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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) 2.3x10 ⁵ CPS.
 - j) Intermediate range high flux (1/2) (P-10).
 - k) Power range high flux low level trip (2/4) (P-10) 25%.
 - 1) 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.

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- 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.

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C. <u>SYMPTOMS</u>

- 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.

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RESPONSE NOT OBTAINED

<u>NOTE</u>

Steps 1 through 4 are IMMEDIATE ACTIONS.

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. \underline{IF} reactor will \underline{NOT} trip AND is \underline{NOT} subcritical, \underline{THEN} perform the following:

- a. De-energize 480V busses 2A AND 6A for 10 seconds.
 - b. Re-energize 480V busses 2A AND 6A.
 - c. <u>IF</u> main generator output breakers closed, <u>THEN</u> depress Blackout Relay Reset 480V Bus pushbutton on SC panel.

 $\overline{\text{IF}}$ reactor can $\overline{\text{NOT}}$ be tripped, $\overline{\text{THEN}}$ go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, Step 1.

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RESPONSE NOT OBTAINED

- 2. <u>Verify Turbine Trip:</u>
 - o Turbine stop valves AND control valves CLOSED

Perform the following:

- a. Manually trip turbine.
- b. $\underline{\text{IF}}$ turbine will $\underline{\text{NOT}}$ trip, $\underline{\text{THEN}}$ close MSIVs.
 - 1) <u>IF</u> MSIVs can <u>NOT</u> be closed, <u>THEN</u>:
 - o Manually run back turbine.
 - AND -
 - o <u>IF</u> local environmental conditions, including radiation, permit <u>THEN</u> locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.

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STEP ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3. Check If SI Is Actuated: o SI annunciator - LIT - OR - o SI system pumps - RUNNIN	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 IF SI is required, THEN manually actuate.
	<u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> go to ES-0.1, REACTOR TRIP RESPONSE, Step 1.

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RESPONSE NOT OBTAINED

- 4. <u>Verify Power To 480V Busses:</u>
 - a. Generator output breakers -OPEN
- a. <u>IF</u> breakers do <u>NOT</u> open 30 seconds after Turbine trip THEN manually open:
 - o BKR7 o BKR9
- b. 480V busses AT LEAST ONE ENERGIZED:
 - o 2A <u>AND</u> 3A

- OR -

b. Try to restore power to at least one 480V bus. <u>IF</u> power can \underline{NOT} be restored to at least one 480V bus, THEN go to ECA-0.0, LOSS OF ALL AC POWER, Step 1.

o 5A

- OR -

o 6A

- c. 480V busses ALL ENERGIZED BY c. Restore power to de-energized OFFSITE POWER
 - 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER

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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.

- 5. <u>Verify RCP Seal Cooling:</u>
 - a. 480V busses ALL ENERGIZED BY a. Perform the following: OFFSITE POWER
 - 1) Start one charging pump
 - 2) Align charging pump suction 2) Align charging pump suction to RWST:
 - a) Open charging pump suction valve from RWST:
 - o LCV-112B
 - b) Close charging pump suction valve from VCT:
 - o LCV-112C
 - switch to STOP

- - 1) Start one charging pump in MANUAL at maximum speed.
 - to RWST:
 - a) Open charging pump suction valve from RWST:
 - o LCV-112B
 - b) Close charging pump suction valve from VCT:
 - o LCV-112C
- c) Place RCS Makeup Control c) Place RCS Makeup Control switch to STOP

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RESPONSE NOT OBTAINED

- Verify Power To Lighting And 6. MCCs:
 - a. 480V busses ALL ENERGIZED BY a. Perform the following: 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

- - 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, <u>THEN</u> 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.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
7.	Verify CCW System Operation:		
1	a. Verify Three CCW pumps - RUNNING	a. Manually start CCW pur busses supplied by of power. <u>IF</u> no CCW pump started, <u>THEN</u> perform following:	fsite can be
		1) Stop all RCPs.	
		 Increase running che pump speed to maximaxima 	
		3) Refer to SOP 4.1.2 COMPONENT COOLING OPERATION to estab backup cooling to t following:	SYSTEM lish
		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.	
	varves closed	a. <u>IF</u> either valve can closed, <u>THEN</u> ensure following valves cl	the the
		o FW regulating val o FW regulating byp o FW stop valves	
	o SG blowdown isolation valves - CLOSED		

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
9.	Verify Proper Emergency SI Valve Alignment:	Manually open valves.	
	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		,
10.	Verify AFW Pumps Running:		
	a. Motor-driven pumps - RUNNING	a. Manually start pumps.	
	b. Turbine-driven pump - RUNNING	b. Perform the following:	
	<u>IF</u> REQUIRED TO MAINTAIN SG LEVELS	 Manually open steam regulator valve: 	n supply
		o PCV-1139	
		Adjust turbine spe control valve as ne	
		o HCV-1118	
		 Open turbine-drive pump FCVs as neces 	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
11.	Verify SI Pumps Running:		
	a. Three SI pumps - RUNNING	a. Perform the followir	ıg:
		1) Manually start pu	umps.
		2) <u>IF</u> three SI pump <u>THEN</u> :	s running,
		a) Ensure MOV-85 MOV-851B are	
		b) Go to step 11	c.
		3) <u>IF</u> 21 AND 22 SI running, <u>THEN</u> :	pumps
		a) Ensure MOV-85	18 open.
		b) Ensure MOV-85	1A closed.
		c) Go to Step 11	с.
		4) <u>IF</u> 22 AND 23 SI running, <u>THEN</u> :	pumps
		a) Ensure MOV-85	1A open.
		b) Ensure MOV-85	1B closed.
		c) Go to Step 11	с.
		5) <u>IF</u> only 22 SI pu <u>THEN</u> :	mp running,
		a) Open AND de-e either MOV-85 MOV-851B	
		b) Go to step 11	с.
	b. 22 SI pump discharge isolation MOV-851A <u>AND</u> MOV-851B - OPEN	b. Manually open valve	s.
	c. Two RHR pumps – RUNNING	c. Manually start pump	S.

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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.	<u>Verify Containment Fan Cooler</u> <u>Units - IN SERVICE:</u>		
	a. Five fan coolers - RUNNING	a. Manually start fan co	olers.
	b. Verify charcoal filter valvesOPEN	b. Manually open valves. charcoal filter valves fan cooler can <u>NOT</u> b opened, <u>THEN</u> manually normal discharge valvaffected fan.	s on a e manually open the
	c. Verify fan normal discharge valves – CLOSED	c. Manually close valves opened to bypass a c charcoal valve.	
	d. Verify TCV-1104 AND TCV-1105 - OPEN	d. Manually open valves.	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINE	D
14.	<u>Verify Containment Ventilation</u> <u>Isolation:</u>		
	a. Containment purge valves - CLOSED:	a. Manually close valv	es.
	o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173	<u>IF</u> valves can <u>NOT</u> ! <u>THEN</u> close valves f room.	
		<u>IF</u> valves can <u>NOT</u> ITHEN dispatch opera personnel to close valves by isolating air.	tor and HP outside
		o FCV-1171, IA-780 o FCV-1173, IA-779	
	b. Containment pressure relief valves - CLOSED:	b. Manually close valv	es.
	o PCV-1190 o PCV-1191 o PCV-1192	\underline{IF} valves can \underline{NOT} \underline{THEN} close valves froom.	
		<u>IF</u> valves can <u>NOT</u> <u>THEN</u> dispatch opera personnel to close valves by isolating air.	tor AND HP outside
		o PCV-1191, IA-777 o PCV-1192, IA-778	
		<u>IF</u> containment prescan <u>NOT</u> be isolated locally close the follower (Fan House 8)	i, <u>THEN</u> ollowing
		o UH-1013, Pressure Inlet Stop o UH-1014, Pressure Outlet stop	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	Verify Containment Isolation Phase A:	
	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:	b. Manually open valves.
	o 1410 o 1413 o SOV-3518 o SOV-3519	
	c. WCP valves - OPEN:	c. Manually open valves.
	o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241	·
	d. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel	
16.	Train A And Train B - Running In	At CCR Panel PY2, perform the following:
	INCIDENT Mode 2	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

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RESPONSE NOT OBTAINED

- 17. <u>Check If Main Steamlines Should</u> <u>Be Isolated:</u>
 - a. Check MSIVs CLOSED
- a. <u>IF</u> ANY of the following signals has occurred, <u>THEN</u> 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 <u>NOT</u> be closed, THEN locally close per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
*18.	<pre>Check If Containment Spray Should Be Actuated:</pre>		
	a. Containment pressure - EVER GREATER THAN 24 PSIG	a. Go to Step 19.	·
	b. Verify spray pumps – RUNNING	b. Manually initiate spr verify both spray pum running. <u>IF NOT</u> , <u>THE</u> start pumps.	ps
	c. Verify spray pump discharge valves - OPEN:	c. Manually open valves.	
	o MOV-866A o MOV-866B o MOV-866C o MOV-866D		
·	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:	e. Manually open valves.	
	o 7864 o 7865 o 7866 o 7867		
	f. Stop all RCPs		

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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.

19. <u>Verify SI Pump Flow:</u>

- a. RCS pressure LESS THAN 1660 PSIG (1690 PSIG FOR ADVERSE CONTAINMENT)
 - SIG FOR PULLOUT AND go to Step 21.
- b. SI pump flow FLOW INDICATED
- b. Manually start pumps and align valves.

a. Place one RHR pump switch in

- 20. <u>Verify RHR Pump Flow:</u>
 - 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.

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21. <u>Verify Total AFW Flow - GREATER</u> THAN 400 GPM

- <u>IF</u> SG narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in any SG, <u>THEN</u> perform the following:
- a. Control feed flow to maintain narrow range level.
- b. Go to step 22.

<u>IF</u> narrow range level less than 9% (26% for ADVERSE CONTAINMENT) in all SGs, <u>THEN</u> perform the following:

- Manually start pumps AND align valves.
- b. <u>IF</u> AFW flow greater than 400 gpm can <u>NOT</u> be established, <u>THEN</u> go to FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK, Step 1.
- 22. <u>Verify AFW Flow To All SGs</u>

Manually start pumps and align valves as necessary.

- 23. <u>Align Service Water System As</u> <u>Follows:</u>
 - 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

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RESPONSE NOT OBTAINED

CAUTION

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

*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 <u>IF</u> 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. <u>IF</u> cooldown continues, <u>THEN</u> 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. <u>IF</u> cooldown continues, <u>THEN</u> close MSIVs. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL

 $\overline{\text{IF}}$ temperature greater than 547 °F and increasing, $\overline{\text{THEN}}$:

o Dump steam to condenser.

- OR -

o Dump steam using SG atmospheric steam dumps.

25. <u>Cr</u> Vā	REACTOR TRIP OR SAF ACTION/EXPECTED RESPONSE neck PRZR PORVs And Spray alves: PORVs - CLOSED	R	ESPONSE NOT OBTAINED
25. <u>Cr</u> Vā	neck PRZR PORVs And Spray		ESPONSE NOT OBTAINED
<u>V ā</u>	alves:	a.	
a.	. PORVs - CLOSED	a.	
			<pre>IF PRZR pressure less than 2335 psig, THEN manually close PORVs.</pre>
			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.
			<pre>IF valve can NOT be closed, THEN locally energize AND close charging line isolation valves:</pre>
			o MOV-205 (At MCC 26AA)
			- OR -
			o MOV-226 (At MCC 26BB) AND MOV-227 (At MCC 26AA)

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
*26.	Check If RCPs Should Be Stopped:		
	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.	Check If Any SG Is Faulted:		
	a. Check pressures in all SGs:	a. Go to Step 28.	
	o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER		
	- OR -		
	o ANY SG COMPLETELY DEPRESSURIZED		
	b. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1		
28.	<pre>Check If SG Tubes Are Intact:</pre>	Go to E-3, STEAM GENERATOR RUPTURE, Step 1.	TUBE
	o NO SG LEVEL INCREASING IN AN UNCONTROLLED MANNER	NOTTONE, Step 1.	
	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		

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RESPONSE NOT OBTAINED

29. Check If RCS Is Intact:

Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

- 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

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

Number:	Title:		Revision Number:
E - 0		REACTOR TRIP OR SAFETY INJECTION	REV. 38

RESPONSE NOT OBTAINED

Evaluate cause of abnormal

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)

35. Check PRT Conditions:

- o Level LESS THAN 77%
- o Pressure LESS THAN $7\ PSIG$
- o Temperature LESS THAN 130°F

conditions. \underline{IF} the cause is a loss of RCS inventory outside containment, \underline{THEN} go to ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 1.

Evaluate cause of abnormal conditions.

<u>IF</u> the cause is a failed open PRZR safety valve, <u>THEN</u> go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

er:		Title:			Revision Number
E-0		REACTOR TRIP OR S	SAFETY	' INJECTION	REV. 38
STEP -	A	CTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
* *	* *	* * * * * * * * * * * * * * * * * * * *		* * * * * * * * * *	* * * * * *
*		<u>CAU</u>	<u> TION</u>		·
* 0 *		offsite power is lost after SI guired to restart safeguards equi			y be
* 0 *	P1a	acing key switches to DEFEAT wil	1 pre	vent auto SI actuation.	
* *	* *	* * * * * * * * * * * * * * * * * * * *	* * *	* * * * * * * * * * *	* * * * * *
36.	<u>Re</u> :	set SI:			
	a.	Check any CCW pump - RUNNING	a.	Place CCR control swit CCW pumps in PULLOUT.	ches for
	b.	Place controls for main AND bypass feedwater regulating valves to CLOSE			·
	С.	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	е.	Ensure Relays reset (1 Safeguards Initiation 1-1 AND 2-1):	
				o SIA-1 o SIM-1 o SIA-2 o SIM-2	

Number:	Title:	Revision Number:
E-0	REACTOR TRIP OR SAFETY INJECTION	REV. 38
	·	

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

Number:	Title:	7	Revision Number:
E-0	REACTOR TRIP OR SAFETY INJECTION		REV. 38
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	f. Verify Train A AND B - RESET	f. Perform the following	ı:
		 Verify correct swi positions per step through 37d 	
		2) One at a time, de Phase A reset but	
		o CI Phase A Trai	n A
		o CI Phase A Trai	п В
		<u>IF</u> Signal does <u>NOT</u> r	eset, <u>THEN</u> :
		 Place keyed switch BYPASS. 	nes to
		2) One at a time, de Phase A reset but	
		o CI Phase A Trai	n A
		o CI Phase A Trai	n B
		<u>IF</u> Signal can <u>NOT</u> be <u>THEN</u> Reset Relays CA on Top of Safeguards Initiation Racks 1-2	1 AND CA2
	g. Check Phase B - ACTUATED	g. Go To Step 38.	
	h. Containment pressure - LESS	h. Perform the following	; :
	THAN 17 PSIG	 WHEN containment less than 17 psig perform steps 37i and 37k. 	, <u>THEN</u>
		2) Continue with Ste	р 38.

Number:	Title:	Revision Number:
E - 0	REACTOR TRIP OR SA	AFETY INJECTION REV. 38
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.	Establish Instrument Air To Containment By Opening PCV-1228	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.	<pre>Check Secondary Radiation - NORMAL:</pre>	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
	o Request periodic activity samples of all SGs	•

Number:	Title:	Revision Number:
E-0	REACTOR TRIP OR SAFETY INJECTION	REV. 38

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.

40. <u>Check If RHR Pumps Should Be Stopped:</u>

- a. Check RCS pressure:
 - 1) Pressure GREATER THAN 320 PSIG
 - 2) Pressure STABLE OR INCREASING
- b. Stop RHR pumps and place in AUTO
- 41. <u>Check If Charging Flow Has Been Established:</u>

- 1) Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.
- 2) Go to Step 41.

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E - 0	REACTOR TRIP OR SAFETY INJECTION	REV. 38

RESPONSE NOT OBTAINED

- 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
- Establish charging flow as necessary to maintain pressurizer level - GREATER THAN 9%(42% FOR ADVERSE CONTAINMENT)
 - Start Charging Pump(s) as necessary
 - 2) IF necessary, THEN Place Speed Controller in manual
 - Adjust charging pump speed to establish flow

Number: E-O	Title: Revision Numbe REACTOR TRIP OR SAFETY INJECTION REV. 38		Revision Number:
STEP	CTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	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 eck If One CCW Pump Should Be	c. Dispatch an operator locally align valves necessary.	
a. b.	CCW pumps - ALL STOPPED Verify adequate power available: o Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR - o Load on running diesel generator - LESS THAN 1760 KW Start one CCW pump on bus with adequate power	a. Go to Step 43. b. IF power NOT available perform the following 1) Refer to SOP 4.1. COMPONENT COOLING OPERATION to estate backup cooling to following: o charging pumps or RHR pumps or SI pumps 2) Go to Step 44.	g: 2 SYSTEM blish

mber:	Title:	Revision Number
E - 0	REACTOR TRIP OR SA	FETY INJECTION REV. 38
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
43.	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 44.
	b. Verify adequate power available:	b. Go to Step 44.
	o Any 480V bus – ENERGIZED FROM OFFSITE POWER	
	- OR -	
	o Load on running diesel generator – LESS THAN 1730 KW	
	 Start one service water pump on non-essential header on bus with adequate power 	
*44.	Check Battery Status:	
	a. Verify battery chargers energized:	a. Perform the following:
	o DC Bus Trouble alarms – CLEARED	 Check MCCs supplying battery chargers - ENERGIZED
	o Battery bus voltage - NORMAL	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
		 WHEN MCCs energized, THEN dispatch operators to energize battery chargers as required.

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E-0	REACTOR TRIP OR SAFETY INJECTION	REV. 38

RESPONSE NOT OBTAINED

- 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.
- 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

Number: E-O	Title: REACTOR TRIP OR SA	FETY INJECTION	Revision Number:
STEP	CTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	2) Stop DC oil pumps as follows: a) Start EITHER AC oil pump: o Bearing Oil pump - OR - o Turning Gear 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	2) IF an AC oil pump of be started, Stop the associated DC oil pump are Turbine shaft stop DC seal oil pump Main Generator Hy vented of MBFPs DC oil pump MBFP shafts stop Continue with Step	te ump as fter Main opped after drogen o after oed
	MBFPs DC oil pump rify Instrument Air Header - BLE	Dispatch NPO to perform t following:	he

- a. Ensure at least one CENTAC running to supply Instrument Air per SOP 29.3 STATION AIR SYSTEM.
- b. $\underline{\text{IF}}$ necessary, $\underline{\text{THEN}}$ 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.

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E - 0	REACTOR TRIP OR SA	FETY INJECTION	REV. 38
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
46.	<u>Dispatch NPO to locally perform</u> <u>the following:</u>		
	o Periodically Check IVSW Tank Level AND Pressure:	o Direct NPO to fill or pressurize tank as nec	essary.
	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 S Air backup <u>OR</u> N2 backu aligned as necessary.	
*47.	<pre>Check If Diesel Generators Should Be Stopped:</pre>		
	a. Verify all 480V busses -	a. Try to restore offsite	e power

- 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

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- STEP -	^	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
48.	<u>Re</u> :	store Ventilation Systems:	•	
	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:	b. Establish portable v per AOI 27.1.9 CONT INACCESSIBILITY SAF	ROL ROOM
		o Bus 3A OR 6A - ENERGIZED BY OFFSITE POWER		
		- OR -		
		o Load on 22 OR 23 diesel generator – LESS THAN 1860 KW		
	c.	Restore PAB ventilation on bus with adequate power.		
	d.	Locally start one 480V switchgear room exhaust fan:	d. <u>IF</u> fan will <u>NOT</u> sta perform the followin	
		o 213 o 215 o 216	 Defeat fan interi Bypass key. 	ock using
		0 210	2) Start one exhaust	fan.
			3) Post fire watch i	

- switchgear room.
- e. Verify at least one cable tunnel exhaust fan RUNNING e. Manually start at least one cable tunnel exhaust fan.

Return To Step 24

49.

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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

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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.

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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.

Number:	Title:	Revision Number:
E-0	REACTOR TRIP OR SAFETY INJECTION	REV. 38

RESPONSE NOT OBTAINED

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

		480V BUSES	
EQUIPMENT	21 DG BUS 5A	22 DG BUS 2A BUS 3A	23 DG BUS 6A
EQUITIENT	003 3A	D03 2A D03 3A	D03 0A
21 SERVICE WATER PUMP 22 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	
23 SERVICE WATER PUMP		ZII KW OK ZII KW	277 KW
24 SERVICE WATER PUMP 25 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	
26 SERVICE WATER PUMP		Z77 KW OK Z77 KW	277 KW
PRZR CONTROL HEATERS			277 KW
21 PRZR BU HEATERS		554 KW	277 131
22 PRZR BU HEATERS 23 PRZR BU HEATERS	485 KW	485 KW	
	, , , , , , , , , , , , , , , , , , , ,	075 111	
21 AFW PUMP 23 AFW PUMP		375 KW	375 KW
21 FAN COOLER UNIT	250 KW		
22 FAN COOLER UNIT	250 KW		
23 FAN COOLER UNIT 24 FAN COOLER UNIT		250 KW 250 KW	
25 FAN COOLER UNIT		230 KW	250 KW
21 SI PUMP	 317 KW		·
22 SI PUMP) 317 KM	317 KW 317 KW	
23 SI PUMP			346 KW
21 SPRAY PUMP	348 KW	·	
22 SPRAY PUMP			348 KW
21 RHR PUMP		319 KW	210 444
22 RHR PUMP			319 KW
21 CHARGING PUMP	150 KW	150 101	
22 CHARGING PUMP 23 CHARGING PUMP		150 KW	150 KW
]		

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E - 0	REACTOR TRIP OR SAFETY INJECTION	REV. 38
ľ		

RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

		480V BUSES	
EQUIPMENT	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 22 CCW PUMP	228 KW	228 KW	
23 CCW PUMP		ZZO NW	228 KW
21 LIGHTING TRANSFORMER		150 KW (N)	150 KW (E)
22 LIGHTING TRANSFORMER 23 LIGHTING TRANSFORMER	225 KW	225 KW	
	LEG KI		110 111
TURBINE AUX OIL PUMP			112 KW
STATION AIR COMPRESSOR	93 KW		

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.

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

RESPONSE NOT OBTAINED

NOTE

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

- Check If Any SG Secondary 1. Pressure Boundary Is Intact:
 - a. Check pressures in all SGs $\,$ a. $\underline{\text{IF}}$ a controlled cooldown is in ANY STABLE OR INCREASING
 - progress, <u>THEN</u> 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.
- Check If Any SG Secondary Pressure Boundary Is Faulted:
 - a. Check pressures in all SGs a. Go to Step 3.

 - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER

- OR -

- o ANY SG COMPLETELY DEPRESSURIZED
- previously isolated:
- b. Verify all faulted SG(s)

 b. You should be in E-2, FAULTED STEAM GENERATOR ISOLATION.
 - o Steamlines
 - o Feedlines

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

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
- 4. You Should Be In An E-1 Or ECA-1
 Series Procedure

You should be in an E-3 or ECA-3 series procedure.

Number:	Title:	Revision Number:
ES-0.1	REACTOR TRIP RESPONSE	REV. 36

A. <u>PURPOSE</u>

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

B. <u>SYMPTOMS OR ENTRY CONDITIONS</u>

This procedure is entered from E-O, 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.

Number:	Title:	Revision	Number:
ES-0.1	REACTOR TRIP RESPONSE	REV.	36

RESPONSE NOT OBTAINED

CAUTION

If SI actuation occurs during this procedure, E-O, 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.
- <u>Verify Power To 480V Busses:</u> 1.
 - OPEN
 - a. Generator output breakers 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.

d. 480V busses - AT LEAST ONE ENERGIZED: o 2A AND 3A RESPONSE NOT OBTAINED 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	Number:	Revision Num			Title:	Ti	Number:		
d. 480V busses - AT LEAST ONE ENERGIZED: o 2A AND 3A - OR - o 5A - OR - o 6A e. 480V busses - ALL ENERGIZED f. Start one charging pump as necessary g. Verify lighting - ENERGIZED h. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED i. Check following MCCs - ENERGIZED d. Try to restore power to at least one 480V bus. If power can NOT be restored to at least one 480V buss. THEN go t ECA-0.0, LOSS OF ALL AC POWER Step 1. d. Try to restore power to at least one 480V bus. If power can NOT be restored to at least one 480V buss. THEN go t ECA-0.0, LOSS OF ALL AC POWER Step 1. 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 h. Reset all MCCs except MCC 28 and MCC 28A. i. Locally reset following MCCs as necessary: o MCC 24 o MCC 27	. 36	ONSE REV. 36	REACTOR TRIP RESPONSE REV. 3		REACTOR TRIP RESPONSE			ES-0.1	
ENERGIZED: o 2A AND 3A - OR - o 5A - OR - o 6A e. 480V busses - ALL ENERGIZED f. Start one charging pump as necessary g. Verify lighting - ENERGIZED h. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED i. Check following MCCs - ENERGIZED east one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can MOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF power can NOT be restored to at least one 480V bus. IF least one 100, and least		SPONSE NOT OBTAINED	RESPONSE	RESPONSE	CTION/EXPECTED RESP	ACT	STEP		
least one 480V bus, THEN go t ECA-0.0, LOSS OF ALL AC POWER Step 1. o 5A o 6A 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 d. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED i. Check following MCCs - ENERGIZED o MCC 24 o MCC 27 o MCC 24 o MCC 27	r	least one 480V bus. <u>IF</u> power	least	T LEAST ONE					
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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 - i. Locally reset following MCCs as necessary: o MCC 24 o MCC 27		loaded, <u>THEN</u> ensure one cable tunnel exhaust fan	l oa cab						
h. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED i. Check following MCCs - ENERGIZED i. Locally reset following MCCs as necessary: o MCC 24 o MCC 27 o MCC 24 o MCC 27				ng pump as					
and MCC 28A - ENERGIZED and MCC 28A. i. Check following MCCs - ENERGIZED i. Locally reset following MCCs as necessary: o MCC 24 o MCC 24 o MCC 27		Reset lighting.	g. Reset	- ENERGIZED	Verify lighting - E	g. Ve			
energized as necessary: o MCC 24 o MCC 27 o MCC 27									
o MCC 27 o MCC 27				MCCs -					
		o MCC 27	o MCC		o MCC 27	0			

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ES-0.1	REACTOR TRIP RESPONSE	REV.	36

RESPONSE NOT OBTAINED

CAUTION

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

* 2. <u>Check RCS Temperatures -</u>

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 <u>IF</u> temperature less than 547 °F and decreasing, <u>THEN</u>:

- 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. <u>IF</u> cooldown continues, <u>THEN</u> 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. <u>IF</u> cooldown continues, <u>THEN</u> close MSIVs. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> locally close MSIVs per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.

 $\overline{\text{IF}}$ temperature greater than 547 °F and increasing, $\overline{\text{THEN}}$:

o Dump steam to condenser.

