

Facility:	Seabrook	Scenario No.:	1	Op Test No.:	1
Examiners:	_____	Candidates:	_____	_____	_____
<u>Initial Conditions:</u>	Mode 1. Unit at 75% power. IC # 210.				
<u>Turnover:</u>	The crew will take the shift and commence a rapid downpower to 50% to remove "A" Main Feedwater Pump from service within the next hour.  Entered TSASs for CS-P-2B being tagged out of service for planned maintenance 2 hours ago. Return to service expected within 6 hours.				
<u>Critical Tasks:</u>	<ol style="list-style-type: none"> <li>MANUALLY trip the reactor from the control room when SSPS fails to automatically trip the reactor. [E-0]</li> <li>Control the EFW flow rate to not less than 25 GPM per SG in order to minimize the RCS cooldown rate before a severe (orange path) challenge develops to the integrity CSF. [ECA-2.1]</li> </ol>				
Event No.	Malf. No.	Event Type*	Event Description		
1	N/A	R (RO) N (BOP/US)	Rapid power decrease.		
2	ptFWPT505	I (BOP/US) TS (US)	PT-505 Turbine First Stage Pressure Transmitter Fails LOW		
3	ltRCLT459	I (RO/US) TS (US)	Controlling PZR Level Channel LT-459 fails LOW		
4	mfTH002 mfTH002 (severity increases) mfRPS001 mfRPS002	C (BOP/US) M (ALL) C (RO/US)	Turbine Generator Vibrations begin to increase.  After entry into abnormal operating procedure, turbine vibrations will rapidly increase beyond automatic turbine trip setpoint resulting in a turbine trip. The reactor fails to trip automatically when the turbine trips. The crew will have to trip the reactor manually (CT).		
5	mfMS051 mfRPS019 mfRPS020 svMSV86 svMSV88 svMSV90 svMSV92 mfSI003	M (ALL) C (BOP)  C (RO)	The combination of high turbine vibrations and turbine trip causes a catastrophic rupture of the main steam bottle (down stream of MSIVs). All four MSIVs will fail to close when the MSI signal is actuated. Manual actuation of MSI in the control room should be attempted, but will not cause the MSIVs to close. Upon automatic actuation of Safety Injection from the RCS cooldown, the "A" Safety Injection pump will not automatically start. Procedure progression will be E-0 ⇒ E-2 ⇒ ECA-2.1 where the crew will be directed to reduce feed flow to all SGs to 25 gpm to avoid severe challenge to the Integrity CSF (CT).		
6	mvFWFV4214A	C (BOP/US)	The motor operator overloads for EFW flow control valve FW-FV-4214A will trip as soon as valve motion is demanded. The operator will be required to utilize FW-FV-4214B to control EFW flow to A SG.		

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specification

## SCENARIO 1 OVERVIEW

The crew will take the shift at 75% with instructions from the SM to reduce power to 50% within the next hour as requested by the dispatcher.

After the crew has the shift (prior to placing rods in manual for the downpower), PT-505 fails low. The crew responds in accordance with OS1235.05, "Turbine Impulse Pressure PT-505 or PT-506 Instrument Failure". The failure of this instrument will result in inward rod movement if rod control is in AUTO. The RO should place rod control in manual to halt rod insertion. The crew will BYPASS PT-505 and continue with the downpower with SM permission. The US will address TS in accordance with OS1235.05.

The crew continues with the power reduction. After the crew reduces power by 3-4%, or at the lead examiners instruction, the controlling PZR level channel, LT-459, fails low. The crew responds in accordance with OS1201.07 "PZR Level Instrument Failure". Charging flow will increase and letdown will isolate. The RO is expected to take manual control of the PZR level controller and restore PZR level. The RO will also restore letdown to service. The US will address TS in accordance with OS1201.07.

After letdown is restored and PZR level is stabilized, the main turbine will experience vibration problems. The crew responds in accordance with ON1231.01, "Turbine Generator High Vibration". After progressing beyond step 1 and at the lead examiners instruction, the turbine vibrations will increase very rapidly beyond the automatic turbine trip setpoint resulting in a Turbine Trip. Since the reactor does not automatically trip, the crew must trip the reactor (CT) and enter E-0, "Reactor Trip or Safety Injection".

The combination of high turbine vibrations and turbine trip causes a catastrophic rupture of the main steam bottle (down stream of MSIVs). All four MSIVs will fail to close when the MSI signal is actuated. Manual actuation of MSI in the control room will not cause the MSIVs to close. The "A" Safety Injection pump will not automatically start, and should be manually started as part of E-0, Attachment A actions.

Procedure progression will be E-0 ⇒ E-2, "Faulted Steam Generator Isolation" ⇒ ECA-2.1, "Uncontrolled Depressurization of All Steam Generators" where the crew will be directed to reduce feed flow to all SGs to 25 gpm (CT) to avoid severe challenge to the Integrity CSF. A component failure will occur as the operator attempts to limit EFW flow to the "A" S/G. The motor overloads for FW-FV-4214A (Train "A" EFW throttle valve to "A" S/G) will actuate and require the operator to utilize FW-FV-4214B (Train "B" EFW throttle valve to "A" S/G) to limit EFW to SG A to 25 gpm. When feed flow has been reduced, NSO(s) dispatched to the MSIVs will successfully close MSIVs in the west pipe chase (SG A and D). The crew will exit ECA-2.1 returning to E-2. With EFW limited to 25 gpm a RED condition will exist for the HEAT SINK CSF. A note at the beginning of FR-H.1, "Response to Loss of Heat Sink" states that the procedure should NOT be implemented if feed flow was reduced by operator action. The scenario will be terminated at Lead Examiner discretion.

## Simulator Operating Exam – Scenario 1

The purpose of scenario one is to observe the crew combat various instrument and component failures as well as a Turbine Vibration problem which progresses beyond automatic turbine trip setpoint that fails to result in a reactor/turbine trip requiring prompt operator action. The scenario will develop into all S/Gs faulted with several complications.

The crew takes the watch at 75% power with instructions to commence a rapid downpower maneuver to 50% to remove the “A” MFP from service. Shortly after taking the shift, PT-505 Turbine Impulse Pressure transmitter fails low. This instrument failure will cause rods to insert automatically. The RO is expected to verify plant conditions, stop rod motion, and restore plant conditions to program band. The US should direct actions in accordance with OS1235.05, “Turbine Impulse Pressure PT-505 or PT-506 Instrument Failure”.

Event Description:		<b>PT-505 TURBINE FIRST STAGE PRESSURE TRANSMITTER FAILS LOW</b>
Time	Position	Applicant's Actions or Behavior
	NOTE	Shaded items are <b>CRITICAL TASKS</b> .
	CREW	Commence power decrease in accordance with OS1000.06, “Power Decrease”. (Figure 6 provides guidance for >10%/hr rapid downpower)
	NOTE	The first event will take place shortly after the crew assumes the watch and prior to any actions to reduce power so that the first event takes place while control rods are in AUTO.
	CUE	After the crew has the watch and on the lead examiner's cue, PT-505 transmitter fails. This generates a B7457 ROD MOTION DETECTED and a D4421 TAVE-TREF DEVIATION alarm on the VAS. The sound of rods stepping in should be noted by the crew.
	RO	RO may take manual control of rods as a skill of the operator. He is expected to check that the rod motion is not warranted by high Tave or turbine load reduction first.
	BOP	Checks FW-PI-505 and determines it has failed low and informs US.
	US	Enters OS1235.05, “Turbine Impulse Pressure PT-505 Or PT-506 Instrument Failure”
	RO	Places rod control in MANUAL. Manually controls rods or turbine load to restore Tavg to program level.
	BOP	Place steam dump controller to STEAM PRESSURE mode, adjusts steam dump pressure setpoint to 1092 psig and places Steam Dump Controller in AUTO
	BOP	Verifies other plant status items (AMSAC, P-13)

	US	Verify TS compliance TS 3.3.1 table 3.3-1 item 18.f. Rx Trip System Instrumentation. Action 8: determine by observation of the associated permissive annunciator windows that the interlock is in its required state for the existing plant condition, or apply Specification 3.0.3. Contacts maintenance/I&C about channel failure. Directs I&C to place AMSAC channel in BYPASS.
	NOTE	I&C will be called to troubleshoot the failed instrument. The instrument will be put in BYPASS which will remove input to any control/protection systems. The I&C personnel will also conduct any tripping of bistables called for by Technical Specification Action Statements.

The crew continues with the power reduction. After the crew reduces power by 3-4%, and when directed by the lead examiner, the controlling PZR level channel, LT-459, fails low. Charging flow will increase and letdown will isolate. The RO is expected to take manual control of the PZR level controller and restore PZR level. The RO will also restore letdown to service.

Event Description:		POWER REDUCTION
Time	Position	Applicant's Actions or Behavior
	CREW	After crew completes OS1235.05, SM directs them to continue downpower. Allow candidates to demonstrate reactivity control by reducing power by 3-4% (lead examiner's discretion).
	NOTE	During power reduction, RO must maintain AFD within administrative limits.
	US	Establishes reactivity management strategy, which should include temperature band, rod control method, AFD band, reactivity plan and load schedule.
	RO	Refers to ODI-56 values for amount of boric acid to be added.
	BOP	Calculates load schedule or refers to the schedule provided in ODI-56.
	US	Makes required notifications or requests SM make these notifications.
	US	Directs reactivity manipulations and ensures required peer checks occur.
	NOTE	Operators are required to remain at the makeup controls during the boration/dilution and makeup evolution. This will ensure proper system response is verified as well as the desired amount.

