Facility: **Point Beach** Scenario No.: **1** OP-Test No.: **2007301**

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: Unit 1 is at 100% power MOL 8010 MWD/MT. Boron Concentration is 829 PPM. Unit 2 is at 100% power.

Turnover: 1P-15A Safety Injection Pump is OOS. The oiler on the inboard pump bearing was damaged and a Maintenance crew is working the job to completion. TSAC 3.5.2.A was entered 6 hours ago and the pump is expected back for operability testing in about 3 hours. 1W-3A CRDM Shroud Fan is OOS due to motor bearing failure.

Today is Sunday, present clock time is real time. An RP Tech and Chemistry Tech are on-site. A crew of Maintenance personnel are working 1P-15A to completion.

The objective of the shift is to maintain stable plant conditions.

Event No.	Malf. No.	Event Type*	Event Description
1		C – BOP TS-SRO	P-32A Service Water Pump Trip (with reduced head capacity on two running SW pumps)
2		C – ALL TS-SRO	Steam Generator Tube Leak on 'A' SG
3		R - RO N – BOP N – SRO	Downpower due to SGTL on 'A' SG
4		I – ALL TS-SRO	1PT-485, Turbine First Stage Pressure Transmitter Fails High
5		M-ALL	SGTR on 'A' SG
6		C - RO	Reactor Trip manual push buttons on 1C04 fail to operate
7		C-BOP	P-38B MDAFW Pump and 1P-29 TDAFW Pump fail to auto start

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

SIMULATOR EXERCISE GUIDE (SEG)

SITE: POINT BEACH **SEG # PB-ILT-07N-001**

SEG TITLE: 2007 NRC EXAM SCENARIO #1 **REV. # 0 DRAFT**

PROGRAM: INITIAL LICENSE TRAINING **#: PB-ILT**

COURSE: **#:**

TOTAL TIME: 2.0

Additional site-specific signatures may be added as desired.

Developed by:	**Russell Joplin**	
	Instructor	*Date*
Reviewed by:	**Andrew Zommers**	
	Instructor	*Date*
	(Simulator Scenario Development Checklist.)	
Validated by:		
	Validation Lead Instructor	*Date*
	(Simulator Scenario Validation Checklist.)	
Approved by:		
	Training Supervision	*Date*

Guide Requirements

Goal of Training:	**To have the crew successfully respond to a SW pump trip, PT-485 failure, SG Tube Leak and Tube Rupture. Embedded within these events is the expectation to properly utilize Technical Specifications.**
Learning Objectives:	None
Prerequisites:	**1.** Simulator available **2.** Students enrolled in Initial License Program
Training Resources:	**1.** Floor Instructor as Shift Manager **2.** Floor Instructor as Shift Technical Advisor **3.** Simulator Booth Operator **4.** Communicator **5.** NRC Examiners
References:	**1.** AOP-6C U1, Uncontrolled Motion of RCCA(s) **2.** AOP-24, Response to Instrument Malfunction **3.** 0-SOP-IC-001 White, Removal of Safeguards or Protection Sensor From Service – White Channels **4.** AOP-3 U1, Steam Generator Tube Leak **5.** AOP-9A Service Water System Malfunction **6.** AOP-17A U1, Rapid Power Reduction **7.** EOP-0 U1, Reactor Trip or Safety Injection **8.** EOP-3 U1, Steam Generator Tube Rupture **9.** Technical Specifications
Commitments:	None
Evaluation Method:	Simulator performance will be evaluated by NRC Examiners IAW NUREG-1021
Operating Experience:	None
Related PRA Information:	None

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. P-32A Service Water Pump Trips with degraded head capacity on other running SW pumps
2. 'A' SG Tube Leak
3. 1PT-485, Turbine First Stage Pressure Transmitter fails HIGH

After EOP Entry:

1. Reactor Trip manual pushbuttons on 1C04 fail to operate
2. P-38B, 'B' MDAFW Pump and 1P-29, Unit 1 TDAFW Pump fail to auto start

Abnormal Events:

1. 1PT-485 Failure
2. P-32A SW pump Trip
3. 'A' SG Tube Leak

Major Transients:

1. Steam Generator Tube Rupture on 'A' SG

Critical Tasks:

1. **RT-7, When a reactor trip is procedurally called for, initiate a manual reactor trip prior to Pressurizer level reaching 10%.**
2. **E3-A Isolate feedwater flow into, and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.**
3. **E3-D Terminate SI before a RED simulator Out Of Limits alarm reached (S/G full to MSIV) and control RCS pressure and make up flow so that primary and secondary inventory are stable before the end of the scenario.**

SCENARIO OVERVIEW:

INITIAL CONDITIONS:

1. This scenario can be run from the following Specific IC set:
   - IC-162, Created from IC-2
2. The following equipment is OOS:
   - 1P-15A, 'A' Safety Injection Pump
   - 1W-3A, 'A' CRDM Shroud Fan

SEQUENCE OF EVENTS:

Event 1: P-32A Service Water Pump Trip

- After completion of crew turnover and examinees have assumed the watch, P-32A, 'A' SW pump trips (per Lead Examiner).
- Crew responds using AOP-9A, Service Water System Malfunction.
- Crew starts additional Service Water Pump(s) as necessary to maintain system pressure using AOP-9A or Alarm Response guidance.
- Crew places tripped pump ('A') to pullout and directs AO to shut SW-10, P-32A discharge valve.
- SRO addresses Technical Specifications for failure.

Event 2: 'A' SG Tube Leak

- Upon stabilization of plant following SW pump malfunction and on Lead examiner's direction, 'A' SG develops a small tube leak.
- Crew responds using AOP-3, SG Tube Leak.
- Crew determines need for rapid power reduction using AOP-17A, Rapid Power Reduction.
- SRO addresses Technical Specifications for tube leakage.

Event 3: 1PT-485, Turbine First Stage Pressure Transmitter Fails High

- Once stable downpower rate has been established, 1PT-485, Turbine First Stage Pressure Transmitter Fails High.

- The crew responds with AOP-6C and/or AOP-24 to ensure resulting rod motion is not required and places rod control in manual.

- Using AOP-6C, crew restores T_{avg} using rods in manual.

- SRO addresses Technical Specifications for failure.

Event 4: Steam Generator Tube Rupture

- Once the PT-485 failure is addressed, 'A' SG has a tube rupture which ramps in over six minutes.

- Examinees recognize increased tube leak rate and determine that a trip is required.

- Manual Reactor Trip buttons on 1C04 do not work and RO must trip the reactor from 1C03.

- RO also initiates manual SI and CI.

- Crew enters EOP-0 and completes immediate actions.

- BOP completes Attachment A of EOP-0.

- Transition is made to EOP-3, Steam Generator Tube Rupture

Event 5: P-38B MDAFW Pump and 1P-29 TDAFW Pumps fail to auto start

- P-38B MDAFW and 1P-29 TDAFW Pumps fails to auto start on either the LOFWTT or SI signal.
- BOP starts these pumps during Attachment A of EOP-0.

