Facility: _Cook Plant Unit 1 & Unit 2_ Scenario No.: _COOK06-01_ Op-Test No.: _____

Examiners: _____ Operators:_____
_____ _____
_____ _____

Initial Conditions: IC-971 (IC37), MOL; 74% power, 941 ppm Boron, 8 GWD

Turnover: PRZ PORV NRV-153 is closed with leakage and Block valve NMO-153 is closed

Event No.	Malf. No.	Event Type*	Event Description
1	RX04A @ 1700	I-RO TS	Pressurizer Pressure Channel NPP-151 Fails Low
2	FW34A FW58B	C-BOP	North CB pump trip; Middle CB pump fails to start in AUTO
3	CV04C	C-RO	75 gpm Letdown Orifice Isolation Valve QRV-162 Fails Closed
4	RX23B @ 0 30 sec Ramp	I-BOP TS	#21 SG level Transmitter fails LOW
5	MS01D @ 20 2 min Ramp	M	Steam Line Break inside Containment (#24 SG)
6	RP07A RP07B	C-BOP	Steam Line Isolation fails to AUTO actuate
7	RP16B RP17B	C-RO	CTS Train B - fails to actuate (AUTO/MANUAL)
8	RP19J	C-RO	RPS relay K626-X3 failure (2East CTS pump fails to start)

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

Summary

The first event will involve the Pressurizer Pressure Controlling Channel, NPP-151, failing LOW. The RO will be required to take manual control of Pressurizer Pressure Master Controller and restore normal pressure control. The Crew will implement the Abnormal Operating Procedure, address Technical Specifications, select an operable channel, and restore pressure control to automatic.

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

The third event will involve the letdown orifice valve failing closed after the secondary plant has been stabilized. The RO will need to restore Letdown through a different valve.

The #21 Steam Generator Level instrument (BLP-111) fails LOW. This results in a higher feedwater flow and Steam Generator level rise. BOP will be required to take manual control and restore normal level. Crew will be required to implement AOP actions to stabilize the plant and address Technical Specifications.

The main event will involve a Main Steamline Break inside containment on the #24 SG. The unit will trip and a Safety Injection will actuate. Failure of the Main Steamline Isolation actuation circuit will require a manual actuation. As the crew performs the actions of E-0, they should identify the Main Steamline Break inside containment on the #24 SG. The crew will transition to E-2 to isolate #24 SG. Containment Pressure will raise and CTS fails to Actuate. The crew may be required to transition to FR-Z.1 to restore CTS. The scenario will terminate when the crew has transitioned to ES-1.1.

Critical Tasks

Isolate #24 Steam Generator
Actuate/Align CTS

Procedures

E-0, Reactor Trip or Safety Injection
E-2, Faulted Steam Generator Isolation
Z.1, Response to High Containment Pressure

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 1

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	Directs operator actions to take manual control of PRZ Press. Master Controller and restore normal pressure control (approx. 2235 psig) Enters and directs actions of 02-OHP 4022.013.009, Pressurizer Pressure Instrument Malfunction procedure.
	RO	Performs the following actions as directed: 1. Restores PRZ pressure using manual control of EITHER: • 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: • 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 for 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: • Both PRZ spray valve controllers • PRZ pressure master controller (Continued on Next Page)

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 1

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

Time	Position	Applicant's Actions or Behavior
	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.
	RO	Monitors PRZ pressure response and ensures normal PRZ heater operations
	US	Refers to ITS LCO: • 3.3.1 RTS Instrumentation (Table 3.3.1-1, Function 6, 8a, 8b – Cond D) • 3.3.2 ESFAS Instrumentation (Table 3.3.2-1, Function 1d, 8b – Cond D & G) • 3.3.4 Remote Shutdown Instrumentation (Table B3.3.4-1 Function 2 Cond A – 30 Days) [02-OHP-4030-214-031 pg. 42] • 3.4.1 DNB & Tavg Parameters (if RCS pressure goes <2000 psig.) • 3.5.2 ECCS Subsystems (Cond A – 72 hr) • TRM 8.1.1 Boration Systems (Cond A – 72 hr)

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 2

Event Description: **North CB pump trip; Middle CB pump fails to start in AUTO**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes feedwater control problem and reports annunciators: Panel #216 Drop 72 and 73 – CB pump trip and discharge press low
	US	Directs operator actions to stabilize the unit and restore Condensate Booster pump capacity.
	RO	Monitor RCS & Secondary parameters for normal operations.
	BOP	Manually start the Middle CB pump May Place North CB pump switch to TRIP and back to NEUTRAL (Clear Alarms) Monitor Secondary parameters for normal operations

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 3

Event Description: **75 GPM Letdown Orifice Valve (QRV-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 75 gpm letdown (using 2-QRV-161, 75 gpm letdown orifice) per 02-OHP-4021-003-001, Attachment 13.
	RO	Restores normal letdown per Attachment 13 as follows: 1. Places 2-QRV-302 in divert position 2. Verifies orifice isolations closed (QRV-160, 161 and 162) 3. Adjusts 2-CRV-470, CCW from LTDN HX outlet controller to 50% 4. Verifies open letdown isolation valves: a. 2-QCR-300, CVCS letdown cntmt isol b. 2-QCR-301, CVCS letdown cntmt isol c. 2-QRV-111, RC letdown to regen hx d. 2-QRV-112, RC letdown to regen hx 5. Adjusts 2-QRV-301, letdown pressure controller to 75% output 6. Checks/adjusts charging flow to > 75 gpm 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. May place a 45 gpm orifice in service by: a. Raise Charging flow to 120 gpm b. Open QRV-160, 45 gpm letdown orifice isolation 10. Places 2-QRV-301 in auto (if desired) 11. Nulls and returns 2-CRV-470 controller to auto 12. Adjusts charging flow as required to maintain PRZ level 13. Places PRZ level control in automatic (if desired) 14. Places 2-QRV-302 in normal (demineralizer) position when letdown temperature is stable.

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 4

Event Description: **#21 SG Level Channel BLP-111 Fails LOW**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes failure of BLP-111 Low and reports associated alarms: Panel #213 Drops 3 and 5 – Level Low
	BOP	Places controller for 2-FRV-210 in manual, lowers controller output to match feed flow with steam flow and stabilizes SG 21 level, as required.
	US	Directs actions of 02-OHP 4022.013.013, Steam Generator Level Instrument Malfunction procedure.
	BOP	Performs the following actions as directed: 1. Restores SG 21 level to program (44%), as required 2. Reports 2-BLP-111 has failed
	US	Direct actions to trip bistables per Attachment A-2 of 02-OHP 4022.013.013. Declares level channel input inoperable
	US	Refers to the following ITS LCOs: · 3.3.1 RTS Instrumentation (Table 3.3.1-1, Function 14 – Cond D) · 3.3.2 ESFAS Instrumentation (Table 3.3.2-1, Function 5b & 6c – Cond D) · 3.3.3 Post Accident Instrumentation (Table 3.3.3-1 Function 19 - Minimum channels met)

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 5/6/7/8

Event Description: **Steam Line Break inside Containment (#24 SG) – CTS Actuation Failure**

Time	Position	Applicant's Actions or Behavior
	RO	Annunciator Panel 222 Drop 84 LIT – ICE COND DOORS OPEN Recognizes and reports rising containment pressure.
	US	Directs RO/BOP to perform the immediate actions of E-0, Reactor Trip or Safety Injection.
	RO/BOP	Performs the immediate actions of E-0: 1. Checks reactor trip 2. Checks turbine trip 3. Checks power to AC emergency buses 4. Checks safety injection status
	US	Ensures immediate actions of E-0 are completed
	RO	Identifies and reports Phase B – Containment Isolation Actuation
	US	Identifies that Containment Pressure is > 2.8 psig and directs actions to Stop RCPs and align containment systems as required per Step 5 RNO of E-0
	RO	Stops all Reactor Coolant Pumps
	RO/BOP	Verifies CEQ fan operation Places lower Cntmt vent unit fans in OFF Places CRDM fans in STOP Places DIS in service 1. Dispatches operator to stop all ice condenser AHUs 2. Starts all hydrogen igniters

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 5/6/7/8

Event Description: **Steam Line Break inside Containment (#24 SG) – CTS Actuation Failure**

Time	Position	Applicant's Actions or Behavior

	US/BOP
	
	Critical Task #1
		Verify MSI requirement met:
		• **Manually closes Main Steam Isolation (SG Stop) valves**
		  • **MRV-240 (for Faulted SG #24)**
		
		• (Also closes Intact SG Isolation Valves – Not Critical)
		  • MRV-210
		  • MRV-220
		  • MRV-230

	US/RO **Critical Task #2**	**1. Manually aligns/starts CNTMT Spray Train A/B :** • **Opens 2W CTS Pump Discharge Valves:** **2-IMO-220 –AND/OR- 2-IMO-221** • **Opens 2-IMO-204, Spray Additive Tank Outlet Valve** • **Starts 2W Containment Spray Pump** **-AND/OR-** • **Starts 2E Containment Spray Pump**
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% - 50% once one SG narrow range level is greater than 13%.
	RO/BOP	Performs manual actions of E-0 Attachment A as directed by US.
	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, for a SG depressurized (at step 21 of E-0).
	US	Directs actions of E-2, Faulted Steam Generator Isolation.
	BOP	Checks closed - SGSV Dump valves
	US/BOP	Identifies #24 steam generator as faulted

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 5/6/7/8

Event Description: **Steam Line Break inside Containment (#24 SG) – CTS Actuation Failure**

Time	Position	Applicant's Actions or Behavior
	US/BOP **Critical Task #1**	**Manually closes the following valves for SG 24:** • **2-FMO-241, TDAFP discharge** • **2-FMO-242, MDAFP discharge** NOTE: The following should be checked closed (not part of Critical Task – Already Closed) • 2-FRV-240, feedwater reg. Valve • 2-FMO-204, feedwater isolation valve • 2-MRV-240, SG Stop Valve • 2-MRV-243, PORV • 2-DCR-304, blowdown sample valve • 2-DCR-340, blowdown isolation valve
	BOP	Closes 2-DRV-407, SG stop valve drain valve
	RO/BOP	Performs the following as directed: • Resets containment isolation phase A • Directs chemistry to sample all SGs for activity
	CREW	Determines that ECCS flow should be reduced .
	US	Announces transition to ES-1.1 SI Termination (at step 8 of E-2).
	US	Direct Actions to Reset SI and Terminate ECCS Flow per ES-1.1.
	RO	Perform actions as directed to Reset SI and terminate ECCS Flow: 1. Reset SI 2. Stop 1 CCP (Charging Pump)
	BOP	Perform actions as directed to Restore Control Air to Containment 1. Reset Containment Isolation Phase A and Phase B 2. Verify Spray Valve Controllers in Manual at Zero Demand. 3. Check Air Pressure 4. Open Control Air Containment Isolation Valves

Op-Test No.: _____ Scenario No.: Cook06-01 Event No.: 5/6/7/8

Event Description: **Steam Line Break inside Containment (#24 SG) – CTS Actuation Failure**

Time	Position	Applicant's Actions or Behavior
	US	Check if Normal Charging can be restored Verify RCS Press Stable or Rising (if Lowering, transition to ES-1.2)
	RO	Perform actions as directed to Establish Charging Flow: 1. Reset and open CCP Leakoff Valves 2. Close BIT Inlet and Outlet Valves 3. Establish Charging and Seal Injection Flow with QRV-251 and QRV-200 4. Control Charging Flow to Stabilize Pressurizer Level
	RO/BOP	Performs the following as directed: • Resets containment isolation phase A • Directs chemistry to sample all SGs for activity
	US	Check if Safety Injection Pumps can be secured Pressure > 1650 psig Verify RCS Press Stable or Rising (if Lowering, transition to ES-1.2)
TERMINATE SCENARIO		

