OPERATING TEST NO.: Primary Scenarios

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			1 (501)		2 (401)		3 (301)			
			RO	BOP	RO	BOP	RO	BOP	RO	SRO
RO	Reactivity	1*								
	Normal	1*		1		1		1		
	Instrument / Component	4*	3,4, 5	2,3, 5,7, 8,9	3	2,4, 6,7, 8,9	3,5, 6,9	2,4, 8, 11		
	Major	1	6	6,10	5	5,10		7, 10		
As RO	Reactivity	1*								
	Normal	0		1		1		1		
	Instrument / Component	2*	3,4, 5	2,3, 5,7, 8,9	3	2,4, 6,7, 8,9	3,5, 6,9	2,4, 8, 11		
	Major	1	6	6,10	5	5,10		7, 10		
SRO-I										
As SRO	Reactivity	0								
	Normal	1*		1		1		1		
	Instrument / Component	2*	3,4	2,5, 7,8, 9	3	2,4, 6,7, 8,9	3,5, 6,9	2,4, 8, 11		
	Major	1		6,10	5	10		7, 10		
SRO-U	Reactivity	0								
	Normal	1*		1		1		1		
	Instrument / Component	2*	3,4	2,5, 7,8, 9	3	2,4, 6,7, 8,9	3,5, 6,9	2,4, 8, 11		
	Major	1		6,10	5	10		7, 10		

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.45.d) but must be significant per Section C.2.a of Appendix D. * Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one for-one basis.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _____

NRC Reviewer: _____

OPERATING TEST NO.: Backup Scenarios

Applicant Type	Evolution Type	Minimum Number	Scenario Number							
			4 (601)		5 (302)					
			RO	BOP	RO	BOP	RO	BOP	RO	BOP
RO	Reactivity	1*	4							
	Normal	1*		1	1	1				
	Instrument / Component	4*	3	3,7, 8	3,4, 5	2,4, 5,6, 7				
	Major	1	5,6	5,6	8	8,9				
As RO	Reactivity	1*	4							
	Normal	0		1	1	1				
	Instrument / Component	2*	3	3,7, 8	3,4, 5	2,4, 5,6, 7				
	Major	1	5,6	5,6	8	8,9				
SRO-I										
As SRO	Reactivity	0	4							
	Normal	1*		1	1					
	Instrument / Component	2*		2,3, 7,8	3,4	2,5, 6,7				
	Major	1	5,6		8	9				
SRO-U	Reactivity	0	4							
	Normal	1*		1	1					
	Instrument / Component	2*		2,3, 7,8	3,4	2,5, 6,7				
	Major	1	5,6		8	9				

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations may be conducted under normal or *controlled* abnormal conditions (refer to Section D.45.d) but must be significant per Section C.2.a of Appendix D. * Reactivity and normal evolutions may be replaced with additional instrument or component malfunctions on a one for-one basis.
(3) Whenever practical, both instrument and component malfunctions should be included; only those that require verifiable actions that provide insight to the applicant's competence count toward the minimum requirement.

Author: _____

NRC Reviewer: _____

Facility: Susquehanna Scenario No.: ILO-501 Op-Test No.: N/A

Examiners: _____ Operators: _____

Initial Conditions: Unit 1 in Mode 2 at ~5% power EOL, Unit 2 at 100% power EOL

Turnover: A plant startup is in progress in accordance with GO-100-002 and is complete up to step 5.49.7. Control rods are being withdrawn in accordance with startup sequence B2, which is currently at step 322. ESS bus 1A202 is selected to its alternate source to allow maintenance on the normal supply breaker. The maintenance is complete and the crew will transfer bus 1A202 to its normal power source following shift turnover. Engineering is investigating increased Off-gas flow. The Computer Group to remove PICSY from service after coordinating with the control room. I&C to perform MSL Flow surveillance SI-183-204, -205, -206, and -207 later this shift.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Transfer Bus 1A202 to Normal Source
2		I	Main Steam Tunnel Temperature Detector Failure
3		C	Reactor Feed Pump 'A' Bearing High Temperature
4		I	IRM 'G' Fails Upscale / IRM Division I Bypass Failure
5		C	LOOP / Scram / 1 Rod Fails to Insert
6		M	Small Break Loss of Coolant Accident
7		I	'B' RHR Pump Auto Logic Failure
8		C	'B' Core Spray Pump Trip
9		I	Breaker 1A20404 Auto Logic Failure
10		M	Rapid Depressurization / RPV Flooding

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

PP&L–SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title:	**ILO CERTIFICATION / NRC EXAM SCENARIO**
Scenario Duration:	**90 Minutes**
Scenario Number:	**ILO-501**
Revision/Date:	**Rev. 0, 7/9/2004**
Course:	**PC007/PC008, Initial License RO/SRO Certification Examination** **PC017/PC018, Initial License RO/SRO NRC Examination**

Operational Activities:

1. **Transfer Bus 1A202 to Normal Source**
2. **MS Tunnel Temperature Detector Failure**
3. **RFP A Bearing High Temperature**
4. **IRM G Upscale/IRM Div 1 Bypass Failure**
5. **LOOP/Scram/1 Rod Fails to Insert**
6. **Small Break LOCA**
7. **B RHR Pump Auto Logic Failure**
8. **B Core Spray Pump Trip**
9. **Breaker 1A20404 Auto Logic Failure**
10. **Rapid Depressurization/RPV Flooding**

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 Unit 1 in MODE 2 at ~ 5% power and Unit 2 at 100% power. ESS Bus 1A202 is aligned to alternate; the crew will transfer bus 1A202 to its normal power source following routine breaker maintenance.

A Reactor Building steam tunnel leak detection instrument failure results in an isolation instrumentation channel failure for the MSIVs. Technical Specifications require declaring the instrument inoperable and taking the actions for Condition A. A high bearing temperature on Reactor Feedwater Pump A will require the crew to transfer feedwater injection to RFP B and shutdown or trip RFP A.

An upscale failure of IRM G will result in a half scram condition; the crew will bypass IRM G and recognize the bypass was unsuccessful preventing reset of the half scram condition.

A loss of offsite power (LOOP) will occur along with numerous onsite ESS bus and diesel generator failures that result in only one 4KV bus (1A202) being energized from the emergency diesel generator. A small recirculation system suction line break occurs inside the drywell along with the power loss. Following the automatic reactor scram and isolation one control rod fails to insert. The loss of power results in a loss of feedwater injection capability and HPCI injection is prevented by a steam supply valve failure. The only high pressure injection source is RCIC. Inventory loss from the break exceeds makeup capacity while reactor pressure remains above the discharge head of low pressure ECCS injection systems and reactor water level drops below TAF (-161"). Logic failure will prevent automatic start of the B RHR pump. Control room manual operation of the failed RHR pump will allow injection from B loop of RHR. The crew will perform Rapid Depressurization and permit low pressure ECCS injection from B RHR and CS pumps. During reactor water level recovery an automatic trip of Core Spray pump B occurs and the crew will be unable to recover the pump. Following the reactor depressurization, when drywell instrument run temperatures exceed SAT curve limits, the US will declare reactor water level indeterminate and enter EO-000-114, RPV Flooding.

With only B RHR injection capacity flooding pressure can not be achieved. Maintenance assistance will allow recovery of emergency diesel generator D. A failure will prevent the automatic closure of breaker 1A20404 from the diesel generator to the bus. The crew can manually close breaker 1A20404 and provide RHR and Core Spray injection using the D pumps. The crew will maximize injection sources to establish RPV pressure ≥81 psig above Suppression Chamber pressure.

The scenario will be terminated when the crew has established RPV pressure ≥81 psig above Suppression Chamber pressure.

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SCENARIO OBJECTIVES

The objective of this scenario is to evaluate the licensed operator candidate's ability to respond to the scenario events. These events will require each candidate to demonstrate the following:

- Knowledge of integrated plant operations
- Ability to diagnose abnormal plant conditions
- Ability to work together as a team
- Ability to mitigate plant transients that exercise their knowledge and use of ONs and EOPs
- Ability to utilize Technical Specifications (SRO Only)

To meet this objective, the licensed operator candidates must demonstrate proficiency in the following competencies:

Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures, references, and Technical Specifications
3. Operate the control boards
4. Communicate and interact with other crew members

Senior Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures and references
3. Operate the control boards (N/A to upgrade candidates)
4. Communicate and interact with the crew and other personnel
5. Direct shift operations
6. Comply with and use Technical Specifications

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CRITICAL TASKS

★ **Perform Rapid Depressurization when RPV level drops to –161 inches**

Safety Significance

RPV leakage or loss of injection systems impacts the ability to provide continued adequate core cooling through core submergence based on inventory loss.

Consequences for Failure to Perform Task

Failure to take the EOP actions will result in uncovering the core and breach of the fuel clad due to over heating.

SSES EOP Basis for:

The following steps provide the operating crew guidance to line up injection systems as available to maintain level >-129". If these actions are unsuccessful, the crew receives additional direction when it is determined that level can not be maintained above TAF.

RC/L- 4 RESTORE AND MAINTAIN LVL BETWEEN **+13"** AND **+54"** USING TABLE **3** SYSTEMS

RC/L-5 **IF** LVL CANNOT BE RESTORED AND MAINTAINED **> +13"** MAINTAIN LVL **> -129"** USING TABLE **3** SYSTEMS AUGMENTING AS DESIRED WITH TABLE **5** ALTERNATE SUBSYSTEMS

RC/L-10 IRRESPECTIVE OF VORTEX LIMITS WITH TABLE **3** SYSTEMS PERFORM ALL
1 LINE UP FOR INJECTION
2 START PUMPS
3 INCREASE INJECTION TO MAX

RC/L-11 **IF** LESS THAN 2 TABLE **4** SUBSYSTEMS CAN BE LINED UP COMMENCE LINING UP AS MANY AS POSSIBLE TABLE **5** ALTERNATE SUBSYSTEMS

RC/L-13 WITH TABLE **5** ALTERNATE SUBSYSTEMS PERFORM ALL:
1 LINE UP FOR INJECTION
2 START PUMPS
3 INCREASE INJECTION TO MAX

CRITICAL TASKS

RC/L-16 **WHEN** LVL CANNOT BE RESTORED AND MAINTAINED **> -161"** GO TO RAPID DEPRESS

Rapid Depressurization is not initiated until RPV water level has dropped to -161" (TAF) because:

- *Adequate core cooling exists so long as RPV water level remains above -161" (TAF).*
- *The time required for RPV water level to decrease to -161" (TAF) can best be used to line up and start pumps, attempting to reverse the decreasing RPV water level trend before Rapid Depressurization is required to assure continued adequate core cooling.*

(Reference: SSES-EPG C1-4 and second override before C3-1)

Indications/Cues for Event Requiring Critical Task

Reactor water level trending downward, eventually indicating less than the top of active fuel height on the Fuel Zone Level Indicator.

Performance Criteria

Perform a Rapid Depressurization per EO-000-112 when water level reaches the TAF –161" as read on the Fuel Zone Instrument.

Initiate ADS / Manually Open all 6 ADS valves

Performance Feedback

Initiating a rapid depressurization causes Reactor pressure to lower to the shutoff head of the low pressure injection systems allowing water level to rise on the Fuel Zone and Wide Range level instruments.

Verify ADS valves are open using light red light indication, acoustic monitoring and lowering Reactor pressure and rising reactor water level.

CRITICAL TASKS

★ **Declare RPV level indication indeterminate due to violation of the RPV Saturation Curve**

★ **Restore power to ESS Bus 1A204 by manually closing breaker 1A20404**

★ **Perform RPV Flooding when RPV level becomes indeterminate by increasing injection flowrate to raise RPV pressure to ≥ 81 psid above Suppression Chamber pressure**

Safety Significance

Adequate core cooling may be challenged if core submergence can not be verified due to indeterminate RPV level indication.

Consequences for Failure to Perform Task

Failure to take the EOP actions may result in uncovering the core and breach of the fuel clad due to over heating.

SSES EOP Basis for:

RC/L-2 **IF** LVL CANNOT BE DETERMINED
GO TO RPV FLOODING

If RPV water level cannot be determined, the actions specified in the subsequent [E0-102] steps cannot be performed since RPV water level and water level trend information is required for determining which actions to take. The transition to EO-000-114, RPV Flooding, is necessary to assure continued adequate core cooling under conditions where RPV water level cannot be determined.

RF-12 COMMENCE AND IRRESPECTIVE OF VORTEX LIMITS INCREASE INJECTION TO ESTABLISH:

RPV PRESS NOT DECREASING
AND
RPV PRESS ≥ **81 PSID** ABOVE SUPP CHMBR PRESS
USING ANY:

- CORE SPRAY
- LPCI WITH FLOW THROUGH HX ASAP
- COND
- CRD MAXIMIZED
- RHRSW X-TIE FROM EITHER UNIT
- FIRE SYSTEM IAW ES-013-001

CRITICAL TASKS

- CRD X-TIE TO OTHER UNIT
- ECCS KEEP-FILL
- RHR SDC SUCTION FILL
- SLC BORON TANK
- SLC DEMIN X-TIE

These systems consist of all motor-driven systems which are available to flood the RPV. As many of these systems as necessary must be used to establish and maintain the conditions required to verify RPV flooding. Establishing adequate core cooling conditions dictates that adherence to Vortex limits not be required.

Three conditions must be satisfied to verify RPV flooding without direct indication of RPV water level:

1. *At least 4 SRVs must be open. This ensures that adequate steam flow will exist for cooling any un-submerged portion of the core when RPV pressure is ≥ 81 psid above Suppression Chamber pressure.*

2. *RPV pressure must <u>not</u> be decreasing. This ensures that the required steam flow will be maintained.*

3. *RPV pressure must be greater than Suppression Chamber pressure by at least 81 psid, the Minimum RPV Flooding Pressure (MRFP).*

The MRFP is defined to be the lowest differential pressure between the RPV and the Suppression Chamber at which steam flow through 4 SRVs is sufficient to remove decay heat. The assumed decay heat generation rate is ten minutes after shutdown from full power. Since ten minutes is the earliest that RPV flooding could reasonably be expected to be needed, establishing and maintaining RPV pressure above the MRFP assures that more than enough steam flows through the SRVs to carry away all core decay heat.

This requires that a sufficient quantity of water reach the core to carry away decay heat by boiling, which in turn requires that RPV water level increase. Maintaining this above the minimum pressure (81 psid) assures that the RPV will ultimately flood to the main steam lines.

Indications/Cues for Event Requiring Critical Task

Violation of the RPV Saturation Curve is indicated by PICSY format (RPVSAT) showing purple indication on the curve, plot on the unsafe side by the Crew and/or RPV level instrumentation failing in the upscale direction.

CRITICAL TASKS

Performance Criteria

Recognize failure of RPV level indicators due to reaching saturation conditions on the instrument runs, initiate rapid depressurization by opening ADS valves and then increasing RPV injection until RPV pressure is NOT decreasing and is ≥ 81 psig above Suppression Chamber pressure.

Performance Feedback

Initiating a rapid depressurization causes Reactor pressure to lower to the shutoff head of the low pressure injection systems allowing water level to rise to the point that RPV pressure will increase to a value that is 81 psid above Suppression Chamber. At this point injection should be stabilized to maintain the DP.

Verify ADS valves are open using light red light indication, acoustic monitoring and lowering Reactor pressure.

Verify injection from available systems raises RPV pressure to a value that is 81 psid above Suppression Chamber.

★ Denotes Simulator Critical Task

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SCENARIO REFERENCES

1. TRANSFER BUS 1A202 TO NORMAL SOURCE

   OP-104-001 4KV ELECTRICAL SYSTEM, REV. 7

2. MAIN STEAM TUNNEL TEMPERATURE DETECTOR FAILURE

   AR-112-B02 STEAM TUNNEL LOGIC B/D HI TEMP, REV. 26
   AR-111-B03 MN STEAM LINE LEAK DETECTION HI TEMP, REV. 27
   AR-111-E01 MSIV LOGIC B/D ISO INITIATED, REV. 27
   TS 3.3.6.1 PRIMARY CONTAINMENT ISOLATION INSTRUMENTATION, AMEND. 213

3. RFP A BRG HI TEMP

   AR-120-B01 RFPT/RFP A, B, C BRG HI TEMP, REV. 14
   OP-145-001 FEEDWATER, REV. 35

4. IRM G UPSCALE FAILURE / IRM DIV 1 BYPASS FAILURE

   AR-103-A01 RPS CHANNEL A1/A2 AUTO SCRAM, REV. 25
   AR-104-A05 IRM CHAN A/C/E/G UPSCALE TRIP OR INOP, REV. 19
   AR-104-B05 IRM UPSCALE, REV. 19
   TS 3.3.1.1 RPS INSTRUMENTATION, AMENDMENT 178

5. LOOP / LOCA / 1 ROD FAILS TO INSERT

   ON-100-101 SCRAM, REV. 11
   ON-004-002 ENERGIZING DEAD 4KV ESS BUS, REV. 16
   ON-104-001 UNIT 1 RESPONSE TO LOSS OF ALL OFFSITE POWER, REV. 13
   ON-104-201 LOSS OF 4KV ESS BUS 1A (1A201), REV. 5
   ON-104-203 LOSS OF 4KV ESS BUS 1C (1A203), REV. 5
   ON-104-204 LOSS OF 4KV ESS BUS 1D (1A204), REV. 5
   EO-000-102 RPV CONTROL, REV. 1
   EO-000-103 PRIMARY CONTAINMENT CONTROL, REV. 2

6. B RHR PUMP AUTO LOGIC FAILURE

7. B CORE SPRAY PUMP TRIP

   AR-113-B03 CORE SPRAY PUMP B TRIP, REV. 21
   AR-157-C01 PUMP B AUTO TRIP, REV. 5

SCENARIO REFERENCES

8. BKR 1A20404 AUTO LOGIC FAILURE

   ON-004-002 ENERGIZING DEAD 4KV ESS BUS, REV. 16

9. RAPID DEPRESSURIZATION / RPV FLOODING

   EO-000-112 RAPID DEPRESSURIZATION, REV. 1
   EO-000-114 RPV FLOODING, REV. 1

SCENARIO SPECIAL INSTRUCTIONS

1. Initialize the simulator to **IC-11**: Unit 1 in MODE 2 at 9% power EOL and Unit 2 at 100% power.

2. Set up the simulator for the scenario by performing the following:
   a. Lower reactor power to ~5%; insert control rods to step 322 in B2 S/U sequence.
   b. Transfer ESS Bus 1B (1A202 to alternate source (Transformer 11; Breaker 1A20201) see OP-104-001, section 3.1.4.

   OR

   Run Auto Exercise file: ILO501SETUP

3. Take a snapshot to **IC-101**.

4. Type **restorepref YPP.ILO-501;** verify that the following pre-inserts and Program Button assignments. **Verity the Environment window:**

MALFS	REMFS	OVRDS	TRIGS
7 : 7	0	1 : 1	4

MALFUNCTIONS

BR04:1A20404	BKR 1A20404 AUTO LOGIC FAILURE
DG024001C	D/G C FAILURE TO START
DG024001D	D/G D FAILURE TO START
MV07:HV155F001 0	HPCI F001 FAIL CLOSED
MV09:HV151F016B 2	'B' DW SPRAY OB ISOL VALVE FAILS TO OPEN
PM04:1P202B	'B' RHR PUMP AUTO START FAILURE
RD1550062239 48	ROD 22-39 STUCK @ 48

REMOTE FUNCTIONS

NONE

OVERRIDES

ZDIC5120S06 OFF	FAILURE OF G IRM BYPASS JOYSTICK

TRIGGERS / ACTIONS

E1 RFP.ATRIP	TRUE WHEN RFPT A IS TRIPPED
E1 = MMF FW145005A 130 30:00 ASIS	REDUCE RFP A HI BRG TEMPERATURE
E2 BCSFLOW	TRUE WHEN 'B' CS FLOW ~3800 GPM
E2 = IMF CS151006B	TRIP 'B' CORE SPRAY PUMP
E3 ILO501RFP	TRUE WHEN BEARING TEMP AT 190 DEG F
E3 = MMF FW145005A 250 20:00 ASIS	SLOW RAMP OF BEARING TEMP INCREASE
E4 ILO501RHRB	TRUE WHEN 'B' RHR CONTROL SW TO START
E4 = DMF PM04:1P202B	DELETES AUTO START FAILURE

SCENARIO SPECIAL INSTRUCTIONS

PROGRAM BUTTONS

[P-1] IMF TH02:TEB21N14B 350	MN STM TUNNEL TEMP DETECTOR FAILURE
[P-2] IMF FW145005A 250 10:00 ASIS	'A' RFP HP BRG HI TEMPERATURE
[P-3] MMF FW145005A 130 30:00 ASIS	REDUCE 'A' RFP HP BRG HI TEMPERATURE
[P-4] IMF NM178004G 125	'G' IRM FAILURE UPSCALE
[P-5] bat YPB.ILO-501A	LOOP/LOCA BATCH FILE
[P-6] IOR QDI43CMC LOCAL	D/G 'C' TO LOCAL
[P-7] IOR QDI43CMD LOCAL	D/G 'D' TO LOCAL
[P-8] DMF DG024001D	DELETE D/G D START FAILURE

5. Verify VENTURI is selected as the Feedwater flow input to PICSY IAW OI-TA-021.

6. Prepare a turnover sheet indicating:

   a. Using start-up rod sequence B2 starting at step 322.
   b. ESS bus 1A202 is selected to alternate source. Maintenance has completed routine breaker maintenance on the normal supply breaker. Transfer Bus 1A202 to normal power source.

7. Prepare the following scenario support documentation:

   a. Reactivity control package for the start-up using B2 S/U sequence at step 322.
   b. Rod coupling surveillance SO-156-007.
   c. GO-100-002 marked up to step 5.49.7.
   d. Prepare to provide plant status specifically RFPs.
   e. Prepare OP-104-101 for bus transfer.
   f. Control Room Phone list.
   g. Shift Assignment Sheet.

8. Acknowledge all PICSY Alarms

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the Simulator to **IC-101**. 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 walkdown.

EVENT	TIME	DESCRIPTION
1		TRANSFER BUS 1A202 TO NORMAL SOURCE
2		MS TUNNEL TEMP DETECTOR FAILURE
3		RFP A BRG HI TEMP
4		IRM G UPSCALE FAILURE / IRM DIV I BYPASS FAILURE
5		LOOP / SCRAM / 1 ROD FAILS TO INSERT
6		SMALL BREAK LOCA
7		B RHR PUMP AUTO LOGIC FAILURE
8		B CORE SPRAY PUMP TRIP
9		BKR 1A20404 AUTO LOGIC FAILURE
10		RAPID DEPRESSURIZATION / RPV FLOODING

SCENARIO EVENT FORM

Event No: 1
Brief Description: **TRANSFER BUS 1A202 TO NORMAL SOURCE**

POSITION	TIME	STUDENT ACTIVITIES
US		Directs PCO to transfer Bus 1A202 to normal (preferred) source per OP-104-001.
PCOP		Transfers Bus 1A202 to normal (preferred) source IAW OP-104-001: 1. ENSURE SU Bus 20 Xfmr 211 Bkr 0A10412 CLOSED. 2. OBSERVE ESS Transformer 211 secondary supply line voltage on Voltmeter XI-00041 is nominally 4200V. 3. ENSURE loads to be picked up by ESS Transformer 211 will not overload Transformer 211. 4. INSERT key and PLACE Xfmr 211-Bus 1B Sync Sel keyswitch to ON. 5. CHECK two voltages MATCHED by OBSERVING Diff AC Volts XI-00036 reads less than 297 volts. 6. CHECK two sources IN PHASE by OBSERVING Synchroscope XI-00037 is at 12 o'clock position. 7. CLOSE Xfmr 211 to Bus 1B Bkr 1A20209 by PLACING switch to CLOSE. 8. OBSERVE Xfmr 211 to Bus 1B Bkr 1A20209 CLOSES. 9. When Xfmr 211 to Bus 1B Bkr 1A20209 CLOSES, OBSERVE Xfmr 111 to Bus 1B Bkr 1A20201 AUTOMATICALLY OPENS. 10. OBSERVE voltage indication on ESS BUS 1B (1A202). (PICSY Display - 4KV) 11. ENSURE Transformer 211 not overloaded by monitoring ESS Xfmr 211 current indication. 12. RETURN Xfmr 211-Bus 1B Sync Sel keyswitch to OFF and REMOVE key. 13. ALIGN all control switch flags to actual breaker positions.

