

Cat C. No comments

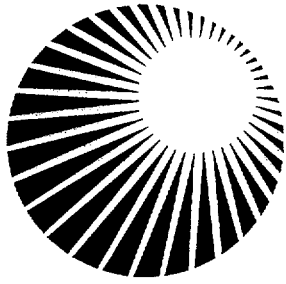
Facility: Seabrook	Scenario No. A Rev. 2	Op-Test No. 1	
Examiners: David Silk Larry Briggs Todd Fish	Operators: US: U 2 / U 6 PSO: U 3 / U 7 BOP: U 4 / U 5		
Objectives: The crew will respond to load reduction order from ISO New England. During the scenario the crew will respond to a Power Range NIS failure, and failure of a MFP recirculation valve. A security breach / sabotage results in Loss of All AC Power that degrades when a reactor coolant pump seal fails.			
Initial Conditions: 100% power, MOL. The main turbine will fail to trip automatically. Diesel Generator DG-1B will fail to start automatically. The C SG has a 0.5 gpd (0.00034 gpm) tube leak to serve as a Red Herring.			
Turnover: 100% power, MOL conditions. Chemistry has determined that the C SG tube leak is 0.5 gpd. Abnormal procedure OS1227.02, Steam Generator Tube Leak, was entered when RM-6505 increased from 46 cpm to about 60 cpm. A very slight increase was also noted on RM-6512, C SG blowdown. The abnormal was exited at step 6b. When Chemistry has updated the RM-6505 correlation, perform the brief required by Attachment A of OS1227.02.			
Event No.	Malf. No.	Event Type*	Event Description
1.	FW012F	C (US)	As soon as the crew has assumed the watch, the recirculation valve for main feed pump (MFP) FW-P-32A will fail open. The increase in feed pump flow causes MFP suction pressure to decrease and the standby condensate pump starts. Thermal power increases due to the reduced feed temperature. <ul style="list-style-type: none"> The crew must reduce turbine load to hold power to the license limit. OS1290.02, RESPONSE TO CONDENSATE OR FEEDWATER SYSTEM TRANSIENT, may be used as a guide. When the crew diagnoses the failure they will direct an NSO to manually close or isolate the valve.
2.		N (US)	ISO New England orders unit back down to 90% within 15 minutes / ASAP for grid stability. At the Chief Examiner's (CE) discretion, continue to next event.
3.	NI002	I (US)	Channel N42, power range NIS fails high. If in automatic, control rods will insert responding to the failed channel. <ul style="list-style-type: none"> The crew will confirm rod control is responding to a failed instrument and place rod control in MANUAL. Abnormal OS1211.04, POWER RANGE NI INSTRUMENT FAILURE, will be used to respond to the failure.

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

Event No.	Malif. No.	Event Type*	Event Description
3.	DEDE097 ED002	M (US)	The major event is initiated by a security event. Unauthorized operation of plant equipment results in loss of 125VDC vital bus 11A. Loss of the vital bus results in a reactor trip due to, among others, loss of feed water flow to all SGs. <ul style="list-style-type: none"> The crew will respond to the reactor trip, performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION.
	RPS003		The main turbine fails to automatically trip. The BOP must manually trip the turbine to prevent excessive cooldown (CCT). Loss of the vital bus also results in loss of control power to TRN A components including DG-1A. The diesel will not start unless an air start valve is manually overridden.
	SY001	M (US)	Shortly after the turbine generator breaker opens, a loss of Off-Site power will occur. With DG-1B automatic start defeated as part of the scenario setup, a loss of all AC occurs as soon as Off-Site power is lost. Additionally, with no power available on bus E5 and loss of the DC bus, vital AC instrument panels 1A and 1E are lost. <ul style="list-style-type: none"> At step 3 of E-0, the crew will transition to ECA-0.0, LOSS OF ALL AC POWER.
			<i>At step 5 of ECA-0.0 the crew will be informed of the security breach and advised that the vital DC bus may be re-energized (CCT).</i>
			At step 5c RNO of ECA-0.0 the crew will direct local starting of DG-1B and power will be restored to bus E6 (CCT).
			At step 5g RNO the crew may restore power to bus E5 by re-energizing vital DC bus 11A. DG-1A will start automatically and restore power to bus E5 (CCT).
	RC016 RC017 RC018	M (US)	Five minutes after the loss of Off-Site power one of the reactor coolant pumps seals will fail due to loss of cooling. The seal failure results in loss of RCS inventory. RCS pressure decreases and an automatic Safety Injection will be actuated (TRN B only, if power has not been restored to TRN A vital AC instrument panel 1A).
4.		M (US)	<ul style="list-style-type: none"> The crew will exit ECA-0.0 and return to E-0, step 3b and continue to step 4 and begin monitoring CSFs for implementation. The crew will proceed through E-0 to step 20 and exit to E-1, LOSS OF REACTOR OR SECONDARY COOLANT. <p>Terminate the exam at CE discretion.</p> <p>EOP sequence: E-0 ⇒ ECA-0.0 ⇒ E-0 ⇒ E-1</p>

- CCT(s)
- MANUALLY trip the main turbine or close the MSIVs before a severe (ORANGE PATH) challenge develops to either the Subcriticality or the Integrity CSF or before transition to ECA-2.1, which ever happens first.
 - ENERGIZE at least one AC emergency Bus before placing safeguards equipment in the pull to lock position.

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



North Atlantic

NRC LICENSE EXAMINATION
SIMULATOR DEMONSTRATIVE EXAMINATION
SCENARIO A Rev. 1

PREPARED BY:

Steve Kesong

INSTRUCTOR

DATE:

2/18/00

REVIEWED BY:

**SUBJECT MATTER EXPERT
(OPTIONAL)**

DATE:

APPROVED BY:

[Signature]

OPERATIONS TRAINING SUPERVISOR

DATE:

2/22/00

SIMULATOR DEMONSTRATIVE EXAMINATION

SCENARIO DESCRIPTION / OBJECTIVES:

The objective of this simulator examination is to assess individual operator performance as well as crew performance and communication skills.

The crew will respond to load reduction order from ISO New England. During the scenario the crew will respond to a Power Range NIS failure, and failure of a MFP recirculation valve. A security breach / sabotage results in Loss of All AC Power that degrades when a reactor coolant pump seal fails.

SIMULATOR DEMONSTRATIVE EXAMINATION

<u>SIMULATOR SETUP</u>	
<p>___ RESET the simulator to 100%, MOL.</p> <p>INITIATE a 0.5 gpd steam generator tube leak on SG C:</p> <p>___ IMF SG001 0.00034 0 0<CR></p> <p>DEFEAT the main turbine automatic trip:</p> <p>___ IMF RPS003<CR></p> <p>DEFEAT automatic start of DG-1B:</p> <p>___ IOR DIDGCS95221 STOP<CR></p> <p>___ IOR DIDGCS95222 STOP<CR></p> <p>Setup Trigger E1 to initiate the Major Event:</p> <p>___ IMF DEDE097 (E1)<CR> (D6054, Batt Chgr 1A Output Bkr Open)</p> <p>___ IMF ED002 (E1 15)<CR> (Loss of 125 VDC Bus 11A)</p> <p>___ IMF DEDE098 (E1 15)<CR> (D6055, Batt 1A Output Bkr to Bus 11A Open)</p> <p>Setup Trigger E2 to initiate loss of all AC after the main generator breaker opens:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file GENBKRTrip (LOEDCS98761[3] .EQ. 1) • SELECT: Assign Trigger File <p>___ TYPE: E2<CR></p> <p>Link the following to trigger E2:</p> <p>___ IMF SY001 (E2 10)<CR> (TOTAL LOSS OF OFFSITE POWER)</p> <p>___ IMF RC016 (E2 300) 1.0 0 0<CR> (RCP-1D #1 SEAL FAILURE)</p> <p>___ IMF RC017 (E2 300) 1.0 0 0<CR> (RCP-1D #2 SEAL FAILURE)</p> <p>___ IMF RC018 (E2 300) 300 0 0<CR> (RCS LEAK)</p>	

SIMULATOR DEMONSTRATIVE EXAMINATION

<u>TURNOVER</u>	
<p>100% power, MOL conditions. Chemistry has determined that the C SG tube leak is 0.5 gpd. Abnormal procedure OS1227.02, Steam Generator Tube Leak, was entered when RM-6505 increased from 46 cpm to about 60 cpm. A very slight increase was also noted on RM-6512, C SG blowdown. The abnormal was exited at step 6b. When Chemistry has updated the RM-6505 correlation, perform the brief required by Attachment A of OS1227.02.</p> <p>No equipment out of service.</p>	

SCENARIO OUTLINE	
<p>Provide the turnover sheet to the US. Allow the crew to walk-down the MCB.</p> <p>When directed by the Chief Examiner (CE), initiate EVENT 1.</p>	<p>The US should brief the crew on the status of the plant and actions taken in OS1227.02, STEAM GENERATOR TUBE LEAK.</p>
<p>EVENT 1 (Component –US)</p> <p>Fail open FW-P-32B recirculation valve: IMF FW012F<CR> (MFP-32B RECIRC VALVE FAILS OPEN)</p> <p><i>CUE: When NSO is directed to check the status of FW-V4065, report that the valve is full open.</i></p> <p><i>When the NSO is directed to close / isolate the valve, use remote function FW009 (FW-V15) to isolate the valve.</i></p> <p>RFI FW<CR></p> <p>SELECT FW009, set to 0.0 (use delay feature to ramp the valve closed).</p> <p>When the NSO has been directed to locally close the recirculation valve, or as directed by the CE, continue to EVENT 2.</p>	<p><i>The increase in feed pump flow causes MFP suction pressure to decrease and the standby condensate pump starts. Thermal power increases due to the reduced feed temperature.</i></p> <p><i>Crew should note thermal power increase and automatic start of the standby condensate pump. Further investigation should reveal that feed pump suction flow is high on both pumps.</i></p> <p>OS1290.02, RESPONSE TO CONDENSATE OR FEEDWATER SYSTEM TRANSIENT, entered based on standby condensate pump starting automatically:</p> <p>The crew must reduce turbine load to hold power to the license limit.</p> <ul style="list-style-type: none"> • US directs BOP to reduce power as necessary. • BOP reduces turbine load <p>Step 4 RNO of OS1290.02 directs crew to check the feed pump recirculation valve for proper operation. When the crew diagnoses the failure they will direct an NSO to manually close or isolate the valve.</p> <p>Step 5 directs crew to check whether the standby condensate is running.</p> <ul style="list-style-type: none"> • US directs BOP to adjust the long-term recirculation valve for 18,000 gpm. • BOP sets CO-FK-4042 for 18,000 gpm. <p>As the NSO closes FW-V15 feed pump flow will return to normal. The crew will use OS1290.02 to restore normal plant configuration.</p>

