NMPC NMP SIMULATOR SCENARIO

O1-OPS- **NRC EXAM SCENARIO 1** **No. of Pages: 25**

LOSS OF OFF-SITE POWER WITH STEAM LEAK IN THE DRYWELL

PREPARER		DATE	5/25/00
VALIDATED	with Ops Crew	DATE	5/15/00
CONFIGURATION CONTROL	NA	DATE	NA
GEN SUPERVISOR OPS TRAINING		DATE	5/30/00
OPERATIONS MANAGER UNIT 1	NA	DATE	NA

SCENARIO SUMMARY

Length: 90 minutes

During normal 100% power operation it is necessary to shift operating TBCLC pumps to perform breaker maintenance on the running TBCLC pump. After shifting the pumps the TBCLC Temperature Controller fails requiring manual control of the TBCLC controller. After this is corrected the Reactor Recirculation MG Set 13 Generator will overheat requiring removing the Recirculation Loop from service. After the pump is removed from service power is raised back to 100%. During the power ascension APRM Channel 12 will fail requiring the channel be bypassed. The lower Recirc Pump 11 seal will fail, after this malfunction is diagnosed the outer seal will fail, the pump discharge isolation valve will not close. Rising drywell pressure and leakage will require a reactor scram. When the reactor is scrammed Off-Site power will be lost and 102 Emergency Diesel fails to start. When containment conditions require, containment sprays will be initiated, the loss of high pressure injection will challenge RPV level. RPV level will be maintained above TAF with alternate injection systems.

Major Procedures: N1-OP-24, N1-OP-1, N1-OP-43A, N1-OP-38C, N1-OP-33A, N1-OP-30, EPIP-EPP-28, N1-SOP-5, N1-SOP-1, & N1-EOP-2 & 4

EAL Classification: Alert (EAL 3.1.1)

Termination Criteria: RPV level controlled above TAF, RPV pressure maintained under 1000 psig, containment parameters controlled per N1-EOP-4.

I. SIMULATOR SET UP

A. IC Number: IC-24

B. Presets/Function Key Assignments

1. Malfunctions:

a. CW14, TBCLC Controller TCV 71-88, Fails Low **(F3)**

b. RR98C, Recirc MG Set #13 Generator Overheating (100% over 10 min) **(F4)**

c. NM21B, APRM Channel 12 Failure INOP **(F5)**

d. RR33 (100% over 3 min), Reciric Pump Seal Lower (Inner) Failure **(F6)**

e. RR34 (100% over 10 min), Recirc Pump Seal Upper (Outer) Failure **(F7)**

f. RR29, Recirc Loop rupture 12% Ramp Time 5:00 minutes **(F8)**

g. ED01A, Loss of Off-Site 115KV Power, JAF-LINE 4 **(F9)**

h. ED01B, Loss of Off-Site 115KV Power, SOUTH OSWEGO-LINE 1 **(F9)**

i. DG01A, Diesel Generator 102 Failure to Start **QUEUED**

2. Remotes:

a. ED12, Open **(F10)**

b. ED13, Close **(F10)**

3. Overrides:

a. RX RECIRC PUMP 11 DISC VALVE, State – POS 2. (05S063-DI-008-05) **QUEUED**

4. Annunciators:

None.

C. Equipment Out of Service

1. None

D. Support Documentation

None

E. Miscellaneous

None

II. TURNOVER

SHIFT TURNOVER INFORMATION

A B C D E F SHIFT/STAFF/SRO CERTS DATE _____

REACTOR POWER	100%
CORE LIFE	EOL
ROD LINE	102%
SHIFT	DAYS

A. Technical Specification LCOs in effect:

1. None

B. Significant Problems/Abnormalities/Equipment Out of Service:

1. None

C. Evolutions/Maintenance Scheduled for this Shift:

1. Shift operating TBCLC Pumps for scheduled maintenance on TBCLC Pump 11 breaker. Place TBCLC Pump 12 in service, secure TBCLC Pump 11.

SHIFT COMPLEMENT

SRO	
RO	
BOP	
EXTRAS	

TASKS AND OBJECTIVES

A. Critical Tasks:

CT-1.0 Given the plant shutdown with a leak in the Drywell the crew will initiate Containment Sprays in accordance with N1-EOP-4 when Torus pressure exceeds 13 psig or before Drywell air temperature exceeds 300°F. The crew will initiate Containment Sprays while in the safe region of the Containment Spray Initiation Limit to prevent exceeding Pressure Suppression Pressure Limit and/or RPV Saturation Temperature.

Tasks:

2260020101 Manually initiate Containment Sprays.

3440070303 Direct corrective actions to mitigate the consequences of an abnormal event (PRA).

3520300505 Maintain cognizance of EOP figures applicability during EOP implementation.

CT-2.0 Given the plant with degraded electrical power and a leak in the drywell the crew will take the appropriate actions to maintain the core covered and begin level restoration with alternate injection systems.

3410140303 Direct shift personnel actions during major plant evolutions (PRA)

3419030103 Monitor functions in the control room

3420220303 Provide technical assistance in troubleshooting system malfunctions

3440070303 Direct corrective actions to mitigate the consequences of the abnormal event (PRA)

3440110303 Direct actions to ensure that core cooling is maintained during an abnormal event (PRA)

3440240303 Direct corrective actions to mitigate the consequences of the emergency event (PRA)

3440250303 Direct shift personnel actions to correct the cause of the emergency abnormal event (PRA)

3440260303 Evaluate the emergency event to determine that conditions are following the expected sequence (PRA)

3440280303 Direct actions to ensure that core cooling and containment is maintained during an emergency event (PRA)

3440370303 Analyze indications to determine that an off normal plant evolution is in progress (PRA)

3440380303 Direct shift personnel actions to ensure plant safety during off normal conditions (PRA)

3440410303 Analyze indications to determine the cause of the abnormal event (PRA)

CT-3.0 Given a lowering pressure in the containment with Containment Sprays operating, the crew will terminate Containment Sprays before drywell pressure reaches 0 psig.

2260040101 Monitor the containment spray system while in operation

2260030101 Shutdown the Containment Spray (PRA).

3410410303 Authorize termination of engineered safety features functions (PRA).

B. Performance Objectives:

PO-1.0 Given the plant in any operating mode, the crew shall demonstrate effective communications in accordance with GAP-OPS-01 on verbal communication.

PO-2.0 Given the plant in an emergency condition, SROs shall demonstrate an understanding of Command and Control, EOP placekeeping techniques and effective use of control room operators (NMP2 Requal Action Plan, Rev 02, 6.B.6).

PO-3.0 Given the plant in any operating condition, the crew shall demonstrate "Self-Checking" work practice techniques for all control action in accordance with Operations Department instructions. (LER 50-410/88-50, NRC IR 50-410/88-01).

PO-4.0 Given the plant during any operating condition, SROs shall direct appropriate conservative action stabilizing the plant within acceptable limits, including scramming the reactor or tripping the turbine manually when necessary.

PO-5.0 Given the plant after any transient or event, SROs shall establish and modify control bands for key plant parameters, to direct actions maintaining parameters within prescribed limits.

PO-6.0 Given the plant in any operating condition, the SRO shall conduct crew updates to inform crew members of plant status, on-going or planned mitigation activities, and to solicit feedback from the team.

PO-7.0 Given the plant in any operating condition, SROs shall prioritize crew actions to address plant conditions using a systematic process.

PO-8.0 Given the plant in any operating condition, the crew shall monitor and communicate values and trends for key plant parameters and equipment status.

PO-9.0 Given the plant in any operating condition, the crew shall focus personnel resources to maintain effective control board attention.

PO-10.0 Given the plant in any operating condition, the crew shall remove plant equipment from service when approaching or exceeding the equipment's operating limits.

PO-11.0 Given the plant during high reactor pressure conditions, the crew shall control RPV pressure manually to stop and prevent ERV cycling.

PO-12.0 Given the plant following a reactor scram, the crew shall control RPV temperature to prevent exceeding Technical Specification allowed cool down rate, or avoid unnecessary safeguards actuation.

PO-13.0 Given the plant in a condition requiring a rapid decrease in reactor power, the crew shall perform an emergency power reduction using recirculation and or manual rod insertion (if necessary) in accordance with approved procedures.

PO-14.0 Given a situation warranting Technical Specification investigation and application, the SRO shall perform an independent review of Technical Specifications and determine appropriate license requirements.

Tasks:

3410170303 Recall Safety Limits, LS3 and LCOs for operations addressed by Technical Specifications

3410180303 Apply Technical Specifications directions for Safety Limits, LS3 and LCOs (PRA).

3410320303 Evaluate Plant System's performance and coordinate appropriate actions per Tech. Specs., if LCO is entered/not satisified (PRA).

PO-15.0 Given the plant in a power operating condition the crew will shift operating TBCLC Pumps and recognize and respond to a TBCLC TCV failure by taking manual control per Annunciator Response Procedures.

PO-16.0 Given the plant in a power operating and rising temperature on 13 RRMG condition the crew will remove 13 RRMG from service per N1-OP-1.

Tasks:

2029010101 Conduct a partial recirculation loop operation

PO-17.0 Given the plant in a power operating condition and an APRM failure the crew will recognize and diagnose the failure, then take the appropriate actions

Tasks:

3410420303 Authorize bypass of engineered safety functions

3410440303 Authorize bypass of an RPS channel from a trip condition (prevent actuation) (PRA)

PO-18.0 Given the plant in a power operating condition and a loss of recirculation pump seals on an operating pump the crew will recognize and diagnose the loss of seals and remove the Recirc Pump from service and isolate the loop per N1-OP-1.

Tasks:

20290101011 Conduct a partial recirculation loop operation

PO-19.0 Given the plant in a tripped condition the crew will respond to a loss of offsite power with a failure of one EDG, taking appropriate actions to mitigate the event and restore normal power.

Tasks:

3410460303 Authorize and direct de-energizing or energizing of electrical busses (incl. Vital & Non-Vital AC & DC) (PRA)

2009020401 Respond to a loss of various AC power boards (PRA)

2620040101 Monitor the AC distribution system in the control room

2629050401 Respond to a loss of T101N or T101S (PRA)

2629060401 Respond to a failure to fast transfer of PB11 and/or 12 (PRA)

2640040101 Monitor the D/G in the control room

PO-20.0 Given degrading conditions in the Primary Containment, the crew will respond to a drywell temperature greater than 150°F and/or respond to a drywell pressure greater than 3.5 psig by restoring drywell cooling per N1-EOP-4.

Tasks:

2000210501 Respond to a drywell temperature greater than or equal to degrees 150°F average.

2000070501 Drywell pressure greater than or equal to 3.5 psi. (PRA)

2230060101 Monitor the containment system

PO-21.0 Given a Torus pressure exceeding 13 psig or before containment temperature exceeds 300°F, manually initiate containment sprays.

Tasks:

2260020101 Manually initiate containment spray. (PRA)

2260040101 Monitor the containment spray system while in operation

PO-22.0 Given the plant in a power operating condition and a loss of 115KV electrical power, the crew will take appropriate actions to mitigate the consequences of a small break loss of coolant accident inside the Primary Containment.

