

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 1 of 12
----------------	---	------------------------

ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

CONTROLLED COPY NUMBER 23

TECHNICAL REVIEW

PORC REVIEW DATE 5/6/92

Thomas H. Marlow
PLANT SUPERINTENDENT

5/8/92
EFFECTIVE DATE

CATEGORY 1.0

REVIEWED BY: _____

11

12

13

14

15

16

17

11

12

13

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 2 of 12
----------------	---	------------------------

- A. PURPOSE - This procedure provides actions to cool down and depressurize the plant to cold shutdown conditions following a SGTR. This recovery method depressurizes the ruptured S/G by dumping steam.
- B. ENTRY CONDITIONS/SYMPTOMS
1. ENTRY CONDITIONS - This procedure is entered from:
 - a. E-3 STEAM GENERATOR TUBE RUPTURE, if plant staff selects steam dump method.
 - b. ES-3.2, POST-SGTR COOLDOWN USING BLOWDOWN, when blowdown is not available and plant staff selects steam dump method.

8

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 3 of 12
----------------	---	------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

<u>CAUTION</u>		

	<ul style="list-style-type: none">o STEAM SHOULD NOT BE RELEASED FROM ANY RUPTURED S/G IF WATER MAY EXIST IN ITS STEAMLINE.o AN OFFSITE DOSE EVALUATION SHOULD BE COMPLETED PRIOR TO USING THIS PROCEDURE.	

	<u>NOTE:</u> <ul style="list-style-type: none">o FOLDOUT page should be open AND monitored periodically.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	Energize PRZR Heaters As Necessary To Saturate PRZR Water At Ruptured S/G Pressure	

52

24
24
24

24
24
24

24

24

24

24

24

24

24

EOP:

ES-3.3

TITLE:

POST-SGTR COOLDOWN USING STEAM DUMP

REV: 6

PAGE 4 of 12

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

2 Check If SI ACCUMs Should Be Isolated:

a. Check the following:

- o RCS subcooling based on core exit T/Cs - GREATER THAN 0°F USING FIGURE MIN SUBCOOLING
- o PRZR level - GREATER THAN 5% [30% adverse CNMT]

b. Dispatch AO 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 outlet valves

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

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

a. Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

c. Vent any unisolated ACCUMs:

1) Open vent valves for unisolated SI ACCUMs.

- ACCUM A, AOV-834A
- ACCUM B, AOV-834B

2) Open HCV-945.

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 5 of 12
----------------	---	------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><u>NOTE:</u> Leakage from ruptured S/G into RCS will dilute RCS boron concentration.</p>		
3	<p>Verify Adequate Shutdown Margin</p> <p>a. Direct HP to sample RCS and ruptured S/G for boron concentration</p> <p>b. Verify boron concentration - GREATER THAN REQUIREMENTS OF FIGURE SDM</p>	<p>b. Borate as necessary.</p>
<p>***** <u>CAUTION</u> 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). *****</p>		
<p><u>NOTE:</u> TDAFW pump flow control valves fail open on loss of IA.</p>		
4	<p>Check Intact S/G Level:</p> <p>a. Narrow range level - GREATER THAN 5% [25% adverse CNMT]</p> <p>b. Control feed flow to maintain narrow range level between 17% [25% adverse CNMT] and 50%</p>	<p>a. Maintain total feed flow greater than 200 gpm until narrow range level greater than 5% [25% adverse CNMT] in intact S/G.</p> <p>b. <u>IF</u> narrow range level in the intact S/G continues to increase in an uncontrolled manner, <u>THEN</u> go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.</p>

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 6 of 12
----------------	---	------------------------

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: Since ruptured S/G 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. Establish and maintain cooldown rate in RCS cold legs - LESS THAN 100°F/HR

b. Dump steam to condenser from intact S/G

b. Manually or locally dump steam from intact S/G using S/G ARV.

