

SIMULATOR EVALUATION SCENARIO COVER PAGE

PROGRAM TITLE: License Operator Training/Licensed Requalification Training

SUBDIVISION: Simulator

SCENARIO TITLE/NO.: 2005 NRC Initial License Exam

COMPUTER CODE FOR L.P.: 1LOT6 Scenario No. 1

Revision No.	Date
2	2-8-05

Revision	Date

INSTRUCTIONAL SETTING: Simulator

APPROXIMATE DURATION: 1.5 Hours

PREPARED BY: \_\_\_\_\_ Date

REVIEWED BY: \_\_\_\_\_ Date

APPROVED FOR IMPLEMENTATION: \_\_\_\_\_ Date

**INITIAL CONDITIONS:**

- IC-181, PW = NRC1; 100% Power, RCS Boron 1205 ppm, CB "D" at 227 steps, Rods in Auto.
- 1CH-P-1C, HHSI/Charging Pump OOS.
- PCV-1RC-456, PORV leakage. MOV-1RC-536, Block Valve closed with power maintained.
- Flood warnings from heavy rains.
- Maintenance investigating 1RW-P-1A, River Water Pump abnormal vibration/noise.

<b><u>ADDITIONAL LINEUP CHANGES</u></b>	<b><u>STICKERS</u></b>	<b><u>VOND MARKINGS</u></b>
PCV-1RC-456 Control Switch in Close MOV-1RC-536 Control Switch in Close	YCT - Both CH-P-1C Switches YCT - PCV-1RC-456 Control Switch YCT - MOV-1RC-536 Control Switch	OM Fig. 7-1, 3E: CH-27, 161 Shut OM Fig. 7-1, 5E: CH-21, 148 Shut
<b><u>EQUIPMENT STATUS</u></b>	<b><u>DATE/TIME OOS</u></b>	<b><u>TECHNICAL SPECIFICATION(S)</u></b>
1CH-P-1C	2 days ago	N/A
PCV-1RC-456	Yesterday 1500	3.4.11.a

**SHIFT TURNOVER INFORMATION**

1. 1CH-P-1C is OOS for pump shaft and coupling replacement and is expected to return within the next 24 - 36 hours.
2. PCV-1RC-456 seat leakage. MOV-1RC-536 is closed with power maintained per T.S. 3.4.11.a.
3. 1WR-P-1A is operable, but investigation of abnormal vibration/noise by Maintenance is ongoing.
4. AOP-1/2.75.2, Acts of Nature - Flood is in effect. River water level is currently 671 feet and stable. Cooling Tower Pump House level is being logged on the Outside Operator Tour.
5. Train "B" is the Protected Train.
6. Reduce reactor power to 75% at 12%/hr. to remove a condenser waterbox from service for cleaning.

SCENARIO SUPPORT MATERIAL REQUIRED

1OM-52.4.B, Load Following

Reactivity Plan for 12%/hr. Load Reduction

Protected Train "B" Wall Plaque

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #1**

Reduce power to 75% at 12% per hour

US directs load reduction in accordance with Reactivity Plan.

BOP initiates load reduction per 1OM-52.4.B, Step IV.A.

Set the desired terminal load on the SETTER.

Set the desired rate on the LOAD RATE thumbwheel (5%/min. maximum).

As the turbine load reduces, maintain the valve position limiter approximately 5% above turbine load to prevent load excursions.

Turbine load and reactor power decreasing at 12%/hr.

Depress the GO pushbutton.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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After the governor valves are off the limiter, transfer the turbine control to the 1<sup>st</sup> stage pressure feedback mode by depressing the 1<sup>ST</sup> STG IN pushbutton AND verify the following:

1. The 1<sup>ST</sup> STG OUT lamp is OFF.
2. The 1<sup>ST</sup> STG IN lamp is ON.

After transfer to the 1<sup>ST</sup> stage pressure feedback mode, set the desired terminal load on the SETTER.

Set the desired rate on the LOAD RATE thumbwheel (5%/min. maximum).

As the turbine load reduces, maintain the valve position limiter approximately 5% above turbine load to prevent load excursions.

Turbine Load and Reactor Power lowering at 12% per hour

Depress the GO pushbutton.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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RO initiates RCS boration as necessary to maintain  $T_{avg} - T_{ref}$  per 1OM-7.4.L, Step IV.A and reactivity plan.

Estimate the volume of boric acid to be added to the RCS using any of the following:

- a. 1OM-7.5, Figure 7.7, "Boron Addition", AND Table 1, "Nomograph Correction Factors"
- b. WAG tables
- c. Reactor Engineer approved computer based methods

Estimate the rate of boron concentration change as a function of boric acid flow rate using 1OM-7.5, Figure 7-8, "Boron Addition Rate", AND Table 1, "Nomograph Correction Factors".

Place the 1MU control switch to Stop for greater than 1 second to allow the blender to unarm.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Place 43/MU control switch to Borate.

Set FCV-1CH-113A, Boric Acid to Blender FCV to the desired boric acid flowrate.

Set Boric Acid Integrator YIC-1CH-113 for the desired quantity.

- a. Reset Boric Acid Integrator YIC-1CH-113.

Start the Reactor Makeup Control System by placing 1MU control switch to Start.

Verify boric acid to blender flow on FR-1CH-113, Boric Acid Flow.

Operate the pressurizer spray as required to limit the difference between boron concentration in the pressurizer and that of the RCS to less than 50 ppm.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Verify boration automatically stops when Boric Acid Integrator YIC-1CH-113 reaches the setpoint.

When boration is complete, perform the following:

- a. Place the 1MU control switch to Stop for greater than 1 second.
- b. Place 43/MU control switch to Auto.
- c. Reset Boric Acid Integrator YIC-1CH-113.
- d. Adjust makeup controls for the new RCS boron concentration.
- e. Place the 1MU control switch to Start.



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<b>EVENT #2</b>			
Valve Position Limiter Failure; Control Rods Fail In Auto	Load rejection occurs and control rods fail in Auto after stepping in.		
When directed, insert the following command:	Annunciators:		Crew acknowledges alarms, notifies US and investigates loss of load.
<b>IMF TUR15 (0 0) 60</b>	[A4-46], Tav <sub>g</sub> Deviation from Tref		
(Other malfunctions pre-loaded)	[A4-124], Rod Control Bank D Low Low		
	[A4-12], Pressurizer Control Low Pressure Deviation		Crew informs US of the loss of electrical load.
	[A4-52], Delta Flux Out of Target Band		
<b>Control rods stop moving after 10 seconds (preloaded).</b>	Control rods stepping in.		US refers to AOP-1.35.2, Load Rejection
	Tav <sub>g</sub> increasing.		
	Steam dump valves opening.		
	RCS pressure increasing.		
	MW decreasing.		
	Control rods not inserting.		RO verifies control rods in Auto.
	Rods in Manual and inserting.		▪ Inserts control rods in Manual
	Boration flow indicated.		RO initiates RCS boration.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
			Crew sounds Standby alarm and announces Unit 1 load rejection.
			US requests SM to evaluate EPP.
	EHC system normal except for valve position limiter.		BOP verifies normal EHC operation.  <ul style="list-style-type: none"> <li>VPL not consistent with pre-event value</li> </ul>
	1LO-M-9A running.		BOP checks at least one EHC pump is running.
	EHC pressure > 1550 psig.		BOP checks EHC fluid pressure greater than 1550 psig.
	Valve position limiter failure; vibration and load satisfactory for condition.		Crew checks if governor valves have closed in sequence, checks turbine vibration recorders.
	Generator load stable.		Crew monitors for subsequent load reductions > 90 Mwe.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Generator load > 270 Mwe. Vacuum < 5.5 inches HgA.		Crew checks if reactor or turbine should be tripped.  <ul style="list-style-type: none"> <li>▪ Generator load &gt; 270 MWe</li> <li>▪ Vacuum &lt; 5.5 inches HgA</li> </ul>
	Generator volts, amps, and power factor satisfactory.		BOP checks main generator parameters.
	Tavg lowering to Tref value.		RO checks Tavg-Tref within $\pm 2^{\circ}\text{F}$ .
	Steam dump valves closed. Steam dumps reset.		BOP resets steam dump controller: <ul style="list-style-type: none"> <li>▪ Verifies steam dump valves closed</li> <li>▪ Places steam dump control mode selector switch to reset</li> <li>▪ Allows switch to spring return to Tavg position</li> </ul>
	Bistable lights extinguished.		<ul style="list-style-type: none"> <li>▪ Verifies load rejection bistables NOT lit</li> </ul>
	VPL malfunctioning.		Crew determines VPL reference setting not at pre-event value.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
FE System and Duquesne Light Controllers acknowledge notification of load rejection.			US notifies Wadsworth (FE) System Control Center and Duquesne Light System Control Center of load rejection.
At SM direction, do not lower turbine load.			US directs I&C to investigate problem with VPL.
			US checks for load reduction of > 15% and informs Chemistry, if necessary.
	TV-1CN-100 closed.		Crew checks TV-1CN-100 closed.
	Reactor power > 25%.		Crew checks if 1CCT-13 should be opened.
Continue with scenario when VPL problem is identified and Tavg-Tref are matched, or at Examiner's discretion.			US may review T.S. 3.2.1, 3.2.5 and 3.1.3.6 for compliance.
			US reviews T.S. 3.4.8 for RCS sampling requirements, if power changed by >15%.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #3**

Pressurizer Pressure Transmitter  
Fails High

PT-1RC-445 fails high slowly.

RO notes alarm and informs US. Crew refers to ARP's, if necessary.

When directed, insert the following command:

**IMF PRS08E (0 0) 2500 120**

Annunciators:

[A4-5], Pressurizer Power Oper Relief Valve Open

US refers to 1OM-6.4.IF, Instrument Failure Procedure, Attachment 2.

[A4-9], Pressurizer Control Press High

[A4-12], Pressurizer Control Press Deviation

[A4-13], Pressurizer Control Press High Pwr Relief Act

PCV-1RC-455D closed.

RO closes PCV-1RC-455D.

PCV-1RC-456 blocked closed.

US refers to Technical Specifications.

- T.S. 3.2.5 may apply if RCS pressure is below DNB setpoint.
- T.S. 3.4.11.a may be referenced, but PORV remains operable in manual, capable of being cycled.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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#### **EVENT #4**

SG Pressure Transmitter Failure

PT-1MS-485 fails low.

When directed, insert the following command:

Crew responds to indications and alarms.

