Final Submittal

ST. LUCIE AUGUST 2004
EXAM NOS. 05000335/2004301
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AUGUST 9 - 20, 2004

1. As Given Simulator Scenario Operator Actions ES-D-2

NRC

Simulator Scenerios

St. Lucie Plant

Facility: St. Lucie Scenario No.: 1 Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various component failures; perform a Rapid Power reduction; and execute the EOPs for a Steam Generator Tube Leak and Rupture combined with a Partial Loss of Power and failed equipment.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A Auxiliary Feedwater Pump is out of service for bearing replacement not expected back this shift. There is a small amount of SG tube leakage on the 2A Steam Generator and the Condenser Air Ejector is out of service.

Preexisting Malfunctions: 2B MSIV is failed-as-is, 2B Charging pump auto-start is disabled, Condenser Air Ejector is OOS, Acid Valve FCV-2210Y failed closed, 2A3 4Kv bus has an automatic fault on reactor trip, HVE-21B CEDM Fan is failed not to auto start, and the 2B MSIV is failed as-is.

Event No.	Malf. No.	Event Type*	Event Description
1	PORV	C-RO	PORV leak, Isolate and place standby valve inservice with SRV ONP.
2	CEDM	C-BOP	CEDM Fan HVE-21A fails and HVE-21B does not start. Per RAB ONP, Crew starts the standby fan.
3	RRS	I- RO	RRS #1 Tavg calculator fails low. Swap to RRS #2 per Pressurizer Pressure and Level ONP 2-0120035.
4	SGTL B	C-RO	Steam Generator Tube Leak appears in the 2B SG. Start a second charging pump. Utilize ONP 2-0830030 to isolate paths and continue plant downpower. (TS 3.4.6.2)
5		R-RO N-BOP	Rapid Downpower ONP Borate with CVCS and insert CEAs to control plant downpower. Decrease power using turbine controls.
6		C-RO	Boric Acid Flow Control Valve fails to open, Per Boron Control ONP, use Emergency Borate Valve and cycle Boric Acid Pump to control flow.
7	RUPT B	M-ALL C-BOP	Steam Generator Tube Rupture Occurs on 2B SG requiring manual reactor trip. When transfer occurs, the 2A3 4Kv buss faults causing a sustained loss of power to the 2A3 4Kv buss. Requires use of 2C AFW pump to feed the 2A SG.
8		C-RO	Partial Loss of power causes SBCS to close requiring manual operation to preclude release from the ADVs.
9	NPO MSIV B	C-RO C-SRO	When conducting SG isolation, the 2B MSIV does not close, must diagnose and order EOP App I to close locally.
			Termination: Isolate 2B SG and begin RCS cooldown to SDC.

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

Op-Test No.: 1 Scenario No.: 1 Event No.: 1 Page 2 of 11

Event Description: Pressurizer Relief Valve Leakage.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports lowering RCS pressure, increase in quench tank parameters indicative of PORV or SRV leak. Notifies SM if RCS pressure falls below 2225 psia an entry into DNB Tech Spec is required. (TS 3.2.5)
		Identifies leaking PORV 1474 leaking by elevated tailpipe temperature on TIA-1110 and lit LEDs on PORV acoustic monitors. Also may receive Quench Tank annunciator H-32.
		Isolates leaking PORV by closing isolation valve V-1476 IAW with ONP. Verifies Tailpipe temperature lowering.
		Places standby PORV inservice by opening the isolation valve V-1477. Verifies no change in tailpipe temperature.
		Recovers pressurizer pressure by energizing backup heaters.
	BOP	Confirms PORV leaking by acoustic flow monitors indicating flow. Confirm isolation by absence of flow indication.
		Confirms no leakage from PORV placed into service.
	SRO	Directs diagnosis when pressurizer and quench tank anomalies are detected.
		Directs RO to isolate leaking PORV by closing isolation valve using guidance of ONP 2-0120036.
		Directs RO to place standby PORV inservice by opening the isolation valve V-1477 using guidance of ONP 2-0120036.
		Directs analysis and recovery from condition using backup heaters.
		Notifies SM of failure when plant stable.

7.0 OPERATOR ACTIONS:

7.1 Immediate Operator Actions:

None /R12

INSTRUCTIONS	CONTINGENCY ACTIONS
7.2 Subsequent Operator Actions: /R12	
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 2340 psia, Then immediately close the applicable block valve (V-1476 or V-1477).

INSERT 1 OF 3

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	1. (continued)
C. If PORVs start to show signs of leakage as indicated by either tailpipe temperature greater than 210°F or tailpipe temperature greater than 190°F and other parameters indicate leakage (i.e., Quench Tank or acoustic parameters), Then PERFORM the following as necessary :	C.
1. If V-1474 indicates flow, Then close PORV block valve V-1476 and verify temperature decrease on TIA-1110. OR	1. If PORV leakage can NOT be isolated, Then: a. Calculate RCS leak rate to determine action required by Technical Specifications. b. Refer to 2-0120031, "Excessive Reactor Coolant System Leakage" for additional guidance.
2. If V-1475 indicates flow, Then close PORV block valve V-1477 and verify temperature decrease on TIA-1106.	

INSERT 2 OF 3

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
1. (continued)	1. (continued)
D. Place the alternate PORV in service if available.	
E. If PORV position indication is lost, Then PERFORM the following as necessary:	E.
1. If V-1474 position indication is lost, Then monitor quench tank level, pressure and temperature, and monitor temperature on TIA-1110 for indications of leakage. OR	1. If PORV leakage is indicated, Then: a. Refer to Step 7.2.1.C above.
2. If V-1475 position indication is lost, Then monitor quench tank level, pressure and temperature, and monitor temperature on TIA-1106 for indications of leakage.	
3. Document quench tank parameters and tailpipe reading every eight hours.	

INSERT 3 of 3

Op-Test No.: 1 Scenario No.: 1 Event No.: 2 Page 3 of 11

Event Description: CEDM Fan HVE-21A failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Acknowledge Ann X-2 CEDM Cooling Fan High. Check Ammeters on both CEDM fans, determine neither fan running. Check recorder TR-23-3.
		Recognize the loss of the HVE-21A CEDM Fan.
		Diagnose the failure of the standby HVE-21B to auto start.
		Manual start on HVE-21B.
	RO	Checks CEA positions and annunciators to verify no negative affect on CEDMs.
	SRO	Directs the Sequence of diagnosis information when the HVE-21A fan fails.
		Implements 2-ONP 25.01 RCB fans procedure for fan failure.
		Directs the start of HVE-21B.
		Notifies SM of failure when plant stable.
		Note: Crew may attempt to start failed HVE-21A fan.
		Role Play: SNPO reports breakers appear to be aligned normally, fuses are good, and no targets are dropped on relays.

6.0 OPERATOR ACTIONS

6.1 Loss of CEDM Cooling Fan

INSTRUCTIONS	CONTINGENCY ACTIONS

CAUTION

§1,2 At least one CEDM Cooling Fan (HVE-21A or HVE-21B) must be in operation to maintain the reactor vessel support structure within design basis. Operator action is required within 45 minutes, to restore a CEDM Cooling Fan to operation or initiate reactor trip and cooldown to at least Hot Shutdown.

NOTE

On a low flow condition from the running CEDM Cooling Fan, the standby fan should automatically start.

1. VERIFY standby CEDM Cooling Fan automatically starts.	**1.** If the standby fan does NOT automatically start, Then PERFORM the following: **A.** ATTEMPT one start of the standby fan. **B.** If the standby fan does NOT start, Then PERFORM Appendix A, CEDM Cooling Fan Local Breaker Operations. **C.** ATTEMPT one start of any available CEDM Cooling Fan. **D.** INITIATE a rapid shutdown using 2-ONP-22.01, Rapid Downpower.

/RUA

Op-Test No.: 1 Scenario No.: 1 Event No.: 3 Page 4 of 11

Event Description: Reactor Reg Calculator Failure

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes rapid increase in letdown rate with plant stable.
		Diagnose and report pressurizer level setpoint and indicated Tavg have dropped due to RRS #1 failure (ARP-H17, H18 and K25).
		Swap channels of RRS to RRS #2
		Operates CVCS letdown bias, and pressurizer heaters as necessary to bring RCS stable.
	BOP	Refers to Pressure & Level ONP 2-0120035 for RRS and level control guidance.
		May acknowledge letdown relief alarm (ARP LC-15)
	SRO	Diagnoses loss of operating RRS due to failure.
		Directs implementation of Pressure & Level ONP 2-0120035 for RRS and level control guidance.
		Directs RO to swap RRS channels to RRS #2.
		Notifies SM of failure when plant stable.

7.0 OPERATOR ACTIONS: (continued)

7.2 (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.

A. Verify selected RRS channel is operating properly.	A. If the selected RRS channel has failed, Then shift to the operable channel.

Op-Test No.: 1 Scenario No.: 1 Event No.: 4 Page 5 of 11

Event Description: 2B Steam Generator Tube Leak

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes Changing Letdown mismatch, lost RCS inventory.
		Operates CVCS and control rods to decrease reactor power and temperature as directed by SRO
		Starts a second charging pump to mitigate pressurizer level loss rate due to Pri-Sec leakage (Pump will not auto-start)
		Reports exceeding Tech Spec leakage rate of 720GPD (Tech Spec 3.4.6.2.c)
		Verifies SG Blowdown isolated if High alarm received.
	BOP	Recognizes Main Steam line and SG Blowdown trends increasing.
		Refers to ONP 2-0830030 SG Tube Leak Off-Normal for Plant response guidance for indications of Pri-Sec leakage.
		Orders NPO to ensure vent alignment and isolate priming steam.
		Orders SNPO to perform line-up and checks at the SG Blowdown Treatment Facility.
		Notify Health Physics of changes in plant condition.
	SRO	Diagnoses 2B SGTL from changing conditions, TS ref leak >720 GPD.
		Orders HP to conduct secondary surveys and possibly evacuate personnel from secondary areas or set up exclusion areas.
		Directs RO to start the standby charging pump 2B.
		Directs RO and BOP to commence plant shutdown.
		Directs plant organization response and orderly plant shutdown using ONP 2-0830020 Steam Generator Tube leak.
		Notifies Chemistry to sample SGs for boron & activity. Also directs chemistry to perform COP 06.05.
		Notifies SM of leak.

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.	

INSERT 1 OF 7

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.

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.	

INSERT 2 OF 7

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.

5. CHECK Air Ejector and / or Steam Generator Blowdown monitor reading.

- Log radiation monitor readings every 15 minutes. (Data Sheet 2)

5. If sample flow to the Blowdown Radiation monitor 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

/R28

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.

NOTE
150 gpd = 0.1 gpm

C. VERIFY estimated primary to secondary leakage is less than 150 gpd in any one S/G.

C. GO TO Step 16 of Appendix A.

INSERT 3 of 7

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 10 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
16. 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 COMMENCE a plant shutdown, 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	
17. 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.	

INSERT 4 OF 7

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 11 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS

18. 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

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.

19. Capture the CTCS sponge ball in accordance with 2-NOP-21.01, Condenser Tube Cleaning System Operation.

20. Ensure condenser air ejector is aligned to the plant vent.

21. Locally isolate auxiliary steam to auxiliary priming ejectors by closing V08245.

INSERT 5 OF 7

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 12 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
22. When the turbine is tripped and the reactor is NOT shutdown, Then shutdown the reactor as follows:	**22.** If the reactor is shutdown, Then go to Step 22 of Appendix A.
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.	
23. When the reactor is shutdown, Then PERFORM BOTH of the following:	**23.**
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."	

Insert 6 of 7

APPENDIX A
ACTIONS IN MODE 1 THROUGH MODE 3 (SIAS NOT BLOCKED)
(Page 13 of 13)

INSTRUCTIONS	CONTINGENCY ACTIONS
24. 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.	
25. GO TO Step 3 of main procedure.	

END OF APPENDIX A

INSERT 7 OF 7

Op-Test No.: 1 Scenario No.: 1 Event No.: 5 Page 6 of 11

Event Description: Plant Shutdown (Pri-Sec Leakage)

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Operates DEH to decrease turbine load; programs load rate, programs destination, starts and stops power change.
		Note: May adjust SG level set points to compensate for level change.
	RO	Operates Boron Control System to borate the RCS and decrease RCS temperature. (discovers event 6 Acid Flow Control failure)
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Operates control rods to maintain ASI.
		Crew may operate Pressurizer Heaters and Spray systems to place the Pressurizer on recirc. (App A of 2-NOP-0030123)
		Crew may notify HP of changes in Letdown Flow.
	SRO	Performs shift brief prior to power decrease
		Directs actions to prepare for and conduct normal plant shutdown. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to place pressurizer on recirc and start additional charging pump
		Directs RO to maintain ASI at 100% value
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease
		Note: crew may additionally address miscellaneous alarms related to the downpower; SG level, Hydrogen pressure, QRP DDPS alarm, BAM Pump Press Low alarm and Nuc-Delta-T RPS alarms.

Op-Test No.: 1 Scenario No.: 1 Event No.: 6 Page 7 of 11

Event Description: Boric Acid FCV failure.

(Acid Flow Controller is failed on scenario set-up)

Time	Position	Applicant's Actions or Behavior
	BOP	Communicates with RO as to control turbine power changer rates when turbine power must be decreased or the turbine must be placed on hold. Programs load demand and load rate into DEH computer.
	RO	Recognizes zero acid flow going to the RCS on FIC-2210Y.
		Diagnoses FCV-2210Y is failed closed, reports to SRO.
		Starts or verifies running a Boric Acid Pump.
		Opens Emergency Borate valve V-2514.
		Monitors and controls resultant decrease in RCS temperature and adjusts downpower and/or cycles boric acid pump to control temperature decrease rates.
	SRO	Directs the gathering of diagnosis information when FCV-2210Y acid flow control valve will not open with a down power required.
		Directs power adjustments and compensations necessary when RCS temperature does not respond initially.
		Directs RO to Start Boric Acid pump and open Emergency Borate valve and cycle the Boric Acid Make-Up pump to control gross boric acid flow for down power per Boron Control ONP 02.01.
		Notifies SM of failure when plant stable.

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 No.: 1 Event No.: 7 Page 8 of 11

Event Description: SG Tube Rupture, Partial Loss of AC Power.
(initiate this failure on examiner cue when enough power change has been observed)

Time	Position	Applicant's Actions or Behavior
	RO	Manually trips the reactor when pressurizer level can no longer be maintained (Pressurizer level H-17 & H18)
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1) • Reactivity Control • RCS pressure control • RCS inventory control • Containment heat removal
		Reports loss of all power to 2A3 4Kv buss due to fault.
	Critical Task	Manually operate SBCS controller HIC-8801 with a loss of power to permissive signals (loss of 2A3 buss) and control SG pressure to prevent continued lifting of SG safeties and release of SG to atmosphere. Must control SG pressure below lift pressure before end of EOP-01 procedure, and will not utilize the ADVs.
	BOP	Makes plant announcement: Plant Trip, NPO call, STA/SC report.
		Perform Standard Post Trip actions (2-EOP-1) • Maintenance of vital auxiliaries (reports 2A3 diff current) • RCS heat removal • Containment conditions
		Directs NPO to perform Appendix X of EOP-99 (Trip response)
		Closes Gland Steam Spillover valve to ensure condenser vacuum is maintained.
		Isolates MSR warm-up block valves to ensure feedwater heaters do not release steam from the secondary.
	SRO	Directs RO and BOP to manually trip reactor when pressurizer level can no longer be maintained
		Performs shift brief and directs entry into 2-EOP-04, Steam Generator Tube Rupture procedure and outlines goals.

