

Note: Correction for the ADAMS record.

This file was added to ADAMS after a self-assessment determined that the pages for the final scenario guides were mis-ordered when they were entered into ADAMS.

Below are the final scenario guide pages in their proper order for Scenarios 1, 2, and 3.

Appendix D

Scenario Outline

Facility: BVPS Unit 2	Scenario No. 1	Op Test No.: <u>2LOT19 NRC</u>
Examiners: _____	Candidates: _____	SRO
_____	_____	ATC
_____	_____	BOP

Initial Conditions: **IC 173 (17):** 75% power, MOL, Equ. XE Conditions, CB “D” @ 185 steps, RCS boron - 980 ppm.

Turnover: Maintain 75% power.

Critical Tasks:

- 1. CT-13 (E-0.Q) Manually trip the turbine.**
- 2. CT-43 (FR-H.1.A) Establish Feedwater flow into at least one SG.**

Event No.	Malf. No.	Event Type	Event Description
1	CNH-PCS09B	(C,A) ATC, SRO	2RCS-LK459F demand drifts to 0% in automatic, reducing charging flow, requires manual PRZR level control.
2	XMT-MSS055A	(C,A) BOP, SRO (TS) SRO	21C steam generator Feed flow transmitter 2FWS*FT496 drifts low.
3	FLX-LDS04	(C,A) ATC, SRO (TS) SRO	25 gpm RCS letdown line leak. (isolable)
4	N/A	(R) ATC (N) BOP, SRO	Management directed Emergency S/D at 2%/min, IAW AOP 2.51.1
5	RCS02B	(M) ALL	520 gpm LOCA on RCS loop B cold leg requiring a reactor trip and safety injection.
6	EHC08A	(C) BOP, SRO	Automatic turbine trip failure, manual trip successful.
7	PMP-AFW001, 2, LOA-AFW022	(M) ALL	Terry turbine and 23A motor driven AFW pumps trip on start. 23B motor driven AFW pump shaft sheared. Crew enters FR-H.1 to restore feedwater via a main feed pump.
8	CNH-PCS10B VLV-RCS034A	(C) ATC, SRO	After re-entry into E-0, MPC fails high, PORV 455C opens and sticks, requires manual closure of block valve and spray valves.
9	PMP-MSC011	(C) BOP, SRO	EDG 2-1 ventilation fan fails to auto start on SI/EDG start.

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

E-0 → FR-H.1 → E-0 → E-1

After taking the shift at 75% power, MOL, the pressurizer master level controller will fail to zero. The crew will diagnose the indications and IAW AOP 2.4.1 part C, the ATC will manually control PRZR level.

The “C” SG feed flow transmitter, 2FWS*FT496, will then drift low. IAW AOP 2.4.1 part A, the BOP will take manual control of feedwater flow and stabilize the plant. The SRO will enter the instrument failure procedure, 2OM-24.4.IF, Attachment 2 and direct the crew to place the alternate channel in service. SRO will address applicable Tech Spec.

A 25 gpm leak will develop on the letdown line outside of CNMT in “A” penetrations area. First indication will be an ALERT on the SLCRS ventilation rad monitor. The crew will then recognize VCT level is decreasing and enter AOP 2.6.7, “Excessive Primary Plant Leakage”, when the ATC isolates letdown, the leak will be isolated. The crew determines that the leak has been isolated and begins efforts to place excess letdown in service.

After the crew has determined that the leak is isolated, Management will direct the crew to S/D at 2%/minute IAW AOP 2.51.1.

After the Reactor power has been lowered to <68%, a 520 gpm LOCA will occur on the “B” loop cold leg. The crew will identify degrading plant parameters and the SRO will direct a pre-emptive reactor trip and enter E-0. The turbine will fail to automatically trip due to the reactor trip, the BOP will manually trip the turbine.

When “Verifying AFW Status” in E-0, the crew will identify that all auxiliary feedwater pumps have failed, the SRO will transition to FR-H.1. IAW FR-H.1 direction the crew will restore feedwater flow by starting a main feedwater pump. After feed flow is verified, the SRO will return to E-0.

After the crew returns to E-0, the Master Pressure controller will fail high causing PORV 455C and the PRZR spray valves to open. The ATC will identify the failure, unsuccessfully attempt to close the PORV and close the motor operated block valve then close both spray valves.

After returning to 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 exits E-1.

Expected procedure flow path is E-0 → FR-H.1 → E-0 → E-1

BEAVER VALLEY POWER STATION

INITIAL CONDITIONS: (IC-173) 75% Power, MOL, Bank D @ 185 steps, Equilibrium XE, 980 PPM Boron,

<u>ADDITIONAL LINEUP CHANGES</u>	<u>STICKERS</u>	<u>MONITOR SETUP</u>
		High power splash
<u>EQUIPMENT STATUS</u>	<u>DATE/TIME OOS</u>	<u>TECHNICAL SPECIFICATION(S)</u>

SHIFT TURNOVER INFORMATION

1. Maintain 75% power.
- 2.
- 3.

SCENARIO SUPPORT MATERIAL REQUIRED

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

PROCEDURES NEEDED

E-0
E-1
FR-H.1
Attachment A-0.6
Attachment A-0.11
Attachment A-1.8
AOP 2.4.1
AOP 2.6.7
AOP 2.51.1
24 IF, Attachment 1
24 IF, Attachment 2

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

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 1:

Pressurizer level controller,
2RCS*LK459F, drifts to 0% in
automatic.

IMF CNH-PCS09B (0 0) 0 60

Insert next malfunction at LE
discretion.

VCT level rises
Charging flow reduces to minimum.

A4-1C, PRZR Control Lvl Dev High/Low,
2RCS*LI459A, 460 and 461 all indicate a
downscale trend.

ATC reports unexpected PRZR level deviation alarm.
ATC identifies 2RCS*LK459F is failing low.
IAW AOP 2.41 part C, ATC places 2RCS*LK459F in
Manual and controls PRZR level
If necessary ATC places 2CHS*FCV122 in manual
and restores PRZR level.

SRO enters AOP 2.4.1, Process Control Failure.
SRO provides a control band and Rx trip criteria of
5% low/90% high for manual PRZR level control.

BOP refers to ARP.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 2:

"C" SG Feed flow channel
2FWS-FT496 drifts low.

IMF XMT-CFW055A (0 0) 0 120

NOTE:

Both ARPs direct manual MFRV control (2FWS-FCV498) and IF procedure implementation.

NOTE: IAW the IF procedure, the crew will place the alternate CH in service within 24 hours or request a BCO be written.

NOTE: There is no applicable TS for the Feedwater flow channel itself, however, when the alternate steam flow channel is placed in service, TS is now applicable to level ch, 2FWS-LT496.

NOTE: TS is not applicable until the crew places alternate channel in service in the process racks. If the crew delays in sending an operator to perform this action, the TS evaluation may need to be performed as a followup.

NOTE:

For purposes of scenario progression, time compression is used for Operator response during event 2

Controlling feed flow channel for 21C steam generator level control drifts low, main feed regulating valve opens in response. Actual feed flow and level rise.

A6-11F, Loop C feed flow > steam flow (valid for actual flow parameters).

SRO transitions to the Feedwater Instrument Failure procedure, 2OM-24.4.IF, Attachment 2, section G.

BOP acknowledges and reports alarms, diagnoses feed flow channel failure, IAW AOP 2.4.1 part A, establishes manual control of "C" MFRV to stabilize 21C SG level.

SRO establishes a control band of 44% ±5%, and Rx trip criteria of 25% low and 85% high for manual SG level control.

ATC reviews ARPs.

BOP places 2FWS-FR498, 21C SG Feedwater Flow Signal Selector, in Position FT 497, CH 3. (BB-C)

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 2: (continued)

ROLE PLAY OPERATIONS

After 1 minute, contact control room and report as an operator that you are ready to place 2FWS-FR498, 21C SG Steam Flow Signal Selector, in position F494.

IOR XC1I088F (0 0) 0

Annunciator A1-4E, Main Steam Flow CH
Selected Trouble alarms when CH is selected.

SRO references Tech. Specs for 2FWS-LT496.

NOTE: After the SRO determines which bi-stables are to be tripped, Insert next event at LE discretion.

Crew dispatches an operator to place 2FWS-FR498, 21C SG Steam Flow Signal Selector, in position F494. (primary process rack RK-2PRI-PROC-8, Control Bldg, 707')

SRO declares 2FWS-LT496 INOPERABLE.

BOP returns 2FWS*FCV498, 21C SG Main Feedwater Reg Vlv, to AUTO.

Tech Spec 3.3.1, function 14, Lo-Lo lvl Rx trip, Condition E, trip B/S w/in 72 hrs.
Tech Spec 3.3.2, function 5b, Hi-Hi lvl Turb trip, Condition D, trip B/S w/in 72 hrs.
Tech Spec 3.3.2, function 6b, SG Lo-Lo AFW start, Condition D, trip B/S w/in 72 hrs.

SRO identifies from Attachment 1 of 24IF procedure that bi-stables that require tripping for this failure are the Lo-Lo Level Rx Trip and the Hi-Hi Level Turbine Trip & FW Isolation bi-stables.

SRO contacts I&C to trip applicable bi-stables.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 3:

25 gpm letdown line leak outside
CNMT (isolable, downstream of
2CHS*AOV204 in "A" penetrations)

IMF FLX-LDS04 (0 0) 25

A4-5A, Rad Monitor trouble.
Alert alarm on SLCRS ventilation Rad monitor,
2RMR-RQ301A (1042) and 2RMR-RQ301B
(2042)

VCT level slowly decreasing

SRO enters 2.6.7, Excessive Primary Plant
Leakage

SRO transitions from AOP 2.6.7, step 2 to step 6

BOP reviews ARPs.
BOP verifies valid Rad monitor indication using ARP.

ATC checks if PRZR level can be maintained by:

- Controlling charging flow to maintain programmed PRZR level
- Verifying PRZR level - STABLE OR RISING

ATC checks if leakage is RCS/CVCS leakage by:

- Checking CNMT, PAB and safeguards conditions are consistent with pre-event.