Annunciators:

**IMF MSS16E (0 0) 0**

[A7-49], Loop 2 Steamline Pressure Low  
or Press Rate Hi

[A7-50], Loop 2 Feedwater Flow >  
Steam Flow

[A7-53], Aux Feed to Stm Gen Valves  
Not Fully Open Train A

SG 1B Channel 3, PT-1MS-485 fails low.

SG 1B Channel 3 steam flow drops  
(density compensation input).

SG 1B feed flow, NR level drops.

FCV-1FW-488 modulates closed in  
automatic.

BOP notes problem with SG 1B level  
control, takes manual control of FCV-  
1FW-488 and informs US.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<b>NOTE: Level deviation is dependent on time of establishing normal MFRV control to restore SG level.</b>	SG 1B level deviation.		Crew determines that steam pressure channel PT-1MS-485 failed low.
			US refers to 1OM-24.4.IF, Instrument Failure Procedure, Attachment 4.
	NR level returning to 44%.		US directs BOP to restore SG 1B level to program level.
	FM-485 selected.		BOP selects redundant SG steam flow signal on FC-1FW-488.
	FCV-1FW-488 in Auto.		US directs BOP to return feedwater control to automatic when SG level is within normal range.
			US refers to T.S. 3.3.2.1 and Table 3.3-3, Items 1.e and 4.d.
			US identifies 6 hour requirement to place channel in the tripped condition.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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US directs crew to trip associated bistables per 1OM-24.4.IF, Attachment 4, Table 1.

US directs I&C to investigate failure of steam pressure channel.

Prior to next event, insert the following command:

Condenser Steam Dump Failure

**IMF MSS07 (0 0)**

**When bistables have been directed to be tripped and malfunction is inserted, continue with the next event.**



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENTS #5, 6, & 7**

Turbine Trip; Condenser Steam Dump Failure; Auto and Manual Reactor Trip Failure; SG ADV Fails Open

When directed, insert the following command:

**IMF TUR01 (0 0)**

Spurious turbine trip leads to ATWS event followed by faulted SG due to stuck open atmospheric dump valve.

RCS pressure and Tavg rising.

Crew determines that the turbine has tripped.

US directs a manual reactor trip.

RO places reactor trip switch to Trip.

RO identifies that reactor failed to trip.

RO depresses BB-A reactor trip pushbutton to attempt reactor trip.

**ATWS**

**Crew enters FR-S.1.**

US transitions to FR-S.1, and informs crew.

Turbine tripped.

BOP verifies turbine is tripped.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**CRITICAL TASK #1:**

**Crew inserts negative reactivity into the core by inserting RCCAs before transitioning from FR-S.1.**

Control rods inserting.

Crew verifies  $T_{REF}$  is decreasing.

RO places control rod group selector in Auto and verifies rods are inserting.

RO drives rods in manual after automatic rod motion stops.

FW-P-3A and 3B running.

TV-IMS-105A and 105B open.

MOV-1FW-151A, B, C, D, E, and F open.

BOP verifies AFW status.

- Motor-driven pumps running
- Turbine-driven AFW pump steam supply valves open
- AFW throttle valves - full open

CH-P-1A running.

SI not actuated.

MOV-1CH-350 open

1CH-P-2A(B) running in fast speed.

RO initiates emergency boration.

- Verify at least one charging pump running
- Check SI actuated
- Open MOV-1CH-350
- Start in-service Boric Acid Transfer Pump in FAST speed

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<p>When directed to locally trip reactor, insert:</p> <p><b>TRG! 3</b></p>	Boration flow > 30 gpm.		<ul style="list-style-type: none"> <li>Verify emergency boration flow - greater than 30 gpm</li> </ul>
	FI-1CH-122A indicates > 75 gpm.		<ul style="list-style-type: none"> <li>Adjust FCV-1CH-122 to establish charging flow greater than 75 gpm</li> </ul>
	PRZR pressure < 2335 psig.		RO checks PRZR pressure < 2335 psig.
			Crew sounds Standby alarm and announces Unit 1 ATWS.
	RTB "A" open (2 minute delay).		Crew dispatches operator to locally trip the reactor.
	RTB "B" open (2 minute delay).		
	Control rods drop.		
	Power decreasing.		
	MOV-1MS-100A, B closed.		BOP verifies turbine trip and reheat steam isolation.
	All reheat stop and interceptor valves closed.		<ul style="list-style-type: none"> <li>Verify MOV-1MS-100A, B closed</li> <li>Reset reheater controller</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
			BOP places both steam dump control interlock selector switches in Off.
	SI not actuated.		US determines SI has not actuated.
			US directs performance of first 10 steps of E-0, as time permits.
	Power range indicates < 5%.		RO checks reactor is subcritical.
	Intermediate Range SUR negative.		<ul style="list-style-type: none"> <li>▪ Power range channels &lt; 5%.</li> <li>▪ Intermediate range channels negative startup rate.</li> </ul>
			RO continues boration, as necessary.
Crew returns to E-0.			US transitions to E-0, and informs crew.
			US directs STA to monitor CSF Status Trees.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Reactor trip and bypass breakers open.		RO verifies reactor trip.
	Rod bottom lights lit.		▪ Rx trip and bypass breakers are open
	Rods at bottom.		▪ Rod bottom lights are lit
	Neutron flux decreasing.		▪ Rod position indication at zero
			▪ Neutron flux is dropping
	Throttle and governor valves closed.		BOP verifies turbine trip.
	Main generator output breakers open.		BOP verifies generator trip.
	Exciter circuit breaker open.		
	1AE and 1DF busses energized.		BOP verifies power to AC emergency busses.
<b>E-0 immediate actions complete.</b>	SI actuated.		RO verifies SI actuated.
<b>NOTE: Pre-emptive action may have been previously performed.</b>			▪ Depresses manual SI actuation pushbuttons (both trains).
			Crew sounds Standby Alarm and announces Unit 1 reactor trip and safety injection.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	1VS-F-4A running.		<p>BOP verifies leak collection exhaust fan is running.</p> <p>US directs starting CNMT hydrogen analyzers.</p> <p>RO verifies SI status.</p> <ul style="list-style-type: none"> <li>Two charging pumps running</li> <li>BIT flow indicated</li> <li>LHSI pumps both running</li> </ul> <p>BOP verifies AFW status.</p> <ul style="list-style-type: none"> <li>AFW pumps running</li> <li>SG AFW throttle valves full open</li> <li>Total AFW flow &gt; 355 gpm</li> </ul> <p>BOP performs Attachment 1-K, Verification of Automatic Actions (Steps listed at end of scenario guideline.)</p>
	CH-P-1A and CH-P-1B running.		
	BIT flow indicated.		
	SI-P-1A and 1B running.		
	MD and TD AFW pumps running.		
	All SG AFW throttle valves open.		
	AFW flow > 355 gpm.		

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
PCV-1MS-101A stuck open.	T <sub>AVG</sub> decreasing.		RO check RCS T <sub>AVG</sub> stable at or trending to 547°F.
	Condenser steam dumps closed.		<ul style="list-style-type: none"> <li>▪ Stop dumping steam.</li> </ul>
	MOV-1MS-100A, B closed.		<ul style="list-style-type: none"> <li>▪ Verify reheat steam isolation.</li> </ul>
	Total AFW flow > 355 gpm.		<ul style="list-style-type: none"> <li>▪ Reduce total feed flow to minimize cooldown.</li> </ul>
	Main steam trip and bypass valves closed.		<ul style="list-style-type: none"> <li>▪ Close main steam trip and bypass valves.</li> </ul>
	Recirc spray pumps not running.		RO checks recirc spray pump status.
	PCV-1RC-456 closed, but leaking.		RO checks PRZR isolated.
	Spray valves closed.		<ul style="list-style-type: none"> <li>▪ PORVs closed</li> </ul>
	Safety relief valves closed.		<ul style="list-style-type: none"> <li>▪ Spray valves closed</li> </ul>
	PRT conditions normal.		<ul style="list-style-type: none"> <li>▪ Safety relief valves closed</li> </ul>
	All PORV MOV's open (except MOV-1RC-536 previously closed).		<ul style="list-style-type: none"> <li>▪ PRT conditions at expected values</li> <li>▪ Power to at least one block valve and at least one open</li> </ul>
	D/P between RCS and highest SG pressure > 200 psid.		Crew checks if RCP's should be stopped.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	SG 1A faulted.		<p>Crew checks if any SG's are faulted.</p> <ul style="list-style-type: none"> <li>▪ BOP determines SG 1A pressure decreasing in uncontrolled manner.</li> </ul>
<b>Crew enters E-2.</b>			US transitions to E-2, and informs crew.
	Control Room dampers shut and timers running.		BOP initiates CREVS and verifies system actuated.
When requested as Unit 2 Operator, report CREVS actuation.			Crew requests Unit 1 CREVS status.
<b><u>CRITICAL TASK #2:</u></b>			
<b>Crew isolates the faulted SG and directs operator to close isolation valve before transition out of E-2.</b>	All yellow SLI marks lit.		Crew verifies steam line isolation.
	Pre-nonreturn valves closed.		BOP closes steamline pre-nonreturn drain valves.
	SG 1B and 1C pressures stable.		BOP checks for any non-faulted SG.



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	SG 1A faulted.		BOP identifies SG 1A pressure decreasing in uncontrolled manner.
			Crew isolates faulted SG.
	Main and Bypass Feed Reg Valves closed.		<ul style="list-style-type: none"> <li>▪ Check FWI - previously verified.</li> </ul>
<b>NOTE: Pre-emptive action may have been previously performed.</b>	AFW throttle valves closed. (May have been previously closed.)		<ul style="list-style-type: none"> <li>▪ Close AFW throttle valves on faulted SG.</li> <li>▪ Direct locally closing MS-15.</li> <li>▪ Attempt to close atmospheric dump valve.</li> <li>▪ Close residual heat release valve.</li> </ul>
	PCV-MS-101A open.		
	HCV-1MS-104 closed.		
When directed to close MS-23, insert the following command:  <b>IRF MSS07 (0 600) 0</b>  (Closes MS-23 on 10 min. delay)			Crew directs operator to locally close MS-23.
			BOP checks PPDWST level > 27.5 feet.
	No SG levels rising in an uncontrolled manner.		Crew checks if SG tubes are intact.
	SI Termination Criteria met.		Crew checks if SI flow can be reduced.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**Crew enters ES-1.1.**

US transitions to ES-1.1, and informs crew.

**Scenario may be terminated upon transition to ES-1.1.**

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**Attachment 1-K, Verification of Automatic Actions**

Diesel Generators - BOTH RUNNING.

Check station instrument air header pressure - GREATER THAN 100 PSIG.

Ensure reheat steam isolation:

- a. Verify [MOV-1MS-100A, B] CLOSED.
- b. Reset reheater controller.