CRITICAL TASK SUMMARY
(COOK06-01)

Task	Elements	Results

#1
 	
Isolate Faulted Steam Generator
	Cueing:
	· **E-2, steps 1, 2 and 5**
	· **Steam generator pressure lowering**
	· **RCS temperature lowering**
	
	Performance Indicators:
	• **Isolate SG 24 by closing:**
	  · ***AFW valves***
	  · ***SG Stop valve***
	• **SG 24 must be isolated before transitioning out of E-2**
	
	Performance Feedback:
	· **RCS cooldown stops**
	· **Depressurization of intact SGs stop**
	· **Feedwater flow to affected SG stops**
		SAT / UNSAT

#2 **Actuate Containment Spray**	**Cueing:** **Containment pressure > 2.9 psig:** • **CNTMT SPRAY ACTUATED alarm** • **LOWER CNTMT PRESS HI-HI alarm** • **E-0, step 5, Check CTS not required** **Performance Indicators:** • **Manually align Train B CTS or manually 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).** **Performance Feedback:** • **Flow is indicated on at least one train of Containment Spray**	**SAT / UNSAT**

SIMULATOR INSTRUCTIONS
(COOK06-01)

Setup:

1. Reset to IC 971 (IC 37 with PORV switches & Summary file)
2. Reset control rods and check group step counters
3. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
4. Advance chart recorder paper & clear chart recorder memory.
5. Update PPC Chart Recorders VCT 20-70, PWR 70-80%, Tave/Tref 560-570°F
6. Start Data Collection Program Save to file _____
7. Go to **RUN** and acknowledge/clear alarms
8. Restore Summary File "**COOK06-01**"
9. Place NRV-153 and NMO-153 to CLOSE, then hang CAUTION tags:
10. Verify the following (pre-load) malfunctions:

- **RP07A**, Train A Steamline Isolation fails to AUTO actuate
- **RP07B**, Train B Steamline Isolation fails to AUTO actuate
- **RP16B**, Train B Containment Spray fails to AUTO actuate
- **RP17B**, Train B Containment Spray MANUAL Actuation Failure
- **RP19J,** Train A RPS Relay K626-X3 Fails
- **FW58B**, Middle CB pump fails to start in AUTO

.

(continued on next page)

SIMULATOR INSTRUCTIONS
(COOK06-01)

Scenario Events:

Event #1

1. Trigger (1) **IMF RX04A**, final value **1700** (NPP-151 fails LOW)

Event #2

2. Trigger (3) **IMF FW34A** (North CB pump trip) when crew has recovered from the Pressurizer Pressure channel failure.

Event #3

3. Trigger (5) **IMF CV04C**, to cause QRV-162 , 75 gpm letdown orifice to fail closed.

Event #4

4. Trigger (7) **IMF RX23B**, final value **2** (BLP-111 fails LOW).

Event #5

5. Trigger (9) **IMF MS01D**, final value **20** (#24 SG Steamline Break upstream of MSIV) after 2 mins:

(continued on next page)

Response to Crew's Requests:

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

   Override ZLOSTMC2[6] to ON to simulate opening cabinet door

   (Override Lights/Relays – RX Flux panel)

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

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

   Delete Override ZLOSTMC2[6] to simulate closing cabinet Door

   If directed to remove power from 2-QMO-225, then activate global malfunction (YG) **101QMO225** for breaker 2-ABV-D-5C.

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

3. If asked, SM Should direct crew to restore 75 GPM letdown using section 4.2 of Attachment 13

(continued on next page)

Response to Crew's Requests:

4. If directed, to trip bistables for **BLP-111** use:

   IOV ZLOSTMC2[7] to ON to simulate opening cabinet Door

   (Override Lights/Relays – RX Flux panel)

Remote	Bistable
RPR050	LS/519A
RPR051	LS/519B

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

   DOV ZLOSTMC2[7] to simulate closing cabinet Door

5. Local actions after entry into E-0:
   - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
   - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
   - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.

6. If directed to secure EDG jacket water pumps then modify remote functions as follows:
   - **MRF EGR 03**, select **OFF** then **AUTO**
   - **MRF EGR 04**, select **OFF** then **AUTO**

Facility: Cook Plant Unit 1 & Unit 2 Scenario No.: COOK06-02 Op-Test No.:

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: IC- 991 (IC37), MOL; 74% power, 941 ppm Boron, 8GWD

Turnover: Turbine Driven AFP OOS for Discharge Valve 2-FW-136 packing adjustment. Reduce power to remove the West FWP from service due to an oil leak.

Event No.	Malf. No.	Event Type*	Event Description
1	RCR20 @ 3	C-RO TS	PRZ PORV (NRV-153) Leak by (3 gpm)
2	RX19A @ 0	I-RO TS	Turbine Impulse Transmitter (MPC-253) fails LOW
3		R	Reduce reactor power and turbine load for West FWP
4	RC23B @ 40 5 min ramp	M	SGTR on #22 SG (400 gpm)
5a	RP10A RP11C	C-RO	Train A Safety Injection signal failure to actuate in AUTO or Manual mode (PRZ panel only)
5b	RP10B RP11B RP11D	C-RO C-BOP	Train B Safety Injection signal failure to actuate in AUTO or Manual mode
6	RX11B @100%	C-BOP	SG #22 PORV Controller Failure

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

Revision 1, 12-12-05

Summary

The Scenario starts with the plant at 74% power with directions to begin a ramp down to take the west main FW pump offline due to a small oil leak.

The first event will involve the Pressurizer PORV NRV-153 drifting partially open. The crew will need to close Block valve (NMO-153) to stop NRV-153 leakage. Crew will be required to address PORV Technical Specifications.

After the crew addresses the PORV failure, the Turbine Impulse instrument (MPC-253) will fail LOW. This results in a control rod insertion if they are in Auto. RO will be required to place rod control in manual. Crew will be required to implement AOP actions to stabilize the plant and address Technical Specifications.

If required allow the crew to continue the power reduction

The main event will involve a Steam Generator Tube Rupture. The SGTR will build in to 400 gpm over 5 minutes. The crew will perform a Reactor Trip and Safety Injection. As the crew performs the actions of E-0, Safety Injection signal will fail to AUTO actuate. Train A Safety Injection can be actuated only from the SIS panel switch. The crew should identify the Steam Generator Tube Rupture on #22 SG. The crew will transition to E-3 to isolate #22 SG. The crew should identify the failure of SG #22 PORV controller (PORV Opens) and take manual control and close the PORV. The scenario will terminate when the crew has completed the cooldown, depressurization, and terminated SI.

Critical Tasks

Manually actuate at least one train of SI before completion of E-0, Step 5.
Isolate #22 Steam Generator
Cooldown RCS
Depressurize RCS to stop #22 SGTR leakage

Procedures

E-0, Reactor Trip or Safety Injection
E-3, Steam Generator Tube Rupture

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 1

Event Description: **Pressurizer PORV (NRV-153) Leakage**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes indication of partially open PORV and reports annunciators: Panel #208 Drop 23 and 24 - PORV open.
	US	Directs RO to close PORV NRV-153. Directs RO to close NMO-153, PORV Block Valve when the PORV won't CLOSE.
	RO	Manually close PORV (NMO-153) Block valve.
Note: Procedure 02-OHP-4022-002-009 is written to identify the leaking valve and isolate it. The crew has indication as to which valve is leaking and so may reference the procedure as applicable.		
	US	May Direct operator action per 02-OHP-4022-002-009, Leaking PORV: • Manually close All PORV Block valves
Note: The crew may elect to implement 02-OHP-4022-002-020, Excessive Reactor Coolant Leakage.		
	US	May Direct operator action per 02-OHP-4022-002-020, RCS Leakage: • Check PRZ Level and adjust Charging as required. • Check VCT Level • Determine RCS Leakrate • Check PRZ PORV and Safety Valve Leakage
	US	Declares PORV 2-NRV-153 inoperable, Refers to Tech Spec 3.4.11 and complies with Actions B Direct operator to send AEO to locally de-energize NMO-153
	RO	Monitors PRZ pressure control system and ensures pressure remains at normal conditions (~2235 psig).

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 2

Event Description: **First Stage Turbine Impulse transmitter (MPC-253) fails LOW**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Recognizes and reports multiple annunciators on Panel 211, 213, and 214 for a Turbine Impulse pressure failure.
	RO	Verifies no runback in progress Places rod control switch in MANUAL Reports failure of MPC-253 instrument
	US	Enters and directs actions of 02-OHP 4022.012.003, Continuous Control Bank Movement procedure.
	RO	Performs the following as directed: 1. Checks for no turbine runback 2. Ensures control rods are in manual with no rod motion 3. Checks rod position above low-low rod insertion limit 4. Checks axial flux difference (AFD) within target band 5. Initiates restoration of equilibrium conditions using either: • Control rod movement • Turbine load adjustment 6. Identifies failed Turbine First Stage Impulse Pressure Instrument
	US	Directs actions per 02-OHP 4022.013.016, Turbine First Stage Impulse Pressure Instrument Malfunction.
	RO	1. Verifies rod control in manual. 2. Places AMSAC bypass/test switch in BYPASS/TEST 3. Places Steam Dump selector control switches to OFF 4. Reduce Turbine load or Withdraw rods to restore Tave-Tref and AFD
	US	Initiates actions to trip bistables for MPC-253 failure per Attachment A of 02-OHP 4022.013.016.
	RO	Verifies proper bistable tripping per Attachment A.
	US	Refers to ITS LCO: 1. 3.3.1 Reactor Trip System Instrumentation (Table 3.3.1-1, Function 18e – Cond L 2. 3.3.2 ESFAS Instrumentation (Table 3.3.2-1, Function 4e – Cond D) 3. TRM 8.3.6 ATWS Mitigation System Actuation Circuitry (AMSAC)

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 3

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	Performs BORATION batch add: ▪ Place RC Makeup Blend control switch in STOP ▪ Place RC Makeup Blend Control Mode switch in BORATE ▪ Set desired batch on BA batch controller ▪ Place RC Makeup Blend control switch in START
	RO	Commences power reduction: · 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.
	BOP/RO	Acts as peer checker for RO during blender operations and RO verifies appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 4/5/6

Event Description: **SGTR on #22 SG, Automatic SI failure, SG PORV Controller Fails Open**

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Recognizes and reports excessive charging flow demand as indicated by: • Lowering Pressurizer level • Lowering Pressurizer pressure • PRZ level deviation alarm Recognize SG leakage based on RMS alarm on 2905 (SJAE) monitor.
	US	May enter and direct operator actions per 02-OHP-4022-002-020, Excessive RCS Leakage (or 02-OHP-4022-002-021 SG Tube Leakage): • Raise charging flow and isolate letdown • Start the second CCP • Maintain VCT level
	RO	Recognizes and reports RCS leak rate greater than the capacity of charging pump **or** unable to maintain pressurizer level/VCT level
	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).
	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: 5. Checks reactor trip 6. Checks turbine trip 7. Checks power to AC emergency buses 8. Checks safety injection status
	US	Ensures immediate actions of E-0 are completed
	RO/BOP **Critical Task #1**	**Check Safety Injection Actuated:** · **Manually Actuate SI (Train A)** **-OR-** · **Manually Start ECCS Equipment and Actuate Phase A (Train B)**
	RO/BOP	Check Systems in Proper Emergency Alignment: • Manually align Train B ECCS equipment for SI