- OR -

o Dump steam using SG atmospheric steam dumps.

umber: ES-0.1	Title: REACTOR TRIP	RESPONSE	Revision Number:
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
3.	<u>Check FW Status:</u>		
	a. Check RCS average temperature - LESS THAN 541°F	 a. Continue with Step 4. temperature decreases than 541°F, <u>THEN</u> do S 3c and 3d. 	to less
	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 as necessary.	the SGs
4.	Verify The Following Automatic Actions Have Occurred:	Manually perform actions appropriate.	as
	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		

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			Ĭ

RESPONSE NOT OBTAINED

- 5. <u>Verify All Control Rods Fully</u> <u>Inserted:</u>
 - a. Check IRPI Indicators -ENERGIZED
 - b. Check IRPI Indicators ALL RODS LESS THAN 7.5 INCHES
- a. Implement AOI 3.4, UNCONTROLLED REACTIVITY ADDITION.
- b. Check all rod positions using PROTEUS (Refer to ATTACHMENT 4, OBTAINING PROTEUS ROD POSITION INDICATION)
 - 1) <u>IF 2 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.

Number:	Title:		Revision Number:
ES-0.1 REACTOR TRI		P RESPONSE .	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
6.	Check PRZR Level Control:		
	a. Verify charging – IN SERVICE	a. Manually place in serv	rice:
		 Start charging pump necessary. 	os as .
		 Establish flow as by adjusting charges speed controller. 	
	b. Level - GREATER THAN 18%	b. Perform the following:	
		1) Verify letdown iso <u>IF NOT</u> ,THEN manual isolate letdown by performing the fol	
		a) Manually close orifice isolation	letdown on valves:
		o 200A o 200B o 200C	
		b) Manually close line isolation	letdown valves:
		o 201 o 202	
		2) Verify PRZR heater <u>NOT</u> , <u>THEN</u> manually	s off. <u>IF</u> turn off.
		3) Control charging to PRZR level to grea 18%.	restore ter than
		4) <u>WHEN</u> PRZR level gr than 18%, <u>THEN</u> pla letdown in service reenergize PRZR he necessary.	ice and
		5) Go to Step 6d.	
	c. Verify letdown - IN SERVICE	c. Manually place in ser	vice.
	d. Level – TRENDING TO 37%	d. Control charging and l to maintain level at	etdown 37%.

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ES-0.1	REACTOR TRIP RESPONSE	REV. 36

RESPONSE NOT OBTAINED

- 7. Check PRZR Pressure Control:
 - a. Pressure GREATER THAN 1840 PSIG
 - b. Pressure STABLE AT OR TRENDING TO 2235 PSIG
- a. Verify SI actuation. <u>IF NOT, THEN</u> manually actuate SI. Go to E-O, REACTOR TRIP OR SAFETY INJECTION, Step 1.
- b. <u>IF</u> pressure less than 2235 psig and decreasing, <u>THEN</u>:
 - 1) Verify PRZR PORVs closed. <u>IF 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 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.

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STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

<u>IF</u> pressure greater than 2235 psig and increasing, THEN:

- 1) Verify PRZR heaters off. <u>IF NOT</u>, <u>THEN</u> manually turn off.
- 2) Control pressure using normal PRZR spray. <u>IF NOT</u> available and letdown is in service, <u>THEN</u> 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.

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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. Check SG Levels:
 - a. Narrow range level GREATER .THAN 9%
 - b. Control feed flow to maintain narrow range level between 9% and 52%
- * 9. <u>Verify All 480V Busses -</u> ENERGIZED BY OFFSITE POWER
 - a. All 480V busses ENERGIZED BY OFFSITE POWER

- a. Maintain total feed flow greater than 400 gpm until narrow range level greater than 9% in at least one SG.
- b. $\underline{\text{IF}}$ narrow range level in any SG continues to increase, $\underline{\text{THEN}}$ stop feed to that SG.
- 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.

Number:	Title:		Revision Number:
ES-0.1	REACTOR TRIP	RESPONSE	REV. 36
→ STEP →	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	Restore Ventilation Systems:		
a	a. Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitor and R-44 in service pe SOP 12.3.2, DIGITAL RA MONITORING SYSTEM OPEL LOCAL.	r ADIATION
t t	o. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER	b. Establish portable ven per AOI 27.1.9 CONTROL INACCESSIBILITY SAFE S CONTROL. Go To Step 1	_ ROOM SHUTDOWN
	- OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW		
	c. Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	c. Establish portable ven per AOI 27.1.9 CONTROL INACCESSIBILITY SAFE CONTROL	_ ROOM
	d. Locally start one 480V switchgear room exhaust fan:	d. <u>IF</u> fan will not start, perform the following:	
	o 213 o 215 o 216	 Defeat fan interloc Bypass key. 	k using
	0 210	2) Start one exhaust f	
		Post fire watch in switchgear room.	480 V
	e. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at leas cable tunnel exhaust t	
	Transfer Condenser Steam Dump To Pressure Control Mode	<u>IF</u> condenser <u>NOT</u> availabluse SG atmospheric steam	
	Check MCC 28 And MCC 28A - ENERGIZED	<u>IF</u> containment sump level than 44'3" <u>AND</u> containmen conditions <u>NOT</u> adverse, reset MCC 28 and MCC 28A	nt <u>THEN</u>

Number:	Title:	Revision Number:
ES-0.1	REACTOR TRIP RESPONSE	REV. 36

RESPONSE NOT OBTAINED

NOTE

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

13. <u>Check RCP Status - AT LEAST ONE</u> RUNNING

Perform the following:

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

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ES-0.1	REACTOR TRIP RESPONSE	REV. 36

RESPONSE NOT OBTAINED

- 15. <u>Shut Down Unnecessary Plant</u> 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. <u>Maintain Stable Plant Conditions:</u>
 - 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. <u>Determine If Plant Cooldown Is</u> 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

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ES-0.1	REACTOR TRIP RESPONSE	REV. 36

ATTACHMENT 1 PRESSURIZER HEATER LOADS

Heater <u>Group</u>	Total <u>KW</u>	480V Bus Supply	Total No. of Heaters	No. of Heater <u>Banks</u>	KW per Heater <u>Banks</u>
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

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ES-0.1	REACTOR TRIP RESPONSE	REV.	36

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	RCS SUBCOOLING °F
(PSIG)	(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 $\ensuremath{\mathsf{PRESSURE}}$

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RESPONSE NOT OBTAINED

1. <u>Use the following table to determine equipment load ratings:</u>

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

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STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

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

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ES-0.1	REACTOR TRIP RESPONSE	REV.	36
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RESPONSE NOT OBTAINED

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

Number:	Title:		Revision Number:
ES-0.2		NATURAL CIRCULATION COOLDOWN	REV. 34

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.

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ES-0.2	NATURAL CIRCULATION COOLDOWN	REV.	34

RESPONSE NOT OBTAINED

CAUTION

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

- * 1. Try To Energize All 480V Busses From Offsite Power:
 - a. Check 138KV feeder 95332 or a. Go to Step 1c. 95331 - ENERGIZED
 - b. Go to Step 1d
 - c. Check 13.8KV feeder 13W92 -ENERGIZED
- c. <u>IF</u> 13.8KV feeder <u>NOT</u> energized, <u>THEN</u> 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.

umber:	Title:		Revision Number:
ES-0.2	NATURAL CIRCUL	NATURAL CIRCULATION COOLDOWN	
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
		4) IF 52GT/BT can NO closed AND no GT con blackstarted, THE district operator implement EO-4087 PROCEDURE FOR RESTOF ELECTRICAL SUPLINDIAN POINT NO. 3. WHEN 13.8KV feede energized, THEN grant street in the stree	Tan be Note to the contact to the co
		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. <u>IF</u> 480V bus 5A <u>OR</u> 6A energized, <u>THEN</u> perfollowing:	<u>NOT</u> orm the
		1) Restore offsite po 480V busses per A Loss of Normal Sta	OI 27.1.1,
		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		

Number:	Title:	 	Revision Number:
ES-0.2	NATURAL CIRCULAT	ION COOLDOWN	REV. 34
STEP	CTION/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 and MCC 28A.	MCC 28
	Check following MCCs – ENERGIZED	j. Locally reset followin as necessary:	g MCCs
	o MCC 24 o MCC 27 o MCC 29	o MCC 24 o MCC 27 o MCC 29	
	eck MCC 28 And MCC 28A - RGIZED	<u>IF</u> containment sump level than 44'3" <u>AND</u> containment conditions <u>NOT</u> adverse, reset MCC 28 and MCC 28A.	nt <u>THEN</u>
	·		

ES-0.2	Title: NATURAL CIRCULAT	natural circulation cooldown	
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAIN	ED
3. <u>R</u> €	estore Ventilation Systems:		
а.	Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation mon and R-44 in servic SOP 12.3.2, DIGITA MONITORING SYSTEM LOCAL.	ce per AL RADIATION
· b.	. Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER	b. Establish portable per AOI 27.1.9 COI INACCESSIBILITY S CONTROL. Go To St	NTROL ROOM AFE SHUTDOWN
	- OR -		
	o Load on 22 or 23 diesel generator – LESS THAN 1860 KW		
c.	Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	c. Establish portable per AOI 27.1.9 COI INACCESSIBILITY S CONTROL	NTROL ROOM
d	. Locally start one 480V switchgear room exhaust fan:	d. <u>IF</u> fan will not st perform the follow	
	o 213 o 215	1) Defeat fan inte Bypass key.	erlock using
	o 216	2) Start one exhau	ıst fan.
		3) Post fire watch switchgear room	
е	. Verify at least one cable tunnel exhaust fan - RUNNING	e. Manually start at cable tunnel exhau	

Number:	Title:	Revision Number:
ES-0.2	NATURAL CIRCULATION COOLDOWN	REV. 34

RESPONSE NOT OBTAINED

CAUTION

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

- 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 4 should be repeated.

* 4. Try To Restart An RCP As Follows:

- 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. <u>Initiate RCS Boration Per</u> Cooldown Curve From Graphs Book
- 6. <u>Verify RCS Boron Concentration By Sampling</u>

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
7.	Check VCT Makeup Control System:		
	a. RCS boration - COMPLETE	 a. Continue with Step 8. boration complete, <u>The Steps 7b and 7c.</u> 	
	b. Set makeup for required boron concentration		
	c. Set makeup for automatic control		
8.	<u>Verify All CRDM Fans - RUNNING</u>	<u>IF</u> MCC 28 <u>OR</u> MCC 28A ene <u>THEN</u> start all CRDM fans	
9.	<u>Initiate RCS Cooldown To Cold</u> <u>Shutdown:</u>		
	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 dum 	os.
	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.	<u>Check RCS Hot Leg Temperatures - LESS THAN 550°F</u>	Return to Step 9.	

ES-0.2 NATURAL CIRCULATION COOLDOWN REV. 34 TRESPONSE 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 NOI be established, THEN use one PRZR PORV and block valve. Go to Step 12. b. Use auxiliary spray as follows: b. Use one PRZR PORV and block valve. 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-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.	mber:	Title:		Revision Number
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7) Initiate spray slowly using HCV-142.8) Adjust charging pump speed		6) Open auxiliary spray valve:		
HCV-142. 8) Adjust charging pump speed		o 212		
• •				

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RESPONSE NOT OBTAINED

CAUTION

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

- 12. <u>Block Low PRZR Pressure SI</u>
- 13. <u>Maintain Following RCS</u> <u>Conditions:</u>
 - 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 ESO2-1)
- 14. Monitor RCS Cooldown:
 - o Core exit TCs DECREASING
 - o RCS hot leg temperatures DECREASING
 - o RCS subcooling based on core exit TCs INCREASING

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RESPONSE NOT OBTAINED STEP ACTION/EXPECTED RESPONSE

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. <u>Initiate RCS Depressurization:</u>

- 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.

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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.

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RESPONSE NOT OBTAINED

NOTE

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

- 16. <u>Continue RCS Cooldown And</u> Depressurization:
 - a. Maintain cooldown rate in RCS cold legs LESS THAN 25°F/HR
 - b. Maintain subcooling requirements of Step 15
 - c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ESO2-1)
- b. Stop depressurization and re-establish subcooling.

- 17. <u>Check For Steam Void In Reactor Vessel:</u>
 - 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.

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:	

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.

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

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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

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

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RESPONSE NOT OBTAINED

<u>CAUTION</u>

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

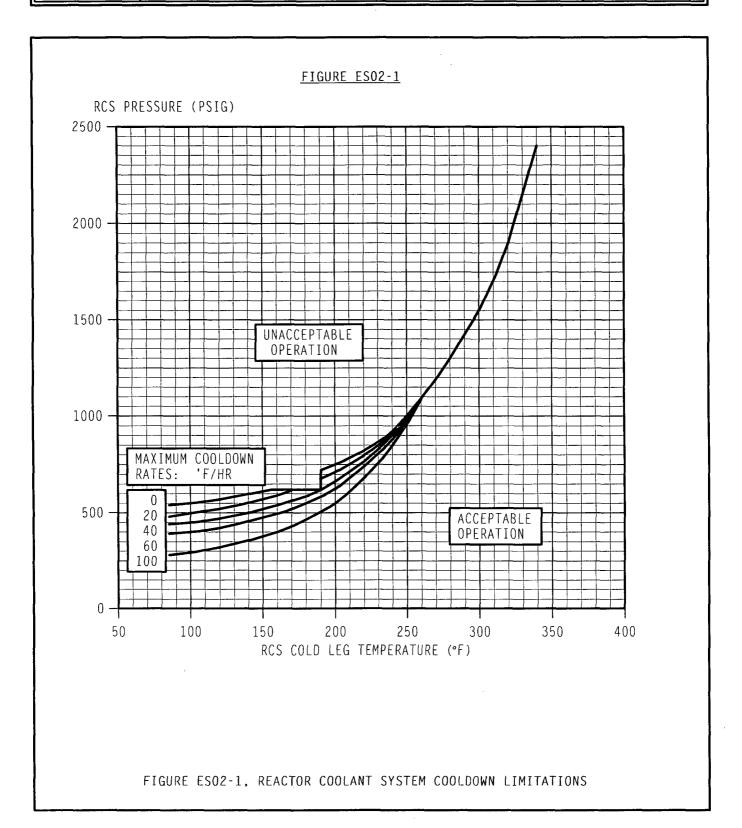
- 25. <u>Continue Cooldown Of Inactive</u> <u>Portion Of RCS:</u>
 - o Cool upper head region using CRDM fans
 - o Cool SG U-tubes by dumping steam from all SGs

NOTE

A waiting period of 27 hours is necessary to allow the head to cool to less than $200\,^{\circ}\text{F}$ if CRDM fans are not running.

- 26. <u>Determine If RCS Depressurization</u>
 <u>Is Permitted:</u>
 - a. Entire RCS LESS THAN 200°F
- a. DO <u>NOT</u> DEPRESSURIZE RCS. Return to Step 24.
- b. Go to POP 3.3, PLANT COOLDOWN

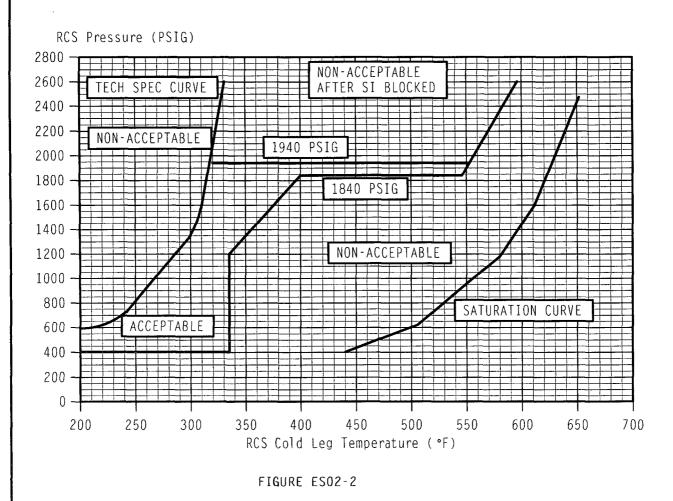
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FIGURE ES02-2

- 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.



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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.

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NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITH RVLIS)

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

- o If SI actuation occurs during this procedure, E-O, 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.
- 1. <u>Check RVLIS AVAILABLE</u>

IF RVLIS <u>NOT</u> available, <u>THEN</u> 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.

* 2. Try To Restart An RCP As Follows:

- 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 3.
- b. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION
- b. Go to Step 3.

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

- d. Start one RCP
- e. Go to appropriate plant procedure:
 - o POP 1.1, PLANT HEATUP

- OR -

o POP 3.3, PLANT COOLDOWN

d. Go to Step 3.

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STEP

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ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE

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

3. Establish PRZR Level To Accommodate Void Growth:

- a. Check PRZR level BETWEEN 20% a. Control charging and letdown AND 35%
 - 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.

Continue RCS Cooldown And 4. Initiate Depressurization:

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

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- c. Maintain RCS temperature and pressure - WITHIN LIMITS OF TECHNICAL SPECIFICATION COOLDOWN CURVE (REFER TO FIGURE ESO3-1)
- 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 2048 Loop 21
 - 5) Close the pressurizer spray valves:
 - o PCV-455A
 - o PCV-455B
 - 6) Open auxiliary spray valve:
 - 0 212
 - 7) Initiate spray slowly using HCV-142.
 - 8) Adjust charging pump speed to increase spray flow.

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RESPONSE NOT OBTAINED

- 5. <u>Control PRZR Level:</u>
 - 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:
 - 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.

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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.

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

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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

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VESSEL (WITH RVLIS)

STEP

RESPONSE NOT OBTAINED

8. Check If SI Pumps Should Be Isolated:

ACTION/EXPECTED RESPONSE

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

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STEP

ES-0.3

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.

14. Continue Cooldown Of Inactive Portion Of RCS:

- 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.

- 15. <u>Determine If RCS Depressurization</u> <u>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-

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ES-0.3	NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN	REV. 34

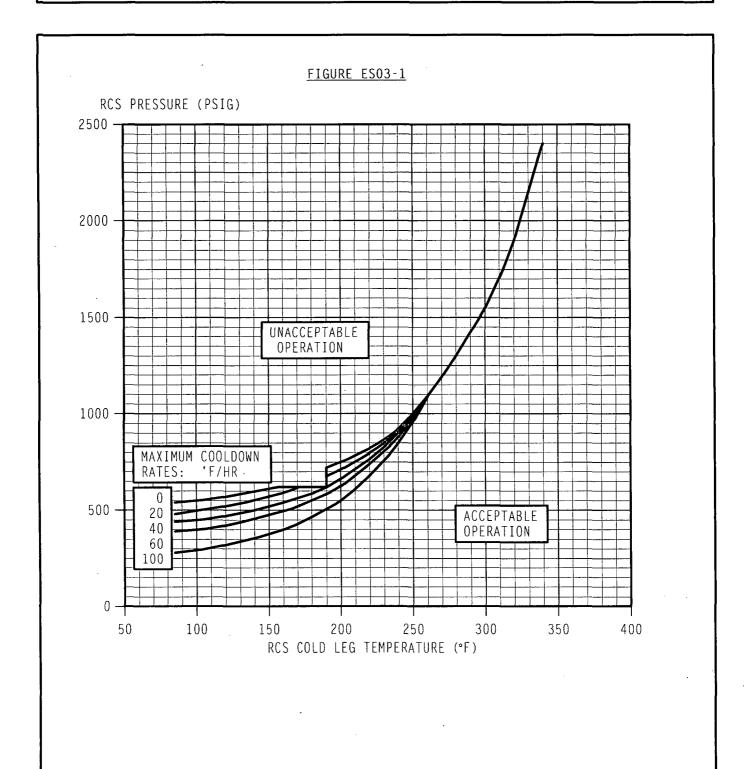


FIGURE ES03-1, REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS

Number: Title:

ES-0.4

NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

Revision Number:

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 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.

Title:

NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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STEP

ES-0.4

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

If SI actuation occurs during this procedure, E-O, 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.

***** 1. 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 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%.

Number: Title: Revision Number: NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN ES-0.4 REV. 34 VESSEL (WITHOUT RVLIS)

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

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.

- 2. Establish PRZR Level To Accommodate Void Growth:
 - a. Check PRZR level BETWEEN 20% a. Control charging and letdown AND 35%
 - as necessary.
 - b. Place charging pump speed controls in manual

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NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- Decrease RCS Hot Leg Temperatures 3. To 500°F:
 - 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 e. Return to Step 3a. - LESS THAN 500°F

f. Stop RCS cooldown

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VESSEL (WITHOUT RVLIS)

REV. 34

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 c. Return to Step 4a. 1600 PSIG
- d. Stop RCS depressurization

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NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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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.
- 5. <u>Decrease RCS Hot Leg Temperatures</u> 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 e. Return to Step 5a. LESS THAN 400°F
 - f. Stop RCS cooldown
- 6. <u>Equalize Charging And Letdown</u> Flows:
 - a. Place charging and letdown controls in manual
 - b. Control charging and seal injection flows to equal letdown and seal return flows

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ES-0.4 NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

7. <u>Maintain RCP Seal Injection Flow</u>
- 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.

- 8. <u>Check If SI Accumulators Should</u> Be Isolated:
 - a. RCS pressure LESS THAN 1000 PSIG
- a. DO <u>NOT</u> ISOLATE ACCUMULATORS. Continue with Step 9. <u>WHEN</u> RCS pressure less than 1000 psig, <u>THEN</u> 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

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NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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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

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NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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STEP

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ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE

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

- 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.

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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.

10. Check PRZR Level - LESS THAN 88%

Increase RCS pressure by 100 psi using PRZR heaters. Return to Step 9.

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STEP

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ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- Decrease RCS Hot Leg Temperatures 11. To 350°F:
 - 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 e. Return to Step 11a. - LESS THAN 350°F

- f. Stop RCS cooldown
- Check If SI Pumps Should Be 12. <u>Isolated:</u>
 - a. RCS hot leg temperature LESS a. DO <u>NOT</u> ISOLATE SI PUMPS. THAN 350°F
 - Return to Step 11.
 - b. Place SI pump control switches in PULLOUT
- 13. 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

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STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- 14. <u>Depressurize RCS:</u>
 - 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.
 - 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

ber: ES-0.4	NATURAL CIRCULATION COOLDO VESSEL (WITHO		Revision Number:
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
15.	Check PRZR Level - LESS THAN 88%	Increase RCS pressure by using PRZR heaters. Ret Step 14.	
16.	<u>Check If RHR System Can Be Placed</u> <u>In Service:</u>		
	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		
* * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * *
	epressurizing the RCS before the ent esult in additional void formation in		F may * *
* *	* * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * *

- - o Cool upper head region using CRDM fans
 - o Cool SG U-tubes by dumping steam from all SGs

Title:

NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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STEP

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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. <u>Determine If RCS Depressurization</u> <u>Is Permitted:</u>
 - 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-

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NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL (WITHOUT RVLIS)

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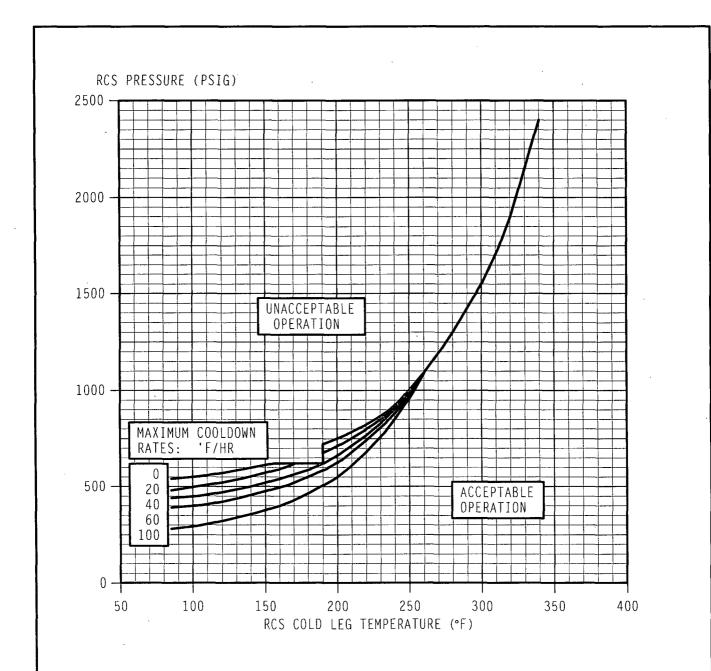


FIGURE ESO4-1, REACTOR COOLANT SYSTEM COOLDOWN LIMITATIONS

Number:	Title:	Revision Number:
E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36
1		

A. <u>PURPOSE</u>

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

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E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

- 1. E-O, 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-O, 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-O, REACTOR TRIP OR SAFETY INJECTION, Step 35, if cause is due to a failed open PRZR safety valve.
- 4. E-O, 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.

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E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36

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.

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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.

* 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

E-1 LOSS OF REACTOR OR SECONDARY COOLANT REV. 36 STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 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 b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines * 3. Check Intact SG Levels: a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT) b. Control feed flow to maintain narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. b. If narrow range level in any SG continues to increase in an uncontrolled manner, THEN go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.	mber:	Title:	Revision Numbe
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 b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines * 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 in an uncontrolled manner, THEN go to E-3, STEAM GENERATOR TUBE	E-1	LOSS OF REACTOR OR	SECONDARY COOLANT REV. 36
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 b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines * 3. Check Intact SG Levels: a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT) b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) in at least one SG. b. Control feed flow to maintain narrow range level in any SG continues to increase in an uncontrolled manner, IHEN go to E-3, STEAM GENERATOR TUBE	STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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o ANY SG COMPLETELY DEPRESSURIZED b. Verify all faulted SG(s) previously isolated: o Steamlines o Feedlines * 3. Check Intact SG Levels: a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT) b. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1. 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. If narrow range level in any SG continues to increase in an uncontrolled manner, THEN go to E-3, STEAM GENERATOR TUBE			
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previously isolated: o Steamlines o Feedlines * 3. Check Intact SG Levels: a. Narrow range level - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT) b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52% GENERATOR ISOLATION, Step 1. 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. IF narrow range level in any SG continues to increase in an uncontrolled manner, THEN go to E-3, STEAM GENERATOR TUBE			
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THAN 9% (26% FOR ADVERSE CONTAINMENT) b. Control feed flow to maintain narrow range level in any 126% FOR ADVERSE CONTAINMENT) 15 and 52% greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG. b. IF narrow range level in any SG continues to increase in an uncontrolled manner, THEN go to E-3, STEAM GENERATOR TUBE	* 3.	Check Intact SG Levels:	
narrow range level between 9% SG continues to increase in an (26% FOR ADVERSE CONTAINMENT) uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE		THAN 9% (26% FOR ADVERSE	greater than 400 gpm until narrow range level greater than 9% (26% for ADVERSE CONTAINMENT) in at least one
		narrow range level between 9% (26% FOR ADVERSE CONTAINMENT)	SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE

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· E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36
!	•	

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.

- * 4. <u>Check PRZR PORVs And Block</u> Valves:
 - a. Power to block valves -AVAILABLE
- a. Restore power to block valvesby 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 any valve can NOT be closed, THEN verify its block valve closed.

