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A. PURPOSE

This procedure provides actions to verify proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to assess plant conditions, and to identify the appropriate recovery procedure.

B. ENTRY CONDITIONS

1. The following conditions require a reactor trip, if one has not occurred:

   a) Overtemperature ΔT (2/4).

   b) Overpower ΔT (2/4).

   c) High pressurizer pressure (2/3) - 2362 psig.

   d) Low pressurizer pressure (2/4, P-7) - 1930 PSIG.

   e) High pressurizer level (2/3, P-7) - 89%.

   f) Low flow or RCP breaker open (2/4, P-7) (1/4, P-8).

   g) RCP bus undervoltage (2/4) (P-7) - 75%.

   h) RCP bus underfrequency/RCP breaker open (2/4, P-7) (1/4, P-8) - 57.5 HZ.

   i) Source range high flux (1/2) (P-10 and P-6) - 2.3×10^5 CPS.

   j) Intermediate range high flux (1/2) (P-10).

   k) Power range high flux low level trip (2/4) (P-10) - 25%.

   l) Power range high flux high level trip (2/4) - 108%.

   m) Low feedwater flow and low steam generator level (1/8) 9% and 1.15×10^6 lbs/hour mismatch.

   n) Low low steam generator level (2/3) - 9%.

   o) Low RCS temperature (2/3) - 385 °F.

This Step continued on the next page.

p) Turbine trip signal (P-7, P-8).

q) Initiation of safety injection.

2. The following conditions require a safety injection, if one has not occurred:

   a) Low pressurizer pressure (2/3) - 1840 psig.

   b) High steamline ΔP (1/4) - 155 psid less than two other loops.

   c) High steamline flow (2/4) - 1.3×10^6 lbs/hour in coincidence with TAVE (2/4, 541°F) or low steamline pressure (2/4, 525 psig).

   d) High containment pressure (2/3) - 2 psig.

   e) High High containment pressure (2/2) of (2/3) - 24 psig.

3. ES-0.1, REACTOR TRIP RESPONSE, if SI must be actuated.

C. SYMPTOMS

1. The following are symptoms of a reactor trip:

   a) Reactor first out annunciator alarm.

   b) Turbine first out annunciator alarm.

   c) Rapid decrease in neutron level indicated by nuclear instrumentation.

   d) All shutdown and control rods are fully inserted. Rod bottom lights are lit.

   e) Rapid decrease in SG level.

2. The following are symptoms of a safety injection:

   a) Reactor first out annunciator alarm.

   b) SI first out annunciator alarm.

   c) FW isolation.

   d) Safeguards equipment sequence signal start.

   e) Phase A isolation.

   f) Steamline isolation.

D. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Steps 1 through 4 are IMMEDIATE ACTIONS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Verify Reactor Trip: o Reactor trip breakers - OPEN o Neutron flux - DECREASING o Rod bottom lights - LIT o Rod position indicators - AT ZERO	Manually trip reactor. IF reactor will NOT trip AND is NOT subcritical, THEN perform the following: a. De-energize 480V busses 2A AND 6A for 10 seconds. b. Re-energize 480V busses 2A AND 6A. c. IF main generator output breakers closed, THEN depress Blackout Relay Reset 480V Bus pushbutton on SC panel. IF reactor can NOT be tripped, THEN go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	Verify Turbine Trip: o Turbine stop valves AND control valves - CLOSED	Perform the following: a. Manually trip turbine. b. IF turbine will NOT trip, THEN close MSIVs. 1) IF MSIVs can NOT be closed, THEN: o Manually run back turbine. - AND - o IF local environmental conditions, including radiation, permit THEN locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Check If SI Is Actuated:</u> o SI annunciator - LIT - OR - o SI system pumps - RUNNING	Check if SI is required: o Containment pressure greater than 2 psig - OR - o PRZR pressure less than 1840 psig - OR - o PRZR level less than 11% - OR - o Steamline ΔP greater than 155 psid - OR - o High steamline flow with EITHER TAVE less than 541°F OR steamline pressure less than 525 psig <u>IF</u> SI is required, <u>THEN</u> manually actuate. <u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> go to ES-0.1, REACTOR TRIP RESPONSE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	Verify Power To 480V Busses:	
	a. Generator output breakers - OPEN	a. IF breakers do NOT open 30 seconds after Turbine trip THEN manually open: o BKR7 o BKR9
	b. 480V busses - AT LEAST ONE ENERGIZED: o 2A AND 3A - OR - o 5A - OR - o 6A	b. Try to restore power to at least one 480V bus. IF power can NOT be restored to at least one 480V bus, THEN go to ECA-0.0, LOSS OF ALL AC POWER, Step 1.
	c. 480V busses - ALL ENERGIZED BY OFFSITE POWER	c. Restore power to de-energized 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

NOTE

Attachment 3 provides 480V equipment load ratings.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Verify RCP Seal Cooling:	
	a. 480V busses - ALL ENERGIZED BY OFFSITE POWER	a. Perform the following:
	1) Start one charging pump	1) Start one charging pump in MANUAL at maximum speed.
	2) Align charging pump suction to RWST:	2) Align charging pump suction to RWST:
	a) Open charging pump suction valve from RWST: o LCV-112B	a) Open charging pump suction valve from RWST: o LCV-112B
	b) Close charging pump suction valve from VCT: o LCV-112C	b) Close charging pump suction valve from VCT: o LCV-112C
	c) Place RCS Makeup Control switch to STOP	c) Place RCS Makeup Control switch to STOP

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. Verify Power To Lighting And MCCs:

a. 480V busses - ALL ENERGIZED BY OFFSITE POWER

1) Reset lighting

2) Reset all MCCs except MCC 28 and MCC 28A

3) Ensure following MCCs - ENERGIZED

- o MCC 24
- o MCC 27
- o MCC 29

RESPONSE NOT OBTAINED:

a. Perform the following:

1) Verify the following MCCs - ENERGIZED:

- o MCC 26A
- o MCC 26B
- o MCC 26C
- o MCC 24A
- o MCC 27A
- o MCC 29A
- o MCC 211

2) IF any diesel generator loaded, THEN ensure one cable tunnel exhaust fan running.

3) Direct available Support Facilities personnel to perform the following:

a) Align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	<u>Verify CCW System Operation:</u>	
	a. Verify Three CCW pumps - RUNNING	a. Manually start CCW pumps on busses supplied by offsite power. <u>IF</u> no CCW pump can be started, <u>THEN</u> perform the following: 1) Stop all RCPs. 2) Increase running charging pump speed to maximum in MANUAL. 3) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps
8.	<u>Verify FW Isolation:</u>	
	o Main boiler feed pumps - TRIPPED	o Manually trip pumps.
	o Main boiler feed pump discharge valves - CLOSED	o Manually close valves. a. <u>IF</u> either valve can <u>NOT</u> be closed, <u>THEN</u> ensure the following valves closed: o FW regulating valves o FW regulating bypass valves o FW stop valves
	o SG blowdown isolation valves - CLOSED	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	Verify Proper Emergency SI Valve Alignment: o SI pump cold leg injection valves - OPEN o 856A o 856E o 856C o 856D o RHR Hx CCW outlet valves - OPEN o 822A o 822B o RHR Hx MOVs - OPEN o 746 o 747	Manually open valves.
10.	Verify AFW Pumps Running:	
	a. Motor-driven pumps - RUNNING	a. Manually start pumps.
	b. Turbine-driven pump - RUNNING <u>IF</u> REQUIRED TO MAINTAIN SG LEVELS	b. Perform the following: 1) Manually open steam supply regulator valve: o PCV-1139 2) Adjust turbine speed control valve as necessary: o HCV-1118 3) Open turbine-driven AFW pump FCVs as necessary

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	Verify SI Pumps Running:	
	a. Three SI pumps - RUNNING	a. Perform the following: 1) Manually start pumps. 2) IF three SI pumps running, THEN: a) Ensure MOV-851A AND MOV-851B are open. b) Go to step 11c. 3) IF 21 AND 22 SI pumps running, THEN: a) Ensure MOV-851B open. b) Ensure MOV-851A closed. c) Go to Step 11c. 4) IF 22 AND 23 SI pumps running, THEN: a) Ensure MOV-851A open. b) Ensure MOV-851B closed. c) Go to Step 11c. 5) IF only 22 SI pump running, THEN: a) Open AND de-energize either MOV-851A OR MOV-851B b) Go to step 11c.
	b. 22 SI pump discharge isolation MOV-851A AND MOV-851B - OPEN	b. Manually open valves.
	c. Two RHR pumps - RUNNING	c. Manually start pumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	Verify Proper Service Water System Operation:	
	a. Three service water pumps - RUNNING ON ESSENTIAL HEADER	a. Manually start pumps.
	b. Service water valves from diesel generator - OPEN	b. Manually open valves.
13.	Verify Containment Fan Cooler Units - IN SERVICE:	
	a. Five fan coolers - RUNNING	a. Manually start fan coolers.
	b. Verify charcoal filter valves - OPEN	b. Manually open valves. IF BOTH charcoal filter valves on a fan cooler can NOT be manually opened, THEN manually open the normal discharge valve on the affected fan.
	c. Verify fan normal discharge valves - CLOSED	c. Manually close valves UNLESS opened to bypass a closed charcoal valve.
	d. Verify TCV-1104 AND TCV-1105 - OPEN	d. Manually open valves.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	Verify Containment Ventilation Isolation:	
	a. Containment purge valves - CLOSED: o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173	a. Manually close valves. IF valves can NOT be closed, THEN close valves from fan room. IF valves can NOT be closed, THEN dispatch operator and HP personnel to close outside valves by isolating instrument air. o FCV-1171, IA-780 o FCV-1173, IA-779
	b. Containment pressure relief valves - CLOSED: o PCV-1190 o PCV-1191 o PCV-1192	b. Manually close valves. IF valves can NOT be closed, THEN close valves from fan room. IF valves can NOT be closed, THEN dispatch operator AND HP personnel to close outside valves by isolating instrument air. o PCV-1191, IA-777 o PCV-1192, IA-778 IF containment pressure relief can NOT be isolated, THEN locally close the following valves (Fan House 88 ft. el): o UH-1013, Pressure Relief Fan Inlet Stop o UH-1014, Pressure Relief Fan Outlet stop

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	<u>Verify Containment Isolation Phase A:</u>	
	a. Phase A valves - CLOSED (See Attachment 1 for valves)	a. Manually actuate phase A AND ensure phase A valves closed.
	b. IVSW valves - OPEN: o 1410 o 1413 o SOV-3518 o SOV-3519	b. Manually open valves.
	c. WCP valves - OPEN: o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241	c. Manually open valves.
	d. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel	
16.	<u>Verify CCR Air Conditioner Train A And Train B - Running In INCIDENT Mode 2</u>	At CCR Panel PY2, perform the following: a. Place mode selector switch to 2 b. Place the follow switches to CUTOUT: o Unit-1 K-8 fan switch (OT2-3) o OT2-1 o OT2-2 c. Check system aligned for INCIDENT - OUTSIDE AIR FILTERED FOR SI/HI RAD

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	Check If Main Steamlines Should Be Isolated:	
	a. Check MSIVs - CLOSED	a. IF ANY of the following signals has occurred, THEN close all MSIVs: o High steamline flow with EITHER TAVE less than 541°F OR steamline pressure less than 525 psig - OR - o Containment pressure - EVER GREATER THAN 24 PSIG IF valves can NOT be closed, THEN locally close per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*18.	<u>Check If Containment Spray Should Be Actuated:</u>	
	a. Containment pressure - EVER GREATER THAN 24 PSIG	a. Go to Step 19.
	b. Verify spray pumps - RUNNING	b. Manually initiate spray AND verify both spray pumps running. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually start pumps.
	c. Verify spray pump discharge valves - OPEN: o MOV-866A o MOV-866B o MOV-866C o MOV-866D	c. Manually open valves.
	d. Verify containment isolation Phase B valves - CLOSED: (See Attachment 2 for valves)	d. Manually close valves.
	e. Verify IVSW isolation Phase B valves - OPEN: o 7864 o 7865 o 7866 o 7867	e. Manually open valves.
	f. Stop all RCPs	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS pressure shall be monitored. IF RCS pressure decreases to less than 320 psig (340 psig for ADVERSE CONTAINMENT), THEN RHR pumps must be manually restarted.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	Verify SI Pump Flow:	
	a. RCS pressure - LESS THAN 1660 PSIG (1690 PSIG FOR ADVERSE CONTAINMENT)	a. Place one RHR pump switch in PULLOUT AND go to Step 21.
	b. SI pump flow - FLOW INDICATED	b. Manually start pumps and align valves.
20.	Verify RHR Pump Flow:	
	a. RCS pressure - LESS THAN 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)	a. Place one RHR pump switch in PULLOUT AND go to Step 21.
	b. RHR pump flow - FLOW INDICATED	b. Manually start pumps and align valves.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21.	Verify Total AFW Flow - GREATER THAN 400 GPM	IF SG narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in any SG, THEN perform the following: a. Control feed flow to maintain narrow range level. b. Go to step 22. IF narrow range level less than 9% (26% for ADVERSE CONTAINMENT) in all SGs, THEN perform the following: a. Manually start pumps AND align valves. b. IF AFW flow greater than 400 gpm can NOT be established, THEN go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1.
22.	Verify AFW Flow To All SGs	Manually start pumps and align valves as necessary.
23.	Align Service Water System As Follows:	
	a. Check Service Water System - ALIGNED FOR THREE HEADER OPERATION	a. Ensure the following valves are closed (service water valve pit): o FCV-1111 o FCV-1112 o SWN-6 o SWN-7 o SWN-4 o SWN-5 Go to Step 24.
	b. Ensure closed SWN-4 AND SWN-5	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF adverse containment conditions exist, THEN use wide range cold leg temperatures to determine RCS temperature.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*24.	Check RCS Temperatures - o Any RCP running: RCS TAVE - STABLE AT OR TRENDING TO 547°F - OR - o No RCP running: RCS cold leg temperatures - STABLE AT OR TRENDING TO 547°F	IF temperature less than 547 °F and decreasing, THEN: a. Stop dumping steam. b. Isolate unnecessary secondary side steam loads: o reheater steam stop valves o steam dump valves o air ejectors o hogging jets c. IF cooldown continues, THEN total feed flow may be reduced BUT must be maintained greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. d. IF cooldown continues, THEN close MSIVs. IF valves can NOT be closed, THEN locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL IF temperature greater than 547 °F and increasing, THEN: o Dump steam to condenser. - OR - o Dump steam using SG atmospheric steam dumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25.	Check PRZR PORVs And Spray Valves:	
	a. PORVs - CLOSED	a. IF PRZR pressure less than 2335 psig, THEN manually close PORVs. IF any PORV can NOT be closed, THEN verify its block valve closed. IF block valve can NOT be closed, THEN go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
	b. Normal PRZR spray valves - CLOSED	b. IF PRZR pressure less than 2210 psig, THEN manually close valves. IF valves can NOT be closed, THEN stop RCP(s) supplying failed spray valve(s): o PC-455A (RCP 24) o PC-455B (RCP 23)
	c. Auxiliary spray valve - CLOSED	c. Manually close valve. IF valve can NOT be closed, THEN locally energize AND close charging line isolation valves: o MOV-205 (At MCC 26AA) - OR - o MOV-226 (At MCC 26BB) AND MOV-227 (At MCC 26AA)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*26.	<u>Check If RCPs Should Be Stopped:</u>	
	a. SI pumps - AT LEAST ONE RUNNING	a. Go to Step 27.
	b. RCS subcooling based on core exit TCs - LESS THAN 24°F (31°F FOR ADVERSE CONTAINMENT)	b. Go to Step 27.
	c. Stop all RCPs	
27.	<u>Check If Any SG Is Faulted:</u>	
	a. Check pressures in all SGs: o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER - OR - o ANY SG COMPLETELY DEPRESSURIZED	a. Go to Step 28.
	b. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1	
28.	<u>Check If SG Tubes Are Intact:</u> o NO SG LEVEL INCREASING IN AN UNCONTROLLED MANNER o Condenser air ejector radiation recorder (R-45) - NORMAL o SG blowdown radiation recorder (R-49) - NORMAL o Main steamline radiation recorder (R-28, R-29, R-30, and R-31) - NORMAL	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29.	<u>Check If RCS Is Intact:</u> o Containment radiation (R-25, R-26) - NORMAL o Gaseous particulate radiation recorder (R-41, R-42) - NORMAL o Containment area radiation (R-2, R-7) - NORMAL o Containment pressure - NORMAL o Containment sump level - NORMAL o Recirculation sump level - NORMAL o Reactor cavity sump level - NORMAL	Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30.	<u>Check If SI Should Be Terminated:</u>	
	a. RCS subcooling based on core exit TCs - GREATER THAN 19°F	a. DO <u>NOT</u> STOP SI PUMPS. Go to Step 32.
	b. Secondary heat sink: o Total feed flow to SGs - GREATER THAN 400 GPM - OR - o Narrow range level in at least one SG - GREATER THAN 9%	b. <u>IF</u> neither condition satisfied, <u>THEN</u> DO <u>NOT</u> STOP SI PUMPS. Go to Step 32.
	c. RCS pressure: o Pressure - STABLE OR INCREASING o Pressure - GREATER THAN 1660 PSIG	c. DO <u>NOT</u> STOP SI PUMPS. Go to Step 32.
	d. PRZR level - GREATER THAN 11%	d. DO <u>NOT</u> STOP SI PUMPS. Go to Step 32.
31.	<u>Go To ES-1.1, SI TERMINATION, Step 1</u>	
32.	<u>Initiate Monitoring Of Critical Safety Function Status Trees</u>	
*33.	<u>Check SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9%	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% and 52%	b. <u>IF</u> narrow range level in any SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34.	Check PAB Radiation - NORMAL: o 98 ft. EL area monitor (R-5987) o Charging pump room area monitor (R-4) o Plant Vent monitors (R-43, R-44)	Evaluate cause of abnormal conditions. IF the cause is a loss of RCS inventory outside containment, THEN go to ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 1.
35.	Check PRT Conditions: o Level - LESS THAN 77% o Pressure - LESS THAN 7 PSIG o Temperature - LESS THAN 130°F	Evaluate cause of abnormal conditions. IF the cause is a failed open PRZR safety valve, THEN go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.
- o Placing key switches to DEFEAT will prevent auto SI actuation.

36. Reset SI:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Check any CCW pump - RUNNING	a. Place CCR control switches for CCW pumps in PULLOUT.
	b. Place controls for main AND bypass feedwater regulating valves to CLOSE	
	c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2	
	d. One at a time, depress Safety Injection reset buttons (Panel SB-2): o Train A o Train B	
	e. Verify Train A AND B - RESET	e. Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

*37. Reset Containment Isolation Phase A And Phase B:

a. Place IVSW switches to OPEN on SN panel:

- o 1410
- o 1413
- o SOV-3518
- o SOV-3519

b. Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

c. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

d. Place control switches for all remaining Phase A isolation valves to CLOSE on SN panel

e. One at a time, depress Phase A reset buttons:

- o CI Phase A Train A
- o CI Phase A Train B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	f. Verify Train A AND B - RESET	f. Perform the following: 1) Verify correct switch positions per steps 37a through 37d 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal does <u>NOT</u> reset, <u>THEN</u>: 1) Place keyed switches to BYPASS. 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal can <u>NOT</u> be reset, <u>THEN</u> Reset Relays CA1 AND CA2 on Top of Safeguards Initiation Racks 1-2 AND 2-2.
	g. Check Phase B - ACTUATED	g. Go To Step 38.
	h. Containment pressure - LESS THAN 17 PSIG	h. Perform the following: 1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> perform steps 37i, 37j and 37k. 2) Continue with Step 38.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	j. One at a time, depress Phase B reset buttons o CI Phase B Train A o CI Phase B Train B	
	k. Verify Train A AND B - RESET	k. Ensure Relays reset (Top of Safeguards Initiation Racks 1-2 AND 2-2): o S1 o S2 o CB1 o CB2
38.	<u>Establish Instrument Air To Containment By Opening PCV-1228</u>	Verify Relays on Top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET: o CA1 o CA2 <u>IF</u> Phase A is <u>NOT</u> reset <u>THEN</u> re-perform step 37.
39.	<u>Check Secondary Radiation - NORMAL:</u> o Request periodic activity samples of all SGs	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS pressure shall be monitored. IF RCS pressure decreases to less than 320 psig, THEN one RHR pump must be manually restarted.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40.	<u>Check If RHR Pumps Should Be Stopped:</u>	
	a. Check RCS pressure:	
	1) Pressure - GREATER THAN 320 PSIG	1) Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
	2) Pressure - STABLE OR INCREASING	2) Go to Step 41.
	b. Stop RHR pumps and place in AUTO	
41.	<u>Check If Charging Flow Has Been Established:</u>	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	a. Charging pumps - AT LEAST ONE RUNNING	a. Perform the following: 1) IF CCW flow to RCP(s) thermal barrier is lost, THEN isolate seal injection to affected RCP(s) before starting charging pumps by either of the following: o Locally energize AND close seal injection isolation valves: o MOV-250A, MCC 26AA, A2 o MOV-250C, MCC 26AA, B2 o MOV-250B, MCC 26BB, L3 o MOV-250D, MCC 26BB, M3 - OR - o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area): o 241A o 241B o 241C o 241D
	b. Establish charging flow as necessary to maintain pressurizer level - GREATER THAN 9%(42% FOR ADVERSE CONTAINMENT) 1) Start Charging Pump(s) as necessary 2) IF necessary, THEN Place Speed Controller in manual 3) Adjust charging pump speed to establish flow	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Align charging pump suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Place RCS Makeup Control switch to STOP	c. Dispatch an operator to locally align valves as necessary.
42.	<u>Check If One CCW Pump Should Be Started:</u>	
	a. CCW pumps - ALL STOPPED	a. Go to Step 43.
	b. Verify adequate power available: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1760 KW	b. <u>IF</u> power <u>NOT</u> available, <u>THEN</u> perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 44.
	c. Start one CCW pump on bus with adequate power	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
43.	<u>Check If One Service Water Pump Should Be Started On Non-Essential Header:</u>	
	a. Service water pumps - NONE RUNNING ON NON-ESSENTIAL HEADER	a. Go to Step 44.
	b. Verify adequate power available: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1730 KW	b. Go to Step 44.
	c. Start one service water pump on non-essential header on bus with adequate power	
*44.	<u>Check Battery Status:</u>	
	a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL	a. Perform the following: 1) Check MCCs supplying battery chargers - ENERGIZED o MCC 24A for battery charger 22 o MCC 26C for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A for battery charger 21 2) <u>WHEN</u> MCCs energized, <u>THEN</u> dispatch operators to energize battery chargers as required.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check lighting - RESET	b. IF Fire Brigade NOT being utilized, THEN direct Support Facilities personnel to align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.
	c. Reduce DC load as follows:	
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 45

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump: o Bearing Oil pump - OR - o Turning Gear Oil pump b) WHEN <u>EITHER</u> AC oil pump above is started, THEN Stop Emerg Bearing Oil Pump c) Dispatch NPO to perform the following: o Start Main Seal Oil Pump, THEN stop DC Seal Oil Pump o Start one MBFP Main Oil Pump THEN stop MBFPs DC oil pump	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started, Stop the associated DC oil pump as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 45
*45.	<u>Verify Instrument Air Header - STABLE</u>	Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM. b. <u>IF</u> necessary, <u>THEN</u> ensure one instrument air compressor running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. <u>IF</u> header can <u>NOT</u> be stabilized, <u>THEN</u> Close PCV-1228.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46.	<u>Dispatch NPO to locally perform the following:</u>	
	o Periodically Check IVSW Tank Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG	o Direct NPO to fill or pressurize tank as necessary.
	o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG	o Direct NPO to ensure Station Air backup <u>OR</u> N_2 backup are aligned as necessary.
*47.	<u>Check If Diesel Generators Should Be Stopped:</u>	
	a. Verify all 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 1) <u>IF</u> any diesel generator loaded, <u>THEN</u> ensure one cable tunnel exhaust fan running.
	b. Stop any unloaded diesel generator and place in standby	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
48.	<u>Restore Ventilation Systems:</u>	
	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL	
	b. Verify adequate power to restore PAB ventilation: o Bus 3A OR 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 OR 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 48d.
	c. Restore PAB ventilation on bus with adequate power.	
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. <u>IF</u> fan will <u>NOT</u> start, <u>THEN</u> perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.
49.	<u>Return To Step 24</u>	

-END-

ATTACHMENT 1

The following valves will close upon containment isolation Phase A:

1. CCW from excess letdown Hx. 796 and 793.
2. CCW to excess letdown Hx. 798 and 791.
3. Vent header from RCDT 1786 and 1787.
4. Gas analyzer PRT 548 and 549.
5. Gas analyzer RCDT 1788 and 1789.
6. Letdown from regenerative HX. 201 and 202.
7. Letdown oriface control stop valves 200A, 200B, and 200C.
8. Make-up to PRT 519 and 552.
9. Containment sump pumps to WDS - hold-up tank 1723 and 1728.
10. Instrument air to containment PCV-1228.
11. RCDT to WDS - hold-up tank 1702 and 1705.
12. SG blowdown and sampling system PCV-1214, 1214A, 1215, 1215A, 1216, 1216A, 1217, 1217A.
13. Radiation monitor return to containment PCV-1234, 1235, 1236, 1237.
14. Accumulator samples 956G and 956H.
15. Sample - pressurizer steam 956A and 956B.
16. Sample - pressurizer liquid 956C and 956D.
17. Sample - RCS loops 21, 22, 23 MOV-956E, and MOV-956F.
18. SJAE to containment 1229 and 1230.
19. Hi-Rad sample system return to containment sump MOV-4399, 5132.
20. Recirculation pump discharge sample line MOV-990A, 990B.
21. Accumulator N_2 Supply Line Stop, 863

THIS ATTACHMENT CONTINUED ON NEXT PAGE

The following ventilation isolation valves will close:

1. Purge air to containment FCV-1170 and FCV-1171.
2. Purge air from containment FCV-1172 and FCV-1173.
3. Containment pressure relief PCV-1190, 1191, 1192.

ATTACHMENT 2

The following valves will close upon containment isolation Phase B:

1. Component cooling to RCS pumps MOV-769 and MOV-797.
2. Component cooling from RCS thermal barrier return MOV-789 and FCV-625.
3. Component cooling from RCS motor bearing return MOV-786 and MOV-784.
4. Seal water return containment isolation valve MOV-222.

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	 BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

Number:	Title:	Revision Number:
ES-0.0	REDIAGNOSIS	REV. 34

1. PURPOSE

This procedure provides a mechanism to allow the operator to determine or confirm the most appropriate post accident recovery procedure.

2. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered based on operator judgement.

3. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

a) Containment radiation levels greater than 1E5 R/hr.

b) Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

This procedure should only be used if SI is in service or is required.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Check If Any SG Secondary Pressure Boundary Is Intact:	
	a. Check pressures in all SGs - ANY STABLE OR INCREASING	a. IF a controlled cooldown is in progress, THEN go to Step 2. IF NOT, THEN the following applies: o IF main steamlines NOT isolated, THEN you should be in E-2, FAULTED STEAM GENERATOR ISOLATION. - OR - o IF main steamlines isolated, THEN you should be in ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS.
2.	Check If Any SG Secondary Pressure Boundary Is Faulted:	
	a. Check pressures in all SGs - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER - OR - o ANY SG COMPLETELY DEPRESSURIZED	a. Go to Step 3.
	b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines	b. You should be in E-2, FAULTED STEAM GENERATOR ISOLATION.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	Check If SG Tubes Are Intact: o NO SG LEVEL INCREASING IN AN UNCONTROLLED MANNER o Condenser air ejector radiation recorder (R-45) - NORMAL o SG blowdown radiation recorder (R-49) - NORMAL o Main steamline radiation recorder (R-28, R-29, R-30, and R-31) - NORMAL	You should be in an E-3 or ECA-3 series procedure.
4.	You Should Be In An E-1 Or ECA-1 Series Procedure	

-END-

A. PURPOSE

This procedure provides the necessary instructions to stabilize and control the plant following a reactor trip without a safety injection.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from E-0, REACTOR TRIP OR SAFETY INJECTION, Step 3, when SI is neither actuated nor required.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If SI actuation occurs during this procedure, E-0, REACTOR TRIP OR SAFETY INJECTION, shall be performed.

NOTE

- o ATTACHMENT 3, 480V EQUIPMENT LOAD RATINGS provides a list of 480V equipment load ratings.
- o Generator trip may be delayed for 30 seconds following reactor or turbine protection trips to protect the turbine from an excessive overspeed condition.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Verify Power To 480V Busses:	
	a. Generator output breakers - OPEN	a. Manually trip generator by opening the following breakers: o BKR7 o BKR9
	b. Generrex excitation - OFF	b. Press manual field excitation OFF button and verify Zero field amps.
	c. Unit power - 6.9KV BUSSES TRANSFERRED TO BUSSES 5 AND 6	c. IF offsite power available, THEN manually transfer busses per SOP 27.1.4, 6900 VOLT SYSTEM.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	d. 480V busses - AT LEAST ONE ENERGIZED: o 2A AND 3A - OR - o 5A - OR - o 6A	d. Try to restore power to at least one 480V bus. IF power can NOT be restored to at least one 480V bus, THEN go to ECA-0.0, LOSS OF ALL AC POWER, Step 1.
	e. 480V busses - ALL ENERGIZED	e. Try to restore power to de-energized 480V busses. 1) IF any diesel generator loaded, THEN ensure one cable tunnel exhaust fan running.
	f. Start one charging pump as necessary	
	g. Verify lighting - ENERGIZED	g. Reset lighting.
	h. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	h. Reset all MCCs except MCC 28 and MCC 28A.
	i. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 29	i. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 29

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 2.	Check RCS Temperatures - o RCS AVERAGE TEMPERATURE STABLE AT OR TRENDING TO 547°F IF ANY RCP RUNNING - OR - o RCS COLD LEG TEMPERATURES STABLE AT OR TRENDING TO 547°F IF NO RCP RUNNING	IF temperature less than 547 °F and decreasing, THEN: a. Stop dumping steam. b. Isolate unnecessary secondary side steam loads: o reheater steam stop valves o steam dump valves o air ejectors o hogging jets c. IF cooldown continues, THEN control total feed flow. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% in at least one SG. d. IF cooldown continues, THEN close MSIVs. IF valves can NOT be closed, THEN locally close MSIVs per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. IF temperature greater than 547 °F and increasing, THEN: o Dump steam to condenser. - OR - o Dump steam using SG atmospheric steam dumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	Check FW Status:	
	a. Check RCS average temperature - LESS THAN 541°F	a. Continue with Step 4. IF temperature decreases to less than 541°F, THEN do Steps 3b, 3c and 3d.
	b. Verify main FW regulating valves - CLOSED	b. Manually close valves.
	c. After 90 second time delay verify bypass FW regulating valves - CLOSED	c. Manually close valves.
	d. Verify total feed flow to SGs - GREATER THAN 400 GPM	d. Establish AFW flow to the SGs as necessary.
4.	Verify The Following Automatic Actions Have Occurred:	Manually perform actions as appropriate.
	o Heater drain pumps - TRIPPED	
	o 22 condensate pump - TRIPPED	
	o Transformer cooling equipment - SHUTDOWN	
	o Reheater steam supply valves - CLOSED	
	o Extraction steam valves - CLOSED	
	o MBFP turbine reheat steam supply non-return valve "A" valves - CLOSED	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	<u>Verify All Control Rods Fully Inserted:</u>	
	a. Check IRPI Indicators - ENERGIZED	a. Implement AOI 3.4, UNCONTROLLED REACTIVITY ADDITION.
	b. Check IRPI Indicators - ALL RODS LESS THAN 7.5 INCHES	b. Check all rod positions using PROTEUS (Refer to ATTACHMENT 4, OBTAINING PROTEUS ROD POSITION INDICATION) 1) <u>IF</u> 2 <u>OR</u> more rod positions are greater than 12 steps withdrawn <u>OR</u> can <u>NOT</u> be determined, <u>THEN</u> implement AOI 3.4, UNCONTROLLED REACTIVITY ADDITION.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	Check PRZR Level Control:	
	a. Verify charging - IN SERVICE	a. Manually place in service: 1) Start charging pumps as necessary. 2) Establish flow as necessary by adjusting charging pump speed controller.
	b. Level - GREATER THAN 18%	b. Perform the following: 1) Verify letdown isolation. IF NOT, THEN manually isolate letdown by performing the following: a) Manually close letdown orifice isolation valves: o 200A o 200B o 200C b) Manually close letdown line isolation valves: o 201 o 202 2) Verify PRZR heaters off. IF NOT, THEN manually turn off. 3) Control charging to restore PRZR level to greater than 18%. 4) WHEN PRZR level greater than 18%, THEN place letdown in service and reenergize PRZR heaters as necessary. 5) Go to Step 6d.
	c. Verify letdown - IN SERVICE	c. Manually place in service.
	d. Level - TRENDING TO 37%	d. Control charging and letdown to maintain level at 37%.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	<u>Check PRZR Pressure Control:</u>	
	a. Pressure - GREATER THAN 1840 PSIG	a. Verify SI actuation. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually actuate SI. Go to E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1.
	b. Pressure - STABLE AT OR TRENDING TO 2235 PSIG	b. <u>IF</u> pressure less than 2235 psig and decreasing, <u>THEN</u>: 1) Verify PRZR PORVs closed. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually close. <u>IF</u> any valve can <u>NOT</u> be closed, <u>THEN</u> verify its block valve closed. 2) Verify PRZR spray valves closed. <u>IF</u> <u>NOT</u>, <u>THEN</u> place controller in manual and close valves. <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> stop RCP(s) supplying failed spray valve(s): o PC-455A (RCP 24) o PC-455B (RCP 23) 3) Verify PRZR heaters on. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually turn on. Refer to ATTACHMENT 1.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

IF pressure greater than 2235 psig and increasing, THEN:

1) Verify PRZR heaters off. IF NOT, THEN manually turn off.