Verify CCR Pumps - TWO RUNNING.

Align Neutron Flux Monitoring For Shutdown:

- a. Transfer NR-1NI-45, Nuclear Recorder to operable source and intermediate range displays.

Verify river water system in service.

- a. RPRW Pumps - TWO RUNNING.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- b. Check CCR Heat EX RW pressure  
- GREATER THAN 20 PSIG.

Check If main steamline isolation  
required.

- a. Check the following:

- CNMT pressure - GREATER THAN  
3 PSIG.

OR

- Steamline pressure - LESS THAN  
500 PSIG.

OR

- Steamline pressure high rate of  
change - ANY ANNUNCIATOR  
LIT.

Annunciator A7-41

Annunciator A7-49

Annunciator A7-57

- b. Verify steamline isolation:

- YELLOW SLI marks - LIT.

Check CIB and CNMT spray status:

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- Containment pressure - HAS REMAINED LESS THAN 8 PSIG.

Verify ESF equipment status:

- Verify SI status by checking all RED SIS marks - LIT.
- Verify CIA by checking all ORANGE CIA marks - LIT.
- Verify FWI by checking all GREEN FWI marks - LIT.

Verify power to both AC emergency busses.

Upon completion, report any discrepancies to SM/US.

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PROGRAM TITLE: License Operator Training/Licensed Requalification Training

SUBDIVISION: Simulator

SCENARIO TITLE/NO.: 2005 NRC Initial License Exam

COMPUTER CODE FOR L.P.: 1LOT6 Scenario No. 2

Revision No.	Date
2	2-8-05

Revision No.	Date

INSTRUCTIONAL SETTING: Simulator

APPROXIMATE DURATION: 1.5 Hours

PREPARED BY: \_\_\_\_\_ Date

REVIEWED BY: \_\_\_\_\_ Date

APPROVED FOR IMPLEMENTATION: \_\_\_\_\_ Date

**INITIAL CONDITIONS:**

- IC-182; PW = NRC2; 53% power, RCS Boron 1350 ppm, CB "D" at 163 steps, Rods in Manual.
- CH-P-1C, HHSI/Charging Pump OOS.
- PCV-1RC-456, PORV 456 leakage. MOV-1RC-536, Block Valve closed with power maintained.
- Flood warnings due to heavy rains.
- Maintenance is investigating abnormal vibration/noise on 1WR-P-1A, River Water Pump.
- Turbine Control selected to First Stage In, Turbine is off the VPL.

<b><u>ADDITIONAL LINEUP CHANGES</u></b>	<b><u>STICKERS</u></b>	<b><u>VOND MARKINGS</u></b>
PCV-1RC-456 Control Switch in "Close" MOV-1RC-536 Control Switch in "Close"	YCT - Both CH-P-1C Switches YCT - PCV-1RC-456 Control Switch YCT - MOV-1RC-536 Control Switch	OM Fig. 7-1, 3E: CH-27, 161 Shut OM Fig. 7-1, 5E: CH-21, 148 Shut
<b><u>EQUIPMENT STATUS</u></b>	<b><u>DATE/TIME OOS</u></b>	<b><u>TECHNICAL SPECIFICATION(S)</u></b>
1CH-P-1C	2 days ago	N/A
PCV-1RC-456	Yesterday 1500	3.4.11.a

**SHIFT TURNOVER INFORMATION**

1. 1CH-P-1C is OOS for pump shaft and coupling replacement and is expected to return within the next 24 - 36 hours.
2. PCV-1RC-456 seat leakage. MOV-1RC-536 is closed with power maintained per T.S. 3.4.11.a.
2. 1WR-P1A is operable, but investigation of abnormal vibration/noise by Maintenance is ongoing.
3. AOP-1/2.75.2 is in effect. River water level is 671 feet and stable. Cooling Tower Pump House level is being logged on the Outside Operator Tour.
4. Train "B" is the Protected Train.
5. Reduce power to take the unit off-line at 12%/hr. due to circulating water intake clogging.

**SCENARIO SUPPORT MATERIAL REQUIRED**

1OM-52.4.B, Load Following

Reactivity Plan for 12%/Hr Power Reduction

Protected Train "B" Wall Plaque



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #1**

Reduce Power

US directs load reduction in accordance with Reactivity Plan.

PO initiates load reduction per 1OM-52.4.B, Step IV.A.

- Set the desired terminal load on the SETTER.
- Set the desired rate on the LOAD RATE thumbwheel (5%/min. maximum).

As the turbine load reduces, maintain the valve position limiter approximately 5% above turbine load to prevent load excursions.

Turbine load and reactor power decreasing at 12%/hr.

Depress the GO pushbutton.

RO initiates RCS boration as necessary to maintain  $T_{AVG} - T_{REF}$  per 1OM-7.4.L, Step IV.A and reactivity plan.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Estimate the volume of boric acid to be added to the RCS using any of the following:

- a. 1OM-7.5, Figure 7.7, "Boron Addition", AND Table 1, "Nomograph Correction Factors"
- b. WAG tables
- c. Reactor Engineer approved computer based methods

Estimate the rate of boron concentration change as a function of boric acid flow rate using 1OM-7.5, Figure 7-8, "Boron Addition Rate", AND Table 1, "Nomograph Correction Factors".

Place the 1MU control switch to Stop for greater than 1 second to allow the blender to unarm.

Place 43/MU control switch to Borate.

Set FCV-1CH-113A, Boric Acid to Blender FCV, to the desired boric acid flowrate.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
			<p>Set Boric Acid Integrator YIC-1CH-113 for the desired quantity.</p> <p>a. Reset Boric Acid Integrator YIC-1CH-113.</p>
			<p>Start the Reactor Makeup Control System by placing 1MU control switch to Start.</p>
			<p>Verify boric acid to blender flow on FR-1CH-113, Boric Acid Flow.</p>
			<p>Operate the pressurizer spray as required to limit the difference between boron concentration in the pressurizer and that of the RCS to less than 50 ppm.</p>
			<p>Verify boration automatically stops when Boric Acid Integrator YIC-1CH-113 reaches the setpoint.</p>
			<p>When boration is complete, perform the following:</p> <p>a. Place the 1MU control switch to</p>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Stop for greater than 1 second.

- b. Place 43/MU control switch to Auto.
- c. Reset Boric Acid Integrator  
YIC-1CH-113.
- d. Adjust makeup controls for the new  
RCS boron concentration.
- e. Place the 1MU control switch to  
Start.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**EVENT #2**

SG 1B Level Transmitter Failure

When directed, insert the following command:

**IMF FWM16D (0 0) 100**

**NOTE: No system response occurs on failure of a single channel due to median signal select feature.**

LT-1FW-484 (Channel 1) fails high.

Annunciator:

[A7-52], Steam Generator 1B Level High-High

Crew responds to indications and alarms.

RO refers to 1OM-24.4.ABE, Steam Generator 1B Level High-High.

US refers to 1OM-24.4.IF, Instrument Failure Procedure, Attachment 1.

US refers to T.S. 3.3.1.1, Item 14 and T.S. 3.3.2.1, Items 5.a and 7.a.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #3**

No. 1 EDG Trouble

When directed, insert the following command:

**IMF EPS11A (0 0)**

Annunciator:

[A9-7], Diesel Generator No. 1 Not Available Or Local Panel Trouble

Crew responds to indications and alarms.

RO refers to 1OM-36.4.AEC, Diesel Generator No. 1 Not Available Or Local Panel Trouble.

Crew dispatches Outside Operator to investigate local alarm.

Outside Operator reports EDG No. 1 control power breaker is open.

US refers to T.S. 3.8.1.1, Action b.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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#### **EVENT #4**

Letdown Pressure Control Valve  
Fails Closed In Auto

When directed, insert the following  
command:

**IOR X06A087P (0 0) 1.0**

PCV-1CH-145 fails closed resulting in a  
loss of normal letdown.

Annunciator:

[A3-107], Non-Regen Heat Exchanger  
Disch Press High

Letdown backpressure rising.

Letdown flow decreasing.

Letdown flow at 105 gpm.

Valve is physically functional;  
problem is in the control circuit.

RO responds to indications and  
alarms.

BOP refers to 1OM-7.4.ABJ, Non-  
Regen Heat Exchanger Disch Press  
High.

US may refer to AOP-1.7.1, Loss Of  
Charging Or Letdown.

RO reports 1CHS-FI150 indicates  
letdown flow is zero.

Crew minimizes any power changes in  
progress.

RO manually controls PCV-1CH-145 to  
restore letdown flow to previous value.

US contacts I&C to investigate failure  
of PCV-CH-145.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #5**

SG 1A MFRV Controller Fails In Auto

When directed, insert the following command:

**IMF FWM15A (0 0) 0 300**

Valve is physically functional; problem is in the control circuit.

FCV-1FW-478, Main Feed Reg Valve fails closed.

Annunciator:

[A7-45], Steam Generator 1A Level Deviation From Setpoint

SG 1A feed flow lowering.

FCV-1FW-478 position and feed flow stabilize in Manual.

BOP recognizes feed flow problem, informs US.

US directs BOP to take manual control FCV-1FW-478 to stabilize SG feed flow and level.

BOP takes manual control of FCV-1FW-478 to raise feed flow.

US directs I&C to investigate problem with FCV-1FW-478.



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #6**

RCS Leak

25 gpm RCS leak in CNMT.

When directed, insert the following command:

Crew responds to indications and alarms.

Annunciators:

**IMF RCS02A (0 0) 25**

[A4-71], Radiation Monitoring High

[A4-72], Radiation Monitoring High-High

US refers to AOP-1.6.7, Excessive Primary Plant Leakage.

[A1-35], Ctmt Air Total Pressure Hi/Lo Channel 1

[A1-43], Ctmt Air Total Pressure Hi/Lo Channel 2

RO checks if PRZR level can be maintained.

RM-1RM-204 in alarm.

RO controls charging flow as necessary to maintain PRZR level.

RM-1RM-215A, B in alarm.

US requests SM to evaluate EPP.

RO controls charging flow as necessary to maintain PRZR level on program.

