Facility: St. Lucie	Scenario No.: 1	Op Test No.: HLC-19 NRC	
Examiners:	Operators:	SRO:	
		RO:	
		BOP:	

Initial Conditions: IC #3 45% power, Xenon building in, 6 gpm dilution rate. MOL. 2C Charging Pump OOS for repack. 2A AFW Pump OOS to repair oil leak. Both Main Feedwater pumps running.

Turnover: Unit was down powered due to an oil leak on the 2B Main Feedwater Pump. Oil leak has been repaired and the 2B Main Feedwater Pump was just started. 2A AFW pump has been OOS for four hours, expected to be returned to service in one hour. The crew is to perform an up power to 100%.

Critical Tasks:

- Start 2B Emergency Diesel Generator
- Establish Feedwater to 2A or 2B SG

Event No.	Malf. No.	Event Type*	Event Description
1		R / RO & SRO N / BOP	Power Increase to 100% power
2	1	I / BOP	DEH swaps to Turbine manual
3	2	I / RO T.S. SRO	Non Selected Pressurizer level channel LIC-1110Y fails low and PCV-1100E fails as is.
4	3	C / BOP T.S / SRO	HVS-1C Containment fan cooler trips. HVS-1D starts manually
5	4	C/ RO	Letdown flow controller HIC-1110 goes to at Maximum Flow
6a	5	M / All	Letdown line leak in Containment RCS leakage (50 gpm)
6b	6	M / All	Letdown line leak in Containment SBLOCA (150 gpm)
7	7	C/ BOP	2A MFW recirc valve will not open resulting in 2A MFW pump trip. 2A MFW 15% Bypass valve does not open post trip. A AFW pump does not start manually or on AFAS and MV-09-11 2C AFW to 2A SG does not open. MV-09-12 2C AFW to 2B SG opens 30% and trips as is.
8	8	C / BOP	B side electrical does not swap to SU transformers. 2B EDG does not auto start. 2B EDG can be manually started by the BOP.
9	9	C / BOP	Upon AFAS the 2B AFW does not start.

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

St. Lucie

The Unit will be turned over to the Crew at 45% power. 2C Charging Pump is out of service for repack. Both Main Feedwater Pumps are running and the Crew is to perform an up power to 100%.

During the up power the DEH system will swap to Turbine manual. No alarm is annunciated with this failure. The up power is to be conducted with the Turbine in manual control.

As the up power progresses, the non-selected Pressurizer level controller LIC-1110Y fails low and PCV-1100E fails as is. This will require selecting PCV-1100F. All heaters will be lost, the B side 4.16 PZR heater breaker tripping open and unable to be re-closed. Key #98 will be required to be taken to the level position to regain the A side Pressurizer heaters. SRO is to evaluate T.S. on loss of heaters. (T.S. 3.4.3)

Containment Cooler HVS-1C trips and is not recoverable. Containment cooler HVS-1D will start manually. The Crew is required to monitor Containment temperature to ensure temperature is maintained less than 120°F. SRO is to evaluate T.S. on loss of one train of Containment cooling. (T.S. 3.6.2.1)

HIC-1110 Letdown controller fails causing full letdown flow. The RO is to take manual control of the letdown flow controller to re-gain control of letdown flow. When flow control is re-gained, the letdown line in the containment will leak at approximately 50 gpm resulting in excessive RCS leakage. The leak will then increase to 150 gpm resulting in a SBLOCA. Pressurizer level will not be maintainable and the Crew should manually trip the Unit.

Upon Unit trip the B side will not swap to the SU transformers and the 2B Diesel will not automatically start. The 2B Diesel will start from the control room since there is no lockout.

Upon the Unit trip the 2A MFW recirc. valve will not open. This will result in the 2A MFW tripping on low flow. Eventually AFAS will actuate but MV-09-11 2C AFW to 2A SG does not open. MV-09-12 2C AFW to 2B SG opens to 70 gpm flow but then the valve motor breaker trips. 2B AFW pump does not start on AFAS but can be manually started. AFAS lockout will occur on the A side due ΔFW pressure when B side pressurizes. Due to the small break LOCA this scenario makes starting the 2B Diesel and restoring feedwater critical.

2-EOP-03, LOCA should be implemented to mitigate the small break (150 gpm) from the letdown line. If the crew has difficultly establishing feedwater they may elect to enter 2-EOP-15, Functional Recovery which is acceptable but may delay the recovery. The scenario may be terminated when feedwater is restored to at least one SG, the RCS is being cooled down and depressurized while maintaining subcooling.

Procedures Used

- 2-GOP-201, Reactor Plant Startup Mode 2 to Mode 1
- 2-GOP-101, Reactor Operating Guidelines During Steady State and Scheduled Load Changes
- 2-NOP-02.24, Boron Concentration Control
- NOP-100.02 Axial Shape Index Control
- 2-ONP-22.03, DEH Turbine Control System
- 2-0120035, Pressurizer Pressure and Level
- 2-ONP-25.01, Loss of RCB Cooling Fans
- 2-ONP-02.03 Charging And Letdown
- 2-0120031, Excessive Reactor Coolant System Leakage
- 2-EOP-01, Standard Post Trip Actions
- 2-EOP-03 Loss of Reactor Coolant

Technical Specifications Entered

- 3.4.3 Pressurizer
- 3.6.2.1 Containment Spray and Cooling Systems

Op Test No.:	1	Scenario #	1	Event #	1	Page	3	of 22
Event Description:	Power increase from 45% to 100%							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: • **Initiate IC #3 45% power. Xenon building in, 9 gpm dilution rate. MOL. 2C Charging Pump OOS for repack. 2A AFW Pump OOS to repair oil leak (OOS for 12 hours. Expected to be returned to service in another 12 hours) Start 2B MFW pump and leave in recirc. position. Place 2A AFW pump and 2C Charging pump to stop.**		
Indications Available:		
NOTE: Inform the crew 2-GOP-201 step 6.131 has been signed off by RE and power ascension is approved. Step 6.130.11 is complete. Start at step 6.130.13.		
	SRO	Direct power increase IAW 2-GOP-201 step 6.132
		Control Rx power and ASI IAW 2-GOP-101 Rx Operating Guidelines step 6.1 (attached pages 4-5)
	RO	Raise dilution rate for power increase IAW 2-NOP-02.24 step 6.5.12 (attached page 6)
		Withdraw CEA's to control Rx power and ASI IAW 2-GOP-101 Rx Operating Guidelines step 6.1 (attached page 4) • CEA Withdrawal, select MS on the CEDMCS Control Switch • Move the IN/HOLD/OUT Switch to the OUT direction
		Divert to WMS by placing V2500 to WMS. Step 6.5.14 (attached page 6)
	BOP	Program DEH for power increase at a rate IAW 2-GOP-101 step 6.1.2.D Category 4. (attached page 4) • Set reference by ensuring REF selected and then depress desired MW endpoint, select ENTER • Depress LOAD RATE type in desired load rate and select ENTER • Depress GO pushbutton

Next scenario page = 7

6.0 INSTRUCTIONS

6.1 Power Level Escalations

NOTE

CEAs should be above the Long-term Steady State Insertion Limit (102 inches withdrawn on Group 5) before reaching 20% core power and at a position to begin controlling ASI at the ESI between 20% and 50% power. Refer to NOP-100.02, Axial Shape Index Control, for further guidance.

1. As Main Generator loading commences, MAINTAIN T-avg at T-ref by:

A. CEA withdrawal in Manual Sequential.

AND / OR

B. Boron concentration changes in accordance with 2-NOP-02.24, Boron Concentration Control.

2. At or above 50% power:

A. All planned reactivity additions should be made by boration or dilution in accordance with 2-NOP-02.24, Boron Concentration Control.

B. USE CEAs for ASI control, CONSIDER the reactivity effect of CEAs when adjusting ASI.

C. REFER to NOP-100.02, Axial Shape Index Control, for specific instructions regarding ASI control during power escalations.

D. ¶1 When raising Reactor power, all power escalation rates should be within the following fuel preconditioning guidelines:

Category	Max Core Power Escalation Rate	Max Equivalent Turbine Generator Load Rate
1	3%/HR at or above 15% Power	.42 MW/MIN
2	3%/HR above 50% Power	.42 MW/MIN
3	20%/HR above 50% Power	2.80 MW/MIN
4	30%/HR above 50% Power	4.2 MW/MIN

6.1 Power Level Escalations (continued)

2. D. (continued)

NOTE

To determine the correct category for a power escalation, Appendix B, Fuel Preconditioning Guidelines Worksheet, may be used. Contact Reactor Engineering if further assistance is required.

Category Definitions:

1. Category 1:

   a. INCREASE in power to a level which has not been previously sustained in this core cycle for at least 72 continuous hours.

2. Category 2:

   a. INCREASE in power following 30 continuous days or more at a power level less than 70% of rated thermal power.

   OR

   b. INCREASE in power to a level which has not been maintained for more than 3 continuous hours during the past 60 days.

3. Category 3:

   a. INCREASE in power to a level which has not been maintained for 3 continuous hours or more during the past 8 days.

4. Category 4:

   a. INCREASE in power to a level which has been maintained for 3 continuous hours or more during the past 8 days.

3. If available, Then ENSURE two Charging Pumps are operating. If necessary, START an additional Charging Pump in accordance with 2-NOP-02.02, Charging and Letdown.

4. PLACE the Pressurizer on recirculation in accordance with Appendix A, Pressurizer Recirculation Guidelines.

5. CONTINUE to load the Main Generator in accordance with 2-GOP-201, Reactor Plant Startup, Mode 2 to Mode 1.

END OF SECTION 6.1

6.5 Aligning for MANUAL Dilution (continued)

CAUTION
To preclude lifting the VCT relief valve while using V-2525, do NOT allow PMW flowrate to exceed the running Charging pump(s) capacity.

12. ☐ ☐ ☐ ☐ ADJUST FIC-2210X PMW Flow in AUTO or MANUAL to desired flowrate (and if using V-2525 do NOT exceed the flowrate for the number of running Charging Pumps).

13. ☐ ☐ ☐ ☐ MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.

14. ☐ ☐ ☐ ☐ If necessary to maintain the desired VCT level, Then DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position:

    A. ☐ ☐ ☐ ☐ ENSURE V2500 VCT Divert Valve indicates OPEN.

    B. ☐ ☐ ☐ ☐ When the desired VCT level is reached, PLACE V2500 in AUTO.

    C. ☐ ☐ ☐ ☐ ENSURE V2500 indicates CLOSED.

15. ☐ ☐ ☐ ☐ When the desired amount of primary water has been added, Then CLOSE FCV-2210X, Primary Makeup Water.

16. ☐ ☐ ☐ ☐ If V-2512 Reactor Makeup Water Stop Vlv was opened, Then PLACE V-2512 in CLOSE and ENSURE it indicates CLOSED.

17. ☐ ☐ ☐ ☐ If V-2525 Boron Load Control Valve was opened, Then PLACE V-2525 in CLOSE and ENSURE it indicates CLOSED.

18. ☐ ☐ ☐ ☐ ENSURE FIC-2210X, PMW Flow controller is in MANUAL and RECUCE output to MINIMUM.

19. ☐ ☐ ☐ ☐ MONITOR for any abnormal change in T_{ave}.

20. ☐ ☐ ☐ ☐ §1 RECORD on Data Sheet 1, Boration / Dilution Log, the number of gallons of Primary Makeup Water added as indicated on FQI-2210X, PMW Flow Totalizer.

21. ☐ ☐ ☐ ☐ If additional dilutions are desired, or if the expected changes to T_{ave} or Boron concentration are NOT achieved, Then REPEAT Steps 6.5.1 through 6.5.20.

/R24A

Op Test No.:	1	Scenario #	1	Event #	2	Page	4 of 22
Event Description:	DEH swaps to Turbine Manual						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger EVENT 2, DEH swap to manual when directed by examiner. If requested, I&C reports up power can be continued using turbine manual.		
Indications Available: No audible alarm associated with this failure. DEH panel indicates: • **Turbine manual light is lit** • **OP Auto light is off** • **Trans Relay 24V monitor light on** **NOTE: this is not a full loss of DEH computer so CONT RESET light will not be lit on Operator Console B**		
	BOP	Recognizes turbine manual light is lit, OP auto light is off. CHANGE load using the following pushbuttons (**2-ONP-22.03 DEH Turbine Control System**) (step 6.2.2.A) • Manipulates GV Raise
NOTE: small pushes (< 1 sec.) of GV Raise will pick up 3-6 megawatts. Holding the pushbutton depressed causes an exponential increase in speed.		
	SRO	Implements **2-ONP-22.03 DEH Turbine Control System** Step 6.2 (attached pages 8-9)
		Directs performance of Data Sheet 1 (attached page 10)
		Contacts Shift Manager to report failure, and entry into **2-ONP-22.03 DEH Turbine Control System**
		Contacts I&C to investigate DEH failure and swap to turbine manual.
	RO	Monitors primary plant parameters during DEH manual operation. Adjusts dilution rate as needed.
EXAMINERS NOTE: Observe coordination between RO & BOP during power ascension in turbine manual.		

Next scenario page = 11

6.2 Loss Of DEH Computer

INSTRUCTIONS **CONTINGENCY ACTIONS**

1. Ψ RECORD initial conditions on Data Sheet 1, Initial Conditions.

NOTE

- The GV Raise and GV Lower pushbuttons operate on an exponential component. The longer the pushbutton is depressed, the faster the change in load will be made.
- Changing Turbine load will change Reactor power.

2. If load changes are necessary, Then PERFORM the following:

   A. CHANGE load using the following pushbuttons:

      - GV Raise
      - GV Lower

   B. PERFORM load changes in accordance with **ONE** of the following:

      - 2-GOP-201, Reactor Plant Startup - Mode 2 to Mode 1.
      - 2-GOP-123, Turbine Shutdown Full Load to Zero Load.

3. NOTIFY I&C.

4. CHECK the following indication:

   - CONT OFF light NOT LIT on Operator Console A.
   - CONT RESET light LIT on Operator Console B.

6.2 Loss Of DEH Computer (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
5. DEPRESS the CONT RESET pushbutton on Operator Console B.	
6. VERIFY the CONT RESET light NOT LIT.	
7. **<u>When</u> ready to return to automatic operation, <u>Then</u> GO TO Appendix A, Return To Automatic Operation.**	

END OF SECTION 6.2

DATA SHEET 1
INITIAL AND FINAL CONDITIONS
(Page 1 of 1)

1. Ψ RECORD initial conditions existing prior to transfer to TURBINE MANUAL, as directed.

2. RECORD final conditions prior to initiating transfer to OPER AUTO, as directed.

PARAMETER	INITIAL CONDITIONS	INITIALS	FINAL CONDITIONS	INITIALS
TURBINE MANUAL (√)				
OPER AUTO (√)				
SEQ VALVE (√)				
SINGLE VALVE (√)				
MW				
GV 1 position (%)				
GV 2 position (%)				
GV 3 position (%)				
GV 4 position (%)				
Keyboard location 4412 (Flow Demand)				
GVC volts (if used)	N/A	N/A		

Reviewed by: ______________________ Date: ________
US / SM

END OF DATA SHEET 1

Op Test No.: 1	Scenario # 1	Event # 3	Page 5 of 22
Event Description:	Non Selected Pressurizer level channel LIC-1110Y fails low		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger EVENT 3, Pressurizer level fails low (LIC-1110Y non selected channel) and PCV-1100E fails as is, when directed by examiner		
Indications Available: Annunciators: • **A-9 - Pzr Htr Xfmer 2B3 trouble** • **H-18 - Pzr Channel Y Level High/Low** • **LB-11 - PZR channel Y Level Low Low** • **H-29 – PZR Proportional HTR low level trip/interlock** • **H-30 – Pzr Backup HTR low level trip/SS isol/intlk.** **Heaters: P-2, B-4, B-5, B-6 no power available. P-1, B-1, B-2, B-3 power available but off.** **Heater transformer breaker B side 2-20403 open.**		
	RO	Recognizes all Pressurizer heaters de-energized. Monitors RCS pressure to ensure spray valves closing in response to loss of heaters. Reports failed 1110Y channel, heaters status, and RCS pressure to US.
		Recognizes failure of PCV-1100E to close as expected and selects operable PCV-1100F when directed.
NOTE: B side heaters will not be available due to breaker 2-20403 unable to be closed.		
	SRO	Implement 2-0120035 Pressurizer Pressure and Level step 7.2.2.G (attached page 15)
		Recognizes entry into DNB Tech Spec 3.2.5 and announces to crew (attached page 14).
	T.S. SRO	Recognizes Tech. Spec. entry (3.4.3) due to unable to regain B side Pressurizer heaters [72 hour action statement (3.4.3.a)] (attached page 13). Should also refer to T.S. 3.3.3.5 remote shutdown instrumentation for loss of channel Y. 30 day action statement.
		Directs backup interlock bypass keyswitch taken to LEVEL position. This will regain only the A side heaters.

Next scenario page = 12

Op Test No.: 1 Scenario # 1 Event # 3 Page 6 of 22

Event Description: Non Selected Pressurizer level channel LIC-1110Y fails low

Time	Position	Applicant's Actions or Behavior
		Contacts Shift manager to report failure of LIC-1110Y and PCV-1100E, entry into 2-0120035 Pressurizer Pressure and Level, and above Tech Specs, and swap to Spray Valve PCV-1100F
	RO	When directed, places backup interlock bypass keyswitch to the LEVEL position. (step 7.2.2.G.1.a)
		Resets all A side Pressurizer heaters. (step 7.2.2.G.1.b)
		Monitors RCS pressure. Controls heaters to ensure 2250 psia.

Next scenario page = 16

REACTOR COOLANT SYSTEM

3/4.4.3 PRESSURIZER

LIMITING CONDITION FOR OPERATION

3.4.3 The pressurizer shall be OPERABLE with a minimum water level of greater than or equal to 27% indicated level and a maximum water level of less than or equal to 68% indicated level and at least two groups of pressurizer heaters capable of being powered from 1E buses each having a nominal capacity of at least 150 kW.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a. With one group of the above required pressurizer heaters inoperable, restore at least two groups to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With the pressurizer otherwise inoperable, be in at least HOT STANDBY with the reactor trip breakers open within 6 hours and in HOT SHUTDOWN within the following 6 hours.

SURVEILLANCE REQUIREMENTS

4.4.3.1 The pressurizer water volume shall be determined to be within its limits at least once per 12 hours.

4.4.3.2 The capacity of each of the above required groups of pressurizer heaters shall be verified to be at least 150 kW at least once per 92 days.

4.4.3.3 The emergency power supply for the pressurizer heaters shall be demonstrated OPERABLE at least once per 18 months by verifying that on an Engineered Safety Features Actuation test signal concurrent with a loss of offsite power:

a. the pressurizer heaters are automatically shed from the emergency power sources, and

b. the pressurizer heaters can be reconnected to their respective buses manually from the control room after resetting of the ESFAS test signal.

POWER DISTRIBUTION LIMITS

DNB PARAMETERS

LIMITING CONDITION FOR OPERATION

3.2.5 The following DNB-related parameters shall be maintained within the limits shown on Table 3.2-2:

a. Cold Leg Temperature

b. Pressurizer Pressure

c. Reactor Coolant System Total Flow Rate

d. AXIAL SHAPE INDEX

APPLICABILITY: MODE 1.

ACTION:

With any of the above parameters exceeding its limit, restore the parameter to within its limit within 2 hours or reduce THERMAL POWER to ≤ 5% of RATED THERMAL POWER within the next 4 hours.

SURVEILLANCE REQUIREMENTS

4.2.5.1 Each of the parameters of Table 3.2-2 shall be verified to be within their limits by instrument readout at least once per 12 hours.

4.2.5.2 The Reactor Coolant System total flow rate shall be determined to be within its limit by measurement* at least once per 18 months.

* Not required to be performed until THERMAL POWER is ≥ 80% of RATED THERMAL POWER.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS / **CONTINGENCY ACTIONS**

2. (continued)

NOTE

With less than 27% level on Channel X, the "A" pressurizer heater transformer feeder breaker (2-20204) trips and the "B" side 480V power supplies deenergize. With less than 27% level on Channel Y, the "B" pressurizer heater transformer feeder breaker (2-20403) trips and the "A" side 480V power supplies deenergize. The backup interlock bypass keyswitch selected to the level position, allows the 480V heater power supplies to be reset.

Instructions:

G. Verify pressurizer level indicating controllers (selected and non-selected) are operating properly and power is available to pressurizer heaters.

Contingency Actions:

2. (continued)

G. If pressurizer heaters are deenergized or level indicating controller(s) failed, Then perform the following:

1. If either level control channel has failed, Then shift to the operable channel and reset heaters as follows:

   a. Place the backup interlock bypass keyswitch (RTGB-203) to the LEVEL position. (This regains power to the proportional and backup heater banks controlled by the selected channel.)

   b. Reset pressurizer heater banks as needed.

   OR

Op Test No.: 1	Scenario #	1	Event #	4	Page 7	of	22

Event Description: HVS-1C Containment fan cooler trips. HVS-1D starts manually.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger EVENT 4, loss of Containment fan cooler when directed by examiner. (HVS-1C trips)		
Indications Available: Annunciator T-12 CNTMT Fan CLR HVS-1C OVRLD / Trip		
	BOP	Responds to annunciator when HVS-1C trips. Recognizes HVS-1C has tripped.
	SRO	Implements **2-ONP-25.01 Loss of RCB Cooling Fans** step 6.4.1 (attached pages 17-18).
		Directs starting of HVS-1D Step 6.4.1.B
		Directs monitoring Containment temperature to ensure ≤120°F maintained. Step 6.4.2
		Contacts Electrical Maintenance Step 6.4.1.C
		Contacts Shift manager to report failure of HVS-1C and entry into **2-ONP-25.01 Loss of RCB Cooling Fans**.
	T.S. SRO	Recognizes Tech. Spec. entry 3.6.2.1 loss of one containment cooling train. Restore within 7 days (attached page 19).
	BOP	Places HVS-1D control switch to the START position and verifies Red light ON and Green light OFF.

Next scenario page = 20

6.4 Loss of Containment Fan Cooler

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

§1,2 Sufficient Containment Fan Coolers (HVS-1A, HVS-1B, HVS-1C or HVE-1D) are required to be in operation to maintain Containment air temperature less than or equal to 120°F. This is necessary to maintain the reactor vessel support structure within design basis. Operator action is required within 45 minutes, to restore air temperature to less than or equal to 120°F or initiate reactor trip and cooldown to at least Hot Shutdown. The total time from the loss of Containment Fan Coolers to Hot Shutdown is 5 hours.

INSTRUCTIONS	CONTINGENCY ACTIONS
1. ATTEMPT one start of the standby Containment Fan Cooler.	1. If standby fan does NOT start, Then PERFORM the following: A. PERFORM Appendix D, Containment Cooling Fan Local Breaker Operations. B. ATTEMPT one start of all available Containment Fan Coolers. C. If any fan does NOT start, Then the following: • Maintenance Supervisor • EM D. REFER TO Tech Specs 3.6.2.1.

6.4 Loss of Containment Fan Cooler (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. CHECK Containment air temperature less than or equal to 120°F.	2. If Containment air temperature greater than 120°F, Then PERFORM the following: A. INITIATE a rapid shutdown using 2-ONP-22.01, Rapid Downpower. B. REFER TO Tech Specs 3.6.1.5. C. If Containment air temperature is NOT less than 120°F within 45 minutes, Then PERFORM the following: 1. TRIP the reactor. 2. TRIP the turbine. 3. IMPLEMENT 2-EOP-01, Standard Post Trip Actions. 4. COOL DOWN to at least Hot Shutdown within 5 hours from the loss of the fan in accordance with 2-GOP-305, Reactor Plant Cooldown – Hot Standby to Cold Shutdown.

CONTAINMENT SYSTEMS

3/4.6.2 DEPRESSURIZATION AND COOLING SYSTEMS

CONTAINMENT SPRAY AND COOLING SYSTEMS

LIMITING CONDITION FOR OPERATION

3.6.2.1 Two containment spray trains and two containment cooling trains shall be OPERABLE.

APPLICABILITY: Containment Spray System: MODES 1, 2, and MODE 3 with Pressurizer Pressure $\geq$ 1750 psia.

Containment Cooling System: MODES 1, 2, and 3.

ACTION:

1. Modes 1, 2, and 3 with Pressurizer Pressure $\geq$ 1750 psia:

   a. With one containment spray train inoperable, restore the inoperable spray train to OPERABLE status within 72 hours and within 10 days from initial discovery of failure to meet the LCO; otherwise be in MODE 3 within the next 6 hours and in MODE 4 within the following 54 hours.

   b. With one containment cooling train inoperable, restore the inoperable cooling train to OPERABLE status within 7 days and within 10 days from initial discovery of failure to meet the LCO; otherwise be in MODE 3 within the next 6 hours and in MODE 4 within the following 6 hours.

   c. With one containment spray train and one containment cooling train inoperable, concurrently implement ACTIONS a. and b. The completion intervals for ACTION a. and ACTION b. shall be tracked separately for each train starting from the time each train was discovered inoperable.

   d. With two containment cooling trains inoperable, restore one cooling train to OPERABLE status within 72 hours; otherwise be in MODE 3 within the next 6 hours and in MODE 4 within the following 6 hours.

   e. With two containment spray trains inoperable or any combination of three or more trains inoperable, enter LCO 3.0.3. immediately.

2. Mode 3 with Pressurizer Pressure < 1750 psia:

   a. With one containment cooling train inoperable, restore the inoperable cooling train to OPERABLE status within 72 hours; otherwise be in MODE 4 within the next 6 hours.

   b. With two containment cooling trains inoperable, enter LCO 3.0.3 immediately

Op Test No.:	1	Scenario #	1	Event #	5	Page	8 of 22
Event Description:	Letdown flow controller HIC-1110 goes to maximum flow						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger EVENT 5, letdown flow controller HIC-1110 when directed by examiner (HIC-1110 goes to maximum flow) **Examiners NOTE: Allow pressure to recover above 2225 prior to initiating event #5.**		
Indications Available: Annunciators: • **M-5 Letdown Press High/Low** • **M-13 Letdown Flow High** • **LC-15 Letdown Relief V2345 Disch Temp High** **Letdown flow increasing to 150 gpm**		
	RO	Responds to letdown flow alarm. Recognizes letdown flow is at maximum.
		When directed places HIC-1110 in manual IAW steps 6.0.12.A.1, A.2, A.3, A.4. of **2-ONP-02.03 Charging and Letdown** (attached page 29). Manually control letdown flow to maintain Pressurizer level.
	SRO	Implements **2-ONP-02.03 Charging and Letdown** step 6.0.12 (attached page 29).
		Directs HIC-1110 placed in manual. Step 6.0.12.A.1. Directs letdown flow controlled to maintain/regain Pressurizer level.
		Contacts Shift Manager to report HIC-1110 failure and entry into **2-ONP-02.03 Charging and Letdown**
NOTE: Crew may elect to isolate letdown if letdown flow is not controlled and letdown relief continues to lift. If letdown is isolated, charging pumps are required to be stopped. Crew should re-establish charging and letdown as soon as possible with HIC-1110 in manual. It is not the intent of this scenario for the crew to need to isolate letdown, but if they should do so they will proceed as follows.		
	SRO	Directs that letdown be isolated and charging pumps secured (attached page 23).
		Directs Pressurizer level to be maintained within +/- 2% of setpoint by starting and stopping charging pump as necessary (attached page 24)

Next scenario page = 21

Op Test No.:	1	Scenario #	1	Event #	5	Page	9	of 22
Event Description:	Letdown flow controller HIC-1110 goes to maximum flow							

Time	Position	Applicant's Actions or Behavior
	SRO	Directs Charging and Letdown to be restored IAW **2-ONP-02.03 Charging and Letdown** step 6.0.11 (attached pages 25-29) (1-NOP-02.02 Charging and Letdown may also be used)
Ion exchanger bypass valve V2520 should be placed in bypass if letdown flow is not recovered in a timely manner. This is IAW annunciator response M-13.		
	RO	Isolates Letdown • CLOSE V2515, Stop Valve-IC • CLOSE V-2516, Containment Isol Valve-IC. • CLOSE V2522, Containment Isol Valve-OC. Secures all running charging pumps. (attached page 23).
		Starts and stops a charging pump as necessary to maintain Pressurizer level within +/- 2% of setpoint. (attached page 24)
		Restores Charging and Letdown IAW step 6.0.11 of **2-ONP-02.03 Charging and Letdown** (attached pages 25-29) (1-NOP-02.02 Charging and Letdown may also be used). • Ensures adequate VCT level. • Ensures Level and Pressure Control selector switches appropriately selected. • PLACES HIC-1110, Level, controller in MANUAL • ENSURE PIC-2201, Pressure controller is in AUTO and set to maintain 150 psig • PLACES the Position Limiter Bypass key switch in the BYPASS position. • ENSURES the Level Control Valves are CLOSED. • BYPASSES Letdown Ion Exchangers. • STARTS one charging pump and verify charging flow.
NOTE: If V2515 closed due to Regenerative Heat Exchanger Outlet Temp High, it may be necessary to cycle V2515 while opening the PZR Level control valve until flow is adequate to clear the high temperature alarm.		
		• VERIFIES the regenerative heat exchanger high temperature alarm M-28, SIAS R-6, or CIS P-3 alarms are NOT present. • OPENS V2515, Stop Valve-IC. • OPENS V2516, Containment Isol Valve-IC. • OPENS V2522, Containment Isol Valve- OC. • ESTABLISHES approximately 5 gpm letdown flow.

Next scenario page = 22

Op Test No.: 1	Scenario # 1	Event # 5	Page 10 of 22
Event Description:	Letdown flow controller HIC-1110 goes to maximum flow		

Time	Position	Applicant's Actions or Behavior
CAUTION: Prolonged use of charging without letdown could result in the Pressurizer going solid. Pressurizer level must be closely monitored.		
NOTE: TI-2229, Charging Temp Outlet Regen HX should NOT be allowed to increase more than 60°F per minute.		
		• RAISES letdown flow at a rate NOT to exceed 5 to 10 gpm over at least a 4 minute period. • Maintains letdown pressure at 150 psig. • Leaves HIC-1110 in manual • PLACES the Position Limiter Bypass key switch to the NORM position. • RAISES PIC-2201, Pressure, setpoint to 430 psig and maintain 430 psig. • NOTIFIES Health Physics dose rates near CVCS ion exchangers and piping may change when ion exchanger is placed in service. • PLACES the Letdown Ion Exchangers back in service.

Next scenario page = 30

6.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If letdown flow is lost, Then STOP the charging pumps.	
A. RETURN the charging pump control switches to AUTO.	

CAUTION

Severe thermal stress and flashing may occur in the Regenerative Heat Exchanger if letdown flow is NOT immediately isolated.

INSTRUCTIONS	CONTINGENCY ACTIONS
2. If charging flow is lost, Then ISOLATE letdown.	**2.1** ISOLATE Letdown by the following:
	A. CLOSE V2515, Stop Valve-IC
	B. CLOSE V-2516, Containment Isol Valve-IC.
	C. CLOSE V2522, Containment Isol Valve-OC.

NOTE

With Charging and Letdown isolated pressurizer level will lower slowly due to RCP controlled bleedoff flow.

3. If charging and letdown flow has been lost, Then MAINTAIN Reactor power and RCS temperature constant to minimize pressurizer level deviations.

4. VERIFY all applicable automatic actions have occurred. Appendix A contains a listing of expected automatic actions.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

CAUTION
Prolonged use of Charging without Letdown could result in the Pressurizer exceeding the Technical Specification limit of 68%. Pressurizer level must be closely monitored.

5. §1 MAINTAIN Pressurizer level between 27% and 68% and within 2% of setpoint as follows:

   5.1 §1 If Pressurizer level can NOT be maintained between 27% and 68%, Then BE in at least HOT STANDBY with the reactor trip breakers OPEN within 6 hours and in HOT SHUTDOWN within the following 6 hours.

   A. As Pressurizer level reduces to approximately 2% less than setpoint, START one Charging Pump.

   B. When Pressurizer level is approximately 2% greater than setpoint, THEN STOP the running Charging Pump.

   C. PLACE the previously running Charging Pump Control Switch in AUTO.

6. If charging and letdown flow has been lost, Then DETERMINE the cause.

7. If a charging system leak has occurred, Then ISOLATE the leak and refer to applicable Technical Specifications for guidance.

8. If the normal charging flow path becomes unavailable, Then REFER TO Appendix B, Alternate Charging Flow Path through A HPSI Header.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. If letdown is unavailable, Then MAINTAIN pressurizer level by temporarily cycling charging pumps.	

NOTE

§3 If one or more charging pumps have lost pumping ability, gas binding may have occurred. This can result from pumping the VCT dry (hydrogen binding) or rupture of a charging pump suction accumulator (nitrogen binding). If this occurred, the charging pumps must be vented after restoring a source of water to the suction.

INSTRUCTIONS	CONTINGENCY ACTIONS
10. If the charging pumps are gas bound, Then REFER TO Appendix C, Venting a Gas Bound Charging Pump.	
11. If charging and letdown has been lost and can be restored, Then RE-ESTABLISH charging and letdown flow as follows:	**11.**
A. ENSURE adequate VCT level is indicated.	**A.1** RESTORE the VCT to a normal level in accordance with 2-ONP-02.01, Boron Concentration Control.
B. ENSURE the Level Control Valve selector switch and the Pressure Control Valve selector switch are selected to the level and pressure control valves presently in service.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

11. (continued)

C. PLACE HIC-1110, Level, controller in MANUAL.

D. ENSURE PIC-2201, Pressure controller is in AUTO and set to maintain 150 psig.

E. PLACE the Position Limiter Bypass key switch in the BYPASS position.

F. ENSURE the Level Control Valves are CLOSED.

G. BYPASS Letdown Ion Exchangers by placing V2520 Ion Exchanger Bypass Valve to the BYPASS RESET POSITION.

H. START one charging pump

I. VERIFY charging flow is indicated.

NOTE

If V2515 closed due to Regenerative Heat Exchanger Outlet Temp High, it may be necessary to cycle V2515 while opening the PZR Level control valve until flow is adequate to clear the high temperature alarm.

J. VERIFY the regenerative heat exchanger high temperature alarm M-28, SIAS R-6 or CIS P-3 alarms are NOT present.

/R15B

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

11. (continued)

K. OPEN V2515, Stop Valve-IC.

L. OPEN V2516, Containment Isol Valve-IC.

M. OPEN V2522, Containment Isol Valve-OC.

N. SLOWLY OPEN the Level Control Valve <u>and</u> ESTABLISH approximately 5 gpm letdown flow.

CAUTION

Prolonged use of charging without letdown could result in the pressurizer going solid. Pressurizer level must be closely monitored.

NOTE

TI-2229, Charging Temp Outlet Regen HX should NOT be allowed to increase more than 60°F per minute.

INSTRUCTIONS	CONTINGENCY ACTIONS
O. <u>WHEN</u> Letdown temperature stabilizes on TIC-2221, Temp Regen Hx Tube Out, <u>Then</u> RAISE letdown flow at a rate NOT to exceed 5 to 10 gpm over at least a 4 minute period.	**O.1** <u>If</u> letdown cannot be restored, <u>Then</u> INITIATE charging as required for restoring pressurizer level, or boration.
P. ENSURE PIC-2201, Pressure controller is maintaining letdown pressure at 150 psig.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**

11. (continued)

Q. When PZR level is at its setpoint,
Then PERFORM the following:

1. BALANCE HIC-1110, LEVEL, controller AUTO to MANUAL output signals, using the BIAS control knob while previewing the AUTO signal.

2. PLACE HIC-1110, LEVEL, controller to AUTO.

3. MONITOR pressurizer level for abnormal trends.

R. PLACE the Position Limiter Bypass key switch to the NORM position.

CAUTION
V2345, LTDN CNTL VLV STATION SAFETY RELIEF, will open at 600 psig.

S. SLOWLY RAISE PIC-2201, Pressure, setpoint to 430 psig.

T. ENSURE letdown pressure is being maintained at 430 psig.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
11. (continued)	
U. NOTIFY Health Physics that dose rates near CVCS ion exchangers and piping may change when ion exchanger is placed in service.	
V. PLACE the Letdown Ion Exchangers back in service by placing V2520 Ion Exchanger Bypass Valve to the AUTO Position.	
12. If Letdown Level control is malfunctioning, Then PERFORM the following:	**12.**
A. VERIFY the output of HIC-1110, LEVEL, is responding as expected to current plant conditions.	**A.1** PLACE HIC-1110 in MANUAL by performing the following: **1.** BALANCE HIC-1110 MANUAL to AUTO controller output signals by previewing and using the MANUAL control knob to match the manual and auto controller output signals. **2.** PLACE HIC-1110 to MANUAL. **3.** ADJUST letdown flow to a value consistent with the current plant conditions. **4.** PERFORM a system walkdown observing for leaks or lifting relief valves.
B. VERIFY the selected level control valve is responding as expected to HIC-1110 output.	**B.1** PLACE the Alternate Level control valve in service in accordance with 2-NOP-02.02, Charging and Letdown.

Op Test No.:	1	Scenario #	1	Event #	6a	Page	11	of	22
Event Description:	Letdown line leak in containment (Excessive RCS leakage)								

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger EVENT 6a, Letdown line break, when directed by examiner (Excessive RCS leakage of 50 gpm)		
Indications Available: Annunciator N-46 Rx cavity leakage High		
	RO	Recognizes cavity sump level leakage recorder increasing, letdown flow lowering.
		Uses HIC-1110 to manually adjust letdown flow in attempt to maintain Pressurizer level (attached page 33).
		Closes LCV-07-11A or LCV-07-11B (to isolate sump from pumping to the EDT) when directed (attached page 35).
		Starts additional charging pumps as necessary and when directed.
		Closes letdown isolation valves V2515, V2516, V2524 when directed.
		Recognizes and announces entry into DNB Tech Spec (3.2.5).
	SRO	Implements **2-0120031 Excessive Reactor Coolant System leakage**. Directs LCV-07-11A or LCV-07-11B closed IAW step 7.2.2.K (attached page 32-36).
		NOTE: IF TIME PERMITS, may enter T.S. action statement for RCS leakage >1 gpm. (T.S. 3.4.6.2, reduce leakage within 4 hours) and may contact shift manager to report entry into **2-0120031 Excessive Reactor Coolant System leakage** step 7.2.2.O (attached page 36).
		Direct termination of up power if not previously done
		NOTE: SRO should state DNB T.S. entered when Pressurizer pressure reaches 2225 psia.

Next scenario page = 37

Op Test No.: 1 Scenario # 1 Event # 6a Page 12 of 22

Event Description: Letdown line leak in containment (Excessive RCS leakage)

Time	Position	Applicant's Actions or Behavior
	SRO	Directs starting additional charging pumps and isolating letdown as necessary to maintain Pressurizer level.
		Evaluates source of leakage and determines approximate leak rate
		Determines plant shutdown is required and conducts crew brief.

Next scenario page = 37

7.0 OPERATOR ACTIONS

7.1 Immediate Operator Actions

1. None

7.2 Subsequent Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If in Modes 1 thru 3 and SIAS is NOT blocked, Then go to step 2.	
If in Modes 3 thru Mode 6 and SIAS is blocked, Then go to step 3.	
2. ACTIONS WHEN IN MODES 1 THRU MODE 3 (SIAS NOT BLOCKED)	
A. If RCS leakage is indicated, Then analyze the information available and determine as accurately as possible the magnitude and seriousness of the leak.	
B. If at any time RCS leakage exceeds the capacity of the charging pumps and pressurizer level cannot be maintained, Then:	
1. In Modes 1 and 2, trip the reactor and turbine and perform 2-EOP-01, Standard Post Trip Actions.	
2. If in Mode 3 (SIAS is NOT Blocked), Then enter 2-EOP-03, Loss of Coolant Accident.	
C. If the containment CIS radiation monitors exceed the present alarm point level, Then ensure containment isolation signal is actuated.	C. Manually actuate CIAS.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS

2. (continued)

D. If pressurizer PORV or safety valve leakage is indicated, Then ensure ONOP 2-0120036, Pressurizer Relief / Safety Valve, has been implemented.

NOTE
RCV-14-1 CCW Surge Tank Vent, will align to the Chemical Drain Tank on high CCW activity.

E. If a CCW high activity alarm is received, Then refer to 2-ONP-14.02, Component Cooling Water Excessive Activity.

F. Ensure charging and letdown is automatically controlling pressurizer level.

G. Ψ If plant conditions permit, Then determine the primary leak rate, per 2-OSP-01.03, Reactor Coolant System Inventory Balance.

CONTINGENCY ACTIONS

2. (continued)

F. Manually control charging and letdown as required to maintain pressurizer level.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

2. (continued)

NOTE

- Pressure Boundary Leakage - is defined as leakage from any pressure containing components of the Reactor Coolant System, such as pressure vessels, piping, pumps and valves (Not Seat Leakage), which are:
  - a. Part of the RCS, or
  - b. Connected to the RCS, up to and including any and all of the following:
    1. The outermost containment isolation valve in system piping which penetrates primary reactor containment,
    2. The second of two valves normally closed during normal reactor operation in system piping which does not penetrate containment,
    3. The RCS safety and relief valves.
- Isolable – (as defined in EPIP-01), personnel must be able to promptly close valve(s) which isolates the leak within the context of initial operator actions*.

  * Initial Operator Actions are actions taken within:
  - 15 minutes (Control Room)
  - 30 minutes (local/field)

H. Initiate the emergency plan if necessary, in accordance with EPIP-01, Classification of Emergencies.

I. §1 If an increase in unidentified leakage has occurred that is less than Technical Specification limit (1 GPM), Then refer to Appendix A.

J. After determining the magnitude of the leak, continue to evaluate all available information to identify leakage source.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)

> **NOTE**
> When using the Reactor Cavity Sump Level instrument (LIS-07-6) on RTGB-205, 1" is approximately equal to 46 gallons.

K. If leak appears to be inside containment as indicated by an increase in cavity sump level, Then close LCV-07-11A or LCV-07-11B to isolate sump from pumping to the EDT.

L. If leak appears to be outside containment, Then consider the following:

1. Local sample valve isolation, refer to Appendix B.
2. Isolating letdown.
3. Isolating RCS sample lines: V5200 thru V5205.
4. Inspect charging pumps for increased seal leakage.

M. If charging pump seal leakage is the suspected source of leakage, Then perform Appendix C, Charging Pump Local Seal Leakage Determination, while continuing.

INSTRUCTIONS	CONTINGENCY ACTIONS
N. Monitor secondary radiation levels for increasing trends on the condenser air ejector, blowdown and main steamline monitors.	N. If secondary radiation levels are increasing. Then refer to ONOP 2-0830030, Steam Generator Tube Leak.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	
O. Refer to Technical Specifications to ensure compliance with all applicable actions.	
P. Evaluate the need to perform a plant shutdown and / or cooldown.	
Q. If a plant shutdown is desired, Then perform a plant shutdown per 2-GOP-123, Turbine Shutdown - Full Load to Zero Load.	
R. If a plant cooldown is desired, Then perform a plant cooldown per 2-GOP-305, Reactor Plant Cooldown - Hot Standby to Cold Shutdown.	
3. ACTIONS WHEN IN MODES 3 (SIAS BLOCKED) THRU MODE 6	**3.**

NOTE

If conditions continue to degrade or this procedure is NOT succeeding in stabilizing plant conditions, then the Low Mode Off-Normal Procedure (LMONP) for the current plant condition should be implemented.

INSTRUCTIONS	CONTINGENCY ACTIONS
A. Perform safety function status check per Low Mode Off-Normal Procedure, Appendix A, for the current plant condition every 15 minutes until exit conditions are met.	
B. If the containment CIS radiation monitors exceed the present alarm point level, Then ensure containment isolation signal is actuated.	**B.** Manually actuate CIAS.

Op Test No.: 1	Scenario # 1	Event # 6b		Page 13	of 22		

Event Description: Letdown line leak in containment (SBLOCA)

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger EVENT 6b, Letdown line break when directed by examiner (SBLOCA of 150 gpm)		
Indications Available:		
	SRO	Directs isolating letdown (if not already done)
		Directs manual Reactor trip when Pressurizer level cannot be maintained IAW **2-0120031 Excessive Reactor Coolant System leakage** step 7.2.2.B.1 (attached page 32).
	RO	Closes letdown isolation valves V2515, V2516, V2524 when directed (if not already done).
		Trips the reactor when directed (attached page 32).

Next scenario page = 38

Op Test No.: 1 Scenario # 1 Event # 7,8	Page 14 of 22
Event Description:	Upon trip, 2A MFW trips on low flow due to its recirc valve (FCV-09-1A2) failing to open. MV-09-11 2C AFW to 2A SG does not open. MV-09-12 2C AFW to 2B SG opens 30% then loses power (fails as is). B side electrical does not swap to SU transformers. 2B Diesel does not automatically start.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Examiners Note: 2A MFW pump trips on low flow due to recirc valve FCV-09-1A2 not opening.		
Indications Available: No lockout alarms.		
	SRO **Critical Task**	Directs BOP to make one attempt to start the 2B (attached page 56)
		Directs implementation of 2-EOP-01, Standard Post Trip Actions: • RO: Reactivity control, Inventory Control, Pressure Control, Core Heat Removal • BOP: Vital Auxiliaries, RCS Heat removal, Containment Conditions
		Contacts STA to report to the control room to assist with the event.
	BOP	Closes MSR block valves. (Reheat panel reset pushbutton must be depressed due to loss of power to two MSR block valves)
		Recognizes 2B Diesel Generator did not start and that there is no lockout alarm.
	Critical Task	Starts the 2B D/G. Confirms D/G parameters (voltage, amperes, frequency) normal, DG breaker closes, the 2B3 bus energizes, and loads sequence onto the 2B3 Bus as expected. (attached page 56)
		Notify NPO to perform Appendix X section 1 of EOP-99.
		Performs EOP-01 Safety functions as directed for: Maint of Vital Auxiliaries RCS Heat Removal, Containment Conditions

Next scenario page = 39

Op Test No.:	1	Scenario #	1	Event #	7,8	Page	15 of 22

Event Description: Upon trip, 2A MFW trips on low flow due to its recirc valve (FCV-09-1A2) failing to open. MV-09-11 2C AFW to 2A SG does not open. MV-09-12 2C AFW to 2B SG opens 30% then loses power (fails as is). B side electrical does not swap to SU transformers. 2B Diesel does not automatically start.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	Maintenance of Vital Auxiliaries • Verifies turbine governor and throttle valves closed • Verify GEN Brk open (East breaker, Mid Breaker and Exciter Breaker) • Verify all vital and non vital AC Buses energized. (2A1, 2A2, 2A3 2AB, 2B1, 2B2 and 2B3 6.9 and 4.16kv buses) NOTE: 2B1 and 2B2 will not be energized due to SU transformer not swapping on trip. • All vital and non vital DC Buses energized.
		RCS Heat Removal • Verify at least one SG has feedwater available • Verify RCS Tavg is between 525 and 535° F • Verify SBCS valves controls Tavg. • Close MSIV at 750 psia. • Close Spillover Bypass valve MV-08-814 (unable to be closed due to loss of power)
		Containment Conditions • Verify containment pressure <2 psig • Verify NO containment radiation monitors in alarm • Verify containment temperature is less than 120° F • Verify NO secondary plant radiation alarms
	RO	Performs EOP-01 Safety Functions as directed for Reactivity Control, Inventory Control, Pressure Control, Core Heat removal

Next scenario page = 40

Op Test No.:	1	Scenario #	1	Event #	7,8	Page	16	of 22

Event Description: Upon trip, 2A MFW trips on low flow due to its recirc valve (FCV-09-1A2) failing to open. MV-09-11 2C AFW to 2A SG does not open. MV-09-12 2C AFW to 2B SG opens 30% then loses power (fails as is). B side electrical does not swap to SU transformers. 2B Diesel does not automatically start.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available: **Examiners note: Due to the small leak SIAS will not actuate until the crew enters 2-EOP-03 and starts a cooldown.**		
	RO	Reactivity Control • Verify Reactor power is lowering. • Verify startup rate is negative. • Verify a maximum of one CEA is not fully inserted.
		Inventory Control • Verify Pressurizer level is between 10 and 68% • Pressurizer level is trending to 30 – 35% (not trending due to letdown leak)
		Pressure Control • Verify RCS pressure is between 1800-2300 psia (at 1736 psia verify SIAS and stop RCP in each loop) • Verify RCS pressure is trending 2225-2275 psia (control manually) • Verify RCS subcooling is >20° F
		Core Heat Removal • Verify at least one RCP running with CCW (if >10 minutes. With no CCW must secure RCP's) • Verify loop delta T is <10° F
	SRO	Performs EOP-01 Diagnostic Flow Chart step 4.0.9.A

Next scenario page = 41

Op Test No.:	1	Scenario #	1	Event #	9	Page	17 of 22

Event Description: AFAS actuation. MV-09-12-2C 2C AFW pump to 2B SG partially opens to 70 gpm flow. 2B AFW pump does not start.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available: **Examiners note: Due to the small leak SIAS will not actuate until the crew enters 2-EOP-03 and starts a cooldown.**		
	SRO	Implement 2-EOP-03, "Loss of Coolant Accident"
		• Directs BOP to perform SFSC's
		• Contact SM to classify the event
		• When SIAS, direct Appendix A EOP-99 Sampling SG's be re-performed. (attached page 42-43).
		• Ensure SIAS flow adequate per Figure 2 SI flow Vs. RCS pressure. (due to high RCS pressure, ECCS flow will not occur until later in the event) (attached page 44)
		• When SIAS. direct CCW restored to RCP's per Appendix J 2-EOP-99 within 10 minutes or stop the running RCP's.(attached pages 45-46)
		• Directs RO to isolate letdown (if not already done)
		• Direct establishing alternate RCP bleedoff flowpath to the RCP's by opening V2507, RCP Bleedoff Relief Stop Vlv.
		• Directs BOP to place Hydrogen Analyzer in service per Appendix L (attached pages 47-48)
		• Direct RO to perform RCS cooldown not to exceed 100°F in any one hour using ADVs.