<p>EVENT 2 (Normal – US)</p> <p><i>CUE: Call the control room as ISO New England and direct crew to reduce unit output to 90% as soon as possible (w/i 15 minutes).</i></p> <p>Continue to EVENT 3, as directed by the CE</p>	<p>The crew should use Figure 6: Rapid Power Decrease Guidelines, of OS1000.06, POWER DECREASE.</p> <ul style="list-style-type: none"> • US briefs crew on control band for temperature and directs PSO to calculate required boration. Informs SM and makes plant announcement. • PSO calculates boration and requests peer check. Begins boration. • BOP begins load reduction, within limitations set by US.
<p>EVENT 3 (Instrument – US)</p> <p>Initiate failure of power range NIS channel N42:</p> <p>IMF NI002<CR> (N42 Power Range Fails High)</p> <p>To indicate Cabinet CP-2 door opening insert D-Point; DVS, DMM: DMM006, D5630, PROTECTION CAB CP-2 DOOR OPEN.</p> <p>IMF DMM006 <CR> To trip bistables; RFL, BIS: BIS014 [RC-TB-421C] OTAT Trip BIS018 [RC-TB-421G] OPAT Trip</p> <p>Delete DMM006, for closing CP-2 Door. DMF DMM006<CR></p> <p>After the crew has completed OS1211.04, or as directed by the CE, continue to EVENT 4.</p>	<p>The control rods will automatically insert in response to the failed NI channel.</p> <p>The crew will enter OS1211.04, POWER RANGE NI INSTRUMENT FAILURE.</p> <ul style="list-style-type: none"> • Crew determines automatic rod insertion is NOT due to Runback / Setback. • US directs actions per procedure. • PSO places rod control in MANUAL, as applicable. • PSO identifies affected NIS channel. • BOP controls Tav_g using turbine load as directed. • PSO bypasses affected channel as directed. • Crew verifies NO redundant bistables tripped and removes control power fuses. • US performs brief and coordinates with I&C to trip bistables. • PSO verifies proper P-10 status. • Crew refers to Technical Specifications (TS) and deletes applicable computer points from scan. • PSO returns Rod Control to AUTO, as applicable. • US informs SM of failure.
<p>EVENT 4 (Major – US)</p> <p>The major event is initiated as a security breach - sabotage. The crew will be notified of the sabotage by an NSO later.</p>	

Initiate the major event by selecting Event Trigger **E1**:

SELECT Initiate Pending Events

NOTE: *Unauthorized operation of plant equipment results in loss of 125VDC vital bus 11A. Loss of the vital bus results in a reactor trip due to, among others, loss of feed water flow to all SGs. Loss of the vital bus also results in loss of control power to TRN A components including DG-1A. The diesel will not start unless an air start valve is manually overridden.*

After the main generator breaker opens, loss of Off-Site power will occur. With DG-1B automatic and manual start defeated as part of the scenario setup, loss of all AC occurs as soon as Off-Site power is lost. With no power available on bus E5 and loss of the DC bus, vital AC instrument panels 1A and 1E are lost.

CUE: *After the I/As of ECA-0.0 have been completed, call the control room as an NSO with security personnel. Report that an apparent terrorist posing as a visitor on tour broke away from the tour long enough to open the battery charger breaker and battery breaker. NSO is prepared to restore power to the battery bus as directed. Terrorist in custody.*

NOTE: *Restore power as directed by the crew. They may pursue either emergency bus.*

CUE: *NSO at DG-1B sees no apparent cause for DG-1B failure to start.*

CUE: *When directed by the control room to attempt local start of DG-1B, perform the following to simulate placing the DG control selector switch in LOCAL:*

CAE! dgbllocal <CR>

CUE: *Report that DG-1B is in LOCAL (unless directed to start and load without reporting).*

The crew will respond to the event using E-0, **REACTOR TRIP OR SAFETY INJECTION**.

- US directs board operators to perform immediate actions (I/A).
- PSO performs I/As.
- BOP performs I/As.
 - ⇒ MANUALLY trips the main turbine (CCT).
 - ⇒ Attempts to restore power to BOTH emergency busses.

The crew diagnoses Loss of All AC and transitions to ECA-0.0, **LOSS OF ALL AC POWER**.

- US directs board operators to perform immediate actions.
- PSO performs I/As.
- BOP performs I/As.
- US directs operator actions in ECA-0.0.

During the performance of ECA-0.0, the crew may, as applicable take a procedure deviation to close the MSIVs when main condenser vacuum is lost. (Basis for deviation is to protect plant equipment).

- US directs BOP to initiate MSI or close the MSIVs.
- US directs PSO to initiate MSI

At step 5 of ECA-0.0, the crew will attempt restoration of power to at least one emergency bus.

- US directs BOP to attempt start of DG B from the MCB.
- US/BOP directs the NSO at DG 1B to start DG 1B locally (CCT).

CUE: Perform the following to simulate LOCAL start of DG-1B:

- Delete the IOR on both emergency STOP Pushbuttons.
- IOR the DG-1B RESET Control switch to RESET and then delete the IOR.
- IOR the Emergency Start Pushbutton to START.

CUE: Report that DG-1B has started (unless directed to start and load without reporting).

CUE: Perform the following to close the breaker:

- Delete the IOR on the DG-1B breaker control switch.

NOTE: If bus E5 is not restored within 13.5 minutes, the MPCS and RDMS should be halted:

IMF SCS001<CR>

IMF RM111<CR>

NOTE: Restoration of power to DC bus 11A per operating procedure requires using the battery charger. As the battery charger is not available, if the crew chooses to restore bus 11A, they will have to take a procedure deviation to restore power by closing the battery breaker.

CUE: When directed to re-energize bus 11A:

DELETE malfs ED002 and DEDE098.

NOTE: When power is restored to the DC bus, vital AC inverters PP-1A and 1E will be re-energized. The ASDVs for SG A and C will be in MANUAL when power is restored (instead of AUTOMATIC). As a result the A and C ASDVs will not control SG pressure automatically and a safety may lift.

Dependent upon timing, the RCP seal failures may be in progress. If so, inventory loss to the RCS will result in on automatic SI when RCS pressure decreases to the SI setpoint.

The crew recognizes restoration of power to bus E6 and verifies proper EPS sequencing.

At step 5g RNO, the crew can restore power to bus E5 by restoring power to DC bus 11A.

- After checking for procedural guidance, the crew should evaluate whether a procedure deviation is warranted.
- If warranted, the US directs that bus 11A be re-energized from the battery (CCT if E6 is not restored).

When bus 11A is restored DG-1A will start automatically and re-energize bus E5. Vital instrument busses 1A and 1E will be restored.

The crew may continue processing through ECA-0.0 while attempting to restore power to bus E5. With at least one emergency bus energized the crew will exit ECA-0.0 at step 5h and go to step 3 of E-0.

At step 4 of E-0, the crew will check whether SI is actuated. IF SI is not actuated and NOT yet required, the crew will exit E-0 and go to ES-0.1, REACTOR TRIP RESPONSE until SI is required.

IF SI is actuated the crew will continue to process through E-0. The crew will process through E-0 based on power available.

Upon CE discretion, terminate the exam when the crew exits E-0 to E-1.	At step 20 of E-0 the crew should exit E-0 and go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT.
CCTs: 1. MANUALLY trip the main turbine or close the MSIVs before a severe (ORANGE PATH) challenge develops to either the Subcriticality or the Integrity CSF or before transition to ECA-2.1, which ever happens first. 2. ENERGIZE at least one AC emergency Bus before placing safeguards equipment in the pull to lock position. EAL Classification: ALERT 6c or 15c or 18b.	

Appendix D

Scenario Outline

Form ES-D-1

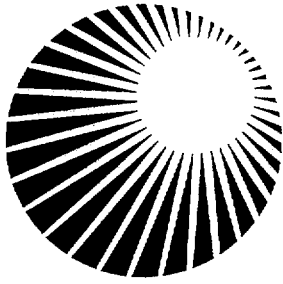
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Examiners: David Silk Larry Briggs Todd Fish	Operators: US: U 4 / U 8 PSO: U 2 / U 6 BOP: U 1 / U 7																					
<p>Objectives: A reactor coolant loop narrow range temperature channel will fail. The crew will be required to reduce power to $\leq 98\%$ power prior to tripping bistables due to the Upper Plenum Anomaly phenomena. Upon completion of tripping bistables, failure of the TRN A SW pump service will occur. The standby ocean SW pump will not start and the crew will initiate a TOWER ACTUATION for TRN A. A spurious turbine trip will occur but the TG breaker will not open. Loss of load will cause a main steam bottle rupture. All MSIVs will fail open. The crew will respond to an uncontrolled depressurization of all SGs.</p>																						
<p>Initial Conditions: 100% power. The main generator breaker will fail to open on trip demand. Automatic transfer to the Reserve Auxiliary Transformer (RAT) will not occur for 13.8kV busses 1 and 2 and 4.16kV emergency bus E5. The A DG will not start automatically.</p>																						
<p>Turnover: 100% power.</p>																						
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Event No.</th> <th style="width: 15%;">Malfunction No.</th> <th style="width: 15%;">Event Type*</th> <th style="width: 60%;">Event Description</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>RC008</td> <td>I (US)</td> <td>The Tavg / ΔT channel for RCS Loop 1 will fail causing the automatic rod control system to insert control rods. <ul style="list-style-type: none"> The crew will respond using OS1201.08, TAVG/DELTA T INSTRUMENT FAILURE. </td> </tr> <tr> <td>2.</td> <td></td> <td>N (US)</td> <td>The crew will reduce power from 100% to $\leq 98\%$ power to allow tripping of the bistables for Event No. 1.</td> </tr> <tr> <td>3.</td> <td>I/O SW</td> <td>C (US)</td> <td>The TRN A SW pump will trip on OC. The standby pump will fail to start automatically or manually. The crew will place TRN A SW on the Cooling Tower. <ul style="list-style-type: none"> The crew will respond using OS1216.01, DEGRADED ULTIMATE HEAT SINK. </td> </tr> <tr> <td>4.</td> <td>ED047 ED003 MSIVs FO MS039</td> <td>M (US)</td> <td>Spurious trip of the main turbine will initiate the major event. When the turbine trips the output breaker will fail to open. A BREAKER FAILURE scheme will be actuated to isolate the TG from the Grid. Automatic transfer to the RAT for busses 1, 2, E5 will <u>not</u> occur. The reactor will trip on turbine trip. The A emergency DG will not automatically start.</td> </tr> </tbody> </table>			Event No.	Malfunction No.	Event Type*	Event Description	1.	RC008	I (US)	The Tavg / ΔT channel for RCS Loop 1 will fail causing the automatic rod control system to insert control rods. <ul style="list-style-type: none"> The crew will respond using OS1201.08, TAVG/DELTA T INSTRUMENT FAILURE. 	2.		N (US)	The crew will reduce power from 100% to $\leq 98\%$ power to allow tripping of the bistables for Event No. 1.	3.	I/O SW	C (US)	The TRN A SW pump will trip on OC. The standby pump will fail to start automatically or manually. The crew will place TRN A SW on the Cooling Tower. <ul style="list-style-type: none"> The crew will respond using OS1216.01, DEGRADED ULTIMATE HEAT SINK. 	4.	ED047 ED003 MSIVs FO MS039	M (US)	Spurious trip of the main turbine will initiate the major event. When the turbine trips the output breaker will fail to open. A BREAKER FAILURE scheme will be actuated to isolate the TG from the Grid. Automatic transfer to the RAT for busses 1, 2, E5 will <u>not</u> occur. The reactor will trip on turbine trip. The A emergency DG will not automatically start.
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4.	ED047 ED003 MSIVs FO MS039	M (US)	Spurious trip of the main turbine will initiate the major event. When the turbine trips the output breaker will fail to open. A BREAKER FAILURE scheme will be actuated to isolate the TG from the Grid. Automatic transfer to the RAT for busses 1, 2, E5 will <u>not</u> occur. The reactor will trip on turbine trip. The A emergency DG will not automatically start.																			

