

Number: E-0	Title: REACTOR TRIP OR SAFETY INJECTION	Rev. Issue Date: LP-Rev. 1 1 Sept. 1983
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A. PURPOSE

This guideline provides actions to verify proper response of the automatic protection systems following manual or automatic actuation of a reactor trip or safety injection, to assess plant conditions, and to identify the appropriate recovery guideline.

B. SYMPTOMS OR ENTRY CONDITIONS

- 1) The following are symptoms that require a reactor trip, if one has not occurred:
[Enter plant specific setpoints and requirements].
- 2) The following are symptoms of a reactor trip:
 - a. Any reactor trip annunciator lit.
 - b. Rapid decrease in neutron level indicated by nuclear instrumentation.
 - c. All shutdown and control rods are fully inserted. Rod bottom lights are lit.
- 3) The following are symptoms that require a reactor trip and safety injection, if one has not occurred:
[Enter plant specific setpoints and requirements].
- 4) The following are symptoms of a reactor trip and safety injection:
 - a. Any SI annunciator lit.
 - b. SI pumps running.
 - c. [Enter plant specific list].

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

NOTE • Steps 1 through 14 are IMMEDIATE ACTION steps.

• Foldout page should be open.

- | | | |
|---|--|--|
| 1 | Verify Reactor Trip: <ul style="list-style-type: none"> • Rod bottom lights - LIT • Reactor trip and bypass breakers - OPEN • Rod position indicators - AT ZERO • Neutron flux - DECREASING | Manually trip reactor. <u>IF</u> reactor will <u>NOT</u> trip, <u>THEN</u> go to FR-S.1, RESPONSE TO NUCLEAR POWER GENERATION/ATWS, Step 1. |
| 2 | Verify Turbine Trip: <ul style="list-style-type: none"> a. All turbine stop valves - CLOSED | a. Manually trip turbine. |
| 3 | Verify Power To AC Emergency Busses: <ul style="list-style-type: none"> a. AC emergency busses - AT LEAST ONE ENERGIZED b. AC emergency busses - ALL ENERGIZED | a. Try to restore power to at least one ac emergency bus. <u>IF</u> power can <u>NOT</u> be restored to at least one ac emergency bus, <u>THEN</u> go to ECA-0.0, LOSS OF ALL AC POWER, Step 1.

b. Try to restore power to deenergized ac emergency busses. |
| 4 | Check If SI Is Actuated:
[Enter plant specific means] | Check if SI is required. <u>IF</u> SI is required, <u>THEN</u> manually actuate. <u>IF</u> SI is <u>NOT</u> required, <u>THEN</u> go to ES-0.1, REACTOR TRIP RESPONSE, Step 1. |

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

5

Verify FW Isolation:

- Flow control valves - CLOSED
- Flow control bypass valves - CLOSED
- FW isolation valves - CLOSED
- SG blowdown isolation valves - CLOSED
- SG sample isolation valves - CLOSED

Manually close valves as necessary.

6

Verify Containment Isolation Phase A:

- a. Phase A - ACTUATED
- b. Phase A valves - CLOSED

a. Manually actuate Phase A.

b. Manually close valves.

7

Verify AFW Pumps Running:

- a. MD pumps - RUNNING
- b. Turbine-driven pump - RUNNING IF NECESSARY

a. Manually start pumps.

b. Manually open steam supply valves

8

Verify SI Pumps Running:

- High-head SI pumps - RUNNING
- Low-head SI pumps - RUNNING

Manually start pumps.

9

Verify CCW Pumps - RUNNING

Manually start pumps.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10	Verify Service Water Pumps - RUNNING	Manually start pumps.
11	Verify Containment Fan Coolers - RUNNING IN EMERGENCY MODE	Manually start fan coolers in emergency mode.
12	Verify Containment Ventilation Isolation: a. Dampers - CLOSED	a. Manually close dampers.
[Appropriate steps for verification of other essential equipment as required by the specific plant design should be placed after Step 12.]		
13	Check If Main Steamlines Should Be Isolated: a. [Enter plant specific means or setpoints] b. Verify main steamline isolation and bypass valves - CLOSED	a. Go to Step 14. b. Manually close valves.
14	Verify Containment Spray Not Required: a. Containment pressure - HAS REMAINED LESS THAN (1) PSIG	a. Perform the following: 1) Verify containment spray initiated. <u>IF NOT</u> , <u>THEN</u> manually initiate. 2) Verify containment isolation Phase B valves closed. <u>IF NOT</u> , <u>THEN</u> manually close valves. 3) Stop all RCPs.

STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

15

Verify SI Flow:

- a. RCS pressure - LESS THAN (2) PSIG
[(3) PSIG FOR ADVERSE
CONTAINMENT]
- b. High-head SI pump flow indicators -
CHECK FOR FLOW
- c. RCS pressure - LESS THAN (4) PSIG
[(5) PSIG FOR ADVERSE
CONTAINMENT]
- d. Low-head SI pump flow indicators -
CHECK FOR FLOW

- a. Go to Step 16.

- b. Manually start pumps and align
valves.

- c. Go to Step 16.

- d. Manually start pumps and align
valves.

16

Verify AFW Flow - GREATER THAN
(6) GPM

Manually start pumps and align valves as
necessary. IF AFW flow greater
than (6) gpm can NOT be established,
THEN go to FR-H.1, RESPONSE TO LOSS
OF SECONDARY HEAT SINK, Step 1.

17

Verify AFW Valve Alignment - PROPER
EMERGENCY ALIGNMENT

Manually align valves as necessary.

18

Verify SI Valve Alignment - PROPER
EMERGENCY ALIGNMENT

Manually align valves as necessary.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	<p>CAUTION</p> <ul style="list-style-type: none"> • <i>If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.</i> • <i>If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required.</i> 	
19	<p>Check RCP Seal Cooling:</p> <p>a. CCW flow to RCP thermal barriers - NORMAL</p>	<p>a. <u>IF</u> CCW to an RCP is lost, <u>THEN</u>:</p> <ol style="list-style-type: none"> 1) Trip the RCP. 2) Reset SI. 3) Verify adequate power available to run one charging pump. If necessary, shed sufficient non-essential loads. 4) Start one charging pump at minimum speed for seal injection.
20	<p>Check RCS Average Temperature - STABLE AT OR TRENDING TO (7)°F</p>	<p><u>IF</u> temperature less than (7)°F and decreasing, <u>THEN</u>:</p> <ol style="list-style-type: none"> a) Stop dumping steam. b) <u>IF</u> cooldown continues, <u>THEN</u> control total feed flow. Maintain total feed flow greater than (6) gpm until narrow range level greater than (8)% [(9)% for adverse containment] in at least one SG. c) <u>IF</u> cooldown continues, <u>THEN</u> close main steamline isolation and bypass valves. <p><u>IF</u> temperature greater than (7)°F and increasing, <u>THEN</u>:</p> <ul style="list-style-type: none"> • Dump steam to condenser. —OR— • Dump steam using SG PORVs.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
21	<p>Check PRZR PORVs And Spray Valves:</p> <p>a. PORVs - CLOSED</p> <p>b. Normal PRZR spray valves - CLOSED</p>	<p>a. IF PRZR pressure less than (10) psig, THEN manually close PORVs. IF any valve can NOT be closed, THEN manually close its block valve. IF block valve can NOT be closed, THEN go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.</p> <p>b. IF PRZR pressure less than (11) psig, THEN manually close valves. IF valves can NOT be closed, THEN stop RCP(s) supplying failed spray valve(s).</p>
22	<p>Check If RCPs Should Be Stopped:</p> <p>a. High-head SI pumps - AT LEAST ONE RUNNING</p> <p>b. RCP Trip Parameter - LESS THAN (12) [(13) FOR ADVERSE CONTAINMENT]</p> <p>c. Stop all RCPs</p>	<p>a. Go to Step 23.</p> <p>b. Go to Step 23.</p>

