

Facility: **SSES**Scenario No.: **PCO17-102**

Op-Test No.: _____

Examiners: _____

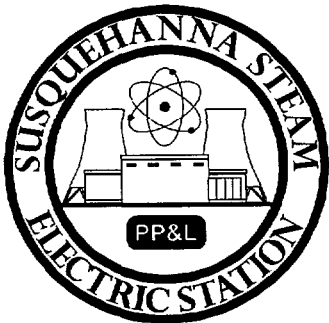
Operators: _____

Initial Conditions: IC-20 Both Units at 100% Power EOL

Turnover: 'B' Service Air Compressor out of service for preventative maintenance. The compressor will not be returned to service this shift. Decrease power to 90% for rod adjustments IAW OP-AD-338 (Attachment C) then call Reactor Engineering. Prior to starting power reduction perform SO-155-006, QUARTERLY ARI MANUAL TRIP CHANNEL FUNCTIONAL TEST.

Event No.	Malfunction No.	Event Type*	Event Description
1	N/A	N	Perform ARI surveillance
2	N/A	R	10% Power reduction to 90%
3	IMF RL02:E411K17	I	HPCI CST low level switch failure
4	IMF AV04:TV11016B 0	I	"B" Recirc pump MG set HYD FLUID CTRL TCV (TIC-11016B) failed closed. "B" Reactor Recirc Pump trip (Auto trips at 210°F as a result of TIC-11016B failure).
5	IMF TC193016 130	M	TURBINE EHC PRESSURE/FLOW GAIN UNIT FAILURE (130%) - MSIV Closure
6	IMF RD155017 bat RPB.HYDATWS-1	M	Hydraulic ATWS
7	IMF SL153001A IMF SL153001B	C	SBLC Squib valves fail to fire.
8	IMF MV06:HV155F006	C	HPCI injection Auto Open failure

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



PP&L-SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title: NRC INITIAL LICENSE OPERATOR EXAMINATION

Scenario Duration: 90 Minutes

Scenario Number: PC017-102

Revision/Date: Rev 0, 5/1/2003

**Course: PC017, Senior Reactor Operator License
PC018, Reactor Operator License**

Operational Activities:

- | | |
|----------------------------------|----------------------------------|
| 1 Surveillance Activity | 5 Turbine EHC System Malfunction |
| 2 Power Change | 6 ATWS |
| 3 HPCI CST Level Switch Failure | 7 SBLC Squib Valve Fail to Fire |
| 4 MG B HYD Fluid TCV Fail Closed | 8 HPCI F006 Auto Logic Failure |

Prepared By:

Instructor

Date

Reviewed By:

Nuclear Operations Training Supervisor

Date

Approved By:

Supervising Manager/Shift Supervisor

Date

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SCENARIO SUMMARY

The scenario begins with the plant operating at 100% power. The "B" Service Air Compressor is out of service for preventive maintenance and will not be returned to service this shift. Unit 2 is in MODE 1 at 100% power.

After assuming the shift, the crew will perform a surveillance activity on the Alternate Rod Insertion system. Upon completion of the surveillance the crew will commence a power decrease requested by Reactor Engineering for a rod pattern adjustment. While meeting this request, a HPCI system CST low level switch fails; HPCI suction source will swap to the suppression pool and Technical Specifications will be addressed. Upon resumption of the power decrease a failure of the "B" Reactor Recirc MG set lube oil TCV-11016B occurs; the valve will fail shut, resulting in elevated lube oil temperatures to the MG set. This will cause "B" reactor recirc pump to eventually trip. The crew will take actions IAW General, Off-Normal and Operating procedures as well as address Technical Specifications for Single-Loop operation.

Following crew response to the tripped recirculation pump, the EHC Pressure/Flow Gain Unit will fail, causing all Main Turbine Bypass and Control valves to open. Reactor pressure will rapidly decrease to cause a MSIV isolation and reactor scram signal. When the reactor scram signal is received, one Scram Discharge Volume will become blocked, resulting in a hydraulic ATWS.

The crew will enter the Level/Power Control procedure to mitigate the ATWS. The crew will initiate SLC, but the Squib valves will fail to fire, requiring alternate SLC injection with RCIC. Since initial ATWS power level is above 5%, the crew will lower RPV level and stabilize in the target band of -60" to -110". When HPCI is initiated the injection valve will fail to open, placing the control switch to open will allow injection flowpath. As RPV water level is being maintained between -60" and -110" crew attempts to insert control rods manually and by resetting/rescramming will be successful. The crew should exit Level/Power Control and re-enter RPV Control to slowly restore and maintain level between +13" to +54".

When all control rods are inserted and actions are in progress to restore RPV water level to +13" to +54", the scenario will be terminated.

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SCENARIO OBJECTIVES

The **SRO** will:

1. Ensure initiation of ESF equipment if automatic operation was not properly initiated (00.AD.131).
2. Inform other shift members and plant management of changes in plant status, potential plant problems or limitations (00.AD.131).
3. Ascertain the need to notify the Duty Manager when a plant event develops and ensure the notification is made (00.AD.131).
4. Implement Loss of Reactor Recirculation Flow (64.ON.010).
5. Implement Turbine EHC Malfunction (93.ON.005).
6. Implement Main Turbine Trip (93.ON.006).
7. Implement Scram (00.ON.018).
8. Implement RPV Control (00.EO.026).
9. Implement Level/Power Control (00.EO.031).
10. Implement Primary Containment Control (00.EO.027).
11. Implement Boron Injection Via RCIC (50.EO.009).
12. Implement RPS and ARI trip bypass (58.EO.006).
13. Ensure required actions per Technical Specifications are met when a LCO is not met (00.TS.002).

The **ROs** will:

1. Perform normal operation of RHR in the Suppression Pool Cooling Mode (49.OP.003).
2. Perform automatic/manual startup of RCIC system (50.OP.010).
3. Perform manual startup of HPCI (52.OP.012).
4. Perform maximizing CRD flow (55.OP.001).
5. Perform initiation of Standby Liquid Control System (53.OP.003).
6. Perform inserting manual scram with CRD system in service (55.OP.006).
7. Perform shutdown of Recirculation Pump for Single Loop operation (64.OP.002).
8. Perform inhibiting ADS (83.OP.005).
9. Implement Loss of Reactor Recirculation Flow (64.ON.010).
10. Implement Turbine EHC Malfunction (93.ON.005).
11. Implement Main Turbine Trip (93.ON.006).
12. Implement Scram (00.ON.018).
13. Implement RPV Control (00.EO.026).
14. Implement Level/Power Control (00.EO.031).
15. Implement Primary Containment Control (00.EO.027).
16. Implement Boron Injection Via RCIC (50.EO.009).

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CRITICAL TASKS

03 ATWS
06 LEVEL / POWER CONTROL

- ★ Lowers RPV level to <-60" but >-161".
- ★ Manually opens HPCI injection HV-155-F006.
- ★ Inserts control rods IAW EO-100-113 Sht. 2.

★ Denotes Simulator Critical Task

- SIGNIFICANCE
- CWS
- ENGINEERING
- FEEDBACK

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SCENARIO REFERENCES

1. SURVEILLANCE ACTIVITY

- SO-155-006 QUARTERLY ARI MANUAL TRIP CHANNEL FUNCTIONAL TEST, REV. 8
- OP-AD-004 OPERATIONS STANDARDS FOR ERROR AND EVENT PREVENTION, REV. 5

2. POWER CHANGE

- GO-100-012 POWER MANEUVERS, REV. 17
- NDAP-QA-338 REACTIVITY MANAGEMENT AND CONTROLS PROGRAM, REV. 6
- OP-AD-001 OPERATIONS STANDARDS FOR SYSTEM AND EQUIPMENT OPERATION, REV. 5
- OP-AD-338 COMMUNICATION REQUIREMENTS FOR REACTIVITY MANIPULATIONS, REV. 1

3. HPCI SYS CST LO LEVEL SWITCH FAILURE

- AR-114-E01 CST LO WATER LEVEL, REV. 22
- TS 3.3.5.1 ECCS INSTRUMENTATION, AMENDMENTS 178 & 204
- OP-AD-002 STANDARDS FOR SHIFT OPERATIONS, REV. 9
- NDAP-QA-0702 ACTION REQUEST AND CONDITION REPORT PROCESS, REV. 12

4. MG B HYD FLUID TEMP CONTROL VALVE FAIL CLOSED / RRP B TRIP

- AR-102-C05 RECIRC MG SET A/B BRG OR FLUID DRIVE OIL HI TEMP, REV. 21
- AR-102-C06 RECIRC MG B FLUID DRIVE OIL HI-LO TEMP, REV. 21
- AR-102-B05 RECIRC MG B DRIVE MTR TRIP, REV. 21
- ON-164-002 LOSS OF REACTOR RECIRCULATION FLOW, REV. 20
- TS 3.4.1 RECIRCULATION LOOPS OPERATING, AMENDMENT 178
- TR 3.2 COLR SECTION 8, 3/15/02
- GO-100-009 SINGLE RECIRCULATION LOOP OPERATION, REV. 13

5. TURBINE EHC SYSTEM MALFUNCTION / MSIV ISOLATION

- ON-156-001 UNEXPLAINED REACTIVITY CHANGE, REV. 14
- ON-193-001 TURBINE EHC SYSTEM MALFUNCTION, REV. 10

6. ATWS / LEVEL/POWER CONTROL / RPV CONTROL

- ON-100-101 SCRAM, REV. 9
- EO-100-102 RPV CONTROL, REV. 1
- EO-100-113 LEVEL-POWER CONTROL/CONTROL ROD INSERTION, REV. 1
- ES-150-002 BORON INJECTION VIA RCIC, REV. 13
- ES-158-002 RPS AND ARI TRIP BYPASS, REV. 4
- EP-PS-100 EMERGENCY PLANT POSITION-SPECIFIC (ED), REV. 16

Continued on next page:

