

EOP: AP-RCS.4	TITLE: SHUTDOWN LOCA	REV: 3 PAGE 1 of 30
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ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

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TECHNICAL REVIEW

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PLANT SUPERINTENDENT

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CATEGORY 1.0

REVIEWED BY: _____

EOP: AP-RCS.4	TITLE: SHUTDOWN LOCA	REV: 3 PAGE 2 of 30
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A. PURPOSE - This procedure provides actions for protecting the reactor core in the event of a loss of coolant accident (LOCA) that occurs during shutdown operations after the SI accumulators are isolated.

B. ENTRY CONDITIONS/SYMPTOMS

1. SYMPTOMS - The symptoms of shutdown loss of coolant accident are:
 - a. Uncontrolled decrease in PRZR level, or
 - b. Uncontrolled decrease in RCS subcooling, or
 - c. Radiation alarms in CNMT, or
 - d. CNMT sump level alarms

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- NOTE:
- o Conditions should be evaluated for site contingency reporting (Refer to EPIP-1.0, GINNA STATION EVENT EVALUATION AND CLASSIFICATION.
 - o Adverse CNMT conditions should be used whenever CNMT pressure is greater than 4 psig or CNMT radiation is greater than 10^{+05} R/hr.

1 Monitor RCS Conditions:

Stop RHR pumps and place in PULL STOP.

- o RCS subcooling based on core exit T/Cs - GREATER THAN FIGURE MIN SUBCOOLING
- o PRZR level - GREATER THAN 5% [30% adverse CNMT]

2 Isolate RCS Letdown:

- a. Verify loop B cold leg to REGEN Hx, AOV-427 - CLOSED

a. Place the following switches in CLOSE:

- Letdown orifice valve (AOV-200A, AOV-200B, and AOV-202)
- Loop B cold leg to REGEN Hx AOV-427

- b. Place letdown pressure controller, PCV-135, in MANUAL and close valve (demand at 100%)

- c. Excess letdown isolation valve, AOV-310 - CLOSED

c. Manually close valve.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: IF the RCS is water solid, THEN charging should be controlled to maintain RCS pressure.

3 Establish Required RCS Injection Flow:

a. Charging pumps - ANY RUNNING

a. Perform the following:

- 1) IF CCW flow is lost to any RCP thermal barrier OR any #1 seal outlet temperature offscale high, THEN dispatch AO with RWST area key to locally isolate seal injection to affected RCP.

- RCP A, V-300A
- RCP B, V-300B

2) Ensure HCV-142 open, demand at 0*.

b. Align charging pump suction to RWST:

b. IF LCV-112B can NOT be opened, THEN perform the following:

- o LCV-112B -OPEN
- o LCV-112C -CLOSED

- 1) Verify charging pump A NOT running and place in PULL STOP.
- 2) Dispatch AO to locally open manual charging pump suction from RWST (V-358 located in charging pump room).
- 3) WHEN V-358 open, THEN direct AO to close V-268 to isolate charging pumps B and C from VCT (V-268 located in charging pump room).

c. Start charging pumps as necessary (75 kw) and establish 75 gpm total charging flow

- Charging line flow
- Seal injection flow

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

4 Verify Charging Flow Adequate:

- a. Check the following:
 - o RCS subcooling based on core exit T/Cs - GREATER THAN FIGURE MIN SUBCOOLING
 - o PRZR level - GREATER THAN 5% [30% adverse CNMT]
 - o PRZR level - STABLE OR INCREASING
- a. Go to Step 5.
- b. Verify charging flow - LESS THAN 75 GPM
- b. Go to Step 7.
- c. Go to AP-RCS.1, REACTOR COOLANT LEAK

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

- o IF RWST LEVEL DECREASES TO LESS THAN 28%, THEN THE SI SYSTEM SHOULD BE ALIGNED FOR SUMP RECIRCULATION USING ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, STEPS 1 THROUGH 13.
- o HEALTH PHYSICS TECHNICIAN SHOULD BE CONSULTED PRIOR TO ENTERING A HIGH AIRBORNE AREA.

