

NMP SIMULATOR SCENARIO

**NRC Scenario 1**

**REV. 00**

**No. of Pages: 25**

STEAM LEAK IN DRYWELL/PSP EXCEEDED/CONTAINMENT SPRAY WITH  
SERVICE WATER

PREPARER	<u>S. Dennis</u>	DATE <u>11/19/07</u>
VALIDATED	<u>Ops Crew with W. Coppom</u>	DATE <u>11/19/07</u>
GEN SUPERVISOR OPS TRAINING	<u>R. Brown</u>	DATE <u>1/23/08</u>
OPERATIONS MANAGER	<u>NA Exam Security</u>	DATE _____
CONFIGURATION CONTROL	<u>NA Exam Security</u>	DATE _____

SCENARIO SUMMARY

Length: 1.5 hours

Initial Power Level: 90%

The scenario begins at 90% power. The BOP will be required to swap from the 2SWP\*P1B to the 2SWP\*P1F for normal equipment rotation. After completion of the pump swap, one of the running RBCLCW pumps will trip and the standby pump will fail to auto start. The standby pump can be manually started by the operators.

An ADS SRV will then go open but can be closed by pulling the SRV solenoid fuses. When this occurs, a Drywell vacuum breaker pair will fail open. The crew will enter the SOP for Stuck Open SRV and the SRO will review Technical Specifications (TS) in regard to the vacuum breakers.

Once TS are addressed a trip will occur on one Feedwater Pump and only a partial Recirc Runback will occur. SOPs must be entered to control feedwater level and address the reduction in power. Cram rods will need to be inserted and TS must be addressed due to loop flow mismatch.

When plant conditions stabilize, one control rod will drift out requiring an entry into the SOP for Unplanned Power Changes. The SOP will require that power be lowered and the RO will reduce recirculation flow IAW procedures. After power is lowered, another control rod will drift out requiring a reactor scram.

When the reactor scrams a steam leak will occur inside the drywell. LPCS and RHR A will fail to initiate and RHR B will trip when Drywell pressure exceeds 1.68 psig.

However, both LPCS and RHR A can be started manually. RHR A must then be placed in Suppression Chamber sprays per EOP-PC. When Suppression Chamber pressure exceeds 10 psig, the crew will attempt to spray the Drywell with RHR A, but RHS\*MOV15A will not open. Spraying the Drywell must be accomplished with Service Water (**Critical Task**). Once DW sprays are in service and PSP is evaluated, it will be recognized that RPV Blowdown is required once above the PSP (**Critical Task**). The crew will blowdown the reactor and continue to control Containment pressure.

The scenario ends with the blowdown complete and containment pressure lowering.

Major Procedures Exercised: EOP-RPV, PC, C2. SOP-8, 34

EAL Classification: Alert 3.1.1 – Primary Containment cannot be maintained below 1.68 psig due to coolant leakage.

Termination Criteria: RPV Blowdown is complete and containment pressure lowering

Mitigation Strategy Code: PC-4

I. SIMULATOR SET UP

A. IC Number: IC-191 or IC-241 w/n08scen1.bat loaded

B. Presets/Function Key Assignments

1. Malfunctions:

- |               |   |        |
|---------------|---|--------|
| a. RH14A      | ECCS FAILS TO INITIATE (DIVI)   | PRESET |
| b. CW16C      | CCP-P1C FAILS TO AUTOSTART  | PRESET |
| c. RH09A      | RHS*MOV15A JAMMED   | PRESET |
| d. CW02B      | RBCLCW PUMP TRIP P1B  | TRG 1  |
| e. PC10B      | DW/WW VACUUM BKR PAIR FAILED OPEN<br>(2ISC*RV34 AB) –DELAY 20 SECONDS                 | TRG 2  |
| f. FW03A      | FEEDWATER PUMP TRIP (P1A)   | TRG 3  |
| g. RR30       | HPU B PMP #1 FAILURE  | TRG 3  |
| h. RR31       | HPU B PMP #2 FAILURE  | TRG 3  |
| f. RD05-18-31 | CONTROL ROD FAILURE DRIFT OUT   | TRG 4  |
| g. RD05-42-39 | CONTROL ROD FAILURE DRIFT OUT   | TRG 6  |
| h. MS04       | STEAM LINE RUPTURE INSIDE PRIMARY<br>CONTAINMENT (1.5% DELAY 3 MINUTES 6 MINUTE RAMP) | TRG 7  |
| i. RH01B      | RHR PUMP TRIP (P1B)   | TRG 8  |

2. Remotes:

- |               |  |       |
|---------------|--|-------|
| a. RD08-18-31 | HCU ISOLATION FOR INSERTED ROD                   | TRG 5 |
| b. RH47       | 2RHS*MOV 15A EOP JMPR<br>(RHS*MOV25A 33 CONTACT) | TRG 9 |
| c. RH49       | 2RHS*MOV 25A EOP JMPR<br>(RHS*MOV15A 33 CONTACT) | TRG 9 |

3. Overrides:

- |                    |                      |       |
|--------------------|----------------------|-------|
| a. OVR-13S05DI2011 | OPEN ADS VLV PSV 134 | TRG 2 |
|--------------------|----------------------|-------|

4. Annunciators:

- a. None

C. Equipment Out of Service

1. None

D. Support Documentation

None

E. Miscellaneous Automatic Event Triggers

1. TRG 7 When scram occurs activates MS04 to cause steam leak.
2. TRG 8 When scram occurs activates RH01B to trip/prevent start of RHS\*P1B.

II.

**SHIFT TURNOVER INFORMATION**

OFF GOING SHIFT:  N  D DATE: \_\_\_\_\_

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

- Control Panel Walkdown (all panels) (SM, CRS, STA, CRO, CRE)

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

- Shift Supervisor Log (SM, CRS, STA)
- CRO Log (CRO)
- Lit Control Room Annunciators (SM, CRS, STA, CRO, CRE)
- Shift Turnover Checklist (ALL)
- LCO Status (SM, CRS, STA)
- Computer Alarm Summary (CRO)

Evolutions/General Information/Equipment Status:

- Reactor Power = 90%
  - Loadline = >100%
  - None
- 
- 
- 
- 

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

Swap Service Water Pumps from the 2SWP\*P1B to the 2SWP\*P1F for normal pump Rotation.

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

- Review new Clearances (SM)
- Shift Crew Composition (SM/CRS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SRO			
ATC RO			
BOP RO			

Scenario ID#

INSTRUCTOR COMMENTS (Strengths, Areas for Improvement, Open Items etc.)


What Happened?	What we did?	Why? (Goals)	Other Options?

### III. PERFORMANCE OBJECTIVES

#### A. Critical Tasks:

- CT-1.0 Spray the Drywell with Service Water when RHR is unavailable.
- CT-2.0 Blowdown the RPV when PSP is exceeded.

#### B. Performance Objectives:

- PO-1.0 Given the plant with direction to swap Service Water Pumps, the crew will remove the 2SWP\*P1B pump from service and place the 2SWP\*P1F pump in service for equipment rotation IAW N2-OP-11.
- PO-2.0 Given the trip of a RBCLCW pump and the failure of the standby pump to auto start, the crew will manually start the standby pump IAW SOP-13.
- PO-3.0 Given the plant or plant system in a condition requiring Technical Specification action, identify the deviation and any required actions/notifications in accordance with all applicable administrative, emergency, and technical procedures.
- PO-4.0 Given a pair of failed open Drywell Vacuum Breakers the crew will diagnose the failure and enter Technical Specifications.
- PO-5.0 Given a stuck open SRV the crew will diagnose the failure enter and execute N2-SOP-34 to close the by pulling the SRV solenoid fuses.
- PO-6.0 Given a single Feedwater Pump trip, with only a partial Recirc Runback, the crew will enter and execute SOPs 6, 101D, and 29, to control feedwater level, reduce power and maintain NMP 2 in service.
- PO-7.0 Given a control rod drift, the crew will execute N2-SOP-8 to fully insert and disarm the control rod.
- PO-8.0 Given the plant operating and a steam leak inside the drywell the crew will diagnose the leak

- PO-9.0 Given a second control rod drift the crew will recognize the requirement to scram the reactor and will perform a reactor scram.
- PO-10.0 Given drywell pressure above 1.68, the crew will verify automatic ECCS initiations and recognize the failure of LPCS and RHR A to start.
- PO-11.0 Given suppression chamber pressure above 10 psig, the crew will spray the drywell using Service Water through RHR B loop prior to exceeding the Primary Containment Pressure Limit.
- PO-12.0 Given suppression chamber pressure above the Pressure Suppression Pressure with drywell sprays in operation, the crew will blowdown the reactor prior to exceeding the Primary Containment Pressure Limit



**EVENT 1**

**Swap Service Water Pumps from the 2SWP\*P1B to the 2SWP\*P1F for normal equipment rotation IAW N2-OP-11.**

**EVENT 1 –SRO Actions**

**EVENT 1 –BOP Actions**

Role Play: As AO, wait two minutes and report that Service Water Pump P1F prestart checks are complete.

Cue: If asked report that SWP strainer and casing venting are complete.

SRO/Crew

- Crew conducts a pre-brief, walks down the panels, and tests annunciators.

SRO

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

BOP

PO-1.0

- Reviews N2-OP-11, Section E.2.0 and G.1.0
- Verifies Precautions and Limitations are met.
- Dispatches AO to perform prestart check of P1D.
- Starts Service Water Pump, P1F and secures Service Water Pump, P1B.

**EVENT 2**

RBCLCW Pump P1B trips. Standby Pump fails to auto-start and must be started manually

**SIM Booth:** Activate Trigger #1 when cued.

**CW02B RBCLCW PUMP TRIP P1B TRG 1**

**EVENT 2 –SRO Actions**

**EVENT 2 –BOP Actions**

**EVENT 2 –RO Actions**

CREW

PO-2.0

- Responds to RBCLCW Pump P1B trip.
- Recognizes the P1A pump fails to start.

SRO

- Directs ROs to respond to annunciators and enter SOP-13
- May contact the Work Execution Center (WEC) for maintenance followup.

BOP

- Recognizes failure of standby RBCLCW pump to auto start.
- References annunciator response for pump trip.
- Refers to SOP-13 and starts the standby pump.
- Place “B” Pump in Pull-To-Lock

RO

- Monitors reactor power, pressure and level.
- May announce on plant page entry to SOP-13

**EVENT 3 –ADS SRV Opens/ Drywell  
vacuum breaker fails open**

**SIM Booth:** Activate Trigger #2 when cued  
**OVR-13S05DI2011 OPEN ADS VLV PSV 134  
PC10B, DW/WW VACUUM BKR PAIR  
FAILED OPEN(2ISC\*RV34 AB) –DELAY 20  
SECONDS**

**EVENT 3 SRO Actions**

*ADS SRV MSS\*PSV134 red light indication lit  
DIV I MSS\*PSV134 OPEN ADS white light lit  
601537 ADS VALVES/SAFETY VALVES  
LEAKING alarms  
601548 SAFETY/RELIEF VALVE OPEN  
alarms.  
SRV is open by it's A solenoid. MWe lowers  
and Suppression Pool temperature rises as  
heat is being added.*

*When the Drywell Vacuum breakers stick/fail  
open, the following annunciators actuate:  
601556 DRYWELL VACUUM BRKR  
INBOARD DISC OPEN  
601557 DRYWELL VACUUM BRKR  
OUTBOARD DISC OPEN*

CREW, SRO PO-4.0 and PO-5.0

SRO PO-3.0

- Enters into N2-SOP-34
- Directs Power Reduction to approx. 85%
- Declares PSV134 ADS valve inoperable.
- Refers to Tech Specs 3.5.1. With one ADS valve inoperable no actions is required. Currently the minimum number of REQUIRED ADS valves is still met with one valve inoperable.
- When informed Report that a pair of DW vacuum breakers are open determines that DW and SC pressures are equal, therefore the vacuum breakers should not be open.

**EVENT 3 SRO Actions (Cont.)**

- Refers to Tech Spec 3.6.1.7.2.C for SP to DW vacuum breakers (2hours) and recognizes requirement to perform N2-OSP-ISC-M@002 within 12 hours.
- May direct one loop of RHS placed in Suppression Pool Cooling.
- IF RHS is placed in Suppression Pool Cooling, declares RHS inoperable for LPCI mode and enters Tech Spec 3.5.1 CONDITION A REQUIRED ACTION A.1 with 7 day COMPLETION TIME.
- IF Suppression Pool Temperature exceeds 90°F, enters EOP-PC and Tech Spec 3.6.2.1
- Notifies Operations and Plant Management.
- Contacts WEC SRO for assistance and work planning.
- Conducts post event brief.

**EVENT 3 RO actions**

RO

- Reports one or both of the following:
  - P601556 Drywell Vacuum Brkr Inboard Disc Open
  - P601557 Drywell Vacuum Brkr Outboard Disc Open.

**EVENT 3 RO actions (Cont.)**

*SRV is expected to be closed prior to the requirement to initiate a manual scram.*

- Informs the CRS that 34A and B vacuum breakers indicate open on Panel 2CEC\*PNL628
- Reduces power to approximately 85% per N2-SOP-101D.
- **IF** Average Suppression Pool temperature is approaching 110°F..... **THEN** Scram the reactor per N2-SOP-101C and continue here.
- Monitors parameters to assist in determining SRV position.
- Monitors and control RPV water level in directed band in manual.
- Make page announcement regarding plant status.

