## RESPONSE TO LOSS OF SECONDARY HEAT SINK

REV 0

STEP ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

EMERGENCY INSTRUCTION SO1-1.2-15

RESPONSE TO LOSS OF SECONDARY HEAT SINK

I. PURPOSE:

The purpose of this instruction is to provide a RESPONSE TO LOSS OF SECONDARY HEAT SINK to minimize possible core damage by systematically attempting to establish feedwater flow from any available source.

II. SYMPTOMS:

1. Less than 10% narrow range level in any SG.

AND.

2. Total flow to SGs less than 250 GPM.

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## RESPONSE TO LOSS OF SECONDARY HEAT SINK

REV 0

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED

- Check If Secondary Heat Sink Is Required:
  - a. RCS pressure GREATER THAN STEAM HEADER PRESSURE.
- a. IF less than steam header pressure, THEN go to SO1-1.2-1.0, REACTOR TRIP OR SI, step 13.

RESPONSE NOT OBTAINED

#### Try to Establish AFW Flow: 2

- a. Depress Train A AND Train B AUTO initiation Dushbuttons.
- b. Verify AFW Pumps Running:
  - 1) Motor driven pump breaker 1) Manually start - CLOSED.
    - pump.
  - 2) Turbine driven pump.

Steam warmup valve - OPEN

2) Manually open valves.

OR

Steam supply valve - OPEN.

- c. Verify AFW Valve Alignment:
  - 1) Motor driven pump:

1) Manually open or close valves as appropriate.

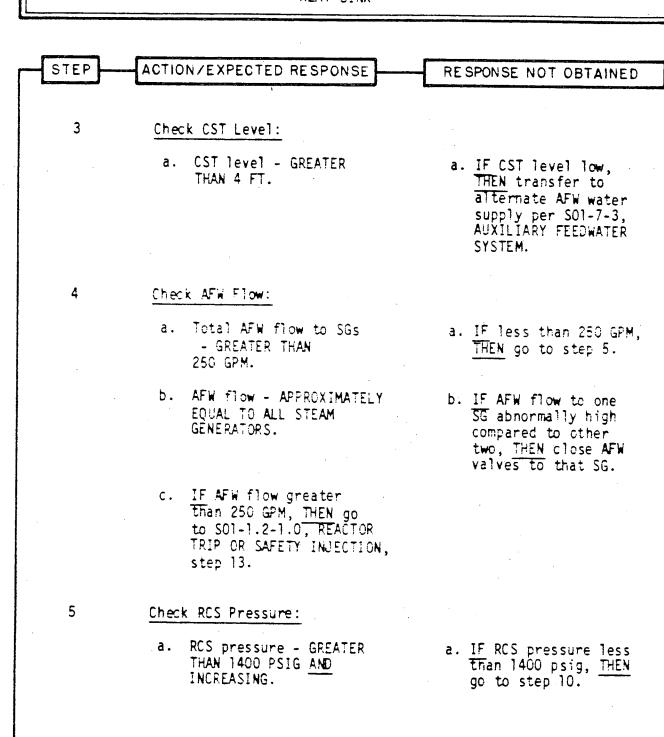
AFW header discharge valve - OPEN.

Main FW header discharge valve - CLOSED.

- 2) Turbine driven pump AFW header discharge valve - GPEN.
- 2) Manually open valve.

- 3) AFW header flow CV controllers - AT PRESET POSITION:
- 3) Manually position controllers.

FCV - 2301 50% FCV - 2300 100% FCY - 3300 100% FCV - 3301 50%



RESPONSE NOT OBTAINED

- 6 Align Main Feed Pumps To SGs:
  - a. Verify feed pumps OPERABLE. a. IF feed pump NOT
    - operable, THEN go to step 9.

b. Align feed pumps:

HV 852 A - OPEN.

HV 854 A - OPEN.

HV 852 B - OPEN.

HV 854 B - OPEN.

- c. Close MOV 20, MOV 21 AND MOV 22.
- d. Close main feedwater regulator bypass CVs.
- e. Start two condensate pumps.
- e. Go to step 9.
- f. Start one feed pump.
- f. Throttle steam dump valves to establish 300 psig steam header pressure. Go to step 9 AND continue procedure until steam header pressure is 300 psig.

STEP ACTION/EXPECTED RESPONSE RESPONSE NOT OBTAINED 7 Establish Main Feed Flow To SGs: a. Open main feedwater a. Go to step 8. regulator bypass CVs AND verify flow to SGs - GREATER THAN ZERO. b. SG narrow range level b. IF less than 26%, THEN - GREATER THAN 26%. throttle main feedwater regulator bypass CVs to maintain: 1) Total feed flow - GREATER THAN 250 GPM. 2) Feed flow per SG - LESS THAN 150 GPM. c. Throttle main feed flow to maintain narrow range level at 50% while continuing with this procedure. 8 Check Level In SGs With Established Main Feed Flow: Narrow range level in at

least one SG

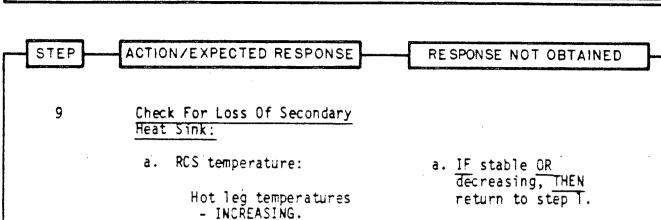
step 13.

- GREATER THAN 10%.

b. Narrow range level in at least one SG INCREASING Go to S01-1.2-1.0, REACTOR TRIP OR SAFETY INJECTION,

a. IF less than 10%, THEN go to step 9.





OR

Core exit TCs - INCREASING.

b. RCS pressure - INCREASING. b. IF stable OR

b. IF stable OR decreasing, THEN return to step 1.