RO	Adds required amount of Boron using OS1008.01, Figure 3 (Boration Checklist). This includes verifying proper system line-up, Placing Blender Mode Start Switch to STOP. Placing Boric Acid Blender Mode Selector Switch to BORATE, selecting desired flow rate and quantity, Placing Blender Mode Start Switch to START, verifying proper plant response, and resetting the control system to AUTO when desired amount of acid is added.
US/BO P/RO	Peer checks will be provided for all reactivity manipulations. Because of a three man crew, this peer check can be provided by the US.
RO	As directed by US, if RCS boron concentration is being changed by greater than 50 ppm, OPERATE pressurizer heaters to force spray to equalize boron concentration between the RCS and pressurizer.
RO	RO will manually insert/withdraw rods to maintain axial flux difference in band.
BOP	Use the LOAD SELECTOR load decrease push-button or LOAD LIMIT SET potentiometer to reduce load to the desired load.
BOP	If reducing load with the load selector, FOLLOW the load set with the load limit set potentiometer and the standby load set.
BOP	Maintain generator VARs consistent with load per The Turbine Generator Capability Curve and load dispatcher's instructions.
BOP	Maintain the manual voltage regulator nulled.
BOP	Maintain speed deviations for both main feed pumps nulled.
	<b>FAILURE OF CONTROLLING PZR LEVEL INSTRUMENT</b>
CUE	VAS D4461 PZR LVL LOW & HTR INTERLOCK ACTUATED & F4324/F4325 PZR GROUP C/D BACKUP HTR TRIPPED & F4323 PZR CONTROL HEATERS TRIPPED annunciators are received. Also LI-459 indication fails low.
RO	Recognizes controlling channel (LI-459) has failed low. Recognizes letdown has isolated. Informs US.
US	Enters and directs action IAW OS1201.07, "PZR Level Instrument Failure".
RO	Takes manual control of PZR level controller RC-LK-459 or controls level with letdown and charging flow.
RO	Selects an alternate level channel for CONTROL/BACKUP as necessary. Selects an alternate RECORDER channel.
RO	Resets the control group of PZR heaters.
RO	Determines that letdown can be restored and restores letdown IAW OS1201.07.

	RO	Establish normal letdown: VERIFIES CC-V341 OPEN, VERIFIES CS-TK-130 in AUTO, CLOSE CS-HCV-189, CLOSE CS-HCV-190, OPEN RC-LCV-459, OPEN CS-V145, establish letdown flow using letdown flow control valves.
	NOTE	OS1002.08, "PZR Level Control System Operations" may be referenced to restore system to AUTO.
	RO	Returns PZR level controller to AUTO after proper controller setpoint and proper PZR level are established.
	US	Verifies TS compliance 3.3.1 table 3.3-1 item 11 and TS 3.3.3.6, item 5, Accident Monitoring Instrumentation. Verifies redundant channel bistables NOT tripped and inform I&C of controller failure.
	NOTE	Table 3-3.1 item 11: inoperable channel LT-459 tripped within 6 hours.
	NOTE	TS 3.3.3.6 item 5: requires that LT-459 be returned to operable status within 7 days.
	US	Informs I & C of failed channel and requests assistance with troubleshooting including placing LT-459 in bypass (if desired by lead examiner)

When directed by the lead examiner, the main turbine generator vibrations will begin to increase to about 8-10 mils requiring entry into ON1231.01, "Turbine High Vibrations". Once into the abnormal and beyond step 1, Turbine Vibrations will rapidly increase beyond the turbine trip setpoint causing an automatic turbine trip. However, the reactor will fail to trip, requiring a manual reactor trip (CT). Immediately following reactor trip, a catastrophic failure of the MS Bottle downstream of MSIVs will occur. MSIV will not be able to close until much later in the scenario when NSO's locally close the "A" and "D" MISV's from the west pipe chase. Other complications will occur as follows:

Event Description:		<b>MAIN GENERATOR VIBRATIONS / AUTO TURBINE TRIP w/o AUTO REACTOR TRIP LEADING TO ALL S/G'S FAULTED WITH INABILITY TO ISOLATE FAULT FROM CONTROL ROOM WITH OTHER COMPLICATIONS</b>
Time	Position	Applicant's Actions or Behavior
	CUE	After the US discusses TS requirements for the failure of controlling PZR level instrument, and at the discretion of the lead examiner, the main turbine generator vibrations will begin to increase as noted by VAS B5933 TURB GEN BRG 7 VIBRATION HIGH & B5935 TURB GEN BRG 8 VIBRATION HIGH.
	CUE	After the crew has progressed beyond step 1 of ON1231.01, "Turbine Generator High Vibration", the Turbine will AUTO trip as noted by RED Hardwire ANNUNCIATOR on UA-52, "TURBINE TRIP", White Hardwire on UA-53, TURBINE TRIP", and numerous vibration alarms are received on VAS.

	NOTE	<b>If the crew is conservative and decides to trip the reactor/turbine based on high vibrations increasing quickly, then it is important that we increase severity before they trip in order to preserve critical tasks.</b>
	BOP	Acknowledges alarms for high turbine vibrations and pulls up MPCS graphics to monitor bearing vibration.
	US	Directs entry into ON1231.01, "High Turbine Vibration".
	BOP/US	Monitors vibrations less than trip limits. Determines that Bearing 7 & 8 are limiting at about 10 mils. (alarm is at 8 mils)
	BOP	Checks Main Generator breaker closed.
	BOP/US	Directs turbine load adjusted until vibration levels are less than values needed to support extended operations. May get Engineering involved.
	BOP/US	Checks Turbine vibrations stable or increasing. (vibrations will remain stable until lead examiner requests the severity increased)
	CUE	After trip and insertion of Main Steam Bottle rupture, the crew will hear the noise generator simulating main steam noise from steamline break until S/G's are blown down.
	RO/US	<b>Recognizes the reactor did NOT trip and MANUALLY trips the Reactor (CT).</b>
	US	Enters E-0, "Reactor Trip or Safety Injection"
	RO	Immediate actions: Verifies reactor trip and bypass breakers open, neutron flux decreasing, and rod bottom lights lit. Checks if SI is actuated, verifies both trains of SI actuated.
	BOP	Immediate actions: Verifies all turbine stop valves closed and generator breaker open, Verifies power to AC Emergency busses, verifies all emergency busses energized.
	RO/BOP/US	Performs ESF Actuation Verification per Attachment A of E-0. Notes "A" SI Pump did not start and manually starts the "A" SI pump. Informs the US that the "A" SI pump did not start but was manually started. Also as part of this attachment Main Steamline isolation is checked. It should be noted all S/G pressures are less than 585 psig, that MSIV's did not close, manual attempt failed and the status should be reported to the US
	RO	Checks containment pressure has remained less than 18 psig by pressure recorder.
	BOP	Verify Total EFW Flow – Greater than 500 GPM.

RO/BOP	Monitor RCS temperature – Stable At or Trending to 557F. RCS will be cooling down due to rupture of MS bottle and MSIVs failing to close. Stop dumping steam to condenser and atmosphere. OPEN EFW min-flow valves AND throttle total feed flow to maintain greater than 500 gpm. If cooldown continues, close MSIVs, MSIV bypasses and upstream drains. MSD-V44 & 45 must be closed on rear of MCB.
BOP	Identifies FW-FV-4214A did not close when attempts are made to throttle EFW. Should throttle FW-FV-4214 <u>B</u> to reduce EFW flow.
BOP/US	NSO's should be sent to locally close MSIV's when it is recognized that MSIV's cannot be closed from MCB.
RO	Check RCS isolated. Verify letdown isolated. Verify PORVs closed. Verify normal Spray valves closed.
RO	Check if RCPs should be stopped. Reports adequate subcooling exists such that RCPs do not need to be secured.
BOP	Check if SG Pressure Boundary is Faulted. All S/G pressures are decreasing in an uncontrolled manner or may be completely depressurized.
US	Directs transition to E-2, "Faulted Steam Generator" based on S/G 'A' depressurization.
BOP/US	Check Main Steam Isolation. Manually closes MSIVs from MCB and directs local closure (may have been previously performed)
BOP/US	Checks if SG pressure boundary is intact. Notes all S/Gs are decreasing in an uncontrolled manner or completely depressurized at this time.
NOTE	If S/G boils dry, the BOP may adjust ASDV setpoints to stabilize RCS temperature as directed by Operator Action Summary page of E-2.
US	Directs transition to ECA-2.1, "Uncontrolled Depressurization of All S/G's"
NOTE	US may address the RED HEAT SINK CSF. He should note the caution in FR-H.1 prior to step 1 and not perform FR-H.1. A caution in ECA-2.1 also states that FR-H.1 should not be implemented unless 500 gpm is not available.
BOP	Check Secondary Pressure boundary. Manually closes MSIVs from MCB and directs local closure (should have been previously performed)
BOP	Check S/G ASDVs closed.
BOP	Checks FWRV and FWRV bypasses closed.
BOP	Checks FWIVs closed.
BOP	Checks MDEFW or SUFP feedwater to supplying S/Gs

	BOP	Closes MS-393 and MS-394.
	RO/BOP	Checks S/G Blowdown valves SB-9, 10, 11, 12 closed.
	RO	Control feed flow to minimize RCS cooldown. Check cooldown rate in RCS less than 100 F/hr.
	BOP/US	Open EFW pump mini-flow valves and decrease feed flow to not less than 25 gpm to each S/G (CT)
	BOP	Checks narrow range S/G levels less than 50%.
	RO	Check RCS hot leg temperatures stable or decreasing.
	RO	Checks if RCPs should be stopped.
	RO	Checks PZR PORV and Block Valves.
	RO/BOP	Checks secondary radiation.
	RO	Checks if RHR pumps should be stopped. With RCS pressure greater than 260 psig, reset SI and stop RHR pumps placing them in standby.
	RO	Checks if Containment Spray should be stopped. Should not be running.
	RO	Check RWST level greater than 115,000 gallons.
	RO	Check if SI Accumulators should be isolated. If at least two RCS hot leg temperatures are < 370 F than energize MCC-E522 and E622 and isolate accumulators, then de-energize MCC-E522 and E622.
	RO	Check if ECCS flow should be reduced. Action taken in this step will determine course of action. If RCS pressure is still decreasing the procedure will loop the operator back to step 2. If RCS pressure is increasing and PZR is > 5%, then SI will be reset.
	CUE	Lead examiner may terminate scenario at any point in ECA-2.1 or if desired to upon transition back to E-2. IF desired to transition back to E-2, it will be reported at this time that "A" & "D" MSIVs have been successfully locally closed.
	NOTE	Upon completion of follow-up questioning, the SRO will perform JPM LOIT08 (Post EAL Determination and Event Classification) They should declare a UE based on EAL-15b It is also possible they may declare a SAE based on the red path which exists on HEAT SINK due to throttling in ECA-2.1 which is acceptable. This will be determined by the staff based on the endpoint of the scenario.