NOTE: Table may be modified as needed to include all scenario time-line items

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	INITIAL CONDITIONS (IC): IC-162 Unit 1 • Mode: 1 • Burnup: 8010MWD/MT • Power: 100% • Boron: (CB): 756 ppm • Temperature: NOT • Pressure: NOP • Xenon: Equilibrium • Rods: Bank D @ 220 steps • Generator: ~530 Mwe	(RO/BOP/ SRO)	
	1. SIMULATOR SET UP (perform set up per the "Simulator Setup Checklist", including entering action items per the "Simulator Input Summary.")		Place OOS tags on 1P-15A and W-3A. Place protected equipment tags on 1P-15B.
	2. Simulator Pre-brief in Classroom: a. Simulator Differences List b. Crew Positions		
	3. COMPLETE TURNOVER: a. Review applicable current Unit Status b. Review relevant At-Power Risk status (Unit 1 is GREEN) c. Review current LCOs not met and Action Requirements d. Verify crew performs walk down of control boards and reviews turnover checklists. e. Crew takes the shift.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EVENT 1: P-32A, 'A' SW Pump Trip (with degraded head capacity on running SW pumps.) After crew assumes the watch, P-32A pump trips.	BOP	Announces pump trip and refers to ARB C01 A 3-5 for Low Service Water Header Pressure. May recommend starting an additional SW pump.
		SRO	Acknowledges alarms/concurs with starting additional SW pump. Enters AOP-9A, Service Water Malfunction.
	Booth: (When asked the P32 A SW pump motor is hot to the touch and the breaker is tripped on overcurrent)	RO/BOP	Checks Forebay Level > -11 Ft. Checks Pumpbay Level > -11Ft. Checks Annunciator for Screen DP – Clear. Check SW Header Pressure Low Alarm – Clear.
	Booth: If an AO is dispatched to look at the diesel low flow alarm, inform control <695 gpm (alarm setpoint) if alarm is in or >695 if alarm is clear.	SRO	Note: Alarm is currently clear, but SRO and BOP should recognize that the alarm was the reason AOP was entered and enter RNO column to ensure proper actions are taken.
		BOP	Start additional SW pumps to maintain header pressure (likely already done). Place P-32A in Pullout IAW Step 4.d RNO. Direct AO to Shut SW-10, P-32A Discharge Valve.
	Booth: (When requested, insert LOA trigger to shut SW-10 and report valve shut)	SRO	Proceed to Step 9. Notify DCS. Address TSACs. Request SM check Emergency Plan.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Booth: (Communicate that RK 31 and 32 have power available)	BOP	Check Supply Header Integrity – Satisfactory. Check Zurn Strainer Power and Alarms. Ensure SW header valves – Open. Check Component Alarms – Clear.
		SRO	Return to Step 1 of AOP-9A.
		BOP	Check Forebay Level. Check Pumpbay Level. Check Screen Alarm Clear. Check Header Alarm Clear.
	NOTE: Alarm is now clear and crew should proceed to step 5		Check Zurn Strainers – Normal. Check Component Alarms – Clear.
	Booth: If asked to walk down the systems, report back nothing abnormal has been found.		Check SW System – Intact.
		Crew	Return to Procedure in effect, exit AOP-9A.
		SRO	Addresses Tech Specs for failure. **TLCO3.7.7.D and TSAC 3.7.8.A for BOTH units with 1 SW pump inoperable.**
	End of Event. Proceed to next event at Lead Examiner discretion		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EVENT 2: Steam Generator Tube Leak on 'A' SG	RO	Announces Unit 1 A Steam Line Radiation High Alarm.
		BOP	Refers to ARB 1C20 C 1-2 for above alarm and RMSARB for 1RE-231 and addresses RMS server.
		SRO	Enters AOP-3, Steam Generator Tube Leak. Addresses Fold Out Page.
		RO	Check SI Not Required (Continuous Action **(CA)**). -PZR level w/in 10% of Program. - Subcooling > 30°F. Check Rx Trip Not Required **(CA).** -Rx Critical. -Chg aligned to VCT. Check PZR Level – Stable or trending to program **(CA).** -Controls charging to maintain level.
		RO/BOP	Check PZR Pressure – Stable or trending to program Check Rx Makeup control – proper concentration, armed and in auto.
		SRO	Notify DCS, Chem and communicate E-plan need to SM.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	'A' SG Tube Leak continued	Crew	Identify Leaking SG – uses High Main Steam Line alarm to identify 'A' SG as leaking.
		SRO	Determine Leak Rate – RO should be able to determine leak rate using charging/letdown balance. Otherwise, SRO requests performance of CAMP 014 from chemistry or OI-55 to determine rate.
		SRO	Addresses note regarding TS leakage requirement and recognizes violation of **TS 3.4.13.** Checks RX shutdown required – leakage clearly exceeds 75 GPD and requires a shutdown. Addresses caution regarding time clock and RMS alarm. Determines action based on step 10 of AOP-3. Leak is > 75GPD and has risen more than 30 GPD over the last hour. Power to be reduced to <50% in one hour and in MODE 3 in following 2 hours. **(CA)** Enters AOP-17A, Rapid Power Reduction.
	Event 3: Rapid Power Reduction IAW AOP-17A	SRO	Determines desired power level and ramp rate and announces to CR – SRO determines that unit must be <50% within one hour of receipt of High Radiation Alarm and that the unit is at 100% power.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Rapid power reduction continued Note: If excessive ramp rate is selected, crew will have difficulty maintaining VCT level and may manually trip due to Charging Pump swap over to RWST. (**Booth Operator:** when requested, start 1P-99A and B by inserting LOA and report to BOP when started)	SRO RO Crew RO BOP RO BOP SRO BOP	SRO also determines that the unit needs to be taken off line and could direct BOP to set the endpoint at 0% on the turbine. Requests SM to notify PSS. Checks Rod control in Auto. Selects Rate Reduction method, likely Operator Auto – Impulse IN per the note prior to step 4. Commences boration, should refer to ROD 1.3 for power reduction boration and rod bank requirements **(CA).** Check PZR Pressure – Stable or trending to program **(CA).** Check PZR Level – Stable at or trending to program **(CA).** Check SG levels – controlling in Auto **(CA).** Maintain T_{avg} – Checks T_{avg} within limits **(CA).** Check MFW Seal Water Pumps Running - Contacts U1 Turbine Operator to Start 1P-99A and B. Determines endpoint is MODE 3. May transfer auxiliary loads.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 4: 1PT-485, Turbine First Stage Pressure Transmitter fails High Once downpower ramp has been established and control rods have begun to move in, Lead Examiner will direct inserting PT-485 failure. Failure will cause rods to step OUT	RO	Identifies outward rod motion, recommends placing rod control in Manual and may suspend load ramp.
		SRO	Concurs with recommendation, directs placing rods in Manual and enters AOP-6C, Uncontrolled Rod Motion (preferred) (May also enter AOP-24).
		Crew	Check Rod Motion Required – determines that rod motion was opposite to that required for down power.
		RO	Maintain RCS T_{avg} – checks T_{avg} within allowed band **(CA).**
	T_{ref} is clipped at 570°F	RO	Check RCS T_{avg} at or Trending to T_{ref} – T_{ref} will need to be calculated by the RO. RO should determine that T_{avg} is higher than T_{ref} and needs to insert rods to restore T_{avg} to program.
		RO/SRO	Check Control Rods – Above Minimum Insertion Limit. Determines rods are well above minimum insertion limit.
	At some point during the performance of AOP-6C after the initial failure and taking controls to manual, the crew may trip the reactor rather than attempt to continue a rapid shutdown with Rods in Manual. If this occurs, increase 'A' SG tube leak to 6% over 6 minutes as soon as the trip is completed.	RO	Verify AFD within limit – Checks DFMOOB Clear. Alarm should be clear. This is a continuous action step which may come into play as rods are driven to stabilize $T_{avg.}$
		SRO	Check Rod Motion due to Instrument Malfunction. Go to AOP-24.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 5: Steam Generator Tube Rupture When entry into AOP-24 is made and on Lead Examiner's direction, increase Tube Leakage on 'A' SG to 6% over 6 minutes	Crew	Recognizes increased leak rate and uses fold out page/continuous action guidance from AOP-3 to trip the reactor.
	CRITICAL TASK: Trip the reactor prior to Pressurizer level reaching 10%	RO	Inserts Manual Trip. Buttons on 1C04 fail to operate. RO directs BOP to standby at 1B01 and 1B02 control switches and uses trip buttons on 1C03 to Trip the reactor, which is successful. RO inserts manual SI and CI also and carries out Immediate Actions of EOP-0. Verify Reactor Trip – RTBs open, bottom lights all lit, IRPIs on bottom, Flux lowering. Verify Turbine Trip – Turbine Stop Valves both shut:. -SL and SR lights lit OR. -Turbine Stop Valves Two Closed Alarm OR -Turbine Valves Bistable both lit. Verify Safeguards Buses – At least one 4160 and one 480 V Bus energized. - Checks voltage on buses and breaker configuration Check if SI is Actuated – was performed manually. - SI and RHR pumps both running. - 'A' SI is tagged out. May reinitiate SI and CI. Verifies Immediate Action steps.
		SRO/RO	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	SG Tube Rupture continued	Crew	Addresses Fold Out Page.
		RO/BOP	Isolates Feed Flow to 'A' SG if level is >29%. P-38A PCV is taken to manual and shut and/or discharge valve to 'A' SG is taken to Manual and Shut. If 1P-29, TDAFW Pump is running, it may be stopped or isolation valve to 'A' SG taken to shut.
		BOP	Performs Attachment A (See Marked Up Attachment. All Conditions normal except for P-38B MDAFW Pump and 1P-29 TDAFW Pump have failed to start automatically).
		RO	Verifies Secondary Heat Sink - >29% in at least one SG. Adjusts AFW flow to 'B' SG as desired to maintain level. 'A' SG should be isolated per Fold Out Page and should not require feed. Verify RCP Seal Cooling – Lab seals on both RCPs should be >20". Verify RCS Temp Control **(CA)** – RO should set 'A' ADV to match current SG pressure to ensure RCS temperature does not rise unacceptably. May lower AFW flow as needed after verifying >29% in 'B' SG. Check PZR PORVs both shut. Check Normal spray valves both shut. Check Aux spray valve shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	SG Tube Rupture continued	RO	Check if RCPs should remain running – Subcooling should be maintained and RCP trip should not be needed
			Direct STA to monitor CSFSTs.
		SRO	Verify Containment Sump Recirc not required **(CA)** – RWST level should still be over 90%.
		RO	Check if Secondary System is intact – SG pressures should not be lowering uncontrollably.
			Check if SG tubes are intact – 'A' SG has indications of a rupture (high radiation, rising level).
		SRO	Request SM contact RP and Chemistry for Main Steam Line surveys and SG samples.
			Transition to EOP-3.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-3 Actions for SGTR	SRO	Addresses Cautions regarding identification and isolation of ruptured SG, Chem Sampling and Fold Out Page.
		Crew	Reviews Fold Out Page – None of the items on the Fold Out Page should require action at this time. Check if RCPs should remain running **(CA)** – RCPs may not be running.
		RO	
		Crew	Identify Ruptured SG – identifies 'A' as ruptured.
		RO/BOP	Shut MSIV on ruptured SG – 1MS-2018 should already be shut.
		BOP	Reset Loss of FW Turbine Trip – depresses LOFWTT reset pushbutton and alarm reset buttons to clear LOFWTT alarm. Minimize Steam Dump from Ruptured SG: - 1HC-468 in auto at 1050. - 1MS-2016, 'A' ADV shut. - Shuts 1MS-2020, TDAFW supply if open. - Determines that 1MS-234, MSIV bypass valve is shut under admin control.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-3 actions continued (Booth Operator: when directed by BOP, insert LOA to shut 1MS-235 and report both valves shut, 1MS-228 is not modeled on Simulator) **CRITICAL TASK: Isolate feedwater flow into, and steam flow from the ruptured SG before a transition to ECA-3.1 occurs.**	BOP Crew BOP RO/SRO SRO BOP	Isolate flow from ruptured SG: - Shuts 1MS-5958 and 2042 if open. - Dispatches AO to shut 1MS-235 and 228 locally, should remind AO that the SG is ruptured and rad levels may be elevated. Check if Feed Flow to Ruptured SG should be stopped **(CA)** – level in 'A' SG should be >29%, thus BOP will secure P-38A MDAFW pump (in pullout) and shut AF-4023 and 1AF-4001 to secure feed from MDAFWP and TDAFWP. Should recognize impact on Unit 2 and inform U2 operator of action. **(TSAC 3.7.5.C).** Verify Ruptured SG not needed for cooldown – checks 'B' SG available for cooldown and 'A' MSIV shut. Check ruptured SG pressure >430 psig – should be well above 430 psig in 'A' SG. Determine Target Core Exit Temp: RO reports pressure in ruptured SG, expected to be near 1050, thus target temp should be 490°F. Addresses notes prior to step 11 concerning cooldown rate and RCP trip criteria. Cooldown RCS to Target Temperature – Since 'B' MSIV is shut, should open 'B' ADV fully in manual.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-3 Steps continued	RO	Check PORVs and Block Valves – PORVs should be shut and block valves open with power.
			Check PZR safety valves – Shut.
		BOP	Stabilize intact SG level **(CA)** – direction to maintain SG level 29-65% during cooldown.
			Lock in SI Signal – manually actuates SI and CI and trips SI bistables in racks behind control boards.
		SRO	Addresses caution regarding loss of offsite power.
		BOP	Reset SI, CI and 1B-03 and 1B-04 Lockouts – performs resets on rear of C01 panel.
			Check 4160 Safeguards buses both energized from offsite – verifies buses energized from 1X04.
			Reestablish IA to Containment: -Starts second IA compressor on C01 Rear. -Checks IA pressure – should be 100 PSIG. -Opens IA-3047, listening for click of IA relay and sets timer for reminder to do the same for IA-3048.
		RO	Check if RHR pumps should be stopped – checks RCS pressure >425 psig and stops both RHR pumps and monitors RCS pressure **(CA).**

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-3 steps continued	RO	Verify Charging Flow – Aligns charging to RWST and establishes maximum charging.
		Crew	Check if RCS cooldown should be stopped – crew checks RCS temperature and stops cooldown when CETs < Target Temp. This step may be performed earlier if conditions are met.
		BOP	Shuts 'B' ADV to stop cooldown.
			Check ruptured SG pressure stable or trending higher – intention of step is to ensure DP can be maintained between SGs. SG pressure should be stable but may be lowering slightly due to cooldown.
		RO	Check RCS Subcooling > 35°F – should be substantial subcooling.
		SRO	Determine if the RCPs are running and proceed to depressurize RCS. SRO should quickly brief RO and BOP about intent of depressurization steps and criteria for stopping depressurization.
		RO	Opens sprays or PORV to depressurize RCS –
			Verifies sprays or PORV shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-3 steps continued **CRITICAL TASK: Terminate SI before a RED simulator Out Of Limits alarm reached (S/G full to MSIV) and control RCS pressure and make up flow so that primary and secondary inventory are stable before the end of the scenario.**	Crew BOP RO Crew	Determines SI pump may be stopped: - Subcooling > 35°F - Heat Sink available - RCS pressure trending higher - PZR level > 10% Stops running ('B') SI pump ('A' is tagged out). Verifies charging flow and stabilizes PZR level. Verify SI flow not required – verifies Subcooling and PZR Level adequate. Checks Rx Makeup armed and in auto and VCT level <17% - should realign RMW pump. Establishes Letdown by opening letdown isolations, setting HC-130 and opening one or two orifice isolations. Establishes charging from VCT. Determines action to take based on SG trend and PZR level to stop SG leakage.
	Once Crew has control of SG leakage, scenario may be terminated per Lead Examiner's direction.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A action Booth: (Inform BOP that SW-LW-61 and 62 are shut when asked)	BOP	Verify feedwater isolation: - Feedwater Regulating and Bypass Valves SHUT. - Both main feed pumps tripped. - MFP discharge MOVs - BOTH SHUT. Verify containment isolation: - CI Panels A and B ALL LIGHTS LIT. - RS-SA-9 SHUT. - No other valves open under administrative control (SM may be asked to verify this). Verify AFW Actuation: - Checks both motor driven AFW pumps running. - May start 1P-29 and P-38B if not previously done. Check both SI pumps running. - A is not running, but is isolated. Check both RHR pumps running. Check only one CCW pump running. Verify Service Water Alignment: - 6 service water pumps running. (P32A not running). - Service water isolation valves shut. - Direct AO to locally check SW-LW-61 or SW-LW-62 shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A action	BOP	Verify Containment Accident Cooling Units Running - All accident fans running. - 1SW-2907 & 2908 OPEN. - Unit 1 Containment Recirc Coolers Water Flow Low Alarm CLEAR. Check Control Room Ventilation IN ACCIDENT MODE: - At least one control room recirc fan RUNNING. - Control room damper solenoid valve PURPLE LIGHT LIT. Check if Main Steam Lines Can Remain Open, checks both MSIVs SHUT. Verify proper SI valve alignment: - Unit 1 SI active status panel ALL LIGHTS LIT. - Unit 1 SI-Spray Ready status panel NO LIGHTS LIT. Verify containment spray not required: Containment Pressure remained < 25 PSIG. Verify SI Flow: - RCS wide range pressure <1400 psig. - Check SI pumps flow indicated. - RCS wide range pressure < [425] 200 psig. This ends the steps of EOP-0 Attachment A.

SIMULATOR INPUT SUMMARY							
Event Trigger	**System**	**Type**	**Code**	**Value**	**Delay**	**Ramp**	**Description**
Preload	PPL	OVR	OVR1PPL033	OFF	-	-	RX Trip A train buttons 1C04 fail
Preload	PPL	OVR	OVR1PPL034	OFF	-	-	RX Trip B train buttons 1C04 fail
Preload	SWS	PMP	PMP1SWS002C	85	-	-	P-32B SW Pump degraded head
Preload	SWS	PMP	PMP1SWS004C	85	-	-	P-32D SW Pump degraded head
Preload	SGN	VLV	VLV1SGN015	4 - Fail to auto open	-	-	1MS-2019 TDAFW STM supply fails to auto open
Preload	SGN	VLV	VLV1SGN016	4 - Fail to auto open	-	-	1MS-2020 TDAFW STM supply fails to auto open
Preload	AFW	BKR	BKR1AFW002	4 - Fail to auto close	-	-	P38B MDAFW Pump breaker fails to auto close
Preload	EPS	LOA	LOA1EPS102	Racked out	-	-	1P15A SI Pump breaker rack out
Preload	SIS	LOA	LOA1SIS017	OPEN	-	-	1SI-866 1P-15A SI Pump discharge MOV breaker*
Preload	SIS	VLV	VLV1SIS046	1-Fail CTL PWR Fuse	-	-	1SI-896 1P-15A SI Pump suction MOV*
Preload	CNM	BKR	BKR1CNM017	6-Fail CTL PWR Fuse	-	-	1W-3A CRDM Shroud fan bkr
1	SWS	BKR	BKR1SWS001	1 - TRIP	-	-	P32A SW Pump breaker trip

SIMULATOR INPUT SUMMARY							
Event Trigger	**System**	**Type**	**Code**	**Value**	**Delay**	**Ramp**	**Description**
3	MSS	XMT	XMT1MSS008A	650	-	45 sec	PT-485 fails high
5	RCS	MAL	MAL1RCS008A	.5	-	60 sec	A SG tube rupture
16	SWS	LOA	LOA1SWS001	0	-	120 sec	P32A Pump discharge valve SW-10
17	CFW	LOA	LOA1CFW083	ON	-	-	1P-99A SGFP Seal Water Pump
17	CFW	LOA	LOA1CFW084	ON	60	-	1P-99B SGFP Seal Water Pump
18	SGN	LOA	LOA1SGN023	0	-	120 sec	1MS235 RW steam supply

*** Ensure valve is closed prior to inserting this preload.**

Historical Record: Developed for the ILT 2007 NRC Exam.