5 Verify SI Injection Capability:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. SI pump discharge valves to RCS cold legs - OPEN <ul style="list-style-type: none"> • SI pump A, MOV-878B • SI pump B, MOV-878D b. SI pumps - AT LEAST TWO PUMPS AVAILABLE | <ul style="list-style-type: none"> a. Manually open valves. Dispatch AO to locally restore power to the following if necessary (locked valve key required): <ul style="list-style-type: none"> • MOV-878B, MCC D position 8C • MOV-878D, MCC D position 8F b. Dispatch AO to restore power to at least two SI pump(s), if necessary. <ul style="list-style-type: none"> • SI pump A, Bus 14 position 20A • SI pump B, Bus 16 position 12A • SI pump C, Bus 14 position 19A or Bus 16 position 13A |
|---|--|

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

6 Establish SI Flow:

- a. Verify the following valves - OPEN
 - RWST outlet valves (MOV-896A and MOV-896B)
 - SI pump C suction valves (MOV-1815A and MOV-1815B)
- b. Open SI pump suction valves from RWST:
 - MOV-825A
 - MOV-825B
- c. Open SI pump discharge valves to RCS cold legs
 - MOV-878B
 - MOV-878D
- d. Start ONE SI pump

a. Manually open valves as necessary.

b. Ensure at least one SI pump suction valve from RWST open.

- MOV-825A
- MOV-825B

c. Ensure at least one valve open.

- SI pump A, MOV-878B
- SI pump B, MOV-878D

7 Initiate Actions To Protect Personnel In CNMT:

- a. Evacuate personnel from CNMT
- b. Periodically monitor CNMT radiation

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

8 Establish Required CNMT Conditions:

a. Depress MANUAL CNMT ISOLATION pushbutton

b. Verify CI/CVI valves - CLOSED

b. Manually close CI and CVI valves. IF valves can NOT be closed, THEN dispatch AO to locally close valves (Refer to Attachment CI/CVI).

c. Start all available CNMT RECIRC fans (240 kw each)

d. Dispatch AO to locally fail open CNMT RECIRC fan cooler SW outlet valves (INT BLDG basement by MG sets)

- FCV-4561
- FCV-4562

9 Check If RCPs Must Be Stopped:

a. RCPs - ANY RUNNING

a. Go to Step 10.

b. Check the following:

- o RCP #1 seal D/P - LESS THAN 220 PSID

b. Ensure PRZR spray valve controllers demand at 0% and go to Step 10.

-OR-

- o RCP #1 seal leakoff - LESS THAN 0.25 GPM

c. Stop affected RCP(s)

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

10 Check RHR Pump Status:

- a. RHR pumps aligned for injection mode:
 - o RWST to RHR pump suction valve, MOV-856 - OPEN
 - o RHR suction valves from loop A hot leg (MOV-700 and MOV-701) - CLOSED
- a. Go to Step 11.
- b. Go to Step 12

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: Continue with Step 13 while aligning RHR for injection. WHEN RHR aligned, THEN do Step 12.

11 Establish RHR Injection Alignment:

- a. Stop any running RHR pump
 - b. Close RHR normal cooling valves:
 - o RHR suction valves from loop A hot leg (MOV-700 and MOV-701) - CLOSED
 - o RHR discharge valves to loop B cold leg (MOV-720 and MOV-721) - CLOSED
 - c. Verify alignment of RHR suction valves from sump B:
 - o MOV-851A and MOV-851B (inside CNMT) - OPEN
 - o MOV-850A and MOV-850B (outside CNMT) - CLOSED
 - d. Verify open RHR pump suction valves (MOV-704A and MOV-704B)
 - e. Open RWST to RHR pump suction valve, MOV-856 (energize DC control power key switch)
 - f. Place RHR Hx bypass valve, HCV-626, to MANUAL and close valve
 - g. Check RHR pump suction temperature - LESS THAN 260°F (PPCS point T0684A or T0684B)
 - h. Open RHR Hx flow control valves (HCV-624 and HCV-625)
 - i. Open RHR core deluge valves (MOV-852A and MOV-852B)
- b. Ensure at least one suction valve and one discharge valve closed.
 - c. Manually align valves as necessary.
 - d. Manually open valves.
 - g. Perform the following:
 - 1) Start one RHR pump on recirculation to reduce RHR pump temperature.
 - 2) WHEN RHR pump suction temperature less than 260°F, THEN stop running RHR pump.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

12 Check If RHR Injection Flow Required:

- a. RCS subcooling based on core exit T/Cs - LESS THAN FIGURE MIN SUBCOOLING
- b. Start one RHR pump

a. Go to Step 13.