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 4/5/6

Event Description: **SGTR on #22 SG, Automatic SI failure, SG PORV Controller Fails Open**

Time	Position	Applicant's Actions or Behavior
	US	Directs subsequent actions of E-0. • Directs BOP to isolate AFW flow to #22 SG when NR Level > 13%.
	RO/BOP	Performs manual actions of Attachment A in E-0 as directed by US.
	US	Completes all actions of E-0 through step 22 (Check If SG Tubes Are Intact).
	US	Announces transition to E-3, Steam Generator Tube Rupture (step 22 of E-0).
	US	Directs actions of E-3, Steam Generator Tube Rupture.
	US/BOP	Identifies #22 steam generator as ruptured
	BOP	Recognize and reports SG #22 PORV 2-MRV-223 has failed Open
	US	Direct operator actions to close SG PORV
	BOP	Place SG PORV #22 in Manual and Closes PORV.
	US/BOP **Critical Task #2**	**Manually closes the following valves for SG 22:** • **2-FMO-222, MDAFP discharge** • **2-MRV-220, SG Stop Valve** • **2-MRV-221, SG Stop Valve Dump Valve** • **2-MRV-222, SG Stop Valve Dump Valve** • **2-MRV-223, PORV** • **2-MCM-221, TDAFP steam supply** **NOTE: The following should be checked closed** • 2-FMO-221, TDAFP discharge • 2-FRV-220, feedwater reg. Valve • 2-FMO-202, feedwater isolation valve • 2-DCR-320, blowdown isolation valve • 2-DCR-302, blowdown sample valve
	BOP	Closes 2-DRV-407, SG stop valve drain valve

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 4/5/6

Event Description: **SGTR on #22 SG, Automatic SI failure, SG PORV Controller Fails Open**

Time	Position	Applicant's Actions or Behavior
	US/BOP **Critical Task #3**	**Directs RCS Cooldown to required core exit temperature:** **_____**
	RO/BOP **Critical Task #3**	**Commence cooldown at maximum rate using Manual Steam Dump Operation –OR- INTACT (3) SG PORVs** **Monitor RCS Thermocouple readings for target temperature** **Stop RCS cooldown when TCs < required temperature: _____**
	US	Directs operator action to maintain TCs < required temperature (provide band)
	RO/BOP	Performs the following as directed: • Resets SI and Containment Isolation Phase A • Establish Control Air to Containment • Stop RHR Pumps
	US **Critical Task #4**	**Directs RCS Depressurization to minimize break flow:** • **Normal spray if RCPs are running**
	RO **Critical Task #4**	**Commence depressurization using Normal Spray as directed:** • **Monitor RCS pressure, PRZ level, and RCS Subcooling** • **Stop RCS depressurization based upon: _____**

Op-Test No.: _____ Scenario No.: COOK06-02 Event No.: 4/5/6

Event Description: **SGTR on #22 SG, Automatic SI failure, SG PORV Controller Fails Open**

Time	Position	Applicant's Actions or Behavior
	US	***Check if ECCS flow should be terminated***
	US/RO	Terminate Safety Injection: ▪ Stop Both SI Pumps ▪ Stop 1 CCP ▪ Isolate BIT
	US/RO	Establish normal charging flow
	US	Verify ECCS flow NOT required
TERMINATE SCENARIO		

CRITICAL TASK SUMMARY
(COOK06-02)

Task	Elements	Results
#1 **Manually Actuate/Align one train of Safety Injection**	**Cueing:** · **Check SI Actuated "Safety Injection Actuated" Status Light LIT (E-0, Step 5.a)** **-OR-** · **Check BOTH CCP leakoff valve "Safety Injection Signal" white lights - LIT** **Performance Indicators:** · **Manually Actuate SI (Train A)** **-OR-** · **Manually Start ECCS Equipment and Actuate Phase A (Train B)** · **Must be performed before transitioning from E-0** **Performance Feedback:** · **ECCS flow is indicated to at least one train (as indicated by flow on cold leg BIT injection flowmeters)** · **One Train of Phase A Isolation is complete per E-0 Attachment A** ·	**SAT / UNSAT**
#2 **Isolates Flow To and From The Ruptured Steam Generator**	**Cueing:** • **Isolate Flow From Ruptured SG (E-3, Step 3)** • **If Ruptured SG … Then Close AFW Valves to Affected SG (E-0, Step 7.b.3), RNO)** • **Check Feed Flow To Ruptured SG Isolated (E-3, Step 4.b)** **Performance Indicators:** • **Isolates SG22:** · **Manually Closes SG PORV** · **Trips SG 22 Stop Valve closed** · **Closes SG 22 Stop Valve dump valves** · **Isolates TDAFP Steam Supply from SG #22** · **Isolates AFW to #22 SG when level is > 13%** • **Prior to RCS cooldown to preclude transition to ECA-3.1, Loss of Reactor Coolant –Subcooled Recovery Desired.** **Performance Feedback:** • **Stable or rising pressure in the ruptured SG.** • **No feedwater flow to the ruptured SG.**	**SAT / UNSAT**

Task	Elements	Results
#3 **Establishes and Maintains RCS Target Temperature**	**Cueing:** • **Initiate RCS Cooldown (E-3, Step 7)** **Performance Indicators:** • **Performs RCS cooldown, establishes and maintains CETC temperatures below target temperature.** • **Temperature must be maintained within limits to prevent transition from E-3 due to either:** · **Loss of subcooling (high temp.)** · **CSF transition (low temp.)** **Performance Feedback:** • **RCS temp. less than target temp.**	**SAT / UNSAT**
#4 **Depressurize RCS**	**Cueing:** • **Depressurize RCS Using Normal Spray… (E-3, Step 17)** **Performance Indicators:** • **Depressurizes RCS using PRZ Spray (NRV-163 & NRV-164).** • **Final RCS conditions must meet SI termination criteria** • **Ruptured SG inventory remains below 44ft. (RCLSG2)** **Performance Feedback:** • **RCS pressure lowering** • **PRZ level rising**	**SAT / UNSAT**

SIMULATOR INSTRUCTIONS
(COOK06-02)

Setup:

11. Reset to IC 991 (IC 37 with Summary file)
12. Reset control rods and check group step counters
13. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
14. Advance chart recorder paper & clear chart recorder memory
15. Update PPC Chart Recorders VCT 20-70, PWR 70-80%, Tave/Tref 560-570°F
16. Start Data Collection Program Save to file _____
17. Go to **RUN** and acknowledge/clear alarms
18. Restore Summary File "**COOK06-02**"
19. Remove TDAFP from Service and hang Clearance Tags on 2-QT-506 and TDAFP Discharge to SG Valves 2-FMO-211, 221, 231, & 241.
    - Verify Closed TDAFP Discharge Valves **FMO-211, 221, 231, & 241**
    - Depress TDAFP **Trip** Pushbutton.
    - Insert Malfunction to simulate Fuses pulled: **FW51**
    - Insert Remote Function to isolate flow path: **FWR52 to 0%**
    - De-energize TDAFP Discharge Valves **IMF 101FMO211, 101FMO221, 101FMO231, & 101FMO241**
20. Verify the following (pre-load) malfunctions:

· **RP10A**, Train A Safety Injection fails to AUTO actuate
· **RP11C**, Train A Safety Injection fails to MANUAL actuate
· **RP10B**, Train B Safety Injection fails to AUTO actuate
· **RP11B**, Train B Safety Injection fails to MANUAL actuate
· **RP11D**, Train B Safety Injection fails to MANUAL actuate

Assign the following to Trigger 1:

Override NRV-153 RED light ON:

· **IOV ZLO101NRV153[RED] ON**
· Override Panel 208 Drop 23 annunciator ON:
· **IOV AN08[023] CRYWOLF**

Assign trigger file "**RxTrip**" to Trigger E7. Assign "**IMF RX11B 100**" to Trigger E7 to cause SG PORV Controller to Fail to 100% on the Rx Trip.

Scenario Events:

Event #1

6. Trigger (1) **IRF RCR20**, final value **3**, (NRV-153 partially open) (Ensure **IRF RCR20 3**, **IOV ZLO101NRV153[RED] ON,** and **IOV AN08[023] CRYWOLF** are all entered on Trigger 1)

Event #3

7. Trigger (3) **IMF RX19A**, final value **0** (MPC-253 fails LOW)

Event #4

8. Trigger (5) **IMF RC23B,** final value **40** (400 GPM) **over 5 minutes** to start the SG tube Leakage.

- Train A/B Safety Injection fails to AUTO/MANUAL actuate is already entered.

Event #7

9. Ensure Trigger (7) **IMF RX11B,** final value **100** (SG PORV Controller failure) Actuates when the Reactor Trips.

(continued on next page)

Response to Crew's Requests:

7. If contacted as AEO to de-energize NMO-153 breaker EZC-D-3D, **IMF 101NMO153**.
8. If directed, to trip bistables for **MPC-253** use:

   IOV ZLOSTMC2[6] to ON to simulate opening cabinet Door

   (Override Lights/Relays – RX Flux panel)

Remote	Bistable
RPR021	FS/512B
RPR027	FS/522B
RXR03	PS/505C
RPR033	FS/532B
RPR039	FS/542B
RXR01	PS/505A

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

   DOV ZLOSTMC2[6] to simulate closing cabinet Door

9. If required, direct the crew as the Shift Manager to start power reduction and be less than 55% within 2 hours to address the West MFP Oil Leak. MTI will be up after the reduction to trip bistables for the Turbine Impulse Pressure failure.
10. If contacted as Radiation Protection, report that the requirements of 12-THP-6010-RPP-706, Gaseous Monitor Alarm Response have been met.
11. If contacted as Chemistry to evaluate SG Blowdown sample line activity per 12-THP-4030-002-208, Primary to Secondary Leakage – report back after some delay that leakage appears to be > 50 GPM on the #22 SG.
12. Local actions after entry into E-0:
    - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
    - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
    - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.

13. If directed to secure EDG jacket water pumps then modify remote functions as follows:
    - **MRF EGR 03**, select **OFF** then **AUTO**
    - **MRF EGR 04**, select **OFF** then **AUTO**

Facility: _Cook Plant Unit 1 & Unit 2_ Scenario No.: COOK06-03 Op-Test No.: ____

Examiners: _____ Operators:_____
_____ _____
_____ _____

Initial Conditions: IC 36 MOL , 51% power, 1015 ppm Boron, 8 GWD burnup

Turnover: 2W MDAFW OOS for Oil Change. The 2W MFP has just been returned to service following repair of an oil leak. Raise Power to 70%.

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

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

Revision 1, 11/21/05

Summary

If required, the crew will be directed by the Shift Manager to raise power to 70%.

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 insert and power will have to be restored. The crew will need to enter an Abnormal Operating Procedure, defeat the failed channel, address Technical Specifications, and restore rod control to auto.

When the RCS Temperature has been restored or a short ramp has been performed, MFC-110, the #21 S/G Main Steam Flow transmitter will fail high. This failure will also raise FW pump speed (apparent steam flow rise tries to maintain a higher DP). The BOP will need to take manual control of the MFP DP and Feedwater Regulating Valve FRV-210 to restore level. The crew will need to enter an Abnormal Operating Procedure, address Technical Specifications, and transfer to operable channel, and return FRV-210 to auto.

