Form 3.3-1 Scenario Outline

Facility: **BVPS Unit 2** Source: **NEW** Scenario No. 1 Op Test No.: 2LOT22 NRC
Examiners: _____ Candidates: _____ SRO
_____ _____ ATC
_____ _____ BOP

Initial Conditions: **IC 146 (17)**: 75% power, MOL, Equ. XE Conditions, CB "D" @ 186 steps, RCS boron - 1130 ppm.

Turnover: Maintain 75% power.
2RCS*PCV456 isolated due to seat leakage, block valve closed. TS 3.4.11, Condition A
2FWE-P23B on clearance, TS 3.7.5, Condition B, 2FWE*P22 has been aligned to the "B" header.

Critical Tasks:
1. CT-16 (E-1.C) Stop RCP's before E-1 exit
2. CT-50 (FR-S.1.A) Isolates the main turbine before WR level < 10% in 2/3 SGs
3. CT-52 (FR-S.1.C) Initiate negative reactivity by inserting RCCAs before completing IOAs of FR-S.1.

Event No.	Malf. No.	Event Type	Event Description
1	XMT-RCS019A	(C,A,MC) ATC (C,A,TS) SRO	Pressurizer Level Channel, 2RCS*LT459 drifts high.
2	GEN02	(C,A,MC) BOP (C,A) SRO	Main generator voltage regulator fails in automatic, causing overexcitation.
3	XMT-MSS026A	(I,A) BOP/SRO (TS) SRO	2MSS-PT101B fails high, 2SVS-PCV101B opens, upon manual closure, valve sticks at 20% open, requires local isolation.
4	TUR01D	(C,A) BOP, SRO	Turbine high bearing vibration requires crew to manually trip the unit.
5	PPL01A PPL01B	(M) ALL	Failure of Automatic and manual Reactor trip from the control room requires entry into FR-S.1.
6	CRF01A	(C) ATC, SRO	Control Rod automatic insertion failure, ATC must manually insert control rods.
7	EHC01B EHC03B	(C) BOP, SRO	Turbine fails to completely trip – requires MSLI.
8	RCS02B	(M) ALL	1200 gpm LOCA occurs on "B" Loop
9	PPL07A	(C) ATC, SRO	Standby Charging/HHSI pump fails to auto start on SI.
10			

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control, (A)bnormal

E-0 → FR-S.1 → E-0 → E-1 → ES-1.2

After taking the shift at 75% power, MOL, 2RCS*LT459 will drift high. The ATC will recognize the failure and respond IAW AOP 2.4.1 IOA's to remove the failed channel from service. The SRO will transition to the Instrument Failure procedure, 2OM-6.4.IF and direct the ATC to complete the removal of the 459 channel from service. The SRO will review applicable Technical Specifications in effect for the failed level transmitter.

The MUG, main unit generator, voltage regulator will then fail causing an over excitation of the MUG, IAW AOP 2.4.1, Process Control Failure, the BOP will place the voltage regulator to “OFF” and correct the over excitation by manually adjusting the “base adjust”.

2MSS-PT101B will fail high causing “B” SG atmospheric steam dump valve, 2SVS-PCV101B, to go full open. The crew will respond IAW the alarm response procedure and attempt to manually close 2SVS-PCV101B which will fail at 20% open causing a slight increase in Rx power. The crew will dispatch an operator to locally isolate failed open valve and the SRO will evaluate applicable TS for failed valve.

A bearing will then begin failing on the turbine causing turbine vibrations to begin increasing, IAW the alarm response procedure, the crew will address the bearing degradation and recognize that when vibrations exceed 14 mils, the turbine is required to be manually tripped. Since Rx power is >50%(P9), the SRO will direct the crew to manually trip the Rx.

The ATC will unsuccessfully attempt to trip the reactor from BB-B and BB-A and IAW FR-S.1 IOA’s begin manually inserting the control rods as auto rod insertion capability failed.
IAW FR-S.1 IOA’s, the BOP will manually trip the turbine, however the turbine will fail to completely trip and require the BOP to manually initiate a Main Steam Line Isolation.
The SRO will enter FR-S.1 with the ATC and BOP performing the IOA’s.

1 minute after Emergency boration flow is established in FR-S.1, if the crew previously dispatched an operator to locally trip the reactor, the reactor will be locally tripped. The ATC will verify reactor power is <5% after which the SRO will return to E-0.

When the SRO transitions to E-0 from FR-S.1, a 1200 gpm LOCA will occur on the B loop resulting in an automatic SI actuation, the “A” charging/HHSI pump will fail to automatically start on the SI signal.

Upon performing the diagnostics in E-0, the SRO will determine that the RCS is not intact and transition to E-1. The scenario will be terminated at the lead evaluators discretion after the crew transitions to ES-1.2.

Expected procedure flow path is E-0 → FR-S.1 → E-0 → E-1 → ES-1.2.

INITIAL CONDITIONS: IC-146 (IC-17) 75 % Power, MOL, Bank D @ 186 steps, Equilibrium XE, 1130 PPM Boron,

ADDITIONAL LINEUP CHANGES	STICKERS	MONITOR SETUP
2RCS*MOV536 closed with power maintained	YCT on CS	High power splash
2FWE*P23B in PTL, 2FWE*P22 Placard to "B"	YCT on CS	
EQUIPMENT STATUS	**DATE/TIME OOS**	**TECHNICAL SPECIFICATION(S)**
2RCS*PCV456 isolated	Yesterday / 1200	3.4.11, Condition A
2FWE*P23B on clearance	8 hours ago	3.7.5, Condition B

SHIFT TURNOVER INFORMATION

1. Maintain 75% power.
2. 2RCS*PCV456 isolated due to seat leakage, block valve closed. TS 3.4.11, Condition A
3. 2FWE*P23B on clearance, TS 3.7.5, Condition B, 2FWE*P22 has been aligned to the "B" header.

SCENARIO SUPPORT MATERIAL REQUIRED

1. Reactivity plan – provide MOL Rapid Power Reduction reactivity plan.
2.

PROCEDURES NEEDED

E-0
E-1
ES-1.2
FR-S.1
Attachment A-0.6
Attachment A-0.11
Attachment A-1.11
Attachment A-1.27
AOP 2.4.1
6 IF, Attach 1

Insert preloads per the simulator preload section of the schedule file for this scenario:

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 1:		
Pressurizer level transmitter 2RCS*LT459 drifts high. **IMF XMT-RCS019A to 100 in 60**	2RCS*LI459A indicates upscale. A4-2, PRZR Control High Low Level Dev.	ATC reports unexpected PRZR level deviation alarm. ATC identifies 2RCS*LT459 is failing high. IAW AOP 2.4.1, Part C, ATC removes 2RCS*LT459 from service by placing PRZR level control channel selector to POS II/III (461/460). If necessary ATC places 2CHS*FCV122 in manual and restores PRZR level.
NOTE: A control band and Rx trip criteria are not applicable if the PRZR level controls remained in AUTO.	SRO enters AOP 2.4.1, Process Control Failure, Part "C".	SRO provides a control band and Rx trip criteria of 5% low/90% high for manual PRZR level control. BOP refers to ARP.
	SRO enters the Reactor Coolant System Instrument failure procedure, 2OM-6.4.IF, attachment 1.	SRO transitions to Reactor Coolant System Instrument failure procedure, 2OM-6.4.IF, attachment 1.
	SRO evaluates Technical Specifications:	3.3.1 (RTS Instrumentation) Condition A; immediately enter the Condition referenced in Table 3.3.1-1 function 9 (PRZR level high) Condition K; trip channel in 72 hrs. or reduce power to < P-7 in 78 hrs. SRO determines following TS are for tracking only 3.3.3 (PAM instrumentation) Table 3.3.3-1 function 11 is met if LT460 and LT461 are operable. 3.3.4 (Remote Shutdown System) Table B.3.3.4-1 function 4.a requirement is met if LT460 is operable.
Continue with next event at LE discretion		

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 2:		
Voltage Regulator Failure **IMF GEN02 to 27 in 30**	MUG Excitation increases Main Generator VARS increase Main Generator Power Factor decreases (more lagging) A7-4C, Generator Field Forcing A7-4H, Generator Field Overcurrent SRO enters AOP 2.4.1, Process Control Failure.	BOP reports unexpected electrical alarm. BOP identifies voltage regulator failure. ATC refers to ARP. IAW AOP 2.4.1, BOP turns voltage regulator off and manually reduces MUG excitation using exciter base adjust to lower VARS to restore power factor. SRO provides BOP a control band for power factor of 0.9 to 1.0 lagging. ATC reviews ARP 2OM-35.4.AAN. IAW 1/2OM-35.4A.A, Crew notifies DLC System Dispatch as soon as practical but within 30 minutes of Voltage Regulator being out of Automatic. SRO contacts Operations management and notifies maintenance of voltage regulator failure.
Continue with next event at LE discretion		