Next scenario page = 49

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 1 of 2)

A Train (√) B Train (√)

☐ 1. If a LOOP has occurred,
Then PERFORM **BOTH** of the following:

☐ A. ENSURE 2AB 480V Load Center is aligned to an energized bus.

☐ B. DISPATCH an operator to restore Instrument Air. **REFER TO** Appendix H, Operation of the 2A and 2B Instrument Air Compressors.

CAUTION

Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

NOTE

- HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open
- When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset

☐ 2. If SIAS has closed the 'N' Header valves,
Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

	A Train (√)	B Train (√)
• HCV-14-8A	___	
• HCV-14-9	___	
OR		
• HCV-14-8B		___
• HCV-14-10		___

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 2 of 2)

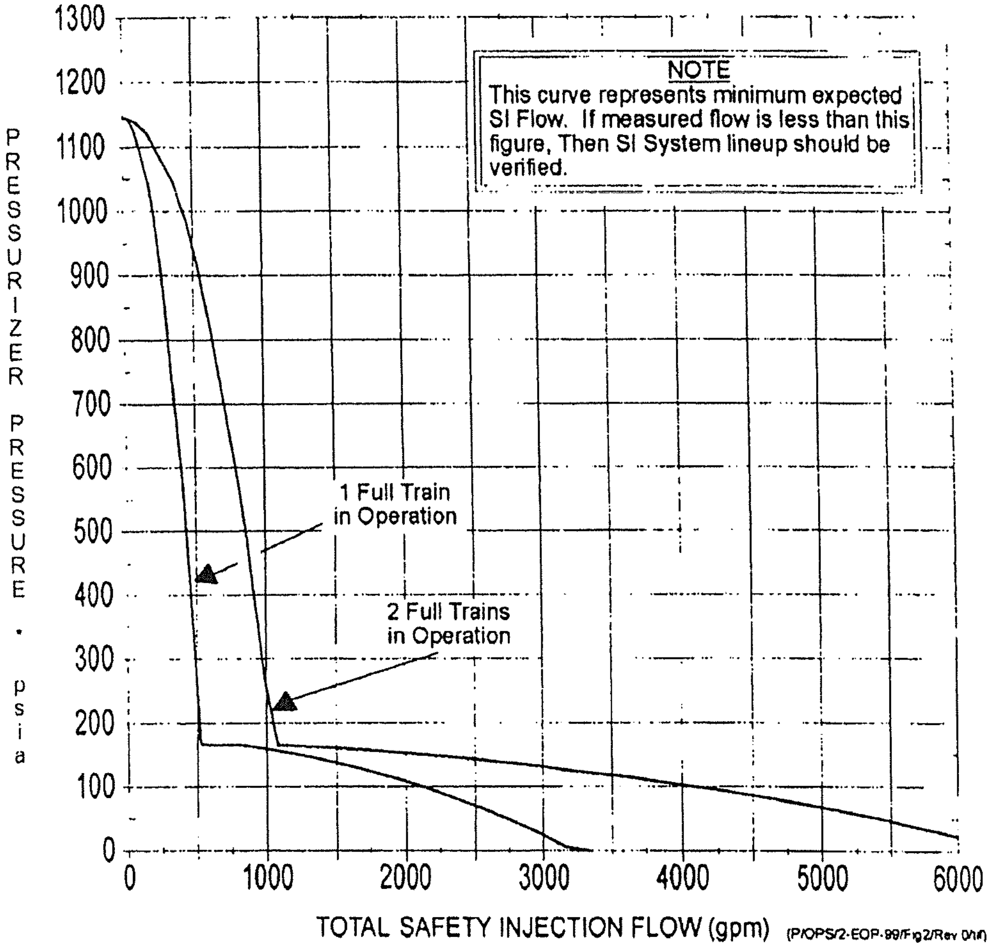
☐ **3.** If CIAS or high radiation has closed the SGBD Sample Valves, Then OPEN FCV-23-7 and FCV-23-9 by PLACING the control switch to CLOSE / OVERRIDE and then to OPEN.

☐ **4.** DIRECT Chemistry to perform S/G samples for activity and boron.

☐ **5.** If S/Gs cannot be sampled, Then DIRECT Health Physics to conduct secondary plant local area radiation surveys.

END OF APPENDIX A

FIGURE 2
SAFETY INJECTION FLOW VS. RCS PRESSURE
(Page 1 of 1)



APPENDIX J

RESTORATION OF CCW AND CBO TO THE RCPs

(Page 1 of 2)

☐ 1. ENSURE Instrument Air to Containment is available by PLACING HCV-18-1 to CLOSE / OVERRIDE and then to OPEN.

CAUTION

Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

NOTE

- HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open.
- When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset.

☐ 2. If SIAS has closed the 'N' Header valves,
Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

- HCV-14-8A 'N' Hdr Isol Discharge ___
- HCV-14-9 'N' Hdr Isol Suction ___

OR

- HCV-14-8B 'N' Hdr Isol Discharge ___
- HCV-14-10 'N' Hdr Isol Suction ___

☐ 3. ALIGN CCW to / from the RCPs by OPENING **ALL** of the following valves:

☐ HCV-14-1, CCW To RC PUMP

☐ HCV-14-2, CCW From RC PUMP

☐ HCV-14-7, CCW To RC PUMP

☐ HCV-14-6, CCW From RC PUMP

☐ 4. If CIAS has isolated controlled bleedoff flow to the VCT,
Then OPEN V2507, RCP Bleedoff Relief Stop Vlv.

APPENDIX J
RESTORATION OF CCW AND CBO TO THE RCPs
(Page 2 of 2)

CAUTION

RCP Seal Cooler isolation valves automatically close on high Seal Cooler outlet temperature of 200°F. Maintaining the control switch in the OPEN position will override this function. CCW radiation monitors should be closely monitored for indication of RCS to CCW leakage should conditions warrant the valve(s) to be maintained in the open position. Consideration should be given to returning the control switch(es) to the AUTO position once the valves have been opened.

☐ 5. ENSURE **ALL** RCP Seal Cooler Isolation valves are OPEN:

- ☐ HCV-14-11-A1, CCW From 2A1 RCP Seal Cooler
- ☐ HCV-14-11-A2, CCW From 2A2 RCP Seal Cooler
- ☐ HCV-14-11-B1, CCW From 2B1 RCP Seal Cooler
- ☐ HCV-14-11-B2, CCW From 2B2 RCP Seal Cooler

☐ 6. VERIFY RCP CCW related alarms are CLEAR or have been evaluated and dispositioned.

END OF APPENDIX J

APPENDIX L

PLACING HYDROGEN ANALYZER IN SERVICE

(Page 1 of 2)

	A Train (√)	B Train (√)
1. SELECT **ONE** sample point by PLACING the sample valve selector switch in the desired position.	FSE-27-8___ (Upper Cntmt. Dome)	FSE-27-12___ (Lwr. Cntmt.)
	FSE-27-9___ (Pzr. Area)	FSE-27-13___ (2B2 RCP)
	FSE-27-10___ (2A1 RCP)	FSE-27-14___ (2B1 RCP)
	FSE-27-11___ (2A2 RCP)	
2. OPEN the Containment Isolation Valves.	FSE-27-15___	FSE-27-17___
	(Sample in to H2 Analyzer)	
	AND	
	FSE-27-16___	FSE-27-18___
	(Sample out of H2 Analyzer)	
3. ENSURE the function selector switch is in the SAMPLE position.	___	___
4. PLACE the OFF / STANDBY / ANALYZE switch to ANALYZE.	___	___

NOTE

If power is interrupted and then restored to an in-service Hydrogen Analyzer (such as after an ESFAS or Undervoltage Relay actuation) the remote control selector pushbutton must be depressed to allow for continued operation of the analyzer from the Control Room.

	A Train (√)	B Train (√)
5. DEPRESS the remote control selector pushbutton.	___	___
6. VERIFY the red sample light energizes.	___	___

APPENDIX L

PLACING HYDROGEN ANALYZER IN SERVICE

(Page 2 of 2)

	A Train (√)	B Train (√)
7. START the Hydrogen Analyzer Recorder. (switch located inside recorder)	___	___
8. Allow five to ten minutes for the Hydrogen Analyzer to stabilize as indicated by the (%) indication leveling off.	___	___

END OF APPENDIX L

Op Test No.: 1	Scenario # 1	Event # 9	Page 18 of 22
Event Description:	AFAS actuation. MV-09-12-2C 2C AFW pump to 2B SG partially opens to 70 gpm flow. 2B AFW pump does not start.		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	SRO **Critical Task**	Direct starting 2B AFW pump when identified no start on AFAS. (attached page 56)
	SRO	May elect to feed 2A SG AND 2B SG by cross tying 2B AFW pump. This should be done IAW **2-ONP-09.02 Auxiliary Feedwater** Appendix C step 2. (attached page 50-51)
	RO	Closes letdown isolation valves V2515, V2516, V2524 when directed. (if not already done)
Examiners Note: Step 14A of EOP-3.0 is N/A because there is no LOOP		
		Perform cooldown using ADVs not to exceed 100°F in any one hour to regain subcooling (OPS Policy 542).
		Monitor subcooling per Figure 1A RCS pressure Temperature (attached page 52)
	RO/BOP **Critical Task**	Identifies 2B AFW pump did not start upon AFAS actuation. Start 2B AFW pump when directed. (attached page 56)
	BOP	When SIAS, restore CCW to RCP's per Appendix J 2-EOP-99 within 10 minutes or stop the running RCP's. (attached pages 45-46)
Examiners Note: A possible new Critical Task may be created by the crew if 10 minutes elapses before CCW is restore by Appendix J.		
		When directed establish alternate RCP bleedoff flowpath to the RCP's by opening V2507, RCP Bleedoff Relief Stop Vlv.

Next scenario page = 54

APPENDIX C
CROSS-CONNECTING AFW
(Page 2 of 4)

1. (continued) INITIAL

H. When the system is to be returned to normal, Then PERFORM the following:

1. CLOSE MV-09-10, Pump 2B Disch To SG 2B Valve. ______
2. If 2A S/G is being fed, Then CLOSE MV-09-9, Pump 2A Disch To SG 2A Valve. ______
3. STOP Auxiliary Feedwater Pump 2A. ______
4. CLOSE SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83. ______
5. Locally CLOSE MV-09-13, 2A To 2B AFW Hdr Cross-tie. ______ NPO
6. Locally CLOSE MV-09-14, 2B To 2A AFW Hdr Cross-tie. ______ NPO
7. PERFORM Independent Verification of the following:

COMPONENT	POSITION	IV INITIAL
MV-09-9, Pump 2A Disch To SG 2A Valve	CLOSED	
MV-09-10, Pump 2B Disch To SG 2B Valve	CLOSED	
SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83	CLOSED	
MV-09-13, 2A To 2B AFW Hdr Cross-tie	CLOSED	
MV-09-14, 2B To 2A AFW Hdr Cross-tie	CLOSED	

NOTE
If cross-tying AFW in Modes 1 - 3, Then the motor driven pump not being used to supply SGs must be declared out-of-service per the applicable Tech. Spec.

2. If 2B AFW Pump is to feed 2A S/G, Then PERFORM the following:

A. ENSURE MV-09-9, Pump 2A Disch to 2A S/G Valve, is CLOSED. ______

B. START Auxiliary Feedwater Pump 2B. ______

C. OPEN SE-09-3, 2B Pump Disch To 2B S/G Vlv Key 84.

APPENDIX C
CROSS-CONNECTING AFW
(Page 3 of 4)

2. (continued) INITIAL

> **CAUTION**
> Opening both MV-09-13 and MV-09-14 while the unit is in Mode 1, 2, 3 could make two independent AFW pump both inoperable.

> **NOTE**
> Key-switches for MV-09-13 and MV-09-14 are located in 2A/2B AFW Pump Room. Two keys are required since the keys are removable in CLOSE only.

D. Locally OPEN MV-09-13, 2A To 2B AFW Hdr Cross-tie. ______ NPO

E. Locally OPEN MV-09-14, 2B To 2A AFW Hdr Cross-tie. ______ NPO

> **CAUTION**
> Ensure total pump flow does not exceed 425 gpm.

F. THROTTLE MV-09-9, Pump 2A Disch To SG 2A Valve, to establish desired flow rate.

> **NOTE**
> While feeding both S/Gs indicated flow is pump flow to both S/Gs.

G. To feed the 2B S/G, THROTTLE MV-09-10, Pump 2B Disch To SG 2B Valve, to establish desired flow rate.

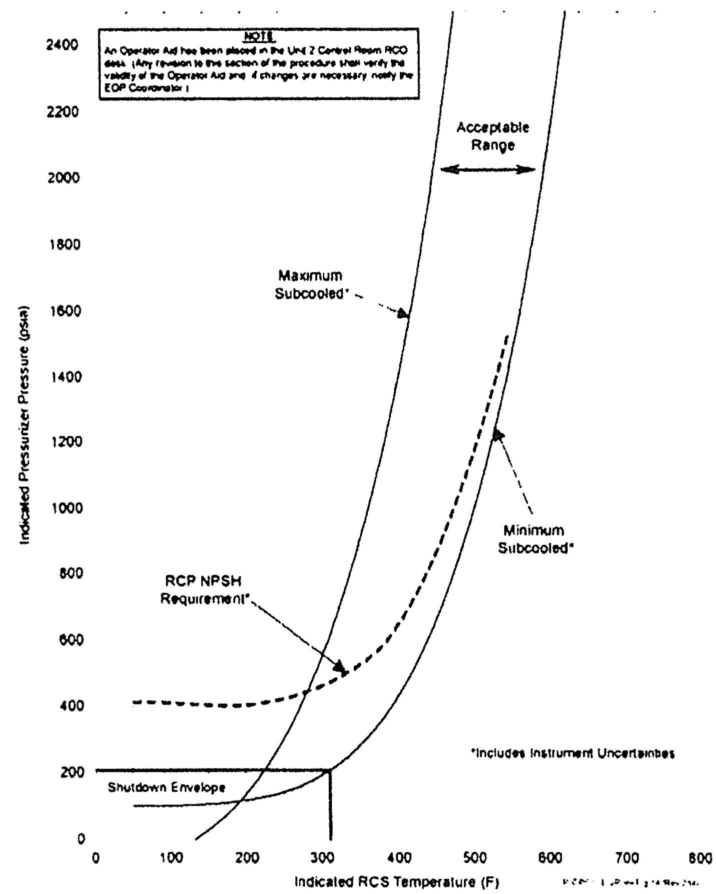
H. When the system is to be returned to normal, Then PERFORM the following:

1. CLOSE MV-09-9, Pump 2A Disch To SG 2A Valve. ______
2. If 2B S/G is being fed, Then CLOSE MV-09-10, Pump 2B Disch To SG 2B Valve. ______
3. STOP Auxiliary Feedwater Pump 2B. ______
4. CLOSE SE-09-3, 2B Pump Disch To 2B S/G Vlv Key 84. ______

FIGURE 1A
RCS PRESSURE TEMPERATURE
(Page 1 of 1)

(Containment Temperature Less Than or Equal to 200°F)

CAUTION
The RCP NPSH curve assumes one pump is operating in each loop. RCP instrumentation should be monitored for seal and pump performance in accordance with 2-EOP-99, Table 13.



RCS Pressure Range	Required QSPDS Subcooled Margin Reading (Rep CET)
2250 psia to 1000 psia	40 to 180°F
1000 psia to 500 psia	50 to 170°F
Less than 500 psia	80 to 160°F

Op Test No.: 1 Scenario # 1 Event # 9 Page 19 of 22

Event Description: AFAS actuation. MV-09-12-2C 2C AFW pump to 2B SG partially opens to 70 gpm flow. 2B AFW pump does not start.

Time	Position	Applicant's Actions or Behavior
	BOP	Places the hydrogen analyzer in service per Appendix L of 2-EOP-99 (attached pages 47-48)
		Compares SI flow to RCS press, Figure 2.(attached page 44)
		Perform Appendix A sampling SG's (attached page 42-43)
		When (if) directed contact NPO to open MV-09-13 and MV-09-14 IAW Appendix C of **2-ONP-09.02 Auxiliary Feedwater** step 2.D and 2.E (attached page 51) to feed 2A AND 2B SG.
		Suggested termination point: • RCS Cooldown progressing ≤100°F per hour • 2A and / or 2B SG is being fed by 2B AFW pump and level is being restored.

Next scenario page = 54

OPERATIONS SHIFT TURNOVER REPORT

UNIT 2 CONTROL ROOM **Day: Today**

Desk RCO: **Board RCO:**

Protected Train: **A**

Unit 2 Identified RCS Leakage: **0** **Unit 2 Unidentified RCS Leakage: 0**

Unit 2 Scheduled Activities per the OSP:

Unit was down powered to 45% due to an oil leak on the 2B Main Feedwater Pump. Oil leak has been repaired and the 2B Main Feedwater Pump was just started. 2A AFW pump has been OOS for four hours, expected to be returned to service in one hour. The crew is to perform an up power to 100%. The crew is to begin the up power at step 6.132 of 2-GOP-201. Reactor Engineering has provided guidance on rate of power increase in accordance with the attached RE letter.

Upcoming ECOs to Hang or Release:

2A AFW pump, clear ECO when work complete.

Tech Spec Action Statement:

None.

OPS 513's:

None

Locked in Annunciators:

G-28 – 2A AFW Pump OVRLD/Trip

M-24 – 2C Charging Pump Suct Press Low/OVRLD/Trip

Current Status:

45% power, Xenon building in, 6 gpm dilution rate. MOL.

Equipment Problems:

2C Charging Pump OOS for repack. 2A AFW Pump OOS to repair oil leak.

RE Letter

Critical Task Evaluation Sheet

Critical Task	Acceptance Criteria
Start 2B Emergency Diesel Generator	BOP starts 2B D/G. Observes 2B D/G voltage, amperes, and frequency are normal, the diesel generator breaker closes, Bus 2B3 energizes, and loads sequence onto the 2B3 Bus as expected. If this task is not accomplished, it will result in creating an unnecessary Station Blackout. The failure of this critical task would be the point of entry into EOP-10, Station Blackout.
Establish Feedwater to 2A or 2B SG	RO/BOP places the 2B AFW pump control switch to the start position. Verifies red light ON & green light OFF, normal pump start & run current, and normal discharge flow to either or both Steam Generators. If this task is not accomplished it will eventually result in loss of heat sink. The failure of this critical task would be if the pump has not been started by the end of Completing the RCS Heat Removal SFSC in EOP-3.0.

Facility: St. Lucie		Scenario No.: 2	Op Test No.: HLC-19 NRC
Examiners:		Operators:	SRO:
			RO:
			BOP:

Initial Conditions: 100% power 2C Charging Pump OOS for repack. 2A AFW Pump OOS to repair oil leak.

Turnover: 100% power. 2A Heater Drain Pump has a severe shaft seal leak and must be removed from service. Perform down power to remove 2A Heater Drain Pump from service.

Critical Tasks:

- Close 2B MSIV.
- Stop one RCP when T_{cold} < 500°F
- Terminate AFW flow to 2B S/G. (Isolate 2B S/G)

Event No.	Malf. No.	Event Type*	Event Description
1		R / RO & SRO N / BOP	Unit down power to remove 2A Heater Drain Pump from service.
2	1	C / RO	Boric Acid Flow Control Valve FCV-2210Y fails closed
3	2	T.S. SRO	2A Charging Pump trips on low oil pressure
4	3	C / BOP	2A DEH Pump Failure / 2B does not auto start
5	4	T.S. / SRO N/BOP	Containment Pressure PT-07-2A fails high
6	5	M / All	Steam Leak in Containment on 2B S/G
7	6	C/ RO	2B MSIV fails to close on MSIS
8	7	C / BOP	AFAS lockout fails to stop feeding 2B SG from 2B AFW pump
9			Isolate 2B S/G

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

St. Lucie

Unit is at 100% power with 2A AFW pump OOS to repair an oil leak. It is expected to be back in service within one hour. The 2C Charging pump is out of service for repack.

The 2A Heater Drain Pump has a severe shaft seal leak and must be removed from service. The crew will perform a down power to approximately 90% to remove the pump from service.

Boric Acid flow control valve FCV-2210Y fails closed and cannot be opened. The crew will implement the Off Normal procedure and use the emergency borate valve to continue the down power.

During the down power the 2A Charging pump will trip on low oil pressure. The SRO will need to make a T.S. 3.1.2.4 & 3.5.2 a2 calls due to one Charging pump operable. If the crew has not started the 2B Charging pump for the down power, procedure requires letdown to be isolated. Charging and Letdown ONP should be implemented and Charging and letdown should be placed back in service if secured. If 2B Charging pump was started prior to the loss of 2A Charging pump, letdown bias will need to be adjusted to maintain Pressurizer level on setpoint.

As the down power progresses the 2A DEH pump trips. The 2B DEH pump does not automatically start and should be manually started.

Containment Pressure PT-07-2B fails high. The SRO should refer to T.S. 3.3.1 and 3.3.2 and implement ONP for loss of Tech. Spec. Instrumentation.

A major steam leak in the Containment will develop. The crew should manually trip the Unit prior to any automatic trip. As the leak progresses and a MSIS is received the 2B MSIV does not close. The MSIV can be closed manually from the Control Room.

AFAS lockout will occur but the 2B AFW pump will continue to feed the faulted S/G through MV-09-10 (which will not close). The crew should stop the 2B AFW pump to terminate flow to the 2B S/G.

2-EOP-05 Excess Steam Demand should be implemented. Termination of scenario should be when the 2B S/G is isolated IAW 2-EOP-99 Appendix R and RCS temperature and pressure are under control.

Procedures Used

- 2-GOP-123, Turbine Shutdown Full Load to Zero Load
- 2-GOP-101, Reactor Operating Guidelines During Steady State and Scheduled Load Changes
- NOP-100.02 Axial Shape Index Control
- 2-ONP-22.01, Rapid Down Power
- 2-ONP-02.01, Boron Concentration Control
- 2-ONP-02.03, Charging and Letdown
- ARP D-36 DEH PUMP OVLD
- 2-ONP-99.01, Loss of Technical Specification Instrumentation
- 2-ONP-08.01 Steam Leak Off-Normal Operating Procedure
- 2-EOP-01, Standard Post Trip Actions
- 2-EOP-05, Excess Steam Demand
- 2-EOP-99, Appendix R

Technical Specifications Entered

- 3.1.2.4 Charging Pump Operation
- 3.5.2 ECCS
- 3.3.1 RPS and 3.3.2 ESFAS

Op Test No.:	1	Scenario #	2	Event #	1	Page	3	of 19
Event Description:	Unit down power to remove 2A Heater Drain Pump from service.							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: If crew chooses 2- GOP-123, Turbine Shutdown - Full load To Zero Load, instead of 2-ONP-22.01, Rapid Down Power procedure then inform SRO the 2A Heater Drain Pump shaft seal leak is getting worse. The pump needs to be stopped ASAP		
Booth Operator Response: Control Room Indications Available:		
	SRO	Supervise/Coordinates Power reduction in accordance with **2-ONP-22.01 Rapid Down Power**. (attached pages *5-20*)
		Directs RO to borate as necessary per Appendix C **2-ONP-22.01 Rapid Down Power.**
		Directs RO to insert of 6 inches Lead group CEA step 6.1.2.
		Directs RO to program DEH for load rate, step 6.1.3.
		When T-ave decrease noted directs GO on the turbine step 6.1.4.
		May direct RO to start additional Charging pump IAW **2-ONP-22.01 'Rapid Downpower'** Appendix D (attached page *18*)
		May direct RO to place Pzr. on recirc IAW **2-ONP-22.01 'Rapid Downpower' Appendix E**. (attached page *19*)

Next scenario page = 4

Op Test No.: 1	Scenario # 2	Event # 1	Page 4 of 19	
Event Description:	Unit down power to remove 2A Heater Drain Pump from service.			

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response:		
Control Room Indications Available:		
	RO	Begins Boration per **Appendix C, ONP-22.01** (attached page *17*)
		Inserts Lead CEA Group 6 inches. • Select MANUAL SEQUENTIAL. • Insert CEAs by taking IN/HOLD/OUT switch to insert.
		If directed starts additional Charging pump IAW **2-ONP-22.01 'Rapid Downpower' Appendix D**. (attached page *18*). Notifies HP that an additional charging pump has been started.
		If directed, places Pzr. On recirc. IAW **2-ONP-22.01 'Rapid Downpower' Appendix E**. (attached page *19*)
	BOP	Programs the DEH per ONP-22.01 step 6.1.3 for the desired load reduction rate. • Set reference by ensuring REF selected and then depress desired MW endpoint, hit ENTER. • Depress LOAD RATE type in desired load rate and hit ENTER. • Depress GO pushbutton.
		Notifies Plant Dispatcher.
		When T-ave decrease is noted, starts Turbine down power per ONP-22.01 step 6.1.4.

Next scenario page = 21

6.0 OPERATOR ACTIONS

6.1 Immediate Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE
This Procedure may contain steps that could adversely affect reactivity. ENSURE that proper consideration and appropriate briefings occur prior to performance of steps that could challenge reactivity.

1. BEGIN boration per Appendix C.
2. INSERT the Lead CEA Group approximately 6 inches to initially lower RCS temperature.
3. PERFORM the following:
   A. PROGRAM the turbine DEH for the desired load reduction rate.
   B. SET DEMAND / REF to desired power level.

NOTE
While performing power maneuvers during which time Tavg and Tref are closely monitored, it may be advantageous to change TR-1111/1121 chart speed from 30 minutes per division to 1 minute per division.

INSTRUCTIONS	CONTINGENCY ACTIONS
4. When a T_{avg} decrease is noted, Then DEPRESS the GO pushbutton on the turbine DEH control panel.	4. If in turbine MANUAL, Then DEPRESS and RELEASE the GV LOWER pushbutton as necessary to reduce / control the load reduction rate.

END OF SECTION 6.1

6.2 Subsequent Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS
1. NOTIFY plant personnel using Gai-tronics and boost function as follows: "Attention all personnel, Unit 2 has commenced a Rapid Down-power due to ______________. " (reason)	
2. NOTIFY System of the rapid down power load reduction.	
3. REFER TO Appendix A, Rapid Down Power Conditional Actions <u>and</u> MONITOR for potential conditions during the down power. A. <u>If</u> any parameter is exceeded, <u>Then</u> NOTIFY the SM / US <u>and</u> PERFORM the required action.	
4. REFER TO Appendix B, Rapid Down Power Parameters <u>and</u> MAINTAIN parameters. A. <u>If</u> any parameter is exceeded, <u>Then</u> NOTIFY the SM / US <u>and</u> EVALUATE the problem.	
5. <u>If</u> it is desired to place additional charging pumps in service, <u>Then</u> PERFORM Appendix D, CHARGING PUMP GUIDANCE, as time permits.	
6. <u>If</u> it is desired to Place the pressurizer on recirculation, <u>Then</u> PERFORM Appendix E, PRESSURIZER RECIRCULATION GUIDELINES, as time permits.	
7. §1 CONTROL Axial Shape Index with CEAs in accordance with NOP-100.02, Axial Shape Index Control, <u>or</u> as directed by the SM / US.	

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
8. MAINTAIN T_{avg} within 6.6°F of T_{ref} using the following: • RCS Boration Rate • CEA Position • Turbine Load	8. If T_{avg} can NOT be maintained within 6.6°F of T_{ref}, Then NOTIFY the SM / US.

CAUTION

Near the end of core life, it may not be possible to stabilize reactor power due to xenon and boron concentrations.

INSTRUCTIONS	CONTINGENCY ACTIONS
9. If desired power level is reached, Then STABILIZE the unit by performing the following:	9.
A. SECURE Boration to the RCS per 2-NOP-02.24, Boron Concentration Control.	
B. ENSURE Tave and Tref are matched and PLACE turbine on Hold.	
C. MATCH Reference and Demand on Turbine Control Panel.	
D. COMMENCE a Dilution to the RCS per 2-NOP-02.24, Boron Concentration Control, that will compensate for transient Xenon effects and maintain Reactor Power as directed by SM / US.	
E. ENSURE that at least two charging pumps are operating per Appendix D.	
F. BALANCE Charging and Letdown flows.	F. If letdown is isolated, Then OPERATE charging pumps as needed to control Pressurizer level.
G. ENSURE the pressurizer is on recirculation per Appendix E.	
H. CONTACT Reactor Engineering for specific guidance on Axial Shape Index Control	

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
10. When power level is approximately 45%, Then PERFORM the following:	10.
A. STOP one Main Feed Pump.	
B. ENSURE Steam Generator levels are maintained between 55% and 75% narrow range level.	B. If the Steam Generator levels can NOT be maintained between 55% and 75% narrow range level, Then RESTART the Main Feed Pump and evaluate the problem.
C. ENSURE Main Feed Pump suction pressure is stable at greater than 400 psig.	
11. When power level is approximately 40%, Then PERFORM the following:	11.
A. STOP the Condensate Pump on the same electrical train as the secured Main Feed Pump.	
B. ENSURE Main Feed Pump suction pressure is stable at greater than 400 psig.	B. If the Main Feed Pump suction pressure can NOT be maintained stable at greater than 400 psig, Then RESTART the Condensate Pump and evaluate the problem.
12. ENSURE FCV-12-1, Condensate Hdr Recirc to Condsr, operates to maintain greater than 10,000 gpm condensate flow.	

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS		CONTINGENCY ACTIONS	
13.	When power level is approximately 35%, Then PERFORM the following:	13.	
A.	OPEN V38238, Demin Wtr to 2A Htr Drain Pump Gland Quench Seal Isol.		
B.	STOP 2A Heater Drain Pump.		
C.	ENSURE Main Feed Pump suction pressure is stable at greater than 400 psig.	C.	If Main Feed Pump suction pressure can NOT be maintained stable at greater than 400 psig, Then RESTART 2A Heater Drain Pump and evaluate the problem.
14.	When power level is approximately 35%, Then PERFORM the following:	14.	
A.	OPEN V38239, Demin Wtr to 2B Htr Drain Pump Gland Quench Seal Isol.		
B.	STOP 2B Heater Drain Pump.		
C.	ENSURE Main Feed Pump suction pressure is stable at greater than 400 psig.	C.	If the Main Feed Pump suction pressure can NOT be maintained stable at greater than 400 psig, Then RESTART 2B Heater Drain Pump and evaluate the problem.

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

WHEN using Reheat **CONTROL** Panel, all four 8" steam valves go closed immediately WHEN Rheostat is moved counterclockwise.

15. When power level is less than 30% and both Heater Drain Pumps are stopped, Then REMOVE the MSRs from service as follows:

    A. CLOSE MSR TCVs using the MSR Reheat Control panel.

    B. CLOSE MV-08-4 and MV-08-10 (A and C MSR block valves).

    C. CLOSE MV-08-8 and MV-08-06 (B and D MSR block valves).

16. When power is approximately 25%, Then TRANSFER station electrical loads from the Auxiliary Transformers to the Startup Transformer by performing the following:

    A. INSERT Sync Plug.

    B. ROTATE to appropriate ST position.

    C. VERIFY SYN-888 is stationary at the 12 o'clock position.

    D. VERIFY incoming and running voltages are matched.

    E. CLOSE the appropriate start-up transformer.

    F. Green FLAG the associated Auxiliary Transformer Breaker.

    G. REMOVE Sync Plug.

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
17. When power is approximately 25%, Then PLACE the running Main Feed Pump in the RECIRC position and ENSURE the following:	17. If the Main Feed Pump suction pressure is NOT maintained greater than 400 psig or Steam Generator levels are NOT maintained between 55% and 75% narrow range level, Then PLACE the Main Feed Pump control switch in AUTO RECIRC and evaluate the problem.
A. Main Feed Pump suction pressure is maintained greater than 400 psig.	
B. Steam Generator levels are maintained between 55% and 75% narrow range.	

CAUTION
It is NOT desirable to trip the Reactor if Rapid Down Power is due to a Steam Generator Tube Leak.

18. If it is desired to trip the Reactor at this power level (20% to 25%), Then PERFORM the following:

    A. RECORD Main Gen KW Hrs in the chronological log as indicated on WHM/881.

    B. Manually TRIP the Reactor.

    C. EXIT to 2-EOP-01.

19. When power level is approximately 20%, Then ENSURE FCV-24-100 through FCV-24-108, Turbine Drain Valves, are OPEN.

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
20. If a Linear Range Safety Channel nuclear power detector is out of service, Then before lowering reactor power to less than 15%, PLACE High Startup Rate trip bistable for the affected channel in bypass or trip condition.	
21. §4 When power is less than 15% but greater than 5%, Then PLACE only one ADV per steam generator in automatic control, if desired.	
22. When power is less than 15%, Then ENSURE that the Reactor Loss of Load trip is bypassed by the following indications: • Three out of four RPS channels Nuclear Pwr indications are less than 11%. • Annunciator L-29, LOSS OF LOAD / LCL PWR DENS CHNL TRIP BYPASS, is LIT.	22. If Reactor Loss of Load trip is NOT bypassed, Then NOTIFY the SM / US and evaluate the problem.
23. If the Reactor Loss of Load trip is bypassed, Then TRIP the turbine and VERIFY: A. The Turbine TV's and GV's are CLOSED. B. The OCBs and Exciter supply breakers are OPEN.	23. If the turbine TVs and GVs do NOT close, Then NOTIFY the SM / US and PERFORM the following: A. TRIP the reactor. B. CLOSE HCV-08-1A, Main Steam Hdr A Isolation Valve. C. CLOSE HCV-08-1B, Main Steam Hdr B Isolation Valve. D. ENSURE generator lockout occurs. E. **GO TO 2-EOP-01, Standard Post Trip Actions.**

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
24. §2 ADJUST boration rate and CEA position to maintain power as directed by the SM / US.	
25. MAINTAIN 2A S/G level between 60% to 70% narrow range.	25. If the Steam Generator level can NOT be maintained between 60% and 70% narrow range level, Then NOTIFY the SM / US and GO TO Main Feedwater Off-Normal procedure 2-0700030.
26. CLOSE MV-09-05, Stm Gen 2A Reg Block Valve.	
27. MAINTAIN 2B S/G level between 60% to 70% narrow range.	27. If the Steam Generator level can NOT be maintained between 60% and 70% narrow range level, Then NOTIFY the SM / US and GO TO Main Feedwater Off-Normal Procedure 2-0700030.
28. CLOSE MV-09-06, Stm Gen 2B Reg Block Valve.	
29. ENSURE RCS heat removal is established and MAINTAIN T_{avg} between 531 and 533°F or as directed by the SM / US.	29. If T_{avg} can NOT be maintained, Then NOTIFY the SM / US and evaluate the problem.
30. ESTIMATE Xenon build-in and its effect on reactor power.	
31. ¶1 VERIFY the reactor is critical.	31. If the reactor is NOT critical, Then NOTIFY the SM / US and evaluate the problem.
32. DILUTE and / or MOVE CEAs as required to maintain reactor power as directed by the SM / US.	

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
33. If directed by the SM / US, Then GO TO 2-GOP-123, Turbine Shutdown-Full Load to Zero Load.	
34. If directed by the SM / US, Then GO TO 2-GOP-203, Reactor Shutdown.	

END OF SECTION 6.2

APPENDIX A
RAPID DOWN POWER CONDITIONAL ACTIONS
(Page 1 of 1)

1. If at any time parameters associated with automatic reactor or turbine trips are challenged and are NOT recovering, Then prior to the respective parameters reaching an automatic trip set point, TRIP the reactor and turbine and **GO TO 2-EOP-01, Standard Post Trip Actions.**

2. If at any time during power changes, T_{avg} is NOT within 6.6°F of T_{ref} for a given power level and efforts to regain control of temperature are unsuccessful, Then TRIP the reactor and **GO TO 2-EOP-01, Standard Post Trip Actions.**

3. If at any time the unit load is greater than 30% power and turbine back pressure is greater than 5.5 inches Hg absolute, Then TRIP the unit and **GO TO 2-EOP-01, Standard Post Trip Actions.**

4. If at any time the unit load is less than or equal to 30% power and turbine back pressure is greater than 3.5 inches Hg absolute, Then TRIP the unit and **GO TO 2-EOP-01, Standard Post Trip Actions.**

5. If at any time the differential pressure between the condensers is 2.5 inches of Hg absolute or higher, Then TRIP the unit and **GO TO 2-EOP-01, Standard Post Trip Actions.**

6. If at any time the rapid down power is terminated, Then ESTIMATE Xenon poison build-in and ADJUST RCS boron concentration and / or CEA position to maintain reactor power as directed by the SM / US.

7. If at any time plant parameters indicates that a steam generator tube leak has occurred, Then FOLLOW 2-0830030, Steam Generator Tube Leak load rate guidelines.

8. Refer to OPS-530 Pre-Planned Power Change Guidance.

END OF APPENDIX A

APPENDIX B
RAPID DOWN POWER PARAMETERS
(Page 1 of 1)

1. Maximum power reduction rate is 45 MW/minute.
2. Maintain Generator amperes less than or equal to 26 kiloamps per phase.
3. Maintain Generator terminal voltage between 21 KV and 23 KV.
4. Maintain Exciter field current less than or equal to 310 amps.
5. Maintain 2A3 and 2B3, 4.16 KV bus voltage between 3.95 KV and 4.35 KV.
6. Maintain Generator frequency greater than 59.5 HZ.
7. Maintain VCT level between 45% and 65% during power reduction.
8. Turbine bearing maximum bearing metal temperature is 225°F (Turbine Trip Criteria).
9. Turbine bearing maximum oil discharge temperature is 180°F F (Turbine Trip Criteria).
10. Turbine exhaust hood sprays automatic actuation temperature is 160°F.
11. Maintain Steam Generator levels between 55% and 75% narrow range level.
12. ¶2 Maintain Generator cold gas temperature between 45°F (7.2°C) and 114°F (46.1°C).
13. Monitor Turbine Cooling Water Pump parameters and operate pumps as necessary to ensure adequate component cooling and pump operation.
14. §3 Maintain pressurizer level between 27% and 68%.

NOTE

§2 Rapid Down power may result in Pressurizer Pressure dropping below DNBR Limit.

15. ¶1 Maintain pressurizer pressure between 2225 and 2275 psia.

END OF APPENDIX B

APPENDIX C

RCS BORATION GUIDANCE

(Page 1 of 1)

NOTE

The steps in this Appendix are applicable when the CVCS is normally aligned, with no RCS boration or dilution in progress. If other than normal alignment, use guidance of 2-NOP-02.24, Boron Concentration Control.

1. BORATE the RCS by the following:

   A. START either Boric Acid Pump 2A or 2B.

   B. PLACE FCV-2210Y control switch in AUTO.

   C. If borating to the VCT, Then OPEN V2512, Reactor Makeup Water Stop Vlv.

   D. If borating to the Charging Pump suction, Then OPEN V2525, Boron Load Control Valve.

   E. ADJUST FIC-2210Y to the desired flowrate. /R15

NOTE

Ensure a minimum of 10 gpm of boric acid flow at all times while BAM pump recirc valve is closed.

   F. If desired to maximize the boric acid flow rate, Then CLOSE the running BAM pump recirc valve.

   G. MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.

   H. If necessary to maintain the desired VCT level, Then DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position.

NOTE

An Operator Aid has been placed at RTGB-205. Any revision to this section of the procedure shall verify the validity of the Operator Aid and, if changes are necessary, a Label Request shall be initiated to incorporate these changes on a new Operator Aid placecard.

END OF APPENDIX C

APPENDIX D
CHARGING PUMP GUIDANCE
(Page 1 of 1)

1. If Charging Pump(s) are to be started, Then PERFORM the following:

A. ENSURE that each Charging pump that is desired to be started is ready to operate by local inspection by the SNPO, if time permits.

B. If associated Charging Pump Recirc Valve is operable, Then ENSURE that it is OPEN prior to starting the Charging Pump.

> **NOTE**
> Placing a second or third charging pump in service will increase letdown flow which may cause the general area dose rates in the vicinity of the letdown line in the 19.5' Pipe Penetration Room or 19.5' Letdown Cubicle Room to exceed 1000 mr/hr (Locked High Radiation Area limit) due to reduced transport time of short-lived radioactive isotopes.

C. START the Charging pump.

D. NOTIFY Health Physics of the charging pump alignment.

E. ADJUST the bias on HIC-1110, Level, using the upper knurled knob to control the letdown flow to maintain the actual Pressurizer Level to program RRS Pressurizer Level for current plant conditions, if required.

F. If FIA-2212, Chg Flow to Regen Hx, is in service, Then VERIFY proper Charging Header flow by observing FIA-2212 raise and stabilize for the number of Charging Pumps that are running.

G. If FIA-2212, Charging to Regen Hx, is NOT in service, Then VERIFY proper Charging Header flow by observing Letdown flow and expected changes in Pressurizer level for the number of Charging Pumps that are running.

H. ENSURE the running Charging Pump Recirc Valve is CLOSED.

I. PLACE the Chrg Pump Sel Running-B/U switch in the proper position for current plant conditions per operator aid placard on RTGB-205. (Charging pump combinations vs. selector switch)

END OF APPENDIX D

APPENDIX E
PRESSURIZER RECIRCULATION GUIDELINES
(Page 1 of 1)

NOTE

- The purpose of placing the Pressurizer on recirculation is to keep the Pressurizer and RCS boron concentration within 25 ppm when changing RCS boron concentration.
- From measured data, the estimated time in minutes to correct a greater than or equal to 25 ppm boron mismatch by operating 6 Backup Heater Banks may be determined as follows:
- Time (in min.) to correct mismatch = [(Pzr ppm - RCS ppm) - 25 ppm] x 3

1. To place the Pressurizer on recirculation:

   A. PLACE all available Backup Heater Bank control switches to ON.

   B. Slowly REDUCE the AUTO setpoint on PIC-1100X or PIC-1100Y, the selected "Pressurizer Pressure" controller, to maintain normal operating pressure.

   C. OBSERVE HIC-1100, "Pressurizer Spray" output and PCV-1100E / 1100F, "Pressurizer Spray Valve" position indication to verify Main Spray flow.

NOTE

Normally, the required number of Backup Bank heaters in service is dependent upon:

1. The magnitude of thermal losses from the system, including leakage to the Quench Tank.
2. The number of heater elements out of service.

The normal configuration is to have enough Backup Bank heaters in service to keep the Proportional Bank heaters at approximately 50% output.

END OF APPENDIX E

APPENDIX F
AXIAL SHAPE INDEX CONTROL
(Page 1 of 1)

Unplanned Load Reductions

NOTE
Contact Reactor Engineering for additional support in planning for or controlling core xenon oscillations.

1. If ASI cannot be maintained within transient band due to the inoperability of CEA(s), Then CONTACT Reactor Engineering to assist in determining the load reduction rate which would minimize the effects of ASI being out of the transient band.

CAUTION
The duration and magnitude of operation with ASI in excess of the Steady State Band should be limited to the maximum extent possible.

2. Every effort should be made to maintain ASI within limits (± 0.5 of the ESI), however, under extreme conditions (e.g., rapid downpower) the SM / US may direct temporary operation outside this limit. If operation outside the limit is unavoidable during a rapid downpower, Then:

   A. MAINTAIN ASI within RPS LPD pre-trip limits.

   B. RESTORE ASI to within limits as soon as is practical.

   C. Contact Reactor Engineering for evaluation and post-stabilization ASI guidance prior to any power increase.

3. REFER to NOP-100.02 for additional guidance on Axial Shape Index Control.

END OF APPENDIX F

Op Test No.:	1	Scenario #	2	Event #	1	Page	5	of 19
Event Description:	Unit down power to remove 2A Heater Drain Pump from service.							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response:		
Control Room Indications Available:		
	SRO	Continues to Supervise/Coordinate Power reduction in accordance with **2-ONP-22.01 Rapid Down Power** Steps 6.2.1 thru 6.2.9.
	RO/BOP	Refers to Appendices A and B as directed by the SRO per steps 6.2.3 and 6.2.4.
	RO	Controls ASI as directed by SRO with CEAs or per NOP-100.02, Axial Shape Index Control Per step 6.2.7.
	RO/BOP	Maintains T-avg within 6.6°F of T-ref per step 6.2.8.
	RO	When desired power level reached, stabilizes unit per step 6.2.9.
	BOP	When desired power level reached, stabilizes unit per step 6.2.9.

Next scenario page = 22

Op Test No.:	1	Scenario #	2	Event #	2	Page	6 of 19
Event Description:	Boric Acid Flow control Valve FCV-2210Y fails closed						

Time	Position	Applicant's Actions or Behavior
		Booth Operator Instructions: Trigger Boric Acid Flow Control Valve FCV-2210Y failure on examiner cue. **Examiners Note: Failure should be inserted after downpower is started approx 97-95% power (and while power is still decreasing and boration is still in progress.**
		Booth Operator Response: When requested by I&C to investigate failure of FCV 2210Y respond will investigate. Response after investigation, valve diaphragm has failed resulting in the valve being unable to open. **Control Room Indications Available: Boric acid flow goes to full scale low, indicating lights for FCV-2210Y goes from dual to green. No associated alarms**
	RO	Recognizes closed indication on FCV-2210Y and notifies SRO.
	SRO	Directs RO actions in accordance with **2-ONP-02.01 Boron Concentration Control** Off-Normal Operating Procedure steps 6.0.9 A – E. (attached page 23)
		Directs RO to secure boration line-up.
		Directs BOP to go to hold on the turbine.
		Ensures either Boric Acid pump is running.
		Directs OPENING V2514, Emergency Borate.
		Directs Placing Makeup Mode Selector Switch in MANUAL.
		Directs cycling the Boric Acid pump as necessary to control boric acid addition rate and rate of power change.
		Directs monitoring for any abnormal change in T-avg.

Next scenario page = 24

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

CAUTION

Prolonged use of V2514, Emergency Borate, can lead to uncontrolled power reduction rates. Boric Acid flow rate is equal to the charging pump flow rate when using the emergency borate valve.