★ Denotes Critical Task

NOTES:	

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

Event No: 1
Brief Description: TRANSFER BUS 1A202 TO NORMAL SOURCE

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 2
Brief Description: MS TUNNEL TEMPERATURE DETECTOR FAILURE

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports alarm STEAM TUNNEL LOGIC B/D HI TEMP; refers to AR-112-B02.
		Reports alarm MAIN STEAM LINE LEAK DETECTION HI TEMP; refers to AR-111-B03.
		Reports alarm MSIV LOGIC B/D ISO INITIATED; refers to AR-111-E01.
		From AR-111-B03 or AR-112-B02: 1. Verifies status of leak detection instrumentation on panel 1C614. 2. Reports TSH-B21-1N600B for Reactor Building steam tunnel is tripped. 3. Checks temperature module for proper operation and alarm setpoint. • Places module switch to read. • Places module switch to set.
		Reports module is reading ~350°F.
		Verifies B MSIV isolation status light is <u>not</u> LIT.
US		Refers to TS 3.3.6.1, Primary Containment Isolation Instrumentation: 1. Table 3.3.6.1 requires 2 channels per trip system operable for function 1.e. 2. In division 2 only one channel is operable, therefore entry into Condition A is required. 3. Required action A.1 is applicable: place channel in trip within 24 hours.
		Contacts Work Week Manager (WWM) and requests I&C investigate failure of TSH-B21-1N600B.

★ Denotes Critical Task

NOTES:	

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

Event No: 2
Brief Description: MS TUNNEL TEMPERATURE DETECTOR FAILURE

INSTRUCTOR ACTIVITY:

After 1A202 bus transfer is complete, activate Reactor Building main steam line tunnel temperature switch failure, **Depress: P-1:**

[P-1] IMF TH02:TEB21N14B 350

ROLE PLAY:

As Work Week Manager acknowledge the instrument failure and state it will be investigated.

SCENARIO EVENT FORM

Event No: 3
Brief Description: RFP A BEARING HI TEMPERATURE

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports alarm from PISCY or RFPT/RFP A, B, C BRG HI TEMP; refers to AR-120-B01: 1. Observes temperatures on TR-11966 on panel 1C668. 2. Determines A RFPT HP bearing has high oil drain temperature indication from TR-11966 or PICSY format data. 3. Determines A RFPT HP bearing has high metal temperature using PICSY format data.
		Dispatches a Plant Operator to check RFPT A oil drains.
		Warms 'C' RFP per OP-145-001 Section 2.2.3.b-e.
US		Directs actions to establish feedwater injection with B RFP.
		Directs reducing load on A RFP or manually tripping A RFP.
		Contacts Work Week Manager (WWM) to investigate RFP A.
PCOM		Refers to OP-145-001, Section 2.5, to establish feed with B RFP: 1. Establishes RFP B discharge pressure 50 –100 psig below reactor pressure by: • Increasing speed using SIC-C32-1R601B controller. • Throttles RFP B recirc flow valve FV-10604B in manual to maintain flow greater than min flow setpoint indication on 1C651. 2. Checks B RFP discharge temperature is approximately equal to A RFP temperature using TR-10608 on 1C652. 3. Feeds vessel with RFP B: • Increases speed using SIC-C32-1R601B until pump just begins to feed. • Reduces minimum flow in manual using FIC-C32-10604B and observes: ✓ RFP B minimum flow decreasing ✓ RFP B discharge flow increasing
		Reduces RFPT A speed and/or trips A RFPT as directed.

★ Denotes Critical Task

NOTES:	

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

Event No: 3
Brief Description: RFP A BEARING HI TEMPERATURE

INSTRUCTOR ACTIVITY:

When actions are complete for Reactor Building steam tunnel temperature element, insert RFPT A bearing high temperature; **Depress P-2**

[P-2] IMF FW145005A 250 10:00 ASIS

NOTE: Setpoint for AR-120-B01 is 195°F bearing metal temperature.
PICSY oil drain temp alarm is 160°F.
PICSY metal drain alarms is 190°F.
PICSY alarms in ~3 minutes.

Monitor temperatures on **RFPTA** (PICSY) and **FW28** (XIS).

When RFP A is shutdown or tripped ensure the RFPT bearing high temperature malfunction is modified to reduce bearing temperature. Trigger **E1** is set to modify the malfunction if the A RFP is tripped, otherwise **Depress P-3:**

[P-3] MMF FW145005A 130 30:00 ASIS

ROLE PLAY:

As Plant Operator sent to investigate the A RFP, wait ~2 minutes and report no visible problems exist at A RFPT.

NOTE: No oil drain sight boxes or local oil drain temperatures are available for the RFPT.

As Work Week Manager acknowledge the RFPT high bearing temperature and state it will be investigated.

As Plant Operator sent to investigate Condensate Filtration trouble alarm report local panel indicates:

FLOW BALANCE TROUBLE (A06)

PROBABLE CAUSE:
Lead filter flow control valve CLOSES.
Loss of Condensate flow.
Lead filter flow transmitter failure

SCENARIO EVENT FORM

Event No: 4
Brief Description: **IRM G UPSCALE FAILURE / IRM DIV I BYPASS FAILURE**

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Recognizes/reports IRM upscale trip and RPS Channel A1/A2 auto scram annunciation.
		Refers to AR-104-A05, IRM CHAN A/C/E/G UPSCALE TRIP OR INOP: 1. Determines IRM G indication is upscale. 2. Observes RPS Channel A trip indication and RMCS rod block indications. 3. Ensures range switch is set to range 10.
		Dispatches a Plant Operator to check condition of IRM drawer switches and indication.
US		Contacts Work Week Manager (WWM) and requests I&C investigate the IRM upscale condition.
		Refers to TS 3.3.1.1 and determines LCO is met with 3 operable IRM channels.
		Directs PCOM to manually bypass IRM channel G.
		Directs PCOM to reset RPS half scram condition.
PCOM		Bypasses IRM G by placing channel bypass joystick to G position.
		Determines IRM G was <u>not</u> bypassed based upon any of these indications: 1. BYPASS indication lamp for IRM G <u>not</u> lit. 2. IRM upscale and trip annunciators not 'slow flashing'. 3. Rod Block annunciator not 'slow flashing'.
US		Contacts Work Week Manager (WWM) and requests I&C investigate the IRM channel bypass failure condition.

★ Denotes Critical Task

NOTES:	

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

Event No: 4
Brief Description: IRM G UPSCALE FAILURE / IRM DIV I BYPASS FAILURE

INSTRUCTOR ACTIVITY:

When RFP 'B' is feeding and RPV and water level control is stable, insert IRM G upscale failure; **Depress: P-4:**

[P-4] IMF NM178004G 125

ROLE PLAY:

As Plant Operator sent to investigate IRM G upscale failure, wait ~2 minutes and report IRM G drawer switch is in Operate and I have both the upscale and trip lights on the drawer lit.

As Work Week Manager acknowledge the upscale failure of IRM G and IRM Channel Bypass failure and state they will be investigated.

SCENARIO EVENT FORM

Event No: 5
Brief Description: LOOP / SCRAM / 1 ROD FAILS TO INSERT

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Performs actions for reactor scram: 1. Places reactor mode switch to shutdown. 2. Verifies/reports rod positions. 3. Reports all rods full-in except rod 22-39 at position 48. 4. Inserts SRM and IRM detectors.
PCOP		Reports electric plant status: 1. Loss of offsite power. 2. D/G A running, not connected to bus 1A201. 3. Bus 1A201 has a bus lockout, AR-015-D08. 4. D/G B is running and connected to bus 1A202. 5. D/G C and D/G D failed to start. 6. Buses 2A201 and 2A202 are energized from D/G. 7. Aux Buses 11A & 11B de-energized.
US		Enters ON-100-101, SCRAM: 1. Directs stabilizing RPV level +13 to +54 inches with RCIC and HPCI. 2. Directs stabilizing RPV pressure <1087 with SRVs.
		Directs implementation of ON-004-002, ENERGIZING DEAD 4KV ESS BUS.
		Directs implementation of ON-104-001, LOSS OF OFFSITE POWER.
		Directs implementation of ON-104-201, LOSS OF 4KV ESS BUS 1A (1A201).
		Directs implementation of ON-104-203, LOSS OF 4KV ESS BUS 1C (1A203).
		Directs implementation of ON-104-204, LOSS OF 4KV ESS BUS 1D (1A204).

★ Denotes Critical Task

NOTES:	

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

Event No: 5
Brief Description: LOOP / SCRAM / 1 ROD FAILS TO INSERT

INSTRUCTOR ACTIVITY:

When the actions for IRM G are complete, insert a LOOP and LOCA, **Depress P-5:**

[P-5] bat YPB.ILO-501A

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 5, 6
Brief Description: LOOP / SMALL BREAK LOCA

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Attempts to energize dead buses 1C (1A203) and 1D (1A204).
		From ON-004-002 and buses 1C and 1D: 1. Confirms normal, alternate, and D/G breakers are open. 2. Checks status of bus lockout relays. 3. Ensures breakers on Attachment C are open. 4. Performs start attempt from 0C653: • Places governor mode selector switch to ISOCH. • Ensures the voltage regulator mode switch in AUTO. • Depresses the start pushbutton. 5. Reports manual start attempt from 0C653 was not successful. 6. Dispatches Plant Operator to perform local start attempt.
		Verifies ESW pump B starts to supply cooling to D/Gs.
		Dispatches Plant Operator to investigate relay status for bus 1A (1A201)
		Reports drywell pressure is >1.72 psig and drywell temperature is >150°F.
US		Enters EO-000-102, RPV CONTROL, and EO-000-103, PRIMARY CONTAINMENT CONTROL, when drywell pressure exceeds 1.72 psig: 1. Directs PCOs to perform panel walkdown for: • Isolations • Initiations • D/G starts 2. Directs RPV level band +13 to +54 inches with RCIC and HPCI. 3. Directs stabilizing RPV pressure <1087 with SRVs.

★ Denotes Critical Task

NOTES:	

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

Event No: 5, 6
Brief Description: LOOP / SMALL BREAK LOCA

INSTRUCTOR ACTIVITY:

If directed to perform local start of D/G C, wait ~2 minutes and transfer the control mode switch to local, **Depress P-6:**

[P-6] IOR QDI43CMC LOCAL

If directed to perform local start of D/G D, wait ~2 minutes and transfer the control mode switch to local, **Depress P-7:**

[P-7] IOR QDI43CMD LOCAL

ROLE PLAY:

As Plant Operator sent to D/Gs C & D, wait ~3 minutes and report the following conditions are present for both D/Gs:

Panel 0C521C & D alarms: D/G BAY HVAC TROUBLE
LUBE OIL CIRCUL PUMP MALFUNCTION
MCC NOT PROPER FOR AUTO OPERATION

All other conditions appear normal.

As Plant Operator sent to bus 1A201, wait ~2 minutes and report bus lockout relays 86A-201 and 86A1-201 are tripped. Also bus relay 87A1 for Bus Primary Differential OC is tripped.

As Plant Operator sent to attempt local start of D/G C, wait ~30 seconds after transferring D/G C to local and report the local start attempt was not successful.

As Plant Operator sent to attempt local start of D/G D, wait ~30 seconds after transferring D/G D to local and report the local start attempt was not successful.

SCENARIO EVENT FORM

Event No: 5, 6
Brief Description: LOOP / SMALL BREAK LOCA

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports panel 1C601 status: 1. CRD pumps not running. 2. RCIC is injecting to the RPV. 3. Div. 1 RHR and Core Spray system inoperable. 4. Div. 2 Core Spray available with B pump only. 5. Div. 2 RHR available with B pump only. 6. HPCI is not injecting; valve F001 failed to open and will not manually open. 7. MSIVs are shut. 8. Isolation signal for 1.72 psig and/or –38".
		Reports RPV LEVEL is lowering.
US		Contacts Work Week Manager to investigate: 1. D/G C & D start failure. 2. Bus 1A201 lockout condition. 3. HPCI F001 valve failure to open.
		Contacts TCC for information concerning loss and restoration of offsite power.
		Directs maintaining RPV LEVEL >-129" when RPV LEVEL can not be maintained >+13".
		Directs Core Spray and RHR systems: 1. Lined up for injection 2. Pumps started
PCOP		Reports Core Spray pump B auto start when RPV LEVEL drops to <-129 inches.
NOTE 1		Reports RHR pump B auto start failure when RPV LEVEL drops to <-129 inches.

★ Denotes Critical Task

NOTES:	(1) Failure of RHR pump B will also be experienced if the US were to direct manual
pushbutton initiation of RHR while executing EO-000-102.	

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

Event No: 5, 6
Brief Description: LOOP / SMALL BREAK LOCA

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 7, 10
Brief Description: B RHR PUMP AUTO LOGIC FAILURE / RAPID DEPRESSURIZATION

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Manually starts RHR pump B: 1. Places and holds control switch for RHR pump B to start position. 2. Observes pump red light lit and amber light not lit.
PCOP		Transitions to Fuel Zone level indicator when WR RPV level indication drops below –145".
		Reports corrected fuel zone RPV water level indication.
		Reports fuel zone level is <-161" (TAF).
★ US		**Directs Rapid Depressurization when RPV level drops to –161 inches.** 1. Enters EO-000-112, RAPID DEPRESSURIZATION. 2. Verifies Suppression Pool level > 5 feet. 3. Directs opening all ADS SRVs. 4. Verifies all ADS SRVs are open.
★ PCOP NOTE 1		**Performs Rapid Depressurization by opening all ADS SRVs.** 1. Arms and depresses Division 1 and/or Division 2 ADS manual pushbuttons and verifies 6 red lights lit for ADS solenoids, or 2. Places individual control switch to open for each ADS SRV (G, J, K, L, M, & N) and verifies red light lit and amber light not lit for each valve solenoid. 3. Verifies 6 ADS SRVs are open: • Observes acoustic monitor status light indication; sees only 3 ADS SRVs open. • Observes RPV pressure decrease. • Observes elevated tail pipe temperatures on TRS-B21-1R614. 4. Verifies Core Spray and LPCI injection valves open when RPV pressure decreases to <420 psig. 5. Reports Core Spray and LPCI injection flow to the RPV.

★ Denotes Critical Task

NOTES:	(1) Div 1 acoustic monitor does not have power, therefore status light indication is not
available for 3 ADS SRVs.	

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

Event No: 7, 10
Brief Description: B RHR PUMP AUTO LOGIC FAILURE / RAPID DEPRESSURIZATION

INSTRUCTOR ACTIVITY:

NOTE: When uncorrected Fuel Zone Level indicates ~-200 inches, corrected RPV LEVEL should be ~-161 inches.

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 8, 9, 10
Brief Description: B CORE SPRAY PUMP TRIP / BRK 1A20404 AUTO LOGIG FAILURE / RPV FLOODING

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports RPV water level trend.
		Reports Core Spray pump B trip.
		Dispatches Plant Operator to investigate Core Spray pump B and breaker 1A20205.
US		Plots drywell instrument run temperature and RPV pressure on the SAT curve.
★ US		**Declares RPV level indication indeterminate due to violation of the RPV Saturation Curve.** 1. Enters EO-000-114, RPV FLOODING when RPV water level is indeterminate. 2. Verifies: • MSIVs and MSL drains closed • RCIC isolation valves HV-149-F007 and HV-149-F008 closed
PCOP		Reports D D/G started; breaker 1A20404 did not auto close to energize bus 1A204.
★ PCOP		**Restores power to ESS Bus 1A204 by manually closing breaker 1A20404:** 1. Verifies all synchroscope switches are OFF on 0C653. 2. Inserts key into synch switch and place to 'ON'. 3. Places breaker 1A20404 control switch to CLOSE. 4. Verifies breaker indicates closed and bus 1A204 power available. 5. Places synch switch to OFF.
		Reports RHR pump 'D' auto starts.
		Reports Core Spray pump 'D' auto starts.
		Reports ESW pump 'D' auto starts.
★ US		**Directs RPV Flooding by increasing injection flowrate to raise RPV pressure to ≥ 81 psid above Suppression Chamber pressure.**

★ Denotes Critical Task

NOTES:	

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

Event No: 8, 9, 10
Brief Description: B CORE SPRAY PUMP TRIP / BRK 1A20404 AUTO LOGIG FAILURE / RPV FLOODING

INSTRUCTOR ACTIVITY:

Ensure the trigger **E-2** actuates to trip Core Spray pump B when flowrate reaches ~3800 gpm.

After RPV Flooding procedure is entered and if permission is granted by the control room to start D/G D, **Depress P-8:**

[P-8] DMF DG024001D

ROLE PLAY:

As Plant Operator sent to Core spray pump B, wait ~3 minutes and report no abnormal conditions are visible around the pump area.

As Plant Operator sent to breaker 1A20205, wait ~3 minutes and report feeder overcurrent relay 50/51 is tripped.

After RPV Flooding procedure is entered, call the control room as maintenance sent to investigate the D/G failures and report you have found a problem with D/G D and need permission to try a start attempt for D D/G.

Following the D/G D start, as maintenance call the control room and state the D/G should function normally from this point. We will continue trouble-shooting D/G C.

SCENARIO EVENT FORM

Event No: 10
Brief Description: RPV FLOODING

POSITION	TIME	STUDENT ACTIVITIES
★ PCOP		**Increases injection flowrate to raise RPV pressure to ≥ 81 psid above Suppression Chamber pressure.** 1. Ensures maximum injection flowrate from Division 2 Core Spray and LPCI pumps. 2. Reports RPV pressure and Suppression Chamber pressure.
US		Determines RPV pressure ≥ 81 psig above Suppression Chamber pressure.
		Records time conditions are met.
		Contacts TSC to enter EP-DS-003, RPV LEVEL DETERMINATION.
US		***After the scenario is complete, classifies the event as a SITE AREA EMERGENCY under EAL FS1 due to a Loss or Potential Loss of the Fuel Clad Barrier and a Loss of the RCS Barrier.***

★ Denotes Critical Task

NOTES:	

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

Event No: 10
Brief Description: RPV FLOODING

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

TERMINATION CUE:

The crew has established injection to raise RPV pressure ≥81 psig above Suppression Chamber pressure.

EVENT CLASSIFICATION:

After the Scenario is complete, have the US classify the scenario for the HIGHEST EAL. Provide the US with any requested information needed to perform the classification.

Facility: Susquehanna Scenario No.: ILO-401 Op-Test No.: N/A

Examiners: _____ Operators: _____

Initial Conditions: Unit 1 at 69% power EOL, Unit 2 at 100% power EOL

Turnover: A plant startup is being conducted in accordance with GO-100-002 and is complete through step 5.74. Control rods are being withdrawn in accordance with startup sequence B2, which is currently at step 550. RCIC is tagged out for maintenance and is not expected back this shift. Unit 1 Cooling Tower lights are out of service due to a bad circuit breaker. The Standby Liquid Control air sparger is open for a Chemistry surveillance.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Drywell Unit Coolers/Fans Surveillance
2		C	Trip of Drywell Fan 1V414A
3		C	Condensate Pump 'C' Trip / RFPT 'A' Control Signal Failure
4		C	Containment Instrument Gas Leak on PT-12643
5		M	Outboard MSIV Closure
6		C	2 SRVs Stick Open
7		C	Bottom Head Drain Line Leak
8		C	HPCI Auto Start Failure
9		C	ADS Auto Logic Failure
10		M	Rapid Depressurization

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

PP&L–SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title:	**ILO CERTIFICATION / NRC EXAM SCENARIO**
Scenario Duration:	**90 Minutes**
Scenario Number:	**ILO-401**
Revision/Date:	**Rev. 0, 7/9/2004**
Course:	**PC007/PC008, Initial License RO/SRO Certification Examination** **PC017/PC018, Initial License RO/SRO NRC Examination**

Operational Activities:

1. **Drywell Unit Coolers/Fans Surveillance**
2. **Trip of Drywell Fan 1V414A**
3. **Condensate Pump C Trip / RFPT A Control Signal Failure**
4. **CIG Leak on PT-12643**
5. **Outboard MSIV Closure**
6. **2 SRVs Stick Open**
7. **Bottom Head Drain Line Leak**
8. **HPCI Auto Start Failure**
9. **ADS Auto Logic Failure**
10. **Rapid Depressurization**

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 plant is operating with Unit 1 at ~70% power and Unit 2 at 100% power. RCIC is tagged out for maintenance. The scenario begins with the crew performing the quarterly LOCA test of Drywell Area Unit Coolers and Fans IAW SO-160-001. During this test, fan 1V414A trips, resulting in a failed surveillance test and the need for the Unit Supervisor to take the required actions of Tech Specs.

After the crew responds to the failed Drywell Cooler Fan, Condensate Pump C will trip along with a simultaneous RFPT A control signal failure. The crew will respond by taking manual control of the Feedwater Level Control System.

This is followed by a leak on Containment Instrument Gas pressure transmitter PT-12643. The crew will respond to the Control Room annunciator and dispatch an operator to the field who will report the leak. The leak causes a swap to the bottle header and requires a Technical Specifications and Technical Requirements review by the US.

After actions for the failed CIG instrument are complete, the outboard MSIVs will fail closed. This initiates a Reactor scram and the resulting RPV pressure surge causes the bottom head drain line inside the Drywell to crack. The SRVs operate to limit the pressure rise as designed; however, two SRVs (G and K) stick open, The crew will attempt to close the stuck open SRVs IAW ON-183-001, but will not be successful. However, 3-4 minutes into the event, the SRVs will close.

The crew will enter EO-000-102, RPV Control, at 1087 psig, and EO-000-103, Primary Containment Control, @ 1.72 psig and 150°F. At 1.72 psig, HPCI will fail to auto start, but when manually initiated, HPCI trips and cannot be restarted. RCIC is unavailable (tagged out of service for maintenance).

Drywell pressure and temperature continue to increase. Elevated Drywell temperatures will require the crew to evaluate Figure 1, RPV Saturation Temperature to verify level instrument availability.

RPV level continues to drop due to the break on the bottom head drain line. At -38", the Recirc pumps trip, resulting in a +50" level swell. SRV operation to maintain RPV pressure < 1087 will result in inventory loss (maximized CRD is the only source of high pressure injection). When RPV level is < -161" and RPV pressure is > 125 psig (EO-000-102 step RC/L-15), the crew will be required to rapidly depressurize. Condensate will not inject due to pre-inserted failures of the Feedwater Low Load Valve (HV-10641) and Bypass (HV-10640). After water level is recovered, the crew will address containment parameters.

The scenario will be terminated when RPV level is restored to +13" to +54" and primary containment parameters are being addressed.

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SCENARIO OBJECTIVES

The objective of this scenario is to evaluate the licensed operator candidate's ability to respond to the scenario events. These events will require each candidate to demonstrate the following:

- Knowledge of integrated plant operations
- Ability to diagnose abnormal plant conditions
- Ability to work together as a team
- Ability to mitigate plant transients that exercise their knowledge and use of ONs and EOPs
- Ability to utilize Technical Specifications (SRO Only)

To meet this objective, the licensed operator candidates must demonstrate proficiency in the following competencies:

Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures, references, and Technical Specifications
3. Operate the control boards
4. Communicate and interact with other crew members

Senior Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures and references
3. Operate the control boards (N/A to upgrade candidates)
4. Communicate and interact with the crew and other personnel
5. Direct shift operations
6. Comply with and use Technical Specifications

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CRITICAL TASKS

★ **Initiate Drywell sprays when Suppression Chamber pressure exceeds 13 psig**

Safety Significance

Maintenance of primary containment integrity.