Tasks:

2000070501 Drywell pressure greater than or equal to 3.5 psi. (PRA)

2000210501 Respond to a Drywell Temperature greater than or equal to 150°F average.

2009040401 Respond to combined loss of coolant (LOCA) inside primary containment and 115KV (PRA)

2009050501 Respond to a LOCA. (PRA)

2230060101 Monitor the Containment System.

3449020401 Respond to Control Room annunciators.

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Begin Scenario Allow 5 minutes for crew walkdown panels.	
	Crew • Walkdown panels • Perform annunciator checks • Conduct shift turnover brief • Assume the shift
After crew assumes the shift they shift operating TBCLC pumps per N1-OP-24, Section F.1.0 OR H.10.0 and H.11.0.	SRO • Provide Pre-Evolution Brief
Event 1 BOP (N) ROLE PLAY: As AO, go to the TBCLC pump perform pre-start checks, verify proper operation and vent pump, if directed. After 12 TBCLC pump has been started, report #12 TBLC Pump is running and all conditions are normal. (Wait one minute then go to the next page and insert malfunction.)	BOP PO-15.0 • Obtain and review N1-OP-24 • Starts standby pump, TBCLC Pp 12 • Directs AO to vent the pump, if required. • Confirms standby pump is operating correctly by verify stable pump amps and discharge pressure. • Stops the TBCLC Pp 11, then places control switch for TBCLC Pump 11 in AUTO START.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ACTIVATE malfunction by depressing F3 key: **CW14, TBCLC Controller TCV 71-88, Fails LOW** **(F3)** Event 2 BOP (I) *TCV-71-88 fails closed. TB COOLING WATER SUPPLY TEMP rises to above 100°F.* Expected Annunciator: *H1 (3-4), TURBINE BLDG COOLING WATER PRESS TEMP MAKEUP FLOW, after about 2:30 minutes.* *A3 (1-1) TURB GEN EXC TRANS 1 TEMPERATURE RECORDER may also alarm due to elevated TBCLC temperature.*	BOP PO-15.0 • While verifying proper TBCLC operation acknowledges annunciator and determines temperature controller has failed low. • Take manual control of the TCV 71-88 per N1-ARP-H1 3-4 step 3a: - Places TCV Controller in MANUAL - Opens TCV and adjusts as necessary to maintain temperature below high alarm setpoint of 100°F. - Observes TB COOLING WTR SUPPLY °F indicator.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
When plant conditions have stabilized, ACTIVATE malfunction by depressing F4 key: **RR98C, Recirculation MG Set #13 Generator Overheating (100% over 10 min.) (F4)** Expected Annunciator after 3.5 minutes: *F2 (2-3), REACT RECIRC MG SET 13* Event 3 BOP (C)	BOP PO-16.0 Responds to annunciator F2-(2-3) • Observes Process Computer point A094, RRMG 13 MTR SLOT TEMP in high alarm. • Dispatches AO to verify proper ventilation and inspect 13 RRMG. • Inform SRO of high temperature on 13 RRMG.
ROLE PLAY: As AO sent to the MG set, report that ventilation system is operating properly and the motor end of #13 RRMG set is extremely hot to the touch. *Note:* *The SRO should direct one of the following actions to reduce the load on 13 RRMG:* • *Emergency Power Reduction, using N1-OP-43A, Attachment 1.* • *13 RRP Shutdown, using N1-OP-1, Section H.2.0.* • *Trip of 13 RRP* *Expected result is that 13 RRMG and RRP will be shutdown due to inability to clear the high temperature condition on RRMG 13.*	SRO • Direct Emergency Power Reduction per N1-OP-43A, Attachment 1. OR • Direct RO to remove RRMG 13 from service - Checks T.S. 3.1.7 for 4 loop operation, .98 APLHGR applies. - Verifies 4 loop thermal limits - Verifies P/F Map updated • When Recirc Pump 13 Discharge Valve is re-opened, declares APRM's inop, due to reverse flow. • Notifies Operations Management • Notifies Chemistry • Notifies Reactor Analyst • Provides Reactivity Brief per GAP-OPS-05.

INSTRUCTOR ACTIONS/ PLANT RESPONSE ROLE PLAY	OPERATOR ACTIONS
As AO sent to the MG set, after the power reduction report that the RRMG appears to be getting hotter, even though the load has been reduced.	
Event 4 RO (R)	BOP • **If directed**, reduces power per N1-OP-43A, Attachment 1, using all RRP's. • **If directed** to lower power using only 13 RRP, - Places Recirc Pump 13 speed control in MANUAL - Lowers RRMG speed to lower temperature. • Determines high temperature cannot be corrected. • **If directed to trip** RRMG set: - Trip #13 RRMG set - Monitor P/F map (4 loop) - Inop APRM's due to reverse flow in idle loop. - Take N1-OP-1, H.1.0 actions for tripped RR pump.
When RRP 13 pump is removed from service delete the Malfunction for REACT RECIRC MG SET 13 GENERATOR OVERHEATING. It will slowly cool down and the alarm will clear.	

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	• **If directed** Removes RRMG from service **in accordance with N1-OP-1, H.2.0** - Verify OPEN Recirc Pump Disc Bypass Valve. - Lower Recirc Pump 13 flow to 6-8x10^6 lb/hr. - Close Recirc Pump 13 Disc Valve. - Stop Reactor RP Motor 13 - Hold Recirc Pump 13 Disc Valve in OPEN position for 2-3 secs. - After 30 min. Close Disc Valve • Monitor and adjust to maintain proper feedwater pump loading.
ROLE PLAY: As operations management (if called) direct power be restored to 100%. As RE (if called) provide the SRO with power maneuver to raise power to 100% using Recirc flow, not to exceed 6 Mwe/min	SRO • Directs power restored to 100% after Recirc Pump 13 discharge valve is closed and conditions established.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ACTIVATE malfunction by depressing F5 key	
NM37B, APRM Channel 12 Failure INOP (F5)	RO PO-17.0
Event 5 RO (I)	Respond to Annunciator • Determines APRM INOP trip • Bypass APRM 12 using N1-OP-38C, sect. H.1.0 - Place APRM 12 in BYPASS - Verify APRM 12 BYPASS light lit on E Panel. - Verify APRM Bypass light lit on LPRM/APRM Drawer
At F Panel, 4 RPS CH 11 white lights extinguish indicating a half reactor trip and Red BU Scram Vent and Drain light extinguishes. Expected Annunciators: *F2 (1-6) APRM 11-14* *F3 (4-4) ROD BLOCK* *F1 (1-1) RPS CH 11 REACT NEUTRON MONITOR* *F1 (2-1) RPS CH 11 AUTO REACTOR TRIP*	
At F Panel, 4 RPS CH 11 white lights illuminate indicating a RPS CH 11 has been reset and Red BU Scram Vent and Drain light illuminates.	• Depress Reactor Trip Reset pushbutton to reset half scram
	SRO • Check T.S. 3.6.2.a(9) (b) and 3.6.2.g(3) • Direct RO to Bypass APRM 12 per N1-OP-38C and reset the half scram. • Verifies (or directs) operation is within the P/F map (ARP F2-1-6)

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ACTIVATE malfunction by depressing F6 key **RR33, #11 Recirc Pump Seal Lower (Inner) Failure (100% over 3 min) (F6)** Event 6 BOP (C) *11 RRP seal pressure approaches 1000 psig due to lower seal failure.* Expected Annunciator: *F2 (1-1), REACT RECIRC PUMP MOTOR 11*	BOP PO-18.0 • Determine the cause of the annunciator, diagnose failure of Recirc Pump 11 inner seal by observing RRP 11 LP SEAL indicator pressure. • Monitor Drywell leakage SRO • Informs Operations Management of 11 RRP seal failure. • Makes preparations to remove 11 RRP from service.
After crew diagnoses the lower seal failure and begins to monitor drywell leakage, ACTIVATE malfunction and override by depressing F7 key **RR34 Recirc Pump Seal Upper (Outer) Failure (100% over 10 min.) (F7)** **Recirc Pump 11 Discharge Valve overridden open. (Queued)**	

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Event 7 BOP (C) *Drywell pressure begins to rise due to both seals being failed. As Drywell pressure rises, Torus level lowers.* Expected Annunciator: *K2 (4-3), DRYWELL PRESSURE HIGH-LOW* *K3 (3-1), TORUS WATER LEVEL HIGH-LOW*	RO PO-18.0 Diagnose failure of Upper Seal • Monitor Recirc Pump and diagnose seal failure • Monitor Drywell parameters SRO • Direct RO to remove RRMG 11 from service and isolate the pump - Checks T.S. 3.1.7 for 3 loop operation - Verifies total recirc flow <50.6x10^6 lb/hr. - Direct APRMs set up 1% per N1-OP43A - Verifies 3 loop thermal limits - Verifies P/F Map updated - Directs power lowered to <90% - Inform Ops Management.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP • Removes RRMG from service in accordance with N1-OP-1 - Place Recirc Pump 11 speed control in MANUAL - Verify OPEN Recirc Pump Disc Bypass Valve OPEN. - Lower Recirc Pump 13 flow to 6-8x10^6 lb/hr. - Close Recirc Pump 11 Disc Valve. - Determine Recirc Pump 11 Disc Valve will **NOT** Close - Notifies Crew
Plant will SCRAM on high drywell pressure of 3.3 to 3.5 psig, if operators do not take other actions.	Crew PO-20.0 • Recognize/report containment parameters degrading – DW humidity rising – DWFD leakage rising – DW pressure rising • Recognize/report containment parameters

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	SRO Direct an emergency power reduction
Reactor scram is required because of rising Drywell pressure and leakage.	• Brief crew on plans to insert manual scram • Direct the RO to place Mode Switch to SHUTDOWN. • Enter N1-SOP-1, Reactor Scram • Enter N1-SOP-5 when Off-Site Power is lost • Enters N1-EOP-2
	RO
WHEN the Mode Switch is placed in SHUTDOWN, ACTIVATE malfunction by depressing F8 key **RR29, Recirc Loop Rupture 12%, ramp time 5:00 minutes. (F8)**	• Place REACTOR MODE Switch in SHUTDOWN • Verify FWLVL Setdown Setpoint initiated • Verify all rods fully inserted. • Insert SRM & IRM Detectors • Downrange IRM's as necessary
2 minutes following the scram, ACTIVATE malfunctions by depressing F9 key **ED01A, Loss of Off-Site 115KV Power Source JAF-LINE 4** **ED01B, Loss of Off-Site 115KV Power SOUTH OSWEGO-LINE 1) (F9)** Event 8 Crew (M)	

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ROLE PLAY: As AO sent to the 102 EDG, report that the EDG has tripped but you have no indication on the cause of the trip.	BOP PO-19.0 • Verifies turbine trip • Diagnoses loss of 115KV Lines • Verifies 103 EDG running • Diagnoses 102 EDG failure to start • Directs an AO to the 102 EDG • Closes MSIV's, when directed for inventory control • Verify EC initiation or manually initiates when directed by opening EC Cond. Return Valves 39-05 and 39-06 • Report loss of high pressure feed after loss of off site power. • Controls EC to control RPV pressure and limit cooldown rate to <100°F/hr
Drywell pressure rises to 3.5 psig and Drywell temperature rises above 150°F.	SRO • Directs entry into EOP-4 when DW temperature reaches 150°F or DW pressure reaches 3.5 psig • Directs RPV water level between +53 & +95 inches. May direct lower band based on level following the scram. • When RPV level can NOT be maintained >53 in. directs use of Alternate Injection Sys. - Liquid Poison from test tank • Directs lockout of Containment Spray Pumps per N1-EOP-4 • Directs preventing Core Spray injection per N1-EOP-2 RP override.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP
	• Verifies that the following: - PB16A-B tie breaker R1042 is tripped - PB17A-B tie breaker R1052 is tripped - EDG 103 loading <2845 emergency <2586 continuous - Drywell Cooling Fans 11, 12, 13, 14, 15 and 16 in PTL - Inst. Air Comp. (IAC) 11 and 12 in PTL. - Place ESW Pump 12 in PTL - Maintain TBCLC <95°F by running ESW Pump 12 as required. - Verify Reset/Resets Lockout 86-17 (PB 17) - Verify RBCLC Pump 12 started - Verify CRD Pump 12 started - UPS 172 shifts to normal - SBC 171 re-energizes - Initiate RBEV Train 12 to establish Rx. Bldg. Differential
WHEN directed to transfer power to instrument bus IC130, ACTIVATE remotes, **ED 12, OPEN (F10)** **ED13, CLOSE (F10)**	
If requested to reset UPS 171 alarm activate RP22	