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 3:	**IMMEDIATE PLANT RESPONSE:**	
2MSS-PT101B fails high **IMF XMT-MSS026A to 1500 in 120** **IMF CNH-MSS03A to 20 on Event 4** (preloaded)	A6-7A, Steamline Pressure High. 2MSS-PI101B trending offscale high. 2SVS-PCV101B strokes full open. RCS temperature decreases. Reactor power increases.	Crew recognizes that 2MSS-PT101B is failing high and that 2SVS-PCV101B has opened in response. ATC monitors RCS temperature and reactor power, informs SRO that power is rising. IAW AOP 2.4.1, SRO directs ATC to take manual control of open ADV, (2SVS-PCV101B) and close it.
	ADV will initially close from BB control but will stick at ~20% open. Reactor power slowly rising.	ATC places controller for 21B SG ADV in manual and attempts to close ADV. Crew recognizes Rx power is slowly rising.
ROLE PLAY: When dispatched to locally isolate 2SVS-PCV101B insert **IRF LOA-MSS017 to 0 in 30** Wait 5 minutes then report that 2SVS*24 is CLOSED.		IAW Alarm Response procedure, crew dispatches field operator to locally isolate 2SVS-PCV101B by locally closing 2SVS*24.
NOTE: The crew may dispatch an operator to locally close 2SVS*PCV101B, the valve will fail closed when it is de-energized. (MCC-E13, 2C) Continue with next event at LE discretion	SRO evaluates Technical Specifications:	3.7.4 (ADVs) Condition A; Restore required ADV line to OPERABLE status within 7 days.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 4: Main turbine bearing #4 high vibration. **IMF TUR01D to 15 in 120** **NOTE:** ARP directs an immediate turbine trip if bearing vibration exceeds 14 mils **ROLE PLAY:** If necessary – report in as Turbine operator that the turbine is shaking.	Bearing #4 vibration at 15 mils, adjacent bearings also indicate abnormally high vibration. A7-3H,Turbine Supervisory Instrument Trouble	BOP acknowledges and reports bearing vibration indications. ATC reviews ARP.
EVENTS 5 - 7, (all preloaded) ATWS with Auto Rod insertion failure, Incomplete Turbine Trip **IMF PPL01A** **IMF PPL01B** **IMF CRF01A** (preloaded) **Critical Task CT-50 (FR-S.1.A):** **Crew isolates the main turbine from the SGs before WR SG level is less than 10% in 2/3 SGs.** SAFETY SIGNIFICANCE -- Failure to trip the main turbine under the postulated plant conditions can lead to violation of the RCS emergency stress limit.	SRO enters FR-S.1	Crew determines that a reactor trip is warranted. ATC attempts a manual reactor trip, reports trip failure/ ATWS condition. SRO directs operators to perform IOA's of FR-S.1, implements FR-S.1 at step 1 of E-0. BOP manually trips Turbine by depressing both Turbine Trip Pushbuttons on BB-C. BOP recognizes Throttle valve AND governor valve remain open following manual Turbine trip. BOP manually initiates a MSLI by depressing all 4 MSLI Pushbuttons on BB-C kickup and verifies all Main Steam Line Isolation valves are closed on BB-C.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE

EVENTS 5 - 7, (continued)

Auto Rod insertion failure.

Critical Task CT-52 (FR-S.1.C):
Crew inserts negative reactivity into the core by inserting RCCAs before completing the immediate action steps of FR-S.1.

SAFETY SIGNIFICANCE -- Failure to insert negative reactivity, under the postulated plant conditions, results in an unnecessary situation in which the reactor remains critical or returns to a critical condition. Performance of the critical task would make the reactor subcritical and provide sufficient shutdown margin to prevent (or at least minimize the power excursion associated with) any subsequent return to criticality.

Failure to insert negative reactivity constitutes "mis-operation or incorrect crew performance which leads to incorrect reactivity control (e.g., failure to initiate emergency boration or manually insert RCCAs)."

ATC recognizes control rods are not automatically inserting, places rods in Manual and begins inserting rods.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5 - 7, (continued)		BOP verifies AFW status. BOP verifies 2FWE*P23A motor-driven AFW pump running. (2FWE*P23B on clearance) BOP verifies 2MSS*SOV105A-F open, turbine-driven AFW pump, 2FWE*P22. BOP verifies all AFW throttle valves are open. BOP verifies AFW flow. Crew initiates Emergency Boration Flow by; Verifying at least 1 charging pump is running Checking Safety Injection is NOT actuated. Aligning Boration path by; Opening 2CHS*MOV350. Starting "A" Boric Acid pump. Verifying Emergency Boration flow > 30 gpm. Aligning Charging flow path by adjusting 2CHS*FCV122 to establish > 40 gpm charging flow. Verifying RCS pressure is < 2330 psig.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<u>EVENTS 5 - 7,</u> (continued) **ROLE PLAY:** When requested to open the reactor trip breakers & trip the rod drive MG set output ACBs, wait until the crew has initiated emergency boration flow then **TOGGLE EVENT 10** Following commands are preloaded, activate Trigger 10 as soon as requested, 1st Rx trip breaker will open 2 minutes after actuating Trigger 10. **PPL02A after 120 on event 10** **PPL02B after 130 on event 10** **LOA-CRF007 after 140 on event 10** **LOA-CRF008 after 150 on event 10** **ROLE PLAY:** When all breakers are open, report actions to the control room.		Crew alerts plant personnel by; • Sounding the standby alarm • Announcing a Unit 2 Rx trip w/o SCRAM • Dispatching an operator to locally trip the Rx.
	Crew continues in FR-S.1 after dispatching an operator to locally trip the Unit 2 reactor.	BOP verifies turbine is tripped. BOP verifies 2MSS-MOV100A,and B automatically CLOSED. BOP depresses the RESET pushbutton on the reheater controller. ATC checks if SI is actuated and reports SI is not actuated.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5 - 7, (continued) **NOTE:** This is a continuous action step, when the Rx is locally tripped, the crew will return to this step and then transition back to E-0, Step 1.		ATC checks if reactor is subcritical: • Power range channels < 5%. • IR channels – negative startup rate. • Continues boration as necessary. Crew confirms that reactor is subcritical, SRO returns to procedure and step in effect. (E-0, step 1)
EVENTS 8 & 9; **NOTE:** When the SRO transitions to E-0, **INSERT** Event 8, 1200 gpm LOCA on "B" Loop. **IMF RCS02B to 1200**	1200 gpm LOCA with Autostart failure of 2CHS*P21A When the Rx is locally tripped. SRO returns to E-0, step 1.	ATC verifies Reactor trip: • Rx trip and bypass breakers open. • Power range indication is < 5%. • Neutron flux is dropping. BOP verifies Turbine trip: • Throttle OR Governor valves ALL are NOT closed but MSLI has been previously initiated. • Main Generator output brks - open. • Exciter Circuit breaker – open. BOP verifies Power to AC Emergency Busses • Using VB-C voltmeters, verifies either AE or DF has voltage indicated. BOP identifies that both emergency busses are energized from off-site power.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 8 & 9, (continued) **NOTE:** Event 8 is inserted when the SRO enters E-0, depending upon the crews timing through the IOA's of E-0, SI may not be actuated or required, but RCS pressure will be dropping and automatic SI will be imminent.	SI automatically actuated due to the SBLOCA.	Check SI Status. ATC checks if SI is required: • ATC verifies CNMT press < 5psig. • ATC verifies PRZR press is not > 1860 psig. • ATC/BOP verifies Steamline press > 500 psig. Crew determines SI is required; ATC manually actuates SI by actuating both trains' Control Switches. ATC/BOP, sounds standby alarm, announces Unit 2 reactor trip and safety injection. Check if SI flow should be reduced: • Crew verifies CNMT radiation, Pressure and Sump level are not consistent to PRE-EVENT. SRO determines SI flow should not be secured.
EVENT 9; Auto start failure of 2CHS*P21A **IMF PPL07A** (preloaded)		ATC verifies SI system status: • Charging pumps running – 1 running. ATC starts 2CHS*P21A. • 2SIS*P21A & 2SIS*P21B running. • HHSI Flow indicated on 2SIS-FI943. BOP verifies AFW status: • "A" motor-driven pump running. • Turb driven pump, all stm supply SOV's open. • AFW throttle valves all FULL OPEN. • Total AFW flow is >340 gpm.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
NOTE: Evaluation of BOP performing Attachment A-0.11 begins on page 20.	<u>List of Attachment A-0.11 discrepancies:</u> Auto start failure of 2CHS*P21A.	BOP performs Attachment A-0.11.
NOTES: Crew may monitor C/D rate after AFW flow is reduced prior to isolating main steamlines. RCPs may have already been tripped at this time IAW E-0 LHP, if so, the crew will monitor Cold Leg temperatures.	RCS temperature <547°F and dropping due to Safety Injection flow.	ATC checks RCS Tavg stable at or trending to 547°F: • ATC verifies no steam release is occurring. (Condenser steam dumps closed) • ATC verifies reheat steam is isolated. • ATC reduces total feedflow to minimize C/D. ATC verifies PRZR isolated • PORVs – CLOSED • Spray Valves – CLOSED • Safety relief valves – CLOSED (use PSMS) • Power to at least one block valve – AVAILABLE (all) • Block valves – AT LEAST ONE OPEN (2)
NOTE: Depending upon the crews timing and procedure progression, the RCP trip criteria may be met by now, if so the crew will verify HHSI flow and stop all RCPS at this time.		ATC checks if RCPs should be stopped: • D/P between RCS pressure and highest SG pressure – <205 PSID. • Criteria for stopping is met. • ATC shuts down all RCPs.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		ATC/BOP checks if any SGs are faulted: • Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED Crew determines no SG's are faulted. Crew checks if SG tubes are intact: • Check all SG levels – NONE RISING IN AN UNCONTROLLED MANNER. • Check Secondary Radiation – CONSISTENT WITH PRE-EVENT VALUES. Crew determines no SG levels are rising in an uncontrolled manner and Secondary Radiation is consistent with pre-event values, therefore all SG tubes are intact.
NOTE: Depending upon the crews timing and procedure progression, the CNMT Radiation may not be in Hi Alarm at this point.	Hi Radiation alarm is in due to containment radiation levels. Incore room and containment radiation monitors in Hi alarm. CNMT Pressure is rising CNMT Sump level is rising SRO transitions to E-1, Loss of Reactor or Secondary Coolant.	Crew checks if RCS is Intact by checking CNMT conditions consistent with pre-event values. • CNMT radiation • CNMT pressure • CNMT sump level Crew determines the RCS is not intact based on CNMT conditions and verifies HHSI valves, 2SIS*MOV867A,B,C,D all open & transitions to E-1.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		ATC checks if CREVS should be actuated: Checks EITHER of the following: • Control Room Radiation Monitor 2RMC*RQ201,202, - NOT IN HIGH ALARM • CIB - HAS NOT OCCURRED. Crew determines CREVS actuation is NOT required.
NOTE: If not already, the D/P criteria for stopping the RCPs will be met at this time. **<u>Critical Task: CT-16 (E-1.C)</u>** **Crew trips all RCPs when RCS to highest SG D/P criteria is exceeded and SI flow verified prior to exiting procedure E-1.** SAFETY SIGNIFICANCE -- Failure to trip the RCPs under the postulated plant conditions leads to core uncovery and to fuel cladding temperatures in excess of 2200°F, which is the limit specified in the ECCS acceptance criteria. Thus, failure to perform the task represents "mis-operation or incorrect crew performance which leads to degradation of the fuel cladding barrier to fission product release" and to "violation of the facility license condition."		ATC checks if RCPs should be stopped: • D/P between RCS pressure and highest SG pressure – <205 PSID • Criteria for stopping will be met. If criteria not already met, ATC continues monitoring and stops ALL RCPs when D/P criteria is met.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
ROLE PLAY: When dispatched to perform Attach A-0.6, wait 5 minutes, insert following commands then report complete. **IRF LOA-LOV093 RACKIN** **IRF LOA-LOV102 RACKIN** **IRF LOA-LOV094 RACKIN** **IRF LOA-LOV103 RACKIN** **IRF LOA-LOV095 RACKIN** **IRF LOA-LOV104 RACKIN** **IRF LOA-LOV096 RACKIN** **IRF LOA-LOV105 RACKIN**	**NOTE:** Schedule file "Att_A_0_6_Linestarters.sch" will automatically insert commands over the next 5 minutes.	ATC/BOP dispatches an operator to energize valves IAW Attachment A-0.6, "Cold Leg Recirculation Component Verification." ATC checks CIB – NOT ACTUATED. ATC/BOP checks if any SGs are faulted: • Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED Crew determines NO SG's are faulted. BOP checks intact SG levels: • NR levels – >12%. Controls feed flow to maintain NR level between 12% and 50%.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		Crew checks if SG tubes are intact: • Check all SG levels – NONE RISING IN AN UNCONTROLLED MANNER. • Check secondary radiation – CONSISTENT WITH PRE-EVENT VALUES. Crew determines no SG levels are rising in an uncontrolled manner and secondary radiation is consistent with pre-event values, therefore all SG tubes are intact. ATC checks PORV's and block valves: • Power to block valves – AVAILABLE (all). • PORVs – CLOSED (all). • Block valves – OPEN (two).
	SI FLOW CANNOT BE REDUCED.	ATC/BOP checks if SI flow can be reduced. • RCS subcooling based on core exit TCs >41F [59F ADVERSE CNMT] • Crew determines RCS subcooling is ≤ required from Attachment A-5.1. SI TERMINATION CONDITIONS ARE NOT SATISIFIED, SRO CONTINUES IN E-1. Check if CNMT spray should be stopped. ATC verifies no Quench or Recirc Spray pumps are running.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		ATC resets SI – both trains. ATC resets CIA – both trains.
NOTE: Due to timing, procedure progression and plant conditions, it is possible that the conditions may not support shutdown of the LHSI pumps at this time.		ATC checks if LHSI pumps should be stopped. ATC verifies RCS pressure is > 225 psig [250 psig ADVERSE CNMT] and is stable or rising. ATC stops both LHSI pumps and places in AUTO. Check RCS and SG Pressures. BOP checks pressure in all SG, NOT stable or rising. ATC checks RCS pressure is dropping. SRO determines SG pressure dropping is NOT due to a faulted SG and continues with procedure based upon preceding note. BOP verifies AC Emergency busses are energized by offsite power. SRO directs BOP to stop unloaded EDG's IAW Attachment A-1.27 as time permits. BOP performs Attachment A-0.6 to verify power available to at least 1 train of Cold Leg Recirculation equipment. BOP reports Attachment A-0.6 completed SAT with no discrepancies.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		Crew evaluates Radiation monitors, determines Auxiliary building and Safeguards radiation is consistent with pre-event values. SRO determines TSC is not activated. SRO directs ATC to monitor nuclear instrumentation to ensure adequate Shutdown Margin. Start additional Plant Equipment to assist in Recovery; SRO directs a field operator to perform Attach. A-1.1 Check if RCS cooldown and depressurization is required. ATC checks RCS pressure > 225 psig [250 psig ADVERSE CNMT]. SRO determines plant conditions support transition to ES-1.2.
	SRO transitions to ES-1.2	