When the SG level has stabilized, 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. 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 transition has been made to ES-1.2.

Critical Tasks	Restore High Head Injection Trip RCPs
Procedures	E-0 Reactor Trip or Safety Injection E-1 Loss of Reactor or Secondary Coolant

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 1

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: · 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.
	RO/BOP	BOP acts as peer checker for RO during blender operations and RO verifies appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 2

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. (Note: May attempt 1 restart of 2E CCW pump per ARP.)
	US	May refer to actions of 02-OHP-4022.016.001, CCW Malfunction procedure.
	BOP	Performs the following actions as directed: 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 ITS LCO 3.7.7, Component Cooling Water System. Condition A Low Pressure Auto Start is NOT a Required Safety Function (2W CCW pump is not inoperable) (**NOTE:** CCW Surge tank valve 2-CRV-412 may close due to loss of flow to Rad Monitor.) If 2-CRV-412 closes, SRO directs actions per 12-OHP-4024-139 #39 CCW HX Rad Monitor to address Rad Monitor Low Flow and re-open 2-CRV-412.

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 3

Event 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.
	RO	Places rod control in manual after verifying no runback in progress. Identifies that PRZ Program Level is affected by this failure.
	US	Enters and directs actions of 02-OHP 4022.012.003, Continuous Control Bank Movement procedure, if rods moved.
	RO	If 02-OHP 4022.012.003 is entered, Performs the following as directed: 7. Checks for no turbine runback 8. Ensures control rods are in manual with no rod motion 9. Checks rod position above low-low rod insertion limit NOTE: Tave failure affects RIL Setpoint – Must use COLR 10. Checks axial flux difference (AFD) within target band 11. Initiates restoration of equilibrium conditions using either: • Control rod movement • Turbine load adjustment 12. Identifies failed RTD channel
	US	Enters and directs actions of 02-OHP 4022.013.007, RCS RTD Instrument Malfunction procedure.

(continued)

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 3

Event Description: **Loop 2 RCS Hot Leg Temperature Transmitter (NTP-121) Fails High (continued)**

Time	Position	Applicant's Actions or Behavior
	RO	5. Ensures control rods are in manual. 6. Reports Loop 2 as failed RCS temperature channel and aligns the following switches: • 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 ITS LCO: • 3.3.1. RTS Instrumentation (Table 3.3.1-1, Function 6 & 7 – Cond D) • 3.3.2 ESFAS Instrumentation (Table 3.3.2-1, Function 4e & 8c – Cond D)

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 4

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: 3. Restores SG 21 level using manual control of 2-FRV-210 4. Places MFP ΔP controller in manual and maintains pressure 5. Reports 2-MFC-110 has failed 6. Places 2-FS-512C selector switch in channel 2 position 7. Nulls and returns 2-FRV-210 controller to auto 8. 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 ITS LCO: • 3.3.1 RTS Instrumentation (Table 3.3.1-1, Function 15 – Cond D) • 3.3.2 ESFAS Instrumentation (Table 3.3.2-1, Function 4e. – Cond D)

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 5/6/7

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

Time	Position	Applicant's Actions or Behavior
	RO/US	Acknowledge Panel 222 Drop 84 alarm for Ice Condenser Doors Open. Determines that a loss of reactor coolant is occurring based on the following: · 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: 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 or rising Containment Pressure).
	RO/BOP	Performs the immediate actions of E-0: 9. Checks reactor trip 10. Checks turbine trip 11. Checks power to AC emergency buses 12. Checks safety injection status
	US	Ensures immediate actions of E-0 are completed

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 5/6/7

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

Time	Position	Applicant's Actions or Behavior
	US	Directs subsequent actions of E-0.
	RO/BOP	Reviews E-0 Foldout Page Criteria.
	BOP	Manually controls AFW flow to maintain SG narrow range levels 13% - 50% once one SG narrow range level is > 13%.
	RO	Reports that 2E CCW pump is NOT running – 2E CCW pump off due to previous failure.
	US/RO ***Critical Task #1***	**Manually opens high head safety injection valves:** • **BIT Outlet Valves** · **2-ICM-250 -AND/OR- 2-ICM-251** · · 2-IMO-256, BIT Inlet (Not critical)
	US/RO	Manually actuates Containment Isolation - Phase A.
	CREW **Critical Task #2**	**Manually stops all Reactor Coolant Pumps (RCPs) within 5 minutes of RCS pressure lowering below 1300 psig .**
	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).

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 5/6/7

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

Time	Position	Applicant's Actions or Behavior
	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 27% - 50%.
	US	Checks if SI Termination Criteria is MET: ▪ RCS Subcooling >40°F ▪ Secondary Heat Sink (SG >13% or AFW Flow >240x10^3) ▪ RCS Pressure rising or stable ▪ Pressurizer Level >20%
	Crew	Transition to ES-1.1, Safety Injection Termination if criteria is met. **(ES-1.1 Actions on Next Page. E-1 Actions Are Continued Below if SI Termination Criteria are NOT met)**
	RO/BOP	Performs the following as directed: 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. 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).

TERMINATE SCENARIO

Op-Test No.: _____ Scenario No.: COOK06-03 Event No.: 5/6/7

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

Time	Position	Applicant's Actions or Behavior
NOTE: Crew may transition to SI termination if criteria is met. This may involve stopping ECCS pumps and realigning charging until parameters change causing them to restart equipment and return to E-1 or ES-1.2. There are several points of transition to ES-1.2 from ES-1.1. The ES-1.1 Steps are listed below. The Scenario may be terminated upon transition to ES-1.2		
	US	Announces transition to ES-1.1, Safety Injection Termination (step 6 of E-1).
	RO/BOP	Reviews ES-1.1, Foldout Page Criteria. Monitors RCS Subcooling >40°F and PZR Level >20%, if NOT realign ECCS and GO TO E-1
	US	Directs Actions of ES-1.1
	RO/BOP	Performs the following as directed: 1. Resets both trains of Safety Injection 2. Stops one Charging Pump. 3. Resets both trains of Phase A 4. Establishes Control Air to Containment
	CREW	Check if RCS Pressure is stable or Rising If Lowering, Transition to ES-1.2
	RO/BOP	Performs the following as directed: 1. Establish Normal Charging Flowpath 2. Isolate BIT Injection
	CREW	Check if: ▪ Pressurizer Level is stable and ▪ RCS Pressure is Stable or Rising If NOT, Transition to ES-1.2

TERMINATE SCENARIO

CRITICAL TASK SUMMARY
(COOK06-03)

Task	Elements	Results
#1 **Manually open high head safety injection valves**	**Cueing:** · **Check ECCS Flow: BIT - Flow Indicated (E-0, Step 12.a)** **-OR-** · **Check Systems In Proper Emergency Alignment: ECCS Monitor lights – Proper Status (E-0, Step 15.c)** **Performance Indicators:** · **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.** **Performance Feedback:** · **BIT flow is indicated to at least one train (as indicated by flow on two cold leg BIT injection flowmeters)**	**SAT / UNSAT**
#2 **Manually trip all Reactor Coolant Pumps**	**Cueing:** • **RCS pressure – less than 1300 psig AND CCPs or SI pumps – at least one running** · **E-0, Foldout Page, Step 1** · **E-0, Step 19** · **E-1, Foldout Page, Step 1** · **E-1, Step 1** **Performance Indicators:** · **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.** **Performance Feedback:** · **RCP ammeters – zero current** · **RCP trip low flow alarms – lit** · **RCS loop flow meters – flow lowering**	**SAT / UNSAT**

SIMULATOR INSTRUCTIONS
(COOK06-03)

Setup:

21. Reset to IC973. (IC 36 raised to 55% with 3 CW pps, 2W AFP OOS, and summary file)
22. Reset control rods and check group step counters
23. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
24. Advance chart recorder paper & clear chart recorder memory
25. Update PPC Chart Recorders VCT 20-70, PWR 50-60%, Tave/Tref 555-565°F
26. Ensure NI Trip Setpoint 79% card is displayed.
27. Start Data Collection Program Save to file _____
28. Restore Summary File: "**ILTCOOK06-03**"
29. 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**
30. Go to **RUN** and acknowledge/clear alarms
31. 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)

Scenario:

Event 2

1. (**NOTE:** Ensure RO is occupied with power change prior to activating trigger to ensure BOP must address failure)
   Trigger (Trg. 1) malfunction **CC01A** (2E CCW pump trip) after crew has placed Main Feedwater pump in service.

   Event 3

2. Trigger (Trg. 2) malfunction **RX02B**, final value **650** (NTP-121 fails hi) after crew has recovered from CCW pump trip.

Event 4

3. Trigger (Trg. 4) malfunction **RX20A**, final value **4e+6** over 10 seconds (MFC-110 fails hi) after crew has completed an appropriate power change.

Event 5

4. Trigger (Trg. 5) malfunction **RC10D**, final value **60**, ramp **5:00** (SB LOCA) after crew has stabilized the plant.

(continued on next page)

Response to Crew's Requests:

1. If dispatched to check 2E CCW breaker T21D3, report that the breaker has tripped on OC. Report no indications of problems with the pump if checked locally.
2. If required, Prompt Crew as Shift Manager to Restore Reactor Power/Temperature while waiting for bistables to be tripped.

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

Override ZLOSTMC2[7] to ON to simulate opening cabinet Door

(Override Lights/Relays – RX Flux panel)

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

Override ZLOSTMC2[2] to ON to simulate lifting Test Rack

Delete Override ZLOSTMC2[7] to simulate closing cabinet Door

Response to Crew's Requests: (continued)

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

Override ZLOSTMC2[6] to ON to simulate opening cabinet Door

(Override Lights/Relays – RX Flux panel)

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

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

Delete Override ZLOSTMC2[6] to simulate closing cabinet Door

4. Local actions after entry into E-0:
   - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
   - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
   - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.

5. 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 2_ Scenario No.: COOK06-04 Op-Test No.:

Examiners: _____ Operators:_____
_____ _____
_____ _____

Initial Conditions: IC 37, 74% power, 941 ppm Boron, 8 GWD

Turnover: 2CD DG is tagged out for oil change.

Event No.	Malf. No.	Event Type*	Event Description
1	RX05A @ 0	I-RO TS	Controlling Pressurizer Level Channel (NLP-151) fails LOW
2	RX17J to 0% over 10 Sec	I-BOP TS	SG Pressure Channel MPP-240 Fails Low
3	Global 101BAP4	C-RO	#4 Boric Acid Pump Trip
4a	FW38 to 30%	C-BOP	Loss of condenser vacuum Ramp in over 15 minutes to 30%
5		R	Power reduction / Reduce Turbine Load
4b	FW38 to 100%		Condenser vacuum degrades requiring a Reactor Trip. Ramp in over 5 minutes to 100%
6	ED01 ED04 ED25	Major	Loss of all AC power (EP Xfrmr, 345kv & 765kv lines) causing entry into ECA-0.0
6a	EG08A - Preload	C-BOP	2 AB DG Speed Governor failure; DG will not reach rated speed resulting in Incomplete Sequence.
7	RC17A to 50% after 35 sec	C-RO	Pressurizer PORV (NRV-151 will stick open @ 50%, 35 sec after reactor trip.)

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

Revision 1, 11-15-2005

Summary

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

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, address Technical Specifications, select an operable channel, and restore automatic control.

After SG level is restored the Boric Acid pump will trip. The crew will be required to address the Technical Requirements manual and select the Standby Boric Acid pump.

