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REVISION 0
CLASS I
JULY 1988

23A5841 REV. 0

SUPPLEMENTAL RELOAD LICENSING SUBMITTAL

FOR

LA SALLE COUNTY STATION UNIT 2

RELOAD 2, CYCLE 3

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IMPORTANT NOTICE REGARDING
CONTENTS OF THIS REPORT

PLEASE READ CAREFULLY

This report was prepared by General Electric solely for Commonwealth Edison Company (CECo) for CECo's use with the United States Nuclear Regulatory Commission (USNRC) for amending CECo's operating license of the La Salle County Station, Unit 2. The information contained in this report is believed by General Electric to be an accurate and true representation of the facts known, obtained or provided to General Electric at the time this report was prepared.

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ACKNOWLEDGEMENTS

The engineering and reload licensing analyses, which form the technical basis of this Supplemental Reload Licensing Submittal, were performed in the Nuclear Fuel and Engineering Services Department by F. T. Bolger.

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1. PLANT-UNIQUE ITEMS (1.0)*

Transient Analysis Basis:	Appendix A
GETAB and Transient Analysis Initial Conditions:	Appendix B

2. RELOAD FUEL BUNDLES (1.0, 2.0, 3.3.1 AND 4.0)

Fuel Type	Cycle Loaded	Number
Irradiated		
8CRB176	1	40
8CRB219	1	260
BP8CRB299L	2	224
New		
BC320C	3	96
BC300D	3	144
Total		764

3. REFERENCE CORE LOADING PATTERN (3.3.1)

Nominal previous cycle core average exposure at end of cycle:	17990 MWd/MT
Minimum previous cycle core average exposure at end of cycle from cold shutdown considerations:	17714 MWd/MT
Assumed reload cycle core average exposure at end of cycle:	19377 MWd/MT
Core loading pattern:	Figure 1

*( ) Refers to area of discussion in General Electric Standard Application for Reactor Fuel, NEDE-24011-P-A-8 (dated May 1986); a letter "S" preceding the number refers to the United States Supplement.

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

Beginning of Cycle, k-effective

Uncontrolled	1.123
Fully Controlled	0.960
Strongest Control Rod Out	0.985
R, Maximum Increase in Cold Core Reactivity with Exposure into Cycle, Delta k	0.005

5. STANDBY LIQUID CONTROL SYSTEM SHUTDOWN CAPABILITY (3.3.2.1.3)

PPM	Shutdown Margin (Delta k) (20 deg.C, Xenon Free)
660	0.037

6. RELOAD-UNIQUE TRANSIENT ANALYSIS INPUT (3.3.2.1.5 AND S.2.2)

Values normally reported in this section are REDY inputs. There were no transients analyzed using REDY.

7. RELOAD-UNIQUE GETAB TRANSIENT ANALYSIS INITIAL CONDITION PARAMETERS (S.2 .2)

Exposure: BOC3 TO EOC3

Fuel Design	Peaking Factors Local	Radial	Axial	R-Factor	Bundle Power(MWT)	Bundle Flow (1000 lb/hr)	Initial MCPR
GE8x8EB*	1.20	1.57	1.40	1.051	6.681	114.9	1.21

*All fuel types are bounded by GE8x8EB.

8. SELECTED MARGIN IMPROVEMENT OPTIONS (S.2.2.2)

Transient Recategorization:	No
Recirculation Pump Trip:	Yes
Rod Withdrawal Limiter:	No
Thermal Power Monitor:	Yes
Improved Scram Time:	No
Exposure Dependent Limits:	No
Exposure Points Analyzed:	1

9. OPERATING FLEXIBILITY OPTIONS (S.2.2.3)

Single-Loop Operation:	Yes
Load Line Limit:	No
Extended Load Line Limit:	Yes
Increased Core Flow	Yes
Flow Point Analyzed:	105%
Feedwater Temperature Reduction:	Yes
ARTS Program:	No
Maximum Extended Operating Domain:	No

10. CORE-WIDE TRANSIENT ANALYSIS RESULTS (S.2.2.1)

Methods Used: GEMINI

Transient	Flux (% NBR)	Q/A (% NBR)	Delta CPR GE8x8EB*	Figure
Exposure Range: BOC3 to EOC3				
Load Rejection Without Bypass	383	115	0.14	2
Loss of Feedwater Heating	119	119	0.11	**
Feedwater Controller Failure	238	111	0.10	3
Exposure Range: BOC3 to EOC3 Extended Load Line Limit				
Load Rejection Without Bypass	328	113	0.12	4
Feedwater Controller Failure	211	109	0.08	5
Exposure Range: Extended EOC with Increased Core Flow				
Load Rejection Without Bypass	414	115	0.15	6
Feedwater Controller Failure	260	112	0.12	7
Exposure Range: Extended EOC with Increased Core Flow and Final Feedwater Temperature Reduction				
Load Rejection Without Bypass	374	114	0.14	8
Feedwater Controller Failure	276	117	0.16	9

*All fuel types are bounded by GE8x8EB.
**See Appendix A.

11. LOCAL ROD WITHDRAWAL ERROR (WITH LIMITING INSTRUMENT FAILURE) TRANSIENT SUMMARY (S.2.2.1)

Limiting Rod Pattern: Figure 10

Rod Block Reading %	Rod Position (Feet Withdrawn)	Delta CPR GE8x8EB*	MLHGR (kW/ft) GE8x8EB*
104	4.0	0.15	18.84
105	4.5	0.18	18.84
106	5.0	0.19	18.84
107	6.5	0.22	18.84
108	12.0	0.23	18.84
109	12.0	0.23	18.84
110	12.0	0.23	18.84

Set Point Selected: 106

12. CYCLE MCPR VALUES (S.2.2)

Non-Pressurization Events

Exposure Range: BOC3 to EOC3

	GE8x8EB*
Loss of Feedwater Heating	1.18
Fuel Loading Error	**
Rod Withdrawal Error	1.26

Pressurization Events

Exposure Range: BOC3 to EOC3

	Option A GE8x8EB*	Option B GE8x8EB*
Load Rejection Without Bypass	1.26	1.22
Feedwater Controller Failure	1.20	1.18

*All fuel types are bounded by GE8x8EB.
**Fuel Loading Error not applicable for C-Lattice plants.

Pressurization Events

Exposure Range: BOC3 to EOC3 Extended Load Line Limit

	Option A GE8x8EB*	Option B GE8x8EB*
Load Rejection Without Bypass	1.24	1.20
Feedwater Controller Failure	1.19	1.17

Exposure Range: Extendad EOC with Increased Core Flow

	Option A GE8x8EB*	Option B GE8x8EB*
Load Rejection Without Bypass	1.27	1.23
Feedwater Controller Failure	1.22	1.20

Exposure Range: Extended EOC with Increased Core Flow and Final Feedwater Temperature Reduction

	Option A GE8x8EB*	Option B GE8x8EB*
Load Rejection Without Bypass	1.26	1.22
Feedwater Controller Failure	1.26	1.24

13. OVERPRESSURIZATION ANALYSIS SUMMARY (S.2.3)

Transient	Steam Line Pressure (psig)	Vessel Pressure (psig)	Plant Response
MSIV Closure (Flux Scram)	1227	1264	Figure 11

*All fuel types are bounded by GE8x8EB.

14. LOADING ERROR RESULTS (S.2.5.4)

Not applicable for C-Lattice plants.

15. CONTROL ROD DROP ANALYSIS RESULTS (S.2.5.1)

Control Rod Drop Accident Analysis is not required for banked position withdrawal sequence plants. NRC approval is documented in NEDE-24011-P-A-8-US, May 1986.

16. STABILITY ANALYSIS RESULTS (S.2.4)

GE SIL-380 recommendations have been included in the pla t [illegible] procedures and/or Technical Specifications; therefore, no s. analysis is required. NRC approval for deletion of a cycle-sp stability analysis is documented in NEDE-24011-P-A-8-US.

17. LOSS-OF-COOLANT ACCIDENT RESULTS (S.2.5.2)

LOCA Method Used: SAFER/GESTR-LOCA

La Salle County Station Units 1 and 2, "SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-31510P, December 1987 (as amended).

