

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

EMERGENCY INSTRUCTION S01-1.2-1.3

STEAM GENERATOR TUBE RUPTURE

I. PURPOSE:

The purpose of this instruction is to provide the diagnostics to enable confirmation of a STEAM GENERATOR TUBE RUPTURE, the initiation of RCS cooldown and depressurization concurrent with steam header depressurization to the point of placing RHR in service, and to minimize the release of radioactivity. Additionally this instruction directs the implementation of procedures to insure long term shutdown and cooling of the reactor.

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NOTE: Foldout page should be open.

1

Identify Ruptured SGs:

- a. SG narrow range level
- AN UNEXPECTED LEVEL
RISE IN ANY SG.

OR

SG blowdown radiation on
ORMS 1216 - GREATER THAN
ALARM SET POINT OR
INCREASING IN ANY SG.

OR

SG samples - HIGH RADIATION
OR ACTIVITY IN ANY SG.

- a. IF NOT immediately
identified, THEN go to
step 3. WHEN ruptured
SG identified, THEN do
step 2.

CAUTION

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Ruptured steam generator level should be maintained at
26% in the narrow range by use of AFW.

2

Minimize Filling of Ruptured
Steam Generator:

- a. WHEN narrow range level reaches
26%, THEN stop all AFW flow to
ruptured SG.

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3

Check AFW Pumps:

- | | |
|---|--|
| a. Electric AFW pump
breaker - CLOSED. | a. Start pump. IF
electric AFW pump
cannot be started,
THEN DO NOT STOP
TURBINE AFW PUMP. Go
to step 4. |
| b. Stop turbine AFW pump:

1) Depress AFW system
MANUAL mode <u>AND</u> RESET
pushbuttons.

2) Depress STOP pushbutton.

3) Verify pump discharge
pressure - DECREASING. | b. Manually position
turbine AFW valves
for turbine shutdown. |

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Check Pressurizer PORVs And
Block Valves:

- a. Power available to block valves.
- b. PORVs - CLOSED.
- c. Block valves - OPEN.

- a. Restore power to block valves.
- b. IF RCS pressure less than 2100 psig, THEN manually close PORVs. IF any PORV cannot be closed, THEN manually close its block valve.
- c. Open block valve unless it was closed to isolate a faulty PORV.

CAUTION

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If any pressurizer PORV opens because of high RCS pressure, repeat step 4 after pressure drops below PORV setpoint.

5

Transfer Steam Dump
Mode:

- a. Place steam dump mode selector switch to PRESSURE CONTROL ATMOS AND CONDENSER.

6

Verify SG Blowdown Status:

- a. SG blowdown - NOT IN PROGRESS.
- a. Manually isolate blowdown.

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Verify RCS Temperature:

- a. RCS temperature
- STABLE AT 535 °F.

- a. Adjust steam dump controller as necessary, attempt to maintain steam dump to condenser only.

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Check SG Levels:

- a. Narrow range level
- GREATER THAN 26%.

- a. IF less than 26%, THEN maintain:

1) Total AFW flow
- GREATER THAN
250 GPM.

2) AFW flow per SG
- LESS THAN
150 GPM.

- b. Throttle AFW flow:

1) IF identified, maintain ruptured SG narrow range level at 26%.

2) Maintain other SG narrow range levels at 50%.

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CAUTION

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If offsite power is lost after SI is reset, manual SI initiation will be necessary to load safeguard equipment onto the diesel powered 4 KV busses.

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Reset SI:

- | | |
|--|----------------------------|
| a. Reset SI at SLSS surveillance panels. | |
| b. Verify lockout switches - RESET. | b. Reset lockout switches. |

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Establish Maximum Charging:

- a. Reset nonrunning charging pump lockout.
- b. Start second charging pump.

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Establish Charging Flow Through
SI Cold Leg Injection Lines:

- a. Align cold leg injection
flowpath:

MOV 356 - OPEN.

MOV 357 - OPEN.

MOV 358 - OPEN.

MOV 18 - OPEN.

MOV 19 - OPEN.

- b. Isolate normal charging
flowpath:

FCV 1112 - CLOSED.

CV 304 - CLOSED.

- c. Place seal supply flow
controllers, FC 1115 A, B
AND C, on MANUAL AND adjust
controllers to establish
maximum flow to each loop:

Do not exceed 600 gpm with
two charging pumps.

OR

300 gpm with one charging
pump.

