

Facility: Fermi 2 Scenario No. 1 Op-Test No: 2012-1

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

**Initial Conditions:** IC-20, MOC, 100% Rx. Power

**Turnover:** The plant has been operating for 230 days. Reactor Power is currently 100% of Rated Thermal Power with Control Rods at the 107% Rod Line. Circulating Water Pump #5 is out of service for motor replacement with an expected return to service in 2 days. The shift will lower Reactor Power to <93% with Recirculation flow to support upcoming surveillance testing that will occur on the next shift.

**NOTE:** The crew's Pre-job Briefing for the reactor power decrease is to be conducted prior to entering the simulator. (Suggested time 30 minutes prior to beginning the scenario.)

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	R (ATC) R (SRO)	Decrease reactor power with recirculation flow to $\leq$ 93%.
2.	B31MF001 5	C (ATC) C (SRO)	RRMG "A" Walkaway >10% speed. ATC trips the RRMG, and CRS enters TS 3.4.1.A.
3.	E51MF000 9	C(BOP)	RCIC Spurious Initiation CRS enters TS 3.5.3.A
4.	R14MF000 1 N20MF002 3	M(All)	Loss of Div 2 Offsite Power / EDGs start / Loss of all Heater Feed Pumps, Reactor Feed Pumps, and Scram
5.	E41MF000 9 E41MF000 5	C(BOP) C(SRO)	HPCI Auto Start Failure / Isolation The crew will manually start HPCI to restore RPV Level. HPCI later isolates.
6.	N21MF003 1 N21RF001 9	C(BOP) C(SRO)	SBFW F001 Fails As Is / Loss of power BOP starts SBFW Pump A and identifies the injection valve failure. (Restored when overloads reset.)
7.	B31MF006 7  EOPRF003 8	M(All)  I ( ATC) I (SRO)  M (All)	Recirc Loop B Rupture (LOCA) Multiple EOP entries and re-entry.  Div 2 EECW Hi Drywell Pressure Lead Lifted. ATC determines EECW is not isolated, and isolates.  At TAF crew Emergency Depressurizes (BOP opens 5

			<p>SRVs, ADS preferred) <b>(CT)</b></p> <p>Crew restores water level 173 – 214” with available High Pressure and Low Pressure ECCS Systems. <b>(CT)</b></p>
		<p>M (ATC)</p> <p>M (SRO)</p>	<p>Crew sprays the Torus using SOP 23.205, “RHR System”, Encl A. (Hard Card)</p> <p>Crew sprays the Drywell using SOP 23.205, “RHR System”, Encl A. (Hard Card) <b>(CT)</b></p>
<p>* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor</p>			

## Scenario 1 Crew Briefing Sheet

### ***Initial Conditions:***

- Reactor Power is 100% of RTP with control rods at the 107% Rod Line.
- Circ Water Pump #5 is out of service for motor replacement. It is scheduled to be returned to service in 2 days.
- The shift will lower power to  $\leq 93\%$  with Recirculation flow to perform Surveillance Procedure 24.109.02 (Rev32) Turbine Bypass Valve Operability Test.

## **ILO NRC Initial Exam Scenario 1 Narrative Summary**

Initial conditions establish Reactor Power at 100%, necessary to best facilitate the RR Pump uncontrolled speed increase malfunction >10% (Malfunction 1).

After a short brief the CRS will direct ATC to commence lowering power with recirc flow. The ATC will lower power with recirc flow until he reaches the recirc speed  $\leq 65\%$ , the RR speed control malfunction will be automatically initiated. ATC will take immediate action to lock the scoop tube, if not already locked, and trip RRMG "A" due to a > 10% speed change. The CRS will direct crew response via AOP 20.138.03, Uncontrolled Recirc Flow Change.

This will result in single-loop operation and entry into AOP 20.138.01, Recirc Pump Trip and require CRS to comply with TS LCOs. Depending on where the crew is on the power to flow map, they may insert the Cram Array to lower Reactor Power to <67.2%. With OPRMs operable they should monitor for instability.

In response to a Loss of Heater Drains resulting from the transient, the CRS will also direct BOP to evaluate the effects on Feedwater Heating and determine Loss of Feedwater Heating AOP applicability.

A malfunction will result in spurious auto-initiation and injection by RCIC. It is expected that the BOP will trip RCIC under CRS direction. This establishes conditions which will later require manual re-start of RCIC, if selected for level-control post LOCA. CRS will evaluate and comply with TS LCOs, and should coordinate with support personnel to control/protect unaffected ECCS equipment.

An electrical fault on the 345kV distribution system will result in an interruption of Division 2 electrical power, a coincidental loss of feedwater, and Rx Scram (either manual or automatic). The Division 2 EDGs will re-energize the ESF Buses. The crew will enter AOPs 20.300.345kv, Loss of 345 Kv, and 20.000.21, Reactor Scram. After Scram Reports, the CRS will enter EOP 29.100.01, RPV Control, Sheet 1 (Level 3).

The loss of feedwater/scram will challenge RPV Level Control, which will be complicated by the LOCA, a loss of all Heater Feed Pumps and two Condenser Pumps, an auto start failure of HPCI, a loss of power to the Standby Feedwater discharge valve, and the earlier trip of RCIC.

Options available to restore RPV level include manual start of HPCI, re-starting RCIC, or opening the discharge valve and restoring Standby Feedwater (either manually or electrically after resetting overloads). If HPCI is manually started it will isolate after ~1 minute. When the only SBFW Pump (A) is started, the discharge valve will fail to open (N2103-F001). The valve will lose power shortly after receiving the open signal.

The only available high pressure injection sources available will be CRD A Pump, SLC A Pump, and RCIC, when re-started.

A Recirc leak will require the CRS to direct EOP actions to recover RPV level and protect the primary containment from overpressure. EOPs 29.100.01, RPV Control and Primary Containment Control, Sheets 1 & 2 will be entered on high drywell pressure. Most typically the ATC will be tasked with containment sprays, and BOP assigned to restore and maintain level.

When the CRS directs the ATC to, “Verify EECW is initiated, isolated from the drywell, and restore cooling to CRD”, the ATC will discover the P4400-F606B failed to isolate. He will report and close the valve.

At ~100" RPV Water Level, the BOP will report that RPV Water Level cannot be maintained >TAF. This will prompt the CRS to brief the crew for Emergency Depressurization.

At TAF (0" core level), the crew will Emergency Depressurize (EOP C-2) (CT) in accordance with 29.100.01, RF/ED/SC, Sheet 3. BOP will be directed to open 5 SRVs, ADS preferred. The crew will then brief and develop a plan for water level recovery, while the plant is being monitored during depressurization.

When LP sources inject and water level is restored >TAF, the crew will coordinate removal of injection systems to maintain RPV Water Level 173 – 214". (CT)

When level is recovered and stabilized, ATC will spray the Torus and Drywell to control Primary Containment Pressure. (CT)

The scenario will be terminated when the plant is stabilized, and evaluation activities are complete.

## Scenario # 1

Lesson "Scenario #1.lsn" Malfunction List:

Label	Description	Target	Delay	Ramp	Step
H_P807_A075_3	Circ Water Pump # 5 OFF Light	0	0	0	1
P807_A075_1	Circ Water Pump # 5 OFF/RESET Switch	1	0	0	1
B31RF0015	RRMG B Scoop Tube Hand Crank cd='BBBCB3101C001A_MZMLNP GT 1076'	65	0	7	2
E51MF0009	RCIC Spurious Initiation	ACTIVE	0	0	3
R14MF0001	Loss of Div 2 Offsite Power	ACTIVE	0	0	4
N20MF0023	Heater Feed Pump C Trip	ACTIVE	0	0	4
E41MF0009	HPCI Auto Start Failure	ACTIVE	0	0	4
N21MF0031*	SBFW N2103-F001 Fail As-Is	0	0	0	4
EOPRF0038	RBCCW High Drywell Isolation Defeat	DEFEAT	0	0	4
N21RF0019*	MOV N2103-F001 Breaker cd='P601_A290_2 OR P601_A291_2 EQ 1'	OPEN	8	0	4
E41MF0005	HPCI Spurious Isolation cd='H_P602_A131_2 EQ 1'	ACTIVE	45	0	4
B31MF0006	Recirc Loop A Rupture	1	0	300	5

\* Delete to reset thermal overload trip (simulated) of N21-F001 breaker.

Step 1 = Setup

Step 2 = Recirc Runaway

Step 3 = RCIC Initiation

Step 4 = Loss of Power (w/ HPCI & SBFW Failures)

Step 5 = LOCA

Simulator Instructions:

1. Initialize simulator to **IC-20**, and place in **RUN**.
2. Open and Execute Lesson **Scenario #1.lsn**.
3. **Trigger Step 1, Setup**
4. **Place an RT dot near Circ Water Pump #5 CMC switch.**
5. Bring crew into simulator and begin scenario when ready.

# Scenario 1

## SOPs

23.138.01  
23.206

## **AOPs**

20.138.03  
20.138.01  
20.107.02  
20.300.345KV

## ARPs

5D85  
3D136  
1D24  
1D90  
1D94

## ESPs

29.ESP.04

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Event Description:      Overview

***Initial Conditions:***

Reactor Power is 100% of RTP with control rods at the 107% Rod Line. Circ Water Pump #5 is out of service for motor replacement. It is scheduled to be returned to service in 2 days. The shift will lower Reactor Power to <93% with Recirculation flow, to support surveillance testing on the next shift.

***The objectives of this scenario are to:***

1. Recognize, respond to, and take the required actions for an instrument / equipment failures requiring the use of operator and Tech Spec actions.
2. Operate RHR in all modes for Primary Containment Control.
3. Recognize and respond to an Uncontrolled Recirc Flow Change.
4. Recognize and respond to a Recirc Pump Trip.
5. Recognize and respond to spurious RCIC initiation.
6. Recognize and respond to a Loss of 345kV Power/ loss of feed.
7. Initiate HPCI Manually after failure to Auto Start.
8. Recover RCIC from a Manual Trip and manually start RCIC
9. Recognize and respond to LOCA conditions.
10. Execute steps in Primary Containment Control and operate the RHR System to control Drywell and Torus Temperature and Pressure.
11. Execute the steps of RPV Control for level (L) and pressure (P).
12. Direct and supervise the Shift team during Normal, Abnormal, and Emergency operations.