Technical Specification MAPLHGR Limits

Fuel Type: BC320C (GE8x8EB)

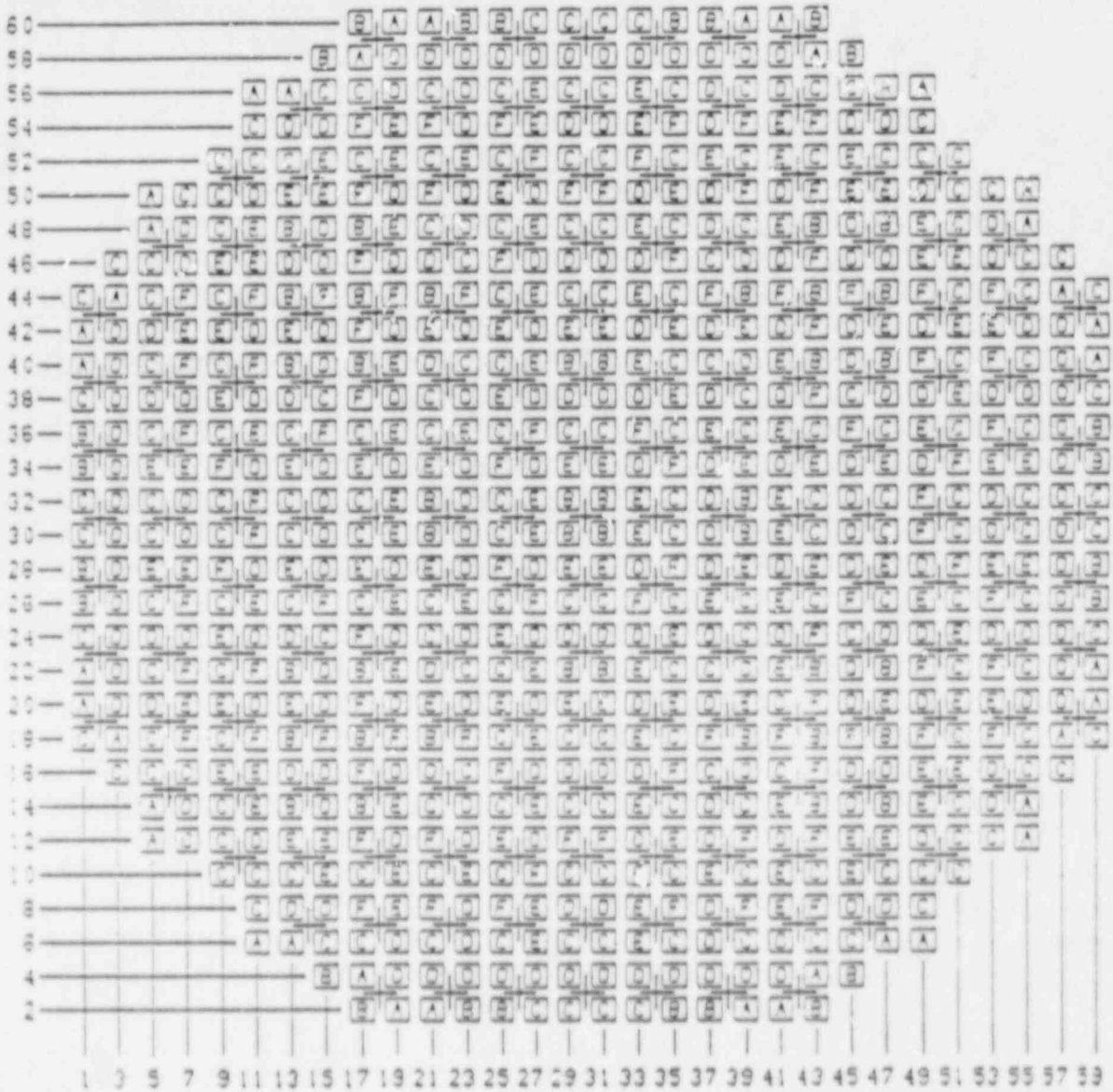
Average Planar Exposure (GWd/ST)	MAPLHGR (KW/ft)	
	Most Limiting	Least Limiting
0.0	11.6	11.6
3.0	--	12.2
4.0	12.2	12.4
6.0	12.6	12.8
8.0	12.9	13.1
10.0	13.1	--
12.5	13.0	13.0
15.0	12.7	12.7
35.0	10.2	10.2
45.0	8.5	8.6
50.0	6.1	6.1

17. LOSS-OF-COOLANT ACCIDENT RESULTS (S.2.5.2)(continued)

Technical Specification MAPLHGR Limits

Fuel Type: BC300D (GE8x8EB)

Average Planar Exposure (GWd/ST)	MAPLHGR (KW/ft)
0.0	11.8
2.0	12.3
3.0	12.6
4.0	12.9
5.0	13.2
10.0	13.5
15.0	13.2
35.0	10.7
45.0	8.7
50.0	6.6



FUEL TYPE	
A = 8CRB176	D = BP8CRB299L
B = 8CRB219	E = BC300D
C = 8CRB219	F = BC320C

Figure 1. Reference Core Loading Pattern

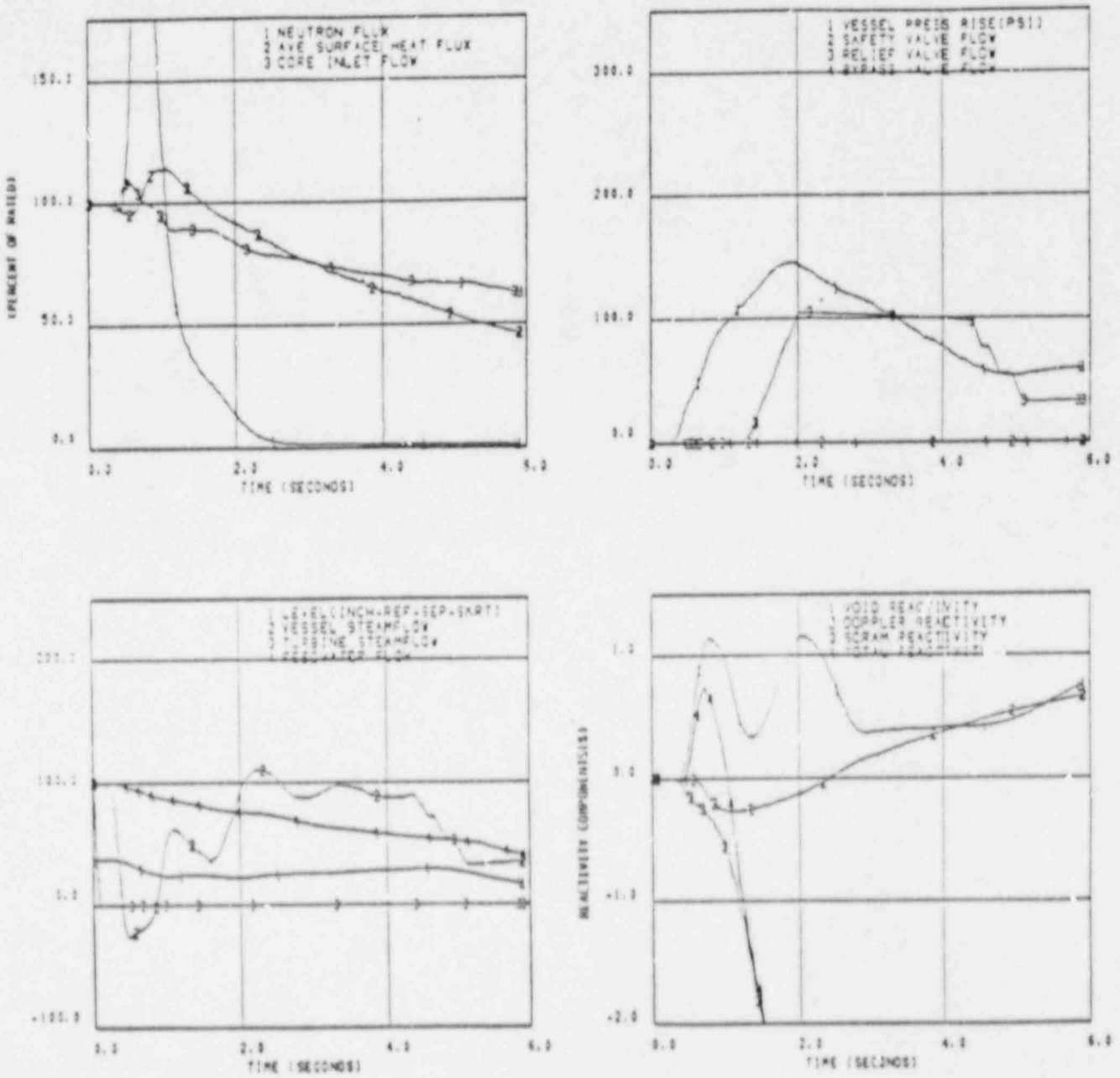


Figure 2. Plant Response to Generator Load Rejection Without Bypass (BOC3 to EOC3)

