Commonwealth Edison Company
LaSalle Generating Station
2601 North 21st Road
Marseilles, IL 61341-9757
Tel 815-357-6761

ComEd

May 19, 2000

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

LaSalle County Station, Unit 2
Facility Operating License No. NPF-18
NRC Docket No. 50-374

Subject: Unit 2 Cycle 8 Core Operating Limits Report for Operation at Uprated Power Conditions Using the Maximum Extended Load Line Limit

Reference: Letter from D. M. Skay, (U.S. NRC), to O.D. Kingsley, (Commonwealth Edison (ComEd) Company), "LaSalle – Issuance of Amendments Regarding Power Uprate (TAC Nos. MA6070 and MA6071)," dated May 9, 2000.

LaSalle County Station, Unit 2 is currently preparing for power ascension to the uprated power level that was approved on May 9, 2000, by the NRC in Amendment 125 to Facility Operating License NPF-18. To support operation at this uprated power condition, a revision to the LaSalle County Station, Unit 2, Core Operating Limits Report (COLR) is necessary to incorporate the results of the cycle specific analyses for the current operating cycle (L2C8), including operation with the Maximum Extended Load Line Limit (MELLL).

In accordance with Technical Specifications Section 6.6A.6.d, "Core Operating Limits Report," and 10 CFR 50.4, "Written Communications," ComEd is submitting the COLR to the NRC.

Should you have any questions concerning this letter, please contact Mr. Frank A. Spangenberg, III, Regulatory Assurance Manager, at (815) 357-6761, extension 2383.

Respectfully,

for

Charles G. Pardee
Site Vice President
LaSalle County Station

Attachment

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – LaSalle County Station

A001

Administrative Technical Requirements

Appendix B (Amendment 38)

LaSalle Unit 2 Cycle 8

Core Operating Limits Report

and

Reload Transient Analysis Results

May 2000

Section 1

LaSalle Unit 2 Cycle 8

Core Operating Limits Report

May 2000

Issuance of Changes Summary

Affected Section	Affected Pages	Summary of Changes	Date
All	All	Original Issue (Cycle 8)	3/99
All	All	Incorporated changes to thermal limits due to uprate and MELLLA operation, revised LHGR and MAPLHGR limits, and necessary administrative changes.	5/00

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Table of Contents

References

1. Commonwealth Edison Company Docket No. 50-374, LaSalle County Station, Unit 2 Facility Operating License, License No. NPF-18.

2. Letter from D. M. Crutchfield to All Power Reactor Licensees and Applicants, Generic Letter 88-16; Concerning the Removal of Cycle-Specific Parameter Limits from Tech Specs, dated October 4, 1988.

3. LaSalle Unit 2 Cycle 8 Neutronics Licensing Report (NLR), NDIT NFM960103, Sequence No. 3, March 2000.

4. LaSalle Unit 2 Cycle 8 Reload Analysis, EMF-96-125, Revision 2, March 1999.

5. LaSalle Unit 2 Cycle 8 Plant Transient Analysis, EMF-96-124(P), Rev. 3, March 1999.

6. LOCA Break Spectrum Analysis for LaSalle Units 1 and 2, EMF-2174(P), March 1999.

7. LaSalle LOCA-ECCS Analysis MAPLHGR Limits for ATRIUM-9B fuel, EMF-2175(P), March 1999.

8. LaSalle Extended Operating Domain (EOD) and Equipment Out of Service (EOOS) Safety Analysis for ATRIUM-9B Fuel, EMF-95-205(P), Rev. 2, June 1996.

9. ARTS Improvement Program analysis for LaSalle County Station Units 1 and 2, NEDC-31531P, December 1993 and Supplement 1, June 1998 (Removal of Direct Scram Bypassed Limit).

10. Lattice-Dependent MAPLHGR Report for LaSalle County Station Unit 2 Reload 6 Cycle 7, 24A5162AA, Revision 0, December 1994.

11. Lattice-Dependent MAPLHGR Report for LaSalle County Station Unit 2 Reload 5 Cycle 6, 23AA7209AA, Revision 1, June 1993.

12. Errata and Addenda Sheet to NEDC-31510P, originally issued March, 1998. addenda issued October 1991. (MAPLHGR limits for reloaded GE fuel initially loaded in Cycle 5).

13. General Electric Standard Application for Reactor Fuel (GESTAR), NEDE-24011-P-A-13, August 1996.

14. "Project Task Report, LaSalle County Station, Power uprate Evaluation, Task 407: ECCS Performance," GE report number GE-NE-A1300384-39-01, Revision 0, Class 3, dated September 1999.

15. Evaluation of a Postulated Slow Turbine Control Valve Closure Event for LaSalle County Station, Units 1 and 2, GE-NE-187-13-0792, Revision 2, July 1998.

16. Transient Analysis Evaluation for LaSalle 3 TCV Operation at Power Uprate and MELLLA Conditions, NFM:BSA:00-025, R.W. Tsai to D. Bost, April 13, 2000.

17. "Updated Transient Analysis: Abnormal Start-up of an Idle Recirculation Loop for LaSalle County Nuclear Station, Units 1 and 2", B33-00296-03P, March 1998 and "LaSalle Unit 2 Cycle 8 Abnormal Idle Recirculation Loop Startup Analysis", DEG:99:070, D. Garber to R. Chin, March 8, 1999.

18. "TIP Symmetry Testing", JHR:97:021, J.H. Riddle to R. Chin, January 20, 1997 and "TIP Symmetry Testing", DEG:99:085, D.Garber to R. Chin, March 23, 1999

19. "Use of SUBTIP Methodology with TIP Symmetry Testing Above 50 Percent Power", DEG:99:087, D. Garber to R.Chin, March 24, 1999

20. "On-Site and Off-Site Reviews of the GE Turbine Control Valve Slow Closure Analysis", T.Rieck to G.Spedl, NFS:BSS:93-117, May 19, 1993.

21. "LaSalle Units 1 and 2 Operating Limits with Multiple Equipment Out of Service (EOOS)", NFS:BSA:95-024, April 6, 1995.

22. NFM Calculation No. BSA-L-99-07, MAPFACf Thermal Limit Multiplier for 105% Maximum Core Flow

23. Reference Not Used.

24. "ComEd GE9/GE10 LHGR Improvement Program" J11-03692-LHGR, Revision 1, February 2000.

25. "LaSalle County Station Power Uprate Project", Task 201: Reactor Power/Flow Map, GE-NE-A1300384-07-01, Revision 1, September 1999

26. Reference Not Used

27. LaSalle Unit 2 Cycle 8 Principal Transient Analysis Parameters, EMF-95-167, Rev. 3, September 1998

28. LaSalle Unit 2 Cycle 8 Mid-Cycle Power Uprate Licensing Report, EMF-2387, April 2000.

29. BND calcnote, L2C8 LHGR Adjustment for Fuel Assembly Type 1 (Bundle 2074/3861) for 105% Power Uprate LOFWH TOPs Violation, NFM:BNDL:00-015, April 14, 2000

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

1. Average Planar Linear Heat Generation Rate (APLHGR) (3/4.2.1)

1.1 Tech Spec Reference:
Tech Spec 3.2.1

1.2 Description:
1.2.1 GE Fuel

The MAPLHGR Limit is determined using the Lattice-Type MAPLHGR limits from Table 1.2 multiplied by the MAPFAC multipliers as indicated in Table 1.1.

TABLE 1.1

Inoperable Equipment	**GE Fuel MAPFAC** For All Power and Flow Levels
None	1.0
Feedwater Heater(s) Out of Service [1]	1.0
Single RR Loop	Figure 1.2-1 and 1.2-2
Abnormal Idle Loop Startup (UFSAR 15.4.4)	Figure 1.2-1 and 1.2-2
Turbine Bypass Valves Out of Service	1.0
EOC Recirculation Pump Trip OOS	1.0
TCV Slow Closure/EOC Recirculation Pump Trip OOS	1.0
TCV(s) Slow Closure / EOC-Recirculation Pump Trip OOS / Feedwater Heater(s) OOS[1]	1.0
Turbine Bypass Valves OOS / Feedwater Heater(s) OOS[1]	1.0
EOC-Recirculation Pump Trip OOS / Feedwater Heater(s) OOS[1]	1.0

1. Up to 100°F reduction (to 326.5°F) in feedwater temperature allowed at full power with Feedwater Heaters Out-of-Service (reduction varies at off-rated power levels). Up to 13°F reduction in feedwater temperature from nominal allowed at all power levels without feedwater heaters considered Out-of-Service.

TABLE 1.2
(Reference 3)

Table for Fuel-Type MAPLHGR Limits	Fuel Type	Cycle First Inserted
1.2-1	GE9B-P8CWB302-9GZ-100M-150-T	5
1.2-2	GE9B-P8CWB300-9GZ-100M-150-T	5
1.2-3	GE9B-P8CWB313-9GZ-100M-150-CECO	6
1.2-4	GE9B-P8CWB316-9GZ-100M-150-CECO	6
1.2-5	GE9B-P8CWB322-11GZ-100M-150-CECO	7
1.2-6	GE9B-P8CWB320-9GZ3-100M-150-CECO	7

1.2.2 SPC Fuel

The MAPLHGR Limit is the Lattice-Type MAPLHGR Limit. The Lattice-Type Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limits are determined from the table given below:

Fuel Type	Cycle First Inserted
SPCA9-381B-13GZ7-80M	8
SPCA9-384B-11GZ6-80M	8

(References 3 and 4)

Planar Average Exposure (GWd/MTU)	MAPLHGR (kW/ft) (all Siemens fuel types)
0.0	13.5
20.0	13.5
61.1	9.39

(References 4 and 7)

For single loop operation (or Abnormal Idle Loop Startup, UFSAR 15.4.4), the MAPLHGR multiplier for SPC fuel is 0.90.
(References 4, 6 and 7)

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
vs.
Average Planar Exposure for Fuel Type GE9B-P8CWB302-9GZ-100M-150-T

(Reference 12 and 24)

Table 1.2-1

Exposure (MWD/ST)	Exposure (MWD/MT)	Lattice-Type MAPLHGR (kW/ft)				
		P8CWL071 9GE	P8CWL326 5G5.0/4G4.0	P8CWL337 9G4.0	P8CWL326 9G4.0	P8CWL071 NOG
0	0	12.74	11.99	11.38	12.04	12.74
200	220.5	12.67	12.07	11.42	12.11	12.67
1000	1102.3	12.48	12.21	11.53	12.27	12.48
2000	2204.6	12.42	12.41	11.74	12.48	12.42
3000	3306.9	12.41	12.58	11.99	12.63	12.41
4000	4409.2	12.44	12.72	12.26	12.76	12.44
5000	5511.6	12.46	12.85	12.46	12.89	12.46
6000	6613.9	12.49	12.97	12.65	13.03	12.49
7000	7716.2	12.51	13.08	12.86	13.17	12.51
8000	8818.5	12.54	13.19	13.07	13.31	12.54
9000	9920.8	12.55	13.31	13.20	13.43	12.55
10000	11023.1	12.57	13.41	13.31	13.51	12.57
12500	13778.9	12.41	13.49	13.34	13.51	12.41
15000	16534.7	12.04	13.19	13.05	13.19	12.04
20000	22046.2	11.27	12.55	12.47	12.55	11.27
25000	27557.8	10.49	11.85	11.88	11.85	10.49
27215.6	30000	12.314	12.314	12.314	12.314	12.314
48080.8	53000	10.800	10.800	10.800	10.800	10.800
58967.1	65000	6.000	6.000	6.000	6.000	6.000
Lattice No.		887	879	880	882	733

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
vs.
Average Planar Exposure for Fuel Type GE9B-P8CWB300-9GZ-100M-150-T

(Reference 12 and 24)

Table 1.2-2

Exposure (MWD/ST)	Exposure (MWD/MT)	Lattice-Type MAPLHGR (kW/ft)					
		P8CWL071 9GE	P8CWL320 4G4.0/3G3.0	P8CWL338 7G3.0	P8CWL338 2G4.0/7G3.0	P8CWL320 7G3.0	P8CWL07 NOG
0	0	12.74	12.41	11.89	11.39	12.48	12.74
200	220.5	12.67	12.47	11.96	11.47	12.49	12.67
1000	1102.3	12.48	12.60	12.12	11.65	12.55	12.48
2000	2204.6	12.42	12.71	12.29	11.90	12.64	12.42
3000	3306.9	12.41	12.82	12.43	12.17	12.73	12.41
4000	4409.2	12.44	12.92	12.51	12.43	12.82	12.44
5000	5511.6	12.46	13.03	12.58	12.54	12.90	12.46
6000	6613.9	12.49	13.13	12.65	12.63	12.98	12.49
7000	7716.2	12.51	13.17	12.71	12.69	13.04	12.51
8000	8818.5	12.54	13.16	12.75	12.73	13.08	12.54
9000	9920.8	12.55	13.14	12.78	12.76	13.11	12.55
10000	11023.1	12.57	13.13	12.80	12.80	13.14	12.57
12500	13778.9	12.41	13.10	12.72	12.71	13.11	12.41
15000	16534.7	12.04	12.80	12.41	12.41	12.81	12.04
20000	22046.2	11.27	12.21	11.82	11.81	12.22	11.27
25000	27557.8	10.49	11.63	11.23	11.22	11.64	10.49
27215.6	30000	12.314	12.314	12.314	12.314	12.314	12.314
48080.8	53000	10.800	10.800	10.800	10.800	10.800	10.800
58967.1	65000	6.000	6.000	6.000	6.000	6.000	6.000
Lattice No.		1204	1200	1201	1202	1203	733

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) vs. Average Planar Exposure for Fuel Type GE9B-P8CWB313-9GZ-100M-150-CECO

(Reference 11 and 24)

Table 1.2-3

Exposure (MWD/ST)	Exposure (MWD/MT)	Lattice-Type MAPLHGR (kW/ft)					
		P8CWL071 9GE	P8CWL339 7G4.0	P8CWL350 2G4.0/5G3.0	P8CWL350 4G4.0/5G3.0	P8CWL339 2G4.0/5G3.0	P8CWL0 71 NOG
0	0	12.74	12.34	11.79	11.32	12.35	12.74
200	220.5	12.67	12.39	11.84	11.40	12.40	12.67
1000	1102.3	12.48	12.49	11.96	11.55	12.52	12.48
2000	2204.6	12.42	12.63	12.12	11.73	12.68	12.42
3000	3306.9	12.41	12.74	12.28	11.92	12.83	12.41
4000	4409.2	12.44	12.85	12.40	12.11	12.96	12.44
5000	5511.6	12.46	12.97	12.49	12.27	13.10	12.46
6000	6613.9	12.49	13.10	12.58	12.39	13.19	12.49
7000	7716.2	12.51	13.22	12.67	12.52	13.29	12.51
8000	8818.5	12.54	13.34	12.76	12.65	13.37	12.54
9000	9920.8	12.55	13.38	12.84	12.78	13.45	12.55
10000	11023.1	12.57	13.38	12.91	12.89	13.41	12.57
12500	13778.9	12.41	13.36	12.85	12.85	13.36	12.41
15000	16534.7	12.04	13.01	12.56	12.56	13.01	12.04
20000	22046.2	11.27	12.34	11.98	11.97	12.33	11.27
25000	27557.8	10.49	11.69	11.38	11.37	11.69	10.49
27215.6	30000	12.314	12.314	12.314	12.314	12.314	12.314
48080.8	53000	10.800	10.800	10.800	10.800	10.800	10.800
58967.1	65000	6.000	6.000	6.000	6.000	6.000	6.000
Lattice No.		1581	1577	1578	1579	1580	733

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
vs.
Average Planar Exposure for Fuel Type
GE9B-P8CWB316-9GZ-100M-150-CECO

(Reference 11 and 24)

Table 1.2-4

Exposure (MWD/ST)	Exposure (MWD/MT)	Lattice-Type MAPLHGR (kW/ft)					
		P8CWL071 9GE	P8CWL339 7G4.0	P8CWL355 4G4.0/3G3.0	P8CWL355 6G4.0/3G3.0	P8CWL339 4G4.0/3G3.0	P8CWL07 1 NOG
0	0	12.74.	12.34	11.87	11.34	12.36	12.74
200	220.5	12.67	12.39	11.94	11.43	12.41	12.67
1000	1102.3	12.48	12.49	12.10	11.61	12.53	12.48
2000	2204.6	12.42	12.63	12.27	11.86	12.65	12.42
3000	3306.9	12.41	12.74	12.41	12.05	12.77	12.41
4000	4409.2	12.44	12.85	12.53	12.23	12.89	12.44
5000	5511.6	12.46	12.97	12.61	12.38	13.02	12.46
6000	6613.9	12.49	13.10	12.69	12.50	13.14	12.49
7000	7716.2	12.51	13.22	12.77	12.62	13.23	12.51
8000	8818.5	12.54	13.34	12.87	12.75	13.34	12.54
9000	9920.8	12.55	13.38	12.96	12.90	13.43	12.55
10000	11023.1	12.57	13.38	13.04	13.02	13.39	12.57
12500	13778.9	12.41	13.36	13.01	13.00	13.36	12.41
15000	16534.7	12.04	13.01	12.70	12.70	13.01	12.04
20000	22046.2	11.27	12.34	12.10	12.10	12.33	11.27
25000	27557.8	10.49	11.69	11.49	11.47	11.69	10.49
27215.6	30000	12.314	12.314	12.314	12.314	12.314	12.314
48080.8	53000	10.800	10.800	10.800	10.800	10.800	10.800
58967.1	65000	6.000	6.000	6.000	6.000	6.000	6.000
Lattice No.		1581	1700	1701	1702	1703	733

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
vs.
Average Planar Exposure for Fuel Type
GE9B-P8CWB322-11GZ-100M-150-CECO

(Reference 10 and 24)

Table 1.2-5

Exposure (MWD/ST)	Exposure (MWD/MT)	Lattice-Type MAPLHGR (kW/ft)					
		P8CWL071 NOG	P8CWL345 5G5.0/4G4.0	P8CWL362 9G4.0	P8CWL362 2G5.0/9G4.0	P8CWL345 9G4.0	P8CWL071 11GE
0	0	12.74	12.09	11.65	11.25	12.11	12.74
200	220.5	12.67	12.13	11.70	11.32	12.15	12.67
1000	1102.3	12.48	12.22	11.83	11.46	12.25	12.48
2000	2204.6	12.42	12.35	12.00	11.61	12.39	12.42
3000	3306.9	12.41	12.48	12.14	11.77	12.54	12.41
4000	4409.2	12.44	12.62	12.28	11.94	12.70	12.44
5000	5511.6	12.46	12.77	12.43	12.11	12.86	12.46
6000	6613.9	12.49	12.90	12.58	12.29	13.02	12.49
7000	7716.2	12.51	13.03	12.73	12.46	13.19	12.51
8000	8818.5	12.54	13.16	12.88	12.64	13.33	12.54
9000	9920.8	12.55	13.30	13.01	12.82	13.43	12.55
10000	11023.1	12.57	13.42	13.12	12.98	13.44	12.57
12500	13778.9	12.41	13.41	13.08	13.04	13.40	12.41
15000	16534.7	12.04	13.05	12.78	12.77	13.06	12.04
20000	22046.2	11.27	12.38	12.16	12.16	12.40	11.27
25000	27557.8	10.49	11.74	11.51	11.51	11.76	10.49
27215.6	30000	12.314	12.314	12.314	12.314	12.314	12.314
48080.8	53000	10.800	10.800	10.800	10.800	10.800	10.800
58967.1	65000	6.000	6.000	6.000	6.000	6.000	6.000
Lattice No.		733	1817	1818	1819	1820	1821

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
vs.
Average Planar Exposure for Fuel Type
GE9B-P8CWB320-9GZ3-100M-150-CECO

(Reference 10 and 24)

Table 1.2-6

Exposure (MWD/ST)	Exposure (MWD/MT)	Lattice-Type MAPLHGR (kW/ft)					
		P8CWL071 NOG	P8CWL346 4G5.0/3G4.0	P8CWL358 7G4.0	P8CWL358 2G5.0/7G4.0	P8CWL346 7G4.0	P8CWL071 9GE2
0	0	12.74	12.05	11.62	11.10	12.09	12.74
200	220.5	12.67	12.09	11.64	11.15	12.14	12.67
1000	1102.3	12.48	12.19	11.73	11.27	12.25	12.48
2000	2204.6	12.42	12.32	11.86	11.44	12.39	12.42
3000	3306.9	12.41	12.44	11.99	11.62	12.53	12.41
4000	4409.2	12.44	12.57	12.13	11.80	12.67	12.44
5000	5511.6	12.46	12.70	12.27	11.96	12.81	12.46
6000	6613.9	12.49	12.83	12.42	12.09	12.89	12.49
7000	7716.2	12.51	12.97	12.54	12.23	12.98	12.51
8000	8818.5	12.54	13.07	12.62	12.37	13.07	12.54
9000	9920.8	12.55	13.15	12.70	12.51	13.15	12.55
10000	11023.1	12.57	13.20	12.77	12.66	13.22	12.57
12500	13778.9	12.41	13.19	12.70	12.67	13.20	12.41
15000	16534.7	12.04	12.89	12.40	12.40	12.90	12.04
20000	22046.2	11.27	12.29	11.82	11.82	12.30	11.27
25000	27557.8	10.49	11.69	11.25	11.25	11.70	10.49
27215.6	30000	12.314	12.314	12.314	12.314	12.314	12.314
48080.8	53000	10.800	10.800	10.800	10.800	10.800	10.800
58967.1	65000	6.000	6.000	6.000	6.000	6.000	6.000
Lattice No.		733	1812	1813	1814	1815	1816

Figure 1.2-1 Power-Dependent SLO and Abnormal Idle Loop Startup MAPLHGR Multipliers for GE Fuel ($MAPFAC_P$)

(Reference 9 and 24)

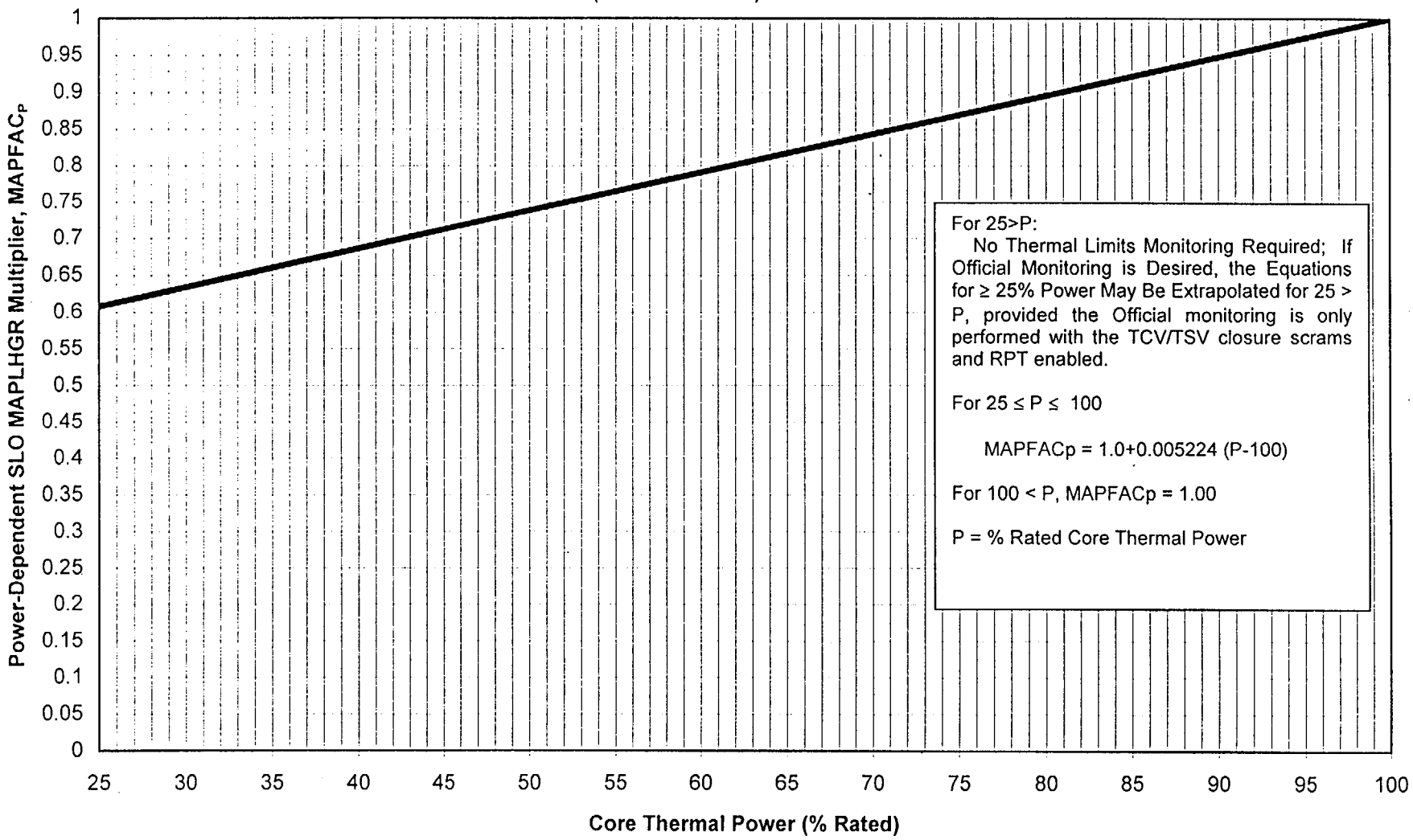
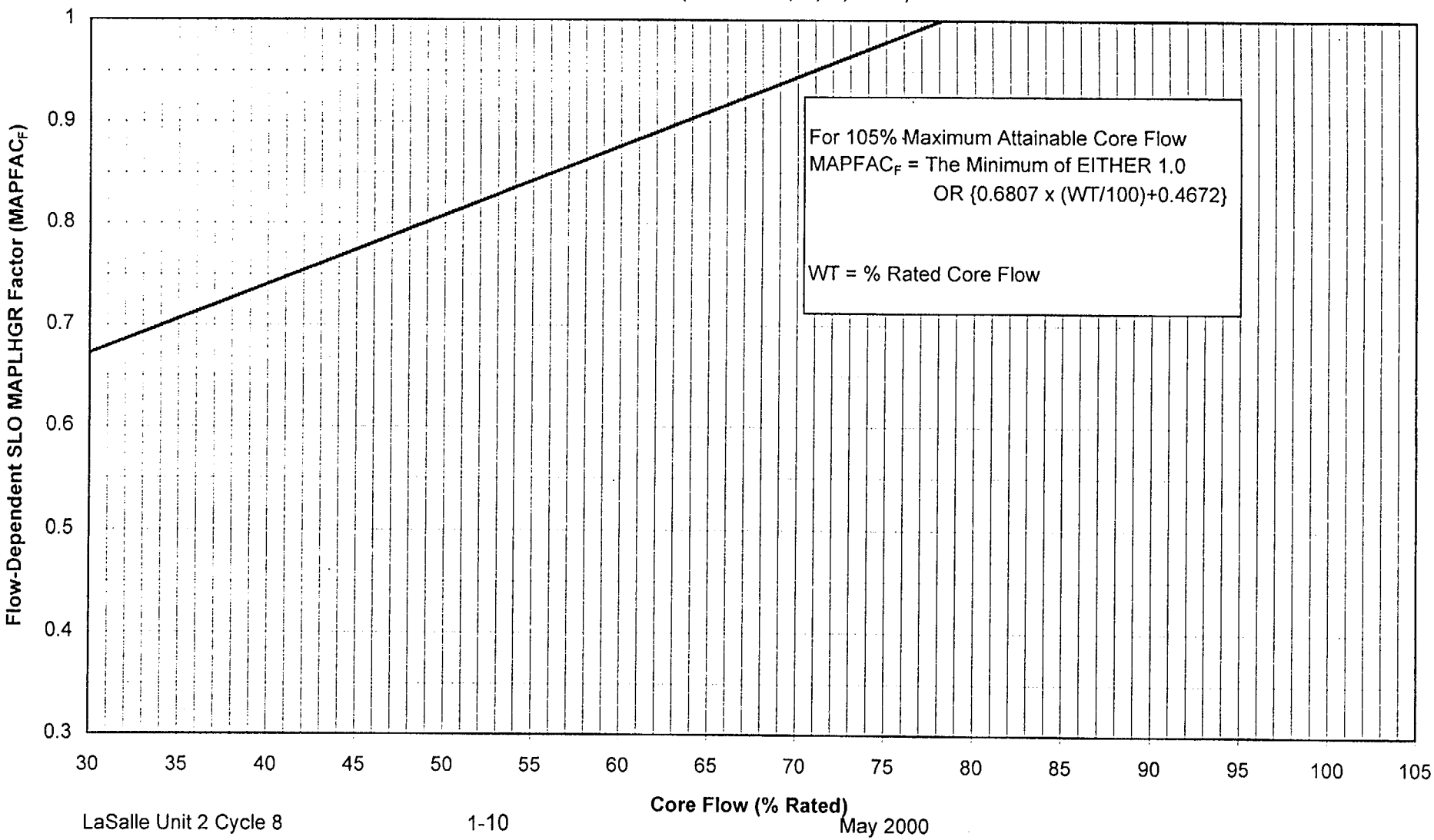


Figure 1.2-2 Flow-Dependent SLO and Abnormal Idle Loop Startup MAPLHGR Multiplier ($MAPFAC_F$)

For GE Fuel (References 9, 17, 22, and 24)



2. Minimum Critical Power Ratio (3/4.2.3)

2.1 Tech Spec Reference:

Tech Spec 3.2.3.

2.2 Description:

MCPR limits from BOC to LFPC are applicable up to a core average exposure of 27,802 MWd/MTU (which is the licensing basis exposure used by SPC). (Reference 28)

2.2.1 Manual Flow Control MCPR Limits

The Governing MCPR Operating Limit while in Manual Flow Control is either determined from 2.2.1.1 or 2.2.1.2, whichever is greater at any given power, flow condition.

2.2.1.1 Power-Dependent MCPR ($MCPR_P$)** (Reference 3 and 28)

2.2.1.1.1 GE Fuel

Table 2-1 gives the $MCPR_P$ limit as a function of core thermal power for Tech Spec Scram Speeds. Table 2-2 gives the $MCPR_P$ limit as a function of core thermal power for Nominal Scram Speeds*.

2.2.1.1.2 Siemens Fuel

Table 2-3 gives the $MCPR_P$ limit as a function of core thermal power for Tech Spec Scram Speeds. Table 2-4 gives the $MCPR_P$ limit as a function of core thermal power for Nominal Scram Speeds*.

2.2.1.2 Flow-Dependent MCPR ($MCPR_F$) (Reference 28)

Table 2-5 gives the $MCPR_F$ limit as a function of flow.

2.2.2 Automatic Flow Control MCPR Limits

Automatic Flow Control MCPR Limits are not provided for L2C8.

* To utilize the MCPR limits for Nominal Scram Speeds, the core average scram speed insertion times must be equal to or less than the following values at the given notch positions:

	Notch Position			
	45	39	25	05
Time (sec)	0.380 (Reference 28)	0.680	1.680	2.680

** For thermal limit monitoring at greater than 100%P, the 100% power MCPRp limits should be applied.

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

$MCPR_P$ for Tech Spec Scram Speeds and GE Fuel

(References 3 and 28)

Table 2-1

Operation from BOC to LFPC

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	1.93	1.50			1.43	1.43
Feedwater Heater(s)	2.73	2.23	2.23	1.55			1.43	1.43
Single RR Loop	2.64	2.14	1.94	1.51			1.44	1.44
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.58			1.46	1.45
EOC Recirc Pump Trip	2.63	2.13	1.93	1.53			1.51	1.49
EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.49
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.60	1.51	1.49
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.49

Coastdown Operation

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	2.03	1.50			1.45	1.44
Feedwater Heater(s)**	2.73	2.23	2.23	1.55			1.45	1.44
Single RR Loop	2.64	2.14	2.04	1.51			1.46	1.45
Single RR Loop/Feedwater Heater(s)	2.74	2.24	2.24	1.56			1.46	1.45
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.59			1.47	1.47
EOC Recirc Pump Trip	2.63	2.13	2.03	1.65			1.52	1.50
EOC Recirc Pump Trip/Feedwater Heater(s)**	2.73	2.23	2.23	1.65			1.52	1.50
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.61	1.54	1.51
Turbine Bypass Valves/Feedwater Heater(s)**	2.73	2.23	2.23	1.59			1.47	1.47
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)**	2.83	2.33	2.33		1.68	1.61	1.54	1.51

* Values are interpolated between relevant power levels. For operation at exactly 25% or 76.2% CTP, the more limiting value is used.

** Feedwater heaters Out-of-Service in coastdown may either be due to an actual OOS condition, or an intentionally entered mode of operation to extend the cycle energy.

$MCPR_P$ for Nominal Scram Speeds and GE Fuel

(References 3 and 28)

Table 2-2

Operation from BOC to LFPC

	Percent Core Thermal Power*							
EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	1.93	1.49			1.42	1.41
Feedwater Heater(s)	2.73	2.23	2.23	1.55			1.43	1.43
Single RR Loop	2.64	2.14	1.94	1.50			1.43	1.42
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.58			1.46	1.45
EOC Recirc Pump Trip	2.63	2.13	1.93	1.53			1.51	1.49
EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.49
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.60	1.51	1.49
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.49

Coastdown Operation

	Percent Core Thermal Power*							
EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	2.03	1.50			1.45	1.44
Feedwater Heater(s)**	2.73	2.23	2.23	1.55			1.45	1.44
Single RR Loop	2.64	2.14	2.04	1.51			1.46	1.45
Single RR Loop /Feedwater Heater(s)	2.74	2.24	2.24	1.56			1.46	1.45
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.59			1.47	1.47
EOC Recirc Pump Trip	2.63	2.13	2.03	1.65			1.52	1.50
EOC Recirc Pump Trip/Feedwater Heater(s)**	2.73	2.23	2.23	1.65			1.52	1.50
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.61	1.54	1.51
Turbine Bypass Valves/Feedwater Heater(s)**	2.73	2.23	2.23	1.59			1.47	1.47
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)**	2.83	2.33	2.33		1.68	1.61	1.54	1.51

* Values are interpolated between relevant power levels. For operation at exactly 25% or 76.2% CTP, the more limiting value is used.

** Feedwater heaters Out-of-Service in coastdown may either be due to an actual OOS condition, or an intentionally entered mode of operation to extend the cycle energy.

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

$MCPR_P$ for Tech Spec Scram Speeds and Siemens Fuel

(References 3 & 28)

Table 2-3

Operation from BOC to LFPC

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	1.93	1.49			1.42	1.41
Feedwater Heater(s)	2.73	2.23	2.23	1.55			1.42	1.41
Single RR Loop	2.64	2.14	1.94	1.50			1.43	1.42
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.57			1.45	1.44
EOC Recirc Pump Trip	2.63	2.13	1.93	1.53			1.49	1.48
EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.48
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.60	1.51	1.48
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.48

Coastdown Operation

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	2.03	1.50			1.44	1.43
Feedwater Heater(s)**	2.73	2.23	2.23	1.55			1.44	1.43
Single RR Loop	2.64	2.14	2.04	1.51			1.45	1.44
Single RR Loop /Feedwater Heater(s)	2.74	2.24	2.24	1.56			1.45	1.44
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.58			1.46	1.46
EOC Recirc Pump Trip	2.63	2.13	2.03	1.65			1.51	1.50
EOC Recirc Pump Trip/Feedwater Heater(s)**	2.73	2.23	2.23	1.65			1.51	1.50
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.61	1.54	1.52
Turbine Bypass Valves/Feedwater Heater(s)**	2.73	2.23	2.23	1.58			1.46	1.46
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)**	2.83	2.33	2.33		1.68	1.61	1.54	1.52

* Values are interpolated between relevant power levels. For operation at exactly 25% or 76.2% CTP, the more limiting value is used.

** Feedwater heaters Out-of-Service in coastdown may either be due to an actual OOS condition, or an intentionally entered mode of operation to extend the cycle energy.

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

$MCPR_P$ for Nominal Scram Speeds and Siemens Fuel

(References 3 & 28)

Table 2-4

Operation from BOC to LFPC

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	1.93	1.48			1.39	1.39
Feedwater Heater(s)	2.73	2.23	2.23	1.55			1.42	1.41
Single RR Loop	2.64	2.14	1.94	1.49			1.40	1.40
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.57			1.45	1.44
EOC Recirc Pump Trip	2.63	2.13	1.93	1.53			1.49	1.48
EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.48
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.60	1.51	1.48
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)	2.83	2.33	2.33		1.68	1.60	1.51	1.48

Coastdown Operation

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	2.63	2.13	2.03	1.50			1.44	1.43
Feedwater Heater(s)**	2.73	2.23	2.23	1.55			1.44	1.43
Single RR Loop	2.64	2.14	2.04	1.51			1.45	1.44
Single RR Loop/Feedwater Heater(s)	2.74	2.24	2.24	1.56			1.45	1.44
Abnormal Idle Loop Startup (UFSAR 15.4.4)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Turbine Bypass Valves	2.63	2.13	2.03	1.58			1.46	1.46
EOC Recirc Pump Trip	2.63	2.13	2.03	1.65			1.51	1.50
EOC Recirc Pump Trip/Feedwater Heater(s)**	2.73	2.23	2.23	1.65			1.51	1.50
TCV Slow Closure/EOC Recirc Pump Trip	2.83	2.33	2.33		1.68	1.61	1.54	1.52
Turbine Bypass Valves/Feedwater Heater(s)**	2.73	2.23	2.23	1.58			1.46	1.46
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)**	2.83	2.33	2.33		1.68	1.61	1.54	1.52

* Values are interpolated between relevant power levels. For operation at exactly 25% or 76.2% CTP, the more limiting value is used.

** Feedwater heaters Out-of-Service in coastdown may either be due to an actual OOS condition, or an intentionally entered mode of operation to extend the cycle energy.

$MCPR_F$ for GE and Siemens Fuel

(Reference 28)

Table 2-5

$MCPR_F$ limits for 105% Maximum Attainable Core Flow

Flow (% rated)	$MCPR_F$ ATRIUM-9B	$MCPR_F$ GE9
0	1.59	1.64
30	1.59	1.64
80	1.28	1.29
105	1.11	1.11

The $MCPR_F$ limits are applicable from BOC through coastdown and in all EOOS scenarios.

3. Linear Heat Generation Rate (3/4.2.4)

3.1 Tech Spec Reference:

Tech Spec 3.2.4.

3.2 Description:

3.2.1 GE Fuel

a. The LHGR Limit is the product of the LHGR Limit in the following tables and the minimum of either the power dependent LHGR Factor*, $LHGRFAC_P$ or the flow dependent LHGR Factor, $LHGRFAC_F$. The LHGR Factors ($LHGRFAC_P$ and $LHGRFAC_F$) for the GE fuel is determined from Figures 3.2-1 through 3.2-3. The following LHGR limits apply for the entire cycle exposure range: (References 9, 14 and 24)

1. GE9B-P8CWB302-9GZ-100M-150-T (bundle 3862 in Reference 24)

Nodal Exposure (GWd/MT)	LHGR Limit (KW/ft)
0.00	14.40
12.73	14.40
27.48	12.31
50.24	10.80
62.14	6.00

2. GE9B-P8CWB300-9GZ-100M-150-T (bundle 3863 in Reference 24)

Nodal Exposure (GWd/MT)	LHGR Limit (KW/ft)
0.00	14.40
12.63	14.40
26.59	12.31
48.36	10.80
60.03	6.00

3. GE9B-P8CWB313-9GZ-100M-150-CECO (bundle 3864 in Reference 24)

Nodal Exposure (GWd/MT)	LHGR Limit (KW/ft)
0.00	14.40
12.45	14.40
26.62	12.31
48.74	10.80
60.50	6.00

4. GE9B-P8CWB316-9GZ-100M-150-CECO (bundle 3865 in Reference 24)

Nodal Exposure (GWd/MT)	LHGR Limit (KW/ft)
0.00	14.40
12.61	14.40
26.92	12.31
49.12	10.80
60.86	6.00

5. GE9B-P8CWB322-11GZ-100M-150-CECO (bundle 3861 in Reference 24)
(Reference 29)

Nodal Exposure (GWd/MT)	LHGR Limit (KW/ft)
0	14.00
13.05	14.00
27.78	11.96
49.74	10.53
60.88	6.00

6. GE9B-P8CWB320-9GZ3-100M-150-CECO (bundle 3860 in Reference 24)

Nodal Exposure (GWd/MT)	LHGR Limit (KW/ft)
0.00	14.40
12.14	14.40
26.19	12.31
48.16	10.80
59.93	6.00

3.2.2 Siemens Fuel

The LHGR Limit is the product of the Steady-State LHGR Limit and the minimum of either the power dependent LHGR Factor*, $LHGRFAC_P$ or the flow dependent LHGR Factor, $LHGRFAC_F$. The Steady-State LHGR limits are given below (Reference 4). $LHGRFAC_P$ is determined from Table 3-1 for Technical Specification Scram Speeds and Table 3-2 for Nominal Scram Speeds as defined in Section 2.2. $LHGRFAC_F$ is determined from Table 3-3. SPC LHGRFAC multipliers for operation up to LFPC are applicable up to a core average exposure of 27,802 MWd/MTU (which is the licensing basis exposure used by SPC). (Reference 28)

Siemens Fuel Steady-State LHGR Limits for the following fuel types:

1. SPCA9-3&1B-13GZ7-80M
2. SPCA9-384B-11GZ6-80M

(Reference 4)

Planar Average Exposure (GWd/MTU)	LHGR limit (kW/ft)
0.0	14.4
15.0	14.4
61.1	8.32

* For thermal limit monitoring at greater than 100%P, the 100% power LHGRFACp limits should be applied.