9. If FCV-2210Y, Boric Acid Valve, fails to OPEN when a power reduction is required, Then PERFORM the following:

   A. START either Boric Acid pump.

   B. OPEN V2514

   C. PLACE Makeup Mode Selector switch in MANUAL.

   D. CYCLE the Boric Acid pump as necessary to control boric acid addition rate and the rate of power reduction.

   E. MONITOR for any abnormal change in Tave

END OF SECTION 6.0

Op Test No.:	1	Scenario #	2	Event #	2	Page	7 of 19
Event Description:	Boric Acid Flow control Valve FCV-2210Y fails closed						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response:		
Control Room Indications Available:		
	SRO	Notifies shift manager of FCV-2210Y failure and entry into **2-ONP-02.01 Boron Concentration Control**. Notifies I&C.
		Directs securing 2A HDP when power less than 92%
	RO	Starts a Boric Acid pump if none are running.
		OPENS V2514, Emergency Borate. o (This will cause annunciator M-42 Emergency Borate V2514 OPEN/OVLD/SS Isol to alarm.)
		Places Makeup Mode Selector Switch in MANUAL.
		Cycles the Boric Acid pump as necessary to control boric acid addition rate and rate of power change.
		Monitors for any abnormal change in T-avg.
	BOP	Puts turbine on HOLD as directed. (if already started)
		Monitors plant parameters while event in progress.
		Secure 2A HPDP IAW 2-GOP-123 step 6.22.1 (attached page 25)

Next scenario page = 26

INITIAL

6.21 ENSURE FCV-12-1, Condensate Hdr Recirc to Condsr, operates to maintain approximately 10,000 GPM condensate flow. ______ NPO

NOTE

The two substeps in the following step may be performed in any order, and they may be performed at any time PRIOR to reaching 35% if the Heater Drain Pump(s) need to be stopped due to plant conditions.

6.22 When power is approximately 35%, Then PERFORM the following:

1. STOP the 2A Heater Drain Pump as follows:

   A. OPEN V38238, Demin Wtr to 2A Htr Drain Pump Gland Quench Seal Isol. ______ NPO

   B. STOP the 2A Heater Drain Pump. ______

   C. ENSURE LCV-11-18A, 4A LP Htr Alt Drain, OPENS to control the level in the 4A Heater. ______ NPO

   D. VERIFY Main Feed Pump suction pressure is being maintained greater than or equal to 400 PSIG as indicated on P1219_A, Feedwater Pumps Header Pressure Suction. ______

   E. If Main Feed Pump suction pressure is **NOT** being maintained greater than or equal to 400 PSIG, Then RESTART the Heater Drain Pump and evaluate the problem. ______

Op Test No.:	1	Scenario #	2	Event #	3	Page	8 of 19
Event Description:	2A Charging Pump trips on low oil pressure						

Booth Operator Instructions: Trigger 2A Charging Pump trip on examiner cue.

Booth Operator Response: SNPO reports the 2A charging pump tripped on low oil pressure and there is oil all over the floor.

Indications Available: 2A Charging Pump Red light ON, Green light OFF
Annunciator M-14 Charging Pump Flow Low, M-30 2A Charging Pump Trouble if ONLY 2A Charging pump was running.

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes 2A Charging Pump trip, and reports to US.
	SRO	If only One Charging pump was running, directs RO to isolate letdown:
		Directs RO IAW **2-ONP-02.03 Charging and Letdown** section steps 6.0.2 thru 6.0.6, 6.0.9, and 6.0.11 (attached pages *27-29*)
	SRO T.S.	Recognizes entry into T.S. 3.1.2.4 and T.S 3.5.2 Action a.2 (both are 72 hour actions to restore a Charging pump).(attached page *30-31*)
		Notifies shift manager of 2A Charging pump trip and entry into 2-ONP-02.03 Charging and Letdown.
	RO	As directed performs **2-ONP-02.03 Charging and Letdown** steps 6.0.2 thru 6.0.6, 6.0.9, and 6.0.11. (attached page *27-29*)
	SRO	If Two Charging pumps were running, directs RO to maintain Pressurizer level on program setpoint.:
		Notifies shift manager of 2A Charging pump trip and entry into 2-ONP-02.03 Charging and Letdown.
		Performs crew brief
	RO	Adjusts Letdown bias to maintain Pressurizer level on program setpoint.

Next scenario page = 32

6.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If letdown flow is lost, Then STOP the charging pumps.	
A. RETURN the charging pump control switches to AUTO.	

CAUTION

Severe thermal stress and flashing may occur in the Regenerative Heat Exchanger if letdown flow is NOT immediately isolated.

INSTRUCTIONS	CONTINGENCY ACTIONS
2. If charging flow is lost, Then ISOLATE letdown.	2.1 ISOLATE Letdown by the following:
	A. CLOSE V2515, Stop Valve-IC
	B. CLOSE V-2516, Containment Isol Valve-IC.
	C. CLOSE V2522, Containment Isol Valve-OC.

NOTE

With Charging and Letdown isolated pressurizer level will lower slowly due to RCP controlled bleedoff flow.

INSTRUCTIONS	CONTINGENCY ACTIONS
3. If charging and letdown flow has been lost, Then MAINTAIN Reactor power and RCS temperature constant to minimize pressurizer level deviations.	
4. VERIFY all applicable automatic actions have occurred. Appendix A contains a listing of expected automatic actions.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

Prolonged use of Charging without Letdown could result in the Pressurizer exceeding the Technical Specification limit of 68%. Pressurizer level must be closely monitored.

5. §1 MAINTAIN Pressurizer level between 27% and 68% and within 2% of setpoint as follows:

   5.1 §1 If Pressurizer level can NOT be maintained between 27% and 68%, Then BE in at least HOT STANDBY with the reactor trip breakers OPEN within 6 hours and in HOT SHUTDOWN within the following 6 hours.

   A. As Pressurizer level reduces to approximately 2% less than setpoint, START one Charging Pump.

   B. When Pressurizer level is approximately 2% greater than setpoint, THEN STOP the running Charging Pump.

   C. PLACE the previously running Charging Pump Control Switch in AUTO.

6. If charging and letdown flow has been lost, Then DETERMINE the cause.

7. If a charging system leak has occurred, Then ISOLATE the leak and refer to applicable Technical Specifications for guidance.

8. If the normal charging flow path becomes unavailable, Then REFER TO Appendix B, Alternate Charging Flow Path through A HPSI Header.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS		CONTINGENCY ACTIONS	
9.	If letdown is unavailable, Then MAINTAIN pressurizer level by temporarily cycling charging pumps.		

NOTE

§3 If one or more charging pumps have lost pumping ability, gas binding may have occurred. This can result from pumping the VCT dry (hydrogen binding) or rupture of a charging pump suction accumulator (nitrogen binding). If this occurred, the charging pumps must be vented after restoring a source of water to the suction.

INSTRUCTIONS		CONTINGENCY ACTIONS	
10.	If the charging pumps are gas bound, Then REFER TO Appendix C, Venting a Gas Bound Charging Pump.		
11.	If charging and letdown has been lost and can be restored, Then RE-ESTABLISH charging and letdown flow as follows:	11.	
A.	ENSURE adequate VCT level is indicated.	A.1	RESTORE the VCT to a normal level in accordance with 2-ONP-02.01, Boron Concentration Control.
B.	ENSURE the Level Control Valve selector switch and the Pressure Control Valve selector switch are selected to the level and pressure control valves presently in service.		

CHARGING PUMPS – OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4 At least two charging pumps shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one charging pump OPERABLE, restore at least two charging pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to its COLR limit at 200°F within the next 6 hours; restore at least two charging pumps to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.4.1 At least two charging pumps shall be demonstrated OPERABLE by verifying that each pump develops a flow rate of greater than or equal to 40 gpm when tested pursuant to the Inservice Testing Program.

4.1.2.4.2 At least once per 18 months verify that each charging pump starts automatically on an SIAS test signal.

3/4.5.2 ECCS SUBSYSTEMS - OPERATING

LIMITING CONDITION FOR OPERATION

3.5.2 Two independent Emergency Core Cooling System (ECCS) subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE high pressure safety injection pump,

b. One OPERABLE low pressure safety injection pump, and

c. An independent OPERABLE flow path capable of taking suction from the refueling water tank on a Safety Injection Actuation Signal and automatically transferring suction to the containment sump on a Recirculation Actuation Signal, and

d. One OPERABLE charging pump.

APPLICABILITY: MODES 1, 2, and 3*.

ACTION:

a. 1. With one ECCS subsystem inoperable only because its associated LPSI train is inoperable, restore the inoperable subsystem to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

2. With one ECCS subsystem inoperable for reasons other than condition a.1., restore the inoperable subsystem to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. In the event the ECCS is actuated and injects water into the Reactor Coolant System, a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation ~~cycles~~ to date. The current value of the usage factor for each affected safety injection nozzle shall be provided in this Special Report whenever its value exceeds 0.70.

* With pressurizer pressure greater than or equal to 1750 psia.

Op Test No.: 1	Scenario # 2	Event # 4	Page 9 of 19
Event Description:	2A DEH pump trips		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger 2A DEH pump trip on examiner cue.		
Booth Operator Response: NPO reports breaker has tripped but there is no apparent problem **Indications Available: No light indication on 2A DEH pump, 2B does not start on decreasing DEH header pressure.** **Annunciator D-36 'DEH Pump OVRLD'** **D-47, DEH Pump DISCH PRESS High/Low**		
	SRO	Recognizes the 2A DEH pump tripped.
		Recognizes the 2B DEH pump did not start.
		Directs BOP to manually start 2B DEH pump.
		Notifies Shift Manager of 2A DEH pump trip.
		Directs BOP to contact NPO and maintenance services to investigate pump trip.
	RO	Monitors primary plant parameters during event.
	BOP	Recognizes the 2A DEH pump tripped.
		Recognizes the 2B DEH pump did not start. Should have started at 1550 psia.
		Refers to Annunciator summary for D-36 'DEH pp overload' and D-47 DEH Pump Disch Press High/Low (attached pages 33-34)
		Manually starts 2B DEH pump as directed.
		Contacts NPO and maintenance services to investigate pump trip

Next scenario page = 35

REVISION NO: 0	PROCEDURE TITLE: ANNUNCIATOR RESPONSE PROCEDURE	PANEL: D
PROCEDURE NO: 2-ARP-01-D36	ST. LUCIE UNIT 2	WINDOW: 36

ANNUNCIATOR PANEL D

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

DEH
PUMP
OVRLD

D-36

DEVICE:	LOCATION:	SETPOINT:
74/720	Bkr 2-40832 on MCC 2A1	De-energized
49/720	Bkr 2-40832 on MCC 2A1	Thermal Overload
74/721	Bkr 2-40610 on MCC 2B1	De-energized
49/721	Bkr 2-40610 on MCC 2B1	Thermal Overload

ALARM CONFIRMATION:
1. Green light LIT on the previously running DEH Pump indicates the thermal overload has actuated.
2. Loss of both indicating lights on RTGB-201 for the affected pump indicates loss of control power or breaker open.

OPERATOR ACTIONS:
1. ENSURE the standby DEH Pump is RUNNING.
2. If the standby pump did NOT start, Then PLACE the control switch to START.
3. If PI-22-26, Emergency Trip Header Pressure, is approaching 1000 psig and dropping, Then PERFORM the following:
   A. CHECK status of annunciator L-29, LOSS OF LOAD/ LCL PWR DENS CHNL TRIP BYPASS.
   B. If annunciator L-29 is CLEAR, Then PERFORM the following:
      1. TRIP the Reactor and Turbine.
      2. IMPLEMENT 2-EOP-01, Standard Post Trip Actions.
4. If the Turbine trips, Then IMPLEMENT 2-EOP-01, Standard Post Trip Actions, if applicable.
5. PLACE the previously running standby DEH Pump control switch to STOP.
6. DISPATCH an operator to the applicable DEH pump breaker:
   - Bkr 2-40832, Elect Hydraulic Gov Fluid Pp 2A, on MCC 2A1.
   - Bkr 2-40610, Elect Hyd Gov Fluid Pump 2B, on MCC 2B1.
7. PERFORM the following at the applicable breaker:
   A. CHECK the breaker CLOSED.
   B. PRESS the Thermal Overload RESET button.
   C. If the breaker is CLOSED and indicating lights are NOT LIT, Then ENSURE the control power fuse is checked and replaced as necessary.
8. If the breaker is TRIPPED or the thermal overload repeatedly actuates, Then CONTACT EM for troubleshooting and repairs.

CAUSES: This alarm may be caused by either of the following for either DEH Pump:
- Thermal Overload (49) Relay actuating due to motor overload.
- Control power loss due to a blown fuse or the breaker is open.

REFERENCES:
1. CWD 2998-B-327 sheets 720 and 803
2. 2998-31

REVISION NO: 0	PROCEDURE TITLE: ANNUNCIATOR RESPONSE PROCEDURE	PANEL: D
PROCEDURE NO: 2-ARP-01-D47	ST. LUCIE UNIT 2	WINDOW: 47

ANNUNCIATOR PANEL D

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60

DEH
PUMP
DISCH PRESS
HIGH/LOW
D-47

DEVICE:	**LOCATION:**	**SETPOINT:**
PS-22-119 (High)	TGB/TG TERM BOX ER	2,225 psig
PS-22-120 (Low)	TGB/TG TERM BOX ER	1,550 psig

ALARM CONFIRMATION:
PI-22-24, EH Fluid, on RTGB-201.

OPERATOR ACTIONS:

1. If pressure is less than 1550 psig, Then PERFORM the following:
   - A. ENSURE the Standby EH Pump is running.
   - B. If DEH pressure continues to drop, Then PREPARE for turbine trip.
   - C. If PI-22-26, Emergency Trip Header Pressure, is approaching 1000 psig and dropping, Then PERFORM the following:
     1. CHECK status of annunciator L-29, LOSS OF LOAD/ LCL PWR DENS CHNL TRIP BYPASS.
     2. If annunciator L-29 is CLEAR, Then PERFORM the following:
        - a. TRIP the Reactor and Turbine.
        - b. IMPLEMENT 2-EOP-01, Standard Post Trip Actions.
   - D. If DEH pressure returns to normal, Then STOP the DEH Pump that was initially running.
   - E. CONTACT MM for trouble shooting and repairs.
2. If pressure is greater than 2225 psig, Then PERFORM the following:
   - A. START the Standby DEH Pump.
   - B. LOCALLY VERIFY the Standby Pump is operating normally with discharge pressure between 1700 and 2100 psig.
   - C. STOP the DEH Pump that was initially running.
   - D. CONTACT MM for trouble shooting and repairs.

CAUSES: A high pressure alarm may be caused by DEH filter clogging or failure of DEH Pump Pressure Control Valves. A low pressure alarm may be caused by DEH Reservoir HP Relief lifting, loss of a DEH Pump, or a system leak.

REFERENCES:
1. CWD 2998-B-327 sheets 721 and 803
2. 2998-31
3. TEDB

Op Test No.:	1	Scenario #	2	Event #	5	Page	10 of 19
Event Description:	Containment Pressure PT-07-2A fails high						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger PT-07-2A failure on examiner cue.		
Booth Operator Response: **Control Room Indications Available: RTGB-206 PIS-07-2A indicates high** **Annunciators in alarm:** **Q-2 ESFAS ATI,** **Q-3 CNTMT Press SIAS Channel Trip,** **S-17 CNTMT Press High Channel Trip,** **P-13 CNTMT Press High CIS Channel Trip,** **P-23 CNTMT Press High CIS Channel Pre Trip,** **L-5 CNTMT Press High Channel Trip,** **L-13 CNTMT Press High Channel Pre Trip**		
	SRO/BOP /RO	Recognize numerous alarms. Identifies failed pressure transmitter.
	SRO	Directs implementation of **2-ONP-99.01, Loss of Tech Spec** Instrumentation step 6.3.2.E.1 or 6.3.2.E.2. (attached page 36)
	SRO T.S.	Recognize entry into T.S. 3.3.1 Table 3.3.1.5 action 2 (1 hour to place in trip or bypass) and 3.3.2 action 13, 18a & 18b. (1 hour to place in trip or bypass) (attached pages 37-41)
		Notifies Shift Manager of PT-07-2A failure and entry into **2-ONP-99.01, Loss of Tech Spec Instrumentation.**
	RO	Monitors primary plant parameters during event.
	BOP	Obtains keys 109,127,128, & 129 and Bypasses, or, Trips Channel A trip units as directed per of **2-ONP-99.01, Loss of Tech Spec Instrumentation** step 6.3.2.E.1 or 6.3.2.E.2. (attached page 36)
		Contacts I&C to troubleshoot failure of PT-07-2A

Next scenario page = 42

6.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)

NOTE

- Containment pressure monitors are covered by Tech Spec 3.3.1, Table 3.3-1 for RPS and Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.
- Containment Pressure SIAS and MSIS share the same bistable and isolation modules.

INSTRUCTIONS	CONTINGENCY ACTIONS
E. Containment Pressure instrumentation indication PIS-07-2A/B/C/D.	**E.1** PERFORM **ONE** of the following: 1. BYPASS the following channels affected by the failed Containment Pressure instrument: • Hi Cntmt Press RPS trip unit (key 109) • Cont Press SIAS (key 127) • Cntmt Press CIS (key 129) • Cntmt Press CSAS (key 128) OR 2. PLACE the affected RPS and ESFAS trip units in TRIP in accordance with Appendix A, Placing Trip Units in Trip.

TABLE 3.3-1

REACTOR PROTECTIVE INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. Manual Reactor Trip	4 4	2 2	4 4	1, 2 3*, 4*, 5*	1 5
2. Variable Power Level – High	4	2(a)(d)	3	1, 2	2#
3. Pressurizer Pressure – High	4	2	3	1, 2	2#
4. Thermal Margin/Low Pressure	4	2(a)(d)	3	1, 2	2#
5. Containment Pressure – High	4	2	3	1, 2	2#
6. Steam Generator Pressure – Low	4/SG	2/SG(b)	3/SG	1, 2	2#
7. Steam Generator Pressure Difference – High	4	2(a)(d)	3	1, 2	2#
8. Steam Generator Level – Low	4/SG	2/SG	3/SG	1, 2	2#
9. Local Power Density – High	4	2(c)(d)	3	1	2#
10. Loss of Component Cooling Water to Reactor Coolant Pumps	4	2	3	1, 2	2#
11. Reactor Protection System Logic	4	2	3	1, 2 3*, 4*, 5*	2# 5
12. Reactor Trip Breakers	4	2(f)	4	1, 2 3*, 4*, 5*	4 5
13. Wide Range Logarithmic Neutron Flux Monitor					
a. Startup and Operating – Rate of Change of Power – High	4	2(e)(g)	3	1, 2	2#
b. Shutdown	4	0	2	3, 4, 5	3
14. Reactor Coolant Flow – Low	4/SG	2/SG(a)(d)	3/SG	1, 2	2#
15. Loss of Load (Turbine Hydraulic Fluid Pressure – Low)	4	2(c)	3	1	2#

TABLE 3.3-1 (Continued)

ACTION STATEMENTS

ACTION 2 - a. With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. The channel shall be returned to OPERABLE status no later than during the next COLD SHUTDOWN.

b. With the number of channels OPERABLE one less than the Minimum Channels OPERABLE, STARTUP and/or POWER OPERATION may continue provided the following conditions are satisfied:

1. Verify that one of the inoperable channels has been bypassed and place the other inoperable channel in the tripped condition within 1 hour.

2. All functional units affected by the bypassed/tripped channel shall also be placed in the bypassed/tripped condition.

With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed below:

Process Measurement Circuit	Functional Unit Bypassed
1. Safety Channel – Nuclear Instrumentation	
Wide Range	Rate of Change of Power – High (RPS)
Linear Range	Variable Power Level – High (RPS) Local Power Density – High (RPS) Thermal Margin/Low Pressure (RPS)
2. Pressurizer Pressure -	Pressurizer Pressure – High (RPS) Thermal Margin/Low Pressure (RPS) Pressurizer Pressure – Low (ESF)
3. Containment Pressure -	Containment Pressure – High (RPS) Containment Pressure – High (ESF)
4. Steam Generator Pressure -	Steam Generator Pressure – Low (RPS) Thermal Margin/Low Pressure (RPS) AFAS-1 and AFAS-2 (AFAS) Steam Generator Pressure – Low (ESF)
5. Steam Generator Level -	Steam Generator Level – Low (RPS) If SG-2A, then AFAS-1 (AFAS) If SG-2B, then AFAS-2 (AFAS)

TABLE 3.3-3

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. SAFETY INJECTION (SIAS)					
a. Manual (Trip Buttons)	2	1	2	1, 2, 3, 4	12
b. Containment Pressure – High	4	2	3	1, 2, 3	13*, 14
c. Pressurizer Pressure – Low	4	2	3	1, 2, 3(a)	13*, 14
d. Automatic Actuation – Logic	2	1	2	1, 2, 3, 4	12
2. CONTAINMENT SPRAY (CSAS)					
a. Manual (Trip Buttons)	2	1	2	1, 2, 3, 4	12
b. Containment Pressure – High-High	4	2	3	1(b), 2(b), 3(b)	18a*, 18b*, 18c
c. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	12
3. CONTAINMENT ISOLATION (CIAS)					
a. Manual CIAS (Trip Buttons)	2	1	2	1, 2, 3, 4	12
b. Safety Injection (SIAS)	See Functional Unit 1 for all Safety Injection Initiating Functions and Requirements				
c. Containment Pressure – High	4	2	3	1, 2, 3	13*, 14
d. Containment Radiation – High	4	2	3	1, 2, 3	13*, 14
e. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	12

TABLE 3.3-3 (Continued)

TABLE NOTATION

(a) Trip function may be bypassed in this MODE when pressurizer pressure is less than 1836 psia; bypass shall be automatically removed when pressurizer pressure is greater than or equal to 1836 psia.

(b) An SIAS signal is first necessary to enable CSAS logic.

(c) Trip function may be bypassed in this MODE below 700 psia; bypass shall be automatically removed at or above 700 psia.

* The provisions of Specification 3.0.4 are not applicable.

ACTION OF STATEMENTS

ACTION 12 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION 13 - With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. The channel shall be returned to OPERABLE status no later than during the next COLD SHUTDOWN.

With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed below.

Process Measurement Circuit	**Functional Unit Bypassed**
1. Containment Pressure -	Containment Pressure – High (SIAS, CIAS, CSAS) Containment Pressure – High (RPS)
2. Steam Generator Pressure -	Steam Generator Pressure – Low (MSIS) AFAS-1 and AFAS-2 (AFAS) Thermal Margin/Low Pressure (RPS) Steam Generator Pressure – Low (RPS)
3. Steam Generator Level -	Steam Generator Level – Low (RPS) If SG-2A, then AFAS-1 (AFAS) If SG-2B, then AFAS-2 (AFAS)
4. Pressurizer Pressure -	Pressurizer Pressure – High (RPS) Pressurizer Pressure – Low (SIAS) Thermal Margin/Low Pressure (RPS)

TABLE 3.3-3 (Continued)

TABLE NOTATION

ACTION 18 - With the number of OPERABLE Channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in either the bypassed or tripped condition and the Minimum Channels OPERABLE requirement is demonstrated within 1 hour. If the inoperable channel can not be restored to OPERABLE status within 48 hours, then place the inoperable channel in the tripped condition.

b. With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed in ACTION 13.

c. With the number of channels OPERABLE one less than the Minimum Channels OPERABLE, operation may proceed provided one of the inoperable channels has been bypassed and the other inoperable channel has been placed in the tripped condition within 1 hour. Restore one of the inoperable channels to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

ACTION 19 - With the number of OPERABLE Channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:

a. Within 1 hour the inoperable channel is placed in either the bypassed or tripped condition. If OPERABILITY can not be restored within 48 hours, be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1.

Op Test No.: 1	Scenario # 2	Event # 6 , 7, 8	Page 11 of 19				

Event Description: Steam Leak in Containment on 2B S/G, 2B MSIV fails to close on MSIS, AFAS lockout fails to stop feeding 2B S/G from 2B AFW pump and MV-09-10 will not close.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger Steam Leak in Containment on examiner cue. Ensure 2B MSIV failure to close on MSIS is enabled.		
Booth Operator Response: Indications Available: RTGB- 206 rising Containment Building pressure, lowering S/G pressures, RCS temperatures dropping, reactor power increasing. Annunciators in alarm: T-9, CONTMNT Fan CLR HVS-1A/1B TEMP High T-15, CONTMNT Fan CLR HVS-1C/1D TEMP High		
	SRO	Recognizes S/G pressure dropping and Containment Building pressure rising.
		Directs RO to trip reactor prior to Auto trip and MSIS.
		Directs implementation of 2-EOP-01, "Standard Post Trip Actions" as follows: RO: Reactivity control, Inventory Control, Pressure control, Core Heat Removal BOP: Vital Auxiliaries, RCS heat removal, Containment Conditions.
	SRO Critical Task	Directs one RCP stopped when T_{cold} approaches 500°F. (attached page 60)
		Directs RO to stop 1 RCP in each loop on SIAS on low Pzr pressure.
		Directs Emergency boration due to uncontrolled cooldown at 500°F.
	SRO Critical Task	Directs manual closure of 2B MSIV following failure to close on MSIS. (attached page 60)
		Calls to request the STA to report to the Control Room to assist with the event

Next scenario page = 43

Op Test No.: 1	Scenario # 2	Event # 6 , 7, 8	Page 12 of 19				

Event Description: Steam Leak in Containment on 2B S/G, 2B MSIV fails to close on MSIS, AFAS lockout fails to stop feeding 2B S/G from 2B AFW pump and MV-09-10 will not close.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response: **Control Room Indications Available:**		
	RO	Manually trips reactor prior to auto trip. Performs EOP-01 Safety Functions as directed for Reactivity Control, Inventory Control, Pressure Control, Core Heat removal.
		Emergency borates when directed. (from RCS Heat Removal Safety Function)
		• Places Makeup Mode Selector Switch in Manual.
		• Ensures V2525 Load control valve closed.
		• Starts 2A or 2B BAM Pump.
		• Closes V2650 Tank 2A Recirc valve.
		• Closes V2651 Tank 2B Recirc valve.
		• Opens V2514 Emergency Borate valve.
		Reactivity Control • Verify Reactor power is lowering. • Verify startup rate is negative. • Verify a maximum of one CEA is not fully inserted.
		Inventory Control • Verify Pressurizer level is between 10 and 68% • Pressurizer level is trending to 30 – 35%.
		Pressure Control • Verifies RCS pressure is between 1800-2300 psia. (at 1736 psia verify SIAS and stop RCP in each loop.) • Verifies RCS pressure is trending 2225-2275 psia. (control manually) • Verifies RCS subcooling is >20°F.

Next scenario page = 44

Op Test No.: 1	Scenario # 2	Event # 6 , 7, 8	Page 13 of 19

Event Description: Steam Leak in Containment on 2B S/G, 2B MSIV fails to close on MSIS, AFAS lockout fails to stop feeding 2B S/G from 2B AFW pump and MV-09-10 will not close.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response:		
Control Room Indications Available:		
	RO	Core Heat Removal • Verifies at least one RCP running with CCW. (if >10 minutes with no CCW must secure) • Verifies loop delta T is <10°F.
	RO Critical Task	Stops one RCP when directed as T_{cold} <500°F (attached page 60)
	RO Critical Task	Manually closes 2B MSIV as directed. (attached page 60)
	BOP	Verifies turbine trip on reactor trip. Performs EOP-01 Safety functions as directed for: Vital Auxiliaries, RCS Heat Removal, Containment Conditions.
		Closes MSR reheat Block Valves and Ensures MSR Warmup Valves are CLOSED.
		Notifies NPO to perform Appendix X section 1 of EOP-99. (outside CR actions)
		.
		Closes Spillover Bypass valve MV-08-814.

Next scenario page = 45

Op Test No.:	1	Scenario #	2	Event #	6 , 7, 8	Page	14	of 19

Event Description: Steam Leak in Containment on 2B S/G, 2B MSIV fails to close on MSIS, AFAS lockout fails to stop feeding 2B S/G from 2B AFW pump and MV-09-10 will not close.

Time	Position	Applicant's Actions or Behavior
	BOP	Maintenance of Vital Auxiliaries • Verifies turbine governor and throttle valves closed. • Verifies GEN Brk open (East breaker, Mid Breaker and Exciter Breaker.) • Verifies all vital and non vital AC Buses energized. • Verifies all vital and non vital DC Buses energized.
		RCS Heat Removal • Verify at least one SG has feedwater available • Verify RCS Tavg is between 525 and 535° F • Verify SBCS valves controls Tavg. • Close MSIV at 750 psia. • Close Spillover Bypass valve MV-08-814 (unable to be closed due to loss of power)
		Containment Conditions • Verifies Containment pressure <2 psig. (Pressure is increasing ensures 4 Containment Cooling fans on.) • Verifies NO Containment radiation monitors in alarm. • Verifies Containment temperature is less than 120°F. (Temperature is increasing) • Verifies NO secondary plant radiation alarms.
		Re-establishes CCW to RCPs IAW 2-EOP-99, Appendix J as directed or stop all RCP's if CCW lost >10 minutes. (this may be done in 2-EOP-01) (attached pages 52-53)

Examiners note: The crew could create another critical task if Appendix J is not completed to restore CCW to the RCPs within 10 minutes..

Next scenario page = 46

Op Test No.: 1	Scenario # 2	Event # 6, 7, 8	Page 15 of 19				

Event Description: Steam Leak in Containment on 2B S/G, 2B MSIV fails to close on MSIS, AFAS lockout fails to stop feeding 2B S/G from 2B AFW pump and MV-09-10 will not close.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response: If dispatched, NPO reports the manual operator on MV-09-10 is broken and it cannot be closed locally. **Control Room Indications Available:**		
	SRO	Evaluates diagnostic flow chart of 2-EOP-01.
		Exits EOP-01 and enters 2-EOP-05 ESD after analysis from Diagnostic Flow chart.
		Directs BOP/STA perform Safety Function Status Check's.(SFSC)
		Directs Appendix A EOP-99 Sampling S/G's.(attached pages 54-54)
		If SIAS present verify SI flow IAW Figure 2.(attached page 51)
		Directs BOP to contact NPO to locally close MV-09-10.
		Directs one RCP/LOOP stopped when SIAS received on low RCS pressure. (may have been directed in 2-EOP-01)
		Directs CCW restored to RCP's per Appendix J 2-EOP-99.(may have been completed in 2-EOP-01) (attached pages 52-53)
		Notifies shift manager of event and need to classify.
		When S/G 2B reaches dry out (WR level near zero and pressure starts to increase), directs RCS temperature stabilized within the limits of Figure 1A using 2A ADV's. (attached page 48)

Next scenario page = 47

Op Test No.: 1	Scenario #	2	Event #	6 , 7, 8	Page	16	of	19

Event Description: Steam Leak in Containment on 2B S/G, 2B MSIV fails to close on MSIS, AFAS lockout fails to stop feeding 2B S/G from 2B AFW pump and MV-09-10 will not close.

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

Booth Operator Response:

Control Room Indications Available:

	RO	Opens 'A' ADV's to stabilize RCS temperature within the limits of Figure 1A when 2B SG blown dry. See Ops Policy 539. (attached page 48-50)
		Stops one RCP/LOOP when directed. (may have been completed in 2-EOP-01)
	STA	Performs SFSC's EOP-05 when directed. • Verify SI flow IAW Figure 2 (attached page 51)
	BOP	Performs EOP-99 Appendix J CCW restoration to RCP's when directed. (may have been completed in 2-EOP-01 (attached pages 52-53)
		Performs Appendix A when directed.(attached pages 54-55)
	SRO/BOP/RO	Recognizes that AFAS lockout has failed and 2B S/G is being fed from 2B AFW pump.
		Directs RO to stop feeding 2B S/G by stopping 2B AFW pump.
		Takes 2B AFW pump control switch to STOP as directed.

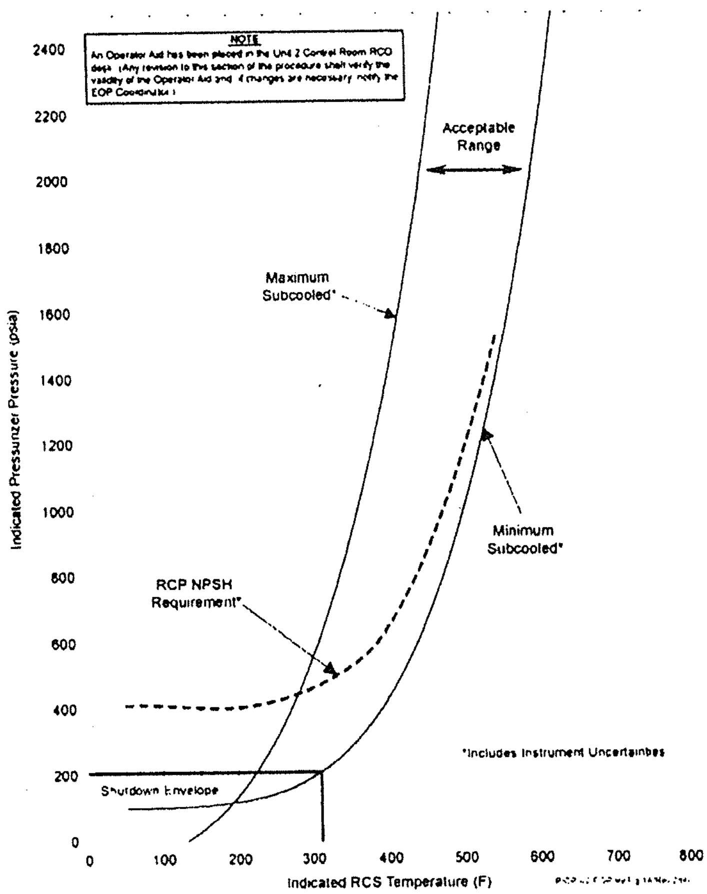
Next scenario page = 56

FIGURE 1A
RCS PRESSURE TEMPERATURE
(Page 1 of 1)

(Containment Temperature Less Than or Equal to 200°F)

CAUTION

The RCP NPSH curve assumes one pump is operating in each loop. RCP instrumentation should be monitored for seal and pump performance in accordance with 2-EOP-99, Table 13.



RCS Pressure Range	Required QSPDS Subcooled Margin Reading (Rep CET)
2250 psia to 1000 psia	40 to 180°F
1000 psia to 500 psia	50 to 170°F
Less than 500 psia	80 to 160°F

	ST. LUCIE PLANT	OPS-539
ST. LUCIE NUCLEAR PLANT OPERATIONS DEPARTMENT	OPERATIONS DEPARTMENT POLICY	Rev. 1
	RCS COOLDOWN GUIDANCE	Date 06/02/09
		Page 1 of 2

THIS POLICY HAS BEEN COMPLETELY REWRITTEN

The purpose of this guidance is to precisely control the plant during RCS cooldowns.

The limit, at which the RCS is cooled, is determined by the plant configuration (e.g., RCPs in operation, number of SGs available, status of subcooling, etc). The method of cooldown will be determined by the availability of condenser vacuum, SBCS, ADVs, and Safety Injection flow rate. When cooling down the RCS:

The US will:

1. Direct the RCO to commence a cooldown of the RCS using ADVs or SBCS.
2. Give the RCO a limit (e.g., Do not exceed 100°F in any one hour period).

The RCO will:

1. Document RCS T-cold (the starting point will always be 532°F post trip). Document and report RCS T-cold and cooldown rate to the US every 10 minutes.
2. Commence a cooldown of the RCS. Ensure that the limits of Figure 1A or 1B are being restored or maintained.
3. Using SBCS for recovery of subcooling or during a Steam Generator Tube Rupture cooldown to T-hot less than 510°F:
   a. Place the SBCS in manual operation.
   b. Fully open PCV-8801. If PCV-8801 is unavailable, use the next available SBCS valve.
4. Using ADVs for recovery of subcooling or during a Steam Generator Tube Rupture cooldown to 510°F:
   a. Place an ADV on each Steam Generator in service, preferably in Auto-Manual (if available) or Manual-Manual.
   b. For Unit 1, open the ADV on each Steam Generator to 50% open.
   c. For Unit 2, fully open one ADV on each Steam Generator.

5. Once subcooling is restored or the cooldown limit is being approached, adjust the position of the ADVs or SBCS to ensure that the cooldown limit-will not be exceeded. The objective here is not to cool down 100°F in a few minutes and then stop the cool down for the remainder of the hour. After the initial opening, ADVs or SBCS should be adjusted to achieve a rate of 100°F/hour, based on each 10 minute plot. Continued lowering of steam flow may be necessary if ECCS flow is present. If after the first 10 minutes the rate is still >100°F/hour, then adjust ADVs or SBCS to 75% open. If after the next 10 minute plot it is still >100°F/hour, then adjust ADVs or SBCS to 50% open and so on until a balance is achieved between steaming and ECCS flow. If ECCS flow alone in contributing to RCS cool down at >100°F/hour, then steaming should be secured.

6. Once 510°F T-hot is reached for a Steam Generator Tube Rupture cooldown, adjust the position of ADVs or SBCS to ensure that the cooldown limit will not be exceeded.

The RCS temperature will be stabilized when the Excessive Steam Demand has terminated, or the Steam Generator has blown dry.

The US will:

1. Direct the RCO to stabilize RCS temperature using ADVs at the lowest RCS T-cold.

The RCO will:

1. Determine the saturation pressure for the lowest RCS T-cold (if this wasn't performed prior to dry-out, the ADV[s] will be opened first then the saturation pressure will be determined).

    a. For Unit 1: open the ADV on the non-faulted Steam Generator to 100% open, in manual, then adjust the auto setpoint to the saturation pressure for the lowest RCS T-cold and place it in auto.

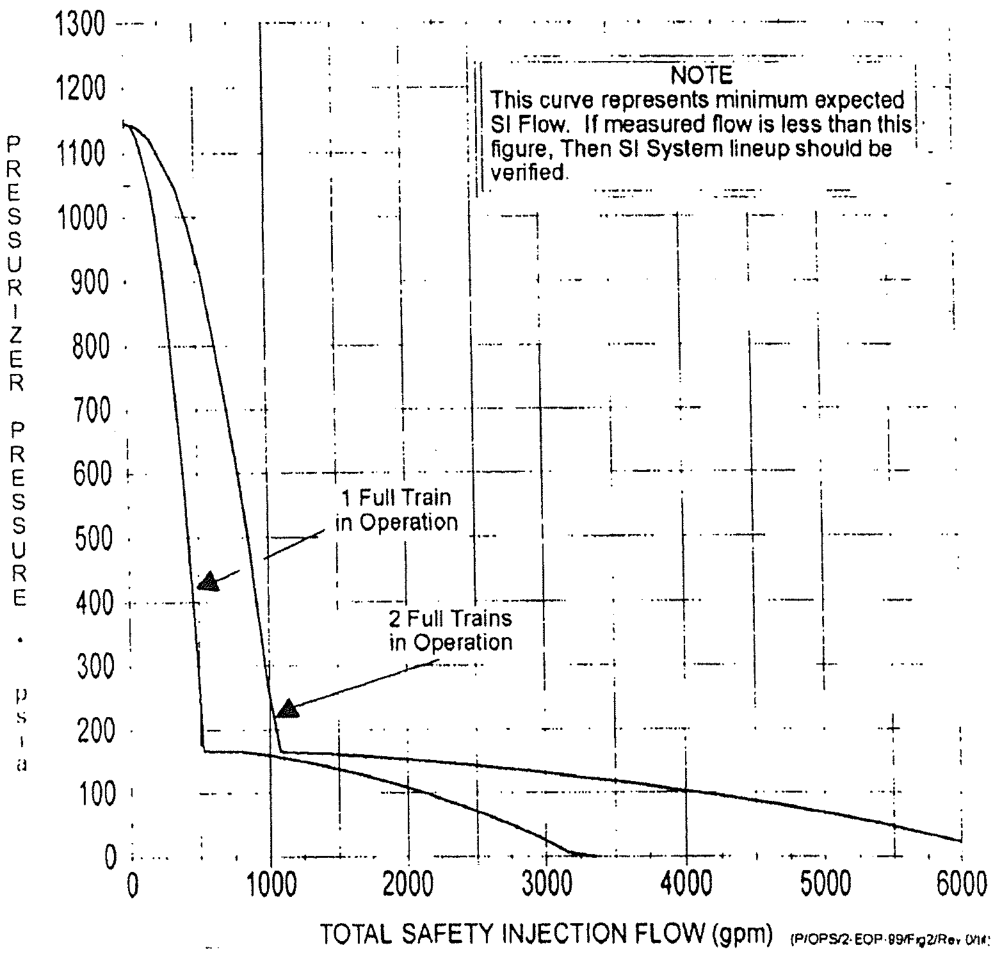
    b. For Unit 2: open one ADVs on the non-faulted Steam Generator to100% open, in manual, then adjust the auto setpoint to the saturation pressure for the lowest RCS T-cold and place it in auto. Open the second ADV on the non-faulted Steam Generator to 100% open, in manual, then adjust the auto setpoint to the saturation pressure for the lowest RCS T-cold and place it in auto.

Approved: (David Lanyi - Signature on File)
Assistant Operations Manager - St. Lucie Plant

FIGURE 2

SAFETY INJECTION FLOW VS. RCS PRESSURE

(Page 1 of 1)



APPENDIX J

RESTORATION OF CCW AND CBO TO THE RCPs

(Page 1 of 2)

☐ 1. ENSURE Instrument Air to Containment is available by PLACING HCV-18-1 to CLOSE / OVERRIDE and then to OPEN.

CAUTION

Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

NOTE

- HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open.
- When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset.

☐ 2. If SIAS has closed the 'N' Header valves, Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

- HCV-14-8A 'N' Hdr Isol Discharge ___
- HCV-14-9 'N' Hdr Isol Suction ___

OR

- HCV-14-8B 'N' Hdr Isol Discharge ___
- HCV-14-10 'N' Hdr Isol Suction ___

☐ 3. ALIGN CCW to / from the RCPs by OPENING **ALL** of the following valves:

☐ HCV-14-1, CCW To RC PUMP
☐ HCV-14-2, CCW From RC PUMP
☐ HCV-14-7, CCW To RC PUMP
☐ HCV-14-6, CCW From RC PUMP

☐ 4. If CIAS has isolated controlled bleedoff flow to the VCT, Then OPEN V2507, RCP Bleedoff Relief Stop Vlv.

APPENDIX J
RESTORATION OF CCW AND CBO TO THE RCPs
(Page 2 of 2)

CAUTION

RCP Seal Cooler isolation valves automatically close on high Seal Cooler outlet temperature of 200°F. Maintaining the control switch in the OPEN position will override this function. CCW radiation monitors should be closely monitored for indication of RCS to CCW leakage should conditions warrant the valve(s) to be maintained in the open position. Consideration should be given to returning the control switch(es) to the AUTO position once the valves have been opened.

☐ 5. ENSURE **ALL** RCP Seal Cooler Isolation valves are OPEN:

- ☐ HCV-14-11-A1, CCW From 2A1 RCP Seal Cooler
- ☐ HCV-14-11-A2, CCW From 2A2 RCP Seal Cooler
- ☐ HCV-14-11-B1, CCW From 2B1 RCP Seal Cooler
- ☐ HCV-14-11-B2, CCW From 2B2 RCP Seal Cooler

☐ 6. VERIFY RCP CCW related alarms are CLEAR or have been evaluated and dispositioned.

END OF APPENDIX J

APPENDIX A

SAMPLING STEAM GENERATORS

(Page 1 of 2)

A Train (√) B Train (√)

☐ 1. If a LOOP has occurred,
Then PERFORM **BOTH** of the following:

☐ A. ENSURE 2AB 480V Load Center is aligned to an energized bus.

☐ B. DISPATCH an operator to restore Instrument Air. **REFER TO** Appendix H, Operation of the 2A and 2B Instrument Air Compressors.

CAUTION

Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

NOTE

- HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open
- When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset

☐ 2. If SIAS has closed the 'N' Header valves,
Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

	A Train	B Train
• HCV-14-8A	___	
• HCV-14-9	___	
OR		
• HCV-14-8B		___
• HCV-14-10		___

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 2 of 2)

☐ 3. If CIAS or high radiation has closed the SGBD Sample Valves,
Then OPEN FCV-23-7 and FCV-23-9 by PLACING the control switch to CLOSE / OVERRIDE and then to OPEN.

☐ 4. DIRECT Chemistry to perform S/G samples for activity and boron.

☐ 5. If S/Gs cannot be sampled,
Then DIRECT Health Physics to conduct secondary plant local area radiation surveys.

END OF APPENDIX A

Op Test No.: 1	Scenario # 2	Event # 9		Page 17	of 19		
Event Description:	Isolate 2B S/G						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Booth Operator Response: When directed, initiate 'Isolate 2BA SG' per App R. **Control Room Indications Available:**		
	SRO **Critical Step**	Directs isolation of 2B S/G, 2-EOP-99 Appendix R section 2. (step 11 stops 2B AFW pump)(attached page 60)
	BOP **Critical Step**	Performs Appendix R section 2 to isolate the 2B S/G when directed. (attached pages 57-58) (attached page 60)
		Calls NPO to perform Appendix R section 2 step 17
		Waits until report back from NPO that step 17 is complete before reporting that Appendix R is complete
		Scenario Termination Cue: • **2B S/G is isolated IAW 2-EOP-99 Appendix R** • **RCS temperature and pressure are stabilized and are under control.**

Next scenario page = 57

APPENDIX R
STEAM GENERATOR ISOLATION
(Page 4 of 6)

Section 2: 2B Steam Generator Isolation

> **CAUTION**
> If S/G isolation is due to a SGTR the secondary plant may have higher than normal radiation levels. Contact Health Physics for area accessibility instructions.

☐ **1.** ENSURE HCV-08-1B, Main Steam Header 'B' Isolation Valve (MSIV), is CLOSED.

☐ **2.** If HCV-08-1B did not close remotely,
Then PERFORM local closure.
REFER TO Appendix I, MSIV Local Closure.

☐ **3.** ENSURE MV-08-1B, MSIV Header 'B' Bypass Valve, is CLOSED.

> **NOTE**
> Instrument air must be available to close MFIVs using RTGB control switch. If instrument air is NOT available when MFIV closure is required, then manual initiation of MSIS should be considered.

☐ **4.** ENSURE HCV-09-2A, Main Feedwater Header ‘B’ Isolation Valve, is CLOSED.

☐ **5.** ENSURE HCV-09-2B, Main Feedwater Header ‘B’ Isolation Valve, is CLOSED.

☐ **6.** If **BOTH** HCV-09-2A and HCV-09-2B, Main Feedwater Isolation Valves to S/G 2B, are NOT CLOSED or suspected of leaking,
Then PERFORM **ANY** of the following **AS NECESSARY**:

☐ **A.** ENSURE **ALL** of the following valves are CLOSED:

- ☐ MV-09-6, Stm Gen 2B Reg Block Valve
- ☐ LCV-9006, 2B 15% Bypass
- ☐ MV-09-4, 2B 100% Bypass

☐ **B.** STOP **BOTH** Main Feedwater Pumps.

☐ **7.** ENSURE FCV-23-5, 2B SG Blowdown, is CLOSED.

APPENDIX R
STEAM GENERATOR ISOLATION
(Page 5 of 6)

Section 2: 2B Steam Generator Isolation (continued)

☐ **8.** ENSURE FCV-23-6, 2B SG Blowdown, is CLOSED.

☐ **9.** ENSURE MV-08-19B, 2B S/G Atmos Dump Vlv, is CLOSED.

☐ **10.** CLOSE MV-08-17, 2B S/G ADV Isol.

☐ **11.** PLACE the control switch for auxiliary feed, Pump 2B, in STOP.

☐ **12.** ENSURE MV-09-10, Pump 2B Disch to SG 2B Valve, is CLOSED.

☐ **13.** ENSURE MV-09-12, Pump 2C to SG 2B, is CLOSED.

☐ **14.** PLACE MV-08-12, SG 2B Stm to AFW PP 2C, in CLOSE.

☐ **15.** ENSURE MV-08-18B, 2B S/G Atmos Dump Vlv, is CLOSED.

☐ **16.** CLOSE MV-08-16, 2B S/G ADV Isol.

☐ **17.** PERFORM the following LOCAL operations:

☐ **A.** UNLOCK and CLOSE V09158, 2C AFW Pump to 2B S/G Isolation.

☐ **B.** UNLOCK and CLOSE V09136, 2B AFW Pump to 2B S/G Isolation.

☐ **C.** CLOSE SE-08-1, Main Steam to 2C AFW Pump Warm-up Valve Solenoid.

☐ **D.** If SE-08-1, Main Steam to 2C AFW Pump Warm-up Valve Solenoid is NOT CLOSED or suspected of leaking,
Then CLOSE V08883, SE-08-1 Inlet Isolation.

(continued on next page)

OPERATIONS SHIFT TURNOVER REPORT

UNIT 2 CONTROL ROOM **Day: Today**

Desk RCO: **Board RCO:**

Protected Train: **A**

Unit 2 Identified RCS Leakage: **0** **Unit 2 Unidentified RCS Leakage: 0**

Unit 2 Scheduled Activities per the OSP:

2A Heater Drain Pump has a severe shaft seal leak and must be removed from service. Perform down power to remove 2A Heater Drain Pump from service.