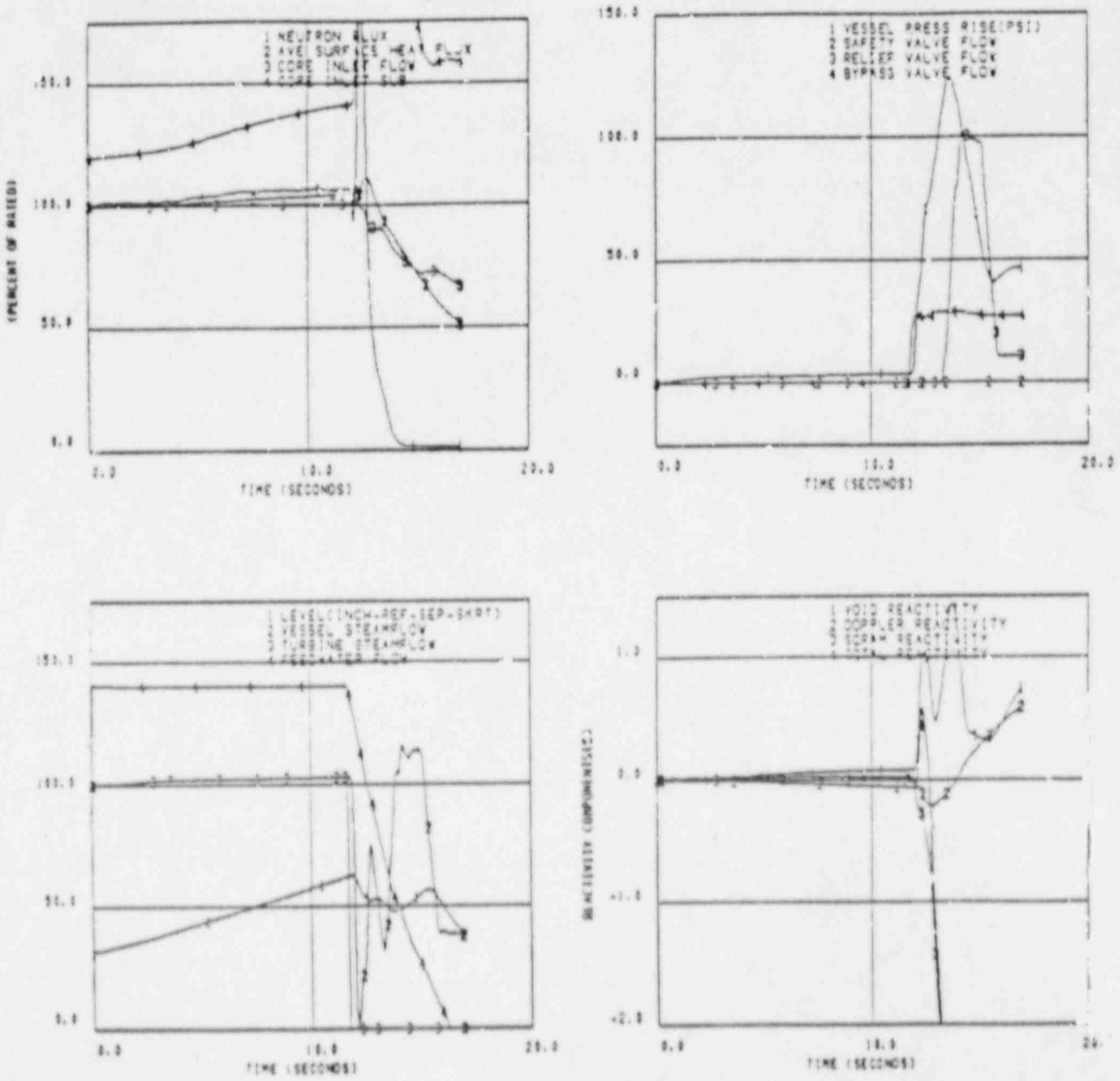


Figure 3. Plant Response to Feedwater Controller Failure (BOC3 to EOC3)

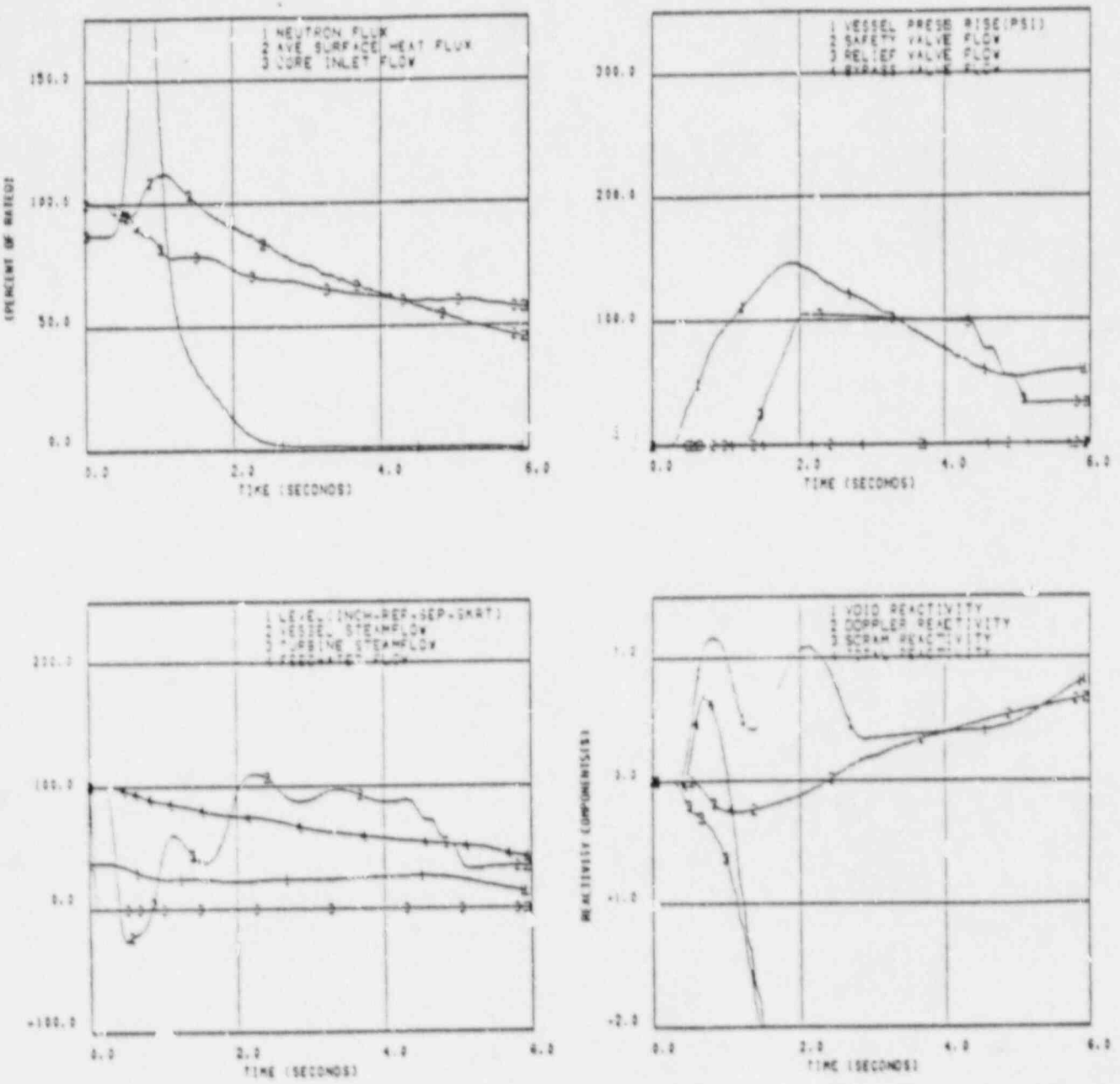


Figure 4. Plant Response to Generator Load Rejection Without Bypass (Extended Load Line [illegible])

