

EOP: AP-RCP.1	TITLE: RCP SEAL MALFUNCTION	REV: 7 PAGE 1 of 8
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ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

CONTROLLED COPY NUMBER 23

TECHNICAL REVIEW

PORC REVIEW DATE 1-27-93

Thomas A. Marboes  
PLANT SUPERINTENDENT

2-5-93  
EFFECTIVE DATE

CATEGORY 1.0

REVIEWED BY: \_\_\_\_\_

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A. PURPOSE - This procedure provides the instructions necessary to diagnose and to respond to a reactor coolant pump seal malfunction.

B. ENTRY CONDITIONS/SYMPTOMS

1. ENTRY CONDITIONS - This procedure is entered from:

- a. E-3, STEAM GENERATOR TUBE RUPTURE, or
- b. ES-1.1, SI TERMINATION, or
- c. ES-1.2, POST LOCA COOLDOWN AND DEPRESSURIZATION, or
- d. ECA-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, or
- e. ECA-2.1, UNCONTROLLED DEPRESSURIZATION OF BOTH STEAM GENERATORS, or
- f. ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT-SUBCOOLED RECOVERY DESIRED, or
- g. ECA-3.2, SGTR WITH LOSS OF REACTOR COOLANT-SATURATED, RECOVERY DESIRED, or
- h. ECA-3.3, SGTR WITHOUT PRESSURIZER PRESSURE CONTROL, or
- i. FR-I.1, RESPONSE TO HIGH PRESSURIZER LEVEL, when RCP seal malfunction is indicated.

2. SYMPTOMS - The symptoms of RCP SEAL MALFUNCTION are;

- a. Annunciator B-17(18), RCP A(B) No.1 SEAL HI-LO FLOW 5.5 GPM 0.25 , lit, or
- b. Annunciator B-9(10), RCP A(B) LABYR SEAL LO DIFF PRESS 15" H2O, lit, or
- c. Annunciator B-3(4), RCP A(B) STAND PIPE HI LEVEL + 1 FT, lit, or

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## 2. SYMPTOMS (cont)

- d. Annunciator B-11(12), RCP A(B) STAND PIPE LO LEVEL -4 FT, lit, or
- e. Annunciator B-25(26), RCP A(B) No. 1 SEAL LO DIFF PRESS 220 PSID, lit, or
- f. Annunciator B-1(2), RCP A(B) No. 1 SEAL OUT HI TEMP 200°F, lit, or,
- g. Annunciator A-7(15), RCP A(B) CCW RETURN HIGH TEMP OR LOW FLOW, lit.



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>*****  <u>CAUTION</u>            IF, AT ANY TIME DURING THIS PROCEDURE, A REACTOR TRIP OR SI OCCURS, E-0, REACTOR TRIP OR SAFETY INJECTION, SHALL BE PERFORMED.            *****</p> <p><u>NOTE:</u> Step 1 is an immediate action step.</p>		
1	<p>Check RCP #1 Seal Indications:</p> <ul style="list-style-type: none"> <li>o #1 seal leakoff flows - LESS THAN 5.5 GPM</li> <li>o #1 seal outlet temperatures - LESS THAN 215°F</li> <li>o #1 seal D/Ps - GREATER THAN 220 PSID</li> <li>o #1 seal leakoff flows - GREATER THAN 0.25 GPM</li> </ul>	<p><u>IF</u> any RCP #1 seal failure verified by <u>MORE THAN ONE</u> indication, <u>THEN</u> perform the following:</p> <ul style="list-style-type: none"> <li>a. Close affected RCP(s) #1 seal discharge valve.               <ul style="list-style-type: none"> <li>• RCP A, AOV-270A</li> <li>• RCP B, AOV-270B</li> </ul> </li> <li>b. <u>IF</u> reactor trip breakers closed, <u>THEN</u> trip the reactor.</li> <li>c. Trip the affected RCP(s).</li> <li>d. <u>IF</u> reactor trip was required, <u>THEN</u> go to E-0, REACTOR TRIP or SAFETY INJECTION. <u>IF NOT</u>, <u>THEN</u> go to Step 3.</li> </ul>