Simulator Scenario Development Checklist

Mark with an X Yes or No for any of the following. If the answer is No, include justification for the no answer or the corrective action needed to correct the discrepancy after the item.

1.	The scenario contains objectives for the desired tasks and relevant human performance tools.	Yes	No X
2.	The scenario identifies key parameter response, expected alarms, and automatic actions associated with the induced perturbations. (This action applies to all SEG's new or revised for those on the ANS/ANSI-3.5-1998 standard. This action is NOT applicable for those on the ANS/ANSI-3.5-1985 standard.)	Yes	No X
3.	The scenario content adequately addresses the desired tasks, through simulator performance, instructor-led training freezes, or both.	Yes X	No
4.	Plant PRA initiating events, important equipment, and important tasks are identified.	Yes X	No
5.	Turnover information includes a Daily At Power or Shutdown Safety Risk Assessment.	Yes X	No
6.	The scenario contains procedurally driven success paths. Procedural discrepancies are identified and corrected before training is given.	Yes X	No
7.	The scenario guide includes responses for all anticipated communications to simulated personnel outside the Control Room, based on procedural guidance and standard operating practices.	Yes X	No
8.	The scenario includes related industry experience.	Yes	No X
9.	Training elements and specific human performance elements are addressed in the scenario critique guide to be used by the critique facilitator. The critique guide includes standards for expected performance.	Yes	No X

Developer and Reviewer: Once checklist is completed and deficiencies are corrected, sign the cover page.

Simulator Scenario Validation Checklist

Mark with an X Yes or No for any of the following. If the answer is No, include an explanation after the item.

		Yes	No
1.	The desired initial condition(s) could be achieved.	X	
2.	All malfunctions and other instructor interface items were functional and responded to support the simulator scenario.	X	
3.	All malfunctions and other instructor interface items were initiated in the same sequence described within the simulator scenario.	X	
4.	All applicable acceptance criteria were met for procedures that were used to support the simulator scenario.	X	
5.	During the simulator scenario, observed changes corresponded to expected plant response.	X	
6.	Did the scenario satisfy the learning or examination objectives without any significant simulator performance issues, or deviations from the approved scenario sequence? If learning objective(s) could not be satisfied, identify the objectives in the Simulator Action Request	X	
7.	Evaluation: The simulator is capable of being used to satisfy learning or examination objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence.	X	

Discrepancies noted (Check "none" or list items found) ☒ None
SMAR = Simulator Action Request

SMAR:_____ SMAR:_____ SMAR:_____ SMAR:_____

Comments: No was selected for several training items on the development checklist. These items will remain 'NO' due this SEG being developed IAW NUREG 1021 for an Initial NRC license exam. No was selected for step 2 of the development checklist due to this being N/A for our plant.

Validator: Sign the cover page only after noted discrepancies are corrected or compensatory actions are taken to ensure quality training.

Facility: **Point Beach** Scenario No.: **2** OP-Test No.: **2007301**

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: Unit 1 is at 47% power, performing OP-1C, Startup to Power Operation at Step 5.123. Unit 1 is at BOL with a boron Concentration of 1702 PPM. Unit 1 rod control is in Manual. Unit 2 is at 100% power.

Turnover: 1P-15A Safety Injection Pump is OOS. The oiler on the inboard pump bearing was damaged and a Maintenance crew is working the job to completion. TSAC 3.5.2.A was entered 6 hours ago and the pump is expected back for operability testing in about 3 hours. 1W-3A CRDM Shroud Fan is OOS due to motor bearing failure.

Today is Sunday, present clock time is real time. An RP Tech and Chemistry Tech are on-site. A crew of Maintenance personnel are working 1P-15A to completion.

The objective of the shift is to maintain stable plant conditions and raise Unit 1 to full load when requested.

Event No.	Malf. No.	Event Type*	Event Description
1		I - RO I - SRO TS -SRO	LT-141, VCT Level Channel Fails High
2		R-RO N-BOP N-SRO	1W-3B CRDM Shroud Fan Trips/Rapid power reduction
3		C – RO C – SRO TS -SRO	Loop 'A' RTD Bypass Line Leak at 25 GPM
4		M – ALL	Small Break LOCA (300 GPM)
5		C – ALL	All Automatic and manual trips fail. (ATWS)
6		C - BOP	1P-15B Fails to Auto Start

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

SIMULATOR EXERCISE GUIDE (SEG)

SITE: POINT BEACH **SEG # PB-ILT-07N-002**

SEG TITLE: 2007 NRC EXAM SCENARIO #2 **REV. # 0 DRAFT**

PROGRAM: INITIAL LICENSE TRAINING **#: PB-ILT**

COURSE: **#:**

TOTAL TIME: 2.0 HOURS

Additional site-specific signatures may be added as desired.

Developed by:	**Russell Joplin**	
	Instructor	*Date*
Reviewed by:	**Andrew Zommers**	
	Instructor	*Date*
	(Simulator Scenario Development Checklist.)	
Validated by:		
	Validation Lead Instructor	*Date*
	(Simulator Scenario Validation Checklist.)	
Approved by:		
	Training Supervision	*Date*

Guide Requirements

Goal of Training:	**To have the crew successfully respond to a VCT level failure, Shroud fan trip, plant downpower, SBLOCA with an ATWS. Embedded within these events is the expectation to properly utilize Technical Specifications.**
Learning Objectives:	None
Prerequisites:	**1.** Simulator available **2.** Students enrolled in Initial License Program
Training Resources:	**1.** Floor Instructor as Shift Manager **2.** Floor Instructor as Shift Technical Advisor **3.** Simulator Booth Operator **4.** Communicator **5.** NRC Examiners
References:	**1.** AOP 1-D, Chemical and Volume Control System Malfunction **2.** AOP-24, Response to Instrument Malfunction **3.** ARB 1C04 1C 2-9, Containment or Aux Bldg Vent System Air Flow Low **4.** AOP-17A, Rapid Power Reduction **5.** AOP-1A, Reactor Coolant Leak **6.** CSP-S.1, Response to Nuclear Power Generation/ATWS **7.** EOP-0, Reactor Trip or Safety Injection **8.** EOP-1, Loss of Reactor or Secondary Coolant **9.** CSP-C.2, Response to Degraded Core Cooling **10.** Technical Specifications, Technical Requirements Manual
Commitments:	None
Evaluation Method:	Simulator performance will be evaluated by NRC Examiners IAW NUREG 1021
Operating Experience:	None
Related PRA Information:	None

QUANTITATIVE ATTRIBUTES

Malfunctions:

Before EOP Entry:

1. LT-141, VCT Level Channel Fails HIGH
2. 1W-3B CRDM Shroud Fan Trips
3. Rapid Power Reduction
4. Loop 'A' RTD Bypass Line Leak

After EOP Entry:

1. ATWS
2. SB LOCA
3. 1P-15B, 'B' SI Pump Fails to Start

Abnormal Events:

1. VCT Level Transmitter Failure
2. RTD Bypass Line Leak
3. 1P-15B Fails to Start on SI

Major Transients:

1. ATWS
2. SB LOCA on Loop 'A' RTD Bypass Line

Critical Tasks:

1. E-0 – I: Manually start at least one SI pump prior to transition out of EOP-0.

2. FR-S.1—C: Insert negative reactivity into the core by at least one of the following methods before completing the immediate action steps of CSP-S.1:
   - De-energizing 1B-01 and 1B-02
   - Insert control rods

SCENARIO OVERVIEW:

INITIAL CONDITIONS:

1. This scenario can be run from the following Specific IC set:
   - IC-163
2. The following equipment is OOS:
   - 1P-15A, 'A' Safety Injection Pump (need relay and OOS tag on Control Board)
   - 1W-3A, 'A' CRDM Shroud Fan (need OOS tag on Control Board)

SEQUENCE OF EVENTS:

Event 1: 1LT-141, VCT Level Channel Fails High

- After completion of crew turnover and examinees have assumed the watch, 1LT-141, VCT Level Channel Fails High.
- Crew enters AOP-1D and determines LT-141 has failed and proceeds to Step 58 of AOP.
- RO places divert valve to VCT and monitors VCT level for need to divert
- SRO refers to TLCO 3.3.1

Event 2: 1W-3B CRDM Shroud Fan Trips/Rapid Power Reduction

- RO responds to annunciator 1C04 1C 2-9, Containment or Auxiliary Bldg Ventilation System Flow Low using ARB
- ARB directs rapid power reduction using AOP-17A, Rapid Power Reduction
- Crew coordinates to lower unit power at 1% per minute

Event 3: Reactor Coolant Leak

- Once Chief Examiner determines that power reduction is sufficient, Loop 'A' RTD bypass line develops a 25 GPM leak and crew enters AOP-1A, Reactor Coolant Leak.
- Crew determines that neither SI nor Rx Trip is required and RO raises charging speed to maintain Pressurizer Level.
- Crew enters diagnostic phase of AOP-1A and begins to determine leak location. Crew will possibly isolate Letdown and Charging. Once these are isolated or at Chief Examiners discretion, raise RCS leak to 300 GPM over 10 minutes.

Event 4: ATWS

- Crew will determine that leak size has increased and PZR level can no longer be maintained. Crew will attempt to insert a manual trip.
- Trip breakers will remain shut and 1B02 will not deenergize, giving an ATWS.
- RO will ensure inward rod motion is being maintained and direct entry into CSP-S.1
- RO will direct the BOP to trip the Turbine while ensuring that inward rod motion is being maintained. Initially, the rod control system will be providing a higher rod speed than manual and RO may choose to allow the auto rod motion to continue while monitoring. Before auto rod motion stops, the RO will place Rod Control Selector Switch to Manual and continue to drive rods in.
- Crew will contact the AO and direct the opening of the Reactor Trip Breakers Locally. Two minutes after this call is received, the booth operator will delete the RTB malfunctions and open the Trip Breakers and communicate this to the Crew.
- During the time the RO is driving rods, the BOP will carry out CSP-S.1 steps to verify AFW, establish Boration, etc. Once RTBs are opened, crew will complete actions in CSP-S.1 and return to EOP-0, Step 1.

Event 5: SB LOCA

- Following completion of CSP-S.1, Crew will return to Step 1 of EOP-0 and complete Immediate Actions and initiate SI, if not already completed. BOP should recognize that 'B' SI pump failed to start and manually start the pump or the BOP will start it during Attachment A.

- Crew will progress to Step 16 of EOP-0 and transition to EOP-1, Loss or Reactor or Secondary Coolant.

- Just before or sometime after the transition to EOP-1, Containment pressure will rise to 5 PSIG and subcooling will degrade to <80ºF.

- Once these conditions occur, the STA will report that an ORANGE PATH entry condition exists for Core Cooling status tree and transition to CSP-C.2, Response to Degraded Core Cooling will be made.

- Crew will take action in CSP-C.2 through Step 14 and check RVLIS indications. Crew should recognize that Vessel Level is stable and continue to secure one RCP and verify SI Accumulator availability.

- Crew will then commence a cooldown using ADVs. Once cooldown is started, scenario will be terminated per Lead Examiner's direction.