Figure 3.2-1 Power-Dependent LHGR Multipliers for GE fuel (formerly $MAPFAC_P$)

(Reference 9 and 24)

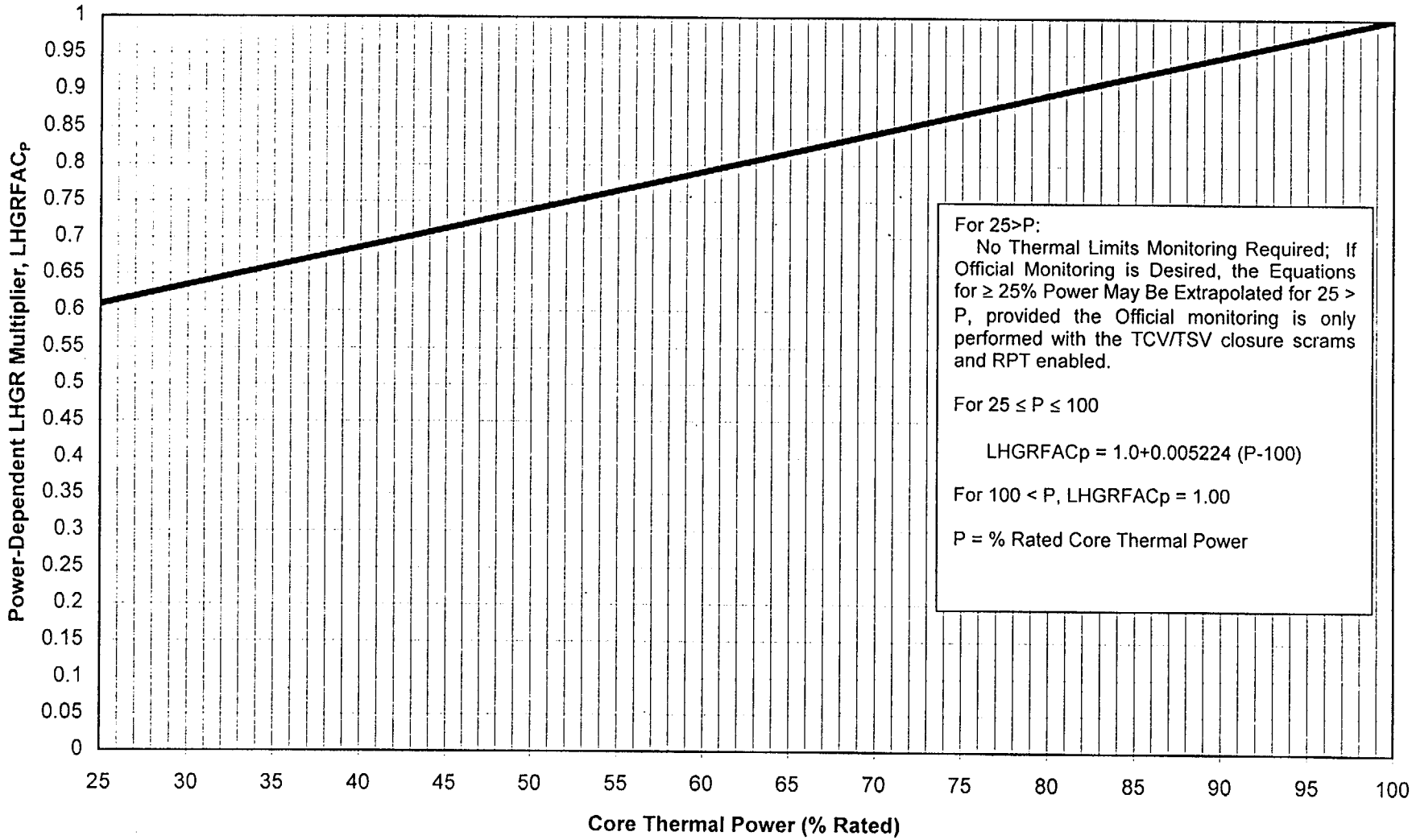


Figure 3.2-2 Power-Dependent LHGR Multiplier for GE Fuel (TCV(s) Slow Closure) (formerly $MAPFAC_P$)

(Reference 15 and 24)

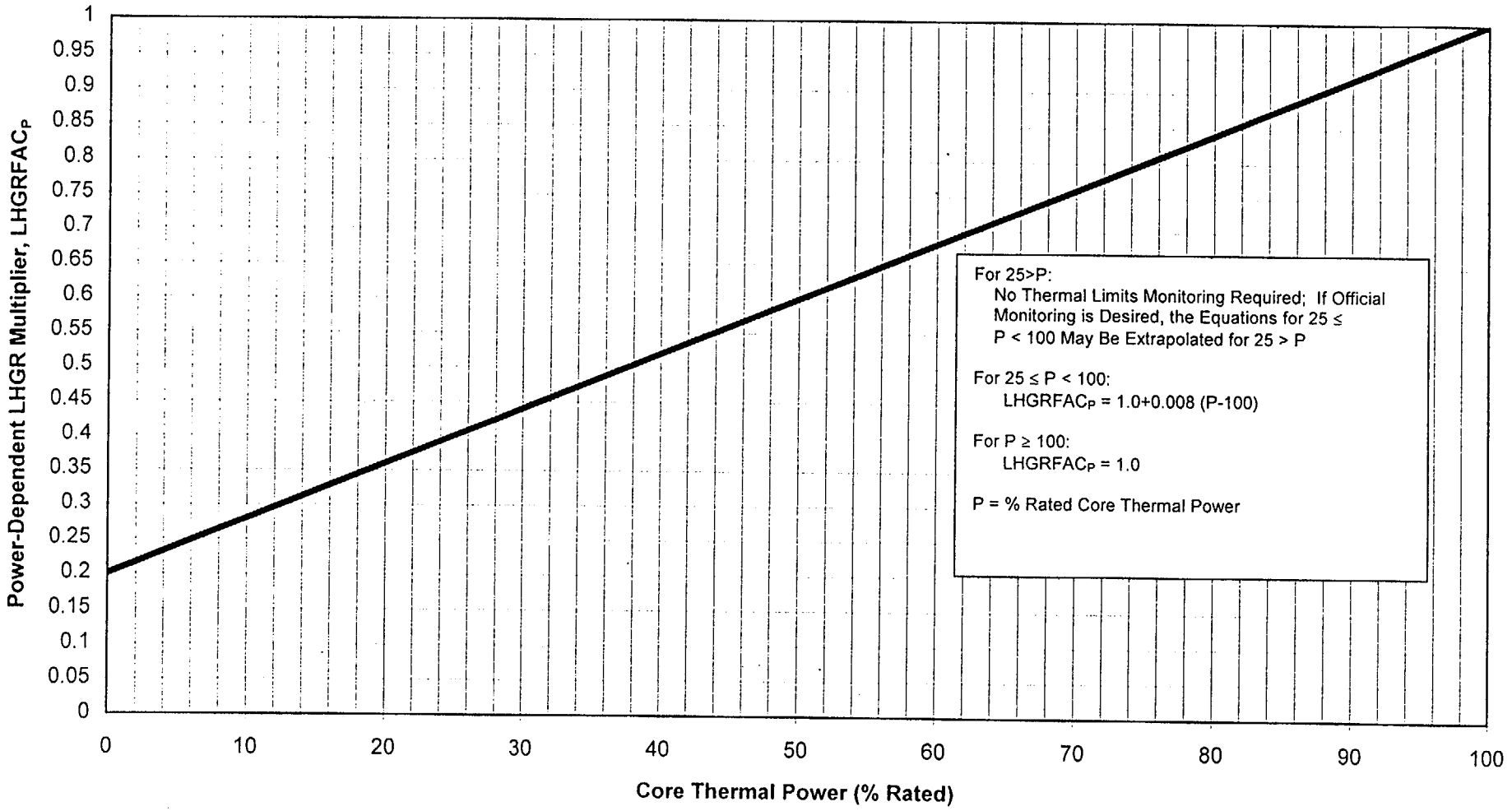
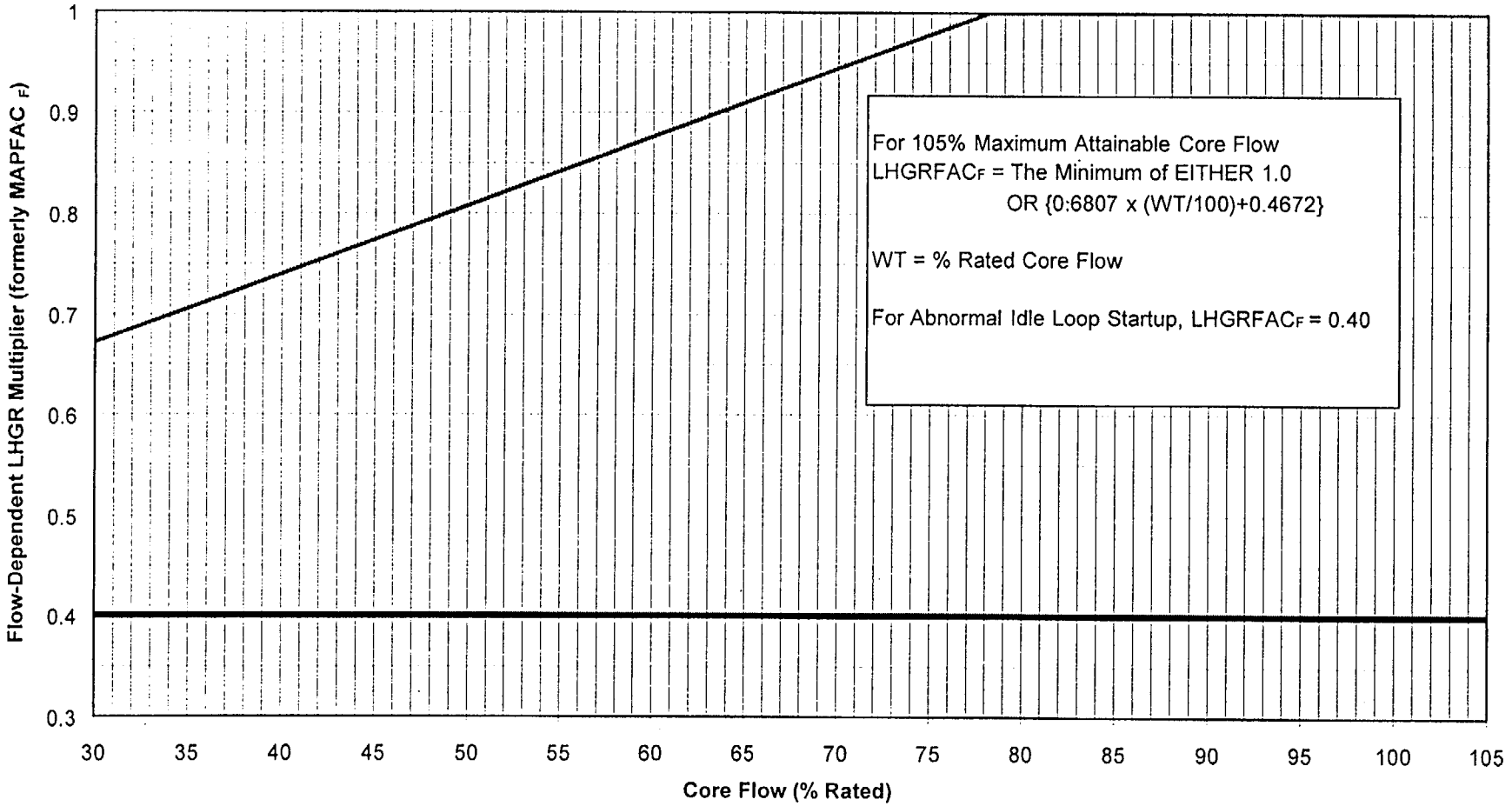


Figure 3.2-3 Flow-Dependent LHGR Multiplier for GE Fuel (formerly $MAPFAC_F$)

(Reference 9 and 17, 22, and 24)



Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report
$LHGRFAC_P$ for Siemens Fuel (TSSS Limits)
Table 3-1
(Reference 28)

Operation from BOC to LFPC

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	0.75	0.75	0.75	1.00			1.00	1.00
Feedwater Heater(s)	0.65	0.65	0.65	0.96			1.00	1.00
Single RR Loop	0.75	0.75	0.75	1.00			1.00	1.00
Abnormal Idle Loop Startup (UFSAR 15.4.4)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Turbine Bypass Valves	0.75	0.75	0.75	0.96			1.00	1.00
EOC Recirc Pump Trip	0.75	0.75	0.75	0.96			1.00	1.00
EOC Recirc Pump Trip/Feedwater Heater(s)	0.60	0.60	0.60		0.86	0.93	0.94	0.97
TCV Slow Closure/EOC Recirc Pump Trip	0.60	0.60	0.60		0.86	0.95	1.00	1.00
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)	0.60	0.60	0.60		0.86	0.93	0.94	0.97

Coastdown Operation

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	0.75	0.75	0.75	0.96			0.97	0.99
Feedwater Heater(s)**	0.65	0.65	0.65	0.96			0.97	0.99
Single RR Loop	0.75	0.75	0.75	0.96			0.97	0.99
Single RR Loop/Feedwater Heater(s)	0.65	0.65	0.65	0.96			0.97	0.99
Abnormal Idle Loop Startup (UFSAR 15.4.4)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Turbine Bypass Valves	0.75	0.75	0.75	0.95			0.97	0.98
EOC Recirc Pump Trip	0.75	0.75	0.75	0.87			0.87	0.89
EOC Recirc Pump Trip/Feedwater Heater(s)**	0.65	0.65	0.65	0.87			0.87	0.89
TCV Slow Closure/EOC Recirc Pump Trip	0.60	0.60	0.60		0.87	0.87	0.87	0.89
Turbine Bypass Valves/Feedwater Heater(s)**	0.65	0.65	0.65	0.95			0.97	0.98
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)**	0.60	0.60	0.60		0.87	0.87	0.87	0.89

* Values are interpolated between relevant power levels. For operation at exactly 25% or 76.2% CTP, the more limiting value is used.

** Feedwater Heaters Out-of-Service in coastdown may either be due to an actual OOS condition, or an intentionally entered mode of operation to extend the cycle energy.

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report

$LHGRFAC_P$ for Siemens Fuel (NSS Times)
Table 3-2
(Reference 28)

Operation from BOC to LFPC

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	0.80	0.80	0.80	1.00			1.00	1.00
Feedwater Heater(s)	0.65	0.65	0.65	0.96			1.00	1.00
Single RR Loop	0.80	0.80	0.80	1.00			1.00	1.00
Abnormal Idle Loop Startup (UFSAR 15.4.4)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Turbine Bypass Valves	0.75	0.75	0.75	0.96			1.00	1.00
EOC Recirc Pump Trip	0.75	0.75	0.75	0.96			1.00	1.00
EOC Recirc Pump Trip/Feedwater Heater(s)	0.60	0.60	0.60		0.86	0.93	0.94	0.97
TCV Slow Closure/EOC Recirc Pump Trip	0.60	0.60	0.60		0.86	0.95	1.00	1.00
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)	0.60	0.60	0.60		0.86	0.93	0.94	0.97

Coastdown Operation

Percent Core Thermal Power*

EOOS Combination	0	25	25	57.2	76.2	76.2	95.2	100
No EOOS	0.75	0.75	0.75	0.96			0.97	0.99
Feedwater Heater(s)**	0.65	0.65	0.65	0.96			0.97	0.99
Single RR Loop	0.75	0.75	0.75	0.96			0.97	0.99
Single RR Loop/Feedwater Heater(s)	0.65	0.65	0.65	0.96			0.97	0.99
Abnormal Idle Loop Startup (UFSAR 15.4.4)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Turbine Bypass Valves	0.75	0.75	0.75	0.95			0.97	0.98
EOC Recirc Pump Trip	0.75	0.75	0.75	0.87			0.87	0.89
EOC Recirc Pump Trip/Feedwater Heater(s)**	0.65	0.65	0.65	0.87			0.87	0.89
TCV Slow Closure/EOC Recirc Pump Trip	0.60	0.60	0.60		0.87	0.87	0.87	0.89
Turbine Bypass Valves/Feedwater Heater(s)**	0.65	0.65	0.65	0.95			0.97	0.98
TCV Slow Closure/EOC Recirc Pump Trip/Feedwater Heater(s)**	0.60	0.60	0.60		0.87	0.87	0.87	0.89

* Values are interpolated between relevant power levels. For operation at exactly 25% or 76.2% CTP, the more limiting value is used.

** Feedwater Heaters Out-of-Service in coastdown may either be due to an actual OOS condition, or an intentionally entered mode of operation to extend the cycle energy.

Administrative Technical Requirements - Appendix B
L2C8 Core Operating Limits Report
$LHGRFAC_F$ for Siemens Fuel
(Reference 28)
Table 3-3

Values Applicable for up to 105% Maximum Attainable Core Flow

Flow (% rated)	$LHGRFAC_F$ ATRIUM-9B
0	0.69
30	0.69
76	1.00
105	1.00

These $LHGRFAC_f$ multipliers apply from BOC through coastdown and in all EOOS scenarios.

4. Control Rod Withdrawal Block Instrumentation (3/4.3.6)

4.1 Tech Spec Reference:

Tech Spec Table 3.3.6-2.

4.2 Description:

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown below:

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
Two Recirculation Loop Operation*	0.66 W + 45%**	0.66 W + 48%**
Single Recirculation Loop Operation*	0.66 W + 39.7%**	0.66 W + 42.7%**

* This setpoint may be lower/higher and will still comply with the RWE Analysis, because RWE is analyzed unblocked.

** Clamped, with an allowable value not to exceed the allowable value for recirculation loop flow (W) of 100%.

5. Allowed Modes of Operation (B 3/4.2.3, B3/4.2.4)

The Allowed Modes of Operation with combinations of Equipment Out-of-Service are as described below:

Equipment Out of Service Options[1]	----------OPERATING REGION--------- Standard	MELLLA	ICF[7]	Coastdown
None	Yes	Yes	Yes	Yes
Feedwater Heaters[2] (Reference 9)	Yes	No[3]	Yes	Yes
Single RR Loop (Reference 9)	Yes	No[8]	N/A	Yes
Turbine Bypass Valves (Reference 9)	Yes	Yes	Yes	Yes
EOC Recirculation Pump Trip (Reference 9)	Yes	Yes	Yes	Yes
TCV Slow Closure/EOC Recirculation Pump Trip (Reference 15)	Yes	Yes	Yes	Yes
TCV Slow Closure/EOC Recirculation Pump Trip / Feedwater Heaters [2] (Reference 15, 20 and 21)	Yes	No[3]	Yes	Yes
Turbine Bypass Valves / Feedwater Heaters [2] (Reference 9)	No	No	No[5]	Yes
EOC Recirculation Pump Trip / Feedwater Heaters [2] (Reference 9)	Yes[4]	No[3]	Yes[4]	Yes
TCV Stuck Closed[6] (Reference 16)	Yes	Yes	Yes	Yes

1 Each EOOS condition may be combined with one SRV OOS, up to two TIP Machines OOS or the equivalent number of TIP channels (100% available at startup from a refuel outage), a 13°F reduction in feedwater temperature (without Feedwater Heaters considered OOS) and/or up to 50% of the LPRMs out of service.

2 Up to 100°F Reduction in Feedwater Temperature Allowed with Feedwater Heaters Out-of-Service. Feedwater Heaters OOS may be an actual OOS conditionl, or an intentionally entered mode of operation to extend the cycle energy.

3 If operating with Feedwater Heaters Out-of-Service, operation in MELLLA is supported by current transient analyses, but administratively prohibited due to core stability concerns.

4 EOC Recirculation Pump Trip OOS/Feedwater Heaters OOS is allowed during non-coastdown operation using the TCV Slow Closure/EOC Recirculation Pump Trip OOS/Feedwater Heaters OOS operating limits.

5 Only when operating in coastdown, otherwise this combination is not allowed.

6 Operation is only allowed when less than 10.5 million lbm/hr steam flow and when average position of 3 open TCVs is less than 50% open, with FCL <103%, and the MCFL setpoint ≥ 120%. TCV Stuck Closed may be in combination with any EOOS except TBVOOS or TCV Slow Closure. If in combination with other EOOS(s), thermal limits may require adjustment for the other EOOS(s) as designated in Sections 1, 2, and 3.

7. ICF is analyzed for up to 105% core flow.

8. The SLO boundary was not moved up with the incorporation of MELLLA. The flow boundary for SLO at uprated conditions remains the ELLLA boundary for pre-uprate conditions. (Reference 25)

6. Traversing In-Core Probe System (3/4.2.1, 3/4.2.3, 3/4.2.4)

6.1 Tech Spec Reference:

Tech Spec Sections 3/4.2.1, 3/4.2.3, 3/4.2.4 for APLHGR, MCPR, and LHGR require the TIP system for recalibration of the LPRM detectors and monitoring thermal limits.

6.2 Description:

When the traversing in-core probe (TIP) system (for the required measurement locations) is used for recalibration of the LPRM detectors and monitoring thermal limits, the TIP system shall be operable with the following:

1. movable detectors, drives and readout equipment to map the core in the required measurement locations, and

2. indexing equipment to allow all required detectors to be calibrated in a common location.

With one or more TIP measurement locations inoperable, the TIP data for an inoperable measurement location may be replaced by data obtained from a 3-dimensional BWR core monitoring software system adjusted using the previously calculated uncertainties, provided the following conditions are met:

1. All TIP traces have previously been obtained at least once during a calibration in the current operating cycle which was performed when the reactor core was operating in an octant symmetric control rod pattern above 50% power, (Reference 19) and

2. The total core TIP uncertainty for the present cycle has been demonstrated to be consistent with the assumptions used in the determination of the MCPR Safety Limit (demonstrated by showing chi squared to be less than 36.19, Reference 18), and

3. The total number of simulated channels (measurement locations) does not exceed 42% (18 channels).

Otherwise, with the TIP system inoperable, suspend use of the system for the above applicable monitoring or calibration functions.

6.3 Bases:

The operability of the TIP system with the above specified minimum complement of equipment ensures that the measurements obtained from use of this equipment accurately represent the spatial neutron flux distribution of the reactor core. The normalization of the required detectors is performed internal to the core monitoring software system.

Startup test criteria for symmetric measured TIP differences is that the calculated Chi-squared value shall be less than the critical value at the 1% level of significance; that critical value being 36.19. Compliance is determined based on the values and methodology provided in Reference 18.

Substitute TIP data, if needed, is 3-dimensional BWR core monitoring software calculated data which is adjusted based on axial and radial factors calculated from previous TIP sets. Since uncertainty could be introduced by the simulation and adjustment process, a maximum of 18 channels may be simulated to ensure that the uncertainties assumed in the substitution process methodology remain valid.

Section 2

LaSalle Unit 2 Cycle 8

Reload Transient Analysis Results

May 2000

Administrative Technical Requirements - Appendix B
L2C8 Reload Transient Analysis Results

Table of Contents

Administrative Technical Requirements - Appendix B
L2C8 Reload Transient Analysis Results

Attachment 1

LaSalle Unit 2 Cycle 8

Neutronics Licensing Report

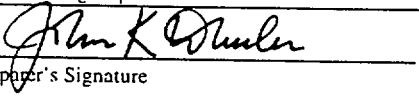
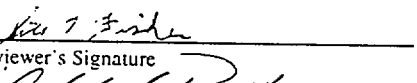
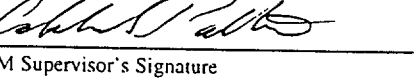
NUCLEAR FUEL MANAGEMENT DEPARTMENT
NUCLEAR DESIGN INFORMATION TRANSMITTAL

☒ SAFETY RELATED ☐ NON-SAFETY RELATED ☐ REGULATORY RELATED	Originating Organization ☒ Nuclear Fuel Management ☐ Other (specify) _____	NDIT No. 960103 Seq. 3 Page 1 of 15

Station LaSalle Unit 2 Cycle 8 Generic _____

To: D. A. Laughton
E. A. McVey (LaSalle)

Subject: LaSalle Unit 2 Cycle 8 Neutronics Licensing Report

John K. Wheeler Preparer	 Preparer's Signature	3/30/2000 Date
Jill T. Fisher Reviewer	 Reviewer's Signature	3/30/2000 Date
Adelmo S. Pallotta NFM Supervisor	 NFM Supervisor's Signature	5/5/00 Date

Status of Information:
☒ Verified
☐ Unverified
☐ Engineering Judgement

Method and Schedule of Verification for Unverified NDITs: N/A

Description of Information: LaSalle Unit 2 Cycle 8 Neutronics Licensing Report

Purpose of Information:

Rev. 0: Provide the station and BSS group LaSalle Unit 2 Cycle 8 Neutronics Licensing Report (NLR).
Rev. 1: This revision updates Section IV." Control Rod Drop Accident," due to new information on Doppler coefficients.
Rev. 2: This revision updates the NLR based on NDIT NFM960082 Rev. 2, "LaSalle Unit 2 Cycle 8 Design Basis Loading Plan," 12/10/1998, which is consistent with NDIT NFM9800166 Seq. 1, "LaSalle 2 Cycle 8 Redesigned Final Licensing Loading Plan and Licensing Energies," 12/2/1998.
Seq. 3: This revision includes results of reanalyses of the RWE and LFWH events for a 105% power uprate scheduled to be implemented on 5/15/00. SPC is responsible for the other neutronics licensing events for L2C8.

Source of Information: As referenced in the NLR

Supplemental Distribution:
Danny Bost (LS)
A. S. Pallotta
M. Y. Hsiao
J. J. Reimer (LS)
A. F. Goss (LS)
LaSalle Central File
Downers Grove Central File

COMMONWEALTH EDISON COMPANY
NUCLEAR FUEL MANAGEMENT

NEUTRONICS LICENSING REPORT

for

LaSalle Unit 2

Cycle 8

Sequence 3

Prepared by: John K. Wheeler Date: 3/28/00

Reviewed by: Jill T. Fisher Date: 3/30/00

Approved by: Adelmo S. Pallotta Date: 3/31/00

Licensing Basis

This document, in conjunction with the references 1, 2 and 4 in Section VIII provide the licensing basis for LaSalle Unit 2 Reload 7, Cycle 8.

Table of Contents

preparer: JKW 3/29/00
MYH, 3-11-99

reviewer JHH 3/11/99

I. Nuclear Design Analysis

I.1 Fuel Bundle Nuclear Design Analysis

Assembly Average Enrichment (ATRIUM-9B), w/o U-235

SPCA9-381B-13GZ7-80M (High Gd)	3.81
SPCA9-384B-11GZ6-80M (Low Gd)	3.84

Axial Enrichment and Burnable Poison Distribution

SPCA9-381B-13GZ7-80M (High Gd)	Figure 1
SPCA9-384B-11GZ6-80M (Low Gd)	Figure 1

Radial Enrichment and Burnable Poison Distribution

SPCA9-403L-13G7	Figure 2
SPCA9-430L-11G7	Figure 3
SPCA9-406L-11G6	Figure 4
SPCA9-434L-10G6	Figure 5

I.2 Core Nuclear Design Analysis

I.2.1 Core Configuration and Licensing Exposure Limits

Bundle Type	Cycle Loaded	Number in Core
GE9B-P8CWB302-9GZ-100M-150-T	5	93
GE9B-P8CWB300-9GZ-100M-150-T	5	8
GE9B-P8CWB313-9GZ-100M-150-CECO	6	80
GE9B-P8CWB316-9GZ-100M-150-CECO	6	151
GE9B-P8CWB322-11GZ-100M-150-CECO	7	96
GE9B-P8CWB320-9GZ-100M-150-CECO	7	80
SPCA9-381B-13GZ7-80M	8	128
SPCA9-384B-11GZ6-80M	8	128

Cycle N-1 core average exposure at end of cycle (MWD/MTU)	26401
Cycle N-1 core average exposure at end of cycle for shutdown consideration (MWD/MTU)	26401

preparer: JKW 3/28/00 3-11-99

reviewer JTS 3/30/2000 JTS 3/31/99

Cycle N-1 core incremental exposure at end of cycle (MWD/MTU)	9734
Cycle N-1 core incremental exposure at end of cycle for shutdown considerations (MWD/MTU)	9734
Cycle N core average exposure at beginning of cycle (MWD/MTU)	14142
Cycle N core incremental exposure at end of cycle (MWD/MTU)	13250

Cycle 8 neutronics analyses are analyzed for the actual EOC N-1 exposure given above. The exposure window that validates the pressurization transients can be found in Reference 1.

I.2.2 Core Reactivity Characteristics

All values reported below are with zero xenon and are for 68°F moderator temperature. The MICROBURN-B cold BOC best estimate K-effective bias is 1.005.

All values shown here were determined during licensing calculations prior to startup. They have not been revised for the actual BOC critical conditions.

BOC Cold K-Effective, All Rods Out	1.11186
BOC Cold K-Effective All Rods In	0.95433
BOC Cold K-Effective, Strongest Rod Out	0.99187
BOC Shutdown Margin, % ΔK	1.313
Minimum Shutdown Margin, % ΔK	1.306
Reactivity Defect (R-value), % ΔK	0.007
Cycle Incremental Exposure Corresponding to Minimum Shutdown Margin R-Value (MWD/MTU)	250
Standby Liquid Control System Shutdown Margin, Cold Condition, (% ΔK)	18.742

LaSalle station has upgraded its Standby Liquid Control System so that the B-10 enrichment has been increased from 18.9% to 45%. The above SBLC analysis assumes 660 ppm with the boron enriched to 45% B-10.

preparer: JKW 3/28/00

reviewer [illegible]

II. Control Rod Withdrawal Error

The control rod withdrawal error event is analyzed at 100% of rated power, 100% of rated flow and unblocked conditions only.

Distance Withdrawn (ft)	ΔCPR
12 (Unblocked)	0.28

The design complies with the SPC 1% plastic strain and centerline melt criteria via conformance to the PAPT (Protection Against Power Transient) LHGR limits. The design complies with the GE centerline melt criteria via conformance to the GE thermal overpower protection (TOP) criteria. The design does not meet the GE mechanical overpower protection (MOP) criteria during a control rod withdrawal error event. However, a further analysis shows that the design complies with the GE 1% plastic strain criteria.

105% Power Uprate: The rod withdrawal error event was reanalyzed to support a 105% power uprate in References 15 and 16. Results indicate that the ΔCPR reported above (0.28) is still valid. The design continues to comply with the SPC PAPT LHGR limits and the GE TOP criteria. Also, the design now complies with the GE 1% plastic strain criteria via conformance to the revised GE MOP criteria from the GE9/GE10 LHGR improvement program of Reference 17.

III. Fuel Loading Error

III.1 Fuel Mislocation Error

<< These data are to be furnished by SPC. >>

III.2 Fuel Misrotation Error

<< These data are to be furnished by SPC. >>

IV. Control Rod Drop Accident

LaSalle is a banked position withdrawal sequence plant. In order to allow the site the option of inserting control rods using the simplified control rod sequence shown in Table 1, a control rod drop accident analysis was performed for the simplified sequence. The resuits demonstrate that the 280 cal/gm Technical Specification Limit is not exceeded. The simplified sequence is thus valid for LaSalle 2 Cycle 8.

<< These data are to be furnished by SPC. >>

preparer: JKW 3/28/00

reviewer [illegible] 3/30/2000

V. Loss of Feedwater Heating

The loss of feedwater heating event is analyzed at 100% of rated power for 87%, 100% and 105% of rated flow and an assumed inlet temperature decrease of 145°F. The event was analyzed from BOC to EOC. The ΔCPR value reported below is bounding for both the SPC and the co-resident GE fuel types and all the analyzed flows.

Event	ΔCPR
Loss of Feedwater Heating	0.190

The design complies with the SPC 1% plastic strain and centerline melt criteria via conformance to the PAPT (Protection Against Power Transient) LHGR limits. The design complies with the GE 1% plastic strain criteria via conformance to the mechanical overpower protection (MOP) limit. The design does not meet the GE thermal overpower protection (TOP) criteria during a loss of feedwater heating event; hence, the MAPLHGR values in the COLR for the affected lattice are adjusted accordingly.

Criteria	Maximum Value (Calculated)	GE Limit
Mechanical Overpower (MOP), %	36.1	45
Thermal Overpower (TOP), %	29.5	25

105% Power Uprate: The loss of feedwater heating event was reanalyzed to support a 105% power uprate in Reference 18. Results indicate that the ΔCPR reported above (0.190) is still valid. The design continues to comply with SPC PAPT LHGR limits and GE MOP criteria. Also, the design continues to not comply with GE TOP criteria during a loss of feedwater heating event (maximum TOP is now 30.3%). Therefore, the ~~MA~~PLHGR values in the COLR will be adjusted accordingly. Also, the MAPLHGR adjustments made previously are no longer necessary.

VI. Maximum Exposure Limit Compliance JKW 4/25/00

Note that the following exposures are based on the actual Cycle 7 EOC exposure of 9,734 MWD/MT and a nominal Cycle 8 exposure of 13,250 MWD/MT. If Cycle 8 reaches it's long window (approximately 500 MWD/MTU beyond the nominal Cycle 8 energy), the exposure limits will still be met. The values shown here have not been revised to account for the 105% power uprate, although all exposure limits will still be met.

Exposure (MWD/MT)	GE9B Projected (MWD/MT)	GE9B Limit (MWD/MT)	ATRIUM-9B Projected (MWD/MT)	ATRIUM-9B Limit (MWD/MT)
Peak Assembly	40,100	42,000*	19,176	48,000
Peak Pellet	54,464	60,000	30,432	66,000

* Batch averaged value

preparer: JKW 3/28/00

reviewer JJ 3/30/2000

VII. Spent Fuel Pool and Fresh Fuel Vault Criticality Compliance

For the L2C8 reload, there are two new SPC ATRIUM-9B assembly types consisting of 4 unique lattices, as identified in I.1 Fuel Bundle Nuclear Design Analysis.

VII.1 Fresh Fuel Vault Criticality Compliance

The fuel storage vault criticality analysis that is detailed in Reference 5 remains valid for the above lattices. All the new (ATRIUM-9B) assemblies comply with the fresh fuel vault criticality limits, i.e., all lattices have an enrichment of less than 5.00 wt % U-235 and a gadolinia content that is greater than 6 rods at 3.0 wt% Gd_2O_3.

VII.2 L1 Spent Fuel Pool Criticality Compliance

The LaSalle Unit 1 spent fuel pool criticality analysis that is detailed in Reference 6 remains valid for the above lattices. All the new (ATRIUM-9B) assemblies comply with the spent fuel pool criticality limits, i.e., all lattices have an enrichment of less than 4.60 wt % U-235 and a gadolinia content that is greater than 8 rods at 3.0 wt% Gd_2O_3.

VII.3 L2 Spent Fuel Pool Criticality Compliance

The LaSalle Unit 2 spent fuel pool criticality analysis that is detailed in Reference 7 remains valid for the above lattices. As shown below, all the new (ATRIUM-9B) assemblies comply with the LaSalle Unit 2 spent fuel pool criticality limit of k-eff < 0.95.

Lattice Type	Maximum k-inf*	Maximum in-Rack k-eff**	Spent Fuel Pool k-eff Limit
SPCA9-403L-13G7	1.18428	< 0.85	0.95
SPCA9-430L-11G7	1.20269	< 0.85	0.95
SPCA9-406L-11G6	1.21344	< 0.85	0.95
SPCA9-434L-10G6	1.22734	< 0.86	0.95

* From 68 °F, uncontrolled CASMO-3G results.
** From Figure 6.1 of Reference 7.

JKW 3/28/00
preparer: MYH, 3-1-99

JJJ 3/30/2000
reviewer PJS 3/12/99

VIII. References

1. "LaSalle Unit 2 Cycle 8 Reload Analysis", Siemens Power Corporation, EMF-96-125, as revised and supplemented for power uprate analyses.

2. "LaSalle Unit 2 Cycle 8 Plant Transient Analysis", Siemens Power Corporation, EMF-96-124(P), as revised and supplemented for power uprate analyses.

3. "LaSalle 2 Cycle 8 Redesigned Final Licensing Loading Plan and Licensing Energy," NDIT NFM9800166 Seq. 1, December 2, 1998.

4. Commonwealth Edison, Nuclear Fuel Services, NFSR-0091, "Benchmark of CASMO/MICROBURN BWR Nuclear Design Methods", as supplemented and approved.

5. "Criticality Safety Analysis for ATRIUM-9B Fuel, LaSalle Units 1 and 2 New Fuel Storage Vault," Siemens Power Corporation, EMF-95-134(P), December 1995.

6. "Criticality Safety Analysis for ATRIUM-9B Fuel, LaSalle Unit 1 Spent Fuel Storage Pool (BORAL Rack)," Siemens Power Corporation, EMF-96-117(P), April 1996.

7. "Criticality Safety Analysis for ATRIUM-9B Fuel, LaSalle Unit 2 Spent Fuel Storage Pool (Boraflex Rack)," Siemens Power Corporation, EMF-95-088(P), February 1996.

8. "LaSalle 2 Cycle 8 Re-design Standby Liquid Control System (SBLC) Worth Calculations," BNDL:98-018, Rev. 0, December 9, 1998.

9. "LaSalle 2 Cycle 8 256 Bundle Redesign LFWH Analysis," BNDL:98-016, Rev. 0, January 5, 1999.

10. "L2C8 RWE delta CPR Analysis," BNDL:99-003, Rev. 0, February 18, 1999.

11. "L2C8 RWE MOP/TOP Analysis," BNDL:98-019, Rev. 0, January 11, 1999.

12. "L2C8 SDM Calculations with As-Built Bundle Weights for the Redesigned L2C8 Core," BNDL:99-010, Rev. 0, March 10, 1999.

13. "Revised MAPLHGR Values for LaSalle 2 – Rev. 1," GE Letter WHC:99-008, from W. H. Hetzel to R. J. Chin, March 16, 1999.

14. "LaSalle 2 Cycle 8 RWE Clad Strain Compliance," GE Letter WHC:99-010, from W. H. Hetzel to R. J. Chin, March 19, 1999.

15. "L2C8 RWE Delta CPR Analysis for 105% Power Uprate," BNDL:00-011, Rev. 0, March 24, 2000.

16. "L2C8 RWE MOP Analysis for Power Uprate," BNDL:00-008, Rev. 0, March 10, 2000.

17. "ComEd GE9/GE10 LHGR Improvement Program," GNF report J11-03692-LHGR, Rev. 1, February 2000.

18. "L2C8 LFWH Analysis for Power Uprate," BNDL:00-007, Rev. 0, February 21, 2000.

preparer: JTW 3/30/00

reviewer [illegible] 3/30/2000

Table 1

L2C8 Shutdown Sequence

Insertion BPWS Rod Group*	(Bank)	Comments
10 or 9	48 - 00	Either Group 10 or 9 may be inserted first.
8	48 - 00	Groups 10 and 9 must be fully inserted prior to insertion of any group 8 rod.
7	48 - 12	All group 8 rods must be fully inserted prior to insertion of any group 7 rods.
7	12 - 00	All group 7 rods must be banked at 12 before continuing insertion to 00.
5 or 6	48 - 00	Groups 5 and 6 may be inserted without banking anytime after Groups 9 and 10 have been inserted and before Group 4.
4	48 - 00	All group 5-10 rods must be fully inserted prior to insertion of any group 4 rods.
3B	48 - 00	All group 4 rods must be fully inserted prior to insertion of any group 3B rods.
3A	48 - 00	All group 3B rods must be fully inserted prior to insertion of any group 3A rods.
2	48 - 00	Analyzed by Standard BPWS
1	48 - 00	Analyzed by Standard BPWS

* Group definitions are from LAP-100-13 Revision 20.