BOP verifies Primary auxiliary bldg (PAB) radiation levels are not NORMAL.
Crew recognizes that SLCRS ventilation radiation monitor has been verified as having a valid radiation signal and therefore radiation levels are NOT normal.

BOP makes plant announcement, requests all non-essential personnel stand clear of PAB.

BOP requests Rad Pro support to locally identify leak.

Crew determines conditions are NOT consistent with pre-event based upon rising radiation levels in PAB.

Crew verifies RCS temperature is stable.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENT 3:</u> (continued)</p> <p>NOTE: The Master Level Controller failed in Event 1, therefore, MLC or FCV122 would be in MANUAL now.</p> <p>NOTE: Due to dynamic nature of event, a followup question regarding applicable TS may be necessary.</p>		<p>ATC verifies 2CHS*FCV122 is maintaining constant PRZR level in AUTO, if not, ATC places 2CHS*FCV122 in Manual and controls PRZR level using 2CHS*FCV122 and/or 2CHS*HCV186.</p> <p>Crew checks VCT level trend and determines that VCT level is DROPPING at >0.7%/min. and reports to SRO that leakrate is >10 gpm but may be isolable.</p> <p>SRO recognizes TS 3.4.13 Condition A, is applicable for unidentified leakage.</p> <p>ATC quantifies leakage & checks for CVCS leakage:</p> <ul style="list-style-type: none"> • Isolates charging/letdown by closing valves: • 2CHS*AOV200A & B Letdown orifice isol. • 2CHS*LCV460A & B Regen Ht Ex inlet. • 2CHS*FCV122, charging flow control vlv. <p>Crew recognizes auxiliary bldg radiation levels begin reducing with letdown isolated.</p> <ul style="list-style-type: none"> • ATC adjusts RCP seal injection flow to obtain NET RCS input of 10 gpm. • Crew determines PRZR level is rising. • Crew determines that with PRZR level rising, the leak has been isolated. • ATC adjusts RCP seal injection to 6-9 gpm per pump.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENT 3:</u> (continued)</p> <p>ROLE PLAY: When the crew makes preparations to place excess letdown in service, report as Shift Manager, that due to the leak, management has requested that crew shutdown the plant to mode 3 at 2%/minute IAW AOP 2.51.1.</p>		<p>ATC determines VCT level can be maintained >5% with normal makeup.</p> <p>ATC controls 2CHS*FCV122 and 2CHS*HCV186 as necessary to maintain at approximately programmed PRZR level.</p> <p>Crew determines it is NOT desirable to restore charging and letdown to service.</p> <p>SRO directs the crew to place EXCESS letdown in service.</p>
<p><u>EVENT 4:</u></p> <p>Unplanned Power Reduction IAW AOP 2.51.1.</p>	<p>SRO enters AOP 2.51.1, Unplanned Power Reduction.</p>	<p>SRO directs ATC and BOP to reduce power to take the plant offline IAW AOP 2.51.1.</p> <p>BOP initiates turbine load reduction:</p> <ul style="list-style-type: none"> • Depress 1st STG IN pushbutton. • Set EHC SETTER to desired load. • Set LOAD RATE thumbwheel to 2%. • Depress GO.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 4: (continued)

- 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.

Crew sounds the standby alarms and announces a Unit 2 rapid power reduction.

ATC places all PRZR heaters to ON.

ATC verifies rod control in AUTO and maintaining Tavg within $\pm 5F$ of Tref.

BOP references and performs Attachment 4 to transfer busses to the offsite sources.

NOTE: Event 5 will automatically initiate when reactor power is reduced to <68% (approx. 7% power reduction).

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 5:

520 gpm SBLOCA on “B” RCS Loop
TRGSET 4 ‘FNISPR(2)<=68’
IMF RCS02B (4 0) 520 0 ASIS’
 (preloaded)

PRZR level and pressure decreases.
 A2-2B, Unidentified Leakage system trouble.
 A1-2G, Incore Instrument/CNMT sump lvl Hi.
 A4-5C, Rad Mon High - 2RMR-RQ303

ATC reports degrading primary plant conditions.
 SRO directs ATC to manually trip the reactor.
 SRO directs the crew to perform IOA’s for E-0.

EVENTS 6, 7, & 9:

(all preloaded to occur on the Rx trip)

NOTE: Event 8 will be manually
 inserted when the crew returns to E-0
 following restoration of feed water flow

Auto main turbine trip failure.
 Loss of all AFW
 2-1 EDG ventilation fan fails to auto start on
 EDG start.

SRO enters E-0, Reactor Trip or Safety
 Injection.

ATC and BOP commence IOA’s of E-0.

ATC verifies reactor trip:

- A5-6D - LIT.
- Power range indication is < 5%.
- Neutron flux is dropping.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, & 9:</u> (continued)</p> <p><u>Critical Task: CT-13 (E-0.Q)</u> Crew manually trips the main turbine before a Severe (orange path) challenge develops to either the Sub-criticality or the Integrity CSF or before transition to ECA-2.1, whichever occurs first.</p> <p>SAFETY SIGNIFICANCE -- Failure to trip the main turbine under the postulated plant conditions causes challenges to CSFs beyond those irreparably introduced by the postulated conditions. Additionally, such an omission constitutes a demonstrated inability by the crew to "take an action...that would prevent a challenge to plant safety."</p> <p>NOTE: Due to the degrading conditions, the crew may pre-emptively manually actuate SI.</p>	<p>Automatic turbine trip failure.</p> <p>SI automatically actuated</p>	<p>BOP verifies Turbine trip did NOT occur:</p> <ul style="list-style-type: none"> • Throttle OR Governor valves NOT closed. • Main Generator output brks – Not open. • Exciter Circuit breaker – not open. <p>BOP manually trips the turbine, then verifies:</p> <ul style="list-style-type: none"> • Throttle OR Governor valves ALL closed. • Main Generator output brks – open. • Exciter Circuit breaker – open. <p>BOP verifies power to AC emergency busses:</p> <ul style="list-style-type: none"> • Using VB-C voltmeters, verifies both 2AE and 2DF busses have voltage indicated. <p>Check SI status: ATC reports SI automatically actuated and manually actuates SI by turning both trains' control switches.</p> <p>ATC/BOP, sounds standby alarm, announces Unit 2 reactor trip and safety injection.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, & 9: (continued)

Check if HHSI flow should be secured by checking the following:

- CNMT & Secondary radiation
- CNMT pressure & sump level
- SG – pressures and levels
- RCS subcooling
- Secondary heat sink exists
- RCS pressure – stable or rising
- PRZR level – >17%
- SI occurred automatically

Due to CNMT parameters not being consistent with pre-event, crew determines SI is required; SI flow should not be secured at this time.

ATC verifies SI System status:

- 2CHS*P21A & 2CHS*P21B running.
- 2SIS*P21A & 2SIS*P21B running.
- HHSI Flow indicated on 2SIS-FI943.

BOP verifies AFW System status

- Motor-driven AFW Pumps – NONE RUNNING and won't start from CR.
- Turb driven AFW Pump Stm Supply Isol Valves – OPEN but turbine is tripped.
- AFW Throttle Vlvs – FULL OPEN
- Total AFW Flow – < 340 GPM

BOP reports no Aux Feedwater pumps running and no aux feed water flow exists.

SRO recognizes that AFW flow cannot be established and enters FR-H.1, Response to Loss of Secondary Heat Sink.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7 & 9: (continued)

NOTE:

PORV's may lift several times during this transient due to natural circulation being established while Safety Injection flow is occurring.

With WR levels >14%, PORV's opening are not due to loss of heat sink; bleed and feed is not required.

ATC checks if secondary heat sink is required by:

- Verifying RCS press is > any non-faulted SG.
- RCS hot leg temperatures >350°F.

Crew determines a secondary heat sink is required.

Crew checks SG WR levels and determines if RCS bleed and feed should be initiated.

- BOP verifies WR lvl in at least 2 SG's is >14%.

Crew determines bleed and feed is not required at this time and continues to monitor WR level.

BOP checks primary plant demineralized water storage tank, 2WTD-TK210, level is >85 inches.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, & 9: (continued)

ROLE PLAY:

When directed to investigate AFW pump status locally, wait 3 minutes then report as appropriate:
 2FWE*P23A, is not running, nothing obvious at the pump.
 2FWE*P23B, motor is running, pump is not turning.
 2FWE*P22 is not running due to the trip throttle valve linkage rod being broken.
 If dispatched to AE switchgear, wait 2 minutes then report that overcurrent relay 51-VE218 is tripped on ACB 2E18 for 2FWE*P23A.

NOTE: Valves have long stroke time, once valve is dual indication the crew may continue in the procedure.

NOTE: Either main feed pump will start if attempted.

Crew tries to establish AFW flow to at least 1 SG.

ATC verifies SG blowdown and blowdown sample lines are isolated.

Crew confirms

- “A” motor-driven pump has tripped.
- “B” motor-driven pump running with no flow.
- Turbine-driven pump tripped on startup.
- All AFW throttle valves are open.

SRO continues to try to restore AFW flow while continuing in procedure.

BOP confirms AFW flow is not >340 gpm.

Crew dispatches an operator to locally establish AFW flow via Attachment A-1.8.

ATC stops all RCP's.

Try to establish main feedwater flow:

BOP verifies 2 condensate pumps are running.

ATC reports CNMT FWI valves are closed.

SRO directs ATC/BOP to reset SI and FWI signals.

- SI signal – both trains.
- FWI signal – both trains.

ATC opens all feedwater CMNT isol valves, 2FWS*HYV157A, B, C.