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. 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 SDG (Attachment D). The crew will energize the vital buses and isolate the stuck PORV. The scenario ends after the transition to ECA-0.1 or ECA-0.2.

Critical Tasks

Isolate Pressurizer PORV
Restore Emergency Power

Procedures

E-0 Reactor Trip or Safety Injection
ECA-0.0 Loss of All AC Power

Revision 1, 11-15-2005

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 1

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

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #208 (Drops 4 and 5) indicative of a pressurizer (PRZ) level instrument failure.
	RO	Places 2-QRV-251, Charging Flow Controller OR PRZ Level Controller to manual and manually adjusts output to adjust charging header flow and seal injection to minimum charging and control seal injection between 6 – 12 gpm due to loss of letdown.
	US	Enters and directs actions of 02-OHP 4022.013.010, Pressurizer Level Instrument Malfunction procedure.
	RO	Performs the following actions as directed: 10. Restores PRZ level using 2-QRV-251 or level controller 11. Reports 2-NLP-151 has failed 12. Ensures PRZ level control is in manual 13. Places PRZ Level CTRL selector switch in Ch 2 & 3 position 14. Places PRZ Level REC selector switch in 2 or 3 position 15. Restore Letdown per 02-OHP-4021-003-001 16. Cycle PRZ Heaters to restore control 17. 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 ITS LCO: • 3.3.1 RTS Instrumentation (Table 3.3.1-1, Function 9 – Cond D) • 3.3.3 Post Accident Monitoring Instrumentation (Table 3.3.4-1, Function12 -Minimum met) • 3.3.4 Remote Shutdown Instrumentation (Condition A) [02-OHP-4030-214-031 pg. 42]

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 2

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 ΔP 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: 9. Restores SG 24 level using manual control of 2-FRV-240 10. Checks SG PORVs closed 11. Places MFP ΔP controller in manual 12. Reports 2-MPP-240 has failed 13. Places 2-FS-542C selector switch in channel 2 position 14. Declares steam flow channel 2-MFC-140 inoperable 15. Nulls and returns 2-FRV-240 controller to auto 16. 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 ITS LCO: · 3.3.1 RTS Instrumentation (Table 3.3.1-1, Function 15 – Cond D) · 3.3.2 ESFAS Instrumentation (Table 3.3.2-1, Function 1e(2) & 4e – Cond D) · 3.3.4 Remote Shutdown Instrumentation (Condition A) [02-OHP-4030-214-031 pg. 40]

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 3

Event Description: **#4 Boric Acid Pump Trip**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #209 Drop 37 which is indicative of a Boric Acid Pump Trip. Verifies that #4 Boric Acid Pump has tripped.
	RO	Verifies that 2-QRV-400 closes and/or stops makeup, if makeup is in progress.
	US	Directs operator actions per 02-OHP-4024-209 Drop 37. Directs RO to start Boric Acid Pump #3.
	US	Refers to ITS TRM: TRO 8.1.1 Boration System – Operating (No entry into Condition A is required)

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 4a

Event Description: **Loss of Condenser Vacuum**

Time	Position	Applicant's Actions or Behavior
	BOP	Acknowledges and reports annunciators: RMS 2910 alarm for SJAE High Flow condition 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: 1. Opens 2-SMO-401, steam to the start-up SJAEs 2. Opens start-up SJAE air off-takes: · 2-SMO-405 · 2-SMO-406 · 2-SMO-407
	BOP	Dispatches operator to check the alignment of: · Steam Seals · Air Ejectors · Circulating Water · Vacuum Breakers (including seal water flow) · Condenser Water Boxes (vented)
	US	Directs actions to reduce turbine load by using either: (see NOTE) · 02-OHP 4021.001.003, Power Reduction · 02-OHP 4022.001.006, Rapid Power Reduction Response

NOTE:
See next two pages for actions associated with power / turbine load reduction.
Page 7 is the Normal Power reduction
Page 8 is for a Rapid Power reduction

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 5

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: · 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.
	RO/BOP	BOP acts as peer checker for RO during blender operations and RO verifies appropriate reactivity feedback.
	BOP	Monitors and maintains main electrical generator temperatures within limits per: · 02-OHP 4021.059.001, Generator Stator Cooling Water System · 02-OHP 4021.080.003, Generator Hydrogen Gas System

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 5

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: · Ensures control rods in auto or manually inserts rods. · Lowers turbine load (reactor power) using the load limiter or operating device.
	RO/BOP	BOP acts as peer checker for RO during blender operations and RO verifies appropriate reactivity feedback.

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 4b

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

Time	Position	Applicant's Actions or Behavior
	RO/BOP	Monitors secondary plant parameters including: · Main condenser vacuum · Main turbine load (MWe) · Main feedpumps condenser vacuum · Main feedwater pump flow capability
	US	Directs RO to perform a Manual Reactor Trip condenser vacuum approaches 21" Hg.
	CREW	Manually trips the reactor.

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 6/7

Event Description: **Loss of All AC Power / 2AB Emergency Diesel Generator Failure 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: 13. Checks reactor trip 14. Checks safety injection status
	BOP	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

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 6/7

Event Description: **Loss of All AC Power / 2AB Emergency Diesel Generator Failure Pressurizer PORV (NRV-151) Sticks Open**

Time	Position	Applicant's Actions or Behavior
	BOP	Checks AFW flow > 240,000 PPH:
	US	Recognizes that both EDGs are not running, can not be started, and that T21A and T21D are de-energized. Go to attachment D since EP is energized.
	RO/BOP	Prepare for Emergency AC restoration: · Dispatch RP & AEO to Isolate RCP Seals 2-CS-311N/S & CS-307 · Place 2-DRV-407 SG Stop Valve Drain to CLOSE
	US	Select Emergency AC Bus for Energizing: DG2CD & DG2AB Trip Control Bus Voltage Failure NOT Lit Check Load Shed lights lit on Both Trains Selects Train to restore: · Step 3 - to energize Bus T21A from EP (TRN B) · Step 6 - to energize Bus T21D from EP (TRN A) *NOTE: Bus T21A is preferred (MCC EZC-A) provides power to the stuck open PRZ PORV's block valve (2-NMO-151).*
	BOP **Critical Task #1**	**Energizes T21A -OR- T21D emergency bus from EP as directed:** **1. Checks T21A (T21D) bus – not faulted** **2. Places DG2AB(CD) supply to bus T21A(D) in pull to lock** **3. Place Train B (A) Load Conservation Switch in LOAD CON** **4. Closes T21A12 (T21D1)4KV EP supply to bus T21A(D)** **5. Checks T21A (T21D) ENERGIZED**
	CREW **Critical Task #2**	**Closes 2-NMO-151, PORV Block Valve when power is available (to stop LOCA to PRT)**
	US/RO	Isolates RCP Seal And Thermal Barrier Returns: Close 2-QCM-350 (2-QCM-250) RCP seal Return Close 2-CCM-454 (2-CCM-453) CCW from RCP Thermal Barrier

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 6/7

Event Description: **Loss of All AC Power / 2AB Emergency Diesel Generator Failure Pressurizer PORV (NRV-151) Sticks Open**

Time	Position	Applicant's Actions or Behavior
	BOP	Energizes T21B (T21C) emergency bus from EP as directed: 1. Checks T21B (T21C) bus – not faulted 2. Places DG2AB(CD) supply to bus T21B(C) in pull to lock 3. Closes T21B2 (T21C2)4KV EP supply to bus T21B(C) 4. Checks T21A (T21D) ENERGIZED
	US	Directs BOP to stabilize RCS Cold Leg temperatures at 547°F.
	BOP	Controls SG PORVs to stabilize SG pressures
	US/RO	Align Equipment for recovery actions as directed: 1. Starts available ESW pump 2. Place Train B (A) Load Conservation Switch in NORMAL 3. Reset and start Control room AHU
	RO/BOP	Places the following equipment in pull to lock: · MDAFPs · CCPs · RHR pumps · SI pumps · CTS pumps · CCW pumps · ESW pumps (non-running) · NESW pumps Verify PRZ Heater Breakers are open with Green Target · T21A6 · T21D9
	US	Determines Recovery Procedure Required: ECA 0.1 if RCS Subcooling is > 40°F and PRZ Level is > 20%. ECA 0.2 if RCS Subcooling is <40°F OR PRZ Level is <20%

[If Required - Actions for ECA-0.2 , Loss Of All AC Power Recovery With SI Required are on the next page]

TERMINATE SCENARIO

Op-Test No.: _____ Scenario No.: COOK06-04 Event No.: 6/7

Event Description: **Loss of All AC Power / 2AB Emergency Diesel Generator Failure Pressurizer PORV (NRV-151) Sticks Open**
[If Required - Actions for ECA-0.2 , Loss Of All AC Power Recovery With SI Required]

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: 1. Checks SI reset 2. Checks emergency valve alignment: · ESW · CCW · ECCS 3. Closes either RCP thermal barrier isolation valve: · 2-CCM-453 (Train A) · 2-CCM-454 (Train B) 4. Establishes CCW: · 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
	BOP	Checks CST and Controls SG Levels Control AFW flow to Establish 27-50%
	RO/BOP	Verify/actuate Containment Isolation Verify/actuate Containment Spray (if PRT Ruptures & Pressure is > 2.8 psig)
	US	Implement FRs as required.
	US	Direct Actions to Verify Power restored to AC buses Direct Actions to Load equipment · Containment CEQ Fans & DIS. · Control Room Ventilation · Battery Chargers

TERMINATE SCENARIO

CRITICAL TASK SUMMARY
(COOK06-04)

Task	Elements	Results
#1 **Restore Emergency Power**	**Cueing:** • **Restore AC Power (ECA-0.0)** • **T21A or T21D bus NOT energized** **Performance Indicators:** • **Restores emergency power (EP) to at least one 4KV emergency (pump) bus (i.e., T21A or T21D).** • **Power is restored prior to depressurizing intact SGs to 190 psig (ECA-0.0, Step 19).** **Performance Feedback:** • **T21A or T21D bus energized** • **Power available to safeguards equipment.**	**SAT / UNSAT**
#2 **Isolate PRZ PORV**	**Cueing:** • **Check If RCS Is Isolated, PRZ PORVs – Closed (ECA-0.0, Step 3.a)** **Performance Indicators:** • **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).** **Performance Feedback:** • **RCS pressure stabilizes** • **PORV block valve indicates closed**	**SAT / UNSAT**

Setup:

32. Reset to IC 974 (IC 37 with Summary file)
33. Reset control rods and check group step counters
34. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
35. Advance chart recorder paper & clear chart recorder memory
36. Update PPC Chart Recorders VCT 20-70, PWR 70-80%, Tave/Tref 560-570°F
37. Start Data Collection Program Save to file _____
38. Go to **RUN** and acknowledge/clear alarms
39. Restore Summary File "**COOK06-04**"
40. Tagout CD EDG as follows:
    - imf **EG10B** (start failure)
    - mrf **EGR14** (RO)
    - mrf **EGR15** (RO)
    - mrf **EGR02** (RO)
    - imf **EG06B**
    - Place clearance tags on CD EDG control switches:
      - Stop-Run
      - Output Breakers in PTL (2)
41. Go to **RUN** and acknowledge/clear alarms
42. Activate the following pre-load malfunctions:
    - **EG08A** (AB EDG failure)
43. Assign "**RTB Open**" to trigger **E1**, Assign Imf **ED01**, Imf **ED04**, Imf **ED25,** and Imf **RC17A @ 50% with 35 sec delay** to trigger **E1**

(Continued on next page)

Scenario:

Event #1

10. Trigger (2) **IMF RX05A**, final value **0** (NLP-151 fails LOW)

Event #2

5. Trigger (4) malfunction **RX17J**, final value **0** over 10 seconds (MPP-240 fails lo) when the crew has recovered from PRZ level instrument failure.