2) Control pressure using normal PRZR spray. IF NOT available and letdown is in service, THEN use auxiliary spray as follows:

   a) Maintain RCP seal injection 6 to 10 gpm.

   b) Reduce charging pump speed to minimum flow.

   c) Close charging line flow control valve:

      o HCV-142

   d) Close the charging stop valves:

      o 204A - Loop 22
      o 204B - Loop 21

   e) Close the pressurizer spray valves:

      o PCV-455A
      o PCV-455B

   f) Open auxiliary spray valve:

      o 212

   g) Initiate spray slowly using HCV-142.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		h) Adjust charging pump speed to increase spray flow. <u>IF</u> auxiliary spray can <u>NOT</u> be used, <u>THEN</u> use one PRZR PORV and block valve.
8.	<u>Check SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9%	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% and 52%	b. <u>IF</u> narrow range level in any SG continues to increase, <u>THEN</u> stop feed to that SG.
* 9.	<u>Verify All 480V Busses - ENERGIZED BY OFFSITE POWER</u>	
	a. All 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 1) <u>IF</u> any diesel generator loaded, <u>THEN</u> ensure one cable tunnel exhaust fan running. 2) <u>IF</u> necessary, <u>THEN</u> verify diesel generators have assumed the following loads: o CCW pumps. o Service water pumps. o Motor-driven AFW pumps. o FCUs. 3) Try to restore offsite power per SOP 27.1.3, OPERATION OF 13.8KV SYSTEM.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	Restore Ventilation Systems:	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 10d.
	c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. IF fan will not start, THEN perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.
11.	Transfer Condenser Steam Dump To Pressure Control Mode	IF condenser NOT available, THEN use SG atmospheric steam dumps.
12.	Check MCC 28 And MCC 28A - ENERGIZED	IF containment sump level less than 44'3" AND containment conditions NOT adverse, THEN reset MCC 28 and MCC 28A.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	Check RCP Status - AT LEAST ONE RUNNING	Perform the following: a. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION. b. Start one RCP. c. IF an RCP can NOT be started, THEN refer to ATTACHMENT 2, NATURAL CIRCULATION VERIFICATION to verify natural circulation. d. IF natural circulation NOT verified, THEN increase dumping steam.
14.	Check If Source Range Detectors Should Be Energized:	
	a. Check intermediate range flux - LESS THAN 1E-10 AMPS	a. Continue with Step 15. WHEN flux less than 1E-10 amps, THEN do Steps 14b and 14c.
	b. Verify source range detectors - ENERGIZED	b. Manually energize source range detectors.
	c. Transfer nuclear recorders to source range scale	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	Shut Down Unnecessary Plant Equipment:	
	o Circulating water pumps not required	
	o Condensate pumps not required	
	o Service water pumps not required	
	o Evaluate secondary plant status and shut down equipment as required	
16.	Maintain Stable Plant Conditions:	
	o PRZR pressure - AT 2235 PSIG	
	o PRZR level - AT 37%	
	o SG narrow range levels - BETWEEN 9% AND 52%	
	o RCS average temperature - AT 547°F	
17.	Place Main Turbine And MBFP Turbines On Turning Gear After Shafts Stop	
18.	Determine If Plant Cooldown Is Required:	
	a. Consult operations manager	
	b. Cooldown - REQUIRED	b. Go to POP 3.2, PLANT RECOVERY FROM TRIP.
	c. Check RCP status - NONE RUNNING	c. Go to POP 3.3, PLANT COOLDOWN.
	d. Go to ES-0.2, NATURAL CIRCULATION COOLDOWN, Step 1	

-END-

ATTACHMENT 1
PRESSURIZER HEATER LOADS

Heater Group	Total KW	480V Bus Supply	Total No. of Heaters	No. of Heater Banks	KW per Heater Banks
23 B.U.	485	5A	21	8	69.3
22 B.U.	485	2A	21	7	69.3
21 B.U.	554	3A	24	7	69.3
Modulating	277	6A	12	4	69.3

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. The following conditions support or indicate natural circulation flow:

o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

o SG pressures - STABLE OR DECREASING

o RCS hot leg temperatures - STABLE OR DECREASING

o Core exit TCs - STABLE OR DECREASING

o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR SG PRESSURE

-END-

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. <u>Obtain PROTEUS Rod Position Indication by EITHER of the following methods:</u>

o Obtain PROTEUS Rod Indication from System Menu:

a. Depress System Menu

b. Type RE

c. Depress Execute

d. Depress Display List

e. In Display Index No. enter 4 (for control banks) or 5 (for shutdown banks)

f. Depress Execute

- OR -

o Obtain PROTEUS Rod Indication from Misc Funct:

a. Depress Misc Funct

b. Enter 13

c. Depress Execute

d. In FUNCTION NUMBER enter 1

e. In REVIEW ROD BANK select the individual control and shutdown banks for display

f. Depress Execute

-END-

A. PURPOSE

This procedure provides actions to perform a natural circulation RCS cooldown and depressurization to cold shutdown, with no accident in progress, under requirements that will preclude any upper head void formation.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. ES-0.1, REACTOR TRIP RESPONSE, Step 18, and

2. ECA-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, Step 22.c, when it has been determined that a plant cooldown is required.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If SI actuation occurs during this procedure, E-0, REACTOR TRIP OR SAFETY INJECTION, shall be performed.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1.	Try To Energize All 480V Busses From Offsite Power:	
	a. Check 138KV feeder 95332 or 95331 - ENERGIZED	a. Go to Step 1c.
	b. Go to Step 1d	
	c. Check 13.8KV feeder 13W92 - ENERGIZED	c. IF 13.8KV feeder NOT energized, THEN perform the following. 1) Ensure breaker GT-2 is open. 2) Request Unit 3 Central Control Room Operator to close breaker 52GT/BT. WHEN 52GT/BT is closed, THEN go to Step 1d. 3) IF 52GT/BT can NOT be closed, THEN Blackstart a GT per SOP 27.5.3, BLACK START OF GAS TURBINE 1, 2 or 3. WHEN a GT is available, THEN go to Step 1e.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		4) IF 52GT/BT can NOT be closed AND no GT can be blackstarted, THEN contact district operator to implement EO-4087, PROCEDURE FOR RESTORATION OF ELECTRICAL SUPPLY TO INDIAN POINT NO. 2 AND NO. 3. WHEN 13.8KV feeder energized, THEN go to Step 1d.
		5) Continue with Step 1h.
	d. Energize 6.9KV bus 5 and bus 6 per SOP 27.1.4, 6900 VOLT SYSTEM	
	e. Ensure 480V Substation - ENERGIZED o SS5 o SS2 o SS3 o SS6	
	f. Reset Blackout Relays	f. IF 480V bus 5A OR 6A NOT energized, THEN perform the following: 1) Restore offsite power to 480V busses per AOI 27.1.1, Loss of Normal Station Power 2) Go to step 1h.
	g. Dispatch operator to restore offsite power to 480V busses per SOP 27.3.1.1, 27.3.1.2, or 27.3.1.3 DIESEL GENERATOR MANUAL OPERATION for the appropriate diesel generator	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	h. Verify lighting - ENERGIZED	h. Reset lighting.
	i. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	i. Reset all MCCs except MCC 28 and MCC 28A.
	j. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 29	j. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 29
2.	<u>Check MCC 28 And MCC 28A - ENERGIZED</u>	<u>IF</u> containment sump level less than 44'3" <u>AND</u> containment conditions <u>NOT</u> adverse, <u>THEN</u> reset MCC 28 and MCC 28A.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Restore Ventilation Systems:</u>	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 3d.
	c. Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. <u>IF</u> fan will not start, <u>THEN</u> perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- If RCP seal cooling had previously been lost, the affected RCP should not be started prior to a status evaluation.
- The maximum rated load on Unit 3 gas turbine substation is 20 MVA. If power is being supplied from Unit 3, there may not be enough power to restart an RCP.

NOTE

- RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.
- If conditions can be established for starting an RCP during this procedure, Step 4 should be repeated.

* 4. Try To Restart An RCP As Follows:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION	a. Go to Step 5.
b. Start one RCP	b. Go to Step 5.
c. Go to appropriate plant procedure: o POP 1.1, PLANT HEATUP - OR - o POP 3.3, PLANT COOLDOWN	

5. Initiate RCS Boration Per Cooldown Curve From Graphs Book

6. Verify RCS Boron Concentration By Sampling

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	Check VCT Makeup Control System:	
	a. RCS boration - COMPLETE	a. Continue with Step 8. WHEN boration complete, THEN do Steps 7b and 7c.
	b. Set makeup for required boron concentration	
	c. Set makeup for automatic control	
8.	Verify All CRDM Fans - RUNNING	IF MCC 28 OR MCC 28A energized, THEN start all CRDM fans.
9.	Initiate RCS Cooldown To Cold Shutdown:	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 25°F/HR	
	b. Dump steam to condenser	b. Dump steam using SG atmospheric steam dumps.
	c. Maintain SG narrow range level - BETWEEN 46% AND 52%	c. Control feed flow as necessary.
	d. RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES02-1)	
10.	Check RCS Hot Leg Temperatures - LESS THAN 550°F	Return to Step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	Depressurize RCS To 1890 psig:	
	a. Check letdown - IN SERVICE	a. Try to establish letdown per SOP 3.1, CHARGING, SEAL WATER AND LETDOWN CONTROL. IF letdown can NOT be established, THEN use one PRZR PORV and block valve. Go to Step 12.
	b. Use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.	b. Use one PRZR PORV and block valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

SI actuation circuits will automatically unblock if PRZR pressure increases to greater than 1940 psig.

12. Block Low PRZR Pressure SI

13. Maintain Following RCS Conditions:

    o RCS pressure - AT 1890 PSIG

    o PRZR level - AT 37%

    o Cooldown rate in RCS cold legs - LESS THAN 25°F/HR

    o RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES02-1)

14. Monitor RCS Cooldown:

    o Core exit TCs - DECREASING

    o RCS hot leg temperatures - DECREASING

    o RCS subcooling based on core exit TCs - INCREASING

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

If at any time it is determined that a natural circulation cooldown and depressurization must be performed at a rate that may form a steam void in the vessel, ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITH RVLIS), Step 1 should be used.

15. Initiate RCS Depressurization:

a. Check CRDM fans - ALL RUNNING

a. Maintain RCS temperature and pressure per instructions given in Figure ES02-2. Go to Step 15c.

b. Maintain RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE psig	RCS SUBCOOLING °F (ADVERSE CONTAINMENT °F)
0 - 400	102
401 - 800	94
801 - 1200	74
1201 - 2500	69

c. Check letdown - IN SERVICE

c. Use one PRZR PORV and block valve. Go to Step 16.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

d. Use auxiliary spray as follows:

1) Maintain RCP seal injection 6 to 10 gpm.

2) Reduce charging pump speed to minimum flow.

3) Close charging line flow control valve:

   o HCV-142

4) Close the charging stop valves:

   o 204A - Loop 22
   o 204B - Loop 21

5) Close the pressurizer spray valves:

   o PCV-455A
   o PCV-455B

6) Open auxiliary spray valve:

   o 212

7) Initiate spray slowly using HCV-142.

8) Adjust charging pump speed to increase spray flow.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Continue RCS Cooldown And Depressurization:	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 25°F/HR	
	b. Maintain subcooling requirements of Step 15	b. Stop depressurization and re-establish subcooling.
	c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES02-1)	
17.	Check For Steam Void In Reactor Vessel: o Check PRZR level - NO UNEXPECTED LARGE VARIATIONS o RVLIS natural circulation range indication - GREATER THAN 100%	Repressurize RCS within limits of Technical Specification cooldown curve to collapse potential voids in system and continue cooldown. (Refer to Figure ES02-1). IF RCS depressurization must continue, THEN go to ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITH RVLIS), Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18.	<u>Check If SI Accumulators Should Be Isolated:</u>	
	a. RCS pressure - LESS THAN 1000 PSIG	a. DO <u>NOT</u> ISOLATE ACCUMULATORS. Continue with Step 19. <u>WHEN</u> RCS pressure less than 1000 psig <u>THEN</u> do Steps 18b, 18c and 18d.
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B 2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	<u>Check If SI Pumps Should Be Isolated:</u>	
	a. RCS hot leg temperature - LESS THAN 350°F	a. DO <u>NOT</u> ISOLATE SI PUMPS. Continue with Step 20. <u>WHEN</u> RCS hot leg temperature less than 350°F, <u>THEN</u> do Step 19b.
	b. Place SI pump control switches in PULLOUT	
20.	<u>Maintain Letdown Flow:</u>	
	a. Open letdown orifice isolation valves as necessary	
	b. Adjust low pressure letdown control valve setpoint as necessary	
21.	<u>Maintain RCP Seal Injection Flow - BETWEEN 6 GPM AND 10 GPM PER RCP</u>	
22.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. RCS temperature - LESS THAN 350°F	a. Return to Step 16.
	b. RCS pressure - LESS THAN 370 PSIG	b. Return to Step 16.
	c. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM	
23.	<u>Establish Nitrogen Bubble In PRZR Per SOP 3.3, PRESSURIZER BUBBLE</u>	
24.	<u>Continue RCS Cooldown To Cold Shutdown</u>	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Depressurizing the RCS before the entire RCS is less than 200 °F may result in void formation in the RCS.

25. Continue Cooldown Of Inactive Portion Of RCS:

    o Cool upper head region using CRDM fans

    o Cool SG U-tubes by dumping steam from all SGs

NOTE

A waiting period of 27 hours is necessary to allow the head to cool to less than 200°F if CRDM fans are not running.

26. Determine If RCS Depressurization Is Permitted:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Entire RCS - LESS THAN 200°F	a. DO NOT DEPRESSURIZE RCS. Return to Step 24.
b. Go to POP 3.3, PLANT COOLDOWN	

-END-

FIGURE ES02-1

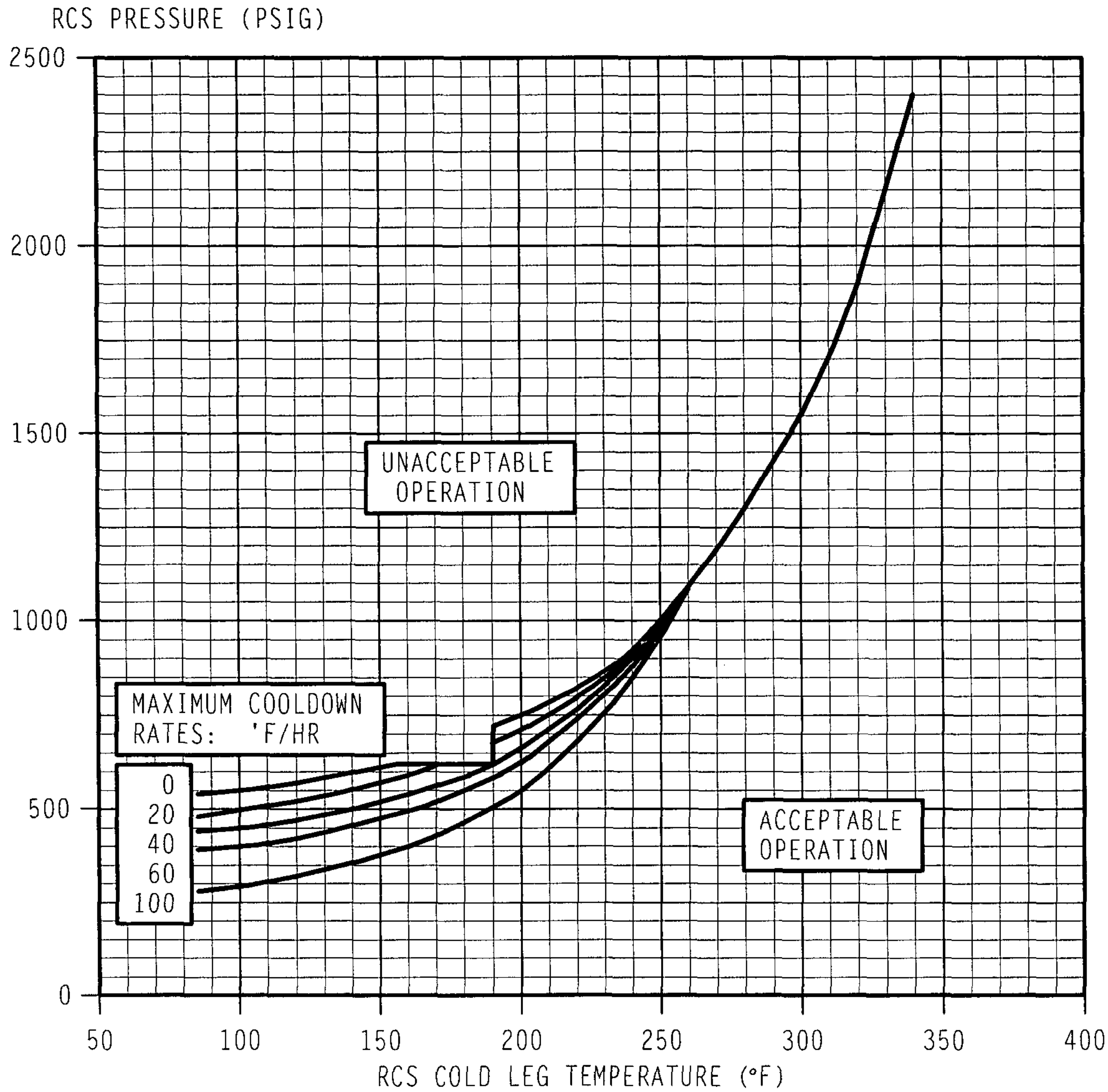

FIGURE ES02-1, REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS

FIGURE ES02-2

1. The cooldown and depressurization scheme given on this figure should be performed in conjunction with the procedure steps in ES-0.2.
2. Maintain RCS pressure approximately 1890 psig until RCS temperature is cooled down to 400 °F.
3. Continue the cooldown and initiate a depressurization of the RCS while maintaining a minimum of 200 °F subcooling (or the Tech Spec limit) until RCS pressure is 1200 psig.
4. Cooldown the RCS to below 350 °F while maintaining 1200 psig.
5. Wait eight (8) hours to allow the upper head to cool before continuing depressurization.
6. See Figure below for the acceptable operating region.

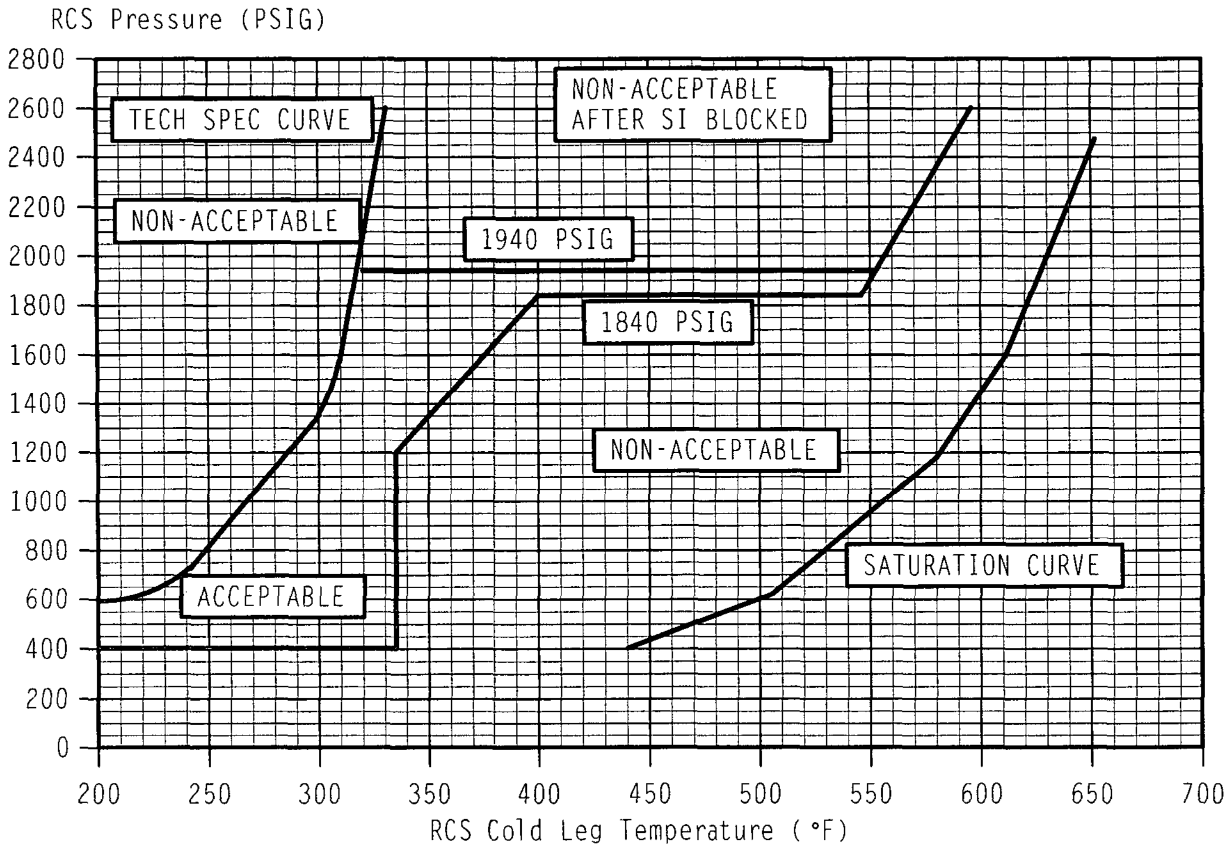

FIGURE ES02-2

Number:	Title:	Revision Number:
ES-0.3	NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITH RVLIS)	REV. 34

A. PURPOSE

This procedure provides actions to continue plant cooldown and depressurization to cold shutdown, with no accident in progress, under conditions that allow for the potential formation of a void in the upper head region with a vessel level system available to monitor void growth.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. ES-0.2, NATURAL CIRCULATION COOLDOWN, after completing Step 15.

2. ES-0.2, NATURAL CIRCULATION COOLDOWN, Step 17, when steam voids cannot be collapsed without exceeding the Technical Specification limits.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o If SI actuation occurs during this procedure, E-0, REACTOR TRIP OR SAFETY INJECTION, shall be performed.
- o The first fourteen steps of ES-0.2, NATURAL CIRCULATION COOLDOWN shall be performed before continuing with this procedure.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Check RVLIS - AVAILABLE	IF RVLIS NOT available, THEN go to ES-0.4, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS), Step 1.

CAUTION

If RCP seal cooling had previously been lost, the affected RCP should not be started prior to a status evaluation.

NOTE

- o RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.
- o If conditions can be established for starting an RCP during this procedure, Step 2 should be repeated.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 2.	Try To Restart An RCP As Follows:	
	a. IF containment sump level less than 44'3" AND containment conditions NOT adverse, THEN reset MCC 28 and MCC 28A	a. Go to Step 3.
	b. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION	b. Go to Step 3.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. Check RVLIS natural circulation range indication - FULL

c. Perform the following:

1) Increase PRZR level to 59% using charging and letdown.

2) Establish subcooling based on core exit TCs using steam dump greater than value obtained from table:

RCS Pressure (psig)	RCS Subcooling °F
0 - 400	74
401 - 800	66
801 - 1200	46
1200 - 2500	41

d. Start one RCP

d. Go to Step 3.

e. Go to appropriate plant procedure:

o POP 1.1, PLANT HEATUP

- OR -

o POP 3.3, PLANT COOLDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Saturated conditions in the PRZR should be established before trying to decrease PRZR level.

3. <u>Establish PRZR Level To Accommodate Void Growth:</u>

   a. Check PRZR level - BETWEEN 20% AND 35%

      RESPONSE NOT OBTAINED: a. Control charging and letdown as necessary.

   b. Place charging pump speed controls in manual

NOTE

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

4. <u>Continue RCS Cooldown And Initiate Depressurization:</u>

   a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR

   b. Maintain RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS Pressure (psig)	RCS Subcooling °F
0 - 400	72
401 - 800	64
801 - 1200	44
1200 - 2500	39

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES03-1)	
	d. Check letdown - IN SERVICE	d. Depressurize RCS using one PRZR PORV and block valve. Go to Step 5.
	e. Depressurize RCS using auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Control PRZR Level:	
	a. Level - GREATER THAN 20%	a. Control charging and letdown, as necessary, to increase PRZR level to greater than 20%.
	b. Level - LESS THAN 88%	b. Perform the following: 1) Turn on PRZR heaters to maintain PRZR pressure stable. 2) Decrease PRZR level to less than 88% by one of the following: o Control charging and letdown as necessary. - OR - o Continue cooldown to shrink RCS inventory.
6.	Check RVLIS Natural Circulation Range Indication - GREATER THAN 75%	Repressurize RCS to maintain RVLIS natural circulation range greater than 75%: a. Turn on PRZR heaters. b. Increase charging flow. Return to Step 4.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	Check If SI Accumulators Should Be Isolated:	
	a. RCS pressure - LESS THAN 1000 PSIG	a. DO NOT ISOLATE ACCUMULATORS. Continue with Step 8. WHEN RCS pressure less than 1000 psig, THEN do Steps 7b, 7c and 7d.
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B 2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	<u>Check If SI Pumps Should Be Isolated:</u>	
	a. RCS hot leg temperature - LESS THAN 350°F	a. DO <u>NOT</u> ISOLATE SI PUMPS. Continue with Step 9. <u>WHEN</u> RCS hot leg temperature less than 350°F, <u>THEN</u> do Step 8.
	b. Place SI pump control switches in PULLOUT	
9.	<u>Maintain Letdown Flow:</u>	
	a. Open letdown orifice isolation valves as necessary	
	b. Adjust low pressure letdown control valve setpoint as necessary	
10.	<u>Maintain RCP Seal Injection Flow - BETWEEN 6 GPM AND 10 GPM PER RCP</u>	
11.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. RCS temperature - LESS THAN 350°F	a. Return to Step 4.
	b. RCS pressure - LESS THAN 370 PSIG	b. Return to Step 4.
	c. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM	
12.	<u>Establish Nitrogen Bubble In PRZR Per SOP 3.3, PRESSURIZER BUBBLE</u>	
13.	<u>Continue RCS Cooldown To Cold Shutdown</u>	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Depressurizing the RCS before the entire RCS is less than 200 °F may result in additional void formation in the RCS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	<u>Continue Cooldown Of Inactive Portion Of RCS:</u>	
	a. Cool upper head region using CRDM fans	
	b. Cool SG U-tubes by dumping steam from all SGs	
	c. RVLIS natural circulation range indication - FULL	c. Return to Step 13.

NOTE

A waiting period of 27 hours is necessary to allow the head to cool to less than 200°F if CRDM fans are not running.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	<u>Determine If RCS Depressurization Is Permitted:</u>	
	a. Entire RCS - LESS THAN 200°F	a. DO <u>NOT</u> DEPRESSURIZE RCS. Return to Step 13.
	b. Go to POP 3.3, PLANT COOLDOWN	

-END-

FIGURE ES03-1

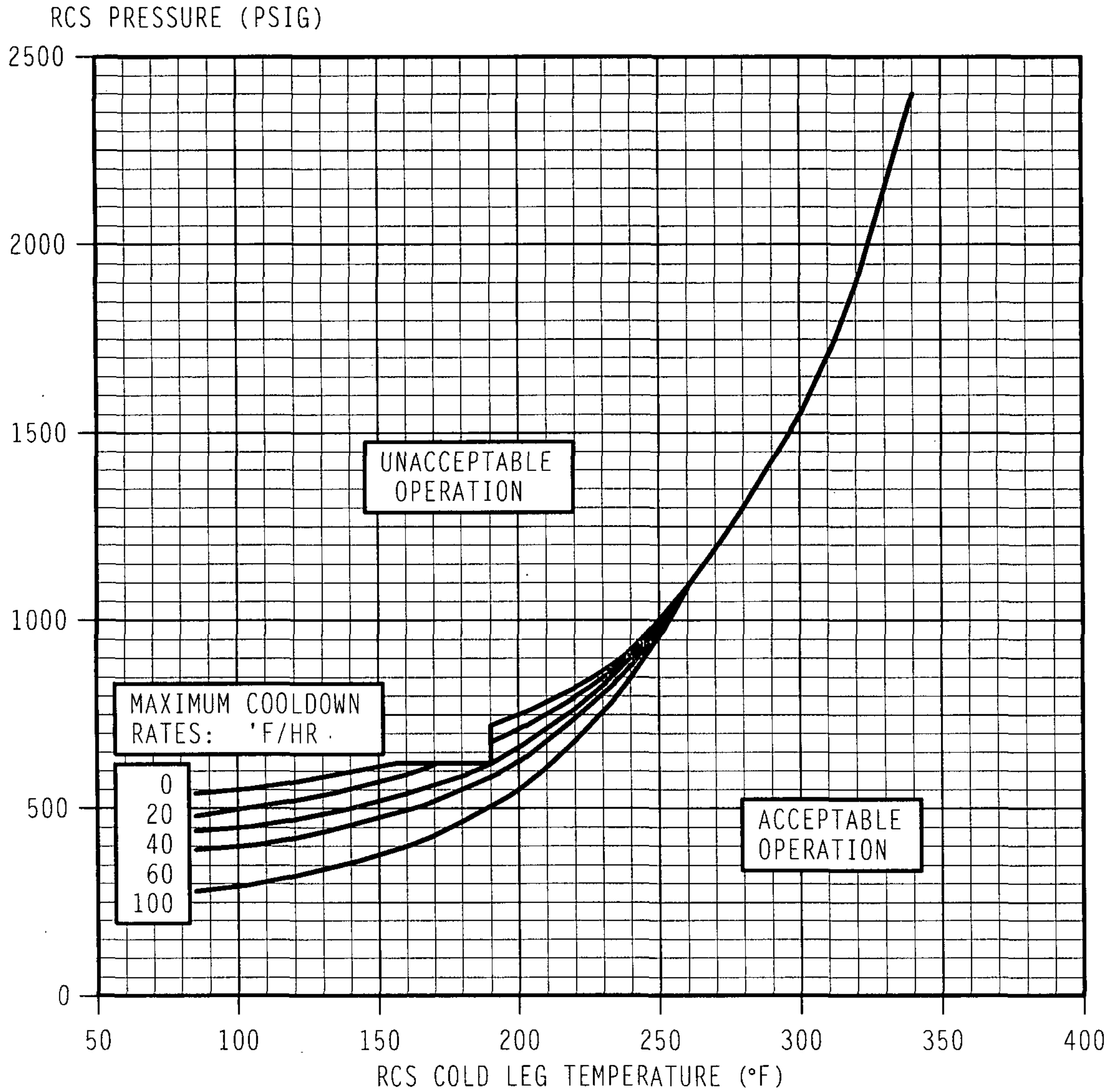

FIGURE ES03-1, REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS

A. PURPOSE

This procedure provides actions to continue plant cooldown and depressurization to cold shutdown, with no accident in progress, under conditions that allow for the potential formation of a void in the upper head region without a vessel level system available to monitor void growth.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITH RVLIS), Step 1, when RVLIS is not available.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If SI actuation occurs during this procedure, E-0, REACTOR TRIP OR SAFETY INJECTION, shall be performed.

NOTE

- o RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.
- o If conditions can be established for starting an RCP during this procedure, Step 1 should be repeated.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1.	<u>Try To Restart An RCP As Follows:</u>	
	a. IF containment sump level less than 44'3" <u>AND</u> containment conditions NOT adverse, THEN reset MCC 28 and MCC 28A	a. Go to Step 2.
	b. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION	b. Go to Step 2.
	c. Check PRZR level - GREATER THAN 59%	c. Control charging and letdown as necessary to increase level to greater than 59%.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	d. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:	d. Establish subcooling based on core exit TCs greater than value obtained from table using steam dump:

RCS Pressure (psig)	RCS Subcooling °F
0 - 400	74
401 - 800	66
801 - 1200	46
1200 - 2500	41

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	e. Start one RCP	e. Go to Step 2.
	f. Go to appropriate plant procedure: o POP 1.1, PLANT HEATUP - OR - o POP 3.3, PLANT COOLDOWN	

NOTE

Saturated conditions in the PRZR should be established before trying to decrease PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	<u>Establish PRZR Level To Accommodate Void Growth:</u>	
	a. Check PRZR level - BETWEEN 20% AND 35%	a. Control charging and letdown as necessary.
	b. Place charging pump speed controls in manual	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Decrease RCS Hot Leg Temperatures To 500°F:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 50°F/HR	
	b. Maintain RCS pressure - AT 1890 PSIG	
	c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES04-1)	
	d. Maintain stable PRZR level using charging	
	e. Check RCS hot leg temperatures - LESS THAN 500°F	e. Return to Step 3a.
	f. Stop RCS cooldown	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	Depressurize RCS To 1600 psig:	
	a. Check letdown - IN SERVICE	a. Use one PRZR PORV and block valve. Go to Step 4c.
	b. Use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.	
	c. Check RCS pressure - LESS THAN 1600 PSIG	c. Return to Step 4a.
	d. Stop RCS depressurization	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- o POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.
- o RCS hot leg and loop ΔTs will continue to decrease after cooldown is stopped until a new steady state condition for decay heat removal is reached.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Decrease RCS Hot Leg Temperatures To 400°F:	
	a. Maintain cooldown rate in RCS cold legs LESS THAN 100°F/HR	
	b. Maintain RCS pressure - AT 1600 PSIG	
	c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES04-1)	
	d. Maintain stable PRZR level using charging	
	e. Check RCS hot leg temperatures - LESS THAN 400°F	e. Return to Step 5a.
	f. Stop RCS cooldown	
6.	Equalize Charging And Letdown Flows:	
	a. Place charging and letdown controls in manual	
	b. Control charging and seal injection flows to equal letdown and seal return flows	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	Maintain RCP Seal Injection Flow - BETWEEN 6 GPM AND 10 GPM PER RCP	

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	Check If SI Accumulators Should Be Isolated:	
	a. RCS pressure - LESS THAN 1000 PSIG	a. DO NOT ISOLATE ACCUMULATORS. Continue with Step 9. WHEN RCS pressure less than 1000 psig, THEN do Steps 8b, 8c and 8d.
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B 2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The upper head region may void during depressurization. This will result in a rapidly increasing PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	Depressurize RCS:	
	a. Check letdown - IN SERVICE	a. Use one PRZR PORV and block valve. Go to Step 9c.
	b. Use auxiliary spray as follows:	
	1) Maintain RCP seal injection 6 to 10 gpm.	
	2) Reduce charging pump speed to minimum flow.	
	3) Close charging line flow control valve: o HCV-142	
	4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21	
	5) Close the pressurizer spray valves: o PCV-455A o PCV-455B	
	6) Open auxiliary spray valve: o 212	
	7) Initiate spray slowly using HCV-142.	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	8) Adjust charging pump speed to increase spray flow.	
	c. Depressurize RCS until either of the following conditions satisfied: o RCS pressure - LESS THAN 600 PSIG - OR - o PRZR level - GREATER THAN 88%	
	d. Stop RCS depressurization	

NOTE

In order to continue overall system depressurization, it may be necessary to cycle PRZR level (cycle pressure) to enhance upper head cooling.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	Check PRZR Level - LESS THAN 88%	Increase RCS pressure by 100 psi using PRZR heaters. Return to Step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	<u>Decrease RCS Hot Leg Temperatures To 350°F:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Maintain RCS pressure - STABLE	
	c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ES04-1)	
	d. Maintain stable PRZR level using charging	
	e. Check RCS hot leg temperatures - LESS THAN 350°F	e. Return to Step 11a.
	f. Stop RCS cooldown	
12.	<u>Check If SI Pumps Should Be Isolated:</u>	
	a. RCS hot leg temperature - LESS THAN 350°F	a. DO <u>NOT</u> ISOLATE SI PUMPS. Return to Step 11.
	b. Place SI pump control switches in PULLOUT	
13.	<u>Equalize Charging And Letdown Flows:</u>	
	a. Place charging and letdown controls in manual	
	b. Control charging and seal injection flows to equal letdown and seal return flows	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	Depressurize RCS:	
	a. Check letdown - IN SERVICE	a. Use one PRZR PORV and block valve. Go to Step 14c.
	b. Use auxiliary spray as follows:	
	1) Maintain RCP seal injection 6 to 10 gpm.	
	2) Reduce charging pump speed to minimum flow.	
	3) Close charging line flow control valve: o HCV-142	
	4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21	
	5) Close the pressurizer spray valves: o PCV-455A o PCV-455B	
	6) Open auxiliary spray valve: o 212	
	7) Initiate spray slowly using HCV-142.	
	8) Adjust charging pump speed to increase spray flow.	
	c. Depressurize RCS until either of the following conditions satisfied: o RCS pressure - LESS THAN 370 PSIG - OR - o PRZR level - GREATER THAN 88%	
	d. Stop RCS depressurization	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	Check PRZR Level - LESS THAN 88%	Increase RCS pressure by 100 psi using PRZR heaters. Return to Step 14.
16.	Check If RHR System Can Be Placed In Service:	
	a. RCS temperature - LESS THAN 350° F	a. Return to Step 11.
	b. RCS pressure - LESS THAN 370 PSIG	b. Return to Step 14.
	c. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM	
17.	Establish Nitrogen Bubble In PRZR Per SOP 3.3, PRESSURIZER BUBBLE	
18.	Continue RCS Cooldown To Cold Shutdown	

CAUTION

Depressurizing the RCS before the entire RCS is less than 200 °F may result in additional void formation in the RCS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	Continue Cooldown Of Inactive Portion Of RCS: o Cool upper head region using CRDM fans o Cool SG U-tubes by dumping steam from all SGs	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

A waiting period of 27 hours is necessary to allow the head to cool to less than 200°F if CRDM fans are not running.