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
23	Check If SGs Are Not Faulted: a. Check pressures in all SGs - <ul style="list-style-type: none"> • NO SG PRESSURE DECREASING IN AN UNCONTROLLED MANNER • NO SG COMPLETELY DEPRESSURIZED 	a. Go to E-2, FAULTED STEAM GENERATOR ISOLATION, Step 1.
24	Check If SG Tubes Are Not Ruptured: <ul style="list-style-type: none"> • Condenser air ejector radiation - NORMAL • SG blowdown radiation - NORMAL 	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
25	Check If RCS Is Intact: <ul style="list-style-type: none"> • Containment radiation - NORMAL • Containment pressure - NORMAL • Containment recirculation sump level - NORMAL 	Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
26	<p>Check If SI Flow Should Be Terminated:</p> <p>a. RCS subcooling based on core exit TCs - GREATER THAN (14)°F</p> <p>b. Secondary heat sink:</p> <ul style="list-style-type: none"> • Total feed flow to SGs - GREATER THAN (6) GPM <p>—OR—</p> <ul style="list-style-type: none"> • Narrow range level in at least one SG - GREATER THAN (8)% <p>c. RCS pressure:</p> <ul style="list-style-type: none"> • Pressure - GREATER THAN (2) PSIG • Pressure - STABLE OR INCREASING <p>d. PRZR level - GREATER THAN (15)%</p>	<p>a. DO NOT STOP SI PUMPS. Go to Step 28.</p> <p>b. <u>IF</u> neither condition satisfied, <u>THEN</u> DO NOT STOP SI PUMPS. Go to Step 28.</p> <p>c. DO NOT STOP SI PUMPS. Go to Step 28.</p> <p>d. DO NOT STOP SI PUMPS. Try to stabilize RCS pressure with normal PRZR spray. Return to Step 26a.</p>
27	Go To ES-1.1, SI TERMINATION, Step 1	

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STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
28	Initiate Monitoring Of Critical Safety Function Status Trees	
	<i>CAUTION Alternate water sources for AFW pumps will be necessary if CST level decreases to less than (16).</i>	
29	Check SG Levels:	
	a. Narrow range level - GREATER THAN (8)%	a. Maintain total feed flow greater than (6) gpm until narrow range level greater than (8)% in at least one SG.
	b. Control feed flow to maintain narrow range level between (8)% and 50%	b. IF narrow range level in any SG continues to increase in an uncontrolled manner, <u>THEN</u> go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
30	Check Secondary Radiation - NORMAL [Enter plant specific means]	Go to E-3, STEAM GENERATOR TUBE RUPTURE, Step 1.
31	Check Auxiliary Building Radiation - NORMAL	Evaluate cause of abnormal conditions. IF the cause is a loss of RCS inventory outside containment, <u>THEN</u> go to ECA-1.2, LOCA OUTSIDE CONTAINMENT, Step 1.
32	Check PRT Conditions - NORMAL	Evaluate cause of abnormal conditions.

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ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

- CAUTION**
- *If offsite power is lost after SI reset, manual action may be required to restart safeguards equipment.*
 - *If SI is reset before automatic transfer of high-head SI pump suction to RWST occurs, manual transfer on BAT low level is required.*

33

Reset SI

34

Reset Containment Isolation Phase A And Phase B

35

Establish Instrument Air To Containment

Start one air compressor and establish instrument air to containment.

CAUTION *RCS pressure should be monitored. If RCS pressure decreases to less than (4) psig the low-head SI pumps must be manually restarted to supply water to the RCS.*

36

Check If Low-Head SI Pumps Should Be Stopped:

a. Check RCS pressure:

1) Pressure - GREATER THAN
(4) PSIG

2) Pressure - STABLE OR INCREASING

b. Stop low-head SI pumps and place in standby

1) Go to E-1, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1.

2) Go to Step 37.

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STEP

ACTION/EXPECTED RESPONSE

RESPONSE NOT OBTAINED

37

Check Power Supply To Charging
Pumps - OFFSITE POWER AVAILABLE

Verify adequate diesel capacity to run
charging pumps. If necessary, shed
sufficient non-essential loads.

38

Check If Charging Flow Has Been
Established:

a. Charging pumps - AT LEAST ONE
RUNNING

a. Perform the following:

1) IF CCW flow to RCP(s) thermal
barrier is lost, THEN isolate seal
injection to affected RCP(s) before
starting charging pumps.

2) Start charging pumps as
necessary.

b. Establish flow as necessary:
[Enter plant specific means]

39

Check If Diesel Generators Should Be
Stopped:

a. Verify ac emergency busses -
ENERGIZED BY OFFSITE POWER

a. Try to restore offsite power to ac
emergency busses. IF offsite power
can NOT be restored, THEN load the
following equipment on ac emergency
busses:

[Enter plant specific list].

b. Stop any unloaded diesel generator
and place in standby

40

Return To Step 20

— END —