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	RO • Operate CRD to maintain level within the band assigned • Operate Emergency Condensers to maintain pressure with the band assigned and NOT exceed 100°F/hr cool-down rate. • Lock out Containment Spray by placing 4 pump control switches in P-T-L. • Observe and report containment parameters (Torus pressure above 13 psig). • Prevent Core Spray injection by installing jumpers, when directed by SRO. • Restarts Drywell Cooling as directed

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	SRO PO-16.0, 19.0
	• Declares an ALERT emergency classification (EAL 3.1.1) • Makes/directs emergency classification station announcement.
Torus pressure rises above 13 psig.	• As available directs starting Drywell Ventilation • When Torus pressure exceeds 13 psig: - Determines that containment spray is permitted per the Containment Spray Initiation Limit Curve (Fig. K) - Directs/verifies that the recirculation pumps are tripped - Directs/verifies that the drywell cooling fans are tripped - Directs initiation of containment spray IAW EOP-4
AFTER containment sprays have been initiated and liquid poison is injecting, **REDUCE RR29 leak rate to 5%.**	

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	RO PO-21.0, 22.0 • Verifies/reports that all recirculation pumps have been tripped • Verifies/reports that all drywell cooling fans have been tripped • Initiates containment spray - Starts Cont. Spray Pump 121 and 122. - Verifies Cont. Spray flow. - Monitors containment pressure and temperature to ensure lowering trend.
Containment pressure and temperature begin lowering.	SRO • Directs containment spray secured before DW pressure drops to 0 psig

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Drywell pressure drops below 3.5 psig	RO • Terminates containment sprays before drywell pressure reaches 0 psig. • Reports containment spray terminated
ROLE PLAY: When the crew has established control of Drywell Pressure, maximized alternate injection call as the Load Dispatcher and tell the Control Room that NORMAL 115KV SERVICE will not be restored for another 8 hours.	SRO • Classifies the event as Alert 3.1.1
TERMINATING CUES: • RPV level maintained above TAF. • RPV pressure restored and maintained below 1000 psig as directed (may be a cooldown in progress) • Containment pressure and temperature are lowering by use of Containment Sprays, as directed in EOP-4.	

Scenario Outline

Nine Mile Point 1	Scenario No. 2	Operating Test No. 1

Examiners:	Candidates:		
	SRO	SRO-2	SRO-5
	RO	SRO-3	RO-1
	BOP	SRO-1	SRO-4

Objectives: Evaluate candidates ability to control and lower reactor power. Perform routine operating tasks such as the Reactor Building Emergency Ventilation (EVS) monthly surveillance testing. During the test the EVS flowmeter will fail requiring the operators to back out of the procedure. After the surveillance, a feedwater pump trip will require lowering power using the Master recirc pump controller. Subsequently, the Recirc Master Controller will fail to a value about 2-4% above the current value causing power to rise by several percent and then not respond to operator control. This will require operating all five recirc pump controllers in manual to lower power to the previous power level. Slowly trash will buildup on the intake structure causing a loss of all cooling water. During the response to the loss of all cooling water the reactor will be manually scrammed. A hydraulic lock will cause a failure to scram. Actions must be taken to lower power and heat input into the Torus because there is no cooling available. The #11 Liquid Poison Pump will fail to start, Candidates must execute normal, abnormal and emergency procedures, and insure compliance with Technical Specifications.

Examination outline change. Changed the order of events 3, 4, and 5 to ensure the RO performs the reactivity manipulation. At NMP1, the BOP may operate the recirc pumps in manual at the F panel while the RO remains at the E panel.

Initial Conditions: 90% Power (IC-14)

Turnover: Continue power operations. High wind conditions exist at the site. Perform Reactor Building Emergency Ventilation System Operability Test, N1-ST-M8.

Event No.	Malf. No.	Type	Event Description
1		N	(BOP/SRO) Perform Reactor Building Emergency Ventilation System (RBEVS) Operability Test, N1-ST-M8.
2	OVRD	I	(BOP/SRO) RBEVS Flow Meter Fails low during testing. Operator secures fan. SRO declares the RBEVS train INOP, enters T.S. 3.4.4

Scenario Outline

3	FW36B	C	(BOP/SRO) Feedwater Pump 12 Low Suction Pressure Trip, Ann. H3 (2-7). Lower power to within the capacity of the Shaft Driven Pump,N1-OP-43A. T.S. 3.1.8 (HPCI). ***Examination outline change. Changed the order of events 3, 4, and 5 to ensure the RO performs the reactivity manipulation. At NMP1, the BOP may operate the recirc pumps in manual at the F panel while the RO remains at the E panel.***
4		R	(RO/SRO) Power reduction with Recirc flow in accordance with N1-OP-43A to prevent automatic low RPV water level trip.
5	OVRD	I	(RO/SRO) Master Recirculation Flow Controller fails higher and then as is. Recirc flow slowly rises. Operators must recognize failure then lower power by placing all five individual MG Recirc Controllers in MANUAL and lower flow to return power to previous power level. Enters N1-SOP-2, N1-OP-1
6	CW12	M/C	(BOP/RO/SRO) Trash buildup on the intake structure clogs the inlet resulting in a low level in the Intake Structure. Enter N1-SOP-7, will require a manual scram, N1-SOP-1 *PRA: Loss of SW* *PRA: Loss of RBCLC* *PRA: Loss of TBCLC*
7	LP01A RD33A RD33B RD33C RD33D RD33E	M	(CREW) ATWS, lower level to control power, close ERVs, manually insert control rods, recognize the failure if the #11 Liquid poison Pump and start the alternate pump. Enter, N1-EOP-2, RPV CONTROL, N1-EOP-3, FAILURE TO SCRAM, N1-EOP-4, PRIMARY CONTAINMENT CONTROL *PRA: Respond to an ATWS* *PRA: Respond to a Torus temperature $\geq$ 110 °F* *PRA: Startup containment spray and torus cooling* *PRA: Execute EOP-3.1* *PRA: (SRO) Direct actions to assure adequate core cooling / containment integrity*

NMPC NMP SIMULATOR SCENARIO

O1-OPS- **NRC EXAM SCENARIO 2** **No. of Pages: 22**

LOSS OF INTAKE STRUCTURE WITH A FAILURE TO SCRAM

PREPARER	Philip G Bolton	DATE 5/25/00
VALIDATED	G Bolton with Ops Crew	DATE 5/15/00
CONFIGURATION CONTROL	NA	DATE NA
GEN SUPERVISOR OPS TRAINING	Steve [illegible]	DATE 5/30/00
OPERATIONS MANAGER UNIT 1	NA	DATE NA

SCENARIO SUMMARY

Length: 90 minutes

The scenario beings at 90% power. Surveillance testing of RBEVS Train 11 will be performed by the crew. During the test, the fan flow indicator will fail downscale and the train will be declared inoperable.

Following the initiation of Tech.Spec. actions, the #12 feedpump trips on a failed low suction pressure trip instrument. The crew must lower power to within the capacity of the shaft driven feedwater pump. When conditions have stabilized the Master Recirculation Flow Controller fails high (about 2-4%) and cannot be operated. This will require that all five individual RRMG Controllers be operated in MANUAL. During this configuration drifting debris will clog the intake structure.

As the intake structure clogs level in the intake bay will lower causing loss of CW, SW, ESW, RW, and Fire pumps. Lowering intake level will require a Manual Scram. When the scram is inserted the control rods will NOT fully insert, additionally Liquid Poison pump 11 will fail to start. N1-EOP-3 must be entered, rods inserted, heat input to the Torus must be minimized because no torus cooling is available.

Major Procedures: N1-SOP-7, N1-SOP-1, N1-SOP-2, N1-EOP-2, N1-EOP-3, N1-EOP-4

EAL Classification: Site Area Emergency (EAL 2.2.2)

Termination Criteria: Control Rods inserted or being inserted, RPV pressure and level under control, Containment pressure and temperature under control and Torus heat loads minimized.

I. SIMULATOR SET UP

A. IC Number: IC-24 100% Reactor power or equivalent, manually lower flow to 90% power (1665 Mwt)

B. Presets/Function Key Assignments

1. Malfunctions:

a. FW36B, Feedwater Pump 12 Low Suction Pressure Trip **(F4)**

b. CW12, Circulating Water Intake Structure blockage (100% over 12 minutes, then restore to 95%) **(F5)**

c. LP01A, Liquid Poison Pump 11 Trip **QUEUED**

d. RD33A, Control Rod Bank Failure to Scram Group I (14) **QUEUED**

e. RD33B, Control Rod Bank Failure to Scram Group II (20) **QUEUED**

f. RD33C, Control Rod Bank Failure to Scram Group III (16) **QUEUED**

g. RD33D, Control Rod Bank Failure to Scram Group IV (26) **QUEUED**

h. RD33E, Control Rod Bank Failure to Scram Group V (31) **QUEUED**

2. Remotes:

a. FW24, Removal of HPCI fuses **(F6)**

3. Overrides:

a. 11 RBEVS Train flow meter downscale (L Panel Page 7 of 8, 11-M040-AO-053, Set at 0.0) **QUEUED**

b. IE5/RY01, Master Recirculation Flow Controller Pot (Set @ 52.0) **(F3)**

4. Annunciators:

None

C. Equipment Out of Service

None

D. Support Documentation

1. N1-ST-M8, Rx Bldg Emergency Ventilation System Operability Test for Train 11 only, marked up through step 7.5.

II. TURNOVER

SHIFT TURNOVER INFORMATION

A B C D E F		
	SHIFT/STAFF/SRO CERTS	DATE
	REACTOR POWER	90%
	CORE LIFE	
	ROD LINE	102%
	SHIFT	DAYS/NIGHTS

A. Technical Specification LCOs in effect:

None

B. Significant Problems/Abnormalities/Equipment Out of Service:

None

C. Evolutions/Maintenance Scheduled for this Shift:

1. Perform N1-ST-M8, Rx Bldg Emergency Ventilation System Operability Test for Train 11 only.

2. Continue 90% power operations

SHIFT COMPLEMENT

SRO	
RO	
BOP	
EXTRAS	

III. TASKS AND OBJECTIVES

A. Critical Tasks:

CT-1 With a reactor scram required and the reactor not shutdown, take action to reduce power by inserting control rods and injecting with Liquid poison to prevent exceeding the Heat Capacity Temperature Limit (HCTL).

Tasks:

2009080501	Respond to an ATWS. (PRA)
2010130101	Scram the reactor manually
2110050501	Inject poison solution into the reactor vessel (PRA)
3410410303	Authorize termination of Engineered Safety Features function. (PRA)
3410420303	Authorize bypass of Engineered Safety Features functions. (PRA)
3440240303	Direct corrective actions to mitigate the consequences of the emergency event. (PRA)
3440280303	Direct actions to ensure that core cooling and containment is maintained during an emergency event. (PRA)
3520010505	Perform an independent assessment of plant conditions during accidents and advise personnel of corrective actions. (PRA)
3520050505	Confirm appropriate operator action for alternate control rod insertion during EOP-3.1 execution. (PRA)
3520060505	When directed, advise the EOP Director when approaching or meeting EOP overrides. (PRA)
3520300505	Maintain cognizance of EOP figures applicability during EOP implementation. (PRA)

CT-2 During an ATWS with conditions met to perform power/level control, terminate and prevent injection, with exception of liquid poison and CRD, into the RPV until conditions are met to re-establish injection to prevent exceeding HCTL.

Tasks:

200-080501 Respond to an ATWS. (PRA)

3410410303 Authorize termination of Engineered Safety Features function. (PRA)

3410420303 Authorize bypass of Engineered Safety Features functions. (PRA)

3440240303 Direct corrective actions to mitigate the consequences of the emergency event. (PRA)

3440280303 Direct actions to ensure that core cooling and containment is maintained during an emergency event. (PRA)

CT-3 When conditions are met to re-establish injection into the RPV, operate injection systems to stabilize and maintain RPV water level above –109" and at or below the level to which it was lowered.