20.	Determine If RCS Depressurization Is Permitted:	
	a. Entire RCS - LESS THAN 200°F	a. DO NOT DEPRESSURIZE RCS. Return to Step 18.
	b. Go to POP 3.3, PLANT COOLDOWN	

-END-

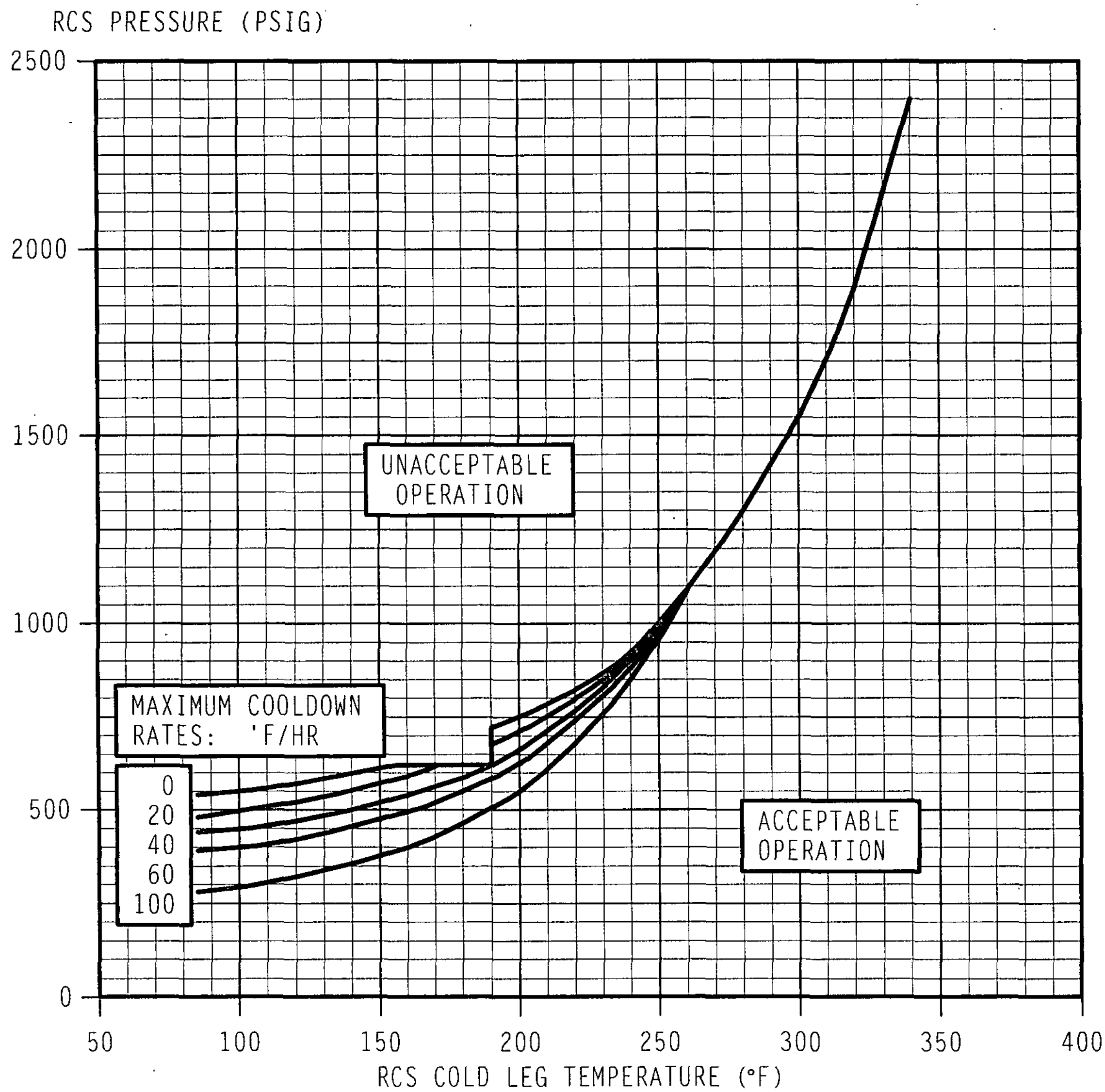

FIGURE ES04-1, REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS

A. PURPOSE

This procedure provides actions to recover from a loss of reactor or secondary coolant.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 25.a, and FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 43.a, when the PRZR PORV is stuck open and its block valve can not be closed.
2. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 29, with any of the following symptoms: high containment radiation, high containment pressure, or high containment sump levels.
3. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 35, if cause is due to a failed open PRZR safety valve.
4. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 40.a, and ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 13.b, when RCS pressure is less than the shutoff head pressure of the RHR pumps.
5. ES-1.1, SI TERMINATION, Step 6 and Step 31, and FR-I.2, RESPONSE TO LOW PRESSURIZER LEVEL, Step 4, if SI has to be re-initiated.
6. E-2, FAULTED STEAM GENERATOR ISOLATION, Step 10, after identification and isolation of a faulted SG.
7. ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 18, after normal injection mode conditions are established.
8. ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 6.b, when a LOCA outside containment is isolated.
9. FR-C.1, RESPONSE TO INADEQUATE CORE COOLING, Step 20 and Step 28, and FR-C.2, RESPONSE TO DEGRADED CORE COOLING, Step 22, after core cooling has been re-established.
10. FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1.a, if RCS pressure is less than all intact SG(s) pressure.
11. FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 41 and Step 43.a, after secondary heat sink has been re-established and all PRZR PORVs are closed.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RVLIS RCP running range indication less than value obtained from table below with any RCP running, RCPs shall be operated as directed in FR-C.2, RESPONSE TO DEGRADED CORE COOLING rather than Step 1 below:

44%	- 4 RCP
30%	- 3 RCP
20%	- 2 RCP
13%	- 1 RCP

NOTE

Attachment 1 provides a list of 480V equipment load ratings.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1.	Check If RCPs Should Be Stopped:	
	a. SI pumps - AT LEAST ONE RUNNING	a. Go to Step 2.
	b. RCS subcooling based on core exit TCs - LESS THAN 24°F (31°F FOR ADVERSE CONTAINMENT)	b. Go to Step 2.
	c. Stop all RCPs	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	<u>Check If Any SG Secondary Pressure Boundary Is Faulted:</u>	
	a. Check pressures in all SGs - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER - OR - o ANY SG COMPLETELY DEPRESSURIZED	a. Go to Step 3.
	b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines	b. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
* 3.	<u>Check Intact SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level in any SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF any PRZR PORV opens because of high PRZR pressure, Step 4b should be repeated after pressure decreases to less than the PORV setpoint.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 4.	<u>Check PRZR PORVs And Block Valves:</u>	
	a. Power to block valves - AVAILABLE	a. Restore power to block valves by closing the following breakers as necessary: o MCC 26B/1H (MOV-535) o MCC 26A/1H (MOV-536)
	b. PORVs - CLOSED	b. <u>IF</u> PRZR pressure less than 2335 psig, <u>THEN</u> manually close PORVs. <u>IF</u> any valve can <u>NOT</u> be closed, <u>THEN</u> verify its block valve closed.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.
- Placing key switches to DEFEAT will prevent auto SI actuation.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Reset SI:	
	a. Check any CCW pump - RUNNING	a. Place CCR control switches for CCW pumps in PULLOUT.
	b. Place controls for main AND bypass feedwater regulating valves to CLOSE	
	c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2	
	d. One at a time, depress Safety Injection reset buttons (Panel SB-2) o Train A o Train B	
	e. Verify Train A AND B - RESET	e. Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* 6. Reset Containment Isolation Phase A And Phase B:

a. Place IVSW switches to OPEN on SN panel:

- o 1410
- o 1413
- o SOV-3518
- o SOV-3519

b. Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

c. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

d. Place control switches for all remaining Phase A isolation valves to CLOSE on SN panel

e. One at a time, depress Phase A reset buttons

- o CI Phase A Train A
- o CI Phase A Train B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	f. Verify Train A AND B - RESET	f. Perform the following: 1) Verify correct switch positions per steps 6a through 6d 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal does <u>NOT</u> reset, <u>THEN</u>: 1) Place keyed switches to BYPASS. 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal can <u>NOT</u> be reset, <u>THEN</u> Reset Relays CA1 AND CA2 on Top of Safeguards Initiation Racks 1-2 AND 2-2.
	g. Check Phase B - ACTUATED	g. Go To Step 7.
	h. Containment pressure - LESS THAN 17 PSIG	h. Perform the following: 1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> do Steps 6i, 6j and 6k. 2) Continue with Step 7.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	j. One at a time, depress Phase B reset buttons o CI Phase B Train A o CI Phase B Train B	
	k. Verify Train A AND B - RESET	k. Ensure Relays reset (Top of Safeguards Initiation Racks 1-2 AND 2-2): o S1 o S2 o CB1 o CB2
7.	<u>Establish Instrument Air To Containment By Opening PCV-1228</u>	Verify Relays on Top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET o CA1 o CA2 <u>IF</u> Phase A is <u>NOT</u> reset <u>THEN</u> re-perform step 6.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	Check Secondary Radiation - NORMAL: o Condenser air ejector radiation recorder (R-45) o SG blowdown radiation recorder (R-49) o Main steamline radiation recorder (R-28, R-29, R-30, and R-31) o Request periodic activity samples of all SGs	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	Check If Charging Flow Has Been Established:	
	a. Charging pumps - AT LEAST ONE RUNNING	a. Perform the following: 1) IF CCW flow to RCP(s) thermal barrier is lost, THEN isolate seal injection to affected RCP(s) before starting charging pumps by either of the following:

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		o Locally energize AND close seal injection isolation valves: o MOV-250A, MCC 26AA, A2 o MOV-250C, MCC 26AA, B2 o MOV-250B, MCC 26BB, L3 o MOV-250D, MCC 26BB, M3 - OR - o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area): o 241A o 241B o 241C o 241D
	b. Establish charging flow as necessary to maintain pressurizer level - GREATER THAN 11%(33% FOR ADVERSE CONTAINMENT) 1) Start Charging Pump(s) as necessary 2) IF necessary Place Speed Controller in manual 3) Adjust charging pump speed to establish flow	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Align charging pump suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Place RCS Makeup Control switch to STOP	c. Dispatch an operator to locally align valves as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	<u>Check If SI Should Be Terminated:</u>	
	a. RCS subcooling based on core exit TCs - GREATER THAN 19°F (26°F FOR ADVERSE CONTAINMENT)	a. DO <u>NOT</u> STOP SI SYSTEM PUMPS. Go to Step 12.
	b. Secondary heat sink: o Total feed flow to intact SGs - GREATER THAN 400 GPM - OR - o Narrow range level in at least one intact SG - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	b. <u>IF</u> neither condition satisfied, <u>THEN</u> DO <u>NOT</u> STOP SI SYSTEM PUMPS. Go to Step 12.
	c. RCS pressure: o Pressure - GREATER THAN 1660 PSIG (1690 PSIG FOR ADVERSE CONTAINMENT) o Pressure - STABLE OR INCREASING	c. DO <u>NOT</u> STOP SI SYSTEM PUMPS. Go to Step 12.
	d. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)	d. DO <u>NOT</u> STOP SI SYSTEM PUMPS. Go to Step 12.
11.	<u>Go To ES-1.1, SI TERMINATION, Step 1</u>	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*12.	<u>Check If Containment Spray Should Be Stopped:</u>	
	a. Spray pumps - RUNNING	a. Go To Step 13.
	b. Containment pressure - LESS THAN 17 PSIG	b. Perform the following: 1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> do Steps 12c through 12f. 2) Continue with Step 13.
	c. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	d. Containment area radiation - NORMAL o R-25, R-26 o R-41, R-42 o R-2, R-7	d. PERFORM the following: 1) <u>WHEN</u> containment spray has been in service for 3.5 hours, <u>THEN</u> perform substeps 12e and 12f. 2) Go to Step 13.
	e. Stop containment spray pumps and place in AUTO	
	f. Close containment spray pump discharge valves: o MOV-866A o MOV-866B o MOV-866C o MOV-866D	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS pressure shall be monitored. If RCS pressure decreases to less than 320 psig (340 psig for ADVERSE CONTAINMENT), one RHR pump must be manually restarted to supply water to the RCS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	Check If RHR Pumps Should Be Stopped:	
	a. Check RCS pressure:	
	1) Pressure - GREATER THAN 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)	1) Go to Step 15.
	2) Pressure - STABLE OR INCREASING	2) Go to Step 14.
	b. Stop RHR pumps and place in AUTO	
14.	Check RCS And SG Pressures:	Return to Step 1.
	o Check pressure in all SGs - STABLE OR INCREASING	
	o Check RCS pressure - STABLE OR DECREASING	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*15.	Check Battery Status:	
	a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL	a. Perform the following: 1) Check MCCs supplying battery chargers - ENERGIZED o MCC 24A for battery charger 22 o MCC 26C for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A for battery charger 21 2) WHEN MCCs energized, THEN dispatch operators to energize battery chargers as required.
	b. Check lighting - RESET	b. IF Fire Brigade NOT being utilized, THEN direct Support Facilities personnel to align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Reduce DC load as follows:	
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 16
	2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump: o Bearing Oil pump - OR - o Turning Gear Oil pump b) WHEN <u>EITHER</u> AC oil pump above is started, THEN Stop Emerg Bearing Oil Pump c) Dispatch NPO to perform the following: o Start Main Seal Oil Pump, THEN stop DC Seal Oil Pump o Start one MBFP Main Oil Pump THEN stop MBFPs DC oil pump	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started, Stop the associated DC oil pump as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 16

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*16.	<u>Verify Instrument Air Header - STABLE</u>	Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM. b. <u>IF</u> necessary, <u>THEN</u> ensure one instrument air compressor running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. <u>IF</u> header can <u>NOT</u> be stabilized, <u>THEN</u> Close PCV-1228.
17.	<u>Dispatch NPO to locally perform the following:</u>	
	o Periodically Check IVSW Tank Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG	o Direct NPO to fill or pressurize tank as necessary.
	o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG	o Direct NPO to ensure Station Air backup <u>OR</u> N_2 backup are aligned as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*18.	Check If Diesel Generators Should Be Stopped:	
	a. Verify all 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 1) IF any diesel generator loaded, THEN ensure one cable tunnel exhaust fan running.
	b. Stop any unloaded diesel generator and place in standby	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	Restore Ventilation Systems:	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 19d.
	c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. IF fan will not start, THEN perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	<u>Initiate Evaluation Of Plant Status:</u>	
	a. Verify cold leg recirculation capability: o Power to recirculation pumps and discharge header valves - AVAILABLE - OR - o Power to RHR pumps and associated valves - AVAILABLE	a. Try to restore cold leg recirculation capability. <u>IF</u> cold leg recirculation capability can <u>NOT</u> be verified, <u>THEN</u> go to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1.
	b. Check PAB radiation - NORMAL: o 98 ft. EL area monitor (R-5987) o Charging pump room area monitor (R-4) o Plant vent monitors (R-43, R-44)	b. Try to identify and isolate leakage: o Dispatch trained personnel to survey PAB. <u>IF</u> the cause is a loss of RCS inventory outside containment, <u>THEN</u> go to ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 1.
	c. Obtain samples: o RCS boron concentration o RCS activity o Containment atmosphere o Containment sump boron concentration	
	d. Routinely check operating safeguards equipment for proper operation as required	
	e. Start additional plant equipment as necessary to assist in recovery: o House service boilers o Ventilation systems o Circulating water pumps o Instrument air closed cooling system	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21.	<u>Check Containment Hydrogen Concentration:</u>	
	a. Obtain a hydrogen concentration measurement: o Dispatch chemistry personnel to obtain sample - OR - o Use H2-02 analyzer on Accident Assessment Panel	
	b. Hydrogen concentration - LESS THAN 0.5% IN DRY AIR	b. Consult operations manager for additional recovery actions. Go to Step 22.

NOTE

RCP trip from Step 1 is not required after RCS cooldown is initiated.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	<u>Check If RCS Cooldown And Depressurization Is Required:</u>	
	a. RCS pressure - GREATER THAN 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)	a. <u>IF</u> flow from any RHR pump or Recirculation pump, as read on FI-946A,B,C,D, greater than 240 gpm (400 gpm FOR ADVERSE CONTAINMENT) to any cold leg, <u>THEN</u> go to Step 23.
	b. Go to ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, Step 1	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23.	<u>Check If Transfer To Cold Leg Recirculation Is Required:</u>	
	a. RWST level - LESS THAN 9.24 FT	a. Return to Step 15.
	b. Go to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1	

-END-

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

	480V BUSES			
	21 DG	22 DG		23 DG
EQUIPMENT	BUS 5A	BUS 2A	BUS 3A	BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

A. PURPOSE

This procedure provides the necessary instructions to terminate safety injection and stabilize plant conditions.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 31, and E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 11, when specified termination criteria are satisfied.

2. FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 45, after heat sink has been re-established and SI has been terminated.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.
- o Placing key switches to DEFEAT will prevent auto SI actuation.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Reset SI:	
	a. Check any CCW pump - RUNNING	a. Place CCR control switches for CCW pumps in PULLOUT.
	b. Place controls for main AND bypass feedwater regulating valves to CLOSE	
	c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2	
	d. One at a time, depress Safety Injection reset buttons (Panel SB-2) o Train A o Train B	
	e. Verify Train A AND B - RESET	e. Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* 2. Reset Containment Isolation Phase A And Phase B:

a. Place IVSW switches to OPEN on SN panel:

o 1410
o 1413
o SOV-3518
o SOV-3519

b. Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

c. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

d. Place control switches for all remaining Phase A isolation valves to CLOSE on SN panel

e. One at a time, depress Phase A reset buttons:

o CI Phase A Train A

o CI Phase A Train B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	f. Verify Train A AND B - RESET	f. Perform the following: 1) Verify correct switch positions per steps 2a through 2d 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B IF Signal does NOT reset, THEN: 1) Place keyed switches to BYPASS. 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B IF Signal can NOT be reset, THEN Reset Relays CA1 AND CA2 on Top of Safeguards Initiation Racks 1-2 AND 2-2.
	g. Check Phase B - ACTUATED	g. Go To Step 3.
	h. Containment pressure - LESS THAN 17 PSIG	h. Perform the following: 1) WHEN containment pressure less than 17 psig, THEN do Steps 2i, 2j and 2k. 2) Continue with Step 3.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	j. One at a time, depress Phase B reset buttons: o CI Phase B Train A o CI Phase B Train B	
	k. Verify Train A AND B - RESET	k. Ensure Relays reset (Top of Safeguards Initiation Racks 1-2 AND 2-2): o S1 o S2 o CB1 o CB2
3.	<u>Establish Instrument Air To Containment By Opening PCV-1228</u>	Verify Relays on Top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET o CA1 o CA2 <u>IF</u> Phase A is <u>NOT</u> reset <u>THEN</u> re-perform step 2.
4.	<u>Stop SI System Pumps And Place In AUTO:</u> o RHR pumps o SI pumps	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

5.	Check If Charging Flow Has Been Established:	
	a. Charging pumps - AT LEAST ONE RUNNING	a. Perform the following: 1) IF CCW flow to RCP(s) thermal barrier is lost, THEN isolate seal injection to affected RCP(s) before starting charging pumps by either of the following: o Locally energize AND close seal injection isolation valves: o MOV-250A, MCC 26AA, A2 o MOV-250C, MCC 26AA, B2 o MOV-250B, MCC 26BB, L3 o MOV-250D, MCC 26BB, M3 - OR - o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area): o 241A o 241B o 241C o 241D

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Establish charging flow as necessary to maintain pressurizer level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT) 1) Start Charging Pump(s) as necessary 2) IF necessary Place Speed Controller in manual 3) Adjust charging pump speed to establish flow	
	c. Align charging pump suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Place RCS Makeup Control switch to STOP	c. Dispatch an operator to locally align valves as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

IF entry is from FR-H.1 RESPONSE TO LOSS OF SECONDARY HEAT SINK, THEN observe CAUTIONS before step 1 prior to starting this step.

* 6. Verify SI System Flow Not Required:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

Response Not Obtained: a. Manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

Response Not Obtained: b. Control charging flow to maintain PRZR level. IF PRZR level can NOT be maintained, THEN manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 7.	Check If Containment Spray Should Be Stopped:	
	a. Spray pumps - RUNNING	a. Go To Step 8.
	b. Containment pressure - LESS THAN 17 PSIG	b. Perform the following: 1) WHEN containment pressure less than 17 psig, THEN do Steps 7c through 7f. 2) Continue with Step 8.
	c. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	d. Containment area radiation - NORMAL o R-25, R-26 o R-41, R-42 o R-2, R-7	d. PERFORM the following: 1) WHEN containment spray has been in service for 3.5 hours, THEN perform substeps 7e and 7f. 2) Go to Step 8.
	e. Stop containment spray pumps and place in AUTO	
	f. Close containment spray pump discharge valves: o MOV-866A o MOV-866B o MOV-866C o MOV-866D	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	<u>Verify All Control Rods Fully Inserted:</u>	
	a. Check IRPI Indicators - ENERGIZED	a. Implement AOI 3.4, UNCONTROLLED REACTIVITY ADDITION.
	b. Check IRPI Indicators - ALL RODS LESS THAN 7.5 INCHES	b. Check all rod positions using PROTEUS (Refer to ATTACHMENT 3, OBTAINING PROTEUS ROD POSITION INDICATION) 1) <u>IF</u> 2 <u>OR</u> more rod positions are greater than 12 steps withdrawn <u>OR</u> can <u>NOT</u> be determined, <u>THEN</u> implement AOI 3.4, UNCONTROLLED REACTIVITY ADDITION.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	<u>Check If One CCW Pump Should Be Started:</u>	
	a. CCW pumps - ALL STOPPED	a. Go to Step 10.
	b. Verify adequate power to run one CCW pump: o Any 480V bus supplying CCW pump - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1760 KW	b. <u>IF</u> power can <u>NOT</u> be restored, <u>THEN</u> perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 12.
	c. Start one CCW pump on 480V bus energized from offsite power	c. Start one CCW pump on diesel generator with load less than 1760 KW. <u>IF</u> no CCW pump can be started, <u>THEN</u> perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 12.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	<u>Check If One Service Water Pump Should Be Started On Non-Essential Header:</u>	
	a. Service water pumps - NONE RUNNING ON NON-ESSENTIAL HEADER	a. Go to Step 11.
	b. Verify adequate power to run one service water pump on non-essential header: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on any diesel generator - LESS THAN 1730 KW	b. Go to Step 11.
	c. Start one service water pump on non-essential header on 480V bus energized from offsite power	c. Start one service water pump on non-essential header on diesel generator with load less than 1730 KW.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

11. <u>Check If Letdown Can Be Established:</u>

a. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)

a. Continue with Step 12. <u>WHEN</u> level increases to greater than 25% (46% for ADVERSE CONTAINMENT), <u>THEN</u> do Step 11b.

b. Establish letdown:

1) Close letdown orifice stops

o 200A
o 200B
o 200C

2) On SN panel open letdown line isolation valves 201 and 202

3) On SN panel place Letdown Flow Control Valves 200 A B C switch to REMOTE

4) Open letdown stop valve LCV 459

5) Place low pressure letdown backpressure controller PCV-135 in MANUAL <u>AND</u> adjust to 75 percent open

6) Open letdown orifice stops to establish desired letdown flow:

o 75 GPM Letdown orifice stop 200A
o 45 GPM Letdown orifice stop 200B
o 75 GPM Letdown orifice stop 200C

7) Set PCV-135 to maintain pressure between 225 psig and 275 psig

8) Place PCV-135 in AUTO

b. Establish excess letdown:

1) Establish CCW flow through the excess letdown heat exchanger by opening CCW valves:

o Inlet valves 791,798
o Outlet valves 793,796

2) Position excess letdown diversion valve 215 to NORMAL to direct flow to the VCT.

3) Verify seal water return containment isolation valve 222 open.

4) Verify excess letdown flow control valve HCV-123 closed.

5) Open excess letdown isolation stop valve 213.

6) Slowly open HCV-123 to warmup the excess letdown heat exchanger.

7) Establish desired excess letdown flow using HCV-123.

8) Maintain excess letdown heat exchanger outlet temperature less than 195 °F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	<u>Check VCT Makeup Control System:</u> a. Makeup set for greater than RCS boron concentration b. Makeup set for automatic control	Adjust controls as necessary.
13.	<u>Align Charging Pump Suction As Follows:</u>	
	a. Check Containment Conditions - NEVER BEEN ADVERSE	a. Align suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Maintain charging pump suction aligned to RWST <u>UNTIL</u> Cold Shutdown Boron Concentration is achieved. 4) Go To Step 14.
	b. Align suction to VCT: 1) Open charging pump suction valve from VCT: o LCV-112C 2) Close charging pump suction valve from RWST: o LCV-112B	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	<u>Check RCP Cooling:</u>	
	a. Check RCP CCW system alarms - CLEARED	a. Establish CCW flow to RCP thermal barriers per SOP 1.3, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN.
	b. Check RCP seal injection flow - BETWEEN 6 GPM AND 10 GPM PER RCP	b. Establish seal injection flow to RCPs per SOP 3.1, CHARGING, SEAL WATER, AND LETDOWN CONTROL.
15.	<u>Check If RCP Seal Return Flow Should Be Established:</u>	
	a. RCP thermal barrier ΔP - POSITIVE	a. Go to Step 16.
	b. CCW pump - AT LEAST ONE RUNNING	b. Go to Step 16.
	c. Establish seal return flow:	c. Manually open valves.
	1) Verify No. 1 seal return valves - OPEN	
	2) Verify seal return containment isolation valve - OPEN	
16.	<u>Transfer Condenser Steam Dump To Pressure Control Mode</u>	<u>IF</u> condenser <u>NOT</u> available, <u>THEN</u> use SG atmospheric steam dumps.
17.	<u>Check RCS Hot Leg Temperatures - STABLE</u>	Control steam dump and total feed flow as necessary to stabilize RCS temperature.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18.	<u>Control PRZR Pressure:</u>	
	a. Turn on heaters and operate normal spray as necessary to maintain pressure stable	a. <u>IF</u> normal spray <u>NOT</u> available and letdown is in service, <u>THEN</u> use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow. <u>IF</u> auxiliary spray can <u>NOT</u> be used, <u>THEN</u> use one PRZR PORV and block valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	<u>Check Intact SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level in any SG continues to increase, <u>THEN</u> stop feed flow to that SG.
*20.	<u>Verify All 480V Busses - ENERGIZED BY OFFSITE POWER</u>	
	a. All 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 1) <u>IF</u> any diesel generator loaded, <u>THEN</u> ensure one cable tunnel exhaust fan running.
	b. Verify lighting - ENERGIZED	b. Reset lighting.
	c. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	c. Reset all MCCs except MCC 28 and MCC 28A.
	d. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 29	d. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 29
	e. Check MCC 28 And MCC 28A - ENERGIZED	e. <u>IF</u> containment sump level less than 44'3" <u>AND</u> containment conditions <u>NOT</u> adverse, <u>THEN</u> reset MCC 28 and MCC 28A.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21.	<u>Restore Ventilation Systems:</u>	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 21d.
	c. Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. <u>IF</u> fan will not start, <u>THEN</u> perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RCP seal cooling had previously been lost, the affected RCP(s) shall not be started prior to a status evaluation.

NOTE

RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	Check RCP Status - AT LEAST ONE RUNNING	Perform the following: a. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION. b. Start one RCP. c. IF an RCP can NOT be started, THEN refer to ATTACHMENT 1 to verify natural circulation. d. IF natural circulation NOT verified, THEN increase dumping steam from intact SGs.
23.	Check If Source Range Detectors Should Be Energized:	
	a. Check intermediate range flux - LESS THAN 1E-10 AMPS	a. Continue with Step 24. WHEN flux less than 1E-10 amps, THEN do Steps 23b and 23c.
	b. Verify source range detectors - ENERGIZED	b. Manually energize source range detectors.
	c. Transfer nuclear recorders to source range scale	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*24.	<u>Check Battery Status:</u>	
	a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL	a. Perform the following: 1) Check MCCs supplying battery chargers - ENERGIZED o MCC 24A for battery charger 22 o MCC 26C for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A for battery charger 21 2) <u>WHEN</u> MCCs energized, <u>THEN</u> dispatch operators to energize battery chargers as required.
	b. Check lighting - RESET	b. <u>IF</u> Fire Brigade <u>NOT</u> being utilized, <u>THEN</u> direct Support Facilities personnel to align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Reduce DC load as follows:	
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 25
	2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump: o Bearing Oil pump - OR - o Turning Gear Oil pump b) WHEN <u>EITHER</u> AC oil pump above is started, THEN Stop Emerg Bearing Oil Pump c) Dispatch NPO to perform the following: o Start Main Seal Oil Pump, THEN stop DC Seal Oil Pump o Start one MBFP Main Oil Pump THEN stop MBFPs DC oil pump	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started, Stop the associated DC oil pump as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 25

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*25.	<u>Verify Instrument Air Header - STABLE</u>	Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM. b. <u>IF</u> necessary, <u>THEN</u> ensure one instrument air compressor running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. <u>IF</u> header can <u>NOT</u> be stabilized, <u>THEN</u> Close PCV-1228.
26.	<u>Dispatch NPO to locally perform the following:</u>	
	o Periodically Check IVSW Tank Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG	o Direct NPO to fill or pressurize tank as necessary.
	o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG	o Direct NPO to ensure Station Air backup <u>OR</u> N_2 backup are aligned as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27.	<u>Check If Diesel Generators Should Be Stopped:</u>	
	a. Verify 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 1) <u>IF</u> any diesel generator loaded, <u>THEN</u> ensure one cable tunnel exhaust fan running.
	b. Stop any unloaded diesel generator and place in standby	
28.	<u>Shut Down Unnecessary Plant Equipment:</u>	
	o Circulating water pumps not required o Condensate pumps not required o Service water pumps not required o Evaluate secondary plant status and shut down equipment as required	
29.	<u>Maintain Plant Conditions - STABLE:</u>	
	o PRZR pressure o PRZR level o RCS temperatures o Intact SG levels	
30.	<u>Place Main Turbine And MBFP Turbines On Turning Gear After Shafts Stop</u>	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

*31. Verify SI System Flow Not Required:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

RESPONSE NOT OBTAINED:

a. Manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

RESPONSE NOT OBTAINED:

b. Control charging flow to maintain PRZR level. IF PRZR level can NOT be maintained, THEN manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

32. Reset FCU Services And CCR Ventilation As Necessary:

a. Place the following control switches in the position indicated:

o CCR Ventilation:
1) At CCR Panel PY2:

a) Place mode selector switch to 2

b) Place the follow switches to CUTOUT:

o Unit-1 K-8 fan switch (OT2-3)
o OT2-1
o OT2-2

o FCU service water valve TCV-1104 - OPEN
o FCU service water valve TCV-1105 - OPEN

o FCU CHAR OUT valves - OPEN
o FCU CHAR IN valves - OPEN
o FCU NORM OUT valves - CLOSE

b. Depress both reset buttons in racks E-7 and F-8 for each of the following:

o FCU service water
o FCU ventilation
o CCR ventilation

33. Go To POP 3.2 PLANT RECOVERY FROM REACTOR TRIP

-END-

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. <u>The following conditions support or indicate natural circulation flow:</u>

   o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

   o SG pressures - STABLE or DECREASING

   o RCS hot leg temperatures - STABLE OR DECREASING

   o Core exit TCs - STABLE OR DECREASING

   o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR SG PRESSURE

-END-

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	 BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

Number: ES-1.1	Title: SI TERMINATION	Revision Number: REV. 36

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. <u>Obtain PROTEUS Rod Position Indication by EITHER of the following methods:</u>

o Obtain PROTEUS Rod Indication from System Menu:

a. Depress System Menu

b. Type RE

c. Depress Execute

d. Depress Display List

e. In Display Index No. enter 4 (for control banks) or 5 (for shutdown banks)

f. Depress Execute

- OR -

o Obtain PROTEUS Rod Indication from Misc Funct:

a. Depress Misc Funct

b. Enter 13

c. Depress Execute

d. In FUNCTION NUMBER enter 1

e. In REVIEW ROD BANK select the individual control and shutdown banks for display

f. Depress Execute

-END-

A. PURPOSE

This procedure provides actions to cool down and depressurize the RCS to cold shutdown conditions following a loss of reactor coolant inventory.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 22.b, when RCS pressure is greater than the shutoff head pressure of the RHR pumps.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RWST level decreases to less than 9.24 ft, the SI System shall be aligned for cold leg recirculation using ES-1.3, TRANSFER TO COLD LEG RECIRCULATION.