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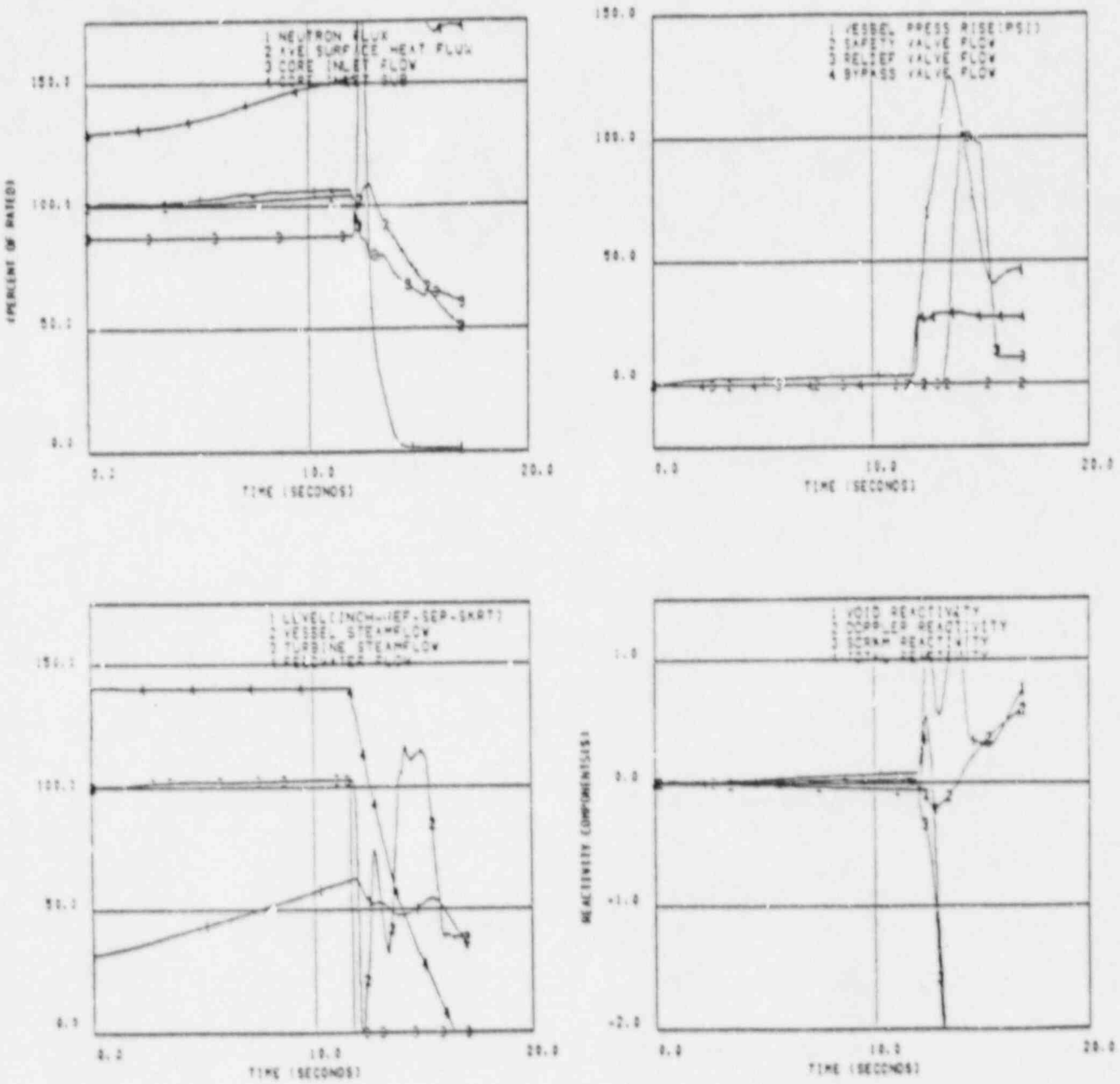

Figure 5. Plant Response to Feedwater Controller Failure (Extended Load Line Limit)

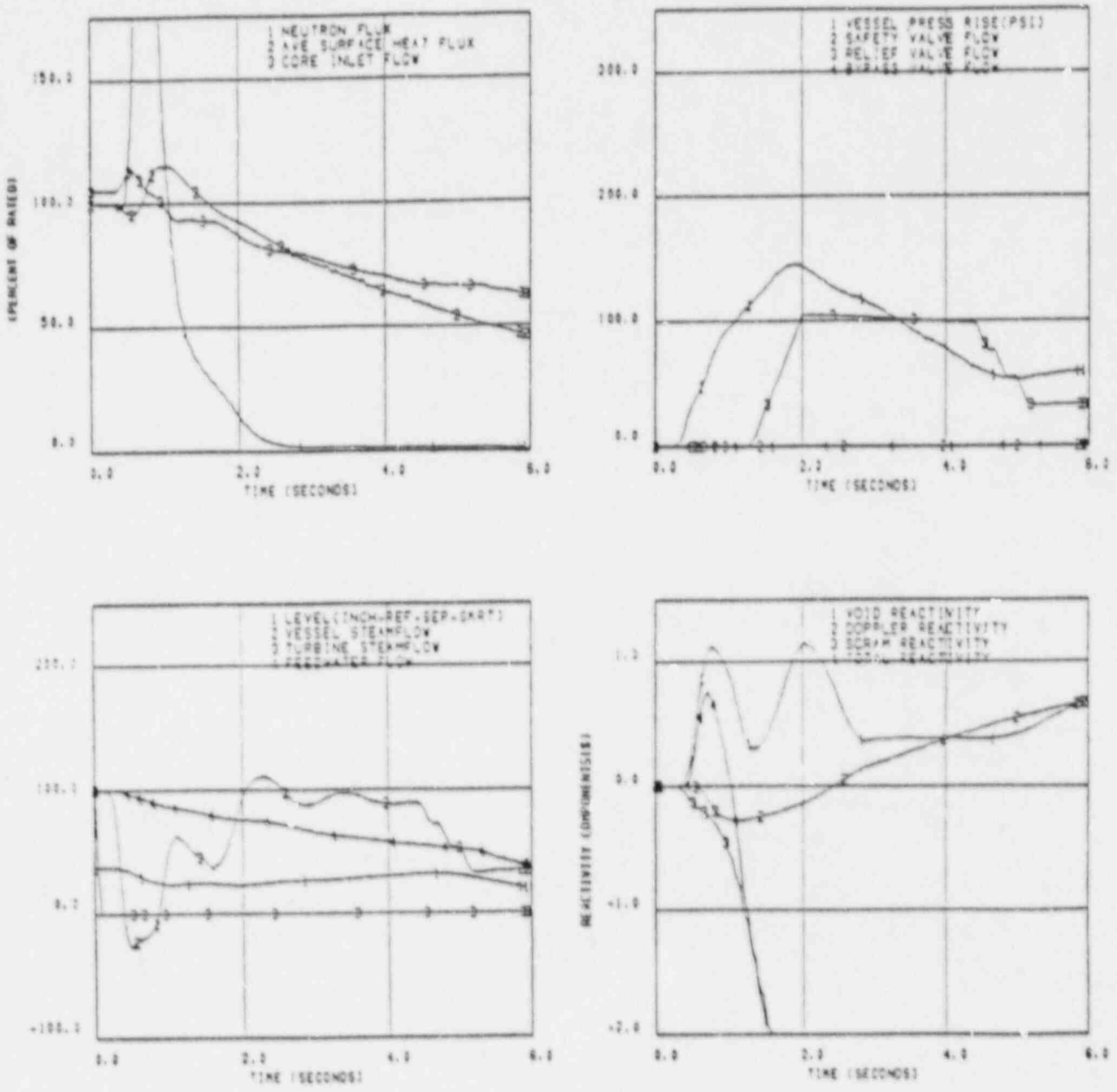

Figure 6. · Plant Response to Generator Load Rejection Without Bypass (Increased Core Flow)