Actions are taken to spray the Drywell during a LOCA when the Suppression Chamber pressure exceeds 13 psig. From the Susquehanna Emergency Operating Procedures basis document, EO-000-103, "The value of 13 psig is the lowest suppression chamber pressure which can occur when 95% of the non-condensables (Nitrogen) in the drywell have been transferred to the suppression chamber." At 13 psig suppression chamber pressure, 5% of the non-condensables remain in the drywell. This 5% value is the limit established to preclude "chugging" – the cyclic condensation of steam at the downcomer openings of the drywell vents. Values in excess of 13 psig are indicative of more non-condensables in the drywell, meaning chugging is more probable.

Chugging (steam bubble collapse at the downcomer exit resulting in a water in-rush to fill the voided areas) induces stresses at the junction of the downcomers and the drywell floor. Repeated such stresses may result in failure of these joints, creating a direct bypass from drywell to suppression chamber. Bypassing the suppression pool will directly pressurize the primary containment during a LOCA may result in failure.

By requiring drywell sprays at 13 psig in the suppression chamber (5% non-condensables in the drywell), a drywell non-condensable value of >1% will be maintained and chugging should not occur.

From Appendix D of NUREG-1021, Draft Revision 9, the critical task listed above has essential safety action that correctly completed, will prevent "degradation of any barrier to fission product release" and the crew will take action to "effectively direct or manipulate engineered safety feature (ESF) controls that would prevent any condition describe in the previous paragraph."

Consequences of Failure to Perform the Task

Potential failure of primary containment.

SSES EOP Basis for:

PC/P-5 **WHEN** SUPP CHMBR PRESS **> 13 PSIG**
CONTINUE
[Directions to initiate drywell sprays]

Drywell spray operation may affect the availability of electrical equipment located in the drywell. Therefore, suppression chamber sprays are given the maximum time allowable to reduce primary containment pressure before operation of drywell sprays is required. The allowable time is determined by the suppression chamber pressure which is equated to the amount of non-condensables remaining in the drywell.

CRITICAL TASKS

The value of 13 psig is the lowest suppression chamber pressure which can occur when 95% of the non-condensables (N_2) in the drywell have been transferred to the suppression chamber. That is, at least 5% non-condensables remain in the drywell when suppression chamber pressure reaches 13 psig. This non-condensable concentration limit is established to preclude chugging - the *cyclic condensation of steam at the downcomer openings of the drywell vents. A suppression chamber pressure greater than 13 psig could be indicative of a lower concentration of non-condensables in the drywell, thereby meaning that chugging is more probable.*

Chugging occurs when a steam bubble collapses at the exit of the downcomers, the rush of water drawn into the downcomers to fill the void induces stresses at the junction of the downcomers and the drywell floor. Repeated occurrence of such stresses could cause fatigue failure of these joints, thereby creating a direct path between the drywell and suppression chamber. Steam discharged through the downcomers could then bypass the suppression pool and directly pressurize the primary containment. Scale model tests have demonstrated that chugging will not occur so long as the drywell contains at least 1% non-condensables. To preclude conditions under which chugging may occur, drywell sprays are conservatively required when at least 5% non-condensables remain in the drywell, i.e., suppression chamber pressure reaches 13 psig.

Both wide range and narrow range suppression chamber pressure indication is available in the control room. Wide range suppression chamber pressure indication is available locally on Containment H_2/O_2 Analyzer Panel if analyzer is selected to suppression chamber.

Indications/Cues for the Event Requiring Critical Task

Multiple control board and control room indications of suppression chamber and drywell pressures.

Performance Criteria

Start an operable RHR loop
Perform a valve alignment to provide a flowpath for spray.

Performance Feedback

RHR pump, valve and system flow indications are available.
Multiple indications of Drywell pressure dropping

CRITICAL TASKS

★ **Limit Drywell spray flow to between 1000 and 2800 gpm for the first 30 seconds**

Safety Significance

Maintenance of primary containment integrity.

Actions are taken to limit the system flowrates when first initiating drywell sprays (1000 to 2800 gpm for the first 30 seconds). The reason for this restriction is to limit the magnitude of the drywell pressure reduction such that it will not go less than atmospheric (prevents air from being drawn in to containment) and ensures a margin to the negative design pressure of the containment.

The BWR Owners Group Emergency Operating Procedures Basis document discusses drywell spray limitations utilizing a Drywell Spray Initiation Limit Curve to protect against containment damage from exceeding the design drywell to suppression chamber differential pressure. From the Susquehanna Emergency Operating Procedures basis document, EO-000-103, "A drywell spray initiation limit has been developed by PPL" which provides the same protection guarantees without necessitating the use of an additional curve on the EOP flowcharts. "By limiting drywell spray flow to between 1000 and 2800 gpm for the first 30 seconds of drywell spray operation, drywell sprays can be initiated without concern" in all regions of the BWR Owners Group curve. "After 30 seconds of operation, the drywell atmosphere contains sufficient vapor to allow full drywell sprays flow." In other words, spraying the drywell within these limits will not result in a drywell pressure rapid reduction such that the differential pressure limit would be challenged.

From Appendix D of NUREG-1021, Draft Revision 9, the critical task listed above has essential safety action that correctly completed, will prevent "degradation of any barrier to fission product release" and the crew will take action to "effectively direct or manipulate engineered safety feature (ESF) controls that would prevent any condition describe in the previous paragraph."

Consequences of Failure to Perform the Task

Potential failure of primary containment.

SSES EOP Basis for:

PC/P-7

SHUT DOWN DW COOLERS
SHUT DOWN RECIRC PUMPS
INITIATE DW SPRAYS
UNLESS PUMPS CONTINUOUSLY NEEDED
FOR ADEQUATE CORE COOLING
LIMITING FLOW TO BETWEEN **1000** AND **2800 GPM**
FOR FIRST **30 SEC**

CRITICAL TASKS

A DWSIL (Drywell Spray Initiation Limit) has been developed by PP&L which provides protection against containment damage from exceeding the design differential pressure, yet does not restrict operation of the drywell sprays. By limiting drywell spray flow to between 1000 and 2800 gpm for the first 30 seconds of drywell spray operation, drywell sprays can be initiated without concern in all regions of this curve. After 30 seconds, the drywell atmosphere contains sufficient vapor to allow full drywell sprays flow. For this reason, the curve is not included.

Indications/Cues for the Event Requiring Critical Task

The Unit Supervisor will direct drywell sprays be initiated, limiting flow to between 1000 and 2800 gpm for the first 30 seconds. The PCO will initiate drywell sprays monitoring the flowrate on available digital and analog indications on 1C601, limiting flow to between 1000 and 2800 gpm for at least the first 30 seconds of operation before increasing flow.

Performance Criteria

Manually throttle HV151-F016A and B and monitor drywell spray
Use clock to determine 30 seconds has elapsed

Performance Feedback

Monitor Drywell spray flow indications during first 30 seconds of drywell spray operation

★ **Secure Drywell sprays before Drywell pressure drops to 0 psig**

★ **Secure Suppression Chamber sprays before Suppression Chamber pressure drops to 0 psig**

Safety Significance

Operation of drywell / suppression chamber sprays is stopped before drywell / suppression chamber pressure decreases to 0 psig to assure that primary containment pressure is not reduced below atmospheric. A positive primary containment pressure precludes air from being drawn in through a primary containment path (which may have been opened for control of primary containment hydrogen and oxygen). It also assures that a margin to the negative design pressure of the primary containment exists.

Consequences for Failure to Perform Task

Potential exists for air to be drawn in through a primary containment path (which may have been opened for control of primary containment hydrogen and oxygen). Could also exceed the negative design pressure of the primary containment.

CRITICAL TASKS

Indications/Cues for Event Requiring Critical Task

Drywell / Suppression Chamber pressure decreasing toward 0 psig.

Performance Criteria

Secures spray flow to the Drywell / Suppression Chamber IAW OP-149-004.

Performance Feedback

Drywell / Suppression Chamber spray isolation valves indicate closed.
Spray flow to the Drywell / Suppression Chamber indicates 0 gpm.
Drywell / Suppression Chamber pressure > 0 psig and no longer decreasing.

★ **Perform Rapid Depressurization when RPV level drops to –161 inches**

Safety Significance

RPV leakage or loss of injection systems impacts the ability to provide continued adequate core cooling through core submergence based on inventory loss.

Consequences for Failure to Perform Task

Failure to take the EOP actions will result in uncovering the core and breach of the fuel clad due to over heating.

SSES EOP Basis for:

The following steps provide the operating crew guidance to line up injection systems as available to maintain level >-129". If these actions are unsuccessful, the crew receives additional direction when it is determined that level can not be maintained above TAF.

RC/L- 4 RESTORE AND MAINTAIN LVL BETWEEN
+13" AND **+54"**
USING TABLE **3** SYSTEMS

RC/L-5 **IF** LVL CANNOT BE RESTORED AND MAINTAINED **> +13"**
MAINTAIN LVL **> -129"** USING TABLE **3** SYSTEMS
AUGMENTING AS DESIRED WITH
TABLE **5** ALTERNATE SUBSYSTEMS

CRITICAL TASKS

RC/L-10 IRRESPECTIVE OF VORTEX LIMITS
WITH TABLE **3** SYSTEMS
PERFORM ALL
1 LINE UP FOR INJECTION
2 START PUMPS
3 INCREASE INJECTION TO MAX

RC/L-11 **IF** LESS THAN 2 TABLE **4** SUBSYSTEMS CAN BE LINED UP
COMMENCE LINING UP AS MANY AS POSSIBLE
TABLE **5** ALTERNATE SUBSYSTEMS

RC/L-13 WITH TABLE **5** ALTERNATE SUBSYSTEMS PERFORM ALL:
1 LINE UP FOR INJECTION
2 START PUMPS
3 INCREASE INJECTION TO MAX

RC/L-16 **WHEN** LVL CANNOT BE RESTORED AND MAINTAINED **> -161"** GO TO RAPID DEPRESS

Rapid Depressurization is not initiated until RPV water level has dropped to -161" (TAF) because:

- *Adequate core cooling exists so long as RPV water level remains above -161" (TAF).*
- *The time required for RPV water level to decrease to -161" (TAF) can best be used to line up and start pumps, attempting to reverse the decreasing RPV water level trend before Rapid Depressurization is required to assure continued adequate core cooling.*

(Reference: SSES-EPG C1-4 and second override before C3-1)

Indications/Cues for Event Requiring Critical Task

Reactor water level trending downward, eventually indicating less than the top of active fuel height on the Fuel Zone Level Indicator.

Performance Criteria

Perform a Rapid Depressurization per EO-100-112 when water level reaches the TAF -161" as read on the Fuel Zone Instrument. Initiate ADS / Manually Open all 6 ADS valves

Performance Feedback

Initiating a rapid depressurization causes Reactor pressure to lower to the shutoff head of the low pressure injection systems allowing water level to rise on the Fuel Zone and Wide Range level instruments.

CRITICAL TASKS

Verify ADS valves are open using light red light indication, acoustic monitoring and lowering Reactor pressure and rising Reactor water level.

★ **Declare RPV level indication indeterminate due to violation of the RPV Saturation Curve**

★ **Perform RPV Flooding when RPV level becomes indeterminate by increasing injection flowrate to raise RPV pressure to ≥ 81 psid above Suppression Chamber pressure**

Safety Significance

Adequate core cooling may be challenged if core submergence can not be verified due to indeterminate RPV level indication.

Consequences for Failure to Perform Task

Failure to take the EOP actions may result in uncovering the core and breach of the fuel clad due to over heating.

SSES EOP Basis for:

RC/L-2 **IF** LVL CANNOT BE DETERMINED
GO TO RPV FLOODING

If RPV water level cannot be determined, the actions specified in the subsequent [EO-102] *steps cannot be performed since RPV water level and water level trend information is required for determining which actions to take. The transition to EO-000-114, RPV Flooding, is necessary* ***to assure continued adequate core cooling*** *under conditions where RPV water level cannot be determined.*

RF-12 COMMENCE AND IRRESPECTIVE OF VORTEX LIMITS
INCREASE INJECTION TO ESTABLISH:

RPV PRESS NOT DECREASING
AND
RPV PRESS ≥ **81 PSID** ABOVE SUPP CHMBR PRESS
USING ANY:

- CORE SPRAY
- LPCI WITH FLOW THROUGH HX ASAP
- COND
- CRD MAXIMIZED

CRITICAL TASKS

- RHRSW X-TIE FROM EITHER UNIT
- FIRE SYSTEM IAW ES-013-001
- CRD X-TIE TO OTHER UNIT
- RHR SDC SUCTION FILL
- SLC BORON TANK
- SLC DEMIN X-TIE

These systems consist of all motor-driven systems which are available to flood the RPV. As many of these systems as necessary must be used to establish and maintain the conditions required to verify RPV flooding. Establishing adequate core cooling conditions dictates that adherence to Vortex limits not be required.

Three conditions must be satisfied to verify RPV flooding without direct indication of RPV water level:

1. *At least 4 SRVs must be open. This ensures that adequate steam flow will exist for cooling any unsubmerged portion of the core when RPV pressure is ≥ 81 psid above suppression chamber pressure.*

2. *RPV pressure must <u>not</u> be decreasing. This ensures that the required steam flow will be maintained.*

3. *RPV pressure must be greater than suppression chamber pressure by at least 81 psid, the Minimum RPV Flooding Pressure (MRFP).*

The MRFP is defined to be the lowest differential pressure between the RPV and the suppression chamber at which steam flow through 4 SRVs is sufficient to remove decay heat. The assumed decay heat generation rate is ten minutes after shutdown from full power. Since ten minutes is the earliest that RPV flooding could reasonably be expected to be needed, establishing and maintaining RPV pressure above the MRFP assures that more than enough steam flows through the SRVs to carry away all core decay heat.

This requires that a sufficient quantity of water reach the core to carry away decay heat by boiling, which in turn requires that RPV water level increase. Maintaining this above the minimum pressure (81 psid) assures that the RPV will ultimately flood to the main steam lines.

Indications/Cues for Event Requiring Critical Task

Violation of the RPV Saturation Curve is indicated by PICSY format (RPVSAT) showing purple indication on the curve, plot on the unsafe side by the Crew and/or RPV level instrumentation failing in the upscale direction.

CRITICAL TASKS

Performance Criteria

Recognize failure of RPV level indicators due to reaching saturation conditions on the instrument runs, initiate rapid depressurization by opening ADS valves and then increasing RPV injection until RPV pressure is NOT decreasing and is 81 psig above suppression chamber pressure.

Performance Feedback

Initiating a rapid depressurization causes Reactor pressure to lower to the shutoff head of the low pressure injection systems allowing water level to rise to the point that RPV pressure will increase to a value that is 81 psid above Suppression Chamber. At this point injection should be stabilized to maintain the DP.

Verify ADS valves are open using light red light indication, acoustic monitoring and lowering Reactor pressure.

Verify injection from available systems raises RPV pressure to a value that is 81 psid above Suppression Chamber.

★ Denotes Simulator Critical Task.

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SCENARIO REFERENCES

1. DRYWELL UNIT COOLERS/FANS SURVEILLANCE / TRIP OF DRYWELL FAN 1V414A

SO-160-001	QUARTERLY LOCA TEST OF DRYWELL AREA UNIT COOLERS/FANS, REV. 7
AR-127-D01	DRWL FAN 1V414A FAILED, REV. 14
AR-106-A16	HVAC DIV 1 PANEL 1C681 SYSTEM TROUBLE, REV. 28
OP-160-001	DRYWELL VENTILATION SYSTEM, REV. 10
TS 3.6.3.2	DRYWELL AIR FLOW SYSTEM, AMMEND. 178

2. CONDENSATE PUMP C TRIP / RFPT A CONTROL SIGNAL FAILURE

AR-101-A08	CONDENSATE PUMP C TRIP, REV. 30
AR-101-B08	CONDENSATE PUMP C MOTOR OVERCURRENT, REV. 30
AR-101-B16	RFPT CONTROL SIGNAL FAILURE, REV. 30
ON-145-001	RPV LEVEL CONTROL SYSTEM MALFUNCTION, REV. 15

3. CIG LEAK ON PT-12643

AR-107-C06	BYPASS INDICATION SYS DIV 2 INOP ECCS/ESF SYS, REV. 26
AR-150-D01	CONTN INSTR GAS SYSTEM, REV. 6
AR-111-H02	INSTRUMENT GAS HEADER A LO PRESS, REV. 27
TR 3.5.3	LONG TERM NITROGEN SUPPLY TO ADS, 8/31/1998

4. OUTBOARD MSIV CLOSURE / 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK

EO-000-102	RPV CONTROL, REV. 1
EO-000-103	PRIMARY CONTAINMENT CONTROL, REV. 2
ON-183-001	STUCK OPEN SAFETY RELIEF VALVE, REV 20

5. HPCI AUTO START FAILURE

OP-152-001	HPCI SYSTEM, REV. 31

6. ADS AUTO LOGIC FAILURE

OP-183-001	AUTOMATIC DEPRESSURIZATION SYSTEM, REV. 15

7. RAPID DEPRESSURIZATION

EO-000-112	RAPID DEPRESSURIZATION, REV. 1

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SCENARIO SPECIAL INSTRUCTIONS

1. Set up the simulator for the scenario by performing the following:
   a. Initialize to IC-17.
   b. Perform following prior to running batch file;
      Remove RCIC from service.
      - RCIC controller to MAN and 0% output.
      - Div. 1 / 2 OOS switches to INOP.
      - Close HV-F007 and HV-F008.
      - Open LV-F054 to decrease header pressure to 0 psig, then close LV-F054.
      - Insert bat RCB.ILO-401SU.
   c. Snapshot to an available IC (currently **IC-105**).

2. Initialize the simulator to **IC-105**, Unit 1 at 69% power EOL; Unit 2 at 100% power EOL.

3. Type **restorepref YPP.ILO-401;** verify the following pre-inserts and Program Button assignments.
   Verify the Environment window:

MALFS	REMFS	OVRDS	TRIGS
9 : 9	0	0 : 0	1

MALFUNCTIONS

AV01:HV149F088	RCIC WARMUP VALVE
AV04:HV10640 0	FAILURE OF FEEDWATER LOW-LOAD VALVE
AV04:LV10641 0	FAILURE OF FEEDWATER STARTUP VALVE
BR05:1A10104	AUX BUS 11A FAILS AS IS
BR05:1A10204	AUX BUS 11B FAILS AS IS
RC150011	RCIC TURBINE TRIP
RL01:B21C1K5A	AUTO ADS LOGIC FAILURE
RL01:B21C1K5B	AUTO ADS LOGIC FAILURE
RL01:E411K2	HPCI AUTO START FAILURE

REMOTE FUNTIONS

DC188073 (part of snapshot)	OPEN BREAKER FOR RCIC F007
DB106383 (part of snapshot)	OPEN BREAKER FOR RCIC F008

OVERRIDES

NONE

TRIGGERS / ACTIONS

E1 PAAA23524	HPCI TURBINE SPEED AT 600 RPM
E1 = IMF HP15215	HPCI TURBINE TRIP

SCENARIO SPECIAL INSTRUCTIONS

PROGRAM BUTTONS

[P-1] IMF PM03:1V414A	TRIP OF DWCLG FAN 1V414A
[P-2] bat YPB.ILO-401A	COND PUMP TRIP / RFP SPD CTRL SGL FAILS
[P-3] bat YPB.ILO-401B	CIG LEAK ON PT-12643
[P-4] (Not Used)	
[P-5] (Not Used)	
[P-6] bat YPB.ILO-401C	CLOSES OB MSIVs / OPENS 3 SRVs / RAMPS BOTTOM HEAD DRAIN LEAKAGE
[P-7] MRF RD155028 100	OPEN CRD PUMP SUCTION FILTER BYPASS

4. Verify LEFM is selected as the Feedwater flow input to PICSY IAW OI-TA-021.

5. Prepare a turnover sheet indicating:

   a. Unit 1 is at 69% power EOL.
   b. Unit 2 is at 100% power EOL.
   c. GO-100-002 is in progress through step 5.74.
   d. Rod Sequence B2; startup at step 550.
   e. RCIC Out of Service
   f. Quarterly LOCA test of Drywell Area Unit Coolers and Fans IAW SO-160-001.
   g. U-1 cooling tower lights out-bad breaker-CR'd
   h. SBLC Air Sparge is open for Chemistry SC

6. Make a copy of shift assignments.

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the Simulator to **IC-105.** 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 walkdown.

EVENT	TIME	DESCRIPTION
1		DRYWELL UNIT COOLERS/FANS SURVEILLANCE
2		TRIP OF DRYWELL FAN 1V414A
3		CONDENSATE PUMP C TRIP / RFPT A CONTROL SIGNAL FAILURE
4		CIG LEAK ON PT-12643
5		OUTBOARD MSIV CLOSURE
6		2 SRVs STICK OPEN
7		BOTTOM HEAD DRAIN LINE LEAK
8		HPCI AUTO START FAILURE
9		ADS AUTO LOGIC FAILURE
10		RAPID DEPRESSURIZATION

SCENARIO EVENT FORM

Event No: 1, 2
Brief Description: DRYWELL UNIT COOLERS/FANS SURVEILLANCE / TRIP OF DRYWELL FAN 1V414A

POSITION	TIME	STUDENT ACTIVITIES
US		Directs performance of quarterly LOCA test of drywell area unit coolers/fans.
		Monitors drywell temperatures during performance of surveillance.
PCOP		Performs quarterly LOCA test of drywell area unit coolers/fans IAW SO-160-001. 1. Monitors drywell temperatures during performance of surveillance. 2. Confirms DRYWELL COOLING FAN A & B TEST SWITCHES in NORMAL. 3. Places control switch for all Drywell Area Coolers/Fans in START HIGH and confirms red operating lights illuminate. 4. Places Drwl Clr 1V411B in STOP position. 5. Places Drywell Cooling Fan A Test Switch in TEST LOCA position. 6. Confirms the 'A' Drywell Area Unit Coolers/Fans (1V411A-1V418A) have stopped as indicated by their individual amber lights. 7. Starts the 'A' Drywell Area Unit Coolers/Fans (1V411A-1V418A) in low speed by placing their control switches in START LOW and commences timing. 8. Confirms the 'A' Drywell Area Unit Coolers/Fans (1V411A-1V418A) are running in low speed as indicated by their individual red lights.
		Reports alarm DRWL FAN 1V414A FAILED; refers to AR-127-D01.
		Dispatches Plant Operator to investigate the breaker for drywell cooling fan 1V414A.
		Notifies US that SO-160-001 has failed due to 1V414A not running for at least 15 minutes.
		Returns Drywell Ventilation System to normal operation IAW OP-160-001.
PCOM		Reports alarm HVAC DIV I PANEL 1C681 SYSTEM TROUBLE; refers to AR-106-A16.
NOTE 1		
US		Declares Drywell Fan 1V414A inoperable; refers to TS 3.6.3.2. Determines Condition A applies: restore drywell cooling fan to OPERABLE within 30 days.
		Contacts WWM and requests maintenance investigate failure of fan 1V414A.

★ Denotes Critical Task

NOTES:	(1) If 'A' Drywell Area Unit Cooler/Fan (1V411A) turned off the following alarms will be
received: DRYWELL VENTIL SYSTEM AR-149-D04 and BYPASS INDICATION SYS DIV 1 INOP	
ECCS/ESF SYS AR-107-B06.	