At Lead Evaluators discretion, terminate scenario when the crew transitions to ES-1.2.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 'Verification of Automatic Actions' performed as time & manpower permit.		BOP performs **Attachment A-0.11,** 'Verification of Automatic Actions' as follows: Verifies power to both AC emergency busses. Checks both EDGs running with SWS valve alignment and ventilation in service. Verify both CNMT hydrogen analyzers running: 2HCS*SOV100A1, B1 – CNMT sample amber lights – LIT. Checks 2HVS*FN204A or 2HVS*FN204B running.
	Ensure Reheat Steam Isolation.	Ensure reheat steam isolation: • Verify 2MSS-MOV100A and B – closed. • Reset reheater controller. • Verify 2GSS-MOV204, spillover vlv, closed.
Steamline isolation manually initiated.		Check if main steamline isolation required: • CNMT pressure – > 7 PSIG -OR- • Steamline pressure – < 500 PSIG -OR- • Steamline pressure high rate of change – 100 PSIG DROP IN 50 SECONDS. If steamline isolation is required, verifies SLI by checking all YELLOW SLI marks – LIT. If steamline isolation is not required continues on.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – (continued) **NOTE:** BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors.		Establish domestic water system cooling to station air compressors; • Opens 2CCS-AOV118. • Verifies at least 1 air compressor is running.
CIB has not occurred.		Verifies at least 1 CCP pump is running unless a CIB has occurred. Align neutron flux monitoring for shutdown: • Verifies SR CHs energized when IR <1E-10. • Transfer 2NME-NR45, nuclear recorder, to operable SR and IR displays.
CIB has not occurred.		Check CIB and CNMT spray status: • CNMT pressure – has remained <11 PSIG. If not – Actuate CIB if required by: • Manually initiating CIB – BOTH SWITCHES FOR BOTH TRAINS. • Manually align equipment as required. • Verify all RCPs – STOPPED. • BV-1 operator verifies CREVS actuation. • Service water flow established to RSS HX(s). Verify service water system in service: • SWS pumps - TWO RUNNING. • Check SWS header pressure – >55 psig. • SWS pump seal water pressure – NOT LOW.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – (continued) 2CHS*P21A auto start failed, manual start successful.		Verify ESF equipment status: • Verify SI status by checking all RED SIS marks – LIT. • Verify CIA by checking all ORANGE CIA marks – LIT. • Verify FWI by checking all GREEN FWI marks – LIT. Verify source range channels energized with audible indication functioning properly, adjusts multiplier switch and volume as necessary.
Attachment A-0.11 – COMPLETE	<u>Discrepancies</u>: 2CHS*P21A auto start failed, manual start successful.	Upon completion, report any discrepancies to SRO.

Form 3.3-1 Scenario Outline

Facility: **BVPS Unit 2** Source: **NEW** Scenario No. 3 Op Test No.: 2LOT22 NRC
Examiners: _____ Candidates: _____ SRO
_____ _____ ATC
_____ _____ BOP

Initial Conditions: **IC 148 (5)**: ~4.5% power, BOL, XE increasing, CB "D" @ 111 steps, RCS boron - 1930 ppm.

Turnover: Due to an oil leak, S/U 2CCS-P21B and S/D 2CCS-P21A IAW 2OM-28.4.H
Raise power to 15% to S/U main turbine IAW 2OM-52.4.A.
Continue power increase IAW reactivity plan and commence turbine roll.
2RCS-PCV456 isolated due to seat leakage, block valve closed. TS 3.4.11, Condition A

Critical Tasks:
1. CT-3 (E-0.E), Manually initiate CIB before Extreme challenge to the CNMT.
2. CT-11 (E-0.O) Close at least 1 CNMT isolation valve/pen before scenario terminated.
3. CT-17 (E-2.A) Isolates faulted SG before transition out of E-2.