***The crew will be required to respond to the following order of events:***

- Recirc Motor Generator "A" Walkaway (TS 3.4.1)
- Spurious RCIC Initiation (TS 3.5.3.A)
- Loss of 345 KV Offsite Power
- HPCI Auto Start Failure
- Failure of N2103-F001, SBFW Disch To RPV Iso Valve
- LOCA – Recirc Loop B Rupture
- Failure of Div 2 EECW Hi Drywell Pressure Isolation.



Op-Test No.: 2012-1 Scenario No.: 1 Event No.: 1 Page 2 of 16Event Description: Decrease Reactor Power With Recirculation Flow

Time	Position	Applicant's Actions or Behavior
0 min	SRO	<ul style="list-style-type: none"> <li>• Short brief on lowering power to <math>\leq 93\%</math>.</li> <li>• Hi-Com announcement commenced lowering reactor power.</li> <li>• Directs ATC to commence lowering power with recirc flow.</li> <li>• Reviews SR 3.4.1.1</li> <li>• Directs BOP to maintain Turbine Flow Limiter <math>5\% &gt;</math> Reactor Power.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Crew Update, "Lowering power with recirc flow."</li> <li>• Lowers reactor power IAW SOP 23.138.01, "Reactor Recirc System", Section 6.1, by adjusting North and South RR MG Set speeds using B31-R621A and B, N and S RR MG Set Speed Controllers. [Speed will be incrementally decreased on N and S RR Pumps to achieve an approximate speed of <math>\leq 63\%</math> speed.]</li> </ul> <p><b>NOTE:</b> At this time reactor power will be <math>\leq 93\%</math>.</p>
	BOP	<ul style="list-style-type: none"> <li>• Maintains Turbine Flow Limiter <math>5\% &gt;</math> Reactor Power.</li> </ul>

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Event Description: <u>RRMG A Walkaway (&gt; 10%)</u>		
Time	Position	Applicant's Actions or Behavior
+20 min	SRO	<ul style="list-style-type: none"> <li>Announces entry into AOP 20.138.03, "Uncontrolled Recirculation Flow Change" and AOP 20.138.01 "Recirculation Pump Trip". (Crew Update)</li> <li>Hi-Com announcements of events.</li> <li>Conducts AOP brief.</li> <li>Directs ATC to perform 20.138.01, Condition C Actions.</li> <li>Directs BOP to verify feedwater heating changes are due to the power change IAW ARP 5D85, "Loss of Heater Drains".</li> <li>Notifies Reactor Engineer (RE) of the unplanned power change and requests his assistance.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p><b>ROLE PLAY:</b> RE states he will come to the control room as soon as possible. Until he gets there, increase monitoring for thermal-hydraulic instabilities.</p> </div> <ul style="list-style-type: none"> <li>Notifies RP and Chemistry of power change &gt;15%. (Condition E)</li> <li>Reviews TS 3.4.1, requirements for SLO. (4 hrs for adjustment of RPS setpoints and Thermal Limits for SLO)</li> <li>Notifies Work Control personnel of RRMG "A" problem, requests a Condition Assessment Resolution Document (CARD) be written, protected system signs be posted for RRMG "B", and review of Plan of the Day for activities that might affect current plant conditions.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>Responds to annunciator 5D85, LOSS OF HEATER DRAINS</li> <li>Reports loss of Heater Drains due to Recirc Pump Trip.</li> <li>Reviews ARP 5D85.</li> <li>Reviews AOP 20.107.02, "Loss of Feedwater Heating", Enclosure A.</li> <li>Reports Feedwater temperature change is consistent with power change.</li> <li>Peer checks closure of B3105-F031A.</li> <li>Peer checks re-opening of B3105-F031A.</li> </ul>

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Event Description: <u>RRMG A Walkaway (&gt; 10%)</u>		
Time	Position	Applicant's Actions or Behavior
	ATC	<div style="border: 1px solid black; padding: 5px;"><b>Malf – B31RF0018 – RRMG “A” Walkaway</b></div> <p><b>NOTE:</b> When recirc pump A speed is <span style="background-color: yellow;">≤ 95%</span>, the recirc runaway malfunction will occur.</p> <ul style="list-style-type: none"> <li>• Identifies RRMG “A” walkaway and locks the scoop tube, if not already locked.</li> <li>• Expected annunciator 3D136, RECIRC SYS B FLUID DRIVE SCOOP TUBE LOCK.</li> <li>• Verifies that North RR MG Set Scoop Tube is locked.</li> <li>• Determines RRMG A speed increased by ≥ 10%.</li> <li>• Reports information to CRS <b>AND</b> announces, “Tripping RRMG A”.</li> <li>• Trips RRMG “A”. (Immediate Action IB.1 of AOP 20.138.03, “Uncontrolled Recirc Flow Change”.)</li> <li>• Monitors reactor power and flow conditions, on the power/flow map.</li> <li>• May direct RB Rounds to investigate the cause for RRMG A walkaway, informs him of the trip, and to adjust lube oil temperature.</li> </ul> <div style="border: 1px solid black; padding: 5px;"><b>ROLE PLAY:</b> RB Rounds reports cannot determine reason for RRMG B speed change and lube oil has been adjusted to maintain 120°F.</div> <ul style="list-style-type: none"> <li>• When directed, performs AOP 20.138.01, Condition C Actions: <ol style="list-style-type: none"> <li>1. Verifies operating RR MG Set speed ≤ 75%.</li> <li>2. Verifies 3D129, RECIRC A and B FLOW LIMITER 2/3 DEFEATED, alarmed.</li> <li>3. Places Recirc A and B Flow Limiter 2/3 Defeat Switch in DEFEAT.</li> <li>4. Closes B3105-F031A for tripped RR Pump. (Requests a peer check.)</li> <li>5. After 5 minutes fully opens B3105-F031A. (Requests a peer check.)</li> <li>6. Verifies Reactor Power &lt; 67.2% or insert the Cram Array to lower Reactor Power to &lt; 67.2%.</li> <li>7. Maintains operating RR MG Set speed 50-75%.</li> </ol> </li> </ul>

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Event Description: <u>RCIC Spurious Initiation</u>		
Time	Position	Applicant's Actions or Behavior
+35 min	BOP	<div style="border: 1px solid black; padding: 2px;"><b>Malf – E51MF0009 – Spurious RCIC Initiation</b></div> <ul style="list-style-type: none"> <li>• Observes Alarm 1D24, RCIC SYSTEM ACTUATED.</li> <li>• Announces alarm for CRS.</li> <li>• Observes RCIC starts and commences to inject to the RPV.</li> <li>• Verifies no valid actuation Level 2 signal by checking:             <ol style="list-style-type: none"> <li>1. Wide Range Level Indicators B21-R604A/B <b>and/or</b></li> <li>2. Post Accident Recorders B21-R623A/B.</li> </ol> </li> <li>• Reports information to CRS.</li> </ul> <p><b>NOTE: IF</b> directed to shutdown RCIC, the candidate will use SOP 23.206. <b>IF</b> the CRS directs tripping RCIC, the candidate will perform Step 3 only.</p> <ul style="list-style-type: none"> <li>• Manually shuts down RCIC by performing actions per SOP 23.206, "RCIC System", Section 8.1:             <ol style="list-style-type: none"> <li>1. Places E51-K615, RCIC Discharge Flow Controller, in MANUAL.</li> <li>2. Using E51-K615, RCIC Discharge Flow Controller, lowers turbine speed until indicating approximately 3000 rpm.</li> <li>3. Trips RCIC turbine as follows:                 <ol style="list-style-type: none"> <li>a. Places RCIC Turbine Trip pushbutton collar in ARMED.                     <ul style="list-style-type: none"> <li>• Verifies Annunciator 1D90, RCIC TURBINE TRIP PUSHBUTTON ARMED, alarms.</li> </ul> </li> <li>b. Depresses RCIC Turbine Trip pushbutton, and verifies:                     <ul style="list-style-type: none"> <li>• Annunciator 1D94, RCIC TURBINE TRIPPED, alarms.</li> <li>• <b>IF</b> open, E5150-F059, RCIC Turbine Trip Throttle Vlv, closes.</li> <li>• RCIC Turbine speed is decreasing or is at zero.</li> <li>• RCIC Turbine Trip Solenoid ENERGIZED white light is ON.</li> <li>• <b>IF</b> open, E5150-F013, RCIC Disch to FW Inbd Iso Valve, closes.</li> <li>• <b>IF</b> open, E5150-F019, RCIC Min Flow Vlv, closes.</li> </ul> </li> </ol> </li> </ol> </li> </ul>

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Event Description: <u>RCIC Spurious Initiation</u>		
Time	Position	Applicant's Actions or Behavior
	BOP (cont'd)	<ul style="list-style-type: none"> <li>• Reviews ARPs 1D24, "RCIC System Actuated" and 1D94, "RCIC Turbine Tripped".</li> <li>• Discusses applicable Tech Specs listed in the ARPs with CRS.</li> <li>• Contacts RB Rounds for RCIC walkdown.</li> <li>• May direct an operator to testability to investigate.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>ROLE PLAY:</b> If directed to testability, report there are no indications for why RCIC started.</p> </div>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges 1D24, RCIC SYSTEM ACTUATED alarm report.</li> <li>• When BOP reports RCIC started on an invalid actuation signal, then directs BOP to trip RCIC.</li> <li>• Announces the event over the Hi-Com.</li> <li>• Reviews TS 3.5.3, RCIC System, Condition A.</li> <li>• Declares RCIC Inop, immediately verifies HPCI operable, and enters a 14 day LCO.</li> <li>• Conducts a crew brief.</li> <li>• Notifies Work Control personnel of RCIC problem, requests a CARD be written, protected system signs be posted for HPCI, and a review of POD for activities that might affect current plant conditions.</li> <li>• May review reportability. (General Regulatory Reporting Requirements List)</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Monitors RPV water level, power, pressure, steam flow and feed flow.</li> <li>• Reports power, level, and pressure are stable.</li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>1</u> Event No.: <u>4</u> Page <u>7</u> of <u>16</u>		
Event Description: <u>Loss of 345 KV, loss of Heater Feed and Reactor Feed Pumps, and Reactor Scram.</u>		
Time	Position	Applicant's Actions or Behavior
+55 min	ATC	<div style="border: 1px solid black; padding: 5px;"> <p><b>Malf – R14MF0001 – Loss of 345 KV Offsite Power</b>  <b>Malf – N20MF0023 – C. HFP Trip</b></p> </div> <ul style="list-style-type: none"> <li>• Places Mode Switch in SHUTDOWN.</li> <li>• Verifies all rods in.</li> <li>• Verifies power decreasing.</li> <li>• Announces Scram Report.</li> <li>• Performs a walkdown of the electrical panels with Hard Card from H11-P811.</li> <li>• Reports, “Loss 345 KV Offsite Power, Div 2 EDGs have started and are loaded.”</li> <li>• Continues walkdown of back panels.</li> <li>• Directs an operator to walkdown and investigate loss of 345 KV.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>ROLE PLAY:</b> Outside Rounds reports nothing abnormal on 345 KV Mat.</p> </div> <ul style="list-style-type: none"> <li>• Reports results of electrical walkdown to CRS.</li> <li>• Performs actions as directed by the CRS IAW AOP 20.300.345KV, “Loss of 345 KV” actions:             <ol style="list-style-type: none"> <li>1. Verifies N &amp; S RR MG Emergency L. O. Pumps running. (Conditions B &amp; C)</li> <li>2. Closes CW Pump #1, 2, &amp; 3 Discharge Iso Valves (N7100-F601, F602, &amp; F603). (Condition E)</li> <li>3. Places CW Pump #1, 2, &amp; 3 CMC Switches in OFF/Reset.</li> <li>4. Verifies EDG 13 Output Breaker closed (EC-3) and verifies closed 72E Pos 2A, 72E Pos 5B, and 72EC Pos 2C (Condition G).</li> <li>5. Verifies EDG 14 Output Breaker closed (ED-3) and verifies closed 72ED Pos 2D and 72F Pos 3A (Condition I).</li> </ol> </li> <li>• May cross-tie V and W buses for SBFW restoration, when directed. (Condition L)</li> </ul>

