Facility:	SHEARON-HARRIS	Scenario No.: 1	Op Test No.: 05000400/2009302
Examiners:		Operators:	
Initial Conditions:	• IC-26, MOL, 88% power		
	• TDAFW Pump has been Out of Service for last 62 hours, due to damaged over speed trip device, due back in 24 hours, awaiting parts from vendor Tech Spec 3.7.1.2 - 72 hour LCO		
	• 'A' Boric Acid Transfer Pump is OOS for motor replacement		
Turnover:	• Plant is at 88% power. The TDAFW Pump has been out of service for 62 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect. Normal shutdown is in progress IAW with GP-006, Normal Plant Shutdown step 9. The desired load rate change is 4 DEH units per minute. Load is set at 120, and the turbine is in hold. The "A" Boric Acid Transfer Pump is OOS for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to downpower.		
Critical Task:	• Trip RCPs once RCP Trip Foldout Criteria is met and prior to exiting PATH-1		
	• Align one train of Containment Spray System for operation prior to containment pressure exceeding 35 psig		
	• Transition to Cold Leg Recirculation prior to RWST level reaching 3%		

Event No.	Malf. No.	Event Type*	Event Description
1		N - BOP R - RO	Plant Shutdown
TRG 2	CVC07	I – RO/SRO	Letdown pressure control valve fails CLOSED
TRG 3	HVA04	C - BOP/SRO TS – SRO	"A" Emergency Services Chilled Water Pump Trip
TRG 4	GEN01	C – BOP/SRO	Generator Voltage Regulator Failure
TRG 5	RCS18B	C - ALL TS – SRO	Small RCS leak (~25 gpm)
TRG 6	RCS01B	M – ALL	Large Break LOCA
7	ZDSQ94:4B	C – RO/SRO	"B" CSIP Fails to auto-start on Safety Injection (preset)
8	ZRPK643A, B ZRPK644A, B ZRPK645A, B	C – RO/SRO	BOTH Containment Spray Pumps Fail to auto-start (preset)
9	ZRPK740A	I – RO/SRO	RWST swap-over fails, 1SI-300 and 1SI-310 fail to open when RWST level reaches 23.4% (preset)

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

Scenario Summary:

The plant is at 88% power in middle of life with the turbine in HOLD. The TDAFW Pump has been out of service for 62 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect. Normal shutdown is in progress IAW with GP-006, Normal Plant Shutdown step 9 with a planned rate change of 4 DEH units per minute. Load is set at 120. The "A" Boric Acid Transfer Pump is OOS for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to a power reduction of >10% (YELLOW risk is a qualitative risk assessment per WCM-001).

Event 1: Crew performs a power reduction IAW GP-006. For this reactivity manipulation it is expected that the SRO will conduct a reactivity brief, the RO will borate per the reactivity plan and the BOP will operate the DEH Controls as necessary to lower power.

Event 2: The Letdown pressure control valve PCV-145 failure (closes in AUTO) can be inserted once the power reduction has been observed to the extent necessary. The crew should respond in accordance with letdown relief line alarm procedure APP-ALB-007, 3-1 and/or 3-5, take MANUAL control of letdown line pressure, adjust letdown pressure and ensure the relief valve re-seats.

Event 3: The trip of the running A-SA ESCWS Chiller can be inserted after letdown pressure has been restored in MANUAL. The crew will respond to various alarms on ALB-023, diagnose the event, and enter AOP-026, Loss of Essential Chill Water System. This will direct starting the 'B' Train ESCWS Chiller. The SRO should evaluate Tech Spec 3.7.13, Essential Services Chilled Water System and PLP-114, Relocated Technical Specifications and Design Basis Requirements. Note that the 'A' Chiller will be inoperable for the remainder of the scenario and this will impact plant response during the Major Event in that this failure will prevent Load Block 9 on sequencer Train 'A" from energizing.

Event 4: The failure of the Generator Voltage Regulator can be inserted once the 'B' Train ESCWS Chiller has been placed in service (Do not wait for Train swap to be completed). This failure will cause generator MVARS to rise above the normal control band and alarms to annunciate on ALB-022 and ERFIS. The BOP operator should attempt to control voltage with the voltage regulator in MANUAL, but this will fail and the base adjuster must be used to reduce MVARs to a lower value within normal operational limits (75 to 175 MVARs).

Event 5: A small RCS leak (~25 gpm) can be inserted once MVARS have been returned to within normal operational limits. Based on control board indications, the crew should diagnose the leak and enter AOP-016, Excessive Primary Plant Leakage. The crew will implement a plant shutdown due to exceeding Tech Spec 3.4.6.2, RCS Operational Leakage and as directed by AOP-016. The SRO will evaluate the leakage to determine the required rate of shutdown.

Events Continued:

Event 6 (Major): LBLOCA (100% severity) on the 'B' Loop can be inserted once the 'B' ESCWS Chiller has been started. The crew should carry out immediate actions of PATH-1. The earlier failure of A-SA ESCWS Chiller will prevent the 'A' Sequencer from reaching Load Block 9. The BOP should manually actuate the MAN PERM switch to enable manual loading on the A-SA bus (due to the earlier trip of the A-SA ESCWS Chiller). Plant conditions will require transition to FR-P.1, Response To Imminent Pressurized Thermal Shock and then return to PATH-1.

Event 7: The 'B' Charging Pump will fail to auto start on the Safety Injection but may be started manually at the MCB.

Event 8: Shortly after entering PATH-1, the crew should recognize that the Foldout Criteria for securing all RCPs has been met and carry out that action. Pressure in containment will continue to rise due to the LOCA and a Containment Spray Actuation will be required. Both Containment Spray Pumps will fail to automatically start and at least one pump will need to be manually started with a flow path established to containment. The 'A' CT pump cannot be manually started unless actions taken during Event 6 for the MAN PERM switch have been completed. Without Containment Spray in service, an ORANGE path will be met for Containment.

Event 9: When RWST level reaches 23.4%, the crew will transition to EPP-010, Transition to Cold Leg Recirculation. 1SI-300 and 1SI-310 will fail to automatically open when RWST level reaches 23.4% and will need to be manually opened.

Once cold leg recirculation has been established, the scenario may be terminated.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Provide a Reactivity Plan to candidates for shutting down the plant
- Provide a copy of the following procedures:
  - GP-006, NORMAL PLANT SHUTDOWN FROM POWER OPERATION TO HOT STANDBY (MODE 1 TO MODE 3) **marked up** through section 5.2 step 8 with step 8 signed off and step 9 circled

INITIAL CONDITIONS:

- IC-26, MOL, 88% power
- Place CIT on the 'A' Boric Acid Transfer Pump and take switch to STOP
- Place 'B' Boric Acid Transfer Pump switch to AUTO and green protected train placard
- Set potentiometers as follows: FK-114: 7.50 FK-113: 3.17
- Protected equipment placards for TDAFP (per OMM-001 Att. 16)
  - 'A-SA' MDAFP – Orange placard
  - 'B-SA' MDAFP – Green placard
  - 'A' Startup Transformer brk 52-2 and 52-3 Orange placards
  - 'B' Startup Transformer brk 52-13 and 52-14 Green placards
- Hang CITs on 1MS-70, 1MS-72 and Trip and Throttle Valve 1MS-T
- Place RED bars on ALB 01-7-5, ALB 017-7-4
- Place BLUE bar on ALB 23-2-13
- Hang restricted access signs on MCR entry swing gates

PRE-LOAD:

- TDAFW Pump OOS due to damaged overspeed trip device1MS-70 and 72 breakers open and Trip and Throttle valve tripped (irf mss034 OPEN, irf mss035 OPEN, imf cfc01c true)
- 'A' Boric Acid Pump OOS for motor replacement (idi xa2i174 STOP,AUTO ilo xa2o174g OFF)
- Containment Spray Pump A fails to auto start on Hi-3 Signal can be manually started (imf zrpk643a FAIL_ASIS, imf zrpk644a FAIL_ASIS, imf zrpk645a FAIL_ASIS)
- Containment Spray Pump B fails to auto start on Hi-3 Signal can be manually started (imf zrpk643b FAIL_ASIS, imf zrpk644b FAIL_ASIS, imf zrpk645b FAIL_ASIS)
- CSIP B fails to auto start on SI (imf zdsq94:4b FAIL_ASIS)
- 1SI-300 and 1SI-310 fail to auto open when RWST level reaches 23.4% (imf zrpk740A FAIL_ASIS)

TRIGGERS:

- ET-2: imf cvc07 (3 00:00:00 00:00:00) 0.0 00:01:00
  Letdown PCV 145 fails closed manual control possible

- ET-3: imf hva04 (4 00:00:00 00:00:00) TRAIN_A
  'A' Chiller Trip respond using AOP-026

- ET-4: imf gen01 (2 00:00:00 00:00:00) 115.0 00:15:00
  Generator Voltage Regulator Failure 15 min ramp APP-ALB-022, or OMM-001, or OP-153.01

- ET-5: imf rcs18b (5 00:00:00 00:00:00) 0.18 00:05:00 0
  Small RCS leak AOP-016 then AOP-038 plant shutdown leakage is ~ 25 gpm

- ET-6: imf rcs01b (6 00:00:00 00:00:00) 100 00:10:00 0
  Large Break Loss of Coolant Accident LBLOCA (inserted per Lead Examiners instruction)

CAEP

!Description of 2009B NRC Exam Scenario 1

! Establish Initial Conditions
! Reset to IC-26
! ~89% power ramped from 100% at 4 DEH Units per min on hold for turnover
! Continue with ramp down due to expiring LCO on TDAFW Pump

! TDAFW Pump is OOS due to damaged overspeed trip device
! Pump has been OOS for 62 total hours and is expected back within the next 24 hours
! Tech Spec 3.7.1.2, 72 hour LCO or HSB within the next 6 hours, HSD following 6 hours
! Hang CIT on both MS-70 and 72 then place protected train placards per OMM-001
irf mss034 (n 00:00:00 00:00:00) OPEN
irf mss035 (n 00:00:00 00:00:00) OPEN
! Trip the TDAFW Pump Trip and Throttle valve
imf cfw01c (n 00:00:00 00:00:00) true

! "A" BA Pump is OOS for motor replacement place MCB switch to STOP
! Hang CIT on CB Switch place the B BA Pump MCB switch to AUTO
! Place B BA pump switch to auto and protect B BA pump switch
idi xa2i174 (n 00:00:00 00:00:00)STOP,AUTO
ilo xa2o174g (n 00:00:00 00:00:00)OFF

! Go to RUN and set DEH ramp rate to 4 Units/Min

! EVENTS:

! Event 1: Crew continues the plant shutdown IAW GP-006 due to LOC expiring on TDAFW pump
! Normal - BOP
! Reactivity - RO

! Event 2: Letdown PCV 145 fails closed manual control possible
! Crew actions addressed per APP ALB-007-3-1 or 3-5
! Instrument - RO/SRO
imf cvc07 (3 00:00:00 00:00:00) 0.0 00:01:00 -

! Event 3: 'A' Chiller Trip
! Crew responds using AOP-026 (no immediate actions)
! Tech Spec 3.7.13 72 hour LCO or HSB within next 6 hours, CSD within following 30 hours
! Component - BOP/SRO
! Tech Spec - SRO
imf hva04 (4 00:00:00 00:00:00) TRAIN_A

! Event 4: Generator Voltage Regulator Failure over 15 min ramp
! Crew actions based on APP-ALB-022, or OMM-001, or OP-153.01
! Component - BOP/SRO
imf gen01 (2 00:00:00 00:00:00) 115.0 00:15:00 -

```
! Event 5: Small RCS leak Crew enters AOP-016 (no immediate actions)
! AOP-016 to AOP-038 for plant shutdown (leakage is ~ 25 gpm)
! Tech Spec 3.4.6.2 < 1 gpm unidentified leakage
! Action b reduce leakage rate to within limits < 4 hours or HSB within next 6, CSD next
30 hours
!   Tech Spec - SRO
        imf rcs18b (5 00:00:00 00:00:00) 0.18 00:05:00 0

! Event 6: LBLOCA
!   Major - ALL
        imf rcs01b (6 00:00:00 00:00:00) 100 00:10:00 0

! Event 7: CSIP B fails to auto start on SI (preloaded)
!   Component - RO/SRO
        imf zdsq94:4b (n 00:00:00 00:00:00)FAIL_ASIS

! Event 8: Containment Spray Pump A fails to auto start on Hi-3 Signal can be manually
started (preload)
! NOTE: This is complicated by the earlier loss of the "A" Chiller
! To start the "A" CS pump you must first establish the manual load block on the "A"
EDG sequencer
! Without establishing the manual load block the CS pump will not start
!   Component - RO/SRO
        imf zrpk643a (n 00:00:00 00:00:00) FAIL_ASIS
        imf zrpk644a (n 00:00:00 00:00:00) FAIL_ASIS
        imf zrpk645a (n 00:00:00 00:00:00) FAIL_ASIS

! Event 8: Containment Spray Pump B fails to auto start on Hi-3 Signal (preloaded)
! The "B" CS pump does not auto start but can be manually started by the RO
!   Component - RO/SRO
        imf zrpk643b (n 00:00:00 00:00:00) FAIL_ASIS
        imf zrpk644b (n 00:00:00 00:00:00) FAIL_ASIS
        imf zrpk645b (n 00:00:00 00:00:00) FAIL_ASIS

! Event 9: 1SI-300 and 1SI-310 fail to auto open when RWST level reaches 23.4%
(preloaded)
! Both valves will not auto open but can be manually opened
!   Instrument - RO/SRO
        imf zrpk740A (n 00:00:00 00:00:00) FAIL_ASIS
```

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Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
LEAD EVALUATOR:		**The crew has been directed to shutdown the plant IAW GP-006, Normal Plant Shutdown due to TDAFW pump being inoperable. GP-006 is signed off through step 8, and the power reduction is on hold for turnover.**
	SRO	GP-006, Step 5.2.9
WHEN Turbine load is less than 75%, **THEN VERIFY** the SGBD Regenerative Heat Exchanger Condensate Outlet is aligned to the CPD effluent per OP-127, Section 7.1.		
PROCEDURE NOTE:		**Routine load changes should be coordinated with the Load Dispatcher to meet system load demands.**
	SRO	DIRECTS BOP to start power reduction at 4 Units/Min with target value set at 120. May direct initiation of a boration before the power reduction begins.
	BOP	Requests PEER check prior to manipulations of DEH Control DEPRESS the LOAD RATE MW/MIN push-button
EVALUATOR NOTE:		**There is no procedural guidance directing when the boration to lower power is required. The crew may elect to perform the boration prior to place the Turbine in GO. The boration steps are located on page 10 of this guide.**

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Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
	BOP	• Verifies the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 Units/minute) • DEPRESS the ENTER push-button • DEPRESS the REF push-button • Verifies the desired load (120 MW per step 5.2.5.e) in the DEMAND display • DEPRESS the ENTER push-button. The HOLD push-button should illuminate
PROCEDURE NOTE:		**The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.**
	BOP	• DEPRESS the GO push-button to start the load reduction and inform crew through 'Crew Update' Turbine in 'GO' • VERIFY the number in the REFERENCE display decreases • VERIFY Generator load is decreasing
	RO	MONITORS primary systems response.
EVALUATOR NOTE:		**The crew may determine to allow CBD to insert in AUTO prior to boration to match reactivity plan rod height.**
	RO	INITIATES boration, as necessary (with SRO concurrence) per OP-107.01.

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Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
	RO	OP-107.01, Section 5.2 and then 5.1 (Boration)
	RO	• DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board • DETERMINE the magnitude of boron concentration increase required • DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC
EVALUATOR NOTE:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**
PROCEDURE CAUTION:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
PROCEDURE NOTE:		**Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.**
	RO	• SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate • VERIFY the RMW CONTROL switch has been placed in the STOP position • VERIFY the RMW CONTROL switch green light is lit • PLACE control switch RMW MODE SELECTOR to the BOR position

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Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
		• MAKE boron concentration adjustments as dictated from sample results.
PROCEDURE NOTE:		**Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows: • TURN control switch RMW CONTROL to START momentarily • VERIFY the RED indicator light is LIT
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**

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Event Description: Lower Power

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY Tavg responds as desired.
	RO	IF rod control is in AUTO, THEN VERIFY the control rods are responding properly.
	RO	VERIFY boration automatically terminates when the desired quantity of boron has been added.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
EVALUATOR NOTE:		**Additional steps are included in section 5.1 but none will be applicable since the system just came out of Automatic. The only steps included here are the ones with verifiable action.**
	RO	VERIFY the RMW CONTROL switch: • Is in the STOP position • The GREEN light is LIT
	RO	PLACE the RMW MODE SELECTOR to AUTO.
	RO	START the makeup system as follows: • TURN control switch RMW CONTROL to START momentarily • VERIFY the RED indicator light is LIT
LEAD EVALUATOR:		**Once satisfied with observation of the power reduction, initiate Event 2 - "Letdown Pressure Controller Failing Closed"**

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Event Description: Letdown Pressure Regulator Failure)

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG 2 "Ltdn Pressure Controller Failing Closed"**
Indications Available: ▪ **ALB-07-3-5 LOW PRESSURE LETDOWN HIGH PRESS** ▪ **ALB-07-5-5 COMPUTER ALARM CHEM & VOL SYSTEMS** ▪ **ALB-07-3-1 LP LETDOWN RELIEF LINE HIGH TEMP**		
	RO	RESPONDS to alarms.
	SRO	Directs RO to carry out actions of APP's. (May direct isolating letdown due to relief lifting)
	RO	• CONFIRM alarm using PI-145, LP Ltdn Press. Report 1CS-38 CLOSED. • VERIFY Automatic Functions: (None) • PERFORM Corrective Actions: o IF necessary to lower letdown pressure, THEN: (YES) ▪ REFER to OP-107, Chemical and Volume control System. ▪ REMOVE or change in-service letdown orifices. o TAKE manual control of PK-145.1, Ltdn Pressure, AND ADJUST 1CS-38 to lower letdown pressure.
	SRO	• Should provide a control band for manual letdown pressure control between 340 psig and 360 psig based on OP-107 normal parameters (may provide wider band) • Contact Work Control for assistance. • Fills out Equipment Problem Checklist
EVALUATOR NOTE: When letdown pressure is being controlled or letdown is isolated, initiate Event 3 ("A" Emergency Services Chilled Water Pump Trip).		

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Event Description: 'A' Emergency Services Chilled Water Pump Trip

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-3 "Trip of the running ESCWS Chiller WC-2 A-SA"**
Indications Available:		**ALB-23-1-18 CHILLER WC2-A TROUBLE** **ALB-23-1-16 WC2-A CH HI/SW LO FLOW**
	BOP	• RESPONDS to alarm on ALB-23 (1-18). • REPORTS WC-2A-SA tripped.
	SRO	ENTERS AOP-026, LOSS OF ESSENTIAL SERVICE CHILLED WATER SYSTEM
PROCEDURE NOTE:		**This procedure contains no immediate actions.**
	BOP	CHECK the in-service chiller RUNNING. (NO)
	CREW	DISPATCH an operator to determine the cause of the chiller trip.
COMMUNICATOR:		**When contacted, wait 2 minutes and then report that the breaker for the chiller has tripped on overcurrent and that there are no visible problems locally at the chiller.**
	BOP	PERFORM the following using OP-148, Essential Service Chilled Water System: START the Standby chiller (Start P-4B and 'B' Chiller) section 5.1 or 5.2 of OP-148. (Attached at end of guide)
COMMUNICATOR:		**If contacted, report "Pre-start checks on P-4B and 'B' Chiller are complete." No simulator booth operations are required.**
EVALUATOR NOTE:		**Section 5.2 of OP-148 may be used if crew determines that loss will be short term.**

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Event Description: 'A' Emergency Services Chilled Water Pump Trip

Time	Position	Applicant's Actions or Behavior
		OP-148, Section 5.1 and Section 5.2 NOTE: Due to crew preference the OP-148 sections are located at the end of this guide in Attachment 1. The BOP will perform the actions of the OP procedure.
COMMUNICATOR:		**IF contacted by the BOP to RESET the Low Chilled Water Flow alarm, wait 15 seconds and then report "The Low Chilled Water No Flow Alarm has been reset, and there are no other alarms." There are NO simulator operations required.**
	CREW	CONTACT Maintenance as necessary for troubleshooting and appropriate corrective actions.
	BOP	CHECK EITHER chiller STARTED. (YES) VERIFY the following AH units for the operating train chiller are RUNNING: • AH-15, Control Room Normal Supply • AH-17, Fuel Vent FP Pump Room Fan Cooler • AH-16, Elec Equip Prot Rm Supply VERIFY the following alarm is CLEAR for the running chiller • ALB-23-1-20, Expansion TK A LO-LO Level • ALB-23-2-20, Expansion TK B LO-LO Level

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Event Description: 'A' Emergency Services Chilled Water Pump Trip

Time	Position	Applicant's Actions or Behavior
	SRO	REFER TO Tech Spec 3.7.13. At least two independent Essential Services Chilled Water System loops shall be OPERABLE. • ACTION: With only one ESCW System loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HSB within the next 6 hours and in CSD within the following 30 hours. Contacts WCC for Work Request and EIR. Contacts Maintenance to investigate and fills out an Equipment Problem Checklist. Obtains OWP-ECW Direct BOP to perform Train Swap
	BOP	Start the corresponding air handlers
	SRO	EXIT this procedure.
EVALUATOR NOTE:		**After the ESCWS Chiller is running - Initiate Event 4 "Generator Voltage Regulator Failure".** **Note: Alarms will not actuate for approximately 2 minutes after TRG 4 is inserted.**

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Event Description: 'Failure of the Generator Voltage Regulator

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-4 "Main Generator Voltage Regulator failure"**
Indications Available: • **MVARS increasing on ERFIS** • **ALB-22-9-4 COMPUTER ALARM GEN/EXCITER SYSTEMS** • **ALB-22-4-3 GENERATOR VOLTAGE/FREQ RATIO/HIGH OR UNDER FREQ** • **ALB-22-6-5 GENERATOR EXCITER MAX EXCITATION & LIMITING** • **ALB-20-5-5 COMPUTER ALARM MS/TURBINE SYSTEMS**		
	BOP	RESPONDS to alarms ALB-022-9-4 and 4-3.
	BOP	ENTERS APP-ALB-022-9-4 then 4-3.
EVALUATOR NOTE:		**Alarm ALB-022-9-4 is a computer alarm. ALB-022-4-3 will initiate corrective actions.** **The crew may refer to AOP-006, Turbine Generator Trouble but no actions will result.**

	BOP	CONFIRM alarm using:
		• AT MCB:
		  • EI-525, Generator Frequency.
		  • EI-520, Generator Phase Volts. (YES-Reports voltage regulation problem)
		  • EI-540, Gen Exciter Field Volts.
		  • EI-541, Gen Exciter Field Current.
		VERIFY Automatic Functions:
		• VOLTAGE Regulator Limiter decreases Generator excitation.
		• IF Voltage Limiter is unable to control excitation increase, a Generator Lockout occurs.

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Event Description: 'Failure of the Generator Voltage Regulator

Time	Position	Applicant's Actions or Behavior
	BOP	PERFORM Corrective Actions: • CHECK for the following at MCB: • EI-525, Generator Frequency, stable at 60 Hz. (YES) • EI-520, Generator Phase Volts, stable at 22 KV. (NO) • EI-540, Gen Exciter Field Volts stable. (YES) • EI-541, Gen Exciter Field Current stable. (YES)
PROCEDURE NOTE:		**An automatic transfer to manual Generator voltage control is indicated by GENERATOR VOLTAGE REGULATOR switch ON and the GREEN light LIT. Both the AMBER light and RED light will be OFF.**

	BOP	ALB-022-4-3
		• OPERATE GENERATOR VOLTAGE ADJUSTER switch to restore Generator voltage to 22 KV and reduce MVARS.
		• IF GENERATOR VOLTAGE ADJUSTER switch is ineffective THEN PERFORM the following to transfer and maintain voltage manually:
		  • OPERATE the GENERATOR VOLTAGE ADJUSTER to attempt to zero the REGULATOR OUTPUT BAL VOLT meter.
		  • PLACE GENERATOR VOLTAGE REGULATOR switch in the TEST position and observe AMBER light LIT and RED light OFF.
		  • OPERATE GENERATOR BASE ADJUSTER switch to restore Generator voltage to 22 KV.
		  • Dispatch AO to inspect voltage regulator

COMMUNICATOR:		**If dispatched to inspect voltage regulator locally, wait approximately 2 minutes and report that there are no abnormal indications at the voltage regulator.**
	SRO	• REFERENCE AOP-028, Grid Instability. (N/A – the problem is not on the grid)

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Event Description: 'Failure of the Generator Voltage Regulator

Time	Position	Applicant's Actions or Behavior
	BOP	• VERIFY Main Generator is operating per the Generator Capability Curve.
	SRO/BOP	• Contacts Load Dispatcher and provides information that the Voltage regulator is in manual o 30 minute requirement per ALB-022-4-3 o 60 minute requirement per OMM-001, Att. 12
	SRO	• Contacts WCC for support and fills out Equipment Problem Checklist • Provides control band to BOP for MVAR control based on OP-153.01 normal limits o 75 to 175 MVAR if above 750 MWe o 65 to 175 MVAR if 550 to 750 MWe
EVALUATOR NOTE:		**After the Generator Voltage Regulator is stabilized insert Event 5 (Small RCS leak (~ 25 gpm.** **The leak is ramped in over 4 minutes. Approximately 1 minute after trigger is actuated, charging flow can be observed increasing.**

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-5 "RCS leak in Containment of ~ 25 gpm"**
Indications Available: • **Increasing Charging flow, VCT level decrease** • **Pressurizer Level decreasing** • **ALB-10-4-5 RAD MONITOR SYSTEM TROUBLE** • **REM-1LT-3502A Cont Leak Detection in Alarm** • **Containment temperature and pressure increasing**		
	RO	RESPONDS to alarms on ALB-10-4-5 and changing plant conditions
	CREW	Identifies entry condition to AOP-016, Leakage Inside CNMT
	SRO	CONFIRM alarm on RM-11, MCB and ERFIS indications
	SRO	ENTERS AOP-016, EXCESSIVE PRIMARY PLANT LEAKAGE
PROCEDURE NOTE: No immediate actions.		
	SRO	**CHECK** RHR in operation. (NO) GO TO Step 3 (Refer to PEP-110)
PROCEDURE NOTE: This step is a qualitative check for leakage obviously in excess of Make Up capability. Isolation of letdown may be necessary. A formal calculation to determine the leakrate is performed in Step 16.		

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	SRO	Reviews note (CONTINUOUS ACTION) **CHECK** RCS leakage within VCT makeup capability. (YES) DIRECTS RO to determine leakrate
	RO	Determines leakrate to be ~25 gpm (±10 gpm) and within VCT makeup capability.
NOTE: If CSIP suction is re-aligned to the RWST, negative reactivity addition should be anticipated.		
	SRO	Reviews note: DIRECTS RO TO **MAINTAIN** VCT level GREATER THAN 5% **GO TO** step 10
	RO	Monitors VCT level and Primary plant parameters during transient
	SRO	**CHECK** valid CNMT Ventilation Isolation monitors (REM-3561A, B, C and D) ALARM CLEAR. (YES) **CHECK** RM 3502A, RCS Leak Detection Radiation Monitor, ALARM CLEAR. (NO) Directs BOP to **VERIFY** CNMT ventilation isolation has ACTUATED
	BOP	VERIFIES CNMT ventilation isolation has occurred (May recommend going to Max Containment Cooling)
	SRO	**CHECK** RM 3502A, RCS Leak Detection Radiation Monitor, ALARM CLEAR (NO) DIRECTS BOP TO **VERIFY** CNMT normal purge and supply fans isolate on high radiation level signal.
	BOP	VERIFIES CNMT normal purge and supply fans and dampers are secured (YES) (AH-82 SA, 1CP-9 and 1CP-5)

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	SRO	CHECK ALL valid Area Radiation Monitors ALARM CLEAR. (YES)
	SRO	CHECK valid Stack Monitors ALARM CLEAR (YES)
	SRO	DIRECT RO to perform RCS flow balance calculation
	RO	Performs RCS flow balance and calculates leakrate of ~25 gpm (±10 gpm)
	SRO	Evaluate RCS leakage Tech Spec 3.4.6.2 • > 1 gpm Unidentified leakage Action b reduce leakage to within limits within 4 hours or HSB within next 6 and CSD within following 30 hours (If informed by BOP to review TS 3.4.6.1 and 3.4.8 they do not apply for this situation)
	CREW	DETERMINE leak location: Using MCB indications, Valid Radiation Monitors and CNMT sump in-leakage the crew should determine leak location as "Inside Containment".
	SRO	Transitions to Attachment 7 DIRECTS BOP to perform attachment 7
	BOP	• Performs AOP-016 Attachment 7 actions (attached on last pages of scenario guide) • Notify Chemistry and HP of leak in progress (if directed by SRO)
	SRO	Determines that RCS leakage is exceeding Tech Specs Continue with the Shutdown IAW GP-006 NOTE: Although NOT directed by AOP-016 for RCS leakage the SRO may determine that a rapid shutdown should be performed and use AOP-038 to quickly get the plant off line.