Event No.	Malf. No.	Event Type	Event Description
1		(N) BOP/SRO	Due to oil leak, S/U 2CCS-P21B & S/D 2CCS-P21A.
2		(R) ATC (N) SRO	Normal power increase to 15% IAW 2OM-52.4.A.
3	CNH-CFW11	(C,A,MC) BOP (C,A) SRO	2FWS*FCV479, Bypass Feedwater valve controller fails as is in AUTO, requires manual operation.
4	XMT-MSC038A	(TS) SRO	2LMS*PT952 fails high.
5	NIS07B	(I ,A) BOP (I ,A,TS) SRO	N36 Instrument Power fuse blown.
6	RCP06A	(C,A) ATC, SRO	"A" RCP high vibration and trip – requires manual Rx trip
7	MSS01A 1E7	(M) ALL	Large Feedwater Fault inside CNMT on "A" SG.
8	PPL08B VLV-SEA015	(C, MC) ATC/BOP (C) SRO	Train B CIA failure w/ 2CHS*MOV378 auto close failure.
9	INH50	(C,MC) ATC (C) SRO	CIB auto actuation failure.
10	INH43	(C,MC) ATC (C) SRO	"B" Quench Spray pump auto start failure.
11	X19o005S OFF X19o020S OFF	(C,MC) BOP (C) SRO	Control room emergency ventilation system fails to actuate on CIB signal, requiring manual initiation.

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control, (A)bnormal

E-0 → E-2 → ES-1.1

Form 3.3-1 Scenario Outline
2L22N3

The crew will take the shift at ~4.5% power with instructions to start up the standby secondary component cooling water pump, 2CCS-P21B, and S/D 2CCS-P21A due to an oil leak then raise power to 15% IAW the reactivity plan to S/U the main turbine. The following malfunctions will occur as power is raised.

After power is >5%, the “A” bypass feedwater regulating valve controller will fail as is. As power rises, the controller problem will become evident requiring the BOP to manually control “A” SG level IAW AOP 2.4.1, Process Control Failure.

After power is >7%, 2LMS*PT952 will fail high. The SRO will respond using Instrument Failure procedure, 2OM-1.4.IF, Attachment 1. The SRO will address TS and notify I&C that bistables will need to be tripped.

The instrument power fuse will then blow for Intermediate Range Instrumentations, channel N36. The crew will enter AOP 2.2.1B and take the channel out of service. The SRO will address TS.

The "A" RCP will then show signs of high vibration, the crew will respond using AOP 2.6.8, “Abnormal RCP Operation”. After diagnosing and monitoring, the vibration will increase in severity to the point where the RCP will trip. Since the plant is less than 30% power, the RCP trip will not cause an automatic Rx trip. The crew will identify the loss of the RCP and manually trip the reactor.

The reactor trip will cause a large feedwater leak on the “A” SG inside CNMT which will cause CNMT pressure to rise to above CIB setpoint with an automatic CIB actuation failure. The crew will recognize that CIB should have occurred and manually actuate CIB after which the ATC will shutdown the RCP’s.

Train “B” CIA will fail to automatically actuate with a Train “A” Penetration valve, 2CHS*MOV378, also failing to automatically close. The crew will manually actuate CIA and close 2CHS*MOV378.

Additionally, the “B” Quench Spray pump will fail to autostart when CIB is initiated, the crew will identify and manually start 2QSS*P21B.

While the BOP is verifying automatic actions have occurred, it will be recognized that the Control Room Emergency ventilation system also failed to actuate on CIB. The BOP will manually actuate the CREV’s system.

The crew will progress thru E-0, upon performing the diagnostics in E-0, the SRO will determine that the “C” is faulted and transition to E-2, isolate the faulted SG and then transition to ES-1.1.

The scenario will be terminated at the lead evaluators discretion after the crew completes isolating HHSI flow in ES-1.1.

Expected procedure flow path is E-0 → E-2 → ES-1.1.

INITIAL CONDITIONS: IC-148(5) 4.5 % Power, BOL, Bank D @ 111 steps, XE increasing, 1930 PPM Boron,

ADDITIONAL LINEUP CHANGES	STICKERS	MONITOR SETUP
2RCS*MOV536 closed with power maintained	YCT on CS	Low power splash
EQUIPMENT STATUS	**DATE/TIME OOS**	**TECHNICAL SPECIFICATION(S)**
2RCS*PCV456 isolated	Yesterday / 1200	3.4.11, Condition A

SHIFT TURNOVER INFORMATION

1. Continue power increase IAW reactivity plan and commence turbine roll.
2. Raise power to 15% to S/U main turbine IAW 2OM-52.4.A.
3. 2RCS*PCV456 isolated due to seat leakage, block valve closed. TS 3.4.11, Condition A
4. Due to an oil leak, upon taking the shift, S/U 2CCS-P21B and S/D 2CCS-P21A IAW 2OM-28.4.H

SCENARIO SUPPORT MATERIAL REQUIRED

1. Reactivity plan – provide BOL Rapid Power Reduction reactivity plan.
2. S/U specific reactivity plan.
3. 2OM-52.4.A
4. 2OM-28.4.H
5. 2OM-7.4.AR

PROCEDURES NEEDED

E-0
E-2
ES-1.1
Attachment A-0.11
AOP 2.2.1B
AOP 2.4.1
AOP 2.6.8
1IF, Attachment 1

Insert preloads per the simulator preload section of the schedule file for this scenario:

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 1: S/U 2CCS-P21B & S/D 2CCS-P21A		IAW 2OM-28.4.H, BOP verifies field operator is standing by and starts 2CCS-P21B. After confirmation of SAT operation from field operator, BOP shuts down 2CCS-P21A.
EVENT 2: Raise power 15% Normal Plant Startup, reactor power increase to 15% to support turbine startup.	Startup procedure, Raising Power from 5% to Full Load Operation, 2OM-52.4.A, step 7.a is in progress.	IAW reactivity plan, ATC dilutes and withdraws rods to raise reactor power to > 15%. When Rx power is >5%, crew identifies and announces entry into Mode 1. ATC initiates control rod withdrawal and dilution IAW the reactivity plan.
NOTE: Reactivity plan requires 150 gallon dilution and 6 rod steps to raise power to 10%. Crew may elect to add total dilution volume in multiple steps.		ATC initiates dilution IAW the reactivity plan; • Places Boric Acid Makeup Blender CS to STOP. • Verifies 2CHS*FCV114A set to desired flow rate. • Set 2CHS-FQIS168A, Total M/U from Blender Flow Totalizer, to desired dilution quantity. • Reset 2CHS-FQIS168A. • Verify 2CHS-FQIS113, Boric Acid Flow to Blender Flow Totalizer, is set to zero. • Places Mode Selector switch in DIL or ALT DIL. • Places Boric Acid Makeup Blender CS to START. • Verify 2CHS*FCV114A opens. • Verify correct flow rate on 2CHS-FR113. • When 2CHS-FQIS168A reaches preset value, verify dilution automatically stops.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 3: Malfunction for event 3 is triggered to insert at 5% power and will become evident when power rises.	"A" SG level decreases due to increased steaming rate at higher power and constant valve position. A6-9E will alarm for SG level dev. if the crew doesn't notice 2FWS*FCV479 malfunction.	BOP recognizes "A" SG level decreasing. IAW Process Control Failure procedure, AOP 2.4.1, BOP places controller for 2FWS*FCV479 in manual and restores SG level to program.
EVENT 4: Malfunction for event 4 is triggered to insert at 7% power 2LMS*PT952 fails high **IMF XMT-MSC038A to 55 in 15**	A1-2F, Containment Pressure High/High-High SRO enters 2OM-1.4.IF, Instrument Failure Procedure SRO refers to Tech. Specs.	ATC determines 2LMS*PT952 failing high BOP reviews the ARP SRO refers to Attachment 1 ATC identifies which channel has failed and how it has failed by comparing 2LMS*PI950, 951, 952, and 953, CNMT Press Indication. Determines 2LMS*PT952 failing high. Tech Spec 3.3.2, Table 3.3.2-1 Items 1.c and 4.c, Condition D • Place HI CNMT Press SI and Intermediate HI-HI CNMT PRESS SLI bistables to trip within 72 hours Items 2.a.3, 2.b.2, 3.b.3, & 4.c; Condition E • Place HI-HI CNMT PRESS CIB bistable to bypass within 72 hours
Proceed with next event at LE discretion **NOTE:** At LE discretion, insert event 5 after Rx power is >10% AND the crew has inserted Rx Trip Blocks		