Op-Test No.: 2012-1 Scenario No.: 1 Event No.: 4 Page 8 of 16Event Description: Loss of 345 KV, loss of Heater Feed and Reactor Feed Pumps, and Reactor Scram.

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Directs ATC to place the Mode Switch in SHUTDOWN.</li> <li>• Announces events over Hi-Com.</li> <li>• Requests Scram Reports.</li> <li>• Directs ATC to electrical panels for walkdown.</li> <li>• Announces EOP entry into 29.100.01, "RPV Control", Sheet 1, Level 3. (Crew Update)</li> <li>• Announces entry into "Loss of 345KV" AOP. (Crew Update)</li> <li>• Directs BOP to confirm isolations and actuations for level as they occur.</li> <li>• Directs BOP to restore and maintain level 173-214 inches.</li> <li>• Directs BOP to control pressure 800-1050 psig.</li> <li>• Consults with ATC to determine extent of equipment loss and which AOP(s) to enter.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Announces scram report.</li> <li>• Initially reports, "Loss 345 KV Offsite Power, Div 2 EDGs have started and are loaded."</li> <li>• Assesses systems available for injection and uses any available systems.</li> </ul>

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Event Description: <u>HPCI Auto Start Failure / Isolation</u>				
Time	Position	Applicant's Actions or Behavior		
+70 min	SRO	<table border="1"> <tr> <td><b>Malf – E41MF0009 – HPCI System Auto Start Failure</b></td> </tr> <tr> <td><b>Malf – E41MF0005 – HPCI Isolation</b></td> </tr> </table> <ul style="list-style-type: none"> <li>• Directs BOP to restore level 173 – 214 inches per 29.100.01, “RPV Control”, Sheet 1, using Table 1 Injection Systems (HPCI, RCIC, SBFW, CRD, SLC).</li> <li>• May direct start of HPCI.</li> </ul>	<b>Malf – E41MF0009 – HPCI System Auto Start Failure</b>	<b>Malf – E41MF0005 – HPCI Isolation</b>
<b>Malf – E41MF0009 – HPCI System Auto Start Failure</b>				
<b>Malf – E41MF0005 – HPCI Isolation</b>				
	BOP	<ul style="list-style-type: none"> <li>• Reports loss of Reactor Feed Pumps.</li> <li>• Reports failure of HPCI to auto-start.</li> <li>• Manually starts HPCI, IAW 23.202, “HPCI System”, Enclosure C (Hard Card): <ol style="list-style-type: none"> <li>1. Places E4101-C003, HPCI Baro Cndr Vacuum Pump, in RUN, and verifies pump starts.</li> <li>2. Opens E4150-F003, HPCI Stm Sply Otbd Iso Vlv.</li> <li>3. Opens E4150-F059, HPCI Lube Oil Clg Wtr Sply Vlv.</li> <li>4. Initiates a start of HPCI System by performing the next two steps simultaneously: <ol style="list-style-type: none"> <li>a. Places E4101-C005, HPCI Turbine Aux Oil Pump, in RUN, and verifies pump starts.</li> <li>b. Opens E4150-F001, HPCI Turb Stm Supply Iso Valve.</li> </ol> </li> <li>5. Opens E4150-F006, HPCI Pmp Inbd Disch Iso Valve.</li> <li>6. Adjusts flow as necessary on E41-K615, HPCI Pump Flow Controller.</li> </ol> </li> </ul> <p><b>NOTE:</b> Shortly after HPCI is started and level begins to increase it will isolate.</p> <ul style="list-style-type: none"> <li>• Reports HPCI Isolation.</li> </ul>		



Op-Test No.: <u>2012-1</u> Scenario No.: <u>1</u> Event No.: <u>6</u> Page <u>10</u> of <u>16</u>		
Event Description: <u>SBFW F001 Fails As Is / Loss of power</u>		
Time	Position	Applicant's Actions or Behavior
+70 min	SRO	<div style="border: 1px solid black; padding: 2px;"><b>Malf – N21MF0031 – SBFW F001 Fails As Is</b></div> <div style="border: 1px solid black; padding: 2px;"><b>Malf – N21RF0019 – N2103-F001 Breaker</b></div> <ul style="list-style-type: none"> <li>• May direct BOP send an operator to investigate loss of power to N2103-F001.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Starts SBFW Pump “A” (From hard card)             <ol style="list-style-type: none"> <li>1. Starts N2103-C003A (B), West (East) Pump A (B) Aux Lube Oil Pump, if available.</li> <li>2. Starts N2103-C001 (2), West (East) Standby Feedwater Pump A (B).</li> <li>3. <b>N2103-F001, SBFW Disch To RPV Iso Valve, does not automatically open and subsequently loses power.</b></li> </ol> </li> <li>• Observes and reports N2103-F001 failure (SBFW Discharge Valve).</li> <li>• Directs TB Rounds or other operator to investigate the loss of power to N2103-F001, at MCC 2PC-1 Pos 5A.</li> </ul> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>ROLE PLAY:</b> TB Rounds reports that he is in the BOP Switchgear Room and will investigate right away. Moments later TB Rounds reports he’s at the MCC and can attempt to reset the thermal overloads, if desired. When BOP directs the reset, TB Rounds resets the thermal overloads. (Power to the valve is restored and valve opens.)</p> </div> <ul style="list-style-type: none"> <li>• Observes N2103-F001 opening and reports the same to CRS.</li> <li>• Opens N2103-F002, SBFW 6” Discharge Flow Control Valve.</li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>1</u> Event No.: <u>7</u> Page <u>11</u> of <u>16</u>			
Event Description: <u>Recirc Loop A Rupture</u>			
Time	Position	Applicant's Actions or Behavior	
~80 min Directed by Examin er	SRO	<table border="1"> <tr> <td><b>Malf – B31MF0066 – Recirc Loop A Rupture (LOCA)</b></td> </tr> </table> <ul style="list-style-type: none"> <li>• Directs BOP to maintain level band (173-214")</li> <li>• Directs BOP to maintain pressure band to 500 -1000 psig.</li> <li>• Announces EOP entry on high Drywell Pressure, Drywell Temperature, Torus Pressure, Torus Level, and Torus Temperature. (Crew Updates)</li> <li>• Directs ATC/BOP to start second CRD Pump IAW 29.ESP.04.</li> <li>• Directs ATC/BOP to inject SLC.</li> <li>• Directs BOP to start RCIC if not previously performed.</li> <li>• When told cannot maintain level gives BOP new level band to 0-214".</li> <li>• Directs BOP to Inhibit ADS, when RPV Level is 32 inches.</li> <li>• Directs ATC to bypass and restore Drywell pneumatics.</li> <li>• Directs ATC to cross-tie V and W Buses IAW 20.300.345kv, section L.</li> </ul>	<b>Malf – B31MF0066 – Recirc Loop A Rupture (LOCA)</b>
<b>Malf – B31MF0066 – Recirc Loop A Rupture (LOCA)</b>			
	ATC	<ul style="list-style-type: none"> <li>• Bypasses and restores Drywell pneumatics if necessary.</li> <li>• When directed, starts second CRD Pump IAW 29.ESP.04, "RPV Injection Using CRD Pumps". <ol style="list-style-type: none"> <li>1. Place C11-R600, CRD Flow Controller, in MANUAL.</li> <li>2. If operation of the second pump is necessary, start standby Control Rod Drive Pump.</li> <li>3. Throttle open Flow Control Valve using C11-R600, CRD Flow Controller.</li> <li>4. Open C1152-F003, CRD Drive/Clg Water PCV, to maximize cooling water flow.</li> </ol> </li> <li>• When directed, injects SLC and reports completion.</li> <li>• Verifies SLC Storage Tank level is decreasing on C41-R601, SLC Storage Tank Level Ind.</li> <li>• Cross-ties V and W buses IAW 20.300.345kv, section L: <ol style="list-style-type: none"> <li>1. Place SBFW Pump B in OFF/RESET.</li> </ol> </li> </ul>	

		<ol style="list-style-type: none"> <li>2. Place Bus 65W Pos W5 in OPEN.</li> <li>3. Place Bus 64V Pos V3 in CLOSE.</li> </ol>
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Op-Test No.: 2012-1 Scenario No.: 1 Event No.: 7 Page 12 of 16

