North Anna Draft Sim Scenarios

Appendix D Scenario Outline Form ES-D-1 (R8, S1)

Facility: North Anna Scenario No.: NRC 1 Op-Test No.: 1A

Examiners: _____ Operators: _____

Initial Conditions: EOL. 100% reactor power. A confirmed 10 gpd tube leak exists in A S/G. 1H EDG is OOS for Maintenance.

Turnover: There are thunderstorms in the area.

POD: Maintain 100% power. Monitor A S/G leakage. Return 1H EDG to service as soon as possible.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (B)	Swap condensate pumps.
2	RC0801	I (R) (N)	Pressurizer level LT-459 spikes low (this should isolate letdown.) (restore letdown) (T/S for SRO)
3	FW1201	I (B)	"A" S/G selected feed flow transmitter fails low. (T/S for SRO)
4	CH1602	C (R)	1-CH-P-1B trips (bearing trouble). No auto-start of remaining charging pumps.
5	RC0703	I (A)	PT-455 fails high, RCS leak (small steam space break)
6	N/A	R (A)	Ramp down due to exceeding RCS T/S leakage.
7	TU1101	C (B)	EH pump trips, standby pump fails to auto start.
8	RC48	M (A)	SBLOCA (Steam space break) 200 gpm.
9	EL01	C (A)	LOOP

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

Facility: North Anna Scenario No.: NRC 2 Op-Test No.: 1A

Examiners: _____ Operators: _____

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Initial Conditions: EOL. 12% Rx power, main turbine startup in progress. 10 gpd tube leakage in "A" S/G. 1H EDG is OOS for maintenance.

Turnover: There are thunderstorms in the area.

POD: Sync main generator to grid; raise reactor power to 30% and hold for chemistry. Monitor "A" S/G leakage. Return 1H EDG to service as soon as possible.

Event No.	Malf. No.	Event Type*	Event Description
0a	N/A	C (All)	Failure of BIT isolation valves to open.
0b	SI0701 SI1303	C (All)	Failure of a single train SI/phase A, equipment will function manually.
0c	N/A	C (All)	Failure of benchboard 1 reactor trip switch.
1	N/A	N (BOP)	Sync main generator to grid, begin ramp to 30%.
2	MS16	I (RO)	PT-464 fails high.
3	N/A	R (RO)	Continue ramp to 30%.
4	BC0501	C (BOP)	Running bearing cooling pump trips, standby pump fails to auto-start.
5	CH18	I (RO)	PCV-1145 fails closed, causing letdown high pressure.
6	FW0109	I (BOP)	"C" SG level channel III fails high resulting in the "C" FRV going full closed.
7	RC0701	I (All)	PT-1444 fails high, PORV sticks open, block valve won't close.
8	RC2403	M (All)	SGTR on "C" SG.

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

Facility: North Anna Scenario No.: NRC 3 Op-Test No.: 1A

Examiners: _____ Operators: _____

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Initial Conditions: MOL. 100% reactor power. A confirmed 10 gpd tube leak exists in "A" S/G. 1H EDG is OOS for Maintenance. PT-457 has failed, and is in test with maintenance working.

Turnover: There are thunderstorms in the area.

POD: Maintain 100% power. Monitor A S/G leakage. Return 1H EDG to service as soon as possible. Support maintenance by starting 1-CH-P-1B.

Event No.	Malf. No.	Event Type*	Event Description
0	N/A	C (All)	Failure of normal charging valve to reopen after SI. (1289B breaker trips when valve is taken to open)
1	CV01	C (BOP)	Containment air in-leakage
2	N/A	N (RO)	Swap charging pumps.
3	CH1202	I (RO)	VCT level transmitter 115 fails high.
4	MS0201	I (BOP/RO)	PT-446 fails low.
5	MS1401	C (RO/BOP)	Small steam leak to occur on "A" S/G safety valve, enough to cause reactor power to rise, and a ramp-down to be required.
6	N/A	R (RO)	Ramp unit down for small steam leak.
7	EL1301	I (All)	Loss of 1-I vital bus.
8	N/A	M (All)	Inadvertent SI due to loss of vital bus and PT-457 being in trip. (normal charging valve 1289B fails to open from MCR)

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

Facility: North Anna Scenario No.: NRC 4 Op-Test No.: 1A

Examiners: _____ Operators: _____

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Initial Conditions: EOL. 50% reactor power, in the process of shutting down for refueling. A confirmed 10 gpd tube leak exists in "A" S/G. 1H EDG is OOS for maintenance.

Turnover: There are thunderstorms in the area.

POD: Shutdown a MFW pump, then continue with the unit shutdown. Monitor A S/G leakage. Return 1H EDG to service as soon as possible.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N (BOP)	Shutdown the second MFW pump.
2	N/A	R (RO)	Continue with the unit shutdown.
3	MS0103	I (BOP)	"B" SG selected steam flow channel fails low.
4	N/A	I (BOP)	"B" SG PORV fails open due to a failure of its pressure transmitter.
5	CH1601 CH1201	C (RO)	"A" charging pump trips and discharge check valve fails to close.
6	RC4601	C (RO)	PRZR spray valve PCV-1455A fails open (able to manually close).
7	RC04	M (All)	When PRZR spray flow was initiated the spray line broke, which caused a PRZR steam space LOCA, requiring a reactor trip and safety injection.
8	RD32 RD38	M (All)	The reactor will not trip automatically or manually and the crew will respond to the ATWS.

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

Scenario Outline

Facility: North Anna Scenario No.: 5

Examiners: _____ Applicants:

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Objectives: To evaluate the applicants' ability to reduce reactor power; to implement AP's, AR's and Tech Specs in response to instrument failures, a loss of Service Water and a loss of emergency bus; to respond to a loss of coolant outside containment (ECA-1.2) with concurrent component malfunctions and subsequent Safety Injection termination (E-1 and ES-1.1).
Initial Conditions: 100% power, BOL. The unit has just returned to full power following a load reduction for seal repairs on B MFW pump. C MFW pump, which had been tagged for coupling repairs, was returned to service while the unit was at reduced power.
Turnover: 1H EDG was tagged-out two hours ago for maintenance. The system operator has reported thunderstorms in the area. There is a 10 gpd tube leak in "A" S/G. Shift orders are to place unit 1 service water pumps in service and secure unit 2 service water pumps in preparation for maintenance on 2-SW-P-1B. When requested, reduce power as determined by Engineering in preparation for removing the C waterbox from service for tube plugging.

Event No.	Malf. No.	Event Type*	Event Description
1		N:BOP/SRO	Shift SW pumps
2		C:ALL	Loss of H emergency bus
3		R:RO	Reduce reactor power (at least 5%)
4		I:RO/SRO	PT-145 fails low, PCV-145 closes fully
5		C:BOP/SRO	1-SW-P-1B trips, loss of B SW header flow
6		I:BOP/SRO	B SG steam flow channel fails high
7		M:ALL	Loss of coolant outside containment
8		C:ALL	Failure of Train B SI to actuate manually or automatically

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

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 1 DOCUMENT REVISION RECORD		
REV	**TIR NUMBER**	**REASON**
0	N02-0293	Develop scenario for NRC initial licensed operator exams, 2002

DOMINION

NORTH ANNA POWER STATION

INITIAL LICENSE CLASS

NRC SIMULATOR EXAMINATION

SCENARIO NRC 1

NRC SIMULATOR EXAMINATION SCENARIO

EVENT	DESCRIPTION
1.	Swap condensate pumps
2.	PRZR LT-1459 failure
3.	"A" SG selected feed flow channel failure
4.	"B" charging pump trip w/no auto start of "A"
5.	PT-1455 fails low, RCS leak (steam space)
6.	Ramp down due to exceeding RCS T/S leakage
7.	EHC pump trips, standby pump fails to start
8.	SBLOCA (steam space – 200 gpm)
9.	LOOP

Scenario Recapitulation:

Malfunctions after EOP entry	**1** (LOOP)
Total Malfunctions	**7** (PRZR LT-1459 fails low, "A" SG feed flow channel failure, "B" charging pump trip w/no auto start of "A", PT-1455 fails high, RCS leak, EHC pump trips and standby pump fails to start, SBLOCA, LOOP)
Abnormal Events	**5** (PRZR LT-1459 fails low, "A" SG feed flow channel failure, "B" charging pump trip w/no auto start of "A", PT-1455 fails low, RCS leak, EHC pump trips and standby pump fails to start)
Major Transients	**2** (SBLOCA, LOOP)
EOPs Entered	**2** (1-E-0, 1-E-1)
EOP Contingencies	**0**
Critical Tasks	**1** (Start a HHSI pump)

SCENARIO DURATION

120 Minutes

SIMULATOR EXAMINATION SCENARIO SUMMARY
SCENARIO NRC 1

The scenario will begin with unit 1 at 100% power with a confirmed 10 gpd tube leak in "A" SG and 1H diesel tagged for maintenance. Shift orders are to monitor "A" SG leakage and return 1H diesel to service when maintenance is complete.

The first event will be a normal evolution. The crew will get a request from predictive analysis to swap the condensate pumps due to higher than normal vibrations on "C". The crew will swap condensate pumps in accordance with 1-OP-30.1, "Operation of Condensate System." The next event will occur when the pump swap is complete.

Pressurizer level channel 459 will fail low. The crew will identify the failure and enter 1-AP-3, "Loss of Vital Instrumentation." to take control of pressurizer level, select operable level channels, and restore letdown. Crew will then return control to auto and reset the pressurizer control heaters. After the crew has identified the appropriate MOP for placing the channel in TRIP, the next event will occur.

The selected feedwater flow transmitter for "A" steam generator will fail low, causing the "A" main feed regulating valve to go full open. The crew will enter 1-AP-3, "Loss of Vital Instrumentation," and the BOP will take manual control of the FRV and control level prior to reaching the high level permissive. The crew will swap to an operable channel and return SG level control to automatic. After technical specifications have been reviewed and the crew has identified the appropriate MOP for placing the channel in TRIP, the next event will occur.

The "B" charging pump will trip and the "A" charging pump will not auto-start. The crew will respond in accordance with the annunciator response for CH PP 1B 15J6 LOCKOUT and manually start a charging pump. (Crew may enter 1-AP-49 and perform applicable actions.) The SRO will declare the "A" and "B" charging pumps inoperable per technical specifications. The next event will occur once technical specifications have been reviewed.

Pressurizer pressure transmitter PT-455 will fail low and a small pressurizer vapor space leak will start. The crew will enter 1-AP- 3 for the failed channel and 1-AP-16 for excessive RCS leakage, and take actions to ramp the unit offline.

During the ramp the running EHC pump will trip and the standby pump will fail to auto-start. The BOP will be required to manually start the standby pump, or the turbine will trip. If the pump is successfully started maintenance will be requested to investigate the trip of the running EHC pump. If the unit trips the next event will occur as the crew enters 1-E-0.

The RCS leak will ramp to 200 gpm and will require the crew to trip and safety inject. The next event will occur when the crew transitions out of 1-E-0.

The plant will experience a loss of offsite power that will require entry into AP-10. Since 1H diesel is tagged out all "H" bus equipment will be lost. The crew will initiate the procedure for energizing the 1H bus from the SBO diesel. The scenario can be terminated when the team enters 1-ES-1.2, or when the lead examiner is satisfied.

SCENARIO TURNOVER SHEET

Read the following to the crew:

Purpose: This examination is intended to evaluate the crew's performance of various tasks associated with the Licensed Operator Training Program. All activities should be completed in accordance with approved operations standards.

1. You are on a day shift during the week.

2. When conditions allow, utilize the computer log systems as you would in the plant.

Unit Status:
Unit 1 is at 100% power. There is a confirmed 10 gpd tube leak in "A" SG. All applicable actions of 1-AP-5 have been completed. RCS boron concentration is 52 ppm and core age is 17,000 MWD/MTU. The deborating IXs have not yet been placed in service. Both IXs are loaded with fresh resin and available for use. The amount of RCS dilution required to raise temperature one degree is 5,478 gallons and the boration required to lower temperature one degree is 18 gallons. Aux steam is on unit 1. The maintenance rule window is green for all planned maintenance.

Unit 2 is at 100% power.

The system operator has reported thunderstorms in the area.

Equipment Status:
1H diesel is tagged for maintenance.

Shift Orders:
Monitor "A" SG tube leakage. Return 1H diesel to service when maintenance is complete. Predictive analysis is monitoring vibrations on "C" condensate pump and may request a pump swap.

EVENT 1: Given that the unit is at power and predictive analysis reports high vibrations on a running main condensate pump, the crew will swap pumps in accordance with 1-OP-30.1, "Operation of Condensate System."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: Predictive analysis contacts control room concerning higher than usual vibrations on the "C" main condensate pump. They request that "B" pump be started and "C" stopped.	
	US requests BOP to obtain 1-OP-30.1 for swapping condensate pumps.	
	BOP directs watchstander to verify 1-CN-P-1B is ready to start.	
	BOP directs watchstander to throttle 1-CN-P-1B discharge valve.	
	BOP starts 1-CN-P-1B.	
	BOP directs watchstander to open 1-CN-P-1B discharge valve.	
	BOP directs watchstander to close the 1-CN-P-1B discharge vent.	
	BOP directs watchstander to throttle 1-CN-P-1C discharge valve.	
	BOP secures 1-CN-P-1C.	
	BOP directs watchstander to open 1-CN-P-1C discharge vent.	
	NOTE: The next event may occur once condensate pumps are swapped, or at the discretion of the lead evaluator.	

EVENT 2: Given that the unit is at power and a PRZR level channel has failed low, the crew will be expected to respond IAW 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies annunciators B-F8, "PZR LO LEVEL," B-G7, "PZR LO LVL HTRS OFF-LETDOWN ISOL," and B-H7, "PZR CONTROL GROUP HTRS OL TRIP."	
	RO identifies PRZR level channel 459 failing low.	
	US directs crew to enter 1-AP-3.	
	RO verifies redundant channels normal.	
	BOP verifies SG level parameters normal.	
	BOP verifies turbine first stage pressure indication normal.	
	RO verifies operable PRZR level channels selected (NO.)	
	Crew takes manual control of PRZR level. • **RO places charging flow control in MANUAL and minimizes charging flow.** • **RO selects PRZR level channels 460/461 for control.**	
	Crew restores letdown. • **RO adjusts charging flow to at least 25 gpm.** • **BOP verifies TV-1204A and 1204B open.** • **RO opens LCV-1460A and 1460B.** • **RO manually opens PCV-1145.** • **RO opens HCV-1200B.** • **RO adjusts PCV-1145 to obtain 300 psig and returns to AUTO.**	
	RO verifies PRZR control group heaters not tripped (NO.)	
	RO resets PRZR control group heaters.	
	BOP verifies both turbine first stage pressure channels normal.	
	BOP verifies operable channels selected for SGWLC.	

EVENT 2: Given that the unit is at power and a PRZR level channel has failed low, the crew will be expected to respond IAW 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew refers to 1-MOP-55.72 for placing the failed channel in trip.	
	US refers to ITS-3.3.1 and determines that the channel must be placed in trip within 72 hours.	
	NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.	

EVENT 3: Given that the unit is at power and the controlling SG feed flow channel has failed low, the crew will be expected to respond IAW 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies "A" SG feedwater flow channel III failing low.	
	US directs crew to enter 1-AP-3.	
	RO verifies redundant channels normal.	
	BOP identifies "A" SG feedwater flow channel III has failed low.	
	Crew manually controls steam generator level. • **BOP places "A" MFRV in MANUAL.** • **BOP restores level in "A" SG to normal.**	
	RO verifies first stage pressure indications normal.	
	RO verifies systems affected by PRZR level channels normal.	
	RO verifies both first stage pressure channels normal.	
	RO verifies all SGWLC channels selected to an operable channel (NO)	
	RO swaps SGWLC channels to channel IV.	
	BOP verifies SG levels on program and returns FRVs to automatic.	
	BOP verifies that "A" SG feedwater flow channel III is the only failed channel.	
	US directs crew to enter 1-MOP-55.78.	
	US refers to ITS-3.3.1 and determines that the channel must be placed in TRIP within 72 hours.	
	NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.	

EVENT 4: Given that the unit is at power and the running charging pump has tripped with no auto start of another pump, the crew will start a charging pump in accordance with annunciator response for C-A6 "CH PP 1B 15J6 LOCKOUT," or 1-AP-49, "Loss of Normal Charging."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: The following actions pertain to annunciator response procedure C-A6.	
	RO identifies annunciators C-B5 " CH PP TO REGEN HX LO PRESS", C-A6 "CH PP 1B 15J6 LOCKOUT", C-G6 "RCP 1A-B-C LABYTH SEAL LO FLOW"	
	RO recognizes that there are no running charging pumps.	
	Crew reviews annunciator responses.	
	US directs RO to start either "A" or "C" charging pump.	
	Crew restores charging flow. • RO starts either "A" or "C" charging pump.	**CRITICAL TASK: Manually start a charging pump.**
	RO restores letdown as directed by the US.	
	US reviews ITS-3.5.2 and declares "A" and "B" charging pumps inoperable.	
	NOTE: If an operator is sent to check the "B" pump breaker he/she will report the breaker tripped on overcurrent.	
	US requests maintenance investigate trip of "B"CHP and auto-start failure of "A" CHP.	
	NOTE: The following actions pertain to 1-AP-49, which the crew may choose to enter.	
	US directs crew to enter 1-AP-49.	
	Crew checks charging pumps for gas binding.	
	Crew identifies that a charging pump manipulation has not taken place.	
	RO identifies letdown automatically isolated.	

EVENT 4: Given that the unit is at power and the running charging pump has tripped with no auto start of another pump, the crew will start a charging pump in accordance with annunciator response for C-A6 "CH PP 1B 15J6 LOCKOUT," or 1-AP-49, "Loss of Normal Charging."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO verifies VCT level greater than 12%.	
	RO verifies charging pump suction MOVs from VCT open.	
	RO verifies VCT pressure greater than 15 psig.	
	RO verifies charging pump discharge flow path.	
	RO verifies charging parameters normal. (NO)	
	Crew checks for piping rupture. (NO)	
	RO verifies running charging pump normal. (NO)	
	US directs RO to start either "A" or "C" charging pump.	
	NOTE: Crew may have previously started a charging pump IAW the annunciator response procedure.	
	Crew restores charging flow. • RO starts either "A" or "C" charging pump.	**CRITICAL TASK: Manually start a charging pump.**
	RO aligns RCS makeup via normal charging.	
	RO verifies seal injection flow.	
	Crew determines letdown should be placed in service.	
	RO restores letdown as directed by the US.	
	RO verifies charging parameters normal.	
	NOTE: If crew started "C" charging pump, then the "C" pump is operable per ITS and 72-hour action applies.	
	US reviews ITS-3.5.2 and declares "A" and "B" charging pumps inoperable.	
	NOTE: The next event will commence after the US reviews Tech Specs, or at the direction of the lead evaluator.	

EVENT 5: Given that the unit is at power and PT-1455 fails high, causing an RCS leak, the crew will respond in accordance with 1-AP-3, "Loss of Vital Instrumentation" and 1-AP-16, "Increasing Primary Plant Leakage."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: The following actions are from 1-AP-3. Once the RCS leak is identified the crew may continue performance of this procedure in conjunction with 1-AP-16.	
	RO identifies various annunciators associated with the instrumentation failure.	
	RO identifies PRZR PT-1455 has failed high and notifies the US.	
	US directs crew to enter 1-AP-3.	
	RO verifies redundant channels normal.	
	BOP verifies SG level control parameters normal.	
	BOP verifies 1st stage pressure indications normal.	
	RO verifies systems affected by PRZR level channels normal.	
	BOP verifies both turbine first stage pressure channels normal.	
	BOP verifies operable channels selected for all SGWLC instruments.	
	Crew identifies 1-MOP-55.73 for PRZR pressure channel failures.	
	US directs crew to verify P-11 permissive status per 1-MOP-55.73 within one hour.	
	US/STA consults ITS-3.3.1 and 3.3.2, and enters action on failed channel to place in trip within 72 hours.	
	NOTE: The following actions concern the RCS leak.	
	Crew identifies that charging flow has increased and/or containment sump pumping frequency has increased.	
	US directs entry into 1-AP-16.	
	Crew verifies that the unit is in mode 1.	
	RO verifies that PRZR level, RCS subcooling, and VCT level are under control.	

