

EOP: ES-0.2	TITLE: NATURAL CIRCULATION COOLDOWN	REV: 1 PAGE 1 of 14
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ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

CONTROLLED COPY NUMBER 23

TECHNICAL REVIEW

PORC REVIEW DATE 4/4/90

Joseph A. Widay  
PLANT SUPERINTENDENT

4/9/90  
EFFECTIVE DATE

QA  NON-QA \_\_\_\_\_ CATEGORY 1.0

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

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EOP: ES-0.2	TITLE: NATURAL CIRCULATION COOLDOWN	REV: 1 PAGE 2 of 14
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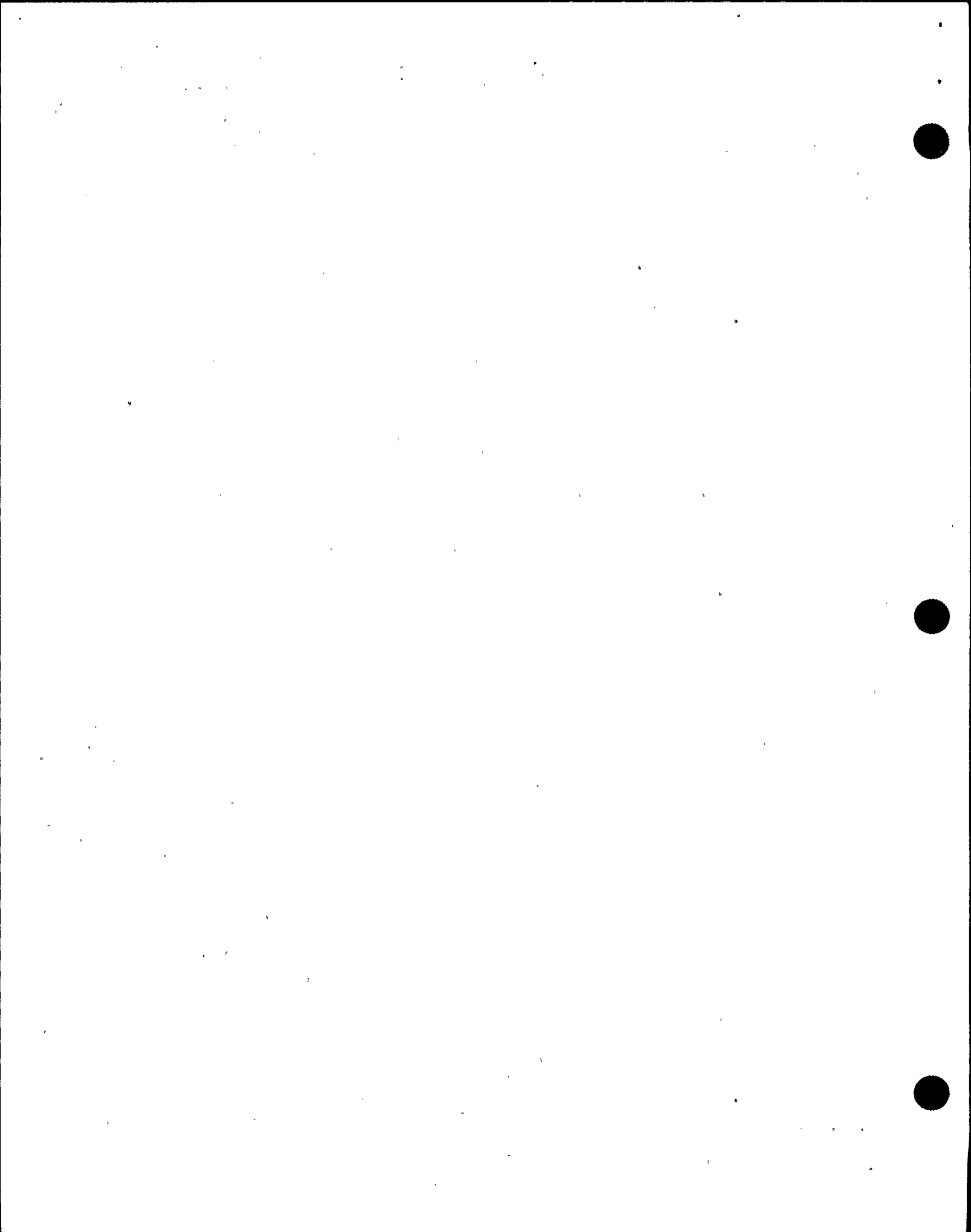
A. PURPOSE

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.

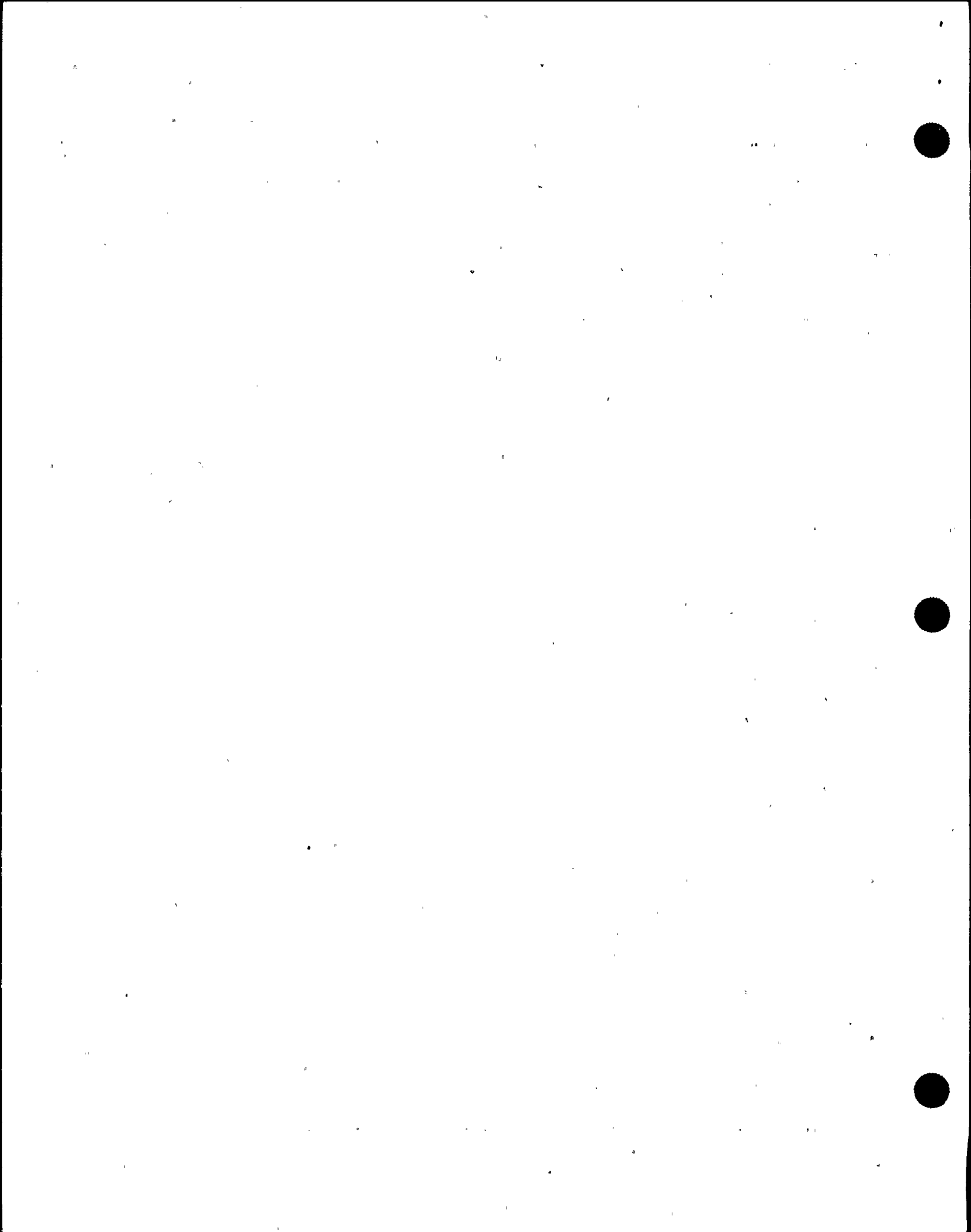
B. SYMPTOMS AND OR ENTRY CONDITIONS

This procedure is entered from:

- 1) ES-0.1, REACTOR TRIP RESPONSE, when it has been determined that a natural circulation cooldown is required.
- 2) ECA-0.1, LOSS OF ALL AC POWER RECOVERY WITHOUT SI REQUIRED, when it has been determined that a natural circulation cooldown is required.
- 3) Other normal operating procedures when a natural circulation cooldown is required.



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
*****		
<u>CAUTION</u>		
IF SI ACTUATION OCCURS DURING THIS PROCEDURE, E-0, REACTOR TRIP OR SAFETY INJECTION, SHOULD BE PERFORMED.		
*****		
<u>NOTE:</u> o Foldout page should be open and monitored periodically.		
o If conditions can be established for starting an RCP during this procedure, Step 1 should be repeated.		
1 Try To Restart An RCP:		
a. Establish conditions for starting an RCP		a. Go to Step 2.
o Bus 11A or 11B energized		
o Refer to Attachment RCP START		
b. Start one RCP		b. Go to Step 2.
c. Go to 0-2.2, PLANT SHUTDOWN FROM HOT SHUTDOWN TO COLD CONDITION		



EOP:

ES-0.2

TITLE:

NATURAL CIRCULATION COOLDOWN

REV: 1

PAGE 4 of 14

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

2 Check VCT Makeup System:

a. Verify the following:

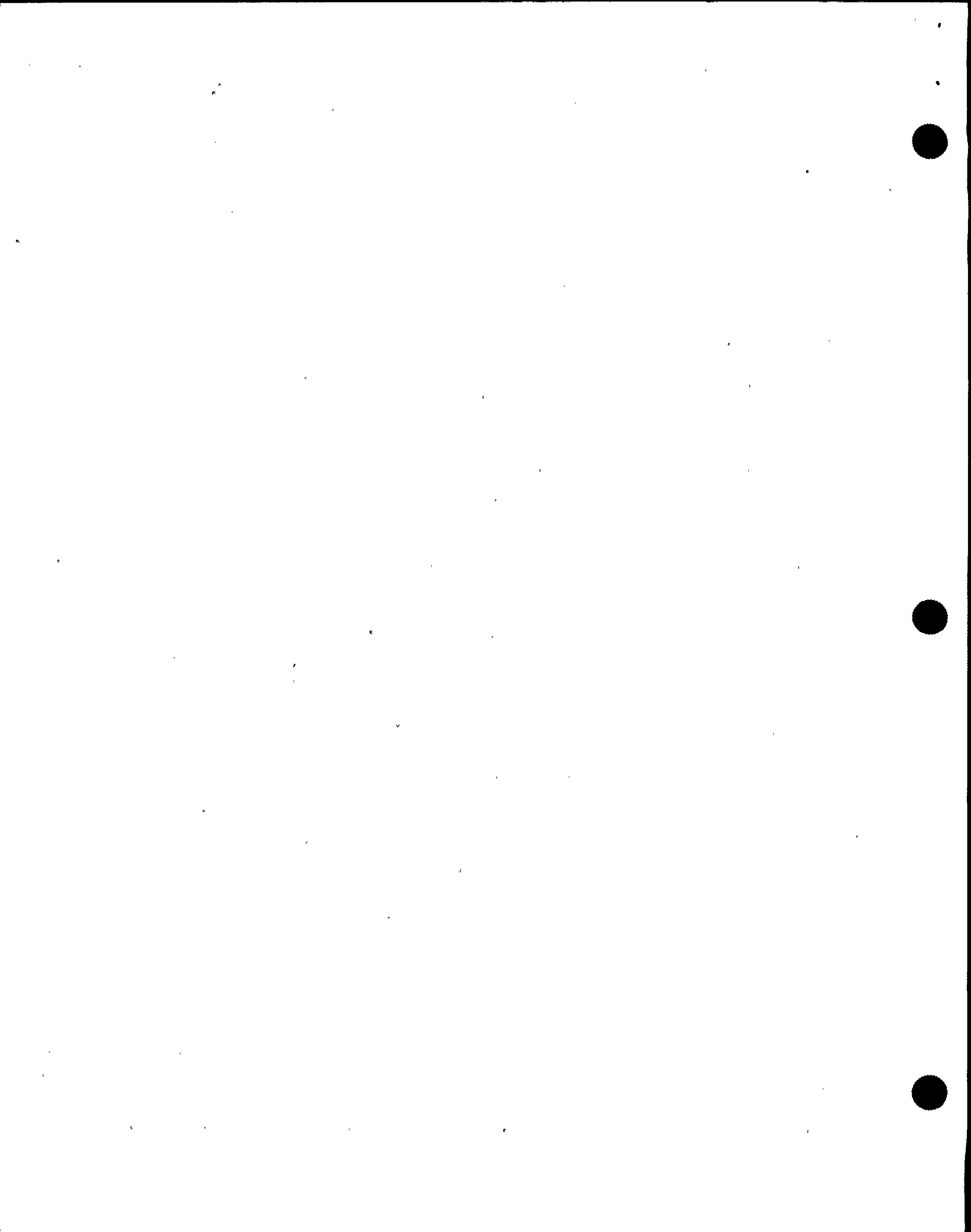
- 1) Boric acid flow control valve  
- SET FOR REQUIRED CSD  
CONCENTRATION
- 2) RMW mode selector switch in  
AUTO
- 3) RMW control armed - RED LIGHT  
LIT

b. Check VCT level

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

b. Manually increase VCT makeup  
flow as follows:

- 1) Ensure BA transfer pumps and  
RMW pumps running.
- 2) Place RMW flow control valve  
HCV-111 in MANUAL and  
increase RMW flow.
- 3) Increase boric acid flow as  
necessary.





## STEP

## ACTION/EXPECTED RESPONSE

## RESPONSE NOT OBTAINED

3 Check Charging Pump Suction  
Aligned To VCT:

a. Check VCT level:

- o Level - GREATER THAN 20%
- o VCT makeup system - AVAILABLE

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 4. WHEN VCT level greater than 40%, THEN do Step 3b.

b. Verify the following:

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

b. Manually align valves as necessary.

4 Borate RCS To Cold Shutdown  
Boron Concentration (Refer to  
Figure SDM)

5 Establish Maximum Rx Vessel  
Head Cooling:

- o Check control rod shroud fans -  
BOTH RUNNING
- o Check one Rx compartment cooling  
fan - RUNNING

Start fans as necessary.



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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6 Verify Adequate Shutdown Margin

- a. Direct HP to sample RCS for boron concentration
- b. Verify boron concentration - GREATER THAN REQUIREMENTS OF FIGURE SDM

b. Perform the following:

- 1) Maintain RCS average temperature greater than 500°F until adequate SDM established.
- 2) Continue to borate as necessary.

\*\*\*\*\*

CAUTION

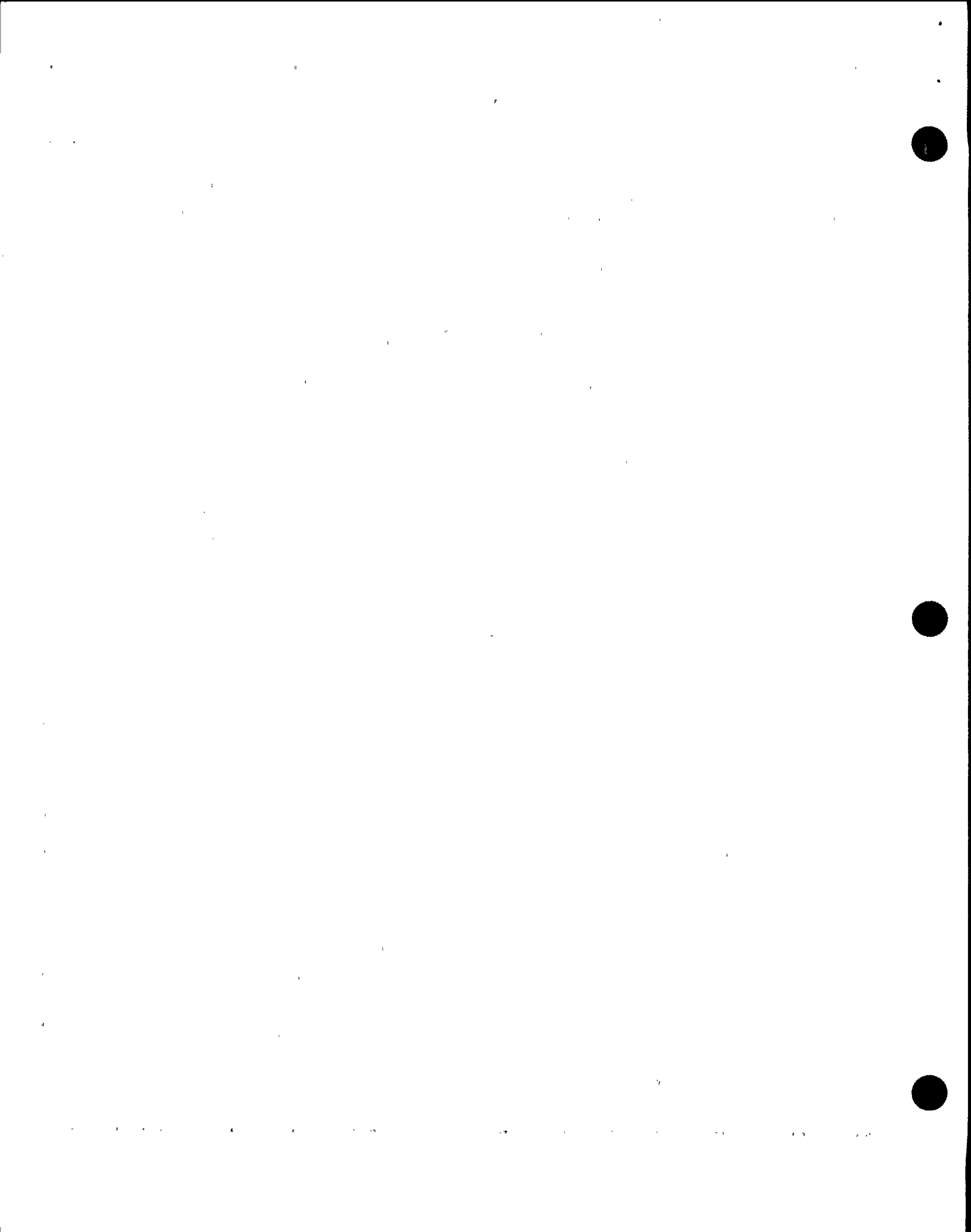
- o IF CST LEVEL DECREASES TO LESS THAN 5 FEET, THEN ALTERNATE WATER SOURCES FOR AFW WILL BE NECESSARY (REFER TO ER-AFW.1, ALTERNATE WATER SUPPLY TO AFW PUMPS).
- o SI MUST BE BLOCKED BEFORE S/G PRESSURE DECREASES TO 514 PSIG.

\*\*\*\*\*

7 Initiate RCS Cooldown To Cold Shutdown:

- a. Dump steam to condenser
- b. Establish and maintain cooldown rate in RCS cold legs - LESS THAN 25°F/HR
- c. Maintain S/G narrow range level - BETWEEN 17% AND 39%
- d. Plot RCS cold leg temperatures and PRZR temperature twice per hour

- a. Manually or locally dump steam using S/G ARVs.
- c. Control feed flow as necessary.



STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

8 Determine RCS Pressure And Temperature Limits:

- a. Check control rod shroud fans - BOTH RUNNING
  
- b. Maintain RCS pressure - WITHIN LIMITS OF FIGURE NAT CIRC C/D WITH SHROUD FANS

a. Perform the following:

- 1) Maintain RCS pressure within limits of Figure NAT CIRC C/D WITHOUT SHROUD FANS.
- 2) Go to Step 9.

\*\*\*\*\*  
CAUTION  
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SI ACTUATION CIRCUITS WILL AUTOMATICALLY UNBLOCK IF PRZR PRESSURE INCREASES TO GREATER THAN 1992 PSIG.

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9 Check If SI Should Be Blocked:

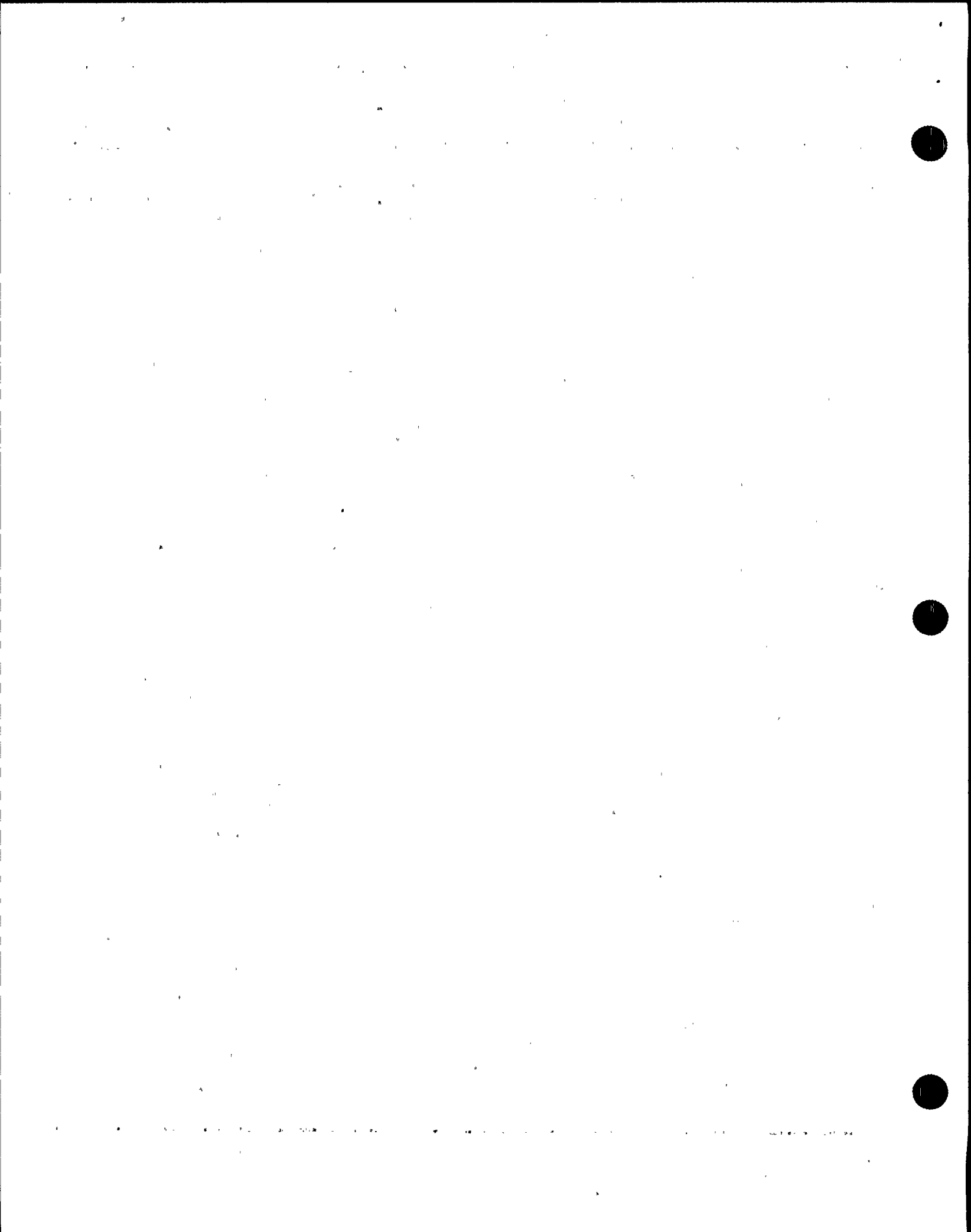
- a. Check the following:
  - o PRZR pressure - LESS THAN 1950 PSIG

-OR-

- o LOW PRZR PRESS BLOCK SAF INJEC status light - LIT
- b. Place SI block switch to BLOCK
- c. Verify SAFETY INJECTION BLOCKED status light - LIT

- a. Continue with Step 10. WHEN either condition satisfied, THEN do Steps 9b and 9c.