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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	Check RCP Seal Return Valve Alignment:	
a.	RCP seal return isolation valve, MOV-313, - OPEN	<p>a. Perform the following:</p> <ol style="list-style-type: none"> <li>1) Ensure CI reset.</li> <li>2) Ensure both trains of XY relays for RCP seal return isolation valve, MOV-313, reset.</li> <li>3) Open RCP seal return isolation valve, MOV-313.</li> </ol> <p><u>IF</u> MOV-313 can <u>NOT</u> be opened, <u>THEN</u> dispatch AO to AUX BLDG with RWST area key to check valve and breaker locally (breaker MCC C position 13J).</p>
b.	<p>Verify RCP seal outlet valves - OPEN</p> <ul style="list-style-type: none"> <li>• RCP A, AOV-270A</li> <li>• RCP B, AOV-270B</li> </ul>	b. Manually open valves. <u>IF</u> valves can <u>NOT</u> be opened, <u>THEN</u> verify IA aligned to CNMT and go to Step 3.
c.	Check RCP #1 seal leakoff flow - LESS THAN 5.5 GPM	c. Return to Step 1.
3	Check RCP Cooling:	Perform the following:
o	Annunciator A-7, RCP A CCW RETURN HIGH TEMP OR LOW FLOW - EXTINGUISHED	<p>a. Verify RCP CCW supply and return valves open.</p> <ul style="list-style-type: none"> <li>• RCP A, MOV-749A and MOV-759A</li> <li>• RCP B, MOV-749B and MOV-759B</li> </ul>
o	Annunciator A-15, RCP B CCW RETURN HIGH TEMP OR LOW FLOW - EXTINGUISHED	<p>b. Ensure open CCW outlet valves from RCP thermal barriers.</p> <ul style="list-style-type: none"> <li>• RCP A, AOV-754A</li> <li>• RCP B, AOV-754B</li> </ul>



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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4	<p>Check RCP #1 Seal Leakoff Flows:</p> <ul style="list-style-type: none"> <li>Seal leakoff flows - GREATER THAN 0.25 GPM</li> <li>Seal leakoff flows - STABLE</li> </ul>	<p>Perform the following:</p> <ul style="list-style-type: none"> <li>Monitor #1 seal outlet temperature. <u>IF</u> seal outlet temperature increasing, <u>THEN</u> return to Step 1.</li> <li>Monitor leakage from #2 seal to RCDT (Trend RCDT level, PPCS point ID L1003).</li> <li>Calculate RCDT leakrate (Refer to RCDT tank level graph in Curve book).</li> <li>Verify affected RCP seal leakoff is between 0.25 gpm and 5.5 gpm using RCDT leak rate and affected RCP seal leakoff flow.</li> </ul>
5	<p>Check RCP #2 Seal Indications:</p> <ul style="list-style-type: none"> <li>Annunciator B-3, RCP A STANDPIPE HI LEVEL +1 FT - EXTINGUISHED</li> <li>Annunciator B-4, RCP B STANDPIPE HI LEVEL +1 FT - EXTINGUISHED</li> </ul>	<p><u>IF</u> affected RCP #1 seal leakoff flow decreasing, <u>THEN</u> failure of #2 seal may be indicated. Continue plant operation while closely monitoring RCP seal indications.</p>



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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
***** <u>CAUTION</u> REDUCING CHARGING FLOW WILL RESULT IN INCREASING REGEN HX OUTLET TEMPERATURE.   *****		
6	Check RCP Labyrinth Seal D/Ps - GREATER THAN 15 INCHES OF WATER	Perform the following: a. Ensure open CCW outlet valves from RCP thermal barriers. • RCP A, AOV-754A • RCP B, AOV-754B b. Verify seal injection flow greater than 5 GPM for affected RCP. c. Adjust HCV-142 as necessary. d. Dispatch AO to check seal injection filter D/P. e. Check CCW surge tank level stable. <u>IF</u> level increasing, <u>THEN</u> go to AP-CCW.1, LEAKAGE INTO THE COMPONENT COOLING LOOP.
7	Check RCP #3 Seal Indications: o Annunciator B-11, RCP A STAND PIPE LO LEVEL -4FT - EXTINGUISHED o Annunciator B-12, RCP B STAND PIPE LO LEVEL -4FT - EXTINGUISHED	Check CNMT radiation monitors normal. • R-11 • R-12 <u>IF</u> RCP standpipe level low and CNMT radiation increasing, <u>THEN</u> # 3 seal leakage increase is probable. Continue plant operation while closely monitoring RCP seal indications.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8	Monitor Plant Conditions:	
a.	RCP #1 seal indications	a. <u>IF</u> affected RCP running, <u>THEN</u> return to Step 1. <u>IF NOT</u> , <u>THEN</u> perform the following:
o	#1 seal leakoff flow - LESS THAN 5.5 GPM	1) Monitor affected RCP (Refer to Attachment RCP DIAGNOSTICS).
o	#1 seal outlet temperature - LESS THAN 215°F	2) Consult Plant Staff to determine if cooldown required.
o	#1 seal D/P - GREATER THAN 220 PSID	
o	#1 seal leakoff flows - GREATER THAN 0.25 GPM	
b.	RCS leakage - NORMAL (Refer to leakage surveillance sheet)	b. Perform the following:
		1) Calculate RCS leakrate.
		2) <u>IF</u> RCS leakrate greater than 1 gpm, <u>THEN</u> refer to Tech Spec section 3.1.5.2 for guidance. <u>IF NOT</u> , <u>THEN</u> consult Plant Staff.
<p><u>NOTE</u>: Refer to O-9.3, NRC IMMEDIATE NOTIFICATION, for reporting requirements.</p>		
9	Notify Higher Supervision	
-END-		