**EVENT 3 BOP Actions**

BOP

- Reports annunciators
- Enters and executes N2-SOP-34
- Identify which SRV is open. (PSV121)
- Place the keylock switch for PSV21 to the OFF position.
- Did the SRV close? **NO**  
(Detail 1)  
Use one or more of following

**EVENT 3 BOP actions (CONT)**

*The SRV does NOT close when the C solenoid fuses are pulled. The SRV DOES close after the 2<sup>nd</sup> set (A solenoid) fuses are pulled.*

*PSV134 closes after pulling F81, F82 F13A, F14A. At P601 position indicating (red and green) lights for PSV134 are now deenergized.*

indications to verify SRV status:

- SPDS Computer
- ERF Computer Points
- MSSZC111; MSSZC128
- Reactor Power Change
- Generator Output Change
- Steam Flow/Feed Flow Mismatch
- Acoustic Monitor

- Proceeds to back panel P628 with fuse pullers and protective safety equipment (PPE). Using **Detail 2**, remove the fuses for the affected SRV in the following order until the SRV closes:
  - C,A,B Solenoid fuse
  - Did SRV close? **YES** for A solenoid  
Detail 1
  - Use one or more of following indications to verify SRV status:
    - SPDS Computer
    - ERF Computer Points
    - MSSZC111
    - MSSZC128
    - Reactor Power Change
    - Generator Output Change
    - Steam Flow/Feed Flow Mismatch
    - Acoustic Monitor

**Role Play:** Acknowledge as Rad Protection in regard to placing SW rad monitor in service when RHR is placed service

**EVENT 4 – Feedwater Pump Trip, Partial Recirc Runback**

**Sim Booth:** Activate Trigger #3 when cued

**FW03A Feedwater Pump Trip (P1A)  
RR30 HPU B PMP #1 FAILURE  
RR31 HPU B PMP #2 FAILURE**

**EVENT 4 SRO Actions**

*When Feedwater Pump trips, RPV water level begins to lower. When level drops below 178 inches, an automatic RCS Flow Control Valve Runback should occur to automatically lower power to about 65%. The B FCV locks up due to a trip of both hydraulic subloops due to a fault.*

*Reactor power will remain above 65% due to the failed FCV.*

**EVENT 4 RO Actions**

- Exits SOP-34 and informs SRO SRV is closed.
- If directed starts RHS in Suppression Pool Cooling.

Crew PO-6.0

- Recognizes and responds to trip of P1A feedwater pump trip.
- Recognizes and responds to partial Recirc Runback

SRO

- Directs crew response IAW the following:
  - SOP-6. Feedwater Failures
  - SOP-101D, Power Reduction
  - SOP-29, Sudden Reduction in Core Flow.
- Refers to TS 3.4.1.B. for Recirc Loop Flow Mismatch (2 hours)
- Direct inserting Cram Rods per SOP-6

RO

- Recognizes trip of P1A Feedwater Pump.

*When the Cram Rods are inserted, power lowers and RPV water level restores to the normal band.*

**EVENT 4 BOP Actions**

**SIM Booth Operator: Insert the next malfunction (TRG 4) for control rod drift PRIOR to resetting the runback.**

**EVENT 5 – Control Rod Drift  
RD05-18-31 CONTROL ROD FAILURE  
DRIFT OUT                      TRG 4**

**EVENT 5 SRO Actions**

- Refers to SOP-6, Feedwater Failures
- Inserts 4 Cram Rods as required by SOP-6
- IAW SOP-6, Closes LV10 for tripped feedwater pump P1A.
- Recognizes Partial Recirc Runback
- Inserts Cram Rods as directed per SOP-6

BOP

- Refers to SOP-29 Attachment 1 to address Recirc loop Flow Mismatch
- Begins recovery actions to reset runback IAW Att.1.

Crew

PO-7.0

- Identifies and reports control rod drift on 18-31

SRO

- Recognizes entry and directs entry to SOP-8, Unplanned Power Changes
- Declares control rod 18-31 inoperable per Tech. Spec. 3.1.3



**EVENT 5 RO Actions**

**Sim Booth Operator: When requested to valve out the HCU, Insert TRG 5 after approximately 2 minutes.**

**RD08-18-31 HCU ISOLATION FOR INSERTED ROD**

**TRG 5**

condition C actions C.1 and C.2 (fully insert and disarm) (4 hours to disarm).

RO

- Recognizes and identifies Control Rod 18-31 drifting out.
- Selects rod for display.
- Refers to SOP-8 and inserts drifting control rod 18-31
- Releases insert pushbutton and observe rod position.
- Recognizes rod continues to drift out
- Drives the rod full-in and holds insert pushbutton until HCU is disarmed.
- When rod 18-31 is full-in, directs field operator to close RDS\*V103 & RDS\*V105.
- Dispatch Auxiliary Operator to isolate HCU by closing RDS\*V103 and V105 in accordance with SOP-08.

**EVENT 6, Second Control Rod Drift**

**Sim Booth:** Activate Trigger #6 when cued  
**RD05-42-39 CONTROL ROD FAILURE  
DRIFT OUT TRG 6**

**EVENT 6 SRO Actions**

**EVENT 6 RO Actions**

Crew

PO-9.0

- Identifies and reports second control rod drift of control rod 42-39

SRO

- Direct mode switch be placed in shutdown
- Enters EOP-RPV
- Enters SOP- 101C
- Directs RPV level control 160 – 200 inches
- Directs RPV pressure control 800 - 1000 psig

RO

- Places mode switch to shutdown.
- Provides scram report:
  - Mode Switch in Shutdown
  - APRMs downscale
  - RPV Water Level
  - RPV Pressure
  - All Rods In
  - FW and MSIV status

**EVENTS 7 & 8, 9 Steam Leak Inside Drywell. LPCS and RHR A Fail to Automatically Initiate and RHR B Trips, MOV15A DW spray valve fails to open**

**Sim Booth: Confirm Trigger #7 and Trigger #8 activated at following reactor scram**

**MS04 STEAM LINE RUPTURE INSIDE PRIMARY CONTAINMENT (1.5% DELAY 3 MINUTES 6 MINUTE RAMP) TRG 7**

**RH01B RHR PUMP TRIP (P1B) TRG 8**

**EVENTS 7 & 8, 9 SRO Actions**

*EAL may be addressed at scenario completion.*

- Maintains RPV level 160-200 inches
- Monitors RPV pressure 800-1000 psig and lowering.

Crew

PO-8.0

- Identifies steam leak and ECCS failures.

SRO

PO-12.0

- Enters EOP-PC
- Directs Inboard MSIV closure to control RPV depressurization
- Directs RO to start LPCS and RHR A pumps.
- Directs RHR A placed in Suppression Chamber sprays.
- Declares an Alert based on EAL 3.1.1

**EVENT 10**

**Note to Evaluator:** It is important that the evaluation to blowdown when above PSP be made only after Drywell sprays are initiated or it is determined that the Drywell cannot be sprayed. It is incorrect EOP implementation to continue to RPV Blowdown without having attempted to spray the Drywell.

- Directs the crew to monitor and report when Suppression Chamber pressure exceeds 10 psig.
- When told that Suppression Chamber pressure exceeds 10 psig Directs the following:
  - Drywell Unit Coolers tripped.
  - Recirc. Pumps tripped
- Verifies within Drywell Spray Initiation Limit Curve
- Directs spraying the Drywell using RHR A and defeating the DW Spray interlocks per EOP-6, Att. 22
- Determines Suppression Chamber pressure above the Pressure Suppression Pressure curve limit.
- **Directs spraying the Drywell using Service Water via RHR B using EOP-6 Att. 5.**

**CT-1.0**

- Verifies that Containment pressure is above PSP with Drywell Sprays in service.
- **Directs RPV Blowdown per EOP-C2, based on being above PSP with Drywell Sprays in service.**
- **Directs 7 ADS SRVs open (1 additional SRV needed due to previous ADS SRV failure)**

**CT-2.0**

**EVENT 7 & 8, 9 RO Actions**

RO

PO-10.0

**SIM Booth:** If directed to defeat DW Spray interlocks for RHS Loop A per EOP-6, Att. 22 activate TRG 9:

**RH47 2RHS\*MOV 15A EOP JMPR  
(RHS\*MOV25A 33 CONTACT)**

**RH49 2RHS\*MOV 25A EOP JMPR  
(RHS\*MOV15A 33 CONTACT)**

The following steps lineup SWP to RHS Loop B (EOP-6 Attachment 5 Section 3.1)

- Directs placing RHR A in Suppression Pool Cooling.

- Reports DW pressure above 1.68 psig.
- Recognizes and reports failure of LPCS and RHR A pumps to start.
- Recognizes and reports failure of DIV I EDG.
- Recognizes and reports trip of RHR B pump.
- Starts LPCS and RHR A pump.
- Places RHR A in Suppression Chamber sprays and does not establish Suppression Pool cooling.
- Defeats the DW Spray interlocks per EOP-6, Att. 22
- Recognizes and reports that RHS\*MOV15A cannot be opened.
- Lineup and spray containment with Service Water per EOP-6 Attachment 5 as follows:
- Verify SWP system is available to inject through RHS loop B.

- Verify the following valves closed:  
(2CEC\*PNL601)
    - RHS\*MOV24B, LPCI B  
INJECTION VLV
    - RHS\*MOV15B, OUTLET TO  
DRYWELL SPRAY
    - RHS\*MOV25B, OUTLET TO  
DRYWELL SPRAY
    - RHS\*MOV33B, OUTLET TO  
SUPPR POOL SPRAY
    - RHS\*FV38B, RETURN TO  
SUPPR POOL COOLING
    - RHS\*MOV12B, HEAT  
EXCHANGER 1B OUTLET  
VLV
    - RHS\*MOV40B, SDC B  
RETURN
    - RHS\*MOV104, RHR B TO  
REACTOR HEAD SPRAY
  
  - Place RHS\*P1B, PMP 1B, control  
switch in Pull-To-Lock.
  - Verify open RHS\*MOV8B, HEAT  
EXCHANGER 1B INLET BYPASS  
VLV.
  - **Verify open RHS\*MOV116, SVCE  
WTR INJECTION TO RHR B.**
- CT-1.0**
- Verify closed, RHS\*AOV126, SER  
WTR-RHR CROSSTIE TELL

The following steps lineup RHS Loop B to spray (EOP-6 Attachment 5 Section 3.4)

*When Drywell Spray is initiated with Service Water, DW and SC Pressure begin to lower.*

- TALE DRAIN VLV.
- **Verify Open RHS\*MOV115, SVCE WTR INJECTION TO RHR B.**  
**CT-1.0**
  - Verify the following valves closed (2CEC\*PNL601):
    - RHS\*MOV24B, LPCI B INJECTION VLV
    - RHS\*MOV33B, OUTLET TO SUPPR POOL SPRAY
    - RHS\*FV38B, RETURN TO SUPPR POOL COOLING
    - RHS\*MOV40B, SDC B RETURN
    - RHS\*MOV104, RHR B TO REACTOR HEAD SPRAY
  - Initiate drywell sprays by opening the following valves:
    - **RHS\*MOV15B, OUTLET TO DRYWELL SPRAY CT-1.0**
    - **RHS\*MOV25B, OUTLET TO DRYWELL SPRAY CT-1.0**
  - Places RHR A in Suppression Pool Cooling.

**EVENT 7 ,8 & 9 BOP Actions**

**EVENT 10 – RPV Blowdown**

**Examiner Note: Applicant must recognize previous ADS SRV failure and open an additional SRV to obtain 7 open for the blowdown.**

**Termination Criteria: RPV Blowdown is complete and Containment pressure is lowering.**

BOP

PO-11.0

- Reports Suppression Chamber pressure above 10 psig.
- Verifies DW unit coolers tripped.
- Trips Recirc pumps.
- **Initiates ADS Division 1 using the pushbuttons on P601 and ensures 7 SRVs are open**

CT-2.0

- Reports that 7 ADS valves open.
- Verifies that RPV pressure is lowering



## V. POST SCENARIO CRITIQUE

### A. NA, NRC Exam

## VI. REFERENCE EVENTS AND COMMITMENTS

### A. Reference Events

- 1.0 During performance of Surveillance (N2-OSP-ADS-R001), when the 8<sup>th</sup> SRV was opened Suppression Chamber pressure became great enough to open a pair of vacuum breakers. The vacuum breakers stayed open for almost 30 minutes until DW and SC pressure equalized.

### B. Commitments

1. None

## VII. LESSONS LEARNED

## EVALUATED SCENARIO CHECKLIST

1. Additional Information about these checks:

For continuing training, can be found in NUREG 1021, ES 604 and Appendix D.

For initial training, can be found in NUREG 1021, ES 301 and Appendix D.