10 <u>Check SI Initiation:</u>

a. SI - INITIATED.

- a. IF RCS pressure AND temperature increasing, THEN initiate SI.
  - Wait approximately one minute, <u>THEN</u> go to step 1T.

(: <u>; :</u>

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

### CAUTION

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.

#### Reset SI:

- a. Reset SI at SLSS surveillance panels.
- b. Verify SI lockout switchesRESET.

### 12 Establish Maximum Charging:

- a. Reset non-running charging pump lockout.
- b. Start second charging pump if available.

RESPONSE NOT OBTAINED

- Establish Charging Flow Path
  Through The 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.

- 14 Check Charging Flow Capability:
  - a. Both charging pump breakers- CLOSED.
- a. IF second charging pump not available, THEN go to step 15 b.

ACTION/EXPECTED RESPONSE STEP RESPONSE NOT OBTAINED 15 Establish Flow Through The SI Cold Leg Injection Lines: Place seal supply flow a. IF unable to establish controllers on MANUAL flow due to instrument AND throttle flow to air failure, THEN go achieve if possible: to step 16. Three injection lines - 200 GPM PER LINE. THEN go to step 15 c.

OR

Two injection lines - 300 GPM PER LINE THEN go to step 15 c.

b. With one charging pump running, place seal supply flow controllers on MANUAL AND throttle flow to achieve if possible:

> Three injection lines - 100 GPM PER LINE.

> > **OR**

Two injection lines - 150 GPM PER LINE.

c. Go to step 17.

b. IF unable to establish flow due to instrument air failure, THEN go to step 16.

OBTAINED



STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT
	6	

- Place Backup Seal Supply Flow Controllers In Service:
  - a. For each controller:
    - Place aux nitrogen supply switch - ON.
    - Place aux position control switch - ON.
    - 3) Adjust aux controller to obtain desired flow per step 15.
    - 4) Place aux position control switch OFF.
    - 5) Repeat 2), 3) AND 4) for any further flow adjustments.
  - b. SI cold leg injection flow ESTABLISHED.
- b. IF flow NOT established, THEN attempt to align normal charging flow path.
- 17 Establish Conditions Support For RCP Operations:
  - a. RCP low CCW flow alarms
     CLEAR.
- a. Manually adjust CCW flow.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

## CAUTION

Do not exceed a total charging pump flow of 600 GPM with two charging pumps or 300 GPM, with one charging pump to prevent damage to charging pumps.

18

# Establish RCS Heat Removal Path:

- a. Verify power available to pressurizer PORV block valves.
- b. Verify pressurizer PORY block valves open.
- c. Open both pressurizer PORVs.
- a. Restore power to PORV block valves.
- b. Open PORV block
   valves.

RESPONSE NOT OBTAINED

## CAUTION

RCS pressure considerations are not a factor in running an RCP.

#### 19 Check RCS Heat Removal Path:

- a. Both pressurizer PORYs- OPEN.
- a. IF both pressurizer PORVs NOT open, THEN:
  - 1) Start one RCP.
  - 2) Open steam dump valves to atmosphere.
  - Depressurize steam header to atmospheric pressure.
  - 4) Align any available low pressure water source to the SGs.
  - 5) Go to step 24.

RESPONSE NOT OBTAINED

### 20 Maintain RCS Heat Removal Path:

- a. Maintain SI cold leg injection flow rate per step 15.
- b. Maintain both pressurizer PORVs open.

# 21 Prepare For Switchover To Cold Leg Recirculation:

- a. RWST level LESS THAN 21%.
- a. Until RWST reaches 21% continue with subsequent steps.
- b. Align SI system for cold leg recirculation per SO1-1.2-1.13, TRANSFER TO COLD LEG INJECTION AND RECIRCULATION, AND continue with this procedure.

# 22 Continue Attempts to Establish Secondary Heat Sink:

- a. AFW Flow.
- b. Feedwater flow.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23	Depressurize Main Steam Header:	
	a. Open steam dump valves to atmosphere.	
	<ul> <li>Depressurize main steam header to atmosphere pressure.</li> </ul>	•
24	Align Alternate Secondary Heat Sink Sources:	
	a. Align any available low pressure water source to the SGs.	
25	Verify RCS Temperatures:	
	<ul><li>a. Core exit TCs - DECREASING</li><li>b. Hot leg temperatures</li><li>- DECREASING.</li></ul>	• IF NOT decreasing, THEN return to step 22.
26	Check For Adequate Secondary Heat Sink:	
	<ul> <li>Narrow range level in at least one SG with established feed flow</li> <li>GREATER THAN 10%.</li> </ul>	a. IF less than 10%, THEN return to step 22.
	b. RCS subcooling based on core exit TCs - GREATER THAN 40 OF.	b. IF less than 40 °F, THEN return to step 22.

RESPONSE NOT OBTAINED

#### 27 Isolate RCS Heat Removal Path:

- Monitor and record core exit baseline temperatures.
- b. Close both pressurizer PORVs.
  - b. IF any PORV cannot be closed, THEN manually close its block valve.
- c. Compare core exit TC temperature increase to baseline - INCREASE LESS THAN 15 OF.
- c. IF increase greater than 15 of, THEN reopen both pressurizer PORYs and return to step 21.

#### 28 Check If SI Can Be Terminated:

- a. RCS pressure INCREASES BY AT LEAST 200 PSIG.
- b. Pressurizer level - GREATER THAN 50%.
- THAN 40 OF.
- d. Go to S01-1.2-1.21, SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT.

- a. DO NOT TERMINATE SI. return to step 26.
  - b. DO NOT TERMINATE SI. return to step 26.
  - return to step 26.

-END-

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