RO

4.0 OPERATOR ACTIONS

REACTIVITY CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 1. DETERMINE Reactivity Control acceptance criteria are met:	
A. VERIFY Reactor power is lowering.	A.1 PERFORM the following **AS NECESSARY** to insert CEAs: 1. Manually TRIP the Reactor. 2. DEENERGIZE the CEDM MG Sets by opening **BOTH** of the following breakers: • LC 2A2, Bkr 2-40212, CEA Drive MG Set 2A • LC 2B2, Bkr 2-40511, CEA Drive MG Set 2B 3. OPEN TCB-1 through TCB-8, at Rx Trip Swgr.
B. VERIFY Startup Rate is negative.	
C. VERIFY a maximum of **ONE** CEA is NOT fully inserted.	C.1 INITIATE Emergency Boration to achieve adequate SDM.

INSERT 1 OF 13

BOP

4.0 **OPERATOR ACTIONS** (continued)

MAINTENANCE OF VITAL AUXILIARIES
(AC & DC POWER)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 2. DETERMINE Maintenance of Vital Auxiliaries acceptance criteria are met:	
A. VERIFY the Turbine is tripped by **ALL** GVs and TVs indicate CLOSED.	A.1 PERFORM **ALL** of the following: 1. Manually TRIP the Turbine. 2. VERIFY Turbine First Stage pressure indicates 0 psig. 3. VERIFY Turbine speed is LOWERING. A.2 If the Turbine is NOT tripped, Then PERFORM the following **AS NECESSARY** to isolate steam to the turbine: 1. Locally TRIP the Turbine. 2. CLOSE **BOTH** MSIVs.
B. **When the Turbine is TRIPPED,** Then VERIFY the Main Generator breakers are OPEN: • 8W49, Generator No. 2 East Breaker • 8W52, Generator No. 2 Mid Breaker • FB 2, Exciter Supply Breaker	B.1 OPEN Main Generator breakers: • 8W49, Generator No. 2 East Breaker • 8W52, Generator No. 2 Mid Breaker • FB 2, Exciter Supply Breaker

(Continued on next page)

(Continued on next page)

- BOP -

INSERT 2 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

MAINTENANCE OF VITAL AUXILIARIES
(AC & DC POWER)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
C. VERIFY **ALL** Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers and are ENERGIZED.	C.1 If **EITHER** Vital 4.16 KV Bus is NOT powered from offsite, Then ENSURE **BOTH** of the following: 1. The associated EDG has STARTED. 2. The associated EDG output breaker is CLOSED. C.2 If **ANY** 6.9 KV or non-vital 4.16 KV bus is NOT powered from offsite, Then INITIATE action to RESTORE power to the bus. C.3 If **NO** Vital 4.16 KV buses are energized, Then PERFORM **ALL** the following: 1. CONTACT Unit 1 to determine power availability. 2. NOTIFY Unit 1 to PERFORM Appendix W, Supplying Unit 2 with AC Power Using SBO Crosstie. 3. PERFORM Appendix V, Receiving AC Power from Unit 1 Using SBO Crosstie.
D. VERIFY **ALL** Vital and Non-Vital DC Buses are ENERGIZED.	D.1 If the 2AB DC Bus is de-energized, Then ALIGN the 2AB DC Bus to an energized Vital DC Bus.

-BOP-

INSERT 3rd

RO

4.0 **OPERATOR ACTIONS** (continued)

RCS INVENTORY CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

Rising Pressurizer level with concurrent lowering RCS Subcooled Margin are symptoms of a Pressurizer Steam Space LOCA.

☐ 3. DETERMINE RCS Inventory Control acceptance criteria are met:

A. VERIFY **BOTH** of the following conditions exist,

- Pressurizer level is between 10 and 68%
- Pressurizer level is trending to between 30 and 35%

A.1 RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing **ANY** of the following:

1. ENSURE proper operation of the Pressurizer Level Control System.
2. Manually CONTROL Charging and Letdown.

RO

4.0 OPERATOR ACTIONS (continued)

RCS PRESSURE CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ **4.** DETERMINE RCS Pressure Control acceptance criteria are met:	
A. VERIFY Pressurizer pressure is between 1800 and 2300 psia.	**A.1** If Pressurizer pressure is less than 2300 psia, and the PORV(s) are OPEN, Then PERFORM **ANY** of the following: **1.** OVERRIDE the open PORV(s). **2.** CLOSE the associated PORV block valve(s). **A.2** If Pressurizer pressure is less than 1736 psia, Then ENSURE **ALL** of the following: **1.** SIAS has ACTUATED. **2.** CIAS has ACTUATED. **3.** **ONE** RCP in **EACH** loop is stopped.
B. VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia.	**B.1** RESTORE and MAINTAIN Pressurizer pressure between 2225 and 2275 psia by performing **ANY** of the following: **1.** ENSURE proper operation of the Pressurizer Pressure Control System. **2.** Manually OPERATE heaters and spray.
C. VERIFY RCS subcooling is at least 20°F.	**C.1** If RCS subcooling is less than 20°F or RCP(s) exhibit cavitation, Then STOP **ALL** RCPs. **C.2** COMMENCE a cooldown, not to exceed 100°F in **ANY** one hour to regain subcooling.

INSERT 5 OF 13

RO

4.0 **OPERATOR ACTIONS** (continued)

CORE HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ **5.** DETERMINE Core Heat Removal acceptance criteria are met:	
A. VERIFY at least **ONE** RCP is RUNNING and supplied with CCW.	**A.1** If CCW is LOST to the RCPs for greater than 10 minutes, Then STOP **ALL** RCPs.
B. VERIFY Loop ΔT is less than 10°F.	

INSERT 6 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

RCS HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 6. DETERMINE RCS Heat Removal acceptance criteria are met:	
A. VERIFY at least **ONE** S/G has **BOTH** of the following conditions: • S/G level is between 20 and 90% NR • Feedwater is available and level is being restored to between 60 and 70% NR	**A.1** PERFORM **BOTH** of the following: **1.** ENSURE Main Feedwater flow is available. **2.** CONTROL Main Feedwater flow to restore S/G level to between 60 and 70% NR.
	A.2 PERFORM **BOTH** of the following: **1.** ENSURE Auxiliary Feedwater flow after AFAS actuation. **2.** CONTROL AFW flow to restore S/G level to between 60 and 70% NR.
B. If **EITHER** of the following conditions exist, • 2A or 2B AFW Pump is the **ONLY** source of Feedwater • Main or Auxiliary Feedwater flow can NOT be re-established Then STOP **ONE** RCP in **EACH** loop.	

(Continued on next page)

(Continued on next page)

-BOP-

INSERT 7 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

RCS HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	**6.** (continued)
C. VERIFY RCS T_{AVG} is between 525 and 535°F.	**C.1** If RCS T_{AVG} is greater than 535°F, Then CONFIRM that at least **ONE** S/G is removing RCS heat: **1.** ENSURE feedwater is being restored to at least **ONE** S/G. **2.** ENSURE SBCS or ADVs are restoring RCS T_{AVG} to between 525 and 535°F.
	C.2 If RCS T_{AVG} is less than 525°F, Then CONFIRM S/G steam and feed rates are NOT excessive: **1.** ENSURE feed flow is NOT excessive. **2.** ENSURE SBCS or ADVs are restoring RCS T_{AVG} to between 525 and 535°F.
	C.3 If T_{COLD} is approaching or less than 500°F, Then PERFORM **BOTH** of the following: **1.** ENSURE at least **ONE** RCP is STOPPED. **2.** INITIATE Emergency Boration to achieve adequate SDM.

(Continued on next page)

(Continued on next page)

-BOP-

INSERT 8 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

RCS HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)
D. VERIFY S/G pressure is between 835 and 915 psig (850 and 930 psia).	D.1 If S/G pressure is greater than 915 psig (930 psia), Then ENSURE the SBCS or ADVs are restoring S/G pressure to less than 915 psig (930 psia).
	D.2 If S/G pressure is less than 835 psig (850 psia), Then ISOLATE steam lines from the S/G: 1. ENSURE SBCS valves are CLOSED. 2. ENSURE ADVs are CLOSED.
	D.3 If S/G pressure is less than 735 psig (750 psia), Then CLOSE the MSIVs.
	D.4 If S/G pressure is less than 585 psig (600 psia), Then ENSURE MSIS has ACTUATED.
E. ENSURE the **FOUR** MSR TCV Block Valves are CLOSED.	E.1 CLOSE **ALL** TCVs using the MSR Reheat Control Panel.
F. ENSURE the MSR Warmup Valves are CLOSED.	
G. If maintaining a vacuum is desired, Then ENSURE MV-08-814, Spillover Bypass Valve, is CLOSED.	

-BOP-

BOP

4.0 **OPERATOR ACTIONS** (continued)

CONTAINMENT CONDITIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 7. DETERMINE Containment Conditions acceptance criteria are met:	
A. VERIFY Containment pressure is less than 2 psig.	**A.1** If Containment pressure is at least 3.5 psig, Then ENSURE **ALL** of the following conditions exist, **1.** SIAS has ACTUATED. **2.** CIAS has ACTUATED. **3.** MSIS has ACTUATED. **4.** **ALL** available Containment Fan Coolers are RUNNING.
	A.2 If Containment pressure is at least 5.4 psig, Then ENSURE **BOTH** of the following conditions exist, **1.** CSAS has ACTUATED. **2.** **EACH** Containment Spray header flow is at least 2700 gpm.
B. VERIFY **NO** Containment Radiation Monitor alarms or rising trends: • CIS Radiation Monitors • Containment Atmospheric Monitors	**B.1** If Containment radiation is greater than 10R/hr, Then ENSURE CIAS has ACTUATED.

(Continued on next page)

(Continued on next page)

INSERT 10F1

BOP

4.0 OPERATOR ACTIONS (continued)

CONTAINMENT CONDITIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
7. (continued)	7. (continued)
C. VERIFY Containment temperature is less than 120°F.	**C.1** ENSURE **ALL** available Containment Fan Coolers are RUNNING.
D. VERIFY **NO** secondary plant radiation alarms or rising trends: • Condenser Air Ejector Monitor • S/G Blowdown Monitors • Main Steamline Monitors	

/R23

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] 8. DIRECT a field operator to perform Secondary Plant Post Trip Actions. **REFER TO** Appendix X, Secondary Plant Post Trip Actions, Section 1.	
[ ] 9. <u>When</u> **ALL** safety function acceptance criteria have been EVALUATED, <u>Then</u> PERFORM **BOTH** of the following:	
A. DIAGNOSE the event. **REFER TO** Chart 1, Diagnostic Flow Chart.	
B. **GO TO the appropriate Emergency Operating Procedure.**	

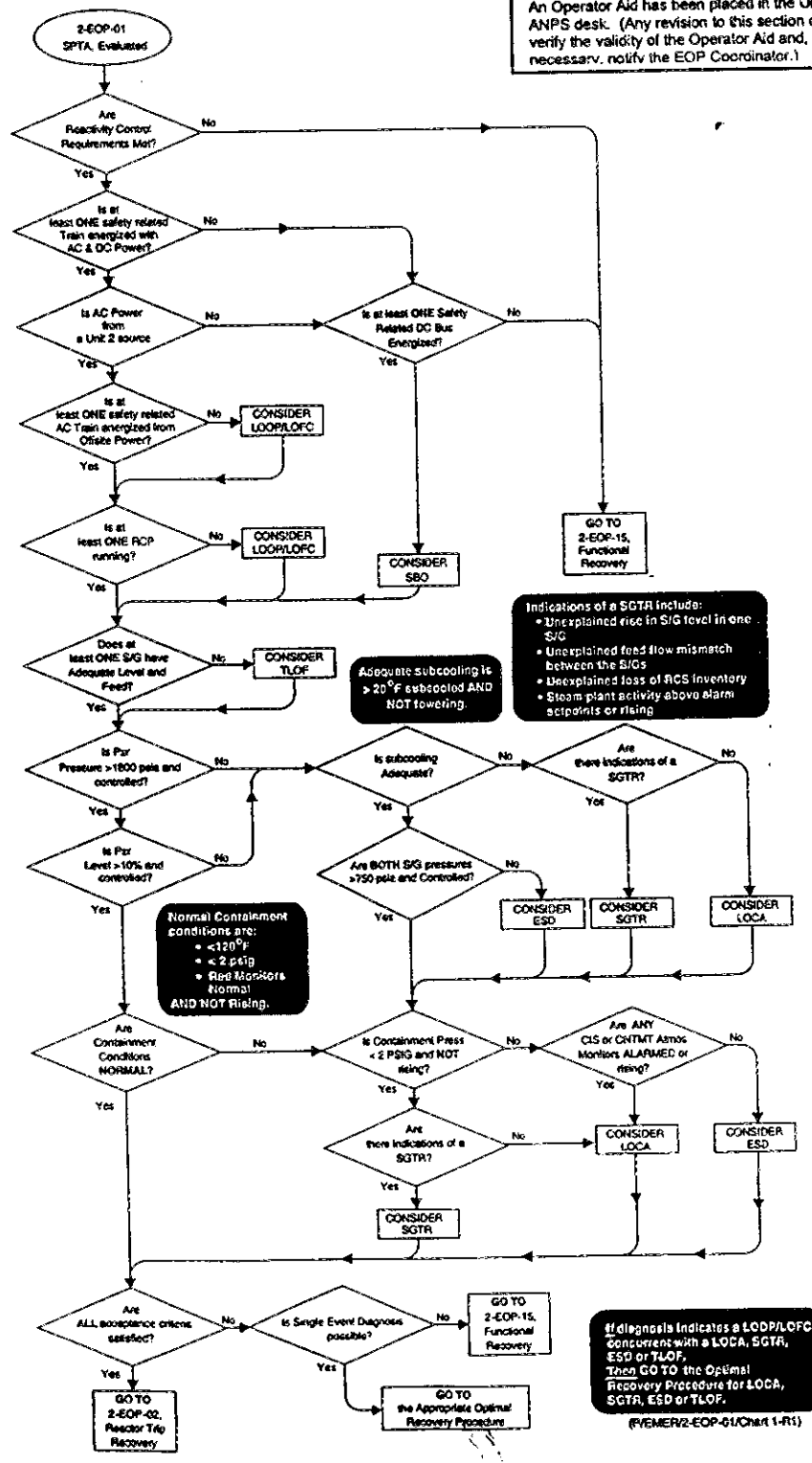
END OF SECTION 4.0

CREW -

INSERT 12 OF 1:

CHART 1
DIAGNOSTIC FLOW CHART
(Page 1 of 1)

NOTE
An Operator Aid has been placed in the Unit 2 Control Room ANPS desk. (Any revision to this section of the procedure shall verify the validity of the Operator Aid and, if changes are necessary, notify the EOP Coordinator.)



(FVEMER/2-EOP-01/Chart 1-R1)

INSERT 13 of 1

Op-Test No.: 1 Scenario No.: 1 Event No.: 8 Page 9 of 11

Event Description: Steam Generator Tube Rupture Recovery

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes SBCS not operating in Automatic due to loss of permissive system power, reports to US.
		Takes Manual control of SBCS and opens valves to commence RCS cooldown as directed by US.
	Critical Task	Transfer SBCS permissive switch to Manual and operate SBCS to reduce RCS temperature, control RCS subcooling and bring plant to SG isolation temperatures (510 degrees T-hot).
		Operate Pressurizer sprays, aux sprays to reduce RCS subcooling and stay within Figure 1A. Maintain RCS pressure as directed by the SRO.
	BOP	Performs safety function status checks for 2-EOP-4
	Critical Task	Restore CCW to RCPs IAW EOP-99 appendix "J" or Trips all RCPs within 10 mins.
		Key block MSIS signal to maintain SBCS available.
		Verifies SI flow per 2-EOP-99, Figure 2
		If RCPs are stopped, verify Natural Circulation.
	SRO	Directs steps in SGTR EOP-04 to commence RCS cooldown and depressurization for ruptured generator isolation.
		Directs SBCS be operated in manual to commence RCS cooldown for SG isolation.
		Direct Block of MSIS signal to ensure continued use of SBCS.
		Operate Pressurizer sprays and heaters to reduce RCS subcooling within figure 1A as directed by the US.
		Orders verification of SI flow per 2-EOP-99, Figure 2

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.

