714, from east hx • 2-WMO-716, to west hx • 2-WMO-718, from west hx 22. Checks CCPs suction from RWST valves open: <ul style="list-style-type: none"> • 2-IMO-910 • 2-IMO-911 23. Checks RWST level < 11 % 24. Closes SI pump discharge crosstie valves: <ul style="list-style-type: none"> • 2-IMO-270 • 2-IMO-275 25. Restores power and closes SI pump recirc to RWST valves: <ul style="list-style-type: none"> • 2-IMO-262 • 2-IMO-263

Op-Test No.: Set 2 Scenario No.: Cook 02-05 Event No.: 7/8/9 Page 13 of 13

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/RO Critical Task #2	<p>Continues to directs/perform switchover as follows:</p> <p>26. Resets and closes CCP leakoff valves:</p> <ul style="list-style-type: none"> • 2-QMO-225 • 2-QMO-226 <p>27. Establishes east RHR supply to CCPs and SI pumps:</p> <ul style="list-style-type: none"> • Opens 2-IMO-340, CCP suction from east RHR hx <p>28. Establishes crosstie between SI pump/CCP suction:</p> <ul style="list-style-type: none"> • Opens 2-IMO-361 • Opens 2-IMO-362 • Checks open 2-IMO-360 <p>29. Starts any ECCS pumps stopped due to low RWST level</p> <p>30. Isolates RWST:</p> <ul style="list-style-type: none"> • Restores power and closes 2-IMO-390, RHR pump suction from RWST • Restores power and closes 2-IMO-261, SI pump suction from RWST • Closes CCP suction from RWST valves: <ul style="list-style-type: none"> • 2-IMO-910 • 2-IMO-911 <p>31. Checks SI pumps/CCPs suction aligned to discharge of RHR pumps.</p>
TERMINATE SCENARIO		

**CRITICAL TASK SUMMARY
(S02-05)**

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

SIMULATOR INSTRUCTIONS (S02-05)

Setup:

1. Reset to IC 37
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
5. Tagout 2W MDAFP as follows:
 - Place control switch in pull-to-lock
 - Place clearance tag on control switch
 - Activate remote function **FWR62**, final value **RO**
6. Go to **RUN** and acknowledge/clear alarms
7. Activate the following pre-load override/malfunction:
 - **ZDI101S2E**, final value **Manual** (2E ESW strainer control switch)
 - **RP19D** (ECCS slave relay failure)

Scenario:

1. Trigger malfunction **SW08B**, final value **75** (2E ESW strainer clogged) after crew has demonstrated ability to lower power.
2. Trigger malfunction **RX17C**, final value **1200** (MPP-212 fails hi) after crew has manually backwashed the ESW strainer.
3. Trigger malfunction **RX04A**, final value **2500** (NPP-151 fails hi) after crew has recovered from the SG pressure instrument failure.
4. Trigger malfunction **RC17C**, final value **50** (NRV-153 fails open) after crew has recovered from the PRZ pressure instrument failure.
5. Trigger malfunction **RC01A**, final value **50** (LB LOCA – loop 1) after crew has recovered from the failed open PRZ PORV.
6. Trigger malfunction **RH01B** (2W RHR pump trip) 15 minutes after SI actuation.

(continued on next page)

SIMULATOR INSTRUCTIONS (S02-05)

Response to Crew's Requests:

1. If contacted to check 2E ESW pump strainer ΔP , then report >95" (gauge pegged high).
2. If directed to trip bistables for MPP-212 use:

Remote	Bistable
RPR096	PS-516C
RPR097	PS-516D

3. If directed to trip bistables for NPP-151 use:

Remote	Bistable
RPR076	PS-455A
RPR077	PS-455B
RPR078	PS-455C
RPR079	PS-455D
RPR117	TS-411C
RPR118	TS-411D

4. If contacted to remove power from 2-QMO-225, then activate global malfunction (YG) **101QMO225**.
5. If contacted to remove power from 2-NMO-153, then activate global malfunction (YG) **101NMO153**.
6. If directed to stop all ice condenser AHUs then activate remote function **CHR01** to **OFF**.
7. If contacted to restore power to 2-QMO-225, then delete global malfunction (YG) **101QMO225**.
8. If directed to secure EDG jacket water pumps then modify remote functions as follows:
 - **EGR 03**, select **OFF** then **AUTO**
 - **EGR 04**, select **OFF** then **AUTO**

Facility: Cook Plant Unit 1 & Unit 2Scenario No.: COOK02-06Op-Test No.: Set 2Examiners: _____

_____Operators: _____

Initial Conditions: IC36, 81% power, 8GWD, Xenon Equilibrium, Tave 567°F, 2W MDAFW OOS

Turnover: Increase Power to 100%. Maintain 120 gpm letdown due to elevated lithium in RCS.

