ATTACHMENT

Core Operating Limits Report

Dresden Station

Unit 2

Cycle 17

October 1999

ISSUANCE OF CHANGES SUMMARY

Affected Section	Affected Pages	Summary of Changes	Date
All	All	Original Issue Cycle 17	10/99
Figure 2.2-1	2-2	Figure 2.2-1 and the table below the figure were revised to reflect how the limits are implemented into the core monitoring code[1].	10/12/99
5.2	5-1	Section 5.2 item d was revised to clarify that during coastdown, operation is limited to the lesser of 100% CTP or the CTP calculated from items i or ii	10/12/99
Table 5.2-1	5-2	Table 5.2-1 was revised to a.) relocate the coastdown limits to a separate section of the table and b.) specify the exposures to which the coastdown limits are to be applied[2]	10/12/99

[1] Powerplex can not implement a step change in an operating limit. Therefore, the COLR was revised to reflect a conservative implementation method for use in the Powerplex input deck.

[2] Seq 00 of the COLR identified EOFP = 28,908 MWd/MTU core average exposure. Calculation No. BNDD:99-060 provides the BOC core average exposure = 14,478.3 MWd/MTU. Therefore, EOFP cycle exposure is equal to 28,908 MWd/MTU – 14,478 MWd/MTU = 14,429.7 MWd/MTU.

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REFERENCES

1. Commonwealth Edison Company Docket No. 50-237, Dresden Nuclear Power Station, Unit 2, Facility Operating License, License No. DPR-19.

2. Letter, D.M. Crutchfield to All Power Reactor Licensees and Applicants, Generic Letter 88-16, Concerning the Removal of Cycle-Specific Parameter Limits from Technical Specifications.

4. EMF-2273, Dresden Unit 2 Cycle 17 Plant Transient Analysis, September 1999, NDIT NFM9900186 Seq00.

5. EMF-2275, Dresden Unit 2 Cycle 17 Reload Analysis, September 1999, NDIT NFM9900187 Seq00.

6. Dresden Unit 2 Cycle 17 Neutronics Licensing Report (NLR), July 23, 1999, NDIT NFM9900126 Seq00.

7. EMF-92-149 (P) and Supplement 1 Revision 1, Dresden Units 2 and 3 Generic Coastdown Analysis with ATRIUM-9B, September 1996, NFM NDIT 960137 Revision 1.

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1.0 ROD BLOCK MONITOR (RBM)

1.1 Technical Specification Reference

3.3.M - Rod Block Monitor (RBM)

Table 3.2.E-1 – Control Rod Block Instrumentation

Table 4.2.E-1 – Control Rod Block Instrumentation Surveillance Requirements

1.2 Description

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown in Table 1.2-1.

TABLE 1.2-1

CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATION SETPOINTS

TRIP FUNCTION:	TRIP LEVEL SETTING:
Rod Block Monitor Upscale (Flow Bias)	
Dual Loop Operation	$\leq 0.65\ W_d$ plus 55*
Single Loop Operation	$\leq 0.65\ W_d$ plus 51*

*W_d - percent of drive flow required to produce a rated core flow of 98 Mlb/hr.

2.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE

2.1 Technical Specification References

3.11.A - AVERAGE PLANAR LINEAR HEAT GENERATION RATE

2.2 Description

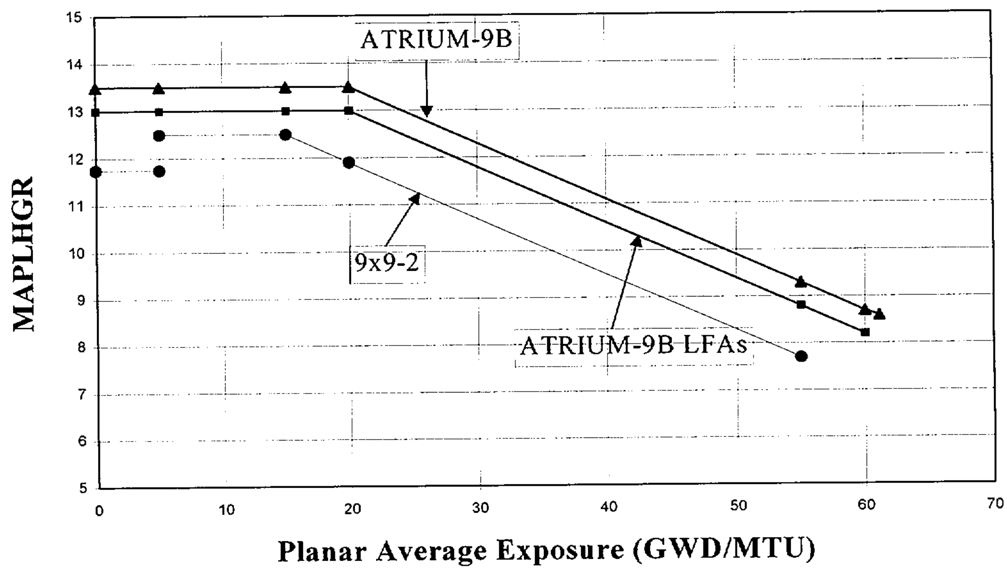
The Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limit versus Planar Average Exposure for each fuel type is determined from Figure 2.2-1.

2.3 MAPLHGR Multipliers

The appropriate multiplicative factor, during single loop operation, to apply to the base MAPLHGR limits specified in Section 2.2 is shown in Table 2.3-1.