Number:	Title:	_	Revision Number:
E - 1	LOSS OF REACTOR OR S	SECONDARY COOLANT	REV. 36
			<u> </u>
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
* * * *	* * * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * *
*	CAUT	<u>ION</u> .	*
	offsite power is lost after SI required to restart safeguards equip		y be , *
	acing key switches to DEFEAT will	prevent auto SI actuation.	* *
* * * *	* * * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * *
F 5	. act CI		
5. <u>Re</u>	set SI:		
ā.	Check any CCW pump - RUNNING	 a. Place CCR control swit CCW pumps in PULLOUT. 	ches for
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	•	•
^	Verify Train A AND B - RESET	o Encuro Dolove monot (Top of
е.	VETTINE THATH A AND B - RESEL	e. Ensure Relays reset (Safeguards Initiation 1–1 AND 2–1):	
		o SIA-1 o SIM-1 o SIA-2 o SIM-2	

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E - 1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36

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

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E - 1	LOSS OF REACTOR OR	SECONDARY COOLANT	REV. 36		
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED			
-	f. Verify Train A AND B - RESET	f. Perform the following:			
		 Verify correct swit positions per step through 6d 			
		2) One at a time, dep Phase A reset butt			
		o CI Phase A Train A o CI Phase A Train B			
		 Place keyed switch BYPASS. 	es to		
				2) One at a time, dep Phase A reset butt	
		o CI Phase A Train	Α		
		o CI Phase A Train	В		
	•				
		<u>IF</u> Signal can <u>NOT</u> be <u>THEN</u> Reset Relays CA1 on Top of Safeguards Initiation Racks 1-2	AND CA2		
	g. Check Phase B - ACTUATED	g. Go To Step 7.			
	h. Containment pressure – LESS THAN 17 PSIG	h. Perform the following	:		
	INAM 17 F31G	1) <u>WHEN</u> containment p less than 17 psig, Steps 6i, 6j and 6	THEN do		
		2) Continue with Step	7.		

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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

 $\overline{\text{IF}}$ Phase A is $\underline{\text{NOT}}$ reset $\overline{\text{THEN}}$ re-perform step 6.

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E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36

RESPONSE NOT OBTAINED

- 8. Check Secondary Radiation -NORMAL:
- Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
- 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

CAUTION

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

- Check If Charging Flow Has Been Established:
 - a. Charging pumps AT LEAST ONE a. Perform the following: RUNNING
- - 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:

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				·		L	

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
- Establish charging flow as necessary to maintain pressurizer level - GREATER THAN 11%(33% FOR ADVERSE CONTAINMENT)
 - Start Charging Pump(s) as necessary
 - 2) IF necessary Place Speed Controller in manual
 - 3) Adjust charging pump speed to establish flow

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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.

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E-1	LOSS OF REACTOR OR S	SECONDARY COOLANT	RÉV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
10.	Check If SI Should Be Terminated:		
	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 Go to Step 12.	PUMPS.
	b. Secondary heat sink:	b. <u>IF</u> neither condition satisfied, <u>THEN</u> DO <u>NO</u>	
	o Total feed flow to intact SGs - GREATER THAN 400 GPM	SYSTEM PUMPS. Go to	
	- OR -		•
	o Narrow range level in at least one intact SG - GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)		
	c. RCS pressure:	c. DO <u>NOT</u> STOP SI SYSTEM Go to Step 12.	PUMPS.
	o Pressure – GREATER THAN 1660 PSIG (1690 PSIG FOR ADVERSE CONTAINMENT)	do to 5tcp 12.	
	o Pressure – STABLE OR INCREASING		•
	d. PRZR level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)	d. DO <u>NOT</u> STOP SI SYSTEM Go to Step 12.	PUMPS.
11.	Go To ES-1.1, SI TERMINATION, Step 1		
			·

ber: E-1	Title:	ROR SECONDARY COOLANT	evision Number REV. 36
F-1	LUSS OF REACTOR	OR SECONDARY COULANT	KEV. 30
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
*12.	<u>Check If Containment Spray Shou</u> <u>Be Stopped:</u>	<u>.</u>	
	a. Spray pumps – RUNNING	a. Go To Step 13.	
	b. Containment pressure - LESS THAN 17 PSIG	b. Perform the following:	
	THAN 17 PSIG	1) <u>WHEN</u> containment pres less than 17 psig, <u>TI</u> Steps 12c through 12f	<u>HEN</u> do
		2) Continue with Step 13	3.
	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	Ţ	
	o R-25, R-26	1) <u>WHEN</u> containment spra been in service for	
	o R-41, R-42	3.5 hours, <u>THEN</u> perfo substeps 12e and 12f	
	o R-2, R-7	2) Go to Step 13.	
	e. Stop containment spray pump and place in AUTO	5	
	f. Close containment spray pum discharge valves:		
	o MOV-866A o MOV-866B o MOV-866C o MOV-866D	•	

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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. 13. Check If RHR Pumps Should Be Stopped: a. Check RCS pressure: 1) Pressure - GREATER THAN 1) Go to Step 15. 320 PSIG (340 PSIG FOR . ADVERSE CONTAINMENT) 2) Pressure - STABLE OR 2) Go to Step 14. INCREASING b. Stop RHR pumps and place in AUT0 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

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E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36

RESPONSE NOT OBTAINED

Check Battery Status: *15.

- a. Verify battery chargers a. Perform the following: energized:
 - o DC Bus Trouble alarms -CLEARED
 - o Battery bus voltage NORMAL
- - 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.

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E-1 LOSS OF REACTOR OR SE	CONDARY COOLANT REV. 36
STEP ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
c. Reduce DC load as follows:	
1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	<pre>1) Stop DC oil pumps as follows:</pre>
	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:	2) <u>IF</u> an AC oil pump can <u>NOT</u> be started. Stop the associated DC oil pump as follows:
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	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
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	

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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.	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 $\overline{\text{OR}}$ N2 backup are aligned as necessary.	

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E-1	LOSS OF REACTOR OR SECONDARY COOLANT	REV. 36

RESPONSE NOT OBTAINED

- *18. <u>Check If Diesel Generators Should</u> <u>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

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STEP 19.	ACTION/EXPECTED RESPONSE Restore Ventilation Systems:	RESPONSE NOT OBTAINED
	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 -	b. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL. Go To Step 19d.
	o Load on 22 or 23 diesel generator - LESS THAN 1860 KW	c. Establish portable ventilation
	supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load d. Locally start one 480V	per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL d. <u>IF</u> fan will not start, <u>THEN</u>
	switchgear room exhaust fan: o 213 o 215 o 216	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.

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RESPONSE NOT OBTAINED

20. Initiate Evaluation Of Plant Status:

- 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
- 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)
- 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

a. Try to restore cold leg recirculation capability.

> <u>IF</u> cold leg recirculation capability can NOT be verified, THEN go to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1.

- b. Try to identify and isolate leakage:
 - o Dispatch trained personnel to survey PAB.

IF the cause is a loss of RCS inventory outside containment, THEN go to ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 1.

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RESPONSE NOT OBTAINED

- 21. <u>Check Containment Hydrogen</u> <u>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 22.

NOTE

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

- 22. <u>Check If RCS Cooldown And</u> <u>Depressurization Is Required:</u>
 - a. RCS pressure GREATER THAN320 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

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RESPONSE NOT OBTAINED

- 23. <u>Check If Transfer To Cold Leg</u>
 <u>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-

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E-1 LOSS OF REACTOR OR SECONDARY COOLANT REV. 36

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

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

EQUIPMENT	21 DG BUS 5A	480V BUSES 22 DG BUS 2A BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP 22 SERVICE WATER PUMP 23 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	277 KW
24 SERVICE WATER PUMP 25 SERVICE WATER PUMP 26 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	277 KW
PRZR CONTROL HEATERS 21 PRZR BU HEATERS 22 PRZR BU HEATERS		554 KW 485 KW	277 KW
23 PRZR BU HEATERS 21 AFW PUMP 23 AFW PUMP	485 KW	375 KW	375 KW
21 FAN COOLER UNIT 22 FAN COOLER UNIT 23 FAN COOLER UNIT	250 KW 250 KW	250 KW	·
24 FAN COOLER UNIT 25 FAN COOLER UNIT		250 KW	250 KW
21 SI PUMP 22 SI PUMP 23 SI PUMP	317 KW	317 KW 317 KW	346 KW
21 SPRAY PUMP 22 SPRAY PUMP	348 KW	1	348 KW
21 RHR PUMP 22 RHR PUMP		319 KW	319 KW
21 CHARGING PUMP 22 CHARGING PUMP 23 CHARGING PUMP	150 KW	150 KW	150 KW

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STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	21 DG BUS 5A	480V BUSES 22 DG BUS 2A BUS 3A	23 DG BUS 6A
21 RECIRC PUMP 22 RECIRC PUMP	304 KW		304 KW
21 CCW PUMP 22 CCW PUMP	228 KW	228 KW	220 NA
23 CCW PUMP 21 LIGHTING TRANSFORMER 22 LIGHTING TRANSFORMER		150 KW (N) 225 KW	228 KW 150 KW (E)
23 LIGHTING TRANSFORMER TURBINE AUX OIL PUMP	225 KW		112 KW
STATION AIR COMPRESSOR	93 KW		

-END-

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ES-1.1	SI TERMINATION	REV.	36

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-O, 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

 ${\sf EOP}$ 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.

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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.

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

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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

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RESPONSE NOT OBTAINED

- f. Verify Train A AND B RESET
- f. Perform the following:
 - 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

<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
- h. Containment pressure LESS THAN 17 PSIG
- g. Go To Step 3.
- h. Perform the following:
 - 1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> do Steps 2i, 2j and 2k.
 - 2) Continue with Step 3.

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[]		

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

 $\underline{\text{IF}}$ Phase A is $\underline{\text{NOT}}$ reset $\underline{\text{THEN}}$ re-perform step 2.

- 4. Stop SI System Pumps And Place In AUTO:
 - o RHR pumps
 - o SI pumps

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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 a. Perform the following: RUNNING
 - - 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

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RESPONSE NOT OBTAINED

- Establish charging flow as necessary to maintain pressurizer level - GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)
 - Start Charging Pump(s) as necessary
 - 2) IF necessary Place Speed Controller in manual
 - 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.

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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. <u>Verify SI System Flow Not Required:</u>
 - a. RCS subcooling based on core exit TCs GREATER THAN VALUE OBTAINED FROM TABLE:
- a. Manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

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

- b. PRZR level GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)
- b. Control charging flow to maintain PRZR level. <u>IF</u> PRZR level can <u>NOT</u> be maintained, <u>THEN</u> manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

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ACTION/EXPECTED RESPONSE STEP

RESPONSE NOT OBTAINED

- ***** 7. Check If Containment Spray Should Be Stopped:
 - a. Spray pumps RUNNING
 - b. Containment pressure LESS THAN 17 PSIG
- a. Go To Step 8.
- 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 d. PERFORM the following: NORMAL
 - o R-25, R-26
 - o R-41, R-42
 - o R-2, R-7
- 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

- - 1) WHEN containment spray has been in service for 3.5 hours, <u>THEN</u> perform substeps 7e and 7f.
 - 2) Go to Step 8.

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RESPONSE NOT OBTAINED

- 8. <u>Verify All Control Rods Fully</u> <u>Inserted:</u>
 - a. Check IRPI Indicators -ENERGIZED
 - b. Check IRPI Indicators ALL RODS LESS THAN 7.5 INCHES
- a. Implement AOI 3.4, UNCONTROLLED REACTIVITY ADDITION.
- b. Check all rod positions using PROTEUS (Refer to ATTACHMENT 3, OBTAINING PROTEUS ROD POSITION INDICATION)
 - 1) <u>IF 2 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.

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RESPONSE NOT OBTAINED

- 9. <u>Check If One CCW Pump Should Be</u> Started:
 - a. CCW pumps ALL STOPPED
 - 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

- a. Go to Step 10.
- 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.

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RESPONSE NOT OBTAINED

- 10. 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 11.
 - b. Verify adequate power to run one service water pump on non-essential header:
- b. Go to Step 11.
- o Any 480V bus ENERGIZED FROM OFFSITE POWER

- OR -

- o Load on any diesel generator - LESS THAN 1730 KW
- 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.

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	ACTION/EXPECTED RESPONSE Check If Letdown Can Be Established: -	RESPONSE NOT OBTAINED	
	a. PRZR level – GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Continue with Step 12 level increases to gre than 25% (46% for ADVE CONTAINMENT), <u>THEN</u> do	ater ERSE
<u> </u>	b. Establish letdown:	b. Establish excess letdo	own:
	 Close letdown orifice stops o 200A o 200B o 200C On SN panel open letdown line isolation valves 201 and 202 On SN panel place Letdown Flow Control Valves 200 A B C switch to REMOTE Open letdown stop valve LCV 459 	 Establish CCW flow the excess letdown exchanger by openin valves: Inlet valves 791 Outlet valves 793 Position excess let diversion valve 215 NORMAL to direct flow VCT. Verify seal water recontainment isolati 222 open. 	heating CCW ,798 3,796 down b to low to
	5) Place low pressure letdown backpressure controller PCV-135 in MANUAL <u>AND</u> adjust to 75 percent open	4) Verify excess letdo control valve HCV-1 closed.	23

- 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

- 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.

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ACTION/EXPECTED RESPONSE STEP

RESPONSE NOT OBTAINED

- 12. Check VCT Makeup Control System:
- Adjust controls as necessary.
- a. Makeup set for greater than RCS boron concentration
- b. Makeup set for automatic control
- 13. Align Charging Pump Suction As Follows:
 - a. Check Containment Conditions a. Align suction to RWST: NEVER BEEN ADVERSE
 - - 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

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STEP	ACTION/	EXPECTED RESPONSE][RE	ESPONSE NOT OBTAINED	
14.	Check RC	Cooling:				
	a. Check CLEAR		arms - a		Establish CCW flow to I thermal barriers per SO REACTOR COOLANT PUMP S AND SHUTDOWN.	P 1.3,
		RCP seal injection WEEN 6 GPM AND 10			Establish seal injection to RCPs per SOP 3.1, CONTROL.	HARGING,
15.		RCP Seal Return F e Established:	<u> 1 ow</u>			
	a. RCP t POSIT	hermal barrier ∆P IVE	- a		Go to Step 16.	
	b. CCW p	ump - AT LEAST ON	E RUNNING b	•	Go to Step 16.	
	c. Estab	lish seal return f	low: c	•	Manually open valves.	

- 1 N M - : C N - 1 - 1 - 1
 - 1) Verify No. 1 seal return
 valves OPEN
 - 2) Verify seal return containment isolation valveOPEN
- 16. <u>Transfer Condenser Steam Dump To Pressure Control Mode</u>
- 17. <u>Check RCS Hot Leg Temperatures STABLE</u>

<u>IF</u> condenser <u>NOT</u> available, <u>THEN</u> use SG atmospheric steam dumps.

Control steam dump and total feed flow as necessary to stabilize RCS temperature.

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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.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
19.	Check Intact SG Levels:	<u> </u>	
	a. Narrow range level – GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed f greater than 400 gpm narrow range level gre than 9% (26% for ADVE CONTAINMENT) in at le SG.	until ater RSE
	b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range level SG continues to incre- stop feed flow to tha	ase, <u>THEN</u>
*20.	Verify All 480V Busses - ENERGIZED BY OFFSITE POWER		
	a. All 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite to 480V busses per AO LOSS OF NORMAL STATIO	I 27.1.1,
		 IF any diesel gene loaded, <u>THEN</u> ensur cable tunnel exhau running. 	re one
	b. Verify lighting - ENERGIZED	b. Reset lighting.	
	c. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	c. Reset all MCCs except and MCC 28A.	MCC 28
	d. Check following MCCs – ENERGIZED	d. Locally reset following as necessary:	ng MCCs
	o MCC 24 o MCC 27 o MCC 29	o MCC 24 o MCC 27 o MCC 29	
	e. Check MCC 28 And MCC 28A - ENERGIZED	e. <u>IF</u> containment sump 1 than 44'3" <u>AND</u> conta conditions <u>NOT</u> advers reset MCC 28 and MCC	rinment e, <u>THEN</u>

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STEP	A	CTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
21.	Res	store Ventilation Systems:			
	a.	Check radiation monitors R-43 and R-44 - IN SERVICE	a.	Place radiation monitor and R-44 in service per SOP 12.3.2, DIGITAL RAMONITORING SYSTEM OPELOCAL.	er ADIATION
	b.	Verify adequate power to restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY OFFSITE POWER - OR -	b.	Establish portable ven per AOI 27.1.9 CONTROL INACCESSIBILITY SAFE CONTROL. Go To Step 2	L ROOM SHUTDOWN
		o Load on 22 or 23 diesel generator - LESS THAN 1860 KW			•
	c.	Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	c.	Establish portable ven per AOI 27.1.9 CONTRO INACCESSIBILITY SAFE CONTROL	L ROOM
	d.	Locally start one 480V switchgear room exhaust fan:	d.	$\underline{\text{IF}}$ fan will not start, perform the following:	

- 1) Defeat fan interlock using Bypass key.
- 2) Start one exhaust fan.
- 3) Post fire watch in 480V switchgear room.
- cable e. Manually start at least one cable tunnel exhaust fan.

o 213

o 215

o 216

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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.

22. <u>Check RCP Status - AT LEAST ONE</u> RUNNING

Perform the following:

- a. Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION.
- b. Start one RCP.
- c. $\underline{\text{IF}}$ an RCP can $\underline{\text{NOT}}$ be started, $\underline{\text{THEN}}$ refer to ATTACHMENT 1 to verify natural circulation.
- d. <u>IF</u> natural circulation <u>NOT</u> verified, <u>THEN</u> increase dumping steam from intact SGs.
- 23. <u>Check If Source Range Detectors</u> Should Be Energized:
 - a. Check intermediate range flux - LESS THAN 1E-10 AMPS
 - b. Verify source range detectorsENERGIZED
 - c. Transfer nuclear recorders to source range scale
- a. Continue with Step 24. WHEN flux less than 1E-10 amps, $\underline{\text{THEN}}$ do Steps 23b and 23c.
- b. Manually energize source range detectors.

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STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

*24. 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.

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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) IF an AC oil pump can NOT 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

- 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

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STEP ACTION/EXPECTED RESPONSE RESPON

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</u> 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 <u>OR</u> N₂ backup are aligned as necessary.

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RESPONSE NOT OBTAINED

- Check If Diesel Generators Should 27. Be Stopped:
 - a. Verify 480V busses ENERGIZED a. Try to restore offsite power BY OFFSITE POWER
 - to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.
 - 1) <u>IF</u> any diesel generator loaded, THEN ensure one cable tunnel exhaust fan running.
 - b. Stop any unloaded diesel generator and place in standby
- 28. 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
- 29. Maintain Plant Conditions -STABLE:
 - o PRZR pressure
 - o PRZR level
 - o RCS temperatures
 - o Intact SG levels
- Place Main Turbine And MBFP 30. <u>Turbines On Turning Gear After</u> Shafts Stop

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RESPONSE NOT OBTAINED

- *31. <u>Verify SI System Flow Not Required:</u>
 - a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- a. Manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

RCS PRESSURE	RCS SUBCOOLING °F
(PSIG)	(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)
- b. Control charging flow to maintain PRZR level. <u>IF PRZR</u> level can <u>NOT</u> be maintained, <u>THEN</u> manually operate SI system pumps as necessary. Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

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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 0T2-1
 - o 0T2-2
 - 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. <u>Go To POP 3.2 PLANT RECOVERY FROM REACTOR TRIP</u>

-END-

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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	RCS SUBCOOLING °F
(PSIG)	(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-

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RESPONSE NOT OBTAINED

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

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

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RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

	21 DG	480V BUSES 22 DG	23 DG
EQUIPMENT	BUS 5A	BUS 2A BUS 3A	BUS 6A
21 RECIRC PUMP 22 RECIRC PUMP	304 KW		304 KW
21 CCW PUMP 22 CCW PUMP 23 CCW PUMP	228 KW	228 KW	228 KW
21 LIGHTING TRANSFORMER 22 LIGHTING TRANSFORMER 23 LIGHTING TRANSFORMER	225 KW	150 KW (N) 225 KW	150 KW (E)
TURBINE AUX OIL PUMP		1	112 KW
STATION AIR COMPRESSOR	93 KW		

-END-

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RESPONSE NOT OBTAINED

- 1. Obtain PROTEUS Rod Position Indication by EITHER of the following methods:
 - 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-

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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. <u>SYMPTOMS OR ENTRY CONDITIONS</u>

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.

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RESPONSE NOT OBTAINED

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.

- ***** 1. Verify All 480V Busses -ENERGIZED BY OFFSITE POWER
 - a. All 480V busses ENERGIZED BY a. Try to restore offsite power 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				
2. Restore Ventilation Systems: a. Check radiation monitors R-43 and R-44 - IN SERVICE 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 c. Restore PAB ventilation on bus supplied by offsite power bus supplied by diesel generator with least load d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216 c. Verify at least one cable a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2 billing in per SOP 12.3.2 billing in per SOP 12.3.2 billing in per A01 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL c. Establish portable ventilation per A0I 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL d. If fan will not start, IHEN 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	umber: ES-1.2	Title: POST LOCA COOLDOWN AND) DEPRESSURIZATION	Revision Number:
2. Restore Ventilation Systems: a. Check radiation monitors R-43 and R-44 - IN SERVICE 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 c. Restore PAB ventilation on bus supplied by offsite power bus supplied by diesel generator with least load d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216 c. Verify at least one cable a. Place radiation monitors R-43 and R-44 in service per SOP 12.3.2 billing in per SOP 12.3.2 billing in per SOP 12.3.2 billing in per A01 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL c. Establish portable ventilation per A0I 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL d. If fan will not start, IHEN 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				
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 c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216 c. Establish portable ventilation per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL d. IE 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 e. Manually start at least one	STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	<u> </u>
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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 C. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load d. Locally start one 480V switchgear room exhaust fan: O 213 O 215 O 216 Defeat fan interlock using Bypass key. O 216 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room. e. Verify at least one cable Per AOI 27.1.9 CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL d. IF fan will not start, THEN perform the following: 1) Defeat fan interlock using Bypass key. O 216 2) Start one exhaust fan.	a.		and R-44 in service p SOP 12.3.2, DIGITAL MONITORING SYSTEM OP	oer RADIATION
- OR - o Load on 22 or 23 diesel generator - LESS THAN 1860 KW c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load 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 e. Manually start at least one	þ	restore PAB ventilation: o Bus 3A or 6A - ENERGIZED BY	per AOI 27.1.9 CONTR INACCESSIBILITY SAFE	OL ROOM SHUTDOWN
c. Restore PAB ventilation on bus supplied by offsite power OR bus supplied by diesel generator with least load d. Locally start one 480V switchgear room exhaust fan: o 213 o 215 o 216 1) Defeat fan interlock using Bypass key. o 216 2) Start one exhaust fan. 3) Post fire watch in 480V switchgear room. e. Verify at least one cable e. Manually start at least one				
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switchgear room. e. Verify at least one cable e. Manually start at least one		0 216	2) Start one exhaust	fan.
· · · · · · · · · · · · · · · · · · ·				n 480V
	е			

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STEP

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. <u>Check If RHR Pumps Should Be Stopped:</u>

- a. Check RCS pressure:
- 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

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REŚPONSE 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.
- Establish Charging Flow:

STEP

- a. Charging pumps AT LEAST ONE a. Perform the following: RUNNING
 - - 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

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	<u> </u>
9 , 2,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		j
b.	. Align charging pump suction to RWST:		
	 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>C</u>	heck Intact SG Levels:		
a	. Narrow range level – GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	a. Maintain total feed greater than 400 gpm narrow range level g than 9% (26% for ADV CONTAINMENT) in at SG.	until reater ERSE
b	. Control feed flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%	b. <u>IF</u> narrow range leve intact SG continues increase in an uncon manner, <u>THEN</u> go to EGENERATOR TUBE RUPT	to trolled E-3, STEAM

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RESPONSE NOT OBTAINED

NOTE

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

- 6. <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. Dump steam using intact SG(s) atmospheric steam dumps.
- 7. Check RCS Subcooling Based On Core Exit TCs GREATER THAN VALUE OBTAINED FROM TABLE:
- Go to Step 17.

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

- 8. <u>Check SI System Pump Status:</u>
- Go to Step 13.
- o SI pumps ANY RUNNING

- OR -

- o RHR pumps ANY INJECTING IN SI MODE
- 9. <u>Place All PRZR Heater Switches In OFF Position</u>

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STEP	ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINE	D
* * *	CAUTION	* * * * * * * * * * * * * * * * * * *
* Voi * res	ding may occur in the RCS during RCS depressurization. Thult in a rapidly increasing PRZR level.	is will *
* * *	* * * * * * '* * * * * * * * * * * * *	* * * * * * * *
′ 10. <u>D</u>	epressurize RCS To Refill PRZR:	
a	. Use maximum normal PRZR spray a. Use one PRZR PORV avalve. <u>IF</u> no PORV	flow path

- 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. $\underline{\text{WHEN}}$ level greater than 25% (46% for ADVERSE CONTAINMENT), $\underline{\text{THEN}}$ do Step 10c.
- c. Stop RCS depressurization

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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. <u>Check If An RCP Should Be Started:</u>
 - a. All RCPs STOPPED

- a. Stop all but one RCP. Go to Step 12.
- b. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- b. Go to Step 17.

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

- c. PRZR level GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)
 - (46% FOR ADVERSE CONTAINMENT)
- d. Check MCC 28 And MCC 28A ENERGIZED
- c. Return to Step 10.
- d. \underline{IF} containment sump level less than 44'3" \underline{AND} containment conditions \underline{NOT} adverse, \underline{THEN} reset MCC 28 and MCC 28A. \underline{IF} MCC 28 can \underline{NOT} be reset, \underline{THEN} go to step 12.
- e. Try to start an RCP as follows:
 - Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION.
 - 2) Start one RCP

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RESPONSE NOT OBTAINED

NOTE

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

12. <u>Check If One SI Pump Should Be Stopped:</u>

- a. Any SI pumps RUNNING
- a. <u>IF</u> RHR pump running in SI mode, <u>THEN</u> Go To Step 17, <u>IF NOT</u>, <u>THEN</u> Go To Step 13.
- b. Determine required RCS subcooling from table:

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

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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 temp greater than 345°F ADVERSE CONTAINMENT to Step 17.	(335°F for
		IF RCS hot leg temp less than 345°F (33 ADVERSE CONTAINMENT ensure at least one running. IF no RHR be operated, THEN gStep 17.	5°F for), <u>THEN</u> RHR pump pump can
	d. PRZR level - GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	d. DO <u>NOT</u> STOP SI PUMP to Step 10.	. Return
	e. Stop one SI pump		
	f. Go to step 12a		
13.	Check If Charging Flow Should Be Controlled To Maintain PRZR Level:		
	a. Check RHR pumps – NONE RUNNING IN SI MODE	a. Go to Step 17.	
	b. Control charging flow to maintain PRZR level		

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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.

14. <u>Check RCP Status:</u>

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) $\underline{\text{IF}}$ an RCP can $\underline{\text{NOT}}$ be started, $\underline{\text{THEN}}$ refer to ATTACHMENT 1 to verify natural circulation.
 - 4) <u>IF</u> natural circulation <u>NOT</u> verified, <u>THEN</u> increase dumping steam.

b. Stop all but one RCP

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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. <u>Depressurize RCS To Minimize RCS</u> <u>Subcooling:</u>
 - a. Use 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
 - 0 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.