BOP starts either main feed pump, 2FWS-P21A or 2FWS-P21B.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, & 9:</u> (continued)</p> <p><u>Critical Task: CT-43 (FR-H.1.A)</u> Crew establishes feedwater flow into at least one SG before RCS feed and bleed is required.</p> <p>SAFETY SIGNIFICANCE -- Failure to establish feedwater flow to any SG results in the crew's having to rely upon the lower priority action of establishing RCS bleed and feed to minimize core uncover. This constitutes incorrect performance that "leads to degradation of any barrier to fission product release."</p>		<p>BOP feeds intact SGs using the feedwater bypass control valves.</p> <p>BOP feeds intact SGs using the feedwater bypass control valves and verifies that either:</p> <ul style="list-style-type: none"> • Core Exit TC's are dropping. OR • SG Wide Range levels are rising. <p>BOP verifies CETC are dropping and WR SG levels are rising.</p>
<p><u>EVENT 8:</u> After return to E-0, enter Event 8. (Master Pressure Controller (MPC) fails high)</p>	<p>SRO returns to E-0, step 10 IAW FR-H-1, step 8.b.</p> <p>Master Pressure Controller (MPC) fails high causing pressurizer spray valves to open and 2RCS*PCV455C to open and stick – block valve can be closed to stop leak.</p>	<p>Feedwater flow now verified.</p>
<p>IMF CNH-PCS10B (0 10) 100 0 ASIS</p>		<p>SRO directs BOP to verify automatic actions by performing Attachment A-0.11 in a timely manner.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, 8, & 9:</u> (continued)</p> <p>NOTE: Evaluation of BOP performing Attachment A-0.11 begins on page 23.</p> <p>NOTE: RCP's should have been tripped previously in FR-H.1 due to loss of heat sink, therefore, ATC needs to check Tcold's VS. Tavg.</p>	<p><u>List of Attachment A-0.11 discrepancies:</u> 2-1 EDG ventilation failed to auto start, 2HVD-FN270A required manual start. Additionally, may note that AFW did not function on SIS actuation and that FWI was reset and CNMT FWI valves have been opened.</p>	<p>BOP performs Attachment A-0.11.</p> <p>ATC checks RCS Tcold stable at or trending to 547F.</p> <p>ATC reports RCS cold leg temperature and cooldown caused by LOCA/ SI flow.</p> <p>Crew stops any steam release, reheat steam is isolated and reduces feedwater flow to minimize cooldown.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, 8, & 9: (continued)

ATC verifies PRZR isolated:

- PORVs – CLOSED

ATC reports PORV, 2RCS*PCV455C, indicates dual indication and won't close.

ATC closes block valve, 2RCS*MOV535, to isolate stuck open PORV.

ATC continues verifying PRZR isolated:

- Spray Valves – BOTH OPEN, require closing.
- Safety relief valves – CLOSED (use PSMS).
- PRT conditions – CONSISTENT WITH EXPECTED VALUES.
- Power to at least one block valve – AVAILABLE (all).
- Block valves – AT LEAST ONE OPEN, (2 are open.)

NOTE:

RCP's were previously S/D in FR-H.1 due to loss of heat sink.

ATC checks if RCPs should be stopped:

- D/P between RCS pressure and highest SG pressure – LESS THAN 205 PSID [220 PSID]

ATC reports all RCPs previously stopped.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<u>EVENTS 6, 7, 8, & 9:</u> (continued)	<p>Hi radiation alarm is in due to containment radiation levels.</p> <p>Incore room and containment radiation monitors in Hi alarm.</p> <p>Containment pressure is rising.</p> <p>Containment sump level is rising.</p>	<p>ATC/BOP checks if any SGs are faulted:</p> <ul style="list-style-type: none"> • Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER OR • ANY SG COMPLETELY DEPRESSURIZED <p>Crew determines no SG's are faulted.</p> <p>Crew checks if SG tubes are intact:</p> <ul style="list-style-type: none"> • Check all SG levels – NONE RISING IN AN UNCONTROLLED MANNER • Check Secondary Radiation – CONSISTENT WITH PRE-EVENT VALUES <p>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.</p> <p>Crew checks if RCS is intact by checking CNMT conditions consistent with pre-event values:</p> <ul style="list-style-type: none"> • CNMT radiation • CNMT pressure • CNMT sump level <p>Crew determines the RCS is not intact, based on CNMT conditions.</p> <p>Crew verifies 2SIS*MOV867A,B,C & D all are open and determines transition to E-1 is appropriate.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, 8, & 9:</u> (continued)</p> <p>ROLE PLAY: When dispatched to energize valves IAW Attachment A-0.6, wait 5 minutes, insert following commands then report complete. IRF LOA-LOV093 (0 0) RACKIN IRF LOA-LOV102 (0 0) RACKIN IRF LOA-LOV094 (0 0) RACKIN IRF LOA-LOV103 (0 0) RACKIN IRF LOA-LOV095 (0 0) RACKIN IRF LOA-LOV104 (0 0) RACKIN IRF LOA-LOV096 (0 0) RACKIN IRF LOA-LOV105 (0 0) RACKIN</p>	<p>SRO transitions to E-1, Loss of Reactor or Secondary Coolant.</p>	<p>ATC checks if CREVS should be actuated:</p> <p>Checks EITHER of the following:</p> <ul style="list-style-type: none"> Control Room radiation monitor, 2RMC*RQ201,202, - NOT IN HIGH ALARM CIB - HAS NOT OCCURRED <p>Crew determines CREVs should not be actuated for given conditions.</p> <p>ATC checks if RCPs should be stopped.</p> <p>ATC reports RCPs were previously stopped.</p> <p>ATC/BOP dispatches an operator to energize valves IAW Attachment A-0.6, "Cold Leg Recirculation Component Verification."</p> <p>ATC checks CIB – NOT ACTUATED.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, 8, & 9: (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 NO SG's are faulted.

BOP checks intact SG levels:

- NR levels – >12%.

Controls feed flow to maintain NR level between 12% and 50%.

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.
- PORVs – CLOSED.
- Block valves – Two open.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, 8, & 9: (continued)

Crew checks if SI Flow should be reduced.

- ATC verifies RCS Subcooling is > 41F 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%.
- ATC confirms RCS pressure stable or rising.
- ATC confirms PRZR level is >17%.

Crew determines that current plant conditions support SI reduction.

NOTE: Due to crew timing and procedure progression, the plant conditions may not support transition to ES-1.1 at this time.

SRO transitions to ES-1.1.

Terminate scenario after the crew evaluates transition to ES-1.1 as appropriate.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 ‘Verification of Automatic Actions’ performed as time & manpower permit.</p>		<p>BOP performs Attachment A-0.11, ‘Verification of Automatic Actions’ as follows:</p>
<p><u>EVENT 9:</u></p>		<p>Checks both EDGs running with SWS valve alignment and ventilation in service.</p>
<p>2HVD*FN270A auto start failure IMF PMP-MSC011 (0 0) 1 (preloaded)</p>		<p>2HVD*FN270A is not running, starts fan by turning CS to OFF then to AUTO or ON.</p>
		<p>Verifies power to both AC emergency busses.</p>
		<p>Checks 2HVS*FN204A or 2HVS*FN204B running.</p>
	<p>Ensure Reheat Steam Isolation.</p>	<p>Ensure reheat steam isolation:</p>
		<ul style="list-style-type: none"> • Verify 2MSS-MOV100A and B – closed. • Reset reheater controller. • Verify 2GSS-MOV204, spillover vlv, closed.
<p>Steamline isolation not required.</p>		<p>Check if main steamline isolation required:</p>
		<ul style="list-style-type: none"> • CNMT pressure – > 7 PSIG
		<p>-OR-</p>
		<ul style="list-style-type: none"> • Steamline pressure – < 500 PSIG
		<p>-OR-</p>
		<ul style="list-style-type: none"> • Steamline pressure high rate of change – 100 PSIG DROP IN 50 SECONDS.
		<p>If steamline isolation is required, verifies SLI by checking all YELLOW SLI marks – LIT.</p>
		<p>If steamline isolation is not required continues on.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 – (continued)</p> <p>NOTE:</p> <p>BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors.</p> <p>CIB has not occurred.</p> <p>CIB has not occurred.</p>		<p>Establish domestic water system cooling to station air compressors;</p> <ul style="list-style-type: none"> • Opens 2CCS-AOV118. • Verifies at least 1 air compressor is running. <p>Verifies at least 1 CCP pump is running unless a CIB has occurred.</p> <p>Align neutron flux monitoring for shutdown:</p> <ul style="list-style-type: none"> • Verifies SR CHs energized when IR <1E-10. • Transfer 2NME-NR45, nuclear recorder, to operable SR and IR displays. <p>Check CIB and CNMT spray status:</p> <ul style="list-style-type: none"> • CNMT pressure – has remained <11 PSIG. <p>If not – Actuate CIB if required by:</p> <ul style="list-style-type: none"> • 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). <p>Verify service water system in service:</p> <ul style="list-style-type: none"> • SWS pumps - TWO RUNNING. • Check SWS header pressure – >55 psig. • SWS pump seal water pressure – NOT LOW. <p>Verify both CNMT hydrogen analyzers running: 2HCS*SOV100A1, B1 – CNMT sample amber lights – LIT.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 – (continued)</p> <p>All ESF equipment operated as required, no discrepancies.</p>	<p>Attachment A-0.11 – COMPLETE</p> <p><u>Discrepancies:</u></p> <ul style="list-style-type: none"> 2-1 EDG ventilation fan, 2HVD*FN270A failed to auto start on EDG start, manual start Satisfactory. 	<p>Verify ESF equipment status:</p> <ul style="list-style-type: none"> 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. <p>Verify source range channels energized with audible indication functioning properly, adjusts multiplier switch and volume as necessary.</p> <p>Upon completion, report any discrepancies to SRO.</p>

Appendix D**Scenario Outline****2L19N2**

Facility: **BVPS Unit 2** Scenario No. 2 Op Test No.: 2LOT19 NRC
 Examiners: _____ Candidates: _____ SRO
 _____ ATC
 _____ BOP

Initial Conditions: **IC-59 (18):** 100% power, MOL, Equ. XE Conditions, CB “D” @ 230 steps, RCS boron - 890 ppm.

Turnover: Maintain 100% power.

