ENCLOSURE 1

GUIDE TO PROPOSED UNIT 3
TECHNICAL SPECIFICATION CHANGES

Page 26 . . . . Relief valves

Page 27 . . . . Relief valves

Page 30 . . . . Relief valves

Page 153. . . . LPCI modification

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1.2 REACTOR COOLANT SYSTEM INTEGRITY

Applicability

Applies to limits on reactor coolant system pressure.

Objective

To establish a limit below which the integrity of the reactor coolant system is not threatened due to an overpressure condition.

Specification

A. The pressure at the lowest point of the reactor vessel shall not exceed 1,375 psig whenever irradiated fuel is in the reactor vessel.

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2.2 REACTOR COOLANT SYSTEM INTEGRITY

Applicability

Applies to trip settings of the instruments and devices which are provided to prevent the reactor system safety limts from being exceeded.

Objective

To define the level of the process variables at which automatic protective action is initiated to prevent the pressure safety limit from being exceeded.

Specification

The limiting safety system settings shall be as specified below:

Protective Action	Limiting Safety System Setting
A. Nuclear system safety valves open--nuclear system pressure	1,250 psig ± 13 psi (2 valves)
B. Nuclear system relief valves open--nuclear system pressure	
Target - Rocks	1,105 psig ± 11 psi (4 valves)
	1,115 psig ± 11 psi (4 valves)

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SAFETY LIMIT | LIMITING SAFETY SYSTEM SETTING

1.2 REACTOR COOLANT SYSTEM INTEGRITY

2.2 REACTOR COOLANT SYSTEM INTEGRITY

	1,125 psig ± 11 psi (1 valve)
Crosbys**	1,150 psig ± 11 psi (2 valves)
OR Target-Rock**	1,125 psig ± 11psi (2 valves)

C. Scram--nuclear system high pressure $\leq$ 1,055 psig

* Analyses have been run which allow operation with either 9 Target-Rocks and 2 Crosby's or 11 Target-Rocks as indicated in the above specification. The results of these analyses are presented in the Bases.

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2.2 BASES

REACTOR COOLANT SYSTEM INTEGRITY

The pressure relief system for each unit at the Browns Ferry Nuclear Plant has been sized to meet two design bases. First, the total safety/relief valve capacity has been established to meet the over-pressure protection criteria of the ASME Code. Second, the distribution of this required capacity between safety valves and relief valves has been set to meet design basis 4.4.4-1 of sub-section 4.4 which states that the nuclear system relief valves shall prevent opening of the safety valves during normal plant isolations and load rejections.

The details of the analysis which shows compliance with the ASME Code requirements is presented in subsection 4.4 of the FSAR and the Reactor Vessel Overpressure Protection Summary Technical Report submitted in response to question 4.1 dated December 1, 1971.

9 Target Rock And 2 Crosby Valves

To meet the safety design basis, thirteen safety-relief valves have been installed on each unit with a total capacity of 81.08% of nuclear boiler rated steam flow. The analysis of the worst overpressure transient, (3-second closure of all main steam line isolation valves) neglecting the direct scram (valve position scram) results in a maximum vessel pressure of 1293 psig if a neutron flux scram is assumed. This results in a 82 psig margin to the code allowable overpressure limit of 1375 psig.

To meet the operational design basis, the total safety-relief capacity of 81.08% of nuclear boiler rated has been divided into 66.88% relief (11 valves) and 14.2% safety (2 valves). The analysis of the plant isolation transient (turbine trip with bypass valve failure to open) assuming a turbine trip scram is presented in Reference 5 on page 29. This analysis shows that the 11 relief valves limit pressure at the safety valves to 1218 psig, well below the setting of the safety valves. Therefore, the safety valves will not open. This analysis shows that peak system pressure is limited to 1243 psig which is 132 psig below the allowed vessel overpressure of 1375 psig.

11 Target Rock Valves Only

To meet the safety design basis, thirteen safety-relief valves have been installed on each unit with a total capacity of 84.2% of nuclear boiler rated steam flow. The analysis of the worst overpressure transient, (3-second closure of all main steam line isolation valves) neglecting the direct scram (valve position scram) results in a maximum vessel pressure of 1280 psig if a neutron flux scram is assumed. This results in a 95 psig margin to the code allowable overpressure limit of 1375 psig.