Event #3

11. Trigger (6) **ICF 101BAP4**, to trip the Boric Acid Pump #4

Event #4a

6. Trigger (8) malfunction **FW38**, final value **30**, ramp **15:00** (loss of condenser vacuum to 30% over 15 min.) after the previous event is triggered. Monitor Vacuum (see attached Conversion Chart) and adjust malfunction severity to stabilize vacuum and allow crew time for ramp. (May need to stop at 28% and then slowly raise back to 30%)

Event #4b

7. 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.

Event #6/7

8. (Set up on Trigger E1) Trigger malfunctions upon reactor trip:
   - **ED01** (loss of offsite 345KV lines)
   - **ED04** (loss of offsite EP transformer)
   - **ED25** (loss of offsite 765KV lines)
   - **RC17A**, final value **50** (NRV-151 sticks 50% open) with **35 sec** delay

(Continued on next page)

Vacuum Conversion Chart for Monitored Parameter ZAOSPI300 (Vacuum Meter)

ZAOSPI300		Vacuum “hg
0.70		21.00
0.71		21.30
0.72		21.60
0.73		21.90
0.74		22.20
0.75		22.50
0.76		22.80
0.77		23.10
0.78		23.40
0.79		23.70
0.80		24.00
0.81		24.30
0.82		24.60
0.83		24.90
0.84		25.20
0.85		25.50
0.86		25.80
0.87		26.10
0.88		26.40
0.89		26.70
0.90		27.00
0.91		27.30
0.92		27.60
0.93		27.90
0.94		28.20
0.95		28.50
0.96		28.80
0.97		29.10

(Continued on next page)

Response to Crew's Requests:

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

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

    (Override Lights/Relays – RX Flux panel)

Remote	Bistable
RPR041	LS/459A

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

    DOV ZLOSTMC2[6] to simulate closing cabinet Door

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

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

(Override Lights/Relays – RX Flux panel)

Remote	Bistable
RPR105	PS-534B
RPR104	PS-534A
RPR035	FS-540A
RPR036	FS-540B
RPR039	FS-542B

Override ZLOSTMC2[1] to ON to simulate lifting Test Rack
Delete Override ZLOSTMC2[6] to simulate closing cabinet Door

16. If contacted as AEO to investigate Breaker 2-AB-A-1D for #4 boric acid Pump 2-PP-46-4, report that the breaker is tripped on overcurrent. Report that the Motor is hot and has a burnt electrical smell.

17. If contacted as U-1 to verify the U-2 HSDP #4 Boric Acid Pump position, report that the Switch is in the Control Room position.

18. 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**

19. If directed to restore N train battery charger then

Modify EDR21 to NEITHER then to TRN A or TRN B

Facility: _Cook Plant Unit 1 & Unit 2_ Scenario No.: COOK06-05 Op-Test No.:

Examiners: _____ Operators:_____
_____ _____
_____ _____

Initial Conditions: IC 975 , 74% power, 941 ppm Boron, 8 GWD

Turnover: Raise Power to 100%. 2W MDAFP OOS.

Event No.	Malf. No.	Event Type*	Event Description
1	NI10B @ 200	I-RO TS	Power Range NI42 fails HIGH
2	101ACRA1 (Global)	C-BOP TS	Loss of Control Room North Air Handling Unit
3	CV05 @ 20%	C-RO	Letdown Heat Exchanger leak (to CCW)
4	RX18 to 1 over 2 min ramp	I-BOP	Main Steam Turbine Bypass Header Pressure UPC-101 Fails Low (Steam Input to FWP Delta-P)
5	RP08A	Major	Spurious Feedwater Isolation
6	RP01A, RP01B, Preload	C-RO	Reactor Fails to Automatically Trip
7a	CV013B	C-RO	2W Centrifugal Charging Pump Trip (fail to start)
7b	ED05H	C-BOP	Loss of 4KV Bus T21D (Loss of E CCP and E MDAFP) on the Reactor Trip
8	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 74% with directions to raise power to 100% following a forced outage.

After the crew has assumed the watch, NI-42 Power Range Channel fails High. The RO will need to take manual rod control. The crew will implement an Abnormal Operating Procedure and address Technical Specifications.

The second event is a trip of the North Control Room Air Handling Unit. The crew will need to investigate the cause, start the South Air Handling Unit, and address Technical Specifications.

After the South Control Room Air Handling Unit is started, a letdown heat exchanger leak will occur. The crew will need to address CCW in-leakage, implement an Abnormal Operating Procedure, isolate Letdown, and establish excess letdown.

After excess letdown is established, the Main Steam Turbine Bypass Header Pressure UPC-101 Fails Low (Steam Input to FWP Delta-P) causing the FW pumps to slow down. The BOP will need to take manual control of FW Pump Speed to establish the proper DP to continue feeding the SGs.

A spurious Feedwater Isolation will require a reactor trip. The automatic Reactor Trip fails requiring the RO to manually trip the Reactor.

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 cyclic loading attempts.

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 Establish FW Flow before SGs Dry out.
Procedures	E-0 Reactor Trip or Safety Injection FR-H.1 Response to Loss of Heat Sink

Revision 1, 11-3-2005

Op-Test No.: _____ Scenario No.:COOK06-05 Event No.: 1

Event Description: **Power Range NI42 fails HIGH.**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #210 which are indicative of a NI instrument failure (Drops 11,13,18, and 19).
	US	Enters and directs actions of 02-OHP 4022.012.003, Continuous Control Bank Movement procedure.
	RO	Performs the following as directed: 13. Checks for no turbine runback 14. Ensures control rods are in manual with no rod motion 15. Checks rod position above low-low rod insertion limit 16. Checks axial flux difference (AFD) within target band 17. Initiates restoration of equilibrium conditions using either: • Control rod movement • Turbine load adjustment 18. Identifies failed power range channel
	US	Enters and directs actions of 02-OHP 4022.013.004, Power Range Malfunction procedure.
	US	Directs operator actions per 02-OHP-4022-013-004, Power Range Malfunction: Verify Rod Control switch in MANUAL Places Rod Stop Bypass selector in NI42 position Reduce turbine load or withdraw rods to minimize Tave/Tref difference Remove NI42 channel from service
	RO/BOP	Performs actions as directed to remove NI-42 from service Place Channel Defeat selector to NI-42 Place Upper Section Channel Current Comparator Defeat Selector to NI-42 Place Lower Section Channel Current Comparator Defeat Selector to NI-42 Place Power Mismatch Bypass selector to NI-42 Verify Delta-T Recorder Selector NOT in Channel 2 Verify Overtemperature Delta-T Recorder Selector NOT in Channel 2 Restore Rod Control to Automatic

Op-Test No.: _____ Scenario No.:COOK06-05 Event No.: 1

Event Description: **Power Range NI42 fails HIGH.**

Time	Position	Applicant's Actions or Behavior
	US	Directs actions to trip bistables associated with NI-42 Power Range Malfunction per Attachment D of 02-OHP 4022.013.004.
	US	Refers to Tech Specs: ▪ 3.3.1 RTS Instrumentation (Table 3.3.1-1, Functions 2a, 2b[<10%], 3a, 3b, 6, 18c & 18d Conditions C, D & L)

Op-Test No.: _____ Scenario No.: COOK06-05 Event No.: 2

Event Description: **Loss of Control Room North Air Handling Unit**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciator on Panel #203 (Drop 23) indicative of the loss of the North Control Room Air Handling Unit.
	US/BOP	Starts the South Control Room Air Handling Unit per OHP 4024.203 Drop 23 annunciator response by placing the South Ctrl Room Air HDLG Unit to RUN. (May attempt 1 restart of the North Control Room Air Handling Unit per ARP)
	US	Refers to Tech Specs (TS): TS 3.7.11 Control Room Air Conditioning (CRAC) System • (Condition A) due to a loss of 1 cooling system.

Op-Test No.: _____ Scenario No.: COOK06-05 Event No.: 3

Event Description: **Letdown Heat Exchanger leak (to CCW)**

Time	Position	Applicant's Actions or Behavior
	RO	Identifies and reports CCW Radiation Rise, • Panel 238 Drop 10, "R17A East CCW Header High Radiation" • Panel 223 Drop 46, "RMS Rad Level High or Sys Abn" Identifies rise in CCW level and reduced letdown flow.
	US	Enters and directs actions of 02-OHP 4022.016.003, CCW In-Leakage procedure.
	Crew	Identifies Letdown HX leak based on low letdown line flow.
	US/RO	Performs actions to isolate Letdown HX per Attachment B: 1. Align 2-QRV-302, cold letdown path select to RC FILTER 2. Align 2-QRV-303 VCT/Holdup Tk inlet selector to CVCS HOLDUP TANK 3. Isolate Letdown and Charging per 02-OHP-4021-003-001 Attachments 4 & 13 as follows: • Close Letdown Isolation Valves 2-QRV-111 & 112 • Close Orifice Isolation Valves 2-QRV-160, 161, & 162 • Reduce Charging With 2-QRV-251 & QRV-200
	US	Directs RO to establish Excess Letdown.
	RO	Place in service excess letdown per 02-OHP-4021-003-001 Attachment 6: 1. Verify the following valves - OPEN: • 2-CCR-460, CCW From Excess Letdown Hx • 2-CCR-462, CCW To Excess Letdown Hx • 2-QCM-250, RCP Seal Water Return • 2-QCM-350, RCP Seal Water Return 2. Open the following valves: • 2-QRV- 113, Excess Letdown To Hx • 2-QRV-114, Excess Letdown To Hx 3. Verify 2-QRV-171, Exs Letdown Hx Outlet Select, is in VCT Position 4. Slowly open 2-QRV-170, Excess Ltdn Hx Outlet Press, **while** maintaining Excess Letdown Hx outlet temperature less than 195°F.
	US	Directs Actions to locally isolate CCW to Letdown HX 2-CCW-160, 164, & 165

Op-Test No.: _____ Scenario No.: COOK06-05 Event No.: 4

Event Description: **Main Steam Turbine Bypass Header Pressure UPC-101 Fails Low (Steam Input to FWP Delta-P)**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciator on Panel #215 Drop 53, FW Controller Failure and indications of a failure affecting main feedwater to all steam generators (SGs): • Main FW Pump Diff Pressure Controller • All SG levels lowering • All feedwater regulating valves opening • Main feedwater pumps speed lowering
	BOP	Places MFP differential pressure controller (or both Main FW Pump controllers) 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 nuclear power during feedwater transient.

Op-Test No.: _____ Scenario No.: COOK06-05 Event No.: 5/6/7/8

Event Description: **Spurious FW Isolation**
Reactor 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 for a reactor trip. .
	CREW **Critical Task #1**	**Manually opens reactor trip breakers in response to (any):** • **Low SG level** • **FW Flow<Stm Flow w/low SG level** • **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: 15. Checks reactor trip 16. Checks safety injection status
	BOP	Performs the (secondary) immediate actions of E-0: 1. Verifies Turbine trip 2. Checks power to AC emergency buses • Reports Loss of 4KV Bus T21D (due to fault) • Trips CD EDG or places T21D8 in PTL to prevent cyclic loading attempts
	US	Ensures immediate actions of E-0 are completed
	US	Determines that a SI is NOT required
	US	Announce Transition to ES-0.1. (Note US should request STA or Identify red path on Heat Sink)
	US/BOP	Announces transition to FR-H.1, Response to Loss of Secondary Heat Sink.