Critical Tasks:

- 1. CT-2 (E-0.D) Actuate SIS.**
- 2. CT-12 (E-0.P) Actuate Main steam line isolation.**
- 3. CT-17 (E-2.A) Isolate Faulted SG.**

Event No.	Malf. No.	Event Type	Event Description
1	XMT-LDS003A	(C,A) ATC, SRO	VCT level transmitter, 2CHS-LT115 fails low.
2	NIS07B	(C,A) BOP, SRO (TS) SRO	N-36, Instrument power fuse blows, requires removal from service and compensatory actions.
3	CRF03-F6	(C,A) ALL (TS) SRO	Control Bank D, Rod F06 drops.
4	FLX-CFW33	(M) ALL	C SG feedwater leak inside Containment.
5	VLV-MSS013	(C) BOP, SRO	Condenser steam dump valve 2MSS-PCV106A stuck open, manual main steamline isolation required.
6	PPL05A, PPL05B	(C) ATC, SRO	Automatic safety injection actuation failure.
7	PPL07A	(C) ATC, SRO	Charging/HHSI pump, 2CHS*P21A auto start failure upon SI actuation.
8	CNH-AFW02A	(C) BOP, SRO	2FWE*HCV100B fails to 100%, requires securing AFW pump.
9	PMP-MSC036 PMP-MSC037	(C) BOP, SRO	Leak Collection Filtered Exhaust Fans, 2HVS*FN204A and B, trip on Rx trip, requires manual starting of 2HVS*FN204B.
10			
11			

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

E-0 → E-2 → ES-1.1

After taking the shift at 100% power, MOL, VCT level transmitter, 2CHS-LT115 will fail low causing an auto makeup to occur. The ATC will identify the LT failure and stop the auto makeup IAW AOP 2.4.1 (Process Control Failure), the crew will then respond to the LT failure IAW the Instrument Failure procedure, 2OM-7.4.IF, Attachment 1.

Intermediate Range channel, N-36, instrument power fuse will blow, the crew will enter AOP 2.1.2B, and take the channel out of service, the SRO will evaluate technical specifications.

Bank D control rod, F06 will then drop, the crew will identify the rod drop, IAW AOP 2.1.8 IOA's, the ATC will verify only one rod has dropped. The SRO will direct the BOP to lower turbine load to raise RCS temperature while the SRO reviews applicable technical specifications.

A feedwater leak will occur on the "C" main feedline inside CNMT, the BOP will identify "C" SG feedflow increasing while level is decreasing, the ATC will identify CNMT pressure rising. The SRO will direct the ATC to manually trip the Rx.

While stabilizing the plant in E-0, the crew will identify that a condenser steam dump valve is failed open requiring a manual mainsteam line isolation to be initiated to stop the RCS cooldown.

The crew will identify that SI is required and did not actuate automatically, the ATC will manually initiate safety injection.

The ATC will identify that the "A" HHSI pump failed to auto start on the SI signal and manually start 2CHS*P21A.

The crew will identify the "C" SG as faulted and the SRO will transition to E-2.

The BOP will attempt to pre-emptively isolate feedwater to the "C" SG and identify that the "B" header AFW valve, 2FWE*HCV100B AFW valve is failed open. The SRO will direct the BOP to take compensatory actions IAW EOP attachment A-1.24, step 8.

While the BOP is performing Attachment A-0.11, they will identify that both Leak Collection Filtered Exhaust Fans have tripped and manually starts 2HVS*FN204B.

After completing isolation of the "C" SG IAW E-2, the SRO will transition to ES-1.1.

The scenario will be terminated following SI termination in ES-1.1.

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

BEAVER VALLEY POWER STATION

INITIAL CONDITIONS: IC-59 (18) 100 % Power, MOL, Bank D @ 230 steps, Equilibrium XE, 890 PPM Boron,

<u>ADDITIONAL LINEUP CHANGES</u>	<u>STICKERS</u>	<u>MONITOR SETUP</u>
		100% power splash
<u>EQUIPMENT STATUS</u>	<u>DATE/TIME OOS</u>	<u>TECHNICAL SPECIFICATION(S)</u>

SHIFT TURNOVER INFORMATION

1. Maintain 100% power.
- 2.
- 3.

SCENARIO SUPPORT MATERIAL REQUIRED

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

PROCEDURES NEEDED

E-0
E-2
ES-1.1
AOP 2.1.8
AOP 2.2.1B
AOP 2.4.1
7 IF, Attach 1
Attachment A-0.11
Attachment A-1.24

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

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 1:

2CHS*LT115 fails low.
IMF XMT-LDS003A

IMMEDIATE PLANT RESPONSE:

Automatic makeup initiates.
2CHS*LI115 VCT level indication decreases
(computer trend for 2CHS*LT112 increases)
A2-2G: VCT Trouble, will annunciate for Low
VCT level.
2CHS*LCV112 goes to full divert to the coolant
recovery tanks.

Crew recognizes 2CHS*LT115 failed low.
Crew confirms actual VCT level is rising.

IAW AOP 2.4.1, ATC recognizes failure and stops the
Automatic makeup.

SRO enters AOP 2.4.1, verifies plant stability and
transitions to CVCS Instrument failure procedure,
2OM-7.4.IF, Attachment 1 to address VCT level
channel failure.

SRO directs ATC to place the VCT Level Control
Selector Switch to the VCT position.
ATC verifies 2CHS*LCV112 and 2CHS*LCV115A
both in the VCT position.

ATC manually initiates VCT makeup as necessary and
maintains VCT level at program range of 20-60%.

Proceed with next event at LE
discretion

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENT 2:</u></p> <p>NIS07B: N36 Intermediate Range instrument fuse blows IMF NIS07B (0 0) 0</p> <p>NOTE: May have already blocked IR train A & B.</p>	<p>A4-4E: NIS Compensator Comparator Trouble</p> <p>SRO enters AOP 2.2.1B, Intermediate Range Channel Malfunction.</p> <p>SRO evaluates Technical Specifications</p>	<p>ATC performs:</p> <ul style="list-style-type: none"> • Check reactor power – > P-10 • Momentarily Place Intermediate Range Block Train A and Train B switches to INTERRANGE 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 <p>TS 3.3.3, Condition A, Restore required channel to OPERABLE status within 30 days. TS 3.3.1, Condition F (1 or 2) INFO ONLY</p> <p>BOP removes failed channel from service:</p> <ul style="list-style-type: none"> • Places Level Trip switch for N36 to BYPASS. <ul style="list-style-type: none"> ○ Verify Annunciator A4-5E, “NIS Source/Int Range High Flux Trip Bypass” in alarm due to failed channel. ○ Verify status light “Level Trip Bypass” on drawer – LIT.
Continue with next event at LE discretion.		

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 3:

Dropped rod. **IMF CRF03-F6 (2 0) 0**

A4-9F, Rod at Bottom
A4-8G, Rod Position Deviation
A4-4F, NIS Power Range Comparator Deviation
DRPI for rod F06 indicates ZERO steps with rod at bottom light lit

SRO enters AOP 2.1.8, Rod Inoperability, Part A for dropped or misaligned rod.

ATC reports numerous primary alarms related to power and control rods.

ATC recognizes a dropped rod, IAW IOA's of AOP 2.1.8, verifies only one rod dropped.

SRO directs the crew to perform IOA's of AOP 2.1.8 for a dropped rod.

ATC responds to dropped rod:

- reports to crew, a single dropped rod, F06.
- places Control Rods in MANUAL.
- verifies Rx remains critical with Tavg >541F.
- reports Tavg is > 4F of Tref.

SRO directs BOP to adjust turbine load as necessary to maintain Tavg within +/- 4F of Tref.

BOP adjusts turbine load as follows:

- depresses 1st STG IN PB.
- adjusts turbine control to desired load.
- adjusts load reduction rate as desired.
- depresses GO.
- reduces power incrementally until Tavg is +/-4F of Tref.

ATC verifies RCS temperature, Tavg, is stable.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENT 3:</u> continued</p> <p>Continue with next event at LE discretion</p>	<p>SRO reviews Tech Specs.</p>	<p>T.S. 3.1.4.2, Condition B; Within 1 hour, verify SDM within limits OR Initiate boration to restore SDM within 1 hour AND Reduce thermal power to $\leq 75\%$ within 2 hours.</p> <p>T.S. 3.4.1 DNB Condition A; Restore DNB parameters to within limits within 2 hours.</p>
<p><u>EVENT 4:</u></p> <p>“C” SG feedwater leak inside CNMT. IMF FLX-CFW33 (0 0) 7000 0 0</p>	<p>ALARMS: A1-2G, Incore Instr Rm/CNMT Sump Lvl high A2-2B, UIL Trouble FIRST OUT ALARM A5-4C, SG 21C Lvl Lo-lo Rx trip</p>	<p>BOP reports “C” SG feedflow is increasing but actual NR level is decreasing. ATC reports CNMT pressure, sump level and humidity are all rising.</p> <p>SRO directs ATC to trip the reactor.</p>
<p><u>EVENTS 5 - 9:</u> (all preloaded)</p> <p>Condenser stm dump failure Automatic Safety injection failure HHSI pump auto start failure AFW valve failed open Leak collection filtered exhaust fan trip</p>	<p>SRO enters E-0, Reactor Trip or Safety Injection.</p>	<p>ATC and BOP commence IOA’s of E-0.</p> <p>ATC verifies reactor trip:</p> <ul style="list-style-type: none"> • A5-6D - LIT. • Power range indication is $< 5\%$. • Neutron flux is dropping. <p>BOP verifies Turbine trip:</p> <ul style="list-style-type: none"> • Throttle OR Governor valves ALL closed. • Main Generator output brks - open. • Exciter Circuit breaker – open.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, 8 & 9:</u> (continued)</p> <p><u>Critical Task CT-2 (E-0.D)</u> Crew manually actuates at least one train of SIS-actuated safeguards before transition to any ORP.</p> <p>SAFETY SIGNIFICANCE -- Failure to manually actuate SI under the postulated conditions constitutes "misoperation or incorrect crew performance that leads to degraded ECCS capacity."</p>		<p>BOP verifies power to AC emergency busses:</p> <ul style="list-style-type: none"> • Using VB-C voltmeters, verifies both 2AE and 2DF busses have voltage indicated. <p>Check SI Status. ATC checks if SI is required:</p> <ul style="list-style-type: none"> • ATC verifies CNMT press < 5psig. • ATC verifies PRZR press is not > 1860 psig. • ATC/BOP verifies Steamline press > 500 psig. <p>Crew determines SI is required; ATC manually actuates SI by actuating both trains' control switches.</p> <p>ATC/BOP, sounds standby alarm, announces Unit 2 reactor trip and safety injection.</p> <p>Check if HHSI flow should be secured by checking the following:</p> <ul style="list-style-type: none"> • CNMT & Secondary radiation • CNMT pressure & sump level • SG – pressures and levels • RCS subcooling • Secondary heat sink exists • RCS pressure – stable or rising • PRZR level – >17% • SI occurred automatically <p>Due to SG pressures and CNMT parameters not being consistent with pre-event, crew determines SI is required; SI flow should not be secured at this time.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, 8 & 9: (continued)

IMF PPL07A (preloaded

NOTE:

BOP may have pre-emptively isolated AFW flow to the "C" SG.