2. Qualitative Attributes

X	Realism/Credibility
X	Event Sequencing
X	Simulator Modeling
X	Evaluating Crew Competencies

3. Quantitative Attributes

6	Total Malfunctions
1	Malfunctions after EOP Entry
4	Abnormal Events
1	Major Transients
2	EOPs Used
1	EOP Contingency Procedures Used
	Simulator Run Time
	EOP Run Time
2	Crew Critical Tasks (if applicable per Attachment 6.)

4. Developmental Checks:

Does every event have either a Critical Task(s) or Performance Objective?

Is Criteria given for sequencing to subsequent events?

Is termination criteria clear and unambiguous?

Does termination criteria allow verification that all CT, PO standards are met?

## NMP SIMULATOR SCENARIO

**NRC Scenario 2**

**REV. 00**

**No. of Pages: 22**

### ATWS/LOSS OF HIGH PRESSURE FEED

PREPARER	<u>S. Dennis</u>	DATE	<u>11/19/07</u>
VALIDATED	<u>Ops Crew with W. Coppom</u>	DATE	<u>11/19/07</u>
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### SCENARIO SUMMARY

Length: 1.5 hours

Initial Power Level: 100%

The scenario begins at 100% power. The RO will perform the surveillance test for the "C" RHR Pump, N2-OSP-RHS Q@006. While the pump is running, the breaker will trip for the RHS B/C Water Leg Pump RHS\*P2 requiring a TS entry by the SRO (TS 3.5.1.C – 72 hours). Once TS are addressed, the in service Instrument Air Compressor will trip requiring operator action to manually start the "C" standby compressor. The "B" compressor will not start.

Oscillations of the in service EHC pressure regulator will occur and require actions to swap to the alternate regulator and lower reactor pressure. Additionally, the RO will be required to lower reactor power to 85% IAW the SOP-23.

High Pressure Core Spray starts unexpectedly, requiring operator action to terminate the initiation. The SRO will address TS for HPCS inoperability and 2 other ECCS pumps inoperable (3.0.3). After addressing TS, the Feedwater Master Controller will then fail "as-is". The crew will enter SOP-6 and control feedwater in manual. Additionally, a failure of the Recirculation FCV will cause the FCV to open. Operator action will be required to control the FCV and reactor level. Cram rods may be inserted or Recirc flow lowered to lower reactor power to pre-transient levels.

The backup EHC pressure regulator will fail and result in a rapid RPV pressure rise. The reactor will automatically scrams, however, all control rods will not fully insert and "A" and "B" reactor feed pumps will trip. EOPs RPV, EOP-Failure-To-Scram will be entered. The RO must inhibit ADS to prevent injection during the ATWS (CT).

The RCIC turbine can be manually controlled after a controller malfunction. SLC pumps will fail to auto-start and must be manually started prior to exceeding the HCTL (CT). RPV level must be restored with "C" FW pump, RCIC (or Condensate Booster Pumps with RPV pressure lowered) precluding the need to perform a RPV Blowdown (CT). The RO will implement actions to insert control rods until all rods are inserted (CT).

Major Procedures Exercised: EOP-RPV, PC, C2. SOP-8, 34

EAL Classification: SAE 2.2.2 – Reactor/Reactivity Control-ATWS

Termination Criteria: RPV level is being controlled in the required band and control rod insertion is in progress.

Mitigation Strategy Code: AT1

## II. SIMULATOR SET UP

C. IC Number: IC-192 or IC-17 w/n08scen2.bat loaded.

### D. Presets/Function Key Assignments

#### 2. Malfunctions:

a.	RH20	RHS*P2 TRIP	TRG 1
b.	IA02A	2IAS-C3A THERMAL OVERLOAD TRIP	TRG 2
c.	IA02B	2IAS-C3B THERMAL OVERLOAD TRIP	PRESET
d.	IA04A	IAS COMPRESSOR LAG AUTO-START FAILURE	PRESET
e.	IA04B	IAS COMPRESSOR B/U AUTO-START FAILURE	PRESET
f.	TC03A	EHC SYS PRESS REG FAILURE-OSCILLATION	TRG 3
g.	CS01B	HPCS INADVERTENT INITIATION	TRG 5
h.	FW15	FW MASTER CTRLR FAILURE-AS IS (DLY 2 SECS)	TRG 6
i.	TC02B	EHC SYS PRESS REG FAILURE-LOW (B)	TRG 7
j.	TC02A	EHC SYS PRESS REG FAILURE-LOW (A)	TRG 7
k.	FW03A	FW PUMP TRIP (P1A) – DELAY 45 SECS	TRG 8
l.	FW03B	FW PUMP TRIP (P1B) – DELAY 45 SECS	TRG 9
m.	RC07	RCIC FLOW TRANSMITTER FAILURE-HI	TRG 10
n.	RP02	RPS-FAILURE TO SCRAM-AUTOMATIC	TRG 22
o.	RP14A	RRCS ARI FAILURE/DEFEATED (DIV I)	TRG 23
p.	RP14B	RRCS ARI FAILURE/DEFEATED (DIV II)	TRG 23
q.	RH08	GRP 5 ISOLATION FAILURE- RHS*MOV122/113	TRG 25
r.	an603109	RPS A DIS VOL HI LVL TRIP	TRG 26
s.	an603409	RPS B DIS VOL HI LVL TRIP	TRG 26
t.	RP08A	RRCS 98 SEC TIMER FAILURE (DIV 1)	PRESET
u.	RP08B	RRCS 98 SEC TIMER FAILURE (DIV II)	PRESET
	RD17A	PARTIAL INSERTION UNDER SCRAM (L1) 48	PRESET
	RD17B	PARTIAL INSERTION UNDER SCRAM (L2) 12	PRESET
	RD17C	PARTIAL INSERTION UNDER SCRAM (L3) 14	PRESET
	RD17E	PARTIAL INSERTION UNDER SCRAM (L5) 16	PRESET
	RD17F	PARTIAL INSERTION UNDER SCRAM (L6) 24	PRESET
	RD17G	PARTIAL INSERTION UNDER SCRAM (L7) 14	PRESET
	RD17H	PARTIAL INSERTION UNDER SCRAM (L8) 48	PRESET
	RD17I	PARTIAL INSERTION UNDER SCRAM (L9) 48	PRESET

RD17J PARTIAL INSERTION UNDER SCRAM (L10)	48	PRESET
RD17K PARTIAL INSERTION UNDER SCRAM (L11)	22	PRESET
RD17L PARTIAL INSERTION UNDER SCRAM (L12)	48	PRESET
RD17M PARTIAL INSERTION UNDER SCRAM (L13)	48	PRESET
RD17N PARTIAL INSERTION UNDER SCRAM (L14)	48	PRESET

Remotes:

- |   |  |        |
|---|--|--------|
| a. RH52 RHR'B' FILL AND VENT                              |  | TRG 24 |
| b. TC02 PRESSURE REG BIAS 'A' 'B' , Value +9, 3 min. ramp |  | TRG 4  |
| c. RR10A FCV A DRIFT                                      |  | TRG 6  |
| d. RR12A FCV A DRIFT POSITION, 100% DELAY 3 SECONDS       |  | TRG 6  |
| e. DEFEAT RCIC/MT TRIP INTLK (EOP-6 ATT 2)                |  | TRG 20 |
| f. MS06A DEFEAT LVL 1 ISOL OF MSIVS (JMPR K148A)          |  | TRG 21 |
| g. MS06B DEFEAT LVL 1 ISOL OF MSIVS (JMPR K148B)          |  | TRG 21 |
| h. MS06C DEFEAT LVL 1 ISOL OF MSIVS (JMPR K148C)          |  | TRG 21 |
| i. MS06D DEFEAT LVL 1 ISOL OF MSIVS (JMPR K148D)          |  | TRG 21 |

4. Overrides:

- a. None

5. Annunciators:

- |   |  |        |
|---|--|--------|
| b. an601658 RHR B HIGH POINT VENT LEVEL , OFF |  | PRESET |
|---|--|--------|

D. Equipment Out of Service

2. None

F. Support Documentation

E. Miscellaneous Automatic Event Triggers

1. TRG 8 and 9. When Mode Switch in SHUTDOWN activates FW03A and B after 45 second delay, tripping both running Feedwater Pumps.
2. TRG10. When RCIC Flow increases (zarcr606) activates RC07 failing the RCIC flow signal high (turbine speed lowers to prevent injection).

II.

**SHIFT TURNOVER INFORMATION**

OFF GOING SHIFT:  N  D DATE: \_\_\_\_\_

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

- Control Panel Walkdown (all panels) (SM, CRS, STA, CRO, CRE)

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

- Shift Supervisor Log (SM, CRS, STA)
- CRO Log (CRO)
- Lit Control Room Annunciators (SM, CRS, STA, CRO, CRE)
- Shift Turnover Checklist (ALL)
- LCO Status (SM, CRS, STA)
- Computer Alarm Summary (CRO)

Evolutions/General Information/Equipment Status:

- Reactor Power = 100%
- Loadline = >100%
- None

**PART III: Remarks/Planned Evolutions:**  
Perform N2-OSP-RHS-Q@006 RHR System Loop C Pump and Valve Operability Test and System Integrity Test

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

- Review new Clearances (SM)
- Shift Crew Composition (SM/CRS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SRO			
ATC RO			
BOP RO			

Scenario ID#

INSTRUCTOR COMMENTS (Strengths, Areas for Improvement, Open Items etc.)


What Happened?	What we did?	Why? (Goals)	Other Options?



#### IV. PERFORMANCE OBJECTIVES

##### C. Critical Tasks:

- CT-1.0 Inhibit ADS to preclude an automatic blowdown, preventing uncontrolled injection during the ATWS.
- CT-2.0 Operate SLC, SRV's, Suppression Pool Cooling and level control systems such that HCTL is not exceeded, precluding the need to perform an RPV Blowdown.
- CT-3.0 Restore and maintain RPV water level above MSCWL, precluding the need to perform an RPV Blowdown.
- CT-4.0 Insert control rods through combination of manually driving rods using RMCS or performing additional manual scrams per EOP-6 Attachment 14, Alternate Control Rod Insertion

##### D. Performance Objectives:

- PO-1.0 Given the plant or plant system in a condition requiring Technical Specification action, identify the deviation and any required actions/notifications.
- PO-2.0 Given RHS B/C Water Leg Pump breaker tripping, the crew will secure from the surveillance, declare the pump inoperable and restore the valve lineup.
- PO-3.0 Given the plant operating at power with an instrument air compressor failure, the operating crew will restore IA header pressure to normal prior to 60 psig IA header pressure.
- PO-4.0 Given the plant operating with a malfunction of the EHC pressure regulator the crew will take action in accordance with N2-SOP-23 to reduce power below 85% and place the "B" pressure regulator in service.
- PO-5.0 Given the plant with a spurious HPCS initiation, the crew will take actions to terminate the injection.
- PO-6.0 Given an operating reactor with a Recirc flow control valve failed open and a FWLC failure the crew will take the appropriate actions to restore and maintain RPV water level.

- PO-7.0 Given the plant operating at power with RPV pressure lowering due to an EHC failure, the crew will verify the MSIVs close and the Reactor SCRAMs in accordance with SOP-101C.
- PO-8.0 Given a loss of Normal Feedwater the crew will stabilize RPV level using RCIC in manual.
- PO-9.0 Given entry conditions to EOPs RPV, PC and C-5, the crew will execute the following actions to mitigate the event:
- Preventing HPCS Injection
  - Inhibiting ADS initiation.
  - Terminating and preventing RPV injection in accordance with EOP Basis and as directed by EOP-C5.
  - Verifying SLS injection prior to Suppression Pool temperature  $\geq$  110°F.
  - Operating Suppression Pool Cooling to minimize suppression pool heatup.
  - Insert Control Rods per EOP-6, Att. 14.

**EVENT 1**

**RHR Pump Operability Test with RHS B/C  
Water Leg Pump breaker trip**

**EVENT 1 –SRO Actions**

**EVENT 1 –BOP Actions**

*After pump starts and discharge pressure is sufficient, annunciator 601540 ADS B RHR B/RHR C PERMISSIVE alarms*

**Role Play:** When directed to open test connections, report that the test connections are open.

Crew

- Crew conducts a pre-brief, walks down the panels, and tests annunciators.

SRO

PO-1.0

- Perform pre-job brief with RO assigned to performance of surveillance
- Authorizes/directs performance of surveillance N2-OSP-RHS-Q@006 for RHS 'C' loop

BOP

- Reviews surveillance, and commences.
- Makes plant announcement starting RHS\*P1C
- Positions RHS\*P1C control switch to start.
- Reports annunciator 601540 alarmed (expected).
- Directs test connection for suction opened.
- Throttle open RHS\*FV38C to 7450 gpm

**Sim Booth OPERATOR**

After pump flow is established at 7450 gpm, activate malfunction using TRG 1:

**RH20 RHS\*P2 TRIP**

*RHR Keep-Full (Water Leg) Pump trips and Annunciator 601648 RHR B SYS*

*VALVES/WATER LEG PMP MOT OVERLOAD alarms*

**EVENT 1 –BOP Actions**

**SIM BOOTH NOTE:** After 2 minutes, Call Control room and report that the pump motor appears to be damaged.

**EVENT 1 – SRO Actions**

**EVENT 2 Instrument Air Compressor “A” Trip**

When directed by lead evaluator activate malfunction TRG 2:

**IA02A Inst. Air Compressor ‘A’ Trip**

- Observe RHS\*MOV4C closed
- Directs test connection for discharge opened.