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Event Description:	"Large Break LOCA		

Time	Position	Applicant's Actions or Behavior
EXAMINER NOTE:		**The next step will be a decision to continue the plant shutdown using either GP-006 or rapidly shutting the plant down IAW-AOP-038. If the SRO asks for guidance, the MSO will direct that the plant shutdown will be conducted using AOP-038 if no guidance is request then a plant shutdown will be continued based on the SRO decision EITHER WAY IS OK.**
		Continue with the plant shutdown using ONE of the following: GP-006, Normal Plant Shutdown from Power Operation to Hot Standby or AOP-038, Rapid Downpower
EXAMINER NOTE: If AOP-038 is performed then follow the actions below. If not performed then crew will continue with downpower IAW GP-006. The actions will be to continue as a normal plant shutdown.		
	SRO	Enters AOP-038, RAPID DOWNPOWER.
PROCEDURE NOTE:		**This procedure contains no immediate actions.** **Steps may be performed simultaneously or out of sequence at the discretion of the Superintendent - Shift Operations.**
EVALUATOR / COMMUNICATOR NOTE:		**The crew may make calls to notify plant management before or during the power reduction. Acknowledge and request a report when more information becomes available.**
		AOP-038, Rapid Downpower Actions
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action Recommendations, AND ENTER the EAL Network at entry point X. NOTIFY Load Dispatcher that the Unit is reducing load. (N/A)
PROCEDURE NOTE: Boration of the RCS commences at Step 10.		

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Event Description: "Large Break LOCA			

Time	Position	Applicant's Actions or Behavior
EVALUATOR'S NOTE:		**The crew may use OP-107, Section 8.21 – RAPID ADDITION OF BORIC ACID TO RCS, to estimate the boration and perform the steps.**
	RO/SRO	DETERMINE required boric acid addition for desired power reduction, as follows: CHECK BOTH of the following conditions exist: • Reactor power is ~75%. • Target power level is provided in OPT-1525, Reactivity Plan Generation Weekly Interval MODE 1 at Full Power (50%, 30% or 5%).
	RO	OBTAIN values from Attachment 2, Gallons of Boric Acid/Target Rod Height Required for Power Reduction. • Desired Boration _____ gal • Target Rod height (D Bank) _____
PROCEDURE NOTE:		**If load reduction rates in excess of 45 MW/min are required, the Unit should be tripped.** **If OSI-PI is available, the following path in PLANTSTATUS.PIW will assess VIDAR functionality:** **Plant Process Computer: DEH (menu), DEH Trends, DEH_MEGAWATTS. If DEH_MEGAWATTS is flat-lining, VIDAR is NOT functioning properly.** **If OSI-PI is NOT available, accessing the ANALOG INPUTS screen on the Graphics Display Computer (located in the Termination Cabinet Room near the ATWS Panel) will show several points, most of which should be updating if the VIDAR Unit is functioning properly.**
PROCEDURE CAUTION:		**Failure of the DEH computer VIDAR Unit while in OPER AUTO has resulted in a plant trip.**

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK BOTH of the following: • DEH System in AUTO (YES) • VIDAR functioning properly (YES)
	BOP	PERFORM the following at the DEH panel: • DEPRESS the Load Rate MW/MIN pushbutton. • ENTER desired rate (NOT to exceed 45 MW/MIN) in DEMAND display. • DEPRESS ENTER pushbutton. • DEPRESS REF pushbutton. • ENTER desired load (120 MW if shutting down) in DEMAND display. • DEPRESS ENTER pushbutton. • CHECK HOLD pushbutton LIT.
	RO	• CHECK Rod Control in AUTO. (YES) • MANUALLY POSITION Control Rods to maintain Tavg within 5°F of Tref. • ENERGIZE ALL available PRZ Backup heaters.
	SRO	DISCUSS Attachment 3, Reactivity Brief, with the MCR staff.
PROCEDURE NOTE:		**With the Megawatt and Impulse Pressure Feedback Loops out of service, the MW indication in the REFERENCE display will not reflect actual MW output. An accurate indication of Main Generator output can be obtained from ERFIS point JEE1568B (Gross MWe).**

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	BOP	COMMENCE turbine load reduction at the DEH panel: • CHECK OPER AUTO Mode AVAILABLE. (YES) • DEPRESS GO pushbutton. • VERIFY the value in the REFERENCE display LOWERS.
PROCEDURE NOTE:		**To prevent over-boration, only the amount of boron required to reduce power to the desired power level should be added.** **Adjustments should be made to boric acid flow based on actual core/rod responses.**
	RO	COMMENCE RCS boration as required to maintain Control Rods above the Rod Insertion Limit (Curve F-X-1).

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Event Description: "Large Break LOCA			

Time	Position	Applicant's Actions or Behavior
EVALUATOR'S NOTE:		**The following boration steps are provided for evaluator use. They are not in AOP-038. They will use OP-107.01 section 8.7 or 5.2. Either section will result in the desired outcome.**
		OP-107.01, CVCS BORATION, DILUTION, AND CHEMISTRY CONTROL Section 8.7 "Rapid Addition of Boric Acid to the RCS"
PROCEDURE NOTE:		**If performing a rapid shutdown of the plant per AOP-038, the following calculation does not have to be completed before boration begins, but should be completed before half of the estimated (or before 500 gallons whichever is less) boron addition has been dispensed.**
	RO	• DETERMINE the volume of boric acid necessary to achieve the required RCS boron concentration. • ENTER the amount determined in previous Step on Attachment 3. • VERIFY the backup Boric Acid Transfer Pump control switch is in STOP. • START the Boric Acid Transfer Pump aligned for Auto Make-up (switch in AUTO) by placing the control switch to START. • OPEN 1CS-278 SB, EMERGENCY BORIC ACID ADDITION. • RECORD the Boric Acid flowrate from FI-110 on Attachment 3. • CALCULATE the amount of time in minutes it will take to deliver the required amount of Boric Acid.
	BOP	**INDEPENDENTLY VERIFY** the calculation

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	RO	**CONTROL** charging and letdown to maintain normal PRZ and VCT levels. **CALCULATE** the final BAT level for the required amount of Boric Acid being added.
	BOP	**INDEPENDENTLY VERIFY** the calculation performed
PROCEDURE NOTE: Boration flow may be interrupted as needed by cycling 1CS-278, while maintaining the total boration time calculated		
	RO	WHEN the calculated amount of time has elapsed, THEN SHUT 1CS-278 SB. STOP the Boric Acid Transfer Pump started previously. **VERIFY** Boric Acid pumps in the following alignment: • One pump is in AUTO. • One pump is in STOP. REQUEST Chemistry to sample the RCS boron concentration. PLACE Reactor Makeup in Auto per Section 5.1.
		OP-107.01, Chemical and Volume Control System, Section 5.2 "Blender Boration Operation"
	RO	• **DETERMINE** the reactor coolant boron concentration from chemistry **OR** the Main Control Room status board. • **DETERMINE** the magnitude of boron concentration increase required. • **DETERMINE** the volume of boric acid to be added.
PROCEDURE NOTE: FIS-113, BORIC ACID BATCH COUNTER, has a tenths position. **PROCEDURE CAUTION:** If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.		

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	RO	• SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
PROCEDURE NOTE: Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.		
	RO	• SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate. • VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit. • PLACE control switch RMW MODE SELECTOR to the BOR position. • START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily.
PROCEDURE NOTE: When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows: • PORV PCV-444B will open at a lower than expected pressure • ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure • Increased probability for exceeding Tech Spec DNB limit for RCS pressure		
	RO	**OPERATE** the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
PROCEDURE NOTE: At least 10 minutes should be allowed for mixing before a sample is taken.		

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	RO	For large boron changes, **PERFORM** the following: a. **DIRECT** Chemistry to sample the RCS for boron concentration. b. **MAKE** boron concentration adjustments as dictated from sample results.
PROCEDURE NOTE: Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP		
	RO	• **START** the makeup system as follows: o **TURN** control switch RMW CONTROL to START momentarily. o **VERIFY** the red indicator light is lit.
PROCDURE CAUTION: The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.		
	RO	• **VERIFY** Tavg responds as desired. • **IF** rod control is in AUTO, • **THEN VERIFY** the control rods are responding properly. • **PLACE** Reactor Makeup in Auto per Section 5.1.

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Event Description: "Large Break LOCA			

Time	Position	Applicant's Actions or Behavior
AOP-038, Rapid Downpower Actions - Continued (step 11)		
	CREW	VERIFY Generator load AND Reactor power LOWERING.
	BOP	MAINTAIN Generator reactive load (VARs) within guidelines.
	RO	CHECK Tavg within 5 °F of Tref. (YES)
	CREW	NOTIFY Chemistry of the following: Reactor power change will exceed 15% in a one hour period.
	SRO	• The following surveillances specified in the applicable sections require performing: o RST-204, Reactor Coolant System Chemistry and Radiochemistry Surveillance, RST-211, Gaseous Effluent Radiochemistry Surveillance • CHECK that a planned load reduction will take the Unit to Turbine shutdown. (YES) • **DISPATCH** an operator to start the Auxiliary Boiler using OP-130.02, Auxiliary Boiler and Fuel Oil. • **NOTIFY** Radwaste Control Room to be prepared for the increased water processing requirements due to boration.
	CREW	**CHECK** Power level at the target value. (NO)
	RO	**BORATE** OR **DILUTE** as necessary to maintain AFD (Curve F-X-2) as close to the target value as possible while maintaining rods above the Rod Insertion Limit (Curve F-X-1).
	SRO	**REQUEST** Chemistry to sample the RCS for boron.
	RO	**ALIGN** RCS makeup for AUTO operation using OP-107.01, CVCS Boration, Dilution, and Chemistry Control.
EVALUATOR'S NOTE:		**Once satisfied with power reduction implementation response to the small RCS leak, initiate Event 6 "Large Break LOCA"**

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Event Description: "Large Break LOCA			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed by Lead Evaluator: Activate TRG-6 "Large Break LOCA"**
Indications Available:		• **RCS Pressure rapid decrease** • **Charging flow increasing** • **Pressurizer level decreasing** • **ALB-09-5-1 PRESSURIZER HIGH-LOW PRESS** • **ALB-09-2-2 PRESSURIZER CONTROL LOW LEVEL DEVIATION** • **ALB-09-3-3 PRZ CONT LOW PRESS AND HEATERS ON** • **ALB-10-8-5a CMPTR ALARM RX COOLANT** • **Radiation monitors in alarm**
Evaluator Note:		**The crew may transition to EPP-004 before the SI is required but it will occur shortly thereafter.** **'B' CSIP will not auto start when SI is initiated.** **Due to the earlier problems with the A-SA ESCWS Chiller, the 'A' sequencer will not reach load block 9, requiring the MAN PERM switch to be manipulated to allow manual loading of 'A' train components.**
	Crew	RESPONDS to RCS inventory alarms.
	RO	INITIATES MANUAL Reactor Trip.
	SRO	ENTERS and directs actions of PATH-1.
	RO	PERFORM immediate actions of PATH-1.

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Event Description: "Large Break LOCA

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY Reactor Trip: • AUTO or MANUAL Reactor Trip successful: • CHECK for any of the following: • Trip breakers RTA and BYA OPEN (YES) • Trip breakers RTB and BYB OPEN (YES) o ROD Bottom lights LIT (YES) o NEUTRON flux decreasing (YES)
	BOP	VERIFY Turbine Trip: • CHECK for any of the following: • ALL turbine throttle valves – SHUT (YES) • ALL turbine governor valves – SHUT (YES)
	BOP	VERIFY power to AC Emergency Buses • 1A-SA and 1B-SB Buses energized by off-site power or EDG's (YES, off-site power)
	RO	CHECK SI Actuation: • CHECK for any of the following – LIT: (YES or NO) o SI Actuated bypass permissive light ▪ ALB-11-2-2 ▪ ALB-11-5-1 ▪ ALB-11-5-3 ▪ ALB-12-1-4
	RO	• SI actuation – REQUIRED (YES) • Actuate SI (AUTO actuated)

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Event Description:	"'B' CSIP Fails to Auto Start on SI		

Time	Position	Applicant's Actions or Behavior
Evaluator's Note:		**Once Containment Pressure exceeds 3 psig the crew should apply adverse CNMT values for the remainder of the scenario.**
	SRO	INFORMS Crew Foldout A applies. **NOTE: The crew may brief on the foldout criteria and stop the RCP's at this time dependent on RCS conditions and leak progression.**
Event 7	RO	• VERIFY ALL CSIPs AND RHR pumps – RUNNING. (NO. 'B' CSIP is not running) o **STARTS 'B' CSIP** • CHECK SI Flow: o SI flow – GREATER THAN 200 GPM. (YES) o RCS pressure – LESS THAN 230 PSIG. (NO)
Critical Task	RO	Foldout A - RCP trip criteria is met or PHASE B Actuation Stops ALL RCPs
	BOP	CHECK Main Steam Isolation:
		• MAIN Steam isolation – ACTUATED. (YES)
	BOP	VERIFY all MSIVs and Bypass Valves - SHUT (YES)

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Event Description: Both CNMT Spray Pumps Fail to Auto Start

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>Event 8</td><td>RO</td><td>
• CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (NO)
• Perform the following:
o Verify CNMT spray – ACTUATED (NO)
o Start at least one CNMT spray pump ('A' pump will not start unless the MAN PERM switch is operated for train A)
▪ Starts 'B' CT Pump
▪ Take A Sequencer to MAN PERM then start 'A' CT Pump
o Locally establish educator flow using TABLE:
<table>
<tr><th>ERFIS POINT (FCT7152)</th><th>MINIMUM FLOW</th><th>MAXIMUM FLOW</th></tr>
<tr><td>DUAL TRAIN</td><td>25.6 GPM</td><td>26.8 GPM</td></tr>
<tr><td>SINGLE TRAIN</td><td>13.0 GPM</td><td>13.2 GPM</td></tr>
</table>
(Eductor flow should be established in band within 15 MINUTES of CNMT spray actuation.)
</td></tr>
<tr><td colspan="3">COMMUNICATOR / BOOTH OPERATOR:
When directed by MCR to adjust spray educator flow, this can be accomplished by utilizing malfunction FT:7152. FI-7152 can be monitored on drawing CNS01. The malfunction can be accessed on the drawing as well. Call back when adjustments are completed.</td></tr>
<tr><td>Critical Task</td><td></td><td>Stop all RCPs (if not performed previously)</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>BOP</td><td>CHECK AFW Status:</td></tr>
<tr><td></td><td></td><td>• AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES)</td></tr>
</table>

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Event Description:	Large Break LOCA (continued)		

<table>
<tr><th>Time</th><th>Position</th><th>Applicant's Actions or Behavior</th></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>SRO</td><td>ASSIGNS a crew member to perform the following:
• VERIFY alignment of components from actuation of ESFAS Signals using Attachment 6, "Safeguards Actuation Verification", while continuing with implementation of EOPs.</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td></td><td>BOP</td><td>CONTROL RCS Temperature:
• STABILIZE AND maintain temperature between 555°F AND 559°F using Table 1.
TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP
• Guidance is applicable until another procedure directs otherwise.
• IF no RCPs running, THEN use wide range cold leg temperature.
<table>
<tr><th>LESS THAN 557°F AND DECREASING</th><th>GREATER THAN 557°F AND INCREASING</th><th>STABLE AT OR TRENDING TO 557°F</th></tr>
<tr><td>• Stop dumping steam</td><td>• IF condenser available THEN transfer steam dump to STEAM PRESSURE mode using OP-126, Section 5.3 AND dump steam to condenser</td><td>• Control feed flow and steam dump to establish and maintain RCS temperature between 555°F AND 559°F</td></tr>
<tr><td>• Control feed flow</td><td>OR</td><td></td></tr>
<tr><td>• Maintain total feed flow greater than 210 KPPH until level greater than 25% [40%] in at least one on intact SG</td><td>• Dump steam using intact SG PORVs
• Control feed flow to maintain SG levels</td><td></td></tr>
</table></td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>BOP</td><td>ENERGIZES AC buses 1A1 AND 1B1</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

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Event Description: Large Break LOCA (continued)

Time	Position	Applicant's Actions or Behavior
	RO	• CHECK PRZ PORVs – SHUT (YES) • CHECK PRZ PORV Block Valves – AT LEAST ONE OPEN. (YES) • PRZ spray valves – SHUT. (YES)
	BOP	IDENTIFY any faulted SG: • CHECK for any of the following: o ANY SG pressures – DECREASING IN AN UNCONTROLLED MANNER (NO) o ANY SG – COMPLETELY DEPRESSURIZED. (NO)
	SRO	Identify Any Ruptured SG • CHECK for all of the following: • CONDENSER vacuum pump effluent radiation – NORMAL. (YES) • SG Blowdown radiation – NORMAL. (YES) • MAIN Steamline radiation – NORMAL. (YES) • Check any SG level – INCREASING IN AN UNCONTROLLED MANNER (NO)
	RO	CHECK for all of the following:
		• CNMT pressure – NORMAL. (NO)
	SRO	GO TO Step 44 (Path-1, Entry Point C)
		• IMPLEMENT Function Restoration Procedures As Required.
EVALUATOR NOTE:		**Due to RCS conditions, a transition to FR-P.1 may be required. There are no significant actions, and the crew will return to procedure and step in effect. The following steps encompass the FR-P.1 actions with return to PATH-1.**

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Event Description:	Large Break LOCA (continued)		

Time	Position	Applicant's Actions or Behavior
	SRO	Initiates FR-P-1
	SRO	• Check RCS Pressure: o Check for both of the following: ▪ RCS pressure – LESS THAN 230 PSIG (YES) ▪ Any RHR HX header flow - GREATER THAN 1000 GPM (YES) • RETURN to procedure and step in effect. (PATH-1)

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Event Description:	Large Break LOCA (continued)		

Time	Position	Applicant's Actions or Behavior
	SRO	Return to PATH-1
	SRO	INFORMS Crew that Foldouts A AND B apply. **NOTE: The crew may brief on the foldout criteria.**
	RO	MAINTAIN RCP Seal Injection flow between 8 GPM AND 13 GPM.
	BOP	CHECK Intact SG Levels:
		• ANY level – GREATER THAN 25% **[40%].** (YES)
		• CONTROL feed flow to maintain all intact levels between 25% AND 50% **[40% AND 50%].**
	RO	CHECK PRZ PORV AND Block Valves: • VERIFY AC buses 1A1 AND 1B1 – ENERGIZED. (YES) • CHECK PRZ PORVs – SHUT. (YES) • CHECK block valves – AT LEAST ONE OPEN. (YES)
	SRO	CONTINUOUS ACTION: IF a PRZ PORV opens on high pressure, THEN verify it shuts after pressure decreases to less than opening setpoint.
	RO	CHECK SI Termination Criteria:
		• RCS subcooling – GREATER THAN
		10°F [40°F] – C (NO)
		20°F [50°F] – M (NO)

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Event Description:	Large Break LOCA (continued)		

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR / COMMUNICATOR: **When contacted to place A/B air compressors in Local Control mode, run CAEP *:\air\ACs_to_local.txt*. When CAEP is complete, report that the air compressors are running in local control mode.** **When contacted to Unlock and Turn ON the breakers for the CSIP suction and discharge cross-connect valves, run CAEP *:\cvc\path-1 att 6 csip suction valves power.txt*. When the CAEP is complete, report completion to the MCR.**		
	SRO	WHENEVER the SI termination criteria are met, THEN GO TO EPP-008, "SI TERMINATION".
	RO	CHECK any CMT Spray Pump – RUNNING. (YES)
	SRO	CONSULT plant operations staff to determine if CNMT spray should be placed in standby.
BOOTH OPERATOR:		**If contacted as plant operations staff, provide the following direction: "Unless directed by procedure, leave CNMT Spray in service until the TSC has completed an evaluation".**
	SRO	CONTINUOUS ACTION: WHEN directed by plant operations staff, place CNMT Spray in standby alignment.
	RO	WHEN flux less than $5x10^{-11}$ AMPS, THEN do Steps 52b AND c. • VERIFY source range detectors – ENERGIZED. • TRANSFER nuclear recorder to source range scale.
	RO	CHECK RHR Pump Status:
		• RCS Pressure – GREATER THAN 230 PSIG. (NO)

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Event Description: Large Break LOCA (continued)

Time	Position	Applicant's Actions or Behavior
	RO	• Establish CCW flow to the RHR Heat Exchanger: • Verify both CCW pumps – RUNNING (YES) • Open the following valves: o TRAIN A: 1CC-147 o TRAIN B: 1CC-167 • Verify CCW flow to the RHR heat exchangers • Perform one of the following to establish two independent CCW systems o Shut train A CCW non-essential supply AND return valves ▪ 1CC-99 ▪ 1CC-128 o Shut train B CCW non-essential supply AND return valves ▪ 1CC-113 ▪ 1CC-127
	BOP	• CHECK EDG Status: o CHECK AC emergency buses 1A-SA AND 1B-SB – ENERGIZED BY OFFSITE POWER. (YES) • CHECK any EDG – RUNNING UNLOADED. (YES)
	RO	RESET SI.
	SRO	Foldouts A and B apply.

Op Test No.: 05000400/2009302	Scenario # 1	Event # 8	Page 42 of 57
Event Description:	Large Break LOCA (continued)		

Time	Position	Applicant's Actions or Behavior
	RO/SRO	• Initiate Evaluation of Plant Status RHR system – CAPABLE OF COLD LEG RECIRCULATION. (YES) o Check auxiliary AND radwaste processing building radiation – NORMAL (YES) • Check RCS status o Check for both of the following: ▪ RCS pressure – LESS THAN 230 psig (YES) ▪ ANY RHR HX header flow – GREATER THAN 1000 GPM (YES)
EVALUATOR NOTE:		**The following step may have RWST level less than 23.4%, requiring transition to EPP-010 dependent on RWST conditions. Otherwise, the crew will remain in PATH-1 until RWST level drops to 23.4% and apply foldout criteria to transition to establish cold leg recirculation.**
	SRO	• Check Cold Leg Recirculation Criteria: o Check SI System – ALIGNED FOR COLD LEG RECIRCULATION (NO) o Perform a brief on EPP-010, "TRANSFER TO COLD LEG RECIRCULATION" to prepare for transfer to cold leg recirculation. o RWST level – LESS THAN 23.4% (2/4 LOW-LOW ALARM) (NO) • RETURN to Step 57 (Evaluating RCS conditions).

Op Test No.: 05000400/2009302	Scenario # 1	Event # 9	Page 43 of 57
Event Description:	RWST swap-over failure (1SI-300 and 1SI-310 fail to open)		

Time	Position	Applicant's Actions or Behavior
	SRO	Implement EPP-010
		Procedure Caution • Perform Steps 1 through 8 without delay. Do NOT implement Function Restoration Procedures prior to completion of these steps. • SI recirculation flow to RCS must be maintained at all times. • Switchover to recirculation may cause high radiation levels in the reactor auxiliary building. Radiation levels must be assessed prior to performance of local actions in the affected areas.
		Procedure Note • Foldout applies. • A minimum of 142 INCHES CNMT wide range sump level ensures the recirculation sump strainers are completely submerged AND assures a long term recirculation suction source. • The following sequence of steps to transfer to cold leg recirculation assumes operability of at least one train of safeguards equipment.
EVALUATOR NOTE:		**The crew may identify that 1SI-300 and 1SI-310 will not open due to failed relay based on the following indications:** • **Bypass Permissive Light Box 4-8 flashing** • **No white light on SI Suction Auto Switchover Reset Train A switch**
Critical Task	SRO/RO	• Establish RHR Pump Recirculation Alignment: o Verify both RHR pumps - RUNNING • Verify CNMT sump to RHR pump suction valves - OPEN: o Train A RHR pump: ▪ 1SI-300 AND 1SI-310 (NO) • Open 1SI-300 AND 1SI-310 o Train B RHR pump: ▪ 1SI-301 AND 1SI-311 • Shut RWST to RHR pump suction valves: o 1SI-322 (Train A) o 1SI-323 (Train B) • Shut low head SI Train A to cold leg valve: o 1SI-340 • Check RHR pump recirculation alignment – AT LEAST ONE TRAIN ESTABLISHED (YES)

Op Test No.: 05000400/2009302	Scenario # 1	Event # 9	Page 44 of 57
Event Description:	RWST swap-over failure (1SI-300 and 1SI-310 fail to open)		

Time	Position	Applicant's Actions or Behavior
	SRO/RO	• Establish CSIP Recirculation Alignment: o Shut CSIP alternate miniflow isolation valves: ▪ 1CS-746 (Train A CSIP) ▪ 1CS-752 (Train B CSIP) • Verify normal miniflow isolation valves – SHUT (YES) o 1CS-182 o 1CS-196 o 1CS-210 o 1CS-214 • Open RHR discharge to CSIP suction valves: o 1RH-25 o 1RH-63 • Reset SI. • Manually realign safeguards equipment following a loss of offsite power. (Refer to PATH-1 GUIDE, Attachment 2.) • Shut RWST to CSIP suction valves AND place in pull-to-lock position: • 1CS-291 (LCV-115B) • 1CS-292 (LCV-115D) • Check Charging System Status: o Check charging line – ISOLATED (YES) ▪ 1CS-235 ▪ 1CS-238 • Verify Both Charging Pumps – RUNNING (YES) • Establish Recirculation Injection Flowpath: o Open alternate high head SI to cold leg valve: ▪ 1SI-52 o Check any BIT outlet valve - OPEN ▪ 1SI-3 ▪ 1SI-4 o Check power for CSIP discharge cross-connect valves - AVAILABLE ▪ 1CS-219 (MCC 1A35-SA-14E) ▪ 1CS-217 (MCC 1B35-SB-12C) ▪ 1CS-218 (MCC 1A35-SA-14D) ▪ 1CS-220 (MCC 1B35-SB-9D) • Shut CSIP discharge cross connect-valves based on Table:

Op Test No.: 05000400/2009302	Scenario # 1	Event # 9	Page 45 of 57
Event Description:	RWST swap-over failure (1SI-300 and 1SI-310 fail to open)		

Time	Position	Applicant's Actions or Behavior
	SRO/RO	NOTE: Two valves are specified to be SHUT for each pump combination for redundancy; however, a single valve provides satisfactory isolation in the event one or more of the specified valves can NOT be SHUT. CSIPs Running: A AND B — Discharge Cross Connect Valves To Be Shut: Any 2: 1CS-217, 1CS-218, 1CS-219, 1CS-220 A AND C: 1CS-217, 1CS-219 B AND C: 1CS-218, 1CS-220
	SRO/RO	▪ Verify High Head SI Flow: (YES) o Alternate header flow (Train A): ▪ FI-940 o Normal header flow (Train B): ▪ FI-943 ▪ Verify CCW Alignment To The RHR Heat Exchangers: o Verify both CCW pumps – RUNNING (YES) o Verify the following valves OPEN (YES) ▪ 1CC-147 ▪ 1CC-167 o Verify CCW flow to the RHR heat exchanger(s). (YES) o Shut train A CCW non-essential supply AND return valves: ▪ 1CC-99 ▪ 1CC-128 o Shut train B CCW non-essential supply AND return valves: ▪ 1CC-113 ▪ 1CC-127 ▪ Observe NOTE prior to Step 9 AND GO TO Step 9. ▪ Implement Function Restoration Procedures As Required. ▪ Align CNMT Spray For Recirculation: o Any CNMT spray pump – RUNNING (YES) o Verify CNMT sump to CNMT spray suction valves – OPEN (YES) ▪ 1CT-105 ▪ 1CT-102 o Verify RWST to CNMT spray pump suction valves - SHUT ▪ 1CT-26 ▪ 1CT-71
		TERMINATE SCENARIO

5.0 STARTUP

5.1. Startup Train A-SA (B-SB) from Main Control Room or Local Panel

5.1.1. Initial Conditions

NOTE: Section 5.2, Placing Standby Train in Operation, should be used when swapping Trains of ESCWS.