Event No.	Malf. No.	Event Type*	Event Description
0	CV013B		2W Centrifugal Charging Pump Trip (fail to start)
1		N	Raise Turbine Load
2		R	Raise Reactor Power
3	RX04A to 1700	I-RO	Pressurizer Pressure Channel NPP-151 Fails Low
4	CV04C	C-RO	75 gpm Letdown Orifice Isolation Valve QRV-162 Fails Closed
5	RX18 to 0	I-BOP	Feedwater Differential Pressure UPC-101 Fails Low
6	RX04C to 1700	Major	PZR Pressure Channel NPP-153 Fails Low, (generating Reactor Trip and SI Signals)
7	RP01A, RP01B, Preload	C-RO	Reactor Fails to Automatically Trip
8	TC03 - Preload	C-BOP	Turbine Fails to Automatically Trip
9	ED05H	C-BOP	Loss of 4KV Bus T21D (Loss of E CCP and E MDAFP) on the Reactor Trip
10	FW46C	C-BOP	Turbine Driven AFW pump Trips on Reactor Trip - Loss of Heat Sink criteria established

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

Summary

The Scenario begins at 81% increasing to 100% following a forced outage.

After the power change, NPP-151 Pressurizer Pressure Channel fails low. The RO will need to take manual control. The crew will implement an Abnormal Operating Procedure, trip bistables, select an operable channel, and restore pressure control to automatic.

The letdown orifice valve will fail closed as bistables are being tripped. The RO will need to restore Letdown through a different valve.

After letdown is restored, the UPC-101 FW Discharge DP Controller fails causing a feedwater transient. The BOP will need to take manual control of FW Pump Speed to establish the proper DP.

On the failure of NPP-153, a SI signal is generated. The automatic Reactor Trip fails requiring the RO to manually trip the Reactor. The automatic Turbine Trip fails requiring the BOP to manually trip the Turbine.

On the Reactor trip, a fault occurs on bus T21D and, separately, the TDAFP trips on mechanical overspeed. The BOP must shutdown the CD DG to prevent the cycling.

The crew will implement E-0 and transition to FR-H.1 loss of Heat Sink within the first few steps. Once FR-H.1 is implemented, the crew will be required to trip the RCPs and initiate feed and bleed. The crew will direct actions to restore FW and should dispatch an operator to reset and start the TDAFP. The scenario will terminate once flow is restored to the SGs.

Critical Tasks	Trip Reactor Establish RCS Feed and Bleed
Procedures	E-0 Reactor Trip or Safety Injection FR-H.1 Response to Loss of Heat Sink

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 1/2 Page 1 of 8

Event Description: **Raise Turbine Load / Raise Reactor Power**

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	Commences power escalation: <ul style="list-style-type: none"> · Raises turbine load (reactor power) using the load limiter. · Maintains Tave/Tref deviation within limits by dilution and turbine load adjustments. · Ensures Axial Flux Difference (AFD) is maintained within target band by manual control rod movement as needed.
	US	Acts as reactivity manager by peer checking RO during blender operations and by verifying appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: <ul style="list-style-type: none"> · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 3 Page 2 of 8