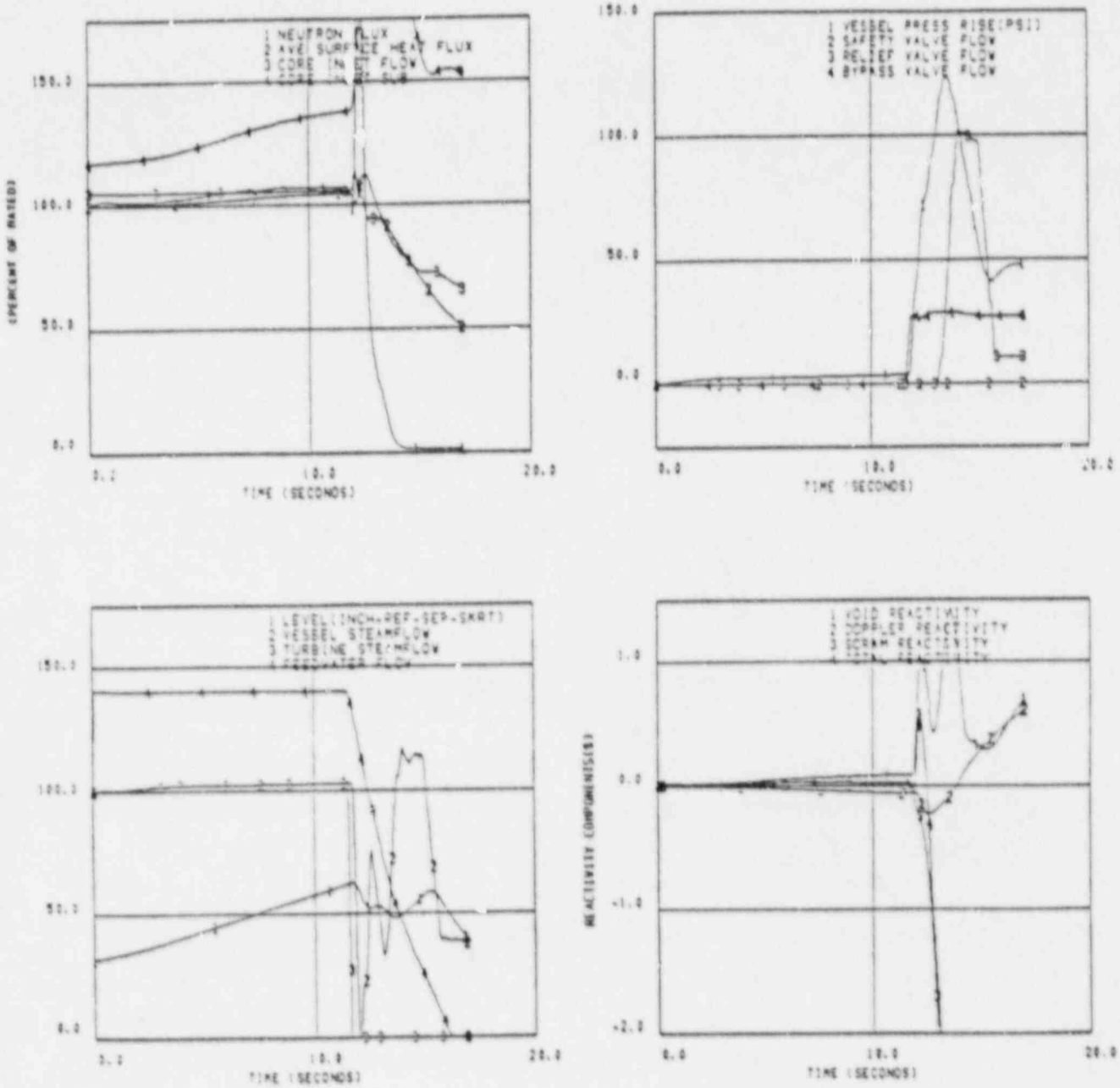

Figure 7. Plant Response to Feedwater Controller Failure (Increase) Core Flow)

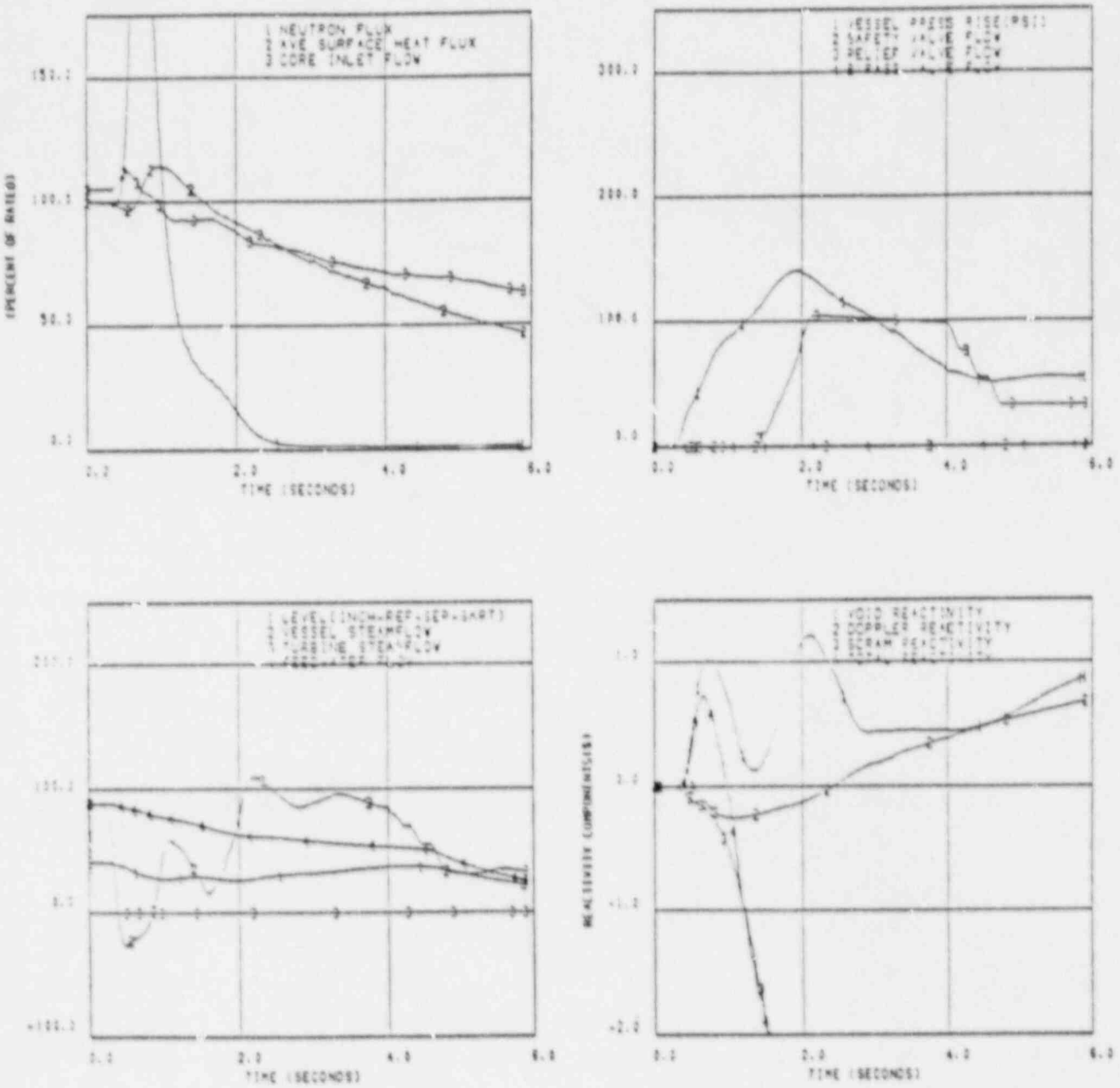

Figure 8. Plant Response to Generator Load Rejection Without Bypass (Increased Core Flow and Final Feedwater Temperature Reduction)