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

- Verify Adequate Shutdown Margin: 16.
 - a. Sample RCS
 - b. Shutdown margin from graphs b. Borate as necessary. book - ADEQUATE

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RESPONSE NOT OBTAINED

- *17. <u>Verify SI System Flow Not Required:</u>
 - a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- a. Manually operate SI System pumps as necessary. Go to Step 18.

RCS PRESSURE	RCS SUBCOOLING °F
(PSIG)	(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)
- b. Manually operate SI System pumps as necessary. Return to Step 10.
- 18. <u>Check If SI Accumulators Should</u> Be Isolated:
 - a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- a. <u>IF</u> at least two RCS hot leg temperatures less than 350 °F, <u>THEN</u> go to Step 18c. <u>IF NOT</u>, <u>THEN</u> go to Step 19.

RCS PRESSURE	RCS SUBCOOLING °F
(PSIG)	(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)
- b. Return to Step 10.

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		AND DEF	PRESSURIZATION	REV. 36
STEP AC	TION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
	heck power to isolation alves - AVAILABLE	с.	Restore power to SI accumulator isolation v	alves.
		·	o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B	
	lose all SI accumulator solation valves	d.	Vent any unisolated accumulators by perform following:	ing the
			1) Close nitrogen supp to accumulators: HCV	
			o <u>IF</u> HCV-863 will <u>N</u> <u>THEN</u> locally close following nitroge	e the
			o 1809 o 1811A o 1811B	

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ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED STEP 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 o Battery bus voltage - NORMAL o MCC 24A for battery charger 22 o MCC 26C for battery charger 24 o MCC 27A for battery charger 24 o MCC 29A for battery charger 24 o MCC 29A for battery charger 21 2) MHEN 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.	lumber:	Title:	Revision Number
*19. Check Battery Status: a. Verify battery chargers energized: o DC Bus Trouble alarms CLEARED o Battery bus voltage - NORMAL o Battery bus voltage - NORMAL 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. 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.		ĺ	·
a. Verify battery chargers energized: o DC Bus Trouble alarms - CLEARED o Battery bus voltage - NORMAL o Battery bus voltage - NORMAL o MCC 24A for battery charger 23 o MCC 27A for battery charger 24 o MCC 29A 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.	STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
energized: 1) Check MCCs supplying battery chargers - ENERGIZED O Battery bus voltage - NORMAL O Battery bus voltage - NORMAL 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 D. 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.	*19. <u>C</u>	heck Battery Status:	
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.	a	energized:	1) Check MCCs supplying
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.		CLEARED	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
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.	,		dispatch operators to energize battery chargers
		o. Check lighting - RESET	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

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
С	. Reduce DC load as follows:		
	1) Verify All 480V buses - ENERGIZED BY OFFSITE POWER	1) Stop DC oil pumps a follows: o TG DC oil pump a Turbine shaft stop DC seal oil pump Main Generator Hyvented o MBFPs DC oil pum MBFP shafts stop	fter Main opped after drogen p after
	<pre>2) Stop DC oil pumps as follows: a) Start <u>EITHER</u> AC oil pump:</pre>	Continue with Step 2) <u>IF</u> an AC oil pump of be started, Stop the associated DC oil profollows:	can <u>NOT</u> ne
	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	o TG DC oil pump a Turbine shaft sto O DC seal oil pump Main Generator Hy vented O MBFPs DC oil pum MBFP shafts stop Continue with Step	opped after drogen p after ped

STEP ACTION/EXPECTED RESPONSE *20. Verify Instrument Air Header - STABLE Dispatch NPO to perform the following: a. Ensure at least one CENTAC running to supply Instrument Air per SDP 29.3 STATION AIR SYSTEM. b. If necessary, THEN ensure one instrument air compressor running per SDP 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 52 PSIG o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG o Direct NPO to ensure Station Air backup OR N2 backup are aligned as necessary.	STEP ACTION/EXPECTED RESPONSE *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 Periodically check WCP Header Pressures - GREATER THAN 52 PSIG o Direct NPO to ensure Station Air backup OR N2 backup are aligned as necessary.	nber:	Title:		Revision Number
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Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG Air backup OR N2 backup are aligned as necessary.	Level AND Pressure: o Level - GREATER THAN 92% o Pressure - GREATER THAN 55 PSIG o Periodically check WCP Header Pressures - GREATER THAN 52 PSIG Air backup OR N2 backup are aligned as necessary.	21.			
o Pressure - GREATER THAN 55 PSIG o Periodically check WCP Header o Direct NPO to ensure Station Pressures - GREATER THAN 52 PSIG Air backup <u>OR</u> N2 backup are aligned as necessary.	o Pressure - GREATER THAN 55 PSIG o Periodically check WCP Header o Direct NPO to ensure Station Pressures - GREATER THAN 52 PSIG Air backup <u>OR</u> N2 backup are aligned as necessary.				essary.
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			Pressures - GREATER THAN 52 PSIG	Air backup <u>OR</u> N2 backu	
		,			•
				·	

Number: ES-1.2	Title: POST LOCA COOLDOWN AND	DEPRESSURIZATION REV. 36
STEP	ACTION/EXPECTED RESPONSE heck If Diesel Generators Should	RESPONSE NOT OBTAINED
	e Stopped: . 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.
С	. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	c. Reset all MCCs except MCC 28 and MCC 28A.
d	l. Check following MCCs – ENERGIZED	d. Locally reset following MCCs as necessary:
	o MCC 24 o MCC 27 o MCC 29	o MCC 24 o MCC 27 o MCC 29
e	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 	
	·	
	·	

Number:	Title:		Revision Number:
ES-1.2	POST LOCA COOLDOWN AND	DEPRESSURIZATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAI	NED
	heck If One CCW Pump Should Be tarted:		
a	. CCW pumps - ALL STOPPED	a. Go to Step 24.	
b	Verify adequate power to run one CCW pump:	b. <u>IF</u> power can <u>NOT</u> <u>THEN</u> perform the	
	o Any 480V bus supplying CCW pump – ENERGIZED FROM OFFSITE POWER - OR -	 Refer to SOP 4 COMPONENT COO OPERATION to backup cooling following: 	LING SYSTEM establish
	o Load on running diesel generator - LESS THAN 1760 KW	o charging pur o RHR pumps o SI pumps	nps
		2) Go to Step 27	
(c. Start one CCW pump on 480V bus energized from offsite power	c. Start one CCW pur generator with lo 1760 KW.	
		IF no CCW nump c	an he started

- 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.

lumber:	Title:	•	Revision Number:
ES-1.2	POST LOCA COOLDOWN AND	DEPRESSURIZATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
24.	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 25.	
	b. Verify adequate power to run one service water pump on non-essential header:	b. Go to Step 25.	
	o Any 480V bus – ENERGIZED FROM OFFSITE POWER		
	- OR -		
	o Load on any diesel generator - LESS THAN 1730 KW		
	c. Start one service water pump on non-essential header on 480V bus energized from offsite power	c. Start one service was on non-essential hea diesel generator wit less than 1730 KW.	der on
25.	<pre>Check RCP Cooling:</pre>		
	a. Check RCP CCW System alarms - CLEARED	 a. Establish CCW flow thermal barriers per REACTOR COOLANT PUMI AND SHUTDOWN. 	SOP 1.3,
	b. RCP seal injection flow - BETWEEN 6 GPM AND 10 GPM PER RCP	b. Establish seal injector RCPs per SOP 3.1, SEAL WATER, AND LETH CONTROL and COL 3.1 AND VOLUME CONTROL	CHARGING, DOWN CHEMICAL

	POST LOCA COOLDOWN AND ACTION/EXPECTED RESPONSE Check If RCP Seal Return Flow Should Be Established:	DEPRESSURIZATION REV. 36 RESPONSE NOT OBTAINED
26.	Check If RCP Seal Return Flow	RESPONSE NOT OBTAINED
	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.
	 Verify No. 1 seal return valves - OPEN 	
	2) Verify seal return containment isolation valve - OPEN	·
*27.	Check If RCPs Must Be Stopped:	
	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</u> <u>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	

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RESPONSE NOT OBTAINED

- 29. <u>Shut Down Unnecessary Plant</u> <u>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.

- 30. <u>Check If RHR System Can Be Placed</u> <u>In Service:</u>
 - a. Check the following:
- a. Go to Step 31.
- o RCS temperatures LESS THAN 350°F
- o RCS pressure LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)
- b. Consult operations manager to determine if RHR System should be placed in service

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
31.	Check Containment Hydrogen Concentration:		
	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 manadditional recovery ac Go to Step 32.	
32.	<u>Check RCS Temperatures - LESS</u> <u>THAN 200° F</u>	Return to Step 2.	
33.	Evaluate Long Term Plant Status:		
	a. Maintain cold shutdown conditions per POP 3.3, PLANT COOLDOWN		
	b. Consult operations manager		
	- E	END -	

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1		i . I

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	RCS SUBCOOLING °F
(PSIG)	(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 -

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ES-1.2 POST LOCA COOLDOWN AND DEPRESSURIZATION REV. 36

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

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

	21 DG	480V BUSES 22 DG	23 DG
EQUIPMENT	BUS 5A	BUS 2A BUS 3A	BUS 6A
21 SERVICE WATER PUMP 22 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	
23 SERVICE WATER PUMP 24 SERVICE WATER PUMP	277 KW		277 KW
25 SERVICE WATER PUMP 26 SERVICE WATER PUMP	·	277 KW OR 277 KW	277 KW
PRZR CONTROL HEATERS 21 PRZR BU HEATERS		554 KW	277 KW
22 PRZR BU HEATERS 23 PRZR BU HEATERS	485 KW	485 KW	
21 AFW PUMP		375 KW	0.75
23 AFW PUMP	050 101		375 KW
21 FAN COOLER UNIT 22 FAN COOLER UNIT 23 FAN COOLER UNIT	250 KW 250 KW	250 KW	
24 FAN COOLER UNIT 25 FAN COOLER UNIT		250 KW 250 KW	250 KW
21 SI PUMP	317 KW		
22 SI PUMP 23 SI PUMP		317 KW 317 KW	346 KW
21 SPRAY PUMP 22 SPRAY PUMP	348 KW		348 KW
22 SPRAT PUMP		319 KW	J40 NW
22 RHR PUMP		313 KM	319 KW
21 CHARGING PUMP 22 CHARGING PUMP	150 KW	150 KW	
23 CHARGING PUMP			150 KW

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ES-1.2	POST LOCA COOLDOWN AND DEPRESSURIZATION	REV. 36

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	21 DG BUS 5A	480V BUSES 22 DG BUS 2A BUS 3A	23 DG BUS 6A
21 RECIRC PUMP 22 RECIRC PUMP	304 KW		304 KW
21 CCW PUMP 22 CCW PUMP	228 KW	228 KW	
23 CCW PUMP			228 KW
21 LIGHTING TRANSFORMER 22 LIGHTING TRANSFORMER 23 LIGHTING TRANSFORMER	225 KW	150 KW (N) 225 KW	150 KW (E)
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. <u>PURPOSE</u>

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.

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ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	REV. 36

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. <u>Dispatch NPO To Fully OPEN CCW</u> <u>Heat Exchanger SW Outlet Valves:</u>
 - o SWN-35
 - o SWN-35-1
- 2. Check SI Status:
 - 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

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ES-1.3	TRANSFER TO COLD LE	EG RECIRCULATION	REV. 36
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		
* *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * *
	F RWST level decreases to 3.0 ft, The shall be stopped.	<u>HEN</u> SI pumps taking suction	n from RWST * * * *
4.	Place Safety Injection Recirc Switches 1 AND 3 To ON:		
	a. Check SI pump 22 - STOPPED	a. <u>IF</u> three SI pumps run <u>THEN</u> stop SI pump 22.	ning,
,	b. Check containment spray pump 21 - STOPPED	b. <u>IF</u> both pumps running place containment spra 21 in PULLOUT.	
	c. Check RHR pumps - BOTH STOPPED	c. Manually trip BOTH RHI	R pumps.
5.	Align Service Water System As Follows:	,	
	 a. Check Service Water System - ALIGNED FOR THREE HEADER OPERATION 	a. Ensure the following are closed (service was 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		÷
	•		

mber:	Title:	=	Re	vision Number
ES-1.3	TRANSFER TO COLD LE	G RE	CIRCULATION	REV. 36
STEP	CTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
6. <u>Red</u>	uce 480V Bus Loads:			
o S	top All charging pumps			
	- AND -			
o S	ecure All PRZR heaters			
	NOT	<u>E</u>		
Diese	1 load may increase to 2300 KW du	ıring	recirculation switch seq	uence.
	ce Safety Injection Recirc tch 2 To ON:			
	Check one service water pump - SUPPLYING NON-ESSENTIAL HEADER	a.	Manually start one NESW in preferred order.	oump
			o 22, 23, 21 if 1-2-3 he	
			non-essential	eader
				eader
			non-essential	
b.	Check CCW Pumps – THREE RUNNING	b.	non-essential - OR - o 25, 26, 24 if 4-5-6 he	eader pump
b.	Check CCW Pumps – THREE RUNNING	b.	non-essential - OR - 0 25, 26, 24 if 4-5-6 he non-essential Ensure at least one CCW running (preferred order	eader pump
	Check CCW Pumps - THREE RUNNING Stop 23 CCW pump	b.	non-essential OR- 0 25, 26, 24 if 4-5-6 he non-essential Ensure at least one CCW running (preferred order 21, 23)	eader pump
С.			non-essential - OR - 0 25, 26, 24 if 4-5-6 he non-essential Ensure at least one CCW running (preferred order 21, 23)	eader pump 22,

ES-1.3		TRANSFER TO COLD) LEG RI	ECIRCULATION	REV. 36
STEP					
	ACTION/E	EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
8.		tainment Level - GREATE 10" ON LI-939 OR LI-941	<u>l</u> ind 47	Containment level subscreases to greater than '10", <u>THEN</u> immediately this step.	•
			a.	Go to ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION.	
* * * * *	* * * *	* * * * * * * * * * * * * * * * * * <u>C.P</u>	· · · ·	* * * * * * * * * * *	* * * * * * * *
* * ·	Switch 4		. * * *	* * * * * * * * * * * * * * * * * * *	* * * * * *
	a. Ensure RUNNIN	recirculation pump 21 - G	· a.	<u>IF</u> 21 pump can <u>NOT</u> be <u>THEN</u> manually start 22 recirculation pump.	started,
				<u>IF</u> neither recirculation can be started, <u>THEN</u> :	on pump
			•	1) Perform .	
				2) <u>WHEN</u> completed, <u>The</u> step 10.	<u>∃EN</u> go to
		ulation pump header rge valves – OPEN	b.	Ensure at least one va STROKING open AND go t step 10.	
	o MOV - o MOV -			335P XV.	
	c. Functi	on complete light - LIT	С.	Recheck required action manually initiate as n	

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ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	REV. 36

RESPONSE NOT OBTAINED

- 10. <u>Determine If Adequate Low Head</u>
 <u>Recirculation Flow Has Been</u>
 <u>Established:</u>
 - 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
- b. <u>IF</u> valves 746 AND 747 BOTH CLOSED, <u>THEN</u> Go to step 24.

 $\underline{\text{IF}}$ $\underline{\text{NOT}}$, $\underline{\text{THEN}}$ perform the following:

- 2) Start 22 recirc pump.
- 3) <u>IF</u> core flow rate required by table can <u>NOT</u> be established, <u>THEN</u>:
 - a) <u>IF</u> BOTH recirc pumps running, <u>THEN</u> stop 22 recirc pump.
 - b) Go to step 24.

Number:	Title:		Revision Number:
ES-1.3	TRANSFER TO COLD LE	G RECIRCULATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
11.	Place Safety Injection Recirc Switch 7 To ON:		
	a. Check SI pumps - ALL STOPPED	a. Manually stop pumps.	
	b. Function complete light - LIT	b. Recheck required action manually initiate as n	
12.	Place Safety Injection Recirc Switch 8 To ON:		
	a. Check containment spray pump test line valve - CLOSED:	a. Manually close valve.	
	o 1813		
13.	Close SI Test Line Valves To RWST:		
	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</u> <u>LEAST ONE RUNNING</u>	<u>IF</u> RHR pump is running for Recirculation, <u>THEN</u> dispato energize The Following	atch NPO
		o MOV-882 on MCC 26B o MOV-1810 on MCC 26A	
		Go to Step 18.	
15.	Check All 480V Busses - ENERGIZED	Go to Step 17.	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16.	Place Safety Injection Recirc Switch 5 To ON:	
	 a. Check at least two service water pumps - SUPPLYING NON-ESSENTIAL HEADER 	 a. Manually start one NESW pump in preferred order.
	NON EGGENTA, LE MENGEN	o 22, 23, 21 if 1-2-3 header non-essential
		- OR -
		o 25, 26, 24 if 4-5-6 header non-essential
		\underline{IF} second service water pump will \underline{NOT} start, \underline{THEN} perform the following:
		 IF both recirculation pumps running, <u>THEN</u> stop ONE recirculation pump.
		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).
		 IF second CCW pump will NOT Start AND BOTH recirc pumps are running, THEN 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.

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RESPONSE NOT OBTAINED

- 17. <u>Dispatch NPO To Perform The</u>
 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
- *18. Check Two CCW Pumps RUNNING

<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.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
19.	Check If Recirc Spray Is Required:		
	a. Containment spray pumps - ANY RUNNING	a. Perform the following:	
	RUNNING	1) <u>IF</u> Containment pres EVER greater than 2 <u>THEN</u> go to step 20	24 psig,
		2) <u>IF NOT, 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.	Verify One RHR Heat Exchanger Isolated As Follows:		
	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.	Open One Spray Header Valve As Follows:		
	o Open MOV-889B	o Open MOV-889A	

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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 b. Align system for high head table - ESTABLISHED
 - 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 c. Consult Operations manager. GREATER THAN 960 GPM

23. Go To Step 37

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<u>L</u>		

RESPONSE NOT OBTAINED

- 24. <u>Dispatch an Operator to Shut Down</u>
 <u>FSB Ventilation</u>
- Notify TSC that FSB ventilation exhaust should be monitored for radioactive contamination.
- 25. <u>Place Interlock Switches For SI Valves To OFF</u>
 - o MOV-842
 - o MOV-843

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ES-1.3	TRANSFER TO CO	LD LEG RECIRCULATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	<u> </u>
* * * *	* * * * * * * * * * * * * * * * *	CAUTION	* * * * * * * * *
	pumps shall be stopped if RCS and pressure.	pressure is greater than their	shutoff *
* * *	* * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * * *	* * * * * * * *
	Place Safety Injection Recirc Switch 6 To ON:		
	a. Check RHR heat exchanger discharge valves - CLOSED:	a. Manually close valves	
	o MOV-746 o MOV-747		
	b. Check RHR heat exchanger No. 21 to SI pump suction header valves - OPEN:		
	o MOV-888A o MOV-888B		
	c. Check SI test line valves - CLOSED:	c. Manually close valves	
•	o MOV-842 o MOV-843		
	d. Arm SI pump suction low pressure alarm by placing toggle switch in up position	n:	
	o PT-947		
	e. Function complete light - L	IT e. Recheck required action manually initiate as	

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20 1.0	TRANSFER TO COLD LEG RECIRCULATION	REV. 36
<u> </u>		

27. <u>Check SI Suction Pressure -</u> GREATER THAN 75 PSIG IF suction pressure is less than

75 psig, $\underline{\text{THEN}}$ perform the following:

- a. <u>IF</u> RHR pump running, <u>THEN</u> recheck RHR alignment per .
 - 1) <u>WHEN</u>, completed, <u>THEN</u> go to step 28.
- b. <u>IF</u> 22 Recirculation pump running, <u>THEN</u>:
 - 1) Stop 22 Recirculation pump.
 - 2) Perform .
 - 3) <u>WHEN</u> , completed, <u>THEN</u> go to step 28.
- c. <u>IF</u> 21 Recirculation pump running, <u>THEN</u>:
 - 1) Stop 21 Recirculation pump.
 - 2) Start 22 Recirculation pump.
 - a) $\underline{\text{IF}}$ 22 Recirc pump can $\underline{\text{NOT}}$ be started perform .
 - b) WHEN, completed, THEN go to step 28.
- d. <u>IF</u> SI pump suction pressure can <u>NOT</u> be established, <u>THEN</u> Go To ECA-1.1, LOSS OF EMERGENCY COOLANT RECIRCULATION, Step 1

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STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

28. <u>Check SI Pumps - AT LEAST 2</u> RUNNING Perform the following:

- a. Ensure Safety Injection recirc switch 7 is OFF
- b. Start two SI pumps
 - o 21
 - o 23

 $\underline{\text{IF}}$ SI pump 21 OR 23 can $\underline{\text{NOT}}$ be started, $\underline{\text{THEN}}$ 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.

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

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STEP	A	CTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
32.		ce Safety Injection Recirc tch 5 To ON:			
		Check at least two service water pumps – SUPPLYING NON-ESSENTIAL HEADER	a.	Manually start one NESW in preferred order.	√ pump
		NON ESSENTINE HEADEN		o 22, 23, 21 if 1-2-3 non-essential	header
		•		- OR -	
				o 25, 26, 24 if 4-5-6 non-essential	header
				$\underline{\text{IF}}$ second service water will $\underline{\text{NOT}}$ start, $\underline{\text{THEN}}$ pthe following:	
				 IF both recirculation running, <u>THEN</u> stop recirculation pump. 	
				Close valve 804 to Spent Fuel Pit Heat Exchanger.	
	b.	Check CCW pumps - AT LEAST TWO RUNNING	b.	Manually start CCW pum necessary (preferred or 21, 23).	
				1) <u>IF</u> second CCW pump Start AND BOTH reci are running, <u>THEN</u> s recirculation pump.	rc pumps
	С.	Check recirculation pump - BOTH RUNNING	С.	<u>IF</u> at least 2 CCW pump at least 2 non-essenti pumps are running, <u>THE</u> a second recirculation	al SW <u>EN</u> start
	d.	Function complete light - LIT	d.	Recheck required action manually initiate as n	

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RESPONSE NOT OBTAINED

- 33. <u>Dispatch NPO To Perform The</u> 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

<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.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
35.	<u>Check If Recirc Spray Is</u> <u>Required:</u>		
	a. Containment spray pumps - ANY RUNNING	a. Perform the following:	
	KONTINU	1) <u>IF</u> Containment pre EVER greater than 2 <u>THEN</u> go to step 36	24 psig,
		2) <u>IF NOT, 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.	Open One Spray Header Valve As Follows:		
	o Open MOV-889B	o Open MOV-889A	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
37.	Check Recirculation Switch Sequence Status:	
	a. Switch 1 function complete light - LIT	a. Perform the following: 1) IF 22 SI pump is stopped, THEN ensure suction valves - CLOSED: 0 MOV-887A 0 MOV-887B 2) Ensure discharge valves for STOPPED Containment Spray pump - CLOSED: 0 21 spray pump: 0 MOV-866A 0 MOV-866B 0 22 spray pump: 0 MOV-866C 0 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-882o MOV-744
		<u>IF NOT</u> , <u>THEN</u> perform the following:
		1) Ensure valve motor controlsRE-ENERGIZED.
		2) Manually close valves.
		 IF valves can <u>NOT</u> be closed, <u>THEN</u> locally close valves.

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STEP ACTION/EXPECTED RESPO	RESPONSE NOT OBTAINED
d. Switch 8 function com light - LIT	lete 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.
*38. <u>Check CCW System Temper</u> <u>LESS THAN 130°F</u>	3) <u>IF</u> valve can <u>NOT</u> be closed, <u>THEN</u> locally close valve.
	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. <u>IF</u> CCW system temperature exceeds 150°F AND Recirc flow has been established through both RHR Heat Exchangers, <u>THEN</u> shut one RHR heat exchanger discharge valve:
	o MOV-746 - OR - o MOV-746

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

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ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED b. Direct available Support b. Check lighting - RESET 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 -1) Stop DC oil pumps as ENERGIZED BY OFFSITE POWER 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

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	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	2) IF an AC oil pump be started, Stop t associated DC oil pollows: o TG DC oil pump a Turbine shaft sto DC seal oil pump Main Generator Hyvented o MBFPs DC oil pum MBFP shafts stop Continue with Step	he pump as ofter Main opped after ydrogen op after ped
	MBFPs DC oil pump erify Instrument Air Header - ABLE	Dispatch NPO to perform following: a. Ensure at least one C running to supply Ins Air per SOP 29.3 STAT SYSTEM. b. IF necessary, THEN en instrument air compreserunning per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION. c. IF header can NOT be stabilized, THEN Close	ENTAC strument ION AIR nsure one ssor

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
	ispatch NPO To Locally Perform ne Following:		
0	Periodically Check IVSW Tank Level AND Pressure:	o Direct NPO to fill or pressurize tank as neo	cessary.
	o Level - GREATER THAN 92%		
	o Pressure - GREATER THAN 55 PSIG		
0	Periodically check WCP Header Pressures – GREATER THAN 52 PSIG	o Direct NPO to ensure S Air backup <u>OR</u> N ₂ back aligned as necessary.	

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STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

*44. <u>Initiate Evaluation Of Plant Status:</u>

- 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
- c. Verify recirculation water pH BETWEEN 7.0 AND 9.5
- b. Continued with step 45. $\underline{\text{WHEN}}$ sample has been obtained, $\underline{\text{THEN}}$ return to step 44c.
- c. Perform the following:
 - 1) <u>IF</u> pH less than 7.0, <u>THEN</u> perform the following:
 - a) Consult operations manager to determine if pH should be adjusted:
 - 1. <u>IF</u> directed to adjust pH, <u>THEN</u> perform the following:
 - a. Add required chemicals to boric acid batching tank.
 - b. Inject to RCS through normal charging paths.
 - 2) <u>IF</u> pH is greater than 9.5, <u>THEN</u> perform the following:
 - a) Inject concentrated boric acid from the BAST to the RCS through normal charging paths.
 - b) Obtain necessary samples.

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STEP	ACTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED
45. <u>Ch</u> <u>Be</u>	eck If SI Accumulators Should 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	с.	Vent any unisolated accumulators by performing the following:
		•	 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
			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 		

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STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

CAUTION

To prevent main steamline isolation, steam dump to condenser should $\underline{\text{NOT}}$ exceed 0.5E6 lbs/hour per SG.

- 46. <u>Check If Intact SGs Should Be</u> <u>Depressurized To RCS Pressure:</u>
 - a. RCS pressure LESS THAN INTACT SG PRESSURE
- a. Go to Step 47.

radioactivity.

- 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
- 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.

b. Do <u>NOT</u> dump steam from any SG with high radiation. Isolate

feed flow to any SG with high

- 47. <u>Determine If Reactor Vessel Head Should Be Vented:</u>
 - a. Consult operations manager

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	L	
48.	<u>Check Containment Hydrogen</u> <u>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 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	
Th	is Step continued on the next page.	