## Simulator Instructor Instructions for Scenario 1

Please track the following parameters in addition to the standard set (if any):

1.  Initialize the simulator at IC #210, 75% power. (This IC is password protected for NRC security reasons. Password can be obtained from Ian Forbes or Len Hubbard ONLY)  
---
  
2.  Protected train is 'A'.
  
3.  Ensure or place the control switch for CS-P-2B in PTL  
 Ensure CS-V-197 is CLOSED with power removed.  
 Danger tag CS-P-2B and CS-V197  
 Ensure the pushbutton control switch for CVCS TRAIN B BYP/INOP light is illuminated.
  
4. Verify the following inserted / activated:  

<input type="checkbox"/>	mfRPS001 AUTOMATIC REACTOR TRIP FAILURE (TRAIN 'A')
<input type="checkbox"/>	mfRPS002 AUTOMATIC REACTOR TRIP FAILURE (TRAIN 'B')
<input type="checkbox"/>	mfRPS019 MS ISOLATION FAILS TO AUTO ACTUATE (TRAIN 'A')
<input type="checkbox"/>	mfRPS020 MS ISOLATION FAILS TO AUTO ACTUATE (TRAIN 'B')

  

<input type="checkbox"/>	mfSI003 SI Pump P-6A FAILS TO AUTO START
<input type="checkbox"/>	svMSV86 ISO VALVE FAILS OPEN
<input type="checkbox"/>	svMSV88 ISO VALVE FAILS OPEN
<input type="checkbox"/>	svMSV90 ISO VALVE FAILS OPEN
<input type="checkbox"/>	svMSV92 ISO VALVE FAILS OPEN

  

<input type="checkbox"/>	mvCSV197, MOV BREAKER STATUS OPEN
<input type="checkbox"/>	bkCS1P2B BREAKER RACKED-OUT

Perform immediately after simulator is in RUN:

<input type="checkbox"/>	ENSURE simulator is stabilized and alarms are cleared.
<input type="checkbox"/>	Run SIMHIST
<input type="checkbox"/>	ENSURE applicable items on Simulator Setup Checklist (NT-5701-6) are completed
<input checked="" type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Feedwater (component)
<input type="checkbox"/>	SELECT: mvFWFV4214A
<input type="checkbox"/>	SELECT: FAILS OPEN
<input type="checkbox"/>	INSERT

Ensure the following Procedures are Available:

<input type="checkbox"/>	OS1000.06, Opened to Figure 6 for Downpower per Turnover
<input type="checkbox"/>	OS1235.05
<input checked="" type="checkbox"/>	OS1201.07
<input type="checkbox"/>	ON1231.01
<input checked="" type="checkbox"/>	E-0
<input type="checkbox"/>	E-2
<input type="checkbox"/>	ECA-2.1
<input type="checkbox"/>	FR-H.1

Shortly after the crew assumes the watch and only after lead examiner's cue:

**PT-505 Failure.**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Feedwater (component)
<input type="checkbox"/>	SELECT: ptFWPT505
<input type="checkbox"/>	SELECT: Fail LOW
<input type="checkbox"/>	SELECT: INSERT

The crew will contact I&C to respond to PT-505. Simulator operator will play role of I&C. When directed by crew, bypass PT-505. If the crew does not make a decision on bypass/trip status, call in as SM and direct BYPASS of PT-505.

**To select operator bypass for PT-505:**

<input type="checkbox"/>	SELECT: Panel Overview
<input type="checkbox"/>	SELECT: AMSAC CP-519
<input type="checkbox"/>	SELECT: Switch SW12 to TPIMP (P505)

**Crew continues power reduction.**

When directed by lead examiner:

**Fail Controlling PZR Level Transmitter.**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Reactor Coolant (component)
<input type="checkbox"/>	SELECT: ItRCLT459
<input type="checkbox"/>	SELECT: Fail LOW
<input type="checkbox"/>	SELECT: INSERT

If I&C is directed to bypass LT-459:

**To select operator bypass for LT-459:**

<input type="checkbox"/>	SELECT: Panel Overview
<input type="checkbox"/>	SELECT: BTI CP1
<input type="checkbox"/>	SELECT: CP1 Door Open
<input type="checkbox"/>	SELECT: The NORM/ENABLE switch to ENABLE
<input type="checkbox"/>	SELECT: LB-459A (High Level Channel Trip) to BYPASS

When directed by lead examiner:

**Main Turbine Generator Vibrations Increase:**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Turbine Generator
<input type="checkbox"/>	SELECT: mfTH002
<input type="checkbox"/>	ENTER: 300 (seconds) into ramp time
<input type="checkbox"/>	ENTER: 6 (mils) into final value
<input type="checkbox"/>	SELECT: INSERT

As soon as the crew has entered ON1231.01, "Turbine High Vibrations" and progressed beyond step 1 at lead examiners discretion, increase turbine vibrations beyond the automatic turbine trip setpoint. (THIS MUST OCCUR BEFORE CREW DECIDES TO TRIP REACTOR/TURBINE)

<input type="checkbox"/>	SELECT: malfunctions at top of page
<input type="checkbox"/>	SELECT: mfTH002
<input type="checkbox"/>	ENTER: 0 (seconds) into ramp time
<input type="checkbox"/>	ENTER: 18 (mils) into final value
<input type="checkbox"/>	SELECT: MODIFY

Post trip ramp the turbine vibrations down to 0 over 200 seconds.

<input type="checkbox"/>	SELECT: malfunctions at top of page
<input type="checkbox"/>	SELECT: mfTH002
<input type="checkbox"/>	ENTER: 200 (seconds) into ramp time
<input type="checkbox"/>	ENTER: 0 (mils) into final value
<input type="checkbox"/>	SELECT: MODIFY

**AS SOON AS REACTOR IS TRIPPED** insert a catastrophic rupture of the Main Steam Bottle (downstream of the MSIVs).

<input type="checkbox"/>	SELECT: MF List
<input checked="" type="checkbox"/>	SELECT: Main Steam
<input type="checkbox"/>	SELECT: mfMS051
<input type="checkbox"/>	SELECT: Final Value of 1 (no time delay or ramp)
<input type="checkbox"/>	SELECT: INSERT

Security will call the Control Room and inform them that there are massive quantities of steam on the south end of the Turbine Building.

Previously, Auto and Manual MSI and Auto MSIV closure malfunctions (previously inserted) will cause all S/Gs to blowdown. Once the crew has reduced EFW flow to about 25 gpm per S/G (CT) in ECA-2.1, NSO's who have been dispatched to locally close MSIV's will be successful in the West Pipe Chase closing the "A" and "D" MSIV's (if desired by lead examiner)

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | SELECT: COMPONENT MF at top of page    |
| <input type="checkbox"/> | CLICK ON: svMSV86 ISO VALVE FAILS OPEN |
| <input type="checkbox"/> | CLICK ON: svMSV92 ISO VALVE FAILS OPEN |
| <input type="checkbox"/> | SELECT : DELETE MF                     |

## **Briefing Sheet/Turnover Information for Scenario 1**

Protected Train is A

MODE 1: 75% RTP, CBD @ 180 steps (ARO = 230 steps), Boron Concentration = 939 ppm. ODI-56 Values for MOL Core 10 on US desk, +1 degrees = 170 gal RMW, -1 degree change = 27 gal BA; AFD target – 1.39. "C" and "D" Backup Heaters are ON.

The Shift Manager has provided instructions to reduce power to 50% within the next hour to remove "A" Main Feedwater Pump from service. Figure 6 of OS1000.06 will be used as guidance for this downpower. ODI-56 values for 25%/HOUR to 18% Main Turbine Shutdown Values should be used.

Centrifugal Charging Pump CS-P-2B is danger tagged out for planned maintenance. Entered TR 3.1.2.2 and TSAS 3.5.2.a two hours prior to turnover. Expected return to service is 6 hours after turnover.

Facility: Seabrook Scenario No.: 2 Op Test No.: 2  
 Examiners: \_\_\_\_\_ Candidates: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Initial Conditions:** Mode 2. Unit is operating at 10<sup>-8</sup> amps , MOL. IC# 211  
**Turnover:** The crew will take the shift and commence a power increase up to but not to exceed 3% power.  
 The "C" Primary Component Water pump is tagged out for bearing replacement. The motor experienced high vibrations during quarterly surveillance.  
 Seismic Event occurred two shifts ago.

- Critical Tasks:**
1. MANUALLY actuate at least one train of Containment Spray or start one train of Containment Spray Building Equipment prior to step 7 of E-0 following Large Break LOCA. [E-0]
  2. PERFORM TRANSFER to cold leg recirculation when automatic swapover occurs or 115,000 gallons in the RWST, whichever occurs first. [ES-1.3]

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	R (RO) N (BOP/US) TS (US)	Raise reactor power from 10 <sup>-8</sup> amps to approximately 3% power. Place Electric EFW Pump (P-37B) in PTL after SM informs crew that it is reported to be inoperable and address TS.
2	ltFWLT529	I (BOP/US) TS (US)	FW-LT-529 Fails LOW causing the "B" Feedwater Regulating Bypass valve to fail open.
3	ptRCPT455	I (RO/US) TS (US)	Controlling PZR pressure channel fails HIGH.
4	mfRC024A mfCBS004 mfCBS005 mfFCS002 mfFW039 svMS1V395 bkFWP37B	M (ALL) C (RO/US) C (RO) C (BOP)	Large Break LOCA occurs leading to automatic reactor trip with failure of Containment Spray pumps to automatically start upon Phase "B" actuation. The crew will have to manually start at least one Containment Spray pump (CT). Upon completion of immediate actions, all RCPs should be tripped based on E-0 Operator Action Summary. The "B" CCP pump will not automatically start, and should be manually started as part of E-0, Attachment A actions. The SUFP will trip after reactor trip and MS-V395 will close after the Steam Driven EFW Pump Auto Starts, causing it to shutdown. It should be recognized by the BOP that there is no EFW flow. Procedure progression will be E-0 to E-1 to FR-P.1 (Red) to FR-Z.1 (Orange) to E-1 to ES-1.3.
5	N/A	N/A	Perform transfer to cold leg recirculation per ES-1.3 when the automatic swapover occurs or 115,000 gallons in the RWST, whichever occurs first. (CT)

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specification

---

## SCENARIO 2 OVERVIEW

The crew will take the watch at  $10^{-8}$  amps on the intermediate range channels. The "C" PCCW Pump is tagged out for maintenance. The crew is instructed to continue a power increase in accordance with OS1000.07, "Approach to Criticality" and OS1000.02, "Plant Startup from Hot Standby to Minimum Load".