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

Event No.	Malf. No.	Event Type*	Event Description
			<ul style="list-style-type: none"> The crew will respond to the reactor trip by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION. The BOP will perform an emergency start of the A DG. At step 18 the crew will exit E-0 and go to E-2, FAULTED STEAM GENERATOR ISOLATION. At step 2 of E-2 the crew will go to ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.
			<i>At step 2 of ECA-2.1 the crew should minimize feed flow to all SGs but ~ 25 gpm should be established and maintained.</i>
			<ul style="list-style-type: none"> The crew will establish ~ 25 gpm feed flow to all SGs (CCT).
			The crew will continue to process ECA-2.1 until at least one MSIV is closed locally. The crew will return to E-2 step 1 when at least one SG pressure increases after the MSIV is closed. Terminate the exam (at CE discretion) when the crew has entered E-1.
			EOP sequence; E-0 ⇒ E-2 ⇒ ECA-2.1 ⇒ E-2 ⇒ E-1

CCT 1. Control the EFW flow rate to not less than 25 gpm per SG in order to minimize the RCS cooldown rate before a severe challenge develops to the Integrity CSF

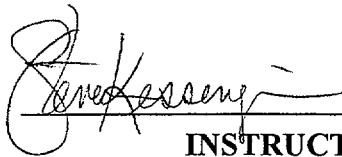
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North Atlantic

NRC LICENSE EXAMINATION
SIMULATOR DEMONSTRATIVE EXAMINATION
SCENARIO I Rev. 1

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The objective of this simulator examination is to assess individual operator performance as well as crew performance and communication skills.

A reactor coolant loop narrow range temperature channel will fail. The crew will be required to reduce power to $\leq 98\%$ power prior to tripping bistables due to the Upper Plenum Anomaly phenomena. Upon completion of tripping bistables, failure of the TRN A SW pump will occur. The standby ocean SW pump will not start and the crew will initiate a TOWER ACTUATION for TRN A. A spurious turbine trip will occur but the TG breaker will not open. Loss of load will cause a rupture of the main steam header. All MSIVs will fail open. The crew will respond to an uncontrolled depressurization of all SGs.

SIMULATOR DEMONSTRATIVE EXAMINATION

<u>SIMULATOR SETUP</u>	
<p>___ Reset the simulator to 100%, MOL</p> <p>Insert malfunction ED047, TG BKR FAILURE TO AUTO TRIP.</p> <p>___ IMF ED047<CR></p> <p>Insert an I/O override to prevent manually opening the TG BKR.</p> <p>___ IOR DIEDCS98761 NA-CLOSE<CR></p> <p>Insert an I/O override on each of the RAT breakers for Busses 1, 2 and 5 to defeat auto transfer from the UAT to the RAT.</p> <p>___ IOR DIEDCS98501 TRIP<CR></p> <p>___ IOR DIEDCS98601 TRIP<CR></p> <p>___ IOR DIEDECS97071 TRIP<CR></p> <p>Insert an I/O override to prevent SW-P-41C from automatically (or Manually) starting when SW-P-41A trips on over-current.</p> <p>___ IOR DISWCS61021 STOP<CR></p> <p>Setup Event Trigger E1 to initiate the major event when the breaker failure scheme is actuated:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file BKRFAILURE (LOSYCS9992-2 .EQ. 1) • SELECT: Assign Trigger File <p>___ Type: E1<CR></p> <p>Link the following 6 commands to trigger E1:</p> <p>___ IMF MS039 (E1) 0.20 15 0<CR> (Main Steam Header Steam leak)</p> <p>___ IOR LOEDCS98761[2] (E1) OFF<CR> (CLOSED Lamp for TG BKR CKT #1)</p> <p>___ IOR LOEDCS98761[4] (E1) OFF<CR> (CLOSED Lamp for TG BKR CKT #2)</p> <p>___ IOR LOEHCUC3851[13] (E1) OFF (Generator BKR CLOSED lamp on EHC panel)</p>	

SIMULATOR DEMONSTRATIVE EXAMINATION

Insert malfunction ED003, A EDG FAILS TO AUTO START: ____IMF ED003<CR> Insert malfunctions to fail open ALL MSIVs: ____IMF MS022A<CR> ____IMF MSO22B<CR> ____IMF MS022C<CR> ____IMF MS022D<CR>	
<u>TURNOVER</u>	
100% power. No equipment out of service	

SCENARIO OUTLINE	
<p>Provide the turnover sheet to the US. Allow the crew to walk-down the MCB.</p> <p>When directed by the Chief Examiner (CE), initiate EVENT 1.</p>	
<p>EVENT 1 (Instrument – US)</p> <p>Insert malfunction RC008, RCS NARROW RANGE Tc FAILS HIGH:</p> <p>IMF RC008<CR></p>	<p>The Tavg / ΔT channel for RCS Loop 1 will fail causing the automatic rod control system to insert control rods.</p> <p>The crew will respond using OS1201.08, TAVG/DELTA T INSTRUMENT FAILURE.</p> <ul style="list-style-type: none"> • PSO responds to VAS alarms, checks MCB indication and determines that LP1 Tavg/ΔT has failed causing auctioneered Tavg to be high. • US directs PSO to place rods in MANUAL. • US directs BOP to ensure Steam Dumps are closed. • US directs PSO to DEFEAT affected Tavg and ΔT channel. • PSO defeats affected channel as directed. <p>Crew restores control systems to automatic as appropriate. Discussion should include returning rods to Full Out Position (FOP) and ΔI control.</p> <ul style="list-style-type: none"> • PSO returns rod control to automatic as directed by the US. • PSO returns PZR level control to auto, as applicable. • Crew verifies NO redundant bistables tripped. • Crew refers to TS. • US performs brief, including the requirement to refer to RE-24 for power restrictions for tripping bistables and coordinates with I&C to trip bistables. • US informs SM of failure.
<p>EVENT 2 (Normal – US)</p>	<p>The crew will reduce power from 100% to $\leq 98\%$ power to allow tripping of the bistables for Event No. 1.</p> <p>The crew should use OS1000.06, POWER</p>

<p>At the discretion of the CE, when the crew has completed the power reduction to 98%, continue to EVENT 3.</p> <p>IF the CE wants to see the crew trip bistables, perform the following as directed by the crew:</p> <p>To indicate Cabinet CP-1 door opening insert D-Point; DVS, DMM: DMM004, D5628, PROTECTION CAB CP-1 DOOR OPEN.</p> <p>IMF DMM004 <CR></p> <p><u>To trip bistables; RFLBIS:</u></p> <p>BIS013 [RC-TB-411C] OTAT Trip BIS017 [RC-TB-411G] OPAT Trip BIS021 [RC-TB-412D] LO-LO Tavg BIS037 [RC-TB-412G] LO Tavg FWI</p> <p>Delete DMM004, for closing CP-1 Door. DMF DMM004<CR></p> <p>As directed by the CE, continue to EVENT 3.</p>	<p>DECREASE, for power reduction.</p> <ul style="list-style-type: none"> • US establishes a control band for RCS temperature control. • PSO determines the boration requirements • BOP determines an "unloading" schedule. • PSO and BOP coordinate load decrease. <p>When power is $\leq 98\%$, the crew will continue with bistable tripping.</p> <ul style="list-style-type: none"> • US directs PSO and I&C coordinate tripping of bistables as directed by the US. <p>Crew exits OS1201.08</p>
<p>EVENT 3 (Component – US)</p> <p>Insert malfunction SW001, SW-P-41A OC TRIP:</p> <p>IMF SW001<CR></p> <p>NOTE: <i>SW-P-41C does not auto start (will not start manually) due to a failure (simulated) of the R1 relay in the start circuitry.</i></p> <p>CUE: <i>When TRN A SW is aligned to the CT, delete the I/O override on SW-P-41C to enable automatic Tower Actuation and the TRN A SW INOP alarm:</i></p> <p>DOR DISWCS61021<CR></p>	<p>The crew will respond using OS1216.01, DEGRADED ULTIMATE HEAT SINK.</p> <ul style="list-style-type: none"> • US directs operator actions in OS1216.01 • BOP manually initiates Tower Actuation (TA) for TRN A SW and verifies component status. <p>The crew refers to ATTACHMENT A to determine whether CT spray and/ or fans are required.</p> <ul style="list-style-type: none"> • US notifies Security that the CT is in service. • US notifies Chemistry to sample the CT basin for NPDES permit. <p>In step 4 the crew aligns TRN A CT pump for auto start capability:</p> <ul style="list-style-type: none"> • BOP places TRN A SW pump switches in PTL. • BOP places the TRN A CT pump

<p>At CE discretion, continue to EVENT 4 when the crew has completed OS1216.01.</p>	<p>control switch in NAS.</p> <ul style="list-style-type: none"> • BOP resets TRN A TA signal <p>The crew refers to TSs and notifies the SM.</p>
<p>EVENT 4 (Major- US)</p> <p>NOTE: <i>Spurious trip of the main turbine will initiate the major event. When the turbine trips the output breaker will fail to open. A BREAKER FAILURE scheme will be actuated to isolate the TG from the Grid. Automatic transfer to the RAT for Busses 1, 2 and E5 will <u>not</u> occur. The reactor will trip on turbine trip. The A emergency DG will not automatically start.</i></p> <p>Initiate the major event by inserting an I/O override to trip the main turbine:</p> <p>IOR DIEHCUC3851TVT TRIP<CR> (Main Turbine Trip Pushbutton on MCB-FF)</p> <p>NOTE: If the crew dispatches NSOs to locally close the MSIVs, do not close them until ECA-2.1 step 2 has been completed.</p> <p>NOTE: <i>Automatic isolation of EFW to one SG will occur due to high flow caused by lower than normal pressure on SGs.</i></p>	<p>The crew will respond to the reactor trip by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION.</p> <ul style="list-style-type: none"> • The US will direct operator actions in E-0. • The BOP will attempt to manually trip the TG Breaker when load decreases to zero. • The BOP will perform an emergency start of DG-1A. <p>At step 4 of E-0, automatic SI will have occurred (or will occur shortly). If the crew performs a MANUAL MSI based on decreasing SG pressures, the MSIVs will not close.</p> <p>At step 7, as applicable, the crew should determine that the affected SG is faulted and leave EFW isolated.</p> <ul style="list-style-type: none"> • The BOP should note that EFW is isolated to one SG. <p>At step 9 the crew will verify that SW is being supplied by CT on TRN A and ocean on TRN B.</p> <ul style="list-style-type: none"> • BOP verifies CT pump operating for TRN A. Ocean pump for TRN B. <p>At step 11, if not already attempted, the crew will attempt to close the MSIVs.</p> <ul style="list-style-type: none"> • BOP initiates a MSI

<p><i>NOTE: At step 2 of ECA-2.1 the crew should minimize feed flow to all SGs but ~ 25 gpm should be established and maintained.</i></p> <p><i>NOTE: After the crew has completed step 2 of ECA-2.1, the NSOs may begin closing MSIVs as directed. The C SG MSIV will not close</i></p> <p>DMF MS022A<CR></p> <p>DMF MS022B<CR></p> <p>DMF MS022D<CR></p> <p>Upon CE discretion, terminate the exam when the crew has entered E-1 from E-2.</p>	<ul style="list-style-type: none"> • PSO initiates MSI • BOP attempts closing MSIVs using the normal close switches. <p>At step 18 the crew will exit E-0 and go to E-2, FAULTED STEAM GENERATOR ISOLATION.</p> <p>At step 2 of E-2 the crew will go to ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.</p> <ul style="list-style-type: none"> • US directs operator actions. • BOP isolates steam flow to the TDEFW pump. • The BOP will establish ~ 25 gpm feed flow to all SGs as directed by the US (CCT). <p>The crew will note that SG pressures begin to recover when the MSIVs are closed and return to E-2, step 1.</p>
<p>CCT:</p> <p>1. Control the EFW flow rate to not less than 25 gpm per SG in order to minimize the RCS cooldown rate before a severe challenge develops to the Integrity CSF</p> <p>EAL CLASSIFICATION: UE 15b</p>	