IF no intact S/G available, THEN perform the following:

o Use faulted S/G.

-OR-

o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 7 of 12
----------------	---	------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED																							
<p>***** <u>CAUTION</u> RCS AND RUPTURED S/G PRESSURES MUST BE MAINTAINED LESS THAN 1050 PSIG. *****</p>																									
<p>6 Control RCS Pressure And Makeup Flow To Minimize RCS-To-Secondary Leakage:</p> <p>a. Perform appropriate action(s) from table:</p> <table border="1"> <thead> <tr> <th rowspan="2">PRZR LEVEL</th> <th colspan="3">RUPTURED S/G NARROW RANGE LEVEL</th> </tr> <tr> <th>INCREASING</th> <th>DECREASING</th> <th>OFFSCALE HIGH</th> </tr> </thead> <tbody> <tr> <td>LESS THAN 13% [40% ADVERSE CNMT]</td> <td> <ul style="list-style-type: none"> o Increase RCS makeup flow o Depressurize RCS using Step 6b. </td> <td> <ul style="list-style-type: none"> o Increase RCS makeup flow </td> <td> <ul style="list-style-type: none"> o Increase RCS makeup flow o Maintain RCS and ruptured S/G pressure equal </td> </tr> <tr> <td>BETWEEN 13% [40% ADVERSE CNMT] AND 50%</td> <td> <ul style="list-style-type: none"> o Depressurize RCS using Step 6b. </td> <td> <ul style="list-style-type: none"> o Energize PRZR heaters </td> <td> <ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal </td> </tr> <tr> <td>BETWEEN 50% AND 75% [65% ADVERSE CNMT]</td> <td> <ul style="list-style-type: none"> o Depressurize RCS using Step 6b. o Decrease RCS makeup flow </td> <td> <ul style="list-style-type: none"> o Energize PRZR heaters </td> <td> <ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal </td> </tr> <tr> <td>GREATER THAN 75% [65% ADVERSE CNMT]</td> <td> <ul style="list-style-type: none"> o Decrease RCS makeup flow </td> <td> <ul style="list-style-type: none"> o Energize PRZR heaters </td> <td> <ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal </td> </tr> </tbody> </table> <p>b. Use normal PRZR spray to obtain desired results for Step 6a</p> <p>b. <u>IF</u> letdown is in service, <u>THEN</u> use auxiliary spray (AOV-296). <u>IF NOT</u>, <u>THEN</u> use one PRZR PORV.</p>			PRZR LEVEL	RUPTURED S/G NARROW RANGE LEVEL			INCREASING	DECREASING	OFFSCALE HIGH	LESS THAN 13% [40% ADVERSE CNMT]	<ul style="list-style-type: none"> o Increase RCS makeup flow o Depressurize RCS using Step 6b. 	<ul style="list-style-type: none"> o Increase RCS makeup flow 	<ul style="list-style-type: none"> o Increase RCS makeup flow o Maintain RCS and ruptured S/G pressure equal 	BETWEEN 13% [40% ADVERSE CNMT] AND 50%	<ul style="list-style-type: none"> o Depressurize RCS using Step 6b. 	<ul style="list-style-type: none"> o Energize PRZR heaters 	<ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal 	BETWEEN 50% AND 75% [65% ADVERSE CNMT]	<ul style="list-style-type: none"> o Depressurize RCS using Step 6b. o Decrease RCS makeup flow 	<ul style="list-style-type: none"> o Energize PRZR heaters 	<ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal 	GREATER THAN 75% [65% ADVERSE CNMT]	<ul style="list-style-type: none"> o Decrease RCS makeup flow 	<ul style="list-style-type: none"> o Energize PRZR heaters 	<ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal
PRZR LEVEL	RUPTURED S/G NARROW RANGE LEVEL																								
	INCREASING	DECREASING	OFFSCALE HIGH																						
LESS THAN 13% [40% ADVERSE CNMT]	<ul style="list-style-type: none"> o Increase RCS makeup flow o Depressurize RCS using Step 6b. 	<ul style="list-style-type: none"> o Increase RCS makeup flow 	<ul style="list-style-type: none"> o Increase RCS makeup flow o Maintain RCS and ruptured S/G pressure equal 																						
BETWEEN 13% [40% ADVERSE CNMT] AND 50%	<ul style="list-style-type: none"> o Depressurize RCS using Step 6b. 	<ul style="list-style-type: none"> o Energize PRZR heaters 	<ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal 																						
BETWEEN 50% AND 75% [65% ADVERSE CNMT]	<ul style="list-style-type: none"> o Depressurize RCS using Step 6b. o Decrease RCS makeup flow 	<ul style="list-style-type: none"> o Energize PRZR heaters 	<ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal 																						
GREATER THAN 75% [65% ADVERSE CNMT]	<ul style="list-style-type: none"> o Decrease RCS makeup flow 	<ul style="list-style-type: none"> o Energize PRZR heaters 	<ul style="list-style-type: none"> o Maintain RCS and ruptured S/G pressure equal 																						