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 5: **NIS07B:** N36 instrument power range fuse blows **IMF NIS07B 0** **NOTE**: May have already blocked IR train A & B Proceed with next event at LE discretion	SRO enters AOP 2.2.1B, Intermediate Range Channel Malfunction, Step 5. A4-4E: NIS Compensator Comparator Trouble	ATC performs: • Check reactor power – > P-10 • Momentarily Place Intermediate Range and Power Range Block Train A and Train B switches to BLOCK position. • Place caution tags on Source Range Trip Block/Reset Train A and Train B switches, "**Manually unblock source range during plant shutdown**". • Verify NR-45 recorder selected to OPERABLE channels • Place Level Trip switch for N36 to BYPASS o Verify Annunciator A4-5E, "NIS Source/Int Range High Flux Trip Bypass" in alarm due to failed channel. o Verify status light "Level Trip Bypass" on drawer – LIT. SRO evaluates T.S. and enters T.S. 3.3.3. condition A. and determines T.S. 3.3.1 condition F.(1 OR 2) is N/A
EVENT 6: A RCP High Vibration, after 3 minutes a locked rotor RCP trip will occur which requires manually tripping the RX. (No auto Rx trip at this power lvl.) **IMF RCP06A to 16 in 3** Additional commands pre-loaded **IMF RCP05A after 180 on event 4**	A2-5C; Reactor Cool Pump Vibration High SRO enters AOP 2.6.8 for Abnormal RCP Operation.	Crew verifies indications on RCP vibration monitor. BOP reports "A" RCP frame vibration at 3.8 mils and shaft is at 16 mils, both are stable. SRO directs ATC to review RCP parameters to determine if immediate RCP shutdown is required. Crew determines Immediate RCP shutdown is not required and continues to monitor parameters while the SRO proceeds with AOP instructions.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
	After a 3-minute time delay, the "A" RCP will trip due to a locked rotor.	ATC identifies that "A" RCP has tripped and the Rx has not automatically tripped. SRO directs the ATC to manually trip the reactor and perform the Immediate Operator actions of E-0. SRO directs the crew to perform the Immediate Operator actions of E-0.
EVENTS 7 – 11; All preloaded	A large feedwater leak occurs as a result of the reactor trip. Both trains of CIB and Train B CIA fail to automatically actuate. 2QSS*P21B fails to autostart and 2CHS*MOV378 fails to autoclose. CREV's auto actuation also failed. SRO enters E-0, step 1.	ATC verifies Reactor trip: • Rx trip and bypass breakers open. • Power range indication is < 5%. • Neutron flux is dropping. BOP verifies Turbine trip: • Throttle OR Governor valves ALL closed. • Main Generator output brks - open. • Exciter Circuit breaker – open. BOP verifies Power to AC Emergency Busses • Using VB-C voltmeters, verifies either AE or DF has voltage indicated. BOP identifies that both emergency busses are energized from off-site power.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 7 -11: (continued) **NOTE:** Expected plant conditions are variable depending upon procedure progression, however all parameters will be degrading and SI will soon be required, if conditions are not met at this time.	SI automatically actuated.	Check SI Status. ATC checks if SI is required: • ATC verifies CNMT press < 5psig. • ATC verifies PRZR press is not > 1860 psig. • ATC/BOP verifies Steamline press > 500 psig. Crew determines SI is required; ATC manually actuates SI by depressing both trains' pushbuttons. ATC/BOP, sounds standby alarm, announces Unit 2 reactor trip and safety injection. Check if SI flow should be reduced: • Crew verifies CNMT radiation, Pressure and Sump level are not consistent to PRE-EVENT. SRO determines SI flow should not be secured. ATC verifies SI system status: • Charging pumps running – 2 running. • 2SIS*P21A & 2SIS*P21B running. • HHSI Flow indicated on 2SIS-FI943.
NOTE: If the BOP has recognized the fault, it is acceptable to pre-emptively isolate AFW flow to the faulted SG after IOA's are completed.		BOP verifies AFW status: • "A" & "B" motor-driven pumps running. • Turb driven pump, all stm supply SOV's open. • AFW throttle valves all FULL OPEN. • Total AFW flow is >340 gpm.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 7 -11: (continued) **NOTE:** Evaluation of BOP performing Attachment A-0.11 begins on page 15 .	List of Attachment A-0.11 discrepancies: CIB auto actuation failure Train B CIA auto actuation failure. 2CHS*MOV378 auto close on SI failure. 2QSS*P21B auto start failure. CREV's auto actuation on CIB failure.	BOP performs Attachment A-0.11.
NOTE: Depending on crew timing, a CIB may have already occurred, CCP will not be in service, RCP's should have been tripped, therefore, ATC needs to check Tcold's VS. Tavg.	RCS temperature <547°F and dropping due feedwater leak and Safety Injection flow.	ATC checks RCS Temp stable at or trending to 547°F: • ATC verifies no steam release is occurring. (Condenser steam dumps closed) • ATC verifies reheat steam is isolated. • ATC reduces total feedflow to minimize C/D. • ATC verifies MSLI actuation has occurred. ATC reports RCS cold leg temperature and cooldown is caused by LOCA/ SI flow. Crew verifies cooldown is continuing and verifies SLI has previously occurred. ATC verifies PRZR isolated • PORVs – CLOSED • Spray Valves – CLOSED • Safety relief valves – CLOSED (use PSMS) • Power to at least one block valve – AVAILABLE (all) • Block valves – AT LEAST ONE OPEN (2)
NOTE: Depending on crew timing, a CIB may not have occurred yet. The ATC will secure RCPs due to CIB actuation/loss of CCP.		ATC checks if RCPs should be stopped: • D/P between RCS pressure and highest SG pressure – <205 PSID. • D/P Criteria for stopping is NOT met.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 7-11: (continued)		ATC/BOP checks if any SGs are faulted: • Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED Crew determines that there is a faulted SG, verifies HHSI flow is indicated and transition to E-2 is required.
	SRO transitions to E-2, Faulted Steam Generator Isolation.	Verify CREVS actuated. ATC/BOP reports CREVS not actuated. SRO directs ATC/BOP to actuate both trains of CREVS using the CONTROL ROOM EMERG AIR SUP ACTUATION pushbuttons, • Verifies the control room air intake and exhaust dampers are CLOSED. • Verifies 2HVC*FN241A running after time delay. SRO requests a BV-1 operator to verify proper CREVS actuation and place CR air intake and exhaust dampers control switches in CLOSE. SRO directs STA to commence Control Room ventilation actions. Refer to Attachment A-2.4.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 7-11: (continued) **NOTE:** Main steamline isolation should have already been manually actuated and verified via attachment A-0.11 by this time, crew not likely to verify again at this time.		ATC/BOP verifies steamline isolation has occurred by checking all YELLOW SLI identified components are in the designated position. (previously verified)
	"A" SG pressure is lower than "B" & "C". "B" & "C" may be slowly lowering as expected due to the cooldown. Crew should respond with "stable" for "B" & "C" SG's.	Crew checks for any non-faulted SGs: • BOP identifies "B" & "C" steam generator pressures are "stable or rising".
	"A" SG pressure & level lowering.	Crew identifies "A" SG as faulted.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 7 - 11: (continued) **Critical Task: CT-17 (E-2.A)** **Crew isolates the faulted SG & directs operator to close isolation valves operated from outside of the control room before transition out of E-2.** SAFETY SIGNIFICANCE -- Failure to isolate a faulted SG that can be isolated causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Also, depending upon the plant conditions, it could constitute a demonstrated inability by the crew to recognize a failure of the automatic actuation of an ESF system or component. **ROLE PLAY:** When requested to isolate 2SVS-27, wait 10 minutes then insert: **IRF LOA-MSS009 to 0 in 30** report to the control room that 2SVS-27 is isolated.	**NOTE:** Crew may have pre-emptively isolated AFW flow to the "A" SG after fault was recognized. **NOTE:** The items underlined in the right column are the components that are required to be verified/manipulated to confirm isolation of a faulted SG.	BOP isolates the faulted, "A" SG as follows: • Verifies FWI. (previously verified) • Closes AFW throttle valves on "A" SG 2FWE*HCV100E, F. • Verifies residual heat release valve is closed. • Directs field operator to close 2SVS-27. • Verifies 2MSS-SOV105A and D closed. • Verifies, "A" SG Atmospheric steam dump valve is closed, 2SVS*PCV101A. • Verifies SG blowdown isolated, 2BDG*AOV100A1. • Verifies SG blowdown sample valves closed, 2SSR*AOV117A, B, C. BOP verifies 2FWE-TK210, PPDWST level is >150 inches.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		Crew checks if SG tubes are intact: • Checks all SG levels – NONE RISING IN AN UNCONTROLLED MANNER. • Check secondary radiation is CONSISTENT WITH PRE-EVENT VALUES. Determines no SG levels are rising in an uncontrolled manner and secondary radiation is CONSISTENT WITH PRE-EVENT VALUES. Crew determines SG tubes ARE INTACT. Crew checks if SI flow should be reduced by: • ATC verifies RCS subcooling is >41F [59F ADVERSE CNMT] based on CETC's. • BOP confirms secondary heat sink available by >340 gpm of feed flow available OR NR level in at least 1 SG >12% [31% ADVERSE CNMT]. • ATC confirms RCS pressure is stable or rising. • ATC confirms PRZR level is >17% [38% ADVERSE CNMT] Crew determines that current plant conditions support SI reduction.
	SRO transitions to ES-1.1, SI Termination	
		ATC/BOP resets SI – both trains. ATC/BOP resets CIA and CIB – both trains. ATC stops 1 charging pump.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		ATC confirms RCS pressure is stable or rising. SRO directs ATC to isolate HHSI flow: • ATC closes 2SIS*MOV867A,B,C, D.
	Indicated HHSI flow decreases to zero.	ATC verifies HHSI flow is secured.
Terminate scenario when the crew terminates HHSI flow in ES-1.1.		