FIGURE 2.2-1

MAPLHGR LIMIT VS PLANAR AVERAGE EXPOSURE



Planar Average Exposure (GWd/MTU)	MAPLHGR Limit 9x9-2 (kW/ft)
0	11.75
5	11.75
5.01	12.5
15	12.5
20	11.9
55	7.7

Planar Average Exposure (GWd/MTU)	MAPLHGR Limit ATRIUM-9B (offset and non-offset) (kW/ft)	MAPLHGR Limit ATRIUM-9B LFA (kW/ft)
0	13.5	13.0
5	13.5	13.0
5	13.5	13.0
15	13.5	13.0
20	13.5	13.0
55	9.3	8.8
60	8.7	8.2
61.1	8.6	-

TABLE 2.3-1

SINGLE LOOP OPERATION MAPLHGR LIMIT MULTIPLIERS

Technical Specification	Title of Technical Specification	Multiplicative Factor 9x9-2	Multiplicative Factor ATRIUM-9B (offset, non-offset, and LFA)
3.11.A & 3.6.A Action 1.d	Average Planar Linear Heat Generation Rate Recirculation Loops	0.90	0.90

3.0 STEADY STATE LHGR

3.1 Technical Specification Reference

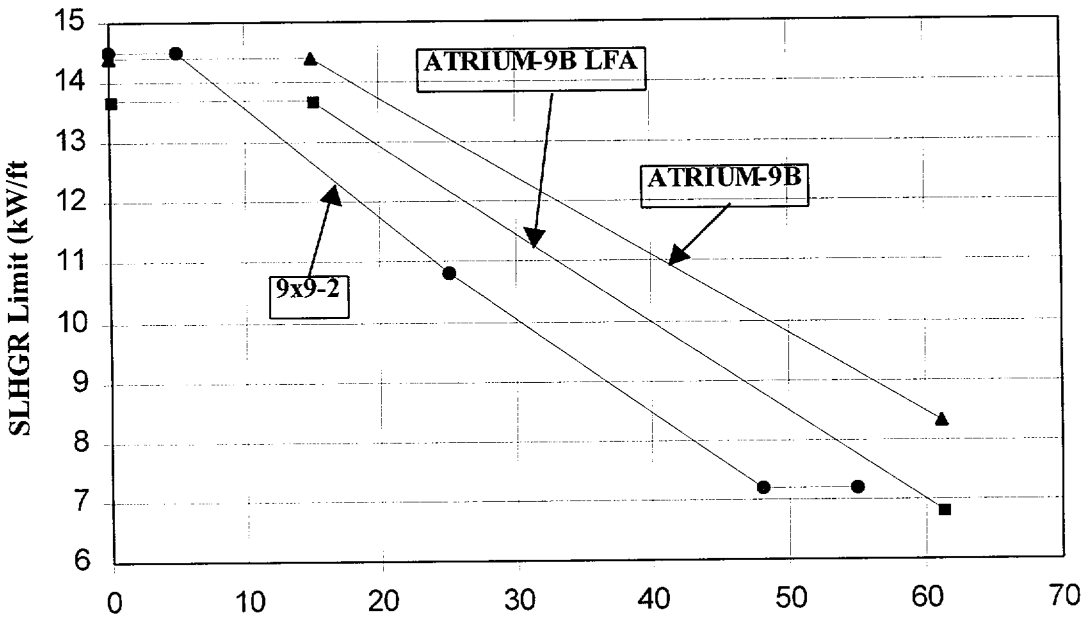
3.11.D - STEADY STATE LINEAR HEAT GENERATION RATE

3.2 Description

The Steady State LHGR (SLHGR) limit versus Planar Average Exposure for each fuel type is determined from Figure 3.2-1.

FIGURE 3.2-1

STEADY STATE LHGR (SLHGR) LIMIT VS. PLANAR AVERAGE EXPOSURE



Planar Average Exposure (GWd/MTU)	SLHGR Limit 9x9-2 (kW/ft)
0	14.5
5.0	14.5
25.2	10.8
48.0	7.2
55	7.2

Planar Average Exposure (GWd/MTU)	SLHGR Limit ATRIUM-9B LFA (kW/ft)	SLHGR Limit ATRIUM-9B (offset and non-offset) (kW/ft)
0	13.7	14.4
15.0	13.7	14.4
61.1	6.84	8.32

4.0 TRANSIENT LHGR

4.1 Technical Specification Reference

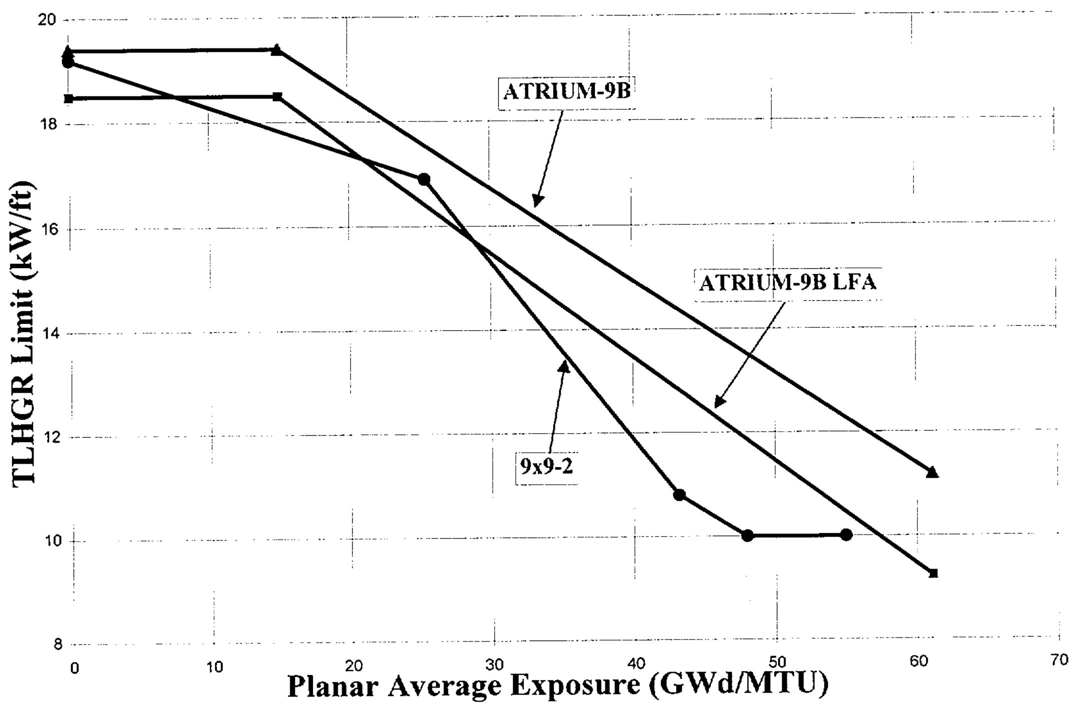
3.11.B - TRANSIENT LINEAR HEAT GENERATION RATE

4.2 Description

The Transient LHGR (TLHGR) limit versus Planar Average Exposure for each fuel type is determined from Figure 4.2-1.