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 8 of 12
----------------	---	------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7	Establish Required RCS Hydrogen Concentration (Refer to S-3.3C, H2 OR O2 REMOVAL FROM PRIMARY SYSTEM BY BURPING VCT)	
8	Check If RCS Cooldown Should Be Stopped: a. RCS cold leg temperatures - LESS THAN 350°F b. Stop RCS cooldown	a. Return to Step 3.
9	Check Ruptured S/G Narrow Range Level - GREATER THAN 17% [25% adverse CNMT]	Refill ruptured S/G to 67% [55% adverse CNMT] using feed flow. <u>IF</u> either of the following conditions occurs, <u>THEN</u> stop feed flow to ruptured S/G: o Ruptured S/G pressure decreases in an uncontrolled manner. -OR- o Ruptured S/G pressure increases to 1020 psig.

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

EOP:	TITLE:	REV: 6
ES-3.3	POST-SGTR COOLDOWN USING STEAM DUMP	PAGE 9 of 12

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p>*****</p> <p style="text-align: center;"><u>CAUTION</u></p> <p>RUPTURED S/G PRESSURE MAY DECREASE RAPIDLY WHEN STEAM IS RELEASED.</p> <p>*****</p> <p><u>NOTE:</u> Steam release from ruptured S/G may be stopped when RHR System is in service.</p>		
10	Initiate Cooldown Of Ruptured S/G:	
	<p>a. Verify condenser available:</p> <ul style="list-style-type: none"> o Intact S/G MSIV - OPEN o Annunciator G-15, STEAM DUMP - LIT <p>b. Dispatch AO to locally open ruptured S/G MSIV bypass valve</p> <p>c. Dump steam to condenser using steam dump pressure controller</p>	<p>a. Manually or locally dump steam using ruptured S/G ARV and go to Step 11.</p>
11	Control RCS Makeup Flow And Letdown To Maintain PRZR Level:	
	<p>a. PRZR level - GREATER THAN 13% [40% adverse CNMT]</p> <p>b. PRZR level - LESS THAN 75% [65% adverse CNMT]</p>	<p>a. Increase RCS makeup flow as necessary and go to Step 12.</p> <p>b. Decrease RCS makeup flow to decrease level and go to Step 13.</p>