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 'Verification of Automatic Actions' performed as time & manpower permit.		BOP performs **Attachment A-0.11,** 'Verification of Automatic Actions' as follows: Verifies power to both AC emergency busses. Checks both EDGs running with SWS valve alignment and ventilation in service. Verify both CNMT hydrogen analyzers running: 2HCS*SOV100A1, B1 – CNMT sample amber lights – LIT. Checks 2HVS*FN204A or 2HVS*FN204B running.
	Ensure Reheat Steam Isolation.	Ensure reheat steam isolation: • Verify 2MSS-MOV100A and B – closed. • Reset reheater controller. • Verify 2GSS-MOV204, spillover vlv, closed.
Automatic Steamline isolation occurred due to CNMT pressure.		Check if main steamline isolation required: • CNMT pressure – > 7 PSIG -OR- • Steamline pressure – < 500 PSIG -OR- • Steamline pressure high rate of change – 100 PSIG DROP IN 50 SECONDS. If steamline isolation is required, verifies SLI by checking all YELLOW SLI marks – LIT. If steamline isolation is not required continues on.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – (continued) **NOTE:** BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors. CIB has occurred, therefore no CCP are running at this time.		Establish domestic water system cooling to station air compressors; • Opens 2CCS-AOV118. • Verifies at least 1 air compressor is running. Verifies at least 1 CCP pump is running unless a CIB has occurred. Align neutron flux monitoring for shutdown: • Verifies SR CHs energized when IR <1E-10. • Transfer 2NME-NR45, nuclear recorder, to operable SR and IR displays.
Event 9 CIB required, auto failed. **<u>Critical Task: CT-3 (E-0.E)</u>** **Crew manually actuates at least the minimum required complement of containment cooling equipment before an Extreme (red path) challenge develops to the Containment CSF.** SAFETY SIGNIFICANCE -- Failure to manually actuate [the minimum required complement of containment cooling equipment][2] under the postulated conditions constitutes a "demonstrated inability by the crew to recognize a failure/incorrect auto actuation of an ESF system or component."	Both trains of CIB failed to automatically actuate, required manual actuation. Additionally, 2QSS*P21B auto start failed and CREV's auto actuation failed, required manual start/alignment.	Check CIB and CNMT spray status: • CNMT pressure – has remained <11 PSIG. If not – Actuate CIB if required by: • Manually initiating CIB – BOTH SWITCHES FOR BOTH TRAINS. • Manually align equipment as required. • Verify all RCPs – STOPPED. • BV-1 operator verifies CREVS actuation. • Service water flow established to RSS HX(s).

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – (continued)		Verify service water system in service: • SWS pumps - TWO RUNNING. • Check SWS header pressure – >55 psig. • SWS pump seal water pressure – NOT LOW. Verify ESF equipment status: • Verify SI status by checking all RED SIS marks – LIT. • Verify CIA by checking all ORANGE CIA marks – LIT. • Verify FWI by checking all GREEN FWI marks – LIT.
<u>Critical Task CT-11 (E-0.O)</u> – Crew closes Cnmt isolation valves such that at least one valve is closed on each critical phase A penetration before the end of the scenario SAFETY SIGNIFICANCE -- Closing at least one containment isolation valve on each critical Phase A penetration, under these conditions and when it is possible to do so, constitutes a task that "is essential to safety," because "its improper performance or omission by an operator will result in direct adverse consequences or significant degradation in the mitigative capability of the plant." In particular, the crew has failed to prevent "degradation of any barrier to fission product release." In this case, the containment barrier is needlessly left in a degraded condition.	CIA Train B failed to automatically actuate, required manual actuation. CIA Train A valve, 2CHS*MOV378 failed to automatically close, manually CLOSED SAT.	Verify source range channels energized with audible indication functioning properly, adjusts multiplier switch and volume as necessary.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – COMPLETE	Discrepancies: CIA, CIB actuation failures. 2QSS*P21B auto start failure. CREV's auto actuation failure. 2CHS*MOV378 auto close failure.	Upon completion, report any discrepancies to SRO.

Form 3.3-1 Scenario Outline

Facility: **BVPS Unit 2** Source: **NEW** Scenario No. 4 Op Test No.: 2LOT22 NRC
Examiners: _____ Candidates: _____ SRO
_____ _____ ATC
_____ _____ BOP

Initial Conditions: **IC 149 (18)**: 100% power, MOL, Equ. XE Conditions, CB "D" @ 226 steps, RCS boron - 1040 ppm.

Turnover: Maintain 100% power.
2RCS*PCV456 isolated due to seat leakage, block valve closed. TS 3.4.11, Condition A
2FWE-P23B Out of service, TS 3.7.5, Condition B

Critical Tasks:
1. CT-18 (E-3.A) Isolate Ruptured SG before ECA-3.1 entry
2. CT-19 (E-3.B) Establish/maintain RCS temperature before Red or Orange path exit.
3. CT-35 (ECA-3.3.A) Terminate Safety Injection prior to completion of SI Flow Verification step of ECA-3.3.

Event No.	Malf. No.	Event Type	Event Description
1	XMT-MSS021A	(C,A) BOP (C,A,TS) SRO	2MSS-PT446 fails LOW
2	XMT-RCS031A	(I,A,MC) ATC (I,A,TS) SRO	2RCS*PT445 fails high, PORV's 455D & 456 open, ATC required to manually close PORV, 2RCS*PCV455D.
3	N/A	(R) ATC (N) BOP, SRO	Management directed Emergency S/D at 2%/min, IAW AOP 2.51.1.
4	RCS04B	(M) - ALL	"B" SG - 375 gpm tube rupture, requires Manual Rx trip
5	XB1i021T	(C) ATC, SRO	BB-B Rx trip switch fails – requires use of BB-A trip sw.
6	VLV-SGB008A-16A	(C,MC) BOP (C) SRO	SG BD isolation failure, requires manual valve closure.
7	VLV-MSS013	(C) BOP, SRO	Steam dump, 2MSS-PCV106A fails open following cooldown during E-3. Crew required to isolate steam lines & control RCS temperature via atmospheric steam dumps.
8	VLV-RCS030 VLV-RCS031	(C) ATC, SRO	PRZR spray valves and remaining PORV fail to open during depressurization in E-3, will require transition to ECA-3.3.
9			
10			

(N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor, (TS)Tech Spec, (MC)Manual Control, (A)bnormal

E-0 → E-3 → ECA-3.3

Form 3.3-1 Scenario Outline
2L22N4

After taking the shift at 100% power, MOL, The non-selected Turbine First Stage pressure transmitter, 2MSS-PT446 will fail low. IAW the instrument failure procedure, the crew will take action to transfer the condenser steam dump control to “Steam Pressure” mode. The SRO will address Tech Specs for the failed channel.

Pressurizer pressure transmitter 2RCS*PT445 then fails high in automatic, 2 PORVs open, 2RCS*PCV455D and 2RCS*PCV456 (456 previously isolated as provided on turnover). 2RCS*PCV455D requires manual closure, IAW the IOA’s of AOP 2.4.1, Part B, the ATC will manually close 2RCS*PCV455D and verify 2RCS*PCV456 is isolated. The SRO will enter AOP 2.4.1 and then transition to 2OM-6.4.IF, Attachment 2 and determine applicable Tech Spec actions.

After the crew has stabilized the plant and the SRO has determined applicable Tech Spec actions, Operations Management will direct the crew to perform a plant shutdown at 2% / minute IAW AOP 2.51.1, Unplanned Power Reduction.

After Rx power has reduced ~10%, a 375 gpm SGTR will then occur on the “B” SG. The crew will identify degrading plant conditions, the SRO will direct the ATC to manually trip the Rx. When the ATC attempts to trip the Rx from BB-B, the Trip switch will fail, the ATC will then trip the Rx using BB-A trip switch. The crew will enter E-0 diagnose a SGTR and transition to E-3.

While the crew is isolating the “B” SG, the BOP will identify that the SG Blowdown valve will not close and procedurally close the backup CNMT isolation valve. Following the cooldown to target temperature, Condenser Steam Dump valve, 2MSS-PCV106A will fail open, the crew will identify the failure and isolate the mainsteam lines and stabilize temperature using the “A” and “C” SG atmospheric steam dump valves.

When the crew attempts to depressurize the RCS, the spray valves will not function, nor will the PRZR PORV’s, 456 was previously isolated on turnover – block valve will not open, 455D CS was placed in "CLOSE" per event 2, valve will not open. 455C will fail to open via control switch, crew will then transition to ECA-3.3.

The scenario is terminated when the crew establishes a normal charging flow path in ECA-3.3.

Expected procedure flow path is E-0 → E-3 → ECA-3.3.

INITIAL CONDITIONS: IC-149 (18) 100 % Power, MOL, Bank D @ 226 steps, Equilibrium XE, 1040 PPM Boron,

ADDITIONAL LINEUP CHANGES	**STICKERS**	**MONITOR SETUP**
2RCS*MOV536 closed with power maintained	YCT on CS	High power splash
2FWE*P23B in PTL	YCT on CS	
EQUIPMENT STATUS	**DATE/TIME OOS**	**TECHNICAL SPECIFICATION(S)**
2RCS*PCV456 isolated	Yesterday / 1200	3.4.11, Condition A
2FWE*P23B on clearance	8 hours ago	3.7.5, Condition B

SHIFT TURNOVER INFORMATION

1. Maintain 100% power.
2. 2RCS*PCV456 isolated due to seat leakage, block valve closed. TS 3.4.11, Condition A
3. 2FWE*P23B Out of service, TS 3.7.5, Condition B

SCENARIO SUPPORT MATERIAL REQUIRED

1. Reactivity plan – provide MOL Rapid Power Reduction reactivity plan.
2.

PROCEDURES NEEDED

E-0
E-3
ECA-3.3
Attachment A-0.11
AOP 2.4.1
AOP 2.6.4
AOP 2.51.1
6 IF, Attach 2
24 IF, Attach 5

Insert preloads per the simulator preload section of the schedule file for this scenario:

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 1:		
1st Stage Pressure Transmitter, 2MSS-PT446 fails low. **IMF XMT-MSS021A to 0 in 10**	2MSS-PT446 failed low (Non controlling Ch) A6-12G, AMSAC Trouble SRO enters 2OM-24.4.IF, "Instrument Failure Procedure" Attachment 5.	Crew identifies 2MSS-PT446 has failed low. SRO enters 2OM-24.4.IF, Attach 5 BOP verifies Steam Dump Control Mode Selector Switch is in TAVG mode. BOP places Steam Dumps in Stm Pressure Mode; • Places 2MSS-PK464, stm press controller, in MAN with 'zero' percent output signal. • Verify or adjust the setpoint for 2MSS-PK464 to the equivalent value for 1005 psig. • Places the Train A and Train B Steam Dump Control Bypass Interlock Selector Switches to OFF/RESET/INTLK. • Place the Steam Dump Control Mode Selector Switch in STM PRESS. • Place 2MSS-PK464, In AUTO. • ATC checks 2RCS-TI408, Stm Dump Demand, is indicating 0% (BB-B) • Places the Train A and Train B Steam Dump Control Bypass Interlock Selector SW's to ON. • Check all steam dump valves remain closed.
NOTE: It is not the intent of the scenario to allow the crew to re-arm AMSAC, after the crew has placed the Condenser steam dumps in Steam Pressure Mode, next event can be entered at the Lead Evaluator discretion.		SRO references Tech Specs. 3.3.1 Condition P for P-13, Verify interlock in required state for existing conditions within 1 hour.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 2:		
2RCS*PT445 fails high, 2 PORV's open, **IMF XMT-RCS031A to 2500**	2 PORV's initially open, 456 previously isolated, PORV 455D will close manually when CS is taken to close. RCS pressure recovers after 455D closed. SRO enters AOP 2.4.1, Part B then transitions to Instrument Failure procedure, 2OM-6.4.IF, attachment 2.	ATC reports multiple unexpected pressurizer alarms. ATC identifies 2RCS*PT445 has failed high and that 2 PORV's have opened. ATC reports that PORV, 2RCS*PCV455D failed to automatically close on low pressure. IAW AOP 2.4.1, Part B, IOA's; ATC responds to 2RCS*PT445 failure by; • Placing CS for 2RCS*PCV455D to close, and verifying 2RCS*MOV536 was previously closed. • If necessary, places Master Pressure control in Manual and adjusts demand to < 40%. • Checks pressure trending to 2235 psig. SRO provides a control band and Rx trip criteria of 2100 psig low/2340 psig high for manual press control. After ATC stabilizes PRZR pressure, places Master pressure controller back in AUTO. SRO transitions to 2OM-6.4.IF, Attachment 2, ATC verifies CS's for PORV 455D / 456 in CLOSE.
	SRO evaluates Technical Specifications: SRO recognizes TS applicability for a 2nd inoperable PORV.	3.4.1 (RCS DNB Parameters, RCS press < 2218 psia) Condition A: restore RCS pressure within 2 hours. 3.4.11 (Pressurizer Power Operated Relief Valves) Condition A, Close and maintain power to associated block valve within 1 hour.

ROLE PLAY:
After the crew has stabilized the plant and the SRO has determined applicable Tech Specs, at Lead Evaluator request, as Shift Manager, inform the crew that due to the current combination of failures, Operations Management has directed the crew to take the plant offline at 2**%**/minute IAW AOP 2.51.1, Unplanned Power Reduction.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 3: Unplanned Power Reduction IAW AOP 2.51.1.	SRO enters AOP 2.51.1, Unplanned Power Reduction.	SRO directs ATC and BOP to reduce power to take the plant offline IAW AOP 2.51.1. BOP initiates turbine load reduction: • Depress 1st STG IN pushbutton. • Set EHC SETTER to desired load. • Set LOAD RATE thumbwheel to 2%. • Depress GO. ATC initiates boration IAW Attachment 1; (2% per minute power reduction). • Places boric acid makeup blender control switch to STOP. • Places mode selector switch to BORATE. • Sets 2CHS*FCV113A to flow rate desired. • Sets 2CHS-FQIS113, BA totalizer, to total volume of BA to be added per reactivity plan. • Resets 2CHS*FQIS113 • Ensures 2CHS*FQIS168 is set to “zero”, then depresses reset. • Places boric acid makeup blender control switch to START, then verifies inservice BA pump starts, 2CHS*FCV113B opens and boric acid flow is indicated on 2CHS-FR113. • Adjusts 2CHS*FCV113A setpoint as desired to control boration flowrate. BOP maintains power factor within limits.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 3: (continued)		Crew sounds the standby alarms and announces a Unit 2 rapid power reduction. ATC places all PRZR heaters to ON.
NOTE: Event 4 will automatically initiate when reactor power is reduced to <90% (approx. 10% power reduction).		ATC verifies rod control in AUTO and maintaining Tavg within ± 5F of Tref. BOP references and prepares to perform Attachment 4 to transfer busses to the offsite sources.
EVENT 4: 375 gpm SGTR on "B" SG **IMF RCS03B 375**	PRZR level and pressure decreases. "B" SG lvl increases with reduction of feedflow. A4-1E, PRZR Control Low press deviation. followed by; A4-1D, PRZR Control press low. A4-1C, PRZR Control low level deviation.	ATC reports degrading primary plant conditions. BOP reports "B" SG level increasing SRO directs ATC to manually trip the reactor and initiate Safety Injection.
EVENTS 5,6, 7, & 8: (all preloaded to occur on/after the reactor trip)	BB-B Rx Trip switch failure. SG Blowdown isolation failure. Condenser Steam dump fails open after use. PRZR spray valves and PORV's fail to open.	ATC attempts to trip the Rx from BB-B, recognizes switch failure and manually trips the Rx from BB-A.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5, 6, 7, & 8: (continued)	SRO enters E-0, Reactor Trip or Safety Injection	SRO directs the crew to perform IOA's for E-0. ATC verifies Reactor trip: • Rx trip and bypass breakers open. • Power range indication is < 5%. • Neutron flux is dropping. BOP verifies Turbine trip: • Throttle OR Governor valves ALL closed. • Main Generator output brks – open. • Exciter Circuit breaker – open.
	AE and DF Busses are energized from offsite.	BOP verifies Power to AC Emergency Busses: • Using VB-C voltmeters or IPC, verifies AE and DF busses have voltage indicated. BOP identifies that both emergency busses are energized from offsite power.
NOTE: Automatic SI may not be actuated at this point, but RCS pressure will be dropping and automatic SI will be imminent, crew may manually initiate SI at this step.	SI automatically actuated due to the SGTR.	Check SI Status. ATC checks if SI is required: • ATC verifies CNMT press < 5psig. • ATC verifies PRZR press is not > 1860 psig. • ATC/BOP verifies Steamline press > 500 psig. Crew determines SI is required; ATC manually actuates SI by actuating both trains' control switchs. ATC/BOP, sounds standby alarm, announces Unit 2 reactor trip and safety injection.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5, 6, 7, & 8: (continued)		Check if SI flow should be reduced: • Crew verifies CNMT radiation, Pressure and Sump level are not consistent to PRE-EVENT. SRO determines SI flow should not be secured. ATC verifies SI system status: • Charging pumps running – 2 running. • 2SIS*P21A & 2SIS*P21B running. • HHSI Flow indicated on 2SIS-FI943. BOP verifies AFW status: • "B" motor-driven pump running. • Turb driven pump, all stm supply SOV's open. • AFW throttle valves all FULL OPEN. • Total AFW flow is >340 gpm.
NOTE: Evaluation of BOP performing Attachment A-0.11 begins on page 18.	List of Attachment A-0.11 discrepancies: none.	BOP performs Attachment A-0.11.
NOTES: Crew may monitor C/D rate after AFW flow is reduced prior to isolating main steamlines.	RCS temperature <547°F and dropping due to Safety Injection flow.	ATC checks RCS Tavg stable at or trending to 547°F: • ATC verifies no steam release is occurring. (Condenser steam dumps closed) • ATC verifies reheat steam is isolated. • ATC reduces total feedflow to minimize C/D.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE

EVENTS 5, 6, 7, & 8: (continued)

ATC verifies PRZR isolated

- PORVs – CLOSED
- Spray Valves – CLOSED
- Safety relief valves – CLOSED (use PSMS)
- Power to at least one block valve – AVAILABLE (all)
- Block valves – AT LEAST ONE OPEN (2)

ATC checks if RCPs should be stopped:

- D/P between RCS pressure and highest SG pressure – <205 PSID.
- Criteria for stopping is not met – all RCPs to remain in service.

ATC/BOP checks if any SGs are faulted:

- Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER

OR

- ANY SG COMPLETELY DEPRESSURIZED

Crew determines no SG's are faulted.

Crew checks if SG tubes are intact:

- Check all SG levels – NONE RISING IN AN UNCONTROLLED MANNER.
- Check Secondary Radiation – CONSISTENT WITH PRE-EVENT VALUES.