7. PRIMARY CONTAINMENT CONTROL

EO-100-103 PRIMARY CONTAINMENT CONTROL, REV. 2

8. OTHER

BWROG SIMULATOR SCENARIO DEVELOPMENT GUIDELINE, TEMPLATE RPV-6

SCENARIO SPECIAL INSTRUCTIONS

1. Initialize the simulator to **IC-20** (Both Units 100% Power, EOL).
2. Set up the simulator for the scenario by performing the following:
Place the "B" Service Air Compressor control switch on 1C668 to OFF.
3. Type **restorepref YPP.PC017-102**; verify the following pre-inserts and Program Button assignments:
Verify the Environment Window:

MALFS	REMFS	OVRDS	TRIGS
63 : 63	1	3:3	0

IOR ZAIM2J115HD5 15 MCFL POT AT 100%
MRF PM091K108B OUT "B" SERVICE AIR COMPRESSOR BKR RACKED OUT
IMF RD155017 PARTIAL SCRAM (BROWNS FERRY EVENT)
 ➤ **IMF MV07:PV146F003 8.7** CRD PRESS VLV F003 FAILED, 8.7% ←
IMF MV06:HV155F006 AUTO LOGIC FAILURE TO OPEN
IMF SL153001A SQUIB VALVE XV-C41-F004A FAILS TO FIRE
IMF SL153001B SQUIB VALVE XV-C41-F004B FAILS TO FIRE
bat RPB.HYDATWS-1
[P-1] IMF RL02:E411K17 HPCI SYS CST LO LEVEL SWITCH FAILURE
[P-2] IMF AV04:TV11016B 0 MG B HYD FLUID CTRL TCV (TIC-11016B) FAILED CLOSED
[P-3] IMF TC193016 130 TURBINE EHC PRESSURE/FLOW GAIN UNIT FAILURE (130%)
[P-4] MRF RD155017 0 146F034 CRD CHARGING WTR ISO VLV CLOSED
[P-5] bat RPB.DISABLARI OPENS ARI BKRS IAW ES-158-002
[P-6] bat RPB.ES158002 BYPASSES RPS IAW ES-158-002
[P-7] DMF RD155017 PARTIAL SCRAM – DELETED
[P-8] bat RBP.HYATW-CLR DELETE HYD ATWS

4. Prepare a turnover sheet indicating:
 - a. "B" Service Air Compressor out of service for preventive maintenance. The system will not be returned to service this shift.
 - b. Decrease power to 90% for rod adjustments IAW OP-AD-338 (Attachment C) then call RE.
 - c. Prior to starting power reduction perform SO-155-006, QUARTERLY ARI MANUAL TRIP CHANNEL FUNCTIONAL TEST.
 - d. Unit 2 is in MODE 1 at 100% power.
5. Prepare a power change with Recirc (form OP-AD-338, Attachments A & C) indicating power to be reduced to 90% at 1%/min.
6. Prepare a copy of SO-155-006, QUARTERLY ARI MANUAL TRIP CHANNEL FUNCTIONAL TEST and a surveillance coversheet.
7. Make a copy of shift assignments.

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SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the Simulator to **IC-20**. Place the Simulator to RUN. Ensure the Program Buttons are assigned as indicated on the Special Instructions sheet via the appropriate Preference File. Assign Shift positions. Direct the start of the 5-minute panel walk down.

EVENT	TIME	DESCRIPTION
1	05	SURVEILLANCE ACTIVITY
2	20	POWER CHANGE
3	25	HPCI SYSTEM CST LO LEVEL SWITCH FAILURE
4	35	MG B HYD FLUID TEMP CONTROL VALVE FAIL CLOSED / RRP B TRIP
5	55	TURBINE EHC SYSTEM MALFUNCTION / MSIV ISOLATION
6	60	ATWS/LEVEL POWER CONTROL/RPV CONTROL
7	65	SBLC SQUIB VALVE FAIL TO FIRE
8	75	HPCI INJECTION F006 AUTO LOGIC FAILURE TO OPEN
	90	TERMINATION CUE

SCENARIO EVENT FORM

Event No: 1, 2, 3

Brief Description: Surveillance Activity / Power Change / HPCI Sys CST Lo Level Switch Failure

POSITION	TIME	STUDENT ACTIVITIES
US		Reviews and authorizes performance of SO-155-006.
PCOP		Performs SO-155-006.
US		Reviews and approves the Reactivity Manipulation Package.
		Conduct a reactivity briefing in accordance with OP-AD-338.
PCOM		Commences power decrease at 1% per minute with Reactor Recirculation Flow Control in accordance with OP-AD-338 and GO-100-012.
PCOP		Reports CST LO WATER LEVEL alarm.
		Refers to AR-114-E01.
		Verifies PUMP SUCT FROM SUPP POOL HV-155-F042 OPENS.
		Verifies PUMP SUCT FROM CST HV-155-F004 CLOSSES.
		Checks CST A level on 0C653, LR-00812.
		Reports CST A level is not low.
		Dispatch Plant Operator to investigate.
US		Contacts Work Week Manager concerning CST level switches.
		Refers to TS 3.3.5.1, Table Function 3.d, enters Condition A & D.
		Makes notifications IAW OP-AD-002, STANDARDS FOR SHIFT OPERATION.
		Identifies a CR is required.

★ Denotes Critical Task

NOTES:	

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
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Event No: 1, 2, 3

Brief Description: Surveillance Activity / Power Change / HPCI Sys CST Lo Level Switch Failure

INSTRUCTOR ACTIVITY:

When reactor power is reduced ~2%, insert HPCI system CST low level switch failure, **Depres P-1:**

[P-1] IMF RL02:E411K17 CST LO WTR LEVEL LSLL-E41-1N002 FAILURE

NOTE: Monitor sim diagram **MW3** to report local CST A level from 0C518A.

ROLE PLAY:

As Plant Operator sent to HPCI CST low level switches, wait ~2 mins. and report there is no visible indication of either switch having a problem.

As Plant Operator sent to CST A, wait ~2 mins. and report there is no visible leakage or loss of CST level.

As FIN Team/I&C sent to investigate the level switch problem, wait ~ 5 mins. and report LSLL-E41-1N002 has failed, it will take ~6 hours to replace and calibrate the switch.

SCENARIO EVENT FORM

Event No: 4

Brief Description: MG B HYD Fluid Temp Control Valve Fail Closed / RRP B Trip

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Recognizes/reports AR-102-C05, RECIRC MG SET A/B BRG OIL FLUID DRIVE HI TEMP, and AR-102-C06, RECIRC MG B FLUID DRIVE OIL HI-LO TEMP alarms.
		Attempts manual control of TIC-110016B; reports failure of TV-110016B.
		Recognizes/reports loss of "B" Recirc pump.
		Depress B MG drive motor breaker stop pushbutton, HS-14001B per the AR.
		Performs actions of ON-164-002, LOSS OF REACTOR RECIRCULATION FLOW.
		Evaluate Power/Flow Map.
		Dispatches NPO to investigate TV-11016B; may direct opening TV bypass valve 110038.
US		Directs Work Week Manager about failure of TV-110016B.
		Directs actions of ON-164-002.
		Contacts Reactor Engineer.
		Refers to GO-100-012, POWER MANEUVERS and GO-100-009, SINGLE RECIRCULATION LOOP OPERATION.
		Refers to T.S. 3.4.1, Recirculating Loops Operating and COLR section 8.0 in TRM section 3.2.
		Directs I&C to perform Flow-Bias Scram setpoint changes for Single Loop operation.
		Makes notifications IAW OP-AD-002, STANDARDS FOR SHIFT OPERATIONS.
		Identifies a Condition Report is required IAW NDAP-QA-702, ACTION REQUEST <u>AND</u> CONDITION REPORT PROCESS.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 4

Brief Description: MG B HYD Fluid Temp Control Valve Fail Closed / RRP B Trip

INSTRUCTOR ACTIVITY:

When power reduction is resumed, wait **one minute** then activate the failure of TIC-11016B: (Ensure this malfunction is entered prior to reaching ~95% power, this will subsequently ensure the power level for ATWS actions later), **Depress P-2:**

[P-2] IMF AV04:TV11016B 0 MG B HYD FLUID CTRL TCV (TIC-11016B) FAIL CLOSED

NOTES:

- Refer to Simulator P&ID **SW3** for TV-110016B status; refer to P&ID **RR6** for "B" Recirc MG Set Oil temperatures.
- RECIRC MG B BRG OR FLUID DRIVE OIL HIGH TEMP alarm (AR-102-C05, 140°F) takes ~2 minutes to annunciate.
- RECIRC MG B FLUID DRIVE OIL HIGH TEMP alarm (AR-102-C06, 190°F) takes ~5 minutes to annunciate.
- The MG Set trips at 210°F in ~6 minutes.

If crew elects to take OP-164-001 Single Loop actions and is subsequently required to manually scram the reactor due to operation in Region I of the Power/Flow map, **perform the next event via [P-3]** as outlined on page 19 **BEFORE** the crew places the **Mode Switch to Shutdown**.

ROLE PLAY:

1. As RE, direct crew to insert control rods per OP-AD-338 Attachment E in CRC Book. You will run the core monitor and report results shortly.
2. If directed as NPO to investigate TV-11016B, wait ~2 minutes and report that the valve is closed; the valve stem appears to be bent.
3. If directed to bypass TV-11016B by opening 110038, wait ~2 minutes and report that the valve is stuck; you can not get the valve open.
4. If directed as FIN Team to investigate failure of TV-11016B, wait ~5 minutes and report that the valve is jammed on it's closed seat; it will take some time to free the valve. You have no time estimate for completion of repairs at this time.
5. As I&C directed to perform Flow-Bias Scram setpoint changes for Single Loop operation, acknowledge the order and perform no further actions.

SCENARIO EVENT FORM

Event No: 5, 6, 7

Brief Description: Turbine EHC System Malfunction / MSIV Isolation / ATWS / Squib Valve Failure

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Observes TCVs and BPVs open and SCRAM.
		Recognizes failure of all control rods to fully insert.
		Performs ON-100-101, SCRAM: <ul style="list-style-type: none"> Place Mode Switch to S/D. Arm and Depress manual scram pushbuttons. Inserts SRMs and IRMs.
		Trips/verifies tripped "A" Recirc Pump.
PCOP		Recognize/reports MSIV closure.
		Initiates ARI.
US		Enters EO-100-102, RPV CONTROL and exits to EO-100-113, LEVEL/POWER CONTROL.
		Directs initiating SLC and inhibiting ADS.
PCOP	NOTE 1	Attempts to initiate SLC, notifies US of SLC Squib valves failure.
US		Directs alternate SLC injection IAW ES-150-002.
PCOP		Inhibits ADS as directed.