NOTE: Table may be modified as needed to include all scenario time-line items

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	INITIAL CONDITIONS (IC): IC-163 from IC-4 Unit 1 • Mode: 1 • Burnup: BOL, raising power from initial SU • Power: 47% • Boron: (CB): 1530 • Temperature: NOT • Pressure: NOP • Xenon: Equilibrium • Rods: Bank D @ 187 steps • Generator: ~240 MWe	(RO/BOP/SRO)	
	1. SIMULATOR SET UP (perform set up per the "Simulator Setup Checklist", including entering action items per the "Simulator Input Summary.")		Install OOS labels for 1P-15A and 1W-3A. Install protected equipment label for 1P-15B.
	2. Simulator Pre-brief in Classroom: a. Simulator Differences List b. Crew Positions		
	3. COMPLETE TURNOVER: a. Review applicable current Unit Status b. Review relevant At-Power Risk status (Unit 1 is GREEN) c. Review current LCOs not met and Action Requirements d. Verify crew performs walk down of control boards and reviews turnover checklists. e. Crew takes the shift.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	1. EVENT 1: 1LT-141, VCT Level Transmitter Fails High. After crew assumes the watch, 1LT-141, VCT Level Transmitter Fails High.	RO	Acknowledges VCT High/Lo Level alarm and informs Crew. May take VCT Level Control Divert valve, 1CV-112A, to VCT position to direct Letdown to VCT.
		SRO	Directs entry into AOP-1D, CVCS Malfunction.
		SRO/RO	Verifies no RCS leak in progress.
		SRO	Addresses notes prior to step 2 and determines LT-141 failure section of AOP should be performed. Continues to step 58.
		SRO/RO RO	Determines that LT-141 has failed. Places 1CV-112A, VCT Level Control Divert valve, to VCT (if not already done) and maintains VCT level <78%.
		SRO	Addresses TLCO. May address Setpoint document and contingencies with crew. Directs informing I&C and DCS and exits procedure.
	TLCO 3.3.1 Instrumentation Table addressed. No actions are required as L-112 is still available		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	2. EVENT 2: Loss of 1W-3B, Running CRDM Shroud Fan trips a. Upon direction of Lead Examiner, insert trigger to trip 'B' CRDM Shroud Fan.	RO	Announce failure and refers to Alarm Response Book for Motor Breaker Trip and Containment or Aux Bldg Vent System Air Flow Low.
	b. When sent to local breaker for shroud fan, report that the breaker has tripped. If requested to close breaker, report that breaker will not stay closed.	BOP	Inspects PAB/Containment ventilation control station on rear of 1C04 and determines only available CRDM shroud fan has tripped. May attempt restart with SRO concurrence. Should contact AO to look at local breaker for fan. 1W3-B control switch might be placed in pullout to clear control board alarms.
	c. If Electrical Maintenance was contacted to look at the breaker, report back it will take several hours to troubleshoot the problem.	SRO	Using guidance in ARB 1C04 1C 2-9, directs rapid power reduction IAW AOP-17A.
		SRO	Announces entry into AOP-17A, Rapid Power Reduction. Determines desired power level and ramp rate and announces to CR – SRO determines that unit be ramped at 1% per minute as directed by ARB.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Rapid power reduction continued	SRO	SRO also determines that the unit needs to be taken off line and could direct BOP to set the endpoint at 0% on the turbine.
		SRO	Requests SM to notify PSS.
		RO	Places Rod control to Auto.
		Crew	Selects Rate Reduction method, likely Operator Auto – Impulse IN per the note prior to step 4.
		RO	Commences boration, should refer to ROD 1.3 for power reduction boration and rod bank requirements Continuous Action Step **(CA).**
			Check PZR Pressure – Stable or trending to program **(CA).**
			Check PZR Level – Stable at or trending to program **(CA).**
			Check SG levels – controlling in Auto **(CA).**
			Maintain Tavg – Checks Tavg within limits **(CA).**
		BOP	Check MFW Seal Water Pumps Running – Running at beginning of scenario.
		RO	
		BOP	Determines endpoint is off-line.
		SRO	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Rapid Power Reduction continued Once Unit Auxiliaries are shifted and with concurrence of Lead Examiner, insert 25 GPM RCS leak. AO reports that local gland steam pressure is 4.0 PSIG AO reports OS-48 and 50 are shut, valves are not modeled on the simulator.	SRO/ BOP	Checks single feed train in operation – Already done due to plant conditions. Isolate SGBD if desired. Transfer Unit auxiliary loads to Station Aux Transformer – Should transfer auxiliaries as follows: - Close 1A-03 to 1A-01 Tie Breaker, 1A52-37 - Open bus 1A-01 Normal Feed, 1A52-01 - Close 1A-04 to 1A-02 Tie Breaker, 1A52-55 - Open bus 1A-02 Normal Feed, 1A52-17 Contact AO for local gland steam pressure. Contact AO to isolate OS-48 and 50 Crossover Steam Dump drain bottle isolations.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	3. **Event 3: Loop 'A' RTD Bypass Line Leak at 25 GPM** Once downpower ramp has been established and with concurrence of Lead Examiner, 25 GPM RCS leak on RTD bypass line develops	Crew	Recognizes indications of leakage inside containment: Rising humidity, Sump 'A' alarm and RMS alarms.
		SRO	Enters AOP-1A, Reactor Coolant Leak.
		RO	Check SI not required **(CA):** Adequate PZR Level and Subcooling. Check Rx Trip not required **(CA):** Charging Aligned to VCT. Check Pressurizer Level **(CA):** stable or trending to program, Adjusts Charging as needed. Check Pressurizer Pressure: Stable or trending to program. Check Rx Makeup Controls: Set for proper blend, armed and in auto. Request SM notify DCS and implement E-Plan. SRO may Address Tech Specs.
	SRO may address Technical Specifications at this time due to RCS leakage. If TS not addressed here, a scenario follow-up question will be needed. **LCO 3.4.13** is not met due to unidentified leakage exceeding 1 GPM.	SRO	Directs performance of steps 7 through 18. These steps include directions to isolate letdown and charging and various other leakage possibilities. Recognizes leak has grown and PZR level cannot be maintained and returns to step 1 to initiate Rx Trip and SI.
	As the leak is unisolable, the Lead Examiner will direct when the team is prepared to make the leak larger and booth operator will increase the leak to 300 GPM over 10 minutes.	Crew	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	4. **Event 4: ATWS**	RO	Attempts to trip reactor using 1C04 pushbuttons. Attempts to trip reactor using C01 pushbuttons. Directs BOP to deenergize B01 and B02.
		BOP	Deenergizes B01. B02 will not deenergize.
	CRITICAL TASK: Insert Negative Reactivity into the core before completing Immediate Action Steps of CSP-S.1	RO	Announces entry into CSP-S.1 and begins driving control rods in. Directs BOP to trip turbine manually. Announces ATWS and contacts AO to go to Unit 1 Rod Drive Room.
	When contacted by crew to go to U1 Rod Drive Room, acknowledge request. After 2 minutes and with lead examiner concurrence, delete RTB malfunctions and open RTBs.	Crew BOP SRO BOP	Trips turbine manually, verifies turbine tripped. Addresses Fold Out Page. Verifies AFW actuation: checks both MDAFW pumps running, checks TDAFW pump running if SG levels <25% [51%]. Aligns Charging suction to RWST: Open 1CV-112B, Closes 1CV-112A. Establishes Emergency Boration: Establish Max Charging, Start BATP, Open 1CV-350, Emergency Borate Valve. Check SI Actuated: SI should not yet have actuated. IF SI actuates during CSP-S.1, BOP will perform Attachment A.
	Attachment A for CSP-S.1 and EOP-0 are nearly identical. See end of this section for Attachment A expected actions. If Att. A is performed for CSP-S.1, the 'B' SI pump will need to be started.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	ATWS Continued	RO/BOP	Check PZR Pressure: <2335, if not, open PORV until it is.
		RO/BOP	Check RTBs open and Turbine Tripped: if AO has not yet been dispatched to Rod Drive Room, step will prompt crew to do so. Turbine should have been tripped at step 2.
	If contacted to locally verify dilution flowpaths, wait 2 minutes and report dilution flowpaths isolated.	Crew	RO/BOP should check dilution flowpaths in the Control Room and dispatch the PAB AO to check the others on the list.
		Crew	Checks RCS Cold Leg > 543ºF. If Cold Leg Temp is < 543ºF, will stop any steam dumping in progress.
		Crew	Crew should determine that an uncontrolled cooldown is not in progress and proceed to step 18.
		Crew	At Step 18, crew checks Core Exit TCs and determines they are well under 1200°F.
			Crew determines that the RTBs are now open and power is lowering as expected.
			Stops Boration since all rods are inserted.
		RO	Transitions back to Step 1 of EOP-0.
		SRO	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	7. SBLOCA Response When Containment Pressure exceeds 5 PSIG, the crew should announce Adverse Containment and used bracketed [ ] setpoints in EOP Performance. NOTE: Once Adverse conditions are reached and subcooling degrades to <80ºF, the STA will report an ORANGE Path for Core Cooling Status Tree. When this report is received by the SRO, the crew will transition to CSP-C.2. This will likely happen just before or some time after the transition to EOP-1.	RO/SRO BOP Crew BOP	Verifies Reactor Trip – RO reports that the Rx was not tripped due to failures but is now tripped. Crew should reenergize B-01 and may reenergize stripped MCCs. Verify Turbine Trip – Turbine is tripped. Verify 4160 and 480 safeguards buses energized – All safeguards buses energized from off-site power. Check if SI is actuated – SI will likely not have actuated automatically in CSP-S.1. If not, the RO will actuate SI now based on Pressurizer Level <10%. May note that 1P-15B had failed to start and start 'B' SI Pump. Addresses Fold Out Page: RCP trip criteria will likely not be met, if so, RO trips RCPs. Containment Pressure will likely not yet be > 5PSIG, if so, adverse containment will be declared. Performs Attachment A. (See following section of this SEG for Att. A Actions). Verifies SG levels > 29[51%] and controls AFW flow to maintain SG levels.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	SB LOCA Continued	RO	Checks RCP Lab Seals > 20”.
			Verifies RCS Temperature Control **(CA):**
			Controls ADVs in Automatic to stabilize RCS cold leg temps.
			Checks PORVs Shut.
			Checks Spray Valves – All Shut.
			Checks RCPs running – If running and subcooling <30[60], stops both RCPs after verifying SI pump delivering flow.
			Direct STA to monitor CSFSTs.
		SRO	Verify Sump Recirc not required **(CA)** – checks RWST level and RCS pressure. Determines sump recirc not required.
		RO	Checks Secondary System intact – No indication of faulted SG.
			Checks SG Tubes Intact – No CR indications of Tube leakage.
			Requests local steam line surveys and SG samples.
			Checks RCS intact inside containment – recognizes indications of RCS break inside containment.
		SRO	Announces transition to EOP-1.
	CRITICAL TASK: Manually start at least one SI pump prior to transition out of EOP-0 (This task should have been completed during performance of Att. A for EOP-0 or CSP-S.1)	SRO/RO	
		SRO	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	8. EOP-1 for SBLOCA NOTE: Once Adverse conditions are reached and subcooling degrades to <80ºF, the STA will report an ORANGE Path for Core Cooling Status Tree. When this report is received by the SRO, the crew will transition to CSP-C.2. This will likely happen just before or some time after the transition to EOP-1. When this happens, the remaining actions of EOP-1 (or EOP-0) will not be performed. If contacted for local surveys, report normal background levels for steam lines.	Crew RO RO/BOP RO SRO BOP	Addresses Fold Out Page: - RCP trip criteria may be met if not previously tripped Check if RCPs should remain running – May be stopped already. Check Secondary System intact – Secondary is intact Stabilize SG Levels **(CA) –** Controls AFW to maintain SG levels and determines tubes are intact. Check Secondary Radiation normal – no indications of a tube leak/rupture. Check PORVs and Block Valves **(CA)** – PORVs Shut, Blocks Open. Addresses Caution regarding loss of offsite power following SI reset. Resets SI, CI and 1B03/1B04 non-safeguards lockouts Checks 4160 Safeguards Buses – both energized Reestablishes IA to Containment: - Starts second IA compressor - Checks IA pressure - Opens IA-3047 then waits ~3 minutes - Opens IA-3048