To meet the operational design basis, the total safety-relief capacity of 84.2% of nuclear boiler rated has been divided into 70% relief (11 valves) and 14.2% safety (2 valves). The analysis of the plant isolation transient (turbine trip with bypass valve failure to open) assuming a turbine trip scram is presented in Reference 5 on page 29. This analysis shows that the 11 relief valves limit pressure at the safety valves to 1206 psig, well below the setting of the safety valves. Therefore, the safety valves will not open. This analysis shows that peak system pressure is limited to 1232 psig which is 143 psig below the allowed vessel overpressure of 1375 psig.

3.5 CORE AND CONTAINMENT COOLING SYSTEMS

8. If specifications 3.5.B.1 through 3.5.B.7 are not met, an orderly shutdown shall be initiated and the reactor shall be shutdown and placed in the cold condition within 24 hours.

9. When the reactor vessel pressure is atmospheric and irradiated fuel is in the reactor vessel at least one RHR loop with two pumps or two loops with one pump per loop shall be operable. The pumps' associated diesel generators must also be operable.

10. If the conditions of specification 3.5.A.5 are met, LPCI and containment cooling are not required.

11. When there is irradiated fuel in the reactor and the reactor vessel pressure is greater than atmospheric, unit 2 RHR pumps B and D with associated heat exchangers and valves must be operable and capable of supplying cross-connect capability except as specified in specification 3.5.B.12 below.

4.5 CORE AND CONTAINMENT COOLING SYSTEMS

second operable access path for the same phase of the mode (drywell sprays, suppression chamber sprays and suppression pool cooling) shall be demonstrated to be operable daily thereafter until the second path is returned to normal service.

8. No additional surveillance required.

9. When the reactor vessel pressure is atmospheric, the RHR pumps and valves that are required to be operable shall be demonstrated to be operable monthly.

10. No additional surveillance required.

11. The B and D RHR pumps on unit 2 which supply cross-connect capability shall be operable monthly when the cross-connect capability is required.

12. When it is determined that one RHR pump or associated heat exchanger located on the unit cross-connection in the

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3.5 CORE AND CONTAINMENT COOLING SYSTEMS

(Note: Because cross-connect capability is not a short term requirement, a component is not considered inoperable if cross-connect capability can be restored to service within 5 hours.)

12. If one RHR pump or associated heat exchanger located on the unit cross-connection in unit 2 is inoperable for any reason (including valve inoperability, pipe break, etc.), the reactor may remain in operation for a period not to exceed 30 days provided the remaining RHR pump and associated diesel generator are operable.

13. If RHR cross-connection flow or heat removal capability is lost, the unit may remain in operation for a period not to exceed 10 days unless such capability is restored.

14. All recirculation pump discharge valves shall be operable prior to reactor startup (or closed if permitted elsewhere in these Specifications).

4.5 CORE AND CONTAINMENT COOLING SYSTEMS

adjacent unit is inoperable at a time when operability is required, the remaining RHR pump and associated heat exchanger on the unit cross-connection and the associated diesel generator shall be demonstrated to be operable immediately and every 15 days thereafter until the inoperable pump and associated heat exchanger are returned to normal service.

13. No additional surveillance required.

14. All recirculation pump discharge valves shall be tested for operability during any period of reactor cold shutdown exceeding 48 hours, if operability tests have not been performed during the preceeding 31 days.

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3.6/4.6 BASES

9 Target Rock And 2 Crosby Valves

To meet the safety design basis, thirteen safety-relief valves have been installed on unit 2 with a total capacity of 81.08% of nuclear boiler rated steam flow. The analysis of the worst overpressure transient, (3-second closure of all main steam line isolation valves) neglecting the direct scram (valve position scram) results in a maximum vessel pressure of 1293 psig if a neutron flux scram is assumed This results in an 82 psig margin of the code allowable overpressure limit of 1375 psig.

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To meet the operational design basis, the total safety-relief capacity of 84.2% of nuclear boiler rated has been divided into 70% relief (11 valves) and 14.2% safety (2 valves). The analysis of the plant isolation transient (turbine trip with bypass valve failure to open) assuming a turbine trip scram is presented in Reference 5 on page 29. This analysis shows that the 11 relief valves limit pressure at the safety valves to 1206 psig, well below the setting of the safety valves. Therefore, the safety valves will not open. This analysis shows that peak system pressure is limited to 1232 psig which is 143 psig below the allowed vessel overpressure of 1375 psig.