Upcoming ECOs to Hang or Release:

2A AFW – release ECO when work is complete.

Tech Spec Action Statement:

None.

OPS 513's:

None

Locked in Annunciators:

G-28 – 2A AFW Pump OVRLD/Trip

M-24 – 2C Charging Pump Suct Press Low/OVRLD/Trip

Current Status:

Unit 2 is at 100% power, steady state, MOL

Equipment Problems:

2C Charging Pump OOS for repack.

2A AFW Pump OOS to repair oil leak. (is expected to be back in service within one hour)

Critical Task Evaluation Sheet

Critical Task	Acceptance Criteria
Close 2B MSIV.	Places the 2B MSIV control switch in the CLOSE position. Verifies red light OFF & green light ON. This action is critical to prevent continued steaming of a faulted S/G and resultant excessive cooldown. The MSIV must be closed prior to completion of step 4.0.7.A of 2-EOP-05 to complete the task successfully.
Stop one RCP when T_{cold} < 500°F	If T_{cold} approaches 500°F and SIAS has not caused the crew to already secure one RCP in each loop, stopping one pump becomes a critical task due core uplift concerns. The pump must be stopped before going below 500°F to successfully complete the task.
Terminate AFW flow to 2B S/G. (Isolate 2B S/G)	Places the 2B AFW pump control switch to the STOP position. Verifies red light OFF & green light ON. This task is critical in order to stop feeding a faulted S/G and thus minimizes cooldown. Must be performed at least by the completion of Appendix R to successfully complete the task.

Facility: St. Lucie	Scenario No.: 5	Op Test No.: HLC-19 NRC	
Examiners: ______	Operators:	SRO:	
______		RO:	
______		BOP:	

Initial Conditions: IC-14, 30% power, MOL. 6 gpm dilution to compensate for Xenon. 2B Main Feedwater pump is out of service to replace the oil cooler. 2C Charging pump is out of service for repack.

Turnover: Crew is to perform an up power to 45% power. 2B Main Feedwater pump is out of service to replace the oil cooler. Not expected back this shift. 2C Charging pump is out of service for repack. Chemistry limits have been cleared to perform an up power within the capacity of the operating Main Feedwater pump.

Critical Tasks:

- Close 2A Diesel output breaker
- Crosstie 2A AFW pump to feed 2B SG

Event No.	Malf. No.	Event Type*	Event Description
1		R / RO & SRO N / BOP	Power increase to approximately 45%.
2	1	C / RO T.S. SRO	Loss of 2B Component Cooling Water Pump
3	2	I / RO	Selected Pressurizer Level Channel LT 1110X fails high
4	3	T.S. SRO	PORV 1474 Acoustic Monitor fails high
5	4	I / BOP T.S. SRO	Reference leg failure on 2A Steam Generator causes LT-9013D, LT-9005, and LT-9012 to fail high.
6	5	M / All	LOOP / Loss of Feedwater
7	6	C / BOP	2B Diesel does not start. 2A Diesel output breaker does not close
8	7	C/ BOP	2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open
9	8	C / BOP	Crosstie 2A AFW pump to feed 2B Steam Generator

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

Scenario Event Description

NRC Scenario 5

St. Lucie

The unit will be turned over to the crew at 30% power. The 2B Main Feedwater Pump is out of service to replace the oil cooler. The crew will increase power to approximately 45%.

A loss of the 2B Component Cooling water pump will require the crew to swap the AB electrical to the B side to take T.S. credit for the 2C Component Cooling water pump.

Selected Pressurizer Level LT 1110X fails high requiring the RO to swap level channels.

Acoustic monitor for PORV 1474 will annunciate and fail high. The crew will determine this failure is only instrument failure and not a leaking PORV. The SRO is to evaluate T.S. for accident monitoring.

The reference leg fails on 2A Steam Generator causing LT-9013D, LT-9005 and LT-9012 to fail high. The crew will need to take manual control of 2A FRV (FCV-9011) to restore level to normal in 2A S/G

A LOOP combined with a loss of feedwater will occur. The 2B Diesel will not start and the 2A Diesel output breaker will not close. The output breaker can be closed from the RTGB. The 2C AFW pump will trip on AFAS or manual start and cannot be restarted. The 2A AFW pump MV-09-9, 2A AFW pump to 2A SG, will not open. The crew is expected to crosstie the 2A AFW pump to feed the 2B SG.

The Crew will enter 2-EOP-09. LOOP, LOFC prior to entering 2-EOP-06 due to AFAS-2 actuating approximately 15 minutes after the trip and AFAS-1 actuating approximately 20 minutes after the trip.

2-EOP-06 Total Loss of Feedwater may not be entered if feed is restored to the 2B S/G in EOP-09. The scenario can be terminated when the crew has closed the 2A Diesel output breaker and the 2B SG is being fed by the 2A AFW pump.

Procedures Used

- 2-GOP-201, Reactor Plant Startup – Mode 2 to Mode 1
- 2-GOP-101, Reactor Operating Guidelines During Steady State and Scheduled Load Changes
- 2-GOP-502, Data Sheets Required for Heatup
- 2-0310030, Component Cooling Water – Off- Normal Operation
- 2-NOP-52.02 Alignment Of 2AB Buses And Components
- 2-0120035, Pressurizer Pressure and Level
- 2-0700030, Main Feedwater
- 2-EOP-01, Standard Post Trip Actions
- 2-EOP-06, Total Loss of Feedwater
- 2-ONP-09.02, Auxiliary Feedwater
- 2-EOP-09, LOOP

Technical Specifications Entered

- 3.7.3 Component Cooling Water System
- 3.3.3.6 Accident Monitoring

Op Test No.:	HLC-19A	Scenario #	5	Event #	1	Page	3	of 21
Event Description:		Power increase to approximately 45%.						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Initiate IC #14 30% power. Xenon building in, 6 gpm dilution rate. MOL. 2C Charging Pump OOS for repack. 2B MFW Pump OOS to repair oil cooler.		
Indications **NOTE: Inform the crew 2-GOP-201 step 6.1.27 has been completed and power ascension is approved.**		
	SRO	Direct power increase IAW 2-GOP-201 step 6.128 (attached page 4)
		Directs Placing MSRs in service ~ 300 MW per 2-GOP-502, Data Sheets Required For Heatup, Appendix – AA (attached page 5-8) as directed.
		Directs Control of Rx power and ASI IAW 2-GOP-101 Rx Operating Guidelines step 6.1 (attached, page 9-10)
	RO	Commences dilution for power increase IAW 2-NOP-02.24 step 6.5 (attached page 11-13)
		Withdraws CEA's to control Rx power and ASI IAW 2-GOP-101 Rx Operating Guidelines step 6.1 (attached page 9-10) • CEA Withdrawal, select MS on the CEDMCS Control Switch • Move the IN/HOLD/OUT Switch to the OUT direction
	BOP	Programs DEH for power increase at a rate IAW 2-GOP-101 step 6.1.2.D Category 4. (attached page 9-10) • Set reference by ensuring REF selected and then depress desired MW endpoint, select ENTER • Depress LOAD RATE type in desired load rate and select ENTER • Depress GO pushbutton
		Places MSRs in service ~ 300 MW per 2-GOP-502, Data Sheets Required For Heatup, Appendix – AA as directed. (attached page 5-8)

Next scenario page =14

6.125 (continued) INITIAL

6. If Exhaust Hood temperatures are less than 150°F (TR-22-6B points 3, 7, 8 and 10), Then:

   A. CLOSE V12396, 2A LP Turb Spray Hdr TCV-22-61A Bypass. ______

   B. CLOSE V12403, 2B LP Turb Spray Hdr TCV-22-61B Bypass. ______

6.126 When Turbine load is approximately 250 MW, Then VERIFY that secondary chemistry values are less than the minor inleakage limits of ONOP 2-0610030, Secondary Chemistry - Off Normal. ______ CHEM

NOTE
Based on JPN Engineering Evaluation, the RE Supervisor, may recommend to Operations that any or all of the 30% Reactor Power level surveillance may be performed at 45% following a power ascension that was NOT as a result of a refueling outage.

6.127 ¶10 If required, Then prior to Reactor Power reaching 30% as indicated on the highest reading instrument, PERFORM the following: ______

1. STOP the power ascension. ______
2. NOTIFY SCE or I&C to perform DCS Steam Generator Feedwater Discharge Coefficients Verification per 2-NOP-102.01. ______ SCE / I&C
3. PERFORM 2-OSP-69.01, Nuclear / Delta T Power Calibration. ______
4. ENSURE scheduled incore surveillance have been performed. ______
5. ENSURE the Incore Detection System is OPERABLE in accordance with OSP-64.01, Reactor Engineering Periodic Tests, Checks and Calibrations. ______

NOTE
The power ascension may continue while the MSRs are being placed in service.

6.128 When Turbine load is approximately 300 MW, Then PERFORM Appendix AA of 2-GOP-502, Placing MSRs In Service. ______

APPENDIX AA
PLACING MSRs IN SERVICE
(Page 1 of 4)

INITIAL

Date ____/____/____

1. DEPRESS the Reset pushbutton on the Reheater Control System. ______

2. VERIFY locally the MSR TCVs are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
TCV-08-1	MS to 2A MSR	CLOSED	
TCV-08-7	MS to 2A MSR	CLOSED	
TCV-08-3	MS to 2B MSR	CLOSED	
TCV-08-9	MS to 2B MSR	CLOSED	
TCV-08-4	MS to 2C MSR	CLOSED	
TCV-08-10	MS to 2C MSR	CLOSED	
TCV-08-2	MS to 2D MSR	CLOSED	
TCV-08-8	MS to 2D MSR	CLOSED	

NOTE
A large steam demand may occur while opening the MSR Block Valves The MSR Block Valves should be opened one at a time, allowing time for the RCS to stabilize.

3. POSITION the MSR Block Valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-4	2A Block TCV	OPEN	
MV-08-6	2D Block TCV	OPEN	
MV-08-8	2B Block TCV	OPEN	
MV-08-10	2C Block TCV	OPEN	

APPENDIX AA
PLACING MSRs IN SERVICE
(Page 2 of 4)

INITIAL

NOTE
Quench water to the MSRs will be supplied immediately upon opening the MSR Block Valves.

4. When the MSR Block Valves are open, Then THROTTLE OPEN the following components to adjust MSR subcooling flow to app 5 to 7 gpm on applicable indicator:

COMPONENT	DESCRIPTION	INDICATOR	INITIAL
V09322	SE-09-1A 2A, MSR Subcooling Dwnstrm Isol	FI-09-4A = 5 to 7 gpm	
V09319	SE-09-1B 2B MSR, Subcooling Dwnstrm Isol	FI-09-4B = 5 to 7 gpm	
V09328	SE-09-1C 2C MSR, Subcooling Dwnstrm Isol	FI-09-4C = 5 to 7 gpm	
V09325	SE-09-1D 2D MSR, Subcooling Dwnstrm Isol	FI-09-4D = 5 to 7 gpm	

NOTE
- When the MSR TCVs have started the warm up period by either automatic or manual control, the Turbine startup should continue.
- If the wrong pushbutton is depressed, the controller can be reset by depressing the Reset pushbutton
- Ramp starts a 2 hour timed opening of TCV-08-7, 8, 9 and 10 (small TCVs). This is followed by a 30 minute time delay and then a 10 minute timed opening of TCV-08-1, 2, 3 and 4 (large TCVs). Total time is 2 hours and 40 minutes until TCV-08-1, 2, 3 and 4 indicate open.

5. If automatic startup is desired, Then DEPRESS the Ramp pushbutton. ______

APPENDIX AA
PLACING MSRs IN SERVICE
(Page 3 of 4)

INITIAL

CAUTION
If the manual valve positioner is NOT on zero before pushing the Manual Valve Position pushbutton, the TCVs will OPEN to a position relative to the manual valve positioner setpoint and possibly damage the MSRs from the resultant thermal stresses.

6. If manual startup is desired, Then PERFORM the following:

A. ENSURE the manual valve positioner is on zero. ______

B. DEPRESS the Manual Valve Position pushbutton. ______

C. Slowly OPEN the TCVs by rotating the manual valve positioner. Manual opening of the MSR TCVs should take approximately 2 hours. ______

7. After the MSR TCVs are OPEN, Then PERFORM the following:

A. POSITION the small TCV isolation valves as follows.

COMPONENT	DESCRIPTION	POSITION	INITIAL
V08381	TCV-08-7 Isol	CLOSED	
V08370	TCV-08-7 Isol	CLOSED	
V08378	TCV-08-8 Dwnstm Isol	CLOSED	
V08382	TCV-08-8 Upstrm Isol	CLOSED	
V08383	TCV-08-9 Isol	CLOSED	
V08372	TCV-08-9 Isol	CLOSED	
V08375	TCV-08-10 Isol	CLOSED	
V08384	TCV-08-10 Isol	CLOSED	

B. ALIGN the MSR vents to the 5A and 5B Feedwater Heaters as follows

COMPONENT	DESCRIPTION	POSITION	INITIAL
V11446	2A MSR to Extr Stm Isol	OPEN	
V11451	2B MSR To Extr Stm Isol	OPEN	
V11117	2C MSR To Extr Stm Isol	OPEN	
V11122	2D MSR To Extr Stm Isol	OPEN	

APPENDIX AA
PLACING MSRs IN SERVICE
(Page 4 of 4)

7. (continued) INITIAL

C. ALIGN the MSR vents to the Condenser as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V11508	2B Cndsr Vent From 2A MSR Isol	CLOSED	
V11507	2B Cndsr Vent From 2B MSR Isol	CLOSED	
V11520	2B Cndsr Vent From 2C MSR Isol	CLOSED	
V11227	2A Cndsr From 2D MSR Tube Bundle Vent Isol	CLOSED	

D. ALIGN the MSR Warm Up Valves as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
MV-08-5	Warmup 2A MSR	CLOSED	
MV-08-7	Warmup 2D MSR	CLOSED	
MV-08-9	Warmup 2B MSR	CLOSED	
MV-08-11	Warmup 2C MSR	CLOSED	

Reviewed by ______________________________ Date ____/____/____
SRO

END OF APPENDIX AA

6.0 INSTRUCTIONS

6.1 Power Level Escalations

NOTE

CEAs should be above the Long-term Steady State Insertion Limit (102 inches withdrawn on Group 5) before reaching 20% core power and at a position to begin controlling ASI at the ESI between 20% and 50% power Refer to NOP-100.02, Axial Shape Index Control, for further guidance.

1. As Main Generator loading commences, MAINTAIN T-avg at T-ref by:

   A. CEA withdrawal in Manual Sequential.

   AND / OR

   B. Boron concentration changes in accordance with 2-NOP-02.24, Boron Concentration Control.

2. At or above 50% power:

   A. All planned reactivity additions should be made by boration or dilution in accordance with 2-NOP-02.24, Boron Concentration Control.

   B. USE CEAs for ASI control, CONSIDER the reactivity effect of CEAs when adjusting ASI.

   C. REFER to NOP-100.02, Axial Shape Index Control, for specific instructions regarding ASI control during power escalations.

   D. ¶1 When raising Reactor power, all power escalation rates should be within the following fuel preconditioning guidelines:

Category	Max Core Power Escalation Rate	Max Equivalent Turbine Generator Load Rate
1	3%/HR at or above 15% Power	.42 MW/MIN
2	3%/HR above 50% Power	.42 MW/MIN
3	20%/HR above 50% Power	2.80 MW/MIN
4	30%/HR above 50% Power	4.2 MW/MIN

6.1 Power Level Escalations (continued)

2. D. (continued)

> **NOTE**
> To determine the correct category for a power escalation, Appendix B, Fuel Preconditioning Guidelines Worksheet, may be used. Contact Reactor Engineering if further assistance is required.

Category Definitions:

1. Category 1:
   a. INCREASE in power to a level which has not been previously sustained in this core cycle for at least 72 continuous hours.

2. Category 2:
   a. INCREASE in power following 30 continuous days or more at a power level less than 70% of rated thermal power

   OR

   b. INCREASE in power to a level which has not been maintained for more than 3 continuous hours during the past 60 days.

3. Category 3:
   a. INCREASE in power to a level which has not been maintained for 3 continuous hours or more during the past 8 days.

4. Category 4:
   a. INCREASE in power to a level which has been maintained for 3 continuous hours or more during the past 8 days.

3. If available, Then ENSURE two Charging Pumps are operating. If necessary, START an additional Charging Pump in accordance with 2-NOP-02.02, Charging and Letdown.

4. PLACE the Pressurizer on recirculation in accordance with Appendix A, Pressurizer Recirculation Guidelines.

5. CONTINUE to load the Main Generator in accordance with 2-GOP-201, Reactor Plant Startup, Mode 2 to Mode 1.

END OF SECTION 6.1

6.5 Aligning for MANUAL Dilution

NOTE

- An Operator Aid has been placed at RTGB-205 PNL "N". Any revision to this section of the procedure shall verify the validity of the Operator Aid and, if changes are necessary, a Label Request shall be initiated to incorporate these changes on a new Operator Aid placard.
- The Operations Supervisor SHALL be notified and a CR submitted of any unexplained or unplanned Reactivity change in accordance with OPS Policy 534 (i.e., >.5 deg Tcold change or >.5% power change).
- If a Reactivity management issue occurs, refer to procedure ADM-09.11, Reactivity Management.
- If constant dilution is desired then ensure flow on FIC-2210X is observable.
- Engineering Assessment of FIC-2210X PMW Flow, shows that there could be an error up to ~± 0.5 gpm, and the recommended minimum flow rate is 2 gpm

1. ☐ ☐ ☐ ☐ ENSURE Section 3.0, Prerequisites is completed at least once per shift
2. ☐ ☐ ☐ ☐ ENSURE Section 4.0, Precautions / Limitations, has been reviewed at least once per shift.
3. ☐ ☐ ☐ ☐ ¶2 ENSURE calorimetric power is less than 100.00% prior to any dilutions by obtaining a DCS calorimetric power.
4. ☐ ☐ ☐ ☐ DETERMINE the desired volume of primary water to be added
5. ☐ ☐ ☐ ☐ PLACE the Makeup Mode Selector switch in MANUAL.
6. ☐ ☐ ☐ ☐ ENSURE FIC-2210X, PMW Flow, is in MANUAL <u>and</u> REDUCE the controller output to ZERO
7. ☐ ☐ ☐ ☐ ENSURE FIC-2210Y, Boric Acid Flow is in MANUAL <u>and</u> REDUCE the controller output to ZERO.
8. ☐ ☐ ☐ ☐ ENSURE either Primary Makeup Water Pump is running.
9. ☐ ☐ ☐ ☐ PLACE FCV-2210X, Primary Makeup Water Control Switch in Auto
10. ☐ ☐ ☐ ☐ <u>If</u> diluting to the VCT, <u>Then</u> OPEN V-2512, Reactor Makeup Water Stop Vlv. /R24A
11. ☐ ☐ ☐ ☐ <u>If</u> diluting to the Charging Pump suction, <u>Then</u> OPEN V-2525, Boron Load Control Valve. /R24A

6.5 Aligning for MANUAL Dilution (continued)

CAUTION
To preclude lifting the VCT relief valve while using V-2525, do NOT allow PMW flowrate to exceed the running Charging pump(s) capacity.

12. ☐ ☐ ☐ ☐ ADJUST FIC-2210X PMW Flow in AUTO or MANUAL to desired flowrate (and if using V-2525 do NOT exceed the flowrate for the number of running Charging Pumps).

13. ☐ ☐ ☐ ☐ MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.

14. ☐ ☐ ☐ ☐ If necessary to maintain the desired VCT level, Then DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position:

    A. ☐ ☐ ☐ ☐ ENSURE V2500 VCT Divert Valve indicates OPEN

    B. ☐ ☐ ☐ ☐ When the desired VCT level is reached, PLACE V2500 in AUTO.

    C. ☐ ☐ ☐ ☐ ENSURE V2500 indicates CLOSED.

15. ☐ ☐ ☐ ☐ When the desired amount of primary water has been added, Then CLOSE FCV-2210X, Primary Makeup Water.

16. ☐ ☐ ☐ ☐ If V-2512 Reactor Makeup Water Stop Vlv was opened, Then PLACE V-2512 in CLOSE and ENSURE it indicates CLOSED

17. ☐ ☐ ☐ ☐ If V-2525 Boron Load Control Valve was opened, Then PLACE V-2525 in CLOSE and ENSURE it indicates CLOSED.

18. ☐ ☐ ☐ ☐ ENSURE FIC-2210X, PMW Flow controller is in MANUAL and RECUCE output to MINIMUM

19. ☐ ☐ ☐ ☐ MONITOR for any abnormal change in T_{ave}.

20. ☐ ☐ ☐ ☐ §1 RECORD on Data Sheet 1, Boration / Dilution Log, the number of gallons of Primary Makeup Water added as indicated on FQI-2210X, PMW Flow Totalizer.

21. ☐ ☐ ☐ ☐ If additional dilutions are desired, or if the expected changes to T_{ave} or Boron concentration are NOT achieved, Then REPEAT Steps 6 5 1 through 6.5 20

6.5 Aligning for MANUAL Dilution (continued)

22. ☐ ☐ ☐ ☐ If it is desired to restore the Boron Concentration Control system to the Automatic Mode of Operation, Then REFER to Section 6.1, Aligning for Automatic VCT Makeup. R24A

23. After review by the Unit Supervisor is complete, this document may be discarded.

END OF SECTION 6.5

Op Test No.:	HLC-19A	Scenario #	5	Event #	2	Page	4	of	21
Event Description:	Loss of 2B Component Cooling Water Pump								

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed by examiner, trigger Loss of 2B CCW pump. Trigger AB Battery Charger when requested by Control Room. SNPO reports 2B CCW motor outboard bearing is very hot and discolored.		
Indications Available: Increasing amps on 2B CCW pump. Alarms: S-2: 2B CCW Hdr Flow High/Low S-32: 2B CCW PUMP OVRLD/ TRIP, alarms and will clear after pump trip. S-26: 2C CCW PUMP HDR VALVES/AB BUS MISALIGNMENT, while aligning 2C pump. S-15: Fuel Pool HX CCW Flow High/Low T-4(T-5,T-6, U-1): CNTMT Fan CLR HVS-1A (1B, 1C, 1D) CCW Flow Low		
	SRO/RO/ BOP	Recognize loss of 2B CCW pump.
	TS SRO	Enters T.S. 3.7.3. (72 hour action to restore 2 CCW pumps, 2 hours to ensure valve lineup commensurate with electrical lineup) (Attached page 18)
NOTE: SRO May elect to stop the power increase (go to hold on the turbine).		
		Enters **2-0310030, Component Cooling Water** - Off-Normal Operation (attached pages 15-16), and directs lineup of 2C CCW pump to replace 2B CCW pump per step 6.2.3.B 1 & 2
		Directs swapping of 2AB bus to the B side per step 6.2.3.B.4 thru 2-NOP-52.02, Alignment Of 2AB Buses And Components, step 4.1.4 A thru C (attached page 17)
		Directs starting the 2C CCW pump per step 6.2.3.B.5
		Directs placing 2B CCW pump to Pull To Lock positions per step 6.2.3.B.7

Next scenario page = 19

6.2 Subsequent Action (continued)

3. A. (continued)

CAUTION
If 2AB AC and DC Busses are not all completely powered from the A side, Then do NOT take Technical Specification Credit for the 2C CCW pump until alignment has been completed.

6. VERIFY the pressures and flows return to normal.

7. PLACE the 2A CCW pump control switch to the PULL TO LOCK position.

8. If the 480V Load Center 2AB and DC bus 2AB are NOT completely aligned to the A side, Then REALIGN the 480V Load Center 2AB and DC bus 2AB to the A side per 2-NOP-52.02, Alignment of 2AB Busses and Components.

B. Loss of the 2B CCW Pump.

1. ENSURE Closed:

- MV-14-1, 2C CCW Pump Discharge to A Header

AND

- MV-14-3, 2C CCW Pump Suction from A Header

2. ENSURE Open:

- MV-14-2, 2C CCW Pump Discharge to B Header

AND

- MV-14-4, 2C CCW Pump Suction from B Header

3. If SDC is in service and CCW is completely lost to an SDC Heat Exchanger, Then SDC flow must be terminated to the affected heat exchanger prior to restoring CCW flow. REFER to ONOP 2-0440030, Shutdown Cooling Off-Normal.

4. ¶2 If the 2C CCW Pump is NOT electrically aligned to the B Electrical Bus AND the Unit is in Modes 1-4, Then REALIGN the 2AB 4.16KV Bus to the B Side per 2-NOP-52.02 PRIOR to starting the 2C CCW Pump on the 2B CCW Header.

6.2 Subsequent Action (continued)

3. B. (continued)

5. START the 2C CCW Pump.

CAUTION

If 2AB AC and DC Busses are not all completely powered from the B side, Then do NOT take Technical Specification Credit for the 2C CCW pump until alignment has been complete.

6. VERIFY the pressures and flows return to normal.

7. PLACE the 2B CCW pump control switch in the PULL TO LOCK position.

8. ¶2 If the 480V Load Center 2AB and DC bus 2AB are NOT completely aligned to the B side, Then REALIGN the 480V Load Center 2AB and DC bus 2AB to the B side per 2-NOP-52.02, Alignment of 2AB Busses and Components.

C. Loss of two (2) CCW Pumps

CAUTION

- REFER to off-normal operating procedure 2-ONP-25.01, Loss of RCB Cooling Fans, for appropriate direction
- §12 Sufficient Containment Fan Coolers (HVS-1A, HVS-1B, HVS-1C or HVS-1D) are required to be in operation to maintain Containment air temperature less than or equal to 120°F. This is necessary to maintain the reactor vessel support structure within design basis Operator action is required within 45 minutes, to restore air temperature to less than or equal to 120°F or initiate reactor trip cooldown to at least Hot Shutdown.

1. ¶3 If the health and safety of the public is in jeopardy, Then ATTEMPT **ONLY ONE** restart.

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

> **NOTE**
>
> While performing Section 4 1 Step 4, the following annunciators will be received
>
> - B-48, 4 16KV SWGR 480V LC/MCC 2AB UV (RTGB 201)
> - S-26, 2C CCW PUMP HDR VALVES/AB BUS MISALIGNMENT (RTGB 206)

4. **ALIGN** 4160V Bus 2AB to B side, as follows:

   A. At RTGB 201, **VERIFY** the following tie breakers are OPEN:

   - Bkr 1-20501, 1AB 4 16 KV BUS SBO TIE
   - Bkr 2-20501, 2AB 4 16 KV BUS SBO TIE

   B. **VERIFY** the following pump control switches are in PULL-TO-LOCK:

   - Component Cooling Water Pump 2C (RTGB 206)
   - Intake Cooling Water Pump 2C (RTGB 202)

   C. At RTGB 201, **PERFORM** the following:

   (1) **OPEN** Bkr 2-20505, 4.16KV BUS TIE 2AB/2A3.

   (2) **OPEN** Bkr 2-20208, 4.16KV BUS TIE 2A3/2AB.

   (3) **CLOSE** Bkr 2-20409, 4 16KV BUS TIE 2B3/2AB

   (4) **CLOSE** Bkr 2-20504, 4 16KV BUS TIE 2AB/2B3.

5. **ALIGN** 480V Load Center 2AB to B side, as follows

   A. **REFER TO** Technical Specifications 3.3 3 1 for the Plant Vent Stack Radiation Monitor.

   B. IF Charging Pump 2C is running, THEN **ALIGN** charging pumps per 2-NOP-02 02, Charging and Letdown, to prepare for the loss of Charging Pump 2C

PLANT SYSTEMS

3/4.7.3 COMPONENT COOLING WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.3 At least two independent component cooling water loops shall be OPERABLE.*

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With only one component cooling water loop OPERABLE, restore at least two loops to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.3 At least two component cooling water loops shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 18 months during shutdown by verifying that each automatic valve servicing safety-related equipment actuates to its correct position on an SIAS test signal.

---

* When CCW pump 2C is being used to satisfy the requirements of this specification, the alignment of the discharge valves shall be verified to be consistent with the appropriate power supply at least once per 24 hours. Upon receipt of annunciation for improper alignment of the pump 2C motor power in relation to any of its motor-operated discharge valves positions, restore proper system alignment within 2 hours.

Op Test No.:	HLC-19A	Scenario #	5	Event #	2	Page	5	of 21
Event Description:		Loss of 2B Component Cooling Water Pump						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available: **Examiners Note: Due to the time needed to swap the 2AB 480V and 2AB DC bus, consider moving on with scenario and initiate Event 3. (Typical time for crews to perform the below is 30-40 minutes)**		
	SRO	If time permits directs realignment of 2AB 480VAC Load Center and DC bus 2AB to B side per 2-NOP-52.02, alignment of 2AB Busses and Components, steps 4.1.1 thru 4.1.3, 4.1.5, 4.1.6 (attached page 20-30)
		Contacts Shift manager to report trip of 2B CCW pump and entry into **2-0310030, Component Cooling Water**
	RO	Monitors primary plant and adjusts dilution rate as necessary.
	BOP	Goes to Hold on turbine if directed.
		Lines up 2C CCW pump per step 6.2.3.B 1 & 2 (attached pages 15-16)
		Swaps of 2AB bus to the B side as directed per step 6.2.3.B.4 thru 2-NOP-52.02, Alignment Of 2AB Buses And Components, step 4.1.4 A thru C (attached pages 20-30). This causes annunciators B-48 (4.16KV SWGR 480V LC/MCC 2AB UV) and S-16 (EMERG 125VDC/4.16KV/480V AB Busses Misaligned) to alarm
		Starts the 2C CCW pump as directed per step 6.2.3.B.5
		Places 2B CCW pump to Pull To Lock position per step 6.2.3.B.7
		If directed realign the 2AB 480VAC Load Center and DC bus 2AB to B side as directed per 2-NOP-52.02, alignment of 2AB Busses and Components steps 4.1.1 thru 4.1.3, 4.1.5, 4.1.6
	T.S. SRO	T.S. 3.3.3.1, Radiation Monitoring Instrumentation, action 27 Plant Vent on 480 VAC SWGR swap loss of power.(72 hour action)

Next scenario page = 31

4.0 INSTRUCTIONS

4.1 <u>Transfer of 2AB Buses and Components from A Side to B Side</u>

1. **REMOVE** the Vital AC SUPS Rectifier from service by performing the following:

   A. At 125V DC Bus 2D, **ENSURE** Bkr 2-61303, PLANT VITAL AC SUPS, is ON

   B. At 480V MCC 2AB, **ENSURE** Bkr 2-42434, CONST. VOLTAGE TRANSFORMER, is ON.

   C. At Vital AC SUPS Inverter, **PERFORM** the following

      (1) **ENSURE** the following breakers are ON

      - CB1, BATTERY INPUT
      - CB4, ALTERNATE SOURCE AC INPUT

      (2) **NOTIFY** Control Room to expect the receipt of annunciator B-33, 120 VAC VITAL/SECURITY/FIRE INVTR TROUBLE (RTGB 201), alarm.

      (3) **PLACE** CB3, AC INPUT, in OFF.

      (4) **VERIFY** INVERTER SUPPLYING LOAD light remains ON.

      (5) **VERIFY** the following lights are ON:

      - INVERTER ON DC BATTERY POWER
      - 480 VOLTS AC FAILURE
      - FAN FAILURE

   D. At 480V MCC 2AB, **PLACE** Bkr 2-42433, INVERTER RECTIFIER, in OFF

   E. **NOTIFY** Control Room the Vital AC SUPS rectifier is removed from service

   F. **VERIFY** annunciator B-33, 120 VAC VITAL/SECURITY/FIRE INVTR TROUBLE (RTGB 201), alarm received

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

2. **REMOVE** the Fire and Security SUPS Rectifier from service by performing the following:

   A. At 125VDC Bus 2D, **ENSURE** Bkr 2-61305, SECURITY VITAL SUPS, is ON

   B. At 480V MCC 2C, **ENSURE** Bkr 2-42508, PS & FD INVERT., is ON.

   C. At Fire Detection & Station Security Vital A.C. SUPS Inverter, **PERFORM** the following:

      (1) **ENSURE** the following breakers are ON:

      - CB1, BATTERY INPUT
      - CB4, ALTERNATE SOURCE AC INPUT

      (2) **NOTIFY** Control Room to expect the receipt of B-33, 120 VAC VITAL/SECURITY FIRE INVTR TROUBLE (RTGB 201), alarm

      (3) **PLACE** CB 403, AC INPUT, in OFF

      (4) **VERIFY** INVERTER SUPPLYING LOAD light remains ON

      (5) **VERIFY** the following lights are ON:

      - FAN FAILURE
      - AC POWER FAILURE
      - BATTERY CURRENT

   D. At 480V MCC 2AB, **PLACE** Bkr 2-42415, INVERTER SEC SUPS RECT., in OFF

   E. **NOTIFY** Control Room the Fire and Security SUPS Rectifier is removed from service

   F. **VERIFY** annunciator B-33, 120 VAC VITAL/SECURITY FIRE INVTR TROUBLE (RTGB 201), alarm received

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

3. TRANSFER DC Bus 2AB to DC Bus 2B by performing the following:

   A. **VERIFY** Battery Charger 2A and/or 2-AA is supplying power to 125V DC Buses 2A and 2AA.

   B. **VERIFY** Battery Charger 2B and/or 2-BB is supplying power to 125V DC Buses 2B and 2BB.

   C. At 480V MCC 2AB, **ENSURE** Bkr 2-42413, BATTERY CHARGER 2AB, is positioned to ON.

   D. At Battery Charger 2AB, **PERFORM** the following:

      (1) **ENSURE** the OFF/ON switch is positioned to ON.

      (2) **ENSURE** 2AB BATTERY CHARGER AC INPUT BREAKER is positioned to ON.

CAUTION

If the AC input breaker is in OFF. then to ensure proper charger warm up, the AC input breaker should be positioned to ON at least 15 minutes prior to placing the DC output breaker to ON.

      (3) **ENSURE** 2AB BATTERY CHARGER DC OUTPUT BREAKER is positioned to ON.

      (4) **VERIFY** DC output voltage is 132 to 137 VDC in the float mode

      (5) IF DC voltage is outside the 132 to 137 VDC range, THEN **PERFORM** the following:

         a. **PLACE** 2AB BATTERY CHARGER DC OUTPUT BREAKER in OFF

         b. **PLACE** 2AB BATTERY CHARGER AC INPUT BREAKER in OFF

         c. **NOTIFY** the US/NWE

      (6) IF the DC output voltage is satisfactory, THEN **PLACE** Battery Charger 2AB in the equalize mode by turning the equalizer timer to HOLD.

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

3. **(continued)**

> **NOTE**
>
> The following alarms on RTGB 201 may be received during the performance of Section 4 1 Step 3 E through Section 4.1 Step 3.J due to no charge conditions on the respective side:
>
> - A20, 125V DC BATT CHGR 2B/2BB TROUBLE
> - A50, 125V BATT CHGR 2AB TROUBLE
> - B20, 125V DC BATT CHGR 2A/2AA TROUBLE

E. At 125V DC Bus 2AB, **PLACE** Bkr 2-60326, CKT #26 (Battery Charger 2AB), in ON.

F. IF DC amperage on Battery Charger 2AB does **NOT** increase as expected, THEN PERFORM the following:

(1) Immediately **PLACE** Bkr 2-60326, CKT #26 (Battery Charger 2AB), in OFF

(2) **CONTACT** US/NWE for further instructions.

G. **NOTIFY** Control Room that Battery Charger 2AB is powering 125V DC Bus 2AB.

> **NOTE**
>
> When performing Section 4.1 Step 3.H, the following annunciators will ALARM:
>
> - S-16, EMERG 125VDC/4.16KV/480V AB BUSES MISALIGNED (RTGB 206)
> - B-60, EMERG 125V DC/4.16KV/480V AB BUSES MISALIGNED (RTGB 201)

H. At RTGB 201, **PERFORM** the following:

(1) **OPEN** Bkr 2-60335, TIE 2AB/2A.

(2) **OPEN** Bkr 2-60143, TIE 2A/2AB.

4.1 Transfer of 2AB Buses and Components from A Side to B Side (continued)

3\. H. **(continued)**

(3) **CLOSE** Bkr 2-60243, TIE 2B/2AB.

(4) **CLOSE** Bkr 2-60333, TIE 2AB/2B

I. **VERIFY** the following annunciators are in ALARM:

- S-16, EMERG 125VDC/4.16KV/480V AB BUSES MISALIGNED (RTGB 206)
- B-60, EMERG 125V DC/4.16KV/480V AB BUSES MISALIGNED (RTGB 201)

J. At Battery Charger 2AB, **TURN** the equalizer timer to zero (0).

K. **VERIFY** Battery Chargers 2B and/or 2-BB are carrying some load.

L. At 125V DC Bus 2AB, **PLACE** Bkr 2-60326, CKT #26 (Battery Charger 2AB), in OFF.

M. **NOTIFY** Control Room that Battery Charger 2AB is in hot standby.

N. **ENSURE** the following battery charger trouble alarms are CLEAR by resetting their associated reflash panels, if necessary

- B-20, 125V DC BATT CHGR 2A/2AA TROUBLE (RTGB-201) - Reflash Panel RA-RAB-11/B-20 (RAB/49/RA2/RAJ) and Reflash Panel RA-RAB-26/B-20 (RAB/48/N-RA4/E-RAK)
- A-20, 125V DC BATT CHGR 2B/2BB TROUBLE (RTGB-201) Reflash Panel RA-RAB-10/A-20 (RAB/48/N-RA3/E-RAK) and Reflash Panel RA-RAB-27/A-20 (RAB/48/S-RA3/W-RAK)
- A-50, 125V DC BATT CHGR 2AB TROUBLE (RTGB-201) - Reflash Panel RA-RAB-12/A-50 (RAB/48/N-RA2/E-RAL)

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)** INITIAL

5. (continued)

C. IF Control Room A/C HVA/ACC-3C is operating, THEN **ALIGN** Control Room air conditioning per 2-NOP-25.07, Control Room Ventilation System, to prepare for the loss of HVA/ACC-3C

NOTE

Refer to Attachment 2, Expected Alarms When Transferring 480V Load Center 2AB Power Source, for alarms received when performing the following step.

D. At RTGB 201, **PERFORM** the following:

(1) **OPEN** Bkr 2-40702, 480V BUS TIE 2AB/2A2.

(2) **OPEN** Bkr 2-40220, 480V BUS TIE 2A2/2AB.

(3) **CLOSE** Bkr 2-40504, 480V BUS TIE 2B2/2AB.

(4) **CLOSE** Bkr 2-40706, 480V BUS TIE 2AB/2B2.

6. **VERIFY** the following annunciators are CLEAR

- B-60, EMERG 125V DC/4 16KV/480V AB BUSES MISALIGNED (RTGB 201)
- S-16, EMERG 125VDC/4.16KV/480V AB BUSES MISALIGNED (RTGB 206)

NOTE

Section 4 1, Steps 7 through 19, may be completed in any order

7. **ENSURE** N-45, WASTE MANAGEMENT LOCAL ALARM (RTGB-205) is CLEAR by locally acknowledging alarms on Waste Management Panel, if necessary.

8. **VERIFY** annunciators listed in Attachment 2 are CLEAR

9. **RESTORE** charging pumps to the desired lineup per 2-NOP-02.02, Charging and Letdown

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)** INITIAL

10. At RTGB-206, **ALIGN** 2C CCW Pump to 2B CCW header as follows:

A. **CLOSE** MV-14-1, PUMP 2C DISCH TO HEADER A. ______ ______ IV

B. **CLOSE** MV-14-3, HEADER A TO PUMP 2C ______ ______ IV

C. **OPEN** MV-14-4, HEADER B TO PUMP 2C. ______ ______ IV

D. **OPEN** MV-14-2, PUMP 2C DISCH TO HEADER B. ______ ______ IV

E. **VERIFY** annunciator S-26, 2C CCW PUMP HDR VALVES/AB BUS MISALIGNMENT, is CLEAR.

F. IF 2C CCW Pump is required to be running, THEN **START** 2C CCW Pump per 2-NOP-14.02, Component Cooling Water System Operation.

11. **ALIGN** 2C ICW Pump to 2B ICW header, as follows:

A. **LOCK CLOSED** SB21165, 2C ICW PUMP X-TIE DISCH To 'A' TRAIN ISOL (INTK/9/N-4/W-C). ______ ______ IV

B. **LOCK OPEN** SB21211, 2C ICW PUMP X-TIE DISCH To 'B' TRAIN ISOL (INTK/9/N-4/W-C) ______ ______ IV

C. IF 2C ICW Pump is required to be running, THEN **START** 2C ICW Pump per 2-NOP-21 03, Intake Cooling Water System Operation

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)** <u>INITIAL</u>

12. **ALIGN** HVA/ACC-3C, Control Room Area Supply Air Handling Unit, CCW supply and return headers to the 2B CCW header as follows:

    A. **LOCK CLOSED** V14510, SUPPLY HDR A TO HVA/ACC-3C CNTL ROOM A/C ISOL (RAB/70/S-RA2/W-RAI). _____ IV

    B. **LOCK CLOSED** V14518, HVA/ACC-3C CNTL ROOM A/C TO RETURN HDR A ISOL (RAB/70/S-RA2/E-RAJ). _____ IV

    C. **LOCK OPEN** V14506, SUPPLY HDR B TO HVA/ACC-3C CNTL ROOM A/C ISOL (RAB/70/N-RA2/W-RAI). _____ IV

    D. **LOCK OPEN** V14514, HVA/ACC-3C CNTL RM A/C TO RETURN HDR B ISOL (RAB/70/S-RA2/E-RAJ). _____ IV

13. IF HVA/ACC-3C is required for operation, THEN **START** HVA/ACC-3C per 2-NOP-25.07, Control Room Ventilation System

14. IF the Instrument Air Emergency Cooling System radiator fan and recirculation pump were in service, THEN **PERFORM** the following:

    A. Locally **START** Recirculation Pump (TGB/24/24/E-B)

    B. Locally **START** Radiator Fan (TGB/24/24/E-B)

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

> **NOTE**
>
> - Verification of proper Plant Vent Stack Radiation Monitor operation includes pump restart when power is restored.
> - Tech Spec 3 3 3.1 is applicable

15. **VERIFY** proper operation of RC-26-90, PLT VENT STACK RAD MONITOR, by performing the following.

    A. On Plant Auxiliary Control Board No 2, **VERIFY** OPER green LED is ON for the following:

    - LOW RANGE
    - EFF LEVEL

    B. On PC-11 Radiation Monitor, **VERIFY** the following parameters on Grid 4 are GREEN (normal):

    - AAL621
    - AAE624

    C. If indications are **NOT** normal, **PRESS** the FLOW pushbutton on RC-26-90, PLT VENT STACK RAD MONITOR panel to start sample flow

    D. If indications are still **NOT** normal, **CONTACT** I&C.

16. IF HVE-37, PASS Room Fan, was running, THEN locally **VERIFY** restart of the fan

17. **VERIFY** annunciator N-45, WASTE MANAGEMENT LOCAL ALARM (RTGB 205), is clear

18. **RESTORE** the Vital AC SUPS Rectifier to service by performing the following

    A. At 480V MCC 2AB, **PLACE** Bkr 2-42433, INVERTER RECTIFIER, in ON

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

18. **(continued)**

B. At Vital AC SUPS Inverter, **PERFORM** the following:

(1) **VERIFY** PRE-CHARGE light is ON.

(2) **PLACE** CB3, AC INPUT, in ON

(3) **VERIFY** INVERTER SUPPLYING LOAD light remains ON

(4) **VERIFY** the following indicating lights are OFF·

- INVERTER ON DC BATTERY POWER
- 480 VOLTS AC FAILURE
- FAN FAILURE

(5) **MONITOR** AC INPUT A C AMPERES meter for an increase indicating the rectifier has picked up the load

C. **NOTIFY** Control Room the Vital AC SUPS rectifier is returned to service

19. **RESTORE** the Fire and Security SUPS Rectifier to service by performing the following.

A. At 480V MCC 2AB, **PLACE** Bkr 2-42415, INVERTER SEC SUPS RECT , in ON.

B. At Fire and Security SUPS Inverter, **PERFORM** the following:

(1) **ENSURE** PRE-CHARGE light is ON

(2) **PLACE** CB 403, AC INPUT, breaker in ON

(3) **VERIFY** INVERTER SUPPLYING LOAD is ON

4.1 **Transfer of 2AB Buses and Components from A Side to B Side (continued)**

19. B. **(continued)**

(4) **VERIFY** the following indicating lights are off:

- AC POWER FAILURE
- BATTERY CURRENT
- FAN FAILURE

(5) **MONITOR** AC INPUT AC AMPERES meter for an increase indicating the rectifier has picked up the load.

C. **NOTIFY** Control Room the Fire and Security SUPS Rectifier is returned to service.

20. **VERIFY** annunciator B-33, 120 VAC VITAL/SECURITY/FIRE INVTR TROUBLE, alarm CLEAR (RTGB 201).

21. **VERIFY** Sewage Lift Station (located in the NE corner of the Turbine Building) is operating properly, as evidenced by the sound of the solenoids energizing and de-energizing

Op Test No.:	HLC-19A	Scenario #	5	Event #	3	Page	6	of	21

Event Description: Selected Pressurizer Level Channel LT 1110X fails high

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed by examiner, trigger LT 1110X fails high.		
Indications Available: Alarms		**H-17 Pzr Channel X Level High/Low** **LA-5 Pzr Channel X Level High**
	SRO / RO	Recognizes numerous alarms, Letdown increases to maximum, and diagnoses that Selected Pressurizer Level Channel LT 1110X failed high.
	SRO	Enters **2-0120035, Pressurizer Pressure And Level**. (attached page 32-34)
		Directs verify operable RRS channel selected
	TS/ SRO	Enters T.S 3.3.3.6a Accident Monitoring Table 3.3-10.12 Action A (7 day action) (Attached pages 35-36)
		Directs verifying proper operation of the Letdown system
		Directs selecting operable PZR Level Channel LT 1110Y.
		Contacts Shift manager to report failure of LT 1110X and entry into **2-0120035 Pressurizer Pressure And Level**
	RO	Recognizes that Letdown flow increases to maximum..
		Ensures operable channels selected for RRS and PZR level (attached pages 32-34).
	BOP	Monitors balance of plant and contacts I&C when directed to troubleshoot problem with LT 1110X.

Next scenario page = 37

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	
G. If (LOOP) Loss of Offsite Power has occurred with diesel generators supplying power and pressurizer level is greater than 27%, Then perform the following to regain pressurizer heaters:	
1. Manually close the breakers for pressurizer heater on 4160V buses Bkr 2-20204 on 2A3 bus Bkr 2-20403 on 2B3 bus.	
2. Manually reset the backup heater breakers B1 and B4 only (200 kw each).	
2. **ABNORMAL PRESSURIZER LEVEL CONDITION**	2.

NOTE
Appendix "B" contains a listing of pressurizer levels which are associated with automatic actions.

INSTRUCTIONS	CONTINGENCY ACTIONS
A. Verify selected RRS channel is operating properly	A. If the selected RRS channel has failed, Then shift to the operable channel. 1. NAVIGATE to the SBCS inputs screen on either FW FPD and reset the TAVE signal, if required
B. Ensure backup charging pump starts and letdown flow is decreasing, or the backup charging pump stops and letdown flow is increasing, whichever is applicable. (Appendix "B" contains expected automatic responses)	B. If automatic actions have NOT occurred, Then manually control charging and letdown flow as required.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
C. Verify level anomaly is NOT caused by a large rate of change in T-avg.	C. Slow the rate of change of T-avg or stabilize until level anomaly is controlled.
D. Verify "Letdown Isol. Valves", V-2515, V-2516, and V-2522 are open.	D. If letdown has isolated, Then secure charging and refer to 2-ONP-02.03, Charging and Letdown.
E. Verify selected pressurizer level control valve (LCV-2110P / LCV-2110Q) is operating properly.	E. If selected level control valve is NOT operating properly, Then take manual control of level control valve and refer to 2-ONP-02.03, Charging and Letdown.
F. Verify selected letdown pressure control valve (PCV-2201P / PCV-2201Q) is operating properly.	F. If selected pressure control valve is NOT operating properly, Then take manual control of pressure control valve and refer to 2-ONP-02.03, Charging and Letdown.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS

2. (continued)

NOTE

With less than 27% level on Channel X, the "A" pressurizer heater transformer feeder breaker (2-20204) trips and the "B" side 480V power supplies deenergize With less than 27% level on Channel Y, the "B" pressurizer heater transformer feeder breaker (2-20403) trips and the "A" side 480V power supplies deenergize. The backup interlock bypass keyswitch selected to the level position, allows the 480V heater power supplies to be reset.