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 switch in CLOSE and then OVERRIDE will open the CCW 'N' header valves, until SIAS is reset.
- 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.

☐ **2.** ALIGN the CCW 'N' header by performing **ONE** of the following:

☐ **A.** If the 'A' CCW header is available,
Then ENSURE **BOTH** of the following valves are OPEN:

☐ HCV-14-8A, 'N' Hdr. Isol. Discharge

☐ HCV-14-9, 'N' Hdr. Isol. Suction

☐ **B.** If the 'B' CCW header is available,
Then ENSURE **BOTH** of the following valves are OPEN:

☐ 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.

HKZ9

Insert 10F2

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

INSERT 2 OF 2

Event Description: SG Tube Rupture Isolation

Time	Position	Applicant's Actions or Behavior
	RO	Continue Cooldown of RCS using SBCS in manual.
		Continue RCS depressurization using Sprays.
	BOP	Performs SFSCs from EOP-04 as directed by US.
		Begins Isolation of 2B SG with Appendix R of EOP-99.
	Critical Task	Discovers 2B MSIV will not close on demand. Directs local closure of HCV-08-1B with Appendix "I" of EOP-99 by the NPO.
		Completes isolation of 2B Steam Generator IAW Appendix R guidance of EOP-99.
		Report successful closure of the MSIV HCV-08-1B.
	SRO	Directs plant recovery steps from EOP-04 to cool down the plant and prepare for SG isolation.
		Directs isolation of the 2B SG when isolation criteria are met.
		Orders local closure of HCV-08-1B with Appendix "I" of EOP-99.
		This scenario can be terminated when the 2B SG isolation steps have been completed, and the order has been given to the NPO to complete the AFW local isolation steps of Appendix R.
		Note: correct E-Plan classification is Alert for SGTR with no release to atmosphere.

4.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS

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. Confirm Diagnosis**

VERIFY 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, and GO TO ONE of the following:

- **The appropriate Optimal Recovery Procedure**
- **2-EOP-15, Functional Recovery**

IR22

☐ * **2. Classify Event**

EVALUATE EPIP Classification criteria for present plant conditions and Emergency Plan Actions.
REFER TO EPIP-01, Classification of Emergencies.

IR22

☐ **3. Implement Placekeeping**

OPEN the Placekeeper
and NOTE the time of EOP entry.

Insert 1 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ **4. Sample Steam Generators** SAMPLE S/Gs. **REFER TO** Appendix A, Sampling Steam Generators.	**4.1** MONITOR other indications of a SGTR.
[*] **5. Ensure Safety Injection Actuation** If RCS pressure is less than 1736 psia, Then ENSURE SIAS has ACTUATED.	**5.1** Manually START/ALIGN SIAS components. **REFER TO** Table 1, Safety Injection Actuation Signal.
[*] **6. 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: **1.** ENSURE electrical power to SI pumps and valves. **2.** ENSURE correct SI valve alignment. **3.** 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.

Insert 2 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **7. RCP Trip Strategy**	
A. If RCS pressure is less than 1736 psia, Then ENSURE **ONE** RCP in **EACH** loop is STOPPED.	
B. If RCS subcooling is less than minimum subcooling, Then ENSURE **ALL** RCPs are STOPPED.	
C. If CCW is LOST to the RCPs for greater than 10 minutes, Then STOP **ALL** RCPs.	

Insert 3 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **8. Ensure RCP Seal Cooling**	
A. VERIFY CCW to the RCPs.	**A.1** If a 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. 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.	**B.** ENSURE RCP controlled bleedoff will remain isolated by PLACING the **TWO** RCP Bleedoff valves to CLOSE.

Insert 4 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **9. Verify RCP Operating Limits** If RCPs are RUNNING, Then VERIFY RCP operating limits are satisfied. **REFER TO** Table 13, RCP Operating Limits.	**9.1** STOP RCPs that do NOT satisfy operating limits.

CAUTION

Operation of the 2C AFW Pump should be avoided to minimize direct releases to the environment. If motor driven AFW pumps are NOT available, steam from the least affected S/G should be used.

[ ] **10. RCS Cooldown to less than 510°F** Cooldown the RCS to T_{HOT} less than 510°F using SBCS.	**10.1** COOLDOWN the RCS to T_{HOT} less than 510°F using ADVs from **BOTH** S/Gs. **10.2** COOLDOWN using 2C AFW Pump and alternate steaming flow paths on the unisolated S/G. **REFER TO** Table 12, Alternate S/G Heat Removal Paths.

Insert 5 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE

RCP operation is desirable while depressurizing the RCS during a SGTR event.

- RCP operation takes precedence over equalizing primary and secondary pressures.
- Monitor RCPs for cavitation as the NPSH curve is approached and exceeded.
- Maintain minimum subcooling within the limits of Figure 1A.

[*] **11. Depressurize the RCS**

PERFORM a controlled RCS depressurization as follows:

A. MAINTAIN RCS pressure within **ALL** the following criteria (listed in order of priority):

- Within the limits of Figure 1A, RCS Pressure Temperature
- Less than 930 psia
- Above the minimum pressure for RCP operation
- Approximately equal to the most affected S/G pressure (within 50 psia)

B. OPERATE Main or Auxiliary Pressurizer spray.

C. If HPSI throttle criteria are met, Then THROTTLE SI flow. **REFER TO** Appendix S, Safety Injection Throttling and Restoration.

11.1 If RCS pressure can NOT be LOWERED and MAINTAINED within the specified criteria, Then OPERATE the PORVs or RCGVS to reduce pressure.

Insert 6 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS **CONTINGENCY ACTIONS**

CAUTION

RCS inventory and 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.

[*] **12. Block MSIS and SIAS**

As the RCS cooldown and depressurization proceed, PERFORM **ANY** of the following:

A. If MSIS is NOT present, Then BLOCK automatic initiation of MSIS.

B. If SIAS is NOT present, Then BLOCK automatic initiation of SIAS.

[*] **13. 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. **REFER TO** Appendix X, Secondary Plant Post Trip Actions, Section 2.

Insert 7 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

☐ **14. 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.

☐ **15. Determine the MOST Affected S/G.**

DETERMINE the **MOST** affected S/G by considering **ALL** of the following:

- S/G sample activities
- Main Steam Line radiation monitoring trending prior to the trip
- S/G level change when NOT feeding
- SGBD radiation monitoring
- **ONE** S/G level rising faster than the other with feed and steaming rates being essentially the same
- Feed flow mismatch between S/Gs
- Steam flow vs. feed flow mismatch in a S/G prior to the trip

Insert 8 of 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **16. Isolate the MOST Affected S/G** When RCS hot leg temperature is less than 510°F, Then ISOLATE the **MOST** affected S/G. **REFER TO** Appendix R, Steam Generator Isolation.	
[*] **17. Maintain ISOLATED S/G below 915 psig (930 psia)** MAINTAIN the ISOLATED S/G pressure less than 915 psig (930 psia) by **ANY** of the following: **A.** Manual operation of the MSIV Bypass valve. (If condenser vacuum exists). **B.** Manual operation of the associated ADV. **C.** Local operation of the associated ADV.	
[ ] **18. Verify Correct S/G was Isolated** VERIFY the **MOST** affected S/G is isolated by observing **ALL** of the following: • S/G sample activities • SGBD monitor radiation levels • SJAE exhaust monitor radiation level • S/G levels	**18.1** If the wrong S/G was isolated, Then RESTORE feeding and steaming capability to the isolated S/G. **18.2** When RCS heat removal has been re-established on the least affected S/G, Then ISOLATE the most affected S/G. **REFER TO** Appendix R, Steam Generator Isolation.

Insert 9 of 9

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.

/R29

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)

APPENDIX R
STEAM GENERATOR ISOLATION
(Page 6 of 6)

Section 2: 2B Steam Generator Isolation (continued)

17. (continued)

☐ **E.** If MV-08-12, S/G 2B Steam to AFW Pump 2C, is NOT CLOSED or suspected of leaking,
Then PERFORM **ANY** of the following **AS NECESSARY**:

☐ **1.** Locally CLOSE MV-08-12 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 2

END OF APPENDIX R

APPENDIX I
MSIV LOCAL CLOSURE
(Page 1 of 1)

☐ **1.** To locally CLOSE HCV-08-1A, 2A S/G MSIV, PERFORM the following:

- ☐ **A.** CLOSE V181197, Inst Air to 2A MSIV – Air Accum & HCV-08-1A Isol.
- ☐ **B.** CLOSE PS-08-12A instrument valve.
- ☐ **C.** REMOVE swaglock cap from PS-08-12A test connection.
- ☐ **D.** OPEN PS-08-12A instrument valve to bleed air from system through the test connection.

☐ **2.** To locally CLOSE HCV-08-1B, 2B S/G MSIV, PERFORM the following:

- ☐ **A.** CLOSE V181195, Inst Air to 2B MSIV – Air Accum & HCV-08-1B Isol.
- ☐ **B.** CLOSE PS-08-12B instrument valve.
- ☐ **C.** REMOVE swaglock cap from PS-08-12B test connection.
- ☐ **D.** OPEN PS-08-12B instrument valve to bleed air from system through the test connection.

END OF APPENDIX I

Shift Turnover

- The plant is operating at 100% power MOC.

- Severe Thunderstorm Warning is in effect for St. Lucie and Indian River Counties.

- 2A HPSI pump is out of service to repair a crack discovered in the CCW cooling line, removed from service 6 hours ago, not expected back this shift.

- 2A Auxiliary Feedwater pump is out of service for bearing replacement, removed from service 12 hours ago, not expected back this shift.

- There is a small amount of SG tube leakage on the 2A Steam Generator (5 GPD). Chemistry is monitoring long term.

- Condenser Air Ejector Rad Monitor is out of service.

- RE recommends holding ASI to 100% power values.

Facility: St. Lucie Scenario No.: 2 Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various component failures; perform a normal plant power increase; and execute the EOPs for a Loss of Forced Circulation and with a Partial Loss of Power and followed by a recoverable Total Loss Of Feedwater.

Initial Conditions: Unit 2 is at 45% power MOC, Xenon building in from downpower for 2B MFW Pump.

The plant is operating at 45% power, MOC. 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A Auxiliary Feedwater Pump is out of service for bearing replacement not expected back this shift. The previous crew has reduced power to 45% to repair a leak in the oil cooler of the 2B Main Feedwater Pump. This pump is repaired and power is holding steady against the build-in of Xenon with dilution, ready for power ascension. There is a small amount of SG tube leakage on the 2A Steam Generator and the Condenser Air Ejector is out of service.

Preexisting Malfunctions: 2A 6.9Kv buss feeder breaker is set up in the failed as is condition and will simulate a blown breaker fuse on the plant trip, CCW system is set with an automatic line break when 2C CCW pump is started. The Condenser Air Ejector is out of service.

Event No.	Malf. No.	Event Type*	Event Description
1		N-BOP	Start 2B Main Feedwater Pump IAW Feedwater Normal Procedure 2-0700020,
2		R- RO N-BOP	Increase Plant Power with GOP-201 RO - Boron and Rod Control BOP - Turbine Control
3	Dilute	I-RO	FCV-2210X Water Flow Control Valve fails open during dilution. Stop dilution and secure power ascension.
4	Level	I-RO	Pressurizer Level Ch X Fails Low, Per Pzr Pressure/Level ONP select Channel Y
5	2A CCW	C-BOP	2A CCW Pump bearing freeze. (T.S.3.7.3) Per CCW ONP start 2C Pump on A Header
6		C - RO C - BOP M-All	CCW N-Header Rupture when 2C CCW Pump starts Close HCV-14-8A to stop loss of 2A Safety Header. Manually Trip Plant per CCW ONP Stop all four RCPs, Loss of Forced Circulation in the RCS. 2A 6.9KV S/U Transformer does not swap on trip.
7	2C Failure	M-All C - RO C-BOP	2C AFW Pump trip on overspeed on AFAS after entering EOP-09 (T.S. 3.7.1.2) AFW 2B SE-09-3 failed closed (Total Loss of Feedwater) 2B Main Feed Pump will not start due to Aux Oil Pump failure.
8	2A restore	C -BOP	Re-energize 2A 6.9KV offsite power feed and feed SGs with 2A Main Feedwater Pump.
			Termination: Start 2A MFP & feed S/G or restore flow from the 2C AFW Pump prior to Once Thru Cooling.

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

Op-Test No.: 1 Scenario No.: 2 Event No.: 1 Page 2 of 12

Event Description: 2B Main Feedwater Pump Start

(Turnover item)

Time	Position	Applicant's Actions or Behavior
	RO	Confirms conditions ready for Main Feedwater Pump start.
		Maintains plant constant by adjusting dilution rate if necessary.
	BOP	Verified conditions ready for Main Feedwater Pump start.
		Starts Main Feedwater Pump 2B IAW Feedwater NOP 2-0700020.
	SRO	Directs start of 2B Main Feedwater Pump.

APPENDIX H
STARTING THE SECOND MAIN FEEDWATER PUMP
(Page 7 of 8)

INITIAL

CAUTION
Closely monitor initial startup of MFW pump. Immediately STOP the pump upon evidence of unusual vibration, heat, noise or other malfunctions.

18. Ensure the following initial conditions exist prior to starting the MFW Pump:

DESCRIPTION	RCO INITIAL
2A MFW Pump	
MV-09-1, Pump 2A Discharge Valve, CLOSED	
FCV-09-1A2, Pump 2A Discharge Recirc Valve, CLOSED	
2A MFW Pump Auxiliary Oil Pump, RUNNING	
2B MFW Pump	
MV-09-2, Pump 2B Discharge Valve, CLOSED	
FCV-09-1B2, Pump 2B Discharge Recirc Valve, CLOSED	
2B MFW Pump Auxiliary Oil Pump, RUNNING	

19. Start one Main Feedwater pump as follows:

A. Start the selected MFW Pump AND place the control switch in the RECIRC position.

RCO

B. Verify the recirc and discharge valves open.

DESCRIPTION	RCO INITIAL
2A MFW Pump	
MV-09-1, Pump 2A Discharge Valve, OPEN	
FCV-09-1A2, Pump 2A Discharge Recirc Valve, OPEN	
2B MFW Pump	
MV-09-2, Pump 2B Discharge Valve, OPEN	
FCV-09-1B2, Pump 2B Discharge Recirc Valve, OPEN	

Insert 1 of 2

APPENDIX H
STARTING THE SECOND MAIN FEEDWATER PUMP
(Page 8 of 8)

19. (continued) INITIAL

C. Ensure the auxiliary oil pump stops.

DESCRIPTION	RCO INITIAL
2A MFW Pump Auxiliary Oil Pump	
2B MFW Pump Auxiliary Oil Pump	

20. Verify normal pump operation by:

A. All MFW Pump related annunciator alarms are clear. _____ RCO

B. Parameters such as running amps, discharge pressure and feedwater flow rate for this condition are within expected ranges. _____ RCO

Insert 2 of 2

Op-Test No.: 1 Scenario No.: 2 Event No.: 2 Page 3 of 12

Event Description: Plant Power Change

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Operates DEH to increase turbine load by: Setting DEMAND as directed by the SRO Setting LOAD RATE as directed by the SRO Starting up power by depressing GO when directed by the SRO.
		Note: May adjust SG level set points to compensate for level change.
	RO	Increases Dilution to the RCS for Xenon by adjusted FRV-2210X to the desired flow rate. (~ 40 gpm for 2 MW/min up power)
		Withdraws CEAs if necessary to maintain ASI within the transient curve.
		Remains cognizant of RCS parameters during up power.
	SRO	Directs power increase IAW GOP-201.
		Directs RO to Raise RCS temperature by CVCS addition
		Directs BOP to Raise turbine power by DEH
		Notifies System of impending power increase.
		Note: crew may additionally address miscellaneous alarms related to the downpower; Long Term Steady State CEA limits, SG level, Hydrogen pressure, QRP DDPS alarm, and Nuke-Delta-T RPS alarms.