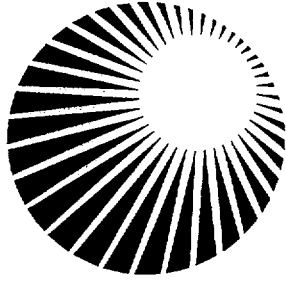
Facility: Seabrook	Scenario No.	H Rev. 3	Op-Test No. 2
Examiners: David Silk Larry Briggs Todd Fish	Operators: US: 11 / 12 PSO: U 4 / U 8 BOP: U 2 / U 6		
Objectives: The crew will continue a plant shutdown. During the shutdown the crew will respond to a failed SG steam flow channel and loss of primary component cooling. The main steam isolation valve (MSIV) for the B SG will inadvertently close. When the MSIV closes one safety valve on the B SG will stick open. The transient on the SG will cause a tube rupture in the faulted SG. The crew will be forced to respond to a faulted / ruptured SG.			
Initial Conditions: 75% power. The standby component cooling pump in TRN B will fail to start automatically when the in-service pump trips.			
Turnover: Approximately 75% power with abnormal procedure OS1200.03, SEVERE WEATHER CONDITIONS, and OS1000.06, POWER DECREASE, in effect. The National Weather Service reports sustained 100 – 115 mph winds with 130 mph gusts from hurricane Madison. Madison is 5 hours away. Currently the winds are 10 – 15 mph out of the ESE (110° - 150°) with high tides running 2 – 3 feet above normal.			
Event No.	Malf. No.	Event Type*	Event Description
1.		N (S)	The crew will continue the power decrease. At the Chief Examiner's (CE) discretion, continue to next event.
2.	MS044	I (US)	The controlling steam flow channel for SG A will fail low. <ul style="list-style-type: none"> The crew will respond using OS1235.04, SG FEED FLOW OR STEAM FLOW INSTRUMENT FAILURE.
3.	I/O PCCW	C (US)	The in-service TRN B PCCW pump, CC-P-11B, will trip on over-current. The standby feature of pump CC-P-11D will fail to automatically start the pump. The PSO will start the standby pump. <ul style="list-style-type: none"> The crew will respond using OS1212. 01, PCCW SYSTEM MALFUNCTION (CCT).
4.	I/O MSIV I/O CCP	M (US)	Spurious closing of the B SG MSIV will initiate the major event. When the MSIV closes one safety valve on the B SG will fail partially open. As inventory decreases in the B SG a 400 gpm tube rupture will develop. The TRN A centrifugal charging pump, CS-P-2A, will trip shortly after the plant trip. <ul style="list-style-type: none"> The crew will respond to the closure of the MSIV by tripping the reactor OR verifying the reactor trip. The crew will perform the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION. At step 8 the crew must ensure that CC-P-11D is running to provide cooling to the TRN B loads. The TRN B CCP is the only HHI pump (CCT).

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

Event No.	Malf. No.	Event Type*	Event Description
4. cont'd		M (US)	<ul style="list-style-type: none"> At step 18 the crew will exit E-0 and go to E-2, FAULTED STEAM GENERATOR ISOLATION. The crew will exit E-2 at step 6 and go to E-3, STEAM GENERATOR TUBE RUPTURE, when they determine that SG B steamline radiation is NOT normal.
			<i>At step 13 of E-3 the crew evaluates whether transition to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED, is appropriate. SG B pressure at this point should be 600 – 700 psig. The transition criteria is ≤ 350 psig. Based on the continued depressurization, the crew may choose to make a procedure deviation and transition to ECA-3.1. If not, they will continue with the cooldown and transition to ECA-3.1 at step 15.</i>
			<ul style="list-style-type: none"> IF the crew chooses to continue in E-3 at step 13, they will cooldown using ASDVs to the appropriate RCS temperature in step 14. At step 15 the B SG pressure will be < 250 psig above the intact SG pressures and the crew will transition to ECA-3.1.
			<ul style="list-style-type: none"> At step 11 of ECA-3.1, the crew resumes / continues the RCS cooldown by dumping steam using the ASDVs while maintaining RCS cooldown rate < 100°F/hr. The crew continues with ECA-3.1 to the SI flow reduction steps.
			Terminate the exam (at CE discretion) after the crew has entered ECA-3.1.
			EOP sequence; E-0 \Rightarrow E-2 \Rightarrow E-3 \Rightarrow ECA-3.1

CCTs 1. MANUALLY start at least one PCCW pump for the available train, to provide adequate component cooling for the operating safeguards train before transition out of E-0.

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



North Atlantic

NRC LICENSE EXAMINATION
SIMULATOR DEMONSTRATIVE EXAMINATION
SCENARIO H Rev. 1

PREPARED BY:


INSTRUCTOR

DATE: 2/18/00

REVIEWED BY:

SUBJECT MATTER EXPERT
(OPTIONAL)

DATE: _____

APPROVED BY:


OPERATIONS TRAINING SUPERVISOR

DATE: 2/22/00

SIMULATOR DEMONSTRATIVE EXAMINATION

SCENARIO DESCRIPTION / OBJECTIVES:

The objective of this simulator examination is to assess individual operator performance as well as crew performance and communication skills.

The crew will continue a plant shutdown. During the shutdown the crew will respond to a failed SG steam flow channel and loss of primary component cooling. The main steam isolation valve (MSIV) for the B SG will inadvertently close. When the MSIV closes one safety valve on the B SG will stick open. The transient on the SG will cause a tube rupture in the faulted SG. The crew will be forced to respond to a faulted / ruptured SG.

SIMULATOR DEMONSTRATIVE EXAMINATION

<u>SIMULATOR SETUP</u>	
<p>___ RESET the simulator to ~ 75% power, MOL and place the simulator in run while performing the setup.</p> <p>Change the wind direction in MPCS to be consistent with the turnover. By the time setup is completed the 15 minute meteorological averages on MET should update.</p> <p>Select Simulator Functions, select Set Variable.</p> <p>___ Enter SCA1627<CR> (Upper wind direction)</p> <p>___ Enter 135<CR></p> <p>Select Set Variable.</p> <p>___ Enter SCA1630<CR> (Lower wind direction)</p> <p>___ Enter 133<CR></p> <p>Setup Event Trigger E1 to initiate loss of PCCW pump CC-P-11B:</p> <p>___ IOR DICCCS22401 (E1) STOP<CR> (CC-P-11B Control Switch to STOP)</p> <p>___ IOR LOCCCS22401[2] (E1) ON<CR> (AMBER Lamp for CC-P-11B)</p> <p>___ IMF DCC044 (E1)<CR> (D4275 PCCW PUMP B BKR TRIP &L/O)</p> <p>___ IMF DCC085 (E1)<CR> (D7491 PCCW PUMP B CS NAS)</p> <p>Setup Event Trigger E2 to remove the overrides and malfunction DCC085 of trigger E1 when the standby CC pump is started:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file DCCSTART (LOCCCS22411-3 .EQ. 1) • SELECT: Assign Trigger File <p>___ Type: E2<CR></p>	<p>The automatic start feature of the standby pump requires the in-service pump control switch to be in NA-START. This trigger will place the in-service (11B) pump control switch in STOP. The automatic start feature will be defeated but the manual start feature will allow the operator to manually start the standby pump.</p>

SIMULATOR DEMONSTRATIVE EXAMINATION

<p>Link commands to Trigger E2:</p> <ul style="list-style-type: none"> • SELECT TRIGS on the top status bar • SELECT Trigger E2 • SELECT Link Command to Trigger <p>___Type: DOR DICCCS22401<CR></p> <p>Repeat the above sequence for the remaining two commands:</p> <p>___Type: DOR LOCCCS22401[2]<CR></p> <p>___Type: DMF DCC085<CR></p> <p>Setup Event Trigger E3 to trip CS-P-2A:</p> <p>___IMF DCS098 (E3)<CR> (D5841 CNTRFGL CHG PUMP A CS NAS)</p> <p>___IOR DICSCS74241 (E3) STOP<CR> (Pump control switch to stop)</p> <p>___IOR LOCSCS74241[2] (E3) ON<CR> (AMBER mismatch lamp)</p> <p>___IMF DCS045 (E3)<CR> (D4652 CNTRFGL CHG PUMP A BKR TRIP & L/O)</p>	
<u>TURNOVER</u>	
<p>Approximately 75% power with abnormal procedure OS1200.03, SEVERE WEATHER CONDITIONS, and OS1000.06, POWER DECREASE, in effect. The National Weather Service reports sustained 100 – 115 mph winds with 130 mph gusts from hurricane Madison. Madison is currently 5 hours away. Currently the winds are 10 – 15 mph out of the ESE (110° - 150°) with high tides running 2 – 3 feet above normal. OS1200.03 has been completed up through step 13, implementing step 14d with the shutdown in progress.</p>	

SCENARIO OUTLINE	
Provide the turnover sheet to the US. Allow the crew to walk-down the MCB.	The US should brief the crew on the status of the plant and actions taken in OS1200.03, SEVERE WEATHER CONDITIONS. The procedure has been completed up to step 13, implementing step 14d.
EVENT 1 (Normal – US) As directed by the Chief Examiner (CE), continue with Event 2.	The crew should continue with the plant shutdown per the turnover instructions using Figure 6, Rapid Power Decrease Guidelines of OS1000.06, POWER DECREASE. <ul style="list-style-type: none"> • US establishes a control band for RCS temperature control. • PSO determines the boration requirements • BOP determines an “unloading” schedule. • PSO and BOP coordinate load decrease.
EVENT 2 (Instrument – US) Insert malfunction MS044, MS LINE A STM FLO CHANNEL 1 FAILS LOW: IMF MS044<CR> Continue to Event 3, as directed by the CE, when the crew has completed OS1235.04.	The crew will respond using OS1235.04, SG FEED FLOW OR STEAM FLOW INSTRUMENT FAILURE. <ul style="list-style-type: none"> • BOP identifies affected SG. • BOP controls level manually to restore feed flow. • US directs BOP to maintain 50% - 70% narrow range level. • US directs BOP to select an alternate steam flow channel and return to automatic control. Crew determines that no SG pressure channel has failed and exits procedure. <ul style="list-style-type: none"> • US performs brief and informs SM of failure. • Crew contacts I&C for troubleshooting and repair.
EVENT 3 (Component – US) Simulate loss of PCCW pump CC-P-11B by Initiating Pending Events of Trigger E1 :	The crew will be alerted to loss of the PCCW pump by hardwired and MPCV VAS alarms.

<ul style="list-style-type: none"> • GO to Event Triggers • SELECT E1 • SELECT Initiate Pending Events <p><i>NOTE: The in-service TRN B PCCW pump, CC-P-11B, will trip on over-current. The standby feature of pump CC-P-11D will fail to automatically start the pump. As soon as the PSO starts the standby pump, Trigger E2 will execute.</i></p> <p>Continue to Event 4, as directed by the CE, when the crew has completed OS1212.01.</p>	<ul style="list-style-type: none"> • The PSO will report loss of CC-P-11B. • The PSO may recommend starting the standby pump prior to entry into the abnormal procedure. • The US may direct or authorize starting of the standby pump prior to entry into the abnormal procedure. <p>The crew will respond using OS1212. 01, PCCW SYSTEM MALFUNCTION.</p> <ul style="list-style-type: none"> • The US directs operator actions in OS1212.01. • The PSO starts the standby pump as directed. • US/PSO verify PCCW system alignment. • US/BOP verify SW aligned to PCCW. • US/PSO verify PCCW system integrity by checking head tank level stable. • US/PSO verify that Thermal Barrier System is intact. • US/PSO verify proper valve alignment. • US/PSO check for normal system operation, checking temperatures, containment structure cooling units and PCCW TS compliance. <p>The crew notifies SM and Tech Support to initiate trouble shooting of CC-P-11B.</p>
<p>EVENT 4 (Major – US)</p> <p>Initiate the major event by closing the MSIV on the B SG:</p> <p>IOR DIMSCS3006 CLOSE<CR> (B SG MSIV control switch)</p> <p><i>CUE: When the B SG MSIV is closed / nearly closed, insert malfunction MS030G at 0.9 (90%) severity.</i></p> <p>IMF MS030G 0.9 0 0<CR> (B SG Safety Valve Fails At Specified Pos)</p>	<p>The BOP, as directed by the US, responds to the closing MSIV by trying to reopen the valve. The crew may dispatch an NSO to the MSIV.</p> <p>When it is obvious that the valve cannot be reopened, or SG level begins to approach the trip setpoint the crew should manually trip the reactor and enter E-0, REACTOR TRIP OR SAFETY INJECTION.</p> <ul style="list-style-type: none"> • US directs operator actions. • PSO performs I/As. • BOP performs I/As.

