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SUPPLEMENTAL RELOAD LICENSING SUBMITTAL FOR JAMES A. FITZPATRICK NUCLEAR POWER PLANT RELOAD 4

GENERAL ELECTRIC

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SUPPLEMENTAL RELOAD LICENSING SUBMITTAL
FOR
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
RELOAD 4

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GENERAL ELECTRIC

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CONTENTS OF THIS REPORT
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1. PLANT UNIQUE ITEMS (1.0)*

Transient Analysis Initial Conditions: Appendix A

2. RELOAD FUEL BUNDLES (1.0, 2.7, 3.3.1 and 4.0)

	Fuel Designation	Cycle Loaded	Number	Number Drilled
Irradiated	8DB274L	2	20	20
	8DB274H	2	56	56
	8DRB265L	3	36	36
	8DRB283	3	100	100
	P8DRB265L	4	24	24
	P8DRB283	4	136	136
New	P8DRB284H	5	128	128
	P8DRB299	5	60	60
Total			560	560

3. REFERENCE CORE LOADING PATTERN (3.3.1)

Nominal previous cycle core average exposure at end of cycle: 16.7 GWd/T

Minimum previous cycle core average exposure at end of cycle from cold shutdown considerations: 16.4 GWd/T

Assumed reload cycle core average exposure at end of cycle: 17.2 GWd/T

Core loading pattern: Figure 1

*( ) refers to areas of discussion in "General Electric Boiling Water Reactor Generic Reload Fuel Application," NEDE-24011-P-A-1 and NEDO-24011-A-1, July 1979, as revised by amendments 2-10.

4. CALCULATED CORE EFFECTIVE MULTIPLICATION AND CONTROL SYSTEM WORTH - NO VOIDS, 20°C (3.3.2.1.1 and 3.3.2.1.2)

BOC k_{eff}	
Uncontrolled	1.116
Fully Controlled	0.957
Strongest Control Rod Out	0.987
R, Maximum Increase in Cold Core Reactivity with Exposure Into Cycle, Δk	0.000

5. STANDBY LIQUID CONTROL SYSTEM SHUTDOWN CAPABILITY (3.3.2.1.3)

ppm	Shutdown Margin (Δk) (20°C, Xenon Free)
600	0.03

6. RELOAD UNIQUE TRANSIENT ANALYSIS INPUTS (3.3.2.1.5 and 5.2)[1]

	EOC	EOC-1 GWd/T
Void Coefficient N/A* (c/% Rg)	-8.8/-11.0	-9.6/-12.0
Void Fraction (%)	41.7	41.7
Doppler Coefficient N/A (c/°F)	-0.23/-0.22	-0.23/-0.22
Average Fuel Temperature (°F)	1343	1343
Scram Worth N/A (%)[2]		
Scram Reactivity vs Time[2]		

*N = Nuclear Input Data
A = Used in Transient Analysis

(1) Applies to Inadvertent Startup of HPCI Pump Event Only

(2) Generic, exposure independent values are used as given in "General Electric Boiling Water Reactor Generic Reload Fuel Application," NEDE-24011-P-A-1, Amendment 10, April 1981.

7. RELOAD UNIQUE GETAB TRANSIENT ANALYSIS INITIAL CONDITION PARAMETERS (5.2)

Fuel Design	Exposure (GWd/T)	Peaking Factors (Local, Radial, Axial)	R-Factor	Bundle Power (MWt)	Bundle Flow (10^3 lb/hr)	Initial MCPR
8x8	EOC	1.22, 1.35, 1.40	1.10	5.75	115	1.29
	EOC-1	1.22, 1.39, 1.40	1.10	5.92	114	1.25
8x8R	EOC	1.20, 1.50, 1.40	1.05	6.40	115	1.29
	EOC-1	1.20, 1.54, 1.40	1.05	6.58	114	1.25
P8x8R	EOC	1.20, 1.48, 1.40	1.05	6.29	116	1.31
	EOC-1	1.20, 1.52, 1.40	1.05	6.46	115	1.28

8. SELECTED MARGIN IMPROVEMENT OPTIONS (5.2.2)

Transient Recategorization:	No
Recirculation Pump Trip:	No
Rod Withdrawal Limiter:	No
Thermal Power Monitor:	Yes
Measured Scram Time:	No
Exposure Dependent Limits:	Yes
Exposures Analyzed (GWd/T):	EOC EOC-1

9. CORE-WIDE TRANSIENT ANALYSIS RESULTS (5.2.1)

Transient	Exposure Range (GWd/T)	ϕ (% NBR)	Q/A (%)	ΔCPR 8x8/8x8R	P8x8R	Figure
Load Rejection without Bypass	EOC	653	125	0.22	0.24	3a
	EOC-1	609	122	0.18	0.21	3b
Inadvertent Start of HPCI Pump	BOC to EOC	128	120	0.14	0.15	4
Feedwater Controller Failure	EOC	362	122	0.17	0.19	5a
	EOC-1	311	120	0.15	0.16	5b

10. LOCAL ROD WITHDRAWAL ERROR (WITH LIMITING INSTRUMENT FAILURE) TRANSIENT SUMMARY (5.2.1)

Limiting Rod Pattern: Figure 6

Includes 2.2% Power Spiking Penalty: Yes

Rod Block Reading*	Rod Position (Feet Withdrawn)	ΔCPR 8x8** 8x8R/P8x8R	MLHGR (kW/ft) 8x8** 8x8R/P8x8R
104	3.0	0.12	16.1
105	3.5	0.15	16.5
106	4.0	0.17	16.8
107	5.0	0.20	16.9
108*	6.5	0.24	16.9
109	7.0	0.24	16.9
110	8.0	0.25	16.9

11. CYCLE MCPR VALUES (5.2)

Exposure Range (GWd/t)	Pressurization Events	Option A	Option B
BOC to EOC-1		8x8/8x8R/P8x8R	8x8/8x8R/P8x8R
	Load Rejection w/o Bypass	0.23/0.23/0.27	0.04/0.04/0.06
	Feedwater Controller Failure	0.19/0.20/0.21	0.13/0.14/0.15
EOC-1 to EOC			
	Load Rejection w/o Bypass	0.28/0.28/0.30	0.16/0.16/0.18
	Feedwater Controller Failure	0.22/0.22/0.25	0.16/0.16/0.18

Exposure Range (GWd/t)	Non-Pressurization Events	8x8/8x8R/P8x8R
BOC to EOC	Inadvertent PCI Pump Start	0.14/0.14/0.15
	Rotated Bundle Error	--/--/0.13
	Rod Withdrawal Error	-- 0.24/0.24

*Indicates set point selected.
**Not Limiting

12. OVERPRESSURIZATION ANALYSIS SUMMARY (5.3)

Transient	P_{sl} (psig)	P_v (psig)	Plant Response
MSIV Closure (Flux Scram)	1236	1275	Figure 7