NOTE

Attachment 2 provides a list of 480V equipment load ratings.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1.	<u>Verify All 480V Busses - ENERGIZED BY OFFSITE POWER</u>	
	a. All 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 1) <u>IF</u> any diesel generator loaded, <u>THEN</u> ensure one cable tunnel exhaust fan running.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	Restore Ventilation Systems:	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 2d.
	c. Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. <u>IF</u> fan will not start, <u>THEN</u> perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS pressure shall be monitored. If RCS pressure decreases to less than 320 psig (340 psig for ADVERSE CONTAINMENT), one RHR pump must be manually restarted to supply water to the RCS.

3. Check If RHR Pumps Should Be Stopped:

   a. Check RCS pressure: — RESPONSE NOT OBTAINED: a. Go to Step 4.

      1) Pressure - GREATER THAN 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)

      2) Pressure - STABLE OR INCREASING

   b. Stop RHR pumps and place in AUTO

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o If no charging pumps are running, starting a charging pump with RWST level less than 15 ft may result in air binding the pump.
- o An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	Establish Charging Flow:	
	a. Charging pumps - AT LEAST ONE RUNNING	a. Perform the following: 1) IF CCW flow to RCP(s) thermal barrier is lost, THEN isolate seal injection to affected RCP(s) before starting charging pumps by either of the following: o Locally energize AND close seal injection isolation valves: o MOV-250A, MCC 26AA, A2 o MOV-250C, MCC 26AA, B2 o MOV-250B, MCC 26BB, L3 o MOV-250D, MCC 26BB, M3 - OR - o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area): o 241A o 241B o 241C o 241D

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Align charging pump suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Place RCS Makeup Control switch to STOP c. Establish maximum flow: o Start additional charging pumps o Adjust charging pump speed controller for maximum flow	
* 5.	<u>Check Intact SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level in any intact SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Shutdown margin from graphs book should be monitored during RCS cooldown.

6. Initiate RCS Cooldown To Cold Shutdown:

   a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR

   b. Use RHR System if in service

   c. Dump steam to condenser from intact SG(s)

   RESPONSE NOT OBTAINED: c. Dump steam using intact SG(s) atmospheric steam dumps.

7. Check RCS Subcooling Based On Core Exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

   RESPONSE NOT OBTAINED: Go to Step 17.

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

8. Check SI System Pump Status:

   RESPONSE NOT OBTAINED: Go to Step 13.

   o SI pumps - ANY RUNNING

   - OR -

   o RHR pumps - ANY INJECTING IN SI MODE

9. Place All PRZR Heater Switches In OFF Position

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Voiding may occur in the RCS during RCS depressurization. This will result in a rapidly increasing PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	<u>Depressurize RCS To Refill PRZR:</u>	
	a. Use maximum normal PRZR spray	a. Use one PRZR PORV and block valve. <u>IF</u> no PORV flow path available, <u>THEN</u> use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.
	b. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	b. Continue with Step 11. <u>WHEN</u> level greater than 25% (46% for ADVERSE CONTAINMENT), <u>THEN</u> do Step 10c.
	c. Stop RCS depressurization	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RCP seal cooling had previously been lost, the affected RCP(s) shall not be started prior to a status evaluation.

NOTE

RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.

11. Check If An RCP Should Be Started:

a. All RCPs - STOPPED

RNO: a. Stop all but one RCP. Go to Step 12.

b. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RNO: b. Go to Step 17.

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

c. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)

RNO: c. Return to Step 10.

d. Check MCC 28 And MCC 28A - ENERGIZED

RNO: d. IF containment sump level less than 44'3" AND containment conditions NOT adverse, THEN reset MCC 28 and MCC 28A. IF MCC 28 can NOT be reset, THEN go to step 12.

e. Try to start an RCP as follows:

1) Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION

2) Start one RCP

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

NOTE

After stopping any SI pump, RCS pressure shall be allowed to stabilize or increase before stopping another SI pump.

12. Check If One SI Pump Should Be Stopped:

a. Any SI pumps - RUNNING

a. IF RHR pump running in SI mode, THEN Go To Step 17, IF NOT, THEN Go To Step 13.

b. Determine required RCS subcooling from table:

RCS SUBCOOLING °F (ADVERSE CONTAINMENT°F)						
	ANY RCP RUNNING			NO RCP RUNNING		
CHARGING PUMP STATUS	ONE HHSI PUMP RUNNING	TWO HHSI PUMPS RUNNING	THREE HHSI PUMPS RUNNING	ONE HHSI PUMPS RUNNING	TWO HHSI PUMPS RUNNING	THREE HHSI PUMPS RUNNING
NONE RUNNING	DO NOT STOP SI PUMPS	127 (146)	61 (81)	DO NOT STOP SI PUMP	138 (154)	69 (85)
ONE RUNNING	274 (286)	119 (137)	59 (76)	274 (286)	130 (146)	68 (83)
TWO RUNNING	247 (261)	111 (129)	58 (74)	250 (264)	122 (137)	66 (82)
THREE RUNNING	209 (228)	105 (123)	57 (73)	219 (235)	115 (131)	64 (80)

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. RCS subcooling based on core exit TCs - GREATER THAN REQUIRED	c. <u>IF</u> RCS hot leg temperatures greater than 345 °F (335°F for ADVERSE CONTAINMENT) <u>THEN</u> go to Step 17. <u>IF</u> RCS hot leg temperatures less than 345°F (335°F for ADVERSE CONTAINMENT), <u>THEN</u> ensure at least one RHR pump running. <u>IF</u> no RHR pump can be operated, <u>THEN</u> go to Step 17.
	d. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	d. DO <u>NOT</u> STOP SI PUMP. Return to Step 10.
	e. Stop one SI pump	
	f. Go to step 12a	
13.	<u>Check If Charging Flow Should Be Controlled To Maintain PRZR Level:</u>	
	a. Check RHR pumps - NONE RUNNING IN SI MODE	a. Go to Step 17.
	b. Control charging flow to maintain PRZR level	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RCP seal cooling had previously been lost, the affected RCP(s) shall not be started prior to a status evaluation.

NOTE

RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	Check RCP Status:	
	a. RCPs - AT LEAST ONE RUNNING	a. Perform the following: 1) Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION. 2) Start one RCP. 3) IF an RCP can NOT be started, THEN refer to ATTACHMENT 1 to verify natural circulation. 4) IF natural circulation NOT verified, THEN increase dumping steam.
	b. Stop all but one RCP	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Voiding may occur in the RCS during RCS depressurization. This will result in a rapidly increasing PRZR level.

15. Depressurize RCS To Minimize RCS Subcooling:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Use normal PRZR spray	a. Use one PRZR PORV and block valve. IF no PORV flow path available, THEN use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		8) Adjust charging pump speed to increase spray flow.
	b. Control PRZR heaters as necessary	
	c. Depressurize RCS until EITHER of the following conditions satisfied: o PRZR level - GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT) - OR - o RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED FROM TABLE:	

RCS PRESSURE psig	RCS SUBCOOLING °F (Adverse Containment °F)
0 - 400	62 (93)
401 - 800	54 (66)
801 - 1200	34 (41)
1201 - 2500	29 (36)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	<u>Verify Adequate Shutdown Margin:</u>	
	a. Sample RCS	
	b. Shutdown margin from graphs book - ADEQUATE	b. Borate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

*17. Verify SI System Flow Not Required:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

RESPONSE NOT OBTAINED: a. Manually operate SI System pumps as necessary. Go to Step 18.

b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

RESPONSE NOT OBTAINED: b. Manually operate SI System pumps as necessary. Return to Step 10.

18. Check If SI Accumulators Should Be Isolated:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

RESPONSE NOT OBTAINED: a. IF at least two RCS hot leg temperatures less than 350 °F, THEN go to Step 18c. IF NOT, THEN go to Step 19.

b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

RESPONSE NOT OBTAINED: b. Return to Step 10.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Check power to isolation valves - AVAILABLE	c. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B
	d. Close all SI accumulator isolation valves	d. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	e. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*19.	Check Battery Status:	
	a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL	a. Perform the following: 1) Check MCCs supplying battery chargers - ENERGIZED o MCC 24A for battery charger 22 o MCC 26C for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A for battery charger 21 2) WHEN MCCs energized, THEN dispatch operators to energize battery chargers as required.
	b. Check lighting - RESET	b. IF Fire Brigade NOT being utilized, THEN direct Support Facilities personnel to align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Reduce DC load as follows:	
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 20
	2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump: o Bearing Oil pump - OR - o Turning Gear Oil pump b) WHEN <u>EITHER</u> AC oil pump above is started, THEN Stop Emerg Bearing Oil Pump c) Dispatch NPO to perform the following: o Start Main Seal Oil Pump, THEN stop DC Seal Oil Pump o Start one MBFP Main Oil Pump THEN stop MBFPs DC oil pump	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started, Stop the associated DC oil pump as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 20

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*20.	Verify Instrument Air Header - STABLE	Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM. b. IF necessary, THEN ensure one instrument air compressor running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. IF header can NOT be stabilized, THEN Close PCV-1228.
21.	Dispatch NPO to locally perform the following:	
	o Periodically Check IVSW Tank Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG	o Direct NPO to fill or pressurize tank as necessary.
	o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG	o Direct NPO to ensure Station Air backup OR N_2 backup are aligned as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	<u>Check If Diesel Generators Should Be Stopped:</u>	
	a. Verify 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.
	b. Verify lighting - ENERGIZED	b. Reset lighting.
	c. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	c. Reset all MCCs except MCC 28 and MCC 28A.
	d. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 29	d. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 29
	e. Check MCC 28 And MCC 28A - ENERGIZED	e. <u>IF</u> containment sump level less than 44'3" <u>AND</u> containment conditions <u>NOT</u> adverse, <u>THEN</u> reset MCC 28 and MCC 28A.
	f. Stop any unloaded diesel generator and place in standby	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23.	<u>Check If One CCW Pump Should Be Started:</u>	
	a. CCW pumps - ALL STOPPED	a. Go to Step 24.
	b. Verify adequate power to run one CCW pump: o Any 480V bus supplying CCW pump - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1760 KW	b. <u>IF</u> power can <u>NOT</u> be restored, <u>THEN</u> perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 27.
	c. Start one CCW pump on 480V bus energized from offsite power	c. Start one CCW pump on diesel generator with load less than 1760 KW. <u>IF</u> no CCW pump can be started, <u>THEN</u> perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 27.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24.	<u>Check If One Service Water Pump Should Be Started On Non-Essential Header:</u>	
	a. Service water pumps - NONE RUNNING ON NON-ESSENTIAL HEADER	a. Go to Step 25.
	b. Verify adequate power to run one service water pump on non-essential header: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on any diesel generator - LESS THAN 1730 KW	b. Go to Step 25.
	c. Start one service water pump on non-essential header on 480V bus energized from offsite power	c. Start one service water pump on non-essential header on diesel generator with load less than 1730 KW.
25.	<u>Check RCP Cooling:</u>	
	a. Check RCP CCW System alarms - CLEARED	a. Establish CCW flow to RCP thermal barriers per SOP 1.3, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN.
	b. RCP seal injection flow - BETWEEN 6 GPM AND 10 GPM PER RCP	b. Establish seal injection flow to RCPs per SOP 3.1, CHARGING, SEAL WATER, AND LETDOWN CONTROL and COL 3.1, CHEMICAL AND VOLUME CONTROL SYSTEM.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26.	<u>Check If RCP Seal Return Flow Should Be Established:</u>	
	a. RCP thermal barrier ΔP - POSITIVE	a. Go to Step 27.
	b. CCW pumps - AT LEAST ONE RUNNING	b. Go to Step 27.
	c. Establish seal return flow:	c. Manually open valves.
	1) Verify No. 1 seal return valves - OPEN	
	2) Verify seal return containment isolation valve - OPEN	
*27.	<u>Check If RCPs Must Be Stopped:</u>	
	a. Check the following:	a. Go to Step 28.
	o Number 1 seal differential pressure - LESS THAN 200 PSID	
	- OR -	
	o Number 1 seal return flow - LESS THAN 0.3 GPM	
	b. Stop affected RCP(s)	
28.	<u>Check If Source Range Detectors Should Be Energized:</u>	
	a. Check intermediate range flux - LESS THAN 1E-10 AMPS	a. Continue with Step 29. <u>WHEN</u> flux less than 1E-10 amps, <u>THEN</u> do Steps 28b and 28c.
	b. Verify source range detectors - ENERGIZED	b. Manually energize source range detectors.
	c. Transfer nuclear recorders to source range scale	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29.	<u>Shut Down Unnecessary Plant Equipment:</u> o Circulating water pumps not required o Condensate pumps not required o Service water pumps not required o Evaluate secondary plant status and shut down equipment as required	

NOTE

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. Check the following: o RCS temperatures - LESS THAN 350°F o RCS pressure - LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	a. Go to Step 31.
	b. Consult operations manager to determine if RHR System should be placed in service	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
31.	<u>Check Containment Hydrogen Concentration:</u>	
	a. Obtain a hydrogen concentration measurement: o Dispatch chemistry personnel to obtain sample - OR - o Use H2-O2 analyzer on Accident Assessment Panel	
	b. Hydrogen concentration - LESS THAN 0.5% IN DRY AIR	b. Consult operations manager for additional recovery actions. Go to Step 32.
32.	<u>Check RCS Temperatures - LESS THAN 200°F</u>	Return to Step 2.
33.	<u>Evaluate Long Term Plant Status:</u>	
	a. Maintain cold shutdown conditions per POP 3.3, PLANT COOLDOWN	
	b. Consult operations manager	

-END-

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

1. The following conditions support or indicate natural circulation flow:

   o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

   o SG pressures - STABLE OR DECREASING

   o RCS hot leg temperatures - STABLE OR DECREASING

   o Core exit TCs - STABLE OR DECREASING

   o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR SG PRESSURE

-END-

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

Number:	Title:	Revision Number:
ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	REV. 36

A. PURPOSE

This procedure provides the necessary instructions for transferring the safety injection system and containment spray system to the recirculation mode

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 23.b, on low RWST level.

2. ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 11, on low RWST level.

3. Many other procedures, whenever RWST level reaches the switchover setpoint.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o Steps 1 through 39 shall be performed without delay. FRPs shall not be implemented prior to completion of these steps.
- o IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.

1. Dispatch NPO To Fully OPEN CCW Heat Exchanger SW Outlet Valves:

   o SWN-35
   o SWN-35-1

2. Check SI Status:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check SI - RESET	a. Perform the following: 1) Place any non-running CCW pumps in PULLOUT. 2) Place controls for main AND bypass feedwater regulating valves in CLOSE. 3) Ensure Automatic Safeguards Actuation key switches (Panel SB-2) in DEFEAT position: o Train A SIA-1 DEFEAT - AND - o Train B SIA-2 DEFEAT 4) One at a time, depress Safety Injection reset pushbuttons (Panel SB-2) o Train A o Train B

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	

CAUTION

IF RWST level decreases to 3.0 ft, THEN SI pumps taking suction from RWST shall be stopped.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	Place Safety Injection Recirc Switches 1 AND 3 To ON:	
	a. Check SI pump 22 - STOPPED	a. IF three SI pumps running, THEN stop SI pump 22.
	b. Check containment spray pump 21 - STOPPED	b. IF both pumps running, THEN place containment spray pump 21 in PULLOUT.
	c. Check RHR pumps - BOTH STOPPED	c. Manually trip BOTH RHR pumps.
5.	Align Service Water System As Follows:	
	a. Check Service Water System - ALIGNED FOR THREE HEADER OPERATION	a. Ensure the following valves are closed (service water valve pit): o FCV-1111 o FCV-1112 o SWN-6 o SWN-7 o SWN-4 o SWN-5 Go to Step 6.
	b. Ensure closed SWN-4 AND SWN-5	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	Reduce 480V Bus Loads: o Stop All charging pumps - AND - o Secure All PRZR heaters	

NOTE

Diesel load may increase to 2300 KW during recirculation switch sequence.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	Place Safety Injection Recirc Switch 2 To ON:	
	a. Check one service water pump - SUPPLYING NON-ESSENTIAL HEADER	a. Manually start one NESW pump in preferred order. o 22, 23, 21 if 1-2-3 header non-essential - OR - o 25, 26, 24 if 4-5-6 header non-essential
	b. Check CCW Pumps - THREE RUNNING	b. Ensure at least one CCW pump running (preferred order 22, 21, 23) 1) Go to step 7d
	c. Stop 23 CCW pump	
	d. Function complete light - LIT	d. Recheck required actions and manually initiate as necessary. 1) IF NO CCW pumps can be started THEN, ensure ACC pumps are running.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	Check Containment Level - GREATER THAN 47' 10" ON LI-939 OR LI-941	IF Containment level subsequently increases to greater than 47' 10", THEN immediately return to this step. a. Go to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.

CAUTION

IF Recirculation flow can NOT be established OR maintained, THEN ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, shall be performed.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	Place Safety Injection Recirc Switch 4 To ON	
	a. Ensure recirculation pump 21 - RUNNING	a. IF 21 pump can NOT be started, THEN manually start 22 recirculation pump. IF neither recirculation pump can be started, THEN: 1) Perform . 2) WHEN completed, THEN go to step 10.
	b. Recirculation pump header discharge valves - OPEN o MOV-1802A o MOV-1802B	b. Ensure at least one valve is STROKING open AND go to step 10.
	c. Function complete light - LIT	c. Recheck required actions and manually initiate as necessary.

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

10. Determine If Adequate Low Head Recirculation Flow Has Been Established:

a. Determine required core cooling from table:

No. of 946A-D flow indicators greater than 400 gpm	Core flow on indicators greater than 400 gpm
4	Lowest of these indicators - GREATER THAN 630 gpm OR Sum of two lowest of these indicators - GREATER THAN 950 GPM
3	Lowest of these indicators - GREATER THAN 630 GPM OR Sum of two lowest of these indicators - GREATER THAN 950 GPM
2	EACH GREATER THAN 500 gpm
1 or None	Required core cooling - NOT MET

b. Core cooling flow required by table - ESTABLISHED

RESPONSE NOT OBTAINED:

b. IF valves 746 AND 747 BOTH CLOSED, THEN Go to step 24.

IF NOT, THEN perform the following:

2) Start 22 recirc pump.

3) IF core flow rate required by table can NOT be established, THEN:

a) IF BOTH recirc pumps running, THEN stop 22 recirc pump.

b) Go to step 24.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	<u>Place Safety Injection Recirc Switch 7 To ON:</u>	
	a. Check SI pumps - ALL STOPPED	a. Manually stop pumps.
	b. Function complete light - LIT	b. Recheck required actions and manually initiate as necessary.
12.	<u>Place Safety Injection Recirc Switch 8 To ON:</u>	
	a. Check containment spray pump test line valve - CLOSED: o 1813	a. Manually close valve.
13.	<u>Close SI Test Line Valves To RWST:</u>	
	a. Place interlock switches for SI Valves To OFF o MOV-842 o MOV-843	
	b. Close valves: o MOV-842 o MOV-843	
14.	<u>Check Recirculation Pumps - AT LEAST ONE RUNNING</u>	<u>IF</u> RHR pump is running for Core Recirculation, <u>THEN</u> dispatch NPO to energize The Following MOVs: o MOV-882 on MCC 26B o MOV-1810 on MCC 26A Go to Step 18.
15.	<u>Check All 480V Busses - ENERGIZED</u>	Go to Step 17.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	<u>Place Safety Injection Recirc Switch 5 To ON:</u>	
	a. Check at least two service water pumps - SUPPLYING NON-ESSENTIAL HEADER	a. Manually start one NESW pump in preferred order. o 22, 23, 21 if 1-2-3 header non-essential - OR - o 25, 26, 24 if 4-5-6 header non-essential <u>IF</u> second service water pump will <u>NOT</u> start, <u>THEN</u> perform the following: 1) <u>IF</u> both recirculation pumps running, <u>THEN</u> stop ONE recirculation pump. 2) Close valve 804 to isolate Spent Fuel Pit Heat Exchanger.
	b. Check CCW pumps - AT LEAST TWO RUNNING	b. Manually start CCW pump as necessary (preferred order 22, 21, 23). 1) <u>IF</u> second CCW pump will <u>NOT</u> Start AND BOTH recirc pumps are running, <u>THEN</u> stop ONE recirculation pump.
	c. Check recirculation pump - BOTH RUNNING	c. <u>IF</u> at least 2 CCW pumps <u>AND</u> at least 2 non-essential SW pumps are running, <u>THEN</u> start a second recirculation pump.
	d. Function complete light - LIT	d. Recheck required actions and manually initiate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	<u>Dispatch NPO To Perform The Following (on 98 ft. EL PAB):</u> a. Energize AND Close RHR miniflow test line valves: o MOV-743 on MCC 26BB o MOV-1870 on MCC 26AA b. Energize the following MOVs o MOV-882 on MCC 26B o MOV-744 on MCC 26A o MOV-1810 on MCC 26A	
*18.	<u>Check Two CCW Pumps - RUNNING</u>	<u>IF</u> river water temperature is above 85°F, <u>THEN</u> perform the following: a. <u>IF</u> one CCW pump running, <u>THEN</u> start another CCW pump (preferred order 22, 21, 23). b. <u>IF</u> three CCW pumps running, <u>THEN</u> stop one CCW pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	<u>Check If Recirc Spray Is Required:</u>	
	a. Containment spray pumps - ANY RUNNING	a. Perform the following: 1) <u>IF</u> Containment pressure - EVER greater than 24 psig, <u>THEN</u> go to step 20. 2) <u>IF</u> <u>NOT</u>, <u>THEN</u> Go to step 22.
	b. Check RWST level - LESS THAN 2.0 FT	b. Return to Step 19a.
	c. Stop containment spray pumps	
	d. Close containment spray pump discharge valves: o 21 spray pump: o MOV-866A o MOV-866B o 22 spray pump: o MOV-866C o MOV-866D	
20.	<u>Verify One RHR Heat Exchanger Isolated As Follows:</u>	
	a. Close either 746 or 747 o If only 822B is open, then close 746 - OR - o If only 822A is open, then close 747	
21.	<u>Open One Spray Header Valve As Follows:</u>	
	o Open MOV-889B	o Open MOV-889A

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. Check Minimum Acceptable Flow To Core And Containment Spray:

a. Determine required core cooling flow from table:

No. of 946A-D flow indicators greater than 400 gpm	Core flow rate on indicators greater than 400 gpm
4	Lowest of these indicators - GREATER THAN 590 GPM OR Sum of two lowest of these indicators - GREATER THAN 920 GPM
3	Lowest of these indicators - GREATER THAN 590 GPM OR Sum of two lowest of these indicators - GREATER THAN 920 GPM
2	EACH GREATER THAN 500 gpm
1 or None	Required core cooling - NOT MET

b. Core cooling flow required by table - ESTABLISHED

RESPONSE NOT OBTAINED: b. Align system for high head recirculation as follows:

1) Close RHR spray header isolation valves:

o MOV-889A
o MOV-889B

2) Go to Step 24.

c. Recirculation spray flow - GREATER THAN 960 GPM

RESPONSE NOT OBTAINED: c. Consult Operations manager.

23. Go To Step 37

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24.	Dispatch an Operator to Shut Down FSB Ventilation	Notify TSC that FSB ventilation exhaust should be monitored for radioactive contamination.
25.	Place Interlock Switches For SI Valves To OFF o MOV-842 o MOV-843	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

SI pumps shall be stopped if RCS pressure is greater than their shutoff head pressure.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26.	<u>Place Safety Injection Recirc Switch 6 To ON:</u>	
	a. Check RHR heat exchanger discharge valves - CLOSED: o MOV-746 o MOV-747	a. Manually close valves.
	b. Check RHR heat exchanger No. 21 to SI pump suction header valves - OPEN: o MOV-888A o MOV-888B	b. Manually open valves.
	c. Check SI test line valves - CLOSED: o MOV-842 o MOV-843	c. Manually close valves.
	d. Arm SI pump suction low pressure alarm by placing toggle switch in up position: o PT-947	
	e. Function complete light - LIT	e. Recheck required actions and manually initiate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27.	Check SI Suction Pressure - GREATER THAN 75 PSIG	IF suction pressure is less than 75 psig, THEN perform the following: a. IF RHR pump running, THEN recheck RHR alignment per . 1) WHEN , completed, THEN go to step 28. b. IF 22 Recirculation pump running, THEN: 1) Stop 22 Recirculation pump. 2) Perform . 3) WHEN , completed, THEN go to step 28. c. IF 21 Recirculation pump running, THEN: 1) Stop 21 Recirculation pump. 2) Start 22 Recirculation pump. a) IF 22 Recirc pump can NOT be started perform . b) WHEN , completed, THEN go to step 28. d. IF SI pump suction pressure can NOT be established, THEN Go To ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
28.	<u>Check SI Pumps - AT LEAST 2 RUNNING</u>	Perform the following: a. Ensure Safety Injection recirc switch 7 is OFF b. Start two SI pumps o 21 o 23 <u>IF</u> SI pump 21 OR 23 can <u>NOT</u> be started, <u>THEN</u> perform the following: o Place containment spray pump 21 control switch in the PULLOUT position. o Place SI pump 22 control switch to PULLOUT. o Place recirculation switch No. 1 to OFF. o Manually OR Locally Open SI pump 22 suction valves: o MOV-887A o MOV-887B o Start SI pump 22 o <u>IF</u> 21 AND 22 SI pumps running, <u>THEN</u>: 1) Ensure MOV-851B open. 2) Ensure MOV-851A closed. o <u>IF</u> 22 AND 23 SI pumps running, <u>THEN</u>: 1) Ensure MOV-851A open. 2) Ensure MOV-851B closed.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29.	<u>Place Safety Injection Recirc Switch 8 To ON:</u>	
	a. Check containment spray pump test line valve - CLOSED: o 1813	a. Manually close valve.
30.	<u>Check Recirculation Pumps - AT LEAST ONE RUNNING</u>	Dispatch NPO to energize the following MOVs: o MOV-882 on MCC 26B o MOV-1810 on MCC 26A Go to Step 34.
31.	<u>Check All 480V Busses - ENERGIZED</u>	Go to Step 33.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32.	<u>Place Safety Injection Recirc Switch 5 To ON:</u>	
	a. Check at least two service water pumps - SUPPLYING NON-ESSENTIAL HEADER	a. Manually start one NESW pump in preferred order. o 22, 23, 21 if 1-2-3 header non-essential - OR - o 25, 26, 24 if 4-5-6 header non-essential <u>IF</u> second service water pump will <u>NOT</u> start, <u>THEN</u> perform the following: 1) <u>IF</u> both recirculation pumps running, <u>THEN</u> stop ONE recirculation pump. 2) Close valve 804 to isolate Spent Fuel Pit Heat Exchanger.
	b. Check CCW pumps - AT LEAST TWO RUNNING	b. Manually start CCW pump as necessary (preferred order 22, 21, 23). 1) <u>IF</u> second CCW pump will <u>NOT</u> Start AND BOTH recirc pumps are running, <u>THEN</u> stop ONE recirculation pump.
	c. Check recirculation pump - BOTH RUNNING	c. <u>IF</u> at least 2 CCW pumps <u>AND</u> at least 2 non-essential SW pumps are running, <u>THEN</u> start a second recirculation pump.
	d. Function complete light - LIT	d. Recheck required actions and manually initiate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
33.	Dispatch NPO To Perform The Following (on 98 ft. EL PAB): a. Energize AND Close RHR miniflow test line Valves: o MOV-743 on MCC 26BB o MOV-1870 on MCC 26AA b. Energize the following MOVs o MOV-882 on MCC 26B o MOV-744 on MCC 26A o MOV-1810 on MCC 26A	
*34.	Check Two CCW Pumps - RUNNING	IF river water temperature is above 85°F, THEN perform the following: a. IF one CCW pump running, THEN start another CCW pump (preferred order 22, 21, 23). b. IF three CCW pumps running, THEN stop one CCW pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
35.	<u>Check If Recirc Spray Is Required:</u>	
	a. Containment spray pumps - ANY RUNNING	a. Perform the following: 1) <u>IF</u> Containment pressure EVER greater than 24 psig, <u>THEN</u> go to step 36. 2) <u>IF</u> <u>NOT</u>, <u>THEN</u> Go to step 37.
	b. Check RWST level - LESS THAN 2.0 FT	b. Return to Step 35a.
	c. Stop containment spray pumps	
	d. Close containment spray pump discharge valves: o 21 spray pump: o MOV-866A o MOV-866B o 22 spray pump: o MOV-866C o MOV-866D	
36.	<u>Open One Spray Header Valve As Follows:</u>	
	o Open MOV-889B	o Open MOV-889A

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37.	<u>Check Recirculation Switch Sequence Status:</u>	
	a. Switch 1 function complete light - LIT	a. Perform the following: 1) <u>IF</u> 22 SI pump is stopped, <u>THEN</u> ensure suction valves - CLOSED: o MOV-887A o MOV-887B 2) Ensure discharge valves for <u>STOPPED</u> Containment Spray pump - CLOSED: o 21 spray pump: o MOV-866A o MOV-866B o 22 spray pump: o MOV-866C o MOV-866D
	b. Check RHR pumps - ALL STOPPED	b. Go to step 37d.
	c. Switch 3 function complete light - LIT	c. Check RHR pump suction and discharge valves - CLOSED: o MOV-882 o MOV-744 <u>IF</u> <u>NOT</u>, <u>THEN</u> perform the following: 1) Ensure valve motor controls - RE-ENERGIZED. 2) Manually close valves. 3) <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> locally close valves.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	d. Switch 8 function complete light - LIT	d. Check SI pump suction valve from RWST - CLOSED: o MOV-1810 IF NOT, THEN perform the following: 1) Ensure valve motor control - RE-ENERGIZED. 2) Manually close valve. 3) IF valve can NOT be closed, THEN locally close valve.
*38.	Check CCW System Temperature - LESS THAN 130°F	Perform the following: a. Ensure CCW Heat Exchanger SW Outlet Valves - FULLY OPEN: o SWN-35 o SWN-35-1 b. Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to SI and RHR pumps. c. IF CCW system temperature exceeds 150°F AND Recirc flow has been established through both RHR Heat Exchangers, THEN shut one RHR heat exchanger discharge valve: o MOV-746 - OR - o MOV-746
39.	Implement FRPs As Required	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40.	<u>Verify Adequate Recirculation Flow:</u>	
	a. Core exit TCs - STABLE OR DECREASING	a. Ensure CCW Heat Exchanger SW Outlet Valves - FULLY OPEN: o SWN-35 o SWN-35-1 <u>IF</u> core exit TCs temperatures can <u>NOT</u> be stabilized, <u>THEN</u> align system for high head recirculation as follows: 1) Close RHR spray header isolation valves: o MOV-889A o MOV-889B 2) Return to Step 24.
*41.	<u>Check Battery Status:</u>	
	a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL	a. Perform the following: 1) Check MCCs supplying battery chargers - ENERGIZED o MCC 24A for battery charger 22 o MCC 26C for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A for battery charger 21 2) <u>WHEN</u> MCCs energized, <u>THEN</u> dispatch operators to energize battery chargers as required.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check lighting - RESET	b. Direct available Support Facilities personnel to perform the following: 1) Align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.
	c. Reduce DC load as follows:	
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 42

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump: o Bearing Oil pump - OR - o Turning Gear Oil pump b) WHEN <u>EITHER</u> AC oil pump above is started, THEN Stop Emerg Bearing Oil Pump c) Dispatch NPO to perform the following: o Start Main Seal Oil Pump, THEN stop DC Seal Oil Pump o Start one MBFP Main Oil Pump THEN stop MBFPs DC oil pump	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started, Stop the associated DC oil pump as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 42
*42.	<u>Verify Instrument Air Header - STABLE</u>	Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM. b. <u>IF</u> necessary, <u>THEN</u> ensure one instrument air compressor running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. <u>IF</u> header can <u>NOT</u> be stabilized, <u>THEN</u> Close PCV-1228.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
43.	Dispatch NPO To Locally Perform The Following:	
	o Periodically Check IVSW Tank Level AND Pressure:	o Direct NPO to fill or pressurize tank as necessary.
	o Level - GREATER THAN 92%	
	o Pressure - GREATER THAN 55 PSIG	
	o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG	o Direct NPO to ensure Station Air backup OR N_2 backup are aligned as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*44.	Initiate Evaluation Of Plant Status:	
	a. Direct Chemistry to Obtain the following samples o RCS boron concentration o RCS activity o Containment atmosphere o Containment sump boron concentration o Recirculation sump pH	
	b. Check recirculation sump pH sample - OBTAINED	b. Continued with step 45. WHEN sample has been obtained, THEN return to step 44c.
	c. Verify recirculation water pH - BETWEEN 7.0 AND 9.5	c. Perform the following: 1) IF pH less than 7.0, THEN perform the following: a) Consult operations manager to determine if pH should be adjusted: 1. IF directed to adjust pH, THEN perform the following: a. Add required chemicals to boric acid batching tank. b. Inject to RCS through normal charging paths. 2) IF pH is greater than 9.5, THEN perform the following: a) Inject concentrated boric acid from the BAST to the RCS through normal charging paths. b) Obtain necessary samples.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
45.	Check If SI Accumulators Should Be Isolated:	
	a. At least two RCS hot leg temperatures - LESS THAN 350°F	a. Continue with Step 47. WHEN at least two hot leg temperatures less than 350°F THEN return to step 45b.
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o IF HCV-863 will NOT close THEN locally close the following nitrogen valves: o 1809 o 1811A o 1811B 2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