FIGURE 4.2-1

TRANSIENT LHGR (TLHGR) LIMIT VS. PLANAR AVERAGE EXPOSURE



Planar Average Exposure (GWd/MTU)	TLHGR Limit 9x9-2 (kW/ft)
0	19.2
25.4	16.9
43.2	10.8
48.0	10.0
55	10.0

Planar Average Exposure (GWd/MTU)	TLHGR Limit ATRIUM-9B LFA (kW/ft)	TLHGR Limit ATRIUM-9B (offset and non-offset) (kWft)
0	18.5	19.4
15.0	18.5	19.4
61.1	9.24	11.2

5.0 MINIMUM CRITICAL POWER RATIO

5.1 Technical Specification References

3.11.C - MINIMUM CRITICAL POWER RATIO

5.2 Description

a. The Operating Limit MCPRs for D2C17 are listed in Table 5.2-1 for 9x9-2 and ATRIUM-9B (including LFAs). The OLMCPRs calculated for D2C17 are based on Technical Specification CRD Scram Insertion Speeds (Technical Specification 3.3.E). When necessary the Operating Limit MCPR from Table 5.2-1 is supplemented by Table 5.2-2 as appropriate.

b. During Manual Flow Control, the Operating Limit MCPR for each fuel type at reduced core flow conditions can be determined from (i) or (ii), whichever is greater:

   i. Figure 5.2-1 using the appropriate flow rate, or

   ii. The Operating Limit MCPR determined from Table 5.2-1 as appropriate and supplemented by Table 5.2-2 as appropriate.

c. Automatic Flow Control is not supported for D2C17

d. During coastdown, operation is limited to the lesser of 100% CTP or the following[1]

   i. Apply the appropriate coastdown limits as described in Section 5.2.b and maintain core thermal power as follows:

$$\text{CTP (\%rated)} \leq 100 - 10 * \left(\frac{\text{current\_exposure(MWd/MTU)} - (\text{EOFP} + 1500)(\text{MWd/MTU})}{1000}\right)$$

   ii. Or apply the appropriate non-coastdown limits as described in Section 5.2.b and monitor and maintain core thermal power as follows:

$$\text{CTP(\%rated)} \leq 100 - 10 * \left(\frac{\text{current\_exposure(MWd/MTU)} - \text{EOFP(MWd/MTU)}}{1000}\right)$$

[1]EOFP is equal to a D2C17 core average exposure of 28,908 MWd/MTU

TABLE 5.2-1

OPERATING LIMIT MCPR

OLMCPR for Operation ≤ **13,800** MWd/MTU Cycle Exposure		
Operating Scenario	**9x9-2 Fuel Operating Limit MCPR**	**ATRIUM-9B[1] Operating Limit MCPR**
Normal Operation[2]	1.48	1.45
Single Loop Operation	1.49	1.46

13,800 MWd/MTU < OLMCPR for Cycle Exposure ≤ **14,429.7** MWd/MTU		
Operating Scenario	**9x9-2 Fuel Operating Limit MCPR**	**ATRIUM-9B[1] Operating Limit MCPR**
Normal Operation[2]	1.51	1.48
Single Loop Operation	1.52	1.49

OLMCPR for Coastdown Operation (Cycle Exposure > **14,429.7** MWd/MTU)		
Operating Scenario	**9x9-2 Fuel Operating Limit MCPR**	**ATRIUM-9B[1] Operating Limit MCPR**
Coastdown[3]	1.59	1.52
Coastdown and SLO Operation	1.60	1.53

[1] Results presented are for both the offset, non-offset, and LFA designs.

[2] Normal Operation results include operation with Feedwater Heaters Out of Service (FHOOS) for up to a 100°F reduction in feedwater temperature.

[3] The 0.08/0.04 MCPR penalty adder for 9x9-2/ATRIUM-9B fuel during coastodwn operation includes the effects of FHOOS for up to a 100°F reduction in feedwater temperature. During coastdown operation if the limits in Table 5.2-1 are not applied, core thermal power must be monitored and maintained in as noted in Section 5.2.