After the crew assumes the watch, they will continue power ascension in accordance with OS1000.07, "Approach to Criticality". Once the lead examiner is satisfied with the reactivity addition, the SM will inform the US that Engineering has determined the Electric EFW Pump to be inoperable. The US should direct P-37A placed in PTL and address TS. He should recognize that a Mode change is not allowed based on these plant conditions.

Once the US has evaluated TS for EFW pump condition and at lead examiners discretion, the "B" S/G level transmitter, LT-529, fails LOW. The crew should respond to the failure in accordance with OS1253.03. The high input to the feed control system will cause "B" S/G feed regulating bypass valves to modulate OPEN, increasing feed flow to "B" S/G. There is no redundant channel for this level transmitter thus the BOP operator must maintain manual control of S/G "B" feed regulating bypass valve for the remainder of the startup. The US will verify TS compliance at the discretion of the lead examiner during or following the scenario.

After the US verifies TS compliance or at the lead examiners discretion, the controlling PZR pressure instrument fails high. PZR spray initiates and RCS pressure will decrease rapidly. It is expected that the RO will identify the failed channel and take manual control of the master pressure controller, stabilizing RCS pressure. TS assessment is can be performed during the scenario or immediately following at the Lead Examiners discretion. If the crew is not timely, the plant may trip on low pressure safety injection (low pressure trip blocked by P-7/P-10) which will not adversely affect the scenario. Whether the crew manually trips the reactor or the reactor automatically trips, A Large Break LOCA will occur with a failure of both containment spray pumps to automatically start. It is a critical task that the crew manually starts at least one containment spray pump prior to step 7 of E-0 (CT).

Following E-0, "Reactor Trip or Safety Injection" immediate actions, the RCPs should be tripped based on E-0 Operator Action Summary required actions. It should be recognized that the "B" CCP did not start and the pump should be manually started during E-0 Attachment A actions. The BOP should recognize the SUFP tripped and the Steam Driven EFW PUMP started but MS-V395 closed and P-37A secured post reactor trip, therefore no EFW flow exists. (Electric EFW Pump P-37B previously placed in PTL). Note that at this low power, there is still adequate S/G inventory and S/G heat sink is not an issue during large break LOCA.

Procedure progression following reactor trip is E-0 to E-1, "Loss of Reactor or Secondary Coolant" to FR-P.1, "Response to Imminent Pressurized Thermal Shock Conditions" (RED) to FR-Z.1, "Response to High Containment Pressure" (ORANGE) to E-1 and to ES-1.3, "Transfer to Cold Leg Recirculation". Note that transitions to FR-P.1 and FR-Z.1 are dependant upon whether plant conditions are met which differ during a low power scenario based on crew progression through procedures. Note that within three minutes of receiving the RWST Lo-Lo level alarm the first three steps of ES-1.3 must be performed. It is a critical task that at least one train of cold leg recirculation be established (CT). Note also that because this is a low power scenario, it is possible depending on how expeditious the crew is to start containment spray, that FRP entry conditions may NOT be met (ie: RCS temperature does may not drop low enough or containment pressure does not remain high enough).

## Simulator Operating Exam – Scenario 2

The purpose of scenario two is to observe the crew combat various instrument and component failures during low power plant conditions following a power increase and TS issue which surfaces related to an EFW pump (P-37B) reported to be inoperable. The scenario will develop into a Large Break LOCA with complications requiring the crew to deal with several FRPs.

The crew takes the watch with instructions to continue a power increase from  $10^{-8}$  amps to 3%. "C" PCCW is danger tagged for maintenance. The S/G "B" level transmitter, LT-529, fails LOW resulting in S/G "B" feed regulating bypass valves modulating open, increasing feed to S/G "B".

Event Description:		<b>POWER ASCENSION/ TS ISSUE &amp; S/G "B" LEVEL TRANSMITTER FAILS LOW</b>
Time	Position	Applicant's Actions or Behavior
	NOTE	Shaded items are <b>CRITICAL TASKS</b> .
		<b>POWER ASCENSION</b>
	CREW	Crew assumes the watch and continues with power ascension on step 4.7 of OS1200.07, "Approach to Criticality" then starts OS1200.02, "Plant Startup from Hot Standby to Minimum Loading". A reactivity brief should occur.
	NOTE	Step 4.7.1 of OS1200.07: The reactor is critical and power is being maintained at approximately $10^{-8}$ amps in the intermediate range. To continue plant startup to minimum load, refer to OS1000.02.
	NOTE	Caution: Do not exceed the capacity of the startup feed pump (191 amps or 3% RTP). Do NOT exceed a STABLE start up rate of 1 DPM.
	RO	Increase reactor power to between 1% and 3% by soluble boron control or control rod motion, and maintain TAVG greater than or equal to TREF and within the limits of Figure 2, TAVG Program.
	RO	RO will have manual control of control rods and withdraw rods at a rate determined by US.
		<b>TECHNICAL SPECIFICATION ISSUE (P-37B)</b>
	CUE	Once the reactivity manipulation is completed satisfactorily and with lead examiner concurrence, the SM will report that the Electric EFW Pump has been reported by Engineering to be inoperable.
	US	Directs BOP to place P-37B in PTL.
	BOP	Places P-37B in PTL, acknowledges alarm and reports the same.

	US	Addresses TS for the reported condition. Enters TSAS 3.7.1.2a and TS 3.0.4. Recognizes a mode change cannot occur.
		<b>S/G "B" LEVEL TRANSMITTER FAILS LOW</b>
	CUE	Once the EFW issue has been evaluated by the NRC team, the lead examiner will direct the failure of the "B" S/G level transmitter, LT-529, to its LOW value. The low S/G level will cause "B" S/G feed regulating bypass valve to modulate open and "B" S/G water level to increase. VAS F4840 S/G B LEVEL LO-LO, D4877, S/G B LEVEL LO, & D4771, S/G B LVL DEV are received.
	BOP	Informs US of increasing S/G water level in "B" S/G. The BOP will verify level deviation on controlling level channel, FW-LI-529. The BOP will take manual control of S/G "B" feed regulating bypass valve and restore S/G "B" water level to the program level.
	US	The US will enter and direct action from OS1235.03, "S/G Level Instrument Failure".
	BOP	Check S/G Water Level Control, identify failed instrument.
	BOP	Control S/G water level manually between 50-70% on the narrow range level detectors.
	US	Verify redundant bistables NOT tripped. Verify Technical Specification Compliance, TS 3.3.1 table 3.3-1 item 13 Reactor Trip System Instrumentation, TS 3.3.2 table 3.3-3, items 5.b, 6.a, 7.c, and 10.c Engineered Safety Features Actuation System Instruments, TS 3.3.3.6 table 3.3-10, item 7 Accident Monitoring Instruments.
	NOTE	TS Actions required: For 3.3.1 and 3.3.2: startup and/or power operation may proceed provided the inoperable channel is placed in the tripped condition within 6 hours and the minimum channels OPERABLE requirement is met. The channel may be bypassed up to 4 hours for surveillance of other channels. For 3.3.3.6: requires LT-529 to be returned to OPERABLE status within 48 hours per action b.
	US	Notifies I&C of level channel failure and directs them to come to the control room.

When directed by the lead examiner, the controlling PZR pressure channel, PT-455, fails high, causing the spray valves to open and RCS pressure to rapidly decrease. The RO is expected to take manual control of the PZR pressure controller and restore RCS pressure to NOP.

Event Description:		<b>PZR PRESSURE INSTRUMENT PT-455 FAILURE</b>
Time	Position	Applicant's Actions or Behavior
	CUE	At lead examiner's cue, the controlling channel of PZR pressure fails high. VAS F7860 PZR PRESS HI CHANNEL TRIP is received. Also a white light on UL-6 for Hi Press P-455A illuminates.
	US	Enters and directs actions of OS1201.06, "PZR Pressure Instrument/Component Failure"
	RO	Checks PORVs closed.
	RO	Check Normal PZR Spray valves Closed. With PZR pressure <2260 psig, the RO may take manual control of spray valves and close them. This should stop RCS pressure drop and avoid reactor trip.
	RO	Determines that PT-455 has failed high.
	RO	Takes manual control of master PZR pressure controller or heaters and spray and restores normal pressure. (This step may have been already been performed as a Skill of the Operator action prior to reading procedural step due to the rapid impact on the plant)
	RO	Selects an alternate pressure channel for CONTROL/BACKUP, as necessary.
	RO	Selects an alternate pressure channel recorder as necessary.
	RO	Selects an alternate delta T, Overtemperature and Over pressure channel for recorder as necessary.
	RO	Once RCS pressure is restored to normal than align pressure control to auto.
	US/RO	Verify Redundant Channel Bistables NOT TRIPPED and Verify Technical Specification Compliance: TS 3.3.1 table 3.3-1, items 7,9, and 10 Reactor Trip System Instrumentation. TS 3.3.2 table 3.3-3 items 1.d and 10.a ESFAS Instrumentation. TS 3.2.5 DNB Parameters (if pressure drops below 2185psig). Ensures I&C is informed.
	NOTE	TS 3.2.5: with pressure below 2185 psig, restore pressure to its normal limits within 2 hours or reduce thermal power to less than 5% RTP within the next 4 hours.
	US	Informs I & C of failed channel and requests assistance with troubleshooting including placing PT-455 in bypass (if desired by lead examiner)

When directed by the lead examiner, INSERT Large break LOCA. The failure of Spray pumps to AUTO start is dormant. Following Reactor Trip, INSERT the trip of the SUFP and MS-V395 closure.