PO-2.0

**BOP**

- Diagnoses RHS B/C Water Leg Reference Pump breaker trip
- Notifies SRO

**SRO**

- Determines the Loss of RHS\*P2, RHS B/C WTR LEG PMP, will render RHS B AND C inoperable.
- Refers to Technical Specification 3.5.1.C -72 hour completion time.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Instrument Air header pressure lowers*  
851228 INSTR AIR CPSR 3A/3B/3C AUTO  
TRIP/FAIL TO START

- BOP PO-3.0
- Reports Annunciator
  - Enters SOP-19
  - Reports Instrument air header pressure lowering
  - Recognizes 'Lag' IAS Compressor B fails to start
  - Selects IAS Compressor C as LEAD on INSTRUMENT AIR COMPRESSOR SELECTOR switch
  - Manually starts IAS Compressor C.

- SRO
- Acknowledges reports
  - Ensures SOP 19 entered
  - Ensures starting of standby IAS compressors

**EVENT 3 EHC REGULATOR OSCILLATION**

**Sim Booth:** When directed by lead evaluator activate malfunction TRG 3:

**TC03A EHC SYS PRESS REG FAILURE-  
OSCILLATION**

*RPV Pressure and power start to oscillate.*  
Annunciator 851148 B PRESS REGULATOR  
IN CONTROL intermittently alarms and clears  
as pressure cycles and controlling regulator is

- Crew PO-4.0
- Reports alarms
  - Reports pressure / power oscillations

*changing. This occurs for the next several minutes, until the B Regulator is biased into control.*

**EVENT 3 –SRO Actions**

SRO

- Direct entry into SOP-23
- Direct power reduced below 85% IAW SOP-101D
- Verify thermal limits are acceptable per OP-23 section for operation with 1 pressure regulator out of service

**EVENT 3 –RO Actions**

RO

- Enter SOP-23
- Perform power reduction below 85%
- Monitors power, pressure and water level while changing in-service EHC regulators.

**EVENT 3 –BOP Actions**

BOP

When requested to adjust EHC bias in Relay Room activate **TRG 4** to bias the “B” EHC pressure regulator in control.

- Direct personnel to relay room to place “B” EHC regulator in control per SOP-23.
- Reports when B regulator is in control.

**TC02 PRESSURE REG BIAS ‘A’ ‘B’ , Value +9, 3 min. ramp TRG 4**

*After regulator bias is adjusted, RPV pressure and power stabilize. RPV Pressure will be about 10 psig higher (if at full power) than the pre-transient value.*

**EVENT 4**

HPCS spurious start

**Sim Booth:** When directed by Lead

Evaluator activate TRG 5:

**CS01B HPCS INADVERTENT INITIATION**

*HPCS Pump and Diesel Generator auto starts. HPCS injects into the vessel. Reactor level increases as HPCS injects. FWLC reduces FW Flow and level stabilizes. Reactor pressure and power lower slightly as HPCS sprays inside the core shroud.*

**EVENT 4 – SRO Actions**

- When pressure is stable, exits SOP-23.

BOP

- Identifies and report HPCS is injecting.
- As time permits, verifies HPCS injection not required.
- If directed, places HPCS in pull-to-lock.
- If directed, closes HPCS injection valve.

SRO

PO-5.0

- Determines HPCS initiation not required.
- May direct HPCS pump be placed in pull-to-lock if still running.
- Directs SOP-06 entry.
- Review Tech Spec 3.5.1 required actions B. and C. and H.

**EVENT 4 SRO Actions (Cont.)**

- Enter TS 3.0.3 Immediately
- Review Tech Spec 3.3.5.1, required actions A.1 and B.3.1.
- Review Tech Spec 3.6.1.3 for HPCS injection valve.
- Contacts Work Week Manager.
- Identifies need for notifications per 10CFR50.72 (b) (3) (v) and 10CFR50.73 (a) (2) (v).
- May direct HPCS injection valve to be closed.
- Conducts transient brief.

**EVENT 4 RO Actions**

Role Play: If called to check the Div 3 Switchgear or HPCS pump, report overcurrent flags on breaker and HPCS pump appears to be damaged.

RO

- Dispatches operator to verify proper operation of Div 3 DG.
- Monitor RPV water level and FWLC system response during transient.

**EVENT 5 & 6 RCS FCV Drifts with FWLC**

**Failure**

**Sim Booth:** When directed by Lead Evaluator activate remotes and malfunction on **TRG 6:**

**RR10A FCV A DRIFT**

**RR12A FCV A DRIFT POSITION, 100%**

**DELAY 3 SECONDS**

**FW15 FW MASTER CTRLR FAILURE-AS IS  
DELAY 2 SECS**

CREW

PO-6.0

- Identifies and reports power rise.



**EVENT 5 & 6 –SRO Actions**

*RCS FCV A Loop begins to drift open. Loop Flow and Total Core Flow rise. Reactor power and steam flow slowly rise, as core flow increases.*

*FWLC Master Controller fails in current position. As steam flow rises, a mismatch is created and RPV water level slowly lowers.*

**EVENT 5 & 6 –RO & BOP Actions**

**BOP implements SOP-8**

*If the Hydraulic Power Unit is shutdown, FCV will be locked due to loss of hydraulics and valve motion will be stopped.*

SRO

- Directs entry to SOP-6, Feedwater Failures
- Directs Manual Control of Feedwater
- Directs entry to SOP -8, Unplanned power changes
- Directs lowering power by insertion of Cram Rods or Lowering Recirc on Loop “B”.

RO

- Monitors FWLC and RPV water level
- Enters SOP-6
- Monitors FW system response and takes manual control as required to maintain normal level band.
- Lowers power with Cram Rods or using “B” Recirc FCV, as directed
- Reviews power to flow map.

BOP

- Enters SOP-8
- Determines power change is caused by Recirc FCV motion.
- Depress HYDRAULIC POWER UNIT SHUTDOWN pushbutton at P602.

**EVENT 7 - EHC Regulator failure cause  
Reactor High Pressure, ATWS, Loss of  
Feedwater**

**Sim Booth:** When directed by the Lead  
Evaluator activate TRG 7:

**TC02B EHC PRESS REG FAILURE-LOW (B)**

**TC02A EHC PRESS REG FAILURE-LOW (A)**

*EHC MAIN STEAM PRESSURE instruments  
go downscale. Turbine Control Valves close  
and Bypass Valves remain closed, since  
regulator senses pressure lowering.*

*RPV Pressure rises rapidly as TCV's close  
RPV High Pressure Scram setpoint of 1052  
psig is exceeded. RPV level lowers. RPS trips  
but all control rods fail to fully insert due to  
hydraulic SDV lock..*

*A loss of Feedwater occurs after Feedwater  
pumps trip.*

*APRM power should be 20 to 25%*

**EVENT 7 SRO Actions**

- Reports status of FCV position and flow mismatch.

Crew PO-7.0, PO-8.0 & PO-9.0

- Recognize and report Reactor SCRAM signal and failure to SCRAM.

SRO

- Directs mode switch placed in shutdown.
- Acknowledges scram report.
- Enters EOP-RPV Control on RPV high pressure and power >4% when scram is required.

- Exits RPV Control due to control rods not fully inserted.
- Enters EOP-C5 Failure to Scram from EOP-RPV.
- Directs ADS logic inhibit to on and verification that HPCS is in pull-to-lock.
- Directs RRCS initiated.
- Directs an initial RPV water level band.
- With Reactor Power >4% and RPV level >100 inches, directs terminate and prevent injection.
- Initially directs a RPV pressure band of 800 to 1000 psig.
- Subsequently lowers the RPV pressure band to a target of 500 – 600 psig to establish injection with Booster pumps.
- May direct Feed Pump C started.
- Directs a loop of RHR be placed in Suppression Pool Cooling.
- Directs control rods inserted using EOP-6, Attachment 14.
- Directs RO to prevent MSIV closure per EOP-6, Attachment 10.
- Acknowledges trip of RCIC turbine.
- May direct LPCS and LPCI injection prevented. (Not preferred source of injection.)

**EVENT 7 RO Actions**

- Enter EOP-PC, executes all legs simultaneously.

RO

- Place reactor mode switch in shutdown.
- Provides scram report.
- Initiates RRCS as directed.
- Takes appropriate action to maintain RPV water level within the directed band.
- When directed, terminates and prevents injection by closing LV10 valves.
- Re-injects to maintain RPV level within directed band.
- **Using condensate system, restore and maintain RPV level above the MSCWL.**

**CT-3.0**

**EVENT 7 BOP Actions**

BOP

- **Places ADS inhibit switches to ON.** **CT-1.0**
- Verifies HPCS in pull to lock.
- Takes appropriate action using SRVs to maintain RPV pressure within the directed band.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Restoring pneumatics to the Drywell allows continued nitrogen supply to operate SRV,s*

**Sim Booth: If requested by control room activate TRG 21 to defeat MSIV Level 1 closure:**

**MS06A through MS06D**

**DEFEAT LVL 1 ISOL OF MSIVS (JMPR K148A - D)**

**EVENT 8 RCIC Controller Failure**

**EVENT 8 BOP Actions**

TRG10 automatically triggers when RCIC system flow rises.

**RC07 RCIC FLOW TRANSMITTER FAILURE-HI TRG 10**

*When RCIC starts, flow transmitter fails high, providing a false high flow signal to the flow controller. RCIC turbine speed lowers to minimum and the system will not inject unless manual control is taken.*

**EVENT 9 – SLC FAILURE TO AUTO START**

*SLC fail to auto start. SLC should be injected before SPT reaches 110 °F*

- Restores pneumatics to the drywell as required.
- If directed, Installs jumpers to defeat MSIV closure isolation per EOP-6, Attachment 10.
- If directed, terminate & Prevent injection at Panel P601.
- Places RHR A(B) in suppression pool cooling.
- Notifies the SM to declare RHR A(B) LPCI mode inoperable.

BOP

- Identify and report to CRS, RCIC failure in automatic.
- Take manual control of RCIC speed controller and raise turbine speed to inject with RCIC, if directed.

BOP

- Identifies Failure of SLC to auto start on initiation signal.

**EVENT 7 –ADDITIONAL RO ACTIONS**

**Sim Booth: When requested to install RPS jumpers and to defeat ARI, activate triggers 22 and 23.**

**RP02 (RPS) TRG 22**

**RP14A and RP14B (ARI) TRG 23**

**SIM Booth: When scram is reset, clear all RD17 malfunctions to allow rod insertion on next manual scram.**

**TIME COMPRESSION**

**If directed by lead examiner clear SDV Hi LVL annunciator malfunctions** (an603109, an603409 RPS A,B DIS VOL HI LVL TRIP) on Trigger 26. This will allow rod insertion when an additional scram is initiated.

- **Manually places SLC in service prior to exceeding the HCTL**

**CT -2.0**

RO

- When directed performs Alternate Control Rod Insertion per EOP-6 Attachment 14
  - Dispatches operator to defeat ARI and RPS interlocks.
  - Reset RPS logic using SCRAM RESET switches.
  - Confirms RPS PILOT SCRAM SOLENOIDS lights are lit (P603).
  - Confirms SDV Vents and Drains open (P603).
  - Performs Manual Control Rod Insertion (Section 3.5) while waiting for SDV to drain.
  - Verify both RDS Pumps running.
  - Places RDS Flow controller in MANUAL and opens to 100%.
  - Close RDS-PV101 Drive Pressure Control Valve.
  - Bypass RWM using keylock switch.
- **Drive Control Rods in using RMCS.**

**CT-4.0**

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

---

*When additional manual scram is inserted, all rods fully insert.*

**Termination Criteria:**

RPV water level being controlled in directed band and control rod insertion in progress.

- **WHEN SDV High Level annunciators clear, insert an additional manual scram by arming and depressing scram pushbuttons. CT-4.0**
- Observe and report control rod motion.
- Provides scram report.

VIII. POST SCENARIO CRITIQUE

B. NA, NRC Exam

IX. REFERENCE EVENTS AND COMMITMENTS

C. Reference Events

None

D. Commitments

2. None

X. LESSONS LEARNED



## EVALUATED SCENARIO CHECKLIST

1. Additional Information about these checks:

For continuing training, can be found in NUREG 1021, ES 604 and Appendix D.

For initial training, can be found in NUREG 1021, ES 301 and Appendix D.

2. Qualitative Attributes

X	Realism/Credibility
X	Event Sequencing
X	Simulator Modeling
X	Evaluating Crew Competencies

3. Quantitative Attributes

6	Total Malfunctions
2	Malfunctions after EOP Entry
2	Abnormal Events
1	Major Transients
2	EOPs Used
2	EOP Contingency Procedures Used
	Simulator Run Time
	EOP Run Time
4	Crew Critical Tasks (if applicable per Attachment 6.)

4. Developmental Checks:

Does every event have either a Critical Task(s) or Performance Objective?

Is Criteria given for sequencing to subsequent events?

Is termination criteria clear and unambiguous?

Does termination criteria allow verification that all CT, PO standards are met?