Op-Test No.: 1 Scenario No.: 2 Event No.: 3 Page 4 of 12

Event Description: Reactor Water Flow Valve Failure FCV-2210X

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports increase flow from FCV-2210X as detected by high flow, increasing temperature or when flow is adjusted and checked.
		Attempt to secure flow with valve control switch.
		Secure dilution by closing Boron Load Control Valve.
		May secure dilution by stopping the primary water pump.
		Regains stable RCS parameters with pressurizer heaters and letdown bias as necessary.
	BOP	Assure plant stable.
	SRO	Direct secure dilution by closing Boron Load Control Valve.
		Direct secure dilution by stopping the primary water pump.
		Request assistance and notify SM.

Op-Test No.: 1 Scenario No.: 2 Event No.: 4 Page 5 of 12

Event Description: Pressurizer Level Channel X

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes and reports Pressurizer Level Channel X failing low from X channel level (ARP-H17) and heater alarms (ARP-H29, H30) (TS 3.4.3 150 Kw heaters)
		Verifies channel failure.
		Swaps Level control to Y Channel control.
		Key Bypass Back Up heater interlock switch to Level position.
		Restores pressurizer heater 480V breakers on the 'B' side by reset of one proportional and three backup heaters.
		Regains stable RCS parameters with pressurizer heaters and letdown bias as necessary.
	BOP	Confirms failed channel, assists with ONP procedures.
	SRO	Directs the gathering of diagnosis information and confirmations of failed channel.
		Implements ONP 2-0120035 Pressurizer Pressure and Level Off Normal procedure to mitigate the failed channel.
		Directs RO to swap to Y channel.
		Notifies SM

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	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.

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

7.0 OPERATOR ACTIONS: (continued)

7.2 (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
	G. (continued)
	2. If actual pressurizer level had decreased below 27% and has been restored, Then reset pressurizer heaters by:
	a. Resetting 4160KV feeder breakers 2-20204 and 2-20403, and Then resetting pressurizer heater control switches.
H. Verify that pressurizer PORV's/Safeties are NOT leaking or actuated as indicated by:	H. If leakage is indicated, Then close PORV block valve(s) V-1476 and/or V-1477 as required, and refer to 2-0120036, "Pressurizer Relief/Safety Valve Off-Normal Operating Procedure."
1. PORV/Safety Valve acoustic flow monitors.	
2. Downstream tailpipe temperatures.	
3. Quench tank level, temperature, and pressure.	

Op-Test No.: 1 Scenario No.: 2 Event No.: 5 Page 6 of 12

Event Description: 2A CCW pump bearing freeze.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognize the amperes increasing on the 2A CCW pump. May observe ARP-S31 if high amperage continues. Multiple CCW alarms are present following loss of the pump including Fuel Pool, Containment Coolers, RCPs etc…
		Stop or verify 2A CCW is stopped.
		Directs SNPO check pump locally.
		Take 2C pump out of pull-to-lock and Start 2C CCW pump to recover flows to CCW system.
		Place 2A CCW pump to Pull-to-Lock.
	RO	Notify Maintenance Supervisor of 2A pump failure.
	SRO	Directs the stop of 2A CCW pump with high amperage.
		Verify sufficient flow remains to N-Header for RCPs.
		Implements ONP 2-0310030 CCW Off-Normal procedure to restore CCW flow to the headers.
		Directs the crew to verify lineup on 2C pump.
		Directs the start of the 2C CCW pump and restoration of flow to the headers.
		Reviews T.S. 3.7.3 was applicable with only one CCW pump
		Role Play: SNPO Reports very hot bearing on 2A CCW pump, and if running reports 2C CCW pump operating normally.

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS:

5.1 Immediate Automatic Actions.

1. CCW Surge Tank vent (RCV-14-1) diverts from atmosphere to the Chemical Drain Tank on high radioactivity in the CCW system.

2. Low level in the B side of the CCW Surge Tank will isolate the N header from the B header by closing HCV-14-8B and HCV-14-10.

3. Low level in the A side of the CCW Surge Tank will isolate the N header from the A header by closing HCV-14-8A and HCV-14-9.

4. A reactor trip will occur, on 2/4 logic, on low CCW flow from the Reactor Coolant Pump return header, after a ten minute time delay.

5.2 Immediate Operator Actions: None.

5.3 Subsequent Action.

1. If a loss of CCW occurs while on SDC, Then perform Safety Function Status Checks of the Low Mode Off-Normal Procedure for the current plant condition.

2. If RCP low cooling water flow alarms are present, Then perform ONOP 2-0120034, Reactor Coolant Pump Off-Normal, in conjunction with the applicable sections of this procedure.

→ 3. If one or more CCW pumps are lost, Then perform the following:

A. Loss of the 2A CCW Pump.

1. Verify closed:

MV-14-2 (2C CCW Pump discharge to B header)

and

MV-14-4 (2C CCW Pump suction from B header)

INSERT 1 OF 2

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

3. (continued)

A. (continued)

2. Verify open:

MV-14-1 (2C CCW Pump discharge to A header)

and

MV-14-3 (2C CCW Pump suction from A 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. Start the 2C CCW Pump.

5. Verify the pressures and flows return to normal.

6. Place the 2A CCW pump control switch to the PULL TO LOCK position.

7. If the 2AB AC and DC Buses are not powered from the A side, then consult Tech Spec 3.7.3 and consider stopping the 2C CCW Pump long enough to shift the 2AB 4160V Bus power supply to the 2A3 Bus. (Refer to 2-NOP-52.02, Transfer of 2AB Buses and Components, for AC and 2-0960020, 125V DC Class 1E Power System Normal Operation, for DC)

INSERT 2 OF 2

Op-Test No.: 1 Scenario No.: 2 Event No.: 6 Page 7 of 12

Event Description: CCW Rupture.

(leak comes in automatically on start of 2C pump)

Time	Position	Applicant's Actions or Behavior
	BOP	Assist crew diagnosis to link CCW pump start with containment leakage flow. (ARP-N46 and Cavity Level ARP-N29)
		Report CCW Surge tank low level alarms (ARP-LA10, LB10).
		Report CCW N-Header valves HCV-14-8B, 9 & 10 isolate, and HCV-14-8A Does NOT isolate.
		Close HCV-14-8A when directed.
	RO	Recognize and report RCS leakage flow indications rising and annunciators (ARP-N46 and N49).
		Diagnose leakage into containment is not being lost from Reactor Coolant System, no level or pressure loss.
		Recognize eventual loss of CCW to Reactor Coolant Pumps.
		Recognize and report loss of letdown system cooling and CVCS Ion Exchanger bypass on high temperature.
	SRO	Directs the gathering of diagnosis information on apparent leakage when the 2C CCW pump is started. .
		Recognize CCW Surge tank alarms both clear when HCV-14-8A is closed.
		Direct the closure of HCV-14-8A.
		(affects TS 3.7.3 on CCW headers)

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

4. (continued)

B. (continued)

7. Quickly reduce the CCW flow through the 2A CCW HX to less than 11,100 GPM, as read on FIS-14-1A (A CCW Header Flow), by isolating CCW flow to the following components, as necessary:

a. One Shutdown Cooling HX (approx. 4000 GPM).

b. Fuel Pool HX (approx. 3500 GPM).

c. Non-running Containment Cooler (approx. 1300 GPM)

These are only very short term fixes for CCW flow. Locally isolate flow to other components and restore flow to the ones listed above as soon as possible.

8. 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

INSERT 1 OF 6

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

5. (continued)

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:
2A HPSI Pump
2A and 2B Containment Fan Coolers
2A SDC Heat Exchanger
3A and 3C Control Room A/C Units
Fuel Pool Heat Exchanger, if aligned to "A" Essential Header

NOTE
CCW has been isolated to the following "A" Essential Header Components:
2A HPSI Pump
2A and 2B Containment Fan Coolers
2A SDC Heat Exchanger
3A and 3C Control Room A/C Units
(Fuel Pool Heat Exchanger, if aligned to "A" Essential Header)

B. If Annunciator LB-10, "CCW Surge Tank Level High/Compartment B Level Low", alarm clears, indicating that the rupture is in the "A" Essential CCW Header, Then perform the following:

1. Stop the 2A CCW Pump.

2. Restore CCW to the "N" Header from the "B" Essential Header by performing the following:

a. Close HCV-14-8B.

b. Close HCV-14-10.

c. Open HCV-14-8B.

d. Open HCV-14-10 (5 second time delay to open).

INSERT 2 OF 6

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

5. (continued)

B. (continued)

3. If the plant is on Shutdown Cooling, Then the primary side of the 2A SDC Head Exchanger must be isolated by closing V3517, 2A SDC HX From LPSI Pump.

4. Dispatch an operator to verify local CCW Surge Tank level indications that the "B" Surge Tank level has been restored.

5. Locate and isolate the leak, if possible.

6. If CCW to the Fuel Pool Heat Exchanger is aligned to the "A" Essential Header (MV-14-18 and MV-14-20 are OPEN), and it is deemed necessary to restore CCW to the Fuel Pool Heat Exchanger from the "B" Essential Header prior to determining the source of the leak on the "A" Header, Then perform the following:

a. Close MV-14-18 and MV-14-20.

b. Open MV-14-17 and MV-14-19.

c. If the "B" Essential Header beings to depressurize or Annunciator LB-10, "CCW Surge Tank Level High/Compartment B Level Low", alarms indicating that the rupture is in the header to or from the Fuel Pool Heat Exchanger, Then close MV-14-17 and MV-14-19.

INSERT 3 OF 6

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

5. (continued)

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
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

NOTE
CCW has been isolated to the following "B" Essential Header Components:
2B HPSI Pump
2C and 2D Containment Fan Coolers
2B SDC Heat Exchanger
2B Control Room A/C Unit
Fuel Pool Heat Exchanger

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 2B 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).

Insert 4 of 6

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

5. (continued)

C. (continued)

3. 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.

4. Dispatch an operator to verify local CCW Surge Tank level indications that the "A" Surge Tank level has been restored.

5. Locate and isolate the leak, if possible.

6. 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.

INSERT 5 OF 6

ST. LUCIE UNIT 2
OFF-NORMAL OPERATING PROCEDURE NO. 2-0310030, REVISION 29
COMPONENT COOLING WATER - OFF NORMAL OPERATION

5.0 INSTRUCTIONS: (continued)

5.3 (continued)

5. (continued)

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

NOTE
CCW has been lost to the following:
Reactor Coolant Pumps
CEDM Coolers
Letdown HX
Sample HXs
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 5.3.6.B, Low Level in the CCW Surge Tank.

Insert 6 of 6

Op-Test No.: 1 Scenario No.: 2 Event No.: 6 cont Page 8 of 12

Event Description: Manual Plant Trip for CCW

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes continued operation without CCW flow will result in automatic reactor trip on RCP CCW.
		When directed, Manually Trip the Reactor and carry out SPTAs using EOP-01.
		Stop all four RCPs due to no CCW Flow.
		Verify RCS temperatures for Natural Circulation formation.
	BOP	Carry out SPTAs of EOP-01
		Report loss of 2A 6.9 Kv power supply from offsite (ARP-B23).
		Report loss of running Main Feedwater Pump 2A.
		One attempt at reenergizing 2A1 6.9 Kv buss (2-30102) may be performed.
	SRO	Direct performance of EOP-01 Standard Post Trip Action with the crew.
		Directs stopping all four RCP due to no CCW Flow.
		Direct one attempt at reenergizing 2A1 6.9 Kv buss by closing start-up transformer breaker (2-30102).
	Critical Task	Stop all four RCPs due to no CCW Flow.

RO

4.0 OPERATOR ACTIONS

REACTIVITY CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 1. DETERMINE Reactivity Control acceptance criteria are met:	
A. VERIFY Reactor power is lowering.	A.1 PERFORM the following **AS NECESSARY** to insert CEAs: 1. Manually TRIP the Reactor. 2. DEENERGIZE the CEDM MG Sets by opening **BOTH** of the following breakers: • LC 2A2, Bkr 2-40212, CEA Drive MG Set 2A • LC 2B2, Bkr 2-40511, CEA Drive MG Set 2B 3. OPEN TCB-1 through TCB-8, at Rx Trip Swgr.
B. VERIFY Startup Rate is negative.	
C. VERIFY a maximum of **ONE** CEA is NOT fully inserted.	C.1 INITIATE Emergency Boration to achieve adequate SDM.

INSERT 1 OF 1

BOP

4.0 **OPERATOR ACTIONS** (continued)

MAINTENANCE OF VITAL AUXILIARIES
(AC & DC POWER)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 2. DETERMINE Maintenance of Vital Auxiliaries acceptance criteria are met:	
A. VERIFY the Turbine is tripped by **ALL** GVs and TVs indicate CLOSED.	A.1 PERFORM **ALL** of the following: 1. Manually TRIP the Turbine. 2. VERIFY Turbine First Stage pressure indicates 0 psig. 3. VERIFY Turbine speed is LOWERING. A.2 If the Turbine is NOT tripped, Then PERFORM the following **AS NECESSARY** to isolate steam to the turbine: 1. Locally TRIP the Turbine. 2. CLOSE **BOTH** MSIVs.
B. **When the Turbine is TRIPPED,** Then VERIFY the Main Generator breakers are OPEN: • 8W49, Generator No. 2 East Breaker • 8W52, Generator No. 2 Mid Breaker • FB 2, Exciter Supply Breaker	B.1 OPEN Main Generator breakers: • 8W49, Generator No. 2 East Breaker • 8W52, Generator No. 2 Mid Breaker • FB 2, Exciter Supply Breaker

(Continued on next page)

(Continued on next page)

- BOP -

INSERT 2 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

MAINTENANCE OF VITAL AUXILIARIES
(AC & DC POWER)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
C. VERIFY **ALL** Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers and are ENERGIZED.	C.1 If **EITHER** Vital 4.16 KV Bus is NOT powered from offsite, Then ENSURE **BOTH** of the following: 1. The associated EDG has STARTED. 2. The associated EDG output breaker is CLOSED. C.2 If **ANY** 6.9 KV or non-vital 4.16 KV bus is NOT powered from offsite, Then INITIATE action to RESTORE power to the bus. C.3 If **NO** Vital 4.16 KV buses are energized, Then PERFORM **ALL** the following: 1. CONTACT Unit 1 to determine power availability. 2. NOTIFY Unit 1 to PERFORM Appendix W, Supplying Unit 2 with AC Power Using SBO Crosstie. 3. PERFORM Appendix V, Receiving AC Power from Unit 1 Using SBO Crosstie.
D. VERIFY **ALL** Vital and Non-Vital DC Buses are ENERGIZED.	D.1 If the 2AB DC Bus is de-energized, Then ALIGN the 2AB DC Bus to an energized Vital DC Bus.