Event Description:		<b>LARGE BREAK LOCA with FAILURE OF CONTAINMENT SPRAY PUMPS TO AUTO START and OTHER COMPLICATIONS</b>
Time	Position	Applicant's Actions or Behavior
	CUE	After the US discusses TS requirements for the failure of controlling PZR pressure instrument, and at the discretion of the lead examiner, a Large Break LOCA will be inserted which leads to an automatic reactor and turbine trip.
	US	Enters E-0, "Reactor Trip or Safety Injection"
	RO	Immediate actions: Verifies reactor trip and bypass breakers open, neutron flux decreasing, and rod bottom lights lit. Checks if SI is actuated, verifies both trains of SI actuated.
	BOP	Immediate actions: Verifies all turbine stop valves closed and generator breaker open, Verifies power to AC Emergency busses, verifies all emergency busses energized.
	RO/US	Upon completion of immediate actions, it should be recognized that with no subcooling and SI or CCPs running that RCP's should be tripped based on Operator Action Summary for E-0.
	RO/BOP/US	Performs ESF Actuation Verification per Attachment A of E-0. Notes "B" CCP Pump did not start and manually starts the "B" CCP pump. Informs the US that the "B" CCP pump did not start but was manually started.
	RO	Checks containment pressure has remained less than 18 psig by pressure recorder. <b>Recognizes that NOT all Phase B status lights are lit, actuates both CBS/CVI manual actuation switches and manually starts at least one containment spray pump. (CT)</b>
	BOP	Verify Total EFW Flow – Greater than 500 GPM. EFW pumps will have started due to the SI. Because of the low power scenario there will be more than sufficient inventory in the S/G's. The BOP should recognize the SUFP did not start and inform US.
	RO/BOP	Monitor RCS temperature – Stable at or Trending to 557F. RCS will be cooling down due to SI flow. Stop dumping steam to condenser and atmosphere. OPEN EFW min-flow valves AND throttle total feed flow to maintain greater than 500 gpm. When SG level is adequate based on 65% wide range in at least two S/Gs or 5% narrow range in at least one S/G (25% narrow range in at least one S/G if adverse), then throttle feed flow to restore S/G level between 25% and 50% narrow range. If cooldown continues, close MSIVs, MSIV bypasses and upstream drains.

	RO	Check RCS isolated. Verify letdown isolated. Verify PORVs closed. Verify normal Spray valves closed.
	RO	Check if RCPs should be stopped. Should have been previously secured by OAS, however, if not they will be secured in this step.
	BOP/US	Check if SG Pressure Boundary is Faulted. Note: The crew could transition into E-2 based on lower pressure in "A" and "B" S/G due to a combination of steam flow to Steam Driven AFW pump being supplied from these two S/Gs and low power scenario. If this is the case they will perform E-2 actions and then transition to E-1.
	RO/BOP/US	Check if SG U-tubes are intact.
	RO/BOP/US	Check if RCS is intact. Recognizes containment pressure/radiation level and containment building level are abnormal.
	US	Directs transition to E-1, "Loss of Reactor or Secondary Coolant".
	RO	Check if RCPs should be stopped. (should already have been stopped)
	Note	Upon first transition out of E-0, CSF Status Trees should be verified. Based on how far the RCS cools down, will determine whether or not an orange or red path will exist for FR-P.1. Also depending on how fast the operators are to start Containment Spray pumps and process through EOPs will determine how high containment pressure is and therefore whether an orange path exists for FR-Z.1. Actions for possible FRP entry are outlined below:
	RO/BOP/US	If a red or orange path exists for FR-P.1 at any time during this scenario, the crew will transition to this procedure, check RCS pressure is < 260 psig and return to procedure step in effect since PTS is not a concern.
	RO/BOP/US	If an orange path exists for FR-Z.1 due to high containment pressure, the crew will transition to this procedure, Verify Containment Isolation Phase A, check if containment spray is required, verify at least one containment enclosure fan is running, verify MSIVs, bypasses and upstream drains isolated, check if feed flow should be isolated to any SG, Check hydrogen concentration and exit this procedure to return to procedure and step in effect.
	BOP	Checks if SG pressure boundary is faulted.
	NOTE	Check intact S/G levels. Should have adequate inventory.
	BOP/RO/US	Checks secondary radiation and determines no transition to E-3 is necessary.

	RO	Check PZR PORV and Block Valves.
	RO/US	Check if ECCS flow should be reduced. Based on insufficient subcooling, the US will proceed to step 7.
	RO	Check if containment spray pumps should be stopped. If containment pressure has dropped below 4 psig than reset Phase B isolation and containment spray signals, stop CBS pumps and place in standby.
	RO	Check if RHR pumps should be stopped. Determine RCS pressure is < 260 psig and do not stop RHR pumps.
	RO/BOP	Check RCS and SG Pressure. If SG pressure is NOT stable or NOT INCREASING OR RCS Pressure is NOT stable or NOT DECREASING than the crew will loop back to Step 1 of E-1 until these conditions are met. If and when they are met continue with following steps.
	BOP	Check if EDG should be stopped. Reset SI, verify all AC busses energized by offsite power from UATs or RATs, stop and unload EDG by depressing both emergency stop pushbuttons, after EDG stopped, reset for auto start and isolate SW to EDG.
	RO/US	Evaluate plant status by verifying cold leg recirculation capability.
	RO	Check if RCS cooldown and depressurization required.
	RO/US	Check if transfer to cold leg recirculation is required (auto swapover actuated or RWST 115,000 gallons). When conditions are met transition to ES-1.3.
	NOTE	May take awhile to get here based on Spray Pumps being secured when containment pressure decreases less than 4 psig.
	RO/BOP/ US	<b>Transfer to cold leg recirculation and establish at least one train of ECCS in operation in the recirculation mode (CT) To accomplish this critical task the following items must be accomplished:</b>
	US	Transition to ES-1.3, "Transfer to Cold Leg Recirculation".
	RO/US	Within three minutes of receiving RWST Lo-Lo Level Alarm, Reset SI, Verify CBS-V8 and V14 FULL OPEN, Simultaneously close CBS-V2 and V5.
	RO	Verify RHR pumps at least one running.
	RO	Place running RHR pump switches in normal after start position.
	RO	Close SI pump mini-flow valves (SI-V89, 90, & 93)
	BOP	Energize MCC-E522 & E622.

	RO	Close RHR Discharge to cold legs 1 & 2 (RH-V14)
	RO	Open SI and CCP suction (CSV460, 461, & 475)
	RO	Open RHR supplies to SI and CCP suction (RH-V35 & 36)
	RO	Start any pump that was stopped due to RWST empty alarm.
	RO	Isolate RWST feed to CCPs and SI pumps (close CBS-V47 & 51, CS-LCV-112D & 112E, De-energize CS-LCV-112D & 112E.
	BOP	Deenergize MCC-E522 & E622.
	Note	Place the simulator in freeze at Lead Examiner discretion.
	NOTE	Upon completion of follow-up questioning, the SRO will perform JPM LOIT08 (Post EAL Determination and Event Classification) They should declare a SAE based on EAL-15d, but this will be determined by the staff based on the endpoint of the scenario.

## Simulator Instructor Instructions for Scenario 2

Please track the following parameters in addition to the standard set (if any):

1.  Initialize the simulator at IC #211, 10<sup>-8</sup>% power. (This IC is password protected for NRC security reasons. Password can be obtained from Ian Forbes or Len Hubbard ONLY)
  
2.  Protected train is "B".  
 ENSURE Train B on MPCS.  
 SWAP sign to reflect TRAIN B on MCB
  
3.  Ensure or place the control switch for CC-P-11C in PTL with power removed.  
 Danger tag CC-P11C control switch
  
4. Verify the following inserted / activated:  
 mfCBS004 CBS P-9A FAILS TO AUTO START (TRAIN 'A')  
 mfCBS005 CBS P-9B FAILS TO AUTO START (TRAIN 'B')  
 mfCS002 CS-P2B FAILS TO AUTO START  
 bkFWP37B P-37B breaker fails open

Perform immediately after simulator is in RUN: **Minimize Run & monitor power.**

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | ENSURE simulator is stabilized and alarms are cleared.                         |
| <input type="checkbox"/> | Run SIMHIST  |
| <input type="checkbox"/> | ENSURE applicable items on Simulator Setup Checklist (NT-5701-6) are completed |

Ensure the following Procedures are Available:

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | OS1000.07 &, OS1000.02 signed off up to step per turnover |
| <input type="checkbox"/> | OS1253.03   |
| <input type="checkbox"/> | OS1201.06   |
| <input type="checkbox"/> | E-0   |
| <input type="checkbox"/> | E-1, FR-P.1, FR-Z.1                                       |
| <input type="checkbox"/> | ES-1.3  |

Shortly after the crew assumes the watch upon completion of power ascension and P-37B TS issue, and only after lead examiner's cue:

**LT-529 Failure.**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Feedwater (component)
<input type="checkbox"/>	SELECT: ltFWLT529
<input type="checkbox"/>	SELECT: Fails LOW
<input type="checkbox"/>	SELECT: INSERT

When directed by lead examiner:

**Fail Controlling PZR Pressure Transmitter.**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Reactor Coolant (component)
<input type="checkbox"/>	SELECT: ptRCPT455
<input type="checkbox"/>	SELECT: Fail HIGH
<input type="checkbox"/>	SELECT: INSERT

The crew will contact I&C to respond to PT-455. Simulator operator will play role of I&C. When directed by crew, bypass PT-455. If the crew does not make a decision on bypass/trip status, call in as SM and direct BYPASS of PT-455.

**To select operator bypass for PT-455:**

<input type="checkbox"/>	SELECT: Panel Overview
<input type="checkbox"/>	SELECT: BTI CP1
<input type="checkbox"/>	SELECT: CP1 Door Open
<input type="checkbox"/>	SELECT: The NORM/ENABLE switch to ENABLE
<input type="checkbox"/>	SELECT: Toggle switches to bypass PB-455A, 455B, 455C, 455D and TB-411C.

When directed by lead examiner:

**INSERT LARGE BREAK LOCA:**

- |                          |                         |
|--------------------------|-------------------------|
| <input type="checkbox"/> | SELECT: MF List         |
| <input type="checkbox"/> | SELECT: Reactor Coolant |
| <input type="checkbox"/> | SELECT: mfRC024A        |
| <input type="checkbox"/> | SELECT: INSERT          |

As soon as the crew has entered E-0, "Reactor Trip or Safety Injection", Insert a trip of the SUFP.