- c. Maintain PRZR pressure greater than 1750 psig and S/G pressure greater than 514 psig until SI blocked.



EOP: ES-0.2	TITLE: NATURAL CIRCULATION COOLDOWN	REV: 1 PAGE 8 of 14
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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: o 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, then procedure ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL, should be used.

o If charging line to PRZR  $\Delta T$  exceeds 320°F, then plant staff should be consulted before using auxiliary spray.

o If auxiliary spray is in use, spray flow may be increased by closing normal charging valve AOV-294 and normal PRZR spray valves.

10 Initiate RCS  
Depressurization:

a. Check letdown - IN SERVICE

a. Try to establish letdown (Refer to Attachment LETDOWN).

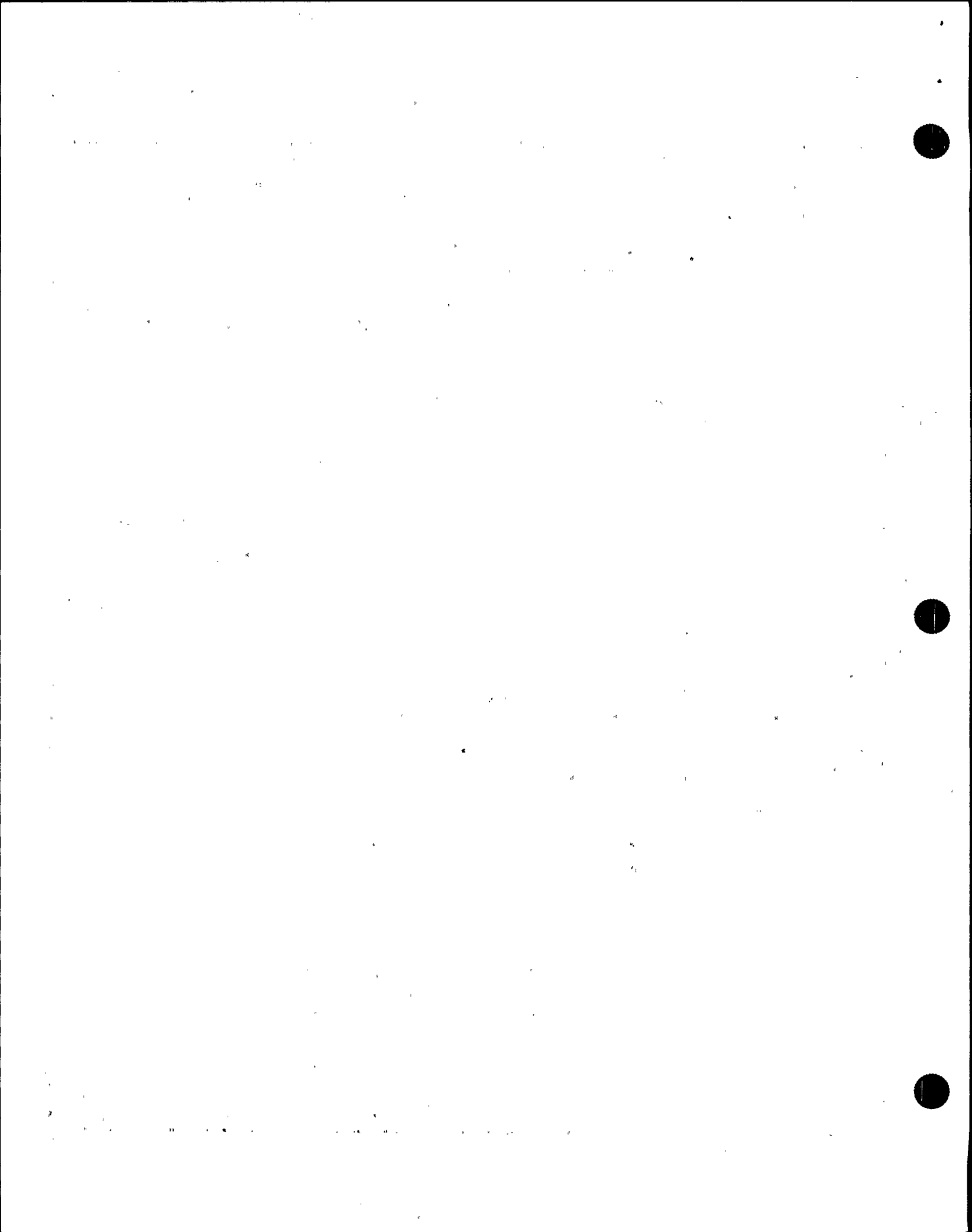
IF letdown can NOT be established, THEN depressurize RCS using one PRZR PORV and go to Step 11.

b. Depressurize RCS using auxiliary spray valve (AOV-296)

b. IF auxiliary spray valve NOT available, THEN use one PRZR PORV.

c. Plot RCS temperature and pressure on curve selected in Step 8

11 Maintain PRZR Level Between  
20% And 30%





STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

12 Monitor RCS Cooldown:

- o Core exit T/Cs - DECREASING
- o RCS hot leg temperatures - DECREASING
- o RCS subcooling based on core exit T/Cs - INCREASING
- o Cooldown rate in RCS cold legs - LESS THAN 25°F/HR

13 Establish Required RCS Hydrogen Concentration (Refer to S-3.3C, H2 OR O2 REMOVAL FROM PRIMARY SYSTEM BY BURPING VCT)

14 Check For Steam Void In Reactor Vessel:

- o PRZR level - NO UNEXPECTED LARGE VARIATIONS
- o RVLIS level (no RCPs) - GREATER THAN 95%

Repressurize RCS within allowable limits and continue cooldown.

IF RCS depressurization must continue, THEN go to ES-0.3, NATURAL CIRCULATION COOLDOWN WITH STEAM VOID IN VESSEL.



EOP:

ES-0.2

TITLE:

NATURAL CIRCULATION COOLDOWN

REV: 1

PAGE 10 of 14

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

15 Check If SI ACCUMS Should Be Isolated:

a. RCS pressure - LESS THAN 1500 PSIG

b. Dispatch A0 with locked valve key to locally close breakers for SI ACCUM discharge valves

- MOV-841, MCC C position 12F
- MOV-865, MCC D position 12C

c. Close SI ACCUM discharge valves

- ACCUM A, MOV-841
- ACCUM B, MOV-865

d. Locally open breakers for MOV-841 and MOV-865

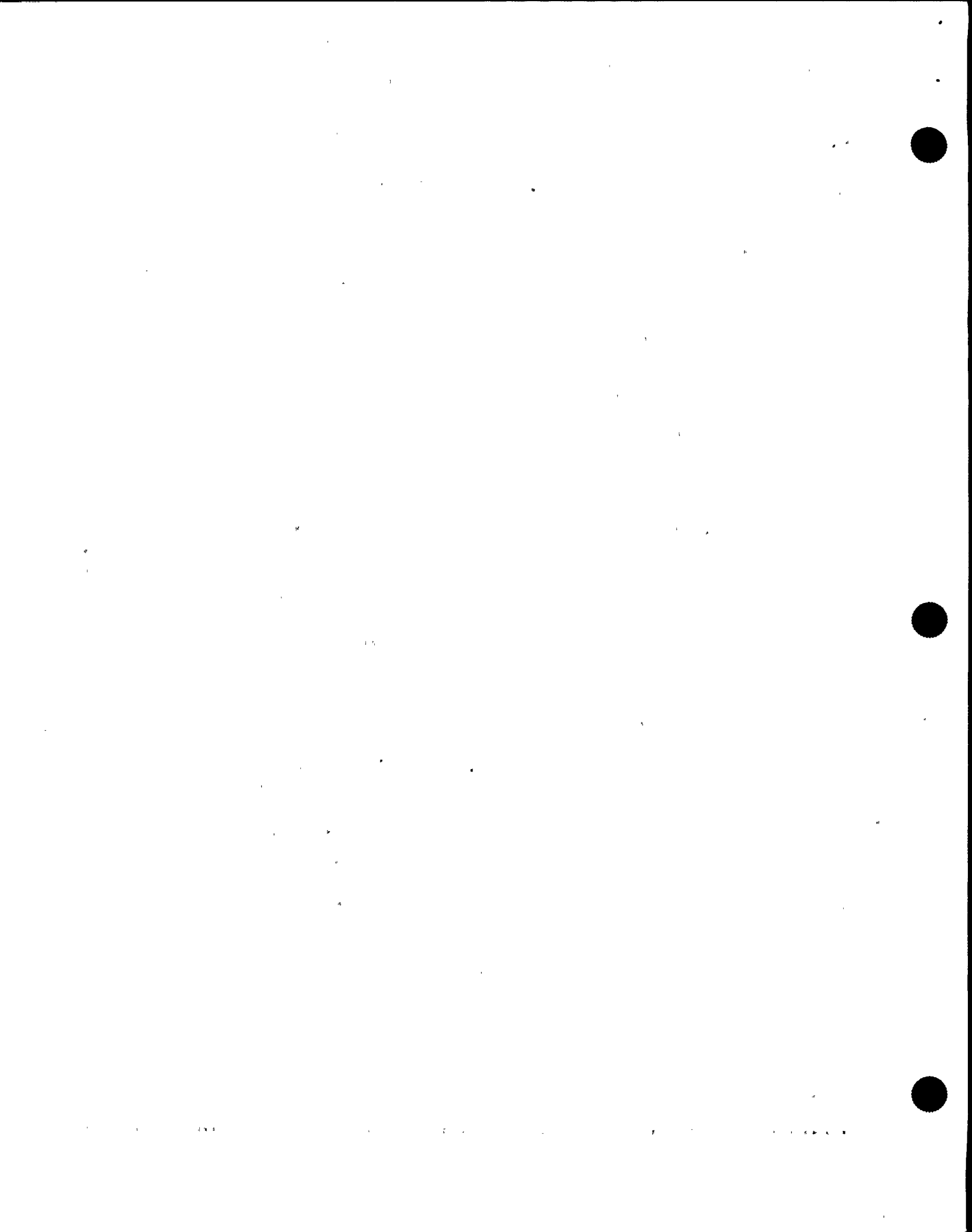
a. Continue with Step 16. WHEN RCS pressure is less than 1500 psig, THEN do Step 15b.

c. IF any valve can NOT be closed, THEN perform the following:

- 1) Dispatch personnel to locally close valves, as necessary.
- 2) Maintain RCS pressure greater than 1000 psig until both SI ACCUMs isolated.

