Facility: **Browns Ferry NPP** Scenario No.: **NRC - 1** Op-Test No.: **1205**

Examiners:_____ Operators: SRO:_____

_____ ATC:_____

_____ BOP:_____

Initial Conditions: 95% power. DG 3A is OOS. Tech Spec 3.8.1 Condition B has been entered and offsite power availability was verified 5 minutes ago.

Turnover: Perform Stroke Time Test on 3-FCV-43-13 and 3-FCV-43-14 per 3-SR-3.6.1.3.5 Section 7.6 and Section 7.7. Raise Power to 100% with Recirc Flow.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP	3-SR-3.6.1.3.5, perform stroke time testing on 2 PCIVs.
2	N/A	R-ATC R-SRO	Raise Power to 100% with flow.
3	cu04	C-ATC TS-SRO	RWCU Leak with failure to Auto isolate.
4	eg13a	C-BOP C-SRO	Bus Duct Cooling Fan A Trip with failure of standby fan to auto start.
5	th03a	C-ATC TS-SRO	RR Pump A Trip with power oscillations.
6	th30d	I-BOP TS-SRO	Level 2 instrument failure (58D) causes HPCI to Auto initiate.
7	hp08	M-ALL	HPCI Steam Leak without Isolation.
8	tc02	C	No bypass valves with ATWS.
9	ed12a	C	Loss of 480V RMOV BD 3A.

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

FINAL

Events

1. BOP will perform Stroke Time Test on 3-FCV-43-13 and 3-FCV-43-14.

2. ATC raises power to 100% with Recirc Flow.

3. The crew will respond to RWCU alarms indicating a leak and RWCU valve 3-FCV-69-1 will fail to automatically isolate. The ATC will isolate RWCU and take actions IAW 2-AOI-64-2A. The SRO will enter EOI-3 on High Secondary Containment Temperatures, evaluate Tech Spec 3.6.1.3, and determine Condition A must be entered. Also, TRM Technical Surveillance Requirement 3.4.1.1 to monitor Reactor Coolant Conductivity continuously cannot be met and samples must be drawn every 4 hours.

4. BOP will respond to Bus Duct Cooling 3A Fan trip and take action IAW with ARPs, start standby Bus Duct Cooling Fan 3B.

5. Reactor Recirculation 3A Pump will trip, crew will respond IAW 3-AOI-68-1A. The ATC will close 3A RR Pump Discharge Valve. Small power oscillations will develop. The ATC will insert control rods to dampen oscillations and exit region 2. The SRO will evaluate Technical Specification 3.4.1; Condition A is required.

6. Level transmitter 58D will fail to less than -45 inches. This failure will result in a HPCI auto initiation. The crew will respond IAW ARPs. Crew will verify that level is in normal band and secure HPCI. The SRO will evaluate Technical Specification 3.3.4.2 Condition A and B, 3.3.5.1 Condition A, B and F, 3.3.5.2 Condition A and B, and 3.8.1 Condition D and J.

7. Shortly after the HPCI initiation a steam leak will develop in the HPCI Room, HPCI will fail to automatically and manually isolate. When attempting to manually isolate the HPCI steam valve, 3-FCV-73-2, the 3A 480V RMOV Board will be lost due to an electrical fault.

8. The crew will enter EOI-3 and scram the Reactor. A small ATWS will occur on the scram; power, level and pressure will be controlled IAW EOI-1. When the second MAX safe temperature is reached the crew will Emergency Depressurize.

9. Turbine Bypass Valves will not be available on the scram with an ATWS of 20 rods.

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner.

All but 6 Control Rods are inserted

Emergency Depressurization complete

Reactor Level is restored and maintained.

Critical Tasks – Four

CT#1-With a primary system discharging into the secondary containment, before any area exceeds the maximum safe operating level, manually scram the reactor.

1. Safety Significance:
   Places the primary system at a lower energy state and reduces driving head and flow of system discharging into the secondary containment.

2. Cues:
   Procedural compliance,.
   Secondary containment area temperatures, level, and radiation indication.
   Field reports.

3. Measured by:
   Observation - US enters EOI-1 at RC-1 and RO manually inserts a scram.

4. Feedback:
   Rod insertion.
   Reactor power decreasing.

Critical Tasks

CT#2-With a primary system discharging into the secondary containment, when two or more areas are greater than their maximum safe operating values for the same parameter, RO initiates Emergency Depressurization as directed by US. BFN Operations Management expectation is that this action will be taken within 5 minutes.

1. Safety Significance:
   Places the primary system in the lowest possible energy state, rejects heat to the suppression pool in preference to outside the containment. and reduces driving head and flow of system discharging into the secondary containment.

2. Cues:
   Procedural compliance.
   Secondary containment area temperatures, level, and radiation indication.
   Field reports.

3. Measured by:
   Observation - US transitions to C-2 and RO opens at least 6 SRV's when two or more areas are greater than their maximum safe operating values for the same parameter.

4. Feedback:
   RPV pressure trend.
   SRV status indications.

CT#3 - During an ATWS, when conditions with Emergency Depressurization required, Terminate and Prevent RPV injection from ECCS and Feedwater until reactor pressure is below the MARFP as directed by US.

1. Safety Significance:
   Prevention of fuel damage due to uncontrolled feeding.

2. Cues:
   Procedural compliance.

3. Measured by:
   Observation - No RHR, CS, C&FW, or HPCI injection prior to being less than MARFP (190 psig).
   AND
   Observation - Feedwater terminated and prevented until less than the MARFP (190 psig).

4. Feedback:
   Reactor power trend, power spikes, reactor short period alarms.
   Injection system flow rates into RPV.

Critical Tasks

CT#4 - With RPV pressure <MARFP (190 psig), slowly increase and control injection into RPV to restore and maintain RPV level above TAF as directed by US.

1. Safety Significance:
   Maintaining adequate core cooling and preclude possibility of large power excursions.

2. Cues:
   Procedural compliance.
   RPV pressure indication.

3. Measured by:
   Observation - Injection not commenced until less than MARFP (190 psig), and injection controlled such that power spikes are minimized, level restored and maintained greater than TAF.

4. Feedback:
   RPV level trend.
   RPV pressure trend.
   Injection system flow rate into RPV.

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER: NRC 1

8 Total Malfunctions Inserted: List (4-8)

4 Malfunctions that occur after EOI entry: List (1-4)

4 Abnormal Events: List (1-3)

1 Major Transients: List (1-2)

3 EOI's used: List (1-3)

2 EOI Contingencies used: List (0-3)

75 Validation Time (minutes)

4 Crew Critical Tasks: (2-5)

YES Technical Specifications Exercised (Yes/No)

Scenario Tasks

EVENT	TASK NUMBER	K/A	RO	SRO
1	Stroke Time Containment Isolation Valves			
	RO U-064-SU-08 SRO S-000-AD-81	223002A2.08	2.7	3.1
2	Raise Power with Recirc Flow			
	RO U-068-NO-17 SRO S-000-NO-138	2.1.23	4.3	4.4
3	RWCU Leak with Failure to Auto Isolate			
	RO U-069-AL-10 SRO S-000-EM-12	223002A2.03	3.0	3.3
4	Bus Duct Cooling Fan Trip			
	RO U-047-AL-13	245000A2.05	3.6	3.8
5	Reactor Recirculation Pump Trip			
	RO U-068-AB-1 SRO S-068-AB-1	202001A2.03	3.6	3.7
6	Level 2 Instrument Failure			
	RO U-073-NO-5 RO U-071-NO-5 SRO S-000-AD-27	216000A3.01	3.4	3.4
7	HPCI Steam Leak			
	RO U-073-AL-06 SRO S-000-AB-03 SRO S-000-EM-12 SRO S-000-EM-15	295032EA2.03	3.8	4.0

Procedures Used/Referenced:

Procedure Number	Procedure Title	Procedure Revision
3-SR-3.6.1.3.5	Primary Containment Isolation Valve Operability Test	Rev 26
3-GOI-100-12	Power Maneuvering	Rev 37
3-OI-68	Reactor Recirculation System	Rev 81
3-ARP-9-3D, W17	RWCU Leak Detection Temperature High	Rev 28
3-AOI-64-2A	Group 3 RWCU Isolation	Rev 9
TS 3.6.1.3	Primary Containment Isolation Valves	Amd 212
TRM 3.4.1	Coolant Chemistry	Rev 21
3-EOI-3	Secondary Containment Control	Rev 11
3-ARP-9-7A, W31	Generator Bus Duct Fan Failure	Rev 23
3-AOI-68-1A	Recirc Pump Trip/Core Flow Decrease OPRMs Operable	Rev 6
3-ARP-9-3F, W29	Reactor Water Level Low Low HPCI/RCIC Initiation	Rev 28
TS 3.3.4.2	Anticipated Transient Without Scram Recirculation Pump Trip (ATWS-RPT) Instrumentation	Amd 213
TS 3.3.5.1	Emergency Core Cooling System (ECCS) Instrumentation	Amd 213
TS 3.3.5.2	Reactor Core Isolation Cooling (RCIC) System Instrumentation	Amd 213
TS 3.8.1	AC Sources - Operating	Amd 244
TS 3.5.1	ECCS - Operating	Amd 244
TS 3.5.3	RCIC System	Amd 244
3-ARP-9-3F, W10	HPCI Leak Detection Temperature High	Rev 28
3-EOI-1	RPV Control	Rev 8
3-AOI-100-1	Reactor Scram	Rev 55
3-EOI-App-3A	SLC Injection	Rev 1
3-EOI-3-C-5	Level/Power Control	Rev 9
3-EOI-App-4	Prevention of Injection	Rev 5
3-EOI-3-C-2	Emergency RPV Depressurization	Rev 8
3-EOI-App-6A	Injection Subsystems Lineup Condensate	Rev 2
3-EOI-App-6C	Injection Subsystems Lineup RHR System II LPCI Mode	Rev 3
3-EOI-App-2	Defeating ARI Logic Trips	Rev 4

Procedures Used/Referenced:

Procedure Number	Procedure Title	Procedure Revision
3-EOI-App-1F	Manual Scram	Rev 2
3-EOI-App-1D	Insert Control Rods using Reactor Manual Control System	Rev 2
3-EOI-2	Primary Containment Control	Rev 8
3-EOI-App-17A	RHR System Operation Suppression Pool Cooling	Rev 6
EPIP-1	Emergency Classification	Rev 47
EPIP-4	Site Area Emergency	Rev 32

Simulator Instructor – IC205

Bat nrc1108-10	**Bat nrcstick20**	**Bat nrcunstick14**
#3A DG tagged out ior ypobkr1838 fail_ccoil mrf dg01a open ior zlo3hs2113ea9a[1] off **#RWCU seal leak no auto iso** imf cu06 imf cu04 (e1 0) 100 300 50 **#bus duct cooling fan trip** imf eg13a (e5 0) **#Recirc pump A trip, with pwr oscillations** imf th03a (e10 0) imf cr02a (e10 30) 10 120 imf cr02b (e10 30) 10 120 **#HPCI Initiate due to failed Instr** imf th30d (e15 0) 35 60 84 imf hp01 (e16 0) **#ATWS/major HPCI Leak (have to manually modify fp02 to close)** mrf fp02 (e20 0) close imf hp09 imf hp08 (e20 0) 8 820 4 trg 21 nrc2011732 trg 21 = imf ed12a ior ypovfcv733 (e20 0) fail_now bat nrcstick20 imf tc02 (e20 0) 0 trg 26 = bat app01f trg 27 = bat app02 trg 28 = bat app08ae trg 29 = bat nrcunstick14	imf rd06r2635 imf rd06r3035 imf rd06r3435 imf rd06r2235 imf rd06r2623 imf rd06r3423 imf rd06r2631 imf rd06r3431 imf rd06r2639 imf rd06r3439 imf rd06r2227 imf rd06r2627 imf rd06r3027 imf rd06r3427 imf rd06r2243 imf rd06r2643 imf rd06r3043 imf rd06r3443 imf rd06r1843 imf rd06r1819	dmf rd06r3435 dmf rd06r3423 dmf rd06r2631 dmf rd06r3431 dmf rd06r2639 dmf rd06r3439 dmf rd06r3027 dmf rd06r3427 dmf rd06r2243 dmf rd06r2643 dmf rd06r3043 dmf rd06r3443 dmf rd06r1843 dmf rd06r1819

#if crew anticipates ED, may have to raise severity hp08 ~25%

NRC Scenario 1

		DESCRIPTION/ACTION
Simulator Setup	manual	Reset to IC 205
Simulator Setup	**Load Batch**	bat nrc1108-10
Simulator Setup	manual	Clearance DG 3A
Simulator Setup		Verify file loaded

Procedures needed :

- **RCP required (95% - 100% with flow)**
- **RCP for Urgent Load Reduction**
- **Marked up copy of 3-GOI-100-12**
- **Copy of 3-SR-3.6.1.3.5 P&L's and Section 7.6 and 7.7**

Simulator Event Guide:

Event 1 Normal: Perform stroke time testing on 2 PCIVs (3-FCV-43-13 and 3-FCV-43-14)

	SRO	Directs BOP to perform 3-SR-3.6.1.3.5, Section 7.6.
	BOP	Performs 3-SR-3.6.1.3.5, Section 7.6.
		3-SR-3.6.1.3.5, Primary Containment Isolation Valve Operability Test, Section 7.6. **NOTES** 1) Valves 3-FCV-43-13 and 3-FCV-43-14 are normally closed. 2) The following section is performed on Panel 3-9-3 unless otherwise noted.
		7.6 3-FCV-43-13 Valve Stroke Timing [1] **RECORD** the initial position of RX RECIRC SAMPLE INBD ISOLATION VLV, 3-FCV-43-13. OPEN / CLOSED (Circle one)
		[2] On 3-LPNL-925-0009B (RB 621', near steps to Precoat Tank), **PLACE** REACTOR RECIRC SAMPLE INBD ISOL VLV, 3-HS-043-0013B OPEN position.
	Driver	When called 3-HS-043-0013B is in the OPEN position.
		[3] **VERIFY OPEN** 3-FCV-43-13 using RX RECIRC SAMPLE INBD ISOLATION VLV, 3-HS-43-13A.
		[4] **CLOSE** and **TIME** 3-FCV-43-13, using RX RECIRC SAMPLE INBD ISOLATION VLV, 3-HS-43-13A, and **RECORD** the closure time below. **3-FCV-43-13 Closure Time (Seconds)** **Normal** **Measured** **Maximum** 0.6 - 1.6 5.0
		[5] **CHECK** 3-FCV-43-13 closure time is less than or equal to the maximum closure time.
	NA	[6] **IF** the time recorded in step 7.6[4] is more than the maximum value listed, **THEN** (Otherwise **N/A** this section.)
	NA	[7] **IF** the stroke time measured in step 7.6[4] is less than or equal to the maximum stroke time but outside the normal range, **THEN** (Otherwise NA this section)
	BOP	[8] **RETURN** 3-FCV-43-13, to the initial position recorded in Step 7.6[1], using RX RECIRC SAMPLE INBD ISOLATION VLV, 3-HS-43-13A.
		[9] On 3-LPNL-925-0009B (RB 621', near steps to Precoat Tank), **PLACE** REACTOR RECIRC SAMPLE INBD ISOL VLV, 3-HS-043-0013B to the CLOSE position.
	Driver	When called 3-HS-043-0013B is in the CLOSE position.

Simulator Event Guide:

Event 1 Normal: Perform stroke time testing on 2 PCIVs

<table>
<tr><td></td><td>SRO</td><td>Directs BOP to perform 3-SR-3.6.1.3.5, Section 7.7.</td></tr>
<tr><td></td><td>BOP</td><td>Performs 3-SR-3.6.1.3.5, Section 7.7.</td></tr>
<tr><td></td><td></td><td>7.7 3-FCV-43-14 Valve Stroke Timing

[1] RECORD the initial position of RX RECIRC SAMPLE OUTBD ISOLATION VLV, 3-FCV-43-14. OPEN / CLOSED (Circle one)</td></tr>
<tr><td></td><td></td><td>[2] On 3-LPNL-925-0009B (RB 621', near steps to Precoat Tank), PLACE REACTOR RECIRC OUTBD ISOLATION VLV, 3-HS-043-0014B to the OPEN position.</td></tr>
<tr><td></td><td>Driver</td><td>When called 3-HS-043-0014B is in the OPEN position.</td></tr>
<tr><td></td><td></td><td>[3] VERIFY OPEN 3-FCV-43-14 using RX RECIRC SAMPLE OUTBD ISOLATION VLV, 3-HS-43-14A.</td></tr>
<tr><td></td><td></td><td>[4] CLOSE and TIME 3-FCV-43-14, using RX RECIRC SAMPLE OUTBD ISOLATION VLV, 3-HS-43-14A, and RECORD the closure time below.

<table>
<tr><th colspan="3">3-FCV-43-14 Closure Time (Seconds)</th></tr>
<tr><th>Normal</th><th>Measured</th><th>Maximum</th></tr>
<tr><td>0.4 - 1.4</td><td></td><td>5.0</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>[5] CHECK 3-FCV-43-14 closure time is less than or equal to the maximum closure time.</td></tr>
<tr><td></td><td>NA</td><td>[6] IF the time recorded in step 7.7[4] is more than the maximum value listed, THEN (Otherwise N/A this section.)</td></tr>
<tr><td></td><td>NA</td><td>[7] IF the stroke time measured in step 7.7[4] is less than or equal to the maximum stroke time but outside the normal range, THEN (Otherwise NA this section)</td></tr>
<tr><td></td><td>BOP</td><td>[8] RETURN 3-FCV-43-14, to the initial position recorded in Step 7.7[1], using RX RECIRC SAMPLE OUTBD ISOLATION VLV, 3-HS-43-14A.</td></tr>
<tr><td></td><td></td><td>[9] On 3-LPNL-925-0009B (RB 621', near steps to Precoat Tank), PLACE REACTOR RECIRC OUTBD ISOLATION VLV, 3-HS-043-0014B to the CLOSE position.</td></tr>
<tr><td></td><td>Driver</td><td>When called 3-HS-043-0014B is in the CLOSE position.</td></tr>
<tr><td></td><td>BOP</td><td>Informs SRO that 3-FCV-43-14 and 3-FCV-43-14 have passed the SR</td></tr>
<tr><td></td><td>Driver</td><td>IF crew contacts the System Engineer or Duty Engineer because the operator "mis-timed" the valve stroke, THEN, as the System Engineer, inform the crew that a second valve stroke is authorized and they should document this as required by the SR.</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Simulator Event Guide:

Event 2 Reactivity: Raise Power to 100% with Recirc Flow

	SRO	Notifies ODS of power increase.
		Directs Power increase using Recirc Flow, per 3-GOI-100-12. [21] **WHEN** desired to restore Reactor power to 100%, **THEN PERFORM** the following as directed by Unit Supervisor and recommended by the Reactor Engineer: • **RAISE** power using control rods or core flow changes. **REFER TO** 3-SR-3.3.5(A) and 3-OI-68.
	ATC	Raise Power w/Recirc, IAW 3-OI-68, Section 6.2
		[1] **IF** desired to control Recirc Pumps 3A and/or 3B speed with Recirc Individual Control, **THEN PERFORM** the following; • Raise Recirc Pump 3A using, RAISE SLOW (MEDIUM), 3-HS-96-15A(15B). **AND/OR** • Raise Recirc Pump 3B using, RAISE SLOW (MEDIUM), 3-HS-96-16A(16B).
		[2] **WHEN** desired to control Recirc Pumps 3A and/or 3B speed with the RECIRC MASTER CONTROL, **THEN ADJUST** Recirc Pump speed 3A & 3B using the following push buttons as required: RAISE SLOW, 3-HS-96-31 RAISE MEDIUM, 3-HS-96-32
	Driver	When directed by NRC, insert **TRIGGER 1** for RWCU Leak with failure to Auto isolate

Simulator Event Guide:

Event 3 Component: RWCU leak with failure to auto isolate

	ATC	Report alarm RWCU LEAK DETECTION TEMP HIGH (3-9-3D Window 17) A. **IF** this alarm is received in conjunction with RWCU ISOL LOGIC CHANNEL A TEMP HIGH [3-XA-55-5B, window 32] and RWCU ISOL LOGIC CHANNEL B TEMP HIGH [3-XA-55-5B, window 33], **THEN EXIT** this procedure and **GO TO** 3-ARP-9-5B. Otherwise, **CONTINUE** in this procedure.
		Report alarms RWCU ISOL LOGIC CHANNEL A TEMP HIGH (3-9-5B Window 32) and RWCU ISOL LOGIC CHANNEL B TEMP HIGH (3-9-5B Window 33)
		RWCU ISOL LOGIC CHANNEL A TEMP HIGH (3-9-5B Window 32) A. **VERIFY** alarm by checking: 1. ATUs on Panel 3-9-83 and 3-9-85. 3. Area temperature indications on LEAK DETECTION SYSTEM TEMPERATURE, 3-TI-69-29, on Panel 3-9-21.
		B. **IF** leak is suspected, **THEN MANUALLY ISOLATE** RWCU or if RWCU automatically isolates, **REFER TO** 3-AOI-64-2A. C. **IF** TIS-69-835A(C) indicates greater than 131°F, **THEN ENTER** 3-EOI-3.
	ATC	Reports RWCU Valve 69-1 failed to isolate
	ATC	Closes 69-1 to stop RWCU Leak
	SRO	Directs Penetration Isolated or concurs with the closure of 69-1
	SRO	Enter EOI-3 and 3-AOI-64-2A
	ATC	**3-AOI-64-2A Group 3 RWCU Isolation** **4.1 Immediate Actions** [1] **VERIFY** automatic actions occur. [2] **PERFORM** any automatic actions which failed to occur.
	Driver	Acknowledge Notifications, when dispatched to ATUs report high temperatures in RWCU HX room and temperature lowering.
	SRO	Contact work management and radiation protection.

Simulator Event Guide:

Event 3 Component: RWCU leak with failure to auto isolate

	BOP	**3-AOI-64-2A Group 3 RWCU Isolation** **4.2 Subsequent Actions** [1] **IF** any EOI entry condition is met, **THEN ENTER** appropriate EOI(s). [2] **CHECK** the following to confirm high area temperature condition exists: • LEAK DETECTION SYSTEM TEMPERATURE, 3-TI-69-29 (Panel 3-9-21) • ATUs in Auxiliary Instrument Room [3] **IF** isolation is caused by high area temperature, **THEN DETERMINE** if a line break exists by: • RWCU ARMs 3-RI-90-9A, 13A, and 14A • Visual Observation • Rx Zone Exhaust Rad Monitors 3-RE-90-142A, 142B, 143A, and 143B [4] **PERFORM** necessary Heat Balance adjustments. **REFER TO** 3-OI-69. [5] **CHECK** the following monitors for a rise in activity: • AREA RADIATION, 3-RR-90-1, Points 9, 13, and 14 (Panel 3-9-2) • AIR PARTICULATE MONITOR CONSOLE, 3-MON-90-50, 3-RM-90-55 and 57 (Panel 3-9-2) • RB, TB, and Refuel Zone Exhaust Rad on CHEMISTRY CAM, MONITOR CONTROLLER, 0-MON-90-361 (Panel 1-9-2) [6] **IF** it has been determined that leakage is the cause of the isolation, **THEN NOTIFY** RADCON of RWCU status. [7] **NOTIFY** Chemistry that RWCU has been removed from service for the following evaluations: • The need to begin sampling Reactor Water • The need to remove the Durability Monitor from service [8] **IF** the isolation cannot be reset, **THEN** [9] **EVALUATE** Technical Requirements Manual Section 3.4.1, Coolant Chemistry, for limiting conditions for operation.
	Driver	When directed by NRC, insert trigger 5 for Bus Duct Cooling Fan Trip

Simulator Event Guide:

Event 3 Component: RWCU leak with failure to auto isolate

	SRO	Evaluate Technical Specification 3.6.1.3 and determine Condition A required and TRM 3.4.1. Notifies Chemistry that continuous monitoring is no longer available and to commence sampling per TRM Surveillance 3.4.1.1. Appendix R compensatory Measure A is required

3.6 CONTAINMENT SYSTEMS

3.6.1.3 Primary Containment Isolation Valves (PCIVs)

LCO 3.6.1.3 Each PCIV, except reactor building-to-suppression chamber vacuum breakers, shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3,
When associated instrumentation is required to be OPERABLE per LCO 3.3.6.1, "Primary Containment Isolation Instrumentation."

CONDITION	REQUIRED ACTION	COMPLETION TIME
A.------NOTE-------- Only applicable to Penetration flow paths With two PCIV's ---------- One or more penetration flow paths with one PCIV inoperable except due to MSIV leakage not within limits.	A.1 Isolate the affected penetration flow path by use of at least one closed and de-activated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured. AND A.2 ----------NOTE---------- Isolation devices in high radiation areas may be verified by use of administrative means. ---------- Verify the affected penetration flow path is isolated.	4 hours except for main steam line AND 8 hours for main steam line Once per 31 days for isolation devices outside primary containment AND Prior to entering MODE 2 or 3 from MODE 4, if Primary containment was de-inerted while in MODE 4, if not performed within the previous 92 days, for isolation devices inside primary containment

App R

Manual #: Fire Protection Report Vol. 1	PLANT: BFN	UNIT(s): 1/2/3	PAGE 837 of 904
TITLE: Appendix R Safe Shutdown Program		SECTION: 4	REV: 11

SECTION III – REQUIRED SAFE SHUTDOWN EQUIPMENT – UNIT 3

EQUIPMENT	DESCRIPTION	UNIT(S)	APPENDIX R FUNCTION	COMPENSATORY MEASURES	AREA / ZONES AFFECTED
			SYSTEM 069 - REACTOR WATER CLEANUP		
3-FCV-069-0001	RWCU INBD SUCT ISLN VLV	3	CLOSE FROM MCR	A	12
3 FCV 069 0002	RWCU OUTBD SUCT ISLN VLV	3	CLOSE FROM MCR	A	1 1, 1 2, 1 3, 1 4, 1 5, 1 6, 2 1, 2 2, 2-3, 2-4, 2-5, 2-6, 3-1, 3-2, 3-4, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25-1, 25-2, 25-3, 26

Simulator Event Guide:

Event 3 Component: RWCU leak with failure to auto isolate

		Enters EOI-3 on High Secondary Containment Temperature. **Secondary Containment Temperature** Monitor and Control Secondary Containment Temperature. Operate available ventilation, per Appendix 8F. Answers **YES** to: Is Any Area Temp Above Max Normal? Isolate all systems that are discharging into the area Verifies RWCU Isolated **Secondary Containment Radiation** Monitor and Control Secondary Containment Radiation Levels. Answers **NO** to: Is Any Area Radiation Level above Max Normal? **Secondary Containment Level** Monitor and Control Secondary Containment Water Levels. Answers **NO** to: Is Any Floor Drain Sump Above 66 inches? AND Answers **NO** to: Is Any Area Water Level Above 2 inches?
	Driver	When directed by NRC, insert trigger 5 for Bus Duct Cooling Fan Trip

Simulator Event Guide:

Event 4 Component: Bus Duct Cooling Fan A Trip with failure of standby fan to auto start

	BOP	Responds to alarm "GEN BUS DUCT FAN FAILURE" 7A-31
		A. **VERIFY** Main Bus Cooling Fans, 3-HS-262-1A or 1-HS-262-2A, indicates running on Panel 3-9-8 **AND START** GEN BUS DUCT HX FAN A(B) using 3-HS-262-1A(2A), on panel 3-9-8 to start the standby fan. B. **IF** no Fans are operating and the Generator is tied to the grid and loaded to greater than the self cooled bus rating of 16,500 amps **THEN**, **IMMEDIATELY INSERT** a manual reactor scram, **AND TRIP** the Main Generator. C. **IF** while executing this procedure, the Bus Duct Temperature is at or above the Temperature Excursion limit of 120°C, **THEN IMMEDIATELY INSERT** a manual reactor scram, **AND TRIP** the Main Generator.
		D. **DISPATCH** personnel as necessary to check the following: 1. Main Bus Cooling Fan on elevation 586' to check fan condition. 2. Monitor Bus Duct temperature by available means including using a portable temperature monitor device locally at the 14 in-service thermostats. **REFER** to Window 32, Figure 1. 3. 480V Unit Board 3A on elevation 586' to check breaker 5C closed. 4. 480V Unit Board 3B on elevation 604' to check breaker 5C closed. E. **VERIFY** the system is operating in accordance with 3-OI-47.
	BOP	Start Standby Bus Duct Cooling Fan B and dispatches personnel
	SRO	Concurs with start or directs start of Bus Duct Cooling Fan B
	BOP	Dispatch personnel to breaker and bus duct cooling fans
	Driver	Breaker for bus duct cooling fan A is tripped, no abnormal indications apparent, if asked to reset breaker, breaker trips again, no problems noted at fans
	SRO	Contact work management and maintenance manager.
	Driver	When directed by NRC, insert **TRIGGER 10** for RR pump A trip

Simulator Event Guide:

Event 5 Component: RR Pump A Trip with power oscillations

<table>
<tr><td></td><td>ATC</td><td>Respond to numerous alarm and Report Trip of RR Pump A</td></tr>
<tr><td></td><td>SRO</td><td>Enter 3-AOI-68-1A Recirc Pump Trip/Core Flow Decrease OPRMs Operable</td></tr>
<tr><td></td><td>ATC</td><td>[1] IF both Recirc Pumps are tripped in modes 1 or 2, THEN (Otherwise N/A),
[2] IF a single Recirc Pump tripped, THEN CLOSE tripped Recirc Pump discharge valve.</td></tr>
<tr><td></td><td>ATC</td><td>Closes 3A Recirc Pump Discharge Valve</td></tr>
<tr><td></td><td>ATC</td><td>[3] IF Region I or II of the Power to Flow Map is entered, THEN IMMEDIATELY take actions to INSERT control rods to less than 95.2% loadline.
[4] RAISE core flow to greater than 45%. REFER TO 3-OI-68.
[5] INSERT control rods to exit regions if not already exited. Refer to 0-TI-464, Reactivity Control Plan Development and Implementation.
[6] MAINTAIN operating Recirc pump flow less than 46,600 gpm. REFER to 3-OI-68.
Report in Region 2 of Power to Flow Map</td></tr>
<tr><td></td><td>SRO</td><td>Directs Load Line reduction to <95%
<table>
<tr><th>ROD NUMBER</th><th>FROM</th><th>TO</th><th></th><th>ROD NUMBER</th><th>FROM</th><th>TO</th></tr>
<tr><td>22-23</td><td>08</td><td>00</td><td></td><td>14-39</td><td>48</td><td>00</td></tr>
<tr><td>22-39</td><td>08</td><td>00</td><td></td><td>46-39</td><td>48</td><td>00</td></tr>
<tr><td>38-23</td><td>08</td><td>00</td><td></td><td>46-23</td><td>48</td><td>00</td></tr>
<tr><td>38-39</td><td>08</td><td>00</td><td></td><td>14-23</td><td>48</td><td>00</td></tr>
<tr><td>30-31</td><td>24</td><td>00</td><td></td><td>06-31</td><td>48</td><td>00</td></tr>
<tr><td>14-31</td><td>08</td><td>00</td><td></td><td>30-55</td><td>48</td><td>00</td></tr>
<tr><td>30-47</td><td>08</td><td>00</td><td></td><td>54-31</td><td>48</td><td>00</td></tr>
<tr><td>46-31</td><td>08</td><td>00</td><td></td><td>30-07</td><td>48</td><td>00</td></tr>
<tr><td>30-15</td><td>08</td><td>00</td><td></td><td>06-39</td><td>48</td><td>00</td></tr>
<tr><td>22-47</td><td>48</td><td>00</td><td></td><td>54-39</td><td>48</td><td>00</td></tr>
<tr><td>38-47</td><td>48</td><td>00</td><td></td><td>54-23</td><td>48</td><td>00</td></tr>
<tr><td>38-15</td><td>48</td><td>00</td><td></td><td>06-23</td><td>48</td><td>00</td></tr>
<tr><td>22-15</td><td>48</td><td>00</td><td></td><td></td><td></td><td></td></tr>
</table>
NOTES:
1 For all rod moves to the "full out" position (notch position 48), this signoff verifies coupling integrity was checked in accordance with 3-OI-85.
2 Second-party verification by a second qualified member of the plant staff (i.e., RE, STA or UO) is required ONLY when the RWM is inoperable OR bypassed with core thermal power ≤ 10%. A Peer Checker may initial when second party is NOT required.
3 Record the rod number and any problems encountered, as applicable.</td></tr>
<tr><td></td><td>Driver</td><td>When directed by NRC, insert trigger 15 for Level 2 instrument failure (58D). When alarm 3F-29 (RX WTR LVL LOW LOW HPCI/RCIC INIT) comes in, insert trigger 16 cause HPCI to initiate</td></tr>
</table>

Simulator Event Guide:

Event 5 Component: RR Pump A Trip with power oscillations

	ATC	Insert Rods per Emergency shove sheets until <95% Load Line
	Driver	When First Control rod is inserted delete Power Oscillations cr02a and cr02b
	SRO	Evaluate Tech Spec for Single Loop Operation TS 3.4.1 Condition A
		Condition A — Requirements of the LCO not met. Required Action A.1 — Satisfy the requirements of the LCO Completion Time — 24 hours MODE Change not permitted until setpoint changes complete.
	Driver	When directed by NRC, insert **TRIGGER 15** for Level 2 instrument failure (58D). When alarm 3F-29 (RX WTR LVL LOW LOW HPCI/RCIC INIT) comes in, insert **TRIGGER 16** cause HPCI to initiate
	SRO	Contact work management and maintenance manager.