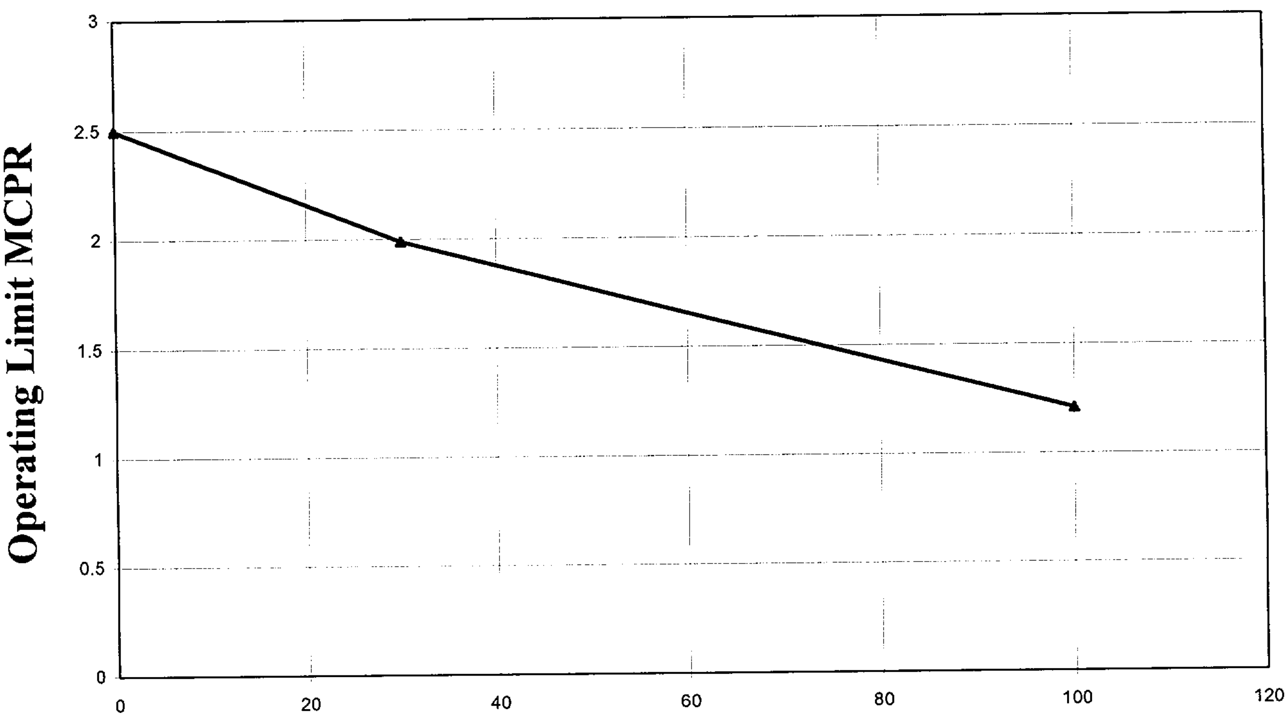
TABLE 5.2-2

BYPASS VALVE DEGRADATION OLMCPR ADDERS

Bypass Valve Delay Time (msec)	9x9-2 OLMCPR Adder (ΔCPR)	ATRIUM-9B (offset, non-offset, and LFA) OLMCPR Adder (ΔCPR)
$0 \leq t \leq 50$	0	0
$50 < t < 75$	0	0
$75 \leq t < 135$	0.01	0.01
$135 \leq t < 1078$	0.02	0.02
$1078 \leq t < 1150$	0.03	0.03
$1150 \leq t < 1288$	0.03	0.04
Bypass valves inoperable or ($t \geq 1288$)	0.03	0.05

FIGURE 5.2-1

OPERATING LIMIT MCPR FOR MANUAL FLOW CONTROL



Core Flow (% Rated, 98 Mlb/hr)
110% Maximum Flow (Technical Specification 4.6.A)

Total Core Flow (% Rated)	Operating Limit MCPR for ATRIUM-9B (offset and non-offset) and 9x9-2 Fuel
100	1.21
30	1.99
0	2.50

6.0 METHODOLOGY

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC in the latest approved revision or supplement of the topical reports describing the methodology. These Methodologies are listed in Technical Specification 6.9.A.6.b.[1]

[1] The current approved exposure limits for ATRIUM-9B fuel are 48/50/60 MWd/MTU assembly average/rod average/peak pellet exposure respectively based on Technical Specification Reference 8. SPC has received NRC approval in EMF-85-74 Revision 0 Supplements 1 and 2 (P)(A) to extend assembly average, rod average, and peak pellet licensing exposures to 48/55/66 MWd/MTU respectively. ComEd has requested to incorporate this document into the Technical Specifications. However, since the current approved exposures have not been incorporated into the Technical Specifications, the D2C17 core will continue to be monitored per the Reference 8 exposures.

Dresden Administrative Technical Requirements

Section 5

Dresden Unit 2 Cycle 17
Reload and Transient Analysis Results

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D2C17 CYCLE SPECIFIC ANALYSES RESULTS

This section provides the ΔCPR results and the core response figures corresponding to the D2C17 transient analyses. The cycle specific results provided in this section correspond to the Chapter 15 UFSAR sections which refer to the Dresden Administrative Technical Requirements for the current cycle information. The corresponding UFSAR sections are also provided.

TABLE 1 D2C17 TRANSIENT ANALYSES ΔCPR RESULTS

Event (% Power/ % Flow)	UFSAR Section	9x9-2 ΔCPR	ATRIUM-9B[1] ΔCPR
Load Rejection No Bypass (100/100)	15.2.2	0.36	0.34
Load Rejection No Bypass (100/87)	15.2.2	0.32	0.28
Turbine Trip No Bypass (100/100)[2]	15.2.3.1	0.36	0.34
Turbine Trip No Bypass (100/87)[2]	15.2.3.1	0.32	0.28
Feedwater Flow Controller Failure (100/100)	15.1.2	0.38	0.35
Feedwater Flow Controller Failure (100/87)	15.1.2	0.33	0.31
Feedwater Flow Controller Failure with Feedwater Heater Out of Service (100/100)	15.1.2	0.39	0.36
Feedwater Flow Controller Failure with Feedwater Heater Out of Service (100/87)	15.1.2	0.35	0.33
Loss of Feedwater Heating	15.1.1	0.24	0.24
Control Rod Withdrawal Error	15.4.2	0.32	0.32
Fuel Loading Error- Mislocated Bundle	15.4.7	0.27	0.27
Fuel Loading Error- Misoriented Bundle	15.4.8	0.08	0.08

[1] Results presented are for the offset, non-offset, and LFA designs
[2] Transient graphical response provided for the limiting LRNB only. LRNB bounds TTNB for D2C17 based on maximum vessel pressure response and neutron flux.

FIGURE 1

Feedwater Controller Failure (FWCF)
at 100% Power/ 100% Flow
with Feedwater Heaters Out of Service (FHOOS)
Key Parameters
(UFSAR 15.1.2)