To prevent main steamline isolation, steam dump to condenser should NOT exceed 0.5E6 lbs/hour per SG.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
46.	Check If Intact SGs Should Be Depressurized To RCS Pressure:	
	a. RCS pressure - LESS THAN INTACT SG PRESSURE	a. Go to Step 47.
	b. Check SGs radiation - NORMAL: o SG blowdown radiation recorder (R-49) o Main steamline radiation recorder (R-28, R-29, R-30, and R-31) o Request periodic activity samples of all SGs	b. Do NOT dump steam from any SG with high radiation. Isolate feed flow to any SG with high radioactivity.
	c. Dump steam to condenser from intact SG(s) until SG pressure less than RCS pressure	c. Dump steam using intact SG(s) atmospheric steam dumps until SG pressure less than RCS pressure.
47.	Determine If Reactor Vessel Head Should Be Vented:	
	a. Consult operations manager	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
48.	Check Containment Hydrogen Concentration:	
	a. Obtain a hydrogen concentration measurement: o Dispatch chemistry personnel to obtain sample - OR - o Use H2-02 analyzer on Accident Assessment Panel	
	b. Hydrogen concentration - LESS THAN 0.5% IN DRY AIR	b. Consult operations manager for additional recovery actions. Go to Step 49.
*49.	Try To Energize All 480V Busses From Offsite Power:	
	a. Check 138KV feeder 95332 or 95331 - ENERGIZED	a. Go to Step 49c.
	b. Go to Step 49d	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Check 13.8KV feeder 13W92 - ENERGIZED	c. IF 13.8KV feeder NOT energized, THEN perform the following: 1) Ensure breaker GT-2 is open. 2) Request Unit 3 Central Control Room Operator to close breaker 52GT/BT. WHEN 52GT/BT is closed, THEN go to Step 49d. 3) IF 52GT/BT can NOT be closed, THEN Black start a GT per SOP 27.5.3, BLACK START OF GAS TURBINE 1, 2 or 3. WHEN a GT is available, THEN go to Step 49e. 4) IF 52GT/BT can NOT be closed AND no GT can be black started, THEN contact district operator to implement EO-4087, PROCEDURE FOR RESTORATION OF ELECTRICAL SUPPLY TO INDIAN POINT NO. 2 AND NO. 3. WHEN 13.8KV feeder energized, THEN go to Step 49d. 5) Continue with Step 50.
	d. Energize 6.9KV bus 5 AND bus 6 per SOP 27.1.4, 6900 VOLT SYSTEM	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	e. Ensure 480V Substation - ENERGIZED o SS5 o SS2 o SS3 o SS6	
	f. Reset Blackout Relays	f. <u>IF</u> 480V bus 5A <u>OR</u> 6A <u>NOT</u> energized, <u>THEN</u> perform the following: 1) Restore offsite power to 480V busses per AOI 27.1.1, Loss of Normal Station Power 2) Go to step 49h.
	g. Dispatch operator to restore offsite power to 480V busses per SOP 27.3.1.1, 27.3.1.2, or 27.3.1.3 DIESEL GENERATOR MANUAL OPERATION for the appropriate diesel generator	
	h. Verify lighting - ENERGIZED	h. Reset lighting.
	i. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	i. Reset all MCCs except MCC 28 and MCC 28A.
	j. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 29	j. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 29

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
50.	<u>Restore Ventilation Systems:</u>	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 AND R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A OR 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 OR 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 50d.
	c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. <u>IF</u> fan will <u>NOT</u> start, <u>THEN</u> perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
51.	Check If Containment Spray Should Be Terminated:	
	a. Check 889A OR 889B - OPEN	a. Go to step 52.
	b. Check Containment Spray - IN SERVICE GREATER THAN 3.5 HOURS	b. Go to step 52.
	c. Close 889A AND 889B	
	d. Check recirculation pumps - ANY RUNNING	d. Go to step 52.
	e. Check RHR Pumps - ANY RUNNING FOR CORE RECIRC OR CONTAINMENT SPRAY	e. Go to step 52.
	f. Ensure 745A AND 745B - OPEN	f. Manually open both valves. 1) IF EITHER valve 745A OR 745B can NOT be opened, THEN ensure valve 746 is OPEN. 2) IF 746 can NOT be opened, THEN: a) Stop running recirc pump. b) Go to step 52.
	g. Stop 21 AND 22 RHR pumps	
	h. Dispatch NPO to perform the following (on 98 ft. EL PAB): 1) Energize AND Close RHR miniflow test line valves: o MOV-743 on MCC 26BB o MOV-1870 on MCC 26AA 2) Energize the following MOVs o MOV-882 on MCC 26B o MOV-744 on MCC 26A o MOV-1810 on MCC 26A	
52.	Cold Leg Recirculation In Service For 24 hours	Return to Step 38.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
53.	Go To ES-1.4, TRANSFER TO HOT LEG RECIRCULATION, Step 1	

-END-

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Dispatch an Operator to Shut Down FSB Ventilation	Notify TSC that FSB ventilation exhaust should be monitored for radioactive contamination.

CAUTION

- o IF EITHER 885A OR 885B is de-energized, THEN do NOT open the energized valve UNTIL de-energized valve has been fully opened locally. Opening the energized valve first may significantly increase local dose levels.
- o Extremely high radiation fields may exist in the area of 885A AND 885B.
- o Starting an RHR pump, will cause a significant increase in local dose levels. Valving piping and pump areas should be evacuated prior to pump start.

NOTE

Position of de-energized MOVs may be verified by Two is True indication OR position prior to loss of power.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	Establish Cold Leg Recirculation Using RHR Pumps:	
	a. Check 885A AND 885B - BOTH ENERGIZED	a. Perform the following: 1) Dispatch NPO to locally OPEN the de-energized valve. 2) Go to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION. WHEN the de-energized valve is opened, THEN return to this step.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Dispatch NPO to energize the following MOV: o MOV-882 on MCC 26B	
	c. Ensure the following Safety Injection Recirc Switches are OFF o Recirc Switch 3 o Recirc Switch 4 o Recirc Switch 5	
	d. Ensure RHR Pumps - BOTH STOPPED o 21 RHR Pump o 22 RHR Pump	
	e. Ensure Recirculation Pumps - BOTH STOPPED o 21 Recirculation Pump o 22 Recirculation Pump	
	f. Ensure 1802A AND 1802B - CLOSED	
	g. Close RHR pump suction valve from RWST: o MOV-882	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
h.	Establish recirculation flow path for RHR pumps: 1) Ensure RHR pump discharge valve is open: o MOV-744 (normally de-energized open) 2) Ensure RHR pump suction valves from containment sump are Open: o 1805 (normally open) o MOV-885A o MOV-885B	h. <u>IF</u> a recirculation flow path can <u>NOT</u> be established, <u>THEN</u> go to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1.
i.	Start RHR pump 22	i. <u>IF</u> 22 RHR pump can <u>NOT</u> be started, <u>THEN</u> start RHR pump 21. 1) <u>IF</u> RHR 21 pump can be <u>NOT</u> be started, <u>THEN</u> Go To ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1.
j.	Return to Step in effect.	

-END-

A. PURPOSE

This procedure provides the necessary instructions for transferring the safety injection system to hot leg recirculation.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 53, when the specified time interval has elapsed.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Dispatch an Operator to Shut Down FSB Ventilation	Notify TSC that FSB ventilation exhaust should be monitored for radioactive contamination.
2.	Dispatch NPO To Energize Valves: o 856B At MCC 26B o 856F At MCC 26A	
3.	Check RHR Spray Header Isolation Valves - CLOSED: o MOV-889A o MOV-889B	Manually close valves.
4.	Close Cold Leg Injection Valve: o MOV-856A - OR - o MOV-856E	
5.	Open Hot Leg Injection Valve To Loop 23: o MOV-856B	
6.	Close Cold Leg Injection Valve: o MOV-856C - OR - o MOV-856D	
7.	Open Hot Leg Injection Valve To Loop 21: o MOV-856F	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	<u>Check Recirculation System Alignment:</u>	
	a. Check MOV-746 OR MOV-747 - CLOSED	a. Ensure 746 OR 747 is closed. 1) <u>IF</u> NEITHER valve can be closed, <u>THEN</u> Close HCV-638 OR 640.
	b. Check Safety Injection Recirc Switch 6 - ON	b. Place Safety Injection Recirc Switch 6 to ON.
9.	<u>Check Valve Alignment And Start SI Pumps:</u>	
	a. Check SI pump suction valves from RHR Hx - OPEN: o MOV-888A o MOV-888B	a. Manually open valves.
	b. Arm SI pump suction low pressure alarm: o PT-947	
	c. Check recirculation switch No. 7 - OFF	c. Place switch in off.
10.	<u>Check SI Suction Pressure - GREATER THAN 75 PSIG</u>	Check SI valve alignment. a. <u>IF</u> adequate suction pressure can <u>NOT</u> be established, <u>THEN</u> consult Operations Manager prior to continuing.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

EDG load should be maintained less than 1660 KW, but may increased to 2010 KW for maximum of 2 hrs in any 24 hr period.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	Start 23 SI Pump As Follows:	
	a. Verify adequate power: o Bus 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 23 diesel generator - LESS THAN 1300 KW	a. IF adequate power can NOT be established, THEN consult Operations Manager prior to continuing.
	b. Start 23 SI pump	b. Perform the following: 1) Place containment spray pump 21 in PULLOUT. 2) Place SI pump 22 in PULLOUT. 3) Place Safety Injection Recirc Switch 1 to OFF. 4) Open SI pump 22 suction valves: o MOV-887A o MOV-887B 5) Ensure MOV-851B open AND MOV-851A closed. 6) Start SI pump 22.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	<u>Ensure 746 AND 747 - CLOSED</u>	Perform the following: a. <u>IF</u> EITHER valve can <u>NOT</u> be closed, <u>THEN</u> Close HCV-638 AND 640. b. <u>IF</u> EITHER HCV-638 OR 640 can <u>NOT</u> be closed, <u>THEN</u> go to step 15.
13.	<u>Check SI Suction Pressure - GREATER THAN 75 PSIG</u>	Check SI valve alignment. a. <u>IF</u> adequate suction pressure can <u>NOT</u> be established, <u>THEN</u> consult Operations Manager prior to continuing.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

EDG load should be maintained less than 1660 KW, but may increased to 2010 KW for maximum of 2 hrs in any 24 hr period.

14. Start 21 SI Pump As Follows:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Verify adequate power: o Bus 5A - ENERGIZED BY OFFSITE POWER - OR - o Load on 21 diesel generator - LESS THAN 1300 KW	a. IF adequate power can NOT be established, THEN consult Operations Manager prior to continuing.
b. Start 21 SI pump	b. Perform the following: 1) Place containment spray pump 21 in PULLOUT. 2) Place SI pump 22 in PULLOUT. 3) Place Safety Injection Recirc Switch 1 to OFF. 4) Open SI pump 22 suction valves: o MOV-887A o MOV-887B 5) Ensure MOV-851A open AND MOV-851B closed. 6) Start SI pump 22.

15. Verify Adequate Recirculation Flow:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Core exit TCs - STABLE OR DECREASING	a. Return to Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Amount Of Time Since Hot Leg Recirculation Had Been Established - 24 HOURS	Go to Step 10.
17.	Stop One SI Pump As Follows:	
	a. Check SI pumps - TWO RUNNING	a. Go to step 18.
	b. Check 22 SI pump - RUNNING	b. Stop 23 SI pump AND go to step 18.
	c. Stop 22 SI pump	
18.	Check Recirc System Alignment:	
	a. Ensure valves 822A AND 822B - OPEN	a. Perform the following: 1) IF NEITHER Valve can be opened, THEN Go to step 21. 2) IF 822B is open, THEN ensure valves 747 AND HCV-638 are open. a) Go to Step 19. 3) IF 822A is open, THEN ensure valves 746 AND HCV-640 are open. a) Go to Step 19.
	b. Ensure Valves 746 AND HCV-640 - OPEN	b. Ensure Valves 747 AND HCV-638 are open.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

19. <u>Determine If Adequate Low Head Recirculation Flow Has Been Established:</u>

a. Determine required core cooling flow from table:

No. of flow indicators greater than 400 gpm	Core flow rate on indicators greater than 400 gpm
4	Lowest of these indicators - GREATER THAN 590 GPM OR Sum of two lowest of these indicators - GREATER THAN 920 GPM
3	Lowest of these indicators - GREATER THAN 590 GPM OR Sum of two lowest of these indicators - GREATER THAN 920 GPM
2	EACH GREATER THAN 500 gpm
1 or None	Required core cooling - NOT MET

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Core flowrate required by table - ESTABLISHED	b. IF core flowrate required by table can NOT be established, THEN: 1) Ensure 746 AND 747 are closed. a) IF EITHER valve can NOT be closed, THEN Close HCV-638 AND 640. b) IF EITHER HCV-638 OR 640 can NOT be closed, THEN go to step 21. 2) Start 23 SI pump IF 23 SI pump can NOT be started, THEN: a) Place containment spray pump 21 in PULLOUT. b) Place SI pump 22 in PULLOUT. c) Place Safety Injection Recirc Switch 1 to OFF. d) Open SI pump 22 suction valves: o MOV-887A o MOV-887B e) Ensure MOV-851B open AND MOV-851A closed. f) Start SI pump 22. 3) Go to step 21.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	Stop SI Pumps As Follows:	
	a. Stop 21 SI pump	
	b. Ensure 22 SI pump in PULLOUT	
	c. Ensure SI Pump 22 Suction Valves close: o 887A o 887B	
	d. Isolate SI pumps (See Attachment 1 for list of valves)	
21.	Align Seal Gas System:	
	a. Ensure following valves are closed: o PCV-1090 inlet stop 1442 o PCV-1090 bypass stop 1444	
	b. Ensure nitrogen supply is available - PI-1075 GREATER THAN 250 PSIG	
	c. Slowly open PCV-1090 inlet stop valve 1442	
	d. Adjust PCV-1090 to maintain 250 psig on PI-1089	
22.	Close Containment Manual Isolation Valves:	
	a. Consult SM to determine the necessary valves on Attachment 2 to be isolated	
	b. Direct NPO to isolate the necessary valves with Health Physics assistance	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23.	Evaluate Long Term Plant Status:	
	a. Consult Operations Manager	

-END-

	Valve Operation	Location	Valving* Completed
IF ON LOW HEAD COLD LEG RECIRC-ULATION	Isolate SI Pumps		
	a) Close MOV 1810	CCR	______
	b) Close MOV-850A	4	______
	c) Close MOV-850B	4	______
	d) Close MOV-851A	CCR	______
	e) Close MOV-851B	CCR	______
	f) Close MOV-888A	CCR	______
	g) Close MOV-888B	CCR	______
	h) Open SOV 3502 (IVSW - 850B)	2	______
	i) Open SOV 3503 (IVSW - 851B)	2	______
	j) Open SOV 3512 (IVSW - MOV-851A)	2	______
	k) Open SOV 3513 (IVSW - MOV-850A)	2	______
	l) Open SOV 3507 (N_2 Gas Mov-888A)	2	______
	m) Open SOV 3508 (N_2 Gas Mov-888B)	2.	______

Location:
1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft El..

* The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

Permission* Granted	Valve Operation	Location	Valving** Completed
A	Isolate Charging Line		
	a) Close MOV-205	4	______
	b) Close MOV-226	4	______
	c) Close MOV-227	4	______
______	d) Open SOV 3501 (IVSW)	2	______
B	Isolate RCP 21 Seal Injection		
	a) Close MOV-4925	4	______
	b) Close MOV-250A	4	______
______	c) Open SOV 3514 (IVSW)	2	______
C	Isolate RCP 22 Seal Injection		
	a) Close MOV-4926	4	______
	b) Close MOV-250B	4	______
______	c) Open SOV 3515 (IVSW)	2	______
D	Isolate RCP 23 Seal Injection		
	a) Close MOV-4927	4	______
	b) Close MOV-250C	4	______
______	c) Open SOV 3516 (IVSW)	2	______

Location:

1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft. El.
5 PACS/PACV Panels - PAB 98 ft. El.
6 Spray Pump Area - PAB 68 ft. El.
7 Personnel Air Lock - Fan House 80 ft. El.
8 Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

(Continued)

Permission* Granted	Valve Operation	Location	Valving** Completed
E	Isolate RCP 24 Seal Injection		
	a) Close MOV-4928	4	________
	b) Close MOV-250D	4	________
________	c) Open SOV 3517 (IVSW)	2	________
F	Isolate RCP Seal Return		
________	a) Close MOV-222	CCR	________
G	Isolate RCP Component Cool. Wtr.		
	a) Close MOV-769 (Supply)	CCR	________
	b) Close MOV-797 (Supply)	CCR	________
	c) Close MOV-786 (Mtr Brg Return)	CCR	________
	d) Close MOV-784 (Mtr Brg Return)	CCR	________
	e) Close MOV-789 (Thermal Barrier)	CCR	________
________	f) Close FCV-625 (Thermal Barrier)	CCR	________
H	Isolate Containment Spray Headers		
	a) Close MOV-869A	4	________
	b) Close MOV-869B	4	________
	c) Open SOV 3504 (IVSW-869B)	2	________
	d) Open SOV 3511 (IVSW-869A)	2	________
________	e) Close 878A (Test Line Stop)	6	________
I	Isolate Recirculation Sample Line		
	a) Close MOV-990A	4	________
	b) Close MOV-990B	4	________
________	c) Open (N2 Gas) SOV 3505	2	________

Location:
1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft El.
5 PACS/PACV Panels - PAB 98 ft. El.
6 Spray Pump Area - PAB 68 ft. El.
7 Personnel Air Lock - Fan House 80 ft. El.
8 Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

(Continued)

Permission* Granted	Valve Operation	Location	Valving** Completed
J	Isolate RHR System		
	a) Close MOV-882	CCR	______
	b) Close MOV-744	CCR	______
	c) Close MOV-743	4	______
	d) Close MOV-1870	4	______
	e) Close MOV-958 (Sample Line)	4	______
	f) Close MOV-959 (Sample Line)	4	______
	g) Close 990D (Sample Line)	3	______
	h) Open SOV 3500 (N2Gas 732)	2	______
	i) Open SOV 3506 (N2Gas MOV-744)	2	______
	j) Open SOV 3509 (N2Gas Sample Line)	2	______
	k) Open SOV 3510 (N2Gas - Between Mov-743/1870)	2	______
	l) Close 732 (RHR Suction)	1	______
	m) Close 859A (SIS Test Line Stop)	1	______
	n) Close 859C (SIS Test Line Stop)	1	______
	o) Close MOV-885A (VC Sump To RHR)	CCR	______
______	p) Close MOV-885B (VC Sump To RHR)	CCR	______
K	Isolate N2 to PRT/RCDT/SIS ACCUM/PORV		
	a) Close SOV 3418 and 3419 (PRT)	2	______
	b) Close SOV 3416 and 3417 (RCDT)	2	______
	c) Close PCV-863 (VC N_2 Supply)	CCR	______
	d) Close 5459 (RCDT N_2 Supply)	1	______
______	e) Close 4136 (PRT N_2 Supply)	1	______

Location:

1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft. El.
5 PACS/PACV Panels - PAB 98 ft. El.
6 Spray Pump Area - PAB 68 ft. El.
7 Personnel Air Lock - Fan House 80 ft. El.
8 Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

(Continued)

Permission* Granted	Valve Operation	Location	Valving** Completed
L	Isolate Containment Pressure Instrumentation		
	a) Close 1814A	1	________
	b) Close 1814B	1	________
________	c) Close 1814C	1	________
M	Isolate PRZR Level Instrumentation DW Tester		
	a) Close 580A	1	________
________	b) Close 580B	1	________
N	Isolate CCW To Recirc Pump Motors		
	a) Close 753G (Return)	1	________
________	b) Close 753H (Supply)	1	________
O	Isolate Weld Channel to Racks in VC		
	a) Close PCV-1111-1 Rack 16 & 17	1	________
________	b) Close PCV-1111-2 Rack 14 & 18	1	________
P	Isolate Station Air To VC		
	a) Close SA-24	1	________
________	b) Close SA-24-1	1	________
Q	Isolate Service Water to FCU's		
	a) Close SWN-41-1A (21 Inlet Iso)	4	________
	b) Close SWN-41-1B (21 Block)	4	________
	c) Close SWN-41-2A (22 Inlet Iso)	4	________
________	d) Close SWN-41-2B (22 Block)	4	________

Location:

1. Piping Penetration Area
2. IVSW Control Panel - PAB 98 ft. El.
3. Gallery above Piping Penetration Area
4. MCC 26 AA and BB - PAB 98 ft. El.
5. PACS/PACV Panels - PAB 98 ft. El.
6. Spray Pump Area - PAB 68 ft. El.
7. Personnel Air Lock - Fan House 80 ft. El.
8. Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

(Continued)

Permission* Granted		Valve Operation		Location	Valving** Completed
Q		Isolate Service Water to FCU's (continued)			
	e)	Close SWN-41-3A	(23 Inlet Iso)	4	______
	f)	Close SWN-41-3B	(23 Block)	4	______
	g)	Close SWN-41-4A	(24 Inlet Iso)	4	______
	h)	Close SWN-41-4B	(24 Block)	4	______
	i)	Close SWN-41-5A	(25 Inlet Iso)	4	______
	j)	Close SWN-41-5B	(25 Block)	4	______
	k)	Close SWN-43-1	(21 Hdr Drain)	1	______
	l)	Close SWN-43-2	(22 Hdr Drain)	1	______
	m)	Close SWN-43-3	(23 Hdr Drain)	1	______
	n)	Close SWN-43-4	(24 Hdr Drain)	1	______
	o)	Close SWN-43-5	(25 Hdr Drain)	1	______
	p)	Close SWN-44-1A	(21 Out Isol)	4	______
	q)	Close SWN-44-1B	(21 Block)	4	______
	r)	Close SWN-44-2A	(22 Out Isol)	4	______
	s)	Close SWN-44-2B	(22 Block)	4	______
	t)	Close SWN-44-3A	(23 Out Isol)	4	______
	u)	Close SWN-44-3B	(23 Block)	4	______
	v)	Close SWN-44-4A	(24 Out Isol)	4	______
	w)	Close SWN-44-4B	(24 Block)	4	______
	x)	Close SWN-44-5A	(25 Out Isol)	4	______
	y)	Close SWN-44-5B	(25 Block)	4	______
	z)	Close SWN-51-1A	(21 Out Sample)	4	______
	aa)	Close SWN-51-2A	(22 Out Sample)	4	______
	ab)	Close SWN-51-3A	(23 Out Sample)	4	______
	ac)	Close SWN-51-4A	(24 Out Sample)	4	______
______	ad)	Close SWN-51-5A	(25 Out Sample)	4	______

Location:
1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft. El.
5 PACS/PACV Panels - PAB 98 ft. El.
6 Spray Pump Area - PAB 68 ft. El.
7 Personnel Air Lock - Fan House 80 ft. El.
8 Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

(Continued)

Permission* Granted		Valve Operation	Location	Valving** Completed
Q		Isolate Service Water to FCU's (continued)		
	ae)	Close SWN-71-1A (21 Mtr Isol)	4	______
	af)	Close SWN-71-1B (21 Mtr Block)	4	______
	ag)	Close SWN-71-2A (22 Mtr Isol)	4	______
	ah)	Close SWN-71-2B (22 Mtr Block)	4	______
	ai)	Close SWN-71-3A (23 Mtr Isol)	4	______
	aj)	Close SWN-71-3B (23 Mtr Block)	4	______
	ak)	Close SWN-71-4A (24 Mtr Isol)	4	______
	al)	Close SWN-71-4B (24 Mtr Block)	4	______
	am)	Close SWN-71-5A (25 Mtr Isol)	4	______
______	an)	Close SWN-71-5B (25 Mtr Block)	4	______
R		Isolate Auxiliary Steam to VC		
	a)	Close UH-43 (Steam Supply)	1	______
______	b)	Close UH-44 (Condensate Return)	1	______
S		Isolate Alternate Safe Shutdown Instrumentation		
	a)	Close IIP-504 (Przr LI-3101-1)	1	______
	b)	Close IIP-505 (Przr LI-3101-1)	1	______
	c)	Close IIP-506 (Przr PI-3105-1)	1	______
	d)	Close IIP-507 (Przr PI-3105-1)	1	______
	e)	Close IIP-500 (22 SG LI-5002-1)	1	______
	f)	Close IIP-501 (22 SG LI-5002-1)	1	______
	g)	Close IIP-502 (21 SG LI-5001-1)	1	______
______	h)	Close IIP-503 (21 SG LI-5001-1)	1	______

Location:
1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft. El.
5 PACS/PACV Panels - PAB 98 ft. El.
6 Spray Pump Area - PAB 68 ft. El.
7 Personnel Air Lock - Fan House 80 ft. El.
8 Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

(Continued)

Permission* Granted	Valve Operation	Location	Valving** Completed
T	Isolate Post Accident Air Sampling		
	a) Move SOV 5018 (VC Samp Ch 1)	5	______
	b) Move SOV 5019 (VC Samp Ch 1)	5	______
	c) Move SOV 5020 (VC Samp Ch 2)	5	______
	d) Move SOV 5021 (VC Samp Ch 2)	5	______
	e) Move SOV 5022 (VC Return Ch 1)	5	______
	f) Move SOV 5023 (VC Return Ch 1)	5	______
	g) Move SOV 5024 (VC Return Ch 2)	5	______
______	h) Move SOV 5025 (VC Return Ch 2)	5	______
U	Isolate City Water To VC		
	a) Close MW-17	1	______
______	b) Close MW-17-1	1	______
V	Isolate Post Accident Venting (Ventilation)		
	a) Close E-1 (VC IA Supply Stop)	5	______
	b) Close E-2 (VC Isolation Stop)	5	______
	c) Close E-3 (Vent Exhaust Isol)	5	______
______	d) Close E-5 (Vent Exhaust Isol)	5	______
W	IF Personnel And Equipment Hatch Air Lock Doors NOT Operating, Isolate Equalizing Valves		
	a) Close 85A (80 ft Air Lock)	7	______
	b) Close 85B (80 ft Air Lock)	7	______
	c) Close 95A (95 ft Air Lock)	8	______
______	d) Close 95B (95 ft Air Lock)	8	______

Location:

1 Piping Penetration Area
2 IVSW Control Panel - PAB 98 ft. El.
3 Gallery above Piping Penetration Area
4 MCC 26 AA and BB - PAB 98 ft. El.
5 PACS/PACV Panels - PAB 98 ft. El.
6 Spray Pump Area - PAB 68 ft. El.
7 Personnel Air Lock - Fan House 80 ft. El.
8 Equipment Hatch Air Lock - MO Bldg 95 ft. El.

* The SM should initial those lines which it is permissible to isolate.

** The NPO should initial each valve as he properly positions it. The CRS can previously position some MOVs. If he does so, he should initial the appropriate right hand column entry.

A. PURPOSE

This procedure provides actions to identify and isolate a faulted steam generator.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 27.b, with the following symptoms:

   a) Any SG pressure decreasing in an uncontrolled manner.

   b) Any SG completely depressurized.

2. E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 2.b, E-3, STEAM GENERATOR TUBE RUPTURE, Step 6.b, ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 11.b, and ECA-3.2, SGTR WITH LOSS OF REACTOR COOLANT - SATURATED RECOVERY DESIRED, Step 4.b, with the following symptoms and/or conditions:

   a) Any SG pressure decreasing in an uncontrolled manner.

   b) Any SG completely depressurized.

   c) Faulted SG isolation not verified.

3. FR-H.5, RESPONSE TO STEAM GENERATOR LOW LEVEL, Step 3, when the affected SG is identified as faulted.

4. Other procedures whenever a faulted SG is identified.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o At least one SG must be maintained available for RCS cooldown.
- o Any faulted SG or secondary break shall remain isolated during subsequent recovery actions unless needed for RCS cooldown.
- o An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Check MSIVs Of Affected SG(s) - CLOSED	Manually close valves. IF valves can NOT be closed, THEN locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.
2.	Check If Any SG Secondary Pressure Boundary Is Intact:	
	a. Check pressures in all SGs - ANY STABLE OR INCREASING	a. IF all SG pressures decreasing in an uncontrolled manner, THEN go to ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 1.
3.	Identify Faulted SG(s):	
	a. Check pressures in all SGs - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER - OR - o ANY SG COMPLETELY DEPRESSURIZED	a. Go to Step 5.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	<u>Isolate Faulted SG(s):</u> o Isolate main feedline o Isolate AFW flow o Dispatch operator to attempt to locally close steam supply header valves from faulted SG to turbine-driven AFW pump as necessary: o MS-41 (SG 22) o MS-42 (SG 23) o Verify SG atmospheric steam dumps - CLOSED o Verify SG blowdown isolation valves - CLOSED o Locally isolate the following lines from faulted SG(s): o Steam traps upstream of MSIVs o MSIV bypass valves	Manually close valves. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> dispatch operator to attempt to locally close valves. <u>IF</u> valves can <u>NOT</u> be closed <u>THEN</u> close associated block valves.
5.	<u>Check CST Level - GREATER THAN 2 FT</u>	Switch to city water supply: a. Open city water header isolation valve: o FCV-1205A b. Open AFW pump suction valves as necessary: o PCV-1187 o PCV-1188 o PCV-1189

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.
- o Placing key switches to DEFEAT will prevent auto SI actuation.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	Reset SI:	
	a. Check any CCW pump - RUNNING	a. Place CCR control switches for CCW pumps in PULLOUT.
	b. Place controls for main AND bypass feedwater regulating valves to CLOSE	
	c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2	
	d. One at a time, depress Safety Injection reset buttons (Panel SB-2) o Train A o Train B	
	e. Verify Train A AND B - RESET	e. Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* 7. Reset Containment Isolation Phase A And Phase B:

a. Place IVSW switches to OPEN on SN panel:

o 1410
o 1413
o SOV-3518
o SOV-3519

b. Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

c. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

d. Place control switches for all remaining Phase A isolation valves to CLOSE on SN panel

e. One at a time, depress Phase A reset buttons:

o CI Phase A Train A

o CI Phase A Train B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	f. Verify Train A AND B - RESET	f. Perform the following: 1) Verify correct switch positions per steps 7a through 7d 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal does <u>NOT</u> reset, <u>THEN</u>: 1) Place keyed switches to BYPASS. 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal can <u>NOT</u> be reset, <u>THEN</u> Reset Relays CA1 AND CA2 on Top of Safeguards Initiation Racks 1-2 AND 2-2.
	g. Check Phase B - ACTUATED	g. Go To Step 8.
	h. Containment pressure - LESS THAN 17 PSIG	h. Perform the following: 1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> do Steps 7i through 7k. 2) Continue with Step 8.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	j. One at a time, depress Phase B reset buttons: o CI Phase B Train A o CI Phase B Train B	
	k. Verify Train A AND B - RESET	k. Ensure Relays reset (Top of Safeguards Initiation Racks 1-2 AND 2-2): o S1 o S2 o CB1 o CB2
8.	<u>Establish Instrument Air To Containment By Opening PCV-1228</u>	Verify Relays on Top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET o CA1 o CA2 <u>IF</u> Phase A is <u>NOT</u> reset <u>THEN</u> re-perform step 7.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	<u>Check Secondary Radiation:</u>	
	a. Request periodic activity samples of all SGs	
	b. Check main steamline radiation recorder (R-28, R-29, R-30, and R-31)	
	c. Check condenser air ejector radiation recorder (R-45)	
	d. Check SG blowdown radiation recorder (R-49)	
	e. Secondary radiation - NORMAL	e. Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
10.	<u>Go To E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1</u>	

-END-

A. PURPOSE

This procedure provides actions to terminate leakage of reactor coolant into the secondary system following a steam generator tube rupture.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 28, when condenser air ejector radiation or SG blowdown radiation is abnormal.

2. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 39,
   E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 8,
   E-2, FAULTED STEAM GENERATOR ISOLATION, Step 9.e,
   ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 9.e, and
   FR-H.3, RESPONSE TO STEAM GENERATOR HIGH LEVEL, Step 8,
   when secondary radiation is abnormal.

3. E-0, REACTOR TRIP OR SAFETY INJECTION, Step 33.b,
   E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 3.b,
   ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, Step 5.b,
   ES-3.1, POST-SGTR COOLDOWN USING BACKFILL, Step 4.b,
   ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN, Step 4.b,
   ES-3.3, POST-SGTR COOLDOWN USING STEAM DUMP, Step 4.b,
   ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 12.b,
   ECA-3.2, SGTR WITH LOSS OF REACTOR COOLANT - SATURATED RECOVERY DESIRED, Step 5.b, and
   ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL, Step 5.b,
   when any SG narrow range level increases in an uncontrolled manner.

4. ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL, Step 2.c, Step 3.b, Step 4.b, and Step 27 when pressurizer pressure control is restored.

5. E-1 series foldout page whenever any SG level increases in an uncontrolled manner or any SG has abnormal radiation.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Attachment 2 provides 480V equipment load ratings.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 1.	Check If RCPs Should Be Stopped:	
	a. SI pumps - AT LEAST ONE RUNNING	a. Go to Step 2.
	b. RCS subcooling based on core exit TCs - LESS THAN 24°F (31°F FOR ADVERSE CONTAINMENT)	b. Go to Step 2.
	c. Stop all RCPs	
2.	Identify Ruptured SG(s)	Continue with Steps 5 through 10. WHEN ruptured SG(s) identified, THEN do Steps 3 and 4.
	o Unexpected rise in any SG narrow range level - OR - o High radiation from any SG sample - OR - o High radiation from any main steamline: o R-28 (SG 21) o R-29 (SG 22) o R-30 (SG 23) o R-31 (SG 24) - OR - o High radiation from any SG blowdown line: o R-49	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- IF the turbine-driven AFW pump is the only available source of feed flow, THEN steam supply to the turbine-driven AFW pump must be maintained from one SG.
- At least one SG must be maintained available for RCS cooldown.
- An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

3. Isolate Flow From Ruptured SG(s):

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a.	Adjust ruptured SG(s) atmospheric steam dump controller setpoint to 74%, 1030 psig.	
b.	Check ruptured SG(s) atmospheric steam dump - CLOSED	b. WHEN ruptured SG pressure less than 1030 psig, THEN verify ruptured SG atmospheric steam dump closed. IF NOT closed, THEN place controller in manual and close valve. IF valve can NOT be closed, THEN locally isolate open valve.
c.	Verify blowdown isolation valve(s) from ruptured SG - CLOSED	c. Manually close valve(s).