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

Event No: 1, 2
Brief Description: DRYWELL UNIT COOLERS/FANS SURVEILLANCE / TRIP OF DRYWELL FAN 1V414A

INSTRUCTOR ACTIVITY:

Enter **P1C68102/P1C68105** on Instructor Station to monitor drywell cooler status.

After all group 1 fans are confirmed running in slow speed (step 5.8 of SO-160-001), insert a trip of drywell cooling fan 1V414A; **Depress P-1:**

[P-1] IMF PM03:1V414A TRIP OF DWCLG FAN 1V414A

Monitor drywell temperatures on PMS format 'CTATM':

Start: 118.4°F
Stop: 132.1°F ~16 minutes

ROLE PLAY:

As Plant Operator sent to check breaker for drywell cooling fan 1V414A, wait 2 minutes and report breaker (1B236033) for fan 1V414A is tripped.

As WWM: "Will investigate to determine if problem is electrical involving breaker or mechanical which would be in the Drywell, which we can't get enter at this time."

SCENARIO EVENT FORM

Event No: 3
Brief Description: CONDENSATE PUMP C TRIP / RFPT A CONTROL SIGNAL FAILURE

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports alarm CONDENSATE PUMP C TRIP; refers to AR-101-A08.
		Reports alarm CONDENSATE PUMP C MOTOR OVERCURRENT; refers to AR-101-B08
		Ensures condensate pump C discharge valve HV-10520C closes.
		Verifies Reactor Feed pump suction greater than 264 psig.
		Reports alarm RFPT CONTROL SIGNAL FAILURE; refers to AR-101-B16.
		Refers to ON-145-001, RPV Level Control System Malfunction.
		Dispatches Plant Operator to investigate C condensate pump and breaker and A RFPT.
		Reports alarm TBCCW HEADER HI-LO TEMP AR-123-G05.
		Stops CONDENSATE PUMP 1P102A(B)(C)(D) by depressing STOP pushbutton.
		Ensures COND PP A(B)(C)(D) DSCH HV-10502A(B)(C)(D) CLOSES.
		Checks Condensate pump header pressure indicates above 530 psig if other Condensate Pumps are left running.
US		Implements ON-145-001, RPV Level Control System Malfunction.
		Contacts WWM and requests maintenance investigate C condensate pump trip and A RFPT control signal failure.
PCOM		Places RPFT A SPD CTL/DEMAND SIGNAL SIC-C32-1R601A controller in MANUAL. 1. Recognizes SIC-C32-1R601A(B)(C) does not take control: 2. Lowers RFPT A(B)(C) MTR SPD CHANGER using HS-12730A1(B1)(C1) slow pushbutton until RFPT Speed LOWERS. 3. Depresses HYD JACK RFPT A(B)(C) HS-12772A(B)(C) ON pushbutton. 4. Adjusts RFPT A(B)(C) MTR SPD CHANGER HS-12730 A1 and A2 (B1 and B2) (C1 and C2) using SLOW pushbuttons to control RPV Water Level ≈ 35 inches and equalizes discharge flows on operating pumps.
		Requests a dedicated operator to control RPV level while in manual.

★ Denotes Critical Task

NOTES:	

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

Event No: 3
Brief Description: **CONDENSATE PUMP C TRIP / RFPT A CONTROL SIGNAL FAILURE**

INSTRUCTOR ACTIVITY:

When actions are complete for the trip of drywell cooling fan 1V414A, insert a trip of the C condensate pump and a simultaneous RFPT 'A' control signal failure; **Depress P-2:**

[P-2] bat YPB.ILO-401A

Monitor PICSY **FWC** for RFP speed control.

ROLE PLAY:

As the Plant Operator sent to investigate the trip of condensate pump C, wait ~3 minutes and report the breaker (1A10109) is tripped and relay 50/51 targets are dropped. The pump shaft seized and breaker tripped on over-current.

As WWM: "Will send a pair of electricians to investigate the breaker and do a quick look at the pump and motor."

SCENARIO EVENT FORM

Event No: 4
Brief Description: CIG LEAK ON PT-12643

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Refers to AR-107-C06, BYPASS INDICATION SYS DIV 2 INOP ECCS/ESF SYS.
		Reports alarm CONTN INSTR GAS SYSTEM; refers to AR-150-D01.
		Verifies position of SV-12644 and SV-12643 on panel 1C601.
		Checks PI-12649; recognizes N2 pressure decaying on BTL1T212A.
		May verify GIG compressor(s) available and attempt to reopen SV-12644.
		Dispatches Plant Operator to gas bottle area to check for leaks.
		Reports alarm INSTRUMENT GAS BOTTLE HEADER LO PRESS; refers to AR-111-H02.
US		Refers to TS 3.5.1 and TR 3.5.3.
		Determines TR 3.5.3 Condition A applies and/or contacts System Engineer for assistance in making operability determination.
		Contacts Work Week Manager to obtain support for repair of CIG leak.

★ Denotes Critical Task

NOTES:	

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

Event No: 4
Brief Description: CIG LEAK ON PT-12643

INSTRUCTOR ACTIVITY:

When the crew has completed actions for the trip of C condensate pump and A RFPT control signal failure, insert a CIG leak on PT-12643; **Depress P-3:**

[P-3] bat YPB.ILO-401B

Monitor Containment Instrument Gas pressures using Screen **PC1.**

ROLE PLAY:

As the Plant Operator sent to Reactor Building elevation 749, wait ~7 minutes and report the sensing line to PT-12643 is leaking. "I see an instrument root valve that should isolate the leak."

Immediately prior to the bottle header pressure reaching 1900 psig (approximately 10 minutes after P-3 depressed), call the control room and report you have closed the instrument root valve to PT-12643.

NOTE:

SV-12644 closes and SV-12643 opens-will not swap back to CIG compressor header until the leak is fixed.

SCENARIO EVENT FORM

Event No: **5, 6, 7, 8**
Brief Description: **OUTBOARD MSIV CLOSURE / 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK / HPCI AUTO START FAILURE**

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Recognizes and reports outboard MSIV closure / Reactor scram.
		Performs actions for Reactor scram: 1. Places reactor mode switch to shutdown. 2. Verifies/reports rod positions. 3. Inserts SRM and IRM detectors.
		Recognizes and reports lowering Reactor pressure.
US		Enters EO-000-102, RPV CONTROL and EO-000-103, PRIMARY CONTAINMENT CONTROL, when drywell pressure exceeds 1.72 psig. 1. Directs PCOs to perform panel walkdown for: • Isolations • Initiations • D/G starts 2. Directs RPV level band +13 to +54 inches.
PCOP		Ensures PC isolations, ECCS initiations, and Diesel Generator starts.
NOTE 1		Recognizes and reports that G, K and L did not close as pressure lowered below setpoint. 1. Refers to ON-183-001 and places affected SRV control switches to OFF. 2. When valves G & K do not close with switch in OFF, affected SRV control switches taken to OPEN and then to OFF. 3. Reports L SRV closed, G and K SRVs open.
		Reports panel 1C601 status: 1. Failure of Buses 11A & 11B to transfer; attempts manual transfer. 2. MSIVs are shut. 3. Isolation signal for 1.72 psig, with D/G starts and ESW pumps in service. 4. HPCI did not auto start on high Drywell pressure.

★ Denotes Critical Task

NOTES:	(1) 'G' and 'K' SRVs will close after 200 seconds and 300 seconds, respectively.

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

Event No: **5, 6, 7, 8**
Brief Description: **OUTBOARD MSIV CLOSURE / 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK / HPCI AUTO START FAILURE**

INSTRUCTOR ACTIVITY:

When the crew has completed actions for the CIG leak, insert the OB MSIV Closure / 2 SRVs Stick Open / Bottom Head Drain Leak malfunctions; **Depress P-6:**

[P-6] bat YPB.ILO-401C

- Closes outboard MSIVs
- Inserts bottom head drain leak
- Sticks 3 SRVs (G, K, L) open: 'L' SRV will close when its control switch is placed in OFF; 'G' SRV will close after 200 seconds; 'K' SRV will close after 300 seconds

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: **5, 6, 7, 8**
Brief Description: **OUTBOARD MSIV CLOSURE / 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK / HPCI AUTO START FAILURE**

POSITION	TIME	STUDENT ACTIVITIES
US		Directs entry to ON-183-001 for Stuck Open SRVs.
		Directs manual startup of HPCI.
PCOP		Manually initiates HPCI IAW OP-152-001: 1. Checks HPCI suction flow path lined up via HV-155-F004 or HV-155-F042. 2. Manually initiates HPCI by arming and depressing the initiation pushbutton, ensuring: • Steam supply valve HV-155-F001 opens • Aux oil pump starts • Cooling water valve HV-156-F059 opens • Barometric condenser vacuum pump starts • Steam line drain valves HV-155-F028 and HV-155-F029 close • Barometric condenser condensate pump discharge valve HV-155-F026 closes • Injection valve HV-F006 opens • HPCI pump room unit cooler 1V209A(B) starts 3. HPCI turbine ramps to rated speed and flow. 4. Recognizes and reports HPCI tripped during start up.
		Reports Suppression Pool Water temperature > 90°F.
US		Contacts Work Week Manager to investigate: 1. HPCI failure to start. 2. 2 SRVs stuck open.
		When RPV level can not be maintained > +13" directs maintaining RPV level > -129" by maximizing CRD and injecting SLC.
		Re-enters EO-000-103, PRIMARY CONTAINMENT CONTROL, when SPT exceeds 90°F.
		Directs placing one loop of RHR in Suppression Pool Cooling and one loop of RHR in Suppression Chamber Spray.

★ Denotes Critical Task

NOTES:	

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

Event No: **5, 6, 7, 8**
Brief Description: **OUTBOARD MSIV CLOSURE / 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK / HPCI AUTO START FAILURE**

INSTRUCTOR ACTIVITY:

When directed to bypass the CRD pump suction filter, **Depress P-7:**

[P-7] MRF RD155028 100 OPEN CRD PUMP SUCTION FILTER BYPASS

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 6, 7
Brief Description: 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK

POSITION	TIME	STUDENT ACTIVITIES
★ US		**Directs securing Suppression Chamber Sprays before Suppression Chamber pressure drops to 0 psig.**
PCOP		Places one loop of RHR in Suppression Pool Cooling IAW OP-149-005, RHR SUPPRESSION POOL COOLING. 1. Places ESW in service. 2. Places RHRSW in service to RHR heat exchanger A (B). 3. Opens Suppression Chamber test shutoff valve HV-151-F028A(B). 4. Starts RHR pump 1P202A(B)(C)(D). 5. Throttles open test line control valve HV-F024A(B) to achieve ≤ 10,000 gpm on FI-E11-1R603 A(B). 6. Observes minimum flow valve HV-151-F007A(B) closes at ~ 3000 gpm. 7. Closes heat exchanger bypass HV-151-F048A(B). 8. Checks RHR pump room coolers 1V210A(B)(C)(D) started.
PCOP		Places one loop of RHR in Suppression Chamber Spray IAW OP-149-004, RHR CONTAINMENT SPRAY. 1. Places ESW in service. 2. Places LOCA OVERRIDE MANUAL OVERRIDE switch to OVERRIDE. 3. Closes LPCI injection valve HV-151-F017A(B). 4. Opens Suppression Chamber test valve HV-151-F028A(B). 5. Starts RHR pump 1P202A(B)(C)(D). 6. Throttles open Suppression Chamber spray valve HV-151-F027A(B) to maintain ≤ 500 gpm as indicated on FI-15120A(B). 7. Places RHRSW in service to RHR heat exchanger A (B).
★ PCOP		**Secures Suppression Chamber Sprays before Suppression Chamber pressure drops to 0 psig.** Throttles closed Suppression Chamber spray valve HV-151-F027A(B).

★ Denotes Critical Task

NOTES:	

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

Event No: 6, 7
Brief Description: 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 6, 7
Brief Description: 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK

POSITION	TIME	STUDENT ACTIVITIES
★ US		**Directs initiating Drywell Sprays when Suppression Chamber pressure > 13 psig.** 1. Directs shutting down Drywell coolers (as necessary). 2. Directs shutting down Recirc pumps (as necessary). **Directs limiting Drywell Spray flow to between 1000 and 2800 gpm for the first 30 seconds.**
★ US		**Directs securing Drywell Sprays before Drywell pressure drops to 0 psig.**
★ PCOP		**Initiates Drywell Sprays IAW OP-149-004, RHR CONTAINMENT SPRAY.** 1. Places ESW in service. 2. Places LOCA OVERRIDE MANUAL OVERRIDE switch to OVERRIDE. 3. Closes LPCI injection valve HV-151-F017A(B). 4. Starts RHR pump 1P202A(B)(C)(D). 5. Opens Drywell spray inboard isolation valve HV-151-F021A(B). **Limits Drywell Spray flow to between 1000 and 2800 gpm for the first 30 seconds.** 6. Throttles open Drywell spray outboard isolation valve HV-151-F016A(B) to establish a flowrate between 1000 and 2800 gpm for the first 30 seconds as indicated on FI-15120A(B). 7. After 30 seconds, throttles open HV-151-F016A(B) to establish ≤ 10,000 gpm as indicated on FI-15120A(B). 8. Places RHRSW in service to RHR heat exchanger A (B).
★ PCOP		**Secures Drywell Sprays before Drywell pressure drops to 0 psig.** Throttles closed Drywell spray outboard isolation valve HV-151-F016A(B).
PCOP		Verifies/reports Core Spray / LPCI pumps auto start when RPV pressure drops to 426 psig or RPV level drops to -129".
		Transitions to Fuel Zone level indicator when WR RPV level indication drops below –145".
		Reports corrected fuel zone level is < -161" (TAF).

★ Denotes Critical Task

NOTES:	

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

Event No: 6, 7
Brief Description: 2 SRVs STICK OPEN / BOTTOM HEAD DRAIN LINE LEAK

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 7, 9, 10
Brief Description: BOTTOM HEAD DRAIN LINE LEAK / ADS AUTO LOGIC FAILURE / RAPID DEPRESSURIZATION

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Recognizes and reports that ADS did not auto initiate.
US		Directs MANUAL initiation of ADS.
PCOP		Manually initiates ADS IAW OP-183-001: 1. ARMS & DEPRESSES A & C or B & D switches. 2. Verifies 6 ADS SRVs are open: • Observes 6 ADS SRVs open on acoustic monitor status light indication. • Observes RPV pressure decrease. • Observes elevated tail pipe temperatures on TRS-B21-1R614.
US		Directs Core Spray and LPCI lined up for injection.
★ **US**		**Directs Rapid Depressurization when RPV level drops to –161 inches.** 1. Enters EO-000-112, RAPID DEPRESSURIZATION. 2. Directs preventing uncontrolled Condensate injection. 3. Verifies Suppression Pool level > 5 feet. 4. Directs opening all ADS SRVs. 5. Verifies all ADS SRVs are open.

★ Denotes Critical Task

NOTES:	

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

Event No: 7, 9, 10
Brief Description: BOTTOM HEAD DRAIN LINE LEAK / ADS AUTO LOGIC FAILURE / RAPID DEPRESSURIZATION

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 7, 9, 10
Brief Description: BOTTOM HEAD DRAIN LINE LEAK / ADS AUTO LOGIC FAILURE / RAPID DEPRESSURIZATION

POSITION	TIME	STUDENT ACTIVITIES
★ PCOP		**Performs Rapid Depressurization by opening all ADS SRVs.** 1. Arms and depresses Division 1 and/or Division 2 ADS manual pushbuttons and verifies 6 red lights lit for ADS solenoids, or 2. Places individual control switch to open for each ADS SRV (G, J, K, L, M, & N) and verifies red light lit and amber light not lit for each valve solenoid. 3. Verifies 6 ADS SRVs are open: • Observes 6 ADS SRVs open on acoustic monitor status light indication. • Observes RPV pressure decrease. • Observes elevated tail pipe temperatures on TRS-B21-1R614. 4. Verifies Core Spray and LPCI injection valves open when RPV pressure decreases to < 420 psig. 5. Reports Core Spray and LPCI injection flow to the RPV. 6. Reports RPV water level trend.
		Takes manual control of Core Spray / LPCI to restore/maintain RPV level +13" to +54".
US		Plots drywell instrument run temperature and RPV pressure on the SAT curve.
★ US		**If RPV Saturation Curve is violated, declares RPV level indication indeterminate;** Enters EO-000-114, RPV FLOODING.
★ US		If EO-000-114 entered, **directs injection with Core Spray/LPCI to establish Reactor pressure ≥ 81 psid above Suppression Chamber pressure.**
★ PCOP		If directed, **injects with Core Spray/LPCI to establish Reactor pressure ≥ 81 psid above Suppression Chamber pressure.**
US		***After the scenario is complete, classifies the event as a SITE AREA EMERGENCY under EAL FS1, assuming RPV level went below –161 inches or was indeterminate. Otherwise classifies the event as an ALERT under EAL FA1.***

★ Denotes Critical Task

NOTES:	

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

Event No: 7, 9, 10
Brief Description: BOTTOM HEAD DRAIN LINE LEAK / ADS AUTO LOGIC FAILURE / RAPID DEPRESSURIZATION

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

TERMINATION CUE:

The scenario will be terminated when RPV level is restored to +13" to +54" and primary containment parameters are being addressed.

EVENT CLASSIFICATION:

After the Scenario is complete, have the US classify the scenario for the HIGHEST EAL. Provide the US with any requested information needed to perform the classification.

Facility: Susquehanna Scenario No.: ILO-301 Op-Test No.: N/A

Examiners: _____ Operators: _____

Initial Conditions: Unit 1 at 30% power EOL, Unit 2 at 100% power EOL

Turnover: Unit 1 is at 30% power with the startup on hold for a Feedwater heater drain valve solenoid replacement. Control rod sequence B2 is currently at step 450. A small leak in the RWCU pump room is being monitored with a video monitor. The leak is on 'B' RWCU pump suction valve 144-F005B. Extraction steam is to be removed from 'C' Feedwater heater string immediately after assuming the shift to avoid spurious valve closures during replacement of solenoid SV-10204B in panel 1C103.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Remove Extraction Steam from 'C' FW HTR String
2		I	MTLO Temperature Element Failure
3		C	Control Rod Drifts In
4		C	Loss of (Reactor Building) Zone 1 HVAC
5		C	Loss of Main Condenser Vacuum
6		C	RPS 'A' Scram Failure
7		M	RCIC Steam Line Break
8		C	RCIC Isolation Failure
9		C	RWCU Pump Room High Temperature
10		M	Rapid Depressurization
11		C	2 ADS SRVs Fail to Open

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

PP&L–SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title:	**ILO CERTIFICATION / NRC EXAM SCENARIO**
Scenario Duration:	**90 Minutes**
Scenario Number:	**ILO-301**
Revision/Date:	**Rev. 0, 7/9/2004**
Course:	**PC007/PC008, Initial License RO/SRO Certification Examination** **PC017/PC018, Initial License RO/SRO NRC Examination**

Operational Activities:

1. **Remove Ext Steam from C Fw Htr String**
2. **MTLO Temperature Element Failure**
3. **Control Rod Drifts In**
4. **Loss of Zone 1 HVAC**
5. **Loss of Main Condenser Vacuum**
6. **RPS 'A' Scram Failure**
7. **RCIC Steam Line Break**
8. **RCIC Isolation Failure**
9. **RWCU Pump Room High Temperature**
10. **Rapid Depressurization**
11. **2 ADS SRVs Fail to Open**

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 Unit 1 at 30% power and Unit 2 at 100% power. A small leak on the suction isolation valve for 'B' RWCU pump is being remotely monitored with video equipment in the Reactor Building. The startup is on hold and Extraction Steam will be removed from Feedwater Heater string C immediately after assuming the shift to allow Maintenance to replace a solenoid in panel 1C103.

A temperature sensor element failure in the main turbine lube oil control loop will cause an oil temperature increase resulting in manual operation of the service water temperature control valve to reduce and stabilize oil temperature. A control rod will drift in several notches; the crew will implement an off-normal procedure and fully insert the drifting rod while an investigation and recovery plan is made.

A loss of Reactor Building HVAC will result in a loss of Zone 1 d/p and require the crew to implement an off-normal procedure. The Technical Specification for Secondary Containment integrity will not be met requiring entry into Condition A. In addition, the loss of Reactor Building HVAC will cause RWCU pump room temperatures to increase faster than normal due to the small steam leak.

A loss of main condenser vacuum will lead the crew to perform a manual reactor scram. RPS 'A' does not trip when the mode switch is taken to shutdown and no control rods insert. The crew will implement actions for failure to scram and when either division 1 manual scram pushbutton is armed and depressed all control rods will fully insert. A loss of Feedwater occurs when the reactor mode switch is placed to shutdown forcing the crew to restore and maintain Reactor water level with RCIC. As condenser pressure continues to increase the MSIVs will automatically close and Reactor pressure will be controlled with SRVs.

When RCIC is initiated a steam line break occurs in the RCIC pump room. RCIC room temperatures will increase to the auto isolation setpoint but the isolation valves fail to close and isolate the leakage. Manual isolation attempts will not be successful. The RWCU temperatures will also rise to the isolation setpoint and RWCU will successfully isolate either manually or automatically. At this point two secondary containment area temperatures have exceeded maximum safe values and a primary system is discharging into secondary containment requiring the crew to perform Rapid Depressurization.

During Rapid Depressurization 2 ADS SRVs will fail to open requiring the crew to open additional SRVs until 6 valves are open to accomplish the blowdown. The scenario will be terminated after the Reactor is depressurized and actions are in progress to implement Suppression Pool Cooling.

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SCENARIO OBJECTIVES

The objective of this scenario is to evaluate the licensed operator candidate's ability to respond to the scenario events. These events will require each candidate to demonstrate the following:

- Knowledge of integrated plant operations
- Ability to diagnose abnormal plant conditions
- Ability to work together as a team
- Ability to mitigate plant transients that exercise their knowledge and use of ONs and EOPs
- Ability to utilize Technical Specifications (SRO Only)

To meet this objective, the licensed operator candidates must demonstrate proficiency in the following competencies:

Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures, references, and Technical Specifications
3. Operate the control boards
4. Communicate and interact with other crew members

Senior Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures and references
3. Operate the control boards (N/A to upgrade candidates)
4. Communicate and interact with the crew and other personnel
5. Direct shift operations
6. Comply with and use Technical Specifications

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CRITICAL TASKS

★ **Recognize failure to scram and initiate a manual scram**

Safety Significance
Control rod insertion initiates power reduction immediately.

Consequences for Failure to Perform Task
Failure to insert control rods allows power to remain elevated with resultant power oscillations and potential core damage.

Indications/Cues for Event Requiring Critical Task
Exceeding an RPS scram setting with NO reactor scram signal, or RPS/ARI fails to fully insert all control rods.

Performance Criteria
Manually insert a reactor scram by arming and depressing the manual scram pushbuttons.

Performance Feedback
Successful insertion of control rods will be indicated by rod position full-in indication.

★ **Perform Rapid Depressurization when two Secondary Containment areas exceed max safe temperature**

Safety Significance
A high-energy leak in the Secondary Containment area impacts the integrity of Secondary Containment. Failure of the Secondary Containment directly relates to the 10CFR100 design criteria of dose to the General Public.

Action is taken to isolate systems that are discharging into Secondary Containment to terminate possible sources of radioactivity release. Minimizing radioactive release to Secondary Containment also helps accomplish the objective of precluding a radioactive release outside Secondary Containment under conditions where Secondary Containment integrity cannot be maintained. Previous containment control actions have not, for whatever reason, mitigated the event and now potentially large areas of the Secondary Containment have been challenged.