JKW 3/28/00
preparer: MYH. 3-22-99

reviewer JJS 3/30/2000 JJS 3/22/99

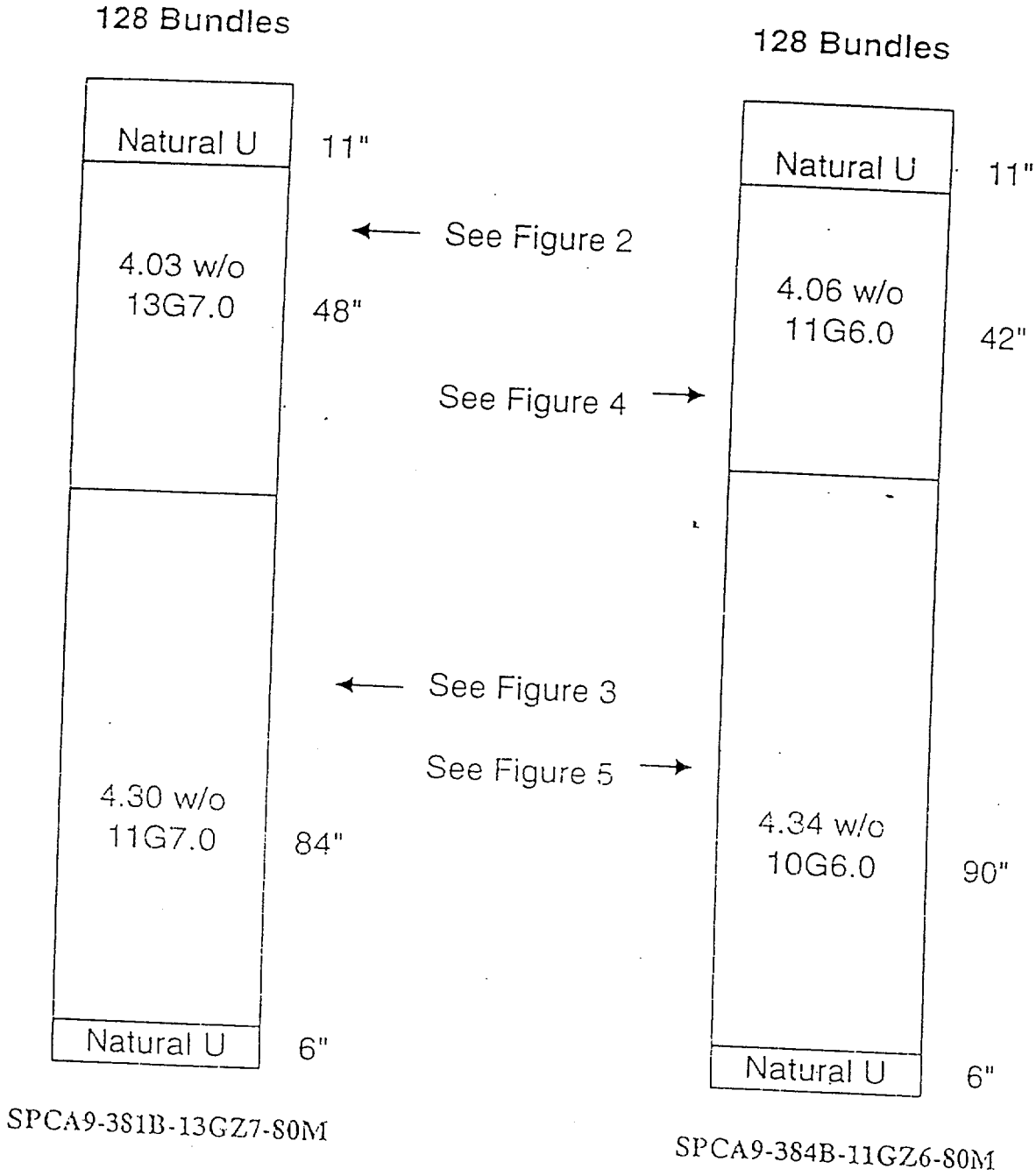
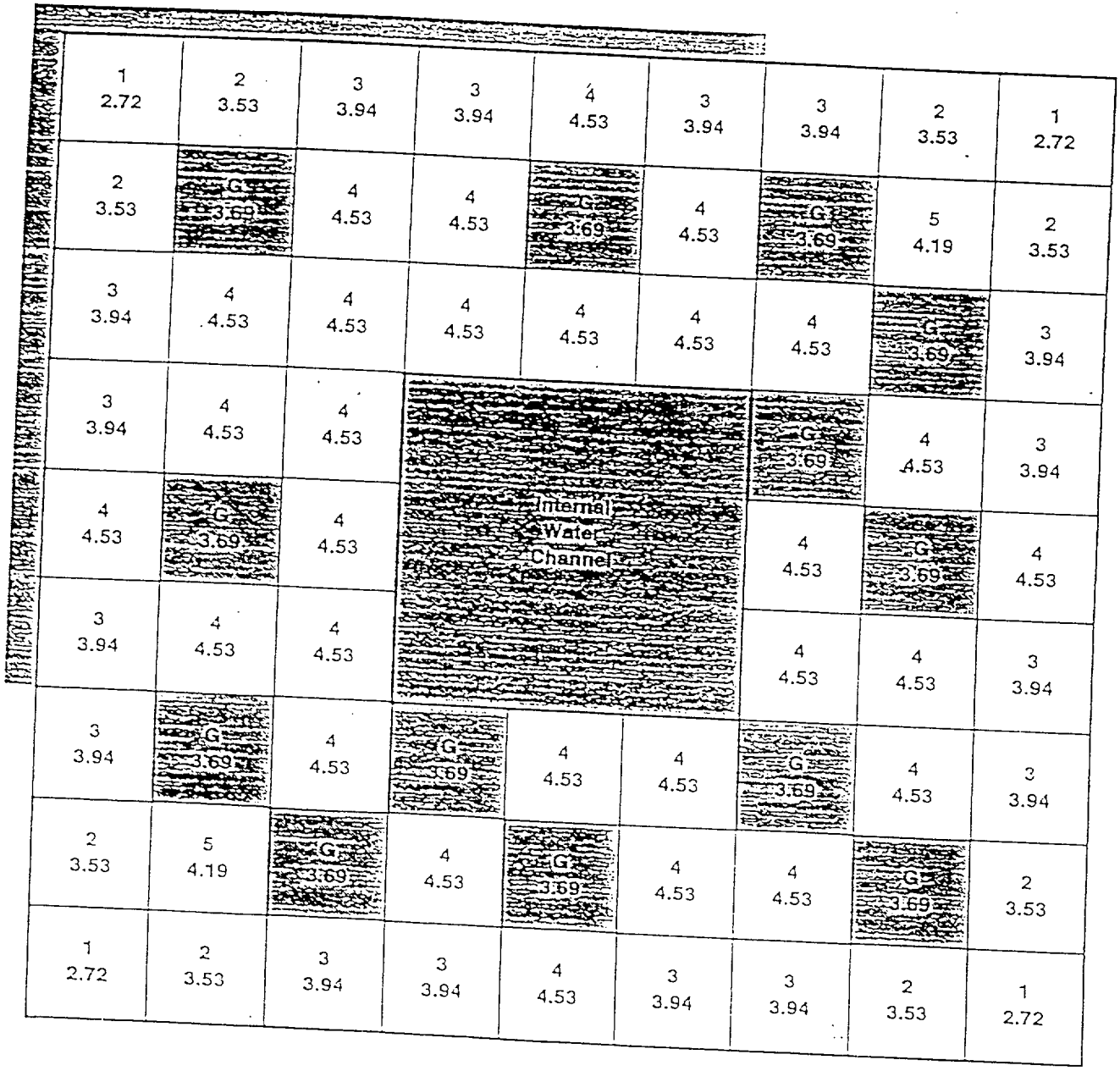


Figure 1. L2C8 FLLP Bundle Design

preparer: JKW 3/28/00 MYH, 3-11-99

reviewer: JJ 3/30/2000 JJ 3/11/99

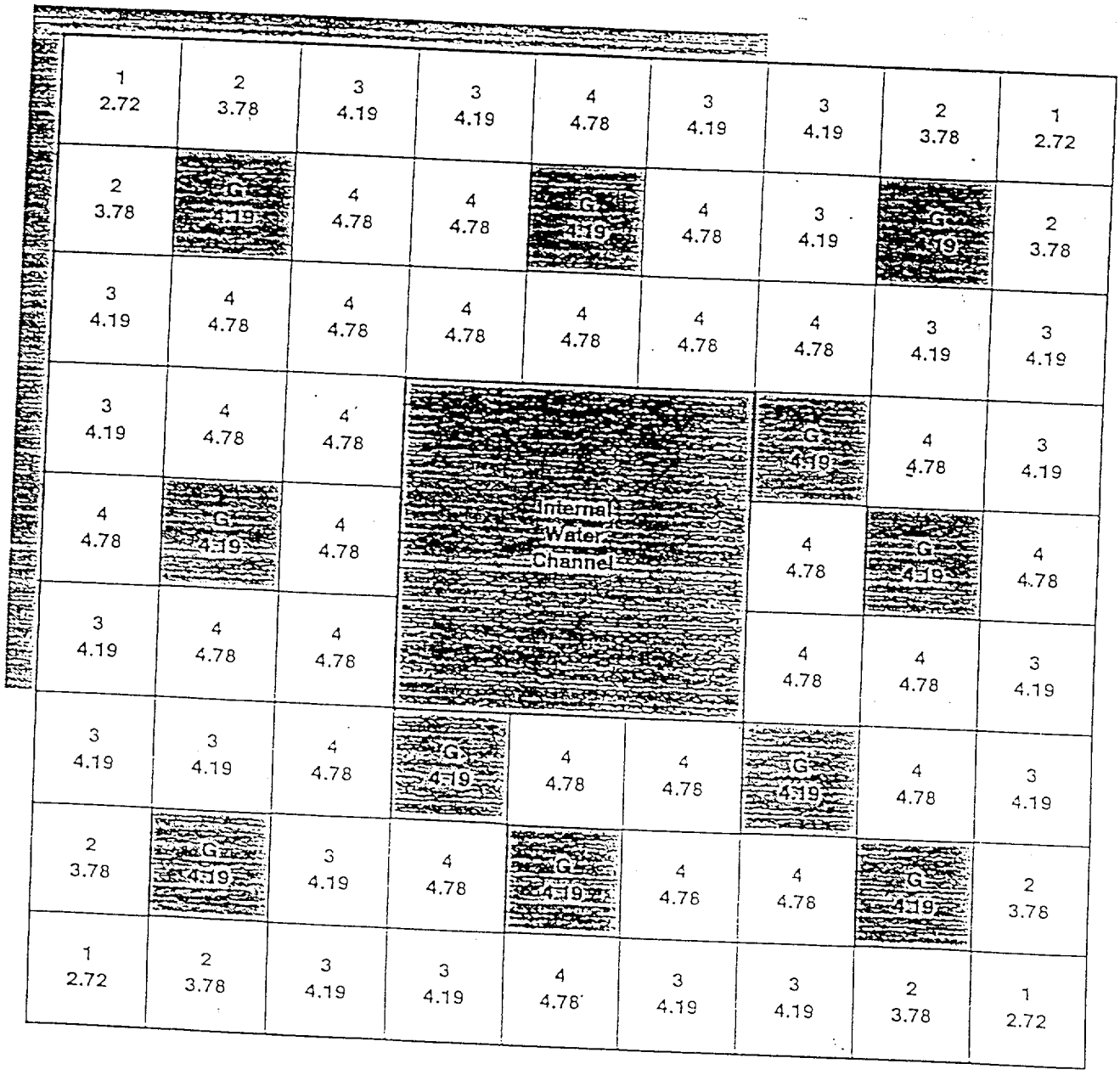


1	Rods (4)	2.72 w/o U-235
2	Rods (8)	3.53 w/o U-235
3	Rods (16)	3.94 w/o U-235
4	Rods (29)	4.53 w/o U-235
5	Rods (2)	4.19 w/o U-235
G	Rods (13)	3.69 w/o U-235+7.0 w/o Gd2O3

Figure 2. SPCA9-403L-13G7 Lattice Enrichment Distribution

preparer: JKW 3/28/00 MYH. 3-21-99

reviewer JJ 3/30/2000 JJ 3/22/99

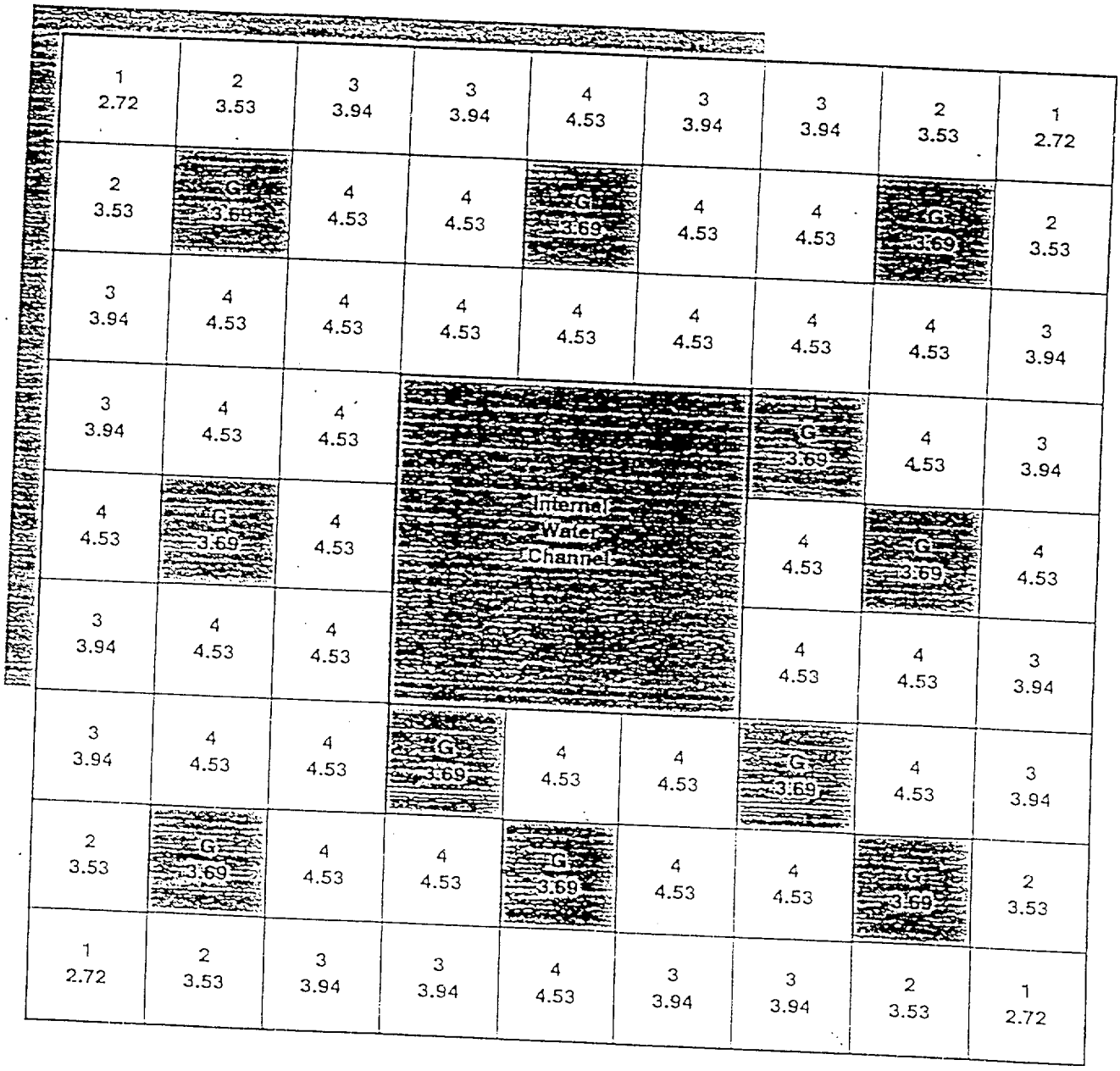


1	Rods (4)	2.72 w/o U-235
2	Rods (8)	3.78 w/o U-235
3	Rods (20)	4.19 w/o U-235
4	Rods (29)	4.78 w/o U-235
G	Rods (11)	4.19 w/o U-235+7.0 w/o Gd2O3

Figure 3. SPCA9-430L-11G7 Lattice Enrichment Distribution

preparer: JKW 3/28/00 JKW 3-21-99

reviewer [illegible] 3/30/2000 [illegible] 3/22/99

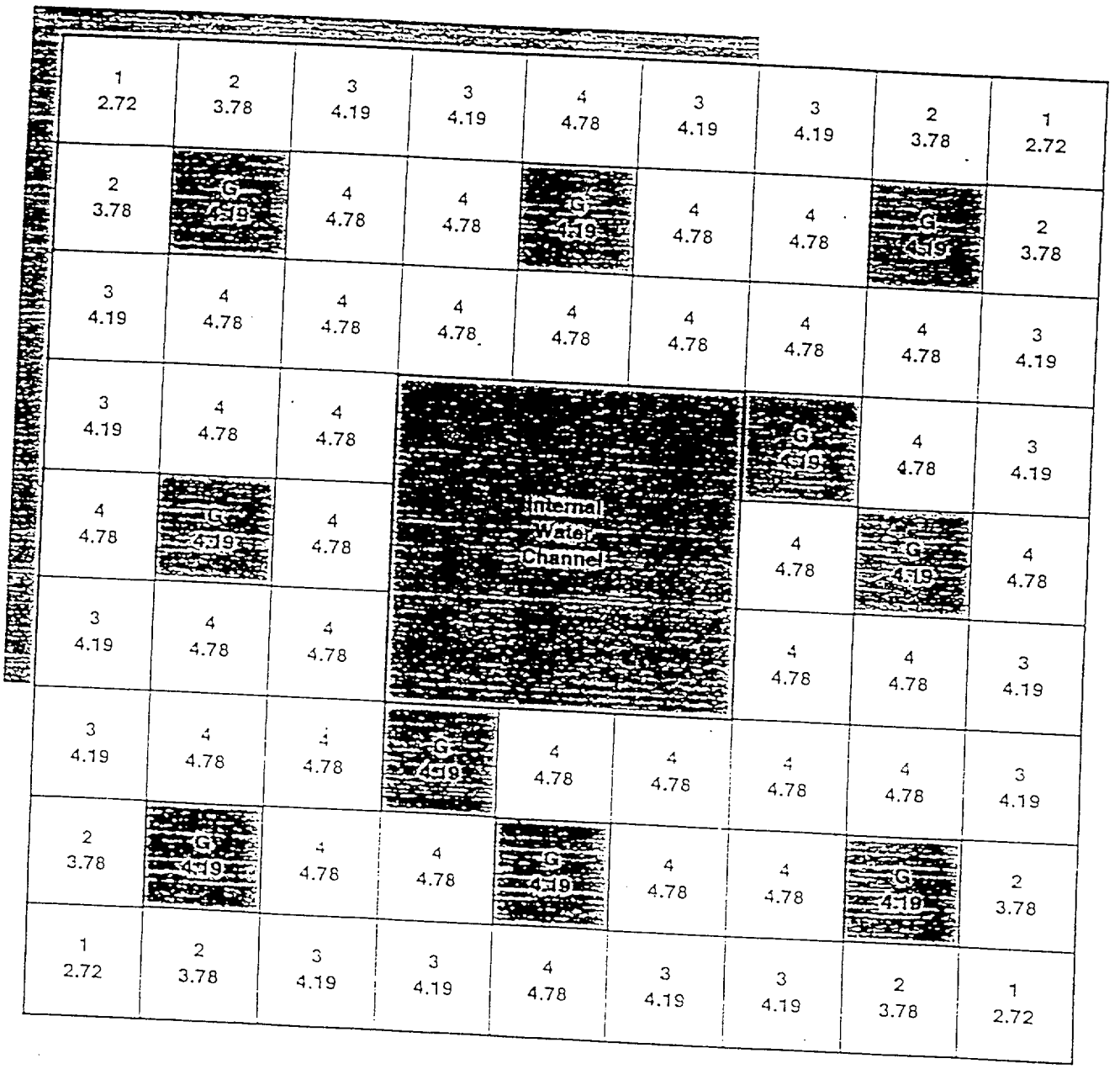


1	Rods (4)	2.72 w/o U-235
2	Rods (8)	3.53 w/o U-235
3	Rods (16)	3.94 w/o U-235
4	Rods (33)	4.53 w/o U-235
G	Rods (11)	3.69 w/o U-235+6.0 w/o Gd2O3

Figure 4. SPCA9-406L-11G6 Lattice Enrichment Distribution

preparer: JKW 3/28/00 JHYH. 3-21-99

reviewer [illegible] 3/31/2000 [illegible] 3/22/99



1	Rods (4)	2.72 w/o U-235
2	Rods (8)	3.78 w/o U-235
3	Rods (16)	4.19 w/o U-235
4	Rods (34)	4.78 w/o U-235
G	Rods (10)	4.19 w/o U-235+6.0 w/o Gd2O3

Figure 5. SPCA9-434L-10G6 Lattice Enrichment Distribution

preparer: JKW 3/28/00

reviewer 3/30/2000
3/22/99

Attachment 2

LaSalle Unit 2 Cycle 8

Reload Analysis Report (Excerpts)

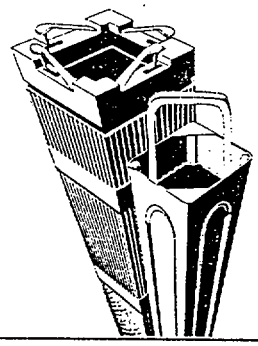
NDIT #
NFM9600146
Seq. 1

SIEMENS

EMF-96-125
Revision 2

LaSalle Unit 2 Cycle 8 Reload Analysis

March 1999



Siemens Power Corporation
Nuclear Division

3. Thermal-Hydraulic Design Analysis

3.2 *Hydraulic Characterization*

3.2.1 Hydraulic Compatibility

Component hydraulic resistances for the fuel types in the LaSalle Unit 2 Cycle 8 core have been determined in single-phase flow tests of full-scale assemblies. The hydraulic demand curves for SPC ATRIUM-9B and GE9 fuel in the LaSalle Unit 2 core are provided in Reference 9.1, Figure 5.2.

3.2.3 Fuel Centerline Temperature

Applicable Report ATRIUM-9B	Reference 9.1, Figure 3.2

3.2.5 Bypass Flow

Calculated Bypass Flow at 100%P/100%F (includes water channel flow)	14.4 Mlb/hr	Reference 9.3

3.3 *MCPR Fuel Cladding Integrity Safety Limit (SLMCPR)*

Two-Loop Operation[a]	1.08	Reference 9.3
Single-Loop Operation[a]	1.09	

3.3.1 Coolant Thermodynamic Condition

Thermal Power (at SLMCPR)	4749 MWt
Feedwater Flow Rate (at SLMCPR)	20.4 Mlbm/hr
Core Exit Pressure (at Rated Conditions)	1031 psia
Feedwater Temperature	420°F

3.3.2 Design Basis Radial Power Distribution

Figure 3.1 shows the radial power distribution used in the MCPR Fuel Cladding Integrity Safety Limit analysis.

---

[a] Includes the effects of channel bow, up to 2 TIPOOS (or the equivalent number of TIP channels), a 2000 EFPH LPRM calibration interval, and up to 50% of the LPRMs out of service.

3.3.3 Design Basis Local Power Distribution

Figures 3.2 and 3.3 show the local power peaking factors used in the MCPR Fuel Cladding Integrity Safety Limit analysis.

SPCA9-381B-13GZ7-80M	Figure 3.2
SPCA9-384B-11GZ6-80M	Figure 3.3

4. Nuclear Design Analysis

4.1 *Fuel Bundle Nuclear Design Analysis*

Assembly Average Enrichment (ATRIUM-9B fuel)

SPCA9-381B-13GZ7-80M	3.81 wt%
SPCA9-384B-11GZ6-80M	3.84 wt%

Radial Enrichment Distribution

SPCA9-403L-13G7	Figure 4.1
SPCA9-430L-11G7	Figure 4.2
SPCA9-406L-11G6	Figure 4.3
SPCA9-434L-10G6	Figure 4.4

Axial Enrichment Distribution — Figures 4.5 and 4.6

Burnable Absorber Distribution — Figures 4.5 and 4.6

Non-Fueled Rods — Figures 4.1–4.4

Neutronic Design Parameters — Table 4.1

Fuel Storage

LaSalle New Fuel Storage Vault — Reference 9.4

The LSB-1 Reload Batch fuel designs meet the fuel design limitations defined in Table 2.1 of Reference 9.4 and therefore can be safely stored in the vault.

LaSalle Unit 1 Spent Fuel Storage Pool (BORAL Racks) Reference 9.5

The LSB-1 Reload Batch fuel designs meet the fuel design limitations defined in Table 2.1 of Reference 9.5 and therefore can be safely stored in the pool.

LaSalle Unit 2 Spent Fuel Storage Pool — Reference 9.6

The LSB-1 Reload Batch fuel designs can be safely stored as long as the fuel assembly reactivity limitations defined in Reference 9.6 are met.

< ComEd has responsibility to confirm that fuel meets reactivity limitations. >

4.2 *Core Nuclear Design Analysis*

4.2.1 Core Configuration

Figure 4.7

Core Exposure at EOC7, MWd/MTU (nominal value)	26,383
Core Exposure at BOC8, MWd/MTU (from nominal EOC7)	14,154
Core Exposure at EOC8, MWd/MTU (licensing basis)	27,822

NOTE: Analyses in this report are applicable to a core exposure of 27,822 MWd/MTU.

< Cycle 8 short window exposure to be determined by ComEd. >

4.2.2 Core Reactivity Characteristics

< This data is to be furnished by ComEd. >

4.2.4 Core Hydrodynamic Stability

Reference 8.5

The results of STAIF calculations for several points along the current exclusion region boundary on the power/flow map for a flow runback from normal operation are shown below. These calculated decay ratios are for demonstrating and tracking relative core stability behavior from cycle to cycle. The Cycle 8 design basis control rod step-through projection was used to establish expected core depletion conditions. For each power/flow point, decay ratios were calculated at multiple cycle exposures to determine the highest expected decay ratio throughout the cycle. Similar calculations were made for the Cycle 7 core, (comprised entirely of GE fuel assemblies). These calculations show that the limiting Cycle 8 decay ratios (values shown in bold) are either bounded by the Cycle 7 values or show no significant change. It is concluded that for nominal operating conditions, Cycle 8 will exhibit stability behavior that is similar to or bounded by the Cycle 7 core.

Table 4.1 Neutronic Design Values

Number of Fuel Assemblies	764
Rated Thermal Power, MWt	3323
Rated Core Flow, Mlbm/hr	108.5
Core Inlet Subcooling, Btu/lbm	18.0
Moderator Temperature, °F	549
Channel Thickness, inch	0.080
Fuel Assembly Pitch, inch	6.0
Wide Water Gap Thickness, inch[a]	0.281
Narrow Water Gap Thickness, inch[a]	0.281

Control Rod Data[b]

Absorber Material	B_4C
Total Blade Support Span, inch	1.580
Blade Thickness, inch	0.260
Blade Face-to-Face Internal Dimension, inch	0.200
Absorber Rod OD, inch	0.188
Absorber Rod ID, inch	0.138
Percentage B_4C, %TD	70

[a] The water gap thicknesses presented are based on 80-mil channels for ATRIUM-9B fuel.

[b] The control rod data represents original equipment control blades at LaSalle and were used in the neutronic calculations.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	12	2	14	13	13	1	14	12	13	2	14	13	13	2	10
2	2	14	13	14	2	15	2	14	1	15	13	14	15	1	10
3	14	13	14	2	15	13	15	2	14	1	14	15	1	15	11
4	13	14	2	12	12	14	1	13	13	13	15	12	13	12	10
5	13	2	15	12	12	2	14	13	13	15	14	13	13	12	10
6	1	15	13	14	2	15	12	15	2	14	13	14	15	12	10
7	14	2	15	1	14	12	15	13	15	1	15	15	1	12	10
8	12	14	2	13	13	15	13	12	2	14	14	1	1	10	
9	13	1	14	13	13	2	15	2	13	15	1	1	10		
10	2	15	1	13	15	14	1	14	15	13	10	10	10		
11	14	13	14	15	14	13	15	14	1	10	10				
12	13	14	15	12	13	14	15	1	1	10					
13	13	15	1	13	13	15	1	1	10	10					
14	2	1	15	12	12	12	12	10							
15	10	10	11	10	10	10	10								

Fuel Type	Number of Assemblies	Bundle Description	Cycle Loaded
1	96	GE9B-P8CWB322-11GZ-100M-150-CECO	7
2	80	GE9B-P8CWB320-9GZ-100M-150-CECO	7
10	93	GE9B-P8CWB302-9GZ-100M-150-T	5
11	8	GE9B-P8CWB300-9GZ-100M-150-T	5
12	80	GE9B-P8CWB313-9GZ-100M-150-CECO	6
13	151	GE9B-P8CWB316-9GZ-100M-150-CECO	6
14	128	SPCA9-381B-13GZ7-80M	8
15	128	SPCA9-384B-11GZ6-80M	8

Figure 4.7 LaSalle Unit 2 Cycle 8 Reference Loading Map (One-Quarter of Symmetrical Core Loading)

5.6 *Fuel Loading Error*

The fuel loading error, including fuel mislocation and misorientation, is classified as an accident. By demonstrating the fuel loading error meets the more stringent Anticipated Operational Occurrence (AOO) requirements, the offsite dose requirement is assured to be met. Because the events listed below result in a ΔCPR value that is less than that of the limiting transient, the AOO requirements and hence the off-site dose requirements are met for the fuel loading error. For LaSalle Unit 2 Cycle 8, the fresh SPC ATRIUM-9B fuel is the limiting fuel for loading errors.

Therefore, the values reported below for the fresh SPC ATRIUM-9B fuel bound all fuel types found in the core.

Event	ΔCPR
Mislocated Bundle	0.17
Misoriented Bundle	0.18

For the fuel loading error, the fresh reload fuel complies with the SPC 1% plastic strain criteria via conformance to SPC transient LHGR limits.

5.7 *Determination of Thermal Margins*

The results of the analyses presented in Sections 5.1–5.3 are used for the determination of the operating limit. Section 5.1 provides the results of analyses at rated conditions. Section 5.2 provides for the determination of the MCPR and LHGR limits at reduced flow ($MCPR_f$, Figure 5.1; $LHGRFAC_f$, Figure 5.2). Section 5.3 provides for the determination of the MCPR and LHGR limits at conditions of reduced power (Figures 5.3–5.10, Tables 5.1–5.5). Limits are presented for base case operation and the EOD, EOOS and combined EOD/EOOS scenarios presented in Table 1.1. The results presented are based on the analyses performed by SPC. As indicated above, the final Cycle 8 MCPR operating limits need to be established in conjunction with the results from ComEd analyses.

Table 5.1 12,000 MWd/MTU Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]

EOOS/EOD Condition	Power (% Rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Base Case Operation	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	1.90	0.75	1.90
	60	1.46	1.00	1.47
	100	1.35	1.00	1.39
Feedwater Heaters Out of Service (FHOOS)	0	2.70	0.65	2.70
	25	2.20	0.65	2.20
	25	2.20	0.65	2.20
	60	1.52	0.96	1.52
	100	1.35	1.00	1.39
Single-Loop Operation	0	2.47	0.40	2.47
	25	2.47	0.40	2.47
	25	2.47	0.40	2.47
	60	2.47	0.40	2.47
	100	2.47	0.40	2.47
Turbine Bypass Valves Out of Service (TBVOOS)	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	2.00	0.75	2.00
	60	1.54	0.96	1.55
	100	1.39	1.00	1.40

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature (except for conditions with FHOOS), and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.1 12,000 MWd/MTU Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]
(Continued)

EOOS/EOD Condition	Power (% Rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Recirculation Pump Trip Out of Service (No RPT)	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	1.90	0.75	1.90
	60	1.49	0.96	1.50
	100	1.42	1.00	1.44
Turbine Control Valve (TCV) Slow Closure and/or No RPT	0	2.80	0.60	2.80
	25	2.30	0.60	2.30
	25	2.30	0.60	2.30
	60	1.52	0.96	1.53
	100	1.42	1.00	1.45
TCV Slow Closure/ FHOOS and/or No RPT	0	2.80	0.60	2.80
	25	2.30	0.60	2.30
	25	2.30	0.60	2.30
	60	1.55	0.92	1.55
	100	1.42	0.98	1.45

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature (except for conditions with FHOOS), and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.2 EOC Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]

EOOS/EOD Condition	Power (% Rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Base Case Operation	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	1.90	0.75	1.90
	60	1.46	1.00	1.47
	100	1.39	1.00	1.40
Feedwater Heaters Out of Service (FHOOS)	0	2.70	0.65	2.70
	25	2.20	0.65	2.20
	25	2.20	0.65	2.20
	60	1.52	0.96	1.52
	100	1.39	1.00	1.40
Single-Loop Operation	0	2.47	0.40	2.47
	25	2.47	0.40	2.47
	25	2.47	0.40	2.47
	60	2.47	0.40	2.47
	100	2.47	0.40	2.47
Turbine Bypass Valves Out of Service (TBVOOS)	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	2.00	0.75	2.00
	60	1.54	0.96	1.55
	100	1.42	1.00	1.43

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature (except for conditions with FHOOS), and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.2 EOC Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]
(Continued)

EOOS/EOD Condition	Power (% Rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Recirculation Pump Trip Out of Service (No RPT)	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	1.90	0.75	1.90
	60	1.50	0.96	1.50
	100	1.46	1.00	1.48
Turbine Control Valve (TCV) Slow Closure and/or No RPT	0	2.80	0.60	2.80
	25	2.30	0.60	2.30
	25	2.30	0.60	2.30
	60	1.54	0.96	1.55
	100	1.48	1.00	1.48
TCV Slow Closure/ FHOOS and/or No RPT	0	2.80	0.60	2.80
	25	2.30	0.60	2.30
	25	2.30	0.60	2.30
	60	1.55	0.92	1.55
	100	1.48	0.94	1.48

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature (except for conditions with FHOOS), and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.3 Coastdown Operation Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]

EOOS/EOD Condition	Power (% rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Coastdown Base Case Operation	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	2.00	0.75	2.00
	60	1.47	0.96	1.47
	100	1.41	0.97	1.42
Coastdown With Single-Loop Operation	0	2.47	0.40	2.47
	25	2.47	0.40	2.47
	25	2.47	0.40	2.47
	60	2.47	0.40	2.47
	100	2.47	0.40	2.47
Coastdown With TBVOOS	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	2.00	0.75	2.00
	60	1.55	0.95	1.56
	100	1.43	0.97	1.44

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature, and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.3 Coastdown Operation Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]
(Continued)

EOOS/EOD Condition	Power (% rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Coastdown With No RPT	0	2.60	0.75	2.60
	25	2.10	0.75	2.10
	25	2.00	0.75	2.00
	60	1.62	0.87	1.62
	100	1.48	0.87	1.49
Coastdown With TCV Slow Closure and/or No RPT	0	2.80	0.60	2.80
	25	2.30	0.60	2.30
	25	2.30	0.60	2.30
	60	1.65	0.87	1.65
	100	1.51	0.87	1.51

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature, and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.4 FFTR/Coastdown Operation Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]

EOOS/EOD Condition	Power (% rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
FFTR/Coastdown Base Case Operation	0	2.70	0.65	2.70
	25	2.20	0.65	2.20
	25	2.20	0.65	2.20
	60	1.52	0.96	1.52
	100	1.41	0.97	1.42
FFTR/Coastdown With Single-Loop Operation	0	2.47	0.40	2.47
	25	2.47	0.40	2.47
	25	2.47	0.40	2.47
	60	2.47	0.40	2.47
	100	2.47	0.40	2.47
FFTR/Coastdown With TBVOOS	0	2.70	0.65	2.70
	25	2.20	0.65	2.20
	25	2.20	0.65	2.20
	60	1.55	0.95	1.56
	100	1.43	0.97	1.44

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels) and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.4 FFTR/Coastdown Operation Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times[a]
(Continued)

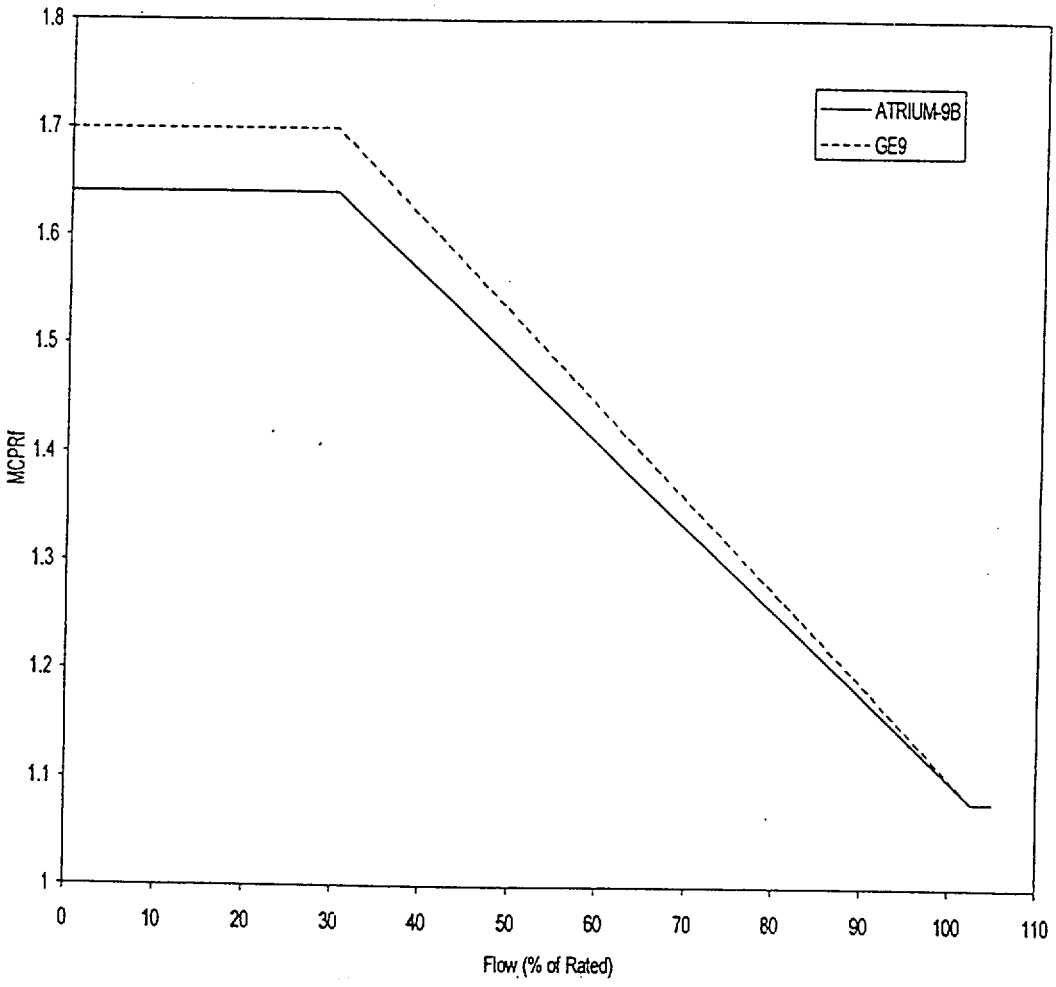
EOOS/EOD Condition	Power (% rated)	ATRIUM-9B Fuel		GE9 Fuel
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
FFTR/Coastdown With No RPT	0	2.70	0.65	2.70
	25	2.20	0.65	2.20
	25	2.20	0.65	2.20
	60	1.62	0.87	1.62
	100	1.48	0.87	1.49
FFTR/Coastdown With TCV Slow Closure and/or No RPT	0	2.80	0.60	2.80
	25	2.30	0.60	2.30
	25	2.30	0.60	2.30
	60	1.65	0.87	1.65
	100	1.51	0.87	1.51

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels) and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.

Table 5.5 Base Case $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for NSS Insertion Times[a]

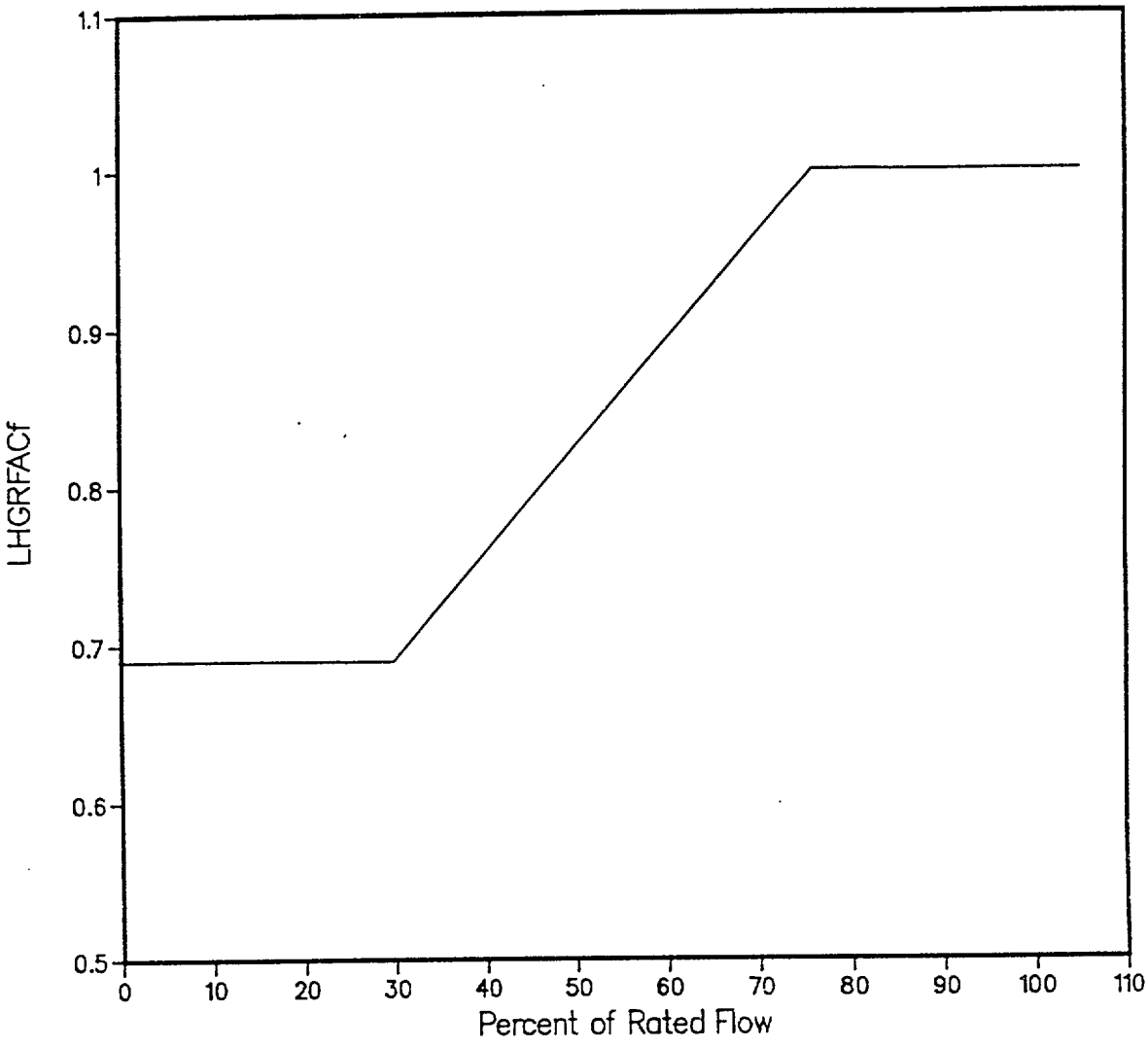
Exposure	Power (% Rated)	ATRIUM-9B Fuel		GE9
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
12,000 MWd/MTU	0	2.60	0.80	2.60
	25	2.10	0.80	2.10
	25	1.90	0.80	1.90
	60	1.43	1.00	1.44
	100	1.31	1.00	1.36
EOC	0	2.60	0.80	2.60
	25	2.10	0.80	2.10
	25	1.90	0.80	1.90
	60	1.45	1.00	1.46
	100	1.36	1.00	1.39

[a] Limits support operation with any combination of one SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature (except for conditions with FHOOS), and up to 50% of the LPRMs out of service in the standard, ICF and ELLLA regions of the power/flow map.