Simulator Event Guide:

Event 6 Instrument: Level 2 instrument failure (58D) causes HPCI to Auto initiate

	Driver	When directed by NRC, insert **trigger 15** for Level 2 instrument failure (58D). When alarm 3F-29 (RX WTR LVL LOW LOW HPCI/RCIC INIT) comes in, insert **trigger 16** cause HPCI to initiate
	BOP	Report alarm 3F-29 RX WTR LVL LOW LOW HPCI/RCIC INIT
	ATC/BOP	A. **CHECK** RPV water level using multiple indications.
		Report indicated water level on B instrument is less than -45 inches but other indicators are normal.
	ATC/BOP	Trips HPCI and locks out Aux Oil Pump using 3-HS-73-47A
	Driver	If dispatched to investigate failure if LI-3-58BB, wait 2 minutes and report, still investigating the cause, but it appears to be a problem with the Level Transmitter LT-3-58D.
	Crew	Determines that Level Transmitter LT-3-58D has failed therefore causing Level Indicator LI-3-58BB to indicate Low
	Driver	If dispatched to investigate the cause of HPCI Auto-Initiation, acknowledge dispatch
	SRO	**Technical Specifications** 3.3.4.2 Condition A Required Action A Completion Time 14 days 3.3.5.1 Condition A, B, and F for the following functions: 1.a, 2.a, 3.a, 4.a, 5.a Required Action A Completion Time Immediately Required Action B.1 Completion Time 1 hour Required Action B.2 Completion Time 1 hour Required Action B.3 Completion Time 24 hours Required Action F.1 Applies however Indefinite Completion time due to ADS Initiation Capability not lost in both Trip Systems Required Action F.2 Completion Time 96 hours 3.3.5.2 Condition A and B for function 1 Required Action A Completion Time Immediately Required Action B.1 Applies however Indefinite Completion time due to RCIC Initiation Capability not lost Required Action B.2 Completion Time 24 hours
	Diver	When directed by NRC, insert trigger 20 for HPCI steam leak without isolation, **Manually modify fp02 to Close**

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

NOTE	**NOTE**	When trigger 20 is inserted a HPCI steam leak with a failure to auto-isolate will occur. Also, 3-FCV-73-3, HPCI outboard Isolation valve will fail on the same trigger 20. When the operator attempts to close 3-FCV-73-2, HPCI inboard Isolation valve, 480V RMOV Board 3A will be lost. Therefore, 3-FCV-73-2 will lose power and be de-energized in the not full close position. This will eventually require the crew to Emergency Depressurize on 2 Max Safe Secondary Containment Temperatures.
	Crew	Recognize rising HPCI Room Temperatures and Radiation Levels. 3F-10 HPCI LEAK DETECTION TEMP HIGH A. **CHECK** HPCI temperature switches on LEAK DETECTION SYSTEM TEMPERATURE, 3-TI-69-29 on Panel 3-9-21. B. **IF** high temperature is confirmed, **THEN ENTER** 3-EOI-3 Flowchart. C. **CHECK** following on Panel 3-9-11 and **NOTIFY** RADCON if rising radiation levels are observed: 1. HPCI ROOM EL 519 RX BLDG radiation indicator, 3-RI-90-24A. 2. RHR WEST ROOM EL 519 RX BLDG radiation indicator, 3-RI-90-25A.
	ATC/BOP	**VERIFIES** HPCI STEAM LINE INBD ISOL VLV, 3-FCV-73-2 **AND** HPCI STEAM LINE OUTBD ISOL VLV, 3-FCV-73-3 **CLOSE.**
		Attempts to isolate HPCI Steam Supply Valves.
		Reports HPCI fails to isolate.
	ATC/BOP	During attempts to isolate HPCI Steam Supply Valves, report a loss of 3A RMOV Board. (Loop 1RHR and Loop 1 Core Spray unavailable.)
	Crew	Contacts personnel to investigate loss of 3A RMOV Board.
	Crew	Dispatches personnel to transfer RPS A to alternate.
	Driver	When requested, wait 4 minutes and place RPS A on alternate, irf rp04 **and** rp03. When requested to reset RPS ATU Gross Failures irf rp09
	Crew	PA announcement to evacuate the HPCI quad or Reactor Building
	SRO	Contact work management and maintenance manager.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	SRO	Enters EOI-3 on Secondary Containment (Area Radiation or Temperature).
	SRO	**IF** Reactor Zone **or** Refuel Zone Exhaust Ventilation isolated and ventilation radiation levels are below 72 mr/hr, **THEN** Restart Reactor Zone and Refuel Zone Ventilation, per Appendix 8F. Defeat isolation interlocks if necessary, Appendix 8E.
		If ventilation isolated and below 72 mr/hr, directs Operator to perform Appendix 8F.
	Driver	If requested, wait 3 minutes and report Appendix 8E complete, **enter** bat app08e
CT #1	SRO	**Enters** EOI-1 RPV Control **and** directs Reactor Scram **before** any temperature exceeds MAX Safe.
CT #2	SRO	Stops at Stop sign When temperatures in two or more areas are above Max Safe, Then Emergency Depressurization is required.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT #1	SRO	**Enters EOI-1 RPV Control and** directs Reactor Scram **before** any temperature exceeds MAX Safe.
CT #2	SRO	Stops at Stop sign When temperatures in two or more areas are above Max Safe, Then Emergency Depressurization is required.
	SRO	**EOI-3 Secondary Containment (Temperature)**
		Monitor and Control Secondary Containment Temperature.
		Is Any Area Temp Above Max Normal? - YES
		Isolate all systems that are discharging into the area except systems required to: • Be operated by EOIs **OR** • Suppress a Fire
		Will Emergency Depressurization Reduce Discharge Into Secondary Containment? - YES
		Proceeds to the STOP sign Before any area temp rises to Max Safe (table 5) Continue:
	Crew	Monitors for Max Safe Temperatures, reports when two areas are above MAX Safe (HPCI Room greater than 270°F and RHR System II Pump Room greater than 215°F)
	SRO	**EOI-3 Secondary Containment (Level)**
		Monitor and Control Secondary Containment Water Levels.
		Is Any Floor Drain Sump Above 66 inches?– NO Is Any Area Water Level Above 2 inches? - NO

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	SRO	**EOI-3 Secondary Containment (Radiation)**
		Monitor and Control Secondary Containment Radiation Levels.
		Is Any Area Radiation Level Max Normal? - YES
		Isolate all systems that are discharging into the area except systems required to: • Be operated by EOIs **OR** • Suppress a Fire
		Will Emergency Depressurization Reduce Discharge Into Secondary Containment? - YES
		Proceeds to the STOP sign Before any area radiation rises to Max Safe (table 4) Continue

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT #1	SRO	**Enters EOI-1 RPV Control and** directs Reactor Scram **before** any temperature exceeds MAX Safe based on EOI-3 step SC/T-6.
CT #1	ATC	Inserts Reactor Scram, Initiates One Channel of ARI and reports "rods out"
	SRO	**Enters EOI-1 from EOI-3 step SC/T-6** Verify Reactor Scram **EOI-1 RC/P** Monitor and Control RPV pressure Exits RC/P and enters C-2, Emergency RPV Depressurization, based on Override step RC/P-4. **EOI-1 RC/L** Monitor and Control RPV Water Level Verify as Required: • PCIS Isolations (Groups 1,2 and 3) • ECCS • RCIC Exits RC/L and enters C-5, Level/Power Control, based on override RC/L-3 **EOI-1 RC/Q** Monitor and Control Reactor Power • Crew may determine Reactor Subcritical and exit RC/Q, as long as NO Boron has been injected, at any point during execution. If this is done Crew would enter AOI-100-1, Reactor Scram, based on override RC/Q-2. **(The following steps will be executed through AOI-100-1 if RC/Q exited)** • Verify Reactor Mode Switch is in Shutdown • Initiate second channel of ARI • Verify Recirc Pump Runback (Pump speed 480rpm or less) • Answers **No** to is Reactor Power above 5% or Unknown **(The Following steps N/A if RC/Q exited)** • Before Suppression Pool Temperature rises to 110F, determines Boron Injection is Required. • Initiates SLC per Appendix 3A

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	SRO	**EOI-1 RC/Q (cont)** Inhibit ADS Verify RWCU System Isolation Answers **Yes** to is SLC injecting into the RPV Stops at step RC/Q-18 until SLC has injected into the RPV to a tank level of 43%, then exits RC/Q and enters AOI-100-1 Trips the SLC pump when SLC tank level drops to 0%
	ATC	Initiates Second Channel of ARI and reports "no rod movement." Verifies Recirc Pump at 480 rpm or less. Reports Reactor Power less than 5% during Scram Report **Should** insert IRM's to determine if Reactor is subcritical
	BOP/ATC	Verify and Report PCIS Isolations, ECCS and RCIC If directed, Initiate SLC per Appendix 3A, Inhibit ADS, and Verify RWCU System Isolation (These steps N/A if RC/Q exited and AOI-100-1 entered)
	ATC/BOP	Performs actions of 3-AOI-100-1 Scram Hardcards
	ATC	**Reactor Scram OATC Hard Card** **1.0 IMMEDIATE ACTIONS** [1] **DEPRESS** REACTOR SCRAM A and B, 3-HS-99-5A/S3A and 3-HS-99-5A/S3B, on Panel 3-9-5. [2] **IF** scram is due to a loss of RPS, **THEN PLACE** REACTOR MODE SWITCH, 3-HS-99-5A-S1, in START & HOT STBY **AND PAUSE** for approximately 5 seconds (Otherwise N/A)
		[3] Refuel Mode One Rod Permissive Light check [3.1] **PLACE** REACTOR MODE SWITCH, 3-HS-99-5A-S1, in REFUEL. [3.2] **CHECK** illuminated REFUEL MODE ONE ROD PERMISSIVE light, 3-XI-85-46. [3.3] **IF** REFUEL MODE ONE ROD PERMISSIVE light, 3-XI-85-46, is **NOT** illuminated, **THEN CHECK** all control rod positions at Full-In Overtravel, or Full-In. (Otherwise N/A)

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	ATC	[4] **PLACE** REACTOR MODE SWITCH, 3-HS-99-5A-S1, in SHUTDOWN. [5] **REPORT** the following status to the US: • Reactor Scram • Mode Switch is in Shutdown • "All rods in" or "rods out" • Reactor Water Level and trend (recovering or lowering). • Reactor pressure and trend • MSIV position (Open or Closed) • Power level
		2.0 SUBSEQUENT ACTIONS: [1] **IF** all control rods **CAN NOT** be verified fully inserted, **THEN PERFORM** the following (otherwise N/A): [1.1] **INITIATE** ARI by Arming and Depressing BOTH of the following: • ARI Manual Initiate, 3-HS-68-119A • ARI Manual Initiate, 3-HS-68-119B [1.2] **VERIFY** the Reactor Recirc Pumps (if running) at minimum speed at Panel 3-9-4. [1.3] **REPORT** "ATWS Actions Complete" and power level.
		[2] **DRIVE** in all IRMs and SRMs from Panel 3-9-5 as time and conditions permit. [3] **VERIFY** SCRAM DISCH VOL VENT & DR VLVS closed by green indicating lights at SDV Display on Panel 3-9-5. [4] **MONITOR** and **CONTROL** Reactor Water Level between +2" and +51", or as directed by US, using RFP/RFPT. [5] **RETURN** to body of procedure at step 4.2[5] **AND CONTINUE** with actions as required.
	BOP	**Reactor Scram BOP Unit Operator Hard Card** **1.0 SUBSEQUENT ACTIONS: PANELS 3-9-7 & 3-9-8** [1] At ≤ 50 MWe, or as directed by the Unit Supervisor, **VERIFY TRIPPED** the Main Turbine as follows: [1.1] **DEPRESS** the TRIP pushbutton, 3-HS-47-67D on Panel 3-9-7. [1.2] **VERIFY OPEN** GENERATOR PCB 234.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	BOP	[1.3] **RESET** disagreement white light as follows: **PLACE** GENERATOR PCB 234, 3-HS-35-234, to NORMAL AFTER TRIP (NAT). [1.4] **VERIFY TRIPPED** GENERATOR EXCITER FIELD BREAKER using 3-HS-57-24. [1.5] **PLACE** GENERATOR EXCITER FIELD BREAKER, 3-HS-57-24 in the NORMAL AFTER TRIP (NAT) position. [2] **ANNOUNCE** Reactor SCRAM over PA system.
		2.0 SUBSEQUENT ACTIONS: PANELS 3-9-3 [1] **MONITOR** and **CONTROL** RPV pressure to keep below 1073 psig and stable, or as directed by US. [1.1] **IF** RPV pressure is lowering rapidly, **THEN CLOSE** the MSIVs. (Otherwise N/A) [1.2] **IF** MSRVs are cycling and bypass valves are available, **THEN MANUALLY OPEN** MSRVs on Panel 3-9-3 until RPV pressure is below 965 psig. (Otherwise N/A) [1.3] **IF** MSRVs are cycling and bypass valves are **NOT** available, **THEN MANUALLY OPEN** MSRVs on Panel 3-9-3 until RPV pressure is controlled between 800 and 1000 psig. (Otherwise N/A)
		[2] **IF** any PCIS isolation signal is received, **THEN VERIFY** PCIS isolations using any of the following: (Otherwise N/A) • Containment Isolation Status System on Panel 3-9-4 • PCIS Mimic and individual control switch indications • ICS • 3-OI-64 [3] **IF** HPCI and/or RCIC are in service and injecting to the vessel, **THEN MONITOR** and **CONTROL** Reactor Water Level as necessary. (Otherwise N/A)
	BOP/ATC	If directed, Initiate SLC per Appendix 3A, Inhibit ADS, and Verify RWCU System Isolation (These steps N/A if RC/Q exited and AOI-100-1 entered)

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	BOP/ATC	**Appendix 3A** 1. **UNLOCK** and **PLACE** 3-HS-63-6A, SLC PUMP 3A/3B, control switch in START PUMP 3A or START PUMP 3B position. 2. **CHECK** SLC System for injection by observing the following: • Selected pump starts, as indicated by red light illuminated above pump control switch. • Squib valves fire, as indicated by SQUIB VALVE A and B CONTINUITY blue lights extinguished, • SLC SQUIB VALVE CONTINUITY LOST Annunciator in alarm on Panel 3-9-5 (3-XA-55-5B, Window 20). • 3-PI-63-7A, SLC PUMP DISCH PRESS, indicates above RPV pressure. • System flow, as indicated by 3-IL-63-11, SLC FLOW, red light illuminated on Panel 3-9-5, • SLC INJECTION FLOW TO REACTOR Annunciator in alarm on Panel 3-9-5 (3-XA-55-5B, Window 14). 3. IF Proper system operation CANNOT be verified, THEN **RETURN** to Step 1 and **START** other SLC pump. 4. **VERIFY** RWCU isolation by observing the following: • RWCU Pumps 3A and 3B tripped • 3-FCV-69-1, RWCU INBD SUCT ISOLATION VALVE closed • 3-FCV-69-2, RWCU OUTBD SUCT ISOLATION VALVE closed. • 3-FCV-69-12, RWCU RETURN ISOLATION VALVE closed. 5. **VERIFY** ADS inhibited. 6. **MONITOR** reactor power for downward trend. 7. **MONITOR** 3-LI-63-1A, SLC STORAGE TANK LEVEL, and **CHECK** that level is dropping approximately 1% per minute.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	SRO	**Enters C-5 from EOI-1 step RC/L-3** Override Step C5-1, states that **IF** Emergency Depressurization is required, **THEN** continue at step C5-19, however, if the SRO has not determined that ED is required at this time then he will continue at step C5-2 (below) Inhibit ADS Answers **Yes** to is any Main Steam Line Open Bypass the following Isolation Interlocks: • MSIV Low Low Low RPV Water Level (APPX (8A) • RB Ventilation Low RPV Water Level (APPX 8E) Crosstie CAD to DW Control Air, if necessary (APPX 8G) **(Step N/A)**
	Driver	When requested for appendix 8A and 8E wait 4 minutes and insert trigger 28 for bat app08ae and report complete
CT#3	SRO	Answers **No** to is Reactor Power Above 5% or Unknown Establishes Reactor Water Level Band between -180 and +51 inches utilizing available injection sources listed on step C5-15. Upon determination that Emergency Depressurization is required continues at step C5-19 and enters C-2 by direction of EOI-3 step SC/T-9 and from EOI-1 step RC/P-4 and directs Crew to Stop and Prevent all Injection Sources to the RPV Except from RCIC, CRD and SLC per step C5-20, in accordance with Appendix 4.
CT#3	BOP/ATC	Inhibits ADS (if not already done per Appendix 3A) If directed, dispatches personnel to perform Appendices 8A and 8E. Maintains Reactor Water Level until directed to Stop and Prevent per Appendix 4. When directed performs Appendix 4 to Stop and Prevent all Injection Sources to the RPV Except from RCIC, CRD and SLC
	Driver	May need to adjust the HPCI Steam Leak to drive crew into 2 max safes

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT#3	BOP/ATC	**Appendix 4** 1. **PREVENT** injection from HPCI by performing the following: a. IF HPCI Turbine is NOT at zero speed, THEN **PRESS** and **HOLD** 3-HS-73-18A, HPCI TURBINE TRIP push-button. **b.** WHEN HPCI Turbine is at zero speed, THEN **PLACE** 3-HS-73-47A, HPCI AUXILIARY OIL PUMP control switch in PULL TO LOCK and **RELEASE** 3-HS-73-18A, HPCI TURBINE TRIP push-button. 3. **PREVENT** injection from CORE SPRAY following an initiation signal by **PLACING** ALL Core Spray pump control switches in STOP. 4. PREVENT injection from LPCI SYSTEM I by performing the following: NOTE Injection may be prevented by performing EITHER step 4.a or step 4.b. a. Following automatic pump start, PLACE RHR SYSTEM I pump control switches in STOP. OR b. BEFORE RPV pressure drops below 450 psig, 1) PLACE 3-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in BYPASS. AND 2) VERIFY CLOSED 3-FCV-74-52, RHR SYS I LPCI OUTBD INJECT VALVE. 5. PREVENT injection from LPCI SYSTEM II by performing the following: NOTE Injection may be prevented by performing EITHER step 5.a or step 5.b. a. Following automatic pump start, PLACE RHR SYSTEM II pump control switches in STOP. **OR**

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT#3	BOP/ATC	**Appendix 4 (continued)** b. BEFORE RPV pressure drops below 450 psig, 1) PLACE 3-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in BYPASS. AND 2) VERIFY CLOSED 3-FCV-74-66, RHR SYS II LPCI OUTBD INJECT VALVE. 6. **PREVENT** injection from CONDENSATE and FEEDWATER by performing the following: a. IF Immediate injection termination from a reactor feedwater pump is required, THEN **PERFORM** step 6.d for the desired pump. b. **LOWER** RFPT 3A(3B)(3C) speed to minimum setting (approximately 600 rpm) using ANY of the following methods on Panel 3-9-5: • Using 3-LIC-46-5, REACTOR WATER LEVEL CONTROL, in MANUAL AND individual 3-SIC-46-8(9)(10), RFPT 3A(3B)(3C) SPEED CONTROL in AUTO, **OR** • Using individual 3-SIC-46-8(9)(10), RFPT 3A(3B)(3C) SPEED CONTROL in MANUAL, **OR** • Using individual 3-HS-46-8A(9A)(10A), RFPT 3A(3B)(3C) SPEED CONT RAISE/LOWER switch in MANUAL GOVERNOR. c. **CLOSE** the following valves BEFORE RPV pressure drops below 450 psig: • 3-FCV-3-19, RFP 3A DISCHARGE VALVE • 3-FCV-3-12, RFP 3B DISCHARGE VALVE • 3-FCV-3-5, RFP 3C DISCHARGE VALVE • 3-LCV-3-53, RFW START-UP LEVEL CONTROL d. **TRIP** RFPTs as necessary to prevent injection by **DEPRESSING** the following push-buttons: • 3-HS-3-125A, RFPT 3A TRIP • 3-HS-3-151A, RFPT 3B TRIP • 3-HS-3-176A, RFPT 3C TRIP.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT #2	SRO	**Determines Emergency Depressurization is required and enters C-2** Answers **No** to will the reactor remain subcritical under all conditions. Waits until he receives the report that Appendix 4 is complete. Answers **Yes** to is Suppression Pool Level above 5.5 ft Directs All ADS Valves opened Answers **Yes** to can Six ADS Valves be opened **Stops** execution of C-2 until: • The Reactor will remain Subcritical without Boron under all conditions **OR** • SLC has injected into the RPV to a tank level of 43% **OR** • The Reactor is Subcritical and No Boron has been injected into the RPV **Stops** execution of execution of C-2 until Shutdown Cooling RPV Pressure Interlocks are clear **Maintain** RPV in Cold Shutdown per Appendix 17D
CT#2	BOP/ATC	Reports when Appendix 4 is complete Reports Suppression Pool Level in Feet when Directed Opens and Verifies Open ALL ADS Valves when directed
CT#4	SRO	**Upon commencement of Emergency Depressurization Continues in C-5 at step C5-21** Answers **Yes** to are at least 2 MSRV's open per C-2, Emergency RPV Depressurization **Stops** until RPV Pressure is below MARFP (190psig with 6 MSRV's open) **Then** continues Directs crew to **Start** and **Slowly** raise RPV Injection to Restore and Maintain RPV Water Level above -180 inches irrespective of pump NPSH limits and Suppression Pool level per Appendix 6A or per Appendix 6C

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT#4	BOP/ATC	**Appendix 6A** 1. **VERIFY CLOSED** the following Feedwater heater return valves: • 3-FCV-3-71, HP HTR 3A1 LONG CYCLE TO CNDR • 3-FCV-3-72, HP HTR 3B1 LONG CYCLE TO CNDR • 3-FCV-3-73, HP HTR 3C1 LONG CYCLE TO CNDR 2. **VERIFY CLOSED** the following RFP discharge valves: • 3-FCV-3-19, RFP 3A DISCHARGE VALVE • 3-FCV-3-12, RFP 3B DISCHARGE VALVE • 3-FCV-3-5, RFP 3C DISCHARGE VALVE 3. **VERIFY OPEN** the following drain cooler inlet valves: • 3-FCV-2-72, DRAIN COOLER 3A5 CNDS INLET ISOL VLV • 3-FCV-2-84, DRAIN COOLER 3B5 CNDS INLET ISOL VLV • 3-FCV-2-96, DRAIN COOLER 3C5 CNDS INLET ISOL VLV 4. **VERIFY OPEN** the following heater outlet valves: • 3-FCV-2-124, LP HEATER 3A3 CNDS OUTL ISOL VLV • 3-FCV-2-125, LP HEATER 3B3 CNDS OUTL ISOL VLV • 3-FCV-2-126, LP HEATER 3C3 CNDS OUTL ISOL VLV 5. **VERIFY OPEN** the following heater isolation valves: • 3-FCV-3-38, HP HTR 3A2 FW INLET ISOL VLV • 3-FCV-3-31, HP HTR 3B2 FW INLET ISOL VLV • 3-FCV-3-24, HP HTR 3C2 FW INLET ISOL VLV • 3-FCV-3-75, HP HTR 3A1 FW OUTLET ISOL VLV • 3-FCV-3-76, HP HTR 3B1 FW OUTLET ISOL VLV • 3-FCV-3-77, HP HTR 3C1 FW OUTLET ISOL VLV 6. **VERIFY OPEN** the following RFP suction valves: • 3-FCV-2-83, RFP 3A SUCTION VALVE • 3-FCV-2-95, RFP 3B SUCTION VALVE • 3-FCV-2-108, RFP 3C SUCTION VALVE 7. **VERIFY** at least one condensate pump running. 8. **VERIFY** at least one condensate booster pump running. 9. **ADJUST** 3-LIC-3-53, RFW START-UP LEVEL CONTROL, to control injection (Panel 3-9-5). 10. **VERIFY** RFW flow to RPV.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT#4	BOP/ATC	**Appendix 6C** 1. IF Adequate core cooling is assured, **AND** It becomes necessary to bypass the LPCI injection valve auto open signal to control injection, THEN **PLACE** 3-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.** 2. **VERIFY OPEN** 3-FCV-74-24, RHR PUMP 3B SUPPR POOL SUCT VLV 3. **VERIFY OPEN** 3-FCV-74-35, RHR PUMP 3D SUPPR POOL SUCT VLV 4. **VERIFY CLOSED** the following valves: • 3-FCV-74-75, RHR SYS II DW SPRAY INBD VLV • 3-FCV-74-74, RHR SYS II DW SPRAY OUTBD VLV • 3-FCV-74-71, RHR SYS II SUPPR CHBR/POOL ISOL VLV • 3-FCV-74-72, RHR SYS II SUPPR CHBR SPRAY VALVE • 3-FCV-74-73, RHR SYS II SUPPR POOL CLG/TEST VLV 5. **VERIFY** RHR Pump 3B and/or 3D running. 6. WHEN RPV pressure is below 450 psig, THEN **VERIFY OPEN** 3-FCV-74-67, RHR SYS II LPCI INBD INJECT VALVE. 7. IF RPV pressure is below 230 psig, THEN **VERIFY CLOSED** 3-FCV-68-3, RECIRC PUMP 3A DISCHARGE VALVE. 8. **THROTTLE** 3-FCV-74-66, RHR SYS II LPCI OUTBD INJECT VALVE, as necessary to control injection. 10. **PLACE** RHRSW pumps in service as soon as possible on ANY RHR Heat Exchangers discharging to the RPV. 11. **THROTTLE** the following in-service RHRSW outlet valves to maintain flow between 1350 and 4500 gpm: • 3-FCV-23-46, RHR HX 3B RHRSW OUTLET VLV • 3-FCV-23-52, RHR HX 3D RHRSW OUTLET VLV

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

CT#4	BOP/ATC	**Starts** and **Slowly** raises RPV Injection to Restore and Maintain RPV Water Level above -180 inches irrespective of pump NPSH limits and Suppression Pool level per Appendix 6A or per Appendix 6C
	SRO	**EOI-1 RC/Q steps RC/Q-20 and RC/Q-21** Reset ARI Defeat ARI Logic Trips if necessary (APPX 2) (This step is N/A, however, crew may choose to perform this step) Insert Control Rods by performing Appendix 1F and 1D **Appendix 1F:** Scram Valves Opened but SDV is Full 1) Reset Scram Defeat RPS Logic Trips if necessary 2) Drain SDV 3) Recharge Accumulators 4) Initiate Reactor Scram **Appendix 1D:** Manual Control Rod Insertion Method 1) Drive Control Rods. Bypass RWM if necessary
	BOP/ATC	Dispatch personnel to perform Appendix 2(N/A) and outside portions of Appendix 1F. Dispatch personnel to close 3-FCV-85-586 (while awaiting completion of Appendix 1F) Drive Rods per Appendix 1D while waiting for completion of Appendix 1F

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	ATC	**Appendix 1F** 2. WHEN RPS Logic has been defeated, THEN **RESET** Reactor Scram. 3. **VERIFY OPEN** Scram Discharge Volume vent and drain valves. 4. **DRAIN** SDV UNTIL the following annunciators clear: • WEST CRD DISCH VOL WTR LVL HIGH HALF SCRAM (Panel 3-9-4, 3-XA-55-4A, Window 1) • EAST CRD DISCH VOL WTR LVL HIGH HALF SCRAM (Panel 3-9-4, 3-XA-55-4A, Window 29). 5. **DISPATCH** personnel to **VERIFY OPEN** 3-SHV-085-0586, CHARGING WATER ISOL. 6. WHEN CRD Accumulators are recharged, THEN **INITIATE** manual Reactor Scram and ARI. 7. **CONTINUE** to perform Steps 1 through 6 UNTIL ANY of the following exists: • ALL control rods are fully inserted, **OR** • NO inward movement of control rods is observed, **OR** • SRO directs otherwise.
	Driver	When directed to perform Appendix 2 and outside portions of Appendix 1F wait 3 minutes. Insert Triggers 26, 27, and 29 then report completion. If directed to close 3-FCV-85-586 wait 3 minutes then insert **mrf rd06 close**. Then report completion. If/When directed to re-open 3-FCV-85-586 wait 3 minutes then insert **mrf rd06 open**. Then report completion.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	ATC	**Appendix 1D** 1. **VERIFY** at least one CRD pump in service. 2. IF Reactor Scram or ARI CANNOT be reset, THEN **DISPATCH** personnel to **CLOSE** 3-SHV-085-0586, CHARGING WATER SOV 3. **VERIFY** REACTOR MODE SWITCH in SHUTDOWN. 4. **BYPASS** Rod Worth Minimizer. 5. **REFER** to Attachment 2 and **INSERT** control rods in the area of highest power as follows: a. **SELECT** control rod. b. **PLACE** CRD NOTCH OVERRIDE switch in EMERG ROD IN position UNTIL control rod is NOT moving inward. c. **REPEAT** Steps 5.a and 5.b for each control rod to be inserted. 6. WHEN NO further control rod movement is possible or desired, THEN **DISPATCH** personnel to **VERIFY OPEN** 3-SHV-085-0586, CHARGING WATER SOV (RB NE, El 565 ft).
	ATC	Continue performance of Appendix 1F and 1D until all rods inserted **OR** Until EOI-1 RC/Q is exited due to Reactor determined to be Subcritical at which point continue to insert rods per 3-AOI-100-1 and 3-OI-85

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	SRO	**Executes all legs of EOI-2 concurrently** **EOI-2 DW/T** Monitor and control Drywell Temperature below 160F using available Drywell Cooling Answers **Yes** to can Drywell Temperature be maintained below 160F **EOI-2 PC/P** Monitor and control Primary Containment pressure below 2.4 psig using the vent system (APPX 12) as necessary Answers **Yes** to can Primary Containment pressure be maintained below 2.4 psig **EOI-2 PC/H** Monitor and control Drywell and Suppression Chamber • Hydrogen at or below 2.4% AND • Oxygen at or below 3.3% Using the Nitrogen Makeup System (APPX 14A) **EOI-2 SP/T** Monitor and control Suppression Pool temperature below 95F using available Suppression Pool Cooling (APPX 17A) as necessary Answers **No** to can Suppression Pool temperature be maintained below 95F (This is assuming Emergency Depressurization is complete and Reactor Water Level has been restored, if Emergency Depressurization has not been conducted yet, the answer will be Yes. If Reactor Water Level has not been restored yet, after Emergency Depressurization, this is not a priority.) Directs Line up of all available Suppression Pool Cooling using only RHR pumps not required to assure adequate core cooling by continuous injection (APPX 17A) (After Emergency Depressurization complete and Reactor Water level restored)
	BOP	Performs Appendix 17A to place Suppression Pool cooling in service after Emergency Depressurization and restoration of Reactor Water level.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	BOP	**Appendix 17A** 1. **If** Adequate core cooling is assured, **OR** Directed to cool the Suppression Pool irrespective of adequate core cooling, **Then** BYPASS LPCI injection valve auto open signal as necessary by PLACING 3-HS-74-155A(B), LPCI SYS I(II) OUTBD INJ VLV BYPASS SEL in BYPASS. 2. **PLACE** RHR SYSTEM I(II) in Suppression Pool Cooling as follows: a. **VERIFY** at least one RHRSW pump supplying each EECW header. b. **VERIFY** RHRSW pump supplying desired RHR Heat Exchanger(s). c. **THROTTLE** the following in-service RHRSW outlet valves to obtain between 1350 and 4500 gpm RHRSW flow: • 3-FCV-23-34, RHR HX 3A RHRSW OUTLET VLV • 3-FCV-23-46, RHR HX 3B RHRSW OUTLET VLV • 3-FCV-23-40, RHR HX 3C RHRSW OUTLET VLV • 3-FCV-23-52, RHR HX 3D RHRSW OUTLET VLV d. **If** Directed by SRO, **Then** PLACE 3-XS-74-122(130), RHR SYS I(II) LPCI 2/3 CORE HEIGHT OVRD in MANUAL OVERRIDE. e. **If** LPCI INITIATION Signal exists, **Then** MOMENTARILY PLACE 3-XS-74-121(129), RHR SYS I(II) CTMT SPRAY/CLG VLV SELECT in SELECT. f. **If** 3-FCV-74-53(67), RHR SYS I(II) LPCI INBD INJECT VALVE, is OPEN, **Then VERIFY CLOSED** 3-FCV-74-52(66), RHR SYS I(II) LPCI OUTBD INJECT VALVE. g. **OPEN** 3-FCV-74-57(71), RHR SYS I(II) SUPPR CHBR/POOL ISOL VLV.

Simulator Event Guide:

Event 7 Major: HPCI Steam Leak without Isolation, Loss of RMOV Board 3A

	BOP	**Appendix 17A (cont)** h. **VERIFY** desired RHR pump(s) for Suppression Pool Cooling are operating. i. **THROTTLE** 3-FCV-74-59(73), RHR SYS I(II) SUPPR POOL CLG/TEST VLV, to maintain EITHER of the following as indicated on 3-FI-74-50(64), RHR SYS I(II) FLOW: • Between 7000 and 10000 gpm for one-pump operation. OR • At or below 13000 gpm for two-pump operation. j. **VERIFY** CLOSED 3-FCV-74-7(30), RHR SYSTEM I(II) MIN FLOW VALVE. k. **MONITOR** RHR Pump NPSH using Attachment 1. l. **NOTIFY** Chemistry that RHRSW is aligned to in-service RHR Heat Exchangers. m. **If** Additional Suppression Pool Cooling flow is necessary, **Then** PLACE additional RHR and RHRSW pumps in service using Steps 2.b through 2.l.
	SRO	Emergency Plan Classification is 3.1-S.

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner:

All but six Control Rods are inserted

Emergency Depressurization complete

Reactor Level is restored and maintained

SHIFT TURNOVER SHEET

Equipment Out of Service/LCO's:

DG 3A is Out of Service. Tech Spec 3.8.1 Condition B has been entered and offsite power availability was verified 5 minutes ago.

Operations/Maintenance for the Shift:

Perform Stroke Time Test on 3-FCV-43-13 and 3-FCV-43-14 per 3-SR-3.6.1.3.5 Section 7.6 and 7.7. Raise Power to 100% with Recirc Flow.

Unit 1 and 2 are 100% Power

Unusual Conditions/Problem Areas:

None

Facility: **Browns Ferry NPP** Scenario No.: **NRC - 3** Op-Test No.: **1205**

Examiners:_____ Operators: SRO:_____

_____ ATC:_____

_____ BOP:_____

Initial Conditions: Unit 3 is at 100% power. Unit 1 and 2 are at 90% power. CRD Pump A is out of service.

Turnover: Complete Weekly EHC Pump Test per 3-OI-47A section 6.2. Lower power to 90% with Recirc Flow.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP N-SRO	Weekly EHC Pump Test per 3-OI-47A section 6.2.
2	N/A	R-ATC R-SRO	Lower Power with Flow to 90%.
3	ad01k	TS-SRO C-BOP	ADS SRV 1-41 fails open, closes w/ inhibit switch.
4	th18d	C-ATC C-SRO	VFD Cooling Water Pump failure.
5	dg03d	C-BOP TS-SRO	Loss of 4KV Shutdown Board 3ED, 3D D/G fails to AUTO tie.
6	rfpt c high vibs	C-ATC C-SRO	RFPT C high vibrations with failure to trip.
7	fw19	M-ALL	FW line break in steam tunnel, ATWS.
8	ms06g dg01a	C-ALL	MSIV D INBD valve fails to AUTO close, D/G A fails to AUTO start.

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

FINAL

Events

1. The BOP Operator will complete the weekly EHC Pumps test per 3-OI-47A section 6.2.

2. ATC will reduce Reactor Power to ≤ 90% RTP with Recirc flow as an immediate action of 3-AOI-1-1, Relief Valve Stuck Open. ADS SRV 1-41 will fail open.

3. ATC will lower power to less than 90%. When power is below 90% the BOP operator will perform 3-AOI-1-1 actions to close SRV. SRO will refer to Tech Specs and determine TS 3.5.1 condition E.

4. After the NRC is satisfied with the power reduction, the VFD Cooling Water Pump for the B Reactor Recirc VFD will trip and the standby pump will fail to start. The ATC will start the standby VFD Cooling Water Pump to restore cooling water preventing a VFD and Reactor Recirc Pump trip.

5. After VFD cooling water restored, 3ED 4KV Shutdown Board will lose power and the 3D Diesel Generator will fail to automatically tie to the Shutdown Board. The BOP will manually tie the Diesel to the board. SRO will refer to Tech Specs and determine TS 3.8.1 condition B and G, and TS 3.8.7.A.

6. High vibrations and low oil pressure alarms will come in on RFPT C, the RFPT will fail to trip and the ATC will have to trip in order to avoid extensive pump and equipment damage. The ATC will also have to lower power an additional 5% so the remaining RFPTs are below their limit of 5050 RPM.

7. Once the plant is stable, the 'A' Feedwater line will break in the Steam Tunnel, a scram will be inserted due to loss of feedwater and lowering level, EOI-1 will be entered. HPCI will be locked out to prevent feeding the leak. An ATWS will occur on the Scram; the SRO will enter C-5 and perform ATWS recovery actions to insert all control rods. Reactor level will decrease to TAF and Emergency Depressurization will be initiated per C-2.

8. MSIV D INBD valve will fail to isolate, crew will isolate Inboard MSIV D. D/G A will fail to automatically start, the crew will manually start D/G A

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner.

Emergency Depressurization complete

Reactor Level is restored and maintained.

All Control Rods inserted.

Critical Tasks - Five

CT#1 - During power operations, with a stuck open Safety Relief Valve , take actions to close the Safety Relief Valve **OR** Scram the Reactor prior to the suppression pool temperature reaching 110F.

1. Safety Significance:
   Prevent a violation of the facility license condition (T.S. 3.6.2.1).

2. Cues:
   Procedural compliance.
   Suppression Pool temperature trend.

3. Measured by:
   With rising Suppression Pool Temperatures, the REACTOR MODE SWITCH is placed in SHUTDOWN,
   OR
   The Safety Relief Valve is closed,
   prior to exceeding 110° in the Suppression Pool.

4. Feedback:
   Reactor Power trend.
   Control Rod indication.
   Suppression Pool temperature trend.

CT#2- With reactor scram required and the reactor not shutdown, to prevent an uncontrolled RPV depressurization and subsequent power excursion, inhibit ADS.

1. Safety Significance:
   Precludes core damage due to an uncontrolled reactivity addition

2. Cues:
   Procedural compliance

3. Measured by:
   ADS logic inhibited prior to an automatic initiation unless all required injection systems are Terminated and Prevented.

4. Feedback:
   RPV pressure trend
   RPV level trend
   ADS annunciator status

Critical Tasks

CT#3 -With a reactor scram required and the reactor not shutdown, initiate action to reduce power by injecting boron (If still critical with challenge to BIIT - 110°F) and inserting control rods.

1. Safety Significance:
   Shutting down reactor can preclude failure of containment or equipment necessary for the safe shutdown of the plant.

2. Cues:
   Procedural compliance
   Suppression Pool temperature

3. Measured by:
   Observation - If operating IAW EOI-1 and C-5, US determines that SLC is required (indicated by verbal direction or EOI placekeeping action) before exceeding 110 degrees F in the Suppression Pool.
   AND
   RO places SLC A / B Pump control switch in ON, when directed by US.

4. Feedback:
   Reactor Power trend
   Control Rod indications
   SLC tank level

CT#4 - During an ATWS, when conditions with Emergency Depressurization required, Terminate and Prevent RPV injection from ECCS and Feedwater until reactor pressure is below the MARFP as directed by US (for these conditions MARFP is 190 psig)

1. Safety Significance:
   Prevention of fuel damage due to uncontrolled feeding.

2. Cues:
   Procedural compliance.

3. Measured by:
   Observation - No ECCS injection prior to being less than the MARFP.
   AND
   Observation - Feedwater terminated and prevented until less than the MARFP.

4. Feedback:
   Reactor power trend, power spikes, reactor short period alarms.
   Injection system flow rates into RPV.

Critical Tasks

CT#5 - With RPV pressure <MARFP (190 psig), slowly increase and control injection into RPV to restore and maintain RPV level above TAF as directed by US.

1. Safety Significance:
   Maintaining adequate core cooling and preclude possibility of large power excursions.

2. Cues:
   Procedural compliance.
   RPV pressure indication.

3. Measured by:
   Observation - Injection not commenced until less than MARFP, and injection controlled such that power spikes are minimized, level restored and maintained greater than TAF.