22

22

22

22

22

22

22

22

22

22

22

22

22

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 10 of 12
----------------	---	-------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
<p><u>NOTE:</u> The upper head region may void during depressurization if RCPs are not running. This may result in a rapidly increasing PRZR level.</p>		
12	Depressurize RCS To Minimize RCS-To-Secondary Leakage:	
	<ul style="list-style-type: none"> a. Depressurize using normal PRZR spray associated with running RCP b. Energize PRZR heaters as necessary c. Maintain RCS pressure at ruptured S/G pressure d. Maintain RCS subcooling based on core exit T/Cs - GREATER THAN 0°F USING FIGURE MIN SUBCOOLING 	<ul style="list-style-type: none"> a. <u>IF</u> letdown is in service, <u>THEN</u> depressurize using auxiliary spray valve (AOV-296). <u>IF NOT</u>, <u>THEN</u> use one PRZR PORV.
13	Check If RCPs Must Be Stopped:	
	<ul style="list-style-type: none"> a. RCPs - ANY RUNNING b. Check the following: <ul style="list-style-type: none"> o RCP #1 seal D/P - LESS THAN 220 PSID -OR- o Check RCP seal leakage - LESS THAN 0.25 GPM c. Stop affected RCP(s) 	<ul style="list-style-type: none"> a. Go to Step 14. b. Go to Step 14.

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 11 of 12
----------------	---	-------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14	Check If RHR Normal Cooling Can Be Established	
	a. RCS cold leg temperature - LESS THAN 350°F	a. Return to Step 9.
	b. RCS pressure - LESS THAN 400 psig [300 psig adverse CNMT]	b. Return to Step 9.
	c. Place RCS overpressure protection system in service (Refer to O-7, ALIGNMENT AND OPERATION OF THE REACTOR VESSEL OVERPRESSURE PROTECTION SYSTEM)	c. <u>IF</u> RCS overpressure protection system can <u>NOT</u> be placed in service, <u>THEN</u> notify TSC of potential Tech Spec violation if RHR system is placed in service.
	d. Establish RHR normal cooling (Refer to Attachment RHR COOL)	
15	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 S/G	c. Manually or locally dump steam using intact S/G ARV <u>IF</u> no intact S/G available and RHR system <u>NOT</u> in service, <u>THEN</u> perform the following: o Use faulted S/G. -OR- o Go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.

10

11

12



EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 12 of 12
----------------	---	-------------------------

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
16	Check Core Exit T/Cs - LESS THAN 200°F	Return to Step 9.
17	Evaluate Long Term Plant Status: <ul style="list-style-type: none">a. Maintain cold shutdown conditions (Refer to 0-2.3, PLANT AT COLD OR REFUELING SHUTDOWN)b. Consult TSC	
-END-		

EOP:

ES-3.3

TITLE:

POST-SGTR COOLDOWN USING STEAM DUMP

REV: 6

PAGE 1 of 1

ES-3.3 APPENDIX LIST

<u>TITLE</u>	<u>PAGES</u>
1) RED PATH SUMMARY	1
2) FIGURE MIN SUBCOOLING	1
3) FIGURE SDM	1
4) ATTACHMENT RHR COOL	2
5) FOLDOUT	1