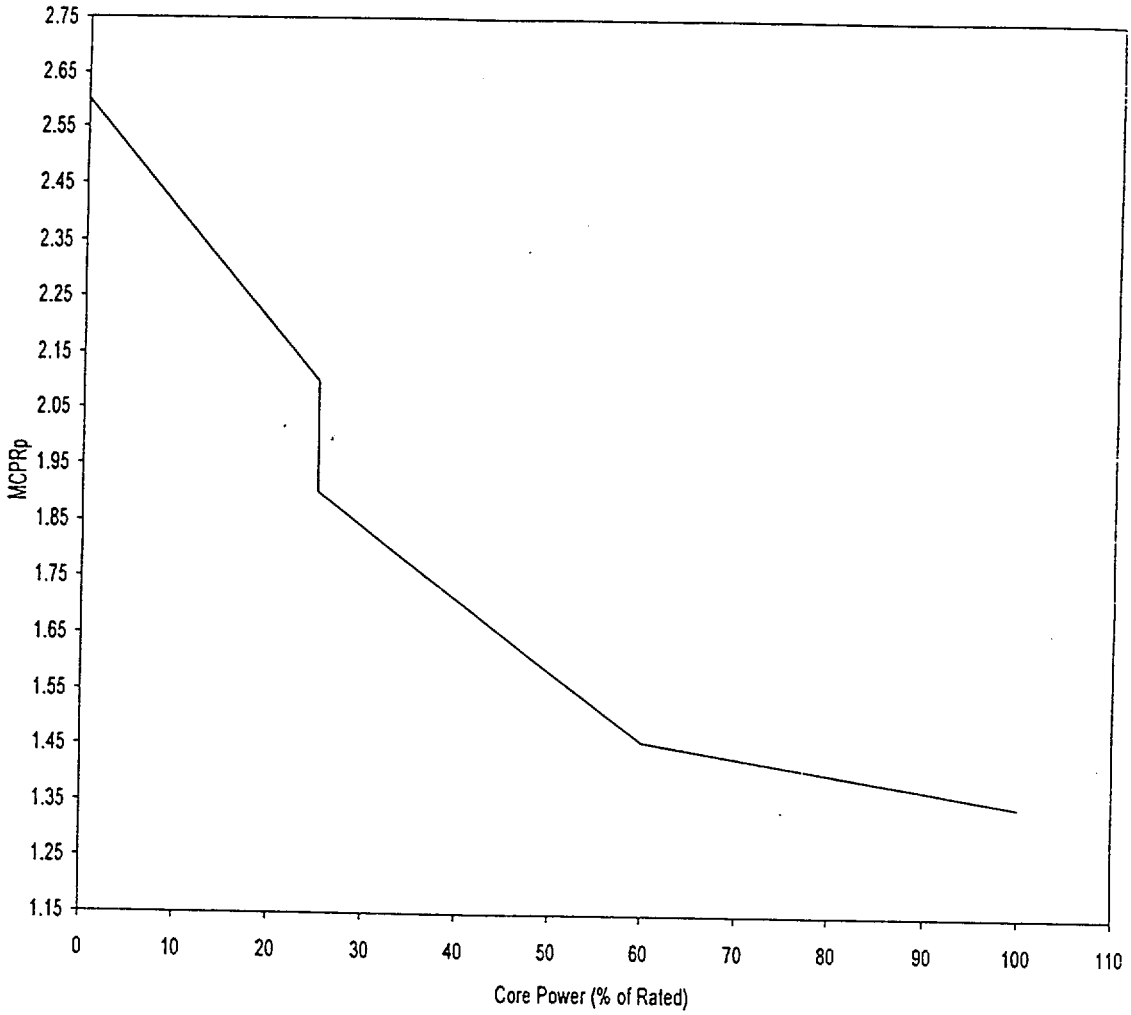
Flow (% rated)	$MCPR_f$ ATRIUM-9B	$MCPR_f$ GE9
0	1.64	1.70
30	1.64	1.70
102.5	1.08	1.08
105	1.08	1.08

Figure 5.1 Flow Dependent MCPR Limits for Manual Flow Control Mode



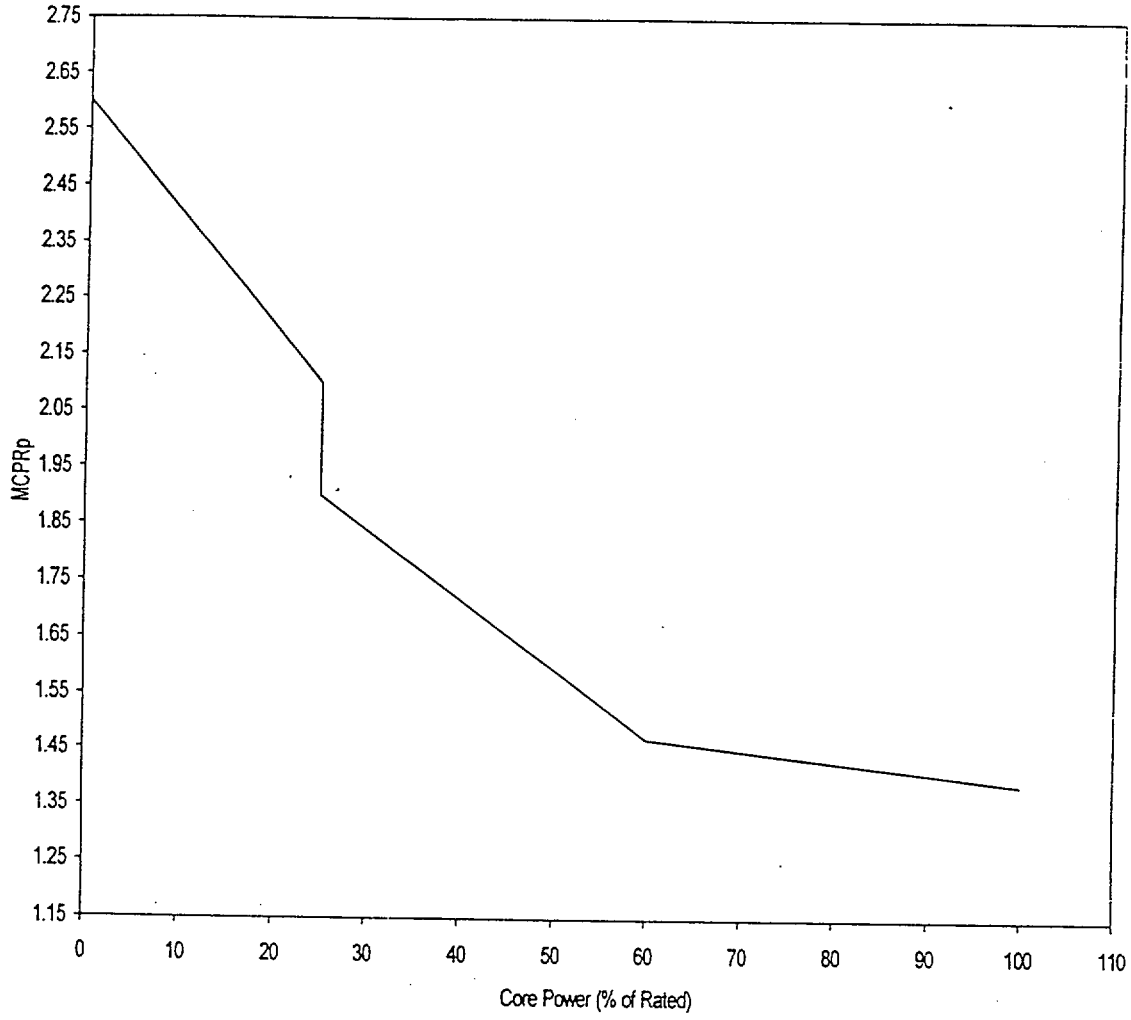
Flow (% rated)	$LHGRFAC_f$
0	0.69
30	0.69
76	1.00
105	1.00

Figure 5.2 Flow Dependent LHGR Multipliers for ATRIUM-9B Fuel



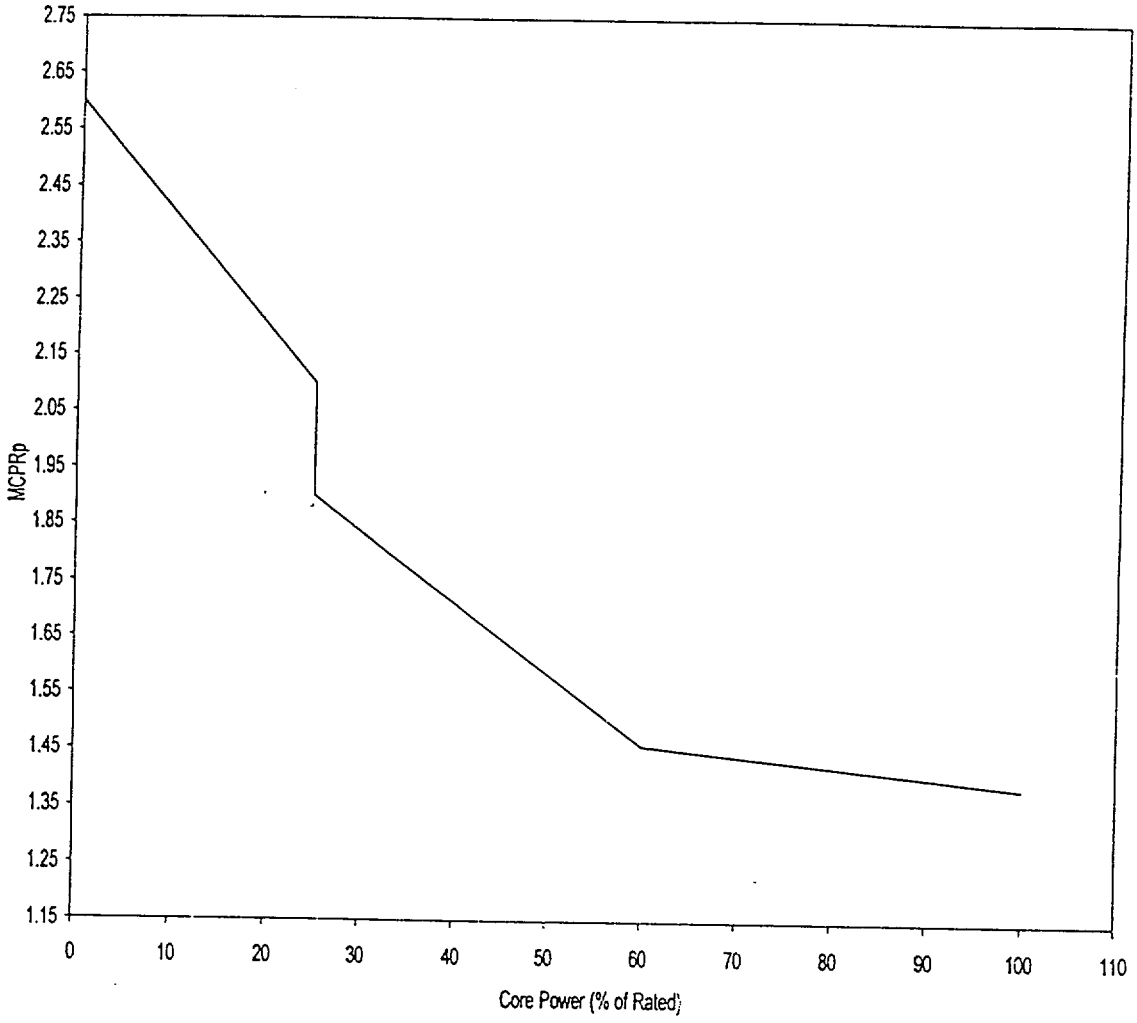
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.46
100	1.35

Figure 5.3 12,000 MWd/MTU Base Case Power Dependent MCPR Limits for ATRIUM-9B Fuel - TSSS Insertion Times



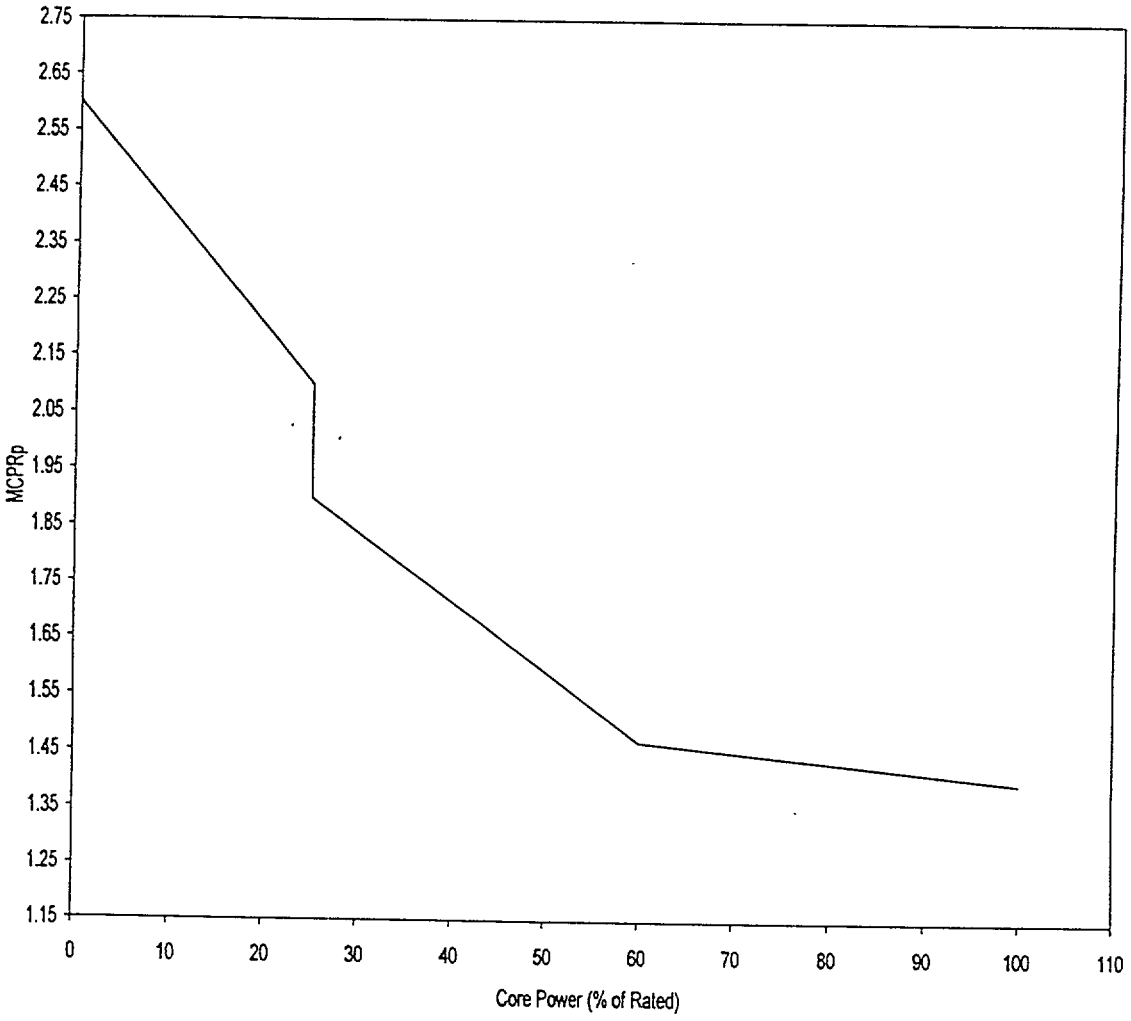
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.47
100	1.39

Figure 5.4 12,000 MWd/MTU Base Case Power Dependent MCPR Limits for GE9 Fuel - TSSS Insertion Times



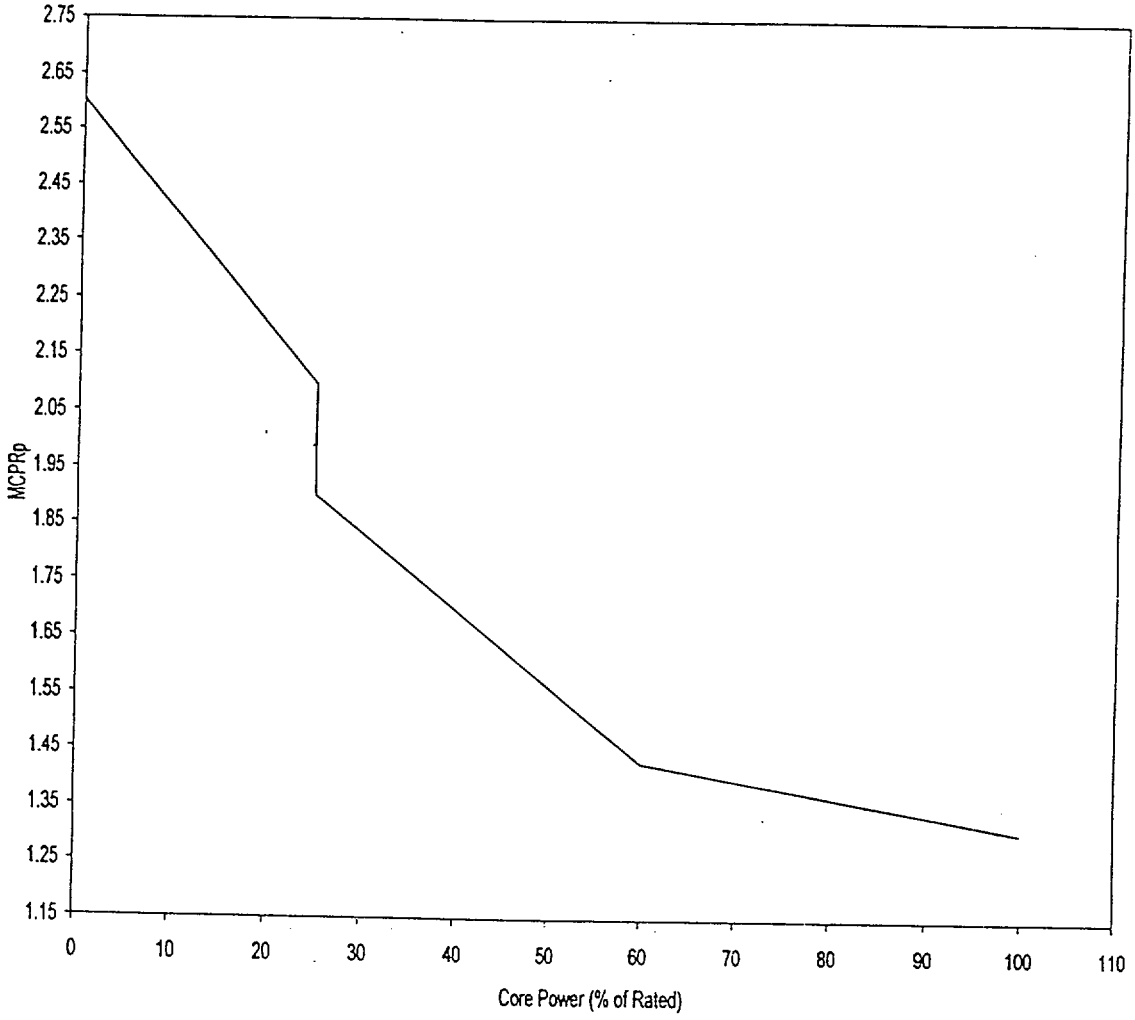
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.46
100	1.39

Figure 5.5 EOC Base Case Power Dependent MCPR Limits for ATRIUM-9B Fuel - TSSS Insertion Times



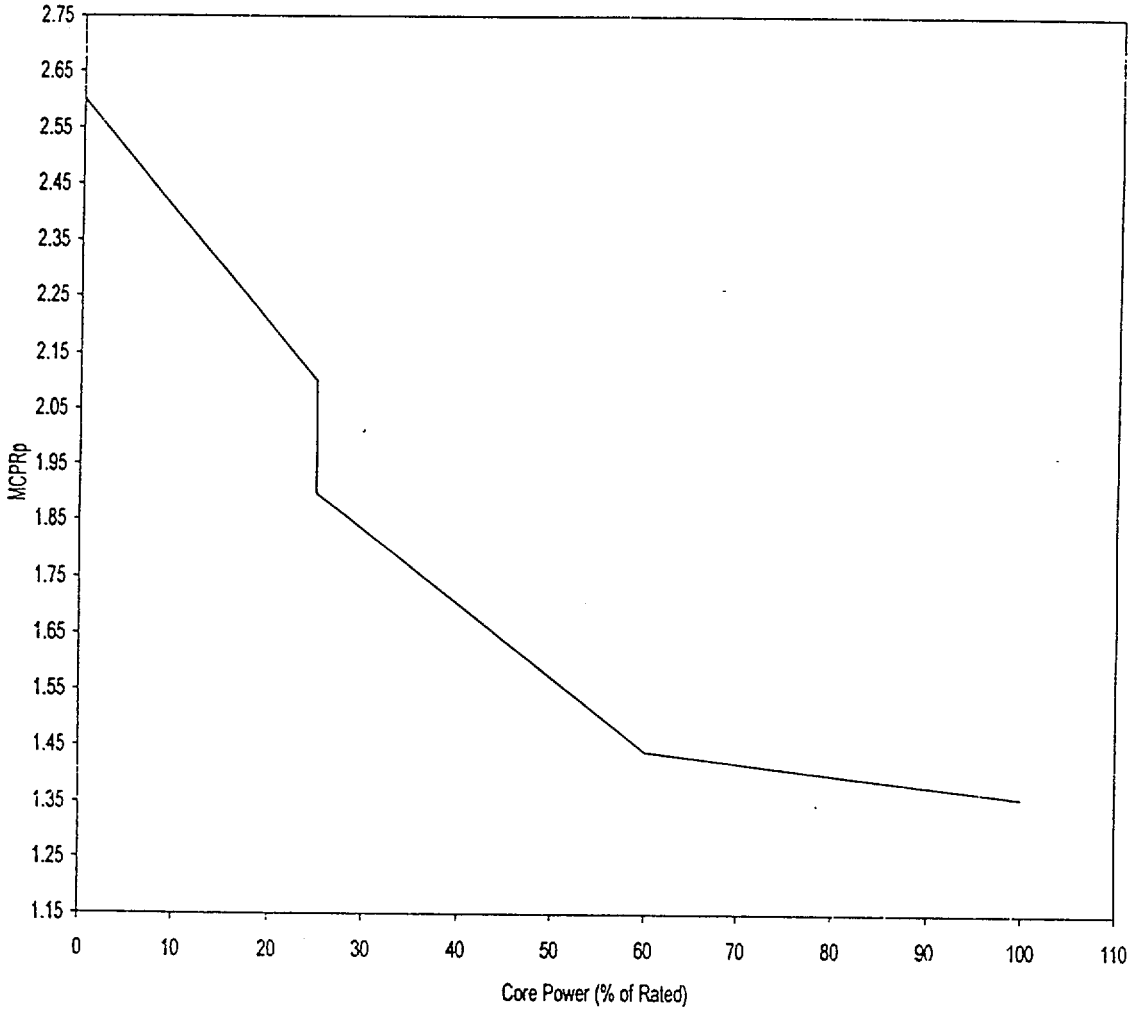
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.47
100	1.40

Figure 5.6 EOC Base Case Power Dependent MCPR Limits for GE9 Fuel - TSSS Insertion Times



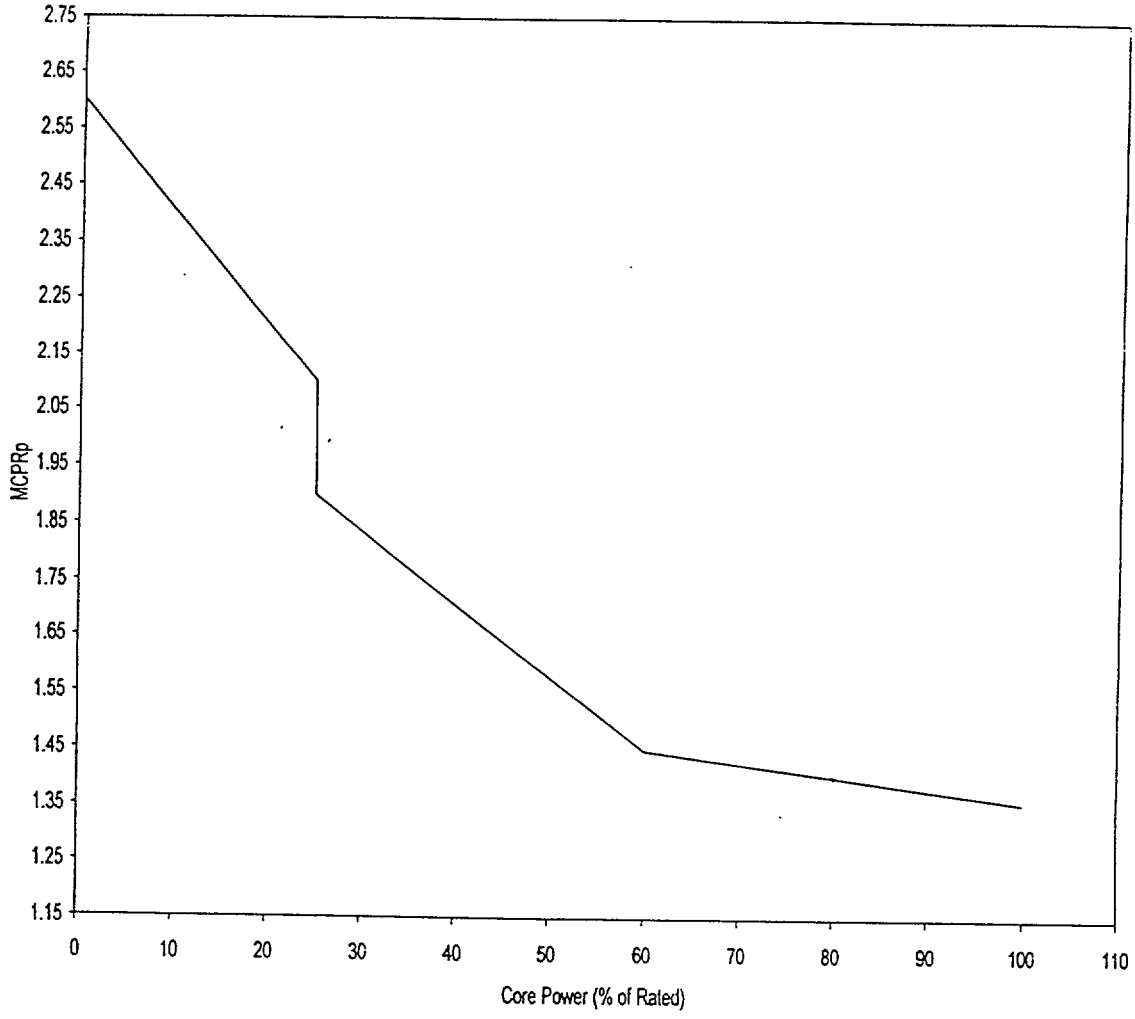
Power (% rated)	$MCPR_p$
0	2.60
25	2.10
25	1.90
60	1.43
100	1.31

Figure 5.7 12,000 MWd/MTU Base Case Power Dependent MCPR Limits for ATRIUM-9B Fuel – NSS Insertion Times



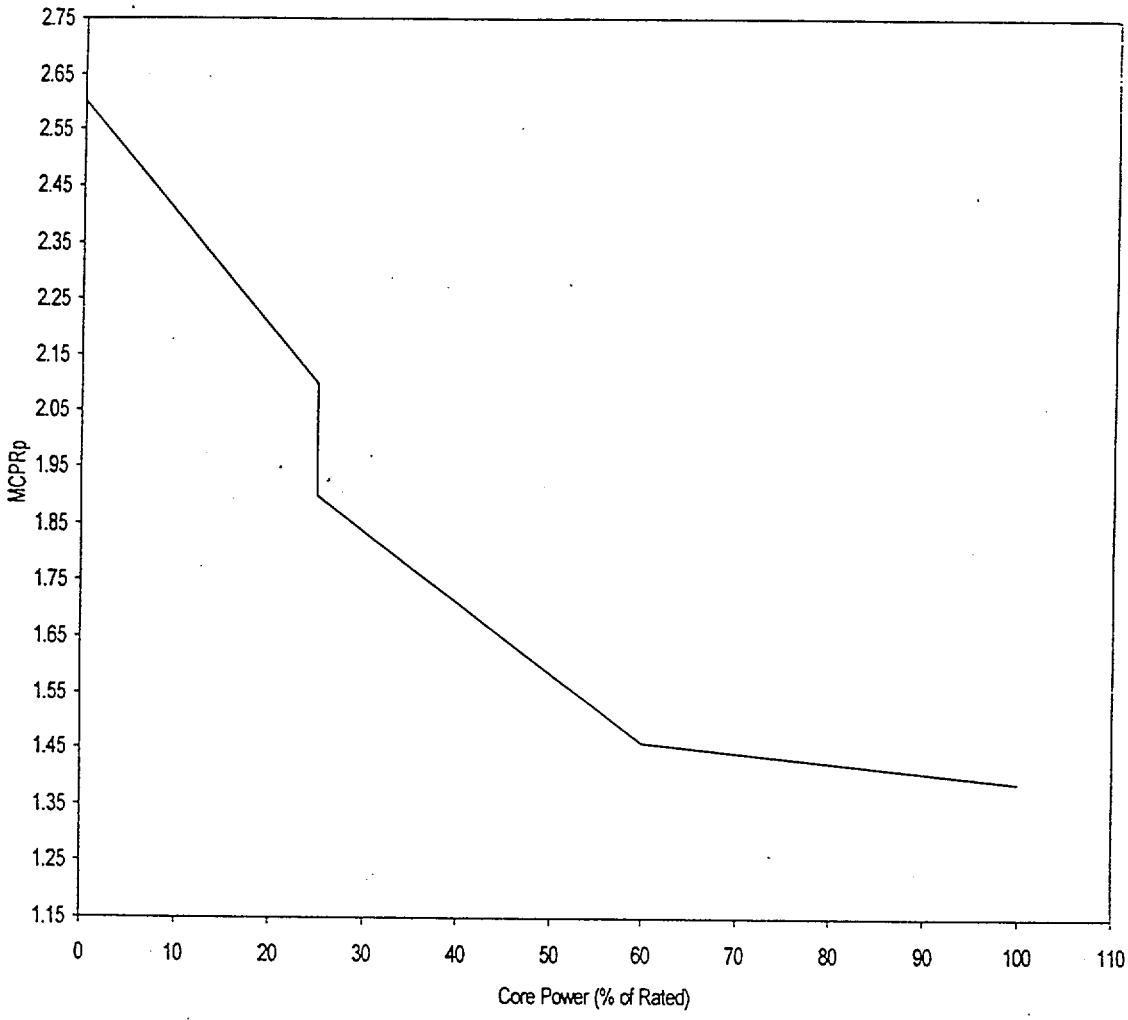
Power (% rated)	$MCPR_p$
0	2.60
25	2.10
25	1.90
60	1.44
100	1.36

Figure 5.8 12,000 MWd/MTU Base Case Power Dependent MCPR Limits for GE9 Fuel – NSS Insertion Times



Power (% rated)	$MCPR_p$
0	2.60
25	2.10
25	1.90
60	1.45
100	1.36

Figure 5.9 EOC Base Case Power Dependent MCPR Limits for ATRIUM-9B Fuel – NSS Insertion Times



Power (% rated)	$MCPR_p$
0	2.60
25	2.10
25	1.90
60	1.46
100	1.39

Figure 5.10 EOC Base Case Power Dependent MCPR Limits for GE9 Fuel – NSS Insertion Times

6. Postulated Accidents

6.1 *Loss-of-Coolant Accident*

6.1.1 Break Location Spectrum — Reference 9.8

6.1.2 Break Size Spectrum — Reference 9.8

6.1.3 MAPLHGR Analyses — Reference 9.9

The MAPLHGR limits presented in Reference 9.9 are valid for LaSalle Unit 2 ATRIUM-9B (LSB-1) fuel for Cycle 8 operation.

Limiting Break: 1.1 ft^2 Break
Recirculation Pump Discharge Line
High Pressure Core Spray Diesel Generator Single Failure

Considering all exposures, the peak clad temperature and peak local metal-water reaction for ATRIUM-9B fuel for Cycle 8 are reported below.

	Maximum PCT (°F)	Peak Local Metal-Water Reaction (%)
ATRIUM-9B Fuel	1807	0.72

The peak core wide metal-water reaction is < 0.16%.

6.2 *Control Rod Drop Accident*

LaSalle Unit 2 is a Banked Position Withdrawal Sequence (BPWS) plant. In order to allow the site the option of shutting down the reactor by inserting control rods using a simplified control rod sequence, a control rod drop accident analysis was performed for the simplified sequence as defined in Attachment 3 of Reference 9.11. The analysis determined that the simplified sequence meets the Technical Specification limit of 280 cal/g for a control rod drop accident. A 0.32%Δk adder is included in the analysis to account for possible rod mis-positioning errors.

Dropped control Rod Worth without 0.32%Δk adder, %Δk	1.112
Dropped control Rod Worth with 0.32%Δk adder, %Δk	1.432
Doppler Coefficient, (%Δk/k)/°F	-10E-6
EOC Effective Delayed Neutron Fraction	0.0053

Effective Delayed Neutron Fraction used	0.0045
Four-Bundle Local Peaking Factor	1.362
Max. Deposited Fuel Rod Enthalpy with 0.32%Δk adder, (cal/g)	244.4
Number of Rods Greater than 170 cal/g with 0.32%Δk adder	590

Note that the limit on maximum deposited enthalpy is 280 cal/g and the limit on the number of rods grater than 170 cal/gm (failed rods) is 770.

6.3 *Spent Fuel Cask Drop Accident*

The radiological consequences of a spent fuel cask drop accident have been evaluated for SPC ATRIUM fuel designs in conformance with the analysis described in the LSCS UFSAR Section 15.7.5. The analysis is assumed to occur 360 days following shutdown of the reactor, and it is assumed that all 32 fuel assemblies in the cask completely fail as a result of the accident.

Because the accident is assumed not to occur sooner than 360 days following shutdown of the reactor, the source term for the accident will be very low due to fission product decay. Hence, the commensurate radiological whole-body and thyroid doses will be very low. The results of this analysis demonstrate that spent fuel cask drop accidents involving SPC ATRIUM fuel will not exceed the established radiological whole-body and thyroid dose limits which are a small fraction of the 10 CFR 100 limits for radiological exposures.

7. Technical Specifications

7.1 *Limiting Safety System Settings*

7.1.1 MCPR Fuel Cladding Integrity Safety Limit

MCPR Safety Limit (all fuel) — two-loop operation	1.08[a]
MCPR Safety Limit (all fuel) — single-loop operation	1.09[a]

7.1.2 Steam Dome Pressure Safety Limit

Pressure Safety Limit	1325 psig

7.2 *Limiting Conditions for Operation*

7.2.1 Average Planar Linear Heat Generation Rate

Reference 9.9

ATRIUM-9B Fuel MAPLHGR Limits		GE9 Fuel MAPLHGR Limits
Average Planar Exposure (GWd/MTU)	MAPLHGR (kW/ft)	< To be furnished by ComEd. >
0.0	13.5	
20.0	13.5	
61.1	9.39	

7.2.2 Minimum Critical Power Ratio

Rated Conditions MCPR Limit[b]

Flow Dependent MCPR Limits:

Manual Flow Control — Figure 5.1

---

[a] Includes the effects of channel bow, up to 2 TIPOOS (or the equivalent number of TIP channels), a 2000 EFPH LPRM calibration interval and up to 50% of the LPRMs out of service.

[b]. This data is to be furnished by ComEd.

Power Dependent MCPR Limits:

Base Case Operation - TSSS Insertion Times	Figures 5.3–5.6
Base Case Operation - NSS Insertion Times	Figures 5.7–5.10
EOD, EOOS and Combined EOD/EOOS Operation	Tables 5.1–5.4

7.2.3 Linear Heat Generation Rate — Reference 9.1

ATRIUM-9B Fuel Steady-State LHGR Limits		GE9 Fuel Steady-State LHGR Limits
Average Planar Exposure (GWd/MTU)	LHGR (kW/ft)	< To be furnished by ComEd. >
0.0	14.4	
15.0	14.4	
61.1	8.32	

The protection against power transient (PAPT) linear heat generation rate curve for ATRIUM-9B fuel is identified in Reference 9.1 and is presented here as Figure 7.1 for convenience. $LHGRFAC_f$ and $LHGRFAC_p$ multipliers are applied directly to the steady-state LHGR limits at reduced power, reduced flow and/or EOD/EOOS conditions to ensure the PAPT LHGR limits are not violated during an AOO. Comparison of the Cycle 8 nodal power histories for the rated power pressurization transients with the approved bounding curves to show compliance with the 1% strain criteria for GE9 fuel is discussed in Reference 9.10.

LHGRFAC Multipliers for Off-Rated Conditions - ATRIUM-9B Fuel:

$LHGRFAC_f$	Figure 5.2
$LHGRFAC_p$	Tables 5.1–5.5

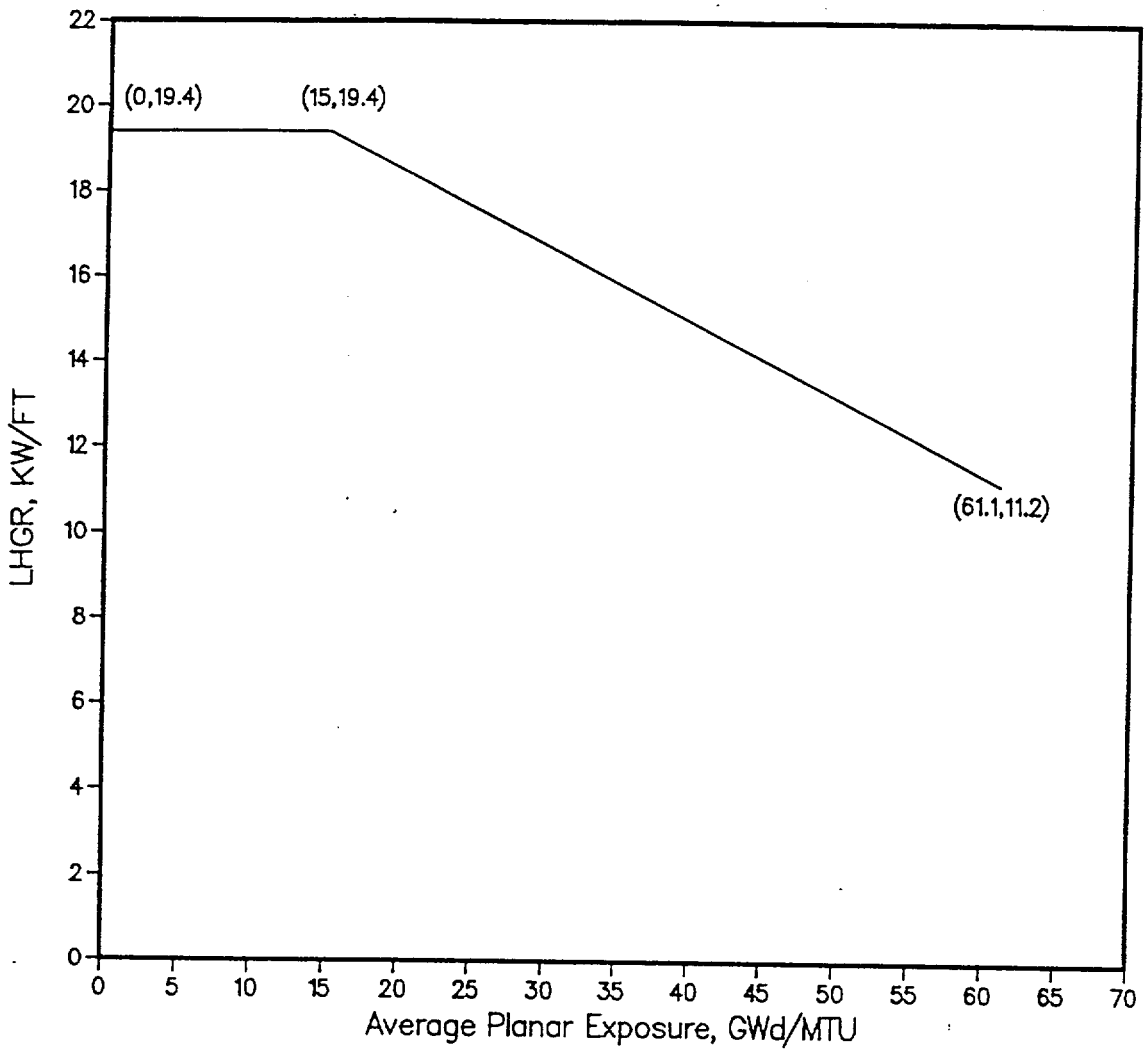


Figure 7.1 Protection Against Power Transient LHGR Limit for ATRIUM-9B Fuel

Attachment 3

LaSalle Unit 2 Cycle 8

Plant Transient Analysis (Excerpts)

Nonproprietary Summary of
EMF-96-124(P) Revision 3

Table 3.1 LaSalle Unit 2 Plant Conditions at Rated Power and Flow

Reactor Thermal Power	3323 MWt
Total Core Flow	108.5 Mlbm/hr
Core Active Flow	94.1 Mlbm/hr
Core Bypass Flow*	14.4 Mlbm/hr
Core Inlet Enthalpy	524.1 Btu/lbm
Vessel Pressures	
Steam Dome	1001 psia
Core Exit (upper plenum)	1012 psia
Lower Plenum	1037 psia
Turbine Pressure	955 psia
Feedwater/Steam Flow	14.32 Mlbm/hr
Feedwater Enthalpy	400.9 Btu/lbm
Recirculating Pump Flow (per pump)	15.83 Mlbm/hr
Core Average Gap Coefficient (EOC)	1158 Btu/hr-ft^2-°F

* Includes water channel flow.

Table 3.4 EOC Base Case LRNB Transient Results

Power/Flow	ATRIUM-9B ΔCPR	ATRIUM-9B LHGRFAC$_p$	GE9 ΔCPR	Peak Neutron Flux (% rated)	Peak Heat Flux (% rated)
TSSS Insertion Times					
100/105	0.301	1.000	0.317	389.88	124.14
100/100	0.296	1.000	0.311	408.37	124.47
100/87	0.296	1.000	0.319	401.28	124.72
80/105	0.303	1.012	0.319	291.43	98.21
80/54.5	0.315	1.036	0.313	263.07	95.22
60/105	0.285	1.052	0.303	222.00	71.91
60/45.2	0.321	1.057	0.294	184.77	70.99
40/105	0.226*	1.126	0.244*	98.83*	45.04*
25/105	0.163*	1.220	0.181*	42.26*	26.64*
NSS Insertion Times					
100/105	0.272	1.000	0.303	356.44	120.28
100/100	0.265	1.000	0.289	371.58	120.23
100/87	0.250	1.017	0.270	354.00	120.14
80/105	0.278	1.025	0.294	262.97	95.79
80/54.5	0.208	1.090	0.210	196.79	89.62
60/105	0.269	1.061	0.287	209.31	70.74
60/45.2	0.225	1.102	0.213	145.72	67.61
40/105	0.212	1.131	0.231	105.18	45.31
25/105	0.137	1.222	0.164	43.21	26.72

* The analysis results presented are from an earlier cycle exposure. The ΔCPR and LHGRFAC$_p$ results are conservatively used to establish the thermal limits.

Table 3.6 EOC Base Case FWCF Transient Results

Power/Flow	ATRIUM-9B ΔCPR	ATRIUM-9B LHGRFAC$_p$	GE9 ΔCPR	Peak Neutron Flux (% rated)	Peak Heat Flux (% rated)
TSSS Insertion Times					
100/105	0.268	1.066	0.294	310.14	121.56
100/100	0.262	1.067	0.283	293.99	121.50
100/87	0.248	1.073	0.263	267.48	120.52
80/105	0.305	1.051	0.316	262.46	99.69
80/54.5	0.217	1.135	0.216	163.28	91.25
60/105	0.358	1.021	0.367	193.36	77.58
60/45.2	0.219	1.148	0.207	117.66	68.57
40/105	0.495*	0.948*	0.489*	109.43*	56.30*
25/105	0.753*	0.821*	0.759*	56.05*	40.57*
NSS Insertion Times					
100/105	0.244	1.082	0.277	278.66	118.76
100/100	0.237	1.086	0.266	262.44	118.41
100/87	0.210	1.098	0.227	233.56	116.66
80/105	0.286	1.062	0.297	245.02	98.01
80/54.5	0.141	1.179	0.139	129.40	87.49
60/105	0.345	1.027	0.355	185.90	76.78
60/45.2	0.152	1.183	0.145	99.03	66.29
40/105	0.476*	0.955*	0.471*	104.13*	55.81*
25/105	0.725*	0.832*	0.684*	68.48*	41.49*

* The analysis results presented are from an earlier cycle exposure. The ΔCPR and LHGRFAC$_p$ results are conservatively used to establish the thermal limits.