13 Verify Adequate SI Flow:

- a. Check RVLIS - AVAILABLE
- b. Check RVLIS indication:
 - o Level (no RCPs) - GREATER THAN 68% [73% adverse CNMT]
 - OR-
 - o Fluid fraction (any RCP running) - GREATER THAN 80%
- c. Core exit T/Cs - STABLE OR DECREASING

a. IF PRZR level greater than 5% [30% adverse CNMT] and stable or increasing, THEN go to Step 13c. IF NOT, THEN start SI pumps as necessary and go to Step 14.

b. Start SI pumps as necessary and go to Step 14.

c. Start SI pumps as necessary.

14 Check RCS Hot Leg Temperatures - STABLE

Control steam dump (or ARVs) and total feed flow as necessary to stabilize RCS temperature.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	Initiate Evaluation Of Plant Status:	
	a. Attempt to identify and isolate RCS break	
	b. Check AUX BLDG radiation - NORMAL <ul style="list-style-type: none"> • Plant vent iodine (R-10B) • Plant vent particulate (R-13) • Plant vent gas (R-14) • CCW liquid monitor (R-17) • CHG pump room (R-4) 	b. Attempt to identify and isolate leakage to AUX BLDG (Refer to AP-RCS.1, REACTOR COOLANT LEAK).
	c. Direct HP to obtain the following samples: <ul style="list-style-type: none"> • RCS boron • RCS activity • CNMT hydrogen • CNMT sump 	
	d. Evaluate and operate equipment as necessary: <ul style="list-style-type: none"> • CCW pumps • SW pumps • Charging pumps • CNMT RECIRC fans • Steam dump/ARVs • VCT makeup system 	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	Reset SI	
17	Reset CI: a. Depress CI reset pushbutton b. Verify annunciator A-26, CNMT ISOLATION - EXTINGUISHED	b. Perform the following: 1) Reset SI. 2) Depress CI reset pushbutton.
18	Verify Adequate Service Water Flow: a. Check at least two SW pumps - RUNNING b. SW header pressure - GREATER THAN 40 PSIG IN EACH LOOP	a. Manually start pumps as power supply permits (258 kw each). b. Manually align valves as necessary.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

19 Establish IA To CNMT:

- | | |
|---|--|
| <p>a. Verify non-safeguards busses energized from offsite power</p> <ul style="list-style-type: none"> o Bus 13 normal feed - CLOSED <li style="text-align: center;">-OR- o Bus 15 normal feed - CLOSED <p>b. Verify turbine building SW isolation valves - OPEN</p> <ul style="list-style-type: none"> • MOV-4613 and MOV-4670 • MOV-4614 and MOV-4664 <p>c. Verify at least two air compressors - RUNNING</p> <p>d. Check IA supply:</p> <ul style="list-style-type: none"> o Pressure - GREATER THAN 60 PSIG o Pressure - STABLE OR INCREASING <p>e. Reset both trains of XY relays for IA to CNMT AOV-5392</p> <p>f. Verify IA to CNMT AOV-5392 - OPEN</p> | <p>a. Perform the following:</p> <ol style="list-style-type: none"> 1) Close non-safeguards bus tie breakers: <ul style="list-style-type: none"> • Bus 13 to Bus 14 tie • Bus 15 to Bus 16 tie 2) Verify adequate emergency D/G capacity to run air compressors (75 kw each).

<u>IF NOT, THEN</u> evaluate if CNMT RECIRC fans should be stopped (Refer to Attachment CNMT RECIRC FANS). 3) <u>WHEN</u> bus 15 restored, <u>THEN</u> reset control room lighting. <p>b. Manually align valves.</p> <p>c. Manually start air compressors as power supply permits (75 kw each). <u>IF</u> air compressors can <u>NOT</u> be started, <u>THEN</u> dispatch AO to locally reset compressors as necessary.</p> <p>d. Perform the following:</p> <ol style="list-style-type: none"> 1) Continue attempts to restore IA (Refer to AP-IA.1, LOSS OF INSTRUMENT AIR). 2) Continue with Step 20. <u>WHEN</u> IA restored, <u>THEN</u> do Steps 19e and f. |
|---|--|

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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20 Check PRZR PORV Block Valves:

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|---|--|
| a. Power to PORV block valves - AVAILABLE | a. Restore power to block valves unless block valve was closed to isolate an open PORV: |
| | <ul style="list-style-type: none"> • MOV-515, MCC C position 6C • MOV-516, MCC D position 6C |
| b. Block valves - AT LEAST ONE OPEN | b. Open one block valve unless it was closed to isolate an open PORV. |

CAUTION

IF ANY RZR PORV OPENS BECAUSE OF HIGH PRESSURE, THEN STEP 21 SHOULD BE PERFORMED AFTER PRESSURE DECREASES TO LESS THAN THE APPLICABLE PORV SETPOINT.