4. Feedback:
   RPV level trend.
   RPV pressure trend.
   Injection system flow rate into RPV.

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER: NRC 3

8 Total Malfunctions Inserted: List (4-8)

3 Malfunctions that occur after EOI entry: List (1-4)

4 Abnormal Events: List (1-3)

1 Major Transients: List (1-2)

3 EOI's used: List (1-3)

2 EOI Contingencies used: List (0-3)

75 Validation Time (minutes)

5 Crew Critical Tasks: (2-5)

YES Technical Specifications Exercised (Yes/No)

Scenario Tasks

	TASK NUMBER	K/A	RO	SRO
1.	Alternate EHC Pumps			
	RO U-47A-NO-04	241000A4.10	2.9	2.9
2.	Lower Power with Recirc Flow			
	RO U-068-NO-25 SRO S-000-NO-138	2.1.23	4.3	4.4
3.	ADS SRV Fails Open			
	RO U-001-AB-1 SRO S-0001-AB-1	239002A2.03	4.1	4.2
4.	VFD Cooling Water Pump Failure			
	RO U-068-AL-33 SRO S-068-AB-01	202001A2.22	3.1	3.2
5.	D/G Automatic Board tie failure			
	RO U-082-NO-01 SRO S-000-AD-27	262001A4.01	3.4	3.7
6.	RFPT C High Vibrations			
	RO U-003-AL-11 SRO S-003-AB-1	259001A2.01	3.7	3.7
7.	Feedwater Line Break			
	RO U-000-EM-13 SRO S-000-EM-14 SRO S-000-EM-15	295031EA2.04	4.6	4.8

Procedures Used/Referenced:

Procedure Number	Procedure Title	Procedure Revision
3-OI-47A	EHC System	Rev 37
3-AOI-1-1	Relief Valve Stuck Open	Rev 11
3-GOI-100-12	Power Maneuvering	Rev 37
3-OI-68	Reactor Recirculation System	Rev 81
3-9-3C Window 25	MAIN STEAM RELIEF VALVE OPEN	Rev 23
3-AOI-1-1	Relief Valve Stuck Open	Rev 11
3-OI-74	Residual Heat Removal System	Rev 100
3-9-4B Window 12	RECIRC DRIVE 3B COOLANT FLOW LOW	Rev 42
3-9-4B Window 28	RECIRC DRIVE 3B PROCESS ALARM	Rev 42
3-9-4B Window 32	RECIRC DRIVE 3B DRIVE ALARM	Rev 42
3-9-6C Window 16	RFPT BRG OIL PRESS LOW	Rev 12
3-9-6C Window 17	RFPT BRG OIL PRESS LOW	Rev 12
3-AOI-3-1	Loss Of Reactor Feedwater or Reactor Water Level High/Low	Rev 9
3-9-5A, Window 8	REACTOR WATER LEVEL ABNORMAL	Rev 41
3-EOI-3	Secondary Containment Control	Rev 11
3-AOI-100-1	Reactor Scram	Rev 55
3-EOI-1	RPV Control	Rev 8
3-EOI-Appendix-11A	Alternate Pressure Control Systems MSRVs	Rev 2
3-EOI-Appendix-5C	Injection System Lineup RCIC	Rev 3
3-EOI-3-C-2	Emergency RPV Depressurization	Rev 8
3-EOI-2	Primary Containment Control	Rev 8
EPIP-1	Emergency Classification	Rev 47

Simulator Instructor – IC28

bat nrc201020 :

#crd A pump oos
ior zlohs851a[1] off

#srv open
imf ad01k (e10 0) 70
trg 11 nrc201020srv
trg 11 = dmf ad01k
trg 12 = mrf ad01k out

#vfd cooling pump failure
ior zlohs682b2a[1] on
ior zlohs682b2a[2] off
mrf th18d trip
ior zdihs682b1a[1] (e1 0) off
trg 2 nrc201020vfd
trg 2 = bat nrc2010202b

#Loss of 4KV SD BD 3ED/DG D Fail to tie
imf dg03d
ior zdi3432113ed (e5 0) trip
ior zdi3hs2113ed8a (e5 0) trip

#rfpt low oil pressure/ high vibration/ oil pump trip
imf fw33g (e3 0) 48 120
imf fw33h (e3 0) 45 60
imf fw33c (e3 0) 65 120
imf fw33d (e3 0) 70 90
imf fw33e (e3 0) 52 45
imf fw33f (e3 0) 67 70
imf fw33j (e3 0) 38 30
imf fw33k (e3 0) 82 100
imf fw33l (e3 0) 63 80
imf fw33m (e3 0) 40 60
ior zlohs03154a[2] (e3 0) off
ior xa556c[11] (e3 0) alarm_on
ior xa556c[15] (e3 0) alarm_on
ior xa556c[16] (e3 0) alarm_on
ior xa556c[26] (e3 0) alarm_on
trg 4 = bat nrc201020a

#Major FW leak in steam tunnel
imf fw19 (e20 0) 30 300
imf ms06g
imf dg01a
trg 14 nrc2011modesw
trg 14 = bat nrcsteamleak
trg 15 nrcmsivd
trg 15 = bat nrcmsivd
bat atws70
trg 25 = bat app01f
trg 26 = bat app02
trg 27 = bat app08ae
trg 28 = bat atws-1
trg 29 = bat sdv
imf sl02 60
trg 30 nrcslc
trg 30 = ior an:xa555b14 alarm_on
trg 6 nrcslc1
trg 6 = ior zlohs636al2 on

bat nrc201020a :

mmf fw33g (e4 0) 12 60
mmf fw33h (e4 0) 12 60
mmf fw33c (e4 0) 36 60
mmf fw33d (e4 0) 36 60
mmf fw33e (e4 0) 12 60
mmf fw33f (e4 0) 12 60
mmf fw33j (e4 0) 12 60
mmf fw33k (e4 0) 11 60
mmf fw33l (e4 0) 11 60
mmf fw33m (e4 0) 11 60

bat nrc2010202b :

mrf th18d close
dor zlohs682b2a[1]
dor zlohs682b2a[2]

bat nrcmsivd :

dmf ms06g

bat nrcsteamleak :

imf th35d 5 360 1

Simulator Instructor – IC28

		DESCRIPTION/ACTION
Simulator Setup	manual	Reset to IC 28
Simulator Setup	manual	Shift to 3B CRD pump and clearance out 3A CRD pump
Simulator Setup	manual	Fault reset and clear alarm on Recirc Pump 3B
Simulator Setup	Load Batch	bat nrc201020
Simulator Setup	manual	Verify file loaded

Procedures:

- **RCP required (100% - 90% with flow)**
- **RCP for Urgent Load Reduction**
- **Provide marked up copy of 3-GOI-100-12**

Simulator Event Guide:

Event 1 Normal: Weekly EHC Pump Test per 3-OI-47A section 6.2.

		6.2 EHC Auto Pump Start Test & Weekly Pump Alternation **NOTES** 1) This section is performed from Panel 3-9-7 unless otherwise specified. 2) This test should be performed during weekly alternation of pumps. 3) This section describes the actions necessary to test (standby) EHC Pump 3A. Testing EHC Pump 3B is the same and the component numbers are enclosed in parenthesis. 4) Operations personnel should be present at the EHC skid to observe proper system operation. 5) If EHC PUMP 3A(3B) TEST, 3-HS-47-4A(5A), is depressed for longer than 10 seconds, annunciator STANDBY EHC PUMP FAILED, 3-XA-47-111 (3-XA-55-7B,Window 15), will alarm.
	BOP	[1] **VERIFY** the EHC System is in service. **REFER TO** Section 5.1.
	BOP	[2] **REVIEW** Precautions and Limitations listed in Section 3.0.
	BOP	[3] **DEPRESS** the EHC PUMP 3A(3B) TEST, 3-HS-47-4A(5A), and **CHECK** the following actions occur: • EHC Hydraulic Fluid Pump 3A(3B) starts. • Annunciator STANDBY EHC PUMP RUNNING, 3-XA-47-108 (3-XA-55-7B Window 8), ANNUNCIATES. • Red light above test switch is ILLUMINATED (PS-47-1B(2B)) (positive indication of pump discharge pressure).
		NOTE **ALLOW** both EHC pumps to operate for at least 30 seconds to allow the Standby pump to expel any air which may have accumulated in the pump casing.

Simulator Event Guide:

Event 1 Normal: Weekly EHC Pump Test per 3-OI-47A section 6.2.

	BOP	[4] **CHECK** the started EHC HYD PUMP A(B) DISCH PRESS, 3-PI-047-0001(0002), indicates between 1550 psig and 1750 psig, locally at the EHC skid.
	DRIVER	Report EHC HYD PUMP A(B) DISCH PRESS, 3-PI-047-0001(0002), indicates between **1650 psig**, locally at the EHC skid.
	BOP	[5] **IF** the started EHC pump discharge pressure is **NOT** between 1550 psig and 1750 psig, **THEN** **ADJUST** the pressure compensator for the started EHC pump to adjust the pump discharge pressure. **REFER TO** Step 8.6[1]
		NOTES 1) The voltmeters in Step 6.2[6] normally indicate approximately zero volts. When an EHC header pressure switch actuates, the associated voltmeter will indicate approximately mid-scale. The Unit Operator should be notified if a voltmeter indicates greater than 5 volts with the EHC System in service. 2) If two out of three EHC header pressure switches actuate, a turbine trip will occur.
		[6] **CHECK** locally on Junction Box 3-JBOX-047-10166 that the following voltmeters indicate approximately 0 volts: • TURBINE EHC HDR PRESS 3-PS-47-63A TRIP IND, 3-EI-047-0063A • TURBINE EHC HDR PRESS 3-PS-47-63B TRIP IND, 3-EI-047-0063B • TURBINE EHC HDR PRESS 3-PS-47-63C TRIP IND, 3-EI-047-0063C
	BOP	Direct AUO to check local voltmeters
	DRIVER	Report local voltmeters indicate 0 volts.
	BOP	[7] **IF** alternating operating EHC pumps, **THEN** **STOP** EHC pump 3B(3A) using EHC HYD FLUID PUMP 3B(3A), 3-HS-47-2A(1A).

Simulator Event Guide:

Event 1 Normal: Weekly EHC Pump Test per 3-OI-47A section 6.2.

		[8] **IF NOT** alternating EHC pumps, **THEN** **STOP** EHC pump 3A(3B) using EHC HYD FLUID PUMP 3A(3B), 3-HS-47-1A(2A).
		[9] **IF** the pump stopped in Step 6.2[7] or 6.2[8] fails to stop or remain stopped, **THEN** **PERFORM** the following: [9.1] **DEPRESS** and **RELEASE** EHC PUMP 3A(3B) TEST, 3-HS-47-4A(5A), to exercise and attempt to correct the positioning of 3-FSV-47-4(5). [9.2] **RESET** annunciator 3-XA-55-7B, Window 15. [9.3] **STOP** the desired EHC pump using EHC HYD FLUID PUMP 3A(3B), 3-HS-47-1A(2A). [9.4] **IF** the pump failed to stop, **THEN** **REPEAT** Steps 6.2[9.1] through 6.2[9.3], as necessary, up to 2 additional times. [9.5] **IF** the pump failed to stop after performing the preceding step, **THEN** **NOTIFY** Site Engineering and/or Maintenance to assist in returning 3-FSV-47-4(5) to its normal position. [9.6] **WHEN** 3-FSV-47-4(5) has been returned to its normal position, **THEN** **REPEAT** Steps 6.2[9.1] through 6.2[9.3], and **CONTINUE** at Step 6.2[10].
	BOP	[10] **CHECK** EHC HEADER PRESSURE, 3-PI-47-7, indicates between 1550 psig and 1650 psig.
		[11] **IF** the started EHC pump discharge pressure is **NOT** between 1550 psig and 1750 psig, **THEN** **ADJUST** the pressure compensator for the started EHC pump to adjust the pump discharge pressure. **REFER TO** Step 8.6[1]
	BOP	[12] **IF** pumps were alternated, **THEN** **RESET** any disagreement flags by placing the operating EHC pump handswitch, 3-HS-47-1A(2A), to START.

Simulator Event Guide:

Event 2 Reactivity: Lower Power with Flow to 90%.

	SRO	Directs Power Reduction using Recirc Flow per 3-GOI-100-12: [9] **REDUCE** reactor power by a combination of control rod insertions and core flow changes, as recommended by Reactor Engineer. **REFER TO** 3-SR-3.1.3.5(A) and 3-OI-68. (N/A if entering 3-GOI-100-12 to recover from Recirc Pump Trip)
		3-OI-68 Precaution and Limitations **3.5.3 Dual Pump Operation** D. Individual pump speeds should be mismatched by ~60 RPM during dual pump operation between 1200 and 1300 RPM to minimize harmonic vibration (this requirement may be waived for short time periods for testing or maintenance).
	ATC	Lowers Power w/Recirc using 3-OI-68, section 6.2 and establishes 60 rpm split
	ATC	**3-OI-68 Section 6.2, Adjusting Recirc Flow** [1] **IF** desired to control Recirc Pumps 3A and/or 3B speed with Recirc Individual Control, **THEN** **PERFORM** the following; (Otherwise N/A) • Raise Recirc Pump 3A using, RAISE SLOW (MEDIUM), 3-HS-96-15A(15B). (Otherwise N/A) • Lower Recirc Pump 3A using SLOW (MEDIUM) (FAST), 3-HS-96-17A(17B)(17C). (Otherwise N/A) <u>AND/OR</u> • Raise Recirc Pump 3B using, RAISE SLOW (MEDIUM), 3-HS-96-16A(16B). (Otherwise N/A) • Lower Recirc Pump 3B using SLOW (MEDIUM) (FAST), 3-HS-96-18A(18B)(18C). (Otherwise N/A)

Simulator Event Guide:

Event 2 Reactivity: Lower Power with Flow to 90%.

	ATC	[2] **WHEN** desired to control Recirc Pumps 3A and/or 3B speed with the RECIRC MASTER CONTROL, **THEN** **ADJUST** Recirc Pump speed 3A & 3B using the following push buttons as required: **RAISE** SLOW, 3-HS-96-31 **RAISE** MEDIUM, 3-HS-96-32 **LOWER** SLOW, 3-HS-96-33 **LOWER** MEDIUM, 3-HS-96-34 **LOWER** FAST, 3-HS-96-35
NRC	NRC	When satisfied with Reactivity Manipulation, ADS SRV Fails Open requiring power to be lowered to less than 90%
Driver	Driver	At lead examiner direction, insert **TRIGGER 10** for failure of ADS SRV 1-41

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

	BOP	Report alarm MAIN STEAM RELIEF VALVE OPEN (3-9-3C Window 25)
		MAIN STEAM RELIEF VALVE OPEN (3-9-3C Window 25) A. **CHECK** MSRV DISCHARGE TAILPIPE TEMPERATURE, 3-TR-1-1, on Panel 3-9-47 and SRV Tailpipe Flow Monitor on Panel 3-9-3 for raised temperature and flow indications. B. **REFER TO** 3-AOI-1-1. C. **IF** alarm is due to sensor malfunction, **THEN** **REFER TO** 0-OI-55 and OPDP-4.
	SRO	Enters 3-AOI-1-1 Relief Valve Stuck Open
		3-AOI-1-1 Relief Valve Stuck Open **NOTE** Once a MSRV is operated, a time delay of 15 to 30 seconds can be expected before a response can be detected on 3-TR-1-1. ICS can be used to monitor the discharge tailpipe temperature, but the appropriate indications on 3-TR-1-1 must be confirmed.
	BOP	Identifies ADS SRV 1-41 open
	BOP	**4.1 Immediate Action** [1] **IDENTIFY** stuck open relief valve by **OBSERVING** the following: • SRV TAILPIPE FLOW MONITOR, 3-FMT-1-4, on Panel 3-9-3, OR • MSRV DISCHARGE TAILPIPE TEMPERATURE recorder, 3-TR-1-1 on Panel 3-9-47.
	ATC	[2] **IF** relief valve transient occurred while operating above 90% power, **THEN** **REDUCE** reactor power to ≤90% RTP with recirc flow.

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

	BOP	[3] **WHILE OBSERVING** the indications for the affected Relief valve on the Acoustic Monitor; **CYCLE** the affected relief valve control switch several times as required: • CLOSE to OPEN to CLOSE positions
		[4] **IF** all SRVs are CLOSED, **THEN** **CONTINUE** at Step 4.2.4. (Otherwise N/A)
		NOTES 1) Once initial transient of SRV opening has stabilized (pressure regulator compensation) the Heat Balance will indicate bad data. 2) The SRV TAILPIPE FLOW MONITOR may seal-in an OPEN position indication.
		3-AOI-1-1 **4.2 Subsequent Action** **NOTES** 1) Once initial transient of SRV opening has stabilized (pressure regulator compensation) the Heat Balance will indicate bad data. 2) The SRV TAILPIPE FLOW MONITOR may seal-in an OPEN position indication.
		4.2.1 Action if a fire exists with SRV stuck open [1] **IF** an SRV is open and a fire exists in ANY Appendix R fire area, **THEN** (Otherwise N/A): **INITIATE** a manual scram before the Suppression Pool temperature exceeds 95°F.

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

	BOP	**4.2.2 Attempt to close valve from Panel 9-3:** [1] **PLACE** the SRV TAILPIPE FLOW MONITOR POWER SWITCH in the OFF position. [2] **PLACE** the SRV TAILPIPE FLOW MONITOR POWER SWITCH in the ON position. [3] **IF** all SRVs are CLOSED, **THEN CONTINUE** at Step 4.2.4. (Otherwise N/A) [4] **PLACE** MSRV AUTO ACTUATION LOGIC INHIBIT, 3-XS-1-202 in INHIBIT:
CT#1	BOP	Observe and report when 3-XS-1-202 is placed in Inhibit, ADS SRV 1-41 closes.
		[5] **IF** relief valve closes, **THEN** **OPEN** breakers (250V RMOV BD 3A BRKR 9B1, 250V RMOV BD 3C BRKR 8A, and BB2 BRKR 710)or **PULL** fuses (3-FU1-001-0041A, 3-FU1-001-0041B, 3-FU1-001-0041C, and 3-FU1-001-0041D) as necessary usingAttachment 1 (Unit 3 SRV Solenoid Power Breaker/Fuse Table).
	DRIVER	Insert **TRIGGER 12** to pull fuses 2 minutes after direction
	DRIVER BOP	Operator Does NOT perform step 6 until Breaker opened or fuses pulled. [6] **PLACE** MSRV AUTO ACTUATION LOGIC INHIBIT 3-XS-1-202, in AUTO.
		NOTES 1) Only the appropriate sections for the stuck open relief valve is required to be performed. 2) The ADS valves that have more than one power supply will AUTO TRANSFER on a loss of power, and are NORMAL SEEKING. 3) ADS Relief valves with hand-switches on Panel 25-32 are listed below and should be operated from that location first. 4) When opening breakers and pulling fuses, opening the breakers is the preferred method when time permits. However, the breakers with multiple locations will require opening each breaker to de-energize the control circuit. In this case, pulling the fuses from Panel 25-32 may be quicker than opening the breakers.

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

<table>
<tr><td></td><td>BOP</td><td colspan="3">[7] IF the SRV valve did not close, THEN
PERFORM the appropriate section from table below.

Directs AUO to Remove Power from SRV 1-41

REMOVE the power from 3-PCV-1-41 by performing one of the following:

A. OPEN the following breakers (Preferred method)
• 250V RMOV 3A, compartment 9B1
• 250V RMOV 3C, compartment 8A
• Battery Board 2, breaker 710

OR

B. In Panel 3-25-32 PULL the following fuses as necessary
• Fuse 3-FU1-001-0041A (Block AA, F2)
• Fuse 3-FU1-001-0041B (Block AA, F7)
• Fuse 3-FU1-001-0041C (Block AA, F12)
• Fuse 3-FU1-001-0041D (Block AA, F15)</td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td>SRO</td><td colspan="3">Evaluate Tech Spec 3.5.1</td></tr>
<tr><td></td><td></td><td>CONDITION

E. One ADS valve Inoperable</td><td>REQUIRED ACTION

E.1 Restore ADS Valve to OPERABLE status</td><td>COMPLETION TIME

14 Days</td></tr>
<tr><td></td><td>SRO</td><td colspan="3">Evaluate Appendix R Page 806 of 904</td></tr>
<tr><td></td><td></td><td colspan="3">3-PCV-001-0041 MAIN STEAM LINE D RELIEF VLV

3 ISOLATE AND OPEN AT PANEL 3-LPNL-925-0032 Compensatory Measures A Area/Zone Affected 16
3 OPEN FROM MCR Compensatory Measures A Area/Zone Affected 3-1, 12</td></tr>
</table>

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

	SRO	May direct Suppression Pool Cooling placed in service IAW 3-OI-74, Section 8.5
	BOP	If Directed, places Suppression Pool Cooling in Service Loop I:
		8.5 Initiation of Loop I(II) Suppression Pool Cooling
		CAUTION PSA concerns with RHR in Suppression Pool Cooling Mode with a LOCA and a LOSP identify that severe water hammer may occur during the pump restart. Therefore, the following guidelines should be used to try and maintain the system below the PSA Risk Assessment goals: RHR in suppression pool cooling should be minimized. Two Loops of RHR in suppression pool cooling should be minimized Use two pumps per loop, if needed, to minimize total time spent in supp pool cooling. Suppression pool cooling run times are tracked in 3-SR-2 to ensure Risk assessment goals are not exceeded.
		NOTES 1) Suppression Pool Cooling is required to be initiated whenever necessary to maintain suppression pool temperature < 95°F, or when directed by other procedures. 2) All operations are performed at Panel 3-9-3 unless otherwise noted.
		[1] **VERIFY** RHR Loop I(II) in Standby Readiness. **REFER TO** Section 4.0. [2] **REVIEW** the precautions and limitations in Section 3.0. [3] **NOTIFY** the other units of placing Loop I(II) of RHR in suppression pool cooling, the subsequent start of common equipment (i.e., RHRSW pumps) and associated alarms are to be expected. [4] **NOTIFY** Radiation Protection for impending action to initiate Suppression Pool Cooling. **RECORD** name and time of Radiation Protection representative notified in the Narrative Log [5] **IF** possible before placing RHRSW in service, **THEN NOTIFY** Chemistry that RHRSW sampling is to be initiated (RHRSW sampling requirements).

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

		[6] **VERIFY** at least one RHRSW Pump is operating on each EECW Header.
		NOTES 1) Step 8.5[7] initiates Suppression Pool Cooling for RHR Loop I. 2) Step 8.5[8] initiates Suppression Pool Cooling for RHR Loop II. 3) RHR Pump(s) may be operated with no RHRSW flow through the associated RHR Heat Exchanger(s), in support of maintenance or testing, provided the RHRSW side of the heat exchanger is pressurized and is approved by the Unit Supervisor.
		[7] **PLACE** RHR Pump and Heat Exchanger A(C) in service as follows: [7.1] **START** an RHRSW Pump to supply RHR Heat Exchanger A(C).
		CAUTIONS 1) **DO NOT EXCEED** 4500 gpm RHRSW flow through any single RHR Heat Exchanger. 2) When operating RHRSW through the heat exchangers, damage can occur to the RHRSW discharge valves for the RHR Heat Exchanger if operating at low flows and high differential pressures for long periods. In order to lower the differential pressure the valves experience, flow through the in service heat exchanger(s) should be established such that the total header flow is ≥ 4000 gpm. When operating RHRSW in split mode with other units, this is calculated by adding the individual flows from each of the in service RHR heat exchangers.
		[7.2] **ESTABLISH** RHRSW flow by performing one the following: [7.2.2] **THROTTLE OPEN** RHR HX 3A(3C) RHRSW OUTLET VLV, 3-FCV-23-34(40), as required for cooling (if another is maintaining minimum flow) and/or to maintain between 4000 and 4500 gpm RHRSW flow as indicated on 3-FI-23-36(42), RHR HTX 3A(3C) RHRSW FLOW. [7.3] **VERIFY CLOSED** RHR SYS I LPCI INBD INJECT VALVE, 3-FCV-74-53. [7.4] **VERIFY CLOSED** RHR SYS I SUPPR POOL CLG/TEST VLV, 3-FCV-74-59.
		[7.5] **VERIFY CLOSED** RHR SYS I SUPPR CHBR SPRAY VALVE, 3-FCV-74-58. [7.6] **VERIFY CLOSED** RHR SYS I DW SPRAY OUTBD VLV, 3-FCV-74-60. [7.7] **VERIFY OPEN** RHR SYS I SUPPR CHBR/POOL ISOL VLV, 3-FCV-74-57.

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

<table>
<tr><td></td><td></td><td>[7.8] VERIFY OPEN RHR SYS I SUPPR CHBR/POOL ISOL VLV, 3-FCV-74-57.</td></tr>
<tr><td></td><td></td><td>CAUTIONS

1) To prevent excessive vibration, RHR pumps should not be allowed to operate for more than 3 minutes at minimum flow.

2) Capacitor bank fuses are subject to clearing when the unit boards are being supplied from the 161kV source and large pumps are started. Unit Supervisors should evaluate placing the Capacitor Banks in Manual prior to starting RHR pumps per 0-OI-57A.
3) When throttling RHR SYS I SUPPR POOL CLG/TEST VLV, 3-FCV-74 59, maintain Blue light illuminated in order to maintain LPCI operability.</td></tr>
<tr><td></td><td></td><td>NOTE
RHR flow should be monitored while in operation on 3-FI-74-50, RHR SYS I FLOW. RHR flow should remain ≤ 10,000 gpm for 1-pump operation and is limited to < 13000 gpm, for two pump operation, due to the flow restricting orifice in the test return line.</td></tr>
<tr><td></td><td></td><td>[7.9] START RHR PUMP A(C) using 3-HS-74-5A(16A).
[7.10] THROTTLE RHR SYS I SUPPR POOL CLG/TEST VLV, 3-FCV-74-59, to maintain RHR flow within limits, as indicated on RHR SYS I CTMT SPRAY FLOW, 3-FI-74-56.
<table>
<tr><td>RHR Pumps in Operation</td><td>1</td><td>2</td></tr>
<tr><td>Loop Flow</td><td>7,000 to 10,000 gpm & Blue light illuminated</td><td><13,000 gpm & Blue light illuminated</td></tr>
</table></td></tr>
<tr><td></td><td></td><td>[7.11] IF desired to raise Suppression Pool Cooling flow and only one Loop I pump is in service, THEN PLACE the second Loop I RHR Pump and Heat Exchanger in service by REPERFORMING Step 8.5[7] for the second pump.</td></tr>
<tr><td></td><td>BOP</td><td>If Directed places Suppression Pool Cooling in Service Loop 2</td></tr>
<tr><td></td><td></td><td>[8] PLACE RHR Pump and Heat Exchanger B(D) in service as follows:
[8.1] START an RHRSW Pump to supply RHR Heat Exchanger B(D).</td></tr>
<tr><td></td><td></td><td>CAUTIONS
1) DO NOT EXCEED 4500 gpm RHRSW flow through any single RHR Heat Exchanger.
2) When operating RHRSW through the heat exchangers, damage can occur to the RHRSW discharge valves for the RHR Heat Exchanger if operating at low flows and high differential pressures for long periods. In order to lower the differential pressure the valves experience, flow through the in service heat exchanger(s) should be established such that the total header flow is ≥ 4000 gpm. When operating RHRSW in split mode with other units, this is calculated by adding the individual flows from each of the in service RHR heat exchangers.</td></tr>
</table>

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

<table>
<tr><td></td><td></td><td>[8.2] THROTTLE OPEN RHR HX 3B(3D) RHRSW OUTLET VLV, 3-FCV-23-46(52), as required for cooling (Refer to caution 2 above.)
[8.3] IF required to maintain Total RHRSW Flow for RHRSW Pump B(D) between 4000 and 4500 gpm, THEN REQUEST another unit to establish RHRSW flow for the associated RHRSW Pump B(D) and maintain Total RHRSW flow between 4000 and 4500 gpm per 0-OI-23. (Otherwise N/A)
[8.4] VERIFY CLOSED RHR SYS II LPCI INBD INJECT VALVE, 3-FCV-74-67.
[8.5] VERIFY CLOSED RHR SYS II SUPPR POOL CLG/TEST VLV, 3-FCV-74-73. (N/A if starting the second Loop II RHR Pump D(B))</td></tr>
<tr><td></td><td></td><td>[8.6] VERIFY CLOSED RHR SYS II SUPPR CHBR SPRAY VALVE, 3-FCV-74-72.
[8.7] VERIFY CLOSED RHR SYS II DW SPRAY OUTBD VLV, 3-FCV-74-74.
[8.8] VERIFY OPEN RHR SYS II SUPPR CHBR/POOL ISOL VLV, 3-FCV-74-71.</td></tr>
<tr><td></td><td></td><td>CAUTIONS
1) To prevent excessive vibration, RHR pumps should not be allowed to operate for more than 3 minutes at minimum flow.
2) Capacitor bank fuses are subject to clearing when the unit boards are being supplied from the 161kV source and large pumps are started. Unit Supervisors should evaluate placing the Capacitor Banks in Manual prior to starting RHR pumps, as referenced in 0-OI-57A.
3) When throttling RHR SYS II SUPPR POOL CLG/TEST VLV, 3-FCV-74-73, maintain Blue light illuminated in order to maintain LPCI operability.</td></tr>
<tr><td></td><td></td><td>NOTE
RHR Flow should be monitored while in operation on 3-FI-74-64, RHR SYS II FLOW. RHR Flow should remain ≤ 10,000 gpm for 1-pump operation and is limited to < 13000 gpm, for two pump operation, due to the flow restricting orifice in the test return line.</td></tr>
<tr><td></td><td></td><td>[8.9] START RHR PUMP B(D) using 3-HS-74-28A(39A).
[8.10] THROTTLE RHR SYS II SUPPR POOL CLG/TEST VLV, 3-FCV-74-73, to maintain RHR flow within limits, as indicated on RHR SYS II CTMT SPRAYFLOW, 3-FI-74-70.
<table>
<tr><th>RHR Pumps in Operation</th><th>1</th><th>2</th></tr>
<tr><td>Loop Flow</td><td>7,000 to 10,000 gpm & Blue light illuminated</td><td><13,000 gpm & Blue light illuminated</td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Simulator Event Guide:

Event 3 Component: ADS SRV 1-41 fails open, closes w/ inhibit switch.

		[8.11] **IF** desired to raise Suppression Pool Cooling flow and only one Loop II pump is in service, **THEN PLACE** the second Loop II RHR Pump and Heat Exchanger in service by **REPERFORMING** Step 8.5[8] for the second pump.
	SRO	Contacts maintenance to investigate cause of SRV failing open.
Driver	Driver	At NRC direction, insert **TRIGGER 1** for trip of 2B1 VFD Cooling Pump
NOTE	NOTE	Move BOP away from 9-4 for next event

Simulator Event Guide:

Event 4 Component: VFD Cooling Water Pump failure.

NOTE	NOTE	Move BOP away from 9-4 for this event
	ATC	Reports the following annunciators 9-4B-12, 28 and 32 RECIRC DRIVE 3B COOLANT FLOW LOW, RECIRC DRIVE 3B PROCESS ALARM, and RECIRC DRIVE 3B DRIVE ALARM
	ATC	Reports the 2B2 VFD Cooling Water Pump for the B Recirc Pump, has tripped.
	ATC	Reports Standby Recirc Drive Cooling Water Pump 2B2, failed to auto start.
	ATC	RECIRC DRIVE 3B COOLANT FLOW LOW **STARTS** RECIRC DRIVE cooling water pump 2B2 **and** **DISPATCHES** personnel to the RECIRC DRIVE, to check the operation of the Recirc Drive cooling water system.
	SRO	Concurs with start of Standby VFD Pump.
	BOP	RECIRC DRIVE 3B DRIVE ALARM A. **REFER TO** ICS Group Display "GD @VFDBDA" and determine cause of alarm. B. **IF** a problem with the cooling water system is indicated, **THEN VERIFY** proper operation of cooling water system. C. **IF** the problem is conductivity in the cooling water system, **THEN VERIFY** demineralizer is in service. D. **IF** a problem with power supplies is indicated, **THEN VERIFY** all the low voltage supply breakers are CLOSED/ON. E. For all other alarms, or any problems encountered **CONTACT** system engineering.
	SRO	Contacts maintenance to investigate VFD cooling and contacts the RE to evaluate thermal limits at current power level
	Crew	Verifies Standby pump started on VFD ICS display "GD @VFDBDA".
	BOP	Dispatches personnel to VFD.
	DRIVER	Wait 4 minutes after dispatched, **THEN** report tripped VFD Pump 2B1 is "hot to the touch", internal bkr closed, 480 volt bkr tripped (480 V SD BD 3A-5D).

Simulator Event Guide:

Event 5 Component: Loss of 4KV Shutdown Board 3ED, 3D D/G fails to AUTO tie.

	DRIVER	Insert **TRIGGER 5** (imf ed09d) and then **TRIGGER 6** (dmf ed09d)to cause a loss of Shutdown Board 3ED, ensure ED09D is deleted prior to operator start DG 3ED.
	BOP	Recognizes Loss of Shutdown Board D and failure of DG 3ED automatically start. Manually Starts DG 3ED and closes DG Output Breaker
	BOP	Reports Loss of Shutdown Board 3ED, failure of DG 3ED to start, and manual start of DG 3ED to SRO.
	SRO	Dispatch AUO to D/G and call Electrical Maintenance, Shift Manager
	DRIVER	When requested to investigate the shutdown board: Report that while Maintenance was moving a spare breaker in the area of the Shutdown Board 3ED, it bumped the racking tool shutter door for the Shutdown Board 3ED Normal breaker. This caused the Normal breaker to open. As AUO, report are **NO** issues with the board (i.e. NO Lockouts).

Simulator Event Guide:

Event 5 Component: Loss of 4KV Shutdown Board 3ED, 3D D/G fails to AUTO tie.

	SRO	Evaluates Tech Specs 3.8.1 (condition B and G) and 3.8.7 (condition A)		
		3.8.1 AC Sources - Operating		
		CONDITION	REQUIRED ACTION	COMPLETION TIME
		B. One required Unit 3 DG inoperable.	B.1 Verify power availability from the offsite transmission network. AND	1 hour AND Once per 8 hours thereafter
			B.2 Declare required feature(s), supported by the inoperable Unit 3 DG, inoperable when the redundant required feature(s) are inoperable. AND	4 hours from discovery of Condition B concurrent with inoperability of redundant required feature(s)
			B.3.1 Determine OPERABLE Unit 3 DG(s) are not inoperable due to common cause failure. OR	24 hours
			B.3.2 Perform SR 3.8.1.1 for OPERABLE Unit 3 DG(s). AND	24 Hours
			B.4 Restore Unit 3 DG to OPERABLE status.	7 days[(a)] AND 14 days from discovery of failure to meet LCO hours

Simulator Event Guide:

Event 5 Component: Loss of 4KV Shutdown Board 3ED, 3D D/G fails to AUTO tie.

		3.8.1 AC Sources – Operating (CONTINUED)		
		CONDITION ---------NOTE---------- Applicable when only one 4.16 kV shutdown board is affected. ---------- G. One required offsite circuit inoperable. <u>AND</u> One Unit 3 DG inoperable.	REQUIRED ACTION G.1 Declare the affected 4.16KV shutdown board inoperable.	COMPLETION TIME Immediately
		3.8.7 Distribution Systems - Operating		
		CONDITION A. One Unit 3 4.16 kV Shutdown Board inoperable.	REQUIRED ACTION ----------NOTE---------- Enter applicable Conditions and Required Actions of Condition B, C, D, and G when Condition A results in no power source to a required 480 volt board. ---------- A.1 Restore the Unit 3 4.16 kV Shutdown Board to OPERABLE status. AND A.2 Declare associated diesel generator inoperable.	COMPLETION TIME 5 days AND 12 days from discovery of failure to meet LCO Immediately

Simulator Event Guide:

Event 5 Component: Loss of 4KV Shutdown Board 3ED, 3D D/G fails to AUTO tie.