Table 3.8 Flow Dependent MCPR Results

Core Flow (% rated)	ATRIUM-9B	GE9
30	1.598	1.566
40	1.510	1.475
50	1.447	1.413
60	1.382	1.352
70	1.314	1.290
80	1.242	1.228
90	1.167	1.162
100	1.097	1.096
102.5	1.080	1.080
105	1.080	1.080

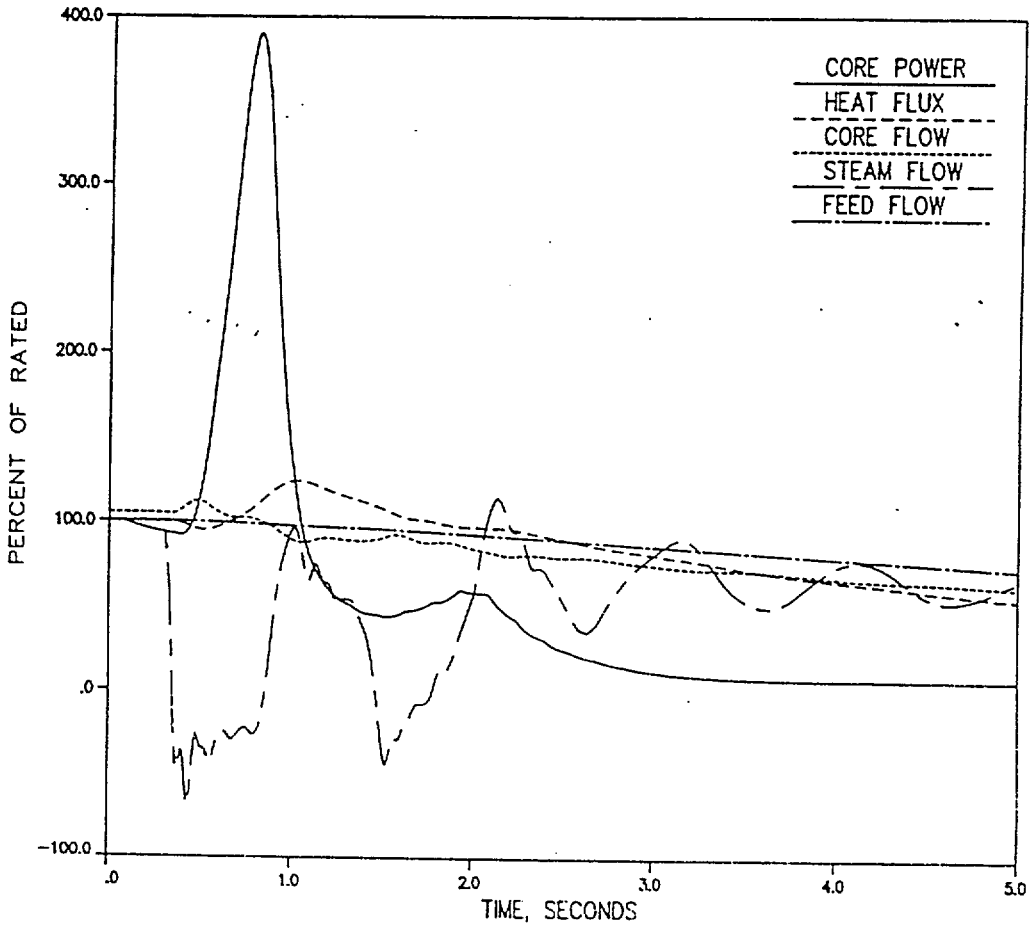


Figure 3.4 EOC Load Rejection No Bypass
at 100/105 – TSSS Key Parameters

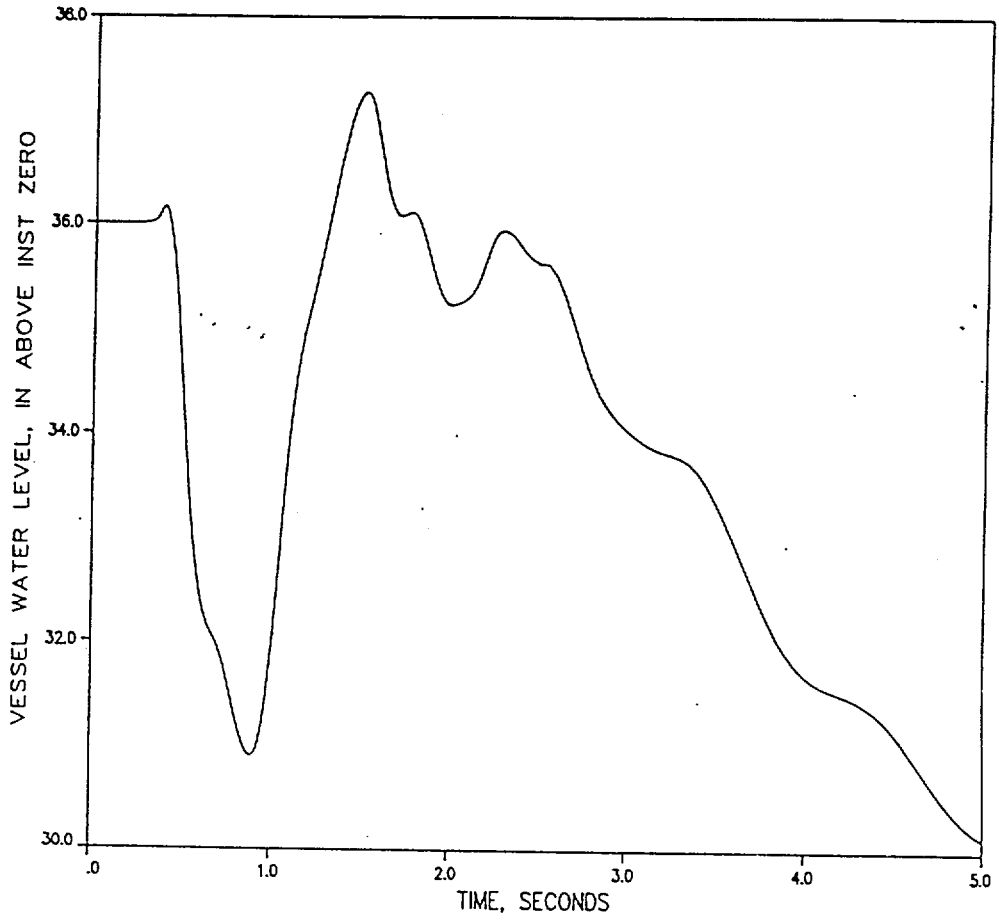


Figure 3.5 EOC Load Rejection No Bypass
at 100/105 – TSSS Vessel Water Level

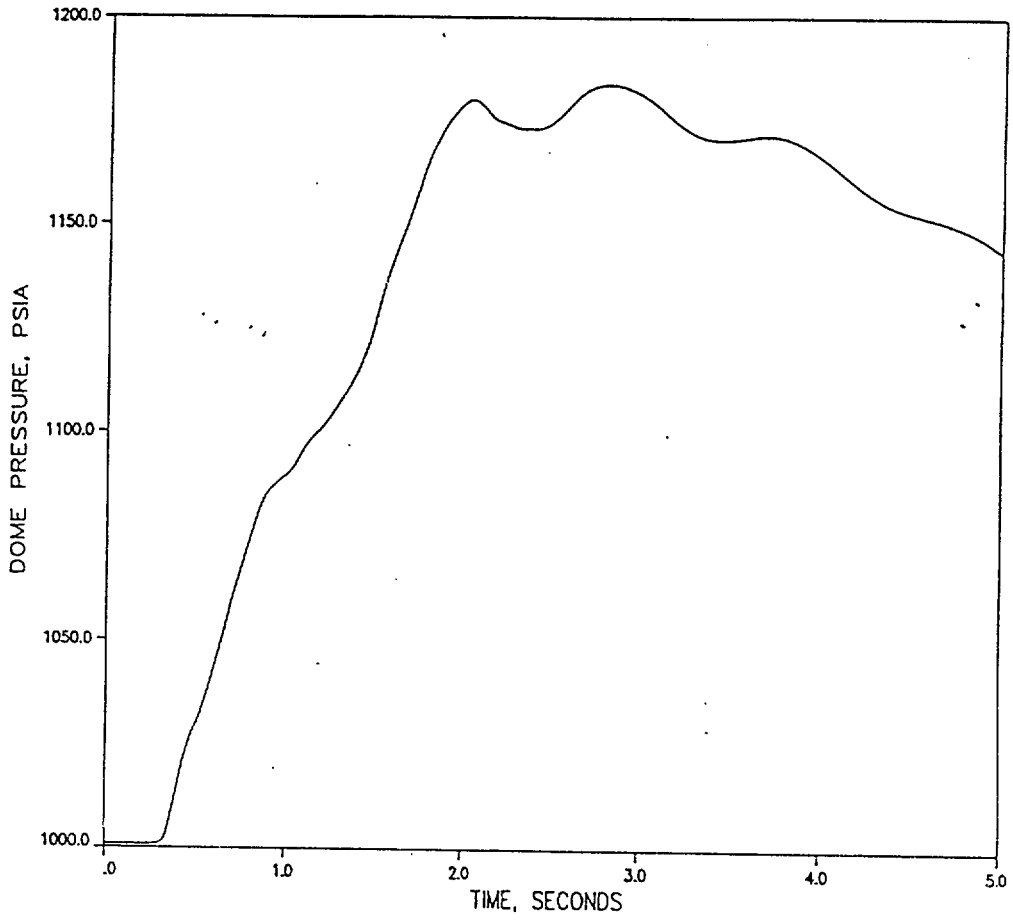


Figure 3.6 EOC Load Rejection No Bypass
at 100/105 – TSSS Dome Pressure

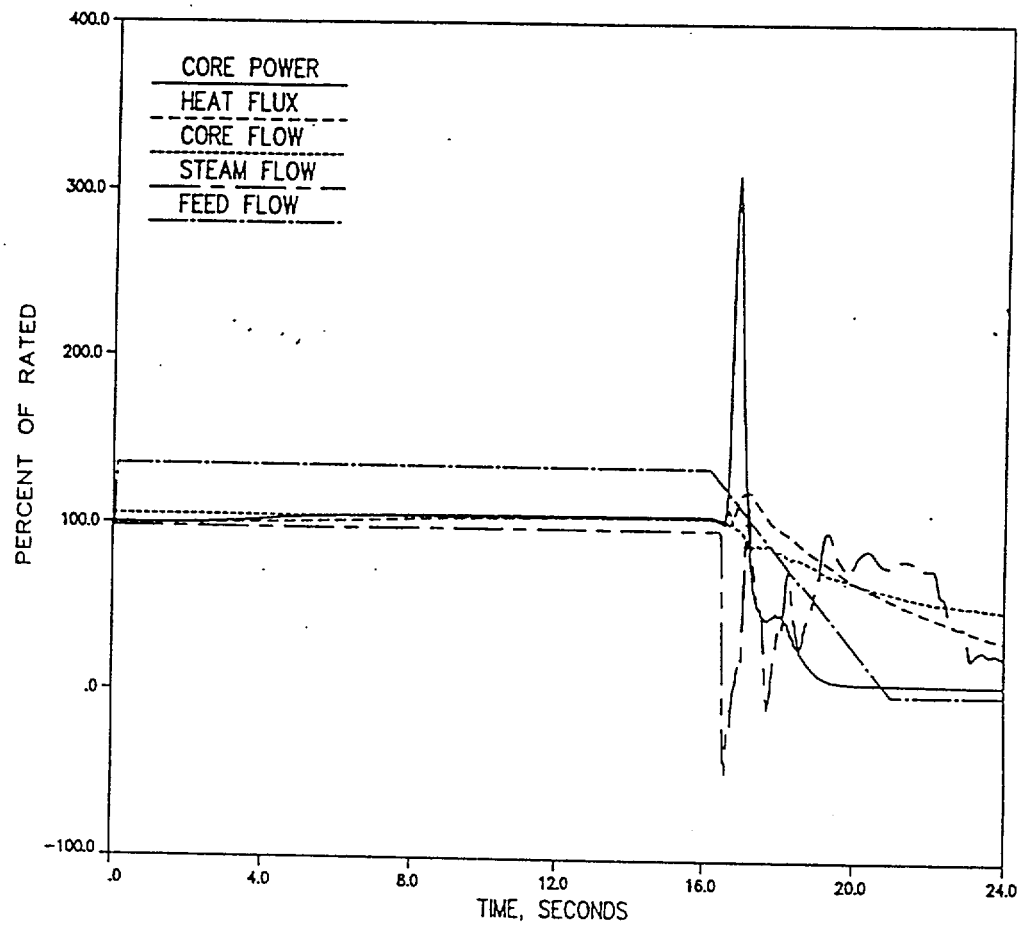


Figure 3.10 EOC Feedwater Controller Failure
at 100/105 – TSSS Key Parameters

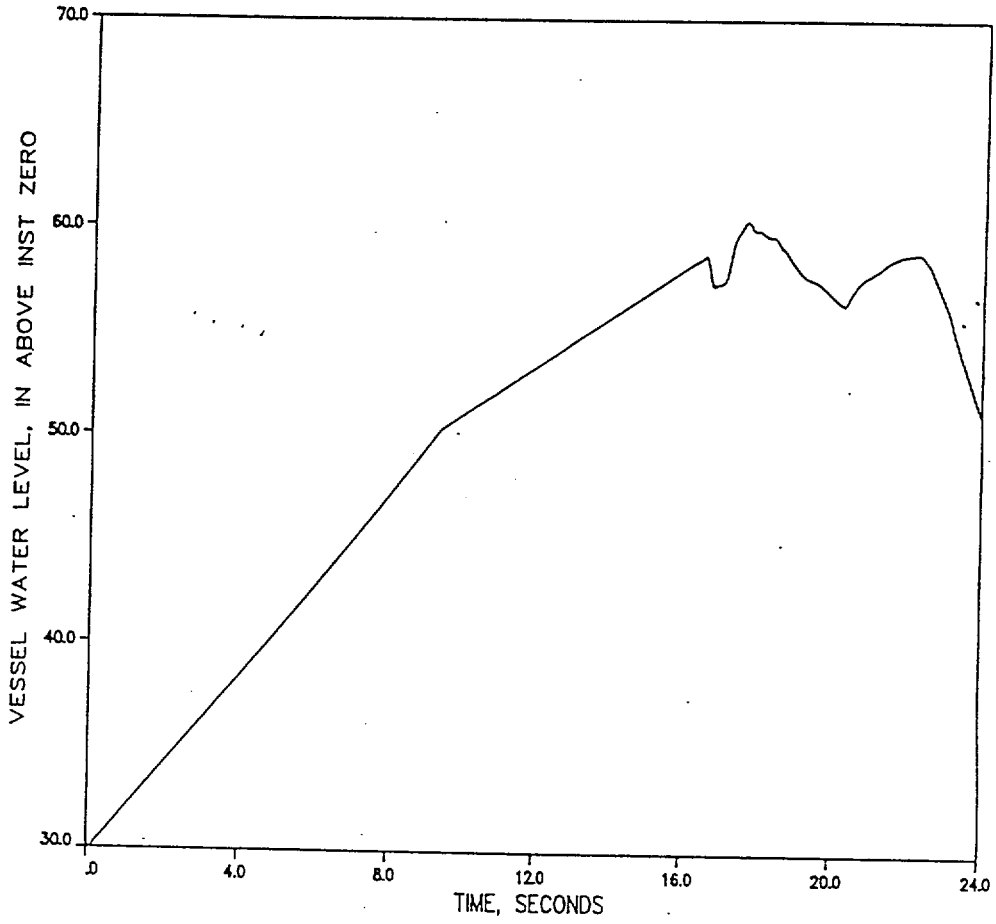


Figure 3.11 EOC Feedwater Controller Failure
at 100/105 – TSSS Vessel Water Level

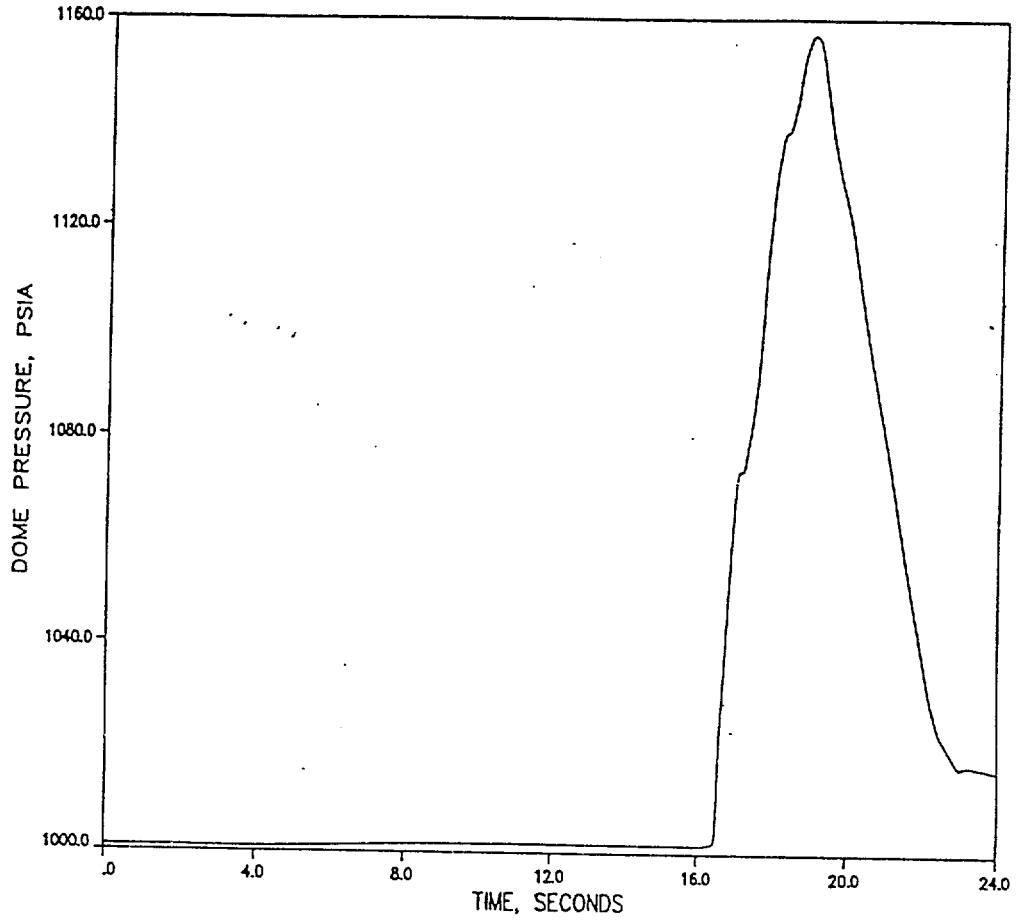
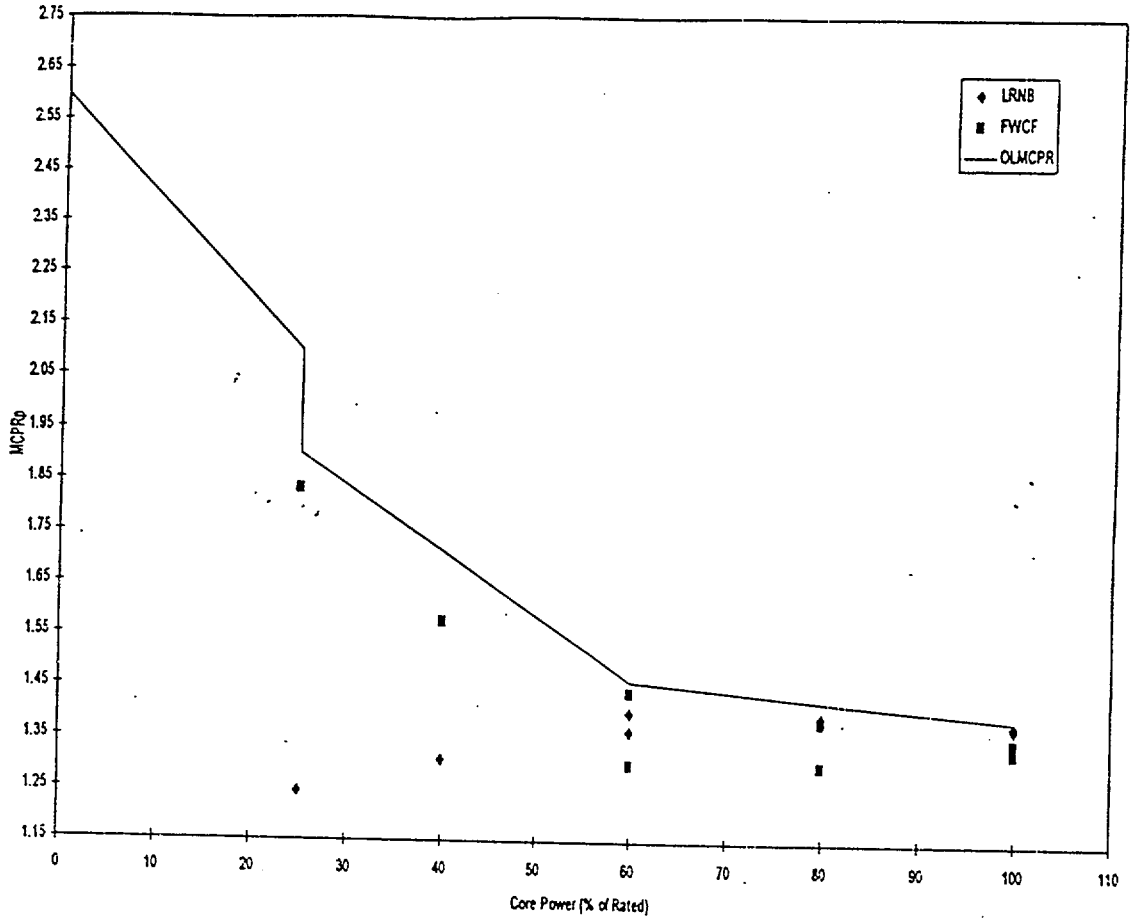
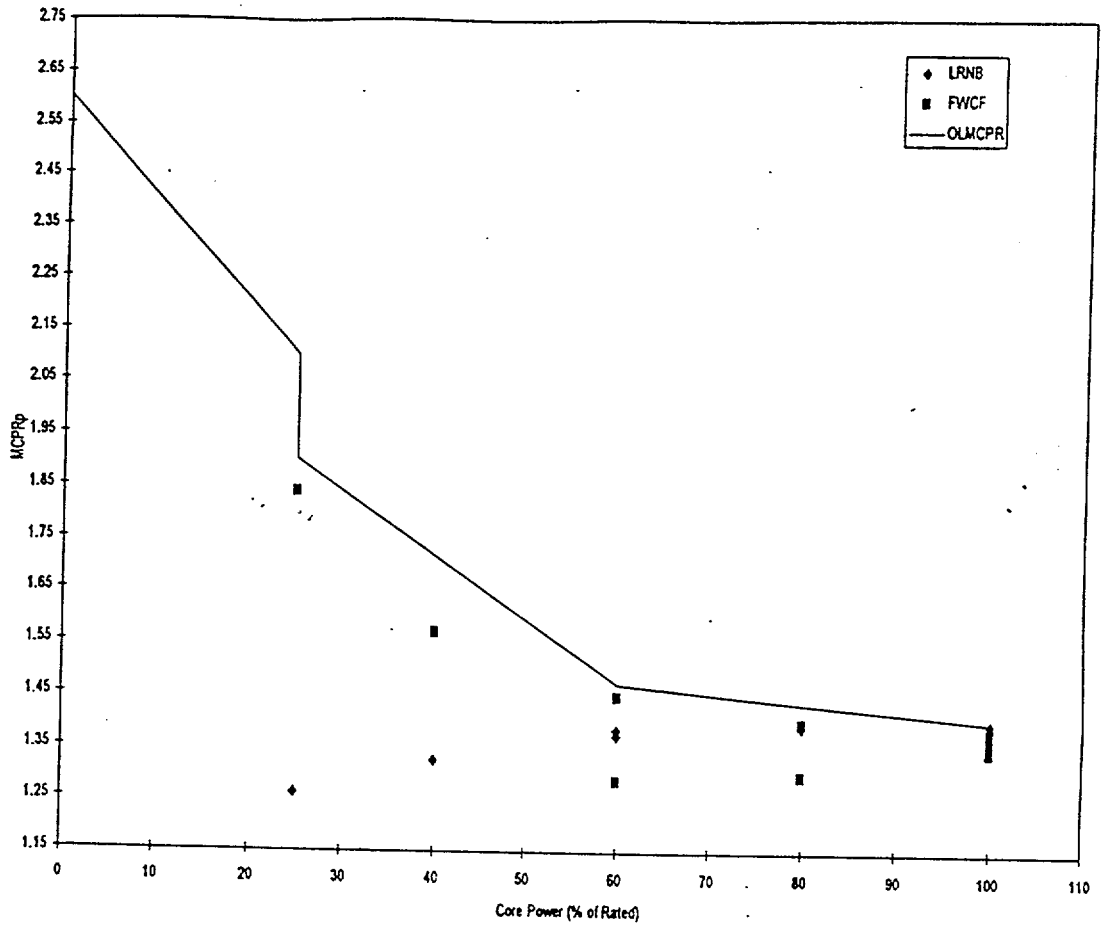


Figure 3.12 EOC Feedwater Controller Failure
at 100/105 – TSSS Dome Pressure



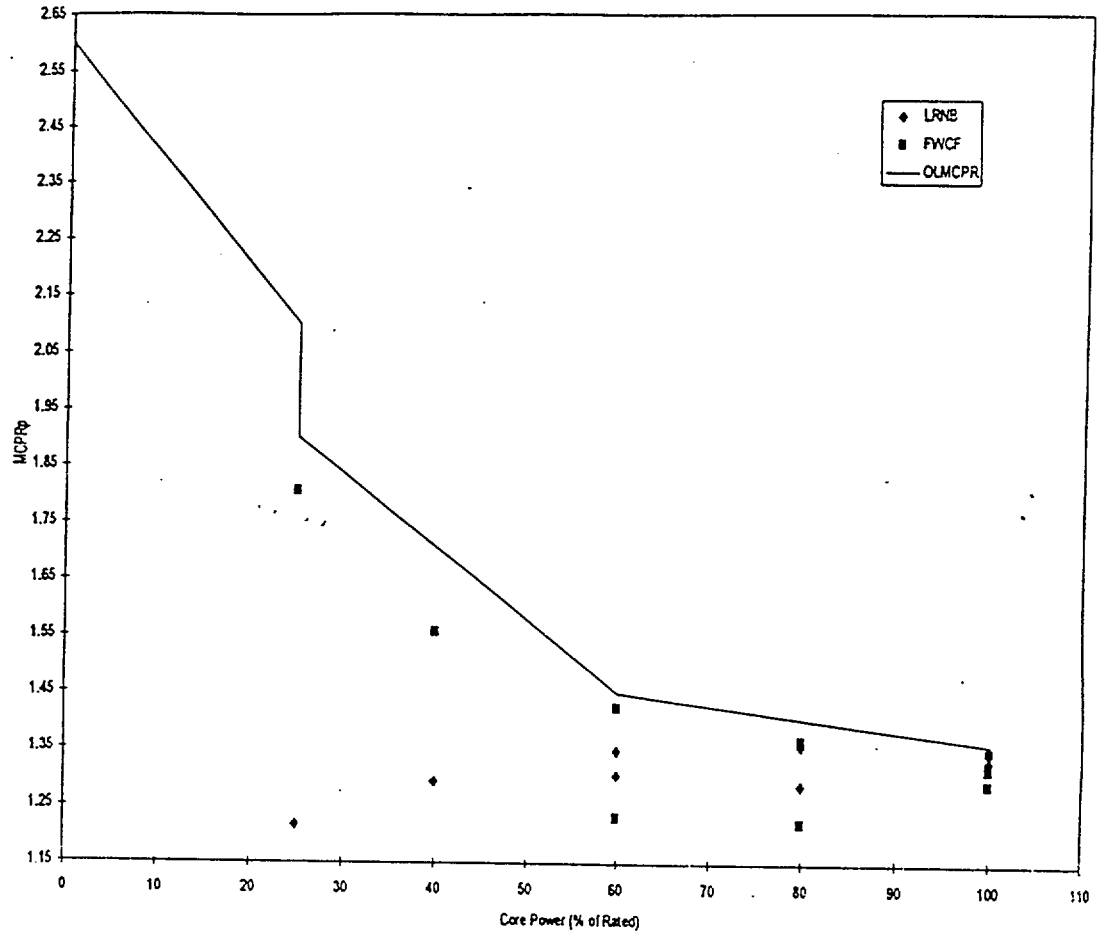
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.46
100	1.39

Figure 3.20 EOC Base Case Power Dependent MCPR Limits for ATRIUM-9B Fuel – TSSS Insertion Times



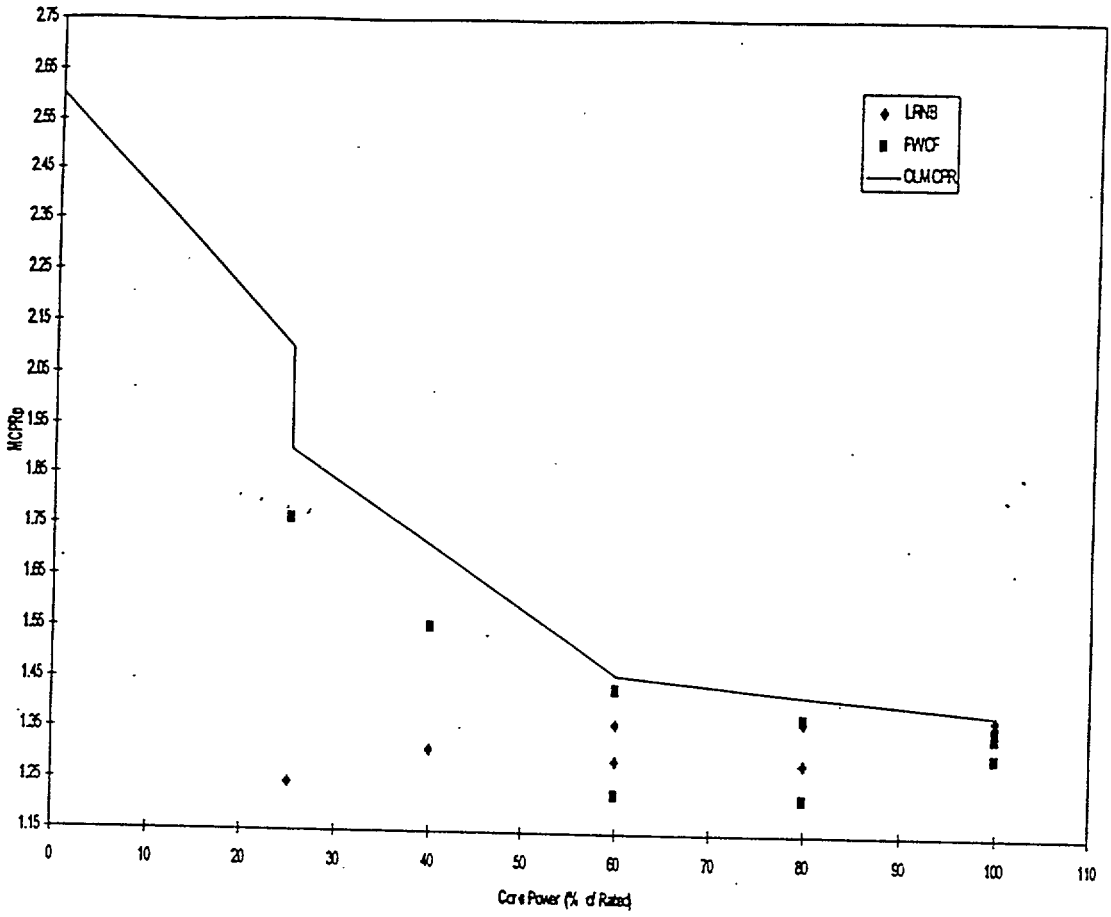
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.47
100	1.40

Figure 3.21 EOC Base Case Power Dependent MCPR Limits for GE9 Fuel – TSSS Insertion Times



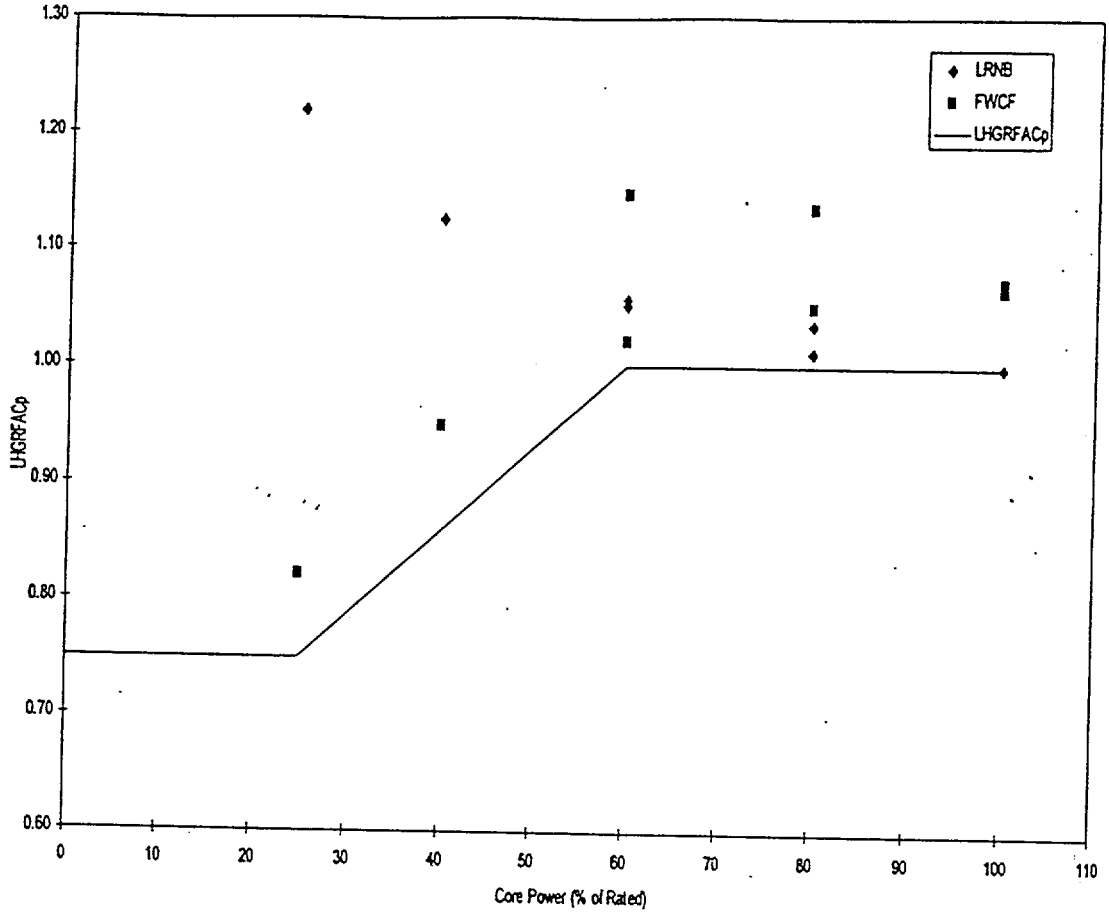
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.45
100	1.36

Figure 3.22 EOC Base Case Power Dependent MCPR Limits for ATRIUM-9B Fuel – NSS Insertion Times



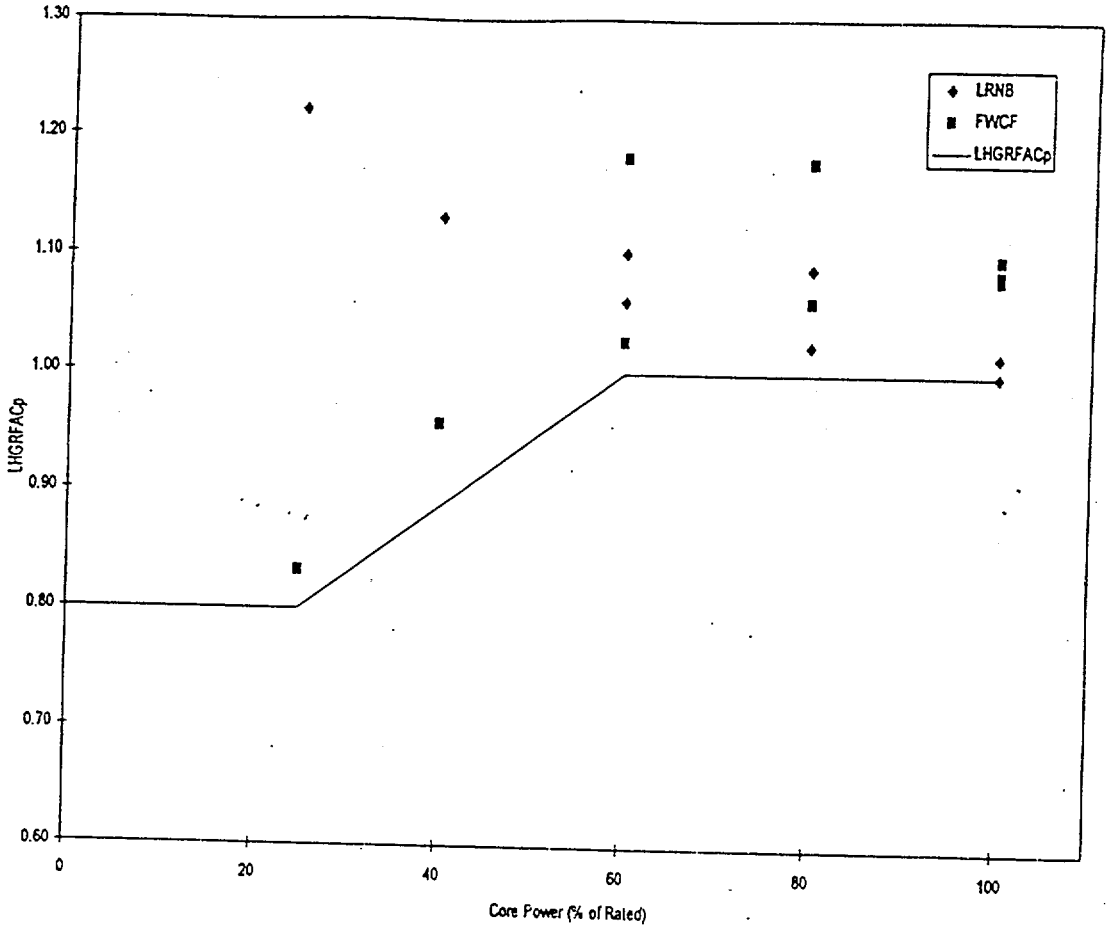
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.46
100	1.39

Figure 3.23 EOC Base Case Power Dependent MCPR Limits for GE9 Fuel – NSS Insertion Times



Power (% rated)	$LHGRFAC_p$
0	0.75
25	0.75
25	0.75
60	1.00
100	1.00

Figure 3.26 EOC Base Case Power Dependent LHGR Multipliers for ATRIUM-9B Fuel – TSSS Insertion Times



Power (% rated)	$LHGRFAC_p$
0	0.80
25	0.80
25	0.80
60	1.00
100	1.00

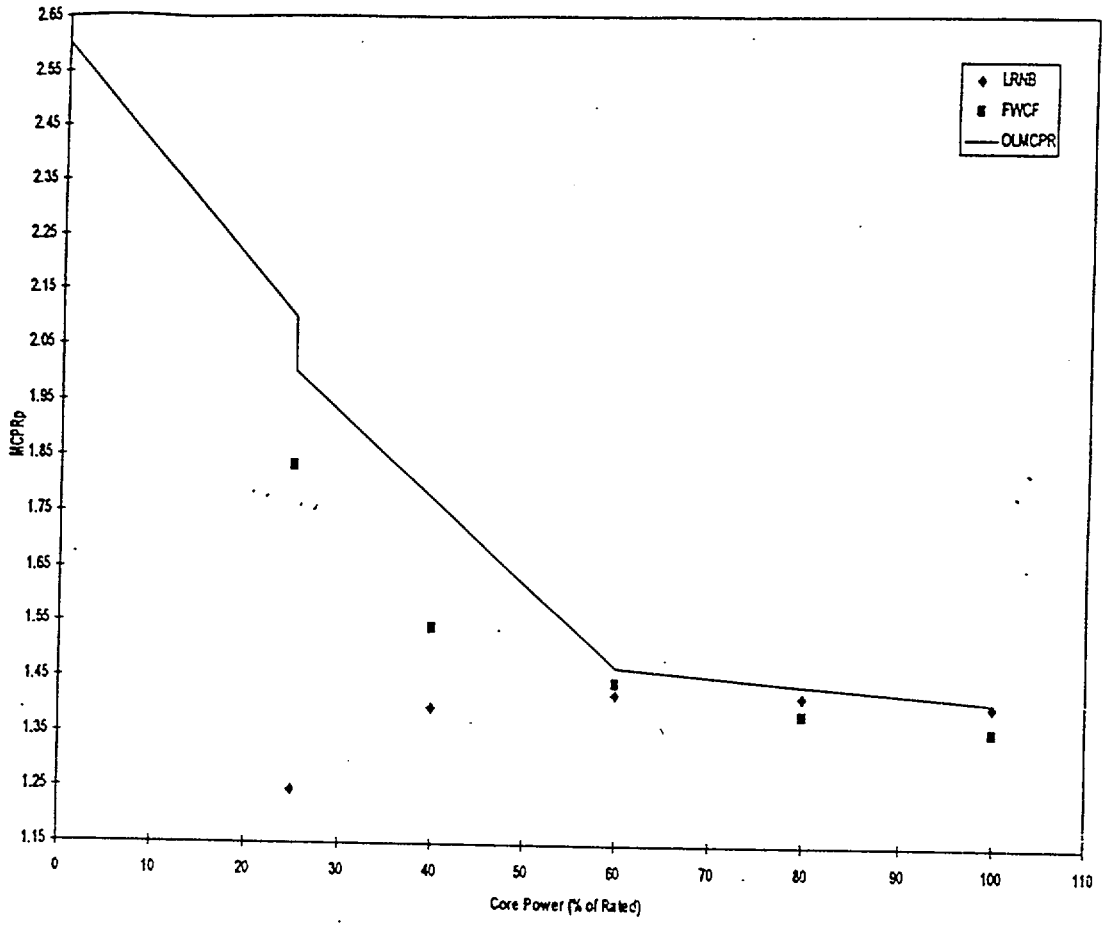
Figure 3.27 EOC Base Case Power Dependent LHGR Multipliers for ATRIUM-9B Fuel – NSS Insertion Times

Table 4.1 Coastdown Operation Transient Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	100/105	0.322	0.978	0.334
LRNB	80/105	0.338	0.985	0.353
LRNB	60/105	0.342	0.971	0.335
LRNB	40/105	0.317	0.961	0.300
LRNB	25/105	0.167	1.150	0.162
FWCF	100/105	0.278	1.063	0.291
FWCF	80/105	0.304	1.056	0.311
FWCF	60/105	0.363	1.030	0.359
FWCF	40/105	0.460	1.050	0.452
FWCF	25/105	0.753	0.995	0.837

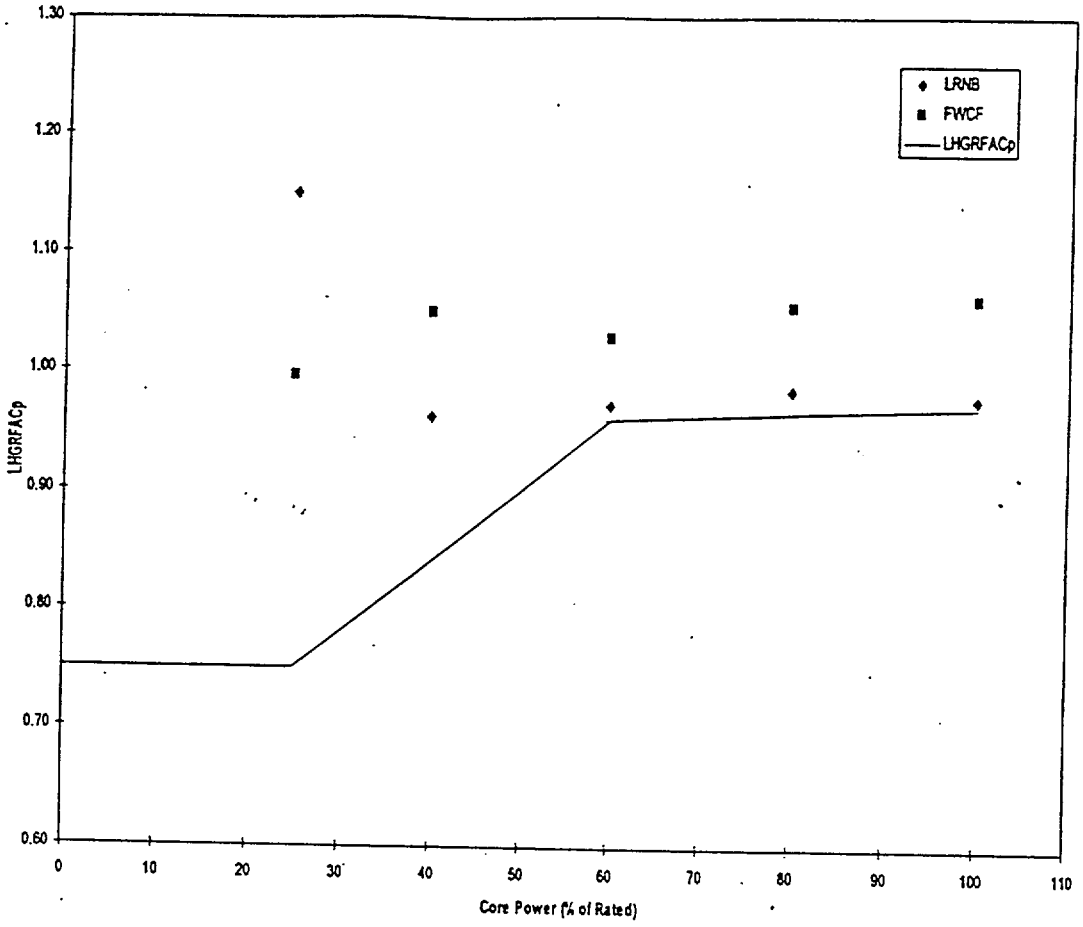
Table 4.2 FFTR/Coastdown Operation Transient Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	100/105	0.272	1.029	0.285
LRNB	80/105	0.266	1.034	0.277
LRNB	60/105	0.288	1.013	0.263
LRNB	40/105	0.246	1.020	0.219
LRNB	25/105	0.121	1.200	0.120
FWCF	100/105	0.283	1.066	0.294
FWCF	80/105	0.318	1.053	0.326
FWCF	60/105	0.387	1.039	0.385
FWCF	40/105	0.571	1.180	0.533
FWCF	25/105	1.006	0.883	1.032



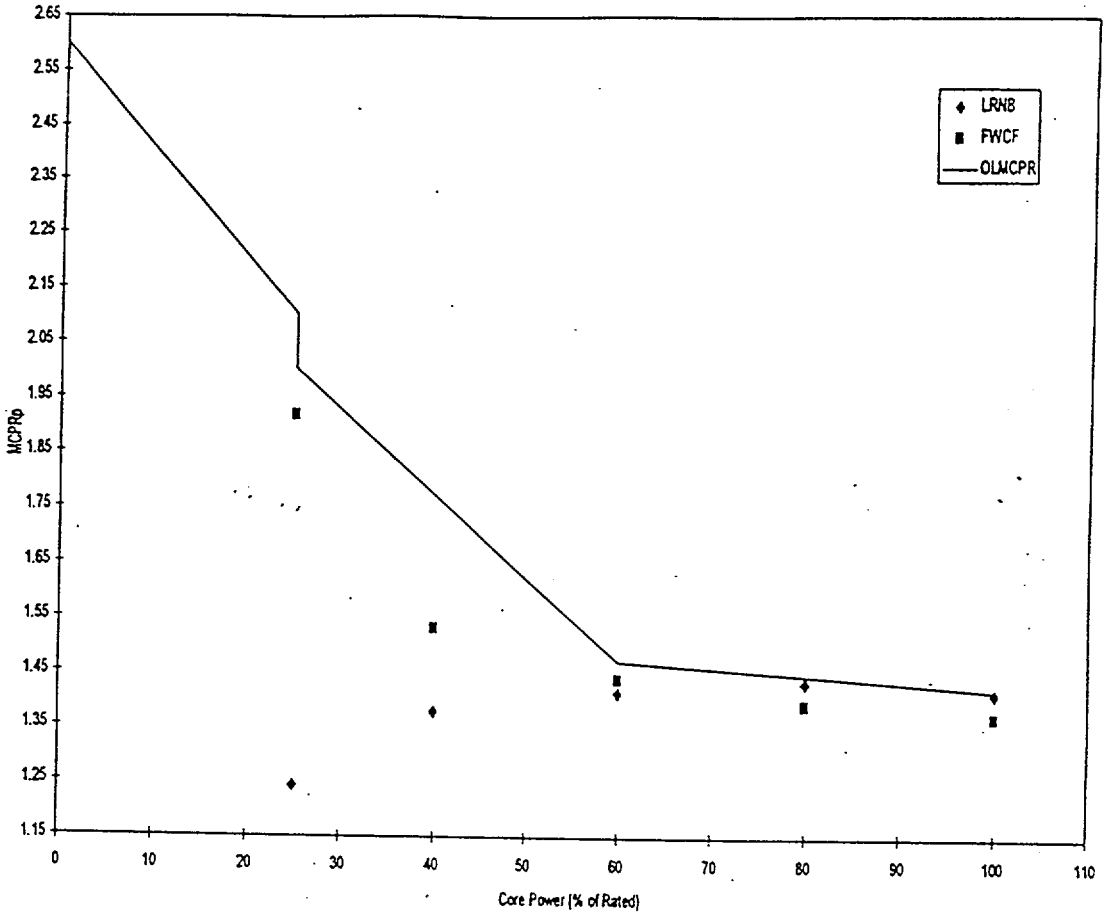
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.47
100	1.41