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c. Check : ENERGI	l3.8KV feeder 13W92 - ZED	c. <u>IF</u> 13.8KV feeder <u>I</u> energized, <u>THEN</u> po following.	
		1) Ensure breaker	GT-2 is open.
		2) Request Unit 3 Control Room Op	
		close breaker 5	2GT/BT.
		<u>WHEN</u> 52GT/BT is <u>THEN</u> go to Step	
		3) <u>IF</u> 52GT/BT can closed, <u>THEN</u> B GT per SOP 27.5 START OF GAS T	lack start a 5.3, BLACK
		or 3. <u>WHEN</u> a GT is av <u>THEN</u> go to Step	
		4) IF 52GT/BT can	NOT he

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

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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:	
		 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	j. Locally reset following MCCs as necessary:	
·	o MCC 24 o MCC 27 o MCC 29	o MCC 24 o MCC 27 o MCC 29	

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

Number: Title: Revision Number: ES-1.3 TRANSFER TO COLD LEG RECIRCULATION **REV. 36 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 b. Go to step 52. IN SERVICE GREATER THAN 3.5 HOURS c. Close 889A AND 889B d. Check recirculation pumps - d. Go to step 52. ANY RUNNING e. Check RHR Pumps - ANY RUNNING e. Go to step 52. FOR CORE RECIRC OR CONTAINMENT **SPRAY** 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

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

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

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

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

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

EQUIPMENT	21 DG BUS 5A	480V BUSES 22 DG BUS 2A BUS 3A	23 DG BUS 6A
21 SERVICE WATER PUMP 22 SERVICE WATER PUMP 23 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	277 KW
24 SERVICE WATER PUMP 25 SERVICE WATER PUMP 26 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	277 KW
PRZR CONTROL HEATERS 21 PRZR BU HEATERS 22 PRZR BU HEATERS		554 KW 485 KW	277 KW
23 PRZR BU HEATERS 21 AFW PUMP 23 AFW PUMP	485 KW	375 KW	375 KW
21 FAN COOLER UNIT 22 FAN COOLER UNIT 23 FAN COOLER UNIT	250 KW 250 KW	250 KW	
24 FAN COOLER UNIT 25 FAN COOLER UNIT	217 141	250 KW	250 KW
21 SI PUMP 22 SI PUMP 23 SI PUMP	317 KW	317 KW 317 KW	346 KW
21 SPRAY PUMP 22 SPRAY PUMP	348 KW		348 KW
21 RHR PUMP 22 RHR PUMP		319 KW	319 KW
21 CHARGING PUMP 22 CHARGING PUMP 23 CHARGING PUMP	150 KW	150 KW	150 KW

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ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	REV. 36

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 22 RECIRC PUMP	304 KW		304 KW
21 CCW PUMP 22 CCW PUMP 23 CCW PUMP	228 KW	228 KW	228 KW
21 LIGHTING TRANSFORMER 22 LIGHTING TRANSFORMER 23 LIGHTING TRANSFORMER	225 KW	150 KW (N) 225 KW	150 KW (E)
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

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

Dispatch an Operator to Shut Down 1. 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.

- 2. Establish Cold Leg Recirculation Using RHR Pumps:
 - a. Check 885A AND 885B BOTH a. Perform the following: **ENERGIZED**
 - - 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, <u>THEN</u> return to this step.

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ES-1.3	TRANSFER TO COLD LEG RECIRCULATION	REV. 36
<u> </u>]
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	
е.	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.	

Number:	Title:		Revision Number:
ES-1.3	TRANSFER TO COL	TRANSFER TO COLD LEG RECIRCULATION	
		CRESCOURS NOT COTAVISED	<u> </u>
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	h. Establish recirculation flow path for RHR pumps:	h. <u>IF</u> a recirculation flor can <u>NOT</u> be establishe go to ECA-1.1, LOSS O	d, <u>THEN</u>
	1) Ensure RHR pump discharge valve is open:	EMERGENCY COOLANT RECIRCULATION, Step 1	
	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		
	i. Start RHR pump 22	i. <u>IF</u> 22 RHR pump can <u>NO</u> started, <u>THEN</u> start R 21.	
		1) <u>IF</u> RHR 21 pump can be started, <u>THEN</u> G ECA-1.1, LOSS OF E COOLANT RECIRCULAT Step 1.	O TO MERGENCY
	j. Return to Step in effect.		
		-END-	
			•

Number:	Title:	Revision Number:
ES-1.4	TRANSFER TO HOT LEG RECIRCULATION	.REV. 36

A. <u>PURPOSE</u>

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.

lumber:	Title:		Revision Number:
ES-1.4	TRANSFER TO HOT LEG	G RECIRCULATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
1.	Dispatch an Operator to Shut Down FSB Ventilation	Notify TSC that FSB vent exhaust should be monito radioactive contamination	red for
2.	Dispatch NPO To Energize Valves:		
	o 856B At MCC 26B		
	o 856F At MCC 26A		
3.	<u>Check RHR Spray Header Isolation</u> <u>Valves - CLOSED:</u>	Manually close valves.	
	o MOV-889A o MOV-889B		
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		

umber:	Title:		Revision Number:
ES-1.4	TRANSFER TO HOT LE	EG RECIRCULATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
8.	<u>Check Recirculation System</u> <u>Alignment:</u>		
	a. Check MOV-746 OR MOV-747 - CLOSED.	a. Ensure 746 OR 747 is	closed.
		 IF NEITHER valve closed, <u>THEN</u> Clos OR 640. 	
	b. Check Safety Injection Recirc Switch 6 – ON	b. Place Safety Injection Switch 6 to ON.	on Recirc
9.	<u>Check Valve Alignment And Start SI Pumps:</u>		
	a. Check SI pump suction valves from RHR Hx - OPEN:	a. Manually open valves	•
	o MOV-888A o MOV-888B		
	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 -</u> GREATER THAN 75 PSIG	Check SI valve alignmen	t.
	MENTEN THAN 15 F319	a. <u>IF</u> adequate suction per can <u>NOT</u> be establish consult Operations Maprior to continuing.	ied, <u>THEN</u>
	•		

ımber:	Title:		Revision Number:
ES-1.4	TRANSFER TO HOT	LEG RECIRCULATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OF	BTAINED
* * * * *	* * * * * * * * * * * * * * * * * * *		* * * * * * * * * * * * * * * * * * * *
	load should be maintained less KW for maximum of 2 hrs in an		y increased to *
* * * * 11. St	art 23 SI Pump As Follows:	* * * * * * * * * *	* * * * * * * * * * * * * * * * * *
	Verify adequate power: o Bus 6A - ENERGIZED BY	a. <u>IF</u> adequate pe established, Operations Mar	THEN consult
	OFFSITE POWER - OR -	continuing.	lager prior to
	o Load on 23 diesel generator - LESS THAN 1300 KW	·	
b.	Start 23 SI pump	b. Perform the f	ollowing:
		1) Place conta pump 21 in	
		2) Place SI p	ump 22 in PULLOUT.
		3) Place Safe Recirc Swi	ty Injection tch 1 to OFF.
		4) Open SI pu valves:	ump 22 suction
		o MOV-887A o MOV-887B	
		5) Ensure MOV MOV-851A c	7-851B open AND closed.
		6) Start SI p	ump 22.

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ES-1.4		TRANSFER TO HOT LEG	RECIRCULATION	REV. 36
STEP	AC	TION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
12.	Ensi	ure 746 AND 747 - CLOSED	Perform the following:	
			a. <u>IF EITHER valve can NO closed, THEN Close HCV 640.</u>	
			b. <u>IF</u> EITHER HCV-638 OR 6 <u>NOT</u> be closed, <u>THEN</u> go step 15.	
13.	Che GRE	<u>ck SI Suction Pressure -</u> ATER THAN 75 PSIG	Check SI valve alignment.	·
	<u>uite</u> ,		a. <u>IF</u> adequate suction pre can <u>NOT</u> be established consult Operations Mana prior to continuing.	, <u>THEN</u>
•				
			•	
				i
			•	
				į

umber:	Title:			Revision Number:
ES-1.4	TRANSFER TO HOT LEG	G RE	CIRCULATION	REV. 36
STEP	ACTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
* * * *	<u>CAUT</u>	* * ION	* * * * * * * * * *	* * * * * * * *
	load should be maintained less th KW for maximum of 2 hrs in any 2			ed to * *
* * * * 14. St	art 21 SI Pump As Follows:	* *	* * * * * * * * * * *	* * * * * *
	Verify adequate power:	a.	<u>IF</u> adequate power can	
	o Bus 5A – ENERGIZED BY OFFSITE POWER		established, <u>THEN</u> cons Operations Manager pric continuing.	
	· - OR -			
	o Load on 21 diesel generator - LESS THAN 1300 KW			
b.	Start 21 SI pump	b.	Perform the following:	
			 Place containment s pump 21 in PULLOUT 	
			2) Place SI pump 22 in	n PULLOUT.
			3) Place Safety Inject Recirc Switch 1 to	
			4) Open SI pump 22 su valves:	ction
			o MOV-887A o MOV-887B	
			5) Ensure MOV-851A ope MOV-851B closed.	en AND
			6) Start SI pump 22.	
	rify Adequate Recirculation ow:		·	
a.	Core exit TCs - STABLE OR DECREASING	a.	Return to Step 1.	

ES-1.4	Title: TRANSFER TO HOT LE	G RECIRCULATION REV. 36
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 S'I pump – RUNNING	b. Stop 23 SI pump AND go to step 18.
	c. Stop 22 SI pump	
18.	Check Recirc System Alignment:	
a.	a. Ensure valves 822A AND 822B – OPEN	a. Perform the following:
		1) <u>IF</u> NEITHER Valve can be opened, <u>THEN</u> Go to step 21.
		2) <u>IF</u> 822B is open, <u>THEN</u> ensure valves 747 AND HCV-638 are open.
		a) Go to Step 19.
		3) <u>IF</u> 822A is open, <u>THEN</u> 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.
		•

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STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

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

umber: ES-1.4	Title: TRANSFER TO HOT L	LEG RECIRCULATION	Revision Number:
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	b. Core flowrate required by table - ESTABLISHED	<pre>b. <u>IF</u> core flowrate requ table can <u>NOT</u> be est <u>THEN</u>:</pre>	
		1) Ensure 746 AND 74 closed.	7 are
		a) <u>IF</u> EITHER valv be closed, <u>THE</u> HCV-638 AND 64	<u>N</u> Close
		b) <u>IF</u> EITHER HCV- can <u>NOT</u> be clo go to step 21.	
		2) Start 23 SI pump	
		<u>IF</u> 23 SI pump can started, <u>THEN</u> :	NOT be
		a) Place containme pump 21 in PUL	
•		b) Place SI pump PULLOUT.	22 in
		c) Place Safety I Recirc Switch	
		d) Open SI pump 2 valves:	22 suction
		o MOV-887A o MOV-887B	
		e) Ensure MOV-851 MOV-851A close	
		f) Start SI pump	22.
		3) Go to step 21.	
		•	

ES-1.4	TRANSFER TO HOT LEG RECIRCULATION	REV. 36

- 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

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

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	Valve Operation	Location	Valving* Completed
IF ON LOW	Isolate SI Pumps		
HEAD COLD LEG	a) Close MOV 1810	CCR	
RECIRC-	b) Close MOV-850A	4	
ULATION	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 - 850	OB) 2	
	i) Open SOV 3503 (IVSW - 851	1B) 2	
	•	V-851A) 2	
	• ,	V-850A) 2	
	1) Open SOV 3507 (N2 Gas Mov		
	m) Open SOV 3508 (N ₂ Gas Mov	· ·	

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.

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			** 1
Permission*			Valving**
Granted	Valve Operation	Location	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	
В	Isolate RCP 21 Seal Injection		
~	a) Close MOV-4925	4	
	b) Close MOV-250A	4	
	c) Open SOV 3514 (IVSW)	2	
С	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	
	c) Open 500 5510 (105w)	L	
			•
Location	1 Dining Ponetration Area		
Location:	1 Piping Penetration Area	. 00 6. 71	
ł	2 IVSW Control Panel - PAB		
	3 Gallery above Piping Pen	etration 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		
i ·			•
[7 Personnel Air Lock - Fan		
	8 Equipment Hatch Air Lock	- MO Bldg 95 11	t. El.
* mb = cM =11 *	mandal mbana lanbah at tu		
•	nitial those lines which it is	hermissiple to	
isolate.			
			•
** The NPO should	initial each valve as he proper!	ly positions	
	n previously position some MOVs).
	al the appropriate right hand co		•
ne bhould initi	ar one appropriate right hand co	ramin circly.	
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		(Continued)	·
Permission*		(John Lindea)	Valving**
Granted	Valve Operation	Location	Completed
-	T. I. Dan of a 1 T.		
E	Isolate RCP 24 Seal Injecti		
`	a) Close MOV-4928 b) Close MOV-250D	4 4	
	c) Open SOV 3517 (IVSW)	2	
	z, open sov esi. (1.6,	-	
F	Isolate RCP Seal Return		
	a) Close MOV-222	CCR	
G	Isolate RCP Component Cool.	Wtr	
S	a) Close MOV-769 (Supply)	CCR	
1	b) Close MOV-797 (Supply)	CCR	
	c) Close MOV-786 (Mtr Brg		
	d) Close MOV-784 (Mtr Brg		
	e) Close MOV-789 (Thermal	Barrier) CCR	
	f) Close FCV-625 (Thermal	Barrier) CCR	
Н	Isolate Containment Spray H	oadors	
11	a) Close MOV-869A	4	
	b) Close MOV-869B	4	
	c) Open SOV 3504 (IVSW-86		
	d) Open SOV 3511 (IVSW-86		
	e) Close 878A (Test Line		
I .	Isolate Recirculation Sample	o Tino	
	a) Close MOV-990A	4	
	b) Close MOV-990B	4	
	c) Open (N2 Gas) SOV 3505	2	
	•		
Location:	1 Piping Penetration Ar		
	2 IVSW Control Panel -		
	3 Gallery above Piping		
	4 MCC 26 AA and BB - P.		
ļ	5 PACS/PACV Panels - P.		
	6 Spray Pump Area - PAR		1
1	7 Personnel Air Lock - 8 Equipment Hatch Air I		
	o Equipment natch Air i	LOCK HO DIEG 95 I	C. EI.
* The SM should a isolate.	initial those lines which it	t is permissible to	e e e e e e e e e e e e e e e e e e e
** m1		i	
	initial each valve as he pr		
	an previously position some		50,
ne shoata thit.	ial the appropriate right ha	na corumn entry.	

Number:	Title:	Revision Number:
ES-1.4	TRANSFER TO HOT LEG RECIRCULATION	REV. 36
	·	

		(Continued)	
Permission*	Walve Operation	Logotion	Valving**
Granted	Valve Operation	Location	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 (Samp		
	f) Close MOV-959 (Samp g) Close 990D (Samp	le Line) 4 le Line) 3	
	h) Open SOV 3500 (N2Ga		
	i) Open SOV 3506 (N2Ga		
	j) Open SOV 3509 (N2Ga		
·	k) Open SOV 3510 (N2Ga		
	Between Mov-743/1		
	1) Close 732 (RHR Suct		
	m) Close 859A (SIS Tes		
	n) Close 859C (SIS Tes	-	
•	o) Close MOV-885A (VC		
	p) Close MOV-885B (VC	Sump To RHR) CCR	
К	Isolate N2 to PRT/RCDT/	SIS ACCUM/PORV	
	a) Close SOV 3418 and	3419 (PRT) 2	
	b) Close SOV 3416 and		
	c) Close PCV-863 (VC N		
	d) Close 5459 (RCDT N ₂		
	e) Close 4136 (PRT N ₂	Supply) 1	
		•	
Location:	1 Piping Penetration	Area	
	2 IVSW Control Panel		
	3 Gallery above Pipi	ng Penetration Area	
	4 MCC 26 AA and BB -		
	5 PACS/PACV Panels -		
	6 Spray Pump Area		
		- Fan House 80 ft.	
	8 Equipment Hatch Ai	r Lock - MO Bldg 95	It. El.
* The SM should isolate.	ld initial those lines which	it is permissible t	0
** mt - 100 1			
	uld initial each valve as he		
	S can previously position son		so,
ne snould l	nitial the appropriate right	nand column entry.	

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ES-1.4	TRANSFER TO HOT LEG RECIRCULATION	REV. 36

•			
	(0	ontinued)	
Permission* Granted	Valve Operation	Location	Valving** Completed
L 	Isolate Containment Pressure a) Close 1814A b) Close 1814B c) Close 1814C	Instrumentation 1 1 1 1	
М	Isolate PRZR Level Instrumen a) Close 580A b) Close 580B	tation DW Tester 1 1	
N .	Isolate CCW To Recirc Pump Mo a) Close 753G (Return) b) Close 753H (Supply)	otors 1 1	
0	Isolate Weld Channel to Racks a) Close PCV-1111-1 Rack 16 b) Close PCV-1111-2 Rack 14	& 17 1	
P .	Isolate Station Air To VC a) Close SA-24 b) Close SA-24-1	1 1	
Q 	Isolate Service Water to FCU'a) Close SWN-41-1A (21 Inleb) Close SWN-41-1B (21 Blocc) Close SWN-41-2A (22 Inled) Close SWN-41-2B (22 Block)	t Iso) 4 k) 4 t Iso) 4	
Location:	1 Piping Penetration Area 2 IVSW Control Panel - PA 3 Gallery above Piping Pe 4 MCC 26 AA and BB - PAB 5 PACS/PACV Panels - PAB 6 Spray Pump Area - PAB 6 7 Personnel Air Lock - Far 8 Equipment Hatch Air Lock	netration Area 98 ft. El. 98 ft. El. 8 ft. El. n House 80 ft. El	
* The SM should i isolate.	nitial those lines which it i	s permissible to	
it. The CRS ca	initial each valve as he propen previously position some MOV al the appropriate right hand	s. If he does s	o <i>,</i>

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		,	
		(0 1)	,
Permission*		(Continued)	Valving**
Granted	Valve Operation	Location	Completed
oraniced .	varve operation	посаттоп	Jonipreded
Q	solate Service Water to	FCU's (continued)	
e)	Close SWN-41-3A (23	Inlet Iso) 4	· .
· f)	•		
g)			<u> </u>
h)			· · · · · ·
i)	•		
j)			
, k) 1)	•		j
m)			i
$\binom{n}{n}$			<u></u>
0)	<u> </u>		<u> </u>
p)			
(p	Close SWN-44-1B (21)	Block) 4	
r)	Close SWN-44-2A (22)	Out Isol) 4	·
s)	•	•	
t	•		1
u)	•		
v.			<u> </u>
W	•		
x y	•		<u> </u>
y , Z)			
aa)			
ab)			
ac)			
ad)			
Location:	1 Piping Penetration A		
ie.	2 IVSW Control Panel		8
	3 Gallery above Piping		ľ.
	4 MCC 26 AA and BB -		:
	5 PACS/PACV Panels -		:
	6 Spray Pump Area - PA 7 Personnel Air Lock -	Ab oo it. El. - Fan House 80 ft. El	t
		Lock - MO Bldg 95 ft	
	o bqurpmene nacen mir	Lock 110 bidg 95 10	
* The SM should inition isolate.	tial those lines which	it is permissible to	е
it. The CRS can p	itial each valve as he p previously position some the appropriate right h	MOVs. If he does s	O, .1

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		(Continued)	(
Dormingion*			Volume**
Permission* Granted	Valve Operation	Location (Valving** Completed
	-		F
Q	Isolate Service Water to ae) Close SWN-71-1A (21)		
	ae) Close SWN-71-1A (21 1 af) Close SWN-71-1B (21 1		(
!	ag) Close SWN-71-2A (22)		(
	ah) Close SWN-71-2B (22)		(
	ai) Close SWN-71-3A (23)	Mtr Isol) 4	
	aj) Close SWN-71-3B (23)		
	ak) Close SWN-71-4A (24)		<u> </u>
	al) Close SWN-71-4B (24)		
	am) Close SWN-71-5A (25) an) Close SWN-71-5B (25)		
	an, crose swn /1 sb (25 h	HILL DIOCK) 4	
R	Isolate Auxiliary Steam t	to VC	
	a) Close UH-43 (Steam St		
	b) Close UH-44 (Condens	ate Return) 1	<u> </u>
S	Isolate Alternate Safe Sh	nutdown Instrumentation	n :i
J	a) Close IIP-504 (Przr I		
	b) Close IIP-505 (Przr l		
	c) Close IIP-506 (Przr I	PI-3105-1) 1	<u> </u>
	d) Close IIP-507 (Przr I		
	e) Close IIP-500 (22 SG		<u> </u>
	f) Close IIP-501 (22 SG		
	g) Close IIP-502 (21 SG h) Close IIP-503 (21 SG		<u></u>
	11) 01036 111 303 (21 50	В1 3001 1) 1	
Location:	1 Piping Penetration A	rea	
	2 IVSW Control Panel		· ·
	3 Gallery above Piping		1
	4 MCC 26 AA and BB -		5
	5 PACS/PACV Panels – 6 Spray Pump Area – PA) -1
		Fan House 80 ft. El.	J
		Lock - MO Bldg 95 ft.	E1.
* The SM shou isolate.	ld initial those lines which :	it is permissible to	1
** The NPO sho	uld initial each valve as he p	properly positions	,
	S can previously position some		
	nitial the appropriate right h]
		- -	
Ī			

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		<u>-</u>	
		(Continued)	
Permission* Granted	Valve Operation	Location	Valving** Completed
Т	Isolate Post Accident Air Sa a) Move SOV 5018 (VC Samp b) Move SOV 5019 (VC Samp c) Move SOV 5020 (VC Samp d) Move SOV 5021 (VC Samp e) Move SOV 5022 (VC Retur f) Move SOV 5023 (VC Retur g) Move SOV 5024 (VC Retur h) Move SOV 5025 (VC Retur	Ch 1) 5 Ch 1) 5 Ch 2) 5 Ch 2) 5 cn Ch 1) 5 cn Ch 1) 5 cn Ch 2) 5	
U	Isolate City Water To VC a) Close MW-17 b) Close MW-17-1	1 1	
V	Isolate Post Accident Ventina) Close E-1 (VC IA Supply b) Close E-2 (VC Isolation c) Close E-3 (Vent Exhaust d) Close E-5 (Vent Exhaust	Stop) 5 Stop) 5 Isol) 5	
W 	IF Personnel And Equipment Doors NOT Operating, Isolat a) Close 85A (80 ft Air Lb) Close 85B (80 ft Air Lc) Close 95A (95 ft Air Ld) Close 95B (95 ft Air Ld)	e Equalizing Valve .ock) 7 .ock) 7 .ock) 8	es
Location:	Piping Penetration Area Volume 1	AB 98 ft. El. enetration Area 3 98 ft. El. 8 98 ft. El. 68 ft. El. an House 80 ft. El	
* The SM should i isolate.	nitial those lines which it	is permissible to	
it. The CRS car	initial each valve as he prop n previously position some MO al the appropriate right hand	OVs. If he does s	50,

Number:	Title:	Revision Number:
E-2	FAULTED STEAM GENERATOR ISOLATION	REV. 34

A. <u>PURPOSE</u>

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

B. SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from:

- 1. E-O, 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.

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E-2	FAULTED STEAM GENERATOR ISOLATION	REV. 34

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.
- 1. <u>Check_MSIVs_Of_Affected_SG(s) -</u> CLOSED

Manually close valves. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> locally close MSIVs per AOI 27.1.9, CONTROL ROOM INACCESSIBILITY SAFE SHUTDOWN CONTROL.

- 2. <u>Check If Any SG Secondary</u> <u>Pressure Boundary Is Intact:</u>
 - a. Check pressures in all SGs -ANY STABLE OR INCREASING
- a. <u>IF</u> all SG pressures decreasing in an uncontrolled manner, <u>THEN</u> go to ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF ALL STEAM GENERATORS, Step 1.
- 3. Identify Faulted SG(s):
 - a. Check pressures in all SGs -
- a. Go to Step 5.
- o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER

- OR -

o ANY SG COMPLETELY DEPRESSURIZED

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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
- 5. <u>Check CST Level GREATER THAN</u> 2 FT

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.

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

, ,			
Number:	Title:		Revision Number:
·E - 2	FAULTED STEAM GENE	RATOR ISOLATION	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	CAUT F offsite power is lost after SI required to restart safeguards equip	eset, THEN manual action m	* * * * * * * * * ay be * *
* o P ·	lacing key switches to DEFEAT will	prevent auto SI actuation	*
* * * :	* * * * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * *
6. <u>R</u> e	eset SI:		
a.	. Check any CCW pump – RUNNING	a. Place CCR control swinCCW pumps in PULLOUT	
b	. Place controls for main AND bypass feedwater regulating valves to CLOSE		
С	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	<pre>. One at a time, depress Safety Injection reset buttons (Panel SB-2)</pre>		
	o Train A		
	o Train B		
е	. Verify Train A AND B - RESET	e. Ensure Relays reset (Safeguards Initiation 1-1 AND 2-1):	
		o SIA-1 o SIM-1 o SIA-2 o SIM-2	

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E-2	FAULTED STEAM GENERATOR ISOLATION	REV. 34

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

E-2	Title: FAULTED STEAM GENI	Revision Numb REV. 34	er:
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	f. Verify Train A AND B - RESET	f. Perform the following:	
		 Verify correct switch positions per steps 7a through 7d 	
		<pre>2) One at a time, depress Phase A reset buttons:</pre>	
		o CI Phase A Train A	
	•	o CI Phase A Train B	
		<u>IF</u> Signal does <u>NOT</u> reset, <u>THEN</u> :	
		 Place keyed switches to BYPASS. 	
		<pre>2) One at a time, depress Phase A reset buttons:</pre>	-
		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:	
	, , , , , , , , , , , , , , , , , , ,	 WHEN containment pressure less than 17 psig, THEN do Steps 7i through 7k. 	
		2) Continue with Step 8.	

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E-2	FAULTED STEAM GENE	RATOR ISOLATION	REV. 34
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 (Safeguards Initiation 1-2 AND 2-2):	
		o S1 o S2 o CB1 o CB2	·
8.	Establish Instrument Air To Containment By Opening PCV-1228	Verify Relays on Top of Safeguards Initiation Rad AND 2-2 - RESET	cks 1-2
		o CA1 o CA2	
		<u>IF</u> Phase A is <u>NOT</u> reset re-perform step 7.	THEN
		,	
•			

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E-2 ·	FAULTED STEAM GENERATOR ISOLATION	REV. 34

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-

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

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

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E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36
	·	

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.

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E-3 STEAM GENERATOR TUBE RUPTURE REV. 36

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE

Attachment 2 provides 480V equipment load ratings.

- * 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. <u>Identify Ruptured SG(s)</u>
 - 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

Continue with Steps 5 through 10. WHEN ruptured SG(s) identified, THEN do Steps 3 and 4.

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E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

RESPONSE NOT OBTAINED

CAUTION

- o 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.
- o At least one SG must be maintained available for RCS cooldown.
- o An evaluation of local environmental conditions, including radiation, shall be performed prior to dispatching personnel to perform local actions.
- 3. <u>Isolate Flow From Ruptured SG(s):</u>
 - a. Adjust ruptured SG(s) atmospheric steam dump controller setpoint to 74%, 1030 psig.
 - b. Check ruptured SG(s)
 atmospheric steam dump CLOSED
- b. <u>WHEN</u> ruptured SG pressure less than 1030 psig, <u>THEN</u> verify ruptured SG atmospheric steam dump closed. <u>IF NOT</u> closed, <u>THEN</u> place controller in manual and close valve. <u>IF valve can NOT</u> be closed, <u>THEN</u> locally isolate open valve.
- c. Verify blowdown isolation valve(s) from ruptured SG -CLOSED
- c. Manually close valve(s).