21 Monitor PRZR PORV Status:

- | | |
|---|---|
| a. Check Reactor Vessel overpressure protection system - IN SERVICE | a. Go to Step 21d. |
| b. Check RCS pressure - LESS THAN 410 PSIG | b. Verify at least one PRZR PORV open. Continue with Step 22. <u>WHEN</u> pressure less than setpoint, <u>THEN</u> do Step 21e. |
| c. Go to Step 21e | |
| d. Check PRZR pressure - LESS THAN 2335 PSIG | d. Verify at least one PRZR PORV open. Continue with Step 22. <u>WHEN</u> pressure less than setpoint, <u>THEN</u> do Step 21e. |
| e. Verify PRZR PORVs - CLOSED | e. Manually close PORVs. <u>IF</u> any PORV can <u>NOT</u> be closed, <u>THEN</u> manually close its block valve. |

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

IF CST LEVEL DECREASES TO LESS THAN 5 FEET, THEN ALTERNATE WATER SOURCES FOR AFW PUMPS WILL BE NECESSARY (REFER TO ER-AFW.1, ALTERNATE WATER SUPPLY TO AFW PUMPS).

NOTE: TDAFW pump flow control valves fail open on loss of IA.

22 Monitor S/G Levels:

- a. Narrow range level - GREATER THAN 5% [25% adverse CNMT]
- a. Maintain total feed flow greater than 200 gpm until narrow range level greater than 17% [25% adverse CNMT] in at least one S/G.
- b. Control feed flow to maintain narrow range level between 17% [25% adverse CNMT] and 39%
- b. IF narrow range level in any S/G continues to increase, THEN stop feed to that S/G.

23 Check If RCS Overpressure Protection Should Be Placed In Service:

- a. Check the following:
 - o RCS cold leg temperature - LESS THAN 350°F
 - o RCS pressure - LESS THAN 400 psig [300 psig adverse CNMT]
- a. Go to Step 24.
- b. Place RCS overpressure protection in service (Refer to O-7, ALIGNMENT AND OPERATION OF THE REACTOR VESSEL OVERPRESSURE PROTECTION SYSTEM)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24	Check core exit T/Cs - GREATER THAN 200°F	Go to Step 26.
<p><u>NOTE:</u> Shutdown margin should be monitored during RCS cooldown (Refer to Figure SDM).</p>		
25	Initiate RCS Cooldown To Cold Shutdown:	
	a. Maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR	
	b. Use RHR system if in service	
	c. Dump steam to condenser from S/Gs	c. Manually or locally dump steam using S/G ARVs.
26	Check RCS Subcooling Based On Core Exit T/Cs - GREATER THAN FIGURE MIN SUBCOOLING	Go to Step 41.
27	Check If SI In Service:	Go to Step 37.
	o SI pumps - ANY RUNNING	
	-OR-	
	o RHR pumps - ANY RUNNING IN INJECTION MODE	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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28 Place PRZR Heater Switches In The Following Positions:

- o PRZR heater control group - PULL STOP
- o PRZR heater backup group - OFF

29 Check PRZR level - LESS THAN 13% [40% adverse CNMT] Go to Step 31.

CAUTION

RCS SUBCOOLING MAY BE LOST TEMPORARILY WHILE PERFORMING DEPRESSURIZATION TO RESTORE PRZR LEVEL.

- NOTE:
- o If auxiliary spray is in use, spray flow may be increased by closing normal charging valve AOV-294 and normal PRZR spray valves.
 - o WHEN using a PRZR PORV, THEN select one with an operable block valve.

30 Depressurize RCS To Refill PRZR:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Depressurize using normal PRZR spray if available b. PRZR level - GREATER THAN 13% [40% adverse CNMT] c. Stop RCS depressurization | <ul style="list-style-type: none"> a. <u>IF</u> normal spray <u>NOT</u> available, <u>THEN</u> use one PRZR PORV. <u>IF</u> IA <u>NOT</u> available, <u>THEN</u> refer to Attachment N2 PORVs.

<u>IF</u> NO PORV available, <u>THEN</u> use auxiliary spray valve (AOV-296). b. Continue with Step 31. <u>WHEN</u> level greater than 13% [40% adverse CNMT], <u>THEN</u> do Step 30c. |
|---|---|

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION
 IF ADVERSE CNMT CONDITIONS EXIST OR IF PRZR LEVEL GREATER THAN 38% WITH
 NORMAL CNMT CONDITIONS, THEN AN RCP SHOULD NOT BE STARTED.