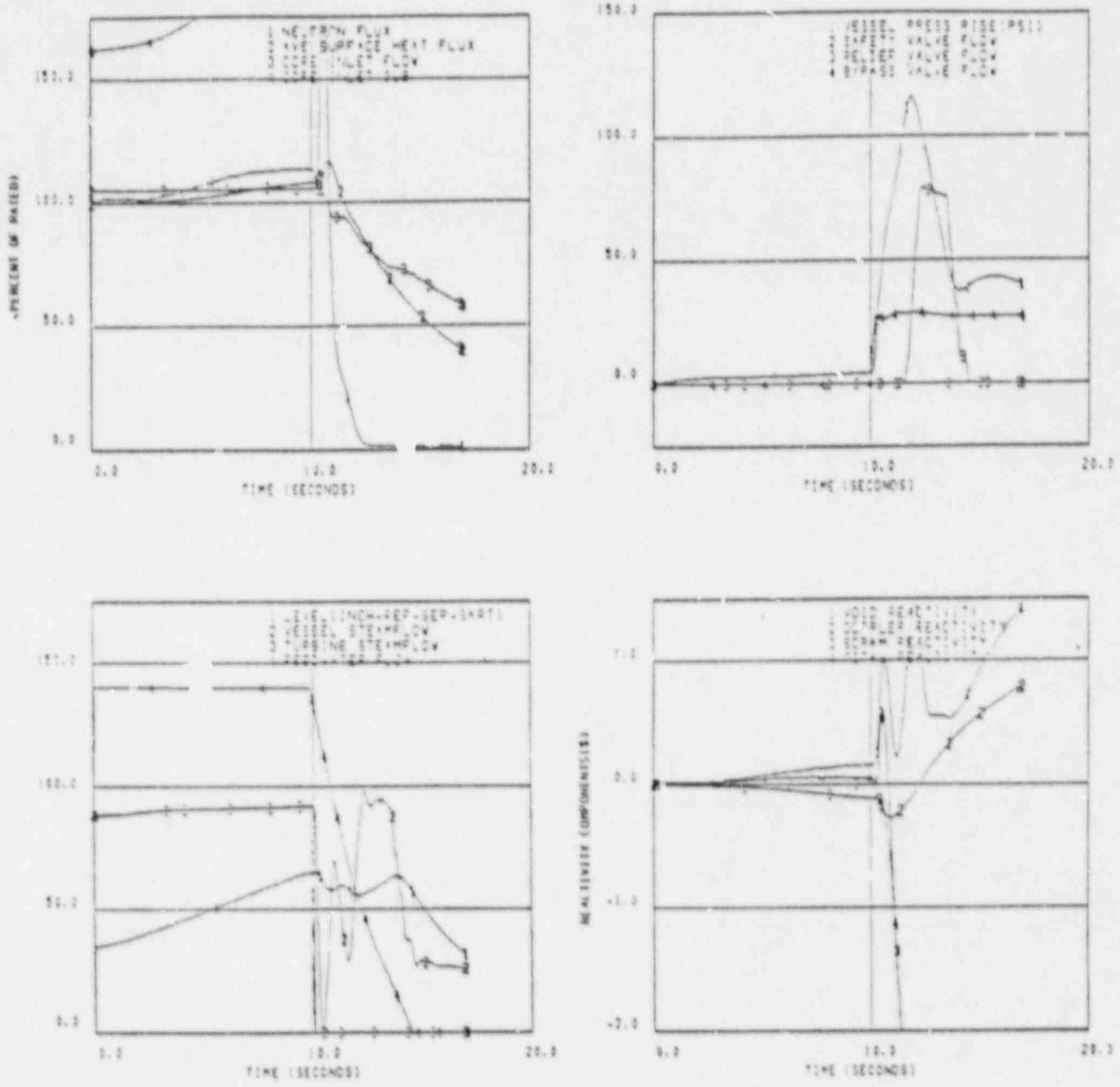

Figure 9. Plant Response to Feedwater Controller Failure (Increased Core Flow and Final Feedwater Temperature Reduction)

	2	6	10	14	18	22	26	30	34	38	42	46	50	54	58
59					18		30		30		18				
55				14		8		8		8		14			
51			18		20		0		0		20		18		
47		14		8		30		30		30		8		14	
43	18		20		4		10		10		4		20		18
39		8		30		26		44		26		30		8	
35	30		0		10		0		0		10		0		30
31		8		30		44		16		44		30		8	
27	30		0		10		0		0		10		0		30
23		8		30		26		44		26		30		8	
19	18		20		4		10		10		4		20		18
15		14		8		30		30		30		8		14	
11			18		20		0		0		20		18		
7				14		8		8		8		14			
3					18		30		30		18				

NOTES:

1. No. indicates number of notches withdrawn out of 48. Blank is a Withdrawn Rod.

2. Error Rod is (26, 35).

Figure 10. Limiting Rod Pattern

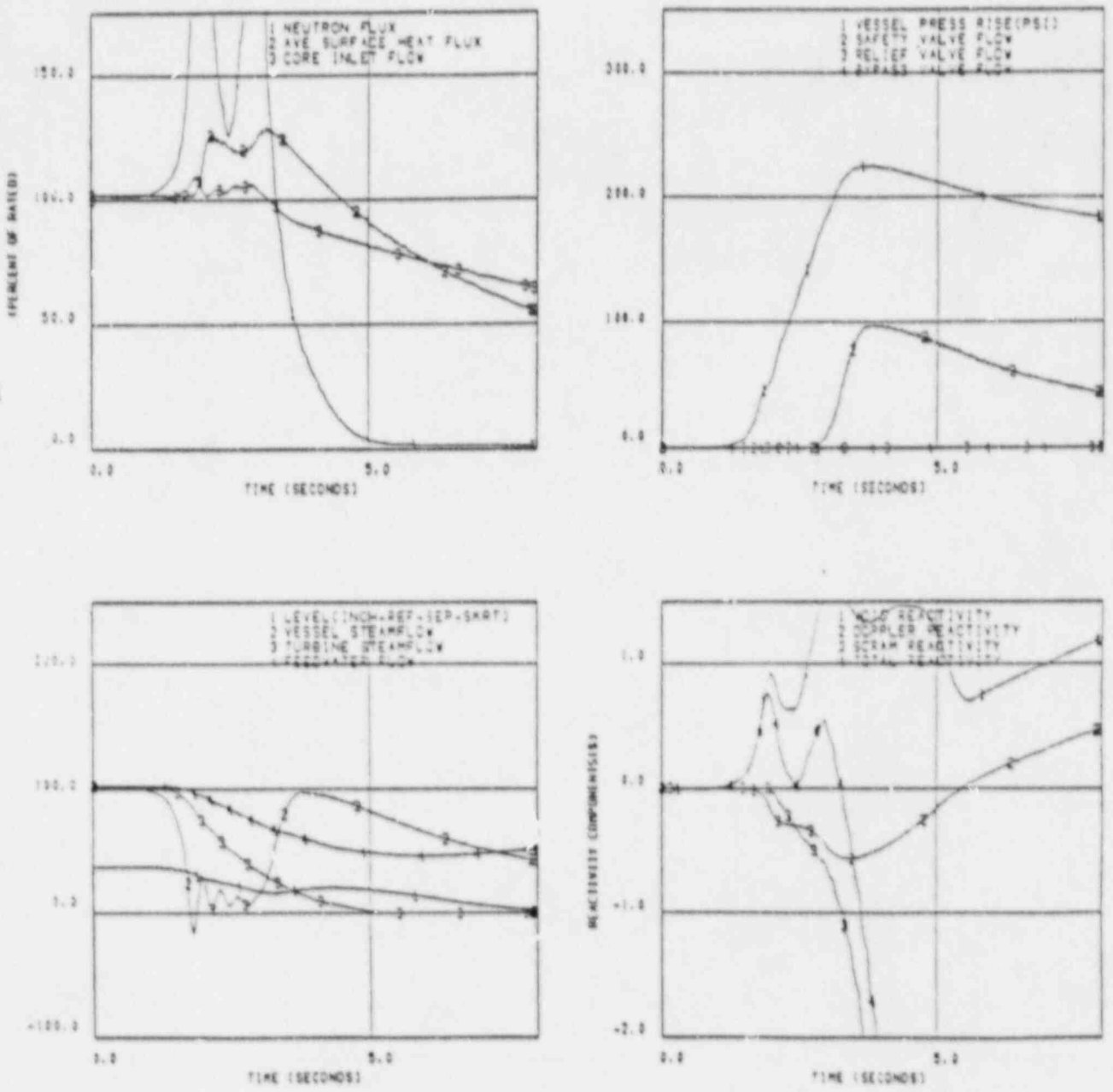

Figure 11. Plant Response to MSIV Closure (Flux Scram)

APPENDIX A
TRANSIENT ANALYSIS BASIS

The Loss of Feedwater Heating event was analyzed using the BWR Simulator Code (Reference A-1). The use of this code is permitted in GESTAR II (Reference A-2).