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AP-RCP.1 APPENDIX LIST

<u>TITLE</u>	<u>PAGES</u>
1) ATTACHMENT RCP DIAGNOSTICS	1



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GINNA STATION

CONTROLLED COPY NUMBER 23

TECHNICAL REVIEW

PORC REVIEW DATE 6-8-91

  
PLANT SUPERINTENDENT

6-9-91  
EFFECTIVE DATE

CATEGORY 1.0

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- A. PURPOSE - This procedure provides actions to use normal operational systems to stabilize plant conditions following restoration of AC emergency power.
- B. ENTRY CONDITIONS/SYMPTOMS
  - 1. ENTRY CONDITIONS - This procedure is entered from:
    - a. ECA-0.0, LOSS OF ALL AC POWER, when AC emergency power is restored and SI is not required.

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

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CAUTION

IF AN SI SIGNAL IS ACTUATED PRIOR TO PERFORMING STEP 10 OF THIS PROCEDURE, THEN SI SHOULD BE RESET TO PERMIT MANUAL LOADING OF EQUIPMENT ON AN AC EMERGENCY BUS.

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- NOTE:
- o CSFSTs should be monitored for information only. FR procedures should not be implemented prior to completion of Step 10.
  - o Adverse CNMT values should be used whenever CNMT pressure is greater than 4 psig or CNMT radiation is greater than  $10^{+05}$  R/hr.

1 Check RCP Seal Isolation Status:

- a. RCP seal injection needle valves - CLOSED
  - V-300A
  - V-300B
- b. RCP CCW return valves - CLOSED
  - MOV-759A
  - MOV-759B

- a. Dispatch AO with key to RWST gate to locally close valves before starting charging pump.
- b. IF valves open or position not known, THEN check CCW pump status:
  - 1) IF pump running, THEN go to Step 2.
  - 2) IF pump NOT running, THEN manually close valves.

IF valve(s) can NOT be closed, THEN place switches for RCP thermal barrier CCW outlet valves to CLOSE.

- AOV-754A
- AOV-754B





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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	Check CI Annunciator A-26, CONTAINMENT ISOLATION - EXTINGUISHED	Perform the following:  a. Depress CI reset pushbutton  b. Verify annunciator A-26, CONTAINMENT ISOLATION, extinguished.



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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3	Establish IA to CNMT:	
a.	Verify non-safeguards busses energized from offsite power <ul style="list-style-type: none"> <li>o Bus 13 normal feed - CLOSED</li> <li>-OR-</li> <li>o Bus 15 normal feed - CLOSED</li> </ul>	a. Perform the following: <ul style="list-style-type: none"> <li>1) Close non-safeguards bus tie breakers: <ul style="list-style-type: none"> <li>• Bus 13 to Bus 14 tie</li> <li>• Bus 15 to Bus 16 tie</li> </ul> </li> </ul>
b.	Check at least two SW pumps - RUNNING	b. Manually start SW pumps as power supply permits (258 kw each).  IF less than two SW pumps running, THEN go to Step 4.
c.	Verify turbine building SW isolation valves - OPEN <ul style="list-style-type: none"> <li>• MOV-4613 and MOV-4670</li> <li>• MOV-4614 and MOV-4664</li> </ul>	c. Manually align valves.
d.	Start at least two air compressors (75 kw each)	d. IF air compressors can NOT be started, THEN dispatch AO to locally reset compressors as necessary.
e.	Check IA supply: <ul style="list-style-type: none"> <li>o Pressure - GREATER THAN 60 PSIG</li> <li>o Pressure - STABLE OR INCREASING</li> </ul>	e. Perform the following: <ul style="list-style-type: none"> <li>1) Continue attempts to restore IA (Refer to AP-IA.1, LOSS OF INSTRUMENT AIR).</li> <li>2) Continue with Step 6. WHEN IA restored, THEN do Steps 3f through 5.</li> </ul>
f.	Reset both trains of XY relays for IA to CNMT (AOV-5392) if necessary	
g.	Verify IA to CNMT AOV-5392 - OPEN	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5	Check If Charging Flow Has Been Established:	
a.	Charging pumps - ANY RUNNING	a. Perform the following: <ul style="list-style-type: none"> <li>1) Ensure seal injection needle valves to both RCPs isolated: <ul style="list-style-type: none"> <li>• RCP A, V-300A</li> <li>• RCP B, V-300B</li> </ul> </li> <li>2) Ensure HCV-142 open, demand at 0%.</li> </ul>
b.	Charging pump suction aligned to RWST: <ul style="list-style-type: none"> <li>o LCV-112B - OPEN</li> <li>o LCV-112C - CLOSED</li> </ul>	b. Manually align valves as necessary. <p><u>IF</u> LCV-112B can <u>NOT</u> be opened, <u>THEN</u> perform the following:</p> <ul style="list-style-type: none"> <li>1) Verify charging pump A <u>NOT</u> running and place in PULL STOP.</li> <li>2) Dispatch AO to locally open manual charging pump suction from RWST (V-358 located in charging pump room).</li> <li>3) <u>WHEN</u> V-358 open, <u>THEN</u> direct AO to close V-268 to isolate charging pumps B and C from VCT (V-268 located in charging pump room).</li> </ul>
c.	Start charging pumps (75 kw each) as necessary and adjust charging flow to restore PRZR level	