13. STABILITY ANALYSIS RESULTS (5.4)

Rod Line Analyzed: Extrapolated Rod Block

Decay Ratio: Figure 8

Reactor Core Stability Decay Ratio, x_2/x_0: 0.87

Channel Hydrodynamic Performance Decay Ratio, x_2/x_0

- 8x8 Channel: 0.37
- 8x8R/P8x8R Channel: 0.30

14. ROTATED BUNDLE ERROR RESULTS (5.4)

Variable Water Gap Misoriented Bundle Analysis: Yes

Includes 2.2% Power Spiking Penalty: Yes

Initial MCPR	Resulting MCPR	Resulting LHGR (kW/ft)
1.18	1.07	15.32

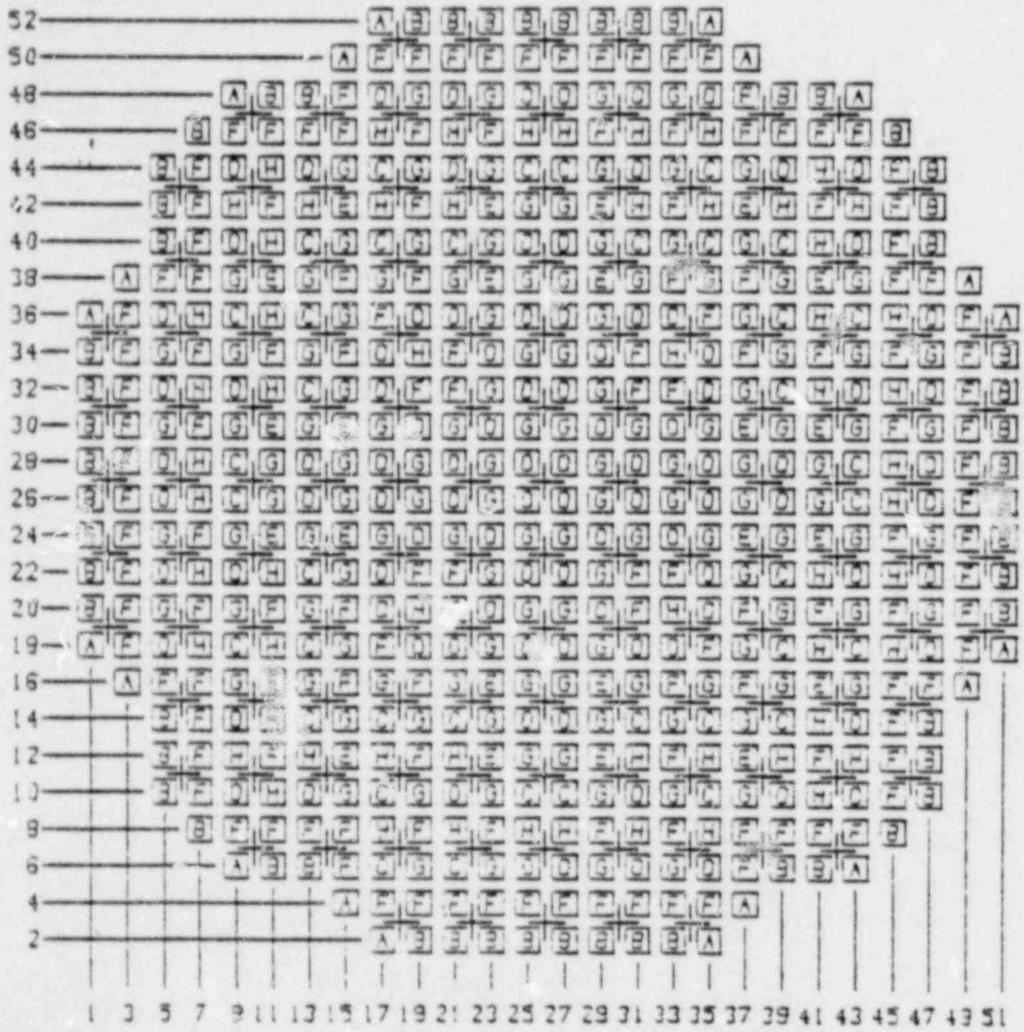
15. CONTROL ROD DROP ANALYSIS RESULTS (5.5.1)

Bounding Analysis Results:

- Doppler Reactivity Coefficient: Figure 9
- Accident Reactivity Shape Functions: Figures 10 and 11
- Scram Reactivity Functions: Figures 12 and 13

16. LOSS-OF-COOLANT ACCIDENT RESULTS, NEW FUEL (5.5.2)

See "Loss-of-Coolant Accident Analysis Report for James A. FitzPatrick Nuclear Power Plant (Lead Plant)," July 1977, NEDO-21662, as amended.



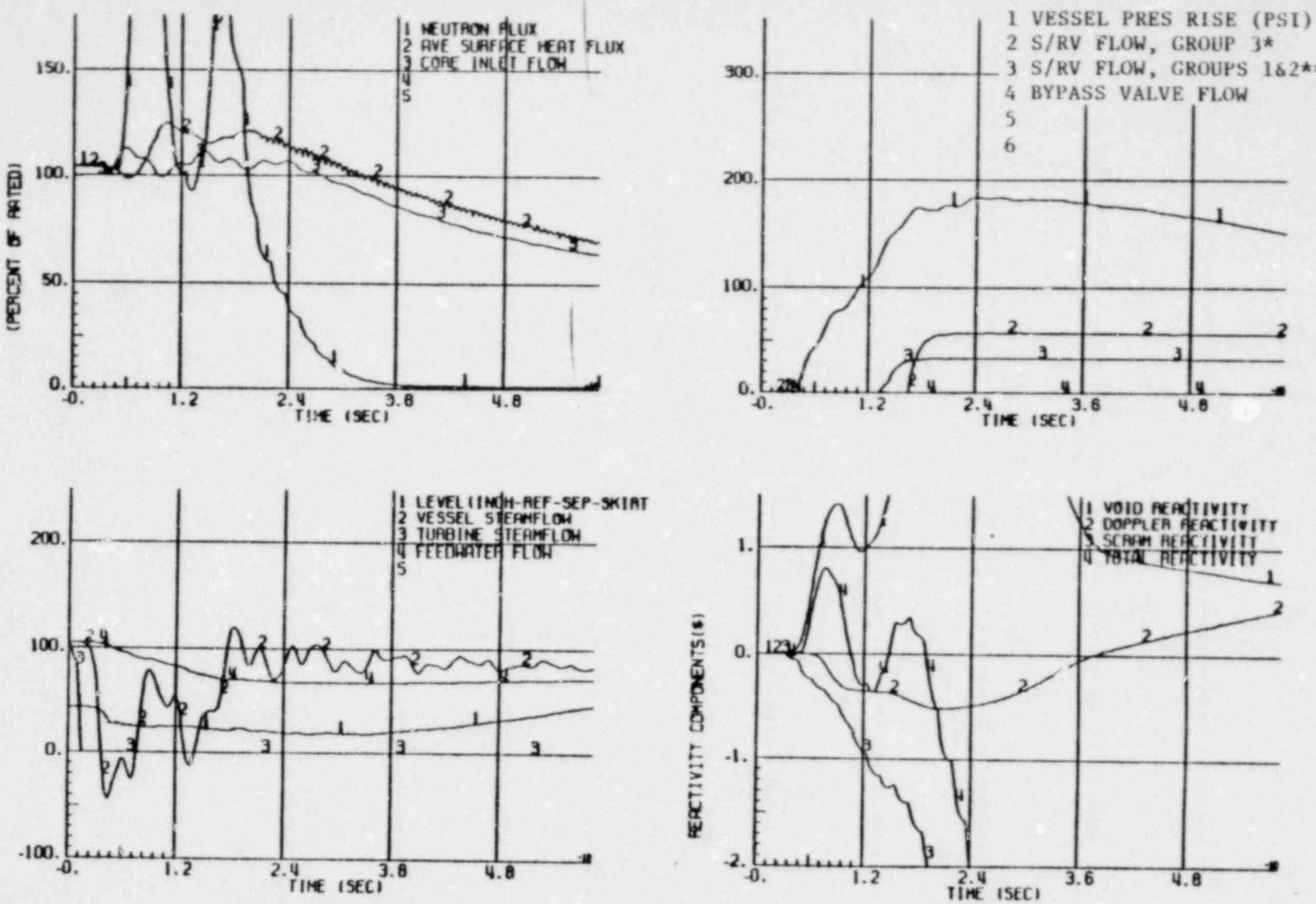
FUEL TYPE	
A = 8DB274L	E = P8DRB265L
B = 8DB274H	F = P8DRB283
C = 8DRB265L	G = P8DRB284H
D = 8DRB283	H = P8DRB299