1. No Chiller Train is in service. _____
2. System filled and vented per Section 8.1. _____
3. System lineup Attachments 1 and 2 are complete. _____
4. For non-emergency starts the prestart checks of Attachment 5 have been performed and an operator should be present to observe start of chiller. _____
5. Section 8.12 Manual Chiller Reset has been performed, if necessary due to chiller trip. _____
6. The L.O. heaters have been in service for twelve hours. (See Precaution and Limitation 4.0.3 for applicability of this Initial Condition)

5.1.2. Procedural Steps

NOTE: Whenever an "A" Train component is referred to in the body of this procedure it's "B" Train counterpart will immediately follow, enclosed by parentheses.

NOTE: ESR 99-00142 has evaluated and determined that long-term closure of the supply and return valves to the NNS AH units will not affect operability of the Essential Services Chiller system. The next two steps will align the NNS AH units however, if it is desired to maintain the NNS isolation valves shut, then steps 5.1.2.1 and 5.1.2.1 may be skipped.

1. **ISOLATE** the supply and return valves to the NNS AH units from the train that will not be placed in service by shutting the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	____

2. **ALIGN** the supply and return valves to the NNS AH units associated with the train that will be placed in service by opening the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	____

5.1.2 Procedural Steps (continued)

NOTE: The local alarm indication for low chilled water flow and low chilled water temperature will lock in until manually reset at the WC-2 control panel.

3. **START** WC-2 Chiller 1A-SA (1B-SB) Chilled water pump P-4 to establish chilled water flow. _____

4. At the Local Control panel, **RESET** the Low Chilled Water Flow alarm using the CHILLED WATER NO FLOW TRIP INDICATION RESET push-button. _____

5. **IF** starting the chiller for the first time following maintenance where the chiller lube oil heater circuit was under clearance,
THEN PERFORM the following:

   a. Locally **START** the oil pump on the 1A-SA (1B-SB) compressor by taking the control switch on the local panel to the MAN position. _____

   b. **RUN** pump for 5 minutes. _____

   c. **STOP** the oil pump on the 1A-SA (1B-SB) chiller compressor by taking the control switch on the local panel to the AUTO position. _____

6. At the Local Control Panel, **CHECK** that all alarm lights are **NOT** lit. _____

7. **IF** any alarm light(s) is lit,
THEN PERFORM the following:

   a. **IF** the Local Select switch is in the LOCAL position,
THEN locally **DEPRESS** the STOP push-button. _____

   b. **IF** the Local Select switch is in the MCB HVAC position,
THEN place the 1A-SA (1B-SB) compressor control switch on AEP-1 to STOP. _____

   c. **IF** any alarm light is still lit,
THEN PERFORM the following:

      (1) **DECLARE** the chiller inoperable. _____

      (2) **INITIATE** corrective actions. _____

5.1.2 Procedural Steps (continued)

NOTE: If the unit cycles off due to low chilled water flow or low chilled water temperature, the unit will automatically restart if all start permissive conditions exist.

NOTE: An anti-recycle feature prevents more than one normal start within a 30 minute period. This anti-recycle feature is bypassed upon any automatic start signal from the ESF sequencer.

NOTE: After going to START on the Chiller Control Switch, the oil pump will start and bring oil pressure up to normal operating pressure prior to chiller start.

NOTE: OPT-1512 rotates the Temperature Control Point potentiometer to clean the surfaces. While OPT-1512 restores the potentiometer to its original position, it is possible that due to the surface cleaning the characteristics of the potentiometer have changed sufficiently to require a manual temperature adjustment per Section 8.14 of this procedure. This will be determined by monitoring temperature after chiller start in the following Step.

8. **START** the chiller by performing one of the following:

   a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 A-SA (WC-2 B-SB) control switch to the START position and release. _____

   OR

   b. **DEPRESS** the START push-button at the local control panel with the Local Select switch in the LOCAL position. _____

5.2. Placing Standby Train In Operation

NOTE: It is necessary to shift associated trains of HVAC units when shifting trains of Essential Services Chilled Water.

NOTE: This Section is written for swapping from Train B ESCW to Train A ESCW, with components for swapping from Train A ESCW to Train B ESCW in parentheses.

5.2.1. Initial Conditions

1. Service water is being supplied to the non-operating chiller WC-2 1A-SA (WC-2 1B-SB). _____
2. One train of ESCW is already in operation. _____
3. For non-emergency starts the prestart checks of Attachment 5 have been performed and an operator should be present to observe start of chiller. _____
4. Section 8.12, Manual Chiller Reset performed if necessary for non-operating chiller. _____
5. The L.O. heaters have been in service for twelve hours. (See Precaution and Limitation 4.0.3 for applicability of this Initial Condition) _____

5.2.2. Procedural Steps

NOTE: The local alarm indication for low chilled water flow and low chilled water temperature will lock in until manually reset at the WC-2 control panel.

NOTE: If starting the chiller compressor is delayed following the start of the P-4 Pump in the next Step, the compressor oil could cool down to the point that the compressor will trip on low oil pressure.

1. At AEP-1, **START** the non-operating Chiller WC-2 A-SA (B-SB) Chilled Water Pump P-4 A-SA (B-SB) to establish chilled water flow in the non-operating train. _____
2. At the Local Control panel, **RESET** the Low Chilled Water Flow alarm using the CHILLED WATER NO FLOW TRIP INDICATION RESET push-button. _____

5.2.2 Procedural Steps (continued)

3. **IF** starting the chiller for the first time following maintenance where the chiller lube oil heater circuit was under clearance,
THEN PERFORM the following:

   a. Locally **START** the oil pump on the standby chiller compressor by taking the control switch on the local panel to the MAN position. _____

   b. **RUN** pump for 5 minutes. _____

   c. **STOP** the standby chiller compressor oil pump by taking the control switch on the local panel to the AUTO position. _____

4. At the Local Control Panel, **CHECK** that all alarm lights are **NOT** lit. _____

5. **IF** any alarm light(s) is lit,
THEN PERFORM the following:

   a. **IF** the Local Select switch is in the LOCAL position

5.2.2 Procedural Steps (continued)

NOTE: OPT-1512 rotates the Temperature Control Point potentiometer to clean the surfaces. While OPT-1512 restores the potentiometer to its original position, it is possible that due to the surface cleaning the characteristics of the potentiometer have changed sufficiently to require a manual temperature adjustment per Section 8.14 of this procedure. This will be determined by monitoring temperature after chiller start in the following Step.

6. **START** the chiller by performing **ONE** of the following:

   a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 A-SA (WC-2 B-SB) control switch to the START position **AND RELEASE**. _____

   OR

   b. **DEPRESS** the START push-button at the local control panel with the local select switch in the LOCAL position. _____

7. **PLACE** additional safety related air handlers in service prior to switchover of the nonessential header. _____

NOTE: ESR 99-00142 has evaluated and determined that long-term closure of the supply and return valves to the NNS AH units will not affect operability of the Essential Services Chiller system. The next two Steps will align the NNS AH units however, if it is desired to maintain the NNS isolation valves shut, then steps 5.2.2.8 and 5.2.2.9 may be skipped.

8. **ISOLATE** the supply and return valves to the NNS AH units from the train that was already operating by shutting the following valves:

1CH-196 SB (1CH-125 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL	_____
1CH-197 SA (1CH-126 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL	_____
1CH-148 SB (1CH-115 SA)	CHILLED WATER TO NESSR FANS CLR ISOL	_____
1CH-149 SA (1CH-116 SB)	CHILLED WATER TO NESSR FAN CLRS ISOL	_____

5.2.2 Procedural Steps (continued)

9. **ALIGN** NNS AH units to the train that will remain operating by opening the following valves:

1CH-125 SB (1CH-196 SB)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	____
1CH-126 SA (1CH-197 SA)	CHILLED WATER FROM NESSR FAN CLRS ISOL.	____
1CH-115 SA (1CH-148 SB)	CHILLED WATER TO NESSR FANS CLR ISOL	____
1CH-116 SB (1CH-149 SA)	CHILLED WATER TO NESSR FAN CLRS ISOL	____

10. **IF** shifting chillers to support placing the standby safety equipment train in service,
THEN PERFORM Attachment 8. ____

NOTE: Service water to the chiller condenser will isolate 90 seconds after the chiller has stopped, SW FROM WC-2 B-SB (A-SA) CONDENSER 1SW-1208 SB (1SW-1055 SA) will close.

11. **STOP** the chiller by performing one of the following:

a. At AEP-1, **PLACE** Water Chiller Compressor WC-2 B-SB (A-SA) control switch to the STOP position and release. ____

OR

b. **DEPRESS** the STOP push-button at the local control panel with the local select switch in the LOCAL position. ____

12. At AEP-1, **STOP** the Chiller WC-2 B-SB (A-SA) Chilled Water Pump P-4 B-SB (A-SA) in the train just secured. ____

Attachment 7
Sheet 1 of 4
Leakage Inside CNMT

INSTRUCTIONS	RESPONSE NOT OBTAINED

1. **STOP** CNMT purge, as follows:

   a. **STOP** Normal Purge supply fans:

   ☐ • AH-82 SA
   ☐ • AH-82 SB

   b. **VERIFY** the following Normal CNMT Purge Inlet/Discharge dampers are SHUT:

   ☐ • 1CP-9 SA
   ☐ • 1CP-5 SA
   ☐ • 1CP-6 SB
   ☐ • 1CP-3 SB

   c. **VERIFY** ONE Airborne Radioactivity Removal fan is RUNNING:

   ☐ • S-1A
   ☐ • S-1B

   d. **VERIFY** CNMT Pre-entry Purge Isolation dampers are SHUT:

   ☐ • 1CP-4 SA
   ☐ • 1CP-10 SA
   ☐ • 1CP-1 SB
   ☐ • 1CP-7 SB
   ☐ • CP-D50

(Continued on Next Page)

Attachment 7
Sheet 2 of 4
Leakage Inside CNMT

INSTRUCTIONS	RESPONSE NOT OBTAINED

1. **(continued)**

   e. **VERIFY** CNMT Vacuum Relief valves/dampers are SHUT:

☐ • 1CB-2, Vacuum Relief

☐ • CB-D51 SA, Vacuum Relief

☐ • 1CB-6, Vacuum Relief

☐ • CB-D52-SB, Vacuum Relief

☐ 2. **NOTIFY** Health Physics that CNMT Purge has been STOPPED.

3. **PERFORM** the following Attachments to monitor the leakage:

☐ • Attachment 18

☐ • Attachment 19

NOTE
If a Containment Ventilation Isolation signal has occurred, Tech Spec 3.0.3 is applicable, since both trains of Containment Vacuum Relief are inoperable.

☐ 4. **CHECK** Containment conditions NORMAL.

☐ 4. **IF** Containment Ventilation Isolation has ACTUATED,
THEN VERIFY proper equipment alignment (refer to OMM-004, Post-trip/ Safeguards Actuation Review). **[A.1]**

☐ 5. **NOTIFY** Chemistry to sample the RCS for Dose Equivalent I-131.

Attachment 7
Sheet 3 of 4
Leakage Inside CNMT

INSTRUCTIONS	RESPONSE NOT OBTAINED
	NOTE Radiation Control personnel must identify radiological conditions or provide coverage and issue a special RWP prior to CNMT entry.
6. CHECK the following indications NORMAL: **[A.1, 3]** ☐ • PRZ level ☐ • CNMT temperature ☐ • CNMT pressure ☐ • CNMT radiation levels ☐ • CNMT sump level ☐ • CNMT sump pumpdown frequency ☐ • RMW System operation frequency	☐ **6. MAKE** a CNMT entry when permissible to locate, identify and isolate the leak.
☐ **7. REFER TO** the following Tech Specs: • 3.4.6.1 • 3.4.6.2 • 3.4.8	

Attachment 7
Sheet 4 of 4

Leakage Inside CNMT

INSTRUCTIONS	RESPONSE NOT OBTAINED

8. **EVALUATE** plant conditions for continued operation:

☐ **a.** **INITIATE** appropriate action to repair the leak.

☐ **b.** **CONSULT** the Responsible Engineer for further leak isolation guidance.

☐ **c.** **VERIFY** any valves or breakers manipulated for leak isolation are documented per the following:

☐ • OMM-001, Operations - Conduct of Operations

☐ • OPS-NGGC-1303, Independent Verification.

☐ **d.** **CONSULT** with Operations Management for other recovery actions.

☐ **9.** **EXIT** this procedure.

– END OF ATTACHMENT 7 –

Facility:	SHEARON-HARRIS	Scenario No.: 2	Op Test No.: 05000400/2009302
Examiners:		Operators:	

Initial Conditions:	• IC-19, MOL, 100% power
	• TDAFW Pump Out of Service due to damaged over speed trip device, due back in 24 hours, awaiting parts from vendor
	• "A" Boric Acid Transfer Pump is OOS for motor replacement
Turnover:	• Plant is at 100% power. The TDAFW Pump has been out of service for 62 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect. The crew is being directed to shut down the plant IAW with GP-006, Normal Plant Shutdown section 5.2, step 4. The desired load rate of change is 4 DEH units per minute. The "A" Boric Acid Transfer Pump is OOS for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW.
Critical Tasks:	• Trip the main turbine by no later than the reading of the PATH-1 immediate actions
	• Establish feedwater flow into at least one SG before RCS feed and bleed is required

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N - BOP R - RO	Power reduction to ≤ 90%
TRG 2	PRS06B	C - RO/SRO TS - SRO	PRZ PORV 445B leakage
TRG 3	TT:144 jtb143b	I – RO/SRO	Letdown Temperature control failure and divert valve 1CS-50 fails to reposition on high temperature
TRG 4	PPI08	C-BOP/SRO TS - SRO	Grid frequency degradation
TRG 5	PPI08	C-BOP/SRO M – All	Grid frequency further degrades requiring Rx Trip per AOP-028, enter PATH-1

6	TUR02	C-BOP/SRO	Turbine Auto Trip fails, PATH-1 RNOs implemented to close turbine governor valves
7	CWF16A CSF16B CFW01A CFW01B	M - ALL	LOSS OF HEAT SINK - • Loss of both feed pumps (MFP 'A' 10 secs after Rx trip, MFP 'B' 50 secs). • Loss of both AFW pumps (AFW Pump 'A' 4 min. after reactor trip, AFW Pump 'B' 5 min. after reactor trip). • Entry into FRP H.1, success path utilizing condensate pumps to establish heat sink.
8	ZRPK622B	I-BOP/SRO	Partial failure of Automatic Phase A Isolation signal (Train B Phase A Slave Relay for CNMT Phase A valves, 1SI-287, 1CS-11 & 1SW-242)
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario Summary:

The plant is at 100% power in the middle of life. The TDAFW Pump has been out of service for 62 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect. A Normal shutdown has been directed by plant management, with a planned rate change of 4 DEH units per minute. The 'A' Boric Acid Transfer Pump is out of service for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to a power reduction of >10% (YELLOW risk is a qualitative risk assessment per WCM-001).

Event 1: Crew performs a power reduction IAW GP-006. For this reactivity manipulation it is expected that the SRO will conduct a reactivity brief, the RO will borate per the reactivity plan and the BOP operator will operate the DEH Controls as necessary to lower power.

Event 2: PRZ PORV 445B leakage can be inserted once the power reduction has been observed to the extent necessary. This failure will cause PRZ PORV 445B to leak, resulting in rising PRT pressure and level. PORV Line Temp indicator TI-463 will increase as observed on the MCB and the crew will respond IAW ALB 009-8-2, PRESSURIZER RELIEF DISCHARGE HIGH TEMP. The crew may utilize AOP-016 Attachment 5 to determine which PORV is leaking. The SRO will evaluate Tech Spec 3.4.4, RCS Relief Valves which will require action statement 'a' to be active.

Events Continued:

Event 3: Failure of the Letdown Temperature Transmitter, TT-144, can be inserted once actions addressing leaking PORV have been completed. The transmitter fails low which causes the system to attempt to increase temperature by reducing Component Cooling Water flow. As cooling flow reduces, actual temperature will increase. The automatic divert to protect the demineralizers fails to operate. Operators should take action IAW ALB 007-3-2, DEMIN FLOW DIVERSION HIGH TEMP to manually restore temperature and divert letdown around the demineralizers.

Event 4: Degradation in grid frequency can be inserted once letdown temperature control has been established. Frequency will degrade to and stabilize at 59.2 Hz, requiring entry into AOP-028, Grid Instability. Conditions will require that the crew implement AOP-028 Attachment 2 to energize the safety busses from the Emergency Diesel Generators.

Event 5: Once one Safety Bus has been transferred to an EDG, the grid will degrade further (58.2 Hz) to the point where the crew should initiate a manual reactor trip and entry into PATH-1.

Event 6: The turbine will fail to automatically trip requiring the crew to implement the RNOs of PATH-1 to close the turbine governor valves.

Event 7: Both Main Feed Pumps will be lost after the reactor is tripped. The 'A' MFW pump will trip 10 seconds after the trip breakers open and the 'B' MFW pump will trip 40 seconds later. The crew will need to verify adequate AFW flow exists to support maintenance of heat sink conditions. Shortly after the crew transitions to EPP-004, both AFW pumps will be lost, requiring transition to FRP-H.1, Response to Loss of Secondary Heat Sink. The AFW pumps and the MFPs will not be available, requiring the crew to secure the RCPs and depressurize one SG in order to establish feedwater flow using the condensate pumps.

Event 8: Phase A isolation will be incomplete, requiring the closure of 1SI-287, 1CS-11 and 1SW-242.

Once the crew has established at least 25% NR level in one SG and transitioned back to EPP-004, the scenario may be terminated.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Provide a Reactivity Plan to candidates for shutting down the plant
- Provide a copy of the following procedures:
  - GP-006, NORMAL PLANT SHUTDOWN FROM POWER OPERATION TO HOT STANDBY (MODE 1 TO MODE 3) marked off up through section 5.2 step 4 (step 5 circled)

INITIAL CONDITIONS:

- IC-19, MOL, 100% power
- Place CIT on the 'A' Boric Acid Transfer Pump and take switch to STOP
- Place 'B' Boric Acid Transfer Pump switch to AUTO and green protected train placard
- Set potentiometers as follows: FK-114: 7.50 FK-113: 3.17
- Protected equipment placards for TDAFP (per OMM-001 Att. 16)
  - 'A-SA' MDAFP – Orange placard
  - 'B-SA' MDAFP – Green placard
  - 'A' Startup Transformer brk 52-2 and 52-3 Orange placards
  - 'B' Startup Transformer brk 52-13 and 52-14 Green placards
- Hang CITs on 1MS-70, 1MS-72 and Trip and Throttle Valve 1MS-T
- Place RED bars on ALB 01-7-5, ALB 017-7-4
- Place BLUE bar on ALB 23-2-13
- Hang restricted access signs on all 3 swing gates

PRE-LOAD:

- TDAFW Pump OOS due to damaged overspeed trip device1MS-70 and 72 breakers open and Trip and Throttle valve tripped (irf mss034 OPEN, irf mss035 OPEN, imf cfc01c true)
- 'A' Boric Acid Pump OOS for motor replacement (idi xa2i174 STOP,AUTO, ilo xa2o174g OFF)
- Turbine auto trip failure (imf tur02 (n 00:00:00 00:00:00) true)
- Partial Phase A failure (imf zrpk622b (n 00:00:00 00:00:00)FAIL_ASIS)

TRIGGERS:

- ET-2: imf prs06b (2 00:00:00 00:00:00) 2 00:00:30 0
  Pressurizer PORV Leakage 2% ramped in over 30 seconds

- ET-3: imf tt:144 (3 00:00:00 00:00:00) 50 00:00:00
  imf jtb143b (3 00:00:00 00:00:00) FAIL_ASIS
  Letdown temp control failure/diverson valve fails to shift

- ET-4: irf ppi08 (4 00:00:00 00:00:00) 59.2 00:02:00
  Grid Frequency drops to 59.2 Hz

- ET-5: TRG= 5 mrf ppi08 58.7 00:02:00
  Grid Frequency lowers to 58.7 Hz and remains low for > 5 minutes

- ET-7: imf CFW16A (40 00:00:10 00:00:00)

  imf CFW16B (40 00:00:50 00:00:00)

  imf cfw01a (40 00:02:00 00:00:00)true

  imf cfw01b (40 00:03:00 00:00:00)true

  Loss of Heat Sink MFW Pumps and AFW Pumps trip after Rx Trip

CAEP

!Description of 2009B NRC Exam Scenario 2 CAEP Reset to IC-19

! Establish Initial Conditions
! Reset to IC-19
! 100% power steady state conditions

! TDAFW Pump is OOS due to damaged overspeed trip device
! Pump has been OOS for 62 total hours and is expected back within the next 24 hours
! Tech Spec 3.7.1.2, 72 hour LCO or HSB within the next 6 hours, HSD following 6 hours
! Hang CIT on both MS-70 and 72 then place protected train placards per OMM-001
irf mss034 (n 00:00:00 00:00:00) OPEN
irf mss035 (n 00:00:00 00:00:00) OPEN
! Trip the TDAFW Pump Trip and Throttle valve
imf cfw01c (n 00:00:00 00:00:00) true

! "A" BA Pump is OOS for motor replacement place MCB switch to STOP
! Hang CIT on CB Switch place the B BA Pump MCB switch to AUTO, protect B BA pump switch
idi xa2i174 (n 00:00:00 00:00:00)STOP,AUTO
ilo xa2o174g (n 00:00:00 00:00:00)OFF

! Preload Trigger 40 (active on Reactor Trip)
TRG 40 "JPPLP4.DSS"

! EVENTS:

! Event 1: Crew starts plant shutdown IAW GP-006 due to LOC expiring on TDAFW pump
! Normal - BOP
! Reactivity - RO

! Event 2: Pressurizer PORV Leakage of 2% that is ramped in over 30 seconds
! Tech Spec 3.4.4 within 1 hr restore to operable or close associated block valve or HSB within next 6, HSD next 6
! Component - RO/SRO
! Tech Spec - SRO
imf prs06b (2 00:00:00 00:00:00) 2 00:00:30 0

! Event 3: Letdown temp control failure with divert valve failing to shift on high temperature
! Instrument - RO/SRO
imf tt:144 (3 00:00:00 00:00:00) 50 00:00:00
imf jtb143b (3 00:00:00 00:00:00) FAIL_ASIS

! Event 4: Grid Frequency lowers to 59.2 Hz w/ramp of 2 minutes AOP-028 entry and power to Emerg. Buses w/EDGs
! Component - BOP/SRO
! Tech Spec - SRO
irf ppi08 (4 00:00:00 00:00:00) 59.2 00:02:00 -

! Event 5: Grid Frequency decrease - drops to <58.4 Hz and remains low requiring Rx Trip and Path-1 entry
! Major - ALL
TRG= 5 mrf ppi08 58.2 00:02:00

! Event 6: Turbine trip fails NOTE: NO TRIGGER (preloaded)
! Component - BOP/SRO
imf tur02 (n 00:00:00 00:00:00) true

! Event 7: Loss of Heat Sink - Both MFW Pumps trip after Rx Trip (tied to trigger 40 after Rx trip)
! Major - ALL
imf CFW16A (40 00:00:10 00:00:00)
imf CFW16B (40 00:00:50 00:00:00)

! Event 7: Continued - AFW Pump A trips 4 mins after Rx Trip, AFW Pp B trips one min later Loss of Heat Sink FRP-H.1 entry
! Component - BOP/SRO
imf cfw01a (40 00:04:00 00:00:00) true
imf cfw01b (40 00:05:00 00:00:00) true

! Event 8: Partial failure of Phase A isolation 1SI-287, 1CS-11 and 1SW-242 fail to position NOTE: NO TRIGGER (preloaded)
! Instrument - BOP/SRO
imf zrpk622b (n 00:00:00 00:00:00) FAIL_ASIS

Op Test No.: 05000400/2009302 Scenario # 2 Event # 1 Page 8 of 43		
Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
LEAD EVALUATOR:		**When the evaluating team has completed their evaluation of the power change Cue Event 2 "PRZ PORV 445B Leakage". It is not necessary to reach 90% power to continue the scenario.**
EVALUATOR NOTE:		**The crew has been directed to shutdown the unit using GP-006, Normal Plant Shutdown, due to TDAFW LCO action statement.** **The crew may elect to manually throttle open a PRZ Spray Valve to establish PRZ Surge line flow and thereby maintain PRZ/RCS boron concentrations within limits.**
	SRO	GP-006, Step 5.2.4.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
EVALUATOR NOTE:		**Crew may refer to OE database**
	RO	ENERGIZE all available Pressurizer Backup Heaters.

Op Test No.: 05000400/2009302 Scenario # 2 Event # 1 Page 9 of 43		
Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Rx power may increase >100% if the Turbine ramp is not started after energizing all Pressurizer Heaters.** **The crew may elect to begin boration prior to lowering turbine load. Turbine load reduction begins on page 12 of this guide.**
PROCEDURE NOTE:		**Routine load changes should be coordinated with the Load Dispatcher to meet system load demands.**
	RO	OP-107.01, Section 5.2 and then 5.1
	RO	• DETERMINE the reactor coolant boron concentration from chemistry OR the Main Control Room status board. • DETERMINE the magnitude of boron concentration increase required. • DETERMINE the volume of boric acid to be added using the reactivity plan associated with the IC.
EVALUATOR NOTE:		**FIS-113, BORIC ACID BATCH COUNTER, has a tenths position.**
PROCEDURE CAUTION:		**If the translucent covers associated with the Boric Acid and Total Makeup Batch counters FIS-113 and FIS-114, located on the MCB, are not closed, the system will not automatically stop at the preset value.**
	RO	SET FIS-113, BORIC ACID BATCH COUNTER, to obtain the desired quantity.
	SRO	Directs boration

Op Test No.: 05000400/2009302	Scenario # 2	Event # 1	Page 10 of 43
Event Description: Lower Power			

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Boration of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase the boric acid delivery rate to the RCS.**
	RO	• SET controller 1CS-283, FK-113 BORIC ACID FLOW, for the desired flow rate. • VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit. • PLACE control switch RMW MODE SELECTOR to the BOR position.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**
	RO	• OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm. o MAKE boron concentration adjustments as dictated from sample results.