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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
* 6	Monitor SI Initiation Criteria:	
a.	RCS subcooling based on core exit T/Cs - GREATER THAN 0°F USING FIGURE MIN SUBCOOLING	a. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.
b.	PRZR level - GREATER THAN 5% [30% adverse CNMT]	b. Control charging flow to maintain PRZR level.  IF 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.
7	Check PRZR Level - GREATER THAN 13% [40% FOR ADVERSE CONTAINMENT]	Control charging flow as necessary.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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CAUTION

- o 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).
- o IF S/G NR LEVEL DECREASES TO LESS THAN 5% [25% ADVERSE CNMT] AND FEED FLOW IS LESS THAN 200 GPM, THEN THE MDAFW PUMPS SHOULD BE MANUALLY LOADED ON AC EMERGENCY BUS TO SUPPLY WATER TO THE S/G(S).

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NOTE:

- o If MDAFW pump operation is not required, pump switches should be maintained in PULL-STOP to prevent automatic start.
- o TDAFW pump flow control valves fail open on loss of IA.

\* 8 Monitor Intact S/G Levels:

a. Narrow range level - GREATER THAN 5% [25% adverse CNMT]

b. Control feed flow to maintain narrow range level between 17% [25% adverse CNMT] and 39%

a. Maintain total feed flow greater than 200 gpm until narrow range level greater than 5% [25% adverse CNMT] in at least one S/G.

IF feed flow less than 200 gpm, THEN perform the following:

1) Verify MDAFW pump discharge valves open.

- MOV-4007
- MOV-4008

2) Manually start MDAFW pumps as necessary (228 KW each).

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
9	Establish S/G Pressure Control:  a. Adjust S/G ARV controllers to maintain existing S/G pressure  b. Verify S/G ARV controllers in AUTO  c. Dispatch AO to perform Attachment SD-2  ***** <div>CAUTION</div> IF AN SI SIGNAL IS ACTUATED AFTER THE SI PUMP SWITCHES ARE PLACED IN AUTO, THEN ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, SHOULD BE PERFORMED.  ***** <div>NOTE: Safeguards pump switches should be placed in AUTO only if associated bus is energized.</div>  10 Place Following Pump Switches In AUTO:  • SI pumps • RHR pumps • CNMT spray pumps	



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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><u>NOTE:</u> FR procedures may now be implemented as necessary.</p>		
11	Verify Adequate SW Flow To CCW Hx:	
	<p>a. Verify at least two SW pumps - RUNNING</p> <p>b. Verify AUX BLDG SW isolation valves - OPEN</p> <ul style="list-style-type: none"> <li>• MOV-4615 and MOV-4734</li> <li>• MOV-4616 and MOV-4735</li> </ul> <p>c. Verify CNMT RECIRC fan annunciator C-2, HIGH TEMPERATURE ALARM - EXTINGUISHED</p>	<p>a. Manually start pumps as power supply permits (258 kw each). <u>IF</u> less than two SW pumps can be operated, <u>THEN</u> go to Step 19.</p> <p>b. Establish SW to AUX BLDG (Refer to Attachment AUX BLDG SW).</p> <p>Continue with Step 19. <u>WHEN</u> SW restored to AUX BLDG, <u>THEN</u> do Steps 11c through 18.</p> <p>c. Dispatch AO to locally throttle flow to CCW Hx to between 5000 gpm and 6000 gpm total flow.</p>
12	Check If Normal CVCS Operation Can Be Established	
	<p>a. Verify IA restored:</p> <ul style="list-style-type: none"> <li>o IA to CNMT (AOV-5392) - OPEN</li> <li>o IA pressure - GREATER THAN 60 PSIG</li> </ul> <p>b. Charging pump - ANY RUNNING</p>	<p>a. Continue with Step 19. <u>WHEN</u> IA restored, <u>THEN</u> do Steps 12 through 18.</p> <p>b. Continue with Step 19. <u>WHEN</u> any charging pump running, <u>THEN</u> do Steps 13 through 18.</p>