CUE: When the reactor is tripped, manually or automatically, Initiate Pending Events of Trigger E3 to cause loss of CS-P-2A.

- GO to Event Triggers
- SELECT E3
- SELECT Initiate Pending Events

CUE: When the B SG wide range level decreases to $\leq 50\%$, insert malfunction SG003, SG B TUBE RUPTURE at 400 gpm severity.

IMF SG003 400 0 0<CR>

NOTE: The SGTR on SG B should cause steamline monitors to alarm prior to the crew proceeding past step 6 of E-2. If indications do not develop on the expected timeline, the crew may exit E-2 to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, until indications of the SGTR develop.

NOTE: At step 13 of E-3 the crew evaluates whether transition to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT – SUBCOOLED RECOVERY DESIRED, is appropriate. SG B pressure at this point should be ~ 300 psig. The transition criteria is ≤ 350 psig. If pressure is > 350 psig, they will continue with the cooldown and transition to ECA-3.1 at step 15.

If EFW is isolated from B SG when the crew gets to step 7, they should evaluate conditions and determine that EFW should NOT be restored to B SG.

At step 8 the crew must ensure that CC-P-11D is running to provide cooling to the TRN B loads. The TRN B CCP is the only HHI pump (CCT).

- PSO verifies that one PCCW pump is running in each loop.
- At step 15 RNO BOP opens the EFW mini-flow valves and throttles EFW, as directed by US, when SG level is adequate.

At step 18 the crew will exit E-0 and go to E-2, FAULTED STEAM GENERATOR ISOLATION.

- At step 3, BOP identifies SG B as faulted SG.
- US/BOP verify that the faulted SG is isolated.
- BOP closes MS-V394, as directed, to isolate SG B from the TD EFW pump.

The crew will exit E-2 at step 6 and go to E-3, STEAM GENERATOR TUBE RUPTURE when they determine that SG B steamline radiation is NOT normal.

The crew should transition to ECA-3.1 with SG pressure < 350 psig. If pressure is > 350 psig in E-3 at step 13, they will cooldown using ASDVs to the appropriate RCS temperature in step 14.

- As directed, the BOP opens the ASDVs for the intact SGs to cooldown at the maximum rate.
- BOP increases EFW flow to intact SGs to maintain inventory and aid cooldown.

At step 15 the B SG pressure will be < 250 psig above the intact SG pressures and the crew will transition to ECA-3.1.

At step 11 of ECA-3.1, the crew resumes / continues the RCS cooldown by dumping

	steam using the ASDVs while maintaining RCS cooldown rate < 100°F/hr.
<p>Terminate the examination, at the discretion of the CE, when the crew has entered ECA-3.1.</p>	<p>At step 17 the crew will determine which RCPs will be shutdown.</p> <ul style="list-style-type: none"> • As directed, PSO shuts down all but RCP C. <p>At step 18 the crew will recognize that only one CCP is running and they will proceed to step 19.</p> <p>At step 19 the crew must determine whether adequate subcooling and PZR level exists (with one RCP running) to remove SI pumps from service.</p> <ul style="list-style-type: none"> • US must use correct table to evaluate SI flow reduction criteria. • As directed, the PSO places SI pumps in standby. <p>When both SI pumps are in standby, the crew will continue to step 20.</p>
<p>CCT:</p> <p>1. MANUALLY start at least one PCCW pump for the available train, to provide adequate component cooling for the operating safeguards train before transition out of E-0.</p> <p>EAL CLASSIFICATION: ALERT 7b</p>	

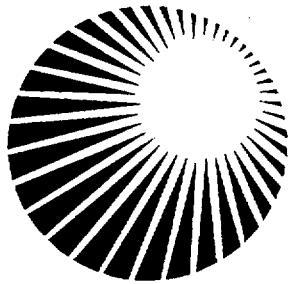
Facility: Seabrook	Scenario No. E Rev. 4	Op-Test No. 3
Examiners: David Silk Larry Briggs Todd Fish	Operators: US: U 1 / U 5 PSO: I 1 / I 2 BOP: U 3 / U 8	
Objectives: The crew will continue with a plant power increase from ~75% power. Shortly after assuming the watch, one main feed pump will trip causing a turbine setback. After stabilizing plant conditions the crew will have to respond to a pressurizer level channel failure that results in loss of letdown. After establishing excess letdown, catastrophic failure of the B RCP results in large break LOCA.		
Initial Conditions: ~ 75% power. RH-P-8A will be OOS. RH-P-8B will fail to start automatically on demand. Phase B containment isolation will not occur on either train until manually actuated by the crew.		
Turnover: The plant is at ~ 75% power. RH-P-8A is OOS for work on the pump motor bearing. AOT remaining for RH-P-8A is 82 hours. Continue with the power increase using OS1000.05, section 4.4		
Event No.	Mal. No.	Event Type*
Event Description		
1.		N (US)
The crew will continue with the power increase. At the Chief Examiner's (CE) discretion, continue with next event.		
2.	FW038	C (US) R (PSO)
Main feedwater pump FW-P-32A will trip. A main turbine setback to 55% power will be initiated.		
<ul style="list-style-type: none"> The crew will respond using OS1231.03, TURBINE RUNBACK/SETBACK. 		
3.	RC009	I (US) I (PSO) C (PSO)
Pressurizer (PZR) level channel RC-LT-459 will fail low causing the PZR heaters to trip and loss of letdown. When RC-LCV-459 closes, it will not re-open.		
<ul style="list-style-type: none"> The crew will respond using OS1201.07, PZR LEVEL INSTRUMENT FAILURE. The crew will establish excess letdown when the PSO reports that RC-LCV-459 will not open. 		
4.	RC028 RC024	M (US) M (PSO)
Catastrophic failure of the B RCP initiates the major event. An automatic reactor trip / safety injection is actuated. Containment pressure quickly exceeds the Containment Spray / Phase B Isolation setpoint (18 psig). Containment Spray is automatically actuated but Phase B isolation does not occur. RH-P-8B fails to start automatically.		

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

Event No.	Malf. No.	Event Type*	Event Description
			<ul style="list-style-type: none"> The crew will respond to the reactor trip / SI by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION. At step 7, of E-0, the crew should manually start RH-P-8B. At step 12 the crew will manually actuate at least one train of containment Phase B Isolation and trip the RCPs, if not already tripped due to loss of subcooling. At step 13 the crew MUST start at least one RH pump, unless already started (CCT). At step 20 the crew exits E-0. A RED path on the Integrity CSF and an ORANGE path on the containment CSF will exist. The crew will address the RED first going to FR-P.1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS. Based on procedure direction, the crew will exit FR-P.1 at step 1 RNO when RCS pressure is less than 260 psig. The crew will go to FR-Z.1, RESPONSE TO HIGH CONTAINMENT PRESSURE. The crew will process through FR-Z.1 and go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT.
			<ul style="list-style-type: none"> The crew will transition from E-1 to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, when the automatic swap-over occurs OR at 115,000 gallons in the RWST, which ever comes first.
			<ul style="list-style-type: none"> The crew will align the ECCS system to establish cold leg recirculation per ES-1.3 (CCT).
			EOP sequence; E-0 ⇒ FR-P.1 ⇒ FR-Z.1 ⇒ E-1 ⇒ ES-1.3 ⇒ E-1
			Terminate the exam (at CE discretion) after the crew has completed ES-1.3.

- CCTs
1. MANUALLY start at least one low-head ECCS pump (RH-P-8A or 8B) before transition out of E-0.
 2. TRANSFER to cold leg recirculation and establish at least one train of ECCS in operation in the recirculation mode.

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



North Atlantic

NRC LICENSE EXAMINATION

SIMULATOR DEMONSTRATIVE EXAMINATION

SCENARIO E

PREPARED BY:

INSTRUCTOR

DATE:

1/17/00

REVIEWED BY:

DATE:

SUBJECT MATTER EXPERT

(OPTIONAL)

APPROVED BY:

OPERATIONS TRAINING SUPERVISOR

DATE:

1/20/00

SIMULATOR DEMONSTRATIVE EXAMINATION

SCENARIO DESCRIPTION / OBJECTIVES:

The objective of this simulator examination is to assess individual operator performance as well as crew performance and communication skills.

The crew will continue with a plant power increase from ~75% power. Shortly after assuming the watch, one main feed pump will trip causing a turbine setback. After stabilizing plant conditions the crew will have to respond to a pressurizer level channel failure that results in loss of letdown. After establishing excess letdown, catastrophic failure of the B RCP results in a large break LOCA.

SIMULATOR DEMONSTRATIVE EXAMINATION

<u>SIMULATOR SETUP</u>	
<p>___ RESET the simulator to ~ 75% power, MOL.</p> <p>REMOVE RH-P-8A from service:</p> <p>___ Control Switch in PTL</p> <p>___ Hang Tag</p> <p>___ Press TRN A ECCS BYPASS/INOPERABLE STATUS pushbutton</p> <p>___ MRF RO017 RACKOUT<CR> (RH-P-8A BKR rack out)</p> <p>REMOVE RH-P-8B from service:</p> <p>___ MRF RO018 RACKOUT<CR> (RH-P-8B BKR rack out)</p> <p>___ IMF DRH018S<CR> (Suppresses D4959, RHR PUMP B BKR CLOSE INOP SIGNAL)</p> <p>___ IOR LORHCS24681[3] ON<CR> (RH-P-8B control switch GREEN lamp)</p> <p>Setup Trigger E1 to allow the operator to manually start RH-P-8B:</p> <ul style="list-style-type: none"> • SELECT RH-P-8B control switch. • SELECT Event Trigger Popup. • SELECT NA-STOP • SELECT .EQ., setpoint = 0, and assign to trigger E1. <p>___ ACCEPT</p> <p>Link the following to Trigger E1:</p> <ul style="list-style-type: none"> • SELECT TRIGS on the top status bar • SELECT Trigger E1 • SELECT Link Command to Trigger <p>___ Type: MRF RO018 RACKIN<CR></p> <p>Repeat the above sequence for the remaining two commands:</p> <p>___ Type: DOR LORHCS24681[3]<CR></p> <p>___ Type: DMF DRH018S<CR></p>	<p>RH-P-8A is OOS for work on seal cooler.</p> <p>When the operator manually starts the pump, the control switch will be moved out of the NA-STOP position to the START position. As soon as the switch is NOT in NA-STOP, the breaker will be racked in and the pump will start.</p>

SIMULATOR DEMONSTRATIVE EXAMINATION

Insert an I/O override that will prevent re-opening RC-LCV-459 during the PZR level channel failure abnormal procedure:

___ **IOR DIRCCS459 AUTO<CR>**

Setup Event Trigger **E12** to initiate RCP-1B failures that will lead to the major event:

- SELECT TRIGS on the top status bar
- SELECT Trigger **E12**
- SELECT Link Command to Trigger

___ Type: **MRF RO038 RACKOUT<CR>**
(RCP-1B breaker)

Repeat the above sequence for the remaining command:

___ Type: **IMF RC028<CR>**
(RCP-1B Shaft Shear)

Setup Event Trigger **E2** to present indications of RCP-1B failure:

- SELECT the RED control switch lamp for RCP-1B.
- SELECT Event Trigger Popup.
- SELECT .EQ., setpoint = 0, assign to Trigger **E2**.