CRITICAL TASKS

Consequences for Failure to Perform Task

Failure to take actions to mitigate the energy released to the Secondary Containment directly affects the radiation dose to the General Public.

SSES EOP Basis for:

SC/T-9 **WHEN** RB AREA TEMP EXCEEDS MAX SAFE IN **2** OR MORE AREAS

RAPID DEPRESS IS REQ'D

Should Secondary Containment area temperatures/radiation/water levels continue to increase to their Max Safe values in more than one area with a primary system discharging into Secondary Containment, the RPV must be rapidly depressurized. Depressurizing the RPV promptly places the primary system in its lowest possible energy state, rejects heat to the suppression pool in preference to outside the containment, and reduces the driving head and flow of primary systems that are un-isolated and discharging into the Secondary Containment.

The criteria of "2 or more areas" identifies the increase in temperature (radiation or water level) trend as a wide spread problem which may pose a direct and immediate threat to Secondary Containment integrity, equipment located in the Secondary Containment, or continued safe operation of the plant.

Indications/Cues for Event Requiring Critical Task

Increasing Steam Leak Detection System temperatures and alarms indicating levels at Max Safe values.

Performance Criteria

Perform a Rapid Depressurization per EO-000-112 when two or more RB areas exceed max safe temperatures per EO-000-104 Table 8.

Initiate ADS / Manually Open all 6 ADS valves

Performance Feedback

Initiating a rapid depressurization causes Reactor pressure to lower which lowers the driving force of any primary system breach.

Verify ADS valves are open using red light indication, acoustic monitoring, lowering Reactor pressure and rising Reactor water level.

★ Denotes Simulator Critical Task

SCENARIO REFERENCES

1. REMOVE EXT STM FROM C FW HTR STRING

OP-147-001	FEEDWATER HEATERS, REV. 16
TS 3.2.2	MINIMUM CRITICAL POWER RATIO, AMMEND. 178

2. MTLO TEMPERATURE ELEMENT FAILURE

AR-123-H05	MAIN TURB L-O COOLER DSCH HI TEMP, REV. 16
AR-105-C05	TURB GEN BRG HI TEMP, REV. 17

3. CONTROL ROD DRIFTS IN

AR-104-H05	ROD DRIFT, REV. 19
OP-155-001	CONTROL ROD HYDRAULIC SYSTEM, REV. 35
ON-155-001	CONTROL ROD PROBLEMS, REV. 21
TS 3.1.3	CONTROL ROD OPERABILITY, AMMEND. 178

4. LOSS OF ZONE 1 HVAC

AR-127-C09	RB ZONE 1 NO VENT, REV. 14
LA-1275-C05	ZONE 1 HI-LO DIFF PRESS, REV. 11
ON-134-002	LOW REACTOR BUILDING DIFFERENTAIL PRESSURE, REV. 5
TS 3.6.4.1	SECONDARY CONTAINMENT, AMMEND. 178

5. LOSS OF MAIN CONDENSER VACUUM

AR-121-F02	SJAE CONDENSER DISCHARGE HI PRESS, REV. 12
AR-121-G01	SJAE SECONDARY EJECTOR DISCHARGE HI PRESS, REV. 12
AR-105-B02	CONDENSER HIGH PRESSURE, REV. 17
OP-193-001	MAIN TURBINE OPERATION, REV. 26
ON-143-001	LOSS OF MAIN CONDENSER VACUUM, REV. 15
ON-100-101	SCRAM, REV. 11

6. RPS 'A' SCRAM FAILURE

AR-103-A01	RPS CHANNEL A1/A2 AUTO SCRAM, REV. 25
EO-000-102	RPV CONTROL, REV. 1

SCENARIO REFERENCES

7. RCIC STM LINE BREAK

AR-016-G15	FIRE PROTECTION PANEL 0C650 SYSTEM TROUBLE, REV. 35
AR-SP-001	FIRE SUP X228_Z7 ALM, REV. 8
AR-SP-002	FIRE DET X109_Z8 ALM, REV. 10
AR-108-E05	RCIC LEAK DETECTION HI TEMP/HI DIFF TEMP, REV. 17
AR-108-F04	RCIC LEAK DETECTION LOGIC A HI TEMP, REV. 17
AR-108-F05	RCIC LEAK DETECTION LOGIC B HI TEMP, REV. 17
EO-000-104	SECONDARY CONTAINMENT CONTROL, REV. 1

8. RCIC ISOL FAILURE

9. RWCU PUMP RM HI TEMP

AR-101-A04	RWCU SYSTEM PRE-ISOLATION HI-TEMP/DIFF TEMP, REV. 30
AR-101-A02	RWCU LEAK DET ISO LOGIC A HI TEMP, REV. 30
AR-101-A03	RWCU LEAK DET ISO LOGIC B HI TEMP, REV. 30
EO-000-112	RAPID DEPRESSURIZATION, REV. 1
EO-000-103	PRIMARY CONTAINMENT CONTROL, REV. 2

10. 2 ADS SRVs FAIL TO OPEN

SCENARIO SPECIAL INSTRUCTIONS

1. Set up the simulator for the scenario by performing the following:
   a. Initialize to IC-15.
   b. Insert RWCU pump room leakage; **IMF CU161007 0.005 0 0.001**
   c. Snapshot to an available IC (currently **IC-104**).

2. Initialize the simulator to **IC-104**, Unit 1 at 30% power EOL and Unit 2 at 100% power EOL.

3. Type **restorepref YPP.ILO-301;** verify the following pre-inserts and Program Button assignments. **Verity the Environment window:**

MALFS	REMFS	OVRDS	TRIGS
7 : 7	0	0 : 0	5

MALFUNCTIONS

CU161007 0.005	RWCU SUCTION BREAK O/S CONTAINMENT
MV08:HV144F001 100	RWCU IB ISOL VALVE (F001) LEAKAGE
MV08:HV144F004 100	RWCU OB ISOL VALVE (F004) LEAKAGE
MV07:HV149F007 100	RCIC ISOL FAILED AT 100% OPEN
RP158007A	RPS 'A' FAILURE TO TRIP
RV04:PSV141F13L 0	SRV 'L' FAIL TO OPEN
RV04:PSV141F13M 0	SRV 'M' FAIL TO OPEN

REMOTE FUNCTIONS
NONE

OVERRIDES
NONE

TRIGGERS / ACTIONS

E1 RPE.MSWNOTRUN	WHEN MODE SW NOT IN RUN E1 IS TRUE
E1 = MMF MC143001 10 0 0.2	INCREASE LOSS OF VACUUM
E1 = bat FWB.TRIPFW	TRIP ALL FW PUMPS
E2 RPE.MANPBA	WHEN A1 OR A2 SCRAM PB DEPRESSED E2 IS TRUE
E2 = DMF RP158007A	DELETE RPS A FAILURE TO TRIP
E3 RCE.RCICSTART	WHEN RCIC INITIATES E3 IS TRUE
E3 = IMF RC150004 60 20:00	RCIC PUMP RM STEAM LEAK
E4 RCE.RCICISOL	WHEN RCIC ISOL SIGNAL E4 IS TRUE
E4 = bat YPB.ILO-301B	INSERTS RCIC STEAM LEAK, INCREASES RWCU LEAK

SCENARIO SPECIAL INSTRUCTIONS

PROGRAM BUTTONS

[P-1] IMF AV02:HV10244C	CLOSE RFP DRNS TO 5C FWH
[P-2] IMF TR03:TT11932 –75 08:00 ASIS	MTLO TEMPERATURE ELEMENT FAILURE
[P-3] IMF RD1550044615 (NONE 0 00:30) 2	ROD 46-15 DRIFT TO 42
[P-4] bat YPB.ILO-301A	LOSS OF ZONE 1 HVAC
[P-5] IMF MC143001 0.2	LOSS OF COND VACUUM
[P-6] MRF RD1550074615 DISARM	HYDRAULIC DISARM HCU 46-15

4. Verify VENTURI is selected as the Feedwater flow input to PICSY IAW OI-TA-021.

5. Prepare a turnover sheet indicating:

   a. Unit 1 is at 30% reactor power, 281 MWe.
   b. GO-100-002 is in progress at step 5.70.
   c. Control rod pull sequence B2 S/U at step 450.
   d. A small steam leak in RWCU pump room is being monitored with a video monitor. Leak is on 144-F005B, suction isolation for 'B' RWCU pump.
   e. The startup is on hold and Extraction Steam should be removed from Feedwater Heater string C immediately after assuming the shift. This is to avoid spurious opening of any valves during replacement of solenoid SV-10204B, FW HTR 3B EXTR STM DRN BEFORE BTV. The work package estimates it will take 15 minutes to change out the solenoid.

6. Prepare the following documents:
   a. Complete GO-100-002 up to step 5.70.
   b. Complete SO-156-007 for current control rod pattern in sequence B2 S/U step 450.

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the Simulator to **IC-104**. 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 walkdown.

EVENT	TIME	DESCRIPTION
1		REMOVE EXT STM FROM C FW HTR STRING
2		MTLO TEMPERATURE ELEMENT FAILURE
3		CONTROL ROD DRIFTS IN
4		LOSS OF ZONE 1 HVAC
5		LOSS OF MAIN CONDENSER VACUUM
6		RPS 'A' SCRAM FAILURE
7		RCIC STM LINE BREAK
8		RCIC ISOL FAILURE
9		RWCU PUMP RM HI TEMP
10		RAPID DEPRESSURIZATION
11		2 ADS SRVs FAIL TO OPEN

SCENARIO EVENT FORM

Event No: 1
Brief Description: REMOVE EXT STM FROM C FW HTR STRING

POSITION	TIME	STUDENT ACTIVITIES
US		Enters TS 3.2.2 for MCPR Limit prior to removing Feedwater Heaters from service.
		Contacts Reactor Engineer to check the Core Performance Log and ensure the margin to the MCPR operating limit is > 0.03.
		Directs removal of extraction steam from 'C' Feedwater Heater string.
PCOP		Notifies PCOM prior to removing extraction steam from any Feedwater Heater.
		Monitors ΔT across heaters using PICSY.
NOTE 1		Removes extraction steam from 'C' Feedwater heater string IAW OP-147-001: 1. Directs Plant Operator to CLOSE RFP Seal Water Bleed Off HV-10244C at panel 1C153B-A. • CLOSE I-A Sup Iso to HV-10244C (1251475). • OPEN drain petcock on 1IA-PCV-10244C. 2. CLOSES HTR 5C HP EXTR ISO HV-10242C 3. CLOSES MSEP A DRN TO HTR 4C HV-10213C 4. CLOSES MSEP B DRN TO HTR 4C HV-10216C 5. CLOSES HTR 4C LP EXTR ISO HV-10241C 6. CLOSES HTR 3C LP EXTR ISO HV-10240C 7. CLOSES SSE DRN TO HTR 2C ISO HV-10270C
PCOM		Monitors reactor power and feedwater temperature.

★ Denotes Critical Task

NOTES:	(1) With Lead Examiner concurrence, it is acceptable to continue on to the next event as soon as the first valve is manipulated.

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

Event No: 1
Brief Description: REMOVE EXT STM FROM C FW HTR STRING

INSTRUCTOR ACTIVITY:

When directed to close RFP seal bleed of HV-10244C at 1C153B-A, **Depress P-1:**

[P-1] IMF AV02:HV10244C

NOTE: Monitor position of HV-10244C on Simulator Diagram **FW22**.
Monitor PICSY FWHT.

ROLE PLAY:

As Reactor Engineer called to check the Core Performance Log, report the margin to the MCPR operating limit is > 0.03.

As Plant Operator dispatched to panel 1C103 to check indication status of HV-10244C, report the valve indicates full closed.

SCENARIO EVENT FORM

Event No: 2
Brief Description: **MTLO TEMPERATURE ELEMENT FAILURE**

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports alarm MAIN TURB L-O COOLER DSCH HI TEMP; refers to AR-123-H05.
NOTE 1		Observes status of TIC-10955 and monitors oil and bearing temperatures using PICSY.
		From AR-123-H05: 1. Checks L-O temps on TR-11931 on 1C668. 2. Checks L-O cooler temperature controller TIC-10955 maintaining between 110°F and 120°F. 3. Determines oil temperature is high and controller is malfunctioning. 4. Transfers TIC-10955 to manual and depresses the OPEN button to lower oil temperatures. 5. Directs a Plant Operator to check TI-11932 local indication. 6. Directs Plant Operator to check service water alignment to oil coolers.
PCOM		Reports alarm TURB GEN BRG HI TEMP; refers to AR-105-C05.
PCOP		From AR-105-C05: 1. Checks turbine/generator bearing temperatures on TR-11980 on 1C652 and compares reading with PICSY reading. 2. Checks L-O cooler temperature controller TIC-10955 maintaining between 110°F and 120°F. 3. Determines oil temperature is high and controller is malfunctioning.
US		Directs response to high oil temperature: take manual control of TIC-10955 to restore oil cooling.
		Contacts Work Week Manager to investigate problem with TIC-10955.

★ Denotes Critical Task

NOTES:	(1) May report PICSY alarm for L-O COOLER OUTLET HI TEMP.

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

Event No: 2
Brief Description: MTLO TEMPERATURE ELEMENT FAILURE

INSTRUCTOR ACTIVITY:

When extraction steam is removed from the C FW HTR string, insert failure of main turbine lube oil temperature sensor; **Depress P-2:**

[P-2] IMF TR03:TT11932 –75 08:00 Asls

NOTE: PICSY alarms in ~30 seconds.
Alarm AR-123-H05 is set at 125°F and occurs in ~1 minute.
Alarm AR-105-C05 is set at 190°F and occurs in ~5 minutes.

Monitor Simulator Diagram **TU4** for oil system parameters.

ROLE PLAY:

As Plant Operator sent to check MTLO local outlet temperature on TI-11932, wait 2 minutes and report temperature as indicated on **TU4**. If sent to check the temperature control valve, report it appears to be operating properly.

SCENARIO EVENT FORM

Event No: 3
Brief Description: CONTROL ROD DRIFTS IN

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports rod drift condition.
NOTE 1		Refers to AR-104-H05, ROD DRIFT: 1. Determines < 3 rods have drifted/scrammed from their target positions. 2. Refers to ON-155-001.
US		Directs response to rod drift.
		Directs PCOM to implement ON-155-001.
		Notifies Reactor Engineer about rod drift condition.
PCOM		From ON-155-001, section 3.4: 1. Depresses 'Display Rods Drifting' and determines rod 46-15 is drifting. 2. Depresses 'Display Scram Valves Open' and determines no scram valves open. 3. Selects rod 46-15 and reports position value. 4. Determines rod should be at position 48. 5. Observes PDI-C12-1R603 and FI-C12-1R605 for cooling water d/p and cooling water flow and determines indications are normal. 6. Inserts rod 46-15 to position 00. 7. Depresses 'Rod Drift Reset' pushbutton to verify rod drift alarm clears.
US		Declares rod 46-15 inoperable, refers to TS 3.1.3: 1. Determines LCO is not met and enters Condition C. 2. Identifies rod 46-15 must be fully inserted within 3 hours and disarmed within 4 hours.
		Directs PCO to hydraulically disarm rod 46-15 using OP-155-001.
PCOM		Directs Plant Operator to hydraulically disarm rod 46-15 IAW OP-155-01, Section 2.6: 1. Close Drive Header Isolation 103 2. Close Exhaust Header Isolation 105 3. Perform Independent Verification using Attachment B

★ Denotes Critical Task

NOTES:	(1) May respond to PICSY RPIS rod drift alarm and refer to OP-155-001 Section 2.6.

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

Event No: 3
Brief Description: CONTROL ROD DRIFTS IN

INSTRUCTOR ACTIVITY:

When actions for MTLO temperature element failure are complete, insert rod drift for rod 46-15, **Depress P-3:**

[P-3] IMF RD1550044615 (NONE 0 00:30) 2

NOTE: Rod 46-15 will drift from position 48 to 42.

When directed to hydraulically disarm HCU 46-15, wait ~ 5 minutes then **Depress P-6:**

[P-6] MRF RD1550074615 DISARM

ROLE PLAY:

As Reactor Engineer state "I will run a thermal monitor and verify thermal limits are not challenged. I will then investigate the problem and work on a corrective action plan."

SCENARIO EVENT FORM

Event No: 4
Brief Description: LOSS OF ZONE 1 HVAC

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports alarm HVAC RX BLDG FAN RM EL799-1C276 TROUBLE.
		Reports alarm HVAC RX BLDG FAN RM EL779-1C275 TROUBLE.
		Reports alarm HVAC DIVISION 1 PANEL 1C681 SYSTEM TROUBLE.
		Dispatches Plant Operator to local panel 1C275 and 1C276.
PCOP		Reports alarm RB ZONE 1 NO VENT; refers to AR-127-C09.
		Performs ON-134-002.
		Observes Zone 1 d/p on 0C681 indicator PDI-07554A1, reports building pressure is zero and not negative 0.25" wg.
US		Directs response to loss of zone 1 HVAC.
		Contacts Work Week Manager to assist with restoration of Zone 1 HVAC.
		Refers to TS 3.6.4.1: 1. Determines LCO is not met and enters Condition A. 2. Identifies Secondary Containment integrity must be restored within 4 hours.
PCOP		Refers to ON-134-002: 1. Identifies if Zone 1 is not in service for 4 hours, be in hot shutdown within next 6 hours. 2. Directs Plant Operator to restore zone 1 HVAC IAW OP-134-002. 3. Starts RB cooling: • Starts both loops of ESW. • Starts all individual room cooler fans in Zone 1 and Zone 3. 4. Monitors Secondary Containment temperatures. 5. Attempts to restore Zone 1 HVAC.

★ Denotes Critical Task

NOTES:	

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

Event No: 4
Brief Description: LOSS OF ZONE 1 HVAC

INSTRUCTOR ACTIVITY:

When actions for the drifting rod are complete, insert a loss of zone 1 HVAC, **Depress P-4:**

[P-4] bat YPB.ILO-301A

ROLE PLAY:

As Plant Operator sent to 1C275 and 1C276, wait 2 minutes and report no zone 1 fans are in-service, fan failed annunciators are in alarm for both trains, and HI-LO differential pressure annunciators are in alarm for zone 1. Fan 1V205A indicates tripped and based on the d/p indications the alarms are due to low d/p.

Alarms at 1C275 (LA-1275-001) – Simulator display LP1C275
RB ZONE 1 SUPPLY SYSTEM FAN 1V202A FAILED (A01)
ZONE I HI-LO DIFF PRESS (C05)
RB ZONE I EXHAUST SYSTEM FAN 1V205A FAILED (D01)
RB ZONE I EXHAUST SYSTEM FAN 1V205B FAILED (D02)

Alarms at 1C276 (LA-1276-001) – Simulator display LP1C276
CIRCULATION SPACE HI-LO DIFF PRESS (C10)

As Plant Operator directed to attempt start of zone 1 HVAC, wait ~5 minutes and report neither subsystem A or B could be started.

As Work Week Manager contacted to support restoration of zone 1 HVAC, state you will send a team out to Unit 1 Reactor Building and have them contact the RB Plant Operator.

As maintenance support for zone 1 HVAC, wait ~7 minutes and report zone 1 fans have trip signals present and more time will be needed to troubleshoot the problem after the electrical prints arrive from the shop.

As Plant Operator sent to perform post-start checks of ESW pumps, wait ~ 3 minutes and report the pumps are running normally.

SCENARIO EVENT FORM

Event No: 5
Brief Description: **LOSS OF MAIN CONDENSER VACUUM**

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports alarm SJAE CONDENSER DISCHARGE HI PRESS; refers to AR-121-F02.
		From AR-121-F02: 1. Ensures condensate flow and temperature are IAW OP-144-001. 2. Ensures HV-10702 is OPEN. 3. Monitors SJAE CDSR DSCH FLOW FI-10724 ON 1C668. 4. Performs ON-143-001.
US		Directs response to loss of condenser vacuum IAW ON-143-001.
		Directs power reduction to maintain backpressure ≤ 3.8" HgA (or within the limits of Attachment H of OP-193-001).
		Contacts Work Week Manager for assistance with the loss of vacuum.
PCOM		Reduces power IAW CRC book to maintain backpressure ≤ 3.8" HgA.
PCOP		Reports alarm SJAE SECONDARY EJECTOR DISCHARGE HI PRESS.
		Refers to AR-121-G01: 1. Checks pressure on PI-10720 on 1C668. 2. Ensures HV-10721 is OPEN on 1C668. 3. Ensures HV-16912 is OPEN on 0C673. 4. Dispatches a Plant Operator to 0C145 to check Recombiner operation.
US		Directs scram imminent actions.
PCOM		Starts MSP and TGOP.
NOTE (1)		

★ Denotes Critical Task

NOTES:	(1) Recirc Pumps are already at minimum speed.

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

Event No: 5
Brief Description: **LOSS OF MAIN CONDENSER VACUUM**

INSTRUCTOR ACTIVITY:

When actions for loss of zone 1 HVAC are complete, insert a slow loss of main condenser vacuum; **Depress P-5:**

[P-5] IMF MC143001 0.2

NOTE: AR-121-F02 alarms in ~ 1 minute.
AR-121-G01 alarms in ~ 1.5 minutes.
AR-105-B02 alarms in ~ 5 minutes and condenser backpressure reaches the limit of Attachment H of OP-193-001.

Monitor main condenser on Simulator display **MC1**; and on PICSY display **TRBVBP** or **MNCOND**.

ROLE PLAY:

As Plant Operator sent to 0C145, wait ~2 minutes and report Unit 1 Recombiner is in-service with several high pressure annunciators in alarm.

SCENARIO EVENT FORM

Event No: 6
Brief Description: RPS 'A' SCRAM FAILURE

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Shifts Aux busses to the startup busses.
		Notifies GCC.
US		Directs mode switch to shutdown.
PCOM		Places the reactor mode switch to shutdown.
★ **PCOM**		**Recognizes and reports failure to scram.** **Arms and depresses manual scram pushbuttons.** Reports all control rods are fully inserted.
		Inserts SRMs and IRMs.
		Reports trip of all RFPTs (loss of all high-pressure feed).
		Reports MSIV closure.
US		Enters EO-000-102, RPV CONTROL.
		Directs PCOs to ensure all PC isolations, ECCS initiations and DG starts.
		Directs PCOP to restore / maintain RPV water level +13" to +54" using RCIC.
		Directs PCOP to stabilize RPV pressure <1087 psig with SRVs.
		Directs PCOM to reset Main Generator lockout relays.
		Directs PCOM to place Feedwater in startup level control.
		Directs RHR placed in Suppression Pool Cooling.
PCOP		Restores / maintains RPV water level +13" to +54" using RCIC.

★ Denotes Critical Task

NOTES:	

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

Event No: 6
Brief Description: RPS 'A' SCRAM FAILURE

INSTRUCTOR ACTIVITY:

When RX Mode Switch is placed to SHUTDOWN, ensure event trigger **E1** actuates to trip all RFPTs (**bat FWB.TRIPFW**) and increase Condenser air in-leakage (**MMF MC143001 10 0 0.2**).

When RPS manual scram pushbutton A1 or A2 is depressed, ensure event trigger **E2** actuates to trip RPS 'A' (**DMF RP158007A**).

When RCIC initiates, ensure event trigger **E3** actuates to insert RCIC steam line break in RCIC pump room (**IMF RC150004 60 20:00**).