-BOP-

INSERT 3E

RO

4.0 **OPERATOR ACTIONS** (continued)

RCS INVENTORY CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

Rising Pressurizer level with concurrent lowering RCS Subcooled Margin are symptoms of a Pressurizer Steam Space LOCA.

☐ 3. DETERMINE RCS Inventory Control acceptance criteria are met:

A. VERIFY **BOTH** of the following conditions exist,

- Pressurizer level is between 10 and 68%
- Pressurizer level is trending to between 30 and 35%

A.1 RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing **ANY** of the following:

1. ENSURE proper operation of the Pressurizer Level Control System.
2. Manually CONTROL Charging and Letdown.

-RO-

-[illegible]-

INSERT 4 OF 13

4.0 OPERATOR ACTIONS (continued)

RO

RCS PRESSURE CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 4. DETERMINE RCS Pressure Control acceptance criteria are met:	
A. VERIFY Pressurizer pressure is between 1800 and 2300 psia.	A.1 If Pressurizer pressure is less than 2300 psia, and the PORV(s) are OPEN, Then PERFORM **ANY** of the following: 1. OVERRIDE the open PORV(s). 2. CLOSE the associated PORV block valve(s).
	A.2 If Pressurizer pressure is less than 1736 psia, Then ENSURE **ALL** of the following: 1. SIAS has ACTUATED. 2. CIAS has ACTUATED. 3. **ONE** RCP in **EACH** loop is stopped.
B. VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia.	B.1 RESTORE and MAINTAIN Pressurizer pressure between 2225 and 2275 psia by performing **ANY** of the following: 1. ENSURE proper operation of the Pressurizer Pressure Control System. 2. Manually OPERATE heaters and spray.
C. VERIFY RCS subcooling is at least 20°F.	C.1 If RCS subcooling is less than 20°F or RCP(s) exhibit cavitation, Then STOP **ALL** RCPs. C.2 COMMENCE a cooldown, not to exceed 100°F in **ANY** one hour to regain subcooling.

- RO -

INSERT 5 of 5

RO

4.0 **OPERATOR ACTIONS** (continued)

CORE HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 5. DETERMINE Core Heat Removal acceptance criteria are met:	
A. VERIFY at least **ONE** RCP is RUNNING and supplied with CCW.	**A.1** If CCW is LOST to the RCPs for greater than 10 minutes, Then STOP **ALL** RCPs.
B. VERIFY Loop ΔT is less than 10°F.	

INSERT 6 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

RCS HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 6. DETERMINE RCS Heat Removal acceptance criteria are met:	
A. VERIFY at least **ONE** S/G has **BOTH** of the following conditions: • S/G level is between 20 and 90% NR • Feedwater is available <u>and</u> level is being restored to between 60 and 70% NR	A.1 PERFORM **BOTH** of the following: 1. ENSURE Main Feedwater flow is available. 2. CONTROL Main Feedwater flow to restore S/G level to between 60 and 70% NR.
	A.2 PERFORM **BOTH** of the following: 1. ENSURE Auxiliary Feedwater flow after AFAS actuation. 2. CONTROL AFW flow to restore S/G level to between 60 and 70% NR.
B. <u>If</u> **EITHER** of the following conditions exist, • 2A or 2B AFW Pump is the **ONLY** source of Feedwater • Main or Auxiliary Feedwater flow can NOT be re-established <u>Then</u> STOP **ONE** RCP in **EACH** loop.	

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-BOP-

INSERT 7 OF 1:

4.0 **OPERATOR ACTIONS** (continued)

BOP

RCS HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)
C. VERIFY RCS T_{AVG} is between 525 and 535°F.	C.1 If RCS T_{AVG} is greater than 535°F, Then CONFIRM that at least **ONE** S/G is removing RCS heat: 1. ENSURE feedwater is being restored to at least **ONE** S/G. 2. ENSURE SBCS or ADVs are restoring RCS T_{AVG} to between 525 and 535°F.
	C.2 If RCS T_{AVG} is less than 525°F, Then CONFIRM S/G steam and feed rates are NOT excessive: 1. ENSURE feed flow is NOT excessive. 2. ENSURE SBCS or ADVs are restoring RCS T_{AVG} to between 525 and 535°F.
	C.3 If T_{COLD} is approaching or less than 500°F, Then PERFORM **BOTH** of the following: 1. ENSURE at least **ONE** RCP is STOPPED. 2. INITIATE Emergency Boration to achieve adequate SDM.
(Continued on next page)	(Continued on next page)

-BOP-

INSERT 8 OF 13

4.0 **OPERATOR ACTIONS** (continued)

BOP

RCS HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
6. (continued)	6. (continued)
D. VERIFY S/G pressure is between 835 and 915 psig (850 and 930 psia).	D.1 If S/G pressure is greater than 915 psig (930 psia), Then ENSURE the SBCS or ADVs are restoring S/G pressure to less than 915 psig (930 psia).
	D.2 If S/G pressure is less than 835 psig (850 psia), Then ISOLATE steam lines from the S/G: 1. ENSURE SBCS valves are CLOSED. 2. ENSURE ADVs are CLOSED.
	D.3 If S/G pressure is less than 735 psig (750 psia), Then CLOSE the MSIVs.
	D.4 If S/G pressure is less than 585 psig (600 psia), Then ENSURE MSIS has ACTUATED.
E. ENSURE the **FOUR** MSR TCV Block Valves are CLOSED.	E.1 CLOSE **ALL** TCVs using the MSR Reheat Control Panel.
F. ENSURE the MSR Warmup Valves are CLOSED.	
G. If maintaining a vacuum is desired, Then ENSURE MV-08-814, Spillover Bypass Valve, is CLOSED.	

-BOP-

IN PART 9 OF 13

BOP

4.0 **OPERATOR ACTIONS** (continued)

CONTAINMENT CONDITIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 7. DETERMINE Containment Conditions acceptance criteria are met:	
A. VERIFY Containment pressure is less than 2 psig.	A.1 If Containment pressure is at least 3.5 psig, Then ENSURE **ALL** of the following conditions exist, 1. SIAS has ACTUATED. 2. CIAS has ACTUATED. 3. MSIS has ACTUATED. 4. **ALL** available Containment Fan Coolers are RUNNING. A.2 If Containment pressure is at least 5.4 psig, Then ENSURE **BOTH** of the following conditions exist, 1. CSAS has ACTUATED. 2. **EACH** Containment Spray header flow is at least 2700 gpm.
B. VERIFY **NO** Containment Radiation Monitor alarms or rising trends: • CIS Radiation Monitors • Containment Atmospheric Monitors	B.1 If Containment radiation is greater than 10R/hr, Then ENSURE CIAS has ACTUATED.

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INSERT 10 OF 1

BOP

4.0 **OPERATOR ACTIONS** (continued)

CONTAINMENT CONDITIONS

INSTRUCTIONS	CONTINGENCY ACTIONS
7. (continued)	7. (continued)
C. VERIFY Containment temperature is less than 120°F.	**C.1** ENSURE **ALL** available Containment Fan Coolers are RUNNING.
D. VERIFY **NO** secondary plant radiation alarms or rising trends: • Condenser Air Ejector Monitor • S/G Blowdown Monitors • Main Steamline Monitors	

/R23

-BOP-

Insert 11 of 17

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ * 8. DIRECT a field operator to perform Secondary Plant Post Trip Actions. **REFER TO** Appendix X, Secondary Plant Post Trip Actions, Section 1.	
☐ 9. When **ALL** safety function acceptance criteria have been EVALUATED, Then PERFORM **BOTH** of the following:	
A. DIAGNOSE the event. **REFER TO** Chart 1, Diagnostic Flow Chart.	
B. **GO TO the appropriate Emergency Operating Procedure.**	

END OF SECTION 4.0

CREW -

INSERT 12 OF 1

Op-Test No.: 1 Scenario No.: 2 Event No.: 6 cont.. Page 9 of 12

Event Description: Loss of Forced Circulation.

Time	Position	Applicant's Actions or Behavior
	RO	Verify parameters confirm Natural Circulation heat removal of the of the RCS.
		Diagnose and report 2B AFW pump is not supplying flow to the 2B SG due to failure of Solenoid AFW isolation valve.
		Commence depressurization to 1800-1850 psia with all RCPs stopped for seal cooling.
	BOP	Perform Safety Function Status Checks of EOP-09 LOFC/LOOP.
		Recognize and report CCW is not available for SG samples and appendix A cannot be completed.
	SRO	Brief the crew on loss of forced circulation and transition to EOP-09 LOFC/LOOP Emergency Procedure.
		Order the performance of EOP-09 LOFC/LOOP Safety Function Status Checks.
		Order the check of Natural Circulation verification with RO.
		Direct RCS depressurized to 1800-1850 for RCP seals.
		Role Play NPO/NWE: If asked to check feed pumps say 2A Main Feed pump looks ready to start and 2B is not ready due to oil problems and the Aux Oil Pump is not running and cannot be started.

Op-Test No.: 1 Scenario No.: 2 Event No.: 7 Page 10 of 12

Event Description: Total Loss of Feedwater

(After crew has transitioned to EOP-09 and verified N/C, trigger the loss of the 2C AFW pp)

Time	Position	Applicant's Actions or Behavior
	RO	Recognizes loss of feedwater flow.
		Ensure all SG blowdown valves are closed.
	BOP	Recognize loss of 2C Aux feed pump on overspeed.
		Recognize 2B Main Feed pump not available with loss of auxiliary oil pump.
		Perform Safety Function Status Checks of EOP-06 TLOF.
	SRO	Direct reevaluation of conditions, Exit EOP-09 and enter EOP-6 Total Loss of Feedwater.
		Direct an inventory of all potential feedwater sources.
		Direct isolation of all SG blowdown flow paths.
		Role Play NPO/NWE: **2C AFW PUMP** If asked to check 2C Aux Feed Pump, say the pump T&T valve is broken off at the yoke, not repairable.
		Role Play NPO/NWE: **2B Solenoid** If asked to check 2B AFW Solenoid valve, describe how you snapped the pin off in the valve engagement hole and cannot insert the pin from that valve or any other. The valve cannot be opened.

Op-Test No.: 1 Scenario No.: 2 Event No.: 8

Event Description: Feedwater Restoration

(Recovery of Feedwater is at examiners discretion. When requested, offsite 2A power can be restored, and/or 2C Aux Feed Pump can be reset to make either available.)

Time	Position	Applicant's Actions or Behavior
	RO	Maintain RCS stable while recovering Feedwater Flow.
	BOP	Performs SFSCs from EOP-06 as directed by ANPS.
	Critical Task	Recovers power to the 2A1 6.9Kv buss by re-powering buss from offsite.
	Critical Task	Starts 2A Main Feedwater pump and restores feed the SGs using the Main Feedwater system.
	SRO	Directs inventory conservations steps from EOP-06.
		Directs power restoration to the 2A1 6.9Kv buss from offsite.
		Directs 2A Main Feedwater pump restart and restoration of feed to the SGs using the Main Feedwater system. Limit flow to 150 GPM for 5 minutes by coarse adjust on 15% valve.
		Role Play NPO/NWE: **BREAKER** If asked to check incoming 6.9Kv breaker; the breaker had a broken close fuse which you have replaced. The breaker should be ready to close.
		This scenario can be terminated when feedwater flow has been restored to the SGs.

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, and 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
and NOTE the time of EOP entry.

[ ] **4. Sample Steam Generators**

Sample S/Gs.
REFER TO Appendix A, Sampling Steam Generators.

Insert 1 of 8

/K14

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.	

Insert 2 of 8

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.	

Insert 3 of 8

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.

Insert 4 of 8

/K14

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** If the RCS is over-subcooled, or RCS pressure exceeds the upper limits of Figure 1A, RCS Pressure Temperature, Then RESTORE subcooling or pressure to within the appropriate limit: **A.** STABILIZE RCS temperature. **B.** DEPRESSURIZE the RCS using Auxiliary Pressurizer spray.

Insert 5 of 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **14. Verify Single Phase Natural Circulation** • If NO RCPs are operating, Then VERIFY natural circulation in at least **ONE** loop by **ALL** of the following: • Loop ΔT less than 50°F • Hot leg temperature constant or lowering • Cold leg temperature constant or lowering • RCS subcooling greater than or equal to minimum subcooling based on Rep CET temperature • NO abnormal difference (greater than 20°F) between T_{HOT} and Rep CET temperature	**14.1** ENSURE proper control of S/G feeding and steaming.
[*] **15. Prepare for Restoration of Offsite Power** If a LOOP has occurred, Then PERFORM **BOTH** of the following: **A.** PERFORM Table 6, Vital Power Breaker Configuration (LOOP). **B.** CONTACT Division Load Dispatcher to restore power to the switchyard.	

Insert 6 of 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **16. Restore Power to a De-energized Vital 4.16 KV Bus** If a Vital 4.16 KV Bus is de-energized, and a power supply is available to restore the bus, Then ALIGN power to the bus. **REFER TO** Appendix B, Power Restoration to a De-energized Bus.	
[*] **17. Restore Offsite Power** When Offsite power is available, Then RESTORE Offsite Power to plant electrical buses. **REFER TO** Appendix D, Restoration of Offsite Power with EDGs in Operation.	

Insert 7 of 8

ATTACHMENT 1
SAFETY FUNCTION STATUS CHECK SHEET
(Page 6 of 7)

6. RCS HEAT REMOVAL

SAFETY FUNCTION	ACCEPTANCE CRITERIA	CHECK √
Steam Generator Level	At least **ONE** S/G level is between 60 and 70% NR with Feedwater available	☐☐☐☐☐☐
	OR	
	Feedwater is being controlled to restore at least **ONE** S/G to between 60 and 70% NR	☐☐☐☐☐☐
	AND	
RCS T_{COLD}	Stable or lowering	☐☐☐☐☐☐

END OF SAFETY FUNCTION 6

Insert 8 of 8

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 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, and 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
and NOTE the time of EOP entry.

[ ] **4. Perform Secondary Surveys**

DIRECT HP to perform secondary surveys.

Insert 1 of 8

/R17

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.

☐ **5. Stop RCPs and Depressurize**

A. STOP **ALL** RCPs.

B. COMMENCE RCS depressurization to between 1800 and 1850 psia.

C. MAINTAIN Pressurizer level between 10 and 68%.

☐ **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.

INSERT 2 OF 8

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 Viv.	

INSERT 3 OF 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **8. Conserve S/G Inventory** CONSERVE inventory in **BOTH** S/Gs by performing **ALL** of the following: **A.** CLOSE Blowdown isolation valves. **B.** CLOSE Blowdown sample valves.	

CAUTION
Initial feedwater flow should be controlled to less than 150 gpm if using Aux Feed and as low as possible if using Main Feed or Condensate for the first 5 minutes, for water hammer and thermal shock concerns.

[*] **9. Replenish S/G Inventory** **A.** Attempt to RESTORE Auxiliary Feedwater to at least **ONE** S/G by considering **ALL** of the following: **1.** If **BOTH** of the following conditions exist, • S/G levels are below 19.5% NR • AFAS has stopped timing Then ENSURE AFAS has ACTUATED.	**1.1** Manually START/ALIGN AFAS components.