104

105

106

107

108

109

110

111

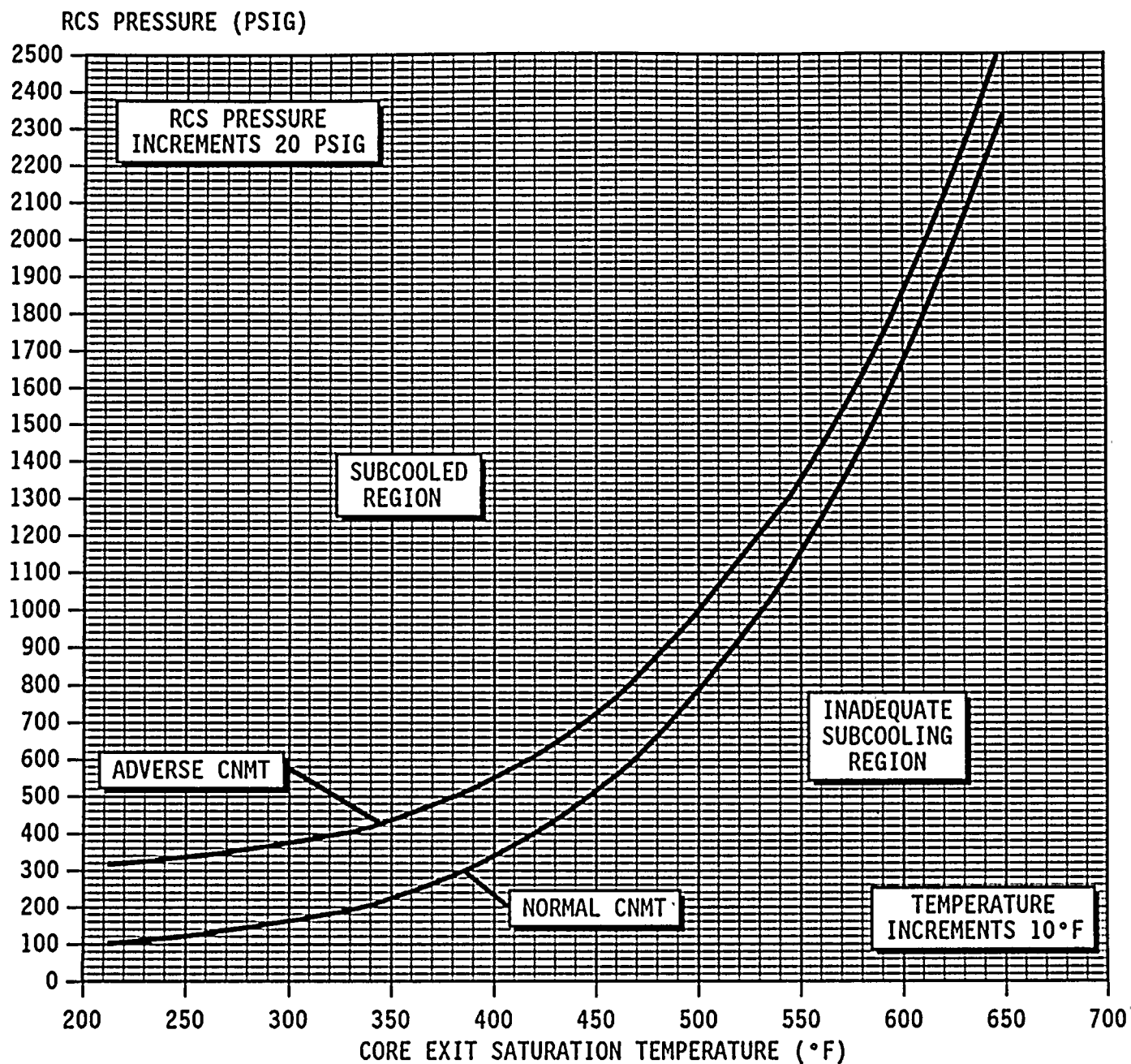
112

113

[illegible][illegible]