RO checks if VCT level can be maintained by normal makeup.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	<p>RM-1MS-102A, B, C, N-16 Steam Generator Leak Monitors normal.</p> <p>RIS-SV100, Condenser Air Ejector Vent normal.</p> <p>RM-BD-101, High Capacity Blowdown monitor normal</p>		BOP checks secondary plant radiation trends normal.
	PRT pressure, level, and temperature normal.		RO checks PRT conditions consistent with pre-event values.
	Slight rise in containment temperature, (may not be noticeable).		RO checks containment temperature is normal.
	Aux. Bldg. radiation normal.		BOP checks Aux. Bldg. radiation levels are normal.
	<p>TV-1CH-200A, B and C closed.</p> <p>LCV-1CH-460A and B closed.</p> <p>FCV-1CH-122 closed.</p> <p>RCP seal injection flow at 6 gpm per pump.</p>		<p>RO isolates charging and letdown.</p> <ul style="list-style-type: none"> <li>▪ Close TV-1CH-200A, B and C</li> <li>▪ Close LCV-1CH-460A and B</li> <li>▪ Close FCV-1CH-122</li> <li>▪ Reduce seal injection flow to 6 gpm per pump</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<b>NOTE: If contacted by US, SM may direct an emergency shutdown per AOP-1.51.1.</b>	PRZR level stable.		RO checks PRZR level stable or dropping.
			RO restores charging and letdown.
	PRZR level > 14%.		<ul style="list-style-type: none"> <li>Adjust FCV-1CH-122 to obtain 30 to 50 gpm</li> <li>Verify PRZR level &gt; 14%</li> </ul>
	PCV-1CH-145 in Manual and 75% open.		<ul style="list-style-type: none"> <li>Place PCV-1CH-145 in Manual and 75% open</li> </ul>
	LCV-1CH-460A and B open. TV-1CH-200A and B open. PI-1CH-145 indicates ~ 300 psig.		<ul style="list-style-type: none"> <li>Open LCV-1CH-460A and B</li> <li>Open TV-1CH-200A, B and C</li> <li>Adjust PCV-1CH-145 until backpressure is ~ 300 psig</li> </ul>
	PCV-1CH-145 in Auto.		<ul style="list-style-type: none"> <li>Place PCV-1CH-145 in Auto</li> </ul>
	FCV-1CH-122 in Auto.		<ul style="list-style-type: none"> <li>Place FCV-1CH-122 in Auto</li> </ul>
	CNMT pressure < 1.5 psig.		Crew checks CNMT pressure < 1.5 psig and stable.
When charging and letdown are restored, initiate the next event.			US may refer to T.S. 3.4.6.2.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENTS #7 & #8**

SBLOCA; Train "B" HHSI Pump Auto Start Failure; Train "A" ESF Components Must Be Started Manually.

RCS Loop "A" LOCA - 2000 gpm.

When directed, insert the following command:

Crew responds to indications and alarms.

Annunciators:

**IMF RCS02A (0 0) 2000 300**

[A4-4], Pressurizer Control Low Level Deviation

**Pre-loaded Commands:**

[A3-58], Charg Pump Disch Flow High-Low

**TRGSET1 JPPLSI(2)==1**

**IMF SIS05A (1 0)**

RCS pressure and PRZR level dropping rapidly.

US orders reactor trip and enters E-0.

**IMF INH40 (0 0)**

RO verifies reactor trip:

**IMF SIS10A (0 0)**

Reactor trip and bypass breakers open.

- Reactor trip and bypass breakers open.

Power range < 5%.

- Power range indication < 5%.

**Crew enters E-0.**

Neutron flux dropping.

- Neutron flux dropping.

Throttle and governor valves closed.

BOP verifies turbine trip.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Main generator output breakers open. Exciter circuit breaker open.		BOP verifies generator trip.
	1AE and 1DF busses energized from offsite power.		BOP verifies power to AC emergency busses.
<b><u>CRITICAL TASK #1:</u></b>			
<b>Crew manually actuates at least one train of SIS actuated safeguards before transition to any ORP.</b>	SI Train "A" not actuated.		RO determines Train "A" SI failed to actuate automatically. (If SI was not manually actuated previously).
	SI actuated (both trains).		<ul style="list-style-type: none"> <li>Manually actuates both SI trains.</li> </ul>
			Crew sounds Standby alarm and announces Unit 1 reactor trip and safety injection.
	1VS-F-4A running.		BOP checks leak collection exhaust fan running.
			US directs starting CTMT hydrogen analyzers.
			RO verifies SI status.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	CH-P-1B running, CH-P-1A tripped and will not restart.		<ul style="list-style-type: none"> <li>Manually starts CH-P-1B</li> </ul>
	BIT flow indicated.		<ul style="list-style-type: none"> <li>BIT flow indicated</li> </ul>
	SI-P-1A and 1B running.		<ul style="list-style-type: none"> <li>LHSI pumps both running</li> </ul>
			BOP verifies AFW status.
	MD and TD AFW pumps running.		<ul style="list-style-type: none"> <li>AFW pumps running</li> </ul>
	All SG AFW throttle valves open.		<ul style="list-style-type: none"> <li>SG AFW throttle valves full open</li> </ul>
	AFW flow > 355 gpm.		<ul style="list-style-type: none"> <li>Total AFW flow &gt; 355 gpm</li> </ul>
			BOP performs Attachment 1-K, Verification Of Automatic Actions (Steps listed at end of scenario guide.)
			RO verifies RCS Tavg stable at or trending to 547°F.
	Condenser steam dumps closed.		<ul style="list-style-type: none"> <li>Stop dumping steam.</li> </ul>
	MOV-1MS-100A, B closed.		<ul style="list-style-type: none"> <li>Verify reheat steam isolation.</li> </ul>
	Total AFW flow > 355 gpm.		<ul style="list-style-type: none"> <li>Reduce total feed flow to minimize cooldown.</li> </ul>
	Recirc spray pumps not running.		RO checks recirc spray pump status.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	<p>PCV-1RC-456 closed, but leaking.</p> <p>Spray valves closed.</p> <p>Safety relief valves closed.</p> <p>PRT conditions normal.</p> <p>All PORV MOV's open (except MOV-1RC-536 previously closed).</p>		<p>RO verifies PRZR isolated.</p> <ul style="list-style-type: none"> <li>▪ PORVs closed</li> <li>▪ Spray valves closed</li> <li>▪ Safety relief valves closed</li> <li>▪ PRT conditions at expected values</li> <li>▪ Power to at least one block valve and at least one open</li> </ul>
	<p>D/P between RCS pressure and highest SG pressure &lt; 200 psid.</p> <p>All RCP's stopped.</p>		<p>RO checks if RCP's should be stopped.</p> <ul style="list-style-type: none"> <li>▪ Stops all RCP's</li> </ul>
	<p>No SG pressures dropping in an uncontrolled manner.</p>		<p>BOP checks if any SG's are faulted.</p>
	<p>No SG levels rising in an uncontrolled manner.</p> <p>All secondary radiation levels normal.</p>		<p>BOP checks if SG tubes are intact.</p> <ul style="list-style-type: none"> <li>▪ SG levels - none rising in an uncontrolled manner</li> <li>▪ Secondary radiation consistent with pre-event values.</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Crew checks if RCS is intact.

CNMT parameters not consistent with pre-event values.

- CNMT radiation, pressure and sump level consistent with pre-event values

**Crew enters E-1.**

US transitions to E-1, and informs crew.

US directs STA to monitor CSF status trees, if not previously done.

CREVS not actuated or required.

BOP checks if CREVS actuated.

### **CRITICAL TASK #2:**

**Crew trips all RCP's when RCS to highest S/G D/P criteria is exceeded (or due to CIB) and prior to exiting E-1.**

D/P between RCS pressure and highest SG pressure < 200 psid and HHSI flow indicated.

RO checks if RCP's should be stopped.

All RCP's stopped.

- Stops all RCP's, if not previously performed

Recirc spray not actuated.

RO checks recirc spray system status.



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	No SG pressures dropping in an uncontrolled manner.		BOP checks if any SG's are faulted.
	AFW flow > 355 gpm.		BOP maintains AFW flow > 355 gpm until NR SG level is > 13%.
	Instrument air header pressure > 100 psig.		BOP checks instrument air header pressure > 100 psig.
	No SG levels rising in an uncontrolled manner.		BOP checks if SG tubes are intact.
	All secondary radiation levels normal.		<ul style="list-style-type: none"> <li>SG levels - none rising in an uncontrolled manner</li> <li>Secondary radiation consistent with pre-event values.</li> </ul>
	Power available to PORV MOV's.		RO checks PZR PORVs and block valves.
	PORVs closed.		<ul style="list-style-type: none"> <li>Power to block valves</li> <li>PORVs closed</li> </ul>
	All PORV MOV's open (except MOV-1RC-536 previously closed).		<ul style="list-style-type: none"> <li>At least one block valve open</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Subcooling > 46F. AFW flow > 355 gpm. RCS pressure dropping.		<p>Crew checks if SI flow should be reduced.</p> <ul style="list-style-type: none"> <li>▪ RCS subcooling &gt; 46F</li> <li>▪ Secondary heat sink available</li> <li>▪ RCS pressure stable or rising</li> </ul> <p>US determines SI Termination Criteria is not met.</p>
	CTMT spray pumps not running.		Crew checks if CTMT spray should be stopped.
	SI reset (both trains).		RO resets SI.
	CIA reset (both trains).		RO resets CIA.
	RCS pressure > 300 psig.		RO checks if LHSI pumps should be stopped.
	Both LHSI pumps stopped and in Auto.		<ul style="list-style-type: none"> <li>▪ Stop LHSI pumps and place in Auto</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	SG pressure stable or rising. RCS pressure stable or dropping.		Check RCS and SG pressures.
	EE-EG-1 stopped.		BOP checks if diesel generators should be stopped. <ul style="list-style-type: none"> <li>▪ BOP manually stops No. 1 EDG, if not previously performed</li> </ul>
	Recirc components available.		Crew verifies cold leg recirculation capability.
	Radiation levels normal.		Crew checks if Aux. Bldg. and Safeguards radiation consistent with pre-event values.
			US requests Chemistry and Health Physics to obtain samples.
			Crew requests TSC assistance to start additional plant equipment.
			Crew checks if RCS cooldown and depressurization is required.
	RCS pressure > 300 psig.		<ul style="list-style-type: none"> <li>▪ RCS pressure &gt; 300 psig</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**Crew enters ES-1.2.**

US transitions to ES-1.2, and informs crew.

**Scenario may be terminated  
upon crew transition to ES-1.2.**

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**Attachment 1-K, Verification of Automatic Actions**

No. 2 EDG is running. No. 1 EDG manually stopped, if running.

Diesel Generators - BOTH RUNNING.

Check station instrument air header pressure - GREATER THAN 100 PSIG.

Ensure reheat steam isolation:

- a. Verify [MOV-1MS-100A, B] CLOSED.
- b. Reset reheater controller.

Verify CCR Pumps - TWO RUNNING.

Align Neutron Flux Monitoring For Shutdown:

- a. Transfer NR-1NI-45, Nuclear Recorder to operable source and intermediate range displays.

