

NOTE: FINAL EXAM USED  
ONLY SCENARIO # 2 & 3  
NMP SIMULATOR SCENARIO

*Spare unit  
will be needed  
for Exam*

SCENARIO # 1

REV. 0

No. of Pages: 22

SINGLE ROD SCRAM/JET PUMP FAILURE/SMALL LOCA WITH LOSS OF PRESSURE  
SUPPRESSION/CONTAINMENT SPRAY WITH SERVICE WATER SYSTEM

PREPARER

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DATE

4/26/02

VALIDATED

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DATE

5/30/02

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OPERATIONS  
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CONFIGURATION  
CONTROL

NA EXAM SECURITY

DATE

NA

SCENARIO SUMMARY

Length: 60 minutes

The scenario begins with the plant operating at rated power. RHR System "A" is out of service for maintenance. An Inboard Drywell to Suppression Chamber Vacuum Breaker is inoperable (open). The crew will perform a planned transfer of RPS "A" electrical power supplies. During the transfer, a single control rod will scram due to a blown fuse on RPS "B" scram pilot valve solenoid. The crew will enter N2-SOP-08 for the unexpected power change and reduce generator MW electric. The crew will restore the control rod to the fully withdrawn position.

When conditions have stabilized, the Rams Head for a Jet Pump pair will separate. The crew will diagnose the jet pump failure based on plant parameter changes. Tech Specs will be entered and a required plant shutdown will be initiated.

During the power reduction, a malfunction in the EHC pressure regulator system causes a rapid reduction in reactor pressure. The crew will enter N2-SOP-23 and manually scram the reactor and close the MSIVs to stabilize reactor pressure and execute N2-EOP-RPV.

After reactor level and pressure are stabilized, the second vacuum breaker in the pair of Drywell to Suppression Chamber Vacuum Breakers will fail open concurrent with small leak from the Reactor Coolant System piping. The vacuum breaker failure results in a loss of Pressure Suppression function within the Primary Containment. As Drywell pressure slowly rises, the crew will execute N2-EOP-PC to control reactor vessel and primary containment parameters. After initiating containment sprays using RHR System "B", the ECCS suction strainer will gradually become clogged with debris in the Suppression Pool. Strainer plugging will require the crew to use an alternate source of containment spray, such as the Service Water System cross-tie to RHR System "B" in order to prevent exceeding Pressure Suppression Pressure Limit (PSP). The use of Service Water for containment spray will be successful in mitigating further degradation of the primary containment.

Major Procedures: N2-SOP-08, N2-SOP-23, N2-SOP-101C, N2-EOP-RPV, N2-EOP-PC, N2-EOP-6 Attachment 5.

EAL Classification: ALERT 3.1.1

Termination Criteria: Reactor is shutdown with RPV Level and Pressure controlled in the directed band. Drywell pressure is lowering as a result of Containment Spray with Service Water and PSP has not been exceeded.

## I. SIMULATOR SET UP

A. IC Number: IC 20, 100% Reactor Power

### B. Presets/Function Key Assignments

#### 1. Malfunctions:

- |  |               |
|--|---------------|
| a. RD095423X, 54-23X Control Rod failure, scrambled,             | <b>ET01</b>   |
| b. RR18, Jet Pump failure, Loop "A"                              | <b>F5</b>     |
| c. RR20, RR Loop Rupture, @ 7% over 5 minutes                    | <b>F8</b>     |
| d. PC10B, Drywell/Wetwell vacuum Brk. Pair failed open           | <b>F8</b>     |
| e. RH18B, RHR "B" Suction Strainer clogged, @ 90% over 3 minutes | <b>ET05</b>   |
| f. RH01B, RHR Pump Trip, (P1B),                                  | <b>ET02</b>   |
| g. MS13, MSIV Isolation Failure                                  | <b>Queued</b> |
| h. TC01A, EHC System Pressure Regulator Fails High               | <b>F6</b>     |

#### 2. Remotes:

- |                                 |               |
|---------------------------------|---------------|
| a. RP01, RPS MG "A", Reset      | <b>F3</b>     |
| b. RP04, RPS MG "A" Stop        | <b>F4</b>     |
| c. RHS*MOV 4A, 103C fuse pulled | <b>Queued</b> |

#### 3. Overrides:

- |  |               |
|--|---------------|
| a. P601-E12A-S07A-A, RHS*MOV 8A Green light "OFF"    | <b>Queued</b> |
| b. P601-E12A-S34A-B, RHS*MOV 9A Green light "OFF"    | <b>Queued</b> |
| c. P601-E12A-S04A-B, RHS*MOV 1A Green light "OFF"    | <b>Queued</b> |
| d. P601-E12A-S06A-B, RHS*MOV 2A Green light "OFF"    | <b>Queued</b> |
| e. P601-E12A-DS35-B, RHS*MOV 1A Amber light "ON"     | <b>Queued</b> |
| f. P601-E12A-DS38-B, RHS*MOV 2A Amber light "ON"     | <b>Queued</b> |
| g. P601-E12A-DS39-B, RHS*MOV 9A Amber light "ON"     | <b>Queued</b> |
| h. P601-E12A-DS42-B, RHS*MOV 8A Amber light "ON"     | <b>Queued</b> |
| i. P628-LTB-2ISCN03-C, 2ISCRV34A INBD Red light "ON" | <b>Queued</b> |

#### 4. Annunciators:

- |  |               |
|--|---------------|
| a. AN601448 RHR "A" System Valve motor overload "ON" | <b>Queued</b> |
| b. AN601556 Drywell Vac Brkr Inbd Disc Open "ON"     | <b>Queued</b> |

C. Equipment Out of Service

1. Remove RHR "A" Loop from service as follows;
  - a) Depress RHR "A" manually out of service pushbutton
  - b) Place RHR "A" Pump Switch in the pull-to-lock position.
  - c) Close RHS\*MOV-2A, 17A and 9A.

D. Support Documentation

1. Marked up copy of N2-REP-16 and Reactivity Maneuver Request (RMR) to restore rod 54-23 to position 48.

E. Miscellaneous

1. ET01 = RPS "A" P603 "White Lights OFF"
2. ET02 = "B" Drywell Spray (both) "OPEN"
3. ET05 = Suppression Chamber Spray Flow "A" or "B" > 600 gpm.

## II.

### SHIFT TURNOVER INFORMATION

SHIFT: ~ N ~ D DATE: \_\_\_\_\_

#### **PART I: To be performed by the oncoming Operator before assuming the shift.**

- Control Panel Walkdown (all panels) (SSS, ASSS, STA, CSO, CRE)

#### **PART II: To be reviewed by the oncoming Operator before assuming the shift.**

- Shift Supervisor Log (SSS, ASSS, STA)
- CSO Log (CSO)
- Lit Control Room Annunciators (SSS, ASSS, STA, CSO, CRE)
- Shift Turnover Checklist (ALL)
- LCO Status (SSS, ASSS, STA)
- Computer Alarm Summary (CSO)

Evolutions/General

Information/Equipment Status:

- Reactor Power = 100%
- Loadline = > 100%

"A" RHR Loop out of service for work on the minimum flow valve. Expected to be returned to service for testing in two (2) days. Seven day LCO on T.S. 3.5.1.A, 3.6.1.6.A, 3.6.2.3.A, and 3.6.2.4.

Inboard Drywell Vac Breaker is inoperable and open 12 hours ago. 60 hours remain on LCO clock for TS 3.6.1.7 Required Action B.1 Maintenance Crews are actively working the problem.

#### **PART III: Remarks/Planned Evolutions:**

Required evolution during this shift - Transfer RPS "A" to alternate and shutdown RPM-MG1A, per N2-OP-97, Section G.2.0. This is being done to facilitate maintenance on the motor.

#### **PART IV: To be reviewed/accomplished shortly after assuming the shift:**

- Review new Clearances (SSS)
- Shift Crew Composition (SSS/ASSS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SSS		CRE	
ASSS		E	
STA		E	
CSO		Other	

## PERFORMANCE OBJECTIVES

### A. Critical Tasks:

CT-1.0 Given an EHC regulator failure resulting in a rapid lowering of reactor pressure, the crew will initiate a manual scram and close the MSIVs per N2-SOP-23.

Tasks: SRO 3449290503 Direct the actions required for an EHC Regulator failure.  
3449300503 Direct the actions required for a Reactor Scram.  
RO 209050501 Perform the required actions for an EHC failure.  
2010130101 Scram the reactor manually and take immediate actions.

CT-2.0 Given a failure of normal Containment Spray systems, the crew will initiate Containment Spray to maintain Suppression Chamber Pressure below Pressure Suppression Pressure Limit using Service Water System Cross-tie to RHR "B" per N2-EOP-6, Attachment 5.

Tasks: SRO: 3449430603 Direct the actions required per EOP-PC section Primary Containment Pressure.  
RO: 2050150101 Operate the Containment Spray System.  
2009250501 Perform the actions required for a Loss of Coolant Accident (Small Leak) inside the Primary Containment.

### B. Performance Objectives:

PO-1.0 Given information contained in the Shift Turnover Sheet, the crew will transfer RPS "A" Scram Solenoid Power Supply from normal to alternate and shutdown the RPM "A" Motor Generator Set, per N2-OP-97.

Tasks: RO 2120090101 Shift the RPS Bus to the Alternate Power Supply.

PO-2.0 Given a half scram condition and a single control rod scram, the crew will implement the actions of N2-SOP-08. The crew will restore the rod to the fully withdrawn position following repairs.

Tasks: RO 2000390401 Perform the actions required for a  
mispositioned control rod.  
2009140501 Perform the actions required for an  
unexplained reactivity change.

PO-3.0 Given a jet pump failure, the crew will commence a plant shutdown as required by Technical Specifications.

Tasks: SRO: 2020030203 Determine Jet Pump Operability.  
3410320303 Evaluate plant system performance and  
coordinate appropriate actions per Tech  
Specs, as required.  
3419120103 Direct the actions of the operators during  
a reactor shutdown.  
3419140103 Direct reactor power changes (>10%)  
using Recirc Flow or Control Rods.  
RO: 2020020101 Adjust the Recirc Flow using Loop  
Manual Control.

PO-4.0 Given an EHC regulator failure resulting in a rapid lowering of reactor pressure, the crew will implement N2-SOP-23.

Tasks: SRO 3449290503 Direct the actions required for an EHC  
Regulator failure.  
RO 209050501 Perform the required actions for an EHC  
failure.

PO-5.0 Given a small reactor coolant leak inside the drywell and a pair of stuck open Drywell/Suppression Chamber Vacuum Breakers, the crew will maintain containment parameters by implementing N2-EOP-PC.

Tasks: SRO: 3449430603 Direct the actions required per EOP-PC  
section Primary Containment Pressure.

RO: 2229020401 Operate the Drywell Cooling System  
with a LOCA signal present.

2050150101 Operate the Containment Spray System.

2009250501 Perform the actions required for a Loss  
of Coolant Accident (Small Leak) inside  
the Primary Containment.

PO-6.0 Given a failure of normal Containment Spray systems, the crew will  
initiate Containment Spray to maintain Suppression Chamber Pressure  
below Pressure Suppression Pressure Limit using Service Water System  
Cross-tie to RHR "B" per N2-EOP-6, Attachment 5.

Tasks: SRO: 3449430603 Direct the actions required per EOP-PC  
section Primary Containment Pressure.

RO: 2050150101 Operate the Containment Spray System.

2009250501 Perform the actions required for a Loss  
of Coolant Accident (Small Leak) inside  
the Primary Containment.

PO-7.0 Given the plant in a condition requiring emergency classification, the SRO  
shall properly classify the event per EPP-EPIP-02.

Tasks: SRO: 3440190303 Classify Emergency Events Requiring  
Emergency Plan Implementation.



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Instructor – check all queued malfunctions, overrides and annunciators have remained active.

Once given shift turnover information, allow no more than five (5) minutes for the crew to perform a walk down of panels.

Begin Scenario.

Normal Evolution

*The RPS “A” white lights on Panel 603 will extinguish and a half-scrum signal will be present.*

CREW

- Complete panel walk down and tests annunciators.
- SRO conducts pre-shift brief.
- Crew assumes the shift.

SRO

PO-1.0

- Directs BOP to shift RPS “A” to its alternate and shutdown RPS “A” per N2-OP-97.
- Conducts pre-evolution brief.

BOP:

PO-1.0

- Review N2-OP-97, Section G.2.0.
  - Verifies that the alternate power supply transformer is available
  - Verifies **NO** SCRAM signals are present in the opposite channel (RPS “B”)
- At Panel 610, places the “Power Source Selector Switch” to “Alt. A”.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #2 RO Component Failure

**RD09, 54-23 becomes active**

**ET01**

*Control Rod 54-23scrammed when RPS "A" was  
transferred to Alternate "A".*

*Expected annunciators:*

603443

*Rod Drift Alarm*

Role Play:

**As Electrical Maintenance/FIN Team** after being  
dispatched, report the "B" RPS fuse is blown at  
HCU 54-23. Recommend replacing fuse.  
AFTER being given permission to replace fuse,  
report the fuse is replaced.

RO:

PO-2.0

- Identifies and reports the four RPS  
"A" white lights have extinguished.
- Identifies and reports Control Rod 54-  
23 has fully inserted.

SRO:

PO-2.0

- Direct entry into N2-SOP-08
- Stops all maintenance activities that  
could cause a half-scam.

RO:

PO-2.0

- Enters and performs actions of N2-  
SOP-08.
  - Reduce power by 40 MWe using  
Recirculation Flow
  - Notify Maintenance to  
troubleshoot the scrambled rod
  - Notify:
    - SSS
    - On-call Reactor Engineer
    - GSO

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Booth Operator Instruction:

When RPS "B" fuse is replaced, manually delete malfunction RD09 54-23

Role Play:

**As Reactor Engineer**, report Rx Engineering will immediately initiate N2-REP-16 and RMR to recover rod 54-23 to position 48 as quickly as possible. Wait 2 minutes, then deliver the paperwork to the SRO, so that rod recovery can proceed.

