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ROCHESTER GAS AND ELECTRIC CORPORATION

GINNA STATION

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TECHNICAL REVIEW

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EOP:

ES-3.2

TITLE:

POST-SGTR COOLDOWN USING BLOWDOWN

REV: 9

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- 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 draining via S/G blowdown.
- B. ENTRY CONDITIONS/SYMPTOMS
 - 1. ENTRY CONDITIONS - This procedure is entered from:
 - a. E-3 STEAM GENERATOR TUBE RUPTURE, if plant staff selects the blowdown method.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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NOTE:

- 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

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.



NOTE: Leakage from ruptured S/G into RCS will dilute RCS boron concentration.

3 Verify Adequate shutdown Margin

- | | |
|---|-------------------------|
| a. Direct HP to sample RCS and ruptured S/G for boron concentration | |
| b. Verify boron concentration - GREATER THAN REQUIREMENTS OF FIGURE SDM | b. Borate as necessary. |

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.

* 4 Monitor Intact S/G Level:

- | | |
|--|---|
| 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 5% [25% adverse CNMT] in intact S/G. |
| b. Control feed flow to maintain narrow range level between 17% [25% adverse CNMT] and 50% | 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. |

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 not be delayed.

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.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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CAUTION

RCS AND RUPTURED S/G PRESSURES MUST BE MAINTAINED LESS THAN 1050 PSIG.

* 6 Control RCS Pressure And Makeup Flow To Minimize RCS-To-Secondary Leakage:

a. Perform appropriate action(s) from table:

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. 	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% AND 50% [40% ADVERSE CNMT]	Depressurize RCS using Step 6b.	Energize PRZR heaters	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 	Energize PRZR heaters	Maintain RCS and ruptured S/G pressure equal
GREATER THAN 75% [65% ADVERSE CNMT]	o Decrease RCS makeup flow	Energize PRZR heaters	Maintain RCS and ruptured S/G pressure equal

b. Use normal PRZR spray to obtain desired results for Step 6a

b. IF letdown is in service, THEN use auxiliary spray (AOV-296). IF NOT, THEN use one PRZR PORV.

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:	
	<ul style="list-style-type: none"> a. RCS cold leg temperatures - LESS THAN 350°F b. Stop RCS cooldown c. Maintain RCS cold leg temperature - LESS THAN 350°F 	a. Return to Step 3.
* 9	Monitor Ruptured S/G Narrow Range Level - LEVEL GREATER THAN 17% [25% adverse CNMT]	<p>Refill ruptured S/G to 67% [55% adverse CNMT] using feed flow.</p> <p><u>IF</u> either of the following conditions occurs, <u>THEN</u> stop feed flow to ruptured S/G:</p> <ul style="list-style-type: none"> o Ruptured S/G pressure decreases in an uncontrolled manner. <p style="text-align: center;">-OR-</p> <ul style="list-style-type: none"> o Ruptured S/G pressure increases to 1020 psig.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE: Blowdown from ruptured S/G may be stopped when RHR system is placed in service.

10 Consult TSC To Determine Appropriate Procedure To Establish Blowdown From Ruptured S/G

IF blowdown can NOT be initiated, THEN go to alternate post-SGTR cooldown procedure, ES-3.1, POST-SGTR COOLDOWN USING BACKFILL, Step 1, OR ES-3.3, POST-SGTR COOLDOWN USING STEAM DUMP, Step 1.

*11 Control RCS Makeup Flow And Letdown To Maintain PRZR Level:

- a. PRZR level - GREATER THAN 13% [40% adverse CNMT]
- b. PRZR level - LESS THAN 75% [65% adverse CNMT]

- a. Increase RCS makeup flow as necessary and go to Step 12.
- b. Decreases RCS makeup flow to decrease level and go to Step 13.

NOTE: The upper head region may void during depressurization if RCPs are not running. This may result in a rapidly increasing PRZR level.

*12 Depressurize RCS To Minimize RCS-To-Secondary Leakage:

- a. Depressurize using normal PRZR spray
- 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

a. IF letdown is in service, THEN depressurize using auxiliary spray valve (AOV-296). IF NOT, THEN use one PRZR PORV.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

*13 Monitor RCP Operation:

- | | |
|---|--|
| <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 <li style="text-align: center; padding: 10px 0;">-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. |
|---|--|

14 Check If RHR Normal Cooling Can Be Established:

- | | |
|--|--|
| <ul style="list-style-type: none"> a. RCS cold leg temperature - LESS THAN 350°F b. RCS pressure - LESS THAN 400 psig [300 psig adverse CNMT] c. Place RCS overpressure protection system in service (Refer to O-7, ALIGNMENT AND OPERATION OF THE REACTOR VESSEL OVERPRESSURE PROTECTION SYSTEM) d. Establish RHR normal cooling (Refer to Attachment RHR COOL) | <ul style="list-style-type: none"> a. Return to Step 9. b. Return to Step 9. 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. |
|--|--|

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
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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.