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>*****</p> <p style="text-align: center;"><u>CAUTION</u></p> <ul style="list-style-type: none"> <li>o RCP THERMAL BARRIER COOLING SHOULD BE ESTABLISHED SLOWLY TO MINIMIZE POTENTIAL INTRODUCTION OF STEAM INTO THE CCW SYSTEM AND THERMAL SHOCK TO RCP.</li> <li>o RCP SEAL INJECTION SHOULD BE ESTABLISHED SLOWLY TO MINIMIZE RCP THERMAL STRESSES AND POTENTIAL SEAL FAILURES.</li> <li>o AS PART OF SUBSEQUENT RECOVERY ACTIONS, RCP(S) SHOULD NOT BE STARTED PRIOR TO A STATUS EVALUATION UNLESS REQUIRED BY AN INADEQUATE CORE COOLING SITUATION.</li> </ul> <p>*****</p> <p><u>NOTE:</u> SW should be aligned to CCW Hxs before restoring RCP seal cooling.</p>		
13	Check RCP Cooling:	Establish normal cooling to RCPs (Refer to Attachment SEAL COOLING).
	a. Check CCW to RCPs:	
	<ul style="list-style-type: none"> <li>o Annunciator A-7, RCP 1A CCW RETURN HIGH TEMP OR LOW FLOW - EXTINGUISHED</li> <li>o Annunciator A-15, RCP 1B CCW RETURN HIGH TEMP OR LOW FLOW - EXTINGUISHED</li> </ul>	
	b. Check RCP seal injection:	
	<ul style="list-style-type: none"> <li>o Labyrinth seal D/Ps - GREATER THAN 15 INCHES OF WATER</li> </ul> <p style="text-align: center;">-OR-</p> <ul style="list-style-type: none"> <li>o RCP seal injection flow to each RCP - GREATER THAN 6 GPM</li> </ul>	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	Check If Seal Return Flow Should Be Established:	
a.	Verify RCP #1 seal outlet temperature - LESS THAN 235°F	a. Go to Step 15.
b.	Verify RCP seal outlet valves - OPEN  • AOV-270A • AOV-270B	b. Manually open valves as necessary.
c.	Reset both trains of XY relays for RCP seal return isolation valve MOV-313 if necessary	
d.	Open RCP seal return isolation valve MOV-313	d. Perform the following:  1) Place MOV-313 switch to OPEN.  2) Dispatch AO with key to RWST gate to locally open MOV-313.
e.	Verify RCP #1 seal leakoff flow - LESS THAN 5.5 GPM	e. <u>IF</u> any RCP seal leakoff flow greater than 5.5 gpm <u>THEN</u> close the affected RCP seal discharge valve:  • RCP A, AOV-270A • RCP B, AOV-270B  <u>IF</u> both RCP seal discharge valves are shut, <u>THEN</u> go to Step 15.
f.	Verify RCP #1 seal leakoff flow - GREATER THAN 0.25 GPM	f. Refer to AP-RCP.1, RCP SEAL MALFUNCTION.

[illegible]

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15	Verify PRZR Level - GREATER THAN 13% [40% adverse CNMT]	Continue with Step 19. <u>WHEN</u> PRZR level increases to greater than 13% [40% adverse CNMT], <u>THEN</u> do Steps 16 through 18.
16	Establish Normal Letdown: <ul style="list-style-type: none"> <li>a. Establish charging line flow to REGEN Hx - GREATER THAN 20 GPM</li> <li>b. Place the following switches to CLOSE: <ul style="list-style-type: none"> <li>• Letdown orifice valves (AOV-200A, AOV-200B, and AOV-202)</li> <li>• AOV-371, letdown isolation valve</li> <li>• AOV-427, loop B cold leg to REGEN Hx</li> </ul> </li> <li>c. Place letdown controllers in MANUAL at 40% open <ul style="list-style-type: none"> <li>• TCV-130</li> <li>• PCV-135</li> </ul> </li> <li>d. Reset both trains of XY relays for AOV-371 and AOV-427 if necessary</li> <li>e. Open AOV-371 and AOV-427</li> <li>f. Open letdown orifice valves as necessary</li> <li>g. Place TCV-130 in AUTO at 105°F</li> <li>h. Place PCV-135 in AUTO at 250 psig</li> <li>i. Adjust charging pump speed and HCV-142 as necessary</li> </ul>	<p><u>IF</u> RCP seal return has been established, <u>THEN</u> establish excess letdown as follows:</p> <ul style="list-style-type: none"> <li>o Place excess letdown divert valve, AOV-312, to NORMAL.</li> <li>o Ensure CCW from excess letdown open, (AOV-745).</li> <li>o Open excess letdown isolation valve AOV-310.</li> <li>o Slowly open HCV-123 to maintain excess letdown temperature less than 195°F and pressure less than 100 psig.</li> <li>o Adjust charging pump speed as necessary.</li> </ul> <p><u>IF</u> RCP seal return <u>NOT</u> established, <u>THEN</u> consult TSC to determine if excess letdown should be placed in service.</p>

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

17 Check VCT Makeup System:

a. Verify the following:

- 1) Boric acid flow control valve  
- SET FOR REQUIRED CSD  
CONCENTRATION (Refer to  
Figure SDM)
- 2) At least one BA and RMW pump  
in AUTO
- 3) RMW mode selector switch in  
AUTO
- 4) RMW control armed - RED LIGHT  
LIT

b. Check VCT level

- o Level - GREATER THAN 20%  
-OR-
- o Level - STABLE OR INCREASING

a. IF VCT auto makeup can NOT be established, THEN manually control VCT level (Refer to ER-CVCS.1, REACTOR MAKEUP CONTROL MALFUNCTION).

b. Manually increase VCT makeup flow as follows:

- 1) Ensure BA transfer pumps and RMW pumps running. IF NOT, THEN dispatch A0 to reset MCC C and MCC D UV lockouts as necessary.
- 2) Place RMW flow control valve HCV-111 in MANUAL and increase RMW flow.
- 3) Increase boric acid flow as necessary.

IF VCT level can NOT be restored, THEN go to Step 19.

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LOSS OF ALL AC POWER RECOVERY WITHOUT SI  
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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

18 Check Charging Pump Suction  
Aligned To VCT:

a. VCT level - GREATER THAN 20%

a. IF VCT level can NOT be  
maintained greater than 5%, THEN  
perform the following:1) Ensure charging pump suction  
aligned to RWST:

o LCV-112B open

o LCV-112C closed

2) Continue with Step 19. WHEN  
VCT level greater than 40%,  
THEN do Step 18b.b. Verify charging pumps aligned to  
VCT

o LCV-112C - OPEN

o LCV-112B, - CLOSED

b. Manually align valves as  
necessary.

## 19 Control PRZR Level:

a. Check letdown - IN SERVICE

a. Stop and start charging pumps as  
necessary to control PRZR level.b. Maintain PRZR level between 13%  
[40% adverse CNMT] and 50%



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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><u>NOTE:</u></p> <ul style="list-style-type: none"> <li>o If auxiliary spray is in use, spray flow may be increased by closing normal charging valve AOV-294 and normal PRZR spray valves.</li> <li>o When using a PRZR PORV select one with an operable block valve.</li> </ul>		
20	Establish PRZR Pressure Control:	
	a. Check letdown - IN SERVICE	<p>a. Perform the following:</p> <ol style="list-style-type: none"> <li>1) Use PRZR heaters and one PRZR PORV to maintain RCS pressure.</li> <li>IF IA <u>NOT</u> available, <u>THEN</u> Refer to Attachment N2 PORVS to operate PORV.</li> <li>2) Go to Step 21.</li> </ol>
	b. Use PRZR heaters and auxiliary spray valve (AOV-296) to maintain RCS pressure	
21	Verify Natural Circulation:	Increase dumping steam from intact S/Gs.
	<ul style="list-style-type: none"> <li>o RCS subcooling based on core exit T/Cs - GREATER THAN 0°F USING FIGURE MIN SUBCOOLING</li> <li>o S/G pressures - STABLE OR DECREASING</li> <li>o RCS hot leg temperatures - STABLE OR DECREASING</li> <li>o Core exit T/Cs - STABLE OR DECREASING</li> <li>o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR S/G PRESSURE</li> </ul>	

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: Adverse CNMT conditions or loss of forced air cooling may result in failure of NIS detectors.

22 Check If Source Range  
Detectors Should Be Energized:

a. Source range channels -  
DEENERGIZED

a. Go to Step 22e.

b. Check intermediate range flux -  
EITHER CHANNEL LESS THAN  
10<sup>-10</sup> AMPS

b. Perform the following:

1) IF neither intermediate range  
channel is decreasing THEN  
initiate boration.

2) Continue with Step 23. WHEN  
flux is LESS THAN 10<sup>-10</sup> amps  
on any operable channel, THEN  
do Steps 22c through e.

c. Check the following:

c. Continue with Step 23. WHEN  
either condition met, THEN do  
Steps 22d and e.

o Both intermediate range  
channels - LESS THAN  
10<sup>-10</sup> AMPS

-OR-

o Greater than 20 minutes since  
reactor trip

d. Verify source range detectors -  
ENERGIZED

d. Manually energize source range  
detectors by depressing P-6  
permissive defeat pushbuttons (2  
of 2).

IF source ranges can NOT be  
restored, THEN refer to  
ER-NIS.1, SR MALFUNCTION and go  
to Step 23.

e. Transfer Rk-45 recorder to one  
source range and one  
intermediate range channel