EVENT 5: Given that the unit is at power and PT-1455 fails high, causing an RCS leak, the crew will respond in accordance with 1-AP-3, "Loss of Vital Instrumentation" and 1-AP-16, "Increasing Primary Plant Leakage."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO checks that 1-CH-LCV-1115A is not diverting.	
	Crew attempts to identify the source of the leakage inside containment.	
	Crew quantifies RCS leakage as greater than 10 GPM.	
	US reviews ITS 3.4.13.	
	NOTE: If the US does not direct the crew to ramp the unit off line, then the OMOC will direct the US to remove the unit from service.	
	US directs crew to ramp unit off line.	
	NOTE: The next event will be the crew reducing unit power for the required reactivity change.	

EVENT 6: Given that there is an RCS leak that exceeds tech spec limits, the crew will ramp the unit off line in accordance with 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: Crew is given reactivity calculations from reactor engineer, verified by STA.	
	US briefs crew on ramp.	
	RO commences lowering Tave using boration/control rods.	
	BOP commences lowering main turbine load. • Verifies load rate at .3%/min. • Lowers reference setter. • Pushes GO button.	
	BOP takes turbine to IMP-IN when power is ≤98%. • Pushes HOLD button • Matches reference and setter • Pulses VPL down until red light lit • Pulses VPL up until red light not lit • Verifies Governor tracking meter reads 0 • Pushes IMP-IN button • Resumes ramp.	
	BOP directs turbine building watchstander to place LP heater drain pumps on recirc and shutdown when power is approximately 90%.	
	NOTE: The next event will occur when the lead evaluator is satisfied with the amount of reactivity change.	

EVENT 7: Given that an EHC pump has tripped and the backup EHC pump has not auto-started, the crew will start the backup pump.		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies K-F5, "TURB SUPERV PANEL TROUBLE".	
	BOP identifies T-B4, "EH FLUID RESERVOIR LOS-PRESSURE."	
	BOP identifies no EHC pump running.	
	US directs BOP to start EHC pump 1-TM-P4.	
	BOP manually starts EHC pump 1-TM-P-4.	
	NOTE: If the crew dispatches an operator to look at EHC pumps, the operator will report that 1-TM-P-3 is unusually hot, and 1-TM-P-4 appears normal.	
	US requests maintenance to investigate trip of EHC pump, and start failure of backup pump.	
	NOTE: The next event will occur after the backup EHC pump is running, or at the direction of the lead evaluator.	

EVENT 8: Given that the unit is at power, and a SBLOCA has occurred, the crew will be expected to respond IAW 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies charging flow increasing and PRZR level decreasing.	
	US will refer back to step 2 of 1-AP-16.	
	RO verifies primary parameters under operator control (NO).	
	RO isolates letdown and maximizes charging flow.	
	RO commences a VCT makeup from the blender.	
	RO informs US that PRZR level is still decreasing.	
	US directs crew to manually trip the reactor and enter 1-E-0.	
	RO/BOP manually trips the reactor.	
	BOP verifies turbine trip.	
	RO verifies AC emergency busses energized.	
	RO/BOP check if safety injection has actuated (NO).	
	NOTE: Depending upon elapsed time, the crew may determine SI is not required at this time and transition to 1-ES-0.1. The following actions are IAW 1-ES-0.1.	
	RO checks RCS Tavg.	
	BOP checks feedwater status.	
	RO verifies charging in service.	
	RO checks PRZR level control.	
	RO checks PRZR pressure control.	
	RO verifies all IRPIs 10 steps or less.	

EVENT 8: Given that the unit is at power, and a SBLOCA has occurred, the crew will be expected to respond IAW 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP verifies adequate HP turbine gland steam pressure.	
	NOTE: The following actions will occur after the crew identifies the need to SI and are IAW 1-E-0.	
	Crew checks if safety injection is required.	
	US directs crew to manually initiate SI.	
	RO/BOP manually initiate SI.	
	BOP verifies FW isolation.	
	US directs RO/BOP to manually initiate phase A isolation.	
	RO/BOP manually initiate phase A isolation.	
	BOP verifies AFW pumps running.	
	NOTE: Crew may have already started the second charging pump.	
	Crew verifies SI pumps running. • Charging pumps running (NO, only one) • RO starts second charging pump • Low-head SI pumps running (YES)	
	BOP verifies SW pumps running.	
	Crew checks if MS should be isolated (NO).	
	BOP verifies SI flow.	
	BOP verifies AFW flow.	
	RO checks RCS temperature stable at or trending to 547°F.	
	RO checks PRZR PORVs and spray valves.	
	RO checks RCP trip and charging pump recirc criteria.	

EVENT 8: Given that the unit is at power, and a SBLOCA has occurred, the crew will be expected to respond IAW 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP checks SGs not faulted (YES).	
	BOP checks SGs not ruptured (YES).	
	Crew checks if RCS is intact inside containment (NO).	
	US directs crew to transition to 1-E-1.	
	NOTE: The next event will occur once the crew transitions out of 1-E-0, or at the direction of the lead evaluator.	

EVENT 9: Given that the unit is tripped, and a loss of off-site power has occurred, the crew will be expected to respond in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew identifies a loss of off-site power, loss of "H" emergency bus.	
	US directs BOP to enter 0-AP-10 while RO continues in E-0.	
	NOTE: The following steps refer to 0-AP-10 actions.	
	BOP performs 0-AP-10 diagnostics.	
	BOP reports results of diagnostics to US.	
	US directs BOP to initiate 0-OP-6.4 to align the SBO to supply 1H emergency bus.	
	US directs an extra operator to initiate 0-MOP-26.64 to walk down the switchyard.	
	NOTE: The following steps refer to 1-E-1 actions.	
	RO checks intact SG levels.	
	RO checks secondary radiation.	
	RO checks PRZR PORVs and block valves.	
	RO checks if SI can be terminated (NO).	
	RO resets CDA	
	RO checks if QS is required. (NO)	
	RO checks QS pump status.	
	RO checks if low-head SI pumps can be stopped. (YES)	
	RO resets SI and stops LHSI pumps.	
	RO/BOP checks RCS and SG pressures	
	RO/BOP checks if diesels should be stopped. (NO)	
	RO/BOP verifies power available to at least one train of cold leg recirculation. (YES)	

EVENT 9: Given that the unit is tripped, and a loss of off-site power has occurred, the crew will be expected to respond in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO/BOP checks auxiliary and safeguards building status.	
	US requests SEM to direct chemistry to sample RCS and containment.	
	US evaluates plant recovery equipment	
	RO/BOP checks containment hydrogen concentration and initiates placing H2 analyzer in service.	
	Crew checks if RCS cooldown and depressurizaion is required. (YES)	
	US directs transition to 1-ES-1.2	
	Note: Scenario can be terminated once crew transitions to 1-ES-1.2, or at the direction of the lead evaluator.	

NOTE: If SEM position not established, SRO(s) involved with scenario are to evaluate and classify the event in accordance with EPIPs following the scenario but prior to the debrief.

NOTE: Scenario may be terminated when all critical tasks have been met or at the discretion of the Lead Evaluator.

REFERENCES

PROCEDURE	REV.
Operating Procedure 1-OP-30.1, "Operation of Condensate System."	27
Operating Procedure 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."	47
Abnormal Procedure 1-AP-3, "Loss of Vital Instrumentation."	17
Abnormal Procedure 1-AP-16, "Increasing Primary Plant Leakage."	18
Abnormal Procedure 0-AP-10, "Loss of Electrical Power."	30
Emergency Operating Procedure 1-E-0, "Reactor Trip or Safety Injection."	28
Emergency Operating Procedure 1-E-1, "Loss of Reactor or Secondary Coolant."	16
Station Annunciator Response Procedures.	N/A
Administrative Procedure VPAP-1407, Verbal Communications.	2
INPO, Guideline for Teamwork and Diagnostic Skill Development: INPO 88-003,	Jan. 1988
INPO, ACAD 90-022 Simulator Training Guidelines	Nov. 1990

ATTACHMENTS

ATTACHMENT 1 - LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 2 - SIMULATOR OPERATOR'S COMPUTER PROGRAM

ATTACHMENT 3 - SCENARIO PERFORMANCE OBJECTIVES

ATTACHMENT 4 - SIMULATOR PERFORMANCE SUMMARY (SXG Only)*

ATTACHMENT 5 - SIMULATOR BOOTH OPERATOR CHECKLIST**

ATTACHMENT 6 – SEG INSTRUCTIONS**

ATTACHMENT 7 – SXG INSTRUCTIONS**

ATTACHMENT 8 - COMPETENCY AREA RATING FACTOR WORKSHEET **

ATTACHMENT 9 - SIMULATOR SCENARIO REVIEW CHECKLIST (SXG Only) *

ATTACHMENT 10 - SIMULATOR EXAMINATION PREBRIEF (SXG Only) **

* Located on N:\N\LORP\Simulator\shl\
** Located in the Instructor Booth.

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

1. SEN 122, Recurring Event: Unisolable Reactor Coolant System Leak

Loviisa Units 1 & 2/VVER (May 16, 1994)

An unisolable reactor coolant system leak developed in the pressurizer shutdown spray valve due to fatigue caused by thermal cycling and stratification.

Note: The VVER design includes two different pressurizer spray systems: normal pressurizer spray and shutdown spray. The normal spray system consists of two spray valves with water for sprays taken from the discharge side of two of the six reactor coolant pumps. The two normal spray paths are identical, each consisting of four parallel spray lines and one warm-up line. The capacity of the normal spray system is sufficient to avoid high reactor pressure during most anticipated transients. The shutdown spray system, which is supplied either from the cold leg of one RCS loop or the normal volume control system, is used for primary pressure decrease during normal reactor shutdowns and also in some transients.

On May 16, 1994, during a routine weekly operator walk-down, fluid leakage was noted from the insulation near the Unit 2 pressurizer shutdown spray valve. The source was determined to be a through-wall crack in the 2-inch diameter valve body, and the plant was shutdown for five days to conduct repairs. Similar crack indications were found on the corresponding valve on Unit 1, and Unit 1 was shutdown for repair on May 23, 1994.

The failed valve had been in service for about 15 years. Although the original design did not provide a means to maintain the pipe warm when the spray valve was closed, in 1980 a small hole was drilled in the valve disc to minimize cyclic thermal stresses. While investigating the cause of the May 16, 1994 crack, temperature stratification was also detected on the outlet side of the valve (a 72°F gradient existed from the top to the bottom of the horizontal run of pipe). The valve is made of forged, titanium-stabilized, austenitic stainless steel.

ATTACHMENT 2

SIMULATOR OPERATOR'S COMPUTER PROGRAM

SIMULATOR OPERATOR'S COMPUTER PROGRAM
Scenario NRC 1

Initial conditions

1. Recall 100% power end-of-life IC (IC-161).
2. Ensure Tave, Tref, PDTT level, and VCT level are selected on trend recorders.
3. Tagout 1H diesel per MOP.
4. Pre-load 10 gpd tube leak on "A" SG (malfunction RC2401 = 8E-4) and allow to run until "A" SG N-16 radiation monitor stabilizes at approximately 10.26 gpd.
5. Make sure LT-1459 is selected channel for pressurizer level.
6. Ensure "B" charging pump is running and "C" charging pump is powered from "J" bus.
7. Ensure "A" and "C" condensate pumps are running.

PRELOADS PRIOR TO SCENARIO START

CONDITION	MALFUNCTION/OVERRIDE/ETC.
Auto start failure of "A" CHP	Enter the following switch overrides: CHP1A_1_ASTRT, delay time = 0, O/R = OFF, trigger = N/A CHP1A_1_ASTP, delay time = 0, O/R = OFF, trigger = N/A CHP1A_ASTP, delay time = 0, O/R = OFF, trigger = N/A
Auto start failure of EHC pump	Switch override: TMP4_ASTP, delay time = 0, O/R = OFF, trigger = N/A.

SCENARIO EVENTS

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
1) Swap condensate pumps	**NOTE: Predictive analysis contacts control room concerning higher than usual vibrations on the "C" main condensate pump. They request that "B" pump be started and "C" stopped.** **NOTE: When directed to throttle closed "B" condensate pump discharge valve 1-CN-22, use PNID screen and setup event trigger to throttle the valve to 3% open over a two-minute period.** **NOTE: When directed to open "B" condensate pump discharge valve 1-CN-22, use PNID screen and setup event trigger to open the valve over a one minute period.** **NOTE: When directed to close 1-CN-486, wait one minute, then inform the crew that 1-CN-486 is closed (not modeled.)** **NOTE: When directed to throttle closed "C" condensate pump discharge valve 1-CN-34, use PNID screen and setup event trigger to throttle the valve to 3% open over a two-minute period.** **NOTE: When directed to open "C" condensate pump discharge valve 1-CN-34, use PNID screen and setup event trigger to open the valve over a one minute period.** **NOTE: When directed to open 1-CN-487, wait one minute, then inform the crew that 1-CN-487 is open (not modeled.)** **NOTE: The next event may occur once condensate pumps are swapped, or at the discretion of the lead evaluator.**
2) RC-LT-1459 failure	RC0801, delay time = 5, ramp = 5, severity value = -1, trigger = 1 **NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.**
3) "A" SG feed flow channel III failure	FW1201, delay time = 5, Ramp = 45, severity value = -1, trigger = 2 **NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
4)1-CH-P-1B trip	CH1602, delay time = 5, trigger = 3 **NOTE: If an operator is sent to check the "B" pump breaker he/she will report the breaker tripped on overcurrent.** **NOTE: The next event will commence after the US reviews Tech Specs, or at the direction of the lead evaluator.**
5)PT-1455 failure and RCS leak	RC0703, delay time = 5, ramp = 5, severity value = +1, trigger = 4 RC04, delay time = 5, ramp = 300, severity value = 10, trigger = 4. **NOTE: If the US does not direct the crew to ramp unit off line, then call as the OMOC and direct the US to remove the unit from service.** **NOTE: The next event will be the crew reducing unit power for the required reactivity change.**
6) Unit rampdown	**NOTE: Crew is given reactivity calculations from reactor engineer, verified by STA.** **NOTE: The next event will occur when the lead evaluator is satisfied with the amount of reactivity change.**
7)EHC pump trip	TU1101, delay time = 5, trigger = 5 **NOTE: If the crew dispatches an operator to look at EHC pumps, the operator will report that 1-TM-P-3 is unusually hot, and 1-TM-P-4 appears normal.** **NOTE: The next event will occur after the backup EHC pump is running, or at the direction of the lead evaluator.**
8)SBLOCA	Update MRC04 to 45% (200 gpm), ramp = 5, delay = 0, trigger = none. **NOTE: The next event will occur after the crew transitions out of 1-E-0, or at the direction of the lead evaluator.**
9)LOOP	EL01, delay time = 5 sec, trigger = 6 **Note: Scenario can be terminated after the crew transitions to 1-ES-1.2, or at the direction of the lead evaluator**

ATTACHMENT 3

SCENARIO PERFORMANCE OBJECTIVES

SIMULATOR REQUALIFICATION EXAMINATION

TERMINAL PERFORMANCE OBJECTIVE

Given equipment failures and operational situations, operate the plant in accordance with Technical Specifications to bring the unit to a safe condition, using applicable procedures, and applying effective teamwork, communication, and diagnostic skills.

GENERIC PERFORMANCE OBJECTIVES

A. During shift operations the shift supervisor will take a conservative course of action, especially when uncertain conditions exist, when dealing with core cooling or heat sink availability, primary system and containment integrity, and reactivity control associated with plant evolutions.

B. During shift operations the shift supervisor will provide overall crew guidance by prioritizing and integrating the actions of the shift crew in accordance with administrative procedures.

C. During shift operations each crew member will participate in a team effort that resolves conflicts, provides input into the team decision and communicates all the necessary information to enhance teamwork in accordance with administrative procedures.

D. During shift operations the Shift Technical Advisor will independently assess events and based on those assessments make recommendations to the crew regarding mitigation strategy.

EVENT 1 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and predictive analysis reports high vibrations on a running main condensate pump, the crew will swap pumps in accordance with 1-OP-30.1, "Operation of Condensate System."

NORTH ANNA SPECIFIC TASKS:

R403 Shift the main condensate pumps

CRITICAL TASK:

N/A

EVENT 2 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a PRZR level channel has failed, the crew will be expected to respond IAW 1-AP-3, "Loss of Vital Instrumentation."

NORTH ANNA SPECIFIC TASKS:

R633 Respond to a failure of the controlling pressurizer level channel

S70 Evaluate compliance with technical specifications

CRITICAL TASK:

See next page

CT Statement:

Crew takes manual control of PRZR level, minimizes charging, and restores letdown.

Safety Significance:

Failure to take manual control of PRZR level constitutes a "mis-operation or incorrect crew performance" which will result in an unnecessary reactor trip on high PRZR level.

Cues:

The controlling PRZR level channel is failed low, letdown is isolated.

Performance Indicator:

RO places controller for 1-CH-FCV-1122 in manual and controls PRZR level.
RO performs RNO step and selects operable channel.
RO restores charging and letdown as directed by the US.

Feedback:

PRZR level does not exceed trip setpoint.

WOG Reference:

None

Conditions:

Prior to a PRZR high level reactor trip.

EVENT 3 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and the controlling SG feed flow channel has failed, the crew will be expected to respond IAW 1-AP-3, "Loss of Vital Instrumentation."

NORTH ANNA SPECIFIC TASKS:

S70 Evaluate compliance with technical specifications.

CRITICAL TASK:

See next page.

CT Statement:

Crew takes manual control of steam generator level and restores level to normal range.

Safety Significance:

Failure to take manual control of SG level constitutes a "mis-operation or incorrect crew performance" which will result in an unnecessary reactor trip on low SG level.

Cues:

The controlling SG feed flow channel has failed low.
Main feed reg valve is going open.
Actual SG level is increasing.

Performance Indicator:

BOP places controller for 1-FW-FCV-1478 in manual and controls "A" SG level.

Feedback:

SG level does not increase to P-14 setpoint.

WOG Reference:

None

Conditions:

Prior to turbine trip/feedwater isolation on high SG level.

EVENT 4 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and the running charging pump has tripped with no auto start of another pump, the crew will start a charging pump in accordance with annunciator response for C-A6 "CH PP 1B 15J6 LOCKOUT."

NORTH ANNA SPECIFIC TASKS:

R699 Respond to main control board annunciator alarms.

CRITICAL TASK:

N/A

EVENT 5 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and PT-1455 fails, causing an RCS leak, the crew will respond in accordance with 1-AP-3, "Loss of Vital Instrumentation" and 1-AP-16, "Increasing Primary Plant Leakage."

NORTH ANNA SPECIFIC TASKS:

R520 Respond to increasing primary-plant leakage

S70 Evaluate compliance with technical specifications

CRITICAL TASK:

N/A

EVENT 6 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that there is an RCS leak that exceeds tech spec limits, the crew will ramp the unit off line in accordance with 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."

NORTH ANNA SPECIFIC TASKS:

None

CRITICAL TASK:

N/A

EVENT 7 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that an EHC pump has tripped and the backup EHC pump has not auto-started, the crew will start the backup pump and attempt to stabilize conditions, or trip the unit.

NORTH ANNA SPECIFIC TASKS:

R699 Respond to main control board annunciator alarms.

CRITICAL TASK:

N/A

EVENT 8 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power, and a SBLOCA has occurred, the crew will be expected to respond IAW 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."

NORTH ANNA SPECIFIC TASKS:

R185 Perform the immediate operator actions in response to a reactor trip or safety injection.
R186 Determine the appropriate recovery procedure following the actuation of a reactor trip with a safety injection.

S69 Identify a reportable occurrence and make appropriate notifications.
S85 Notify the appropriate personnel of emergency events.

CRITICAL TASK:

See next page.

CT Statement:

Crew starts a second charging pump during safety injection.

Safety Significance:

Failure to start the second available charging pump constitutes a "mis-operation or incorrect crew performance" which leads to degraded ECCS capacity."

Cues:

SI signal present
Only one charging pump is running with two available.

Performance Indicator:

RO manually starts second available charging pump.