Figure 1. Reference Core Loading Pattern

DELETED

See Section 6

Figure 2. Scram Reactivity and Control Rod
Drive Specifications



*Group 3 S/RV Set Point = 1140 psig +1%
**Group 1 S/RV Set Point = 1090 psig +1%
Group 2 S/RV Set Point = 1105 psig +1%

Figure 3a. Plant Response to Generator Load Rejection Without Bypass, EOC 5

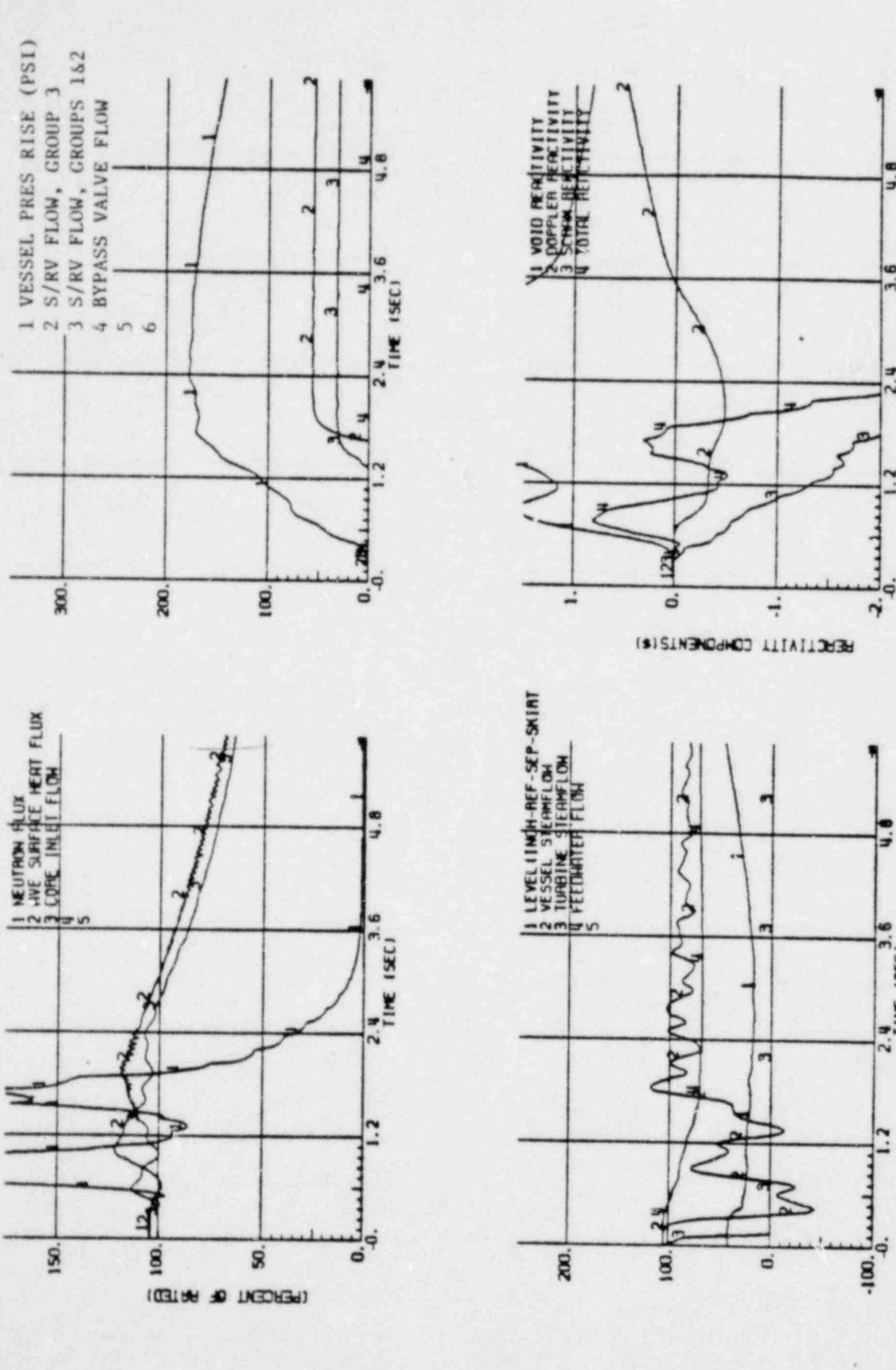


Figure 3b. Plant Response to Generator Load Rejection Without Bypass, EOC 5-1000 MWd/t