Event Description: Recirc Loop A Rupture

Time	Position	Applicant's Actions or Behavior
	BOP	<ul style="list-style-type: none"> <li>• Reports Level 2.</li> </ul> <p><b>NOTE:</b> RCIC has a spurious initiation signal locked in.</p> <ul style="list-style-type: none"> <li>• Resets the RCIC Turbine Trip to inject, IAW SOP 23.206, "RCIC System", Section 7.1, as follows:               <ol style="list-style-type: none"> <li>1. Re-starts RCIC by performing the following:                   <ol style="list-style-type: none"> <li>a. Places RCIC Turbine Trip pushbutton collar in DISARMED.</li> <li>b. Closes and re-opens E5150-F059, RCIC Trip Throttle Valve.</li> </ol> </li> <li>2. Monitors system operation and verifies flow path.</li> <li>3. Reports RCIC is injecting at 650 gpm.</li> </ol> </li> <li>• Reports cannot maintain level.</li> <li>• When power is restored, starts second SBFW Pump B and maximizes injection with both pumps.</li> <li>• When Level 1 is reached, gives Crew Update, "Level 1, ADS is/is not timing down, and MSIVs are closed.</li> <li>• When directed, if not previously inhibited, inhibits ADS.</li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>1</u> Event No.: <u>8</u> Page <u>13</u> of <u>16</u>		
Event Description:    Div 2 EECW isolation to the Drywell / Restoration of Cooling to CRD		
Time	Position	Applicant's Actions or Behavior
+60 min	SRO	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p align="center"><b>Malfunction – EOPRF0038 – Div 2 EECW Hi Drywell Pressure Lead Lifted</b></p> </div> <ul style="list-style-type: none"> <li>• Directs ATC to verify EECW initiated, isolated to the Drywell, and restore cooling to CRD.</li> <li>• <b>IF</b> necessary, may direct closure of P4400-F606B.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Verifies Div 1 (2) EECW initiated and isolated to the Drywell by checking the indications of the following equipment:               <ol style="list-style-type: none"> <li>1. The white Emergency Mode Light is ON for Div 1 (2).</li> <li>2. EECW Pump A (B) is running.</li> <li>3. EESW Pump A (B) is running.</li> <li>4. P4400-F603A (B), Div 1 (2) EECW Supply Iso Vlv is closed.</li> <li>5. P4400-F601A (B), Div 1 (2) EECW Return Iso Vlv is closed.</li> <li>6. P4400-F602A (B), Div 1 (2) EECW Makeup Tnk Iso Vlv is open.</li> <li>7. P4400-F605A (B), Div 1 (2) EECW To SE (NW) Sump Hx Iso Vlv is closed.</li> <li>8. P4400-F608, Div 2 EECW To DW Sump Hx Iso Vlv is closed.</li> <li>9. P4400-F604, Div 2 EECW To CRD Sply Iso Vlv is closed.</li> <li>10. P4400-F614, Div 1 EECW To Penet Clr's Iso Vlv is closed.</li> <li>11. P4400-F613, Div 1 EECW To Batt Rm's A/C Iso Vlv is closed.</li> <li>12. P4400-F606A (B), Div 1 (2) EECW DW Otbd Supply Vlv is closed.</li> </ol> </li> <li>• Reports D2 EECW not isolated to the Drywell. (P4400-F606B is open)</li> <li>• Isolates D2 EECW to the Drywell by closing P4400-F606B.</li> <li>• Restores cooling to CRD pumps as follows:               <ol style="list-style-type: none"> <li>1. High DW Pressure is present, places Div 2 EECW Manual Override keylock switch to OVERRIDE.</li> <li>2. Depresses RESET pushbutton for Div 2 EECW Isolation Valves.</li> <li>3. Opens P4400-F604, Div 2 EECW To CRD Supply Iso Valve.</li> </ol> </li> </ul>

Op-Test No.: 2012-1 Scenario No.: 1 Event No.: 9 Page 14 of 16Event Description: Emergency Depressurization and water level restoration

Time	Position	Applicant's Actions or Behavior
	SRO	<ul style="list-style-type: none"> <li>• Conducts an EOP brief in preparation for ED.</li> <li>• Directs BOP to open 5 SRVs, ADS preferred [EOP 29.000.01, RF/ED/SC Sheet 3 (Emergency Depressurization)]. When RPV Level is between 0" and -25" on core level indication.</li> <li>• Briefs crew on water level restoration and control.</li> </ul>
CRITICAL TASK	BOP	<ul style="list-style-type: none"> <li>• When directed opens 5 SRVs, ADS preferred, when RPV Level is between 0" and -25" on core level indication. (CT)</li> </ul>
CRITICAL TASK		<ul style="list-style-type: none"> <li>• Maximizes injection with high and low pressure injection systems to restore reactor water level to 173-214". (CT)</li> <li>• Crew Update, "Water level is turning."</li> <li>• Crew Update, "Water level above top of active fuel."</li> </ul> <p><b>NOTE: No water level systems should be throttled or shut down until RPV Water Level is above TAF. (0 inches on core level)</b></p> <ul style="list-style-type: none"> <li>• Shuts down and throttles injection systems when water level is &gt; 0" to control water level 173-214".</li> </ul> <p><b>NOTE: Normally Div 1 RHR is shut down first, if not the selected loop for injection, to be used for containment cooling and sprays.</b></p>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>1</u> Event No.: <u>10</u> Page <u>15</u> of <u>16</u>		
Event Description:    Recirc Loop A Rupture / Containment Sprays		
Time	Position	Applicant's Actions or Behavior
~80 min	SRO	<ul style="list-style-type: none"> <li>• Assigns ATC containment pressure control.</li> <li>• Directs ATC to Place Div 1 RHR in Torus Cooling and Torus Spray.</li> <li>• After report from ATC, directs ATC to stop spraying the Torus before Torus Pressure is 0 psig. (EOP Override)</li> <li>• Directs ATC to shutdown Drywell Cooling Fans.</li> <li>• Directs ATC to spray the Drywell.</li> <li>• After report from ATC, directs to stop spraying the Drywell before Drywell Pressure is 0 psig. (EOP Override)</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Places D1 RHR in Torus Cooling/Torus Spray Mode IAW SOP 23.205, "RHR System", Enclosure A (Hard Card) <ol style="list-style-type: none"> <li>1. <b>If</b> High Drywell Pressure or RPV Level 1 actuation exist, place the Containment Spray Mode Select switch in MANUAL.</li> <li>2. <b>If</b> RPV level is below Level 0, place selected division Containment Spray 2/3 Core Height Override keylock switch in MANUAL OVERRIDE.</li> <li>3. <b>If</b> initiating <b>Torus Cooling Mode</b>, perform the following: <ol style="list-style-type: none"> <li>a. Unlocks and opens E1150-F028A (B), Div 1 (2) RHR Torus Iso Vlv.</li> <li>b. Starts one RHR Pump.</li> <li>c. Throttles E1150-F024A (B), Div 1 (2) RHR Torus Clg Iso, to desired flow.</li> <li>d. When flow is &gt; 3000 gpm, verifies E1150-F007A (B), Div 1 (2) RHR Pmps Min Flow Vlv, closes.</li> <li>e. Starts RHR Service Water System. (RHRSW Flow may be delayed until after Torus Spray is established.)</li> <li>f. To increase cooldown rate, throttles closed E1150-F048A (B), Div 1 (2) RHR Hx Bypass Vlv.</li> </ol> </li> </ol> </li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>1</u> Event No.: <u>10</u> Page <u>16</u> of <u>16</u>		
Event Description:    Recirc Loop A Rupture / Containment Sprays		
Time	Position	Applicant's Actions or Behavior
	ATC	<p>4. <b>If initiating Torus Spray Mode</b>, perform the following:</p> <ol style="list-style-type: none"> <li>Verifies RHR is in LPCI or Torus Cooling Mode. (RHRSW Flow may be delayed until after Torus Spray is established.)</li> <li>Verifies open or unlocks and opens E1150-F028A (B), Div 1 (2) RHR Torus Iso Vlv.</li> <li>Opens E1150-F027A (B), Div 1 (2) RHR Torus Spray Iso Vlv.</li> <li>Verifies RHR flow increases by approximately 500 gpm.</li> </ol> <ul style="list-style-type: none"> <li>Shuts down Drywell Cooling Fans.</li> <li>Places D1 RHR in Drywell Spray Mode IAW IAW SOP 23.205, "RHR System", Enclosure A (Hard Card) <b>(CT)</b></li> </ul> <p>5. <b>If initiating Drywell Spray Mode</b>, perform the following:</p> <ol style="list-style-type: none"> <li>Opens E1150-F021A (B), Div 1 (2) RHR DW Spray Inbd Iso Vlv.</li> <li>Starts or verifies started RHR Pump A or C (B or D).</li> <li>Unlocks and throttles open E1150-F016A (B), Div 1 (2) RHR DW Spray Otbd Iso Vlv, and ensures that RHR flow does not exceed 14,000 gpm per RHR Pump.</li> </ol> <p>6. Performs or verifies complete the following sections of SOP 23.205 as applicable:</p> <ul style="list-style-type: none"> <li>Torus Cooling Mode, Emergency Operation</li> <li>Torus Spray Mode</li> <li>Drywell Spray Mode</li> </ul> <p>7. Verifies complete RHRSW Manual Operation, Enclosure B of 23.208, "RHRSW System".</p> <p><b>NOTE: May shut the E1150-F010 (RHR Cross-connect).</b></p>

**CRITICAL  
TASK**

Facility: Fermi 2 Scenario No. 2 Op-Test No: 2012

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

**Initial Conditions: IC- 14**

**Turnover:** Reactor Startup is in progress with power at 23%. The Main Turbine generator is synchronized to the grid at 175 MW. After shift turnover, the crew will continue startup using GOP 22.000.02. First step to be completed is step 7.2.2.22, transferring from Startup Level Controller to Single Element control

**NOTE:** The Pre-job Briefing on transferring to single element control using 23.107 is to be conducted by the crew prior to entering the simulator. (suggested time 30 minutes prior to the beginning of the scenario)

Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	N (ATC) N (SRO)	Place Feed Water Control SULCV to single element.
2.	N/A	C (ATC) C (SRO)	Swap of the running RRMG LO Pump due to loud noise
3.	E41RF0008	(SRO)	CST Level Low Instrument Failure, Evaluates TS 3.3.5.1 ECCS Instrumentation and TS 3.3.5.2 RCIC System Instrumentation.
4.	N30MF0044 NH01N3031	C (BOP) C (SRO)	Trip of Main Turbine Generator, TS 3.7.6 Main Turbine Bypass System and MSR.
5.	N21MF0029	M (All)	Loss of North Reactor Feed Pump
	C11MF0001	M (All)	RPS Fails to Cause a Scram (Total Scram Failure) Crew Inserts Control Rods (CT 1a)
	BA03B2103 F028A-D		MSIV Closure
6.	C4AAK2BT VSP -1	C (ATC) C(SRO)	SLC Squib valve fails to fire Crew Injects SLC (CT 1b)
7.	E51MF0097	C (BOP) C(SRO)	RCIC does not auto start at L2
8.	B21MF0023	C (BOP) C (SRO)	SRV A fails open.(CT 2)

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



## **Scenario 2 Crew Briefing Sheet**

### ***Initial Conditions:***

- Reactor Power is 23%.
- The Main Turbine Generator is synchronized to the grid at 175 MW
- The shift will continue startup using GOP 22.000.02. After assuming the shift, the crew will transfer Feed Water Control from Startup Level Control to Single Element.