Feedback:

Increase in HHSI flow.

WOG Reference:

None

Conditions:

Before exiting E-0.

EVENT 9 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is tripped, and a loss of off-site power has occurred, the crew will be expected to respond in accordance with 0-AP-10, "Loss of Electrical Power."

NORTH ANNA SPECIFIC TASKS:

S27 Direct the restoration of the electrical distribution system following the performance of the loss of electrical power diagnostic

CRITICAL TASK:

N/A

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 2 DOCUMENT REVISION RECORD		
REV	**TIR NUMBER**	**REASON**
0	N02-0293	Develop scenario for NRC initial licensed operator exams, 2002

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 2 DOCUMENT REVISION RECORD		
REV	**TIR NUMBER**	**REASON**

DOMINION

NORTH ANNA POWER STATION

INITIAL LICENSE CLASS

NRC SIMULATOR EXAMINATION

SCENARIO 2

NRC SIMULATOR EXAMINATION SCENARIO

EVENT	DESCRIPTION
1.	Sync main generator to grid
2.	Main steam pressure transmitter PT-1464 fails high
3.	Continue ramping to 30%
4.	Loss of Bearing Cooling
5.	Letdown PCV fails closed
6.	"C" SG level channel III failure
7.	PT-1444 fails high, PORV sticks open and block valve thermals
8.	SGTR on "C" SG

Scenario Recapitulation:

Malfunctions after EOP entry	**3** (Single train SI, failure of BIT inlet valves, SGTR on "C" SG)
Total Malfunctions	**8** (PT-1464 failure, Loss of Bearing Cooling, PCV-1145 failure, "C" SG level channel III failure, PT-1444 failure/stuck PORV/block valve failure, single train SI, failure of BIT inlet valves, SGTR on "C" SG)
Abnormal Events	**5** (PT-1464 failure, Loss of Bearing Cooling, PCV-1145 failure, "C" SG level channel III failure, PT-1444 failure)
Major Transients	**1** (SGTR on "C" SG)
EOPs Entered	**3** (1-E-0, 1-E-1, 1-E-3)
EOP Contingencies	**1** (1-ECA-3.1)
Critical Tasks	**2** (Establish HHSI flow; isolate AFW to "C" SG)

SCENARIO DURATION

120 Minutes

SIMULATOR EXAMINATION SCENARIO SUMMARY
SCENARIO NRC 2

The first event will be a normal evolution to synchronize and load the main generator. The unit is at 12% power with 1-OP-15.2 and 1-OP-2.1 completed through adjusting the setter ramp rate to two percent per minute. Prior to entering the simulator, the crew will receive turnover and conduct a pre-job brief for placing the unit on-line. Immediately after assuming the watch, the crew will synchronize and load the main generator, then continue to increase turbine load. When the condenser steam dumps are fully closed, the next event will occur.

Main steam header pressure transmitter PT-1464 will fail high over a 60-second period causing the steam dumps to open. The crew will respond by entering 1-AP-38, "Excessive Load Increase," which directs them to turn the steam dumps OFF. After the crew completes 1-AP-38, they will continue ramping. If they are reluctant to do so because of steam dumps being unavailable, the Operations Manager on Call will direct them to continue increasing power.

The third event will be a reactivity manipulation to continue the ramp to 30%. As soon as the Lead Examiner observes the required ramp he will signal for the next event to occur.

The running BC pump will trip. The crew should identify annunciators associated with the loss of BC and the US should direct the crew to enter 1-AP-19, "Loss of Bearing Cooling Water." The crew will identify the failure of the standby BC pump to auto-start and manually start the pump. After the crew stabilizes the unit, the next event will occur.

Letdown pressure controller will fail causing letdown PCV-1145 to fully close and actuating annunciator C-B2, LOW PRESS LETDWN LINE HI PRESS. The crew will refer to the annunciator response, place PCV-1145 in MANUAL and restore letdown parameters to normal. After the crew has stabilized letdown, the next event will occur.

The "C" steam generator level channel III will fail high, causing the "C" main feed regulating valve to go full closed. The crew will enter 1-AP-3, "Loss of Vital Instrumentation," and the BOP will take manual control of the FRV and restore level prior to reaching the SG low-low level reactor trip setpoint. After the US refers to technical specifications and the crew has identified the appropriate MOP for placing the channel in TRIP, the next event will occur.

PRZR PT-1444 will fail high causing the PORV and spray valves to fully open. The crew will enter 1-AP-44, "Loss of RCS Pressure." The PORV will not close manually and the block MOV will thermal out before it closes fully. RCS pressure will continue to decrease. The crew will enter 1-E-0, "Reactor Trip or Safety Injection." After tripping the unit, RCS pressure will continue to decrease and SI will occur. One train of SI and phase A will fail to actuate automatically, requiring the crew to manually align equipment. After HHSI flow is established, the last event will occur.

A 300-gpm tube rupture will develop in C S/G. The crew will identify increasing water level in "C" SG coincident with decreasing RCS pressure. The crew will transition to 1-E-1, "Loss of Reactor or Secondary Coolant," then to 1-ECA-3.1, "SGTR with Loss of Reactor Coolant – Subcooled Recovery Desired." The scenario may be terminated after the crew transitions to 1-ECA-3.1 or at the direction of the lead examiner.

SCENARIO TURNOVER SHEET
Read the following to the crew:

This examination is intended to evaluate the crew's performance of various tasks associated with the Licensed Operator Training Program. All activities should be completed in accordance with approved operations standards.

3. You are on a day shift during the week.

4. When conditions allow, utilize the computer log systems as you would in the plant.

Unit Status:
Unit 1 is at 12% power. The main generator is ready to be synchronized and loaded. RCS boron is 266 ppm and core age is 17,000 MWD/MTU. The amount of RCS dilution required to raise temperature one degree is 569 gallons and the boration required to lower temperature one degree is 11 gallons. Aux steam is on unit 2. The Mrule window is green for all planned maintenance.

Unit 2 is at 100% power.

The system operator has reported thunderstorms in the area.

Equipment Status:
The main generator automatic synchronizing circuit is not functioning properly. A 10 gpd tube leak exists in "A" SG. 1H diesel was tagged-out two hours ago for maintenance.

Shift Orders:
Prior to entering the simulator, perform a pre-job brief for placing the unit on-line. After assuming the watch, place the unit on-line without delay.

Place the unit on line by manually synchronizing and loading the main generator, then ramp to 30% power. Hold for chemistry cleanup. Continue to monitor "A" SG tube leakage.

EVENT 1: Given that the unit is at 12% power with the main generator ready to be placed on line, the crew will manually synchronize and load the main generator in accordance with 1-OP-15.2, "Main Generator Operation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: The following steps are from 1-OP-15.2.	
	BOP manually closes main generator output breaker.	
	BOP verifies generator assumes some load or raises setter to assume load.	
	BOP places synch key in OFF.	
	BOP zeroes balance volts as necessary.	
	BOP adjusts setter to .3 percent per minute.	
	BOP adjusts generator voltage as necessary.	
	US directs crew to release ERF computer point from OFF SCAN.	
	US directs crew to return to 1-OP-2.1 to continue increasing power.	
	NOTE: The next event will occur after condenser steam dumps are fully closed or at the direction of the lead examiner.	

EVENT 2: Given that the unit is at power, the crew will respond to PT-464 failing high and an unexpected power increase in accordance with 1-AP-38, "Excessive Load Increase".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies steam dumps open and informs US.	
	US directs crew to enter 1-AP-38.	
	Crew stops power increase. • **RO places both Steam Dump Interlock switches to OFF/RESET.**	
	BOP checks S/G PORVs.	
	BOP checks turbine load normal.	
	RO checks reactor power stable.	
	BOP identifies PT-464 failed high and informs US.	
	BOP checks turbine load control.	
	Crew checks plant status – stable.	
	Crew checks plant steam systems.	
	Crew verifies cause of load increase corrected.	
	US references VPAP-1410 and makes required notifications.	
	US directs crew to continue increasing power.	

EVENT 2: Given that the unit is at power, the crew will respond to PT-464 failing high and an unexpected power increase in accordance with 1-AP-38, "Excessive Load Increase".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: If crew is reluctant to continue power increase due to unavailability of steam dumps, the Operations Manager on Call will direct them to continue increasing power and transfer steam dumps to Tavg mode when directed by procedure.	
	NOTE: The next event will be the crew increasing unit power for the required reactivity manipulation.	

EVENT 3: Given that the unit has just been placed on-line, the crew will continue increasing power to 30% in accordance with 1-OP-2.1, "Unit Operation from Mode 2 to Mode 1."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: Crew is given reactivity calculations from reactor engineer, verified by STA.	
	RO commences raising Tave using dilution/control rods.	
	BOP commences increasing main turbine load • Verifies load rate at .3%/min • Raises reference setter. • Pushes GO button.	
	NOTE: The next event will occur when the lead examiner is satisfied with the reactivity change.	

EVENT 4: Given that the unit is at power and the running BC pump has tripped, the crew will respond IAW 1-AP-19, "Loss of Bearing Cooling Water."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies annunciators F-E4, "BC WTR DISCH HDR LO PRESS," and F-F4, "BC WTR PP 1A-1B AUTO TRIP SYS MISALIGNED," and informs US.	
	US directs the crew to enter 1-AP-19.	
	BOP identifies "A" BC pump tripped and informs US.	
	BOP starts "B" BC pump.	
	BOP verifies BC pump running with normal indications.	
	BOP verifies BC system operating normally in tower mode.	
	Crew monitors main generator temperatures.	
	Crew dispatches an operator to locally check equipment.	
	NOTE: The next event will occur after the crew has started the standby BC pump and stabilized the plant, or as directed by the lead evaluator.	

EVENT 5: Given that the unit is at power, and 1-CH-PC-1145, Letdown Low Pressure controller output, has failed low, the crew will respond IAW annunciator 1C-B2, "LOW PRESS LETDWN LINE HI PRESS".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies annunciator C-B2, "LOW PRESS LETDWN LINE HI PRESS".	
	RO identifies 1-CH-PC-1145 failed low and informs US.	
	Crew refers to annunciator response procedure.	
	RO takes manual control of 1-CH-PCV-1145 and opens it to reestablish 300 psig.	
	US notifies instrument department to investigate.	
	NOTE: The next event will occur after the RO has stabilized letdown, or at the direction of the lead evaluator.	

EVENT 6: Given that the unit is at power and the controlling SG level channel has failed high, the crew will respond in accordance with 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies "C" SG level channel III failing high and informs US.	
	US directs crew to enter 1-AP-3.	
	BOP verifies redundant channels normal.	
	BOP identifies "C" SG level channel III has failed high.	
	Crew manually controls steam generator level. • **BOP places "C" MFRV in MANUAL.** • **BOP restores level in "C" SG to normal.**	
	RO verifies first stage pressure indications normal.	
	RO verifies systems affected by PRZR level channels normal.	
	RO verifies both first stage pressure channels normal.	
	BOP verifies all SGWLC channels selected to an operable channel. (NO)	
	BOP verifies that "C" SG level channel III is the only failed channel.	
	US directs crew to enter 1-MOP-55.76.	
	US refers to ITS-3.3.1 and 3.3.2, and determines that the channel must be placed in TRIP within 72 hours.	
	NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.	

EVENT 7: Given that PT-1444 has failed high with a stuck-open PORV and block MOV, the crew will respond in accordance with 1-AP-44, "Loss of RCS Pressure," and 1-E-0, "Reactor Trip or Safety Injection."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies alarms associated with PT-1444 failing high and PRZR PORV open, and informs US.	
	US directs crew to enter 1-AP-44.	
	RO attempts to close PRZR PORV and identifies valve stuck open.	
	RO attempts to close PORV block MOV and identifies valve closed partially, then thermalled out.	
	RO closes PRZR spray valves and identifies RCS pressure continuing to decrease.	
	US directs crew to enter 1-E-0.	
	RO/BOP trip the reactor.	
	BOP trips the turbine.	
	RO verifies AC emergency busses energized.	
	RO/BOP check if SI has actuated or is required.	
	RO identifies RCS pressure continuing to decrease, requiring manual initiation of SI.	
	US directs crew to manually initiate SI.	
	RO/BOP manually initiate SI.	
	Crew identifies that train "A" SI did not actuate.	

EVENT 7: Given that PT-1444 has failed high with a stuck-open PORV and block MOV, the crew will respond in accordance with 1-AP-44, "Loss of RCS Pressure," and 1-E-0, "Reactor Trip or Safety Injection."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP verifies feedwater isolation (NO).	
	BOP closes main feed MOVs, stops 1-FW-P-1A1 and 1C1, and places standby feed pump in PTL.	
	RO/BOP manually initiate phase A.	
	US initiates phase A attachment.	
	BOP verifies AFW pumps are running.	
	RO/BOP verifies SI pumps are running (NO).	
	Crew starts SI pumps. • **RO starts 1-CH-P-1A.** • **BOP starts 1-SI-P-1A.**	
	BOP verifies SW pumps running (NO.) • BOP starts 1-SW-P-1A.	
	Crew checks if MS lines should be isolated. (NO)	
	Crew verifies cold leg SI flow (NO).	
	US directs BOP to perform 1-E-0 attachment to verify SI flow path.	

EVENT 7: Given that PT-1444 has failed high with a stuck-open PORV and block MOV, the crew will respond in accordance with 1-AP-44, "Loss of RCS Pressure," and 1-E-0, "Reactor Trip or Safety Injection."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: Crew may have previously identified lack of SI flow and established SI flow IAW the CAP.	
	Crew establishes HHSI flow. • BOP checks charging pump alignment. • BOP checks BIT recircs closed. • BOP checks BIT outlet valves open. • BOP checks BIT inlet valves open (NO.) • **BOP opens 1-SI-MOV-1867A** • BOP verifies SI flow.	**CRITICAL TASK: Open BIT inlet valve 1867A.**
	BOP verifies AFW flow.	
	RO checks RCS Tavg.	
	RO checks PRZR PORVs and block valves.	
	US directs transition to 1-E-1.	
	NOTE: The next event will occur after the crew establishes HHSI flow, or at the direction of the lead evaluator.	

EVENT 8: Given that a SGTR has occurred and a PRZR PORV is stuck open and cannot be isolated, the crew will respond in accordance with 1-E-3, "Steam Generator Tube Rupture," and 1-ECA-3.1, "SGTR with Loss of Reactor Coolant – Subcooled Recovery Desired."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO checks RCP trip and charging pump recirc criteria.	
	BOP checks SGs not faulted.	
	BOP checks intact SG levels and identifies "C" SG level continuing to increase after isolating AFW.	
	BOP checks secondary radiation and identifies "C" SG MS line radiation monitor increasing.	
	US directs transition to 1-E-3.	
	RO checks RCP trip and charging pump recirc criteria.	
	Crew identifies ruptured generator.	
	Crew isolates flow from ruptured SG. • **BOP places "C" SG PORV setpoint at 5.6** • BOP checks "C" PORV closed • **Crew initiates attachment for local actions** • RO checks decay heat release valve closed • BOP verifies "C" blowdown trip valves closed • BOP closes "C" MSTV • **BOP stops feed flow to "C" SG**	**CRITICAL TASK:** **Isolate AFW to "C" SG**
	US initiates attachment 2 for local turbine building operations.	
	RO checks pressurizer PORVs and block valves.	

EVENT 8: Given that a SGTR has occurred and a PRZR PORV is stuck open and cannot be isolated, the crew will respond in accordance with 1-E-3, "Steam Generator Tube Rupture," and 1-ECA-3.1, "SGTR with Loss of Reactor Coolant – Subcooled Recovery Desired."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	US directs crew to enter 1-ECA-3.1.	
	RO resets both trains of SI.	
	RO resets both trains of phase A.	
	BOP establish instrument air to containment.	
	Crew verifies all AC busses energized by offsite.	
	RO places all pressurizer heaters in PTL.	
	Crew checks if CDA reset is required. (NO)	
	Crew checks if QS is required. (NO)	
	BOP checks QS pump status.	
	BOP monitors "C" SG level.	
	Crew checks if low heads should be stopped (YES).	
	BOP places low-heads in AUTO.	
	BOP checks auxiliary building status.	

EVENT 8: Given that a SGTR has occurred and a PRZR PORV is stuck open and cannot be isolated, the crew will respond in accordance with 1-E-3, "Steam Generator Tube Rupture," and 1-ECA-3.1, "SGTR with Loss of Reactor Coolant – Subcooled Recovery Desired."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	US asks station emergency manager to request chemistry samples.	
	Crew evaluates plant recovery equipment.	
	BOP places hydrogen analyzer in service.	
	BOP checks SGs not faulted.	
	BOP checks intact SG levels.	
	Crew initiates RCS cooldown.	
	NOTE: Scenario may be terminated after the crew transitions to 1-ECA-3.1 or at the direction of the lead examiner.	

NOTE: If SEM position not established, SRO(s) involved with scenario are to evaluate and classify the event in accordance with EPIPs following the scenario but prior to the debrief.

NOTE: Scenario may be terminated when all critical tasks have been met or at the discretion of the Lead Evaluator.

REFERENCES

PROCEDURE	REV.
Operation Procedure 1-OP-15.2, "Main Generator Operation."	35
Abnormal Procedure 1-AP-38, "Excessive Load Increase."	11
Operation Procedure 1-OP-2.1, "Unit Operation From Mode 2 to Mode 1."	68
Abnormal Procedure 1-AP-3, "Loss of Vital Instrumentation."	17
Abnormal Procedure 1-AP-19, "Loss of Bearing Cooling."	13
Abnormal Procedure 1-AP-44, "Loss of Reactor Coolant System Pressure."	14
Emergency Operating Procedure 1-E-0, "Reactor Trip or Safety Injection."	28
Emergency Operating Procedure 1-E-1, "Loss of Reactor or Secondary Coolant."	16
Emergency Operating Procedure 1-E-3, "Steam Generator Tube Rupture."	19
Emergency Contingency Action 1-ECA-3.1, "SGTR With Loss of Reactor Coolant – Subcooled Recovery Desired."	15
Station Annunciator Response Procedures.	N/A
Administrative Procedure VPAP-1407, Verbal Communications.	2
INPO, Guideline for Teamwork and Diagnostic Skill Development: INPO 88-003,	Jan. 1988
INPO, ACAD 90-022 Simulator Training Guidelines	Nov. 1990

ATTACHMENTS

ATTACHMENT 1 - LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 2 - SIMULATOR OPERATOR'S COMPUTER PROGRAM

ATTACHMENT 3 - SCENARIO PERFORMANCE OBJECTIVES

ATTACHMENT 4 - SIMULATOR PERFORMANCE SUMMARY (SXG Only)*

ATTACHMENT 5 - SIMULATOR BOOTH OPERATOR CHECKLIST**

ATTACHMENT 6 – SEG INSTRUCTIONS**

ATTACHMENT 7 – SXG INSTRUCTIONS**

ATTACHMENT 8 - COMPETENCY AREA RATING FACTOR WORKSHEET **

ATTACHMENT 9 - SIMULATOR SCENARIO REVIEW CHECKLIST (SXG Only) *

ATTACHMENT 10 - SIMULATOR EXAMINATION PREBRIEF (SXG Only) **

* Located on N:\N\LORP\Simulator\shl\
** Located in the Instructor Booth.