G. Verify pressurizer level indicating controllers (selected and non-selected) are operating properly and power is available to pressurizer heaters.

CONTINGENCY ACTIONS

2. (continued)

G. If pressurizer heaters are deenergized or level indicating controller(s) failed, Then perform the following:

1. If either level control channel has failed, Then shift to the operable channel and reset heaters as follows:

   a. Place the backup interlock bypass keyswitch (RTGB-203) to the LEVEL position (This regains power to the proportional and backup heater banks controlled by the selected channel)

   b. Reset pressurizer heater banks as needed.

   OR

INSTRUMENTATION

ACCIDENT MONITORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.6 The accident monitoring instrumentation channels shown in Table 3.3-10 shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a.* With the number of OPERABLE accident monitoring channels less than the Required Number of Channels shown in Table 3.3-10, either restore the inoperable channel to OPERABLE status within 7 days, or be in HOT SHUTDOWN within the next 12 hours.

b.* With the number of OPERABLE accident monitoring channels less than the Minimum Channels OPERABLE requirements of Table 3.3-10, either restore the inoperable channels to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN within the next 12 hours.

c.** With the number of OPERABLE Channels one less than the Total Number of Channels shown in Table 3.3-10, either restore the inoperable channel to OPERABLE status within 7 days if repairs are feasible without shutting down or prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days following the event outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

d.** With the number of OPERABLE Channels less than the Minimum Channels OPERABLE requirements of Table 3.3-10, either restore the inoperable channel(s) to OPERABLE status within 48 hours if repairs are feasible without shutting down or:

1. Initiate an alternate method of monitoring the reactor vessel inventory; and

2. Prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days following the event outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status, and

3. Restore the Channel to OPERABLE status at the next scheduled refueling.

e. The provisions of Specification 3.0.4 are not applicable.

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* Action statements do not apply to Reactor Vessel Level Monitoring System, Containment Sump Water Level (narrow range) and Containment Sump Water Level (wide range) instruments.

** Action statements apply only to Reactor Vessel Level Monitoring System, Containment Sump Water Level (narrow range) and Containment Sump Water Level (wide range) instruments.

TABLE 3.3-10

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	REQUIRED NUMBER OF CHANNELS	MINIMUM CHANNELS OPERABLE
1. Containment Pressure	2	1
2. Reactor Coolant Outlet Temperature – T_{Hot} (Wide Range)	2	1
3. Reactor Coolant Inlet Temperature – T_{Cold} (Wide Range)	2	1
4. Reactor Coolant Pressure – Wide Range	2	1
5. Pressurizer Water Level	2	1
6. Steam Generator Pressure	2/steam generator	1/steam generator
7. Steam Generator Water Level – Narrow Range	1/steam generator	1/steam generator
8. Steam Generator Water Level – Wide Range	1/steam generator*	1/steam generator*
9. Refueling Water Storage Tank Water Level	2	1
10. Auxiliary Feedwater Flow Rate (Each pump)	1/pump*	1/pump*
11. Reactor Cooling System Subcooling Margin Monitor	2	1
12. PORV Position/Flow Indicator	2/valve***	1/valve**
13. PORV Block Valve Position Indicator	1/valve**	1/valve**
14. Safety Valve Position/Flow Indicator	1/valve***	1/valve***
15. Containment Sump Water Level (Narrow Range)	1****	1****
16. Containment Water Level (Wide Range)	2	1
17. Incore Thermocouples	4/core quadrant	2/core quadrant
18. Reactor Vessel Level Monitoring System	2*****	1*****

* These corresponding instruments may be substituted for each other.

** Not required if the PORV block valve is shut and power is removed from the operator.

*** If not available, monitor the quench tank pressure, level and temperature, and each safety valve/PORV discharge piping temperature at least once every 12 hours.

**** The non-safety grade containment sump water level instrument may be substituted.

***** Definition of OPERABLE: A channel consists of eight (8) sensors in a probe of which four (4) sensors must be OPERABLE.

Op Test No.:	HLC-19A	Scenario #	5	Event #	4	Page	7	of 21
Event Description:	PORV 1474 Acoustic Monitor fails high							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed by examiner, trigger PORV 1474 Acoustic Monitor fails high		
Indications Available: Alarms LC-1 PZR PORV/SAFETY OPEN **Examiners Note: If Applicants realize that only the Acoustic Monitor has failed, they may elect to swap PORV Block valves. (Open V1477 and Close V1476 and open breaker) This will allow T.S. 3.3.3.6 to be exited.**		
	SRO/RO/ BOP	Recognize that PORV 1474 Acoustic Monitor is in alarm.
	SRO	Enters **2-0120036, Pressurizer Relief/ Safety Valve** (attached page 38)
	T S SRO	Evaluates T.S. 3.3.3.6, Accident Monitoring Instrumentation action a.), may refer to 2-OSP-100.17, Accident Monitoring Instrumentation Monthly Channel Check, step 7.1.18 (attached pages 39-41)
		Directs checking plant parameters to determine if PORV is open by **2-0120036 Pressurizer Relief/ Safety Valve**, steps 7.2.1 by checking PORV 1474 Position indicating light, Discharge line temperature and Quench Tank parameters and documenting using Data Sheet 30.
		Determines that only the PORV 1474 Acoustic Monitor has failed.
		Contacts Shift manager to report PORV 1474 Acoustic Monitor has failed and entry into **2-0120036 Pressurizer Relief/ Safety Valve**
	BOP/RO	Observes tailpipe temperatures, pressurizer pressure stable, and determines PORV 1474 is not open.
	BOP/RO	Checks as directed plant parameters to determine if PORV is open by 2-0120036, steps 7.2.1 by checking PORV1474 Position indicating light, Discharge line temperature and Quench Tank parameters. Documents using Data Sheet 30.
	BOP/RO	Monitors balance of plant.

Next scenario page = 42

7.0 OPERATOR ACTIONS

7.1 Immediate Operator Actions

1. None

7.2 Subsequent Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS
1. RELIEF VALVE FAILURE OR LEAKAGE:	1.
A. Determine which PORV is open or leaking by observing acoustic flow monitors or PORV position indicating lights.	A. If it is NOT known which PORV is stuck open, Then immediately close both block valves (V-1476 and V-1477).
B. If a PORV has failed OPEN, Then place the control switch to OVERRIDE position and verify valve closure by 1. Position indicating lights. 2. Acoustic flow monitoring 3. Discharge line temperature 4. Quench tank parameters.	B. If the relief valve does NOT close and pressurizer pressure is less than 2300 psia, Then immediately close the applicable block valve (V-1476 or V-1477).

INSTRUMENTATION

ACCIDENT MONITORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.6 The accident monitoring instrumentation channels shown in Table 3.3-10 shall be OPERABLE.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

a.* With the number of OPERABLE accident monitoring channels less than the Required Number of Channels shown in Table 3.3-10, either restore the inoperable channel to OPERABLE status within 7 days, or be in HOT SHUTDOWN within the next 12 hours.

b.* With the number of OPERABLE accident monitoring channels less than the Minimum Channels OPERABLE requirements of Table 3.3-10, either restore the inoperable channels to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN within the next 12 hours.

c.** With the number of OPERABLE Channels one less than the Total Number of Channels shown in Table 3.3-10, either restore the inoperable channel to OPERABLE status within 7 days if repairs are feasible without shutting down or prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days following the event outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status.

d.** With the number of OPERABLE Channels less than the Minimum Channels OPERABLE requirements of Table 3.3-10, either restore the inoperable channel(s) to OPERABLE status within 48 hours if repairs are feasible without shutting down or:

1. Initiate an alternate method of monitoring the reactor vessel inventory; and

2. Prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within 30 days following the event outlining the action taken, the cause of the inoperability and the plans and schedule for restoring the system to OPERABLE status, and

3. Restore the Channel to OPERABLE status at the next scheduled refueling.

e. The provisions of Specification 3.0.4 are not applicable.

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* Action statements do not apply to Reactor Vessel Level Monitoring System, Containment Sump Water Level (narrow range) and Containment Sump Water Level (wide range) instruments.

** Action statements apply only to Reactor Vessel Level Monitoring System, Containment Sump Water Level (narrow range) and Containment Sump Water Level (wide range) instruments.

TABLE 3.3-10

ACCIDENT MONITORING INSTRUMENTATION

INSTRUMENT	REQUIRED NUMBER OF CHANNELS	MINIMUM CHANNELS OPERABLE
1. Containment Pressure	2	1
2. Reactor Coolant Outlet Temperature – T_{Hot} (Wide Range)	2	1
3. Reactor Coolant Inlet Temperature – T_{Cold} (Wide Range)	2	1
4. Reactor Coolant Pressure – Wide Range	2	1
5. Pressurizer Water Level	2	1
6. Steam Generator Pressure	2/steam generator	1/steam generator
7. Steam Generator Water Level – Narrow Range	1/steam generator	1/steam generator
8. Steam Generator Water Level – Wide Range	1/steam generator*	1/steam generator*
9. Refueling Water Storage Tank Water Level	2	1
10. Auxiliary Feedwater Flow Rate (Each pump)	1/pump*	1/pump*
11. Reactor Cooling System Subcooling Margin Monitor	2	1
12. PORV Position/Flow Indicator	2/valve***	1/valve**
13. PORV Block Valve Position Indicator	1/valve**	1/valve**
14. Safety Valve Position/Flow Indicator	1/valve***	1/valve***
15. Containment Sump Water Level (Narrow Range)	1****	1****
16. Containment Water Level (Wide Range)	2	1
17. Incore Thermocouples	4/core quadrant	2/core quadrant
18. Reactor Vessel Level Monitoring System	2*****	1*****

* These corresponding instruments may be substituted for each other.

** Not required if the PORV block valve is shut and power is removed from the operator.

*** If not available, monitor the quench tank pressure, level and temperature, and each safety valve/PORV discharge piping temperature at least once every 12 hours.

**** The non-safety grade containment sump water level instrument may be substituted.

***** Definition of OPERABLE: A channel consists of eight (8) sensors in a probe of which four (4) sensors must be OPERABLE.

7.1 (continued) INITIAL

16. *Verify PORV block valve position indicators are illuminated and indicate desired position (not required if the PORV block valves are closed and power is removed).

A. V1476 ______

B. V1477 ______

17. *Verify PORV Valve Position Indicators are illuminated and indicate desired position.

A. V1474 ______

B. V1475 ______

18. *Verify the following on the PORV and Safety Valve acoustic flow monitor (FI-01-1, FI-01-2, FI-01-3, FI-01-4 & FI-01-5):

A. No flow indication Red LEDs is illuminated. ______

B. Power available Red LEDs are illuminated. ______

7.2 If it has been evaluated that an accident monitoring instrument has failed the channel check, Then ensure that a plant work order is initiated and the instrument is entered in the equipment out-of-service program. Additionally, ensure those instruments determined to be satisfactory are removed from the equipment out-of-service program. Equipment out-of-service entries for CETs and HJTCs are documented on a form similar to Table 1 of this data sheet. A single generic EOOS entry is utilized. Table 1 will be maintained in the EOOS notebook along with the green PWO tags associated with the individual plant work orders. A single yellow dot will be affixed to the QSPDS monitor to identify that the system has pending work orders. ______

7.3 Ensure that Table 1 is placed in the review file at the beginning of each fuel cycle and a new Table 1 is initiated (transferring all existing EOOS entries to the new Table 1). ______

7.4 ¶3 *The Accident Monitoring Instrumentation checked by this Data Sheet has been verified against and meets the requirements of Tech Spec 3.3.3.6, Table 3.3-10. ______

Op Test No.:	HLC-19A	Scenario #	5	Event #	5	Page	8	of	21

Event Description: Reference leg failure on 2A Steam Generator causes LT-9013D, LT-9005, and LT-9012 to fail high.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed by examiner, trigger Reference leg failure on 2A S/G		
Indications Available: G-1: 2A S/G Level High/Low		
	SRO/RO/ BOP	Recognizes FRV FCV-9011 (2A S/G) going closed and subsequently diagnoses cause to be an instrument failure (reference leg failure).
	SRO	Enters **2-07000030, Main Feedwater.**(attached pages 44-47)
		Directs taking manual control of FCV-9011 (2A S/G) and restoring normal S/G level, step 6.1.1.
Examiners Note: If 2 or more SG Narrow Range Level Safety Channels on either SG indicate less than 50% and lowering, the crew would be required to trip the reactor at this time. Step 6.1.2 .(attached pages 44-47))		
Examiners Note: If the failure has not yet been diagnosed as a reference leg failure the SRO may direct performance of step 6.2.1 to compare DCS levels with the NR Level Safety Channels. .(attached pages 44-47)		
		May direct BOP to perform step 6.2.1 to ensure the FRV itself is working correctly. .(attached pages 44-47)
		Enters **2-ONP-99-01 Loss of Tech Spec Instrumentation** step 6.3.2.H (attached page 54)
		Directs BOP to bypass affected failed instrument channels IAW **2-ONP-99-01 Loss of Tech Spec Instrumentation** step 6.3.2.H
		Recognizes entry into Tech Spec 3.3.1 Table 3.3-1.8 Action 2.a (attached pages 48-50) and Tech Spec 3.3.2 Table 3.3-3.7.C Action 20.a (attached pages 51-53)
		Contacts Shift manager to report reference leg failure and entry into **2-07000030, Main Feedwater and 2-ONP-99-01 Loss of Tech Spec**

Next scenario page = 55

Op Test No.:	HLC-19A	Scenario #	5	Event #	5	Page	9	of 21

Event Description: Reference leg failure on 2A Steam Generator causes LT-9013D, LT-9005, and LT-9012 to fail high.

Time	Position	Applicant's Actions or Behavior
		Instrumentation
Booth Operator Instructions:		
Indications Available:		
	RO	Takes manual control of FCV-9011 (2A S/G) and restores normal S/G level, step 6.1.1. This action causes annunciator G-18, 2A FW Reg Sys in manual
	BOP	Bypasses affected failed instrument channels per **2-ONP-99-01 Loss of Tech Spec Instrumentation** step 6.3.2.H

Next scenario page = 55

Op Test No.:	HLC-19A	Scenario #	5	Event #	5	Page	9	of 21

Event Description: Reference leg failure on 2A Steam Generator causes LT-9013D, LT-9005, and LT-9012 to fail high.

Time	Position	Applicant's Actions or Behavior
		Instrumentation
Booth Operator Instructions:		
Indications Available:		
	RO	Takes manual control of FCV-9011 (2A S/G) and restores normal S/G level, step 6.1.1. This action causes annunciator G-18, 2A FW Reg Sys in manual
	BOP	Bypasses affected failed instrument channels per **2-ONP-99-01 Loss of Tech Spec Instrumentation** step 6.3.2.H

Next scenario page = 55

6.0 OPERATOR ACTIONS

6.1 Abnormal Steam Generator Level – Immediate Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS

1. If feedwater valve controller is malfunctioning, Then TAKE manual control and RESTORE normal S/G level.

2. If 2 or more SG Narrow Range Level Safety Channels on **EITHER** SG:

   - INDICATE less than or equal to 50% and lowering, /R38

   OR

   - are APPROACHING 50% UNCONTROLLABLY, /R38

   Then PERFORM the following:

   A. TRIP the reactor.

   B. TRIP the turbine.

   C. **GO TO 1-EOP-01, Standard Post Trip Actions.**

3. If 2 or more SG Narrow Range Level Safety Channels on **EITHER** SG INDICATE greater than or equal to 80% with a rising trend on SG wide range level and **ONE** of the following exists:

   - Reactor power is greater than or equal to 15%

   OR

   - Loss of Load trip is ENABLED (L-35 IS NOT IN ALARM).

   Then PERFORM the following:

   A. TRIP the reactor.

   B. TRIP the turbine.

   C. **GO TO 1-EOP-01, Standard Post Trip Actions.**

6.2 Abnormal Steam Generator Level (Subsequent Actions)

INSTRUCTIONS **CONTINGENCY ACTIONS**

CAUTION

- If Main Feed Regulating Valve(s) is pinned open and a Rx trip occurs, Main Feedwater Block Valve(s) must be CLOSED.
- ENSURE appropriate considerations and/or briefings occur prior to the initiation of actions in this procedure that could adversely affect reactivity.
- With one NR SG level channel bypassed and the remaining channel becomes inaccurate (signal drift or fail on scale), the FWCS will control to the inaccurate signal which could result in major FW valve and flow swings.
- If a SG NR level channel is bypassed, stationing a dedicated RCO at the FW controls should be considered.

NOTE

- A 1% change in wide range level is approximately equal to a 5% change in narrow range level.
- S/G wide range level indication will lead narrow range level indication by approximately 30 seconds to 2 minutes as feedwater flow to the steam generator changes. Therefore, wide range level should be used as a predictor in determining the need for changes in feedwater flow while feedwater regulating valves and/or bypass valves are in manual. For example, if narrow range level is falling but wide range level is stable or increasing, stop increasing feedwater flow to the S/G and wait for narrow range level to turn around. If S/G narrow range level is used as the only level trend indication, an overfeed condition could occur, and a feedwater isolation and/or turbine trip on high S/G level is extremely likely.
- Steam generator level control will be adversely effected by changes in steam generator pressure. For example, if steam generator pressures are not stable due to fluctuations in SBCS operation, this will be seen in steam generator level perturbations.
- If S/G level reaches 20.5% narrow range, a Rx trip will occur.
- 2 out of the 3 SG level channels used by the DCS on both Trains share a reference leg with each other as well as sharing it (i.e., same reference leg) with a Safety Level Channel (MD on "A" and MA on "B" Train). Because of this configuration, a reference leg leak would not only cause all 3 channel indicators to rise but would cause the DCS Arbitration logic to choose the failing (rising) NR level control channel resulting in an actual lowering of SG level. Any SG level alarms or DCS indications (particularly High Level) should be immediately compared against all four Safety Level Channels in order to ascertain actual SG level.

6.2 Abnormal Steam Generator Level (Subsequent Actions) (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

1. VERIFY SG level by comparing DCS indicated level with NR level Channels MA - MD on RTGB 102.

   A. If DCS and NR level channels agree in direction, Then proceed to Step 2.

   B. If the DCS NR and VALIDATED SG NR level indicators are High and / or rising and the majority of the NR level channels are indicating low and / or are lowering, Then PERFORM the following:

      1. GO TO the 1A (1B) S/G FW INPUTS screen.
      2. SELECT BYPASS for the NR Control Channel that is indicating High Level.
      3. VERIFY the VALIDATED SG level Output signal matches actual SG level.
      4. VERIFY that the Feedwater Control valves are Opening to return SG level back to setpoint.
      5. Check NR SG level channels and take appropriate actions for any deviating channels.
      6. Inform I&C and Engineering.

6.2 Abnormal Steam Generator Level (Subsequent Actions) (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

With the high power feedwater valve (FCV-9011/9021) in MANUAL and the low power feedwater valve (FCV-9005/9006) in AUTO the DCS algorithm provides a demand signal to the low power feedwater valve whenever the high power feedwater valve is re-positioned. This demand signal is designed to compensate for movement of the high power feedwater valve such that there is no net impact to flow (essentially an "opposite" signal). This signal may override the normal level and steam / feed flow demands if a large demand is placed on the high power valve (low power valve will open if high power valve is rapidly closed).

INSTRUCTIONS	CONTINGENCY ACTIONS
C. VERIFY FCV-9011 (FCV-9021), SG 1A (1B) FEED REG Valves are controlling SG levels at setpoint.	**C.1** If FCV-9011 (FCV-9021), SG 1A (1B) FEED REG Valves are NOT controlling SG levels at setpoint, Then PERFORM the following: **1.** ENSURE that the applicable control station, LIC-9005 for SG 'A' (or LIC-9006 for SG 'B'), LOW PWR M/A STA is selected to AUTO (A). **2.** PLACE applicable control station, FIC-9011 (FIC-9021), HIGH PWR M/A STA in MANUAL (M). **3.** CLOSE S/G 1A (1B) FEED REG Valve using the Manual Down Arrow until the 15% BYPASS Valve OPENS to 20% to 50% as indicated on the LOW PWR M/A STA POS indicator.

3/4.3 INSTRUMENTATION

3/4.3.1 REACTOR PROTECTIVE INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.1 As a minimum, the reactor protective instrumentation channels and bypasses of Table 3.3-1 shall be OPERABLE.

APPLICABILITY: As shown in Table 3.3-1.

ACTION:

As shown in Table 3.3-1.

SURVEILLANCE REQUIREMENTS

4.3.1.1 Each reactor protective instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations for the MODES and at the frequencies shown in Table 4.3-1.

4.3.1.2 The logic for the bypasses shall be demonstrated OPERABLE prior to each reactor startup unless performed during the preceding 92 days. The total bypass function shall be demonstrated OPERABLE at least once per 18 months during CHANNEL CALIBRATION testing of each channel affected by bypass operation.

4.3.1.3 The REACTOR TRIP SYSTEM RESPONSE TIME of each reactor trip function shall be demonstrated to be within its limit at least once per 18 months. Neutron detectors are exempt from response time testing. Each test shall include at least one channel per function such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific reactor trip function as shown in the "Total No. of Channels" column of Table 3.3-1.

TABLE 3.3-1

REACTOR PROTECTIVE INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. Manual Reactor Trip	4 4	2 2	4 4	1, 2 3*, 4*, 5*	1 5
2. Variable Power Level – High	4	2(a)(d)	3	1, 2	2#
3. Pressurizer Pressure – High	4	2	3	1, 2	2#
4. Thermal Margin/Low Pressure	4	2(a)(d)	3	1, 2	2#
5. Containment Pressure – High	4	2	3	1, 2	2#
6. Steam Generator Pressure – Low	4/SG	2/SG(b)	3/SG	1, 2	2#
7. Steam Generator Pressure Difference – High	4	2(a)(d)	3	1, 2	2#
8. Steam Generator Level – Low	4/SG	2/SG	3/SG	1, 2	2#
9. Local Power Density – High	4	2(c)(d)	3	1	2#
10. Loss of Component Cooling Water to Reactor Coolant Pumps	4	2	3	1, 2	2#
11. Reactor Protection System Logic	4	2	3	1, 2 3*, 4*, 5*	2# 5
12. Reactor Trip Breakers	4	2(f)	4	1, 2 3*, 4*, 5*	4 5
13. Wide Range Logarithmic Neutron Flux Monitor					
a. Startup and Operating – Rate of Change of Power – High	4	2(e)(g)	3	1, 2	2#
b. Shutdown	4	0	2	3, 4, 5	3
14. Reactor Coolant Flow – Low	4/SG	2/SG(a)(d)	3/SG	1, 2	2#
15. Loss of Load (Turbine Hydraulic Fluid Pressure – Low)	4	2(c)	3	1	2#

TABLE 3.3-1 (Continued)

ACTION STATEMENTS

ACTION 2 -

a. With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. The channel shall be returned to OPERABLE status no later than during the next COLD SHUTDOWN.

b. With the number of channels OPERABLE one less than the Minimum Channels OPERABLE, STARTUP and/or POWER OPERATION may continue provided the following conditions are satisfied:

1. Verify that one of the inoperable channels has been bypassed and place the other inoperable channel in the tripped condition within 1 hour.

2. All functional units affected by the bypassed/tripped channel shall also be placed in the bypassed/tripped condition.

With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed below:

Process Measurement Circuit	Functional Unit Bypassed
1. Safety Channel – Nuclear Instrumentation	
Wide Range	Rate of Change of Power – High (RPS)
Linear Range	Variable Power Level – High (RPS) Local Power Density – High (RPS) Thermal Margin/Low Pressure (RPS)
2. Pressurizer Pressure -	Pressurizer Pressure – High (RPS) Thermal Margin/Low Pressure (RPS) Pressurizer Pressure – Low (ESF)
3. Containment Pressure -	Containment Pressure – High (RPS) Containment Pressure – High (ESF)
4. Steam Generator Pressure -	Steam Generator Pressure – Low (RPS) Thermal Margin/Low Pressure (RPS) AFAS-1 and AFAS-2 (AFAS) Steam Generator Pressure – Low (ESF)
5. Steam Generator Level -	Steam Generator Level – Low (RPS) If SG-2A, then AFAS-1 (AFAS) If SG-2B, then AFAS-2 (AFAS)

INSTRUMENTATION

3/4.3.2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.2 The Engineered Safety Features Actuation System (ESFAS) instrumentation channels and bypasses shown in Table 3.3-3 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3-4.

APPLICABILITY: As shown in Table 3.3-3.

ACTION:

a. With an ESFAS instrumentation channel trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3-4, declare the channel inoperable and apply the applicable ACTION requirement of Table 3.3-3 until the channel is restored to OPERABLE status with the trip setpoint adjusted consistent with the Trip Setpoint value.

b. With an ESFAS instrumentation channel inoperable, take the ACTION shown in Table 3.3-3.

SURVEILLANCE REQUIREMENTS

4.3.2.1 Each ESFAS instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations during the MODES and at the frequencies shown in Table 4.3-2.

4.3.2.2 The logic for the bypasses shall be demonstrated OPERABLE during the at power CHANNEL FUNCTIONAL TEST of channels affected by bypass operation. The total bypass function shall be demonstrated OPERABLE at least once per 18 months during CHANNEL CALIBRATION testing of each channel affected by bypass operation.

4.3.2.3 The ENGINEERED SAFETY FEATURES RESPONSE TIME of each ESFAS function shall be demonstrated to be within the limit at least once per 18 months. Each test shall include at least one channel per function such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific ESFAS function as shown in the "Total No. of Channels" column of Table 3.3-3.

TABLE 3.3-3 (Continued)

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
6. LOSS OF POWER (LOV)					
a. (1) 4.16 kV Emergency Bus Undervoltage (Loss of Voltage)	2/Bus	2/Bus	1/Bus	1, 2, 3	17
(2) 480 V Emergency Bus Undervoltage (Loss of Voltage)	3/Bus	2/Bus	2/Bus	1, 2, 3	17
b. (1) 4.16 kV Emergency Bus Undervoltage (Degraded Voltage)	3/Bus	2/Bus	2/Bus	1, 2, 3	17
(2) 480 V Emergency Bus Undervoltage (Degraded Voltage)	3/Bus	2/Bus	2/Bus	1, 2, 3	17
7. AUXILIARY FEEDWATER (AFAS)					
a. Manual (Trip Buttons)	4/SG	2/SG	4/SG	1, 2, 3	15
b. Automatic Actuation Logic	4/SG	2/SG	3/SG	1, 2, 3	15
c. SG Level (2A/2B) – Low	4/SG	2/SG	3/SG	1, 2, 3	20a*, 20b*, 20c
8. AUXILIARY FEEDWATER ISOLATION					
a. SG 2A – SG 2B Differential Pressure	4/SG	2/SG	3/SG	1, 2, 3	20a*, 20b*, 20c
b. Feedwater Header 2A – 2B Differential Pressure	4/SG	2/SG	3/SG	1, 2, 3	20a*, 20c

TABLE 3.3-3 (Continued)

TABLE NOTATION

ACTION 20 - With the number of channels OPERABLE one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:

a. The inoperable channel is placed in either the bypassed or tripped condition within 1 hour. If an inoperable SG level channel can not be restored to OPERABLE status within 48 hours, then AFAS-1 or AFAS-2 as applicable in the inoperable channel shall be placed in the bypassed condition. If an inoperable SG DP or FW Header DP channel can not be restored to OPERABLE status within 48 hours, then both AFAS-1 and AFAS-2 in the inoperable channel shall be placed in the bypassed condition. The channel shall be returned to OPERABLE status no later than during the next COLD SHUTDOWN.

b With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed in ACTION 13.

c. With the number of channels OPERABLE one less than the Minimum Channels OPERABLE, operation may proceed provided one of the inoperable channels has been bypassed and the other inoperable channel placed in the tripped condition within 1 hour. Restore one of the inoperable channels to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

6.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

- S/G level indicators are covered by Tech Spec 3.3.1, Table 3.3-1 for RPS and Tech Spec 3.3.2, Table 3.3-3 for ESFAS.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.

H. Steam Generator Level instrumentation indication:

- LIC-9013A/B/C/D
- LIC-9023A/B/C/D

H.1 PERFORM **ONE** of the following:

1. BYPASS the following channels affected by the failed instrument:
   - Lo Lvl SG RPS trip unit (key 104)
   - If SG-2A, Then AFAS-1
     AFAS cabinet door key 202
     chan A – key 203
     chan B – key 204
     chan C – key 205
     chan D – key 206
   - If SG-2B, Then AFAS-2
     AFAS cabinet door key 202
     chan A – key 203
     chan B – key 204
     chan C – key 205
     chan D – key 206
   - Place the affected channel steam generator Hi Lvl Override Keyswitch to bypass.
     chan A – key 15
     chan B – key 16
     chan C – key 17
     chan D – key 18

OR

Op Test No.:	HLC-19A	Scenario #	5	Event #	6, 7	Page	10	of	21

Event Description: LOOP / Loss of Feedwater, 2B Diesel does not start. 2A Diesel output breaker does not close.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed by examiner, trigger LOOP / Loss of Feedwater, 2B EDG should not auto start and 2A output breaker does not close.		
Indications Available: **When SNPO called by Control Room Local 2B EDG alarms in are:** **6-1: 2B EDG TRIP/LOCKOUT** **6-2: START DC FAILURE/ SS ISOL** **If asked, one minute later state, lockout unable to be reset.** **If requested, SNPO reports breaker 60221 has not tripped.**		
	SRO/RO/ BOP	Multiple alarms, recognize Reactor /Turbine trip
	SRO	Directs implementation of 2-EOP-01, "Standard Post Trip Actions" as follows: • RO: Reactivity control, Inventory Control, Pressure control, Core Heat Removal • BOP: Vital Auxiliaries, RCS heat removal, Containment Conditions.(2B EDG does not auto start)
		Recognizes that the 2B EDG did not start and that 2B EDG has alarm A-26, 2B Emerg D/G Lockout/SS Isol.
		Contacts the STA to report to the control room to assist with the event.
	Critical Task **SRO**	Recognizes that 2A EDG breaker did not close. Directs BOP to close the 2A EDG breaker.
	BOP	Recognizes that the 2B EDG did not start and that 2B EDG has alarm A-26, 2B Emerg D/G Lockout/SS Isol.
	Critical Task	Recognizes that 2A EDG breaker did not close. Close the 2A EDG breaker when directed.

Next scenario page = 74

Op Test No.:	HLC-19A	Scenario #	5	Event #	6, 7	Page	11	of 21
Event Description:	LOOP / Loss of Feedwater, 2B Diesel does not start. 2A Diesel output breaker does not close.							

Time	Position	Applicant's Actions or Behavior
	BOP	
Booth Operator Instructions:		
Indications Available:		
	BOP	Contacts SNPO to check out problem with 2B EDG
	RO	Performs EOP-01 Safety Functions as directed for Reactivity Control, Inventory Control, Pressure Control, Core Heat removal
		Reactivity Control • Verify Reactor power is lowering. • Verify startup rate is negative. • Verify a maximum of one CEA is not fully inserted.
		Inventory Control • Verify Pressurizer level is between 10 and 68% • Pressurizer level is trending to 30 – 35%
		Pressure Control • Verify RCS pressure is between 1800-2300 psia • Verify RCS pressure is trending 2225-2275 psia • Verify RCS subcooling is >20° F
		Core Heat Removal • Verify at least one RCP running with CCW. (LOOP, no RCP's running) • Verify loop delta T is <10° F
	BOP	Verifies turbine trip on reactor trip. Performs EOP-01 Safety functions as directed for: Vital Auxiliaries, RCS Heat Removal, Containment Conditions.

Next scenario page = 74

Op Test No.:	HLC-19A	Scenario #	5	Event #	6, 7	Page	12	of	21
Event Description:	LOOP / Loss of Feedwater, 2B Diesel does not start. 2A Diesel output breaker does not close.								

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	BOP	Ensures MSR Warmup Valves are CLOSED. Calls NPO to manually close due to loss of power.
		Notifies NPO to perform Appendix X section 1 of EOP-99.
		•
		Maintenance of Vital Auxiliaries • Verifies turbine governor and throttle valves closed • Verify GEN Brk open (East breaker, Mid Breaker and Exciter Breaker) • Verify all vital and non vital AC Buses energized. (closes 2A EDG output breaker) • All vital and non vital DC Buses energized.
		RCS Heat Removal • Verify at least one S/G has feedwater available. • Verify RCS T-avg is between 525 and 535°F by: • Places one ADV on 'A' side and one ADV on 'B' side in 'Auto' / 'Auto'
		Containment Conditions • Verify Containment pressure <2 psig. • Verify NO Containment radiation monitors in alarm. • Verify Containment temperature is less than 120°F. • Verify NO secondary plant radiation alarms.

Next scenario page = 74

Op Test No.:	HLC-19A	Scenario #	5	Event #	8, 9	Page	13	of 21
Event Description:	2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open, Crosstie 2A AFW pump to feed 2B Steam Generator							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger Restore Instrument Air when contacted by Control Room		
Indications Available:		
	SRO	Performs Diagnostic Flow Chart
		Exits EOP-01 to EOP-09, LOOP (attached pages 61-65)
		Directs STA SFSC's for EOP-09 performed every 15 minutes.
		Directs Appendix A of EOP-99, to Sample Steam Generators. (attached page 66-67). Directs HP to perform secondary surveys.
		Directs Ensure EDG Loading
		Directs Appendix H of EOP-99, 'Restore Instrument Air'
Examiners Note: If Instrument air is restored after 30 minutes with RCP CCW valves in auto, the CCW valves will re-open, which is in violation of above step.		
		Ensure RCP Seal; Cooling
Examiners note: If not completed within 30 minutes of loss of CCW, ensure CCW NOT restored to RCPs.		
		Directs RCS depressurized to 1800 to 1850 psia using auxiliary sprays. (key 76 and 77 to operate SE-02-3 and SE-02-4)
		Directs closing of MSIV's
		Directs closing of S/G blowdown and sample valves

Next scenario page = 74

Op Test No.:	HLC-19A	Scenario #	5	Event #	8, 9	Page	14	of 21
Event Description:	2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open, Crosstie 2A AFW pump to feed 2B Steam Generator							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When contacted by Control Room perform 2-ONP-09.02, Auxiliary Feedwater Appendix C steps 1A thru 1H as directed.		
Indications Available: Alarm: G-46, 2C AFW PUMP TURBINE FAILURE/Trip/OVRLD/SS ISOL		
	SRO	Directs Stabilize RCS Temperature.
		Directs Ensure S/G Level 60 to 70%
		If AFAS NOT actuated, direct AFW restored by manual starting of pumps and opening of valves IAW 2-NOP-09.02 **Auxiliary Feedwater System Operation** (attached page 68-69)
	RO	If Appendix H, 'Restore Instrument Air' not completed within 30 minutes of loss of CCW, ensures CCW is NOT restored to RCP's.
		RCS depressurized to 1800 to 1850 psia using auxiliary sprays as directed.
		Cycles a charging pump on and off as necessary to maintain Pressurizer level.
		Stabilizes RCS Temperature as directed.
		Ensures S/G Level 60 to 70% as directed
	BOP	Informs NPO to perform Appendix H, 2-EOP-99 restore Instrument Air, as directed
		Resets Instrument Air Compressors when notified by NPO

Next scenario page = 74

Op Test No.:	HLC-19A	Scenario #	5	Event #	8, 9	Page	15	of 21
Event Description:	2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open, Crosstie 2A AFW pump to feed 2B Steam Generator							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: 2C AFW overspeed trip linkage will not reset. MV 09-9 manual operator will not engage allowing opening the valve. **Reports to the Control Room that MV-09-9 is stuck and will not open.**		
Indications Available:		
	BOP	Aligns and initiates AFW flow to 2A and 2B SG IAW **2-NOP-09.02 Auxiliary Feedwater System Operation** (attached page 68-69)
		Contacts SNPO to open MV-09-9 locally
		Closes the MSIV's as directed.
		Closes the S/G blowdown and sample valves as directed.
		Performs EOP-99 Appendix X section 2 (attached page 70-75) as directed
		Recognizes 2C AFW pump trips when started. 2B AFW pump discharge valve solenoid fails to open.
EXAMINERS NOTE:		IF Crew responds to Safety Function Status Check on RCS Heat Removal, based on AFW and SG levels, within the required 15 minutes, they may use the appropriate ONP and NOP to restore AFW. IF this happens, they will not transition to EOP-6. See 2-NOP-09.02, Step 4.4.1, 2A AFW PUMP to 2B S/G (attached pages 59-67), and **2-ONP-09.02 "Auxiliary Feedwater**, Appendix C, Cross-Connect AFW (attached pages 70-71).

Next scenario page = 74

4.0 OPERATOR ACTIONS

INSTRUCTIONS | **CONTINGENCY ACTIONS**

NOTE

- Instruments should be channel checked when one or more confirmatory indications are available.
- Steps designated with an * may be performed non-sequentially or are to be performed continuously.

[*] 1. **Confirm Diagnosis**

VERIFY LOOP/LOFC Safety Function Status Check acceptance criteria are satisfied every 15 minutes.

1.1 REDIAGNOSE the event using 2-EOP-01 Chart 1, Diagnostic Flow Chart,
<u>and</u> GO TO ONE of the following:

- **The appropriate Optimal Recovery Procedure**
- **2-EOP-15, Functional Recovery**

[*] 2. **Classify Event**

EVALUATE EPIP Classification criteria for present plant conditions and Emergency Plan Actions.
REFER TO EPIP-01, Classification of Emergencies.

[ ] 3. **Implement Placekeeping**

OPEN the Placekeeper
<u>and</u> NOTE the time of EOP entry.

[ ] 4. **Sample Steam Generators**

Sample S/Gs.
REFER TO Appendix A, Sampling Steam Generators.

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 5. **Ensure EDG Loading**	
If a LOOP has occurred, Then ENSURE the following for **EACH** Vital 4.16 KV Bus:	
A. EDG has STARTED.	A.1 Locally START the EDG. **REFER TO** Appendix C, Diesel Generator Local Start.
B. EDG Output Breaker is CLOSED.	
C. LOOP Loads are ENERGIZED.	C.1 Manually ALIGN EDG loads. **REFER TO** Table 8, Emerg. Diesel Generator Loading (LOOP).
[*] 6. **Restore Instrument Air**	
If a LOOP has occurred, Then PERFORM **BOTH** of the following:	
A. ENSURE 2AB 480V Load Center is aligned to an energized bus.	
B. DISPATCH an operator to restore Instrument Air. **REFER TO** Appendix H, Operation of the 2A and 2B Instrument Air Compressors.	

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 7. **Ensure RCP Seal Cooling**	
A. VERIFY CCW to the RCPs.	A.1 If an SIAS or CIAS has isolated CCW to the RCPs, Then RESTORE CCW. **REFER TO** Appendix J, Restoration of CCW and CBO to the RCPs.
	A.2 If CCW is lost for greater than 30 minutes, Then PERFORM **BOTH** of the following:
	A. ENSURE CCW to the RCPs will remain isolated by PLACING the **FOUR** Containment CCW To/From RC Pump valves to CLOSE.
	B. ENSURE RCP controlled bleedoff will remain isolated by PLACING the **TWO** RCP Bleedoff valves to CLOSE.
B. If **BOTH** of the following conditions exist, • RCPs have CCW flow • CIAS has isolated the normal RCP bleedoff flowpath to the VCT Then ESTABLISH the alternate RCP bleedoff flowpath to the Quench Tank by OPENING V2507, RCP Bleedoff Relief Stop Vlv.	

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE Annunciator R-8 SIAS Channel A/B Actuation Block Permissive, alarms at a setpoint of 1836 psia.	
[*] **8. Depressurize the RCS** **A.** COMMENCE depressurizing the RCS to between 1800 and 1850 psia. **B.** MAINTAIN pressurizer level between 10 and 68%.	
[*] **9. Protect Main Condenser** **A.** If a LOOP has occurred, Then PERFORM **BOTH** of the following to protect the Secondary Plant: 1. ENSURE MSIVs are CLOSED. 2. ENSURE SGBD is ISOLATED. **B.** STABILIZE the Secondary Plant. **REFER TO** Appendix X, Secondary Plant Post Trip Actions, Section 2.	
[*] **10. Stabilize RCS Temperature** ENSURE RCS T_{COLD} is less than 535°F and controlled by operation of **ANY** of the following: • SBCS • ADVs	**10.1** If RCS T_{COLD} is greater than 535°F, Then VERIFY MSSVs are controlling RCS temperature. **10.2** If ADVs are unavailable, Then use alternate steaming paths. **REFER TO** Table 12, Alternate S/G Heat Removal Paths.

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **11. Ensure S/G Level 60 to 70% NR** ENSURE at least **ONE** S/G has level being maintained or restored to between 60 and 70% NR.	
[*] **12. Verify Pzr Level** VERIFY Pressurizer level meets **BOTH** of the following conditions: **A.** Within 10 to 68%. **B.** Trending to between 30 to 35%.	**12.1** OPERATE charging pumps and letdown as necessary to restore level.
[*] **13. Maintain RCS Within Figure 1A Limits** MAINTAIN the RCS less than the upper limits of Figure 1A, RCS Pressure Temperature, by performing **ANY** of the following: **A.** OPERATE Auxiliary Pressurizer sprays. **B.** OPERATE Pressurizer heaters.	**13.1** <u>If</u> the RCS is over-subcooled, <u>or</u> RCS pressure exceeds the upper limits of Figure 1A, RCS Pressure Temperature, <u>Then</u> RESTORE subcooling or pressure to within the appropriate limit: **A.** STABILIZE RCS temperature. **B.** DEPRESSURIZE the RCS using Auxiliary Pressurizer spray.

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 1 of 2)

A Train (√) B Train (√)

☐ 1. If a LOOP has occurred,
Then PERFORM **BOTH** of the following:

☐ A. ENSURE 2AB 480V Load Center is aligned to an energized bus.

☐ B. DISPATCH an operator to restore Instrument Air. **REFER TO** Appendix H, Operation of the 2A and 2B Instrument Air Compressors.

CAUTION

Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

NOTE

- HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open
- When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset

☐ 2. If SIAS has closed the 'N' Header valves,
Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

	A Train (√)	B Train (√)
• HCV-14-8A	___	
• HCV-14-9	___	
OR		
• HCV-14-8B		___
• HCV-14-10		___

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 2 of 2)

☐ **3.** If CIAS or high radiation has closed the SGBD Sample Valves,
Then OPEN FCV-23-7 and FCV-23-9 by PLACING the control switch to CLOSE / OVERRIDE and then to OPEN.

☐ **4.** DIRECT Chemistry to perform S/G samples for activity and boron.

☐ **5.** If S/Gs cannot be sampled,
Then DIRECT Health Physics to conduct secondary plant local area radiation surveys.

END OF APPENDIX A

4.4 Using Auxiliary Feed Pump Discharge Cross – tie Valves

INITIAL

4.4.1 2A AFW PUMP to 2B S/G.

NOTE

Control switches for MV-09-13 and MV-09-14 Cross-Tie valves are located in the 2A / 2B AFW PP Room. The control switches are key operated (#301). Two keys are necessary as the keys are removable in CLOSE only.

CAUTION

Opening both MV-09-13, 2A to 2B AFW HDR CROSS-TIE, and MV 09 14, 2B to 2A AFW HDR CROSS-TIE, while in Modes 1, 2, or 3 can only be performed by declaring one AFW train inoperable. (Section 7.1.3 Management Directive 1)

1. **ENSURE** PUMP 2A is running. ______
2. **OPEN** SE-09-2, 2A PUMP DISCH TO 2A S/G VLV. (KEY 83) ______
3. **ENSURE** the RCS is in MODEs 4, 5, or 6.

   Current plant MODE________ ______
4. **PLACE** MV-09-13, 2A to 2B AFW HDR CROSS-TIE, key switch (#301) to OPEN. ______
5. **VERIFY** valve is OPEN by local control box indication. ______
6. **PLACE** MV-09-14, 2B to 2A AFW HDR CROSS-TIE, key switch (#301) to OPEN. ______
7. **VERIFY** the valve is OPEN by local control box indication. ______

NOTE

MV-09-9 should be closed unless feeding of both S/Gs is desired.

8. **THROTTLE** MV-09-10, PUMP 2B DISCH TO SG 2B VALVE, as necessary to establish and maintain desired flow to 2B S/G. ______

4.4.1 2A AFW PUMP to 2B S/G. (continued) **INITIAL**

9. IF flow is desired to the 2A S/G while filling the 2B S/G, THEN **THROTTLE** MV-09-9, PUMP 2A DISCH TO SG 2A VALVE, as necessary to establish and maintain desired flow to 2A S/G. ______

10. IF desired, THEN **STOP** flow to the 2B S/G from the 2A AFW PUMP by performing the following:

    A. **CLOSE** MV-09-10, PUMP 2B DISCH TO SG 2B VALVE. ______

    B. **CLOSE** MV-09-14, 2B to 2A AFW HDR CROSS-TIE, by taking local key switch to CLOSE and removing key. ______

    ______ IV

    C. **CLOSE** MV-09-13, 2A to 2B AFW HDR CROSS-TIE, by taking local key switch to CLOSE and removing key. ______

    ______ IV

11. IF desired then **STOP** flow to the 2A S/G from the 2A AFW PUMP by CLOSING MV-09-9, PUMP 2A DISCH TO SG 2A VALVE. ______

12. **CLOSE** SE-09-2, 2A PUMP DISCH TO 2A S/G VLV. ______

13. IF steam generator feed is no longer desired, THEN **STOP** PUMP 2A. ______

Performed By: ______________________ ________ ________
Print/Sign Initials Date

Verified By: ______________________ ________ ________
Print/Sign Initials Date

APPENDIX X
SECONDARY POST TRIP ACTIONS
(Page 5 of 8)

Section 2: CONTROL ROOM ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 1. ENSURE **ONLY ONE** MFW Pump is RUNNING, with the control switch in RECIRC.	
☐ 2. ENSURE **ONLY ONE** Condensate Pump is RUNNING.	
☐ 3. If AFAS has actuated, and use of Main Feedwater is desired, Then PERFORM **ALL** of the following:	☐ 3.1 If AFAS has **NOT** actuated and use of Main Feedwater is desired, Then PERFORM **ALL** of the following:
☐ A. ENSURE AFAS is RESET.	☐ A. ENSURE **BOTH** S/G [Main FRV] Block valves CLOSED.
☐ B. ENSURE **BOTH** S/G [Main FRV] Block valves CLOSED. 1. MV-09-5 2. MV-09-6	☐ B. For **EACH** MFW header to be placed in service, ENSURE the associated MFIVs are OPEN.
☐ C. ENSURE **BOTH** Low Power M/A Stations in MANUAL.	☐ C. ENSURE **BOTH** Low Power M/A Stations in MANUAL.
☐ D. For **EACH** MFW header to be placed in service, ENSURE the associated MFIVs are OPEN.	☐ D. DEPRESS **BOTH** pushbuttons to RESET the Low Power Feedwater Valves.
☐ E. DEPRESS **BOTH** pushbuttons to RESET the Low Power Feedwater Valves.	☐ E. ADJUST the Low Power M/A Stations **AS NECESSARY** to control S/G levels.

APPENDIX X
SECONDARY POST TRIP ACTIONS
(Page 6 of 8)

Section 2: **CONTROL ROOM ACTIONS** (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
3. (continued)	
☐ F. ADJUST the Low Power M/A Stations **AS NECESSARY** to control S/G levels.	
☐ G. RESTORE AFW to the standby alignment.	
☐ 4. ENSURE **BOTH** Heater Drain Pumps are STOPPED.	
☐ 5. ENSURE **BOTH** of the following:	
☐ A. Bearing Oil Pump <u>and</u> Seal Oil Backup Pump RUNNING.	☐ A.1 ENSURE Emergency Bearing Oil Pump RUNNING.
☐ B. <u>When</u> the turbine reaches 600 rpm, <u>Then</u> Bearing Oil Lift Pump RUNNING.	
☐ 6. ENSURE the Turbine Drain Valves are OPEN.	
☐ 7. ENSURE **ONLY ONE** Turbine Cooling Water Pump is RUNNING.	
☐ 8. VERIFY Turbine Generator Bearing Oil temperature between 110 to 120°F.	☐ 8.1 DIRECT a field operator to adjust TCW to the in-service TLO Cooler to maintain outlet Oil temperature between 110 to 120°F.