Op Test No.: 05000400/2009302 Scenario # 2 Event # 1 Page 11 of 43		
Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Boration may be manually stopped at any time by turning control switch RMW CONTROL to STOP.**
	RO	• START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. • Verifies proper valve and pump alignment
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**
	RO	• VERIFY Tavg responds as desired. • IF rod control is in AUTO, THEN VERIFY the control rods are responding correctly. • VERIFY boration automatically terminates when the desired quantity of boron has been added. • PLACE Reactor Makeup in Auto per Section 5.1.
	RO	PLACE Reactor Makeup in Auto per Section 5.1.
EVALUATOR NOTE:		**Additional steps are included in section 5.1 but none will be applicable since the system just came out of Automatic. The only steps included here are the ones with verifiable action.**

Op Test No.: 05000400/2009302	Scenario # 2	Event # 1	Page 12 of 43
Event Description: Lower Power			

Time	Position	Applicant's Actions or Behavior
	RO	• VERIFY the RMW CONTROL switch: o Is in the STOP position. o The GREEN light is LIT. • PLACE the RMW MODE SELECTOR to AUTO. • START the makeup system as follows: o TURN control switch RMW CONTROL to START momentarily. o VERIFY the RED indicator light is LIT. • Reports to CRS that boration is complete and Makeup is back in AUTO
EVALUATOR NOTE: The following steps will initiate turbine load reduction IAW GP-006.		
	SRO	INFORMS Load Dispatcher that a load reduction to 90% will begin. (N/A, per Initial Conditions)

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Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		**A failure of the Vidar in the DEH computer has resulted in a plant trip in the past. This failure would affect operation in Operator Auto, and can be detected in either of the following ways:** • **If OSI-PI is available, the process book PLANTSTATUS.PIW, DEH Trends function of the Plant Process Computer: DEH (menu) contains a point for DEH MEGAWATTS. With a failure of the Vidar, this point will not be updating.** • **If OSI-PI is NOT available, accessing the ANALOG INPUTS screen on the Graphics display computer (in the Termination Cabinet room near the ATWS panel) will show several points, most of which should be updating if the Vidar is functioning properly.**
EVALUATOR NOTE:		**There is no procedural guidance directing when the boration to lower power is required. The crew may elect to perform the boration prior to place the Turbine in GO. The boration steps are located on page 11 of this guide.**
	SRO	DIRECTS BOP to start power reduction at 4 DEH Units/Min. May direct initiation of a boration before the power reduction begins.
	BOP	Requests PEER check prior to manipulations of DEH Control

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Event Description: Lower Power		
Time	Position	Applicant's Actions or Behavior
	BOP	• DEPRESS the LOAD RATE MW/MIN push-button. • ENTER the desired rate, **NOT** to exceed 5 MW/MIN, in the DEMAND display. (4 DEH Units/minute) • DEPRESS the ENTER push-button. • DEPRESS the REF push-button. • ENTER the desired load (120 MW per CRS) in the DEMAND display. • DEPRESS the ENTER push-button. The HOLD push-button should illuminate.
PROCEDURE NOTE:		**The unloading of the unit can be stopped at any time by depressing the HOLD push-button. The HOLD lamp will illuminate and the GO lamp will extinguish. The load reduction can be resumed by depressing the GO push-button. The HOLD lamp will extinguish and the GO lamp will illuminate.**
	BOP	• DEPRESS the GO push-button to start the load reduction and inform crew through 'Shift Update' Turbine in 'GO'. • VERIFY the number in the REFERENCE display decreases. • VERIFY Generator load is decreasing. • WHEN Turbine load is less than 95%, THEN VERIFY the 3A and 3B Feedwater Vents have been opened per OP-136, Section 7.2
COMMUNICATOR:		**Acknowledge direction. No simulator response actions are required.**
LEAD EVALUATOR:		**Once satisfied with observation of the power reduction, initiate Event 2 - "PRZ PORV 445B Leakage" Good point is following return of Makeup to AUTO.**

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Event Description: PRZ PORV 445B Leakage		
Time	Position	Applicant's Actions or Behavior

BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG 2 "PRZ PORV 445B leakage"**
Indications Available:		**ALB-009-8-2 PRESSURIZER RELIEF DISCHARGE HIGH TEMP TI-463 rising**
	RO	• RESPONDS to alarms ALB-009-8-2. • ENTERS and performs APP-ALB-009-8-2.
	SRO	Refer to TS 3.4.4 and 3.4.6.2 as referenced by ALB-009-8-2
EVALUATOR NOTE:		**The SRO may elect to enter AOP-016, Excessive Primary Leakage. If so, then those actions begin on page 18 of this guide.**
	BOP	Crew may place turbine in HOLD (based on TAVG)
	RO	CONFIRM alarm using: • PRZ PORV discharge line temperature TI-463. • PRESSURIZER relief tank level, pressure, and temperature LI-470.1, PI-472.1, and TI-471.1. • PRESSURIZER PORV position indication. VERIFY Automatic Functions: (None) PERFORM Corrective Actions: • IF a PORV is open (NO), THEN CHECK PRZ pressure using PI-444, PI-445.1, PI-456, and PI-457.
PROCEDURE NOTE:		**For minor leakage, it may be necessary to have Engineering assistance to develop proper strategies.**

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Event Description: PRZ PORV 445B Leakage

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		**Any PORV isolations that are shut due to decreasing RCS Pressure should NOT be reopened without further evaluation.**
	SRO	• IF all PORV's are closed and RCS pressure is normal, THEN DETERMINE which PORV is leaking and isolate it: • IF leakage is significant, THEN SHUT all PORV isolations. REOPEN one at a time to identify affected PORV.
EVALUATOR NOTE:		**ERIS Point TRC-0463 can be used to evaluate if PORV is leaking.**
	RO	• Shuts PORV isolations as directed by SRO o After shutting RC-115, PRT Relief Line Temperature starts to decrease • Determines/reports PORV-445B leaking.
	SRO	ENTER TS 3.4.4.a – within one hour either restore the PORV to operable or close the block valve with power maintained.
EVALUATOR NOTE:		**Cue Event 3 (Letdown Temperature Control Failure, Diversion Valve Fails to Shift) after the leaking PORV is isolated and the TS declaration.**
EVALUATOR NOTE:		**If AOP-016 is entered (Optional reference), the crew will be directed to Attachment 5 for specific actions for a leaking PRZ PORV. Attachment 5 actions follow.**

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Event Description: PRZ PORV 445B Leakage		
Time	Position	Applicant's Actions or Behavior

	SRO	Enter AOP-016 (Optional reference)
	SRO	WHEN leakage location has been determined, THEN PERFORM the applicable Attachment (Attachment 5)
	RO	• CHECK the PRZ PORVs SHUT. (YES) • CHECK that the leaking PORV has been identified. (NO) • SHUT the associated PORV Block Valve. • PERFORM ONE of the following based on severity of leak. • SHUT AND REOPEN ONE PORV Block Valve at a time to identify the affected PORV.
	SRO	• Enter Tech Spec 3.4.4.a. • VERIFY valve manipulated for leak isolation is documented per the following: o OMM-001, Operations – Conduct of Operations o OPS-NGGC-1303, Independent Verification. o Initiates Equipment Problem Checklist o Contacts WCC for assistance • EXIT this procedure.
EVALUATOR NOTE:		**Initiate Event 3 (letdown temperature Control Failure, Diversion Valve Fails to Shift) when the leaking PORV has been identified and Tech Specs have been addressed.**

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Event Description: Letdown Temperature Control Failure, Diversion Valve Fails to Shift		
Time	Position	Applicant's Actions or Behavior

BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-3 "Letdown Temperature Control Failure, Diversion Valve Fails to Shift"**
Indications Available:		**TK-144 Failed Low (0)** **ALB-07-3-2, DEMIN FLOW DIVERSION HIGH TEMP.** **ALB-07-5-5, COMPUTER ALARM CHEM & VOL SYSTEMS (When 1CS-50 is placed to VCT)**
	RO	• RESPONDS to alarm and ENTERS APP-ALB-07-3-2. • CONFIRM alarm using TI-143, LP Letdown Temperature. • VERIFY Automatic Functions: o 1CS-50, Letdown to VCT/Demin, diverts flow to the VCT. • PERFORM Corrective actions: o VERIFY that 1CS-50 diverts flow to the VCT, bypassing the BTRS and Purification Demineralizers. (NO) ▪ Manually positions 1CS-50 to VCT • PERFORM the following as needed to lower letdown temperature:

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Event Description: Letdown Temperature Control Failure, Diversion Valve Fails to Shift		
Time	Position	Applicant's Actions or Behavior
	RO	• VERIFY proper charging flow is established. (YES) • LOWER letdown flow. (N/A – CCW Problem) • IF CCW flow to the Letdown Heat Exchanger appears low, THEN: o TAKE manual control of TK-144. (YES) o OPEN 1CC-337, to raise CCW flow. (YES) ▪ Temperature should be established within a normal control band of 110 to 120°F • Reports to CRS when temperature is in the desired band
	SRO	• Contacts Work Control and/or System Engineer for assistance. May also contact Chemistry. • Initiates Equipment Problem Checklist.
COMMUNICATOR:		**If contacted as WCC or System Engineer, provide direction to: "maintain flow bypassing the demineralizers until a resin damage assessment is completed".**
EVALUATOR NOTE:		**After letdown temperature has been stabilized initiate Event 4 "Grid Frequency Degradation"**

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Event Description: Grid Frequency Degradation		
Time	Position	Applicant's Actions or Behavior
EVALUATOR'S NOTE		**This event will have grid frequency degrade to the point where vital busses will be transferred to the EDGs. Once vital bus 1B-SB and associated 480V busses are energized from EDG 'B', initiate event 5. This scenario is not designed to swap charging pumps in preparation to power 1A-SA from EDG 'A'.**
BOOTH OPERATOR:		**When directed by Lead Evaluator:** **Actuate TRG-4 "Lowering Grid Frequency"**
Indications Available:		**Turbine speed decreasing** **EI-525 lowering (indicated frequency)** **SG levels decrease slightly**
EVALUATOR NOTE:		**If grid frequency is not observed by the crew, have the Communicator call in as the Load Dispatcher to inform the crew that the grid is experiencing frequency problems. There are no low frequency alarms.**
	SRO	Enters AOP-028, GRID INSTABILITY.
PROCEDURE NOTE:		• **This procedure contains no immediate actions.** • **The loss of Off-Site power may require the initiation of the Emergency Plan**
	SRO	REFER TO PEP-110, Emergency Classification and Protective Action Recommendations, AND enter EAL Network at entry point X.

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Event Description: Grid Frequency Degradation

Time	Position	Applicant's Actions or Behavior
		PROCEDURE NOTE: • **If frequency drops suddenly and power is greater than P-7, the reactor will trip automatically when RCP frequency decreases to 57.5 Hz, resulting in a turbine trip.** • **Operation of electrical motors with voltage below the normal band will increase stator current and change torque loading. Component trips, insulation and/or bearing damage, shorts, grounds, or blown fuses may result. The probability of damage is increased with lowering voltage and increased operating time.**
		PROCEDURE CAUTION: • **Operation of the unit between 59.0 and 58.4 Hz should be limited to 5 minutes, after which time the generator must be taken off-line.** • **Operation below 58.4 Hz is not allowed and the generator must be taken off line immediately.**
	BOP	CHECK Main Generator indications for ANY of the following conditions: • Generator frequency less than 59 Hz for greater than or equal to 5 minutes (NO) • Generator frequency less than 58.4 Hz (NO) • Turbine speed less than or equal to 1752 RPM (NO)
	SRO	GO TO Step 3.
	BOP	CHECK BOTH Emergency Buses ENERGIZED. (YES)

Op Test No.: 05000400/2009302 Scenario # 2 Event # 4 Page 22 of 43		
Event Description: Grid Frequency Degradation		
Time	Position	Applicant's Actions or Behavior

	SRO	SECURE unnecessary equipment to minimize component damage.
	SRO	CHECK with the Senior Dispatcher that BOTH of the following conditions exist:
		• The system grid is able to provide adequate voltage support in the event of a LOCA. (YES) • Adequate system frequency can be maintained during performance of this procedure. (YES)
COMMUNICATOR:		**If Load Dispatcher is contacted, provide information to crew that "the grid can support adequate voltage and frequency control in the event of a LOCA. Grid frequency appears to be stabilizing and we are continuing actions to raise grid frequency."**
	BOP	CHECK the Main Generator ONLINE by observing the following for adverse trends: (YES) • Turbine Speed • EI-526, SWYD North Bus Voltage (normally 232.5kV) • EI-527, SWYD South Bus Voltage (normally 232.5kV) • EI-520, Generator Phase Volts (normally 22kV) • EI-525, Generator Frequency (normally 60 Hz) • EI-567, MegaVars (normally 75 to 175 MVARs out)
	SRO	NOTIFY the Load Dispatcher of any observed adverse trends. (contacted earlier for load reduction)

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Event Description: Grid Frequency Degradation		
Time	Position	Applicant's Actions or Behavior
	CREW	• TREND plant electrical parameters per Attachment 1 until the grid is determined to be STABLE. • CHECK for indications of a load rejection during performance of this procedure.
	SRO	OBSERVE Caution before Step 10 AND GO TO Step 10.
PROCEDURE CAUTION:		• **With off-site voltage or system frequency unstable, EDGs must NOT be paralleled with off-site power since severe load swings may occur and overload the EDGs.** • **Loss of Service Water flow to an EDG requires the affected EDG be stopped.**
	BOP	**CHECK** ANY EDG operating paralleled to the Grid. (NO) CHECK ALL of the following parameters WITHIN the limits of the indicated range: • 6.9 kV Emergency Buses – 6550 to 7250 volts: o EI-6956A1 SA, EMER BUS A VOLTS (YES) o EI-6956B1 SB, EMER BUS B VOLTS (YES) • Frequency - 59.5 to 60.5 Hz (NO)
	SRO	ENERGIZE the Emergency Buses with the associated EDG per Attachment 2. • Provide direction to BOP to utilize Attachment 2

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Event Description: Grid Frequency Degradation		
Time	Position	Applicant's Actions or Behavior

	RO	Attachment 2 actions
	RO	DETERMINE which Emergency Bus is supplying power to the operating CSIP. (1A-SA)
PROCEDURE NOTE:		• **MDAFW FCVs will get an auto open signal (unless an AFW isolation signal is present) when either breaker 105 or 125 opens.** • **On a loss of power to an emergency bus the associated steam supply valve to the Turbine Driven AFW Pump will open.** • **This step will cause CVIS isolation and render both Containment Vacuum Reliefs inoperable (Tech Spec 3.0.3).**
	BOP	• OPEN the supply breaker to the Emergency Bus NOT supplying power to the operating CSIP: o Emergency Bus B-SB to Aux Bus E Tie Breaker 125 SB • VERIFY the associated EDG STARTS AND ENERGIZES the associated Emergency Bus.
	CREW	• VERIFY proper load sequencing for the Emergency Bus being ENERGIZED per OMM-004, Post-Trip/Safeguards Review, Attachment 12.
	BOP	• CHECK the following for the Emergency Bus being ENERGIZED: o B Sequencer Load Block 9 AUTO ACT COMPLETE MAN LOAD PERMITTED light is LIT.

Op Test No.: 05000400/2009302	Scenario # 2	Event # 4	Page 25 of 43
Event Description: Grid Frequency Degradation			

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		• **Any TDAFW Pump steam supply valve shut in the following step will not automatically re-open if an AFW actuation is received. TDAFW FCVs do not receive auto-open signals.** • **Stopping a MDAFW Pump powered by the EDG or shutting a MDAFW FCV will block further automatic actuations until the original condition for pump start is cleared.**
	BOP	CONTROL AFW as necessary to maintain reactor power AND S/G levels for plant conditions. • Stops TDAFW Pump (already under clearance) • Stops MDAFW pump 'B" or closes all AFW flow control valves
PROCEDURE NOTE:		**Energizing 480V Emergency Buses will restore power to the following:** • **PZR Heater Banks** • **PZR PORV Block Valves** • **Air Compressors (Compressors will not auto start)** • **125 VDC Battery Chargers**
EVALUATOR'S NOTE:		**Direct Booth Operator to insert Event 5, resulting in degradation of frequency requiring a reactor trip. This scenario is not intended to have the crew swap charging pumps.**
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate Trigger-5** **"Grid Frequency degrades requiring RxTrip"**

Op Test No.: 05000400/2009302 Scenario # 2 Event # 5 Page 26 of 43		
Event Description: Grid Frequency Further Degrades, requires Reactor Trip		
Time	Position	Applicant's Actions or Behavior

EVALUATOR NOTE:		**Event 5 will initiate the following sequence of events:** • **Grid frequency further degrades requiring Rx Trip per AOP-028, enter PATH-1** • **Turbine Auto Trip fails, PATH-1 RNOs implemented to close turbine governor valves** • **LOSS OF HEAT SINK - Loss of both feed pumps (MFP 'A' 10 secs after Rx trip, MFP 'B' 50 secs). Loss of both AFW pumps (AFW Pump 'A' 4 min. after reactor trip, AFW Pump 'B' 5 min. after reactor trip). Entry into FRP H.1, success path utilizing condensate pumps to establish heat sink.**
Indications Available:		**ALB-022-4-3, GENERATOR VOLTAGE/FREQ RATIO/HIGH OR UNDER FREQ**
	CREW	Responds to alarm and identifies frequency conditions requiring a trip of the reactor.
	SRO	Directs MANUAL reactor trip.
	SRO	Enters PATH-1
	RO	Initiates a MANUAL reactor trip.
	CREW	Performs PATH-1 immediate actions.

Op Test No.: 05000400/2009302 Scenario # 2 Event # 6 Page 27 of 43		
Event Description: Reactor Trip with Turbine Auto Trip Failure		
Time	Position	Applicant's Actions or Behavior

	RO	VERIFY Reactor Trip:
		• AUTO or MANUAL Reactor Trip successful:
		• CHECK for any of the following:
		  • TRIP breakers RTA and BYA OPEN (YES)
		  • TRIP breakers RTB and BYB OPEN (YES)
		• ROD Bottom lights LIT (YES)
		• NEUTRON flux decreasing (YES)

Critical Task	BOP	VERIFY Turbine Trip: • CHECK for any of the following: • ALL turbine throttle valves – SHUT (NO) • ALL turbine governor valves – SHUT (NO) o **Manually trip the turbine from the MCB**
	BOP	VERIFY power to AC Emergency Buses:
		• 1A-SA and 1B-SB Buses energized by Off-site power or EDG's (YES, 1A-SA by Off-site, 1B-SB by EDG 'B')
	RO	CHECK SI Actuation (NO)
	RO	SI Required (NO)

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 28 of 43		
Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW		
Time	Position	Applicant's Actions or Behavior

	SRO	GO TO EPP-004, REACTOR TRIP RESPONSE, Step 1.
PROCEDURE NOTE:		**Foldout applies.**
EVALUATOR NOTE:		**No EPP-004 Foldout criteria apply in this scenario.** **The A and B MDAFW will trip 4 and 5 minutes (respectively) after the reactor trip.**
	CREW	At this point the crew may recognize that both MFW pumps have tripped and identify when the MDAFW pumps trip to challenge heat sink.
	BOP	Starts the 'B' MDAFW pump (may have left running, controls flow to SGs with flow control valves)
	SRO	Informs Shift Manager to evaluate EAL Network Using Entry Point X.
	BOP	Check RCS Temperature: • Check SG blowdown isolation valves – SHUT (YES) Stabilize AND maintain temperature between 555°F AND 559°F using Table 1. • Control feed flow and steam dump to stabilize temperature between 555°F AND 559°F
	RO	Check RCP Status:
		• Check RCPs - AT LEAST ONE RUNNING (YES)

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Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW

Time	Position	Applicant's Actions or Behavior
	BOP	Check Feed System Status: • RCS Temperature - LESS THAN 564°F (YES) • Verify feed reg valves – SHUT (YES) • Check feed flow to SGs - GREATER THAN 210 KPPH (currently YES, but should report later when MDAFW Pump 'A' is tripped and 'B' MDAFW Pump is tripped)
	CREW	Contacts AO to investigate loss of MDAFW Pumps as they are recognized.
COMMUNICATOR:		**If dispatched to investigate cause of loss of MFW and MDAFW pumps, wait approximately 2 minutes then report that "overcurrent flags are tripped for all breakers, and that there are no adverse indications locally at the pumps."**
	RO	Check Control Rod Status: • Check DRPI – AVAILABLE (YES) • Verify all control rods - FULLY INSERTED (YES)
	SRO	Transitions to FRP-H.1 following trip of 'B' MFAFW Pump (This pump tripping will immediately cause a RED on HEAT SINK.) Contacts WCC (if not already done) to obtain assistance to restore AFW or MFW pumps to service.
EVALUATOR NOTE:		**The crew's success path for this scenario is to depressurize a SG and establish feed using the Condensate System.**

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 30 of 43		
Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW		
Time	Position	Applicant's Actions or Behavior

	SRO	Implement FRP-H.1
EVALUATOR NOTE:		**AS soon as FRP-H.1 is entered, direct the Booth Operator to activate Trigger 6 "Restore bus frequency to 60 Hz" (ramped in over 3 minutes).**
COMMUNICATOR:		**Monitor bus frequency and immediately notify the MCR as the Load Dispatcher when frequency returns to 60 Hz. Inform crew that frequency has been restored and has been stabilized.**
	SRO	PERFORM the following: • IMPLEMENT function restoration procedures as required. • Informs Shift Manager to EVALUATE EAL Network using entry Point X. (Refer to PEP-110)
	RO	CHECK Secondary Heat Sink Requirements: • RCS pressure – GREATER THAN ANY NON-FAULTED SG PRESSURE. (YES) • RCS temperature – GREATER THAN 350°F [330°F]. (YES) • STOP any running RHR pumps. (N/A)
	BOP	CHECK SG Blowdown and SG Sample Valves shut (YES) (COMPLETED IN EPP-004)

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 31 of 43		
Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW		
Time	Position	Applicant's Actions or Behavior
	BOP/SRO	ESTABLISH AFW Flow to at least ONE SG: • OBSERVE MCB indications to determine cause of AFW failure: o CST level (NO) o MDAFW pump power supplies (NO) o TDAFW pump steam supply valves (YES) o TDAFW pump speed controller (NO) o TDAFW pump control power (NO) o AFW valve alignment (NO) • TRY to restore AFW flow at the MCB. (Refer to Attachment 1 for guidance of rate of feed flow.) (Refer to OP-137, Auxiliary Feedwater System, for guidance regarding AFW pump operations, precautions and limitations and valve operation.) • TOTAL feed flow to SGs – GREATER THAN 210 KPPH. (NO)
	BOP/SRO	PERFORM the following: • CONTINUE attempts to restore AFW flow at the MCB.
	SRO	OBSERVE NOTE prior to Step 5 AND continue with Step 5.
PROCEDURE NOTE:		**After stopping all RCPs and placing steam dump in the steam pressure mode, RCS pressure and temperature will increase as natural circulation is established. A large loop ΔT prior to PRZ PORV opening confirms natural circulation. This must be considered while evaluating bleed and feed criteria.**

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 32 of 43

Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW

Time	Position	Applicant's Actions or Behavior
	RO	Stop Heat Input From RCP Operations: • STOPs ALL RCP.
	BOP	CHECK all of the following to determine if steam can be dumped to condenser: • CHECK any intact SG MSIV – OPEN. (YES) • CHECK condenser available (C-9) light (BPLB 3-3) – LIT. (YES) • STEAM dump control system – AVAILABLE. (YES)
EVALUATOR NOTE:		**The following three substeps may VERIFY actions completed in EPP-004.**
	BOP	• PLACE steam dump pressure controller in manual AND decrease output to 0%. • PLACE steam dump mode select switch in STEAM PRESS. • ADJUST steam dump controller setpoint to 84% (1092 PSIG) AND place in auto.
	BOP	ESTABLISH Main FW Flow to at least ONE SG:
		• CHECK condensate system – IN SERVICE. (YES)
		• SUPPORT condition for FW startup – AVAILABLE. (NO, both pumps are tripped on overcurrent and unavailable)
		• POWER to at least ONE Main FW pump – AVAILABLE. (YES)
		• PP-1D212 – ENERGIZED. (YES)

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 33 of 43

Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW

Time	Position	Applicant's Actions or Behavior
	SRO	WHEN support conditions met, THEN do Steps 6c AND d. Observe CAUTION prior to Step 8 AND GO TO Step 8.
PROCEDURE CAUTION:		**Following block of automatic SI actuation, manual SI actuation may be required if conditions degrade. (Examples of degraded conditions are the inability to maintain or restore PRZ level, RVLIS indication or RCS subcooling.)**
PROCEDURE NOTE:		**After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**
	RO	DEPRESSURIZE RCS AND BLOCK Low Steam Pressure SI: • CHECK SI - IN SERVICE (NO) • GO TO Step 8e. DEPRESSURIZE RCS to between 1900 PSIG AND 1950 PSIG • CHECK letdown - IN SERVICE (YES) • DEPRESSURIZE using auxiliary spray. BLOCK SI Signals: • Low PRZ pressure • Low steam pressure MAINTAIN pressure less than 1950 PSIG..
Evaluator Note:		**RCS pressure will need to be monitored or it will continue to decrease with AUX spray until noticed. This may also result in letdown isolation. If VCT level drops <5%, CSIP suction will swap the RWST.**

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 34 of 43		
Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW		
Time	Position	Applicant's Actions or Behavior

PROCEDURE NOTE:		**Depressurizing only one SG minimizes the likelihood of reaching the "bleed and feed" criteria (due to lowering SG level) AND the likelihood of the appearance of degraded plant conditions that might require manual SI actuation.** **The preferred SG to depressurize is the intact SG with the highest indicated wide range level.** **A second SG may be depressurized if condensate flow cannot be established to the first SG depressurized.**

	BOP	DEPRESSURIZE One SG To Less Than 500 PSIG AND ESTABLISH Condensate Flow:
		• IDENTIFY the SG to be depressurized.
		• SHUT the following valves for the SGs that are NOT to be depressurized.
		  • MSIVs
		  • MSIV bypass valves
		  • SG main Steam drain isolation before MSIV
		DUMP steam at maximum rate to depressurize identified to SG to 500 PSIG using any of the following (listed in order of preference):
		• Condenser steam dump
		ESTABLISH condensate flow using Attachment 3.

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 35 of 43		
Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW		
Time	Position	Applicant's Actions or Behavior

	BOP	FRP-H.1 Attachment 3
PROCEDURE NOTE:		**This attachment provides instructions for establishing condensate flow to one SG to restore secondary heat sink. It may also be used as a reference for establishing condensate flow to SGs while implementing other EOPs.** **The low steam pressure SI blocked, main steam line isolation will occur if the high steam pressure rate setpoint is exceeded.** **If an action or its contingency in this attachment can NOT be accomplished, the operator should return to the step in effect, while continuing efforts to establish condensate flow.**
EVALUATOR NOTE:		**FRP-H.1 Attachment 3 is attached on the end of this scenario guide for use if desired.**
	BOP	CHECK Primary and Secondary Conditions To Allow Establishing Condensate Flow: • CHECK low steam SG pressure SI – BLOCKED (YES) • CHECK SG pressure for SG to which condensate flow is to be established - LESS THAN 500 (NO) • GO To Step 2.
PROCEDURE NOTE:		**The preferred SG to depressurize is the intact SG with the highest indicated wide range level.**
EVALUATOR NOTE:		**While depressurizing SGs with steam dumps, the MSIVs may close automatically requiring use of SG PORVs.**

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7 Page 36 of 43

Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW

Time	Position	Applicant's Actions or Behavior
	BOP	Depressurize One SG To Less Than 500 PSIG: • Identify the SG to be depressurized. • Shut the following valves for the SGs that are NOT to be depressurized. o MSIVs o MSIV bypass valves o SG main steam drain isolations before MSIV: ▪ SG A: 1MS-231 ▪ SG B: 1MS-266 ▪ SG C: 1MS-301 • Dump steam at maximum rate to depressurize identified SG to 500 PSIG using any of the following (listed in order of preference): o Condenser steam dump o SG PORVs o Locally operate SG PORVs using OP-126, "MAIN STEAM, EXTRACTION STEAM, AND STEAM DUMP SYSTEMS", Section 8.2. o TDAFW pump CHECK Condensate System Status: • At least one condensate – RUNNING (YES) • At least one condensate booster pump – RUNNING (YES)
PROCEDURE NOTE:		**The main FW pump discharge valve control switches must be held in the OPEN position to open the valves with the main FW pumps stopped.**
	BOP	OPEN The Following Valves: • Low pressure FW heater bypass valves: (1CE-330/1CE-359) • High pressure FW heater bypass valves: (1FW-110) • Main FW pump discharge valves: (1FW-29/1FW-60)

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Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW

Time	Position	Applicant's Actions or Behavior
	RO	RESET SI. (Not active)
	CREW	Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to PATH-1 GUIDE, Attachment 2.) (NA)
	BOP	RESET FW Isolation. PLACE Feed Reg Bypass Controllers In Manual AND Set Output To Zero. RESET AND open main FW isolation valve(s): (All open already) • 1FW-159 (A SG) • 1FW-277 (B SG) • 1FW-217 (C SG) SHUT Main FW Pump Recirc Valves: (1FW-8/1FW-39) PLACE Condensate Booster Pump Controllers In Manual AND Control Discharge Pressure At 600 PSIG.