___ **ACCEPT**

Link the following to Trigger **E2**:

- SELECT TRIGS on the top status bar
- SELECT Trigger **E2**
- SELECT Link Command to Trigger

___ Type: **MRF RO038 RACKIN<CR>**

Repeat the above sequence for the remaining command:

___ Type: **IMF DRC122<CR>**
(D4443 RCP B BKR TRIP & LOCK OUT)

The intent of Triggers **E12** and **E2** are to present indications of catastrophic failure of RCP-1B as the initiating event for LB LOCA. Racking the breaker out and back in will generate the control switch lamp indications consistent with the pump tripping.

SIMULATOR DEMONSTRATIVE EXAMINATION

<p>Insert I/O overrides that will prevent automatic initiation of Containment Phase B (P signal) Isolation on both ESF Trains:</p> <p>___ IOR DICBSCS2358 RESET<CR></p> <p>___ IOR DICBSCS2359 RESET<CR></p> <p>Setup Event Trigger E3 to allow the operator to manually initiate TRN B Containment Phase B Isolation:</p> <ul style="list-style-type: none"> • SELECT either one of the TRN B CBS/P/CVI Actuation switches on MCB BPF09. • SELECT Event Trigger Popup • SELECT ACTUATE • SELECT .EQ., setpoint=1, assign to Trigger E3 <p>___ ACCEPT<CR></p> <p>Link the following to Trigger E3:</p> <ul style="list-style-type: none"> • SELECT TRIGS on the top status bar • SELECT Trigger E3 • SELECT Link Command to Trigger <p>___ Type: DOR DICBSCS2359<CR></p>	<p>Defeats AUTO Phase B Isolation TRN A</p> <p>Defeats AUTO Phase B Isolation TRN A</p>
<p><u>TURNOVER</u></p>	
<p>The plant is at ~ 75% power. RH-P-8A is OOS for work on the pump motor bearing. AOT remaining for RH-P-8A is 82 hours. Continue with the power increase using OS1000.05, section 4.4.</p>	

SCENARIO OUTLINE	
<p>Provide the turnover sheet to the US. Allow the crew to walk-down the MCB.</p> <p>EVENT 1 (Normal – US)</p> <p>The crew should be allowed to increase power to satisfy the requirement for the US to get a Normal evolution. As soon as the Chief Examiner is satisfied that the Normal event has been observed, continue to Event 2.</p>	<p>The US should brief the crew on the status of the plant. The crew should continue with the power increase per the turnover instructions using OS1000.05, POWER INCREASE, step 4.4.</p> <ul style="list-style-type: none"> • US establishes a control band for RCS temperature control. • PSO determines the dilution requirements • BOP determines a loading schedule. • PSO and BOP coordinate load increase.
<p>EVENT 2 (Reactivity – PSO) (Component – US)</p> <p>Initiate a trip of main feed pump FW-P-32A: IMF FW038<CR> (A MFP Low Lube Oil Pressure Trip)</p> <p>Continue to Event 3, as directed by CE, when the crew has completed OS1231.03</p>	<p>A main turbine setback to 55% power will be initiated.</p> <ul style="list-style-type: none"> • The BOP should identify that MFP A has tripped <p>The crew will respond using OS1231.03, TURBINE RUNBACK/SETBACK.</p> <ul style="list-style-type: none"> • Crew diagnoses setback due to loss of MFP A. • US directs board operators to verify proper control system response: <ul style="list-style-type: none"> ⇒ Turbine load decreasing ⇒ Rod Control inserting rods ⇒ Steam Dumps open ⇒ SG level control • US directs PSO to perform boration / rapid boration as required by RIL status and AFD control. • Crew monitors RCS temperature and steam dump status. • Crew determines cause of setback to be loss of MFP. • US notifies chemistry, SM and Load Dispatch of transient. • Crew refers to TS for ACTIONS, contacts SM.

<p>EVENT 3 (Instrument – US & PSO) (Component – PSO)</p> <p>Initiate failure of the controlling channel of pressurizer level indication by inserting malfunction RC009, PZR LEVEL CHANNEL 1 FAILS LOW:</p> <p>IMF RC009<CR></p> <p><i>NOTE: The control switch for RC-LCV-459 is overridden to AUTO. When the PSO attempts to restore normal letdown the valve will not open. The crew will establish excess letdown.</i></p>	<p>Pressurizer (PZR) level channel RC-LT-459 will fail low causing the PZR heaters to trip and loss of letdown.</p> <ul style="list-style-type: none"> Based on indication and alarms, the PSO should diagnose the event as a PZR level channel failure. <p>The crew will respond using OS1201.07, PZR LEVEL INSTRUMENT FAILURE.</p> <ul style="list-style-type: none"> PSO responds to VAS alarms, checks MCB indication and determines that loss of letdown has been caused by the failed PZR level channel. PSO determines that the failed channel is the controlling channel. US directs the PSO to manually control PZR level at program. PSO reduces charging to minimize PZR level increase. US directs PSO to select an alternate channel for control and restore PZR heaters. US/PSO determine that charging flow and pressurizer level are adequate for restoration of normal letdown. <p>When the crew attempts to restore normal letdown, RC-LCV-459 will not open and the crew will establish excess letdown.</p> <ul style="list-style-type: none"> US directs establishing excess letdown. PSO performs manipulations to establish excess letdown. US directs an operator to remove letdown flow input to the calorimetric by deleting a MPCS point from scan. PSO aligns pressurizer level control for automatic operation. Crew verifies NO redundant bistables tripped. Crew refers to TS.
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<p>CUE: When I&C is directed to trip bistables perform the following:</p> <p>To indicate Cabinet CP-1 door opening insert D-Point D5628, PROTECTION CAB CP-1 DOOR OPEN:</p> <p>IMF DMM004<CR></p> <p><u>To trip bistable; RFI,BIS:</u></p> <p>BIS098 [RC-LB-459A] PZR LVL HI</p> <p>Delete DMM004, for closing CP-1 Door.</p> <p>DMF DMM004<CR></p> <p>Continue to Event 4, as directed by the CE, when the crew has completed OS1201.07.</p>	<ul style="list-style-type: none"> • US performs brief and coordinates with I&C to trip bistables. • US informs SM of failure.
<p>EVENT 4 (Major – US & PSO)</p> <p>Initiate the major event by executing Event Trigger E12:</p> <ul style="list-style-type: none"> • SELECT TRIGS on the top status bar • SELECT Trigger E12 • SELECT Initiate Pending Events <p>As soon as the reactor trips, insert malfunction RC024, RCS COLD LEG LOCA:</p> <p>IMF RC024<CR></p> <p>NOTE: IF the crew pursues restoration of RH-P-8A, report that the motor would require 5 hours (minimum) to return to service.</p>	<p>Catastrophic failure of the B RCP initiates the major event. An automatic reactor trip / safety injection is actuated. Containment pressure quickly exceeds the Containment Spray / Phase B Isolation setpoint (18 psig). Containment Spray is automatically actuated but Phase B isolation does not occur. RH-P-8B fails to start automatically. The crew will respond to the reactor trip / SI by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION.</p> <ul style="list-style-type: none"> • US directs operator actions. • PSO performs I/As. • BOP performs I/As. <p>At step 7, of E-0, the crew should manually start RH-P-8B.</p> <ul style="list-style-type: none"> • PSO starts RH-P-8B as directed. <p>At step 12 the crew will manually actuate at least one train of containment Phase B Isolation and trip the RCPs, if not already tripped due to loss of subcooling.</p> <ul style="list-style-type: none"> • PSO manually initiates Phase B

NOTE: When the crew transitions out of E-0 there should be a RED path on P (Integrity) due to the large SI flow and an ORANGE path on Z (Containment) due to the containment pressure.

The crew will transition out of FR-P.1 when they determine that RCS pressure is < 260 psig (no chance for PTS). The crew will go to FR-Z.1 and process through the procedure.

NOTE: Placing the H2 analyzer(s) in service requires manual valve line-up in the field. The TSC should be contacted to dispatch a team from the OSC.

Isolation (TRN B).

At step 13 the crew MUST start at least one RH pump, unless already started (CCT).

- PSO starts RH-P-8B as directed.

At step 20 the crew exits E-0 and goes to FR-P.1, RESPONSE TO IMMINENT PRESSURIZED THERMAL SHOCK CONDITIONS (RED path on P).

At step 1 of FR-P.1 the crew determines PTS is not a valid concern at the time.

- PSO reports that RCS pressure is < 260psig.
- PSO reports that RHR flow (for the running pump) is > 1000 gpm.

The crew exits FR-P.1 to procedure and step in effect. With an ORANGE path on Z, the procedure in effect is FR-Z.1, RESPONSE to HIGH CONTAINMENT PRESSURE.

The crew will proceed through FR-Z.1 to step 7. The crew should contact the TSC for placing the H2 analyzer(s) in service.

At step 10 of FR-Z.1 the crew will go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT.

- At step 3, as directed by US, BOP controls feed flow to SGs based on adverse containment restrictions.
- At step 10, as directed by US, PSO RESETS SI.
- At step 10, as directed by US, BOP, will stop the emergency diesels and reset for auto start.

At step 12 the crew should determine that even though RH-P-8A is not available, the plant is capable of establishing cold leg recirculation.

When automatic switchover to RWST occurs OR RWST level decreases to 115,000 gallons, the crew will go to ES-1.3, TRANSFER TO COLD LEG

<p>Terminate the exam (at CE discretion) after the crew has completed ES-1.3.</p> <p>NOTE: Restore MPCS points deleted from scan.</p>	<p>RECIRCULATION and realign systems as necessary (CCT).</p> <ul style="list-style-type: none"> • PSO will simultaneously CLOSE the RWST suction valves CBS-V2 and CBS-V5. • PSO will verify RH-P-8B control switch in NA-START. • PSO will close SI pump mini-flow valves SI-V89, SI-V-90 and SI-V93. • BOP will energize MCC-522 & 622. • PSO will close RH-V14. • PSO will open / verify open CS-V460, CS-V461 and CS-V475. • PSO will open RH-V35 and RH-V36. • PSO will start any pumps stopped due to the RWST empty alarm, as applicable. • PSO will close CBS-V47 and CBS-V51. • PSO will close CS-LCV-112 D & E. • US will direct NSO to de-energize CS-LCV-112D & E. • BOP will de-energize MCC-522 & 622. • US/PSO verify PCCW to CBS heat exchangers. • US/PSO verify PCCW to RHR heat exchangers. • The crew will return to E-1.
<p>CCTs:</p> <ol style="list-style-type: none"> 1. MANUALLY start at least one low-head ECCS pump (RH-P-8A or 8B) before transition out of E-0. 2. TRANSFER to cold leg recirculation and establish at least one train of ECCS in operation in the recirculation mode. <p>EAL CLASSIFICATION: SAE based on 15d or possibly P-RED depending on time in scenario.</p>	

Facility: Seabrook	Scenario No. G Rev. 3	Op-Test No. 2
Examiners: David Silk Larry Briggs Todd Fish	Operators: US: U 3 / U 7 PSO: U 1 / U 5 BOP: I 1 / I 2	
<p>Objectives: The crew will perform a Quarterly surveillance on the Feedwater Isolation Valves. While at 100% power, the crew will respond to a failure of the controlling pressurizer pressure channel and loss of the in-service centrifugal charging pump. The shaft will shear on main feed pump FW-P-32B. SG LO-LO level reactor trip demand will be actuated but the reactor will not trip. The crew will be forced to respond to a loss of feedwater induced Anticipated Transient Without Scram (ATWS).</p>		
<p>Initial Conditions: 100% power. The reactor will not trip automatically or manually. DG-1B breaker will not close on demand. The turbine driven (TD) EFW pump will trip due to overspeed when steam is supplied to the turbine. When the turbine generator breaker trips, a loss of Off-Site power will occur.</p>		
<p>Turnover: The plant is at 100% power. SI-P-6A is OOS for pump bearing inspection. Remaining AOT for SI-P-6A is 140 hours. The quarterly surveillance for the FWI valves needs to be completed ASAP. The ACTIVITY NUMBER is 1-FW-OT033.</p>		
Event No.	Mal. No.	Event Type*
1.		N (US)
		The BOP will be directed to perform the surveillance (no other operations support available). At the Chief Examiner's (CE) discretion continue to the next event. <i>This surveillance doesn't take long and can be abandoned without consequence to the scenario at any time.</i>
2.	RC031	I (US)
		<p>The controlling channel of pressurizer (PZR) pressure will drift low over 15 minutes from 2235 to 1600 psig. If the crew does not take action, a reactor trip demand will occur on high PZR pressure.</p> <ul style="list-style-type: none"> The PSO should be directed (or recommend) that the master pressure controller be controlled in manual to restore PZR pressure to the normal band. The crew will respond using OS1201.06, PZR PRESSURE INSTRUMENT PT-455/458 FAILURE.
3.	RO027	C (US)
		<p>An over-current trip of CS-P-2A will cause the crew to respond to loss of charging.</p> <ul style="list-style-type: none"> The crew will respond using OS1202.02, CHARGING SYSTEM FAILURE.
4.	FW007E	M (US)
		Main feed pump FW-P-32B shaft shear will initiate the major event. Feed flow will be drastically reduced but no setback occurs because the pump does not trip. SG levels decrease rapidly and a SG LO-LO level reactor trip demand occurs.

