

Facility: <u>Cook Plant</u>		Scenario No.: <u>NRC 2016-01</u>		Op-Test No.: _____	
Examiners: _____		Operators: _____		_____	
_____		_____		_____	
_____		_____		_____	
Initial Conditions: MOL <u>49% Power, East MFP online, West MFP Idle, MSR In, East MDAFW pump OOS.</u>					
Turnover: <u>Stable at 49% power. The unit is shutting down and the reactor must be in Mode 3 within the next 4 hours due to exceeding the LCO for the East MDAFW pump. It has been out of service to perform motor replacement for 73 hours. Currently in 1-OHP 4021.001.003, Power Reduction.</u>					
Event No.	Malf. No.	Event Type*	Event Description		
1		N-BOP	Swap #1 Control Fluid Pump for #3 Control Fluid Pump		
2		R-RO	Continue Power Reduction		
3	U1_101ACRA1 (Global)	C-BOP TS	Loss of Control Room North Air Handling Unit		
4	U1_NTP131 to 650°F	I-RO TS	RCS T <sub>HOT</sub> instrument (NTP-131) fails HIGH		
5	U1_FDC_251 to 13 over 9 min. ramp	I-BOP	Main Feedwater Pump Delta-P Controller Setpoint fails low over 9 minutes.		
6	U1_CV04C	C-RO	QRV- 162 (75 gpm orifice)Fails Closed due to a solenoid fault		
7	U1_FW05A	Major	Trip of East MFP and Loss of ALL Feedwater		
8	U1_ED05E	M ALL	Loss of Bus T11A due to fault on Bus 1A		
9	U1_TC02 U1_RP07A U1_RP07B	C-BOP	Main Turbine Fails to Trip/ Steam Line Auto Isolation Failure		
10	U1_FW51 U1_FW48C	C-BOP	TDAFW pump T&TV failure due to blown control power fuse West AFW pump power is lost (East AFW is OOS)		

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

## **Summary**

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

The crew is directed to continue power reduction to shut down.

After the power change, a trip of the North Control Room Air Handling Unit will occur. The crew will need to investigate the cause, start the South Air Handling Unit, and address Technical Specifications.

The next event will involve the RCS T<sub>h</sub> Inst (NTP-131) fails High. This will result in control rod movement requiring the crew to respond using IFR-001. After disabling the channel rods can be restored.

The MFP Delta P Controller Setpoint fails low over 9 minutes. The crew will be required to respond using IFR-001 and placing MFP's in manual control.

The next event will involve a failure of letdown orifice failing closed due to a solenoid fault. The crew will respond and restore letdown to service.

The major event will involve a trip of the East MFP resulting in a loss of all feedwater. The crew will manually trip the reactor. On the trip bus T11A will be lost due to a fault and the AB EDG will trip causing a loss of one train of power. This will result in a loss of the West MDAFP.

The Main Turbine will fail to trip requiring the closure of the steam stop valves.

The TDAFP will fail to start due to blown control power fuses. This will require a transition to FR-H-1, Loss of Secondary Heat Sink. When heat sink is restored via AFW cross-tie or with the TDAFP (local or repaired), the scenario is complete.

## **Critical Tasks**

- Manually isolate Steam Lines (turbine trip) prior to ECA-2.1
- Establish FW Flow to SG before Bleed and Feed is required

## **Procedures**

- E-0, Reactor Trip or Safety Injection
- FR-H-1, Loss of Secondary Heat Sink

Facility: Cook Plant                      Scenario No.: NRC 2016-02                      Op-Test No.: \_\_\_\_\_

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

Initial Conditions: MOL, 80% power

Turnover: Raise Power to 100%

Event No.	Malf. No.	Event Type*	Event Description
1	U1_QLC451@ 0	I-RO TS	VCT Level Transmitter (QLC-451) fails LOW
2		R-RO	Raise Turbine and Reactor Power
3	U1_QTC302@ 175F	C-RO	Letdown Temperature Controller fails High
4	U1_FFC220 @ 2	I-BOP TS	SG Feed Flow Instrument (FFC-220) fails LOW
5	U1_RC16 to 100% over 2 min. ramp	M - ALL	Pressurizer Steam Space Manway Leak
6	TC03 RP07A RP07B	C-BOP	Failure of Main Turbine Auto Trip (With SLI failure)

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

## **Summary**

The crew is directed to begin raising power to 100%.

Before the power rise has begun, the VCT Level instrument (QLC-451) failing LOW. This will result in the VCT Low Level alarm and auto makeup. The crew will be required to enter the AOP and address the Technical Requirements Manual. The RO will be required to terminate the auto makeup to RCS.

