

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

EMERGENCY INSTRUCTION S01-1.2-15

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.

STEP

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1

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 S01-1.2-1.0,
REACTOR TRIP OR SI,
step 13.

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2	<u>Try to Establish AFW Flow:</u>	
	a. Depress Train A AND Train B AUTO initiation pushbuttons.	
	b. Verify AFW Pumps Running:	
	1) Motor driven pump breaker - CLOSED.	1) Manually start pump.
	2) Turbine driven pump. Steam warmup valve - OPEN	2) Manually open valves.
	<u>OR</u>	
	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 - OPEN.	2) Manually open valve.
	3) AFW header flow CV controllers - AT PRESET POSITION:	3) Manually position controllers.
	FCV - 2301 50%	
	FCV - 2300 100%	
	FCV - 3300 100%	
	FCV - 3301 50%	

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3	<u>Check CST Level:</u> a. CST level - GREATER THAN 4 FT.	a. IF CST level low, <u>THEN</u> transfer to alternate AFW water supply per S01-7-3, AUXILIARY FEEDWATER SYSTEM.
4	<u>Check AFW Flow:</u> a. Total AFW flow to SGs - GREATER THAN 250 GPM. b. AFW flow - APPROXIMATELY EQUAL TO ALL STEAM GENERATORS. c. IF AFW flow greater than 250 GPM, <u>THEN</u> go to S01-1.2-1.0, REACTOR TRIP OR SAFETY INJECTION, step 13.	a. IF less than 250 GPM, <u>THEN</u> go to step 5. b. IF AFW flow to one SG abnormally high compared to other two, <u>THEN</u> close AFW valves to that SG.
5	<u>Check RCS Pressure:</u> a. RCS pressure - GREATER THAN 1400 PSIG <u>AND</u> INCREASING.	a. IF RCS pressure less than 1400 psig, <u>THEN</u> go to step 10.

STEP

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6

Align Main Feed Pumps To SGs:

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| a. Verify feed pumps - OPERABLE. | a. IF feed pump NOT operable, <u>THEN</u> 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 MCV 20, MCV 21
<u>AND</u> MCV 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 <u>AND</u> continue procedure until steam header pressure is 300 psig. |

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7	<u>Establish Main Feed Flow To SGs:</u>	
	a. Open main feedwater regulator bypass CVs <u>AND</u> verify flow to SGs - GREATER THAN ZERO.	a. Go to step 8.
	b. SG narrow range level - GREATER THAN 26%.	b. <u>IF</u> less than 26%, <u>THEN</u> 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	<u>Check Level In SGs With Established Main Feed Flow:</u>	
	a. Narrow range level in at least one SG - GREATER THAN 10%.	a. <u>IF</u> less than 10%, <u>THEN</u> go to step 9.
	b. Narrow range level in at least one SG INCREASING Go to S01-1.2-1.0, REACTOR TRIP OR SAFETY INJECTION, step 13.	

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9	<u>Check For Loss Of Secondary Heat Sink:</u>	
	a. RCS temperature: Hot leg temperatures - INCREASING.	a. IF stable OR decreasing, THEN return to step T.
	<u>OR</u>	
	Core exit TCs - INCREASING.	
	b. RCS pressure - INCREASING.	b. IF stable OR decreasing, THEN return to step T.
10	<u>Check SI Initiation:</u>	
	a. SI - INITIATED.	a. IF RCS pressure AND temperature increasing, THEN initiate SI.
		1) Wait approximately one minute, THEN go to step 1T.

STEP

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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.

11

Reset SI:

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

12

Establish Maximum Charging:

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

STEP

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13

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.

STEP

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15

Establish Flow Through The
SI Cold Leg Injection Lines:

- a. Place seal supply flow controllers on MANUAL AND throttle flow to achieve if possible:

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.

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

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

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16	<p><u>Place Backup Seal Supply Flow Controllers In Service:</u></p> <p>a. For each controller:</p> <ol style="list-style-type: none">1) Place aux nitrogen supply switch - ON.2) 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.	<p>b. IF flow NOT established, THEN attempt to align normal charging flow path.</p>
17	<p><u>Establish Conditions Support For RCP Operations:</u></p> <p>a. RCP low CCW flow alarms - CLEAR.</p>	<p>a. Manually adjust CCW flow.</p>

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CAUTION

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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:

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

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CAUTION

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

19

Check RCS Heat Removal Path:

a. Both pressurizer PORVs
- OPEN.

a. IF both pressurizer
PORVs NOT open, THEN:

- 1) Start one RCP.
- 2) Open steam dump valves to atmosphere.
- 3) Depressurize steam header to atmospheric pressure.
- 4) Align any available low pressure water source to the SGs.
- 5) Go to step 24.

STEP

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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 S01-1.2-1.13, 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.

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23

Depressurize Main Steam Header:

- a. Open steam dump valves to atmosphere.
- b. Depressurize main steam header to atmosphere pressure.

24

Align Alternate Secondary Heat Sink Sources:

- a. Align any available low pressure water source to the SGs.

25

Verify RCS Temperatures:

- a. Core exit TCs - DECREASING
- b. Hot leg temperatures - DECREASING.

- IF NOT decreasing, THEN return to step 22.

26

Check For Adequate Secondary Heat Sink:

- a. Narrow range level in at least one SG with established feed flow - GREATER THAN 10%.

- a. IF less than 10%, THEN return to step 22.

- b. RCS subcooling based on core exit TCs - GREATER THAN 40 °F.

- b. IF less than 40 °F, THEN return to step 22.

STEP

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27

Isolate RCS Heat Removal Path:

- | | |
|--|---|
| <ul style="list-style-type: none"> a. Monitor and record core exit baseline temperatures. b. Close both pressurizer PORVs. c. Compare core exit TC temperature increase to baseline - INCREASE LESS THAN 15 OF. | <ul style="list-style-type: none"> b. IF any PORV cannot be closed, THEN manually close its block valve. c. IF increase greater than 15 OF, THEN reopen both pressurizer PORVs and return to step 21. |
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28

Check If SI Can Be Terminated:

- | | |
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| <ul style="list-style-type: none"> a. RCS pressure - INCREASES BY AT LEAST 200 PSIG. b. Pressurizer level - GREATER THAN 50%. c. RCS subcooling - GREATER THAN 40 OF. d. Go to S01-1.2-1.21, SI TERMINATION FOLLOWING LOSS OF SECONDARY COOLANT. | <ul style="list-style-type: none"> a. DO NOT TERMINATE SI, return to step 26. b. DO NOT TERMINATE SI, return to step 26. c. DO NOT TERMINATE SI, return to step 26. |
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-END-

H. E. MORGAN
MANAGER, STATION OPERATIONS