31 Check If An RCP Should Be Started:

a. Both RCPs - STOPPED

a. Perform the following:

- 1) Stop all but one RCP.
- 2) Place spray valve controller for idle RCP in MANUAL at 0% demand.
- 3) Go to Step 32.

b. RCS subcooling based on core exit T/Cs - GREATER THAN FIGURE MIN SUBCOOLING

b. Go to Step 41.

c. PRZR level - GREATER THAN 13% [40% adverse CNMT]

c. Return to Step 29.

d. Try to start an RCP

d. IF an RCP can NOT be started, THEN perform the following:

- 1) Establish conditions for starting an RCP
 - a) Bus 11A or 11B energized
 - b) Refer to Attachment RCP START
- 2) Start one RCP

- 1) Verify IA to CNMT, AOV-5392, open. IF NOT, THEN go to Step 32.
- 2) Ensure at least one control rod shroud fan running (45 kw).
- 3) Ensure one Rx compartment cooling fan running (23 kw).

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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32 Check RCS Cold Leg Temperature - GREATER THAN 285°F Go to Step 36.

CAUTION

IF RHR PUMP SUCTION TEMPERATURE IS GREATER THAN 260°F, THEN CONSULT TSC BEFORE STARTING AN RHR PUMP.

33 Check SI Pump Status:

- | | |
|---|---|
| <p>a. Three SI pumps - RUNNING</p> <p>b. RCS subcooling Based on core exit T/Cs - GREATER THAN 35°F [90°F adverse CNMT]</p> <p>c. PRZR level - GREATER THAN 13% [40% adverse CNMT]</p> <p>d. Stop one SI pump</p> | <p>a. Go to Step 34.</p> <p>b. <u>IF</u> RCS hot leg teperature greater than 320°F [310°F adverse CNMT] or <u>IF</u> RHR normal cooling in service, <u>THEN</u> go to Step 41.</p> <p><u>IF</u> RHR normal cooling <u>NOT</u> in service and RCS hot leg teperature less than 320°F [310°F adverse CNMT], <u>THEN</u> ensure at least one RHR pump running in injection mode and go to Step 33c. <u>IF</u> no RHR pump can be operated in injection mode, <u>THEN</u> go to Step 41.</p> <p>c. DO <u>NOT</u> stop SI pump. Return to Step 30.</p> |
|---|---|

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

34 Check If One Of Two SI Pumps Should Be Stopped:

- a. Two SI pumps - RUNNING
- b. Determine required RCS subcooling from table

a. Go to Step 35.

Charging Pump Availability	RCS Subcooling Criteria
NONE	120°F [200°F adverse CNMT]
ONE	115°F [190°F adverse CNMT]
TWO	105°F [180°F adverse CNMT]
THREE	100°F [175°F adverse CNMT]

- c. RCS subcooling based on core exit T/Cs - GREATER THAN VALUE FROM TABLE ABOVE USING FIGURE MIN SUBCOOLING

c. IF RCS hot leg temperature greater than 320°F [310°F adverse CNMT] or IF RHR normal cooling in service, THEN go to Step 41.

IF RHR normal cooling NOT in service and RCS hot leg temperature less than 320°F [310°F adverse CNMT], THEN ensure at least one RHR pump running in injection mode and go to Step 34d. IF no RHR pump can be operated in injection mode, THEN go to Step 41.

- d. PRZR level - GREATER THAN 13% [40% adverse CNMT]

d. DO NOT stop SI pump. Return to Step 30.

- e. Stop one SI pump

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

35 Check If Last SI Pump Should Be Stopped:

a. Any SI pump - RUNNING

a. Go to Step 37.

b. Determine required RCS subcooling from table

Charging Pump Availability	RCS Subcooling Criteria
NONE	Insufficient subcooling to stop SI pump.
ONE	255°F [295°F adverse CNMT]
TWO	235°F [285°F adverse CNMT]
THREE	210°F [270°F adverse CNMT]

c. RCS subcooling based on core exit T/Cs - GREATER THAN REQUIRED SUBCOOLING

c. IF RCS hot leg temperature greater than 320°F [310°F adverse CNMT] or IF RHR normal cooling in service, THEN go to Step 41.