After an acceptable power change, the Letdown Temperature Controller failing High in AUTO. This will result in excess letdown cooling. RO will be required to take manual control of CRV-470 and restore temperature to normal band.

The fourth event will involve a failure of #2 Steam Generator Feed Flow instrument (FFC-220) LOW. This will result in a rise in feedwater flow to #2 SG with corresponding SG level rise. The BOP will be required to take manual control of FRV-220. Crew will be required to implement AOP actions to stabilize the plant and address Technical Specifications.

The major event will involve a large leak on the PRZ Steam Space Manway. A unit trip will be required. As the crew performs the actions of E-0, the Main Turbine will fail to automatically trip. The crew will transition to E-1. The scenario will terminate when the crew has transitioned to ES-1.2 for Post LOCA cooldown.

## **Critical Tasks**

- Manually trip the Turbine prior to a transition to ECA-2.1
- Stop all running RCPs when RCS pressure is below 1300 psig

## **Procedures**

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

**Simulator Instructions**  
(NRC 2016-03)

Appendix D

Scenario Outline

Form ES-D-1

Facility: <u>Cook Plant</u> Scenario No: <u>NRC 2016-03</u> Op-Test No.: _____.			
Examiners: _____		Operators: _____	
_____		_____	
_____		_____	
Initial Conditions: MOL 1% Pwr, Manual Aux Feed to SG, Turbine offline			
Turnover:    Start the Middle Condensate Booster Pump, Raise Power to 3% for MFW Pump Start-up (Extra-RO will start the MFP)			
Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Start the Middle Condensate Booster Pump.
2		R-RO	Raise Power to 3% Power.
3	U1_NLP151 100	I-RO TS	Pressurizer level channel CH 1: 1-NLP-151, fails High
4	ED07A	C-RO TS	PZR HTR Transformer Fails (11PHA Fails).
5	CLC10 to 0%	I-BOP	Hotwell Level Transmitter CLC-10 Fails LOW.
6	RX11D @100%	C-BOP TS	SG PORV Controller Failure.
7	ED01 ED25 ED03A EG06B	M	Loss of All AC Power.  1CD EDG Trip.
8	EG08A	C-BOP	1AB EDG Speed Governor Failure.
9	FW48C	C-BOP	TD AFW Pump Fails to AUTO start.

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

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## **Simulator Instructions** **(NRC 2016-03)**

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### **Summary**

The BOP is directed to start the Middle Condensate Booster Pump (CBP). The operator will place the Middle CBP in service in accordance with the normal operating procedure.

The Crew is directed to raise power to 3-4% for MFW Pump Start-up.

The third event will involve the Pressurizer Level Controlling Channel NLP-151 failing high. The RO will have to manually control level. The crew will need to implement an Abnormal Operating Procedure, select an operable channel, and restore Pressurizer Level controller to auto, and address Technical Specifications.

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

Then the Hotwell Level Transmitter CLC-10 fails LOW. The low failure will cause the Condensate Makeup valve (CRV-55) to fully open and the Condensate Letdown Valve (CRV-155) to fully close causing a rise in actual hotwell level. The BOP will be required to take manual control of the Hotwell Level Controller and return hotwell level to a normal band. The non failed hotwell level input may be selected for subsequent auto control.

The next event will involve the failure of the SG #14 PORV Controller. The controller will fail causing PORV 1-MRV-243 to fully open. This will also cause Reactor power to slightly rise. The BOP will need to take manual action to close the PORV and the US will need to declare the associated radiation monitor inoperable.

The Major event is a loss of all AC power. The reactor will trip. Failure of the EDGs will require entry into ECA-0.0 actions. Failure of the TDAFW Pump to auto start will require a manual start to restore feedwater flow. The crew will be required to take actions to restore Emergency Power (EP). The crew should transition to ECA-0.1 once power has been restored to one Safeguards Bus. The scenario will terminate when the crew has restored emergency power and transitioned to ECA-0.1 or ECA-0.2.

### **Critical Tasks**

- Establish AFW (Start TDAFWP)
- Restore Emergency Power to Safeguards Bus

### **Procedures**

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

Facility: Cook Plant                      Scenario No.: NRC 2016-04                      Op-Test No.: \_\_\_\_\_

Examiners: \_\_\_\_\_    Operators: \_\_\_\_\_  
 \_\_\_\_\_  
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Initial Conditions: MOL 50% pwr; East Motor Driven AF Pump OOS.