IF any SI ACCUM can NOT be isolated AND RCS depressurization to less than 1000 psig is required, THEN:

- 1) Open vent valves for unisolated SI ACCUMs.
  - ACCUM A, AOV-834A
  - ACCUM B, AOV-834B
- 2) Open HCV-945.
- 3) Maintain RCS pressure greater than SI ACCUM pressure.



EOP:

ES-0.2

TITLE:

NATURAL CIRCULATION COOLDOWN

REV: 1

PAGE 11 of 14

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

16 Check If SI System Normal  
Shutdown Alignment Should Be  
Established:

a. Verify the following:

- o RCS cold leg temperatures -  
LESS THAN 350°F
- o RCS pressure - LESS THAN  
1500 PSIG

b. Lock out SI system as follows:

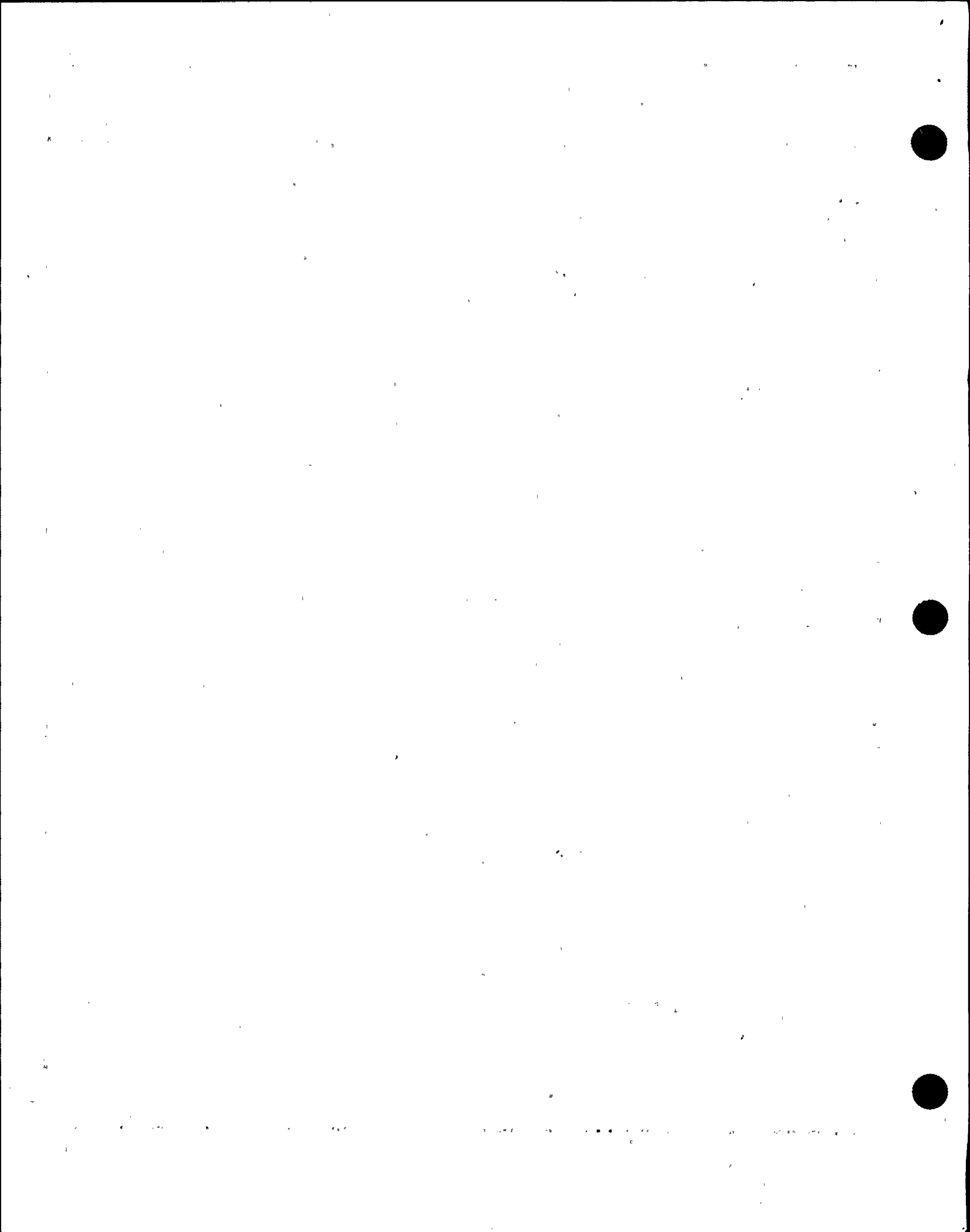
- 1) Place all SI pump switches in  
PULL STOP
- 2) Locally close breakers for SI  
pump discharge valves to cold  
legs
  - MOV-878B, MCC C position 8C
  - MOV-878D, MCC D position 8F
- 3) Close SI pump discharge to  
cold legs
  - MOV-878B
  - MOV-878D
- 4) Locally open breakers for  
MOV-878B and MOV-878D

a. Do NOT lock out SI system.

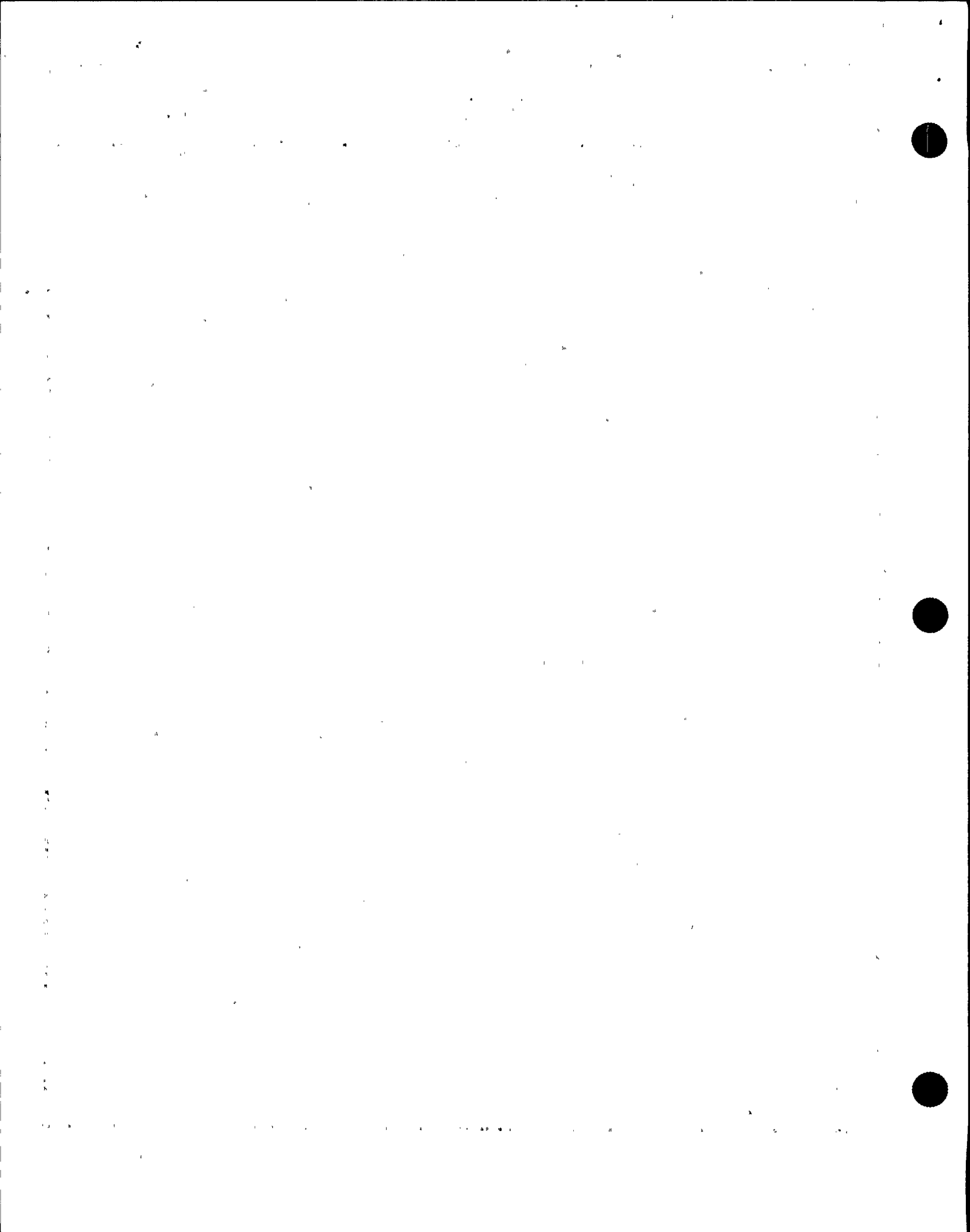
Continue with Step 17. WHEN  
requirements met, THEN do  
Step 16b.

17 Maintain Letdown Flow:

- a. Open letdown orifice valves as  
necessary
- b. Adjust low pressure letdown  
control valve setpoint as  
necessary



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18	<p>Maintain Required RCP Seal Injection Flow And Labyrinth Seal D/P:</p> <ul style="list-style-type: none"> <li>o Labyrinth seal D/P to each RCP - GREATER THAN 15 INCHES OF WATER</li> <li>o Seal injection flow to each RCP - GREATER THAN 6 GPM</li> </ul>	<p>Perform the following:</p> <ul style="list-style-type: none"> <li>o Adjust charging flow to REGEN Hx (HCV-142) as necessary.</li> </ul> <p style="text-align: center;">-OR-</p> <ul style="list-style-type: none"> <li>o Dispatch AO to adjust seal injection needle valves if necessary.</li> </ul> <ul style="list-style-type: none"> <li>• RCP A, V-300A</li> <li>• RCP B, V-300B</li> </ul>
19	<p>Check If RHR Normal Cooling Can Be Established:</p> <ul style="list-style-type: none"> <li>a. RCS cold leg temperature - LESS THAN 350°F</li> <li>b. RCS pressure - LESS THAN 400 PSIG</li> <li>c. Place RCS overpressure protection system in service (Refer to 0-7, ALIGNMENT AND OPERATION OF THE REACTOR VESSEL OVERPRESSURE PROTECTION SYSTEM)</li> <li>d. Establish RHR normal cooling (Refer to Attachment RHR COOL)</li> </ul>	<ul style="list-style-type: none"> <li>a. Return to Step 7.</li> <li>b. Return to Step 7.</li> <li>c. <u>IF</u> RCS overpressure protection system can <u>NOT</u> be placed in service, <u>THEN</u> consult Plant staff to determine if RHR normal cooling should be established and go to Step 20.</li> </ul>
20	<p>Continue RCS Cooldown To Cold Shutdown</p>	





STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

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CAUTION

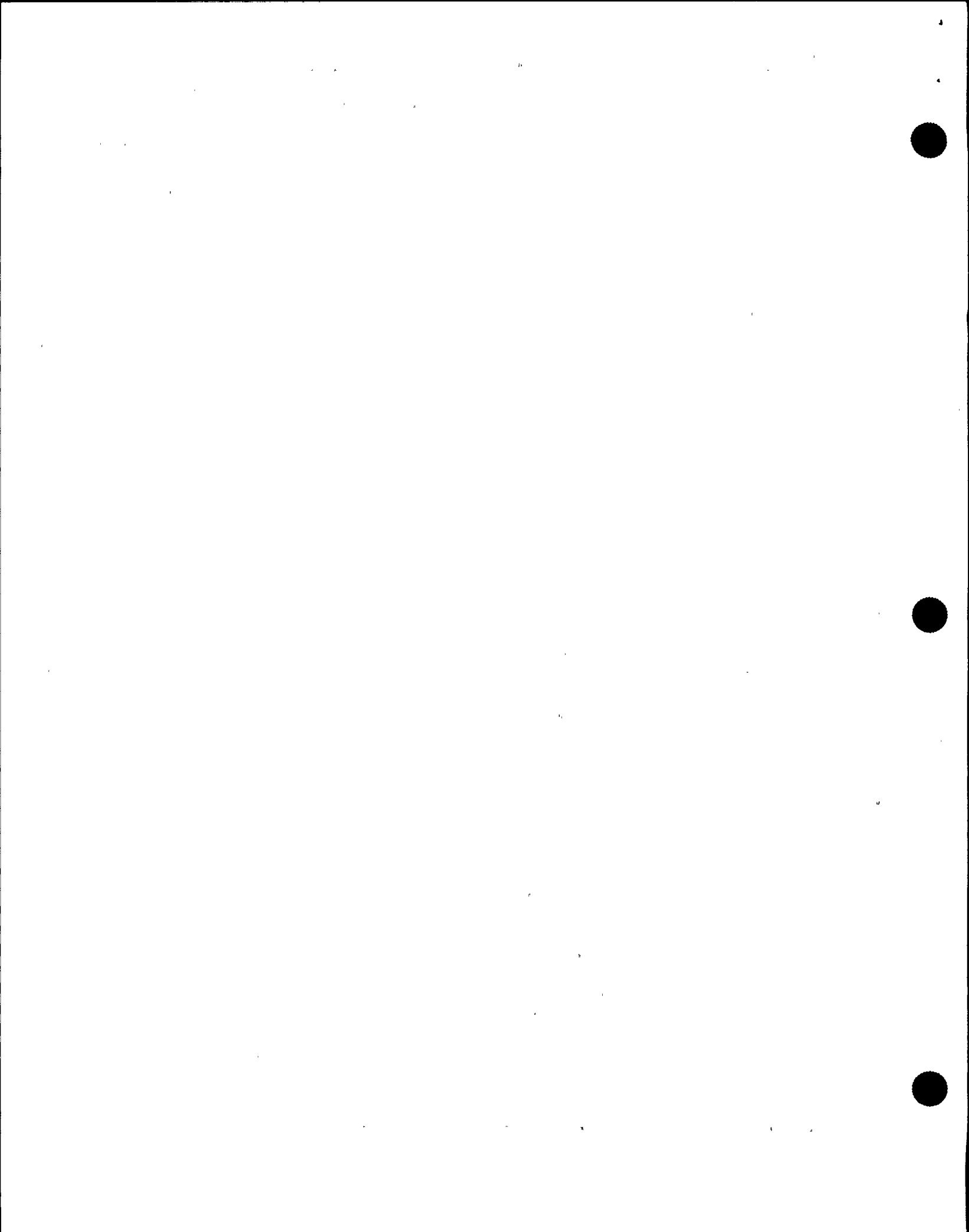
DEPRESSURIZING THE RCS BEFORE THE ENTIRE RCS IS LESS THAN 200°F MAY RESULT IN ADDITIONAL VOID FORMATION IN THE RCS.

\*\*\*\*\*

21 Continue Cooldown Of Inactive Portion Of RCS:

a. Cool upper head region using control rod shroud fans

b. Cool S/G U-tubes by dumping steam from all S/Gs



STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

\*\*\*\*\*

CAUTION

IF LESS THAN TWO CONTROL ROD SHROUD FANS ARE RUNNING, THE UPPER HEAD REGION MAY REMAIN ABOVE 200°F FOR UP TO 29 HOURS AFTER REACHING CSD.

\*\*\*\*\*

22 Determine If RCS  
Depressurization Is  
Permitted:

a. Entire RCS - LESS THAN 200°F

- Core exit T/Cs
- Upper head T/Cs
- RCS hot leg temperature
- RCS cold leg temperature

b. Check control rod shroud fan status - BOTH RUNNING DURING COOLDOWN

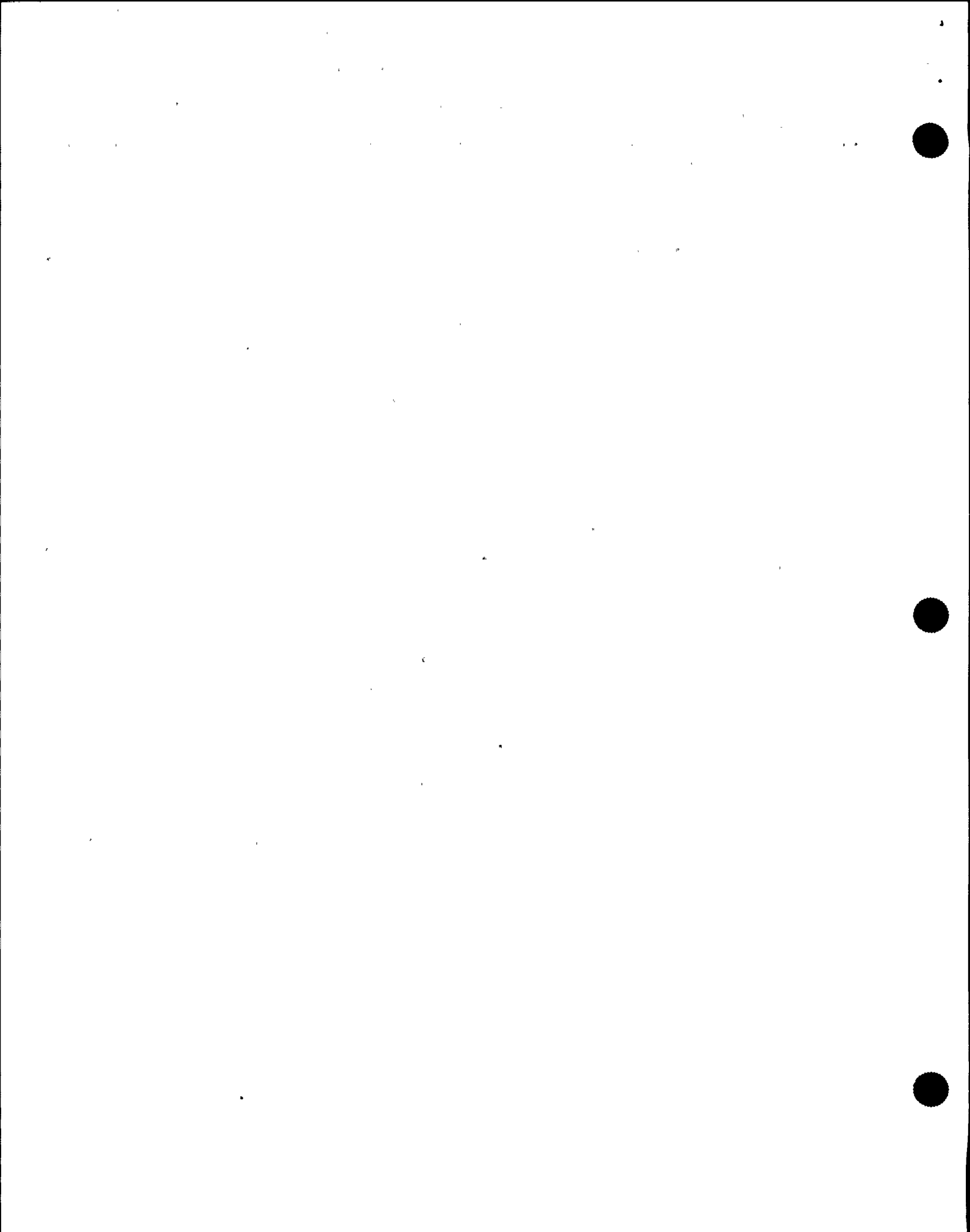
c. Maintain cold shutdown conditions (Refer to 0-2.3, PLANT AT COLD SHUTDOWN)

a. Do NOT depressurize RCS.

Return to Step 20.

b. Consult Plant staff to determine wait period for upper head cooling.

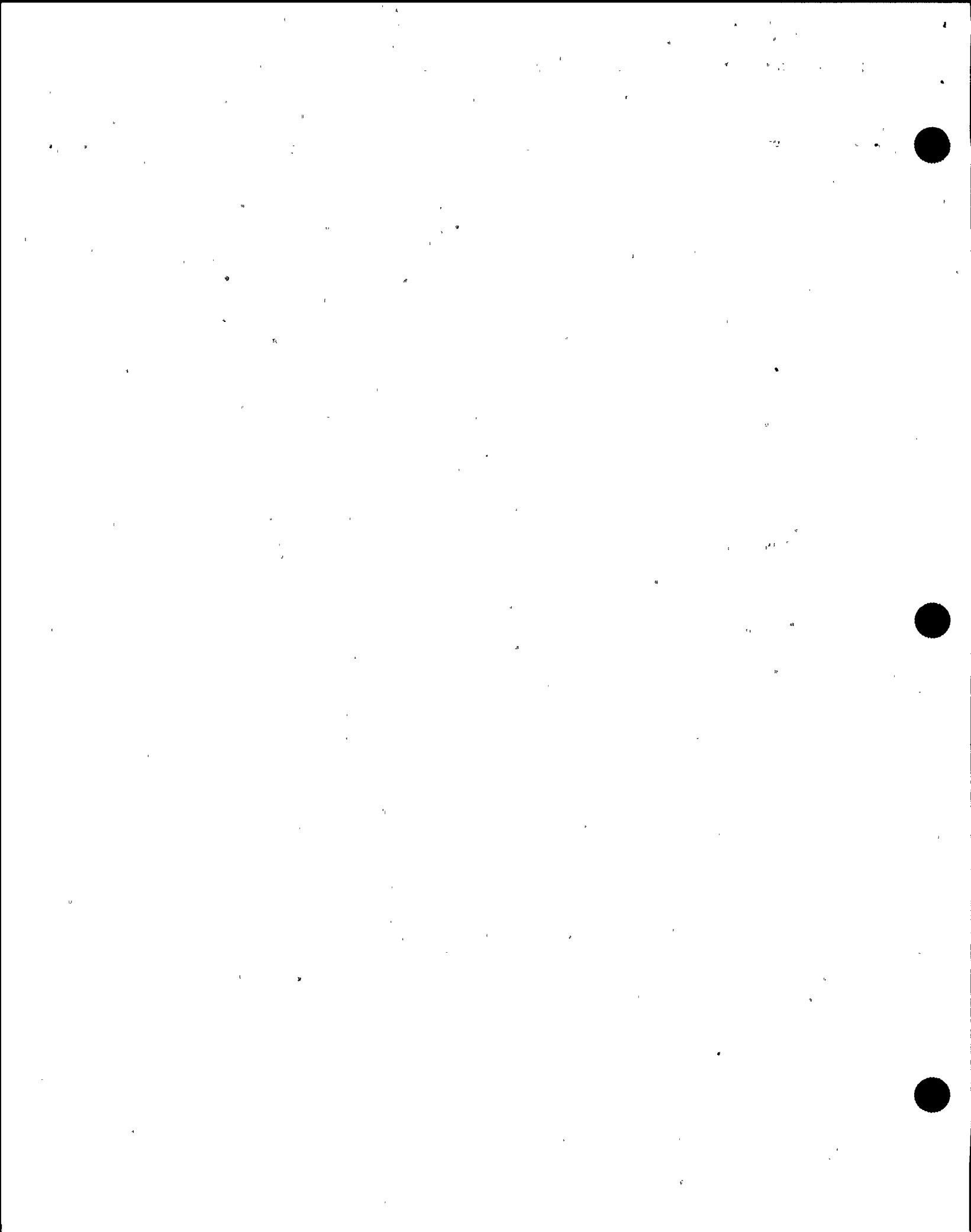
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EOP: ES-0.2	TITLE: NATURAL CIRCULATION COOLDOWN	REV: 1 PAGE 1 of 1
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ES-0.2 APPENDIX LIST