Tasks:

2009080501 Respond to an ATWS. (PRA)

3440240303 Direct corrective actions to mitigate the consequences of the emergency event. (PRA)

3440280303 Direction actions to ensure that core cooling and containment is maintained during an emergency event. (PRA)

B. Performance Objectives:

PO-1.0 Given the plant in any operating mode, the crew shall demonstrate effective communications in accordance with GAP-OPS-01 on verbal communication.

PO-2.0 Given the plant in an emergency condition, SROs shall demonstrate an understanding of Command and Control, EOP placekeeping techniques and effective use of control room operators (NMP2 Requal Action Plan, Rev 02, 6.B.6).

3410140303 Direct shift personnel actions during major plant evolutions (PRA)

3419030103 Monitor functions in the control room

3420220303 Provide technical assistance in troubleshooting system malfunctions

3440070303 Direct corrective actions to mitigate the consequences of the abnormal event (PRA)

3440110303 Direct actions to ensure that core cooling is maintained during an abnormal event (PRA)

3440240303 Direct corrective actions to mitigate the consequences of the emergency event (PRA)

3440250303 Direct shift personnel actions to correct the cause of the emergency abnormal event (PRA)

3440260303 Evaluate the emergency event to determine that conditions are following the expected sequence (PRA)

3440280303 Direct actions to ensure that core cooling and containment is maintained during an emergency event (PRA)

3440370303 Analyze indications to determine that an off normal plant evolution is in progress (PRA)

3440380303 Direct shift personnel actions to ensure plant safety during off normal conditions (PRA)

3440390303 Ensure required notifications of on-site and off-site personnel for off normal events are performed

3440410303 Analyze indications to determine the cause of the abnormal event (PRA)

PO-3.0 Given the plant in any operating condition, the crew shall demonstrate "Self-Checking" work practice techniques for all control action in accordance with Operations Department instructions. (LER 50-410/88-50, NRC IR 50-410/88-01).

PO-4.0 Given the plant during any operating condition, SROs shall direct appropriate conservative action stabilizing the plant within acceptable limits, including scramming the reactor or tripping the turbine manually when necessary.

PO-5.0 Given the plant after any transient or event, SROs shall establish and modify control bands for key plant parameters, to direct actions maintaining parameters within prescribed limits.

PO-6.0 Given the plant in any operating condition, the SRO shall conduct crew updates to inform crew members of plant status, on-going or planned mitigation activities, and to solicit feedback from the team.

PO-7.0 Given the plant in any operating condition, SROs shall prioritize crew actions to address plant conditions using a systematic process.

PO-8.0 Given the plant in any operating condition, the crew shall monitor and communicate values and trends for key plant parameters and equipment status.

PO-9.0 Given the plant in any operating condition, the crew shall focus personnel resources to maintain effective control board attention.

PO-10.0 Given the plant in any operating condition, the crew shall remove plant equipment from service when approaching or exceeding the equipment's operating limits.

PO-11.0 Given the plant during high reactor pressure conditions, the crew shall control RPV pressure manually to stop and prevent ERV cycling.

PO-12.0 Given the plant following a reactor scram, the crew shall control RPV temperature to prevent exceeding Technical Specification allowed cool down rate, or avoid unnecessary safeguards actuation.

PO-13.0 Given the plant in a condition requiring a rapid decrease in reactor power, the crew shall perform an emergency power reduction using recirculation and or manual rod insertion (if necessary) in accordance with approved procedures.

PO-14.0 Given a situation warranting Technical Specification investigation and application, the SRO shall perform an independent review of Technical Specifications and determine appropriate license requirements.

3410170303 Recall Safety Limits, LS3 and LCOs for operations addressed by Technical Specifications

3410180303 Apply Technical Specifications directions for Safety Limits, LS3 and LCOs (PRA).

3410320303 Evaluate Plant System's performance and coordinate appropriate actions per Tech. Specs., if LCO is entered/not satisified (PRA).

PO-15.0 Given the plant operating at power the crew will perform N1-ST-M8, Rx Bldg Emergency Ventilation System Operability Test for Train 11. Recognize a failure of the RBEVS flow meter, declare 11 Train of RBEVS inoperable and take appropriate actions.

PO-16.0 Given a Torus temperature exceeding 85°F, the crew will manually initiate torus cooling.

2230060101 Monitor the containment system

PO-17.0 Given the plant in a power operating condition recognize, diagnose and respond to a master recirculation controller failure, high, using appropriate methods to control reactor power within limits.

2009060401 Investigate unexplained reactivity changes

2410020101 Monitor turbine bypass control system

3449020401 Respond to Control Room annunciators.

PO-18.0 Given the plant in a power operating condition and a electrical feedpump (12) failure the crew will recognize and diagnose the failure and reduce power to within the capacity of the Shaft Driven Pump, prior to an automatic low RPV water level scram.

2000270501 Respond to a feedwater system or component failure

2590040101 Monitor operation of the reactor feedwater system in the control room

PO-19.0 Given the plant in a power operating condition the crew will recognize and respond to a loss of intake from lake Ontario, resulting in a loss of intake bay level and CW, SW, ESW,RW, and FW pumps. The crew will Scram the plant and take appropriate actions.

2750030101	Monitor circulating water system operation in the control room
2750120101	Respond to trip/shutdown one circulating water pump in operation
2760040101	Monitor the service water system
2770060101	Monitor the ESW system in the control room

PO-20.0 Given the plant in a tripped condition the crew will recognize and respond to a failure of the control rods to fully insert with the reactor still at power. The crew will initiate actions to lower power, lower heat output and insert control rods.

2009080501	respond to an anticipated transient without scram (ATWS)
2010110101	Monitor the CRD system in the control
2000190501	Respond to a torus water temperature greater than or equal to 110°F (PRA)
2230060101	Monitor the containment system

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Begin Scenario Allow 5 minutes for crew to walkdown panels.	Crew • Walkdown panels • Perform annunciator checks • Conduct shift turnover brief • Assume the shift SRO Conduct a pre-evolution brief for performing surveillance N1-ST-M8, RBEVS Operability Test.
Event 1 BOP (N) *When* 202-53, *EVS FAN 11 is started, instrument 202-49B, EMER VENT FLOW indicator remains downscale due to instrument failure.* Event 2 BOP (I)	BOP PO-15.0 Review and perform N1-ST-M8. • Verifies open 202-36, EM VENTILATION FROM REACTOR BLDG BV. • Verifies closed 202-47, EM VENTILATION TIE BV. • Opens 202-37, EM VENTILATION LOOP 11 INLET BV • Start 202-53, EVS FAN 11 • Verifies open 202-34, EM VENT EXHAUST FAN 11 OUTLET BV. • Confirms proper operation of 202-50, EM VENT EXHAUST FAN 11 INLET FCV. • Identifies and reports to SRO instrument 202-49B, EMER VENT FLOW indicator is failed downscale.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ROLE PLAY: As AO sent to the EVS Fan 11, report back that everything appears normal.	SRO Acknowledge report from BOP • Direct suspension of the surveillance. • Directs operator to N/A steps up to step 8.1.14, then back out of the procedure by performing steps 8.1.14 through 8.1.19 • Review Tech. Specs 3.4.4 • Determine a 7 day LCO (TS 3.4.4.e) • Contact plant supervision and inform them of the problem. • Contact FIN team or maintenance for assistance. • Verify the operability of the redundant component. BOP When directed secures RBEVS Train 11 • Place 202-53 EVS Fan 11 c/s to STOP • Place 202-37, EM Vent Loop 11 Inlet BV c/s to AUTO and verify Closed • Place 202-34, EM Vent Exh Fan 11 Outlet BV c/s to AUTO and verify Closed

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ACTIVATE malfunction by depressing F4 key **FW36B, Feedwater Pump Low Suction Pressure Trip (F4)** Event 3 BOP (C) *12 Feedpump trips. RPV water level begins to lower.* Expected Annunciator: *H3 (2-7), REACTOR FW PUMP 12 TRIP OVERLOAD SUCTION HI-LEVEL*	BOP PO-18.0 • Performs actions per N1-ARP-H3-2-7 - Place 12 FW Pump control switch to PTL - Confirm Aux Oil Pump running and pump NOT spinning backwards - Verify FW Pump FCV closed • Monitors RPV Water level. SRO Directs Emergency Power reduction per N1-OP-43A (May direct a normal power reduction) • Lower power to below 80% (to stabilize RPV water level) • Enter T.S. 3.1.8 • Notify Operations Management • May direct preparing Feedwater pump 11 for startup

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Event 4 RO (R)	RO Performs power reduction as directed by SRO, using Master Flow Controller at E Panel.
After power has been reduced to within the capacity of Feedwater Pump 13 and Examiners are ready ACTIVATE Override by depressing F3 key, **13A16P1, Master Recirculation Flow Controller Pot (Set @ 52.0 which is approximately 4% above current output) (F3)**	RO PO-16.0 Recognizes power rising Diagnoses Recirculation Flow Controller Failure. • Notifies SRO/Crew • Enters N1-SOP-2 • Enter N1-OP-1, Sect. F.1.0 • Monitor for thermal-hydraulic instability
Event 5 RO (I) *Reactor power and turbine load rise. Turbine Bypass Valves open.* Expected Annunciators: *A1 (4-6), TURBINE BY-PASS VALVES OPEN* *F2 (1-6), APRM 11-14* *F3 (1-1), APRM 15-18*	• Places all five individual MG Recirc Controllers in MANUAL and lower flow to return power to 90% - Verify individual Recirc Pump Speed Controls in BAL - Null deviation meters - Place each Controller in MANUAL - Obtain and place "Attention Recirc Pump Controller(s) in MANUAL labels from the SSS and display at all the effected controls

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	SRO Direct reactor power lowered to <90% power • Contact plant supervision and inform them of the problem. • Contact FIN team for assistance.
	BOP Using Individual Recirc Pump Speed Controllers lowers recirc flow to lower power to about 70%
	RO Monitor Reactor Power and coordinate with BOP on power reduction.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
when plant conditions have stabilized ACTIVATE malfunction by depressing F5 key **CW12 CIRCULATING WATER INTAKE STRUCTURE BLOCKAGE (100% over 12 minutes) F5** **AFTER 12 minutes set CW12 value to 95%)** Event 6 BOP (C) Expected Alarms: *H1 (4-3), SCREEN WASH PUMP-SCREEN TRIP LOW VOLT DIFF PRESS* *H2 (1-3), CIRCULATING WATER PUMP INTAKE LEVEL LOW*	SRO PO-19.0 Enter N1-SOP-7 • Confirm intake forebay lowering • Trip one CW Pump • Rapidly reduce load for one CW Pump • Monitor all forebay pumps for abnormal operation • Attempt to restore level • Determine level is NOT being restored • Trip CW Pump • Verify one SW Pump operating • Verify one SW Pump secured • Direct a Reactor Scram • Enter N1-EOP-2 then exit to EOP-3 • Direct ADS Bypassed • Verify ARI initiated • Verifies both ECs in service • Verify all Recirc Pumps tripped • Recognize the main condenser is NOT available and verify MSIVs Closed

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ROLE PLAY: As the AO sent to the Screen house report that the screens and trash racks appear clear but that the level in the intake bay is slowly lowering. Current level is about 238'	BOP • Dispatch an operator to the screen house to investigatge • Enter N1-SOP-7 • Verify one CW pump Tripped • Monitor pumps taking a suction from the forebay for abnormal operation. • When directed by the SRO - Trip the CW Pump - Verify one SW Pump operating - Verify one SW Pump secured - Initiate ECs - Start ESW Pumps - Secure SW Pump - Close MSIVs - Trip all Recirc Pumps
Following manual scram, rods fail to fully insert. The reactor remains at power.	RO PO19.0 • Rapidly lower Recirc Flow to lower power for one CW Pump operation, if directed. • When directed to manually scram: - Place Reactor Mode Switch in SHUTDOWN - Verify FWLVL Setpoint Setdown initiated. - Recognize control rods did NOT fully insert - Notify Crew

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP • Bypass ADS • Initiate ARI • Verify all Recirc Pumps tripped • Verify M/S in REFUEL
Torus temperature rises as heat is rejected to the containment through open ERV's.	SRO • Directs RPV pressure band of 800 to 1000 psig using EC's and ERV's • Direct execution of EOP-3.1 • Direct terminating and preventing RPV injection per EOP-1.0, Att. 24 • Direct RPV level lowered to –41 in.
ROLE PLAY: As NAO when directed pull fuses FU8/FU9, acknowledge the request, **Wait 2 minutes then ACTIVATE F6, Remote, FW24, Removal of HPCI fuses.** **Then report the HPCI fuses FU8/FU9 have been removed.**	BOP • Perform EOP-1.0, Att. 24 - Place FW controllers 11 & 12 in Manual - Manually Close FWP Valves 11 & 12 - Direct NAO to pull fuses FU8/FU9 - Allow level to lower - Report when RPV level is –41 in on the FZ instr. • Manually opens ERV's to maintain 800 to 1000 psig, as directed.