NMP SIMULATOR SCENARIO

**NRC Scenario 3**

**REV. 00**

**No. of Pages: 19**

PLANT STARTUP WITH LOSS OF RPV LEVEL INSTRUMENTS  
RPV FLOODING REQUIRED

PREPARER	<u>S. Dennis</u>	DATE <u>11/20/07</u>
VALIDATED	<u>Ops Crew with W. Coppom</u>	DATE <u>11/20/07</u>
GEN SUPERVISOR OPS TRAINING	<u>R. Brown</u>	DATE <u>1/23/08</u>
OPERATIONS MANAGER	<u>NA Exam Security</u>	DATE _____
CONFIGURATION CONTROL	<u>NA Exam Security</u>	DATE _____

SCENARIO SUMMARY

Length: 1.5 hours

Initial Power Level: 2% Startup with RPV Pressure at 900 psig

The scenario begins with a plant startup in progress and reactor pressure at 900 psig. Control rods will be withdrawn until one bypass valve is open 25%. When that occurs, the operators will transfer the Reboiler Steam Supply to Main Steam. After that occurs, the plant startup will continue with control rod withdrawal.

While increasing power an inop trip will occur on IRM channel "A". The operators will bypass the affected IRM and reset the half scram. TS (TS 3.3.1.1) will be referred to by the SRO.

Next, a loss of offsite power to Div I Switchgear occurs when breaker 16-2 fails open, the crew will take action per N2-SOP-03 to stabilize plant parameters and adjust Service Water flow. The SRO will be required to address TS (TS 3.8.1.A – 1 Hr for surveillance – 72 hour SD LCO).

A seismic event will then occur causing a service water pump trip requiring a restart of a service water pump and entry to TS 3.7.1.E. -72 hours. IRM "G" also receives an upscale trip requiring a TS entry. N2-SOP-N2-90 will be entered to address the seismic event.

Once conditions are stabilized, a seismic aftershock will occur causing a rupture of an RPV level instrument reference leg. Initially drywell pressure rise slowly and the operators will manually scram the plant. Entry into EOP-RPV and EOP-PC will be

required on high Drywell Pressure. After Drywell Cooling is restored a second reference leg ruptures and a small RCS leak develops. The crew will place Suppression Chamber Spray in service. The event is complicated by a failure of Division 2 ECCS to initiate automatically. Operator action will be required to manually initiate Division 2 ECCS.

After Suppression Chamber Spray is initiated the remaining RPV water level instruments fail. The crew must determine that water level indication is no longer valid and enter RPV Flooding EOP-C4. An RPV blowdown must be initiated to allow the RPV to be flooded to the Main Steam Lines. (CT). Only 5 SRVs will initially open requiring operator action to open additional SRVs. The crew must flood the RPV to the elevation of the main steam lines in accordance with RPV flooding EOP-C4 (CT). Once RPV is flooded, containment parameters can be addressed.

Major Procedures Exercised: EOP-RPV, PC, C4

EAL Classification: Alert 8.4.4 – Seismic Event,  
SAE – 2.1.2 –RPV Flooding Required

Termination Criteria: Level recovered to the main steam lines as indicated by acoustic monitors, RPV pressure rising, or tailpipe temperatures lowering.

Mitigation Strategy: RL4 SE5

### III. SIMULATOR SET UP

E. IC Number: IC-191 or IC-244 w/n08scen3.bat loaded, Ensure RWM is functional when IC is snapped.

F. Presets/Function Key Assignments

3. Malfunctions:

a. RH14B ECCS FAILS TO INITIATE (DIV II)	PRESET
b. AD08E ADS VLV N2 SUPPLY SEVERED (MSS*PSV134)	PRESET
c. AD08G ADS VLV N2 SUPPLY SEVERED (MSS*PSV129)	PRESET
d. NM09A IRM CHANNEL FAILURE – INOP (A)	TRG 1
e. ED04F 4.16 KV NORMAL BUS FAULT (SWG16)	TRG 2
f. MT01 SEISMIC ACCELERATION, .085	TRG 3
h. NM06G IRM CHANNEL FAILURE- UPSCALE (G) 30 sec delay	TRG 3
i. CW01F SERVICE WATER PUMP TRIP (P1F)	TRG 3
j. RR35A, RX VES NOZZLE N14 340 DEG RUPTURE DW	TRG 4
K. RR34A, RX VES NOZZLE N14 20 DEG RUPTURE DW	TRG 5
j. RR20 RR LOOP RUPTURE –DBA LOCA, 0.8%	TRG 5
K. RPV LEVEL INSTRUMENTS ALL FAIL UPSCALE	TRG 6

Remotes:

a. CS14 OPS-CSH01 PNL625 TST SW CSH*MOV107	TRG 7
--	-------

5. Overrides:

a. None

6. Annunciators:

c. None

E. Equipment Out of Service

3. None

G. Support Documentation

F. Miscellaneous - **ENSURE THE FOLLOWING PROCEDURES ARE OUT IN THE CONTROL ROOM SIGNED OFF AS INDICATED BELOW**

N2-OP- 3 – signed off thru step 3.3.32

N2-OP-101A – step 2.46.3 completed

N2-OP-101A - step 2.45 in progress



Scenario ID#

INSTRUCTOR COMMENTS (Strengths, Areas for Improvement, Open Items etc.)


What Happened?	What we did?	Why? (Goals)	Other Options?

## V. PERFORMANCE OBJECTIVES

### E. Critical Tasks:

- CT-1.0 Given loss of level instruments, the crew will initiate an RPV blowdown by opening seven ADS valves per N2-EOP-C4.
- CT-2.0 Given conditions requiring RPV flooding, crew will flood the RPV to the elevation of the main steam lines per EOP-C4.

### F. Performance Objectives:

- PO-1.0 Given the plant or plant system in a condition requiring Technical Specification action, identify the deviation and any required actions/notifications.
- PO-2.0 Given the plant with a reactor startup in progress, the crew will identify and take actions for a failed IRM detector in accordance with N2-OP-92.
- PO-3.0 Given the reactor plant operating at full power when service water pump trips, the crew will take action to stabilize service water in accordance with N2-SOP-03.
- PO-4.0 Given a LOCA inside the primary containment, the crew will manually initiate a scram before high drywell pressure scram setpoint is reached.
- PO-5.0 Given N2-SOP-101C and EOP-RPV, monitor and control Reactor Water Level and Reactor Pressure.
- PO-6.0 Given the plant shutdown following a LOCA and RPV level indication not usable, the crew will perform RPV flooding in accordance with EOP-C4.
- PO-7.0 With RPV level instrumentation unavailable for use the crew will open 7 ADS valves in accordance with EOP-C4.
- PO-8.0 With RPV level instrumentation unavailable, 7 ADS valves open, the crew will inject with all systems necessary to flood the RPV to the Main Steam Lines in accordance with EOP-C4.

**EVENT 1**  
**Continue Startup**

CREW

Crew conducts a pre-brief, walks down the panels, and tests annunciators.

SRO

- Direct the RO to continue withdrawing control rods until RPV pressure is approximately 925 psig and BPV #1 is 25% open.

RO

- Withdraws control rods IAW sequence.
- Monitors RPV, CRD and Nuclear Instruments
- Establish a stable positive period greater than 60 seconds using
- control rods as required.
- Maintain IRM indications between 25 AND 75 on 125% scale by ranging IRM range switches as required.

BOP

- Maintain Reactor Water Level between 178.3" AND 187.3"
- Adjust EHC Pressure Setpoint to raise RPV pressure to 925 psig.



**EVENT 2 Transfer Reboiler Steam Supply to  
Main Steam**

**Role Play:**

When dispatched to IPNL204, report RESET pushbuttons have been depressed for LV8 valves.

SRO

- Directs the BOP to change the Reboiler Steam supply to the Main Steam supply provided that Reactor pressure control is established with a Turbine Bypass Valve open 20% or greater.

BOP

- Verifies an operator is stationed at the Auxiliary Boilers.
- If required, manually open 2ASS-MOV148, MAIN STM TO AUX STM ISOL VLV (Step not required)
- Close 2ASS-AOV145, AUX BLR STM INLET VLV,
- Place the Reboiler 2ASS-STV112 and 2ESS-STV104 control switches in the AUTO
- Direct the local operator to depress the RESET PUSHBUTTONS on the 2CES-IPNL204
- Open 2CNA-HV34A(B)
- Monitor for proper reboiler operation
- Reports steam supply transferred.

**EVENT 3 IRM "A" Inop Trip**

When directed by lead evaluator activate TRG  
1:

**NM09A, IRM CHANNEL A FAILURE – INOP**

*RPS A PILOT SCRAM VALVE SOLENOIDS  
four white lights are out, indicating RPS trip  
system A is tripped.*

*603102 RPS A NMS TRIP alarms*

*603110 RPS A AUTO TRIP alarms*

*603201 IRM TRIP SYSTEM A*

*UPSCALE/INOPERABLE alarms*

*At P603 IRM reading remains consistent with  
its current value, but IRM A red UPSC TR OR  
INOP red light above range switch is lit,  
indicating an INOP trip has occurred.*

SRO PO-1.0

- Direct actions for IRM failure consult ITS 3.3.1.1.

RO PO-2.0

- Recognize IRM "A" failure.
- Reports to SRO.
- Bypass IRM "A" per N2-OP-92, H.3.0.
- Resets half scam per N2-OP-97, Sect H.2.0
- At 2CEC\*PNL603, reset SCRAM signals by momentarily placing applicable switches to RESET as follows:
  - REACTOR SCRAM RESET LOGIC A
  - REACTOR SCRAM RESET LOGIC C
  - Verify PILOT SCRAM VALVE SOLENOID white lights A, C, E AND G are lit.
- Reports IRM bypassed and half scam reset.

**EVENT 4 Loss of power to Div I switchgear.**

**When directed by lead evaluator activate**

**TRG 2:**

**ED04F, 4.16 KV NORMAL BUS FAULT**

**(SWG16)**

*Loss of power to Div I/III Switchgear.  
Div I and III EDGs start and pick up their  
respective buses.*

*SWP non-essential headers isolate.*

*SWP\*P1A automatically sequences on.*

*One required Offsite power source is  
inoperable.*

*Service Water is inoperable with a division of  
non-essential MOVs overridden open.*

Crew

PO-3.0

- Recognize loss of power from SWG016.
- Enter SOP-3 and perform immediate actions to stabilize SWP and restore pneumatics.

SRO

PO-1.0

- Monitor crew actions and implementation of SOP-3.
- Evaluate Tech Specs for the loss of power to SWG016. T.S. 3.8.1 AC Sources Operating.
- Enters T. S. 3.8.1 Condition A, restore in 24 hrs.
- Enters T.S. 3.7.1 Condition C, restore in 72 hrs.

BOP

- Perform additional actions of SOP-3 for a loss of power with EDGs on the bus.
- Verify Div I/III EDGs start.
- Verify SWP non-essential headers

**EVENT 5 Small Seismic Event, Service Water Pump trip, IRM G Upscale trip**

**When directed by lead evaluator activate TRG 3:**

**MT01 SEISMIC ACCELERATION (.085)**  
**CW01F SERVICE WTR PP TRIP (P1F)**  
**NM06G IRM G Fails Upscale (30 sec delay)**  
*842121 Seismic Acceleration Exceeded alarms*  
*Half scram on RPS A which cannot be reset.*  
*IRM "G" can not be bypassed due to the previous IRM "A" inop condition.*

isolate.

- Verify Div I SWP pump restarts.
- Restore flow to SWP non-essential headers.
- Start 3<sup>rd</sup> SWP pump in Div II.
- Restore pneumatics.

Crew

PO-2.0, 3.0

- Report alarms
- Monitor plant conditions
- Recognize trip of SWP\*P1F.
- Recognize IRM G upscale trip.
- Recognizes half scram on RPS A.
- Responds to Seismic alarm.

SRO

- Monitor crew response
- Directs SOP-90 entry for seismic event
- Entry into T.S. 3.7.1, Cond. E, required Act. E.1, restore required pump within 72 hours.
- Evaluates starting second SWP pump in DIV I.

*ALERT 8.4.4 is met when seismic acceleration exceeds OBE (0.075)*

- Direct actions for IRM failure enter TS 3.3.1.1. ; trip channel with completion time of 12 hours.
- Recognize EAL 8.4.4 is met.