The crew will enter with reactor power approximately 24%. After a short brief, they will shift Feed Water Control from the Startup Level Controller to Single element.

A call from Reactor Building Rounds will report an **abnormal noise** coming from the running RRMG Set LO Pump. They will recommend switching to the A2 LO Pump. After a brief, the CRS will direct the ATC to perform 23.138.01 section 4.2 RR MG Set Lube Oil Pump Shift.

Alarm 2D48, HPCI/RCIC SUCTION TRANS CST LEVEL LOW will alarm. The BOP will comply with ARP, verifies the suction swap for both RCIC and HPCI. After investigation, the crew will determine that **E41-N661B failed downscale**. The CRS will evaluate TS 3.3.5.1 ECCS Instrumentation and TS 3.3.5.2 RCIC System Instrumentation.

After TS determination, **the turbine will trip**. Due to the current power level, the team will determine a manual scram is not required, 20.109.01 TURBINE/GENERATOR TRIP will be entered. Conditions B and C will apply, **the output breakers will have to manually opened** by the CRNSO. After executing these steps, the CRS will hold a brief. The CRS will evaluate TS 3.7.6 Main Turbine Bypass System and MSR.(Condition A. Must meet LCO 3.2.2 MCPR Limits within 2 hours.)

After execution of AOP, the **North Feed Pump will trip**. AOP for loss of feed will be entered. Standby Feed Water can be started, but the CRS should determine there is inadequate pumping capacity. The reactor will scram on level 3 or when the CRS the Mode Switch to SHUTDOWN.

**All rods will remain in place** after scram and **MSIVs will go closed**. **RCIC will fail to auto start**. After SLC has been directed to be injected, **the first squib valve will fail to fire**, causing the 603 operator to start the other SLC pump.

### **SET UP:**

1. Pre-mark GOP 22.000.02 to STEP 7.2.2.22. Provide candidates a copy of 23.107 30 minutes prior for briefing transferring SULCV to single element control.
2. Load IC-14, OPEN and EXECUTE scenario #2.

### **EXECUTION.**

1. Trigger initial conditions. During the transfer of FWC, the candidates may dispatch an operator if the running feed pump is oscillating. Report no abnormalities.
2. After FWC in single elements, booth operator will call to report abnormal noise in RRMG LO Pump.
3. After shifting of LO pumps, Trigger first malfunction. All other malfunctions are controlled by floor instructor with the following exceptions.
4. During the turbine trip, the SRO may direct evaluation of loss of feed water heating. If this is done, they will be in the region for a scram. If direction is given to place the mode switch in shutdown, trigger the feed pump trip.
5. After the candidates determine an SRV is stuck open and operator is dispatched, this malfunction is removed.

## Scenario 2

### GOP

22.000.02

### SOPs

23.107 Section 5.6

23.138.01 Section 4.2

### AOPs

20.107.02

20.107.01

20.109.01

20.000.21

20.000.25

### ARPs

2D48

4D46

### ESPs

29.ESP.11

29.ESP.03

29.ESP.09

29.ESP.10

### IS

3.3.5.1

3.3.5.2

3.7.6

3.2.2

Op-Test No.: 2012-1      Scenario No.: 2      Event No.: N/A      Page 1 of 11

Event Description:      Overview

**Initial Conditions:** Reactor Startup is in progress with power at 23%. The Main Turbine generator is synchronized to the grid at 175 MW. After shift turnover, the crew will continue startup using GOP 22.000.02. First step to be completed is step 7.2.2.22, transferring from Startup Level Controller to Single Element control.

***The objectives of this scenario are to:***

1. Recognize, respond to, and take the required actions for an instrument / equipment failures requiring the use of operator and Tech Spec actions.
2. Recognize and respond to a RRMG LO Pump abnormal noise.
3. Recognize and respond to a CST Level Low Instrument Failure.
4. Recognize and respond to Trip of "Main Turbine Generator".
5. Recognize and respond to a Loss of Reactor Feed Pump.
6. Recognize and respond Anticipated Transient Without Scram (ATWS).
7. Direct and supervise the Shift team during Normal, Abnormal, and Emergency operations.

***The crew will be required to respond to the following order of events:***

- Abnormal noise in RRMG LO Pump A1.
- CST Level Low Instrument Failure
- Main Turbine Trip
- Loss of Feedwater Heating
- Loss of Feedwater
- ATWS
- RCIC failure to auto start
- Squib Valve fails to fire
- SRV "A" fails open after initial opening

Op-Test No.: 2012-1 Scenario No.: 2 Event No.: 1 Page 2 of 11Event Description: Transferring from Startup Level Controller to Single Element control

Time	Position	Applicant's Actions or Behavior
0 min	SRO	<ul style="list-style-type: none"> <li>• Short brief on transferring from SULCV to Single Element</li> <li>• Directs BOP to commence transferring from SULCV to Single Element</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Monitors power, pressure, and level.</li> <li>• May act as a peer check.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Performs 23.107 section 5.6- Transfer from Startup Level Control Mode to Single Element Control Mode.</li> <li>• May dispatch an operator due to minor fluctuations in feed pump speed during evolution.</li> </ul> <div style="border: 1px solid black; padding: 2px; margin: 5px 0;"> <p><b>ROLE PLAY: All indications normal. No abnormalities observed.</b></p> </div> <ul style="list-style-type: none"> <li>• Place or verify, Level Control Mode switch in 1 ELEM. If C32-K816, FW &amp; RR Flat Panel Display, is available, verify DCS logic is in 1 ELEMENT.</li> <li>• Place C32-R616A (B), N (S) Reactor Feed Pump Controller, in AUTO for the desired Reactor Feed Pump.</li> <li>• Adjust or verify, C32-R616A (B), N (S) Reactor Feed Pump Controller, bias is 0%.</li> <li>• Place C32-R618, Master Feedwater Level Controller, in AUTO.</li> <li>• Place C32-R620, N21-F403 RPV Startup LCV Controller, in MANUAL.</li> <li>• Adjust the RPV water level setpoint, if required.</li> <li>• Adjust output of C32-R620, N21-F403 RPV Startup LCV Controller, until N21-F403, RPV Startup LCV, is 100% open. Allow time for Reactor Feed Pump Turbine North (South) speed to lower after each adjustment.</li> <li>• Lower RPV water level setpoint approximately 2 inches and allow RPV water level to stabilize.</li> <li>• Open N2100-F608, S RFP Disch Line Iso Valve and N2100-F607, N RFP Disch Line Iso Valve.</li> <li>• <b>WHEN</b> RPV water level stabilizes, slowly return RPV water level setpoint to desired RPV water level.</li> </ul>

		<ul style="list-style-type: none"><li>• Place RPV Startup LCV Mode Switch in RUN.</li><li>• Verify C32-R620, N21-F403 RPV Startup LCV Controller, is in MANUAL.</li><li>• Verify the N21-F403, RPV Startup LCV, is closed.</li><li>• Verify the DCS Logic is in RUN.</li><li>• Verify the N21-F403, SULCV is closed.</li><li>• Report to the CRS that DCS is in single element control</li></ul>
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Time	Position	Applicant's Actions or Behavior
Op-Test No.: 2012-1 Scenario No.: 2 Event No.: 2 Page 4 of 11		
Event Description: <u>RRMG LO Pump abnormal noise</u>		
+25 min	BOP	<p><b>ROLE PLAY: Reactor building Rounds calls the Control Room and states that the running North RRMG SET LO Pump is making a loud metallic noise. Recommends switching to the A2 LO pump.</b></p> <ul style="list-style-type: none"> <li>• Receives the report from the field and reports to the CRS. Recommends starting standby pump.</li> <li>• Peer checks the ATC swap of the RRMG Set LO Pump from A1 to A2.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report and recommendation.</li> <li>• Holds a brief on switching lube oil pumps.</li> <li>• Directs ATC to perform 23.138.01 section 4.2 RR MG Set Lube Oil Pump Shift.</li> <li>• Notifies Work Control personnel of abnormal noise from RRMG Set LO Pump A1, requests a CARD be written, and a review of POD for activities that might affect current plant conditions.</li> <li>• May allow the ATC to leave the A1 pump in OFF/RESET rather than placed back in AUTO per the procedure due to the abnormal noise.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Performs 23.138.01 section 4.2 RR MG Set Lube Oil Pump Shift.</li> <li>• Place the standby N RRMG Set Lube Oil Pump A2 in RUN.</li> <li>• Place the running N RRMG Set Lube Oil Pump A1 in OFF/RESET.</li> <li>• Verify the A2 PUMP starts.</li> <li>• May ask to leave the A1 pump in OFF/RESET, otherwise it is put back in AUTO.</li> <li>• Contacts the RB Rounds to Verify Fluid Drive Bearing Oil Supply is 25 to 45 psig as indicated on B31-RA5SA North RR MG Set Brg Oil Supply Press Ind(locally at RR MG Set gauge board).</li> </ul> <p><b>ROLE PLAY: Reactor building Rounds reports a good start of A2 pump and oil pressure is 32 psig.</b></p>