Verify River Water System In Service.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- a. RPRW Pumps - TWO RUNNING.
- b. Check CCR Heat EX RW pressure  
- GREATER THAN 20 PSIG.

Check If Main Steamline Isolation  
Required.

- a. Check the following:
  - CNMT pressure - GREATER THAN 3 PSIG.

OR

- Steamline pressure - LESS THAN 500 PSIG.

OR

- Steamline pressure high rate of change - ANY ANNUNCIATOR LIT.

- Annunciator A7-41

- Annunciator A7-49

- Annunciator A7-57

- b. Verify steamline isolation:
  - YELLOW SLI marks - LIT.

Check CIB and CNMT Spray Status:

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- Containment pressure - HAS REMAINED LESS THAN 8 PSIG.

Verify ESF Equipment Status:

- a. Verify SI status by checking all RED SIS marks - LIT.
- b. Verify CIA by checking all ORANGE CIA marks - LIT.
- c. Verify FWI by checking all GREEN FWI marks - LIT.

Verify Power To Both AC Emergency Busses.

Upon completion, report any discrepancies to SM/US.

SIMULATOR EVALUATION SCENARIO COVER PAGE

PROGRAM TITLE: License Operator Training/Licensed Requalification Training

SUBDIVISION: Simulator

SCENARIO TITLE/NO.: 2005 NRC Initial License Exam

COMPUTER CODE FOR L.P.: 1LOT6 Scenario No. 3

Revision	Date
2	2-8-05

Revision	Date

INSTRUCTIONAL SETTING: Simulator

APPROXIMATE DURATION: 1.5 Hours

PREPARED BY: \_\_\_\_\_ Date \_\_\_\_\_

REVIEWED BY: \_\_\_\_\_ Date \_\_\_\_\_

APPROVED FOR IMPLEMENTATION: \_\_\_\_\_ Date \_\_\_\_\_



**INITIAL CONDITIONS:**

- IC-183; PW = NRC3; 25% Power, RCS boron at 1690 ppm, CB "D" at 133 steps. Rods in Manual.
- PCV-1RC-456, PORV 456 leakage. MOV-1RC-536, Block Valve closed with power maintained.
- FW-P-1B, Steam Generator Feed Pump is OOS.
- Flood watch remains in effect.
- Turbine Control selected to First Stage In, Turbine is off the VPL.

<b><u>ADDITIONAL LINEUP CHANGES</u></b>	<b><u>STICKERS</u></b>	<b><u>VOND MARKINGS</u></b>
PCV-1RC-456 Control Switch in Close MOV-1RC-536 Control Switch in Close FW-P-1B in P-T-L Swap In-service BAST Tags	YCT - PCV-1RC-456 Control Switch YCT - MOV-1RC-536 Control Switch YCT - FW-P-1B Control Switch	
<b><u>EQUIPMENT STATUS</u></b>	<b><u>DATE/TIME OOS</u></b>	<b><u>TECHNICAL SPECIFICATION(S)</u></b>
PCV-1RC-456	Yesterday 1500	3.4.11.a
FW-P-1B	12 hours ago	N/A

**SHIFT TURNOVER INFORMATION**

1. PCV-1RC-456 seat leakage. MOV-1RC-536 is closed with power maintained per T.S. 3.4.11.a.
2. FW-P-1B is OOS to replace motor leads and is expected to return within the next 24 hours.
3. AOP-1/2.75.2 is in effect. River water level is 671 feet and stable. Cooling Tower Pump House level is being logged on the Outside Operator Tour.
4. 1CCT-13 is closed.
5. FCV-FW-150A and 150B have been restored to normal operation.
6. FCV-MS-100B and 100D, MSR Purge Valves are open.
7. Main Feedwater Regulating Valves are controlling SG levels in Auto.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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8. Train "B" is the Protected Train
9. Raise power to 60% at 12%/hr. after an extended outage to repair cooling tower pumps.

**SCENARIO SUPPORT MATERIAL REQUIRED**

1OM-52.4.A, Raising Power From 5% To Full Load Operation

Reactivity Plan for 12%/Hr Power Ascension

Protected Train "B" Wall Plaque

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #1**

Raise Power To 60%

US directs power increase to 60% per 1OM-52.4.A, Step IV.F.19.

Conversion Economics requests raising power to 60% at 12%/hr.

Crew reviews/agrees with reactivity plan. US approves for use. Crew begins power increase.

RO initiates dilution per 1OM-7.4.N, Step IV.A.

Estimate the volume of makeup water to be added to the RCS using any of the following:

- a. 1OM-7.5, Figure 7-9, "Boron Dilution", AND Table 7-1, "Nomograph Correction Factors"
- b. WAG tables
- c. Reactor Engineering approved computer based methods

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Estimate the rate of boron concentration change as a function of dilution water flow using 1OM-7.5, Figure 7-10, "Boron Dilution Rate", AND Table 7-1, "Nomograph Correction Factors".

Place the 1MU switch in Stop for greater than 1 second to allow the blender to unarm.

Place 43/MU control switch to DIL OR ALT DIL as directed by the SM/US.

Set AM-1CH-114, Blender Total Flow Set Point to the desired flow rate.

Set blender output Integrator YIC-1CH-168A to the desired quantity.

a. Reset blender output integrator YIC-1CH-168A.

Log the flow totalizer indication, AND add to it the number of gallons set into the batch integrator.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Turbine load and reactor power increasing at 12%/hr.		<p>Start the reactor makeup control system by placing 1MU control switch to Start.</p> <p>Operate pressurizer heaters to initiate automatic spray operation as required so that the difference in boron concentration between the RCS and pressurizer is &lt; 50 ppm.</p> <p>Verify dilution automatically stops when blender output integrator YIC-1CH-168A reaches the setpoint.</p> <p>When dilution is complete, perform the following:</p> <ol style="list-style-type: none"> <li>Place 1MU control switch in Stop for greater than 1 second.</li> <li>Place the 43/MU control switch to AUTO.</li> <li>Reset blender output integrator YIC-1CH-168A.</li> <li>Place the 1MU switch to Start.</li> <li>Adjust makeup controls for the new RCS boron concentration.</li> </ol>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Turbine load and reactor power  
increasing at 12%/hr.

BOP initiates turbine load increase to  
35% power.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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## **EVENT #2**

Train "A" RW Pump Trips; Backup Pump Manual Start

When directed, insert the following command:

**IMF AUX10A (0 0)**

1WR-P-1A trips, 1WR-P-1B fails to auto start.

Annunciators:

[A1-40], CC WTR HT EXCH River WTR PP Disch Line 'A' Press Low

[A1-48], CC WTR HT EXCH River WTR PP Disch Line 'B' Press Low

[A1-59], Intake Struct River WTR PP Disch Line 'A' Press Low

[A1-67], Intake Struct River WTR PP Disch Line 'B' Press Low

[A1-82], River Water PP Auto Start-Stop

1WR-P-1B running.

BOP recognizes loss of 1WR-P-1A and reports to US.

US refers to AOP-1.30.2, River Water, Normal Intake Structure Loss.

RO checks reactor plant river water pump status.

RO recognizes and reports 1WR-P-1B did not auto start.

RO manually starts 1WR-P-1B.

RO checks PI-1RW-113A(B), CCR Heat Exchanger RW Pressure > 20 psig.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**NOTE: Do not rack WR-P-1C onto the AE bus.**

US directs local operator to rack 1WR-P-1C onto bus.

BOP checks turbine plant river water system status.

US refers to T.S. 3.7.4.1.



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #3**

Loss of 4KV Bus 1AE

1AE bus de-energized, No. 1 EDG fails to auto start.

When directed, insert the following command:

#### **IMF EPS04E (0 0)**

Annunciators:

[A8-105], 4160V Emerg Bus 1AE ACB  
1A10 Auto Trip

[A8-106], 4160V Emerg Bus 1AE ACB  
1E7 Auto Trip

[A8-109], 4160V Emerg Bus 1AE  
Undervoltage

[A9-74], 480V Emerg Trans 1-BN  
Undervoltage

[A9-100], 125V DC Battery Chgr 1  
Failure

[A9-108], 125V DC Battery Chgr 3  
Failure

Crew responds to indications and alarms.

US enters AOP-1.36.2, Loss Of 4KV  
Emergency Bus.

BOP checks at least one AC  
emergency bus is energized.

RO checks at least one charging pump  
is running.

Crew sounds Standby alarm and  
announces loss of 4KV 1AE bus.

CCR flow indicated to all RCP's.

RO verifies CCR flow to all RCP  
thermal barriers.

RHR not in service.

RO checks RHR in service.

No red or yellow border annunciators in  
alarm.

Crew responds to color coded  
annunciators.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<p><b>NOTE: Crew may choose to allow CH-P-1A to auto start and secure CH-P-1B, or manually start and stop CH-P-1A.</b></p>	<p>EE-EG-1 running.</p>		<p>BOP starts No. 1 EDG to restore power to 1AE bus.</p> <ul style="list-style-type: none"> <li>▪ Depress both emergency stop pushbuttons</li> <li>▪ Place selector switch in Exercise position</li> <li>▪ Start EDG No. 1</li> <li>▪ Ensure EDG speed at 900 rpm</li> <li>▪ Depress field flash pushbutton</li> <li>▪ Close ACB-1E9</li> </ul>
	<p>ACB 1E9 closed. CH-P-1A running (auto started).</p>		<p>Crew checks associated RPRW pump is running.</p>
	<p>1WR-P-9A running.</p>		<ul style="list-style-type: none"> <li>▪ Starts 1WR-P-9A</li> </ul> <p>US refers to T.S. 3.8.1.1 Action c.</p>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<b>EVENT #4</b>			
Loss of Feedwater and EDG No. 1 Failure	FW-P-1A trips followed by trip of EE-EG-1 2 minutes later.		
When directed, insert the following command:	Annunciators:		Crew identifies loss of main feedwater pump and SG feed flow.
<b>IMF FWM01A (0 0)</b>	[A7-37], Steam Generator Feed Pump Auto Stop		
	[A7-40], Steam Generator Feed Pump Disch Equalizing Press Low		US enters AOP-1.24.1, Loss Of Main Feedwater.
	[A7-29], Reactor Trip & Low Tavg or SI Main Feedwater Valve Closed		
	1CN-P-1A and 1B running. 1SD-P-1A and 1B running.		BOP verifies condensate and heater drain pumps are running.
	Reactor power < 65%.		RO checks reactor power > 65%.
	SG levels dropping.		US directs RO to trip the reactor.
<b>Crew enters E-0.</b>			US transitions to E-0, and informs crew.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENTS #5, 6, 7**

SG 1B SGTR; MD AFW Pump "B"  
Fails To Auto Start; CIA Fails To  
Auto Actuate

SG 1B 500 gpm SGTR (occurs at Step 7  
of ES-0.1)

#### **Pre-loaded Commands**

RO manually trips reactor.