★ Denotes Critical Task

NOTES:	NOTE 1: This event is classified as a SITE AREA EMERGENCY due to ATWS/SLC failure IAW EP-PS-100, EAL 11.3.

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
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Event No: 5, 6, 7

Brief Description: Turbine EHC System Malfunction / MSIV Isolation / ATWS / Squib Valve Failure

INSTRUCTOR ACTIVITY:

1. When the actions for the loss of "B" Recirc pump are complete (pump tripped and single loop operations discussed), fail the in service EHC pressure transmitter, **Depress P-3:**

[P-3] IMF TC193016 130 TURBINE EHC PRESSURE/FLOW GAIN UNIT FAILURE (130%)

NOTE: Boron injection via RCIC will not be done in this scenario.

ROLE PLAY:

1. As NPO dispatched to investigate SLC, wait ~3 minutes and report that the SLC pumps are running and the discharge relief valves are chattering. Pump discharge pressure on the local gage is cycling between ~1250 psig and 1450 psig.
2. As FUS, acknowledge direction to perform ES-150-002, Boron Injection Via RCIC but take no further action. If the crew requests a status update role play as necessary since boron injection is not going to be permitted.

SCENARIO EVENT FORM

Event No: 6, 8
 Brief Description: ATWS / Level Power Control / RPV Control / HPCI F006 Auto Logic Failure

POSITION	TIME	STUDENT ACTIVITIES
★US		<i>Directs RPV level lowered to <-60" but >-161".</i>
		<i>Directs establishing RPV level target band of -60" to -110"</i>
		<i>Directs controlling RPV pressure between 800 and ≤1087 psig.</i>
		<i>Directs PCOM to insert control rods IAW EO-100-113 Sht. 2, CONTROL ROD INSERTION.</i>
		<ul style="list-style-type: none"> • <i>Directs bypassing RSCS/RWM and manually inserting control rods.</i> • <i>Directs implementation of ES-158-002.</i>
★PCOP		<i>Low</i> <i>ers and controls RPV level to <-60" but >-161" using available injection systems.</i>
		<ul style="list-style-type: none"> • <i>Lowers RCIC speed controller</i>
		<i>Establishes RPV level in target band of -60" to -110" using RCIC & HPCI.</i>
		Reports HPCI Injection F006 failure to open.
★PCOP		<i>Manually OPENS HPCI Injection valve F006.</i>
PCOP		Maintains RPV pressure between 800 and 1087 psig using SRVs in alphabetical order.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 6, 8

Brief Description: ATWS / Level Power Control / RPV Control / HPCI F006 Auto Logic Failure

INSTRUCTOR ACTIVITY:

1. When the PCOM directs closing 146F034 to isolate the CRD Charging header, wait ≈2 minutes and **Depress P-4:**

[P-4] MRF RD155017 0 146F034 CRD CHARGING WTR ISO VLV CLOSED

ROLE PLAY:

As NPO directed to close CRD Charging Water Isolation Valve 146F034, report the valve has been closed.

INSTRUCTOR ACTIVITY:

2. When the PCOM has manually inserted ~10 control rods and RPV water level has been stabilized between -60" and -110", call the Unit Supervisor on the page and ask permission to open ARI breakers 1D614006 & 1D624016 IAW ES-158-002 wait ~2 minutes, **Depress P-5:**

[P-5] bat RPB.DISABLARI OPENS ARI BKRS IAW ES-158-002

ROLE PLAY:

As FUS, report that the ARI breakers have been opened IAW ES-158-002. You are continuing with bypassing RPS at this time.

INSTRUCTOR ACTIVITY:

3. After disabling ARI above, call the Unit Supervisor on the page and ask permission to bypass RPS trips IAW ES-158-002 wait ~3 minutes and complete ES-158-002 **Depress P-6:**

[P-6] bat RPB.ES158002 BYPASSES RPS IAW ES-158-002

ROLE PLAY:

As FUS, report that RPS has been bypassed and ES-158-002 is now completed.

SCENARIO EVENT FORM

Event No: 6
Brief Description: ATWS / Level Power Control / RPV Control

POSITION	TIME	STUDENT ACTIVITIES
★PCOM		<i>Inserts control rods IAW EO-100-113 Sheet 2.</i> <ul style="list-style-type: none"> • <i>Bypasses RSCS/RWM.</i> • <i>Directs 146F034 closed, as necessary.</i> • <i>Commences manual control rod insertion.</i> • <i>Resets scram.</i> • <i>Drains SDV and inserts another scram.</i> • <i>Verifies and reports all control rods in.</i>
US		Acknowledges all control rods inserted.
		Exits EO-100-113 and re-enters EO-100-102.
		Directs RPV water level be restored to +13" to +54".
		Enters EO-100-103, PRIMARY CONTAINMENT CONTROL.
		Directs Suppression Pool Cooling maximized.
PCOP		Places both loops of RHR in Suppression Pool Cooling.
PCOP		Restores RPV water level to +13" to +54".
		TERMINATION CUE: All control rods are inserted and actions are in progress to restore RPV water level to +13" to +54".

★ Denotes Critical Task

NOTES:	

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
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Event No: 6
Brief Description: ATWS / Level Power Control / RPV Control

INSTRUCTOR ACTIVITY:

1. When the PCOM resets the scram, delete the ATWS malfunction, **Depress P-7 and P-8:**

[P-7] DMF RD155017 PARTIAL SCRAM – DELETED

[P-8] bat RBP.HYATW-CLR DELETES HYD ATWS

NOTE: It takes ~7 minutes for RPS A1/A2 (B1/B2) SCRAM DSCH VOL HI WTR LEVEL TRIP annunciators (AR-103/104-F02) on 1C651 to clear. Monitor P&ID Display **RD-5** for SDV status.

ROLE PLAY:

As necessary.

TERMINATION CUE:

All control rods are inserted and actions are in progress to restore RPV water level to +13" to +54".

Facility: **SSES** Scenario No.: **PCO17-103** Op-Test No.: _____

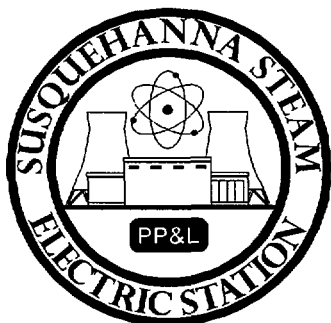
Examiners: _____ Operators: _____

Initial Conditions: **IC-123 Unit 1 30% Power EOL.(4)** Unit 2 start-up in progress, ~ 1 hour from synchronizing to the grid.

Turnover: **HPCI is out of service for repairs to oil pump breaker and oil changeout.(5)** The system will not be returned to service this shift. Mechanical vacuum pump is out of service for a seal replacement. The system will not be returned to service this shift. Perform SO-054-A03, QUARTERLY ESW FLOW VERIFICATION LOOP A. Maintenance is standing by for vibration data.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	Perform "A" ESW Loop Surveillance
2	IMF RD1550043823 (NONE 0 20) 5	R	Rod 38-23 drifts to position 38 (6)
3	IMF PM03:0P504A	C	"A" ESW pump trips during surveillance
4	IMF DS104001A (NONE 10 0)	C	Loss of "1A" ESS bus/Loss of RPS/Loss of CRD
5	IMF MV07:HV144F100 100	C	RWCU F001 (7) VLV FAILED-OPEN
6	IMF CU161007 100 4:00 IMF MV07:HV144F106 (102) 100 IMF MV09:HV144F001 (004) 98	M	Unisolable break on RWCU line inside Secondary Containment
7	IMF RC150011 IMF BR05:1A10104 (204)	M	Loss of all High pressure feed. (Leads to loss of adequate core cooling, requiring rapid depressurization)

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



PP&L-SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title: NRC INITIAL LICENSE OPERATOR EXAMINATION

Scenario Duration: 90 Minutes

Scenario Number: PC017-103

Revision/Date: Rev 0; 5/1/03

**Course: PC017, SENIOR REACTOR OPERATOR LICENSE
PC018, REACTOR OPERATOR LICENSE**

Operational Activities:

- | | |
|------------------------------|-------------------------------------|
| 1 Surveillance Activity | 5 Control Rod Drift |
| 2 Inoperable ESW Pump | 6 RWCU Break Inside Sec Containment |
| 3 Loss of 1A ESS Bus | 7 Loss of High Pressure Feed |
| 4 RWCU F001 Failure to Close | |

Prepared By:

Instructor

Date

Reviewed By:

Nuclear Operations Training Supervisor

Date

Approved By:

Supervising Manager/Shift Supervisor

Date

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SCENARIO SUMMARY

The scenario begins with the plant operating at 30% power. HPCI is out of service for governor repair work and the Mechanical Vacuum Pump is out of service for seal replacement. A quarterly surveillance test of the "A" ESW Loop is scheduled for this shift. Unit 2 start-up is in progress, ~1 hour from synchronizing to the grid.

The first event will be a control rod will drift in to position 38. The crew will insert the rod to position 00. Then a failure of the 1A ESW Pump when started for the "A" ESW Loop Flow Surveillance. The crew will address Technical Specifications and declare the pump inoperable as well as terminate the ESW Surveillance. A loss of ESS Bus 1A will occur as a result of breaker problems with the ESW Pump. The crew will respond to the loss of the bus per Off-Normal procedures and rack-out the failed ESW pump breaker; (the bus will not be recovered for the duration of the scenario). Other actions required by the crew will include restoring CRD and resetting the RPS half-scam.