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

1. SOER 83-2 Steam Generator Tube Rupture.

2. NRC IE Bulletin N90-49 Stress Corrosion Cracking in PWR Steam Generator Tubes.

ATTACHMENT 2

SIMULATOR OPERATOR'S COMPUTER PROGRAM

SIMULATOR OPERATOR'S COMPUTER PROGRAM
Scenario NRC 2

Initial conditions

8. Recall IC for 12% power (IC163).

9. Ensure Tave, Tref, PDTT level, and VCT level are selected on trend recorders.

10. Tagout 1H diesel per MOP.

11. Ensure "B" charging pump and both unit-2 SW pumps running.

12. Show 10 gpd leak on "A" SG (8E-4).

13. Provide copy of 1-OP-2.1 signed off through step 5.2.20.

14. Provide copy of 1-OP-15.2 signed off through step 5.1.20.

15. Recall monitor screen: scenario2.

PRELOADS PRIOR TO SCENARIO START

CONDITION	MALFUNCTION/OVERRIDE/ETC.
BIT inlet valves fail to open on SI	SIMOV867B_RACKIN = RACKOUT, delay time = 0, event trigger = SI2: safetyinj on MOV867_GREEN, override = ON
Failure of SI train A and phase A train A	SI0701, delay time = 0, event trigger = none SI1303, delay time = 0, event trigger = none
PORV sticks in open position	Remote function – reactor coolant: RC1901, delay time = 0, event trigger = none Trigger 11 = RCMOV536_CLOSE MOV control: RCMOV536_Rackin = rackout, delay time = 0, trigger = 11
Failure of BC pump auto-start	BCP_AUTO_DEFEAT = true
Failure of reactor trip switch on benchboard 1	Switch overrides: • RX_TRIP_TRIP, override = OFF, delay time = 0, trigger = none • RX_TRIP_ATRIP, override = OFF, delay time = 0, trigger = none

SCENARIO EVENTS

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
1) Sync main generator, ramp	**NOTE: The next event will occur after condenser steam dumps are fully closed or at the direction of the lead examiner.**
2) PT-1464 failure	MS16, delay time = 5, ramp = 240, severity value = .5, trigger = 1 **NOTE: If crew is reluctant to continue power increase due to unavailability of steam dumps, the Operations Manager on Call will direct them to continue increasing power and transfer steam dumps to Tavg mode when directed by procedure.** **NOTE: The next event will be the crew increasing unit power for the required reactivity manipulation.**
3) Ramp continues	**NOTE: The next event will occur when the lead examiner is satisfied with the reactivity change.**
4) Loss of Bearing Cooling	BCP1_PROTECT(1) = true **NOTE: The next event will occur after the crew has started the standby BC pump and stabilized the plant, or as directed by the lead evaluator.**
5) PCV-1145 fails closed	CH18, delay time = 5 sec, ramp = 5 sec, severity value = +1, trigger = 3 **NOTE: If contacted to visually observe 1-CH-PCV-1145, report that you see nothing abnormal.** **NOTE: The next event will occur after the RO has stabilized letdown, or at the direction of the lead evaluator.**
6) "C" SG level channel failure	FW0109, delay time = 5, ramp = 5, severity value = +1, trigger = 4 **NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.**
7) PT-1444 failure	RC0701, delay time = 5, ramp = 5, severity value = 1, trigger = 5 **NOTE: The next event will occur after the crew establishes HHSI flow, or at the direction of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
8) SGTR on "C" SG	RC2403, delay time = 5, ramp = 60, severity value = 35, trigger = 6 **NOTE: When called, pick up attachment(s) for local operations to isolate "C" SG.** **NOTE: If contacted to check breaker for block valve report that breaker is tripped and the thermal cannot be reset.** **NOTE: If contacted to close PORV using Appendix R switch report that you took the switch to the ISOLATE position, but it felt "loose" and you don't believe it actually operated.** **NOTE: Scenario may be terminated after the crew transitions to 1-ECA-3.1 or at the direction of the lead examiner.**

ATTACHMENT 3

SCENARIO PERFORMANCE OBJECTIVES

SIMULATOR REQUALIFICATION EXAMINATION

TERMINAL PERFORMANCE OBJECTIVE

Given equipment failures and operational situations, operate the plant in accordance with Technical Specifications to bring the unit to a safe condition, using applicable procedures, and applying effective teamwork, communication, and diagnostic skills.

GENERIC PERFORMANCE OBJECTIVES

A. During shift operations the shift supervisor will take a conservative course of action, especially when uncertain conditions exist, when dealing with core cooling or heat sink availability, primary system and containment integrity, and reactivity control associated with plant evolutions.

B. During shift operations the shift supervisor will provide overall crew guidance by prioritizing and integrating the actions of the shift crew in accordance with administrative procedures.

C. During shift operations each crew member will participate in a team effort that resolves conflicts, provides input into the team decision and communicates all the necessary information to enhance teamwork in accordance with administrative procedures.

D. During shift operations the Shift Technical Advisor will independently assess events and based on those assessments make recommendations to the crew regarding mitigation strategy.

EVENT 1 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at 12% power with the main generator ready to be placed on line, the crew will manually synchronize and load the main generator in accordance with 1-OP-15.2, "Main Generator Operation."

NORTH ANNA SPECIFIC TASKS:

R379 Synchronize the main generator

CRITICAL TASK:

N/A

EVENT 2 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power, the crew will respond to an unexpected power increase in accordance with 1-AP-38, "Excessive Load Increase".

NORTH ANNA SPECIFIC TASKS:

R539 Perform the immediate operator actions in response to an excessive load increase.

S69 Identify a reportable occurrence and make appropriate notifications

CRITICAL TASK:

See next page

CT Statement:

Crew stops power increase

Safety Significance:

Failure to stop power increase and coolant temperature decrease would cause average coolant temperature to drop below the minimum temperature for criticality, and the following can not be assured : 1) Moderator temperature coefficient is within its analyzed temperature range, 2) Protective instrumentation is within its normal operating range, 3) P-12 interlock is above its setpoint, and 4) Compliance with Appendix G to 10 CFR part 50.

Cues:

Indication of power increase:

- Several annunciators. (i.e. Pzr Hi/Lo Press, Pzr Lo Level)
- Reactor power increasing.
- Steam flow increasing.

Performance Indicator:

RO place both steam dump interlock switches to OFF/RESET.

Feedback:

- Reactor power increase stopped
- Steam dumps indicate closed
- Steam flow decreased

WOG Reference:

N/A

Conditions:

Prior to receiving an automatic Rx trip on over power

EVENT 3 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit has just been placed on-line, the crew will continue increasing power to 30% in accordance with 1-OP-2.1, "Unit Operation from Mode 2 to Mode 1."

NORTH ANNA SPECIFIC TASKS:

N/A

CRITICAL TASK:

N/A

EVENT 4 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and the running BC pump has tripped, the crew will respond IAW 1-AP-19, "Loss of Bearing Cooling Water."

NORTH ANNA SPECIFIC TASKS:

R522 Stabilize the unit following a loss of Bearing Cooling Water

CRITICAL TASK:

N/A

EVENT 5 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power, and 1-CH-PC-1145, Letdown Low Pressure controller output, has failed low, the crew will respond in accordance with annunciator 1C-B2, "LOW PRESS LETDWN LINE HI PRESS".

NORTH ANNA SPECIFIC TASKS:

R699 Respond to main control board annunciator alarms.

CRITICAL TASK:

N/A

EVENT 6 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a controlling SG level channel has failed, the crew will respond in accordance with 1-AP-3, "Loss of Vital Instrumentation."

NORTH ANNA SPECIFIC TASKS:

R626 Respond to a steam generator water level control channel failure

S70 Evaluate compliance with technical specifications.

CRITICAL TASK:

See next page.

CT Statement:

Crew takes manual control of steam generator level and restores level to normal range.

Safety Significance:

Failure to take manual control of SG level constitutes a "mis-operation or incorrect crew performance" which will result in an unnecessary reactor trip on low SG level.

Cues:

The controlling SG level channel has failed high.
Main feed reg valve is going closed.
Actual SG level is decreasing.

Performance Indicator:

BOP places controller for 1-FW-FCV-1498 in manual and controls "C" SG level.

Feedback:

SG level does not decrease to SG low-low level reactor trip setpoint.

WOG Reference:

None

Conditions:

Prior to reactor trip on low-low SG level.

EVENT 7 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that a SGTR has occurred, the crew will respond in accordance with 1-AP-24, "Steam Generator Tube Leak," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-3, "Steam Generator Tube Rupture."

NORTH ANNA SPECIFIC TASKS:

R185 Perform the immediate operator actions in response to a reactor trip or safety injection.

CRITICAL TASK:

N/A

EVENT 8 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that a SGTR has occurred and a PRZR PORV is stuck open and cannot be isolated, the crew will respond in accordance with 1-ECA-3.1, "SGTR with Loss of Reactor Coolant – Subcooled Recovery Desired."

NORTH ANNA SPECIFIC TASKS:

R634 Respond to a loss of reactor coolant system pressure.
R730 Verify safety injection flow
R187 Identify and isolate a ruptured steam generator.
R211 Depressurize the reactor coolant system using a subcooled recovery following a steam generator tube rupture coincident with a loss of reactor coolant.
R469 Place a containment hydrogen analyzer in operation

CRITICAL TASK:

See Following Pages

CT Statement:

Crew isolates flow to/from ruptured S/G.

Safety Significance:

Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. Upon loss of differential pressure, the crew must transition to a contingency procedure that constitutes an incorrect performance that "...necessitates the crew taking compensating action which complicates the event mitigation strategy..."

Cues:

Indication of unexpected increasing SG water level

Performance Indicator:

BOP adjusts ruptured SG PORV setpoint at 1050 PSIG.
RO/BOP directs an auxiliary operator to locally close 1-MS-95, Steam to the Terry Turbine from "C" SG.
BOP closes 1-FW-HCV-100C.

Feedback:

Indication of:

* stable or increasing pressure in the ruptured SG.
* decreasing or zero feedwater flow rate to the ruptured SG.

WOG Reference:

E-3 Background

Conditions:

Isolate before a transition to ECA-3.1 occurs.

CT Statement:

Crew manually aligns the BIT.

Safety Significance:

Failure to establish HHSI flow constitutes a "mis-operation or incorrect crew performance which leads to degraded ECCS capacity."

Cues:

Indication/annunciation of:

* reactor trip and safety injection
* no SI flow
* BIT inlet and outlet valves closed

Performance Indicator:

BOP opens 1-SI-MOV-1867A.

Feedback:

BIT inlet and outlet valves indicate open and BIT flow indicated.

WOG Reference:

E-0 Background

Conditions:

Prior to exiting E-0.

NORTH ANNA TRAINING CENTER
SIMULATOR EXERCISE GUIDE SCENARIO NRC 3
DOCUMENT REVISION RECORD

REV	TIR NUMBER	REASON
0	N02-0293	Develop scenario for NRC initial licensed operator exams, 2002

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 3 DOCUMENT REVISION RECORD		
REV	**TIR NUMBER**	**REASON**

DOMINION

NORTH ANNA POWER STATION

INITIAL LICENSE CLASS

NRC SIMULATOR EXAMINATION

SCENARIO NRC 3

NRC SIMULATOR EXAMINATION SCENARIO

EVENT	DESCRIPTION
1.	Containment air inleakage
2.	Swap charging pumps
3.	VCT level channel failure
4.	First stage pressure failure
5.	Steam leak on MS safety valve
6.	Unit rampdown for steam leak
7.	Loss of 1-I vital bus
8.	Inadvertent SI

Scenario Recapitulation:

Malfunctions after EOP entry	**1** (Failure of 1-CH-MOV-1289B to open from control room)
Total Malfunctions	**6** (Containment air inleakage, VCT level channel failure, first stage pressure failure, steam leak on "A" safety, loss of 1-I vital bus, failure of 1-CH-MOV-1289B to open)
Abnormal Events	**6** (Containment air inleakage, VCT level channel failure, first stage pressure failure, steam leak on "A" safety, loss of 1-I vital bus, failure of 1-CH-MOV-1289B to open)
Major Transients	**1** (Inadvertent SI due to loss of vital bus 1-I)
EOPs Entered	**1** (E-0)
EOP Contingencies	**0**
Critical Tasks	**2** (Prevent loss of charging pump suction; isolate AFW to "A" SG)

SCENARIO DURATION

105 minutes

SIMULATOR EXAMINATION SCENARIO SUMMARY
SCENARIO NRC 3

The scenario begins with unit 1 at 100% power with a 10 gpd tube leak in "A" SG, 1H diesel is tagged for maintenance, and 1-RC-PT-1457 in test. Shift orders are to monitor "A" SG tube leakage, support maintenance in repair of PT-1457, and return 1H EDG to service when released by maintenance

Once the crew assumes the watch, a leak will occur on a containment purge line, resulting in excessive air in-leakage to the containment. The crew should identify this in-leakage by annunciators and increasing containment partial pressure, and manually start the containment vacuum pumps in order to reduce containment pressure. The crew should identify that the containment vacuum pumps are unable to maintain vacuum and refer to 1-AP-18, "Increasing Containment Pressure", and ITS 3.6.4 for allowable containment pressure. There will be a report from the field that a loud whistling sound is coming from the containment vacuum breaker, and if requested can be isolated by hand torquing. Once the crew has isolated and stopped the leak, the next event will occur.

Maintenance will request operations to swap to "B" charging pump per the shift orders. The crew will swap pumps using 1-OP-8.9, "Transferring Running Charging Pumps." After the charging pump swap is complete, the next event will occur.

VCT Level transmitter 115 will fail high. The crew will respond in accordance with the AR for VCT HI-LO LEVEL L-115, by opening the breaker to stop 1115A from diverting to the stripper and starting a manual makeup to restore VCT level. The crew should discuss the loss of the RWST swapover on low level, and the loss of auto makeup capability. Once the designated breaker has been opened the next event will occur.

The selected first stage pressure channel will fail low. The crew will respond in accordance with 1-AP-3, "Loss of Vital Instrumentation." The RO will place rod control in manual. The BOP will either take manual control of SG level, or allow SG level to control at 33% in automatic, as directed by the US. The US should refer to technical specifications and determine that trips and permissives must be checked within one hour and the channel must be placed in trip within 72 hours. After the crew has determined the appropriate MOP for placing the channel in trip, the next event will occur.

"A" S/G safety valve will develop a steam leak. The crew should identify the increase in reactor power and enter 1-AP-38. The crew should reduce power to $\leq$ 100% by ramping the turbine. A call from a security officer will help the crew identify the leak location as a steam generator safety valve. The US will consult ITS and determine that the safety is inoperable and the units needs to be ramped to $\leq$52% within 4 hours. Operations management will direct the crew to ramp the unit down to a lower power level while attempts to repair the valve are planned.

The crew will start a ramp-down in accordance with 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2," when the lead examiner signals that the reactivity change is sufficient then the next event will occur.

The vital bus inverter for vital bus 1-I will fail, this will de-energize channel I instrumentation and, along with PT-457 being failed, will initiate a SI. The crew will enter 1-E-0 and stabilize the unit. The US will then direct the BOP to enter 0-AP-10 and make preparations to reenergize the bus from the SOLA. When the crew gets to the point of securing SI flow, the normal charging valve will not open (breaker will trip when the switch is taken to open). The crew will direct the valve be opened locally. The scenario will end once team transitions to 1-ES-1.1, or at the discretion of the lead evaluator.

SCENARIO TURNOVER SHEET

Read the following to the crew:

This examination is intended to evaluate the crew's performance of various tasks associated with the Licensed Operator Training Program. All activities should be completed in accordance with approved operations standards.

5. You are on a day shift during the week.

6. When conditions allow, utilize the computer log systems as you would in the plant.

Unit Status:
Unit 1 is at 100% power. RCS boron is 864 ppm and core age is 9000 MWD/MTU. The amount of RCS dilution required to raise temperature one degree is 235 gallons and the boration required to lower temperature one degree is 15 gallons. Aux steam is on unit 1. The Mrule window is green for all planned maintenance.

Unit 2 is at 100% power.

The system operator has reported thunderstorms reported in the area.

Equipment Status:
There is a confirmed 10 gpd tube leak in "A" SG. 1H diesel was tagged-out two hours ago for maintenance. 1-RC-PT-1457 has failed and has been placed in TRIP.

Shift Orders:
Monitor "A" SG tube leakage. Support maintenance in repair of PT-1457. Place "B" charging pump in service for maintenance to observe seal leakage. After "B" charging pump is verified normal, stop "A" charging pump and leave in AUTO. Note that "B" charging pump was last run last week when boron concentration was 872 ppm, so boron adjustment/purge will not be necessary.

EVENT 1: Given that the unit is at power and indications exist of excessive air inleakage to the containment, the crew will respond IAW the applicable annunciator response, and 1-AP-18, "Increasing Containment Pressure."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies annunciators J-F2, CONTAINMENT PARTIAL PRESS+0.1 PSI CH I-II.	
	BOP identifies increasing containment partial pressure.	
	BOP starts a containment vacuum pump.	
	BOP identifies containment partial pressure continues to increase.	
	US directs crew to enter 1-AP-18.	
	US refers to ITS-3.6.4 to determine containment partial pressure limit.	
	BOP checks containment vacuum pump flow.	
	BOP checks condenser air ejector radiation monitor and discharge lineup.	
	BOP identifies containment partial pressure continues to increase.	
	BOP starts another containment vacuum pump.	
	Crew dispatches watchstanders to locate leakage source.	

EVENT 1: Given that the unit is at power and indications exist of excessive air inleakage to the containment, the crew will respond IAW the applicable annunciator response, and 1-AP-18, "Increasing Containment Pressure."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: APPROXIMATELY 3 MINUTES AFTER BEING DISPATCHED, AN OPERATOR WILL REPORT THAT CONTAINMENT VACUUM BREAKER 1-HV-MOV-102 IS MAKING A LOUD WHISTLING SOUND.	
	US refers to TRM-5.1 and ITS-3.6.3 to determine containment isolation valve operability, and ITS-3.6.1 to determine containment integrity requirements.	
	Crew directs operator to hand torque the MOV to stop the leak.	
	NOTE: The next event will occur after the crew stabilizes containment partial pressure, or as directed by the lead evaluator.	

EVENT 2: Given that the unit is at power and charging pumps are to be swapped, the crew will swap charging pumps IAW 1-OP-8.9, "Transferring Running Charging Pumps."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: The SS will call the US and request the crew to place "B" charging pump in service without delay for maintenance to observe seal leakage per the shift orders.	
	US/RO reviews precautions and limitations, and verifies that pump was recently in service.	
	RO places P-250 trend block on a short interval trend for "B" CHP bearing temperatures.	
	US determines that boron concentration will not be adversely affected by pump start.	
	RO requests auxiliary building operator to verify that the auxiliary oil pump for "B" CHP is in auto and running.	
	NOTE: Auxiliary building operator will report that the auxiliary oil pump for "B" charging pump is running in AUTO.	
	RO starts 1-CH-P-1B.	
	Crew identifies annunciator C-A8, "CH PP 1C 15J7 LOCKOUT," as expected alarm due to both "A" and "B" charging pumps running.	
	RO resets "C" charging pump lockout by placing control switch in PTL then to AUTO.	
	Crew verifies charging pump lube oil temperature is <128°F.	
	NOTE: After "B" charging pump is started, the auxiliary building operator will report that the pump looks fine and there is no seal leakage.	
	RO stops 1-CH-P-1A.	

EVENT 2: Given that the unit is at power and charging pumps are to be swapped, the crew will swap charging pumps IAW 1-OP-8.9, "Transferring Running Charging Pumps."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: If requested, the auxiliary building operator will report that seal leakage is zero on "A" charging pump.	
	RO monitors trend block until temperatures stable.	
	NOTE: The next event will occur after charging pumps have been swapped, or at the direction of the lead evaluator.	

EVENT 3: Given that the unit is at power and VCT level transmitter 1115 has failed high, the crew will respond in accordance with the applicable annunciator response.		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies annunciator C-A1, "VCT HI-LO LEVEL L-115."	
	RO identifies LT-1115 is failed high and VCT is diverting to stripper.	
	NOTE: Depending on VCT level the RO may start a manual makeup.	
	US reads note in AR about 1-CH-LT-1115 failing high - loss of auto swapover capability, full divert to stripper, loss of auto makeup capability.	
	CREW TAKES ACTION TO PREVENT LOSS OF CHARGING PUMP SUCTION. • Crew directs an operator to open breaker 7 in 1-EP-CB-26B. • RO performs manual makeup to prevent VCT from emptying (if required.)	**CRITICAL TASK: Direct an operator to open the breaker to de-energize 1-CH-LCV-1115A, or makeup to VCT to prevent loss of charging pump suction.**
	US makes notifications about LT-1115 failure and requests instrument shop assistance.	
	NOTE: The next event may occur once the letdown divert valve has been de-energized, or at the discretion of the lead evaluator.	