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
NOTE: After RPS is reset to allow another manual rod insertion, delete malfunctions RD33B and RD33D. This will allow two groups of of rods to insert if another manual scram is attempted. *When RPV water level is lowered, reactor power will lower.*	SRO • Direct Level be reduced to TAF per Fuel Zone water level correction Curve X of EOP-3. • Direct RO to report when APRMs indicate <6% and when the ERVs have closed (provided containment press <3.5 psig). • Direct injecting boron • Directs FW injection recommenced to maintain level between –109 inches and –84 inches. • Monitors EOP-3, Fig. M, Heat Capacity Temperature Limit • Records Liquid Poison Tank level for determining Hot Shutdown Boron Weight. • DIRECT INSERTION RODS PER EOP 3.1 BOP • Allow RPV level to lower to TAF on Fuel Zone level instruments. • Recommences FW injection recommenced to maintain level between –109 inches and –84 inches, when directed.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
After feedwater flow is re-established, RPV water level should stabilize between –109 and –84 inches.	RO • Report when APRMs <6% • Report when ERVs Close • Record RPV level when APRMs <6% or ERVs stay closed with DW pressure below 3.5 psig
	BOP • Initiate boron injection - Record Poison Tank Level - Start Liquid Poison Pump - Observes Liquid Poison Pump 11 fails to start - Notifies SRO/Crew - Starts Liquid Poison Pump 12 - Verify RWCU isolates • Report when torus temperature >85°F

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	RO • Drive Control Rods using RMCS - Verify a CRD pump operating (check CRD Pump cooling) - Verify Mode Switch in Refuel - Override ARI using key switch on F-Panel - Install RPS Scram logic Relay Bypass Jumpers in N Panel - Reset the Scram - Bypass the RWM on E Panel using Keylock SW to ON. - Fully insert Control Rods beginning high power region of the core using the Emergency Rod In position
Selected control rods will insert when driven in using RMCS.	• Maintain adequate CRD drive pressure by: - Fully Open Flow control Valve - Close 44-04 - Close 44-167 (except as necessary to scram rods)
Control rods will fully insert as manual scrams are inserted.	• When SDV is drained initiate a manual scram - Verify Control Rods move in - Repeat manual scrams

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP • Recognize intake level rising • Operate ESW pump to maintain RBCLC temps. SRO • Classifies the event as SAE 2.2.2
TERMINATION CRITERIA: Control Rods inserted or being inserted, RPV pressure and level under control, Containment pressure and temperature under control, and Torus heat loads minimized.	

NMPC NMP SIMULATOR SCENARIO

O1-OPS- NRC EXAM SCENARIO 3 No. of Pages: 22

MAIN TURBINE FAILURE AND LARGE COOLANT LEAK INSIDE THE DRYWELL

PREPARER	Philip G Ballard	DATE	5/25/00
VALIDATED	G Bolton with Ops Crew	DATE	5/16/00
CONFIGURATION CONTROL	NA	DATE	NA
GEN SUPERVISOR OPS TRAINING	[illegible]	DATE	5/30/00
OPERATIONS MANAGER UNIT 1	NA	DATE	NA

SCENARIO SUMMARY

Length: 90 minutes

The scenario starts with the plant operating at rated conditions. The crew will perform N1-ST-M4, a monthly surveillance on the Emergency Diesel Generator. During performance of this surveillance the crew will recognize that the Governor has failed. This will put the plant in a seven day LCO.

A failure of the steam supply to the second stage reheater will cause an unbalanced condition on the main turbine and a turbine high vibration condition. This will require lowering power to 80% and isolating the second stage reheaters. During the power reduction the crew will notice a failure of the feedwater controller and must control feedwater in MANUAL. After the power reduction the main turbine will throw turbine blades and trip. Turbine blades will puncture the condenser causing a loss of vacuum and hotwell level. The turbine trip will cause a coolant leak in the drywell. Containment temperature, pressure and humidity, will rise. Operators will take actions to lower containment pressure with spray. With limited high pressure injection sources RPV level will lower to TAF requiring the crew to perform an emergency depressurization and restore RPV level with low pressure systems.

Major Procedures: N1-OP-1, N1-OP-43A, N1-OP-41, N1-OP-16, N1-SOP-1, N1-SOP-4, N1-EOP-2, N1-EOP-4, N1-EOP-8

EAL Classification Alert (EAL 3.1.1)

Termination Criteria: RPV depressurized and RPV level restored, Containment pressure and temperature under control.

I. SIMULATOR SET UP

A. IC Number: IC 24

B. Presets/Function Key Assignments

1. Malfunctions:

a. FW16, Feedwater Master Controller Fails AS IS **(F3)**

b. MS08, Second Stage Reheater 112 Steam Supply Valve Closes **(F4)**

c. TU02, Main Turbine High Vibration Bearings 5 and 6 (53% over 3min.) **(F4)**

d. TC01, Main Turbine Trip **(F5)**

e. MC01, Main Condenser Air In-leakage (100% over 2 minutes) **(F5)**

f. FW01A, Condensate Pump A Trip (2 minute TD) **(F5)**

g. FW01B, Condensate Pump B Trip (2 minute TD) **(F5)**

h. FW01C, Condensate Pump C Trip (2 minute TD) **(F5)**

i. RR29, Recirc Loop Rupture, 15% **(F5)**

2. Remotes:

a. DG01, DG 102 Governor Speed Droop, Droop **Queued**

3. Overrides:

a. KW Meter overridden at 0 KW, A4, 01A004M005-AO-077 **Queued**

b. Kvar Meter overridden at 0 Kvar, A4, 01A004M008-AO-080 **Queued**

c. Phase 1 Amperage Meter at 0 Amps, A4, 01A004M006-AO-078 **Queued**

d. Phase 2 Amperage Meter at 0 Amps, A4, 01A004M009-AO-081 **Queued**

e. Phase 3 Amperage Meter at 0 Amps, A4, 01A004M013-AO-085 **Queued**

f. Hotwell Level South, LI-49-40, (Override to 2.0 over 2 min.) **(F5)**

g. Hotwell Level North, LI-49-03A, (Override to 2.0 over 2 min.) **(F5)**

4. Annunciators:

a. H2 (2-7), CONDENSER HOTWELL LVL HIGH-LOW, TUA 1:40 min **(F5)**

b. H2 (3-1), TURB BLDG FLOOR DRAIN 11-18 LEVEL-HIGH, TUA 1:40 min **(F5)**

c. H2 (3-2), TURB BLDG E D 11-12 LEVEL-HIGH, TUA 1:40 min **(F5)**

C. Equipment Out of Service

None

D. Support Documentation

1. N1-ST-M4, EDG/ED 102 and 103 Operability Test, for EDG/ED 102, completed up to step 8.1.20.

E. Miscellaneous

1. 2 Stopwatches for EDG surveillance.

II. TURNOVER

SHIFT TURNOVER INFORMATION

A B C D E F		
	SHIFT/STAFF/SRO CERTS	DATE
	REACTOR POWER	100%
	CORE LIFE	MOL
	ROD LINE	102%
	SHIFT	DAYS/NIGHTS

A. Technical Specification LCOs in effect:

None

B. Significant Problems/Abnormalities/Equipment Out of Service:

None

C. Evolutions/Maintenance Scheduled for this Shift:

1. Complete N1-ST-M4, EDG/ED 102 and 103 Operability Test for EDG/ED 102

SHIFT COMPLEMENT

SRO	
RO	
BOP	
EXTRAS	

III. TASKS AND OBJECTIVES

A. Critical Tasks:

CT-1.0 Given the plant with a leak in the drywell and a loss of the Feedwater/HPCI system the crew will perform an RPV Blowdown and take the appropriate actions to maintain the core covered and restore RPV level with alternate injection systems.

3410140303	Direct shift personnel actions during major plant evolutions (PRA)
3419030103	Monitor functions in the control room
3420220303	Provide technical assistance in troubleshooting system malfunctions
3440070303	Direct corrective actions to mitigate the consequences of the abnormal event (PRA)
3440110303	Direct actions to ensure that core cooling is maintained during an abnormal event (PRA)
3440240303	Direct corrective actions to mitigate the consequences of the emergency event (PRA)
3440250303	Direct shift personnel actions to correct the cause of the emergency abnormal event (PRA)
3440260303	Evaluate the emergency event to determine that conditions are following the expected sequence (PRA)
3440280303	Direct actions to ensure that core cooling and containment is maintained during an emergency event (PRA)
3440370303	Analyze indications to determine that an off normal plant evolution is in progress (PRA)
3440380303	Direct shift personnel actions to ensure plant safety during off normal conditions (PRA)
3440410303	Analyze indications to determine the cause of the abnormal event (PRA)

CT-2.0 Given the plant shutdown with a leak in the Drywell the crew will initiate Containment Sprays in accordance with N1-EOP-4 when Torus pressure exceeds 13 psig or before Drywell air temperature exceeds 300°F. The crew will initiate Containment Sprays while in the safe region of the Containment Spray Initiation Limit to prevent exceeding Pressure Suppression Pressure Limit and/or RPV Saturation Temperature.

Tasks:

2260020101 Manually initiate Containment Sprays.

3440070303 Direct corrective actions to mitigate the consequences of an abnormal event (PRA).

3520300505 Maintain cognizance of EOP figures applicability during EOP implementation.

CT-3.0 Given a lowering pressure in the containment with Containment Sprays operating, the crew will terminate Containment Sprays before drywell pressure reaches 0 psig.

2260040101 Monitor the containment spray system while in operation

2260030101 Shutdown the Containment Spray (PRA).

3410410303 Authorize termination of engineered safety features functions (PRA).

B. Performance Objectives:

PO-1.0 Given the plant in any operating mode, the crew shall demonstrate effective communications in accordance with GAP-OPS-01 on verbal communication.

PO-2.0 Given the plant in an emergency condition, SROs shall demonstrate an understanding of Command and Control, EOP placekeeping techniques and effective use of control room operators (NMP2 Requal Action Plan, Rev 02, 6.B.6).

3410140303 Direct shift personnel actions during major plant evolutions (PRA)

3419030103 Monitor functions in the control room

3420220303 Provide technical assistance in troubleshooting system malfunctions

3440070303 Direct corrective actions to mitigate the consequences of the abnormal event (PRA)

3440110303 Direct actions to ensure that core cooling is maintained during an abnormal event (PRA)

3440240303 Direct corrective actions to mitigate the consequences of the emergency event (PRA)

3440250303 Direct shift personnel actions to correct the cause of the emergency abnormal event (PRA)

3440260303 Evaluate the emergency event to determine that conditions are following the expected sequence (PRA)

3440280303 Direct actions to ensure that core cooling and containment is maintained during an emergency event (PRA)

3440370303 Analyze indications to determine that an off normal plant evolution is in progress (PRA)

3440380303 Direct shift personnel actions to ensure plant safety during off normal conditions (PRA)

3440390303 Ensure required notifications of on-site and off-site personnel for off normal events are performed

3440410303 Analyze indications to determine the cause of the abnormal event (PRA)

PO-3.0 Given the plant in any operating condition, the crew shall demonstrate "Self-Checking" work practice techniques for all control action in accordance with Operations Department instructions. (LER 50-410/88-50, NRC IR 50-410/88-01).