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

Event No.	Malf. No.	Event Type*	Event Description
4 cont'd	RPS002 RPS007 SY001 RC014	M (US)	<p>The reactor does not trip. The crew will respond by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION.</p> <ul style="list-style-type: none"> The PSO will attempt to manually trip the reactor. The reactor does not trip. The crew goes to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS. The PSO performs immediate actions of FR-S.1 (CCT). The BOP performs immediate actions of FR-S.1 (CCT). The crew continues with FR-S.1 steps
			<p><i>Thirty seconds after the main generator breaker opens loss of Off-Site power occurs and the B DG breaker does not close. No means of emergency boration will exist at that point. The motor driven EFW pump is not available because it is powered from bus E6 (B DG). The TDEFW pump trips on overspeed and will not be restored (broke).</i></p> <p><i>The SUFP will be a success path in FR-H.1</i></p>
			<p><i>The crew completes FR-S.1 and goes to the procedure and step in effect. Normally E-0, the crew will go straight to FR-H.1 due the RED path and E-0 having already been exited.</i></p>
			<ul style="list-style-type: none"> At step 1, of FR-H.1, the crew verifies heat sink required. At step 2 the crew will note that no CCP is available and go directly to step 10 (bleed and feed). The crew will perform steps 10 through 18, and at step 20 begins to "look" for feed sources to the SGs. The crew will establish the SUFP as a feed source using step 5 as a guideline and return to step 21 to continue with the procedure. At steps 24 and 25 the crew will close PORVs and exit to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, when subcooling is still less than required.*
			<ul style="list-style-type: none"> At step 12 of E-1 the crew goes to ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.*
			<p>Terminate the exam (at CE discretion) when the crew establishes feed flow.</p>
			<p>EOP sequence; E-0 ⇒ FR-S.1 ⇒ FR-H.1 ⇒ (E-1 ⇒ ES-1.2)*</p>

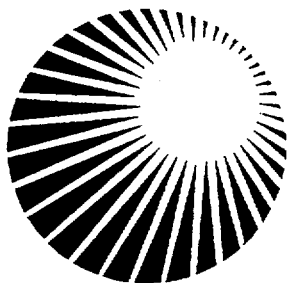
CCTs 1. INSERT negative reactivity into the core by at least one of the following methods in accordance with FR-S.1:

- Automatic and/or Manual insertion of the RCCAs.
- Establish Emergency Boration flow to the RCS.

2. ISOLATE the main turbine from the SGs before proceeding to step 5 of FR-S.1 on an ATWS initiated by a loss of feedwater.

* Dependent upon status of SGs when feed flow is established.

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



North Atlantic

NRC LICENSE EXAMINATION
SIMULATOR DEMONSTRATIVE EXAMINATION
SCENARIO G

PREPARED BY:

Steven Kessinger

INSTRUCTOR

DATE:

1/17/00

REVIEWED BY:

**SUBJECT MATTER EXPERT
(OPTIONAL)**

DATE:

APPROVED BY:

[Signature]

OPERATIONS TRAINING SUPERVISOR

DATE:

1/20/00

SIMULATOR DEMONSTRATIVE EXAMINATION

SCENARIO DESCRIPTION / OBJECTIVES:

The objective of this simulator examination is to assess individual operator performance as well as crew performance and communication skills.

The crew will perform a Quarterly surveillance on the Feedwater Isolation Valves. While at 100% power, the crew will respond to a failure of the controlling pressurizer pressure channel and loss of the in-service centrifugal charging pump. The shaft will shear on main feed pump FW-P-32B. SG LO-LO level reactor trip demand will be actuated but the reactor will not trip. The crew will be forced to respond to a loss of feedwater induced Anticipated Transient Without Scram (ATWS).

SIMULATOR DEMONSTRATIVE EXAMINATION

<u>SIMULATOR SETUP</u>	
<p>___ RESET the simulator to 100%, MOL.</p> <p>___ IMF RPS002<CR> (AUTOMATIC REACTOR TRIP FAILURE)</p> <p>___ IMF RPS007<CR> (MANUAL RX TRIP SWITCHES FAIL TO OPERATE)</p> <p>___ IMF DEDE333S<CR> (Suppresses DG-1B INOP alarm)</p> <p>Insert an I/O override to prevent the DG-1B breaker from closing:</p> <p>___ IOR DIEDECS97101 TRIP<CR></p> <p>Setup Event Trigger E1 to trip the TD EFW pump when MS-V395 begins to open:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file 395OPEN (LOMSCS3062-1 .EQ. 1) • SELECT: Assign Trigger File <p>___ Type: E1<CR></p> <p>Link the following to trigger E1:</p> <p>___ IMF MS015A (E1 5)<CR></p> <p>Setup Event Trigger E2 to fail open a pressurizer safety valve when the main turbine trips:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file MTTRIP (LOEHCUC3851-4 .EQ. 1) • SELECT: Assign Trigger File <p>___ Type: E2<CR></p> <p>Link the following to trigger E2:</p> <p>___ IMF RC014 (E2) 1.0 0 0<CR></p> <p>Setup Event Trigger E3 to initiate loss of Off-Site power 30 seconds after the TG Breaker opens:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file GENBKRTRIP (LOEDCS98761-3 .EQ. 1) • SELECT: Assign Trigger File <p>___ Type: E3<CR></p> <p>Link the following to trigger E3:</p> <p>___ IMF SY001 (E3 30)<CR></p>	

SIMULATOR DEMONSTRATIVE EXAMINATION

<p>Setup Event Trigger E4 to provide indication for CS-P-2A over-current trip:</p> <ul style="list-style-type: none"> • GO to Trigger Directory • SELECT: file CCPATRIP (LOCSCS74241-1 .EQ. 0) • SELECT: Assign Trigger File <p>___Type: E4<CR></p> <p>Link the following VAS alarm to trigger E4:</p> <p>___IMF DCS045 (E4)<CR> (D4652 CNTRFGL CHG PUMP A BKR TRIP & L/O)</p> <p>Link the following remote function to E4:</p> <ul style="list-style-type: none"> • SELECT TRIGS on the top status bar • SELECT Trigger E4 • SELECT Link Command to Trigger <p>___Type MRF RO027 RACKIN<CR> (Racks in CS-P-2A breaker)</p> <p>REMOVE SI-P-6B from service:</p> <p>___Control Switch in PTL</p> <p>___Hang Tag</p> <p>___Press TRN B ECCS BYPASS/INOPERABLE STATUS pushbutton</p> <p>___MRF RO020 RACKOUT<CR></p>	<p>Red Herring</p>
<p><u>TURNOVER</u></p>	
<p>The plant is at 100% power.</p> <p>SI-P-6B is OOS for pump bearing inspection.</p> <p>Remaining AOT for SI-P-6A is 140 hours.</p> <p>The quarterly surveillance for the FWI valves needs to be completed ASAP. The ACTIVITY NUMBER is 1-FW-OT033.</p>	

SCENARIO OUTLINE	
Provide the turnover sheet to the US. Allow the crew to walk-down the MCB.	The US should brief the crew on the status of the plant. The US will perform a pre-evolution briefing for the FWIV surveillance
<p>EVENT 1 (Normal – US)</p> <p><i>NOTE: This surveillance doesn't take long and can be abandoned without consequence to the scenario at any time.</i></p> <p>At the Chief Examiner's (CE) discretion continue to Event 2.</p>	<p>The crew performs the applicable portion of OX1436.07, Main Feedwater System Valve Quarterly, Cold Shutdown Operability Tests And 18 Month Position Verification:</p> <ul style="list-style-type: none"> • US directs BOP actions • BOP performs activity 1-FW-OT033
<p>EVENT 2 (Instrument – US)</p> <p>Insert malfunction RC031, PZR PRESSURE CHANNEL P455 FAILURE, to cause indicated pressure to drift from 2235 psig to 1600 psig over 15 minutes:</p> <p>IMF RC031 1600 900 2235<CR></p> <p><i>NOTE: If the crew does not take action, a reactor trip demand will occur on high PZR pressure.</i></p>	<p>Indications to the crew will include PZR pressure trending down on chart recorder and MPCS trends, pressurizer heaters cycling ON and hardwired annunciator alarms.</p> <ul style="list-style-type: none"> • PSO responds to VAS alarms, checks MCB indication and determines that a PZR pressure channel has failed. • The PSO should be directed (or recommend) that the master pressure controller be controlled in manual to restore PZR pressure to the normal band. <p>The crew will respond using OS1201.06, PZR PRESSURE INSTRUMENT PT-455/458 FAILURE.</p> <ul style="list-style-type: none"> • PSO determines that the failed channel is the controlling channel. • US directs the PSO to manually control PZR pressure at program. • PSO manually controls PZR pressure to re-establish normal pressure. • US directs PSO to select an alternate channel for control / backup and recorder as necessary. • US/PSO verify proper operation of the pressure control system. • US directs PSO to realign pressure control system for automatic operation. • US/PSO verify NO redundant bistables are tripped.

<p>EVENT 2 cont'd</p> <p>CUE: When directed as I&C, trip the following bistables:</p> <p>To indicate Cabinet CP-1 door opening insert D-Point; DVS, DMM: DMM004, D5628, PROTECTION CAB CP-1 DOOR OPEN.</p> <p>IMF DMM004 <CR></p> <p>To trip bistables: RFI.BIS:</p> <p>BIS094 [RC-PB-455A] HI PRESS TRIP BIS059 [RC-PB-455B] P-11 BIS088 [RC-PB-455C] LO PRESS TRIP BIS055 [RC-PB-455D] LO PRESS SI BIS013 [RC-TB-411C] OTAT TRIP</p> <p>Delete DMM004, for closing CP-1 Door.</p> <p>DMF DMM004<CR></p> <p>As directed by the CE, continue to EVENT 3.</p>	<p>The crew verifies TS compliance.</p> <ul style="list-style-type: none"> • The US conducts briefing with crew and I&C for bistable tripping: • US notifies SM of instrument failure.
<p>EVENT 3 (Component – US)</p> <p>Initiate loss of CS-P-2A (simulated OC trip):</p> <p>MRF RO027 RACKOUT<CR></p> <p>NOTE: Trigger E4 will rack in the breaker and insert MPCSD point alarm for CS-P-2A trip & L/O.</p> <p>CUE: IF contacted as Tech Support Engineer, recommend that CS-P-2A be placed in PTL until the pump can be examined.</p> <p>NOTE: IF the crew does not place the pump in PTL, it will start on demand. Prevent auto start as follows:</p> <p>I/O override the AMBER lamp ON I/O override the control switch to TRIP.</p> <p>As directed by the CE, continue to Event 4.</p>	<p>The crew will respond to the loss of charging using OS1202.02, CHARGING SYSTEM FAILURE.</p> <ul style="list-style-type: none"> • US directs operator actions • PSO reduces / isolates letdown flow as required. • PSO starts another (CS-P-2B) as directed by the US. • US/PSO checks RCP seal injection greater than 6 gpm per pump. • US/PSO check charging system intact. • PSO restores letdown as directed by US. • PSO restores normal pressurizer level control. • Crew verifies TS compliance. • US notifies SM of charging pump failure. • Crew notifies Tech Support Engineer.