NOTE:

Evaluation of BOP performing Attachment A-0.11 begins on page 16.

List of Attachment A-0.11 discrepancies:

2CHS*P21A auto start failure.
2HVS*FN204A & B not running.

ATC verifies SI System status:

- 2CHS*P21A & 2CHS*P21B running, identifies only 2CHS*P21B running and manually starts 2CHS*P21A.
- 2SIS*P21A & 2SIS*P21B running.
- HHSI Flow indicated on 2SIS-FI943.

BOP verifies AFW status:

- Both 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.

SRO directs BOP to verify automatic actions by performing Attachment A-0.11 in a timely manner.

BOP performs Attachment A-0.11.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, 8 & 9: (continued)

NOTE:

If the feed break was not diagnosed prior to the trip, steam pressures will begin to diverge following steamline isolation, allowing for diagnosis of the faulted SG.

Critical Task: E-0.P

Crew manually actuates main steam line isolation before a Severe (orange path) challenge develops to either the Sub-criticality or Integrity CSF or before transition to ECA-2.1, whichever occurs first.

SAFETY SIGNIFICANCE – Failure to close the MSIVs under these conditions causes challenges to CSFs beyond those irreparably introduced by these conditions. Additionally, such an omission constitutes a failure by the crew to “demonstrate the ability to recognize a failure or an incorrect automatic actuation of an ESF system or component,” and to “take one or more actions that would prevent a challenge to plant safety.”

NOTE: To solidify this Critical Task, all automatic Main Steam Line Isolation signals have been inhibited, including Intermediate High CNMT pressure.

RCS temperature <547°F and dropping due to safety injection flow and steam break flow.

NOTE:

If the feed break was diagnosed quickly, the BOP may have preemptively performed a MSLI after performing E-0 IOA's.

ATC checks RCS Tav_g stable at or trending to 547F.

ATC reports RCS Tav_g is <547F and dropping.
SRO directs ATC to:

- Stop dumping steam & verify steam dumps closed. ATC reports 2MSS-PCV106A is stuck open and will not close.
- SRO directs ATC to initiate a SLI by depressing 4 of 4 PB.
- Verify 2MSS-MOV100A, B are closed.
- Depress the reheater controller RESET PB.
- Minimize total feedflow while maintaining > 340 gpm until 1 NR level is >31% (adverse).

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 6, 7, 8, & 9: (continued)

NOTE:

RCP trip criteria is not likely to be met at this point in the scenario, if so, RCP's will be tripped at this time.

ATC verifies PRZR isolated:

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

ATC checks if RCPs should be stopped:

- D/P between RCS pressure and highest SG pressure – LESS THAN 205 PSID [220 PSID]

ATC reports RCP trip criteria is not met, all RCPs left in service at this time.

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 there is a faulted SG, verifies HHSI flow is indicated and transition to E-2 is required.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, 8 & 9:</u> (continued)</p> <p>NOTE: Main steamline isolation should have already occurred and verified via attachment A-0.11 by this time, crew not likely to verify again at this time.</p>	SRO transitions to E-2, Faulted Steam Generator Isolation.	<p>Verify CREVS actuated. ATC/BOP reports CREVS not actuated.</p> <p>SRO directs ATC/BOP to actuate both trains of CREVS using the CONTROL ROOM EMERG AIR SUP ACTUATION pushbuttons,</p> <ul style="list-style-type: none"> • Verifies the control room air intake and exhaust dampers are CLOSED. • Verifies 2HVC*FN241A running after time delay. <p>SRO requests a BV-1 operator to verify proper CREVS actuation and place CR air intake and exhaust dampers control switches in CLOSE.</p> <p>SRO directs STA to commence Control Room ventilation actions. Refer to Attachment A-2.4.</p> <p>ATC/BOP verifies steamline isolation has occurred by checking all YELLOW SLI identified components are in the designated position. (previously verified)</p>
	<p>“C” SG pressure is lower than “A” & “B”. “A” & “B” may be slowly lowering as expected due to the cooldown. Crew should respond with “stable” for “A” & “B” SG’s.</p>	<p>Crew checks for any non-faulted SGs:</p> <ul style="list-style-type: none"> • BOP identifies “A” & “B” steam generator pressures are “stable or rising”.
	“C” SG pressure & level lowering.	Crew identifies “C” SG as faulted.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 6, 7, 8 & 9:</u> (continued) <u>Critical Task: CT-17 (E-2.A)</u> Crew isolates the faulted SG & directs operator to close isolation valves operated from outside of the control room before transition out of E-2.</p> <p>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.</p> <p>ROLE PLAYS: When requested to isolate 2SVS-29, wait 10 minutes then insert: IRF LOA-MSS011 (0 0) 0 60 report to the control room that 2SVS-29 is isolated.</p> <p>When requested to de-energize and close 2FWE*HCV100B, wait 10 minutes then insert: IMF VLV-AFW014A (0 0) 0 60 report to the control room actions complete.</p>	<p>NOTE: Crew may have pre-emptively isolated AFW flow to the “C” SG after fault was recognized.</p> <p>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.</p>	<p>BOP isolates the faulted, “C” SG as follows:</p> <ul style="list-style-type: none"> • <u>Verifies FWI.</u> (previously verified) • <u>Closes AFW throttle valves on “C” SG 2FWE*HCV100A, B.</u> <p>BOP reports 2FWE*HCV100B will not close. SRO directs BOP to respond IAW Attachment A-1.24, AFW Throttle Valve Failure, step 8.</p> <ul style="list-style-type: none"> • Verifies 2FWE*P22 or 23A running with flow. • Resets SI signal, both trains. • <u>Secures 2FWE*P23B, places CS in PTL.</u> • Dispatches an operator to locally de-energize and close 2FWE*HCV100B. • <u>Verifies AFW flow to “C” SG at zero.</u> <ul style="list-style-type: none"> • <u>Verifies residual heat release valve is closed.</u> • <u>Directs field operator to close 2SVS-29.</u> • <u>Verifies 2MSS-SOV105C and F closed.</u> • <u>Verifies, “C” SG Atmospheric steam dump valve is closed, 2SVS*PCV101C.</u> • <u>Verifies SG blowdown isolated, 2BDG*AOV100C1.</u> • <u>Verifies SG blowdown sample valves closed, 2SSR*AOV117A, B, C.</u> <p>BOP verifies 2FWE-TK210, PPDWST level is >150 inches.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		<p>Crew checks if SG tubes are intact:</p> <ul style="list-style-type: none"> • Checks all SG levels – NONE RISING IN AN UNCONTROLLED MANNER. • Check secondary radiation is CONSISTENT WITH PRE-EVENT VALUES. <p>Determines no SG levels are rising in an uncontrolled manner and secondary radiation is CONSISTENT WITH PRE-EVENT VALUES.</p> <p>Crew determines SG tubes ARE INTACT.</p> <p>Crew checks if SI flow should be reduced by:</p> <ul style="list-style-type: none"> • 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] <p>Crew determines that current plant conditions support SI reduction.</p> <p>ATC/BOP resets SI – both trains.</p> <p>ATC/BOP resets CIA and CIB – both trains.</p> <p>ATC stops 1 charging pump.</p>
	SRO transitions to ES-1.1, SI Termination	

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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ATC confirms RCS pressure is stable or rising.

SRO directs ATC to isolate HHSI flow:

- ATC closes 2SIS*MOV867A,B,C, D.

ATC verifies HHSI flow is secured.

Indicated HHSI flow decreases to zero.

Terminate scenario when the crew terminates HHSI flow in ES-1.1.