Role Play:

Acknowledge directions given by the BOP.

Wait two (2) minutes and insert remotes:

**RP01, RPS MG1 EPA, Reset** **F3**

**RP04, RPS MG1, Stop** **F4**

Role Play:

Report to the RO that the RPS "A" EPA breaker is reset and the RPS "A" MG Set is shutdown.

*The RPS "A" white lights on Panel 603 will be lit after the RPM EPA Breakers are reset.*

BOP:

- Dispatch AO to reset the RPS "A" EPA breaker and stop the RPS "A" MG Set.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Control Rod 54-24 moves to position 48*

Event #3 BOP/SRO Component Failure

When control rod 54-23 is at position 48 and  
conditions have stabilized, insert malfunction:

**RR18, Jet Pump Failure (Loop A) F5**

*Expected Annunciators:*

*603139, Reactor Water Level High/Low*

*603217, Flow Reference Off Normal*

SRO:

- After receiving N2-REP-16 and RMR AND Fuse is replaced, directs control rod recovery.
- Reviews RMR
- Performs Reactivity Brief per GAP-OPS-05.
- Provides reactivity control oversight during rod movement.

RO:

- Fully withdraws rod 54-23 using continuous withdraw buttons
- Respond to any RBM alarms generated during rod withdrawal.
- Performs coupling check at position 48

BOP:

- Provides independent verification for RO during rod withdrawal.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

603442, Control Rod Out Block

*Reactor Power, MWe and Total Core flow lowers.*

*Recirc Loop A flow and Pump amps rise.*

*Loop A Jet Pump flow lowers and Loop B Jet Pump flow rises.*

*Jet Pumps 3 and 4 differential pressures lower as compared with other Jet Pumps at H13-P619.*

Role Play:

As Operations Management, direct the SRO to commence a normal Plant shutdown as soon as possible.

RO:

PO-3.0

- Reports alarm
- Monitors Reactor Power, level and pressure.
- Determines Jet Pumps 3 and 4 have failed.
- Determines excessive Jet Pump flow mismatch exists.
- Enters N2-SOP-8, Section 4.7.4.
- Performs N2-OSP-LOG-D001, Attachments 8 and 10.
- Report results to SRO and refer to Technical Specification 3.4.3.

SRO

PO-3.0

- Acknowledges RO report.
- Enters T.S. 3.4.3, for Inop Jet Pump.
- Enters T.S. 3.4.1, for Jet Pump Flow Mismatches.
- Determines the Jet Pump flow mismatch must be restored within 2 hours.
- Directs RCS Loop "B" flow lowered to restore Jet Pump flow mismatch.
- Notifies Ops. Management.
- Determines the Plant must be in Hot Shutdown within 12 hours.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #4 RO Reactivity Manipulation

Event #5 RO Instrument Failure

When Reactor Power has been reduced 5% to 10%,  
insert the following malfunction:

**TC01A, EHC System Pressure**

**Regulator fails high.**

**F6**

*Expected Annunciator:*

*851119 Turbine Trouble*

*851150 Turbine Bypass Valve open*

*Reactor Pressure and Main Steam Line pressure  
start lowering.*

*EHC System opens TCV's and the TBV's.*

*If Reactor Pressure reaches 776 psig the MSIV's  
will receive a signal to close, but remain open due  
to Isolation Failure malfunction.*

- Directs CREW to perform Plant Shutdown per N2-OP-101C.

- Briefs CREW on the Shutdown.

RO:

- Commence power reduction by lowering Recirc. flow

BOP:

PO-4.0

- Identifies and reports EHC Regulator failure.
- Enters and notifies SRO and RO of required actions of N2-SOP-23.

SRO:

PO-4.0

- Acknowledges BOP report.
- Directs RO to manually scram the Reactor per and close the MSIV's.
- Enter and execute N2-EOP-RPV.



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*If RPV water level drops to 108", HPCS will automatically start.*

Event #6 Major Transient

When post SCRAM level and pressure have been stabilized insert the following malfunctions:

**RR20, RR Loop Rupture, @ 7% over 5 minutes.**

**F8**

**PC10B, Drywell/Wetwell Vacuum Breaker pair failed open.**

**F8**

*Drywell and Suppression Chamber pressure begin to rise.*

*Expected Major Annunciator:*

*601556 DRYWELL VACUUM BRKR*

*INBOARD DISC OPEN*

*601557 DRYWELL VACUUM BRKR*

*OUTBOARD DISC OPEN*

*603140 DRYWELL PRESSURE HIGH/LOW*

*Drywell and Suppression Chamber pressure will rise together and exceed 1.68 psig.*

*Reactor Pressure will continue to lower.*

- Start a Reactor Feedwater Pump
- Injects through LV10

RO:

- Reports Reactor water level and pressure are lowering.

BOP:

PO-5.0

- Reports Drywell and Suppression Chamber pressures are rising.
- Drywell/Suppression Chamber vacuum breakers 2ISC\*RV34 A & B are open.

SRO:

- When Drywell Pressure exceeds 1.68 psig:
  - Re-enter N2-EOP-RPV
  - Enter N2-EOP-PC
    - Directs Suppression Chamber Spray using RHR Loop "B".



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #7 BOP Component Failure

When Suppression Chamber Spray is initiated, the following malfunction will occur:

**RH18B, RHR B Suction Strainer Clogged @  
90% over 3 minutes. ET05**

*RHR Pump B amps and flow will start oscillating  
as the suction strainer clogs.*

Evaluator Note: Crew will either secure RHR Pump “B” from Suppression Chamber Spray now and align Service Water to RHR Loop “B” OR align Service Water to RHR Loop “B” after the RHR

- Directs DW Coolers restored.

BOP:

- Reports rising containment pressure and temperature. (w/values)
- Lines up Service Water to the RHR heat exchanger.
- Initiates Suppression Chamber Spray by opening RHS\*MOV33B.
- Verifies and reports CSH automatically started as required.

BOP:

- Recognize and report Suction Strainer clogging problem.
- Monitor RHR Pump “B” parameters.
- If directed, secures Suppression Chamber Spray by closing RHS\*MOV33B and tripping RHS\*P1B.

SRO:

- May direct use of alternate sources for Containment Spray.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

pump auto trips. Either path is acceptable as long as Drywell Spray is initiated with Service Water before exceeding PSP.

*Suppression Chamber pressure continues to rise and exceeds 10 psig.*

*After Drywell Sprays are initiated, Drywell and Suppression Chamber Pressure begin to lower.*

SRO:

- When Suppression Chamber pressure is greater than or equal to 10 psig, directs:
  - Directs Drywell sprays initiated either using RHR "B" OR Service Water lined up to RHR "B".
    - Directs RCS Pumps and Drywell Unit Coolers tripped
    - Verifies parameters within DW Spray Initiation Curve.
  - LPCI/LPCS injection overridden prior to injection.

BOP:

- Reports containment pressure and temperature. (w/values)
- Initiates Drywell Sprays by opening RHS\*MOV15B and MOV25B.
- Starts fifth Service Water Pump.
- Restores nitrogen to the Drywell when directed.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

NOTE: If SRO elects to keep using the "B" RHR Pump, it will automatically trip when the Drywell Spray MOVs are full open by the following malfunction:

**RH01B, RHR Pump Trip**

**ET02**

**Termination Cue:**

- Reactor is shutdown with RPV Level and Pressure controlled in the directed band.
- Drywell and Suppression Chamber Pressure is lowering as a result of Containment Spray using Service Water.
- Pressure Suppression Pressure (PSP) limit has not been exceeded.

BOP:

**CT-2.0**

- Secures Drywell and Suppression Chamber Sprays using "B" RHR.
- **Aligns RHR Service Water to spray using N2-EOP-06, Attachment 5.**
  - Places RHS\*P1B in PTL
  - Close RHS\*MOV12B
  - **Open RHS\*MOV116**
  - **Open RHS\*MOV115**
- **Sprays Drywell and Suppression Pool using Service Water.**
  - **Verify RHS\*MOV24B closed**
  - **Verify RHS\*FV38B closed**
  - **Open RHS\*MOV33B to spray Suppression Chamber**
  - **Open RHS\*MOV15B and 25B to spray Drywell.**

SRO:

- Classify this event as an ALERT, EAL 3.1.1. by completing Category "A" JPM for this scenario.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

SRO Candidate Evaluator:

After simulator is placed in FREEZE, ask the SRO  
Candidate to classify the event.

SRO:

PO-7.0

- Classify this event as a ALERT 3.1.1

V. POST SCENARIO CRITIQUE (Not required for Annual and Initial Operating Exams.)

VI. REFERENCE EVENTS AND COMMITMENTS

A. Reference Events

1. None

B. Commitments

1. None

VII. LESSONS LEARNED

<b>Nine Mile Point 2</b>	<b>Scenario No. 2</b>	<b>Operating Test No. 1</b>	
<b>Examiners:</b>		<b>Candidates:</b> SRO: Upgrade 1,2,3 RO: Instant 1,2,3 BOP: RO 1, 2, Surrogate	
<b>Objectives:</b> Evaluate candidates ability to perform routine operating tasks using normal, abnormal and emergency procedures while ensuring compliance with Technical Specifications. The candidates will respond to the following events: <ol style="list-style-type: none"> <li>1. CRD pump trip</li> <li>2. Recirculation FCV fail to full open position</li> <li>3. RCIC steam leak in Reactor Building with a failure to isolate</li> <li>4. Control rods fail to fully insert on a valid scram signal.</li> </ol> This scenario will be classified as a SITE AREA EMERGENCY (EAL 4.1.1)			
<b>Initial Conditions:</b> <ol style="list-style-type: none"> <li>1. Reactor Startup in progress, currently at 50% reactor power and 80-100% rod line.</li> <li>2. N2-OP-8 Section E, step 4.0 is being used to start the third 4<sup>th</sup> Point Heater Drain pump and place it pumping forward.</li> </ol>			
<b>Turnover:</b> <ol style="list-style-type: none"> <li>1. Currently the Plant is at 50% reactor power and 80-100% rod line.</li> <li>2. Continue Plant startup (N2-OP-101D, Section E, step 1.10), and place the third 4<sup>th</sup> Point Heater Drain pump in service and start pumping forward per N2-OP-8, Section E, step 4.0.</li> </ol>			
Event No.	Malf. No.	Type	Event Description
1		N	(BOP/SRO) Start HDL Pump 3 for pumping forward per N2-OP-8.
2	RD12A	C	(RO) "A" CRD pump trip - Electrical fault
3		R	(RO) Raise Reactor Power to 70-75% using Reactor Recirculation FCVs.
4	RR49A	C	(RO/SRO) Recirculation FCV position indication failure causes FCV to open. (T.S. 3.4.1 Loop Flow Mismatch.) DER 2-2000-3775
5	Overrides		(SRO) MCC 302 Feeder Breaker to ICS*MOV128 trips open, (T.S. 3.6.1.3 Primary Containment Isolation Valve Inoperable).
6	RC12, RC11 RX01	C	(BOP/RO/SRO) RCIC Steam Leak with RCIC Failure to Isolate requiring a manual scram. Minor Fuel Failure (3% over 2 minutes following scram)
7	RD17A RD07	M	(RO/BOP/SRO) One Group of 12 Control Rods stuck at position 04 and power < 4%. Emergency Blowdown is required due to high Reactor Building temperatures.
8	AD08C	C	(BOP/SRO) ADS/SRV PSV 126 fails to open during Emergency Blowdown due to Loss of N <sub>2</sub> supply.

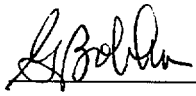
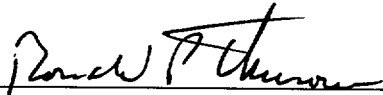

## NMP SIMULATOR SCENARIO

SCENARIO # 2

REV. 0

No. of Pages: 23

### CRD PUMP TRIP/RCS FCV FAILURE/RCIC STEAM LEAK WITH STUCK RODS

PREPARER	<u></u>	DATE	<u>4/26/02</u>
VALIDATED	<u>Ameler, Gerberich, Jones</u>	DATE	<u>5/28/02</u>
GEN SUPERVISOR OPS TRAINING	<u></u>	DATE	<u>6/15/02</u>
OPERATIONS MANAGER UNIT 2	<u></u>	DATE	<u>6/13/02</u>
CONFIGURATION CONTROL	_____	DATE	_____

### SCENARIO SUMMARY

Length: 60 minutes

The scenario begins at 50% power during power ascension. The crew will continue the plant startup using normal operating procedures. Heater Drain Pumps will be lined up to pump forward prior to raising power.

The operating Control Rod Drive Pump will trip due to an electrical fault. The crew will implement the required actions of N2-SOP-30 and start the standby Control Rod Drive Pump. The crew will commence power ascension by raising Recirculation Flow System (RCS). As power is being raised, the RCS Flow Control Valve will experience a failure of the valve position components (RVDT) which results in an uncontrolled ramping open of the FCV. The operator will implement the actions of N2-SOP-08 to stop the valve motion by tripping the Hydraulic Power Unit (HPU). The power excursion results in a small amount of fuel failure, which results in elevated radiation levels later in the scenario. Tech Spec entry is required due to the RCS Loop Flow mismatch.

When conditions are stable, the circuit breaker for RCIC Steam Line Isolation valve trips open. This results in Primary Containment Isolation Valve inoperability. The crew will investigate the breaker trip. A steam leak will develop on the RCIC steam piping resulting in a rise in Reactor Building temperatures. When the high temperature isolation setpoint is exceeded the crew will enter and execute N2-EOP-SC. A failure in the RCIC isolation circuit prevents manual and automatic isolation of the leaking steam line. The crew will be required to manually initiate a reactor scram, based on the rising Reactor Building temperature. A group of 12 control rods will fail to fully insert. The crew will continue attempts to isolate the steam line and monitor the rising temperatures and radiation levels in the Reactor Building. When more than one area temperature exceeds 212°F, the crew is required to perform an RPV Blowdown per N2-EOP-C2. The Blowdown is complicated by the post scram control rod positions and the inability to open all seven ADS valves.