Event Description: **Pressurizer Pressure Channel (NPP-151) Fails Low**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 indicative of a pressurizer (PRZ) pressure instrument failure (Drops 8, 9, 10).
	US	Enters and directs actions of 02-OHP 4022.013.009, Pressurizer Pressure Instrument Malfunction procedure.
	RO	<p>Performs the following actions as directed:</p> <ol style="list-style-type: none"> 1. Restores PRZ pressure using manual control of EITHER: <ul style="list-style-type: none"> • PRZ pressure master controller • Both PRZ spray valve controllers 2. Reports 2-NPP-151 has failed 3. Ensures PRZ pressure master controller is in manual 4. Places PRZ Press Ctrl selector switch in Ch 2 & 3 position 5. Places the following recorder switches in Ch 2, 3 or 4 position: <ul style="list-style-type: none"> • PRZ Press Rec selector • Delta T selector • Overpower Delta T selector • Overtemp Delta T selector 6. Verifies 2-QMO-225, E CCP Leakoff is open 7. Dispatches Aux operator to open breaker from 2-QMO-225 8. Checks 2-NLP-151, PRZ Level Channel 1 and 2-NLI-151, PRZ Level Cold Calibration instruments for failure 9. Nulls and returns the following controllers to auto: <ul style="list-style-type: none"> • Both PRZ spray valve controllers • PRZ pressure master controller
	US	Declares the 2E Centrifugal Charging Pump inoperable.
	US	Initiates actions to trip bistables associated with 2-NPP-151 PZR Pressure Failure per Attachment A of 02-OHP 4022.013.009.

Event Description: **Pressurizer Pressure Channel (NPP-151) Fails Low**

Time	Position	Applicant's Actions or Behavior
	US	<p>Refers to Tech Specs (TS):</p> <ul style="list-style-type: none"> • TS 3.3.1.1 <u>RTS Instrumentation</u> (Table 3.3-1, *Action 6) • TS 3.3.2.1 <u>ESFAS Instrumentation</u> (Table 3.3-3, *Action 14) • TS 3.3.3.5 <u>Remote Shutdown Instrumentation</u> • TS 3.5.2 <u>ECCS Subsystems</u> • TS 3.1.2.4 <u>Rx Control System Charging Pump - Operating</u> <p>*Identifies requirement to trip associated bistables within 1 hour of pressurizer pressure channel failure.</p>

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 4 Page 4 of 8

Event Description: **75 GPM Letdown Orifice Valve (QVR-162) Fails Closed**

Time	Position	Applicant's Actions or Behavior
	RO	Identifies and reports rise in pressurizer (PRZ) level due to reduction in letdown flow (of 75 gpm) as a result of 2-QRV-162 failing closed.
	US/RO	Isolates letdown and minimizes charging flow to that amount required for seal injection.
	US	Directs RO to restore normal 120 gpm letdown (using 2-QRV-161, 75 gpm letdown orifice) per 02-OHP-4021-003-001, Attachment 13.
	RO	<p>Restores normal letdown per Attachment 13 as follows:</p> <ol style="list-style-type: none"> 1. Places 2-QRV-302 in divert position 2. Checks/adjusts charging flow to > 75 gpm 3. Verifies orifice isolations closed (QVR-160, 161 and 162) 4. Opens 2-CRV-470, CCW from letdown hx outlet controller 5. Verifies open letdown isolation valves: <ul style="list-style-type: none"> • 2-QCR-300, CVCS letdown cntmt isol • 2-QCR-301, CVCS letdown cntmt isol • 2-QRV-111, RC letdown to regen hx • 2-QRV-112, RC letdown to regen hx 6. Adjusts 2-QRV-301, letdown pressure controller to 50% output 7. Opens 2-QRV-161, 75 gpm letdown orifice isolation 8. Adjusts 2-QRV-301 to maintain 160 – 350 psig on 2-QPC-301 9. Places 2-QRV-301 in auto (if desired) 10. Nulls and returns 2-CRV-470 controller to auto 11. Adjusts charging flow as required to maintain PRZ level 12. Places PRZ level control in automatic if desired) 13. Places 2-QRV-302 in normal (demineralizer) position when letdown temperature is stable. <p><i>Note: RO should continue, placing the 45 gpm letdown orifice in service as follows:</i></p> <ol style="list-style-type: none"> 14. Adjusts 2-QRV-301, to lower letdown pressure to ~160 psig. 15. Raises charging flow to match expected letdown flow. 16. Opens 2-QRV-160, 45 gpm letdown orifice isolation 17. Adjusts 2-QRV-301 to control letdown pressure 160–350 psig. 18. Places 2-QRV-301 in auto (if desired)

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 5 Page 5 of 8

Event Description: **Feedwater Differential Pressure (UPC-101) Fails Low**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciators on Panel #216, 213, and 214 and indications which are indicative of a failure affecting main feedwater to all steam generators (SGs): <ul style="list-style-type: none"> • All SG levels lowering • All feedwater regulating valves opening • Main feedwater pumps speed lowering
	BOP	Places MFP differential pressure controller in manual and raises output (raise MFW discharge pressure / flow) to match feedwater flow with steam flow and restore SG levels to program.
	CREW	Identifies that 2-UPC-101, main steam bypass header pressure instrument has failed low affecting actual low side pressure input to the MFP differential pressure controller.
	BOP	Monitors/adjusts MFP differential pressure to restore SG levels to program.
	RO	Monitors thermal/nuclear power during feedwater transient.