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | SELECT: MF List                         |
| <input type="checkbox"/> | SELECT: Feedwater                       |
| <input type="checkbox"/> | SELECT: mfFW039 (FW-P-113 Trip - Bus 4) |
| <input type="checkbox"/> | SELECT: INSERT                          |

As soon as SUFP trip malfunction is inserted, Insert a closure of MS-V395 which will cause P-37A (Steam Driven EFW Pump) to loss steam and secure.

- |                          |                                |
|--------------------------|--------------------------------|
| <input type="checkbox"/> | SELECT: MF List                |
| <input type="checkbox"/> | SELECT: Main Steam (component) |
| <input type="checkbox"/> | SELECT: svMS1V395              |
| <input type="checkbox"/> | SELECT: Fails Closed           |
| <input type="checkbox"/> | SELECT: INSERT                 |

## **Briefing Sheet/Turnover Information for Scenario 2**

Protected Train is "B".

MODE 2: 10<sup>-8</sup>% Power, CBD @ 90 steps (ARO = 230 steps), Boron Concentration = 947 ppm. RCS Temp is 559 F. ODI-56 Values for MOL Core 10 on US desk, +1 degrees = 170 gal RMW, -1 degree change = 27 gal BA; "C" and "D" Backup Heaters are ON.

The crew assumes the watch and continues with power ascension on step 4.7 of OS1000.07, "Approach to Criticality" then starts OS1000.02, "Plant Startup from Hot Standby to Minimum Loading". The power increase should not exceed 3% power.

"C" Primary Component Cooling Water Pump (P-11C) is danger tagged out for bearing replacement. The SUFP is supplying S/Gs via Main Feedwater Regulating Bypass Valves in AUTO. The Main Condenser is available and all MSIVs are open. A Seismic event occurred two shifts ago, Engineering Walkdowns are in progress (no other action for this is required)

Facility: Seabrook Scenario No.: 3 Op Test No.: 3

Examiners: \_\_\_\_\_ Candidates: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Initial Conditions: Mode 1. Unit is operating at 100% power. (IC# 212)

Turnover: The ASDV for the "D" Steam Generator (MS-PV-3004) is tagged out of service due to a positioner air leak. Entered TSAS 3.3.3.5 action c, 3.6.3 action c and 3.7.1.6 action a, two hours ago. Expected outage time is 12 hours.

The Pressurizer control group heaters are tagged out of service. The control circuit for the heaters has failed to zero output. A troubleshooting plan has been developed and Electrical Maintenance is investigating the problem. The heaters have been out of service for 10 hours. Backup Heater Group "B" is ON.

- Critical Tasks:
1. MANUALLY trip the reactor from the control room when SSPS fails to automatically trip the reactor. [E-0]
  2. MANUALLY trip the main turbine before a severe (Orange Path) challenge develops to either the Subcriticality or the Integrity CSF, or before transition to ECA-2.1, whichever happens first. [E-0]
  3. MANUALLY trip the "C" and "D" RCPs when subcooling is <40 F such that an Orange path on Core Cooling does not occur when forced circulation in the RCS stops.

Event No.	Malf. No.	Event Type*	Event Description
1	mfHD027	C (BOP/US)	"A" Heater Drain Pump Trips on overcurrent
2	N/A	R (ALL)	As a result of the heater drain pump trip, a loss of feedwater preheating will result in positive reactivity and subsequent power increase. The crew will need to take positive control to restore power less than 100%.
3	ttRCTT411	I (RO/US) TS (US)	Loop 1 Tc Instrument Fails HIGH
4	mfED001 mfRPS001 mfRPS002 mfRPS003	M (ALL) C (RO/BOP)	Loss of 13.8kV Bus 1 causes a Loss of "A" & "B" RCP's with a failure of an automatic reactor trip (CT) and main turbine trip (CT) to occur. Note that although Safety Injection should actuate, ALL Safety Injection pumps will be prevented from manual start (malfunction numbers are not shown since no credit is taken for these failures)
5	mfRC016 mfRC019 mfRC049D	M (ALL) C (RO/US)	Subsequent to reactor trip, the Reactor Vessel will develop a flange leak. The crew will need to trip the remaining "C" and "D" RCPs based on loss of RCS subcooling (CT). Once tripped, the RCS leak will become significantly larger to force the crew into FR-C series procedures. The "A" CCP will also trip on overcurrent.

\* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Technical Specification

## SCENARIO 3 OVERVIEW

The crew will take the watch with reactor power at 100%. The ASDV for the "D" Steam Generator (MS-PV-3004) is tagged out of service due to a positioner air leak. TSAS 3.3.3.5 action c, 3.6.3 action c and 3.7.1.6 action a was entered two hours ago. Expected outage time is 12 hours. The Pressurizer control group heaters are tagged out of service. The control circuit for the heaters has failed to zero output. A troubleshooting plan has been developed and Electrical Maintenance is investigating the problem. The heaters have been out of service for 10 hours. Backup Heater Group "B" is ON.

After the crew assumes the watch, the "A" Heater Drain Pump will trip on overcurrent. The crew should respond to the pump trip in accordance with OS1290.02, "Response to Condensate or Feedwater Heater System Transient". As a result of this malfunction, the colder water being fed into the steam generators due to loss of preheating will result in a positive reactivity addition and resultant power increase greater than rated thermal. The crew must respond by lowering turbine load.

Once power is restored below rated thermal and the crew has performed the first few steps of OS1290.02 or at the lead examiner's discretion, the Loop #1 narrow range temperature instrument will fail HIGH. This results in Tavg for Loop #1 failing high and an automatic rod insertion. The RO should take manual control of control rods and stop uncontrolled insertion. The crew will respond to the Tc instrument failure in accordance with OS1201.08, "Tavg/Delta T Instrument Failure". The crew should defeat affected loop delta-T and Tavg inputs. The US should verify TS compliance.

At the discretion of the lead examiner, A Loss of 13.8kV Bus 1 will occur. The 13.8 kV Bus 1 UAT breaker trips and the associated RAT breaker fails to fast transfer. Loss of power to Bus 1 results in reactor trip demand due to loss off A & B RCPs and A & C Circulating Water pumps. The reactor fails to trip automatically and the operator is required to manually trip the reactor (CT). On the reactor trip, the automatic Turbine Trip fails. The operator is required to manually trip the main turbine (CT). The crew will enter E-0, "Reactor Trip or Safety Injection".

Upon reactor trip, the Reactor Vessel Flange will develop a 275 gpm leak resulting in a SBLOCA. (Note to speed up the scenario and drop subcooling quicker, leak size will be increased greater than 275 gpm) This will result in Safety Injection actuation which will automatically or manually be actuated, however no SI pumps will start nor will manual starts be successful from the control room. Note that safety injection may also occur due to the cooldown associated with the Main Turbine not tripping depending on how expeditious the operators are in tripping the Main Turbine. Also note that all attempts to establish Safety Injection will NOT be successful as the intention is to force the crew into FR-C series procedure(s). The "A" CCP will trip on overcurrent following reactor trip. Because of the loss of subcooling, the crew is required by the Operator Action Summary of E-0 to trip the remaining running RCP's (C & D) (CT). Once RCP's are tripped the SBLOCA will become significantly larger to drive the crew into inadequate core cooling FRP's.

Procedure progression following reactor trip is E-0 to ES-0.1, "Reactor Trip Response" and back to E-0 to E-1, "Loss of Reactor or Secondary Coolant" potentially to ECA-1.1, "Loss of Emergency Coolant Recirculation" and then to FR-C.2, "Response to Degraded Core Cooling" (ORANGE) and/or FR-C.1 (RED) when conditions are met. The scenario will end when the crew recognizes the positive displacement charging pump cannot be started because the mini-flow recirculation valve (CS-V-205) cannot be opened and/or maintenance gives the crew back one of the SI pumps or at the discretion of the lead examiner.

### Simulator Operating Exam – Scenario 3

The purpose of scenario three is to observe the crew combat various instrument and component failures, to maintain reactor power less than rated thermal power limit, and eventually to handle an RCS leak which develops into a LOCA with no SI capability forcing the crew into Inadequate Core Cooling FRP's.

The crew takes the watch with instructions to maintain Reactor Power at 100%. The "D" ASDV and PZR control bank heaters are tagged out of service. Shortly after taking the watch, the "A" Heater Drain Pump will trip on overcurrent.

Event Description:		<b>"A" HEATER DRAIN PUMP TRIPS ON OVERCURRENT AND THE CREW RESPONDS TO MAINTAIN REACTOR POWER LESS THAN THERMAL LIMIT</b>
Time	Position	Applicant's Actions or Behavior
	NOTE	Shaded items are <b>CRITICAL TASKS</b> .
	CREW	Crew assumes the watch and maintains power in accordance with OS1000.10, "Operation at Power".
	CUE	Shortly after assuming the watch, upon lead examiner's cue, the "A" Heater Drain Pump will trip on overcurrent. The BOP will note breaker misposition for "A" Heater Drain Pump. VAS D4205 HTR DRAIN PUMP A BK TRIP & L/O is received.
	BOP	Informs US of tripped Heater Drain Pump.
	US	The US will enter and direct action from OS1290.02, "Response to Condensate or Feedwater Heater System Transient".
	BOP/ RO/US	Monitor Reactor Power less than 3411 MWt. Reduce turbine load as necessary to maintain power less than 3411 MWt. This should be coordinated between the control room team. Reactivity Management expectations of NAP-402 should be adhered to and OS1000.10, "Operation at Power", provides plant specific guidance if 3411 MWt is exceeded.
	BOP	Check heater drain system. Recognizes only one heater drain pump is running. Directs NSO to HD-CP-551 to close HD-LV-4508A.
	BOP	Monitor Main Feed Pump suction pressure by checking pressure > 250 psig, notes standby condensate pump is running and adjusts CO-FK-4042 to 18,000 gpm for 3 pump operation.
	BOP	Checks Feed Water Heater Level Control normal.

	Crew	Checks Secondary Plant Stabilized. It is not the intent to process through this lengthy abnormal which checks in great detail to ensure the secondary plant has stabilized, so at the Lead Examiner discretion, the next malfunction should be implemented when sufficient reactivity manipulation has been observed.
	US	Notifies Electrical/Mechanical Maintenance and/or Work Week Manager of heater drain pump failure and directs them to troubleshoot cause. May pass this off to the SM or WCS.