EVENT 4: Given that the unit is at power, and the controlling first stage pressure channel has failed low, the crew will respond IAW 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies SG level error alarms and high steam flow alarms.	
	RO identifies annunciator B-A7, "MEDIAN/HI TAVG <> TREF DEVIATION."	
	BOP identifies first stage pressure channel III failing low.	
	US directs entry into 1-AP-3.	
	BOP verifies redundant instrument channel indication normal.	
	BOP verifies SG level control parameters normal.	
	NOTE: US may instruct BOP to place MFRVs in manual and control OR allows SG levels to control at 33%.	
	BOP verifies turbine first stage pressure indication normal (NO).	
	CREW TAKES ACTION TO PREVENT EXCESSIVE CONTROL ROD INSERTION. • RO places rod control in MANUAL.	
	RO verifies PRZR level indications normal.	
	BOP verifies both turbine first stage pressure channels normal (NO).	
	RO transfers condenser steam dumps to steam pressure mode.	
	BOP verifies operable channels selected for SGWLC (NO).	

EVENT 4: Given that the unit is at power, and the controlling first stage pressure channel has failed low, the crew will respond IAW 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO/BOP swap SGWLC channels as directed by the US.	
	BOP verifies SG levels on program and returns MFRVs to automatic.	
	RO verifies Tave and Tref matched and returns rod control to automatic.	
	Crew refers to 1-MOP-55.81 for placing the failed channel in trip.	
	US refers to ITS-3.3.1 (condition R) and 3.3.2 (condition D) and determines that trips/permissives must be checked within 1 hour and the failed channel must be placed in trip within 72 hours.	
	NOTE: The next event will occur after the crew identifies the applicable MOP, and rods have been restored to fully withdrawn and placed back in AUTO, or as directed by the lead evaluator.	

EVENT 5: Given that the unit is at power and a steam leak has developed on the "A" SG, the crew will respond in accordance with 1-AP-38, "Excessive Load Increase."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO notices a decrease in Tave and an increase in reactor power.	
	US directs crew to perform immediate actions of 1-AP-38.	
	RO verifies steam dumps closed.	
	BOP verifies SG PORVs closed.	
	Crew determines that turbine must be ramped down to reduce power below 100%.	
	CREW STOPS POWER INCREASE. • BOP ramps turbine down, at rate determined by US, until power is ≤ 100% and stable.	
	NOTE: A security officer will inform the crew that steam can be seen coming from the roof of the unit 1 MSVH.	
	Crew sends an operator to investigate steam leak.	
	NOTE: The operator sent to the MSVH will report that a safety valve on "A" SG appears to be leaking by the seat.	
	US requests maintenance help to repair/gag the leaking SG safety valve.	
	US refers to ITS 3.7.1 and determines need to ramp unit to 52% within 4 hours.	
	NOTE: The Operations Manager on Call will request that the unit be ramped to 50% power.	
	NOTE: The next event will be the crew reducing unit power for the required reactivity manipulation.	

EVENT 6: Given that there is a steam generator safety valve leaking by, the crew will reduce unit power in accordance with 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	US briefs crew on ramp.	
	NOTE: When the US directs the RO to determine the reactivity required to ramp the unit, lead examiner will provide the crew with reactivity calculations from the reactor engineer, verified by the STA.	
	RO commences lowering Tave using boration/control rods.	
	BOP commences lowering main turbine load. • Verifies load rate at .3%/min. • Lowers reference setter. • Pushes GO button.	
	BOP takes turbine to IMP-IN when power is ≤98%. • Pushes HOLD button • Matches reference and setter • Pulses VPL down until red light lit • Pulses VPL up until red light not lit • Verifies governor tracking meter reads 0 • Pushes IMP-IN button • Resumes ramp.	
	BOP directs turbine building watchstander to place LP heater drain pumps on recirc and shutdown when power is approximately 90%.	
	NOTE: The next event will occur when the lead evaluator is satisfied with the reactivity change.	

EVENT 7: Given that the unit is at power and a loss of vital bus 1-I has occurred, the crew will respond in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: The loss of vital bus 1-I will cause a safety injection on PRZR low-low pressure. The crew will proceed to 1-E-0 (event 8) until the plant is stable.	
	NOTE: The following steps refer to 0-AP-10 actions. 1-E-0 actions begin with event 8.	
	US directs BOP to initiate 0-AP-10.	
	BOP performs 0-AP-10 diagnostics.	
	BOP reports results of diagnostics to US.	
	US directs BOP to initiate 1-MOP-26.60 for loss of vital bus 1-I.	
	Crew directs safeguards operator to investigate loss of vital bus 1-I.	
	NOTE: Operator sent to check inverter 1-I will report that the inverter cabinet is charred on the outside and a strong odor of burnt insulation is apparent in the area near the inverter.	
	US directs electrical department to investigate 1-I vital bus and inverter.	
	NOTE: Electricians sent to check inverter 1-I will report that the inverter is apparently damaged and cannot be re-energized.	
	NOTE: Electricians sent to check vital bus 1-I will report that the bus has been checked and that there is no evidence of damage.	
	US directs backboards to perform 1-MOP-26.60 and re-energize the vital bus via the SOLA transformer.	

EVENT 7: Given that the unit is at power and a loss of vital bus 1-I has occurred, the crew will respond in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew monitors RCP stator/bearing temperatures due to loss of CC flow and stops any RCPs that exceed limits.	
	Crew refers to 1-AP-3, 1-AP-4.3 and 1-AP-6.	
	US refers to ITS 3.8.7 and 3.8.9 declares the vital bus and inverter inoperable.	
	Crew energizes the vital bus via the SOLA transformer.	
	NOTE: Event 8 will occur concurrently with this event.	

EVENT 8: Given that the unit is at power and the loss of vital bus 1-I has caused an inadvertent SI, the crew will respond in accordance with 1-E-0, "Reactor Trip or Safety Injection".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	US directs crew to enter 1-E-0.	
	RO verifies reactor tripped.	
	BOP verifies turbine tripped.	
	RO verifies AC emergency buses energized.	
	Crew checks if safety injection has actuated. (YES)	
	RO/BOP manually initiate safety injection.	
	NOTE: At this point, the US may choose to direct the BOP to perform 0-AP-10.	
	BOP verifies feedwater isolation.	
	RO/BOP manually initiate phase A isolation.	
	BOP verifies AFW pumps running.	
	RO/BOP verify SI pumps running.	
	BOP verifies SW pumps running.	
	Crew checks if MS lines should be isolated (NO).	

EVENT 8: Given that the unit is at power and the loss of vital bus 1-I has caused an inadvertent SI, the crew will respond in accordance with 1-E-0, "Reactor Trip or Safety Injection".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew checks if CDA is required (NO).	
	Crew checks if QS is required (NO).	
	RO/BOP verify SI flow.	
	RO/BOP verifies AFW flow.	
	RO checks RCS average temperature.	
	RO checks pressurizer PORVs and spray valves.	
	RO checks RCP trip and charging pump recirc criteria.	
	BOP checks SG not faulted (NO)	
	US directs transition to 1-E-2.	
	BOP verifies MSTVs and MSTV bypass valves closed (NO).	
	BOP closes MSTVs.	
	BOP checks pressures in all SGs.	
	BOP identifies that only "A" SG is faulted.	

EVENT 8: Given that the unit is at power and the loss of vital bus 1-I has caused an inadvertent SI, the crew will respond in accordance with 1-E-0, "Reactor Trip or Safety Injection".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew isolates the faulted SG. • BOP verifies MFW isolated. • **BOP closes A SG AFW supply valve 1-FW-MOV-100D.** • BOP verifies 1-FW-HCV-100A closed. • BOP verifies A SG PORV closed. • BOP verifies all SG blowdown trip valves closed. • Crew dispatches an operator to locally close 1-MS-18. • Crew dispatches an operator to verify closed 1-MS-19.	**CRITICAL TASK: Isolate AFW to "A" SG**
	BOP checks ECST level.	
	BOP establishes IA to containment.	
	BOP checks secondary radiation.	
	Crew checks if SI can be terminated (YES).	
	US directs crew to transition to 1-ES-1.1.	
	RO resets SI.	
	RO stops one charging pump and places it in auto.	
	RO checks RCS pressure stable or increasing (YES).	
	BOP isolates the BIT.	

EVENT 8: Given that the unit is at power and the loss of vital bus 1-I has caused an inadvertent SI, the crew will respond in accordance with 1-E-0, "Reactor Trip or Safety Injection".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO puts FCV-1122 in manual and closes.	
	RO verifies HCV-1311 closed.	
	RO attempts to open normal charging valves.	
	RO reports that breaker for 1-CH-MOV-1289B appears to have tripped.	
	Crew dispatches operator/electrician to investigate.	
	NOTE: Operator/electrician sent to breaker will report that it can not be re-closed.	
	US will request an operator to hand-crank the MOV open.	
	NOTE: MOV-1289B will be handcranked open when requested.	
	RO will establish 25 gpm charging.	
	RO will control charging flow to maintain pressurizer level.	
	US will announce transition to 1-ES-1.1, step 7.	
	NOTE: The scenario may be terminated when the crew transitions to 1-ES-1.1, or at the discretion of the lead evaluator.	

REFERENCES

PROCEDURE	REV.
Operating Procedure 1-OP-8.9, "Transferring Running Charging Pumps."	6
Abnormal Procedure 1-AP-18, "Increasing Containment Pressure."	6
Abnormal Procedure 1-AP-3, "Loss of Vital Instrumentation."	17
Abnormal Procedure 1-AP-38, "Excessive Load Increase."	11
Abnormal Procedure 0-AP-10, "Loss of Electrical Power."	30
Operating Procedure 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."	47
Emergency Procedure 1-E-0, "Reactor Trip or Safety Injection."	28
Station Annunciator Response Procedures.	N/A
Administrative Procedure VPAP-1407, Verbal Communications.	2
INPO, Guideline for Teamwork and Diagnostic Skill Development: INPO 88-003,	Jan. 1988
INPO, ACAD 90-022 Simulator Training Guidelines	Nov. 1990

ATTACHMENTS

ATTACHMENT 1 - LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 2 - SIMULATOR OPERATOR'S COMPUTER PROGRAM

ATTACHMENT 3 - SCENARIO PERFORMANCE OBJECTIVES

ATTACHMENT 4 - SIMULATOR PERFORMANCE SUMMARY (SXG Only)*

ATTACHMENT 5 - SIMULATOR BOOTH OPERATOR CHECKLIST**

ATTACHMENT 6 – SEG INSTRUCTIONS**

ATTACHMENT 7 – SXG INSTRUCTIONS**

ATTACHMENT 8 - COMPETENCY AREA RATING FACTOR WORKSHEET **

ATTACHMENT 9 - SIMULATOR SCENARIO REVIEW CHECKLIST (SXG Only) *

ATTACHMENT 10 - SIMULATOR EXAMINATION PREBRIEF (SXG Only) **

* Located on N:\N\LORP\Simulator\shl\
** Located in the Instructor Booth.

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

1. San Onofre 1, Westinghouse PWR.

Automatic Reactor Trip Upon Transfer of Vital Bus #1 With Pre-Existing Failure of High Startup Rate Block Relay. At 1:14 p.m. on October 17, 1991, during the performance of corrective maintenance on an alarm module powered from vital bus #1, and with pre-existing failure of the high startup rate (SUR) block relay, unit 1 automatically tripped from 91 percent power on a spurious high SUR signal. The spurious SUR signal was generated when a momentary power interruption occurred during an automatic transfer of vital bus # 1 to its alternate power source, which was initiated due to a momentary ground fault on the bus. As a taped alarm module power lead was being routed through a grooming hole in the module chassis, the lead arced apparently through the tape to the module chassis, causing the ground. Plant response to the scram was normal. Laboratory analysis of the taped lead revealed that the insulating capability of the tape had apparently been degraded during handling. This is postulated to have occurred when the taped lead contacted a sharp edge of the grooming hole on the alarm module chassis when the lead was inserted through the hole. The methodology used to route insulated live leads will be reviewed. Any methodology enhancements identified by this review will be implemented as appropriate. There is no safety significance to this event since all RPS and AFW components actuated in accordance with design.

2. Commonwealth Edison ZION 2 Westinghouse

With unit 2 at full power , operating personnel reported excessive steam leak around the bonnet of the main steam safety valve , 2ms0026 . Aged , worn , and deteriorated body to bonnet gaskets and possible steam cuts on gasket surfaces caused the bonnet steam leak on the mainsteam safety valve 2ms0026 . Mechanical maintenance personnel made a temporary repair by injecting furmanite sealing compound into existing injection plugs on the main steam safety valve. Another work request has been written for a permanent repair later.

3. Florida Power & Light Company TURKEY POINT 4 Westinghouse

Operations personnel noted during rounds that the main steam line '4c' steam safety valve inlet flange had a steam leak. The external leakage presented a personnel safety hazard, unacceptable loss of secondary steam and degradation of the valve's fluid containment function. The main steam system and unit 4, at full power, were not affected. A related '4c' steam line safety, rv-4-1413 , was also found leaking concurrently and was reported separately. Gasket wearout or material defect / flaw or loose inlet flange bolting are possible causes of the steam leakage; root cause was not determined. Leakage was stopped by sealing compound injection / temporary on-line leak repair. Post maintenance testing was satisfactory noting no further leakage.

ATTACHMENT 2

SIMULATOR OPERATOR'S COMPUTER PROGRAM

SIMULATOR OPERATOR'S COMPUTER PROGRAM
Scenario NRC 3

Initial conditions

16. Recall 100% power middle-of-life IC.

17. Ensure Tave, Tref, PDTT level, and VCT level are selected on trend recorders.

18. Tagout 1H diesel per MOP.

19. Pre-load 10 gpd tube leak on "A" SG (malfunction RC2401 = 8E-4) and allow to run until "A" SG N-16 radiation monitor stabilizes at approximately 10.26 gpd.

20. Place PT-1457 in trip per MOP-55.73.

21. Ensure VCT level is 40%.

22. Ensure "A" charging pump running.

PRELOADS PRIOR TO SCENARIO START

CONDITION	MALFUNCTION/OVERRIDE/ETC.
PT-1457 failure	RC0705, delay time = 0, ramp = 0, severity level = -1, trigger = N/A
Failure of 1115B and 1115D to auto-open	MOV115B_MP = OFF MOV115D_MP = OFF
CH-MOV-1289B failure to re-open	Using PNID, setup event trigger to take CHMOV289B_RACKIN = F when control switch is taken to OPEN.

SCENARIO EVENTS

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
1) Containment air inleakage	CV01, delay time = 5, ramp = 5, severity value = 20, trigger = 1 NOTE: APPROXIMATELY 3 MINUTES AFTER BEING DISPATCHED, AN OPERATOR WILL REPORT THAT CONTAINMENT VACUUM BREAKER 1-HV-MOV-102 IS MAKING A LOUD WHISTLING SOUND. **NOTE: If told to attempt to hand-torque the MOV:** **Delete CV01 malfunction, then inform the MCR crew that the valve has been closed and that the whistling noise has stopped.** **NOTE: If asked why the valve was open, report that there are some painters in the area, however, they said that they did nothing to the valve.** **NOTE: The next event will occur after the crew stabilizes containment partial pressure, or as directed by the lead evaluator.**
2) VCT level transmitter 1115 failure	CH1202, delay time = 5, ramp = 5, severity value = 1, trigger = 2. **NOTE: When requested to open breaker 7 in 1-EP-CB-26B, activate event trigger 6 on a one-minute timer with the following overrides:** • **Lamp override LCV115A_LT_R, override OFF** • **Lamp override LCV115A_RT_R, override OFF** • **Switch override LCV115A_AUTO, override OFF** • **Switch override LCV115A_DIVERT, override OFF** • **Switch override LCV115A_NORM, override ON** **NOTE: IF crew does not request breaker 7 opened, and has NOT manually opened charging pump suction valves from RWST, observe VCT level. If VCT is allowed to empty, take PNID variable CHMOV115E_RACKIN = F and CHMOV115E = 0, then set CH1201_DEG and CH1202 both = -1. If crew does NOT restore a suction source within 30 seconds after VCT empties, trip running charging pumps.** **NOTE: The next event may occur once the letdown divert valve has been de-energized, or at the discretion of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
3) Swap charging pumps	**NOTE: As the SS, call the US and request the crew to place "B" charging pump in service without delay for maintenance to observe seal leakage per the shift orders.** **NOTE: Auxiliary building operator will report that the auxiliary oil pump for "B" charging pump is running in AUTO.** **NOTE: After "B" charging pump is started, report to RO that pump looks fine and there is no seal leakage.** **NOTE: If requested, the auxiliary building operator will report that seal leakage is zero on "A" charging pump.** **NOTE: The next event may occur once charging pumps have been swapped, or at the direction of the lead evaluator.**
4) First stage pressure failure	MS0201, delay time = 5, ramp = 45, severity value = -1, trigger = 3 **NOTE: The next event will occur after the crew identifies the applicable MOP, and rods have been restored to fully withdrawn and placed back in AUTO, or as directed by the lead evaluator.**
5) Small steam leak	MS1401, delay time = 5, ramp = 5, severity value = 75, trigger = 4 **NOTE: After MS1401 is fully implemented, setup event trigger from either RTB open to ramp severity value from 75% to 50% over a 5 second period.** **NOTE: A security officer will inform crew that steam can be seen coming from the roof of the unit 1 MSVH.** **The operator sent to the MSVH will report that a safety valve on "A" SG appears to be leaking by the seat.** NOTE: If the crew does not begin a ramp, then have the OMOC request the crew begin a controlled ramp to 50% power. NOTE: The next event will be the crew reducing unit power for the required reactivity manipulation.
6) Ramp down	**NOTE: The next event will occur when the lead evaluator considers the reactivity change to be sufficient.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
7) Loss of VB 1-I	EL1301, delay time = 5, event trigger = 5. **NOTE: Operator sent to check inverter 1-I will report that the inverter cabinet is charred on the outside and a strong odor of burnt insulation is apparent in the area near the inverter.** **NOTE: Electricians sent to check inverter 1-I will report that the inverter is apparently damaged and cannot be re-energized.** **NOTE: Electricians sent to check vital bus 1-I will report that the bus has been checked and that there is no evidence of damage.** **NOTE: When crew requests SOLA transformer supply breaker closed, wait 2 minutes and then call back and tell them the breaker is closed.**
8) Inadvertent SI	**NOTE: Operator sent to breaker for 1-CH-MOV-1289B will report that it cannot be re-closed.** **NOTE: When the crew requests MOV-1289B be handcranked open, use PNID to open valve.** **NOTE: The scenario may be terminated when the crew transitions to 1-ES-1.1, or at the discretion of the lead evaluator.**

ATTACHMENT 3

SCENARIO PERFORMANCE OBJECTIVES

SIMULATOR REQUALIFICATION EXAMINATION

TERMINAL PERFORMANCE OBJECTIVE

Given equipment failures and operational situations, operate the plant in accordance with Technical Specifications to bring the unit to a safe condition, using applicable procedures, and applying effective teamwork, communication, and diagnostic skills.

GENERIC PERFORMANCE OBJECTIVES

A. During shift operations the shift supervisor will take a conservative course of action, especially when uncertain conditions exist, when dealing with core cooling or heat sink availability, primary system and containment integrity, and reactivity control associated with plant evolutions.

B. During shift operations the shift supervisor will provide overall crew guidance by prioritizing and integrating the actions of the shift crew in accordance with administrative procedures.

C. During shift operations each crew member will participate in a team effort that resolves conflicts, provides input into the team decision and communicates all the necessary information to enhance teamwork in accordance with administrative procedures.

D. During shift operations the Shift Technical Advisor will independently assess events and based on those assessments make recommendations to the crew regarding mitigation strategy.

EVENT 1 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and indications exist of excessive air inleakage to the containment, the crew will respond IAW the applicable annunciator response, and 1-AP-18, "Increasing Containment Pressure."

NORTH ANNA SPECIFIC TASKS:

R521 Respond to increasing containment pressure.

S70 Evaluate compliance with technical specifications.

CRITICAL TASK:

N/A

EVENT 2 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and VCT level transmitter 1115 is failed, the crew will respond in accordance with the applicable annunciator response.

NORTH ANNA SPECIFIC TASKS:

R699 Respond to main control board annunciator alarms.

CRITICAL TASK:

See next page

CT Statement:

Crew takes action to prevent loss of charging pump suction.