Op Test No.: 05000400/2009302 Scenario # 2 Event # 7	Page 38 of 43
Event Description: Loss Of Heat Sink Both Main FW Pumps Trip and No AFW	

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Local checks for flow noise may be used to confirm the presence of flow.**
COMMUNICATOR:		**When directed to go to desired FRV Bypass valve, wait 2 minutes, then report that you are standing by as requested. Monitor for flow on simulator.** **In order to monitor for flow, open the monitored parameter file - Plant Status Monitor CFW. The following parameters can be utilized to identify when flow starts** • **Line 21: wcfw479(1) FRV Bypass Valve A flow** • **Line 22: wcfw479(2) FRV Bypass Valve B flow** • **Line 23: wcfw479(3) FRV Bypass Valve C flow**
	BOP	ESTABLISH Feed Flow To SG(s): (Refer to Attachment 1 while performing actions that restore feed flow.)
EVALUATOR NOTE:		**When restoring heatsink using Condensate flow before RCS Bleed And Feed: IF wide range RCS Tcold is stable at OR trending to the saturation temperature corresponding to the depressurized SG pressure, THEN feed the depressurized SG without restriction on rate.**
Critical Task	BOP	ESTABLISH feed flow using a. Locally establish feed flow using the feed reg bypass valves from the MCB. **Feed flow to at least one SG -ESTABLISHED**
EVALUATOR NOTE:		**Terminate the scenario once feed flow has been established and at least one SG NR level is at or trending to 25%.**

Op Test No.: 05000400/2009302	Scenario # 2	Event # 5/6/7/8	Page 39 of 43
Event Description: FRP-H.1 Attachment 3			

Time	Position	Applicant's Actions or Behavior

RESPONSE TO LOSS OF SECONDARY HEAT SINK

Attachment 3
Sheet 1 of 5
ESTABLISHING CONDENSATE FLOW TO SGs

Instructions	Response Not Obtained

NOTE:
- This attachment provides instructions for establishing condensate flow to one SG to restore secondary heat sink. It may also be used as a reference for establishing condensate flow to SGs while implementing other EOPs.
- The low steam pressure SI blocked, main steam line isolation will occur if the high steam pressure rate setpoint is exceeded.
- If an action or its contingency in this attachment can NOT be accomplished, the operator should return to the step in effect, while continuing efforts to establish condensate flow.

1. Check Primary and Secondary Conditions To Allow Establishing Condensate Flow:		
a. Check low steam SG pressure SI - BLOCKED	a.	WHEN RCS pressure is less than 2000 PSIG, THEN block SI signals: o Low PRZ pressure o Low steam pressure
b. Check SG pressure for SG to which condensate flow is to be established - LESS THAN 500 PSIG	b.	GO To Step 2.
c. GO TO Step 3.		

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Op Test No.: 05000400/2009302	Scenario # 2	Event # 5/6/7/8	Page 40 of 43

Event Description: FRP-H.1 Attachment 3

Time	Position	Applicant's Actions or Behavior

RESPONSE TO LOSS OF SECONDARY HEAT SINK

Attachment 3
Sheet 2 of 5
ESTABLISHING CONDENSATE FLOW TO SGs

Instructions	Response Not Obtained

NOTE: The preferred SG to depressurize is the intact SG with the highest indicated wide range level.

2. Depressurize One SG To Less Than 500 PSIG:

a. Identify the SG to be depressurized.

b. Shut the following valves for the SGs that are NOT to be depressurized.

- o MSIVs
- o MSIV bypass valves
- o SG main steam drain isolations before MSIV:

  SG A: 1MS-231
  SG B: 1MS-266
  SG C: 1MS-301

b. Shut the following valves for the SG to be depressurized.

- o MSIV
- o MSIV bypass valve
- o SG main steam drain isolation before MSIV:

  SG A: 1MS-231
  SG B: 1MS-266
  SG C: 1MS-301

c. Dump steam at maximum rate to depressurize identified SG to 500 PSIG using any of the following (listed in order of preference):

1) Condenser steam dump

2) SG PORVs

3) Locally operate SG PORVs using OP-126, "MAIN STEAM, EXTRACTION STEAM, AND STEAM DUMP SYSTEMS", Section 8.2.

4) TDAFW pump

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Op Test No.: 05000400/2009302	Scenario # 2	Event # 5/6/7/8	Page 41 of 43

Event Description: FRP-H.1 Attachment 3

Time	Position	Applicant's Actions or Behavior

RESPONSE TO LOSS OF SECONDARY HEAT SINK

Attachment 3
Sheet 3 of 5
ESTABLISHING CONDENSATE FLOW TO SGs

Instructions	Response Not Obtained
3. Check Condensate System Status:	
a. At least one condensate pump - RUNNING	a. Place one condensate pump in service. (Refer to OP-134, "CONDENSATE SYSTEM", Section 5.3.)
b. At least one condensate booster pump - RUNNING	b. Place one condensate booster pump in service. (Refer to OP-134, "CONDENSATE SYSTEM", Section 5.5.)

NOTE: The main FW pump discharge valve control switches must be held in the OPEN position to open the valves with the main FW pumps stopped.

4. Open The Following Valves:

- Low pressure FW heater bypass valves:

  1CE-330
  1CE-359

- High pressure FW heater bypass valves:

  1FW-110

- Main FW pump discharge valves:

  1FW-29
  1FW-60

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Op Test No.: 05000400/2009302	Scenario # 2	Event # 5/6/7/8	Page 42 of 43

Event Description: FRP-H.1 Attachment 3

Time	Position	Applicant's Actions or Behavior

RESPONSE TO LOSS OF SECONDARY HEAT SINK

Attachment 3
Sheet 4 of 5
ESTABLISHING CONDENSATE FLOW TO SGs

Instructions	Response Not Obtained
5. Reset SI.	IF any train of SI will NOT reset at MCB, THEN reset at SSPS using PATH-1 GUIDE. Attachment 12.
6. Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to PATH-1 GUIDE. Attachment 2.)	
7. Reset FW Isolation.	
8. Place Feed Reg Bypass Controllers In Manual AND Set Output To Zero.	Verify feed reg bypass valves SHUT
9. Reset AND open main FW isolation valve(s): 1FW-159 (A SG) 1FW-277 (B SG) 1FW-217 (C SG)	
10. Shut Main FW Pump Recirc Valves: 1FW-8 1FW-39	Locally shut main FW pump recirc manual isolation valve(s): 1FW-5 (FW pump A) 1FW-36 (FW pump B)
11. Place Condensate Booster Pump Controllers In Manual AND Control Discharge Pressure At 600 PSIG.	

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Op Test No.: 05000400/2009302	Scenario # 2	Event # 5/6/7/8	Page 43 of 43
Event Description: FRP-H.1 Attachment 3			

Time	Position	Applicant's Actions or Behavior

RESPONSE TO LOSS OF SECONDARY HEAT SINK

Attachment 3
Sheet 5 of 5
ESTABLISHING CONDENSATE FLOW TO SGs

Instructions	Response Not Obtained

NOTE: Local checks for flow noise may be used to confirm the presence of flow.

12. Establish Feed Flow To SG(s):

(Refer to Attachment 1 while performing actions that restore feed flow.)

a. Establish feed flow using the feed reg bypass valves from the MCB.

a. Locally establish feed flow using the feed reg bypass valves.

(Refer to OP-134.01, "FW SYSTEM", Section 8.4.)

b. Feed flow to SG(s) - ESTABLISHED

b. Perform the following:

1) Verify main FW block valve(s) - OPEN:

1FW-130 (A SG)
1FW-246 (B SG)
1FW-188 (C SG)

2) Locally establish feed flow using the feed reg valve(s).

(Refer to OP-134.01, "FW SYSTEM", Section 8.3.)

- END -

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Facility:	SHEARON-HARRIS	Scenario No.: 3	Op Test No.: 05000400/2009302
Examiners:		Operators:	

Initial Conditions:	• IC-11, MOL, 90% power, started up 9 hrs ago from Rx Trip 21 hours ago
	• The TDAFW Pump has been Out of Service for 6 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect
	• 'A' Boric Acid Transfer Pump is out of service for motor replacement, expected return to service in 6 hours
Turnover:	• Plant is at 90% power, MOL with the turbine in HOLD. A plant startup is in progress following a reactor trip 21 hours ago. The reactor went critical 9 hours ago. The TDAFW Pump has been out of service for 6 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect. Normal startup in progress IAW with GP-005, Power Operation (Mode 2 to Mode 1) section 5.0 step 138.c. with a planned rate change of 4 DEH units per minute. Load is set at 960, and the turbine is in hold. The "A" Boric Acid Transfer Pump is out of service for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to startup.
Critical Task:	• Start the 'A' RHR pump prior to the completion of PATH-1 Attachment 6.
	• Isolate AFW flow to the 'B' SG from the MDAFW pumps prior to exiting EPP-014
	• Close MSIVs for SG 'A' and 'C' prior to exiting EPP-015.

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N – BOP R - RO	Power escalation to 100%
TRG 2	TE:575A TE:575B TE:575C	C-BOP/SRO	Main Transformer High Temperature
TRG 3	CVC29A	C-RO/SRO TS - SRO	CSIP "A" Shaft Shear
TRG 4	XD1I121	C–BOP/SRO TS – SRO	Containment Fan Cooler Fan (AH-2 A-SA) Trips
TRG 5	NIS07E	I – RO/SRO TS - SRO	Power Range N-43 fails HI
TRG 6	MSS11	M – All	Main Steam Line Break outside of Containment

TRG 7	MSS05A MSS05B MSS05C	C-BOP/SRO	MSIVs fail to close and can't be closed from control room - Enter EPP-015 then exit after valves are closed locally
8	ZRPK616A ZRPK616B	I –BOP/SRO	SG 'B' AFW isolation valve fails to close on Feedwater Isolation signal
9	ZDSQ2:52A	I-RO/SRO	'A' RHR Pump fails to start from sequencer
10	ZRPK630A ZRPK630B	I-BOP/SRO	Phase A failure - Same slave relay in each train fails to actuate respective Phase A Isolation Valves • 1SP-948/1SP-949 • 1ED-94/1ED-95 • 1SP-16/1SP-939 • 1SP-916/1SP-918
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario Summary:

Plant is at 90% power, MOL with the turbine in HOLD. A plant startup is in progress following a reactor trip 21 hours ago. The reactor went critical 9 hours ago. The TDAFW Pump has been out of service for 6 hours and is not expected to be back in service for an additional 24 hours. LCO 3.7.1.2 action 'a' is in effect. Normal startup in progress IAW with GP-005, Power Operation (Mode 2 to Mode 1) section 5.0 step 138.c, with a planned rate change of 4 DEH units per minute. Load is set at 960, and the turbine is in hold. The "A" Boric Acid Transfer Pump is out of service for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to startup.

Event 1: Crew performs a power escalation IAW GP-005. For this reactivity manipulation, it is expected that the SRO will conduct a reactivity brief, the RO will dilute per the reactivity plan and the BOP will operate the DEH Controls as necessary to raise power.

Event 2: High Main Transformer temperatures can be initiated once the power escalation has been observed to the extent necessary to evaluate reactivity control. High temperature alarms will annunciate on ERFIS and ALB-022 requiring entry into AOP-035. The crew will need to stop the power escalation and evaluate conditions and determine that the transformer will need to be removed from service within 24 hours. If contacted, plant management will provide direction to hold power at the present level while the problem is being investigated.

Event 3: CSIP 'A' shaft shear can be inserted once the Main Transformer corrective actions have been determined. This will result in multiple alarms on ALB-006 and ALB-007 associated with the loss of charging flow, requiring entry into AOP-018, RCP Abnormal Conditions in order to address the loss of seal injection. The crew will start CSIP 'B' and re-establish seal injection IAW AOP-018 and then restore letdown per OP-107, Chemical and Volume Control System. The SRO will evaluate Tech Specs for the loss of CSIP 'A'.

Events Continued:

Event 4: Loss of AH-2A can be inserted once letdown has been restored. This will result in annunciator ALB 027-8-2, CONTAINMENT FAN COOLERS AH-2 LOW FLOW – O/L actuating. The crew will have to establish the 'B' train of Containment Fan Coolers IAW OP-169, Containment Cooling and Ventilation. The SRO will evaluate Tech Spec 3.6.2.3, Containment Systems – Containment Cooling System.

Event 5: Power Range Channel N-43 fails high once the 'B' train of Containment Fan Coolers has been placed in service. This will cause rods to start stepping in and the crew should enter AOP-001, Malfunction of Rod Control and Indication System. The crew should perform the immediate actions of AOP-001, placing Rod Control in MANUAL to stop rod motion. Follow up actions of AOP-001 will be performed in order to restore rod withdrawal capability. The SRO will evaluate Tech. Spec 3.3.1 for any impact due to the failed instrument.

Event 6: Main Steam Line Break outside of Containment is initiated once rod withdrawal capability has been restored. The crew will trip the reactor, initiate SI and enter PATH-1.

Event 7: Automatic Main Steam Isolation does not occur, and the crew will attempt to close the MSIVs at the MCB. The MSIVs will fail to close manually requiring direction to plant operators to isolate air to the MSIVs. The crew will transition from PATH-1 to EPP-014 and then to EPP-015 due to uncontrolled depressurization of all SGs. Once in EPP-015, the 'A' and 'C' MSIVs will be closed locally and the crew will transition back to EPP-014.

Event 8: The AFW Auto Isolation for the 'B' SG will not occur and the crew will have to manually isolate AFW flow to the 'B' Steam Generator.

Event 9: The 'B' RHR pump will trip immediately after it starts and cannot be restarted. The 'A' RHR pump will fail to start automatically from the 'A' Sequencer. The 'A' RHR pump can be started by the operator. This will be accomplished during the completion of PATH-1 Guide Attachment 6.

Event 10: Phase A isolation will not complete due to relay failure for the following containment isolation valves: 1SP-948/1SP-949, 1ED-94/1ED-95, 1SP-16/1SP-939, 1SP-916/1SP-918. In order to assure at least single valve containment Phase A isolation, the operator will have to close either 1SP-948 or 1SP-949 AND either 1ED-94 or 1ED-95. This will be accomplished during the completion of OMM-004 Attachment 4 which is directed by PATH-1 Guide Attachment 6.

The scenario may be terminated at the lead Evaluator's discretion following transition back to EPP-014.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Provide a Reactivity Plan to candidates for raising power to >90%
- Provide a copy of GP-005, Power Operation (Mode 2 to Mode 1) signed off up to and including step 138.c of section 5.0.
- Provide a copy of OP-130.01 section 8.5 and 8.6.
- Provide a copy of OP-136 section 5.1.
- Provide a copy of OP-153.02 section 8.6 and 8.7.

INITIAL CONDITIONS:

- IC-11, MOL, 90 % power, started up 9 hrs ago from Rx Trip 21 hours ago
- Place CIT on the 'A' Boric Acid Transfer Pump and take switch to STOP
- Place 'B' Boric Acid Transfer Pump switch to AUTO and green protected train placard
- Set potentiometers as follows: FK-114: 7.50 FK-113: 3.54
- Protected equipment placards for TDAFP (per OMM-001 Att. 16)
    - 'A-SA' MDAFP – Orange placard
    - 'B-SA' MDAFP – Green placard
    - 'A' Startup Transformer brk 52-2 and 52-3 Orange placards
    - 'B' Startup Transformer brk 52-13 and 52-14 Green placards
- Hang CITs on 1MS-70, 1MS-72 and Trip and Throttle Valve 1MS-T
- Place RED bars on ALB 01-7-5, ALB 017-7-4
- Place BLUE bar on ALB 23-2-13
- Hang restricted access signs on all 3 swing gates

PRE-LOAD:

- TDAFW Pump OOS due to damaged overspeed trip device1MS-70 and 72 breakers open and Trip and Throttle valve tripped (irf mss034 OPEN, irf mss035 OPEN, imf cfc01c true)
- 'A' Boric Acid Pump OOS for motor replacement (idi xa2i174 STOP,AUTO ilo xa2o174g OFF)
- Failure of Auto AFW Block on SG "B" (imf zrpk616a (n 00:00:00 00:00:00)FAIL_ASIS, imf zrpk616b (n 00:00:00 00:00:00)FAIL_ASIS)
- Phase A failure of 1SP-949/1SP-949, 1ED-94/1ED-95, 1SP-16/1SP-939, 1SP-916/1SP-918 (imf zrpk630a (n 00:00:00 00:00:00)FAIL_ASIS, imf zrpk630b (n 00:00:00 00:00:00)FAIL_ASIS)
- 'A' RHR pump fails to start from the sequencer (imf zdsq:52a)
- 'B' RHR pump trips when it starts (imf rhr01b)
- MSIVs fail to close (imf mss05a (n 00:00:00 00:00:00)2, imf mss05b (n 00:00:00 00:00:00)2 , imf mss05c (n 00:00:00 00:00:00)2)

TRIGGERS:

- ET-2: TRG= 2 imf TE:575A 111.9 8:20

TRG= 2 imf TE:575B 111.2 8:30

TRG= 2 imf TE:575C 112.3 8:10

Main Transformer High Temperature AOP-035 entry - MTF winding temp heatup from start of 77°C

- ET-3: cvc29a (3 00:00:00 00:00:00) true
  CSIP Pump 'A' Shaft Shear

- ET-4: imf hva01b (4 00:00:00 00:00:00) true
  Containment Fan Cooler AH-2 A-SA trip

- ET-5: imf nis07e (5 00:00:00 00:00:00)200.0 00:00:00
  Power Range Channel N-43 fails HI

- ET-6: imf mss11 (6 00:00:00 00:00:00)4e+006 00:01:00
  Main Steam Line Break Outside Containment size to prevent RED or ORANGE on Integrity

- ET-7: TRG= 7 dmf mss05a, TRG= 7 dmf mss05c 30
  Allows closure of MSIV 'A' and 'C' ONLY AFTER CREW IS IN EPP-015

CAEP

!Description of 2009B NRC Exam Scenario 3 CAEP Reset to IC-11

! TDAFW Pump is OOS due to damaged overspeed trip device
! Pump has been OOS for 62 total hours and is expected back within the next 24 hours
! Tech Spec 3.7.1.2, 72 hour LCO or HSB within the next 6 hours, HSD following 6 hours
! Hang CIT on both MS-70 and 72 then place protected train placards per OMM-001
irf mss034 (n 00:00:00 00:00:00) OPEN
irf mss035 (n 00:00:00 00:00:00) OPEN
! Trip the TDAFW Pump Trip and Throttle valve
imf cfw01c (n 00:00:00 00:00:00) true

! A BA Pump OOS for motor replacement place MCB switch to STOP
! Hang CIT on CB Switch and place the B BA Pump MCB switch to AUTO, protect B BA pump switch
idi xa2i174 (n 00:00:00 00:00:00)STOP,AUTO
ilo xa2o174g (n 00:00:00 00:00:00)OFF

! Event 1: Crew performs power escalation to 100% power IAW GP-005
! Normal - ALL
! Reactivity - ALL

! Event 2: Main Transformer High Temperature AOP-035 entry - MTF winding temp heatup from start of 77°C
! Annunciator ALB-22 9-5 Comp Alarm Elect Dist Systems will come in during temp increase
! Sim Operator can view heatup using ERFIS plot GD AOP-035
! Component - BOP
TRG= 2 imf TE:575A 111.9 8:20
TRG= 2 imf TE:575B 111.2 8:30
TRG= 2 imf TE:575C 112.3 8:10

! Event 3: CSIP "A" Shaft Shear requires entry to AOP-018
! Component - RO
! Tech Spec - SRO
imf cvc29a (3 00:00:00 00:00:00) true

! Event 4: Containment Fan Cooler AH-2 A-SA trip
! Component - BOP
! Tech Spec - SRO
imf hva01b (4 00:00:00 00:00:00) true

```
! Event 5: Power Range Channel N-43 fails HI
!   Instrument - RO
!   Tech Spec - SRO
    imf nis07e (5 00:00:00 00:00:00)200.0 00:00:00

! Event 6: Main Steam Line Break Outside Containment size to prevent receiving a RED
    or ORANGE condition on Integrity
!   Major - ALL
    imf mss11 (6 00:00:00 00:00:00)4e+006 00:01:00 400000
! MSIV's fail to close (preloaded)
    imf mss05a (n 00:00:00 00:00:00)2
    imf mss05b (n 00:00:00 00:00:00)2
    imf mss05c (n 00:00:00 00:00:00)2

! Event 7: MSIV "A" and "C" close - NOTE: ONLY AFTER CREW HAS ENTERED EPP-
    015
! NOTE: "C" MSIV will close 30 seconds after "A" MSIV
    TRG= 7 dmf mss05a
    TRG= 7 dmf mss05c 0:30

! Event 8: Failure of Auto AFW Block on SG "B" (preloaded)
!   Instrument - RO
    imf zrpk616a (n 00:00:00 00:00:00)FAIL_ASIS
    imf zrpk616b (n 00:00:00 00:00:00)FAIL_ASIS

! Event 9: "A" RHR Pump fails to start from sequencer (preloaded)
!   Component - RO
    imf zdsq2:52a (n 00:00:00 00:00:00)FAIL_ASIS

! Event 9 continued: "B" RHR Pump Trips when it autostarts
    imf RHR01B

! Event 10: Phase A failure of 1SP-948/1SP-949, 1ED-94/1ED-95, 1SP-16/1SP-939,
    1SP-916/1SP-918 (preloaded)
!   Instrument - BOP
    imf zrpk630a (n 00:00:00 00:00:00)FAIL_ASIS
    imf zrpk630b (n 00:00:00 00:00:00)FAIL_ASIS
```

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Event Description: Raise Power		
Time	Position	Applicant's Actions or Behavior
LEAD EVALUATOR:		**When the evaluating team has completed their evaluation of the power change initiate Event 2 "Main Transformer High temperature". Event 2 can be triggered ~5 minutes early because it will take ~7 minutes before the alarms come in.**
	SRO	Provides direction per GP-005, Step 138.d
	BOP	**CONTINUE** the load increase by depressing the GO pushbutton. Monitors turbine and feedwater system response.
	SRO	Direct Radwaste Control Room to supply Auxiliary Steam from Extraction Steam per OP-130.01 Section 8.5 or Section 8.6.
BOOTH OPERATOR:		**Respond as Radwaste Operator but no simulator actions are required.**
EVALUATOR NOTE:		**The crew may elect to start a dilution before the power change is initiated.**
EVALUATOR NOTE:		**OP-107.01 section 5.3 is a "Continuous Use" procedure.**
PROCEDURE NOTES:		**If Blender Dilution (Alternate Dilution) Operation is for RCS temperature adjustments during steady state power operations, Steps 5.3.2.1 through 5.3.2.3 are not applicable. Operator experience will dictate the required amount of makeup water needed.** **FIS-114 may be set for one gallon less than desired. A pressure transient caused by 1CS-151 shutting results in FIS-114 normally indicating one gallon more than actual flow but two gallons more would not be unexpected.**
	RO	SETS FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.

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Event Description: Raise Power		
Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**Dilution of the RCS will be dependent on charging and letdown flow rate. Placing additional letdown orifices in service will increase dilution rate of the RCS.**
PROCEDURE CAUTION:		**Setting RMUW flow controller for a desired flow rate greater than 90 gpm when performing a dilution in the normal dilute mode will result in a flow deviation alarm. The reduced flow in this configuration is due to the additional back pressure from the spray nozzles and letdown flow to the VCT.**
	RO	• SET total makeup flow as follows: o IF performing DIL in Step 5.3.2.8, THEN SET controller 1CS-151, FK-114 RWMU FLOW, for less than or equal to 90 gpm. (YES) o VERIFY the RMW CONTROL switch has been placed in the STOP position. • VERIFY the RMW CONTROL switch green light is lit. • PLACE the control switch RMW MODE SELECTOR to the DIL **OR** the ALT DIL position.
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK-444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure.** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure.** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure.**

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Event Description: Raise Power		
Time	Position	Applicant's Actions or Behavior
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and the RCS boron concentration to less than 10 ppm. (Already on due to power escalation)
PROCEDURE NOTE:		**At least 10 minutes should be allowed for mixing before sample is taken.** **Dilution (Alternate Dilution) may be manually stopped at any time by turning the control switch RMW CONTROL to STOP.**
	RO	START the makeup system as follows: • TURN control switch RMW CONTROL to START momentarily. • VERIFY the red indicator light is lit. • Verify valve alignment and proper flow.
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**

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Event Description: Raise Power		
Time	Position	Applicant's Actions or Behavior

	RO	• VERIFY Tavg responds as desired.
		• IF rod control is in AUTO, THEN VERIFY the control rods are stepping in to the desired height.
		• PLACE Reactor Makeup in Auto per Section 5.1.2
		• VERIFY the RMW CONTROL switch:
		  o Is in the STOP position.
		  o The green light is lit.
		• PLACE one BORIC ACID TRANSFER PUMP A-SA(B-SB) in AUTO. (A-SA is tagged out)
		• PLACE one BORIC ACID TRANSFER PUMP B-SB(A-SA) in STOP. (A-SA is tagged out)
		• PLACE the RMW MODE SELECTOR to AUTO.
		• START the makeup system as follows:
		  o TURN control switch RMW CONTROL to START momentarily.
		  o VERIFY the red indicator light is lit.

EVALUATOR NOTE:		**Event 2 can inserted ~5 minutes early because it will take ~7 minutes before any of the alarms annunciate.** **Insert Event 2 when the evaluating team has completed their evaluation of Event 1** **Event 2 "Main Transformer High temperature"**

Op Test No.: 05000400/2009302	Scenario # 3	Event # 2	Page 12 of 46
Event Description: Main Transformer High Temperature			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-2 "Main Transformer High Temperatures" (Note it will take ~ 7 minutes before alarms actuate).**
Indications Available:		**ALB-022-9-5, Computer Alarm Elect Dist System** **ERFIS Points TE:575A/TE:575B/TE:575C (Main Transformer Winding Temperatures)**
	BOP	Identifies annunciators and references APP-ALB-22-5-1 and APP-ALB-22-9-5 • CONFIRM alarm using: o On Gen Protective Relay Panel 1A (1B), Gen Lockout G1A (G1B) relay status o At Main Transformer Phase A, B, and C, alarm status light indications • VERIFY Automatic Functions: (NONE actuated) o If a Fault Pressure Trip of the Main Transformers occurs, a Generator lockout will occur, o resulting in the following o (1)Breakers 52-7 and 52-9 will trip o (2)Exciter Field Breaker will trip o (3)Main Turbine will trip o (4)Plant loads will automatically transfer from the UAT to the SUT • PERFORM Corrective Actions: • GO TO AOP-035, Main Transformer Trouble.

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Event Description: Main Transformer High Temperature

Time	Position	Applicant's Actions or Behavior
	SRO	Implement AOP-035, Main Transformer Trouble
	BOP	Place turbine in HOLD (pre-emptive action)
	CREW	**DISPATCH** an operator to the Main Transformers with Attachment 1, Main Transformer Trouble Local Actions
COMMUNICATOR:		**When dispatched to address Attachment 1, wait 2 minutes and then report the following information:** • **All three windings have local Hot Spot Temperature alarms** • **Local readings are approximately 111°C and stable** • **All three transformer cooling banks are operating** • **Unable to determine the cause of the higher temperatures**
	BOP	**MONITOR** transformer parameters (ERFIS Display AOP-035):

Control Board Indication	
EI-521	Gen Phase A Current
EI-522	Gen Phase B Current
EI-523	Gen Phase C Current
ERFIS Points	
TEE0575A	Main Transformer Phase A Temp (Winding)
TEE0575B	Main Transformer Phase B Temp (Winding)
TEE0575C	Main Transformer Phase C Temp (Winding)
IEE1567A	Gen Phase A Current
IEE1567B	Gen Phase B Current
IEE1567C	Gen Phase C Current
TGA0902A	Iso Phase A Bus Duct Temp Mn Xfmr
TGA0902B	Iso Phase B Bus Duct Temp Mn Xfmr
TGA0902C	Iso Phase C Bus Duct Temp Mn Xfmr

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Event Description: Main Transformer High Temperature

Time	Position	Applicant's Actions or Behavior
	SRO	NOTIFY the following personnel of any problems with main transformers. • Responsible Engineer • Load Dispatcher (System Operator) • Plant/Transmission Activities Coordinator (PTAC) Initiate Equipment Problem Checklist **GO TO** the applicable step: (7, Page 8)
	SRO	PERFORM the following for transformer high temperatures: **(Note- Winding temperatures are >110°C and <120°C)** • **GO TO** the applicable substep for the highest temperatures reached: (Determines 24 hrs for time to unload transformer based on temperatures) • Initiates Equipment Problem Checklist • Contacts WCC for assistance
COMMUNICATOR:		**If contacted as plant management, direct the crew to maintain current power level. Engineering has been contacted and will be evaluate the current conditions in order to provide a recommendation for plant response.**
	SRO	**REMOVE** transformers from service within 24-hours, as follows: • CHECK EITHER of the following temperature conditions exists: (YES) o Windings greater than or equal to 110°C (YES) o Top Oil greater than or equal to 90°C (NO) • **EVALUATE** using water spray on transformer coolers. • **REDUCE** load using GP-006, Normal Plant Shutdown from Power Operations to Hot Standby. • **GO TO** Step 9 to remove transformers from service within 24-hours from exceeding temperature limits.