BOP

- Refers to ARPs.
- Places SWP\*P1F in pull-to-lock.
- Throttles flows on remaining running SWP Pumps to maintain flows  $\leq 10,000$  gpm.
- If directed, starts second Div I SWP pumps as follows:
  - Start CSL Pump
  - Start RHR A Pumps
  - Start either SWP Pump C or E
  - Report status to SRO

**EVENT 6 Seismic Aftershock Event, RPV Instrument Line Rupture**

When directed by lead evaluator:

**Manually place MT01 Seismic Acceleration at new value of 0.25 on TRG 4. THEN activate TRG 4:  
MT01 Seismic Acceleration 0.25  
RR35A, RX VES NOZZLE N14 340 DEG  
RUPTURE DW**

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Drywell pressure rises and RPV water level lowers with the following alarms:*

*601718 HPCS REACTOR WATER LEVEL HIGH*

*602226 RECIRC PMP 1B AUTO TRIP LOW SPEED TRANSFER*

*603139 REACTOR WATER LEVEL HIGH/LOW*

*603141 FD WTR SYSTEM REACTOR WATER LEVEL HIGH*

*NARROW RANGE LEVEL "A" METER (C33-R606A ON P603) fails upscale and FEEDPUMP LEVEL 8 CHANNEL "A" trips. REACTOR PRESS RECORDER (C33-R609 ON P603), RX PRESS WIDE RANGE METER (C33-R605 ON P603) fail downscale.*

*Reactor building ventilation system will isolate and standby gas treatment system will start up. ECCS systems will actuate. EDG's will start and run unloaded.*

*Initially after the scram, EOP-RPV entry conditions are not expected to be met since initial power level is low.*

Crew

PO-4.0

- Recognize / report alarms and rising Drywell Pressure.
- Initiates a manual scram on rising Drywell pressure prior to automatic scram setpoint 1.68 psig is reached.

SRO

PO-5.0

- Monitor plant response
- Acknowledge scram report
- Enters SOP-101C for initial response until an EOP entry condition is reached.

*With RX LEVEL NR A level transmitter failed upscale, RPV water level slowly lowers.*

**Preset malfunction RH14B, ECCS FAILS TO INITIATE (DIV II) becomes effective.**

- Enter into EOP-RPV on high DWP
- Directs operators to control water level between the Post Scram low level and 200 inches and to restore RPV level to between 160 and 200 inches.
- Enters EOP-PC and RPV on high DWP
- Directs Drywell Cooling restored per EOP-6 Attachment 24.

RO

- May take manual control of FW prior to scram
- Places Mode switch to shutdown and provides scram report
- Restores RPV level (as directed).

SRO

- Recognizes/Responds to crew communication that Division II ECCS failed to auto initiate hen expected
- Directs Manual initiation of Division II ECCS
- May direct injection prevented from LP ECCS not needed for Core Cooling (RPV Override) before RPV pressure drops to 400 psig.

BOP

- Takes action to manually initiate Div II ECCS
- If directed, prevents LP ECCS injection before RPV pressure drops to 400 psig (EOP-RPV override)
- As Directed Injects with available FWS/Cond
- Restores Drywell Cooling per EOP-6 Attachment 24 as follows:
  - Determines hottest DW temperature is below 250°F
  - Places Div I and Div II DRYWELL UNIT COOLER WTR LOCA OVERRIDE switches to OVERRIDE
  - Closes individual Unit Cooler CCP-MOV's
  - Opens CCP Containment Isolation valves  
2CCP\*MOV265, 273, 122 and 124
  - Re-opens individual Unit Cooler CCP-MOV's
  - Places GRP 1 and GRP 2 UNIT COOLER FANS LOCA OVERRIDE switches to



**EVENT 7**

**AFTER DW Cooling is restored, activate**

**TRG 5**

**RR34A RR34A, RX VES NOZZLE N14 20**

**DEG RUPTURE DW**

**RR20 RR LOOP RUPTURE DBA 0.8%**

*REACTOR LEVEL RECORDER (B22-R623A ON P601), REACTOR PRESSURE RECORDER (B22-R623A ON P601), and SPDS PRESSURE input fails low.*

*RHS\*MOV24A Injection Valve receives an OPEN PERMISSIVE. If using RHS Loop A for SC Spray, Injection valve must be overridden closed to allow RHS\*MOV33A to be opened.*

*Use of RHS Loop B instead of Loop A is also acceptable, even without LOCA initiation signal present.*

*Drywell and Suppression Chamber pressure rise at a faster rate. Suppression Chamber pressure slowly rises and SC Spray should be established. Pressure remains below 10 psig and DW should not be required.*

OVERRIDE

- Starts all ten available DW Unit Cooler fans
- Reports DW Cooling is restored.

SRO

- Directs operator to establish SC sprays before pressure reaches 10 psig EOP-6, Att. 22

BOP

- Establishes SC sprays before pressure reaches 10 psig IAW EOP-6, Att. 22 as follows:
  - Verify closed RHS\*MOV24A
  - Verify RHS\*P1A running
  - Open RHS\*MOV33A
  - Verify spray header flow
  - IF Suppression Pool Cooling is also directed, throttle open RHS\*FV38A
  - Open SWP valve to RHS Heat Exchanger.

**EVENT 8**– Loss of RPV level indication, RPV Flooding

**SIM BOOTH: AFTER SC Spray is in service, activate TRG 6:**

**RR27, RPV LEVEL INSTRUMENTS ALL FAUL UPSC**

*Remaining narrow, wide and upset range level instruments at P603 fail upscale. Fuel Zone recorder and indicator along with the wide range level instruments on P601 PAM recorders also fail upscale. Shutdown range on P851 is failed.*

*RHS Loop being used for spray should now be manually realigned to inject, since flooding is required.*

*As the RPV floods, RPV pressure begins to rise. When sufficient pressure is in the RPV, the P601 SRV indicators may now indicate the SRVs are open.*

CREW PO-5.0 – 8.0

- Crew recognizes that RPV level is unknown.

SRO

- Enters EOP-C4 for RPV flooding
- **Directs restoration of pneumatics and RPV blowdown ( 7 ADS valves open) CT-1.0**  
Acknowledge only 5 ADS SRVs open.
- Directs additional SRVs opened
- Directs MSIVs shut.
- Directs RCIC Steam Line Isolations shut.
- Directs Main Steam line drains isolated.
- Directs RPV injection with available systems
- **Directs Continued Injection until the main steam lines are flooded as indicated by:**
  - **Increasing Reactor pressure.**
  - **SRV Red Light Indication on P601 –acoustic monitor noise.**
  - **Decreasing SRV tailpipe temperature.**

**CT-2.0**

**Preset malfunctions AD08E, ADS VLV N2 SUPPLY SEVERED (MSS\*PSV134) and AD08G ADS VLV N2 SUPPLY SEVERED (MSS\*PSV129) become effective.**

*At P601, ADS Accumulator Tank pressure drop to 0 psig for the failed SRV's.*

*After flooding to the steam lines the crew may divert a loop of RHS to SC Spray. If SCP has exceeded 10 psig, Drywell Spray should be directed.*

- Verify ECCS injecting
- Monitor containment response
- Directs crew to monitor for indications of core damage IAW EOP-C4

BOP

- Initiates blowdown by opening 7 ADS valves
- Report only 5 ADS SRVs open.
- Open additional SRVs
- **Establishes 7 SRVs open**

**CT- 1.0**

- Continues feeding vessel with available systems as directed.
- Monitors for indications of main steam lines flooded.
- **Continues Injection until the main steam lines are flooded as indicated by:**
  - **Increasing Reactor pressure.**
  - **SRV Red Light Indication on P601 –acoustic monitor noise.**
  - **Decreasing SRV tailpipe temperature.**

**CT-2.0**

RO

- Shuts all MSIVs.
- Verifies shut RCIC Steam Isolation valves, 2ICS\*MOV121 & 2ICS\*MOV128.
- Verify closed Main Steam Lines drain valves.
- Continues feeding vessel with available systems as directed.
- **Monitors if main steam lines are flooded as indicated by:**
  - **Increasing Reactor pressure.**
  - **SRV Red Light Indication on P601 –acoustic monitor noise.**
  - **Decreasing SRV tailpipe temperature.**

**CT-2.0**

**Termination Criteria:**

Indication of Mean Steam Lines Flooded is determined by crew

XI. POST SCENARIO CRITIQUE

C. NA, NRC Exam

XII. REFERENCE EVENTS AND COMMITMENTS

E. Reference Events

None

F. Commitments

3. None

4.

XIII. LESSONS LEARNED

## EVALUATED SCENARIO CHECKLIST

1. Additional Information about these checks:

For continuing training, can be found in NUREG 1021, ES 604 and Appendix D.

For initial training, can be found in NUREG 1021, ES 301 and Appendix D.

2. Qualitative Attributes

X	Realism/Credibility
X	Event Sequencing
X	Simulator Modeling
X	Evaluating Crew Competencies

3. Quantitative Attributes

6	Total Malfunctions
2	Malfunctions after EOP Entry
3	Abnormal Events
1	Major Transients
2	EOPs Used
1	EOP Contingency Procedures Used
	Simulator Run Time
	EOP Run Time
2	Crew Critical Tasks (if applicable per Attachment 6.)

4. Developmental Checks:

Does every event have either a Critical Task(s) or Performance Objective?

Is Criteria given for sequencing to subsequent events?

Is termination criteria clear and unambiguous?

Does termination criteria allow verification that all CT, PO standards are met?

NMP SIMULATOR SCENARIO

**NRC Scenario 4**

**REV. 00**

**No. of Pages: 30**

STATION BLACKOUT WITH STEAM LEAK IN DRYWELL

PREPARER	<u>S. Dennis</u>	DATE	<u>12/6/07</u>
VALIDATED	<u>Ops Crew with W. Coppom</u>	DATE	<u>12/9/07</u>
GEN SUPERVISOR OPS TRAINING	<u>R. Brown</u>	DATE	<u>1/23/08</u>
OPERATIONS MANAGER	<u>NA Exam Security</u>	DATE	<u>                    </u>
CONFIGURATION CONTROL	<u>NA Exam Security</u>	DATE	<u>                    </u>

SCENARIO SUMMARY

Length: 1.5 hours

Initial Power Level: 100%

The scenario begins with the crew performing a power maneuver to lower power to 90% for a rod line adjustment which will take place on the next shift. The crew will perform surveillance N2-OSP-RMC-W@001 Control Rod Movement and Position Verification. Following the third rod tested, a trip of the running CRD pump will occur due to a clogged suction strainer. Actions must be taken to start the standby pump. Once the standby pump is started, position indication for a control rod will be lost requiring the SRO to address Technical Specifications (TS 3.1.3.C.1 and 2).

One of the Control Room AC units will trip and the standby unit will fail to auto-start. The SRO will enter TS 3.7.3.A. The running Stator Water Cooling pump then trips and the standby pump fails to start but can be manually started. If a bypass valve opens due to the pump trip and generator runback a power reduction will be required. When conditions stabilize, a loss of 4KV normal NNS-SWG015 will occur which affects RPS and requires operator action to transfer RPS to its alternate supply. Additionally, Switchgear 15 may be re-powered.

Once conditions are stabilized, a small leak will develop in the drywell requiring a manual scram of the reactor. A failure of the mode switch and RPS manual scram pushbuttons will occur requiring the use of RRCS to insert control rods (CT). The SRO will enter EOPs and EOP contingencies.

Once the rods are inserted, a Loss of Offsite Power will occur. Additionally, the EDGs will fail to auto start. The operators will take actions to start the EDGs in the control room IAW SOP-03 but they will fail to start. SOP-Station Blackout must be entered and NRC 2008 Scenario 4

the EDGS can be started locally to repower the bus or the HPCS EDG can be used to re-power a Divisional bus (**CT**). The containment leak will get worse. The operators will be expected to control containment pressure with Drywell Spray prior to exceeding the Pressure Suppression Pressure (**CT**).

Major Procedures Exercised: EOP-RPV, PC, C6. SOP-1,3,11,30,68

EAL Classification: Alert – 6.1.3 – AC Power loss for >15 minutes on one bus  
Alert – 3.1.1 – Primary Containment Pressure cannot be maintained <1.68 psig  
Alert - 2.1.1 – auto scram failed

Termination Criteria: Containment pressure is decreasing and RPV level and pressure are being controlled.