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RESPONSE NOT OBTAINED

- d. Verify at least one motor-driven AFW pump - RUNNING
- d. <u>IF</u> turbine-driven AFW pump is the only available source of feed, <u>THEN</u> 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

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E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

RESPONSE NOT OBTAINED

- g. Close ruptured SG(s) MSIVs
- g. Perform the following:
 - 1) Close all remaining MSIVs.

 <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> 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

<u>IF</u> any ruptured SG can <u>NOT</u> be isolated from at least one intact SG, <u>THEN</u> go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

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E-3	STEAM GENERATOR TUBE RUPTURE	REV.	36

RESPONSE NOT OBTAINED

CAUTION

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

- 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)

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E-3	STEAM GENERATOR TUBE RUPTURE	REV.	36

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.

- * 5. <u>Check PRZR PORVs And Block Valves:</u>
 - a. Power to block valves -AVAILABLE
 - b. PORVs CLOSED

- 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. <u>IF</u> PRZR pressure less than 2335 psig, <u>THEN</u> 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.

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E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

RESPONSE NOT OBTAINED

- 6. Check If Any SG Is Faulted:
 - a. Check pressures in all SGs a. Go to Step 7.

 - o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER

- OR -

- o ANY SG COMPLETELY DEPRESSURIZED
- b. Verify all faulted SG(s) previously isolated:
- b. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.

- o Steamlines
- o Feedlines

NOTE

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

***** 7. Check Intact SG Levels:

- a. Narrow range level GREATER a. Maintain total feed flow THAN 9% (26% FOR ADVERSE CONTAINMENT)
 - 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, THEN return to Step 1.

umber:		Title:			Revision Number:
E-3		STEAM GENERA	TOR TUBI	RUPTURE	REV. 36
STEP		CTION/EXPECTED RESPONSE		ESPONSE NOT OBTAINED	
SILF		TION/LAFECTED RESPONSE		LSFONSE NOT OBTAINED	
* * *	*	* * * * * * * * * * * * * * * * * <u>C</u> .	<u>AUTION</u>	* * * * * * * * * * * *	* * * * ,* * *
* 0 *		offsite power is lost after S uired to restart safeguards eq			y be *
* o	Pla	cing key switches to DEFEAT w	ill pre	vent auto SI actuation.	*
* * *	* *	* * * * * * * * * * * * *	* * * *	* * * * * * * * * *	* * * * * * *
8.	<u>Res</u>	et SI:			
	a.	Check any CCW pump – RUNNING	· a.	Place CCR control switch CCW pumps in PULLOUT.	ches for
		Place controls for main AND bypass feedwater regulating valves to CLOSE			
		Ensure Automatic Safeguards Actuation key switches on Panel SB-2 in DEFEAT position	1:	·	
		o Train A SIA-1			
		- AND -			
		o Train B SIA-2			
	d.	One at a time, depress Safety Injection reset buttons (Pane SB-2):			
		o Train A			
		o Train B			
	е.	Verify Train A AND B - RESET	е.	Ensure Relays reset (T Safeguards Initiation 1-1 AND 2-1):	
				o SIA-1 o SIM-1 o SIA-2 o SIM-2	

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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

ber: E-3	Title: STEAM GENERATO	R TUBE RUPTURE	Revision Number:
CTED.	ACTION/EXPECTED DECRONGE	DECOUNCE NOT OBTAINED	
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	<u> </u>
	f. Verify Train A AND B – RESET	f. Perform the following	:
		 Verify correct swi positions per step through 9d 	
		2) One at a time, dep Phase A reset butt	
		o CI Phase A Train	A
		o CI Phase A Train	В
		<u>IF</u> Signal does <u>NOT</u> re	eset, <u>THEN</u> :
		 Place keyed switch BYPASS. 	es to
		2) One at a time, dep Phase A reset butt	
		o CI Phase A Train	A
	•	o CI Phase A Trair	В
		<u>IF</u> Signal can <u>NOT</u> be <u>THEN</u> Reset Relays CA on Top of Safeguards Initiation Racks 1-2	L AND CA2
	g. Check Phase B - ACTUATED	g. Go To Step 10.	
	h. Containment pressure - LESS	h. Perform the following	:
	THAN 17 PSIG	1) <u>WHEN</u> containment p less than 17 psig Steps 9i through S	, <u>THEN</u> do
		2) Continue with Ste	10.

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E-3	STEAM GENERATOR	TUBE RUPTURE REV. 36
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.	Establish Instrument Air To Containment By Opening PCV-1228	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.

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RESPONSE NOT OBTAINED STEP ACTION/EXPECTED RESPONSE 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. Go to ECA-3.1, SGTR WITH LOSS OF 11. Check Ruptured SG(s) Pressure -GREATER THAN 440 PSIG 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. <u>Initiate RCS Cooldown:</u>

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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 1050 1025 1000 975 950 900 850 800 750 700 650 600 550 500 440	519 (513) 513 (507) 510 (504) 507 (501) 504 (497) 500 (494) 494 (487) 487 (480) 479 (472) 471 (464) 463 (456) 454 (447) 445 (438) 435 (428) 424 (416) 409 (401)

BTEP ACTION/EXPECTED RESPONSE D. Transfer steam dump to pressure mode and dump steam to condenser at maximum rate, NOT to exceed 0.5E6 lbs/hour per SG D. 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. Core exit TCs less than required, THEN perform Step 12d. d. Stop RCS cooldown AND maintain required core exit temperature	umber:	Title:		Revision Number:
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.	E - 3	STEAM GENERATOR	R TUBE RUPTURE	REV. 36
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.	STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
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		b. Transfer steam dump to pressure mode and dump steam to condenser at maximum rate, NOT to exceed 0.5E6 lbs/hour	from intact SGs manual locally per AOI 27.1. CONTROL ROOM INACCES SAFE SHUTDOWN CONTROOUT OUse intact SG atmosteam dumps.	lly or 9, SIBILITY L: spheric
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			<pre>IF no intact SG avail THEN perform the foll o Control feed flow t SG to cool down RCS - OR -</pre>	able, owing: to faulted
REQUIRED TEMPERATURE core exit TCs less than required, <u>THEN</u> perform Step 12d. d. Stop RCS cooldown AND maintain			LOSS OF REACTOR CO SUBCOOLED RECOVERY	OLANT -
			core exit TCs less the required, <u>THEN</u> perfo	han

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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.

- 13. Establish Charging Flow:
 - a. Charging pumps ONE RUNNING
- a. <u>IF</u> more than one charging pump running, <u>THEN</u> stop all but one charging pump AND go to Step 13b.

<u>IF</u> no charging pumps running, <u>THEN</u> perform the following:

- 1) <u>IF</u> CCW flow to RCP(s) thermal barrier is lost, <u>THEN</u> 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
 - 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

- 1) Locally open LCV-112B bypass:
 - o 288

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RESPONSE NOT OBTAINED

CAUTION

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

14. <u>Check Ruptured SG(s) Pressure - STABLE OR INCREASING</u>

<u>IF</u> pressure continues to decrease to less than 250 psid above the pressure of the intact SG(s) used for cooldown, <u>THEN</u> 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	RCS SUBCOOLING °F
(PSIG)	(ADVERSE CONTAINMENT)
0 - 400	72 (103)
401 - 800	64 (76)
801 - 1200	44 (51)
1200 - 2500	39 (46)

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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. <u>Depressurize RCS To Minimize</u> <u>Break Flow And Refill PRZR:</u>
 - a. Normal PRZR spray AVAILABLE a. Go to Step 17. OBSERVE
 - 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 -

RESPONSE NOT OBTAINED

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

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

- 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) IF valve can NOT be closed, THEN 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

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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.

- 17. Depressurize RCS Using PRZR PORV To Minimize Break Flow And Refill PRZR:
 - a. PRZR PORV flow path AT LEAST a. Establish auxiliary spray: ONE AVAILABLE
 - - 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

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STEP ACTION	EXPECTED RESPONSE	RESPONSE NOT OBTAIN	ED
		6) Open auxiliary	spray valve:
		o 212	
		7) Initiate spray HCV-142.	slowly using
		8) Adjust charging to increase spr	
		9) <u>IF</u> auxiliary sp established, <u>Th</u> Step 16b.	ray <u>HEN</u> return to
		<u>IF</u> auxiliary spray established, <u>THEN</u> ECA-3.3, SGTR WITH	go to

- 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 -

This Step continued on the next page.

b. Return to step 17a.

Step 1.

PRESSURIZER PRESSURE CONTROL,

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RESPONSE NOT OBTAINED

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

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

- c. Close PRZR PORV
- 18. <u>Check RCS Pressure INCREASING</u>
- c. Close PORV block valve.

Close PRZR PORV block valve. <u>IF</u> pressure continues to decrease, <u>THEN</u> 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.

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RESPONSE NOT OBTAINED

CAUTION

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

19. <u>Check If SI Flow Should Be</u> <u>Terminated:</u>

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

a. DO <u>NOT</u> STOP SI PUMPS. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

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

- 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)
- c. RCS pressure STABLE OR c. DO NOT STOP SI PUMPS. Go to INCREASING ECA-3.1, SGTR WITH LOSS OF
- b. <u>IF</u> neither condition satisfied, <u>THEN</u> DO <u>NOT</u> STOP SI PUMPS. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT -SUBCOOLED RECOVERY DESIRED, Step 1.

- c. DO <u>NOT</u> 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)
- d. DO <u>NOT</u> STOP SI PUMPS. Return to Step 11.

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RESPONSE NOT OBTAINED

- 20. Stop SI Pumps And Place In AUTO
- 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 pumpRUNNING
- c. Establish maximum charging flow from one Charging pump
 - 1) Ensure HCV-142 FULLY OPEN
 - 2) Increase Charging pump
 speed to maximum

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RESPONSE NOT OBTAINED

- *22. <u>Verify SI Flow Not Required:</u>
 - a. RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:

			_		
RCS PRESSURE (PSIG)				BCOOLING °F CONTAINMENT)	
401	-	1200		44 24	(83) (56) (31) (26)

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)
- 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. <u>Verify All 480V Busses -</u> ENERGIZED BY OFFSITE POWER

Try to restore offsite power to 480V busses per AOI 27.1.1, LOSS OF NORMAL STATION POWER.

<u>IF</u> any diesel generator loaded, <u>THEN</u> ensure one cable tunnel exhaust fan running.

umber:	Title:		Revision Number:
E-3	STEAM GENERATOR	TUBE RUPTURE	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
24. <u>Re</u>	estore Ventilation Systems:		
a.	Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monit and R-44 in service SOP 12.3.2, DIGITAL MONITORING SYSTEM OF LOCAL.	per RADIATION
b.	Verify adequate power to restore PAB ventilation:	b. Establish portable v	ROL ROOM
	o Bus 3A OR 6A – ENERGIZED BY OFFSITE POWER	INACCESSIBILITY SAF CONTROL. Go To Step	
	- OR -		
	o Load on 22 OR 23 diesel generator - LESS THAN 1860 KW		
c.	Restore PAB ventilation on bus supplied by offsite power	c. Restore PAB ventilat supplied by diesel with load less than	generator
		<u>IF</u> normal PAB ventilmOT be restored, <u>TH</u> establish portable vertable ver	<u>EN</u> entilation ROL ROOM
d	. Locally start one 480V switchgear room exhaust fan:	d. <u>IF</u> fan will <u>NOT</u> sta perform the followin	
	o 213 o 215	 Defeat fan interl Bypass key. 	ock using
	o 216	2) Start one exhaust	fan.
,		Post fire watch i switchgear room.	n 480V
e	. Verify at least one cable tunnel exhaust fan – RUNNING	e: Manually start at le cable tunnel exhaust	

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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.

25. <u>Check If RHR Pumps Should Be Stopped:</u>

- a. RCS pressure GREATER THAN a. Go to Step 26. 320 PSIG (340 PSIG FOR ADVERSE CONTAINMENT)
- b. Stop RHR pumps and place in AUTO

mber:	Title:	Revision Numb					
E-3	STEAM GENE	RATOR TUBE RUPTURE REV. 36					
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:					
		 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	d. PERFORM the following:					
	o R-25, R-26	1) <u>WHEN</u> containment spray has been in service for					
	o R-41, R-42	3.5 hours, <u>THEN</u> perform substeps 26e and 26f.					
	o R-2, R-7	2) Go to Step 27.					
	e. Stop containment spray pump and place in AUTO	S					
	f. Close containment spray pum discharge valves:	pp					
	o MOV-866A o MOV-866B o MOV-866C o MOV-866D						

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E-3	STEAM GENERATOR TUBE RUPTURE			REV. 36
STEP AC	TION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
	ck If One CCW Pump Should Be			
. a. (CCW pumps – ALL STOPPED	a.	Go to Step 28.	
	Verify adequate power available:	b.	<u>IF</u> power <u>NOT</u> available perform the following:	
(Any 480V bus - ENERGIZED FROM OFFSITE POWER - OR -		1) Refer to SOP 4.1.2 COMPONENT COOLING OPERATION to estab backup cooling to t following:	SYSTEM lish
(D Load on running diesel generator - LESS THAN 1760 KW		o charging pumps o RHR pumps o SI pumps	
			2) Go to Step 30.	
	Start one CCW pump on 480V bus energized from offsite power	с.	Start one CCW pump on generator with load le 1760 KW.	
			<u>IF</u> no CCW pump can be	started.

- 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.

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E-3	STEA	STEAM GENERATOR TUBE RUPTURE	
STEP	- ACTION/EXPECTED RESPON	NSE . RESPONSE NOT OBTA	INED
28.	Check If One Service Wat Can Be Started On Non-Es Header:		
	a. Service water pumps - RUNNING ON NON-ESSEN	NONE a. Go to Step 29. TIAL HEADER	
	b. Verify adequate power available:	b. Go to Step 29.	
	o Any 480V bus – ENE FROM OFFSITE POWER		
	- OR -		
	o Load on running die generator – LESS TH		
	c. Start one service wat on non-essential head 480V bus energized f offsite power	der on on non-essential	header on with load

Number:	Title: STEAM GENERATOR	TUBE RUPTURE	Revision Number:
29. Cr	ACTION/EXPECTED RESPONSE heck If Letdown Can Be stablished:	RESPONSE NOT OBTAINED	
	PRZR level – GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)	a. Continue with Step 30 PRZR level increases greater than 25% (46% ADVERSE CONTAINMENT), Step 29b.	to for
b.	. Establish letdown:	b. Establish excess letd	own:
	1) Close letdown orifice stops o 200A o 200B o 200C	1) Establish CCW flow the excess letdown exchanger by opening valves:	heat ng CCW
	2) On SN panel open letdown line isolation valves 201 and 2023) On SN panel place Letdown	o Inlet valves 791 o Outlet valves 79 2) Position excess le diversion valve 21 NORMAL to direct f	3,796 tdown 5 to
	Flow Control Valves 200 A B C switch to REMOTE 4) Open letdown stop valve LCV 459	the VCT. 3) Verify seal water containment isolations.	return

5) Place low pressure letdown backpressure controller PCV-135 in MANUAL AND

6) Open letdown orifice stops

to establish desired

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

8) Place PCV-135 in AUTO

letdown flow:

o 45 GPM

o 75 GPM

and 275 psig

adjust to 75 percent open

o 75 GPM Letdown orifice

stop 200A

stop 200B

Letdown orifice

Letdown orifice stop 200C

4) Verify excess letdown flow control valve HCV-123

isolation stop valve 213.

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

7) Establish desired excess

8) Maintain excess letdown heat exchanger outlet

letdown flow using HCV-123.

temperature less than 195°F.

5) Open excess letdown

heat exchanger.

closed.

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E-3	STEAM GENERATOR	TUBE RUPTURE REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
30.	Align Charging Pump Suction As Follows:	
	a. Check Containment Conditions -	a. Align suction to RWST:
	NEVER BEEN ADVERSE	 Open charging pump suction valve from RWST:
	•	o LCV-112B
		2) Close charging pump suction valve from VCT:
		o LCV-112C
		 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:	
	 Open charging pump suction valve from VCT: 	
	o LCV-112C	
	2) Close charging pump suction valve from RWST:	
	o LCV-112B	
31.	Check VCT Makeup Control System:	Adjust controls as necessary.
•	a. Makeup set for greater than RCS boron concentration	
	b. Makeup set for automatic control	f.
		•

Number:	Title:		Revision Number:
E-3	STE	AM GENERATOR TUBE RUPTURE	REV. 36

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. <u>Control RCS Pressure And Makeup</u>
<u>Flow To Minimize RCS-To-Secondary</u>
<u>Leakage:</u>

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

RESPONSE NOT OBTAINED

a. Perform appropriate action(s)
 from table:

RUPTURED SG(s) 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

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E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

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.

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

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:
 - 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.

Number:	Title:		Revision Number:
E-3	·	STEAM GENERATOR TUBE RUPTURE	REV. 36

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 EITHER 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) IF an AC oil pump can NOT 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

umber:	Title:		Revision Number:
E-3	STEAM GENERATOR	TUBE RUPTURE	REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
*34.	<u>Verify Instrument Air Header - STABLE</u>	Dispatch NPO to perform t	he
		a. Ensure at least one Cl running to supply Ins Air per SOP 29.3 STAT SYSTEM.	trument
		b. <u>IF</u> necessary, <u>THEN</u> er instrument air compres running per SOP 29.2 INSTRUMENT AIR SYSTEM OPERATION.	ssor
		c. <u>IF</u> header can <u>NOT</u> be stabilized, <u>THEN</u> Clos	e
35.	Dispatch NPO to locally perform the following:		
	o Periodically Check IVSW Tank Level AND Pressure:	o Direct NPO to fill or pressurize tank as nec	essary.
	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 S Air backup <u>OR</u> N2 backu aligned as necessary.	
•			

Number:	Title:		Revision Number:
E-3	E-3 STEAM GENERATOR TUBE RUPTURE		REV. 36
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
36.	<u>Check If Diesel Generators Should</u> <u>Be Stopped:</u>		
	a. Verify 480V busses - ENERGIZED BY OFFSITE POWER	a. Try to restore offsite to 480V busses per AOI LOSS OF NORMAL STATIO	27.1.1,
	b. Verify lighting – RESET	b. Reset lighting.	
	c. Verify all MCCs except MCC 28 and MCC 28A - ENERGIZED	c. Reset all MCCs except and MCC 28A.	MCC 28
	d. Check following MCCs – ENERGIZED	d. Locally reset followin as necessary:	g MCCs
	o MCC 24 o MCC 27 o MCC 29	o MCC 24 o MCC 27 o MCC 29	
	e. Check MCC 28 And MCC 28A - ENERGIZED	e. <u>IF</u> containment sump le than 44'3" <u>AND</u> contain conditions <u>NOT</u> advers reset MCC 28 and MCC	nment e, <u>THEN</u>
	f. Stop any unloaded diesel generator and place in standby		
37.	Minimize Secondary System Contamination:		
	a. Isolate boiler blowdown		

b. Isolate condenser overboarding

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

c. Isolate makeup to CST

38.

Number:	Title:		Revision Number:
E-3	STEAM GENERATOR	TUBE RUPTURE	REV. 36
STEP.	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAIN	ED
39.	Check RCP Cooling:		
	a. Check RCP CCW system alarms - CLEARED	a. Establish CCW flow thermal barriers p REACTOR COOLANT P AND SHUTDOWN.	er SOP 1.3,
	b. Check RCP seal injection flowBETWEEN 6 GPM AND 10 GPM PER RCP	b. Establish seal ing to RCPs per SOP 3 SEAL WATER, AND L CONTROL and COL 3 AND VOLUME CONTRO	.1, CHARGING, ETDOWN .1, CHEMICAL

- 40. Check If RCP Seal Return Flow <u>Should Be Established:</u>
 - a. RCP thermal barrier ΔP a. Go to Step 41. POSITIVE
 - b. CCW pumps AT LEAST ONE RUNNING
 - 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

- b. Go to Step 41.

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

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

Number:	Title:		,	Revision Number
E-3		STEAM GENERA	TOR: TUBE RUPTURE	REV. 36
STEP	ACTION/EXPEC	TED RESPONSE	RESPONSE NOT OBTAI	NED .
لـــــــــــــــــــــــــــــــــــــ			2) Establish cond starting an RC SOP 1.3, REACT PUMP OPERATION	P per ΓOR COOLANT
		•	Start one RCP.	

- b. Stop all but one RCP
- 42. <u>Check If Source Range Detectors</u> <u>Should Be Energized:</u>
 - a. Check intermediate range flux LESS THAN 1E-10 AMPS
 - b. Verify source range detectorsENERGIZED
 - c. Transfer nuclear recorders to source range scale
- 43. <u>Shut Down Unnecessary Plant</u> <u>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

a. Continue with Step 43. WHEN flux less than 1E-10 amps, THEN do Steps 42b and 42c.

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. Manually energize source range detectors.

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36
l!		

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

CAUTION

- o 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.
- o Consult operations manager to determine appropriate cooldown method.
- 44. <u>Go To Appropriate Post-SGTR</u> <u>Cooldown Method:</u>
 - o Go to ES-3.1, POST-SGTR COOLDOWN USING BACKFILL, Step 1
 - OR -
 - o Go to ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN, Step 1
 - OR --
 - o Go to ES-3.3, POST-SGTR COOLDOWN USING STEAM DUMP, Step 1

-END-

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36

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-

Number:	Title:	Revision	Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV.	36
!			

RESPONSE NOT OBTAINED

1. <u>Use the following table to determine equipment load ratings:</u>

		480V BUSES	
EQUIPMENT	21 DG BUS 5A	22 DG BUS 2A BUS 3A	23 DG BUS 6A
EQUITIENT	003 JA	003 ZA 003 3A	B03 0A
21 SERVICE WATER PUMP 22 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	
23 SERVICE WATER PUMP	!	Z// KW OK Z// KW	277 KW
24 SERVICE WATER PUMP 25 SERVICE WATER PUMP	277 KW	277 KW OR 277 KW	
26 SERVICE WATER PUMP		ETT KN OK ETT KN	277 KW
PRZR CONTROL HEATERS			277 KW
21 PRZR BU HEATERS		554 KW	
22 PRZR BU HEATERS 23 PRZR BU HEATERS	485 KW	485 KW	
21 AFW PUMP		375 KW	
23 AFW PUMP		3/5 KW	375 KW
21 FAN COOLER UNIT	250 KW		
22 FAN COOLER UNIT	250 KW		
23 FAN COOLER UNIT		250 KW 250 KW	
25 FAN COOLER UNIT		200 1111	250 KW
21 SI PUMP	317 KW		
22 SI PUMP		317 KW 317 KW	246 141
23 SI PUMP			346 KW
21 SPRAY PUMP 22 SPRAY PUMP	348 KW		348 KW
			J40 KW
21 RHR PUMP 22 RHR PUMP		319 KW	319 KW
			212 KM
21 CHARGING PUMP 22 CHARGING PUMP	150 KW	150 KW	
23 CHARGING PUMP		150 KW	150 KW

Number:	Title:	Revision Number:
E-3	STEAM GENERATOR TUBE RUPTURE	REV. 36
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RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

EQUIPMENT	21 DG BUS 5A	480V BUSES 22 DG BUS 2A BUS 3A	23 DG BUS 6A
EggTTTEIT	300 011		300 011
21 RECIRC PUMP 22 RECIRC PUMP	304 KW		304 KW
21 CCW PUMP 22 CCW PUMP 23 CCW PUMP	228 KW	228 KW	228 KW
21 LIGHTING TRANSFORMER 22 LIGHTING TRANSFORMER 23 LIGHTING TRANSFORMER	225 KW	150 KW (N) 225 KW	150 KW (E)
TURBINE AUX OIL PÜMP			112 KW
STATION AIR COMPRESSOR	93 KW		

-END-

Number:	Title:	Revision	Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV.	34

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.

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ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34

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

<u>CAUTION</u>

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

2. <u>Check If SI Accumulators Should</u> Be Isolated:

- a. Check the following:
 - o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RÉCOVERY DESIRED, Step 1.

RCS PRESSURE	RCS SUBCOOLING °F
(PSIG)	(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)

Number:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED b. Restore power to SI b. Check power to isolation valves - AVAILABLE accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B c. Close all SI accumulator c. Vent any unisolated isolation valves 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 THEN locally close the following nitrogen valves: o 1809 o 1811A o 1811B This Step continued on the next page.

Number:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34

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. Verify Adequate Shutdown Margin: a. Sample ruptured SG(s) b. Sample RCS c. Shutdown margin from graphs c. Borate as necessary. book - ADEQUATE

Number:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34

RESPONSE NOT OBTAINED

* 4. <u>Check Intact SG Levels:</u>

- a. Narrow range level GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)
- b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%
- 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. <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.

Number:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34

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.

- 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.

IF no intact SG available and
RHR System NOT in service,
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.

Number:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34

RESPONSE NOT OBTAINED

* 6. <u>Check Ruptured SG(s) Narrow Range</u> <u>Level - GREATER THAN 9% (26% FOR</u> ADVERSE CONTAINMENT)

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)
 - b. PRZR level LESS THAN 69% (63% FOR ADVERSE CONTAINMENT)
- a. Increase RCS makeup flow or decrease letdown as necessary. Go to Step 8.
- b. Decrease RCS makeup flow or increase letdown to decrease level which will decrease RCS pressure. Go to Step 9.

lumber:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34
STEP	ACTION/EXPECTED RESPONSE NOT OBTAIN	NED
	NOTE upper head region may void during RCS depressurization running. This may result in a rapidly increasing PRZR	
	epressurize RCS To Backfill From uptured SG(s):	

- 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.

Number:	Title:	Revision	Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV.	34

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	RCS SUBCOOLING °F
(PSIG)	(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.

- 9. <u>Check If RHR System Can Be Placed</u> <u>In Service:</u>
 - a. Check the following:
- a. Go to Step 10.
- o RCS temperature LESS THAN 350°F
- o RCS pressure LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)
- b. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM

Number:	Title:	Revision Number:
ES-3.1	POST-SGTR COOLDOWN USING BACKFILL	REV. 34
1]

RESPONSE NOT OBTAINED

- *****10. Check If RCPs Must Be Stopped:
 - a. Check the following:
- a. Go to Step 11.
- 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)
- 11. <u>Check RCS Temperatures - LESS</u> Return to Step 3. THAN 200°F

- **Evaluate Long Term Plant Status:** 12.
 - 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. <u>PURPOSE</u>

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.

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

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

CAUTION

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

1. <u>Turn On PRZR Heaters As Necessary</u>
<u>To Saturate PRZR Water At</u>
<u>Ruptured SG Pressure</u>

CAUTION

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

- 2. <u>Check If SI Accumulators Should</u> <u>Be Isolated:</u>
 - a. Check the following:
 - o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

RCS PRESSURE	RCS SUBCOOLING °F
(PSIG)	(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)

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

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED b. Check power to isolation b. Restore power to SI valves - AVAILABLE accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B c. Close all SI accumulator c. Vent any unisolated isolation valves 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 THEN locally close the following nitrogen valves: o 1809 o 1811A o 1811B This Step continued on the next page.