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-1 Steps continued	RO	Verifies Charging Flow – May establish max charging depending on pressurizer level.
		Crew	Evaluates whether SI can be terminated: - SI flow will not be able to be terminated due to leak size with a single SI pump available. - Continues to Step 14.
		BOP	Check if Containment Spray should be stopped – Containment Spray should not have actuated.
		RO/BOP	Check if RHR pumps should be stopped – checks RCS pressure > 425 PSIG and stable and stops both RHR pumps. (**CA**) Monitors RCS pressure.
		SRO	Determines Safeguards buses powered from offsite and requests EDGs be stopped.
	SM – When requested to stop EDGs, inform SRO that the 4th license will be responsible for stopping EDGs	Crew	Initiate evaluation of plant status - Checks one train available for sump recirc. - Checks CR radiation normal. - Requests Samples.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-1 Steps continued	SRO	Requests local surveys.
		RO/BOP	Determines PAB radiation levels normal and no PAB sump alarms.
			Checks RHR sump alarm clear.
			Checks RCS Pressure > 200[425] PSIG.
		Crew	Transitions to CSP-C.2 on STA Report.
	This transition will be made upon STA report of Core Cooling ORANGE Path.	SRO	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	CSP-C.2 Actions	SRO	Addresses notes regarding RCPs and Foldout Page Foldout Page items for Sump Recirc and AFW Switchover will require no action. Crew will note that containment is Adverse.
		Crew	Verify Sump Recirc is not required – Not required by plant conditions
		BOP	Verify SI Valve Alignment – notes that 'A' SI train is out of service. Other ECCS systems aligned as expected.
		Crew	Verify SI Flow in Both Trains – As noted above, 'A' SI train is OOS. Should verify max. charging IAW RNO. Check RCS Wide Range Pressure < 425, will not be. Continue with step 4.
		RO	Resets SI, CI and 1B-03 and 1B-04 Non-Safeguards Equipment Lockouts.
		BOP	Check 4160 Safeguards buses energized from off-site
			Reestablish IA to containement • Starts 2nd IA compressor • Checks IA pressure • Opens 1IA-3047, then after ~3 minutes, 1IA-3048
		RO	Check RCS Vent Paths – Power available to PORVs, PORVs shut and Block valves open. Remaining valves are deenergized and shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	CSP-C.2 Actions	SRO/RO	Check Both RCPs stopped – No, both are running, go to step 13.
		SRO RO	Addresses note regarding normal RCP conditions. Maintain Support Conditions for Running RCPs – ensures RCP parameters normal
		SRO/RO	Checks Vessel Level with table – since both RCPs are running and containment is adverse, must have >120 ft WR level, will not be met. Check Vessel Level Trend – Vessel level will be stable.
		RO	
	In the unlikely event that the crew determines that vessel level is rising, the crew will return to step 1 and repeat the steps already taken, then they will again arrive at this step. At some point, they will determine that level has stabilized and will continue to step 16	Crew	Proceeds to step 16 to Check RCPs – determines both are running. Stops one RCP.
		SRO/BOP	Checks Accumulators – Pressure is ~750 PSIG and accumulator outlet valves are open with no power.
	If crew wishes to energize 1SI-841A and B to check valve position, insert trigger 10 to power the valves.	SRO	Addresses note regarding faulted/ruptured SG
		BOP	Stabilize Intact SG Level – determines that SG levels are >51% and feed flow being controlled to maintain level. Addresses caution regarding CSP-P.1.
		SRO	Depressurized Both SGs to 200 PSIG, not to exceed 100ºF/hr Cooldown Rate using ADVs.
		BOP	
	Once cooldown has been established, terminate scenario per Lead Examiner's direction.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 (CSP-S.1) Attachment A actions Where there is a difference in Att. A Actions, the CSP-S.1 Actions will be denoted by parentheses ( ). When contacted regarding status of SW-LW-61/62, verify on Simulator that valves are shut and report same to BOP.	BOP	(Verify Safeguards Buses Energized). Verify feedwater isolation: - Feedwater Regulating and Bypass Valves SHUT. - Both main feed pumps tripped. - MFP discharge MOVs - BOTH SHUT. Verify containment isolation: - CI Panels A and B ALL LIGHTS LIT - RS-SA-9 SHUT. - No other valves open under administrative control (SM may be asked to verify this). Verify AFW Actuation: - Checks both motor driven AFW pumps running. Check both SI pumps running. - A is not running, but is isolated - (Manually actuates both trains of SI) - (Starts B SI Pump) - If B has not yet been started, starts B SI pump. Check both RHR pumps running. Check only one CCW pump running. Verify Service Water Alignment: - 6 service water pumps running. - Service water isolation valves shut. - Direct AO to locally check SW-LW-61 or SW-LW-62 shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A actions continued	BOP	Verify Containment Accident Cooling Units Running - All accident fans running. - 1SW-2907 & 2908 OPEN. - Unit 1 Containment Recirc Coolers Water Flow Low Alarm CLEAR. Check Control Room Ventilation IN ACCIDENT MODE: - At least one control room recirc fan RUNNING - Control room damper solenoid valve PURPLE LIGHT LIT Check if Main Steam Lines Can Remain Open, checks both MSIVs SHUT, as appropriate. (Not contained in CSP-S.1 Attachment A) Verify proper SI valve alignment: - Unit 1 SI active status panel ALL LIGHTS LIT - Unit 1 SI-Spray Ready status panel NO LIGHTS LIT Verify containment spray not required: Containment Pressure < 25 PSIG Verify SI Flow: - RCS wide range pressure <1400 psig - Check SI pumps flow indicated - RCS wide range pressure < [425] 200 psig This ends the steps of EOP-0 Attachment A.

SIMULATOR INPUT SUMMARY							
Event Trigger	**System**	**Type**	**Code**	**Value**	**Delay**	**Ramp**	**Description**
Preload	EPS	LOA	LOA1EPS102	Racked out	-	-	1P15A SI Pump breaker rack out
Preload	SIS	LOA	LOA1SIS017	OPEN	-	-	1SI-866 1P-15A SI Pump discharge MOV breaker*
Preload	SIS	VLV	VLV1SIS046	1-Fail CTL PWR Fuse	-	-	1SI-896 1P-15A SI Pump suction MOV*
Preload	CNM	BKR	BKR1CNM017	6-Fail CTL PWR Fuse	-	-	1W-3A CRDM Shroud fan bkr
Preload	SIS	BKR	BKR1SIS002	4-Fail Auto Close	-	-	1P-15B SI Pump Fails to Auto Start
Preload	PPL	MAL	MAL1PPL001A	3-Fails to Open	-	-	'A' RTB Fails to Open
Preload	PPL	MAL	MAL1PPL001B	3-Fails to Open	-	-	'B' RTB Fails to Open
Preload	EPS	BKR	BKR1EPS003	5-Fails As Is	-	-	High Side Breaker to X-12 Fails Closed
Preload	EPS	BKR	BKR1EPS024	5-Fails As Is	-	-	1B02 Normal Feed Fails Closed
1	CVC	XMT	XMT1CVC020A	100%	15 sec	20 sec	1LT-141 Fails High

SIMULATOR INPUT SUMMARY							
Event Trigger	**System**	**Type**	**Code**	**Value**	**Delay**	**Ramp**	**Description**
3	CNM	BKR	BKR1CNM018	1-Trip	15 sec	-	1W-3B CRDM Fan Trips
5	RCS	MAL	MAL1RCS003B	25 GPM	15 sec	20 sec	Loop A RTD Bypass Line Leak
10	SIS	LOA	LOA1SIS012	Close	15 sec	-	Bkr for 1SI-841A
10	SIS	LOA	LOA1SIS013	Close	2 min	-	Bkr for 1SI-841B

*** Ensure valve is closed prior to inserting this preload.**

Historical Record: Developed for ILT 2007 NRC Exam.

Simulator Scenario Development Checklist

Mark with an X Yes or No for any of the following. If the answer is No, include justification for the no answer or the corrective action needed to correct the discrepancy after the item.

		Yes	No
1.	The scenario contains objectives for the desired tasks and relevant human performance tools.		X
2.	The scenario identifies key parameter response, expected alarms, and automatic actions associated with the induced perturbations. (This action applies to all SEG's new or revised for those on the ANS/ANSI-3.5-1998 standard. This action is NOT applicable for those on the ANS/ANSI-3.5-1985 standard.)		X
3.	The scenario content adequately addresses the desired tasks, through simulator performance, instructor-led training freezes, or both.	X	
4.	Plant PRA initiating events, important equipment, and important tasks are identified.	X	
5.	Turnover information includes a Daily At Power or Shutdown Safety Risk Assessment.	X	
6.	The scenario contains procedurally driven success paths. Procedural discrepancies are identified and corrected before training is given.	X	
7.	The scenario guide includes responses for all anticipated communications to simulated personnel outside the Control Room, based on procedural guidance and standard operating practices.	X	
8.	The scenario includes related industry experience.		X
9.	Training elements and specific human performance elements are addressed in the scenario critique guide to be used by the critique facilitator. The critique guide includes standards for expected performance.		X

Developer and Reviewer: Once checklist is completed and deficiencies are corrected, sign the cover page.

Simulator Scenario Validation Checklist

Mark with an X Yes or No for any of the following. If the answer is No, include an explanation after the item.

1.	The desired initial condition(s) could be achieved.	Yes X	No
2.	All malfunctions and other instructor interface items were functional and responded to support the simulator scenario.	Yes X	No
3.	All malfunctions and other instructor interface items were initiated in the same sequence described within the simulator scenario.	Yes X	No
4.	All applicable acceptance criteria were met for procedures that were used to support the simulator scenario.	Yes X	No
5.	During the simulator scenario, observed changes corresponded to expected plant response.	Yes X	No
6.	Did the scenario satisfy the learning or examination objectives without any significant simulator performance issues, or deviations from the approved scenario sequence? If learning objective(s) could not be satisfied, identify the objectives in the Simulator Action Request	Yes X	No
7.	Evaluation: The simulator is capable of being used to satisfy learning or examination objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence.	Yes X	No

Discrepancies noted (Check "none" or list items found) ☒ None
SMAR = Simulator Action Request

SMAR:_____ SMAR:_____ SMAR:_____ SMAR:_____

Comments: No was selected for several training items on the development checklist. These items will remain 'NO' due this SEG being developed IAW NUREG 1021 for an Initial NRC license exam. No was selected for step 2 of the development checklist due to this being N/A for our plant.

Validator: Sign the cover page only after noted discrepancies are corrected or compensatory actions are taken to ensure quality training.

Facility: **Point Beach** Scenario No.: **3** OP-Test No.: **2007301**

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: Unit 1 is at ~3% power MOL 8010 MWD/MT preparing to raise power and roll the turbine. Boron Concentration is 1215 PPM. Unit 2 is at 100% power.

Turnover: 1P-15A Safety Injection Pump is OOS. The oiler on the inboard pump bearing was damaged and a Maintenance crew is working the job to completion. TSAC 3.5.2.A was entered 6 hours ago and the pump is expected back for operability testing in about 3 hours. 1W-3A CRDM Shroud Fan is OOS due to motor bearing failure.

Today is Sunday, present clock time is real time. An RP Tech and Chemistry Tech are on-site. A crew of Maintenance personnel are working 1P-15A to completion.

The objective of the shift is to continue Unit 1 power ascension. LCO 3.0.4.b was utilized and a risk assessment was completed to allow entry into Mode 1 with 1P-15A OOS.

Event No.	Malf. No.	Event Type*	Event Description
1		R – RO N – BOP N - SRO	OP-1C Up Power from 3% to ~12%
2		I – RO I – SRO TS-SRO	T-404A, Loop B T Hot Fails High.
3		C – RO C – SRO TS- SRO	1P-2A, 'A' Charging Pump Winding Ground and pump trip.
4		C – ALL	Steam Leak from 'B' SG I/S Containment w/ Auto Rx Trip Failure
5		M – ALL	SLR on 'B' SG
6		C - BOP	1SI-10X and 20X relays fail to actuate causing a failure of MSIVs to close and a failure of Feedwater Isolation.

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

SIMULATOR EXERCISE GUIDE (SEG)

SITE: POINT BEACH **SEG # PB-ILT-07N-003**

SEG TITLE: 2007 NRC EXAM SCENARIO #3 **REV. # 0 DRAFT**

PROGRAM: INITIAL LICENSE TRAINING **#: PB-ILT**

COURSE: **#:**

TOTAL TIME: 2.0 HOURS

Additional site-specific signatures may be added as desired.

Developed by:	**Russell Joplin**	
	Instructor	*Date*
Reviewed by:	**Andrew Zommers**	
	Instructor	*Date*
	(Simulator Scenario Development Checklist.)	
Validated by:		
	Validation Lead Instructor	*Date*
	(Simulator Scenario Validation Checklist.)	
Approved by:		
	Training Supervision	*Date*

Guide Requirements

Goal of Training:	**To have the crew successfully raise power to ~12% from 3%, respond to T-404A, Loop B T_{hot} failure, respond to a Steam Leak and Steam Line Break on 'B' SG. Embedded within these events is the expectation to properly utilize Technical Specifications.**
Learning Objectives:	None
Prerequisites:	**1.** Simulator available **2.** Students enrolled in Initial License Program
Training Resources:	**1.** Floor Instructor as Shift Manager **2.** Floor Instructor as Shift Technical Advisor **3.** Simulator Booth Operator **4.** Communicator **5.** NRC Examiners
References:	**1.** OP-1C, Startup to Power Operation, Unit 1 **2.** AOP-24, Response to Instrument Malfunction **3.** 0-SOP-IC-001 Yellow, Removal of Safeguards or Protection Sensor from Service, Yellow Channel **4.** AOP-1D, CVCS Malfunction **5.** AOP-2A, Secondary Coolant Leak **6.** EOP-0, Reactor Trip or Safety Injection **7.** EOP-2, Faulted Steam Generator Isolation **8.** EOP-1, Loss of Reactor or Secondary Coolant **9.** Technical Specifications and Technical Requirements Manual
Commitments:	None
Evaluation Method:	Simulator performance will be evaluated by NRC Examiners IAW NUREG 1021
Operating Experience:	None
Related PRA Information:	None

QUANTITATIVE ATTRIBUTES

Normal Events/Reactivity Manipulations:

1. Raise power from ~3% IAW OP-1C, Startup to Power Operation, Unit 1

Malfunctions:

Before EOP Entry:

1. T-404A, Loop B T_{hot} Fails High
2. 1P-2A, 'A' Charging Pump Winding Ground and Trip
3. 'B' Steam Line Leak Inside Containment

After EOP Entry:

1. 1SI-10X and 20X relays fail to actuate, causing a failure of MSIVs to shut

Abnormal Events:

1. T-404A, Loop B T_{hot} Fails High
2. 1P-2A, 'A' Charging pump winding ground and trip
3. Steam Leak on 'B' Steam Line Inside Containment

Major Transients:

1. Steam Line Break on 'B' Main Steam Line

Critical Tasks:

1. RT-7: When a reactor trip is procedurally called for, initiate a manual reactor trip prior to 5 psig in Containment.
2. E-2 – A: Isolate the faulted SG before transition out of EOP-2.