IF no intact S/G available and RHR system NOT in service, 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.

16 Check Core Exit T/Cs - LESS THAN 200°F

Return to Step 9.

17 Evaluate Long Term Plant Status:

- a. Maintain cold shutdown conditions - (Refer to O-2.3, PLANT AT COLD OR REFUELING SHUTDOWN)
- b. Consult TSC

-END

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ES-3.2 APPENDIX LIST

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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

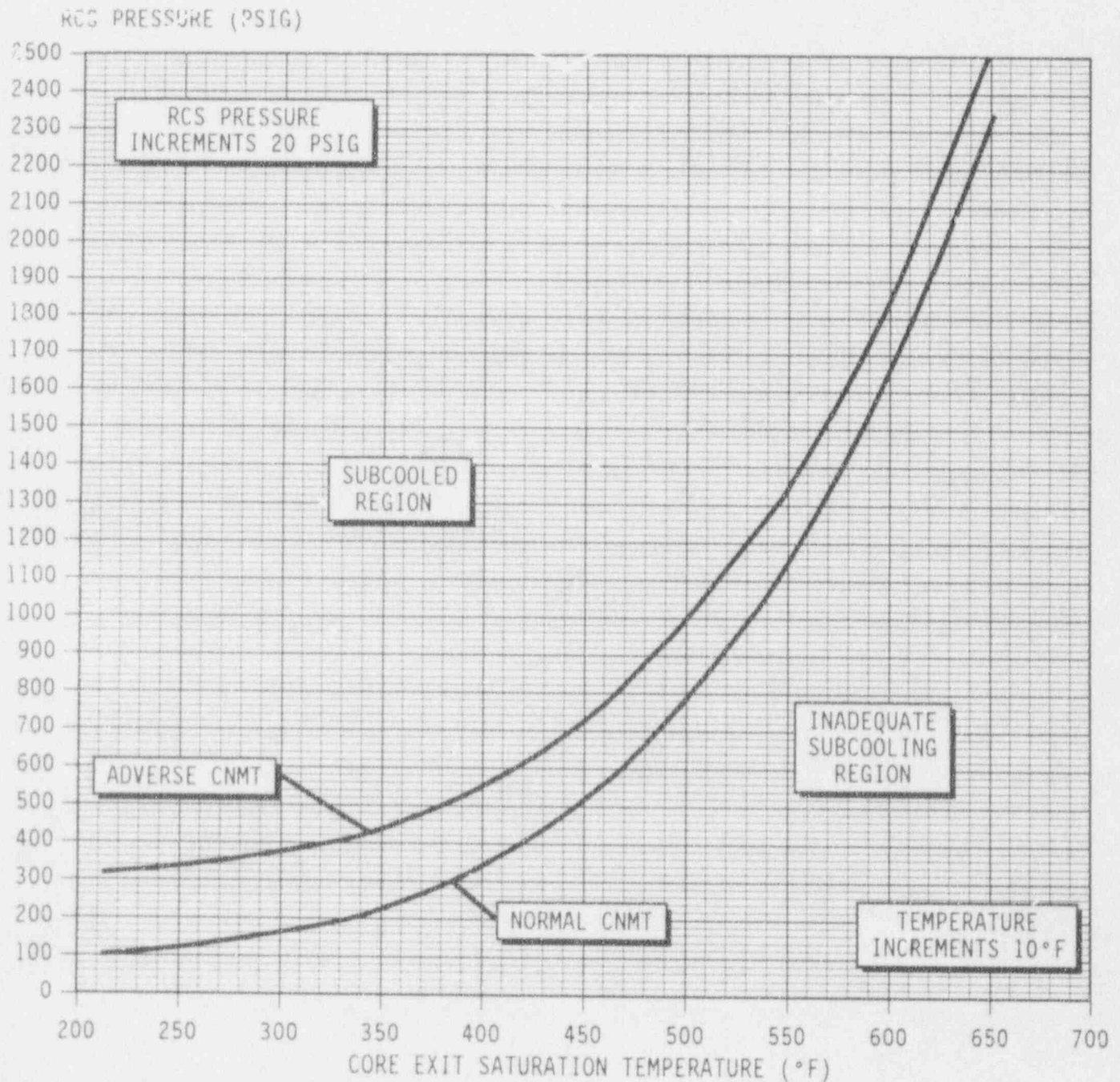
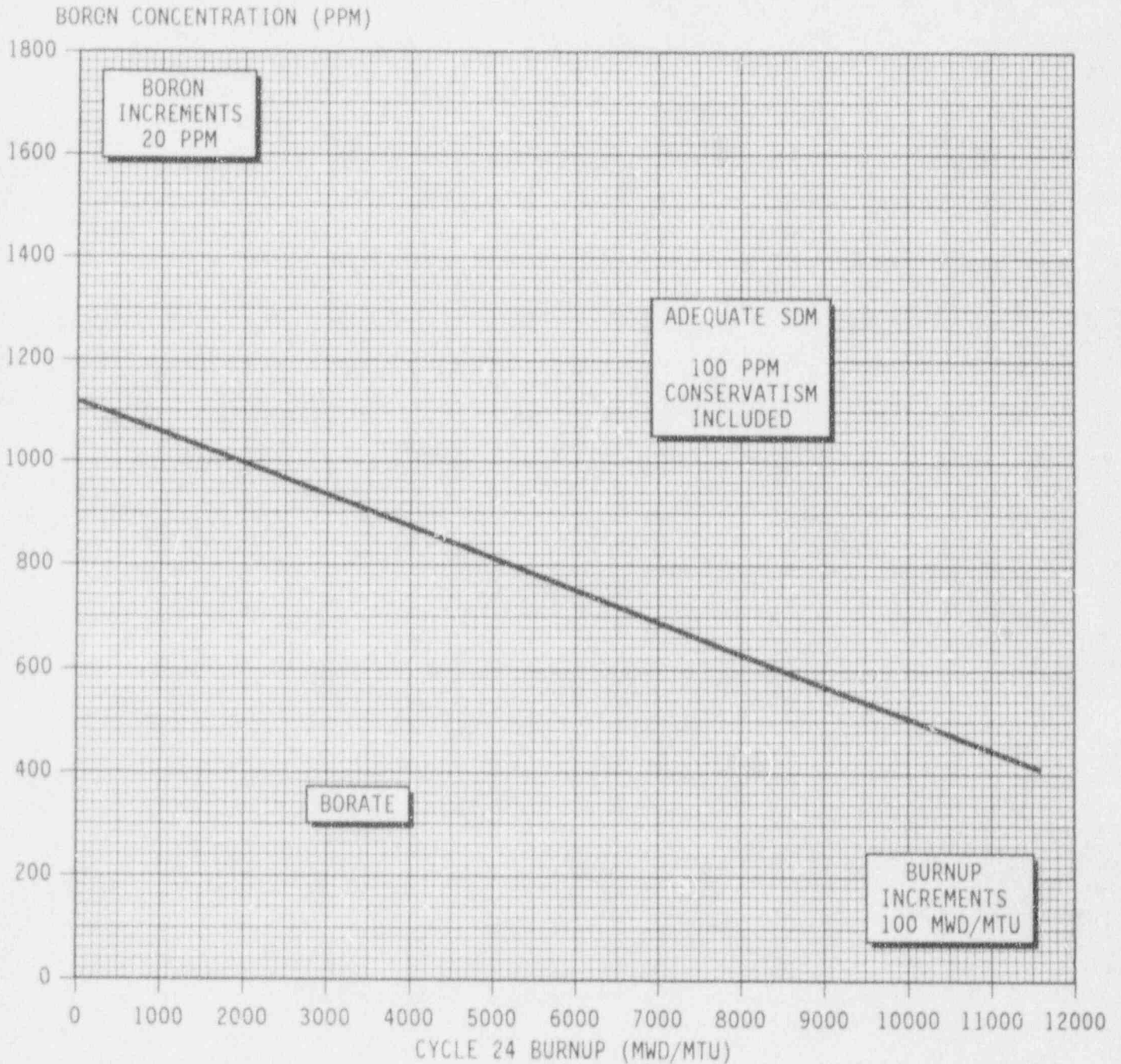


FIGURE SDM

NOTE: 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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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).

5. MULTIPLE S/G TUBE RUPTURE CRITERIA

IF any intact S/G level increases in in an uncontrolled manner OR IF any intact S/G has abnormal radiation, THEN go to ECA-3.1, SGTR WITH LOSS OF REACTOR COOLANT - SUBCOOLED RECOVERY DESIRED, Step 1.