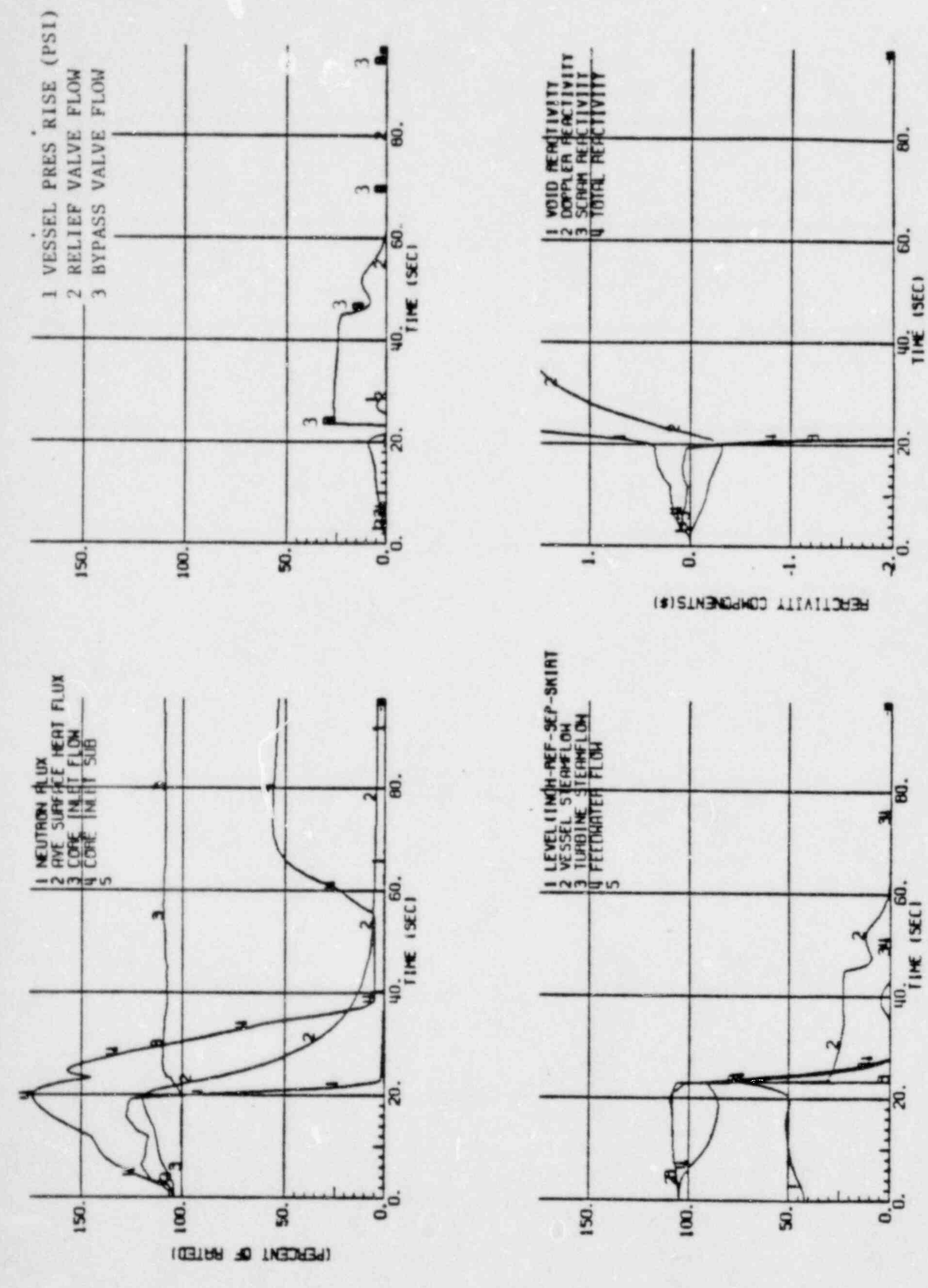


Figure 4. Plant Response to Inadvertent Start of HPCI Pump

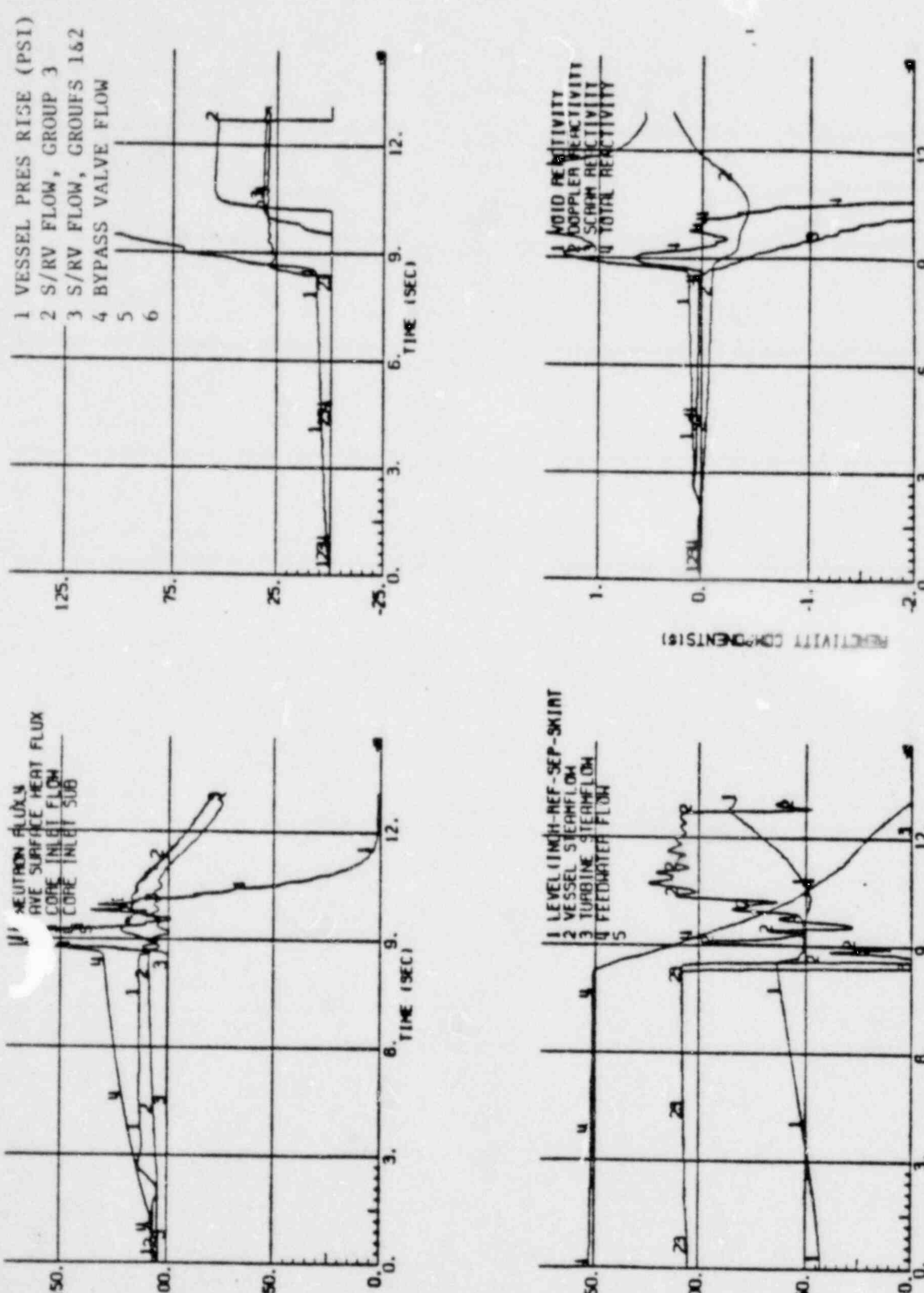


Figure 5a. Plant Response to Feedwater Controller Failure, EOC 5

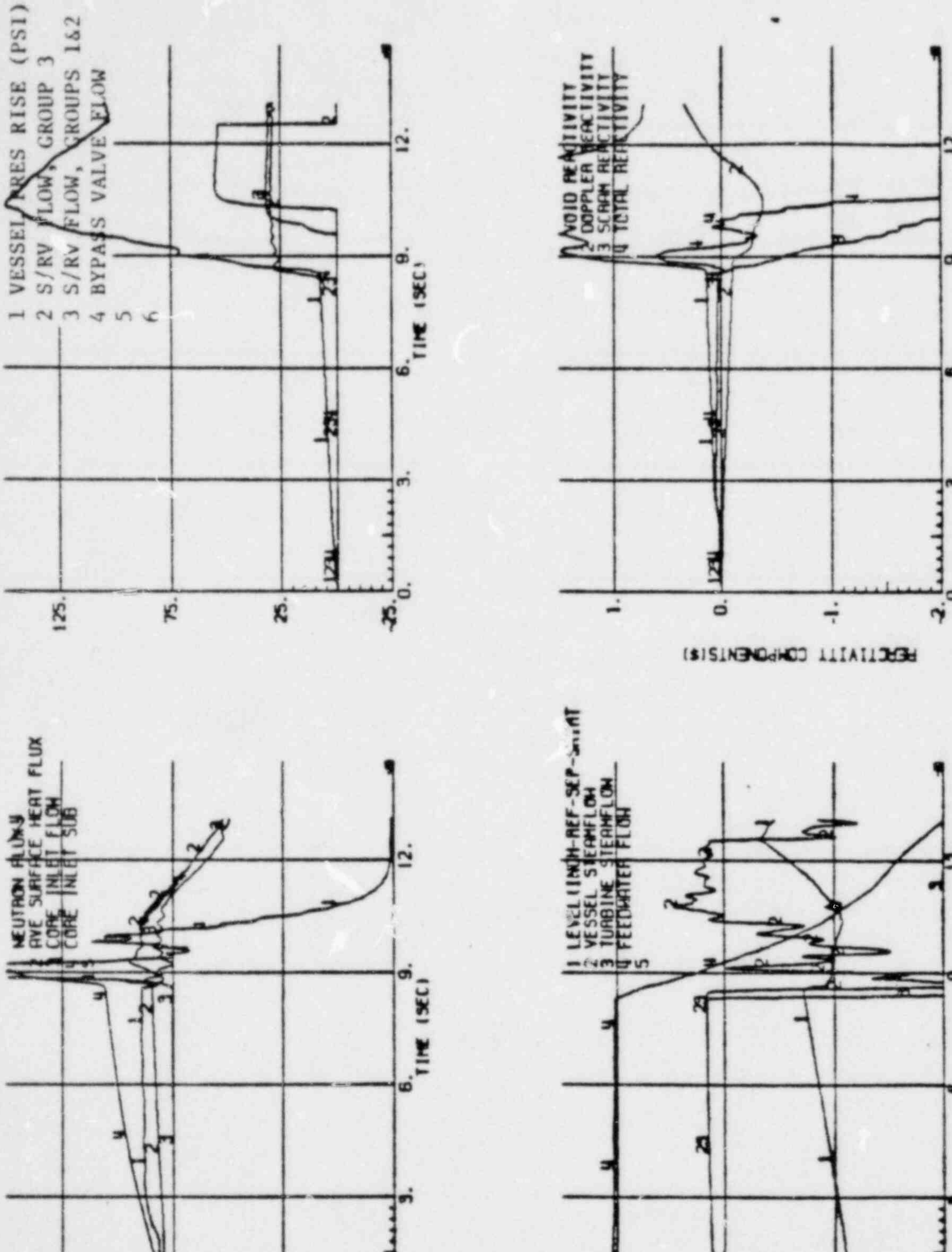


Figure 5b. Plant Response to Feedwater Controller Failure, EOC 5-1000 MWd/t

	02	06	10	14	18	22	26
51							
47				30		12	
43					12		24