Safety Significance:

With VCT level transmitter LT-115 failed high the auto swapover to the RWST is lost, letdown is on full divert to the gas stripper, and makeup capability is lost. If the level decrease is not stopped the charging pumps will lose suction. Failure to stop the level decrease constitutes a "mis-operation or incorrect crew performance which leads to degraded ECCS capacity."

Cues:

VCT HI-LO LEVEL L-115 annunciator
Letdown on full divert to gas stripper

Performance Indicator:

Operator is instructed to open breaker 7 in 1-EP-CB-26B.
Manual makeup is started to restore VCT level.

Feedback:

VCT level stable or increasing.

WOG Reference:

None

Conditions:

Before charging pumps lose suction from the VCT.

EVENT 3 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and charging pumps are to be swapped, the crew will swap charging pumps IAW 1-OP-8.9, "Transferring Running Charging Pumps."

NORTH ANNA SPECIFIC TASKS:

R593 Transfer the running charging pump

CRITICAL TASK:

N/A

EVENT 4 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power, and the controlling first stage pressure channel has failed, the crew will respond IAW 1-AP-3, "Loss of Vital Instrumentation."

NORTH ANNA SPECIFIC TASKS:

R719 Respond to a failure of the controlling first-stage pressure channel.

S70 Evaluate compliance with technical specifications.

CRITICAL TASK:

See next page.

CT Statement:

RO places rods in manual to stop rod insertion.

Safety Significance:

A rod insertion caused by a failed first stage pressure transmitter causes an unnecessary transient and could allow rods to insert below the low-low insertion limit.

Cues:

Control rods stepping in.
Failed first stage pressure transmitter.

Performance Indicator:

Crew identifies first stage pressure failure.
RO places rod control to MANUAL.

Feedback:

Rods stop stepping.

WOG Reference:

None

Conditions:

Before rod low-low insertion limit alarm.

EVENT 5 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a steam leak has developed on the "A" SG, the crew will respond in accordance with 1-AP-38, "Excessive Load Increase."

NORTH ANNA SPECIFIC TASKS:

R539 Perform the immediate operator actions in response to an excessive load increase

CRITICAL TASK:

See next page

CT Statement:

Crew stops power increase.

Safety Significance:

Failure to stop power increase and coolant temperature decrease would cause average coolant temperature to drop below the minimum temperature for criticality. This would mean the following could not be assured: 1) Moderator temperature coefficient is within its analyzed temperature range, 2) Protective instrumentation is within its normal operating range, 3) P-12 interlock is above its setpoint, and 4) Compliance with Appendix G to 10 CFR part 50.

Cues:

Indication of power increase:

* Several annunciators. (i.e. PRZR Hi/Lo Press, PRZR Lo Level)
* Reactor power increasing.
* Steam flow increasing.

Performance Indicator:

BOP ramps turbine back until reactor power < 100%.

Feedback:

Reactor power increase stopped
Steam flow decreased

WOG Reference:

None

Conditions:

Prior to receiving an automatic reactor trip on over power.

EVENT 6 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that there is a steam generator safety valve leaking by, the crew will reduce unit power in accordance with 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."

NORTH ANNA SPECIFIC TASKS:

N/A

CRITICAL TASK:

N/A

EVENT 7 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a loss of vital bus 1-I has occurred, the crew will respond in accordance with 0-AP-10, "Loss of Electrical Power."

NORTH ANNA SPECIFIC TASKS:

S27 Direct the restoration of the electrical distribution system following the performance of the loss of electrical power diagnostic

CRITICAL TASK:

N/A

EVENT 8 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and the loss of vital bus 1-I has caused an inadvertent SI, the crew will respond in accordance with 1-E-0, "Reactor Trip or Safety Injection".

NORTH ANNA SPECIFIC TASKS:

R185 Perform the immediate operator actions in response to a reactor trip or safety injection.

CRITICAL TASK:

N/A

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 4 DOCUMENT REVISION RECORD		
REV	**TIR NUMBER**	**REASON**
0	N02-0293	Develop scenario for NRC initial licensed operator exams, 2002

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 4 DOCUMENT REVISION RECORD		
REV	**TIR NUMBER**	**REASON**

DOMINION

NORTH ANNA POWER STATION

INITIAL LICENSE CLASS

NRC SIMULATOR EXAMINATION

SCENARIO NRC 4

NRC SIMULATOR EXAMINATION SCENARIO

EVENT	DESCRIPTION
1.	Shutdown a MFW pump
2.	Continue the unit shutdown for refueling
3.	"B" SG selected steam flow channel fails
4.	"B" SG PORV fails open due to failure of pressure transmitter
5.	"A" charging pump trips and discharge check valve fails to close
6.	PRZR spray valve PCV-1455A fails open (able to manually close)
7.	SBLOCA
8.	ATWS

Scenario Recapitulation:

Malfunctions after EOP entry	**1** (ATWS)
Total Malfunctions	**6** ("B" SG steam flow channel failure, "B" SG PORV failure, "A" charging pump trip w/failure of discharge check valve, PRZR spray valve failure, SBLOCA, ATWS)
Abnormal Events	**4** ("B" SG steam flow channel failure, "B" SG PORV failure, "A" charging pump trip w/failure of discharge check valve, PRZR spray valve failure)
Major Transients	**1** (SBLOCA)
EOPs Entered	**2** (1-E-0, 1-E-1)
EOP Contingencies	**1** (1-FR-S.1)
Critical Tasks	**1** (Bring reactor subcritical)

SCENARIO DURATION

120 Minutes

SIMULATOR EXAMINATION SCENARIO SUMMARY
SCENARIO NRC 4

The scenario will begin with unit 1 at 50% power in the process of shutting down for refueling. A confirmed 10 gpd tube leak exists in "A" SG and 1H diesel is tagged for maintenance. Shift orders are to shutdown "C" main feedwater pump and continue with the unit shutdown, monitor "A" SG leakage, and return 1H diesel to service when maintenance is complete.

The first event will be a normal evolution. The crew will shutdown "C" main feedwater pump in accordance with 1-OP-31.1, "Main Feedwater System," prior to continuing with the unit shutdown. After the pump is shutdown, the next event will occur.

The next event will be the required reactivity manipulation. The crew will continue with the unit shutdown for refueling in accordance with 1-OP-2.2, "Unit Power Operation from Mode 1 to Mode 2." When the lead examiner is satisfied with the reactivity change, the next event will occur.

The selected steam flow transmitter for "B" steam generator will fail low, causing the "B" main feed regulating valve to go full closed. The crew will enter 1-AP-3, "Loss of Vital Instrumentation," and the BOP will take manual control of the FRV and control level prior to reaching the low-low level reactor trip setpoint. The crew will swap to an operable channel and return SG level control to automatic. After technical specifications have been reviewed and the crew has identified the appropriate MOP for placing the channel in TRIP, the next event will occur.

The "B" SG PORV will fail open due to a failure of its pressure transmitter. The crew will respond in accordance with 1-AP-38, "Excessive Load Increase," and manually close the valve. After the crew stabilizes the unit, the next event will occur.

The "A" charging pump will trip and its discharge check valve will fail to close following the automatic start of "B" charging pump. The crew will respond in accordance with 1-AP-49, "Loss of Normal Charging," and restore normal charging flow. The US will declare "A" charging pump inoperable IAW technical specifications. After the crew has stabilized the unit and the US has reviewed technical specifications, the next event will occur.

Pressurizer spray valve PCV-1455A will fail open causing RCS pressure to decrease. The crew will respond in accordance with 1-AP-44, "Loss of RCS Pressure," and manually close the valve. After the crew has stabilized the unit, the next event will occur.

The PRZR spray line piping fails causing a RCS leak, which eventually degrades to a small-break LOCA. The crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," and determine that a reactor trip is required. The next event will occur when the crew attempts to manually trip the reactor.

The reactor will not trip manually or automatically and the crew will respond in accordance with 1-FR-S.1, "Response to Nuclear Power Generation/ATWS." The reactor trip breakers will be locally opened and the crew will eventually transition back to 1-E-0, "Reactor Trip or Safety Injection." After completing the diagnostic steps, the crew will transition to 1-E-1, "Loss of Reactor or Secondary Coolant," and determine that a post-LOCA cooldown and depressurization is required. The scenario can be terminated when the team enters 1-ES-1.2, "Post-LOCA Cooldown and Depressurization," or when the lead examiner is satisfied.

SCENARIO TURNOVER SHEET

Read the following to the crew:

Purpose: This examination is intended to evaluate the crew's performance of various tasks associated with the Licensed Operator Training Program. All activities should be completed in accordance with approved operations standards.

7. You are on a day shift during the week.

8. When conditions allow, utilize the computer log systems as you would in the plant.

Unit Status:
Unit 1 is at 50% power in the process of shutting down for refueling. The unit ramp is being held for turnover. There is a confirmed 10 gpd tube leak in "A" SG. All applicable actions of 1-AP-5 have been completed. RCS boron concentration is 120 ppm and core age is 17,000 MWD/MTU. The amount of RCS dilution required to raise temperature one degree is 2097 gallons and the boration required to lower temperature one degree is 17.7 gallons. Xenon is increasing. Aux steam is on unit 2. The maintenance rule window is green for all planned maintenance.

Unit 2 is at 100% power.

The system operator has reported thunderstorms in the area.

Equipment Status:
1H diesel was tagged-out two hours ago for maintenance.

Shift Orders:
Monitor "A" SG tube leakage. Shutdown "C" main feedwater pump, then continue with the unit shutdown.

EVENT 1: Given that a unit shutdown for refueling is in progress, the crew will shutdown "C" main feedwater pump IAW 1-OP-31.1, "Main Feedwater System," before continuing with the unit shutdown.		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP reviews initial conditions, and precautions and limitations.	
	BOP places control switches for "B" MFW pump in PULL-TO-LOCK.	
	BOP closes discharge MOV for "B" MFW pump.	
	BOP verifies either "A" or "C" MFW pump recirculation valve is open.	
	BOP closes discharge MOV for "C" MFW pump.	
	BOP verifies "C" MFW pump motor amps and discharge pressure decrease.	
	BOP places control switches for "C" MFW pump in PULL-TO-LOCK.	
	BOP requests turbine building operator to place the "C" MFW pump auxiliary oil pump in HAND.	
	BOP places MFW pump recirculation valve in AUTO.	
	BOP requests turbine building operator to observe local MFW pump flow indication.	
	NOTE: Turbine building operator will report "A" MFW pump flow indication is approximately 8,000 gpm.	
	BOP places control switches for "C" MFW pump in AUTO and verifies discharge MOV opens.	
	BOP requests turbine building operator to verify alignment of warm-up lines.	
	NOTE: The next event will occur after feedwater pump has been shutdown, or at the direction of the lead evaluator.	

EVENT 2: Given that a unit shutdown for refueling is in progress, the crew will continue with the unit shutdown in accordance with 1-OP-2.2, "Unit Power Operation from Mode 1 to Mode 2."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: Crew is given reactivity calculations from reactor engineer, verified by STA, to be provided prior entering the simulator.	
	US briefs crew on ramp prior to entering the simulator.	
	RO commences lowering Tave using boration/control rods.	
	BOP commences lowering main turbine load. • Verifies load rate at .3%/min. • Lowers reference setter. • Pushes GO button.	
	NOTE: The next event will occur when the lead evaluator is satisfied with the amount of reactivity change.	

EVENT 3: Given that the unit is at power and a controlling SG steam flow channel has failed low, the crew will respond IAW 1-AP-3, "Loss of Vital Instrumentation."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies "B" SG steam flow channel III failing low.	
	US directs crew to perform immediate actions of 1-AP-3.	
	BOP verifies redundant channels normal.	
	BOP identifies "B" SG steam flow channel III has failed low.	
	Crew manually controls steam generator level. • **BOP places "B" MFRV in MANUAL.** • **BOP restores level in "B" SG to normal.**	
	RO verifies first stage pressure indications normal.	
	RO verifies systems affected by PRZR level channels normal.	
	RO verifies both first stage pressure channels normal.	
	RO selects all SGWLC channels to an operable channel.	
	BOP verifies that "B" SG steam flow channel III is the only failed channel.	
	US directs RO to enter 1-MOP-55.77.	
	US refers to ITS-3.3.1 and 3.3.2 and determines the channel must be placed in TRIP within 72 hours.	
	NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.	

EVENT 4: Given that the unit is at power and a SG PORV has failed open, the crew will respond IAW 1-AP-38, "Excessive Load Increase".		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies loss of MW and RO identifies increase in reactor power.	
	US directs crew to enter 1-AP-38.	
	RO verifies all steam dumps closed.	
	BOP identifies "B" SG PORV open.	
	CREW STOPS POWER INCREASE. • BOP reduces turbine load.	
	NOTE: Security will report a loud noise and steam coming from the top of the unit-1 main steam valve house.	
	BOP verifies turbine load normal.	
	RO verifies reactor power is less than or equal to 100% power.	
	Crew dispatches an operator to check for the source of steam.	
	Crew checks plant stable.	
	BOP checks all steam flow indications normal.	
	BOP checks turbine control in operator auto.	
	NOTE: The operator will report that the "B" steam generator PORV is open.	
	Crew directs the operator to isolate the "B" SG PORV by closing 1-MS-59.	
	NOTE: The next event will occur after the crew has stabilized the unit, or at the direction of the lead evaluator.	

EVENT 5: Given that the unit is at power and a loss of the running charging pump concurrent with a failed open discharge check valve has occurred, the crew will respond in accordance with 1-AP-49, "Loss of Normal Charging."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies loss of "A" charging pump.	
	US directs crew to enter 1-AP-49.	
	RO checks "B" charging pump for gas binding.	
	RO identifies that a charging pump manipulation has taken place.	
	BOP closes discharge MOVs for "A" charging pump.	
	RO verifies charging flow returns to normal.	
	RO restores letdown as directed by the US.	
	NOTE: Operator/electricians will report "A" charging pump breaker has an instantaneous overcurrent drop.	
	US reviews ITS 3.5.2 for having only one operable HHSI pump.	
	NOTE: During the time that the "A" charging pump is tripped with both discharge MOVs open (and a failed-open check valve) ITS 3.5.2 condition C states that ITS 3.0.3 actions apply.	
	NOTE: The next event will occur after the crew stabilizes the unit, or at the direction of the lead evaluator.	

EVENT 6: Given that the unit is at power and a PRZR spray valve has failed open, the crew will be expected to respond IAW 1-AP-44, "Loss of Reactor Coolant System Pressure."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew identifies RCS pressure decreasing.	
	US directs crew to enter 1-AP-44.	
	RO checks PRZR PORV closed.	
	RO checks PRZR master controller normal.	
	RO identifies that one spray valve is open.	
	CREW STOPS RCS PRESSURE DECREASE. • RO places failed spray valve controller in MANUAL and closes spray valve.	
	Crew verifies all PRZR heaters energized.	
	RO checks auxiliary spray valve closed.	
	Crew checks PRZR safety valves and PORVs closed.	
	Crew verifies RCS pressure stable or increasing.	
	Crew verifies RCS pressure returned to normal.	
	US requests I&C to investigate problem with spray valve.	
	NOTE: The next event will occur after the crew stabilizes the unit, or at the direction of the lead evaluator.	

EVENT 7: Given that the unit is at power and a PRZR spray line fails causing a small-break LOCA, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," and 1-E-0, "Reactor Trip or Safety Injection."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew identifies that charging flow has increased and/or containment sump pumping frequency has increased.	
	US directs crew to enter 1-AP-16.	
	Crew verifies that the unit is in mode 1.	
	RO checks PRZR level, RCS subcooling, and VCT level under control. (NO)	
	RO isolates letdown by closing HCV-1200B and LCV-1460A and B.	
	RO manually opens FCV-1122 to maximize charging flow.	
	RO starts a manual makeup to the VCT from the blender.	
	Crew determines that PRZR level cannot be maintained and a reactor trip is required.	
	US directs the crew to enter 1-E-0.	
	Crew attempts to manually trip the reactor. (NO)	
	NOTE: The next event will occur when the crew identifies the failure of the reactor to trip.	

EVENT 8: Given that the unit is at power, and a valid ATWS condition exists concurrent with a SBLOCA, the crew will respond IAW 1-FR-S.1, "Response to Nuclear Power Generation/ATWS," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew identifies the reactor did not trip and takes action to bring the reactor subcritical. • US directs crew to enter 1-FR-S.1. • **RO verifies automatic rod insertion or manually inserts control rods.** • BOP manually trips the turbine. • BOP checks AFW pumps running. • RO verifies at least one charging pump running. • **RO places 1-CH-P-2A in FAST.** • **RO opens 1-CH-MOV-1350.** • Crew verifies adequate negative reactivity insertion. • RO checks PRZR pressure.	**CRITICAL TASK: Ensure control rods insert and initiate emergency boration, or dispatch operator to trip reactor locally.**
	RO checks if reactor trip has occurred (NO.)	
	NOTE: The following action satisfies the critical task of bringing the reactor subcritical.	
	Crew identifies the reactor did not trip and takes action to bring the reactor subcritical. • **Crew dispatches an operator to locally open reactor trip breakers.**	
	BOP checks if turbine trip has occurred.	
	BOP checks SG levels.	
	RO verifies all dilution paths isolated.	
	Crew checks for reactivity insertion from uncontrolled RCS cooldown (NO).	

EVENT 8: Given that the unit is at power, and a valid ATWS condition exists concurrent with a SBLOCA, the crew will respond IAW 1-FR-S.1, "Response to Nuclear Power Generation/ATWS," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO checks CETCs.	
	RO verifies reactor subcritical.	
	US directs crew to return to 1-E-0.	
	RO verifies reactor tripped.	
	BOP verifies turbine trip.	
	RO verifies AC emergency busses energized.	
	Crew checks if safety injection has actuated. (YES)	
	US directs crew to manually initiate SI.	
	RO/BOP manually initiate SI.	
	BOP verifies FW isolation.	
	US directs RO/BOP to manually initiate phase A isolation.	
	RO/BOP manually initiate phase A isolation.	
	BOP verifies AFW pumps running.	

EVENT 8: Given that the unit is at power, and a valid ATWS condition exists concurrent with a SBLOCA, the crew will respond IAW 1-FR-S.1, "Response to Nuclear Power Generation/ATWS," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO/BOP verify SI pumps running.	
	BOP verifies SW pumps running.	
	Crew checks if MS should be isolated (NO).	
	BOP verifies SI flow.	
	BOP verifies AFW flow.	
	RO checks RCS temperature stable at or trending to 547°F.	
	BOP adjusts AFW flow.	
	RO checks PRZR PORVs and spray valves.	
	RO checks RCP trip and charging pump recirc criteria.	
	BOP checks SGs not faulted (YES).	
	BOP checks SGs not ruptured (YES).	
	Crew checks if RCS is intact inside containment (NO).	
	US directs crew to transition to 1-E-1.	

EVENT 8: Given that the unit is at power, and a valid ATWS condition exists concurrent with a SBLOCA, the crew will respond IAW 1-FR-S.1, "Response to Nuclear Power Generation/ATWS," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO checks RCP trip and charging pump recirc criteria.	
	BOP checks SGs not faulted (YES).	
	BOP checks SGs not ruptured (YES).	
	BOP checks secondary radiation.	
	RO checks PRZR PORVs and block valves.	
	RO checks if SI can be terminated (NO).	
	RO resets CDA.	
	RO checks if QS is required. (NO)	
	RO checks QS pump status.	
	RO checks if low-head SI pumps can be stopped. (YES)	
	RO resets SI and stops LHSI pumps.	
	Note: Scenario can be terminated once the crew stops LHSI pumps, or at the direction of the lead evaluator.	

NOTE: If SEM position not established, SRO(s) involved with scenario are to evaluate and classify the event in accordance with EPIPs following the scenario but prior to the debrief.

NOTE: Scenario may be terminated when all critical tasks have been met or at the discretion of the Lead Evaluator.