Major Procedures: N2-SOP-08, N2-EOP-RPV, N2-EOP-SC, and N2-EOP-C2.

EAL Classification: SITE AREA EMERGENCY (EAL 4.1.1)

Termination Criteria: RPV RPV Blowdown is completed. RPV water level is maintained above -42 inches. Reactor Building temperatures are lowering.



## I. SIMULATOR SET UP

IC Number: IC-15 50% reactor power and 74% rod line.

### A. Presets/Function Key Assignments

#### 1. Malfunctions:

- |   |               |
|---|---------------|
| a. RD12A, CRD Pump (P1A) Trip.  | <b>F3</b>     |
| b. RR49A, FCV "A" RVDT Coupling Failure   | <b>F6</b>     |
| c. RC11, RCIC Isolation Failure   | <b>Queued</b> |
| d. RC12, RCIC Steam Leak in RB 215' Elevation, 25% ramp 10 minutes  | <b>F5</b>     |
| e. RD17A, Partial Insertion of a Bank of Rods under Scram (L1),<br>triggered by the Mode Switch in the "shutdown" position. | <b>ET04</b>   |
| f. RD071435, Control Rod 14-35 Stuck TD 30 sec  | <b>ET04</b>   |
| g. RD075031, Control Rod 50-31 Stuck TD 30 sec  | <b>ET04</b>   |
| h. RX01, Fuel Cladding Failure, 3% over 2 minutes,<br>triggered by the Mode Switch in the "shutdown" position.              | <b>ET04</b>   |
| g. AD08C, ADS Valve N <sub>2</sub> Supply severed (MSS*PSV126)  | <b>Queued</b> |

#### 2. Remotes:

- a. NONE

#### 3. Overrides:

- |   |               |
|---|---------------|
| a. MOV 121, Steam Supply Line Isolation (Outboard) – "OPEN"   | <b>Queued</b> |
| b. MOV 128, Steam Supply Line Isolation (Inboard) – "OPEN"  | <b>Queued</b> |
| c. MOV 128, Steam Supply Inboard Isolation INOP Amber – "ON"  | <b>F4</b>     |
| d. MOV 128, Steam Supply Line Isolation (Outboard) Green – "OFF"  | <b>F4</b>     |
| e. MOV 128, Steam Supply Line Isolation (Outboard) Red – "OFF"  | <b>F4</b>     |
| f. MOV 121, Steam Supply Line Isolation (Outboard) Green – "ON",<br>triggered when alarm 601157 RB High Temperature actuates. | <b>ET02</b>   |
| g. MOV 121, Not Fully OPEN, Amber – "ON",<br>triggered when alarm 601157 RB High Temperature actuates.                        | <b>ET02</b>   |

#### 4. Annunciators:

- |  |           |
|--|-----------|
| a. AN601305, RCIC System Inoperable – "ON"     | <b>F4</b> |
| b. AN601319, RCIC Valves Motor Overload – "ON" | <b>F4</b> |

C. Equipment Out of Service

1. NONE

D. Support Documentation

1. N2-OP-101D, Section E.1.10
2. N2-OP-08, Section E.4

E. Miscellaneous

1. Perform N2-OP-08 Section G.1.0 to place Heater Drain Pump "C" back on Recirc, but leave Pump "A" and "B" pumping forward.
2. Yellow Rod Line Sign posted

II.

**SHIFT TURNOVER INFORMATION**

SHIFT: ~ N ~ D DATE: \_\_\_\_\_

**PART I: To be performed by the oncoming Operator before assuming the shift.**

- Control Panel Walkdown (all panels) (SSS, ASSS, STA, CSO, CRE)

**PART II: To be reviewed by the oncoming Operator before assuming the shift.**

- Shift Supervisor Log (SSS, ASSS, STA)
- CSO Log (CSO)
- Lit Control Room Annunciators (SSS, ASSS, STA, CSO, CRE)
- Shift Turnover Checklist (ALL)
- LCO Status (SSS, ASSS, STA)
- Computer Alarm Summary (CSO)

Evolutions/General

Information/Equipment Status:

- Reactor Power = 50%
- Loadline = 74%

Plant start-up in progress per N2-OP-101D

Expected to be at 100% Power by the end of this shift.

Appropriate log entries have been made

**PART III: Remarks/Planned Evolutions:**

Continue Plant startup (N2-OP-101D, Section E, step 1.10), and place the third 4<sup>th</sup> Point Heater

Drain pump in service and start pumping forward per N2-OP-8, Section E.4.0.

THEN raise power to 65% with Recirc Flow

**PART IV: To be reviewed/accomplished shortly after assuming the shift:**

- Review new Clearances (SSS)
- Shift Crew Composition (SSS/ASSS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SSS		CRE	
ASSS		E	
STA		E	
CSO		Other	

### III. PERFORMANCE OBJECTIVES

#### A. Critical Tasks:

CT-1.0 Given conditions requiring an RPV Blowdown and all control rods not fully inserted the crew shall terminate and prevent all RPV injection sources (except CRD, RCIC and SLS) prior to opening ADS valves per N2-EOP-C2. *ok*

Tasks: SRO 344-952-06-03 Direct the actions required per EOP-C2, RPV Blowdown

CT-2.0 Given conditions requiring an RPV Blowdown and all control rods not fully inserted the crew shall open seven ADS valves to reduce reactor pressure below 153 psig per N2-EOP-C2.

Tasks: SRO 344-952-06-03 Direct the actions required per EOP-C2, RPV Blowdown

RO: 218-002-01-01 Manually initiate the ADS System and monitor while activated

CT-3.0 Given conditions requiring an RPV Blowdown and all control rods not fully inserted the crew shall restore and maintain RPV water level above - 42 inches by injecting with Feedwater when RPV pressure drops below 153 psig per N2-EOP-C5.

Tasks: SRO: 344-957-06-03 Direct the actions required per EOP-C5, Failure To Scram

#### B. Performance Objectives:

PO-1.0 Given the plant at 50% power during power ascension the crew will lineup the 4<sup>th</sup> Point Heater Drain Pumps to pump forward in accordance with N2-OP-8.

Tasks: RO: 243-901-01-01 Startup the Feedwater Heater & Extraction Steam System

PO-2.0 Given an electrical fault trip of the operating Control Rod Drive Pump the crew will start the standby pump in accordance with N2-SOP-30.

Tasks: SRO: 3449730403 Respond to a loss of CRD pumps during plant operations.

RO: 2000340401 Perform the actions required for a CRD System failure (Pump trip).

PO-3.0 Given a failure (unexpected opening) of a Recirc Flow Control Valve (RCS FCV) that results in Jet Pump flow mismatch the crew will stabilize reactor power and Recirc Flow in accordance with N2-SOP-08 and comply with Technical Specifications.

Tasks: SRO: 2029050403 Determine if flow mismatch exceeds Tech Spec requirements.

3410320303 Evaluate plant systems performance and coordinate appropriate actions per Tech Specs, as required.

3449280503 Direct the actions required for an unexplained core reactivity change.

RO: 2009140501 Perform the actions required for an unexplained core reactivity change.

2009340101 Respond to a failure of a Flow Control Valve Hydraulic Power Unit.

PO-4.0 Given a circuit breaker trip on the RCIC Steam Line Containment Isolation Valve (ICS\*MOV128), the crew will identify non compliance with Primary Containment Isolation Valve Tech Specs, investigate the cause of the breaker trip and initiate actions to restore Tech Spec compliance.

Tasks: SRO: 3410320303 Evaluate plant systems performance and coordinate appropriate actions per Tech Specs, as required.

PO-5.0 Given an unisolable steam leak in the Reactor Building the crew will enter attempt to isolate the leak and manually scram the reactor prior to any area exceeding 212°F per N2-EOP-SC.

Tasks: SRO: 344-946-06-03 Direct the actions required per EOP-SC  
Section Temperature/Radiation

RO: 201-013-01-01 Scram the reactor manually and take immediate actions.

PO-6.0 Given reactor power below 4% and a failure of one group of control rods to fully insert following a manual scram the crew will execute the actions of N2-EOP-C5.

Tasks: SRO: 344-957-06-03 Direct the actions required per EOP-C5,  
Failure To Scram

RO: 200-936-05-01 Manual control rod insertion IAW EOP-6,  
Att.14

PO-7.0 Given an unisolable steam leak in the Reactor Building resulting in more than one area above 212°F and all rods not fully inserted, the crew will terminate and prevent RPV injection and open 7 ADS valves to perform an RPV Blowdown per N2-EOP-C2.

Tasks: SRO: 344-952-06-03 Direct the actions required per EOP-C2,  
RPV Blowdown

RO: 218-002-01-01 Manually initiate the ADS System and monitor while activated

PO-8.0 Given the plant in a condition requiring emergency classification, the SRO shall properly classify the event per EPP-EPIP-02.

Tasks: SRO: 344-019-03-03 Classify Emergency Events Requiring  
Emergency Plan Implementation.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Instructor – check all queued malfunctions, overrides and annunciators have remained active.

Once given shift turnover information, allow no more than five (5) minutes for the crew to perform a walk down of panels.

Begin Scenario.

Event #1 BOP Normal Evolution

Role Play: As AO acknowledge the need to establish communication with the Control Room at Panel 204.

Wait about 2 minutes and report that you are stationed at Panel 204 and communications with the Control Room has been established.

CREW

- Complete panel walk down and tests annunciators.
- SRO conducts pre-shift brief.
- Crew assumes the shift.

SRO

PO-1.0

- Directs BOP to place the third 4<sup>th</sup> Point Heater Drain Pump in service per N2-OP-08, Section E.4.0
- Conducts pre-evolution brief.

BOP:

PO-1.0

- Perform N2-OP-08, Section E.4.0
  - Dispatches an AO to 2CES-IPNL204 to monitor 4<sup>th</sup> Point Heater Level AND maintain communication with the Control Room.
  - Set 2HDL-LV4C auto setpoint thumbwheel to 36%

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Booth Operator Instruction:

WHEN directed to raise 2HDL-LV24C setpoint to 67%, activate REMOTE:

***FW13C to 67%***

Event #2 RO Component Failure

Booth Operator Instruction:

When the last of the 4<sup>th</sup> Point Heater Drain Pumps is pumping forward, insert the following malfunction:

**RD12A, CRD Pump Trip (P1A) – F3**

*CRD\*P1A trips on instantaneous overcurrent.*

*Expected annunciators:*

*603308 CRD PUMP 1A/1B AUTO TRIP*

*603313 CRD PUMP 1A/1B MOTOR ELEC FAULT*

*603311 CRD CHARGING WTR PRESSURE LOW*

*603446 CRD PUMP DISCH HEADER PRESSURE  
LOW*

- Open 2HDL-LV4C using controller in manual to match auto setpoint.
- Verify 2HDL-FV35C recirc valve closes as pump flow rises.
- Places 2HDL-LV4C controller in auto.
- Directs AO at IPNL204 to raise setpoint for 2HDL-LV24C to 67%.
- Report all 4<sup>th</sup> Point Heater Drain Pumps are pumping forward.

RO:

- Identifies and reports the loss of RDS-P1A.

SRO:

PO-2.0

- Direct entry into N2-SOP-30, Section 4.2.



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

NOTE: Depending on the amount of time that no CRD pump is operating, Annunciator 603316, "Control Rod High Temperature" may be received at this time.

Role Play:

As AO wait about three minutes and report; "RDS-P1A breaker is tripped with an overcurrent flag." and/or "RDS-P1A motor is very hot to the touch."

Role Play:

IF Annunciator 603316, "Control Rod High Temperature" has actuated, as dispatched AO, wait about three minutes report that the highest temperature is on rod 18-43 and ask the RO if the alarm is clear.

RO:

PO-2.0

- Takes the actions of N2-SOP-30 to start the standby CRD Pump.
  - Determines that NO accumulators are inoperable.
  - Shift RDS-FC107 Flow Controller to MAN
  - Close FCV to 0%
  - Determines pump trip was NOT caused by low suction pressure by observing Electric Fault trip annunciator
  - Starts RDS -P1B
  - Opens FCV to establish 63 gpm
  - Shift RDS-FC107 to AUTO.
- Dispatches AO to RDS-P1A and/or the supply breaker.

RO:

- Recognizes and reports the Control Rod high temperature alarm.
- Dispatched an AO to monitor CRD temperatures.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

If it is **NOT**, report the temperature at 265°F.

If it **IS**, report the temperature at 239°F.

Event #3 RO Reactivity Manipulation

After RDS-P1B is running and the Control Rod high temperature alarm is investigated and cleared the CREW will continue the power ascension.

Event #4 RO/SRO Component Failure

Booth Operator Instruction:

AFTER RO Evaluator has determined power change was significant enough for evaluation AND the power ascension will continue, activate malfunction for the "A" Recirculation FCV by depressing F6 key:

**RR49A, FCV "A" RVDT coupling failure**  
**F6**

*After malfunction is entered, the next FCV demand signal will cause the FCV to open fully regardless of the demands that may be inserted by the RO.*

*Recirc Loop "A" flow and reactor power will rise. When the FCV hydraulics are isolated a jet pump loop flow mismatch is likely to be occurring.*

*If a "close" signal is inputted, the FCV will close to minimum position and a power reduction*

SRO:

- Directs power ascension to continue by raising power to 65% with recirc flow.

RO:

- Raises Recirc Flow using Loop Flow Controllers in Manual.