SCENARIO OVERVIEW:

INITIAL CONDITIONS:

1. This scenario can be run from the following Specific IC set:
   - IC-161, Created from a Unit 1 low power IC
2. The following equipment is OOS:
   - 1P-15A, 'A' Safety Injection Pump
   - 1W-3A, 'A' CRDM Shroud Fan

SEQUENCE OF EVENTS:

Event 1: Normal Up Power IAW OP-1C

- After completion of crew turnover and examinees have assumed the watch, crew is directed to raise power IAW OP-1C at step 5.24.2
- Crew pulls control rods to raise power from 3% to 12%.
- Crew monitors plant parameters as necessary
- Crew announces entry into MODE 1 when power is 5%

Event 2: T-404A, Loop B T_{hot} instrument fails high.

- Upon reaching ~12% power, T-404A, Loop B Thot instrument fails high.
- Pressurizer program level will rise to 45.8% and auto charging pump will speed up to attempt to raise level. RO should take auto pump to manual to control level.
- Crew suspends power increase and enters AOP-24, Response to Instrument Malfunction
- Crew implements AOP-24 and removes channel from service IAW 0-SOP-IC-001 Yellow Removal of Safeguards or Protection Sensor from Service, Yellow Channel
- SRO addresses Technical Specifications for failure

Event 3: 1P-2A, 'A' Charging Pump Ground and Trip

- Once Technical Specifications have been addressed and channel is removed from service, 1P-2A Charging Pump develops a winding ground and trips ~3 minutes later
- Crew responds using AOP-1D, CVCS Malfunction
- Crew starts 'B' Charging Pump and restores PZR Level
- SRO addresses Technical Specifications and Technical Requirements Manual for failure.

Event 4: 'B' SG steam leak with Auto Reactor Trip failure

- Once plant is stable following Charging Pump failure, 'B' Steam Line begins to leak inside containment.
- Auto Reactor Trip is failed and crew must trip Reactor prior to reaching 5 PSIG inside containment.
- Reactor will be manually tripped when Containment pressure reaches 2 PSIG
- Once Reactor is tripped, Steam Line leak becomes a Steam Line Break

Event 5: 'B' Main Steam Line Break

- Crew responds to SLR with EOP-0. Due to SI relay failures, MSIVs will not automatically close.
- BOP identifies these failures during performance of Attachment A of EOP-0.
- Crew will proceed through EOP-0 then to EOP-2 to isolate faulted 'B' SG.
- Crew will then enter EOP-1 and scenario will terminate upon transition to EOP-1.

PB-ILT-07N-003, INITIAL NRC EXAM SCENARIO 3, Rev. 0 Draft

NOTE: Table may be modified as needed to include all scenario time-line items

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	INITIAL CONDITIONS (IC): IC-161 Unit 1 • Mode: 2 • Burnup: 8010 • Power: 3% • Boron: (CB): 1173 ppm • Temperature: NOT • Pressure: NOP • Xenon: Equilibrium • Rods: Bank D @ 145 steps • Generator: 0 Mwe	(RO/BOP/SRO)	
	1. SIMULATOR SET UP (perform set up per the "Simulator Setup Checklist", including entering action items per the "Simulator Input Summary.")		Place OOS labels on 1P-15A and 1W-3A. Place protected equipment label on 1P-15B.
	2. Simulator Pre-brief in Classroom: a. Simulator Differences List b. Crew Positions		
	3. COMPLETE TURNOVER: a. Review applicable current Unit Status b. Review relevant At-Power Risk status (Unit 1 is GREEN) c. Review current LCOs not met and Action Requirements d. Verify crew performs walk down of control boards and reviews turnover checklists. e. Crew takes the shift.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EVENT 1: Raise Power from 3% toward 17% **NOTE:** Have the Shift Manager prompt the crew to shift Feedwater control to MFRV's if desired by Lead Examiner. **End of evolution:** Proceed to next event at Lead Examiner discretion.	Crew RO BOP	Briefs power ascension (may be performed in classroom prior to beginning of the scenario). Withdraws rods and adjust steam demand as needed to establish power increase. Shifts Feedwater control to Main Feed Reg Valves at ~10% power.
	Event 2: T-404A, Loop B Thot Fails High	RO SRO RO/BOP SRO Crew RO	Recognizes instrument failure for the Yellow channel. Recommends placing the automatic charging pump in Manual to keep Pressurizer level from rising above program level. SRO acknowledged recommendation and alarms. RO/BOP address the ARB's for alarms associated with the Thot failure. Enter AOP-24 Response to Instrument Malfunction. Identifies T-404A, Loop B Thot as failed instrument. Checks that instrument is controlling channel for PZR Level Program. Ensures that Charging is in manual.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	T-404A Instrument failure continued In order to save scenario time, the package for removing the channel from service will be prepared by the exam team before the scenario and will be provided to the Crew when they ask for it to be prepared.	RO SRO	Return affected parameter to desired value – ensures that PZR level is returning to program value. References step regarding performance of AOP-21. SM should inform SRO that the 4th license will reference AOP-21. Addresses caution regarding currently tripped bistables – this does not apply as no other bistables are tripped. Directs removal of failed instrument IAW 0-SOP-IC-001 YELLOW.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Removal of T-404A IAW 0-SOP-IC-001 Yellow **Note: Although the switch names have "Unit 2" on the label, they are Unit 1 Switches**	SRO RO BOP Crew RO	Refers to 0-SOP-IC-002, Technical Specification LCO-Instrument Cross Reference to determine applicable Technical Specifications. Verifies that applicable pages of 0-SOP-IC-001 Yellow are present and other pages have been discarded. Conducts pre-job brief for instrument removal. Obtains SM permission to remove instrument. Directs performance of Att. A Actions. Place Rods in Manual – Already done due to power level. In C-107, Place Tavg defeat SW to LOOP B UNIT2 (Loop B2). In C-108, Place Delta-T Defeat SW to LOOP B UNIT2. Desired to leave Rods in Manual due to power level. Places following Bistables to Trip: Overpower Trip. OP Rod Stop. Over Temp Trip. OT Rod Stop. HIGH Tavg. LOW Tavg (Proving Lamp should light). Acknowledges Alarms.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Removal of T-404A IAW 0-SOP-IC-001 Yellow	BOP/RO SRO RO SRO	Removes T-404 and T-408 PPCS Points from Scan. Returns to AOP-24. May return Charging pump to auto. Addresses Technical Specification for failure – • TS Table 3.3.1.-1 item 5. • TS Table 3.3.1.-1 item 6. • TS Table 3.3.2.-1 item 4d-3. Returns to OP-1C.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 3: 1P-2A, 'A' Charging Pump Winding Ground and Trip **Booth Operator/Communicator**: When directed to go investigate 1B-03 Ground Fault, wait 2 minutes and report that one light is bright and the other two are dim on the local ground fault panel. If contacted again following pump trip, inform crew that all ground fault lights are now the same intensity. **Booth Operator/Communicator**: When sent out to investigate Charging pump and associated breaker, inform control room breaker is tripped on overcurrent and motor is hot to the touch. **Booth Operator/Communicator**: If sent to check charging pump relief, wait 2 minutes and report charging reliefs on Unit 1 are **NOT** lifting **(Insert next malfunction per Lead Examiner.)**	BOP Crew SRO RO RO SRO	Announces 1B-03 Ground Fault Alarm (C02 D 3-2) and refers to Alarm Response Book. Contacts AO to investigate 1B-03 Ground Fault. May begin to shift loads powered from 1B-03. When 'A' charging pump trips, enter AOP-1D, CVCS Malfunction. Checks RCS Leak not in progress Continuous action **(CA)** Addresses Foldout page and notes. Determines Chg Pump trip and goes to Step 3. Check any charging pump running – C should be running. Check Charging Flow Stable – Should answer yes. Check Charging Pump relief not lifted – no indication of lifting relief. May dispatch AO. Check VCT Level – Should be > 17% .. Check Charging System response: Should start 'B' Charging Pump and adjust lab seals using CV-142. May place 'A' charging pump in pullout. Requests DCS Notification. Refers to TRM for Charging Pump requirements.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 4: 'B' SG Steam Leak Inside Containment with Auto Rx Trip Failure	Crew	Responds to Containment Sump 'A' Alarm and rising humidity in containment. Checks RMS clear.
		SRO	Enters AOP-2A, Secondary Coolant Leak.
		Crew	Determines if secondary coolant leak hazardous to personnel or equipment. **(CA)**
			Maintain plant within limits. **(CA)**
		RO	Maintain RCS Tavg. **(CA)**
		Crew	Check containment conditions normal, crew may perform actions to lower pressure in containment.
	NOTE: Steps 4 through 10 may be performed in any order and are diagnostic.	Crew	Recognizes increased leak rate and uses fold out page/continuous action guidance from AOP-2A to trip the reactor.
	CRITICAL TASK: When a reactor trip is procedurally called for, initiate a manual reactor trip prior to 5 psig in Containment		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	B' SG Steam Leak Inside Containment with Auto Rx Trip Failure (cont'd)	RO	Inserts Manual Trip. Verify Reactor Trip – RTBs open, bottom lights all lit, IRPIs on bottom, Flux lowering Verify Turbine Trip – Turbine Stop Valves both shut: -SL and SR lights lit OR -Turbine Stop Valves Two Closed Alarm OR -Turbine Valves Bistable both lit Verify Safeguards Buses – At least one 4160 and one 480 V Bus energized - Checks voltage on buses and breaker configuration Check if SI is Actuated – may have automatically at this point. RO may insert manual SI and CI during this step.
		SRO/RO	Verifies Immediate Action steps

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 5: Steam Line Break on 'B' SG with SI Relay Failures	Crew	Fold out page criteria reviewed.
		Crew	Isolate feed flow to faulted S/G per foldout page.
		BOP	Perform Attachment A (steps listed later).
		SRO/RO	Review notes and verify heat sink.
			Verify lab seal cooling.
			Verify RCS Temp control **(CA).**
			Check PZR PORV's shut.
			Verify Sprays shut.
			Check if RCP's should remain running.
		SRO/STA	Start monitoring critical safety functions.
		SRO/RO	Verify Sump Recirc not required **(CA).**
		Crew	Check if Secondary is intact and then transition to EOP-2 due to faulted S/G.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 5: Steam Line Break on 'B' SG with SI Relay Failures (cont'd)	Crew	Review notes and foldout page information. Crew should determine that the A S/G is available for cooldown.
		SRO/RO	Check RCS temperature.
		RO	Isolate MSIV's.
		Crew	Check if any S/G NOT faulted.
		Crew	Identify faulted S/G. Crew determined B S/G is faulted.
		BOP	Reset LOFWTT.
		Crew	Isolate Feedwater to faulted S/G.
		Crew	Isolate flow from S/G. **(Unit 2 will be in TSAC 3.7.5.c when placing P-38B in pullout.)**
	NOTE: Booth communications are to wait 3 minutes and reply 1MS-237 and 1MS-238 are shut. Use LOA for 1MS-237, 1MS-238 is not modeled.	BOP	Check CST level.
		BOP	Check RMS normal.
	CRITICAL TASK: E-2 – A: Isolate the faulted SG before transition out of EOP-2.	SRO	Transition to EOP-1.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Event 5: Steam Line Break on 'B' SG with SI Relay Failures (cont'd)	Crew	Review foldout page data and take required actions.
		RO	Check if RCP's should remain running.
		BOP	Check if secondary is intact.
		BOP	Stabilize intact S/G levels.
		BOP	Check Secondary RMS normal.
		RO	Check PORV's and block valves shut.
		BOP	Reset SI.
			Reset CI.
			Reset B-03 and B04 lockouts.
			Check 4160 energized from offsite power.
			Re-establish IA to containment.
		RO	Verify Charging flow.
		Crew	Check if SI should be terminated.
	Scenario may be terminated at any time per Lead Examiners discretion.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A action EOP-0 Attachment A action **Booth: (Inform BOP that SW-LW-61 and 62 are shut when asked)**	BOP	Verify feedwater isolation: - Shuts Feedwater Regulating and Bypass Valves. - Both main feed pumps tripped. - MFP discharge MOVs - BOTH SHUT. Verify containment isolation: - CI Panels A and B ALL LIGHTS LIT. - RS-SA-9 SHUT. - No other valves open under administrative control (SM may be asked to verify this). Verify AFW Actuation: - Checks both motor driven AFW pumps running. Check both SI pumps running. - A is not running, but is isolated. Check both RHR pumps running. Check only one CCW pump running. Verify Service Water Alignment: - 6 service water pumps running. (P32A not running). - Service water isolation valves shut. - Direct AO to locally check SW-LW-61 or SW-LW-62 shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A action (cont'd)	BOP	Verify Containment Accident Cooling Units Running - All accident fans running. - 1SW-2907 & 2908 OPEN. - Unit 1 Containment Recirc Coolers Water Flow Low Alarm CLEAR. Check Control Room Ventilation IN ACCIDENT MODE: - At least one control room recirc fan RUNNING. - Control room damper solenoid valve PURPLE LIGHT LIT. Check if Main Steam Lines Can Remain Open, shuts both MSIVs due to relay failures if not previously done. Verify proper SI valve alignment: - Unit 1 SI active status panel ALL LIGHTS LIT. - Unit 1 SI-Spray Ready status panel NO LIGHTS LIT. Verify containment spray not required: Containment Pressure remained < 25 PSIG. Verify SI Flow: - RCS wide range pressure <1400 psig. - Check SI pumps flow indicated. - RCS wide range pressure < [425] 200 psig. This ends the steps of EOP-0 Attachment A.