		Appendix R Manual #: Fire Protection Report Vol. 1 | PLANT: BFN | UNIT(s): 1/2/3 | PAGE 888 of 904 TITLE: Appendix R Safe Shutdown Program | SECTION: 4 | REV: 11 EQUIPMENT: Diesel Generator 3D | UNIT(S): 0 | APPENDIX R FUNCTION: Start and load from Main Control Room | TESTING REQUIREMENTS: Verify diesel can be started and loaded from Main Control Room | PROCEDURES: 3-SR-3.8.1.1(3D) 3-SR-3.8.1.7(3D)
	DRIVER	When directed by lead examiner insert trigger 3 for RFPT High Vibrations

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

	DRIVER	When directed by lead examiner insert trigger 3 for RFPT High Vibrations
	ATC	Respond to numerous RFPT C Alarms and indications on Panel 9-6.
	ATC	Report Vibrations increasing on RFPT C and the 3C oil pump has tripped
	ATC	**RFPT HP OIL PRESS LOW** A. CHECK Feedwater flow, discharge pressure, RPMs, and valve position on affected Feedpump, Panel 3-9-6. B. IF oil pressure is lowering, THEN IMMEDIATELY START companion Main Oil Pump. C. DISPATCH personnel to RFPT Room to check hydraulic oil pressure, oil tank level and oil system for leaks. D. IF hydraulic pressure lowers to 75 psig as seen on the RFPT control panel, THEN MANUALLY TRIP the Feedpump turbine.
		RFPT C ABNORMAL 3-9-6C-Window 15 REFER TO appropriate alarm response procedure.
		RFPT BRG OIL PRESS LOW 3-9-6C-Window 16 A. IF the RFPT has tripped, THEN REFER TO 3-OI-3, Section 8.1. B. IF not running, THEN START Companion Main Oil Pump. C. DISPATCH personnel to RFPT Room to check oil pressure, strainer DP, oil tank level and oil system for leaks.
		3-OI-3, RFW System Precautions and Limitations GG. For operating Feed Pumps, monitor and maintain the following parameters within ranges described below. 1. RFPT Hydraulic Pressure: ≈. RFPT Hydraulic Pressure: ≈ 2. Lube Oil Pressure to RFP Bearings: ≈. Lube Oil Pressure to RFP 3. Lube Oil Pressure to RFPT Bearings: ≈. Lube Oil Pressure to RFPT 4. Bearing lube oil from cooler: 110□. Bearing lube oil from cooler: 1 Computer Point Id's 24-56, 24-54, and 24-52). 5. Bearing lube oil to cooler: 180□. Bearing lube oil to cooler: 18 Computer Point Id's TBD025, TBD032, and TBD039). 6. Maximum Oil Temp Rise across the Turbine Bearings: 50□. 7. Vertical Vibration at RFP Bearing Supports: 2 mils double amplitude. **8. RFPT Speed: 5050 rpm maximum (3-9-6).**

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

	SRO	Directs normal Shutdown of RFPT 3C and call work control to initiate work order
		RFPT VIB OR AXIAL POSITION HIGH-HIGH 3-9-6C-Window 17 A. CHECK RFPT/RFP vibration readings on 3-XR-3-177 on Panel 3-9-6 AND RFPT and RFP Vibration display(RFPTV) on ICS. B. **DISPATCH** personnel to Panel 3-LPNL-025-0673, Vibration Monitoring Panel, located outside of RFP Room 3A, EL 617', to PERFORM the following: • REPORT vibration data for affected RFPT/RFP. • REPORT all alarm/alert conditions on panel. • Advise the Unit Operator of any changes in vibration data. C. IF a sustained vibration exceeding the DANGER setpoints (REFER TO setpoints on the next page) is confirmed on both pump inboard and outboard bearings or any turbine bearing, THEN REMOVE the RFPT from Service.
Driver	Driver	After dispatched wait 3 minutes and report an Oil Pressure of 65# and lowering, High Strainer DP and a small oil leak, not able to determine the source of the leak at this time. Oil Level is 5/8. If Pump has not been tripped report that you cannot enter the RFPT Room
Driver	Driver	**When RFPT is tripped initiate Trigger 4 to lower vibration readings** (bat nrc201020a).
	SRO	Directs trip of RFPT 3C
	ATC	**RFPT TRIP CIRCUIT ABNORMAL** A. VERIFY alarm and RFPT trip by checking Panel 3-9-6, RFPT speed, governor valve position and discharge flow. B. VERIFY reactor power is within the capacity of operating RFPs. C. **IF** BKR TRIPOUT PNL 3-9-9 DC DIST (3-XA-55-8C, alarm window 20) is illuminated, **THEN CHECK** for tripped breakers 105, 106, and 107 on Panel 3-9-9. D. **IF** RFP is tripped, **THEN** REFER TO 3-OI-3, Section 8.1 or 3-AOI-3-1.
	Crew	Plant Announcement "Tripping 3C RFPT"

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

	ATC	**RFPT TRIPPED; RFPT VIB/AXIAL POSITION HIGH OR PWR FAILURE** 3-9-6C Window 33 A. **CHECK** RFPT/RFP vibration readings on 3-XR-3-177 on Panel 3-9-6 AND RFPT and RFP Vibration display(RFPTV) on ICS.
		B. **DISPATCH** personnel to Panel 3-LPNL-025-0673, Vibration Monitoring Panel, located outside of RFP Room 3A, El 617', to PERFORM the following: • **CHECK** Power Supplies on panel energized. • **REPORT** vibration data for affected RFPT/RFP. • **REPORT** all alarm/alert conditions on panel. • **ADVISE** Unit Operator of any changes in vibration data.
		C. **IF** vibration is high, **THEN PERFORM** the following: • **CHECK** condenser vacuum on 3-P/TR2-2. • **CHECK** oil and bearing temperatures on the computer printout.
		D. **VERIFY** I&C 3B power (Panel 3-9-9, BKR 329) **NOT** tripped.
		E. **REQUEST** assistance from Site Engineering.
		F. **ADJUST** load on pump, as necessary.
Driver	Driver	Vibration Report : If RFPT is not tripped, report high vibrations numerous alarm and alert conditions and a rumble in the RFPT C Room. If RFPT has been tripped report vibration readings lowering and numerous alarm and alert conditions were in. Acknowledge communications with other organizations
	ATC	Recommends Trip of RFPT C or Trips RFPT C
	SRO	Direct Trip of RFPT C and enter **Loss Of Reactor Feedwater or Reactor Water Level High/Low 3-AOI-3-1**
NOTE	NOTE	The SRO may chose to runback Reactor Power with Recirc flow prior to tripping the RFPT, OR upon tripping the RFPT, the Recirc Pumps receive a run back signal to 75% speed at 27" (normal range) if the discharge flow of a RFP is less than 889,000 lb/hr 19% (rated flow).
Driver	Driver	When RFPT is tripped initiate trigger 4 to lower vibration readings (bat nrc201020a).

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

		3-OI-3 **7.1 RFP/RFPT Shutdown**
		CAUTIONS 1) FAILURE to monitor SJAE/OG CNDR CNDS FLOW, 3-FI-2-42, on Panel 3-9-6 for proper flow (between 2 x 106 and 3 x 106 lbm/hr) may result in SJAE isolation. 2) Changes in Condensate System flow may require adjustment to SPE CNDS BYPASS, 3-FCV-002-0190. 3) When isolating the Reactor Feedwater Pump(s) for maintenance, the associated injection water should also be isolated to prevent high seal differential pressure and allow the RFW Pump shafts to rotate freely.
		[1] **REFER TO** Section 3.0 and **REVIEW** Precautions and Limitations.
		NOTE It may be necessary to switch to SINGLE ELEMENT mode from THREE ELEMENT mode earlier than recommended if Feedwater control becomes unstable.
		[2] **IF** RFP being removed from service is last operating RFP **OR IF** at any time Feedwater control becomes unstable, **THEN DEPRESS** SINGLE ELEMENT push-button, 3-HS-46-6/1. (Otherwise N/A) **VERIFY** green backlight for push-button illuminated. [3] **VERIFY** in AUTO, RFPT 3A(3B)(3C) TURNING GEAR MOTOR, 3-HS-3-101A(127A)(152A).
		NOTES 1) When selected, then Column 1 on individual RFPT Speed Control Panel Display Stations (PDS) displays actual pump speed and is NOT controlled in any mode. 2) When selected, then Column 2 on individual RFPT Speed Control PDS displays pump flow bias and is changed with Ramp Up/Ramp Down push-buttons with controller in AUTO. 3) When selected, then Column 3 on individual RFPT Speed Control PDS displays RFPT speed demand and is changed with Ramp Up/Ramp Down push-buttons with controller in MANUAL. 4) Illustration 2 has additional information on RFPT Speed Control PDSs.
Driver	Driver	When RFPT is tripped initiate trigger 4 to lower vibration readings (bat nrc201020a).

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

		[4] **LOWER** speed of RFPT/RFP being removed from service by performing either one of the following: □**IF** using individual RFPT Manual Governor switch, **THEN GO TO** Step 7.1[5]. □**IF** using individual RFPT Speed Control PDS in MANUAL, **THEN GO TO** Step 7.1[6]. [5] **LOWER** speed of RFPT using individual RFPT 3A(3B)(3C) SPEED CONT RAISE/LOWER switch 3-HS-46-8A(9A)(10A) as follows (Panel 3-9-5): [5.1] **DEPRESS** RFPT Speed Control Raise/Lower switch to MANUAL GOVERNOR. □**VERIFY** illuminated amber light at switch. [5.2] **SLOWLY LOWER** RFPT speed by placing RFPT Speed Control switch in RAISE or LOWER positions as necessary. [5.3] **IF** this is **NOT** the last operating RFP, **THEN OBSERVE** rise in speed of any operating RFPT in auto as RFW Control System maintains Reactor water level.
		[6] **LOWER** speed of RFPT using individual RFPT 3A(3B)(3C) SPEED CONTROL PDS, 3-SIC-46-8(9)(10) as follows (Panel 3-9-5): [6.1] **PLACE** PDS in MANUAL and **VERIFY** Column 3 selected. [6.2] **SLOWLY LOWER** RFPT speed using Ramp Up/Ramp Down push-buttons as necessary. [6.3] **IF** this is **NOT** the last operating RFP, **THEN OBSERVE** rise in speed of any operating RFPT in auto as RFW Control System maintains Reactor water level.
		CAUTION RFP Discharge Check Valve failure may be experienced while removing RFP from service.
		[7] **IF** at any time RFP Discharge Check Valve failure is experienced while removing RFP from service, **THEN PERFORM** the following: (Otherwise N/A) [7.1] **DEPRESS** RFP Discharge Testable Check valve push-button for approximately ten seconds (Panel 3-9-6).
Driver	Driver	When RFPT is tripped initiate trigger 4 to lower vibration readings (bat nrc201020a).

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

		[7.2] **CHECK** reverse flow through check valve has stopped. [7.3] **IF** RFP Discharge Testable Check Valve failure is still being experienced, **THEN PERFORM** one of the following: [7.3.1] **IMMEDIATELY RETURN** RFP to service. [7.3.2] **PERFORM** the following: A. **VERIFY** open RFP Minimum Flow Valve. B. **CLOSE** RFP Discharge Valve. C. **TRIP** RFPT. [8] **CONTINUE** to slowly lower RFPT speed to minimum speed setting (approximately 600 rpm). [9] **IF** RFPT/RFP being removed from service is **NOT** the last operating RFP, **THEN GO TO** Step 7.1[11]
		[11] **WHEN** RFPT 3A(3B)(3C) is ready to be shutdown, **THEN DEPRESS** RFPT 3A(3B)(3C) TRIP, 3-HS-3-125A(151A)(176A), to trip RFPT being removed from service.
		NOTES 1) Check valve position indicator should NOT be relied upon for positive valve closure indication. 2) Step 7.1[13] is performed only if RFP Discharge Check Valve failure occurs.
		[12] **VERIFY CLOSED**, RFP 3A(3B)(3C) DISCH TESTABLE CHECK VLV, 3-FCV-3-94(93)(92), by one of the following: [illegible] [illegible] [13] **IF** RFP Discharge Check Valve failure is experienced, **THEN PERFORM** the following: [13.1] **DEPRESS** RFP 3A(3B)(3C) DISCHARGE TESTABLE CK VLV push-button, 3-HS-3-94A(93A)(92A). □**VERIFY** Discharge Check Valve closed. [13.2] **IF** RFP Discharge Check Valve failure is still being experienced, **THEN PERFORM** one of the following: [13.2.1] **IMMEDIATELY RETURN** RFP to service. [13.2.2] **PERFORM** the following: A. **VERIFY OPEN** RFP 3A(3B)(3C) MIN FLOW VALVE, 3-FCV-3-20(13)(6). B. **CLOSE** RFP 3A(3B)(3C) DISCHARGE VALVE using 3-HS-3-19A(12A)(5A). C. **VERIFY** RFPT tripped. [13.2.3] **REQUEST** assistance from Site Engineering and Maintenance.
Driver	Driver	When RFPT is tripped initiate trigger 4 to lower vibration readings (bat nrc201020a).

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

		NOTE Turning Gear motor will lockout if Turning Gear does NOT engage within five seconds of reaching zero speed. Lockout can be reset by placing control switch to OFF and pulling switch out (in OFF position).
		[14] **IF** RFP is **NOT** rolling on minimum flow **AND** RFPT coasts down to zero speed, **THEN VERIFY** Turning Gear motor starts and engages. [15] **CLOSE** RFP 3A(3B)(3C) DISCHARGE VALVE, 3-FCV-3-19(12)(5). [16] **PLACE** RFP 3A(3B)(3C) MIN FLOW VALVE, 3-HS-3-20(13)(6), in CLOSE. [17] **VERIFY** Turning Gear engaged.
		CAUTION When isolating the Reactor Feedwater Pump(s) for maintenance, the associated injection water should also be isolated to prevent high seal differential pressure and allow the RFW Pump shafts to rotate freely.
		[18] **IF** Unit Supervisor determines it necessary to close suction valve when isolating the Reactor Feedwater Pump for maintenance, **THEN PERFORM** the following for the Reactor Feedwater Pump to be isolated: (Otherwise N/A) [18.1] **CLOSE** RFP 3A(3B)(3C) SUCTION VALVE, 3-FCV-2-83(95)(108). [18.2] **CLOSE** RFP 3A(3B)(3C) INJECTION WATER SUPPLY SOV, 3-SHV-003-0593(0604)(0616).
		[19] **IF** the Reactor Feedwater Pump is NOT being isolated for maintenance and Unit Supervisor determines it necessary to close suction valve, **THEN CLOSE** RFP 3A(3B)(3C) SUCTION VALVE, 3-FCV-2-83(95)(108) (otherwise N/A). [20] **CLOSE** the following applicable valve (Panel 3-9-6): • [illegible] • [illegible] • [illegible] [21] **CLOSE** the following applicable valve (Panel 3-9-6): • [illegible] • [illegible] • [illegible]
Driver	Driver	When RFPT is tripped initiate trigger 4 to lower vibration readings (bat nrc201020a).

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

		[22] **OPEN** the following drain valves for RFPT being removed from service: A. RFPT 3A(3B)(3C) LP STOP VLV ABOVE SEAT DR, 3-FCV-6-120(125)(130) B. RFPT 3A(3B)(3C) LP STOP VLV BELOW SEAT DR, 3-FCV-6-121(126)(131) C. RFPT 3A(3B)(3C) HP STOP VALVE ABOVE SEAT DR, 3-FCV-6-122(127)(132) D. RFPT 3A(3B)(3C) HP STOP VLV BELOW SEAT DR, 3-FCV-6-123(128)(133) E. RFPT A(B)(C) FIRST STAGE DRAIN VLV, 3-FCV-6-124(129)(134) F. RFPT 3A(3B)(3C) HP STEAM SHUTOFF ABOVE SEAT DRAIN, 3-FCV-006-0153(0155)(0157), Local Control G. RFPT A(B)(C) LP STEAM SHUTOFF ABOVE SEAT DRAIN, 3-FCV-006-0154(0156)(0158), Local Control
		CAUTION DO **NOT** remove Seal Steam from RFPT until Reactor is de-pressurized.
		NOTE The remainder of Section 7.1 is required to be performed only when RFPT/RFP being removed from service is last operating RFPT/RFP and is NOT required to maintain Condenser Vacuum.
		[23] **REFER TO** 3-OI-47C and **REMOVE** Seal Steam from all three RFPTs.
		NOTE Illustration 7 provides instruction for controlling Raw Cooling Water through RFP lube oil cooler.
		[24] **WHEN** lube oil to RFP and RFPT bearings reaches 110°F **AND** seal steam has been removed, **THEN PLACE** the following switches in OFF: • . he following switches in OFF:ngs reaches • . he following switches in OFF:ngs reaches • . he following switches in OFF:ngs reaches • [25] **VERIFY** the following temperature control valves fully closed: • . □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ (El 586', T13-G) • . 13-G) ', □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ (El 586', T13-F) • . 13-F) ', □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ (El 586', T13-E)
Driver	Driver	When RFPT is tripped initiate trigger 4 to lower vibration readings (bat nrc201020a).

Simulator Event Guide:

Event 6 Component: RFPT C high vibrations with failure to trip.

		[26] **REFER TO** 3-OI-24 and **MANUALLY ISOLATE** cooling water supply to lube oil cooler. [27] **SHUTDOWN** RFPT/RFP Oil Pumps as follows: [27.1] **IF** Shutting down RFPT/RFP 3A Oil Pumps, **THEN PLACE** the following switches in STOP and PULL TO LOCK: [27.2] **IF** Shutting down RFPT/RFP 3B Oil Pumps, **THEN PLACE** the following switches in STOP and PULL TO LOCK: [27.3] **IF** Shutting down RFPT/RFP 3C Oil Pumps, **THEN PLACE** the following switches in STOP and PULL TO LOCK:
		[28] **PLACE** the following in STOP: [29] **IF** directed by Unit Supervisor, **THEN STOP** RFPT OIL TANK VAPOR EXTRACTOR, using 3-HS-3-126A.
	SRO	Call Radwaste to lock out TB sumps and contact Chemistry to determine possible oil intrusion into Condensate system
	SRO	Contact RE to evaluate Thermal Limits at current power level
	DRIVER	When directed by Lead Examiner Insert **Trigger 20** Feedwater Line Break in Turbine Bldg

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	DRIVER	When directed by Lead Examiner Insert **Trigger 20** Feedwater Line Break in Turbine Bldg
	ATC	Responds to alarms "RECTOR FEED PUMPS A, B, AND C ABNORMAL", "RFWCS ABNORMAL" and "REACTOR WATER LEVEL ABNORMAL"
	ATC	**3-ARP-9-5A Reactor Water Level Abnormal** 3-9-5A Window 8 A. **VERIFY** Reactor water level hi/low using multiple indications including Average Narrow Range Level on 3-XR-3-53 recorder, 3-LI-3-53, 3-LI-3-60, 3-LI-3-206, and 3-LI-3-253 on Panel 3-9-5. B. **IF** alarm is valid, **THEN** **REFER TO** 3-AOI-3-1 or 3-OI-3. C. **IF** 3-LI-3-53, 3-LI-3-60, 3-LI-3-206, and 3-LI-3-253 has failed or is invalid, **THEN** with SRO permission, **BYPASS** the affected level instrument. **REFER TO** 3-OI-3, Section 8.2.
	ATC	Monitors Reactor Water Level and Reports trend, recommends Manual Reactor Scram Determines Feedwater Line A Leak in the Turbine Building on line due to high Feedwater Line A Flow and Reactor Feed Pump Flows Increasing with a Lowering Reactor Water Level.
	SRO	Directs a Manual Reactor Scram inserted Directs Reactor Feed Pumps to be tripped, Reactor Feed Pump Discharge Valves shut, and Condensate Booster Pumps then Condensate Pumps secured (Isolate and stop leak)
	ATC	Inserts Manual Reactor Scram Trips Reactor Feed Pumps and shuts Reactor Feed Pump Discharge Valves Secures Condensate Booster Pumps then Condensate Pumps
DRIVER	**DRIVER**	When reactor is scrammed, insert **TRIGGER 29** (bat sdv).
NOTE	**NOTE**	Not all rods will insert.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

		Reactor Scram OATC Hard Card
	ATC	**IMMEDIATE ACTIONS** [1] **DEPRESS** REACTOR SCRAM A and B, 3-HS-99-5A/S3A and 3-HS-99-5A/S3B, on Panel 3-9-5. [2] **IF** scram is due to a loss of RPS, **THEN** **PLACE** REACTOR MODE SWITCH, 3-HS-99-5A-S1, in START & HOT STBY **AND PAUSE** for approximately 5 seconds (Otherwise N/A)
		[3] Refuel Mode One Rod Permissive Light check [3.1] **PLACE** REACTOR MODE SWITCH, 3-HS-99-5A-S1, in REFUEL. [3.2] **CHECK** illuminated REFUEL MODE ONE ROD PERMISSIVE light, 3-XI-85-46. [3.3] **IF** REFUEL MODE ONE ROD PERMISSIVE light, 3-XI-85-46, is **NOT** illuminated, **THEN** **CHECK** all control rod positions at Full-In Overtravel, or Full-In.(Otherwise N/A)
		[4] **PLACE** REACTOR MODE SWITCH, 3-HS-99-5A-S1, in SHUTDOWN.
		[5] **REPORT** the following status to the US: • Reactor Scram • Mode Switch is in Shutdown • "All rods in" or "rods out" • Reactor Water Level and trend (recovering or lowering). • Reactor pressure and trend • MSIV position (Open or Closed) • Power level

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	ATC	**2.0 SUBSEQUENT ACTIONS:** [1] **IF** all control rods **CAN NOT** be verified fully inserted, **THEN PERFORM** the following (otherwise N/A): [1.1] **INITIATE** ARI by Arming and Depressing BOTH of the following: • ARI Manual Initiate, 3-HS-68-119A • ARI Manual Initiate, 3-HS-68-119B [1.2] **VERIFY** the Reactor Recirc Pumps (if running) at minimum speed at Panel 3-9-4. [1.3] **REPORT** "ATWS Actions Complete" and power level.
		[2] **DRIVE** in all IRMs and SRMs from Panel 3-9-5 as time and conditions permit.
		[3] **VERIFY** SCRAM DISCH VOL VENT & DR VLVS closed by green indicating lights at SDV Display on Panel 3-9-5.
		[4] **MONITOR** and **CONTROL** Reactor Water Level between +2" and +51", or as directed by US, using RFP/RFPT.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	SRO	**Enters EOI-1 on Low Reactor Water Level**
	SRO	EOI-1 (**Reactor Pressure**) Monitor and Control Reactor Pressure
		IF Drywell Pressure Above 2.4 psig? - **NO**
	SRO	IF Emergency Depressurization is Anticipated and the Reactor will remain subcritical without boron under all conditions **THEN** Rapidly depressurize the RPV with the Main Turbine Bypass Valves irrespective of cooldown rate ?- **NO**
		IF Emergency Depressurization is required THEN exit RC/P and enter C2 Emergency Depressurization? - **NO**
		IF RPV water level cannot be determined? - **NO**
		Is any MSRV Cycling? - **YES**
		IF Steam cooling is required? - **NO**
		IF Suppression Pool level and temperature cannot be maintained in the safe area of Curve 3? - **NO**
		IF Suppression Pool level cannot be maintained in the safe area of Curve 4? - **NO**
		IF Drywell Control air becomes unavailable? – **NO.** **THEN** crosstie CAD to Drywell Control Air, Appendix 8G.
	SRO	Direct a Pressure Band of 800 to 1000 psig, Appendix 11A.
	ATC/BOP	Maintain directed pressure band, IAW Appendix 11A.
	SRO	EOI-1 RPV Pressure – Augment RPV Pressure control as necessary with one or more of the following depressurization systems: HPCI Appendix 11C RCIC Appendix 11B RFPTs on minimum flow Appendix 11F Main Steam System Drains Appendix 11D Steam Seals Appendix 11G SJAEs Appendix 11G Off Gas Preheater Appendix 11G RWCU Appendix 11E.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	ATC/BOP	Pressure Control IAW **Appendix11A, RPV Pressure Control SRVs**
		1. IF Drywell Control Air is **NOT** available, **THEN**: **EXECUTE** EOI Appendix 8G, CROSSTIE CAD TO DRYWELL CONTROL AIR, **CONCURRENTLY** with this procedure.
		2. IF Suppression Pool level is at or below 5.5 ft, **THEN:** **CLOSE** MSRVs and **CONTROL** RPV pressure using other options.
		3. **OPEN** MSRVs; using the following sequence to control RPV pressure, as directed by SRO: a. 3-PCV-1-179 MN STM LINE A RELIEF VALVE b. 3-PCV-1-180 MN STM LINE D RELIEF VALVE. c. 3-PCV-1-4 MN STM LINE A RELIEF VALVE d. 3-PCV-1-31 MN STM LINE C RELIEF VALVE e. 3-PCV-1-23 MN STM LINE B RELIEF VALVE f. 3-PCV-1-42 MN STM LINE D RELIEF VALVE g. 3-PCV-1-30 MN STM LINE C RELIEF VALVE h. 3-PCV-1-19 MN STM LINE B RELIEF VALVE. i. 3-PCV-1-5 MN STM LINE A RELIEF VALVE. j. 3-PCV-1-41 MN STM LINE D RELIEF VALVE k. 3-PCV-1-22 MN STM LINE B RELIEF VALVE l. 3-PCV-1-18 MN STM LINE B RELIEF VALVE m. 3-PCV-1-34 MN STM LINE C RELIEF VALVE

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

Event 8 Component: MSIV D INBD valve fails to AUTO close

	Crew	Recognizes High Pressure Coolant Injection is feeding the Feedwater leak.
	SRO	Directs trip and lockout of HPCI, isolates additional leakage source.
	SRO	EOI-1 (**Reactor Level**)
		Monitor and Control Reactor Level.
		Verify as required PCIS isolations group (1,2 and 3), ECCS and RCIC, Directs group 2 and 3 verified.
	ATC/BOP	Verifies Group 2 and 3 isolation.
	SRO	IF it has not been determined that the reactor will remain subcritical, **THEN** Exit RC/L; **ENTER** C5 Level / Power Control.
	SRO	**C5 Level / Power Control**
		If Emergency Depressurization is required? - **NO**
		RPV Water level cannot be determined? – **NO**
		The reactor will remain subcritical without Boron under all conditions? – **NO**
		PC water level cannot be maintained below 105 feet **OR** Suppression Chamber pressure cannot be maintained below 55 psig? - **NO**
CT#2	SRO	Directs ADS Inhibited.
CT#2	ATC/BOP	Inhibits ADS.
NOTE	NOTE	During ATWS recover actions MSIV D INBD valve fails to automatically close on -122" RPV water level.
	Crew	The crew will recognize the isolation failure and manually close the MSIV D INBD valve on panel 9-3.
	SRO	Is any Main Steam Line Open?- **NO**
	ATC/BOP	Closes MSIV D INBD valve and reports to SRO.
	Crew	Calls for Appendix 8A and 8E. Turbine Building AUO
Driver	Driver	When called for Appendix 8A and 8E, wait 6 minutes. Call back and report, "Field actions are complete for Appendix 8A and 8E." ENTER **TRIGGER 27** (bat app08ae)
		IF Suppression Pool Temperature is above 110°F **AND** Reactor Power is above 5% **AND** a MSRV is open or cycling **OR** drywell pressure is above 2.4 psig **AND** RPV water level is above -162 inches? – **NO**
		Is Reactor Power above 5% ?- **NO**

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	SRO	Is Power above 5% or unknown? **NO**
	SRO	Is Power above 5% or unknown AND RPV Water Level above -50 inches?- **NO**
	SRO	Directs a Level Band with RCIC, Appendix 5C and CRD, Appendix 5B.
	BOP	**Control Reactor Water Level with RCIC IAW 3-EOI Appendix-5C** 1. IF BOTH of the following exist: • [illegible] **AND** • [illegible] necessary, THEN **EXECUTE** EOI Appendix 16A concurrentlywith this procedure. 2. IF BOTH of the following exist: • [illegible] **AND** • [illegible] interlocks, THEN **PERFORM** the following: a. **EXECUTE** EOI Appendix 16K concurrently with this procedure. b. **RESET** auto isolation logic using 3-XS-71-51A(B), RCICAUTO-ISOL LOGIC A(B) RESET pushbuttons. 3. **VERIFY RESET** and **OPEN** 3-FCV-71-9, RCIC TURB TRIP/THROT VLV. 4. **VERIFY** 3-FIC-71-36A, RCIC SYSTEM FLOW/CONTROL, controller in AUTO with setpoint at 620 gpm. 5. **OPEN** the following valves: • 3-FCV-71-39, RCIC PUMP INJECTION VALVE • 3-FCV-71-34, RCIC PUMP MIN FLOW VALVE • 3-FCV-71-25, RCIC LUBE OIL COOLING WTR VLV. 6. **PLACE** 3-HS-71-31A, RCIC VACUUM PUMP, handswitch in START. 7. **OPEN** 3-FCV-71-8, RCIC TURBINE STEAM SUPPLY VLV, to start RCIC Turbine.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

		8. **CHECK** proper RCIC operation by observing the following: a. RCIC Turbine speed accelerates above 2100 rpm. b. RCIC flow to RPV stabilizes and is controlled automatically at 620 gpm. c. 3-FCV-71-40, RCIC TESTABLE CHECK VLV, opens by observing 3-ZI-71-40A, DISC POSITION, red light illuminated. d. 3-FCV-71-34, RCIC PUMP MIN FLOW VALVE, closes as flow rises above 120 gpm. 9. IF BOTH of the following exist: • RCIC Initiation signal is NOT present, **AND** • RCIC flow is below 60 gpm, THEN **VERIFY OPEN** 3-FCV-71-34, RCIC PUMP MIN FLOW VALVE. **10. ADJUST** 3-FIC-71-36A, RCIC SYSTEM FLOW/CONTROL, controller as necessary to control injection.
	ATC/ BOP	**Appendix 5B** 1. IF Maximum injection flow is NOT required, THEN **VERIFY** CRD aligned as follows: 2. IF BOTH of the following exist: CRD is NOT required for rod insertion, **AND** Maximum injection flow is required, THEN **LINE UP** ALL available CRD pumps to the RPV as follows: a. IF CRD Pump 3A is available, THEN **VERIFY** RUNNING CRD Pump 3A or 3B. b. IF CRD Pump 3B is available, THEN **VERIFY** RUNNING CRD Pump 3A or 3B. c. OPEN the following valves to increase CRD flow to the RPV: • 3-PCV-85-23, CRD DRIVE WATER PRESS CONTROL VLV • 3-PCV-85-27, CRD CLG WATER PRESS CONTROL VLV • 3-FCV-85-50, CRD EXH RTN LINE SHUTOFF VALVE. d. ADJUST 3-FIC-85-11, CRD SYSTEM FLOW CONTROL, on Panel 9-5 to control injection WHILE maintaining 3-PI-85-13A, CRD ACCUM CHG WTR HDR PRESS, above 1450 psig, if possible.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	SRO	EOI-1 **(Power Control)**
		Monitor and Control Reactor Power.
		Will the reactor will remain sub subcritical without boron under all conditions? - **NO**
		If the reactor subcritical and No boron has been injected?- **NO**
		Verify Reactor Mode Switch in Shutdown.
		Initiate ARI.
	ATC	Initiates ARI.
	SRO	Verify Recirc Runback (pump speed 480 rpm).
	ATC	Verifies Recirc Runback.
	SRO	Is Power above 5%? - YES Directs tripping Recirc Pumps
	ATC	Trips Recirc Pumps.
CT#3	SRO	Before Suppression Pool temperature rises to 110°F, continue:
		Insert Control Rods Using **one or more** of the following methods: • Appendix 1F • Appendix 1D
	DRIVER	**WHEN** directed to perform Appendix 1F and Appendix 2, wait 4 minutes and insert **TRIGGER 25** and **TRIGGER 26 THEN** report appendix 2 complete and field action for appendix 1F complete. **WHEN** the Scram has been reset **THEN** insert **TRIGGER 28** to enter bat ATWS-1

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

CT#3	ATC	Inserts Control Rods, IAW Appendix 1D and 1F.
	ATC	Insert Control Rods, IAW Appendix 1F.
		1. **VERIFY** Reactor Scram and ARI reset. a. IF ARI CANNOT be reset, THEN **EXECUTE** EOI Appendix 2 concurrently with Step 1.b of this procedure. b. IF Reactor Scram CANNOT be reset, THEN **DISPATCH** personnel to Unit 3 Auxiliary Instrument Room to defeat ALL RPS logic trips as follows: 1) **REFER** to Attachment 1 and **OBTAIN** four 3-ft banana jack jumpers from EOI Equipment Storage Box. 2) **REFER** to Attachment 2 and **JUMPER** the following relay terminals in Panel 9-15, Rear: a) Relay 5A-K10A (DQ) Terminal 2 to Relay 5A-K12E (ED) Terminal 4 (Bay 1). b) Relay 5A-K10C (AT) Terminal 2 to Relay 5A-K12G (BH) Terminal 4 (Bay 3). 3) **REFER** to Attachment 3 and **JUMPER** the following relay terminals in Panel 9-17, Rear: a) Relay 5A-K10B (DQ) Terminal 2 to Relay 5A-K12F (ED) Terminal 4 (Bay 1). b) Relay 5A-K10D (AT) Terminal 2 to Relay 5A-K12H (BH) Terminal 4 (Bay 3). 2. **WHEN** RPS Logic has been defeated, **THEN RESET** Reactor Scram. 3. **VERIFY OPEN** Scram Discharge Volume vent and drain valves. 4. **DRAIN** SDV UNTIL the following annunciators clear: • WEST CRD DISCH VOL WTR LVL HIGH HALF SCRAM (Panel 3-9-4, 3-XA-55-4A, Window 1) • EAST CRD DISCH VOL WTR LVL HIGH HALF SCRAM (Panel 3-9-4, 3-XA-55-4A, Window 29). 5. **DISPATCH** personnel to **VERIFY OPEN** 3-SHV-085-0586, CHARGING WATER SHUTOFF. 6. **WHEN** CRD Accumulators are recharged, **THEN INITIATE** manual Reactor Scram and ARI. 7. **CONTINUE** to perform Steps 1 through 6, **UNTIL ANY** of the following exists: • ALL control rods are fully inserted, **OR** • NO inward movement of control rods is observed, **OR** • SRO directs otherwise.
DRIVER	DRIVER	When the scram is reset, inset **TRIGGER 28** (bat atws-1) to remove the ATWS condition and allow rods to insert on subsequent scram.
NOTE	NOTE	It will take approximately 7 minutes for the scram discharge volume to drain after the scram is reset.
	ATC	After scram discharge volume is drained, inserts manual reactor scram. All rods insert.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS

		Appendix 1D NOTE: This EOI Appendix may be executed concurrently with EOI Appendix 1A or 1B at SRO discretion when time and manpower permit. 1. **VERIFY** at least one CRD pump in service. NOTE: Closing 3-SHV-085-0586, CHARGING WATER SOV, valve may reduce the effectiveness of EOI Appendix 1A or 1B. 2. IF Reactor Scram or ARI CANNOT be reset, THEN **DISPATCH** personnel to **CLOSE** 3-SHV-085-0586, CHARGING WATER SOV (RB NE, El 565 ft). 3. **VERIFY** REACTOR MODE SWITCH in SHUTDOWN. 4. **BYPASS** Rod Worth Minimizer. 5. **REFER** to Attachment 2 and **INSERT** control rods in the area of highest power as follows: a. **SELECT** control rod. b. **PLACE** CRD NOTCH OVERRIDE switch in EMERG ROD IN position UNTIL control rod is NOT moving inward. c. **REPEAT** Steps 5.a and 5.b for each control rod to be inserted. NOTE: A ladder may be required to perform the following step. **REFER** to Tools and Equipment, Attachment 1. 6. WHEN ... NO further control rod movement is possible or desired, THEN **DISPATCH** personnel to **VERIFY OPEN** 3-SHV-085-0586, CHARGING WATER SOV (RB NE, El 565 ft).