3.6/4.6 **BASES**

Experience in relief and safety valve operation shows that a testing of 50 percent of the valves per year is adeq[illegible]e to detect failures or deteriorations. The relief and safety valves are benchtested every second operating cycle to ensure that their set points are within the ±1 percent tolerance. The relief valves are tested in place once per operating cycle to establish that they will open and pass steam.

The requirements established above apply when the nuclear system can be pressurized above ambient conditions. These requirements are applicable at nuclear system pressures below normal operating pressures because abnormal operational transients could possibly start at these conditions such that eventual overpressure relief would be needed. However, these transients are much less severe, in terms of pressure, than those starting at rated conditions. The valves need not be functional when the vessel head is removed, since the nuclear system cannot be pressurized.

REFERENCES

1. Nuclear System Pressure Relief System (BFNP FSAR Subsection 4.4)

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ENCLOSURE 2

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NUCLEAR ENERGY BUSINESS GROUP • GENERAL ELECTRIC COMPANY
SAN JOSE, CALIFORNIA 95125

GENERAL ELECTRIC

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TITLE Browns Ferry Unit 3 Reload 2 Supplemental Licensing Submittal

ISSUE DATE June 1979

ERRATA And ADDENDA SHEET

NO. 1

DATE 9/25/79

NOTE: Correct all copies of the applicable publication as specified below.

ITEM	REFERENCES (SECTION, PAGE PARAGRAPH, LINE)	INSTRUCTIONS (CORRECTIONS AND ADDITIONS)
1.	Appendix A	Replace with attached Appendix A.

APPENDIX A

Fuel Loading Error LHGR: 16.02 kW/ft

Safety/Relief Valve Capacity at Setpoint (No./%): 11/70

Spring Safety Valve Capacity at Setpoint (No./%): 2/14.2

ANALYSES FOR ALTERNATE SAFETY/RELIEF VALVES

For the purpose of monitoring valve performance, two 6R10 Crosby Safety Relief Valves (SRVs) will be installed for cycle 3 operation. The two Crosby SRVs set at 1150 psig will replace two Target Rock valves set at 1125 psig in locations G and H which are not automatic depressurization system (ADS) locations.

The Crosby SRV is a simple, direct-acting, spring-loaded valve with an external pneumatic piston. Safety valve action occurs when the inlet pressure forces exceed the spring load and force the valve disc off of its seat.

For manual actuation, the external pneumatic piston is capable of opening the valve against the force of the spring at any steam pressure down to 0 psig. The pneumatic operator is so arranged that if it malfunctioned it would not prevent the valve disc from lifting if steam inlet pressure reached the spring set pressure.

Since the Target Rock valves on Browns Ferry Unit No. 3 have had their throats enlarged to provide increased capacity, the capacity of each of the two Crosby replacement valves is 94.3% of each of the modified Target Rock valves when compared at the same inlet pressure.

The SRV change is indicated by the following table:

FROM Current BF3/C3		TO Proposed SRV		
Setpoint, psig	SRV # of Target Rock	Setpoint, psig	SRV # of TR	SRV # of Crosby
1105+1%	4	1105+1%	4	0
1115+1%	4	1115+1%	4	0
1125+1%	3	1125+1%	1	0
		1150+1%	0	2

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The total SRV capacity at setpoint used in these analyses was 66.88%.

For Browns Ferry 3 cycle 3, transient analyses for the limiting transients have been performed to evaluate the impact of using the 2 Crosby Safety Relief Valves set at 1150 psig instead of 2 high set Target Rock SRVs, and the plant responses are indicated in Figure A-1 and A-2 which are similar to previous **Figures 3 and 7, respectively. The analyses presented used preliminary estimates of the capacity of the Crosby SRVs as 75.5%. These analyses are conservative when applied with the actual value of the valve capacity** (94.3%).