39		30		10		10	
35			12		32		32
31		12		10		0	
27			24		32		32

Notes:
1. Rod Pattern Is 1/4 Core Mirror Symmetric, Upper Left Quadrant Shown on Map.
2. Numbers Indicate Number of Notches Withdrawn out of 48. Blank Is a Withdrawn Rod.
3. Error Rod Is Rod (22,31).

Figure 6. Limiting RWE Rod Pattern

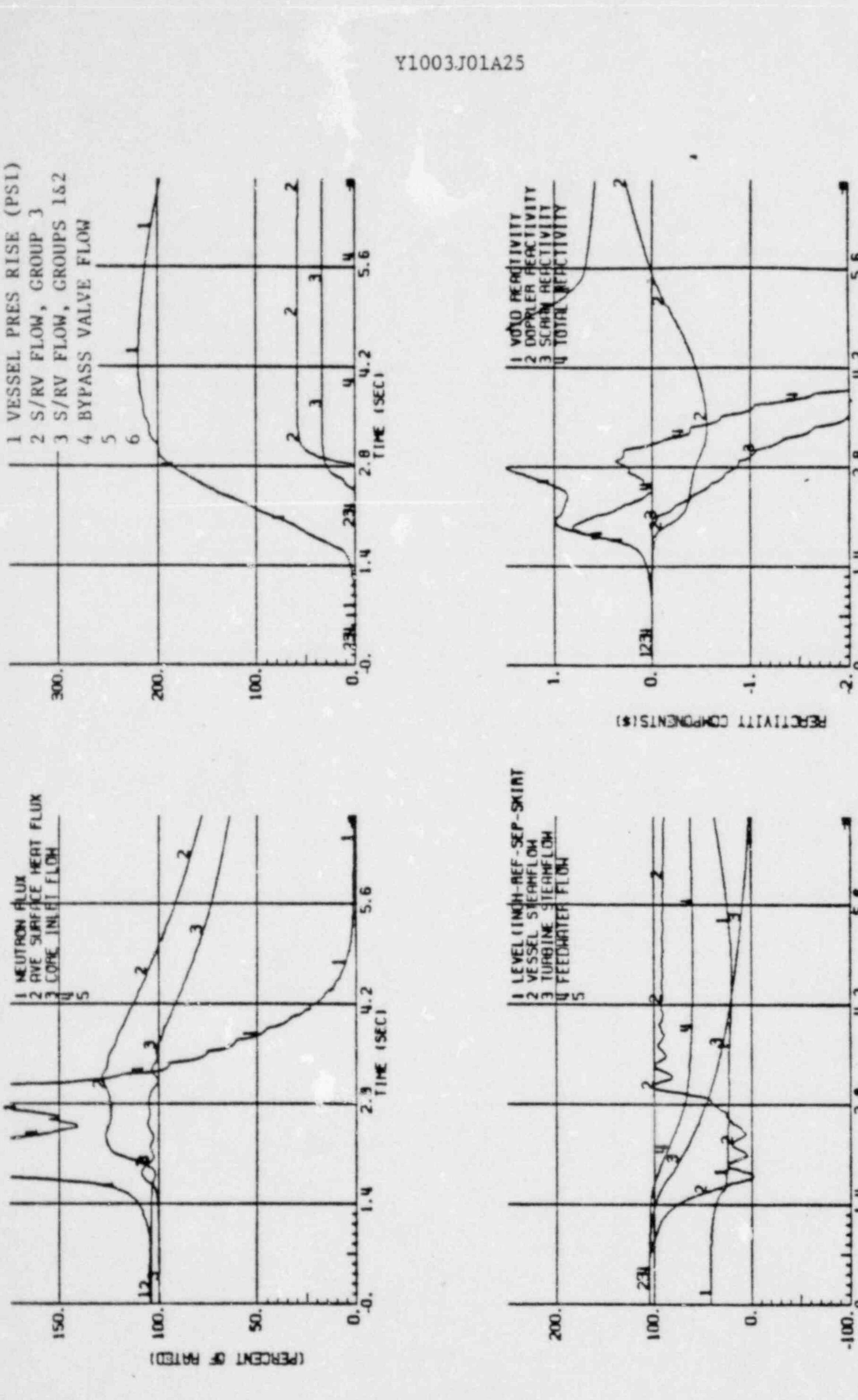


Figure 7. Plant Response to MSIV Closure (Flux Scram)