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 ‘Verification of Automatic Actions’ performed as time & manpower permit.</p>		<p>BOP performs Attachment A-0.11, ‘Verification of Automatic Actions’ as follows:</p>
		<p>Checks both EDGs running with SWS valve alignment and ventilation in service.</p>
		<p>Verifies power to both AC emergency busses.</p>
<p><u>EVENT 9:</u> 2HVS*FN204A and B trip IMF PMP-MSC0036 (0 0) 1 IMF PMP-MSC0037 (0 0) 1 (preloaded)</p>	<p>Ensure Reheat Steam Isolation</p>	<p>Checks 2HVS*FN204A or 2HVS*FN204B running. Identified no fans running, only 2HVS*FN204B would start manually.</p>
		<p>Ensure reheat steam isolation:</p> <ul style="list-style-type: none"> • Verify 2MSS-MOV100A and B – closed. • Reset reheater controller. • Verify 2GSS-MOV204, spillover vlv, closed
<p>Steamline isolation required.</p>		<p>Check if main steamline isolation required:</p> <ul style="list-style-type: none"> • CNMT pressure – > 7 PSIG -OR- • Steamline pressure – < 500 PSIG -OR- • Steamline pressure high rate of change – 100 PSIG DROP IN 50 SECONDS. <p>If steamline isolation is required, verifies SLI by checking all YELLOW SLI marks – LIT.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 – (continued)</p> <p>NOTE:</p> <p>BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors.</p> <p>CIB has occurred.</p> <p>CIB has occurred.</p>		<p>Establish domestic water system cooling to station air compressors;</p> <ul style="list-style-type: none"> • Opens 2CCS-AOV118. • Verifies at least 1 air compressor is running. <p>Verifies at least 1 CCP pump is running unless a CIB has occurred.</p> <p>Align neutron flux monitoring for shutdown:</p> <ul style="list-style-type: none"> • Verifies SR CHs energized when IR <1E-10. • Transfer 2NME-NR45, nuclear recorder, to operable SR and IR displays. <p>Check CIB and CNMT spray status:</p> <ul style="list-style-type: none"> • CNMT pressure – has remained <11 PSIG. <p>If not – Actuate CIB if required by:</p> <ul style="list-style-type: none"> • 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). <p>Verify service water system in service:</p> <ul style="list-style-type: none"> • SWS pumps - TWO RUNNING. • Check SWS header pressure – >55 psig. • SWS pump seal water pressure – NOT LOW. <p>Verify both CNMT hydrogen analyzers running: 2HCS*SOV100A1, B1 – CNMT sample amber lights – LIT.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 – (continued)</p> <p>2CHS*P21A failed to auto start on SI signal, manual start SAT.</p>	<p>Attachment A-0.11 – COMPLETE</p> <p><u>Discrepancies:</u> 2CHS*P21A auto start failure, manual start SAT. 2HVS*FN204A & B not running, Only 2HVS*FN204B would manually start.</p>	<p>Verify ESF equipment status:</p> <ul style="list-style-type: none"> • 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. <p>Verify source range channels energized with audible indication functioning properly, adjusts multiplier switch and volume as necessary.</p> <p>Upon completion, report any discrepancies to SRO.</p>

Appendix D**Scenario Outline**

Facility:	BVPS Unit 2	Scenario No. 3	Op Test No.: <u>2LOT19 NRC</u>
Examiners:	_____	Candidates:	_____ SRO
	_____		_____ ATC
	_____		_____ BOP
<u>Initial Conditions:</u> IC-87 (29): 100% power, EOL, Equ. XE Conditions, CB “D” @ 230 steps, RCS boron - 100 ppm.			
<u>Turnover:</u> Maintain 100% power.			
<u>Critical Tasks:</u> 1. CT-11 (E-0.O) Close CNMT isolation valves. 2. CT-18 (E-3.A) Isolate ruptured SG. 3. CT-19 (E-3.B) Establish/maintain RCS temperature.			

Event No.	Malf. No.	Event Type	Event Description
1	XMT-RCS019A	(C,A) ATC, SRO (TS) SRO	Pressurizer Level Channel, 2RCS*LT459 drifts high.
2	XMT-MSS043A	(C,A) ALL (TS) SRO	Load rejection – VPL failure, Auto Rod insertion failure - requires manual rod insertion 2OM-26.4.X
3	CNH-CFW12	(C,A) BOP, SRO	2FWS*FCV488 fails ASIS in Auto during Load rejection – requires manual control.
4	XMT-RCS031A	(C,A) ATC, SRO (TS) SRO	Pressurizer pressure transmitter 2RCS*PT445 fails high in automatic, 2 PORVs open. 2RCS*PCV455D requires manual closure, 2RCS*PCV456 sticks open, PORV block valve 2RCS*MOV536 fails to close.
5	RCS04A	(M) ALL	Reactor trip causes a 650 gpm 21A SG tube rupture.
6	VLV-MSS011 VLV-MSS012	(C) BOP, SRO	Reheat steam fails to auto isolate on trip - requires closing 2MSS-MOV100A and B.
7	PPL08A, PPL08B	(C) ATC, SRO	Automatic CIA actuation does not occur; manual initiation is required.
8	CNH-PCS07	(C) BOP, SRO	Condenser steam dump controller failed to 0%, ASDVs required for RCS cooldown.
9			
10			
11			

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

E-0 → E-1 → E-3 → ECA-3.1

After taking the shift at 100% power, EOL, 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 complete the removal of the 459 channel from service. and then review applicable Technical Specifications in effect for the failed level transmitter.

The valve position limiter will fail to 70% causing a load rejection. The control rods will fail to step in automatically in response to the load rejection. The crew will identify the load rejection and enter AOP 2.35.2, Load Rejection. The crew will stabilize the plant after which the BOP will be directed to use procedure 2OM-26.4.X, Recovering Turbine Governor Valves from the Valve Position Limiter, to remove the turbine from the valve position limiter. The SRO will evaluate technical specifications.

When the load rejection occurs, the "A" main feed regulating valve, 2FWS-FCV488 will fail ASIS in AUTO, requiring the BOP to manually control the "A" SG level.

Pressurizer pressure transmitter 2RCS*PT445 then fails high in automatic, 2 PORVs open. 2RCS*PCV455D requires manual closure, 2RCS*PCV456 sticks open, PORV block valve, 2RCS*MOV536, fails to close.

The SRO will direct the ATC to manually trip the Rx, the Rx trip will cause a 650 gpm SGTR to occur on the "A" SG.

Reheat steam will fail to automatically isolate on the trip along with CIA failing to automatically initiate on the SI signal. The BOP will isolate the reheat steam supply and the ATC will manually initiate CIA.

The SRO will progress thru E-0 then transition to E-1 due to the stuck open/unisolated PORV. Due to the SGTR, the SRO will then transition to E-3, then to ECA-3.1 due to the stuck open/unisolated PORV.

The crew will progress through ECA-3.1 to the point of initiating a cooldown, the steam dump controller will fail to zero requiring the crew to utilize the atmospheric steam dumps to perform the RCS cooldown.

The scenario will be terminated when the crew has initiated a RCS cooldown utilizing the atmospheric steam dumps at < 100 degrees F/hour.

Expected procedure flow path is E-0 → E-1 → E-3 → ECA-3.1.

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INITIAL CONDITIONS: (IC-29) 100 % Power, EOL, Bank D @ 230 steps, Equilibrium XE, 100 PPM Boron,

<u>ADDITIONAL LINEUP CHANGES</u>	<u>STICKERS</u>	<u>MONITOR SETUP</u>
		100% power splash
<u>EQUIPMENT STATUS</u>	<u>DATE/TIME OOS</u>	<u>TECHNICAL SPECIFICATION(S)</u>

SHIFT TURNOVER INFORMATION

1. Maintain 100% power.
- 2.
- 3.

SCENARIO SUPPORT MATERIAL REQUIRED

1. Reactivity plan – provide EOL Rapid Power Reduction reactivity plan.
- 2.

PROCEDURES NEEDED

E-0
E-1
E-3
ECA-3.1
Attachment A-0.6
Attachment A-0.11
Attachment A-4.1
AOP 2.4.1
AOP 2.35.2
6 IF, Attach 1
2OM -26.4.X

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

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENT 1:

Pressurizer level transmitter
2RCS*LT459 drifts high.

IMF XMT-RCS019A (0 0) 100 60

NOTE:

A control band and Rx trip criteria are not applicable if the PRZR level controls remained in AUTO.

2RCS*LI459A indicates upscale.
ALARM:
A4-2, PRZR Control High Low Level Dev.

SRO enters AOP 2.4.1, Process Control Failure, Part "C".

SRO enters the Reactor Coolant System Instrument failure procedure, 2OM-6.4.IF, attachment 1.

SRO evaluates Technical Specifications:

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 3 (461/460).
If necessary ATC places 2CHS*FCV122 in manual and restores PRZR level.

SRO provides a control band and Rx trip criteria of 5% low/90% high for manual PRZR level control.

BOP refers to ARP.

SRO transitions to Reactor Coolant System Instrument failure procedure, 2OM-6.4.IF, attachment 1.

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

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 2 & 3:</u></p> <p>Turbine Runback due to Valve Position limiter failure, Control rods fail to auto step in. Main Feed regulating valve, 2FWS*FCV488 fails asis in auto during load rejection. IMF EHC06 (9 0) 70 0 ASIS IMF CNH-CFW12 (9 0) 1</p>	<p><u>IMMEDIATE PLANT RESPONSE:</u></p> <p>Megawatts decrease, RCS temperature and pressure rise accordingly. Rods fail to auto step in.</p> <p>ALARM: A4-3C, Tavg Deviation from Tref</p> <p>SRO enters AOP-2.35.2, Load Rejection.</p>	<p>ATC recognizes megawatts decreasing and announces load rejection has occurred.</p> <p>ATC checks control rod system. ATC reports control rods failed to insert automatically, after verifying Tavg was not matched with Tref, ATC placed rods in manual and continued inserting to match Tavg and Tref. ATC reviews reactivity plan to determine required boration.</p> <p>Crew sounds the standby alarm, announces a Unit 2 load rejection and informs the SM to evaluate EPP.</p>
<p><u>NOTE:</u></p> <p>If DNB Tech Spec entry not identified by the crew at this time, ask as a follow-up question.</p>	<p>SRO evaluates Technical Specifications:</p>	<p>TS 3.4.1, (RCS DNB Parameters, RCS press < 2214 psia) Condition A: restore RCS pressure within 2 hours.</p>
<p><u>EVENT 3:</u></p> <p>Malfunction for event 3 is preloaded to insert when the load rejection occurs, it will become evident following the load rejection.</p>	<p>“B” SG level increases due to increased feeding rate at higher power and constant valve position.</p> <p>A6-10E will alarm for SG level dev. if the crew doesn’t notice 2FWS*FCV488 malfunction.</p>	<p>BOP recognizes “B” SG level increasing. IAW Process Control Failure procedure, AOP 2.4.1, BOP places controller for 2FWS*FCV488 in manual and restores SG level to program.</p> <p>BOP verifies normal EHC system operation by:</p> <ul style="list-style-type: none"> Verifying valve position limit is not consistent with pre-event.