When directed by the lead examiner, a Loop 1 Tc instrument will fail HIGH resulting a HIGH Tavg for Loop 1. Auctioneered Tavg will fail high resulting in inward rod motion.

Event Description:		<b>LOOP1 TC INSTRUMENT FAILS HIGH</b>
Time	Position	Applicant's Actions or Behavior
	CUE	When secondary plant is stabilized from Heater Drain Pump trip and reactor power has been returned to < 3411 MWt and upon lead examiner's cue, a loop 1 Tc fails high resulting in high Tavg for loop 1. The following VAS alarms will come in due to the failure: B7457 ROD MOTION DETECTED, D4422 AUCTIONEERED TAVG HIGH, and D4421 TAVG-TREF DEVIATION. The sound of rods driving inward will also cue the operators. Operators will have visual indication on loop 1 Tavg and delta-T instrumentation of which instrument has failed.
	RO	RO should identify which channel is faulted by using Tavg and Delta-T instruments.
	RO	Verify rod motion unnecessary and place rod control in MANUAL to stop insertion. The RO may do this very quickly prior to referencing any procedure as a skill of the operator.
	US	Enters and directs action of OS1201.08, "TAVG-Delta T Instrument Failure"
	RO	Determine loop 1 TAVG channel failed HIGH.
	RO	Place rod control in MANUAL (required by procedure at this point).
	RO	Depress loop 1 delta-T defeat pushbutton. Depress loop 1 Tavg defeat pushbutton. Select a non-affected channel for Delta T, Overtemperature, Overpower recorder.

	RO	Restore Tavg within 1F of Tref by manually controlling rod motion. The operators may choose to reduce turbine load instead because they are maintaining < 3411 MWt due to the last problem – this is acceptable.
	RO	Place rod control in AUTO.
	US	Verify redundant channel bistables NOT tripped and verify technical specification compliance. TS 3.3.1 table 3.3-1 items 7 & 8. Coordinate with I&C for bypass operation or bistable tripping within 6 hours. TR-19, FW Isolation on Low RCS Tave Coincident with Reactor Trip
	NOTE	TS Actions required: For 3.3.1 ITEMS 7 & 8: startup and/or power operation may proceed provided the inoperable channel is placed in the tripped condition within 6 hours and the minimum channels OPERABLE requirement is met. The channel may be bypassed up to 4 hours for surveillance of other channels. TR-19, FW Isolation on Low RCS Tave Coincident with Reactor Trip should be referenced.

When directed by the lead examiner, Insert a Loss of 13.8 kV Bus 1 with failure of automatic reactor & turbine trip. Subsequent to reactor trip, an RCS leak will develop requiring trip of "C" and "D" RCPs. Subsequent to RCP trip the leak develops into a large LOCA. Because all SI pumps do not start, the crew will be forced into Inadequate Core Cooling FRP's.

Event Description:		<b>LOSS OF BUS 1 WITH FAILURE OF REACTOR/TURBINE TO TRIP, LEADING TO AN RCS LEAK AND LARGE BREAK LOCA AND INADEQUATE CORE COOLING.</b>
Time	Position	Applicant's Actions or Behavior
	CUE	After the US discusses TS requirements for the failure of Tc Loop 1 instrument, and/or at the discretion of the lead examiner, a Loss of Bus 1 will be inserted. Numerous control room alarms will actuate. Loss of RCS Flow RED Hardwire on UA-52 annunciator coupled with rods not on the bottom should key the operators that a reactor trip has not occurred and is required.
	RO/US	Recognizes that a reactor trip has not occurred and is required and manually trips the reactor. (CT)
	BOP/ US	Recognizes that a turbine trip has not occurred and is required and manually trips the turbine. (CT) This can be done as part of immediate action steps of E-0.
	US	Enters E-0, "Reactor Trip or Safety Injection"

	RO	Immediate actions: Verifies reactor trip and bypass breakers open, neutron flux decreasing, and rod bottom lights lit. Checks if SI annunciators NOT lit and verifies conditions are not met.
	BOP	Immediate actions: Verifies all turbine stop valves closed and generator breaker open, Verifies power to AC Emergency busses, verifies all emergency busses energized.
	Note	It is possible SI may have actuated based on length of time the turbine operated post reactor trip. If SI actuated or is required, then a transition will not be made to ES-0.1 and the crew will proceed in E-0.
	US	Based on SI not required, transitions to ES-0.1, "Reactor Trip Response".
	RO/US	Once in ES-0.1, the developing RCS leak will cause the crew to recognize deteriorating plant conditions requires manual/or automatic actuation of SI and to return to E-0, Step 1. While in ES-0.1, the crew may perform first several steps (Monitor RCS Temperature, Check FW Status, Verify all Control Rods Inserted, Check PZR Level and Pressure etc.)
	ALL	US directs transition back to E-0, Step 1 and Immediate Actions are re-performed.
	RO/US	When RCS subcooling drops to less than 40 F, the "C" and "D" RCPs should be tripped based on Operator Action Summary for E-0. (CT)
	NOTE	It is possible based on crew timing that the "A" CCP was not yet tripped because per the scenario, it is not tripped until subcooling decays below RCP trip criteria.
	RO/BOP/ US	Performs ESF Actuation Verification per Attachment A of E-0. All attempts to start any SI pumps will be unsuccessful. Informs the US the status of SI. Also notes, "A" CCP tripped.
	RO	Checks containment pressure has remained less than 18 psig by pressure recorder. This is continuous action and when containment pressure is > 18 psig, All Phase B status lights should be verified lit and RCPs should be stopped.
	BOP	Verify Total EFW Flow – Greater than 500 GPM.
	RO/BOP	Monitor RCS temperature – Stable at or Trending to 557F. RCS will be cooling down due to SI and EFW flow. Stop dumping steam to condenser and atmosphere. OPEN EFW min-flow valves AND throttle total feed flow to maintain greater than 500 gpm. When SG level is adequate based on 65% wide range in at least two S/Gs or 5% narrow range in at least one S/G (25% narrow range in at least one S/G if adverse), then throttle feed flow to restore S/G level between 25% and 50% narrow range. If cooldown continues, close MSIVs, MSIV bypasses and upstream drains.

	RO	Check RCS isolated. Verify letdown isolated. Verify PORVs closed. Verify normal Spray valves closed.
	RO	Check if RCPs should be stopped. Should have been previously secured by OAS or if Phase "B" isolation occurred, however, if not they will be secured in this step.
	BOP/US	Check if SG Pressure Boundary is Faulted.
	RO/BOP/US	Check if SG U-tubes are intact.
	RO/BOP/US	Check if RCS is intact. Recognizes containment pressure/radiation level and containment building level are abnormal.
		<b><u>E-1 Actions Outlined Below</u></b>
	US	Directs transition to E-1, "Loss of Reactor or Secondary Coolant".
	RO	Check if RCPs should be stopped. (should already have been stopped) It is critical that RCPs are stopped.
	Note	Upon first transition out of E-0, CSF Status Trees should be verified.
	RO/BOP/US	When an orange path exists for FR-C.2 RCS Subcooling <40 F, no RCPs running, and CETs <725 F with RVLIS < 40% the crew will transition to this procedure. (FR-C.2 actions to follow)
	BOP	Checks if SG pressure boundary is faulted.
	NOTE	Check intact S/G levels. When SG level is adequate based on 65% wide range in at least two S/Gs or 5% narrow range in at least one S/G (25% narrow range in at least one S/G if adverse), then OPEN EFW min-flow valves AND throttle total feed flow to restore S/G level between 5% and 50% narrow range (25% to 50% for adverse) If S/G level is not adequate than maintain total feedwater flow >500 gpm until they are adequate.
	BOP/RO/US	Checks secondary radiation and determines transition to E-3 is NOT necessary.
	RO	Check PZR PORV and Block Valves.
	RO/US	Check if ECCS flow should be reduced. Based on insufficient subcooling, the US will proceed to step 7.
	RO	Check if containment spray pumps should be stopped. If containment pressure has dropped below 4 psig than reset Phase B isolation and containment spray signals, stop CBS pumps and place in standby.
	RO	Check if RHR pumps should be stopped. Determine RCS pressure is < 260 psig and do not stop RHR pumps. Note RHR pumps are not running.

	RO/BOP	Check RCS and SG Pressure. If SG pressure is NOT stable or NOT INCREASING OR RCS Pressure is NOT stable or NOT DECREASING than the crew will loop back to Step 1 of E-1 until these conditions are met. If and when they are met continue with following steps.
	BOP	Check if EDG should be stopped. Reset SI, verify all AC busses energized by offsite power from UATs or RATs, stop and unload EDG by depressing both emergency stop pushbuttons, after EDG stopped, reset for auto start and isolate SW to EDG.
	RO/US	Evaluate plant status by verifying cold recirculation capability. It should be recognized that cold leg recirculation capability does NOT exist without SI pumps so therefore a transition to ECA-1.1 is warranted.
	US	Directs transition to ECA-1.1. Continues in ECA-1.1 until FRP's are required.
		<b><u>ECA-1.1 Actions Outlined Below</u></b>
	RO/US	Check for Cold Leg Recirculation Condition (no conditions are met – go to step 8)
	ALL	Check Emergency Coolant Recirculation Equipment Available. Recognize power is available however RHR pumps are not operable) Should involve SM, WCS, and/or Maintenance to status repair of SI Equipment.
	RO	Reset SI and automatic switchover S signal reaset for S/RWST LO-LO CBS-V8 or CBS-V14 Auto Open.
	RO	Checks RWST level > 60,000 gallons
	RO/US	Determines minimum containment spray requirements. Based on containment pressure, secures non-needed CBS Pumps.
		<b><u>FR-C.2 Actions Outlined Below</u></b>
	US	When conditions are met (as described above), Directs transition to FR-C.2
	RO	Verify ECCS flow in all Trains. Checks that no CCP flow is indicated. Attempts start of PDP using Attachment A.
	RO/US	Recognizes CS-V205, PDP mini-flow valve does not have power and therefore cannot be opened, therefore this is not a success path. May direct the NSO to open in the field (this will be unsuccessful).
	RO	Checks RCS Vent paths (PORVs, Rx Head Vents, RCS Sample Valves, Letdown and Excess Letdown Valves CLOSED)
	RO	Check RCP Status – secured (go to step 7)