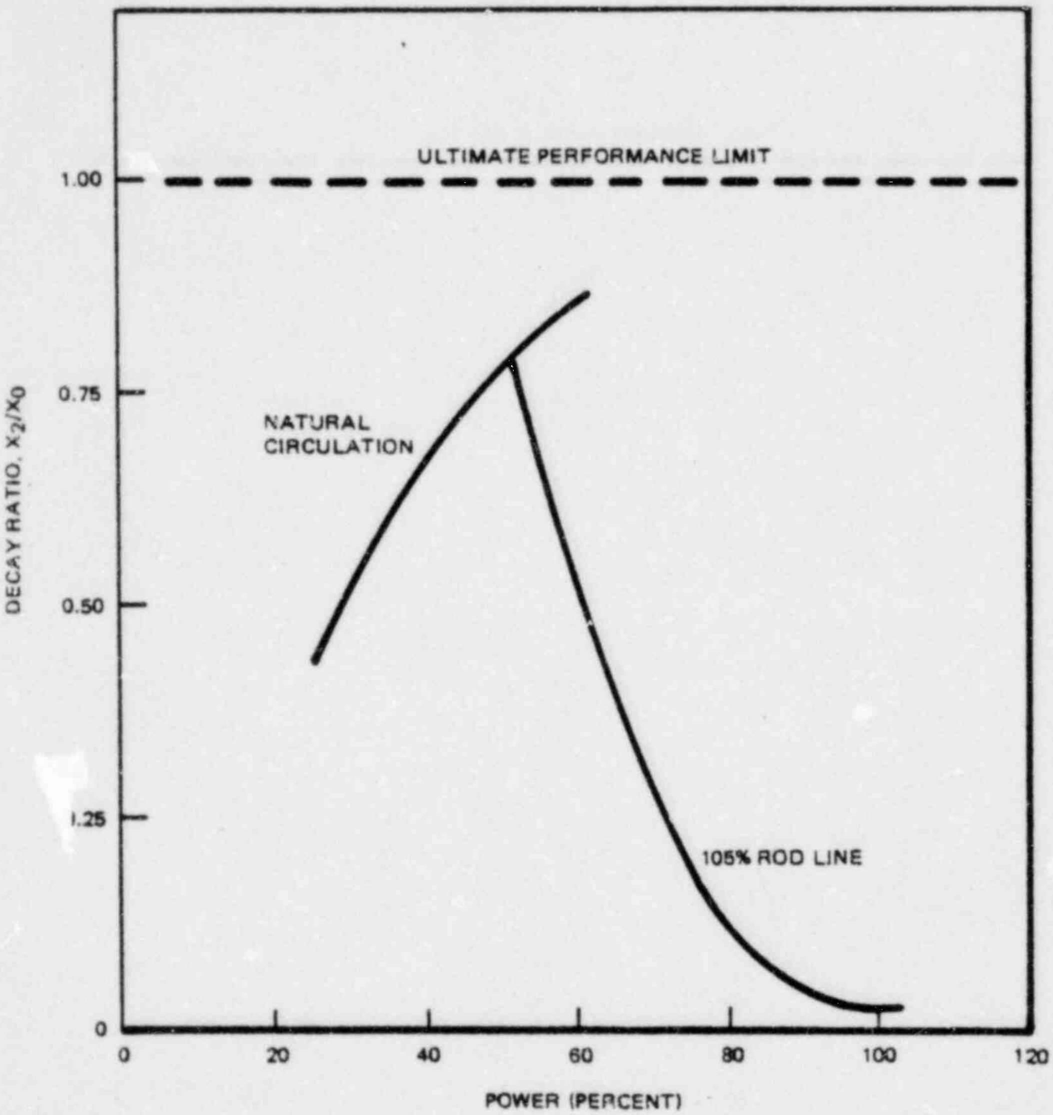


Figure 8. Reactor Core Decay Ratio versus Power

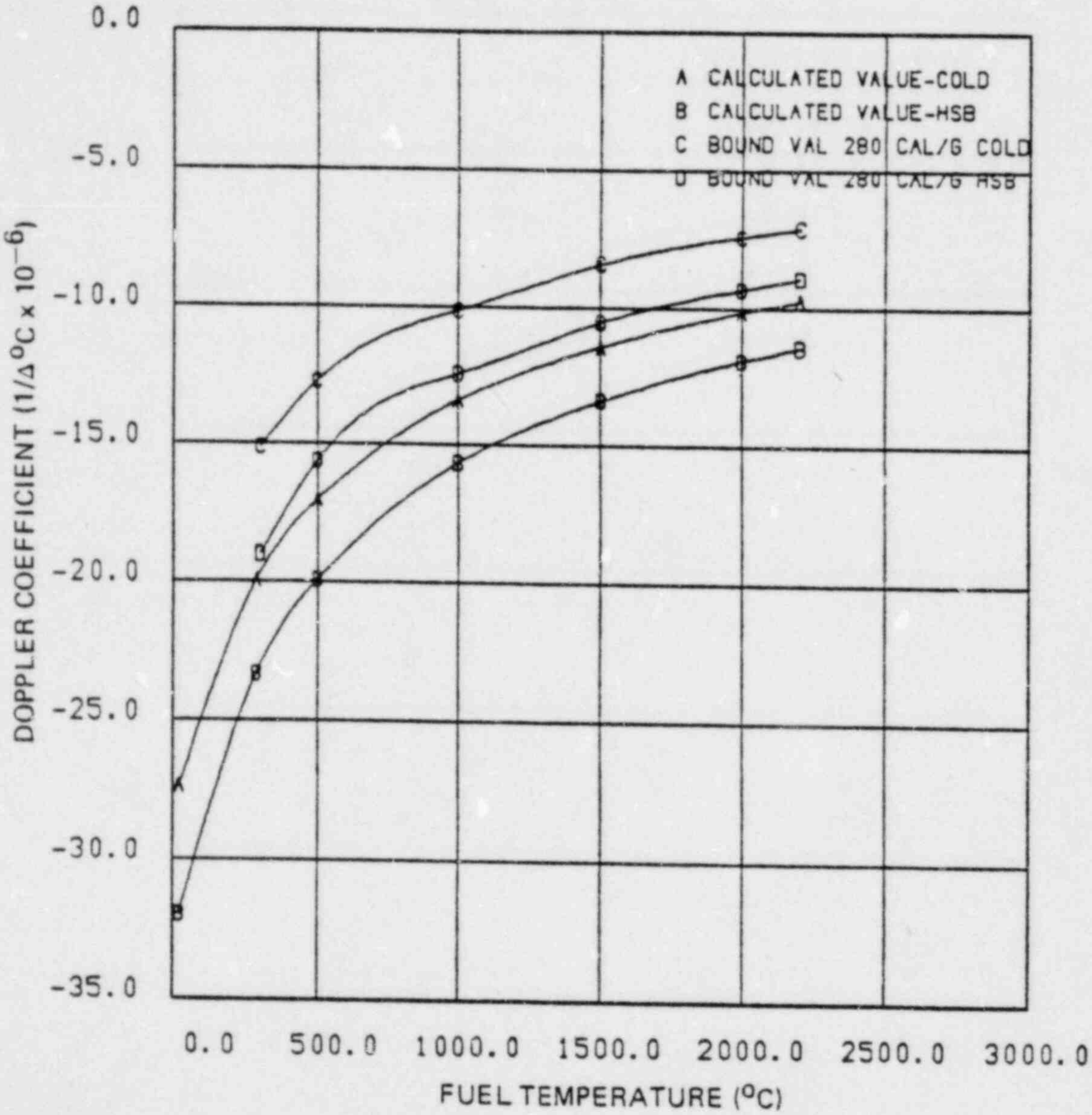


Figure 9. Doppler Reactivity C efficient Comparison for RDA

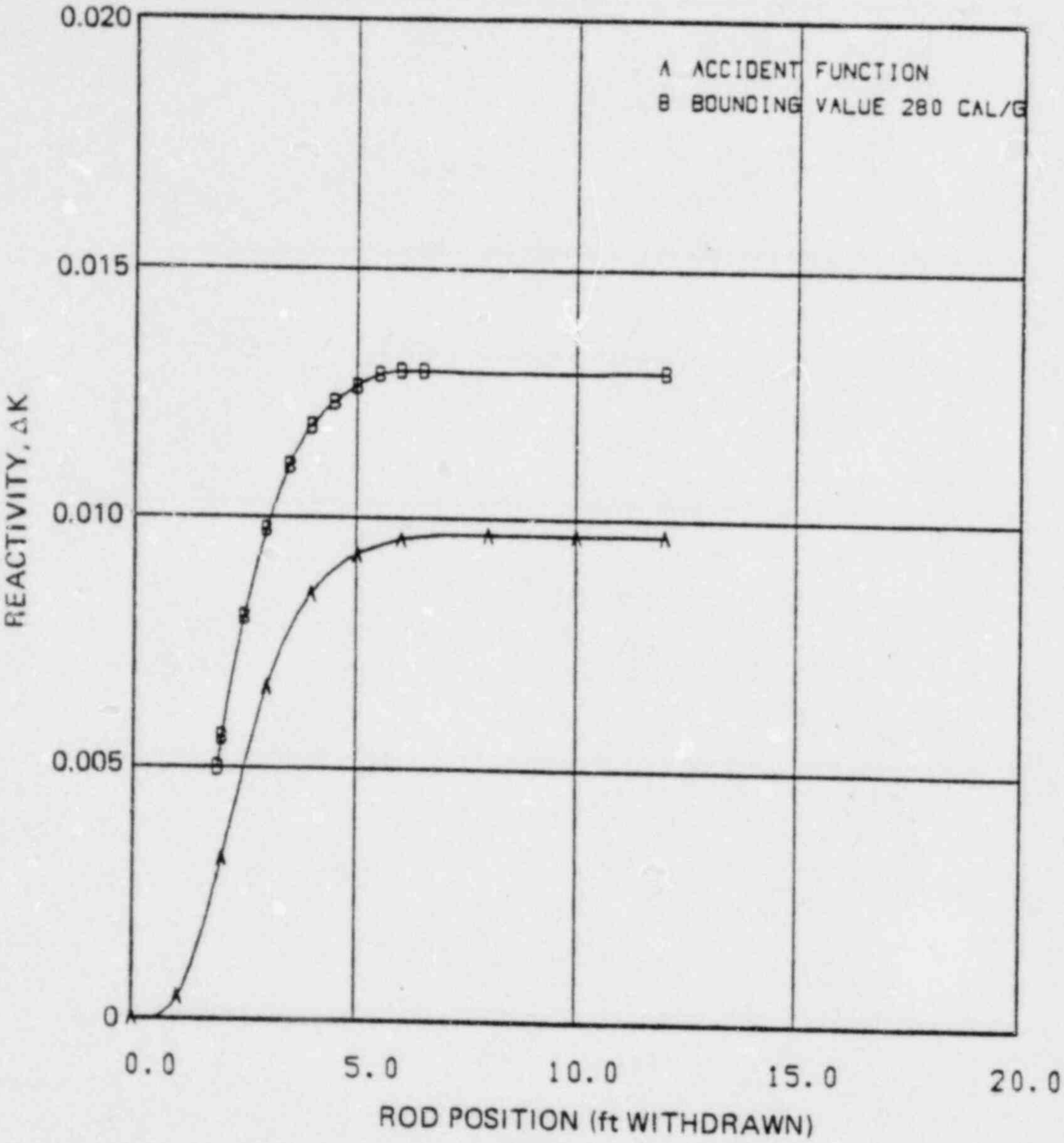


Figure 10. RDA Reactivity Shape Function, Cold