APPENDIX X
SECONDARY POST TRIP ACTIONS
(Page 7 of 8)

Section 2: CONTROL ROOM ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 9. When Turbine speed reaches ZERO rpm, Then VERIFY the turning gear automatically ENGAGES.	☐ 9.1 PERFORM **ALL** of the following:
	☐ **A.** PLACE Turning Gear in MANUAL.
	☐ **B.** VERIFY the Turning Gear Permissive Light is ON.
	☐ **C.** Locally ENSURE the Turning Gear is ENGAGED.
	☐ **D.** Locally START the Turning Gear.
☐ 10. If Reactor power history is low, Then CONSIDER reducing steam generator blowdown flow to maintain RCS temperature.	
☐ **11. Place Boron Dilution Alarm System in Operation.** When indicated Reactor power is less than 10^{-5}%, Then PERFORM **BOTH** of the following:	☐ **11.1** If **BOTH** Boron Dilution Alarm System channels are NOT operating, Then PERFORM applicable actions of ONP-02.01, Boron Concentration Control.
☐ **A.** ENERGIZE **BOTH** channels of Startup Nuclear Instrumentation to place the Boron Dilution Alarm System in operation.	
☐ **B.** VERIFY **BOTH** Boron Dilution Alarm System Channels are operating.	

APPENDIX X
SECONDARY POST TRIP ACTIONS
(Page 8 of 8)

Section 2: **CONTROL ROOM ACTIONS** (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE
Excessive moisture can build up in CEDMC's room, and impact equipment reliability if 15 KW heaters are not energized after plant shutdown.

☐ 11. NOTIFY SNPO to energize 15 KW heater located in the CEDMC's room to minimize humidity build-up per 2-NOP-25.10, CEDMCS Air Conditioning System Operation.

☐ 12. CONSIDER contacting the Division Load Dispatcher for a switching order to OPEN the Main Generator disconnects.

END OF APPENDIX X

Op Test No.:	HLC-19A	Scenario #	5	Event #	8, 9	Page	16	of 21

Event Description: 2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open, Crosstie 2A AFW pump to feed 2B Steam Generator

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available: No AFW flow available		
EXAMINERS NOTE: Crew may not perform based on SFSC response in EOP-09.		
	SRO	Re - diagnose using diagnostic flow chart and exit to EOP-06 'Total Loss of Feedwater'
		Direct STA perform SFSC's for EOP-06 performed every 15 minutes.
		Direct HP to perform secondary surveys if not already performed.
		Direct RCS depressurized to 1800 to 1850 psia using auxiliary sprays if not already performed.
		Direct Appendix H, restore Instrument Air, of EOP-99 if not already performed.
		If Appendix H, 'Restore Instrument Air' not completed within 30 minutes of loss of CCW, ensure CCW NOT restored to RCP's if not already performed.
NOTE: When AB Bus is swapped in App-H AFW flow indication on RTGB will be restored.		
		Direct closing of S/G blowdown and sample valves if not already performed.
		Direct closing of MSIV's if not already performed.
		Direct EOP-99 Appendix X section 2 if not already performed.

Op Test No.:	HLC-19A	Scenario #	5	Event #	8, 9	Page	17	of	21
Event Description:	2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open, Crosstie 2A AFW pump to feed 2B Steam Generator								

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions:		
Indications Available:		
	SRO **Critical Task**	Direct Restore S/G Inventory by using **2-ONP-09.02, Auxiliary Feedwater** Appendix C steps 1A thru 1H (attached pages 77-78) if not already performed.
	BOP	Performs as directed SFSC's for EOP-06 every 15 minutes.
	RO	RCS depressurized to 1800 to 1850 psia using auxiliary sprays SE-02-3 and SE-0204, as directed if not already performed.
		If Appendix H, 'Restore Instrument Air' not completed within 30 minutes of loss of CCW, ensures CCW is NOT restored to RCP's.
	BOP	Contacts NPO to perform local steps in Appendix H, restore Instrument Air, of EOP-99 if not already performed.
		Resets Instrument Air Compressors when notified by NPO if not already performed.
		Closes the MSIV's as directed if not already performed.

Op Test No.:	HLC-19A	Scenario #	5	Event #	8, 9	Page	18	of 21
Event Description:	2C AFW pump trips and MV-09-9 2A AFW pump to 2A SG fails to open, Crosstie 2A AFW pump to feed 2B Steam Generator							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed by NPO (after appropriate time delay), trigger MV-09-13 and 14 open, and throttle MV-09-10 as directed.		
Indications Available:		
		Closes the S/G blowdown and sample valves as directed if not already performed.
		Performs EOP-99 Appendix X section 2 as directed if not already performed.
	BOP **Critical Task**	Restores S/G Inventory by using **2-ONP-09.02, Auxiliary Feedwater** Appendix C steps 1A thru 1H as directed. Contacts NPO to perform steps (attached pages 77-78)
NOTE: When NPO locally opens MV-09-10 this may cause an AFAS-1 lockout so 1-SE-09-2 will need to be opened.		
NOTE: The crew may not need to enter EOP-06 if feed is restored to the 2B S/G in EOP-09.		
		Suggested termination point: • 2A Diesel output breaker has been closed and • 2B S/G is being fed by the 2A AFW pump.

APPENDIX C
CROSS-CONNECTING AFW
(Page 1 of 4)

INITIAL

> **NOTE**
> If cross-tying AFW in Modes 1 - 3, Then the motor driven pump not being used to supply SGs must be declared out-of-service per the applicable Tech. Spec.

1. If 2A AFW Pump is to feed 2B S/G, Then PERFORM the following:

   A. ENSURE MV-09-10, Pump 2B Disch To S/G 2B Valve, is CLOSED. ______

   B. START Auxiliary Feedwater Pump 2A. ______

   C. OPEN SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83. ______

> **CAUTION**
> Opening both MV-09-13 and MV-09-14 while in Modes 1, 2, 3 could make two independent AFW flow path inoperable.

> **NOTE**
> Key-switches for MV-09-13 and MV-09-14 are located in 2A/2B AFW Pump Room Two keys are required since the keys are removable in CLOSE only.

   D. Locally OPEN MV-09-13, 2A To 2B AFW Hdr Cross-tie. ______ NPO

   E. Locally OPEN MV-09-14, 2B To 2A AFW Hdr Cross-tie. ______ NPO

> **CAUTION**
> Ensure total pump flow does not exceed 425 gpm.

   F. THROTTLE MV-09-10, Pump 2B Disch To SG 2B Valve, to establish desired flow rate. ______

> **NOTE**
> While feeding both S/Gs indicated flow is pump flow to both S/Gs.

   G. To feed the 2A S/G, THROTTLE MV-09-9, Pump 2A Disch To SG 2A Valve, to establish desired flow rate. ______

APPENDIX C
CROSS-CONNECTING AFW
(Page 2 of 4)

1. (continued) INITIAL

H. When the system is to be returned to normal, Then PERFORM the following:

1. CLOSE MV-09-10, Pump 2B Disch To SG 2B Valve. ______
2. If 2A S/G is being fed, Then CLOSE MV-09-9, Pump 2A Disch To SG 2A Valve. ______
3. STOP Auxiliary Feedwater Pump 2A. ______
4. CLOSE SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83. ______
5. Locally CLOSE MV-09-13, 2A To 2B AFW Hdr Cross-tie. ______ NPO
6. Locally CLOSE MV-09-14, 2B To 2A AFW Hdr Cross-tie. ______ NPO
7. PERFORM Independent Verification of the following:

COMPONENT	POSITION	IV INITIAL
MV-09-9, Pump 2A Disch To SG 2A Valve	CLOSED	
MV-09-10, Pump 2B Disch To SG 2B Valve	CLOSED	
SE-09-2, 2A Pump Disch To 2A S/G Vlv Key 83	CLOSED	
MV-09-13, 2A To 2B AFW Hdr Cross-tie	CLOSED	
MV-09-14, 2B To 2A AFW Hdr Cross-tie	CLOSED	

NOTE
If cross-tying AFW in Modes 1 - 3, Then the motor driven pump not being used to supply SGs must be declared out-of-service per the applicable Tech. Spec.

2. If 2B AFW Pump is to feed 2A S/G, Then PERFORM the following:

A. ENSURE MV-09-9, Pump 2A Disch to 2A S/G Valve, is CLOSED. ______

B. START Auxiliary Feedwater Pump 2B ______

C. OPEN SE-09-3, 2B Pump Disch To 2B S/G Vlv Key 84.

OPERATIONS SHIFT TURNOVER REPORT

UNIT 2 CONTROL ROOM **Day: Today**

Desk RCO: **Board RCO:**

Protected Train: **A**

Unit 2 Identified RCS Leakage: **0** **Unit 2 Unidentified RCS Leakage:** **.03**

Unit 2 Scheduled Activities per the OSP:

2B MFW pump OOS for cooler replacement, Not expected back this shift. .2C Charging pump out for repack , Chemistry limits have been cleared to perform an up power within the capacity of the operating Main Feedwater pump.

Upcoming ECOs to Hang or Release:

None.

Tech Spec Action Statement:

None.

OPS 513's:

None

Locked in Annunciators:

P-38, 2A/2B MFW Pump Disch MV-09-1/2 OVLD

M-48, 2C Charging Pump SS Isol V2553 OVLD

G-11, 2B FW Pump Trouble

Current Status:

29% power, MOL, 6gpm dilution, Chemistry limits checked OK to raise power per step 6.128 of 2-GOP-201.

Longstanding Problems:

None.

Inter-Office Correspondence

RE:PSL 10-001

To: Shift Manager

Date: January 11, 2010

From: Walter D. Mead, Jr. Department: **Reactor Engineering**

Subject: UNIT 2 POWER ASCENSION.

The following recommended guidance is provided by RE to raise reactor power from 30% to 45%. The Main Feed pump is scheduled to return Thursday night at 2300, and ascension to full power is expected to commence at midnight. A supplemental guidance letter will be released prior to the return to full power.

1. ASI is currently moving toward the top of the core (negative ASI movement) and is expected to trend in this manner until approximately 2300 this evening (1/11/10).
2. Raise power without withdrawing CEAs beyond 126".
3. The recommended power ascension rate is 20%/hr (3 MW/min).

Please contact Reactor Engineering should the need for additional guidance arise.

Walter D. Mead Jr.
Walter Mead
Reactor Engineering

John Harmon
John Harmon
Reactor Engineering Supervisor

For Exam Use Only

Critical Task Evaluation Sheet

Critical Task	Acceptance Criteria
Close 2A Diesel output breaker	BOP starts 2B D/G. Observes 2B D/G voltage, amperes, and frequency are normal, the diesel generator breaker closes, Bus 2B3 energizes, and loads sequence onto the 2B3 Bus as expected. If this task is not accomplished, it will result in creating an unnecessary Station Blackout. The failure of this critical task would be the point of entry into EOP-10, Station Blackout.
Crosstie 2A AFW pump to feed 2B SG	RO/BOP Ensure 2A AFW pump is running. Verifies red light ON & green light OFF, normal pump start & run current, and normal discharge flow to 2B S/G through the crosstie. If this task is not accomplished it will eventually result in loss of heat sink. The failure of this critical task would be if it is required to initiate Once Through Cooling per EOP-15, Functional Recovery.

Facility:	St. Lucie	Scenario No:	8	Op Test No.:	NRC HLC-19A

Examiners: ____________ ____________ ____________

Operators: SRO: ____________ RO: ____________ BOP: ____________

Initial Conditions: 2-3 % power, BOC. 2C Charging pump OOS for repack.

Turnover: 2-3% power. BOC, 1622 PPM boron, MTC approximately '0'. 2C Charging pump OOS for repack. MFW and SBCS are in service. Vacuum has been drawn in the Condenser. Directions for the shift: Raise power and place the Turbine on line.

Critical Task:

- Start 2A HPSI pump

Event No.	Malf. No.	Event Type*	Event Description
1		R / RO	Perform up power to 10%
2	1	T.S. SRO	CIS RM RIS-26-4-2 (B Channel) fails high. Bypass ESFAS bistable
3	2	C / RO	Individual CEA does not move out with group
4	3	C / RO C / BOP T.S. / SRO	2A2-2A3 Spurious Opening resulting momentary deenergization of 2A3 4.16 KV bus MCC 2A8 Fails to energize after bus re-energized
5	4	C / BOP	CCW B header rupture. HCV-14-10 fails to close
6a	5	C / ALL	SGTL 2B Steam Generator
6b	6	M / All	SGTR 2B Steam Generator
7	7	M / All	2A Steam Generator MSSV opens. Closes at 500 psia
8	8	C / RO	Failure of MSIS requires manual actuation
9	9	C / BOP	On SIAS 2A HPSI pump fails to start
10		C / BOP	Isolate the 2A SG per Appdx R

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

Next Scenario Page = 4

Scenario Event Description
NRC Scenario 8

St. Lucie Unit 2

The crew assumes the shift at 2-3% power. The 2C Charging pump is out of service to replace shaft seals. The crew will be instructed to raise power and place the unit on line.

Shortly after turnover, CIS RM-26-4-2 fails high. This is a T.S. SRO call and the channel must be bypassed IAW 2-ONP-99.01.

As the RO is withdrawing CEA's one CEA in the group will not move. I/C should be notified to investigate. The individual CEA movement issue will be resolved and that CEA will be realigned with its group. If the CEA movement issue is not noticed prior to misaligned greater than 7 inches this should be a T.S. call.

A spurious opening of the 2A2-2A3 Tie Breaker will cause the 2A3 4.16KV bus to de-energize. As designed, the bus will be de-energized for about 10 seconds and then the 2A Diesel Generator closes onto the bus. The spurious opening of the tie breaker will be resolved and the breaker will be manipulated to parallel with the grid. When the 2A3 bus is tied back to the grid, the 2A Diesel Generator will be shut down. When 2A3 bus is reenergized, MCC 2A8 will fail to energize (not required for scenario). This will require a Tech Spec call by the SRO. MCC 2A8 can be re-energized after the Tech Spec call. Pressurizer heaters, charging and letdown will have to be restored. Additional manipulations of the SBVS, CR ventilation and SBCS DCS input will also have to be manipulated (not necessary to continue).

CCW header B will rupture causing the surge tank to lower. The 'N' header should isolate, however HCV-14-10 fails to close. The Operator should recognize this and manually close HCV-14-10. CCW can then be restored to the RCPs via the A header.

A SGTL occurs on the 2B Steam Generator followed by a SGTR. This will require a Reactor shutdown. When the unit is tripped a Main Steam Safety valve on the 2A Steam Generator opens and fails to close until 500 psia steam pressure on the generator. MSIS fails to actuate at 700 psia and must be manually actuated. The crew should exit EOP-01 to EOP-15 due to a dual event (ESD and SGTR). NOTE: Operations management written guidelines state if a MSSV fails to reseat when designed the Steam Generator is considered faulted until the MSSV is gagged.

Upon SIAS the 2A HPSI pump fails to start. It can be manually started. This is a critical step due to the rupture of the B CCW header, the 2B HPSI pump is considered inoperable.

The exercise can be terminated when the 2A Steam Generator is isolated. A cool down is in progress using the 2B Steam Generator.

Procedures used

- 2-GOP-201, 'Reactor Plant Startup Mode 2 to Mode 1'
- 2-NOP-25.07, 'Control Room Ventilation System'
- 2-ONP-25.02, 'Ventilation Systems'
- 2-ONP-99.01, 'Loss of Technical Specification Instrumentation'
- 2-0120035, 'Pressurizer Pressure and Level'
- 2-0110030, 'CEA Off-Normal Operation and Realignment'
- 2-0310030, 'Component Cooling Water – Off- Normal Operation'
- 2-ONP-47.01. 'Loss of A Safety Related AC Bus'
- 2-ONP-02.03, 'Charging and Letdown'
- 2-ONP-26.02, 'Area Radiation Monitors'
- 2-0830030, 'Steam Generator Tube Leak'
- 2-EOP-01, 'Standard Post Trip Actions'
- 2-EOP-15, 'Functional Recovery'

Technical Specifications entered

- 3.3.2 ESFAS Table 3.3-3
- 3.8.3.1 Onsite Power Distribution

Op Test No.:	HLC 19A	Scenario #	8	Event #	1	Page	4	of	24
Event Description:	Raise Reactor power								

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **Initiate IC #78 and ensure 2C Charging Pump out of service**
- **Sign off applicable steps in 2-GOP-201 up to step 6.10**
- **Hand out 2-GOP-201 signed off up to step 6.10.**

Time	Position	Applicant's Actions or Behavior
	SRO	Direct power increase to 10-12% IAW 2-GOP-201 step 6.10 in preparation to roll the Turbine. (attached pages 5-8)
		2-GOP-201 step 6.11, When Reactor is in Mode 1, direct maximize SG blowdown IAW 2-NOP-23.02 Steam Generator Blowdown System Operations, (attached pages 9-10)
		Direct CEA Group 5 withdrawn to raise Reactor power (may direct dilution)
	RO	If directed commence Dilution for power increase IAW 2-NOP-02.24 step 6.5.12, 13, 14 (attached pages 11-12) M-26 expected.
		Withdraw CEAs in 'Manual Sequential' as directed to control Rx power.

NOTE: Power should be raised initially by CEA's. CEA's should be withdrawn to at least 102" prior to 20% power to meet LTSSIL

Time	Position	Applicant's Actions or Behavior
	BOP	Monitor SBCS for proper operation during power increase.
		When directed call Unit 1 to determine SG blowdown flow rate.
		Adjust SG blowdown to no more than 100 gpm per SG. IAW 2-NOP-23.02 Steam Generator Blowdown System Operations step 6.5.1.C (2A SG). Step 6.5.2.C (2B SG) (attached pages 9-10)

Next Scenario Page = 13

6.8 (continued) **INITIAL**

2. P. (continued)

6. Using the Single Down Arrow, CONTINUOUSLY and FULLY CLOSE LCV-9006, 2B 15% BYPASS Valve while VERIFYING FCV-9021, SG 2B FEED REG Valve OPENING and SG level being maintained at setpoint. ______

3. RESTORE the AFW system to its normal standby lineup in accordance with 2-NOP-09.02, Auxiliary Feedwater System Operation. ______

NOTE
If the SBCS is already in service or Turbine startup on ADVs is desired, the next step is NOT required to be performed.

6.9 If desired PLACE SBCS in service as follows:

1. ENSURE the Steam Bypass Permissive switch is in the AUTO position. ______

2. ENSURE all five SBCS controllers are in AUTOMATIC. ______

3. NAVIGATE to the SBCS OVERVIEW screen and if the INFO TAG "COND VAC RESET REQUIRED" is on the SBCS OVERVIEW screen, Then PERFORM the following:

   A. SELECT the [COND VAC RESET] Button to bring up the COND VAC RESET Button Overlay. ______

   B. SELECT the [COND VAC RESET] Button and VERIFY this Button momentarily flashes from Gray to White. ______

   C. VERIFY the INFO TAG "COND VAC RESET REQUIRED" disappears from the screen. ______

4. Slowly CLOSE the ADVs and ENSURE the SBCS valves begin to open and control RCS temperature at approximately 532°F. ______

6.10 When the Main Feedwater Control System and SBCS are in service, raise reactor power between 10% to 12%. ______

INITIAL

6.11 When Reactor is in Mode 1, Then MAXIMIZE Steam Generator Blowdown per Chemistry direction. REFER to 2-NOP-23.02, Steam Generator Blowdown System Operations. ______

> **NOTE**
> Steps 6.12 through 6.20 may be performed concurrently and/or in any order.

6.12 ENSURE Step 6.3, of this procedure is COMPLETE. ______ SRO

Date / Time ____________/____________

6.13 ENSURE the Reactor is critical and the RCS is at approximately 532°F and 2250 PSIA. ______ SRO

6.14 ENSURE that Steam Generators are being maintained between 60% and 70% narrow range level. ______ SRO

6.15 ENSURE the DEH System is in service in accordance with 2-NOP-22.03, DEH System Operation. ______ SRO

6.16 ENSURE the status of the Main Generator disconnects are as follows:

1. ENSURE 8G50, Unit 2 Generator Disconnect, is CLOSED and clear of switching clearance tags. ______ Switchman
2. ENSURE 8G51, Unit 2 Generator Disconnect, is CLOSED and clear of switching clearance tags. ______ Switchman

INITIAL

NOTE
The following indicating lights are located inside the lower cubicle, south side, center panel of the Excitation Switchgear.

6.17 ENSURE the excitation switchgear power supply is properly aligned to the 2C DC Bus as follows:

1. VERIFY the Normal Available light is LIT. ______
2. If the Normal Available light is NOT LIT, Then ENSURE bkr 2-60601 Ckt #1 on the 125V DC Bus Power Panel 2C is ON. ______
3. VERIFY the Emergency Available light is LIT. ______
4. If the Emergency Available light is NOT LIT, Then ENSURE bkr 2-61310 Ckt #10 on the 125V DC bus 2D is ON. ______
5. VERIFY the Load Connected to Normal light is LIT. ______
6. If the Load Connected to Normal light is NOT LIT and the Load Connected To Emergency light is LIT, Then HOLD the Reset toggle switch to the RESET position. ______
7. When the Load Connected To Normal light LIGHTS and the Load Connected to Emergency light is NO longer LIT, Then RELEASE the Reset toggle switch. ______

6.18 ENSURE alarms in the voltage regulator cubicle are acknowledged and reset. ______

6.19 ENSURE the Hydrogen Control Panel is in service as follows:

1. ENSURE bkr 2-60201 Ckt #1 on the 125V DC Bus Power Panel 2B is ON. ______
2. ENSURE all unexplained alarms are reset. ______
3. ENSURE the Purity Meter Blower switch located in the lower back half of the Hydrogen Control Panel is On. ______

6.20 ENSURE one Isophase Bus Cooling Fan is in operation. ______

INITIAL

6.21 ENSURE the MSR tube side vents are aligned to the condenser to purge non-condensible gases as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V11508	2B Cndsr Vent From 2A MSR Isol	OPEN	
V11446	2A MSR To Extr Stm Isol	CLOSED	
V11507	2B Cndsr Vent From 2B MSR Isol	OPEN	
V11451	2B MSR To Extr Stm Isol	CLOSED	
V11520	2B Cndsr Vent From 2C MSR Isol	OPEN	
V11117	2C MSR To Extr Stm Isol	CLOSED	
V11227	2A Cndsr From 2D MSR Tube Bundle Vent Isol	OPEN	
V11122	2D MSR To Extr Stm Isol	CLOSED	

1. DEPRESS the Reset pushbutton on the Reheat Control Valve Panel. ______

2. VERIFY locally the MSR TCVs are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
TCV-08-1	MS to 2A MSR	CLOSED	
TCV-08-7	MS to 2A MSR	CLOSED	
TCV-08-3	MS to 2B MSR	CLOSED	
TCV-08-9	MS to 2B MSR	CLOSED	
TCV-08-4	MS to 2C MSR	CLOSED	
TCV-08-10	MS to 2C MSR	CLOSED	
TCV-08-2	MS to 2D MSR	CLOSED	
TCV-08-8	MS to 2D MSR	CLOSED	

3. ENSURE the manual isolation valves for the MSR TCVs are positioned as follows:

COMPONENT	DESCRIPTION	POSITION	INITIAL
V08381	TCV-08-7 Isol	OPEN	
V08370	TCV-08-7 Isol	OPEN	
V08378	TCV-08-8 Dwnstm Isol	OPEN	
V08382	TCV-08-8 Upstrm Isol	OPEN	
V08383	TCV-08-9 Isol	OPEN	
V08372	TCV-08-9 Isol	OPEN	
V08375	TCV-08-10 Isol	OPEN	
V08384	TCV-08-10 Isol	OPEN	

6.5 Adjusting Steam Generator Blowdown Flow **CHECK**

NOTE

- If the respective Steam Generator Pressure Control Valve is Bypassed or in Manual, monitor and adjust as required.
- High total Steam Generator Blowdown flows (in excess of 200 gpm total) may require use of two Closed Blowdown Cooling pumps to maintain Closed Blowdown outlet temperature less than 140 degrees F. Refer to 2-NOP-34.02, Blowdown Cooling System – Closed, to start the second Closed Blowdown Cooling Pump.

1. PERFORM the following to adjust 2A Steam Generator Blowdown Flow.

   A. If PCV-23-2 is in SERVICE, STATION an OPERATOR at PCV-23-2 to ensure pressure is maintained approximately 300 psig as indicated on PIC-23-2. _____

   B. If PCV-23-2 is BYPASSED, STATION an OPERATOR at V23252, PCV-23-2 Bypass, to adjust pressure to maintain approximately 300 psig as indicated on PIC-23-2. _____

   C. If FCV-23-12 is in AUTO, SLOWLY Adjust the setpoint on FIC-23-12 to desired flow. _____

   D. If FCV-23-12 is in MANUAL, SLOWLY depress the raise / lower pushbuttons on FIC-23-12 to obtain the desired flow. _____

   E. If FCV-23-12 is bypassed, Then THROTTLE V23124, FCV-23-12 Bypass, as necessary to adjust flow. _____

2. PERFORM the following to adjust 2B Steam Generator Blowdown Flow.

   A. If PCV-23-3 is in SERVICE, STATION an OPERATOR at PCV-23-3 to ensure pressure is maintained approximately 300 psig as indicated on PIC-23-3. _____

   B. If PCV-23-3 is BYPASSED, STATION an OPERATOR at V23255, PCV-23-3 Bypass, to adjust pressure to maintain approximately 300 psig as indicated on PIC-23-3. _____

   C. If FCV-23-14 is in AUTO, SLOWLY Adjust the setpoint on FIC-23-14 to desired flow. _____

6.5 Adjusting Steam Generator Blowdown Flow (continued) **CHECK**

2. (continued)

D. If FCV-23-14 is in MANUAL, SLOWLY depress the raise / lower pushbuttons on FIC-23-14 to obtain the desired flow. _____

E. If FCV-23-14 is bypassed, Then THROTTLE V23149, FCV-23-14 Bypass, as necessary to adjust flow. _____

END OF SECTION 6.5

6.5 Aligning for MANUAL Dilution

NOTE

- An Operator Aid has been placed at RTGB-205 PNL "N". Any revision to this section of the procedure shall verify the validity of the Operator Aid and, if changes are necessary, a Label Request shall be initiated to incorporate these changes on a new Operator Aid placard.
- The Operations Supervisor SHALL be notified and a CR submitted of any unexplained or unplanned Reactivity change in accordance with OPS Policy 534 (i.e., >.5 deg Tcold change or >.5% power change).
- If a Reactivity management issue occurs, refer to procedure ADM-09.11, Reactivity Management.
- If constant dilution is desired then ensure flow on FIC-2210X is observable.
- Engineering Assessment of FIC-2210X PMW Flow, shows that there could be an error up to ~± 0.5 gpm, and the recommended minimum flow rate is 2 gpm.

1. ☐ ☐ ☐ ☐ ENSURE Section 3.0, Prerequisites is completed at least once per shift.
2. ☐ ☐ ☐ ☐ ENSURE Section 4.0, Precautions / Limitations, has been reviewed at least once per shift.
3. ☐ ☐ ☐ ☐ ¶2 ENSURE calorimetric power is less than 100.00% prior to any dilutions by obtaining a DCS calorimetric power.
4. ☐ ☐ ☐ ☐ DETERMINE the desired volume of primary water to be added.
5. ☐ ☐ ☐ ☐ PLACE the Makeup Mode Selector switch in MANUAL.
6. ☐ ☐ ☐ ☐ ENSURE FIC-2210X, PMW Flow, is in MANUAL <u>and</u> REDUCE the controller output to ZERO.
7. ☐ ☐ ☐ ☐ ENSURE FIC-2210Y, Boric Acid Flow is in MANUAL <u>and</u> REDUCE the controller output to ZERO.
8. ☐ ☐ ☐ ☐ ENSURE either Primary Makeup Water Pump is running.
9. ☐ ☐ ☐ ☐ PLACE FCV-2210X, Primary Makeup Water Control Switch in Auto.
10. ☐ ☐ ☐ ☐ <u>If</u> diluting to the VCT, <u>Then</u> OPEN V-2512, Reactor Makeup Water Stop Vlv. /R24A
11. ☐ ☐ ☐ ☐ <u>If</u> diluting to the Charging Pump suction, <u>Then</u> OPEN V-2525, Boron Load Control Valve. /R24A

6.5 Aligning for MANUAL Dilution (continued)

CAUTION
To preclude lifting the VCT relief valve while using V-2525, do NOT allow PMW flowrate to exceed the running Charging pump(s) capacity.

12. ☐ ☐ ☐ ☐ ADJUST FIC-2210X PMW Flow in AUTO or MANUAL to desired flowrate (and if using V-2525 do NOT exceed the flowrate for the number of running Charging Pumps).

13. ☐ ☐ ☐ ☐ MAINTAIN VCT pressure less than or equal to 30 psig by opening and closing V2513, VCT Vent, as needed.

14. ☐ ☐ ☐ ☐ If necessary to maintain the desired VCT level, Then DIVERT the letdown flow to the Waste Management System by placing V2500, VCT Divert Valve, in the WMS position:

    A. ☐ ☐ ☐ ☐ ENSURE V2500 VCT Divert Valve indicates OPEN.

    B. ☐ ☐ ☐ ☐ When the desired VCT level is reached, PLACE V2500 in AUTO.

    C. ☐ ☐ ☐ ☐ ENSURE V2500 indicates CLOSED.

15. ☐ ☐ ☐ ☐ When the desired amount of primary water has been added, Then CLOSE FCV-2210X, Primary Makeup Water.

16. ☐ ☐ ☐ ☐ If V-2512 Reactor Makeup Water Stop Vlv was opened, Then PLACE V-2512 in CLOSE and ENSURE it indicates CLOSED.

17. ☐ ☐ ☐ ☐ If V-2525 Boron Load Control Valve was opened, Then PLACE V-2525 in CLOSE and ENSURE it indicates CLOSED.

18. ☐ ☐ ☐ ☐ ENSURE FIC-2210X, PMW Flow controller is in MANUAL and RECUCE output to MINIMUM.

19. ☐ ☐ ☐ ☐ MONITOR for any abnormal change in T_{ave}.

20. ☐ ☐ ☐ ☐ §1 RECORD on Data Sheet 1, Boration / Dilution Log, the number of gallons of Primary Makeup Water added as indicated on FQI-2210X, PMW Flow Totalizer.

21. ☐ ☐ ☐ ☐ If additional dilutions are desired, or if the expected changes to T_{ave} or Boron concentration are NOT achieved, Then REPEAT Steps 6.5.1 through 6.5.20.

/R24A

Op Test No.:	HLC 19A	Scenario #	8	Event #	1	Page	5	of 24
Event Description:		Raise Reactor power						

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **If NPO asked to ensure MSR tube side vents aligned to condenser (step 6.21`2-GOP-201) state this step has been verified**
- **If Chemistry asked for SG Blowdown flow rate, state 100 gpm per SG.**
- **If asked from SNPO state PCV-23-2 and PCV-23-3 SG blowdown PCV's are in auto.**
- **If Unit 1 asked for SG blowdown flow rate state 40 gpm per SG.**

Time	Position	Applicant's Actions or Behavior
	BOP	If directed depress RESET pushbutton on Reheat Control Panel. Step 6.21.1. Notify NPO to verify locally TCV's closed.
	BOP / RO	When Reactor power reaches 5%, make plant announcement 'Reactor is in Mode 1'
	RO	Resets variable High Power resets.

Op Test No.: HLC 19A	Scenario # 8	Event # 2		Page 6 of 24			
Event Description:	CIS RM RIS-26-4-2 (B Channel) fails high						

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **When in Mode 1 trigger "E2-CIS RM RIS-26-4-2 fails high".**

Control Room Indications:

- **Channel B Containment Radition instrument failed high**
- **Annunciator**
  - **P-5 – CNTMT Rad High CIS Channel Trip**
  - **P-15 – CNTMT Rad High CIS Channel Pre Trip**
  - **Q-2 – Engineered Safeguards ATI Fault**
- **Containment evacuation alarm**

EXAMINER NOTE: Event 3 may occur before Event 2 if examiner does not request Event 2 during power ascension.

Time	Position	Applicant's Actions or Behavior
	SRO T.S.	Direct actions IAW **2-ONP-99.01, Loss of Tech Spec Instrumentation** section 6.3.2.D. Refer to TS 3.3.2 Action b. (Table 3.3-3) (attached pages 15-19) Action 13 and 14
		May enter **2-ONP-26.02, "Area Radiation Monitors"** (including Appendix A), to verify validity of the alarm. (attached pages 20-22)
		Plant announces disregard invalid alarm
		Contacts Shift Manager to report failure of RM RIS-26-4-2, and entry into **2-ONP-99.0, Loss of Tech Spec Instrumentation**.
	RO	Recognize Channel B ESFAS CIS rad monitor failed high
		Verify PC-11 channel indications and that only one channel is in alarm.
	BOP	Make plant announcement to disregard Cont. Evac alarm
		When directed Bypass ESFAS channel MB instrument RIS-26-4-2 (Key 130)

Next Scenario Page = 23

6.3 ESFAS Channel Malfunction (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)

NOTE

- Containment radiation monitors are covered by Tech Spec 3.3.2, Table 3.3-3.
- ESFAS cabinet door key, key 114, is required for bypassing ESFAS.

INSTRUCTIONS	CONTINGENCY ACTIONS
D. Containment radiation instrumentation indication: • RIS-26-3-2 (MA) • RIS-26-4-2 (MB) • RIS-26-5-2 (MC) • RIS-26-6-2 (MD)	**D.1** PERFORM **ONE** of the following: **1.** BYPASS the CIS channel affected by the failed radiation monitor using key 130. OR **2.** PLACE the affected ESFAS trip unit in TRIP in accordance with Appendix A, Placing Trip Units in Trip

3/4.3.2 ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.2 The Engineered Safety Features Actuation System (ESFAS) instrumentation channels and bypasses shown in Table 3.3-3 shall be OPERABLE with their trip setpoints set consistent with the values shown in the Trip Setpoint column of Table 3.3-4.

APPLICABILITY: As shown in Table 3.3-3.

ACTION:

a. With an ESFAS instrumentation channel trip setpoint less conservative than the value shown in the Allowable Values column of Table 3.3-4, declare the channel inoperable and apply the applicable ACTION requirement of Table 3.3-3 until the channel is restored to OPERABLE status with the trip setpoint adjusted consistent with the Trip Setpoint value.

b. With an ESFAS instrumentation channel inoperable, take the ACTION shown in Table 3.3-3.

SURVEILLANCE REQUIREMENTS

4.3.2.1 Each ESFAS instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations during the MODES and at the frequencies shown in Table 4.3-2.

4.3.2.2 The logic for the bypasses shall be demonstrated OPERABLE during the at power CHANNEL FUNCTIONAL TEST of channels affected by bypass operation. The total bypass function shall be demonstrated OPERABLE at least once per 18 months during CHANNEL CALIBRATION testing of each channel affected by bypass operation.

4.3.2.3 The ENGINEERED SAFETY FEATURES RESPONSE TIME of each ESFAS function shall be demonstrated to be within the limit at least once per 18 months. Each test shall include at least one channel per function such that all channels are tested at least once every N times 18 months where N is the total number of redundant channels in a specific ESFAS function as shown in the "Total No. of Channels" column of Table 3.3-3.

TABLE 3.3-3 (Continued)

TABLE NOTATION

(a) Trip function may be bypassed in this MODE when pressurizer pressure is less than 1836 psia; bypass shall be automatically removed when pressurizer pressure is greater than or equal to 1836 psia.

(b) An SIAS signal is first necessary to enable CSAS logic.

(c) Trip function may be bypassed in this MODE below 700 psia; bypass shall be automatically removed at or above 700 psia.

* The provisions of Specification 3.0.4 are not applicable.

ACTION OF STATEMENTS

ACTION 12 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

ACTION 13 - With the number of channels OPERABLE one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may continue provided the inoperable channel is placed in the bypassed or tripped condition within 1 hour. The channel shall be returned to OPERABLE status no later than during the next COLD SHUTDOWN.

With a channel process measurement circuit that affects multiple functional units inoperable or in test, bypass or trip all associated functional units as listed below.

Process Measurement Circuit	Functional Unit Bypassed
1. Containment Pressure -	Containment Pressure – High (SIAS, CIAS, CSAS) Containment Pressure – High (RPS)
2. Steam Generator Pressure -	Steam Generator Pressure – Low (MSIS) AFAS-1 and AFAS-2 (AFAS) Thermal Margin/Low Pressure (RPS) Steam Generator Pressure – Low (RPS)
3. Steam Generator Level -	Steam Generator Level – Low (RPS) If SG-2A, then AFAS-1 (AFAS) If SG-2B, then AFAS-2 (AFAS)
4. Pressurizer Pressure -	Pressurizer Pressure – High (RPS) Pressurizer Pressure – Low (SIAS) Thermal Margin/Low Pressure (RPS)

TABLE 3.3-3 (Continued)

TABLE NOTATION

ACTION 14 - With the number of channels OPERABLE one less than the Minimum Channels OPERABLE, STARTUP and/or POWER OPERATION may continue provided the following conditions are satisfied:

a. Verify that one of the inoperable channels has been bypassed and place the other inoperable channel in the tripped condition within 1 hour.

b. All functional units affected by the bypassed/tripped channel shall also be placed in the bypassed/tripped condition as listed below.

Process Measurement Circuit	Functional Unit Bypassed/Tripped
1. Containment Pressure -	Containment Pressure – High (SIAS, CIAS, CSAS) Containment Pressure – High (RPS)
2. Steam Generator Pressure -	Steam Generator Pressure – Low (MSIS) AFAS-1 and AFAS-2 (AFAS) Thermal Margin/Low Pressure (RPS) Steam Generator Pressure – Low (RPS)
3. Steam Generator Level -	Steam Generator Level – Low (RPS) If SG-2A, then AFAS-1 (AFAS) If SG-2B, then AFAS-2 (AFAS)
4. Pressurizer Pressure -	Pressurizer Pressure – High (RPS) Pressurizer Pressure – Low (SIAS) Thermal Margin/Low Pressure (RPS)

ACTION 15 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channels to OPERABLE status within 48 hours or be in at least HOT STANDBY within 6 hours and in HOT SHUTDOWN within the following 6 hours.

ACTION 16 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or declare the associated valve inoperable and take the ACTION required by Specification 3.7.1.5.

ACTION 17 - With the number of OPERABLE Channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or place the inoperable channel in the tripped condition and verify that the Minimum Channels OPERABLE requirement is demonstrated within 1 hour; one additional channel may be bypassed for up to 2 hours for surveillance testing per Specification 4.3.2.1.

TABLE 3.3-3

ENGINEERED SAFETY FEATURES ACTUATION SYSTEM INSTRUMENTATION

FUNCTIONAL UNIT	TOTAL NO. OF CHANNELS	CHANNELS TO TRIP	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ACTION
1. SAFETY INJECTION (SIAS)					
a. Manual (Trip Buttons)	2	1	2	1, 2, 3, 4	12
b. Containment Pressure – High	4	2	3	1, 2, 3	13*, 14
c. Pressurizer Pressure – Low	4	2	3	1, 2, 3(a)	13*, 14
d. Automatic Actuation – Logic	2	1	2	1, 2, 3, 4	12
2. CONTAINMENT SPRAY (CSAS)					
a. Manual (Trip Buttons)	2	1	2	1, 2, 3, 4	12
b. Containment Pressure – High-High	4	2	3	1(b), 2(b), 3(b)	18a*, 18b*, 18c
c. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	12
3. CONTAINMENT ISOLATION (CIAS)					
a. Manual CIAS (Trip Buttons)	2	1	2	1, 2, 3, 4	12
b. Safety Injection (SIAS)	See Functional Unit 1 for all Safety Injection Initiating Functions and Requirements				
c. Containment Pressure – High	4	2	3	1, 2, 3	13*, 14
d. Containment Radiation – High	4	2	3	1, 2, 3	13*, 14
e. Automatic Actuation Logic	2	1	2	1, 2, 3, 4	12

4.0 OPERATOR ACTIONS

4.1 Containment Isolation Radiation Monitors

INSTRUCTIONS | **CONTINGENCY ACTIONS**

> **NOTE**
> If a containment evacuation alarm sounds with personnel inside containment, the Radiation Protection Manager or on-site designee must approve re-entry into the containment.

1. If a containment evacuation alarm has actuated and personnel are in the containment, Then:

   A. ANNOUNCE over the Gaitronics for all personnel to leave their work in a safe condition and evacuate the containment.

   B. NOTIFY HP to commence an evaluation of the containment radiological conditions.

   C. CONTACT Security to perform personnel accountability for the evacuation.

   D. ANNOUNCE over Gaitronics restoration of containment access when advised by Radiation Protection Manager that radiological conditions are safe for return to work.

4.1 Containment Isolation Radiation Monitors (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

NOTE

A Containment Isolation signal is generated when at least two of the following monitors exceed the HIGH alarm setpoint:
RC-26-3 / RC-26-4 / RC-26-5 / RC-26-6

2. DETERMINE alarm validity:

A. VERIFY PC-11 channel display for the affected channel is NOT blue (indicating system or equipment failure) or magenta (indicating PC-11 communications failure).

B. VERIFY PC-11 channel indication agrees with indication on the Control Room monitor for the affected channel (i.e., alert or high alarm):

- RC-26-3, CIS
- RC-26-4, CIS
- RC-26-5, CIS
- RC-26-6, CIS

C. VERIFY increased or increasing trend for the affected channel:

- RR-26-3, CIS
- RR-26-4, CIS
- RR-26-5, CIS
- RR-26-6, CIS

D. If only one CIS monitor is alarmed, Then CHECK the other CIS monitors for increasing radiation level trends.

2.1 If the alarm is NOT valid, Then **GO TO Appendix A,** Inoperable Monitor.

2.2 If PC-11 Driver hang alarm appears refer to Appendix C.

APPENDIX A
<u>INOPERABLE MONITOR</u>
(Page 1 of 1)

<u>INITIAL</u>

1. §1 NOTIFY Health Physics to PERFORM surveys of the affected area as required (if accessible). ______

2. CHECK local operation of the affected area as required (if accessible). ______

3. <u>If</u> required, <u>Then</u> NOTIFY I&C to check the affected Monitor. ______

4. <u>If</u> monitor is inoperable, <u>Then</u> PERFORM the following:

   A. REFER to 2-NOP-26.01, Radiation Monitors, for operating instructions. ______

   B. INITIATE a NPWO in accordance with ADM-10.02, Plant Work Request / Order Origination. Identify on Work Request if Monitor is in continuous alarm. ______

   C. NOTIFY Health Physics to perform surveys of the affected area in accordance with HPP-4, Scheduling of Health Physics Activities. ______

   D. <u>If</u> the inoperable monitor is any of the following:

      - Fuel Storage Pool Area
      - Containment Isolation (CIS)
      - Control Room Isolation
      - Containment Area (High Range)

      <u>Then</u> REFER TO Technical Specification 3.3.3.1, Radiation Monitoring, for required actions. ______

END OF APPENDIX A

Op Test No.:	HLC 19A	Scenario #	8	Event #	3	Page	7	of 24
Event Description:		CEA does not move with group						

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **Trigger CEA #57 fails to withdraw.(soon after passing through 7% power)**
- **When I/C called wait 5 minutes and report ACTM card toggle switch has been reset and recommend attempt to move CEA (REMOVE MALFUNCTION)**

Control Room Indications: Deviation will be first picked up on CEA Display Monitor

- **Annunciators: K-11 – CEA Motion Inhibit (if not picked up before 4")**
  K-30 – CEA Position Deviation Motion Block (ADS)

EXAMINERS NOTE: RO should recognize CEA failure prior to CEA deviation alarm.

Time	Position	Applicant's Actions or Behavior
	RO	Recognize CEA #57 failure to move with group
		Place CEDMCS panel in OFF
	SRO	Implement **2-0110030, 'CEA Off-Normal Operation and Realignment'**. If CEA misaligned >7 inches direct implementation of Appendix C, Appendix A, and/or Appendix H to realign. (attached pages 25-34)
		Contacts Shift Manager to report failure of CEA #57, and entry into **2-0110030, 'CEA Off-Normal Operation and Realignment.'** Also informs Reactor Engineering
		If CEA misaligned by >7 inches implement T.S. 3.1.3.1 Realign to within 7 inches of CEA's within group within 1 hour Appendix C.
		Directs I/C to trouble shoot IAW Appendix A of **2-0110030, 'CEA Off-Normal Operation and Realignment'.**
		When called by I/C on request to move CEA #57 direct RO to perform Appendix A **2-0110030, 'CEA Off-Normal Operation and Realignment'.**

Op Test No.:	HLC 19A	Scenario #	8	Event #	3	Page	8	of 24
Event Description:		CEA does not move with group						

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions: When directed trigger step to allow CEA to move.

When I/C called wait 5 minutes and report the ACTM card toggle switch has been reset and recommend attempt to move CEA

Time	Position	Applicant's Actions or Behavior
	SRO	When Appendix A complete, direct realignment IAW Appendix H
		Request Rx Eng direction on CEA#57 realignment
	RO	When directed perform Appendix C (attached pages 28-29)
		When directed perform Appendix A (attached pages 30-32)
		When directed to realign perform Appendix H (attached pages 33-34)

Next Scenario Page = 35

7.0 OPERATOR ACTIONS

7.1 Immediate Operator Actions:

INSTRUCTIONS	CONTINGENCY ACTIONS
1. Place CEDMCS panel in OFF.	
2. If continuous CEA withdrawal is indicated, while CEDMCS panel is OFF, Then trip the reactor and turbine and carry out 2-EOP-01, Standard Post Trip Actions.	
3. If a mismatch between reactor power and turbine power (T-avg and T-ref) exists, Then adjust turbine power to equal reactor power.	

NOTE

If two CEAs are misaligned, with one misaligned greater than or equal to 15 inches and the other misaligned greater than 7.0 inches, then actions of two CEAs misaligned from any other CEA in its group by greater than or equal to 15 inches would apply.

INSTRUCTIONS	CONTINGENCY ACTIONS
4. If 2 or more CEAs are misaligned from any other CEA in their group by greater than 15 inches and / or dropped, while in Mode 1 or 2, Then manually trip the reactor and turbine and carry out 2-EOP-01, Standard Post Trip Actions.	

7.2 Subsequent Operator Actions:

INSTRUCTIONS **CONTINGENCY ACTIONS**

> **NOTE**
> This Procedure may contain steps that could adversely affect reactivity. ENSURE that proper consideration and appropriate briefings occur prior to performance of steps that could challenge reactivity.

1. If continuous CEA insertion is indicated, while the CEDMCS panel is OFF, Then locally open the disconnect for the affected CEA(s) at the CEDM coil power supply panels in the cable spreading room.

2. Notify Reactor Engineering, Operations Supervisor and Operations Manager of time of CEA misalignment.

   - NOT required if in Mode 3.
   - If unable to reach the Operations Manager, NOTIFY the Plant General Manager or any of his direct reports.

3. Refer to the appropriate appendix listed below and apply the instructions as required.

7.2 Subsequent Operator Actions: (continued)

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE

- Guidance for realigning misaligned CEAs during performance of Preop 3200091, Reload Startup Physics Testing is provided in Appendix I of Preop 3200091, Reload Startup Physics Testing.
- CEAs on the hold bus will still de-energize on a reactor trip.
- Respond to all CEA alarms by use of the appropriate appendix in this procedure.
- More than one appendix may be required.
- If two CEAs are misaligned, with one misaligned greater than or equal to 15 inches and the other misaligned greater than 7.0 inches, the actions of Appendix E will apply.