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 7, 8, 9
Brief Description: RCIC STM LINE BREAK / RCIC ISOL FAILURE / RWCU PUMP RM HI TEMP

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Controls Reactor pressure with SRVs.
		Places RHR in Suppression Pool Cooling.
		Recognizes and responds to the following alarms: • FIRE PROTECTION PANEL 0C650 SYSTEM TROUBLE; AR-016-G05 • FIRE SUP X228_Z7 ALM (Panel 0C650) • FIRE DET X109_Z8 ALM (Panel 0C650)
		Reports high / rising temperatures in RCIC room.
		Reports alarm RCIC LEAK DETECTION HI TEMP/HI DIFF TEMP; refers to AR-108-E05.
		Attempts to manually isolate / close HV-F007 and HV-F008.
		Reports inability to isolate RCIC.
		Contacts maintenance to attempt to manually close HV-F007 and/or HV-F008.
US		Enters EO-000-104, SECONDARY CONTAINMENT CONTROL, and directs crew response.
		Directs PCOP to restore / maintain RPV water level +13" to +54" using HPCI.
PCOM		Reports alarm RWCU SYSTEM PRE-ISOLATION HI TEMP/HI DIFF TEMP; refers to AR-101-A04.
		Reports alarms RWCU LEAK DET ISO LOGIC A/B HI TEMP; refers to AR-101-A02/A03.
		Ensures RWCU automatically isolates (or manually isolates RWCU).
PCOP		Restores / maintains RPV water level +13" to +54" using HPCI.
US		Determines two areas (RCIC and RWCU) above max safe temperature.

★ Denotes Critical Task

NOTES:	

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

Event No: 7, 8, 9
Brief Description: RCIC STM LINE BREAK / RCIC ISOL FAILURE / RWCU PUMP RM HI TEMP

INSTRUCTOR ACTIVITY:

When the RCIC isolation setpoint is reached, verify HV-F007 remains full open (**IMF MV07:HV149F007 100 0 100**) and ensure event trigger **E4** actuates to run **bat YPB.ILO-301B** to prevent HV-F008 isolation (**IMF MV07:HV149F008 83**) and increase RWCU leakage (**MMF CU161007 0.5 0 0.005**).

NOTE: If the crew lowers RPV pressure, the RCIC leak will need to be increased in order to exceed MAX NORMAL TEMPERATURE in the RCIC Room: **MMF RC150004.**

Type **P1C61408** to monitor RCIC temperatures on Panel 1C614.

ROLE PLAY:

When contacted to attempt manual closure of RCIC outboard isolation valve, wait ~ 3 and report that the India team has been dispatched to attempt closure.

If/when contacted to check the breakers for RCIC isolation valves, wait ~ 3 then report the OB valve DC breaker (**1D254031**) is closed. Wait another 3 minutes and report the IB valve AC breaker (**1B246022**) is also closed.

SCENARIO EVENT FORM

Event No: 10, 11
Brief Description: RAPID DEPRESSURIZATION / 2 ADS SRVs FAIL TO OPEN

POSITION	TIME	STUDENT ACTIVITIES
★ US		**Directs Rapid Depressurization when two Secondary Containment areas exceed max safe temperature.** 1. Enters EO-000-112, RAPID DEPRESSURIZATION. 2. Directs preventing uncontrolled Condensate injection. 3. Verifies Suppression Pool level > 5 feet. 4. Directs opening all ADS SRVs. 5. Verifies all ADS SRVs are open.
★ PCOP		**Performs Rapid Depressurization by opening all ADS SRVs.** 1. Arms and depresses Division 1 and/or Division 2 ADS manual pushbuttons and verifies 6 red lights lit for ADS solenoids, or 2. Places individual control switch to open for each ADS SRV (G, J, K, L, M, & N) and verifies red light lit and amber light not lit for each valve solenoid. 3. Verifies 6 ADS SRVs are open: • Observes 6 ADS SRVs open on acoustic monitor status light indication. • Observes RPV pressure decrease. • Observes elevated tail pipe temperatures on TRS-B21-1R614. 4. Recognizes and reports SRVs 'L' and 'M' failed to open. 5. Opens two additional SRVs to obtain 6 open SRVs.
US		Directs RPV level restored and maintained +13" to +54" with available systems.
		Enters EO-000-103, PRIMARY CONTAINMENT CONTROL, due to Suppression Pool temperature > 90°F.
		Directs both loops of RHR placed in Suppression Pool Cooling.

★ Denotes Critical Task

NOTES:	

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

Event No: 10, 11
Brief Description: RAPID DEPRESSURIZATION / 2 ADS SRVs FAIL TO OPEN

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 10, 11
Brief Description: RAPID DEPRESSURIZATION / 2 ADS SRVs FAIL TO OPEN

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Places both loops of Suppression Pool Cooling in service IAW OP-149-005, RHR SUPPRESSION POOL COOLING. 1. Places ESW in service. 2. Places RHRSW in service to RHR heat exchanger A / B. 3. Opens Suppression Chamber test shutoff valve HV-151-F028A / B. 4. Starts RHR pump 1P202A(C) / B(D). 5. Throttles open test line control valve HV-F024A / B to achieve ≤10,000 gpm on FI-E11-1R603 A / B. 6. Observes minimum flow valve HV-151-F007A / B closes at ~ 3000 gpm. 7. Closes heat exchanger bypass HV-151-F048A / B. 8. Checks RHR pump room coolers 1V210A(C) / B (D) started.
US		***After the scenario is complete, classifies the event as a SITE AREA EMERGENCY under EAL FS1 due to a Potential Loss of the RCS Barrier and a Loss of the Primary Containment Barrier.***

★ Denotes Critical Task

NOTES:	

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

Event No: 10, 11
Brief Description: RAPID DEPRESSURIZATION / 2 ADS SRVs FAIL TO OPEN

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

TERMINATION CUE:

The Reactor is depressurized, level is restored to +13" to +54" and actions are in progress to implement Suppression Pool cooling.

EVENT CLASSIFICATION:

After the Scenario is complete, have the US classify the scenario for the HIGHEST EAL. Provide the US with any requested information needed to perform the classification.

Facility: Susquehanna Scenario No.: ILO-601 Op-Test No.: N/A

Examiners: _____ Operators: _____

Initial Conditions: Unit 1 at 90% power EOL, Unit 2 at 100% power EOL

Turnover: 1B EHC pump is out of service for breaker maintenance and will not be returned to service this shift. RHR Loop 'A' has just been secured from Suppression Pool Cooling and 1A RHRSW pump is running for vibration data, which is complete. The crew will shutdown RHRSW following shift turnover. ESW pumps 'A' and 'B' are in service to support Suppression Pool Cooling operation. Chemistry and Reactor Engineering are investigating a spike in Off-Gas activity during the last Control Rod Exercise Surveillance.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Secure 1A RHRSW Pump
2		I	RHRSW Radiation Monitor Fails Upscale
3		C	Loss of Stator Cooling
4		R	Power Reduction
5		M	Generator Lockout / Turbine Trip
6		M	RPS 'B' Failure to Trip / ARI Failure / ATWS
7		C	SLC System Squib Valves Fail
8		C	1A EHC Pump Trip

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

PP&L–SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title:	**ILO CERTIFICATION / NRC EXAM SCENARIO**
Scenario Duration:	**90 Minutes**
Scenario Number:	**ILO-601**
Revision/Date:	**Rev. 0, 7/9/2004**
Course:	**PC007/PC008, Initial License RO/SRO Certification Examination** **PC017/PC018, Initial License RO/SRO NRC Examination**

Operational Activities:

1. **Secure 1A RHRSW Pump**
2. **RHRSW Rad Monitor Fails Upscale**
3. **Loss of Stator Cooling**
4. **Power Reduction (33)**
5. **Generator Lockout / Turbine Trip**
6. **RPS 'B' Failure to Trip / ATWS (3)**
7. **SLC System Squib Valves Fail**
8. **1A EHC Pump 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

The scenario begins with Unit 1 at 90% power EOL and Unit 2 at 100% power BOL. 1B EHC pump is out of service for breaker maintenance. RHR loop 'A' has just been secured from Suppression Pool cooling and 1A RHRSW pump is running for maintenance to record vibration data. The crew will shutdown 1A RHR SW pump.

Following shutdown of 1A RHRSW the RHRSW radiation monitor will fail upscale. The crew will direct Chemistry to obtain a grab sample of RHRSW to validate the indicated high radiation condition. The US will declare the RHRSW radiation detector inoperable and enter TR 3.11.1.5.

The Stator Cooling TCV-10183 will fail closed causing a loss of Stator Cooling. Investigation will determine that the TCV is operating erratically and investigation/repairs is on going. Stator Cooling temperatures will increase and the crew will decrease generator load IAW Alarm Response ON-197-001.

Even with generator load reduced, Stator Cooling will continue to rise causing a Main Turbine Trip if the crew does not remove the unit from service before hand. A failure of RPS 'B' to trip will result in an Electrical ATWS and all control rods will fail to insert. ARI will not properly actuate, further inhibiting control rod insertion. When the crew initiates SLC a failure of the squib valves to fire will prevent SLC injection. The crew will initiate action to inject boron with the RCIC system and inhibit ADS. The crew will decrease core power by lowering RPV water level to < -60" but > -161" using Feedwater. A loss of 1A EHC pump will result in a loss of EHC hydraulic fluid pressure causing the TBVs to close. SRV operation will raise Suppression Pool water temperature requiring the crew to enter the Primary Containment Control procedure and maximize Suppression Pool cooling. Actuation of SRVs will eventually cause Drywell pressure to increase > 1.72 psig resulting in a loss of Condensate and Feedwater injection due to initiation of Plant Aux Load Shed circuitry. The crew will restore and maintain RPV water level with HPCI and RCIC systems.

The crew will be unsuccessful at rod insertion by maximizing CRD and drifting control rods. Manually driving rods and venting the scram air header will be successful for rod insertion.

The scenario will be terminated when all control rods have been inserted and actions are in progress to maximize Suppression Pool cooling and restore RPV water level to +13" to +54".

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SCENARIO OBJECTIVES

The objective of this scenario is to evaluate the licensed operator candidate's ability to respond to the scenario events. These events will require each candidate to demonstrate the following:

- Knowledge of integrated plant operations
- Ability to diagnose abnormal plant conditions
- Ability to work together as a team
- Ability to mitigate plant transients that exercise their knowledge and use of ONs and EOPs
- Ability to utilize Technical Specifications (SRO Only)

To meet this objective, the licensed operator candidates must demonstrate proficiency in the following competencies:

Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures, references, and Technical Specifications
3. Operate the control boards
4. Communicate and interact with other crew members

Senior Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures and references
3. Operate the control boards (N/A to upgrade candidates)
4. Communicate and interact with the crew and other personnel
5. Direct shift operations
6. Comply with and use Technical Specifications

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CRITICAL TASKS

★ **Recognize failure to scram and inject SLC and inhibit ADS**

Safety Significance

Early boron injection has the following benefits:

Stop or prevent large magnitude Limit Cycle Oscillations which can lead to core damage.
Limit fuel damage from uneven flux patterns that could result from partial rod inserts.
Inhibiting ADS prevents uncontrolled injection of large amounts of relatively cold, unborated low pressure ECCS water when the reactor is not shutdown with control rods.

Consequences for Failure to Perform Task

Failure to inject Boron can result in

Cycle oscillations which can lead to core damage.
Fuel damage from uneven flux patterns that could result from partial rod inserts.
Failure to inhibit ADS can result in large amounts of positive reactivity addition due to boron dilution and cold water injection.

SSES EOP Basis for:

LQ/Q-3 IF INITIAL ATWS PWR > 5%
OR CANNOT BE DETERMINED

INJECT SLC
AND
INHIBIT ADS

When scram and ARI have failed, reactor power must be considered to determine if immediate boron injection is required. If initial ATWS power was greater than 5%, then a relatively large number of control rods have failed to insert. The seriousness of this condition requires immediate injection of boron to positively terminate the ATWS event.

ADS initiation may result in the injection of large amounts of relatively cold, unborated water from low-pressure injection systems. With the reactor either critical or shutdown on boron, the positive reactivity addition due to boron dilution and temperature reduction through the injection of cold water may result in a reactor power excursion large enough to cause substantial core damage. Preventing ADS is therefore appropriate whenever boron injection is required.

Indications/Cues for Event Requiring Critical Task

ATWS with initial reactor power level greater than 5% APRM power.

CRITICAL TASKS

Performance Criteria

Inject SLC by inserting key into keylock switch and turning to start SLC pumps, fire the Squib valves and close the Reactor Water Cleanup isolation valve.
Alternate SLC injection using RCIC (ES-150-002)
Inhibit ADS by placing 1C601 keylock switches to INHIBIT

Performance Feedback

Successful SLC injection would be indicated by a lowering SLC tank level and a corresponding power level decrease.
Successful ADS inhibiting is indicated by Green Indicating Light at switch illuminating.

★ **Insert control rods IAW EO-000-113, Sheet 2, Control Rod Insertion**

Safety Significance

Control rod insertion initiates immediate power reduction.

Consequences for Failure to Perform Task

Failure to insert control rods allows power to remain elevated with resultant power oscillations and potential core damage.

Indications/Cues for Event Requiring Critical Task

Exceeding a RPS scram setting with NO reactor scram signal, or RPS/ARI fail to fully insert all control rods.

Performance Criteria

Insert Control Rods by one or more of the following methods:
- Maximize CRD to drift control rods
- Drive control rods after bypassing RWM and RSCS
- Reset and Scram again by performing ES-158-002, Bypass RPS Logic Trips
- De-energizing RPS solenoids by performing ES-158-001
- Local venting of scram air header

Performance Feedback

Successful insertion of control rods will be indicated by:
- Rod position full-in indication for manual insertion of control rods, venting scram air header or de-energizing RPS solenoids
- Rod position full-in after resetting scram, draining scram discharge volume and re-scram

CRITICAL TASKS

★ **Lower RPV level to < –60 inches but > –161 inches**

Safety Significance

Core damage due to unstable operation can be prevented or at least mitigated by promptly reducing feedwater flow so that level is lowered below the feedwater spargers.

Consequences for Failure to Perform Task

A General Electric Company study (NEDO-32047) indicates that the major threat to fuel integrity from ATWS is caused by large-amplitude power/flow instabilities. These density-wave instabilities will most likely develop in the non-isolation ATWS where the feedwater system is still available for makeup to the RPV. In this event, the feedwater system maintains normal water level, but feedwater heating is lost due to tripping of the turbine. Without preheating of the feedwater, high levels of core-inlet subcooling develop which can drive the reactor into a highly unstable mode of operation. General Electric calculations indicate that power oscillations become large enough to cause melting of fuel in high-power bundles.

SSES EOP Basis for:

LQ/L-13 MAINTAIN LVL BETWEEN **-60"** AND **-161"**
USING TABLE 15 SYSTEMS
BYPASSING INTERLOCKS AS NECESSARY IAW ANY:

The purpose of this step is to uncover the feedwater spargers sufficiently to reduce core inlet subcooling.

In the non-isolation ATWS event, core damage due to unstable operation can be prevented or at least mitigated by promptly reducing feedwater flow so that level is lowered below the feedwater spargers. Once level drops below the sparger nozzles, which are located at -24", the feedwater is sprayed into a region occupied by saturated steam. Steam will then condense on the injected feedwater, and the coolant will be heated as it falls to the liquid surface within the downcomer. Heating of the feedwater by steam condensation limits the buildup of core inlet subcooling and can prevent the onset of severe power/flow instabilities.

This step identifies the widest acceptable water level control band. Although level fluctuations within this band are safe, it is very desirable to maintain level within the more restrictive target area of -110" to -60". The target area and expanded band are shown in Figure 8, Water Level Operation Guidance. The intent of this step is to remain within the target band at all times unless prohibited by system perturbations, and remain within the expanded band at all times.

CRITICAL TASKS

Operation outside the target area has the following disadvantages:

The basis for an upper level of -60" is given above.

A lower level of -110" is specified for the following reasons:

1. *Provides a margin for core coverage.*

2. *Avoids operation near TAF where core power is more responsive to RPV pressure fluctuations.*

3. *Makes level control easier by maintaining level above the narrow region of the downcomer.*

   Below -110" the downcomer free area reduces from 300 ft^2 to 88 ft^2 resulting in increased magnitude of indicated level oscillations.

4. *Maintains sufficient core flow to carry liquid boron from lower plenum upward into the core.*

   As level is decreased below -110", boron mixing efficiency is reduced because the natural circulation flow rate through the jet pumps is reduced and is not as efficient at carrying the injected boron from the lower plenum upward into the core.

   At very low downcomer water levels near or below top of active fuel, there is little water available in the region above the jet pump throat for mixing with boron injected via RCIC. In this situation, there is concern that boron may accumulate in the stagnant region of the downcomer which is below the jet pump throat.

5. *Water level can be determined from wide range level instrumentation.*

6. *Avoids MSIV isolation setpoint of -129".*

RPV level below TAF is <u>not</u>, by itself, a determination of whether or not level can be maintained > -161". The determination that level cannot be maintained > -161" must be made based upon:

- *availability of high pressure injection systems, <u>and</u>,*
- *present level trend*

This decision must not be made prematurely since depressurization of a critical core results in destabilizing affects and has a potential to cause core damage.

Controlling reactor pressure, power and level with condensate and SRVs at 500 psig is difficult because all 3 parameters affect each other. Therefore, rapid depressurization is recommended when high pressure injection cannot be obtained.

CRITICAL TASKS

The initial influence of reactor depressurization is stabilizing since the additional flashing of liquid phase required for depressurization introduces excess voids in the reactor core which can essentially terminate the fission process if the rate of depressurization is high enough. Once the depressurization is complete, however, the result is the immediate initiation of power excursions. Core damage is expected to occur from high clad stresses induced by: temperature excursions above the rewet temperature, PCI, cyclic fatigue, burnout or having the fuel enthalpy exceed the cladding failure threshold.

Indications/Cues for Event Requiring Critical Task

ATWS with initial reactor power level greater than 5% APRM power.

Performance Criteria

Lower reactor water level by manually controlling injection rate from Feedwater, HPCI and/or RCIC.

Preventing injection such as RCIC and HPCI as level drops below -30" and -38" respectively may be required when Feedwater is available.

The preferred systems for use in controlling RPV water level are those Table 15 Systems which inject into the feedwater sparger or outside the core shroud. These are used because cold water is preheated by steam and the flow path outside the core shroud mixes the relatively cold injected water with the warmer water in the lower plenum prior to reaching the core. Injection from SLC and CRD are always permitted during ATWS events. The operator throttles existing injection except CRD and SLC and prevents unwanted injection as necessary to decrease level.

Performance Feedback

Lowering water level to –60 to –110 inches will result in power level lowering as indicated on the Average Power Range Monitors.

★ Denotes Simulator Critical Task

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SCENARIO REFERENCES

1. SECURE 1A RHRSW PUMP

SO-116-A03	QUARTERLY RHRSW SYSTEM FLOW VERIFICATION DIVISION I, REV. 1
OP-054-001	EMERGENCY SERVICE WATER SYSTEM, REV. 22
TR 3.8.2.1	MOV THERMAL OVERLOAD PROTECTION – CONTINUOUS, 4/2/02

2. RHRSW RAD MONITOR FAILS UPSCALE

AR-109-F01	RHR SW A HI RADIATION, REV. 23
TR 3.11.1.5	RADIOACTIVE LIQUID PROCESS MONITORING INSTR, 9/1/98

3. LOSS OF STATOR COOLING

AR-106-E04	STATOR COOLING WATER PANEL 1C125 SYSTEM TROUBLE, REV. 28
AR-106-B04	STATOR COOLING WATER OUTLET HEADER HI TEMP, REV. 28
AR-106-E09	GEN CORE MONITOR STATOR/FIELD OVERHEATING, REV. 28
OP-197-001	STATOR COOLING SYSTEM, REV. 20
ON-197-001	LOSS OF STATOR COOLING, REV. 8

4. POWER REDUCTION

GO-100-012	POWER MANEUVERS, REV. 19
OP-AD-338	COMMUNICATION REQUIREMENTS FOR REACTIVITY MANIPULATIONS, REV. 1

5. GENERATOR LOCKOUT / TURBINE TRIP

ON-100-101	SCRAM, REV. 11
EO-000-102	RPV CONTROL, REV. 1

6. RPS 'B' FAILS TO TRIP / ATWS / SQUIB VALVES FAIL / 1A EHC PUMP TRIP

EO-000-113	LEVEL POWER CONTROL / CONTROL ROD INSERTION, REV. 1
ES-150-002	BORON INJECTION VIA RCIC, REV. 13
ES-150-001	RCIC TURBINE ISOLATION AND TRIP BYPASS, REV. 14
ES-158-001	DE-ENERGIZING SCRAM PILOT SOLENOIDS, REV. 6
AR-105-I03	EHC HYD FLUID PUMP DSCH LO PRESS, REV. 17
EO-000-103	PRIMARY CONTAINMENT CONTROL, REV. 2
OP-149-005	RHR SUPPRESSION POOL COOLING, REV. 21
OP-184-001	MAIN STEAM SYSTEM, REV. 19
TS 3.1.7	STANDBY LIQUID CONTROL (SLC) SYSTEM, AMMEND. 178

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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-20**, both Units at 100% power (Unit 1 at EOL).
   b. Insert rods to step 555 USING S/D Sequence B2, adjust total core flow for ~90% power.
   c. Place 1A RHRSW pump in service per SO-116-A03.
   d. Place ESW I/S, start ESW pumps A & B.
   e. Place handswitch to STOP for 1B EHC pump.

2. Snapshot to an available IC (currently **IC-103**).

3. Initialize the simulator to **IC-103**.

4. Type **RESTOREPREF YPP.ILO-601**; verify the following pre-inserts and Program Button assignments. **Verify the Environment window:**

MALFS	REMFS	OVRDS	TRIGS
6 : 6	1	0 : 0	3

MALFUNCTIONS

PM01:1P113B OFF	1B EHC BKR CONTROL POWER
RP158007B	RPS 'B FAIL TO TRIP
RL03:63X114725D1	ARI FAILURE
RL03:63X214725D1	ARI FAILURE
SL153001A	SQUIB VALVE 'A' FAIL
SL153001B	SQUIB VALVE 'B' FAIL

REMOTE FUNCTIONS

PM101P113B OUT	1B EHC PUMP BKR RACKED OUT

OVERRIDES

NONE

TRIGGERS / ACTIONS

E1 BAAA26409	EVENT TRIGGER – MODE SWITCH TO SHUTDOWN
E1 = MRF RD155023 0	THROTTLE CRD MAN ISO CLOSED WHEN E1 IS TRUE
E1 = IMF PM03:1P113A	1A EHC PUMP TRIP
E2 ILO601RHRSWA	WHEN 'A' RHRSW PP SWITCH TO OFF E2 IS TRUE
E2 = IMF TR02:RITS11216A (NONE 30 0)	RHRSW RAD MONITOR FAILS UPSCALE
1E+6 0 ASIS	

SCENARIO SPECIAL INSTRUCTIONS

PROGRAM BUTTONS

[P-1] IMF AV04:TCV10183 99 20:00 84	STATOR COOLING TCV-10183 FAIL
[P-2] bat YPB.ILO-601A	ACKNOWLEDGE AND RESET LOCAL 1C125 ALARMS
[P-3] MRF RD155023 0	THROTTLE CRD MAN ISO CLOSED
[P-4] IMF PM03:1P113A	1A EHC PUMP TRIP
[P-5] bat RDB.VSAH	VENT SCRAM AIR HEADER
[P-6] bat RDB.RSAH	RESTORE SCRAM AIR HEADER

5. Verify LEFM is selected as the Feedwater flow input to PICSY IAW OI-TA-021.

6. Prepare a turnover sheet indicating:

   a. Unit 1 is at 90% power EOL; Unit 2 is at 100% power EOL.
   b. 1B EHC pump is out of service for breaker maintenance and will not be returned to service this shift.
   c. RHR Loop 1A has just been secured from Suppression Pool cooling and 1A RHRSW pump is running for vibration data. Vibration recording is complete, shutdown RHRSW.
   d. ESW pumps A & B are in service to support Suppression Pool cooling operation. Remove pumps from service when RHRSW surveillance is completed.
   e. Chemistry and Reactor Engineering investigating spike in Off Gas activity during last Control Rod Exercising Surveillance.