Shortly after responding to the ESS Bus fault, an unisolable break will occur on the RWCU suction piping located in Secondary Containment. The break will cause one area of SC to approach maximum safe temperature, requiring the crew to manually scram the reactor. Upon initiating the manual scram FWLC will fail, causing RPV water level to drop. When the Main Turbine trips, the Aux Buses will fail to transfer and cannot be manually transferred resulting in a loss of Condensate/Feedwater. Main Turbine BPVs will fail shut, requiring pressure control with SRVs. RCIC will trip when initiated either automatically or manually, and will be unavailable for the rest of the transient. The only high pressure sources remaining, SLC and CRD, will not be able to keep up with the rate of inventory loss from the RWCU system break and from actuating SRVs for pressure control. When RPV level can no longer be maintained above TAF, the crew will perform Rapid Depressurization and restore RPV level with low pressure systems.

When the reactor has been rapidly depressurized, RPV level has been restored to +13" to 54" and actions are in progress to initiate Suppression Pool Cooling, the scenario will be terminated.

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SCENARIO OBJECTIVES

The **SRO** will:

1. Inform other shift members and plant management of changes in-plant status, potential plant problems or limitations.
2. Implement Loss of 4KV Bus (04.ON.011).
3. Implement Loss of CRD System Flow (55.ON.014).
4. Implement Scram (00.ON.018).
5. Implement RPV control (00.EO.026).
6. Implement Primary Containment Control (00.EO.027).
7. Implement Secondary Containment Control (00.EO.028).
8. Implement Rapid Depressurization (00.EO.030).
9. Ensure that required actions per Technical Specifications/Technical Requirements are met when a LCO/TRO is entered (00.TS.003).
10. Shutdown the reactor when it is determined reactor safety is in jeopardy, or when operating parameters exceed any RPS setpoint and scram does not occur.

The **ROs** will:

1. Perform LPCI injection through heat exchanger (49.OP.013).
2. Perform manual operation of Core Spray (51.OP.001).
3. Perform maximizing CRD System flow (55.OP.001).
4. Perform ESW system manual startup (54.OP.004).
5. Perform Loss of 4KV Bus (04.ON.011).
6. Perform Scram (00.ON.018).
7. Perform RPV Control (00.EO.026).
8. Perform Primary Containment Control (00.EO.027).
9. Perform Secondary Containment Control (00.EO.028).
10. Perform Rapid Depressurization (00.EO.030).

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CRITICAL TASKS

13 SECONDARY CONTAINMENT CONTROL

- ★ Manually scram the reactor before any RWCU area temperature reaches Max Safe Temperature.

11 RAPID DEPRESSURIZATION

- ★ Perform Rapid Depressurization when RPV level drops to -161".

- ★ Denotes Simulator Team Critical Task

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SCENARIO REFERENCES

1. SURVEILLANCE ACTIVITY- INOPERABLE ESW PUMP
SO-054-001 QUARTERLY ESW FLOW VERIFICATION LOOP A, REV. 2
AR-016-A10 ESW PUMP A, B, C, D TRIP, REV. 35
TS 3.7.2 EMERGENCY SERVICE WATER SYSTEM, AMENDMENT 178
NDAP-QA-702 ACTION REQUEST AND CONDITION REPORT PROCESS, REV. 12
OP-AD-002 STANDARDS FOR SHIFT OPERATIONS, REV. 9
2. LOSS OF ESS BUS 1A
ON-104-201 LOSS OF ESS BUS 1A, REV. 5
TS 3.8.7 DISTRIBUTION SYSTEMS OPERATING, AMENDMENT 178
TS 3.6.1.3 PCIVs, AMENDMENT 195
3. LOSS OF CRD/LOSS OF RPS/RWCU F001 FAILURE
ON-155-007 LOSS OF CRD SYSTEM FLOW, REV. 16
ON-158-001 LOSS OF RPS, REV. 6
4. ROD DRIFT
AR-104-H05 ROD DRIFT, REV. 17
ON-155-001 CONTROL ROD PROBLEMS, REV. 18
5. RWCU BREAK INSIDE SECONDARY CONTAINMENT
AR-101-A02 RWCU LEAK DET ISO LOGIC A HI TEMP, REV. 29
AR-101-A03 RWCU LEAK DET ISO LOGIC B HI TEMP, REV. 29
AR-101-B02 RWCU LEAK DET ISO LOGIC A HI LEAKAGE, REV. 29
AR-101-B02 RWCU LEAK DET ISO LOGIC B HI LEAKAGE, REV. 29
EO-100-104 SECONDARY CONTAINMENT CONTROL, REV. 1
ON-100-101 SCRAM, REV. 9
6. LOSS OF HIGH PRESSURE FEED
EO-100-102 RPV CONTROL, REV. 1
7. LOSS OF ADEQUATE CORE COOLING
EO-100-112 RAPID DEPRESSURIZATION, REV. 1
8. PRIMARY CONTAINMENT CONTROL
EO-100-103 PRIMARY CONTAINMENT CONTROL, REV. 2
OP-149-005 RHR SUPPRESSION POOL COOLING, REV. 20
9. OTHER BWROG SIMULATOR SCENARIO DEVELOPMENT GUIDELINE, TEMPLATES SC-1 AND RPV-1

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SCENARIO SPECIAL INSTRUCTIONS

1. Set-up the simulator for the scenario by performing the following:
 - a. Initialize the simulator to **IC-18** (100% Power, EOL).
 - b. Close and status control pink tag the HPCI F002 and F003 valves, place the HPCI controller in MAN set at 0%. Also, depressurize the steam supply header by opening the F054, steam trap bypass; then reclose the valve.
2. Take a snapshot to a saved IC at 30% Power
3. Initialize the simulator to IC-123.
4. Type **restorepref YPP.PC017-103**; verify the following pre-inserts and Program Button assignments.
Verify the Environment Window:

MALFS	REMFS	OVRDS	TRIGS
12 :12	8	2:2	5

TRG E1 BAAA26409 EVENT TRIGGER: MODE SWITCH TO SHUTDOWN
TRG E1 = IMF FW145011 FWLC MASTER CTLR FAILS LOW WHEN E1 TRUE
TRG E1 = IMF TC193001 MAIN TURBINE TRIP WHEN E1 TRUE
TRG E2 GAAA00214 EVENT TRIGGER: RCIC TURBINE SPEED >500 RPM
TRG E2 = IMF RC150011 RCIC TURBINE TRIP WHEN E2 TRUE
TRG E3 CAAA00706 EVENT TRIGGER: "A" ESW PUMP START SWITCH DEPRESSED
TRG E3 = IMF PM03:0P504A "A" ESW PUMP TRIP WHEN E3 TRUE
TRG E3 = IMF DS104001A (NONE 10 0) ESS 1A LOCKOUT WHEN E3 TRUE, 10 SEC. TD
bat HPCIOOS SIMULATES HPCI OOS
bat YPB.EVAL505A REMOVES MECHANICAL VACUUM PUMP FOR MAINTENANCE
IMF CN03:LICC32R600 0 FWLC MASTER CONTROLLER FAILURE IN MAN
IMF TC193025 ALL TURBINE BPVs FAIL CLOSED
IMF MV09:HV144F001 98 RWCU INLET IB ISO VALVE BINDING
IMF MV09:HV144F004 98 RWCU INLET OB ISO VALVE BINDING
IMF BR05:1A10104 TIE BUS TO 11A BKR FAILS AS-IS
IMF BR05:1A10204 TIE BUS TO 11B BKR FAILS AS-IS
IMF MV07:HV144F100 100 RWCU F100 VLV FAILED-OPEN
IMF MV07:HV144F106 100 RWCU F106 VLV FAILED-OPEN
IMF MV07:HV144F102 100 RWCU F102 VLV FAILED-OPEN
[P-1] MRF PC125001 OPEN IA - CIG 90# HEADER CROSS-TIE VLVS OPEN
[P-2] IMF RD1550043823 (NONE 0 20) 5 ROD 3823 DRIFT TO POS. 38
[P-3] MRF RM179024 A MSL RAD MON RESET
[P-4] MRF RM179026 C MSL RAD MON RESET
[P-5] MRF PM140P504A OUT A ESW PUMP BKR 1A20108 RACKED-OUT
[P-6] IMF CU161007 100 4:00 RWCU SUCTION PIPING BREAK OUTSIDE CTMT
[P-7] IMF TR02:RIT13708 48 5:00 1.997 RWCU PUMP ACCESS ARM INCREASES

Continued on next page:

5. Prepare a turnover sheet indicating:
 - a. HPCI is out of service for repairs to oil pump breaker and lube oil changeout. The system will not be returned to service this shift.
 - b. Mechanical Vacuum Pump is out of service for a seal replacement. The system will not be returned to service this shift.
 - c. Perform SO-054-A03, QUARTERLY ESW FLOW VERIFICATION LOOP A. Maintenance is standing by for vibration data.
 - d. Unit 2 start-up in progress, ~1 hour from synchronizing to the grid.
6. Prepare an LCO Sheet: HPCI has been out of service for 24 hours to repair a governor control-oil leak.
7. Copy the procedure SO-054-A03, QUARTERLY ESW FLOW VERIFICATION LOOP A and prepare a surveillance coversheet.
8. Make a copy of shift assignments.
9. Place the Simulator in **RUN**.

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the simulator to IC-123. Ensure the Preference File is executed per the Special Instructions Sheet. Assign Shift positions. Direct the Crew to begin a five minute panel walk down.

[illegible]

SCENARIO EVENT FORM

Event No: 1, 2, 3, 4, 5

Brief Description: Surveillance Activity / Rod Drift In INOP ESW Pump / Loss of 1A ESS Bus / Loss of CRD
Loss of RPS / RWCU F001Failure

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Commences SO-054-A03, QUARTERLY ESW FLOW VERIFICATION LOOP A.
PCOM		Reports rod drift alarm.
US		Directs performance of ON-155-001, CONTROL ROD PROBLEMS.
PCOM		Depress Display Rods Drifting button for Full Core Display.
		Determines rod 38-23 is drifting.
		Depress Display Scram Valves Open button for Full Core Display.
		Determines scram valves are not open.
		Selects rod 38-23 on RMCS rod select matrix.
		Reports rod 38-23 position.
		Inserts rod 38-23 to position 00.
US		Contacts Reactor Engineering.
PCOP		Continues SO-054-A03, QUARTERLY ESW FLOW VERIFICATION LOOP A.
		Starts "A" ESW pump, responds to AR-016-A10 ESW PUMPS A,B,C,D TRIP annunciator.
		Directs NPO to investigate "A" ESW Pump and breaker.
US		Directs termination of SO-054-A03.
		Contacts Work Week Manager about "A" ESW Pump trip.
		Checks Technical Specifications, declares 7 day LCO IAW T.S. 3.7.2 C-1 for loss of "A" ESW pump.
PCOP		Recognizes/reports loss of 1A ESS Bus.
PCOM		Reports half-scam, loss of CRD, failure of RWCU F001 valve.
US		Directs performance of ON-104-201, LOSS OF ESS BUS 1A.