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	d. Verify at least one motor-driven AFW pump - RUNNING	d. IF turbine-driven AFW pump is the only available source of feed, THEN perform the following: 1) Dispatch operator to isolate steam supply from ruptured SG(s) to turbine-driven AFW pump: o MS-41 (22 SG) o MS-42 (23 SG) 2) Go to Step 3f.
	e. Check 22 AND 23 SGs - INTACT	e. Close turbine-driven AFW pump steam supply valve PCV-1139. Dispatch operator to isolate steam supply from ruptured SG(s) to turbine-driven AFW pump: o MS-41 (22 SG) o MS-42 (23 SG)
	f. Dispatch operator to perform the following: o Close steam traps upstream of ruptured SG(s) MSIV o Ensure ruptured SG(s) MSIV bypass valve - CLOSED	

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

	g. Close ruptured SG(s) MSIVs	g. Perform the following:
		
		1) Close all remaining MSIVs. IF valves can NOT be closed, THEN locally close per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.
		
		2) Verify following valves closed:
		o Turbine stop valves.
		o Condenser steam dump valves.
		o Moisture separator reheater valves.
		o 21 MBFP stop valve MS-7
		o 22 MBFP stop valve MS-7-1
		o Dispatch operator to
		  o Close air ejector stop valve MS-8
		  o Close gland steam regulator stop valves
		
		3) Use intact SG(s) atmospheric steam dump valves for RCS temperature control
		
		IF any ruptured SG can NOT be isolated from at least one intact SG, THEN go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* *

CAUTION

IF any ruptured SG is faulted, THEN feed flow to that SG should remain isolated unless needed for RCS cooldown.

* *

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	Check Ruptured SG(s) Level:	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain feed flow to ruptured SG until level greater than 9% (26% for ADVERSE CONTAINMENT). Continue with Step 5. WHEN ruptured SG level greater than 9% (26% for ADVERSE CONTAINMENT), THEN stop feed flow to ruptured SG(s).
	b. Stop feed flow to ruptured SG(s)	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF any PRZR PORV opens because of high pressure, THEN proper PORV closure should be verified after pressure drops below the PORV setpoint.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 5.	Check PRZR PORVs And Block Valves:	
	a. Power to block valves - AVAILABLE	a. Restore power to block valves by closing the following breakers as necessary: o MCC 26B/1H (MOV-535) o MCC 26A/1H (MOV-536)
	b. PORVs - CLOSED	b. IF PRZR pressure less than 2335 psig, THEN manually close PORVs. IF a PORV can NOT be closed, THEN verify its block valve closed. IF block valve can NOT be closed, THEN go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	Check If Any SG Is Faulted:	
	a. Check pressures in all SGs - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER - OR - o ANY SG COMPLETELY DEPRESSURIZED	a. Go to Step 7.
	b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines	b. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.

NOTE

The turbine-driven AFW pump may be returned to service after steam supply from ruptured SG(s) is isolated.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 7.	Check Intact SG Levels:	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	b. IF narrow range level in any intact SG continues to increase in an uncontrolled manner, THEN return to Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.
- Placing key switches to DEFEAT will prevent auto SI actuation.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	Reset SI:	
	a. Check any CCW pump - RUNNING	a. Place CCR control switches for CCW pumps in PULLOUT.
	b. Place controls for main AND bypass feedwater regulating valves to CLOSE	
	c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2	
	d. One at a time, depress Safety Injection reset buttons (Panel SB-2): o Train A o Train B	
	e. Verify Train A AND B - RESET	e. Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

* 9. Reset Containment Isolation Phase A And Phase B:

a. Place IVSW switches to OPEN on SN panel:

o 1410
o 1413
o SOV-3518
o SOV-3519

b. Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

c. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

d. Place control switches for all remaining Phase A isolation valves to CLOSE on SN panel

e. One at a time, depress Phase A reset buttons:

o CI Phase A Train A

o CI Phase A Train B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	f. Verify Train A AND B - RESET	f. Perform the following: 1) Verify correct switch positions per steps 9a through 9d 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal does <u>NOT</u> reset, <u>THEN</u>: 1) Place keyed switches to BYPASS. 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B <u>IF</u> Signal can <u>NOT</u> be reset, <u>THEN</u> Reset Relays CA1 AND CA2 on Top of Safeguards Initiation Racks 1-2 AND 2-2.
	g. Check Phase B - ACTUATED	g. Go To Step 10.
	h. Containment pressure - LESS THAN 17 PSIG	h. Perform the following: 1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> do Steps 9i through 9k. 2) Continue with Step 10.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	j. One at a time, depress Phase B reset buttons: o CI Phase B Train A o CI Phase B Train B	
	k. Verify Train A AND B - RESET	k. Ensure Relays reset (Top of Safeguards Initiation Racks 1-2 AND 2-2): o S1 o S2 o CB1 o CB2
10.	<u>Establish Instrument Air To Containment By Opening PCV-1228</u>	Verify Relays on Top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET o CA1 o CA2 <u>IF</u> Phase A is <u>NOT</u> reset <u>THEN</u> re-perform step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Isolation of the ruptured SG(s) from the intact SG(s) to be used for RCS cooldown should be completed by closing the main steamline isolation and bypass valves for the ruptured SG(s) OR for the intact SG(s) before continuing to Step 11, unless a ruptured SG is needed for RCS cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	Check Ruptured SG(s) Pressure - GREATER THAN 440 PSIG	Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

CAUTION

To prevent main steamline isolation, steam dump to condenser should NOT exceed 0.5E6 lbs/hour per SG.

NOTE

RCP trip from Step 1 is not required after starting RCS cooldown.

12. Initiate RCS Cooldown:

This Step continued on the next page.

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

a. Determine required core exit temperature:

RUPTURED SG PRESSURE (PSIG)	CORE EXIT TEMPERATURE °F (ADVERSE CONTAINMENT °F)
Greater than OR Equal to	
1100	519 (513)
1050	513 (507)
1025	510 (504)
1000	507 (501)
975	504 (497)
950	500 (494)
900	494 (487)
850	487 (480)
800	479 (472)
750	471 (464)
700	463 (456)
650	454 (447)
600	445 (438)
550	435 (428)
500	424 (416)
440	409 (401)

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Transfer steam dump to pressure mode and dump steam to condenser at maximum rate, NOT to exceed 0.5E6 lbs/hour per SG	b. Dump steam at maximum rate from intact SGs manually or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL: o Use intact SG atmospheric steam dumps. o Use turbine-driven AFW pump. IF no intact SG available, THEN perform the following: o Control feed flow to faulted SG to cool down RCS. - OR - o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.
	c. Core exit TCs - LESS THAN REQUIRED TEMPERATURE	c. Continue with Step 13. WHEN core exit TCs less than required, THEN perform Step 12d.
	d. Stop RCS cooldown AND maintain required core exit temperature	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF no charging pumps are running, THEN starting a charging pump with RWST level less than 15 ft may result in vapor binding the pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	Establish Charging Flow:	
	a. Charging pumps - ONE RUNNING	a. IF more than one charging pump running, THEN stop all but one charging pump AND go to Step 13b. IF no charging pumps running, THEN perform the following: 1) IF CCW flow to RCP(s) thermal barrier is lost, THEN go to Step 14. OBSERVE CAUTION PRIOR TO STEP 14. 2) Start one charging pump.
	b. Align charging pump suction to RWST:	
	1) Open charging pump suction valve from RWST: o LCV-112B	1) Locally open LCV-112B bypass: o 288
	2) Close charging pump suction valve from VCT: o LCV-112C	
	3) Place RCS Makeup Control switch to STOP	
	c. Adjust charging pump speed controller to maximum	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS cooldown in Step 12 shall be completed before continuing to Step 14.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	Check Ruptured SG(s) Pressure - STABLE OR INCREASING	IF pressure continues to decrease to less than 250 psid above the pressure of the intact SG(s) used for cooldown, THEN go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.
15.	Check RCS Subcooling Based On Core Exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:	Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	72 (103)
401 - 800	64 (76)
801 - 1200	44 (51)
1200 - 2500	39 (46)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

IF narrow range level in ruptured SG(s) increases to 73% (58% FOR ADVERSE CONTAINMENT), THEN one PRZR PORV may be used as directed in Step 17 to decrease RCS pressure more rapidly.

16. Depressurize RCS To Minimize Break Flow And Refill PRZR:

a. Normal PRZR spray - AVAILABLE

RNO: a. Go to Step 17. OBSERVE CAUTION PRIOR TO STEP 17.

b. Spray PRZR with maximum available spray until ANY of the following conditions satisfied:

o BOTH of the following:

1) RCS pressure - LESS THAN RUPTURED SG(s) PRESSURE

2) PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

- OR -

o PRZR level - GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT)

- OR -

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	o RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED FROM TABLE:	

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Close spray valve(s):	
	1) Normal spray valves	1) Stop RCP(s) supplying failed spray valve(s): o PC-455A (RCP 24) o PC-455B (RCP 23)
	2) Auxiliary spray valve	2) <u>IF</u> valve can <u>NOT</u> be closed, <u>THEN</u> energize AND manually close charging line isolation valves: o MOV-205 (At MCC 26AA) - OR - o MOV-226 (At MCC 26BB) AND MOV-227 (At MCC 26AA)
	d. Go to Step 19. OBSERVE CAUTION PRIOR TO STEP 19	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o IF a PRZR PORV is used to depressurize the RCS, THEN the PRT may rupture, causing abnormal containment conditions.
- o Cycling of the PRZR PORV shall be minimized.

NOTE

IF RCPs are NOT running, THEN the upper head region may void during RCS depressurization. This will cause rapidly increasing PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	Depressurize RCS Using PRZR PORV To Minimize Break Flow And Refill PRZR:	
	a. PRZR PORV flow path - AT LEAST ONE AVAILABLE	a. Establish auxiliary spray: 1) Maintain RCP seal injection 6 to 10 gpm 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow. 9) <u>IF</u> auxiliary spray established, <u>THEN</u> return to Step 16b. <u>IF</u> auxiliary spray can <u>NOT</u> be established, <u>THEN</u> go to ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL, Step 1.
	b. Open one PRZR PORV and block valve until ANY of the following conditions satisfied: o BOTH of the following: 1) RCS pressure - LESS THAN RUPTURED SG PRESSURE 2) PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT) - OR - o PRZR level - GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT) - OR -	b. Return to step 17a.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	o RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED FROM TABLE:	

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Close PRZR PORV	c. Close PORV block valve.
18.	Check RCS Pressure - INCREASING	Close PRZR PORV block valve. IF pressure continues to decrease, THEN perform the following: a. Monitor following conditions for indication of leakage from PRZR PORV: o PRT temperature. o PRT pressure. o PRT level. o PORV downstream temperature. o Acoustic monitors. b. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

SI MUST BE TERMINATED when termination criteria are satisfied to prevent overfilling the ruptured SG(s).

19. Check If SI Flow Should Be Terminated:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

Response Not Obtained: a. DO NOT STOP SI PUMPS. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

b. Secondary heat sink:

- o Total feed flow to SG(s) - GREATER THAN 400 GPM AVAILABLE

  \- OR -

- o Narrow range level in at least one intact SG - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)

Response Not Obtained: b. IF neither condition satisfied, THEN DO NOT STOP SI PUMPS. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

c. RCS pressure - STABLE OR INCREASING

Response Not Obtained: c. DO NOT STOP SI PUMPS. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

d. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

Response Not Obtained: d. DO NOT STOP SI PUMPS. Return to Step 11.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	<u>Stop SI Pumps And Place In AUTO</u>	
21.	<u>Establish Charging Flow:</u>	
	a. Charging pumps - AT LEAST ONE RUNNING	a. Perform the following: 1) <u>IF</u> CCW flow to RCP(s) thermal barrier is lost, <u>THEN</u> isolate seal injection to affected RCP(s) before starting charging pumps by either of the following: o Locally energize AND close seal injection isolation valves: o MOV-250A, MCC 26AA, A2 o MOV-250C, MCC 26AA, B2 o MOV-250B, MCC 26BB, L3 o MOV-250D, MCC 26BB, M3 - OR - o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area): o 241A o 241B o 241C o 241D
	b. Ensure only one Charging pump - RUNNING	
	c. Establish maximum charging flow from one Charging pump 1) Ensure HCV-142 - FULLY OPEN 2) Increase Charging pump speed to maximum	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

*22. Verify SI Flow Not Required:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

RESPONSE NOT OBTAINED: a. Manually operate SI pumps as necessary to maintain subcooling. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

RESPONSE NOT OBTAINED: b. Manually operate SI pumps as necessary to maintain PRZR level. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

*23. Verify All 480V Busses - ENERGIZED BY OFFSITE POWER

RESPONSE NOT OBTAINED: Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.

IF any diesel generator loaded, THEN ensure one cable tunnel exhaust fan running.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24.	<u>Restore Ventilation Systems:</u>	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A OR 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 OR 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 24d.
	c. Restore PAB ventilation on bus supplied by offsite power	c. Restore PAB ventilation on bus supplied by diesel generator with load less than 1860 KW. <u>IF</u> normal PAB ventilation can <u>NOT</u> be restored, <u>THEN</u> establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. <u>IF</u> fan will <u>NOT</u> start, <u>THEN</u> perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS pressure shall be monitored. If RCS pressure decreases to less than 320 psig (340 psig for ADVERSE CONTAINMENT), RHR pumps must be manually restarted.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25.	Check If RHR Pumps Should Be Stopped:	
	a. RCS pressure - GREATER THAN 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)	a. Go to Step 26.
	b. Stop RHR pumps and place in AUTO	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*26.	Check If Containment Spray Should Be Stopped:	
	a. Spray pumps - RUNNING	a. Go To Step 27.
	b. Containment pressure - LESS THAN 17 PSIG	b. Perform the following: 1) WHEN containment pressure less than 17 psig, THEN do Steps 26c through 26f. 2) Continue with Step 27.
	c. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	d. Containment area radiation - NORMAL o R-25, R-26 o R-41, R-42 o R-2, R-7	d. PERFORM the following: 1) WHEN containment spray has been in service for 3.5 hours, THEN perform substeps 26e and 26f. 2) Go to Step 27.
	e. Stop containment spray pumps and place in AUTO	
	f. Close containment spray pump discharge valves: o MOV-866A o MOV-866B o MOV-866C o MOV-866D	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27.	Check If One CCW Pump Should Be Started:	
	a. CCW pumps - ALL STOPPED	a. Go to Step 28.
	b. Verify adequate power available: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1760 KW	b. IF power NOT available, THEN perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 30.
	c. Start one CCW pump on 480V bus energized from offsite power	c. Start one CCW pump on diesel generator with load less than 1760 KW. IF no CCW pump can be started, THEN perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 30.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
28.	Check If One Service Water Pump Can Be Started On Non-Essential Header:	
	a. Service water pumps - NONE RUNNING ON NON-ESSENTIAL HEADER	a. Go to Step 29.
	b. Verify adequate power available: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1730 KW	b. Go to Step 29.
	c. Start one service water pump on non-essential header on 480V bus energized from offsite power	c. Start one service water pump on non-essential header on diesel generator with load less than 1730 KW.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29.	Check If Letdown Can Be Established:	
	a. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Continue with Step 30. WHEN PRZR level increases to greater than 25% (46% for ADVERSE CONTAINMENT), THEN do Step 29b.
	b. Establish letdown: 1) Close letdown orifice stops o 200A o 200B o 200C 2) On SN panel open letdown line isolation valves 201 and 202 3) On SN panel place Letdown Flow Control Valves 200 A B C switch to REMOTE 4) Open letdown stop valve LCV 459 5) Place low pressure letdown backpressure controller PCV-135 in MANUAL AND adjust to 75 percent open 6) Open letdown orifice stops to establish desired letdown flow: o 75 GPM Letdown orifice stop 200A o 45 GPM Letdown orifice stop 200B o 75 GPM Letdown orifice stop 200C 7) Set PCV-135 to maintain pressure between 225 psig and 275 psig 8) Place PCV-135 in AUTO	b. Establish excess letdown: 1) Establish CCW flow through the excess letdown heat exchanger by opening CCW valves: o Inlet valves 791,798 o Outlet valves 793,796 2) Position excess letdown diversion valve 215 to NORMAL to direct flow to the VCT. 3) Verify seal water return containment isolation valve 222 open. 4) Verify excess letdown flow control valve HCV-123 closed. 5) Open excess letdown isolation stop valve 213. 6) Slowly open HCV-123 to warmup the excess letdown heat exchanger. 7) Establish desired excess letdown flow using HCV-123. 8) Maintain excess letdown heat exchanger outlet temperature less than 195 °F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30.	<u>Align Charging Pump Suction As Follows:</u>	
	a. Check Containment Conditions - NEVER BEEN ADVERSE	a. Align suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C 3) Maintain charging pump suction aligned to RWST <u>UNTIL</u> Cold Shutdown Boron Concentration is achieved. 4) Go To Step 31.
	b. Align suction to VCT: 1) Open charging pump suction valve from VCT: o LCV-112C 2) Close charging pump suction valve from RWST: o LCV-112B	
31.	<u>Check VCT Makeup Control System:</u> a. Makeup set for greater than RCS boron concentration b. Makeup set for automatic control	Adjust controls as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RCS and ruptured SG(s) pressures must be maintained less than the ruptured SG(s) atmospheric steam dump setpoint.

NOTE

Level in the ruptured SG should be maintained in the narrow range.

*32. Control RCS Pressure And Makeup Flow To Minimize RCS-To-Secondary Leakage:

This Step continued on the next page.

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

a. Perform appropriate action(s) from table:

RUPTURED SG(s) LEVEL / PRZR LEVEL	INCREASING	DECREASING	OFFSCALE HIGH
LESS THAN 25% (46% FOR ADVERSE CONTAINMENT)	o Increase RCS Makeup Flow o Depressurize RCS Using Step 32b	Increase RCS Makeup Flow	o Increase RCS Makeup Flow o Maintain RCS And Ruptured SG(s) Pressures Equal
BETWEEN 25% (46% FOR ADVERSE CONTAINMENT) AND 56%	Depressurize RCS Using Step 32b	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal
BETWEEN 56% And 69% (63% FOR ADVERSE CONTAINMENT)	o Depressurize RCS Using Step 32b o Decrease RCS Makeup Flow	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal
GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT)	Decrease RCS Makeup Flow	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Use normal PRZR spray per Step 32a	b. <u>IF</u> letdown is in service, <u>THEN</u> use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow. <u>IF</u> auxiliary spray can <u>NOT</u> be used, <u>THEN</u> use one PRZR PORV and block valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*33.	Check Battery Status:	
	a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL	a. Perform the following: 1) Check MCCs supplying battery chargers - ENERGIZED o MCC 24A for battery charger 22 o MCC 26C for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A for battery charger 21 2) WHEN MCCs energized, THEN dispatch operators to energize battery chargers as required.
	b. Check lighting - RESET	b. IF Fire Brigade NOT being utilized, THEN direct Support Facilities personnel to align lighting to TSC bus per AOI 27.1.12, PAB LIGHTING TRANSFORMER 23 ALTERNATE POWER SUPPLY.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Reduce DC load as follows:	
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 34
	2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump: o Bearing Oil pump - OR - o Turning Gear Oil pump b) WHEN <u>EITHER</u> AC oil pump above is started, THEN Stop Emerg Bearing Oil Pump c) Dispatch NPO to perform the following: o Start Main Seal Oil Pump, THEN stop DC Seal Oil Pump o Start one MBFP Main Oil Pump THEN stop MBFPs DC oil pump	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started, Stop the associated DC oil pump as follows: o TG DC oil pump after Main Turbine shaft stopped o DC seal oil pump after Main Generator Hydrogen vented o MBFPs DC oil pump after MBFP shafts stopped Continue with Step 34

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*34.	Verify Instrument Air Header - STABLE	Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM. b. IF necessary, THEN ensure one instrument air compressor running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. IF header can NOT be stabilized, THEN Close PCV-1228.
35.	Dispatch NPO to locally perform the following:	
	o Periodically Check IVSW Tank Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG	o Direct NPO to fill or pressurize tank as necessary.
	o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG	o Direct NPO to ensure Station Air backup OR N_2 backup are aligned as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
36.	Check If Diesel Generators Should Be Stopped:	
	a. Verify 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.
	b. Verify lighting - RESET	b. Reset lighting.
	c. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	c. Reset all MCCs except MCC 28 and MCC 28A.
	d. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 29	d. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 29
	e. Check MCC 28 And MCC 28A - ENERGIZED	e. IF containment sump level less than 44'3" AND containment conditions NOT adverse, THEN reset MCC 28 and MCC 28A.
	f. Stop any unloaded diesel generator and place in standby	
37.	Minimize Secondary System Contamination:	
	a. Isolate boiler blowdown	
	b. Isolate condenser overboarding	
	c. Isolate makeup to CST	
38.	Turn On PRZR Heaters As Necessary To Saturate PRZR Water At Ruptured SG(s) Pressure	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
39.	<u>Check RCP Cooling:</u>	
	a. Check RCP CCW system alarms - CLEARED	a. Establish CCW flow to RCP thermal barriers per SOP 1.3, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN.
	b. Check RCP seal injection flow - BETWEEN 6 GPM AND 10 GPM PER RCP	b. Establish seal injection flow to RCPs per SOP 3.1, CHARGING, SEAL WATER, AND LETDOWN CONTROL and COL 3.1, CHEMICAL AND VOLUME CONTROL SYSTEM.
40.	<u>Check If RCP Seal Return Flow Should Be Established:</u>	
	a. RCP thermal barrier ΔP - POSITIVE	a. Go to Step 41.
	b. CCW pumps - AT LEAST ONE RUNNING	b. Go to Step 41.
	c. Establish seal return flow:	c. Manually open valves.
	1) Verify No. 1 seal return valves - OPEN	
	2) Verify seal return containment isolation valve 222 - OPEN	

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

CAUTION

IF RCP seal cooling had previously been lost, THEN the affected RCP shall not be started prior to a status evaluation.

NOTE

RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.

*41. Check RCP Status:

a. RCPs - AT LEAST ONE RUNNING

a. Perform the following:

1) IF RVLIS natural circulation range indication less than 100%, THEN perform the following:

o Increase PRZR level to greater than 59% (80% for ADVERSE CONTAINMENT).

o Increase RCS subcooling based on core exit TCs to greater than value obtained from table:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	74 (105)
401 - 800	66 (78)
801 - 1200	46 (53)
1200 - 2500	41 (48)

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		2) Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION.
		3) Start one RCP.
		4) <u>IF</u> an RCP can <u>NOT</u> be started, <u>THEN</u> refer to ATTACHMENT 1 to verify natural circulation.
		5) <u>IF</u> natural circulation <u>NOT</u> verified, <u>THEN</u> increase dumping steam.
	b. Stop all but one RCP	
42.	<u>Check If Source Range Detectors Should Be Energized:</u>	
	a. Check intermediate range flux - LESS THAN 1E-10 AMPS	a. Continue with Step 43. <u>WHEN</u> flux less than 1E-10 amps, <u>THEN</u> do Steps 42b and 42c.
	b. Verify source range detectors - ENERGIZED	b. Manually energize source range detectors.
	c. Transfer nuclear recorders to source range scale	
43.	<u>Shut Down Unnecessary Plant Equipment:</u>	
	o Circulating water pumps not required	
	o Condensate pumps not required	
	o Service water pumps not required	
	o Evaluate secondary plant status and shut down equipment as required	

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTION

- An offsite dose evaluation per IP-1007 must be completed prior to using ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN or ES-3.3, POST-SGTR COOLDOWN USING STEAM DUMP.
- Consult operations manager to determine appropriate cooldown method.

44. Go To Appropriate Post-SGTR Cooldown Method:

- Go to ES-3.1, POST-SGTR COOLDOWN USING BACKFILL, Step 1

  - OR -

- Go to ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN, Step 1

  - OR -

- Go to ES-3.3, POST-SGTR COOLDOWN USING STEAM DUMP, Step 1

-END-

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

1. The following conditions support or indicate natural circulation flow:

   o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

   o SG pressures - STABLE OR DECREASING

   o RCS hot leg temperatures - STABLE OR DECREASING

   o Core exit TCs - STABLE OR DECREASING

   o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR SG PRESSURE

-END-

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

A. PURPOSE

This procedure provides actions to cooldown and depressurize the plant to cold shutdown conditions following a steam generator tube rupture. This recovery method depressurizes the ruptured SG(s) by draining it through the ruptured SG tube into the RCS.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-3, STEAM GENERATOR TUBE RUPTURE, Step 44, if operations manager selects backfill method.

2. ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN, Step 9, when blowdown is not available and operations manager selects backfill method.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

The first RCP started following any natural circulation cooldown must be in a loop with the non-ruptured SG(s).

1. Turn On PRZR Heaters As Necessary To Saturate PRZR Water At Ruptured SG Pressure

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

2. Check If SI Accumulators Should Be Isolated:

   a. Check the following:

      o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

      o PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

   RESPONSE NOT OBTAINED: a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

NOTE

RCS boron concentration should be sampled and plotted every 30 minutes.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Verify Adequate Shutdown Margin:</u>	
	a. Sample ruptured SG(s)	
	b. Sample RCS	
	c. Shutdown margin from graphs book - ADEQUATE	c. Borate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 4.	<u>Check Intact SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level in any intact SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Since ruptured SG(s) may continue to depressurize to less than the minimum RCS pressure necessary for continued RCP operation, cooldown to cold shutdown should be completed as quickly as possible, not to exceed 100°F/hr.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	<u>Initiate RCS Cooldown To Cold Shutdown:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Use RHR System if in service	
	c. Dump steam to condenser from intact SG(s)	c. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump. <u>IF</u> no intact SG available and RHR System <u>NOT</u> in service, <u>THEN</u> perform the following: o Control feed flow to faulted SG to cooldown RCS. - OR - o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 6.	<u>Check Ruptured SG(s) Narrow Range Level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)</u>	Refill ruptured SG to 73% (58% for ADVERSE CONTAINMENT) using feed flow. <u>IF</u> either of the following conditions occurs, <u>THEN</u> stop feed flow to ruptured SG: o Ruptured SG pressure decreases in an uncontrolled manner. - OR - o Ruptured SG pressure increases to 1000 psig.
* 7.	<u>Control RCS Makeup And Letdown To Maintain PRZR Level:</u>	
	a. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Increase RCS makeup flow or decrease letdown as necessary. Go to Step 8.
	b. PRZR level - LESS THAN 69% (63% FOR ADVERSE CONTAINMENT)	b. Decrease RCS makeup flow or increase letdown to decrease level which will decrease RCS pressure. Go to Step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The upper head region may void during RCS depressurization if RCPs are not running. This may result in a rapidly increasing PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 8.	Depressurize RCS To Backfill From Ruptured SG(s):	
	a. Use normal PRZR spray	a. IF letdown is in service, THEN use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		<u>IF</u> auxiliary spray can <u>NOT</u> be used, <u>THEN</u> use one PRZR PORV and block valve.
	b. Turn on PRZR heaters as necessary	
	c. Maintain RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:	

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

<u>NOTE</u>

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. Check the following: o RCS temperature - LESS THAN 350°F o RCS pressure - LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	a. Go to Step 10.
	b. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*10.	<u>Check If RCPs Must Be Stopped:</u>	
	a. Check the following: o Number 1 seal differential pressure - LESS THAN 200 PSID - OR - o Number 1 seal return flow - LESS THAN 0.3 GPM	a. Go to Step 11.
	b. Stop affected RCP(s)	
11.	<u>Check RCS Temperatures - LESS THAN 200°F</u>	Return to Step 3.
12.	<u>Evaluate Long Term Plant Status:</u>	
	a. Maintain cold shutdown conditions per POP 3.3, PLANT COOLDOWN	
	b. Consult operations manager	

-END-

Number:	Title:	Revision Number:
ES-3.2	POST-SGTR COOLDOWN USING BLOWDOWN	REV. 34

A. PURPOSE

This procedure provides actions to cool down and depressurize the plant to cold shutdown conditions following a steam generator tube rupture. This recovery method depressurizes the ruptured SG(s) by draining it using SG blowdown.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from E-3, STEAM GENERATOR TUBE RUPTURE, Step 44, if operations manager selects the blowdown method.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An offsite dose evaluation per IP-1007 must be completed prior to using this procedure.

1. Turn On PRZR Heaters As Necessary To Saturate PRZR Water At Ruptured SG Pressure

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

2. Check If SI Accumulators Should Be Isolated:

   a. Check the following:

      o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

      o PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

   RESPONSE NOT OBTAINED: a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

NOTE

RCS boron concentration should be sampled and plotted every 30 minutes.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Verify Adequate Shutdown Margin:</u>	
	a. Sample ruptured SG(s)	
	b. Sample RCS	
	c. Shutdown margin from graphs book - ADEQUATE	c. Borate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 4.	<u>Check Intact SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level in any intact SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Since ruptured SG(s) may continue to depressurize to less than the minimum RCS pressure necessary for continued RCP operation, cooldown to cold shutdown should be completed as quickly as possible, not to exceed 100°F/hr.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	<u>Initiate RCS Cooldown To 350 °F:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Dump steam to condenser from intact SG(s)	b. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump. <u>IF</u> no intact SG available, <u>THEN</u> perform the following: o Control feed flow to faulted SG to cooldown RCS. - OR - o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTION

RCS and ruptured SG pressures must be maintained less than the ruptured SG(s) atmospheric steam dump setpoint.

* 6. Control RCS Pressure And Makeup Flow To Minimize RCS-To-Secondary Leakage:

a. Perform appropriate action(s) from table:

RUPTURED SG(s) LEVEL / PRZR LEVEL	INCREASING	DECREASING	OFFSCALE HIGH
LESS THAN 25% (46% FOR ADVERSE CONTAINMENT)	o Increase RCS Makeup Flow o Depressurize RCS Using Step 6b	Increase RCS Makeup Flow	o Increase RCS Makeup Flow o Maintain RCS And Ruptured SG(s) Pressures Equal
BETWEEN 25% (46% FOR ADVERSE CONTAINMENT) AND 56%	Depressurize RCS Using Step 6b	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal
BETWEEN 56% And 69% (63% FOR ADVERSE CONTAINMENT)	o Depressurize RCS Using Step 6b o Decrease RCS Makeup Flow	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal
GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT)	Decrease RCS Makeup Flow	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Use normal PRZR spray per Step 6a	b. IF letdown is in service, THEN use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow. IF auxiliary spray can NOT be used, THEN use one PRZR PORV and block valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

7.	Check If RCS Cooldown Should Be Stopped:	
	a. RCS temperatures - LESS THAN 350°F	a. Return to Step 3.
	b. Stop RCS cooldown	
	c. Maintain RCS Temperatures - LESS THAN 350°F	
* 8.	Check Ruptured SG(s) Narrow Range Level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	Refill ruptured SG to 73% (58% for ADVERSE CONTAINMENT) using feed flow. IF either of the following conditions occurs, THEN stop feed flow to the ruptured SG: o Ruptured SG pressure decreases in an uncontrolled manner. - OR - o Ruptured SG pressure increases to 1000 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Blowdown from ruptured SG(s) may be stopped when RHR System is in service.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	Establish Blowdown From Ruptured SG(s):	Go to alternate post-SGTR cooldown guideline, ES-3.1, POST-SGTR COOLDOWN USING BACKFILL, Step 1, or, ES-3.3, POST-SGTR COOLDOWN USING STEAM DUMP, Step 1.
	a. Align SG blowdown system as necessary per SOP 7.2, SECONDARY BOILER BLOWDOWN PURIFICATION SYSTEM	
*10.	Control RCS Makeup And Letdown To Maintain PRZR Level:	
	a. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Increase RCS makeup flow or decrease letdown as necessary. Go to Step 11.
	b. PRZR level - LESS THAN 69% (63% FOR ADVERSE CONTAINMENT)	b. Decrease RCS makeup flow or increase letdown to decrease level which will decrease RCS pressure. Go to Step 12.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The upper head region may void during RCS depressurization if RCPs are not running. This may result in a rapidly increasing PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*11.	Depressurize RCS To Minimize RCS-To-Secondary Leakage:	
	a. Use normal PRZR spray	a. IF letdown is in service, THEN use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		IF auxiliary spray can NOT be used, THEN use one PRZR PORV and block valve.
	b. Turn on PRZR heaters as necessary	
	c. Maintain RCS pressure at ruptured SG(s) pressure	
	d. Maintain RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:	

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*12.	Check If RCPs Must Be Stopped:	
	a. Check the following:	a. Go to Step 13.
	o Number 1 seal differential pressure - LESS THAN 200 PSID	
	- OR -	
	o Number 1 seal return flow - LESS THAN 0.3 GPM	
	b. Stop affected RCP(s)	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. Check the following: o RCS temperature - LESS THAN 350°F o RCS pressure - LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	a. Return to Step 8.
	b. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	<u>Continue RCS Cooldown To Cold Shutdown:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Use RHR System	
	c. Dump steam to condenser from intact SG(s)	c. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump. <u>IF</u> no intact SG available and RHR System <u>NOT</u> in service, <u>THEN</u> perform the following: o Control feed flow to faulted SG to cooldown RCS. - OR - o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.
15.	<u>Check RCS Temperatures - LESS THAN 200°F</u>	Return to Step 8.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Evaluate Long Term Plant Status: a. Maintain cold shutdown conditions per POP 3.3, PLANT COOLDOWN b. Consult operations manager	

-END-

Number:	Title:	Revision Number:
ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34

A. PURPOSE

This procedure provides actions to cool down and depressurize the plant to cold shutdown conditions following a steam generator tube rupture. This recovery method depressurizes the ruptured SG(s) by dumping steam.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. E-3, STEAM GENERATOR TUBE RUPTURE, Step 44, if operations manager selects steam dump method.

2. ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN, Step 9, when blowdown is not available and operations manager selects steam dump method.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

o Steam shall not be released from any ruptured SG if water may exist in its steamline.

o An offsite dose evaluation per IP-1007 must be completed prior to using this procedure.