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Event Description: Main Transformer High Temperature		
Time	Position	Applicant's Actions or Behavior

COMMUNICATOR:	**If the crew directs water spray cooling for the "A" Main Transformer, inform them that you will contact System Engineering and get approval prior to use.**
EVALUATOR NOTE:	**After the crew has stabilized plant power from activities of Event 2, initiate Event 3 "CSIP 'A' Shaft Shear"**

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Event Description: CSIP 'A' Shaft Shear

Time	Position	Applicant's Actions or Behavior
		BOOTH OPERATOR: **When directed by Lead Evaluator: Actuate TRG-3 "CSIP 'A' shaft shear"**
		Indications Available: **ALB-06-1-1 CHARGING PUMP DISCHARGE HEADER HIGH-LOW FLOW** **ALB-08-2-1 RCP SEAL WATER INJECTION LOW FLOW**
	RO	• RESPONDS to alarms on ALB-06-1-1 and ALB-08-2-1. • REPORTS CSIP 'A' shaft shear (From MCB indications of no flow and pump still running with abnormal amps) • Takes MCB switch for 'A' CSIP to STOP and reports to CRS that 'A' CSIP is secured
	SRO	ENTERS AOP-018, RCP Abnormal Conditions.
Immediate Action	RO	PERFORMS immediate actions. • CHECK ANY CSIP RUNNING. (YES but shaft sheared. CSIP 'A' may have been preemptively secured if the shaft shear has been identified) • ISOLATE letdown by verifying the following valves SHUT: o 1CS-7, 45 GPM Letdown Orifice A o 1CS-8, 60 GPM Letdown Orifice B o 1CS-9, 60 GPM Letdown Orifice C
	SRO	REFER to PEP-110, Emergency Classification and Protective Action Recommendations, AND ENTER the EAL Network at entry point X.

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Event Description: CSIP 'A' Shaft Shear

Time	Position	Applicant's Actions or Behavior
		COMMUNICATOR: The crew should dispatch AOs to investigate. **IF dispatched, wait 1-2 minutes then report that "the shaft is broken on the 'A' CSIP." Report as TB operator (if dispatched) that "there are no apparent problems at the breaker for 'A' CSIP."**
		PROCEDURE NOTE: Minimum allowable flow for a CSIP is 60 gpm which is provided by normal miniflow during normal operation and alternate miniflow during safety injection. Maintaining CSIP flow greater than or equal to 60 gpm also satisfies this requirement.
	SRO	EVALUATE plant conditions AND GO TO the appropriate section: MALFUNCTION | SECTION | PAGE Loss of CCW and/or Seal Injection to RCPs | 3.1 | 5
	RO	CHECK ALB-5-1-2A, RCP Thermal Bar HDR High Flow, alarm CLEAR. (YES)
	SRO	CHECK ALL RCPs operating within the limits of Attachment 1. (YES)
	RO	• CHECK ALL RCPs RUNNING. (YES) • CHECK the following NORMAL for ALL RCPs: o CCW flow (YES) o Seal Injection flow (NO)

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Event Description: CSIP 'A' Shaft Shear

Time	Position	Applicant's Actions or Behavior
	SRO	RESTORE using the applicable attachment:
		MALFUNCTION: Loss of Seal Injection flow only — ATTACHMENT: Attachment 4 (Page 32)

	RO	• CHECK at least one CSIP RUNNING. (NO)
		• PLACE controller FK-122.1, Charging Flow in MANUAL AND SHUT.
		• SHUT HC-186.1, RCP Seal WTR INJ Flow.
		• VERIFY a suction path for the standby CSIP by performing the following:
		  o VERIFY CSIP suction flowpath from VCT as follows:
		  ▪ VERIFY greater than 5% level is established in VCT. (YES)
		  ▪ VERIFY the following valves are OPEN:
		  • LCV-115C, VCT Outlet (1CS-165) (YES)
		  • LCV-115E, VCT Outlet (1CS-166) (YES)
		• START the standby CSIP. (CSIP 'B')

EVALUATOR NOTE:		**The answer to 'CHECK seal injection flow LOST for less than 5 minutes' could be NO. If so, the crew will be directed to restore seal injection flow in accordance with Attachment 4 which will limit the cooldown rate of the seal inlet and pump radial bearings to 1 °F/minute.**

Time	Position	Applicant's Actions or Behavior
	RO	• CHECK seal injection flow LOST for less than 5 minutes. (YES) • ADJUST HC-186.1, RCP Seal WTR INJ Flow, to establish seal injection flow as necessary to maintain the following: o LESS than 31 gpm total flow to all RCPs o BETWEEN 8 and 13 gpm to all RCPs
	BOP	START CSIP room ventilation per OP-172, Reactor Auxiliary Building HVAC System. (AH-9B) • Starts AH-9B
	RO	RESTORE Charging and Letdown flow per OP-107, Chemical and Volume Control System.
EVALUATOR NOTE:		**The steps for evaluating restoration of letdown begin on page 19.**
	SRO	• INITIATE action to determine and correct the cause of the loss of the CSIP. • Completes an Equipment Problem Checklist and contacts WCC for assistance. • Directs AO to remove control power from 'A' CSIP
BOOTH OPERATOR **COMMUNICATOR**		**IF directed - Remove control power from the 'A' CSIP. Use remote function CVC047 to open knife switch for control power to the A CSIP.** **Report back after control power has been removed.**
	RO	CHECK seal injection flow between 8 and 13 gpm has been established to all RCPs.

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Event Description: CSIP 'A' Shaft Shear

Time	Position	Applicant's Actions or Behavior
	SRO	WHEN seal injection flow has been established between 8 and 13 gpm, THEN PERFORM OST-1126, Reactor Coolant Pump Seals Controlled Leakage Evaluation Monthly Interval Modes 1-4. (Will not be completed before next event is initiated)
	SRO	ENTERS TS: • 3.1.2.2, Boron Injection Flowpaths, 72 hours to restore at least 2 boron injection flowpaths, or be in Hot Standby within the next 6 hours • 3.1.2.4, CSIP's, 72 hours to restore at least 2 CSIPs, or be in Hot Standby within the next 6 hours • 3.5.2, ECCS Subsystems, 72 hours to restore the inoperable subsystem to operable status, or be in Hot Standby within the next 6 hours
	RO	OP-107, 5.4 – Initiating Normal Letdown
	RO	• Verifies Initial Conditions: o Charging flow established o PRZ Level > 17% o CS-7, CS-8, CS-9 (Letdown Orifice Isolation valves) SHUT
PROCEDURE CAUTION:		**If Charging flow was stopped or greatly reduced prior to letdown being secured, there is a possibility that the Letdown line contains voids due to insufficient cooling. This is a precursor to water hammer, and should be evaluated prior to initiating letdown flow.**

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Event Description: CSIP 'A' Shaft Shear			

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY 1CC-337, TK-144 LTDN TEMPERATURE, controller is: • in AUTO AND • set for 110 to 120 °F (4.0 to 4.7 on potentiometer) normal operation
PROCEDURE NOTE:		PK-145.1 LTDN PRESSURE, 1CS-38, may have to be adjusted to control at lower pressures.

	RO	• VERIFY 1CS-38 Controller, PK-145.1 LTDN PRESSURE, in MAN with output set at 50%.
		• VERIFY open the following Letdown Isolation Valves:
		  • 1CS-2, LETDOWN ISOLATION LCV-459
		  • 1CS-1, LETDOWN ISOLATION LCV-460
		• VERIFY open 1CS-11, LETDOWN ISOLATION.

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Event Description: CSIP 'A' Shaft Shear

Time	Position	Applicant's Actions or Behavior

PROCEDURE NOTE: **The following table gives the minimum charging flow required to keep the regenerative heat exchanger temperature below the high temperature alarm when letdown is established:**

Letdown Flow (to be established)	Minimum Charging Flow necessary when letdown is established
45 gpm	20 gpm
60 gpm	26 gpm
105 gpm	46 gpm
120 gpm	53 gpm

PROCEDURE NOTE: **If Pressurizer level is above the programmed level setpoint, charging flow should be adjusted to a point above the minimum required to prevent regenerative heat exchanger high temperature alarm but low enough to reduce pressurizer level.**

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Event Description: CSIP 'A' Shaft Shear

Time	Position	Applicant's Actions or Behavior
	RO	• ADJUST controller 1CS-231, FK-122.1 CHARGING FLOW, as required to: o Maintain normal pressurizer level program o Keep regenerative heat exchanger temperature below the high temperature alarm when the desired letdown orifice is placed in service. • OPEN an Orifice Isolation Valve (1CS-7, 1CS-8, 1CS-9) for the orifice to be placed in service. • ADJUST 1CS-38 position by adjusting PK-145.1 output as necessary to control LP LTDN Pressure (PI-145.1) at 340 to 360 psig, to prevent lifting the LP Letdown Relief. • WHEN Letdown pressure has stabilized at 340 to 360 psig on PI-145.1, LP LTDN PRESS, THEN PERFORM the following: o a. ADJUST PK-145.1 LTDN PRESSURE setpoint to 58% o b. PLACE the controller in AUTO.

Time	Position	Applicant's Actions or Behavior
	RO	• VERIFY PK-145.1 LTDN PRESSURE Controller maintains Letdown pressure stable at 340 to 360 psig. • OPEN additional orifice isolation valves (1CS-7, 1CS-8, 1CS-9) as required. • ADJUST charging flow as necessary to: o prevent high temperature alarm (per table above) o maintain pressurizer programmed level. • PLACE PRZ level controller, LK-459F, in MAN to cancel any integrated signal. • PLACE PRZ level controller, LK-459F, in AUTO. • WHEN the following occurs: o Program pressurizer level is matching the current pressurizer level AND o Letdown and seal return are balanced with seal injection flow and charging flow. • THEN place controller 1CS-231, FK-122.1 CHARGING FLOW, in AUTO. • COMPLETE Section 5.4.3. (Position Verification)
EVALUATOR NOTE:		**The SRO may address OWP-CS, CHEMICAL AND VOLUME CONTROL SYSTEM. This OWP verifies status light box verification when CSIP 'A' is tagged out for maintenance and will not be implemented for this scenario.**
	SRO	Contacts WCC for EIR and support. Requests that either control power or breaker is racked out on 'A' CSIP
EVALUATOR NOTE:		**IF the crew did not have the control power removed or the breaker racked out on 'A' CSIP, when the SI signal occurs later in the scenario the 'A' CSIP will restart.** **After Letdown is restored initiate Event 4 "Containment Fan Cooler Trip"**

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Event Description: Containment Fan Cooler (AH-2 A-SA) Trips			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		**When directed by lead evaluator, Actuate TRG-4 "Containment Fan Cooler Trip AH-2A trips"**
Indications Available:		**ALB-027-7-2 CONTAIMENT FAN COOLERS AH-2 LOW FLOW-O/L** **ALB-01-6-5 ESF SYS TRN A BYPASSED OR INOPERABLE**
	BOP	• RESPONDS to alarm on ALB-027-7-2 and ALB-01-6-5 • Refers to annunciator response
	BOP	CONFIRM alarm using: • AH-2 fans running indication • AH-2 fan trouble indication • Damper position indication **VERIFY** Automatic Functions: • Fans trip on overload. (YES)
	BOP	PERFORM Corrective Actions: • CHECK the fan status indication. • IF the running fan has tripped, THEN START standby containment fan per OP-169, Containment Cooling and Ventilation. • CHECK proper damper alignment per OP-169, Containment Cooling and Ventilation. • DISPATCH an operator to check the status of the following breakers: o 1A22-SA-2A, AH-2 (1A-SA) CNMT Fan Cooler

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Event Description: Containment Fan Cooler (AH-2 A-SA) Trips

Time	Position	Applicant's Actions or Behavior
		COMMUNICATOR: When dispatched as an AO to investigate fan breakers, approximately 2 to 3 minutes later report there is an overcurrent trip condition on breaker 1A22-SA-1A, AH-2 (1A-SA) CNMT Fan Cooler.
		EVALUATOR NOTE: The RO may need to borrate while holding power.
	SRO	Direct BOP to start the B train of containment fan cooler using OP-169, Containment Cooling and Ventilation AND select AH-2 1B-SA as the lead fan.
	BOP	Verifies Initial Conditions met • Place the control switches for both fans in each Containment cooler unit AH-2 A-SA (AH-1 B-SB) and AH-2 A-SA to LO-SPD.
		PROCEDURE NOTE: Steps 5.1.2.2 and 5.1.2.3 must be done without delay. The fan should not be allowed to coast down before being started in fast speed.
	BOP	• Place the control switch for the fans started in Step 5.1.2.1 to STOP. • Place the control switches for the fans stopped in Step 5.1.2.2 to HI-SPD.
	BOP	• Place the control switch for each fan to be removed from service to STOP.

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Event Description: Containment Fan Cooler (AH-2 A-SA) Trips

Time	Position	Applicant's Actions or Behavior
	SRO	Evaluate Tech Spec 3.6.2.3.a • Restore to operability in 7 days, or then be in Hot Standby in the next 6 hours o This LCO is eliminated once the 'B' train fans are selected for LEAD. • Initiates Equipment Problem Checklist and contacts WCC for assistance
EVALUATOR NOTE:		**After 'B' Train Containment Fan Coolers have been placed in service, initiate Event 5 "PR NIS Channel 43 Fails High"**

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-5 "PR NIS Channel 43 fails High"**
Indications Available: • **Uncontrolled rod motion/bistable trips** • **N-43 fails to 120%** • **ALB-13-4-1, POWER RANGE HIGH NEUTRON FLUX HIGH SP ALERT** • **ALB-13-4-2, POWER RANGE HIGH NEUTRON FLUX RATE ALERT** • **ALB-13-4-5, POWER RANGE CHANNEL DEVIATION** • **ALB-13-5-1, OVERPOWER ROD STOP** • **ALB-10-6-5A, O/TEMPΔT BLK ROD C-3 ALERT** • **ALB-10-6-5A 6-5B O/TEMP ΔT ALERT**		
	RO	RESPONDS to alarms/uncontrolled rod motion.
	SRO	ENTERS and directs actions of AOP-001.
	RO	PERFORMS immediate actions.
EVALUATOR NOTE:		**Rods cannot be moved out until AOP actions clear the overpower rod stop. A TS declaration is not required for this event.**
Immediate Action	RO	CHECK that LESS THAN TWO control rods are dropped. (YES)
Immediate Action	RO	POSITION Rod Bank Selector Switch to MAN.
Immediate Action	RO	CHECK Control Bank motion STOPPED. (YES)
	SRO	PROCEEDS to Section 3.2.

Time	Position	Applicant's Actions or Behavior
	RO	CHECK that instrument channel failure has NOT OCCURRED by observing the following: • RCS Tavg (YES) • RCS Tref (YES) • POWER Range NI channels (NO) • TURBINE first stage pressure
	SRO	PERFORM the following: • IF a power supply is lost, THEN GO TO AOP-024, Loss of Uninterruptible Power Supply. (NO) • IF an individual instrument failed, THEN MAINTAIN manual rod control until corrective action is complete. (YES) • IF a Power Range NI Channel failed, THEN PLACE the affected NI Rod Stop Bypass switch to BYPASS at the Detector Current Comparator Drawer. (YES)
	RO	Manually OPERATE affected control bank to restore the following: • Equilibrium power and temperature conditions • Rods above the insertion limits of Tech Spec 3.1.3.6 and PLP-106, Technical Specification Equipment List Program and Core Operating Limits Report. VERIFY proper operation of the following: (YES) • CVCS demineralizers • BTRS • Reactor Makeup Control System

Time	Position	Applicant's Actions or Behavior
	SRO	CHECK that this section was entered due to control banks MOVING OUT. (NO)
		• GO TO Step 6.
	RO	CHECK that NEITHER of the following OCCURRED: • Unexplained RCS boration (NO) • Unplanned RCS dilution (NO)
	SRO	CHECK that an automatic Rod Control malfunction OCCURRED. (NO) • GO TO Step 9. • EXIT this procedure. • Initiate Equipment Problem Checklist and contact WCC for assistance. • Tech Spec Evaluation: o 3.3.1 for N-43, Action 2, inoperable channel placed in tripped condition within 6 hours o 3.3.1 for OT ΔT, Action 6, inoperable channel placed in tripped condition within 6 hours o 3.2.1 for AFD limits, restore AFD within 15 minutes or reduce thermal power to < 50% within 30 minutes (Not applicable AFD is operable, AFD monitor is inoperable) o 3.2.4 for QPTR, calculate QPTR at least once per hour per specification 4.2.4.2
EVALUATOR NOTE:		**OWP-RP-25 for N-43 failure is not required for completion prior to initiating the next event.** **Once actions for failed N-43 have been completed, initiate Event 6 "Main Steam Line Break Outside of Containment"**

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator:** **Actuate TRG-6 "MS Line Break Outside of CNMT"**
Indications Available:		• **ALB-09-3-3, PRZ CONT LOW PRESS AND HEATERS ON** • **ALB-09-5-1 PRESSURIZER HIGH-LOW PRESS** • **Increasing Reactor power** • **RCS pressure decreasing** • **Charging flow increasing** • **SG pressures lowering**
	RO	Recommends Reactor Trip, Manually Trips Reactor and manually SI (with no objection from CRS)
	SRO	ENTERS and directs actions of PATH-1.
	RO	Manually trips the reactor PERFORM immediate actions of PATH-1.
	RO	VERIFY Reactor Trip: • AUTO or MANUAL Reactor Trip successful: • CHECK for any of the following: • Trip breakers RTA and BYA OPEN (YES) • Trip breakers RTB and BYB OPEN (YES) • ROD Bottom lights LIT (YES) • NEUTRON flux decreasing (YES)

Time	Position	Applicant's Actions or Behavior

	BOP	VERIFY Turbine Trip:
		• CHECK for any of the following:
		  • ALL turbine throttle valves – SHUT (YES)
		  • ALL turbine governor valves – SHUT (YES)
		VERIFY power to AC Emergency Buses
		• 1A-SA and 1B-SB Buses energized by off-site power or EDG's (YES, off-site power)

	RO	CHECK SI Actuation:
		• CHECK for any of the following – LIT: (YES or NO, SRO may direct initiation of SI following recognition of steam break)
		  • SI Actuated bypass permissive light
		  • ALB-11-2-2
		  • ALB-11-5-1
		  • ALB-11-5-3
		  • ALB-12-1-4
		SI actuation – REQUIRED (YES)
		  • Actuate SI (if not preemptively actuated earlier)

	SRO	• Initiate monitoring of monitoring the Critical Safety Function Trees • Informs Shift Superintendent to evaluate EAL Network Using Entry Point X. • Foldout A Applies
EVALUATOR NOTE:		**The crew should brief on the general foldout criteria.** **The 'B' RHR pump trips when started. The 'A' RHR pump does not AUTO start from the sequencer and must be manually started.**

Time	Position	Applicant's Actions or Behavior
	RO	• VERIFY ALL CSIPs AND RHR pumps – RUNNING. (NO). **Event #9** • Identifies that there are no RHR pumps running
Critical Task		STARTS 'A' RHR pump
		CHECK SI Flow: • SI flow – GREATER THAN 200 GPM. (YES)
	RO	RCS pressure – LESS THAN 230 PSIG. (NO)
	BOP	Directs TB AO -Place the A and B I/A compressors to local control mode. Directs RAB AO – Locally unlock and turn on the breakers for the CSIP suction and discharge cross connect valves: Refer to Attachment 11.
BOOTH OPERATOR:		**When contacted to place A/B air compressors in Local Control mode, run CAEP :\air\ACs_to_local.txt.**
COMMUNICATOR:		**When CAEP is complete, report that the air compressors are running in local control mode.**
BOOTH OPERATOR		**When contacted to Unlock and Turn ON the breakers for the CSIP suction and discharge cross-connect valves, run CAEP *:\cvc\path-1 att 6 csip suction valves power.txt.***
COMMUNICATOR:		**When the CAEP is complete, report task to the MCR.**

Time	Position	Applicant's Actions or Behavior
	BOP	CHECK Main Steam Isolation: • MAIN Steam isolation – ACTUATED. (YES) **Event #7** • VERIFY Main Steam Isolation Valves SHUT. (NO) • Attempts to close ALL MSIV's (MSIV's will not shut)

Time	Position	Applicant's Actions or Behavior
	RO	CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (YES)
	BOP	CHECK AFW Status: • AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES)
	SRO	ASSIGNS BOP to perform the following:
Critical Task	BOP	• VERIFY alignment of components from actuation of ESFAS Signals using Attachment 6, "Safeguards Actuation Verification", while continuing with implementation of EOPs. • Identifies Phase A valves have NOT all aligned and places valves to correct position (per OMM-004 Attachment 4): **Event 10** **1SP-948/1SP-949 (Must close 1 for critical task)** **1ED-94/1ED-95 (Must close 1 for critical task)** 1SP-16/1SP-939 (Not needed for critical task) 1SP-916/1SP-918 (Not needed for critical task)
	RO	Control RCS Temperature: Stabilize AND maintain temperature between 555°F AND 559°F using Table 1. TABLE 1: RCS TEMPERATURE CONTROL GUIDELINES FOLLOWING RX TRIP • Guidance is applicable until another procedure directs otherwise. • IF no RCPs running, THEN use wide range cold leg temperature.

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**The only action available to control RCS temperature is to limit AFW flow but a flow reduction to < 210 kpph should not be initiated until SG levels have recovered to at least 25% in one SG.**
	RO	Check PRZ PORVs AND Spray Valves: • Verify AC buses 1A1 AND 1B1 – ENERGIZED (YES) • CHECK PRZ PORVs – SHUT (YES) • CHECK PRZ PORV Block Valves – AT LEAST ONE OPEN. (YES) • PRZ spray valves – SHUT. (YES)

	BOP	IDENTIFY any faulted SG:
		• CHECK for any of the following:
		  • ANY SG pressures – DECREASING IN AN UNCONTROLLED MANNER (YES)
		  • ANY SG – COMPLETELY DEPRESSURIZED. (NO)

	SRO	Transitions to EPP-014

Time	Position	Applicant's Actions or Behavior
	SRO	EPP-014
Procedure Caution:		**At least one SG must be maintained available for RCS cooldown.** **Any faulted SG OR secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.**
	SRO	Implements FRPs
	BOP	Check MSIVs AND Bypass Valves: a. Verify all MSIVs – SHUT (NO)
	SRO	SRO direct the following actions to be taken outside the MCR: Perform the following: • Locally shut instrument air supply to RAB 261: 1IA-814 (north of AH-19 1A-SA) • Locally remove cap AND open drain valve: 1IA-1876 (located in corridor outside
	BOP	• Verify all MSIV bypass valves – SHUT (NO) • Check Any SG NOT Faulted: o Any SG pressure - STABLE OR INCREASING (NO)

Time	Position	Applicant's Actions or Behavior
	SRO	TRANSITIONS to EPP-015.
	SRO	Foldout applies.
EVALUATOR NOTE:		**The EPP-015 Foldout criteria that may apply is:** **<u>MINIMUM FEED FLOW</u>** **IF level in any SG is less than 25% [40%], THEN maintain a minimum of 12.5 KPPH feed flow to that SG.**
EVALUATOR NOTE:		**' B' SG MSIV will not close in this scenario. After the MSIVs for 'A' and 'C' SGs are closed, pressures will rise and meet EPP-014 transition criteria.** **When appropriate, have simulator booth operator run Trigger 7 to close SG 'A' and 'C' MSIVs.**
	BOP	CHECK MSIVs AND Bypass Valves: • VERIFY all MSIVs – SHUT (NO) • Perform the following: (Previously directed) • Locally shut instrument air supply to RAB 261: 1IA-814 (north of AH-19 1A-SA) • Locally remove cap AND open drain valve: 1IA-1876 (located in corridor outside • VERIFY all MSIV Bypass Valves – SHUT (YES)
PROCEDURE CAUTION:		**IF the TDAFW pump is the only available source of feed flow, THEN maintain steam supply to the TDAFW pump from one SG. (N/A – under clearance)**

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**IF local actions are required, attempts to isolate all boundaries of one SG should be completed prior to starting those for another SG.**
	BOP	CHECK Secondary Pressure Boundary for ALL SGs: • VERIFY SG PORVs – SHUT (YES) • VERIFY Main FW isolation valves – SHUT (YES) • SHUT steam supply valves to TDAFW pump: (NO, tagged closed) o SG B: 1MS-70 (Tagged) o SG C: 1MS-72 (Tagged) • VERIFY main steam drain isolations before MSIVs – SHUT: (YES) o SG A: 1MS-231 o SG B: 1MS-266 o SG C: 1MS-301 • VERIFY SG Blowdown isolation valves – SHUT (YES) • VERIFY Main Steam Analyzer isolation valves – SHUT (YES)
PROCEDURE NOTE:		**AS SG pressure and steam flow decrease, RCS hot leg temperatures will eventually stabilize and may increase. Adjusting feed flow and steam dump will control RCS hot leg temperatures.**
	RO	CONTROL RCS Temperature: • CHECK RCS cooldown rate – LESS THAN 100°F/HR (NO)

Time	Position	Applicant's Actions or Behavior
	BOP	Reduce feed flow to 12.5 KPPH to each SG.
	CREW	Identifies RED Path on Heat Sink and transitions to FRP-H.1
	SRO	Enters FRP-H.1
	SRO	Reads Caution prior to step 1 and determines that FRP-H.1 should not be performed Caution: This procedure should NOT be performed if total feed flow capability of 210 KPPH is available AND total feed flow has been reduced due to operator action as directed by the EOPs. EXITS FRP-H.1 and returns to EOP-EPP-015
	SRO	Returns to EPP-015 and continues in procedure
	RO	Check RCS hot leg temperatures - STABLE OR DECREASING (YES/NO)

Time	Position	Applicant's Actions or Behavior

EVALUATOR NOTE:	**On your direction have the BOOTH OPERATOR actuate closure of 'A' and 'C' MSIV** **Several more EPP-015 steps are included in the scenario guide but EPP-014 transition criteria should be met shortly after MSIV 'A' and MSIV 'C' are closed.**
BOOTH OPERATOR:	**When directed by Evaluator actuate TRG-7 "A & C MSIV closure"**

	RO	Maintain RCP Seal Injection Flow Between 8 GPM And 13 GPM. Check RCP Trip Criteria: • Check RCPs - AT LEAST ONE RUNNING (YES – 2 RCPs are running A and B) Check all of the following: • SI flow - GREATER THAN 200 GPM (YES) • Check RCS pressure - LESS THAN 1400 PSIG (NO)
	RO	Check PRZ PORV AND Block Valves: • Verify power to PORV block valves – AVAILABLE (YES) • PRZ PORVs – SHUT (YES) • GO TO Step 6f. • Check block valves - AT LEAST ONE OPEN (YES) • IF a PRZ PORV opens on high pressure, THEN verify it shuts after pressure decreases to less than opening setpoint.

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.**
	BOP/SRO	Check Secondary Radiation: Check for all of the following: • Condenser vacuum pump effluent rad – NORMAL (YES) • SG blowdown radiation – NORMAL (YES) • Main steamline radiation – NORMAL (YES) • SG activity sample - NORMAL (IF AVAILABLE) (N/A)
	RO	Check RHR Pump Status:
Critical Task	RO	• Check any RHR pumps – RUNNING ('B' pump – NO, pump tripped on start, 'A' pump - NO) o Starts 'A' RHR pump
	RO	• RCS Pressure - GREATER THAN 230 PSIG (YES) • RCS pressure - STABLE OR INCREASING (YES) • Check RHR pump suction - ALIGNED TO RWST (YES) • Reset SI. • Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Refer to PATH-1 GUIDE, Attachment 2.) • Stop RHR pumps. (YES)

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO EPP-014, "Faulted Steam Generator Isolation" in accordance with EPP-015 FOLDOUT criteria when SG Pressure begins to rise.
	SRO	IMPLEMENT Function Restoration Procedures as required.