RO:

PO-3.0

- Recognize and respond to the "A" FCV failure, using N2-SOP-08, Section 3.3 and 4.4.
  - May attempt to stabilize flow by inputting a close signal to FCV "A".
  - Shutdown the HPU using P602 pushbutton
  - Close outboard valves to isolate hydraulic lines to the FCV.
- Report the "A" FCV failure to the SRO.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Role Play:

As I&C, wait about five minutes and report that the failure of the "A" FCV was due to an RVDT failure.

It is NOT intended for the crew to place the alternate position indication system in service for this scenario.

Event #5 SRO Component Failure/Tech Spec

Booth Operator Instruction:

When directed by the Lead Evaluator, insert the following overrides for ICS\*MOV128 breaker trip, by depressing F4 key:

**MOV\*128, Steam Supply Line Isolation**

**(Inboard) – Green – "OFF"**

**MOV\*128, Steam Supply Line Isolation**

**(Inboard) – Red – "OFF"**

**MOV\*128, Steam Supply Inboard Isolation –**

**INOP Amber – "ON"**

**AN601305, RCIC System Inoperable – "ON"**

**AN601319, RCIC Valve Motor Overload – "ON"**

**All on "F4"**

**MOV\*128 Steam Supply Line Isolation**

**(Inboard) – "OPEN"**

**Queued**

SRO:

PO-3.0

- Acknowledges RO report.
- If flow is lowered due to the FCV failure, enters N2-SOP-29.
- Enters T.S. 3.4.1 for Loop Flow Mismatch
- Notifies I&C to investigate the cause of the "A" FCV failure.

BOP:

- Recognizes and reports RCIC Inboard Isolation Valve failure.
- Dispatches AO to investigate breaker trip for MOV\*128.

SRO:

PO-4.0

- Acknowledges BOP report.
- Refers to T.S. 3.6.1.3, Primary Containment Isolation failure.
- Requests I&C assistance.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Role Play:

When dispatched by the BOP, ask for panel and breaker numbers.

Wait two (2) minutes and report breaker in the tripped condition. "No cause is apparent."

Event #6 Major Transient

Booth Operator Instruction:

After Tech Specs are reviewed by the SRO for MOV\*128 failure, insert the following malfunction:

**RC12, RCIC Steam Leak in Reactor Building,  
25% over 10 minute ramp F5**

*Expected Annunciators:*

*852254 Process Airborne Rad Monitor Activated*

*601157 – Reactor Building General Areas  
Temperature High is received and RCIC Steam  
Line should isolate as temperature rises above  
135°F. WCS system isolates.*

BOP:

- Check DRMS to determine RB HVR\*RE32A/B alarming
- Verify RB Ventilation System isolates and GTS starts.
- When directed, evacuates the reactor Building.

SRO:

- Enters EOP-SC when HVR\*RE32A/B exceed DRMS Red setpoint.
- Directs RB evacuated.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

WHEN 601157, Reactor Building General Areas  
Temperature High is received, Event Trigger ET02  
activates:

**MOV\*121, Steam Supply Line Isolation  
(Outboard) – Green – “ON”**

**MOV\*121, Not Fully Open – Amber – “ON”**

**ET02**

**MOV\*121 Steam Supply Line Isolation**

**(Outboard) – “OPEN”**

**Queued**

**(Prevents valve from closing)**

*MOV\*128 has no power and MOV\*121 appears to  
be closing.*

*However, RCIC steam line pressure stay up and  
temperatures in the area are still rising.*

*Thus, no isolation of the RCIC Steam Line has  
occurred.*

BOP:

- Recognize and reports increasing area temperatures and high airborne radiation levels in the Reactor Building.
- Confirms WCS and RHR isolation.
- Reports failure of RCIC to automatically isolate.
- Monitors back panels for trending area temperatures and radiation levels.
- Reports levels and trends to the SRO.

SRO:

- Directs BOP to manually isolate RCIC Steam Line.

BOP:

- Attempts to manually isolate the RCIC Steam Line by closing MOV\*121.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

First area temperature approaches 212 °F.

Event #7 Crew Component Failure  
Placing the Mode Switch in SHUTDOWN position  
will trigger the following malfunctions:  
**RD17A, Partial Insertion of a Bank of Rods  
under Scram (L1), final value of "04"**  
**RD071435, Control Rod 14-35 Stuck**  
**RD075031, Control Rod 50-31 Stuck**  
**RX01, Fuel Cladding failure, 3% over 2 minutes.**

ET04

RO:

- Verifies Reactor Building Ventilation isolated, GTS, HVR\*UC413B and all RB area unit coolers are running.

BOP:

- Recognizes and reports the failure of the manual isolation of the RCIC Steam Line. *EOP entry Condition recognized*

SRO:

PO-5.0

- Recognizes that a "primary system" is discharging into the Reactor Building. *Enters N2-EOP-SC/RR*
- Direct a manual scram and entry into N2-SOP-101C, before any area exceeds 212°F. *also N2-EOP-SC/RR SC-9*
- Enters N2-EOP-RPV.

RO:

PO-5.0

- Places the Mode Switch to SHUTDOWN.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Booth Operator Instruction:

IF MSIV Low Level isolations are directed to be bypassed **MANUALLY** enter the following REMOTE functions:

**MS06A, Defeat Level 1 Isolation, Defeated**  
**MS06B, Defeat Level 1 Isolation, Defeated**  
**MS06C, Defeat Level 1 Isolation, Defeated**  
**MS06D, Defeat Level 1 Isolation, Defeated**

- Enter*
- Recognizes and reports that **NOT** all control fully inserted
  - Reports reactor power, pressure and water level.

SRO:

- What is power level?  
How many rods stick out.  
Power about 4% PC-6.01  
Trip recovers*
- Enters N2-EOP-C5
    - Directs BOP to inhibit ADS and place HPCS in PTL
    - Directs RO to initiate RRCS per N2-EOP-6, Attachment 13
    - May direct MSIV Low Level isolations bypassed per N2-EOP-6, Attachment 10.
    - Assigns RPV water level and pressure bands.

BOP:

- Inhibits ADS using keylock switches.
- Places HPCS Pump switch in PTL.

RO:

- Manually initiates RRCS by arming and depressing RRCS pushbuttons.
- Reports control rods are still **NOT** fully inserted, but Reactor power is less than 4% and lowering.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

IF RO drives control rods per N2-EOP-6 Attachment 14, rods 14-35 and 50-31 are stuck at position 04. This ensures RPV Blowdown is performed in the all rods not full in leg of EOP-C2. IF rods are not driven until after the blowdown, delete RD07 14-35 and RD07 50-31, to allow all rods to be fully inserted.

Booth Operator Instruction:

WHEN directed by the Lead Evaluator to ensure 2<sup>nd</sup> area temperature reaches 212°F, activate malfunction by depressing F7 key:

**RC12, RCIC Steam Leak in Reactor Building**  
**30% F7**

*The second area temperature exceeds 212 °F.*

SRO:

- Directs RO to enter and perform N2-EOP-6, Attachment 14.

BOP:

- Reports second area temperature above 212°F to the SRO.

SRO:

PO-7.0

- Acknowledges BOP report of second area temperature above 212°F.
- Enters and executes N2-EOP-C2.
  - Directs RO and BOP to terminate and prevent all injection to the



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #8 BOP/SRO Component Failure

The queued malfunction:

**AD08C, ADS Valve N<sub>2</sub> supply severed. Queued**  
will prevent one of the ADS / SRV's from opening.

RPV, except CRD, RCIC and SLS.

- After RPV injection is terminated and prevented, directs BOP to open seven (7) ADS/SRV's.

RO: **CT-1.0**

- **Terminates and prevents injection to the RPV by closing Feedwater LV10s.**

BOP:

- Terminates and prevents injection from ECCS systems as follows:
  - Manually initiates Div 1 and 2 RHR logic
  - Overrides closed CSL and 3 RHR system Injection Valves
  - Places CSL and RHR "C" pumps in PTL.

BOP: **CT-2.0**

- **Attempts to open seven (7) ADS / SRV's by arming and depressing both divisions of ADS logic.**
- Recognizes and reports failed ADS / SRV to the SRO.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Reactor Pressure is lowering.  
Reactor Building Area Temperature level out and  
start to lower  
Suppression Pool temperature is rising but  
controlled.*

NOTE: If control rods are not yet being driven in,  
ensure EOP-6 Attachment 14 is continuing at this  
point in the scenario.

SRO:

- Acknowledges the failed ADS / SRV.
- Directs BOP to open a non-ADS / SRV so that the total open relief valves is seven (7).

BOP:

**CT-2.0**

- **Opens a non-ADS / SRV using keylock switch**
- Reports seven (7) SRVs are open.

RO:

**CT-3.0**

- Reports when RPV pressure drops below 153 psig.
- **When directed, commences injection by opening FWS- LV10s to restore and maintain level above -42 inches.**

SRO:

- When RPV pressure drops below 153 psig directs injection to restore and maintain level above -42 inches.

Booth Operator Instruction:

**After RPS is reset, delete malfunction RD17A to allow control rods to fully insert when a manual scram signal is inserted. Also verify stuck rod malfunctions RD071435 and RD075031, Control Rod Stuck are removed**

RO:

- Performs N2-EOP-6, Attachment 14, Alternate Control Rods Insertion, Sections 3.3 Additional Manual Scrams AND 3.5 Manual Control Rod Insertion (by driving rods) concurrently:
- Additional Manual Scrams
  - Directs ARI interlocks defeated by pulling ARI fuses.
  - Directs RPS defeated by installing RPS jumpers.
  - After ARI fuses are pulled and RPS jumpers are installed resets RPS logic and verifies eight white RPS solenoid lights are lit
  - Verify SDV Vent and Drain valves are open.
  - Waits until SDV is drained before inserting a manual scram using pushbuttons.

RO:

- Manual Control Rod Insertion:
  - Starts 2<sup>nd</sup> CRD Pump
  - Places CRD FCV in MAN and

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

**Termination Cue:**

- RPV RPV Blowdown is completed.
- Reactor Building temperatures are lowering.
- RPV water level is restored and maintained above -42 inches
- All rods are fully inserted

SRO Candidate Evaluator:

After simulator is placed in FREEZE, ask the SRO Candidate to classify the event.

fully opens valve.

- Fully closes Drive Pressure Control Valve to raise drive pressure.
- Bypasses RWM using key.
- Begins driving control rods.

SRO:

PO-8.0

- Classify this event as a SITE AREA EMERGENCY (EAL 4.1.1)

V. POST SCENARIO CRITIQUE (Not required for Annual and Initial Operating Exams.)

VI. REFERENCE EVENTS AND COMMITMENTS

A. Reference Events

1. None

B. Commitments

1. None

VII. LESSONS LEARNED

<b>Nine Mile Point 2</b>		<b>Scenario No. 3</b>		<b>Operating Test No. 1</b>	
<b>Examiners:</b>			<b>Candidates:</b> SRO: Instant 1,2,3 RO: RO1,2, Surrogate BOP: Upgrade 1,2,3		
<b>Objectives:</b> Evaluate candidates ability to perform routine operating tasks using normal, abnormal and emergency procedures while ensuring compliance with Technical Specifications. The candidates will respond to the following events:					
1. APRM #2 fails upscale 2. Standby Gas Train "B" Fan trip during testing. 3. Emergency Shutdown of Reactor Feedwater Pump "B". 4. Inadvertent RCIC Initiation. 5. Loss of Offsite Power Line 5 with Diesel Generator failure. 6. Small LOCA with concurrent Loss of Feedwater. This scenario will be classified as an ALERT (EAL 3.1.1)					
<b>Initial Conditions:</b>					
1. 100% Power Above 100% Rod Line (IC-20)					
<b>Turnover:</b>					
1. 100% Power Above 100% Rod Line 2. MFLCPR is 0.95 3. Unidentified Drywell leakage has risen from 0.1 gpm to higher value in the last 24 hours. 4. Perform Monthly 10 hour run surveillance for Standby Gas Train "B".					
Event No.	Malf. No.	Type	Event Description		
1		N	(BOP/SRO) Standby Gas Train "B" 10 hour run surveillance		
2	NM11B	I	(RO) APRM # 2 fails high requiring manual bypass		
3	PC04B	C	(BOP/SRO) Standby Gas Train "B" Fan trip during surveillance. T.S. 3.6.4.3, Seven day Required Action A.1		
4	Field Report	C	(BOP) Feedwater Pump "B" Emergency Shutdown due to excessive seal leakage.		
5		R	(RO) Emergency Power Reduction using Cram Rods and Recirc Flow for Feedwater Pump Shutdown		
6	RC10	C	(BOP) Inadvertent RCIC Injection to the Reactor.		
7	ED02A DG02A	C	(BOP/RO/SRO) Loss of Line 5, EDG-1 fails to auto start requiring a manual scram with concurrent small break LOCA.		
8	FW01B Overrides RR20	M	(RO/SRO) Loss of Feedwater due to degraded power. NPS-SWG-001 fails to transfer to Line 6 following Generator trip. Small LOCA occurs during scram.		
9	CS02	C	(BOP/SRO) HPCS fails to automatically start.		
10	CS05	C	(BOP) HPCS Pump trip after manually starting and injecting.		

1  
CT's

NMP SIMULATOR SCENARIO

SCENARIO # 3

REV. 0

No. of Pages: 28

EMERGENCY FEEDWATER PUMP SHUTDOWN/RCIC SPURIOUS INITIATION/LOSS  
OF HIGH PRESSURE FEED/SMALL LOCA

PREPARER

G. Bohlen

DATE

4/26/02

VALIDATED

Almeter, Jones, Gerbanich

DATE

5/31/02

GEN SUPERVISOR  
OPS TRAINING

Ronald P. Thurman

DATE

6/5/02

OPERATIONS  
MANAGER UNIT 2

DMW

DATE

6/3/02

CONFIGURATION  
CONTROL

NA EXAM SECURITY

DATE

NA

SCENARIO SUMMARY

Length: 75 minutes

The crew will perform a scheduled surveillance on Standby Gas Train "B". APRM #2 will fail upscale, requiring bypassing of the failed instrument. After APRM#2 is bypassed, the Standby Gas Fan 1B will trip. The SRO will enter Tech Specs for the inoperable GTS Train.