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 6/7/8/9/10 Page 6 of 8

Event Description: **PZR Press Channel (NPP-153) Fails Low – Reactor Trip Signal
Reactor Fails To Automatically Trip
Turbine Fails To Automatically Trip
Loss of 4KV Bus T21D On Reactor Trip
Turbine Driven AFW Pump Trips On Reactor Trip**

Time	Position	Applicant's Actions or Behavior
	CREW	Recognizes the need to manually trip the reactor (2/4 PRZ pressure channels failed low).
	CREW Critical Task #1	Manually opens reactor trip breakers in response to (either): <ul style="list-style-type: none"> • PRZ pressure < reactor trip/safety injection setpoints • Failure of reactor to trip automatically (ATWS alarms)
	US	Directs RO/BOP to perform the immediate actions of E-0, Reactor Trip or Safety Injection.
	RO	Performs the (primary) immediate actions of E-0: <ol style="list-style-type: none"> 1. Checks reactor trip 2. Checks safety injection status
	BOP	Performs the (secondary) immediate actions of E-0: <ol style="list-style-type: none"> 1. Recognizes turbine failed to automatically trip: <ul style="list-style-type: none"> • Manually actuates turbine trip 2. Checks power to AC emergency buses <ul style="list-style-type: none"> • Reports Loss of 4KV Bus T21D (due to fault) • Trips CD EDG to prevent cyclic loading attempts
	US	Ensures immediate actions of E-0 are completed
	US	Directs subsequent actions of E-0.
	US/BOP	Announces transition to FR-H.1, Response to Loss of Secondary Heat Sink per E-0, Step 7.a. - RNO (SG narrow range levels off-scale low and no AFW flow).

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 6/7/8/9/10 Page 7 of 8

Event Description: **PZR Press Channel (NPP-153) Fails Low – Reactor Trip Signal**
Reactor Fails To Automatically Trip
Turbine Fails To Automatically Trip
Loss of 4KV Bus T21D On Reactor Trip
Turbine Driven AFW Pump Trips On Reactor Trip

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Reviews foldout page for FR-H.1, Response to Loss of Secondary Heat Sink.
	US	Directs actions of FR-H.1, Response to Loss of Secondary Heat Sink.
	US/RO	<ul style="list-style-type: none"> • Recognizes no CCPs available • Trips all RCPs • Goes to Step 18 of FR-H.1 (RCS Bleed and Feed)
	CREW Critical Task #2	Initiates RCS bleed and feed: <ol style="list-style-type: none"> 1. Checks SI actuated 2. Checks RCS feed path: <ul style="list-style-type: none"> • South SI pump running • ECCS monitor lights in proper status 3. Establishes RCS bleed path <ul style="list-style-type: none"> • Checks PRZ PORV block valves energized and open • Places all (3) PRZ PORV switches to open position 4. Resets SI 5. Resets containment isolation phase A 6. Opens control air to containment valves: <ul style="list-style-type: none"> • 2-XCR-100 • 2-XCR-101 • 2-XCR-102 • 2-XCR-103 7. Checks bleed path: <ul style="list-style-type: none"> • All 3 PRZ PORVs open • All 3 PRZ PORV block valves open 8. Perform E-0, Steps 5 – 17 (as time permits)
	US/BOP	Continues attempts to establish secondary heat sink: <ul style="list-style-type: none"> • Dispatches operator to reset TDAFP mechanical overspeed.