	BOP	CHECK MSIVs AND Bypass Valves:
		• VERIFY all MSIVs – SHUT. (NO)
		• VERIFY all MSIV bypass valves – SHUT. (YES)
		CHECK Any SG NOT Faulted:
		• ANY SG pressure STABLE OR INCREASING. (YES)
		IDENTIFY Any Faulted SG:
		• CHECK for any of the following:
		  • ANY SG pressure – DECREASING IN AN UNCONTROLLED MANNER. (YES-"B")
		  • ANY SG – COMPLETELY DEPRESSURIZED. (YES - "B")
		ISOLATE Faulted SG(s):
		• VERIFY faulted SG(s) PORV – SHUT. (YES)
		• VERIFY Main FW isolation valves – SHUT. (YES)

Critical Task	BOP	• VERIFY MDAFW AND TDAFW pump isolation valves to faulted SG(s) – SHUT. (NO, unless closed earlier) **Event 8** • **Closes 1AF-93, MDAFW Pump "B" to SG "B" before SI is terminated. TDAFW pump isolation valves do not need to be closed to isolate AFW flow since the TDAFW pump is not available for operation.**

Time	Position	Applicant's Actions or Behavior
	BOP	Shut faulted SG(s) to steam supply valve to TDAFW pump – SHUT. • SG B: 1MS-70 (Tagged Shut) • VERIFY main steam drain isolation(s) before MSIVs – SHUT (YES) • VERIFY SG Blowdown isolation valves – SHUT. (YES) • VERIFY main steam analyzer isolation valves – SHUT. (YES) CHECK CST Level – GREATER THAN 10%. (YES)
PROCEDURE NOTE:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.**
	SRO	CHECK Secondary Radiation: • CHECK for all of the following: • SG Blowdown radiation – NORMAL. (YES) • MAIN steamline radiation – NORMAL. (YES)
	RO	CHECK SG Levels: • ANY level – INCREASING IN AN UNCONTROLLED MANNER. (NO) CHECK if SI has been terminated: • SI flow – GREATER THAN 200 GPM. (YES)

Time	Position	Applicant's Actions or Behavior

	RO	CHECK SI Termination Criteria:
		CHECK Subcooling – GREATER THAN
		• 10°F [40°F] – C (YES)
		• 20°F [50°F] – M
		• CHECK secondary heat sink by observing any of the following:
		  • LEVEL in at least one intact SG – GREATER THAN 25% [40%]. (YES/NO)
		  • TOTAL feed flow to SGs – GREATER THAN 210 KPPH. (YES)
		• RCS pressure – STABLE OR INCREASING. (YES)
		• PRZ level – GREATER THAN 10% [30%]. (YES)
		RESET SI.

	SRO	CONTINUOUS ACTION: MANUALLY realign Safeguards Equipment following a loss of offsite power.
	RO	Reset Phase A and Phase B Isolation Signals.
	RO	Restore Instrument Air and Nitrogen to Containment: Open the following valves: • 1IA-819 • 1SI-287 STOP all but ONE CSIP. CHECK RCS pressure – STABLE OR INCREASING. (YES)

Time	Position	Applicant's Actions or Behavior
	RO	ISOLATE High Head SI Flow: • CHECK CSIP suction – ALIGNED TO RWST. (YES) • OPEN normal miniflow isolation valves: o 1CS-182 o 1CS-196 o 1CS-210 o 1CS-214 • SHUT BIT outlet valves: o 1SI-3 o 1SI-4 • VERIFY cold leg AND hot leg injection valves – SHUT o 1SI-52 o 1SI-86 o 1SI-107 • OBSERVE CAUTION prior to Step 19 AND GO TO Step 19.
PROCEDURE CAUTION:		**High head SI flow should be isolated before continuing.**
	RO	ESTABLISH Charging Lineup: • SHUT charging flow control valve: o FK-122.1 • OPEN charging line isolation valves: o 1CS-235 o 1CS-238
Lead Evaluator:		**Terminate the scenario when normal charging has been established.**

Facility:	SHEARON-HARRIS	Scenario No.: 4	Op Test No.: 05000400/2009302
Examiners:		Operators:	
Initial Conditions:	• IC-27, MOL, 4% power, Xenon free startup in progress		
	• 'A' Boric Acid Transfer Pump is Out of Service for motor replacement, expected return to service in 6 hours		
	• FRV Bypass Valves controlling SG level		
Turnover:	The plant is at 4% power, MOL, plant startup in progress. Criticality was achieved 2 hours ago, 72 hours after a trip from 100% power. GP-005, Power Operation (Mode 2 to Mode 1) is completed through step 95. The "A" Boric Acid Transfer Pump is OOS for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to startup.		
Critical Task:	• Manually close 'A' SG PORV prior to exiting PATH-2		
	• Depressurize the RCS to minimize primary to secondary leakage prior to SG "A" exceeding 95% level		
	• Manually actuate SI prior to exiting PATH-1.		

Event No.	Malf. No.	Event Type*	Event Description
1	N/A	N- BOP R- RO	Start power escalation to 7 – 9% in preparation to roll the turbine. Place FRVs in service.
TRG 2	HVA009	C- BOP/SRO TS - SRO	Trip of running AH-85A fan, standby fails to Auto Start
TRG 3	LT:460	I-RO/SRO TS-SRO	Pressurizer Level Transmitter for LT-460 fails low which isolates letdown. Must restore letdown per APP.
TRG 4	SWS07A	C-RO/SRO	NSW Pump "A" Shaft Shear requiring AOP-022 entry
TRG 5	CFW16A CFW16B ZR211113 ZR211158	R –ALL C-BOP/SRO	'A' MFP trips with MFP 'B' failure to start. Maintain Rx power <10% and initiate AFW in accordance with AOP-010.
TRG 6	SGN05A	M-ALL	'A' SGTR occurs, 420 GPM ramped in over 3 minutes.

7	JPB455D JPB456D XC1I036	C-RO/SRO	Auto SI failure. Failure caused by 2 SI (Train A and B) Low Pressurizer Pressure relay failures. Failure of one MCB SI manual actuate switch
TRG 8	PT:308	C-BOP/SRO	"A" SG PORV fails open in auto due to PT-308 failing high, Operator can close manually
* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor			

Scenario Summary:

The plant is at 4% power, MOL, plant startup in progress. GP-005, Power Operation (Mode 2 to Mode 1) is completed through step 95. Criticality was achieved 2 hours ago, 72 hours after a trip from 100% power. The "A" Boric Acid Transfer Pump is OOS for motor replacement and is expected to be returned to service in 6 hours. Plant risk condition is YELLOW due to startup.

Event 1: The crew performs a power escalation IAW GP-005 to raise power to between 7 and 9% in preparation to perform step 96 of GP-005, placing the FRVs in automatic. Following completion of step 96, the crew will start to raise power IAW GP-005.

Event 2: Trip of the running AH-85A fan can be inserted once the power escalation has been observed to the extent necessary. This trip will provide alarms at the MCB and the crew will enter the appropriate APP. This trip should auto start the standby AH-85 fan, however the auto start has failed. The standby fan can be started manually from the MCB. The SRO should evaluate Tech Specs 3.8.1.1, AC Sources – Operating, and 3.3.3.5b, Remote Shutdown System.

Event 3: Controlling Pressurizer level channel LT-460 fails low can be inserted once AH-85B has been started. The crew should respond in accordance with alarm response procedure APP-ALB-009. The crew should take Charging FCV-122 to Manual and maintain Pressurizer level within the directed control band and shift level control to an alternate channel. Letdown will restored IAW OP-107, Chemical and Volume Control System. The SRO should evaluate Tech Specs and identify Tech Spec 3.3.1, action 6 as applicable.

Event 4: Normal Service Water Pump 'A' sheared shaft can be inserted once Pressurizer level has been stabilized and letdown restored. This will result in multiple NSW alarms and the crew should enter AOP-022. Once immediate actions are complete the crew should use the AOP to start up the standby NSW pump and verify proper system operation.

Event 5: 'A' MFP trip, with the 'B' MFW pump failing to auto start may be inserted once NSW has been restored. Both MDAFW pumps fail to auto start but can be started in the MCR. The crew may need to reduce power to be within AFW flow capacity in order to maintain SG water levels between 52% and 62% in accordance with AOP-010.

Events Continued:

Event 6: A SGTR on the 'A' SG can be inserted following stabilization of secondary parameters IAW AOP-010. A 320 gpm tube leak will develop over 3 minutes. The crew will implement AOP-016 due to the leakage. As the leak progresses, conditions will be met to require a reactor trip. The crew will initiate a reactor trip and implement PATH-1 actions.

Event 7: When conditions requiring a safety injection are met, automatic SI will not occur. One manual SI switch is blocked. Manual initiation of SI is possible with the other switch.

Event 8: When the BOP is directed to energize busses 1A1 and 1B1, the SG 'A' PORV will fail open in automatic. The SG PORV may be closed manually at the MCB. The crew may recognize the PORV being open based on alarms and MCB indications and take pre-emptive action to close the PORV. This will result in a transition to PATH-2. If the PORV is not closed, MCB indications may require transition to EPP-014 and then to PATH-2 to mitigate the ruptured SG. PATH-2 will implement actions to isolate the ruptured SG and depressurize the RCS to eliminate break flow.

Terminate scenario once the RCS has been depressurized and all but one CSIP is stopped IAW Path 2.

SIMULATOR SETUP

SPECIAL INSTRUCTIONS

- Ensure rods are ON in SFC
- Reset to saved IC-169 (Note: do NOT run CAEP for scenario 4. All triggers are saved in IC-169)
- Provide a Reactivity Plan to candidates for power escalation
- Provide a copy of GP-005, Power Operation (Mode 2 to Mode 1) signed off up to and including step 95 of section 5.0.
- Provide a copy of OP-131.04 Moisture Separator Reheaters signed off up to step 6
- Go to RUN and silence/acknowledge alarms, then set potentiometers as follows:
  - FK-114: 5.03
  - FK-113: 7.50
- Check RODUP to ensure rod position correct and update if needed, go to FREEZE

INITIAL CONDITIONS:

- Use IC-27, MOL, 4.5% power reactivity data
- FRV Bypass valves are controlling SG levels
- Place CIT on the 'A' Boric Acid Transfer Pump and take switch to STOP
- Place 'B' Boric Acid Transfer Pump switch to AUTO and green protected train placard
- Hang restricted access signs on swing gates

PRE-LOAD:

- 'A' Boric Acid Pump OOS for motor replacement (idi xa2i174 STOP,AUTO
  ilo xa2o174g OFF)
- Auto SI failure, Failure caused by 2 SI (Train A and B) Low Pressurizer Pressure relay failures
  - imf jpb455d FAIL_ASIS
  - imf jbp456d FAIL_ASIS
- A and B Motor Drive AFW pumps fail to start after BOTH Main FW pumps trip
  - imf zr211113 (n 0 0) FAIL_DEENERGIZED,FAIL_ASIS
  - imf zr211158 (n 0 0) FAIL_DEENERGIZED,FAIL_ASIS

TRIGGERS:

- ET-2 Trip of running AH-85A fan, standby fails to Auto Start (irf hva009 (2 00:00:00 00:00:00) BKR_OFF)

- ET-3: Pressurizer Level Transmitter for LT-460 fails low which isolates letdown must restore letdown per APP imf lt:460 (3 00:00:00 00:00:00) 0 00:00:00

- ET-4: NSW Pump "A" Shaft Shear requires AOP-022 entry imf sws07a (4 00:00:00 00:00:00)true

- ET-5: A MFW Pump trips and B MFW Pump trips after starting requires AOP-010 entry and AFW to supply SG's imf cfw16a (6 00:00:00 00:00:00) true
  imf cfw16b (6 00:00:10 00:00:00) true)

- ET-6: A SG Tube Rupture at design break flow of 420 gpm requires AOP-016 and PATH-1 Entry imf sgn05a (7 00:00:00 00:00:00) 420 00:03:00 0

- ET-8: "A" SG PORV fails open in auto due to PT-308 failing high, Operator can close manually imf pt:308a (9 00:00:00 00:00:00) 1300.0 00:00:00

- ET-10: NSW A CONTROL POWER STATUS to off irf sws100 (10 00:00:00 00:00:00) CP_OFF

CAEP

!Description of 2009B NRC Exam Scenario 4 Reset to IC-27

! To establish initial conditions: Place the simulator in run.
! The boron concentration will increase and Rx power will decrease to ~4% then the simulator will go to freeze in 8 minutes.
! NOTE: All initial conditions and Triggers will be created and you must line up the BA pumps.

imf rcs05 (n 00:00:00 00:00:00) 1525.0 00:00:60 -
80 dmf rcs05

! "A" BA Pump OOS for motor replacement place MCB switch to STOP
! Hang CIT on CB Switch place the B BA Pump MCB switch to AUTO, protect B BA pump switch

idi xa2i174 (n 00:00:00 00:00:00)STOP,AUTO
ilo xa2o174g (n 00:00:00 00:00:00)OFF

! Event 5 problems
! A and B Motor Drive AFW pumps fail to start after BOTH Main FW pumps trip
! Both pumps can be manually started and will be directed to in AOP-010

imf zr211113 (n 0 0) FAIL_DEENERGIZED,FAIL_ASIS
imf zr211158 (n 0 0) FAIL_DEENERGIZED,FAIL_ASIS

! Events

! Event 1: Raise Rx power to 7 - 9% and place FRV's in AUTO IAW GP-005
! Normal - BOP
! Reactivity - RO

! Event 2: Trip of running AH-85A fan, standby fails to Auto Start
! Component - BOP/SRO
! Tech Spec - SRO

irf hva009 (2 00:00:00 00:00:00) BKR_OFF

! AH-85B fails to start in Standby

imf z3263tib (n 00:00:00 00:00:00) FAIL_ASIS

! Event 3: Pressurizer Level Transmitter for LT-460 fails low which isolates letdown must restore letdown per APP
! Instrument - RO/SRO
! Tech Spec - SRO

imf lt:460 (3 00:00:00 00:00:00) 0 00:00:00

! Event 4: NSW Pump "A" Shaft Shear requires AOP-022 entry
! Component - RO/SRO
! Tech Spec - SRO

imf sws07a (4 00:00:00 00:00:00)true

! Event 5: A MFW Pump trips and B MFW Pump trips after starting requires AOP-010 entry and AFW to supply SG's
! Reactivity - ALL
! Component - BOP/SRO
imf cfw16a (5 00:00:00 00:00:00) true
imf cfw16b (5 00:00:10 00:00:00) true

! Event 6: A SG Tube Rupture at design break flow of 420 gpm requires AOP-016 and PATH-1 Entry
! Major - ALL
imf sgn05a (6 00:00:00 00:00:00) 420 00:03:00 0

! Event 7: Auto SI failure (preloaded)
! Failure caused by 2 SI (Train A and B) Low Pressurizer Pressure relay failures
! Component - RO/SRO
imf jpb455d (n 00:00:00 00:00:00) FAIL_ASIS
imf jpp456d (n 00:00:00 00:00:00) FAIL_ASIS

! Failure of one MCB SI manual actuate switch (preloaded - the one by the Rx Trip breaker indication)
idi xc1i036 (n 00:00:00 00:00:00) ASIS

! Event 8: "A" SG PORV fails open in auto due to PT-308 failing high, Operator can close manually
! Instrument - BOP/SRO
imf pt:308a (8 00:00:00 00:00:00) 1300.0 00:00:00

! Trigger 10: NSW A CONTROL POWER STATUS to off, emulates opening control power knife switch
irf sws100 (10 00:00:00 00:00:00) CP_OFF

! Simulator goes to freeze 8 minutes after going to run to allow initial conditions to be established
480 frz

These conditions have been saved to IC-169 for the NRC exam

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Event Description: Start Power Escalation

Time	Position	Applicant's Actions or Behavior
Event 1	CREW	Raise power IAW GP-005
	BOP	Adjusts steam dump demand signal as necessary.
	RO	Initiates dilution as necessary
		OP-107, Chemical Volume Control System
	RO	DETERMINE the volume of makeup water to be added. This may be done by experience or via the reactivity plan associated with the Simulator IC.
	RO	SETS FIS-114, TOTAL MAKEUP WTR BATCH COUNTER, to obtain the desired quantity.
	RO	SET total makeup flow as follows:
		• IF performing DIL in Step 8, THEN SET controller 1CS-151, FK-114 RWMU FLOW, for less than or equal to 90 gpm.
		• IF performing ALT DIL in Step 8, THEN SET controller 1CS-151, FK-114 RWMU FLOW, for the desired flow rate.
	RO	VERIFY the RMW CONTROL switch has been placed in the STOP position.
	RO	VERIFY the RMW CONTROL switch green light is lit.
	RO	PLACE the control switch RMW MODE SELECTOR to the DIL OR the ALT DIL position.

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Event Description: Start Power Escalation

Time	Position	Applicant's Actions or Behavior
PROCEDURE NOTE:		**When PRZ backup heaters are energized in manual, PK 444A1, PRZ Master Pressure Controller (a PI controller) will integrate up to a greater than normal output, opening PRZ Spray Valves to return and maintain RCS pressure at setpoint. The result is as follows:** • **PORV PCV-444B will open at a lower than expected pressure** • **ALB-009-3-2, PRESSURIZER HIGH PRESS DEVIATION CONTROL, will activate at a lower than expected pressure** • **Increased probability for exceeding Tech Spec DNB limit for RCS pressure**
NOTE:		**SRO concurrence should be obtained prior to energizing the Back Up Heaters in MANUAL.**
	RO	OPERATE the pressurizer backup heaters as required to limit the difference between the pressurizer and RCS boron concentration to less than 10 ppm.
	RO	START the makeup system as follows:
		• TURN control switch RMW CONTROL to START momentarily.
		• VERIFY the RED indicator light is LIT.
PROCEDURE CAUTION:		**The operation should be stopped if an unanticipated reactivity effect is seen. Do not resume the operation until the cause has been corrected.**

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Event Description: Start Power Escalation

Time	Position	Applicant's Actions or Behavior
	RO	VERIFY Tavg responds as desired. IF rod control is in AUTO, THEN VERIFY the control rods are stepping out to the desired height. (N/A – rod control is in MANUAL) VERIFY dilution automatically terminates when the desired quantity has been added. PLACE Reactor Makeup in AUTO per Section 5.1. VERIFY the RMW CONTROL switch: • Is in the STOP position. • The GREEN light is LIT. PLACE the RMW MODE SELECTOR to AUTO. START the makeup system as follows: • TURN control switch RMW CONTROL to START momentarily. • VERIFY the RED indicator light is LIT.
		GP-005, Power Operation (Mode 2 to Mode 1)
	CREW	Identifies entry into Mode 1
	SRO	Completes steps 55 and 56 in GP-005 Directs BOP to perform Step 97, **TRANSFER** SG level control to the Main Feedwater Regulating valves
	BOP	**WHEN** Feedwater Regulating Bypass Valve FCV Controller demand is between 70% and 80%, **OR** when Reactor Power is between 7 and 9%, **THEN TRANSFER** SG level control to the Main Feedwater Regulating valves as follows: • 1FW-140, MN FW A REG BYP FK-479.1 • 1FW-256, MN FW B REG BYP FK-489.1 • 1FW-198, MN FW C REG BYP FK-499.1

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Event Description: Start Power Escalation

Time	Position	Applicant's Actions or Behavior
	BOP	**PLACE** the Main FW Regulating Valve Controllers in AUTO: • 1FW-133, MAIN FW A REGULATOR FK-478 • 1FW-249, MAIN FW B REGULATOR FK-488 • 1FW-191, MAIN FW C REGULATOR FK-498
PROCEDURE NOTE:		The following Steps verify the Feed Regulating valves will respond prior to fully closing the Feedwater Regulating Valve Bypass FCVs.
	BOP	**LOWER** the output of the following Feedwater Regulating Valve Bypass FCV Controllers to a position 10% lower than the current output: • 1FW-140, MN FW A REG BYP FK-479.1 • 1FW-256, MN FW B REG BYP FK-489.1 • 1FW-198, MN FW C REG BYP FK-499.1
PROCEDURE NOTE:		If the demand signal reaches a value of 10% with no response from the Feedwater Regulating Valves, it may be necessary to return the FRV controller to MAN to cancel any integrated signal and assess the situation before continuing.
	BOP	**WHEN** Feedwater Regulating Valves indicate BOTH of the following responses: • Controller output increasing • SG level returning to normal **THEN LOWER** output of the following Feedwater Regulating Valve Bypass FCV Controllers to 0% Minimum output): • 1FW-140, MN FW A REG BYP FK-479.1 • 1FW-256, MN FW B REG BYP FK-489.1 • 1FW-198, MN FW C REG BYP FK-499.1

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Event Description: Start Power Escalation

Time	Position	Applicant's Actions or Behavior
	BOP	At STATUS LIGHT BOX 1, **VERIFY SHUT** the following Feedwater Regulating Valve Bypass FCVs: • A BYP FW-140 (Window 4-1) • B BYP FW-256 (Window 4-2) • C BYP FW-198 (Window 4-3)
LEAD EVALUATOR:		**Prior to initiating Event 2 ensure that the 'A' and 'B' SG Feed Reg Valves are placed in service. Then, once satisfied with observation of the power escalation, initiate Event 2 (Trip of running AH-85 Fan).** **Note: During validation the crew was allowed to place all 3 Feed Reg valves in service prior to Event 2.**

Op Test No.: 05000400/2009302	Scenario # 4	Event # 2	Page 13 of 41
Event Description: Trip of AH-85A			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**This trip should auto start the AH-85B fan, however the auto start has failed.**
BOOTH OPERATOR:		**When directed by Lead Evaluator: AcutateTRG-2 "Trip of the Running AH-85A Fan"**
Indications Available:		**ALB-027-1-4, DIESEL GEN ELEC EQUIP RM SUP FANS AH-85 LOW FLOW-O/L**
	BOP	ENTERS APP-ALB-027-1-4
	BOP	IDENTIFIES the tripped fan, AH-85A REPORTS failure of AH-85B standby fan to start STARTS standby AH-85B Contacts AO to investigate
	SRO	Prepares Equipment Problem checklist Contacts WCC for support REFER to Tech Specs (and possibly OWP-HVAC) • T.S 3.8.1.1, AC Sources – Operating (Perform OST-1023, Offsite Power Verification within one hour) Contacts AO to perform OST-1023 • T.S. 3.3.3.5b, Remote Shutdown System action c 72 hour LCO
COMMUNICATOR:		**When contacted as AO after ~ 2 min. report that the breaker for AH-85A was found in the tripped condition** **Report that OST-1023 is completed 10-15 minutes after assignments are given.**
LEAD EVALUATOR:		**Once the plant has stabilized and Tech Specs have been evaluated, initiate Event 3, "Pressurizer level transmitter LT-460 Fails Low"**

Op Test No.: 05000400/2009302	Scenario # 4	Event # 3	Page 14 of 41
Event Description: Pressurizer Level Transmitter LI-460 Fails Low			

Time	Position	Applicant's Actions or Behavior
EVALUTATOR NOTE:		**Event #3 is the controlling Pressurizer Level Instrument, LT-460, failing low resulting in letdown isolation. The crew should respond in accordance with alarm response procedure APP-ALB-009-4-3. The crew will be required to take Charging FCV-122 to manual and select an alternate controlling channel and restore letdown.**
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-3 "Pressurizer Level Instrument, LT-460, fails low"**
Indications Available:		**ALB-009-4-3, PRESSURIZER LOW LEVEL LTDN SECURED AND HTRS OFF** **Pressurizer Level Indication on LI-460** **Letdown Flow Indication FI-150.1**
	RO	IDENTIFY a failed Pressurizer Level Channel
	SRO	ENTER APP-ALB-009-4-3 Provide level bands and trip levels IAW OMM-001 Att. 13 (controlling band +/- 5% of reference level, trip limits of 10% and 90%)
	RO	**CONFIRM** alarm using: • Pressurizer level LI-459A1, LI-460, LI-461.1 (LI-460 low) • Letdown flow FI-150.1

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Event Description: Pressurizer Level Transmitter LI-460 Fails Low

Time	Position	Applicant's Actions or Behavior
	RO	PERFORM Corrective Actions: • IF PRZ level is low, THEN VERIFY letdown is isolated AND heaters are off. (YES) • IF RCS leakage is indicated, THEN GO TO AOP-016, Excessive Primary Plant Leakage. (NO) • IF alarm is due to malfunction of level control system, THEN MANUALLY RESTORE normal level. (NO, LT-459 is controlling channel for PZR level) • IF the alarm is due to a failed level instrument, (YES) o USING the Pressurizer Level Controller Selector switch, THEN SELECT a position which places the two operable channels into service. (Select channels 459/461) • VERIFY the failed channel is not selected, at the MCB recorder panel. (NO) • RESET the control heaters by placing the control switch to OFF and then back to ON. • IF maintenance is to be performed, THEN REFER TO OWP-RP, Reactor Protection.
	RO	SELECT 459/461 on Pressurizer Level Controller Selector
	SRO	Evaluate T.S. 3.3.1 (6 hours to place in tripped condition) T.S. 3.3.6 (Tracking EIR) Prepares an Equipment Problem Checklist Contacts WCC for assistance. • (WR, EIR and Maintenance support)
	RO	OP-107, 5.4 – Initiating Normal Letdown
	RO	• Verifies Initial Conditions: o Charging flow established o PRZ Level > 17% o CS-7, CS-8, CS-9 (Letdown Orifice Isolation valves) SHUT

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Event Description: Pressurizer Level Transmitter LI-460 Fails Low			

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		If Charging flow was stopped or greatly reduced prior to letdown being secured, there is a possibility that the Letdown line contains voids due to insufficient cooling. This is a precursor to water hammer, and should be evaluated prior to initiating letdown flow.
	RO	VERIFY 1CC-337, TK-144 LTDN TEMPERATURE, controller is: • in AUTO AND • set for 110 to 120 °F (4.0 to 4.7 on potentiometer) normal operation
PROCEDURE NOTE:		**PK-145.1 LTDN PRESSURE, 1CS-38, may have to be adjusted to control at lower pressures.**

	RO	• VERIFY 1CS-38 Controller, PK-145.1 LTDN PRESSURE, in MAN with output set at 50%.
		• VERIFY open the following Letdown Isolation Valves:
		  • 1CS-2, LETDOWN ISOLATION LCV-459
		  • 1CS-1, LETDOWN ISOLATION LCV-460
		• VERIFY open 1CS-11, LETDOWN ISOLATION.

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Event Description: Pressurizer Level Transmitter LI-460 Fails Low			

Time	Position	Applicant's Actions or Behavior
		PROCEDURE NOTE: The following table gives the minimum charging flow required to keep the regenerative heat exchanger temperature below the high temperature alarm when letdown is established:

Letdown Flow (to be established)	Minimum Charging Flow necessary when letdown is established
45 gpm	20 gpm
60 gpm	26 gpm
105 gpm	46 gpm
120 gpm	53 gpm

		PROCEDURE NOTE: If Pressurizer level is above the programmed level setpoint, charging flow should be adjusted to a point above the minimum required to prevent regenerative heat exchanger high temperature alarm but low enough to reduce pressurizer level.
	RO	• ADJUST controller 1CS-231, FK-122.1 CHARGING FLOW, as required to: o Maintain normal pressurizer level program o Keep regenerative heat exchanger temperature below the high temperature alarm when the desired letdown orifice is placed in service. • OPEN an Orifice Isolation Valve (1CS-7, 1CS-8, 1CS-9) for the orifice to be placed in service. • ADJUST 1CS-38 position by adjusting PK-145.1 output as necessary to control LP LTDN Pressure (PI-145.1) at 340 to 360 psig, to prevent lifting the LP Letdown Relief. • WHEN Letdown pressure has stabilized at 340 to 360 psig on PI-145.1, LP LTDN PRESS, THEN PERFORM the following: o a. ADJUST PK-145.1 LTDN PRESSURE setpoint to 58% o b. PLACE the controller in AUTO.