A report from the Turbine Building that Feedwater Pump "B" seal leak is worsening will prompt the crew to perform a Rapid Power Reduction by inserting Cram Rods and reducing Recirc Flow. Cram rod insertion is required because MFLCPR is above 0.93. Following the power reduction, the crew will perform an Emergency Shutdown of Feedwater Pump "B".

When conditions are stable, RCIC spuriously initiates. The crew will be required to stop RCIC injection within 4 minutes to prevent an automatic trip of the Main Turbine. For this scenario, if the crew does not stop RCIC injection in time, the RCIC turbine will automatically trip. This will ensure the remainder of the scenario runs as intended for candidate evaluations. When RCIC injection is stopped, a Loss of Offsite Line 5 occurs and the Division 1 Emergency Diesel Generator fails to start. This results in a required manual scram.

Following the manual scram, NPS-SWG001 fails to transfer to Line 6. A loss of all Feedwater pumps results due to the degraded electrical sources. The crew will be required to control reactor water level with the High Pressure Core Spray (CSH) Pump. The CSH Pump will require a manual start to maintain level above TAF, due to a failure of the pump to automatically start. A small LOCA occurs resulting in a loss of inventory and the need for Drywell Spray.

After High Pressure Core Spray (CSH) injection is initiated, the High Pressure Core Spray (CSH) Pump will trip on an electrical fault. This results in a loss of all High Pressure Injection. The Crew will determine that RPV level cannot be maintained above TAF and execute the Alternate Level Control steps of N2-EOP-RPV. The Crew will then restore and maintain level above TAF by performing an RPV Blowdown and injecting with a Low Pressure Injection source.

Major Procedures: N2-SOP-03, N2-SOP-101C, N2-SOP-06, N2-EOP-RPV, N2-EOP-PC,  
N2-EOP-C2

EAL Classification: ALERT EAL 3.1.1

Termination Criteria: RPV level restored and maintained above TAF with Low Pressure ECCS  
Systems and Primary Containment parameters being controlled by  
Containment Spray.



## I. SIMULATOR SET UP

A. IC Number: IC 20, 100% Reactor Power

### B. Presets/Function Key Assignments

#### 1. Malfunctions:

- |   |               |
|---|---------------|
| a. NM11B, APRM "B" Channel Failure Upscale  | <b>F3</b>     |
| b. RC10, RCIC Spurious Initiation TRA :30   | <b>F4</b>     |
| c. RC06, RCIC turbine trip TUA 3:50   | <b>F4</b>     |
| d. PC04B, Standby Gas Treatment Train 1B Fan Trip                                   | <b>F6</b>     |
| e. DG02A, Diesel Generator #1 Trip  | <b>F7</b>     |
| f. ED02A, Loss of offsite Line #5   | <b>F7</b>     |
| g. RR20, DBA LOCA, 8% over 7 minute ramp  |               |
| Triggered when the Mode Switch is placed in "SHUTDOWN"                              | <b>ET01</b>   |
| h. FW01B, "B" Condensate Pump Trip  |               |
| Triggered when the Mode Switch is placed in "SHUTDOWN"                              | <b>ET01</b>   |
| i. CS02, High Pressure Core Spray Auto Start Failure                                | <b>Queued</b> |
| j. CS05, High Pressure Core Spray Pump Trip TD 30 seconds                           | <b>ET03</b>   |
| Triggered when CSH*P1 Pump red light is ON, after control switch is placed in START |               |
| k. EG15A, No Transfer To Reserve Power SWG001                                       | <b>Queued</b> |

2. Remotes: none

3. Overrides: none

4. Annunciators: none

### C. Equipment Out of Service

none

### D. Support Documentation

N2-OSP-GTS-M001, Attachment 3, completed to step 7.3.1

### E. Miscellaneous

Post White "MFLCPR > 0.93" sign at P603

II.

**SHIFT TURNOVER INFORMATION**

SHIFT:      ~ N    ~ D    DATE: \_\_\_\_\_

**PART I:      To be performed by the oncoming Operator before assuming the shift.**

- Control Panel Walkdown (all panels)    (SSS, ASSS, STA, CSO, CRE)

**PART II:      To be reviewed by the oncoming Operator before assuming the shift.**

- Shift Supervisor Log (SSS, ASSS, STA)
- CSO Log (CSO)
- Lit Control Room Annunciators (SSS, ASSS, STA, CSO, CRE)
- Shift Turnover Checklist (ALL)
- LCO Status (SSS, ASSS, STA)
- Computer Alarm Summary (CSO)

Evolutions/General

Information/Equipment Status:

- Reactor Power =      100%
- Loadline =      >100%

MFLCPR is 0.95

Unidentified Drywell leakage has risen from 0.1 gpm to current reading in the last 24 hours.

**PART III:      Remarks/Planned Evolutions:**

Continue N2-OSP-GTS-M001, Attachment 3, GTS Filter Train 1B Functional Test (10 hour Run)

**PART IV:      To be reviewed/accomplished shortly after assuming the shift:**

- Review new Clearances (SSS)
- Shift Crew Composition (SSS/ASSS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SSS		CRE	
ASSS		E	
STA		E	
CSO		Other	

### III. PERFORMANCE OBJECTIVES

#### A. Critical Tasks:

CT-1.0 Given a loss of all Feedwater Pumps following a reactor scram and a failure of High Pressure Core Spray (CSH) to automatically start the crew will manually start CSH to maintain level above TAF (-18 inches).

Tasks: SRO 3410400303 Authorize actions related to Engineering Safety Features including starting, stopping and bypassing.

3449400603 Direct the actions required per EOP-RPV Section Level.

RO 2009080501 Perform the actions required for a complete loss of Feedwater.

2060050101 Manually initiate HPCS from the Control Room (PRA).

CT-2.0 Given a small reactor coolant leak into the Drywell the crew will initiate Drywell Spray and maintain Drywell Pressure below Pressure Suppression Pressure Limit, when Suppression Pool Pressure exceeds 10 psig per N2-EOP-PC.

Tasks: SRO 3449430603 Direct the actions required per EOP-PC Section Primary Containment Pressure.

RO 2050150101 Operate the Containment Spray System.

2009250501 Perform the actions required for a Loss of Coolant Accident (Small Leak) inside the Primary Containment.

CT-3.0 Given a loss of all high pressure injection, the crew will restore and maintain RPV water level above TAF (-18 inches) by performing an RPV Blowdown and injecting with at least one Low Pressure Injection system per the Alternate Level Control steps of N2-EOP-RPV.

Tasks: SRO 3449220503 Direct the actions for a loss of all Feedwater and HPCS.

RO 2009100501 Perform the actions required for a loss of all Feedwater and HPCS.

B. Performance Objectives:

PO-1.0 Given N2-OSP-GTS-M001 for routine performance, the crew will continue the surveillance test on Standby Gas Train "B" in accordance with applicable sections of N2-OSP-GTS-M001.

Tasks: SRO 3420240303 Authorize performance of surveillance tests on shift.

RO 2610030101 Place the Standby Gas Treatment System in service with suction from HVR from the Control Room.

PO-2.0 Given APRM #2 failing upscale during power operation the crew will identify the failed instrument, bypass APRM #2 per N2-OP-92 and ensure compliance with Technical Specifications.

Tasks: SRO 3449320503 Direct the actions required for a loss of flux indication (APRM/LPRM failure).

RO 2009040501 Perform the actions required for an APRM/LPRM failure.

PO-3.0 Given a report from the Turbine Building that Feedwater Pump "B" seal is degrading, the crew will perform a Rapid Power Reduction by inserting cram rods and reducing Recirc Flow per N2-SOP-101D, prior to performing an Emergency Shutdown of Feedwater Pump "B", per N2-SOP-06.

Tasks: SRO 3419140103 Direct reactor power changes (>10%) using Recirc Flow or Control Rods.

RO 2020020101 Adjust the Recirc loop flow using Loop Manual control.

PO-4.0 Given a RCIC system spurious initiation, the crew will take actions to terminate RCIC injection into the reactor vessel in accordance with 601347 annunciator response.

Tasks: RO 2179140101 Operate the RCIC system following an automatic initiation.

PO-5.0 Given a Loss of Line #5 and failure of Division I Emergency Diesel Generator (EDG) to start resulting in a loss of Service Water, the crew will implement the actions of N2-SOP-03, N2-SOP-11 and perform a manual reactor scram.

Tasks:	SRO	3449400503	Respond to a Loss of Offsite Power with the unit on line.
		3449180503	Direct the actions required for a Loss of Service Water per N2-SOP-11.
		3449300503	Direct the actions required for a Reactor Scram.
	RO	2000350501	Perform the actions required for a Loss of Offsite Power (PRA).
		2769090101	Perform actions for a loss of all Service Water Pumps.
		2769110401	Operate the Service Water System with a loss of one division of Offsite Power. (PRA)

PO-6.0 Given a reactor coolant leak into the Drywell the crew will control Primary Containment parameters by entering and executing N2-EOP-PC.

Tasks:	SRO	3449420603	Direct the actions required per EOP-PC Section Drywell Temperature.
		3449430603	Direct the actions required per EOP-PC Section Primary Containment Pressure.
	RO	2050150101	Operate the Containment Spray System.
		2009250501	Perform the actions required for a Loss of Coolant Accident (Small Leak) inside the Primary Containment.
		2229020401	Operate the Drywell Cooling System with a LOCA signal present.

2059450101 Perform the actions required for an  
automatic initiation of LPCI.

2090040101 Monitor the automatic operation of the  
LPCS system from the Control Room.

PO-7.0 Given the plant in a condition requiring emergency classification, the SRO  
shall properly classify the event per EPP-EPIP-02.

SRO: 3440190303 Classify Emergency Events Requiring  
Emergency Plan Implementation.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Instructor – check all queued malfunctions, overrides and annunciators have remained active.

Once given shift turnover information, allow no more than five (5) minutes for the crew to perform a walk down of panels.

Begin Scenario.

Event #1 BOP Normal Evolution

Role Play: As Turbine Building AO on Rounds, report that a small seal leak has developed on Feedwater Pump “B”. The water stream leaking from the seal is about the diameter of a pencil.

CREW

- Complete panel walk down and tests annunciators.
- SRO conducts pre-shift brief.
- Crew assumes the shift.

SRO

PO-1.0

- Directs BOP to perform the Standby Gas Treatment “B” System Functional Test, “B” Train, N2-OSP-GTS-M001, Attachment 3.
- Conducts pre-evolution brief.

BOP

PO-1.0

- Reviews N2-OSP-GTS-M001, Standby Gas Treatment System Functional Test, Attachment 3.
- Obtain SRO permission to perform the test.
- Establish communication between the Control Room and the GTS Filter Train 1B.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Role Play: As AO, report the following conditions exist locally;

2GTS\*CH1B heater "LOW AIR FLOW" green light *is energized* at Panel 30B.

Timer reading at Panel 102 – 3430 hrs.

Queue: NO additional sampling is required at this time.

Role Play: As AO, report the following conditions exist locally at Panel 30B:

2GTS\*CH1B Heater "ON" red indicating light *is energized*.

2GTS\*CH1B Heater "LOW AIRFLOW" green indicating light *is de-energized*.

2GTS\*CH1B Heater "OVERTEMPERATURE" green indicating light *is de-energized*.

- Request AO check:
  - 2GTS\*CH1B heater "LOW AIR FLOW" green light energized at Panel 30B.
  - Timed reading at Panel 102 in the south Auxiliary Bay.

BOP: PO-1.0

- Start 2GTS\*FLT1B
- Observe the following at P871:
  - SBGTS TRAIN B INITIATION red indicating light energized.
  - SBGTS FAN 2GTS\*FN1B red indicating light energized.
  - GTS\*MOV1B, INLET FROM RX BLDG VENTILATION, open.
  - GTS\*AOV2B, TRAIN B INLET VLV, open.
  - GTS\*AOV3B, FAN 1B DISCH ISOL LV, open.
- Request AO at Panel 30B check:
  - 2GTS\*CH1B Heater "ON" red indicating light energized.
  - 2GTS\*CH1B Heater "LOW AIRFLOW" green indicating light de-energized.
  - 2GTS\*CH1B Heater "OVERTEMPERATURE" green indicating light de-energized.



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #2 RO Instrument Failure

Booth Operator Instruction:

When SRO acknowledges GTS Train 1B is  
running, insert malfunction

**NM11B, APRM B Channel Failure upscale  
F3**

*Expected Annunciators:*

*603202 – APRM Trip System UPSCALE/INOP*

*603208 – APRM Trip System UPSCALE*

*603442 – Control Rod OUT BLOCK*

BOP:

- Notify SRO GTS Train 1B has been started per N2-OSP-GTS-M001.

RO

PO-2.0

- Reports and responds to alarms.
  - Determine APRM #2 has alarmed
  - Check other APRM Channels to verify no scram should have occurred.
- Check back panels for additional indications/information.
- Enter N2-OP-92, Neutron Monitoring, and bypass the affected APRM using Section H.2.0.
  - Verify no other APRM in bypass
  - Place APRM bypass joystick to APRM # 2 position.
  - Verify APRM # 2 bypass light on P603 is “lit”
  - Verify “BYP” is displayed in inverse video on APRM # 2 Chassis (P608)
  - Verify “blue” BYPASSED LED on 2/4 Module is lit (P608)

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #3 BOP/SRO Component Failure/Tech Spec  
Booth Operator Instruction:

When the SRO completes the crew update, activate  
malfunction, by depressing F6 key:

**PC04B, Standby Gas Train Fan 1B Trip F6**

*Annunciator 871125, SBGTS Fan 1B Auto Trip/Fail  
To Start*

- Reset the 2/4 Module per N2-OP-92,  
Section F.8.0
  - Depress “TRIP MEMORY  
RESET” pushbutton (P608)
  - Verify all red and yellow LED’s  
are extinguished.

