

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EMERGENCY INSTRUCTION

ES-0.1

REACTOR TRIP RESPONSE

Revision 1

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PORC REVIEW DATE: JUN 15 1987

APPROVED BY: [Signature]

Plant Manager

JUN 15 1987

DATE APPROVED: \_\_\_\_\_

Reason for revision (include all Instruction Change Form Nos.):

Revised to step 4: add transition to FR-H.1 for loss of all FW; step 9:

delete letdown flow established due to conflict with Writers Guide; step 11:

revised P-6 setpoint to  $< 10^{-10}$  amps; and step 20: revised SI-407 to SI-407.2.

The last page of this instruction is number: 13

# PLANT INSTRUCTION REVISION LOG

ES-0.1

[illegible]

## REACTOR TRIP RESPONSE

### A. PURPOSE

This guideline provides the necessary instructions to stabilize and control the plant following a reactor trip without a safety injection.

### B. SYMPTOMS

1. Any reactor trip annunciator lit
2. Rapid decrease in neutron level indicated by nuclear instrumentation
3. All control rods fully inserted. Rod bottom lights lit.
4. Rapid decrease in unit load to zero power.

### C. TRANSITION FROM OTHER INSTRUCTIONS

E-0, Reactor Trip Or Safety Injection



REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
	<u>CAUTION:</u> If SI actuation occurs, then E-0, Reactor Trip Or Safety Injection, should be used.	
1	<u>Verify All Control Rods Fully Inserted</u> a. Rod bottom lights - ON b. RPIs at 0 STEPS c. Announce reactor trip	IF any control rod <u>NOT</u> fully inserted, <u>THEN</u> emergency borate 350 gal for each rod not fully inserted
2	<u>Check T-avg</u> a. T-avg <u>&lt;</u> 547°F  b. T-avg - STABLE AND CONTROLLED	a. IF T-avg > 547°F, <u>THEN</u> verify steam dumps <u>OR</u> S/G PORVs open  b. IF T-avg decreasing in an uncontrolled manner, <u>THEN</u> verify steam dumps <u>AND</u> S/G PORVs closed  IF uncontrolled cooldown continues, <u>THEN</u> close MSIVs <u>AND</u> MSIV bypass valves

REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
3	<u>Verify MFW Isolation</u> a. MFW isolation valves - CLOSED b. MFW reg valves - CLOSED c. MFW bypass valves - CLOSED d. MFW pumps - TRIPPED	
4	<u>Verify AFW Status</u> a. AFW Pumps - RUNNING b. AFW level control valves in AUTO c. IF S/G level < 33%, <u>THEN</u> verify AFW flow d. S/G blowdown valves - CLOSED	Establish at least one AFW pump operation and AFW flow or MFW  IF AFW or MFW flow can <u>NOT</u> be established, <u>THEN</u> go to * FR-H.1, RESPONSE TO LOSS OF SECONDARY HEAT SINK
5	<u>Check S/G Levels</u> a. Narrow range S/G levels > 25%  b. Control S/G levels between 25% and 50%	a. Verify AFW flow and S/G levels returning to normal program

REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
6	<u>Check RCS Press</u>	
a.	Press > 1870 psig	a. <u>IF</u> RCS press $\leq$ 1870 psig, <u>THEN</u> actuate SI. Go to * E-O, REACTOR TRIP OR SAFETY INJECTION
b.	Press $\leq$ 2235 psig	b. <u>IF</u> RCS press > 2235 psig, <u>THEN</u> :  1) Verify pZR heaters off  2) Control press using normal pZR sprays, aux spray <u>with</u> letdown, or one pZR PORV in this preferred order
c.	Press trending to 2235 psig	c. <u>IF</u> RCS press decreasing, <u>THEN</u> :  1) Verify pZR PORV or block valve closed  2) Verify normal pZR sprays closed or stop RCP supplying failed spray valve  3) Verify aux spray valve closed  4) Turn on pZR heaters as necessary



REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
7	<u>Check Pzr Level</u>  a. Level > 17%	a. <u>IF</u> pzr level $\leq$ 17%, <u>THEN</u> :  1) Verify letdown isolation  2) Verify pzr heaters off  3) Restore pzr level > 17%  4) <u>WHEN</u> pzr level > 17%, <u>THEN</u> turn on pzr heaters as necessary
	b. Level trending to 25%	
8	<u>Check Charging In Service</u>  a. Charging flow established	<u>IF</u> charging isolated, <u>THEN</u> establish charging  a. Close FCV-62-89  b. Open charging line isolation FCV-62-90 and 91  c. Open FCV-62-85 or 86  d. Adjust FCV-62-89 and 93 to establish following:  1) Seal injection flow 8 gpm per RCP  2) Pzr level ~ 25% and stable  e. Open seal water return FCV-62-61 and 63

REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
9	<u>Check Letdown In Service</u>	<p>WHEN p2r level &gt; 17%, <u>THEN</u> establish letdown:</p> <ul style="list-style-type: none"><li>a. Verify one charging pump running</li><li>b. Open letdown isolation valves:<ul style="list-style-type: none"><li>1) FCV-62-69</li><li>2) FCV-62-70</li><li>3) FCV-62-77</li></ul></li><li>c. Adjust letdown press controller FCV-62-81 ~ 25% open and in manual</li><li>d. Open an orifice valve</li><li>e. Adjust FCV-62-81 for desired press, then place in AUTO<ul style="list-style-type: none"><li>1) 320 psig at normal letdown temp</li></ul></li></ul>
10	<u>Check Cntmt Conditions -NORMAL</u> <ul style="list-style-type: none"><li>a. Press</li><li>b. Radiation</li><li>c. Temp</li></ul>	



REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
11	<u>Check If Source Range Detectors Should Be Energized</u>  a. Check intermediate range flux range $< 10^{-10}$ amps  b. Ensure source range detectors energized  c. Transfer NR-45 to one source and intermediate range	a. <u>WHEN</u> intermediate flux $< 10^{-10}$ amps, <u>THEN</u> ensure source range detectors energized
12	<u>Check Offsite Power</u>  a. All shutdown boards energized by offsite power	a. Attempt to restore offsite power per AOI-35

REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
	<u>CAUTION:</u> Normal T-avg indication and associated interlocks will be inaccurate during natural circulation or when RCS temp is below 530°F.	
13	<u>Check RCP Status</u>	
	a. At least one RCP running	a. Attempt to restart an RCP (loop 2 preferred) per SOI-68.2  <u>IF</u> an RCP can <u>NOT</u> be started, <u>THEN</u> verify natural circulation  RCS subcooling  S/G press stable or decreasing  T-hot stable or decreasing  Core exit T/C stable or decreasing  T-cold at saturation temp for S/G press  <u>IF</u> natural circulation <u>NOT</u> verified, <u>THEN</u> increase dumping steam

REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
14	<u>Check Main Turbine</u> <ul style="list-style-type: none"><li>a. Bearing oil pumps running ( 1500 rpm)</li><li>b. Bearing lift pump running ( 600 rpm)</li><li>c. Place turbine on turning gear after shaft stops</li></ul>	
15	<u>Align MSRs Normal</u> <ul style="list-style-type: none"><li>a. Press RESET on MSR control panel</li><li>b. Close HP steam to MSR isolation valves</li><li>c. Open starting vents</li><li>d. Close operating vents</li></ul>	
16	<u>Shutdown Unnecessary Plant Equipment</u> <ul style="list-style-type: none"><li>a. Leave 2 hotwell pumps running</li><li>b. Leave 1 condensate booster pump running</li><li>c. Stop DI booster pumps</li><li>d. Stop heater drain tank pumps and close discharge valves</li><li>e. Open exciter field breaker and place voltage regulator control switch in off position</li></ul>	



REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
17	<u>Check Extraction Steam Valves And Drain Valves</u> <ul style="list-style-type: none"><li>a. Close heaters 1 and 2 extraction steam valves</li><li>b. Open turbine drain valves</li><li>c. Open MFW pump turbine drain valves</li><li>d. Locally open extraction drain valves, HS-5-94</li></ul>	
18	<u>Control S/G Press</u> <ul style="list-style-type: none"><li>a. Transfer condenser steam • dump to press control mode</li><li>b. Control set ~ 1005 psig</li><li>c. Maintain all S/G press within 100 psi<ul style="list-style-type: none"><li>1) Avoid feeding any S/G too rapidly</li><li>2) Divert AFW from any S/G with low press</li></ul></li></ul>	<ul style="list-style-type: none"><li>a. IF condenser <u>NOT</u> available, <u>THEN</u> use S/G PORVs</li><li>c. IF S/G <math>\Delta P &gt; 100</math> psi, <u>THEN</u> verify SI actuation. Go to * E-0, REACTOR TRIP OR SAFETY INJECTION</li></ul>

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<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
19	<u>If Available, Align MFW Normal</u> <ul style="list-style-type: none"><li>a. MFW pump controllers in manual and set to zero</li><li>b. MFW reg valve and bypass valve controllers in manual and set to zero</li><li>c. Reset MFW isolation</li><li>d. Restart MFW pump turbine</li><li>e. Open MFW isolation valves</li><li>f. Control MFW pump speed and feedwater bypass valve position as follows:<ul style="list-style-type: none"><li>1) S/G levels ~ 33%</li><li>2) T-avg ~ 547°F</li></ul></li></ul>	<ul style="list-style-type: none"><li>f. <u>IF</u> S/G level or T-avg can <u>NOT</u> be maintained, <u>THEN</u> return to AFW control</li></ul>

REACTOR TRIP RESPONSE

<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
20	<u>Complete Surveillances And Reports</u>	
	a. SI-268, Verification Of P-4 Interlock	
	b. SI-603, High Flux Adjustment After Shutdown, within 30 min after reactor trip	
	c. SI-407.2 and SI-415 if reactor power decreased by $\geq 15\%$	
	d. SI-38, Shutdown Margin	
	e. AI-18, file package 18 for Reactor Trip Report and NRC notification within 4 hours after reactor trip	



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<u>STEP</u>	<u>ACTION/EXPECTED RESPONSE</u>	<u>RESPONSE NOT OBTAINED</u>
21	<u>Maintain Stable Plant Conditions</u>  a. RCS press ~ 2235 psig  b. Pzr level ~ 25%  c. S/G narrow range levels between 25% and 50%  d. RCS T-avg ~ 547°F	
22	<u>Go To Applicable Plant Instruction</u>  a. ES-0.3, Natural Circulation Cooldown  b. GOI-2, Plant Startup From Hot Standby To Minimum Load  c. GOI-3, Plant Shutdown From Minimum Load to Cold Shutdown Conditions	

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