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

CT#3	BOP/ATC	Initiate SLC IAW Appendix 3A
		1. **UNLOCK** and **PLACE** 3-HS-63-6A, SLC PUMP 2A/2B, control switch in START-A or START-B position. 2. **CHECK** SLC System for injection by observing the following: • Selected pump starts, as indicated by red light illuminated above pump control switch. • Squib valves fire, as indicated by SQUIB VALVE A and B CONTINUITY blue lights extinguished. • SLC SQUIB VALVE CONTINUITY LOST Annunciator in alarm on Panel 3-9-5 (3-XA-55-5B, Window 20). • 3-PI-63-7A, SLC PUMP DISCH PRESS, indicates above RPV pressure. • System flow, as indicated by 3-IL-63-11, SLC FLOW, red light illuminated on Panel 3-9-5. • SLC INJECTION FLOW TO REACTOR Annunciator in alarm on Panel 3-9-5 (3-XA-55-5B, Window 14).
		3. IF Proper system operation CANNOT be verified, THEN **RETURN** to Step 1 and **START** other SLC pump. 4. **VERIFY** RWCU isolation by observing the following: • RWCU Pumps 2A and 2B tripped. • 3-FCV-69-1, RWCU INBD SUCT ISOLATION VALVE closed. • 3-FCV-69-2, RWCU OUTBD SUCT ISOLATION VALVE closed. • 3-FCV-69-12, RWCU RETURN ISOLATION VALVE closed. 5. **VERIFY** ADS inhibited. 6. **MONITOR** reactor power for downward trend. 7. **MONITOR** 3-LI-63-1A, SLC STORAGE TANK LEVEL, and **CHECK** that level is dropping approximately 1% per minute.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	SRO	Determines RPV Level Cannot be restored and maintained above -180 inches.
	SRO	Determined Emergency Depressurization is Required.
CT#4	**SRO**	Direct Terminate and Prevent IAW Appendix 4.
	ATC/BOP	Terminate and Prevent IAW Appendix 4
CT#4	BOP/ATC	**Appendix 4** 1. **PREVENT** injection from HPCI by performing the following: a. IF HPCI Turbine is **NOT** at zero speed, **THEN PRESS** and **HOLD** 3-HS-73-18A, HPCI TURBINE TRIP push-button. b. **WHEN** HPCI Turbine is at zero speed, **THEN PLACE** 3-HS-73- 47A, HPCI AUXILIARY OIL PUMP control switch in PULL TO LOCK and **RELEASE** 3-HS-73-18A, HPCI TURBINE TRIP push-button. 3. **PREVENT** injection from CORE SPRAY following an initiation signal by **PLACING** ALL Core Spray pump control switches in STOP

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

		Appendix 4 (continued) 4. **PREVENT** injection from LPCI SYSTEM I by performing the following: **NOTE** Injection may be prevented by performing EITHER step 4.a or step 4.b. a. Following automatic pump start, PLACE RHR SYSTEM I pump control switches in STOP. **OR** b. BEFORE RPV pressure drops below 450 psig, 1) PLACE 3-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in BYPASS. **AND** 2) VERIFY CLOSED 3-FCV-74-52, RHR SYS I LPCI OUTBD INJECT VALVE.
		5. **PREVENT** injection from LPCI SYSTEM II by performing the following
		NOTE Injection may be prevented by performing EITHER step 5.a or step 5.b. a. Following automatic pump start, PLACE RHR SYSTEM II pump control switches in STOP. **OR** b. BEFORE RPV pressure drops below 450 psig, 1) PLACE 3-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in BYPASS. **AND** 2) VERIFY CLOSED 3-FCV-74-66, RHR SYS II LPCI OUTBD INJECT VALVE

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

		Appendix 4 (continued) **NOTE** Injection may be prevented by performing EITHER step 5.a or step 5.b. a. Following automatic pump start, PLACE RHR SYSTEM II pump control switches in STOP. **OR** b. BEFORE RPV pressure drops below 450 psig, 1) PLACE 3-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in BYPASS. **AND** 2) VERIFY CLOSED 3-FCV-74-66, RHR SYS II LPCI OUTBD INJECT VALVE
		6. **PREVENT** injection from CONDENSATE and FEEDWATER by performing the following: a. **IF** Immediate injection termination from a reactor feedwater pump is required, **THEN PERFORM** step 6.d for the desired pump.
		c. **CLOSE** the following valves BEFORE RPV pressure drops below 500 psig: • 3-FCV-3-19, RFP 2A DISCHARGE VALVE • 3-FCV-3-12, RFP 2B DISCHARGE VALVE • 3-FCV-3-5, RFP 2C DISCHARGE VALVE • 3-LCV-3-53, RFW START-UP LEVEL CONTROL
		d. **TRIP** RFPTs as necessary to prevent injection by **DEPRESSING** the following push-buttons: • 3-HS-3-125A, RFPT 3A TRIP • 3-HS-3-151A, RFPT 3B TRIP • 3-HS-3-176A, RFPT 3C TRIP.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	SRO	**Enters C-2, Emergency RPV Depressurization** Answers **Yes** to will the Reactor remain subcritical without Boron under all conditions Answers **Yes** to is Drywell Pressure above 2.4 psig Does not prevent Injection from any Core Spray or LPCI pumps because they are all needed to assure adequate core cooling Answers **Yes** to is Suppression Pool Level above 5.5 feet Directs opening of all ADS Valves Answers **Yes** to can 6 ADS Valves be opened Maintains 6 ADS Valves open until RPV cold shutdown Interlocks are clear
CT#5	BOP/ATC	Reports Suppression Pool Level in Feet when directed by SRO Opens 6 ADS valves and verifies open when directed **When RPV Pressure is low enough for Injection of LPCI and Core Spray, operator should verify available systems are injecting.** When adequate core cooling is assured begins to throttle flow to prevent overfilling RPV.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	BOP/ATC	**Appendix 6B, Loop I LPCI** 1. IF Adequate core cooling is assured, **AND** It becomes necessary to bypass the LPCI injection valve auto open signal to control injection, THEN **PLACE** 3-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in **BYPASS.** 2. **VERIFY OPEN** 3-FCV-74-1, RHR PUMP 3A SUPPR POOL SUCT VLV. 3. **VERIFY OPEN** 3-FCV-74-12, RHR PUMP 3C SUPPR POOL SUCT VLV. 4. **VERIFY CLOSED** the following valves: • 3-FCV-74-61, RHR SYS I DW SPRAY INBD VLV • 3-FCV-74-60, RHR SYS I DW SPRAY OUTBD VLV • 3-FCV-74-57, RHR SYS I SUPPR CHBR/POOL ISOL VLV • 3-FCV-74-58, RHR SYS I SUPPR CHBR SPRAY VALVE • 3-FCV-74-59, RHR SYS I SUPPR POOL CLG/TEST VLV 5. **VERIFY** RHR Pump 3A and/or 3C running. 6. WHEN RPV pressure is below 450 psig, THEN **VERIFY OPEN** 3-FCV-74-53, RHR SYS I LPCI INBD INJECT VALVE. 7. IF RPV pressure is below 230 psig, THEN **VERIFY CLOSED** 3-FCV-68-79, RECIRC PUMP 3B DISCHARGE VALVE. 8. **THROTTLE** 3-FCV-74-52, RHR SYS I LPCI OUTBD INJECT VALVE, as necessary to control injection. 10. **PLACE** RHRSW pumps in service as soon as possible on ANY RHR Heat Exchangers discharging to the RPV. 11. **THROTTLE** the following in-service RHRSW outlet valves to maintain flow between 1350 and 4500 gpm: • 3-FCV-23-34, RHR HX 3A RHRSW OUTLET VLV • 3-FCV-23-40, RHR HX 3C RHRSW OUTLET VLV

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	BOP/ATC	**Appendix 6C, Loop II LPCI** 1. IF Adequate core cooling is assured, **AND** It becomes necessary to bypass the LPCI injection valve auto open signal to control injection, THEN **PLACE** 3-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.** 2. **VERIFY OPEN** 3-FCV-74-24, RHR PUMP 3B SUPPR POOL SUCT VLV. 3. **VERIFY OPEN** 3-FCV-74-35, RHR PUMP 3D SUPPR POOL SUCT VLV. 4. **VERIFY CLOSED** the following valves: • 3-FCV-74-75, RHR SYS II DW SPRAY INBD VLV • 3-FCV-74-74, RHR SYS II DW SPRAY OUTBD VLV • 3-FCV-74-71, RHR SYS II SUPPR CHBR/POOL ISOL VLV • 3-FCV-74-72, RHR SYS II SUPPR CHBR SPRAY VALVE • 3-FCV-74-73, RHR SYS II SUPPR POOL CLG/TEST VLV. 5. VERIFY RHR Pump 3B and/or 3D running. 6. WHEN RPV pressure is below 450 psig, THEN **VERIFY OPEN** 3-FCV-74-67, RHR SYS II LPCI INBD INJECT VALVE. 7. IF RPV pressure is below 230 psig, THEN **VERIFY CLOSED** 3-FCV-68-3, RECIRC PUMP 3A DISCHARGE VALVE. 8. **THROTTLE** 3-FCV-74-66, RHR SYS II LPCI OUTBD INJECT VALVE, as necessary to control injection. 9. **MONITOR** RHR Pump NPSH using Attachment 1. 10. **PLACE** RHRSW pumps in service as soon as possible on ANY RHR Heat Exchangers discharging to the RPV. 11. **THROTTLE** the following in-service RHRSW outlet valves to maintain flow between 1350 and 4500 gpm: • 3-FCV-23-46, RHR HX 3B RHRSW OUTLET VLV • 3-FCV-23-52, RHR HX 3D RHRSW OUTLET VLV.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	BOP/ATC	**Appendix 6D, Loop I Core Spray** 1. **VERIFY OPEN** the following valves: • 3-FCV-75-2, CORE SPRAY PUMP 3A SUPPR POOL SUCT VLV • 3-FCV-75-11, CORE SPRAY PUMP 3C SUPPR POOL SUCT VLV • 3-FCV-75-23, CORE SPRAY SYS I OUTBD INJECT VALVE. 2. **VERIFY CLOSED** 3-FCV-75-22, CORE SPRAY SYS I TEST VALVE. 3. **VERIFY** CS Pump 3A and/or 3C **RUNNING**. 4. WHEN RPV pressure is below 450 psig, THEN **THROTTLE** 3- FCV-75-25, CORE SPRAY SYS I INBD INJECT VALVE, as necessary to control injection at or below 4000 gpm per pump.
	BOP/ATC	**Appendix 6E, Loop II Core Spray** 1. **VERIFY OPEN** the following valves: • 3-FCV-75-30, CORE SPRAY PUMP 3B SUPPR POOL SUCT VLV • 3-FCV-75-39, CORE SPRAY PUMP 3D SUPPR POOL SUCT VLV • 3-FCV-75-51, CORE SPRAY SYS II OUTBD INJECT VALVE 2. **VERIFY CLOSED** 3-FCV-75-50, CORE SPRAY SYS II TEST VALVE. 3. **VERIFY** CS Pump 3B and/or 3D **RUNNING**. 4. WHEN RPV pressure is below 450 psig, THEN **THROTTLE** 3-FCV-75-53, CORE SPRAY SYS II INBD INJECT VALVE, as necessary to control injection at or below 4000 gpm per pump.
	SRO	Contacts RE to determine if the Reactor will remain subcritical under all conditions (Note 1)

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	SRO	**Enters EOI-2 on High Drywell Pressure** **DW/T** Monitor and control Drywell temperature below 160F using available Drywell cooling Answers **No** to can Drywell Temperature be maintained below 160F Operate all available drywell cooling Before Drywell Temperature rises to 200F enter EOI-1 and Scram Reactor (this will already be complete at this time) Before Drywell Temperature rises to 280F continue Answers **Yes** to is Suppression Pool Level below 18 Feet Answers **Yes** to are Drywell Temperatures and Pressures within the safe area of curve 5 Directs Shutdown of Recirc Pumps and Drywell Blowers (should leave Drywell Blowers running due to being unable to spray because adequate core cooling is not assured) Does not initiate Drywell Sprays Because Adequate Core Cooling is not assured at this time

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	ATC/BOP	Vent Containment IAW **Appendix 12**
		1. VERIFY at least one SGTS train in service. 2. VERIFY CLOSED the following valves (Panel 2-9-3 or Panel 2-9-54): 2-FCV-64-31, DRYWELL INBOARD ISOLATION VLV, 2-FCV-64-29, DRYWELL VENT INBD ISOL VALVE, 2-FCV-64-34, SUPPR CHBR INBOARD ISOLATION VLV, 2-FCV-64-32, SUPPR CHBR VENT INBD ISOL VALVE.
		Steps 3, 4, 5 and 6 are If / Then steps that do not apply
		7. **CONTINUE** in this procedure at: Step 8 to vent the Suppression Chamber through 2-FCV-84-19, **OR** Step 9 to vent the Suppression Chamber through 2-FCV-84-20.
		8. VENT the Suppression Chamber using 2-FIC-84-19, PATH B VENT FLOW CONT, as follows: a. PLACE keylock switch 2-HS-84-35, DW/SUPPR CHBR VENT ISOL BYP SELECT, to SUPPR-CHBR position (Panel 2-9-54). b. VERIFY OPEN 2-FCV-64-32, SUPPR CHBR VENT INBD ISOL VALVE (Panel 2-9-54). c. PLACE 2-FIC-84-19, PATH B VENT FLOW CONT, in AUTO with setpoint at 100 scfm (Panel 2-9-55). d. PLACE keylock switch 2-HS-84-19, 2-FCV-84-19 CONTROL, in OPEN (Panel 2-9-55). e. VERIFY 2-FIC-84-19, PATH B VENT FLOW CONT, is indicating approximately 100 scfm. f. CONTINUE in this procedure at step 12.

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	BOP	Vents Primary Containment IAW **Appendix 12**
		9. VENT the Suppression Chamber using 2-FIC-84-20, PATH A VENT FLOW CONT, as follows: a. VERIFY OPEN 2-FCV-64-141, DRYWELL DP COMP BYPASS VALVE (Panel 2-9-3). b. PLACE keylock switch 2-HS-84-36, SUPPR CHBR/DW VENT ISOL BYP SELECT, to SUPPR-CHBR position (Panel 2-9-54). c. VERIFY OPEN 2-FCV-64-34, SUPPR CHBR INBOARD ISOLATION VLV (Panel 2-9-54). d. VERIFY 2-FIC-84-20, PATH A VENT FLOW CONT, in AUTO with setpoint at 100 scfm (Panel 2-9-55). e. PLACE keylock switch 2-HS-84-20, 2-FCV-84-20 ISOLATION BYPASS, in BYPASS (Panel 2-9-55). f. VERIFY 2-FIC-84-20, PATH A VENT FLOW CONT, is indicating approximately 100 scfm. g. CONTINUE in this procedure at step 12.
		Steps 10 and 11 are to Vent the Drywell and will not be used since the crew will be successful at venting through the Suppression Chamber
		12. ADJUST 2-FIC-84-19, PATH B VENT FLOW CONT, or 2-FIC-84-20, PATH A VENT FLOW CONT, as applicable, to maintain ALL of the following: Stable flow as indicated on controller, AND 2-PA-84-21, VENT PRESS TO SGT HIGH, alarm light extinguished, AND Release rates as determined below: iii. IF Venting for ANY other reason than items i or ii above, THEN MAINTAIN release rates below Stack release rate of 1.4 x 107 µCi/s AND 0-SI-4.8.B.1.a.1 release fraction of 1.
	DRIVER	Acknowledge Notification

Simulator Event Guide:

Event 7 Major: FW line break in steam tunnel. ATWS.

	Crew	During ATWS recover actions D/G A will fail to automatically start on 2.45# DW pressure or -122" RPV water Level. The crew will recognize the auto start failure and manually start D/G A at panel 9-23.
	SRO	The Emergency Classification is 1.1-S1 or 1.2 S

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner.

Emergency Depressurization complete

Reactor Level is restored and maintained.

All Control Rods inserted.

SHIFT TURNOVER SHEET

Unit 3 is at 100% power

Units 1 and 2 are at 90% power

Equipment Out of Service/LCO's:

CRD Pump A is out of service.

Operations/Maintenance for the Shift:

Complete Weekly EHC Pump Test per 3-OI-47A section 6.2. Lower power to 90% with Recirc Flow for a Rod Pattern Adjustment

Unusual Conditions/Problem Areas:

A flash flood watch is in effect for the next six hours.

Facility: **Browns Ferry NPP** Scenario No.: **NRC - 5** Op-Test No.: **1205**

Examiners:_____ Operators: SRO:_____

_____ ATC:_____

_____ BOP:_____

Initial Conditions: The unit is at approximately 90% power. RHR Pump 2A is tagged out for scheduled maintenance. Tech Spec 3.5.1 Condition A has been entered.

Turnover: Perform RFPT 2B Overspeed Trip Exerciser Test per 2-OI-3 section 8.10 and then raise power to 100% with Recirc Flow.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N-BOP N-SRO	RFPT 2B Overspeed Trip Exerciser Test per 2-OI-3 Section 8.10.
2	N/A	R-ATC R-SRO	Increase reactor power to 100% using recirc flow per 2-OI-68
3	sw02b	C-ATC TS-SRO	RBCCW pump B trips. 2-FCV-70-48 fails to AUTO close.
4	og04a	C-BOP C-SRO	Loss of SJAE, swap to standby SJAE.
5	rd07r1835	C-ATC TS-SRO	30-23 Control rod drifts out of the core, 2-AOI-85-6. Then sticks when driven in, 2-OI-85 and 2-AOI-85-7.
6	batch file	C-BOP C-SRO	EHC pump trip. Standby pump fails to AUTO start.
7	tc07	M-ALL	EHC leak on pump casing leads to turbine trip and scram. A Reactor Coolant Leak inside the Drywell, during the ATWS recovery actions, will require Containment venting and sprays.
8	sl02	C-ALL	SLC failure to inject
9	zdixs74129	C-ALL	2C RHR pump will fail to start and RHR Loop II select logic will fail. Operator must use RHRSW w/ RHR loop I to spray the suppression chamber and drywell.

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

FINAL

Events

1. BOP Operator will perform RFPT 2B Overspeed Trip Exerciser Test per 2-OI-3 Section 8.10.

2. Crew will raise power to 100% using Recirc Flow.

3. RBCCW pump 2B will trip. The ATC Operator will secure RWCU. 2-FCV-70-48 will fail to AUTO close on low pressure and the ATC operator will manually close the valve with the control switch on Panel 2-9-6. ATC will contact Unit 1 and align the spare RBCCW pump to Unit 2 and re-open 2-FCV-70-48. SRO will refer to the TRM and determine Technical Surveillance Requirement 3.4.1.1 to monitor Reactor Coolant Conductivity continuously cannot be met and samples must be drawn every 4 hours.

4. The crew will respond to a loss of the in-service SJAE (A). The BOP operator will shift SJAE's to B in service per 2-OI-66.

5. The ATC will recognize and respond to control rod 30-23 drifting out of the core per 2-AOI-85-5. The ATC will select and drive the rod. When rod is being driven IN, the rod will stick. The SRO will refer to Tech Specs and determine TS 3.1.3 condition A is appropriate for one stuck rod and depending on the timing the rod may not have rod position indication when it sticks and TS 3.1.3. Condition C will be appropriate.

6. The running EHC pump will trip and the standby pump will fail to AUTO start. The BOP will start the standby EHC pump. When the standby EHC pump starts a leak will develop on the pump casing.

7. The EHC leak will force the crew to manually Scram the reactor, trip the turbine, and lock out the running EHC pump. The Turbine Bypass Valves will be unavailable. An ATWS will occur on the Reactor Scram and the crew will perform ATWS recovery actions to insert all control rods with exception of the stuck rod 18-35. During the crew's response to the ATWS, a Reactor Coolant leak inside the Drywell will require Suppression Chamber Sprays and Containment Sprays to be performed.

8. A failure of RHR Loop II Select Logic and a failure of RHR Pump 2C to start will cause the crew to use RHRSW via Loop I of RHR to spray the suppression chamber and drywell. SLC will fail to inject during performance of ATWS actions.

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner.

All Control Rods are inserted

Suppression Chamber /Drywell Sprays performed using RHRSW

Critical Tasks – Two

CT#1- With a reactor scram required and the reactor not shutdown, initiate action to reduce power by inserting control rods before containment parameters require Emergency Depressurization (DW temperature 280°F).

1. Safety Significance:
   Shutting down reactor can preclude failure of containment or equipment necessary for the safe shutdown of the plant.

2. Cues:
   Procedural compliance
   CRD Pump B operating

3. Measured by:
   Observation - Control Rod insertion commenced in accordance EOI Appendixes 1A, 1F, 2, 1D.

4. Feedback:
   Reactor Power trend.
   Control Rod indications.

CT#2- . When suppression chamber pressure exceeds 12 psig, initiate Drywell Sprays while in the safe region of the Drywell Spray Initiation Limit(DSIL) curve using RHRSW Standby Coolant.

1. Safety Significance:
   Precludes failure of containment

2. Cues:
   Procedural compliance
   High Drywell Pressure and Suppression Chamber Pressure

3. Measured by:
   Observation - US directs Drywell Sprays IAW with EOI Appendix 17B
   AND
   Observation - RO initiates Drywell Sprays

4. Feedback:
   Drywell and Suppression Pressure lowering
   RHRSW flow to containment

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER: NRC 5

8 Total Malfunctions Inserted: List (4-8)

4 Malfunctions that occur after EOI entry: List (1-4)

4 Abnormal Events: List (1-3)

1 Major Transients: List (1-2)

2 EOI's used: List (1-3)

1 EOI Contingencies used: List (0-3)

75 Validation Time (minutes)

2 Crew Critical Tasks: (2-5)

YES Technical Specifications Exercised (Yes/No)

Scenario Tasks

EVENT	TASK NUMBER	K/A	RO	SRO
1	RFPT 2B Overspeed Trip Exerciser Test			
		2.1.20	4.6	4.6
2	Raise reactor power using recirc flow			
	RO U-068-NO-17 SRO S-000-NO-138	2.1.23	4.3	4.4
3	Loss of RBCCW			
	RO U-070-AL-03 SRO S-070-AB-01	206000A2.17	3.9	4.3
4	Loss of SJAE			
	RO U-066-NO-7 SRO S-047-AB-3	295002AA2.01	2.9	3.1
5	Control Rod Drift			
	RO U-085-AL-12 SRO S-085-AB-5	201003A2.03	3.4	3.7
6	EHC Fluid Leak			
	RO U-47A-AL-05 SRO S-047-AB-02	241000A2.20	2.5	2.6
7	Reactor Coolant leak and ATWS			
	RO U-000-EM-5 SRO S-000-EM-3 SRO S-000-EM-5 SRO S-000-EM-15 RO U-000-EM-1 SRO S-000-EM-1 SRO S-000-EM-2	295024EA2.04	3.9	3.9

Procedures Used/Referenced:

Procedure Number	Procedure Title	Procedure Revision
2-OI-3	Reactor Feedwater System	Rev 139
2-GOI-100-12	Power Maneuvering	Rev 41
2-OI-68	Reactor Recirculation System	Rev 139
2-ARP-9-4C	Alarm Response Procedure	Rev 30
2-AOI-70-1	Loss of Reactor Building Closed Cooling Water	Rev 29
2-OI-70	Reactor Building Closed Cooling Water System	Rev 63
2-OI-69	Reactor Water Cleanup System	Rev 106
TS 3.4.1	Recirculation Loops Operating	Amd 258
2-AOI-47-3	Loss of Condenser Vacuum	Rev 19
2-ARP-9-53	Alarm Response Procedure	Rev 36
2-ARP-9-5A	Alarm Response Procedure	Rev 48
2-AOI-85-6	Rod Drift Out	Rev 19
TS 3.1.3	Control Rod Operability	Amd 301
2-OI-85	Control Rod Drive System	Rev 130
2-ARP-9-7B	Alarm Response Procedure	Rev 29
2-AOI-100-1	Reactor Scram	Rev 97
BFN-ODM-4.20	Strategies for Successful Transient Mitigation	Rev 0
2-OI-92	Source Range Monitors	Rev 21
2-OI-92A	Intermediate Range Monitors	Rev 28
2-OI-47	Turbine Generator System	Rev 163
2-OI-64	Primary Containment System	Rev 116
2-EOI-1	RPV Control Flowchart	Rev 12
2-EOI Appendix-3A	SLC Injection	Rev 5
2-EOI-2-C-5	Level – Power Control Flowchart	Rev 11
2-EOI Appendix-11A	Alternate RPV Pressure Control Systems MSRVs	Rev 4
2-EOI Appendix-8A	Bypassing Group 1 RPV Low Low Low Level Isolation Interlocks	Rev 3
2-EOI Appendix-8E	Bypassing Group 6 Low RPV Level and High Drywell Pressure Isolation Interlocks	Rev 2

Procedures Used/Referenced:

Procedure Number	Procedure Title	Procedure Revision
2-EOI Appendix-5A	Injection Systems Lineup Condensate/Feedwater	Rev 9
2-EOI Appendix-2	Defeating ARI Logic Trips	Rev 4
2-EOI Appendix-1D	Insert Control Rods Using Reactor Manual Control System	Rev 6
2-EOI Appendix-1A	Removal and Replacement of RPS Scram Solenoid Fuses	Rev 6
2-EOI-2	Primary Containment Control Flowchart	Rev 10
2-EOI Appendix-12	Primary Containment Venting	Rev 4
2-EOI Appendix-17C	RHR System Operation Suppression Chamber Sprays	Rev 11
2-EOI Appendix-17B	RHR System Operation Drywell Sprays	Rev 10
2-EOI Appendix-6A	Injection Subsystems Lineup Condensate	Rev 4
EPIP-1	Emergency Classification	Rev 47
EPIP-4	Site Area Emergency	Rev 32

Simulator Instructor – IC28

pref/NRC/1205-5
pfk 01 tog
pfk 02 ann silence
pfk 03 bat NRC/1205-5
pfk 04 imf sw02b
pfk 05 imf og04a
pfk 06 imf rd04r3023
pfk 07 dmf rd04r3023
pfk 08 imf rd06r3023
pfk 09 bat NRC/ehcpumptrip
pfk 10 imf tc07 20 180
pfk 11 bat app01aout
pfk 12 bat app01ain
pfk s1 mor ypovfcv74100 norm
pfk s2 mrf sw09 open
pfk s3 bat app02
pfk s4 bat app01f
pfk s5 bat app08ae
pfk s6 bat sdv
pfk s7 bat atws-1

Batch/NRC/1205-5
bat atws80
bat rhra
imf rh01c
ior zdihs7416a null
imf rp07
imf rp14b
ior zdihs68119ap1 asis
trg e10 NRC/modesw
trg e10= imf th22 100
trg e10= imf th21 0.15
trg e10= mmf tc07 100
ior zdihxs74129 asis
bat NRC/7048ftc
trg e1 NRC/HS7048
trg e1= bat NRC/7048-1
trg e5 NRC/ehc
trg e5= bat NRC/ehcpumptrip-1
imf sl02

Scenario 5

		DESCRIPTION/ACTION
Simulator Setup	manual	Reset to IC 110
Simulator Setup	**Load prefs**	restorepref NRC/1205-5
Simulator Setup	**Load Batch**	F3 (load batch file)
Simulator Setup		Verify file loaded
Simulator Setup	manual	Clearance out RHR Pump 2A

Procedures:

- **RCP required (90% - 100% with flow)**
- **RCP for Urgent Load Reduction**
- **Provide marked up copy of 2-GOI-100-12**

Simulator Event Guide:

Event 1 Normal: RFPT 2B Overspeed Trip Exerciser Test

	SRO	Directs BOP to perform RFPT 2B Overspeed Trip Exerciser, 2-OI-3 section 8.10
		8.10 Overspeed Trip Exerciser Test **NOTES** 1) The following steps will test the circuitry associated with the overspeed trip test and mechanical overspeed trip lockout. The test may be performed at speed or stopped; it should be performed prior to rolling the turbine off the turning gear and periodically with the applicable RFP in operation. This test will normally be performed during scheduled reductions in power with reactor power less than 90%. 2) The success of this test depends on the mechanical overspeed trip bolt actuating as a result of oil pressure. The system was designed for this test to be performed with the RFPT at normal operating speed. The test may not function properly at less than 75% speed (4125 rpm) due to the trip mechanism being sluggish at speeds well below rated. If this is the case, no action is required except to reperform the test at a higher speed. 3) The following steps are performed at Panel 2-9-6.
	BOP	Performs RFPT 2B Overspeed Trip Exerciser Test, 2-OI-3 section 8.10
		[1] **OBTAIN** Unit Supervisor approval to perform this test.
		[2] For RFPT being tested, **VERIFY** Main Oil Pump running: • RFPT 2B 2B1(2B2) MAIN OIL PMP
		[3] **PLACE** RFPT (2B) OVERSPEED TEST TRIP LOCKOUT switch, 2-HS-3-(135A), in MECH. [3.1] **CHECK** the following: • Green (normal) light extinguished at switch. • Amber (mechanical lockout) light to right of green light illuminated.
		[4] **DEPRESS** and **HOLD** RFPT (2B) OVERSPEED TEST pushbutton, 2-HS-3-(136). [4.1] **CHECK** the following: • White (trip) light illuminated at pushbutton. • Green (normal) light extinguished at pushbutton.

Simulator Event Guide:

Event 1 Normal: RFPT 2B Overspeed Trip Exerciser Test

	BOP	[5] **RELEASE** RFPT (2B) OVERSPEED TEST pushbutton.
		[6] **DEPRESS** and **HOLD** RFPT (2B) OVERSPEED TEST RESET pushbutton, 2-HS-3-(132). [6.1] **CHECK** the following: • White (trip) light illuminated at 2-HS-3-(132) pushbutton. • White (trip) light extinguished at 2-HS-3-(136) pushbutton.
		[7] **RELEASE** RFPT (2B) OVERSPEED TEST RESET pushbutton, 2-HS-3-(132). [7.1] **CHECK** the following: • White light extinguished at 2-HS-3-(132) pushbutton. • Green (normal) light illuminated at 2-HS-3-(136) pushbutton.
		NOTE Waiting 30 seconds before placing Overspeed Test Trip Lockout switch in normal position in Step 8.10[8] allows ample time for Overspeed test trip logic to reset. [8] **WHEN** 30 seconds has elapsed, **THEN PLACE** (2B)RFPT OVERSPEED TEST TRIP LOCKOUT switch, 2-HS-3-(135A), in NORM. [8.1] **CHECK** the following: • Green (normal) light illuminated at switch. • Amber (mechanical lockout) light to right of Green light is extinguished.
	BOP	[9] **NOTIFY** Unit Supervisor when test is complete.
	BOP	Informs SRO that RFPT 2B Overspeed Trip Exerciser Test Completed Satisfactorily

Simulator Event Guide:

Event 2 Reactivity: Raise Power to 100% with Recirc Flow

	SRO	Notifies ODS of power increase.
		Directs Power increase using Recirc Flow, per 2-GOI-100-12. [21] **WHEN** desired to restore Reactor power to 100%, **THEN PERFORM** the following as directed by Unit Supervisor and recommended by the Reactor Engineer: • **RAISE** power using control rods or core flow changes. **REFER TO** 2-SR-3.3.5(A) and 2-OI-68.
		2-OI-68 Reactor Recirc Precaution and Limitation 3.5.3: D. Individual pump speeds should be mismatched by ~60 RPM during dual pump operation between 1200 and 1300 RPM to minimize harmonic vibration (this requirement may be waived for short periods for testing or maintenance).
	SRO	Personally oversee reactivity changes, IAW OPDP-1, Section 3.6.
	ATC	Raise Power w/Recirc, IAW **2-OI-68, Section 6.2**
		[1] **IF** desired to control Recirc Pumps 2A and/or 2B speed with Recirc Individual Control, **THEN PERFORM** the following; • Raise Recirc Pump 2A using, RAISE SLOW (MEDIUM), 2-HS-96-15A(15B). **AND/OR** • Raise Recirc Pump 2B using, RAISE SLOW (MEDIUM), 2-HS-96-16A(16B).
		[2] **WHEN** desired to control Recirc Pumps 2A and/or 2B speed with the RECIRC MASTER CONTROL, **THEN ADJUST** Recirc Pump speed 2A & 2B using the following push buttons as required: RAISE SLOW, 2-HS-96-31 RAISE MEDIUM, 2-HS-96-32
	BOP	Provides Peer Check for reactivity change
	Driver	When directed by NRC, insert F4 for RBCCW pump 2B trip with 2-FCV-70-48 FTC

Simulator Event Guide:

Event 3 Component: RBCCW pump B trips. 2-FCV-70-48 fails to AUTO close.

	Driver	When directed by NRC, insert F4 for RBCCW pump 2B trip with 2-FCV-70-48 FTC
	BOP/ATC	Responds to alarm 4C-12, RBCCW PUMP DISCH. HDR PRESS LOW Report Trip of RBCCW Pump 2B.
	BOP/ATC	Automatic Action: Closes 2-FCV-70-48, non-essential loop, closed cooling water sectionalizing MOV. A. **VERIFY** 2-FCV-70-48 CLOSING/CLOSED. B. **VERIFY** RBCCW pumps A and B in service. C. **VERIFY** RBCCW surge tank low level alarm is reset. D. **DISPATCH** personnel to check the following: • RBCCW surge tank level locally. • RBCCW pumps for proper operation. E. **REFER TO** 2-AOI-70-1, for RBCCW System failure and 2-OI-70, for starting spare pump.
	SRO	Enters 2-AOI-70-1, Loss of Reactor Building Closed Cooling Water.
	ATC	Closes 2-FCV-70-48 and report the sectionalizing valve failed to close automatically
	SRO	Contacts Maintenance Shift Manager to investigate failure of sectionalizing valve to close.
	BOP	Dispatch Personnel to investigate RBCCW Pump 2B trip
	ATC	**2-AOI-70-1 Loss of Reactor Building Closed Cooling Water**
		4.1 Immediate Actions [1] **IF** RBCCW Pump(s) has tripped, **THEN** Perform the following • **SECURE** RWCU Pumps. • **VERIFY** RBCCW SECTIONALIZING VLV, 2-FCV-70-48 **CLOSED. (NO)**
	ATC	Secures RWCU Pumps and Closes 2-FCV-70-48.
	SRO	**4.2 Subsequent Actions** [1] **IF** Reactor is at power **AND** Drywell Cooling cannot be immediately restored, **AND** core flow is above 60%,**THEN:** (Otherwise N/A): [2] **IF** any EOI entry condition is met, **THEN ENTER** appropriate EOI(s) (Otherwise N/A).

Simulator Event Guide:

Event 3 Component: RBCCW pump B trips. 2-FCV-70-48 fails to AUTO close.

		Steps 1 and 2 (on previous page) are NA
		[3] **IF** RBCCW Pump(s) has tripped and it is desired to restart the tripped RBCCW pump, **THEN PERFORM** the following (Otherwise N/A): [3.1] **INSPECT** the tripped RBCCW pump and its associated breaker for any damage or abnormal conditions. [3.2] **IF** no damage or abnormal conditions are found, **THEN ATTEMPT** to restart tripped RBCCW pump(s).
	Driver	When dispatched, report RBCCW Pump 2B breaker is tripped. There is also a smell of burnt wiring and charring on the breaker.
	SRO	[4] **IF** unable to restart a tripped pump, **THEN PLACE** Spare RBCCW Pump in service. REFER TO 2-OI-70. Direct Unit 1 to place Spare RBCCW Pump in service
	Driver	When called to place spare RBCCW Pump in service, wait 3 minutes (mrf sw02 align). **THEN** inform Unit 2 Operator that spare RBCCW Pump is in service.
	SRO	[5] **IF** RBCCW flow was restored to two pump operation by placing the Spare RBCCW pump in service in the preceding step, **THEN PERFORM** the following: [5.1] **REOPEN** RBCCW SECTIONALIZING VLV, 2-HS-70-48A. [5.2] **RESTORE** the RWCU system to operation. (REFER TO 2-OI-69) Directs ATC or BOP to Open Sectionalizing Valve and Restore RWCU.
	NRC	Note to NRC: ATC not expected to perform restoration of RWCU
	ATC	Opens Sectionalizing Valve, 2-FCV-70-48.
	SRO	Determines RBCCW SECTIONALIZING VALAVE, 2-HS-48-70 is NOT in Appendix R
	SRO	References TR 3.4.1COOLANT CHEMISTRY. With RWCU out of service determines the TSR3.4.1.1 is no longer met by continuous monitoring of reactor coolant conductivity.
	SRO	Calls Chemistry to commence sampling for reactor coolant conductivity

Simulator Event Guide:

Event 3 Component: RBCCW pump B trips. 2-FCV-70-48 fails to AUTO close.

		TECHNICAL SURVEILLANCE REQUIREMENTS SURVEILLANCE: TSR 3.4.1.1 — ----------NOTE---------- Not required when there is no fuel in the reactor vessel. ---------- Monitor reactor coolant conductivity. FREQUENCY: Continuously OR 4 hours when the continuous conductivity monitor is inoperable and the reactor is not in MODE 4 or 5 OR 8 hours when the continuous conductivity monitor is inoperable and the reactor is in MODE 4 or 5
	Driver	When directed by NRC, insert F5 for loss of SJAE

Simulator Event Guide:

Event 4 Component: Loss of SJAE, swap to standby SJAE.

	Driver	When directed by NRC, insert F5 for loss of SJAE
	SRO	Enters AOI-47-3 Loss of Condenser Vacuum.
	BOP	Offgas Panel 9-53 Alarms: Window 4, OG HOLDUP LINE INLET FLOW LOW: Operator action: **VERIFY OPEN**, FCV-66-28, off-gas system isolation valve. **VERIFY** that SJAE auto isolation has **NOT** occurred. Window 10, H2 WATER CHEMISTRY ABNORMAL: Operator action: None at this time Window 20, H2 WATER CHEMISTRY SHUTDOWN: Operator action: None at this time
	BOP	Swaps to B SJAE IAW 2-AOI-47-3 Loss of Condenser Vacuum.
	BOP	**4.2 Subsequent Actions (continued)** . [11] **IF** a failure of the in-service SJAE is indicated, **THEN** **PLACE** the standby SJAE in service as follows: **NOTES** 1) This section may be used to return either SJAE to service following a shutdown or an isolation. 2) Potential causes of PCV valve closure are: • Condensate pressure from SJAE A(B) less than 60 psig, 2-PI-2-34(40), Panel 25-105. • SJAE 2A(2B) CONDENSATE INLET VALVE closed at 2-HS-2-31A(36), Panel 2-9-6. • SJAE 2A(2B) CONDENSATE OUTLET VALVE closed at 2-HS-2-35A(41A), Panel 2-9-6. • STEAM TO SJAE A(B) STAGE I & II, 2-PI-1-150(152), Panel 25-105 is less than 155 psig. (disabled for the SJAE selected by 2-HS-001-0375) • Loss of I&C bus A(B), power is required to be restored to return the SJAE to service. 3) 2-HS-001-0375, SJAE TRAIN PERMISSIVE, should be placed in the position for the SJAE being placed in service. This switch will normally be in the position of the standby SJAE.

Simulator Event Guide:

Event 4 Component: Loss of SJAE, swap to standby SJAE.

	SRO	Contact Maintenance Shift Manager to investigate SJAE failure
	BOP	[11.1] **PLACE** SJAE TRAIN PERMISSIVE 2-HS-001-0375 in the position for the SJAE being placed in service. This switch will normally be in the position of the Standby SJAE. (Panel 925-105 on junction box 8595) (N/A if Placing the standby SJAE in service) [11.2] **VERIFY** off gas isolation is reset, using OG OUTLET/DRAIN ISOLATION VLVS, 2-HS-90-155, Panel 2-9-8. [11.3] **VERIFY** the following valves are OPEN: • SJAE 2A(2B) INLET VALVE, 2-HS-66-11(15), Panel 2-9-8 • STEAM TO SJAE 2A(2B), 2-HS-1-155A(156A), Panel 2-9-7
	BOP	[11.4] **VERIFY** SJAE 2A(2B) OG OUTLET VALVE, 2-HS-66-14(18), AUTO/OPEN (Panel 2-9-8) [11.5] **PLACE** SJAE 2A(2B) PRESS CONTROLLER 2-HS-1-150(152) in CLOSE and then in OPEN at Panel 2-9-7. [11.6] **VERIFY** the following valves OPEN (red lights illuminated) at Panel 2-9-7. • STEAM TO SJAE 2A(2B) STAGES 1,2, AND 3, 2-PCV-1-151/166 (153/167). • SJAE 2A(2B) INTMD CONDENSER DRAIN 2-FCV-1-150(152). [11.7] **MONITOR** hotwell pressure as indicated on HOTWELL PRESS AND TEMP recorder, 2-XR-2-2 (Panel 2-9-6). [11.8] For the SJAE not being placed in service, • **VERIFY CLOSED** SJAE 2B(2A) OG OUTLET VALVE, 2-HS-66-18(14) (Panel 2-9-8). • **VERIFY CLOSED** SJAE 2B(2A) PRESSURE CONTROLLER, 2-HS-1-152(150) (Panel 2-9-7) [11.9] **VERIFY** SJAE TRAIN PERMISSIVE, 2-HS-001-0375, in the position for the SJAE selected for Standby operation SJAE A(SJAE B). (Panel 925-105 on junction box 8595)

Simulator Event Guide:

Event 4 Component: Loss of SJAE, swap to standby SJAE.