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Verify SG Tube Rupture Has Occurred:

a. Ruptured SG - IDENTIFIED.

a. IF NOT identified,
THEN check
containment
conditions:

- 1) Containment
pressure - LESS
THAN 1.4 PSIG AND
NOT INCREASING.
- 2) Containment
radiation on ARMS
1232 - LESS THAN
ALARM POINT AND NOT
INCREASING.
- 3) Containment sump
level - LESS THAN
SUMP LEVEL ALARM
POINT AND NOT
INCREASING.

IF any containment
condition high, THEN
go to S01-1.2-1.1,
LOSS OF REACTOR
COOLANT.

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CAUTION

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Depressurizing the RCS can result in steam voiding in the upper head and rapid filling of the pressurizer.

CAUTION

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If PRT rupture disk is blown, abnormal containment conditions may not be reliable indications of a LOCA.

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Depressurize RCS To Establish Pressurizer Level:

- | | |
|--|--|
| <p>a. Open one pressurizer PORV.</p> <p>b. <u>WHEN</u> pressurizer level is - GREATER THAN 50%,
<u>THEN</u> close the PORV.</p> <p>c. Verify pressurizer level - STABLE.</p> | <p>b. <u>IF</u> an PORV cannot be closed, <u>OR</u> RCS pressure decreasing, <u>THEN</u> close that PORV block valve.</p> <p>c. <u>IF</u> pressurizer level continues to increase after closing PORV, <u>THEN</u> close respective PORV block valve.</p> |
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NOTE: If possible RCPs should be run such that pressurizer spray capability is assured.

- 14 Energize Pressurizer Heaters:
- a. IF SIS/LOP occurred, THEN reset 480 V bus lockout switches.
 - b. Close pressurizer heater breakers.

- 15 Establish Conditions For RCP Operation:
- a. Verify CCW low flow alarm - RESET.
 - b. Verify RCS pressure - GREATER THAN 350 PSIG.
 - c. Verify #1 seal water delta pressure alarm - RESET.
 - d. Start oil lift pump.
 - e. Start at least one RCP in an intact loop.

- IF an RCP cannot be immediately started, THEN go to step 16 AND start an RCP when conditions allow.

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Check IF SI System Pumps
Can Be Stopped:

- a. RCS pressure - GREATER THAN 1050 PSIG AND STABLE OR INCREASING.
- b. Pressurizer level - GREATER THAN 25%.
- c. Stop both feed pumps.
- d. Stop both SI pumps.

- a. IF RCS pressure Less than 1050 psig, THEN DO NOT stop SI system pumps go to step 17.

CAUTION

Remain within Tech. Spec. Pressure Temperature Limits.

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Initiate RCS Cooldown
And Depressurization:

- a. Maximize cooldown rate by steam dump to condenser. Do not exceed 100 °F/hr.
- b. Maintain pressurizer level 25% to 70% by adjusting cold leg injection flow.
- c. Depressurize RCS to approximately steam header pressure by controlling normal spray AND heaters.

- a. Dump steam to atmosphere.
- b. IF pressurizer level exceeds 70%, THEN stop depressurization.
- c. IF sprays are not available, THEN use one PORV.

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CAUTION

If RCPs are not running, then monitor core exit TCs to ensure RCS heat removal.

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Verify SI Reinitiation
Not Required:

- | | |
|--|--|
| a. Pressurizer level - GREATER THAN 20%. | a. IF level cannot be maintained greater than 20%, THEN start one SI pump and corresponding feed pump and return to step 13. |
| b. RCS temperatures - DECREASING. | b. IF RCS temperatures increasing, THEN start one SI pump and corresponding feed pump and return to step 13. |

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Restart One Condensate Pump:

- a. Close hotwell drawoff block valves.
- b. Start one condensate pump AND assure condensate system mini flow established.

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Verify Adequate Shutdown Margin:

- a. Initiate RCS boron sampling.

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Minimize Release Of Contaminants:

- a. Close AFW pump flush water valves.
- b. Verify OR align air ejector after condenser drains to condenser.
- c. Close steam to ammonia strippers.
- d. Close unnecessary chem lab sample valves.
- e. Align chem lab sample header to radwaste.
- f. Limit hotwell overboarding.
- g. Limit reheater sump pump usage.

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Check If RCS Cooldown Should Be Stopped:

a. Steam header pressure
- APPROXIMATELY
350 PSIG.

b. IF RCS pump running, THEN
~~stop dumping steam to~~
terminate cooldown.

c. Maintain RCS AND steam
header pressure at
approximately 350 psig.

a. IF greater than
350 psig, THEN return
to step 17.

b. IF RCS NOT running
continue dumping steam
until RCS temperature
is less than 350 °F,
THEN terminate
cooldown. Go to
step 23.