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ES-3.2	POST-SGTR COOLDOWN USING BLOWDOWN	REV. 34

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

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L		

RESPONSE NOT OBTAINED

- * 4. Check Intact SG Levels:
 - a. Narrow range level GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)
 - b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%
- 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. <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.

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]]		

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.

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.

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1		ŀ	

RESPONSE NOT OBTAINED

CAUTION

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

- * 6. <u>Control RCS Pressure And Makeup</u> <u>Flow To Minimize RCS-To-Secondary</u> <u>Leakage:</u>
 - a. Perform appropriate action(s)
 from table:

RUPTURED SG(s) 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

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ES-3.2	POST-SGTR COOLDO	WN USING BLOWDOWN	REV. 34
STEP	CTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
b.	Use normal PRZR spray per Step 6a	b. <u>IF</u> letdown is in ser use auxiliary spray a	
		 Maintain RCP seal to 10 gpm. 	injection
		Reduce charging potential to minimum flow.	ump speed
	•	3) Close charging lice control valve:	ne flow
		o HCV-142	
S.		4) Close the charging valves:	g stop
		o 204A - Loop 22 o 204B - Loop 21	
		5) Close the pressur valves:	izer spray
		o PCV-455A o PCV-455B	
		6) Open auxiliary sp	ray valve:
		o 212	,
		7) Initiate spray sl HCV-142.	owly using
		8) Adjust charging p to increase spray	
	·	<u>IF</u> auxiliary spray caused, <u>THEN</u> use one Fand block valve.	
·			

ber:	Title:		Revision Number
ES-3.2	POST-SGTR COOLDOWN	USING BLOWDOWN	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	NOTE P 3.3, PLANT COOLDOWN, shall be refoldown.		nt during
ا <u>ئ</u>	Check If RCS Cooldown Should Be Stopped:		
•	a. RCS temperatures - LESS THAN 350°F	a. Return to Step 3.	
1	b. Stop RCS cooldown		
•	c. Maintain RCS Temperatures - LESS THAN 350°F		
	Check Ruptured SG(s) Narrow Range Level – GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)	Refill ruptured SG to 735 for ADVERSE CONTAINMENT) feed flow. <u>IF</u> either of following conditions occustop feed flow to the rup	using the rs, <u>THEN</u>
		o Ruptured SG pressure do in an uncontrolled mann	
		- OR -	
		o Ruptured SG pressure i to 1000 psig.	ncreases

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ES-3.2	POST-SGTR COOLDOWN USING BLOWDOWN	REV. 34

NOTE

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

- 9. <u>Establish Blowdown From Ruptured</u> <u>SG(s):</u>
 - a. Align SG blowdown system as necessary per SOP 7.2, SECONDARY BOILER BLOWDOWN PURIFICATION SYSTEM

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.

- *10. <u>Control RCS Makeup And Letdown To</u> Maintain PRZR Level:
 - a. PRZR level GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)
 - b. PRZR level LESS THAN 69% (63% FOR ADVERSE CONTAINMENT)
- a. Increase RCS makeup flow or decrease letdown as necessary.Go to Step 11.
- b. Decrease RCS makeup flow or increase letdown to decrease level which will decrease RCS pressure. Go to Step 12.

ber:	Title:		Revision Number
ES-3.2	POST-SGTR COOLI	DOWN USING BLOWDOWN	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
	upper head region may void du running. This may result in		
	epressurize RCS To Minimize CS-To-Secondary Leakage:		
a.	Use normal PRZR spray	a. <u>IF</u> letdown is in secure use auxiliary spray	
	•	1) Maintain RCP seal 6 to 10 gpm.	injection
		Reduce charging p to minimum flow.	ump speed
		<pre>3) Close charging li control valve:</pre>	ne flow
	•	o HCV-142	
		4) Close the charging valves:	g stop
		o 204A - Loop 22 o 204B - Loop 21	
*		5) Close the pressurvalves:	rizer spray
		o PCV-455A o PCV-455B	· ·
		6) Open auxiliary sp	oray valve:
		o 212	

This Step continued on the next page.

8) Adjust charging pump speed to increase spray flow.

Number: Title: Revision Number:

ES-3.2 POST-SGTR COOLDOWN USING BLOWDOWN REV. 34

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 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 - 400 401 - 800 801 - 1200 1200 - 2500	52 (83) 44 (56) 24 (31) 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)

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

RESPONSE NOT OBTAINED

- 13. <u>Check If RHR System Can Be Placed In Service:</u>
 - a. Check the following:
- a. Return to Step 8.
- o RCS temperature LESS THAN 350°F
- o RCS pressure LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)
- b. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM

ber:	Title:	Revision N	umber
ES-3.2	POȘT-SGTR COOLDOWN	USING BLOWDOWN REV.	34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
14.	Continue RCS Cooldown To Cold Shutdown:		
	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</u> <u>THAN 200°F</u>	Return to Step 8.	

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ES-3.2	POST-SGTR COOLDOWN USING BLOWDOWN	REV. 34

RESPONSE NOT OBTAINED

- 16. <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-3.3	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. <u>SYMPTOMS OR ENTRY CONDITIONS</u>

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.

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34

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. <u>Check If SI Accumulators Should</u> Be <u>Isolated</u>:
 - a. Check the following:
 - o RCS subcooling based on core exit TCs - GREATER THAN VALUE OBTAINED FROM TABLE:
- a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

RCS PRESSURE	RCS SUBCOOLING °F
(PSIG)	(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)

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED b. Check power to isolation b. Restore power to SI valves - AVAILABLE accumulator isolation valves. o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B c. Vent any unisolated c. Close all SI accumulator isolation valves 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 THEN locally close the following nitrogen valves: o 1809 o 1811A o 1811B

umber:	Title:		Revision Number:
ES-3.3	POST-SGTR COOLDO	WN USING STEAM DUMP	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
		<pre>2) Open the following as necessary:</pre>	valves
		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	
RC	S boron concentration should be s	sampled and plotted every 30 π	ninutes.
3.	Verify Adequate Shutdown Margin:		
	a. Sample ruptured SG(s)		
	b. Sample RCS	•	
	c. Shutdown margin from graphs book - ADEQUATE	c. Borate as necessary.	

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

RESPONSE NOT OBTAINED

* 4. Check Intact SG Levels:

- a. Narrow range level GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)
- b. Control feed flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%
- 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. <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.

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34

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.

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

<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.

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34
H		

CAUTION

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

- * 6. <u>Control RCS Pressure And Makeup</u>
 <u>Flow To Minimize RCS-To-Secondary</u>
 <u>Leakage:</u>
 - a. Perform appropriate action(s)
 from table:

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

ES-3.3 POST-SGTR COOLDON	Revision Number WN USING STEAM DUMP REV. 34
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:
	 Maintain RCP seal injection to 10 gpm.
	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.
	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.

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV.	34

RESPONSE NOT OBTAINED

NOTE

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

- Check If RCS Cooldown Should Be Stopped:
 - a. RCS temperatures LESS THAN a. Return to Step 3. 350° F

- 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. $\underline{\text{IF}}$ either of the following conditions occurs, $\underline{\text{THEN}}$ 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.

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34

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.

9. <u>Dump Steam From Ruptured SG(s) To Condenser:</u>

Dump steam using ruptured SG(s) atmospheric steam dumps.

- o Locally operate MSIV bypass valves as necessary
- *10. <u>Control RCS Makeup And Letdown To Maintain PRZR Level:</u>
 - a. PRZR level GREATER THAN 25% (46% FOR ADVERSE CONTAINMENT)
 - b. PRZR level LESS THAN 69%
 (63% FOR ADVERSE CONTAINMENT)
- a. Increase RCS makeup flow or decrease letdown as necessary. Go to Step 11.
- b. Decrease RCS makeup flow or increase letdown to decrease level which will decrease RCS pressure. Go to Step 12.

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

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. <u>Depressurize RCS To Minimize RCS-To-Secondary Leakage:</u>
 - a. Use normal PRZR spray
- a. <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.

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ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	REV. 34

RESPONSE NOT OBTAINED

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

- 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	RCS SUBCOOLING °F
(PSIG)	(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

- 0'R -

- o Number 1 seal return flow LESS THAN 0.3 GPM
- b. Stop affected RCP(s)

nber:	Title:		Revision Number:
ES-3.3	POST-SGTR COOLDOWN	USING STEAM DUMP	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
13.	Check If RHR System Can Be Placed In Service:		
	a. Check the following:	a. Return to Step 8.	
·	o RCS temperature - LESS THAN 350°F	·	
	o RCS pressure – LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)		
	b. Place RHR System in service per SOP 4.2.1, RESIDUAL HEAT REMOVAL SYSTEM		
	•		

mber:	Title:		Revision Number:
ES-3.3	POST-SGTR COOLDOWN (USING STEAM DUMP	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
14.	Continue RCS Cooldown To Cold Shutdown:		
	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 p AOI 27.1.9, CONTROL R INACCESSIBILITY SAFE CONTROL, dump steam f intact SG(s):	OOM SHUTDOWN
		o Use SG atmospheric dumps.	steam
		- OR -	
		o Use turbine-driven	AFW pump.
		<u>IF</u> no intact SG availa RHR system <u>NOT</u> in ser <u>THEN</u> perform the foll	vice,
		o Control feed flow t SG to cool down RCS	o faulted
		- OR -	
		o Go to ECA-3.1, SGTR LOSS OF REACTOR COO SUBCOOLED RECOVERY Step 1.)LANT -
15.	Check RCS Temperatures - LESS THAN 200°F	Return to Step 8.	

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

- 16. <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:
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-O, 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.

er:	Title:		Revision Number
CA-0.0	LOSS OF ALL	AC POWER	REV. 36
ТЕР	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	<u>NO</u>		
0	Steps 1 through 4 are IMMEDIATE ACT	ION steps.	,
0	CSF Status Trees shall be monitored not be implemented.	for information only. FRPs	shall
1.	Verify Reactor Trip:	Manually trip reactor.	
	o Reactor trip breakers - OPEN	· .	
	o Neutron flux - DECREASING		
* *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * *
* s	n evaluation of local environmental chall be performed prior to dispatchingtions.		
* *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * *	* * * * * *
2.	<u>Verify Turbine Trip:</u>	Manually trip turbine. valves can <u>NOT</u> be closed,	
	o Turbine stop valves - CLOSED	close MSIVs. <u>IF</u> MSIVs co closed, <u>THEN</u> manually run	n <u>NOT</u> be
	o Turbine governor valves - CLOSED	turbine and locally close per AOI 27.1.9, CONTROL FINACCESSIBILITY SAFE SHUCONTROL.	MSIVs ROOM

ECA-0.0	Title: LOSS OF ALL	AC POWER	Revision Number:
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
3.	Check If RCS Is Isolated:		
	a. PRZR PORVs - CLOSED o PCV-455C o PCV-456	a. <u>IF</u> PRZR pressure les 2335 psig, <u>THEN</u> man PORVs.	
	b. Letdown isolation valves - CLOSED	b. Manually close valve	
	o LCV-459 o 200A o 200B o 200C		
	c. Excess letdown isolation valveCLOSED	c. Manually close valve	
	o 213		
4.	Verify AFW Flow - GREATER THAN 400 GPM:		
	a. Verify turbine-driven AFW pump	a. Perform the followin	g:
	- RUNNING	 Manually open steregulator valve: 	eam supply
		o PCV-1139	
		Adjust steam sup control valve as	
		o HCV-1118	
	 Manually align turbine-driven AFW pump flow control valves as necessary to establish flow 		

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RESPONSE NOT OBTAINED

- 5. Verify Generator Trip:
 - a. Generator output breakers a. Manually trip generator by OPEN
 - 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. <u>IF</u> offsite power available. <u>THEN</u> 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.
- ***** 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.

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RESPONSE NOT OBTAINED

- b. Energize 480V bus with running diesel generator
- b. Perform the following:
 - Trip running diesel generator(s).
 - 2) <u>IF</u> 13.8KV feeder 13W92 energized, <u>THEN</u> restore power to buses per SOP 27.1.3, OPERATION OF 13.8KV SYSTEM <u>AND</u> 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) <u>IF</u> 13.8KV feeder 13W92 can <u>NOT</u> be energized, <u>THEN</u> 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.

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RESPONSE NOT OBTAINED

- 4) <u>IF</u> 52GT/BT can <u>NOT</u> be closed, <u>THEN</u> blackstart a GT per SOP 27.5.3, BLACK START OF GAS TURBINE 1, 2 OR 3 to restore power, <u>THEN</u> 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.

<u>WHEN</u> power is available, <u>THEN</u> 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:
- c. Go to Step 7. Observe cautions prior to step 7.

o 2A AND 3A

- OR -

o 5A

- OR -

o 6A

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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	
* * * ; *	<u>CAUTION</u>	* * * * * * * *
	nen any 480V bus is energized, recovery actions shall continue carting with Step 26.	e * *
* pi	an SI signal exists or if an SI signal is actuated during trocedure, it shall be reset per Step 19b to permit manual load quipment on an 480V bus.	
	a diesel generator is started, a service water pump shall be the essential header to provide diesel generator cooling.	e started *
	ace Following Equipment vitches In PULLOUT Position:	
0 0 0 0 0	Containment spray pumps SI pumps FCUs Motor-driven AFW pumps CCW pumps RHR pumps Turning gear oil pump	
	Bearing oil pump Turbine auxiliary oil pump	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
* 8.	Check 480V Electrical System: a. Check power to an 480V bus - AVAILABLE o 2A AND 3A - OR - o 5A - OR - o 6A b. Check 480V bus switchgear AND cabling - AVAILABLE	a. Continue efforts to 480V power supply. with Step 9. WHEN supply available, Step 8b. b. Refer to AOI 27.1.9 ROOM INACCESSIBILIT	Continue 480V power THEN go to , CONTROL
	o 2A <u>AND</u> 3A - OR - o 5A - OR -	SHUTDOWN CONTROL to safe shutdown condit Continue with Step switchgear <u>AND</u> cabl available, <u>THEN</u> go	cions. 9. <u>WHEN</u> ing
	c. Check any 480V bus - ENERGIZED o 2A AND 3A' - OR - o 5A - OR - o 6A	c. Energize 480V bus p AOI 27.1.1, LOSS OF STATION POWER. <u>IF</u> 4 <u>NOT</u> be energized <u>I</u> continue with Step	NORMAL 80V bus can <u>HEN</u>
	d. Go to Step 26		

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
9.	Dispatch Personnel To Locally Close Valves To Isolate RCP Seals And Place Valve Switches In CLOSED Position:		·
	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.	Check If CST Is Isolated From Hotwell:		
	a. Verify condenser hotwell isolation valves - CLOSED:	a. <u>IF</u> valve(s) open or p not known, <u>THEN</u> dispa personnel to locally	atch
	o LCV-1128 o LCV-1128A o LCV-1129	<pre>valve(s). IF valve(s) be closed, THEN local corresponding isolation</pre>	ly close
	o CD-6 o CT-8	o CT-7 for LCV-1128 a LCV-1128A. o CD-5 for LCV-1129.	and
	b. Place condenser hotwell isolation valve controllers in MANUAL:		
	o LCV-1128 o LCV-1128A o LCV-1129		

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RESPONSE NOT OBTAINED

11. <u>Check SG Status:</u>

- a. MSIVs CLOSED
- b. Main FW regulating and bypass valves ~ CLOSED
- c. Blowdown isolation valves CLOSED

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

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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. <u>Check If Any SG Secondary</u>
<u>Pressure Boundary Is Faulted:</u>

- a. Check pressures in all SGs -
- a. Go to Step 13.
- o ANY SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER

- OR -

- o ANY SG COMPLETELY DEPRESSURIZED
- 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. <u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> dispatch operator to attempt to locally close or block valves.

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RESPONSE NOT OBTAINED

13. 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

Try to identify ruptured SG(s). Continue with Step 14. WHEN ruptured SG(s) identified, THEN 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 NOT</u>, <u>THEN</u> manually close.

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RESPONSE NOT OBTAINED

CAUTION

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

14. Check Intact SG Levels:

- a. Narrow range level GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT)
- b. Control AFW flow to maintain narrow range level between 9% (26% for ADVERSE CONTAINMENT) and 52%
- a. Maintain maximum AFW flow until narrow range level is greater than 9% (26% for ADVERSE CONTAINMENT) in at least one SG.
- b. <u>IF</u> narrow range level in any SG continues to increase in an uncontrolled manner, <u>THEN</u> 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 <u>WHEN</u> SG pressure less than 1030 psig, <u>THEN</u> verify SG atmospheric steam dump closed. <u>IF NOT</u>, <u>THEN</u> manually close.

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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, H₂ AND CO₂ 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. <u>Check CST Level GREATER THAN</u> 2 FT

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

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ACTION/EXPECTED RESPONSE STEP

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.
- 17. Depressurize Intact SGs To 210 psig:
 - a. Check SG narrow range levels a. Perform the following: GREATER THAN 9% (26% FOR ADVERSE CONTAINMENT) in at least one SG
 - - 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.

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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. CONTROL ROOM INACCES SAFE SHUTDOWN CONTRO steam from intact SG(SIBILITY L, dump
	c. Check RCS cold leg temperatures - GREATER THAN 325°F	c. Perform the following1) Control SG atmosph steam dumps to sto depressurization.	eric
		2) Go to Step 18.	
1	d. Check SG pressures - LESS THAN 210 PSIG	d. Continue with Step 18 pressures decreased t than 210 psig, THEN Step 17e.	o less
	e. Manually control SG atmospheric steam dumps to maintain SG pressures at 210 psig	e. Locally per AOI 27.1. ROOM INACCESSIBILITY SHUTDOWN CONTROL, du from intact SG(s) to SG pressures at 210 p	SAFE mp steam maintain
18.	<pre>Check Reactor Subcritical: o Intermediate range channels - ZERO OR NEGATIVE STARTUP RATE</pre>	Control SG atmospheric s dumps to stop SG depress and allow RCS to heat up	surization

o Source range channels – ZERO OR NEGATIVE STARTUP RATE Number: Title: Revision Number: LOSS OF ALL AC POWER ECA-0.0 **REV. 36**

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

Placing key switches to DEFEAT will prevent auto SI actuation.

NOTE

Depressurization of SGs will result in SI actuation.

- 19. <u>Check SI Signal Status:</u>
 - 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

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RESPONSE NOT OBTAINED

- 20. Verify Containment Isolation Phase A:
 - a. Phase A valves CLOSED (See a. Manually actuate phase A AND ATTACHMENT 1 for valves)
 - ensure phase A valves closed.
 - b. IVSW valves OPEN:
- b. Manually open valves.

- - o 1410
 - o 1413
 - o SOV-3518
 - o SOV-3519
- c. WCP valves OPEN:
- c. Manually open valves.

- o PCV 1238
- o PCV 1239
- o PCV 1240
- o PCV 1241
- d. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAI	NED
_	erify Containment Ventilation solation:		
a	. Containment purge valves - CLOSED:	a. Manually close va	alves.
	o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173	<u>IF</u> valves can <u>NO</u> <u>THEN</u> close valves room.	
	·	<u>IF</u> valves can <u>NO</u> <u>THEN</u> dispatch opersonnel to clos valves by isolatair.	erator and HP se outside
		o FCV-1171, IA-7 o FCV-1173, IA-7	

- o PCV-1190
- o PCV-1191
- o PCV-1192

IF valves can NOT be closed, THEN close valves from fan room.

<u>IF</u> valves can <u>NOT</u> 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 <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

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RESPONSE NOT OBTAINED

22. <u>Check Containment Pressure - HAS REMAINED LESS THAN 24 PSIG</u>

Perform the following:

- Verify containment spray signal actuated. <u>IF NOT, THEN</u> manually actuate.
- b. Verify containment isolation Phase B valves closed.
 - 1) <u>IF NOT</u>, <u>THEN</u> manually close valves (See ATTACHMENT 2).
 - IF 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
- 23. <u>Check Containment Radiation LESS THAN 10 R/HR</u>

Manually close containment isolation valves as necessary. <u>IF</u> valves can <u>NOT</u> be manually closed, <u>THEN</u> dispatch operator and HP personnel to locally close valves.

24. <u>Check Core Exit TCs - LESS THAN</u> 1200° F

<u>IF</u> Core Exit temperatures greater than 1200°F AND increasing, <u>THEN</u> go to SACRG-1, Severe Accident Control Room Guideline Initial Response, Step 1.

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RESPONSE NOT OBTAINED

- 25. <u>Check If AC Emergency Power Is</u> 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.

<u>IF</u> 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.

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RESPONSE NOT OBTAINED

- 26. <u>Stabilize SG Pressures:</u>
 - 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.

- 27. <u>Verify Service Water System</u>
 <u>Operation:</u>
 - a. Verify valve alignment PROPER ALIGNMENT PER SOP 24.1, SERVICE WATER SYSTEM OPERATION
 - R ALIGNMENT PER SOP 24.1, necessary. CE WATER SYSTEM OPERATION
 - b. Verify at least one pump -RUNNING ON ESSENTIAL HEADER
- b. Manually start pump.

a. Manually align valves as

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RESPONSE NOT OBTAINED

- 28. <u>Load Equipment On Energized 480V</u> Bus:
 - 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.

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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

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RESPONSE NOT OBTAINED

- 29. <u>Select Recovery Procedure:</u>
 - a. Check RCS subcooling based on core exit TCs GREATER THAN POWER RECOVERY WITH SI VALUE OBTAINED FROM TABLE:
 - REQUIRED, Step 1.

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

- THAN 11% (33% FOR ADVERSE CONTAINMENT)
- ACTUATED OR REQUIRED
- d. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1
- b. Check PRZR level GREATER
 b. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.
- c. Check SI equipment SI $\,$ c. Go to ECA-0.1, LOSS OF ALL AC $\,$ POWER RECOVERY WITHOUT SI REQUIRED, Step 1.

-END-

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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.
- 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

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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.

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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.

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RESPONSE NOT OBTAINED

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

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

This Step continued on the next page.

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RESPONSE NOT OBTAINED

Use the following table to determine equipment load ratings:

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

-END-

Number:	Title:	Revision Number:
ECA-0.1	LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED	REV. 34
ECA-0.1	LUSS OF ALL AC FUWER RECOVERT WITHOUT ST REQUIRED	

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. <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.

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RESPONSE NOT OBTAINED

CAUTION

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

1. <u>Check RCP Seal Isolation Status:</u>

- a. RCP seal injection isolation valves outside containment -CLOSED:
 - o MOV-250A
 - o MOV-250B
 - o MOV-250C
 - o MOV-250D
- b. RCP thermal barrier CCW return isolation valve outside containment CLOSED:
 - o MOV-789

- a. <u>IF</u> valves open or position not known, <u>THEN</u> check charging pump status:
 - 1) <u>IF</u> pump running, <u>THEN</u> go to Step 2.
 - 2) IF pump NOT running, THEN locally close valves before starting charging pump.
- b. <u>IF</u> valve open or position not known, <u>THEN</u> check CCW pump status:
 - 1) <u>IF</u> pump running, <u>THEN</u> 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

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
2. <u>ç</u>	heck Containment Isolation hase A - NOT ACTUATED	Perform the following:	
<u> </u>	nase A - NOI ACTUATED	a. Reset containment iso Phase A:	lation
		 Place IVSW switcher SN panel 	es to OPEN
		o 1410 o 1413 o SOV 3518 o SOV 3519	
		2) Place CNTMT RAD MO VALVES control swi OPEN on SN panel	
		2) Diago nonconnal an	

 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.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAI	NED
* * * *	· · · · · · · · · · · · · · · · · · ·	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *
* o T	ne loads placed on the energized spacity of the power source.	480V bus shall not exce	ed the *
	f no charging pumps are running, evel less than 15 ft may result		
* o I * d	f seal injection is not isolated amage to the RCP shafts and seal	, starting a charging pu s.	mp may cause **
* * *	* * * *. * * * * * * * * * * *	* * * * * * * * * * * *	* * * * * * * * * *
3. <u>M</u>	anually Load Following Equipment n 480V Bus:	_	
a	. Check instrument air - AVAILABLE	 a. Start one instrum compressor. 	ent air
b	 Start one service water pump on non-essential header 		
	. Start one CCW pump	c. Manually start on one CCW pump can started, <u>THEN</u> est cooling to Charge RHR numps per SO	NOT be tablish backup ng, SI, and

- 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
- 2) Start one charging pump
- e. Start FCUs as necessary

- RHR pumps per SOP 4.1.2, COMPONENT COOLING SYSTEM OPERATION.
 - 1) Manually align valve. <u>IF</u> VCT <u>NOT</u> available, <u>THEN</u> establish suction from RWST:
 - o Open suction valve from RWST:
 - o LCV-112B
 - o Close suction valve from VCT:
 - o LCV-112C

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RESPONSE NOT OBTAINED

- 4. Establish 32 gpm Charging Flow:
 - o Adjust charging pump speed controller to establish 32 gpm
- * 5. <u>Verify SI System Flow Not Required:</u>
 - 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.

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

- b. PRZR level GREATER THAN 11% (33% FOR ADVERSE CONTAINMENT)
- b. Control charging flow to maintain PRZR level. <u>IF</u> PRZR level can <u>NOT</u> be maintained, <u>THEN</u> go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.
- 6. <u>Check PRZR Level GREATER THAN</u> 25% (46% FOR ADVERSE CONTAINMENT)

Control charging flow as necessary.

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ECA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED REV. 34

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.

<u>NOTE</u>

If power sources permit, it is desirable to switch AFW supply from turbine-driven AFW pump to motor-driven AFW pump.

- 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.

 $\overline{\text{IF}}$ AFW flow $\overline{\text{NOT}}$ greater than 400 gpm, $\overline{\text{THEN}}$:

- 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%

mber:	Title:		Revision Number:
ECA-0.1	LOSS OF ALL AC POWER RECO	VERY WITHOUT SI REQUIRED	REV. 34
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
8. <u>Es</u>	tablish 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		
* * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * *
* swit	n SI signal is actuated during t ches have been placed in AUTO, p R RECOVERY WITH SI REQUIRED, sh	his procedure after the SI procedure ECA-0.2, LOSS OF A	
· <u>Pu</u>	neck Valve Alignment And Place Imp Switches For Energized Isses In AUTO:		
0	SI pump RHR pump Containment spray pump		
10. <u>In</u>	nplement FRPs As Required		

Number: Title: Revision Number:

ECA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED REV. 34

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. <u>Establish RCP Seal Cooling:</u>

- 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

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12. <u>Check If RCP Seal Return Flow Should Be Established:</u>

STEP

a. CCW pumps - AT LEAST ONE RUNNING

ACTION/EXPECTED RESPONSE

- 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.

RESPONSE NOT OBTAINED

- 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.