#### **Crew continues with E-0.**

RO verifies reactor trip:

Reactor trip and bypass breakers open.

- Reactor trip and bypass breakers open.

Power range < 5%.

- Power range indication < 5%.

Neutron flux dropping.

- Neutron flux dropping.

Throttle or governor valves closed.

BOP verifies turbine trip.

Main generator output breakers open.

BOP verifies generator trip.

Exciter breaker open.

1AE bus de-energized; 1DF bus  
energized from offsite power.

BOP verifies power to AC emergency  
busses.

- BOP recognizes and reports trip of  
No. 1 EDG.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**E-0 immediate actions complete.** SI not actuated and not required.

RO checks if SI is actuated.

**Crew enters ES-0.1.**

US transitions to ES-0.1, and informs crew.

US directs STA to begin monitoring CSF status trees.

Crew sounds Standby alarm and announces Unit 1 reactor trip.

RCS T<sub>AVG</sub> trending to 547F.

Check RCS temperature stable at or trending to 547F.

BOP maintains RCS temperature:

- Check at least 1 MSIV open
- Check condenser available
- Set steam header setpoint slightly above existing steam header pressure
- Place steam dump controller in Manual
- Verify demand is zero

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
			<ul style="list-style-type: none"> <li>Place steam dumps in STM PRESS Mode</li> <li>Place steam dump controller in AUTO</li> <li>Adjust controller setpoint to as necessary to maintain RCS temperature</li> </ul>
	Instrument air pressure > 100 psig.		BOP checks station instrument air header pressure > 100 psig.
	RCS T <sub>AVG</sub> < 554F.		BOP checks feedwater status.
	MFRV's closed.		<ul style="list-style-type: none"> <li>RCS T<sub>AVG</sub> - Less than 554F.</li> <li>Verify Main Feedwater Reg Valves closed</li> </ul>
<b><u>CRITICAL TASK #1:</u></b>	No AFW pumps running.		<ul style="list-style-type: none"> <li>Check AFW Pumps - any running</li> </ul>
<b>Crew establishes feedwater flow into at least one SG before RCS bleed and feed is required.</b>	FW-P-2 and FW-P-3B running.		<ul style="list-style-type: none"> <li>BOP manually starts FW-P-2 and FW-P-3B</li> </ul>
	Bypass FRV's closed.		<ul style="list-style-type: none"> <li>Close Bypass FRV's</li> </ul>
	FW-P-1A tripped. FW-P-1B out-of-service.		<ul style="list-style-type: none"> <li>Stop all but one main feed pump</li> </ul>
	Total feed flow > 355 gpm.		<ul style="list-style-type: none"> <li>Verify total feed flow &gt; 355 gpm</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<p>When the crew reaches ES-0.1, Step 7, insert the following:</p> <p><b>IMF RCS03B (0 0) 500</b></p>	All control rods inserted.		RO verifies all control rods are fully inserted.
	PRZR level dropping.		RO checks PRZR level > 14%.
	Charging in service.		RO checks charging is in service.
	Letdown in service.		RO checks letdown in service.
	PRZR level dropping.		RO verifies PRZR level trending to 22%.
	SG 1B 500 gpm SGTR		RO maintains crew informed of PRZR pressure and level trends.
	PRZR level and pressure dropping.		
<p><b>Crew re-enters E-0.</b></p>			US directs RO to actuate SI and transitions to E-0.
	Reactor tripped.		RO reverifies reactor trip.
	Turbine tripped.		BOP reverifies turbine trip.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Main generator tripped.		BOP re verifies generator trip.
	1DF bus energized.		BOP re verifies power to AC emergency busses.
	No. 2 EDG running.		BOP verifies No. 2 diesel generator is running.
	SI actuated (both trains).		RO manually actuates SI both trains.
			Crew sounds Standby alarm and announces Unit 2 reactor trip and SI.
	1VS-F-4A running.		BOP checks leak collection exhaust fan is running.
			US directs starting CNMT hydrogen analyzers.
			RO verifies SI status.
	CH-P-1A (1B) running.		<ul style="list-style-type: none"> <li>At least two charging pumps running</li> </ul>



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	BIT flow indicated. SI-P-1A and 1B running.		<ul style="list-style-type: none"> <li>▪ BIT flow indicated</li> <li>▪ LHSI pumps both running</li> </ul>
	FW-P-2 and FW-P-3B running. AFW throttle valves open. AFW flow > 355 gpm.		BOP verifies AFW status. <ul style="list-style-type: none"> <li>▪ AFW pumps running</li> <li>▪ AFW throttle valves full open</li> <li>▪ Total AFW flow &gt; 355 gpm.</li> </ul>
When directed, insert the following commands:			
IMF VLV-AFW02 (0 0) 0 60	MOV-1FW-151B closed.		US directs operator to locally close AFW Train "A" valves.
IMF VLV-AFW04 (0 0) 0 60	MOV-1FW-151D closed.		
IMF VLV-AFW06 (0 0) 0 60	MOV-1FW-151F closed.		
NOTE: <b>CRITICAL TASK #2</b> is performed as part of Attachment 1-K actions. (Refer to page 28)			BOP performs Attachment 1-K, Verification of Automatic Actions (Steps listed at end of scenario guideline.)
	RCS T <sub>AVG</sub> controlled on steam dumps.		BOP verifies RCS T <sub>AVG</sub> stable or trending to 547°F.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Recirc spray pumps not running.		RO checks recirc spray pump status.
	PCV-1RC-456 closed, but leaking.		RO verifies PRZR isolated.
	Spray valves closed.		<ul style="list-style-type: none"> <li>▪ PORVs closed</li> </ul>
	Safety relief valves closed.		<ul style="list-style-type: none"> <li>▪ Spray valves closed</li> <li>▪ Safety relief valves closed</li> </ul>
	PRT conditions normal.		<ul style="list-style-type: none"> <li>▪ PRT conditions at expected values</li> </ul>
	All PORV MOV's open (except MOV-1RC-536 previously closed).		<ul style="list-style-type: none"> <li>▪ Power to at least one block valve and at least one open</li> </ul>
	D/P between RCS pressure and highest SG pressure > 200 psid.		RO checks if RCP's should be stopped.
	No SG pressures dropping in an uncontrolled manner.		BOP checks if any SG's are faulted.
	SG 1B level rising in an uncontrolled manner.		BOP checks if SG tubes are intact.
Crew enters E-3.			US transitions to E-3, and informs crew.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	CREVS not actuated nor required. CIB not actuated. RM-1RM-218A, B not in high alarm.		BOP checks if CREVS is actuated.
	D/P between RCS pressure and highest SG pressure > 200 psid.		RO checks if RCP's should be stopped.
	SG 1B ruptured. Unexpected rise in NR level.		Crew identifies ruptured SG.
<b><u>CRITICAL TASK #3:</u></b> <b>Crew isolates feed flow into and steam flow from the ruptured SG and directs operator to close isolation valve(s) operated from outside the control room before a transition to ECA-3.1 occurs.</b>	PCV-1MS-101B in manual and closed.		RO places SG 1B ADV in manual and closes.
	HCV-1MS-104 closed.		RO verifies residual heat release valve is closed.
	FW-P-3B running.		BOP verifies at least one MD AFW pump is running.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	MOV-1MS-105 closed.		BOP closes MOV-1MS-105.
	1MS-16 closed.		Crew dispatches an operator to close TD AFW pump steam supply valve.
			BOP verifies steam supply from intact SG.
			BOP restarts TDAFW pump.
	TV-1MS-111B closed.		BOP closes SG 1B pre-nrtn drain isolation valves.
	TV-1MS-101B closed.		BOP closes SG 1B main steam trip, bypass, and non-return valves.
	MOV-1MS-101B closed.		
	NRV-1MS-101B closed.		
	SG 1B level > 13%.		BOP checks ruptured SG level.
<b>EOP pre-emptive action.</b>	SG 1B AFW throttle valves closed. (May have been previously performed.)		Crew isolates feed flow to SG 1B.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Main feedwater isolated.		BOP checks FWI previously verified.
	SG 1B pressure > 380 psig.		BOP checks SG 1B pressure > 380 psig.
	Instrument air header pressure > 100 psig.		BOP checks instrument air header pressure > 100 psig.
			US determines target cooldown temperature based on ruptured SG pressure.
			US directs STA to trend cooldown rate.
	Condenser steam dumps open.		BOP verifies condenser available and initiates cooldown at maximum rate, (or uses SG ADV's).
	RCS pressure < 1950 psig.		RO blocks steamline SI when RCS pressure reaches 1950 psig.
	T <sub>avg</sub> < 541°F.		BOP defeats T <sub>AVG</sub> interlock during cooldown.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Total AFW flow > 355 gpm or SG level between 25% and 50%.		BOP checks intact SG levels.
	PORV's closed; MOV's open (except previously closed MOV-1RC-536).		RO checks power to PORV's and block valves.
	SI reset (both trains).		RO resets SI.
	CIA and CIB reset (both trains).		RO resets CIA and CIB.
	RCS at target temperature.		BOP stops RCS cooldown at target temperature.
	Station IA pressure > 100 psig.		BOP checks if CNMT instrument air is available.
	TV-1IA-400 open.		<ul style="list-style-type: none"> <li>▪ Station IA header pressure &gt; 100 psig</li> <li>▪ TV-1IA-400 open</li> </ul>
	CNMT IA pressure > 85 psig.		<ul style="list-style-type: none"> <li>▪ CNMT IA header pressure &gt; 85 psig</li> </ul>
	LHSI pumps previously stopped.		RO checks if LHSI pumps should be stopped.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Core exit TC's below target temperature.		Crew checks if RCS cooldown should be stopped.
	SG 1B pressure stable.		BOP checks SG 1B pressure stable or rising.
	Subcooling > 66F.		RO checks subcooling is satisfactory.
	RCPs 1A and 1C running.		RO initiates RCS depressurization.
	PRZR spray valves open.		<ul style="list-style-type: none"> <li>▪ Check RCPs 1A and 1C are running.</li> <li>▪ Fully open PRZR spray valves</li> <li>▪ Open one PORV</li> <li>▪ Check depressurization method is effective</li> </ul>
	PRZR PORV open.		<p>Crew depressurizes until any of the following conditions are satisfied:</p> <ul style="list-style-type: none"> <li>▪ PRZR level &gt; 75%, OR</li> <li>▪ RCS subcooling &lt; Att. 6-A, OR</li> <li>▪ RCS pressure &lt; ruptured SG pressure, AND</li> </ul>

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- PRZR level > 18%

**CRITICAL TASK #4:**

**Crew depressurizes RCS to meet SI termination criteria before water release from the SG safety or atmospheric relief valve.** RCS depressurization stopped.