NOTE: RCS temperature may be higher than
normal RHR system alignment temperature.
The initial RHR system inservice temperature
of 350 °F does not apply for this
instruction.

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Place RHR System In Service

a. Implement S01-4-9, RESIDUAL
HEAT REMOVAL SYSTEM OPERATION.

CAUTION

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Charging and letdown flows should be compared to
determine if leakage between the RCS and the ruptured
SG exists.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
24	<p><u>Align Letdown System:</u></p> <ul style="list-style-type: none">a. Place letdown pressure controller PCV 1115 to - MANUAL, SET AT 50% OPEN.b. Verify LCV 1100 A control switch - AUTO.c. Open RCS letdown CV 525 AND CV 526 and manually adjust letdown pressure to stable conditions.d. Place letdown pressure controller PCV 1115 to AUTO set at 350 psig.	<ul style="list-style-type: none">b. Manually position switch.
25	<p><u>Align Charging Pump Suction To VCT:</u></p> <ul style="list-style-type: none">a. Verify VCT level - GREATER THAN 20%.b. Open MOV 1100 C.c. Close MOV 1100 B AND D.d. Place control switches for MOV 1100 B, D AND C IN AUTO.	<ul style="list-style-type: none">a. Manually restore level.
26	<p><u>Establish Normal Charging:</u></p> <ul style="list-style-type: none">a. Establish desired charging flow with FCV 1112.b. Adjust FCV 1115 A, B AND C to less than 50% open.c. Close MOV 356, MOV 357 AND MOV 358, AND adjust RCP seal water controllers to maintain 20 inches of delta pressure across the thermal barrier.	

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Align VCT Makeup Control System:

- | | |
|---|------------------------------------|
| a. Set makeup controller for cold shutdown concentration. | |
| b. Place makeup system in automatic. | b. Adjust controls as appropriate. |

28

Continue RCS Cooldown With RHR System in Service:

- | | |
|--|---|
| a. Attempt to cooldown RCS with RHR system to approximately 140 °F. | a. <u>IF</u> RCS heat load is greater than RHR capacity, <u>THEN</u> remove heat load <u>in excess of</u> RHR heat removal capacity by dumping steam. |
| b. Maintain cooldown rate to less than 50 °F/hr. | |
| c. Maintain RCS pressure approximately equal to steam header pressure. | |

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Subsequent Action Determination:

- | | |
|---|--|
| a. Evaluate long term plant status. | |
| b. Go to S01-1.2-1.01, REACTOR TRIP RESPONSE, step 9. | |

-END-

H. E. MORGAN
MANAGER, STATION OPERATIONS

MOTOR DRIVEN AFW PUMP RESTART CRITERIA

- a. IF a motor driven AFW pump trips on low discharge pressure, THEN:
- 1) Lower AFW flow controllers.
 - 2) Reset AND restart pump.

SI REINITIATION CRITERIA FOLLOWING STEAM GENERATOR TUBE RUPTURE

- a. IF pressurizer level decreases to less than 25%, THEN start one SI pump and its corresponding feed pump.

COLD LEG RECIRCULATION SWITCHOVER CRITERIA

- a. IF RWST level less than 21%, THEN align SI system for cold leg injection and recirculation per S01-1.2-T.13, TRANSFER TO COLD LEG INJECTION AND RECIRCULATION.

SYMPTOMS FOR RESPONSE TO INADEQUATE CORE COOLING

- a. Go to S01-1.2-14, RESPONSE TO INADEQUATE CORE COOLING, when ANY ONE of the following symptoms occur:
- 1) Five or more core exit TCs - GREATER THAN 1200 °F.
 - OR
 - 2) RCS hot leg temperatures - GREATER THAN 700 °F.

SYMPTOMS FOR RESPONSE TO LOSS OF SECONDARY HEAT SINK

- a. Go to S01-1.2-15, RESPONSE TO LOSS OF SECONDARY HEAT SINK, if AFW Flow is NOT AVAILABLE.

IF EVENTS REQUIRE IMPLEMENTATION OF THIS PROCEDURE:

- a. Notify Shift Technical Advisor.
- b. Notify Shift Communicator.
- c. Determine if event is classified as an emergency and requires notification of offsite agencies and implementation of the Emergency Plan per S0123-VIII-11, RECOGNITION AND CLASSIFICATION OF EMERGENCIES.
- d. IF event is NOT classified as an emergency in c above THEN determine if notification of the NRC is required within one hour per S01-14-13, NOTIFICATION TO NRC OF SIGNIFICANT EVENTS.