Figure 4.1 Coastdown Power Dependent
MCPR Limits for ATRIUM-9B Fuel



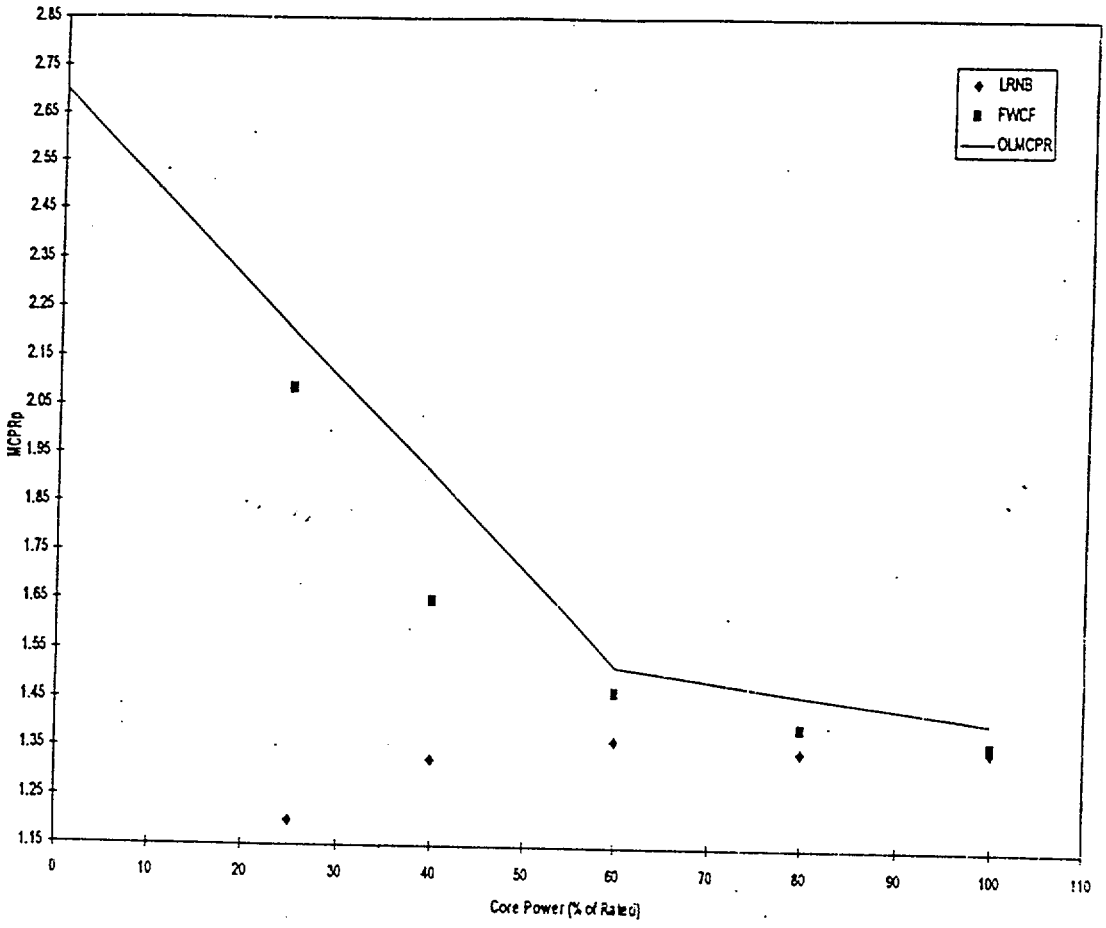
Power (% rated)	$LHGRFAC_p$
0	0.75
25	0.75
25	0.75
60	0.96
100	0.97

Figure 4.2 Coastdown Power Dependent
LHGR Multipliers for ATRIUM-9B Fuel



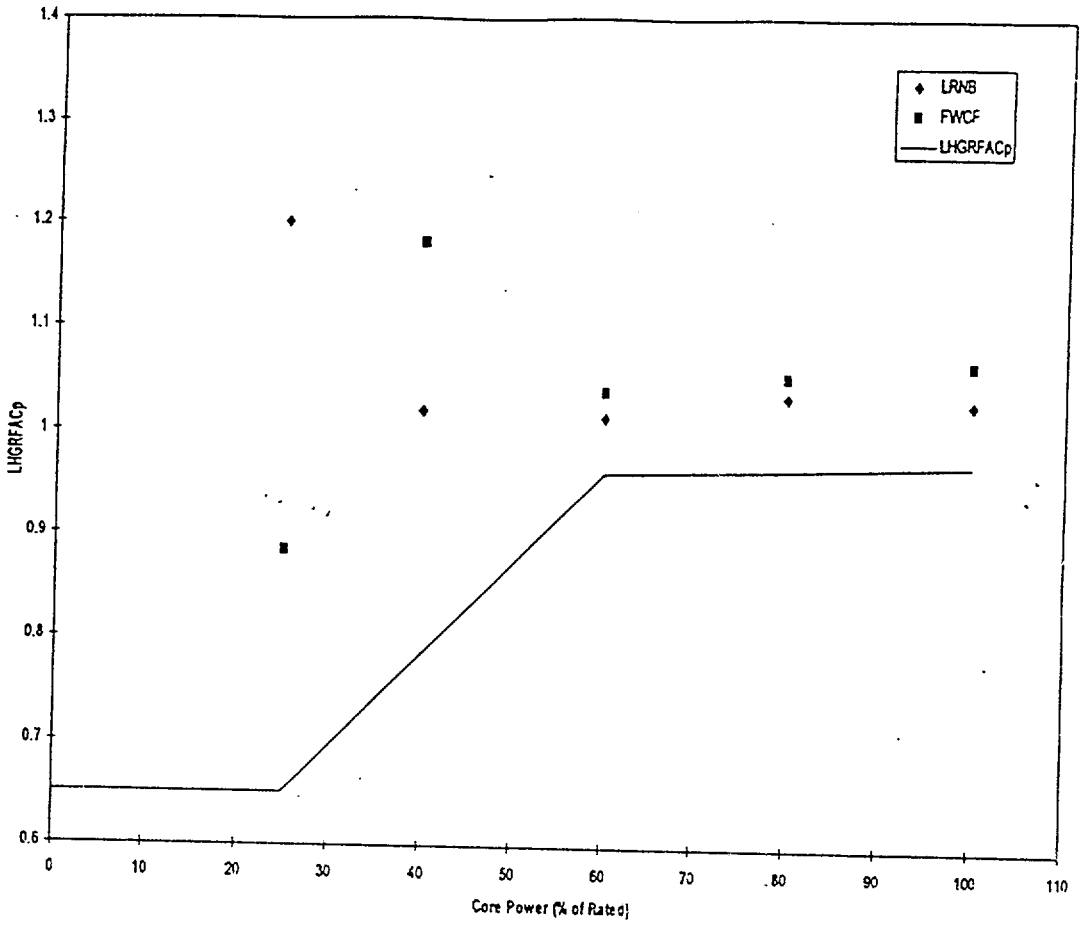
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.47
100	1.42

Figure 4.3 Coastdown Power Dependent MCPR Limits for GE9 Fuel



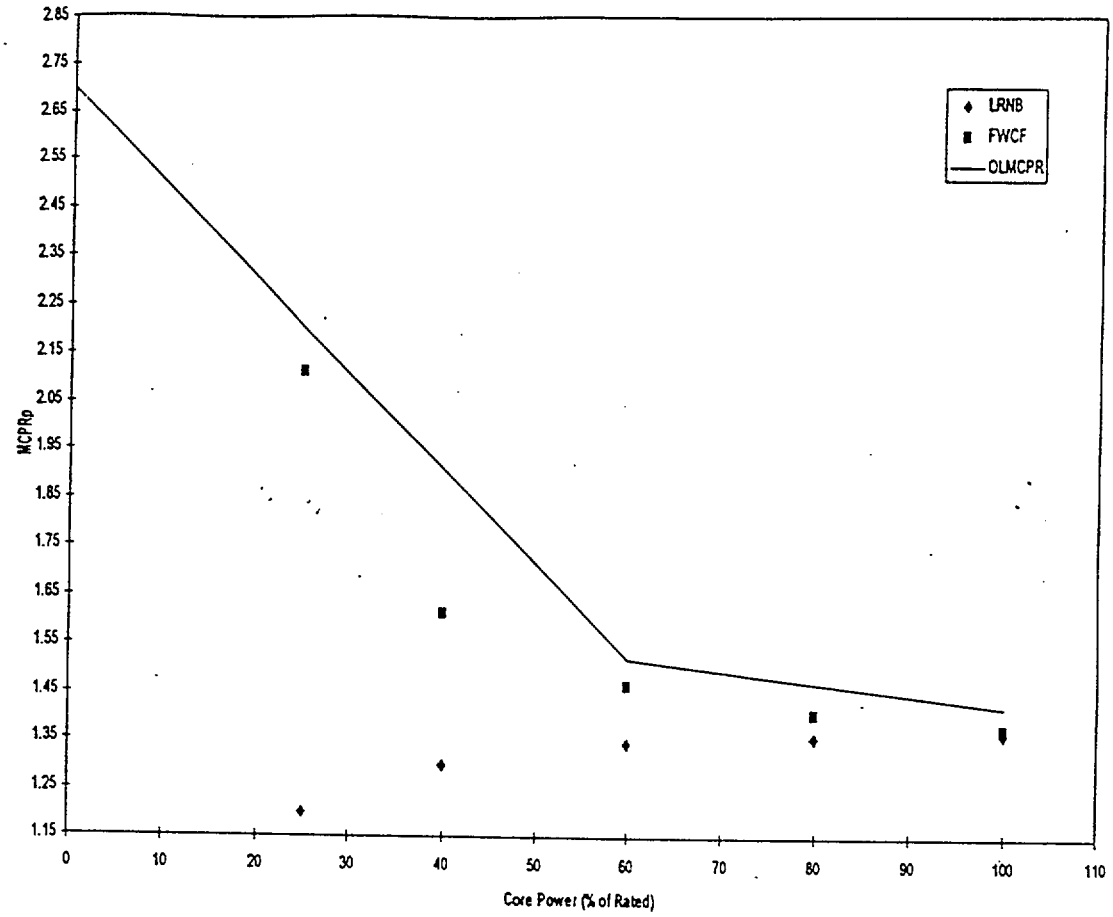
Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.52
100	1.41

Figure 4.4 Combined FFTR/Coastdown Power Dependent MCPR Limits for ATRIUM-9B Fuel



Power (% rated)	$LHGRFAC_p$
0	0.65
25	0.65
25	0.65
60	0.96
100	0.97

Figure 4.5 Combined FFTR/Coastdown Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.52
100	1.42

Figure 4.6 Combined FFTR/Coastdown Power Dependent MCPR Limits for GE9 Fuel

Table 5.2 EOC Feedwater Heater Out of Service Analysis Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	LHGRFAC$_p$	ΔCPR
FWCF	100/105	0.276	1.062	0.301
FWCF	80/105	0.328	1.036	0.336
FWCF	60/105	0.418*	0.971*	0.420*
FWCF	40/105	0.617*	0.875*	0.592*
FWCF	25/105	1.025*	0.712*	1.007*

* The analysis results presented are from an earlier cycle exposure. The ΔCPR and LHGRFAC$_p$ results are conservatively used to establish the thermal limits.

Table 5.3 Abnormal Recirculation Loop Startup Analysis Results

Power/Flow (%rated/%rated)	FCV Position	ATRIUM-9B	
		ΔCPR*	$LHGRFAC_p$
35/47	15% open	1.31	0.450
35/47	27% open	1.37	0.429

* ΔCPR results for ATRIUM-9B fuel are conservatively applicable for GE9 fuel.

Table 5.5 EOC Turbine Bypass Valves Out of Service Analysis Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B ΔCPR	ATRIUM-9B $LHGRFAC_p$	GE9 ΔCPR
FWCF	100/105	0.333	1.004	0.347
FWCF	80/105	0.377	0.991	0.391
FWCF	60/105	0.435	0.967*	0.445
FWCF	40/105	0.577*	0.903*	0.563*
FWCF	25/105	0.837*	0.793*	0.795*

* The analysis results presented are from an earlier cycle exposure. The ΔCPR and $LHGRFAC_p$ results are conservatively used to establish the thermal limits.

Table 5.7 EOC Recirculation Pump Trip Out of Service Analysis Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	LHGRFAC$_p$	ΔCPR
LRNB	100/105	0.377	1.000	0.394
LRNB	100/87	0.351	1.000	0.365
LRNB	80/105	0.368	1.000	0.385
LRNB	60/105	0.345	0.978	0.362
LRNB	40/105	0.273	1.054	0.289
LRNB	25/105	0.182	1.122	0.194
FWCF	100/105	0.326	1.000	0.340
FWCF	80/105	0.357	0.981	0.370
FWCF	60/105	0.401	0.964	0.410
FWCF	40/105	0.505*	0.912*	0.496*
FWCF	25/105	0.728*	0.806*	0.721*

* The analysis results presented are from an earlier cycle exposure. The ΔCPR and LHGRFAC$_p$ results are conservatively used to establish the thermal limits.

Table 5.9 EOC Turbine Control Valve Slow Closure Analysis Results

Event	Slow Valve(s) Characteristics	Power/Flow (%rated/%rated)	ATRIUM-9B ΔCPR	ATRIUM-9B $LHGRFAC_p$	GE9 ΔCPR
LRNB	1 TCV Closing at 2.0 sec	100/105*	0.387	1.000	0.382
LRNB	1 TCV Closing at 2.7 sec	100/105*	0.395	1.000	0.391
LRNB	2 TCVs Closing at 7.75 sec	100/105*	0.184	1.045	0.223
LRNB	1 TCV Closing at 2.0 sec	100/100*	0.361	1.000	0.368
LRNB	1 TCV Closing at 2.0 sec	100/87*	0.363	1.000	0.389
LRNB	1 TCV Closing at 2.7 sec	100/87*	0.341	1.000	0.369
LRNB	1 TCV Closing at 2.0 sec	80/105*	0.387	1.000	0.393**
LRNB	2 TCVs Closing at 7.75 sec	80/105*	0.249	1.028	0.264
LRNB	2 TCVs Closing at 7.75 sec	60/105*	0.322**	1.026	0.375**
LRNB	1 TCV Closing at 2.0 sec	60/105*	0.381	0.968	0.380
LRNB	1 TCV Closing at 2.0 sec	40/105***	0.798**	0.773**	0.749**
LRNB	1 TCV Closing at 2.0 sec	25/105***	1.003**	0.706**	0.975**
LRNB w/ FHOOS	1 TCV Closing at 2.7 sec	100/105*	0.316	0.948	0.324

* Scram initiated by high neutron flux.

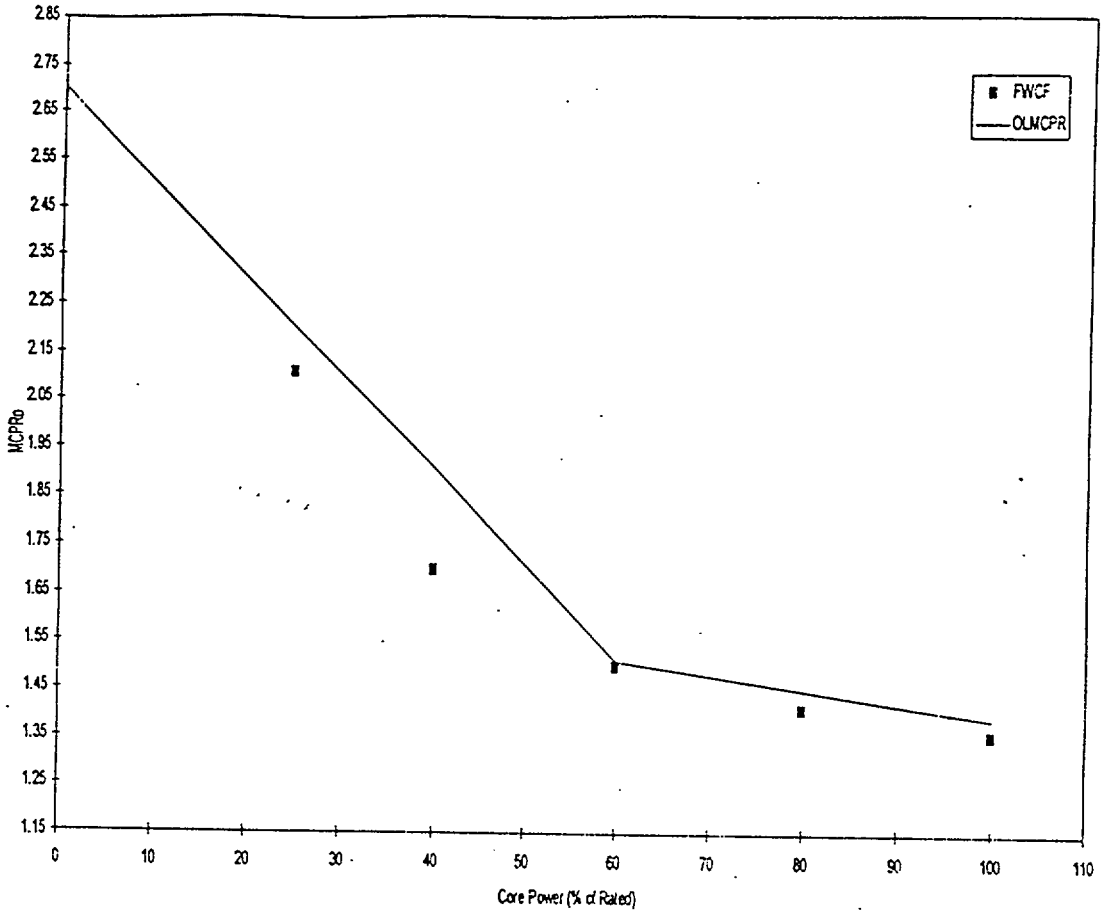
** The analysis results presented are from an earlier cycle exposure. The ΔCPR and $LHGRFAC_p$ results are conservatively used to establish the thermal limits.

*** Scram initiated by high dome pressure.

Table 5.11 EOC Recirculation Pump Trip and Feedwater Heater Out of Service Analysis Results

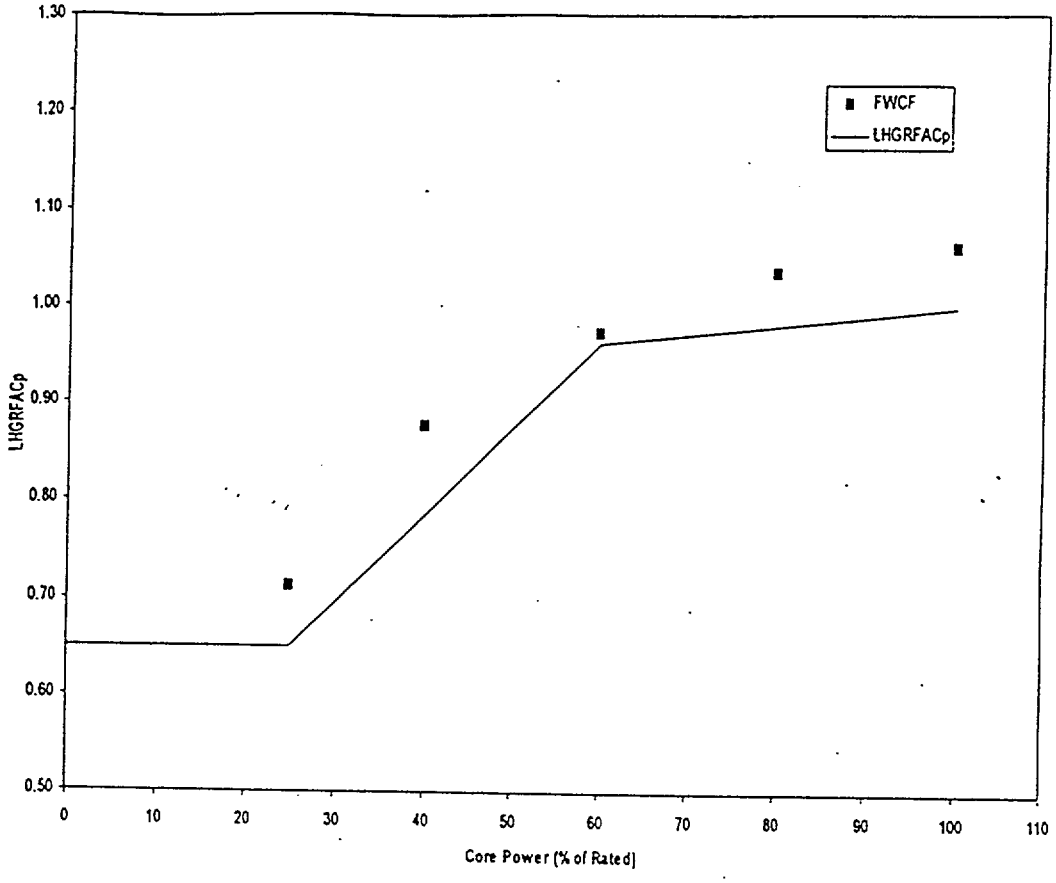
Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	LHGRFAC$_p$	ΔCPR
LRNB	100/105	0.311	0.942	0.333
FWCF	100/105	0.325	0.994	0.333
FWCF	80/105	0.374	0.969	0.382
FWCF	60/105	0.446	0.928*	0.450
FWCF	40/105	0.620*	0.847*	0.590*
FWCF	25/105	0.984*	0.709*	0.971*

* The analysis results presented are from an earlier cycle exposure: The ΔCPR and LHGRFAC$_p$ results are conservatively used to establish the thermal limits.



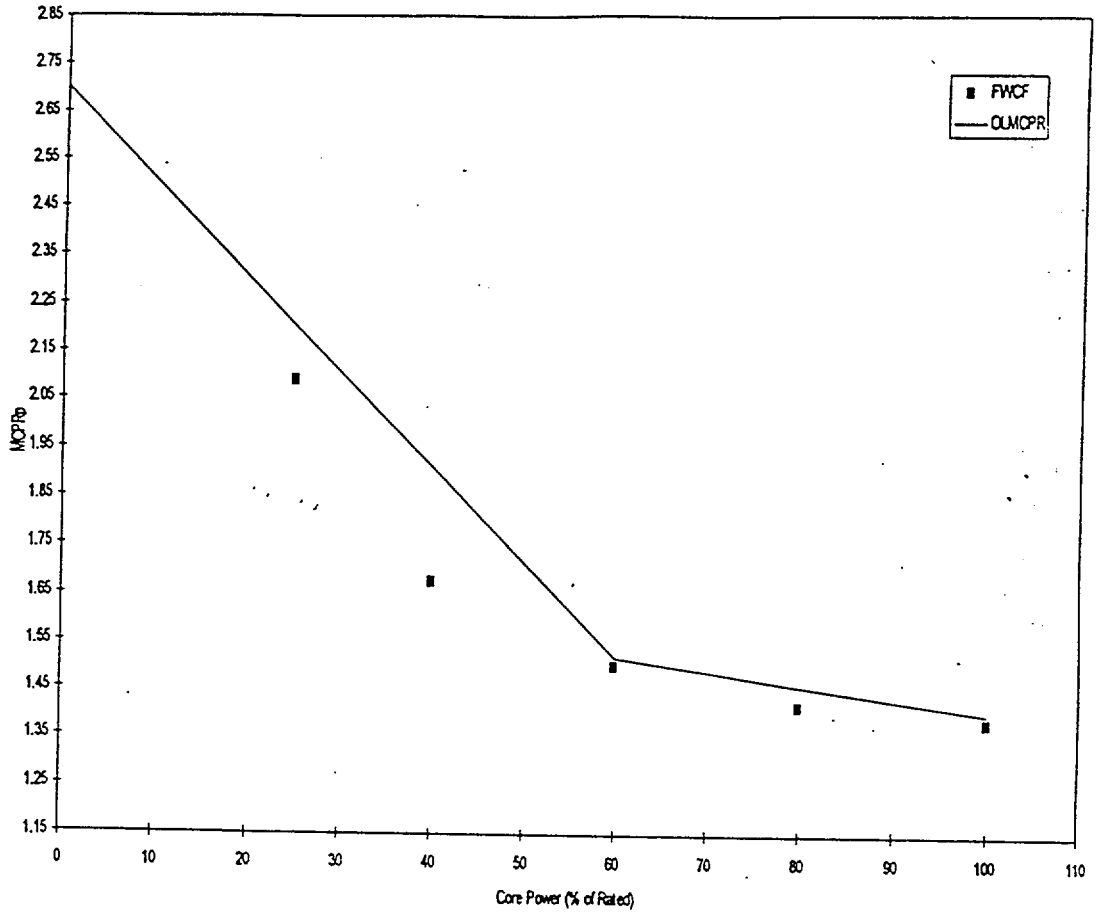
Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.52
100	1.39

Figure 5.4 EOC Feedwater Heaters Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



Power (% rated)	$LHGRFAC_p$
0	0.65
25	0.65
25	0.65
60	0.96
100	1.00

Figure 5.5 EOC Feedwater Heaters Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.52
100	1.40

Figure 5.6 EOC Feedwater Heaters Out of Service Power Dependent MCPR Limits for GE9 Fuel

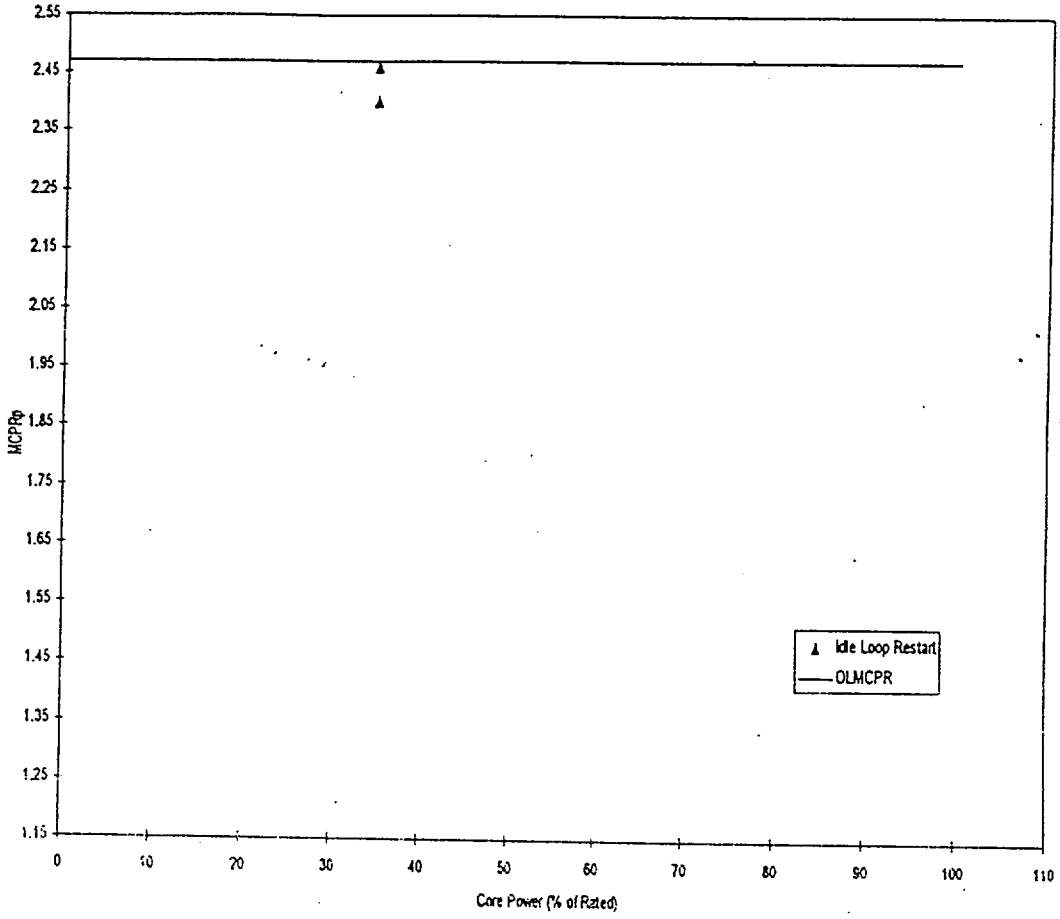


Figure 5.7 Abnormal Idle Recirculation Loop Startup
Power Dependent MCPR Limits for ATRIUM-9B Fuel

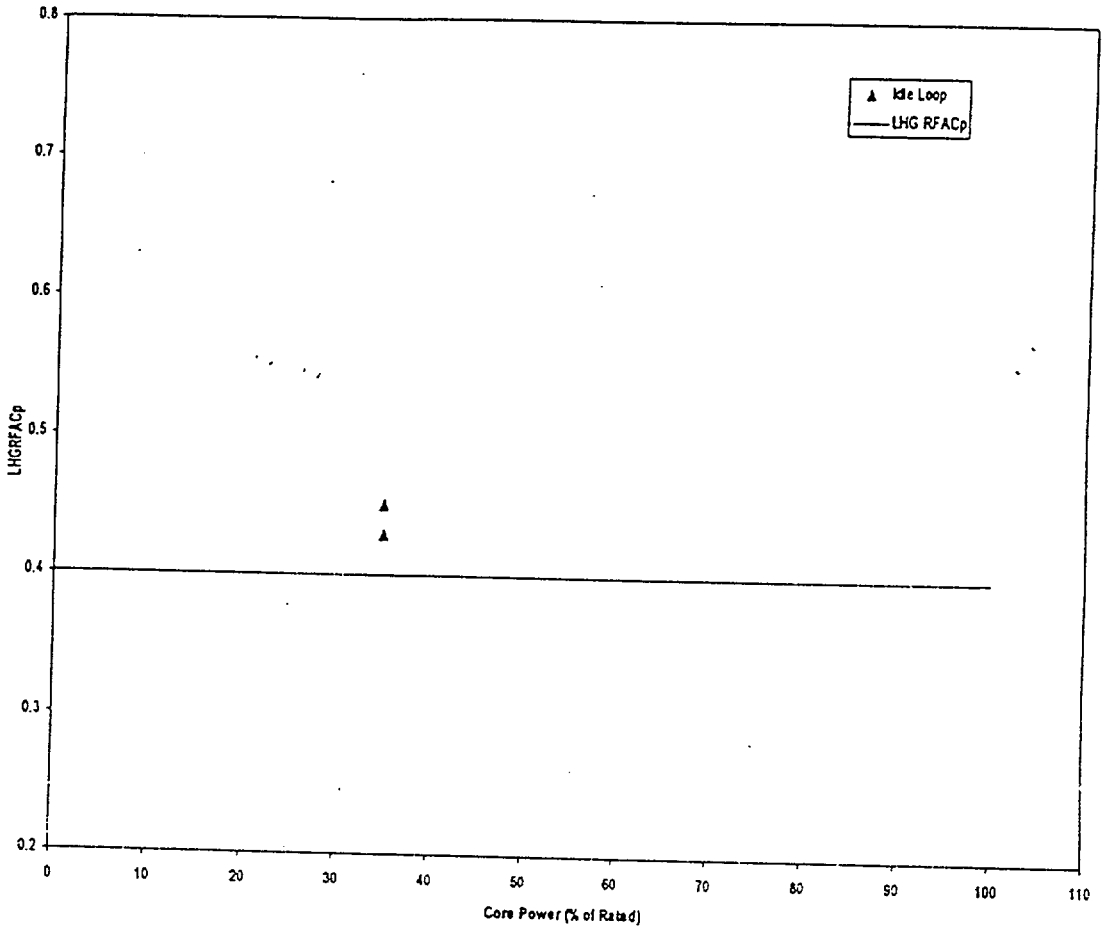


Figure 5.8 Abnormal Idle Recirculation Loop Startup
Power Dependent LHGR Multipliers for ATRIUM-9B Fuel

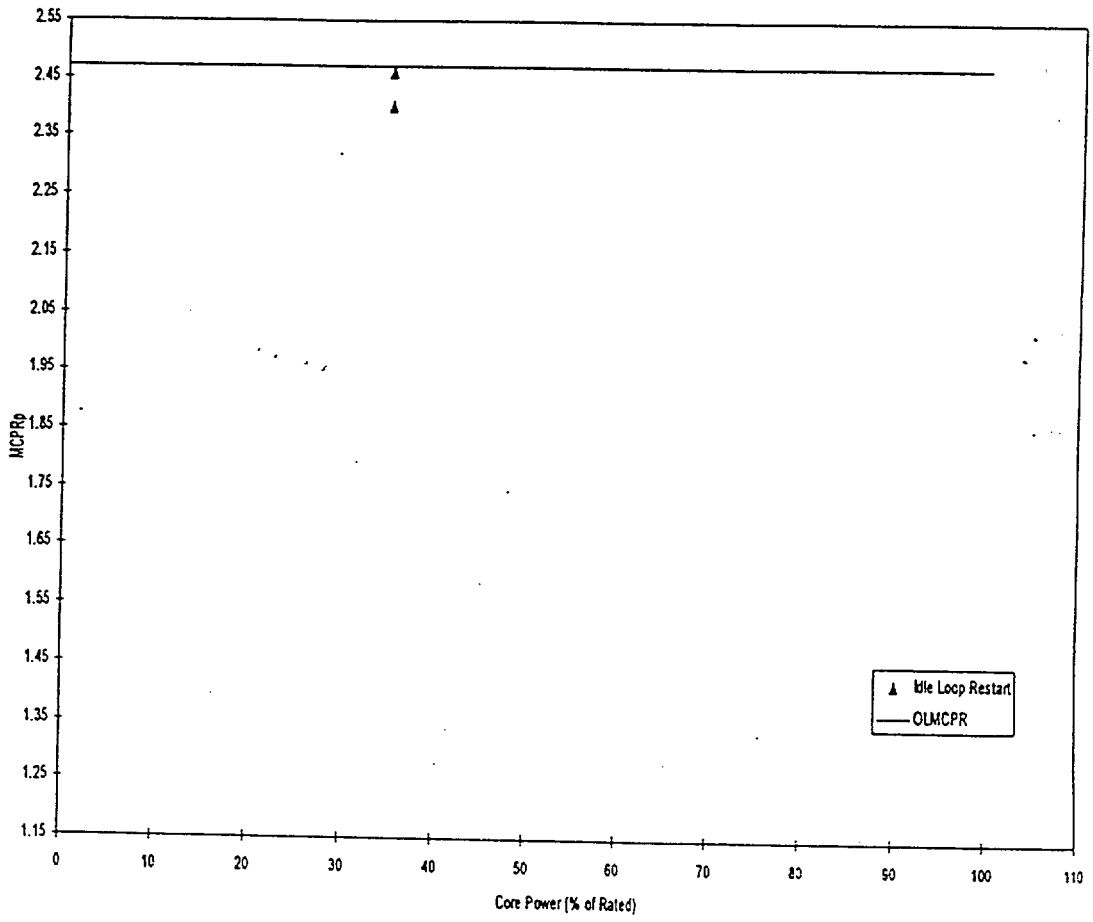
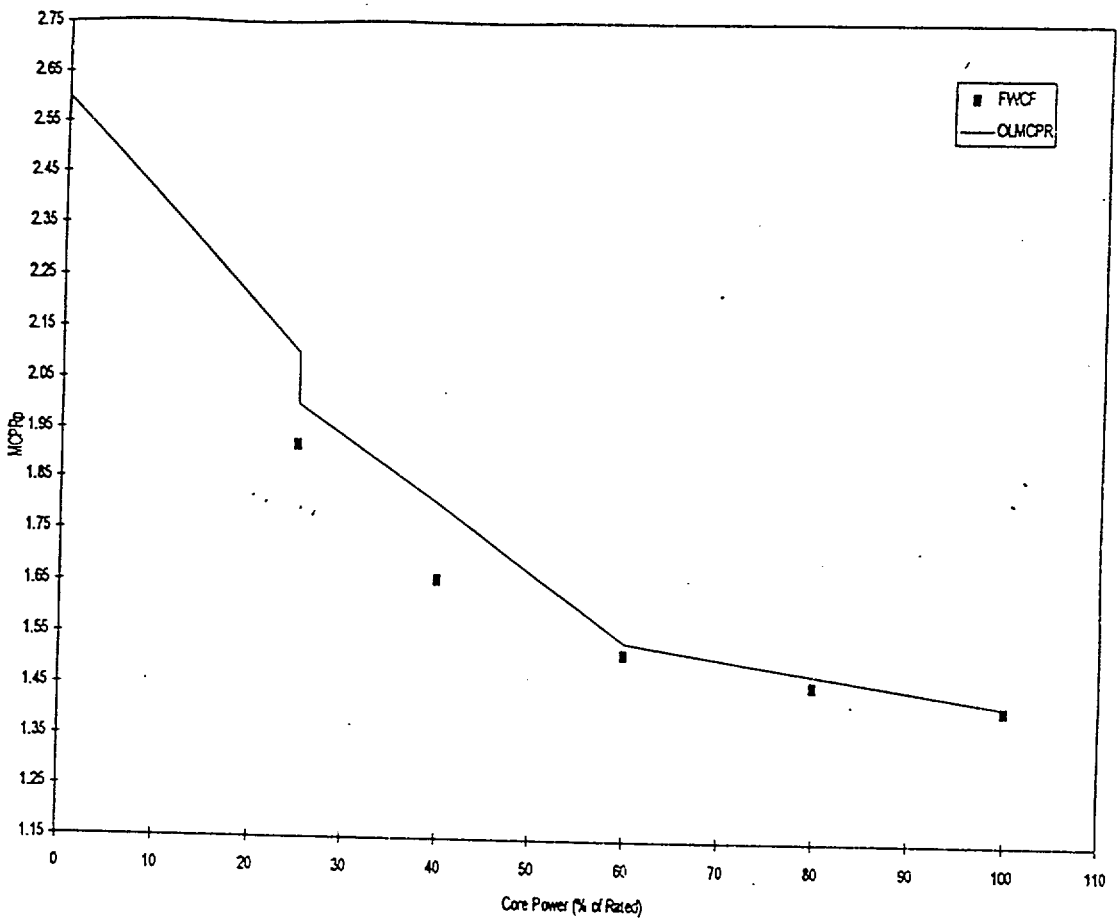
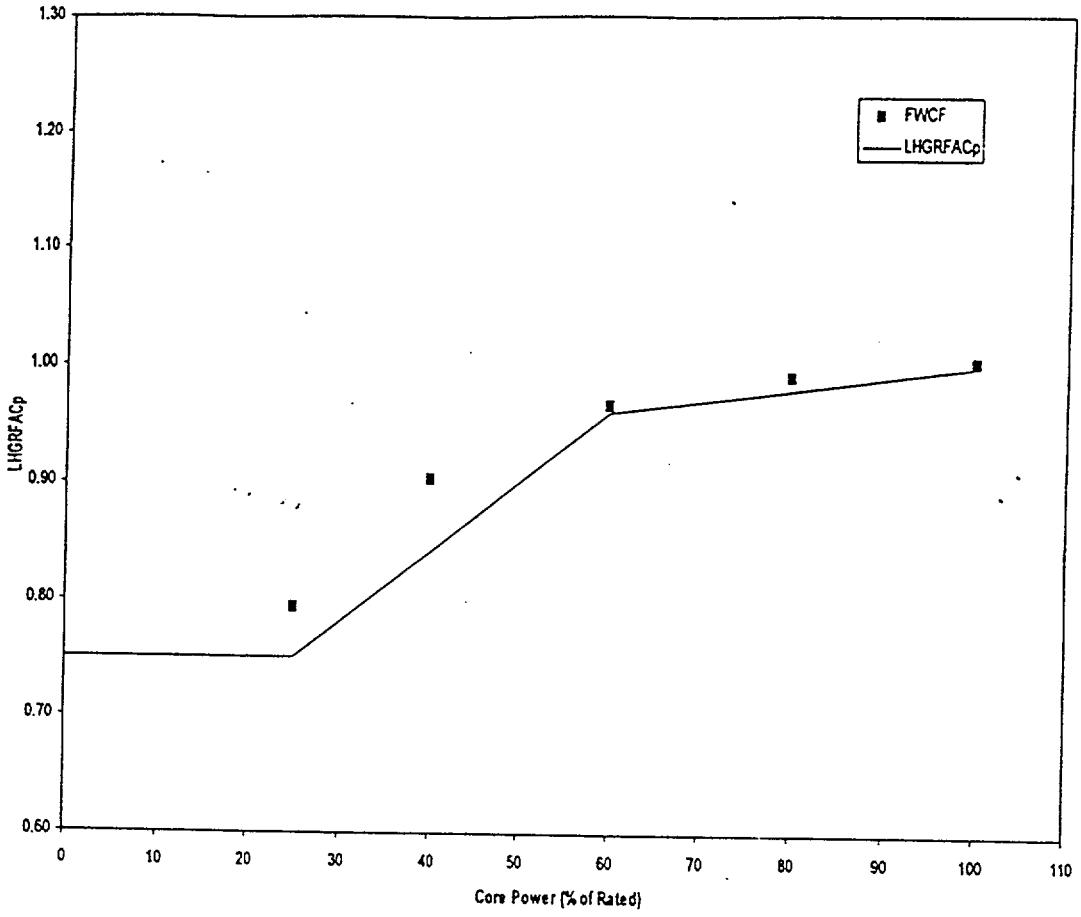


Figure 5.9 Abnormal Idle Recirculation Loop Startup
Power Dependent MCPR Limits for GE9 Fuel