IF RHR normal cooling NOT in service and RCS hot leg temperature less than 320°F [310°F adverse CNMT], THEN ensure at least one RHR pump running in injection mode and go to Step 35d. IF no RHR pump can be operated in injection mode, THEN go to Step 41.

d. PRZR level - GREATER THAN 13% [40% adverse CNMT]

d. DO NOT stop SI pump. Return to Step 30.

e. Stop SI pump

f. Go to Step 37

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

36 Check If SI Pump Should Be Stopped:

- a. Any SI pump - RUNNING
- b. RCS pressure - GREATER THAN 295 psig [510 psig adverse CNMT]
- c. PRZR level - GREATER THAN 13% [40% adverse CNMT]
- d. Stop one SI pump
- e. Return to Step 36a

- a. Go to Step 37.
- b. Go to Step 41.
- c. Do NOT stop SI pump. Return to Step 30.

37 Check If Charging Flow Should Be Controlled To Maintain PRZR Level:

- a. Check RHR pumps - ANY RUNNING IN INJECTION MODE
- b. Go to Step 41.

- a. Start charging pumps and control charging flow to maintain PRZR level and go to Step 38.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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CAUTION

IF ADVERSE CNMT CONDITIONS EXIST OR IF PRZR LEVEL GREATER THAN 38% WITH NORMAL CNMT CONDITIONS, THEN AN RCP SHOULD NOT BE STARTED.

38 Check RCP Status:

a. RCPs - AT LEAST ONE RUNNING

a. Try to start one RCP

1) Establish conditions for starting an RCP

a) Bus 11A or 11B energized

b) Refer to Attachment RCP START

2) Start one RCP. IF an RCP can NOT be started, THEN verify natural circulation (Refer to Attachment NC). IF natural circulation NOT verified, THEN increase dumping steam.

3) Go to Step 39.

b. Stop all but one RCP

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

CAUTION

DEPRESSURIZING THE RCS MAY RESULT IN LOSING THE MINIMAL RCP #1 SEAL OPERATING CONDITIONS. THIS WILL REQUIRE THE RCPS TO BE TRIPPED.

- NOTE:
- o If auxiliary spray is in use, spray flow may be increased by closing normal charging valve AOV-294 and normal PRZR spray valves.
 - o WHEN using a PRZR PORV, THEN select one with an operable block valve.

39 Depressurize RCS To Minimize RCS Subcooling:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Depressurize using normal PRZR spray if available | <ul style="list-style-type: none"> a. <u>IF</u> normal spray <u>NOT</u> available, <u>THEN</u> use one PRZR PORV. <u>IF</u> IA <u>NOT</u> available, <u>THEN</u> refer to Attachment N2 PORVs. <u>IF</u> NO PORV available, <u>THEN</u> use auxiliary spray valve (AOV-296). |
| <ul style="list-style-type: none"> b. Energize PRZR heaters as necessary | |
| <ul style="list-style-type: none"> c. Depressurize RCS until EITHER of the following conditions satisfied: <ul style="list-style-type: none"> o PRZR level - GREATER THAN 75% [65% adverse CNMT] | |
| -OR- | |
| <ul style="list-style-type: none"> o RCS subcooling based on core exit T/Cs - LESS THAN 10°F USING FIGURE MIN SUBCOOLING | |
| <ul style="list-style-type: none"> d. Stop RCS depressurization | |

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
40	Verify Adequate Shutdown Margin	
	a. Direct HP to sample RCS for boron concentration	
	b. Verify boron concentration - GREATER THAN REQUIREMENTS OF FIGURE SDM	b. Borate as necessary.
41	Monitor RCS Inventory:	
	a. Check the following:	a. Perform the following:
	o RCS subcooling based on core exit T/Cs - GREATER THAN FIGURE MIN SUBCOOLING	1) Manually operate SI pumps to restore inventory and/or subcooling. DO NOT operate more than two SI pumps.
	o PRZR level - GREATER THAN 5% [30% adverse CNMT]	2) Go to Step 42.
	b. Go to Step 43	
42	Verify Adequate SI Flow:	
	a. Check RVLIS - AVAILABLE	a. IF PRZR level greater than 5% [30% adverse CNMT] and stable or increasing, THEN go to Step 42c. IF NOT, THEN start SI pumps as necessary and go to Step 43.
	b. Check RVLIS indication:	b. Start SI pumps as necessary and go to Step 43.
	o Level (no RCPs) - GREATER THAN 68% [73% adverse CNMT]	
	-OR-	
	o Fluid fraction (any RCP running) - GREATER THAN 80%	
	c. Core exit T/Cs - STABLE OR DECREASING	c. Start SI pumps as necessary.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

43 Check If Emergency D/Gs
Should Be Stopped:

- a. Verify AC emergency busses energized by offsite power:
 - o Emergency D/G output breakers - OPEN
 - o AC emergency bus voltage - GREATER THAN 420 VOLTS
 - o AC emergency bus normal feed breakers - CLOSED
- b. Stop any unloaded emergency D/G and place in standby (Refer to Attachment D/G STOP)

a. Try to restore offsite power (Refer to ER-ELEC.1, RESTORATION OF OFFSITE POWER).