SRO

PO-2.0

- Acknowledges RO report of “APRM  
and Rod Block” annunciators.
- Directs I&C be contacted to  
investigate and troubleshoot APRM #2
- Consults Technical Specifications to  
determine minimum required  
channels.
  - T.S. 3.3.1, Table 3.3.1-1
  - NO action required at this time

BOP:

PO-3.0

- Reports and responds to alarms.
  - Verify Fan 1B tripped
  - Verify GTS\* AOV2B and 3B  
are closed.

SRO:

- Refers to Tech Spec 3.6.4.3, Restore in  
Seven day Required Action A.1

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #4 BOP Component Failure

After GTS Tech Spec is reviewed:

Role Play:

As an AO call the Control Room and report that the "B" Feedwater Pump seal leak has gotten worse. Steam is starting to blow out from the seal. Report that you are leaving the area because it looks like the seal will start blowing more steam at any minute.

RO:

- Acknowledge the AO's report.
- Relay status of "B" Feedwater Pump seal to the SRO.

SRO:

- Acknowledges RO report.
- Directs RO to perform Rapid Power Reduction per N2-SOP-101D
- Directs BOP to perform an Emergency Shutdown of Feedwater Pump "B" per N2-SOP-06.
- Requests assistance from Maintenance.

Event #5 RO Reactivity Manipulation

RO:

- Enters N2-SOP-101D
  - Begins reduction in Reactor Power using Recirculation Flow Controls
  - Inserts 1<sup>st</sup> four Cram Rods before reducing power below 75%
- Lowers power to about 60% to 65%.

Role Play:

As the AO acknowledge that you are standing by in a safe location and that you will check out the "B" Feedwater pump once it is secured and the seal quits blowing steam.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Role Play:

As AO report Feedwater Pump "B" Aux Lube Oil pump control switch is in START and the pump is running.

Booth Operator Instruction:

When directed to remove Cond Demins from service, MANUALLY activate REMOTE  
**FW01A, Cond Demineralizer A, OFF**  
**FW01B, Cond Demineralizer B, OFF**  
**FW01C, Cond Demineralizer C, OFF**

Role Play:

As AO report three Cond Demins were removed from service. Five Demins are in service and conditions are satisfactory.

Event #6 BOP Component Failure

BOP:

- Performs Emergency Feedwater Pump Shutdown per N2-SOP-06, Step 4.5 after power is reduced.
  - Places FWS-P1B control switch to STOP
  - Verify Aux LO Pump started.
  - Confirm RPV level is controlled between 178 inches and 187 inches.
  - Places LV10B controller to Manual and closes LV10B
  - Closes FWS-MOV47B Disch Valve.
  - Dispatches AO to place Aux Lube Oil Pump control switch to start.
  - Dispatches AO to remove Condensate Demineralizers from service, as required for the reduced power level.

CREW:

Notifies Fire Dept and RP of steam leak from feed pump.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Booth Operator Instruction:

When conditions are stable and all notifications and crew updates are complete, activate the following malfunctions, using F4 key:

**RC10, RCIC Spurious Initiation (TRA 30 sec)**

**RC06, RCIC turbine trip (TUA 3:50) F4**

*Plant response:*

*RCIC initiates and injects.*

Booth Operator:

IF contacted, trip unit E51-N656E, high exhaust pressure is only unit in tripped condition.

*Four minutes after RCIC initiates, the turbine will trip to maintain the scenario on the planned path.*

CREW:

PO-4.0

- Identifies and reports RCIC is injecting
- Identifies that reactor vessel level is in normal band.

BOP

- Refers to 2CEC\*PNL601 for annunciator 601347.

SRO

Directs reset of RCIC logic or shutting of 2ICS\*MOV126 to stop injection.

BOP

- Secures RCIC injection as directed by the SRO and the annunciator response.
- Identifies and reports RCIC trip (if not manually tripped).

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #7 Major Transient

Booth Operator Instruction:

When RCIC injection has been terminated, insert the following remote/malfunctions using F7 key:

**ED02A, Loss of Offsite Line 5, True      F7**

**DG02A, Diesel Generator #1 Trip**

*Plant Response:*

*Emergency Bus 101 trips and remains de-energized.*

*Division I Service Water Pumps trip.*

*Division II Service Water Non Essential MOVs close, resulting in loss of Service Water.*

*Division I RHR and LPCS systems are lost.*

SRO

- Refers to Tech Spec 3.5.3, Verifies HPCS is Operable – Action A1  
Restore in 14 days - Action A2

BOP:

PO-5.0

- Determine 2ENS\*SWG101 has lost power, and Division I Diesel Generator has failed to start.
- Dispatches an AO to Division I Diesel Generator to investigate.
- Verify Service Water flow to RHR heat exchanger "B" by;
  - Verifying open 2SWP\*MOV90B, and
  - Throttle open 2SWP\*MOV33B until flow through the heat exchanger is > 3,000 gpm.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Role Play:

As AO acknowledge that you are on your way to Division I Diesel Generator.

Event #8 Component Failure

Booth Operator Instruction:

When Mode Switch is in SHUTDOWN, verify both malfunctions active from ET01:

**RR20, RR Loop Rupture – DBA LOCA at 8% ramped in over seven (7) minutes, and FW01B, Condensate Pump Trip P1B.**

BOP

- Verifying SWP Division II non-essentials are isolating by verifying the following valves are closing;
  - 2SWP\*MOV19B
  - 2SWP\*MOV93B
  - 2SWP\*MOV3B
- Throttle running Service Water Pump discharge valves to maintain pump flows < 10,000 gpm as required.

CREW:

PO-5.0

- Enter N2-SOP-03, Loss of AC Power, Section D.1.7.
- Enter N2-SOP-11, Loss of Service Water.

SRO:

PO-5.0

- Direct a manual scram be inserted per N2-SOP-03, Loss of AC Power, Section D.1.7, and
- Enter N2-SOP-11, Section 3.2.

BOP:

PO-5.0

- Enters N2-SOP-03, Section D.1.7
  - Trips Main Turbine
  - Trips Reactor Recirculation Pumps
  - Trips WCS Pumps

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Feedwater Pump "A" trips when NPS-SWG001 fails to transfer to offsite power.*

RO: PO-5.0

- Manually SCRAM the Reactor by placing the mode switch in "SHUTDOWN".
- Enters N2-SOP-101C
  - Reports RPV level, pressure, APRMs downscale and "all rods in".
- Reports loss of the Condensate Pump and the imminent loss of Feedwater.

SRO: PO-5.0

- Enters N2-EOP-RPV when level is below 159 inches.

*Drywell pressure begins to rise and is trending up toward 1.68 psig.*

RO:

- Reports loss of Feedwater.
- Monitors Reactor power, water level and pressure and takes action as directed.
- Reports Drywell pressure above 1.68 psig

*Drywell pressure exceeds 1.68 psig. Division II Low Pressure ECCS start. High Pressure Core Spray initiation signal is received, but CSH Pump fails to automatically start.*



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Containment pressure and temperature are still rising. Reactor Vessel water level is lowering faster.*

Event #9 BOP Component Failure

SRO: PO-6.0

- Enters N2-EOP-PC when Drywell Pressure exceeds 1.68 psig
- Directs Suppression Chamber Spray
- Directs Drywell Coolers restored.
- Directs RPV Water level restored above 159 inches with CSH Pump.

BOP CT-1.0

- Verifies Division II RHR initiation signal is received.
  - RHR Pump "B" and RHR Pump "C" sequence on.
- Verifies and reports CSH failure to start.
  - **When directed, manually starts CSH Pump and confirms injection.**
  - Coordinates RPV level control with the RO, by manually starting and stopping CSH Pump.

SRO:

- Acknowledges failure of CSH to automatically start.
- Directs manual start of CSH as required to maintain RPV level above 159 inches.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #10 BOP Component Failure

Thirty seconds after the CSH Pump has been manually started malfunction will activate:

**CS05, High Pressure Core Spray Pump Trip**

**ET03**

*CSH trips on an electrical fault and cannot be restarted. RPV level is lowering.*

*When water level drops below 17.8 inches (Level 1), ADS Timers will initiate, MSIVs close.*

BOP:

- Reports CSH trip on electrical fault and will not restart.
- Dispatched AO to investigate CSH.

SRO:

- Acknowledges CSH failure.
- Determines RPV water level cannot be maintained above -18 inches.
- Directs;
  - ADS to be inhibited
  - Maximizing injection using all preferred injection systems. (CRD is the only one still available for high pressure injection.)
  - Use of "Alternate Injection Systems" as needed.
    - SLS Boron Injection from Boron Tank or Test Tank
  - Directs either RHR Loop "B" lined up for injection per EOP-6, Attachment 30. OR RHR "B" in the LPCI mode.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*RPV water level drops to -18 inches (TAF)*

*Suppression Chamber Pressure exceeds 10 psig.*

Booth Operator Instruction:

When directed to defeat Group 5 Isolation per EOP-6 Attachment 30, **MANUALLY INSERT MALFUNCTION RH08, Group 5 Isolation Failure**

Note: Crew may chose to line up RHR "B" for injection per N2-EOP-6 Att. 30. OR RHR "B" in the LPCI mode.

SRO:

Directs:

- At least two (2) low pressure subsystem are aligned for injection.
  - RHR "C"
  - RHR "B"
- Prior to RPV level lowering to -42 inches, enter N2-EOP-C2, RPV Blowdown and perform concurrently.
- Specify new RPV level bands as necessary.

BOP:

- Inhibits ADS using keylock switches.
- If directed, initiates SLS injection

BOP:

- If directed Performs EOP-6 Attachment 30
  - Closes SC Spray Valve RHS\*MOV33B, if open.
  - Defeats Group 5 Isolation
  - Waits for RPV Pressure to drop below 350 psig

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Suppression Chamber Pressure approaches PSP  
EOP-PC Fig L (about 17 psig at 200 foot Pool  
water level).*

- If directed, initiates SLS injection  
either from Boron Tank or Test Tank

BOP: CT-3.0

- **Open seven (7) ADS/SRV's by  
arming and depressing both division  
ADS Manual Initiation pushbuttons  
at P601.**
- When RPV pressure drops below 350  
psig, verifies injection (if using EOP-6  
Attachment 30)
- **Restore and maintain RPV level in  
specified band (above -18 inches)  
using RHR "B" and/or RHR "C".**

SRO:

- Direct Drywell sprays **WHEN**  
Suppression Chamber Pressure  
exceeds 10 psig using RHR Loop "B"  
only after adequate core cooling  
assured by maintaining water level  
above TAF.
  - Directs Drywell coolers tripped
  - Directs RCS Pumps tripped
  - Verifies Drywell pressure and  
temperature are within Fig K of  
EOP-PC.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

**Termination Cue:**

- RPV level restored and controlled above -18 inches TAF.
- Drywell Sprays are in progress (or were previously in service and secured to establish injection).

SRO Candidate Evaluator:

After simulator is placed in FREEZE, ask the SRO Candidate to classify the event.

SRO

- IF Pressure Suppression Pressure (PSP) is exceeded, recognize RPV Blowdown per EOP-C2 is required.

RO:

- When directed, verifies RCS Pumps have tripped and Drywell Unit Coolers are tripped prior to initiating DW Sprays

BOP:

PO-6.0

- Initiates Suppression Chamber and Drywell Sprays as required.

SRO:

PO-7.0

Classify this event as an "Alert", EAL 3.1.1.

V. POST SCENARIO CRITIQUE (Not required for Annual and Initial Operating Exams.)

VI. REFERENCE EVENTS AND COMMITMENTS

A. Reference Events

1. None

B. Commitments

1. None

VII. LESSONS LEARNED

*SPARE**NOT USED*

<b>Nine Mile Point 2</b>		<b>Scenario No. 4</b> <b>Alternate Scenario</b>		<b>Operating Test No. 1</b>
<b>Examiners:</b>			<b>Candidates:</b>	
<p><b>Objectives:</b> Evaluate candidates ability to perform routine operating tasks using normal, abnormal and emergency procedures while ensuring compliance with Technical Specifications. The candidates will respond to the following events:</p> <ol style="list-style-type: none"> <li>1. Service Water pump trip</li> <li>2. Reactor feedwater flow transmitter failure</li> <li>3. Lowering Main Condenser vacuum due to air in-leakage</li> <li>5. Control rods fail to fully insert on a valid scram signal</li> <li>6. RHR heat exchanger Service Water MOV failure.</li> </ol> <p>This scenario will be classified as a Site Area Emergency. (EAL 2.2.2)</p>				
<p><b>Initial Conditions:</b></p> <ol style="list-style-type: none"> <li>1. Plant is operating at 100% power and 100% rod line. (IC-20)</li> <li>2. Standby Liquid Control Pump SLS*P1A is out of service to repair a leaky pump seal. (Day One of Seven day LCO on T.S. 3.1.7, Required Action A.)</li> <li>3. Clearance has been issued on SLS*P1A.</li> </ol>				
<p><b>Turnover:</b></p> <ol style="list-style-type: none"> <li>1. Plant is at 100% reactor power and 100% rod line.</li> <li>2. Required evolutions during this shift - Start Service Water pump SWP*P1E for normal equipment rotation and shutdown SWP*P1C per N2-OP-11.</li> <li>3. SLS*P1A is out of service to repair a leaky pump seal. SLS is to be returned to service on the next shift. Day One of Seven day LCO on T.S. 3.1.7, Required Action A.</li> </ol>				
Event No.	Malf. No.	Type	Event Description	
1		N	(BOP) Swap operating Service Water pumps. (N2-OP-11).	
2	FW34B	I	(RO) Feedwater Flow Transmitter "B" fails intermittently downscale, requires taking Manual control.	
3		N	(RO) Transfer Feedwater Level Control System to Automatic.	
4	MC01	C	(BOP) Lowering of Condenser Vacuum	
5		R	(RO) Reduce Reactor Power to about 75% and stabilize.	
6	CW01E	C	(BOP/SRO) Trip of newly started Service Water Pump. (T.S. 3.7.1.E/ Less than the required pumps running)	
7	RD17Z	M	(RO/SRO) ATWS Hydraulic Lock of Control Rods at Position 08 (18-20% power).	
8	RP08A & B	C	(BOP) RRCS Timer Failure requires manual boron injection.	
9	Overrides	C	(BOP) Service Water from RHR Heat exchanger valve fails to open for Suppression Pool Cooling.	