FIGURE MIN SUBCOOLING

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



1944-1945

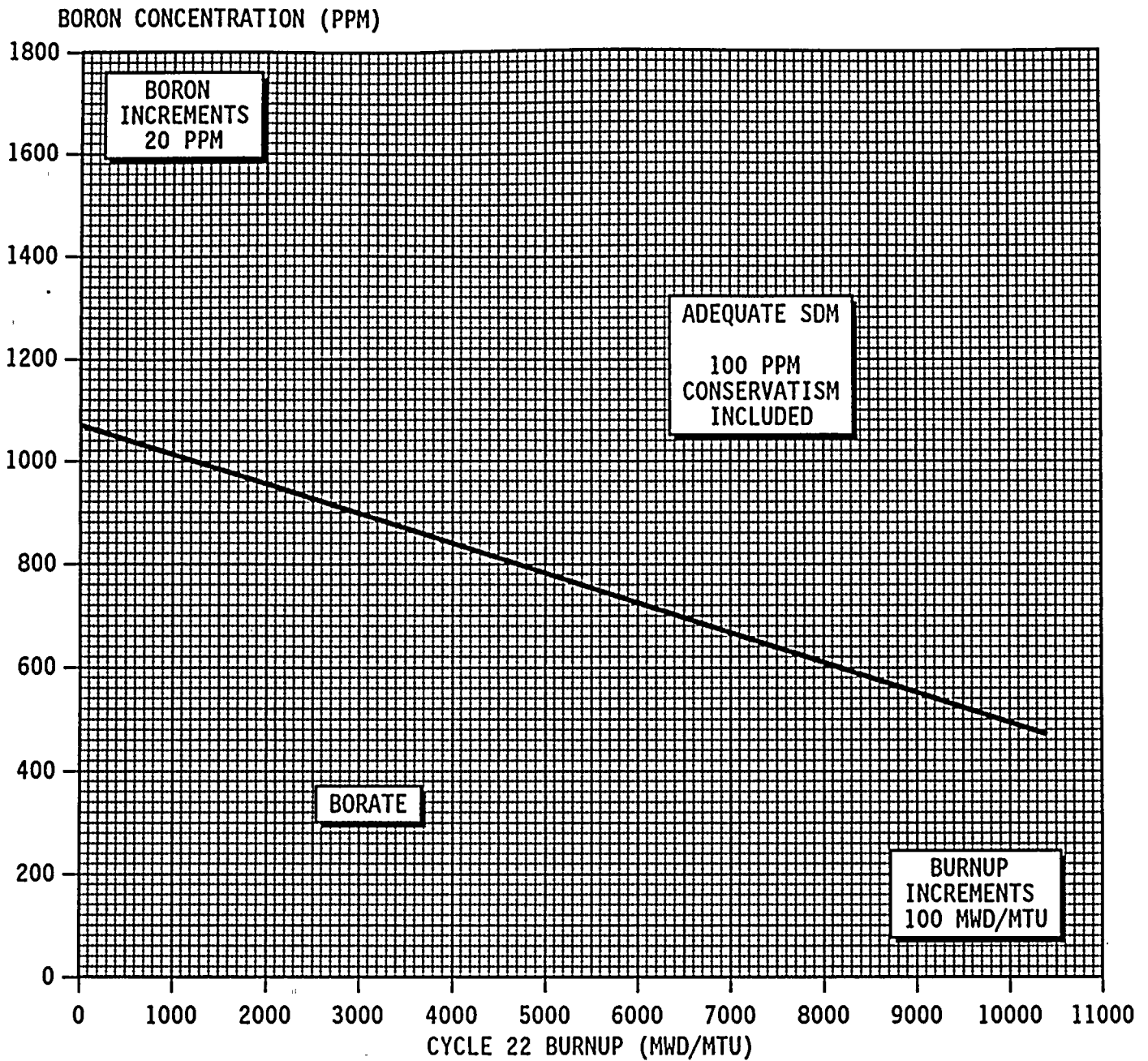
1946-1947

1948-1949

1950-1951

1952-1953

FIGURE SDM



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

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

EOP: ES-3.3	TITLE: POST-SGTR COOLDOWN USING STEAM DUMP	REV: 6 PAGE 1 of 1
----------------	---	-----------------------

FOLDOUT PAGE

1. SI REINITIATION CRITERIA

IF either condition listed below occurs, THEN operate SI pumps manually as necessary and go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, 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% [30% adverse CNMT]

2. SECONDARY INTEGRITY CRITERIA

IF any S/G pressure is decreasing in an uncontrolled manner or is completely depressurized AND has not been isolated, THEN go to E-2, FAULTED S/G ISOLATION, Step 1.

3. COLD LEG RECIRCULATION SWITCHOVER CRITERION

IF RWST level decreases to less than 28%, THEN go to ES-1.3, TRANSFER TO COLD LEG RECIRCULATION, Step 1.

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).