Note	NRC	Candidate may use "Hard Card" from 2-OI-66, Appendix B to place spare SJAE in service (procedure below)
	BOP	**Standby SJAE System Lineup Hard Card** **1.0 OPERATOR ACTIONS** **NOTES** Radiation Protection should be notified prior to placing a SJAE in service. If time does not permit this due to plant conditions then notification should be made when possible. 2-HS-001-0375, SJAE TRAIN PERMISSIVE (located on 2-LPNL-925-0105, U2 TB, el 586') should normally be in the position of the standby SJAE. If problems are encountered while placing a SJAE in service and time permits, operate this switch as required during the performance of this section. [1] **VERIFY RESET** Off-Gas isolation using 2-HS-90-155, OG OUTLET/DRAIN ISOLATION VLVS. [2] **VERIFY OPEN** the following valves: • 2-HS-66-11(15), SJAE 2A(2B) INLET VALVE. • 2-HS-1-155A(156A), STEAM TO SJAE 2A(2B). [3] **VERIFY** in **AUTO/OPEN** 2-HS-66-14(18), SJAE 2A(2B) OG OUTLET VALVE. [4] **PLACE** 2-HS-1-150(152), SJAE 2A(2B) PRESS CONTROLLER, in **CLOSE** and then in **OPEN**. [5] **VERIFY OPEN** the following valves (red light illuminated): • 2-PCV-1-151/166 (153/167), STEAM TO SJAE 2A(2B) STAGES 1,2, AND 3. • 2-FCV-1-150(152), SJAE 2A(2B) INTMD CONDENSER DRAIN. [6] **MONITOR** hotwell pressure as indicated on recorder 2-XR-2-2, HOTWELL TEMP AND PRESS, on Panel 2-9-6. [7] **FOR** the SJAE not being placed in service, **VERIFY CLOSED** the following valves: • 2-HS-66-18(14), SJAE 2B(2A) OG OUTLET VALVE. • 2-HS-1-152(150), SJAE 2B(2A) PRESSURE CONTROLLER. • 2-HS-1-156A(155A) STEAM TO SJAE 2B(2A)

Simulator Event Guide:

Event 5 Component: 30-23 Control rod drifts out of the core, then sticks when driven in.

	Driver	When directed by NRC, insert F6 for Control Rod 30-23 drift out
	ATC	Announces and responds to alarm 9-5A window 28, Control Rod Drift
		A. **DETERMINE** which rod is drifting from Full Core Display.
	ATC	Identifies Control Rod 30-23 is drifting out of the core and announces
	SRO	Directs performance of ARP and direction that if 2 rods are drifting, a Manual Reactor Scram will be required
		B. **IF** no control rod motion is observed, **THEN RESET** rod drift as follows. 1. **PLACE** ROD DRIFT ALARM TEST switch, 2-HS-85-3A-S7, in RESET and **RELEASE**. 2. **RESET** the annunciator.
		C. **IF** rod drifting in, **THEN REFER TO** 2-AOI-85-5 and 2-AOI-85-7.
		D. **IF** rod drifting out, **THEN REFER TO** 2-AOI-85-6 and 2-AOI-85-7
	SRO	Directs entry into 2-AOI-85-6, Rod Drift Out
	ATC	Responds per 2-AOI-85-6
		F. **REFER TO** Tech Spec 3.1.3, 3.10.8.
		2-AOI-85-6, Rod Drift Out **4.0 OPERATOR ACTIONS** **CAUTION** [NRC/C] Operations outside of the allowable regions shown on the Recirculation System Operating Map could result in thermal-hydraulic power oscillations and subsequent fuel damage. **4.1 Immediate Actions** [1] **IF** multiple control rod drifts are identified, **THEN MANUALLY SCRAM** the reactor and enter 2-AOI-100-1.
	BOP	Identifies that Rod 30-23 is the only rod drifting and does not Manually Scram the Reactor
	SRO	Dispatches AUO and SRO with heat gun to measure HCU temperatures.
		Request Reactor Engineer to come to the control room.
		Contact Maintenance Shift Manager for support troubleshooting control rod.

Simulator Event Guide:

Event 5 Component: 30-23 Control rod drifts out of the core, then sticks when driven in.

	SRO	Contact System 85 Engineer.
	ATC	**4.2 Subsequent Actions** [1] **IF** a Control Rod is moving from its intended position without operator actions, **THEN SELECT** the drifting control rod and **INSERT** to the FULL IN (00) position.
	ATC	Selects Control Rod 30-23 and attempts to insert the control rod
	NA	[2] **IF** control rod drive does NOT respond to INSERT signal, **THEN PERFORM** the following: (Otherwise N/A) [2.1] **REDUCE** Total Core Flow, as indicated on TOTAL CORE FLOW/CORE PRESS DROP, 2-XR-68-50 on Panel 2-9-5, by approximately 10% to control possible power increase. [2.2] **IF** drifting control rod is causing Reactor power to rapidly rise at a rate which can NOT be controlled by reducing recirculation flow, **THEN MANUALLY SCRAM** the Reactor.(Otherwise N/A)
	Driver	When ATC selects rod 30-23 and gives an insert signal delete the rod drift out malfunction by pressing F7, then when rod gets to position 08, insert a stuck rod malfunction by pressing F8.
		[3] **NOTIFY** the Reactor Engineer to Evaluate Core Thermal Limits and Preconditioning Limits for the current Control Rod pattern. [4] **IF** another Control Rod Drift occurs before Reactor Engineering completes the evaluation, **THEN MANUALLY SCRAM** Reactor and enter 2-AOI-100-1.
	SRO/ATC	Monitors for a second Control Rod Drift and contacts Reactor Engineer to evaluate Core Thermal Limits
	ATC	Recognizes Control Rod 30-23 sticks at approximately position 08 and announces Stuck Control Rod
	SRO	Directs ATC to perform actions for Control Rod Difficult to Insert in 2-OI-85
	ATC	**2-OI-85, Control Rod Drive System** **8.16 Control Rod Difficult to Insert** [1] **VERIFY** the control rod will not notch in, in accordance with Section 6.7 or 8.19. [2] **REVIEW** all Precautions and Limitations in Section 3.0. [3] **IF** RWM is enforcing, **THEN VERIFY** RWM operable and LATCHED in to the correct ROD GROUP.

Simulator Event Guide:

Event 5 Component: 30-23 Control rod drifts out of the core, then sticks when driven in.

	ATC	[4] **CHECK** CRD SYSTEM FLOW is between 40 gpm and 65 gpm, indicated by 2-FIC-85-11. [5] **CHECK** CRD DRIVE WTR HDR DP, 2-PDI-85-17A is between 250 psid and 270 psid. [6] **IF** the CRD SYSTEM FLOW or CRD DRIVE WTR HDR DP had to be adjusted, **THEN PROCEED TO** Section 6.7.
	ATC	Checks all pressures and flows associated with the CRD system and determines that they are within the required range
	NA	[7] **IF** control rod motion is observed, but the CRD fails to notch-in with normal operating drive water pressure, **THEN**:
	NA	[8] **IF** the control rod problem is believed to be air in the hydraulic system, **THEN FLUSH** the control rod by placing the CRD CONTROL SWITCH, 2-HS-85-48, in ROD IN, for several minutes **OR** until the control rod begins to insert. [9] **IF** the control rod begins to insert normally, **THEN PROCEED TO** Section 6.7.
	NA	[10] **IF** the control rod still fails to notch in **AND** the control rod problem is believed to be air in the hydraulic system, **THEN PROCEED TO** Section 8.8 to vent the HCU, and **RETURN** to Step 8.16[11]. [11] **ATTEMPT** to notch rod in using CRD CONTROL SWITCH, 2-HS-85-48.
		[12] **IF** the control rod still fails to notch in, **THEN**: [12.1] **NOTIFY** the Unit Supervisor and Reactor Engineer to Refer to section Stuck Control Rod-Test to distinguish a Hydraulic Problem from Mechanical Binding, TI-20, and **RETURN** to Section 8.16. [12.2] **REQUEST** the Unit Supervisor and Reactor Engineer to evaluate the control rod operability. Refer to Tech Spec 3.1.
	ATC	Contacts the Reactor Engineer to refer to Stuck Control Rod-Test to determine if there is a hydraulic problem or if the Rod is mechanically bound

Simulator Event Guide:

Event 6 Component: EHC pump trip. Standby pump fails to AUTO start.

	SRO	Refers to Tech Spec 3.1.3 and determines Condition A applies
		Technical Specification 3.1.3 Condition A Required Action A1 Completion Time Immediately Required Action A2 Completion Time 2 hours Required Action A3 Completion Time 24 hours Required Action A4 Completion Time 72 hours
	NOTE	If the malfunction is inserted such that the rod sticks between reed switches, it will NOT have indication and the SRO may declare the control rod INOP and enter Condition C and Condition E since the Condition C Required Actions cannot be completed.
		Condition C Required Action C1 Completion Time 3 hours Required Action C2 Completion Time 3 hours Condition E Required Action E1 Completion Time 12 hours
	Driver	When directed by NRC, insert F9 for EHC pump trip, with standby pump fail to start

Simulator Event Guide:

Event 6 Component: EHC pump trip. Standby pump fails to AUTO start.

	Diver	When directed by NRC, **insert F9** for EHC pump trip, with standby pump fail to start
	BOP	Announces Alarm 9-7B, Window 15, Standby EHC Pump Failed
	SRO	Directs response per ARP
		A. On Panel 2-9-7: 1. **VERIFY** alarm by checking EHC HEADER PRESSURE indicator, 2-PI-47-7. 2. **VERIFY** EHC PUMP 2B, 2-HS-47-2A and/or EHC PUMP 2A, 2-HS-47-1A running.
	Driver	30 seconds after BOP starts EHC Pump 2B, **insert F10** for unisolable EHC leak on a 180 second ramp
	BOP	Determines that EHC Pump 2A is tripped and that EHC Pump 2B failed to start automatically. BOP starts 2B EHC Pump and verifies pressure returns to normal
	BOP	3. **CHECK** EHC PUMP 2B PUMP MTR CURRENT 2-EI-47-2 and/or EHC PUMP 2A PUMP MTR CURRENT 2-EI-47-1. **NOTE** Lights extinguish at 1300 psig lowering and illuminate at 1500 psig rising. 4. **CHECK** lights above EHC PUMP 2A TEST pushbutton 2-HS-47-4A and EHC PUMP 2B TEST pushbutton 2-HS-47-5A. B. **DISPATCH** personnel to pumping unit to check for abnormal conditions. **NOTE** On EHC Hydraulic System failure accumulator and check valve arrangement will provide approximately one minute bypass valve operation. C. **IF** EHC Hydraulic System fails, **THEN VERIFY** turbine trips at or below 1100 psig.
	Driver	When dispatched to the EHC pump skid, wait 3 minutes and report that oil is spraying from the casing of the 2B EHC Pump and it cannot be isolated
	SRO	Determines that EHC Fluid Pressure will soon be lost and a Manual Scram and Turbine trip must be inserted. May direct Core Flow Runback if time permits.
	BOP	Calls Radwaste to lockout Turbine Building sumps
	Driver	**Ensure trigger 10 goes active** on the MODESWITCH

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	SRO	Directs ATC to insert manual Reactor scram and BOP to trip the turbine and lock out the EHC pumps
	ATC	Performs actions of OATC Hard card
		Reactor Scram OATC Hard Card **1.0 IMMEDIATE ACTIONS** [1] **DEPRESS** REACTOR SCRAM A and B, 2-HS-99-5A/S3A and 2-HS-99-5A/S3B, on Panel 2-9-5.
	ATC	Depresses Reactor Scram Pushbuttons and determines RPS did not de-energize
	NA	[2] **IF** scram is due to a loss of RPS, **THEN** [3] Refuel Mode One Rod Permissive Light check
		[4] **PLACE** REACTOR MODE SWITCH, 2-HS-99-5A-S1, in SHUTDOWN. [5] **REPORT** the following status to the US: • Reactor Scram • Mode Switch is in Shutdown • All rods in" or "rods out" • Reactor Water Level and trend (recovering or lowering). • Reactor pressure and trend • MSIV position (Open or Closed) • Power level
	ATC	Places Reactor Mode switch in Shutdown and determines RPS still has not de-energized. Performs Scram report and proceeds to subsequent actions of Hard Card
CT#1		**2.0 SUBSEQUENT ACTIONS:** [1] **IF** all control rods **CAN NOT** be verified fully inserted, **THEN PERFORM** the following (otherwise N/A): [1.1] **INITIATE** ARI by Arming and Depressing BOTH of the following: • ARI Manual Initiate, 2-HS-68-119A • ARI Manual Initiate, 2-HS-68-119B [1.2] **VERIFY** the Reactor Recirc Pumps (if running) at minimum speed at Panel 2-9-4. [1.3] **REPORT** "ATWS Actions Complete" and power level.
CT#1	ATC	Initiates both channels of ARI and determines rod movement, Runs Recirc Pumps back to minimum speed, Announces ATWS Actions complete and Reactor Power is approximately 80%.
	Driver	After ARI is initiated and some rods have inserted **insert Shift F6** (bat sdv)

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

		[2] **DRIVE** in all IRMs and SRMs from Panel 2-9-5 as time and conditions permit. [3] **VERIFY** SCRAM DISCH VOL VENT & DR VLVS closed by green indicating lights at SDV Display on Panel 2-9-5. [4] **MONITOR** and **CONTROL** Reactor Water Level between +2" and +51", or as directed by US, using RFP/RFPT. [5] **RETURN** to body of procedure at step 4.2[5] **AND CONTINUE** with actions as required.
	ATC	Drives in IRMs and SRMs as time permits, verifies SDV vents and drains are closed, and monitors and controls Reactor Water Level as directed by US
	BOP	Performs actions of BOP Reactor Scram Hard Card
		Reactor Scram BOP Unit Operator Hard Card **1.0 SUBSEQUENT ACTIONS: PANELS 2-9-7 & 2-9-8** **NOTES** 1) The following steps are not required to be performed in order, but only as required to maintain stable conditions. 2) It is desired to trip the turbine prior to receiving the GEN REVERSE PWR FIRST RELAY OPERATION 2-EA-57-136 (2-XA-55-8A, Window 7) alarm to avoid motorizing the generator. [1] At ≤ 50 MWe, or as directed by the Unit Supervisor, **VERIFY TRIPPED** the Main Turbine as follows:
		[1.1] **DEPRESS** the TRIP pushbutton, 2-HS-47-67D on Panel 2-9-7. [1.2] **VERIFY** OPEN Generator Output Breaker, by placing GENERATOR PCB 224, 2-HS-242-0224A, to TRIP. [1.3] IMMEDIATELY **PLACE** VOLTAGE REGULATOR START/STOP SEL, 2-HS-57-24, to STOP and release. [1.4] **CHECK** the following at 2-HS-57-24: • GREEN light illuminated • RED light extinguished [2] **ANNOUNCE** Reactor SCRAM over PA system.
	BOP	Trips the Main turbine and locks out the EHC pumps, opens the generator breaker and places the voltage regulator in the STOP position, and announces Reactor Scram over the PA system
	NA	[1] **MONITOR** and **CONTROL** RPV pressure to keep below 1073 psig and stable. [1.1] **IF** RPV pressure is lowering rapidly, **THEN**
	NA	[1.2] **IF** MSRVs are cycling and bypass valves are available, **THEN**

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

		[1.3] **IF** MSRVs are cycling and bypass valves are **NOT** available, **THEN MANUALLY OPEN** MSRVs on Panel 2-9-3 until RPV pressure is controlled between 800 and 1000 psig.
	BOP	Manually opens MSRVs on panel 9-3 to control Reactor Pressure 800-1000 psig until further direction is provided by the US
		[2] **IF** any PCIS isolation signal is received, **THEN VERIFY** PCIS isolations using any of the following: (Otherwise N/A) • Containment Isolation Status System on Panel 2-9-4 • PCIS Mimic and individual control switch indications • ICS • 2-OI-64 [3] **IF** HPCI and/or RCIC are in service and injecting to the vessel, **THEN MONITOR** and **CONTROL** Reactor Water Level as necessary. (Otherwise N/A)
	BOP	Verifies PCIS isolation signals received and reports condition of PCIS and HPCI/RCIC to US
	SRO	**Enters EOI-1 on Scram condition and Reactor Power above 5%** **RC/Q** Monitor and Control Reactor Power. Verify Rx Mode Switch in shutdown - Done Initiate ARI – Done Verify RR pumps runback to 480 RPM or less – Done If Rx Power >5%, trips RR pumps (SRO directs ATC to trip RR pumps) Before SP temp rises to 110F, initiate SLC (SRO directs ATC, if necessary) **RC/P** Monitor and Control RPV Pressure. Answers **NO** to: Is any MSRV cycling? (BOP has already opened SRVs as necessary) Directs BOP to maintain RPV Pressure 800 -1000 psig using Appendix 11A. **RC/L** Monitor and Control RPV Water Level. Verify as Required: • PCIS Isolations (Groups 1, 2 and 3) • ECCS • RCIC SRO exits RC/L and enters C-5, because the Reactor will not remain subcritical without Boron under all conditions (Note 1)
	ATC	Trips Recirc pumps, injects SLC by direction of SRO iaw with EOI-Appendix-3A, if necessary

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	SRO	Directs initiation of SLC if Reactor Power is Greater than 5% when step RC/Q-10 is reached of EOI-1 (this step should be NA based on validation results)
	NRC	SLC may be initiated depending what power is when step RC/Q-10 is reached. Based on Scenario validation, Reactor Power should be less than 5% power when step RC/Q-10 is reached. BFN-ODM-4.20, Strategies for Successful Transient Mitigation, section 4.7.3, step D states, "When EOI-1, Step RC/Q-10 is reached, IF reactor power is greater than APRM downscale, THEN INITIATE SLC."
	ATC	Initiate **SLC IAW Appendix 3A**, if necessary
		1. **UNLOCK** and **PLACE** 2-HS-63-6A, SLC PUMP 2A/2B, control switch in START-A or START-B position. 2. **CHECK** SLC System for injection by observing the following: • Selected pump starts, as indicated by red light illuminated above pump control switch. • Squib valves fire, as indicated by SQUIB VALVE A and B CONTINUITY blue lights extinguished, • SLC SQUIB VALVE CONTINUITY LOST Annunciator in alarm on Panel 2-9-5 (2-XA-55-5B, Window 20). • 2-PI-63-7A, SLC PUMP DISCH PRESS, indicates above RPV pressure. • System flow, as indicated by 2-IL-63-11, SLC FLOW, red light illuminated on Panel 2-9-5, • SLC INJECTION FLOW TO REACTOR Annunciator in alarm on Panel 2-9-5 (2-XA-55-5B, Window 14).
		3. **IF** Proper system operation **CANNOT** be verified, **THEN RETURN** to Step 1 and **START** other SLC pump. 4. **VERIFY** RWCU isolation by observing the following: • RWCU Pumps 2A and 2B tripped • 2-FCV-69-1, RWCU INBD SUCT ISOLATION VALVE closed • 2-FCV-69-2, RWCU OUTBD SUCT ISOLATION VALVE closed. • 2-FCV-69-12, RWCU RETURN ISOLATION VALVE closed. 5. **VERIFY** ADS inhibited. 6. **MONITOR** reactor power for downward trend. 7. **MONITOR** 2-LI-63-1A, SLC STORAGE TANK LEVEL, and **CHECK** that level is dropping approximately 1% per minute.
NOTE	**NOTE**	SLC will fail to initiate and will not be obvious to the operator, there is no action for the operator to take to correct the SLC failure to inject

Simulator Event Guide:

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	BOP	Pressure Control IAW **Appendix11A, RPV Pressure Control SRVs**
		1. IF Drywell Control Air is **NOT** available, **THEN**: **EXECUTE** EOI Appendix 8G, CROSSTIE CAD TO DRYWELL CONTROL AIR, **CONCURRENTLY** with this procedure.
		2. IF Suppression Pool level is at or below 5.5 ft, **THEN:** **CLOSE** MSRVs and **CONTROL** RPV pressure using other options.
		3. **OPEN** MSRVs; using the following sequence to control RPV pressure, as directed by SRO:
		a. 2-PCV-1-179 MN STM LINE A RELIEF VALVE
		b. 2-PCV-1-180 MN STM LINE D RELIEF VALVE.
		c. 2-PCV-1-4 MN STM LINE A RELIEF VALVE
		d. 2-PCV-1-31 MN STM LINE C RELIEF VALVE
		e. 2-PCV-1-23 MN STM LINE B RELIEF VALVE
		f. 2-PCV-1-42 MN STM LINE D RELIEF VALVE
		g. 2-PCV-1-30 MN STM LINE C RELIEF VALVE
		h. 2-PCV-1-19 MN STM LINE B RELIEF VALVE.
		i. 2-PCV-1-5 MN STM LINE A RELIEF VALVE.
		j. 2-PCV-1-41 MN STM LINE D RELIEF VALVE
		k. 2-PCV-1-22 MN STM LINE B RELIEF VALVE
		l. 2-PCV-1-18 MN STM LINE B RELIEF VALVE
		m. 2-PCV-1-34 MN STM LINE C RELIEF VALVE
	SRO	Enters C-5, based on override RC/L-3 from EOI-1
		Calls Maintenance Shift Manager for support on restoration of RHR C, CS Logic and SLC

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	SRO	IF It has not been determined that the reactor will remain subcritical, THEN Exit RC/L; enter C5 Level / Power Control.
		IF Emergency Depressurization is required? - NO
		IF RPV Water level cannot be determined? – NO
		The Reactor will remain subcritical without Boron under all conditions - NO
		IF PC water level cannot be maintained below 105 feet OR Suppression Chamber pressure cannot be maintained below 55 psig? - NO
	SRO	Directs ADS Inhibited.
	ATC/BOP	Inhibits ADS.
	SRO	Is any Main Steam Line Open? - YES
		Direct Bypass of isolation interlocks, Appendix 8A and Appendix 8E.
	Crew	Calls for Appendix 8A and 8E.
	Driver	When called for Appendix 8A and 8E, wait 6 minutes. Call back and report, "Field actions are complete for Appendix 8A and 8E." ENTER Shift F5 (bat app08ae)
	ATC/BOP	Appendix 8A 3. Operator to verifies closed the following valves (Unit 2 Control Room, Panel 9-3): 2-FCV-43-13, RX RECIRC SAMPLE INBD ISOLATION VLV 2-FCV-43-14, RX RECIRC SAMPLE OUTBD ISOLATION VLV.
	SRO	**C5 Level / Power Control**
		Crosstie CAD to DW Control Air if necessary (Appendix 8G). - NOT Necessary
		IF Suppression Pool Temperature is above 110°F AND Reactor Power is above 5% AND An MSRV is open or cycling or drywell pressure is above 2.4 psig AND RPV water level is above (-) 162 inches? - NO
	SRO	Is Reactor Power above 5%? NO
		Maintain RPV Water Level between -180 inches and +51 inches with Condensate and Feedwater App 5A and/or HPCI App 5D
	SRO	Directs RPV Water level maintained +2 to +51 inches with Condensate and Feed iaw EOI App-5A

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	ATC	Performs actions necessary to maintain RPV Water Level +2 to +51 inches iaw EOI App-5A
		Appendix-5A 1. IF It is desired to use a reactor feed pump that is in operation, THEN **CONTINUE** at step 12 to control the operating pump.
		12. **SLOWLY ADJUST** RFPT speed UNTIL feedwater flow to the RPV is indicated, using ANY of the following methods on Panel 2-9-5: • Individual 2-HS-46-8A(9A)(10A), RFPT 2A(2B)(2C) SPEED CONT RAISE/LOWER switch in MANUAL GOVERNOR, **OR** • Individual 2-SIC-46-8(9)(10), RFPT 2A(2B)(2C) SPEED CONTROL in MANUAL, **OR** • 2-LIC-46-5, REACTOR WATER LEVEL CONTROL, in MANUAL with individual 2-SIC-46-8(9)(10), RFPT 2A(2B)(2C) SPEED CONTROL in AUTO. 13. **ADJUST** RFPT speed as necessary to control injection using the methods of step 12. 14. WHEN RPV level is approximately equal to desired level AND automatic level control is desired, THEN **PLACE** 2-LIC-46-5, REACTOR WATER LEVEL CONTROL, in AUTO with individual 2-SIC-46-8(9)(10), RFPT 2A(2B)(2C) SPEED CONTROL in AUTO.
CT#1	SRO	Directs actions necessary to insert rods iaw EOI-1, steps RC/Q-20 and 21
	SRO	Directs ARI reset and ARI logic trips defeated iaw with EOI App-2,DEFEATING ARI LOGIC TRIPS, and EOI App-1A, REMOVAL AND REPLACEMENT OF RPS SCRAM SOLENOID FUSES. Directs ATC to drive control rods until scram can be reset and SDV have drained
	Driver	When scram is reset insert Shift F7 (bat atws-1)
	Driver	When directed to perform Appendix 2 wait 3 minutes and insert Shift F3 (bat app02) then report completion.

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	ATC	**Appendix 1D** 1. **VERIFY** at least one CRD pump in service. 2. IF Reactor Scram or ARI CANNOT be reset, THEN **DISPATCH** personnel to **CLOSE** 2-SHV-085-0586, CHARGING WATER SOV 3. **VERIFY** REACTOR MODE SWITCH in SHUTDOWN. 4. **BYPASS** Rod Worth Minimizer. 5. **REFER** to Attachment 2 and **INSERT** control rods in the area of highest power as follows: a. **SELECT** control rod. b. **PLACE** CRD NOTCH OVERRIDE switch in EMERG ROD IN position UNTIL control rod is NOT moving inward. c. **REPEAT** Steps 5.a and 5.b for each control rod to be inserted. 6. WHEN NO further control rod movement is possible or desired, THEN **DISPATCH** personnel to **VERIFY OPEN** 2-SHV-085-0586, CHARGING WATER SOV (RB NE, El 565 ft).
	Driver	If directed to close 2-FCV-85-586, wait 3 minutes, then insert **mrf rd06 close** and report completion. If/When directed to re-open 2-FCV-85-586, wait 3 minutes, then insert **mrf rd06 open** and report completion.
	ATC	When report received that Appendix-2 is complete, reset the Reactor Scram and verify SDV vents and drains open to drain the SDV
	Driver	When scram is reset insert Shift F6 (bat sdv) and **Shift F7** (bat atws-1)
	SRO	When SDV alarms 9-4A windows 1 and 29 have cleared call the OSUS and direct Appendix-1A completed to de-energize RPS and attempt to insert rods
	Driver	When called to complete Appendix-1A, wait 3 minutes and **insert F11** (bat app01out)
CT#1	ATC	Determine that all rods inserted upon completion of Appendix-1A and announce to the SRO
	SRO	Upon determination that all rods have been inserted, SRO exits C-5 and enters RC/L from EOI-1 based on override step C5-1 and exits RC/Q based on step RC/Q-2 and enters AOI-100-1
	Driver	When called to re-install fuses RPS fuses per Appendix 1A, wait 1 minute and **insert F12** (bat app01in)

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	NRC	A leak inside the Drywell develops shortly after the Reactor is Scrammed, EOI-2 will be entered on Drywell pressure and all legs executed concurrently
	SRO	**Executes all legs of EOI-2 concurrently** **EOI-2 DW/T** Monitor and control Drywell Temperature below 160°F, using available Drywell Cooling. Answers **NO** to: Can Drywell Temperature be maintained below 160°F? **PC/P** Monitor and control Primary Containment pressure below 2.4 psig using the Vent System (Appendix 12) as necessary Direct Appendix 12 Answers **No** to can Primary Containment Pressure be maintained below 2.4 psig Before Suppression Chamber Pressure rises to 12 psig Initiate Suppression Chamber Sprays using only those pumps not required for Adequate Core Cooling **Directs Suppression Chamber Sprays**
	SRO	**EOI-2 PC/H** Monitor and control Drywell and Suppression Chamber: • Hydrogen at or below 2.4% **AND** • Oxygen at or below 3.3% Using the Nitrogen Makeup System (APPX 14A). **EOI-2 SP/T** Monitor and control Suppression Pool temperature below 95°F, using available Suppression Pool Cooling (APPX 17A) as necessary.
	SRO	**EOI-2 SP/L** Monitor and control Suppression Pool Level between -1 inch and -6 inches. Can Suppression pool level be maintained above -6 inches YES Can Suppression pool level be maintained below -1 inch YES

Simulator Event Guide:

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	BOP	**Vent Containment IAW Appendix 12**
		1. VERIFY at least one SGTS train in service. 2. VERIFY CLOSED the following valves (Panel 2-9-3 or Panel 2-9-54): 2-FCV-64-31, DRYWELL INBOARD ISOLATION VLV, 2-FCV-64-29, DRYWELL VENT INBD ISOL VALVE, 2-FCV-64-34, SUPPR CHBR INBOARD ISOLATION VLV, 2-FCV-64-32, SUPPR CHBR VENT INBD ISOL VALVE.
		Steps 3, 4, 5 and 6 are If / Then steps that do not apply
		7. **CONTINUE** in this procedure at: Step 8 to vent the Suppression Chamber through 2-FCV-84-19, **OR** Step 9 to vent the Suppression Chamber through 2-FCV-84-20.
		8. VENT the Suppression Chamber using 2-FIC-84-19, PATH B VENT FLOW CONT, as follows: a. PLACE keylock switch 2-HS-84-35, DW/SUPPR CHBR VENT ISOL BYP SELECT, to SUPPR-CHBR position (Panel 2-9-54). b. VERIFY OPEN 2-FCV-64-32, SUPPR CHBR VENT INBD ISOL VALVE (Panel 2-9-54). c. PLACE 2-FIC-84-19, PATH B VENT FLOW CONT, in AUTO with setpoint at 100 scfm (Panel 2-9-55). d. PLACE keylock switch 2-HS-84-19, 2-FCV-84-19 CONTROL, in OPEN (Panel 2-9-55). e. VERIFY 2-FIC-84-19, PATH B VENT FLOW CONT, is indicating approximately 100 scfm. f. CONTINUE in this procedure at step 12.

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Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	BOP	**Vents Primary Containment IAW Appendix 12**
		9. VENT the Suppression Chamber using 2-FIC-84-20, PATH A VENT FLOW CONT, as follows: a. VERIFY OPEN 2-FCV-64-141, DRYWELL DP COMP BYPASS VALVE (Panel 2-9-3). b. PLACE keylock switch 2-HS-84-36, SUPPR CHBR/DW VENT ISOL BYP SELECT, to SUPPR-CHBR position (Panel 2-9-54). c. VERIFY OPEN 2-FCV-64-34, SUPPR CHBR INBOARD ISOLATION VLV (Panel 2-9-54). d. VERIFY 2-FIC-84-20, PATH A VENT FLOW CONT, in AUTO with setpoint at 100 scfm (Panel 2-9-55). e. PLACE keylock switch 2-HS-84-20, 2-FCV-84-20 ISOLATION BYPASS, in BYPASS (Panel 2-9-55). f. VERIFY 2-FIC-84-20, PATH A VENT FLOW CONT, is indicating approximately 100 scfm. g. CONTINUE in this procedure at step 12.
		Steps 10 and 11 will not apply in this scenario
		12. ADJUST 2-FIC-84-19, PATH B VENT FLOW CONT, or 2-FIC-84-20, PATH A VENT FLOW CONT, as applicable, to maintain ALL of the following: Stable flow as indicated on controller, AND 2-PA-84-21, VENT PRESS TO SGT HIGH, alarm light extinguished, AND Release rates as determined below: iii. IF Venting for ANY other reason than items i or ii above, THEN MAINTAIN release rates below Stack release rate of 1.4 x 107 µCi/s AND 0-SI-4.8.B.1.a.1 release fraction of 1.
	Driver	Acknowledge Notification

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	BOP	**Initiate Suppression Chamber Sprays per Appendix 17C**
		1. BEFORE Suppression Chamber pressure drops below 0 psig, **CONTINUE** in this procedure at Step 6. 2. IF Adequate core cooling is assured **OR** Directed to spray the Suppression Chamber irrespective of adequate core cooling, THEN **BYPASS** LPCI injection valve open interlock as necessary: • **PLACE** 2-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in **BYPASS**. • **PLACE** 2-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.**
	BOP	5. **INITIATE Suppression Chamber Sprays** as follows: a. **VERIFY** at least one RHRSW pump supplying each EECW header. b. IF EITHER of the following exists: • LPCI Initiation signal is NOT present, **OR** • Directed by SRO, THEN **PLACE** keylock switch 2-XS-74-122(130), RHR SYS I(II) LPCI 2/3 CORE HEIGHT OVRD, in MANUAL OVERRIDE. c. **MOMENTARILY PLACE** 2-XS-74-121(129), RHR SYS I(II) CTMT SPRAY/CLG VLV SELECT, switch in SELECT. d. IF 2-FCV-74-53(67), RHR SYS I(II) INBD INJECT VALVE, is OPEN, THEN **VERIFY CLOSED** 2-FCV-74-52(66), RHR SYS I(II) OUTBD INJECT VALVE. e. **VERIFY OPERATING** the desired RHR System I(II) pump(s) for Suppression Chamber Spray. f. **VERIFY OPEN** 2-FCV-74-57(71), RHR SYS I(II) SUPPR CHBR/POOL ISOL VLV. g. **OPEN** 2-FCV-74-58(72), RHR SYS I(II) SUPPR CHBR SPRAY VALVE. h. IF RHR System I(II) is operating ONLY in Suppression Chamber Spray mode, THEN **CONTINUE** in this procedure at Step 5.k. i. **VERIFY CLOSED** 2-FCV-74-7(30), RHR SYSTEM I(II) MIN FLOW VALVE. j. **RAISE** System flow by placing the second RHR System I(II) pump in service as necessary. k. **MONITOR** RHR Pump NPSH using Attachment 2.
	BOP	Determines that Select Logic on RHR Loop II is not functioning and therefore neither the Drywell nor the Suppression Chamber can be sprayed from RHR Loop II

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	BOP	Attempts to spray The Suppression Chamber from RHR Loop I with 2C RHR pump, however, the 2C RHR pump immediately trips after attempted start
	BOP	Informs SRO that Containment Sprays are unavailable with either Loop of RHR and the containment must be sprayed with RHRSW using Loop I of RHR (Standby Coolant)
	SRO	Directs containment sprays using Loop I of RHR with RHRSW (Standby Coolant) iaw EOI App-17C for the Suppression Chamber and EOI App-17B for the Drywell
	BOP	**Initiate Suppression Chamber Sprays with Standby Coolant per Appendix 17C**
		NOTE Step 7 is performed ONLY if directed from Step 3 to spray the Suppression Chamber using Standby Coolant Supply to RHR Loop I. 7. **INITIATE** Suppression Chamber Sprays on RHR Loop I using Standby Coolant Supply as follows: a. IF EITHER of the following exists: • LPCI Initiation signal is NOT present, **OR** • Directed by SRO, THEN **PLACE** keylock switch 2-XS-74-122, RHR SYS I LPCI 2/3 CORE HEIGHT OVRD, in MANUAL OVERRIDE. b. **MOMENTARILY PLACE** 2-XS-74-121, RHR SYS I CTMT SPRAY/CLG VLV SELECT, switch in SELECT. c. IF 2-FCV-74-53, RHR SYS I INBD INJECT VALVE, is OPEN, THEN **VERIFY CLOSED** 2-FCV-74-52, RHR SYS I OUTBD INJECT VALVE.
		d. **VERIFY CLOSED** the following valves: • 2-FCV-74-61, RHR SYS I DW SPRAY INBD VLV • 2-FCV-74-60, RHR SYS I DW SPRAY OUTBD VLV • 2-FCV-74-58, RHR SYS I SUPPR CHBR SPRAY VALVE • 2-FCV-74-59, RHR SYS I SUPPR POOL CLG/TEST VLV • 2-FCV-23-52, RHR HX 2D RHRSW OUTLET VLV. e. **VERIFY** RHR Pumps 2A and 2C are NOT running. f. **START** RHRSW Pumps D1 and D2.