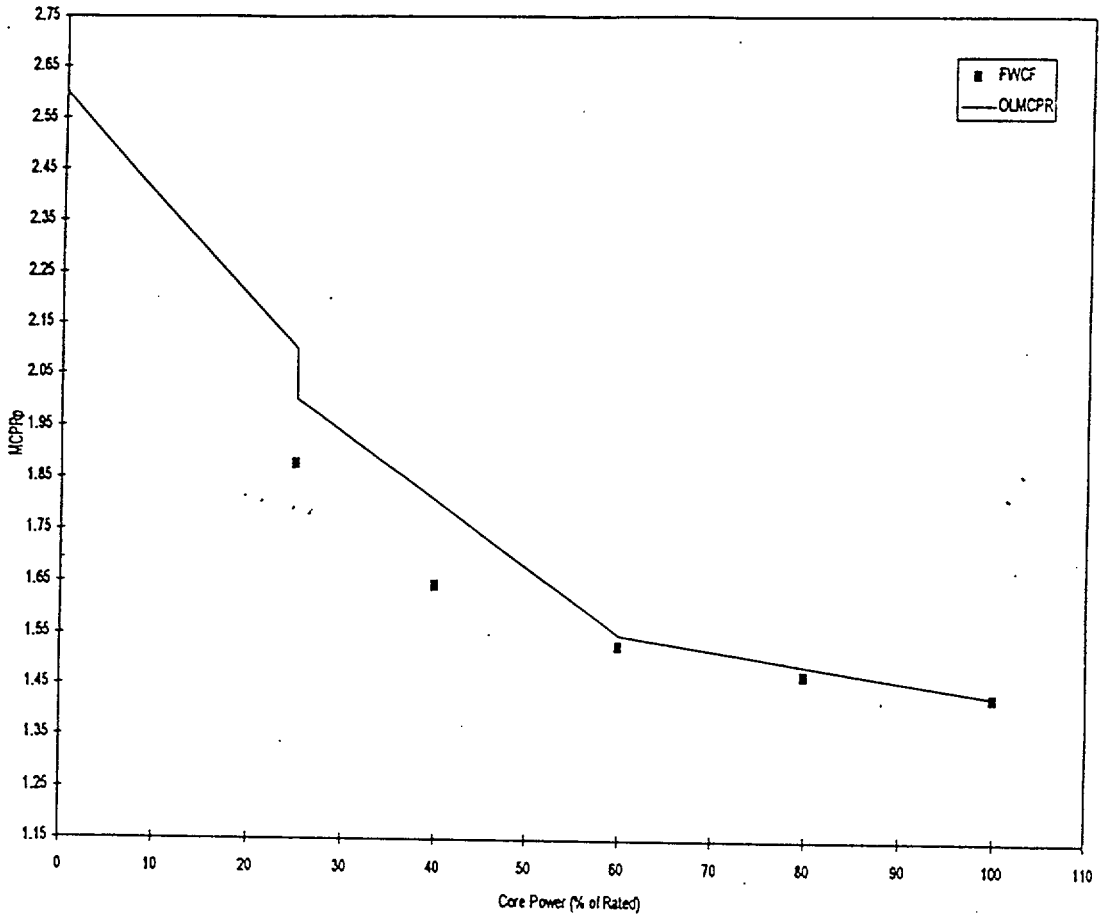
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.54
100	1.42

Figure 5.13 EOC Turbine Bypass Valves Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



Power (% rated)	$LHGRFAC_p$
0	0.75
25	0.75
25	0.75
60	0.96
100	1.00

Figure 5.14 EOC Turbine Bypass Valves Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.55
100	1.43

Figure 5.15 EOC Turbine Bypass Valves Out of Service Power Dependent MCPR Limits for GE9 Fuel

Attachment 5

TCV Slow Closure Analysis (Excerpts)

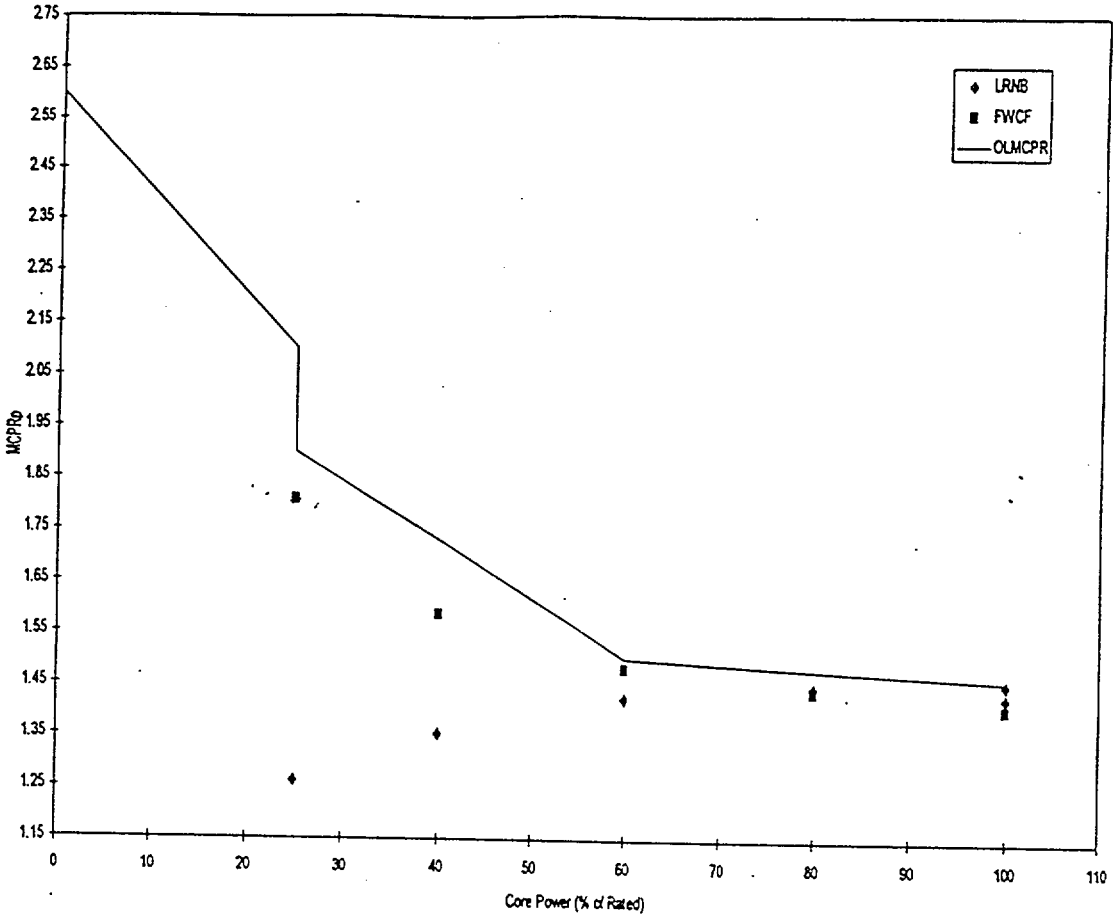
Administrative Technical Requirements - Appendix B
L2C8 Reload Transient Analysis Results

Table 4. - TOP and MOP Values for the Off-rated Transient Events

	LRNBP, One TCV Slow Closure at 50%/s, 3 TCV Fast Closure	LRNBP, All TCV Slow Closure at 19%/s
Calculated TOP	26.17	49.27
Calculated MOP	26.17	55.30
Adjusted MOP		60.83
Required MOP		38.0
Required MAPFAC		0.62
Limiting MACFAC		0.60 (a)

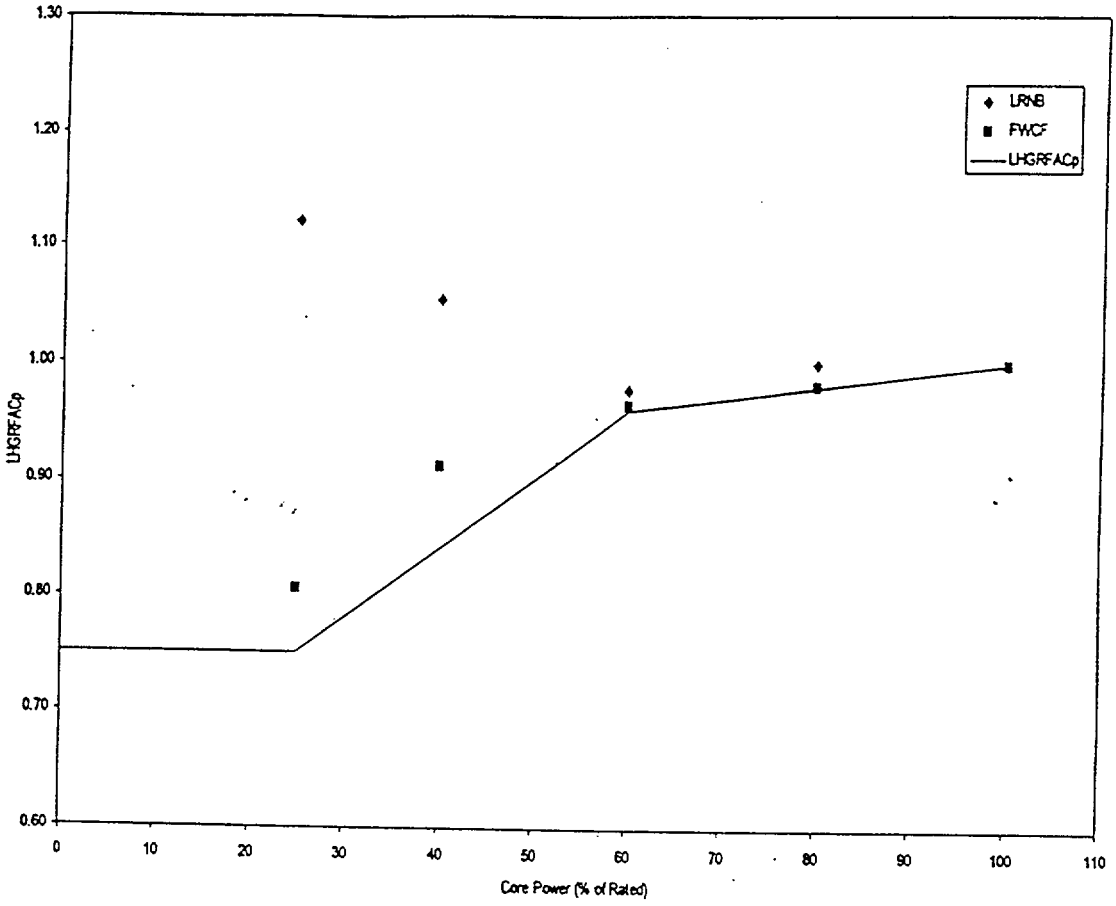
Note : (a) Based on Figure 3.2-2 in COLR.

(b) Based on the GE9/10 LHGR Improvement Report, the MAPFACs are applied to LHGR (Reference 24)



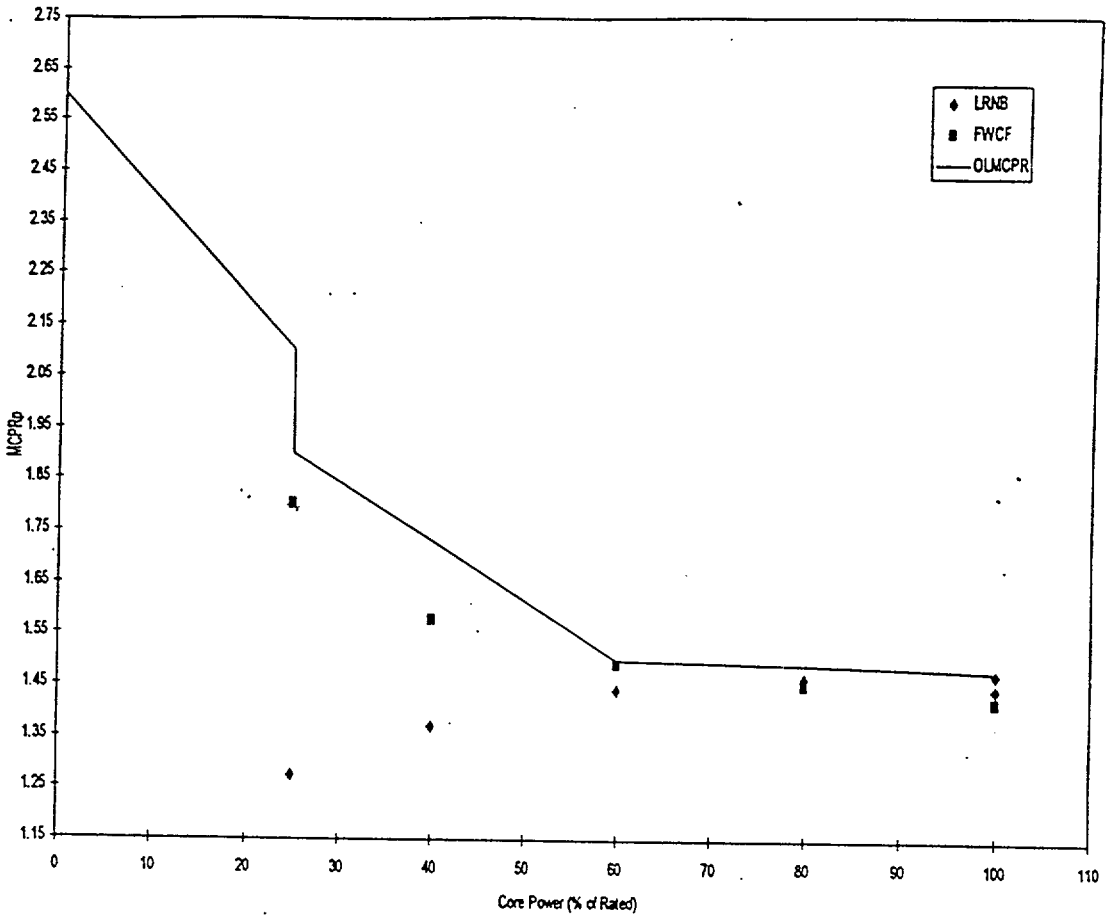
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.50
100	1.46

Figure 5.19 EOC Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



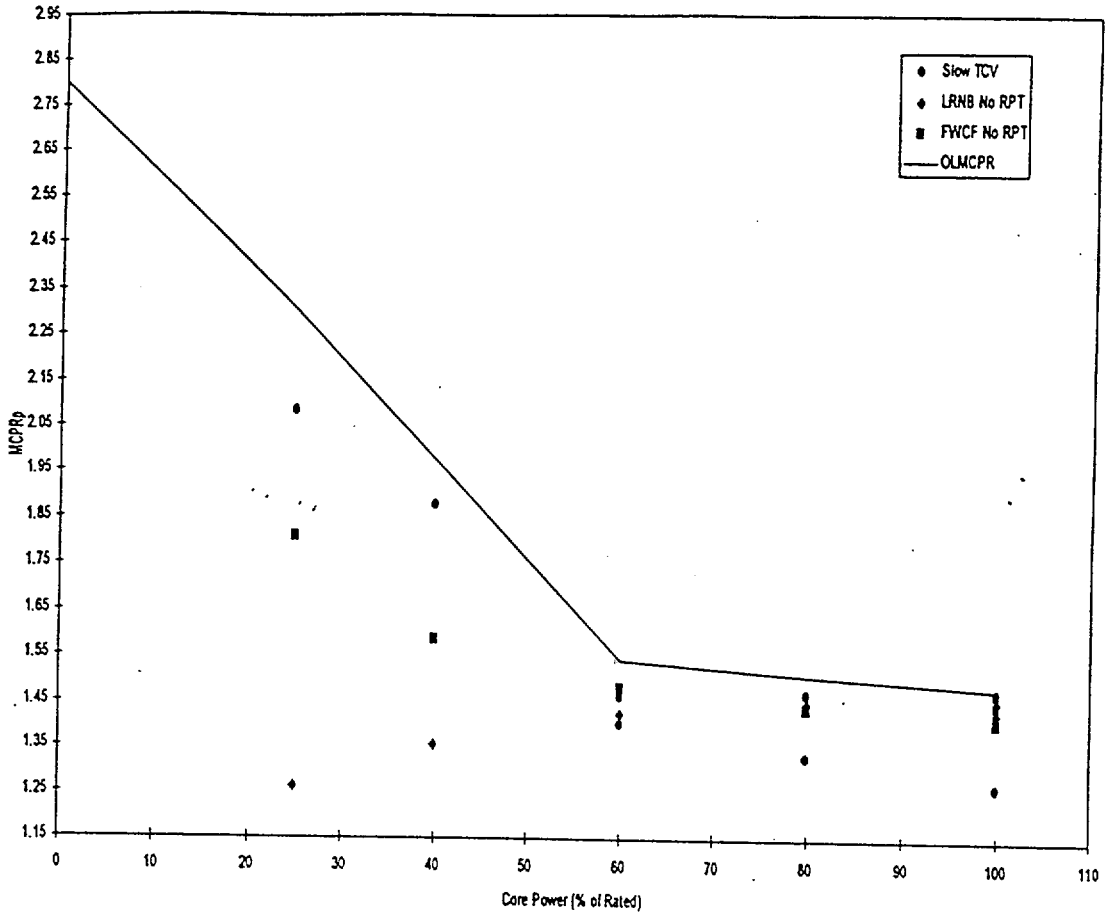
Power (% rated)	$LHGRFAC_p$
0	0.75
25	0.75
25	0.75
60	0.96
100	1.00

Figure 5.20 EOC Recirculation Pump Trip Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



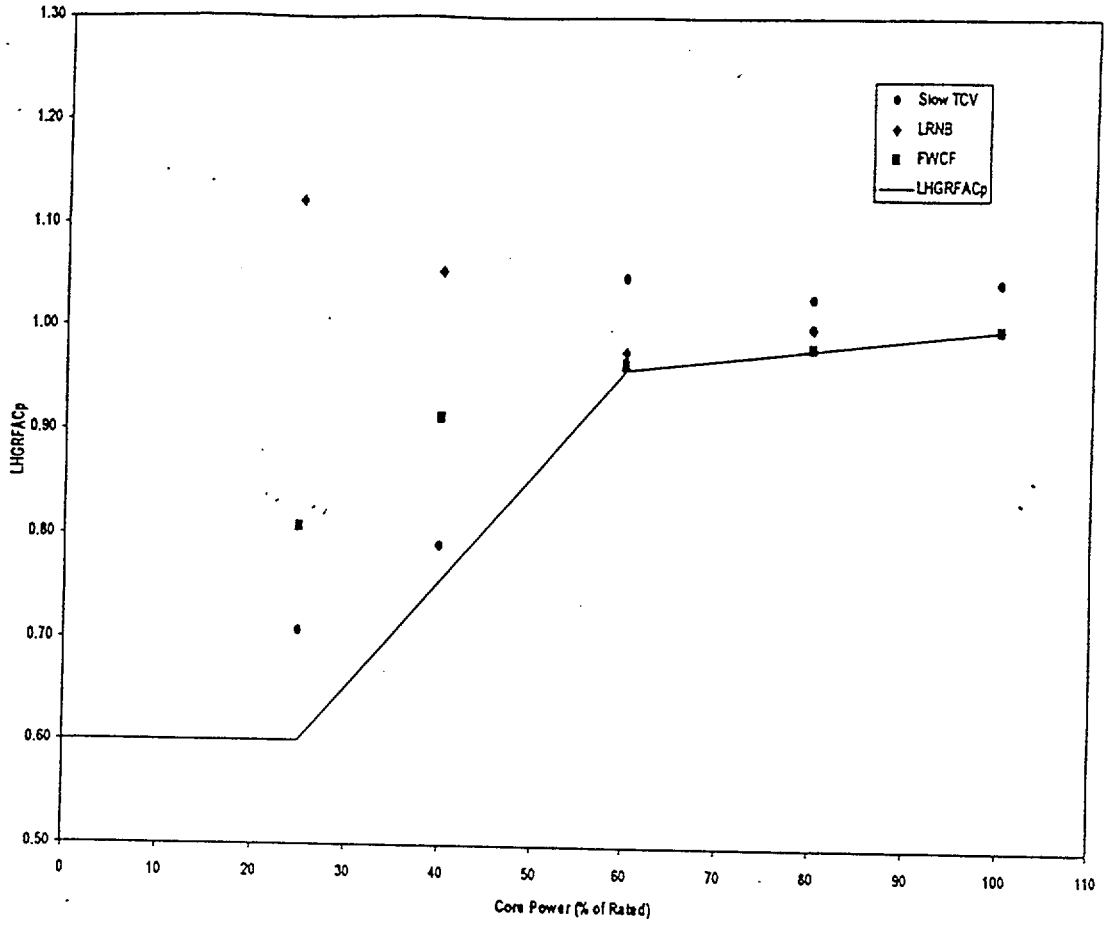
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	1.90
60	1.50
100	1.48

Figure 5.21 EOC Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for GE9 Fuel



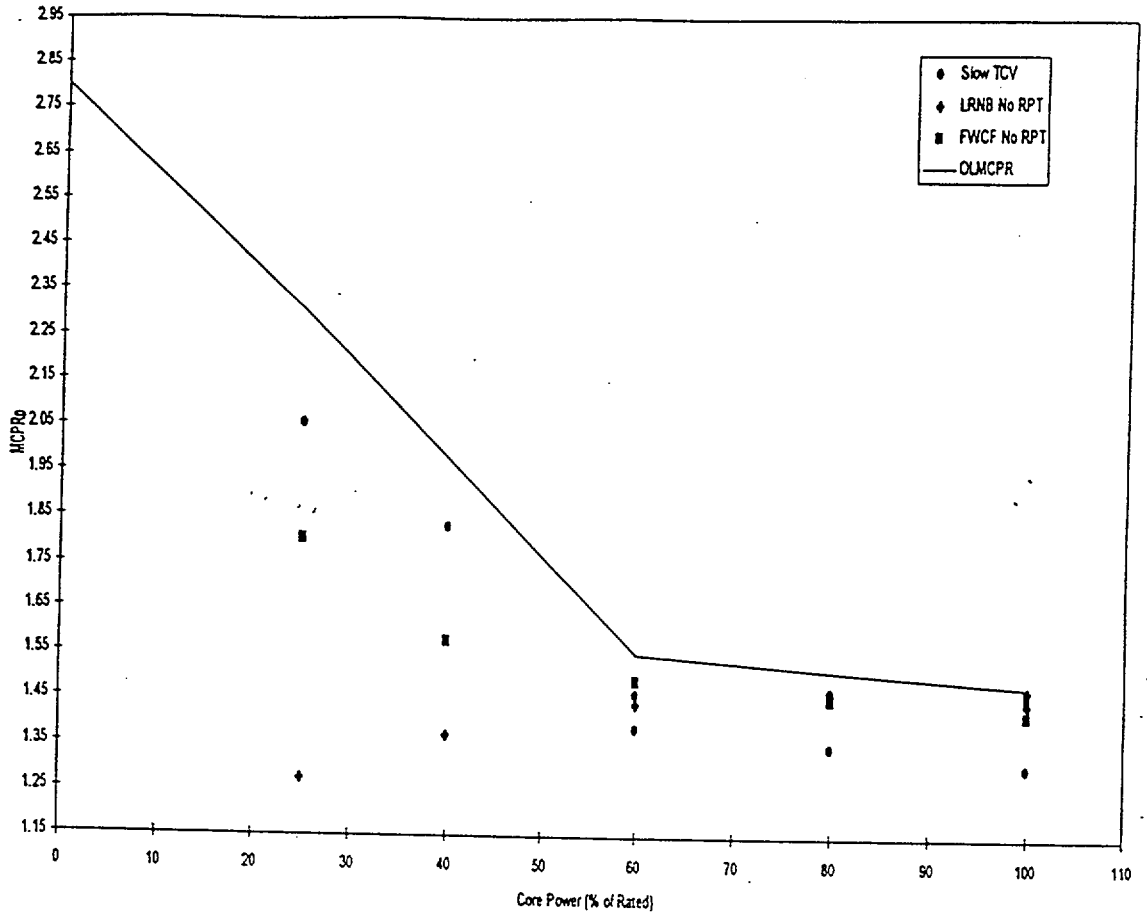
Power (% rated)	$MCPR_p$ Limit
0	2.80
25	2.30
25	2.30
60	1.54
100	1.48

Figure 5.25 EOC Turbine Control Valve Slow Closure and/or Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



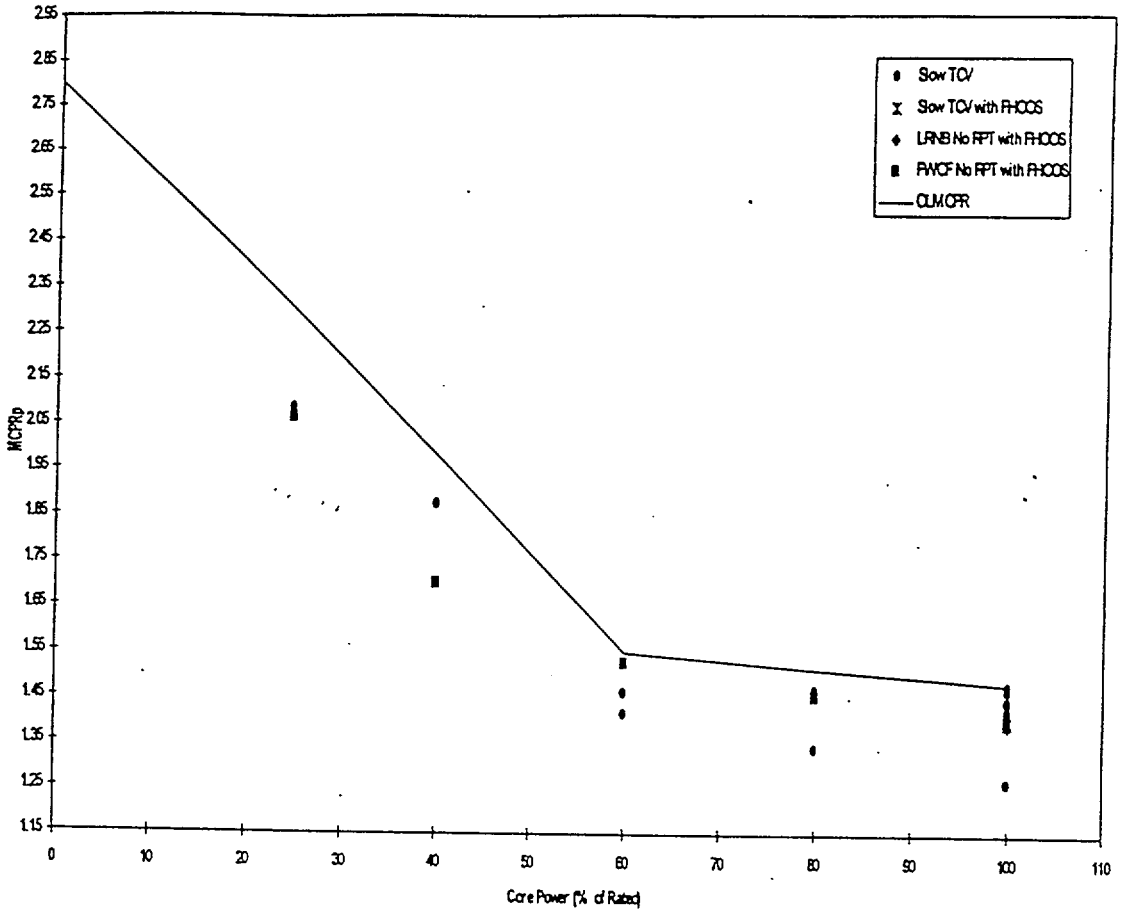
Power (% rated)	$LHGRFAC_p$
0	0.60
25	0.60
25	0.60
60	0.96
100	1.00

Figure 5.26 EOC Turbine Control Valve Slow Closure and/or Recirculation Pump Trip Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



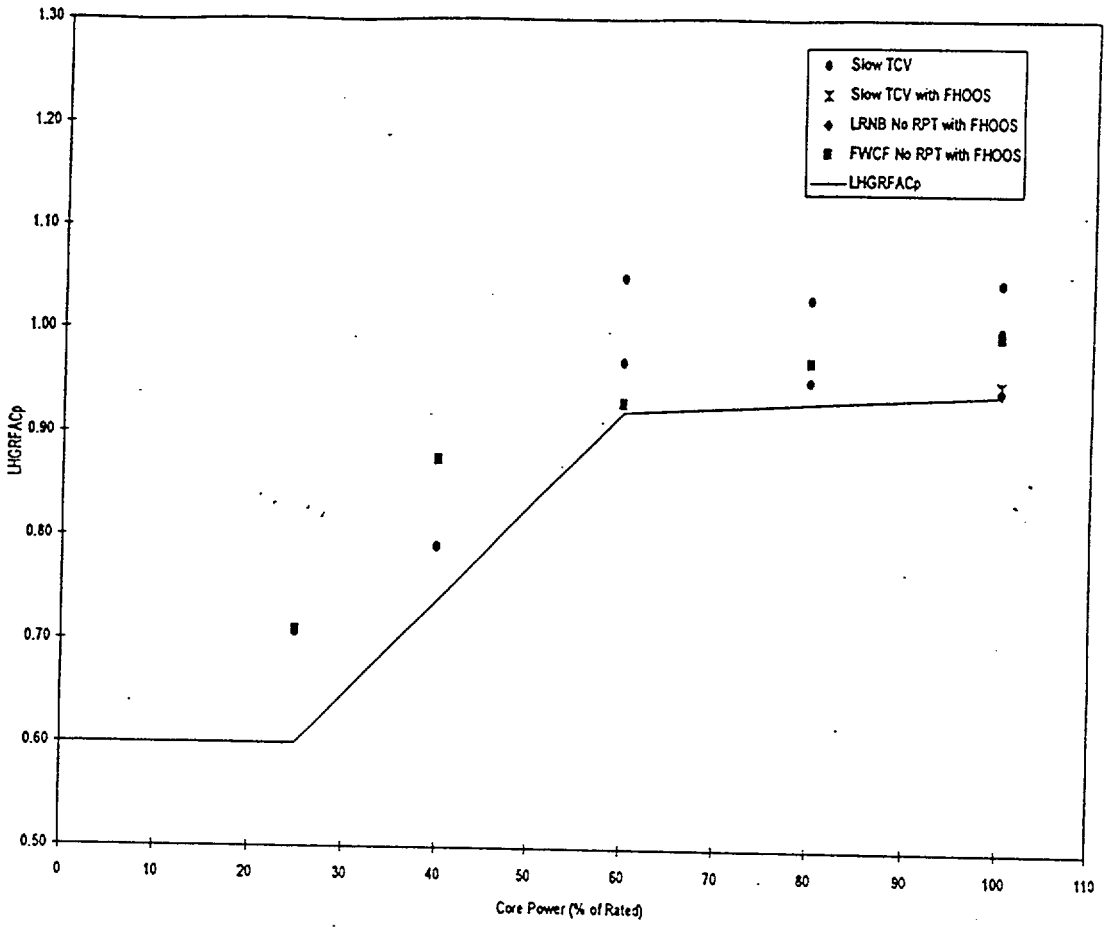
Power (% rated)	$MCPR_p$ Limit
0	2.80
25	2.30
25	2.30
60	1.55
100	1.48

Figure 5.27 EOC Turbine Control Valve Slow Closure and/or Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for GE9 Fuel



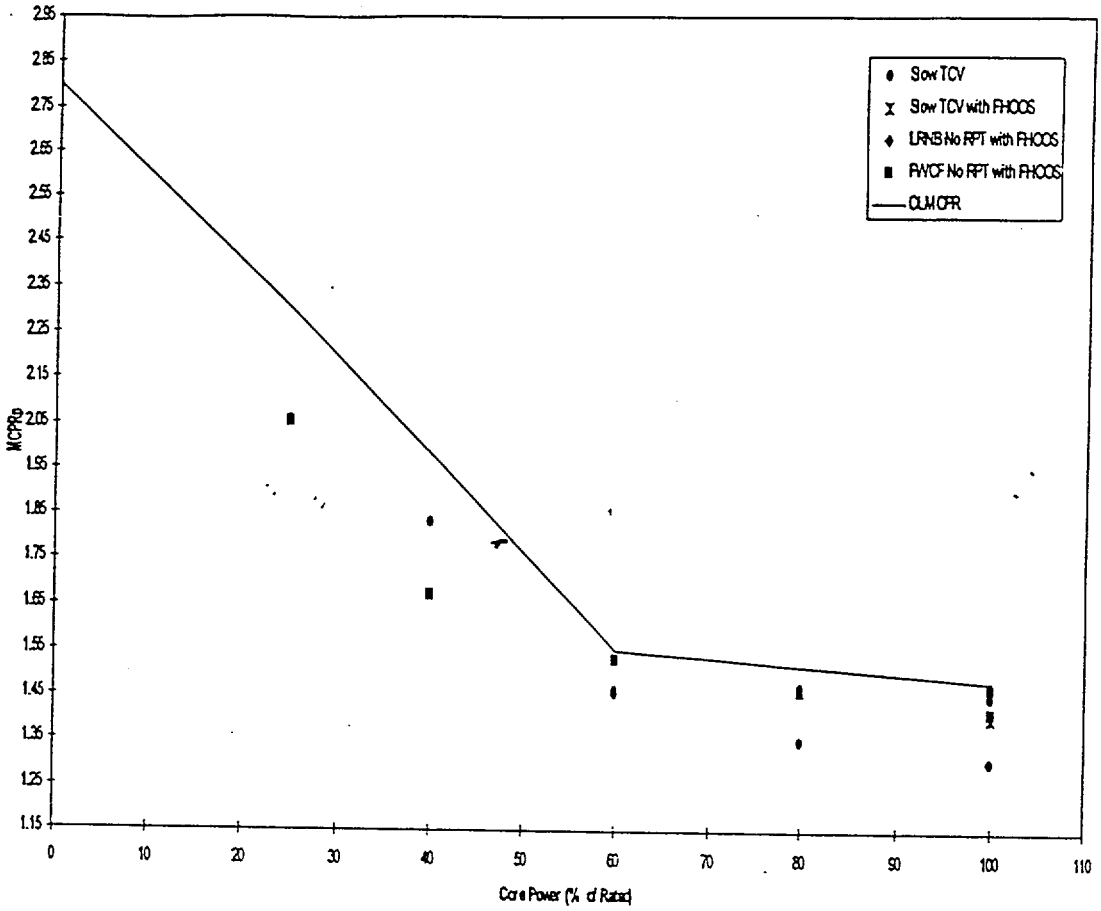
Power (% rated)	$MCPR_p$ Limit
0	2.80
25	2.30
25	2.30
60	1.55
100	1.48

Figure 5.31 EOC Turbine Control Valve Slow Closure and/or Recirculation Pump Trip and Feedwater Heaters Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



Power (% rated)	$LHGRFAC_p$
0	0.60
25	0.60
25	0.60
60	0.92
100	0.94

Figure 5.32 EOC Turbine Control Valve Slow Closure and/or Recirculation Pump Trip and Feedwater Heaters Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



Power (% rated)	$MCPR_p$ Limits
0	2.80
25	2.30
25	2.30
60	1.55
100	1.48

Figure 5.33 EOC Turbine Control Valve Slow Closure and/or Recirculation Pump Trip and Feedwater Heaters Out of Service Power Dependent MCPR Limits for GE9 Fuel

Table 6.1 Coastdown Turbine Bypass Valves Out of Service Analysis Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
FWCF	100/105	0.347	0.984	0.357
FWCF	80/105	0.390	0.984	0.401
FWCF	60/105	0.447	0.962	0.452
FWCF	40/105	0.560	0.959	0.557
FWCF	25/105	0.753	0.958	0.837

Table 6.2 Coastdown Recirculation Pump Trip Out of Service Analysis Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	100/105	0.396	0.877	0.407
LRNB	80/105	0.459	0.900	0.452
LRNB	60/105	0.461	0.895	0.464
LRNB	40/105	0.424	0.876	0.402
LRNB	25/105	0.281	1.020	0.261
FWCF	100/105	0.339	0.978	0.349
FWCF	80/105	0.381	0.977	0.397
FWCF	60/105	0.451	0.958	0.457
FWCF	40/105	0.507	0.987	0.500
FWCF	25/105	0.753	0.970	0.837

Table 6.3 Coastdown Slow Turbine Control Valve Closure Analysis Results

Event	Slow Valve(s) Characteristics	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
			ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	1 TCV Closing at 2.0 sec	100/105*	0.424	0.908	0.413
LRNB	1 TCV Closing at 2.7 sec	100/105*	0.430	0.903	0.420
LRNB	1 TCV Closing at 2.0 sec	80/105*	0.481	0.925	0.475
LRNB	1 TCV Closing at 2.0 sec	60/105*	0.479	0.933	0.463
LRNB	1 TCV Closing at 2.0 sec	40/105**	0.844	0.827	0.817
LRNB	1 TCV Closing at 2.0 sec	25/105**	1.167	0.733	0.955

* Scram initiated by high neutron flux.

** Scram initiated by high dome pressure.

Table 6.4 Combined FFTR/Coastdown Turbine Bypass Valves Out of Service Analysis Results

Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
FWCF	100/105	0.343	1.014	0.348
FWCF	80/105	0.383	1.003	0.392
FWCF	60/105	0.450	0.983	0.454
FWCF	40/105	0.598	1.076	0.560
FWCF	25/105	1.006	0.883	1.032

Table 6.5 Combined FFTR/Coastdown Operation With Recirculation Pump Trip Out of Service Analysis Results

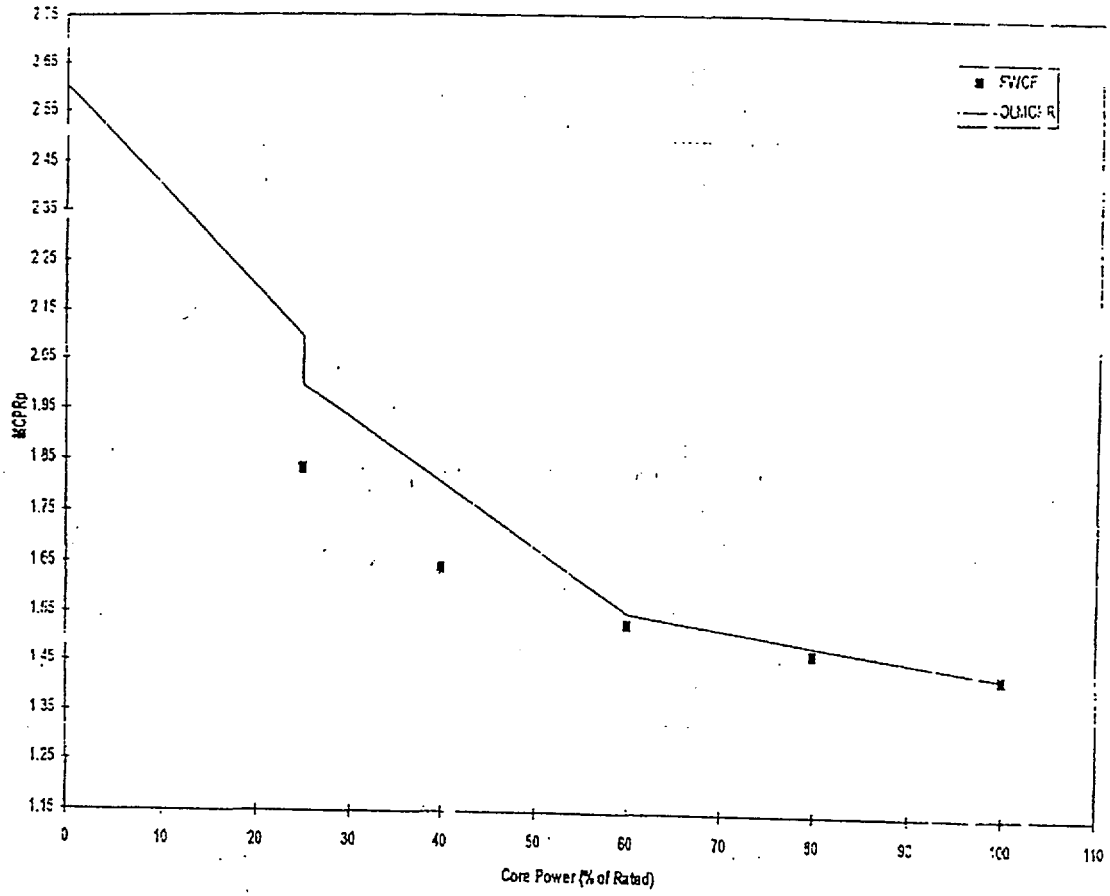
Event	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	100/105	0.357	0.920	0.341
LRNB	80/105	0.439	0.936	0.439
LRNB	60/105	0.447	0.928	0.406
LRNB	40/105	0.328	0.929	0.285
LRNB	25/105	0.233	1.059	0.207
FWCF	100/105	0.340	0.972	0.345
FWCF	80/105	0.405	0.972	0.413
FWCF	60/105	0.461	0.962	0.463
FWCF	40/105	0.579	0.942	0.540
FWCF	25/105	1.006	0.883	1.032

Table 6.6 Combined FFTR/Coastdown Slow Turbine Control Valve Closure Analysis Results

Event	Slow Valve(s) Characteristics	Power/Flow (%rated/%rated)	ATRIUM-9B		GE9
			ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	1 TCV Closing at 2.0 sec	100/105*	0.389	0.948	0.377
LRNB	1 TCV Closing at 2.7 sec	100/105*	0.380	0.957	0.368
LRNB	1 TCV Closing at 2.0 sec	80/105*	0.435	0.962	0.429
LRNB	1 TCV Closing at 2.0 sec	60/105*	0.426	0.957	0.405
LRNB	1 TCV Closing at 2.0 sec	40/105**	0.822	0.803	0.759
LRNB	1 TCV Closing at 2.0 sec	25/105**	1.097	0.758	0.968

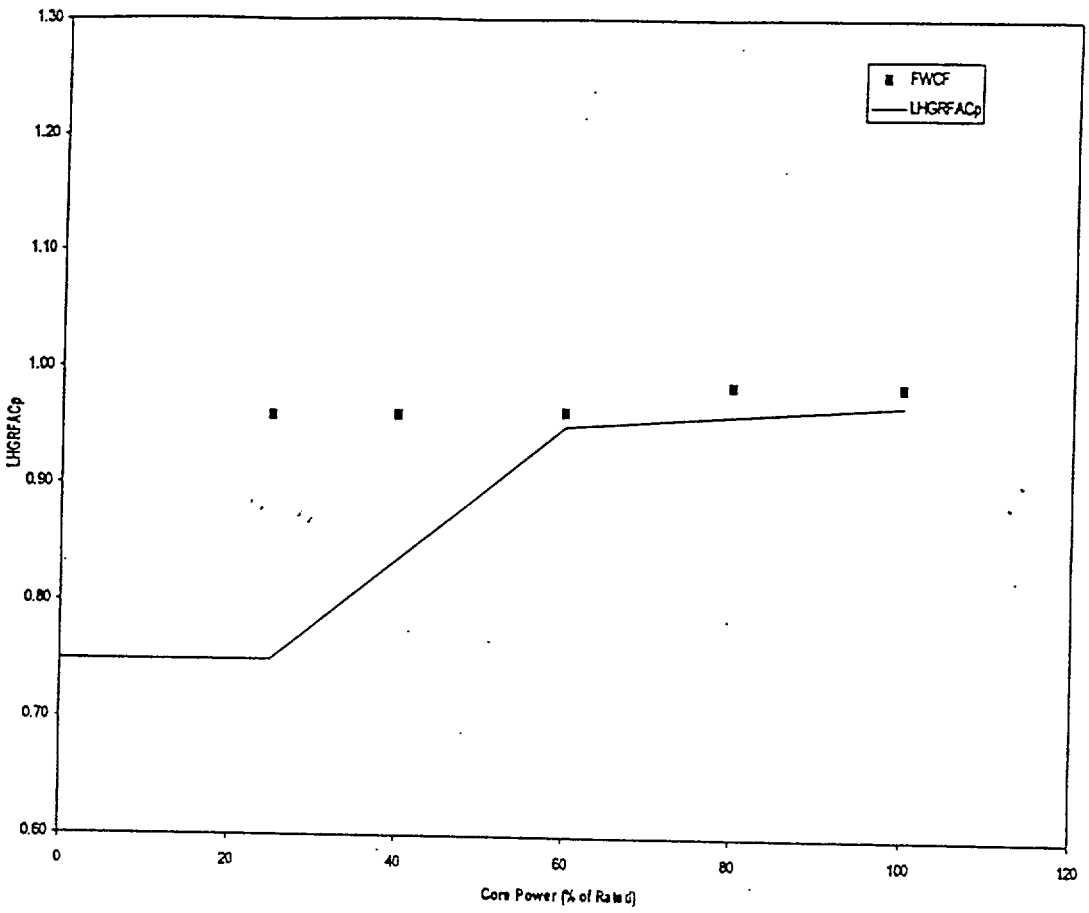
* Scram initiated by high neutron flux.

