Facility: Fermi 2 (50-341) Scenario No.: 3-1 Op-Test No.: 2010-301

Examiners: _____ Operators: _____

Initial Conditions: 100% RTP MOL; 5 control rods have slow scram times

Turnover: The plant is at 100% power. Five control rods have slow scram times. No equipment out of service. ~~Torus water level must be lowered to support scheduled surveillances later in the day.~~

Event No.	Malf. No.	Event Type*	Event Description
~~1~~		~~N (BOP)~~	~~Lower Torus Water level using TWMS.~~
2		C (BOP) TS (SRO)	CCHVAC Chill Water Pump Control Power failure results in loss of chill water.
3		~~R (RO)~~ [C (RO)]	High Generator Cooling Water Inlet Temperature/Power reduction to reduce generator loading.
4		C (RO)	Small RWCU leak requiring manual isolation.
5		C (RO /BOP)	Unisolable Circulating Water system rupture at inlet to condenser; leak starts small and grows resulting in shutdown of CW system.
6		M	Small break LOCA (above normal water level – steam line, head vent, etc.)
~~7~~		~~C (RO)~~	~~SBFW Injection Valve (F001) partially opens~~

SUMMARY:

The scenario starts with the plant at 100% rated thermal power. 5 control rods have slow scram times. ~~The crew will lower Torus water level using TWMS. Once Torus water level has been reduced,~~ The Control Center chill water pump will trip, and the crew will restore CCHVAC chill water to operation. The CRS will address technical Specifications for the loss of chill water. Once the Tech Specs are addressed a high temperature condition on the Stator Cooling Water system will require **[a plant scram and main turbine trip.]**~~a power reduction to reduce generator loading.~~ Once conditions are stabilized, a leak will develop in the North RWCU Pump room requiring shutdown and isolation of the system. The SRO will address the Technical Specification impacts in accordance with TS 3.3.6.1. Once the Tech Specs are addressed an unisolable Circulating Water system rupture at inlet to condenser will occur; leak starts small and grows resulting in shutdown of CW system and loss of vacuum ~~and resultant plant scram~~. A small break LOCA (above normal water level – steam line, head vent, etc.) will develop requiring implementation of EOPs 29.100.01 Sheets 1 and 2. The break will be small enough, so that Safety relief valves will initially need to be cycled to maintain reactor pressure. A HPCI control failure will prevent injection with HPCI. ~~Reactor pressure will need to be reduced to allow use of low pressure sources.~~ Eventually Drywell Sprays will need to be initiated to control Drywell temperature and/or pressure.

NOTES ON THE AS-ADMINISTERED SCENARIO

1. Second scenario for SRO applicant in the CRS position in order to evaluate implementation of EOPs (1st scenario did not require EOP entry).
2. Event 1 deleted since an additional “Normal” evolution not needed to support licensing decision for BOP operator (Third scenario for RO applicant).
3. Event 3 changed from “Reactivity Manipulation” to “Component Failure” since all crews Scrammed the reactor per Loss of TBCCW AOP guidance.
4. Event 7 deleted since scenario progressed such that SBFW injection was not needed, and therefore was not started.

I. SIMULATOR SETUP

A. Initial Conditions

1. Reset the simulator to an IC with the plant at the following conditions:
   a) 100% rated thermal power, MOL
   b) Torus water level high enough to support lowering of level.

B. Malfunctions and Remotes

MF/RF/POLBL	DESCRIPTION	TARGET VALUE	STEP NO.	RAMP	DELAY
E41MF0013	HPCI SPEED CONTROL FAILURE	0.0	1	N/A	N/A
N21MF0031	SPFW F001 FAILURE	0.4	1	N/A	N/A
TBBGFUSE-V083118CC	D1 CCHVAC CHILL WATER PUMP FUSE	TRUE	2	N/A	N/A
PC07N30F414ZMANTVP	N30F414 MANUAL VALVE	TRUE	3	N/A	N/A
PC07N30F414TASTEM	N30F414 POSITION	0.09%	3	5 sec	N/A
G33MF0011	RWCU PUMP SUCTION LEAK	4.0%	4	1200 sec	N/A
N71MF0016	CW LEAK IN TURBIN BLDG	30.0%	5	600 sec	N/A
B21MF0021	LEAK ON C STEAM LINE	0.25%	6	10 sec	
B31MF0066	RECIRC LOOP RUPTURE - A	0.25%			
N71RF0008	#2 CW PUMP DISCH VALVE BREAKER	OPEN			