PO-4.0 Given the plant during any operating condition, SROs shall direct appropriate conservative action stabilizing the plant within acceptable limits,

including scramming the reactor or tripping the turbine manually when necessary.

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PO-9.0 Given the plant in any operating condition, the crew shall focus personnel resources to maintain effective control board attention.

PO-10.0 Given the plant in any operating condition, the crew shall remove plant equipment from service when approaching or exceeding the equipment's operating limits.

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PO-14.0 Given a situation warranting Technical Specification investigation and application, the SRO shall perform an independent review of Technical Specifications and determine appropriate license requirements.

3410170303 Recall Safety Limits, LS3 and LCOs for operations addressed by Technical Specifications

3410180303 Apply Technical Specifications directions for Safety Limits, LS3 and LCOs (PRA).

3410320303 Evaluate Plant System's performance and coordinate appropriate actions per Tech. Specs., if LCO is entered/not satisified (PRA).

PO-15.0 Given the plant operating normally at power the crew will perform monthly surveillance on the 102 EDG in accordance with N1-ST-M4 and determine the EDG is inoperable.

2640040101 Monitor the D/G in the control room

PO-16.0 Given the plant operating normally at power the crew will recognize, diagnose and take the appropriate actions for a failed 2nd stage reheater steam valve, causing unbalanced main turbine operation

2390050101 Monitor the main steam system in the control room

3449020401 Respond to control room annunciators

PO-17.0 Given the plant operating normally at power the crew will recognize, diagnose and take the appropriate actions for a failed Feedwater Master Controller

2000270501 Respond to a feedwater system or component failure

2590040101 Monitor operation of the reactor feedwater system in the control room

3449020401 Respond to control room annunciators

PO-18.0 Given the plant operating normally at power the crew will recognize, diagnose and take the appropriate actions for a main turbine failure resulting in a turbine trip, scram, loss of vacuum and loss of hotwell level

2000290401 Respond to a turbine generator trip

2560120101 Monitor condensate system operation in the control room

3449020401 Respond to control room annunciators

PO-19.0 Given degrading conditions in the Primary Containment, the crew will respond to a drywell temperature greater than 150°F and/or respond to a drywell pressure greater than 3.5 psig.

2000210501 Respond to a drywell temperature greater than or equal to degrees 150°F average.

2000070501 Drywell pressure greater than or equal to 3.5 psi. (PRA)

2230060101 Monitor the containment system

PO-20.0 Given a Torus pressure exceeding 13 psig or before containment temperature exceeds 300°F, manually initiate containment sprays.

2260020101 Manually initiate containment spray. (PRA)

2260040101 Monitor the containment spray system while in operation

PO-21.0 Given a major steam rupture in the primary containment and loss of high pressure injection sources take actions to maximize alternate injection systems and perform an emergency depressurization of the reactor vessel when RPV level cannot be maintained.

2009180501 Respond to a loss of containment integrity.

3440280303 Direct actions to ensure that core cooling is maintained and containment is maintained during an emergency event (PRA) conditions (PRA).

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Begin Scenario	Crew • Walkdown panels • Perform annunciator checks • Conduct shift turnover brief • Assume the shift
	SRO Conduct a pre-evolution brief for performing surveillance N1-ST-M4, EDG/ED 102 and 103 Operability Test
Event 1 BOP (N); Event 2 BOP (I) Role Play: As an NAO at the EDG establish radio communications with the RO performing the surveillance test.	BOP PO-15.0 Perform N1-ST-M4, completed through step 8.1.20. • Establish communications between control room and EDG 102. • Verify Prerequisites met • Start EDG 102, record time to reach - Frequency - Voltage • Adjust speed to 60 Hz • Place Sync Key for R1022 to ON • Adjust EDG to establish a slow clockwise rotation on the sync scope.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
When EDG output breaker R1022 is closed annunciator A4 2-3, DSL GEN 102 START alarms, generator amps, KW and KVAR will remain at 0 and will not respond to changes in governor postion. This is due to a malfunction of the EDG 102 governor system. ROLE PLAY: As AO if directed to set speed droop to 0, report that EDG 102 speed droop has been set to 0. (Set Remote DG01 to ISOCH) ROLE PLAY: When contacted as Ops Management, direct the EDG 102 to be shutdown.	• When sync scope is 5 min before 12 o'clock closes R1022 • Attempts to adjust EDG governor to raise EDG 102 load to 100KW • Determine that EDG 102 can NOT be adjusted • Notify CREW. • When directed, shutdown EDG 102. • N/As remaining procedure steps and advances to step 8.1.38. SRO Acknowledge report from BOP • Direct suspension of the surveillance. • Directs opening of R1022 breaker. • Review Tech. Specs 3.6.3.c • Determine a 7 day LCO • Determine within 8 hours it's not a common mode failure or perform M4 on EDG/ED 103 within 8 hours • Contact plant supervision and inform them of the problem. • Directs EDG 102 to be shudown. • Contact FIN team/WEC SRO for assistance.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
After EDG 102 has been shutdown and Tech Specs have been reviewed, ACTIVATE malfunctions by depressing F4 key (This malfunction will take about 3.5 minutes to cause an alarm.) **MS08, Second Stage Reheater 112 Steam Supply Valve Closes** **TU02, Main Turbine High Vibration Bearings 5 and 6 (53% over 5min.) (F4)** Event 4 BOP (C) Expected Annunciator: *A2 (3-5), TURBINE SUPERVISORY SYSTEM* This malfunction will require lowering load and removing both 2nd stage reheaters	BOP PO-16.0 Responds per ARP A2 (3-5) • Confirms alarm on computer • Check vibration detector • Notify Tech Support and ISI • Investigate reheater system alignment per N1-OP-41 • At N Panel, determine steam to one 2nd stage reheater isolated by observing MOV 25 (08-30) is closed. • 2nd stage reheat must be secured to the reheaters to balance turbine per N1-OP-41, Sect. H.1.0 • Notifies Crew SRO Per N1-OP-41, Directs power reduction to lower TCV position to <80% to allow removing 2nd stage reheat steam from service.
Event 5 RO (R)	RO Lowers power using Recirc Master Flow controller until TCVs <80% • Notifies Load Dispatcher • Notify RE

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
AFTER Evaluators observes sufficient power change, ACTIVATE malfunction by depressing F3 key **FW15, Feedwater Master Controller Fails AS IS (F3)**	BOP Monitors plant and equipment resetting controls as necessary (adjusting controllers in BAL). • Notifies Chemistry • Monitors Turbine • Monitors feedwater pump loading and adjust pump in manual during downpower.
Event 3 BOP (I)	RO/BOP PO-17.0 Determine RPV level is NOT being automatically controlled and that feedwater flow is constant (this will be noticed during the power change)
Reactor Water level rises as steam flow is reduced during the downpower and feedwater flow remains constant, due to malfunctioning controller. *Expected Annunciator:* *F2 3-3 REACT VESSEL LEVEL HIGH-LOW*	SRO • When notified of feedwater controller failure, directs - Power reduction stopped - Manual control of feedwater

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP • Place FWP 13 FCV in MANUAL and restore RPV level - N1-OP-16, Sect. F.6.0 - Verify MCPR >1.62 - Null FCV Controller - Place FCV Controller in MANUAL - Lower Feedflow to restore RPV level - Control RPV level in MANUAL
ROLE PLAY: As AO dispatched to Panel Loader M/A Station, report to Control Room that PCV 08-36 and 08-31 are in manual and full open. N1-OP-41, Section H.1.2 is complete.	BOP • Removes 2nd stage reheat steam per Sect. H.1.0 - Direct AO to the Panel Loader M/A Station at East Wall of the South Reheater Room, Turbine Bldg. El 300 - Direct AO to place Panel Loaders (08-36 and 08-31) in MANUAL - At the N Panel Close, the Open 2nd Stage Reheater Stop Stop Check Valve - Directs AO to continue removing 2nd Stage Reheaters from service. Continue at N1-OP-41step H.1.4.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
AFTER BOP operator secures steam to the 2nd stage reheater and returns from N Panel, **Raise TU02, Main Turbine High Vibration Bearings 5 and 6 to 100%.**	
Main Turbine rotor fails causing a turbine trip and the reactor scram. The turbine throws blading and damages the condenser hotwell, resulting in a loss of hotwell level and condenser vacuum.	BOP PO-18.0 (Operator may notice rising vibration levels and notify the crew and manually trip the turbine) Recognize Turbine Trip and Reactor Scram
Event 6; Event 7 Crew (M) Wait 2 min after turbine vibration has been raised to 100%, **or if operators trip the turbine,** THEN ACTIVATE malfunctions by depressing F5 key **TC01, Main Turbine Trip** **MC01, Main Condenser Air In-leakage (100% over 2 minutes)** **FW01A, Condensate Pump A Trip (2 minute TD)** **FW01B, Condensate Pump B Trip (2 minute TD)** **FW01C, Condensate Pump C Trip (2 minute TD)** **Hotwell Level South, LI-49-40, (Override to 2.0 over 2 min.) (F5)** **Hotwell Level North, LI-49-03A, (Override to 2.0 over 2 min.)** **RR29, Recirc Loop Rupture, at 15%. (F5)**	• Controls RPV Level • Recognizes loss of vacuum • Enter N1-SOP-4 - Verifies TSVs Closed - Verifies TCVs Closed - CRVs Closed - PB 11 & 12 supplied from Reserve Power - Verify Aux Oil Pumps ON - Reset Generator 86 Relays - Restart Stator Water Cooling Pump - Start Bearing Lift Pump • Recognize turbine high vibration • Recognizes loss of Hotwell level • High Sump Levels in Turb Bldg. • Diagnose condenser failure and loss of feedwater

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Expected Annunciators *H2 (2-7), CONDENSER HOTWELL LVL HIGH-LOW* *H2 (3-1), TURB BLDG FLOOR DRAIN 11-18 LEVEL-HIGH* *H2 (3-2), TURB BLDG E D 11-12 LEVEL-HIGH*	
	RO PO-18.0 • Place REACTOR MODE Switch in SHUTDOWN • Verify FWLVL Setdown Setpoint initiated (Control Feed flow in MANUAL) • Verify all rods fully inserted. • Insert SRM & IRM Detectors • Downrange IRMs as necessary
	SRO • Directs entry into: - N1-SOP-4 - N1-SOP-1 • Directs RPV water level between +53 & +95 inches. May direct lower band based on level following transient. • Initiating ECs for Pressure Control • Maximize CRD injection
Drywell pressure rises to 3.5 psig. Core Spray pumps automatically start.	