7. Prepare a TRO (3.8.2.1) sheet for bypassing RHRSW overloads IAW SO-116-A03.

8. Markup SO-116-A03 Quarterly RHRSW System Flow Verification Division I through step 5.1.2.

9. Prepare an OD-7 for the current rod pattern.

10. Prepare an OP-AD-338, Attachment E "CONTROLLED SHUTDOWN / UNPLANNED POWER REDUCTION" form. Enter 65 in step S-3 and enter 463 step S-4 3).

11. Insert the OD-7; OP-AD-338, Attachment E; and page 01 of the Shutdown Control Rod Sequence B2 into the CRC Book.

12. Prepare an OP-149-005, Attachment C entry for the Special Log Book for biocide injection. Indicate injection was performed 4 days previous to today, the exam date.

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the Simulator to **IC-103**. 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 walkdown.

EVENT	TIME	DESCRIPTION
1		SECURE 1A RHRSW PUMP
2		RHRSW RAD MONITOR FAILS UPSCALE
3		LOSS OF STATOR COOLING (FAILURE OF TCV-10183)
4		POWER REDUCTION
5		GENERATOR LOCKOUT / TURBINE TRIP
6		RPS 'B' FAILURE TO TRIP / ATWS
7		SLC SYSTEM SQUIB VALVES FAIL
8		1A EHC PUMP TRIP

SCENARIO EVENT FORM

Event No: 1
Brief Description: SECURE 1A RHRSW PUMP

POSITION	TIME	STUDENT ACTIVITIES
US		Directs shutdown of 1A RHRSW pump IAW SO-116-A03.
		Complies with TR 3.8.2.1, MOV THERMAL OVERLOAD PROTECTION-CONTINUOUS.
PCOP		Implements SO-116-A03, Quarterly RHRSW System Flow Verification Division I, Step 5.1.3. 1. Verifies the last biocide injection date in the Special Log Book. 2. Notifies US to comply with TR 3.8.2.1. 3. Reduces RHRSW flow to 1500 gpm by throttling close HV-11210A. 4. Stops RHRSW pump 1P506A. 5. Closes HX Inlet valve HV-11210A. 6. Closes HX Outlet valve HV-11215A. 7. After 2 minutes returns motor overload bypass switch HS-11210A1 to OPERATE on 0C697. 8. Ensures RHRSW pump Supply Fan 1V506A stops. 9. Dispatches Plant Operator to confirm 1A RHRSW pump discharge check valve external indicating arm in CLOSED position. 10. Shuts down ESW pumps 'A' & 'B' IAW OP-054-001.

★ Denotes Critical Task

NOTES:	

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

Event No: 1
Brief Description: SECURE 1A RHRSW PUMP

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As the Plant Operator sent to confirm 1A RHRSW pump discharge check valve external indicating arm in the CLOSED position, wait 5 minutes then report the external indicating arm is in the CLOSED position.

SCENARIO EVENT FORM

Event No: 2
Brief Description: **RHRSW RAD MONITOR FAILS UPSCALE**

POSITION	TIME	STUDENT ACTIVITIES
PCOP		Reports alarm RHR SW A HI RADIATION; refers to AR-109-F01.
		Checks indication for RR-D12-1R606 on 1C600.
		Dispatches Plant Operator to check operation of indicator and trip unit RITS-11216A.
US		Notifies Chemistry to obtain grab sample.
		Contacts WWM to investigate RHRSW Rad Monitor problem.
		Refers to TR 3.11.1.5, RADIOACTIVE LIQUID PROCESS MONITORING INSTRUMENTATION: Declares RHRSW Rad Monitor inoperable; enters Condition B of TR 3.11.1.5.
		Contacts WWM/Maintenance about failed RHRSW Rad Monitor.

★ Denotes Critical Task

NOTES:	

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

Event No: 2
Brief Description: RHRSW RAD MONITOR FAILS UPSCALE

INSTRUCTOR ACTIVITY:

When 1A RHRSW pump is stopped verify after ≈30 seconds the RHRSW radiation monitor failure upscale,

TRG E2 = IMF TR02:RITS11216A (NONE 30 0) 1E+6 0 ASIS RHRSW RM 'A' FAIL UPSCALE

ROLE PLAY:

As Chemistry contacted to obtain a grab sample of Unit 1 RHRSW, acknowledge the request to obtain a grab sample. No further information will be provided.

As Plant Operator sent to the indicator and trip unit, wait 2 minutes and report that a high radiation condition is indicated.

As WWM, acknowledge the request to investigate the RHRSW radiation monitor. No further information will be provided.

SCENARIO EVENT FORM

Event No: 3, 4
Brief Description: LOSS OF STATOR COOLING (FAILURE OF TCV-10183) / POWER REDUCTION

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports alarm STATOR COOLING WATER PANEL 1C125 SYSTEM TROUBLE; refers to AR-106-E04.
		Reports alarm STATOR COOLING WATER OUTLET HEADER HI TEMP; refers to AR-106-B04.
		Verifies Stator Cooling water temperatures on PICSY format and/or indication lights on 1C668.
		Dispatches Plant Operator to investigate loss of Stator Cooling.
		Refers to OP-197-001, STATOR COOLING SYSTEM.
		Directs Plant Operator to monitor/report Stator Cooling water temperatures and investigate Panel 1C125 TROUBLE alarm.
US		Refers to ON-197-001, LOSS OF STATOR COOLING: Directs generator load lowered to reduce temperature rise of Stator Cooling water.
		Directs implementation of GO-100-012, POWER MANEUVERS.
		Directs power reduction using instructions from the CRC Book.
		Contacts WWM/Maintenance to investigate the loss of Stator Cooling.
		Notifies Chemistry/Health Physics power changed by 15%.
		Notifies System Engineer to perform temperature trending and evaluation.
		Directs scram imminent actions per ON-100-101.
PCOM		Implements GO-100-012, POWER MANEUVERS; reduces generator load as directed.
		Plots power changes on the power to flow map; maintains core flow >65 mlbm/hr.
		Performs scram imminent actions: starts MSP and TGOP.
PCOP		Performs scram imminent actions: shifts aux busses to the startup busses, notifies GCC of power reduction / impending scram.

★ Denotes Critical Task

NOTES:	

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

Event No: 3, 4
Brief Description: **LOSS OF STATOR COOLING (FAILURE OF TCV-10183) / POWER REDUCTION**

INSTRUCTOR ACTIVITY:

When actions are complete for RHRSW Rad Monitor failure insert a failure of Stator Cooling TCV-10183, **Depress P-1:**

[P-1] IMF AV04:TCV10183 99 20:00 84 STATOR COOLING TCV-10183 FAIL

Monitor PICSY **GENB** or **MNGEN** or **GST01** and **GST02** for indications and alarm status.
Monitor **EC3** and **LP1C12502** on Instructor Console for Stator Cooling parameter status.

To acknowledge alarms on local panel 1C125, **Depress P-2:**

[P-2] bat YPB.ILO-601A ACKNOWLEDGE AND RESET LOCAL 1C125 ALARMS

ROLE PLAY:

The first alarm received in the Control Room will be STATOR COOLING WATER PANEL 1C125 SYSTEM TROUBLE (AR-106-E04).

- As Plant Operator sent to 1C125 wait 2 minutes and report that the INLET TEMP HIGH (LA-1125-002-A03) alarm is in and TISH-10183B is ___ °F (read from **EC3**). Further investigation indicates heat exchanger delta p is ~50 psid and TIC-10183 is set at 108 °F.

In approximately 10 minutes, the second alarm received in the Control Room will be STATOR COOLING WATER OUTLET HEADER HI TEMP (AR-106-B04).

- As Plant Operator at 1C125 report that the OUTLET TEMP HIGH (LA-1125-002-B01) alarm is in and TISH-10183A is greater than 165 °F. Investigation indicates TCV-10183 appears to be binding.

In approximately 8 more minutes, the third alarm received in the Control Room will be GEN CORE MONITOR STATOR/FIELD OVERHEATING (AR-106-E09).

- As Plant Operator at 1C125 report that the GENERATOR PROTECTION CIRCUIT ENERGIZED (LA-1125-002-C01) alarm is in and temperature from the stator is greater than 174 °F.

If directed by PCO transfer heat exchangers per OP-197-001.

SCENARIO EVENT FORM

Event No: **5, 6, 7, 8**
Brief Description: **GENERATOR LOCKOUT/TURBINE TRIP / RPS 'B' FAILURE TO TRIP/ATWS / SLC SYSTEM SQUIB VALVES FAIL / 1A EHC PUMP TRIP**

POSITION	TIME	STUDENT ACTIVITIES
US		Directs manual scram BEFORE Generator Lockout occurs.
PCOM		Places mode switch to SHUTDOWN.
★ **PCOM**		**Recognizes and reports failure to scram.**
		Arms and depresses manual scram initiation pushbuttons.
		Inserts SRMs and IRMs.
		Reports generator lockout and main turbine trip condition.
PCOP		Initiates ARI; reports ARI has failed.
		Ensures PC isolations, ECCS initiations, and Diesel Generator starts.
US		Enters EO-000-102, RPV CONTROL, and exits to EO-000-113, LEVEL POWER CONTROL.
★ **US**		**Directs SLC initiated and ADS inhibited.**
★ **PCOP**		**Initiates SLC.** 1. Places SBLC manual initiation Keylock control switch to START. 2. Observes SBLC pumps 1P208A and B start. 3. Reports Squib valves failed; SLC is <u>not</u> injecting.
PCOM		4. Verifies RWCU outboard isolation valve HV-144-F004 closed.
★ **PCOP**		**Inhibits ADS.** Places ADS A and B Logic Control keylock switches to INHIBIT.
★ **US**		**Directs boron injection with RCIC IAW ES-150-002, BORON INJECTION WITH RCIC.**

★ Denotes Critical Task

NOTES:	

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

Event No: **5, 6, 7, 8**
Brief Description: **GENERATOR LOCKOUT/TURBINE TRIP / RPS 'B' FAILURE TO TRIP/ATWS / SLC SYSTEM SQUIB VALVES FAIL / 1A EHC PUMP TRIP**

INSTRUCTOR ACTIVITY:

When TSH10183 is greater than 174 °F for 70 seconds the Main Turbine will trip.

When the mode switch is placed to SHUTDOWN, verify event trigger actuates to cause the CRD pressure throttling valve manual isolation valve to fail closed and trip 1A EHC pump.

NOTE: If trigger E1 fails to actuate, **Depress P-3** to cause the CRD pressure throttling valve manual isolation valve to fail closed preventing drifting control rods with CRD.

[P-3] MRF RD155023 0 THROTTLE CRD MAN ISO CLOSED

NOTE: If trigger E1 fails to actuate, **Depress P-4** to insert a trip of 1A EHC pump.

[P-4] IMF PM03:1P113A 1A EHC PUMP TRIP

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 6, 7, 8
Brief Description: RPS 'B' FAILURE TO TRIP/ATWS / SLC SQUIB VALVES FAIL / 1A EHC PUMP TRIP

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports alarm EHC HYD FLUID PUMP DSCH LO PRESS.
		Reports TBVs have CLOSED (~ 1 – 2 minutes after EHC pump trip).
★ US		**Directs insertion of control rods IAW EO-000-113 Sht. 2, Control Rod Insertion.** 1. Directs maximizing CRD to drift control rods. 2. Directs bypassing RSCS and RWM and establishing normal CRD system parameters to manually drive control rods. 3. Directs venting the scram air header. 4. Directs performance of ES-158-001, DE-ENERGIZING SCRAM PILOT SOLENOIDS.
★ PCOM		**Inserts control rods IAW EO-000-113 Sht. 2, Control Rod Insertion.** 1. Maximizes CRD to drift control rods. 2. Bypasses RSCS and RWM; attempts to establish normal CRD system parameters for manual rod insertion. 3. Directs Plant Operator to vent scram air header. 4. Recognizes/reports inability to establish normal CRD system parameters but continues with actions for manual rod insertion. 5. Reports manual control rod insertion is successful.
★ US		**Directs lowering RPV water level to < –60 inches but > –161 inches.** Gives a target level band of –60 inches to –110 inches using Feedwater.
		Directs overriding HPCI and RCIC system injection.
		Directs RPV pressure stabilized below 1087 psig with SRVs.
		Directs bypassing MSIV and CIG interlocks.
		Contacts WWM to investigate SLC system problem.

★ Denotes Critical Task

NOTES:	

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

Event No: 6, 7, 8
Brief Description: RPS 'B' FAILURE TO TRIP/ATWS / SLC SQUIB VALVES FAIL / 1A EHC PUMP TRIP

INSTRUCTOR ACTIVITY:

As necessary

NOTE: Drywell pressure reaches 1.72 psig in ≈15 minutes.

Suppression Pool temperature reaches ≈150 °F in 16 minutes.

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 6, 7, 8
Brief Description: RPS 'B' FAILURE TO TRIP/ATWS / SLC SQUIB VALVES FAIL / 1A EHC PUMP TRIP

POSITION	TIME	STUDENT ACTIVITIES
★ PCOM		**Lowers RPV water level to < –60 inches but > –161 inches.** 1. Reduces RFP speed / discharge pressure to lower RPV level. 2. Maintains RPV level < –60 inches but > –161 inches (>–110 inches) using Feedwater.
PCOP		Overrides HPCI and RCIC system injection by reducing flow controller setpoints.
		Stabilizes RPV pressure below 1087 psig with SRVs.
		Bypasses MSIV and CIG interlocks IAW OP-184-001, MAIN STEAM SYSTEM.
PCOP		Reports Suppression Pool water temperature exceeds 90 °F.
US		Enters EO-000-103, PRIMARY CONTAINMENT CONTROL, when SPT exceeds 90 °F. Directs placing both loops of RHR in Suppression Pool cooling IAW OP-149-005, RHR SUPPRESSION POOL COOLING.
PCOP		Places both loops of Suppression Pool Cooling in service IAW OP-149-005, RHR SUPPRESSION POOL COOLING. 1. Places ESW in service. 2. Places RHRSW in service to RHR heat exchanger A / B. 3. Opens Suppression Chamber test shutoff valve HV-151-F028A / B. 4. Starts RHR pump 1P202A(C) / B(D). 5. Throttles open test line control valve HV-F024A / B to achieve ≤10,000 gpm on FI-E11-1R603 A / B. 6. Observes minimum flow valve HV-151-F007A / B closes at ~ 3000 gpm. 7. Closes heat exchanger bypass HV-151-F048A / B. 8. Checks RHR pump room coolers 1V210A(C) / B (D) started.
PCOM		Reports loss of Condensate and Feedwater when Drywell pressure exceeds 1.72 psig.

★ Denotes Critical Task

NOTES:	

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

Event No: 6, 7,8
Brief Description: RPS 'B' FAILURE TO TRIP/ATWS / SLC SQUIB VALVES FAIL / 1A EHC PUMP TRIP

INSTRUCTOR ACTIVITY:

When Suppression Pool water temperature reaches ≈150 °F, or 15 minutes after requested to vent the Scram Air Header, **Depress P-5:**

[P-5] bat RDB.VSAH VENT SCRAM AIR HEADER

NOTE: Monitor P&ID **RD6** for status of venting/restoring scram air header.
Monitor HCTL curve on PICSY to ensure the SAH is vented in time to prevent violating this curve.

ROLE PLAY:

As Plant Operator venting the scram air header, inform the control room that you have closed/checked-closed 147002A/B and uncapped and opened 147007. Air has rushed out of the header and has now stopped.

SCENARIO EVENT FORM

Event No: 6, 7, 8
Brief Description: RPS 'B' FAILURE TO TRIP/ATWS / SLC SQUIB VALVES FAIL / 1A EHC PUMP TRIP

POSITION	TIME	STUDENT ACTIVITIES
US		Re-enters EO-000-113 when Drywell pressure exceeds 1.72 psig.
		Directs RPV level control with HPCI and RCIC; level band < –60 inches but > –161 inches with a target level band of –60 inches to –110 inches.
PCOP		Restores/maintains RPV level control with HPCI & RCIC between –60 inches and –161 inches (–110 inches).
PCOM		Verifies control rod insertion as the scram air header is vented; reports all rods fully inserted.
US		Directs restoration of scram air header.
		Directs stopping actions for ES-150-002, BORON INJECTION WITH RCIC.
		Directs stopping actions for ES-158-001, DE-ENERGIZING SCRAM PILOT SOLENOIDS.
		Exits EO-000-113 Sheets 1 and 2; re-enters EO-000-102. Directs establishing RPV water level +13" to +54".
PCOP		Establishes RPV water level +13" to +54" with HPCI/RCIC.
		Directs Plant Operator to restore the scram air header.
US		***After the scenario is complete, determines TS 3.1.7 RA C.1 is applicable for the failure of both SLC subsystems. If RA C.1 not completed within 8 hours, the unit must be in Mode 3 within 12 hours.***
US		***After the scenario is complete, classifies the event as a SITE AREA EMERGENCY under EAL MS3 due to RPS and ARI failure.***

★ Denotes Critical Task

NOTES:	

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

Event No: 6, 7, 8
Brief Description: RPS 'B' FAILURE TO TRIP/ATWS / SLC SQUIB VALVES FAIL / 1A EHC PUMP TRIP

INSTRUCTOR ACTIVITY:

NOTE: Monitor P&ID **RD6** for status of venting/restoring scram air header.

If directed to restore the scram air header following venting, wait 2 minutes then, **Depress P-6**

[P-6] bat RDB.RSAH RESTORE SCRAM AIR HEADER

ROLE PLAY:

As Plant Operator directed to restore the scram air header, wait 2 minutes and report that you have closed and capped 147007 and re-opened 147002A, which was the supply valve that was previously open.

TERMINATION CUE:

All control rods have been inserted and actions are in progress to maximize Suppression Pool cooling and restore RPV water level to +13" to +54".

TECHNICAL SPECIFICATION DETERMINATION:

After the scenario is complete, have the US determine any Technical Specification requirements due to the failure of SLC to inject.

EVENT CLASSIFICATION:

After the Scenario is complete, have the US classify the scenario for the HIGHEST EAL. Provide the US with any requested information needed to perform the classification.

Facility: Susquehanna Scenario No.: ILO-302 Op-Test No.: N/A

Examiners: _____ Operators: _____

Initial Conditions: Unit 1 at 80% power EOL, Unit 2 in Mode 4

Turnover: CRD pump 1B is out of service for breaker maintenance and is not expected to return this shift. Condensate pump 1B has a possible ground, requiring the crew to remove 1B Condensate pump from service for inspection. No surveillance activities are planned or due during the shift. Chemistry and Reactor Engineering are investigating a spike in Off-Gas activity during the last Control Rod Exercise Surveillance.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Shutdown 1B Condensate Pump
2		C	Condensate Minimum Flow Recirc Valve Failure
3		I	'A' Narrow Range Level Instrument Fails Upscale
4		C	Fuel Clad Failure
5		I	RPS 'A' Failure to Trip
6		C	'D' Main Steam Line Failure to Isolate
7		C	Main Steam Line Leak in Turbine Building
8		M	Radioactivity Release
9		M	Rapid Depressurization

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

PP&L–SUSQUEHANNA TRAINING CENTER

SIMULATOR SCENARIO

Scenario Title:	**ILO CERTIFICATION / NRC EXAM SCENARIO**
Scenario Duration:	**90 Minutes**
Scenario Number:	**ILO-302**
Revision/Date:	**Rev. 0, 7/9/2004**
Course:	**PC007/PC008, Initial License RO/SRO Certification Examination** **PC017/PC018, Initial License RO/SRO NRC Examination**

Operational Activities:

1. **Shutdown 1B Condensate Pump**
2. **Cond Min Flow Recirc Valve Failure**
3. **A NR Level Instrument Fails Upscale (15)**
4. **Fuel Clad Failure (4)**
5. **RPS A Failure to Trip**
6. **D MSL Failure to Isolate**
7. **MSL Leak in Turbine Building (5)**
8. **Radioactivity Release (14)**
9. **Rapid Depressurization**

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 Unit 1 at 80% power EOL and Unit 2 in MODE 4. 1B CRD pump is out of service for breaker maintenance. Condensate pump 1B has a possible ground; the crew will shutdown Condensate pump 1B for inspection. The crew will recognize the Condensate pump minimum flow recirc valve failed open and will manually close the valve to maintain proper condensate pump header pressure.

Following the shutdown of 1B Condensate pump the 'A' Narrow Range Level instrument will fail upscale. Feedwater level control system response will stabilize RPV water level at ≈ +23" in automatic. The crew will implement an Off-Normal procedure to transfer RPV water level control from averaged level control to selected level control and return RPV water level control to automatic.

Following the water level perturbation a fuel clad failure will result in Turbine Building area high radiation and increasing main steam line radiation. The crew will respond by decreasing Reactor power. Radiation levels will continue to rise requiring the crew to manually scram the Reactor and manually close the MSIVs and MSL drains. When the mode switch is placed to shutdown a failure to scram will occur when RPS 'A' fails to trip. The control rods will insert when the crew initiates ARI.

Following the scram a main steam line break will occur in the Turbine Building Steam Tunnel. The 'D' MSL fails to isolate resulting in a sustained release to the Turbine Building. Release rates from the Turbine Building Vent Stack will increase above the ALERT level requiring entry into Radioactive Release Emergency Operating Procedure, EO-000-105. The crew will request performance of dose calculations and conduct a Reactor cooldown at <100°F/hr. When off-site dose calculations exceed the General Emergency level the crew will rapidly depressurize the Reactor.

The scenario will be terminated when the crew has performed a Rapid Depressurization and restored RPV water level to +13" to +54".

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SCENARIO OBJECTIVES

The objective of this scenario is to evaluate the licensed operator candidate's ability to respond to the scenario events. These events will require each candidate to demonstrate the following:

- Knowledge of integrated plant operations
- Ability to diagnose abnormal plant conditions
- Ability to work together as a team
- Ability to mitigate plant transients that exercise their knowledge and use of ONs and EOPs
- Ability to utilize Technical Specifications (SRO Only)

To meet this objective, the licensed operator candidates must demonstrate proficiency in the following competencies:

Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures, references, and Technical Specifications
3. Operate the control boards
4. Communicate and interact with other crew members

Senior Reactor Operator Candidates:

1. Interpret/diagnose events and conditions based on alarms, signals, and readings
2. Comply with and use procedures and references
3. Operate the control boards (N/A to upgrade candidates)
4. Communicate and interact with the crew and other personnel
5. Direct shift operations
6. Comply with and use Technical Specifications

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CRITICAL TASKS

★ **Recognize failure to scram and initiate ARI**

Safety Significance

Initiation of ARI provides an independent and redundant means of depressurizing the reactor scram air header and operating the scram discharge volume vent and drain valves, causing rapid control rod insertion.

Rapid control rod insertion initiates an immediate power reduction and, in the case of a fuel clad failure, will quickly reduce the amount of radiation being released from the Reactor.

Consequences for Failure to Perform Task

Failure to insert control rods allows power to remain elevated with continued release of radiation from the Reactor and also increases the potential for additional fuel damage.

Also, OP-AD-055, "Operations Procedure Program", Section 9, defines Immediate Operator Actions as: "Actions required immediately after the start of an event to stop the degradation of and mitigate the consequences of conditions that threaten fuel, RPV, or primary containment...". Attachment C of this procedure lists the following Immediate Operator Actions:

MSL RAD Increasing but < Trip Point (Fuel Clad Failure)	• Reduce Reactor Power • If Power Decrease did not stop RAD increase: – Manually Scram Reactor AND – Isolate MSIVs and MSL Drains
Existing Scram Condition	• PLACE Mode SW to S/D • OBSERVE all-rods-in • If More than 1 Rod > 00 – Arm and Depress Manual Scram PBs AND – Initiate ARI • Insert SRMs & IRMs • Ensure: – Primary Containment Isolations – ECCS Initiations – DGs Start

CRITICAL TASKS

Indications/Cues for Event Requiring Critical Task

Manual insertion of an RPS scram with NO control rod motion.