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INSERT 4 OF 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. A. (continued)	
2. If **ANY** of the following conditions exist, • Mechanical or electrical overspeed of the 2C AFW Pump has occurred • Steam binding of an AFW Pump is suspected • Crosstying of Auxiliary Feedwater Discharge Headers is desired Then RESTORE Auxiliary Feedwater components. **REFER TO** 2-ONP–09.02, Auxiliary Feedwater.	**2.1** If Control Room operation of the 2C AFW Pump is unsuccessful, Then take local control. **REFER TO** Appendix G, Local Operation of the '2C' Auxiliary Feedwater Pump.
B. If Offsite power is available, Then attempt to restore Main Feedwater to at least **ONE** S/G as follows: **1.** ENSURE MSIS is RESET. **REFER TO** Appendix P, Restoration of Components Actuated By ESFAS. **2.** ENSURE **ONLY ONE** Condensate Pump is RUNNING.	
(Continued on next page)	**(Continued on next page)**

INSERT 5 OF 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. B. (continued)	**9.B** (continued)
3. ENSURE **ONLY ONE** Main Feedwater Pump is RUNNING, with the control switch in RECIRC.	**3.1** If a Main Feedwater Pump is NOT available, Then FEED with a Condensate Pump by performing **ALL** of the following: **A.** VERIFY level in **BOTH** S/Gs is at least 30% NR. **B.** ENSURE V09218, S/G Fill Valve, is fully OPEN. **C.** Locally ADJUST FCV-12-1, Condensate Hdr Recirc to Cndsr, to maintain 2500 gpm. **D.** COOLDOWN the RCS using SBCS/ADVs. Do NOT exceed 100°F in **ANY** 1 hour period to depressurize the S/Gs. **E.** BLOCK automatic initiation of MSIS. **F.** BLOCK automatic initiation of SIAS.
4. ENSURE **BOTH** 15% Bypass Valve Controllers are in MANUAL with MINIMUM output.	
5. DEPRESS **BOTH** pushbuttons to RESET the 15% Bypass Valves.	

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INSERT 6 OF 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
9. B. (continued)	**9.B** (continued)
6. ENSURE the MFIVs in **EACH** intact feedwater header are OPEN.	**6.1** If AFAS has closed the MFIVs, Then OVERRIDE and open the valves.
7. FEED the S/G by use of **ANY** of the following flowpaths: • 15% Bypass Valve • 100% Bypass Valve • Main Feed Regulating and associated Block Valve	**7.1** If local operation of the Main Feed Regulating valve is required, Then take local control. **REFER TO** ONP 2-0700030, Main Feedwater.
[*] **10. Protect Main Condenser**	
A. If a LOOP has occurred, Then ENSURE MSIVs are CLOSED.	
B. STABILIZE the Secondary Plant. **REFER TO** Appendix X, Secondary Plant Post Trip Actions, Section 2.	

Insert 7 of 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS

[*] **11. Verify RCS Heat Removal**

VERIFY adequate RCS heat removal with at least **ONE** S/G by observing **BOTH** of the following:

- At least **ONE** S/G has a level of at least 15% WR
- RCS T_{COLD} is stable or lowering

[*] **12. Maintain S/G Level 60 to 70% NR**

When feedwater is restored,
Then PERFORM the following to restore level in at least **ONE** S/G.

A. LIMIT initial feedwater flow rate to approximately 150 gpm.

B. When **EITHER** of the following conditions exist,

- Feed flow has been supplied for 5 minutes
- S/G water level has risen

Then CONTROL feedwater flow rate to restore and maintain S/G level 60 to 70% NR.

CONTINGENCY ACTIONS

11.1 If **EITHER** of the following conditions exist,

- **BOTH** S/G levels are less than 15% WR
- An uncontrolled rise in RCS T_{COLD} of 5°F or greater

Then PERFORM **BOTH** of the following:

A. ESTABLISH once through cooling.
REFER TO 2-EOP-15, RCS and Core Heat Removal, Success Path 3: Once-Through-Cooling.

B. **EXIT this procedure and GO TO 2-EOP-15, Functional Recovery.**

INSERT 8 OF 8

Shift Turnover

- The plant is operating at 45% power MOC with a constant 20 GPM dilution in progress following a power reduction 4 hours ago to remove the 2B Main Feed pump. Xenon is building in.

- Severe Thunderstorm Warning is in effect for St. Lucie and Indian River Counties.

- 2A HPSI pump is out of service to repair a crack discovered in the CCW cooling line, removed from service 6 hours ago, not expected back this shift.

- 2A Auxiliary Feedwater pump is out of service for bearing replacement, removed from service 12 hours ago, not expected back this shift. GOP-102 is complete.

- The 2B MFW pump had a leak in the main oil cooler and was removed from service for repair. Repairs are complete and power is holding constant in preparation for power ascension which has been approved. Commence power increase to 100% IAW GOP-201, step 6.127.7

- There is a small amount of SG tube leakage on the 2A Steam Generator (5 GPD). Chemistry is monitoring long term.

- Condenser Air Ejector Rad Monitor is out of service.

- RE recommends an up power at 2 MW/min following the ASI curve.

Facility: St. Lucie Scenario No.: 4 Op-Test No.: 1

Objectives: To evaluate the students ability to implement the ONOPs for various component failures; perform a rapid plant power reduction; and manually trip the reactor when a loss of Instrument Air occurs. Execute the EOP for a Loss of Reactor Coolant combined with failed equipment and a recover SI flow.

Initial Conditions: Unit 2 is at 100% power MOC

Turnover: The plant is operating at 100% power, MOC. 2A HPSI Pump has been removed from service unexpectedly to repair a cracked CCW cooling line. 2A Auxiliary Feedwater Pump is out of service for bearing replacement not expected back this shift. There is a small amount of SG tube leakage on the 2A Steam Generator and the Condenser Air Ejector is out of service.

Preexisting Malfunctions: 2B HPSI is air-bound and all SIAS actuation relays are failed as-is. The Condenser Air Ejector is out of service.

Event No.	Malf. No.	Event Type*	Event Description
1	2A ICW	C- BOP	2A ICW Pump breaker trips, Per ICW ONP, Start 2C ICW Pump on the A header.
2	PZR HTR	C-RO	2B3 Pzr Heater Breaker fails open, RO adjust Pzr Spray
3	CEA	C-RO	CEA #7 Slips into the core, recoverable.
4	HVS-4A	C- BOP	HVS-4A stops, Stop all RAB fans per Ventilation ONP Restart RAB ventilation per RAB Ventilation NOP using HVS-4B
5	MAIN FEED	I-BOP	Steam Generator Level Transmitter LT-9021 Slowly Fails High
6	RCP SEALS	R-RO N-BOP	Middle and Lower seals fail on RCP 2A1, Commence shutdown per Rapid Down Power ONP RO - Boron and Rod Control BOP - Turbine Control
7		M	LOCA occurs on Rx Trip, Stop RCPs on low RCS pressure.
8		I - RO	B SIAS does not auto actuate, Manual SIAS
9	HPSI Restore	C - RO	2B HPSI Pump is air bound with no flow, exit to EOP-15
			Termination: Vent 2B HPSI Pump to get flow per Fig 2, cooling down RCS to place SDC in service

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

Op-Test No.: 1 Scenario No.:4 Event No.: 1 Page 2 of 12

Event Description: 2A ICW Pump Failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Recognizes and reports 2A ICW pump trips. (ARP-E16, E17, E30, LB-4)
		Attempt one restart of the pump, if directed.
		Directs ANPO to locally prepare 2C ICW Pump for start.
		Start 2C ICW Pump IAW OP 2-0640020.
	RO	Confirms plant stable.
	SRO	Directs the stopping of 2A ICW pump, or recognize tripped.
		May attempt one restart of 2A pump if not stopped by BOP.
		Implements ONP 2-0640030 Intake Cooling Water to recover from pump loss by starting the pump on a depressurized header (appendix C of the NOP).
		Directs line-up and start of 2C ICW pump.
		Implements OP2-0640020 to start the 2C ICW pump.
		Role Play: Acknowledge request to throttle ICW 2C discharge, isolate PT. Conduct the reverse when pump starts.

APPENDIX C
STARTING THE 2C INTAKE COOLING WATER PUMP
(Page 1 of 6)

INITIAL

NOTE
2C ICW pump discharge is normally aligned to the A header.

1. Starting the 2C ICW pump on the A ICW header, with header depressurized:

   A. Verify locked closed SB 21211, 2C ICW Pump X-tie Disch. to B Train Isol. _____

   B. Verify locked open SB 21165, 2C ICW Pump X-tie Disch. to A Train Isol. _____

   C. Check the 2C ICW pump motor for proper lube oil level. _____

   D. Throttle open SB 21206, 2C ICW Pump Disch. Valve to 10 turns open. _____

   E. Close SH 21204, PI-21-5C Isol. for 2C ICW Pp. Disch. Press. _____

   F. Close the local instrument isolation for PT-21-8A, A ICW Hdr. Pressure Transmitter. _____

   G. Start 2C ICW pump. _____ RCO

   H. Slowly open SH 21204, PI-21-5C Isol. for 2C ICW Pp. Disch. Press. _____

   I. As pressure begins to rise in the A ICW Hdr., slowly open SB 21206, 2C ICW Pump Disch. Valve until valve is fully open, then lock open SB 21206. _____

   J. Slowly open the local instrument isolation for PT-21-8A, A ICW Hdr. Pressure Transmitter. _____

   K. Place the 2A ICW pump control switch to the PULL TO LOCK position. _____ RCO

Insert 1 of 2

APPENDIX C
STARTING THE 2C INTAKE COOLING WATER PUMP
(Page 2 of 6)

1. (continued) INITIAL

L. Walk system completely and vent all air from piping and heat exchanger through the following valves as required for the A ICW header:

1. SH 21332 2A CCW Hx Strainer SS-21-1A Vent _____
2. SH 21197 2A CCW Hx Tube Side Inlet Vent _____
3. SH 21198 2A CCW Hx Outlet Line Vent _____
4. SH 21358 2A TCW Hx Strainer SS-21-4A Vent _____
5. SH 21171 2A TCW Hx Tube Side Outlet Vent _____
6. SH 21172 2A TCW Hx Tube Side Inlet Vent _____

M. Align Sodium Hypochlorite to the inservice ICW pumps as per 0-NOP-40.01, Hypochlorite System Operation.

N. Perform the following lineup to verify components are properly aligned:

VALVE NUMBER	COMPONENT NAME	POSITION	IV
SB21206	2C ICW Pump Disch Valve	LOCK OPEN	
SH21204	PI-21-5C Isol	OPEN	
N/A	PT-21-8A Local Inst Isol	OPEN	
SH21332	2A CCW Hx Strainer SS-21-1A Vent	CLOSED	
SH21197	2A CCW Hx Tubeside Inlet Vent	CLOSED	
SH21198	2A CCW Hx Outlet Line Vent	CLOSED	

2. Starting the 2C ICW pump on the A ICW header, with header pressurized:

A. Verify locked closed SB 21211, 2C ICW Pump X-tie Disch. to B Train Isol. _____

INSERT 2 OF 2

Op-Test No.: 1 Scenario No.: 4 Event No.: 2 Page 3 of 12

Event Description: Pressurizer Heater Failure.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Recognize pressurizer heater problem with ARP-H-29, H30, and the absence of H17 and/or H18.
		Diagnose loss of pressurizer heaters and pressure lowering.
		Recognizes and reports 2B3 pressurizer heater buss breaker 2-20403 has failed open (ARP-A9 on breaker trouble).
		Reclose pressurizer heater buss breaker 2-20403 and then reset pressurizer heaters P2, B4, B5, and B6.
		Adjusts heaters to recover pressure control after power is restored.
	BOP	Assist with pressurizer heater failure procedures.
		Assist with pressurizer heater buss breaker.
	SRO	Diagnose loss of pressurizer heater, implement ONP 2-012035 Pressurizer Pressure & Level.
		Directs re-closure of pressurizer heater buss breaker.
		Evaluate Tech Spec 3.4.3 on pressurizer heaters.
		Role Play SNPO: Pressurizer heater buss and transformer windings are all normal temperatures and there is not reflash lit on the panel. Pressurizer heater breaker 2-20403 also appears normal .

Op-Test No.: 1 Scenario No.: 4 Event No.: 3 Page 4 of 12

Event Description: CEA #7 Slips into the Core.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	RO	Diagnoses single CEA insertion into the core.
		Determine and report CEA#7 position as slipped to 110 inches.
		Places CEMCS to OFF.
		Perform CEA ONP Appendix D actions for a slipped CEA.
		Perform CEA ONP Appendix A to determine operability.
		Perform CEA ONP Appendix D to recover the CEA back to its group. May borate to hold temperature constant.
	BOP	Assist with calls and peer checks for CEA movement.
		Reviews ARPs K11-CMI, K27-OOSeq, K28-PPDIL, K29-PDIL, K30-Deviation.
		Adjust pulse counter position from DCS back to 136 inches.
	SRO	Diagnose CEA slipped and operable condition. Direct RO investigation and stabilization of RCS of necessary.
		Direct turbine load reduction if necessary to stabilize power, or borate reactor slightly if necessary to hold temperature constant.
		Contact RE, SM, Ops Supervisor, and Ops Manager.
		Ensure Tech Spec 3.1.3.1.d compliance with CEA F_{tr} COLR Specifications Determine 48 minute recovery time from; • COLR Figure 3.1-1 • COLR Figure C.3
		Contact RE, SM, Ops Supervisor, and Ops Manager.
		Role Play RE: Indicate CEA-7 withdrawal is advised.

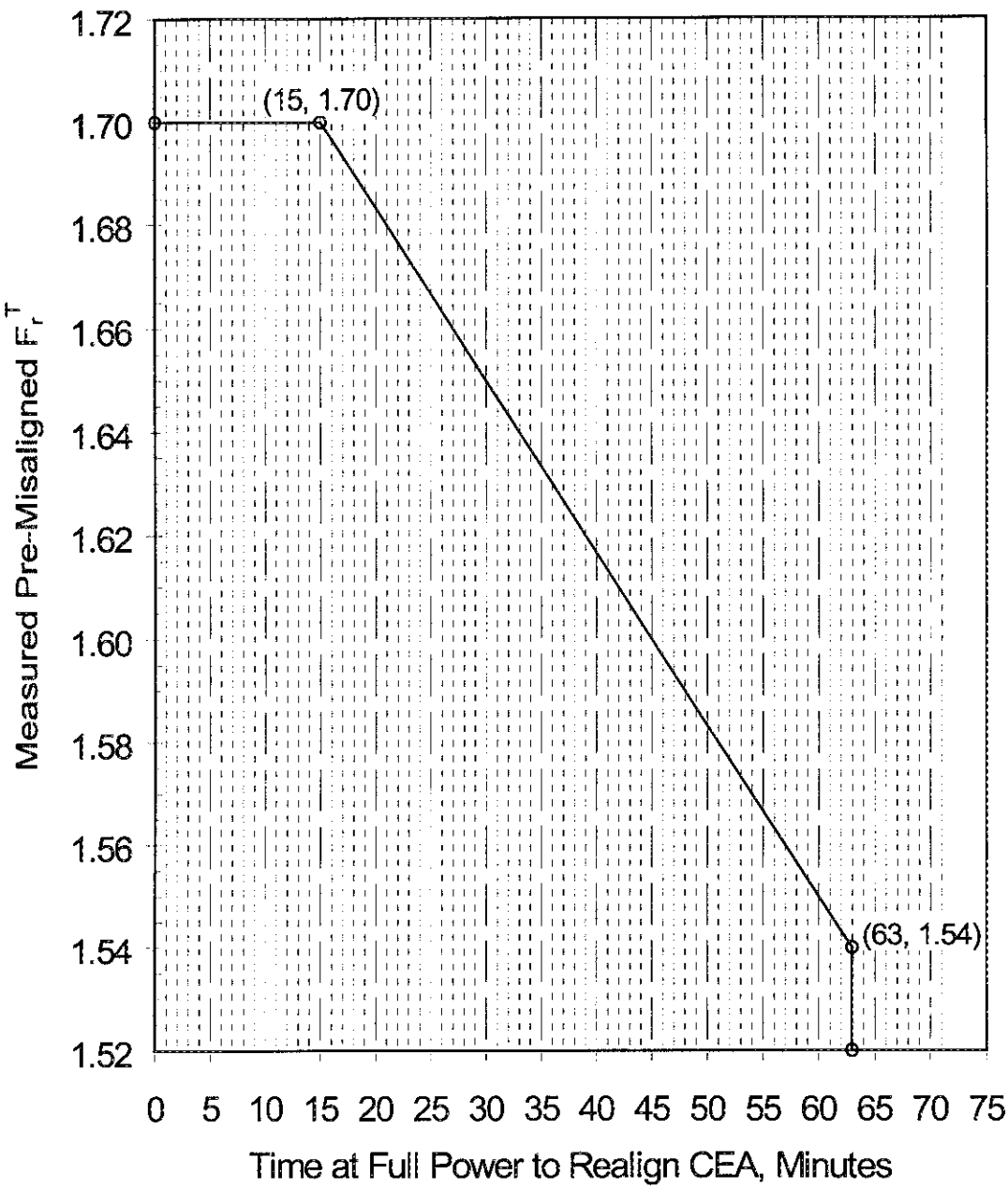

FIGURE 3.1-1a
Allowable Time to Realign CEA vs. Initial F_r^T

INSERT

St. Lucie Plant
Unit 2 Cycle 14
Operator Information
Figure C.3

Date	EFPH	F^t_{xy} Axial Peaking	F^t_r Radial Peaking	T_q Core Tilt	Equil. Shape Index Current Value Posted on Channel D RPS (Updated as needed)	
					Date	Value
05/2003	200	1.661	1.621	1.000	05/2003	-0.107
05/2003	5000	1.614	1.590	1.000	05/2003	0.097

Prepared by:_____05/22/03 Reviewed by:_____

INSERT

APPENDIX D
ONE CEA MISALIGNED BY GREATER THAN 15 INCHES BUT NOT A DROPPED CEA
(Page 1 of 3)

NOTE
Refer to T.S. 3.1.3.1.d

1. Ensure the following:

   A. CEDMCS panel in OFF.

   B. Turbine power adjusted to equal reactor power.

   C. CEA motion inhibit.

NOTE
If in the previous 8 hours a dropped or slipped CEA has been successfully retrieved, upper plant management will make the decision to retrieve the CEA and continue operation.