CEA MALFUNCTION	APPENDIX
CEA investigation for operability	A
One or more CEAs inoperable	B
One or more CEAs misaligned greater than 7 inches but less than or equal to 15 inches.	C
One CEA misaligned greater than 15 inches.	D
Two CEAs dropped or misaligned greater than 15 inches.	E
One dropped CEA	F
CEA position indication malfunction	G
CEA realignment (Modes 1, 2 and 3)	H
Realignment of one dropped CEA (Mode 1)	I
Hi gripper voltage alarm	J
CEDMCS Trouble Alarm	K

4. If conditions require a unit shutdown (per Tech Spec), Then implement the E-Plan as required.

APPENDIX C

ONE OR MORE CEA(S) MISALIGNED FROM ANY OTHER CEA IN ITS GROUP BY GREATER THAN 7 INCHES BUT LESS THAN OR EQUAL TO 15 INCHES

(Page 1 of 2)

NOTE
Refer to T.S. 3.1.3.1.f

1. Ensure the following:
   - A. CEDMCS panel in OFF.
   - B. Turbine power adjusted to equal reactor power.
   - C. CEA motion inhibit.
2. Determine from symptoms and CEA position indications, the operability of the CEA in accordance with Appendix A.
3. During determination of the cause of the misaligned CEA, maintain reactor power at or below, but NOT to exceed the power level which resulted from the CEA insertion.
4. If CEA(s) determined to be inoperable due to excessive friction or mechanical interference, refer to Appendix B and continue with the steps of this appendix as applicable.

NOTE
If this procedure is employed while in Mode 3, the one hour time restriction does NOT apply.

5. §1 If CEA(s) are operable, Then realign the CEA(s) within one hour from the initial misalignment in accordance with Appendix H.
6. §1 If CEA inoperable:
   - A. Within one hour from the initial misalignment, realign the remainder of operable CEAs in the group within 7 inches of inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown in Fig. 1 (COLR Fig. 3.1-2). The thermal power level shall be restricted pursuant to specification 3.1.3.6 during subsequent operation.
7. §1 If unable to perform Step 5 or Step 6, Then be in at least Hot Standby within six hours.
8. If a CEA becomes misaligned greater than 15 inches, but does NOT drop while performing the above section, Then proceed to Appendix D.

APPENDIX C

ONE OR MORE CEA(S) MISALIGNED FROM ANY OTHER CEA IN ITS GROUP BY GREATER THAN 7 INCHES BUT LESS THAN OR EQUAL TO 15 INCHES

(Page 2 of 2)

9. If the CEA drops while performing the above section, Then proceed to Appendix F.

10. Upon ascertaining that plant conditions are normal, continue with the reactor startup or return to the desired operating power level in accordance with 2-GOP-101, Reactor Operating Guidelines During Steady State and Scheduled Load Change. The guidelines for ASI oscillation control should be implemented appropriately.

END OF APPENDIX C

APPENDIX A
CEA INVESTIGATION FOR OPERABILITY
(Page 1 of 3)

CAUTION

- Reactor Power shall NOT be increased above the stable power level established following the CEA(s) misalignment.
- Criticality shall be anticipated any time CEAs are being withdrawn.

1. For the affected CEA(s), perform the following to determine operability:

   A. Place the mode select switch in the manual individual mode.

   B. Select the affected CEA on the individual CEA selection switches.

   C. Select the group of the affected CEA on the group select switch.

   D. If CEA motion inhibit is present, Then:

      1. Depress and hold the CEA motion inhibit bypass pushbutton.

      2. Depress then release the bypass enable pushbutton.

   E. If the CEA was dropped, Then first withdraw the affected CEA until core mimic CEA bottom light and lower electrical limit lights both deenergize.

CAUTION

Do NOT exceed ± 10 inches of the original position without permission from the US.

   F. Insert and withdraw the affected CEA and check for smooth operation and normal indications.

   G. If CEA is determined to be operable proceed to the applicable appendix for CEA realignment.

APPENDIX A

CEA INVESTIGATION FOR OPERABILITY

(Page 2 of 3)

> **NOTE**
>
> Tripped CEA disconnect and / or loss of CEA subgroup logic function will cause dropped CEAs.

2. If the CEA(s) does NOT operate (move), Then check the status of the CEDM coil power supply panels in the cable spreading room:

A. Symptoms:

1. CEA disconnect in OFF; red light off, green light on.

2. CEA disable lights are red for the affected CEA.

3. Timer failure lights are red for the affected CEA.

B. Trouble Shooting:

1. If CEA disconnect is off, Then:

a. Turn ON disconnect switch.

b. Reset ACTM card toggle switch. (located inside cabinet, top switch, UG ENGD light should remain on).

2. If CEA disconnect is not off, Then:

a. Reset ACTM card toggle switch.

C. Check the air conditioning system for proper operation.

D. Check the cooling fans for proper operation.

E. Contact the I&C Dept. for assistance and notify them of the problem and any abnormalities found.

1. Check the CEDMCS and CEA drive system for alarms that might indicate the CEA problem.

> **CAUTION**
>
> Do NOT exceed ± 10 inches of original position without permission from the US.

2. Withdraw and insert the CEA(s) in manual individual or manual group at the direction of I&C to support troubleshooting.

APPENDIX A
CEA INVESTIGATION FOR OPERABILITY
(Page 3 of 3)

2. (continued)

F. Have I & C perform the following as necessary.

1. Check associated power supplies and fuses.

2. Obtain coil current traces and voltage measurements to determine the location of trouble.

> **NOTE**
> Two or more CEAs simultaneously transferring to the lower gripper could indicate CEDMCS noise caused by system grounds.

3. If two or more CEAs simultaneously transfer to the lower gripper, Then perform the following:

a. Direct I&C to troubleshoot for possible system grounds.

b. Minimize movement of CEAs.

G. Proceed to the applicable Appendix for CEA realignment or to Appendix B if CEA is determined to be inoperable.

END OF APPENDIX A

APPENDIX H
CEA REALIGNMENT (MODES 1, 2 AND 3)
(Page 1 of 2)

1. While realigning CEAs, observe the following:

   A. Regulating CEAs shall be withdrawn in sequence and overlap between groups shall NOT exceed 54 inches.

   B. Do NOT exceed a sustained SUR of 1.4 DPM (alarm 1.3 DPM).

   C. Criticality shall be anticipated any time CEAs are being withdrawn.

   D. If deviation between CEAs in any group approaches 3 inches, stop group withdrawal and realign CEAs.

   E. While CEA is misaligned, individual CEA positions within the group shall be determined at least once per 8 hours except when the CEA position deviation circuit is out of service, then verify CEA positions at least once every four hours.

2. Misaligned CEA(s) while in Modes 2 and 3 (subcritical).

   A. Place the mode select switch in the manual individual mode.

   B. Select the misaligned CEA on the individual CEA selection switches.

   C. Select the group of the misaligned CEA on the group select switch.

   D. If CEA motion inhibit is present then:

      1. Depress and hold the CEA motion inhibit bypass pushbutton.

      2. Depress then release the bypass enable pushbutton.

   E. REALIGN the CEA by performing **ONE** of the following:

      - INSERT the remainder of the group to the misaligned CEA and then withdraw the group to the pre-misaligned position.

      - ALIGN the misaligned CEA to the remainder of the group.

   F. Check the position of all CEAs in the group for proper alignment (CEDMCS and DCS).

APPENDIX H
CEA REALIGNMENT (MODES 1, 2 AND 3)
(Page 2 of 2)

3. Misaligned CEA(s) while in Modes 1 and 2 (critical).

> **CAUTION**
> Reactor Power shall NOT be increased above the stable power level established following the CEA(s) misalignment.

A. Prior to realigning of CEA, contact Reactor Engineering and supply them with the following information.

1. Power level at which recovery is to be made.
2. Rate of CEA movement during recovery.
3. Movement of other CEAs to support recovery.

B. Place the mode select switch in the manual individual mode.

C. Select the misaligned CEA on the individual CEA selection switches.

D. Select the group of the misaligned CEA on the group select switch.

E. If CEA motion inhibit is present, Then:

1. Depress and hold the CEA motion inhibit bypass pushbutton.
2. Depress then release the bypass enable pushbutton.

F. Realign CEA to the group position while borating as necessary to maintain Reactor Power at or below the power level which resulted from the CEA insertion.

G. Check the position of all CEAs in the group for proper alignment (CEDMCS and DCS).

H. Using manual group mode, readjust the group positions for proper automatic sequencing as necessary.

END OF APPENDIX H

Op Test No.:	HLC 19A	Scenario #	8	Event #	4	Page	9	of	24
Event Description:	2A2-2A3 Spurious Opening resulting momentary deenergization of 2A3 4.16 KV bus								

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed, trigger OPEN 2A2- 2A3 Tie Breaker de-energizing the 2A3 4.16KV bus. 2A EDG will start and load onto the 2A3 4.16KV Bus. **Booth Operator Instructions: When NPO directed to investigate loss of bus, wait three minutes and state maintenance person was walking down an ECO and bumped the door tie-breaker cubicle door and breaker opened. No apparent damage to the breaker.** **Control Room Indications:** **Key Annunciator:** **B-9 – PZR HTR XFMR 2A3 Trouble** **B-29 – 480V LC 2A3/2AB Load Shed RLY Failure** **H-29 - PZR SAFETY V1202 DISCH TEMP HIGH** **H-30 QUENCH TANK LEVEL HIGH/LOW** **M-5 LETDOWN PRESS HIGH/LOW**		
	SRO	Recognize 2A3 4.16KV bus is momentarily de-energized and 2A Diesel Generator has started and closed onto the bus.
		Implements **2-ONP-47.01, 'Loss of Safety Related A.C. Bus'** (attached pages 36-43)
		Recognizes loss of letdown, direct charging pumps to be stopped and control switches place in AUTO
		Contact EM and I&C
		Implements **2-ONP-47.01, 'Loss of Safety Related A.C. Bus'** Appendix A (attached pages 38-43)
		May implement **2-0120035, "Pressurizer Pressure and Level"**, due to the need to select an operable pressure control channel and RRS channel and to reset heaters. (attached pages 44-50)
		If up power in progress, directs stopping power ascension places turbine on "HOLD"

Next Scenario Page = 51

6.2 Subsequent Operator Actions

CAUTION

Various instruments and equipment that are normally used for the assessment of critical safety functions may NOT be operable. Use all available indications.

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If letdown flow is lost, Then: A. SECURE charging. B. ENSURE all operable charging pump control switches are returned to AUTO.	
2. INVESTIGATE and DETERMINE which electrical bus was lost.	
3. VERIFY "RCP CCW Flow Low 10 Minute Timing" annunciator is NOT in alarm.	3. If RCP 10 Minute Time Delay Trip is in alarm, Then: A. ISOLATE N Header supply and RETURN valves from the inoperable CCW train OR B. ISOLATE CCW to the Fuel Pool Heat Exchanger.
4. If plant is in mode 3 through 6 (SIAS Blocked), Then PERFORM safety function status check of Low Mode Off-Normal Procedure for the current plant condition.	

6.2 Subsequent Operator Actions (continued)

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE

If more than one electrical bus has been lost, several appendices may be required to restore electrical lineup to normal. Figure 1 contains a diagram of the main power distribution system to aid in the performance of this procedure.

5. RESTORE power to the deenergized bus per the appropriate Appendix below:

VOLTAGE	DEENERGIZED BUS	APPENDIX
4160	2A3	A
4160	2B3	B
4160	2AB	C
480 L.C.	2AB	D
480 L.C.	2A2	E
480 L.C.	2B2	F
480 L.C.	2A5	G
480 L.C.	2B5	H
480 M.C.C.	2A5	I
480 M.C.C.	2B5	J
480 M.C.C.	2A6	K
480 M.C.C.	2B6	L
480 M.C.C.	2A7	M
480 M.C.C.	2B7	N
480 M.C.C.	2A8	O
480 M.C.C.	2B8	P
480 M.C.C.	2A9	Q
480 M.C.C.	2B9	R
480 M.C.C.	2AB	S

6. If RAB electrical equipment room ventilation has been lost, Then RESTORE per 2-NOP-25.06, RAB Ventilation System.

7. EVALUATE Technical Specifications for lost electrical busses and equipment.

APPENDIX A
RESTORATION OF 2A3 4160V BUS
(Page 1 of 6)

INITIAL

1. If the deenergized bus is the 2A3 4160V bus, Then PROCEED as follows:

CAUTION
Various instruments and equipment that are normally used for the assessment of critical safety functions may not be operable. Use all available indications.

NOTE
Table 1 contains a listing of the major loads that have been lost.

A. With less than two CCW pumps running, MONITOR RCP bearing and seal temperatures closely. ______

B. ISOLATE N header supply and return valves from the A CCW Train, if necessary, to increase cooling to the RCPs.

- HCV-14-8A ______
- HCV-14-9 ______

C. ENSURE ICW pump does NOT start on a depressurized header. PERFORM the following if required:

1. PLACE the 2A ICW pump (or 2C, if aligned to the A train) switch in the PULL to LOCK position. ______

AND

2. Locally THROTTLE 2A ICW pump (or 2C, if aligned to the A train) discharge valve approximately 10 turns open. ______

D. If a differential current lockout has occurred, (Annunciators B-14), Then DISPATCH an operator to the switchgear to check for any relay indications or other apparent problems. (ΔCurrent Relay located on 2A CCW pump breaker cubicle). ______

APPENDIX A
RESTORATION OF 2A3 4160V BUS
(Page 2 of 6)

1. (continued) INITIAL

CAUTION
Resetting the differential current lockout relay will immediately result in the diesel output breaker closing and the diesel loading onto the bus.

E. If no apparent damage exists, one attempt may be made to reset the lockout. ______

F. ATTEMPT to energize the bus from the 2A diesel generator, as follows:

1. VERIFY the 2A diesel generator is up to full speed and voltage. ATTEMPT a manual start of the engine if necessary. ______

2. When the diesel generator is ready to synchronize, INSERT the synchronize plug and make only one attempt to close in the 2A diesel output breaker 2-20211. ______

3. If the diesel generator did NOT start or is NOT running correctly, SEND an operator to the diesel building to investigate. ______

G. REFER to applicable appendices to re-power load centers. ______

H. If the bus has NOT been reenergized, Then ATTEMPT to cross tie the bus to the 2A2 4160V bus as follows:

1. ENSURE breakers to be closed are first green flagged. ______

2. ENSURE the 2A2 4160V bus is energized, if deenergized, perform the following as necessary:

a. If a differential current lockout has occurred, (Annunciator B-13), Then DISPATCH an operator to the switchgear to check for any relay indications or other apparent problems. (ΔCurrent Relay located on 2-20110 breaker cubicle). ______

b. If no apparent damage exists, one attempt may be made to reset the lockout. ______

APPENDIX A
RESTORATION OF 2A3 4160V BUS
(Page 3 of 6)

1. H. 2. (continued) INITIAL

c. INSERT sync plug and turn to position ST-2A2 and MAKE only one attempt to Close Startup Transformer breaker 2A 2-20102. ______

OR

INSERT sync plug and turn to position AT-2A2 and MAKE only one attempt to Close Aux Transformer breaker 2A 2-20101. ______

d. If the 2A2 4160V bus can NOT be energized, Then PROCEED with Step 1.H. ______

3. MAKE one attempt to close the 2A2/2A3 tiebreaker 2-20109. ______

4. INSERT the sync plug and turn to position TIE-2A3 and MAKE only one attempt to close the 2A3/2A2 tiebreaker 2-20209. ______

I. CALL the Electrical Department for assistance, if breaker(s) will NOT close. ______

J. If NOT done previously, DISPATCH an operator to the switchgear to check for relay indications and any other possible problems. ______

K. If the diesel generator is loaded on the bus and the bus can be powered from an auxiliary / startup transformer, PERFORM the following if desired:

1. ENSURE breakers to be closed are first green flagged. ______

2. CLOSE breaker 2-20109 2A2 to 2A3 tie breaker. ______

NOTE
The EDG Governor Control Amber light must be lit to ensure the EDG governor motor operated potentiometer is set to 60 cycles **PRIOR** to selecting the sync plug to position TIE-2A3.

3. ENSURE amber light is lit on the diesel generator governor control. ______

APPENDIX A
RESTORATION OF 2A3 4160V BUS
(Page 4 of 6)

1. K. (continued) INITIAL

> **CAUTION**
> Potential for diesel generator trip exists. Prior to closing the bus tie breaker, verify there are no diesel generator trips locked in (Annunciators B-26).

4. PLACE the synchronize plug in the TIE 2A3 position and MATCH voltages using the DG voltage control. ______

5. With the DG governor control, MAKE the synchroscope go slow in the counter-clockwise direction. ______

6. CLOSE breaker 2-20209 2A3/2A2 just before the needle on the synchroscope passes through the 12 o'clock position. Immediately GO TO raise on the diesel governor control and HOLD it there until the Diesel has stabilized (to prevent reverse power trip). ______

7. UNLOAD 2A diesel generator to 100KW and open 2A diesel generator output breaker. ______

8. STOP 2A diesel generator and VERIFY proper restart conditions by amber light indications on voltage regulator and governor controls. ______

   a. COMPLETE all of the activities associated with shutdown of the Emergency Diesel Generators IAW normal operating procedures, including draining the accumulated water from the day tanks. ______

9. REMOVE the sync plug. ______

APPENDIX A
RESTORATION OF 2A3 4160V BUS
(Page 5 of 6)

INITIAL

1. (continued)

L. If the bus can NOT be reenergized quickly, Then PERFORM the following:

> **NOTE**
> The HVE-21B CEDM Cooling Fan breaker may have to be RECLOSED manually due to an undervoltage trip condition on the A side bus.

R7

1. ENSURE the following are running:
   a. HVE-21B CEDM cooling fan ______
   b. HVS-2B Rx cavity cooling fan ______
   c. HVE-3B Rx support cooling fan ______
   d. HVS-1C & 1D containment coolers ______
2. REFER to 2-ONP-25.01, Loss of RCB Cooling Fans, due to the loss of two containment coolers. ______
3. ENSURE that Pressurizer level and pressure controllers are selected to the unaffected Y channel, and then REFER to ONOP 2-0120035, Pressurizer Pressure and Level, to restore the PZR heaters as necessary. ______
4. If the 2AB 480V load center was aligned to the A bus, REALIGN it to the energized B bus as follows:
   a. OPEN 2-40702 2A2 Tie Breaker to 2AB 480V LC. ______
   b. OPEN 2-40220, 2A2 Tie Breaker to 2AB 480V load center. ______
   c. CLOSE 2-40504 2B2 Tie breaker to 2AB 480V load center. ______
5. CLOSE 2-40706, 2B2 Tie breaker to 2AB 480V load center. ______

APPENDIX A
RESTORATION OF 2A3 4160V BUS
(Page 6 of 6)

1. L. (continued) INITIAL

6. If the 2AB 4160V bus was aligned to the deenergized A bus, REALIGN it to the energized B bus as follows:

   a. OPEN 2-20505, 2A3 tie breaker to 2AB 4160V bus. ______

   b. OPEN 2-20208, 2A3 tie breaker to 2AB 4160V bus. ______

   c. CLOSE 2-20409 2B3 tie breaker to the 2AB 4160V bus. ______

   d. CLOSE 2-20504 2B3 tie breaker to the 2AB 4160V bus. ______

7. START the 2C ICW pump on the depressurized header per 2-NOP-21.03C, 2C Intake Cooling Water System Operation. ______

8. START 2C CCW pump per ONOP 2-0310030, Component Cooling Water - Off Normal Operation. ______

9. If shutdown cooling has been lost, Then RESTORE SDC per ONOP 2-0440030, Shutdown Cooling Off-Normal. ______

10. RESTORE charging and letdown, if necessary, per 2-ONP-02.03, Charging and Letdown. ______

11. ALIGN the 2AB battery charger to the 2A DC bus per 2-NOP-50.01A, 125V DC Bus 2A (Class 1E) Normal Operation. ______

12. MONITOR the 2A diesel fuel oil day tank levels, as they will NOT automatically refill. ______

END OF APPENDIX A

Op Test No.:	HLC 19A	Scenario #	8	Event #	4	Page	10	of	24

Event Description: 2A2-2A3 Spurious Opening resulting momentary deenergization of 2A3 4.16 KV bus

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **If requested, the Shift Manager and/or Electrical Maintenance Supervisor give OK to reclose the 2A2-2A3 Tie Breaker.**
- **When directed to reset non-essentials, call and state the 2A8 MCC non-essentials will not reset. Appears MCC still de-energized.**

Time	Position	Applicant's Actions or Behavior
	SRO	Direct restoration of CR ventilation and SBVS/Fuel Pool ventilation systems. Recognize must reenergize MCC 2A8 before restoring Fuel Pool ventilation.
		From Appendix A step K direct the 2A3 KV bus powered from the Startup transformer and the 2A Diesel unloaded and stopped. (attached pages 40-41)
		Direct non-essential loads reset.
		Resets DCS TAVE signal on SBCS or FW FPD input screens if required. Using **2-0120035, "Pressurizer Pressure and Level"** (attached page 48)

EXAMINERS NOTE: When 2A3 4.16 KV bus re-energized 2A8 MCC load center breaker tripped deenergizing the bus.

Time	Position	Applicant's Actions or Behavior
	SRO T.S.	Recognize T.S. 3.8.3.1 Action 'a' re-energize within 8 hours. NOTE: Also applied when the bus was initially de-energized.
		Contacts Shift Manager to report failure of 2A2-2A3 Tie Breaker, and entry into **2-ONP-47.01, 'Loss of Safety Related A.C. Bus.'**

Op Test No.:	HLC 19A	Scenario #	8	Event #	4	Page	11	of	24

Event Description: 2A2-2A3 Spurious Opening resulting momentary deenergization of 2A3 4.16 KV bus

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: None		
	RO	Recognize loss of letdown, **STOPS** Charging pumps and places control switches in AUTO
	RO/BOP	Recognizes loss of power to the LIC 1100 X and PIC 1100X requiring selection of the Y controllers to regain PZR heaters.
		Recognize and announce DNB Tech Spec entry if applicable.
		Selects operable Pressurizer pressure control and RRS channels and resets Pressurizer heaters IAW **2-0120035, "Pressurizer Pressure and Level"**. Obtains key 98 for backup interlock bypass keyswitch. Places key in LEVEL position and reset B side heaters. (attached pages 44-50)
		Monitors adequate CCW flow to the RCP's. Monitors RCP bearing and seal temperatures.
		When directed restore Charging and letdown IAW **2-ONP-02.03, 'Charging and Letdown'** step 6.0.11 (attached pages 53-57)

Next Scenario Page = 58

7.0 OPERATOR ACTIONS

7.1 Immediate Operator Actions

1. None

7.2 Subsequent Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

- Technical Specifications 3.3.3.5, Remote Shutdown System Instrumentation, and 3.3.3.6, Accident Monitoring Instrumentation, are applicable for Pressurizer Level and Pressure Instrumentation malfunctions.
- If SIAS has actuated, SIAS must be RESET before Pressurizer Heaters can be energized.

INSTRUCTIONS	CONTINGENCY ACTIONS
1. **ABNORMAL PRESSURIZER PRESSURE CONDITION**	1.

NOTE

Appendix "A" contains a listing of pressurizer pressures which are associated with automatic actions.

INSTRUCTIONS	CONTINGENCY ACTIONS
A. Verify pressurizer spray, proportional and back-up heaters are operating properly in automatic. Refer to Appendix "A" for expected automatic responses.	A. If system is NOT operating properly in automatic, Then perform the following as necessary: 1. If selected pressure channel has failed, Then shift to the operable pressure channel. 2. If selected pressure channel has failed high (greater than 2340 psia), Then after selecting the operable channel, reset heater control switches on RTGB 203.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. A. (continued)	1. A. (continued)
	3. If both pressure channels are failed or automatic pressure control does NOT operate properly, Then operate spray controller in manual and energize or deenergize heaters as necessary.

NOTE

Divergence of Spray Line Temperatures between 2B1 and 2B2 Spray lines may indicate a stuck open spray valve. The stuck open spray valve would have the spray line with the higher temperature approaching cold leg temperature.

INSTRUCTIONS	CONTINGENCY ACTIONS
B. Verify PCV 1100E, Spray Valve 2B2, and PCV 1100F, Spray Valve 2B1, CLOSED by observing BOTH of the following:	B. If either spray valve is OPEN, Then perform the following:
1. CLOSED valve position indication.	1. If PCV 1100E, Spray Valve 2B2, is OPEN, Then PLACE the spray valve selector switch in PCV 1100F.
2. TIA-1103, Spray Line 2B1 Temperature, and TIA-1104, Spray Line 2B2 Temperature, approximately equal.	2. If PCV 1100F, Spray Valve 2B1, is OPEN, Then PLACE the spray valve selector switch in PCV 1100E.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	1. B. (continued) 3. If pressure continues to decrease due to a failed open main spray valve, Then consider performing the following: • Trip the reactor and turbine • Stop the RCP in the affected loop. PCV 1100E-2B2 RCP PCV 1100F-2B1 RCP 4. If the RCP in the affected loop has been secured and pressure continues to decrease, Then consider securing both 2B1 and 2B2 RCPs.
C. Verify SE-02-03, and SE-02-04, Auxiliary Spray Valve(s), CLOSED.	C. If auxiliary spray valve(s) is OPEN, Then: 1. Attempt to close using key switch. 2. If auxiliary spray valves will NOT close, Then stop all charging and isolate letdown. Refer to 2-ONP-02.03, Charging and Letdown. 3. Review AP 0010134, Component Cycles and Transients, for applicability when plant is stabilized.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	1. (continued)

NOTE
Normally one PORV is isolated at power.

D. Verify power operated relief valves are closed.	D. If PORV is OPEN and pressure is less than 2300 psia, Then close PORV block valve(s) V-1476 and / or V-1477. Refer to 2-0120036, Pressurizer Relief / Safety Valve Off-Normal Operating Procedure.
E. Ensure that PORV's V-1474 and V-1475 hand switches are in the proper position for existing plant conditions; see below:	

Switch in NORMAL RANGE:	Switch in LTOP:
1. (Lift Setpoint 2370 psia) RCS temperature greater than 255°F during heatup or greater than 240°F during a cooldown.	1. (Lift Setpoint 490 psia) RCS temperature less than 255°F during heatup or less than 240°F during cooldown.

F. Verify pressure anomaly is NOT caused by a large rate of change of T-avg.	F. Slow the rate of change of T-avg or stabilize until pressure anomaly is controlled.

/R26

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	
G. If (LOOP) Loss of Offsite Power has occurred with diesel generators supplying power and pressurizer level is greater than 27%, Then perform the following to regain pressurizer heaters:	
1. Manually close the breakers for pressurizer heater on 4160V buses Bkr 2-20204 on 2A3 bus Bkr 2-20403 on 2B3 bus.	
2. Manually reset the backup heater breakers B1 and B4 only (200 kw each).	
2. **ABNORMAL PRESSURIZER LEVEL CONDITION**	2.

> **NOTE**
> Appendix "B" contains a listing of pressurizer levels which are associated with automatic actions.

INSTRUCTIONS	CONTINGENCY ACTIONS
A. Verify selected RRS channel is operating properly.	A. If the selected RRS channel has failed, Then shift to the operable channel. 1. NAVIGATE to the SBCS inputs screen on either FW FPD and reset the TAVE signal, if required.
B. Ensure backup charging pump starts and letdown flow is decreasing, or the backup charging pump stops and letdown flow is increasing, whichever is applicable. (Appendix "B" contains expected automatic responses.)	B. If automatic actions have NOT occurred, Then manually control charging and letdown flow as required.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	**2.** (continued)
C. Verify level anomaly is NOT caused by a large rate of change in T-avg.	**C.** Slow the rate of change of T-avg or stabilize until level anomaly is controlled.
D. Verify "Letdown Isol. Valves", V-2515, V-2516, and V-2522 are open.	**D.** If letdown has isolated, Then secure charging and refer to 2-ONP-02.03, Charging and Letdown.
E. Verify selected pressurizer level control valve (LCV-2110P / LCV-2110Q) is operating properly.	**E.** If selected level control valve is NOT operating properly, Then take manual control of level control valve and refer to 2-ONP-02.03, Charging and Letdown.
F. Verify selected letdown pressure control valve (PCV-2201P / PCV-2201Q) is operating properly.	**F.** If selected pressure control valve is NOT operating properly, Then take manual control of pressure control valve and refer to 2-ONP-02.03, Charging and Letdown.

7.2 Subsequent Operator Actions (continued)

INSTRUCTIONS

2. (continued)

NOTE

With less than 27% level on Channel X, the "A" pressurizer heater transformer feeder breaker (2-20204) trips and the "B" side 480V power supplies deenergize. With less than 27% level on Channel Y, the "B" pressurizer heater transformer feeder breaker (2-20403) trips and the "A" side 480V power supplies deenergize. The backup interlock bypass keyswitch selected to the level position, allows the 480V heater power supplies to be reset.

G. Verify pressurizer level indicating controllers (selected and non-selected) are operating properly and power is available to pressurizer heaters.

CONTINGENCY ACTIONS

2. (continued)

G. If pressurizer heaters are deenergized or level indicating controller(s) failed, Then perform the following:

1. If either level control channel has failed, Then shift to the operable channel and reset heaters as follows:

   a. Place the backup interlock bypass keyswitch (RTGB-203) to the LEVEL position. (This regains power to the proportional and backup heater banks controlled by the selected channel.)

   b. Reset pressurizer heater banks as needed.

OR

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. If letdown is unavailable, Then MAINTAIN pressurizer level by temporarily cycling charging pumps.	

NOTE

§3 If one or more charging pumps have lost pumping ability, gas binding may have occurred. This can result from pumping the VCT dry (hydrogen binding) or rupture of a charging pump suction accumulator (nitrogen binding). If this occurred, the charging pumps must be vented after restoring a source of water to the suction.

INSTRUCTIONS	CONTINGENCY ACTIONS
10. If the charging pumps are gas bound, Then REFER TO Appendix C, Venting a Gas Bound Charging Pump.	
11. If charging and letdown has been lost and can be restored, Then RE-ESTABLISH charging and letdown flow as follows:	11.
A. ENSURE adequate VCT level is indicated.	A.1 RESTORE the VCT to a normal level in accordance with 2-ONP-02.01, Boron Concentration Control.
B. ENSURE the Level Control Valve selector switch and the Pressure Control Valve selector switch are selected to the level and pressure control valves presently in service.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

11. (continued)

C. PLACE HIC-1110, Level, controller in MANUAL.

D. ENSURE PIC-2201, Pressure controller is in AUTO and set to maintain 150 psig.

E. PLACE the Position Limiter Bypass key switch in the BYPASS position.

F. ENSURE the Level Control Valves are CLOSED.

G. BYPASS Letdown Ion Exchangers by placing V2520 Ion Exchanger Bypass Valve to the BYPASS RESET POSITION.

H. START one charging pump

I. VERIFY charging flow is indicated.

NOTE

If V2515 closed due to Regenerative Heat Exchanger Outlet Temp High, it may be necessary to cycle V2515 while opening the PZR Level control valve until flow is adequate to clear the high temperature alarm.

J. VERIFY the regenerative heat exchanger high temperature alarm M-28, SIAS R-6 or CIS P-3 alarms are NOT present.

/R15B

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

11. (continued)

K. OPEN V2515, Stop Valve-IC.

L. OPEN V2516, Containment Isol Valve-IC.

M. OPEN V2522, Containment Isol Valve-OC.

N. SLOWLY OPEN the Level Control Valve <u>and</u> ESTABLISH approximately 5 gpm letdown flow.

<u>CAUTION</u>
Prolonged use of charging without letdown could result in the pressurizer going solid. Pressurizer level must be closely monitored.

<u>NOTE</u>
TI-2229, Charging Temp Outlet Regen HX should NOT be allowed to increase more than 60°F per minute.

INSTRUCTIONS	CONTINGENCY ACTIONS
O. <u>WHEN</u> Letdown temperature stabilizes on TIC-2221, Temp Regen Hx Tube Out, <u>Then</u> RAISE letdown flow at a rate NOT to exceed 5 to 10 gpm over at least a 4 minute period.	O.1 <u>If</u> letdown cannot be restored, <u>Then</u> INITIATE charging as required for restoring pressurizer level, or boration.
P. ENSURE PIC-2201, Pressure controller is maintaining letdown pressure at 150 psig.	

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS | **CONTINGENCY ACTIONS**

11. (continued)

Q. When PZR level is at its setpoint,
Then PERFORM the following:

1. BALANCE HIC-1110, LEVEL, controller AUTO to MANUAL output signals, using the BIAS control knob while previewing the AUTO signal.

2. PLACE HIC-1110, LEVEL, controller to AUTO.

3. MONITOR pressurizer level for abnormal trends.

R. PLACE the Position Limiter Bypass key switch to the NORM position.

CAUTION
V2345, LTDN CNTL VLV STATION SAFETY RELIEF, will open at 600 psig.

S. SLOWLY RAISE PIC-2201, Pressure, setpoint to 430 psig.

T. ENSURE letdown pressure is being maintained at 430 psig.

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
11. (continued)	
U. NOTIFY Health Physics that dose rates near CVCS ion exchangers and piping may change when ion exchanger is placed in service.	
V. PLACE the Letdown Ion Exchangers back in service by placing V2520 Ion Exchanger Bypass Valve to the AUTO Position.	
12. <u>If</u> Letdown Level control is malfunctioning, <u>Then</u> PERFORM the following:	12.
A. VERIFY the output of HIC-1110, LEVEL, is responding as expected to current plant conditions.	A.1 PLACE HIC-1110 in MANUAL by performing the following: 1. BALANCE HIC-1110 MANUAL to AUTO controller output signals by previewing and using the MANUAL control knob to match the manual and auto controller output signals. 2. PLACE HIC-1110 to MANUAL. 3. ADJUST letdown flow to a value consistent with the current plant conditions. 4. PERFORM a system walkdown observing for leaks or lifting relief valves.
B. VERIFY the selected level control valve is responding as expected to HIC-1110 output.	B.1 PLACE the Alternate Level control valve in service in accordance with 2-NOP-02.02, Charging and Letdown.

Op Test No.:	HLC 19A	Scenario #	8	Event #	4	Page	12 of 24

Event Description: 2A2-2A3 Spurious Opening resulting momentary deenergization of 2A3 4.16 KV bus

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **SNPO report load center Bkr 2-40352 has tripped but can see no reason for the trip.**

	BOP	Recognize key annunciator B-22 4.16KV SWGR 2A2-2A3 TIE BKR OVRLD TRIP. Verify breaker 2-20109 and 20209 are open.
		Verifies 2A EDG has started and loaded onto 2A3 Bus.
		When directed, calls NPO and SNPO to checkout breakers 2-20109 and 20209 respectively.
		When directed energize the 2A3 4.16 KV bus from the Startup. transformer IAW Appendix A step K (attached pages 40-41)
		Restore shield building/fuel pool ventilation system using **2-ONP-26.02 Area Radiation Monitors**. (attached pages 59-60)
		Resets DCS TAVE signal on SBCS or FW FPD input screens if required. (attached pages 48)

Next Scenario Page = 61

APPENDIX B
FUEL POOL VENTILATION RESTORATION
(Page 1 of 2)

1. RESET the Fuel Pool High Radiation interlocks as follows (HVAC Panel):

   A. PRESS the Fuel Pool HVAC HI RAD A Reset pushbutton.

   B. PRESS the Fuel Pool HVAC HI RAD B Reset pushbutton.

2. STOP the operating Shield Building Exhaust Fan(s):

   - HVE-6A, SBVS Exhaust Fan
   - HVE-6B, SBVS Exhaust Fan

3. ENSURE the following components are positioned as indicated:

COMPONENT ID	COMPONENT NAME	POSITION
FCV-25-32	SBVS Isolation Valve	OPEN
FCV-25-30	Fuel Handling Emerg Vent Vlv	CLOSED
FCV-25-11	Outside Cooling Air to SBVS	CLOSED
D-29	Fuel Pool Inlet Damper	OPEN
D-31	Fuel Pool Outlet Damper	OPEN
D-33	Fuel Hdlg Bldg Inlet Damper	OPEN
D-35	Fuel Hdlg Bldg Outlet Damper	OPEN
FCV-25-33	SBVS Isolation Valve	OPEN
FCV-25-31	Fuel Handling Emerg Vent Vlv	CLOSED
FCV-25-12	Outside Cooling Air to SBVS	CLOSED
D-30	Fuel Pool Inlet Damper	OPEN
D-32	Fuel Pool Outlet Damper	OPEN
D-34	Fuel Hdlg Bldg Inlet Damper	OPEN
D-36	Fuel Hdlg Bldg Outlet Damper	OPEN

4. PLACE Fuel Pool Ventilation in service as follows:

   A. START a Fuel Pool Exhaust Fan:

      - HVE-16A, Fuel Pool Exhaust Fan
      - HVE-16B, Fuel Pool Exhaust Fan

   B. VERIFY HVS-6, Fuel Pool Supply Fan, starts.

APPENDIX B
FUEL POOL VENTILATION RESTORATION
(Page 2 of 2)

5. NOTIFY the SNPO to place Fuel Handling Building Ventilation in service as follows:

   A. START HVE-15, Fuel Handling Bldg Exhaust Fan.

   B. VERIFY HVS-7, Fuel Handling Bldg Supply Fan, starts.

   C. START HVE-17, Fuel Handling Bldg Swgr Area Exhaust Fan.

END OF APPENDIX B

Op Test No.:	HLC 19A	Scenario #	8	Event #	5	Page	13 of	24
Event Description:		CCW Header B rupture HCV-14-10 fails open						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: When directed trigger CCW header B rupture **Control Room Indication available:** **Annunciators:** **LA-10, CCW Surge Tank Compartment A Level Low** **LB-10, CCW Surge Tank Compartment B Level Low** **L-14, REACTOR COOLANT FLOW LOW CHANNEL PRE TRIP** **EXAMINERS NOTE: If crew manually trips the reactor due to failure of restoring the 'N' header within 10 minutes, insert SGTL / SGTR**		
	SRO	Recognizes low CCW surge tank alarms
		Implements **2-0310030, 'Component Cooling Water Off-Normal Operation'** step 6.2.5 (attached pages 63-67)
		Directs verification of 'N' header valves closing
		Direct closing HCV-14-10 when informed failed to close
		Directs stopping 2B CCW pump
		Directs restoring 'N' header from 'A' side (step 6.2.5.C.2)
		Directs Nuclear Watch Engineer to send someone to CCW Platform.
NOTE: CCW 'N' header must be restored within 10 minutes or the Reactor should be tripped and the RCP's should be turned off.		
	SRO	Direct placing 2B HPSI and Containment Spray Pumps to STOP. Step 6.2 5.C.3.
		Contacts Shift Manager to report CCW header B rupture, HCV-14-10 failure, and entry into **2-0310030, 'Component Cooling Water Off-Normal Operation.**

6.2 Subsequent Action (continued)

4. B. 8. (continued)

c. Non-running Containment Cooler (approx. 1300 GPM)

COMPONENT ID	COMPONENT NAME	POSITION	INITIAL
MV-14-9	CCW Supply to HVS-1A	CLOSED	
MV-14-11	CCW Supply to HVS-1B	CLOSED	
MV-14-13	CCW Supply to HVS-1C	CLOSED	
MV-14-15	CCW Supply to HVS-1D	CLOSED	

9. PLACE the following pump control switches in STOP on RTGB-206: /R37

- 2B HPSI Pump /R37
- 2B Containment Spray Pump /R37

10. CONSULT Tech Spec 3.7.3 due to loss of a Heat Exchanger.

5. If a CCW Header is ruptured, Then PERFORM the following:

NOTE
Annunciators LA-10, CCW Surge Tank Compartment A Level Low, and LB-10, CCW Surge Tank Level High / Compartment B Level Low, will alarm on a rupture of either the "A", "B", or "N" CCW Header, or failure of the makeup system.

A. VERIFY that the "N" Header automatically isolates from the "A" and "B" Headers due to low levels in both compartments of the CCW Surge Tank by closure of the following:

- HCV-14-8A
- HCV-14-8B
- HCV-14-9
- HCV-14-10

6.2 Subsequent Action (continued)

5. (continued)

NOTE

CCW has been isolated to the following "B" Essential Header Components:
2B HPSI Pump
2B CS Pump
2C and 2D Containment Fan Coolers
2B SDC Heat Exchanger
2B Control Room A/C Unit
Fuel Pool Heat Exchanger

CAUTION

Loss of component cooling water flow through any of the heat exchangers listed below can result in severe thermal stress and flashing upon re-admittance of cooling flow:
2B HPSI Pump
2B CS Pump
2C and 2D Containment Fan Coolers
2B SDC Heat Exchanger
3B Control Room A/C Unit
3C Control Room A/C Unit, if aligned to "B" Essential Header
Fuel Pool Heat Exchanger, if aligned to "B" Essential Header

C. If Annunciator LA-10, CCW Surge Tank Compartment A Level Low, alarm clears, indicating that the rupture is in the "B" Essential CCW Header, Then PERFORM the following:

1. STOP the CCW Pump currently supplying the "B" Header:

- 2B CCW Pump

OR

- 2C CCW Pump

2. RESTORE CCW to the "N" Header from the "A" Essential Header by performing the following:

a. CLOSE HCV-14-8A.

b. CLOSE HCV-14-9.

c. OPEN HCV-14-8A.

d. OPEN HCV-14-9 (5 second time delay to open).

6.2 Subsequent Action (continued)

5. C. (continued)

3. PLACE the following pump control switches in STOP on RTGB-206: /R37

   - 2B HPSI Pump /R37
   - 2B Containment Spray Pump /R37

4. If the plant is on Shutdown Cooling, Then the primary side of the 2B SDC Heat Exchanger must be isolated by closing V3658, 2B SDC HX Inlet From LPSI Pump.

5. DISPATCH an operator to verify local CCW Surge Tank level indications that the "A" Surge Tank level has been restored.

6. LOCATE and ISOLATE the leak, if possible.

7. If it is deemed necessary to restore CCW to the Fuel Pool Heat Exchanger from the "A" Essential Header prior to determining the source of the leak on the "B" Header, Then PERFORM the following:

   a. CLOSE MV-14-17 and MV-14-19.

   b. OPEN MV-14-18 and MV-14-20.

   c. If the "A" Essential Header begins to depressurize or Annunciator LA-10, CCW Surge Tank Compartment A Level Low, alarms indicating that the rupture is in the header to or from the Fuel Pool Heat Exchanger, Then CLOSE MV-14-18 and MV-14-20.

6.2 Subsequent Action (continued)

5. (continued)

NOTE

CCW has been lost to the following:

Reactor Coolant Pumps
CEDM Coolers
Letdown HX
Sample HXs
2A and 2B Waste Gas Compressors

CAUTION

Loss of component cooling water flow through any of the heat exchangers listed below can result in severe thermal stress and flashing upon re-admittance of cooling flow:

Reactor Coolant Pumps
CEDM Coolers
Letdown Heat Exchanger
Sample Heat Exchangers
2A and 2B Waste Gas Compressors

D. If Annunciators LA-10, CCW Surge Tank Compartment A Level Low, and LB-10, CCW Surge Tank Level High / Compartment B Level Low, both clear, indicating that the rupture is in the "N" Header, Then PERFORM the following:

1. TRIP the Reactor and the Turbine.
2. TRIP all four RCPs.
3. IMPLEMENT 2-EOP-01, Standard Post Trip Actions.
4. LOCATE and ISOLATE the leak, if possible.

E. If Annunciators LA-10, CCW Surge Tank Compartment A Level Low, and LB-10, CCW Surge Tank Level High / Compartment B Level Low, do not clear, Then GO TO Step 6.2.6.B, Low Level in the CCW Surge Tank.

6.2 Subsequent Action (continued)

NOTE
CCW Surge Tank vent (RCV-14-1) diverts from atmosphere to the Chemical Drain Tank on high radioactivity in the CCW system.

6. If abnormal level conditions exist in the CCW surge tank, Then PERFORM the following:

   A. High Level in the CCW Surge Tank.

      1. CHECK the CCW Radiation Monitors (RM-26-1 and RM-26-2) for abnormal trends. If high radiation is indicated, REFER to 2-ONP-14.02, Component Cooling Water Excessive Activity.

      2. CHECK the CCW Surge Tank Makeup Flow meter (FQ-14-14) for flow. If makeup flow is indicated, CLOSE V14100, Makeup Isol, and VERIFY V14101, Alternate Makeup Supply, is closed.

      3. EVALUATE S/G Blowdown Sample Heat Exchangers as a source of in leakage.

   B. Low Level in the CCW Surge Tank

      1. CHECK the CCW Surge Tank Makeup Flow Meter (FQ-14-14) for flow:

         a. If no flow is indicated:

            1. VERIFY LCV-14-1, CCW Surge Tank Fill Valve, and V14100, Makeup Isol, are open.

            2. VERIFY a Demin Water Pump is running.

CAUTION
Use the fire system as a makeup source only as a last resort.

         b. If flow is indicated:

            1. COMMENCE a visual search of the CCW System for evidence of leakage.

            2. REFER to Appendix A to aid in the leak search.

            3. ISOLATE the leak, if possible.

Op Test No.: HLC 19A	Scenario # 8	Event # 5	Page 14 of 24
Event Description:	CCW Header B rupture HCV-14-10 fails open		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: As SNPO report leak at drain valve V14478 and will not isolate.		
	SRO T.S.	T.S. 3.7.3 Action statement 72 hours to restore 2 trains
NOTE: SRO may direct securing Charging and Letdown		
	BOP	Recognizes low CCW surge tank alarms and recognizes HCV-14-10 failure to close and notifies US
		When HCV-14-10 closed, recognizes annunciator LA-10, 'CCW Surge Tank Compartment A Level Low' clears indicating rupture is on 'B' header
	BOP	Stops 2B CCW pump when directed
		When directed perform step 6.2.5.C.2 to restore 'N' header from 'A' side. (attached pages 64-65)
		Places the 2B HPSI and 2B Containment Spray Pump in STOP.
	RO	Monitors RCP bearing and seal temperatures
		Sets CCW Makeup valve to .85
		If directed, secures Charging and Letdown

Next Scenario Page = 68

Op Test No.:	HLC 19A	Scenario #	8	Event #	6a	Page	15	of 24
Event Description:		SGTL / SGTR						

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

- **When directed by examiner trigger SGTL, This will result in a 20 gpm SGTL**

Control Room Indications available:

- **Lowering Pressurizer pressure and level**
- **PC-11 SJAE and Blowdown alarms**

Time	Position	Applicant's Actions or Behavior
	SRO	Recognize Steam generator tube leak occurring on 2B SG • SJAE alarm on PC-11 • 2B SG Blowdown radiation • Mismatch Chg / Letdown • Recognize entry into DNB Tech Spec 3.2.5

EXAMINERS NOTE: May refer to **2-0120031 Excessive RCS Leakage** if Charging and Letdown mismatch identified prior to SJAE radiation alarm.

Time	Position	Applicant's Actions or Behavior
	SRO	Implement **2-0830030, "Steam Generator Tube Leak"** (attached pages 69-82) • Implement Appendix A and refer to Figure 2 • Directs or Brief if leak becomes >capacity of charging pumps we will manually trip reactor • Estimate primary to secondary leakage using daily chemistry report. • Contact HP and inform of present plant conditions, conduct secondary surveys • Direct Chemistry to implement COP-06.05 High activity in a SG • Step 11, Consider isolating U-1 Vacuum drag • Step 12 Verify SGBD not aligned to Discharge Canal • Direct field operators to perform step 13, 17, 18, 19 and 20 of Appendix A (attached pages 79-81) • Contact Chemistry for secondary sampling
	SRO T.S.	Determine T.S. 3.4.6.2. c (Action a) HSB within 6 hours

Next Scenario Page=83

7.0 OPERATOR ACTIONS

7.1 Immediate Operator Actions

1. None

7.2 Subsequent Operator Actions

INSTRUCTIONS	CONTINGENCY ACTIONS
1. **If in Mode 1 through Mode 3 (SIAS NOT Blocked), Then PERFORM Appendix A and refer to Figure 2 as needed.**	
2. **If in Mode 3 through Mode 6 (SIAS is blocked), Then PERFORM Appendix B and refer to Figure 3 as needed.**	
3. If continued use of SBCS is desired, Then block automatic initiation of MSIS at 700 psia (annunciators P-18, P-20), as follows:	
A. Block MSIS by turning MSIS block key switches (21 and 22) on RTGB 206 to the block position.	
B. Ensure annunciators P-8 and (P-10), MSIS Actuation Channel A (B) Blocked, alarm when blocked.	
4. Maintain steam generator level in the operating band (60% - 70% narrow range) using main or auxiliary feedwater system.	