		Directs performance of ON-158-001, LOSS OF RPS.
		Directs performance of ON-155-007, LOSS OF CRD SYSTEM FLOW.
		Directs performance of ON-117-001, LOSS OF INSTRUMENT BUS.
		Refers to T.S. 3.8.7 A-1, declares 8-hour LCO for loss of ESS Bus 1A. May also refer to T.S. 3.6.1.3 for containment isolation valve (F001) failure.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 1, 2, 3, 4, 5

Brief Description: Surveillance Activity / Rod Drift In INOP ESW Pump / Loss of 1A ESS Bus / Loss of CRD
Loss of RPS / RWCU F001 Failure

INSTRUCTOR ACTIVITY:

1. As soon as ESW surveillance has begun and BEFORE crew starts "A" ESW pump insert control rod 38-23 drift in, **Depress P-2:**

[P-2] IMF RD1550043823 (NONE 0 20) 5 ROD 38-23 DRIFT IN TO POS 38

When the crew starts "A" ESW pump for SO-054-A03, verify the Event Triggers activate to cause:

2. An instantaneous overcurrent trip of "A" ESW pump, **AND 10 sec. later**
3. A lockout-trip of 1A ESS Bus.

ROLE PLAY:

1. If spray pond level is requested, report level as 678' 6".
2. When directed as ASO to investigate "A" ESW Pump, wait ~1 min. and report that the pump is not running; it otherwise appears to be normal.
3. When directed as NPO to investigate "A" ESW Pump breaker 1A20108, wait ~2 mins. and report that the breaker has a 50/51 device flag (instantaneous overcurrent). You also smell a burnt odor in the vicinity of the breaker.
4. As NPO dispatched to investigate 1A ESS Bus, report that both the Primary and Backup Lockout Relays (86A-201 and 86A1-201), are tripped. If asked to reset the lockouts, report that they will not reset.
5. As FIN Team dispatched to investigate "A" ESW Pump and 1A ESS Bus, wait ~3 mins. and report that breaker 1A20108 for the "A" ESW Pump has failed, which was the cause for the ESS Bus 1A Lockout trip. The ESS Bus will require extensive investigation and testing prior to attempting re-energization. Also, request ESW PUMP 1A 4.16kv breaker racked out.

SCENARIO EVENT FORM

Event No: 1, 2, 3, 4, 5

Brief Description: Surveillance Activity / INOP ESW Pump / Loss of 1A ESS Bus / Loss of CRD
Loss of RPS / RWCU F001 Failure / Rod Drift In

POSITION	TIME	STUDENT ACTIVITIES
US		Directs cross-tying Instrument Air and the CIG 90# Header.
		Evaluator Note: STAs would normally be available to support the monitoring functions for the ESW pumps
PCOP		Dispatches NPO to cross-tie IA and the CIG 90# Header.
		Starts 2 ESW Pumps to support auto start of A Diesel Generator.
		Starts "B" CRD pump, restores CRD system IAW ON-155-007, LOSS OF CRD SYSTEM FLOW.
PCOM		Transfers RPS "A" to ALT IAW ON-158-001.

★ Denotes Critical Task

NOTES:	

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
--

Event No: 1, 2, 3, 4, 5
Brief Description: Surveillance Activity / INOP ESW Pump / Loss of 1A ESS Bus / Loss of CRD
Loss of RPS / RWCU F001Failure /

INSTRUCTOR ACTIVITY:

1. When directed to cross-tie IA and the CIG 90# header, wait ~2 mins. and **Depress P-1:**

[P-1] MRF PC125001 OPEN

IA - CIG 90# HEADER CROSS-TIE VLVS OPEN

ROLE PLAY:

As NPO directed to cross-tie IA and CIG, report valves 126167 and 126172 are open and the headers have been cross-tied.

3. When directed to reset MSL rad monitors, wait ~ 2 mins. and **Depress P-3 and P-4:**

[P-3] MRF RM179024 RESET A MSL RAD MON RESET

[P-4] MRF RM179026 RESET C MSL RAD MON RESET

ROLE PLAY:

As NPO directed to reset MSL rad monitor A & C, call on the plant page and report MSL rad monitors A & C are reset.

NOTE:

1. If directed to reset other Area and Process Rad Monitors, **type: RFI RM** and reset Rad Monitors as directed.
2. Recovery of RPS Bus 'A' should be allowed to continue until cooling is restored to both RRP's.

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
--

Event No: 1, 2, 3, 4, 5

Brief Description: Surveillance Activity / INOP ESW Pump / Loss of 1A ESS Bus / Loss of CRD
Loss of RPS / RWCU F001 Failure / Rod Drift In

INSTRUCTOR ACTIVITY:

When directed to rack-out breaker 1A20108, wait ~2 mins. and **Depress P-5:**

[P-5] MRF PM140P504A OUT A ESW PUMP BKR 1A20108 RACKED-OUT

ROLE PLAY:

1. As NPO directed to rack-out breaker 1A20108, report that the breaker is racked-out.

SCENARIO EVENT FORM

Event No: 6
Brief Description: RWCU Break Inside Sec Containment

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Recognizes/reports indications of RWCU system leak.
		Responds to AR-101-A02/A03, RWCU LEAK DET ISO LOGIC A/B HI TEMP.
		Responds to AR-101-B02/B03, RWCU LEAK DET ISO LOGIC A/B HI LEAKAGE.
		Reports RWCU F004 valve is isolating.
		Evacuates area and notifies Health Physics.
US		Enters EO-100-104, SECONDARY CONTAINMENT CONTROL.
		Directs starting of ESW, and all Room Coolers.
		Directs commencing reactor shutdown due to area temps. > max normal.
PCOM	NOTE 1	Reports RWCU has failed to isolate; reports loss of indication on RWCU F004 valve.
★US		<i>Directs scram-imminent actions, enters EO-100-102 RPV CONTROL and directs manual scram before any RWCU temperature reaches max safe.</i>
PCOM		Runs-back Recirc flow to 65 Mlbs/hr.
		Starts MSOP, TGOP.
★		<i>Manually scrams reactor before any RWCU temperature reaches max safe.</i>
PCOP		Attempts to transfer house loads to Aux Buses; reports failure of Tie Bus to 11A and 11B breakers.

★ Denotes Critical Task

NOTES:	NOTE 1: This event is classified as a SITE AREA EMERGENCY based on RWCU leak
	IAW EP-PS-100-6, EAL 18.3.

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
--

Event No: 6
Brief Description: RWCU Break Inside Sec Containment

INSTRUCTOR ACTIVITY:

1. ~1 min. after reporting breaker 1A201108 has been racked out, insert an unisolable RWCU leak, **Depress P-6 and P-7:**

[P-6] IMF CU161007 100 4:00 RWCU SUCTION PIPING BREAK OUTSIDE CTMT

[P-7] IMF TR02:RIT13708 48 5:00 1.997 RAMPS UP RWCU PUMP AREA RADS

2. When Mode Switch is placed in SHUTDOWN, verify event triggers activate to cause the following:
 - FWLC Master Controller output fails low, resulting in RPV level shrinking to ~-40 to -50".
 - The Main Turbine trips, causing the Aux Buses to subsequently de-energize.

ROLE PLAY:

1. As NPO directed to investigate RWCU F001, wait ~2 mins. and report that breaker 1B236053 is tripped-open. If asked to reset/reclose the breaker, report that it immediately tripped-open again.
2. As NPO directed to investigate RWCU F004, wait ~2 mins. and report that breaker 1D274042 is tripped-open. If asked to reset/reclose the breaker, report that it immediately tripped-open again.
3. As FIN Team dispatched to investigate the RWCU F001/F004 problems, wait ~3 mins. and report that the breakers functioned properly; the problem may be with the associated valve's motor-operator.
4. If contacted as Security to report status of blowout panels; inform the crew that steam is visible above the Unit 1 CST area.

SCENARIO EVENT FORM

Event No: 7

Brief Description: Loss of High Pressure Feed / Loss of Adequate Core Cooling

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports failure of FWLC Master Controller output.
		Reports loss of Feedwater/Condensate Pumps when Turbine trips.
US		Directs RPV water level restored to +13" to +54" with RCIC.
		Contacts Work Week Manager concerning Aux Buses failing to transfer.
PCOP		Reports RCIC tripped when started.
		Dispatches NPO to investigate RCIC trip.
US		Directs RPV level maintained +13" to -161" with CRD/SLC.
		Contacts Work Week Manager concerning RCIC.
PCOP		Maximizes CRD and initiates SLC if directed.
US		Directs RHR and CS systems started and lined-up for injection.
PCOM/P		Initiates both loops of CS and RHR.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 7

Brief Description: Loss of High Pressure Feed / Loss of Adequate Core Cooling

INSTRUCTOR ACTIVITY:

None.

ROLE PLAY:

1. As FIN Team dispatched to investigate the Aux Buses, wait ~3 mins. and report that the Transfer logic has failed. It will take time to troubleshoot the exact cause for the failure. You will call back when you have a better idea of repair strategy and time estimates.
2. As NPO directed to investigate the RCIC trip, wait ~2 mins. and report that the RCIC overspeed trip mechanism is tripped and the linkage is bent. You cannot reset the overspeed trip.