2. Maintain reactor power at or below, but NOT to exceed the power level which resulted from the CEA insertion.

3. Determine from symptoms and CEA position indications, the operability of the CEA in accordance with Appendix A.

4. 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.

5. If CEA determined to be inoperable for any reason, refer to Appendix B.

NOTE
If difficulty is experienced in CEA realignment, a power reduction to less than or equal to 70% rated thermal power should be initiated.

6. If in Mode 3, realign the CEA in accordance with Appendix H and proceed to Step 7.

7. §1 If in Modes 1 and 2, Then refer to plant curve book and obtain the most recent F^T_R value. This value, when interpreted on the technical specification Fig. 3.1-1a, will indicate the amount of time to restore the CEA within 7 inches of all other CEAs in its group.

   A. Within the time allowed by Technical Specification COLR Fig. 3.1-1a, restore the CEA (per Appendix H) to within 7 inches of all other CEAs in its group.

INSERT

APPENDIX D
ONE CEA MISALIGNED BY GREATER THAN 15 INCHES BUT NOT A DROPPED CEA
(Page 2 of 3)

7. (continued)

NOTE
§3 Technical Specification Bases, B 3/4.1.3, requires a prompt realignment of the misaligned CEA. Therefore, it is expected that the remainder of this step is completed within 1 hour following expiration of the time allowed by Technical Specification COLR Figure 3.1-1a in order to be in full compliance with Specification 3.1.3.1.

B. If the CEA has not been realigned within the time allowed, Then reduce power to less than or equal to 70% of rated thermal power.

CAUTION
During the unit downpower, CEA realignment shall NOT be performed unless reactor power is stabilized.

NOTE
Refer to T.S. 3.1.3.1.e

C. §1 When reactor power is less than or equal to 70% of rated thermal power, Then COMPLETE either of the below substeps.

1. Realign the CEA (per Appendix H) to within 7 inches of all the other CEAs in its group.

OR

2. Declare the CEA inoperable and PERFORM the following:

a. CHECK pre-misalignment ASI.

b. If pre-misalignment ASI was more negative than -0.15 ASI Units, Then reduce power to less than 70% of the Thermal Power level prior to the misalignment.

c. ALIGN the remainder of the CEA's in the group to within 7 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown on Figure 1 (Tech. Spec. COLR Fig 3.1-2).

d. MAINTAIN thermal power level restrictions in accordance with Technical Specification 3.1.3.6 during subsequent operation.

INSERT

APPENDIX D

ONE CEA MISALIGNED BY GREATER THAN 15 INCHES BUT NOT A DROPPED CEA

(Page 3 of 3)

8. 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 D

INSERT

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 ANPS.

   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.

INSERT

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 ANPS.

   2. Withdraw and insert the CEA(s) in manual individual or manual group at the direction of I&C to support troubleshooting.

INSERT

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

INSERT

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.: 1	Scenario No.: 4	Event No.: 4	Page 5 of 12
Event Description:	HVS-4A Failure		

Time	Position	Applicant's Actions or Behavior
	BOP	Report Ann W-16 "RAB Supply HVS-4A Trouble" to US.
		Recognize HVS-4A has stopped.
		Stops HVE-10A per 2-ONP-25.02 "Ventilation Systems".
		Restarts RAB ventilation per "RAB Ventilation System" 2-NOP-25.06 using HVS-4B.
	RO	Assures plant stable during evolution.
	SRO	Directs stopping of HVE-10A per per 2-ONP-25.02 "Ventilation Systems".
		Directs SNPO to investigate HVS-4A status.
		Directs BOP to restart RAB ventilation per "RAB Ventilation System" 2-NOP-25.06 using HVS-4B.
		Refers to T.S. 3.7.8 and notifies SM of 7 day Action Statement
		Role Play SNPO: HVS-4A stopped and hotter than normal.

6.1 RAB Ventilation (continued)

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE
With both RAB Main Supply fans stopped, the RAB Main Exhaust Fans and ECCS Emergency Exhaust Fans should be stopped.

2. If both HVS-4A and HVS-4B, RAB Main Supply Fans, are TRIPPED, Then PERFORM the following:

A. STOP all running RAB Main Exhaust Fans in accordance with 2-NOP-25.06, RAB Ventilation System:

- HVE-10A
- HVE-10B

B. STOP ALL running ECCS Emergency Exhaust Fan:

- HVE-9A
- HVE-9B

C. MONITOR RAB area temperatures.

D. REFER TO Tech Spec 3.7.8.

END OF SECTION 6.1

Insert 1 of 2

7.2 Return to Service From Both RAB Main Exhaust Fans Shutdown INITIAL

NOTE
The non-applicable fans should be marked N/A.

1. If an ECCS Emergency Exhaust Fan is running, Then STOP the running fan:
   - HVE-9A. _____
   - HVE-9B. _____
2. START **ONE** RAB Main Supply Fan:
   - HVS-4A. _____
   - HVS-4B. _____
3. START **ONE** RAB Main Exhaust Fan:
   - HVE-10A. _____
   - HVE-10B. _____
4. If the SJAE exhaust is to be re-aligned to the Plant Vent Stack, Then ALIGN SJAE Exhaust in accordance with OP 2-0610029, Condenser Air Removal Operations. _____

END OF SECTION 7.2

Insert 2 of 2

Op-Test No.: 1 Scenario No.: 4 Event No.: 5 Page 6 of 12

Event Description: SG Level Transmitter slowly failing High.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Reports B Steam Generator levels going lower, while LT-9021 is trending higher. Feed Reg cutting back.
		Request to take control of B Main Feed Reg.
		Takes control of B Feed Reg and raises feedwater flow to raise SG level on the affected side back to 65%.
	RO	Assures plant stable during evolution.
	SRO	Confirm diagnosis of failed level transmitter LT-9021.
		Implements Feedwater ONP 2-070030, and directs BOP to place Feed Reg controller in Manual and restore level.
		Reviews 40% level trip criteria with crew.
		Notifies SM and I&C.

7.2 Subsequent Operator Actions: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
4. If S/G levels are NOT being controlled, Then perform the following:	**4.**
A. Verify main feedwater Reg. valves (MFRV) are responding properly for current condition.	**A.** If MFRVs are NOT controlling S/G levels, Then perform the following as needed to control S/G level: **1.** Place MFRV(s) controller in MANUAL. **2.** If ≥50% power operate 100% bypass valve(s) in conjunction with the 15% bypass valves per Appendix B and / or C as appropriate as required. **3.** Adjust MFRV controller setpoint as necessary. **4.** Locally operate MFRV(s) using Appendix A. **5.** Contact I&C Department for 15% bypass valve auto control.
B. Verify the 15% bypass valves are responding properly for the current conditions.	**B.** If the 15% bypass are NOT controlling S/G levels, Then perform the following as needed to control S/G level: **1.** Place 15% bypass valve controllers in MANUAL.

Op-Test No.: 1 Scenario No.: 4 Event No.: 6 Page 7 of 12

Event Description: RCP 2A1 Seal Failures.

(Requires examiner cue)

Time	Position	Applicant's Actions or Behavior
	BOP	Assist with RCP diagnosis.
		Notify system engineering for assistance.
		Comply with 30 minute readings of deals with DS#1.
		.
	RO	Acknowledge Ann J-2, directs to RCP ONP 2-0120034
		Monitors RCP Seals for degradation.
		Reports two RCP Seals Failed from indications that upper and middle seal cavity temperatures are nearly RCS pressure and controlled bleed-off flow is higher than normal.
	SRO	Directs the monitoring of RCP Seals. Has the BOP take 30 minute readings.
		Implements RCP ONP 2-0120034 for seal failures.
		Concludes two failed RCP seals will require removal of unit from service.

7.2 Subsequent Operator Actions: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

- If controlled bleedoff or lower seal cavity temperature is greater than 250°F, the life time of the seal is being reduced.
- If seal cavity pressures are NOT equally reduced by approximately one-third of RCS pressure, seal damage has occurred.

10. Verify RCP seal pressure, controlled bleedoff pressure, seal cavity temperature and bleedoff cavity temperatures are normal.

10. If RCP seal alarms are present, Then perform the following:

A. Inspect RCP instrumentation to verify which indicator is in alarm condition.

B. If CBO or lower seal cavity temperature reaches 250°F for 10 minutes or greater than 300°F at any time, Then PERFORM the following:

1. TRIP the Reactor.

2. TRIP the Turbine.

3. STOP the affected RCP.

4. DEPRESSURIZE and COOLDOWN the RCS as necessary to maintain CBO and lower seal cavity temp less than 250°F.

Insert 1 of 3

7.2 Subsequent Operator Actions: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

10. (continued)

C. If controlled bleedoff flow is high, Then inspect for failed seals and begin taking 30 minute readings on controlled bleedoff flow and cavity pressures using Data Sheet 1, until it is determined that additional seal degradation is NOT occurring.

D. If Controlled Bleedoff flow is lost, Then PERFORM the following:

1. ENSURE V2505, RCP Bleedoff, is OPEN.

2. ENSURE V2524, RCP Bleedoff, is OPEN.

3. If RCP Bleedoff flow can NOT be reestablished by opening V2505 and V2524, Then OPEN V2507, RCP Bleedoff Relief Stop Vlv.

4. If RCP Controlled Bleedoff flow can NOT be reestablished within 30 minutes, Then PERFORM the following:

a. Trip the Reactor.

b. Trip the Turbine.

c. STOP all RCPs.

Insert 2 of 3

7.2 Subsequent Operator Actions: (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
	10. (continued)
	E. If any seal has failed, indicated by a loss of differential pressure across the seal, Then take 30 minute readings on controlled bleedoff flow and cavity pressures using Data Sheet 1, until it is determined that additional seal degradation is NOT occurring.
	F. If two seals have failed, Then:
	1. Notify the system dispatcher.
	2. Begin a unit shutdown.
	3. When CEA TCBs are open, Then stop the affected RCP.
	G. If three seals have failed, Then:
	1. Trip the reactor and turbine.
	2. Trip the affected RCP.
	3. If an immediate RCS cooldown is NOT to be performed, Then depressurize the RCS to approximately 1850 PSIA to maintain RCP lower seal cavity temperature less than 300°F.
	Insert 3 of 3

Op-Test No.: 1 Scenario No.: 4 Event No.: 6 cont.. Page 8 of 12

Event Description: Plant Shutdown (RCP ONP)

Time	Position	Applicant's Actions or Behavior
	BOP	Monitors secondary parameters during power change
		Operates DEH to decrease turbine load
		Note: May adjust SG level set points to compensate for level change.
	RO	Operates Boron Control System to borate the RCS and decrease RCS temperature.
		Inserts CEAs to start temperature lowering for Rapid Downpower.
		Remains cognizant of RCS parameters during down power.
		Operates control rods to maintain ASI.
		NOTE: Crew may operate Pressurizer Heaters and Spray systems to place the Pressurizer on recirc, start second Charging Pump and balance Letdown Flow
	SRO	Performs shift brief prior to power decrease
		Directs actions to prepare for and conduct normal plant shutdown. Refers to Rapid Downpower ONP procedure 2-ONP-22.01
		Directs RO to start additional charging pump
		Directs RO to maintain ASI at 100% value
		Directs RO to decrease RCS temperature by CVCS addition
		Directs BOP to decrease turbine power by DEH
		Notifies System of impending power decrease
		Note: crew may additionally address miscellaneous alarms related to the downpower; SG level, Hydrogen pressure, QRP DDPS alarm, and Nuke-Delta-T RPS alarms.
		Note: **Do Not allow restoration of the 2B HPSI pump** until the crew has entered EOP-15 and the examiner has given the cue.

6.0 OPERATOR ACTIONS

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

- Steps 1-10 may be performed in any order and utilizing skill of the craft as directed by SM / US depending on plant conditions. It is the expectation that actions taken utilizing skill of the craft will be verified with the appropriate procedure when time permits.
- 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.

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.

5. 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)

6. NOTIFY the Division Load Dispatcher of the rapid down power load reduction.

INSERT 1 OF 2

6.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
7. REFER TO Appendix A, Rapid Down Power Conditional Actions and MONITOR for potential conditions during the down power.	
A. If any parameter is exceeded, Then NOTIFY the SM / US and PERFORM the required action.	
8. REFER TO Appendix B, Rapid Down Power Parameters and MAINTAIN parameters.	
A. If any parameter is exceeded, Then NOTIFY the SM / US and EVALUATE the problem.	
9. §1 CONTROL Axial Shape Index with CEAs in accordance with 0-NOP-100.02, Axial Shape Index Control, or as directed by the SM / US.	
10. MAINTAIN T_{avg} within 6.6°F of T_{ref} using the following: • RCS Boration Rate • CEA Position • Turbine Load	**10.** If T_{avg} can NOT be maintained within 6.6°F of T_{ref}, Then NOTIFY the SM / US.
11. If desired power level is reached, Then STABILIZE the unit by performing the following:	
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.	

INSERT 2 OF 2

Op-Test No.: 1 Scenario No.: 4 Event No.: 7 Page 9 of 12

Event Description: Loss of Reactor Coolant.

Time	Position	Applicant's Actions or Behavior
	RO	Manually trips the reactor when directed.
		Perform systematic board walkdown
		Perform Standard Post Trip actions (2-EOP-1)
		Report all safety function status to SRO
		Reports high reactor cavity leakage (ARP-N46)
	BOP	Perform systematic board walkdown
		Perform Standard Post Trip actions of 2-EOP-1
	Critical Task	Recognize LOCA, loss of subcooling with SIAS on low pressure, stops all four RCPs.
	SRO	Diagnoses RCS loss of coolant greater than charging pump capacity.
		Directs RO and BOP in the performance of 2-EOP-1
		Directs RCO to stop all four RCPs due to loss of subcooling with SIAS on low pressure.