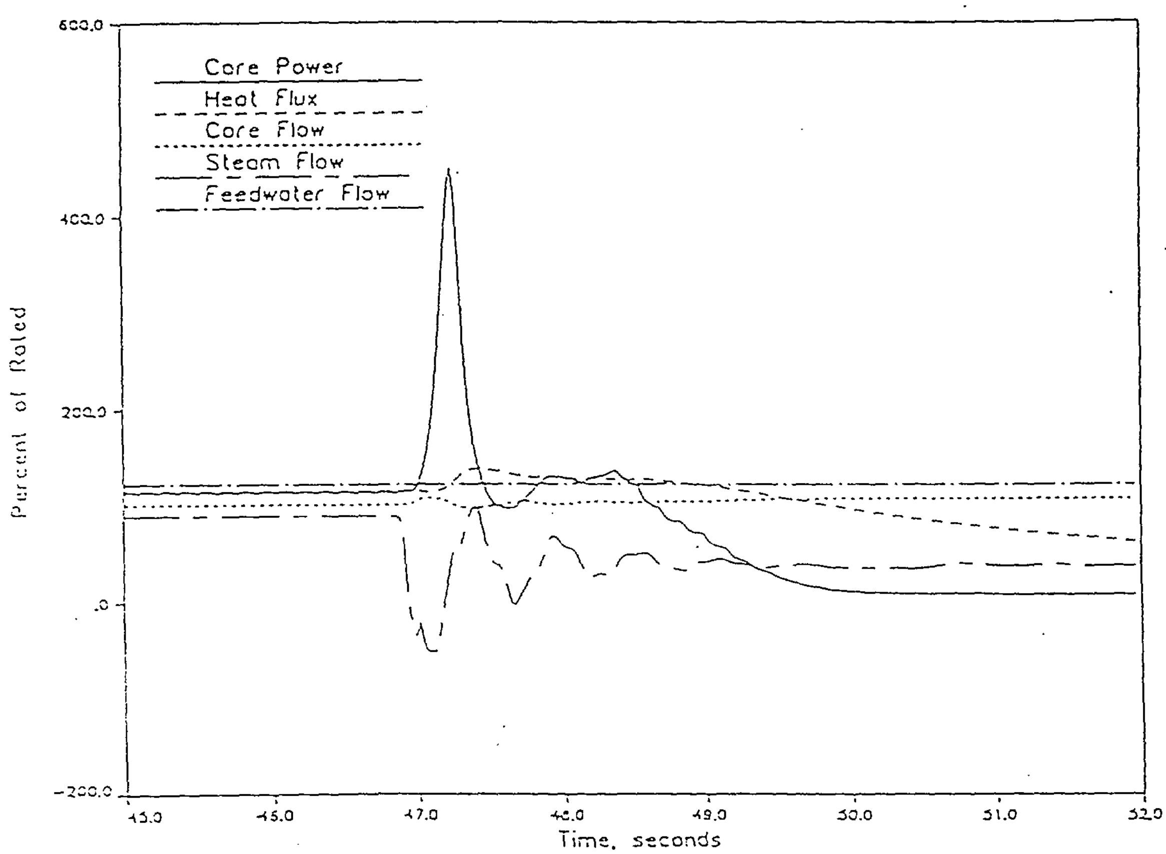

FIGURE 2
Feedwater Controller Failure (FWCF)
at 100% Power/ 100% Flow
with Feedwater Heaters Out of Service (FHOOS)
Vessel Water Level
(UFSAR 15.1.2)

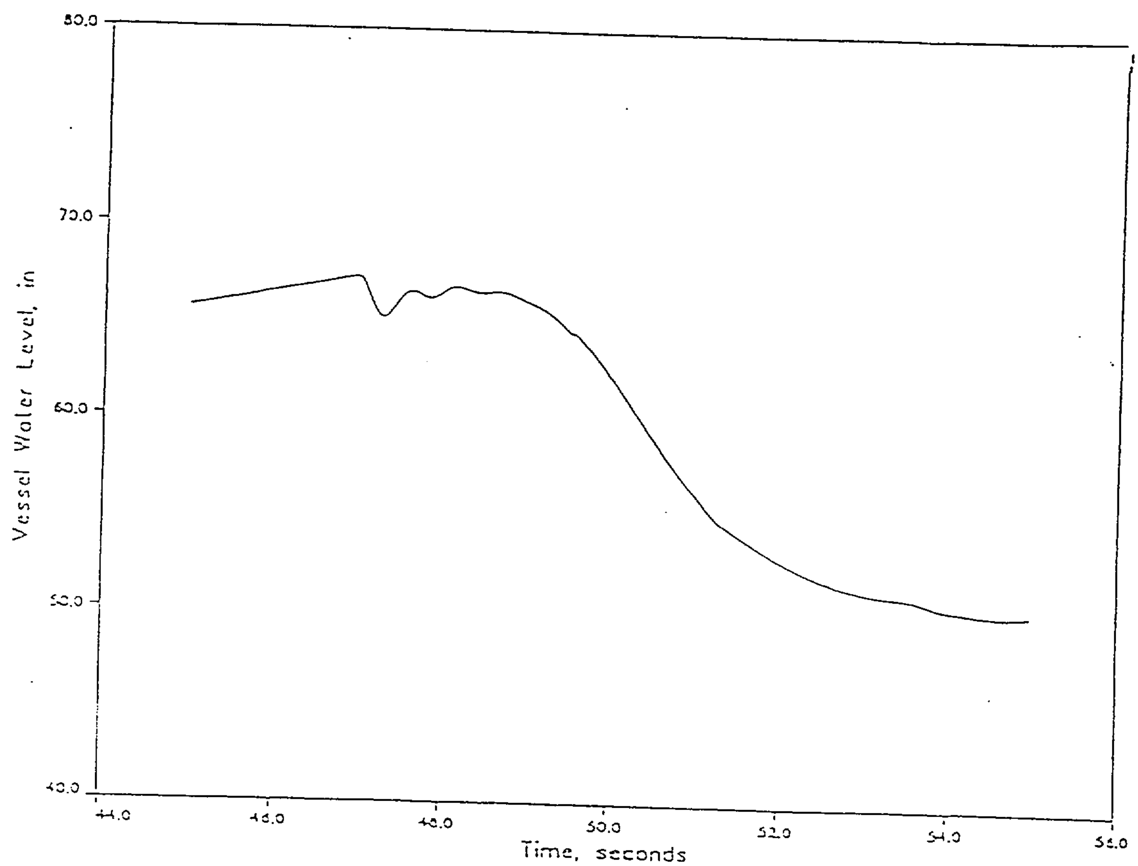

FIGURE 3

Feedwater Controller Failure (FWCF)
at 100% Power/ 100% Flow
with Feedwater Heaters Out of Service (FHOOS)
Vessel Pressure Response
(UFSAR 15.1.2)