SCENARIO EVENT FORM

Event No: 7

Brief Description: Loss of High Pressure Feed / Loss of Adequate Core Cooling

POSITION	TIME	STUDENT ACTIVITIES
PCOM/P		Informs US that RPV level has reached -161".
★US		<i>Performs Rapid Depressurization when RPV level drops to -161".</i>
		<i>Enters EO-100-112, RAPID DEPRESSURIZATION.</i>
		<i>Verifies Suppression Pool level >5'.</i>
		<i>Directs Rapid Depressurization by opening 6 ADS valves.</i>
★PCOM/P		<i>Initiates Rapid Depressurization by opening 6 ADS valves.</i>
US		Directs restoring RPV level to +13" to +54" with RHR and CS.
PCOM/P		Restores RPV level to +13" to +54" with RHR and CS.
US		Enters EO-100-103 due to high Suppression Pool temperature.
		Directs maximizing Suppression Pool Cooling.
PCOM/P		Places both loops of RHR in Suppression Pool Cooling IAW OP-149-005, RHR SUPPRESSION POOL COOLING.
		TERMINATION CUE:
		Rapid Depressurization has been completed, RPV level has been restored to +13" to +54", and actions are in progress to initiate Suppression Pool Cooling.

★ Denotes Critical Task

NOTES:	

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
--

Event No: 7

Brief Description: Loss of High Pressure Feed / Loss of Adequate Core Cooling

INSTRUCTOR ACTIVITY:

None.

ROLE PLAY:

As necessary.

TERMINATION CUE:

Rapid Depressurization has been completed, RPV level has been restored to +13" to +54", and actions are in progress to initiate Suppression Pool Cooling.

Facility: SSS Scenario No.: PC017-104 Op-Test No.: _____

Examiners: _____ Operators: _____

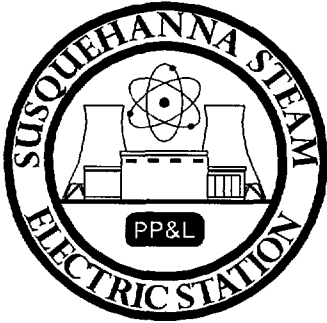
Initial Conditions: IC-16 Unit 1 50% Power EOL. Unit 2 100% power EOL

Turnover B2 Start-up Sequence was suspended at step 539. Power ascension was suspended while BOP equipment is placed into service. Place 'C' RFP in service IAW GO-100-102 step 6.71.3 then continue rod withdrawal to 75% reactor power.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N	Place C Reactor Feed Pump in service.
2	N/A	R	Raise reactor power (power increase enough to cause stuck rod indications for event 3 below)
3	IMF RD1550063407 12 0 12	C	Stuck Rod (34-07)
4	bat FWB.PC017-104A	I	Loss of extraction steam to 3B feedwater heater (HTR 3B LEVEL CONTROL FAILURE)
5	MRF DC102140 OPEN	C	Dual Reactor Recirc Pump Trip
6	bat FWB.CPTRIP	C	Loss of all condensate pumps
7	bat RRB.PC017-104B	M	Instrument line Ref Leg Break & Bottom Head Leak inside the Drywell
8	IMF RL01:E411K2	C	HPCI Auto Start Failure
9	IMF RH149004A (4B) 20 4:00	C	RHR Suction line leak

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

Designated Spare - NOT USED!



**PP&L-SUSQUEHANNA
TRAINING CENTER**

SIMULATOR SCENARIO

Scenario Title: NRC INITIAL LICENSE OPERATOR EXAMINATION

Scenario Duration: 90 Minutes

Scenario Number: PC017-104

Revision/Date: Rev 0; 5/1/03

**Course: PC017, SENIOR REACTOR OPERATOR LICENSE
PC018, REACTOR OPERATOR LICENSE**

Operational Activities:

- | | |
|---------------------------------|------------------------------|
| 1 Place C RFP In Service | 6 Loss of Condensate Pumps |
| 2 Raise Power by Rod Withdrawal | 7 Instr Line Break Inside DW |
| 3 Stuck Control Rod | 8 HPCI Auto Start Failure |
| 4 Loss of Extraction Steam 3B | 9 RHR Suction Line Leak |
| 5 Dual RRP Trip | |

Prepared By:

Instructor

Date

Reviewed By:

Nuclear Operations Training Supervisor

Date

Approved By:

Supervising Manager/Shift Supervisor

Date

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SCENARIO SUMMARY

Unit 1 is 50% power EOL, Unit 2 is 100% power EOL. Power ascension is in progress on Unit 1. The crew will place RFP C in service then continue raising power by withdrawing control rods. After several rods are withdrawn control rod 34-07 will fail to move. An Off-Normal procedure will direct the crew to raise drive water d/p at which time rod motion will continue.

An instrument failure will cause a level control problem in feedwater heater 3B resulting in an automatic extraction steam isolation to heater 3B. An Off-Normal procedure will require the crew to manually isolate extraction steam to feedwater heaters 4B and 5B. Technical Specification for MCPR is impacted by the loss of extraction steam. After addressing the actions for loss of extraction steam a dual Recirc MG A & B drive motor breaker trip occurs resulting from a 125 VDC breaker trip. Immediate Operator action is to place the Mode Switch to Shutdown, no other equipment is affected by the 125 VDC breaker trip.

When the reactor mode switch is placed in shutdown a loss of all condensate pumps occurs resulting in a loss of feedwater injection. The crew will respond by establishing RPV level control with HPCI and RCIC. An auto start failure in the HPCI system will require a component by component startup to allow injection. Shortly after the reactor scram an instrument line break inside the drywell will result in a loss of numerous reactor water level and pressure instruments in Division 1. Drywell pressure and temperatures will increase and require Emergency Operating Procedure entry which will direct initiation of Suppression Chamber Spray initially. The RHR loop chosen to initiate containment spray will experience a suction line leak requiring Emergency Operating Procedure entry which will direct shutdown and isolation of the RHR system discharging into the Secondary Containment. The crew will successfully isolate the RHR leakage and perform containment sprays with the other loop of RHR. This delay in starting sprays will result in Suppression Chamber pressure exceeding 13 psig, requiring the crew to initiate drywell sprays. Containment parameters will improve following spray initiation.

After Drywell Sprays have been initiated and RPV water level is maintained +13" to +54" the scenario will be terminated.

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SCENARIO OBJECTIVES

The **SRO** will:

1. Ensure initiation of ESF equipment if automatic operation was not properly initiated.
2. Inform other shift members and plant management of changes in-plant status, potential plant problems or limitations.
3. Implement Appropriate Portions of Condition Report (00.AD.267)
4. Implement Appropriate Portions of Plant Startup, Heatup and Power Operation (00.GO.013)
5. Respond to a Stuck control Rod (55.ON.016)
6. Implement Scram (00.ON.018).
7. Implement RPV control (00.EO.026).
8. Implement Primary Containment Control (00.EO.027).
9. Implement Secondary Containment Control (00.EO.028).
10. Implement Loss of Feedwater Heating (Extraction Steam) (47.ON.005)
11. Implement Loss of Recirc Flow (64.ON.010)
12. Ensure that required actions per Technical Specifications/Technical Requirements are met when a LCO/TRO is entered (00.TS.003).
13. Shutdown the reactor when it is determined reactor safety is in jeopardy, or when operating parameters exceed any RPS setpoint and scram does not occur.

The **ROs** will:

1. Perform Feeding With Additional Reactor Feed Pump (45.OP.010)
2. Implement HWC Operation When Placing a Third Reactor Feed Pump In Service (45.OP.025)
3. Implement Appropriate Portions of Plant Startup, Heatup and Power Operation (00.GO.013)
4. Respond to a Stuck control Rod (55.ON.016)
5. Implement Loss of Feedwater Heating (Extraction Steam) (47.ON.005)
6. Implement Loss of Recirc Flow (64.ON.010)
7. Perform Scram (00.ON.018).
8. Perform RPV Control (00.EO.026).
9. Perform HPCI Component by Component Start-up (52.OP.002)
10. Perform Primary Containment Control (00.EO.027).
11. Perform Secondary Containment Control (00.EO.028).
12. Perform RHR Containment Spray (49.OP.005)
13. Perform Manual Component by Component Startup of RCIC (50.OP.015)

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CRITICAL TASKS

21 LOSS OF RECIRC FLOW

- ★ Manually scram the reactor due to a dual Recirc Pump trip.

06 PRIMARY CONTAINMENT CONTROL

- ★ Isolates RHR System discharging into the Secondary Containment.
- ★ Sprays the Drywell when Suppression Chamber pressure exceeds 13 psig.
- ★ Limits Drywell Spray flow to between 1000 and 2800 gpm for the first 30 seconds.

NOT SEPARATE
TASKS - LIMITED
AND PART OF
COMMON
PERFORMANCE

- ★ Denotes Simulator Team Critical Task

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SCENARIO REFERENCES

1. PLACE C RFP IN SERVICE
GO-100-002 PLANT STARTUP, HEATUP AND POWER OPERATION, REV. 40
OP-145-001 RFP AND RFP LUBE OIL SYSTEM, REV. 32
OP-145-002 HYDROGEN WATER CHEMISTRY, REV. 4
2. INCREASE POWER BY ROD WITHDRAWAL
CORE REACTIVITY CONTROL BOOK, REV. 1
OP-AD-338 COMMUNICATION REQUIREMENTS FOR REACTIVITY MANIPULATIONS, REV. 1
OP-AD-001 OPERATIONS STANDARDS FOR SYSTEM AND EQUIPMENT OPERATION, REV. 5
SO-156-007 CONTROL ROD COUPLING / FULL IN INDICATOR CHECKS, REV. 8
3. STUCK ROD
ON-155-001 CONTROL ROD PROBLEMS, REV. 18
NDAP-QA-702 ACTION REQUEST AND CONDITION REPORT PROCESS, REV. 12
4. LOSS OF EXTRACTION STEAM TO 3B HEATER
ON-147-001 LOSS OF FEEDWATER HEATING EXTRACTION STEAM, REV. 13
AR-120-H07 FW LOOP B PANEL 1C102 TROUBLE, REV. 12
AR-120-D07 FW HTR STRING B DUMP VLV OPEN, REV. 1
TS 3.2.2 MCPR, AMENDMENT 178
5. DUAL REACTOR RECIRC PUMP TRIP
AR-102-B02 RECIRC MG A DRIVE MTR TRIP, REV. 21
AR-102-B05 RECIRC MG B DRIVE MTR TRIP, REV. 21
OP-AD-055 OPERATIONS PROCEDURE PROGRAM, REV. 0
ON-164-002 LOSS OF REACTOR RECIRCULATION FLOW, Rev. 20
ON-100-101 SCRAM, REV. 9
EO-100-102 RPV CONTROL, REV. 1
6. LOSS OF ALL CONDENSATE PUMPS
7. INSTRUMENT LINE BREAK INSIDE DRYWELL
EO-100-103 PRIMARY CONTAINMENT CONTROL, REV. 2
OP-149-004 RHR CONTAINMENT SPRAY, REV. 17
8. HPCI AUTO START FAILURE
OP-152-001 HPCI SYSTEM, REV. 28
9. RHR SUCTION LINE BREAK
EO-100-104 SECONDARY CONTAINMENT CONTROL, REV. 1