RO

4.0 OPERATOR ACTIONS

REACTIVITY CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 1. DETERMINE Reactivity Control acceptance criteria are met:	
A. VERIFY Reactor power is lowering.	A.1 PERFORM the following **AS NECESSARY** to insert CEAs: 1. Manually TRIP the Reactor. 2. DEENERGIZE the CEDM MG Sets by opening **BOTH** of the following breakers: • LC 2A2, Bkr 2-40212, CEA Drive MG Set 2A • LC 2B2, Bkr 2-40511, CEA Drive MG Set 2B 3. OPEN TCB-1 through TCB-8, at Rx Trip Swgr.
B. VERIFY Startup Rate is negative.	
C. VERIFY a maximum of **ONE** CEA is NOT fully inserted.	C.1 INITIATE Emergency Boration to achieve adequate SDM.

INSERT 1 OF 3

BOP

4.0 OPERATOR ACTIONS (continued)

MAINTENANCE OF VITAL AUXILIARIES
(AC & DC POWER)

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 2. DETERMINE Maintenance of Vital Auxiliaries acceptance criteria are met:	
A. VERIFY the Turbine is tripped by **ALL** GVs and TVs indicate CLOSED.	A.1 PERFORM **ALL** of the following: 1. Manually TRIP the Turbine. 2. VERIFY Turbine First Stage pressure indicates 0 psig. 3. VERIFY Turbine speed is LOWERING. A.2 If the Turbine is NOT tripped, Then PERFORM the following **AS NECESSARY** to isolate steam to the turbine: 1. Locally TRIP the Turbine. 2. CLOSE **BOTH** MSIVs.
B. **When the Turbine is TRIPPED,** Then VERIFY the Main Generator breakers are OPEN: • 8W49, Generator No. 2 East Breaker • 8W52, Generator No. 2 Mid Breaker • FB 2, Exciter Supply Breaker	B.1 OPEN Main Generator breakers: • 8W49, Generator No. 2 East Breaker • 8W52, Generator No. 2 Mid Breaker • FB 2, Exciter Supply Breaker

(Continued on next page)

(Continued on next page)

- BOP -

INSERT 2 OF 6

4.0 **OPERATOR ACTIONS** (continued)

BOP

MAINTENANCE OF VITAL AUXILIARIES
(AC & DC POWER)

INSTRUCTIONS	CONTINGENCY ACTIONS
2. (continued)	2. (continued)
C. VERIFY **ALL** Vital and Non-Vital AC buses transfer from Auxiliary to Start-up Transformers and are ENERGIZED.	C.1 If **EITHER** Vital 4.16 KV Bus is NOT powered from offsite, Then ENSURE **BOTH** of the following: 1. The associated EDG has STARTED. 2. The associated EDG output breaker is CLOSED. C.2 If **ANY** 6.9 KV or non-vital 4.16 KV bus is NOT powered from offsite, Then INITIATE action to RESTORE power to the bus. C.3 If **NO** Vital 4.16 KV buses are energized, Then PERFORM **ALL** the following: 1. CONTACT Unit 1 to determine power availability. 2. NOTIFY Unit 1 to PERFORM Appendix W, Supplying Unit 2 with AC Power Using SBO Crosstie. 3. PERFORM Appendix V, Receiving AC Power from Unit 1 Using SBO Crosstie.
D. VERIFY **ALL** Vital and Non-Vital DC Buses are ENERGIZED.	D.1 If the 2AB DC Bus is de-energized, Then ALIGN the 2AB DC Bus to an energized Vital DC Bus.

Insert 3rd

RO

4.0 **OPERATOR ACTIONS** (continued)

RCS INVENTORY CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS

NOTE

Rising Pressurizer level with concurrent lowering RCS Subcooled Margin are symptoms of a Pressurizer Steam Space LOCA.

☐ 3. DETERMINE RCS Inventory Control acceptance criteria are met:

A. VERIFY **BOTH** of the following conditions exist,

- Pressurizer level is between 10 and 68%
- Pressurizer level is trending to between 30 and 35%

A.1 RESTORE and MAINTAIN Pressurizer level between 30 and 35% by performing **ANY** of the following:

1. ENSURE proper operation of the Pressurizer Level Control System.
2. Manually CONTROL Charging and Letdown.

-RO-

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Insert 4 of 13

4.0 **OPERATOR ACTIONS** (continued)

RO

RCS PRESSURE CONTROL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 4. DETERMINE RCS Pressure Control acceptance criteria are met:	
A. VERIFY Pressurizer pressure is between 1800 and 2300 psia.	A.1 If Pressurizer pressure is less than 2300 psia, and the PORV(s) are OPEN, Then PERFORM **ANY** of the following: 1. OVERRIDE the open PORV(s). 2. CLOSE the associated PORV block valve(s).
	A.2 If Pressurizer pressure is less than 1736 psia, Then ENSURE **ALL** of the following: 1. SIAS has ACTUATED. 2. CIAS has ACTUATED. 3. **ONE** RCP in **EACH** loop is stopped.
B. VERIFY Pressurizer pressure is trending to between 2225 and 2275 psia.	B.1 RESTORE and MAINTAIN Pressurizer pressure between 2225 and 2275 psia by performing **ANY** of the following: 1. ENSURE proper operation of the Pressurizer Pressure Control System. 2. Manually OPERATE heaters and spray.
C. VERIFY RCS subcooling is at least 20°F.	C.1 If RCS subcooling is less than 20°F or RCP(s) exhibit cavitation, Then STOP **ALL** RCPs. C.2 COMMENCE a cooldown, not to exceed 100°F in **ANY** one hour to regain subcooling.

- RO -

INSERT 5 OF 13

RO

4.0 **OPERATOR ACTIONS** (continued)

CORE HEAT REMOVAL

INSTRUCTIONS	CONTINGENCY ACTIONS
☐ 5. DETERMINE Core Heat Removal acceptance criteria are met:	
A. VERIFY at least **ONE** RCP is RUNNING and supplied with CCW.	A.1 If CCW is LOST to the RCPs for greater than 10 minutes, Then STOP **ALL** RCPs.
B. VERIFY Loop ΔT is less than 10°F.	

INSERT 6 OF 1

Op-Test No.: 1 Scenario No.: 4 Event No.: 8 Page 10 of 12

Event Description: Failure of SIAS to actuate

Time	Position	Applicant's Actions or Behavior
	RO	Recognize absence of SIAS signal.
	Critical Task	Manually actuates SIAS signal, verifies equipment start.
	BOP	Performs safety function status checks for EOP-03 or EOP-15 as directed.
		Verifies SI flow per 2-EOP-99, Figure 2
	SRO	Due to sustained lack of HPSI flow, briefs crew on exit of EOP-03 to EOP-15.
		Directs steps in Functional Recovery EOP-15 to isolate LOCA and commence RCS cooldown and depressurization for shutdown cooling entry.
		Directs manual actuation of SIAS.
		Orders verification of SI flow per 2-EOP-99, Figure 2
		Note: SRO and Crew will eventually elect to transition to EOP-15 Functional Recovery directly with no HPSI pumps available.

Event Description: 2B HPSI Air Bound Pump

Time	Position	Applicant's Actions or Behavior
	RO	Recognize and report 2B HPSI pump amps swinging, no flow.
		Stop 2B HPSI pump.
	Critical Task	Direct SNPO to check pump locally and direct the venting of the pump to recover SI flow.
		Starts 2B HPSI to restore flow to the core and verifies adequate flow per Figure 2.
		Manually operate Atmospheric Dump Valves to reduce RCS temperature and establish a cooldown rate of 100 degrees in any one hour.
	BOP	Performs SFSCs from EOP-03 (or EOP-15) as directed by US.
	SRO	Directs stopping of 2B HPSI Pump.
		Directs venting to restore the 2B HPSI pump to operable.
		Directs start of vented 2B HPSI to restore flow to the core and verifies adequate flow per Figure 2.
		Note: SRO and Crew may elect to transition to EOP-15 Functional Recovery with no SIAS and no HPSI pumps available.
		This scenario can be terminated when the 2B HPSI pump has been vented and restarted restoring flow to the RCS and verifies adequate flow per Figure 2, with an RCS Cooldown is underway.

4.0 OPERATOR 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 subcooling 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. Confirm Diagnosis

*

VERIFY 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, and GO TO ONE of the following:

- **The appropriate Optimal Recovery Procedure**
- **2-EOP-15, Functional Recovery**

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/K23

Insert 1

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **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 and NOTE the time of EOP entry.	
[ ] **4. Sample Steam Generators** SAMPLE S/Gs. **REFER TO** Appendix A, Sampling Steam Generators.	**4.1** MONITOR other indications of a SGTR.
[*] **5. 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.	**5.1** Manually START/ALIGN SIAS components. **REFER TO** Table 1, Safety Injection Actuation Signal.

Insert 2

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **6. 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: **1.** ENSURE electrical power to SI pumps and valves. **2.** ENSURE correct SI valve alignment. **3.** 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.

Insert 3

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **7. RCP Trip Strategy**	
A. If RCS pressure is less than 1736 psia, Then ENSURE **ONE** RCP in **EACH** loop is STOPPED.	
B. If RCS subcooling is less than minimum subcooling, Then ENSURE **ALL** RCPs are STOPPED.	
C. If CCW is LOST to the RCPs for greater than 10 minutes, Then STOP **ALL** RCPs.	

Insert 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **8. Ensure RCP Seal Cooling**	
A. VERIFY CCW to the RCPs.	**A.1** If a 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.	

Insert 5

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
[*] **9. Verify RCP Operating Limits** If RCPs are RUNNING, Then VERIFY RCP operating limits are satisfied. **REFER TO** Table 13, RCP Operating Limits.	**9.1** STOP RCPs that do NOT satisfy operating limits.
[*] **10. Isolate the LOCA** ISOLATE the LOCA by performing **ALL** of the following:	
A. If RCS pressure is less than 2300 psia, Then VERIFY **BOTH** PORVs are CLOSED.	**A.1** PERFORM **ANY** of the following: **1.** OVERRIDE the open PORV(s). **2.** CLOSE the associated PORV block valve(s).
B. ENSURE Letdown is ISOLATED.	
C. ENSURE ALL **SIX** RCS sample valves are CLOSED.	
D. VERIFY NO RCS leakage into the CCW system: **1.** Absence of CCW Surge Tank high level alarm (Annunciator LB-10). **2.** ENSURE sample flow to the CCW radiation monitors and NO indication of activity.	**2.1** If RCS to CCW leakage is suspected, Then ISOLATE the leak. **REFER TO** 2-ONP-14.02, Component Cooling Water Excessive Activity.

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Insert 6

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
10. (continued)	**10.** (continued)
E. VERIFY LOCA is NOT occurring outside of containment :	**E.1** If a LOCA is occurring outside of containment, Then LOCATE and ISOLATE the leak.
1. No unexplained RAB radiation monitors in alarm.	
2. No unexplained RAB sump level alarms (Annunciators LA-2, LA-8, LB-2 and LB-8).	

☐ **11. Place Hydrogen Analyzers in Service**

PLACE Hydrogen Analyzers in service.
REFER TO Appendix L, Placing Hydrogen Analyzer in Service.

[*] **12. Ensure Containment Isolation and Cooling**

If **ANY** of the following conditions exist,

- Containment pressure is greater than 3.5 psig
- Containment radiation is greater than 10 R/hr
- SIAS is ACTUATED

Then PERFORM **ALL** of the following:

(continued on next page)

Insert 7

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS
12. (continued)	**12.** (continued)
A. ENSURE **BOTH** of the following:	
1. ENSURE CIAS has ACTUATED.	**1.1** Manually START/ALIGN CIAS components. **REFER TO** Table 2, Containment Isolation Actuation Signal.
2. If Containment pressure is greater than 3.5 psig, Then ENSURE MSIS has ACTUATED.	**2.1** Manually START/ALIGN MSIS components. **REFER TO** Table 5, Main Steam Isolation Actuation Signal.
B. ENSURE **ALL** available Emergency Containment HVAC systems are RUNNING: • At least **ONE** train of SBVS • At least **ONE** train of Containment Fan Coolers	
[*] **13. Ensure Containment Spray Actuation** If Containment pressure is greater than 5.4 psig, Then ENSURE **BOTH** of the following:	**13.1** Manually START/ALIGN CSAS components. **REFER TO** Table 3, Containment Spray Actuation Signal.
1. CSAS has ACTUATED.	
2. Containment Spray flow is at least 2700 gpm from **EACH** header.	

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Insert 8

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

[*] **14. 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.
REFER TO Appendix X, Secondary Plant Post Trip Actions, Section 2.

[ ] **15. 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.

[*] **16. Extend Hydrazine Operation**

Within 1 hour of CSAS actuation, ENSURE only **ONE** Hydrazine Pump is RUNNING.

Insert 9

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS	CONTINGENCY ACTIONS

☐ **17. LOCA Isolated Branch Step**

If the LOCA is isolated
Then GO TO step 53.

NOTE
Cooldown rates up to 100°F in any 1 hour period are permitted to regain or maintain minimum subcooling.

[*] **18. RCS Cooldown (to SDC)**

COOLDOWN the RCS using SBCS.

A. If RCPs are operating,
Then COOLDOWN not to exceed 100°F in **ANY** 1 hour period.
REFER TO 2-GOP-305, Reactor Plant Cooldown – Hot Standby to Cold Shutdown.

B. If RCPs are NOT operating,
Then COOLDOWN not to exceed 50°F in **ANY** 1 hour period.
REFER TO ONP 2-0120039, Natural Circulation Cooldown.

18.1 COOLDOWN the RCS using ADVs.

18.2 COOLDOWN using 2C AFW Pump and alternate steaming flow paths.
REFER TO Table 12, Alternate S/G Heat Removal Paths.

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Insert 10

4.0 OPERATOR ACTIONS (continued)

INSTRUCTIONS **CONTINGENCY ACTIONS**

NOTE
Maintaining subcooling as low as possible while still within the limits of Figure 1A or 1B will lower the break flow rate and minimize the severity of the accident.

[*] **19. Depressurize the RCS to SDC**

CONTROL the RCS depressurization to SDC entry conditions using **ANY** of the following:

A. DEPRESSURIZE the RCS using Main or Auxiliary Pressurizer sprays.

B. If HPSI throttle criteria are met, Then CONTROL pressure by throttling SI flow.
REFER TO Appendix S, Safety Injection Throttling and Restoration.

CAUTION
RCS inventory and 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.

[*] **20. Block MSIS and SIAS**

As the RCS cooldown and depressurization proceed, PERFORM **BOTH** of the following:

A. If MSIS is NOT present, Then BLOCK automatic initiation of MSIS.

B. If SIAS is NOT present, Then BLOCK automatic initiation of SIAS.

Insert U

Shift Turnover

- The plant is operating at 100% power MOC.
- Severe Thunderstorm Warning is in effect for St. Lucie and Indian River Counties.
- 2A HPSI pump is out of service to repair a crack discovered in the CCW cooling line, removed from service 6 hours ago, not expected back this shift.
- 2A Auxiliary Feedwater pump is out of service for bearing replacement, removed from service 12 hours ago, not expected back this shift.
- There is a small amount of SG tube leakage on the 2A Steam Generator (5 GPD). Chemistry is monitoring long term.
- Condenser Air Ejector is out of service.
- RE recommends holding ASI to 100% power values.