Turnover: Perform ESW Pump Strainer Backwash. Raise Power to 80%

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Perform ESW Strainer Backwash
2	U1_QLC452 to 100	I-RO TS	VCT Level Channel QLC 452 fails HIGH
3		R-RO	Raise Reactor Power to 80%
4	U1_CBP U1_FW58B U1_FW58C	C-BOP	North CB pump trip; Middle CB pump fails to start in AUTO
5	U1_RX08A @ 100	C-RO	Spray Valve fails open in Auto
6	U1_MPP242 @1200 psig	I-BOP TS	SG 4 Pressure Channel (MPP-242) fails High (SG #14 PORV fails open)
7	U1_RC10A to 20% over 5 min. ramp  U1_RC01A at 50% after 5 min.	Major	Large Break Loss of Coolant Accident on Loop 1 (Starts Out Slowly)
8	U1_RP19D - Preload	C-RO	Slave Relay Failure: (K610) 1E RHR and 1N SI Pumps Fail to AUTO Start (Also CR Ventilation will not fully align)
9	U1_WRHR	C-RO	1W RHR Pump Trips 15 minutes after SI

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

## **Summary**

The scenario starts with the plant at 54% power with the Both Main FW Pumps in service.

The crew is directed to perform a PMT on the East ESW Pump Strainer (Manual Backwash)

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

After the VCT Level Failure, the crew is directed to raise power.

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

A short time later a failure of one of the PZR Spray valves will fail Open while in Auto. The crew will respond to lowering RCS pressure by closing the valve in manual using OHP-4022-IFR-001.

Next a failure of SG #14 Pressure Channel (MPP-242) fails high causing SG #14 PORV to fully open. This will also cause Reactor power to slightly rise. The BOP will need to take manual action to close the PORV, the crew will implement AOP actions, and the US will need to declare the associated radiation monitor inoperable.

Shortly after the SG Pressure Channel failure, a LOCA will slowly develop resulting in a large break LOCA. The plant will trip and Safety Injection will actuate. As the crew performs the actions of E-0 they will note that the 1E RHR and SI pumps failed to auto start on the SI due to a slave relay K610 failure. The crew will transition to E-1 and to ES-1.3 to align for cold leg recirculation. The 1W RHR will trip 15 minutes into the event. The crew will have to align ECCS to the recirculation sump without the 1W RHR pump. The scenario will terminate when the crew has aligned ECCS for cold leg injection.

### **Critical Tasks**

Establish Low Pressure SI (RHR)  
Establish Cold Leg Recirculation

### **Procedures**

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



Facility: Cook Plant Scenario No.: NRC 2016-05 Op-Test No.: \_\_\_\_\_

Examiners: \_\_\_\_\_ Operators: \_\_\_\_\_  
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Initial Conditions: MOL; 54% power,

Turnover: Swap NESW Pumps, Shutdown Plant for FW pump oil system repairs

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Start South NESW Pump and Stop the North NESW pump.
2		R-RO	Lower Reactor Power and Turbine Load
3	U1_NPP151 @ 1700	I-RO TS	Pressurizer Pressure Channel NPP-151 Fails Low
4	U1_TACSE Stator Short	C-BOP	East Turbine Aux Cooling Water pump trip
5	RC17C to 50%	C-RO TS	Pressurizer PORV NRV-153 Opens.
6	U1_BLP111 @ 0 over 30 sec	I-BOP TS	#11 SG level Transmitter fails LOW
7	U1_MS01D @ 20 over 2 min	M-ALL	Steam Line Break inside Containment (#14 SG)
8	U1_RP07A U1_RP07B	C-BOP	Steam Line Isolation fails to AUTO actuate
9	U1_RP16B U1_RP20E U1_RP20J	C-RO	CTS (West) Train B - fails to actuate (AUTO) Discharge Valves fail to Open West CTS fails to Start
10	U1_ECSP stator short	C-RO	East CTS pump Trip

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

## **Summary**

The plant is at 50% power and the BOP is directed to swap the NESW pumps.

The crew is directed to start the South NESW Pump and shutdown the North NESW pump. An AEO has been briefed and the starting party is ready for the pump start. After NESW Pumps have been swapped, the crew is directed to lower power.

If required, the crew will be directed by the Shift Manager to lower power.

While reducing power, the Pressurizer Pressure Controlling Channel, NPP-151, fails 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.

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

Next, the Pressurizer PORV NRV153 will fail partially open. This results in Actual RCS pressure lowering. The RO will be required to take manual actions to isolate the PORV (close block valve) and restore normal pressure conditions.

The #11 Steam Generator Level instrument (BLP-111) fails LOW. This results in a higher feedwater flow and Steam Generator level rises. 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 major event will involve a Main Steamline Break inside containment on the #14 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 #14 SG. The crew will transition to E-2 to isolate #14 SG. Containment Pressure will rise 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 #14 Steam Generator  
Actuate/Align CTS

## **Procedures**

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