1. Turn On PRZR Heaters As Necessary To Saturate PRZR Water At Ruptured SG(s) Pressure

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

2. Check If SI Accumulators Should Be Isolated:

a. Check the following:

o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

o PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

Response Not Obtained: a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

NOTE

RCS boron concentration should be sampled and plotted every 30 minutes.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Verify Adequate Shutdown Margin:</u>	
	a. Sample ruptured SG(s)	
	b. Sample RCS	
	c. Shutdown margin from graphs book - ADEQUATE	c. Borate as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 4.	<u>Check Intact SG Levels:</u>	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level in any intact SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Since ruptured SG(s) may continue to depressurize to less than the minimum RCS pressure necessary for continued RCP operation, cooldown to cold shutdown should be completed as quickly as possible, not to exceed 100°F/hr.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Initiate RCS Cooldown To 350 °F:	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Dump steam to condenser from intact SG(s)	b. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps - OR - o Use turbine-driven AFW pump IF no intact SG available, THEN perform the following: o Control feed flow to faulted SG to cooldown RCS - OR - o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

CAUTION

RCS and ruptured SG(s) pressures must be maintained less than the ruptured SG(s) atmospheric steam dump setpoint.

* 6. Control RCS Pressure And Makeup Flow To Minimize RCS-To-Secondary Leakage:

a. Perform appropriate action(s) from table:

PRZR LEVEL \ RUPTURED SG(s) LEVEL	INCREASING	DECREASING	OFFSCALE HIGH
LESS THAN 25% (46% FOR ADVERSE CONTAINMENT)	o Increase RCS Makeup Flow o Depressurize RCS Using Step 6b	Increase RCS Makeup Flow	o Increase RCS Makeup Flow o Maintain RCS And Ruptured SG(s) Pressures Equal
BETWEEN 25% (46% FOR ADVERSE CONTAINMENT) AND 56%	Depressurize RCS Using Step 6b	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal
BETWEEN 56% And 69% (63% FOR ADVERSE CONTAINMENT)	o Depressurize RCS Using Step 6b o Decrease RCS Makeup Flow	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal
GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT)	Decrease RCS Makeup Flow	Turn On PRZR Heaters	Maintain RCS And Ruptured SG(s) Pressures Equal

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Use normal PRZR spray per Step 6a	b. <u>IF</u> letdown is in service, <u>THEN</u> use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow. <u>IF</u> auxiliary spray can <u>NOT</u> be used, <u>THEN</u> use one PRZR PORV and block valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	Check If RCS Cooldown Should Be Stopped:	
	a. RCS temperatures - LESS THAN 350° F	a. Return to Step 3.
	b. Stop RCS cooldown	
	c. Maintain RCS temperatures - LESS THAN 350° F	
* 8.	Check Ruptured SG(s) Narrow Range Level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	Refill ruptured SG to 73% (58% for ADVERSE CONTAINMENT) using feed flow. IF either of the following conditions occurs, THEN stop feed flow to the ruptured SG: o Ruptured SG pressure decreases in an uncontrolled manner. - OR - o Ruptured SG pressure increases to 1000 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Ruptured SG(s) pressure may decrease rapidly when steam is released.

NOTE

Steam release from ruptured SG(s) may be stopped when RHR System is in service.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	Dump Steam From Ruptured SG(s) To Condenser:	Dump steam using ruptured SG(s) atmospheric steam dumps.
	o Locally operate MSIV bypass valves as necessary	
*10.	Control RCS Makeup And Letdown To Maintain PRZR Level:	
	a. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Increase RCS makeup flow or decrease letdown as necessary. Go to Step 11.
	b. PRZR level - LESS THAN 69% (63% FOR ADVERSE CONTAINMENT)	b. Decrease RCS makeup flow or increase letdown to decrease level which will decrease RCS pressure. Go to Step 12.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The upper head region may void during RCS depressurization if RCPs are not running. This may result in a rapidly increasing PRZR level.

*11. Depressurize RCS To Minimize RCS-To-Secondary Leakage:

a. Use normal PRZR spray

RESPONSE NOT OBTAINED:

a. IF letdown is in service, THEN use auxiliary spray as follows:

1) Maintain RCP seal injection 6 to 10 gpm.

2) Reduce charging pump speed to minimum flow.

3) Close charging line flow control valve:

o HCV-142

4) Close the charging stop valves:

o 204A - Loop 22
o 204B - Loop 21

5) Close the pressurizer spray valves:

o PCV-455A
o PCV-455B

6) Open auxiliary spray valve:

o 212

7) Initiate spray slowly using HCV-142.

8) Adjust charging pump speed to increase spray flow.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

IF auxiliary spray can NOT be used, THEN use one PRZR PORV and block valve.

b. Turn on PRZR heaters as necessary

c. Maintain RCS pressure at ruptured SG(s) pressure

d. Maintain RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

*12. Check If RCPs Must Be Stopped:

a. Check the following:

a. Go to Step 13.

o Number 1 seal differential pressure - LESS THAN 200 PSID

- OR -

o Number 1 seal return flow - LESS THAN 0.3 GPM

b. Stop affected RCP(s)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. Check the following: o RCS temperature - LESS THAN 350° F o RCS pressure - LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	a. Return to Step 8.
	b. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	<u>Continue RCS Cooldown To Cold Shutdown:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Use RHR System	
	c. Dump steam to condenser from intact SG(s)	c. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump. <u>IF</u> no intact SG available and RHR system <u>NOT</u> in service, <u>THEN</u> perform the following: o Control feed flow to faulted SG to cool down RCS - OR - o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.
15.	<u>Check RCS Temperatures - LESS THAN 200°F</u>	Return to Step 8.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Evaluate Long Term Plant Status: a. Maintain cold shutdown conditions per POP 3.3, PLANT COOLDOWN b. Consult operations manager	

-END-

Number:	Title:	Revision Number:
ECA-0.0	LOSS OF ALL AC POWER	REV. 36

A. PURPOSE

This procedure provides actions to respond to a loss of all AC power.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. The symptom of a loss of all AC power is the indication that all 480V busses are de-energized.

2. This procedure is entered from E-0, REACTOR TRIP OR SAFETY INJECTION, Step 4.b, on the indication that all 480V busses are de-energized.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

o Steps 1 through 4 are IMMEDIATE ACTION steps.

o CSF Status Trees shall be monitored for information only. FRPs shall not be implemented.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Verify Reactor Trip: o Reactor trip breakers - OPEN o Neutron flux - DECREASING	Manually trip reactor.

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	Verify Turbine Trip: o Turbine stop valves - CLOSED o Turbine governor valves - CLOSED	Manually trip turbine. IF stop valves can NOT be closed, THEN close MSIVs. IF MSIVs can NOT be closed, THEN manually run back turbine and locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	<u>Check If RCS Is Isolated:</u>	
	a. PRZR PORVs - CLOSED o PCV-455C o PCV-456	a. <u>IF</u> PRZR pressure less than 2335 psig, <u>THEN</u> manually close PORVs.
	b. Letdown isolation valves - CLOSED o LCV-459 o 200A o 200B o 200C	b. Manually close valve.
	c. Excess letdown isolation valve - CLOSED o 213	c. Manually close valve.
4.	<u>Verify AFW Flow - GREATER THAN 400 GPM:</u>	
	a. Verify turbine-driven AFW pump - RUNNING	a. Perform the following: 1) Manually open steam supply regulator valve: o PCV-1139 2) Adjust steam supply speed control valve as necessary: o HCV-1118
	b. Manually align turbine-driven AFW pump flow control valves as necessary to establish flow	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Verify Generator Trip:	
	a. Generator output breakers - OPEN	a. Manually trip generator by opening the following breakers: o BKR 7 o BKR 9
	b. Generrex excitation - OFF	b. Press manual field excitation OFF button and verify Zero field amps.
	c. Unit power - 6.9KV BUSSES TRANSFERRED TO BUSSES 5 AND 6	c. IF offsite power available, THEN manually transfer busses per SOP 27.1.4, 6900 VOLT SYSTEM.

CAUTION

The load on the diesel generators should remain less than 1660 KW but may be increased to 2010 KW for a maximum of 2 hrs in any 24 hr period.

NOTE

o This procedure should continue as local operator actions to restore power are being performed.

o Attachment 3 provides a list of 480V equipment load ratings.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 6.	Try To Restore Power to Any 480V Bus:	
	a. Check diesel generator status - AT LEAST ONE RUNNING	a. Emergency start diesel generators per SOP 27.3.1.1, 27.3.1.2, OR 27.3.1.3 DIESEL GENERATOR MANUAL OPERATION for the appropriate diesel generator.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Energize 480V bus with running diesel generator	b. Perform the following: 1) Trip running diesel generator(s). 2) IF 13.8KV feeder 13W92 energized, THEN restore power to buses per SOP 27.1.3, OPERATION OF 13.8KV SYSTEM AND SOP 27.1.4, 6900 VOLT SYSTEM. WHEN 6.9KV buses energized, THEN energize 480V buses per AOI 27.1.1, LOSS OF NORMAL STATION POWER. 3) IF 13.8KV feeder 13W92 can NOT be energized, THEN perform the following: a) Ensure breaker GT-2 is open. b) Request Unit 3 CCR Operator to close breaker 52GT/BT. c) WHEN 52GT/BT is closed: 1. Energize 6.9KV bus 5 and bus 6 per SOP 27.1.4, 6900 VOLT SYSTEM. 2. Energize 480V buses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		4) IF 52GT/BT can NOT be closed, THEN blackstart a GT per SOP 27.5.3, BLACK START OF GAS TURBINE 1, 2 OR 3 to restore power, THEN go to Step 6c.
		5) IF 52GT/BT can NOT be closed AND no GT can be blackstarted, THEN contact district operator to implement EO-4087, PROCEDURE FOR RESTORATION OF ELECTRICAL SUPPLY TO INDIAN POINT NO. 2 AND NO. 3. WHEN power is available, THEN perform the following: a) Energize 6.9KV bus 5 and bus 6 per SOP 27.1.4, 6900 VOLT SYSTEM. b) Energize 480V buses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.
	c. Check 480V busses - AT LEAST ONE ENERGIZED: o 2A AND 3A - OR - o 5A - OR - o 6A	c. Go to Step 7. Observe cautions prior to step 7.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

d. Start one service water pump on the essential header to support running diesel generator

e. Return to procedure and step in effect

CAUTION

- o When any 480V bus is energized, recovery actions shall continue starting with Step 26.
- o If an SI signal exists or if an SI signal is actuated during this procedure, it shall be reset per Step 19b to permit manual loading of equipment on an 480V bus.
- o If a diesel generator is started, a service water pump shall be started on the essential header to provide diesel generator cooling.

7. Place Following Equipment Switches In PULLOUT Position:

- o Containment spray pumps
- o SI pumps
- o FCUs
- o Motor-driven AFW pumps
- o CCW pumps
- o RHR pumps
- o Turning gear oil pump
- o Bearing oil pump
- o Turbine auxiliary oil pump

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 8.	<u>Check 480V Electrical System:</u>	
	a. Check power to an 480V bus - AVAILABLE o 2A <u>AND</u> 3A - OR - o 5A - OR - o 6A	a. Continue efforts to restore a 480V power supply. Continue with Step 9. <u>WHEN</u> 480V power supply available, <u>THEN</u> go to Step 8b.
	b. Check 480V bus switchgear <u>AND</u> cabling - AVAILABLE o 2A <u>AND</u> 3A - OR - o 5A - OR - o 6A	b. Refer to AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL to maintain safe shutdown conditions. Continue with Step 9. <u>WHEN</u> switchgear <u>AND</u> cabling available, <u>THEN</u> go to Step 8c.
	c. Check any 480V bus - ENERGIZED o 2A <u>AND</u> 3A - OR - o 5A - OR - o 6A	c. Energize 480V bus per AOI 27.1.1, LOSS OF NORMAL STATION POWER. <u>IF</u> 480V bus can <u>NOT</u> be energized <u>THEN</u> continue with Step 9.
	d. Go to Step 26	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	<u>Dispatch Personnel To Locally Close Valves To Isolate RCP Seals And Place Valve Switches In CLOSED Position:</u> o RCP seal return isolation valve outside containment: o MOV-222 o RCP seal injection isolation valves outside containment: o MOV-250A o MOV-250B o MOV-250C o MOV-250D o RCP thermal barrier CCW return isolation valve outside containment: o MOV-789	
10.	<u>Check If CST Is Isolated From Hotwell:</u>	
	a. Verify condenser hotwell isolation valves - CLOSED: o LCV-1128 o LCV-1128A o LCV-1129 o CD-6 o CT-8	a. <u>IF</u> valve(s) open or position not known, <u>THEN</u> dispatch personnel to locally close valve(s). <u>IF</u> valve(s) can <u>NOT</u> be closed, <u>THEN</u> locally close corresponding isolation valve: o CT-7 for LCV-1128 and LCV-1128A. o CD-5 for LCV-1129.
	b. Place condenser hotwell isolation valve controllers in MANUAL: o LCV-1128 o LCV-1128A o LCV-1129	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	<u>Check SG Status:</u>	Manually close valves. <u>IF</u> valves can <u>NOT</u> be manually closed, <u>THEN</u> locally close valves. Locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	a. MSIVs - CLOSED	
	b. Main FW regulating and bypass valves - CLOSED	
	c. Blowdown isolation valves - CLOSED	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

A faulted or ruptured SG that is isolated should remain isolated. However, steam supply to the turbine-driven AFW pump must be maintained from at least one SG.

12.	Check If Any SG Secondary Pressure Boundary Is Faulted:	
	a. Check pressures in all SGs - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER - OR - o ANY SG COMPLETELY DEPRESSURIZED	a. Go to Step 13.
	b. Isolate faulted SG(s): o Isolate AFW flow o Dispatch operator to attempt to locally close steam supply header valves from faulted SG to turbine-driven AFW pump as necessary: o MS-41 (SG 22) o MS-42 (SG 23) o Verify SG atmospheric steam dump closed	b. Manually close valves. IF valves can NOT be closed, THEN dispatch operator to attempt to locally close or block valves.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	<u>Check If SG Tubes Are Intact:</u> o NO SG LEVEL INCREASING IN AN UNCONTROLLED MANNER o Condenser air ejector radiation recorder (R-45)- NORMAL o SG blowdown radiation recorder (R-49) - NORMAL o Main steamline radiation recorder (R-28, R-29, R-30 and R-31) - NORMAL	Try to identify ruptured SG(s). Continue with Step 14. <u>WHEN</u> ruptured SG(s) identified, <u>THEN</u> isolate ruptured SG(s): o Isolate AFW flow. o Dispatch operator to attempt to locally close steam supply header valves from faulted SG to turbine- driven AFW pump as necessary: o MS-41 (SG 22) o MS-42 (SG 23) o <u>WHEN</u> SG pressure less than 1030 psig, <u>THEN</u> verify SG atmospheric steam dump closed. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually close.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

City water for AFW pumps will be necessary if CST level decreases to less than 2 ft.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	Check Intact SG Levels:	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain maximum AFW flow until narrow range level is greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control AFW flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	b. IF narrow range level in any SG continues to increase in an uncontrolled manner, THEN isolate ruptured SG: o Isolate AFW flow. o Dispatch operator to attempt to locally close steam supply header valves from faulted SG to turbine-driven AFW pump as necessary: o MS-41 (SG 22) o MS-42 (SG 23) o WHEN SG pressure less than 1030 psig, THEN verify SG atmospheric steam dump closed. IF NOT, THEN manually close.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Emergency oil pump may be needed to supply makeup oil to seal oil system.

15. Check DC Bus Loads:

a. Shed all large non-essential DC loads:

o Main turbine emergency oil pump after shaft stopped

o Main feed pump emergency oil pump after shaft stopped

b. Purge generator hydrogen per SOP 26.2, H_2 AND CO_2 TO MAIN GENERATOR as necessary and shutdown emergency seal oil DC pump

c. Dispatch personnel to monitor DC power supply and shed additional loads as necessary

16. Check CST Level - GREATER THAN 2 FT

RESPONSE NOT OBTAINED:

Switch to city water supply:

a. Open city water header isolation valve:

o FCV-1205A

b. Open AFW pump suction valves as necessary:

o PCV-1187
o PCV-1188
o PCV-1189

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o SG pressures should not be decreased to less than 110 psig to prevent injection of accumulator nitrogen into the RCS.
- o SG narrow range level should be maintained greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. If level cannot be maintained, SG depressurization should be stopped until level is restored in at least one SG.

NOTE

- o The SGs should be depressurized at maximum rate to minimize RCS inventory loss.
- o PRZR level may be lost and reactor vessel upper head voiding may occur due to depressurization of SGs. Depressurization should not be stopped to prevent these occurrences.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	Depressurize Intact SGs To 210 psig:	
	a. Check SG narrow range levels - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT) in at least one SG	a. Perform the following: 1) Maintain maximum AFW flow until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. 2) Continue with Step 18. WHEN narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG, THEN do Steps 17b, 17c, 17d and 17e.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Manually dump steam at maximum rate using SG atmospheric steam dumps to establish required SG pressure	b. Locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s).
	c. Check RCS cold leg temperatures - GREATER THAN 325°F	c. Perform the following: 1) Control SG atmospheric steam dumps to stop SG depressurization. 2) Go to Step 18.
	d. Check SG pressures - LESS THAN 210 PSIG	d. Continue with Step 18. <u>WHEN</u> SG pressures decreased to less than 210 psig, <u>THEN</u> do Step 17e.
	e. Manually control SG atmospheric steam dumps to maintain SG pressures at 210 psig	e. Locally per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s) to maintain SG pressures at 210 psig.
18.	<u>Check Reactor Subcritical:</u> o Intermediate range channels - ZERO OR NEGATIVE STARTUP RATE o Source range channels - ZERO OR NEGATIVE STARTUP RATE	Control SG atmospheric steam dumps to stop SG depressurization and allow RCS to heat up.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Placing key switches to DEFEAT will prevent auto SI actuation.

NOTE

Depressurization of SGs will result in SI actuation.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	Check SI Signal Status:	
	a. SI - HAS BEEN ACTUATED	a. Go to Step 23. WHEN SI actuated, THEN do Steps 19b, 20, 21 and 22.
	b. Reset SI:	
	1) Check any CCW pump - RUNNING	1) Place CCR control switches for CCW pumps in PULLOUT.
	2) Place controls for main AND bypass feedwater regulating valves to CLOSE	
	3) Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2	
	4) One at a time, depress Safety Injection reset buttons (Panel SB-2): o Train A o Train B	
	5) Verify Train A AND B - RESET	5) Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	<u>Verify Containment Isolation Phase A:</u>	
	a. Phase A valves - CLOSED (See ATTACHMENT 1 for valves)	a. Manually actuate phase A AND ensure phase A valves closed.
	b. IVSW valves - OPEN: o 1410 o 1413 o SOV-3518 o SOV-3519	b. Manually open valves.
	c. WCP valves - OPEN: o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241	c. Manually open valves.
	d. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21.	<u>Verify Containment Ventilation Isolation:</u>	
	a. Containment purge valves - CLOSED: o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173	a. Manually close valves. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> close valves from fan room. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> dispatch operator and HP personnel to close outside valves by isolating instrument air. o FCV-1171, IA-780 o FCV-1173, IA-779
	b. Containment pressure relief valves - CLOSED: o PCV-1190 o PCV-1191 o PCV-1192	b. Manually close valves. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> close valves from fan room. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> dispatch operator AND HP personnel to close outside valves by isolating instrument air. o PCV-1191, IA-777 o PCV-1192, IA-778 <u>IF</u> containment pressure relief can <u>NOT</u> be isolated, <u>THEN</u> locally close the following valves (Fan House 88 ft. el): o UH-1013, Pressure Relief Fan Inlet Stop o UH-1014, Pressure Relief Fan Outlet stop

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	Check Containment Pressure - HAS REMAINED LESS THAN 24 PSIG	Perform the following: a. Verify containment spray signal actuated. IF NOT, THEN manually actuate. b. Verify containment isolation Phase B valves closed. 1) IF NOT, THEN manually close valves (See ATTACHMENT 2). 2) IF valves can NOT be manually closed, THEN locally close valves. c. Ensure IVSW isolation Phase B valves open. o 7864 o 7865 o 7866 o 7867 d. One At A Time, Depress Containment Spray Reset Pushbuttons: 1) Spray SYS Reset Train A 2) Spray SYS Reset Train B
23.	Check Containment Radiation - LESS THAN 10 R/HR	Manually close containment isolation valves as necessary. IF valves can NOT be manually closed, THEN dispatch operator and HP personnel to locally close valves.
24.	Check Core Exit TCs - LESS THAN 1200°F	IF Core Exit temperatures greater than 1200°F AND increasing, THEN go to SACRG-1, Severe Accident Control Room Guideline Initial Response, Step 1.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
25.	Check If AC Emergency Power Is Restored:	
	a. Check 480V busses - AT LEAST ONE ENERGIZED o 2A AND 3A - OR - o 5A - OR - o 6A	a. Continue to control RCS conditions and monitor plant status: 1) Check status of local actions: o AC power restoration o RCP seal isolation. o DC power supply. 2) Check status of auxiliary boration systems: o BAST temperature greater than 155°F. IF temperature less than 155°F, request engineering support to provide an emergency power supply for the boric acid heat trace system to prevent crystallization. 3) Check status of spent fuel cooling: o Spent fuel pit low level alarm actuated. o Continue to monitor spent fuel pit level and add makeup as necessary. 4) Open doors on all control room cabinets. 5) Dispatch personnel to open AFW pump room roll-up door. 6) Return to Step 12.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26.	Stabilize SG Pressures:	
	a. Manually control SG atmospheric steam dumps	a. Locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s):

CAUTION

The loads placed on the energized 480V bus shall not exceed the capacity of the power source.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
27.	Verify Service Water System Operation:	
	a. Verify valve alignment - PROPER ALIGNMENT PER SOP 24.1, SERVICE WATER SYSTEM OPERATION	a. Manually align valves as necessary.
	b. Verify at least one pump - RUNNING ON ESSENTIAL HEADER	b. Manually start pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. <u>Load Equipment On Energized 480V Bus:</u>

a. Bus 5A

1) Reset MCCs

o MCC 26A
o MCC 29A

2) Ensure 21 Battery Charger in service

3) Ensure 21 Static Inverter on alternate power supply per SOP 27.1.6, INSTRUMENT BUS, DC DISTRIBUTION SYSTEM AND PA SYSTEM INVERTER

4) Ensure 23 Static Inverter on alternate power supply per SOP 27.1.6

b. Bus 2A

1) Reset MCCs

o MCC 24
o MCC 24A

2) Ensure 22 Battery Charger in service

3) Ensure 22 Static Inverter on alternate power supply per SOP 27.1.6

4) Ensure PA System Inverter on alternate power supply per SOP 27.1.6

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

c. Bus 3A

1) Reset MCCs

o MCC 26C
o MCC 211

2) Ensure 23 Battery Charger in service

d. Bus 6A

1) Reset MCCs

o MCC 26B
o MCC 27A

2) Ensure 24 Battery Charger in service

3) Ensure 24 Static Inverter on alternate power supply per SOP 27.1.6

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
29.	Select Recovery Procedure:	
	a. Check RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:	a. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)	b. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.
	c. Check SI equipment - SI ACTUATED OR REQUIRED	c. Go to ECA-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, Step 1.
	d. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1	

-END-

ATTACHMENT 1

The following valves will close upon containment isolation Phase A:

1. CCW from excess letdown Hx. 796 and 793.
2. CCW to excess letdown Hx. 798 and 791.
3. Vent header from RCDT 1786 and 1787.
4. Gas analyzer PRT 548 and 549.
5. Gas analyzer RCDT 1788 and 1789.
6. Letdown from regenerative HX. 201 and 202.
7. Letdown oriface control stop valves 200A, 200B, and 200C.
8. Make-up to PRT 519 and 552.
9. Containment sump pumps to WDS - hold-up tank 1723 and 1728.
10. Instrument air to containment PCV-1228.
11. RCDT to WDS - hold-up tank 1702 and 1705.
12. SG blowdown and sampling system PCV-1214, 1214A, 1215, 1215A, 1216, 1216A, 1217, 1217A.
13. Radiation monitor return to containment PCV-1234, 1235, 1236, 1237.
14. Accumulator samples 956G and 956H.
15. Sample - pressurizer steam 956A and 956B.
16. Sample - pressurizer liquid 956C and 956D.
17. Sample - RCS loops 21, 22, 23 MOV-956E, and MOV-956F.
18. SJAE to containment 1229 and 1230.
19. Hi-Rad sample system return to containment sump MOV-4399, 5132.
20. Recirculation pump discharge sample line MOV-990A, 990B.
21. Accumulator N_2 Supply Line Stop, 863

THIS ATTACHMENT CONTINUED ON NEXT PAGE

The following ventilation isolation valves will close:

1. Purge air to containment FCV-1170 and FCV-1171.
2. Purge air from containment FCV-1172 and FCV-1173.
3. Containment pressure relief PCV-1190, 1191, 1192.

The following valves will close upon containment isolation Phase B:

1. Component cooling to RCS pumps MOV-769 and MOV-797.
2. Component cooling from RCS thermal barrier return MOV-789 and FCV-625.
3. Component cooling from RCS motor bearing return MOV-786 and MOV-784.
4. Seal water return containment isolation valve MOV-222.

STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED

1. Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	22 DG BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP	277 KW			
22 SERVICE WATER PUMP		277 KW OR	277 KW	
23 SERVICE WATER PUMP				277 KW
24 SERVICE WATER PUMP	277 KW			
25 SERVICE WATER PUMP		277 KW OR	277 KW	
26 SERVICE WATER PUMP				277 KW
PRZR CONTROL HEATERS				277 KW
21 PRZR BU HEATERS			554 KW	
22 PRZR BU HEATERS		485 KW		
23 PRZR BU HEATERS	485 KW			
21 AFW PUMP			375 KW	
23 AFW PUMP				375 KW
21 FAN COOLER UNIT	250 KW			
22 FAN COOLER UNIT	250 KW			
23 FAN COOLER UNIT		250 KW		
24 FAN COOLER UNIT			250 KW	
25 FAN COOLER UNIT				250 KW
21 SI PUMP	317 KW			
22 SI PUMP		317 KW	317 KW	
23 SI PUMP				346 KW
21 SPRAY PUMP	348 KW			
22 SPRAY PUMP				348 KW
21 RHR PUMP			319 KW	
22 RHR PUMP				319 KW
21 CHARGING PUMP	150 KW			
22 CHARGING PUMP			150 KW	
23 CHARGING PUMP				150 KW

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	480V BUSES 21 DG BUS 5A	22 DG BUS 2A	 BUS 3A	23 DG BUS 6A
21 RECIRC PUMP	304 KW			
22 RECIRC PUMP				304 KW
21 CCW PUMP	228 KW			
22 CCW PUMP		228 KW		
23 CCW PUMP				228 KW
21 LIGHTING TRANSFORMER		150 KW (N)		150 KW (E)
22 LIGHTING TRANSFORMER			225 KW	
23 LIGHTING TRANSFORMER	225 KW			
TURBINE AUX OIL PUMP				112 KW
STATION AIR COMPRESSOR	93 KW			

-END-

A. PURPOSE

This procedure provides actions to use normal operational systems to stabilize plant conditions following restoration of 480V power.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from ECA-0.0, LOSS OF ALL AC POWER, Step 29.c, when 480V power is restored and SI is not required.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.
- IF an SI signal is actuated prior to performing Step 9 of this procedure, both SI reset buttons should be depressed to permit manual loading of equipment on ac emergency bus.

NOTE

CSF Status Trees shall be monitored for information only. FRPs shall not be implemented prior to completion of Step 9.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Check RCP Seal Isolation Status:	
	a. RCP seal injection isolation valves outside containment - CLOSED: o MOV-250A o MOV-250B o MOV-250C o MOV-250D	a. IF valves open or position not known, THEN check charging pump status: 1) IF pump running, THEN go to Step 2. 2) IF pump NOT running, THEN locally close valves before starting charging pump.
	b. RCP thermal barrier CCW return isolation valve outside containment - CLOSED: o MOV-789	b. IF valve open or position not known, THEN check CCW pump status: 1) IF pump running, THEN go to Step 2. 2) IF pump NOT running, THEN manually close valve. IF valve cannot be closed, THEN manually close CCW return flow control valve outside containment: o FCV-625

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. <u>Check Containment Isolation Phase A - NOT ACTUATED</u>

Perform the following:

a. Reset containment isolation Phase A:

1) Place IVSW switches to OPEN on SN panel

o 1410
o 1413
o SOV 3518
o SOV 3519

2) Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

3) Place personnel and equipment hatch solenoid control switches to INCIDENT on SM panel.

4) Place control switches for all Phase A isolation valves to CLOSE on SN panel.

5) Depress Phase A reset buttons. <u>IF</u> Isolation Signal will <u>NOT</u> reset, <u>THEN</u> perform the following:

a) Verify correct switch positions per steps a.1), a.2), a.3), a.4).

b) Depress Phase A reset buttons

<u>IF</u> Isolation Signal still will <u>NOT</u> reset, <u>THEN</u> place keyed switches to BYPASS and Depress Phase A reset buttons.

b. <u>IF</u> Phase B actuated, <u>THEN</u> perform the following:

1) Reset Containment Spray.

2) Depress Phase B reset buttons.

c. Establish instrument air to containment by opening isolation valve PCV-1228.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o The loads placed on the energized 480V bus shall not exceed the capacity of the power source.
- o If no charging pumps are running, starting a charging pump with RWST level less than 15 ft may result in air binding the pump.
- o If seal injection is not isolated, starting a charging pump may cause damage to the RCP shafts and seals.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	Manually Load Following Equipment On 480V Bus:	
	a. Check instrument air - AVAILABLE	a. Start one instrument air compressor.
	b. Start one service water pump on non-essential header	
	c. Start one CCW pump	c. Manually start one CCW pump.IF one CCW pump can NOT be started, THEN establish backup cooling to Charging, SI, and RHR pumps per SOP 4.1.2, COMPONENT COOLING SYSTEM OPERATION.
	d. Check valve alignment and start charging pump:	
	1) Check valve alignment: o Charging pump suction valve from VCT - OPEN: o LCV-112C o VCT makeup control system - SET FOR AUTOMATIC CONTROL AND GREATER THAN RCS BORON CONCENTRATION	1) Manually align valve. IF VCT NOT available, THEN establish suction from RWST: o Open suction valve from RWST: o LCV-112B o Close suction valve from VCT: o LCV-112C
	2) Start one charging pump	
	e. Start FCUs as necessary	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. Establish 32 gpm Charging Flow:

   o Adjust charging pump speed controller to establish 32 gpm

* 5. Verify SI System Flow Not Required:

   a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

   RESPONSE NOT OBTAINED: a. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

   b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)

   RESPONSE NOT OBTAINED: b. Control charging flow to maintain PRZR level. IF PRZR level can NOT be maintained, THEN go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.

6. Check PRZR Level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)

   RESPONSE NOT OBTAINED: Control charging flow as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o City water for AFW pumps will be necessary if CST level decreases to less than 2 ft.
- o If narrow range level in all SGs decreases to less than 9% (26% for ADVERSE CONTAINMENT) and AFW flow is less than 400 gpm , the motor-driven AFW pumps shall be manually loaded on 480V bus to supply water to the SGs.

NOTE

If power sources permit, it is desirable to switch AFW supply from turbine-driven AFW pump to motor-driven AFW pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	Check Intact SG Levels:	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain AFW flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. IF AFW flow NOT greater than 400 gpm, THEN: 1) Open AFW flow control valves as necessary. 2) Start motor-driven AFW pumps as necessary.
	b. Control AFW flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. Establish SG Pressure Control:

   a. Set each SG atmospheric steam dump controller to maintain existing SG pressure

   b. Place each SG atmospheric steam dump controller in automatic mode

   c. Locally return SG atmospheric steam dumps to remote control if necessary per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL

CAUTION

If an SI signal is actuated during this procedure after the SI pump switches have been placed in AUTO, procedure ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, should be performed.

9. Check Valve Alignment And Place Pump Switches For Energized Busses In AUTO:

   o SI pump
   o RHR pump
   o Containment spray pump

10. Implement FRPs As Required

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o RCP thermal barrier cooling shall be established slowly to minimize potential introduction of steam into the CCW system.
- o RCP seal injection shall be established so that bearing temperature is reduced at a maximum rate of 1 °F per minute to minimize RCP thermal stresses and potential seal failures.
- o As part of subsequent recovery actions, RCPs shall not be started prior to a status evaluation.

11. Establish RCP Seal Cooling:

    a. Establish CCW flow to RCP thermal barriers per SOP 1.3, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN.

    b. Establish seal injection flow to RCPs per SOP 3.1, CHARGING, SEAL WATER AND LETDOWN CONTROL and COL 3.1 CHEMICAL AND VOLUME CONTROL SYSTEM

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	<u>Check If RCP Seal Return Flow Should Be Established:</u>	
	a. CCW pumps - AT LEAST ONE RUNNING	a. Go to Step 14.
	b. RCP thermal barrier ΔP - POSITIVE	b. Go to Step 13.
	c. Establish seal return flow:	c. Manually open valves.
	1) Verify No. 1 seal return valves - OPEN	
	2) Verify seal return containment isolation valve - OPEN	
	d. Check number 1 seal return flow - NORMAL	d. <u>IF</u> number 1 seal return flow excessive, <u>THEN</u> isolate number 1 seal return flow from affected RCP.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	<u>Check If Letdown Can Be Established:</u>	
	a. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Continue with Step 14. <u>WHEN</u> level increases to greater than 25% (46% for ADVERSE CONTAINMENT), <u>THEN</u> do Step 13b.
	b. Establish letdown: 1) Close letdown orifice stops o 200A o 200B o 200C 2) On SN panel open letdown line isolation valves 201 and 202 3) On SN panel place Letdown Flow Control Valves 200 A B C switch to REMOTE 4) Open letdown stop valve LCV 459 5) Place low pressure letdown backpressure controller PCV-135 in MANUAL <u>AND</u> adjust to 75 percent open 6) Open letdown orifice stops to establish desired letdown flow: o 75 GPM Letdown orifice stop 200A o 45 GPM Letdown orifice stop 200B o 75 GPM Letdown orifice stop 200C 7) Set PCV-135 to maintain pressure between 225 psig and 275 psig 8) Place PCV-135 in AUTO	b. Establish excess letdown: 1) Establish CCW flow through the excess letdown heat exchanger by opening CCW valves: o Inlet valves 791,798 o Outlet valves 793,796 2) Position excess letdown diversion valve 215 to NORMAL to direct flow to the VCT. 3) Verify seal water return containment isolation valve 222 open. 4) Verify excess letdown flow control valve HCV-123 closed. 5) Open excess letdown isolation stop valve 213. 6) Slowly open HCV-123 to warmup the excess letdown heat exchanger. 7) Establish desired excess letdown flow using HCV-123. 8) Maintain excess letdown heat exchanger outlet temperature less than 195 °F.