44 Check RCP Cooling:

- a. Check CCW to RCPs
 - o Annunciator A-7, RCP A CCW RETURN HIGH TEMPERATURE OR LOW FLOW - EXTINGUISHED
 - o Annunciator A-15, RCP B CCW RETURN HIGH TEMPERATURE OR LOW FLOW - EXTINGUISHED
- b. Check RCP seal injection
 - o Labyrinth seal D/P - GREATER THAN 15 INCHES
 - o RCP seal injection flow - GREATER THAN 6 GPM

Establish normal cooling to RCPs (Refer to Attachment SEAL COOLING).

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

45 Check If Seal Return Flow
Should Be Established:

- | | |
|---|--|
| <p>a. Verify instrument bus D -
ENERGIZED</p> <p>b. Verify RCP #1 seal outlet
temperature - LESS THAN 235°F</p> <p>c. Verify RCP SEAL DISCH VLVS - OPEN</p> <ul style="list-style-type: none"> • AOV-270A • AOV-270B <p>d. Rreset both trains of XY relays
for RCP seal return isolation
valve MOV-313</p> <p>e. Open RCP seal return isolation
valve MOV-313</p> <p>f. Verify RCP #1 seal leakoff flow
- LESS THAN 5.5 GPM</p> <p>g. Verify RCP #1 seal leakoff flow
- GREATER THAN 0.25 GPM</p> | <p>a. Restore power to instrument bus
D from MCC B or MCC A
(maintenance supply).</p> <p>b. Go to Step 46.</p> <p>e. Perform the following:</p> <ol style="list-style-type: none"> 1) Place MOV-313 switch to open. 2) Dispatch AO with key to RWST
gate to locally open MOV-313. <p>f. <u>IF</u> any RCP seal leakoff flow
greater than 5.5 gpm, <u>THEN</u>
perform the following:</p> <ul style="list-style-type: none"> o Close affected RCP SEAL DISCH
VLV. <ul style="list-style-type: none"> • RCP A, AOV-270A • RCP A, AOV-270B o Trip affected RCP. <p><u>IF</u> both RCP SEAL DISCH VLVS
shut, <u>THEN</u> go to Step 46</p> <p>g. Refer to AP-RCP.1, RCP SEAL
MALFUNCTION.</p> |
|---|--|

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: This procedure should be continued while obtaining CNMT hydrogen sample in step 46.

46 Check CNMT Hydrogen Concentration:

- | | |
|---|--|
| <ul style="list-style-type: none"> a. Direct HP to start CNMT hydrogen monitors as necessary b. Hydrogen concentration - LESS THAN 0.5% | <ul style="list-style-type: none"> b. Consult TSC to determine if hydrogen recombiners should be placed in service. |
|---|--|

47 Check If Normal RHR Cooling Can Be Established:

- | | |
|---|---|
| <ul style="list-style-type: none"> a. Check the following: <ul style="list-style-type: none"> o RCS cold leg temperature - LESS THAN 350°F o RCS pressure - LESS THAN 400 psig [300 psig adverse CNMT] b. Place RCS overpressure protection in service (Refer to O-7, ALIGNMENT AND OPERATION OF THE REACTOR VESSEL OVERPRESSURE PROTECTION SYSTEM) c. Consult plant staff to determine if RHR normal cooling should be established using Attachment RHR COOL | <ul style="list-style-type: none"> a. Go to Step 48. |
|---|---|

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
48	Check core exit T/Cs - LESS THAN 200°F	Return to Step 21.
49	Evaluate Long Term Plant Status: a. Maintain cold shutdown conditions b. Consult plant staff	
	<u>NOTE:</u> Refer to O-9.3, NRC IMMEDIATE NOTIFICATION, for reporting requirements.	
50	Notify Higher Supervision	