Time	Position	Applicant's Actions or Behavior
Op-Test No.: 2012-1 Scenario No.: 2 Event No.: 3 Page 5 of 11		
Event Description: <u>CST Level Low Instrument Failure</u>		
+35 min	BOP	<p><b>Malf – E41RF0008 – CST Level Low Instrument Failure</b></p> <ul style="list-style-type: none"> <li>• Observes Alarm 2D48, HPCI/RCIC SUCTION TRANS CST LEVEL LOW.</li> <li>• Announces alarm for CRS.</li> <li>• Verifies open E4150-F041, HPCI Torus Suct Otbd Iso Vlv, E4150-F042, HPCI Torus Suct Inbd Iso Vlv, E5150-F029, RCIC Torus Suct Otbd Iso Vlv, and E5150-F031, RCIC Torus Suct Inbd Iso Vlv.</li> <li>• Verifies closed E4150-F004, HPCI CST Suct Iso Vlv, E5150-F010, RCIC Pump CST Suction Iso Valve, E4150-F008, HPCI Test Line Iso Vlv, E41-F011, HPCI/RCIC Test Iso/PCV, and E5150-F022, RCIC Test Line Iso Valve.</li> <li>• Verifies level on P11-R801, DST, CRT &amp; CST Level Recorder, and reports to CRS.</li> <li>• Dispatches operator to verify level locally and at testability.</li> </ul> <p><b>ROLE PLAY: Rounds Operators report level at 26 feet locally and downscale on instrument E41-N661B.</b></p> <ul style="list-style-type: none"> <li>• Reports to CRS findings from the field.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report of 2D48, HPCI/RCIC SUCTION TRANS CST LEVEL LOW.</li> <li>• Notifies Work Control personnel of loss of CST level Instrument, requests a CARD be written, and a review of POD for activities that might affect current plant conditions.</li> <li>• Evaluates TS 3.3.5.1 ECCS Instrumentation (condition D-verify HPCI suction to Torus) and TS 3.3.5.2 RCIC System Instrumentation (condition D-verify RCIC suction aligned to Torus within 12 hours).</li> <li>• Directs BOP to align suction sources from CST to the torus.</li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>2</u> Event No.: <u>4</u> Page <u>6</u> of <u>11</u>		
Event Description: <u>Main Turbine Trip/ failure of reverse power generator trip.</u>		
Time	Position	Applicant's Actions or Behavior
+50 min	BOP	<p><b>Malf – N30MF0044 – Main Turbine Trip</b>  <b>Malf- NH01N3031 S000 1_67TF_F_ACT1- Failure of reverse power trip.</b></p> <p>Acknowledge and announce 4D46, MAIN TURBINE TRIPPED.</p> <ul style="list-style-type: none"> <li>• From <b>20.109.01</b>, Stabilizes Reactor Pressure &lt; 1045 psig with Turbine Bypass Valves.</li> <li>• Verifies the following closed Turbine Stop Valves, Turbine Control Valves, Low Pressure Stop Valves, Low Pressure Intercept Valves, and Live Steam to MSR Iso Valves.</li> <li>• Opens Gen Output Breakers CM, and CF. May identify they should have tripped on reverse power.</li> <li>• If directed, evaluate for loss of Feed Water Heating.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Reports power, pressure, and level.</li> <li>• Places Mode Switch in SHUTDOWN <b>IF</b> directed by the CRS.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report of 4D46, and ATC report.</li> <li>• Announces Main Turbine Trip.</li> <li>• Holds brief on Main Turbine Trip.</li> <li>• Directs BOP to perform subsequent actions from <b>20.109.01</b> Main Turbine Trip B.1, B.2, and C.1.</li> <li>• Notifies Work Control personnel of turbine trip, requests a CARD be written, and a review of POD for activities that might affect current plant conditions.</li> <li>• Evaluate TS 3.7.6 Main Turbine Bypass System and MSR.(Condition A. Must meet LCO 3.2.2 MCPR Limits within 2 hours.)</li> <li>• May direct BOP to evaluate for loss of Feed water heating.</li> <li>• May direct Mode Switch to SHUTDOWN if evaluation of Feed Water heating is completed and Reactor Power is above 25%.</li> </ul>

Time	Position	Applicant's Actions or Behavior
Op-Test No.: <u>2012-1</u> Scenario No.: <u>2</u> Event No.: <u>5</u> Page <u>7</u> of <u>11</u>		
Event Description: <u>Reactor Feed Pump Trip/ Scram/ ATWS/ MSIV closure</u>		
+65 min	BOP	<p><b>Malf – N21MF0029 – North Reactor Feed Pump Trip.</b></p> <p><b>Malf – C11MF0001 – Failure of all rods.</b></p> <p><b>Malf- B21Mf028a,b,c,d- MSIV Closure</b></p> <ul style="list-style-type: none"> <li>• Recognizes and reports trip of the North Reactor Feed Pump.</li> <li>• Starts Standby Feed Water if directed by the CRS. This path is unsuccessful for maintaining water level.</li> <li>• Provides scram reports.</li> <li>• Reports MSIV Closure.</li> <li>• Inhibits ADS.</li> <li>• Confirms initiations and actuations for level as they occur.</li> <li>• Bypasses and restores Drywell Pneumatics.</li> <li>• Orders 29.ESP.11 to be completed.</li> <li>• Acknowledges pressure band of 900-1050 psig.</li> <li>• As directed by the CRS, terminate and prevent all injection to the RPV with exception of RCIC, Boron, and CRD.</li> <li>• Maintain water level within given band of the CRS direction.</li> <li>• Place RHR in Torus Cooling when directed.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges trip of the running feed pump.</li> <li>• May direct the BOP to start Standby Feed Water. This path is unsuccessful for maintaining water level.</li> <li>• May hold a brief for loss of Feed Water.</li> <li>• Directs the ATC to place Mode Switch in SHUTDOWN, when determination of lack of adequate pumping capability is available.</li> <li>• Announces event.</li> </ul>

	SRO(cont)	<ul style="list-style-type: none"> <li>• Directs crew to prepare their scram reports.</li> <li>• Announces failure to scam.</li> <li>• Receives scram reports</li> <li>• Directs BOP to inhibit ADS.</li> <li>• Directs FSQ1-8.</li> <li>• Directs to BOP to confirm initiations and actuations for level as they occur.</li> <li>• Directs ATC to inject SLC.</li> <li>• Directs BOP to bypass and restore Drywell Pneumatics and order 29.ESP.11.</li> <li>• Directs to BOP a pressure band of 900-1050 psig.</li> <li>• Analyzes level leg to determine if terminate and prevent is necessary. If necessary, directs the BOP to terminate and prevent.</li> <li>• Direct a level band for the BOP, typically 0-50 inches.</li> <li>• Directs BOP to place RHR in Torus Cooling mode to lower Torus Temperature.</li> </ul>
CRITICAL TASK	ATC	<ul style="list-style-type: none"> <li>• Reports power, level, and pressure.</li> <li>• Places Mode Switch in SHUTDOWN when directed by the CRS.</li> <li>• When Mode Switch does not scram, pushes RPS push buttons</li> <li>• Reports to CRS that there is a failure to scram.</li> <li>• Provides scram reports.</li> <li>• Trips RR pumps.</li> <li>• Initiates ARI.</li> <li>• Injects SLC.(CT1a)</li> <li>• Attempts alternate control rod insertion using 29.ESP.03.(CT1b)</li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>2</u> Event No <u>6</u> Page <u>9</u> of <u>11</u>		
Event Description: <u>Squib valve fails to fire</u>		
Time	Position	Applicant's Actions or Behavior
<b>+70 min</b>	ATC	<div style="border: 1px solid black; padding: 2px;"><b>Malf -C4AAK2BTVSP -1- Squib valve fail to fire</b></div> <ul style="list-style-type: none"> <li>• Place key lock for selected SLC pump to run.</li> <li>• After diagnosis, determines Squib did not fire.</li> <li>• Selects other SLC pump.</li> <li>• Verifies proper pump operation and isolation of RWCU.</li> <li>• Marks time of SLC initiation and SLC Tank level.</li> <li>• Reports failure of squib valve to CRS.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Receives report of SLC injection, noting time for injection and SLC Tank level.</li> </ul>

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Event Description: RCIC auto start failure

Time	Position	Applicant's Actions or Behavior
+70 min	BOP	<div data-bbox="561 485 1406 520" style="border: 1px solid black; padding: 2px;"> <b>Malf –E51MF0006 97- RCIC Auto Start Failure</b> </div> <ul style="list-style-type: none"> <li>• Recognizes RCIC does not auto start on Level 2.</li> <li>• Reports RCIC auto start failure to CRS.</li> <li>• Manually starts RCIC if needed for level control.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges RCIC did not start on Level 2.</li> </ul>

Op-Test No.: <u>2012-1</u> Scenario No.: <u>3</u> Event No.: <u>8</u> Page <u>11</u> of <u>11</u>		
Event Description: <u>SRV A Fails open</u>		
Time	Position	Applicant's Actions or Behavior
<b>+75 min</b>	BOP	<div style="border: 1px solid black; padding: 2px;"><b>Malf - B21mf0023 100– SRV A Fails open.</b></div> <ul style="list-style-type: none"> <li>• Recognizes pressure is low out of band(900-1050 psig).</li> <li>• Recognizes SRV A should be closed.</li> <li>• Pushes OPEN then CLOSED pushbutton.</li> <li>• Informs CRS.</li> <li>• <b>Coordinates with Operators the removal of fuses for SRV A. (CT 2)</b></li> <li>• Informs CRS of indications of closed SRV.</li> </ul> <div style="border: 1px solid black; padding: 2px;"><b>Role Play- Operator responds and removes fuses for SRV A. Gives indications of SRV tailpipe temperature decreasing.</b></div>
<b>CRITICAL TASK</b>		
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges report of open SRV.</li> <li>• Directs operator to remove fuses for SRV A</li> </ul>

Facility: <u>          Fermi 2          </u> Scenario No. <u>  3  </u> Op-Test No: <u>2012-1</u> Spare Scenario			
<b>Initial Conditions:</b> <u>IC-21, EOL, 100% Rx. Power.</u>			
<b>Turnover:</b> <u>The plant has been operating for 364 days. Reactor Power is currently 100% of rated thermal power. All rods are full out. The crew is to perform 23.623 section 6.2, Rod Drift Alarm Test.</u>			
<b>NOTE:</b> The Pre-job Briefing for Control Rod Drift Test to be conducted by the crew prior to entering the simulator. (suggested time 30 minutes prior to beginning the scenario).			
Event No.	Malf. No.	Event Type*	Event Description
1.	N/A	N (ATC) N (SRO)	Perform Control Rod Drift Test.
2.	R11MF0021	C (BOP) C (SRO)	Loss of <b>Bus</b> 68K. Reviews TR 3.12.2, requirements for EFP INOP. (14 Days to restore)
3.	C11MF1111	C (ATC) C(SRO)	Control Rod 58-23 drift into core. Reviews 3.1.3, Control Rod Operability, Section 3.1.6, Rod Pattern Control, and Section 3.3.2.1, Control Rod Block Instrumentation.
4.	C97MF1087	<b>C (SRO)</b> <b>C (BOP)</b>	Earthquake, Reviews TR 3.3.7.2, Seismic Monitoring Instrumentation and TR 3.7.4, Shore Barrier Protection
5.	E5ACFU_TR1 CC 1	C(BOP)	<b>RHRSW</b> MDCT Fan A trips.
6.	C97MF1087 E51MF0010	M(ALL)	Reflash Earthquake/ RCIC steam leak
7.	EOPRF0024	C(BOP) C(SRO)	RCIC fail to isolate, Scram prior to exceeding Max safe temperature( <b>CT1</b> )
8.	C71MF0001	C ( <b>ATC</b> )	Mode switch does not scram, RPS Push buttons work( <b>CT2</b> )
9.	B21MF0103	M (All)	Main steam leak. All MSIVs closed.
10.	N/A	M (All)	On second area temperature > max safe, crew Emergency Depressurizes (BOP opens 5 SRVs, ADS preferred) ( <b>CT3</b> )
11.	B21MF0030 B21MF0031	C(BOP)	SRV "H" fails to open. SRV "J" fails to open.