C. Communications

EVENT	POSITION/TITLE	MESSAGE
2	Rounds	If sent to investigate chill water pump trip report that breaker is tripped (over current)
4	Rounds	JUST BEFORE ACTUATING THE MALFUNCTION REPORT “Steam is visible on the camera for the North RWCU Pump Room”
4	Local Operator	Report Relay Room Temperatures as requested
5	Local Operator	REPORT Water spray/Loud noises in CND Hotwell area of TB basement
5	RW Operator	IF Asked – TB sump pumps running for past 15 min.

D. Required Materials

Shift Turnover Package

II. REQUIRED OPERATOR ACTIONS

TIME	POSITION	EXPECTED ACTIONS
	CRS	Focus/Turn Over Brief
		~~**EVENT 1 – LOWER TORUS WATER LEVEL**~~
	~~CRS/CRNSO~~	~~Briefs crew on evolution~~
	~~CRNSO~~	~~Lowers Torus water level IAW 23.144, "Torus Water Management System"~~ ~~Transfer TWMS from Bypass Mode to lower level as follows:~~ ~~o Depress Open pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.~~ ~~o When TWMS Pump ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.~~ ~~When the desired Torus Water Level is reached:~~ ~~o Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.~~ ~~o When TWMS Pump ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.~~

TIME	POSITION	EXPECTED ACTIONS
		<u>EVENT 2 – CCHVAC CHILL WATER PUMP TRIP</u>
	CRNSO	Respond to the following alarms: 8D5, DIV I CONTROL ROOM A/C TROUBLE 8D72, MOTOR TRIP Determines that chiller trip is due to trip of chill water pump and reports to CRS
	CRS	Announces entry into and direct actions of 20.413.01, “Control Center HVAC System Failure” Directs CRNSO to shutdown the Div 1 Train of CCHVAC and start the Div 2 Train Addresses Tech Spec 3.7.4, Control Center Air Conditioning (AC) System • Cond. A, Restore to operable status within 30 days
	CRNSO	Shift CCHVAC Trains as directed Shutdown the malfunctioning division of CCHVAC by placing the Mode Select Switch in ALL STOP. Start the standby Division of CCHVAC by placing the Mode Select Switch in ALL AUTO. Ensures proper system operation IAW 23.413, “Control Center HVAC”

TIME	POSITION	EXPECTED ACTIONS
		<u>EVENT 3 -- HIGH GENERATOR COOLING WATER INLET TEMPERATURE/POWER REDUCTION</u>
	CRNSO	Respond to alarms 4D70, GENERATOR INLET WATER TEMP HIGH 5D2, TBCCW PUMPS RECIRC VALVE CLOSED ☐ Observes and reports Stator Water Temperature (N30-R804, Stator Wtr Cooling Inlet Temp Recorder) ☐ Dispatch operator to check for TBCCW abnormalities ☐ Observes opening of N30-K812, Stator Winding Clrs TCV N30-F414 Ctrlr. ☐ Direct NO to remove Demineralizer from service, by closing N3000-F090, Stator Wtr Demineralizer Inlet Isolation Valve. ☐ IF necessary, to lower temperature, throttle open P4300-F070, TBCCW Return From Stator Water Cooling Hx's TCV 10" Bypass Vlv. ☐ IF necessary, lower TBCCW Temperature in accordance with 23.128, "Turbine Building Closed Cooling Water System" ☐ IF Main Turbine Generator has not tripped, reduce Generator Load as necessary to prevent exceeding the following Stator Cooling Water Operating Temps (consistent with normal operation): • N30-R804, Stator Wtr Cooling Inlet Temp Recorder, 131°F (COP H11-P804). • N30-R156, Stator Water Cooling Gen Outlet Temp Ind, 172°F (H21-P251, TB2-K3). ☐ Vent HX based on recommendation from field.
	CRS	Directs P603 to **[scram the reactor (20.128.01)]** ~~reduce power (22.000.03 or 23.623)~~ **[Directs CRNSO to trip the Main Turbine]**
	P603/CRNSO	~~Reduces reactor power as directed~~ ~~☐ Decrease Reactor Power by decreasing Reactor Recirculation Pump Speed and/or inserting Control Rods in reverse order of the approved Rod Pull Sheet~~ ~~OR~~ ~~☐ Rapid Power Reduction~~ ~~o Reduce Core Flow (but to not less than 55% of rated Core Flow), to achieve the desired power level, by depressing and releasing the RECIRC MANUAL RUNBACK pushbutton.~~ ~~o Evaluate power, Neutron Flux Instability, and temperature decrease and insert the Cram Array to the desired reactor power~~ **[See Event 5 for Post-Scram Response]**