Op-Test No.: Set 2 Scenario No.: Cook 02-06 Event No.: 6/7/8/9/10 Page 8 of 8

Event Description: **PZR Press Channel (NPP-153) Fails Low – Reactor Trip Signal**
Reactor Fails To Automatically Trip
Turbine Fails To Automatically Trip
Loss of 4KV Bus T21D On Reactor Trip
Turbine Driven AFW Pump Trips On Reactor Trip

Time	Position	Applicant's Actions or Behavior
	US/BOP	Relatches and restarts TDAFP
	BOP	Restores AFW flow to the SGs from the TDAFP.
TERMINATE SCENARIO		

**CRITICAL TASK SUMMARY
(S02-06)**

Task	Elements	Results
<p align="center">#1</p> <p align="center">Manually Trip Reactor</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> • Challenge to multiple reactor trip setpoints: <ul style="list-style-type: none"> · Low PRZ pressure reactor trip · Low PRZ pressure safety injection • RX TRIP BKR TRAIN A/B UV TRIP (ATWS) alarms <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Manually open at least one reactor trip breaker from the control room. • Must be performed prior to: <ul style="list-style-type: none"> · SG Dryout (<15% wide range level) · Exceeding RCS safety valve limit (2485 psig) <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> • RPIs indicate rods - fully inserted • Rod bottom lights – lit • Neutron flux - lowering 	<p align="center">SAT / UNSAT</p>
<p align="center">#2</p> <p align="center">Establish RCS Bleed (and Feed)</p>	<p><u>Cueing:</u></p> <ul style="list-style-type: none"> • Enters FR-H.1 at Step 7 of E-0 (Check AFW Flow) • Commences bleed and feed actions from Step 7 when it has been determined that no CCPs are running. <p><u>Performance Indicators:</u></p> <ul style="list-style-type: none"> • Stops all RCPs (extends time to SG dryout) • Opens all PRZ PORVs (establishes bleed path) • Must be performed prior to SG Dryout (<15% wide range level) <p><i>(Note: RCS Feed initiated by automatic SI)</i></p> <p><u>Performance Feedback:</u></p> <ul style="list-style-type: none"> • PRZ PORV red lights lit • PRZ PORV tailpipe temperatures rising • PRT pressure/temperature/level rising 	<p align="center">SAT / UNSAT</p>

SIMULATOR INSTRUCTIONS (S02-06)

Setup:

1. Reset to 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
5. Tagout 2W MDAFP as follows:
 - Place control switch in pull-to-lock
 - Place clearance tag on control switch
 - Activate remote function **FWR62**, final value **RO**
6. Go to **RUN** and acknowledge/clear alarms
7. Activate the following pre-load malfunctions:
 - **CV013B** (2W CCP fails to start)
 - **RP01A** (Auto reactor trip / train A failure)
 - **RP01B** (Auto reactor trip / train B failure)
 - **TC03** (Main turbine auto trip failure)

Scenario:

1. Trigger malfunction **RX04A**, final value **1700** (NPP-151 fails lo) after crew has demonstrated ability to raise power.
2. Trigger malfunction **CV04C**, final value **0** (QRV-162 fails closed) when the final bistables are being tripped for PZR pressure instrument failure.
3. Trigger malfunction **RX18**, initial value **850**, final value **0**, ramp **1:00** (UPC-101 fails lo over 1 min.) after the crew restores normal letdown.
4. Trigger malfunction **RX04C**, final value **1700** (NPP-153 fails lo – RT/SI signal) after the crew recovers from the feedwater transient.
5. Trigger the following malfunctions when the reactor trip is tripped manually:
 - **ED05H** (Loss of 4KV Bus T21D)
 - **FW46C** (TDAFP trip)

(continued on next page)

**SIMULATOR INSTRUCTIONS
(S02-06)**

Response to Crew's Requests:

1. If directed to trip bistables for NPP-151 use:

Remote	Bistable
RPR076	PS-455A
RPR077	PS-455B
RPR078	PS-455C
RPR079	PS-455D
RPR117	TS-411C
RPR118	TS-411D

2. If directed to remove power from 2-QMO-225, then activate global malfunction (YG) **101QMO225**.
3. If contacted as chemistry regarding loss of normal letdown, then request 120 gpm normal letdown should be placed in service ASAP due to elevated lithium.
4. If directed to locally reset the TDAFP mechanical overspeed device, delay/wait until RCS bleed and feed has been initiated (all PRZ PORVs open), then delete malfunction **FW46C** and **report to the control room that the TDAFP mechanical overspeed device has been reset locally**.
5. If directed to stop all ice condenser AHUs then activate remote function **CHR01** to **OFF**.
6. If directed to secure EDG jacket water pumps then modify remote functions as follows:
- **EGR 03**, select **OFF** then **AUTO**
 - **EGR 04**, select **OFF** then **AUTO**