The first portion of the table in Section 9 changes as follows:

Transient	Exposure	Power (%)	Core Flow (%)	ϕ (% NBR)	Q/A (% NBR)	P_{sl} (psig)	P_v (psig)	ΔCPR 8x8	ΔCPR 8x8R	ΔCPR P8x8R	Plant Response
Load Rejection without Bypass	BOC-EOC	104.5	100	229.5	109.3	1218	1243	0.15	0.15	0.16	Figure A-1

The table in Section 12 becomes

OVERPRESSURIZATION ANALYSIS SUMMARY (5.3)

Transient	Power (%)	Core Flow (%)	P_{sl} (psig)	P_v (psig)	Plant Response
MSIV Closure (Flux Scram)	104.5	100	1260	1293	Figure A-2

The peak vessel bottom pressure increased 13 psi to 1293 psig, but it is still well below the limit of 1375 psig for vessel overpressure protection.

There is no effect on the peak heat flux because the SRVs with setpoints of 1125 psig or greater open after the time of peak heat flux and therefore do not impact the ΔCPR.

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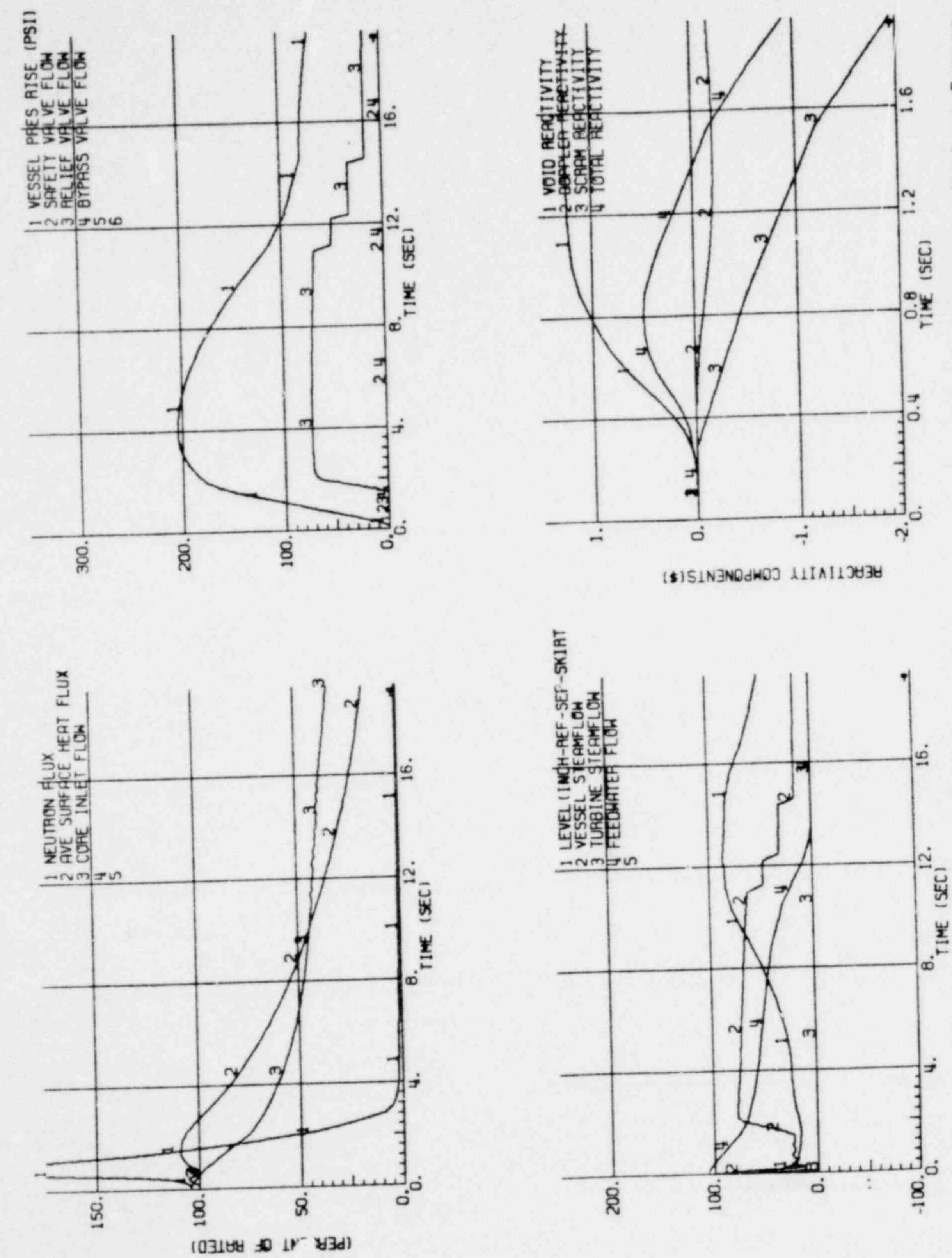