SIMULATOR INPUT SUMMARY							
Event Trigger	**System**	**Type**	**Code**	**Value**	**Delay**	**Ramp**	**Description**
Preload	PPL	MAL	MAL1PPL001A	1-Auto Fail	-	-	RX Trip A breaker fail auto open
Preload	PPL	MAL	MAL1PPL001B	1-Auto Fail	-	-	RX Trip B breaker fail auto open
Preload	EPS	LOA	LOA1EPS102	Racked out	-	-	1P15A SI Pump breaker rack out
Preload	SIS	LOA	LOA1SIS017	OPEN	-	-	1SI-866 1P-15A SI Pump discharge MOV breaker*
Preload	SIS	VLV	VLV1SIS046	1-Fail CTL PWR Fuse	-	-	1SI-896 1P-15A SI Pump suction MOV*
Preload	CNM	BKR	BKR1CNM017	6-Fail CTL PWR Fuse	-	-	1W-3A CRDM Shroud fan bkr
Preload	PPL	RLY	RLY1PPL068	2-Fail as is	-	-	1SI 10X Relay fail as is
Preload	PPL	RLY	RLY1PPL070	2-Fail as is	-	-	1SI 20X Relay fail as is
1	RCS	XMT	XMT1RCS029A	650	15 sec	20 sec	Loop B T_{hot} fails High
3	CVC	MOT	MOT1CVC001	1-Winding Ground	10 sec	-	'A' Charging Pump motor winding ground
5	SGN	MAL	MAL1SGN003B	100,000	10 sec	20 min	'B' SG Steam Line Break inside Cont
17	SGN	LOA	LOA1SGN025	0	-	-	1MS-237 RW Steam isolation

*** Ensure valve is closed prior to inserting this preload.**

Historical Record: Developed for the ILT 2007 NRC Exam.

Simulator Scenario Development Checklist

Mark with an X Yes or No for any of the following. If the answer is No, include justification for the no answer or the corrective action needed to correct the discrepancy after the item.

1.	The scenario contains objectives for the desired tasks and relevant human performance tools.	Yes	No X
2.	The scenario identifies key parameter response, expected alarms, and automatic actions associated with the induced perturbations. (This action applies to all SEG's new or revised for those on the ANS/ANSI-3.5-1998 standard. This action is NOT applicable for those on the ANS/ANSI-3.5-1985 standard.)	Yes	No X
3.	The scenario content adequately addresses the desired tasks, through simulator performance, instructor-led training freezes, or both.	Yes X	No
4.	Plant PRA initiating events, important equipment, and important tasks are identified.	Yes X	No
5.	Turnover information includes a Daily At Power or Shutdown Safety Risk Assessment.	Yes X	No
6.	The scenario contains procedurally driven success paths. Procedural discrepancies are identified and corrected before training is given.	Yes X	No
7.	The scenario guide includes responses for all anticipated communications to simulated personnel outside the Control Room, based on procedural guidance and standard operating practices.	Yes X	No
8.	The scenario includes related industry experience.	Yes	No X
9.	Training elements and specific human performance elements are addressed in the scenario critique guide to be used by the critique facilitator. The critique guide includes standards for expected performance.	Yes	No X

Developer and Reviewer: Once checklist is completed and deficiencies are corrected, sign the cover page.

Simulator Scenario Validation Checklist

Mark with an X Yes or No for any of the following. If the answer is No, include an explanation after the item.

1.	The desired initial condition(s) could be achieved.	Yes X	No
2.	All malfunctions and other instructor interface items were functional and responded to support the simulator scenario.	Yes X	No
3.	All malfunctions and other instructor interface items were initiated in the same sequence described within the simulator scenario.	Yes X	No
4.	All applicable acceptance criteria were met for procedures that were used to support the simulator scenario.	Yes X	No
5.	During the simulator scenario, observed changes corresponded to expected plant response.	Yes X	No
6.	Did the scenario satisfy the learning or examination objectives without any significant simulator performance issues, or deviations from the approved scenario sequence? If learning objective(s) could not be satisfied, identify the objectives in the Simulator Action Request	Yes X	No
7.	Evaluation: The simulator is capable of being used to satisfy learning or examination objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence.	Yes X	No

Discrepancies noted (Check "none" or list items found) ☒ None
SMAR = Simulator Action Request

SMAR:_____ SMAR:_____ SMAR:_____ SMAR:_____

Comments: No was selected for several training items on the development checklist. These items will remain 'NO' due this SEG being developed IAW NUREG 1021 for an Initial NRC license exam. No was selected for step 2 of the development checklist due to this being N/A for our plant.

Validator: Sign the cover page only after noted discrepancies are corrected or compensatory actions are taken to ensure quality training.

Facility: **Point Beach** Scenario No.:**Backup** OP-Test No.: **2007301**

Examiners: _____ Operators: _____
_____ _____
_____ _____

Initial Conditions: Unit 1 is at 100% Power, MOL. Unit 2 is at 100% Power. Present clock time is real time.

Turnover: G-01 EDG is out of service for annual maintenance. It was taken out of service 3 days ago and is expected to be returned to service in 3 days. G-02 is aligned to 4.16 kV buses 1A-05 and 2A-05 IAW OI-35A.

P-38B, Electric Auxiliary Feedwater Pump was declared inoperable 4 hours ago due to recirculation line cracks and has just been tagged out for repair.

A Severe Thunderstorm Watch is in effect for the next 4 hours.

Unit 1 is making preparations for reducing power for testing of the Atmospheric and Condenser Steam Dumps.

The objective of the shift is to reduce power to <95% for stroke testing of the dumps.

OP-2A, "Normal Power Operation" is the procedure in effect for the downpower (<10% load reduction).

Event No.	Malf. No.	Event Type*	Event Description
1		R - RO N - BOP N- SRO	Perform a down-power IAW OP-2A.
2		I - RO I - SRO TS- SRO	LT-428, Pressurizer Level Transmitter (controlling channel) fails low.
3		C - ALL	Loss of Condenser Vacuum
4		M– ALL	Condenser Vacuum degrades to reactor trip criteria.
5		C - RO SRO	Main Turbine Fails to AUTO & MANUALLY Trip.
6		C - BOP TS- SRO	1P-29, Turbine Driven Auxiliary Feedwater Pump trips on overspeed.
7		C - BOP TS- SRO	Trip of P-38A, 'A' MDAFWP
8		M - ALL	Loss of Heat Sink that is recoverable using Main Feedwater.

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

SIMULATOR EXERCISE GUIDE (SEG)

SITE: POINT BEACH **SEG # PB-ILT-07N-004**

SEG TITLE: 2007 NRC EXAM SCENARIO #4 **REV. # 0**

PROGRAM: INITIAL LICENSE TRAINING **#: PB-ILT**

COURSE: **#:**

TOTAL TIME: 2.0

Additional site-specific signatures may be added as desired.

Developed by:	**Russell Joplin** *Instructor*	*Date*
Reviewed by:	**Andrew Zommers** *Instructor* *(Simulator Scenario Development Checklist.)*	*Date*
Validated by:	*Validation Lead Instructor* *(Simulator Scenario Validation Checklist.)*	*Date*
Approved by:	*Training Supervision*	*Date*

Guide Requirements

Goal of Training:	**To have the crew successfully lower power to ~94% from 100%, respond to LT-428, Pressurizer Level failure, respond to Loss of Condenser Vacuum with a Loss of Heat Sink. Embedded within these events is the expectation to properly utilize Technical Specifications.**
Learning Objectives:	None
Prerequisites:	**1.** Simulator available **2.** Students enrolled in Initial License Program
Training Resources:	**1.** Floor Instructor as Shift Manager **2.** Floor Instructor as Shift Technical Advisor **3.** Simulator Booth Operator **4.** Communicator **5.** NRC Examiners
References:	**1.** OP-2A Normal Power Operation **2.** AOP-24, Response to Instrument Malfunction **3.** 0-SOP-IC-001 BLUE, Removal of Safeguards or Protection Sensor From Service – Blue Channels **4.** AOP-1D, CVCS Malfunction **5.** AOP-5A U1, Loss of Condenser Vacuum **6.** EOP-0 U1, Reactor Trip or Safety Injection **7.** CSP-H.1 Response to Loss of Secondary Heat Sink **8.** Technical Specifications
Commitments:	None
Evaluation Method:	Simulator performance will be evaluated by NRC Examiners IAW NUREG-1021
Operating Experience:	None
Related PRA Information:	None

QUANTITATIVE ATTRIBUTES

Normal Events/Reactivity Manipulations:

1. Lower power from ~100% to 94% IAW OP-2A, Normal Power Operations

Malfunctions:

Before EOP Entry:

1. LT-428 Pressurizer Level fails LOW
2. Loss of Condenser vacuum

After EOP Entry:

1. Main Turbine fail to trip in AUTO and MANUAL
2. 1P-29 TDAFW Pump trips on overspeed
3. P-38A MDAFW Pump trips

Abnormal Events:

1. LT-428 Pressurizer Level fails LOW
2. Loss of Condenser vacuum

Major Transients:

1. Loss of Heat Sink

Critical Tasks:

1. **RT-7, When a reactor trip is procedurally called for, initiate a manual reactor trip prior to Main Condenser Vacuum reaching 8 in Hg Abs.**
2. **FR-H.1 A Restore feedwater flow into at least one steam generator before RCS bleed and feed is required.**

SCENARIO OVERVIEW:

INITIAL CONDITIONS:

1. This scenario can be run from the following Specific IC set:
   - IC-160 created from IC-002
2. The following equipment is OOS:
   - G01 EDG OOS for annual Maintenance
   - P38B MDAFW Pump was declared OOS 4 hours ago due to cracks in the recirculation line. Place control switch for P-38B in pullout.

SEQUENCE OF EVENTS:

Event 1: Reduce power from 100 to less than 95%

- After completion of crew turnover and examinees have assumed the watch, crew is directed to lower power IAW OP-2A Attachment A.
- Crew borates and inserts control rods to raise lower from 100% to ~94%.
- Crew monitors plant parameters as necessary

Event 2: LT-428 Pressurizer Level fails LOW

- After completion of downpower, 1LT-428 Pressurizer Level Fails LOW.
- Crew enters AOP-24 and determines LT-428 has failed.
- RO places charging controls in auto and monitors pressurizer level.
- SRO refers to Technical Specifications
- Channel is removed from service per 0-SOP-IC-001 BLUE.

Event 3: Loss of Condenser vacuum

- Once Technical Specifications have been addressed and channel is removed from service, a lowering condenser vacuum begins.
- Crew recognizes lowering condenser vacuum and enters AOP-5A.
- Crew takes actions in AOP-5A to mitigate the lowering vacuum

Event 4: Main Turbine fail to trip in AUTO and MANUAL

- Crew recognizes the need for a plant trip and initiates a reactor trip.
- RO will need to take manual actions to secure the turbine due to auto and manual trip failures.

Event 5: P-38A MDAFW Pump trips and 1P-29 TDAFW Pump overspeed

- All available AFW for Unit 1 will be disabled.
- Crew recognizes loss of AFW and may try to restore equipment.