Crew determines "B" SG level is rising in an uncontrolled manner and verifies HHSI valves, 2SIS*MOV867A,B,C,D all open & transition to E-3 is appropriate.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5, 6, 7, & 8: (continued)	SRO transitions to E-3, Steam Generator Tube Rupture.	SRO directs STA to commence control room ventilation actions. Refer to Attachment A-2.5. ATC checks if RCPs should be stopped: • D/P between RCS pressure and highest SG pressure – <205 PSID. Crew determines criteria for stopping RCPs is not met.
NOTE: Crew may have pre-emptively isolated AFW flow to the "B" SG when rupture was identified after NR level >12%.	"B" SG ruptured	Crew notes that "B" SG was previously identified as the ruptured SG based upon unexpected NR level rise. • BOP verifies "B" SG NR level >12%. • SRO directs BOP to isolate feed flow to ruptured SG.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5, 6, 7, & 8: (continued) **Critical Task: CT-18 (E-3.A)** **Crew isolates feed flow into and steam flow from the ruptured SG and directs operator to close isolation valve(s) operated from outside of the control room before a transition to ECA-3.1 occurs.** SAFETY SIGNIFICANCE -- Failure to isolate the ruptured SG causes a loss of differential pressure between the ruptured SG and the intact SGs. Upon a loss of differential pressure, the crew must transition to a contingency procedure that constitutes an incorrect performance that necessitates the crew taking compensating action which complicates the event mitigation strategy. **ROLE PLAY:** 5 minutes after being dispatched to locally isolate 2SVS*28, insert **IRF LOA-MSS010 to 0** then report back that 2SVS*28 has been closed.	**NOTE:** The items underlined in the right column are the components that are required to be verified/manipulated to confirm isolation of a ruptured SG.	ATC/BOP isolates flow from the ruptured SG. BOP verifies "B" SG atmospheric steam dump, 2SVS*PCV101B, closed and raises setpoint to 100%. SRO dispatches operator to locally close 2SVS*28. BOP verifies residual heat removal valve – CLOSED. Isolate ruptured SG to turbine driven AFW pump. • BOP reports 1 motor driven AFW pp running. • BOP closes 2MSS*SOV105B and 105E. Verify closed ruptured SG blowdown isolation valve. BOP reports 2BDG*AOV100B1 will not close. BOP CLOSES 2BDG*AOV101B2. Close main steamline drain from ruptured SG. • BOP closes 2SDS*AOV111B1. Close 2SDS*AOV129A, RHR piping drain isolation. • BOP closes 2SDS*AOV129A. Close ruptured SG main steam isol & bypass vlvs. • BOP closes 2MSS*AOV101B. • BOP verifies 2MSS*AOV102B closed. BOP checks ruptured SG pressure – >240 PSIG.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENTS 5, 6, 7, & 8: (continued) **NOTE:** It is not likely that cooldown will be completed at this step, crew will stop the RCS cooldown when criteria is met.	Condenser available .	Crew initiates RCS cooldown: SRO determines required core exit temperature as a function of ruptured SG pressure: SRO directs ATC to block low steamline pressure SI when PRZR pressure <2000 psig. BOP dumps steam to condenser from A & C SGs at maximum rate by: • Checking MSIVs - AT LEAST ONE OPEN. • Checking condenser available. • Placing condenser steam dump controller in MANUAL. • Place steam dumps in STM PRESS Mode • Checks TAVG >541°F by Status light D-11, "2/3 Lo-Lo Tavg" (Panel 622) - LIT • Defeats TAVG interlock until status light A-12, "Stm Dump Defeat Interlock" (Panel 622) – LIT • Gradually raises steam dump rate to maximum rate (~25% demand) • Verifies Core Exit TCs (CETC's) are reducing When CETC's (average of hottest trisector), Less than REQUIRED Core exit temp, BOP stops RCS cooldown and maintains CETC's < REQUIRED TEMPERATURE.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE

EVENT 7:

Condenser steam dump valve, 2MSS-PCV106A fails open following cooldown.
IMF VLV-MSS13
(preloaded)

Critical Task: CT-19 (E-3.B)
Crew establishes/maintains an RCS temperature so that transition from E-3 does not occur because the RCS temperature is in either of the following conditions:

Too high to maintain minimum required subcooling for subsequent RCS depressurization.
OR
Below the RCS temperature that causes a red or orange path challenge to Sub-criticality or Integrity CSF.

SAFETY SIGNIFICANCE -- Failure to establish and maintain the correct RCS temperature during a SGTR leads to a transition from E-3 to a contingency procedure, which constitutes an incorrect performance that necessitates the crew taking compensating action which complicates the event mitigation strategy.

BOP recognizes RCS cooldown has not stopped and that a condenser steam dump valve will not close.

SRO directs BOP to isolate Main Steam lines and stabilize RCS temp using Atmospheric stm dumps.
BOP closes 2MSS*AOV101A and 2MSS*AOV101C.

BOP manually controls 2SVS*PCV101A and 2MSS*PCV101C to stabilize RCS temperature.
May also use, 2SVS*HCV104 if they previously dispatched an operator to isolate it from the "B" SG.

BOP stops RCS cooldown and maintains core exit TCs – LESS THAN REQUIRED TEMPERATURE.

BOP checks intact SG levels:
- "A" & "C" NR levels – >12%.

BOP controls feed flow to maintain narrow range level between 26% and 50%.

ATC checks PRZR PORVs and block valves:
- Power to block valves –All AVAILABLE.
- PORVs – ALL CLOSED.
- Block valves – AT LEAST ONE OPEN. (two)

ATC resets SI, CIA and CIB.
If not previously completed, crew verifies C/D completed and maintains core exit TCs – < target temp

BOP verifies ruptured "B" SG Pressure- STABLE OR RISING.

ATC verifies RCS subcooling based on core exit TCs - >61F.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 8:		
PRZR PORVs and spray valves fail to open preventing depressurization. **IMF VLV-RCS030** **IMF VLV-RCS031** **IMF CNH-RCS02A (2 120) 0** **IMF CNH-RCS03A (2 120) 0** (commands pre-loaded)		ATC depressurizes RCS to minimize break flow and refill PRZR. • Checks RCPs 21A & 21C, BOTH RUNNING. • Attempts to open both PRZR spray valves. • Attempts to open one PRZR PORV. ATC reports failure with valves, no valves will open. Checks depressurization method – IS NOT EFFECTIVELY REDUCING RCS PRESSURE. ATC recognizes and informs SRO that the depressurization method is not effectively reducing RCS Pressure. SRO directs ATC to close PRZR spray valves.
	SRO enters ECA-3.3	BOP checks "B" SG NR level less than 92%.
	Step skipped if "B" NR level was > 92%	ATC confirms 21C RCP running and normal spray did not result in pressure reduction therefore normal spray is not available.
	Step skipped if "B" NR level was > 92%	ATC attempts to open remaining PORV's/ Block valves – none will result in pressure reduction. SRO continues with procedure.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 8: (continued)	Step skipped if "B" NR level was > 92%	BOP checks intact SG levels • "A" & "C" NR levels - > 12% BOP controls feed flow to maintain narrow range level between 26% and 50%.
	Step skipped if "B" NR level was > 92%	ATC verifies PRZR level > 17%. Crew checks if SI can be terminated. ATC verifies RCS Subcooling is greater than 41°F based on CETC's BOP confirms secondary heat sink available by >340 gpm of feed flow available OR NR level in "A" or "C" SG > 12%. ATC confirms RVLIS Dynamic head range is > 85%. Crew determines "B" SG NR level is rising in an uncontrolled manner or is offscale high. SRO directs ATC to stop 1 charging pump.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
EVENT 8: (continued)		
<u>Critical Task: CT-35 (ECA-3.3.A)</u> **Crew terminates SI when ECA-3.3 termination criteria are met and prior to completion of "SI Flow Verification" step of ECA-3.3.** SAFETY SIGNIFICANCE -- Failure to terminate SI during a SGTR (when the termination criteria are met) needlessly complicates the mitigation strategy. It also constitutes a "significant reduction of safety margin beyond that irreparably introduced by the scenario."	Indicated SIS flow decreases to zero.	SRO directs ATC to isolate HHSI flow. ATC closes 2SIS*MOV867A, B, C, D

At Lead Evaluators discretion, terminate scenario when the crew has terminated SI flow IAW ECA-3.3.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 'Verification of Automatic Actions' performed as time & manpower permit.		BOP performs **Attachment A-0.11,** 'Verification of Automatic Actions' as follows: Verifies power to both AC emergency busses. Checks both EDGs running with SWS valve alignment and ventilation in service. Verify both CNMT hydrogen analyzers running: 2HCS*SOV100A1, B1 – CNMT sample amber lights – LIT. Checks 2HVS*FN204A or 2HVS*FN204B running.
	Ensure Reheat Steam Isolation.	Ensure reheat steam isolation: • Verify 2MSS-MOV100A and B – closed. • Reset reheater controller. • Verify 2GSS-MOV204, spillover vlv, closed.
		Check if main steamline isolation required: • CNMT pressure – > 7 PSIG -OR- • Steamline pressure – < 500 PSIG -OR- • Steamline pressure high rate of change – 100 PSIG DROP IN 50 SECONDS.
		If steamline isolation is required, verifies SLI by checking all YELLOW SLI marks – LIT. If steamline isolation is not required continues on.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – (continued) **NOTE:** BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors.		Establish domestic water system cooling to station air compressors; • Opens 2CCS-AOV118. • Verifies at least 1 air compressor is running.
CIB has not occurred.		Verifies at least 1 CCP pump is running unless a CIB has occurred. Align neutron flux monitoring for shutdown: • Verifies SR CHs energized when IR <1E-10. • Transfer 2NME-NR45, nuclear recorder, to operable SR and IR displays.
CIB has not occurred.		Check CIB and CNMT spray status: • CNMT pressure – has remained <11 PSIG. If not – Actuate CIB if required by: • Manually initiating CIB – BOTH SWITCHES FOR BOTH TRAINS. • Manually align equipment as required. • Verify all RCPs – STOPPED. • BV-1 operator verifies CREVS actuation. • Service water flow established to RSS HX(s). Verify service water system in service: • SWS pumps - TWO RUNNING. • Check SWS header pressure – >55 psig. • SWS pump seal water pressure – NOT LOW.

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
Attachment A-0.11 – (continued)		Verify ESF equipment status: • Verify SI status by checking all RED SIS marks – LIT. • Verify CIA by checking all ORANGE CIA marks – LIT. • Verify FWI by checking all GREEN FWI marks – LIT. Verify source range channels energized with audible indication functioning properly, adjusts multiplier switch and volume as necessary.
Attachment A-0.11 – COMPLETE	Discrepancies: none	Upon completion, report any discrepancies to SRO.