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	BOP	**NOTE** 2-BKR-074-0100, RHR SYS I U-1 DISCH XTIE breaker compartment is maintained in the OPEN position as an Appendix R requirement. g. **NOTIFY** Unit 1 Operator to perform the following: 1) **VERIFY CLOSED** 1-FCV-23-52, RHR HEAT EXCHANGER D COOL WATER OUTLET VLV (Unit 1, Panel 1-9-3). 2) **OPEN** 1-FCV-23-57, STANDBY COOLANT VALVE FROM RHRSW (Unit 1, Panel 1-9-3). 3) **DISPATCH** personnel to place 2-BKR-074-0100, RHR SYS I U-1 DISCH XTIE in ON (480V RMOV BD 1B Compartment 19A).
	Driver	As unit 1 Operator, when called, inform that 1-FCV-23-52 is closed. When called to open 1-FCV-23-57, insert Shift F2 (mrf sw09 open) and inform that 1-FCV-23-57 is open
	Driver	When called to place 2-BKR-74-100 in ON, wait 3 minutes and insert Shift F1 (mor ypovfcv74100 norm) then inform 2-BKR-74-100 is ON
		h. **NOTIFY** Unit 3 Operator to VERIFY CLOSED 3-FCV-23-52, RHR HX 3D RHRSW OUTLET VLV (Unit 3, Panel 3-9-3).
	Driver	As unit 3 Operator, when called, inform that 3-FCV-23-52 is closed
		i. **OPEN** the following valves: • 2-FCV-74-100, RHR SYS I U-1 DISCH XTIE • 2-FCV-74-57, RHR SYS I SUPPR CHBR/POOL ISOL VLV • 2-FCV-74-58, RHR SYS I SUPPR CHBR SPRAY VLV.
	BOP	Informs SRO that he is spraying the Suppression Chamber with Standby Coolant using RHR Loop I
CT#2	SRO	When Suppression Chamber Pressure exceeds 12 psig, determines that Drywell Sprays are required. Directs **Loop I** of RHR to be placed in Drywell Sprays with Standby Coolant per EOI Appendix 17B.

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

CT#2	BOP	**Drywell Sprays per appendix 17B** 1. IF Adequate core cooling is assured **OR** Directed to spray the Drywell irrespective of adequate core cooling, THEN **BYPASS** LPCI injection valve open interlock as necessary: • **PLACE** 2-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in **BYPASS**. • **PLACE** 2-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.**
		2. **VERIFY** Recirc Pumps and Drywell Blowers shutdown.
	SRO	Directs Recirc Pumps secured (if not already done) and directs Drywell Blowers secured
	ATC	Secures both Reactor Recirc Pumps
	BOP	Goes around back and secures the Drywell Blowers on panel 9-25
		3. IF Directed by SRO to spray the Drywell using RHR System I(II), THEN **CONTINUE** in this procedure at Step 6 using RHR Loop I(II).
		4. IF Directed by SRO to spray the Drywell using Standby Coolant supply, THEN **CONTINUE** in this procedure At Step 8 using RHR Loop I OR At Step 9 using RHR Loop II.
	BOP	Continues in procedure at step 8 to spray the drywell using Standby Coolant with RHR Loop I
CT#2		i. **OPEN** THE FOLLOWING VALVES: • 2-FCV-74-100, RHR SYS I U-1 DISCH XTIE • 2-FCV-74-60, RHR SYS I DW SPRAY OUTBD VLV • 2-FCV-74-61, RHR SYS 1 DW SPRAY INBD VLV
	NRC	All steps in Appendix 17B for using Standby Coolant on Loop I of RHR are the same up to step i.
	BOP	Opens RHR SYS I DW SPRAY INBD VLV 2-FCV-74-61 and RHR SYS I DW SPRAY OUTBD VLV 2-FCV-74-60 and informs SRO that Drywell Sprays are in progress using Standby Coolant with RHR Loop I
	BOP	Informs SRO that both Drywell and Suppression Chamber pressures are lowering
	SRO	Directs BOP to secure Drywell and Suppression Chamber Sprays before 0 psig

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	SRO	Directs App 17A, RHR SYS OPERATION SUPPRESSION POOL COOLING
	BOP	Initiates Suppression Pool Cooling per Appendix 17A
	BOP	**Suppression Pool Cooling per App 17A** 1. IF Adequate core cooling is assured **OR** Directed to spray the Drywell irrespective of adequate core cooling, THEN **BYPASS** LPCI injection valve open interlock as necessary: • **PLACE** 2-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in **BYPASS**. • **PLACE** 2-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.** **NOTE: Step may have been performed as part of App 17B**
	BOP	2. PLACE RHR SYSTEM I(II) in Suppression Pool Cooling as follows: a. **VERIFY** at least one RHRSW pump supplying each EECW header b. **VERIFY** RHRSW pump supplying desired RHR Heat Exchanger(s)
		c. THROTTLE the following in-service RHRSW outlet valves to obtain between 1350 and 4500 gpm RHRSW flow: • 2-FCV-23-34, RHR HX 2A RHRSW OUTLET VLV • 2-FCV-23-46, RHR HX 2B RHRSW OUTLET VLV • 2-FCV-23-40, RHR HX 2C RHRSW OUTLET VLV • 2-FCV-23-52, RHR HX 2D RHRSW OUTLET VLV
		d. IF .....Directed by SRO, THEN... **PLACE** 2-XS-74-122(130), RHR SYS I(II) LPCI 2/3 CORE HEIGHT OVRD in MANUAL OVERIDE
		e. IF .....LPCI Initiation signal exists, THEN...**MOMENTARILY PLACE** 2-XS-74-121(129), RHR SYS I(II) CTMT SPRAY/CLG VLV SELECT in SELECT
		f. IF .....2-FCV-74-53(67), RHR SYS I(II) LPCI INBD INJECT VALVE is OPEN, THEN...VERIFY CLOSED 2-FCV-74-52(66), RHR SYS I(II) LPCI OUTBD INJECT VALVE.

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

		g. **OPEN** 2-FCV-57(71), RHR SYS I(II) SIPPR CHBR/POOL ISOL VLV
		h. VERIFY desired RHR pump(s) for Suppression Pool Cooling are operating.
		CAUTION RHR system flows below 7000 gpm or above 10000 gpm for one –pump operation may result in excessive vibration and equipment damage.
		i. **THROTTLE OPEN** 2-FCV-74-59(73), RHR SYS I(II) SUPPR POOL CLG/TEST VLV, to maintain EITHER of the following as indicated on 2-FI-74-50(64), RHR SYS I(II) FLOW: • Between 7000 and 10000 gpm for one-pump operation **OR** • At or below 13000 for two-pump operation
		j. **VERIFY CLOSED** 2-FCV-74-7(30), RHR SYSTEM I(II) MIN FLOW VALVE
		k. **MONITOR** RHR Pump NPSH using Attachment 1.
		l. **NOTIFY** Chemistry that RHRSW is aligned to in-service RHR Heat Exchangers.
		e. IF .....Additional Suppression Pool Cooling flow is necessary, THEN...**PLACE** additional RHR and RHRSW pumps in service using Steps 2.b through 2.l

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	SRO	Directs All available Low Pressure ECCS Pumps secured when/if 2.45 psig in the drywell with 450 psig Reactor Pressure is reached to prevent overfilling the RPV
	BOP/ATC	Secures Core Spray Pumps and RHR Loop II pumps when/if 2.45 psig in the drywell with 450 psig Reactor Pressure is reached to prevent overfilling the RPV
	SRO	Directs ATC to transition RPV Water Level control to EOI App-6A when/if RPV pressure drops below 500 psig
	ATC	**Appendix 6A** 1. **VERIFY CLOSED** the following feedwater heater return valves: • 1-FCV-3-71, HP HTR 1A1 LONG CYCLE TO CNDR • 1-FCV-3-72, HP HTR 1B1 LONG CYCLE TO CNDR • 1-FCV-3-73, HP HTR 1C1 LONG CYCLE TO CNDR. 2. **VERIFY CLOSED** the following RFP discharge valves: • 1-FCV-3-19, RFP 1A DISCHARGE VALVE • 1-FCV-3-12, RFP 1B DISCHARGE VALVE • 1-FCV-3-5, RFP 1C DISCHARGE VALVE. 3. **VERIFY OPEN** the following drain cooler inlet valves: • 1-FCV-2-72, DRAIN COOLER 1A5 CNDS INLET ISOL VLV • 1-FCV-2-84, DRAIN COOLER 1B5 CNDS INLET ISOL VLV • 1-FCV-2-96, DRAIN COOLER 1C5 CNDS INLET ISOL VLV 4. **VERIFY OPEN** the following heater outlet valves: • 1-FCV-2-124, LP HEATER 1A3 CNDS OUTL ISOL VLV • 1-FCV-2-125, LP HEATER 1B3 CNDS OUTL ISOL VLV • 1-FCV-2-126, LP HEATER 1C3 CNDS OUTL ISOL VLV.
		5. **VERIFY OPEN** the following heater isolation valves: • 1-FCV-3-38, HP HTR 1A2 FW INLET ISOL VALVE • 1-FCV-3-31, HP HTR 1B2 FW INLET ISOL VALVE • 1-FCV-3-24, HP HTR 1C2 FW INLET ISOL VALVE • 1-FCV-3-75, HP HTR 1A1 FW OUTLET ISOL VALVE • 1-FCV-3-76, HP HTR 1B1 FW OUTLET ISOL VALVE • 1-FCV-3-77, HP HTR 1C1 FW OUTLET ISOL VALVE. 6. **VERIFY OPEN** the following RFP suction valves: • 1-FCV-2-83, RFP 1A SUCTION VALVE • 1-FCV-2-95, RFP 1B SUCTION VALVE • 1-FCV-2-108, RFP 1C SUCTION VALVE. 7. **VERIFY** at least one condensate pump running. 8. **VERIFY** at least one condensate booster pump running. 9. **ADJUST** 1-LIC-3-53, RFW START-UP LEVEL CONTROL, to control injection (Panel 1-9-5). 10. **VERIFY** RFW flow to RPV.

Simulator Event Guide:

Event 7 Major: EHC leak on pump casing leads to turbine trip and scram

	ATC	Transitions RPV Water Level control to EOI App-6A and verifies RFP Discharge valves are closed to prevent overfilling RPV
	SRO	REP Classification is a Site Are Emergency. EAL 1.2-S

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner:

All Control Rods are inserted

Suppression Chamber /Drywell Sprays performed using RHRSW

SHIFT TURNOVER SHEET

Thunderstorms are expected in the area for the next 3 hours.

Equipment Out of Service/LCO's:

RHR Pump 2A is tagged out for scheduled maintenance.
The following Tech Specs have been entered
Tech Spec 3.5.1 Condition A.
Tech Spec 3.6.2.3 Condition A
Tech Spec 3.6.2.4 Condition A
Tech Spec 3.6.2.5 Condition A
TRM 3.5.1 Condition A

Operations/Maintenance for the Shift:

Perform RFPT 2B Overspeed Trip Exerciser Test per 2-OI-3 section 8.10 and then raise power to 100% with Recirc Flow.

Unusual Conditions/Problem Areas:

None

Facility: **Browns Ferry NPP** Scenario No.: **NRC - 9** Op-Test No.: **1205**

Examiners:_____ Operators: SRO:_____

_____ ATC:_____

_____ BOP:_____

Initial Conditions: Unit 2 is at 6% power. A shutdown is in progress in accordance with 2-GOI-100-12A, section 5.3.4 [8]. The Auxiliary Boilers are running and Steam Seals have been shifted to the Aux Boiler. A3 EECW pump is tagged for maintenance.

Turnover: Lower power to < 5% and transfer SJAE and Off-Gas Preheaters from nuclear steam to auxiliary. A Severe thunderstorm watch is in effect for the next 10 to 12 hours.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R-ATC R-SRO	Lower power to < 5% with control rods.
2	rd22	C-ATC C-SRO	CRD flow element fails high causing 2-FIC-85-11 CRD flow control valve to close.
3	N/A	N-BOP N-SRO	Place SJAE & OG Preheaters on Aux steam.
4	sw03J	C-BOP TS-SRO	Trip of C3 EECW - Operator manually starts and aligns the C1 EECW pump per ARP.
5	bat	C-BOP C-SRO	PSC Head Tank Pump Failure.
6	bat	C-ATC TS-SRO	Recirc pump A high vibration, dual seal failure, trip, isolable.
7	th33a	M-ALL	Steam line break in Drywell.
8	ed10a	C-ALL	Loss of 480V Shutdown Board 2A.
9	zdihs7475	C-ALL	RHR loop II Drywell spray valve 74-75 fails to open.

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

FINAL

Events

1. Starting ~ 6% power, the crew will lower power to < 5% by inserting control rods per 2-GOI-100-12A, RCP, and 2-OI-85.

2. During the power reduction the crew will respond to the CRD flow element failing high causing 2-FIC-85-11 CRD flow control valve to close. The ATC will take action to take manual control of the CRD flow controller and restore CRD system parameters.

3. Turbine sealing steam has already been swapped to aux boiler steam and the crew will swap the operating SJAE and Off-Gas Preheaters from nuclear steam to aux boiler steam per 2-GOI-100-12A and 2-OI-66.

4. C3 EECW pump will trip, with A3 EECW pump tagged, the crew will respond per the ARP and manually start the C1 EECW pump. The SRO will refer to Tech Specs and initially determine TS 3.7.2 Condition A. Once the C1 EECW pump has been aligned the SRO will determine TS 3.7.1 Condition A now applies.

5. The crew will respond to a PSC head Tank low level and recognize that the neither PSC head pump is running. Attempts to start the first PSC head tank pump will fail and the second PSC head tank pump will start when the BOP manually starts it.

6. Reactor Recirculation Pump 2A high vibration will be received followed by an inner seal failure and then an outer seal failure. The crew will trip Recirc pump 2A and enter 2-AOI-68-1A. The operator will isolate the recirc loop. The SRO will refer to Tech Specs and determine TS 3.4.1 Condition A is applicable.

7. A steam line break in the Drywell will cause the crew to insert a manual scram. All rods will insert.

8. 480V Shutdown Board 2A will be lost and can be transferred to alternate power by the crew from panel 2-9-8 in the control room. Transferring the 480V S/D Board 2A will allow the crew to spray the drywell with RHR Loop I.

9. The drywell leak will cause Drywell pressure to increase and the crew will respond per EOI-1 and EOI-2 to spray the Suppression Chamber and Drywell. RHR Loop II Drywell sprays will be unavailable due to 2-FCV-74-75 failing to open.

Terminate the scenario when the following condition is satisfied or upon request of Lead Examiner.

Drywell Sprays in service with RHR Loop I

Critical Tasks - One

CT#1-When Suppression Chamber Pressure exceeds 12 psig, initiate Drywell Sprays while in the safe region of the Drywell Spray Initiation Limit (DSIL) curve and prior to exceeding the PSP limit.

1. Safety Significance:
   Precludes failure of containment

2. Cues:
   Procedural compliance
   High Drywell Pressure and Suppression Chamber Pressure

3. Measured by:
   Observation - US directs Drywell Sprays IAW with EOI Appendix 17B
   AND
   Observation - RO initiates Drywell Sprays

4. Feedback:
   Drywell and Suppression Pressure lowering
   RHR flow to containment

OR

CT#1- Before Drywell temperature rises to 280°F, initiate Drywell Sprays while in the safe region of the Drywell Spray Initiation Limit (DSIL) curve.

1. Safety Significance:
   Precludes failure of containment

2. Cues:
   Procedural compliance
   High Drywell Pressure and Suppression Chamber Pressure

3. Measured by:
   Observation - US directs Drywell Sprays IAW with EOI Appendix 17B
   AND
   Observation - RO initiates Drywell Sprays

4. Feedback:
   Drywell and Suppression Pressure lowering
   RHR flow to containment

SCENARIO REVIEW CHECKLIST

SCENARIO NUMBER: NRC 9

7 Total Malfunctions Inserted: List (4-8)

3 Malfunctions that occur after EOI entry: List (1-4)

4 Abnormal Events: List (1-3)

1 Major Transients: List (1-2)

2 EOI's used: List (1-3)

0 EOI Contingencies used: List (0-3)

75 Validation Time (minutes)

1 Crew Critical Tasks: (2-5)

YES Technical Specifications Exercised (Yes/No)

Scenario Tasks

EVENT	TASK NUMBER	K/A	RO	SRO
1	Lower Power with Control Rods			
	RO U-085-NO-07 SRO S-000-AD-31	2.2.2	4.6	4.1
2	Swap SJAEs and Preheaters from Main Steam to Auxiliary Boiler Steam			
	RO U-066-NO-14	271000A1.01	3.3	3.2
3	CRD Flow Element Failure			
	RO U-085-AB-03	201001A3.01	3.0	3.0
4	EECW Pump Trip			
	RO U-067-NO-12	400000A2.01	3.3	3.4
5	Respond to PSC Head Tank Low Level			
	RO U-075-AL-03	203000A4.03	3.4	3.4
6	Recirc pump high vibration/dual seal failure			
	U-068-AL-11	202001A1.14	3.1	3.2
7	Drywell LOCA			
	RO U-000-EM-05 SRO S-000-EM-04 SRO S-000-EM-05 SRO T-000-EM-15	295028EA2.01	4.0	4.1

Procedures Used/Referenced:

Procedure Number	Procedure Title	Procedure Revision
2-GOI-100-12	Power Maneuvering	Rev 41
2-OI-68	Reactor Recirculation System	Rev 139
2-OI-85	Control Rod Drive System	Rev 130
2-ARP-9-5A	Alarm Response Procedure	Rev 48
2-OI-66	Off-Gas System	Rev 104
0-OI-67	EECW System	Rev 94
2-ARP-9-20A	Alarm Response Procedure	Rev 25
TS 3.7.1	RHRSW System and UHS	Amd 254
TS 3.7.2	EECW System and UHS	Amd 254
2-ARP-9-3A	Alarm Response Procedure	Rev 44
2-ARP-9-4A	Alarm Response Procedure	Rev 37
2-AOI-68-1A	Recirc Pump Trip/Core Flow Decrease OPRMs Operable	Rev 8
2-AOI-64-1	Drywell Pressure and/or Temperature High, or Excessive Leakage into Drywell	Rev 24
TS 3.4.1	Recirculation Loops Operating	Amd 258
2-ARP-9-5B	Alarm Response Procedure	Rev 26
2-ARP-9-3B	Alarm Response Procedure	Rev 20
2-AOI-100-1	Reactor Scram	Rev 97
2-EOI-1	RPV Control Flowchart	Rev 12
2-EOI Appendix-5A	Injection Systems Lineup Condensate/Feedwater	Rev 9
2-EOI-2	Primary Containment Control Flowchart	Rev 10
2-EOI Appendix-17C	RHR System Operation Suppression Chamber Sprays	Rev 11
2-ARP-9-8B	Alarm Response Procedure	Rev 14
2-EOI Appendix-17B	RHR System Operation Drywell Sprays	Rev 10

Simulator Instructor - IC90

pref/NRC/1205-9
pfk 01 tog
pfk 02 ann silence
pfk 03 bat NRC/1205-9
pfk 04 imf rd22 100
pfk 05 mrf rd05 b
pfk 06 mrf og10 norm
pfk 07 mrf og03a open
pfk 08 mrf og03b open
pfk 09 mrf og04a aux
pfk 10 mrf og04b aux
pfk 11 imf sw03j
pfk 12 mrf sw06 close
pfk s1 bat NRC/pscpump
pfk s2 bat RRPAVIB1
pfk s3 imf th33a 1
pfk s4 dmf ed10a

batch/NRC/1205-9
mrf ms01 on
ior ypobkrrhrswpa3 fail_ccoil
ior zlohs2385a[1] off
ior zdihs2385a NASP
trg e3 NRC/pscpump
trg e3= dor xa553a26
trg e5 NRC/modesw
imf th33b (e5 360) 15 600 3
trg e5= imf ed10a
trg e5= ior zdihs7475a asis
trg e5= imf pc16a
imf hp04

Scenario 9

		DESCRIPTION/ACTION
Simulator Setup	manual	Reset to IC 90
Simulator Setup	**Load Batch**	restorepref NRC/1205-9
Simulator Setup	manual	F3 (load batch file)
Simulator Setup		Verify file loaded
Simulator Setup		Clearance out A3 EECW Pump
Simulator Setup	manual	Bring up RWM & turn CRD power off

RCP required (10% - < 5% with rods) Provide marked up copy of 2-GOI-100-12
Simulator Event Guide:

Simulator Event Guide:

Event 1 Reactivity: Lower Power to < 5% with Control Rods

	SRO	Direct Power decrease with rods to < 5% power per RCP and 2-OI-85
	ATC	Lower Power with Control Rods per 2-OI-85, section 6.7. Control Rods:
		CAUTION Positioning control rods should be done with utmost diligence and care. Notch Inserting control rods provides the most deliberate controlled method of inserting control rods. **NOTES** 1) The following steps are performed from Panel 2-9-5 unless noted otherwise. 2) If rod insertion to Position 00 is required and core thermal power is ≤ 10%, entry into LCO 3.1.6 may be required.
		6.7 Control Rod Insertion **6.7.1 Initial Requirements** [1] **REVIEW** Precautions and Limitations in Section 3.7 and 3.8. [2] **OBSERVE** the following during control rod repositioning: • Control rod reed switch position indicators (four rod display) agree with indication on Full Core Display. • Nuclear Instrumentation responds as control rods move through the core (This ensures control rod is following drive during Control Rod movement.)
		[3] **VERIFY** the following prior to control rod movement: • CRD POWER, 2-HS-85-46 in ON. • When Rod Worth Minimizer is enforcing, the ROD WORTH MINIMIZER is operable and LATCHED in to the correct ROD GROUP.
		[4] **PERFORM** the following to insert the control rod as appropriate. • Control Rod Notch Insertion per Section 6.7.2. • Control Rod Continuous Insertion per Section 6.7.3.

Simulator Event Guide:

Event 1 Reactivity: Lower Power to < 5% with Control Rods

<table>
<tr><td></td><td>ATC</td><td>6.7.2 Notch Insertion of Control Rod
[1] VERIFY Section 6.7.1 has been performed.
[2] SELECT desired control rod by depressing appropriate CRD ROD SELECT pushbutton, 2-XS-85-40.
[3] OBSERVE the following for selected control rod:
• CRD ROD SELECT pushbutton is brightly ILLUMINATED.
• White light on Full Core Display ILLUMINATED
[4] PLACE CRD CONTROL SWITCH, 2-HS-85-48, to ROD IN and RELEASE.
[5] OBSERVE the control rod settles into the desired position and the ROD SETTLE light extinguishes.</td></tr>
<tr><td></td><td></td><td>[6] IF control rod is to be notch inserted, THEN: PERFORM either of the following as desired: (Otherwise N/A)
[6.1] IF the control rod moved and settled back to the initial position, THEN ATTEMPT to re-insert control rod per step 6.7.2[4].
[6.2] Refer to Section 8.16 for additional methods to reposition control rod.</td></tr>
<tr><td></td><td></td><td>[7] IF control rod settles one notch past its intended position,
THEN With Unit Supervisors permission return the control rod to the intended position per Section 6.6.
[8] IF the Control Rod moves more than one notch from its intended position, THEN: Refer to 2-AOI-85-7 MISPOSITIONED CONTROL ROD.</td></tr>
<tr><td></td><td></td><td>[9] WHEN control rod movement is no longer required AND deselecting control rods is desired, THEN:
[9.1] PLACE CRD POWER, 2-HS-85-46, in OFF.
[9.2] PLACE CRD POWER, 2-HS-85-46, in ON.</td></tr>
<tr><td></td><td></td><td>Rod sequence: FROM TO
<table>
<tr><td>10-11</td><td>12</td><td>00</td></tr>
<tr><td>50-11</td><td>12</td><td>00</td></tr>
<tr><td>50-51</td><td>12</td><td>00</td></tr>
<tr><td>10-51</td><td>12</td><td>00</td></tr>
<tr><td>02-19</td><td>12</td><td>00</td></tr>
<tr><td>18-03</td><td>12</td><td>00</td></tr>
<tr><td>42-03</td><td>12</td><td>00</td></tr>
<tr><td>58-19</td><td>12</td><td>00</td></tr>
<tr><td>58-43</td><td>12</td><td>00</td></tr>
<tr><td>42-59</td><td>12</td><td>00</td></tr>
<tr><td>18-59</td><td>12</td><td>00</td></tr>
<tr><td>02-43</td><td>12</td><td>00</td></tr>
</table></td></tr>
</table>

Simulator Event Guide:

Event 1 Reactivity: Lower Power to < 5% with Control Rods

	ATC	**6.7.3 Continuous Insertion of Control Rod** [1] **VERIFY** Section 6.7.1 has been performed. [2] **SELECT** desired control rod by depressing appropriate CRD ROD SELECT pushbutton, 2-XS-85-40. [3] **OBSERVE** the following for selected control rod: • CRD ROD SELECT pushbutton is brightly ILLUMINATED. • White light on Full Core Display ILLUMINATED [4] **PLACE** AND **HOLD** CRD CONTROL SWITCH, 2-HS-85-48, to ROD IN. [5] **WHEN** control rod notch reaches even rod notch position prior to desired final control rod notch position, **THEN RELEASE** CRD CONTROL SWITCH, 2-HS-85-48.
		[6] **OBSERVE** the control rod settles into desired position **AND** ROD SETTLE light extinguishes. [7] **IF** control rod settles one notch past its intended position, **THEN** With Unit Supervisors permission return the control rod to the intended position per Section 6.6. [8] **IF** the Control Rod moves more than one notch from its intended position, **THEN**: Refer to 2-AOI-85-7 MISPOSITIONED CONTROL ROD.
		[9] **WHEN** control rod movement is no longer required **AND** deselecting control rods is desired, **THEN**: [9.1] **PLACE** CRD POWER, 2-HS-85-46, in OFF. [9.2] **PLACE** CRD POWER, 2-HS-85-46, in ON.
	ATC	Down ranges IRM's per 2-GOI-100-12A to maintain on range between 25 and 75 as reactor power is lowered.
	Driver	When directed by the NRC and after several Rods have been inserted, insert F4 (imf rd22 100) to fail the CRD flow element
	NRC	When CRD flow element is failed, ATC should take action to restore CRD parameters and continue driving rods to < 5% power

Simulator Event Guide:

Event 2 Component: CRD flow element fails high causing 2-FIC-85-11 CRD flow control valve to close.

	ATC	Reports **Alarm 9-5A-window 10 CRD ACCUM CHG WTR HDR PRESS HIGH** A. **VERIFY** pressure high on CRD ACCUM CHG WTR HDR 2-PI-85-13A, B. **CHECK** 2-FCV-85-11A (B) in service. C. **IF** in-service controller has failed, **THEN REFER TO 2**-OI-85. D. **IF** pressure is still greater than 1510 psig after verifying proper controller operation, **THEN THROTTLE** PUMP DISCH THROTTLING, 2-THV-085-0527, to maintain between 1475 and 1500 psig.
	ATC	Report CRD controller is not responding in Automatic.
	Examiner Note	The crew may use OPDP-1 guidance listed below, or 2-OI-85 Section 8.33 to take manual control of 2-FIC-85-11. **OPDP-1 Conduct of Operations** **3.5 Manual Control of Automatic Systems** A. If an automatic control or an automatic action is confirmed to have malfunctioned, take prompt actions to place that control in manual or to accomplish the desired function. (e.g. Establishment of manual level control following automatic FCV failure to control level or manual start of an EDG that failed to auto start.)
	SRO	Directs ATC to take MANUAL control of 2-FIC-85-11 and adjust flow to normal band of 40-65 gpm.
	ATC	Takes manual control and restores CRD Parameters.
		2-OI-85 Control Rod Drive System **8.33 AUTOMATIC/MANUAL operation of 2-FIC-85-11** [1] **REVIEW** all Precautions and Limitations in Section 3.6. [2] **IF** transferring 2-FIC-85-11 from AUTO to MANUAL **THEN**: (Otherwise N/A) [2.1] **PLACE** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11 in BAL. [2.2] **BALANCE** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, by turning Manual Control Pot inside Control Selector Wheel until red deviation pointer is in the Green Band. [2.3] **PLACE** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, in MAN. [2.4] **ADJUST** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11 manual potentiometer to establish the desired system flow. Refer to Section 5.1 or 6.10.
	SRO	Contacts Work Control to investigate 2-FIC-85-11 failure.
	Examiner Note	Normal CRD parameters are: Cooling Water D/P: 10-14 psid Drive Water D/P: 250-270 psid CRD System Flow : 40-65 gpm

Simulator Event Guide:

Event 2 Component: CRD flow element fails high causing 2-FIC-85-11 CRD flow control valve to close.

	Examiner Note	If ATC/US is unable to diagnose that the CRD controller can be shifted to manual and parameters can be restored the US may direct shifting CRD Flow Control Valves iaw 2-OI-85 section 6.3
		6.3 Shifting CRD Flow Control Valves [1] **VERIFY** Control Rod Drive Hydraulic System in operation. Refer to Section 5.1. [2] **REVIEW** all Precautions and Limitations in Section 3.6. **NOTE** 1) Erratic operation of CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, may be observed during refueling/shutdown operations when larger ΔPs exists due to low reactor pressure and CRD pressure. 2) As CRD Flow Control Valves are shifting, CRD System Flow Controller should be adjusted, as needed, to maintain a constant flow. [3] **PERFORM** the following for Flow Control Valve being brought into service from Reactor Bldg El 565': [3.1] **OPEN** FCV-85-11A(B) INLET SOV, 2-SHV-085- 0563(0561). [3.2] **OPEN** FCV-85-11A(B) OUTLET SOV, 2-SHV-085- 0564(0562). [3.3] **VERIFY OPEN** PCV BYPASS SOV TO FCV-85-11A(B), 2-85-317(318). [3.4] **CHECK OPEN** PCV 85-11 SOV, 2-85-247. [3.5] **CHECK OPEN** HDR ISOL TO FCV-85-11A & B, 2-85-313. [3.6] **CHECK** FCV-85-11A THREE WAY ISOL valve handle in Horizontal position for 2-85-251. [3.7] **CHECK** FCV-85-11B, THREE WAY ISOL valve handle in Horizontal position for 2-85-252.

Simulator Event Guide:

Event 2 Component: CRD flow element fails high causing 2-FIC-85-11 CRD flow control valve to close.

	Driver	When/if directed to perform step [3] of 2-OI-85, wait 3 minutes and report completion. If directed to perform entire section 6.3 of 2-OI-85, then wait 3 minutes and insert **mrf rd05 b** and report completion
		6.3 Shifting CRD Flow Control Valves (continued) [4] **VERIFY** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, in BAL position on outer control selector wheel. [4.1] **BALANCE** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, by turning Manual Control Pot inside Control Selector Wheel UNTIL red deviation pointer is in Green Band. [4.2] **TURN** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, Control Selector from BAL position to MAN position. [5] **REDUCE** CRD SYSTEM FLOW using 2-FIC-85-11, to approximately 40 gpm with Manual Control Pot on 2-FIC-85-11. [6] **PLACE** CRD SYSTEM FLOW CV SELECTOR SW, 2-XS-85-11, on 2-LPNL-925-0018B, to select Flow Control Valve being brought into service, in VALVE A(VALVE B).
	Driver	When/if directed to perform step [6] of 2-OI-85 or to perform entire section 6.3 of 2-OI-85, wait 3 minutes and insert **mrf rd05 b** then report completion
		[7] **CHECK** selected in-service valve opening and out-of-service valve closing. [8] **PERFORM** the following for Flow Control Valve being removed from service: [8.1] **CLOSE** FCV-85-11A(B) INLET SOV, 2-SHV-085-0563(0561). [8.2] **CLOSE** FCV-85-11A(B) OUTLET SOV, 2-SHV-0850564(0562). [9] **ADJUST** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, to establish between 40 gpm and 65 gpm. [10] **BALANCE** CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, by **TURNING** Flow Demand Thumb Wheel until Red Deviation Pointer is in Green band, **AND PLACE** in AUTO **OR** BALANCE. [11] **VERIFY** CRD STABILIZING FLOW, 2-FI-85-22, is approximately 6 gpm (locally on 2-LPNL-925-0018B). [12] **VERIFY** CRD DR WATER HDR FLOW, 2-FI-85-15A, is approximately 0 gpm.
		6.3 Shifting CRD Flow Control Valves (continued) [13] **ESTABLISH** the following by alternately adjusting tape setpoint of CRD SYSTEM FLOW CONTROL, 2-FIC-85-11, **AND** throttled position of CRD DRIVE WATER PRESS CONTROL VLV, 2-HS-85-23A: • CRD CLG WTR HDR DP, 2-PDI-85-18A between 10 psid and 20 psid. • CRD DRIVE WTR HDR DP, 2-PDI-85-17A between 250 psid and 270 psid. • CRD SYSTEM FLOW, 2-FIC-85-11 between 40 gpm and 65 gpm.

Simulator Event Guide:

Event 2 Component: CRD flow element fails high causing 2-FIC-85-11 CRD flow control valve to close.

<table>
<tr><td></td><td></td><td>NOTE
PUMP DISCH THROTTLING valve, 2-85-527, has been set to supply 1500 psig charging water pressure and Unit Supervisor authorization is required prior to changing valve position.

[14] IF CRD ACCUM CHG WTR HDR PRESSURE, 2-PI-85-13A, is less than 1475 psig, OR greater than 1500 psig, THEN THROTTLE PUMP DISCH THROTTLING, 2-THV-085-0527, to maintain pressure within normal operating range of between 1475 psig and 1500 psig, as indicated on 2-PI-85-13A.</td></tr>
<tr><td></td><td>ATC</td><td>If/When ATC has swapped CRD FCVs he will realize that this has not corrected the failed flow element problem</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO</td><td>Consults Technical Specifications:</td></tr>
<tr><td></td><td></td><td rowspan="2">3.1.4 Control Rod Scram Times
LCO 3.1.4
a. No more than 13 OPERABLE control rods shall be "slow," in accordance with Table 3.1.4-1; and
b. No more than 2 OPERABLE control rods that are "slow" shall occupy adjacent locations.

<table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>A. Requirements of the LCO not met.</td><td>A.1 Be in MODE 3.</td><td>12 hours</td></tr></table></td></tr>
<tr><td></td><td></td></tr>
</table>

Simulator Event Guide:

Event 2 Component: CRD flow element fails high causing 2-FIC-85-11 CRD flow control valve to close.

3.1.3 Control Rod OPERABILITY

LCO 3.1.3 Each control rod shall be OPERABLE.

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One or more control rods inoperable for reasons other than Condition A orB.	C.1 ------NOTE---------- RWM may be bypassed as allowed by LCO 3.3.2.1, if required, to allow insertion of inoperable control rod and continued operation. ---------- Fully insert inoperable control rod..	3 hours
	AND	
	C.2 Disarm the associated CRD.	4 hours

CONDITION	REQUIRED ACTION	COMPLETION TIME
E. Required Action and associated Completion Time of Condition A, C, or D not met.	E.1 Be in MODE 3.	12 hours
OR		
Nine or more control rods inoperable.		

Simulator Event Guide:

Event 3 Normal: Place SJAE & OG Preheaters on Aux steam.

	SRO	Direct BOP to place SJAE & OG Preheaters on Aux Steam per 2-GOI-100-12A
		2-GOI-100-12A [8] **WHEN** Reactor power is less than 5% and PRIOR TO Turbine Bypass Valves closing, **THEN REDUCE** nuclear steam loads as follows: [8.1] **IF** auxiliary steam is available, **THEN TRANSFER** SJAE and Offgas Preheaters from nuclear steam to auxiliary steam per 2-OI-66. (Otherwise N/A)
	BOP	**2-OI-66, Off-Gas System** **8.12 Swapping SJAEs and Preheaters from MS to Aux Boiler Steam** [1] **CHECK** the following initial conditions are satisfied: A. All Precautions and Limitations in Section 3.0 have been reviewed. B. SJAE and/or preheaters are in service using main steam. C. Swapping to Aux Boiler Steam has been directed by Unit Supervisor/SRO or 2-GOI-100-12A. D. Auxiliary Boiler(s) in service per 0-OI-12 and boiler pressure greater than or equal to 165 psig.
		[2] **VERIFY OPEN** UNITS 1 & 2 SJAE STM valve, 0-12-662 (TB EL 565' north of Aux. Boiler A in overhead).
	Driver	When dispatched to verify open Units 1 & 2 Steam Valve, 0-12-662, wait 1 minute and report valve 0-12-662 is OPEN
		[3] **CHECK** Auxiliary Steam Supply pressure at 2-PI-1-150 and 152 on Panel 25-105, is between 170 and 250 psig.
	Driver	Report Auxiliary Steam Pressures on 2-PI-1-150 and 2-PI-1-152 are approximately 190 psig
	BOP	**CAUTION** The following step terminates steam flow to the SJAEs until the Auxiliary Boiler Steam supply valves are opened. Close coordination between personnel operating Auxiliary Boiler valves and Unit Operator is required. [4] **PLACE** both of the following to CLOSE at Panel 2-9-7. A. SJAE 2A PRESSURE CONTROLLER, 2-HS-1-150. B. SJAE 2B PRESSURE CONTROLLER, 2-HS-1-152.
		[5] **VERIFY** in NORM, SJAE TRAIN PERMISSIVE, 2-HS-001-0375 (Panel 925-105 on junction box 8595).
	Driver	Insert F6 (mrf og10 norm) when contacted to place SJAE train permissive in NORM and report completion

Simulator Event Guide:

Event 3 Normal: Place SJAE & OG Preheaters on Aux steam.