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>ROLE PLAY SM: If necessary, as SM, direct the crew to remove the turbine from the limiter.</p> <p>NOTE: It is not the intent to recover completely from the limiter, next event can be entered at the LE discretion.</p> <p>Proceed to next event at LE discretion. (see note above)</p>		<p>SRO directs BOP to perform 2OM-26.4.X, Recovering Turbine Governor Valves from the Valve Position Limiter, to remove the turbine from the limiter.</p> <p>IAW 2OM-26.4.X, step 2, BOP recovers the turbine governor valves from the limiter as follows:</p> <ul style="list-style-type: none"> • Adjusts the setter below the present reference setting. • Sets the load rate thumbwheel to 1%/minute. • Presses the “GO” pushbutton. • Adjusts the load rate thumbwheel as directed by SRO. • Presses the “HOLD” pushbutton when the “VALVE POS LIMIT” light extinguishes.
<p><u>EVENT 4:</u></p> <p>2RCS*PT445 fails high, 2 PORV’s open, 2RCS*PCV456 fails to 15% open with Block valve failed open, requiring crew to manually trip the reactor.</p> <p>IMF XMT-RCS031A (0 0) 2500 0</p> <p>ROLE PLAY: If dispatched to investigate MCC breaker for 2RCS*MOV536, wait 5 minutes then report breaker 10C on MCC-2-E05 is tripped and won't reset.</p>	<p>2 PORV’s initially open, 456 sticks at 15% open, PORV 455D will close manually when CS is taken to close. RCS pressure continues to decrease.</p>	<p>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 and 456 both failed to automatically close on low pressure. ATC closes 2RCS*PCV455D. ATC attempts to close 2RCS*PCV456, PORV remains at dual position. ATC attempts to close block valve, 2RCS*MOV536. ATC reports 2RCS*MOV536 will not close.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>NOTE: Due to dynamic nature of event, a followup question regarding applicable TS may be necessary.</p> <p>EVENTS 5, 6, 7, & 8 650 gpm SGTR on "A" SG when Rx is tripped Reheat steam isolation failure. Automatic CIA actuation failure. Condenser steam dump controller failure, will require ASDV's for cooldown. (all commands preloaded)</p>	<p>SRO recognizes TS applicability for an inoperable PORV and Block valve.</p> <p>SRO enters E-0, Reactor Trip or Safety Injection.</p>	<p>TS 3.4.11, Conditions B and C.</p> <p>Crew determines failure will not support normal plant operations. SRO directs crew to manually trip and perform IOA's for E-0.</p> <p>ATC and BOP commence IOA's of E-0.</p> <p>ATC verifies reactor trip:</p> <ul style="list-style-type: none"> • A5-6D - LIT. • Power range indication is < 5%. • Neutron flux is dropping. <p>BOP verifies Turbine trip:</p> <ul style="list-style-type: none"> • Throttle OR Governor valves ALL closed. • Main Generator output brks - open. • Exciter Circuit breaker – open. <p>BOP verifies power to AC emergency busses:</p> <ul style="list-style-type: none"> • Using VB-C voltmeters, verifies both 2AE and 2DF busses have voltage indicated.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<u>EVENTS 5, 6, 7, & 8:</u> (continued)	SI automatically actuated	<p>Check SI status: ATC reports SI automatically actuated and manually actuates SI by turning both trains' control switches.</p> <p>ATC/BOP, sounds standby alarm, announces Unit 2 reactor trip and safety injection.</p> <p>Check if HHSI flow should be secured by checking the following:</p> <ul style="list-style-type: none"> • CNMT & Secondary radiation • CNMT pressure & sump level • SG – pressures and levels • RCS subcooling • Secondary heat sink exists • RCS pressure – stable or rising • PRZR level – >17% • SI occurred automatically <p>Due to SG parameters not being consistent with pre-event, crew determines SI is required; SI flow should not be secured at this time.</p> <p>ATC verifies SI System status:</p> <ul style="list-style-type: none"> • 2CHS*P21A & 2CHS*P21B running. • 2SIS*P21A & 2SIS*P21B running. • HHSI Flow indicated on 2SIS-FI943.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 5, 6, 7, & 8:</u> (continued)</p> <p>NOTE: BOP may have pre-emptively isolated AFW flow to the "A" SG after NR level rose to > 12%.</p>		<p>BOP verifies AFW status:</p> <ul style="list-style-type: none"> • Both 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.
<p>NOTE: Evaluation of BOP performing Attachment A-0.11 begins on page 19.</p>	<p><u>List of Attachment A-0.11 discrepancies:</u> Reheat steam auto isolation failure. Automatic CIA actuation failure. Manual actuation SAT for both malfunctions.</p>	<p>SRO directs BOP to verify automatic actions by performing Attachment A-0.11 in a timely manner.</p> <p>BOP performs Attachment A-0.11.</p>
<p><u>EVENT 6:</u> 2MSS-MOV100A/B auto close failure IMF VLV-MSS011 (0 0) 1 IMF VLV-MSS012 (0 0) 1 (preloaded)</p>	<p>RCS temperature <547°F and dropping due to safety injection flow and reheat steam auto isolation failure.</p>	<p>ATC checks RCS Tavg stable at or trending to 547F.</p> <p>ATC reports RCS Tavg is <547F and dropping. SRO directs ATC to:</p> <ul style="list-style-type: none"> • Stop dumping steam • Verify 2MSS-MOV100A, B are closed. <p>BOP reports to SRO that 2MSS-MOV100A & B failed to automatically close on the turbine trip, both valves did manually close successfully.</p> <ul style="list-style-type: none"> • Depress the reheater controller RESET PB. • Minimize total feedflow while maintaining > 340 gpm until 1 NR level is >12% [31% ADVERSE CNMT].

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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EVENTS 5, 6, 7, & 8: (continued)

NOTE:
Crew may transition to E-3 immediately after entering E-1 based on E-1 LHP criteria, otherwise transition to E-3 will occur at the “Check for a Ruptured SG” step of E-1.

SRO transitions to E-1, Loss of Reactor or Secondary Coolant.

ATC verifies PRZR isolated:

- PORVs – CLOSED

ATC reports PORV 2RCS*PCV456 won’t close and block valve 2RCS*MOV536 also has failed to close.

ATC verifies HHSI flowpath, 2SIS*MOV867A,B,C,D all open.

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 should not be actuated for given conditions.

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.

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 5, 6, 7, & 8:</u> (continued)</p> <p>ROLE PLAY:</p> <p>When dispatched to energize valves IAW Attachment A-0.6, wait 5 minutes, insert following commands then report complete.</p> <p>IRF LOA-LOV093 (0 0) RACKIN</p> <p>IRF LOA-LOV102 (0 0) RACKIN</p> <p>IRF LOA-LOV094 (0 0) RACKIN</p> <p>IRF LOA-LOV103 (0 0) RACKIN</p> <p>IRF LOA-LOV095 (0 0) RACKIN</p> <p>IRF LOA-LOV104 (0 0) RACKIN</p> <p>IRF LOA-LOV096 (0 0) RACKIN</p> <p>IRF LOA-LOV105 (0 0) RACKIN</p>		<p>ATC/BOP dispatches an operator to energize valves IAW Attachment A-0.6, “Cold Leg Recirculation Component Verification.”</p>
		<p>ATC checks CIB – NOT ACTUATED.</p> <p>ATC/BOP checks if any SGs are faulted:</p> <ul style="list-style-type: none"> Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER OR ANY SG COMPLETELY DEPRESSURIZED <p>Crew determines NO SG’s are faulted.</p> <p>BOP checks intact SG levels:</p> <ul style="list-style-type: none"> NR levels – >12%. <p>Controls feed flow to maintain NR level between 12% and 50%.</p>

BEAVER VALLEY POWER STATION

INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 5, 6, 7, & 8:</u> (continued)</p> <p>NOTE:</p> <p>Crew may have previously transitioned to E-3 based on E-1 LHP criteria.</p>	<p>SRO transitions to E-3, Steam Generator Tube Rupture.</p>	<p>Crew checks if SG tubes are intact:</p> <ul style="list-style-type: none"> • Check all SG levels – NONE RISING IN AN UNCONTROLLED MANNER. • Check secondary radiation – CONSISTENT WITH PRE-EVENT VALUES. <p>Crew determines “A” 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.</p> <p>SRO directs STA to commence control room ventilation actions. Refer to Attachment A-2.5.</p>
<p>NOTE:</p> <p>Crew may have pre-emptively isolated AFW flow to the "A" SG when rupture was identified after NR level >12%.</p>	<p>“A” SG ruptured</p>	<p>ATC checks if RCPs should be stopped:</p> <ul style="list-style-type: none"> • D/P between RCS pressure and highest SG pressure – <205 PSID. <p>Crew determines criteria for stopping RCPs is not met.</p> <p>Crew notes that “A” SG was previously identified as the ruptured SG based upon unexpected NR level rise.</p> <ul style="list-style-type: none"> • BOP verifies “A” SG NR level >12%. • SRO directs BOP to isolate feed flow to ruptured SG.