Event 6: Loss of Heat Sink

- EOP-0 will direct the Crew to CSP-H.1 due to loss of Heat Sink.
- Crew will be unable to restore AFW and trip the RCP's.
- Feed flow to the S/G's will be initiated via the Main Feed Pumps.
- Crew will transition back to EOP-0 after feed restoration.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	INITIAL CONDITIONS (IC): IC-160 Unit 1 • Mode: 1 • Burnup: 8010 MWD/MT • Power: 100% • Boron: (CB): 756 ppm • Temperature: NOT • Pressure: NOP • Xenon: Equilibrium • Rods: Bank D @ 220 steps • Generator: ~530 Mwe	(RO/BOP/ SRO)	
	SIMULATOR SET UP (perform set up per the "Simulator Setup Checklist", including entering action items per the "Simulator Input Summary.")		Place OOS labels on P-38B and G01. Place P-38B CS in Pullout. Place protected equipment labels on remaining AFW pumps.
	Simulator Pre-brief in Classroom: • Simulator Differences List Crew Positions		
	COMPLETE TURNOVER: • Review applicable current Unit Status • Review relevant At-Power Risk status (Unit 1 is YELLOW) • Review current LCOs not met and Action Requirements • Verify crew performs walk down of control boards and reviews turnover checklists. • Crew takes the shift.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	1. EVENT 1: Downpower from 100% to about 94%	Crew	Crew briefs the downpower (may be done in the classroom prior to beginning the scenario).
		RO	Borate and move rods as needed for the downpower.
	End of evolution: Proceed to next event at Lead Examiner discretion.	BOP	Lower turbine load for the downpower.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	2. EVENT 2: 1LT-428 Pressurizer Level transmitter fails HIGH. a. After crew completes the downpower, LT-428 fails LOW.	RO	Recognizes instrument failure for the Blue channel. Recommends placing the automatic charging pump in manual to keep Pressurizer level from rising above program level.
		SRO	SRO acknowledged recommendation and alarms.
		RO/BOP	RO/BOP address the ARBs for alarms associated with the level failure.
	Crew may enter AOP-1D, CVCS Malfunction, to restore letdown.	Crew	Crew may swap to another controlling channel per ARB 1C04 1C1-3.
		SRO	Enter AOP-24 Response to Instrument Malfunction.
		Crew	Identifies LT-428 Pressurizer Level as failed instrument.
	May enter TSAC 3.4.9, Pressurizer if level rises above 48%.	RO	Checks that instrument is controlling channel for PZR Level Program.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	LT-428 Instrument failure continued In order to save scenario time, the package for removing the channel from service will be prepared by the exam team before the scenario and will be provided to the Crew when they ask for it to be prepared. **End of Event.** Proceed to next event at Lead Examiner discretion after instrument is removed from service.	RO Crew RO SRO	Ensures that Charging is in manual. Remove LT-428 from service. Return affected parameter to desired value – ensures that PZR level is returning to program value. Addresses caution regarding currently tripped bistables – this does not apply as no other bistables are tripped. Directs removal of failed instrument IAW 0-SOP-IC-001 BLUE.
	AOP-1D Actions	Crew RO	Check RCS leak not in progress – no indications of RCS leak Addresses Foldout page and notes. May enter TSAC 3.4.9 Determine CVCS malfunction – determines that Letdown has isolated and proceeds to step 48. Check Letdown – Inadvertently Isolated Reduce Charging to minimum – may establish 20 GPM flow in preparation to restore letdown Check that letdown restoration can be performed – once controlling channel has been isolated, letdown may be restored Ensure orifice outlet valves shut – all orifice isolations will be shut Ensure normal charging is in service – will be in service

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
		RO	Check PZR level > 20% - should be much higher Establish letdown: • Open letdown containment isolations – will open if shut • Open 1RC-427, Letdown isolation valve • Ensure regen HX flow established – may take HC-130 to manual and verify valve is responding • Ensure 20 GPM Charging Flow – if not already done, will raise charging flow to 20 GPM • Adjust backpressure and open orifice valve(s) to establish letdown – Will take letdown line pressure controller to manual and open some amount to mitigate the pressure surge that occurs when opening CV-200 valve. Notify DCS Return to procedure and step in effect – exits AOP-1D.
		SRO	

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	3. EVENT 3: Lowering Condenser Vacuum	Crew	Recognize a lowering condenser vacuum.
		RO/BOP	Address alarms and/or indications associated with lowering vacuum.
		SRO	Enter AOP-5A for low vacuum.
		RO/SRO	Maintain RCS Temp. (Continuous action **(CA)**)
		RO/SRO	Determine if continued operation of the turbine is allowed.
	Communicator: If called to report condenser air flow, report that the reading is pegged high at >25 SCFM. When directed to place all air ejectors in service, acknowledge the request.	RO	Check for excessive air in-leakage.
		RO	Direct AO to place all available air ejectors in service.
	Lowering Condenser Vacuum continued.	SRO	Check if Priming air ejector should be used.
	If called for local delta Pressure reading on the condensers, report 0.25 inches delta.	SRO	Notify personnel.
		Crew	Perform Rapid Power Reduction per AOP-17A if needed.
	3. **CRITICAL TASK: RT-7, When a reactor trip is procedurally called for, initiate a manual reactor trip prior to Main Condenser Vacuum reaching 8 in Hg Abs.**	BOP/SRO	Determine that a plant trip is needed due to low vacuum.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	4. Event 4: Failure of the Main Turbine to trip in Auto or manual.	Crew	Recognizes low vacuum to trip the reactor.
		RO	Inserts Manual Trip of the reactor. Verify Reactor Trip – RTBs open, bottom lights all lit, IRPIs on bottom, Flux lowering. Verify Turbine Trip – Turbine Stop Valves both shut:. Turbine will not trip in AUTO or MANUAL. RO will need to take the EH pumps to pullout and ramp the turbine governor valves shut. MSIV's may also be shut per the RNO. Verify Safeguards Buses – At least one 4160 and one 480 V Bus energized. - Checks voltage on buses and breaker configuration Check if SI is Actuated – was performed manually. - SI and RHR pumps both running.
	Communicator/Booth Operator: If contacted to locally trip the turbine, wait one minute, delete auto turbine trip failure and report turbine locally tripped.	SRO/RO	Verifies Immediate Action steps. Following IA verification, may contact AO to locally trip turbine.
		Crew	Addresses fold out page.
		BOP	Performs Attachment A.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	5. Event 5: 1P-29 TDAFW Pump overspeed and P-38A trip **Booth/Communicator:** When called to check on AFW pump conditions, report that 1P-29, TDAFW pump overspeed trip mechanism is in pieces on the floor and that P-38A is hot to the touch. If asked for P-38A breaker indications, breaker has tripped on overcurrent.	BOP/RO BOP SRO	Determines loss of 1P-29 TDAFW pump on overspeed and that P-38A tripped. Verifies Secondary Heat Sink - >29% in at least one SG. - Heat sink cannot be verified so transition to CSP-H.1 is performed.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	6. Event 6: Loss of Heat Sink	Crew	Review Cautions/Notes/Foldout page.
		RO/BOP	Check if Heat Sink is required.
		Crew	Check if RCS Bleed and Feed is required.
		BOP	Isolate Blowdown.
		Crew	Check for cause of AFW malfunction in Control.
		BOP	Check feed flow to S/G's.
		RO	Stop both RCP's.
		BOP	Check Condensate pump(s) running.
		BOP	Maintain Hotwell level. **(CA)**
		Crew	Check Condensate and Feed piping intact.
		BOP	Establish Feedwater flow path.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	Loss of Heat Sink continued	BOP	Check at least one MFP running. - RNO column will be used to start a MFP.
		BOP	Check MFP discharge MOV open.
		BOP	Establish feed flow to S/G's. **(CA)**
	CRITICAL TASK: FR-H.1 A Restore feedwater flow into at least one steam generator before RCS bleed and feed is required.	SRO	Return to EOP-0.
	Scenario will be terminated per Lead Examiner's direction upon return to EOP-0.		

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A action Booth: (Inform BOP that SW-LW-61 and 62 are shut when asked)	BOP	Verify feedwater isolation: - Feedwater Regulating and Bypass Valves SHUT. - Both main feed pumps tripped. - MFP discharge MOV's - BOTH SHUT. Verify containment isolation: - CI Panels A and B ALL LIGHTS LIT - RS-SA-9 SHUT. - No other valves open under administrative control (SM may be asked to verify this). Verify AFW Actuation: - Checks both motor driven AFW pumps running. - May attempt start of 1P-29 and P-38A if not previously done. Check both SI pumps running. Check both RHR pumps running. Check only one CCW pump running. Verify Service Water Alignment: - 6 service water pumps running. - Service water isolation valves shut. - Direct AO to locally check SW-LW-61 or SW-LW-62 shut.

SCENARIO TIME-LINE:			
SEQ	SEQUENCE OF EVENTS / INSTRUCTOR NOTES	CREW POS	EXPECTED STUDENT RESPONSES
	EOP-0 Attachment A action	BOP	Verify Containment Accident Cooling Units Running. - All accident fans running. - 1SW-2907 & 2908 OPEN. - Unit 1 Containment Recirc Coolers Water Flow Low Alarm CLEAR. Check Control Room Ventilation IN ACCIDENT MODE: - At least one control room recirc fan RUNNING. - Control room damper solenoid valve PURPLE LIGHT LIT. Check if Main Steam Lines Can Remain Open, checks both MSIVs SHUT. Verify proper SI valve alignment: - Unit 1 SI active status panel ALL LIGHTS LIT. - Unit 1 SI-Spray Ready status panel NO LIGHTS LIT. Verify containment spray not required: Containment Pressure remained < 25 PSIG. Verify SI Flow: - RCS wide range pressure <1400 psig. - Check SI pumps flow indicated. - RCS wide range pressure < [425] 200 psig. This ends the steps of EOP-0 Attachment A.

SIMULATOR INPUT SUMMARY

Relative Order	System Or Panel Drawing	Type	Code	Severity Or Value	Ramp	Delay	Description
Preload	AFW	BKR	BKR1AFW002	6-fail ctl pwr fuse	-	-	P-38B MDAFW pump breaker
Preload	EHC	MAL	MAL1EHC007A	-	-	-	Manual Turbine Trip failure
Preload	EHC	MAL	MAL1EHC007B	-	-	-	Auto Turbine Trip failure
Preload	AFW	MAL	MAL1AFW001	-	-	-	1P-29 overspeed trip
JCRFTR	AFW	BKR	BKR1AFW001	1-trip	-	120	P38A MDAFW pump trip 2 min after Rx trip
1	RCS	XMT	XMT1RCS009A	0	-	-	1LT-420 Pzr Level fail low
3	CFW	MAL	MAL1CFW005A	550	-	-	Loss of Cond A Vacuum
3	CFW	MAL	MAL1CFW005B	550	-	-	Loss of Cond B Vacuum
10	CFW	LOA	LOA1CFW083	on	-	-	1P-99A SGFP Seal Water Pump
10	CFW	LOA	LOA1CFW084	on	-	120	1P-99B SGFP Seal Water Pump

Historical Record: Developed for the ILT 2007 NRC Exam.

Simulator Scenario Development Checklist

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3.	The scenario content adequately addresses the desired tasks, through simulator performance, instructor-led training freezes, or both.	Yes X	No
4.	Plant PRA initiating events, important equipment, and important tasks are identified.	Yes X	No
5.	Turnover information includes a Daily At Power or Shutdown Safety Risk Assessment.	Yes X	No
6.	The scenario contains procedurally driven success paths. Procedural discrepancies are identified and corrected before training is given.	Yes X	No
7.	The scenario guide includes responses for all anticipated communications to simulated personnel outside the Control Room, based on procedural guidance and standard operating practices.	Yes X	No
8.	The scenario includes related industry experience.	Yes	No X
9.	Training elements and specific human performance elements are addressed in the scenario critique guide to be used by the critique facilitator. The critique guide includes standards for expected performance.	Yes	No X

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Simulator Scenario Validation Checklist

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		Yes	No
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2.	All malfunctions and other instructor interface items were functional and responded to support the simulator scenario.	X	
3.	All malfunctions and other instructor interface items were initiated in the same sequence described within the simulator scenario.	X	
4.	All applicable acceptance criteria were met for procedures that were used to support the simulator scenario.	X	
5.	During the simulator scenario, observed changes corresponded to expected plant response.	X	
6.	Did the scenario satisfy the learning or examination objectives without any significant simulator performance issues, or deviations from the approved scenario sequence? If learning objective(s) could not be satisfied, identify the objectives in the Simulator Action Request	X	
7.	Evaluation: The simulator is capable of being used to satisfy learning or examination objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence.	X	

Discrepancies noted (Check "none" or list items found) ☒ None
SMAR = Simulator Action Request

SMAR:_____ SMAR:_____ SMAR:_____ SMAR:_____

Comments: No was selected for several training items on the development checklist. These items will remain 'NO' due this SEG being developed IAW NUREG 1021 for an Initial NRC license exam. No was selected for step 2 of the development checklist due to this being N/A for our plant.

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