The Loss of Feedwater Heating Event plot normally reported in Section 10 is not an output of the BWR Simulator Code; therefore, this plot is not included in this document.

REFERENCES

A-1. "Three Dimensional BWR Core Simulator," NEDO-20953A, January 1977.

A-2. "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A-8, May 1986.

APPENDIX B

GETAB AND TRANSIENT ANALYSIS INITIAL CONDITIONS

The values used in the GETAB and Transient Analysis are given in Table B-1. The following values differ from the values reported in NEDE-24011-P-A-8-US, May 1986.

Table B-1

PLANT PARAMETER

Parameter	Analysis Value	NEDE-24011 Value
Thermal Power MWt	3323	3453
Rated Steamflow x 10^6 lb/hr	14.30	14.97
Dome Pressure psig	1006	1020
Non-Fuel Power Fraction	0.038	0.04
Dual Mode Safety/Relief Valves (18)		
Relief Mode Low Setpoint psig	1087	1076
Safety Mode Low Setpoint psig	1162	1165

ADDITIONAL INFORMATION REGARDING THE SUPPLEMENTAL RELOAD LICENSING SUBMITTAL
FOR LA SALLE 2 RELOAD 2/CYCLE 3

Section 3. REFERENCE CORE LOADING PATTERN

Cycle N-1 Incremental Exposure	8200 MWd/ST
Cycle N Exposure Increment	7450 MWd/ST
Cycle N Full Power Capability (if different from above)	-

Section 4. CALCULATED CORE EFFECTIVE MULTIPLICATION AND CONTROL SYSTEM WORTH (NO VOIDS, 20°C)

Cycle Incremental Exposure Corresponding to Minimum Shutdown Margin R-Value	6000 MWD/ST

Section 6. RELOAD-UNIQUE TRANSIENT ANALYSIS INPUT (REDY EVENTS)

EOC Void Fraction (Haling)	REDY Not Used
EOC Bypass Flow Fraction	REDY Not Used
Delayed Neutron Fraction (BOC/EOC)	REDY Not Used
Void Coefficient X 10^3 (BOC/EOC) [Units are $(\Delta k/k)/(\Delta \%$ voids)]	REDY Not Used

Section 10. CORE-WIDE TRANSIENT ANALYSIS RESULTS

Limiting Exposure	Transient	Power (% NBR)	Flow (% NBR)	Flux (% NBR)	Q/A (% NBR)	PSL (psig)	PV (Dome) (psig)	PV (Bottom) (psig)
EOC	TTNBP	100	100	342.6	112.8	1141	1149	1177
EOC	LRNBP	100	100	382.9	114.7	1143	1150	1178
EOC	MSIVF	102	100	484.2	129.1	1227	1232	1264
Not Analyzed	MSIVD							
(PANACEA)	LFWH	100	87	119.4	119.2	N/A	1006	1027 est
EOC	FWCF	100	100	238.1	111.1	1122	1128	1155

ADDITIONAL INFORMATION REGARDING THE SUPPLEMENTAL RELOAD LICENSING SUBMITTAL

FOR LA SALLE 2 RELOAD 2/CYCLE 3

Section 10. CORE-WIDE TRANSIENT ANALYSIS REPORT (CONTINUED)

Were resolved OPL-3 values used for safety and relief valve characteristics? Yes

Assumed MSIV Closure Characteristics:

Time (sec)	MSIV Area (per unit)
0.0	1.0 (fully opened)
0.6	1.0
1.7	0.01
3.0	0.0 (fully closed)

Section 14. ROD BLOCK LINE EQUATION

RB $\leq$0.58W + 50

Section 15. LOADING ERROR RESULTS

Bundle Type for Limiting Misorientation: N/A

ADDITIONAL INFORMATION REGARDING THE SUPPLEMENTAL RELOAD LICENSING SUBMITTAL

FOR LA SALLE 2 RELOAD 2/CYCLE 3

Section 3. REFERENCE CORE LOADING PATTERN

Cycle N-1 Incremental Exposure _____

Cycle N Exposure Increment _____

Cycle N Full Power Capability (if different from above) _____

Section 4. CALCULATED CORE EFFECTIVE MULTIPLICATION AND CONTROL SYSTEM WORTH (NO VOIDS, 20°C)

Cycle Incremental Exposure Corresponding to Minimum Shutdown Margin R-Value _____

Section 6. RELOAD-UNIQUE TRANSIENT ANALYSIS INPUT (REDY EVENTS)

(Provided unless generic LOFH is reported)

EOC Void Fraction (Haling) _____

EOC Bypass Flow Fraction _____

Delayed Neutron Fraction (BOC/EOC) _____

Void Coefficient X 10^3 (BOC/EOC) _____

[Units are (Δk/k)/(Δ% voids)]

Section 10. CORE-WIDE TRANSIENT ANALYSIS RESULTS/ELLLA

Limiting Exposure	Transient	Power (% NBR)	Flow (% NBR)	Flux (% NBR)	Q/A (% NBR)	PSL (psig)	PV (Dome) (psig)	PV (Bottom) (psig)
EOC	TTNBP	100	87	290.6	110.8	1142	1150	1174
EOC	LRNBP	100	87	327.9	112.7	1142	1150	1174
EOC	MSIVF	102	87	458.7	122.4	1228	1232	1259
Not Analyzed	MSIVD							
Not Analyzed	LFWH							
EOC	FWCF	100	87	210.6	109.4	1122	1128	1152

ADDITIONAL INFORMATION REGARDING THE SUPPLEMENTAL RELOAD LICENSING SUBMITTAL

FOR LA SALLE 2 RELOAD 2/CYCLE 3

Section 3. REFERENCE CORE LOADING PATTERN

Cycle N-1 Incremental Exposure _____

Cycle N Exposure Increment _____

Cycle N Full Power Capability (if different from above) _____

Section 4. CALCULATED CORE EFFECTIVE MULTIPLICATION AND CONTROL SYSTEM WORTH (NO VOIDS, 20°C)

Cycle Incremental Exposure Corresponding to Minimum Shutdown Margin R-Value _____

Section 6. RELOAD-UNIQUE TRANSIENT ANALYSIS INPUT (REDY EVENTS)

(Provided unless generic LOFH is reported)

EOC Void Fraction (Haling) _____

EOC Bypass Flow Fraction _____

Delayed Neutron Fraction (BOC/EOC) _____

Void Coefficient X 10^3 (BOC/EOC) _____

[Units are (Δk/k)/(Δ% voids)]

Section 10. CORE-WIDE TRANSIENT ANALYSIS RESULTS/ICF

Limiting Exposure	Transient	Power (% NBR)	Flow (% NBR)	Flux (% NBR)	Q/A (% NBR)	PSL (psig)	PV (Dome) (psig)	PV (Bottom) (psig)
EOC+190 MWd/ST	TTNBP	100	105	372.7	113.9	1141	1149	1178
EOC+190 MWd/ST	LRNBP	100	105	413.9	115.3	1142	1150	1180
EOC+190 MWd/ST	MSIVF	102	105	489.1	127.2	1228	1232	1267
Not Analyzed	MSIVD							
Not Analyzed	LFWH							
EOC+190 MWd/ST	FWCF	100	105	259.7	112.3	1122	1128	1157