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 5, 6, 7, & 8:</u> (continued)</p> <p><u>Critical Task: CT-18 (E-3.A)</u> 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.</p> <p>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.</p> <p>ROLE PLAY: 5 minutes after being dispatched to locally isolate 2SVS*27, insert IRF LOA-MSS009 (0 0) 0 60 then report back that 2SVS*27 has been closed.</p>	<p>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.</p>	<p>ATC/BOP isolates flow from the ruptured SG.</p> <p><u>BOP verifies “A” SG atmospheric steam dump, 2SVS*PCV101A, closed and raises setpoint to 100%.</u></p> <p><u>SRO dispatches operator to locally close 2SVS*27.</u> <u>BOP verifies residual heat removal valve – CLOSED.</u></p> <p>Isolate ruptured SG to turbine driven AFW pump.</p> <ul style="list-style-type: none"> • BOP reports 2 motor driven AFW pps running. • <u>BOP closes 2MSS*SOV105A and 105D.</u> <p>Verify closed ruptured SG blowdown isolation valve.</p> <ul style="list-style-type: none"> • ATC verifies 2BDG*AOV100A1 is closed. <p>Close main steamline drain from ruptured SG.</p> <ul style="list-style-type: none"> • <u>ATC closes 2SDS*AOV111A1.</u> <p>Close 2SDS*AOV129A, RHR piping drain isolation.</p> <ul style="list-style-type: none"> • <u>BOP closes 2SDS*AOV129A.</u> <p>Close ruptured SG main steam isol & bypass vlvs.</p> <ul style="list-style-type: none"> • <u>BOP closes 2MSS*AOV101A.</u> • BOP verifies 2MSS*AOV102A closed. <p>BOP checks ruptured SG pressure – >240 PSIG.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENTS 5, 6, 7, & 8:</u> (continued)</p>	<p>Condenser available</p>	<p>Crew initiates RCS cooldown: SRO determines required core exit temperature as a function of ruptured SG pressure:</p> <p>SRO directs ATC to block low steamline pressure SI when PRZR pressure <2000 psig.</p> <p>BOP dumps steam to condenser from B & C SGs at maximum rate by:</p> <ul style="list-style-type: none"> • 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) <p>Crew reports steam dump controller demand remains at 0% and that the condenser steam dump valves are not effectively reducing CETC's.</p> <p>SRO directs BOP to manually dump steam at maximum rate using atmospheric steam dumps. BOP opens 2SVS*PCV101B BOP opens 2SVS*PCV101C BOP opens 2SVS*HCV104</p>
<p><u>EVENT 8:</u> IMF CNH-PCS07 (4 0) 0 (preloaded)</p>	<p>Steam pressure controller failed asis in AUTO and MANUAL.</p>	
<p>NOTE: Before using 2SVS*HCV104, crew must recognize that they must have dispatched an operator to locally isolate from the "A" SG and received a report that it was isolated.</p>		

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p><u>EVENT 8</u>:(continued)</p> <p><u>Critical Task: CT-19 (E-3.B)</u> 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:</p> <p>Too high to maintain minimum required subcooling for subsequent RCS depressurization</p> <p>OR</p> <p>Below the RCS temperature that causes a red or orange path challenge to Sub-criticality or Integrity CSF</p> <p>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.</p>	<p>SRO transitions to ECA-3.1</p>	<p>BOP checks if RCS cooldown should be stopped:</p> <ul style="list-style-type: none"> • When core exit TCs (average of hottest trisector) – < REQUIRED TEMPERATURE. <p>BOP stops RCS cooldown and maintains core exit TCs – LESS THAN REQUIRED TEMPERATURE.</p> <p>BOP checks intact SG levels:</p> <ul style="list-style-type: none"> • “B” & “C” NR levels – >12%. <p>BOP controls feed flow to maintain narrow range level between 26% and 50%.</p> <p>ATC checks PRZR PORVs and block valves:</p> <ul style="list-style-type: none"> • Power to block valves –2 AVAILABLE. • PORVs – ALL CLOSED. (PCV-456 open) • Block valves – AT LEAST ONE OPEN. (all) <p>ATC reports that PORV 2RCS*PCV456 remains partially open and the associated MOV block valve is de-energized and can NOT be closed.</p> <p>SRO determines transition to ECA-3.1 is required.</p> <p>ATC resets SI – both trains. ATC resets CIA and CIB – both trains.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>NOTE: BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors.</p>		<p>BOP opens 2CCS-AOV118 to establish domestic water cooling to the SAS compressors.</p>
		<p>BOP verifies station instrument air press >90 psig. BOP establishes Instrument air to CNMT by:</p> <ul style="list-style-type: none"> • Verifying 2IAC-MOV131 is open. • Opening 2IAC*MOV130.
		<p>BOP verifies CNMT instrument air press >85 psig.</p>
		<p>BOP verifies all AC busses energized by offsite.</p>
		<p>ATC places all PRZR heaters in PTL.</p>
		<p>ATC checks any quench or recirc spray pump running.</p>
		<p>ATC reports that no quench or recirc spray pumps are running.</p>
<p>NOTE: BOP may have already pre-emptively isolated AFW flow after NR level was >12%.</p>		<p>BOP verifies NR level in “A” SG >12% then closes AFW valves to “A” SG:</p> <ul style="list-style-type: none"> • 2FWE*HCV100E and 2FWE*HCV100F.
		<p>BOP confirms that FWI was previously verified.</p>
		<p>ATC checks if LHSI pumps should be stopped:</p> <ul style="list-style-type: none"> • ATC verifies RCS pressure is >225 psig and stable or rising.
		<p>ATC stops both LHSI pumps and places CS’s in AUTO.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
		<p>BOP evaluates radiation monitors, determines Auxiliary building and Safeguards radiation is consistent with pre-event values.</p> <p>SRO determines TSC is not activated.</p> <p>SRO directs ATC to monitor nuclear instrumentation to ensure adequate shutdown margin.</p> <p>ATC/BOP checks if any SGs are faulted</p> <ul style="list-style-type: none"> Pressures in all SGs – ANY DROPPING IN AN UNCONTROLLED MANNER OR ANY SG COMPLETELY DEPRESSURIZED <p>Crew determines NO SG's are faulted.</p> <p>BOP checks "B" & "C" NR levels >12% (intact SGs) and controls feed flow to maintain NR level between 26% and 50%.</p> <p>SRO determines TSC is not activated.</p> <p>SRO directs ATC to monitor nuclear instrumentation to ensure adequate shutdown margin.</p> <p>BOP initiates RCS cooldown to cold shutdown:</p> <ul style="list-style-type: none"> Maintain RCS cold leg C/D rate <100F/HR. Initiate a trend of RCS cold leg temp/pressure. Initial every half hour. Refer to Attachment A-4.1.

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
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SRO instructs ATC to block low steam line pressure SI when PRZR pressure is <2000 psig.

Crew verifies instrument air press >90 psig and at least 1 MSIV is open with the condenser available.

Crew recognizes that the steam dump controller was previously identified as failed.

SRO directs BOP to manually dump steam using atmospheric steam dumps.

BOP opens 2SVS*PCV101B

BOP opens 2SVS*PCV101C

OR

BOP opens 2SVS*HCV104

BOP gradually raises steam dump rate to initiate RCS cooldown and not exceed cooldown rate of 100F/HR.

Terminate scenario when the crew establishes RCS cooldown in ECA-3.1 and demonstrates the intent to limit C/D rate to < 100 °F/Hr.

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 ‘Verification of Automatic Actions’ performed as time & manpower permit.</p>		<p>BOP performs Attachment A-0.11, ‘Verification of Automatic Actions’ as follows:</p>
		<p>Checks both EDGs running with SWS valve alignment and ventilation in service.</p>
		<p>Verifies power to both AC emergency busses.</p>
		<p>Checks 2HVS*FN204A or 2HVS*FN204B running.</p>
<p>EVENT 6: 2MSS-MOV100A/B auto close failure IMF VLV-MSS011 (0 0) 1 IMF VLV-MSS012 (0 0) 1 (preloaded)</p>	<p>Ensure Reheat Steam Isolation</p>	<p>Ensure reheat steam isolation:</p> <ul style="list-style-type: none"> • Verify 2MSS-MOV100A and B – closed. Valves not closed - required manual closure. • Reset reheater controller. • Verify 2GSS-MOV204, spillover vlv, closed
<p>Steamline isolation not required.</p>		<p>Check if main steamline isolation required:</p>
		<ul style="list-style-type: none"> • CNMT pressure – > 7 PSIG -OR- • Steamline pressure – < 500 PSIG -OR- • Steamline pressure high rate of change – 100 PSIG DROP IN 50 SECONDS.
		<p>If steamline isolation is required, verifies SLI by checking all YELLOW SLI marks – LIT.</p>
		<p>If steamline isolation is not required continues on.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 – (continued)</p> <p>NOTE:</p> <p>BOP may have already pre-emptively opened 2CCS-AOV118 to provide cooling to the Station Air compressors.</p> <p>CIB has not occurred.</p> <p>CIB has not occurred.</p>		<p>Establish domestic water system cooling to station air compressors;</p> <ul style="list-style-type: none"> • Opens 2CCS-AOV118. • Verifies at least 1 air compressor is running. <p>Verifies at least 1 CCP pump is running unless a CIB has occurred.</p> <p>Align neutron flux monitoring for shutdown:</p> <ul style="list-style-type: none"> • Verifies SR CHs energized when IR <1E-10. • Transfer 2NME-NR45, nuclear recorder, to operable SR and IR displays. <p>Check CIB and CNMT spray status:</p> <ul style="list-style-type: none"> • CNMT pressure – has remained <11 PSIG. <p>If not – Actuate CIB if required by:</p> <ul style="list-style-type: none"> • 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). <p>Verify service water system in service:</p> <ul style="list-style-type: none"> • SWS pumps - TWO RUNNING. • Check SWS header pressure – >55 psig. • SWS pump seal water pressure – NOT LOW. <p>Verify both CNMT hydrogen analyzers running: 2HCS*SOV100A1, B1 – CNMT sample amber lights – LIT.</p>

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INSTRUCTIONAL GUIDELINES	PLANT STATUS / PROCEDURAL GUIDANCE	EXPECTED STUDENT RESPONSE
<p>Attachment A-0.11 – (continued)</p> <p><u>EVENT 7:</u></p> <p>Automatic CIA actuation failure</p> <p><u>Critical Task CT-11 (E-0.O)</u></p> <p>Crew closes CNMT isolation valves such that at least one valve is closed on each critical phase A penetration at the completion of Attachment 1-K.</p> <p>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</p>	<p>Attachment A-0.11 – COMPLETE</p> <p><u>Discrepancies:</u></p> <ul style="list-style-type: none"> • Reheat steam auto isolation failure. • Automatic CIA actuation failure. <p>Manual actuation SAT for both malfunctions.</p>	<p>Verify ESF equipment status:</p> <ul style="list-style-type: none"> • Verify SI status by checking all RED SIS marks – LIT. • Verify CIA by checking all ORANGE CIA marks – LIT. IDENTIFIES CIA failed to automatically actuate and actuates both trains CIA. • Verify FWI by checking all GREEN FWI marks – LIT. <p>Verify source range channels energized with audible indication functioning properly, adjusts multiplier switch and volume as necessary.</p> <p>Upon completion, report any discrepancies to SRO.</p>