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



***Initial Conditions:***

- Reactor Power is 100%.
- The plant has been operating for 364 days, all rods are full out.
- The shift will perform Control Rod Drift Test per 23.623 section 6.2 for the given rods on the SPF.

### ILO NRC Initial Exam Scenario 3 Narrative Summary

Initial plant conditions are reactor power currently 100% with all rods full out. The surveillance “perform 23.623 section 6.2 rod drift alarm test for one rod per JMC set” will be completed by the crew. The crew will take the shift after briefing in the classroom.

After a short brief the CRS will direct ATC to commence the surveillance for rods 02-19, 22-03, 34-03, and 58-19(JMC 1-4). This will be completed satisfactory prior to next malfunction.

An electrical malfunction will be inserted to cause a loss of electrical bus 68K. This will be identified by the BOP operator after performing electric plant walk down. The BOP will also identify there is a loss of GSW. Both loss of 68K and loss of GSW will be entered by the crew. The CRS will direct starting available GSW pumps. The CRS will direct the BOP to coordinate with NO to secure the DFP. CRS will evaluate and comply with TS LCOs, and should coordinate with support personnel to control/protect DFP.

Control rod 58-43 will drift into the core. This will be identified by the ATC. CRS will direct entry into the control rod drift AOP, and direct the ATC to disarm the drifting control rod. CRS will evaluate and comply with TS LCOs.

A seismic event will be triggered. The BOP will direct an operator to the relay room per ARP 6D69 to determine the magnitude. The CRS will enter the Seismic event AOP. The ATC will be given critical parameters to monitor. After a report from the Relay Room, the CRS will direct the BOP to reset CCHVAC Purge Compressors and start all MDCT Fans. The first MDCT fan will trip due to brake being engage. The CRS will direct disengaging the brake and restart of the fan. CRS will evaluate and comply with TS LCOs

A flash of ARP 6D69 SEISMIC EVENT will occur, which will lead to a RCIC leak. This will be identified by the team. The EOP Sheet 5 will be entered. CRS will direct isolating RCIC. ATC will report that RCIC has failed to isolate. The CRS will direct the ATC to place the Mode Switch to SHUTDOWN before the RCIC Quad exceeds the maximum safe operating temperature. **(CT)**

CRS will make an announcement and take scram reports. CRS will enter Sheet 1 ON Level 3. The ATC will be directed to confirm isolations and actuations for level as they occur. The CRS will direct a pressure band of 500-700 psig per ODE-10. This can be accomplished by the ATC or BOP using the bypass valves.

A second steam leak will occur. Once identified by the crew, the CRS will direct shutting all MSIVS. After a second area temperature exceeds the maximum safe temperature, 5 ADS SRVs will be opened. **(CT)** Two ADS SRVs will fail to open.

**SET UP:**

1. Give candidates a copy of 23.623 section 6.2, Rod Drift Alarm Test 30 minutes prior to scenario for prejob brief. Also a copy of the SPF to direct which rods will be tested.
2. Load IC-62, OPEN and EXECUTE scenario #3. If IC-62 unavailable, IC-21 with GSW Pumps 3-5 should be running during setup.

**EXECUTION.**

1. Trigger initial conditions.
2. On loss of 68K, the candidates may shut down the DFP. Coordination with the Outside Rounds Operator is required. Remote function P80RF001 will need to be inserted to shutdown the DFP.
3. After earthquake and MDCT fan trip, remove malfunction after making the report that the brake is dis-engaged.

Event Description: Overview***Initial Conditions:***

The plant has been operating for 364 days. Reactor Power is currently 100% of rated thermal power. All rods are full out. The crew is to perform 23.623 section 6.2, Rod Drift Alarm Test.

***The objectives of this scenario are to:***

1. Recognize, respond to, and take the required actions for instrument / equipment failures requiring the use of operator and Tech Spec actions.
2. Recognize and respond to a Loss of 68K.
3. Recognize and respond to a Loss of GSW.
4. Recognize and respond to Control Rod Drift.
5. Recognize and respond to a Seismic Event.
6. Recognize and respond to a steam leak in the RCIC Quad.
7. Direct and supervise the Shift team during Normal, Abnormal, and Emergency operations.

***The crew will be required to respond to the following order of events:***

- Loss of 68K/Loss of GSW
- Control Rod 58-23 drifting into the core
- Seismic Event
- "A" RHR MDCT Fan brake engaged
- RCIC leak
- RCIC Isolation failure
- Mode Switch Failure
- Steam Tunnel leak
- SRV "H" and "J" fail to open

Event Description: Perform Control Rod Drift Alarm Test.

Time	Position	Applicant's Actions or Behavior
0 min	SRO	<ul style="list-style-type: none"> <li>• Short brief on Control Rod Drift Alarm Test.</li> <li>• Directs ATC to commence test on control rods 02-19, 22-03, 34-03, and 58-19.</li> <li>• Grants permission for Rod Select Power to be ON for each rod tested.</li> <li>• Directs BOP to act as peer checker.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Request permission for Rod Select Power to ON.</li> <li>• Performs 23.623 section 6.2 Rod Drift Alarm Test. ATC will place the Rod Select Power to ON, hold the Rod Drift Alarm in TEST, and insert rod momentarily. ATC will verify 3D80 alarms and the ROD DRIFT indicting light come ON, on the Full Core Display. ATC will reset alarm and place Control Rod in its original position.</li> </ul> <p><b>NOTE:</b> After completion, ATC will place Rod Select Power to OFF.</p>
	BOP	<ul style="list-style-type: none"> <li>• Act as peer checker for the ATC.</li> </ul>

Event Description: Loss of Bus 68K

Time	Position	Applicant's Actions or Behavior
<p>Start after 2<sup>nd</sup> Control Rod Drift Test</p>	<p>SRO</p>	<div data-bbox="542 436 1409 541" style="border: 1px solid black; padding: 5px;"> <p><b>NOTE: Insert malfunction after completing the 2<sup>nd</sup> Control Rod Drift Test.</b></p> <p><b>Malf – R11MF0021 – Loss of 68K</b></p> </div> <ul style="list-style-type: none"> <li>• Directs BOP to perform “Electric Plant Walkdown”.</li> <li>• Announces loss of 68K and enters AOP.(crew update)</li> <li>• Acknowledges loss of GSW and enter loss of GSW AOP. (crew update)</li> <li>• AOP Brief for both 20.131.01 Loss of GSW and 20.300.68K Loss of Bus 68K.</li> <li>• Directs BOP to perform 20.131.01, Condition B subsequent actions, starting any available GSW Pump.</li> <li>• Directs BOP to perform subsequent actions C 20.300.68K Loss of Bus 68K.</li> <li>• Notifies Security that Bus 72T is de-energized.</li> </ul> <div data-bbox="542 978 1409 1045" style="border: 1px solid black; padding: 5px;"> <p><b>ROLE PLAY: Security acknowledges Bus 72T is de-energized.</b></p> </div> <ul style="list-style-type: none"> <li>• Reviews TR 3.12.2, requirements for EFP INOP. (14 Days to restore)</li> <li>• Notifies Work Control personnel of BUS 68K, requests a Condition Assessment Resolution Document (CARD) be written, protected system signs be posted for DFP and running GSW, and review of Plan of the Day for activities that might affect current plant conditions.</li> </ul>
	<p>BOP</p>	<ul style="list-style-type: none"> <li>• Performs “Electric Plant Walkdown”.</li> <li>• Announces Loss of Bus 68K. (crew update).</li> <li>• Informs CRS results from rest of electrical walkdown, emphasis on loss of power to running GSW Pumps.</li> <li>• Starts available GSW Pumps.</li> <li>• Informs CRS DFP is running.</li> <li>• Opens breakers and places CMC switches associated with condition C of 20.300.68K AOP.</li> <li>• Directs Rounds Operator to perform walkdown of 68K and report any abnormalities.</li> </ul> <div data-bbox="542 1688 1409 1755" style="border: 1px solid black; padding: 5px;"> <p><b>ROLE PLAY: Outside Rounds reports breaker tripped on overcurrent.</b></p> </div>

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Event Description: Loss of Bus 68K

Time	Position	Applicant's Actions or Behavior
	ATC	<ul style="list-style-type: none"><li>• Monitors RPV water level, power, pressure, steam flow and feed flow.</li><li>• Reports power, level, and pressure are stable.</li><li>• Monitors critical parameters per 20.131.01 Loss of GSW as assigned by the CRS.</li></ul>

Event Description: Control Rod 58-43 Drift into the core.