ADDITIONAL INFORMATION REGARDING THE SUPPLEMENTAL RELOAD LICENSING SUBMITTAL

FOR LA SALLE 2 RELOAD 2/CYCLE 3

Section 3. REFERENCE CORE LOADING PATTERN

Cycle N-1 Incremental Exposure _____

Cycle N Exposure Increment _____

Cycle N Full Power Capability (if different from above) _____

Section 4. CALCULATED CORE EFFECTIVE MULTIPLICATION AND CONTROL SYSTEM WORTH (NO VOIDS, 20°C)

Cycle Incremental Exposure Corresponding to Minimum Shutdown Margin R-Value _____

Section 6. RELOAD-UNIQUE TRANSIENT ANALYSIS INPUT (REDY EVENTS)

(Provided unless generic LOFH is reported)

EOC Void Fraction (Haling) _____

EOC Bypass Flow Fraction _____

Delayed Neutron Fraction (BOC/EOC) _____

Void Coefficient X 10^3 (BOC/EOC) _____

[Units are $(\Delta k/k)/(\Delta \%$ voids)]

Section 10. CORE-WIDE TRANSIENT ANALYSIS RESULTS/ICF+FFWTR

Limiting Exposure	Transient	Power (% NBR)	Flow (% NBR)	Flux (% NBR)	Q/A (% NBR)	PSL (psig)	PV (Dome) (psig)	PV (Bottom) (psig)
EOC+817 MWd/ST	TTNBP	100	105	341.4	112.5	1137	1145	1173
EOC+817 MWd/ST	LRNBP	100	105	373.6	114.3	1139	1146	1174
EOC+817 MWd/ST	MSIVF	102	105	412.0	125.4	1220	1225	1258
Not Analyzed	MSIVD							
Not Analyzed	LFWH							
EOC+817 MWd/ST	FWCF	100	105	276.2	116.8	1116	1121	1149

REFERENCES

1. Unit 1 Cycle 3 Reload Licensing Submittal and Technical Specification Changes, LOSR 87-74

2. GE Document NEDE-31455, "Extended Operating Domain and Equipment Out of Service for LaSalle County Nuclear Station Units 1 and 2", dated November 1987 with addendum in Attachment 6.

3. GE document NEDC-31510P, "LaSalle County Station Units 1 and 2 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analyses," dated December 1987, Proprietary.

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ATTACHMENT G

GE Document NEDC-31510P, "LaSalle County Station Units 1 and 2 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analyses", Addendum Issued March, 1988, Proprietary.

This document will be sent under separate cover

5102K

ATTACHMENT H

GE STANDARD LICENSING STABILITY ANALYSIS RESULTS

GE Nuclear Energy

August 9, 1988
REP:88-173

cc: W. F. Naughton

Mr. R. A. Roehl
Supervising Fuel Buyer
COMMONWEALTH EDISON COMPANY
Fuel Department, 234 E
P. O. Box 767
Chicago, IL 60690

SUBJECT: LaSalle Unit 2 Reload 2 Stability Analysis

REFERENCE: 1. "Contract between Commonwealth Edison Company and General Electric Company for Fuel Bundle Fabrication and Related Services for Quad Cities Nuclear Power Station and LaSalle County Station," dated January 6, 1986.

ATTACHMENT: LaSalle Unit 2 Reload 2 Standard Licensing Stability Analysis

Dear Mr. Roehl:

Attached are the results of the standard licensing stability analysis for LaSalle Unit 2, Cycle 3. These results are based on approved GESTAR-II models using approved procedures and were calculated in the same way as the Cycle 2 results. However, if LaSalle has a pump trip event similar to that experienced in Cycle 2, they should expect results similar to those observed in Cycle 2.

Very truly yours,

R. E. Parr
Senior Fuel Project Manager
Edison Projects
M/C 174; (408) 925-6526

REP:mg.3

ATTACHMENT 1

LaSalle 2/Cycle 3

The results of the standard licensing stability analysis are given below, consistent with the cycle 2 analysis approach. The results reflect the effects of the more negative C-3 void coefficients and the lower pressure drop GE-8 fuel.

	DECAY RATIO AT THE INTERSECTION OF NATURAL CIRCULATION AND	
	105% Rod Line	Extrap. APRM Rod Block
Core Decay-Ratio	.63	.72
Channel Decay Ratio		
P8x8R/8X8R	.47	.63
GE-8	.42	.56

The plot for this case is shown in Figure 1.

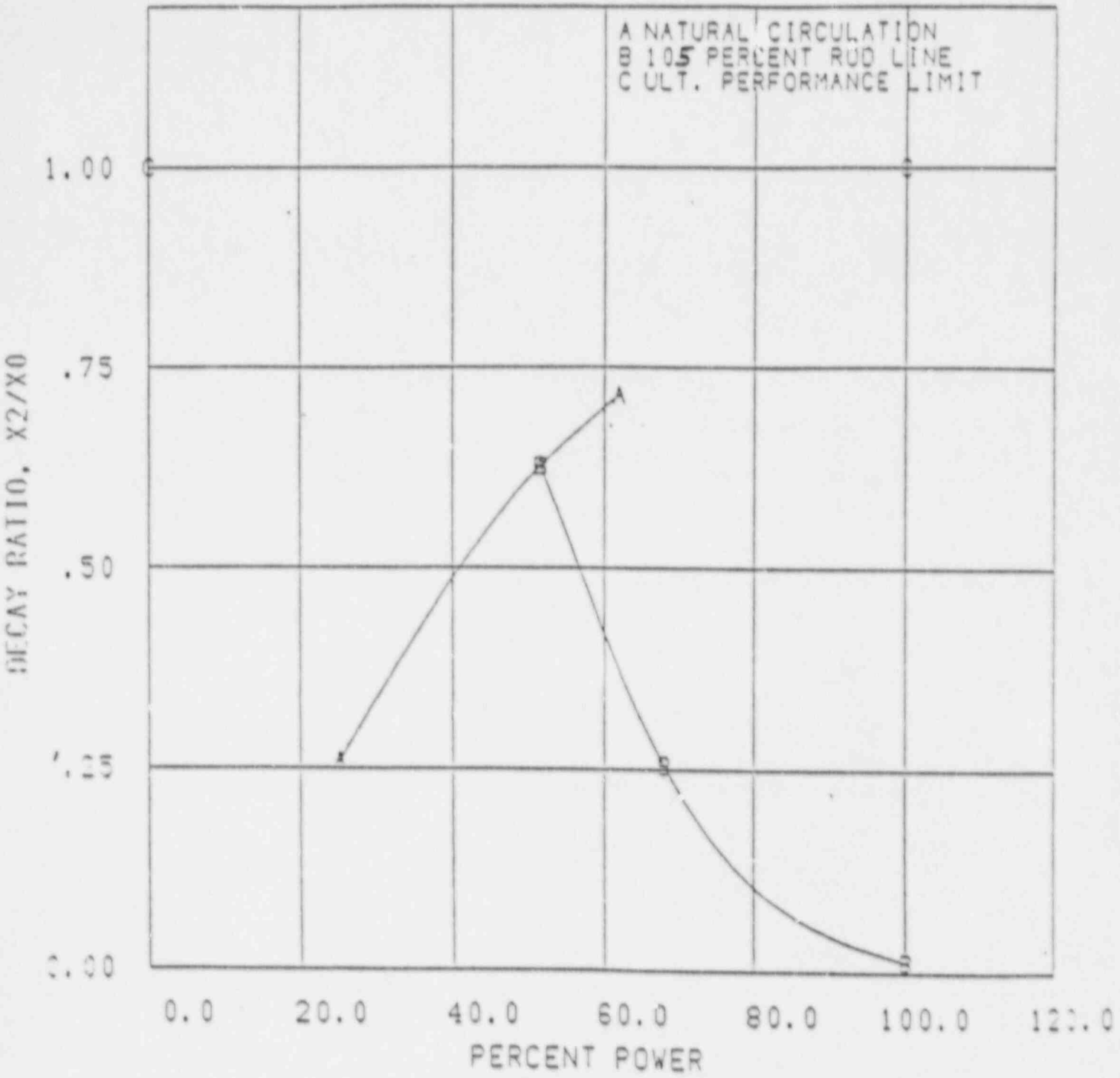

Figure 1. Reactor Core Decay Ratio vs Power