Op-Test No.: _____ Scenario No.: COOK06-05 Event No.: 5/6/7/8

Event Description: **Spurious FW Isolation**
Reactor 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	Attempts to start 2 West CCP. Determines that 2 West CCP is not available
	US/RO **Critical Task #2**	• 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: 1. Actuate SI 2. Checks RCS feed path: • South SI pump running • ECCS monitor lights in proper status 3. Establishes RCS bleed path • 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:** • **2-XCR-100** • **2-XCR-101** • **2-XCR-102** • **2-XCR-103** 7. Checks bleed path: • 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: • Dispatches operator to reset TDAFP mechanical overspeed.

Op-Test No.: _____ Scenario No.: COOK06-05 Event No.: 5/6/7/8

Event Description: **Spurious FW Isolation**
Reactor 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
	CREW **Critical Task #3**	**Restores AFW flow to the SGs from the TDAFP.**
TERMINATE SCENARIO		

CRITICAL TASK SUMMARY
(COOK06-05)

Task	Elements	Results

#1
 	
Manually Trip Reactor
	Cueing:
	• **Challenge to multiple reactor trip setpoints:**
	  · **SG Level Low-Low Reactor trip**
	  · **SG Level Low with FW Flow<Steam Flow Reactor Trip**
	• **RX TRIP BKR TRAIN A/B UV TRIP (ATWS) alarms**
	
	Performance Indicators:
	• **Manually open at least one reactor trip breaker from the control room.**
	• **Must be performed prior to:**
	  · **SG Dryout (<17% wide range level)**
	  · **Exceeding RCS safety valve limit (2485 psig)**
	
	Performance Feedback:
	• **RPIs indicate rods - fully inserted**
	• **Rod bottom lights – lit**
	• **Neutron flux - lowering**
		SAT / UNSAT

#2 **Establish RCS Bleed (and Feed)**	**Cueing:** • **Enters FR-H.1 on Heat Sink Red Path after exiting E-0 (No AFW Flow)** • **Commences bleed and feed actions from FR-H.1 Step 2 when it has been determined that no CCPs are running.** **Performance Indicators:** • **Stops all RCPs (extends time to SG dryout)** • **Opens all PRZ PORVs (establishes bleed path)** • **Must be performed prior to SG Dryout (<17% wide range level)** **(Note: RCS Feed initiated by SI)** **Performance Feedback:** • **PRZ PORV red lights lit** • **PRZ PORV tailpipe temperatures rising** • **PRT pressure/temperature/level rising**	**SAT / UNSAT**

CRITICAL TASK SUMMARY
(COOK06-05)

Task	Elements	Results
#3 **Establish FW Flow before SGs Dry out.**	**Cueing:** • **AFW flow < 240,000 PPH** • **NR SG Levels OFFSCALE LOW** **Performance Indicators:** • **Manually start at least one AFW Pump from the control room.** • **Establish FW per foldout page to lower CETC's** • **Must be performed prior to:** · **SG Dryout (<15% wide range level)** **Performance Feedback:** • **AFW or FW flow indicated to SGs** • **CETC's - lowering**	**SAT / UNSAT**

Setup:

44. Reset to IC 975 (IC 37 with W MDAFP OOS, W CCP operating with summary file)
45. Reset control rods and check group step counters
46. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
47. Advance chart recorder paper & clear chart recorder memory
48. Update PPC Chart Recorders VCT 20-70, PWR 70-80%, Tave/Tref 560-570°F
49. Start Data Collection Program Save to file _____
50. Go to **RUN** and acknowledge/clear alarms
51. Restore Summary File "**COOK06-05**"
52. Ensure the West CCP is operating (2E CCP in Standby)
53. 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**
54. Go to **RUN** and acknowledge/clear alarms
55. Activate the following pre-load malfunctions:
    - **RP01A** (Auto reactor trip / train A failure)
    - **RP01B** (Auto reactor trip / train B failure)
    - Assign "**RTB Open**" to trigger **E10**, Assign IMF **CV13B**, IMF **ED05H** and IMF **FW46C** to trigger **E10**

(continued on next page)

SIMULATOR INSTRUCTIONS
(COOK06-05)

Scenario:

Event #1

9. Trigger (Trg 1) malfunction **NI10B**, final value **200** (NI-42 fails high)

Event #2

10. Trigger (Trg 2) Global malfunction **101ACRA1** (Loss of Control Room North Air Handling Unit) after crew has recovered from the NI failure.

Event #3

11. Trigger (Trg 3) malfunction **CV05**, final value 2**0** (Letdown HX leak) after the South Control Room Air Handling unit is started.

Event #4

12. Trigger (Trg 4) malfunction **RX18** final value **1**, ramp **2:00** (UPC-101 fails lo over 2 min.) after the crew establishes excess letdown.

Event #5

13. Trigger (Trg 5) malfunction **RP08A** after the crew recovers from the feedwater transient.

Events #7/8

14. (Set up on Trigger E10)Trigger the following malfunctions when the reactor trip is tripped manually:
    - **CV13B** (2W CCP Trips)
    - **ED05H** (Loss of 4KV Bus T21D)
    - **FW46C** (TDAFP trip)

(continued on next page)

Response to Crew's Requests:

20. If directed, to trip bistables for **NI-42** use:
    IOV ZLOSTMC2[7] to ON to simulate opening cabinet Door
    (Override Lights/Relays – RX Flux panel)

Remote	Bistable
RPR123	TS/421C
RPR124	TS/421D

    IOV ZLOSTMC2[2] to ON to simulate lifting Test Rack
    DOV ZLOSTMC2[7] to simulate closing cabinet Door

21. If contacted as AEO to investigate the North Air Handling Unit Trip, report back after 2 min. delay that Breaker 2-AB-D has an OC trip.

22. If contacted as chemistry regarding loss of normal letdown, then request that Excess Letdown be placed in Service

23. If dispatched to Isolate CCW to Letdown HX use the following: (drawing CC4)
    - Use RF **CCR10** to **CLOSE** to isolate CCW-160.
    - Use RF **CCR11** to **0%** to isolate CCW-164.
    - Verify RF **CCR12** is at **0%** to for CCW-165.

24. If contacted as MTI to investigate UPC-101 malfunction, report back after some 3 min. delay that the cause cannot be determine and further testing will be required.

25. If directed to locally reset the TDAFP mechanical overspeed device, wait until

After RCS bleed and feed has been initiated (all PRZ PORVs open),

delete malfunction **FW46C** *and* ***report to the control room that the TDAFP mechanical overspeed device has been reset locally.***

26. Local actions after entry into E-0:
    - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
    - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
    - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.

27. 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 2 Scenario No.: COOK06-05a Op-Test No.:

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: IC 975 , 74% power, 941 ppm Boron, 8 GWD

Turnover: Raise Power to 100%. 2W MDAFP OOS.

Event No.	Malf. No.	Event Type*	Event Description
1	NI10B @ 200	I-RO TS	Power Range NI42 fails HIGH
2	101ACRA1 (Global)	C-BOP TS	Loss of Control Room North Air Handling Unit
3	CV05 @ 20%	C-RO	Letdown Heat Exchanger leak (to CCW)
~~4~~	~~RX18 to 1 over 2 min ramp~~	~~I-BOP~~	~~Main Steam Turbine Bypass Header Pressure UPC-101 Fails Low (Steam Input to FWP Delta-P)~~ **[Event Not Used]**
5	RP08A	Major	Spurious Feedwater Isolation
6	RP01A, RP01B, Preload	C-RO	Reactor Fails to Automatically Trip
7a	CV013B	C-RO	2W Centrifugal Charging Pump Trip (fail to start)
7b	ED05H	C-BOP	Loss of 4KV Bus T21D (Loss of E CCP and E MDAFP) on the Reactor Trip
8	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 74% with directions to raise power to 100% following a forced outage.

After the crew has assumed the watch, NI-42 Power Range Channel fails High. The RO will need to take manual rod control. The crew will implement an Abnormal Operating Procedure and address Technical Specifications.

The second event is a trip of the North Control Room Air Handling Unit. The crew will need to investigate the cause, start the South Air Handling Unit, and address Technical Specifications.

After the South Control Room Air Handling Unit is started, a letdown heat exchanger leak will occur. The crew will need to address CCW in-leakage, implement an Abnormal Operating Procedure, isolate Letdown, and establish excess letdown.

~~After excess letdown is established, the Main Steam Turbine Bypass Header Pressure UPC-101 Fails Low (Steam Input to FWP Delta-P) causing the FW pumps to slow down. The BOP will need to take manual control of FW Pump Speed to establish the proper DP to continue feeding the SGs.~~

A spurious Feedwater Isolation will require a reactor trip. The automatic Reactor Trip fails requiring the RO to manually trip the Reactor.

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 cyclic loading attempts.

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 Establish FW Flow before SGs Dry out.
Procedures	E-0 Reactor Trip or Safety Injection FR-H.1 Response to Loss of Heat Sink

Revision 1, 11-3-2005

Op-Test No.: _____ Scenario No.:COOK06-05a Event No.: 1

Event Description: **Power Range NI42 fails HIGH.**

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports annunciators on Panel #210 which are indicative of a NI instrument failure (Drops 11,13,18, and 19).
	US	Enters and directs actions of 02-OHP 4022.012.003, Continuous Control Bank Movement procedure.
	RO	Performs the following as directed: 19. Checks for no turbine runback 20. Ensures control rods are in manual with no rod motion 21. Checks rod position above low-low rod insertion limit 22. Checks axial flux difference (AFD) within target band 23. Initiates restoration of equilibrium conditions using either: • Control rod movement • Turbine load adjustment 24. Identifies failed power range channel
	US	Enters and directs actions of 02-OHP 4022.013.004, Power Range Malfunction procedure.
	US	Directs operator actions per 02-OHP-4022-013-004, Power Range Malfunction: Verify Rod Control switch in MANUAL Places Rod Stop Bypass selector in NI42 position Reduce turbine load or withdraw rods to minimize Tave/Tref difference Remove NI42 channel from service
	RO/BOP	Performs actions as directed to remove NI-42 from service Place Channel Defeat selector to NI-42 Place Upper Section Channel Current Comparator Defeat Selector to NI-42 Place Lower Section Channel Current Comparator Defeat Selector to NI-42 Place Power Mismatch Bypass selector to NI-42 Verify Delta-T Recorder Selector NOT in Channel 2 Verify Overtemperature Delta-T Recorder Selector NOT in Channel 2 Restore Rod Control to Automatic

Op-Test No.: _____ Scenario No.:COOK06-05a Event No.: 1

Event Description: **Power Range NI42 fails HIGH.**

Time	Position	Applicant's Actions or Behavior
	US	Directs actions to trip bistables associated with NI-42 Power Range Malfunction per Attachment D of 02-OHP 4022.013.004.
	US	Refers to Tech Specs: ▪ 3.3.1 RTS Instrumentation (Table 3.3.1-1, Functions 2a, 2b[<10%], 3a, 3b, 6, 18c & 18d Conditions C, D & L)

Op-Test No.: _____ Scenario No.: COOK06-05a Event No.: 2

Event Description: **Loss of Control Room North Air Handling Unit**

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports annunciator on Panel #203 (Drop 23) indicative of the loss of the North Control Room Air Handling Unit.
	US/BOP	Starts the South Control Room Air Handling Unit per OHP 4024.203 Drop 23 annunciator response by placing the South Ctrl Room Air HDLG Unit to RUN. (May attempt 1 restart of the North Control Room Air Handling Unit per ARP)
	US	Refers to Tech Specs (TS): TS 3.7.11 Control Room Air Conditioning (CRAC) System • (Condition A) due to a loss of 1 cooling system.