14. <u>Control Charging And Letdown Flow To Maintain PRZR Level Between 25% (46% For ADVERSE CONTAINMENT)</u> And 63%

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	Establish PRZR Pressure Control:	
	a. Check letdown - IN SERVICE	a. Use PRZR heaters and one PRZR PORV and block valve as necessary to maintain RCS pressure. Go to Step 16.
	b. Use PRZR heaters and use auxiliary spray as follows to maintain RCS pressure: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142 4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	<u>Verify Natural Circulation:</u>	Increase dumping steam from intact SGs.

o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

o SG pressures - STABLE OR DECREASING

o RCS hot leg temperatures - STABLE OR DECREASING

o Core exit TCs - STABLE OR DECREASING

o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR SG PRESSURE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	<u>Check If Source Range Detectors Should Be Energized:</u>	
	a. Check intermediate range flux - LESS THAN 1E-10 AMPS	a. Continue with Step 18. <u>WHEN</u> flux less than 1E-10 amps, <u>THEN</u> do Steps 17b and 17c.
	b. Verify source range detectors - ENERGIZED	b. Manually energize source range detectors.
	c. Transfer nuclear recorders to source range scale	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18.	Verify Adequate Shutdown Margin:	
	a. Sample RCS	
	b. Shutdown margin from graphs book - ADEQUATE	b. Borate as necessary.
19.	Maintain Plant Conditions - STABLE: o RCS pressure o PRZR level o RCS temperature o Intact SG levels	
*20.	Verify SI System Flow Not Required:	
	a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:	a. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)	b. Control charging flow to maintain PRZR Level. IF PRZR level can NOT be maintained, THEN go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.
21.	Try To Restore Offsite Power To All 480V Busses Per The Appropriate Plant Procedures	Maintain plant conditions stable using 480V power.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	Determine If Plant Natural Circulation Cooldown Is Required:	
	a. Consult operations manager	
	b. Natural circulation cooldown - REQUIRED	b. Try To Restart An RCP As Follows: 1) Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION 2) Start an RCP 3) Go to appropriate plant procedure: o POP 1.1, PLANT HEATUP - OR - o POP 3.3, PLANT COOLDOWN
	c. Go to ES-0.2, NATURAL CIRCULATION COOLDOWN, Step 1	

-END-

Number:	Title:	Revision Number:
ECA-0.2	LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED	REV. 34

A. PURPOSE

This procedure provides actions to use engineered safeguards systems to recover plant conditions following restoration of 480V power.

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

1. ECA-0.0, LOSS OF ALL AC POWER, Step 29.a, when 480V power is restored and SI is required.

2. ECA-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, Step 5 and Step 20, if SI is required.

C. ADVERSE CONTAINMENT CONDITIONS

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Placing key switches to DEFEAT will prevent auto SI actuation.

NOTE

CSF Status Trees shall be monitored for information only. FRPs shall not be implemented prior to completion of Step 13.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	Check SI Signal Status - RESET	Reset SI: a. Check any CCW pump - RUNNING Place CCR control switches for CCW pumps in PULLOUT. b. Place controls for main AND bypass feedwater regulating valves to CLOSE c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2 d. One at a time, depress Safety Injection reset buttons (Panel SB-2): o Train A o Train B e. Verify Train A AND B - RESET Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.	Check RCP Thermal Barrier CCW Isolation Status:	
	a. CCW pumps - ALL STOPPED	a. Go to Step 3.
	b. CCW return isolation valve outside containment - CLOSED: o MOV-789	b. Manually isolate CCW to RCP thermal barriers: o Close CCW return isolation valve outside containment: o MOV-789 - OR - o Close CCW return flow control valve outside containment: o FCV-625
3.	Check Containment Radiation - LESS THAN 10 R/HR	Manually close containment isolation valves as necessary. IF valves can NOT be manually closed, THEN dispatch operator and HP personnel to locally close valves.
4.	Establish Containment Fan Cooler Units Operation:	
	a. Start fan coolers	
	b. Verify charcoal filter valves - OPEN	b. Manually open valves. IF BOTH charcoal filter valves on a fan cooler can NOT be manually opened, THEN manually open the normal discharge valve on the affected fan.
	c. Verify fan normal discharge valves - CLOSED	c. Manually close valves UNLESS opened to bypass a closed charcoal valve.
	d. Verify TCV-1104 AND TCV-1105 - OPEN	d. Manually open valves.

Number:	Title:	Revision Number:
ECA-0.2	LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED	REV. 34

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Check RWST Level - GREATER THAN 9.24 FT	Establish cold leg recirculation: a. Go to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1
6.	Manually Align Valves To Establish SI Injection Mode:	
	a. Verify SI pump suction valve from RWST - OPEN: o MOV-1810	a. Manually open valve.
	b. Align SI System valves: 1) Open RHR Hx CCW outlet valves: o MOV-822A o MOV-822B 2) Open RHR Hx outlet valves: o MOV-746 o MOV-747	

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

CAUTION

- o The loads placed on the energized 480V bus shall not exceed the capacity of the power source.
- o If a CCW pump can not be started, SOP-4.1.2, COMPONENT COOLING SYSTEM OPERATION should be referenced to establish cooling to the SI and RHR pumps.

7. Manually Load Following Equipment On 480V Bus:

   a. Service water pump on essential header

   b. RHR pump

   c. SI pump

   d. Instrument air compressor 21

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o City water for AFW pumps will be necessary if CST level decreases to less than 2 ft.
- o If SG narrow range level decreases to less than 9% (26% for ADVERSE CONTAINMENT) and AFW flow is less than 400 gpm, the motor-driven AFW pumps shall be manually loaded on 480V bus to supply water to the SGs.

NOTE

If power sources permit, it is desirable to switch AFW supply from turbine-driven AFW pump to motor-driven AFW pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	Check Intact SG Levels:	
	a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain AFW flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. IF AFW flow NOT greater than 400 gpm, THEN: 1) Open AFW flow control valves as necessary. 2) Start motor-driven AFW pumps as necessary.
	b. Control AFW flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	<u>Verify Containment Isolation Phase A:</u>	
	a. Phase A valves - CLOSED (See ATTACHMENT 1 for valves)	a. Manually actuate phase A AND ensure phase A valves closed.
	b. IVSW valves - OPEN: o 1410 o 1413 o SOV-3518 o SOV-3519	b. Manually open valves.
	c. WCP valves - OPEN: o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241	c. Manually open valves.
	d. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	<u>Verify Containment Ventilation Isolation:</u>	
	a. Containment purge valves - CLOSED: o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173	a. Manually close valves. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> close valves from fan room. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> dispatch operator and HP personnel to close outside valves by isolating instrument air. o FCV-1171, IA-780 o FCV-1173, IA-779
	b. Containment pressure relief valves - CLOSED: o PCV-1190 o PCV-1191 o PCV-1192	b. Manually close valves. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> close valves from fan room. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> dispatch operator AND HP personnel to close outside valves by isolating instrument air. o PCV-1191, IA-777 o PCV-1192, IA-778 <u>IF</u> containment pressure relief can <u>NOT</u> be isolated, <u>THEN</u> locally close the following valves (Fan House 88 ft. el): o UH-1013, Pressure Relief Fan Inlet Stop o UH-1014, Pressure Relief Fan Outlet stop

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	<u>Check Containment Pressure - HAS REMAINED LESS THAN 24 PSIG</u>	Perform the following: a. Verify containment spray signal actuated. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually actuate. b. Verify containment isolation Phase B valves closed. <u>IF</u> <u>NOT</u>, <u>THEN</u> manually close valves. (See ATTACHMENT 2 for list of valves.) <u>IF</u> valves can <u>NOT</u> be manually closed, <u>THEN</u> locally close valves. c. Ensure IVSW isolation Phase B valves open. o 7864 o 7865 o 7866 o 7867 d. One At A Time, Depress Containment Spray Reset Pushbuttons: 1) Spray SYS Reset Train A 2) Spray SYS Reset Train B
12.	<u>Check If Containment Spray Pump Switches Should Be Placed In AUTO:</u>	
	a. RWST level - GREATER THAN 9.24 FT	a. Go to Step 13.
	b. Place containment spray pump switches in AUTO	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	Check RCP Seal Isolation Status:	
	a. RCP seal injection isolation valves outside containment - CLOSED: o MOV-250A o MOV-250B o MOV-250C o MOV-250D	a. Locally close valves before starting charging pump.
14.	Implement FRPs As Required	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	Check If One CCW Pump Should Be Started:	
	a. CCW pumps - ALL STOPPED	a. Go to Step 16.
	b. Verify adequate power to run one CCW pump: o Any 480V bus supplying CCW pump - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1760 KW	b. IF power can NOT be restored, THEN perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 18.
	c. Start one CCW pump on 480V bus energized from offsite power	c. Start one CCW pump on diesel generator with load less than 1760 KW. IF no CCW pump can be started, THEN perform the following: 1) Refer to SOP 4.1.2 COMPONENT COOLING SYSTEM OPERATION to establish backup cooling to the following: o charging pumps o RHR pumps o SI pumps 2) Go to Step 18.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Check If One Service Water Pump Should Be Started On Non-Essential Header:	
	a. Service water pumps - NONE RUNNING ON NON-ESSENTIAL HEADER	a. Go to Step 17.
	b. Verify adequate power to run one service water pump on non-essential header: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on any diesel generator - LESS THAN 1730 KW	b. Go to Step 17.
	c. Start one service water pump on non-essential header on 480V bus energized from offsite power	c. Start one service water pump on non-essential header on diesel generator with load less than 1730 KW.

CAUTION

- o RCP thermal barrier cooling shall be established slowly to minimize potential introduction of steam into the CCW System. RCP thermal barrier cooling should not be established to an RCP with excessive seal leakage.
- o As part of subsequent recovery actions, RCPs shall not be started prior to a status evaluation.

17. Establish CCW Flow To RCP Thermal Barriers Per SOP 1.3, REACTOR COOLANT PUMP STARTUP AND SHUTDOWN.

18. Go To E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1

-END-

ATTACHMENT 1

The following valves will close upon containment isolation Phase A:

1. CCW from excess letdown Hx. 796 and 793.
2. CCW to excess letdown Hx. 798 and 791.
3. Vent header from RCDT 1786 and 1787.
4. Gas analyzer PRT 548 and 549.
5. Gas analyzer RCDT 1788 and 1789.
6. Letdown from regenerative HX. 201 and 202.
7. Letdown oriface control stop valves 200A, 200B, and 200C.
8. Make-up to PRT 519 and 552.
9. Containment sump pumps to WDS - hold-up tank 1723 and 1728.
10. Instrument air to containment PCV-1228.
11. RCDT to WDS - hold-up tank 1702 and 1705.
12. SG blowdown and sampling system PCV-1214, 1214A, 1215, 1215A, 1216, 1216A, 1217, 1217A.
13. Radiation monitor return to containment PCV-1234, 1235, 1236, 1237.
14. Accumulator samples 956G and 956H.
15. Sample - pressurizer steam 956A and 956B.
16. Sample - pressurizer liquid 956C and 956D.
17. Sample - RCS loops 21, 22, 23 MOV-956E, and MOV-956F.
18. SJAE to containment 1229 and 1230.
19. Hi-Rad sample system return to containment sump MOV-4399, 5132.
20. Recirculation pump discharge sample line MOV-990A, 990B.
21. Accumulator N_2 Supply Line Stop, 863

THIS ATTACHMENT CONTINUED ON NEXT PAGE

The following ventilation isolation valves will close:

1. Purge air to containment FCV-1170 and FCV-1171.
2. Purge air from containment FCV-1172 and FCV-1173.
3. Containment pressure relief PCV-1190, 1191, 1192.

The following valves will close upon containment isolation Phase B:

1. Component cooling to RCS pumps MOV-769 and MOV-797.
2. Component cooling from RCS thermal barrier return MOV-789 and FCV-625.
3. Component cooling from RCS motor bearing return MOV-786 and MOV-784.
4. Seal water return containment isolation valve MOV-222.

Number:	Title:	Revision Number:
ECA-1.1	LOSS OF EMERGENCY COOLANT RECIRCULATION	REV. 34

A. <u>PURPOSE</u>

This procedure provides actions to restore emergency coolant recirculation capability, to delay depletion of the RWST by adding makeup and reducing outflow, and to depressurize the RCS to minimize break flow.

B. <u>SYMPTOMS OR ENTRY CONDITIONS</u>

This procedure is entered from:

1. E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 20.a, when cold leg recirculation capability cannot be verified.

2. ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 8, when containment water level is insufficient to establish recirculation flow.

3. ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 9, when at least one flow path from the sump cannot be established or maintained.

4. ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 27, when adequate recirculation flow cannot be maintained.

5. ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 6.a, when a LOCA outside containment cannot be isolated.

C. <u>ADVERSE CONTAINMENT CONDITIONS</u>

EOP values for adverse containment should be used if either of the following conditions exist:

1. Containment radiation levels greater than 1E5 R/hr.

2. Containment pressure greater than 4 psig.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o If emergency coolant recirculation capability is restored during this procedure, further recovery actions shall continue by returning to procedure and step in effect.
- o IF RWST level decreases to 3.0 ft THEN SI System pumps taking suction from RWST shall be stopped.
- o IF RWST level decreases to 2.0 ft, THEN Containment Spray Pumps shall be stopped

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	<u>Check Emergency Coolant Recirculation Equipment - AVAILABLE</u> o Recirculation pump flow path - OR - o RHR pump recirculation flow path - OR - o Low head to high head flow path	Try to restore at least one train. <u>IF</u> failure of check valves, suction line to SI pumps, OR excessive leakage is suspected, refer to AOI 10.1.1, EXCESSIVE SI SYSTEM LEAKAGE.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.

2. Add Makeup To RWST As Necessary:

   a. Dispatch operator to open valves from the boric acid blender to RWST:

      1) PW-295

      2) PW-350

   b. Close FCV-110B

   c. Set blender controls to manually makeup to RWST

CAUTION

City water for AFW pumps will be necessary if CST level decreases to less than 2 ft.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 3.	Check Intact SG Levels:	
	a. Narrow range level - GREATER THAN 9%(26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
	b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%	b. IF narrow range level in any SG continues to increase, THEN stop feed flow to that SG.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Shutdown margin from graphs book should be monitored during RCS cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	Initiate RCS Cooldown To Cold Shutdown:	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Dump steam to condenser from intact SG(s)	b. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump. IF no intact SG available, THEN control feed flow to faulted SG to cooldown RCS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	Verify Containment Fan Cooler Units - IN SERVICE:	
	a. Five fan coolers - RUNNING	a. Manually start fan coolers.
	b. Verify charcoal filter valves - OPEN	b. Manually open valves. IF BOTH charcoal filter valves on a fan cooler can NOT be manually opened, THEN manually open the normal discharge valve on the affected fan.
	c. Verify fan normal discharge valves - CLOSED	c. Manually close valves UNLESS opened to bypass a closed charcoal valve.
	d. Verify TCV-1104 AND TCV-1105 - OPEN	d. Manually open valves.
6.	Check RWST Level - GREATER THAN 3.0 FT	Go to step 24.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. Determine Containment Spray Requirements:

a. Determine number of spray pumps required from table:

RWST LEVEL	CONTAINMENT PRESSURE	FAN COOLERS RUNNING IN EMERGENCY MODE	SPRAY PUMPS REQUIRED
Greater than 9.24 ft	Greater than 47 psig	-	2
	Between 2 psig and 47 psig	0, 1	2
		2, 3, 4	1
		5	0
	Less than 2 psig	-	0
Between 9.24 ft and 2 ft	Greater than 47 psig	-	2
	Between 2 psig and 47 psig	0	2
		1, 2, 3	1
		4, 5	0
	Less than 2 psig	-	0
Less than 2 ft	-	-	0

b. Spray pumps running - EQUAL TO NUMBER REQUIRED

b. Manually operate spray pumps and associated discharge valves as necessary.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- o IF offsite power is lost after SI reset, THEN manual action may be required to restart safeguards equipment.
- o Placing key switches to DEFEAT will prevent auto SI actuation.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	Check SI Signal Status - RESET	Reset SI: a. Check any CCW pump - RUNNING Place CCR control switches for CCW pumps in PULLOUT. b. Place controls for main AND bypass feedwater regulating valves to CLOSE c. Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position: o Train A SIA-1 - AND - o Train B SIA-2 d. One at a time, depress Safety Injection reset buttons (Panel SB-2): o Train A o Train B e. Verify Train A AND B - RESET Ensure Relays reset (Top of Safeguards Initiation Racks 1-1 AND 2-1): o SIA-1 o SIM-1 o SIA-2 o SIM-2

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9.	<u>Establish One Train Of SI System Flow:</u>	
	a. SI pump - ONLY ONE RUNNING	a. Operate SI pumps as necessary.
	b. RCS pressure - LESS THAN 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)	b. Stop RHR pumps. Go to Step 10.
	c. RHR pump - ONLY ONE RUNNING	c. Operate RHR pumps, as necessary.
10.	<u>Verify No Backflow From RWST To Containment Sump:</u>	
	a. Containment sump valves - OPEN o MOV-885A o MOV-885B	a. <u>IF</u> both containment sump valves closed, <u>THEN</u> go to Step 11.
	b. Valve from RWST to RHR pump - CLOSED o MOV-882	b. Manually close valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If RCP seal cooling had previously been lost, the affected RCP(s) shall not be started prior to a status evaluation.

NOTE

RCPs should be run in the following order to provide normal PRZR spray: RCP 24, RCP 23.

11. Check If An RCP Should Be Started:

a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE (PSIG)	RCS SUBCOOLING °F (ADVERSE CONTAINMENT)
0 - 400	52 (83)
401 - 800	44 (56)
801 - 1200	24 (31)
1200 - 2500	19 (26)

RESPONSE NOT OBTAINED: a. Stop all RCPs. Go to Step 12.

b. All RCPs - STOPPED

RESPONSE NOT OBTAINED: b. Stop all but one RCP. Go to Step 12

c. Check MCC 28 And MCC 28A - ENERGIZED

RESPONSE NOT OBTAINED: c. IF containment sump level less than 44'3" AND containment conditions NOT adverse, THEN reset MCC 28 and MCC 28A. IF MCC 28 can NOT be reset, THEN go to step 12.

d. Try to start an RCP as follows:

1) Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION

2) Start one RCP

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*12.	Check If SI Can Be Terminated: a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE BELOW:	Establish minimum SI flow to remove decay heat. Perform the following: a. Determine minimum SI flow required from Figure ECA11-1 b. Establish minimum SI flow c. Go to Step 17

RCS PRESSURE psig	RCS SUBCOOLING °F (ADVERSE CONTAINMENT °F)
0 - 400	102 (133)
401 - 800	94 (106)
801 - 1200	74 (81)
1201 - 2500	69 (76)

b. Check RVLIS indication:

o Natural circulation range - GREATER THAN 60% IF NO RCP RUNNING

- OR -

o RCP running range - GREATER THAN 25% IF ONE RCP RUNNING

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

*13. Reset Containment Isolation Phase A And Phase B:

a. Place IVSW switches to OPEN on SN panel:

o 1410
o 1413
o SOV-3518
o SOV-3519

b. Place CNTMT RAD MON WCPS VALVES control switch to OPEN on SN panel

c. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

d. Place control switches for all remaining Phase A isolation valves to CLOSE on SN panel

e. One at a time, depress Phase A reset buttons:

o CI Phase A Train A

o CI Phase A Train B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	f. Verify Train A AND B - RESET	f. Perform the following: 1) Verify correct switch positions per steps 13a through 13d 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B IF Signal does NOT reset, THEN: 1) Place keyed switches to BYPASS. 2) One at a time, depress Phase A reset buttons: o CI Phase A Train A o CI Phase A Train B IF Signal can NOT be reset, THEN Reset Relays CA1 AND CA2 on Top of Safeguards Initiation Racks 1-2 AND 2-2.
	g. Check Phase B - ACTUATED	g. Go To Step 14.
	h. Containment pressure - LESS THAN 17 PSIG	h. Perform the following: 1) WHEN containment pressure less than 17 psig, THEN do Steps 13i through 13k. 2) Continue with Step 14.

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons: o Spray SYS Reset Train A o Spray SYS Reset Train B	
	j. One at a time, depress Phase B reset buttons: o CI Phase B Train A o CI Phase B Train B	
	k. Verify Train A AND B - RESET	k. Ensure Relays reset (Top of Safeguards Initiation Racks 1-2 AND 2-2): o S1 o S2 o CB1 o CB2
14.	<u>Establish Instrument Air To Containment By Opening PCV-1228</u>	Verify Relays on Top of Safeguards Initiation Racks 1-2 AND 2-2 - RESET o CA1 o CA2 <u>IF</u> Phase A is <u>NOT</u> reset <u>THEN</u> re-perform step 13.
15.	<u>Stop SI System Pumps And Place In AUTO:</u> o SI pumps o RHR pumps	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

If no charging pumps are running, starting a charging pump with RWST level less than 15 ft may result in air binding the pump. If air binding occurs or if no charging flow is observed, the blender controls shall be manually set to supply water to the suction of the charging pumps as per Step 16b.

16. Establish Charging Flow:

a. Charging pumps - AT LEAST ONE RUNNING

a. Perform the following:

1) IF CCW flow to RCP(s) thermal barrier is lost, THEN isolate seal injection to affected RCP(s) before starting charging pumps by either of the following:

o Locally energize AND close seal injection isolation valves:

o MOV-250A, MCC 26AA, A2
o MOV-250C, MCC 26AA, B2
o MOV-250B, MCC 26BB, L3
o MOV-250D, MCC 26BB, M3

\- OR -

o Locally close seal injection needle valves (51 ft. el, Piping Penetration Area):

o 241A
o 241B
o 241C
o 241D

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	b. Check RWST level - GREATER THAN 15 FT	b. Try To Add Makeup To RCS From Alternate Source: 1) Dispatch operator to close valves from the boric acid blender to RWST: o PW-295 o PW-350 2) Manually set blender controls to supply water to charging pump suction 3) Go to Step 16d.
	c. Align charging pump suction to RWST: 1) Open charging pump suction valve from RWST: o LCV-112B 2) Close charging pump suction valve from VCT: o LCV-112C	
	d. Establish maximum flow: 1) Start additional charging pumps 2) Adjust charging pump speed controller for maximum flow	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17.	Verify Adequate RCS Makeup Flow:	
	a. Check RVLIS indication: o Natural circulation range - GREATER THAN 60% IF NO RCP RUNNING - OR - o RCP running range - GREATER THAN 25% IF ONE RCP RUNNING	a. Increase RCS makeup flow to maintain RVLIS indication as necessary.
	b. Core exit TCs - STABLE OR DECREASING	b. Increase RCS makeup flow to maintain TCs stable or decreasing.

CAUTION

Voiding may occur in the RCS during RCS depressurization. This will result in a rapidly increasing PRZR level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18.	Depressurize RCS To Minimize RCS Subcooling:	
	a. Use normal PRZR spray	a. Use one PRZR PORV and block valve. IF no PORV flow path available, THEN use auxiliary spray as follows: 1) Maintain RCP seal injection 6 to 10 gpm. 2) Reduce charging pump speed to minimum flow. 3) Close charging line flow control valve: o HCV-142

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
		4) Close the charging stop valves: o 204A - Loop 22 o 204B - Loop 21 5) Close the pressurizer spray valves: o PCV-455A o PCV-455B 6) Open auxiliary spray valve: o 212 7) Initiate spray slowly using HCV-142. 8) Adjust charging pump speed to increase spray flow.
	b. Control PRZR heaters as necessary	

This Step continued on the next page.

STEP — ACTION/EXPECTED RESPONSE — RESPONSE NOT OBTAINED

c. Depressurize RCS until EITHER of the following conditions satisfied:

- o PRZR level - GREATER THAN 69% (63% FOR ADVERSE CONTAINMENT)

  \- OR -

- o RCS subcooling based on core exit TCs - LESS THAN VALUE OBTAINED FROM TABLE:

RCS PRESSURE psig	RCS SUBCOOLING °F (Adverse Containment °F)
0 - 400	62 (93)
401 - 800	54 (66)
801 - 1200	34 (41)
1201 - 2500	29 (36)

RESPONSE NOT OBTAINED:

c. If necessary, manually operate SI pumps to maintain RCS subcooling based on core exit TCs greater than value obtained from table below:

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

POP 3.3, PLANT COOLDOWN, shall be referred to for plant alignment during cooldown.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19.	<u>Check If RHR System Can Be Placed In Service:</u>	
	a. Check the following: o RCS temperatures - LESS THAN 350°F o RCS pressure - LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	a. Go to Step 20.
	b. Consult operations manager to determine if RHR System should be placed in service	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	<u>Check If SI Accumulators Should Be Isolated:</u>	
	a. At least two RCS hot leg temperatures - LESS THAN 350°F	a. Continue with Step 21. <u>WHEN</u> at least two hot leg temperatures less than 350°F, <u>THEN</u> do steps 20b through 20d
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o <u>IF</u> HCV-863 will <u>NOT</u> close <u>THEN</u> locally close the following nitrogen valves: o 1809 o 1811A o 1811B 2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*21.	Check If RCPs Must Be Stopped:	
	a. Check the following: o Number 1 seal differential pressure - LESS THAN 200 PSID - OR - o Number 1 seal return flow - LESS THAN 0.3 GPM	a. Go to Step 22.
	b. Stop affected RCP(s)	
22.	Check RCS Temperature - GREATER THAN 200°F	Go to Step 33.
23.	Check RWST Level - LESS THAN 3.0 FT	Return to Step 1.
24.	Stop SI System Pumps Taking Suction From RWST And Place Switches In PULLOUT Position: o RHR pumps o SI pumps	
*25.	Check RWST Level - GREATER THAN 2.0 FT	Stop Containment Spray Pumps.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

26. Try To Add Makeup To RCS From Alternate Source:

    a. Dispatch operator to close valves from the boric acid blender to RWST:

       o PW-295
       o PW-350

    b. Set blender controls to manually supply water to charging pump suction

    c. Start charging pumps

    d. Establish charging flow by adjusting charging pump speed controller as necessary

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

To prevent main steamline isolation, steam dump to condenser should NOT exceed 0.5E6 lbs/hour per SG.

27. Check If All Intact SGs Should Be Depressurized To 710 psig:

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
a. Check SG pressures - GREATER THAN 710 PSIG	a. Go to Step 28.
b. Dump steam to condenser at maximum rate, NOT to exceed 0.5E6 lbs/hour per intact SG(s), to establish required SG pressure	b. Dump steam at maximum rate, NOT to exceed 0.5E6 lbs/hour per intact SG(s), manually or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL: o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump.
c. Check SG pressures - LESS THAN 710 PSIG	c. Return to Step 27b.
d. Stop SG depressurization	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
28.	<u>Depressurize All Intact SGs To Inject SI Accumulators As Necessary:</u>	
	a. Dump steam to condenser as necessary to maintain appropriate RVLIS indication: o Natural circulation range - AT 60% IF NO RCP RUNNING - OR - o RCP running range - AT 25% IF ONE RCP RUNNING	a. Manually, or locally per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s) to maintain appropriate RVLIS indication: o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump.
	b. Check SG pressures - LESS THAN 110 PSIG	b. Return to Step 28a.
	c. Stop SG depressurization	
29.	<u>Check If SI Accumulators Should Be Isolated:</u>	
	a. At least two RCS hot leg temperatures - LESS THAN 350°F	a. Continue with Step 30. <u>WHEN</u> at least two RCS hot leg temperatures less than 350°F, <u>THEN</u> do Steps 29b through 29d.
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B

This Step continued on the next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by performing the following: 1) Close nitrogen supply valve to accumulators: HCV-863. o IF HCV-863 will NOT close THEN locally close the following nitrogen valves: o 1809 o 1811A o 1811B 2) Open the following valves as necessary: o Accumulator 21: o 891A o HCV-943 o Accumulator 22: o 891B o HCV-943 o Accumulator 23: o 891C o HCV-943 o Accumulator 24: o 891D o HCV-943
	d. Open all SI accumulator isolation valve breakers	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30.	<u>Check If RCPs Must Be Stopped:</u>	
	a. Check the following: o Number 1 seal differential pressure - LESS THAN 200 PSID - OR - o Number 1 seal return flow - LESS THAN 0.3 GPM	a. Go to Step 31.
	b. Stop affected RCP(s)	
31.	<u>Depressurize All Intact SGs To Atmospheric Pressure:</u>	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Dump steam to condenser	b. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
32.	Check If RHR System Should Be Placed In Service:	
	a. Check the following: o RCS temperature - LESS THAN 350° F o RCS pressure - LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	a. Return to Step 31.
	b. Consult operations manager to determine if RHR System should be placed in service	
33.	Maintain RCS Heat Removal:	
	a. Use RHR System if in service	
	b. Dump steam to condenser from intact SGs	b. Manually, or locally per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL, dump steam from intact SG(s): o Use SG atmospheric steam dumps. - OR - o Use turbine-driven AFW pump. IF no intact SG available and RHR System NOT in service, THEN control feed flow to faulted SG to cooldown RCS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
34.	Check Containment Hydrogen Concentration:	
	a. Obtain a hydrogen concentration measurement: o Dispatch chemistry personnel to obtain sample - OR - o Use H2-02 analyzer on Accident Assessment Panel	
	b. Hydrogen concentration - LESS THAN 0.5% IN DRY AIR	b. Consult operations manager for additional recovery actions. Go to Step 35.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
35.	Restore Ventilation Systems:	
	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2, DIGITAL RADIATION MONITORING SYSTEM OPERATION - LOCAL.
	b. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 35d.
	c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load	c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL
	d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216	d. IF fan will not start, THEN perform the following: 1) Defeat fan interlock using Bypass key. 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room.
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at least one cable tunnel exhaust fan.
36.	Consult Operations Manager	

-END-

FIGURE ECA11-1

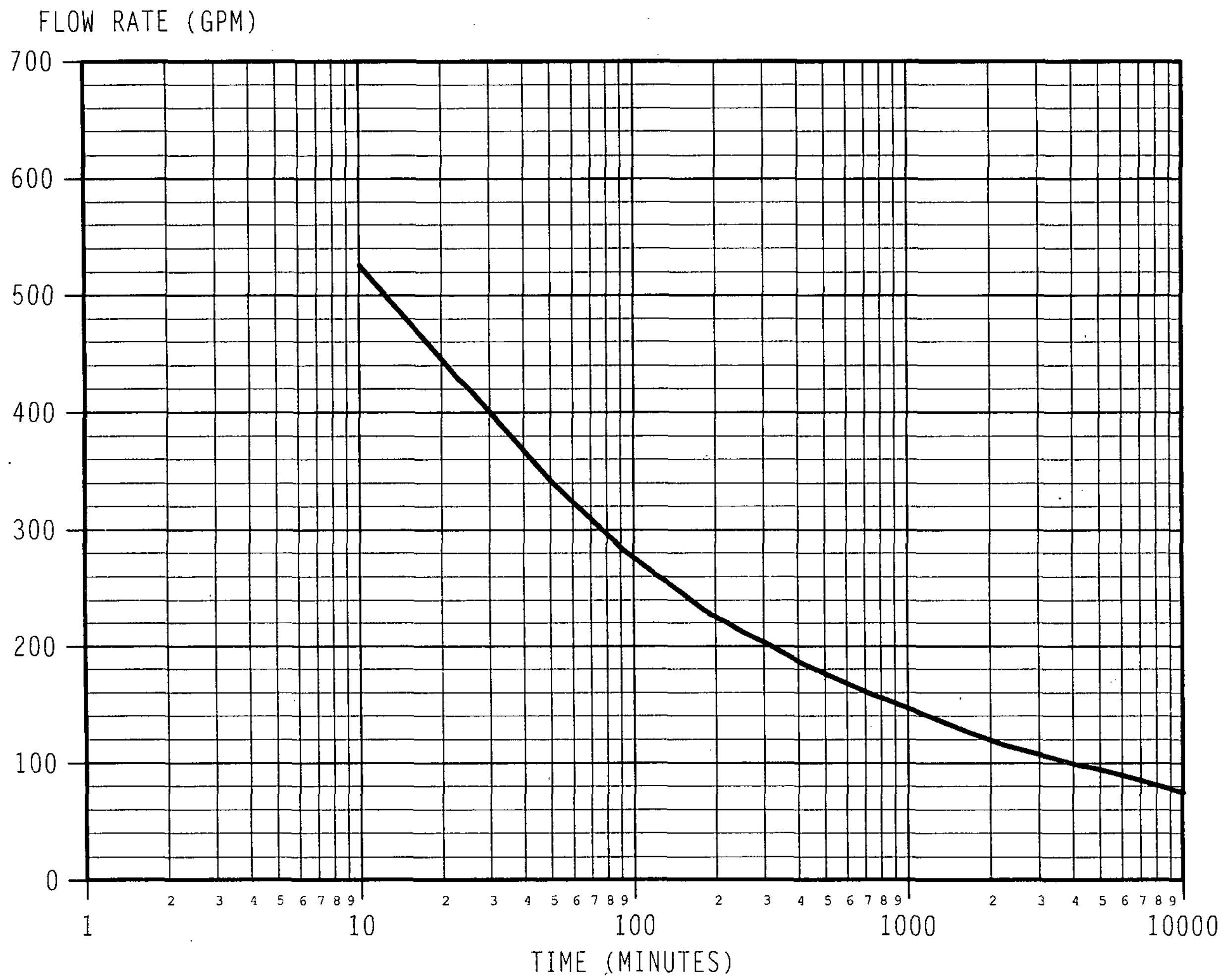

FIGURE ECA11-1, MINIMUM SI FLOW RATE VERSUS TIME AFTER TRIP