REFERENCES

PROCEDURE	REV.
Operating Procedure 1-OP-31.1, "Main Feedwater System."	6
Operating Procedure 1-OP-2.2, "Unit Power Operation From Mode 1 to Mode 2."	47
Abnormal Procedure 1-AP-3, "Loss of Vital Instrumentation."	17
Abnormal Procedure 1-AP-38, "Excessive Load Increase."	12
Abnormal Procedure 0-AP-10, "Loss of Electrical Power."	30
Abnormal Procedure 1-AP-49, "Loss of Normal Charging."	
Abnormal Procedure 1-AP-16, "Increasing Primary Plant Leakage."	18
Function Restoration Procedure 1-FR-S.1, "Response to Nuclear Power Generation/ATWS."	12
Emergency Procedure 1-E-0, "Reactor Trip or Safety Injection."	28
Emergency Procedure 1-E-1, "Loss of Reactor or Secondary Coolant."	16
Station Annunciator Response Procedures.	N/A
Administrative Procedure VPAP-1407, Verbal Communications.	2
INPO, Guideline for Teamwork and Diagnostic Skill Development: INPO 88-003,	Jan. 1988
INPO, ACAD 90-022 Simulator Training Guidelines	Nov. 1990

ATTACHMENTS

ATTACHMENT 1 - LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 2 - SIMULATOR OPERATOR'S COMPUTER PROGRAM

ATTACHMENT 3 - SCENARIO PERFORMANCE OBJECTIVES

ATTACHMENT 4 - SIMULATOR PERFORMANCE SUMMARY (SXG Only)*

ATTACHMENT 5 - SIMULATOR BOOTH OPERATOR CHECKLIST**

ATTACHMENT 6 – SEG INSTRUCTIONS**

ATTACHMENT 7 – SXG INSTRUCTIONS**

ATTACHMENT 8 - COMPETENCY AREA RATING FACTOR WORKSHEET **

ATTACHMENT 9 - SIMULATOR SCENARIO REVIEW CHECKLIST (SXG Only) *

ATTACHMENT 10 - SIMULATOR EXAMINATION PREBRIEF (SXG Only) **

* Located on N:\N\LORP\Simulator\shl\
** Located in the Instructor Booth.

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 1

LERs, SOERs, and/or RELATED INDUSTRY EVENTS

1. SEN 122, Recurring Event: Unisolable Reactor Coolant System Leak

Loviisa Units 1 & 2/VVER (May 16, 1994)

An unisolable reactor coolant system leak developed in the pressurizer shutdown spray valve due to fatigue caused by thermal cycling and stratification.

Note: The VVER design includes two different pressurizer spray systems: normal pressurizer spray and shutdown spray. The normal spray system consists of two spray valves with water for sprays taken from the discharge side of two of the six reactor coolant pumps. The two normal spray paths are identical, each consisting of four parallel spray lines and one warm-up line. The capacity of the normal spray system is sufficient to avoid high reactor pressure during most anticipated transients. The shutdown spray system, which is supplied either from the cold leg of one RCS loop or the normal volume control system, is used for primary pressure decrease during normal reactor shutdowns and also in some transients.

On May 16, 1994, during a routine weekly operator walk-down, fluid leakage was noted from the insulation near the Unit 2 pressurizer shutdown spray valve. The source was determined to be a through-wall crack in the 2-inch diameter valve body, and the plant was shutdown for five days to conduct repairs. Similar crack indications were found on the corresponding valve on Unit 1, and Unit 1 was shutdown for repair on May 23, 1994.

The failed valve had been in service for about 15 years. Although the original design did not provide a means to maintain the pipe warm when the spray valve was closed, in 1980 a small hole was drilled in the valve disc to minimize cyclic thermal stresses. While investigating the cause of the May 16, 1994 crack, temperature stratification was also detected on the outlet side of the valve (a 72°F gradient existed from the top to the bottom of the horizontal run of pipe). The valve is made of forged, titanium-stabilized, austenitic stainless steel.

ATTACHMENT 2

SIMULATOR OPERATOR'S COMPUTER PROGRAM

SIMULATOR OPERATOR'S COMPUTER PROGRAM
Scenario NRC 4

Initial conditions

23. Recall 50% power end-of-life IC (IC-166).

24. Sign off a copy of 1-OP-2.2 to the appropriate step. Print a copy of 1-OP-31.1 with the applicable sections removed.

25. Ensure Tave, Tref, PDTT level, and VCT level are selected on trend recorders.

26. Tagout 1H diesel per MOP.

27. Pre-load 10 gpd tube leak on "A" SG (malfunction RC2401 = 8E-4) and allow to run until "A" SG N-16 radiation monitor stabilizes at approximately 10.26 gpd.

28. Ensure "A" and "C" MFW pumps are running, and "A" charging pump is running.

PRELOADS PRIOR TO SCENARIO START

CONDITION	MALFUNCTION/OVERRIDE/ETC.
Reactor trip failure.	Remote function - rod control: RD32 and RD38, delay time = 0, trigger = none. Remote function – SSPS: AMSAC_DEFEAT = T, delay time = 0, trigger = none.
"A" charging pump discharge check valve failure.	CH2101, delay time = 0, trigger = none.

SCENARIO EVENTS

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
1) Shutdown "C" MFW pump	**NOTE: Turbine building operator will report "A" MFW pump flow indication is approximately 8,000 gpm.** **NOTE: Approximately five minutes after crew directs an operator to align MFW pump warmup lines, report that the warmup lines are aligned.** **NOTE: The next event will occur after feedwater pump has been shutdown, or at the direction of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
2) Unit shutdown for refueling	**NOTE: Crew is given reactivity calculations from reactor engineer, verified by STA, to be provided prior to entering the simulator.** **NOTE: The next event will occur when the lead evaluator is satisfied with the amount of reactivity change.**
3) "B" SG steam flow channel III failure	MS0103, delay time = 5, ramp = 30, severity value = -1, trigger = 1 **NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.**
4) "B" SG PORV failure	Remote function – main steam: MSPCV101B_K, delay time = 5, ramp = 5, remote value = 100, trigger = 2 **NOTE: Security will report a loud noise and steam coming from the top of the unit-1 main steam valve house.** **NOTE: Approximately two minutes after crew dispatches an operator to the MSVH, report that the "B" steam generator PORV is open.** **NOTE: When the crew directs the operator to close 1-MS-59, use the PNID screen to ramp the valve shut over 20 seconds.** **NOTE: The next event will occur after the crew has stabilized the unit, or at the direction of the lead evaluator.**
5) "A" charging pump trip and check valve failure	CH1601, delay time = 5, trigger = 3 **NOTE: Operator/electricians will report "A" charging pump breaker has an instantaneous overcurrent drop.** **NOTE: The next event will occur after the crew stabilizes the unit, or at the direction of the lead evaluator.**
6) PRZR spray valve failure	RC4601, delay time = 5, ramp = 150, severity value = 2, trigger = 4 **NOTE: The next event will occur after the crew stabilizes the unit, or at the direction of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
7) SBLOCA	RC04, delay time = 5, ramp = 5, severity value = 100, trigger = 5 **NOTE: The next event will occur when the crew identifies the failure of the reactor to trip.**
8) ATWS	**NOTE: Reactor trip will be initiated approximately 2 minutes after an operator is dispatched to locally open the reactor trip breakers. Use PNID to open the breakers.** **NOTE: Scenario can be terminated once the crew stops LHSI pumps, or at the direction of the lead evaluator.**

ATTACHMENT 3

SCENARIO PERFORMANCE OBJECTIVES

SIMULATOR REQUALIFICATION EXAMINATION

TERMINAL PERFORMANCE OBJECTIVE

Given equipment failures and operational situations, operate the plant in accordance with Technical Specifications to bring the unit to a safe condition, using applicable procedures, and applying effective teamwork, communication, and diagnostic skills.

GENERIC PERFORMANCE OBJECTIVES

A. During shift operations the shift supervisor will take a conservative course of action, especially when uncertain conditions exist, when dealing with core cooling or heat sink availability, primary system and containment integrity, and reactivity control associated with plant evolutions.

B. During shift operations the shift supervisor will provide overall crew guidance by prioritizing and integrating the actions of the shift crew in accordance with administrative procedures.

C. During shift operations each crew member will participate in a team effort that resolves conflicts, provides input into the team decision and communicates all the necessary information to enhance teamwork in accordance with administrative procedures.

D. During shift operations the Shift Technical Advisor will independently assess events and based on those assessments make recommendations to the crew regarding mitigation strategy.

EVENT 1 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that a unit shutdown for refueling is in progress, the crew will shutdown "C" main feedwater pump IAW 1-OP-31.1, "Main Feedwater System," before continuing with the unit shutdown.

NORTH ANNA SPECIFIC TASKS:

R407 Remove a main feedwater pump from operation

CRITICAL TASK:

N/A

EVENT 2 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that a unit shutdown for refueling is in progress, the crew will continue with the unit shutdown in accordance with 1-OP-2.2, "Unit Power Operation from Mode 1 to Mode 2."

NORTH ANNA SPECIFIC TASKS:

None

CRITICAL TASK:

N/A

EVENT 3 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a controlling SG steam flow channel has failed, the crew will respond IAW 1-AP-3, "Loss of Vital Instrumentation."

NORTH ANNA SPECIFIC TASKS:

R626 Respond to a steam generator water level control channel failure

S70 Evaluate compliance with technical specifications.

CRITICAL TASK:

See next page.

CT Statement:

Crew takes manual control of steam generator level and restores level to normal range.

Safety Significance:

Failure to take manual control of SG level constitutes a "mis-operation or incorrect crew performance" which will result in an unnecessary reactor trip on low SG level.

Cues:

The controlling SG steam flow channel has failed low.
Main feed reg valve is going closed.
Actual SG level is decreasing.

Performance Indicator:

BOP places controller for 1-FW-FCV-1478 in manual and controls "A" SG level.

Feedback:

SG level does not decrease to reactor trip setpoint.

WOG Reference:

None

Conditions:

Prior to reactor trip on low SG level.

EVENT 4 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a SG PORV has failed open, the crew will respond IAW 1-AP-38, "Excessive Load Increase".

NORTH ANNA SPECIFIC TASKS:

R539 Perform the immediate operator actions in response to an excessive load increase

CRITICAL TASK:

See next page

CT Statement:

Crew stops power increase.

Safety Significance:

Failure to stop power increase and coolant temperature decrease would cause average coolant temperature to drop below the minimum temperature for criticality. This would mean the following could not be assured: 1) Moderator temperature coefficient is within its analyzed temperature range, 2) Protective instrumentation is within its normal operating range, 3) P-12 interlock is above its setpoint, and 4) Compliance with Appendix G to 10 CFR part 50.

Cues:

Indication of power increase:

* Several annunciators. (i.e. PRZR Hi/Lo Press, PRZR Lo Level)
* Reactor power increasing.
* Steam flow increasing.

Performance Indicator:

BOP reduces turbine load until power is $\leq$ pre-event value.

Feedback:

Reactor power increase stopped
Steam flow decreased

WOG Reference:

None

Conditions:

Prior to receiving an automatic reactor trip on over power.

EVENT 5 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a loss of the running charging pump concurrent with a failed open discharge check valve has occurred, the crew will respond in accordance with 1-AP-49, "Loss of Normal Charging."

NORTH ANNA SPECIFIC TASKS:

R572 Restore charging flow following a loss of normal charging

CRITICAL TASK:

N/A

EVENT 6 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a PRZR spray valve has failed open, the crew will be expected to respond IAW 1-AP-44, "Loss of Reactor Coolant System."

NORTH ANNA SPECIFIC TASKS:

R634 Respond to a loss of Reactor Coolant System pressure

CRITICAL TASK:

See next page

CT Statement:

Crew stops RCS pressure decrease.

Safety Significance:

Failure to close the RCS spray valve under the postulated plant conditions constitutes "mis-operation or incorrect crew performance which leads to degradation of any barrier to fission product release." In this case, DNBR is reduced. Therefore, failure to close the spray valve represents a "demonstrated inability by the crew to take an action or combination of actions that would prevent a challenge to plant safety."

Cues:

Valid indication of pressure decreasing by the presence of various annunciators, indication of RCS spray valve open, and RCS pressure indication decreasing and procedurally directed by 1-AP-44.

Performance Indicator:

RO places controller for 1-RC-PCV-1455A in MANUAL
RO closes 1-RC-PCV-1455A.

Feedback:

RCS pressure decrease stopped.

WOG Reference:

N/A

Conditions:

Prior to reaching an automatic reactor trip on low pressure.

EVENT 7 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power and a PRZR spray line fails causing a small-break LOCA, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," and 1-E-0, "Reactor Trip or Safety Injection."

NORTH ANNA SPECIFIC TASKS:

R520 Respond to increasing primary-plant leakage
R185 Perform the immediate operator actions in response to a reactor trip or safety injection.
R186 Determine the appropriate recovery procedure following the actuation of a reactor trip with a safety injection.

S69 Identify a reportable occurrence and make appropriate notifications.

CRITICAL TASK:

N/A

EVENT 8 PERFORMANCE OBJECTIVES

EVENT GOAL: Given that the unit is at power, and a valid ATWS condition exists concurrent with a SBLOCA, the crew will respond IAW 1-FR-S.1, "Response to Nuclear Power Generation/ATWS," 1-E-0, "Reactor Trip or Safety Injection," and 1-E-1, "Loss of Reactor or Secondary Coolant."

NORTH ANNA SPECIFIC TASKS:

R224 Perform the immediate operator actions in response to a nuclear power generation/ATWS

S94 Classify an emergency event
S85 Notify the appropriate personnel of emergency events.

CRITICAL TASK:

See next page.

CT Statement:

Crew take actions to bring the reactor subcritical.

Safety Significance:

Failure to insert negative reactivity under the postulated plant conditions results in an unnecessary situation in which the reactor remains critical. Failure to insert negative reactivity constitutes "mis-operation or incorrect crew performance which leads to incorrect reactivity control."

Cues:

Valid indication of a required reactor trip by the presence of a first out annunciator, with a failure of the reactor to trip automatically or manually from the control room.

Performance Indicator:

RO manually insert control rods if rod speed decreases to < 72 spm.
RO place in-service boric acid transfer pump in fast speed.
RO open emergency borate valve 1-CH-MOV-1350
- OR -
Crew dispatch operator to locally trip the reactor using attachment #3, Remote Reactor Trip.

Feedback:

- Control rods moving in or fully inserted.
- Emergency boration flow indicated.
- Neutron flux decreasing.
- Pressurizer pressure less than 2335 psig.
  OR
- Rod bottom lights on.
- IRPIs indicating zero.
- Neutron flux < 5%.

WOG Reference:

FR-S.1 – Background Document

Conditions:

Prior to completion of step requiring its performance.

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 5		
REV	**TIR NUMBER**	**REASON**

NORTH ANNA TRAINING CENTER SIMULATOR EXERCISE GUIDE SCENARIO NRC 5		
REV	**TIR NUMBER**	**REASON**
1	N02-0293	Revised old scenario for use as a "spare."

DOMINION

NORTH ANNA POWER STATION

INITIAL LICENSE CLASS

NRC SIMULATOR EXAMINATION

SCENARIO NRC 5

NRC SIMULATOR EXAMINATION SCENARIO

EVENT	DESCRIPTION
1.	Shift Service Water pumps
2.	Loss of "H" emergency bus
3.	Ramp unit for waterbox repairs
4.	Letdown PT-145 fails low
5.	"B" SW pump trips/loss of SW header flow
6.	"B" SG steam flow channel fails high
7.	LOCA outside CTMT

Scenario Recapitulation:

Malfunctions after EOP entry	**2** (LOCA outside containment, failure of charging pump suction to swap to RWST.)
Total Malfunctions	**6** (Loss of 1H emergency bus, LOCA outside containment, Letdown pressure transmitter failure, Service Water pumps trip, SG steam flow transmitter failure, failure of charging pump suction to swap to RWST.)
Abnormal Events	**4** (Loss of 1H emergency bus, Service Water pumps trip, SG steam flow transmitter failure, failure of charging pump suction to swap to RWST.)
Major Transients	**1** (LOCA outside containment)
EOPs Entered	**1** (E-0)
EOP Contingencies	**1** (ECA-1.2)
Critical Tasks	**2** (Manually align charging pump suction to RWST, isolate LOCA outside containment)

SCENARIO DURATION

90 Minutes

SIMULATOR EXAMINATION SCENARIO SUMMARY
SCENARIO NRC 5

The scenario begins with both units at 100% power. Unit 1 has just returned to full power following a load reduction for seal repairs to 1-FW-P-1B. C MFW pump had been tagged for coupling repairs, which were completed while the unit was at reduced power. 1H EDG was tagged-out two hours ago for maintenance. The system operator has reported thunderstorms in the area. There is a 10 gpd tube leak in "A" S/G. Shift orders are to place both unit-1 service water pumps in service and secure both unit-2 service water pumps in preparation for maintenance on 2-SW-P-1B. When requested, reduce power as determined by Engineering in preparation for removing the "C" waterbox from service for tube plugging.

The first event will be for the BOP to shift Service Water pumps as directed by the turnover. After the BOP has shifted Service Water pumps, the next event will occur.

The "H" emergency bus normal feeder breaker will trip due to a breaker relay failure. 1H emergency diesel will auto-start but will fail to load. The resulting secondary transient will cause reactor power to increase, and the crew will be expected to respond IAW 1-AP-38, "EXCESSIVE LOAD INCREASE," and reduce reactor power to less than 100%. Once the crew has stabilized the unit, the crew will be expected to respond IAW 0-AP-10, "LOSS OF ELECTRICAL POWER," and restore power to the 1H 4160-volt bus. After power has been restored, the next event will occur.

The crew will receive a request to reduce unit power for waterbox repairs and will commence reducing unit power. Once the crew has ramped the unit a sufficient amount, the next event will occur.

Letdown PT-145 will fail low causing PCV-145 to close fully. The RO will be expected to determine that the transmitter has failed and respond IAW annunciator C-B1, "LO PRESS LETDWN REL LINE HI TEMP," and isolate letdown. Once the RO has isolated letdown and placed excess letdown in service, the next event will occur.

1-SW-P-1B will trip, resulting in a loss of "B" SW header flow. The crew will be expected to respond IAW 0-AP-12, "LOSS OF SERVICE WATER," and direct the unit-2 operator to start 2-SW-P-1A. The pump will trip on restart and the crew must direct unit-2 operator to start 2-SW-P-1B and align to "B" header. After flow has been restored and the SW system verified stable, the next event will occur.

B SG steam flow channel fails high causing "B" SG MFRV to open. The BOP will be expected to respond IAW 1-AP-3, "LOSS OF VITAL INSTRUMENTATION," and take manual control of SG level. After the crew has referred to the MOP to place the channel in trip, the next event will occur.

The check valves from the RCS Cold Legs to the LHSI Pumps will begin to experience backleakage. The LHSI pump discharge check valves will hold causing relief valves 1-SI-RV-1845A, B, & C to lift. This will result in a "SFGDS AREA SUMP HI/HI-HI LEVEL" annunciator A-C1 and a high and high-high alarm on 1-RM-VG-112/113. The crew should determine that based on increased charging, the increased pumping of the safeguards sump,

and the alarm on the "B" vent stack that there is an RCS leak outside the containment. The crew will be expected to respond IAW 1-AP-16, "INCREASING PRIMARY PLANT LEAKAGE," and isolate letdown, maximize charging, and start a VCT makeup. The leak will degrade until PRZR level cannot be maintained, and the crew will manually trip the reactor and enter 1-E-0, "REACTOR TRIP OR SAFETY INJECTION." After verifying the immediate actions, the crew will be unable to maintain PRZR level and will manually initiate SI. Train B SI will fail to actuate. VCT level will decrease and the charging pump suction will not auto-swap to the RWST. The crew will manually open the charging pump suctions from the RWST. The crew will continue in 1-E-0 until directed to transition to 1-ECA-1.2, "LOCA OUTSIDE CONTAINMENT". The scenario may be terminated after the LOCA is isolated IAW 1-ECA-1.2, or as directed by the Chief Examiner.

SCENARIO TURNOVER SHEET

Read the following to the crew:

Purpose: This examination is intended to evaluate the crew's performance of various tasks associated with the Licensed Operator Training Program. All activities should be completed in accordance with approved operations standards.