EVENT 4 (Major – US)

Initiate the major event by inserting malfunction FW007E, MAIN FEED PUMP B SHAFT SHEAR:

IMF FW007E<CR>

NOTE: *Feed flow will be drastically reduced but no setback occurs because the pump does not trip. SG levels decrease rapidly and a SG LO-LO level reactor trip demand occurs. The reactor does not trip.*

NOTE: *(Trigger E2) As soon as the main turbine is tripped, one pressurizer safety will fail open.*

NOTE: *(Trigger E3) Thirty seconds after the main generator breaker opens loss of Off-Site power occurs and the B DG breaker does not close.*

- *No means of emergency boration will exist at that point.*
- *The motor driven EFW pump is not available because it is powered from bus E6 (B DG).*

NOTE: *(Trigger E1) Five seconds after MS-V395 starts to open, MS-V129 will trip on overspeed. The TD EFW will not be restored. NO EFW flow is available after loss of Off-Site power.*

CUE: *When directed as an NSO to trip the reactor, wait approximately 30 seconds and then delete malfunction RPS002:*

DMF RPS002<CR>

The crew will respond by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION.

- US directs operator actions
- The PSO will attempt to manually trip the reactor. The reactor does not trip.

The crew goes to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION / ATWS.

- The PSO performs immediate actions of FR-S.1 (CCT).
- The BOP performs immediate actions of FR-S.1 (CCT).

The crew continues with FR-S.1 steps:

The BOP will report that the TD EFW has tripped when the crew checks EFW at step 3.

- US / BOP directs NSO to re-establish TD EFW per step 3 RNO.
- PSO aligns and starts components for emergency boration to the extent possible with loss of power.
- US/Crew dispatches NSO to trip the reactor locally.

At step 7 of FR-S.1, as directed by the US, the BOP may initiate actions to establish feed flow using the SUFP from bus 5.

NOTE: At step 1 of FR-H.1, RCS pressure should be ~1400 psig and hot leg temperatures ~620 °F. Heat Sink is required.

NOTE: Depending on the timing of feed restoration, the SG wide range levels may decrease below the HOT DRY (adverse CNTMT) level setpoint of 30%. This will significantly increase the time to transition out of FR-H.1

CUE: When directed to transfer the SUFP power from Bus 4 to Bus E5 perform the following:

Ensure that the MCB switches are in PTL

Rack out the Bus 4 breaker:

MRF RO047 RACKOUT<CR>

Switch control power to bus E5:

MRF FW042 BUS-E5<CR>

Rack in the Bus E5 breaker:

MRF RO161 RACKIN<CR>

At the discretion of the CE, terminate the exam after the crew has established feed flow.

At step 14 the crew will verify the reactor is subcritical and go to procedure and step in effect. Based on RED path on HEAT SINK, the crew should go directly to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, step 1.

At step 1, of FR-H.1, the crew verifies heat sink required.

At step 2 the crew will note that no CCP is available and go directly to step 10 (bleed and feed).

At step 11 the crew initiates SI (only TRN A emergency bus has power).

- At step 13 PSO opens BOTH PZR PORVs as directed by US.
- At step 20 the crew begins to "look" for feed sources to the SGs.

The crew will establish the SUFP as a feed source using step 5 as a guideline and return to step 21 to continue with the procedure.

- As directed by the US, the BOP will coordinate switching of the SUFP to bus E5.
- The BOP must reset TRN A RMO prior to placing the Bus 5 control switch in AUTO to make the SUFP available.

Dependent the status of the SGs (Hot Dry or not) the crew will establish feed flow.

- At steps 24 and 25 the crew will close PORVs and exit to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, when subcooling is still less than required due to open safety.
- At step 12 of E-1 the crew transitions to ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.

CCTs:

1. INSERT negative reactivity into the core by at least one of the following methods in accordance with FR-S.1:
 - Automatic and/or Manual insertion of the RCCAs.
 - Establish Emergency Boration flow to the RCS.
2. ISOLATE the main turbine from the SGs before proceeding to step 5 of FR-S.1 on an ATWS initiated by a loss of feedwater.

EAL CLASSIFICATION: SAE based on H-red (with Hot Dry SG criteria); ALERT based on Heat Sink restored on 15c OR C yellow with Z yellow.

Backup

Facility: Seabrook	Scenario No.	F Rev. 1	Op-Test No.
Examiners:	David Silk Larry Briggs Todd Fish	Operators:	US: PSO: BOP:
<p>Objectives: The crew will continue a plant power increase from ~ 55% power toward 100%. During the power increase the crew will respond to a misaligned rod and a failed SG level channel. Loss of a vital instrument panel (combined with an RCS WR temperature instrument being OOS) will cause both pressurizer PORVs to open. One PORV will stick open and the block valve will become jammed as it is closing, forcing the crew to respond to a small break LOCA. Due to loss of the vital instrument panel TRN B SI will not be actuated. The operators will be required to manually start TRN B components until the vital instrument panel is restored.</p>			
<p>Initial Conditions: ~ 55% power. RCS loop 2 WR T_h is OOS and failed low. The MSIVs will fail to close on a Main Steam Isolation signal (if generated). The main turbine will fail to automatically trip. Control rod (RCCA) H-8 (CBD) will not move on demand.</p>			
<p>Turnover: Power increase in progress at ~ 55% power. RCS loop 2 WR T_h is OOS. Remaining AOT on RC-TI-423A is 36 hours. SI-P-6A is OOS for pump bearing inspection. Remaining AOT for SI-P-6A is 140 hours. Continue power increase using OS1000.05, POWER INCREASE, section 4.3.</p>			
Event No.	Malf. No.	Event Type*	Event Description
1.	CP012	N (US)	The crew will continue with the power increase. Allow the crew to proceed with the power increase, at least to the point of seeing noticeable effects of boron dilution. At the Chief Examiner's (CE) discretion, continue with next event.
2.	FW045	I (US)	<p>The D SG controlling NR level channel fails low. Feed flow to the D SG is increased and operator action is required to reduce feed flow to prevent a plant trip.</p> <ul style="list-style-type: none"> The crew will respond using OS1235.03, SG LEVEL INSTRUMENT FAILURE.
3.	CP012	C (US)	<p>By the time the crew is responding / has responded to the failed SG level channel, the bank D control rods should have been moved enough to reveal the rod that is not moving. Deviation alarms will alert the crew to the misaligned rod if the crew does not notice deviation on the DRPI display.</p> <ul style="list-style-type: none"> The crew will respond to the misaligned rod using OS1210.06, MISALIGNED CONTROL ROD. The crew must ensure that the cause of the deviation has been determined and corrected prior to attempting rod realignment.

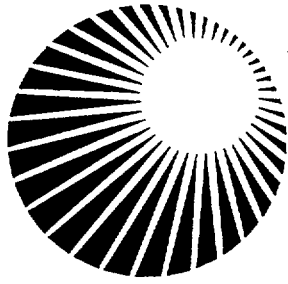
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Event No.	Malf. No.	Event Type*	Event Description
4.	ED042	M (US)	<p>Loss of vital instrument panel 1-EDE-PP-1B combined with the Loop 2 WR T_h failed low will cause both pressurizer PORVs to open. RCS pressure will decrease rapidly and a reactor trip / safety injection occurs. The B PORV will stick full open. The block valve for the B PORV, if closed by the operator, will jam partially open and the breaker will trip (indication is not lost). PP-1B supplies power to TRN B SSPS. When SI is actuated, TRN B will not actuate automatically OR manually. TRN B components will have to be individually started / positioned by the crew.</p>
			<ul style="list-style-type: none"> The crew will respond to the reactor trip / safety injection by performing the immediate actions of E-0, REACTOR TRIP OR SAFETY INJECTION. The BOP must manually trip the turbine (CCT). After the immediate actions the PSO may recommend that the PORVs be closed. <p>When the B PORV does not close and subcooling is < 40°F, the RCPs should be stopped.</p> <ul style="list-style-type: none"> At step 7, of E-0, the crew should manually start SI-P-6B. At step 13 the crew MUST start at least one SI pump, unless already started (CCT). At step 16 the crew should attempt to close any open PORV, unless already performed and then go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, when the B PORV will not close.
	DMF ED042		<p><i>IF the crew has dispatched an operator to place PP-1B on the maintenance supply, the panel may be re-energize when the crew transitions to E-1.</i></p>
			<p><i>At step 6 of E-1 all criteria should be satisfied to allow the crew to go to ES-1.1, SI TERMINATION.</i></p> <p><i>At step 2 of ES-1.1, when one CCP is stopped, RCS pressure begins to decrease rapidly. The crew should go to ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION.</i></p>
			<p>Summarizing the expected out come in ES-1.2; the crew will begin a cooldown and proceed to step 12. At step 12 the crew will use the RNO to go to step 22 because subcooling is still less than 40°F. The crew will be looped back to step 5 from step 32. On the second pass through ES-1.2 the crew will be able to restart one RCP and begin flow reduction. The crew will not be able to stop the only SI pump because subcooling will be too low. They will be directed to step 22 and start the loop over again.</p>
			EOP sequence; E-0 ⇒ E-1 ⇒ ES-1.1 ⇒ ES-1.2
			Terminate the exam (at CE discretion) when the crew has completed the second loop back to step 5.

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

- CCTs
1. MANUALLY trip the main turbine before a severe challenge develops to either the subcriticality or the integrity CSF or before transition to ECA-2.1, whichever happens first.
 2. ESTABLISH flow from at least one intermediate head ECCS pump (SI-P-6A or 6B) before transition out of E-0.

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



North Atlantic

NRC LICENSE EXAMINATION
SIMULATOR DEMONSTRATIVE EXAMINATION
SCENARIO F

PREPARED BY:

INSTRUCTOR

DATE:

1/17/00

REVIEWED BY:

**SUBJECT MATTER EXPERT
(OPTIONAL)**

DATE:

APPROVED BY:

OPERATIONS TRAINING SUPERVISOR

DATE:

1/26/00

SIMULATOR DEMONSTRATIVE EXAMINATION

SCENARIO DESCRIPTION / OBJECTIVES:

The objective of this simulator examination is to assess individual operator performance as well as crew performance and communication skills.

The crew will continue a plant power increase from ~ 55% power toward 100%. During the power increase the crew will respond to a misaligned rod and a failed SG level channel. Loss of a vital instrument panel (combined with an RCS WR temperature instrument being OOS) will cause both pressurizer PORVs to open. One PORV will stick open and the block valve will become jammed as it is closing, forcing the crew to respond to a small break LOCA. Due to loss of the vital instrument panel TRN B SI will not be actuated. The operators will be required to manually start TRN B components until the vital instrument panel is restored.