<u>TITLE</u>	<u>PAGES</u>
1) RED PATH SUMMARY	1
2) FIGURE MIN SUBCOOLING	1
3) FIGURE SDM	1
4) FIGURE NAT CIRC C/D WITHOUT SHROUD FANS	1
5) FIGURE NAT CIRC C/D WITH SHROUD FANS	1
6) ATTACHMENT RCP START	1
7) ATTACHMENT LETDOWN	1
8) ATTACHMENT RHR COOL	2
9) FOLDOUT	1



EOP: ES-0.2	TITLE: NATURAL CIRCULATION COOLDOWN	REV: 1 PAGE 1 of 1
----------------	--	-----------------------

RED PATH SUMMARY

- a. SUBCRITICALITY - Nuclear power greater than 5%
- b. CORE COOLING - Core exit T/Cs greater than 1200°F  
-OR-  
Core exit T/Cs greater than 700°F AND  
RVLIS level (no RCPs) less than 43% [46%  
adverse CNMT]
- c. HEAT SINK - Narrow range level in all S/Gs less than 5%  
[25% adverse CNMT] AND total feedwater flow  
less than 200 gpm
- d. INTEGRITY - Cold leg temperatures decrease greater than  
100°F in last 60 minutes AND RCS cold leg  
temperature less than 285°F
- e. CONTAINMENT - CNMT pressure greater than 60 psig

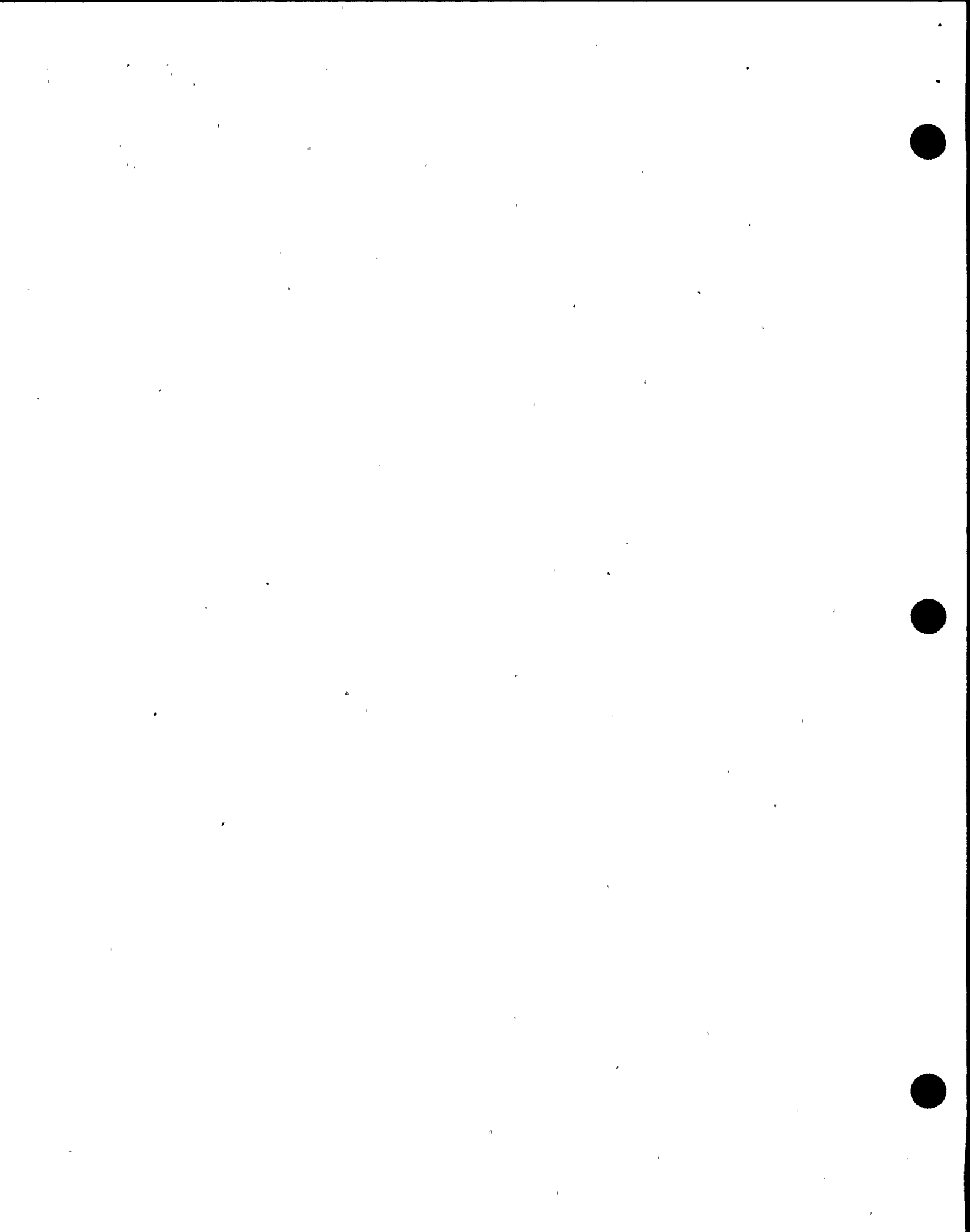
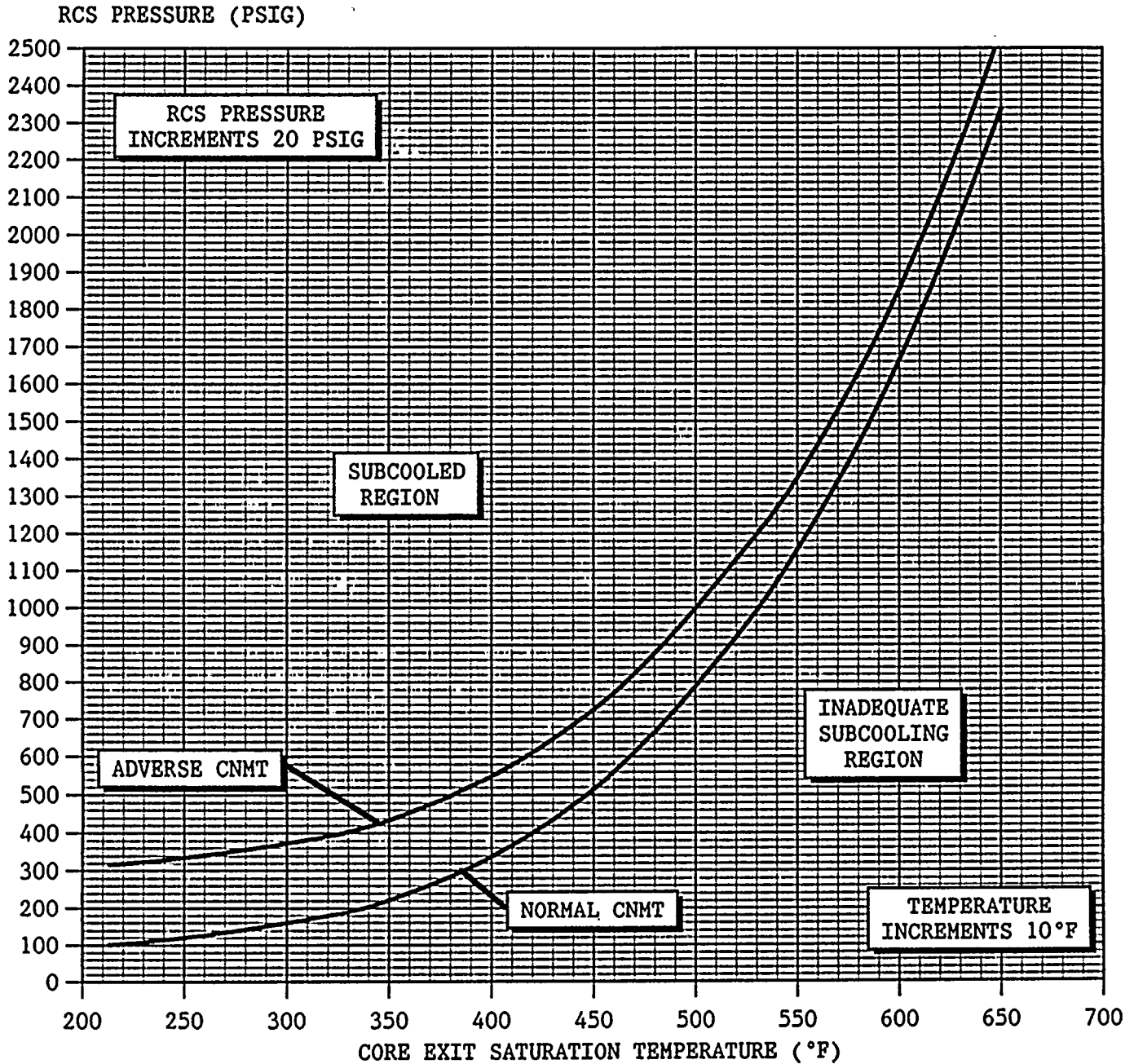