9. You are on a day shift during the week.

10. When conditions allow, utilize the computer log systems as you would in the plant.

Unit Status:
Unit 1 is at 100% power. RCS boron is 1442 and core age is 2000. The amount of RCS dilution required to raise temperature one degree is gallons and the boration required to lower temperature one degree is gallons. Aux steam is on unit 1. The unit has just returned to full power following a load reduction for seal repairs on B MFW pump. C MFW pump, which had been tagged for coupling repairs, was returned to service while the unit was at reduced power.

Unit 2 is at 100% power.

Equipment Status:
1H EDG was tagged-out two hours ago for maintenance. The system operator has reported thunderstorms in the area. There is a 10 gpd tube leak in "A" S/G.

Shift Orders:
Place unit 1 service water pumps in service and secure unit 2 service water pumps in preparation for maintenance on 2-SW-P-1B. When requested, reduce power as determined by Engineering in preparation for removing the C waterbox from service for tube plugging.

EVENT 1: Given that shift orders require service water pumps to be swapped to unit 1 in service, the crew will start and stop pumps IAW 0-OP-49.4, "Shifting Service Water Components."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP dispatches watchstander to locally verify that 1-SW-P-1A and 1-SW-P-1B are ready to start.	
	BOP verifies service water spray valves and bypass valves aligned.	
	BOP starts 1-SW-P-1A.	
	BOP directs unit-2 operator to stop 2-SW-P-1B	
	BOP verifies service water parameters normal.	
	BOP starts 1-SW-P-1B.	
	BOP directs unit-2 operator to stop 2-SW-P-1A.	
	BOP verifies service water parameters normal.	
	BOP informs US that PT-62.2.1 must be performed on both units.	
	NOTE: The next event may occur once unit 1 SW pumps are running, or at the direction of the lead evaluator.	

EVENT 2: Given that power to 1H emergency bus has been lost, the crew will respond to the resulting power increase in accordance with 1-AP-38, "Excessive Load Increase," and the loss of the bus in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew identifies numerous control board annunciators and the loss of various "H" bus equipment.	
	Crew notes reactor power increasing above 100%.	
	US directs crew to perform actions of 1-AP-38, "EXCESSIVE LOAD INCREASE."	
	RO verifies steam dumps closed.	
	BOP verifies SG PORVs closed.	
	BOP reduces reactor power by reducing turbine load.	
	Crew stabilizes power at less than or equal to 100%.	
	US directs crew to perform actions of 0-AP-10, "LOSS OF ELECTRICAL POWER."	
	BOP checks unit-1 emergency buses.	
	BOP gives attachment 24 to RO.	
	BOP checks radioactive releases from both units secured.	
	BOP checks unit-2 emergency buses.	
	BOP gives attachment 23 to unit-2 RO.	
	BOP checks status of all buses.	

EVENT 2: Given that power to 1H emergency bus has been lost, the crew will respond to the resulting power increase in accordance with 1-AP-38, "Excessive Load Increase," and the loss of the bus in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP verifies EDGs not the sole source of power to emergency buses.	
	BOP notifies US of results of electrical system diagnosis.	
	US directs BOP to initiate 1-MOP-6.70 for 1H emergency bus.	
	Crew directs watchstander/electricians to check the bus.	
	US reviews ITS 3.8.1 for more restrictive LCO time requirements and actions.	
	NOTE: The watchstander/electricians will report that the bus has no apparent problems and an electrician doing routine breaker inspections accidentally tripped the feeder breaker. There are no drops in on the bus.	
	The US will direct that the bus be re-energized from the "F" transfer bus.	
	The crew will place various equipment in PTL to prepare for bus restoration.	
	The BOP will verify power available to the bus breakers.	
	The BOP will dispatch two operators to the rack room to defeat the UV trip of the feeder breakers OR dispatch an operator to the SBO building to place the interlock defeat for 43-15F3 in the SBO position.	
	The BOP will close 15F3.	
	The BOP will turn on the sync key for 15H11 and close 15H11.	**If the BOP chose the SBO switch above he must hold the C/S in close for 15 seconds.**

EVENT 2: Given that power to 1H emergency bus has been lost, the crew will respond to the resulting power increase in accordance with 1-AP-38, "Excessive Load Increase," and the loss of the bus in accordance with 0-AP-10, "Loss of Electrical Power."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	The BOP will check bus parameters and turn of the sync key.	
	The BOP will tell the rack room operators that the defeat switch may be released **OR** tell the operator in the SBO room to return the switch to NORM.	
	If necessary, the BOP will direct an operator to close the stub bus breaker.	
	The BOP will direct an operator to re-energize the 480-volt busses.	
	The crew will direct an operator to shutdown the diesel fire pump and return it to Auto.	
	The crew will return equipment switches to their initial positions.	
	NOTE: The crew will restore CC flow to the RCPs and reset rad monitors.	
	NOTE: The next event will occur once equipment has been returned to normal, or as directed by the lead evaluator.	

EVENT 3: Given that the unit is required to be ramped down to allow a waterbox to be removed from service, the crew will lower power in accordance with 1-OP-2.1, "Unit Operation from Mode 2 to Mode 1."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	US briefs crew on ramp.	
	NOTE: Crew is given reactivity calculations from reactor engineer, verified by STA.	
	RO commences lowering Tave using boration/control rods.	
	BOP places turbine control in IMP-IN.	
	BOP commences decreasing main turbine load • Verifies load rate at .3%/min • Lowers reference setter. • Pushes GO button.	
	NOTE: The next event will occur when the lead examiner is satisfied with the reactivity change.	

EVENT 4: Given that letdown pressure transmitter 1145 has failed low, the crew will respond in accordance with the annunciator response for C-B1, "LOW PRESS LETDWN REL LINE HI TEMP."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	RO identifies letdown flow decreasing/fluctuating and indicated pressure decreasing to zero.	
	RO identifies annunciator C-B1, "LOW PRESS LETDWN REL LINE HI TEMP."	
	RO determines letdown relief valve is lifting	
	RO isolates letdown by closing letdown orifices isolation valves and letdown isolation valves.	
	RO places excess letdown in service: • Closes 1-CH-HCV-1137 • Has operator energize loop drains • Places 1-CH-HCV-1389 in VCT position • Places 1-CH-FCV-1122 in manual and closes • Opens a loop drain valve • Opens 1-CH-HCV-1201 • Slowly opens 1-CH-HCV-1137 • Maintains parameters	
	US informs Instrument Department of failure	
	NOTE: The next event may occur once excess letdown has been placed in service, or at the discretion of the lead evaluator.	

EVENT 5: Given that the unit is at power and a service water pump has tripped, the crew will respond in accordance with 0-AP-12, "Loss of Service Water."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies annunciators J-H3, "SW PP 1-P1B, 2-P1B AUTO TRIP" and J-B3, "SERV WTR RETURN HDR LO FLOW."	
	BOP identifies 1-SW-P-1B tripped and low flow on "B" service water header.	
	US directs crew to enter 0-AP-12, "Loss of Service Water."	
	BOP checks service water reservoir level normal.	
	Crew checks for indications of flooding.	
	Crew verifies service water supply headers intact.	
	BOP verifies at least one service water pump running on each supply header. (NO)	
	Crew performs RNO step and directs unit-2 operator to start 2-SW-P-1A.	
	NOTE: The unit 2 operator will report that 2-SW-P-1A started, then tripped.	
	Crew directs unit-2 operator to start 2-SW-P-1B.	
	Crew directs watchstander to throttle open 2-SW-11 and then throttle closed 2-SW-13 to align 2-SW-P-1B to "B" service water header.	
	Crew dispatches watchstanders/electricians to determine reason for pump trips.	
	BOP verifies service water return header flow normal.	
	BOP verifies service water system stable.	

EVENT 5: Given that the unit is at power and a service water pump has tripped, the crew will respond in accordance with 0-AP-12, "Loss of Service Water."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	US refers to ITS-3.7.8 and enters action "b" due to two service water pumps inoperable.	
	NOTE: The next event may occur once SW flow is restored, or at the discretion of the lead evaluator.	

EVENT 6: Given that the unit is at power and a selected steam flow channel has failed high, the crew will respond in accordance with 1-AP-3, "LOSS OF VITAL INSTRUMENTATION."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP identifies "B" SG steam flow channel III failing high.	
	US directs crew to perform immediate actions of 1-AP-3.	
	BOP verifies redundant channels normal.	
	Crew manually controls steam generator level. • BOP places "B" MFRV in MANUAL. • BOP restores level in "B" SG to normal.	
	BOP verifies turbine 1st stage pressure channels normal.	
	RO verifies systems affected by PRZR level channels normal.	
	RO verifies both first stage pressure channels normal.	
	RO selects all SGWLC channels to an operable channel.	
	BOP verifies that "B" SG steam flow channel III is the only failed channel.	
	US directs RO to enter 1-MOP-55.77.	
	US refers to ITS-3.3.1 and 3.3.2 and determines the channel must be placed in TRIP within 72 hours.	
	NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.	

EVENT 7: Given that there are indications of a LOCA outside containment, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-ECA-1.2,"LOCA Outside Containment."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew identifies annunciator A-C1, "SFGDS AREA SUMP HI/HI-HI LEVEL".	
	RO identifies PRZR level decreasing.	
	US directs crew to perform actions of 1-AP-16, "INCREASING PRIMARY PLANT LEAKAGE."	
	RO identifies PRZR level decreasing, isolates letdown, maximizes charging, and starts a VCT makeup.	
	Crew identifies Vent Stack "B" high radiation alarm.	
	RO identifies PRZR level continuing to decrease.	
	US directs crew to perform actions of 1-E-0, "REACTOR TRIP OR SAFETY INJECTION."	
	Crew trips reactor.	
	BOP trips turbine.	
	RO verifies AC buses energized.	
	Crew manually initiates Safety Injection.	
	Crew identifies that train "A" SI did not actuate.	
	BOP verifies feedwater isolation (NO).	

EVENT 7: Given that there are indications of a LOCA outside containment, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-ECA-1.2,"LOCA Outside Containment."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	BOP closes main feed MOVs, stops 1-FW-P-1A1 and 1C1, and places standby feed pump in PTL.	
	RO/BOP manually initiate phase A.	
	US initiates phase A attachment.	
	BOP verifies AFW pumps are running.	
	RO/BOP verifies SI pumps are running (NO).	
	Crew starts SI pumps. • **RO starts 1-CH-P-1A.** • **BOP starts 1-SI-P-1A.**	
	BOP verifies available SW pumps running	
	Crew checks if MS should be isolated (NO).	
	BOP verifies SI flow.	
	BOP verifies AFW flow.	
	NOTE: CREW SHOULD IDENTIFY DECREASING VCT LEVEL AS LEAK SIZE IS INCREASED TO 280 GPM AND MANUALLY SWAP CHARGING PUMP SUCTION TO RWST.	CRITICAL TASK

EVENT 7: Given that there are indications of a LOCA outside containment, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-ECA-1.2,"LOCA Outside Containment."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: THE CREW MAY CHOOSE TO BREAK OFF THE BOP TO ISOLATE THE LEAK USING 1-ECA-1.2 AS GUIDANCE. THESE STEPS ARE LISTED LATER.	
	RO checks RCS Tavg.	
	RO checks PRZR PORVs and block valves.	
	RO checks RCP trip and charging pump recirc criteria.	
	BOP checks SGs not faulted.	
	BOP checks SGs not ruptured.	
	Crew checks RCS is intact inside containment.	
	Crew checks if SI should be reduced (NO).	
	US directs U-2 OATC to initiate 0-AP-47	
	Crew checks RCS conditions normal outside containment (NO)	
	US directs transition to 1-ECA-1.2, "LOCA Outside Containment."	
	NOTE: The crew may have chosen to perform these actions ahead of time.	

EVENT 7: Given that there are indications of a LOCA outside containment, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-ECA-1.2,"LOCA Outside Containment."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	NOTE: THE FOLLOWING ACTIONS ARE FROM 1-ECA-1.2.	
	BOP verifies LHSI pump Hot Leg Injection valves closed.	
	BOP verifies SI accumulator sample valves closed.	
	Crew isolates LOCA outside containment. BOP closes LHSI pump Cold Leg Injection valves. • 1-SI-MOV-1890C • 1-SI-MOV-1890D	CRITICAL TASK
	BOP closes LHSI pump discharge valves 1-SI-MOV-1864A/B.	
	RO checks RCS pressure increasing. (YES)	
	US directs transition to 1-E-1, "Loss Of Reactor Or Secondary Coolant".	
	NOTE: The scenario may be terminated once crew acknowledges transition to 1-E-1, or at the discretion of the lead evaluator.	
	NOTE: THE FOLLOWING STEPS ARE FROM 1-E-1.	
	RO checks RCP trip and charging pump recirc criteria.	
	BOP checks SGs not faulted.	
	BOP checks SG levels.	

EVENT 7: Given that there are indications of a LOCA outside containment, the crew will respond in accordance with 1-AP-16, "Increasing Primary Plant Leakage," 1-E-0, "Reactor Trip or Safety Injection," and 1-ECA-1.2,"LOCA Outside Containment."		
TIME	EXPECTED ACTION	INSTRUCTOR REMARKS
	Crew checks secondary radiation.	
	RO checks PRZR PORVs and block valves.	
	Check if SI can be terminated (YES).	
	US directs transition to 1-ES-1.1, "SI Termination."	

NOTE: Scenario may be terminated when all critical tasks have been met or at the discretion of the Lead Evaluator.

REFERENCES

PROCEDURE	REV.
Operating Procedure 0-OP-49.4, "Shifting Service Water Components."	12
Operating Procedure 1-OP-2.1, "Unit Operation From Mode 2 to Mode 1."	68
Operating Procedure 1-OP-8.5, "Operation of Excess Letdown."	14
Maintenance Operating Procedure 1-MOP-6.70, "1-EE-SW-1H, 4160-Volt Emergency Bus."	25
Abnormal Procedure 1-AP-3, "Loss of Vital Instrumentation."	17
Abnormal Procedure 0-AP-10, "Loss of Electrical Power."	32
Abnormal Procedure 0-AP-12, "Loss of Service Water."	25
Abnormal Procedure 1-AP-16, "Increasing Primary Plant Leakage."	18
Abnormal Procedure 1-AP-38, "Excessive Load Increase."	12
Emergency Operating Procedure 1-E-0, "Reactor Trip or Safety Injection."	28
Emergency Operating Procedure 1-E-1, "Loss of Reactor or Secondary Coolant."	16
Emergency Contingency Procedure 1-ECA-1.2, "LOCA Outside Containment."	4
Station Annunciator Response Procedures.	N/A
Administrative Procedure VPAP-1407, Verbal Communications.	2
INPO, Guideline for Teamwork and Diagnostic Skill Development: INPO 88-003,	Jan. 1988
INPO, ACAD 90-022 Simulator Training Guidelines	Nov. 1990

ATTACHMENTS

ATTACHMENT 1 - LERs, SOERs, and/or RELATED INDUSTRY EVENTS

ATTACHMENT 2 - SIMULATOR OPERATOR'S COMPUTER PROGRAM

ATTACHMENT 3 - SCENARIO PERFORMANCE OBJECTIVES

ATTACHMENT 4 - SIMULATOR PERFORMANCE SUMMARY (SXG Only)*

ATTACHMENT 5 - SIMULATOR BOOTH OPERATOR CHECKLIST**

ATTACHMENT 6 – SEG INSTRUCTIONS**

ATTACHMENT 7 – SXG INSTRUCTIONS**

ATTACHMENT 8 - COMPETENCY AREA RATING FACTOR WORKSHEET **

ATTACHMENT 9 - SIMULATOR SCENARIO REVIEW CHECKLIST (SXG Only) *

ATTACHMENT 10 - SIMULATOR EXAMINATION PREBRIEF (SXG Only) **

* Located on N:\N\LORP\Simulator\shl\
** Located in the Instructor Booth.

ATTACHMENT 2

SIMULATOR OPERATOR'S COMPUTER PROGRAM

SIMULATOR OPERATOR'S COMPUTER PROGRAM
Scenario NRC 5

Initial conditions

29. Recall 100% power beginning-of-life IC (IC 173).

30. Ensure Tave, Tref, PDTT level, and VCT level are selected on trend recorders.

31. Tag-out 1H EDG per MOP.

32. Pre-load 10 gpd tube leak on "A" SG (malfunction RC2401 = 1.1E-3) and allow to run until "A" SG N-16 radiation monitor stabilizes at approximately 10.26 gpd.

PRELOADS PRIOR TO SCENARIO START

CONDITION	MALFUNCTION/OVERRIDE/ETC.
Failure of train B SI	SI0702, delay time = 0, trigger = none.
Failure of 1115B and 1115D to auto open	MOV115B_MP = OFF MOV115D_MP = OFF

SCENARIO EVENTS

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
1) Shift SW pumps	**NOTE: If directed to verify unit 1 SW pumps ready to start, report that both pumps are ready to start.** **NOTE: May need to call and inform BOP as each pump started that they look fine.** **NOTE: If directed to do PT-62.2.1 on both units, reply that you will print the PTs and perform them at the designated times.** **NOTE: The next event may occur once unit 1 SW pumps are running, or at the direction of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
2) Loss of "H" bus	EL0301, delay time = 5, trigger = 2. **NOTE: The watchstander/electricians will report that the bus has no apparent problems and an electrician doing routine breaker inspections accidentally tripped the feeder breaker. There are no drops in on the bus.** **NOTE: Report back as necessary from the SBO or rack room on necessary switch positions.** **NOTE: When directed to stop the diesel fire pump and place it in Auto - wait several minutes and then use trigger 12.** **NOTE: The next event will occur once equipment has been returned to normal, or as directed by the lead evaluator.**
3) Reduce power for waterbox repairs	NOTE: AFTER CREW RESTORES RCP THERMAL BARRIER FLOW AND RESETS R/M HI-HI ALARMS, CALL IN AS SHIFT SUPERVISOR AND DIRECT CREW TO REDUCE POWER (5% LESS THAN THE CURRENT POWER) FOR WATERBOX REPAIRS. **NOTE: The next event will occur when the lead examiner is satisfied with the reactivity change.**
4) Letdown pressure transmitter fails low	CH04, delay time = 5, ramp = 30, severity value = -1, trigger = 4 **NOTE: When contacted to energize loop drains, wait 1 minute then use trigger 13.** **NOTE: The next event may occur once excess letdown has been placed in service, or at the discretion of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
5) Unit 1"B" SW pump trip, Unit 2 "A" SW pump trip	Unit 1 "B" pump SW0102, delay time = 5, trigger = 5 **NOTE: When crew directs unit 2 to start 2-SW-P-1A, implement the following malfunction:** Unit 2 "A" pump SW0104, delay time = 5, trigger 6 NOTE: WHEN DIRECTED TO CHECK SW PUMP BREAKER(S), REPORT OVERCURRENT TRIPS. **NOTE: When directed to align 2-SW-P-1B to B header, after 2 minutes use PNID to ramp 2-SW-11 open and 2-SW-13 closed.** **NOTE: The next event may occur once SW flow is restored, or at the discretion of the lead evaluator.**
6) CH.III "B" steam flow fails high	MS0103, delay time = 5, ramp = 30, severity level = +1, trigger 7 **NOTE: The next event will occur after the crew identifies the appropriate MOP, or at the direction of the lead evaluator.**

EVENT	MALFUNCTION/OVERRIDE/COMMUNICATIONS
7) LOCA outside containment	(109 gpm leak) SI16 = 10, ramp = 5 NOTE: IF DIRECTED TO CHECK SAFEGUARDS BUILDING, REPORT STEAM ISSUING FROM UNDER THE DOOR. (280 gpm leak) update SI16 to 30, ramp = NOTE: IF PRESSURIZER LEVEL AND PRESSURE STABILIZE OR RECOVER TOO SOON, THEN DO THE FOLLOWING: (490 gpm leak) update SI16 to 55%. **NOTE: IF crew has NOT manually opened charging pump suction valves from RWST, observe VCT level if VCT is allowed to empty, take PNID variable CHMOV115E_RACKIN = F and CHMOV115E = 0, then set CH1201_DEG and CH1202 both = -1. If crew does NOT restore a suction source within 30 seconds after VCT empties, trip running charging pumps.** NOTE: THE SCENARIO MAY BE TERMINATED ONCE CREW ACKNOWLEDGES TRANSITION TO 1-E-1, OR AT THE DISCRETION OF THE LEAD EVALUATOR.