Figure A-1. Browns Ferry 3 Cycle 3 - Plant Response to Generator Load Rejection Without Bypass (Two Crosby SRVs Set at 1150 psig)

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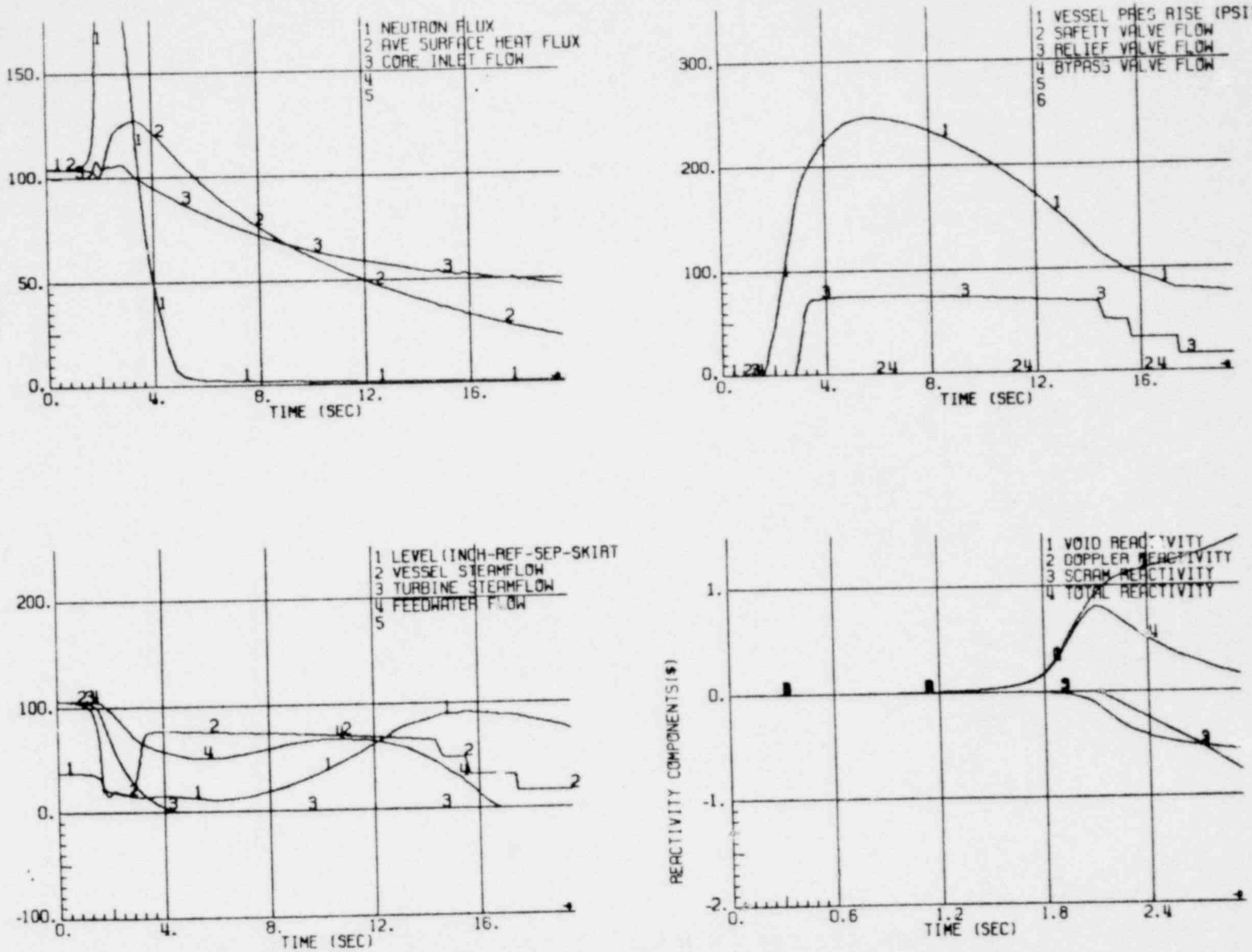

Figure A-2. Browns Ferry 3 Cycle 3 - Plant Response to MSIV Closure, Flux Scram
(Two Crosby SRVs Set at 1150 psig)

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