## NMP SIMULATOR SCENARIO

SCENARIO # 4

REV. 0

No. of Pages: 25

### SERVICE WATER PUMP TRIP/FEEDWATER FLOW TRANSMITTER FAILURE/LOSS OF VACUUM/LOW POWER ATWS WITH MSIV CLOSURE

PREPARER	<u>G. Bohler</u>	DATE	<u>4/16/02</u>
VALIDATED	<u>Almeter, Gerbondy, Jones (Operations)</u>	DATE	<u>5/28/02</u>
GEN SUPERVISOR OPS TRAINING	<u>Ronald P. Thurman</u>	DATE	<u>6/15/02</u>
OPERATIONS MANAGER UNIT 2	<u>DAN</u>	DATE	<u>6/3/02</u>
CONFIGURATION CONTROL	<u>NA EXAM SECURITY</u>	DATE	<u>NA</u>

#### SCENARIO SUMMARY

Length: 90 minutes

The scenario begins at rated power and Standby Liquid Control Pump "A" out of service. The crew will swap operating Service Water Pumps (SWP). When SWP\*P1E is started, Feedwater flow transmitter "B" begins to intermittently fail, due to an air bound transmitter. The crew will respond by taking manual control of the Feedwater Level Control System (FWLC) and stabilizing water level in the normal operating band, per N2-SOP-06. While continuing with the SWP pump swap, the crew will dispatch assistance to determine the cause of the FWLC malfunction. After receiving a report from the field that the transmitter has been repaired, the crew will place FWLC back to automatic control. When FWLC is returned to automatic, an upscale failure of the Recirc Flow signal to APRM#2 will fail upscale, resulting in a control rod block. The crew will bypass APRM#2.

After FWLC is returned to automatic, a small increase in Condenser air in-leakage occurs and Condenser vacuum slowly degrades. The crew will perform a power reduction to stabilize vacuum per N2-SOP-09. The reduction in power will stabilize condenser vacuum. While plant conditions are stable, the recently started SWP pump will trip, requiring Tech Spec entry. After starting an additional SWP pump to restore Tech Spec compliance, vacuum will again begin to lower and the crew will initiate a manual scram, prior to the automatic turbine low vacuum trip. Control rod pattern after the scram will result in reactor power remaining about 20%. The crew will enter and execute the Failure To Scram, N2-EOP-C5.

Condenser vacuum will continue to degrade, resulting in an automatic closure of the MSIVs. The crew will then control reactor pressure using the Relief Valves and start RHR in Suppression Pool Cooling, to control the heat addition into the Primary Containment. The Service Water Valve from the RHR Heat Exchanger will fail to open causing the crew to use the other available RHR loop for Suppression Pool Cooling. The crew will be required to manually inject boron and insert control rods to limit the Suppression Pool temperature rise.



## NMP SIMULATOR SCENARIO

**SCENARIO # 4**

**REV. 0**

**No. of Pages: 21**

### SERVICE WATER PUMP TRIP/FEEDWATER FLOW TRANSMITTER FAILURE/LOSS OF VACUUM/LOW POWER ATWS WITH MSIV CLOSURE

PREPARER	_____	DATE	_____
VALIDATED	_____	DATE	_____
GEN SUPERVISOR OPS TRAINING	_____	DATE	_____
OPERATIONS MANAGER UNIT 2	_____	DATE	_____
CONFIGURATION CONTROL	_____	DATE	_____

#### SCENARIO SUMMARY

Length: 90 minutes

The scenario begins at rated power and Standby Liquid Control Pump "A" out of service. The crew will swap operating Service Water Pumps (SWP). When SWP\*P1E is started, Feedwater flow transmitter "B" begins to intermittently fail, due to an air bound transmitter. The crew will respond by taking manual control of the Feedwater Level Control System (FWLC) and stabilizing water level in the normal operating band, per N2-SOP-06. While continuing with the SWP pump swap, the crew will dispatch assistance to determine the cause of the FWLC malfunction. After receiving a report from the field that the transmitter has been repaired, the crew will place FWLC back to automatic control.

After FWLC is returned to automatic, a small increase in Condenser air in-leakage occurs and Condenser vacuum slowly degrades. The crew will perform a power reduction to stabilize vacuum per N2-SOP-09. The reduction in power will stabilize condenser vacuum. While plant conditions are stable, the recently started SWP pump will trip, requiring Tech Spec entry. After starting an additional SWP pump to restore Tech Spec compliance, vacuum will again begin to lower and the crew will initiate a manual scram, prior to the automatic turbine low vacuum trip. Control rod pattern after the scram will result in reactor power remaining about 20%. The crew will enter and execute the Failure To Scram, N2-EOP-C5.

Condenser vacuum will continue to degrade, resulting in an automatic closure of the MSIVs. The crew will then control reactor pressure using the Relief Valves and start RHR in Suppression Pool Cooling, to control the heat addition into the Primary Containment. The Service Water Valve from the RHR Heat Exchanger will fail to open causing the crew to use the other available RHR loop for Suppression Pool Cooling. The crew will be required to manually inject boron and insert control rods to limit the Suppression Pool temperature rise.

Major Procedures: N2-SOP-06, N2-SOP-09, N2-EOP-C5, N2-EOP-6 Attachment 14.

EAL Classification: SITE AREA EMERGENCY EAL 2.2.2

Termination Criteria: Suppression Pool Cooling in service and all Control Rod Insertion are fully inserted per N2-EOP-6 Attachment 14.

## I. SIMULATOR SET UP

IC Number: IC-20 (100% power and > 100% rod line)

### A. Presets/Function Key Assignments

#### 1. Malfunctions:

- |   |               |
|---|---------------|
| a. RD17Z, RD 17 for all Banks, All at position "08".  | <b>Queued</b> |
| b. RP08A, RRCS 98 second Timer Failure (Division I)   | <b>Queued</b> |
| c. RP08B, RRCS 98 second Timer Failure (Division II)  | <b>Queued</b> |
| d. SL02A, SLS-VEX3A Fails To Fire   | <b>Queued</b> |
| e. SL03A, SLC Pump Suction MOV1A Fails To Open  | <b>Queued</b> |
| f. FW34B, Feedwater Loop Flow Transmitter Output fails to ZERO (B),<br>(This event is cyclic and occurs six (6) times once started. | <b>F4</b>     |
| g. CW01E, Service Water Pump Trip (P1E), TRIP   | <b>F3</b>     |
| h. MC01, Main Condenser Air Inleakage, 3% over 3 minutes.   | <b>F5</b>     |
| g. MC01, Main Condenser Air Inleakage, reduced to 1%.   | <b>F6</b>     |
| h. MC01, Main Condenser Air Inleakage, raised to 25% over 5 minutes.  | <b>F7</b>     |
| i. MC01, Main Condenser Air Inleakage, raised to 100%,<br>triggered when the Mode Switch is placed in "shutdown".                   | <b>ET01</b>   |
| j. RP14A, RRCS/ARI Failure/Defeated (Div I)   | <b>F10</b>    |
| k. RP14B, RRCS/ARI Failure/Defeated (Div II)  | <b>F10</b>    |
| l. RP02, RPS Failure To Scram-Automatic   | <b>F10</b>    |

#### 2. Remotes:

- a. NONE

#### 3. Overrides:

- |  |               |
|--|---------------|
| a. Service Water Discharge MOV33A, Heat Exchanger (A) – "closed"   | <b>F8</b>     |
| b. Service Water Discharge MOV33B, Heat Exchanger (B) – "closed"   | <b>F9</b>     |
| c. P601 Lamp, Standby Liquid Control Pump "A", Green light OFF     | <b>Queued</b> |
| d. P601 Lamp, SLC Storage Tank Outlet MOV1A Close, Green light OFF | <b>Queued</b> |
| e. P601 Lamp, Squib Vlv "A" Ready, White light OFF                 | <b>Queued</b> |
| f. P601 Lamp, SLC Pump 1A Inop, Amber light ON                     | <b>Queued</b> |
| g. P601 Lamp, SLC Squib Valve VEX3A Inop, Amber light ON           | <b>Queued</b> |

- 4. Annunciators:
  - a. NONE
- C. Equipment Out of Service
  - 1. SLS System "A" out of service
    - a. SLS\*P1A Pump Keylock Control Switch hang Red Clearance.
    - b. SLS\*MOV1A hang Red Clearance
    - c. Depress Div 1 SLS Manually Out of Service pushbutton
- D. Support Documentation
  - 1. None
- E. Miscellaneous
  - 1. ET01 = Mode Switch in the "shutdown" position.

II.

**SHIFT TURNOVER INFORMATION**

SHIFT:        ~ N    ~ D    DATE: \_\_\_\_\_

**PART I:        To be performed by the oncoming Operator before assuming the shift.**

- Control Panel Walkdown (all panels)    (SSS, ASSS, STA, CSO, CRE)

**PART II:        To be reviewed by the oncoming Operator before assuming the shift.**

- Shift Supervisor Log (SSS, ASSS, STA)
- CSO Log (CSO)
- Lit Control Room Annunciators (SSS, ASSS, STA, CSO, CRE)
- Shift Turnover Checklist (ALL)
- LCO Status (SSS, ASSS, STA)
- Computer Alarm Summary (CSO)

Evolutions/General

Information/Equipment Status:

- Reactor Power =        100%
- Loadline =        > 100%

SLS-P1A out of service to repair leaky pump seal, Day 1 of 7 day LCO on T.S. 3.1.7 Required Action A. Expected Return to service on the next shift

Service Water Pump SWP\*P1E is being started for normal equipment rotation. Pump is filled, vented and ready to be started.

**PART III:        Remarks/Planned Evolutions:**

Start SWP\*P1E then shutdown SWP\*P1C per N2-OP-11. SWP\*P1E is being started normal equipment rotation. Leave this pump running after being started.

**PART IV:        To be reviewed/accomplished shortly after assuming the shift:**

- Review new Clearances (SSS)
- Shift Crew Composition (SSS/ASSS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SSS		CRE	
ASSS		E	
STA		E	
CSO		Other	

### III. PERFORMANCE OBJECTIVES

#### A. Critical Tasks:

- CT-1.0 Given a failure to scram transient with continued power generation, the crew will inhibit ADS to prevent automatic ADS activation.
- CT-2.0 Given a failure to scram transient with power generation and RPV level above 100 inches, the crew will terminate and prevent injection (except Boron, CRD, RCIC) and ultimately control RPV level between MSCWL, -42 (Fig Z, -73 @ 800 psig) and 100 inches.
- CT-3.0 Given a failure to scram transient with continued power generation and SRVs being used for pressure control, the crew will utilize manual control of RPV pressure, suppression pool cooling, standby liquid control injection and control rod insertion to prevent exceeding HCTL (Fig M).

#### B. Performance Objectives:

- PO-1.0 Given direction to swap operating Service Water Pumps, the crew will start SWP\*P1E and shutdown SWP\*P1C per N2-OP-11.
- PO-2.0 Given a Feedwater Flow transmitter failure the crew shall take manual control of the Feedwater Level Control System and stabilize RPV water level between 178 inches and 187 inches per N2-SOP-06.
- PO-3.0 Given Main Condenser air in-leakage resulting in a lowering condenser vacuum the crew shall perform a Rapid Power Reduction to stabilize vacuum per N2-SOP-09 and N2-SOP-101D.
- PO-4.0 Given a trip of an operating Service Water Pump the crew will enter Tech Specs and restore Service Water configuration to comply with Tech Specs.
- PO-5.0 Given Main Condenser air in-leakage resulting in a lowering condenser vacuum the crew shall perform a manual reactor scram prior to the automatic turbine trip setpoint.

- PO-6.0     Given a failure to scram transient with power above 4% the crew shall manually inject boron before Suppression Pool temperature exceeds 110°F per N2-EOP-C5
- PO-7.0     Given a failure to scram transient with power above 4% the crew shall operate Suppression Pool Cooling systems to prevent exceeding the Heat Capacity Temperature Limit (HCTL) per N2-EOP-PC
- PO-8.0     Given a failure to scram transient with power above 4% the crew shall insert control rods by manually driving control rods and initiating additional manual scrams to prevent exceeding the Heat Capacity Temperature Limit (HCTL) per N2-EOP-6 Attachment 14.
- PO-9.0     Given the plant in a condition requiring emergency classification, the SRO shall properly classify the event per EPP-EPIP-02.

IV. INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Instructor – check all queued malfunctions, overrides and annunciators have remained active.

Once given shift turnover information, allow no more than five (5) minutes for the crew to perform a walk down of panels.

Begin Scenario.

Event #1 BOP Normal Evolution

Role Play: As AO, wait three minutes and report that Service Water Pump P1E prestart checks are complete.

CREW

- Complete panel walk down and tests annunciators.
- SRO conducts pre-shift brief.
- Crew assumes the shift.

SRO

- Directs the BOP to start Service Water Pump 1E and secure Service Water Pump 1C per N2-OP-11.
- Conducts a pre-evolution brief.