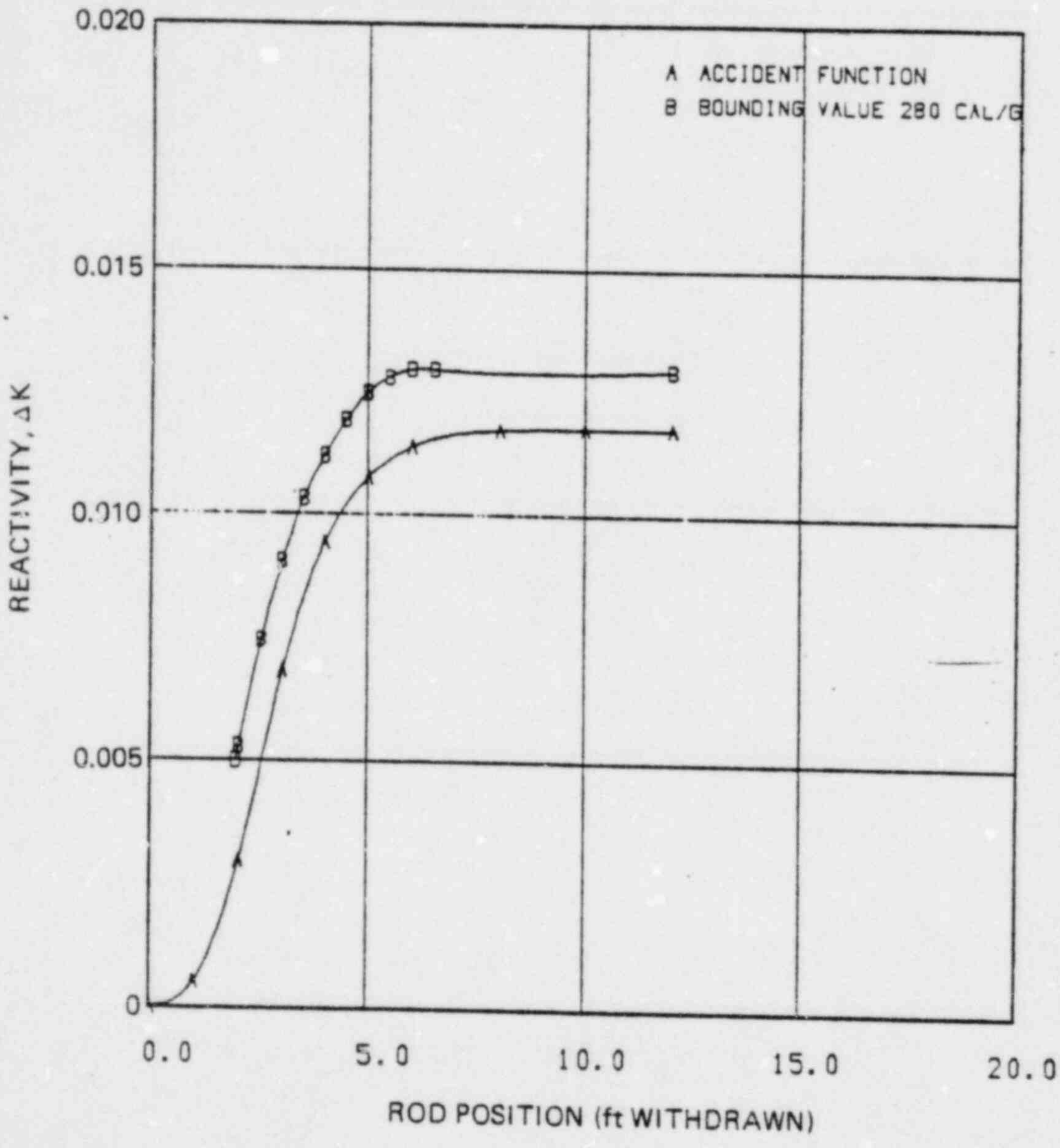


Figure 11. RDA Reactivity Shape Function, Hot Standby

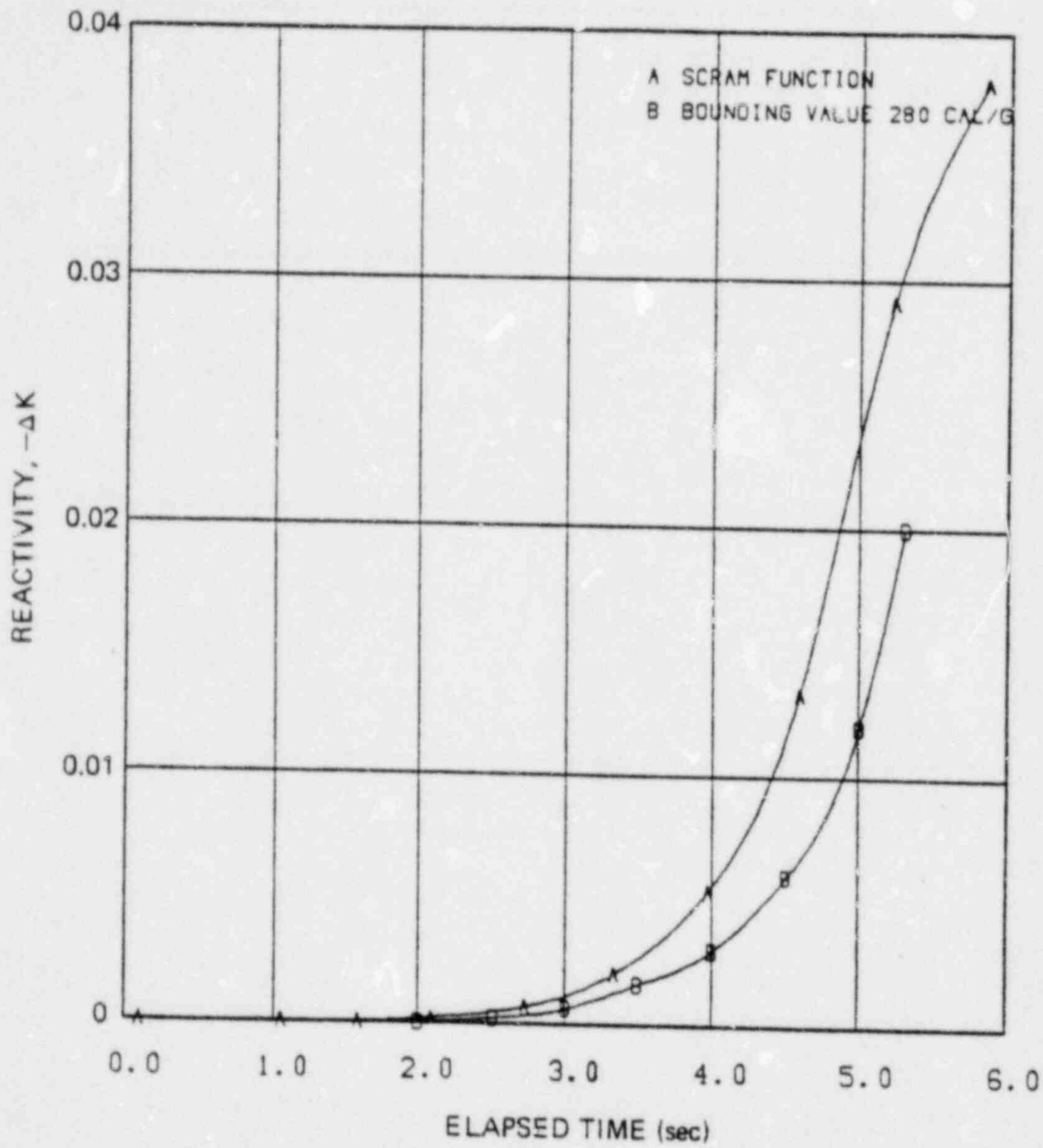


Figure 12. RDA Scram Reactivity Function, Cold

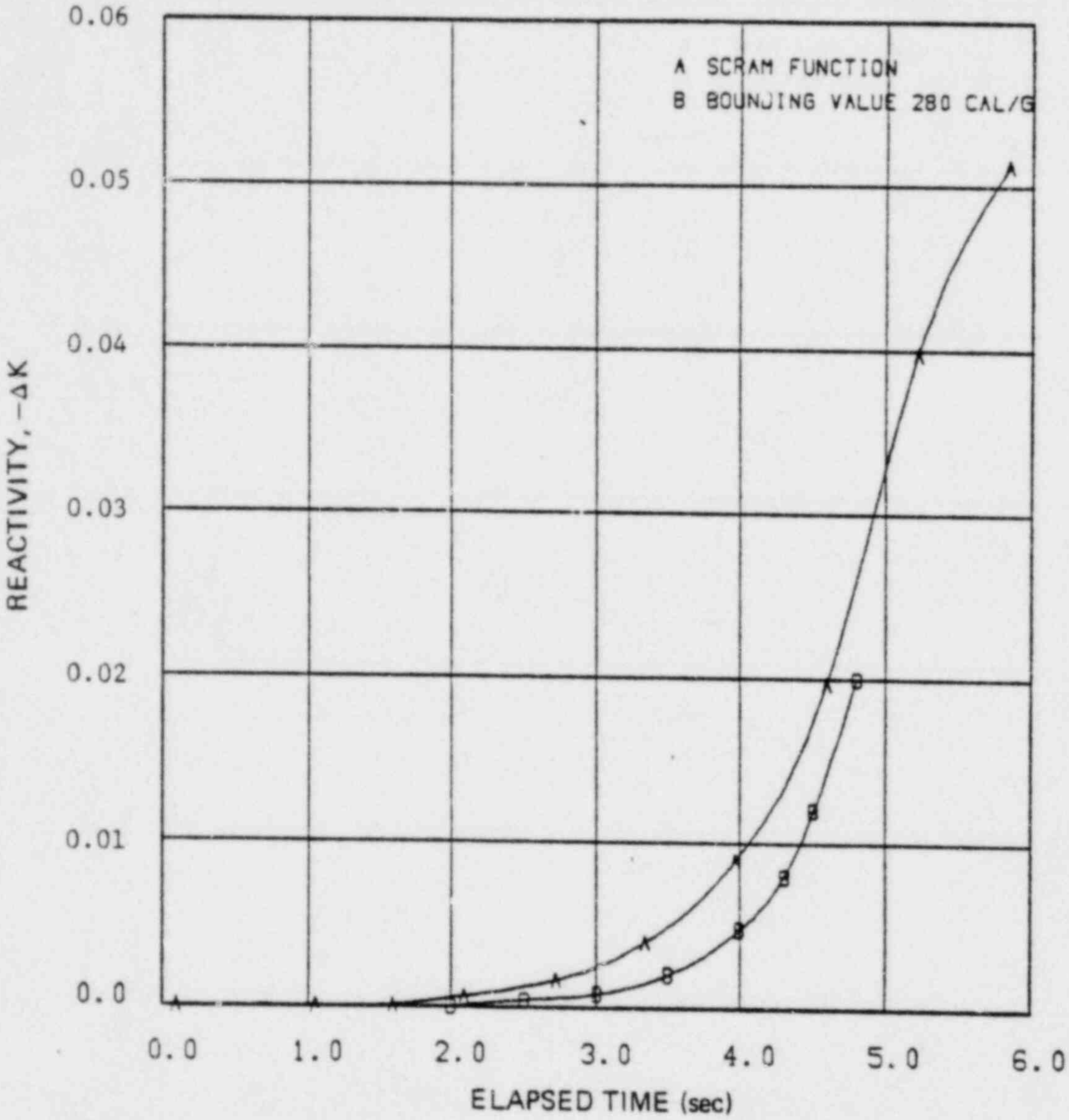


Figure 13. RDA Scram Reactivity Function, Hot Standby

APPENDIX A

TRANSIENT ANALYSIS INITIAL CONDITIONS

S/RV Capacity	84.2%

This valve more accurately represents the capacity of the S/RVs in the "as-installed" conditions.

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