STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

EMERGENCY INSTRUCTION SO1-1.2-14

RESPONSE TO INADEQUATE CORE COOLING

I. PURPOSE

The purpose of this instruction is to provide a RESPONSE TO INADEQUATE CORE COOLING to minimize possible core damage by systematically attempting to establish alternate means of core cooling.

II. SYMPTOMS:

A. The following are symptoms of inadequate core cooling:

1. Five or more core exit thermocouples greater than 1200 °F.

2. RCS hot leg RTDs greater than 700 °F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION
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If prior to reaching step 11, RWST level decreases to 21%, the actions of SO1-1.2-1.13, TRANSFER TO COLD LEG INJECTION AND RECIRCULATION must be completed.

NOTE: The Check boxes in step 1 are provided as an aid in assuring that a minimum of one SI train (A or B) is fully aligned.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1	Try To Establish SI Flow To RCS:	
	a. Verify both SI trains initiated.	a. Manually initiate SI
	b. SI pump breakers.	b. Manually start pump.
	12C05 - CLOSED. E(A) ☐	
	11C05 - CLOSED. W(B) ☐	
	12C04 - CLOSED. E(A) ☐	
	11C04 - CLOSED. W(B) ☐	
	c. Verify SI Valve Alignment.	c. Manually open or close valves as appropriate.
	Feed pump valves:	
	HV 852 A&B - CLOSED. A ☐ B ☐	
	HV 854 A&B - CLOSED. A ☐ B ☐	
	HV 851 A&B - OPEN. A ☐ B ☐	
	HV 853 A&B - OPEN. A ☐ B ☐	
	CV 875 A&B - OPEN. A ☐ B ☐	
	d. RCS SI injection MOVs 850 A,B and C - OPEN.	d. Manually open valves as appropriate.
	e. IF RCS pressure is less than 1170 PSIG, THEN check SI line flow loop indicators - CHECK FOR FLOW.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2	Try To Establish Charging Flow To RCS:	
	a. Align charging pump suction: 1) MOV 1100 B AND D - OUT OF AUTO AND OPEN. 2) MOV 1100 C - OUT OF AUTO AND CLOSED.	a. Manually open OR close valves as appropriate.
	b. Verify both charging pump breakers - CLOSED.	b. Manually start both pumps: 1) Manually start preselected pump. 2) Manually start standby pump: Reset SI at SLSS surveillance panels. Reset non-running charging pump lockout. Start second charging pump.
	c. Align cold leg injection flow path: MOV 356 - OPEN. MOV 357 - OPEN. MOV 358 - OPEN. MOV 18 - OPEN. MOV 19 - OPEN.	
	d. Throttle FC 1115 A, B AND C to establish maximum flow. Do not exceed 600 gpm.	
	e. IF flow to RCS less than 600 gpm, THEN throttle FCV 1112 to obtain a total flow of 600 gpm.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3	Establish Conditions Support For RCP Operations:	
	a. RCP low CCW flow alarms - RESET.	a. Manually adjust CCW flow.
	CAUTION ======= AFW pump water supply must be maintained to ensure adequate heat sink.	
4	Check CST Level:	
	a. CST level - GREATER THAN 4 FT.	a. IF CST level low, THEN transfer to alternate AFW water supply per SO1-7-3, AUXILIARY FEEDWATER SYSTEM.
5	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 to maintain narrow range level at 50%.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION
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TC printouts drop off the thousands digit, therefore, 1200 °F will appear as 200 °F.