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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)
 - 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

- a. Continue with Step 14. WHEN level increases to greater than 25% (46% for ADVERSE CONTAINMENT), THEN do Step 13b.
- 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
 - 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. Control Charging And Letdown Flow
 To Maintain PRZR Level Between0 of 14
 25% (46% For ADVERSE CONTAINMENT)
 And 63%

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STEP	AC	TION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
15.	<u>Esta</u>	blish PRZR Pressure Control:		
	a. C	Check letdown - IN SERVICE	a. Use PRZR heaters and e PORV and block valve a necessary to maintain pressure. Go to Step	is RCS
	6	Use PRZR heaters and use nuxiliary spray as follows to naintain RCS pressure:		
	1) Maintain RCP seal injection 6 to 10 gpm.	•	
	2	 Reduce charging pump speed to minimum flow. 		
	3	3) Close charging line flow control valve:		
		o HCV-142		
	4	1) Close the charging stop valves:		
		o 204A - Loop 22 o 204B - Loop 21		
	ί	5) Close the pressurizer spray valves:		
		o PCV-455A o PCV-455B	·	
	(6) Open auxiliary spray valve:		
		o 212		
	7	7) Initiate spray slowly using HCV-142.		
	8	 Adjust charging pump speed to increase spray flow. 		

Number: Title: Revision Number:

ECA-0.1 LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED REV. 34

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	RCS SUBCOOLING °F
(PSIG)	(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
- 17. <u>Check If Source Range Detectors</u> Should Be Energized:
 - a. Check intermediate range flux - LESS THAN 1E-10 AMPS
 - b. Verify source range detectorsENERGIZED
 - c. Transfer nuclear recorders to source range scale
- a. Continue with Step 18. WHEN flux less than 1E-10 amps, THEN do Steps 17b and 17c.
- b. Manually energize source range detectors.

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STEP — ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- 18. <u>Verify Adequate Shutdown Margin:</u>
 - a. Sample RCS
 - b. Shutdown margin from graphs book - ADEQUATE
- b. Borate as necessary.
- 19. <u>Maintain Plant Conditions STABLE:</u>
 - o RCS pressure
 - o PRZR level
 - o RCS temperature
 - o Intact SG levels
- *20. <u>Verify SI System Flow Not Required:</u>
 - 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	RCS SUBCOOLING °F
(PSIG)	(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)
- b. Control charging flow to maintain PRZR Level. <u>IF</u> PRZR level can <u>NOT</u> be maintained, <u>THEN</u> 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.

mber:	Title:	Revision Number:
ECA-0.1	LOSS OF ALL AC POWER RECOVERY I	WITHOUT SI REQUIRED REV. 34
STEP	ACTION/EXPECTED RESPONSE R	ESPONSE NOT OBTAINED
22. <u> </u>	Determine If Plant Natural Circulation Cooldown Is Required:	
	a. Consult operations manager	
.1	b. Natural circulation cooldown - b. REQUIRED	Try To Restart An RCP As Follows:
		 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-	
		i i

Number:	Title:	Revision Number:
ECA-0.2	LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED	RFV. 34

A. PURPOSE

This procedure provides actions to use engineered safeguards systems to recover plant conditions following restoration of 480V power.

B. <u>SYMPTOMS OR ENTRY CONDITIONS</u>

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.

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ECA-0.2 LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED REV. 34

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.

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

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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:	b. Manually isolate CCW to RCP thermal barriers:
·	o MOV-789	o Close CCW return isolation valve outside containment:
		o MOV-789
		- OR -
		<pre>o Close CCW return flow control valve outside containment:</pre>
		o FCV-625
3.	<u>Check Containment Radiation - LESS THAN 10 R/HR</u>	Manually close containment isolation valves as necessary. <u>IF</u> valves can <u>NOT</u> be manually closed, <u>THEN</u> dispatch operator and HP personnel to locally close valves.
4.	Establish Containment Fan Cooler Units Operation:	
i E	a. Start fan coolers	
	b. Verify charcoal filter valvesOPEN	b. Manually open valves. <u>IF</u> BOTH charcoal filter valves on a fan cooler can <u>NOT</u> be manually opened, <u>THEN</u> 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 5. Check RWST Level - GREATER THAN 9.24 FT 6. Manually Align Valves To Establish SI Injection Mode: a. Verify SI pump suction valve from RWST - OPEN: o MOV-1810 b. Align SI System valves: 1) Open RHR Hx CCW outlet valves: o MOV-822A o MOV-822A o MOV-746 o MOV-747	Number:	Title:	Revision Number:
5. Check RWST Level - GREATER THAN 9.24 FT 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 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	ECA-0.2	LOSS OF ALL AC POWER REC	OVERY WITH SI REQUIRED REV. 34
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 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
Establish SI Injection Mode: a. Verify SI pump suction valve from RWST - OPEN: o MOV-1810 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	5.		a. Go to ES-1.3, TRANSFER TO COLD
from RWST - OPEN: o MOV-1810 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	6.		
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			a. Manually open valve.
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			
o MOV-822A o MOV-822B 2) Open RHR Hx outlet valves: o MOV-746 o MOV-747		1) Open RHR Hx CCW outlet	
o MOV-746 o MOV-747		o MOV-822A	
o MOV-747		2) Open RHR Hx outlet valves:	
		•	•

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ECA-0.2	LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED	REV. 34
STEP	CTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED	
* * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * *
	e loads placed on the energized 480V bus shall not exceed the pacity of the power source.	ne *
* OPI	a CCW pump can not be started, SOP-4.1.2, COMPONENT COOLING ERATION should be referenced to establish cooling to the SImps.	
* * * *	* * * * * * * * * * * * * * * * * * * *	* * '* * * * *
	nually Load Following Equipment 480V Bus:	
a.	Service water pump on essential header	
b.	RHR pump	
c.	SI pump	
d.	Instrument air compressor 21	
	·	
·		
1		

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ECA-0.2 LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED REV. 34

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.

- 8. <u>Check Intact SG Levels:</u>
 - 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.

<u>IF</u> AFW flow <u>NOT</u> greater than 400 gpm, <u>THEN</u>:

- 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%

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<u> </u>			
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
9.	<u>Verify Containment Isolation</u> <u>Phase A:</u>		
	a. Phase A valves – CLOSED (See ATTACHMENT 1 for valves)	a. Manually actuate phase ensure phase A valves	
	b. IVSW valves - OPEN:	b. Manually open valves.	
	o 1410 o 1413 o SOV-3518 o SOV-3519		
	c. WCP valves - OPEN:	c. Manually open valves.	
	o PCV 1238 o PCV 1239 o PCV 1240 o PCV 1241		
·	d. Place personnel AND equipment hatch solenoid control switches to INCIDENT on SM panel		
			:
			į

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	Verify Containment Ventilation Isolation:	
	a. Containment purge valves - CLOSED:	a. Manually close valves.
	o FCV-1170 o FCV-1171 o FCV-1172 o FCV-1173	<u>IF</u> valves can <u>NOT</u> be closed, <u>THEN</u> close valves from fan room.
		IF 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:	b. Manually close valves.
	o PCV-1190 o PCV-1191 o PCV-1192	<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

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	heck Containment Pressure - HAS EMAINED LESS THAN 24 PSIG	Perform the following:	
<u>K</u>	LIMINED LESS THAN 24 FSIG	 a. Verify containment sp signal actuated. <u>IF</u> manually actuate. 	
		b. Verify containment is	olation

c. Ensure IVSW isolation Phase B valves open.

Phase B valves closed. IF NOT, THEN manually close valves. (See ATTACHMENT 2 for list of valves.) IF valves can NOT be manually closed, THEN locally close valves.

- 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</u>
 <u>Switches Should Be Placed In</u>
 AUTO:
 - a. RWST level GREATER THAN 9.24 FT
 - b. Place containment spray pump switches in AUTO
- a. Go to Step 13.

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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. Check RCP Seal Isolation Status: 13. a. RCP seal injection isolation valves outside containment - a. Locally close valves before starting charging pump. CLOSED: o MOV-250A o MOV-250B o MOV-250C o MOV-250D Implement FRPs As Required 14.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED]
15.	<pre>Check If One CCW Pump Should Be Started:</pre>		
	a. CCW pumps – ALL STOPPED	a. Go to Step 16.	
	b. Verify adequate power to run one CCW pump:	b. <u>IF</u> power can <u>NOT</u> be <u>THEN</u> perform the fol	
	o Any 480V bus supplying CCW pump – ENERGIZED FROM OFFSITE POWER - OR –	 Refer to SOP 4.1. COMPONENT COOLING OPERATION to esta backup cooling to following: 	S SYSTEM blish
	o Load on running diesel generator - LESS THAN 1760 KW	o charging pumps o RHR pumps o SI pumps	
		2) Go to Step 18.	
	c. Start one CCW pump on 480V bus		

generator with load less than

1760 KW.

IF 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 18.

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======		
STEP	ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED	-
	Check If One Service Water Pump Should Be Started On Non-Essential Header:	·
	a. Service water pumps - NONE a. Go to Step 17. RUNNING ON NON-ESSENTIAL HEADER	
	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	
	c. Start one service water pump on non-essential header on 480V bus energized from diesel generator with load offsite power c. Start one service water pump on non-essential header on diesel generator with load less than 1730 KW.	
* * *	* * * * * * * * * * * * * * * * * * *	*
* 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-	

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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

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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.

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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.

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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. SYMPTOMS OR ENTRY CONDITIONS

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. 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.

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. `	REV.	T COULANT RECIRCULATION	LUSS OF EMERGE	ECA-1.1

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
- 1. <u>Check Emergency Coolant</u> <u>Recirculation Equipment -</u> AVAILABLE
 - 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.

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STEP ACTI	N/EXPECTED RESPONSE NOT OBTAIN	IED
STEP ACTI	N/EXPECTED RESPONSE NOT OBTAIN	IED
STEP ACTI	RESPONSE NOT OBTAIN CAUTION	* * * * * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * * * * *	CAUTION	* * * * * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * * * * *	CAUTION ation of local environmental conditions, including re	* * * * * * * * * * * * * * * * * * *
* * * * * * * * * * * * * * * * * * *	CAUTION	* * * * * * * * * * * * * * * * * * *

- 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.

* 3. Check Intact SG Levels:

- a. Narrow range level GREATER THAN 9%(26% FOR ADVERSE CONTAINMENT)
- b. Control feed flow to maintain narrow range level between 9% (26% FOR ADVERSE CONTAINMENT) and 52%
- 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. $\underline{\text{IF}}$ narrow range level in any SG continues to increase, $\underline{\text{THEN}}$ stop feed flow to that SG.

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RESPONSE NOT OBTAINED

NOTE

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

- 4. <u>Initiate RCS Cooldown To Cold Shutdown:</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> control feed flow to faulted SG to cooldown RCS.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	<u>Verify Containment Fan Cooler</u> <u>Units - IN SERVICE:</u>	
	a. Five fan coolers - RUNNING	a. Manually start fan coolers.
	b. Verify charcoal filter valvesOPEN	b. Manually open valves. <u>IF</u> BOTH charcoal filter valves on a fan cooler can <u>NOT</u> be manually opened, <u>THEN</u> 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.
	3.0 11	
		•
	·	
·		
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RESPONSE NOT OBTAINED

- 7.. <u>Determine Containment Spray</u> 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 47 psig		. 2
Greater	Between	0, 1	2
than	2 psig and	2, 3, 4	1
9.24 ft	47 psig	5	0
	Less than 2 psig	· -	. 0
	Greater than 47 psig		2
Between	Between	0	2 .
9.24 ft	2 psig and	1, 2, 3	1
and 2 ft	47 psig	4, 5	0
	Less than 2 psig	-	0
Less than 2 ft	-	-	0 .

- b. Spray pumps running EQUAL TO
 b. Manually operate spray pumps
 and associated discharge valves as necessary.

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STEP ACTION/EXP	ECTED RESPONSE	RESPONSE NOT OBTAINED]
* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * * *
* * o IF offsite p * required to r		reset, THEN manual action	may be *
* * o Placing key :	switches to DEFEAT wil	 prevent auto SI actuatio	n. *
* * * * * * * * *	* * * * * * * * * *	* * * * * * * * * * * * *	* * * * * * * *
8. <u>Check SI Sig</u>	nal Status - RESET	Reset SI:	
		a. Check any CCW pump	RUNNING
		Place CCR control sw CCW pumps in PULLOU	itches for Γ.
		 b. Place controls for ma bypass feedwater reg valves to CLOSE 	ain AND ulating
		c. Ensure Automatic Saf Actuation key switch Panel SB-2 in DEFEA	es on
		o Train A SIA-1	
		- AND -	
		o Train B SIA-2	
		d. One at a time, depre Injection reset butt SB-2):	ess Safety cons (Panel
		o Train A	
		o Train B	
		e. Verify Train A AND E	B - RESET
		Ensure Relays reset Safeguards Initiatio 1-1 AND 2-1):	(Top of n Racks
·		o SIA-1 o SIM-1 o SIA-2	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
9.	Establish One Train Of SI System Flow:		
	a. SI pump – ONLY ONE RUNNING	a. Operate SI pumps as ne	cessary.
	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.	Verify No Backflow From RWST To Containment Sump:		
	a. Containment sump valves - OPEN	a. <u>IF</u> both containment su valves closed, <u>THEN</u> go Step 11.	
	o MOV-885A		,
	o MOV-885B		
	b. Valve from RWST to RHR pump - CLOSED	b. Manually close valve.	
	o MOV-882		
	•		

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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. <u>Check If An RCP Should Be Started:</u>

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

a. Stop all RCPs. Go to Step 12.

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

- b. All RCPs STOPPED
- c. Check MCC 28 And MCC 28A ENERGIZED
- b. Stop all but one RCP. Go to Step 12
- c. <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. <u>IF</u> MCC 28 can <u>NOT</u> be reset, <u>THEN</u> go to step 12.
- d. Try to start an RCP as follows:
 - Establish conditions for starting an RCP per SOP 1.3, REACTOR COOLANT PUMP OPERATION
 - 2) Start one RCP

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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

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	eset Containment Isolation hase A And Phase B:		
a 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.		

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STEP ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
f. Verify Train A AND B - RESET	f. Perform the following:
	 Verify correct switch positions per steps 13a through 13d
	<pre>2) One at a time, depress Phase A reset buttons:</pre>
	o CI Phase A Train A
	o CI Phase A Train B
	<u>IF</u> Signal does <u>NOT</u> reset, <u>THEN</u> :
	 Place keyed switches to BYPASS.
	<pre>2) One at a time, depress Phase A reset buttons:</pre>
	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 14.
h. Containment pressure - LESS	h. Perform the following:
THAN 17 PSIG	1) <u>WHEN</u> containment pressure less than 17 psig, <u>THEN</u> do Steps 13i through 13k.
	2) Continue with Step 14.
	•

This Step continued on the next page.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	i. One At A Time, Depress Containment Spray Reset Pushbuttons:	
1	o Spray SYS Reset Train A	
ļ	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.	Establish Instrument Air To Containment By Opening PCV-1228	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.	Stop SI System Pumps And Place In AUTO:	
	o SI pumps	
	o RHR pumps	

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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.

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STEP	-[A	CTION/EXPECTED RESPONSE	RESF	PONSE NOT OBTAINED	
	b.	Check RWST level - GREATER THAN 15 FT		y To Add Makeup To R ternate Source:	CS From
			1)	Dispatch operator to valves from the bor blender to RWST:	
				o PW-295 o PW-350	
			2)	Manually set blende controls to supply charging pump sucti	water to
			3)	Go to Step 16d.	
	c.	Align charging pump suction to RWST:			
		 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:			
		 Start additional charging pumps 			
		Adjust charging pump speed controller for maximum flow			
					,

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STEP ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
17. <u>Verify Adequate RCS Makeup Flow:</u>	
a. Check RVLIS indication:	a. Increase RCS makeup flow to maintain RVLIS indication as
o Natural circulation range - GREATER THAN 60% IF NO RCP RUNNING	necessary.
- OR -	
o RCP running range – GREATER THAN 25% IF ONE RCP RUNNING	
b. Core exit TCs - STABLE OR DECREASING	 Increase RCS makeup flow to maintain TCs stable or decreasing.
* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *
<pre>* Voiding may occur in the RCS during RO * result in a rapidly increasing PRZR lo * * * * * * * * * * * * * * * * * * *</pre>	
18. <u>Depressurize RCS To Minimize RCS Subcooling:</u>	
a. Use 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:
	 Maintain RCP seal injection to 10 gpm.
	Reduce charging pump speed to minimum flow.
	3) Close charging line flow control valve:
	o HCV-142
This Step continued on the next page.	

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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.
	Adjust charging pump speed to increase spray flow.
b. Control PRZR heaters as necessary	
	·

This Step continued on the next page.

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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: c. If necessary, manually operate SI pumps to maintain RCS subcooling based on core exit TCs greater than value obtained from table below:

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)

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RESPONSE NOT OBTAINED

NOTE

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

- 19. <u>Check If RHR System Can Be Placed In Service:</u>
 - a. Check the following:
- a. Go to Step 20.
- o RCS temperatures LESS THAN 350°F
- o RCS pressure LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)
- b. Consult operations manager to determine if RHR System should be placed in service

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STEP	CTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20. <u>Che</u> <u>Be</u>	eck If SI Accumulators Should Isolated:	
a.	At least two RCS hot leg temperatures - LESS THAN 350°F	a. Continue with Step 21. WHEN at least two hot leg temperatures less than 350°F, THEN do steps 20b through 20d
b.	Check power to isolation valves - AVAILABLE	 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	 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: a. Go to Step 22. 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) 22. Check RCS Temperature - GREATER Go to Step 33. THAN 200 PF 23. Check RWST Level - LESS THAN Return to Step 1. 3.0 FT 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 Stop Containment Spray Pumps. 2.0 FT	Number:	Title:	Revision Number:
*21. Check If RCPs Must Be Stopped: a. Check the following: a. Go to Step 22. 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) 22. Check RCS Temperature - GREATER Go to Step 33. THAN 200°F 23. Check RWST Level - LESS THAN Return to Step 1. 3.0 FT 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 Stop Containment Spray Pumps. 2.0 FT	ECA-1.1	LOSS OF EMERGENCY COOL	ANT RECIRCULATION REV. 34
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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 b. Stop affected RCP(s) 22. Check RCS Temperature - GREATER THAN 200°F 23. Check RWST Level - LESS THAN Return to Step 1. 3.0 FT. 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 Stop Containment Spray Pumps. 2.0 FT	STEP	- ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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) 22. Check RCS Temperature - GREATER Go to Step 33. THAN 200°F 23. Check RWST Level - LESS THAN Return to Step 1. 3.0 FT. 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 Stop Containment Spray Pumps. 2.0 FT	*21.	Check If RCPs Must Be Stopped:	·
pressure - LESS THAN 200 PSID - OR - O Number 1 seal return flow - LESS THAN 0.3 GPM b. Stop affected RCP(s) 22. Check RCS Temperature - GREATER THAN 200°F 23. Check RWST Level - LESS THAN 3.0 FT. 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.		a. Check the following:	a. Go to Step 22.
o Number 1 seal return flow - LESS THAN 0.3 GPM b. Stop affected RCP(s) 22. Check RCS Temperature - GREATER THAN 200°F 23. Check RWST Level - LESS THAN 3.0 FT. 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.	:		
b. Stop affected RCP(s) 22. Check RCS Temperature - GREATER THAN 200°F 23. Check RWST Level - LESS THAN Return to Step 1. 3.0 FT. 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 Stop Containment Spray Pumps. 2.0 FT		- OR -	
22. Check RCS Temperature - GREATER THAN 200° F 23. Check RWST Level - LESS THAN 3.0 FT. 24. Stop SI System Pumps Taking Suction From RWST And Place Switches In PULLOUT Position: 0 RHR pumps 0 SI pumps *25. Check RWST Level - GREATER THAN 2.0 FT	: 		
THAN 200°F 23. Check RWST Level - LESS THAN		b. Stop affected RCP(s)	
3.0 FT. 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	22.		Go to Step 33.
Suction From RWST And Place Switches In PULLOUT Position: o RHR pumps o SI pumps *25. <u>Check RWST Level - GREATER THAN</u> Stop Containment Spray Pumps. 2.0 FT	23.		Return to Step 1.
o SI pumps *25. <u>Check RWST Level - GREATER THAN</u> Stop Containment Spray Pumps. <u>2.0 FT</u>	24.	Suction From RWST And Place	
2.0 FT			
	*25.		Stop Containment Spray Pumps.
·			,

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ECA-1.1	LOSS OF EMERGENCY COOLANT RECIRCULATION	REV. 34
STEP	ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAIN	ED
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	
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ECA-1.1 LOSS OF EMERGENCY CO		
LOSS OF EMERGENCY CO	OLANT RECIRCULATION	REV. 34
STEP ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	* * * * * * * *
To prevent main steamline isolation,exceed 0.5E6 lbs/hour per SG.	steam dump to condenser shou	1d <u>NOT</u> *
* * * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * * *	* * * * * *
27. <u>Check If All Intact SGs Should Be</u> <u>Depressurized To 710 psig:</u>		
a. Check SG pressures – GREATER THAN 710 PSIG	a. Go to Step 28.	
 b. Dump steam to condenser at maximum rate, <u>NOT</u> to exceed 0.5E6 lbs/hour per intact SG(s), to establish required SG pressure 	b. Dump steam at maximum r <u>NOT</u> to exceed 0.5E6 lbs per intact SG(s), manua locally per AOI 27.1.9, CONTROL ROOM INACCESSIS SAFE SHUTDOWN CONTROL:	:/hour lly or
	o Use SG atmospheric st dumps.	eam .
	- OR -	
	o Use turbine-driven Af	W pump.
c. Check SG pressures - LESS THAN 710 PSIG	c. Return to Step 27b.	`
d. Stop SG depressurization		•
•		

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
28.	Depressurize All Intact SGs To Inject SI Accumulators As Necessary:		
	 a. Dump steam to condenser as necessary to maintain appropriate RVLIS indication: o Natural circulation range - AT 60% IF NO RCP RUNNING 	a. Manually, or locally AOI 27.1.9 CONTROL INACCESSIBILITY SAF CONTROL, dump steam intact SG(s) to main appropriate RVLIS in	ROOM E SHUTDOWN from ntain
	- OR -	o Use SG atmospheri dumps.	c steam
	o RCP running range – AT 25% IF ONE RCP RUNNING	- OR -	
		o Use turbine-drive	n AFW pump.
	b. Check SG pressures - LESS THAN 110 PSIG	b. Return to Step 28a.	
	c. Stop SG depressurization		
29.	<pre>Check If SI Accumulators Should Be Isolated:</pre>		
	a. At least two RCS hot leg temperatures - LESS THAN 350°F	a. Continue with Step at least two RCS ho temperatures less t <u>THEN</u> do Steps 29b t	t leg han 350°F,
	b. Check power to isolation valves - AVAILABLE	b. Restore power to SI accumulator isolation	n valves.
		o 894A MCC 26A o 894C MCC 26A o 894B MCC 26B o 894D MCC 26B	
	·		

umber:	Title: LOSS OF EMERGENCY C	DOLANT RECIRCULATION	Revision Number:
STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
C	c. Close all SI accumulator isolation valves	c. Vent any unisolated accumulators by perfor following:	ming the
		 Close nitrogen sup to accumulators: HC 	ply valve :V-863.
		o <u>IF</u> HCV-863 will <u>THEN</u> locally clo following nitrog	se the
		o 1809 o 1811A o 1811B	·
		<pre>2) Open the following as necessary:</pre>	valves
		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		
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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
30.	Check If RCPs Must Be Stopped:		·
	a. Check the following:	a. Go to Step 31.	
	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)		•
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 AOI 27.1.9, CONTROL INACCESSIBILITY SAFE CONTROL, dump steam intact SG(s):	ROOM SHUTDOWN
		o Use SG atmospheric dumps.	steam
		- OR -	
		o Use turbine-driven	AFW pump.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED	
	Check If RHR System Should Be Placed In Service:		
	a. Check the following:	a. Return to Step 31.	
	o RCS temperature - LESS THAN 350°F		
·	o RCS pressure – LESS THAN 370 PSIG (270 PSIG FOR ADVERSE CONTAINMENT)	•	
	 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		
	h Dump steam to condenser from	h Manually or locally m	ner ·

- 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.

<u>IF</u> no intact SG available and RHR System <u>NOT</u> in service, <u>THEN</u> control feed flow to faulted SG to cooldown RCS.

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STEP

RESPONSE NOT OBTAINED

- 34. Check Containment Hydrogen Concentration:
 - a. Obtain a hydrogen concentration measurement:

ACTION/EXPECTED RESPONSE

o Dispatch chemistry personnel to obtain sample

- OR -

- o Use H2-O2 analyzer on Accident Assessment Panel
- b. Hydrogen concentration LESS b. Consult operations manager for THAN 0.5% IN DRY AIR
 - additional recovery actions. Go to Step 35.

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STEP	A	CTION/EXPECTED RESPONSE	R	ESPONSE NOT OBTAINED	
35.	Res	tore Ventilation Systems:			
	a.	Check radiation monitors R-43 and R-44 - IN SERVICE	a. Place radiation monitors R- and R-44 in service per SOP 12.3.2, DIGITAL RADIA MONITORING SYSTEM OPERATION LOCAL.		er ADIATION
	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 ver per AOI 27.1.9 CONTRO INACCESSIBILITY SAFE CONTROL. Go To Step	L ROOM SHUTDOWN
	С.	Restore PAB ventilation on bus supplied by offsite power <u>OR</u> bus supplied by diesel generator with least load	С.	Establish portable ver per AOI 27.1.9 CONTRO INACCESSIBILITY SAFE CONTROL	L ROOM
	d.	Locally start one 480V switchgear room exhaust fan:	d.	<u>IF</u> fan will not start perform the following:	
		0 213		1) Defeat fan interloo	ck using

- o 215
- o 216

- Bypass key.
- 2) Start one exhaust fan.
- 3) Post fire watch in 480V switchgear room.
- Verify at least one cable e. Manually start at least one tunnel exhaust fan RUNNING cable tunnel exhaust fan.
- e. Verify at least one cable
- 36. <u>Consult Operations Manager</u>

-END-

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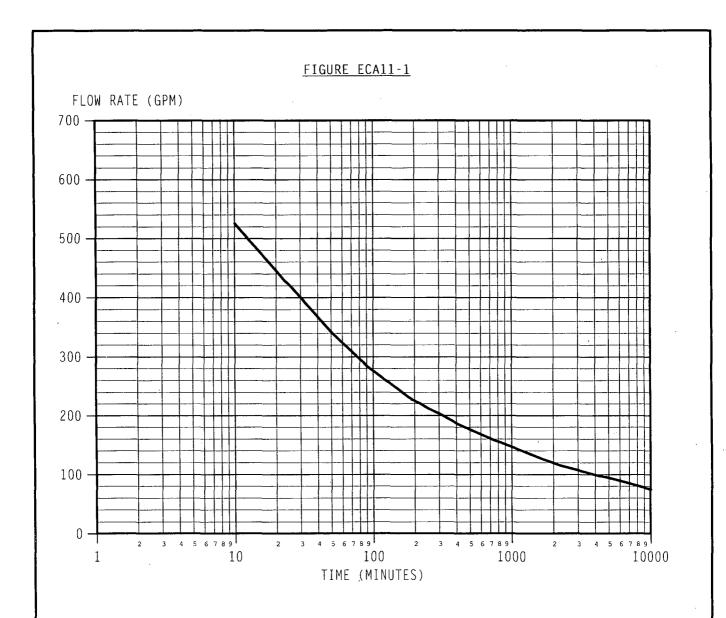


FIGURE ECAll-1, MINIMUM SI FLOW RATE VERSUS TIME AFTER TRIP