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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23	Verify Adequate Shutdown Margin:	
	a. Direct RP to sample RCS and PRZR liquid for boron concentration	
	b. Verify boron concentration - GREATER THAN REQUIREMENTS OF FIGURE SDM	b. Borate as necessary.
24	Maintain Stable Plant Conditions	
	a. RCS pressure - STABLE	a. Control PRZR heaters and auxiliary spray if available.
	b. RCS temperature - STABLE	b. Control dumping steam as necessary.
	c. PRZR level - BETWEEN 13% [40% adverse CNMT] and 50%	c. Control charging as necessary.
	d. Intact S/G level - BETWEEN 17% [25% adverse CNMT] and 39%	d. Control S/G feed flow as necessary.
*25	Monitor SI Initiation Criteria:	
	a. RCS subcooling based on core exit T/Cs - GREATER THAN 0°F USING FIGURE MIN SUBCOOLING	a. Go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.
	b. PRZR level - GREATER THAN 5% [30% adverse CNMT]	b. Control charging flow to maintain PRZR level.
		IF PRZR level can NOT be maintained, THEN go to ECA-0.2, LOSS OF ALL AC POWER RECOVERY WITH SI REQUIRED, Step 1.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26	Try To Restore Offsite Power To All AC Busses (Refer to ER-ELEC.1, RESTORATION OF OFFSITE POWER)	Maintain plant condition stable using AC emergency power.
27	Determine If Natural Circulation Cooldown Is Required:	
	a. Consult plant staff to determine if RCS cooldown is necessary	a. <u>IF</u> cooldown <u>NOT</u> required, <u>THEN</u> go to 0-3, HOT SHUTDOWN WITH XENON PRESENT.
	b. At least one RCP - OPERABLE	b. Go to ES-0.2, NATURAL CIRCULATION COOLDOWN.
	c. Go to 0-2.2, PLANT SHUTDOWN FROM HOT SHUTDOWN TO COLD SHUTDOWN	
-END-		

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ECA-0.1 APPENDIX LIST

<u>TITLE</u>	<u>PAGES</u>
1) FIGURE MIN SUBCOOLING	1
2) FIGURE SDM	1
3) ATTACHMENT SD-1	1
4) ATTACHMENT SD-2	1
5) ATTACHMENT N2 PORVS	1
6) ATTACHMENT SEAL COOLING	2
7) ATTACHMENT AUX BLDG SW	1

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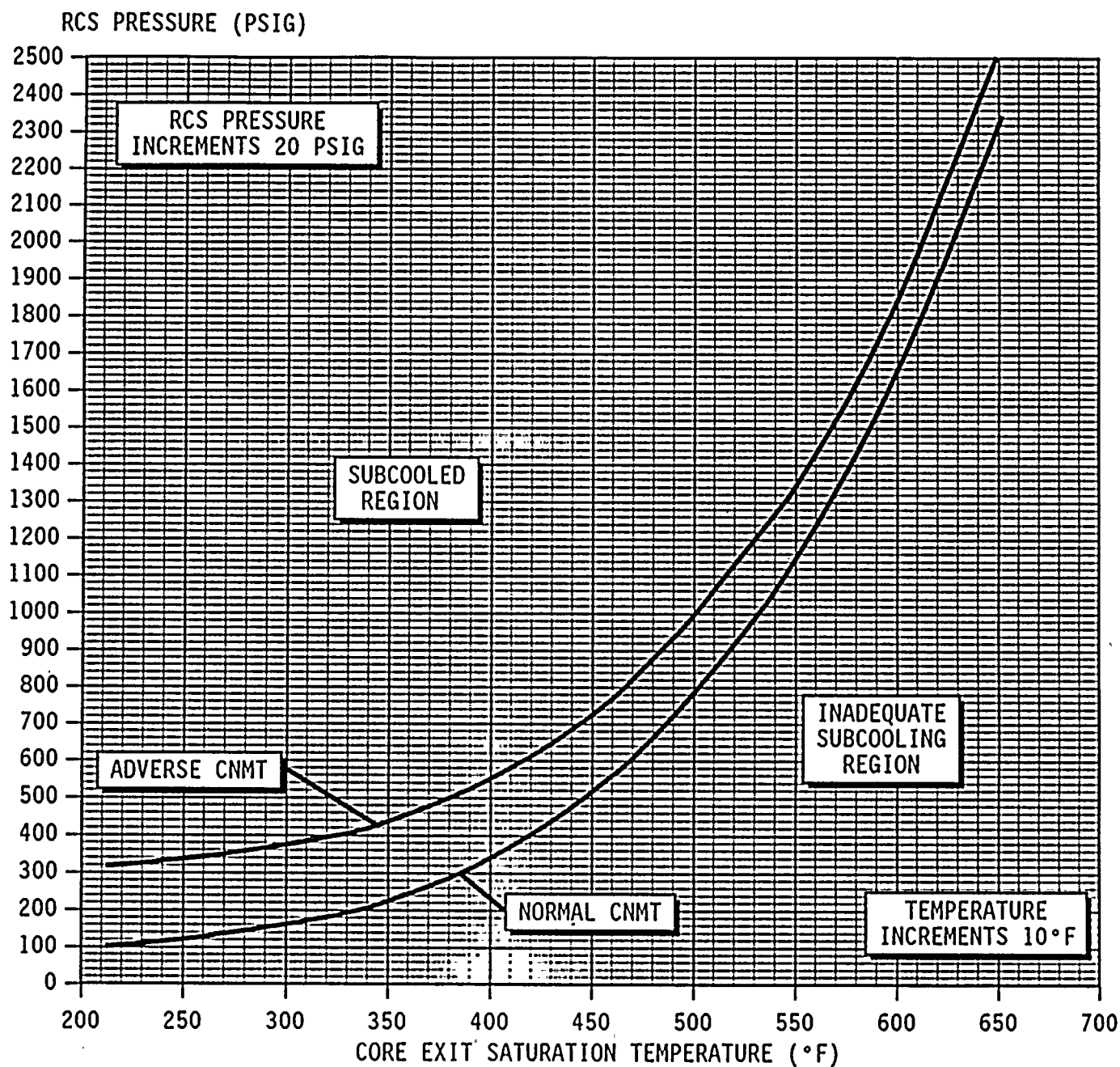
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FIGURE MIN SUBCOOLING