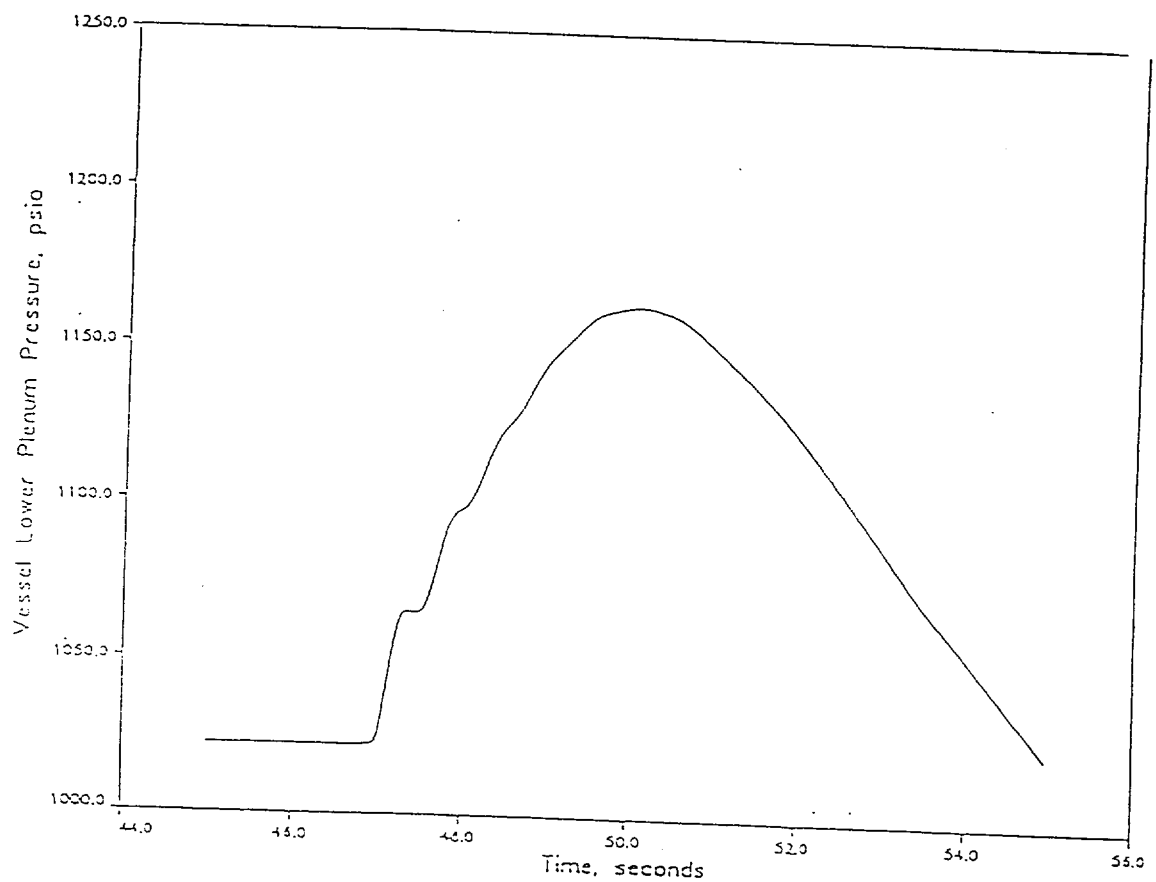

FIGURE 4

Load Rejection No Bypass (LNRB)
at 100% Power/ 100% Flow
KEY PARAMETERS
(UFSAR 15.2.2)

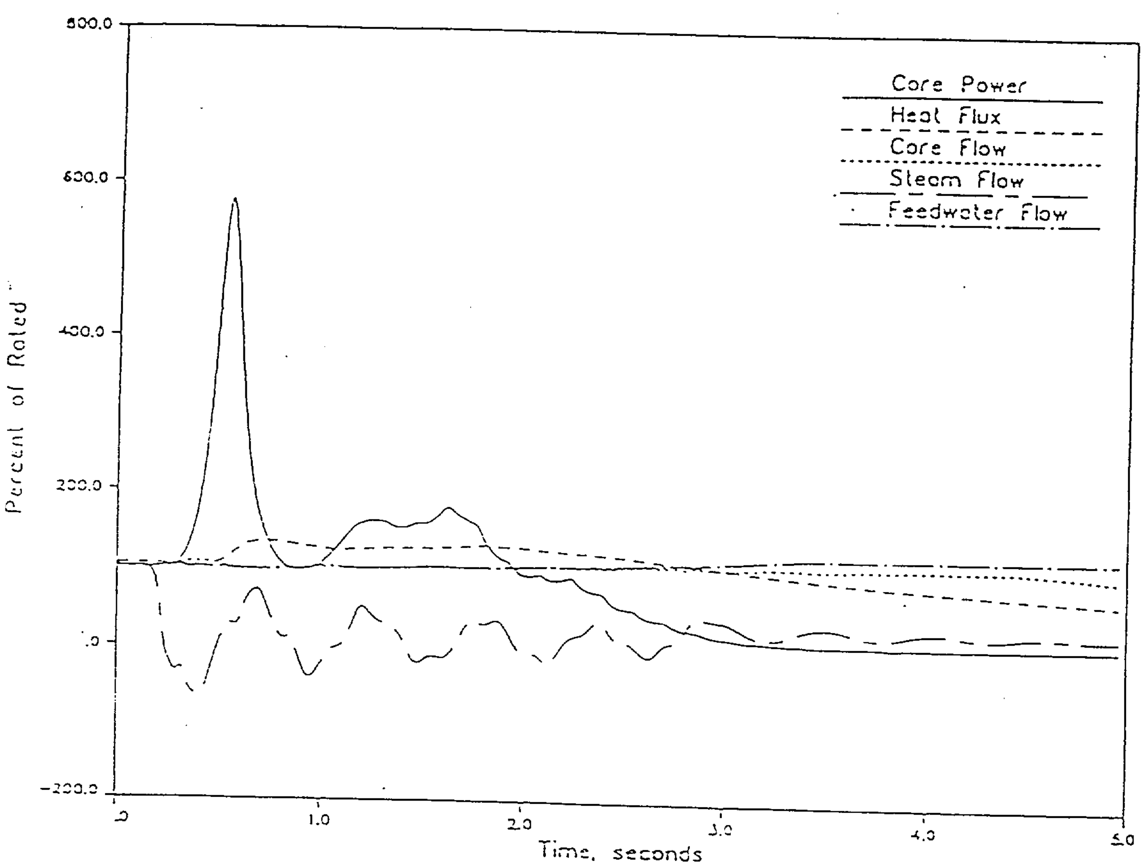

FIGURE 5

Load Rejection No Bypass (LNRB)
at 100% Power/ 100% Flow
Vessel Water Level
(UFSAR 15.2.2)