	BOP	[6] For the SJAE to be returned to service **DEPRESS** the open pushbutton for AUX STM TO SJAE A(B) 1st, 2nd & 3rd STG, 2-HS-12-3A(5A) UNTIL valve is fully open at JB 3524 El. 586' T6-C.
	Driver	Insert F7 to lineup SJAE 'A' **OR** insert F8 to lineup SJAE 'B' when contacted to Depress the open pushbutton for Aux Steam to SJAE that is to be returned to service and report completion
	BOP	[7] **CHECK** Auxiliary Steam Supply pressure at 2-PI-1-150 and/or 152 on Panel 25-105, is between 175 and 250 psig.
	Driver	Report Auxiliary Steam Pressures on 2-PI-1-150 and 2-PI-1-152 are approximately 190 psig
	BOP	[8] **PLACE** both of the following to CLOSE at Panel 2-9-7. A. STEAM TO SJAE 2A, 2-HS-1-155A. B. STEAM to SJAE 2B, 2-HS-1-156A.
		[9] **SWAP** steam to the preheaters by performing the following located in turbine bldg breezeway T-7 B LINE El 586: [9.1] **OPEN** AUX STEAM TO OFF-GAS PREHEATER 2A, using 2-HS-012-0074B. [9.2] **OPEN** AUX STEAM TO OFF-GAS PREHEATER 2B, using 2-HS-012-0075B. [9.3] **CLOSE** STEAM TO OFF-GAS PREHEATER 2A, 2-HS-001-0176C. [9.4] **CLOSE** STEAM TO OFF-GAS PREHEATER 2B, 2-HS-001-0176D.
	Driver	Insert F9 **AND** F10 to open Aux Steam to OG Preheaters 2A (2-HS-012-0074B) and 2B (2-HS-012-0075B) when contacted and report completion. Report Steam to OG Preheaters 2A (2-HS-001-0176C) and 2B (2-HS-001-0176D) are closed
	Driver	At NRC direction, insert F11 (imf sw03j) to enter trip of C3 EECW Pump

Simulator Event Guide:

Event 4 Component: Trip of C3 EECW - Operator manually starts and aligns the C1 EECW pump per ARP.

	Driver	At NRC direction, insert F11 (imf sw03j) to enter trip of C3 EECW Pump
	BOP	Respond to alarm 20A-35.
		20A-35 EECW SOUTH HDR DG SECTION PRESS LOW B. **CHECK** Panel 2-9-3 for status of North header pump(s) breaker lights and pump motor amps normal. C. **NOTIFY** UNIT SUPERVISOR, Unit 1 and Unit 3. D. **START** standby EECW Pump for affected header, if available. H. **IF** pump failure is cause of alarm, **THEN REFER TO** Tech Spec 3.7.2.
	Driver	If contacted, as Unit 3 Operator, inform that 4KV SD BD 3EB received a Motor Overload or Trip alarm If contacted as Unit 1 operator, you did not secure the C3 EECW Pump
		0-OI-67, EECW System **8.3 Operation of RHRSW Pump C1 (for EECW in place of C3)** **CAUTION** Only one RHRSW pump in a given RHRSW pump room may be counted toward meeting Technical Specification 3.7.2 requirements for EECW pump operability. **NOTES** 1) RHRSW Pump C1 may be aligned for service by this section when: • It is used to meet the minimum number of Tech. Spec. operable pumps; or • At the discretion of the Unit Supervisor, it is needed to replace another pump's operation; or • At the discretion of the Unit Supervisor, it is needed to assist in supplying header flow/pressure demand. 2) If used to meet EECW requirements, RHRSW pump C1 must be aligned to EECW, the pump started, and should remain running. RHRSW Pump C1 does **NOT** have the same auto start signals as RHRSW Pump C3. 3) The RHRSW pump control switches and amp meters are located at Control Room Panel 9-3, Unit 1, 2, and 3. 4) When RHRSW Pump C1 is aligned for EECW, its RHRSW function required by the Safe Shutdown Program (Appendix R) is inoperable. Appendix R program equipment operability requirements of FPR-Volume 1 shall be addressed. [1] To line up RHRSW Pump C1 for EECW System operation, **PERFORM** the following: [1.1] **VERIFY** EECW System is in prestartup/standby readiness alignment in accordance with Section 4.0. [1.2] **REVIEW** all precautions and limitations in Section 3.0. [1.3] **VERIFY** RHRSW Pump C1 is in standby readiness in accordance with 0-OI-23.

Simulator Event Guide:

Event 4 Component: Trip of C3 EECW - Operator manually starts and aligns the C1 EECW pump per ARP.

		8.3 Operation of RHRSW Pump C1 (for EECW in place of C3) (contd) [1.4] **VERIFY** RHRSW Pump C1 upper and lower motor bearing oil level is in the normal operating range. [1.5] **UNLOCK** and **CLOSE** RHRSW PMP C1 & C2 CROSSTIE, 0-23-544 at RHRSW C Room. [1.6] **OPEN** RHRSW PMP C1 CROSSTIE TO EECW, 0-FCV-67-49 using one of the following: • RHRSW PMP C1 CROSSTIE TO EECW, 0-HS-67-49A/1 on Unit 1 • RHRSW PUMP C1 SUPPLY TO EECW, 0-HS-67-49A/2 on Unit 2 • RHRSW PUMP C1 SUPPLY TO EECW, 0-HS-67-49A/3 on Unit 3 [1.7] **REQUEST** a caution order be issued to tag RHRSW Pump C1 and its associated crosstie valves to inform Operations personnel that it is aligned for EECW system operation and that the C1 pump should remain running to be operable for EECW. [2] To start RHRSW (EECW) Pump C1, **PERFORM** the following: [2.1] **START** RHRSW Pump C1 using one of the following: • RHRSW PUMP C1, 0-HS-23-8A/1 on Unit 1 • RHRSW PUMP C1, 0-HS-23-8A/2 on Unit 2 • RHRSW PUMP C1, 0-HS-23-8A/3 on Unit 3 [2.2] **VERIFY** RHRSW Pump C1 running current is less than 53 amps using one the following: • RHRSW PUMP C1 AMPS, 0-EI-23-8/1 on Unit 1 • RHRSW PUMP C1 AMPS, 0-EI-23-8/2 on Unit 2 • RHRSW PUMP C1 AMPS, 0-EI-23-8/3 on Unit 3 [2.3] **VERIFY** locally, RHR SERVICE WATER PUMP C1 breaker charging spring recharged by observing amber breaker spring charged light is on and closing spring target indicates charged. [2.4] **VERIFY** RHRSW Pump C1 upper and lower motor bearing oil level is in the normal operating range.
	Driver	If dispatched to check C3 EECW pump breaker, report breaker tripped on overload and breaker smells burnt but no visible smoke or flames (3EB 4kv SD BD)
		8.3 Operation of RHRSW Pump C1 (for EECW in place of C3) (contd) [2.5] **NOTIFY** Chemistry of running RHRSW (EECW) pump(s). [2.6] **VERIFY** a caution order has been issued to tag RHRSW Pump C1 and its associated crosstie valves to inform Operations personnel that it is aligned for EECW system operation and that the C1 pump should remain running to be operable for EECW.

Simulator Event Guide:

Event 4 Component: Trip of C3 EECW - Operator manually starts and aligns the C1 EECW pump per ARP.

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>Driver</td><td>When chemistry contacted, acknowledge report
When contacted as Work Control for Caution Order, acknowledge direction and inform will begin working on a Caution Order
When dispatched as intake AUO to check Oil Levels and close 0-23-544 valve wait 2 minutes and insert F12 (mrf sw06 close), then report oil levels are normal and the 0-23-544 valve is closed
When contacted to check breaker charging spring recharged for the C1 EECW pump, wait 2 minutes and inform amber breaker spring charged light is on and closing spring target indicates charged.
When contacted as Intake AUO for second Oil Level check, report Oil Levels are normal</td></tr>
<tr><td></td><td>SRO</td><td>Evaluate Technical Specification 3.7.2 before the C1 EECW Pump is aligned</td></tr>
<tr><td></td><td></td><td>3.7.2 Emergency Equipment Cooling Water (EECW) System and Ultimate Heat Sink(UHS)
LCO 3.7.2 The EECW System with three pumps and UHS shall be OPERABLE.
<table><tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr><tr><td>B. Required Action and associated Completion Time of Condition A not met.

OR

Two or more required EECW pumps inoperable.

OR

UHS inoperable.</td><td>B.1 Be in MODE 3.

AND

B.2 Be in MODE 4.</td><td>12 hours

36 hours</td></tr></table></td></tr>
</table>

Simulator Event Guide:

Event 4 Component: Trip of C3 EECW - Operator manually starts and aligns the C1 EECW pump per ARP.

<table>
<tr><td></td><td>SRO</td><td>Evaluate Technical Specification 3.7.1 after the C1 EECW Pump is aligned</td></tr>
<tr><td></td><td></td><td>3.7.1 Residual Heat Removal Service Water (RHRSW) System and Ultimate Heat Sink (UHS)

LCO 3.7.1
----------NOTE----------
The number of required RHRSW pumps may be reduced by one for each fueled unit that has been in MODE 4 or 5 for □ 24 hours.

Four RHRSW subsystems and UHS shall be OPERABLE with the number of OPERABLE pumps as listed below:
1. 1 unit fueled - four OPERABLE RHRSW pumps.
2. 2 units fueled - six OPERABLE RHRSW pumps.
3. 3 units fueled - eight OPERABLE RHRSW pumps.</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr>
<tr><td>A. One required RHRSW pump inoperable.</td><td>A.1 ----------NOTES---------
1. Only applicable for the 2 units fueled condition.

2. Only four RHRSW pumps powered from a separate 4 kV shutdown board are required to be OPERABLE if the other fueled unit has been in MODE 4 or 5 for > 24 hours.

Verify five RHRSW pumps powered from separate 4 kV shutdown boards are OPERABLE.

OR

A.2 Restore required RHRSW pump to</td><td>

IMMEDIATELY

30 days</td></tr>
</table>
</td></tr>
<tr><td></td><td>SRO</td><td>Contacts the Work Control to get caution tag on C1 RHRSW pump to identify it is aligned to EECW.</td></tr>
</table>

Simulator Event Guide:

Event 4 Component: Trip of C3 EECW - Operator manually starts and aligns the C1 EECW pump per ARP.

	SRO	Contacts Maintenance to investigate the trip of C3 EECW pump.

Simulator Event Guide:

Event 5 Component: PSC Head Tank Pump Failure.

	Driver	At NRC direction, insert Shift F1 (bat NRC/pscpump) to enter PSC head tank pump failure
	BOP	Report alarm **PSC HEAD TANK LEVEL LOW 2-9-3A Window 26**
		A. **VERIFY** both PSC Head Tank Pumps are running. B. **VERIFY** power available to pumps. C. **CHECK** PSC PUMP SUCTION INBD and OUTBD ISOL VALVEs, 2-FCV-75-57 and 58, open.
	BOP	Reports PSC Head Tank Pumps failed to auto start
	SRO	Directs the BOP to attempt to start PSC head tank pumps per ARP
	BOP	Starts PSC 2B Pump to restore PSC tank level.
	Driver	Approximately 30 seconds after PSC Pump started, delete alarm override - xa553a[26]
	Driver	If dispatched to check PSC head tank, report no leaks noted and no abnormalities noted with the PSC pump 2A.
	SRO	Refers to TRM and confirms keepfill pressures are within specification:
		TR 3.5.4 Maintenance of Filled Discharge Pipe LCO 3.5.4 The OPERABLE pressure indicators on the discharge of the RHR and CS pumps shall indicate not less than listed below. PI-75-20 39 psig PI-75-48 39 psig PI-74-51 48 psig PI-74-65 35 psig
	Driver	When requested by lead examiner, insert Shift F2 (bat RRPAVIB) for Recirc Pump 'A' trip

Simulator Event Guide:

Event 6 Component: Recirc pump A high vibration, dual seal failure, trip, isolable.

	Driver	When requested by lead examiner, insert Shift F2 (bat RRPAVIB) for Recirc Pump 'A' trip
		ARP 2-9-4A Window 20 RECIRC PUMP MTR 1A VIBRATION HIGH A. **CHECK** temperatures on RECIRC PMP MTR 1A & 1B WINDING AND BRG TEMP recorder, 1-TR-68-71 on Panel 1-9-21 are below: • Pump motor bearing temperatures (<190°F) • Pump motor winding temperatures (<255°F) • Pump Seal Cavity temperatures (<180°F) • Pump cooling water from Seal Cooling temperature (<140°F) • Pump motor cooling water from bearing temperature (<140°F) • B. **CHECK** for a rise in Drywell equip sump pumpout rate due to seal leakage. C. **DISPATCH** personnel to 1-LPNL-925-0712 (Vibration Mon. System) on EL 565' and REPORT the Vibration Data for Pump A to the Unit Operator and any other alarm indications. The person shall advise the Unit Operator of any changes in the vibration values. D. **IF** alarm seals in, **THEN** **ADJUST** pump speed slightly to try reset the alarm. E. **IF** unable to reset alarm, **THEN** • **CONSULT** with Unit Supervisor, and with his concurrence, • **SHUTDOWN** the Recirc pump, and • **REFER TO** 1-AOI-68-1A or 1-AOI-68-1B.
	ATC	Reports failure of the #1 seal on Reactor Recirc Pump A

Simulator Event Guide:

Event 6 Component: Recirc pump A high vibration, dual seal failure, trip, isolable.

		RECIRC PUMP A NO. 1 SEAL LEAKAGE ABN, 2-9-4A Window 25: A. **DETERMINE** initiating cause by comparing No. 1 and 2 seal cavity pressure indicators on Panel 2-9-4 or ICS. • Plugging of No. 1 RO - No. 2 seal cavity pressure indicator drops toward zero. • Plugging of No. 2 RO - No. 2 seal pressure approaches no. 1 seal pressure. • Failure of No. 1 seal - No. 2 seal pressure is greater than 50% of the pressure of No. 1. • Failure of No. 2 seal - no. 2 seal pressure is less than 50% of the No. 1 seal.
		NOTE 1) Possible indications of dual seal failure include: • Window 18 on this panel alarming in conjunction with this window. • Rising drywell pressure and/or temperature. • Increased leakage into the drywell sump. • Increased vibration of the recirc pump
	Driver	When AOU dispatched sent to investigate vibration, report 15 mils and rising.
	SRO	Enters: **2-AOI-68-1A, Recirc Pump Trip/Core Flow Decrease OPRMs Operable,** **2-AOI-64-1, Drywell Pressure and/or Temperature High, or Excessive Leakage Into Drywell.**
		2-AOI-68-1A, Recirc Pump Trip/Core Flow Decrease OPRMs Operable, [1] **IF** both Recirc Pumps are tripped in modes 1 or 2, **THEN** (Otherwise N/A), [1.1] **SCRAM** the Reactor. **CAUTION** [NER/C] Failure to restart Reactor Recirculation pumps in a timely manner may result in exceeding the differential temperature limit for pump start and subsequently require plant depressurization to avoid exceeding pressure-temperature limits for the reactor vessel.

Simulator Event Guide:

Event 6 Component: Recirc pump A high vibration, dual seal failure, trip, isolable.

		[2] **IF** a single Recirc Pump tripped, **THEN CLOSE** tripped Recirc Pump discharge valve. [3] **IF** Region I or II of the Power to Flow Map is entered, **THEN** (Otherwise N/A) **IMMEDIATELY** take actions to INSERT control rods to less than 95.2% loadline. Refer to 0-TI-464, Reactivity Control Plan Development and Implementation. [4] **RAISE** core flow to greater than 45%. **REFER TO** 2-OI-68. [5] **INSERT** control rods to exit regions if not already exited. Refer to 0-TI-464, Reactivity Control Plan Development and Implementation. [6] **MAINTAIN** operating Recirc pump flow less than 46,600 gpm. Refer to 2-OI-68. [7] [NER/C] **WHEN** plant conditions allow, **THEN**, (Otherwise N/A) **MAINTAIN** operating jet pump loop flow greater than 41 x 10^6 lbm/hr (2-FI-68-46 or 2-FI-68-48).
	SRO	AOI-64-1 Directs BOP to Vent the Drywell
	Driver	When/if requested to start a standby gas fan remote function pc01a or b or c

Simulator Event Guide:

Event 6 Component: Recirc pump A high vibration, dual seal failure, trip, isolable.

<table>
<tr><td></td><td>SRO</td><td>Evaluates Tech Spec 3.4.1 and enters Condition A</td></tr>
<tr><td></td><td></td><td>3.4.1 Recirculation Loops Operating
LCO 3.4.1Two recirculation loops with matched flows shall be in operation
<u>OR</u>
One recirculation loop may be in operation provided the following limits are applied when the associated LCO is applicable:
a. LCO 3.2.1, “AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR),” single loop operation limits specified in the COLR;
b. LCO 3.2.2, “MINIMUM CRITICAL POWER RATIO (MCPR),” single loop operation limits specified in the COLR;
c. LCO 3.3.1.1, “Reactor Protection System (RPS) Instrumentation,” Function 2.b (Average Power Range Monitors Flow Biased Simulated Thermal Power - High), Allowable Value of Table 3.3.1.1-1 is reset for single loop operation;
APPLICABILITY: MODES 1 and 2.</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>CONDITION</th><th>REQUIRED ACTION</th><th>COMPLETION TIME</th></tr>
<tr><td>A. Requirements of the LCO not met.</td><td>A.1 Satisfy the requirements of the LCO.</td><td>24 hours</td></tr>
<tr><td>B. Required Action and associated Completion Time of Condition A not met.

<u>OR</u>

No recirculation loops in operation.</td><td>B.1 Be in MODE 3.</td><td>12 hours</td></tr>
</table>
</td></tr>
<tr><td></td><td>BOP</td><td>Contacts Control Bay AUO to perform vent log</td></tr>
<tr><td></td><td>SRO</td><td>Calls the Reactor Engineer to change the single loop MCPR limits.</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>Driver</td><td>At NRC direction, insert Shift F3 (imf th33a 1) for steam leak inside containment, when contacted to perform vent log acknowledge</td></tr>
</table>

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	Driver	At NRC direction, insert Shift F3 (imf th33a 1) for steam leak inside containment
	BOP/ATC	Announces Drywell Pressure rising and responds to alarms 9-5B, Window 31 and 9-3B, Window 19
		9-5B, Window 31, Drywell Pressure Abnormal A. **VERIFY** alarm using multiple indications. B. **IF** RBCCW has been lost, **THEN REFER TO** 2-AOI-70-1. C. **REFER TO** 2-AOI-64-1.
		9-3B, Window 19, Drywell Norm Operating Pressure High A. **CHECK** drywell pressure and temperature for rise. B. **CHECK** weather report for atmospheric pressure. C. **IF** Drywell DP Compressor is running, **THEN STOP** compressor. D. **CHECK** N2 makeup valves to Suppression Chamber and Drywell closed. E. **CHECK** Drywell Control Air System Flow Elements 2-FIQ-032-00092 (Rx Bldg 565' R10-S) and 2-FIQ-032-0075 (Rx Bldg 565' R20-T0) < 1.7 SCFM. F. **IF** pressure rise is due to normal startup, **THEN REFER TO** 2-OI-64 for normal venting instructions. G. **IF** Drywell pressure is high, **THEN REFER TO** 2-AOI-64-1.
	BOP	Confirms that a Drywell leak is present based on Drywell Temperature and Pressure rise
	SRO	Directs entry into 2-AOI-64-1 and pre-determines a Drywell Pressure value at which the ATC shall insert a manual scram
		2-AOI-64-1 **4.2 Subsequent Actions** [1] **IF** any EOI entry condition is met, **THEN ENTER** appropriate EOI(s). (Otherwise N/A) [2] **IF** Drywell Pressure is High, **THEN PERFORM** the following: (Otherwise N/A) [2.1] **CHECK** Drywell pressure using multiple indications. [2.2] **IF** Drywell pressure rising rate indicates Reactor Scram at 2.45 psi is imminent, **THEN REDUCE** Reactor power via Recirc flow to minimize the impact of a scram from high power. (Otherwise N/A) [2.3] **CHECK** Drywell pressure using multiple indications. [2.4] **ALIGN and START** additional Drywell coolers and fans as necessary. **REFER TO** 2-OI-64. [2.5] **VENT** Drywell as follows:
	BOP	Verifies Drywell venting is still in progress from Reactor Recirc Pump seal failure
	Driver	After Modeswitch is placed in the Shutdown position, insert Shift F4 (dmf ed10a)

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	SRO	Directs ATC to insert a Reactor Scram prior to Drywell Pressure reaching 2.45 psig
	ATC	Inserts Manual Reactor Scram and performs immediate actions of 2-AOI-100-1 and Hard Card actions
	Driver	Ensure trigger 5 goes active on the MODESWITCH
		Reactor Scram OATC Hard Card **1.0 IMMEDIATE ACTIONS** [1] **DEPRESS** REACTOR SCRAM A and B, 2-HS-99-5A/S3A and 2-HS-99-5A/S3B, on Panel 2-9-5.
	ATC	Depresses Reactor Scram Pushbuttons and reports rod movement
	NA	[2] **IF** scram is due to a loss of RPS, **THEN** [3] Refuel Mode One Rod Permissive Light check [3.1] **PLACE** REACTOR MODE SWITCH, 2-HS-99-5A-S1, in REFUEL. [3.2] **CHECK** illuminated REFUEL MODE ONE ROD PERMISSIVE light, 2-XI-85-46. [3.3] **IF** REFUEL MODE ONE ROD PERMISSIVE light, 2-XI-85-46, is **NOT** illuminated, **THEN CHECK** all control rod positions at Full-In Overtravel, or Full-In. (Otherwise N/A)
		[4] **PLACE** REACTOR MODE SWITCH, 2-HS-99-5A-S1, in SHUTDOWN. [5] **REPORT** the following status to the US: • Reactor Scram • Mode Switch is in Shutdown • All rods in" or "rods out" • Reactor Water Level and trend (recovering or lowering). • Reactor pressure and trend • MSIV position (Open or Closed) • Power level
	ATC	Places Reactor Mode switch in Shutdown, Performs Refuel Mode One Rod Permissive Light Check and announce All Rods In on Scram report. Proceeds to subsequent actions of Hard Card
	Driver	After Modeswitch is placed in the Shutdown position, insert Shift F4 (dmf ed10a)

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	NA	**2.0 SUBSEQUENT ACTIONS:** [1] **IF** all control rods **CAN NOT** be verified fully inserted, **THEN PERFORM** the following (otherwise N/A):
		[2] **DRIVE** in all IRMs and SRMs from Panel 2-9-5 as time and conditions permit. [3] **VERIFY** SCRAM DISCH VOL VENT & DR VLVS closed by green indicating lights at SDV Display on Panel 2-9-5. [4] **MONITOR** and **CONTROL** Reactor Water Level between +2" and +51", or as directed by US, using RFP/RFPT. [5] **RETURN** to body of procedure at step 4.2[5] **AND CONTINUE** with actions as required.
	ATC	Drives in all IRMs and SRMs as time permits, verifies SDV Vents and Drains are closed, monitors RPV water level
	BOP	Performs actions of BOP Reactor Scram Hard Card
		Reactor Scram BOP Unit Operator Hard Card **1.0 SUBSEQUENT ACTIONS: PANELS 2-9-7 & 2-9-8** **NOTES** 1) The following steps are not required to be performed in order, but only as required to maintain stable conditions. 2) It is desired to trip the turbine prior to receiving the GEN REVERSE PWR FIRST RELAY OPERATION 2-EA-57-136 (2-XA-55-8A, Window 7) alarm to avoid motorizing the generator. [1] At ≤50 MWe, or as directed by the Unit Supervisor, **VERIFY TRIPPED** the Main Turbine as follows:
		[1.1] **DEPRESS** the TRIP pushbutton, 2-HS-47-67D on Panel 2-9-7. [1.2] **VERIFY** OPEN Generator Output Breaker, by placing GENERATOR PCB 224, 2-HS-242-0224A, to TRIP. [1.3] IMMEDIATELY **PLACE** VOLTAGE REGULATOR START/STOP SEL, 2-HS-57-24, to STOP and release. [1.4] **CHECK** the following at 2-HS-57-24: • GREEN light illuminated • RED light extinguished [2] **ANNOUNCE** Reactor SCRAM over PA system.
	BOP	Trips the Main turbine, opens the generator breaker and places the voltage regulator in the STOP position, and announces Reactor Scram over the PA system
	Driver	After Modeswitch is placed in the Shutdown position, insert Shift F4 (dmf ed10a)

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	NA	[1] **MONITOR** and **CONTROL** RPV pressure to keep below 1073 psig and stable. [1.1] **IF** RPV pressure is lowering rapidly, **THEN**
		[1.2] **IF** MSRVs are cycling and bypass valves are available, **THEN MANUALLY OPEN** MSRVs on Panel 2-9-3 until RPV pressure is below 965 psig. (Otherwise N/A)
	BOP	Manually opens SRVs until RPV Pressure is below 965 psig then closes SRVs
	NA	[1.3] **IF** MSRVs are cycling and bypass valves are **NOT** available, **THEN MANUALLY OPEN** MSRVs on Panel 2-9-3 until RPV pressure is controlled between 800 and 1000 psig.
		[2] **IF** any PCIS isolation signal is received, **THEN VERIFY** PCIS isolations using any of the following: (Otherwise N/A) • Containment Isolation Status System on Panel 2-9-4 • PCIS Mimic and individual control switch indications • ICS • 2-OI-64 [3] **IF** HPCI and/or RCIC are in service and injecting to the vessel, **THEN MONITOR** and **CONTROL** Reactor Water Level as necessary. (Otherwise N/A)
	BOP	Verifies PCIS isolation signals received and reports condition of PCIS and HPCI/RCIC to US.
	SRO	**Enters EOI-1 on High Drywell Pressure** **RC/Q** Monitor and Control Reactor Power. Exits RC/Q based override step RC/Q-2 and enters 2-AOI-100-1 **RC/P** Monitor and Control RPV Pressure. Answers **NO** to: Is any MSRV cycling? (BOP has already opened SRVs as necessary) Directs BOP to maintain Rx Pressure with Turbine Bypass Valves. **RC/L** Monitor and Control RPV Water Level. Verify as Required: • PCIS Isolations (Groups 1, 2 and 3) • ECCS • RCIC Restore and maintain RPV water between +2 and +51 inches with one or more of the following inj. sources • CNDS AND FW Appendix-5A Can RPV water level be restored and maintained above +2 inches-YES

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	SRO	Directs ATC to maintain RPV water level +2 to +51 inches with condensate and feedwater per Appendix-5A
	ATC	Performs actions necessary to maintain RPV Water Level +2 to +51 inches iaw EOI App-5A
		Appendix-5A 1. IF It is desired to use a reactor feed pump that is in operation, THEN **CONTINUE** at step 12 to control the operating pump.
		12. **SLOWLY ADJUST** RFPT speed UNTIL feedwater flow to the RPV is indicated, using ANY of the following methods on Panel 2-9-5: • Individual 2-HS-46-8A(9A)(10A), RFPT 2A(2B)(2C) SPEED CONT RAISE/LOWER switch in MANUAL GOVERNOR, **OR** • Individual 2-SIC-46-8(9)(10), RFPT 2A(2B)(2C) SPEED CONTROL in MANUAL, **OR** • 2-LIC-46-5, REACTOR WATER LEVEL CONTROL, in MANUAL with individual 2-SIC-46-8(9)(10), RFPT 2A(2B)(2C) SPEED CONTROL in AUTO. 13. **ADJUST** RFPT speed as necessary to control injection using the methods of step 12. 14. WHEN RPV level is approximately equal to desired level AND automatic level control is desired, THEN **PLACE** 2-LIC-46-5, REACTOR WATER LEVEL CONTROL, in AUTO with individual 2-SIC-46-8(9)(10), RFPT 2A(2B)(2C) SPEED CONTROL in AUTO.

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	NRC	EOI-1 and EOI-2 will be entered on Drywell pressure and all legs executed concurrently
	SRO	**Executes all legs of EOI-2 concurrently** **EOI-2 DW/T** Monitor and control Drywell Temperature below 160°F, using available Drywell Cooling. Answers **NO** to: Can Drywell Temperature be maintained below 160°F? **PC/P** Monitor and control Primary Containment pressure below 2.4 psig using the Vent System (Appendix 12) as necessary – In Progress Answers **No** to can Primary Containment Pressure be maintained below 2.4 psig Before Suppression Chamber Pressure rises to 12 psig Initiate Suppression Chamber Sprays using only those pumps not required for Adequate Core Cooling **Directs Suppression Chamber Sprays**
	SRO	**EOI-2 PC/H** Monitor and control Drywell and Suppression Chamber: • Hydrogen at or below 2.4% **AND** • Oxygen at or below 3.3% Using the Nitrogen Makeup System (APPX 14A). **EOI-2 SP/T** Monitor and control Suppression Pool temperature below 95°F, using available Suppression Pool Cooling (APPX 17A) as necessary.
	SRO	**EOI-2 SP/L** Monitor and control Suppression Pool Level between -1 inch and -6 inches. Can Suppression pool level be maintained above -6 inches YES Can Suppression pool level be maintained below -1 inch YES
	SRO	Directs Suppression Chamber Sprays with both loops of RHR per Appendix 17C

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	BOP	Initiate Suppression Chamber Sprays per Appendix 17C
		1. BEFORE Suppression Chamber pressure drops below 0 psig, **CONTINUE** in this procedure at Step 6. 2. IF Adequate core cooling is assured **OR** Directed to spray the Suppression Chamber irrespective of adequate core cooling, THEN **BYPASS** LPCI injection valve open interlock as necessary: • **PLACE** 2-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in **BYPASS**. • **PLACE** 2-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.**
	BOP	5. **INITIATE** Suppression Chamber Sprays as follows: a. **VERIFY** at least one RHRSW pump supplying each EECW header. b. IF EITHER of the following exists: • LPCI Initiation signal is NOT present, **OR** • Directed by SRO, THEN **PLACE** keylock switch 2-XS-74-122(130), RHR SYS I(II) LPCI 2/3 CORE HEIGHT OVRD, in MANUAL OVERRIDE. c. **MOMENTARILY PLACE** 2-XS-74-121(129), RHR SYS I(II) CTMT SPRAY/CLG VLV SELECT, switch in SELECT. d. IF 2-FCV-74-53(67), RHR SYS I(II) INBD INJECT VALVE, is OPEN, THEN **VERIFY CLOSED** 2-FCV-74-52(66), RHR SYS I(II) OUTBD INJECT VALVE. e. **VERIFY OPERATING** the desired RHR System I(II) pump(s) for Suppression Chamber Spray. f. **VERIFY OPEN** 2-FCV-74-57(71), RHR SYS I(II) SUPPR CHBR/POOL ISOL VLV. g. **OPEN** 2-FCV-74-58(72), RHR SYS I(II) SUPPR CHBR SPRAY VALVE. h. IF RHR System I(II) is operating ONLY in Suppression Chamber Spray mode, THEN **CONTINUE** in this procedure at Step 5.k. i. **VERIFY CLOSED** 2-FCV-74-7(30), RHR SYSTEM I(II) MIN FLOW VALVE. j. **RAISE** System flow by placing the second RHR System I(II) pump in service as necessary. k. **MONITOR** RHR Pump NPSH using Attachment 2.
	BOP	Determines that Select Logic on RHR Loop II is not functioning and therefore neither the Drywell nor the Suppression Chamber can be sprayed from RHR Loop II
	SRO	Directs Suppression Chamber Sprays from RHR Loop I

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	BOP	Diagnoses that RHR Loop I containment spray valves have lost power and determines that 480 Volt Shutdown Board 2A has been lost
	BOP	Responds to loss of 480 Volt Shutdown Board per ARP 9-8B, Window 29
		9-8B, Window 29, 480V Shutdown BD 2A UV or XFR A. **CHECK** for indication of 480V Shutdown Bd 2A loss: • RWCU Pump 2A shutdown. • Fuel pool cooling Pump 2A shutdown. • 480V Shutdown Bd 2A voltage (2-EI-57-30). • RBCCW Pump 2A Shutdown. • Half Scram. B. **IF** 480V Shutdown Bd 2A is lost, **THEN** Manually **TRANSFER** to alternate source by placing CS in **ALTERNATE** position on Panel 2-9-8. C. **IF** manual transfer is accomplished, **THEN REFER TO** 0-OI-57B, 2-OI-99, and appropriate OIs for recovery or realignment of equipment. D. **IF** manual transfer is **NOT** accomplished, **THEN REFER TO** Tech Spec 3.8.7 and 3.8.8.
	SRO	Directs Transferring 480 Volt Shutdown Board 2A to alternate iaw the ARP
	BOP	Transfers 480 Volt Shutdown Board 2A to alternate by placing CS in ALTERNATE position on panel 2-9-8
	BOP	Commences Suppression Chamber Sprays iaw Appendix-17C (PROCEDURE ABOVE)
CT#1	SRO	When Suppression Chamber Pressure exceeds 12 psig, determines that Drywell Sprays are required. Directs **Loop I** of RHR to be placed in Drywell Sprays per EOI Appendix 17B.

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

CT#1	BOP	**Drywell Sprays per appendix 17B** 1. IF Adequate core cooling is assured **OR** Directed to spray the Drywell irrespective of adequate core cooling, THEN **BYPASS** LPCI injection valve open interlock as necessary: • **PLACE** 2-HS-74-155A, LPCI SYS I OUTBD INJ VLV BYPASS SEL in **BYPASS**. • **PLACE** 2-HS-74-155B, LPCI SYS II OUTBD INJ VLV BYPASS SEL in **BYPASS.**
		2. **VERIFY** Recirc Pumps and Drywell Blowers shutdown.
	SRO	Directs Recirc Pumps secured (if not already done) and directs Drywell Blowers secured
	ATC	Secures both Reactor Recirc Pumps
	BOP	Goes around back and secures the Drywell Blowers on panel 9-25
		3. IF Directed by SRO to spray the Drywell using RHR System I(II), THEN **CONTINUE** in this procedure at Step 6 using RHR Loop I(II).
		6. **INITIATE** Drywell Sprays as follows: a. **VERIFY** at least one RHRSW pump supplying each EECW header. b. IF EITHER of the following exists: • LPCI Initiation signal is NOT present, **OR** • Directed by SRO, THEN **PLACE** keylock switch 2-XS-74-122(130), RHR SYS I(II) LPCI 2/3 CORE HEIGHT OVRD, in MANUAL OVERRIDE. c. **MOMENTARILY PLACE** 2-XS-74-121(129), RHR SYS I(II) CTMT SPRAY/CLG VLV SELECT, switch in SELECT. d. IF 2-FCV-74-53(67), RHR SYS I(II) LPCI INBD INJECT VALVE, is OPEN, THEN **VERIFY CLOSED** 2-FCV-74-52(66), RHR SYS I(II) LPCI OUTBD INJECT VALVE. e. **VERIFY OPERATING** the desired System I(II) RHR pump(s) for Drywell Spray. f. **OPEN** the following valves: • 2-FCV-74-60(74), RHR SYS I(II) DW SPRAY OUTBD VLV • 2-FCV-74-61(75), RHR SYS I(II) DW SPRAY INBD VLV g. **VERIFY CLOSED** 2-FCV-74-7(30), RHR SYSTEM I(II) MIN FLOW VALVE.

Simulator Event Guide:

Event 7 Major: Steam line break in Drywell.

	BOP	h. IF Additional Drywell Spray flow is necessary, THEN...**PLACE** the second System I(II) RHR Pump in service. i. **MONITOR** RHR Pump NPSH using Attachment 2. j. **VERIFY** RHRSW pump supplying desired RHR Heat Exchanger(s). k. **THROTTLE** the following in-service RHRSW outlet valves to obtain between 1350 and 4500 gpm RHRSW flow: • 2-FCV-23-34, RHR HX 2A RHRSW OUTLET VLV • 2-FCV-23-46, RHR HX 2B RHRSW OUTLET VLV • 2-FCV-23-40, RHR HX 2C RHRSW OUTLET VLV • 2-FCV-23-52, RHR HX 2D RHRSW OUTLET VLV l. **NOTIFY** Chemistry that RHRSW is aligned to in-service RHR Heat Exchangers.
	SRO	Directs Drywell Sprays secured before 0 psig in the Drywell
		7. WHEN ... EITHER of the following exists: • Before drywell pressure drops below 0 psig, **OR** • Directed by SRO to stop Drywell Sprays, THEN **STOP** Drywell Sprays as follows: a. **VERIFY CLOSED** the following valves: • 2-FCV-74-100(101), RHR SYS I U-1(SYS II U3) DISCH XTIE • 2-FCV-74-60(74), RHR SYS I(II) DW SPRAY OUTBD VLV • 2-FCV-74-61(75), RHR SYS I(II) DW SPRAY INBD VLV b. **VERIFY OPEN** 2-FCV-74-7(30), RHR SYSTEM I(II) MIN FLOW VALVE.

Terminate the scenario when the following conditions are satisfied or upon request of Lead Examiner:

Drywell Sprays in service with RHR Loop I

SHIFT TURNOVER SHEET

Unit 2 is at approximately 6% power

Units 1 and 3 are operating at 100% power

Equipment Out of Service/LCO's:

A3 EECW pump is tagged for maintenance. Appendix R compensatory measure 'A' is in effect for the appropriate fire zones associated with RHRSW Pump A3, 0-PMP-023-0085, on page 460 of the Fire Protection Report.

Operations/Maintenance for the Shift:

Unit 2 is at 6% power. A shutdown is in progress in accordance with 2-GOI-100-12A, section 5.3.4 [8]. Reactor Pressure is being controlled with Turbine Bypass Valves. RFPTs 'B' and 'C' are in service controlling Reactor Water Level with RFPT 'C' in Auto. The Main Turbine is on the Turning Gear. The Auxiliary Boilers are in service and Steam Seals have been shifted to the Auxiliary Boiler.

Lower power to < 5% and transfer SJAE and Off-Gas Preheaters from nuclear steam to auxiliary. All Surveillance Requirements for Modes 3 and 4 are complete.

Unusual Conditions/Problem Areas:

The National Weather Service has issued a Severe Thunderstorm Watch for the next 10 to 12 hours.