Mitigation Strategy: PC3 SE1



#### IV. SIMULATOR SET UP

G. IC Number: IC-194 or IC-17 w/n08scen4.bat loaded

#### H. Presets/Function Key Assignments

##### 4. Malfunctions:

a.	RD18	ONLINE CRD SUCTION FLTR CLOG	TRG 1
b.	RD11	30-59 CONTROL ROD FAILURE RPIS (ANY) (DELAY 5 SECONDS)	TRG 2
c.	EG06A	MAIN GEN STATOR CLG PMP TRIP	TRG 4
d.	MS03	STM LEAK INSIDE PRI CONT, 5%	TRG 7
e.	RP03	RPS FAILURE TO SCRAM	PRESET
f.	ED02A	LOSS OF OFFSITE 115KV LINE 5	TRG 8
g.	ED02B	LOSS OF OFFSITE 115KV LINE 6	TRG 8
h.	DG01A	DG #1 FAILURE TO START	PRESET
i.	DG01C	DG #3 FAILURE TO START	PRESET
j.	ED14	UPS FAULT 2VBB-UPS1G	TRG 9
k.	MS04	STM LINE RUPTURE IN PRI CONT 1% RAMP 8 minutes	TRG 13

##### 2. Remotes:

a.	RP02	RPS MG2 EPA, RESET	TRG 6
b.	RC02	RCIC LVL 8 TRIP, DEFEAT	TRG 14
c.	DG01	LOCKOUT RELAY DG1, RESET	TRG 11
d.	DG03	LOCKOUT RELAY DG3, RESET	TRG 12
e.	SB05	2VBS-PNLA102 BKRS 1,2	TRG 20
f.	SB06	2VBS-PNLB102 BKR 3 (DLY 10 SECS)	TRG 20
g.	SB07	2VBS-PNLA104 BKR 3 (DLY 20 SECS)	TRG 20
h.	SB08	2VBS-PNLB103 BKR 7 (DLY 30 SECS)	TRG 20
i.	SB01	2VBS-PNLA101 BKRS 6,7,9,11,12,13,19,20,36,37 (DLY 1 MIN)	TRG 20
j.	SB02	2VBS-PNLB101 BKR 5,6,7,8,9,12,13,14,15 (DLY 1MIN 10 SECS)	TRG 20
k.	SB03	2VBS-PNLB104 BKR 3 (DLY 1 MIN 20 SECS)	TRG 20
l.	SB04	2VBS-PNLA103 BKR 3 (DLY 1 MIN 45 SECS)	TRG 20
m.	SB11	2VBS-PNLA101 BKR 35	TRG 21

- n. SB12 2VBS-PNLB101 BKR 23 (DLY 10 SECS) TRG 21
- o. SB09 2VBS-PNL101A BKRS 3,11,13,20 (DLY 20 SECS) TRG 21
- p. SB13 2BYS-PNL201A BKRS 11,18,19,20 (DLY 30 SECS) TRG 21
- q. SB15 2BYS-PNL202A BKRS 1,2,3,4,5,6 (DLY 1 MIN TRG 21
- r. SB14 2BYS-PNL201B BKRS 18,21 (DLY 1 MIN 10 SECS) TRG 21
- s. SB10 2VBS\*PNL301B BKRS 12,13,17,20 TRG 21  
(DLY 1 MIN 20 SECS)
- t. SB16 2BYS\*PNL202B BKRS 1,2,3,4 (DLY 1 MIN 45 SECS) TRG 21

6. Overrides:

- a. OVR-20A2S065DI2438 PTL CNTL RM A/C FAN ACU 1A SW TRG 3
- b. OVR-04A2S022DI6126 GEN STR COOL PMP 2GMC P1B PRESET
- c. OVR-05A2S101DI7234 PTL NORM INCOMING TRG 5  
13.8KV NORM BUS FD
- d. OVR-18A3S095DI1357 STP CONTROL ROOM A/C FAN\*ACU1B  
PRESET  
OFF (GRN)
- e. OVR-18A3S095DI1358 NAP CONTROL ROOM A/C FAN\*ACU1B  
PRESET  
OFF (GRN)

7. Annunciators:

- d. 870326 Control Rm AC Unit 1A Auto Trip, Crywolf, 10 sec delay TRG 3

F. Equipment Out of Service

- 4. None

H. Support Documentation

- 1. Provide RMR for Power reduction with Recirc Flow.
- 2. Working copy of N2-OSP-RMC-W@001 for rod exercising.

G. Miscellaneous

- 1. EVENT TRIGGER 2 rod 30-59 at 46 trgset 2 "rdvposb(182)== 736"
- 2. EVENT TRIGGER 15 and 16, both for "zdpc1hvcb01(2)" (ACU1B control switch taken to start). This deletes the preset overrides that are preventing ACU1B from auto-starting (OVR-18A3S095DI1357 and OVR-18A3S095DI1358)

II.

**SHIFT TURNOVER INFORMATION**

OFF GOING SHIFT:  N  D DATE: \_\_\_\_\_

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

- Control Panel Walkdown (all panels) (SM, CRS, STA, CRO, CRE)

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

Shift Supervisor Log (SM, CRS, STA)

- CRO Log (CRO)

Lit Control Room Annunciators  
(SM, CRS, STA, CRO, CRE)

- Shift Turnover Checklist (ALL)

- LCO Status (SM, CRS, STA)

- Computer Alarm Summary (CRO)

Evolutions/General Information/Equipment Status:

- Reactor Power = 100%
- Loadline = >100%
- None

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

Lower Reactor power per RMR to 90% to support rod line adjustment next shift.

Perform N2-OSP-RMC-W@001 Control Rod Movement and Position Verification Test

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

- Review new Clearances (SM)
- Shift Crew Composition (SM/CRS)
- Test Control Annunciators (CRE)

TITLE	NAME	TITLE	NAME
SRO			
ATC RO			
BOP RO			

Scenario ID#

INSTRUCTOR COMMENTS (Strengths, Areas for Improvement, Open Items etc.)


What Happened?	What we did?	Why? (Goals)	Other Options?

## VI. PERFORMANCE OBJECTIVES

### G. Critical Tasks:

- CT-1.0 Given a failure of RPS the crew will use of RRCS to insert control rods.
- CT-2.0 Given a Loss of Off-Site Power with a failure of the EDGs the operators will take actions to re-power at least one vital bus (either with a local EDG start or HPCS EDG cross tie) IAW SOP-03.
- CT-3.0 Given a leak in the drywell the crew will initiate Drywell Spray prior to exceeding the Pressure Suppression Pressure

### H. Performance Objectives:

- PO-1.0 Given the plant at rated power, the crew will lower power to 90% using recirc flow control following the guidance of the provided RMR and N2-OP-101D.
- PO-2.0 Given the plant at 90% power, the crew will perform surveillance N2-OSP-RMC-W@001
- PO-3.0 Given a loss of the a running CRD pump, the crew will start the Standby CRD pump before receiving any accumulator alarms, IAW N2-SOP-30.
- PO-4.0 Given the failure of control rod position indication for a control rod Refer to N2-OP-96, Section H and restore RPIS.
- PO-5.0 Given the plant or plant system in a condition requiring Technical Specification action, identify the deviation and any required actions/notifications.
- PO-6.0 Given a loss of the operating stator water cooling pump and the failure of the standby pump to auto start the operating crew will take action to manually start the standby pump IAW N2-SOP-21, N2-SOP-68 and N2-SOP-101C.
- PO-7.0 Given a loss of the Control Room AC Unit and the failure of the standby AC unit to auto start the operating crew will take action to manually start the standby AC unit IAW N2-OP-53A.

- PO-8.0 With an electrical fault on NNS-SWG015, the crew will electrically isolate NNS-SWG015 and investigate the cause per N2-SOP-03.
- PO-9.0 With "B" RPS de-energized due to loss of NNS-SWG015, the crew will re-energize "B" RPS from its alternate supply per N2-SOP-97.
- PO-10.0 With DW Cooling fans de-energized due to loss of NNS-SWG015, the crew will start DRS-UC3A per N2-OP-60.
- PO-11.0 With the plant operating at power the crew will respond to LOCA in the drywell
- PO-12.0 Given the plant following a scram with a station blackout, the crew will respond to the station blackout in accordance with N2-SOP-1 and N2-SOP-03.

**EVENT 1 – Power reduction to 90%**

**EVENT 1 –SRO Actions**

**EVENT 1 –RO Actions**

*Core Flow lowers, Power lowers*

**EVENT 1 –BOP Actions**

CREW

- Crew conducts a pre-brief, walks down the panels, and tests annunciators.

SRO

PO-1.0

- If not previously performed, conducts Shift and Reactivity Briefs.
- Directs power lowered to 90% per RMR and OP-101D

RO

- Lowers power to 90 % by reducing core flow
- Moves RCS\*HYV17A&B individually in the close direction, maintaining loop flow differential at a minimal value by alternating between the two valves.
- Monitors NIs and rate of power change.

BOP

- Monitors plant parameters to verify proper operations.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

**EVENT 2 - Perform N2-OSP-RMC-W@001  
Control Rod Movement and Position  
Verification Surveillance Test**

**EVENT 2 –SRO Actions**

SRO

PO-2.0

- Authorizes/directs performance of surveillance N2-OSP-RMC-W@001

**EVENT 2 –RO Actions**

RO

- Commences surveillance
- Exercises first control rod
- Exercises the second rod

**EVENT 3 CRD P1A suction filter clog**

When directed by lead evaluator activate malfunction on TRG 1:

**RD18, ONLINE CRD SUCTION FLTR CLOG.**

*RDS-P1A trips on low suction pressure.*

*AN 603318 CRD Pmp Suct Fltr Diff Press High*

*AN 603315 CRD Pmp 1B Suct Press Low*

*AN 603309 CRD Pmp 1A Suct Press Low*

*AN 603308 CRD Pmp 1A/1B Auto Trip RDS-P1A trips*

*AN 603446 CRD PUMP DISCH HEADER PRESSURE LOW*

CREW

PO-3.0

- Recognize/Report the loss of RDS-P1A

**EVENT 3 SRO Actions**

SRO

- Directs RO to halt surveillance test.



**NOTE: If Required, prompt SRO to continue with surveillance test when CRD suction Filters are swapped**

**EVENT 3 –RO Actions**

**Examiner Note: May receive alarm 603324 for RWCU system. This will require RWCU to be removed from service (due to loss of CRD flow to pump seals)**

Role Play: As an Operator dispatched to Swap CRD Suction Filters, wait 3 min. or as directed by lead instructor, **clear Malfunction RD18** and report Suction Filters swapped.

**Examiner Note: The following annunciator may alarm during the CRD suction Filter swap.**

*AN 603316, "CONTROL ROD HIGH TEMPERATURE" alarms.*

- Directs RO to enter and execute SOP-30
- When suction filter has been swapped directs the resumption of Control Rod Movement surveillance test.

RO

- Enters and executes SOP-30
  - Places RDS Flow Controller to "MAN"
  - Closes RDS Flow Control Valve
  - Directs AO to shift RDS Suction Filters
  - Throttles closed WCS\*MOV200 until F/Ds are in "HOLD"
  - Trips WCS Pumps
  - Acknowledge CRD Suction Filter Swap.
  - Restart a CRD pump per N2-SOP-30.
  - Report CRD Flow restored.

CREW

- Recognizes/Reports control rod high temperature alarm and takes the actions of ARP.
- Dispatches Aux Operator to monitor CRD temperatures.

Role Play: As the Aux Operator dispatched to monitor CRD temperatures, report that highest temperature is on rod 18-43 (report 265°F if alarm is in, report 240°F if alarm is clear).

**EVENT 4 - Rod Position Indication Lost**

**NOTE: Trigger 2 automatically activates when rod 30-59 is at position 46, after 5 second delay.**

**EVENT 4 SRO Actions**

Role Play: As the Reactor Engineer direct a halt to all further rod movement and direct the SRO to determine the control rod movement and notify Reactor Engineering if any control rod movement occurs.

Role Play: As the I & C Supervisor ask for all the current control room annunciators and state you will send an I & C Tech to determine the cause of the problem.

CREW PO-4.0 & 5.0

- Resumes N2-OSP-RMC-W@001 Control Rod Movement and Position Verification.
- Diagnose loss of RPIS for 30-59

SRO

- Suspend all attempts to move control rods.
- Direct entry into N2-OP-96, Section H.
- Refer to Technical Specification 3.1.3
- Determines a control rod whose position cannot be determined be declared inoperable and fully inserted within 3 hours and disarmed within 4 hours.

**EVENT 4 RO Actions**

PNL 615 is not simulated. If required provide cue that I&C will obtain this data.

**EVENT 5 - Control Room AC unit trips**

**When directed by lead evaluator activate TRG 3:**

**OVR-20A2S065DI2438 PTL CNTL RM A/C FAN ACU 1A SW, ON AN870326 Control Rm AC Unit 1A Auto Trip, CRYWOLF (10 sec delay).**

*2HVC\*ACU1A Control Room ACU trips. ACU1B should start on low flow, but it fails to automatically start.*

- Notify the Reactor Engineer AND Contact the I&C Department to troubleshoot AND repair.

RO

- Suspend all attempts to move control rods.
- Refer to N2-OP-96, Section H.
- Record the lit LEDs in 2CEC-PNL615.
- Attempt to determine the position of 30-59 by checking:
  - The Full-In (or Full-out) indication on the R&DD.
- Demand an OD-7 printout from the process computer.
- Reposition rod to a known position.

CREW

PO-7.0

- Recognizes and diagnoses the loss of Control Room AC and the standby unit failure to auto-start.

**EVENT 5 SRO Actions**

SRO

- Directs manual start of CNTL RM A/C FAN ACU 1B
- Enters procedure N2-OP-53A
- Enters TS 3.7.2.A – 7 days, TS 3.7.3.A – 30 days.

**EVENT 5 RO Actions**

- Monitors Reactor Power, Pressure & Level

**EVENT 5 BOP Actions**

BOP

- Manually starts CNTL RM A/C FAN ACU 1B.
- Verifies system conditions IAW  
Enters procedure N2-OP-53A
- Verifies CR HVAC operates correctly

**EVENT 6 Stator water pump trip, failure of standby to auto start**

When directed by the lead evaluator activate TRG 4

**EG06A MAIN GEN STATOR CLG PMP TRIP (P1A)**

*GMC-P1A trips on motor electric fault.  
AN851135, STTR CLG WTR Pump 1A/1B  
Auto Trip/Fail to Start  
GMC-P1B fails to start automatically  
EHC Loadset motor begins to runback  
Turbine bypass valves begin to open.*

Crew

PO-8.0

- Recognizes/reports loss of GMC-P1A.
- Recognizes failure of standby GMC pump to start automatically.