Op Test No.: 05000400/2009302	Scenario # 4	Event # 3	Page 18 of 41
Event Description: Pressurizer Level Transmitter LI-460 Fails Low			

Time	Position	Applicant's Actions or Behavior
EVALUATOR NOTE:		**Placing LK-459F in AUTO may take several minutes due to matching PRZ level to reference level.**
	RO	• VERIFY PK-145.1 LTDN PRESSURE Controller maintains Letdown pressure stable at 340 to 360 psig. • OPEN additional orifice isolation valves (1CS-7, 1CS-8, 1CS-9) as required. • ADJUST charging flow as necessary to: o prevent high temperature alarm (per table above) o maintain pressurizer programmed level. • PLACE PRZ level controller, LK-459F, in MAN to cancel any integrated signal. • PLACE PRZ level controller, LK-459F, in AUTO. • WHEN the following occurs: o Program pressurizer level is matching the current pressurizer level AND o Letdown and seal return are balanced with seal injection flow and charging flow. • THEN place controller 1CS-231, FK-122.1 CHARGING FLOW, in AUTO. • COMPLETE Section 5.4.3. (Position Verification)
LEAD EVALUATOR:		**Once the plant has stabilized and Tech Specs have been evaluated, initate Event 4 "NSW Pump 'A' Shaft Shear"**

Op Test No.: 05000400/2009302	Scenario # 4	Event # 4	Page 19 of 41
Event Description: 'A' NSW Pump Shaft Shear			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**On cue from the Lead Evaluator Actuate Trg-4 "NSW Pump 'A' sheared shaft"**
Indications Available: • **ALB-02-6-1, SERV WTR SUPPLY HDR A LOW PRESS** • **ALB-02-7-1, SERV WTR SUPPLY HDR B LOW PRESS** • **ALB-02-7-2, SERV WTR PUMPS DISCHARGE LOW PRESS** • **ALB 02-5-5, SERV WTR HEADER A HIGH-LOW FLOW** • **ALB 02-6-6, SERV WTR HEADER B HIGH-LOW FLOW**		
	RO	Responds to ALB-02 alarms – reports low NSW header pressure with pump running indication.
EVALUATOR NOTE:		**The ESW Pumps will auto start on low header pressure.**
	SRO	Enters AOP-022, LOSS OF SERVICE WATER.
Immediate Action	RO	CHECK ESW flow lost to ANY RUNNING CSIP - MORE THAN 1-minute: (NO)
	SRO	GO TO Step 2.
Immediate Action	SRO	CHECK ESW flow lost to ANY RUNNING EDG - MORE THAN 1-minute: (NO)

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Event Description: 'A' NSW Pump Shaft Shear			

Time	Position	Applicant's Actions or Behavior
		COMMUNICATOR: There are several points in the AOP where an AO may be dispatched to check for leaks and proper operation of equipment. Report no leaks, no breaker problems but when dispatched to the pump, after 1 to 2 minutes report that the coupling appears to have failed and request maintenance assistance.
		BOOTH OPERATOR IF REQUESTED TO OPEN KNIFE SWITCH ON THE 'A' NSW PUMP BREAKER: Run Trigger 10 "open the knife switch" then have Communicator report back when completed
	SRO	GO TO Step 3.
	SRO	GO TO the appropriate step as indicated by the parameter LOST: • NSW Pump failure (YES) • NSW Pump loss of flow Proceeds to Step 6
	RO	CHECK loss of NSW Header due to NSW Pump FAILED or LOSS OF FLOW. START standby NSW Pump as follows: • VERIFY discharge valve for affected pump is CLOSING by placing affected pump control switch to STOP. • START standby NSW Pump in priming mode by momentarily placing standby NSW Pump control switch to START. • WHEN discharge valve for affected pump is fully SHUT, THEN PLACE and HOLD control switch for running pump to START to fully OPEN pump discharge valve. CHECK ANY NSW Pump - RUNNING. (YES)

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Event Description: 'A' NSW Pump Shaft Shear			

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO Section 3.2 (page 30).
EVALUATOR NOTE:		**The following alarms will annunciate due to loss of cooling in containment and subsequent start of ESW:** • **ALB-028-5-1, CONTAINMENT AIR HIGH VACUUM** • **ALB-028-8-5, COMPUTER ALARM VENTILATION SYSTEM** **The BOP should identify these alarms and identify Tech Specs 3.6.1.4, 3.6.1.1, 3.6.3, 3.6.5 and 3.9.4 to be referenced**
	SRO	CHECK Turbine trip required by ANY of the following conditions - EXIST: (NO) • No NSW Pump can be operated • Non-isolable leak exists in the NSW system • Major isolable leak exists on the Turbine Building NSW Header AND time does not permit a controlled plant shutdown OBSERVE Note prior to Step 13 AND GO TO Step 13.
PROCEDURE NOTE:		**Steps 13 through 19 address leaks on NSW turbine building header. Leaks on individual components supplied by the Turbine Building header are addressed by Steps 20 and 21.**
	CREW	CHECK for minor isolable leak on Turbine Building header – ANY EXISTING. (NO)
	SRO	GO TO Step 20.
	CREW	CHECK for leak in an individual component - ANY EXISTING. (NO)

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Event Description: 'A' NSW Pump Shaft Shear

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO Step 22.
	CREW	CHECK for leak on WPB header - ANY EXISTING. (NO) GO TO Step 24.
	RO	CHECK that NSW Pump(s) - MALFUNCTIONED. (YES)
	CREW	PERFORM the following for affected NSW Pump(s):
		CHECK NSW Pump breaker(s) - MALFUNCTIONED. (NO)
	SRO	GO TO Step 25.b.
	RO/BOP	CHECK adequate pump suction inventory EXISTS: (YES) • LI-9300.1, Service Water PMP A CHMBR LVL, GREATER THAN 51% (ERFIS LSW9300) • LI-9302, Service Water PMP B CHMBR LVL, GREATER THAN 51% (ERFIS LSW9302) • LI-1931, Cooling Tower Basin Level, GREATER THAN 31 inches
	CREW	Locally VERIFY the following for the affected NSW Pump per OP-139, Service Water System: • Proper cooling and seal water supply to NSW Pumps. (YES) • Proper operation of NSW strainer backwash. (YES) Locally CHECK NSW Pump(s) for signs of damage (shaft shear or other obvious problems). (YES)
	SRO	• INITIATE appropriate corrective action for the loss of NSW. • Initiate Equipment Problem Checklist and contact WCC. • Exit AOP-022
EVALUATOR NOTE:		**Once the plant has stabilized, initiate Event 5 'A' MFW Pump Trip with 'B' MFW Pump Fail to Start**

Op Test No.: 05000400/2009302	Scenario # 4	Event # 5	Page 23 of 41
Event Description: 'A' MFW Pump Trip with 'B' MFW Pump Fail to Start			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When directed by Lead Evaluator: Actuate TRG-5 'A' MFW Pump Trip with 'B' MFW Pump Fail to Start.**
Indications Available:		• **Lowering Level on all three Steam Generators** • **ALB-016-1-2, FW PUMP A/B LUBE OIL LOW PRESS OR TRIP** • **ALB-016-2-2, LOSS OF BOTH MAIN FW PUMPS**
	BOP	Identify loss of 'A' MFW pump Identify annunciators
	SRO	Enters AOP-010, Feedwater Malfunctions
Immediate Actions	SRO/BOP	• **CHECK** ANY Main Feedwater Pump TRIPPED. (YES) • **CHECK** initial Reactor power less than 90%. (YES) • **CHECK** initial Reactor power less than 80%. (YES)
PROCEDURE NOTE:		Turbine runback will automatically terminate at approximately 50% power with DEH in AUTO. Turbine runbacks are quickly identified by ALB-020-2-2, TURBINE RUNBACK OPERATIVE, in alarm and RUNBACK OPER light LIT as long as the initiating signal is present on DEH Panel A.
	SRO/BOP	• **CHECK** initial Reactor power less than 60%. (YES) • **CHECK** DEH controlling Turbine Valves PROPERLY. (YES)

Op Test No.: 05000400/2009302	Scenario # 4	Event # 5	Page 24 of 41
Event Description: 'A' MFW Pump Trip with 'B' MFW Pump Fail to Start			

Time	Position	Applicant's Actions or Behavior
	BOP	**MAINTAIN** ALL of the following: • At least ONE Main Feedwater Pump RUNNING (NO) **PERFORM** the following: • **IF** ANY SG level drops to 30% **THEN TRIP** the Reactor **AND GO TO** EOP Path-1 PROCEDURE NOTE: Mode change occurs at 5% Reactor power. **IF** Above POAH **AND** Reactor power is LESS THAN 10%, **THEN**: (YES) • **INITIATE** AFW flow to maintain Steam Generator levels between 52 and 62%. (AFW is running due to loss of both MFW pumps) • **REDUCE** power as necessary **IF** below POAH, **THEN**: (NO)
EVALUATOR NOTE:		**At this point, the SRO would direct a power reduction to be within the capacity of the AFW pumps. This reactivity manipulation is not required to satisfy this evaluation. When desired initiate Event 6, 'A' SGTR**

Op Test No.: 05000400/2009302	Scenario # 4	Event # 7	Page 25 of 41
Event Description: Auto SI fails to actuate			

Time	Position	Applicant's Actions or Behavior
EVALUATOR'S NOTE:		**Once AFW is established, or the SRO directs a reactor trip, initiate Event 6, SGTR. The leak will ramp up to 420 gpm over 3 minutes. The first few steps of AOP-016 may be implemented prior to initiate the Rx trip and are included as part of this scenario guide. The crew may conservatively elect to trip the Rx, if so this will eliminate immediate AOP-016 entry.** **Additionally, automatic SI will fail to actuate, requiring a manual SI actuation. Once the reactor is tripped, Event 8, SG 'A' PORV fails open will be initiated.**
BOOTH OPERATOR:		**When directed by Lead Evaluator: actuate TRG-6** **"A" SGTR - 420 gpm**
Indications Available:		**ALB-009-2-2, PRESSURIZER CONTROL LOW LEVEL DEVIATION** **ALB-10-4-5, RAD MONITOR SYSTEM TROUBLE**
	RO	Responds to alarms and/or indications of RCS leakage.
EVALUATOR'S NOTE:		**Alarms associated with RCS leakage will direct implementation of AOP-016, EXCESSIVE PRIMARY PLANT LEAKAGE. Letdown will have to be reduced or isolated to stabilize charging flow on scale.** **The RO may take MANUAL control of FCV-122, Charging Flow Control Valve, at any point after the failure is recognized.** **If the crew elected to trip the Reactor on loss of MFW, the crew will be in PATH-1, not AOP-016.**

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Event Description: Auto SI fails to actuate

Time	Position	Applicant's Actions or Behavior
	SRO	Enters AOP-016, Excessive Primary Plant Leakage
PROCEDURE NOTE: • **This procedure contains no immediate actions.** • **Throughout this procedure, as well as all AOPs, actions are based on valid alarms and instrumentation. Actions based on invalid indication are not applicable.** • **When possible (except in the cases of rapidly propagating leaks and leaks approaching Action Level 3), leakage should be qualitatively confirmed prior to declaration of an action level. Leakage is qualitatively confirmed when two different indications (such as grab samples or radiation monitors) trend in the same direction with the same approximate order of magnitude.**		
	RO/SRO	CHECK RHR in operation. (NO) GO TO Step 3.
	SRO	REFER TO PEP-110, Emergency Classification And Protective Action
		Recommendations, AND ENTER the EAL Network at entry point X.
PROCEDURE NOTE: **This step is a qualitative check for leakage obviously in excess of Make Up capability. Isolation of letdown may be necessary. A formal calculation to determine the leakrate is performed in Step 16.**		
	CREW	May identify 'A' SG as the ruptured generator due to rising SG level.
	RO	CHECK RCS leakage within VCT makeup capability. (NO)
	SRO	Directs MANUAL reactor trip and manual SI.
	RO	INITIATES MANUAL Reactor Trip and attempts SI.

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Event Description: Auto SI fails to actuate			

Time	Position	Applicant's Actions or Behavior
	SRO	ENTERS and directs actions of PATH-1.
	RO	PERFORM immediate actions of PATH-1. VERIFY Reactor Trip: • AUTO or MANUAL Reactor Trip successful: • CHECK for any of the following: • Trip breakers RTA and BYA OPEN (YES) • Trip breakers RTB and BYB OPEN (YES) o ROD Bottom lights LIT (YES) o NEUTRON flux decreasing (YES)
	BOP	VERIFY Turbine Trip: • CHECK for any of the following: • ALL turbine throttle valves – SHUT (YES) • ALL turbine governor valves – SHUT (YES) VERIFY power to AC Emergency Buses • 1A-SA and 1B-SB Buses energized by off-site power or EDG's (YES, off-site power)
Critical Task	RO	CHECK SI Actuation (NO) Attempts to manually initiate SI based on directions and indications of plant parameters approaching ESFAS set points (MCB SI switch on Reactor panel does NOT function) **Uses second SI switch to manually actuate SI near SI reset switches (successful SI)**
	SRO	Monitor Function Restoration Procedures As Required.

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Event Description: 'A' SG Tube Rupture (Continued)

Time	Position	Applicant's Actions or Behavior
	SRO	• Evaluate EAL Network using entry point X. • Foldout A Applies. o Assigns RO and BOP foldout items
	RO	Verify All CSIPs AND RHR pumps - RUNNING (YES) CHECK SI Flow: • SI flow – GREATER THAN 200 GPM. (YES) RCS pressure – GREATER THAN 230 PSIG. (YES)
	BOP	CHECK Main Steam Isolation: • MAIN Steam isolation – ACTUATED. (NO) MAIN Steam isolation – REQUIRED. (NO) • Steam line pressure – LESS THAN 601 PSIG. • CNMT pressure – GREATER THAN 3.0 PSIG. • Manual closure of all MSIVs AND bypass valves is desired
	RO	CHECK CNMT Pressure – HAS REMAINED LESS THAN 10 PSIG. (YES)
	BOP	CHECK AFW Status: • AFW flow – AT LEAST 210 KPPH AVAILABLE. (YES) CHECK any SG level – GREATER THAN 25% [40%]. (YES) VERIFY Alignment of Components From Actuation of ESFAS Signals Using Attachment 6, "Safeguards Actuation Verification", While Continuing with this Procedure.

Op Test No.: 05000400/2009302	Scenario # 4	Event # 6	Page 29 of 41
Event Description: 'A' SG Tube Rupture (Continued)			

Time	Position	Applicant's Actions or Behavior
	BOP	Directs TB AO -Place the A and B I/A compressors to local control mode. Directs RAB AO – Locally unlock and turn on the breakers for the CSIP suction and discharge cross connect valves: Refer to Attachment 11.
BOOTH OPERATOR:		**When contacted to place A/B air compressors in Local Control mode, run CAEP :\air\ACs_to_local.txt.**
COMMUNICATOR:		**When CAEP is complete, report that the air compressors are running in local control mode.**
BOOTH OPERATOR		**When contacted to Unlock and Turn ON the breakers for the CSIP suction and discharge cross-connect valves, run CAEP *:\cvc\path-1 att 6 csip suction valves power.txt.***
COMMUNICATOR:		**When the CAEP is complete, report task to the MCR.**
EVALUATOR'S NOTE:		**The RO will perform all board actions until the BOP completes Attachment 6. The BOP is permitted to properly align plant equipment in accordance with Attachment 6 without SRO approval. The Scenario Guide still identifies tasks by board position because the time frame for completion of Attachment 6 is not predictable.**
	BOP	Control RCS Temperature: Stabilize AND maintain temperature between 555°F AND 559°F using Table 1. • Control feed flow and steam dump to stabilize temperature between 555 °F AND 559 °F VERIFY AC buses 1A1 AND 1B1 – ENERGIZED. (NO) • Energize AC buses 1A1 AND 1B1
EVALUATOR NOTE:		**Direct Booth Operator to initiate Event 8, 'A' SG PORV fails open when BOP energizes the first of the two buses.**

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Event Description: 'A' SG PORV fails open			

Time	Position	Applicant's Actions or Behavior
BOOTH OPERATOR:		**When AC buses 1A1 AND 1B1 are energized, Initiate Event 8 'A' SG PORV to fail open.**
	RO	CHECK PRZ PORVs – SHUT. (YES) CHECK block valves – AT LEAST ONE OPEN. (YES-All OPEN) PRZ spray valves – SHUT. (YES)
EVALUATOR NOTE:		**If the crew has not identified SG "A" PORV as OPEN then a transition to EPP-014 should occur. If SG "A" PORV has been closed in MANUAL then the crew will continue in PATH-1 to the PATH-2 transition. (Page 34 of this guide)**

	BOP	IDENTIFY any faulted SG:
		• CHECK for any of the following:
		  • ANY SG pressures – DECREASING IN AN UNCONTROLLED MANNER (YES/NO – "A")
		  • ANY SG – COMPLETELY DEPRESSURIZED. (NO)

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Event Description: 'A' SG PORV fails open			

Time	Position	Applicant's Actions or Behavior
	SRO	(IF SG PORV Remains Open) GO TO EPP-014, Faulted Steam Generator Isolation
COMMUNICATOR:		**If directed to walk down the system to check for leaks: Wait 3 minutes and then report SG "A" PORV tailpipe is blowing steam.**
PROCEDURE NOTE:		• **At least one SG must be maintained available for RCS cooldown.** • **Any faulted SG OR secondary break should remain isolated during subsequent recovery actions unless needed for RCS cooldown.**
	SRO	IMPLEMENT Function Restoration Procedures as required.
	BOP	CHECK MSIVs and BYPASS Valves:
		• VERIFY all MSIVs – SHUT. (YES/NO If not in PATH-1, then NO)
	BOP	VERIFY all MSIV bypass valves – SHUT. (YES)
	BOP	CHECK any SG NOT Faulted:
		• ANY SG pressure – STABLE OR INCREASING. (YES)
	BOP	IDENTIFY any Faulted SG:
		• CHECK for any of the following:

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Event Description: 'A' SG PORV fails open			

Time	Position	Applicant's Actions or Behavior
		• ANY SG pressure – DECREASING IN AN UNCONTROLLED MANNER (YES , 'A') • ANY SG pressure – COMPLETELY DEPRESSURIZED (NO)
	BOP	ISOLATE Faulted SG(s):
Critical Task		• VERIFY faulted SG(s) PORV – SHUT (NO) • **Places SG 'A' PORV in MANUAL and closes to terminate the release before exiting EPP-014.**

	BOP	• VERIFY Main FW isolation valves – SHUT (YES)
		• VERIFY MDAFW and TDAFW pump isolation valves to faulted SG(s) – SHUT
		• SHUT faulted SG(s) steam supply valve to TDAFW pump – SHUT (NA)
		• VERIFY main steam drain isolation(s) before MSIVs – SHUT:
		  • SG A: 1MS-231 (YES)
		  • SG B: 1MS-266 (YES)
		  • SG C: 1MS-301 (YES)
		• VERIFY SG Blowdown isolation valves – SHUT (YES)
		• VERIFY main steam analyzer isolation valves – SHUT (YES)
		CHECK CST Level – GREATER THAN 10% (YES)

PROCEDURE NOTE:		**A SG may be suspected to be ruptured if it fails to dry out following isolation of feed flow. Local checks for radiation can be used to confirm primary-to-secondary leakage.**
EVALUATOR NOTE:		**The "Check secondary radiation" could be answered YES or NO, depending on the condition of the alarm before SI was initiated.**

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Event Description: 'A' SG PORV fails open

Time	Position	Applicant's Actions or Behavior
	SRO	CHECK Secondary Radiation: • SG Blowdown radiation – NORMAL (YES/NO) • MAIN steamline radiation – NORMAL (YES/NO)
	BOP	CHECK SG Levels:
		• ANY level – INCREASING IN AN UNCONTROLLED MANNER (YES, "A")

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Event Description: 'A' SG Tube Rupture (Continued)			

Time	Position	Applicant's Actions or Behavior
	SRO	GO TO PATH-2, Entry Point J.
	SRO	FOLDOUT C applies.
EVALUATOR'S NOTE:		**No actions should result from FOLDOUT "C" during the remainder of the scenario.** **The board utilized for PATH-2 is an abbreviated version of EOP-Guide 2. The actions identified within this scenario guide are consistent with those actions utilized by the SRO.**
	SRO	EVALUATE EAL Network using Entry Point U. IMPLEMENT Function Restoration Procedures as required.
PROCEDURE NOTE:		**The RCP Trip Criteria is in effect until an RCS cooldown is initiated.**
	RO	CHECK RCP Trip Criteria: • ANY RCP – RUNNING (YES) • Check all of the following: o SI flow - GREATER THAN 200 GPM (YES) o Check RCS pressure - LESS THAN 1400 PSIG (NO)
	BOP	Ruptured SG identified • SG level – INCREASING IN AN UNCONTROLLED MANNER (YES – "A")

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Event Description: 'A' SG Tube Rupture (Continued)			

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION:		• **At least one SG must be maintained available for RCS cooldown.** • **If the TDAFW pump is the only available source of feed flow, one steam supply valve from an intact SG must be maintained open.**

	BOP	ADJUST ruptured SG PORV controller setpoint to 88% (1145 PSIG) AND place in auto.
		• Places SG "A" PORV in MANUAL and closes (if not already performed earlier). It should NOT be placed in AUTO. If it is placed in AUTO then the operator should determine that it has opened, place it in MANUAL, close it, and leave it in MANUAL.
		• CHECK ruptured SG PORV – SHUT. (YES/NO)
		• SHUT ruptured SG steam supply valve to TDAFW pump:
		  • May already be closed
		• VERIFY blowdown isolation valves from ruptured SG – SHUT (YES)
		• SHUT ruptured SG main steam drain isolation before MSIV:
		  • SG A: 1MS-231
		• SHUT ruptured SG MSIV and BYPASS valve. (SG "A")
		  o Ruptured SG MSIV and bypassed valves SHUT (YES)

	SRO	Observe CAUTION prior to Step 8 AND GO TO Step 8.
PROCEDURE CAUTION:		**If ruptured SG is faulted AND is NOT needed for RCS cooldown, THEN feed flow to that SG should remain isolated.**

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Event Description: 'A' SG Tube Rupture (Continued)			

Time	Position	Applicant's Actions or Behavior
	BOP	• Ruptured SG Level Greater than 25% [40%] – GREATER THAN 25% (YES) o Stop feed flow by shutting the MDAFW and TDAFW isolation valves to the ruptured SG.
PROCEDURE CAUTION:		**The steam supply valve from the ruptured SG to the TDAFW pump should be shut OR isolated before continuing.**
	BOP	CHECK Ruptured SG(s) Pressure – GREATER THAN 260 PSIG [350 PSIG] (YES)
	RO	Block Low Steam Pressure SI: • Pressure - LESS THAN 2000 PSIG (YES) • Block low steam pressure SI.
PROCEDURE NOTE:		**After the low steam pressure SI signal is blocked, main steamline isolation will occur if the high steam pressure rate setpoint is exceeded.**

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Event Description: 'A' SG Tube Rupture (Continued)

Time	Position	Applicant's Actions or Behavior
	SRO	• At least one intact SG - AVAILABLE FOR RCS COOLDOWN (YES)

LOWEST RUPTURED SG PRESSURE (PSIG)	ERFIS AVAILABLE: CORE EXIT TEMPERATURE (°F)	ERFIS NOT AVAILABLE: HIGHEST CORE EXIT TC (PREFERRED) OR ACTIVE LOOP WIDE RANGE T-HOT (°F)
ABOVE 1100	530 [495]	520 [490]
1000 TO 1100	515 [485]	505 [475]
900 TO 1000	505 [470]	495 [465]
800 TO 900	490 [460]	480 [450]
700 TO 800	475 [445]	465 [435]
600 TO 700	460 [425]	450 [420]
500 TO 600	440 [410]	430 [400]
400 TO 500	420 [385]	410 [380]
300 TO 400	390 [360]	380 [350]
200 TO 300	360 [NA]	350 [NA]

EVALUATOR NOTE: **The MSIVs may have been previous shut. IF the crew did not identifiy SG "A" PORV was OPEN and transitioned to EPP-014 they may have closed all MSIVs. IF so this would require using the SG 'B' and 'C' PORVs to perform the cool down.**

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Event Description: 'A' SG Tube Rupture (Continued)

Time	Position	Applicant's Actions or Behavior

	BOP	• Condenser available for steam dump (YES)
		• Intact SG MSIV – OPEN (YES)
		• Place steam dump pressure controller in manual AND decrease output to 0%.
		• Place steam dump mode select switch in STEAM PRESS.
		• When RCS temperature - LESS THAN OR EQUAL 553°F (P-12 SETPOINT) (YES)
		  o Momentarily place both steam dump interlock bypass switches to INTLK BYP. (YES)
		  o Verify LOW-LOW STEAM DUMP (P-12) BYPASSED status light – ILLUMINATED (YES)
		• Dump steam from intact SGs to condenser at maximum rate.

EVALUATOR NOTE:		**During cooldown at MAX Rate, Main Steam Line Isolation may occur, requiring use of SG 'B' and 'C' PORVs to continue cooling down.** **The crew will continue with the procedure while the cooldown is in progress. When the CET temperature is less than the target then the crew should terminate the cooldown and continue with the procedure.**
PROCEDURE CAUTION:		**Cooldown may cause an invalid Red or Orange on the integrity CSFST. FRP-P.1 should not be implemented until step 39 is completed.**
	RO	• Core exit TCs - LESS THAN REQUIRED TEMPERATURE (NO) • WHEN core exit TCs less REQUIRED TEMPERATURE THEN STOP RCS cooldown and maintain core exit TCs less than required temperature. • Continue recovery actions during cooldown • Maintain RCP Seal Injection Flow Between 8 GPM And 13 GPM.

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Event Description: 'A' SG Tube Rupture (Continued)

Time	Position	Applicant's Actions or Behavior
PROCEDURE CAUTION: • **If an AFW isolation to an intact SG occurs, the signal may be reset to allow restoration of AFW. (An AFW isolation will occur if a main steam line isolation signal is present AND one SG pressure decreases 100 PSIG below the other two SGs.)** • **If the steam supply valve from the ruptured SG to TDAFW pump reopens due to decreasing SG level, it must be restored to the shut position. (Two out of three SG levels decreasing below 25% will open both steam supply vales to the TDAFW pump.)**		
	BOP	• Control feed flow to maintain intact SG levels between 25% and 50% [40% and 50%] • AFW flow - AT LEAST 210 KPPH AVAILABLE (YES)
	SRO	GO TO Step 16.
	RO	• Verify power available to PORV block valves (YES) • Check PRZ PORVs – SHUT (YES) • Check block valves - AT LEAST ONE OPEN (YES) • IF a PRZ PORV opens on high pressure, THEN verify it shuts after pressure decreases to less than opening setpoint. • Reset SI.
	SRO	Manually Realign Safeguards Equipment Following A Loss Of Offsite Power. (Direct BOP)

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Event Description: 'A' SG Tube Rupture (Continued)

Time	Position	Applicant's Actions or Behavior
	RO	• Reset Phase A AND Phase B Isolation Signals. (Phase A only is actuated) • Establish Instrument Air AND Nitrogen To CNMT: o Opens the following valves: ▪ 1IA-819 ▪ 1SI-287 • RCS pressure - GREATER THAN 230 PSIG (YES) • Stop RHR pumps.
	RO	• Core exit TCs - LESS THAN REQUIRED TEMPERATURE (YES/NO)
	BOP	• Stop RCS cooldown and Maintain core exit TCs less than required temperature.
	BOP	• Check ruptured SG pressure - STABLE OR INCREASING (YES)
	RO	Check RCS Subcooling - GREATER THAN 30 °F – C (YES)
Critical Task	RO	Depressurize RCS To Minimize Break Flow AND Refill PRZ:
		• Normal PRZ spray – AVAILABLE (YES) • PRZ level less than 75% [60%] (YES) • RCS subcooling greater than 10°F (YES) • RCS pressure less than ruptured SG pressure (NO) • Open normal spray valves to depressurize RCS as maximum rate
EVALUATOR NOTE:		**Crew will maintain the spray valves open until RCS pressure is less than SG pressure. They may close the spray valves if they do not meet PRZ level or subcooling conditions.**

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Event Description: 'A' SG Tube Rupture (Continued)

Time	Position	Applicant's Actions or Behavior
	RO	• Shut Spray valves used for depressurization. (YES) • If valves cannot be shut, stop RCPs 'A' and 'B' (NO) • Do not restart RCPs until spray valves shut (NA) • RCS subcooling greater than 10°F (YES) • Level in at least one intact SG greater than 25% (YES)

	RO	• RCS pressure - STABLE OR INCREASING (YES)
		• PRZ level - GREATER THAN 10% [30%] (YES)
		• Stop All But One CSIP.
		• Check CSIP suction - ALIGNED TO RWST (YES)
		• Open normal miniflow isolation valves:
		  • 1CS-182
		  • 1CS-196
		  • 1CS-210
		  • 1CS-214

	RO	• CSIP Normal Miniflow valves open (YES)
		• Shut BIT outlet valves:
		  • 1SI-3
		  • 1SI-4

LEAD EVALUATOR - Terminate the scenario after BIT outlet valves 1SI-3 and 1SI-4 are SHUT.		