FIGURE MIN SUBCOOLING

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



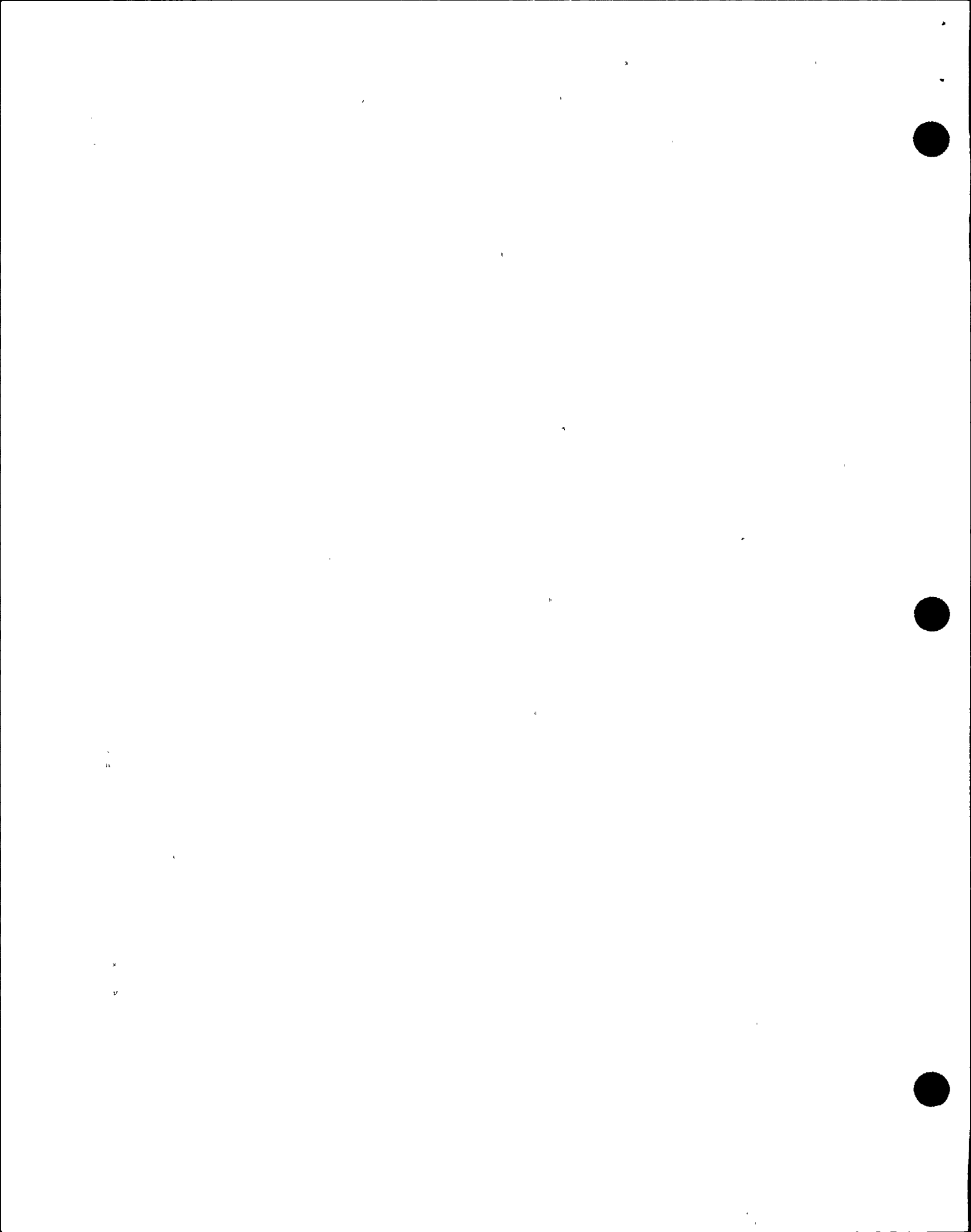
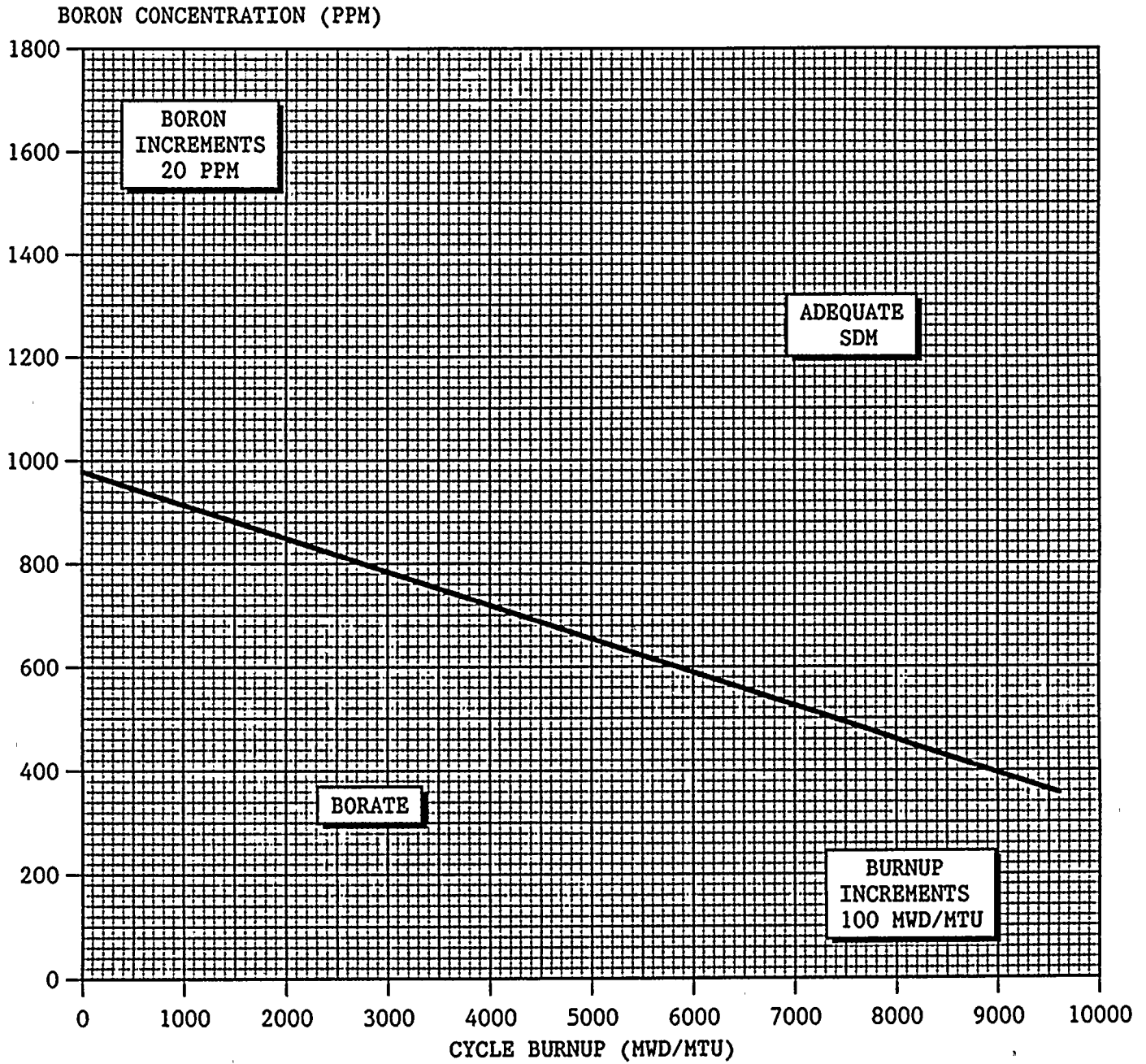


FIGURE SDM



NOTE: To obtain core burnup, use PPCS turn on code BURNUP.

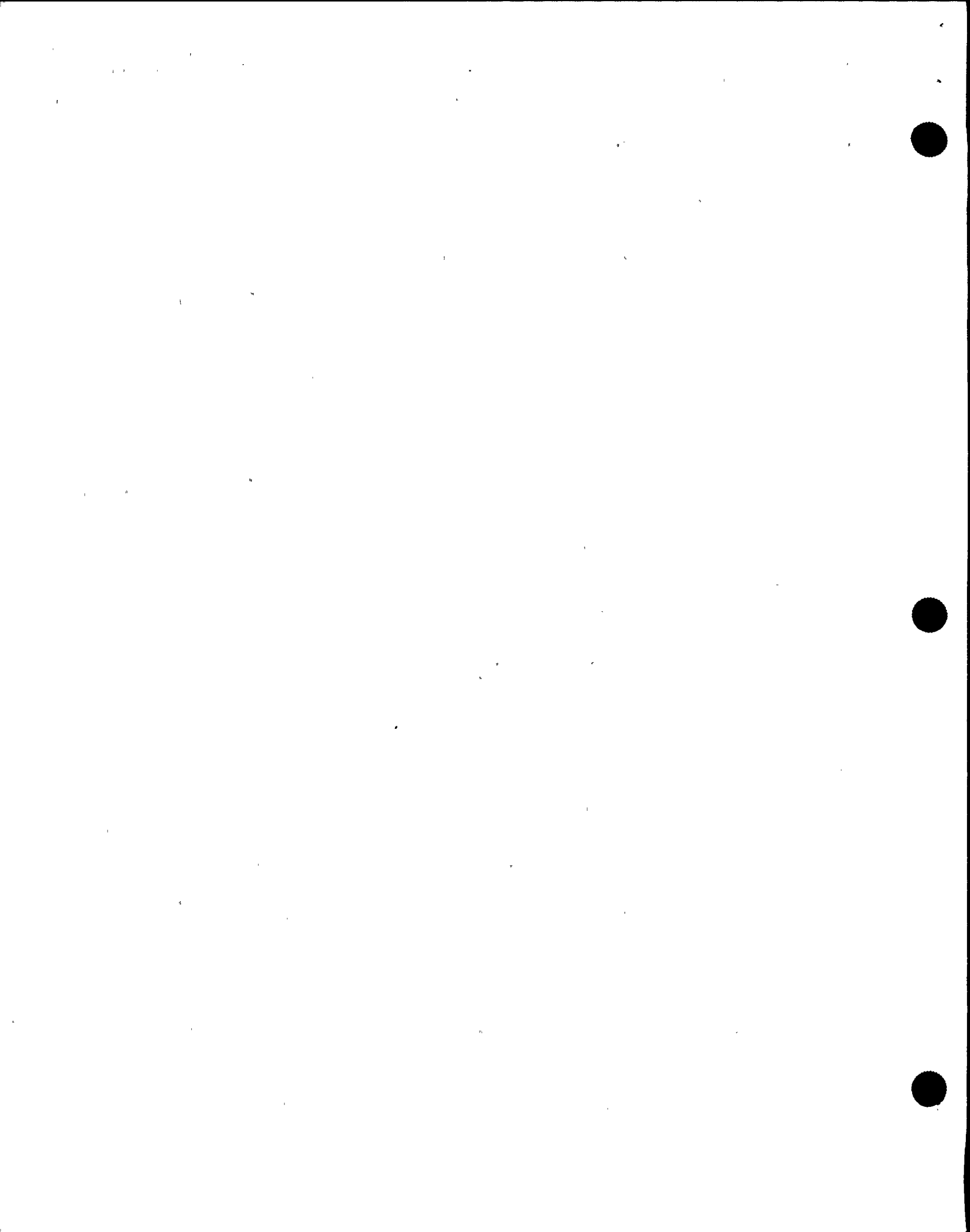
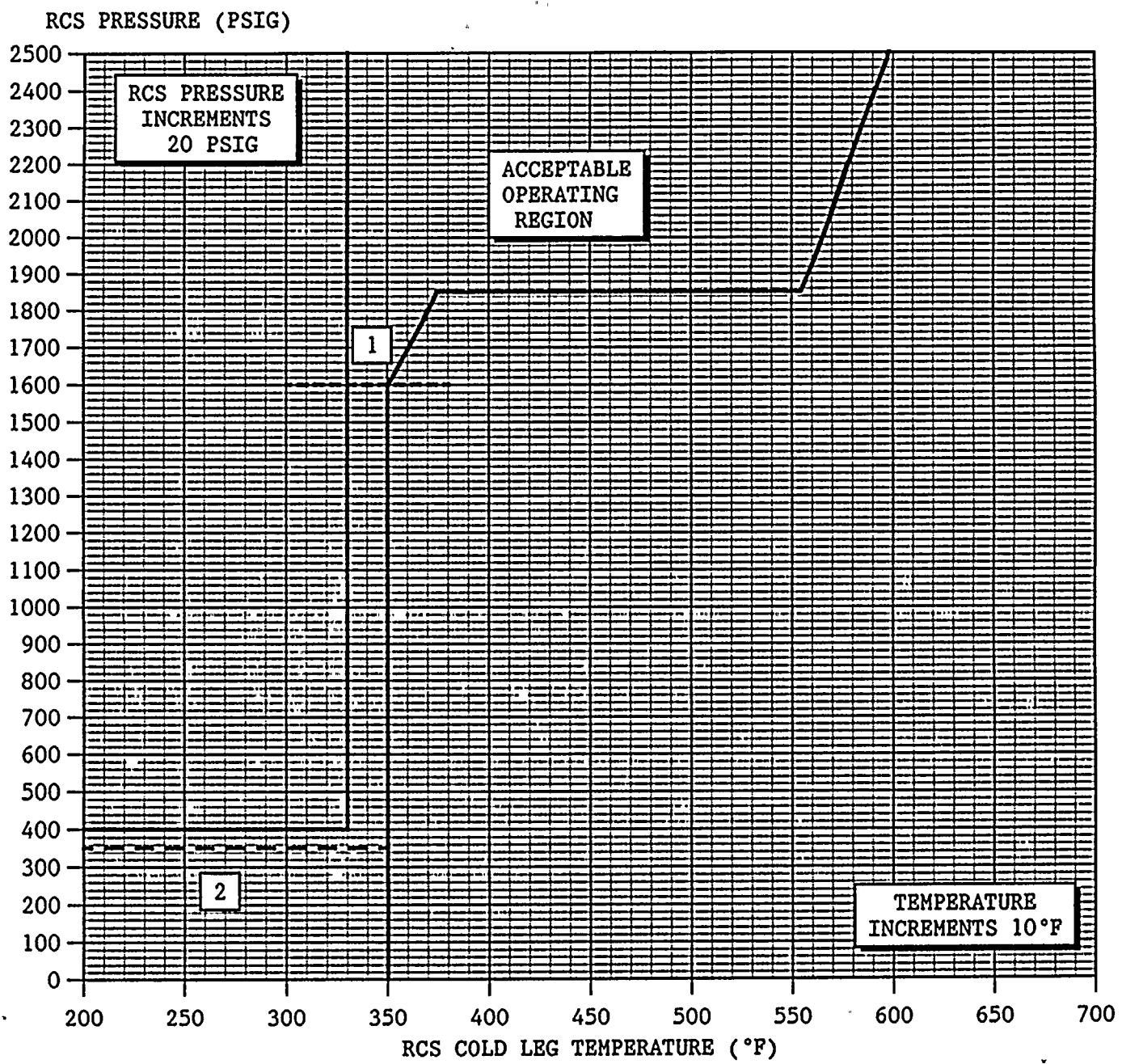