Time	Position	Applicant's Actions or Behavior
+35 min	ATC	<div data-bbox="537 411 1406 449" style="border: 1px solid black; padding: 2px;"><b>Malf – C11MF1111 – Control Rod 58-43 Drift into the core</b></div> <ul style="list-style-type: none"> <li>• Observes Alarm 3D80, Control Rod Drift Alarm.</li> <li>• Announces alarm for CRS.</li> <li>• Identifies rod 58-43 drifting, places the Rod Select Power to ON, and selects rod 58-43.</li> <li>• Reports rod 58-43 drifting in to the core to CRS.</li> <li>• If rod is not fully in, ATC will fully insert using EMER ROD IN.</li> <li>• Monitors critical parameter, second drifting rod.</li> <li>• Coordinate with Rounds Operator to disarm the control rod.</li> </ul> <div data-bbox="537 793 1406 869" style="border: 1px solid black; padding: 2px;"><b>ROLE PLAY: Close C11-F103 and C11-F105 for HCU 58-43. Delete Malf – C11MF1111.</b></div>
	BOP	<ul style="list-style-type: none"> <li>• Act as peer checker for ATC actions.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges Alarm 3D80, Control Rod Drift Alarm report.</li> <li>• Announces and enters 20.106.07 Control Rod Drift AOP.</li> <li>• Announces the 20.106.07 Control Rod Drift event over the Hi-Com.</li> <li>• AOP Brief for 20.106.07 Control Rod Drift.</li> <li>• Directs ATC to perform subsequent actions for condition C of 20.106.07.</li> <li>• Reviews 3.1.3, Control Rod Operability, Section 3.1.6, Rod Pattern Control, and Section 3.3.2.1, Control Rod Block Instrumentation.</li> <li>• Conducts a crew brief.</li> <li>• Notifies Work Control personnel of rod 58-43 disarmed, requests a CARD be written, protection tags be hung for C11-F103 and C11-F105, and a review of POD for activities that might affect current plant conditions.</li> </ul>



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Event Description: Seismic Event/Earthquake

Time	Position	Applicant's Actions or Behavior
+45 min	BOP	<div data-bbox="537 478 1406 516" style="border: 1px solid black; padding: 2px;"> <p><b>Malf – C97MF1087 – Earthquake</b></p> </div> <ul style="list-style-type: none"> <li>• Responds to 6D69, SEISMIC SYSTEM EVENT/TROUBLE.</li> <li>• Direct an operator to D30-K800, Active Seismic Central Recorder, to perform 23.612,"Seismic Monitoring".</li> </ul> <div data-bbox="537 659 1406 726" style="border: 1px solid black; padding: 2px;"> <p><b>ROLE PLAY: Dispatched Operator reports 0.02G vertical, 0.04G horizontal, No LED red light.</b></p> </div> <ul style="list-style-type: none"> <li>• Attempts to start all RHRSW MDCT Fans.</li> <li>• Resets CCHVAC Purge Compressors</li> <li>• Monitors any critical parameters assigned by CRS per 20.000.01.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Announces events over Hi-Com.</li> <li>• Announces and enters 20.000.01 Earthquake AOP. (crew update)</li> <li>• AOP Brief for 20.000.01 Earthquake.</li> <li>• Assigns critical parameters per AA.1 20.000.01.</li> <li>• Acknowledges the magnitude reported by the field and orders AC.3-AC.6 to BOP.</li> <li>• Performs AC.2, AC.3, AC.7, and AC.9.</li> <li>• Reviews TR 3.3.7.2, Seismic Monitoring Instrumentation and TR 3.7.4, Shore Barrier Protection, for applicability.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Reports power, level, and pressure are stable.</li> <li>• Monitors critical parameters per 20.000.01 Earthquake as assigned by the CRS.</li> </ul>

Event Description: Trip of RHRSW MDCT FAN "A"

Time	Position	Applicant's Actions or Behavior
	BOP	<p data-bbox="537 422 1408 457"><b>Malfunction – E5ACFU_TR1CC 1– RHR MDCT Fan A trips</b></p> <ul data-bbox="537 474 1365 583" style="list-style-type: none"> <li>• While starting "A" RHRSW MDCT Fan, acknowledges trip of fan.</li> <li>• Dispatches an operator to investigate.</li> </ul> <div data-bbox="537 600 1408 699" style="border: 1px solid black; padding: 5px;"> <p data-bbox="553 604 1391 695"><b>ROLE PLAY: Outside Rounds reports Brake is engaged for "A" RHRSW MDCT Fan. Disengages brake after BOP orders to disengage.</b></p> </div> <ul data-bbox="537 711 1040 835" style="list-style-type: none"> <li>• Reports to CRS brake was engaged.</li> <li>• Restarts "A" RHRSW MDCT fan.</li> <li>• Stops "A" RHRSW MDCT fan.</li> </ul>
	SRO	<ul data-bbox="537 856 1154 982" style="list-style-type: none"> <li>• Acknowledges trip of MDCT Fan.</li> <li>• Acknowledges brake engaged.</li> <li>• Assigns BOP to perform AE.1 through AE.3.</li> </ul>

Time	Position	Applicant's Actions or Behavior
+60 min	BOP	<div style="border: 1px solid black; padding: 5px;"> <p><b>Malf –C97MF1087– Earthquake</b>  <b>Malf –E51MF0010 – RCIC Steam Leak</b></p> </div> <ul style="list-style-type: none"> <li>• Responds to 6D69, SEISMIC SYSTEM EVENT/TROUBLE and 16D27 FIRE ALARM.</li> <li>• Announces affected zone as RCIC Quad(NE Quad Sub basement).</li> <li>• Isolate RCIC.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Directs BOP to isolate RCIC when temperature is <math>\geq</math> max normal.</li> <li>• Monitors RCIC Quad temperature.</li> <li>• Announces entry into EOP 29.100.01, SC/RR, Sheet 5.</li> <li>• Before RCIC Quad temperature reaches max safe, briefs crew on reactor shutdown.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>• Responds to 3D34, SEC CONTM TEMP HIGH-HIGH EOP ENTRY alarm. Reports potential EOP entry.</li> <li>• Responds to 3D18, IPCS MONITORED INPUTS ABNORMAL. (High area temp alarm.)</li> <li>• Monitors IPCS Area Temperatures.</li> </ul>

Event Description: RCIC failure to isolate, SCRAM, Mode Switch Failure

Time	Position	Applicant's Actions or Behavior
+65 min <b>CRITICAL TASK</b>	ATC	<ul style="list-style-type: none"> <li>• Places Mode Switch in Shutdown <b>BEFORE</b> RB Steam Tunnel Temperature reaches 210°F (CT).</li> <li>• After Mode Switch is Taken to Shutdown and scram unsuccessful, RPS push buttons pushed.</li> <li>• Verifies all control rods fully inserted.</li> <li>• Verifies reactor power decreasing.</li> <li>• Gives Scram Report.</li> <li>• Verifies Recirc Pumps runback to minimum.</li> <li>• Verifies SDV Vent and Drain Valves closed.</li> <li>• Verifies Post Scram Feedwater Logic and Post Scram Water Level Logic Setdown are sealed in.</li> </ul>
	BOP	<ul style="list-style-type: none"> <li>• Reports to CRS RCIC unable to be isolated.</li> <li>• Gives scram report.</li> <li>• Maintains reactor water 173-214" using RFPs, SBFW, or HPCI.</li> <li>• Lowers pressure to 500psig using the bypass valves if MSIVs are open.</li> <li>• Confirms isolations and actuations for level as they occur.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Requests Scram Reports.</li> <li>• Before RB Steam Tunnel temperature reaches 210°F, announces entry into EOP 29.100.01, RPV Control, Sheet 1, step RC-1 and AOP 20.000.21, Reactor Scram. Directs the ATC to place the Mode Switch in Shutdown.</li> <li>• Directs BOP to maintain reactor water 173-214" using RFPs, SBFW, RCIC or HPCI.</li> <li>• Directs crew to lower reactor pressure 500-1000 psig using bypass valves</li> <li>• Makes Hi-Com announcement of event.</li> </ul>

Time	Position	Applicant's Actions or Behavior
+50 min	BOP	<p><b>Malf - B21MF0103 – Steam Line Rupture in the Tunnel</b></p> <p>Responds to 16D7, AUX BLDG 2ND/3RD/4TH FLOORS HIGH RADN alarm. Reports potential EOP entry. (Main Steam Tunnel Temp 160°F.)</p> <ul style="list-style-type: none"> <li>Responds to 1D66, STEAM LEAK DETECTION AMBIENT TEMP HIGH alarm. Reports potential EOP entry. (Main Steam Tunnel Temp 160°F.)</li> <li>Responds to IPCS alarm for Main Steam Tunnel high temperature.</li> <li>Manually closes MSIVs when directed.</li> <li>Observes RB Tunnel temperature continuing to rise.</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>Responds to 3D34, SEC CONTM TEMP HIGH-HIGH EOP ENTRY alarm. Reports potential EOP entry. (Main Steam Tunnel Temp 160°F.)</li> <li>Responds to 3D18, IPCS MONITORED INPUTS ABNORMAL. (High area temp alarm.)</li> <li>Monitors IPCS Area Temperatures.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>Directs BOP to isolate Main Steam Lines when temperature is <math>\geq 160^\circ\text{F}</math>.</li> <li>Monitors RB Steam Tunnel temperature.</li> <li>When RB Steam Tunnel temperature reaches <math>210^\circ\text{F}</math>, briefs crew on emergency depressurization.</li> </ul>

Time	Position	Applicant's Actions or Behavior
+75 min	BOP	<ul style="list-style-type: none"> <li>When directed, opens 5 SRVs (ADS preferred). (CT)</li> </ul>
	ATC	<ul style="list-style-type: none"> <li>Bypasses and restores Drywell Pneumatics.</li> </ul>

	SRO	<ul style="list-style-type: none"><li>• When area temperatures are &gt;MSO in 2 or more areas, directs BOP to open 5 SRVs, ADS preferred [EOP 29.000.01, RF/ED/SC Sheet 3 (Emergency Depressurization EOP C-2)]. (CT)</li><li>• Directs BOP/ATC to bypass and restore Drywell pneumatics if necessary.</li></ul>
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 Event Description: SRV "H" and "J" fail to open.

Time	Position	Applicant's Actions or Behavior
+75min	BOP	<div data-bbox="545 365 1406 453" style="border: 1px solid black; padding: 5px;"> <p><b>Malf – B21MF0030 – SRV H fails to open</b>  <b>Malf– B21MF0031 – SRV J fails to open</b></p> </div> <ul style="list-style-type: none"> <li>• Identifies 2 ADS valves fail to open.</li> <li>• Selects two non-ADS SRVs to open, for a total of five.</li> <li>• Informs the CRS of the SRVs that failed to open.</li> </ul>
	SRO	<ul style="list-style-type: none"> <li>• Acknowledges 2 ADS SRVs did not open.</li> </ul>

**GOP**

**SOPs**

23.623 Section 6.2  
23.612  
23.501.01  
23.101  
23.208  
23.413

**AOPs**

20.000.21  
20.131.01  
20.300.68K  
20.106.07  
20.000.01

**ARPs**

3D80  
6D69  
16D27  
3D34  
16D7  
1D66  
7d6  
4d142

**ESPs**

**TS**

TR3.12.2  
3.1.3  
3.3.2.1  
TR 3.3.72  
TR 3.7.4