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SCENARIO SPECIAL INSTRUCTIONS

1. Set-up the simulator for the scenario by performing the following:
 - a. Initialize the simulator to **IC-16**. Unit 1 at 50% Power EOL. Unit 2 is 100% power EOL.
 - b. Place Condensate Demin E & F in service.
 - c. Start Condensate Pump D.
 - d. Place Circ Water Pump D in service.
2. Take a snapshot to a saved IC.
3. Initialize to IC-124.
4. Type **restorepref YPP.PC017-104**; verify the following pre-inserts and Program Button assignments.
Verify the Environment Window:

MALFS	REMFS	OVRDS	TRIGS
2:2	0	2:2	1

IMF RD1550063407 12 0 12	ROD 3407 STUCK AT POSITION 12
IMF RL01:E411K2	HPCI AUTO START FAILURE
TRG E1 BAAA26409	MODE SWITCH TO S/D
TRG E1 = bat FWB.CPTRIP	TRIP ALL CONDENSATE PUMPS
[P-1] DMF RD1550063407	DELETE STUCK ROD 34-07
[P-2] bat FWB.PC017-104A	HTR 3B LEVEL CONTROL FAILURE
[P-3] MRF DC102140 OPEN	DUAL REACTOR RECIRC PUMP TRIP
[P-4] bat RRB.PC017-104B	REF LEG BREAK & BOTTOM HEAD LEAK
[P-5] IMF RH149004A 20 4:00	RHR LOOP A SUCTION BREAK
[P-6] IMF RH149004B 20 4:00	RHR LOOP B SUCTION BREAK

*ALL INSERTED PRE-INSERTS
TO 5 CEM FOR
PP 2/1*

5. Prepare a turnover sheet indicating:
 - a. Unit 1 is at 50% power, Unit 2 is in MODE 1 at 100% power EOL.
 - b. Using B2 Startup Sequence at step 539.
 - c. Power ascension was suspended while BOP equipment is placed into service.
 - d. Place C RFP in service IAW GO-100-002 step 6.71.3 then continue with rod withdrawal to 75% reactor power.

Continued on next page:

6. Ensure the B2 Startup Sequence CRC Book is placed in the simulator and remove the B2 Shutdown Sequence.
7. Prepare a marked up copy of page 23 from the Start-up Control Rod Sequence B2. Sign off all steps up to step 539.
8. Make copies of pages 24 and 24A from the Start-up Control Rod Sequence B2 to use as page replacements following the scenario.
9. Copy GO-100-002 completed up to step 6.71. Signoff confirmation for the following steps; 6.71.1, 6.71.2, 6.71.5, and 6.71.6.
10. Copy SO-156-007 signed off to support rod withdrawal starting at step 539. Prepare a surveillance coversheet.
11. Copy OP-145-001 signed off to step 2.5.5 to have 'C' RFP warmed and on mini-flow .
12. Make a copy of shift assignments.
13. Place the Simulator in **RUN**.

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the simulator to **IC-124**. Ensure the Preference File is executed per the Special Instructions Sheet. Assign Shift positions. Direct the Crew to begin a five minute panel walk down.

EVENT	TIME	DESCRIPTION
1		PLACE C RFP IN SERVICE
2		INCREASE POWER BY ROD WITHDRAWAL
3		STUCK ROD
4		LOSS OF EXTRACTION STEAM TO 3B HEATER
5		DUAL REACTOR RECIRC PUMP TRIP
6		LOSS OF ALL CONDENSATE PUMPS
7		INSTRUMENT LINE BREAK INSIDE DRYWELL
8		HPCI AUTO START FAILURE
9		RHR SUCTION LINE BREAK
		TERMINATION CUE

SCENARIO EVENT FORM

Event No: 1
Brief Description: PLACE C RFP IN SERVICE

POSITION	TIME	STUDENT ACTIVITIES
US		Directs implementation of OP-145-001, RFP AND RFP LUBE OIL SYSTEM.
PCOM		Establish RFP discharge pressure 50-100 psig below Reactor pressure.
		Increases RFP speed using SIC-C32 1R601C.
		Maintains RFP minimum flow on FI-10604C greater than minimum flow setpoint FI-10612C by manually throttling FIC-10604C.
		Verifies RFP C discharge temperature is ~ equal to RFP A & B discharge temperature on TR-10608.
		Direct Plant Operator to align Hydrogen Water Chemistry System for placing C RFP IAW OP-145-002, HYDROGEN WATER CHEMISTRY.
		Raise RFP speed using SIC-C32-1R601C until injection flow just begins.
		Slowly reduce RFP C minimum flow by depressing CLOSE button on FIC-10604C while observing: <ul style="list-style-type: none"> • RFP C minimum flow decreasing. • RFP C discharge flow increasing. • RFP A & B discharge flow decreasing to match RFP C flow increase.
		CLOSE minimum flow valve.
		Match RFP C output meter (horizontal) with the demand meter (vertical) by adjusting SIC-C32-1R601C.
		Place RFP C SIC-C32-1R601C to AUTO.
		Adjust RFP A & B flows using bias thumbwheel until discharge flows on 3 RFPs are ~ equal.
		Place FIC-10604C in AUTO when discharge flow is > 1.5 mlbm/hr.
		Directs Plant Operator to close 106155, RFP C OB Seal Drain Ctl Vlv Bypass.
		Directs STA to select LEFM in PICSY for Calc of Core Thermal Power.
		Directs Plant Operator to establish automatic flow balancing for condensate filters.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 1
Brief Description: PLACE C RFP IN SERVICE

INSTRUCTOR ACTIVITY:

As necessary.

ROLE PLAY:

1. As Plant Operator sent to align HWC System for placing RFP C in service, wait ~ 5 mins. and report HWC System is aligned support placing RFP C in service. (OP-145-002, flow is reduced to ~3 until RFP placed in service then ramped back to ~38 SCFH)
2. As Plant Operator sent to close 106155, wait 2 mins. and report 106155 is closed.
3. As STA directed to select LEFM in PICSY for calculation of core thermal power acknowledge the direction and take no further action.
4. As Plant Operator directed to establish automatic flow balancing for the condensate filters acknowledge the direction and take no further action.

SCENARIO EVENT FORM

Event No: 2, 3
Brief Description: INCREASE POWER / STUCK ROD

POSITION	TIME	STUDENT ACTIVITIES
US		Conduct Reactivity Manipulation Briefing for the upcoming power increase.
		Direct the power increase.
		Direct implementation of Reactor Engineer Instruction in the CRC Book.
		Direct implementation of GO-100-002, PLANT STARTUP, HEATUP AND POWER OPERATION.
PCOM		Increase reactor power as directed by the US and CRC Book.
		Plots power change on the power to flow map.
		Maintains load set ~100 MWe above existing load.
PCOP		Notifies GCC before the power increase begins.
PCOM		Identifies control rod 34-07 failed to move after a withdraw command.
US		Directs implementation of ON-155-001, CONTROL ROD PROBLEMS.
		Notifies Reactor Engineering.
		Makes notifications IAW OP-AD-002, STANDARDS FOR SHIFT OPERATIONS.
		Identifies a CR is required IAW NDAP-QA-0702, ACTION REQUEST <u>AND</u> CONDITION REPORT PROCESS.

★ Denotes Critical Task

NOTES:	

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
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Event No: 2, 3
Brief Description: INCREASE POWER / STUCK ROD

INSTRUCTOR ACTIVITY:

NOTE: Stuck rod 34-07 is a pre-inserted malfunction.

As necessary.

ROLE PLAY:

As Reactor Engineer notified about stuck rod 34-07, acknowledge the condition and state no further notification is necessary if the rod moves during implementation of procedure actions.

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 2, 3
Brief Description: INCREASE POWER / STUCK ROD

INSTRUCTOR ACTIVITY:

After the ON-155-001 actions are implemented to raise drive water d/p, permit continued rod movement,
Depress P-1:

[P-1] DMF RD1550063407 DELETE STUCK ROD 34-07

ROLE PLAY:

As necessary.

SCENARIO EVENT FORM

Event No: 4

Brief Description: LOSS OF EXTRACTION STEAM TO 3B HEATER

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports HTR 3B LP EXTR ISO HV-10240B is closing.
		Dispatch a Plant Operator to 1C102 to investigate heater problem.
		Checks heater levels on 1C668 and determines FW HTR 103B and 104B have high level indication.
US		Directs implementation of ON-147-001, LOSS OF FEEDWATER HEATING EXTRACTION STEAM.
PCOM		Plot position on power to flow map.
PCOP		Checks MSL and Offgas Pretreatment Log radiation monitors on 1C600.
		Notifies US MCPR LCO 3.2.2 is applicable. (2hr LCO, Decrease <25% pwr)
US		Refers to TS 3.2.2.
		Notifies Reactor Engineering.
PCOP		Notify PCOM to be aware of lower feedwater temperatures as valves are being closed.
		CLOSES MSEP A DRN TO HTR 4B HV-10213B.
		CLOSES MSEP B DRN TO HTR 4B HV-10216B.
PCOM		Monitors reactor power as feedwater heating is reduced.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 4
Brief Description: LOSS OF EXTRACTION STEAM TO 3B HEATER

INSTRUCTOR ACTIVITY:

After actions for stuck rod 34-07 are complete and rod 34-07 is being moved to its bank position insert a loss of extraction steam to heater 3B, **Depress P-2:**

[P-2] bat FWB.PC017-104A HTR 3B LEVEL CONTROL FAILURE

NOTE: Heater 3B extraction steam isolates in ~3.5 minutes.
Monitor LP1C102 for heater alarms and indications.