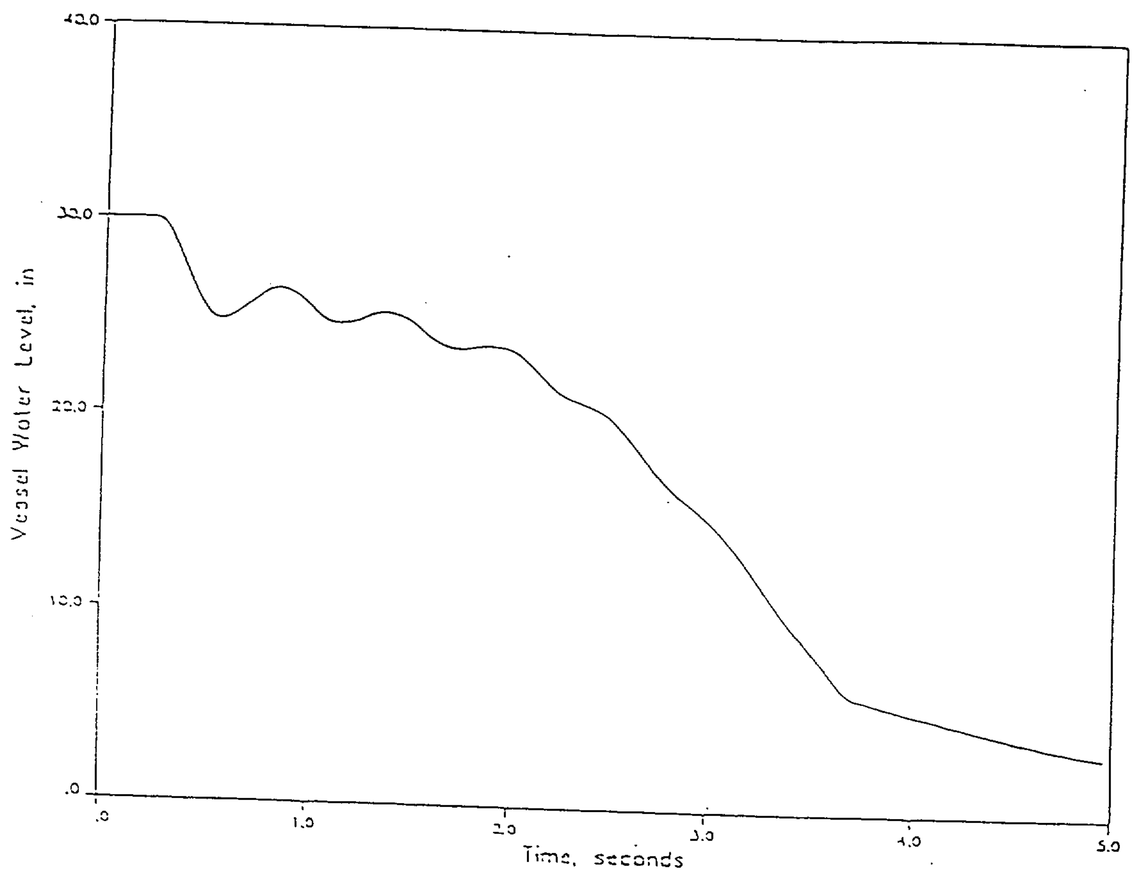

FIGURE 6

Load Rejection No Bypass (LNRB)
at 100% Power/ 100% Flow
Vessel Pressure Response
(UFSAR 15.2.2)

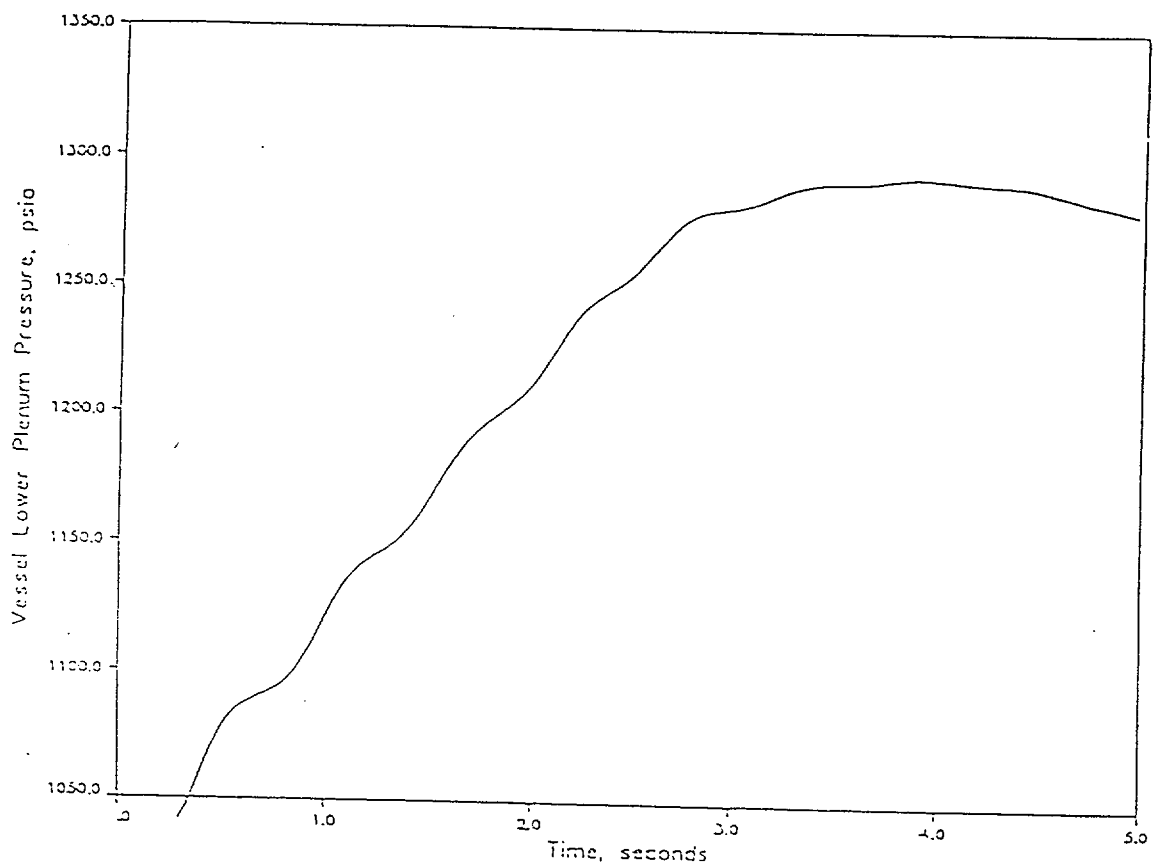

FIGURE 7

Main Steam Line Isolation Valve (MSIV) Closure
at 100% Power/ 87% Flow
Key Parameters
(UFSAR 15.2.4)