BOP:

PO-1.0

- Reviews N2-OP-11, Section E.2.
  - Verifies Precautions and Limitations of D.14 are met.
  - Dispatches AO to perform prestart check of P1E.
- Starts Service Water Pump, P1E and secures Service Water Pump, P1C.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #2 RO Instrument Failure

Booth Operator Instruction:

When the Service Water Pump SWP\*P1E is started,  
insert the following malfunction:

**FW34B, Feedwater Loop Flow Transmitter  
Output Fails to Zero (B) F4**

**NOTE:** This malfunction will activate and deactivate six times over about a one minute span. This is being done to ensure confirmatory recognition of the problem that exists and to ensure a high level alarm is received without causing a plant trip.

*603139, Reactor Water Level High/Low actuates.  
Reactor Water Level will rise each time the  
transmitter fails low.*

*No automatic action will occur because level will  
not exceed 202.8 inches and the failure is not long  
enough in duration.*

Role Play: Inform SRO that time compression is being used.

As I&C report that the "B" Feedflow transmitter was air-bound and has been vented and recommend FWLC placed back in automatic control. Report Work Order directs performing N2-OP-3, F.8.4.8 thru F.8.4.13 to return FWLC to AUTO

RO

PO-2.0

- Recognize and reports transmitter problem to the SRO.
- Enters and performs appropriate actions of N2-SOP-06, Section 4.2.
  - Place FWLC Master Level Controller to Manual
  - Operates FWLC to stabilize RPV level between 178 inches and 187 inches.
  - Reports FWLC in Manual.

SRO

- Acknowledges RO report.
- Directs entry into N2-SOP-06.
- Requests assistance from I&C.

SRO

- Direct RO to place FWLC in automatic control.
- Perform pre-evolution brief.



INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

Event #3 RO Normal Evolution

*FWLC will go into automatic operation and  
Reactor Water level will remain relatively  
unchanged.*

Role Play: When voltage differential is checked,  
report that differential is +4 mVDC.

Event #4 BOP Component Failure

Booth Operator Instruction:

When APRM#2 is bypassed, activate malfunction:

**MC01, Main Condenser Air Inleakage, 3%  
ramped over 3 minutes.**

**F5**

RO

- Enters and performs steps of N2-OP-03, Section F.8.4.8 through 13.
  - At CEC-PNL612, Bay A; Checks voltage differential (using portable voltmeter) between AUTO and MAN.
  - Adjust Master Controller HIC1600 setpoint thumbwheel until level needle is in the green band.
  - Depress Master Controller HIC1600 AUTO (A) pushbutton and verify green light is on.
  - Verify RPV level is stable.
  - Adjust Master Controller HIC1600 setpoint thumbwheel, if necessary approx. 183 inches.
  - Report FWLC is in automatic.

BOP

- Recognizes and reports higher than normal off-gas flowrates and a lowering Condenser vacuum.

SRO

PO-3.0

- Acknowledges BOP report.
- Directs entry into N2-SOP-09.
- Directs RO to reduce Reactor Power using N2-SOP-101D to stabilize vacuum.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Annunciator 851306 Offgas Trouble actuates*  
*Off-Gas flowrate rises.*  
*Condenser vacuum lowers.*

Event #5 RO Reactivity Manipulation

Booth Operator Instruction:

When Reactor Power has started to lower, insert /  
change the following malfunction:

MC01, Main Condenser Air Inleakage, final  
value 1%.

F6

*Reactor Power lowers.*  
*Main Condenser vacuum appears to be stabilizing.*

Event #6 BOP/SRO Component Failure/Tech Spec  
Role Play: As AO in SWP Pump Bay, report to the  
Control Room that SWP\*P1E motor feels  
extremely hot to the touch and is making an arcing  
noise.

Booth Operator Instruction:

When Vacuum has stabilized, notifications are  
being made by the SRO and the report from the

RO

PO-3.0

- Lowers Reactor Power using Reactor Recirculation flow.
- Inserts CRAM Rods as directed.

BOP

- Recognizes and reports that Main Condenser vacuum appears to be stabilizing with the power reduction.

SRO

- Acknowledges BOP report.
- Directs a hold on the power reduction to observe vacuum trend.
- Notifies Plant Management of power reduction.

BOP

PO-4.0

- Recognizes and reports condition of the SWP\*P1E tripped to the SRO.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

SWP Pump Bay is made, insert the following malfunction by depressing F3 key:

**CW01E, Service Water Pump Trip (P1E),  
Trip F3**

*Expected Associated Annunciators:*

*601114, Service Water Pump 1A/1C/1E Motor /  
Feeder Electrical Fault.*

Role Play: As the AO, wait three minutes and report that Service Water Pump P1E, 86-lockout relay is tripped.

Booth Operator Instruction:

When power level is stable and notifications are made of entry into SWP Tech Spec, activate malfunction:

**MC01, Main Condenser Air Inleakage, final  
value 25% over 5 minutes. F7**

*Off-Gas flowrate rises.*

*Condenser vacuum lowers.*

- Performs actions required by N2-ARP-01, 601114.
- Maintains operating SWP Pump flows below 10,000 gpm by throttling pump discharge MOV74s.
- Starts an additional Service Water Pump, as directed by SRO.
- Dispatches AO to investigate the cause of P1E trip.

SRO

PO-4.0

- Request assistance from Electrical Maintenance.
- Refer to T.S. 3.7.1 Condition E, Required Action E.1, restore to four operating SWP pumps within 72 hours.
- Directs start of another SWP pump.
- Notifies Plant Management

BOP

- Recognizes and reports off-gas flowrates rising again and that Condenser vacuum is lowering.

SRO

- Acknowledges BOP report.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Expected Associated Annunciators:*

*851358, Turbine Condenser A/B/C Vacuum Low.*

*851306, Off Gas System Trouble.*

- Directs re-entry into N2-SOP-09.
- Directs RO to reduce Reactor Power using N2-SOP-101D.

RO

- Lowers Reactor Power using Reactor Recirculation flow.
- Inserts CRAM Rods as directed.

BOP

- Reports Main Condenser vacuum is continuing to lower and is approaching the Main Turbine trip setpoint.

*Reactor Power is lowering and Main Condenser vacuum continues to get worse.*

*Main Condenser vacuum is approaching the Main Turbine trip setpoint.*

SRO

PO-5.0

- Acknowledges BOP report.
- Directs the RO to enter N2-SOP-101C and manually SCRAM the Reactor.

Event #7 Major Transient

RO

PO-5.0

- Enters and executes N2-SOP-101C.
- Places the Mode Switch to "shutdown".
  - Recognizes and reports that **NOT** all control fully inserted
  - Reports power, level and RPV pressure.

Booth Operator Instruction:

When the Mode Switch is placed in the "shutdown" position verify the following malfunction is triggered:

**MC01, Main Condenser Air Inleakage,**

**final value 100%**

**ET01**

**RD17Z, RD17 for all Banks**

**Position 8**

**Queued**

*RPS channels trip. Control Rods insert, but only to position 08, due to hydraulic lock.*

*Reactor Power lowers to about 20%. RPV water level lowers, then recovers to about 180 inches with Feedwater.*

*Condenser vacuum continues to lower at a faster rate.*

Booth Operator Instruction:

IF directed to bypass MSIV Low Level isolations,

**MANUALLY ACTIVATE REMOTE Functions:**

**MS06A, Defeat Level 1 Isolation, Defeated**

**MS06B, Defeat Level 1 Isolation, Defeated**

**MS06C, Defeat Level 1 Isolation, Defeated**

**MS06D, Defeat Level 1 Isolation, Defeated**

SRO

- Acknowledges RO report.
- Enters N2-EOP-RPV, then exits.
- Enters N2-EOP-C5
  - Directs BOP to “inhibit ADS” and “prevent HPCS injection”
  - Directs RO to “initiate RRCS”, N2-EOP-6, Attachment 13
  - Directs the RO to trip the Reactor Recirculation Pumps.
  - May direct MSIV isolations bypassed per EOP-6 Attachment 10.
  - Directs RPV injection terminated/prevented and level lowered to below 100 inches (50 inches to 80 inches expected band).
  - Directs pressure band 800 psig to 1000 psig using Bypass Valves.

BOP

**CT-1.0**

- Inhibits ADS using keylock switches
- Places HPCS Pump switch in the Pull-to Lock position.
- Monitors RPV pressure

Event #8 BOP Component Failure

When the RO initiates RRCS the 98 second timers should start to cause the initiation of SLS and the isolation of WCS. However this will not occur due to the following:

**RP08A, RRCS 98 second timer failure,  
Div.I and RP08B, RRCS 98 second timer  
failure, Div.II** **Queued**

*When RPV water level drops below 108 inches  
RCIC automatically starts and injects. RCS Pumps  
will trip.*

RO

**CT-2.0**

- Manually initiates RRCS.
- Trips the Reactor Recirculation Pumps.
- Reports control rods are still **NOT** fully inserted.
- Maintains RPV level in the directed band (50 inches to 80 inches):
  - Terminates and prevents P603 and 601 and lowers RPV level to -42 to 100 inches.
- Reports Reactor Power level.
- Recognizes and reports that SLS did **NOT** initiate.

SRO

- Acknowledges RO and BOP reports.
- Directs the BOP to manually initiate SLS.
- Directs RO to enter and perform N2-EOP-6, Attachment 14.

BOP

**CT-3.0, PO-6.0**

- Manually initiates SLS
  - **Places SLS\* P1B keylock switch to START**
  - Verify Suction Valves open
  - Verify SLS\*P1B starts
  - Verify Squib Valves fire
  - Verify system flow about 43 gpm.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Main Condenser vacuum is still lowering and reaches 8.5 inches. The MSIVs automatically close.*

*Suppression Pool temperature (SPT) begins to rise and exceeds 90 °F, due to heat addition from SRV use.*

Booth Operator Instruction:

WHEN ARI and RPS are directed to be defeated wait 2 minutes, then activate the following using F10 key:

**RP14A, ARI Failure (Div I)**

**RP14B, ARI Failure (Div II)**

- Verify Reactor Water Cleanup isolated.

RO

- Reports MSIV closure.

SRO:

**CT-3.0**

- Directs BOP to maintain Reactor pressure band 800 psig to 1000 psig using SRV's.
- When SPT exceeds 90°F enters EOP-PC.
  - **Directs BOP to initiate Suppression Pool Cooling.**

RO

**CT-4.0, PO-8.0**

- Performs N2-EOP-6, Attachment 14, Alternate Control Rods Insertion, Sections 3.3 Additional Manual Scrams AND 3.5 Manual Control Rod Insertion (by driving rods) concurrently.
- Additional Manual Scrams
  - Directs ARI interlocks defeated by pulling ARI fuses.
  - Directs RPS defeated by installing RPS jumpers.
  - After ARI fuses are pulled and

**RP02, RPS Failure to Scram**

**F10**

Role Play: After ARI and RPS is defeated/bypassed, report ARI fuses are pulled and RPS jumpers are installed.

Booth Operator Instruction:

**After RPS is reset delete malfunction RD17Z to allow control rods to fully insert when a manual scram signal is inserted.**

*Control Rods will insert when being manually driven in using Continuous Insert pushbutton.*

**Event #9 BOP Component Failure**

Booth Operator Instruction:

When the BOP attempts to place an RHR loop in Suppression Pool Cooling, insert appropriate loop override:

**If the "A" Loop is chosen insert:**

**Service Water Discharge MOV\*33A Hx.**

**"A" – Closed.**

**F8**

RPS jumpers are installed resets RPS logic and verifies eight white RPS solenoid lights are lit

- Verify SDV Vent and Drain valves are open.
- Waits until SDV is drained before inserting a manual scram using pushbuttons.

RO

PO-8.0

- Manual Control Rod Insertion:
  - Starts 2<sup>nd</sup> CRD Pump
  - Places CRD FCV in MAN and fully opens valve.
  - Fully closes Drive Pressure Control Valve to raise drive pressure.
  - Bypasses RWM using key.
  - Begins driving control rods.

BOP

- Places RHR Loop in Suppression Pool Cooling.
- Recognizes and reports that the RHR Heat Exchanger Service Water discharge valve will not open.



**If the "B" Loop is chosen insert:**

**Service Water Discharge MOV\*33B Hx. "B" –  
Closed.**

**F9**

Booth Operator Instruction:

When RPS is reset and ARI is defeated per EOP-6 Attachment 14, manually remove malfunction RD17Z. This will allow all control rods to fully insert when additional RPS trips are inserted.

If directed by the Lead Evaluator, Annunciator Override 603409, RPS B DIS VOLUME HIGH LEVEL TRIP, Off. This will shorten the time required for the RO to insert another manual RPS trip.

After RPS is manually tripped, clear the override, so that the annunciator actuates again.

SRO

- Acknowledges BOP report.
- Directs BOP to place the other Loop of RHR in Suppression Pool Cooling.

BOP

**CT-3.0, PO-7.0**

- **Places other RHR Loop in Suppression Pool Cooling.**

RO

- After at least one SDV High Level Trip annunciator clears, inserts a manual scram using scram pushbuttons
- Reports all rods are full in

SRO

- Exits EOP-C5, then enters EOP-RPV.

**Termination Cue:**

- One Loop of RHR has been successfully placed into Suppression Pool Cooling.
- All Control Rods are fully inserted per N2-EOP-6 Attachment 14 and EOP-C5 has been exited.

SRO Candidate Evaluator:

After simulator is placed in FREEZE, ask the SRO Candidate to classify the event.

SRO

PO-9.0

- Classify this event as a SITE AREA EMERGENCY EAL 2.2.2

V. POST SCENARIO CRITIQUE (Not required for Annual and Initial Operating Exams.)

VI. REFERENCE EVENTS AND COMMITMENTS

A. Reference Events

1. None

B. Commitments

1. None

VII. LESSONS LEARNED