Performance Criteria

Insert control rods by manually initiating ARI.

Performance Feedback

Successful insertion of control rods will be indicated by rod position full-in indication following manual initiation of ARI.

★ **Perform Rapid Depressurization before EPB projected dose / dose rates reach General Emergency declaration criteria**

Safety Significance

In order to minimize radiation exposure to the public, Rapid Depressurization of the RPV is required if a primary system is discharging and the radioactivity release rate cannot be controlled below the release rate that requires a General Emergency.

Consequences for Failure to Perform Task

Failure to take the EOP actions will result in increased dose and/or dose rates at the EPB.

SSES EOP Basis for:

RR-6 **BEFORE** EPB PROJECTED DOSE/DOSE RATE REACHES GENERAL EMERGENCY DECLARATION CRITERIA

RAPID DEPRESS IS REQ'D

An offsite radioactivity release rate above the General Emergency action level represents a substantial increase in the severity of the offsite radioactivity release, relative to the entry condition, and accordingly presents a more immediate threat to the continued health and safety of the public. Rapid depressurization is directed before the release rate reaches the General Emergency level to reduce the radioactivity release rate.

CRITICAL TASKS

Indications/Cues for Event Requiring Critical Task

Offsite radiation exposures and radiation release rates are obtained from dose projections normally performed by NERO personnel. The results of these projections are then transmitted to the Control Room Crew. The Crew must determine that the calculated results exceed the limits for General Emergency level releases (1R or 1R/hour TEDE or 5R or 5R/hour Thyroid CDE at the EPB) as noted on EO-000-105 Table 13.

Performance Criteria

Perform a Rapid Depressurization per EO-000-112 when EPB dose or dose rates are projected to exceed EO-000-105 Table 13 values.

Initiate ADS / Manually open all 6 ADS valves.

Performance Feedback

Initiating a rapid depressurization causes Reactor pressure to lower which lowers the driving force of any primary system breach.

Verify ADS valves are open using red light indication, acoustic monitoring, lowering Reactor pressure and rising Reactor water level.

★ Denotes Simulator Critical Task.

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SCENARIO REFERENCES

1. SHUTDOWN 1B CONDENSATE PUMP / CONDENSATE MIN FLOW RECIRC VALVE FAILURE

OP-144-001	CONDENSATE AND FEEDWATER SYSTEM, REV. 31

2. 'A' NARROW RANGE INSTRUMENT FAILS UPSCALE

AR-101-A17	RX WATER HI LEVEL, REV. 30
AR-101-B17	RX WATER HI-LO LEVEL, REV. 30
ON-145-001	RPV LEVEL CONTROL SYSTEM MALFUNCTION, REV. 15
TS 3.3.2.2	FEEDWATER / MAIN TURBINE HIGH WATER LEVEL TRIP, AMENDMENT 178

3. FUEL CLAD FAILURE

AR-101-B05	RX BLDG AREA PANEL 1C605 HI RADIATION, REV. 30
AR-101-C05	TURB BLDG AREA PANEL 1C605 HI RADIATION, REV. 30
AR-103-D01	MN STM LINE HI HI RADIATION, REV. 25
AR-111-C03	MN STM LINE RAD MONITOR HI RADIATION, REV. 27
ON-100-101	SCRAM, REV. 11
ON-159-002	CONTAINMENT ISOLATION, REV. 22
EO-000-102	RPV CONTROL, REV. 1
EO-000-104	SECONDARY CONTAINMENT CONTROL, REV. 1

4. RPS 'A' FAILURE TO TRIP

OP-AD-055	OPERATIONS PROCEDURE PROGRAM, REV. 0
EO-000-113	LEVEL/POWER CONTROL, REV. 1

5. 'D' MSL FAILURE TO ISOLATE / MSL LEAK IN TURBINE BUILDING

AR-015-D04	STACK MONITORING SYS 0C630/0C677 HI-HI RADIATION, REV. 29
AR-015-E04	STACK MONITORING SYS 0C630/0C677 HI RADIATION, REV. 29
AR-111-B03	MN STM LINE LEAK DETECTION HI TEMP, REV. 27
AR-112-B03	MN STM LINE LEAK DETECTION HI TEMP, REV. 26
ON-070-001	ABNORMAL GASEOUS RADIATION RELEASE/CAM ALARMS, REV. 13
TS 3.6.1.3	PRIMARY CONTAINMENT ISOLATION VALVES, AMMEND. 195

6. RADIOACTIVITY RELEASE / RAPID DEPRESSURIZATION

EO-000-105	RADIOACTIVITY RELEASE CONTROL, REV. 1
EO-000-112	RAPID DEPRESSURIZATION, REV. 1
EO-000-103	PRIMARY COMTAINMENT CONTROL, REV. 2
OP-149-005	RHR SUPPRESSION POOL COOLING, REV. 21

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SCENARIO SPECIAL INSTRUCTIONS

1. Initialize the simulator to **IC-18**: Unit 1 at 80% power EOL, Unit 2 in MODE 4.
2. Reduce Recirc flow to 75.6 MLBM/HR to achieve ~80% reactor power.
3. Snapshot to an available IC (currently **IC-106**).
4. Type **restorepref YPP.ILO-302;** verify the following pre-inserts and Program Button assignments. **Verify the Environment window:**

MALFS	REMFS	OVRDS	TRIGS
6 : 6	3	1 : 1	3

MALFUNCTIONS

RP158007A	RPS 'A' FAILURE TO TRIP
AV06:HV141F022D 100	MSIV F022D BIND DURING MOTION
AV06:HV141F028D 100	MSIV F028D BIND DURING MOTION
TR02:XTT03701 2	SET WIND SPEED AT 60 M @ 2MPH
TR02:XTT03730 2	SET WIND SPEED AT B/U TWR @ 2MPH
TR03:XTT03701	SET WIND SPEED AT 60 M OFFSET

REMOTE FUNCTIONS

EN100002 2	SET WIND SPEED AT 2 M @ 2 MPH
EN100009 0.3	SET WIND SPEED VARIABLILITY @ 0.3 MPH
PM131P132B OUT	1B CRD PUMP BKR RACKED OUT

OVERRIDES

ZAOXR03705A	SET WIND SPEED AT 10 M @ 2 MPH

TRIGGERS / ACTIONS

E1 BAAA26409	EVENT TRIGGER MODE SWITCH IN SHUTDOWN
E1 = IMF MS183008 0.9	D' MSL LEAK IN TURBINE BUILDING
E2 ILO302CONDPP	'B' COND PUMP STOP SWITCH
E2 = IMF AV04:FV10508 10	STICK MIN FLOW VALVE AT 10% OPEN
E3 ILO302COND	MIN FLOW CONTROLLER IN MANUAL
E3 = DMF AV04:FV01508	REMOVE MIN FLOW VALVE MALFUNCTION

PROGRAM BUTTONS

[P-1] IMF TR02:PDTC321N004A 60 0 ASIS	NR LEVEL 'A' FAILURE UPSCALE
[P-2] IMF RR179003 90 15:00	FUEL FAILURE 90 PINS
[P-3] bat YPB.ILO-302A	RAMP TB SPING RELEASE RATES

SCENARIO SPECIAL INSTRUCTIONS

5. Verify all simulator tasks are running properly (type 'sus' and then 'ols' on xis-2)

6. Verify LEFM is selected as the Feedwater flow input to PICSY IAW OI-TA-021.

7. Prepare a Reactor Engineering Instructions package.

8. Prepare/markup GO-100-012 up through step 5.74.

9. Prepare a turnover sheet indicating:

   a. Unit 1 is at 80% power EOL.
   b. CRD pump 1B is out of service for breaker maintenance, it is not expected to return this shift.
   c. Condensate pump 1B has a possible ground; shutdown Condensate pump 1B for inspection immediately after shift turnover.
   d. No surveillance activities are planned or due during the shift.
   e. Chemistry and RX Engineering still investigating spike in Off-gas activity during the last Control Rod Exercise Surveillance.
   f. Unit 2 is in MODE 4.

10. Prepare a MIDAS DOSE SUMMARY REPORT form.

11. Make a copy of shift assignments.

SCENARIO EVENT DESCRIPTION FORM

Initial Conditions: Initialize the Simulator to IC-106. 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 walkdown.

EVENT	TIME	DESCRIPTION
1		SHUTDOWN 1B CONDENSATE PUMP
2		CONDENSATE MIN FLOW RECIRC VALVE FAILURE
3		'A' NR LEVEL INSTRUMENT FAILS UPSCALE
4		FUEL CLAD FAILURE
5		RPS 'A' FAILURE TO TRIP
6		'D' MSL FAILURE TO ISOLATE
7		MSL LEAK IN TURBINE BUILDING
8		RADIOACTIVITY RELEASE
9		RAPID DEPRESSURIZATION

SCENARIO EVENT FORM

Event No: 1, 2
Brief Description: SHUTDOWN 1B CONDENSATE PUMP / MINIMUM FLOW RECIRC VALVE FAILURE

POSITION	TIME	STUDENT ACTIVITIES
US		Directs shutdown of 1B Condensate pump IAW OP-144-001, CONDENSATE AND FEEDWATER SYSTEM.
PCOM		Implements OP-144-001, CONDENSATE AND FEEDWATER SYSTEM. 1. Depresses STOP pushbutton for 1B Condensate pump. 2. Observes RPV water level and Feedwater System response.
PCOP		Implements OP-144-001, CONDENSATE AND FEEDWATER SYSTEM. 1. Ensures 1B Condensate pump discharge valve (HV10502B) closes. 2. Observes Condensate header pressure to ensure greater than 530 psig.
		Recognizes Condensate header pressure is less than 530 psig on PICSY format.
		Determines Condensate recirc valve FV-10508 is not fully closed.
		Places Condensate recirc valve controller FIC-10508 in MANUAL and closes the valve.
		Dispatches Plant Operator to investigate problem with FV-10508.
US		Notifies WCC/Maintenance 1B Condensate pump is shutdown.
		Notifies WCC of problem with Condensate recirc valve FV-10508.

★ Denotes Critical Task

NOTES:	

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

Event No: 1, 2
Brief Description: SHUTDOWN 1B CONDENSATE PUMP / MINIMUM FLOW RECIRC VALVE FAILURE

INSTRUCTOR ACTIVITY:

When Condensate pump 1B stopped, ensure event trigger **E2 (ILO302CONDPP)** actuates to fail recirc valve FV-10508 at 10% open (**IMF AV04:FV10508 10**).

When Condensate recirc valve controller FIC-10508 placed in MANUAL, ensure event trigger **E3 (ILO302COND)** actuates to remove recirc valve FV-10508 malfunction (**DMF AV04:FV10508**).

Monitor the condensate system on **FW7**.

ROLE PLAY:

As Plant Operator dispatched to investigate Condensate recirc valve FV-10508, wait ~ 2 minutes and **IF** the valve has not yet been closed from the control room, report it sounds like there is flow in the recirc line. **IF** the valve has already been closed, report there is no indication on any problems associated with the valve.

SCENARIO EVENT FORM

Event No: 3
Brief Description: **'A' NR LEVEL INSTRUMENT FAILS UPSCALE**

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports alarms RX WATER HI-LO LEVEL and RX WATER HI LEVEL.
		Reports 'A' NR level reading +60".
		Observes FWLC response to stabilize RPV water level.
		Reports 'B' and 'C' NR level indication stabilizes at ~22.5".
		Reports 'A' Hi Water Level Trip green status light is ON.
		Refers to AR-101-B17, RX WATER HI-LO LEVEL.
		Refers to AR-101-A17, RX WATER HI LEVEL.
US		Directs implementation of ON-145-001, RPV LEVEL CONTROL SYSTEM MALFUNCTION.
PCOM NOTE 1		Implements ON-145-001, RPV LEVEL CONTROL SYSTEM MALFUNCTION. 1. Places FW LEVEL CTL/DEMAND SIGNAL LIC-C32-1R600 controller in MAN. 2. Adjusts LIC-C32-1R600 to restore RPV water level to ~+ 35". 3. Selects 'B' NR level signal input. 4. Transfers from AVERAGED to SELECTED level. 5. Nulls FW LEVEL CTL/DEMAND LIC-C32-1R600 controller. 6. Places FW LEVEL CTL/DEMAND LIC-C32-1R600 controller in AUTO.
US		Contacts WWM to investigate 'A' NR level instrument failure.
		Refers to TS 3.3.2.2; declares 'A' NR level channel inoperable, enters Condition A.

★ Denotes Critical Task

NOTES:	(1) If level not restored to ~ 35 inches (> 30 inches) prior to transfer to "B" SELECTED
level input signal, a #2 Recirc runback will occur.	

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

Event No: 3
Brief Description: **'A' NR LEVEL INSTRUMENT FAILS UPSCALE**

INSTRUCTOR ACTIVITY:

When the actions are complete for the Condensate recirc valve failure, insert 'A' NR level instrument failure upscale; **Depress P-1:**

[P-1] IMF TR02:PDTC321N004A 60 0 ASIS NR LEVEL 'A' FAILURE UPSCALE

ROLE PLAY:

As WWM sent to investigate 'A' NR level problem, wait 5 minutes, and report the differential pressure transmitter is failed and must be replaced and calibrated. The repairs are expected to take approximately 8 hours.

SCENARIO EVENT FORM

Event No: 4
Brief Description: FUEL CLAD FAILURE

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Reports alarm TURB BLDG AREA PANEL 1C605 HI RADIATION.
		Observes Turbine building area radiation reading on PICSY.
		Reports increasing radiation levels: TURBINE FRONT END, SJAE RM and FEEDWATER HEATER AREA.
		Refers to AR-101-C05, TURB BLDG AREA PANEL 1C605 HI RADIATION.
		Evacuates Unit 1 TB of all non-essential personnel.
		Contacts HP to perform HP-TP-441.
US		Directs PCOP to monitor MSL and Off-gas radiation levels on PICSY and/or panel 1C600.
PCOP		Reports radiation levels are increasing for MSL and Off-gas.
		Reports alarm MN STM LINE RAD MONITOR HI RADIATION; refers to AR-111-C03.
		Checks MSL and Off-gas radiation monitors for indication and trend.
US		Enters EO-100-104, SECONDARY CONTAINMENT CONTROL.
		Refers to ON-159-002, CONTAINMENT ISOLATION, ATTACHMENT F.
		Directs power reduction using Recirc flow.
		May enter ON-100-101, SCRAM and direct scram imminent actions.
PCOM		Reduces power by reducing Recirc flow.
		Performs scram imminent actions if directed.
PCOM		Reports alarm RX BLDG AREA PANEL 1C605 HI RADIATION.
		Refers to AR-101-B05, RX BLDG AREA PANEL 1C605 HI RADIATION.

★ Denotes Critical Task

NOTES:	

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

Event No: 4
Brief Description: FUEL CLAD FAILURE

INSTRUCTOR ACTIVITY:

When FWLC master controller is restored to auto insert a fuel clad failure, **Depress P-2:**

[P-2] IMF RR179003 90 15:00 FUEL FAILURE 90 PINS

NOTE: Turbine building area high radiation alarm is received in <1 minute.
Main steam line high radiation alarm is received in ~ 7 minutes.

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 4, 5
Brief Description: FUEL CLAD FAILURE / RPS 'A' FAILURE TO TRIP

POSITION	TIME	STUDENT ACTIVITIES
PCOM		Monitors Reactor Building radiation levels on PICSY (RADRX, RXBE).
		Reports increasing radiation levels: CRD N & S, HPCI ROOM, RCIC ROOM and RB SUMP AREA.
		Evacuates Unit 1 RB of all non-essential personnel.
		Performs scram imminent actions if directed.
PCOM		Reports alarm MN STM LINE HI HI RADIATION.
		Refers to AR-103-D01, MN STM LINE HI HI RADIATION.
US		Directs manually scramming Reactor; enters ON-100-101, SCRAM.
PCOM		Places the Reactor mode switch to SHUTDOWN.
★ **PCOM**		**Recognizes and reports failure to scram.** Arms and depresses manual scram pushbuttons.
		Inserts SRMs and IRMs.
US		Enters EO-000-102, RPV CONTROL, and exits to EO-000-113, LEVEL POWER CONTROL.
★ **US**		**Ensures ARI initiation.**
★ **PCOP** NOTE 1 PCOM		**Initiates ARI.** 1. Arms and depresses Division 1 and Division 2 ARI pushbuttons. 2. Reports ARI has actuated. 3. Reports all control rods are fully inserted.

★ Denotes Critical Task

NOTES:	(1) IAW Attachment C of OP-AD-055, this is an Immediate Operator Action for a scram condition and more than one control rod is > 00.

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

Event No: 4, 5
Brief Description: FUEL CLAD FAILURE / RPS 'A' FAILURE TO TRIP

INSTRUCTOR ACTIVITY:

When the crew places the Mode Switch to SHUTDOWN, verify trigger **E1** activates to initiate a steam leak in the Steam Tunnel.

E1 (BAAA26409) = IMF MS183008 0.9

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: **4, 5, 6, 7**
Brief Description: **FUEL CLAD FAILURE / RPS 'A' FAILURE TO TRIP / 'D' MSL FAILURE TO ISOLATE / MSL LEAK IN TURBINE BUILDING**

POSITION	TIME	STUDENT ACTIVITIES
US		Exits EO-000-113 and re-enters EO-000-102.
		Directs closure of MSIVs and drains IAW ON-159-002, Attachment F.
		Directs RPV water level maintained +13" to +54" with RCIC and CRD.
		Directs RPV pressure maintained <1087 psig with SRVs.
		Directs PCOM to reset main generator lockouts.
PCOP		Manually closes MSIVs and drains.
		Reports 'D' MSL failed to isolate.
		Verifies 'D' MSL flow indication on 1C652 indication FI-C32-1R603D.
US		Enters EO-000-104, SECONDARY CONTAINMENT CONTROL.
NOTE 1		Contacts maintenance for the MSIV failures in 'D' MSL.
PCOP		Reports alarm STACK MONITORING SYS 0C630/0C677 HI RADIATION.
		Refers to AR-015-E04, STACK MONITORING SYS 0C630/0C677 HI RADIATION.
		Checks SPING, reports increasing TB Stack Noble Gas.
PCOP		Reports alarms MN STM LINE LEAK DETECTION HI TEMP DIV 1 / 2.
		Verifies 1C614 temperature readings; reports high temperature in TB Steam Tunnel.

★ Denotes Critical Task

NOTES:	(1) A common error is Rapid Depressurization when the radiation levels on elevations
645' and 719' increase to > max safe levels. There is no primary system discharging to any Secondary	
Containment area throughout this scenario.	

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

Event No: 4, 5, 6, 7
Brief Description: FUEL CLAD FAILURE / RPS 'A' FAILURE TO TRIP / 'D' MSL FAILURE TO ISOLATE / MSL LEAK IN TURBINE BUILDING

INSTRUCTOR ACTIVITY:

When the MSIVs and drains are closed increase TB release rates, **Depress P-3:**

[P-3] bat YPB.ILO-302A RAMP TB SPING RELEASE RATES

ROLE PLAY:

As necessary

SCENARIO EVENT FORM

Event No: 8, 9
Brief Description: RADIOACTIVITY RELEASE / RAPID DEPRESSURIZATION

POSITION	TIME	STUDENT ACTIVITIES
US		Enters EO-000-105, RADIOACTIVITY RELEASE, when TB Iodine or NG release rate exceeds ALERT Level.
		Requests Off-Site Dose Calculations.
		Directs Reactor cooldown < 100°F/hr with SRVs.
PCOP		Initiates cooldown < 100°F/hr using SRVs.
★ **US** NOTE 1		**Directs Rapid Depressurization before EPB projected dose/dose rate reaches the General Emergency declaration criteria.** 1. Enters EO-000-112, RAPID DEPRESSURIZATION. 2. Directs preventing uncontrolled Condensate injection. 3. Verifies Suppression Pool level > 5 feet. 4. Directs opening all ADS SRVs. 5. Verifies all ADS SRVs are open.
★ **PCOP**		**Performs Rapid Depressurization by opening all ADS SRVs.** 1. Arms and depresses Division 2 ADS manual pushbuttons and verifies 6 red lights lit for ADS solenoids, or 2. Places individual control switch to open for each ADS SRV (G, J, K, L, M, & N) and verifies red light lit and amber light not lit for each valve solenoid. 3. Verifies 6 ADS SRVs are open: • Observes 6 ADS SRVs open on acoustic monitor status light indication. • Observes RPV pressure decrease. • Observes elevated tail pipe temperatures on TRS-B21-1R614.

★ Denotes Critical Task

NOTES:	(1) GE declaration criteria can be obtained from either the Offsite Dose Calculations
(MIDAS) report, or from SPING, as directed in Table 13 of EO-000-105.	

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

Event No: 8, 9
Brief Description: RADIOACTIVITY RELEASE / RAPID DEPRESSURIZATION

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

Approximately 10 minutes after the crew enters EO-000-105 and Off-Site Dose Calculations have been requested, report to the Control Room as the TSC Dose Calculator and provide the crew the attached MIDAS report.

NOTE:

Off-Site dose is projected to reach 1.6 Rem TEDE based on existing release rate and plant conditions.

SCENARIO EVENT FORM

Event No: 8, 9
Brief Description: RADIOACTIVITY RELEASE / RAPID DEPRESSURIZATION

POSITION	TIME	STUDENT ACTIVITIES
US		Directs RPV level restored and maintained +13" to +54" with Condensate.
		Enters EO-000-103, PRIMARY CONTAINMENT CONTROL, due to Suppression Pool temperature > 90°F.
		Directs placing both loops of RHR in Suppression Pool Cooling.
PCOM		Restores and maintains RPV level at +13" to +54" with Condensate.
PCOP		Places both loops of Suppression Pool Cooling in service IAW OP-149-005, RHR SUPPRESSION POOL COOLING. 1. Places ESW in service. 2. Places RHRSW in service to RHR heat exchanger A / B. 3. Opens Suppression Chamber test shutoff valve HV-151-F028A / B. 4. Starts RHR pump 1P202A(C) / B(D). 5. Throttles open test line control valve HV-F024A / B to achieve ≤10,000 gpm on FI-E11-1R603 A / B. 6. Observes minimum flow valve HV-151-F007A / B closes at ~ 3000 gpm. 7. Closes heat exchanger bypass HV-151-F048A / B. 8. Checks RHR pump room coolers 1V210A(C) / B (D) started.
US		***After the scenario is complete, determines TS 3.6.1.3 RA B.1 is applicable for the failure of both MSIVs in "D" main steam line. If RA B.1 not completed within 1 hour, the unit must be in Mode 4 within 36 hours.***
US		***After the scenario is complete, classifies the event as a GENERAL EMERGENCY under EAL RG1 due to projected dose rates exceeding the limits at the EPB.***

★ Denotes Critical Task

NOTES:	

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

Event No: 8, 9
Brief Description: RADIOACTIVITY RELEASE / RAPID DEPRESSURIZATION

INSTRUCTOR ACTIVITY:

As necessary

ROLE PLAY:

As necessary

TERMINATION CUE:

Rapid depressurization has been performed and RPV water level has been restored to +13" to +54".

TECHNICAL SPECIFICATION DETERMINATION:

After the scenario is complete, have the US determine any Technical Specification requirements due to the failure to isolate the "D" Main Steam Line.

EVENT CLASSIFICATION:

After the Scenario is complete, have the US classify the scenario for the HIGHEST EAL. Provide the US with any requested information needed to perform the classification.