6 Check Core Cooling:

a.	Core Exit TCs - LESS THAN 1200 °F.	a. IF 5 TCs or more are high, THEN go to step 7.
b.	Core exit TCs - DECREASING	b. IF increasing, THEN return to step 1.
c.	RCS hot leg RTDs - LESS THAN 700 °F.	c. IF greater than 700 °F, THEN go to step 7.
d.	IF RC charging flow is established OR IF RCS pressure is less than 1170 psig, SI flow indicators indicate flow.	d. IF flow is not indicated from either source, THEN return to step 1.
e.	Return to SO1-1.2-1.0, REACTOR TRIP OR SAFETY INJECTION, step 10.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7	Check Pressurizer PORVs And Block Valves:	
	a. Power available to block valves.	a. Restore power to block valves.
	b. PORVs - CLOSED.	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. Block valves - OPEN.	c. Open block valve unless it was closed to isolate a faulty PORV.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8	Rapidly Decrease Steam Header Pressure to Atmospheric Pressure:	
	a. Place steam dump mode selector switch to PRESSURE CONTROL, CONDENSER.	a. IF steam dump to the condenser not available, place steam dump mode selector switch to PRESSURE CONTROL ATMOS.
	b. Place steam dump controller to MANUAL AND open steam dump valves.	
	c. Verify steam header pressure decreasing to ATMOSPHERIC PRESSURE.	c. IF steam header pressure NOT decreasing, THEN go to step 10.
	d. Verify SI flow to RCS - GREATER THAN ZERO.	d. Go to step 10.
9	Check Core Cooling:	
	a. Core exit TCs - LESS THAN 1200 °F AND DECREASING.	a. IF condition NOT satisfied, THEN go to step 10.
	b. RCS hot leg RTDs - LESS THAN 700 °F.	b. IF condition NOT satisfied, THEN go to step 10.
	c. IF RC charging flow is established OR IF RCS pressure is less than 1170 psig, THEN SI flow indicators indicate flow.	c. IF flow is not indicated from either source, THEN return to step 10.
	d. Return to SO1-1.2-1.0, REACTOR TRIP OR SAFETY INSPECTION step, 10.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Normal conditions for starting RCPs are desired but should not prevent RCP start.

10 Check Core Exit TCs:

a. Temperature - LESS THAN 1200 °F.

a. Start RCPs AND operate until core exit TCs less than 1200 °F.

1) IF core exit TCs greater than 1200 °F and all available RCPs running, THEN open all pressurizer PORVs and block valves.

2) Continue dumping steam and maintain PORV status until RCS SI flow established.

3) Go to step 11.

b. Continue dumping steam.

c. Go to step 13.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

RWST level should be monitored after establishing the flow path in step 11a. Transfer to step 12 b flow path should be initiated as RWST level approaches 12% and must be completed prior to reaching 7%.

11	Establish Alternate Low Pressure RCS Injection Flow Path:		
	a.	RWST level - GREATER THAN 12%.	a. Go to step 12.
	b.	Verify MOV 883 - OPEN.	b. Manually open valve.
	c.	Open MOV 880	
	d.	Verify MOV 356, MOV 357 AND MOV 358 - OPEN.	d. Manually open valves.
	e.	Verify both refueling water pump breakers - CLOSED.	e. Manually start pumps. IF only one refueling water pump running, THEN override and close CV 517 AND CV 518.
	f.	Adjust FC 1115 A, B AND C to establish maximum total flow to RCS while maintaining spray flow.	
	g.	Go to step 13.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12	Establish Alternate Low Pressure RCS Recirculation And Injection Flow Path:	
	a. With RWST level - LESS THAN 12% OR indicated containment sump level - GREATER THAN GRADE MINUS 7 FT.	
	b. Start both SI recirc pumps.	
	c. Verify two CCW pump breakers - CLOSED.	c. Manually start pumps.
	d. Verify one salt water cooling pump breaker - CLOSED.	d. Manually start pump.
	e. Open CV 737 A AND B.	
	f. Verify CV 517 AND CV 518 - CLOSED.	f. Override AND close CV 517 AND CV 518.
	g. Verify one refueling water pump breaker - CLOSED.	g. Manually start pump. IF two pumps running, THEN stop one pump.
	h. Open MOV 866 A AND B.	
	i. Close MOV 883.	
	j. Verify MOV 880 - OPEN.	j. Manually open valve.
	k. Verify MOV 356, MOV 357, AND MOV 358 - OPEN.	k. Manually open valves.
	l. Adjust FC 1115 A, B AND C to establish 330 GPM total flow to RCS.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13	Check Core Cooling:	
	a. Core exit TCs - LESS THAN LESS THAN 400 °F.	a. IF greater than 400 °F, THEN go to step 8 AND verify AND monitor conditions established.

CAUTION
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Do not proceed to step 14 until alternate low pressure RCS injection flow has been verified.

14	Stop Any Running RCPs:	
	a. Trip RCP.	
15	Subsequent Action:	
	a. Go to SO1-1.2-1.1, LOSS OF REACTOR COOLANT, step 16.	

-END-

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