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 1 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. If at any time RCS leakage exceeds the capacity of the charging pumps and pressurizer level cannot be maintained, Then: A. If in Modes 1 and 2, Then trip the reactor and turbine and implement 2-EOP-01, Standard Post Trip Actions. B. If in Mode 3 (SIAS NOT Blocked), Then implement 2-EOP-04, Steam Generator Tube Rupture.	

NOTE

¶1 Quick diagnosis of a tube leak and subsequent rapid isolation of the effected S/G will minimize secondary contamination and radiation exposure. Observation of S/G Blowdown Radiation Monitors may assist in validating SJAE Radiation Monitor indications, and may become the primary measured indication if the SJAE Radiation Monitor is out-of-service. Even before confirmation of a tube leak has been established, planning and preparation for unit shutdown and mitigating the affects should commence, by performing notifications, procedure reviews, crew briefings, and ensuring resources are available to tend to the unit conditions.

INSTRUCTIONS	CONTINGENCY ACTIONS
2. Ensure sufficient charging pumps are operating and maintaining pressurizer level.	2. If pressurizer level is NOT being maintained, Then isolate letdown to assist in maintaining pressurizer level.
3. If the steam generator blowdown rad monitor is in High Alarm, Then ensure steam generator blowdown and sample valves from the affected steam generator have closed on high radiation.	3. Manually close the S/G blowdown and sample valves from the affected steam generator.
4. Notify Health Physics of present plant conditions and to conduct secondary area radiation surveys.	

APPENDIX A

ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)

(Page 2 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

- A time delay may exist between an increase in SJAE monitor reading and Steam Generator Blowdown monitor readings.
- Steam Generator Blowdown sample isolates on Steam Generator Blowdown process monitor high radiation signal.

CAUTION

IF conditions of Steam Generator Tube Leakage Change, THEN REDIAGNOSIS of shutdown conditions is REQUIRED to ensure compliance with EPRI guidelines and Technical Specifications.

5. CHECK Air Ejector and / or Steam Generator Blowdown monitor reading.

- Log radiation monitor readings every 15 minutes. (Data Sheet 2)

5. If Steam Generator sample flow is isolated due to CIAS or high radiation, Then perform the following, to regain sample flow only:

- PLACE control switch for FCV-23-7/9 to CLOSE / OVERRIDE position
- OPEN FCV-23-7/9

6. If Air Ejector and / or Steam Generator Blowdown monitor shows step rise or continuous rise, Then perform the following:

A. DIRECT Chemistry to implement COP-06.05, High Activity in a Steam Generator.

B. ESTIMATE primary to secondary leakage by comparing Air Ejector monitor (preferred) and / or Steam Generator Blowdown monitor reading with Daily Chemistry Report.

B. If it is not possible to estimate primary to secondary leakage or the radiation monitors are out-of-service, Then determine leak rate by Chemistry sample.

APPENDIX A

ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)

(Page 3 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	**6.** (continued)

CAUTION

Downpower load rate should be consistent with allowed time. Use of most of the time allowed for the downpower will minimize possible plant perturbations.

NOTE

- The following step is used to estimate an increase in the rate of change of the leak.

  Example: Initially estimated leak rate is 80 gpd. 30 minutes later estimated leak rate is 95 gpd. 95 gpd - 80 gpd = 15 gpd increase in 30 minutes, which is an increase of 30 gpd / hr.

- Data Sheet 1 is available to facilitate monitoring leakage.

C. If **BOTH** the following conditions exist,

- §3, 4 Estimated primary to secondary leakage is ≥ 75 gpd.
- Estimated rate of change in primary to secondary leakage is ≥ 30 gpd / hr (as measured by an increase of ≥ 15 gpd in 30 minutes)

Then PERFORM the following:

1. REDUCE power at a rate of 10 mw/min to ≤ 50% in 1 hr and be in Mode 3 in the next 2 hrs, in accordance with 2-ONP-22.01, Rapid Downpower.
2. Go to Step 16 of Appendix A.

C. Go TO Step 6.D of Appendix A.

APPENDIX A

ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)

(Page 4 of 13)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
6. (continued)	**6.** (continued)

NOTE

150 gpd = 0.1 gpm

D. If RCS inventory balance or plant indications confirm primary to secondary leakage exceeds Tech Spec limits. OR Valid SJAE and / or S/G Blowdown Radiation Monitor indicates S/G tube leakage is ≥ 150 gpd, Then PERFORM the following: 1. COMMENCE a plant shutdown at a rate of 3 mw/min, be in Mode 3 in ≤ 6 hrs, in accordance with **ONE** of the following: • 2-GOP-123, Turbine Shutdown - Full Load to Zero Load • 2-ONP-22.01, Rapid Downpower 2. GO TO Step 16 of Appendix A.	**D.** Go TO Step 6.E of Appendix A.

R36A

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 5 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)

CAUTION

Downpower load rate should be consistent with allowed time. Use of most of the time allowed for the downpower will minimize possible plant perturbation.

INSTRUCTIONS	CONTINGENCY ACTIONS
E. If **BOTH** the following conditions exist, • §3,4 Estimated primary to secondary leakage is ≥ 75 gpd. • There is no operable SJAE or affected S/G Blowdown radiation monitor, Then PERFORM the following: 1. REDUCE power at a rate of 3 mw/min and be in Mode 3 in the next 6 hrs, in accordance with 2-ONP-22.01, Rapid Downpower. 2. Go to Step 16 of Appendix A.	E. Go TO Step 6.F of Appendix A.

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 6 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)

CAUTION
Downpower load rate should be consistent with allowed time. Use of most of the time allowed for the downpower will minimize possible plant perturbation.

F. If either of the following condition exists:

- §3,4 The estimated primary to secondary leakage is greater than or equal to 75 gpd and is sustained for greater than or equal to one hour.

OR

- §2 Primary to secondary leak rate is unstable or increasing AND both SJAE and S/G Blowdown radiation monitors become inoperable.

Then PERFORM the following:

1. COMMENCE a plant shutdown at a rate of 3 mw/min and be in Mode 3 in less than or equal to 24 hours, in accordance with one of the following:
   - 2-GOP-123, Turbine Shutdown Full Load to Zero Load
   - 2-ONP-22.01, Rapid Downpower
2. Go to Step 16 of Appendix A.

F. Go TO Step 6.G of Appendix A. /R36

/R36

/R36

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 7 of 13)

INSTRUCTIONS

6. (continued)

> **NOTE**
> A stabilized leak rate is when the rate of change is less than or equal to 10% of the last determined leak rate.

G. If estimated primary to secondary leakage is less than 75 gpd but greater than or equal to 30 gpd, Then PERFORM the following:

1. DETERMINE the affected Steam Generator.
2. ESTIMATE primary to secondary leakage by comparing Air Ejector and S/G Blowdown rad monitor readings with the daily Chemistry report using the following schedule.
   a. If the primary to secondary leak rate is not stable, Then PERFORM the monitoring comparison every 15 minutes.
   b. If the leak rate has been stable for more than one hour, Then PERFORM the monitoring comparison every 2 hours.
   c. If the leak rate has been stable for more than one 24 hours, Then CONTINUE monitoring in accordance with Chemistry requirements.
3. CONSULT with Chemistry on the contaminated water plan for operational requirements.

CONTINGENCY ACTIONS

6. (continued)

G. GO TO Step 6.H of Appendix A.

APPENDIX A

ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)

(Page 8 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
6. G. (continued)	**6. G.** (continued)
4. With concurrence from Chemistry, CONTACT I&C to adjust process monitor alarm setpoints.	
5. GO TO Step 7 of Appendix A.	
H. If estimated primary to secondary leakage is less than 30 gpd but greater than or equal to 5 gpd, Then PERFORM the following:	**H.** GO TO Step 7 of Appendix A.
1. DETERMINE the affected Steam Generator	
2. QUANTIFY Steam Generator leakage	
3. RETURN out-of-service radiation monitoring instrumentation to service.	
4. INCREASE monitoring frequency of radiation monitors to hourly.	
5. With concurrence from Chemistry, CONTACT I&C to adjust process monitor alarm setpoints.	

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 9 of 13)

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE
A full isotopic analysis of steam generator water activity could take up to an hour. If an expeditious indication of gross activity is required, a frisk in the Secondary Lab or a quick count gamma analysis in the Hot Lab, will yield the necessary information to determine the gross magnitude and source of the leak.

7. Notify Chemistry of present plant conditions and to sample both steam generators for activity. If a CIAS or high radiation signal has closed the steam generator sample valves, Then they may be opened to permit sampling as follows:

   A. Place control switch for FCV-23-7/9 to CLOSE / OVERRIDE position and then take switch to OPEN position.

NOTE
A prompt determination of the leak rate takes precedence over fulfilling the 2 hour time requirement of Data Sheet 1.

8. Determine the primary to secondary leak rate, per 2-OSP-01.03, Reactor Coolant System Inventory Balance.

NOTE
- §1 If total tube leakage is greater than .1 GPM, Then the reactor must be in Hot Standby within 6 hours, and Cold Shutdown within the following 30 hours. Reference Daily Chemistry Report for projected Condenser Air Ejector Reading (CPM) with a .1 GPM Primary / Secondary Leak.
- A prompt expeditious shutdown is desired, however a controlled shutdown with minimal pressure transients takes precedence over a short duration to shutdown.

/R36B

9. NOTIFY Plant Management of potential plant shutdown.

APPENDIX A

ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)

(Page 10 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
10. REVIEW procedures and CONDUCT shift briefs as needed for plant shutdown.	
11. CONSIDER isolating blowdown and vac drag on Unit 1.	
12. VERIFY steam generator blowdown is not aligned to the discharge canal.	
13. DIRECT a field operator to the SGBTF to perform ALL of the following: **A.** ENSURE SGBTF Truck Bay (roll-up) door is CLOSED. **B.** ENSURE SGBTF ventilation systems are in operation: • Supply Fans HVS-10A or HVS-10B • Exhaust Fans HVE-41A or HVE-41B • SGBTF Ventilation Process Monitor	
14. VERIFY RCS water inventory balance <u>and / or</u> Chemistry samples indicate primary to secondary leak rate is less than or equal to 30 gpd.	**14. RETURN TO Step 6.B** of Appendix A.
15. <u>If</u> RCS Inventory balance <u>and / or</u> Chemistry samples indicate primary to secondary leak rate is less than 5 gpd, <u>Then</u> EXIT this procedure and continue with the normal monitoring program.	**15.** RETURN to Step 6.B of Appendix A.

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 11 of 13)

INSTRUCTIONS **CONTINGENCY ACTIONS**

CAUTION
Downpower load rate should be consistent with allowed time. Use of most of the time allowed for the downpower will minimize possible plant perturbation.

16. PERFORM ALL of the following:

- If necessary, Then INITIATE the Emergency Plan.
- CONTINUE to monitor process monitors for changing conditions due to Steam Generator tube leakage every 15 minutes.
- CONSULT with Chemistry to implement Contaminated Water Plan.

17. DIRECT a field operator to the SGBTF to perform ALL of the following:

A. ENSURE SGBTF Truck Bay (roll-up) door is CLOSED.

B. ENSURE SGBTF ventilation systems are in operation:

- Supply Fans HVS-10A or HVS-10B
- Exhaust Fans HVE-41A or HVE-41B
- SGBTF Ventilation Process Monitor

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 12 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

To reduce the release of potentially radioactive steam from turbine auxiliary feedwater pump exhaust, motor driven auxiliary feedwater or main feedwater pumps should be used. If the motor driven auxiliary feedwater pumps are not available, steam from the unfaulted or least affected steam generator should be used to drive the turbine driven auxiliary feedwater pump.

18. Capture the CTCS sponge ball in accordance with 2-NOP-21.01, Condenser Tube Cleaning System Operation.

19. Ensure condenser air ejector is aligned to the plant vent.

20. Locally isolate auxiliary steam to auxiliary priming ejectors by closing V08245.

21. When the turbine is tripped and the reactor is NOT shutdown, Then shutdown the reactor as follows:

A. REFER TO 2-GOP-203, Reactor Shutdown.

B. Verify that shutdown margin is within the limits specified in COLR in accordance with 2-NOP-100.04, Surveillance Requirements for Shutdown Margin Modes 2, 3, 4 & 5 Subcritical.

Contingency action:

21. If the reactor is shutdown, Then go to Step 22 of Appendix A.

Op Test No.:	HLC 19A	Scenario #	8	Event #	10	Page	21	of	25

Event Description: Enter 2-EOP-15 Functional Recovery. Isolate 2A SG per Appendix R

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:		
	SRO	Implements 2-EOP-15 Functional Recovery: Implement Steps1-9 (attached page 91-99)
		Direct SFSCS to be performed every 15 minutes.
		Identify Success Paths (Attachment 3)(attached page 98)
		Perform success path step 12 A-C (attached page 96)
		Determines Containment Isolation Safety function NOT met (most affected SG not yet isolated). (attached page 98)
		Directs cooldown and isolation of the 2A SG using per RCS and Core Heat Removal HR-2 (attached pages 103-112)
		Directs isolation of the 2A SG using Appendix R of EOP-99, per RCS and Core Heat Removal HR-2 (attached pages 100-102)
		When Appendix R complete determines Containment Isolation Safety Function met per Success Path CI-1
		Suggested termination point: • 2A SG isolated • All safety functions met • Initiate Cooldown

4.0 OPERATOR INITIAL ACTIONS

INSTRUCTIONS | **CONTINGENCY ACTIONS**

CAUTION

A harsh containment condition exists if containment temperature is greater than 200°F. Figure 1A should be used for determination of saturation margin when indicated containment temperature is **less** than or **equal** to 200°F. Figure 1B should be used when indicated containment temperature is **greater** than 200°F. Figure 1A should also be used if containment temperature had exceeded 200°F during event progression but was lowered to 200°F or less by containment cooling systems.

NOTE

- Instruments should be channel checked when one or more confirmatory indications are available. Reg Guide 1.97 designated instruments should be used for diagnosis of events and confirmation of safety functions.
- Steps designated with an * may be performed non-sequentially or are to be performed continuously.

[*] 1. **Classify Event**

EVALUATE EPIP Classification criteria for present plant conditions and Emergency Plan Actions. **REFER TO** EPIP-01, Classification of Emergencies.

[ ] 2. **Implement Placekeeping**

OPEN the Placekeeper <u>and</u> NOTE the time of EOP entry.

4.0 OPERATOR INITIAL ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **3. RCP Trip Strategy**	
A. If **ANY** of the following conditions exist, • 2A or 2B AFW Pump is the **ONLY** source of Feedwater • RCS pressure is less than 1736 psia • RCS Temperature is less than 500°F Then STOP **ONE** RCP in **EACH** loop.	
B. If **ANY** of the following conditions exist, • Main or Auxiliary Feedwater flow can NOT be re-established • RCS subcooling is less than minimum subcooling • CCW is LOST to the RCPs for greater than 10 minutes Then STOP **ALL** RCPs.	

4.0 OPERATOR INITIAL ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **4. Ensure RCP Seal Cooling**	
A. VERIFY CCW to the RCPs.	**A.1** If SIAS has isolated CCW to the RCPs, Then RESTORE CCW. **REFER TO** Appendix J, Restoration of CCW and CBO to the RCPs. **A.2** If CCW is lost for greater than 30 minutes, Then PERFORM **BOTH** of the following: **A.** ENSURE CCW to the RCPs will remain isolated by PLACING the **FOUR** Containment CCW To/From RC Pump valves to CLOSE. **B.** ENSURE RCP controlled bleedoff will remain isolated by PLACING the **TWO** RCP Bleedoff valves to CLOSE.
B. If **BOTH** of the following conditions exist, • RCPs have CCW flow • CIAS has isolated the normal RCP bleedoff flowpath to the VCT Then ESTABLISH the alternate RCP bleedoff flowpath to the Quench Tank by OPENING V2507, RCP Bleedoff Relief Stop Vlv.	

4.0 OPERATOR INITIAL ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 5. **Verify RCP Operating Limits** If RCPs are RUNNING, Then VERIFY RCP operating limits are satisfied. **REFER TO** Table 13, RCP Operating Limits.	5.1 STOP RCPs that do NOT satisfy operating limits.
[ ] 6. **Sample S/Gs** Sample **BOTH** S/Gs for activity and boron. **REFER TO** Appendix A, Sampling Steam Generators.	
[ ] 7. **Place Hydrogen Analyzers in Service** PLACE **BOTH** Hydrogen Analyzers in service. **REFER TO** Appendix L, Placing Hydrogen Analyzer in Service.	
[*] 8. **Protect Main Condenser** PERFORM **BOTH** of the following: A. If a LOOP has occurred, Then PERFORM **BOTH** of the following to protect the Secondary Plant: 1. ENSURE MSIVs are CLOSED. 2. ENSURE SGBD is ISOLATED. B. STABILIZE the Secondary Plant **AS NECESSARY**. **REFER TO** Appendix X, Secondary Plant Post Trip Actions, Section 2.	

4.0 OPERATOR INITIAL ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **9. Restore Instrument Air** If a LOOP has occurred, Then PERFORM **BOTH** of the following: **A.** ENSURE 2AB 480V Load Center is aligned to an energized bus. **B.** DISPATCH an operator to restore Instrument Air. **REFER TO** Appendix H, Operation of the 2A and 2B Instrument Air Compressors.	
[*] **10. Perform Safety Function Status Checks** PERFORM the Safety Function Status Checks every 15 minutes. **REFER TO** Attachment 1, Safety Function Status Check Sheet.	
[*] **11. Identify Success Paths** IDENTIFY the success paths to be used to satisfy each safety function. **REFER TO** Attachment 3, Functional Recovery Success Paths.	

4.0 OPERATOR INITIAL ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **12. Perform Success Path Instructions** PERFORM **ALL** of the following **IN THE ORDER LISTED.** **A.** Instructions for a success path **MOST LIKELY** to be met for safety functions that are NOT met by **ANY** success path. **B.** Instructions for success paths for safety functions that are NOT met by Success Path 1. **C.** Instructions for **ALL** other success paths for safety functions met by Success Path 1.	
[*] **13. Perform Long Term Actions** <u>When</u> **ALL** Safety Function Status Check acceptance criteria are being satisfied, <u>Then</u> PERFORM Long Term Actions. **REFER TO** Section 4.10, Long Term Actions.	

END OF INITIAL ACTIONS

4.7 CONTAINMENT ISOLATION - CI-1 (continued)

Success Path 1 – Automatic/Manual Isolation (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION
If there is a conflict between isolating a S/G with indications of S/G tube leakage or isolating a S/G with an unisolable steam leak,
Then the S/G with the ESD should be isolated. At least **ONE** S/G must remain available for heat removal.

[*] 2. **Determine If SGTR Present**

If a SGTR has occurred as indicated by **ANY** of the following,

- S/G activity
- Main steam piping radiation
- S/G level change when NOT feeding
- S/G blowdown activity
- **ONE** S/G level rising faster than the other with feed and steaming rates being essentially the same for **BOTH**
- Feedflow mismatch between S/Gs
- Steam flow vs. feed flow mismatch in a S/G **PRIOR** to the trip

Then IDENTIFY and ISOLATE the **MOST** affected S/G.
REFER TO Heat Removal Success Path HR-1 or HR-2,
and **RETURN TO** this success path when the MOST affected S/G is ISOLATED.

ATTACHMENT 3
FUNCTIONAL RECOVERY SUCCESS PATHS
(Page 1 of 1)

Safety Functions	Success Paths	Checkoffs					
		1	2	3	4	5	6
Reactivity Control	RC-1, CEA Insertion						
	RC-2, Boration via CVCS						
	RC-3, Boration via SIAS						
Maint of Vital Aux - DC	MVA-DC-1, Batteries/Chargers						
Maint of Vital Aux - AC	MVA-AC-1, Startup Transformers						
	MVA-AC-2, EDGs						
	MVA-AC-3, Unit Crosstie						
RCS Inventory Control	IC-1, CVCS						
	IC-2, Safety Injection						
RCS Pressure Control	PC-1, Subcooled Control						
	PC-2, PORVs/Pzr Vent						
	PC-3, Saturated Control						
RCS & Core Heat	HR-1, S/G Without SIAS						
	HR-2, S/G With SIAS						
	HR-3, Once Through Cooling						
Containment Isol	CI-1, Automatic/Manual Isol						
Cntmt Press & Temp	CTPC-1, Normal Cntmt Fans						
	CTPC-2, Cntmt Coolers						
	CTCP-3, Cntmt Spray						
Cntmt Comb Gas	CCGC-1, Hydrogen <3.5%						
	CCGC-2, Hydrogen >3.5%						

END OF ATTACHMENT 3

ATTACHMENT 1
SAFETY FUNCTION STATUS CHECK SHEET
(Page 12 of 16)

6. CONTAINMENT ISOLATION Automatic/Manual Isolation, CI-1

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
CIS Radiation Monitors	No valid alarms or unexplained rising trends	☐☐☐☐☐☐
		OR
CIAS	Actuated	☐☐☐☐☐☐
		AND
Containment Pressure	Less than 3.5 psig	☐☐☐☐☐☐
		OR
CIAS	Actuated	☐☐☐☐☐☐
		AND
Secondary Plant Activity (Condenser Air Ejector, Blowdown and Main Steamline Radiation Monitors)	No valid alarms or unexplained rising trends	☐☐☐☐☐☐
		OR
If a SGTR exists	The **MOST** affected S/G is ISOLATED	☐☐☐☐☐☐
		AND
	The **MOST** affected S/G pressure is less than 915 psig (930 psia)	☐☐☐☐☐☐
		AND
	No Steam Release from the **MOST** affected S/G	☐☐☐☐☐☐

END OF SAFETY FUNCTION 6

APPENDIX R
STEAM GENERATOR ISOLATION
(Page 1 of 6)

Section 1: 2A Steam Generator Isolation

> **CAUTION**
> If S/G isolation is due to a SGTR the secondary plant may have higher than normal radiation levels. Contact Health Physics for area accessibility instructions.

☐ **1.** ENSURE HCV-08-1A, Main Steam Header 'A' Isolation Valve (MSIV), is CLOSED.

☐ **2.** If HCV-08-1A did not close remotely,
Then PERFORM local closure.
REFER TO Appendix I, MSIV Local Closure.

☐ **3.** ENSURE MV-08-1A, MSIV Header 'A' Bypass Valve, is CLOSED.

> **NOTE**
> Instrument air must be available to close MFIVs using RTGB control switch. If instrument air is NOT available when MFIV closure is required, then manual initiation of MSIS should be considered.

☐ **4.** ENSURE HCV-09-1A, Main Feedwater Header 'A' Isolation Valve, is CLOSED.

☐ **5.** ENSURE HCV-09-1B, Main Feedwater Header 'A' Isolation Valve, is CLOSED.

☐ **6.** If **BOTH** HCV-09-1A and HCV-09-1B, Main Feedwater Isolation Valves to S/G 2A, are NOT CLOSED or suspected of leaking,
Then PERFORM **ANY** of the following **AS NECESSARY**:

- ☐ **A.** ENSURE **ALL** of the following valves are CLOSED:
  - ☐ MV-09-5, Stm Gen 2A Reg Block Valve
  - ☐ LCV-9005, 2A 15% Bypass
  - ☐ MV-09-3, 2A 100% Bypass
- ☐ **B.** STOP **BOTH** Main Feedwater Pumps.

☐ **7.** ENSURE FCV-23-3, 2A SG Blowdown, is CLOSED.

APPENDIX R
STEAM GENERATOR ISOLATION
(Page 2 of 6)

Section 1: 2A Steam Generator Isolation (continued)

☐ **8.** ENSURE FCV-23-4, 2A SG Blowdown, is CLOSED.

☐ **9.** ENSURE MV-08-18A, 2A S/G Atmos Dump Vlv, is CLOSED.

☐ **10.** CLOSE MV-08-14, 2A S/G ADV Isol.

☐ **11.** PLACE the control switch for auxiliary feed, Pump 2A, in STOP.

☐ **12.** ENSURE MV-09-9, Pump 2A Disch to SG 2A Valve, is CLOSED.

☐ **13.** ENSURE MV-09-11, Pump 2C to SG 2A, is CLOSED.

☐ **14.** PLACE MV-08-13, SG 2A Stm to AFW PP 2C, in CLOSE.

☐ **15.** ENSURE MV-08-19A, 2A S/G Atmos Dump Vlv, is CLOSED.

☐ **16.** CLOSE MV-08-15, 2A S/G ADV Isol.

☐ **17.** PERFORM the following LOCAL operations:

- ☐ **A.** UNLOCK and CLOSE V09152, 2C AFW Pump to 2A S/G Isolation.
- ☐ **B.** UNLOCK and CLOSE V09120, 2A AFW Pump to 2A S/G Isolation.
- ☐ **C.** CLOSE SE-08-2, Main Steam to 2C AFW Pump Warm-up Valve Solenoid.
- ☐ **D.** If SE-08-2, Main Steam to 2C AFW Pump Warm-up Valve Solenoid is NOT CLOSED or suspected of leaking,
  Then CLOSE V08884, SE-08-2 Inlet Isolation.

(continued on next page)

APPENDIX R
<u>STEAM GENERATOR ISOLATION</u>
(Page 3 of 6)

Section 1: 2A Steam Generator Isolation (continued)

17. (continued)

☐ **E.** <u>If</u> MV-08-13, S/G 2A Steam to AFW Pump 2C, is NOT CLOSED or suspected of leaking,
<u>Then</u> PERFORM **ANY** of the following **AS NECESSARY**:

☐ **1.** Locally CLOSE MV-08-13 using the handwheel.

☐ **2.** ISOLATE steam to 2C AFW Pump as follows:

☐ **a.** CLOSE MV-08-3, 2C Pump.

☐ **b.** Locally CLOSE the following valves:
- ☐ V08622, CB #67 Drain
- ☐ V08618, Drain off MV-08-3 Isol
- ☐ V08619, Drain off MV-08-3 Isol

End of Section 1

4.6 RCS and CORE HEAT REMOVAL – HR-2 **Success Path 2 – S/G With SIAS**

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **1. Ensure Safety Injection Actuation** If **ANY** of the following conditions exist, • RCS pressure is less than 1736 psia • Containment pressure is greater than 3.5 psig Then ENSURE SIAS has ACTUATED.	**1.1** Manually START/ALIGN SIAS components. **REFER TO** Table 1, Safety Injection Actuation Signal.
[*] **2. Maximize SI Flow** If SIAS is present, Then PERFORM **ALL** of the following: **A.** ENSURE **ALL** available SI Pumps are RUNNING.	
B. VERIFY adequate SI flow. **REFER TO** Figure 2, Safety Injection Flow vs. RCS Pressure.	**B.1** TAKE actions to restore SI flow: **A.** ENSURE electrical power to SI pumps and valves. **B.** ENSURE correct SI valve alignment. **C.** ENSURE operation of necessary auxiliary systems.
C. ENSURE **ALL** available Charging Pumps are RUNNING.	**C.1** If the Charging Header is NOT available, Then CONSIDER charging to the HPSI header. **REFER TO** Appendix T, Alternate Charging Flow Path to RCS Through 'A' HPSI Header.

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued) — **Success Path 2 – S/G With SIAS** (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **3. Depressurize RCS for SI Flow**	
If Safety Injection flow is inadequate due to high RCS pressure, Then DEPRESSURIZE the RCS:	
A. CONTROL RCS temperature.	
B. CONTROL pressurizer heaters and main or auxiliary spray.	
C. OPERATE the PORVs or Pressurizer Vents **AS NECESSARY.**	
[ ] **4. Maintain RCS Subcooling (SBO)**	
If Station Blackout has occurred, and at least **ONE** vital 4.16 KV AC bus is NOT energized, Then MAINTAIN RCS subcooling:	
A. PERFORM a plant cooldown **AS NECESSARY** to maintain RCS subcooling based on Rep CET temperature.	**A.1** ENSURE **BOTH** of the following conditions exist, • At least **ONE** S/G has level maintained or restoring to between 60 and 70% NR • Rep CET temperature is NOT more than 22°F superheated
B. VERIFY the reactor will remain shutdown for 50°F less than the indicated T_{COLD} and boron concentration at the time of the event initiation, at 50°F intervals.	**B.1** If projected Shutdown Margin indicates that the reactor will NOT remain shutdown, Then STOP the cooldown.

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued)

Success Path 2 – S/G With SIAS (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**
NOTE Cooldown rates up to 100°F in **ANY** 1 hour period are permitted to regain or maintain minimum subcooling.	
☐ **5. Cooldown RCS**	
If at least **ONE** Vital 4.16 KV bus is energized, Then PERFORM the following:	
A. COOLDOWN the RCS using SBCS.	**A.1** COOLDOWN using ADVs. **A.2** COOLDOWN using alternate steaming paths. **REFER TO** Table 12, Alternate S/G Heat Removal Paths.
1. If RCPs are operating, Then COOLDOWN not to exceed 100°F in **ANY** 1 hour period.	
2. If RCPs are NOT operating, Then COOLDOWN not to exceed 50°F in **ANY** 1 hour period.	
3. If RCPs are NOT operating and a S/G is ISOLATED for a SGTR event, Then COOLDOWN not to exceed 30°F in **ANY** 1 hour period.	
B. BORATE the RCS until Shutdown Margin is greater than the value required by the COLR. **REFER TO** 2-NOP-02.24, Boron Concentration Control.	

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued)

Success Path 2 – S/G With SIAS (continued)

INSTRUCTIONS

[*] **6. Verify Single Phase Natural Circulation**

If **NO** RCPs are operating,
Then VERIFY natural circulation flow in at least **ONE** loop by **ALL** of the following:

- Loop ΔT (T_{HOT} minus T_{COLD}) less than 50°F
- Hot leg temperature constant or lowering
- Cold leg temperature constant or lowering
- RCS subcooling is greater than minimum subcooling, based on Rep CET temperature
- NO abnormal difference (greater than 20°F) between T_{HOT} and Rep CET temperature

CONTINGENCY ACTIONS

6.1 ENSURE proper control of S/G feeding and steaming.

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued)

Success Path 2 – S/G With SIAS (continued)

INSTRUCTIONS

CONTINGENCY ACTIONS

[*] **7. Ensure Two Phase Natural Circulation**

If **NO** RCPs are operating,
and single phase natural circulation can NOT be maintained,
Then ENSURE **ALL** of the following conditions exist,

- **ALL** available Charging pumps are RUNNING
- SI flow is within the SI flow delivery curve.
  REFER TO Figure 2. Safety Injection Flow vs. RCS Pressure
- At least **ONE** S/G is available for RCS heat removal with level being restored to or maintained between 60 and 70% NR
- Rep CET temperature is less than 22°F superheated

CAUTION

Containment Conditions safety functions should be under **positive control** prior to blocking safeguards signals. Safety functions should be closely monitored for degradation. Manual actuation of ESFAS may be necessary should conditions warrant.

[ ] **8. Block MSIS**

As the RCS cooldown and depressurization proceed, PERFORM the following:

A. If MSIS is NOT present,
Then BLOCK automatic initiation of MSIS.

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued)

Success Path 2 – S/G With SIAS (continued)

INSTRUCTIONS	**CONTINGENCY ACTIONS**

CAUTION

If there is a conflict between isolating a S/G with indications of S/G tube leakage or isolating a S/G with an unisolable steam leak,
Then the S/G with the ESD should be isolated. At least **ONE** S/G must remain available for heat removal.

[*] **9. Determine If ESD Present**

If an ESD has occurred as indicated by **ANY** of the following,

- High steam flow from S/G
- Lowering S/G pressure
- Lowering S/G level
- Lowering RCS cold leg temperature
- Lowering Pressurizer pressure
- Lowering Pressurizer level

Then DETERMINE the **MOST** affected steam generator.

[ ] **10. If No ESD, GO TO Step 15**

If there are NO ESD indications,
Then GO TO Step 15.

[*] **11. Isolate the MOST Affected S/G**

If MSIS has NOT isolated the leak,
Then ISOLATE the **MOST** affected S/G.
REFER TO Appendix R, Steam Generator Isolation.

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued)

Success Path 2 – S/G With SIAS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **13. Stabilize RCS Temperature** If there are **NO** indications of a LOCA or SGTR, Then STABILIZE RCS temperature by performing **ALL** of the following: **A.** STEAM the **LEAST** affected S/G using the ADV. **B.** CONTROL feedwater to the **LEAST** affected S/G. **C.** ENSURE the RCS is within the limits of Figure 1A or 1B, RCS Pressure Temperature. **D.** If **BOTH** of the following conditions are met, • NO RCPs are RUNNING • The limits of Figure 1A or 1B were exceeded Then PERFORM **BOTH** of the **1.** RECORD the temperature, pressure and time when control of RCS temperature was regained. **2.** MAINTAIN RCS Pressure and Temperature stable for a minimum of **TWO** hours.	**13.1** Steam using 2C AFW Pump and alternate steaming flow paths. **REFER TO** Table 12, Alternate S/G Heat Removal Paths.

4.6 RCS and CORE HEAT REMOVAL – HR-2 (continued) — **Success Path 2 – S/G With SIAS** (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
NOTE Cooldown rates up to 100°F in **ANY** 1 hour period are permitted to regain or maintain minimum subcooling.	
☐ **14. Cooldown RCS** If indication of a LOCA or SGTR exists, Then PERFORM the following:	
A. COOLDOWN the RCS using SBCS.	**A.1** COOLDOWN using ADVs. **A.2** COOLDOWN using alternate steaming paths. **REFER TO** Table 12, Alternate S/G Heat Removal Paths.
1. If RCPs are operating, Then COOLDOWN not to exceed 100°F in **ANY** 1 hour period.	
2. If RCPs are NOT operating, Then COOLDOWN not to exceed 50°F in **ANY** 1 hour period.	
3. If RCPs are NOT operating, and a S/G is ISOLATED for a SGTR event, Then COOLDOWN not to exceed 30°F in **ANY** 1 hour period.	
B. BORATE the RCS until Shutdown Margin is greater than the value required by the COLR. **REFER TO** 2-NOP-02.24, Boron Concentration Control.	

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 13 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
22. When the reactor is shutdown, Then PERFORM BOTH of the following:	**22.**
A. COMMENCE an RCS cooldown until hot leg temperature is less than 510°F using the SBCS.	**A.** If the SBCS is NOT available, Then PERFORM both of the following: **1.** Steam to the atmosphere using the atmospheric steam dump valves. **2.** Reevaluate the E-Plan classification.
B. DEPRESSURIZE the RCS and maintain 20°F to 50°F subcooling per Figure 1, RCS Pressure / Temperature.	
23. If RCS pressure and level are being controlled, Then when RCS pressure reaches 1836 psia and annunciator R-8, SIAS Channel Block Permissive alarms, perform the following:	
A. Block channels A and B of SIAS by turning the SIAS block key switches (99 & 100) on RTGB 206 to the block position.	
B. Ensure annunciators R-9 and R-10 SIAS Actuation Channel A (B) Blocked have annunciated.	
24. GO TO Step 3 of main procedure.	

END OF APPENDIX A

Op Test No.:	HLC 19A	Scenario #	8	Event #	6a	Page	16	of 24
Event Description:		SGTL / SGTR						

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: • **Notify Control Room Appendix A steps 13, 17, 18, 19 and 20 are complete approximately 10 minutes after request.** **Indications Available:** • **Charging and letdown mismatch.** • **PC-11 SJAE trending up and eventual alarm** • **PC-11 Blowdown trending up (10-15 minutes after SJAE)**		
	BOP/RO	Recognize Steam generator tube leak occurring
		• SJAE radiation alarms • Mismatch Chg. / Letdown
	RO	Determines approximate leak rate of 20 gpm based on Charging / Letdown mismatch.
	SRO	Direct RO to isolate Letdown (Close V2515, V2516, V2522) as leak increases.
		Notifies SM of SGTL and power reduction
		Direct power reduction to Mode 3 IAW step 6.F.1 then goes to step 16 of Appendix A. (attached page 80)

Op Test No.: HLC 19A	Scenario # 8	Event # 6b	Page 17 of 24
Event Description:	SGTL / SGTR		

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Trigger SGTR when directed by examiner **EXAMINERS NOTE: Trigger SGTR prior to commencing plant S/D**		
	BOP/RO	Recognize Steam generator tube leak increasing
		• Blowdown radiation trending up • Mismatch Chg. / Letdown
	SRO	Directs Reactor tripped when notified Pressurizer level cannot be maintained.
	BOP	Monitors and maintains SG levels 60-70%
		Communicate with HP and Chemistry as directed by SRO
		Makes plant announcement of Unit shutdown
	RO	Isolate letdown when directed as leak increases
		Trips the Reactor when directed by SRO
		Recognize Pressuirzer level lowering with letdown isolated and both Charging pumps running.
		Inserts CEA's in Manual Sequential when directed, to place the plant in Mode 3
		Trips the Reactor when directed by SRO

Op Test No.:	HLC 19A	Scenario #	8	Event #	7, 8, 9	Page	18	of	24
Event Description:		Reactor trip 2A MSSV fails open. Failure of MSIS to actuate. Failure of 2A HPSI pump to start.							

Time	Position	Applicant's Actions or Behavior
		Booth Operator Instructions: • **When directed by Control Room to perform Appendix X of EOP-99 wait one minute and report back stating there is a MSSV stuck open on the 2A SG.** **EXAMINERS NOTE: The MSSV will reset at 500 psia SG pressure**
	SRO	Directs implementation of 2-EOP-01, "Standard Post Trip Actions" as follows: • RO: Reactivity control, Inventory Control, Pressure control, Core Heat Removal • BOP: Vital Auxiliaries, RCS heat removal, Containment Conditions.
		Requests STA to report to the control room to assist with the event.
	RO	Performs EOP-01 Safety Functions for Reactivity Control, Inventory Control, Pressure Control, Core Heat removal
		Reactivity Control • Verify Reactor power is lowering • Verify startup rate is negative. • Verify a maximum of one CEA is not fully inserted.
		Inventory Control • Verify pressurizer level is between 10 and 68% • Pressurizer level is trending to 30 – 35% (take manual control of chg pumps and isolate letdown if not already isolated)
		Pressure Control • Verify RCS pressure is between 1800-2300 psia (at 1736 psia verify SIAS and stop RCP in each loop) • Verify RCS pressure is trending 2225-2275 psia (control manually) • Verify RCS subcooling is >20° F

Op Test No.:	HLC 19A	Scenario #	8	Event #	7, 8, 9	Page	19 of	24

Event Description: Reactor trip 2A MSSV fails open. Failure of MSIS to actuate. Failure of 2A HPSI pump to start.

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: If asked to gag the SG safety, report back in three minutes, the gag, normally on the steam trestle is missing.		
	CRITICAL TASK RO	Upon SIAS (1736 psia) recognize 2A HPSI failed to start. Request SRO permissive to start 2A HPSI pump. Starts 2A HPSI pump.
	RO	Stops one RCP / LOOP when SIAS on low Pzr. Pressure
	CRITICAL TASK SRO	Direct 2A HPSI pump started
	SRO	Direct CCW restored to RCP's per Appendix J (attached pages 88-89) when isolated by SIAS. If not restored within 10 minutes, direct stopping RCP's
	RO	Core Heat Removal • Verify at least one RCO running with CCW (if >10 minutes with no CCW must secure) • Verify loop delta T is <10 F
	BOP	Performs EOP-01 Safety functions as directed for: Vital Auxiliaries, RCS Heat Removal, Containment Conditions
		Maintenance of Vital Auxiliaries • Verifies turbine governor and throttle valves closed • Verify GEN Brk open (East breaker, Mid Breaker and Exciter Breaker) • Verify all vital and non vital AC Buses energized. (2A1, 2A2, 2A3 2AB, 2B1, 2B2 and 2B3 6.9 and 4.16kv buses) • All vital and non vital DC Buses energized.

Op Test No.:	HLC 19A	Scenario #	8	Event #	7, 8, 9	Page	20	of	24
Event Description:		Reactor trip 2A MSSV fails open. Failure of MSIS to actuate. Failure of 2A HPSI pump to start.							

Time	Position	Applicant's Actions or Behavior
Booth Operator Instructions: Approximately 2 minutes after being directed to perform Appdx. X section 1, NPO reports the 2A MSSV is lifting.		
	BOP	RCS Heat Removal • Verify at least one SG has feedwater available (AFW or MFW) • Verify RCS Tavg is between 525 and 535 F • Verify SG pressure is between 835 and 915 psig. • Ensure MSR Block valves and warmup valves closed
	BOP	Recognizes MSIS fails to actuate at 700 psia. Recommends to SRO to manually actuate MSIS. Manually actuates MSIS when directed.
	SRO	Concurs / Gives direction to manually actuate MSIS.
	BOP	Containment Conditions • Verify containment pressure <2 psig • Verify NO containment radiation monitors in alarm. • Verify containment temperature is less than 120 F • Verify NO secondary plant radiation alarms (SG Blowdown may be in alarm
		Upon unit trip, notify NPO to perform App.X sect.1 of EOP-99.
		Restore CCW to RCP's per Appendix J (attached pages 88-89)
EXAMINERS NOTE: If Appendix J not completed in 10 minutes, potential new Critical Task		
	SRO	Evaluate diagnostic flow chart of 2-EOP-01 Determines SGTR and ESDE. Directs entry to 2-EOP-15, 'Functional Recovery'

Next Scenario Page = 90

APPENDIX J
RESTORATION OF CCW AND CBO TO THE RCPs
(Page 1 of 2)

☐ **1.** ENSURE Instrument Air to Containment is available by PLACING HCV-18-1 to CLOSE / OVERRIDE and then to OPEN.

CAUTION

Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

NOTE

- HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open.
- When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset.

☐ **2.** If SIAS has closed the 'N' Header valves, Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

- HCV-14-8A 'N' Hdr Isol Discharge ___
- HCV-14-9 'N' Hdr Isol Suction ___

OR

- HCV-14-8B 'N' Hdr Isol Discharge ___
- HCV-14-10 'N' Hdr Isol Suction ___

☐ **3.** ALIGN CCW to / from the RCPs by OPENING **ALL** of the following valves:

☐ HCV-14-1, CCW To RC PUMP
☐ HCV-14-2, CCW From RC PUMP
☐ HCV-14-7, CCW To RC PUMP
☐ HCV-14-6, CCW From RC PUMP

☐ **4.** If CIAS has isolated controlled bleedoff flow to the VCT, Then OPEN V2507, RCP Bleedoff Relief Stop Vlv.

APPENDIX J
RESTORATION OF CCW AND CBO TO THE RCPs
(Page 2 of 2)

CAUTION
RCP Seal Cooler isolation valves automatically close on high Seal Cooler outlet temperature of 200°F. Maintaining the control switch in the OPEN position will override this function. CCW radiation monitors should be closely monitored for indication of RCS to CCW leakage should conditions warrant the valve(s) to be maintained in the open position. Consideration should be given to returning the control switch(es) to the AUTO position once the valves have been opened.

☐ **5.** ENSURE **ALL** RCP Seal Cooler Isolation valves are OPEN:

- ☐ HCV-14-11-A1, CCW From 2A1 RCP Seal Cooler
- ☐ HCV-14-11-A2, CCW From 2A2 RCP Seal Cooler
- ☐ HCV-14-11-B1, CCW From 2B1 RCP Seal Cooler
- ☐ HCV-14-11-B2, CCW From 2B2 RCP Seal Cooler

☐ **6.** VERIFY RCP CCW related alarms are CLEAR or have been evaluated and dispositioned.

END OF APPENDIX J

Op Test No.:	HLC 19A	Scenario #	8	Event #	10	Page	22	of 25

Event Description: Enter 2-EOP-15 Functional Recovery. Isolate 2A SG per Appendix R

Time	Position	Applicant's Actions or Behavior

Booth Operator Instructions:

	BOP	Perform 2-EOP-99 Appendix A, Sampling SG's (attached pages 113-114)
		Perform Appendix R to isolate 2A SG (attach pages 100-102)
		Monitor RCP operating limits.
		Suggested termination point: • 2A SG isolated • All safety functions met • Initiate Cooldown

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 1 of 2)

A Train (√) B Train (√)

☐ **1.** If a LOOP has occurred,
Then PERFORM **BOTH** of the following:

☐ **A.** ENSURE 2AB 480V Load Center is aligned to an energized bus.

☐ **B.** DISPATCH an operator to restore Instrument Air. **REFER TO** Appendix H, Operation of the 2A and 2B Instrument Air Compressors.

> **CAUTION**
> Under SIAS conditions the CCW 'N' header should only be aligned to **ONE** essential header. This will maintain train separation while safeguards signals are still present.

> **NOTE**
> - HCV-14-9 (HCV-14-10) will open 5 seconds after HCV-14-8A (HCV-14-8B) starts to open
> - When SIAS is present, placing the control switches in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset

☐ **2.** If SIAS has closed the 'N' Header valves,
Then RESTORE flow from **EITHER** 'A' or 'B' CCW Header by PLACING the control switches for the desired train to CLOSE and then to OVERRIDE:

	A Train (√)	B Train (√)
• HCV-14-8A	___	
• HCV-14-9	___	
OR		
• HCV-14-8B		___
• HCV-14-10		___

APPENDIX A
SAMPLING STEAM GENERATORS
(Page 2 of 2)

☐ **3.** If CIAS or high radiation has closed the SGBD Sample Valves,
Then OPEN FCV-23-7 and FCV-23-9 by PLACING the control switch to CLOSE / OVERRIDE and then to OPEN.

☐ **4.** DIRECT Chemistry to perform S/G samples for activity and boron.

☐ **5.** If S/Gs cannot be sampled,
Then DIRECT Health Physics to conduct secondary plant local area radiation surveys.

END OF APPENDIX A

OPERATIONS SHIFT TURNOVER REPORT

UNIT 2 CONTROL ROOM **Day: Today**

Desk RCO: **Board RCO:**

Protected Train: **A**

Unit 2 Identified RCS Leakage: **0** **Unit 2 Unidentified RCS Leakage: 0**

Unit 2 Scheduled Activities per the OSP:

Raise power and place the Turbine on line starting with step 6.10 of 2-GOP-201, Reactor Plant Startup – Mode 2 to Mode 1.

Upcoming ECOs to Hang or Release:

None.

Tech Spec Action Statement:

None.

OPS 513's:

None

Locked in Annunciators:

D-19 – DEH DC Supply Trouble.
D-29 – Hydrogen Alarm Panel Trouble
D-59 – Generator Condition Monitor Alarm.
K-6 – CEA Auto Motion Low Power Prohibit.
K-18 – Auto Withdrawal Prohibit.
L-12 – Steam Bypass Demand AWP.
L-23 – CEA Long Term Steady State Insertion Limit.
L-29 – Loss of Load/LCL PWR DENS Channel Trip Bypassed.
L-41 – Start-Up Rate Trip in Service.
M-48 – 2C Charging Pump SS ISOL/V2553 OVRLD.

Current Status:

2-3% power. BOC, 1622 PPM boron, MTC approximately '0'. MFW and SBCS are in service. Vacuum has been drawn in the Condenser.

All Surveillances are completed and approvals given to go to Mode 1.

Reactor Engineering Guidance recommends Gp 5 at 102" at 20% Power.

Equipment Problems:

2C Charging pump OOS for repack.

Inter-Office Correspondence

RE:PSL 10-001

To: Shift Manager

Date: January 12, 2010

From: Walter D. Mead, Jr. Department: **Reactor Engineering**

Subject: UNIT 2 POWER ASCENSION.

The following recommended guidance is provided by RE to return the unit to full power operation.

1. Low power physics testing has confirmed that MTC is 0 pcm/°F.
2. Group 5 CEAs should exceed 102" prior to reaching 20% power.
3. Raise power in preparation for turbine roll with CEAs only.
4. Power ascension greater than 15% power shall be at 0.42 MW/min (3%/hr).
5. Nuclear/ Delta T Power Calibrations shall be required at 30% power, 45% power, 80% power, and 98% power.

Please contact Reactor Engineering should the need for additional guidance arise.

Walter D. Mead Jr.
Walter Mead
Reactor Engineering

John Harmon
John Harmon
Reactor Engineering Supervisor

For Exam Use Only

Critical Task Evaluation Sheet

Critical Task	Acceptance Criteria
Start 2A HPSI pump	RO identifies failure of the 2A HPSI pump to start on SIAS. He starts the 2A HPSI pump and verifies Red light ON and Green light OFF and proper flow indication. The pump must be started prior to loss of subcooling in order to successfully complete the task.