-END-

AP-RCS.4 APPENDIX LIST

<u>TITLE</u>	<u>PAGES</u>
1) FIGURE MIN SUBCOOLING	1
2) FIGURE SDM	1
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4) ATTACHMENT RCP START	1
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9) ATTACHMENT N2 PORVS	1
10) ATTACHMENT CI/CVI	2

FIGURE MIN SUBCOOLING

NOTE: Subcooling Margin = Saturation Temperature From Figure Below [-] Core Exit T/C Indication

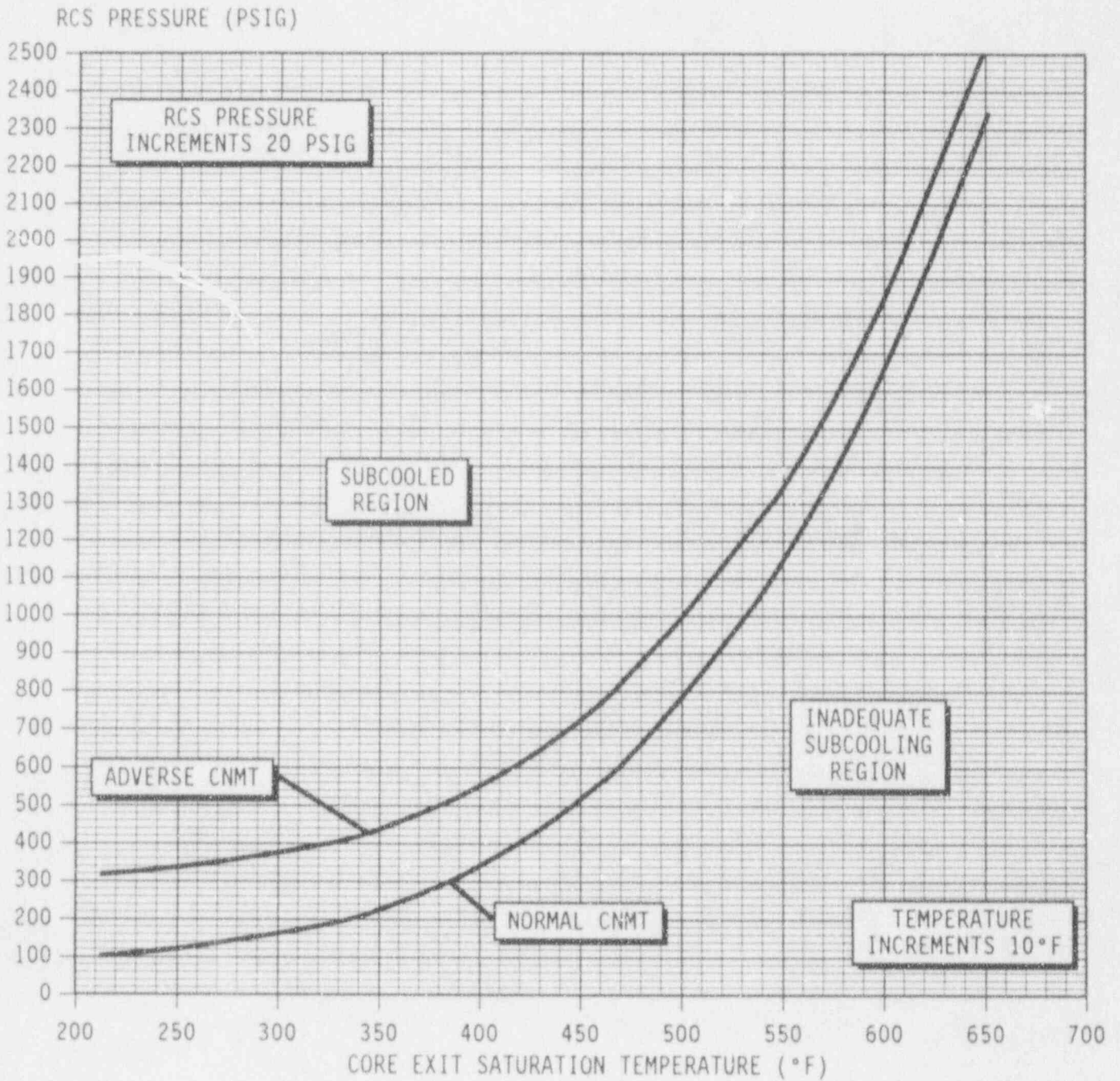


FIGURE SDM

NOTE: o Curve includes allowance for one stuck rod. Add 100 ppm for each additional stuck rod.
o To obtain core burnup, use PPCS turn on code BURNUP.