FIGURE NAT CIRC C/D WITHOUT SHROUD FANS



- [1] Wait 11 Hours before decreasing RCS pressure less than 1600 psig
- [2] RCS pressure should be maintained greater than 350 psig for 29 Hours to prevent voiding in the Rx vessel upper head.

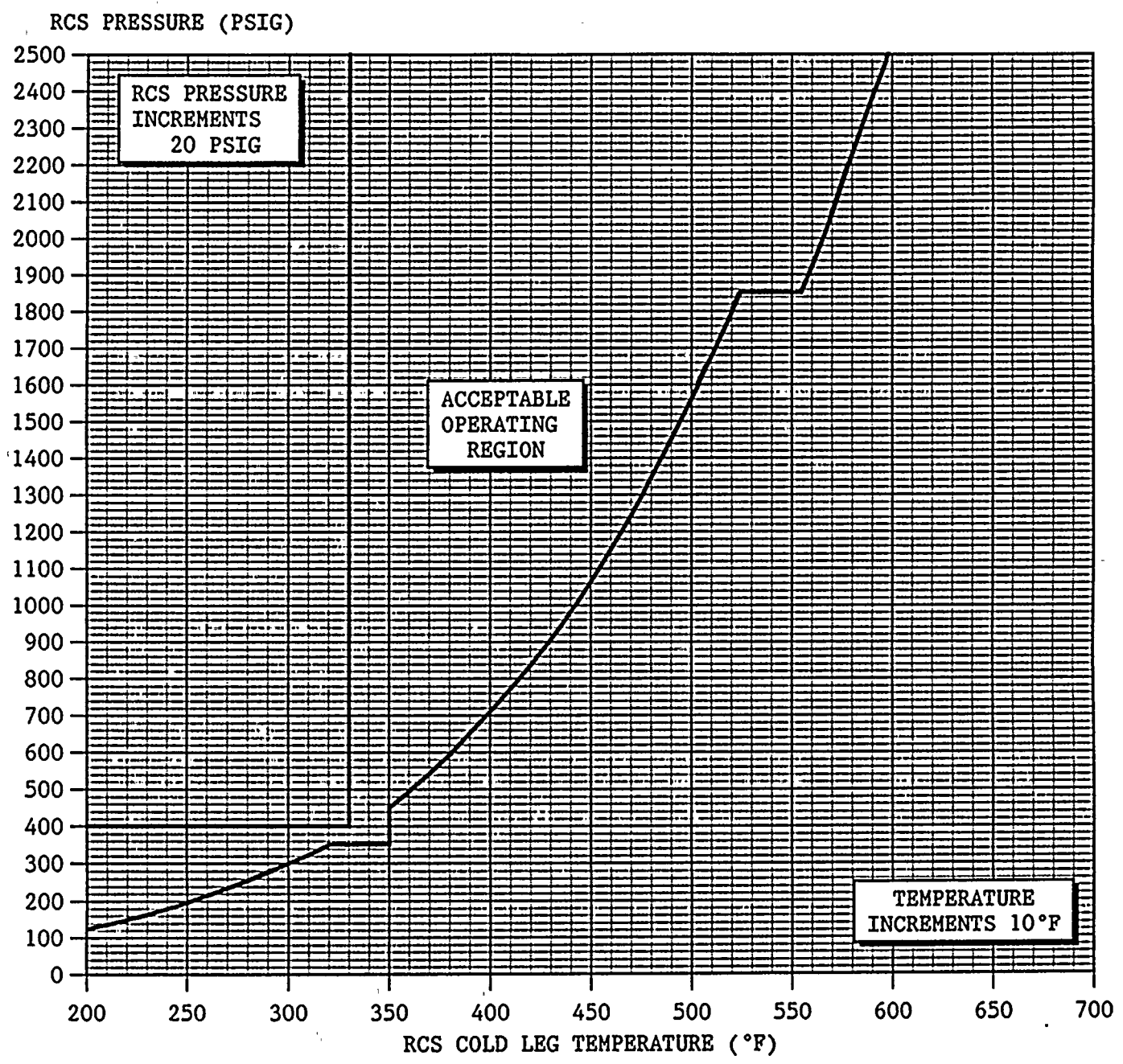


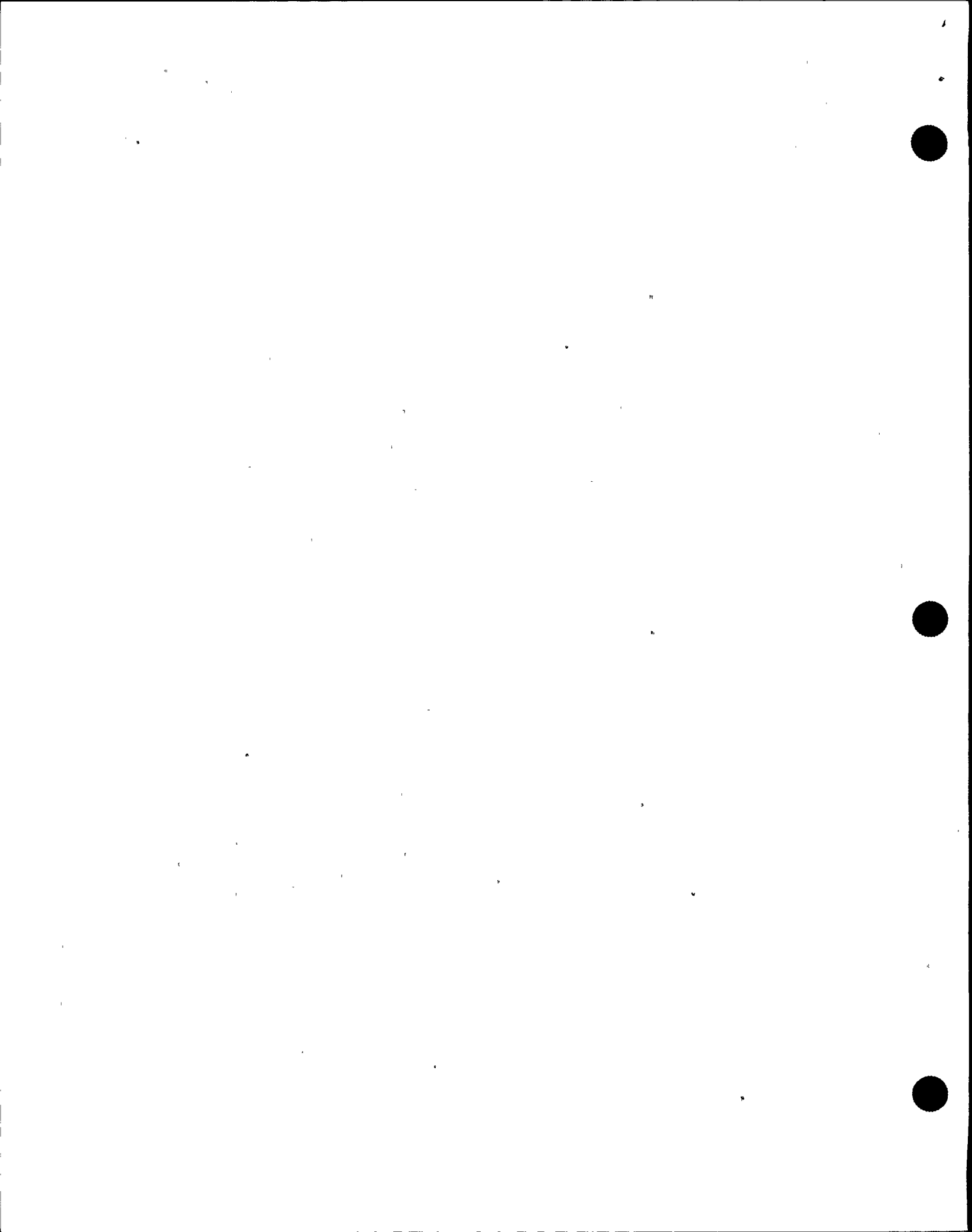
EOP:  
ES-0.2

TITLE:  
NATURAL CIRCULATION COOLDOWN

REV: 1  
PAGE 1 of 1

FIGURE NAT CIRC C/D WITH SHROUD FANS







EOP: ES-0.2	TITLE: NATURAL CIRCULATION COOLDOWN	REV: 1 PAGE 1 of 1
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FOLDOUT PAGE

1. RCP TRIP CRITERIA

IF BOTH conditions listed below occur, THEN trip both RCPs:

- a. SI pumps - AT LEAST TWO RUNNING
- b. RCS pressure minus maximum S/G pressure - LESS THAN 175 psig

2. SI PUMP AUTO SWITCHOVER CRITERION

WHEN BAST level decreases to 10%, THEN ensure SI pump automatic switchover to RWST.

3. SI ACTUATION CRITERIA

IF EITHER condition listed below occurs, THEN actuate SI and go to E-0, REACTOR TRIP OR SAFETY INJECTION, Step 1.

- o RCS subcooling based on core exit T/Cs - LESS THAN 0°F USING REQUIREMENTS OF FIGURE MIN SUBCOOLING

- OR -

- o PRZR level - CHARGING CAN NOT CONTROL LEVEL GREATER THAN 5%

4. AFW SUPPLY SWITCHOVER CRITERION

IF CST level decreases to less than 5 feet, THEN switch to alternate AFW water supply (Refer to ER-AFW.1, ALTERNATE WATER SUPPLY TO AFW PUMPS).