TIME	POSITION	EXPECTED ACTIONS
		EVENT 4 – RWCU LEAK REQUIRING MANUAL ISOLATION
	CRNSO	Responds to alarm 16D27, FIRE ALARM (Zone 10, RB2-D9 Div 1 Cable Tray Area] - Determines affected zone from Fire Detection/Protection Mimic Board and reports to CRS. - Dispatches NO to investigate.
	CRS	May announce entry into 20.000.22, "Plant Fires" Announces entry into 20.707.01, "Loss of RWCU" - Directs P603 to isolate RWCU OR Directs P603 to shutdown and isolate RWCU in accordance with 23.707, "Reactor Water Clean Up"

	P603	Shutdown and isolates RWCU IAW 20.707, "Reactor Water Cleanup"
		- Close the following:
		  o G3352-F001.
		  o G3352-F004.
		  o G3352-F220.
		- Slowly throttle open G3352-F044 until dual.
		- Open the following:
		  o G3352-F035 (preferred).
		  OR
		  o G3352-F034.
		- Slowly throttle open G3300-F033 to depressurize RWCU System.
		
		OR
		
		Shutdown and isolate RWCU in accordance with 23.707, "Reactor Water Clean Up"

TIME	POSITION	EXPECTED ACTIONS
		<u>EVENT 5 – CIRC WATER LEAK</u> **[NOTE: Plant shutdown and post-scram actions performed as part of Event 3.]**
	~~CRS~~	~~Directs P603 to reduce power (22.000.03, Flooding and/or 20.125.01, Loss of Vacuum)~~
	~~P603~~	~~Reduces reactor power as directed~~ ~~Decrease Reactor Power by decreasing Reactor Recirculation Pump Speed and/or inserting Control Rods in reverse order of the approved Rod Pull Sheet~~ ~~OR~~ ~~Rapid Power Reduction~~ ~~o Reduce Core Flow (but to not less than 55% of rated Core Flow), to achieve the desired power level, by depressing and releasing the RECIRC MANUAL RUNBACK pushbutton.~~ ~~o Evaluate power, Neutron Flux Instability, and temperature decrease and insert the Cram Array to the desired reactor power~~
	CRS	~~Directs P603 to Place Mode Switch in SHUTDOWN~~ Directs CRNSO to ~~ensure Turbine Shutdown, THEN~~ shutdown Circ Water ~~Directs CRNSO to shut MSIV's~~
	P603	Places Reactor Mode Switch in SHUTDOWN Post-Scram Report: Reactor Mode Switch in SHUTDOWN Control Rod Status (All Inserted) Reactor Power and Trend (Downscale and decreasing on -80 sec period) RPS Status (Manually Actuated) Turbine Status (Tripped or On-Line)
	CRNSO	Post-Scram Report RPV Water Level Status RPV Pressure Status MSIV Status