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	RO/BOP • Report high Drywell pressure and temperature. • Report Torus pressure above 13 psig. SRO PO-19.0, 20.0 • Enter EOP-4 • Directs lockout of all Containment Spray Pumps. • When Torus Press exceeds 13 psig - Verify containment spray initiation limits allow spray (Figure K) - Direct securing DW cooling fans - Direct securing RRMGs - Directs initiating Containment Spray • At +53 inches RPV level directs starting of Alternate Injection Systems - Liquid Poison, Test Tank or - Liquid Poison, Boron Tank

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	RO • Operate CRD to maintain level within the band assigned • Operate Emergency Condensers to maintain pressure with the band assigned and NOT exceed cool-down rate. • Lock out Containment Spray by placing 4 pump control switches in PTL. • Observe and report containment parameters
	BOP PO-20.0 • Verify tripped Recirculation Pumps • Secures Drywell Cooling Fans • Initiates containment spray - Starts Cont. Spray Pump 111 or 122 - Starts one of the other 3 Cont. Spray pumps - Verifies Cont. Spray flow • Secures Containment Sprays before Drywell pressure lowers to 0 psig.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	SRO PO-21.0 • When RPV level drops below –84 inches and before level drops to –109 inches, enters N1-EOP-8, RPV Blowdown - Directs EOP-1, Att 4 jumpers - Direct both ECs into service - Direct RO to open 3 ERVs • Direct 3 ERVs open • Directs containment spray secured before DW pressure drops to 0 psig
When ERV's are opened, RPV pressure lowers as energy is released to the Torus. When RPV pressure lowers to about 365 psig, the Core Spray Inside Isolation Valves (40-01, 40-10, 40-09 and 40-11) automatically open unless jumper were installed per EOP-8.	RO PO-21.0 • Open 3 ERVs • Installs EOP-1, Att 4 jumpers • Report 3 ERVs open
	BOP PO-21.0 • Verifies Torus level above 8 feet. • Secures Containment Sprays • Verifies Core Spray injection • Verifies RPV level restoration • Secures/throttles Core Spray as directed to control RPV level per N1-EOP-1 Attachment 4.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Terminating Cues: • Vessel level restored • Vessel depressurized • Containment pressure and temperature under control	SRO Classify emergency event • Declare an Alert per EAL 3.1.1 DW pressure greater than 3.5 psig.

History

3/31/00 Test ran scenario with Operations crew of Rick Slade, Steve Brown, Steve Evanchak and Mark Wood. Couldn't get level low enough with steam line rupture in the drywell without also depressurizing the RPV. This was supposed to drive the crew to perform an Emergency Blowdown at –109 inches, but it didn't. Changed the malfunction to water break (RR29 at 15%). Bowles and Slade tested this on 4/1/00, to ensure blowdown would be required. Incorporated changes as a result of the 3/31 test run.

5/16/00 Validated with Randall McCoy, Rich Morgan, Tom Frechette, (Eric Kelsey, STA, observed)

592770

SEM FIDELITY

- CHARTS / EOPS IN CR ARE IN COLOR, SEM ARE B&W AND GREYSCALE - NO DESCERNABLE IMPACT

NMPC NMP SIMULATOR SCENARIO

O1-OPS- **ALTERNATE NRC EXAM SCENARIO** **No. of Pages: 22**

PARTIAL RPS FAILURE WITH A SDV BREAK IN THE SECONDARY CONTAINMENT

PREPARER	Philip G. Ballard	DATE 5/25/00
VALIDATED	G Ballard with Ops Crew	DATE 5/16/00
CONFIGURATION CONTROL	NA	DATE NA
GEN SUPERVISOR OPS TRAINING	[illegible]	DATE 6/2/00
OPERATIONS MANAGER UNIT 1	NA	DATE NA

SCENARIO SUMMARY

Length: 90 minutes

The scenario beings with the plant at 90% power beginning a 12 hour soak during a startup with several LPRMs inoperative and bypassed. The crew is to perform Control Rod Exercising Operability test, N1-ST-W1. During Control Rod movement a rod drifts IN. This reactivity event causes an LPRM failure. An inadvertent HPCI initiation signal causes the operating Feedwater pump to shift to the HPCI mode. This pump must be removed from service which will require a power reduction. After the pump is removed from the crew is expected to take actions per Technical Specifications. Following the initiation of T.S. actions the EPR begins to oscillate requiring the MPR be placed in service. As the MPR is placed in service the EPR and MPR fail LOW causing Reactor Pressure and Power to spike. A failure of RPS 11 to automatically scram occurs requiring a MANUAL Scram to be inserted for a full scram to occur. The scram causes a rupture of the SDV in the Secondary Containment, which can NOT be isolated. Temperature and radiation in the Secondary Containment will rise until RPV Blowdown is required.

Major Procedures: N1-OP-1, N1-OP-43A, N1-OP-16, N1-OP-31, N1-SOP-1, N1-EOP-2, N1-EOP-5, N1-EOP-8

EAL Classification: Site Area Emergency (EAL 3.4.1, 4.1.1)

Termination Criteria: RPV de-pressurized and RPV level under control, Secondary Containment pressure and temperature under control.

I. SIMULATOR SET UP

A. IC Number: IC-14 90% Reactor power

B. Presets/Function Key Assignments

1. Malfunctions:

a. RD09 (02-27), Control Rod 02-27 Failure – Drift In **(F3)**

b. NM29 (04-33C), LPRM 04-33C Fails - Downscale **(F4)**

c. FW29, HPCI Mode Inadvertent Initiation (Pump 12) **(F5)**

d. TC06, EPR oscillates **(F8)**

e. RP04A, RPS Channel 11 Failure to Scram – Automatic **Queued**

f. RP09, ARI/ATWS Air Header Exhaust Port Blocked **Queued**

g. TC05, Electrical Pressure Regulator Fails – Low **(F7)**

h. TC08, Mechanical Pressure Regulator Fails – Low **(F7)**

i. RD41, Scram Dump Volume Rupture (100%) **(F7)**

j. RX01, Fuel Cladding Failure (10%) **(F7)**

k. RP03, Reactor Scram **(F6)**

2. Remotes:

None

3. Overrides:

None

4. Annunciators:

None

C. Equipment Out of Service

On the APRM, back panel (G) bypass LPRMs; 12-41C, 20-49D, 12-17C, 20-33C, and 12-17B

D. Support Documentation

a. N1-ST-W1, Control Rod Exercising Operability Test completed through step 7.17.

b. Ensure Reactivity Control Book (CRC) is updated to indicate LPRM's 12-41C, 20-49D, 12-17C, 20-33C and 12-17B are bypassed.

c. Prepare an Attachment 5, APRM OPERABILITY form

E. Miscellaneous:

a. After initializing the simulator lower power to 90% using Recirc Flow, Bypass the LPRMs:

1) 12-41C – APRM 12
2) 20-49D – APRM 16
3) 12-17C – APRM 13
4) 20-33C - APRM 12
5) 12-17B – APRM 17

b. Reset the chart recorders for 90% operation.

c. Direct the video camera to the side of the E Panel to look at the Control Rod Select pushbuttons.

II. TURNOVER

SHIFT TURNOVER INFORMATION

A B C D E F		
	SHIFT/STAFF/SRO CERTS	DATE
	REACTOR POWER	90%
	CORE LIFE	EOL
	ROD LINE	102%
	SHIFT	DAYS/NIGHTS

A. Technical Specification LCOs in effect:

None

B. Significant Problems/Abnormalities/Equipment Out of Service:

LPRMs; 12-41C, 20-49D, 12-17C, 20-33C, and 12-17B are inoperative and bypassed

C. Evolutions/Maintenance Scheduled for this Shift:

1. Perform N1-ST-W1, Control Rod Exercising Operability Test
2. Remain at 90% power during this shift, the startup will continue next shift.

SHIFT COMPLEMENT

SRO	
RO	
BOP	
EXTRAS	

III. TASKS AND OBJECTIVES

A. Critical Tasks:

CT-1.0 Given the plant with an un-isolatable Primary System pipe break in the Secondary Containment the crew will initiate an RPV Blowdown when two Reactor Building general area temperatures exceed the Maximum Safe Value.

Tasks:

3410140303	Direct shift personnel actions during major plant evolutions (PRA)
3419030103	Monitor functions in the control room
3420220303	Provide technical assistance in troubleshooting system malfunctions
3440070303	Direct corrective actions to mitigate the consequences of the abnormal event (PRA)
3440240303	Direct corrective actions to mitigate the consequences of the emergency event (PRA)
3440250303	Direct shift personnel actions to correct the cause of the emergency abnormal event (PRA)
3440260303	Evaluate the emergency event to determine that conditions are following the expected sequence (PRA)
3440280303	Direct actions to ensure that core cooling and containment is maintained during an emergency event (PRA)
3440370303	Analyze indications to determine that an off normal plant evolution is in progress (PRA)
3440380303	Direct shift personnel actions to ensure plant safety during off normal conditions (PRA)
3440410303	Analyze indications to determine the cause of the abnormal event (PRA)

CT-2.0 Given the plant with an automatic scram setpoint exceeded and failure of one RPS channel to automatically trip, the crew will insert a manual scram within two minutes of the scram setpoint being exceeded.

B. Performance Objectives:

PO-1.0 Given the plant in any operating mode, the crew shall demonstrate effective communications in accordance with GAP-OPS-01 on verbal communication.

PO-2.0 Given the plant in an emergency condition, SROs shall demonstrate an understanding of Command and Control, EOP placekeeping techniques and effective use of control room operators (NMP2 Requal Action Plan, Rev 02, 6.B.6).

3410140303	Direct shift personnel actions during major plant evolutions (PRA)
3419030103	Monitor functions in the control room
3420220303	Provide technical assistance in troubleshooting system malfunctions
3440070303	Direct corrective actions to mitigate the consequences of the abnormal event (PRA)
3440110303	Direct actions to ensure that core cooling is maintained during an abnormal event (PRA)
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3440390303 Ensure required notifications of on-site and off-site personnel for off normal events are performed

3440410303 Analyze indications to determine the cause of the abnormal event (PRA)

PO-3.0 Given the plant in any operating condition, the crew shall demonstrate "Self-Checking" work practice techniques for all control action in accordance with Operations Department instructions. (LER 50-410/88-50, NRC IR 50-410/88-01).

PO-4.0 Given the plant during any operating condition, SROs shall direct appropriate conservative action stabilizing the plant within acceptable limits, including scramming the reactor or tripping the turbine manually when necessary.

PO-5.0 Given the plant after any transient or event, SROs shall establish and modify control bands for key plant parameters, to direct actions maintaining parameters within prescribed limits.

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PO-9.0 Given the plant in any operating condition, the crew shall focus personnel resources to maintain effective control board attention.

PO-10.0 Given the plant in any operating condition, the crew shall remove plant equipment from service when approaching or exceeding the equipment's operating limits.

PO-11.0 Given the plant during high reactor pressure conditions, the crew shall control RPV pressure manually to stop and prevent ERV cycling.

PO-12.0 Given the plant following a reactor scram, the crew shall control RPV temperature to prevent exceeding Technical Specification allowed cool down rate, or avoid unnecessary safeguards actuation.

PO-13.0 Given the plant in a condition requiring a rapid decrease in reactor power, the crew shall perform an emergency power reduction using recirculation and or manual rod insertion (if necessary) in accordance with approved procedures.

PO-14.0 Given a situation warranting Technical Specification investigation and application, the SRO shall perform an independent review of Technical Specifications and determine appropriate license requirements.

3410170303 Recall Safety Limits, LS3 and LCOs for operations addressed by Technical Specifications

3410180303 Apply Technical Specifications directions for Safety Limits, LS3 and LCOs (PRA).

3410320303 Evaluate Plant System's performance and coordinate appropriate actions per Tech. Specs., if LCO is entered/not satisified (PRA).

PO-15.0 Given the plant at full power perform Control Rod Exercising Operability Test, N1-ST-W1. Recognize and respond to a control rod drifting into the core. Take appropriate action.

2010110101 Monitor the CRD system in the control room

PO-16.0 Given the plant operating normally at power the crew will recognize, diagnose and respond to an LPRM downscale failure resulting in the associated APRM becoming inoperable.

PO-17.0 Given the plant operating normally at power the crew will recognize, diagnose and take the appropriate actions for the electric feedwater pump 12 shifting to the HPCI inject mode.

2000270501 Respond to a feedwater system or component failure

2590040101 Monitor operation of the reactor feedwater system in the control room

3449020401 Respond to control room annunciators

PO-19.0 Given the plant in the process of shutting down the crew will recognize, diagnose and respond to EPR oscillations by placing the MPR in service.