RO closes PORV and spray valves.

**Scenario may be terminated upon crew completion of RCS depressurization in E-3.**



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**Attachment 1-K, Verification of Automatic Actions**

	EE-EG-1 tripped.		<p>Diesel Generators - BOTH RUNNING.</p> <p>Check station instrument air header pressure - GREATER THAN 100 PSIG.</p> <p>Ensure reheat steam isolation:</p> <ul style="list-style-type: none"> <li>a. Verify [MOV-1MS-100A, B] CLOSED.</li> <li>b. Reset reheater controller.</li> </ul>
4KV 1AE bus de-energized.	Only CC-P-1B running.		<p>Verify CCR Pumps - TWO RUNNING.</p> <p>Align Neutron Flux Monitoring For Shutdown:</p> <ul style="list-style-type: none"> <li>a. Transfer NR-1NI-45, Nuclear Recorder to operable source and intermediate range displays.</li> </ul> <p>Verify river water system in service.</p> <ul style="list-style-type: none"> <li>a. RPRW Pumps - TWO RUNNING.</li> </ul>
4KV 1AE bus de-energized.	Only WR-P-1B running.		

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- b. Check CCR Heat EX RW pressure  
- GREATER THAN 20 PSIG.

Check If main steamline isolation  
required.

- a. Check the following:

- CNMT pressure - GREATER THAN  
3 PSIG.

OR

- Steamline pressure - LESS THAN  
500 PSIG.

OR

- Steamline pressure high rate of  
change - ANY ANNUNCIATOR  
LIT.

Annunciator A7-41

Annunciator A7-49

Annunciator A7-57

- b. Verify steamline isolation:

- YELLOW SLI marks - LIT.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Check CIB and CNMT spray status:

- Containment pressure - HAS REMAINED LESS THAN 8 PSIG.

Verify ESF equipment status:

- a. Verify SI status by checking all RED SIS marks - LIT.
- b. Verify CIA by checking all ORANGE CIA marks - LIT.
- c. Verify FWI by checking all GREEN FWI marks - LIT.

Verify power to both AC emergency busses.

Upon completion, report any discrepancies to SM/US.

**CRITICAL TASK #2:**

Initiate at least one train of CIA prior to completion of attachment 1-K.

CIA manually actuated.

4KV Bus 1AE de-energized. 1DF bus energized.

SIMULATOR EVALUATION SCENARIO COVER PAGE

PROGRAM TITLE: License Operator Training/Licensed Requalification Training

SUBDIVISION: Simulator

SCENARIO TITLE/NO.: 2005 NRC Initial License Exam

COMPUTER CODE FOR L.P.: 1LOT6 Scenario No. 4

Revision	Date
2	2-17-05

Revision	Date

INSTRUCTIONAL SETTING: Simulator

APPROXIMATE DURATION: 1.5 Hours

PREPARED BY: \_\_\_\_\_ Date

REVIEWED BY: \_\_\_\_\_ Date

APPROVED FOR IMPLEMENTATION: \_\_\_\_\_ Date

**INITIAL CONDITIONS:**

- IC-184; PW = NRC4; 75% Power, Equil Xe, RCS boron at 1279 ppm, CB "D" at 190 steps.
- PCV-1RC-456, PORV leakage. MOV-1RC-536, Block Valve closed with power maintained.
- River water level has receded. Flood watch cancelled on last shift.
- 1WR-P-1A, River Water Pump OOS.
- Turbine control selected to First Stage Out, Turbine is on the VPL.

<b><u>ADDITIONAL LINEUP CHANGES</u></b>	<b><u>STICKERS</u></b>	<b><u>VOND MARKINGS</u></b>
PCV-1RC-456 Control Switch in Close MOV-1RC-536 Control Switch in Close WR-P-1A in P-T-L	YCT - PCV-1RC-456 Control Switch YCT - MOV-1RC-536 Control Switch YCT - WR-P-1A Control Switch	
<b><u>EQUIPMENT STATUS</u></b>	<b><u>DATE/TIME OOS</u></b>	<b><u>TECHNICAL SPECIFICATION(S)</u></b>
PCV-1RC-456	Yesterday 1500	3.4.11.a
WR-P-1A	2 days ago	N/A

**SHIFT TURNOVER INFORMATION**

1. PCV-1RC-456 seat leakage. MOV-1RC-536 is closed with power maintained per T.S. 3.4.11.a.
2. 1WR-P-1A is OOS for motor bearing replacement. WR-P-1C is in standby on the AE bus.
3. Protected Train is Train "B".
4. Raise power to 100% at 12%/per hour. Plant was at reduced power for 1 week due to condenser water box outage.

**SCENARIO SUPPORT MATERIAL REQUIRED**

1OM-52.4.B, Load Following

Reactivity Plan for 12%/Hr Power Ascension

Protected Train "B" Wall Plaque

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #1**

Raise Power To 100%

US directs power increase to 100% per 1OM-52.4.B, Step IV.B.13.

**NOTE:** This event is not required to satisfy the qualitative or quantitative requirements of NUREG-1021, but may be performed at Chief Examiner's discretion.

Crew reviews/agrees with reactivity plan. US approves for use. Crew begins power increase.

BOP initiates turbine load increase.

- a. Set the desired terminal load on the SETTER.
- b. Set the desired rate on the LOAD RATE thumbwheel (5%/min. maximum).
- c. As the turbine load increases, maintain the valve position limiter approximately 5% above turbine load to prevent load excursions.
- d. Depress the GO pushbutton.

Turbine load and reactor power increasing at 12%/hr.

RO initiates RCS dilution as necessary to maintain  $T_{AVG} - T_{REF}$  per 1OM-7.4.N, Step IV.A.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Estimate the volume of makeup water to be added to the RCS using any of the following:

- a. 1OM-7.5, Figure 7-9, "Boron Dilution", AND Table 7-1, "Nomograph Correction Factors"
- b. WAG tables
- c. Reactor Engineering approved computer based methods

Estimate the rate of boron concentration change as a function of dilution water flow using 1OM-7.5, Figure 7-10, "Boron Dilution Rate", AND Table 7-1, "Nomograph Correction Factors".

Place the 1MU switch in Stop for greater than 1 second to allow the blender to unarm.

Place 43/MU control switch to DIL OR ALT DIL as directed by the SM/US.

Set AM-1CH-114, Blender Total Flow Set Point to the desired flow rate.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Set YIC-1CH-168A, Blender Output Integrator to the desired quantity.

- a. Reset Blender Output Integrator YIC-1CH-168A.

Log the flow totalizer indication AND add to it the number of gallons set into the batch integrator.

Start the reactor makeup control system by placing 1MU control switch to Start.

Operate pressurizer heaters to initiate automatic spray operation as required so that the difference in boron concentration between the RCS and pressurizer is < 50 ppm.

Verify dilution automatically stops when YIC-1CH-168A, Blender Output Integrator reaches the setpoint.

When dilution is complete, perform the following:



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- a. Place 1MU control switch in Stop for greater than 1 second.
- b. Place the 43/MU control switch to Auto.
- c. Reset YIC-1CH-168A, Blender Output Integrator.
- d. Place the 1MU switch to Start.
- e. Adjust makeup controls for the new RCS boron concentration.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<b>EVENT #2</b>			
MFW Pump "B" Trip; Load Reduction Required	FW-P-1B trips.		Crew responds to indications and alarms.
When directed, insert the following command:	Annunciators:		
<b>IMF FWM01B (0 0)</b>	[A7-37], Steam Generator Feed Pump Auto Stop		BOP determines that 1B Main Feed Pump is tripped.
	[A7-39], Steam Generator Feed Pump Disch Flow Hi Start 2 <sup>nd</sup> Pump		
	[A7-45], Steam Generator 1A Level Deviation from Setpoint		US enters AOP-1.24.1, Loss of Main Feedwater.
	[A7-53], Steam Generator 1B Level Deviation from Setpoint		
	[A7-61], Steam Generator 1C Level Deviation from Setpoint		BOP verifies condensate pumps and heater drain pumps running.
	Only FW-P-1A running.		RO determines reactor power is > 65%.
If requested, SM should direct a load reduction at rate of 5%/minute.			US directs load reduction to 65% power in accordance with AOP-1.51.1.
			Crew alerts plant personnel of emergency shutdown.
	PORV's 455C and 455D are available.		Verify PORV's available.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
			Crew initiates a plant shutdown.
			BOP sets turbine load setter at 2% (or 5%) per minute at direction of US.
			RO determines required boration using the reactivity plan for rapid power reduction.
	Reactor power decreasing.		RO initiates RCS normal or emergency boration at direction of US.
	Turbine load decreasing.		BOP depresses the reference control GO pushbutton.
			After the governor valves are off the limiter: <ul style="list-style-type: none"> <li>▪ Transfer turbine control to the 1<sup>st</sup> stage pressure feedback by depressing the 1<sup>st</sup> stage IN pushbutton.</li> <li>▪ Verify 1<sup>st</sup> stage OUT lamp is OFF and 1<sup>st</sup> stage IN lamp is ON.</li> </ul>
	Governor valves responding normally.		Verify governor valve movement not excessive during load reduction.
	Control rods in Auto.		RO places control rods in AUTO and verifies Tavg is within +/- 5F of Tref.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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All PRZR heaters energized.

RO places all PRZR heaters to On.

BOP maintains valve position limit at 5% above existing turbine load during the load reduction.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #3**

Dropped Control Rod K-6

Insert malfunction following load reduction, after crew has control of SG level and  $T_{AVG}$  is within 2F of  $T_{REF}$ .

**IMF CRF04BV (0 0) 1**

Rod K-6 drops due to stationary gripper failure.

Annunciators:

[A4-59], NIS Power Range Low Setpoint Flux Deviation or Auto Defeat

[A4-67], NIS Power Range High Setpoint Flux Deviation or Auto Defeat

[A4-68], NIS Power Range Comparator

[A4-76], Computer Alarm Rod Deviation/Seq

Rod K-6 dropped.

Control rods in manual.

RCS  $T_{AVG} > 541F$  and stable.

Crew responds to indications and alarms.

US refers to AOP-1.1.8, Rod Inoperability.

RO checks only 1 rod dropped.

US confirms 1 control rod dropped.