TIME	POSITION	EXPECTED ACTIONS
	CRS	Announces Entry into and direct actions of 29.100.01, Sht. 1, “RPV Control” Confirm reactor shutdown with all rods inserted RPV LEVEL o Confirm isolations and actuations o Restore and maintain RPV water level 173” to 214” RPV PRESSURE o Manually open SRV’s and reduce RPV press to 960 psig o Stabilize RPV press < 1093 psig o Depressurize RPV at < 90°F/hr
	P603	Performs the following as directed: Maintains RPV water level 173” to 214” with SBFW, RCIC and CRD ~~Observes failure of SBFW injection valve to fully open; dispatches operator to investigate.~~ Observes and reports inability to inject using HPCI
	CRNSO	Performs the following as directed: Opens SRVs as needed to lower RPV pressure to 960 psig / Dispatches Operator Stabilizes RPV pressure < 1093 psig. Places one or both divisions of RHR in Torus Cooling Attempts to raise Torus water level with TWMS

TIME	POSITION	EXPECTED ACTIONS
		<u>EVENT 6 – SMALL BREAK L0CA INSIDE CONTAINMENT</u>
	P603/CRNSO	Observes and reports rising Drywell Pressure

	CRS	Announces entry into and directs actions of 29.100.01, Sht. 2, “Primary Containment Control”
		- TORUS TEMP
		  - When torus water temp > 95°F Operate ALL available torus water cooling
		- DRYWELL TEMP
		  - When Drywell temperature cannot be maintained < 145°F, Directs operation of ALL Drywell Cooling (29.ESP.08)
		  - **Before Drywell Temperature reaches 340°F, Sprays Drywell (CRITICAL TASK)**
		- DRYWELL PRESSURE
		  - Confirm Isolations and Actuations on High Drywell Pressure
		  - Before Torus pressure reaches 9 psig, Initiate Torus Sprays
		  - **When Torus Pressure > 9 psig, Sprays Drywell (CRITICAL TASK)**

	CRNSO	Performs the following as directed:
		- Confirm Isolations and Actuations on High Drywell Pressure
		  - EECW Initiation and Isolation
		  - Restore Cooling to CRD
		  - Shutdown RR Pumps
		  - Prevent injection from CS and LPCI not needed for core cooling
		- Places one or both divisions of RHR in Torus Cooling
		  - If High Drywell Pressure or RPV Level 1 actuation exists, place the Containment Spray Mode Select switch in MANUAL.
		  - Unlock and open E1150-F028A (B), Div 1 (2) RHR Torus Iso Vlv.
		  - Start one RHR Pump.
		  - Throttle E1150-F024A (B), Div 1 (2) RHR Torus Clg Iso, to desired flow.
		  - When flow is > 3000 gpm, verify E1150-F007A (B), Div 1 (2) RHR Pmps Min Flow Vlv, closes.
		  - Start RHR Service Water System. (RHRSW Flow may be delayed until after Torus Spray is established.)
		  - To increase cooldown rate, throttle closed E1150-F048A (B), Div 1 (2) RHR Hx Bypass Vlv.

TIME	POSITION	EXPECTED ACTIONS
		Before Torus pressure reaches 9 psig, Initiate Torus Sprays o Verify RHR is in LPCI or Torus Cooling Mode. (RHRSW Flow may be delayed until after Torus Spray is established.) o Verify open or unlock and open E1150-F028A (B), Div 1 (2) RHR Torus Iso Vlv. o Open E1150-F027A (B), Div 1 (2) RHR Torus Spray Iso. o Verify RHR flow increases by approximately 500 gpm. **Initiates Drywell Sprays (CRITICAL TASK)** o Open E1150-F021A (B), Div 1 (2) RHR DW Spray Inbd Iso Vlv. o Start or verify started RHR Pump A or C (B or D). o If a second RHR pump is available, verify or open E1150-F048A(B), Div 1 (2) RHR Hx Bypass Vlv, and start second RHR pump. o Unlock and throttle open E1150-F016A (B), Div 1 (2) RHR DW Spray Otbd Iso Vlv, and ensure that RHR flow does not exceed 14,000 gpm per RHR Pump, 13,000 gpm for RHR pump D.

TERMINATION CRITERIA		
		The scenario may be terminated when: Drywell Spray has been initiated RPV water level is under the control of the crew OR When directed by the Chief Examiner

III. CRITICAL TASKS

A. Initiate Drywell Spray upon one of the following

- When Torus Pressure > 9 psig
- Before Drywell Temperature reaches 340°F