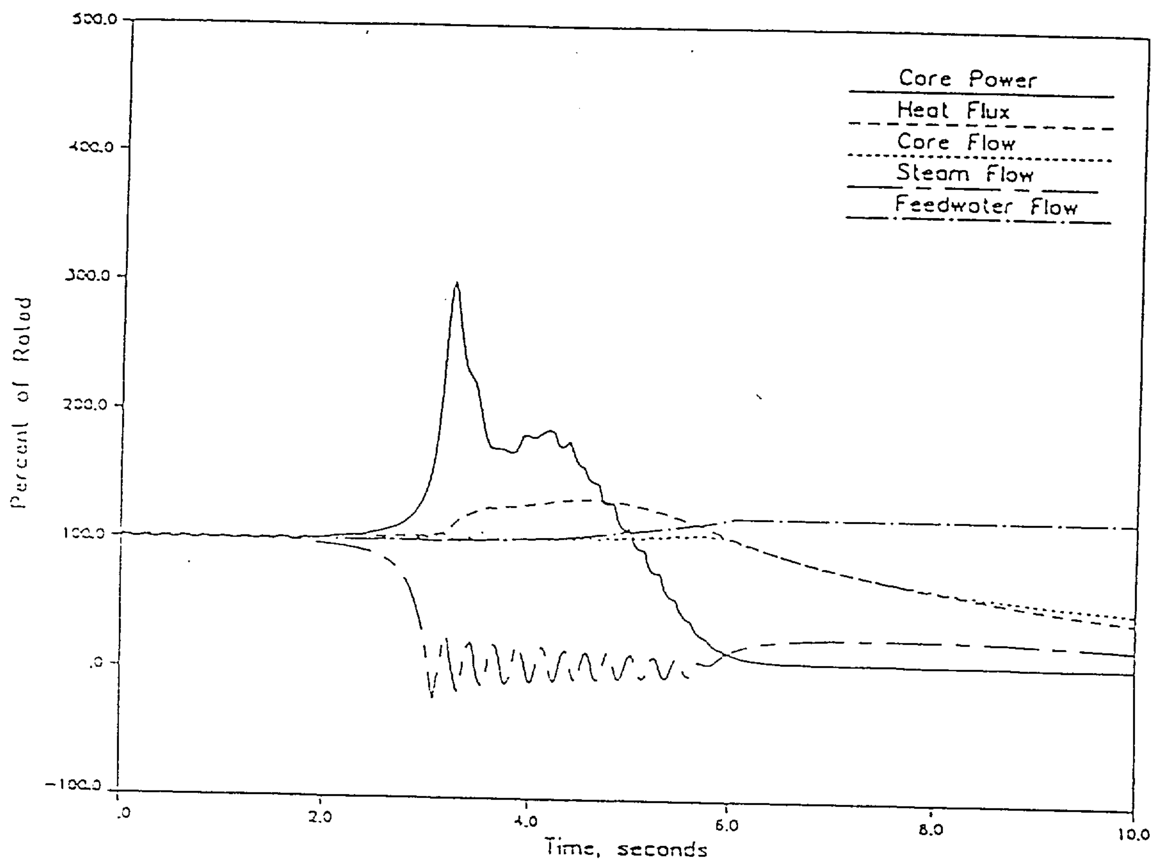

FIGURE 8

Main Steam Line Isolation Valve (MSIV) Closure
at 100% Power/ 87% Flow
Vessel Water Level
(UFSAR 15.2.4)

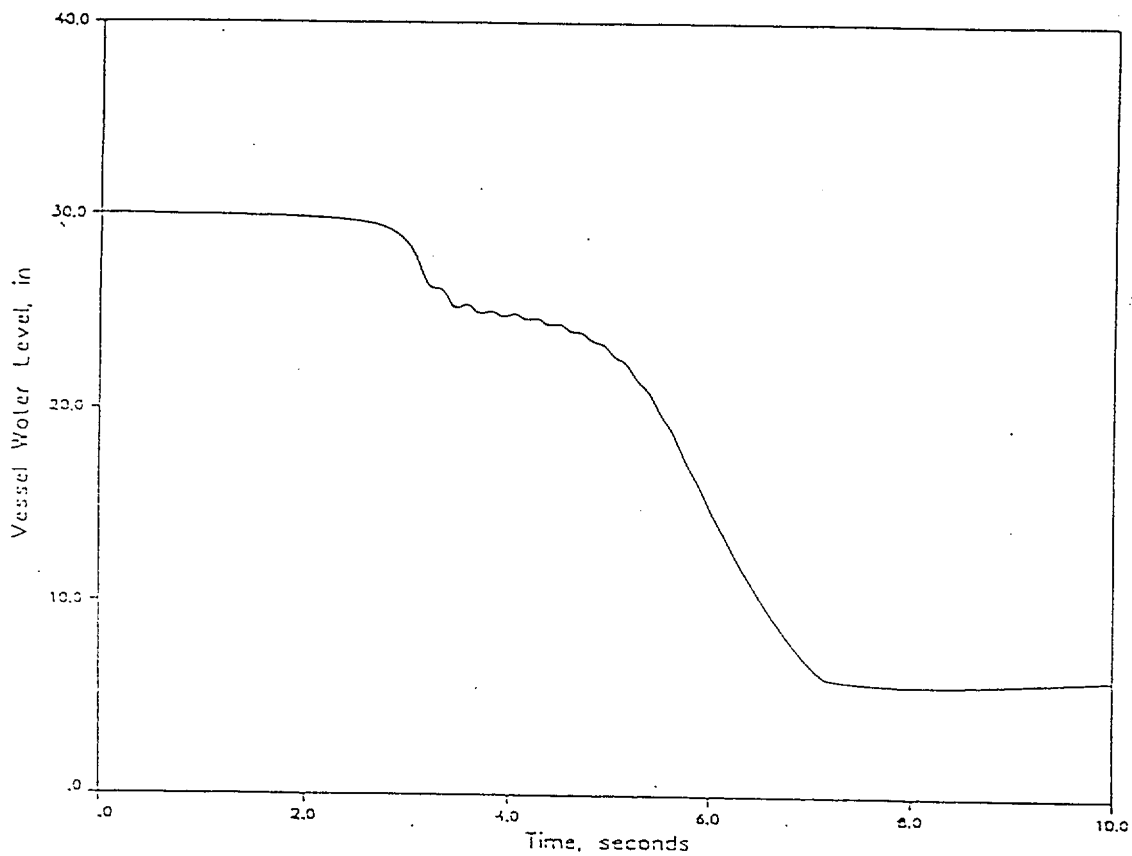

FIGURE 9

Main Steam Line Isolation Valve (MSIV) Closure
at 100% Power/ 87% Flow
Vessel Pressure Response
(UFSAR 15.2.4)