**EVENT 6 SRO Actions**

SRO

- Enters SOP-68

**EVENT 6 RO Actions**

RO

- Enters SOP-68
- If a runback occurs, initiate a power reduction IAW N2-SOP-101D as necessary to maintain the BPV closed

**EVENT 6 BOP Actions**

BOP

Role Play: As the AO sent to Stator Water skid that all conditions are normal. If sent to the breaker for GMC-P1A report that the breaker front is warm.  
Report that the breaker for GMC-P1B appears normal.

- Enters SOP-68
- Manually starts GMC-P1B
- Reports start of standby GMC pump
- Dispatched personnel to the local GMC skid to check for probable causes.

**EVENT 7 Loss of NNS-SWG015**

**When directed by lead evaluator activate override on TRG 5:**

**OVR-05A2S101DI7235 STP NORM INCOMING 13.8KV NORM BUS FD**

*Supply breaker to NNS-SWG015 (15-3) trips open. SWG015 and NJS-US6 de-energize*

*Major alarms include 852545 4KV BUS NNS 015 SUPPLY ACB AUTO TRIP/FTC, 852547*

CREW

PO-8.0, 9.0, 10.0

- Recognize trip of RPS and loss of SWG015.
- Enter SOP-3 for loss of SWG015.
- Enter SOP-97 to re-energize RPS B Scram Solenoids.

*4KV BUS NNS 015 UNDERVOLTAGE and  
852453 LOAD CENTER NJS US6  
UNDERVOLTAGE*

*Plant response will include loss of CCS-P1B,  
RDS-P1B (non-running pump, if A was  
restarted in Event 3), WCS-P1B, 1/2 of DW  
Cool Fans and RPM - MG1B causing the RPS  
B scram pilot solenoids to de-energize (silent  
half scram).*

**CUE:** After being dispatched by control room,  
report as Electrical Maintenance that NNS-  
SWG015 has no problems and it appears a  
problem occurred with BKR 15-3.

**EVENT 7 SRO Actions**

**Role Play:** After being dispatched by control  
room, report as Electrical Maintenance that  
Switchgear 15 has no problems and it appears  
a problem occurred with BKR 15-3.

**Role Play:** As AO dispatched for SOP-97,  
report, as necessary:

- RPM\*ACB1B tripped
- RPM\*ACB2B tripped
- RPM-MG1B not running
- RPM-MG1B Generator Output switch  
closed
- NHS-MCC009-4EL breaker closed

**SRO**

- Ensures SOP-3 is entered for  
SWG015 loss.

**EVENT 7 RO Actions**

**EVENT 7 BOP Actions**

*If RPS Power Source Selector Switch at P610 is incorrectly positioned to ALT A, a reactor scram will occur.*

**Sim Booth:** When asked to reset the EPAs for RPS, activate remote on **TRG 6:**

**RP02 RPS MG2 EPA, RESET**

**Role Play:** As AO dispatched for SOP-97 to reset the EPAs report:

- EPA relay trip flags reset
- EPA breaker reset

*After the EPA breakers are reset, the four white lights for P603 RPS B scram pilot solenoid lights will light, indicating power is restored to scram pilot solenoids.*

RO

- Check control rod positions for drifting control rods
- Monitor Power, Pressure & Level

BOP

- Place RPS Alternate power switch to ALT B at P610.
- Direct an operator to reset the EPAs.

**EVENT 8 Steam Leak in containment,  
Failure to Scram**

**When RPS B has been re-energized per  
SOP-97 and as directed by the lead  
evaluator, activate malfunction TRG 7:**

**MS03 STM LEAK INSIDE PRI CONT, 5%**

*603140 Drywell Pressure HIGH/LOW*

**EVENT 8 SRO Actions**

*When the Mode switch is placed in  
SHUTDOWN and manual scram pushbuttons  
are depressed, the RPS logic fails to trip. N2-  
EOP-RPV is entered and then exited. N2-  
EOP-C5 is entered.*

*After RRCS is manually initiated, the ARI  
function will bleed down the scram air header  
and all control rods fully insert.*

CREW

PO-11.0

- Recognizes and responds to annunciator.
- Identifies and reports changing containment parameters.

SRO

- Directs mode switch to shutdown.
- Enters RPV Control.
- Directs EOP-RPV on power >4% and scram is required.
- Exits EOP-RPV and enters EOP-C5 Failure to SCRAM.
- Directs ADS logic inhibited.
- Directs CSH placed in pull-to-lock. Inches
- **Directs RRCS initiated. Rods Insert**

**CT-1.0**

- Exits EOP-C5, Re-Enters EOP-RPV
- Directs a RPV water level band 160-200 inches.



**EVENT 8 RO Actions**

*RPS fails to trip.*

*Control rods insert after the scram air header  
bleeds down following ARI/RRCS initiation.*

**EVENT 8 BOP Actions**

- Directs a RPV pressure band with a target of 800-1000 psig.
- Directs EOP-6, Attachment 13.
- May direct EOP-6 Attachment 10.

RO

PO-4.0

- Place reactor mode switch in shutdown and provides scram reports.
  - Attempts manual scram using RPS pushbuttons
  - Recognizes and Reports all control rods did not insert
  - **Initiates RRCS IAW EOP-6, Attachment 13 (rods insert)**
- CT-1.0**
- Takes appropriate action to maintain RPV water level within the directed band of 160 -200 inches.

BOP

- Takes appropriate action to maintain RPV pressure within the directed band.
- Inhibits ADS.
- As directed places HPCS in PTL

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Drywell Cooling can only be restored if AC power is available, when this step is implemented.*

- Restores drywell Cooling (EOP-6 att 24):
  - Determines drywell temperature <250°F
  - Overrides drywell unit cooler water LOCA isolation interlocks with keylock switches.
  - Verifies closed drywell unit cooler inlet valves
- Restores CCP to drywell by opening containment isolation valves.
  - Restores CCP to drywell unit coolers by opening drywell unit cooler inlet valves.
  - Overrides drywell unit cooler fan interlocks with keylock switches.
  - Restarts drywell Unit cooler Fans (all).

**Sim Booth Operator:** After exiting EOP-Failure to Scram and re-entering EOP-RPV control AND a level and pressure band has been established activate **TRG 8:**

**EVENT 9 – Loss of Offsite Power with EDG Auto start failures (SBO).**

**ED02A, LOSS OF OFFSITE 115KV LINE 5  
ED02B, LOSS OF OFFSITE 115KV LINE 6**

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*Loss of Line 5 and 6 resulting in NPS-SWG001 and 003.*  
*Loss of all Feed*  
*Recirc pumps trip*  
*CRD pump trips*  
*Circ Water pumps trip and condenser vacuum degrades.*  
*Loss of all AC except Div III Diesel*

**EVENT 9 SRO Actions**

TRG 20 and 21 are only used if load shedding is directed during the SBO. It is likely that SBO will be exited prior to initiating load shed.

**EXAMINER NOTE:**

**After the SRO enters the Station Blackout EOP, and requests performance of the step to Bypass the RCIC Room High Temperature Alarms, the EDGs will be made available.**

**The field operator dispatched will report that there are indications of an incomplete start on both EDGs and they can be started locally.**

**At examiners discretion, once operators are dispatched to the 4KV buses per SOP-3 Attachment 1, a prompt may be given regarding the availability of the EDGs.**

**Sim Booth:**

**When requested, as the field operator report that there are indications of an incomplete start on both EDGs, the problem was found and they can be started**

CREW

PO-12.0

- Recognizes and reports Loss of Power.
- Recognizes SOP and EOP- entry Conditions.

SRO

- Directs Entry to SOP-3 for Loss of AC
- Directs start attempt of the EDGs from the control room
- **Restores power to at least one vital bus either with the EDGs or Cross-Tie of the HPCS EDG to a bus**

**CT-2.0**

- Enters Station Blackout-SOP and performs all legs concurrently until EDG(s) are returned to service and vital buses are repowered.
- Updates crew on EOP-RPV entry.
- Directs level control using RCIC.
- Directs pressure control using SRV's
- Directs entry into EOP-PC as appropriate.

locally.

**After the SRO enters the Station Blackout EOP, and requests performance of the step to Bypass the RCIC Room High Temperature Alarms, the EDGs will be made available.**

**When directed by examiner to allow restart of the EDGS;**

**Manually Delete Malfunctions:**

**DG01A for Div 1 DG**

**DG01C for Div 2 DG**

**AND**

**Insert Remote DG01 –Reset TRG 11**

**Insert Remote DG03 –Reset TRG 12**

**EVENT 9 BOP Actions**

*Per procedures, if the HPCS Div III DG is the only DG started, it must be manually shutdown because of lack of cooling water. Cooling water is supplied from Div I and II service water.*

**Sim Booth: Once the Divisional EDGs have started and the emergency busses are energized, activate TRG 13:**

**MS04, STM LINE RUPTURE IN PRI CON 1% with 8 minute ramp.**

- Directs suppression chamber spray be initiated before exceeding 10 psig suppression chamber pressure.

BOP

- Attempts to start the EDGs 1 and III as per SOP-3 Detail “A” instructions:
  - Checks listed annunciators
  - Reports DGs cannot be started from control room die to lit annunciators
  - RECOGNIZES AND REPORTS THAT NEITHER EDG can be STARTED.
- Secures HPCS EDG IAW SOP-3
- Once EDGs are started, Controls RPV pressure with SRVs – 800 - 1000 psig

*Drywell and Suppression Chamber Pressure rise and approach 10 psig (SCP).*

- Places RHR A(B) in suppression chamber sprays as follows.
  - Opens SWP\*MOV90A(B) – may be delayed until after spray are in service as follows:
  - Verifies RHR pump A(B) running.
  - Verifies RHS\*MOV24A(B) overridden closed.
  - Opens RHS\*MOV33B to establish SC spray flow.
  - Opens RHS\*FV38A(B) and establish approximately 7450 gpm-if suppression pool cooling is required.
  - Throttles open SWP\*MOV33A(B) to establish flow not to exceed 7400 gpm. May be required to start 5<sup>th</sup>Service Water pump (post-LOCA).
  - Closes RHS\*MOV8A(B) – after 10 minute time delay from ECCS initiation signal.
  - Directs RP to place SWP\*RE23A(B) in service.

INSTRUCTOR ACTIONS/  
PLANT RESPONSE

OPERATOR ACTIONS

*DW pressure continues to rise and when SC pressure exceeds 10 psig, DW Spray is required.*

*Pressure Suppression Pressure (PSP from EOP-PC Curve L) limit is about 17 psig in SC with SPL at 200.5 feet.*

*After DW Sprays are initiated, DWP and SCP begin to lower.*

SRO

- Directs DW spray when SC Pressure is >10 psig
- Verifies DW spray conditions are met.
- Directs RCS Pumps tripped.
- Direct DRS Unit Coolers tripped.
- **Directs DW Spray IAW EOP-6, Attachment 22 prior to exceeding the PSP limit.**

**CT-3.0**

RO/BOP

- When directed to place DW spray in service
  - Trips/verifies tripped RCS Pumps.
  - Trips DRS Unit Coolers.
- **Places RHR in Drywell Spray prior to exceeding the Pressure Suppression pressure limit as follows: CT-3.0**
  - Verifies an initiation signal present.
  - Opens SWP\*MOV90A(B) – May be delayed until after sprays are in service.
  - Verifies RHR pump running.
  - Verifies closed RHS\*FV38A (B).

- Verifies open RHS\*MOV4A (B).
- **Opens RHS\*MOV25A (B).**
- **Opens RHS\*MOV15A (B).**
- Verifies RHS\*MOV4A (B) closes.
- Verifies approximately 7450 gpm on drywell spray header.
- Closes RHS\*MOV8A (B) after 10 minute time delay from receipt of initiation signal.
- Contacts RP to start SWP\*RE23A(B).
- Throttles open SWP\*MOV33A (B) to establish flow not to exceed 7400 gpm – may be required to start 5<sup>th</sup> service water pump (post LOCA).
- Monitors for improving containment parameters

**Termination Cue:**

Containment pressure is decreasing and RPV level and pressure are being controlled.

#### XIV. POST SCENARIO CRITIQUE

D. NA, NRC Exam

#### XV. REFERENCE EVENTS AND COMMITMENTS

G. Reference Events

None

H. Commitments

5. None

#### XVI. LESSONS LEARNED



## EVALUATED SCENARIO CHECKLIST

1. Additional Information about these checks:

For continuing training, can be found in NUREG 1021, ES 604 and Appendix D.

For initial training, can be found in NUREG 1021, ES 301 and Appendix D.

2. Qualitative Attributes

X	Realism/Credibility
X	Event Sequencing
X	Simulator Modeling
X	Evaluating Crew Competencies

3. Quantitative Attributes

7	Total Malfunctions
2	Malfunctions after EOP Entry
5	Abnormal Events
1	Major Transients
2	EOPs Used
1	EOP Contingency Procedures Used
	Simulator Run Time
	EOP Run Time
2	Crew Critical Tasks (if applicable per Attachment 6.)

4. Developmental Checks:

Does every event have either a Critical Task(s) or Performance Objective?

Is Criteria given for sequencing to subsequent events?

Is termination criteria clear and unambiguous?

Does termination criteria allow verification that all CT, PO standards are met?