	RO/US	Checks core cooling which determines what path to take in this procedure. If Lead Examiner requests to restore a CCP, conditions would more than likely met to return to procedure and step in effect. Otherwise proceed accordingly.
	RO	Check SI Accumulator Valves Open
	BOP	Check intact S/G levels –narrow range > 5% (25% adverse), if not increase feedwater flow. If they are, open mini-flow valves and throttle feedwater flow.
	BOP	Depressurize all intact S/Gs to 125 psig. Note that the “D” ASDV cannot be used for depressurization due to ASDV work.
	Note	Place the simulator in freeze at Lead Examiner discretion.
		<b><u>FR-C.1 Actions Outlined Below</u></b>
	US	When conditions are met, (CETs >1100 F, or RCS Subcooling < 40 F with no RCPs, CETs >725 and RVLIS < 40%) transition to FR-C.1
	RO	Verify ECCS flow in all Trains. Checks that no CCP flow is indicated. Attempts start of PDP using Attachment A.
	RO/US	Recognizes CS-V205, PDP mini-flow valve does not have power and therefore cannot be opened, therefore this is not a success path.
	RO	Checks RCP Support Conditions.
	RO	Check SI Accumulator Valves OPEN
	RO	Checks CETs < 1100 F
	BOP	Checks Containment Hydrogen Concentration
	BOP	Check intact S/G levels –narrow range > 5% (25% adverse), if not increase feedwater flow. If they are, open mini-flow valves and throttle feedwater flow.
	RO	Checks RCS Vent paths (PORVs, Rx Head Vents, RCS Sample Valves, Letdown and Excess Letdown Valves CLOSED)
	BOP	Depressurize all intact S/Gs to 125 psig. Note that the “D” ASDV cannot be used for depressurization due to ASDV work.
	Note	Place the simulator in freeze at Lead Examiner discretion.
	NOTE	If used for SROs in the US position, Upon completion of follow-up questioning, the SRO will perform JPM LOIT08 (Post EAL Determination and Event Classification) This will be determined by the staff based on the endpoint of the scenario.

### Simulator Instructor Instructions for Scenario 3

Please track the following parameters in addition to the standard set (if any):

1.  Initialize the simulator at IC #212, 100% power. (This IC is password protected for NRC security reasons. Password can be obtained from Ian Forbes or Len Hubbard ONLY)
2.  Protected train is 'A'.
3.  Ensure "B" PZR Backup Heaters are ON  
 Place a CAUTION tag on "D" ASDV Selector Switch  
 Place a DANGER tag on PZR Control Bank Heaters switch (ensure PTL)  
 Ensure MS-V49 is CLOSED.
4. Verify the following malfunctions inserted / activated:  
 mfRPS001 AUTOMATIC REACTOR TRIP FAILURE (TRAIN 'A')  
 mfRPS002 AUTOMATIC REACTOR TRIP FAILURE (TRAIN 'B')  
 mfRPS003 AUTOMATIC TURBINE TRIP FAILURE  
 svMSV3004 MODULATING VALVE FAILS CLOSED  
 bkCS1P2B 52 CC PUMP "B" BREAKER FAILS OPEN  
 bkRHR8A RHR PUMP "A" BREAKER FAILS OPEN  
 bkRHR8B RHR PUMP "B" BREAKER FAILS OPEN  
 bkSIP6A SI PUMP "A" BREAKER FAILS OPEN  
 bkSIP6B SI PUMP "B" BREAKER FAILS OPEN

Perform immediately after simulator is in RUN:

- |                          |  |
|--------------------------|--|
| <input type="checkbox"/> | ENSURE simulator is stabilized and alarms are cleared.                         |
| <input type="checkbox"/> | Run SIMHIST.   |
| <input type="checkbox"/> | ENSURE applicable items on Simulator Setup Checklist (NT-5701-6) are completed |

Ensure the following Procedures are Available:

<input type="checkbox"/>	OS1000.10
<input type="checkbox"/>	OS1290.02
<input type="checkbox"/>	OS1201.08
<input type="checkbox"/>	E-0, ES-0.1
<input type="checkbox"/>	E-1, ECA-1.1,
<input type="checkbox"/>	FR-C.2, FR-C.1

Shortly after the crew assumes the watch and only after lead examiner's cue:

**“A” Heater Drain Pump Trips.**

- |                          |                       |
|--------------------------|-----------------------|
| <input type="checkbox"/> | SELECT: MF List       |
| <input type="checkbox"/> | SELECT: Heater Drains |
| <input type="checkbox"/> | SELECT: mfHD027       |
| <input type="checkbox"/> | SELECT: INSERT        |

When directed by the operating crew, throttle HD-LV-4503A as follows:

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | SELECT: LOCAL PANELS                                    |
| <input type="checkbox"/> | SELECT: Feedwater/MVD                                   |
| <input type="checkbox"/> | SELECT: Fischer Porter Heater Drains                    |
| <input type="checkbox"/> | CLICK on 1-HD-LY-4508-A right arrow & INPUT 0 for value |
| <input type="checkbox"/> | SELECT: INSERT  |

When directed by lead examiner:

**Fail Loop 1 Tc Instrument HIGH.**

- |                          |                                     |
|--------------------------|-------------------------------------|
| <input type="checkbox"/> | SELECT: MF List                     |
| <input type="checkbox"/> | SELECT: Reactor Coolant (component) |
| <input type="checkbox"/> | SELECT: ttRCTT411                   |
| <input type="checkbox"/> | SELECT: Fail HIGH                   |
| <input type="checkbox"/> | SELECT: INSERT                      |

The crew will contact I&C to respond to TT-411. Simulator operator will play role of I&C. When directed by crew, bypass PT-411. If the crew does not make a decision on bypass/trip status, call in as SM and direct BYPASS of PT-411.

**To select operator bypass for TT-411:**

- |                          |   |
|--------------------------|---|
| <input type="checkbox"/> | SELECT: Panel Overview                          |
| <input type="checkbox"/> | SELECT: BTI CP1                                 |
| <input type="checkbox"/> | SELECT: CP1 Door Open                           |
| <input type="checkbox"/> | SELECT: The NORM/ENABLE switch to ENABLE        |
| <input type="checkbox"/> | TOGGLE: TB411G OP-Delta T to bypass             |
| <input type="checkbox"/> | TOGGLE: TB411C OT-Delta T to bypass             |
| <input type="checkbox"/> | TOGGLE: TB412G Low Tavg for Feedwater to bypass |
| <input type="checkbox"/> | TOGGLE: TB412D Low Low Tavg for P-12 to bypass  |

When directed by lead examiner:

**INSERT LOSS OF BUS 1:**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Electrical Distribution
<input type="checkbox"/>	SELECT: mfED001
<input type="checkbox"/>	SELECT: FAILS OPEN
<input type="checkbox"/>	SELECT: INSERT

**As soon as the crew has entered E-0, "Reactor Trip or Safety Injection", (IF SI DOES NOT OCCUR) Insert, reactor head flange leak which gets larger and requires "C" & "D" RCPs tripped due to RCS subcooling < 40F.**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Reactor Coolant
<input type="checkbox"/>	SELECT: mfRC019
<input type="checkbox"/>	ENTER: Final Value of 275 gpm
<input type="checkbox"/>	SELECT: INSERT

**As required to drop RCS subcooling, (THIS MUST OCCUR IF SI HAS ALREADY ACTUATED OR WHEN IT IS ACTUATED), increase RCS leak:**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Reactor Coolant System
<input type="checkbox"/>	SELECT: mfRC049D
<input type="checkbox"/>	INSERT: Value of 1500 gpm
<input type="checkbox"/>	INSERT: Ramp time of 60 seconds
<input type="checkbox"/>	SELECT: INSERT

**Monitor RCS subcooling and inform Lead Examiner when subcooling has dropped below 40 F.**

**AFTER RCPs HAVE BEEN TRIPPED due to Loss of RCS Subcooling, increase RCS leak substantially to deplete core inventory and force the crew into FR-C series. (May need to increase the rate when SI accumulators dump to speed up time required to heat up core and to enter FRP's -- ie: change to 150,000 over 600 seconds or insert mfRC024D-Double ended Hot Leg Break)**

**(Note that Step 7 of FR-C.2 is a transition back to E-1 if the orange path has cleared. Increasing the break size will prevent this transition by depleting core inventory quicker and force the crew into FR-C.1)**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Reactor Coolant System
<input type="checkbox"/>	SELECT: mfRC049D
<input type="checkbox"/>	INSERT: Value of 100000 gpm
<input type="checkbox"/>	INSERT: Ramp time of 600 seconds
<input type="checkbox"/>	SELECT: MODIFY

**AFTER INCREASING RCS LEAK SIZE, trip the "A" CCP:**

<input type="checkbox"/>	SELECT: MF List
<input type="checkbox"/>	SELECT: Chemical and Volume Control
<input type="checkbox"/>	SELECT: mfCS016
<input type="checkbox"/>	SELECT: INSERT

**If called to open CS-V205, report after a short while that CS-V205 could not be locally opened and that maintenance has been informed.**

### **Briefing Sheet/Turnover Information for Scenario 3**

Protected Train is A

MODE 1: 100% Power, CBD @ 230 steps (ARO = 230 steps), Boron Concentration = 899 ODI-56 Values for MOL Core 10 on US desk, +1 degrees = 170 gal RMW, -1 degree change = 27 gal BA; AFD target – 1.92%, Current AFD – 1.92%.

The crew assumes the watch and continues to maintain Reactor Power at 100% in accordance with OS1000.10, "Operations at Power".

The Pressurizer Control Group heaters are tagged out of service. The control circuit for the heaters was failed to zero output. A troubleshooting plan has been developed and Electrical Maintenance is investigating the problem. The heaters have been out of service for 10 hours. Backup Heater Group "B" is ON.

"D" ASDV (MS-PV-3004) is out of service due to a positioner air leak. The upstream isolation (MS-V49) is DANGER tagged. TSAS 3.3.3.5 action c, 3.6.3 action c and 3.7.1.6 action a were entered two hours ago. Expected outage time is 12 hours. The selector switches on the MCB and RSS have been CAUTIONED tagged to allow I&C to operate the ASDV. The work package includes instruction to contact the Control Room prior to causing valve to open.