ROLE PLAY:

1. As Plant Operator sent to 1C102 wait ~ 1 min. and report you have:
HTR 3B & 4B HI LEVEL ALARMS
HTR 4B DUMP VALVE NOT 100% CLOSED ALARM
HTR 4B level is controlling on the dump valve.
2. As Plant Operator sent to determine valve status at 1C102 on heater string B, report the normal and emergency drain valves are closed on heater 3B, the normal drain outlet from heater 4B is closed, and the emergency dump valve on heater 4B is open.

SCENARIO EVENT FORM

Event No: 4, 5, 6

Brief Description: **LOSS OF EXTRACTION STEAM TO 3B HEATER / DUAL RRP TRIP / LOSS OF CONDENSATE PUMPS**

POSITION	TIME	STUDENT ACTIVITIES
PCOP		CLOSES HTR 4B LP EXTR ISO HV-10241B.
		CLOSES HTR 5B HP EXTR ISO HV-10242B.
		If feedwater heating is not restored within 2 hours, isolate feedwater string B.
		Directs Plant Operator to check normal and emergency drain from heater 3B OPEN and drain inlet from heater 4B CLOSED.
PCOM		Report Recirc MG A & B Drive Motor Trip.
★PCOM		Place Reactor Mode Switch to SHUTDOWN due to a dual Recirc Pump Trip.
		Performs actions of ON-100-101, SCRAM: <ul style="list-style-type: none"> • Reports all control rods are fully inserted • Inserts SRMs and IRMs.
★US		Directs Reactor Mode Switch to Shutdown due to a dual Recirc Pump Trip .
		Enters EO-100-102, RPV CONTROL
		Directs implementation of ON-100-101, SCRAM.
		Directs a panel walkdown for Isolations, ECCS Initiations, and D/G Starts.
		Directs RPV level restored and maintained +13" to +54" with HPCI and RCIC.
		Directs RPV pressure stabilized <1087 psig.
PCOM		Reports loss of Condensate and Feedwater pumps.
PCOP		Performs panel walkdown and reports status for Isolations, ECCS Initiations and D/G starts.

★ Denotes Critical Task

NOTES:	

INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
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Event No: 4, 5, 6

Brief Description: LOSS OF EXTRACTION STEAM TO 3B HEATER / DUAL RRP TRIP / LOSS OF
CONDENSATE PUMPS

INSTRUCTOR ACTIVITY:

1. When actions are complete for loss of extraction steam, insert a dual Reactor Recirc pump trip, **Depress P-3:**

[P-3] MRF DC102140 OPEN BREAKER 1D61419 TRIP

ROLE PLAY:

As Plant Operator sent to Recirc MG A & B drive motor breakers, wait ~2 mins. and report breaker 1A10110 and 1A10210 are tripped and there are no flags for any protective relays.

2. When the Mode Switch is placed to Shutdown verify event trigger 1 activates a trip of all condensate pumps.

TRG E1 = bat FWB.CPTRIP TRIP ALL CONDENSATE PUMPS

3. When EO-102 is entered, insert an instrument line break inside drywell, **Depress P-4:**

[P-4] bat RRB.PC017-104B REF LEG BREAK & BOTTOM HEAD DRAIN LEAK

SCENARIO EVENT FORM

Event No: 6, 7, 8

Brief Description: **LOSS OF CONDENSATE PUMPS / INSTR LINE BREAK INSIDE DRYWELL**
HPCI AUTO START FAILURE

POSITION	TIME	STUDENT ACTIVITIES
US		Contacts Work Week Manager concerning Recirc MG A & B drive motor breaker trips.
		Contacts Work Week Manager concerning loss of all condensate Pumps.
PCOP		Reports HPCI auto start failure.
		Performs HPCI component by component startup IAW OP-152-001, HPCI SYSTEM.
		Controls HPCI injection to restore and maintain RPV water level +13" to +54".
PCOM/P	NOTE 1	Reports drywell pressure and temperature rising.
		Reports loss of division 1 level and pressure indicators.
		Verifies RPV level using redundant level indicators.
US		Enters EO-100-103, PRIMARY CONTAINMENT CONTROL when drywell pressure exceeds 1.72 psig
		Re-enters EO-100-102 when drywell pressure exceeds 1.72 psig.
		Directs suppression chamber sprays placed in service.

★ Denotes Critical Task

NOTES:	NOTE1: This event is classified as an ALERT based on reactor coolant leakage rate greater than 50 gpm IAW EP-PS-100, EAL 12.2.
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INSTRUCTOR ACTIVITIES, ROLE PLAY, AND INSTRUCTOR'S PERSONAL NOTES
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Event No: 6, 7, 8

Brief Description: LOSS OF CONDENSATE PUMPS / INSTR LINE BREAK INSIDE DRYWELL
HPCI AUTO START FAILURE

INSTRUCTOR ACTIVITY:

As necessary.

ROLE PLAY:

1. As FIN Team sent to investigate the Recirc MG A & B drive motor breaker trip, wait ~10 mins. and report a trip signal from RPT breakers 3A (20501) and 3B (20601) is present. We will continue to investigate.
2. As FIN Team sent to investigate the Condensate pumps, wait ~10 mins. and report a trip signal is present from the Plant Aux Load Shed circuit. Further trouble shooting is required, when anything new develops we will notify you in the control room.

SCENARIO EVENT FORM

Event No: 7, 9

Brief Description: INSTR LINE BREAK INSIDE DRYWELL / RHR SUCTION LINE BREAK

POSITION	TIME	STUDENT ACTIVITIES
PCOM/P		Sprays the Suppression Chamber IAW OP-149-004, RHR CONTAINMENT SPRAY.
		Places RHRSW in service IAW OP-116-001, RHRSW SYSTEM.
	Note 1	Reports RHR LOOP A(B) ROOM FLOODED alarm. (AR-109(111)-H08)
		Verifies Suppression Pool level dropping.
		Dispatches Plant Operator to investigate room flooding.
US		Enters EO-100-104, SECONDARY CONTAINMENT CONTROL.
★US	Note 1	<i>Directs isolating RHR system discharging into the Secondary Containment.</i>
		Directs start of ESW and unit coolers with a cooling source.
		Re-enter EO-100-103, PRIMARY CONTAINMENT CONTROL due to suppression pool level <22'.
★PCOM/P	Note 1	<i>Isolates RHR system discharging into the Secondary Containment.</i>
		<i>Stops RHR pump.</i>
		<i>Closes HV-151-F004A(B) and HV-151-F004C(D).</i>
		Reports Suppression Pool level has stopped dropping.
PCOM/P		Starts ESW and unit coolers with a cooling source.
US		Directs other loop of RHR placed in Suppression Chamber sprays.

★ Denotes Critical Task

NOTES:	NOTE 1: The RHR suction break will occur on which ever RHR loop is initially started for sprays.

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 7, 9

Brief Description: INSTR LINE BREAK INSIDE DRYWELL / RHR SUCTION LINE BREAK

INSTRUCTOR ACTIVITY:

Which ever loop of RHR is chosen to initiate sprays will incur a failure, monitor for the loop chosen to insert the correct failure below.

1. If the 'A' loop of RHR is placed in service; immediately after either A or C pump is started, initiate s suction line break, **Depress P-5:**

[P-5] IMF RH149004A 20 4:00 RHR LOOP A SUCTION BREAK

2. If the 'B' loop of RHR is placed in service; immediately after either B or D pump is started, initiate s suction line break, **Depress P-6:**

[P-6] IMF RH149004B 20 4:00 RHR LOOP B SUCTION BREAK

ROLE PLAY:

As NPO dispatched to investigate RHR/CS Pump rooms, wait ~2 minutes and report you are unable to enter either RHR because something is blocking the door; you hear a loud noise like water rushing into the room. If asked, report you are unable to determine water levels in the rooms.

SCENARIO EVENT FORM

Event No: 7, 9

Brief Description: INSTR LINE BREAK INSIDE DRYWELL / RHR SUCTION LINE BREAK

POSITION	TIME	STUDENT ACTIVITIES
PCOM/P		
		Places RHR in Supp Chmbr Sprays with ≤ 500 gpm spray flow.
US		Directs terminating Supp Chmbr Sprays before Supp Chmbr pressure drops to 0 psig.
★US		<i>Directs Spraying the DW when Supp Chmbr pressure exceeds 13 psig.</i>
★US		<i>Directs DW spray flow limited to between 1000 and 2800 gpm for the first 30 seconds.</i>
		Directs terminating DW Sprays before DW pressure drops to 0 psig.
★PCOM/P		<i>Sprays the DW when Supp Chmbr pressure exceeds 13 psig.</i>
★PCOM/P		<i>Limits DW spray flow to between 1000 and 2800 gpm for the first 30 seconds.</i>
		Establishes 9500 gpm spray flow before throttling.
		Reports DW pressure and temperature dropping.
		Terminates DW Sprays before DW pressure drops to 0 psig.
		Terminates Supp. Chmbr. Sprays before Supp. Chmbr. pressure drops to 0 psig.
		TERMINATION CUE:
		Drywell sprays have been initiated and RPV water level is maintained +13" to +54" the scenario can be terminated.

★ Denotes Critical Task

NOTES:	

**INSTRUCTOR ACTIVITIES, ROLE PLAY,
AND INSTRUCTOR'S PERSONAL NOTES**

Event No: 7, 9

Brief Description: INSTR LINE BREAK INSIDE DRYWELL / RHR SUCTION LINE BREAK

INSTRUCTOR ACTIVITY:

As necessary.

ROLE PLAY:

As necessary.

TERMINATION CUE:

Drywell sprays have been initiated and RPV water level is maintained +13" to +54" the scenario can be terminated.