2459200401 Respond to a malfunction of the EPR

2490030101 Monitor the MPR/EPR pressure regulating system

PO-20.0 Given a failure to automatically scram from a scram condition the crew will recognize the failure to scram and initiate a manual scram of the effected channel to cause a full scram.

PO-21.0 Given the plant shutdown with a primary system leak in the secondary containment, the crew will recognize the break and attempt to isolate the leak then lower RPV pressure when required

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Begin Scenario. Allow 5 minutes for the crew to walkdown panels.	Crew • Walkdown panels • Perform annunciator checks • Conduct shift turnover brief • Assume the shift
	SRO • Conduct a pre-evolution brief for performing surveillance N1-ST-W1, Control Rod Exercising Operability Test. • Conducts Reactivity Brief per GAP-OPS-05.
Event 1 RO (N) When rod 02-27 is notched in, ACTIVATE malfunction by depressing F3 key **RD09, Control Rod 02-27 Failure Drift In (F3)** Event 2 RO (C) *Control Rod 02-27 continues to insert* Expected Annunciator: *F3 (2-6), CONTROL ROD DRIFT*	RO Perform N1-ST-W1. • Verify Prerequisites met • Select Control Rod 02-35 and insert one notch, then withdraw back to 48. • Select Control Rod 02-31 and insert one notch, then withdraw back to 48. • Select Control Rod 02-27 and insert one notch • Recognize 02-27 is drifting in • Notify CREW

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	SRO • Acknowledge report from RO • Direct confirming Rod Drift • Directs verification of no other rod drifts occurring. • Direct inserting 02-27 to notch 00 with the EMERGENCY ROD IN Switch • Verify 02-27 stays at 00 when Switch is released • Contact Reactor Engineering and inform them of the problem. • Review Tech. Specs 3.1.1 • Determine 02-27 will have no T.S. concerns when it is valved out. • Direct HCU Valved out in accordance with N1-OP-5, Sect. H with cooling water maintained to the drive.
NOTE: To valve out an HCU, delete the malfunction To reset the Rod Drift, Remote RD07	BOP • Refers to N1-ARP-F3-2-6 and assists RO and SRO in implementing actions. • Inform crew that more than one rod drifting requires a manual scram. • Informs SRO that HCU 02-27 is required to be valved out. • Ensures ROD DRIFT alarm is reset, after HCU is valved out. • Initiates OD-7 Option 2 to update PPC.

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	RO • Confirms Rod Drift on RPIS indication. • Insert 02-27 to notch 00 with the EMERGENCY ROD IN Switch • Verify 02-27 stays at 00 when Switch is released • Direct an AO to valve out 02-27 HCU in accordance with N1-OP-5, Sect. H.1.1 with cooling water maintained. - Provides pre job brief for AO.
ACTIVATE malfunction by depressing F4 key **NM29 (04-33C), LPRM 04-33C Fails - Downscale (F4)** Event 3 RO (I) Expected Annunciator: *F2 (4-5), LPRM CH 11*	
NOTE: Bypassing the LPRM will have no effect, APRM 12 is INOP, But, the crew may bypass the APRM to prevent further trouble.	BOP • Performs N1-ARP-F2-4-5 actions - Determine which LPRM failed - Bypasses LPRM 04-33C - Reset trip on G Panel • Logs LPRM failure in Reactivity Control Book.

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
NOTE: SRO should declare APRM 12 INOP due to 3 level C LPRMs inop. To perform an APRM GAF in the simulator booth initiate an AGAF at the simulator control panel.	SRO • Performs APRM Operability Determination per N1-OP-38C Attachment 5 and TS tables 3.6.2.a and 3.6.2.g. • Determnes APRM 12 is INOP but sufficient APRMs are operable and plant operation is NOT affected. • Directs BOP to bypass LPRM 04-33C per N1-OP-38C section H.3.0. • Contacts RE to request an APRM GAF adjustment.
ACTIVATE malfunction by depressing F5 key **FW29, HPCI Mode Inadvertent Initiation (Pump 12) (F5)** Event 4 BOP (C) Expected Annunciator: *F4 (4-1), HPCI MODE AUTO INITIATE*	BOP • Perform N1-ARP-F4-4-1 actions - Confirm HPCI CH 12 light lit on E Panel - Verify FWP 12 FCV Control M/A Station Mode Switch in MANUAL and pump flow < 1.9 x 10^6 lbm/hr - Verifies manual control is NOT available • Lower power per OP-43A to remove FWP 12 from service • Remove FWP 12 from service in accordance with OP-16 or Change Motor Driven pumps

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ROLE PLAY: As Operations Management (Brain Booth) direct the SRO to lower power to 75% and shift FWP's. As RE acknowledge the failed LPRM and the power reduction, there is no restriction on the power reduction the return to power should be conducted at 6Mwe/hr.	SRO • Check T.S. 3.1.8, declare one component INOP and enter 15 Day LCO • Notify Operations Management • Notify FIN Team • Notifies RE • Prior to lowering the Motor Driven Feed Pump flow below 1.5 x 10^6 lbm/hr verifies MCPR >1.59 • Conduct pre-evolution and Reactivity Briefs. • Direct a power reduction to Remove FWP 12 from service and/or place FWP 11 in service per N1-OP-16, F.2.0.
	RO Using N1-OP-43A, lower power with the Master Recirc Flow Controller

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ROLE PLAY: As AO go to the FWP 11 and report: • Oil Levels NORMAL • Lubrication and Cooling Water flows NORMAL • Pump is running normally and ready for loading. • For FWP 12 following pump shutdown, report that the shaft has stopped.	BOP Monitor equipment during power reduction and re-set M/A station balances When power has been lowered: IF swapping Feed Pumps • Dispatch an AO to FWP 11 to determine pump status • Verify FW Pump 11 FCV Control M/A Station in MANUAL and the valve is closed • Start FWP 11 • Slowly Open FWP FCV while Closing FWP 12 FCV • Raise FW Pump 11 flow to between 1.0 and 1.5 x 10^6 lbm/hr • Verifies 13 FCV is maintaining RPV water level. • When FWP 12 FCV is Closed place FWP 12 control switch to STOP • Confirm Aux Oil Pump running and pump NOT spinning backwards • Verify FWP 12 FCV Closed

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ACTIVATE malfunction by depressing F8 key **TC06, EPR oscillates (F8)** Event 7 Crew (M) Expected Annunciator *A2 (4-4), TURBINE MECHANICAL PRESS. REG IN CONTROL*	SRO Diagnose MPR cycling Enter SOP-2
	BOP Observes RPV Press and recognizes EPR is oscillating • Lowers MPR setpoint to place MPR in control and stop oscillations • Attempt to raise EPR
ACTIVATE malfunctions by depressing F7 key **TC05, Electrical Pressure Regulator Fails – Low (F7)** **TC08, Mechanical Pressure Regulator Fails – Low (F7)** **RP04A, RPS Channel 11 Failure to Scram Automatic (F7)** **RD41, Scram Dump Volume Rupture (100%) (F7)** **RX01, Fuel Cladding Failure (10%)** After the reactor has been scrammed insert: **RP03, Reactor Scram (F6)**	SRO Enter N1-SOP-1 • Determine a failure of RPS 11 to automatically scram and direct inserting a MANUAL trip of RPS 11 channel. • Enters N1-EOP-2 on High RPV Pressure

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Expected Annunciators: *L1 (4-3), REACT BLDG VENT RAD MONITOR OFF NORMAL* *K1 (1-1), RX BLDG AREA TEMP HIGH* *H1 (1-7), OFF GAS HIGH RADIATION* *H1 (4-8), AREA RADIATION MONITORS*	
	RO • Determine a failure of RPS 11 to automatically scram and manually insert a MANUAL trip. • Place REACTOR MODE Switch in SHUTDOWN • Verify FWLVL Setdown Setpoint initiated (Control Feed flow in MANUAL) • Verify Rods inserted to >04 • Insert SRM & IRM Detectors • Downrange IRMs as necessary • When all rods verified in: - Place SDV High Level Bypass Switch in BYPASS - Place REACTOR MODE Switch in SHUTDOWN • Recognize/report ARM alarm in CRD area • Recognize/report fire alarms in RB west side 237' and 261' • Recognize/report high temperature alarms

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
Role Play As operator dispatched to Aux Control Room, report Reactor Building temperatures: Temperatures: SDV (202-132) 168°F SDV (202-133) 164°F HCU/Scram North (202-135) 155°F HCU/Scram South (202-134) 131°F North Instrument Room 96°F All other areas are slightly elevated **NOTE:** No General Area temperature information is available until an operator has been dispatched to the Reactor Building to monitor area temperatures. Do NOT approach 135°F in 2 General Areas until you want the crew to perform an RPV Blowdown.	BOP • Recognize high pressure event • Manually Open ERVs as necessary to maintain RPV pressure <965 psig • Verify ECs in service • Verify TBV Open controlling RPV pressure. • Verify electrical power shifted to the Reserve Buses • Recognize rising temperatures in the Reactor Building • Recognize/report alarms and annunciators • K1-1-1, RB High Area Temperature • L1-3-3, RB CAM • DA 4116W and DA 4076WL • H1-4-8, ARM • L1-3-6, RBEVS channel 11 • L1-4-6, RBEVS channel 12 • Confirms alarms on computer • Diagnose failure of SDV • Notify Crew

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
ROLE PLAY: WAIT until directed by lead evaluator (when ready to perform the RPV Blowdown) THEN report as AO and RP tech. dispatched to monitor area temperatures, that general area temperature on Elevation 261 South side is 137°F AND that steam is rising to El 261 from El 237 and suspect that El 237 is significantly above 135°F. As operator dispatched to Aux Control Room, report Reactor Building temperatures: Temperatures: SDV (202-132) 188°F SDV (202-133) 178°F HCU/Scram North (202-135) 175°F HCU/Scram South (202-134) 151°F North Instrument Room 126°F All other areas are slightly elevated and slowly rising.	SRO Enter N1-SOP-17 Direct RP and AOs to investigate the source of the high ARM Enter N1-EOP-5 • Direct verification that Rx. Bldg Vent. Shifts to EVS • Direct resetting the scram to isolate the SDV • Re-enter N1-EOP-2 • Verify primary system discharging into RB and cannot be isolated When report is received that 2 General Areas temperatures are above 135°F • RPV Blowdown is required and directs entry into EOP-08 • Verify emergency condensers in service • Verify torus water level • Direct open three ERVs • Wait for SDC interlocks to clear • Direct reset reactor scram when pressure falls below 550 psig

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP • Confirms - EVS Fan 11 Started - EVS Fan 12 Started - RBSF 11 Stopped - RBSF 12 Stopped - RBEF 11 Stopped - RBEF 12 Stopped - EM Vent Exh Fan 11 Outlet BV Open - EN Vent Loop 11 Inlet BV Open - EM Vent Exh Fan 12 Outlet BV Open - EN Vent Loop 12 Inlet BV Open - EM Vent loop 11 Cool BV Closed - EM Vent loop 12 Cool BV Closed - React Bldg Supply Fan Inlet Dampers Closed - React Bldg Exhaust Fan Outlet Dampers Closed - React Bldg Supply Isolation Valves Closed - React Bldg Exhaust Isolation Valves Closed • Before 30 minutes have elapsed secure one train of RBEVs

IV. SCENARIO

INSTRUCTOR ACTIONS/ PLANT RESPONSE	OPERATOR ACTIONS
	BOP Continued When directed perform RPV Blowdown per N1-EOP-8 • Manually initiates ECs • Opens 3 ERVs • Places Cont. Spray in Torus Cooling • Place Shutdown Cooling in service when RPV pressure lowers
Termination Criteria: RPV de-pressurized and RPV level under control, Secondary Containment pressure and temperature under control.	SRO • Classifies the event as SAE 3.4.1, 4.1.1