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



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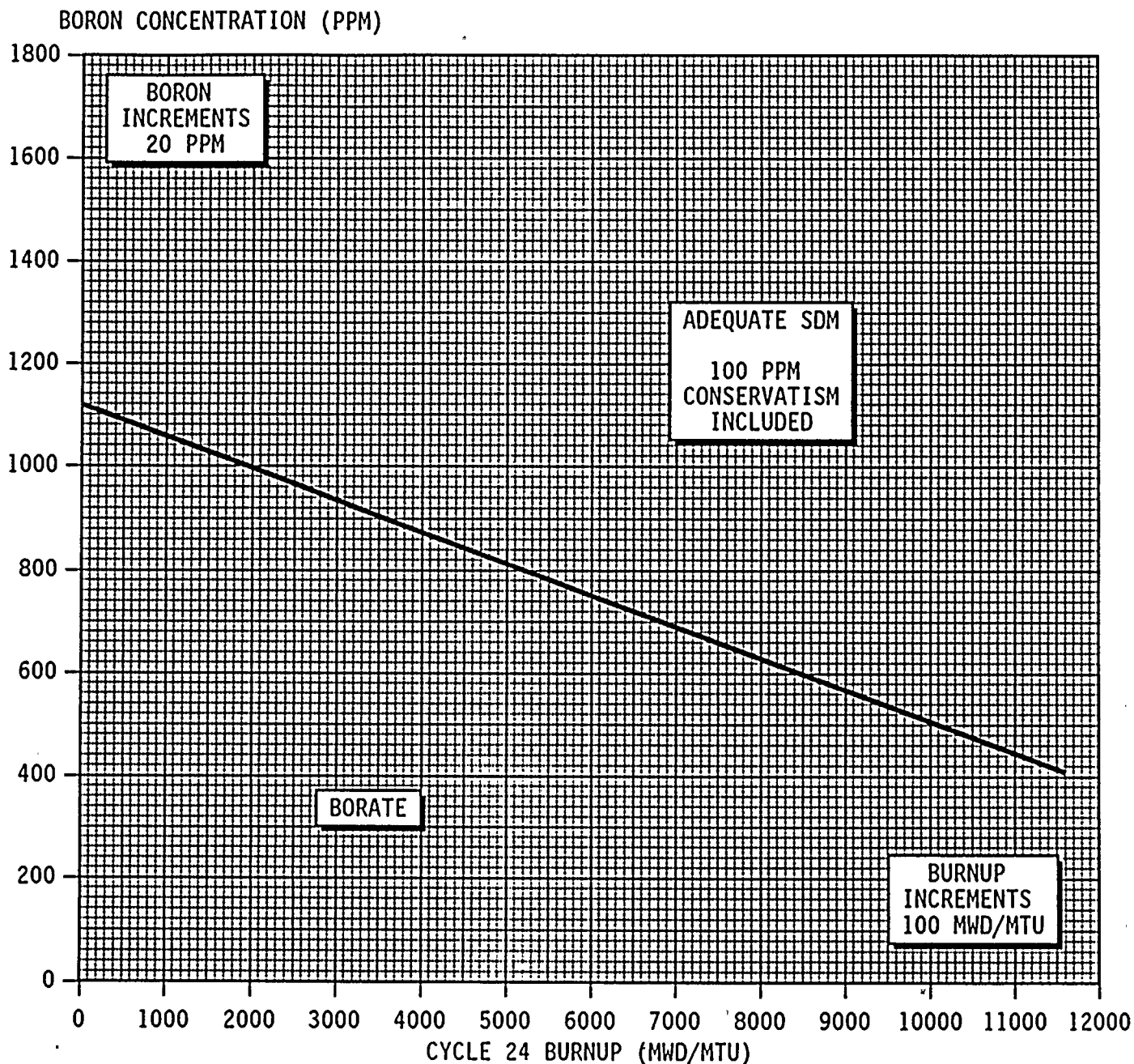
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FIGURE SDM

- 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.



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