Op-Test No.: _____ Scenario No.: COOK06-05a Event No.: 3

Event Description: **Letdown Heat Exchanger leak (to CCW)**

Time	Position	Applicant's Actions or Behavior
	RO	Identifies and reports CCW Radiation Rise, • Panel 238 Drop 10, "R17A East CCW Header High Radiation" • Panel 223 Drop 46, "RMS Rad Level High or Sys Abn" Identifies rise in CCW level and reduced letdown flow.
	US	Enters and directs actions of 02-OHP 4022.016.003, CCW In-Leakage procedure.
	Crew	Identifies Letdown HX leak based on low letdown line flow.
	US/RO	Performs actions to isolate Letdown HX per Attachment B: 4. Align 2-QRV-302, cold letdown path select to RC FILTER 5. Align 2-QRV-303 VCT/Holdup Tk inlet selector to CVCS HOLDUP TANK 6. Isolate Letdown and Charging per 02-OHP-4021-003-001 Attachments 4 & 13 as follows: • Close Letdown Isolation Valves 2-QRV-111 & 112 • Close Orifice Isolation Valves 2-QRV-160, 161, & 162 • Reduce Charging With 2-QRV-251 & QRV-200
	US	Directs RO to establish Excess Letdown.
	RO	Place in service excess letdown per 02-OHP-4021-003-001 Attachment 6: 5. Verify the following valves - OPEN: • 2-CCR-460, CCW From Excess Letdown Hx • 2-CCR-462, CCW To Excess Letdown Hx • 2-QCM-250, RCP Seal Water Return • 2-QCM-350, RCP Seal Water Return 6. Open the following valves: • 2-QRV- 113, Excess Letdown To Hx • 2-QRV-114, Excess Letdown To Hx 7. Verify 2-QRV-171, Exs Letdown Hx Outlet Select, is in VCT Position 8. Slowly open 2-QRV-170, Excess Ltdn Hx Outlet Press, **while** maintaining Excess Letdown Hx outlet temperature less than 195°F.
	US	Directs Actions to locally isolate CCW to Letdown HX 2-CCW-160, 164, & 165

Op-Test No.: _____ Scenario No.: COOK06-05a Event No.: 4

Event Description: **~~Main Steam Turbine Bypass Header Pressure UPC-101 Fails Low (Steam Input to FWP Delta-P)~~ [Event Not Used]**

Time	Position	Applicant's Actions or Behavior
	~~BOP~~	~~Recognizes and reports annunciator on Panel #215 Drop 53, FW Controller Failure and indications of a failure affecting main feedwater to all steam generators (SGs):~~ ~~• Main FW Pump Diff Pressure Controller~~ ~~• All SG levels lowering~~ ~~• All feedwater regulating valves opening~~ ~~• Main feedwater pumps speed lowering~~
	~~BOP~~	~~Places MFP differential pressure controller (or both Main FW Pump controllers) 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 nuclear power during feedwater transient.~~

Op-Test No.: _____ Scenario No.: COOK06-05a Event No.: 5/6/7/8

Event Description: **Spurious FW Isolation**
Reactor 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 for a reactor trip. .
	CREW **Critical Task #1**	**Manually opens reactor trip breakers in response to (any):** • **Low SG level** • **FW Flow<Stm Flow w/low SG level** • **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: 17. Checks reactor trip 18. Checks safety injection status
	BOP	Performs the (secondary) immediate actions of E-0: 3. Verifies Turbine trip 4. Checks power to AC emergency buses • Reports Loss of 4KV Bus T21D (due to fault) • Trips CD EDG or places T21D8 in PTL to prevent cyclic loading attempts
	US	Ensures immediate actions of E-0 are completed
	US	Determines that a SI is NOT required
	US	Announce Transition to ES-0.1. (Note US should request STA or Identify red path on Heat Sink)
	US/BOP	Announces transition to FR-H.1, Response to Loss of Secondary Heat Sink.

Op-Test No.: _____ Scenario No.: COOK06-05a Event No.: 5/6/7/8

Event Description: **Spurious FW Isolation**
Reactor 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	Attempts to start 2 West CCP. Determines that 2 West CCP is not available
	US/RO **Critical Task #2**	• 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: 9. Actuate SI 10. Checks RCS feed path: • South SI pump running • ECCS monitor lights in proper status 11. Establishes RCS bleed path • Checks PRZ PORV block valves energized and open • **Places all (3) PRZ PORV switches to open position** **12. Resets SI** **13. Resets containment isolation phase A** **14. Opens control air to containment valves:** • **2-XCR-100** • **2-XCR-101** • **2-XCR-102** • **2-XCR-103** 15. Checks bleed path: • All 3 PRZ PORVs open • All 3 PRZ PORV block valves open 16. Perform E-0, Steps 5 – 17 (as time permits)
	US/BOP	Continues attempts to establish secondary heat sink: • Dispatches operator to reset TDAFP mechanical overspeed.

Op-Test No.: _____ Scenario No.: COOK06-05a Event No.: 5/6/7/8

Event Description: **Spurious FW Isolation**
Reactor 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
	CREW **Critical Task #3**	**Restores AFW flow to the SGs from the TDAFP.**
TERMINATE SCENARIO		

CRITICAL TASK SUMMARY
(COOK06-05a)

Task	Elements	Results
#1 **Manually Trip Reactor**	**Cueing:** • **Challenge to multiple reactor trip setpoints:** · **SG Level Low-Low Reactor trip** · **SG Level Low with FW Flow<Steam Flow Reactor Trip** • **RX TRIP BKR TRAIN A/B UV TRIP (ATWS) alarms** **Performance Indicators:** • **Manually open at least one reactor trip breaker from the control room.** • **Must be performed prior to:** · **SG Dryout (<17% wide range level)** · **Exceeding RCS safety valve limit (2485 psig)** **Performance Feedback:** • **RPIs indicate rods - fully inserted** • **Rod bottom lights – lit** • **Neutron flux - lowering**	**SAT / UNSAT**
#2 **Establish RCS Bleed (and Feed)**	**Cueing:** • **Enters FR-H.1 on Heat Sink Red Path after exiting E-0 (No AFW Flow)** • **Commences bleed and feed actions from FR-H.1 Step 2 when it has been determined that no CCPs are running.** **Performance Indicators:** • **Stops all RCPs (extends time to SG dryout)** • **Opens all PRZ PORVs (establishes bleed path)** • **Must be performed prior to SG Dryout (<17% wide range level)** **(Note: RCS Feed initiated by SI)** **Performance Feedback:** • **PRZ PORV red lights lit** • **PRZ PORV tailpipe temperatures rising** • **PRT pressure/temperature/level rising**	**SAT / UNSAT**

CRITICAL TASK SUMMARY
(COOK06-05a)

Task	Elements	Results
#3 **Establish FW Flow before SGs Dry out.**	**Cueing:** • **AFW flow < 240,000 PPH** • **NR SG Levels OFFSCALE LOW** **Performance Indicators:** • **Manually start at least one AFW Pump from the control room.** • **Establish FW per foldout page to lower CETC's** • **Must be performed prior to:** · **SG Dryout (<15% wide range level)** **Performance Feedback:** • **AFW or FW flow indicated to SGs** • **CETC's - lowering**	**SAT / UNSAT**

Setup:

56. Reset to IC 975 (IC 37 with W MDAFP OOS, W CCP operating with summary file)
57. Reset control rods and check group step counters
58. Place Master Annunciator Silence pushbutton lockout ring in LOCKOUT position
59. Advance chart recorder paper & clear chart recorder memory
60. Update PPC Chart Recorders VCT 20-70, PWR 70-80%, Tave/Tref 560-570°F
61. Start Data Collection Program Save to file _____
62. Go to **RUN** and acknowledge/clear alarms
63. Restore Summary File "**COOK06-05**"
64. Ensure the West CCP is operating (2E CCP in Standby)
65. 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**
66. Go to **RUN** and acknowledge/clear alarms
67. Activate the following pre-load malfunctions:
    - **RP01A** (Auto reactor trip / train A failure)
    - **RP01B** (Auto reactor trip / train B failure)
    - Assign "**RTB Open**" to trigger **E10**, Assign IMF **CV13B**, IMF **ED05H** and IMF **FW46C** to trigger **E10**

(continued on next page)

SIMULATOR INSTRUCTIONS
(COOK06-05a)

Scenario:

Event #1

15. Trigger (Trg 1) malfunction **NI10B**, final value **200** (NI-42 fails high)

Event #2

16. Trigger (Trg 2) Global malfunction **101ACRA1** (Loss of Control Room North Air Handling Unit) after crew has recovered from the NI failure.

Event #3

17. Trigger (Trg 3) malfunction **CV05**, final value 2**0** (Letdown HX leak) after the South Control Room Air Handling unit is started.

~~*Event #4*~~ **[Event Not Used]**

~~18. Trigger (Trg 4) malfunction **RX18** final value **1**, ramp **2:00** (UPC-101 fails lo over 2 min.) after the crew establishes excess letdown.~~

Event #5

19. Trigger (Trg 5) malfunction **RP08A** after the crew recovers from the feedwater transient.

Events #7/8

20. (Set up on Trigger E10)Trigger the following malfunctions when the reactor trip is tripped manually:
    - **CV13B** (2W CCP Trips)
    - **ED05H** (Loss of 4KV Bus T21D)
    - **FW46C** (TDAFP trip)

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Response to Crew's Requests:

28. If directed, to trip bistables for **NI-42** use:
    IOV ZLOSTMC2[7] to ON to simulate opening cabinet Door
    (Override Lights/Relays – RX Flux panel)

Remote	Bistable
RPR123	TS/421C
RPR124	TS/421D

    IOV ZLOSTMC2[2] to ON to simulate lifting Test Rack
    DOV ZLOSTMC2[7] to simulate closing cabinet Door

29. If contacted as AEO to investigate the North Air Handling Unit Trip, report back after 2 min. delay that Breaker 2-AB-D has an OC trip.

30. If contacted as chemistry regarding loss of normal letdown, then request that Excess Letdown be placed in Service

31. If dispatched to Isolate CCW to Letdown HX use the following: (drawing CC4)
    - Use RF **CCR10** to **CLOSE** to isolate CCW-160.
    - Use RF **CCR11** to **0%** to isolate CCW-164.
    - Verify RF **CCR12** is at **0%** to for CCW-165.

~~32. If contacted as MTI to investigate UPC-101 malfunction, report back after some 3 min. delay that the cause cannot be determine and further testing will be required.~~

33. If directed to locally reset the TDAFP mechanical overspeed device, wait until

After RCS bleed and feed has been initiated (all PRZ PORVs open),

delete malfunction **FW46C** *and* ***report to the control room that the TDAFP mechanical overspeed device has been reset locally.***

34. Local actions after entry into E-0:
    - Locally stop U2 Ice Condenser AHUs MRF **CHR01** to OFF
    - Place PACHMAS in service – MRF **CHR02 or 03** with 10 min delay.
    - U1 has aligned CR vent for U2 SI, Fan **2-HV-AS-1** is running.

35. 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**