RO places control bank selector switch in Manual, if in Auto.

Crew checks RCS  $T_{AVG} > 541F$ , within  $\pm 4F$  of  $T_{ref}$  and stable.

US determines power operation may continue if within 1 hour:

- Rod declared inoperable
- Verify shutdown margin requirements of T.S. 3.1.1.1

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- Power reduced to less than 75%
- High Neutron Flux Setpoint reduced to less than 85% within 4 hours
- Verify shutdown margin once per 12 hours
- Request RE perform Incore Flux Map

As Manager, Operations direct that conditions remain stable while determining cause of rod problem.

US requests guidance from Manager, Operations on whether to withdraw misaligned rod.

**Continue with scenario when Technical Specifications have been addressed, or at Chief Examiner's discretion.**

US may refer to T.S. 3.1.3.1, Action c.3.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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#### **EVENT #4**

Pressurizer Master Pressure  
Control Output Fails High

When directed, insert the following  
command:

**IOR X07A090P (0 0) 0 600**

RC-PK-444A fails in Auto, Manual  
control available.

Annunciators:

[A4-12], Pressurizer Control Low  
Pressure Deviation

[A4-11], Pressurizer Control Pressure  
Low

[A4-5], Pressurizer Power Oper. Relief  
Valve Open

PORV 455C and spray valves open.

PORV and spray valves closed.

PRZR heaters energized.

Crew responds to indications and  
alarms.

RO takes manual control of PRZR  
Master Pressure Controller.

RO reduces output of controller to  
close PORV and spray valves.

RO energizes PRZR heaters, as  
required.

US refers to T.S. 3.2.5.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #5**

Feed Flow Transmitter Fails High

FT-1FW-497, SG 1C Channel 3 fails high.

When directed, insert the following command:

Crew responds to indications and alarms.

**IMF FWM14F (0 0) 5E6**

Annunciators:

[A7-58], Loop 3 Feedwater Flow Greater Than Steam Flow

[A7-61], Steam Generator 1C Level Deviation from Setpoint

[A7-63], Steam Generator 1C Level Low

[A7-64], Loop 3 Steam Flow Greater Than Feedwater Flow

US refers to 1OM-24.4.IF, Instrument Failure Procedure, Attachment 2.

FCV-1FW-498 closes slowly.

BOP takes manual control of FCV-1FW-498 and adjusts SG level, as required.

FC-1FW-498 selected to FM-496 position.

BOP selects redundant feed flow transmitter for control.

FCV-1FW-498 in Auto.

BOP returns FCV-1FW-498 to Auto when SG level is stable within normal range.



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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When directed to trip bistables,  
insert the following:

**IOR XS03C23 (0 0) 1**

Protection Rack 18 door open.

US contacts I&C to direct tripping of  
bistables.

**IMF BST-RCS058 (0 0) 0**

BS-498B tripped.

**IMF BST-RCS059 (0 0) 0**

BS-498C tripped.

**DOR XS03C23**

Protection Rack 18 door closed.

US contacts I&C to investigate failure  
of FT-1FW-497.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #6**

SG 1C Feedwater Regulating Valve  
Fails Closed

FCV-1FW-498 fails closed. Manual  
control unsuccessful. Reactor Trip  
required.

When directed, insert the following  
command:

**IMF FWM07C (0 0) 0 120**

Annunciator:

[A7-61], Steam Generator 1C Level  
Deviation From Setpoint

BOP takes manual control of SG 1C  
Feed Reg Valve.

US determines FRV failure is not  
recoverable.

**Crew enters E-0.**

US directs RO to manually trip reactor  
and enters E-0.

RO verifies reactor trip:

Reactor trip and bypass breakers open.

- Reactor trip and bypass breakers  
open.

Power range < 5%.

- Power range indication < 5%.

Neutron flux dropping.

- Neutron flux dropping.

Throttle or governor valves closed.

BOP verifies turbine trip.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Main generator output breakers open.

BOP verifies generator trip.

Exciter circuit breaker open.

1AE and 1DF busses energized by  
offsite power.

BOP verifies power to AC emergency  
busses.

SI not actuated and not required.

RO checks if SI is actuated.

**Crew enters ES-0.1.**

US transitions to ES-0.1, and informs  
crews

US directs STA to begin monitoring  
CSF status trees.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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### **EVENT #7**

Main Steam Line Break With MSIV Failure

Steam break downstream of MSIV "B".

When directed, insert the following command:

Crew sounds Standby alarm and announces Unit 1 reactor trip.

**IMF MSS02B (0 0) 1E7**

Preloaded command for MSIV failure.

RCS temperature dropping.

RO checks RCS temperature stable at or trending to 547F.

### **CRITICAL TASK #1:**

**Crew manually actuates main steam line isolation before a Sever (orange path) challenge develops to either the Subcriticality or Integrity CSF or before transition to ECA-2.1, whichever occurs first.**

Steam dump valves closed.

- Stop dumping steam
- Verify reheat steam isolation

MOV-1MS-100A, B closed.

SG blowdown valves closed.

- Verify SG blowdown isolated.
- Throttle total feed flow > 355 gpm.
- Close valves with YELLOW SLI marks

AFW flow throttled to < 355 gpm.

SG 1B MSIV open.

SI actuated.

US directs SI initiation or SI actuates.

**Crew re-enters E-0.**

US re-enters E-0, and informs crew.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	Reactor tripped.		RO re verifies reactor trip.
	Turbine tripped.		BOP re verifies turbine trip.
	Main generator tripped.		BOP re verifies generator trip.
	1AE and 1DF busses energized.		BOP re verifies power to AC emergency busses.
	SI actuated (both trains).		BOP manually actuates both SI trains.
			Crew sounds Standby alarm and announce Unit 1 reactor trip and SI.
	1VS-F-4A running.		BOP checks leak collection exhaust fan running.
			US directs starting CNMT hydrogen analyzers.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	CH-P-1A and CH-P-1B running. BIT flow indicated. SI-P-1A and 1B running.		RO verifies SI status. <ul style="list-style-type: none"> <li>▪ Two charging pumps running</li> <li>▪ BIT flow indicated</li> <li>▪ LHSI pumps both running</li> </ul>
	FW-P-3A, 3B and FW-P-2 running. All SG AFW throttle valves open. Total AFW flow > 355 gpm.		BOP verifies AFW status. <ul style="list-style-type: none"> <li>▪ AFW pumps running</li> <li>▪ AFW throttle valves full open.</li> <li>▪ Total AFW flow &gt; 355 gpm</li> </ul>
			BOP performs Attachment 1-K, Verification of Automatic Actions (Steps listed at end of scenario guideline.)
	T <sub>AVG</sub> stabilizing after MSIV closure.		BOP verifies RCS Tavg stable or trending to 547°F.
	Recirc spray pumps not running.		RO checks recirc spray pump status.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
	PCV-1RC-456 closed, but leaking. Spray valves closed. Safety relief valves closed. PRT conditions normal. All PORV MOV's open (except MOV-1RC-536 previously closed).		RO checks PRZR isolated. <ul style="list-style-type: none"> <li>▪ PORVs closed</li> <li>▪ Spray valves closed</li> <li>▪ Safety relief valves closed</li> <li>▪ PRT conditions at expected values</li> <li>▪ Power to at least one block valve and at least one open</li> </ul>
	D/P between RCS pressure and highest SG pressure > 200 psid.		RO checks if RCP's should be stopped.
	No SG pressures dropping in an uncontrolled manner.		BOP checks if any SG's are faulted.
	No SG levels rising in an uncontrolled manner.		BOP checks if SG tubes are intact.
	CNMT radiation, pressure and sump levels at pre-event values.		RO checks if RCS is intact.  Crew checks if SI flow should be reduced.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
<b>Crew enters ES-1.1, if SI Termination criteria is satisfied.</b>			US transitions to ES-1.1, and informs crew.
	SI reset (both trains).		RO resets SI.
	CIA and CIB reset (both trains).		RO resets CIA and CIB.
	One HHSI pump running.		RO stops one HHSI pump.
	RCS pressure rising.		RO check RCS pressure stable or rising.
<b><u>CRITICAL TASK #2:</u></b>  <b>Crew stops HHSI injection prior to water relief through the Pressurizer PORVs.</b>	MOV-SI-867A and 867B shut.		RO isolates the BIT. ▪ Close MOV-1SI-867A, B
	MOV-SI-867D and 867D shut.		▪ Close MOV-1SI-867C, D
			RO establishes normal charging flow.
	FCV-1CH-122 closed.		▪ Close FCV-1CH-122
	MOV-1CH-310 open.		▪ Open MOV-1CH-310



INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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MOV-1CH-289 open.

- Open MOV-1CH-289

FCV-1CH-122 output adjusted.

- Adjust FCV-1CH-122 to maintain PRZR level

RO controls charging flow to maintain PRZR level.

**Scenario may be terminated after BIT is isolated and normal charging flow is established.**

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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**Attachment 1-K, Verification of Automatic Actions**

Diesel Generators - BOTH RUNNING.

Check station instrument air header pressure - GREATER THAN 100 PSIG.

Ensure reheat steam isolation:

- a. Verify [MOV-1MS-100A, B] CLOSED.
- b. Reset reheater controller.

Verify CCR Pumps - TWO RUNNING.

Align Neutron Flux Monitoring For Shutdown:

- a. Transfer NR-1NI-45, Nuclear Recorder to operable source and intermediate range displays.

Verify river water system in service.

- a. RPRW Pumps - TWO RUNNING.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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- b. Check CCR Heat EX RW pressure  
- GREATER THAN 20 PSIG.

Check If main steamline isolation  
required.

- a. Check the following:

- CNMT pressure - GREATER THAN  
3 PSIG.

OR

- Steamline pressure - LESS THAN  
500 PSIG.

OR

- Steamline pressure high rate of  
change - ANY ANNUNCIATOR  
LIT.

Annunciator A7-41

Annunciator A7-49

Annunciator A7-57

- b. Verify steamline isolation:

- YELLOW SLI marks - LIT.

INSTRUCTIONAL GUIDELINES	PLANT STATUS OR RESPONSE	OBJECTIVE	EXPECTED STUDENT RESPONSE
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Check CIB and CNMT spray status:

- Containment pressure - HAS  
REMAINED LESS THAN 8 PSIG.

Verify ESF equipment status:

- a. Verify SI status by checking all  
RED SIS marks - LIT.
- b. Verify CIA by checking all  
ORANGE CIA marks - LIT.
- c. Verify FWI by checking all GREEN  
FWI marks - LIT.

Verify power to both AC emergency  
busses.

Upon completion, report any  
discrepancies to SM/US.