** Scram initiated by high dome pressure.



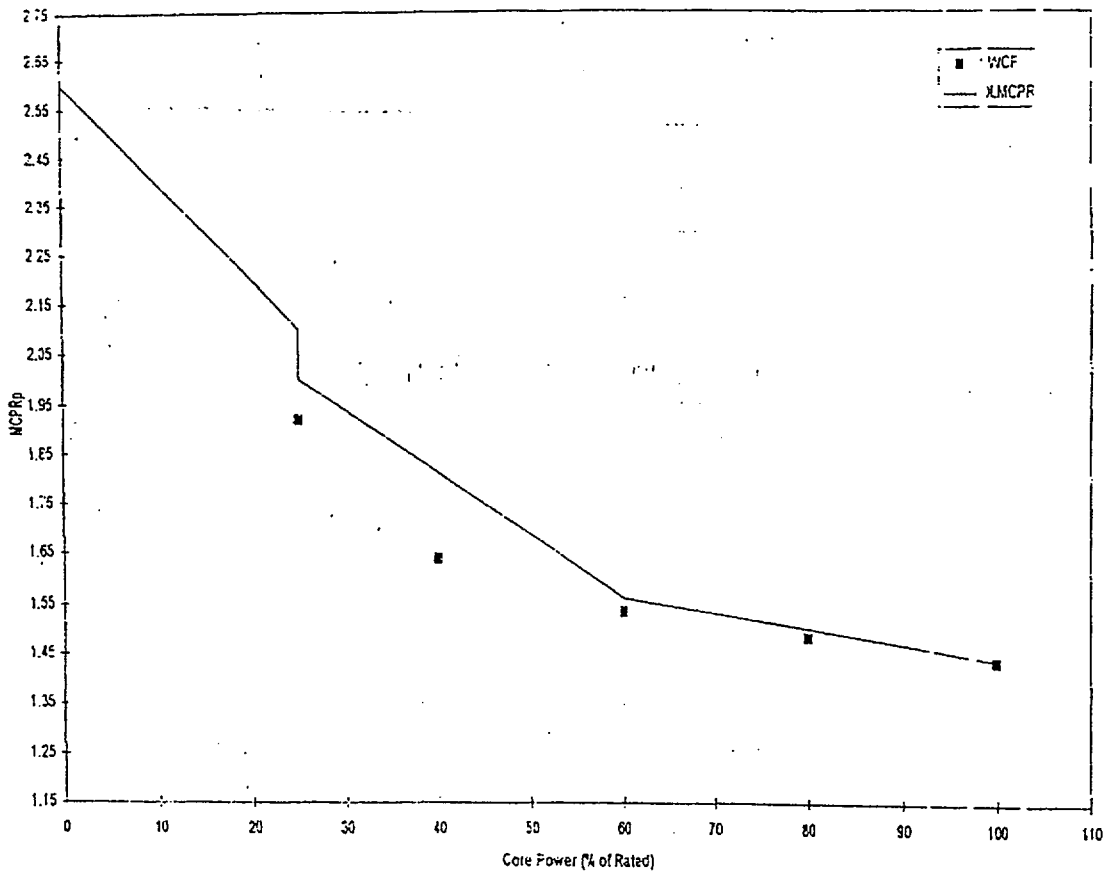
Power (% rated)	$MCPR_p$ Limits
0	2.60
25	2.10
25	2.00
60	1.55
100	1.43

Figure 6.1 Coastdown Operation With Turbine Bypass Valves Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



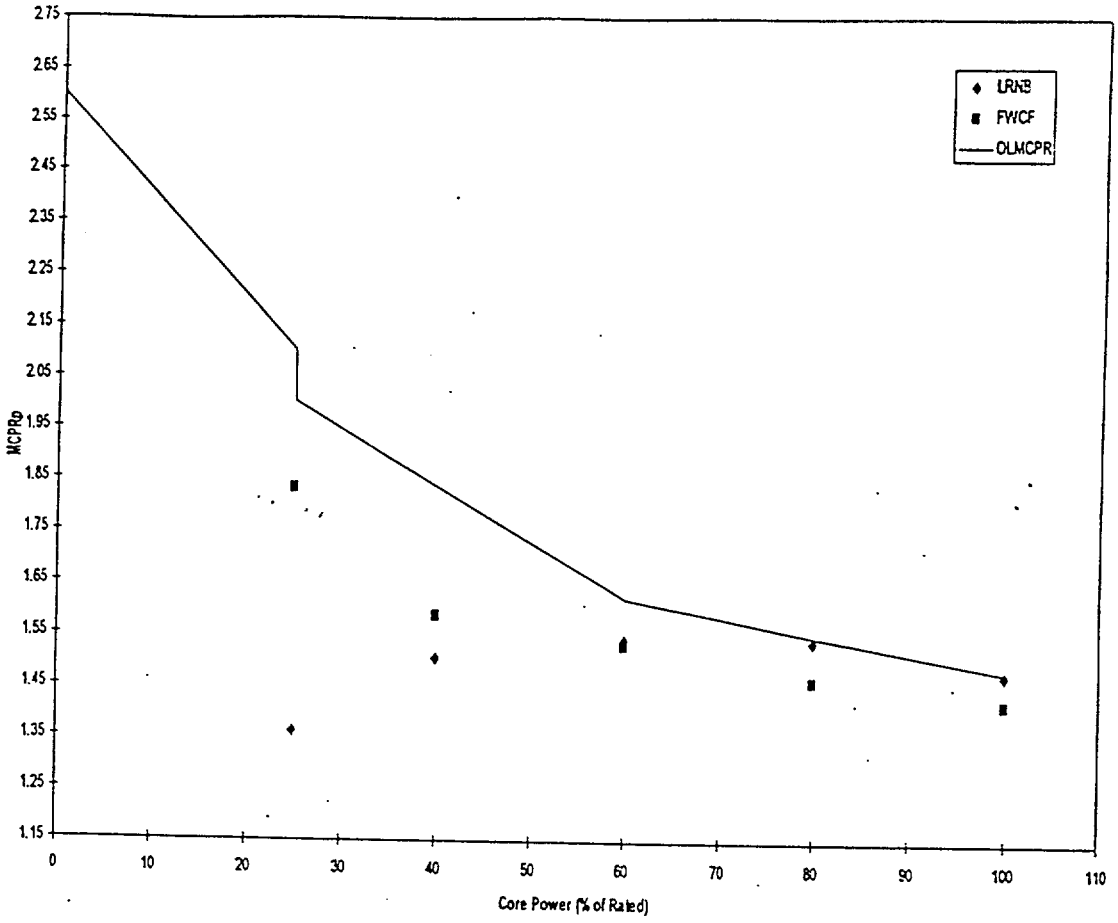
Power (% rated)	$LHGRFAC_p$
0	0.75
25	0.75
25	0.75
60	0.95
100	0.97

Figure 6.2 Coastdown Operation With Turbine Bypass Valves Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



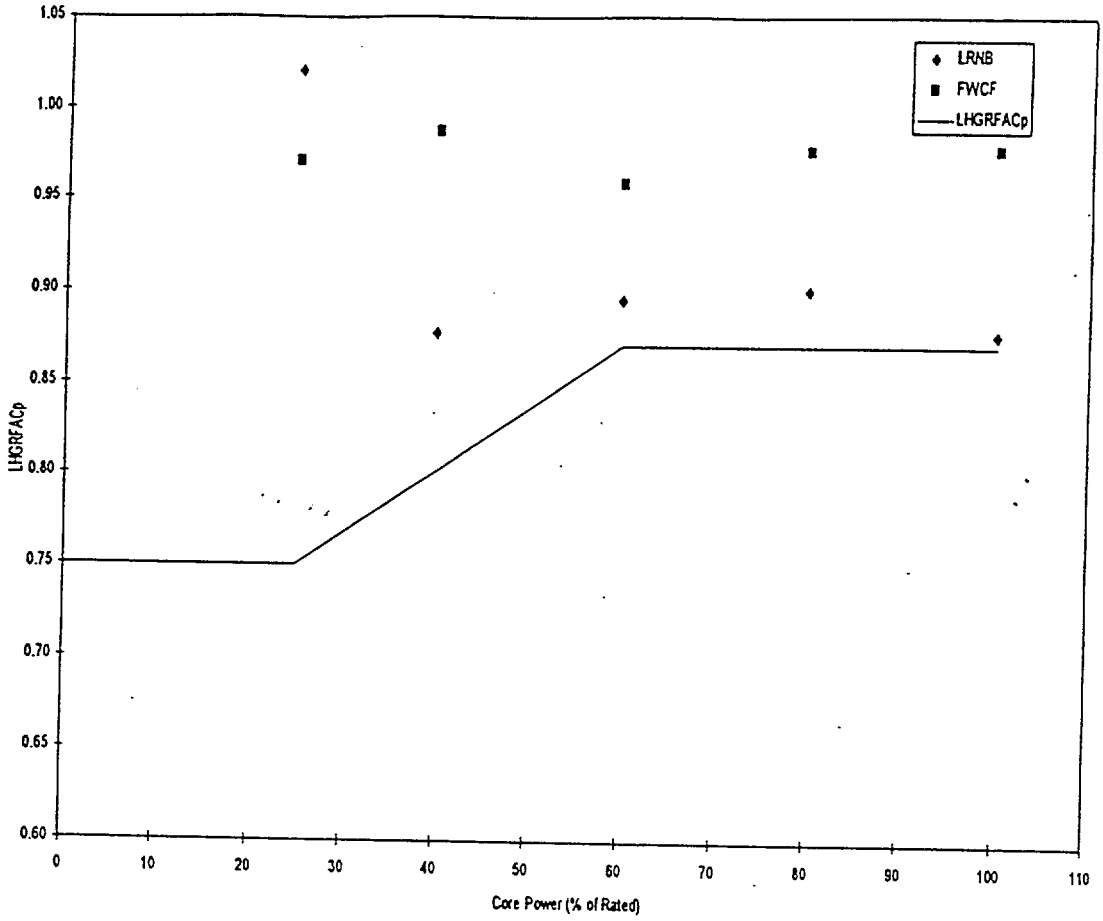
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.56
100	1.44

Figure 6.3 Coastdown Operation With Turbine Bypass Valves Out of Service Power Dependent MCPR Limits for GE9 Fuel



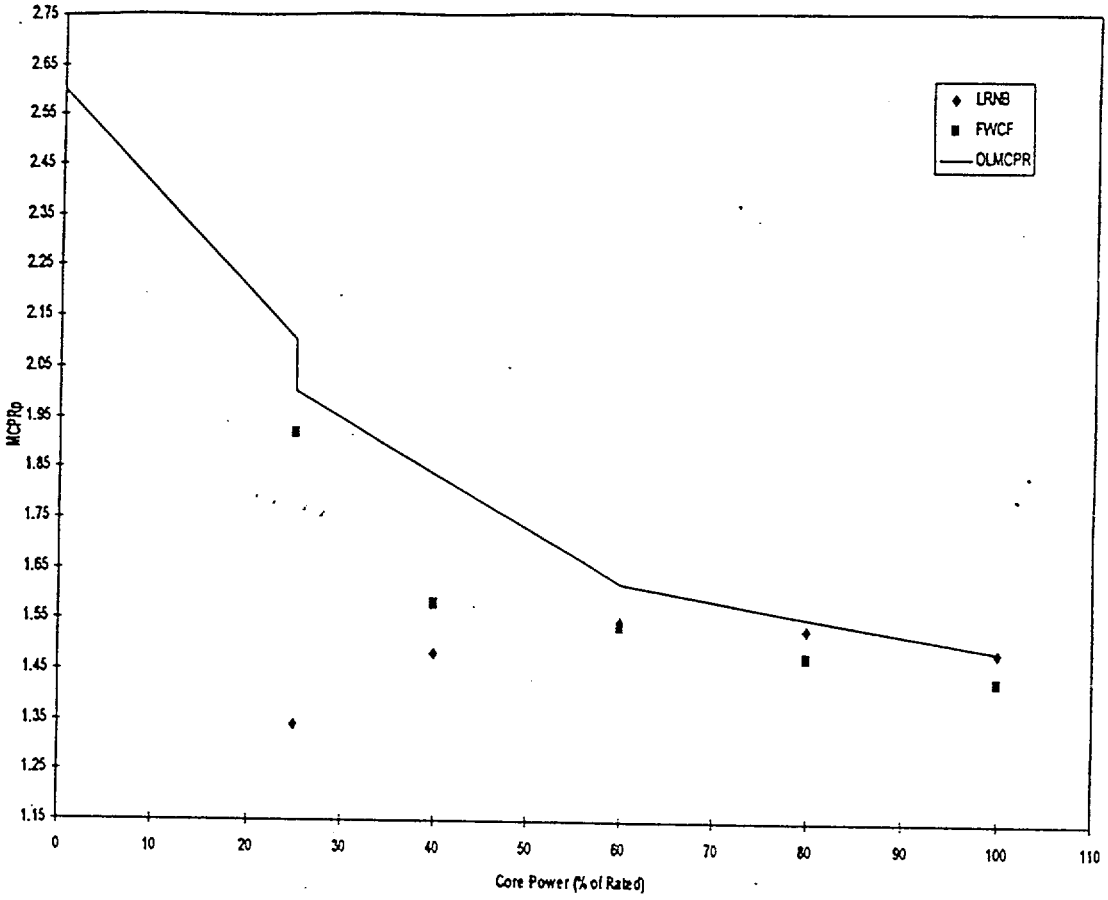
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.62
100	1.48

Figure 6.4 Coastdown Operation With Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



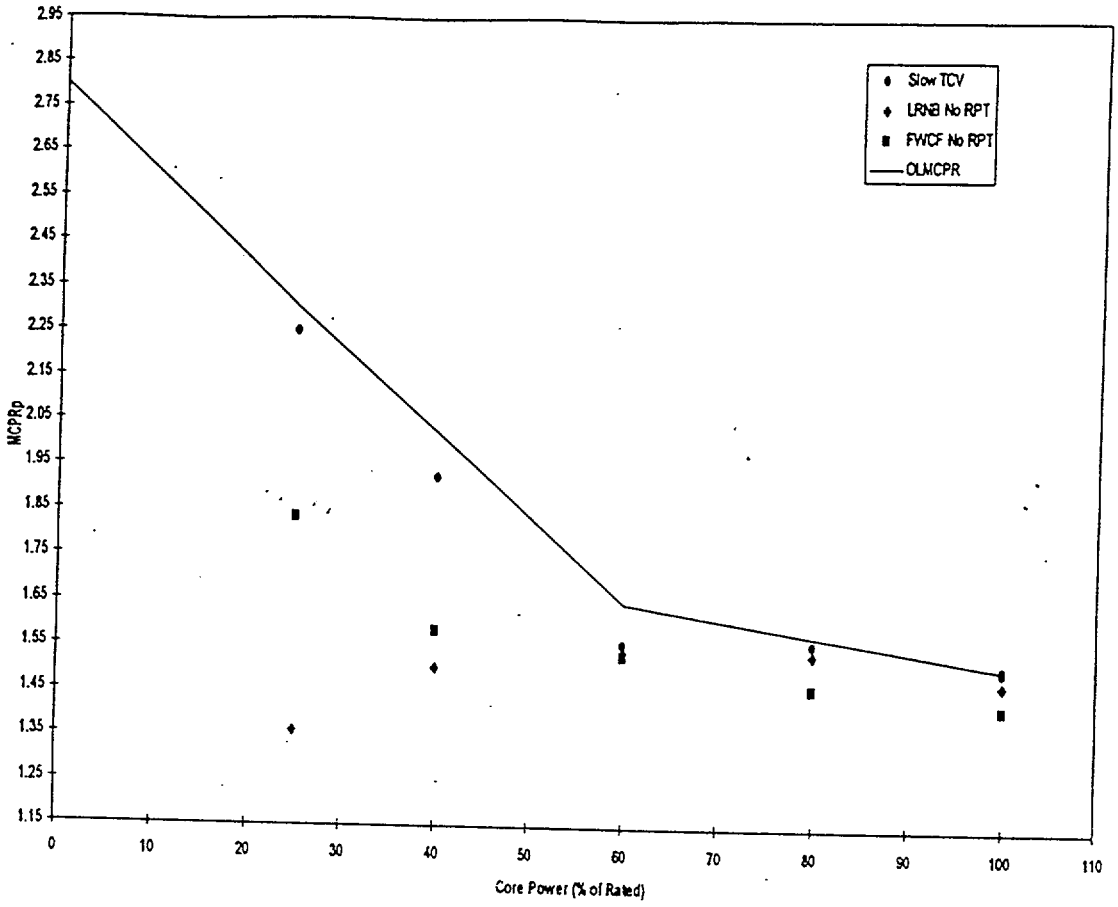
Power (% rated)	$LHGRFAC_p$
0	0.75
25	0.75
25	0.75
60	0.87
100	0.87

Figure 6.5 Coastdown Operation With Recirculation Pump Trip Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



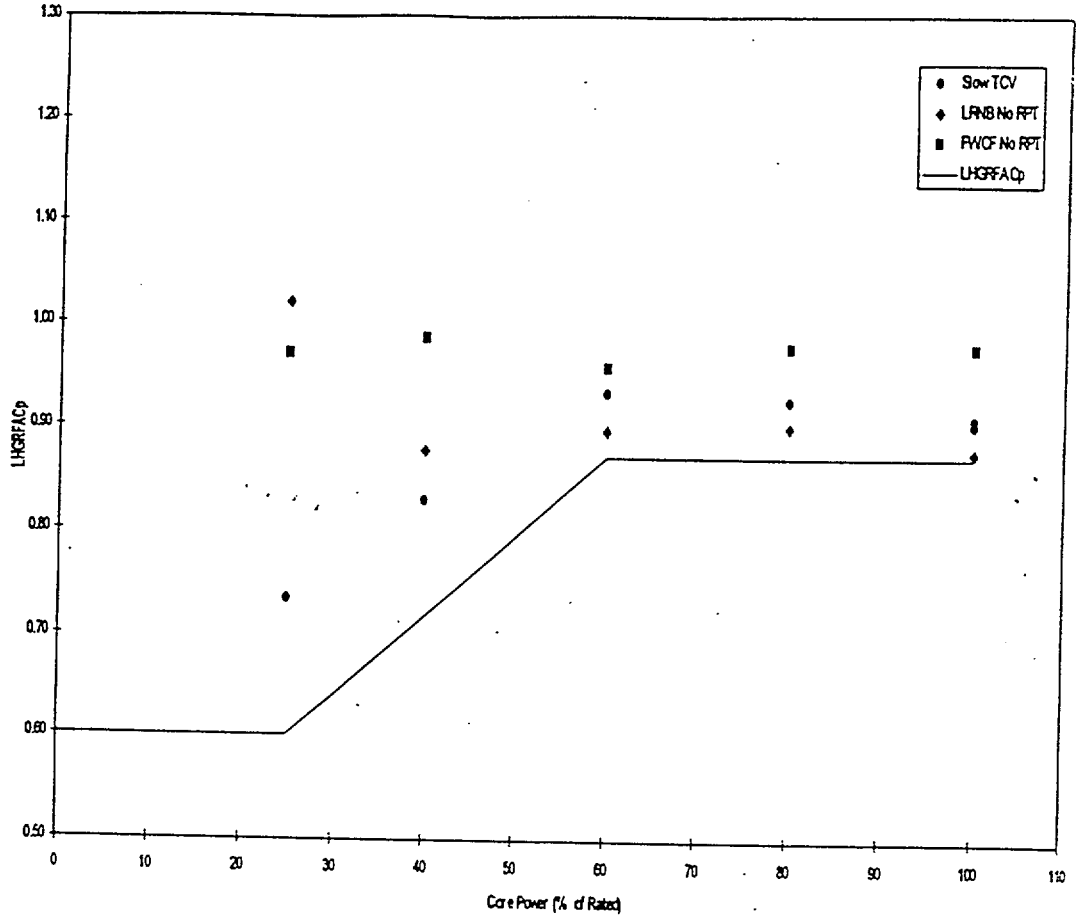
Power (% rated)	$MCPR_p$ Limit
0	2.60
25	2.10
25	2.00
60	1.62
100	1.49

Figure 6.6 Coastdown Operation With Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for GE9 Fuel



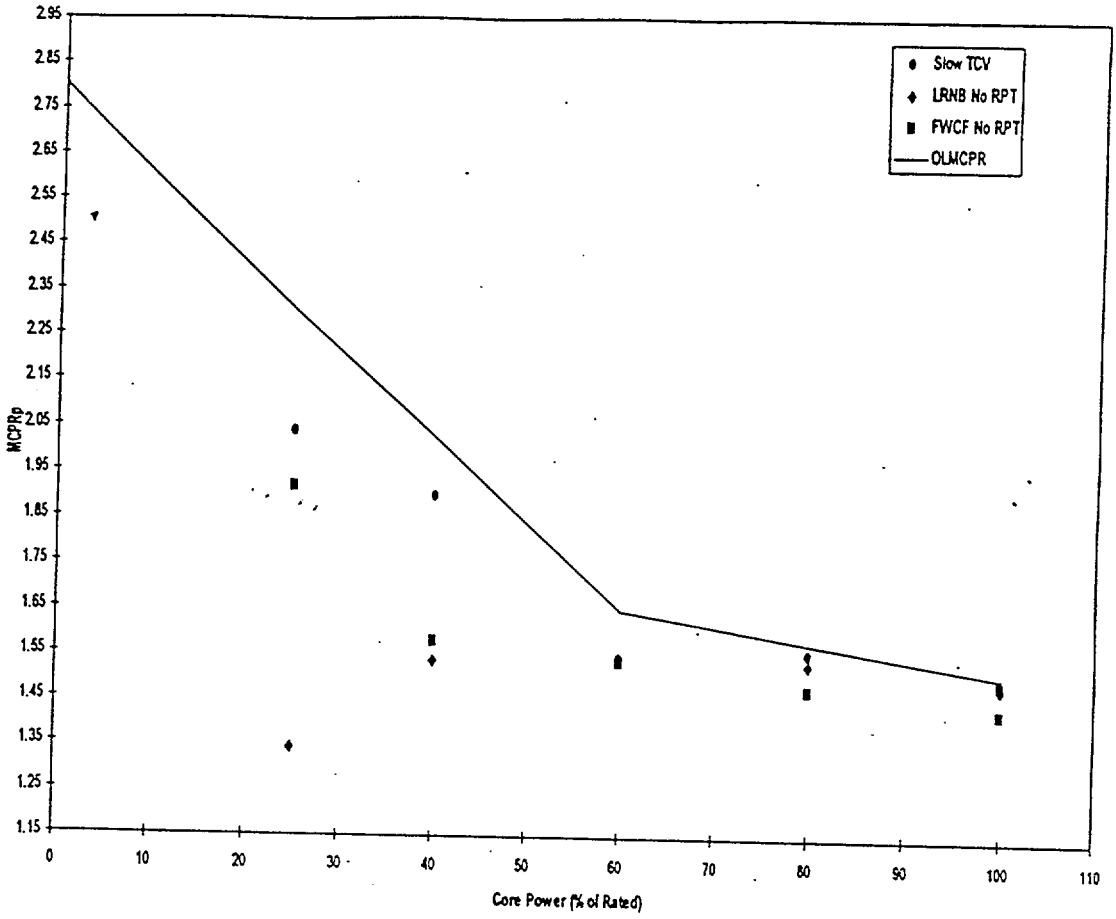
Power (% rated)	$MCPR_p$ Limit
0	2.80
25	2.30
25	2.30
60	1.65
100	1.51

Figure 6.7 Coastdown Operation With Turbine Control Valve Slow Closure and/or No RPT Power Dependent MCPR Limits for ATRIUM-9B Fuel



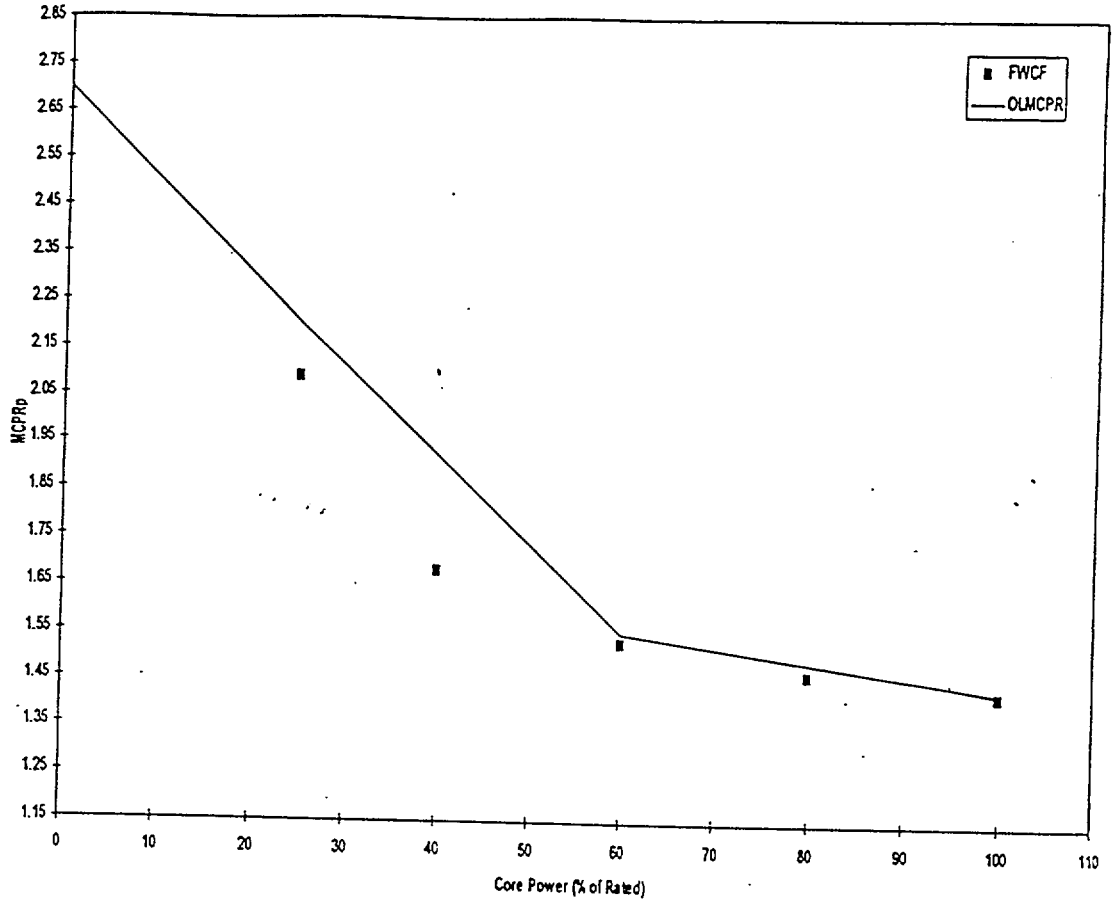
Power (% rated)	$LHGRFAC_p$
0	0.60
25	0.60
25	0.60
60	0.87
100	0.87

Figure 6.8 Coastdown Operation With Turbine Control Valve Slow Closure and/or No RPT Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



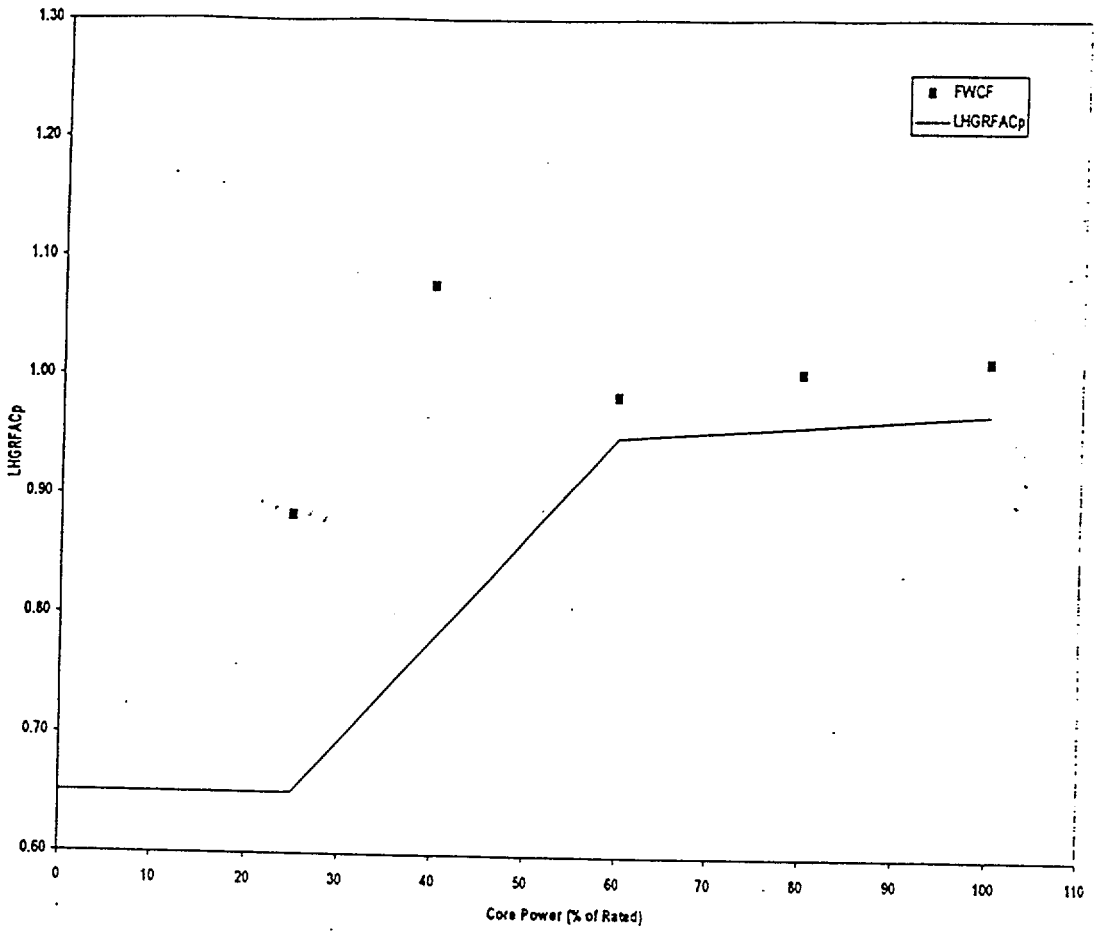
Power (% rated)	$MCPR_p$ Limit
0	2.80
25	2.30
25	2.30
60	1.65
100	1.51

Figure 6.9 Coastdown Operation With Turbine Control Valve Slow Closure and/or No RPT Power Dependent MCPR Limits for GE9 Fuel



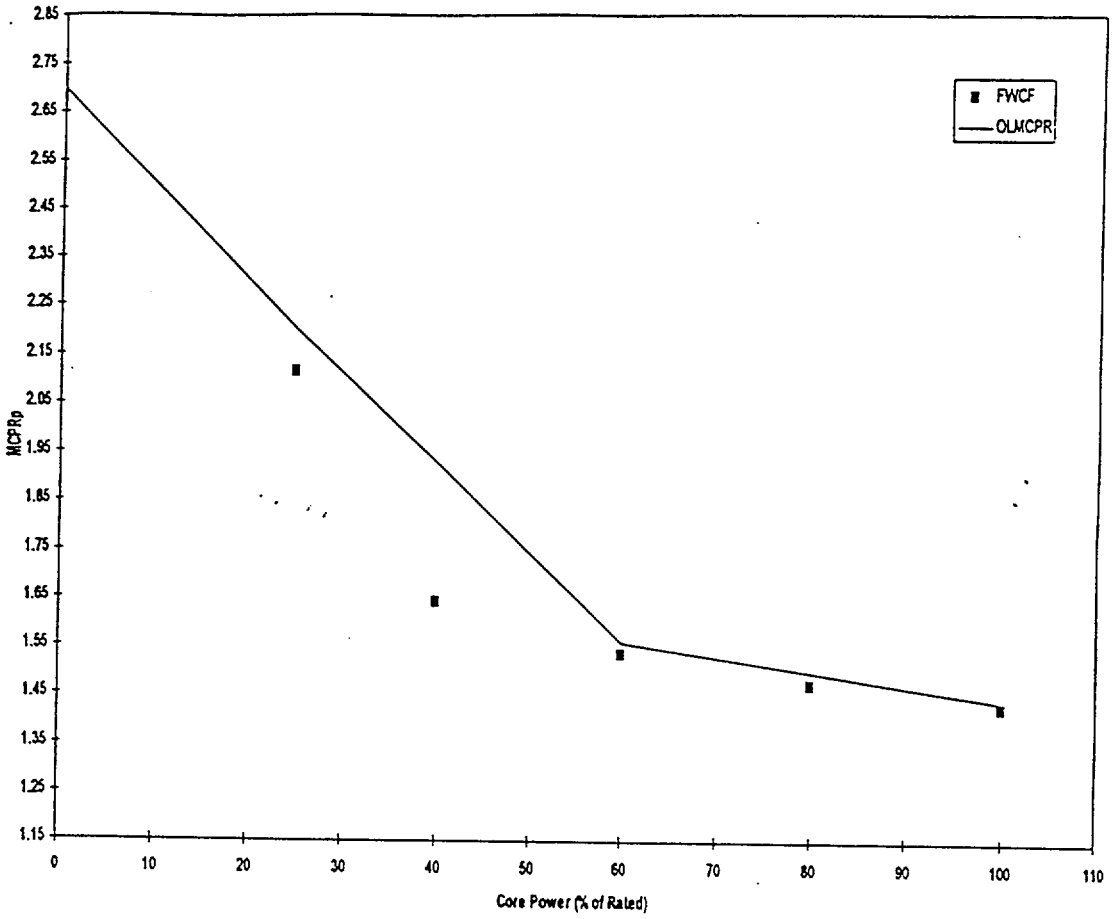
Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.55
100	1.43

Figure 6.10 Combined FFTR/Coastdown Operation With Turbine Bypass Valves Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



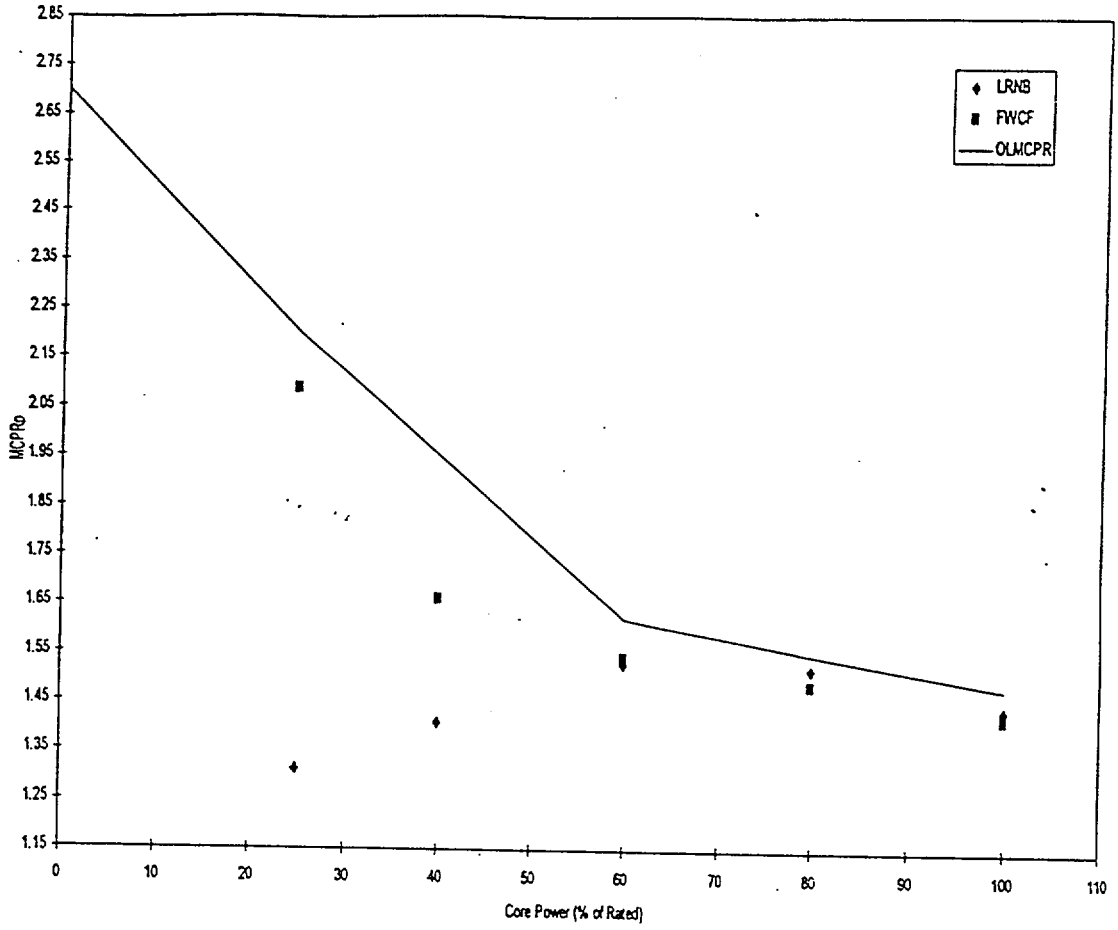
Power (% rated)	$LHGRFAC_p$
0	0.65
25	0.65
25	0.65
60	0.95
100	0.97

Figure 6.11 Combined FFTR/Coastdown Operation With Turbine Bypass Valves Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



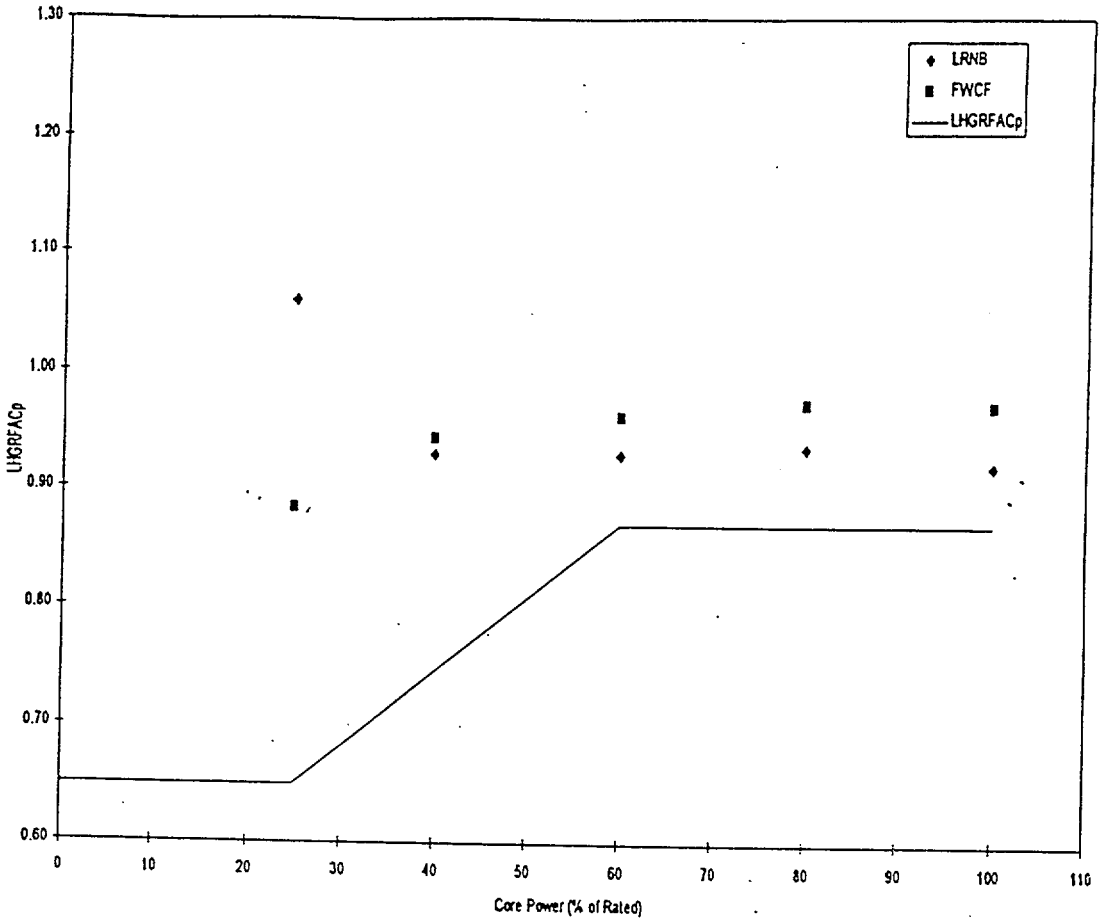
Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.56
100	1.44

Figure 6.12 Combined FFTR/Coastdown Operation With Turbine Bypass Valves Out of Service Power Dependent MCPR Limits for GE9 Fuel



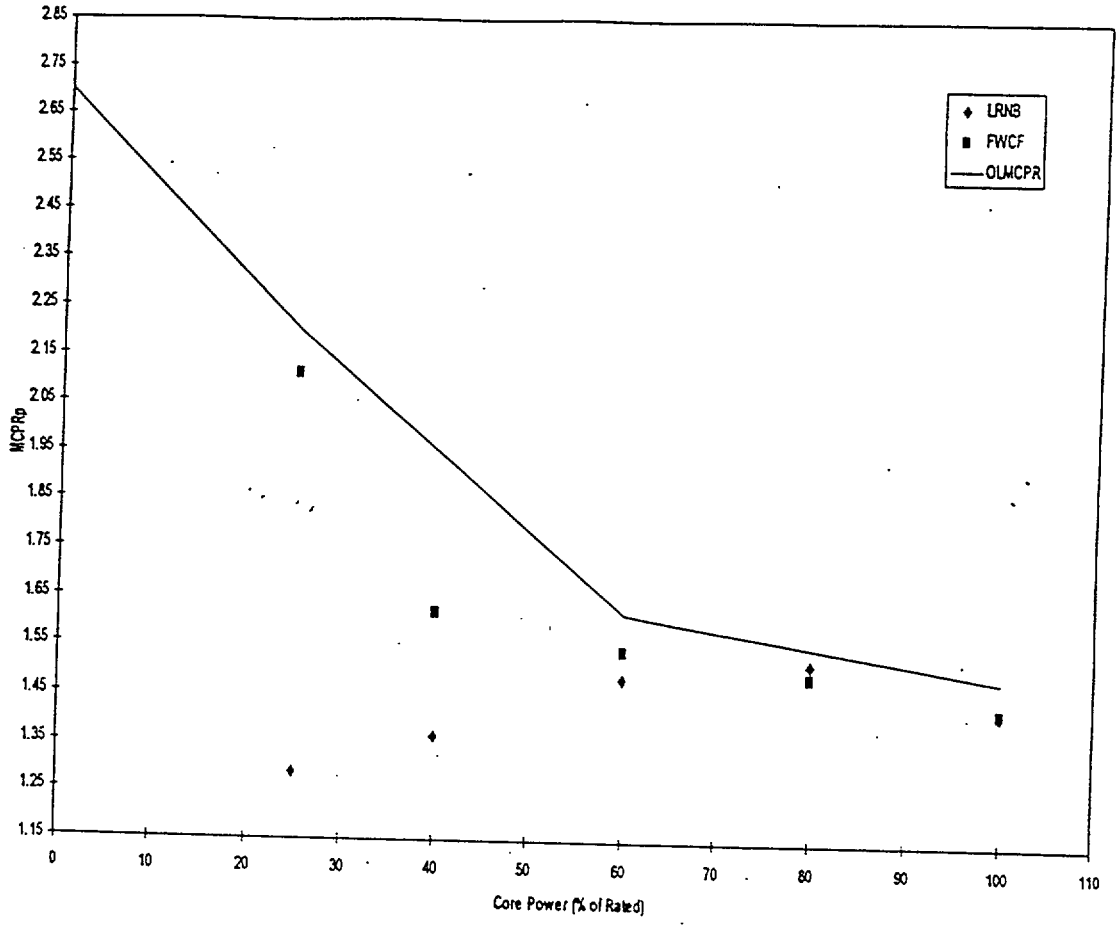
Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.62
100	1.48

Figure 6.13 Combined FFTR/Coastdown Operation With Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for ATRIUM-9B Fuel



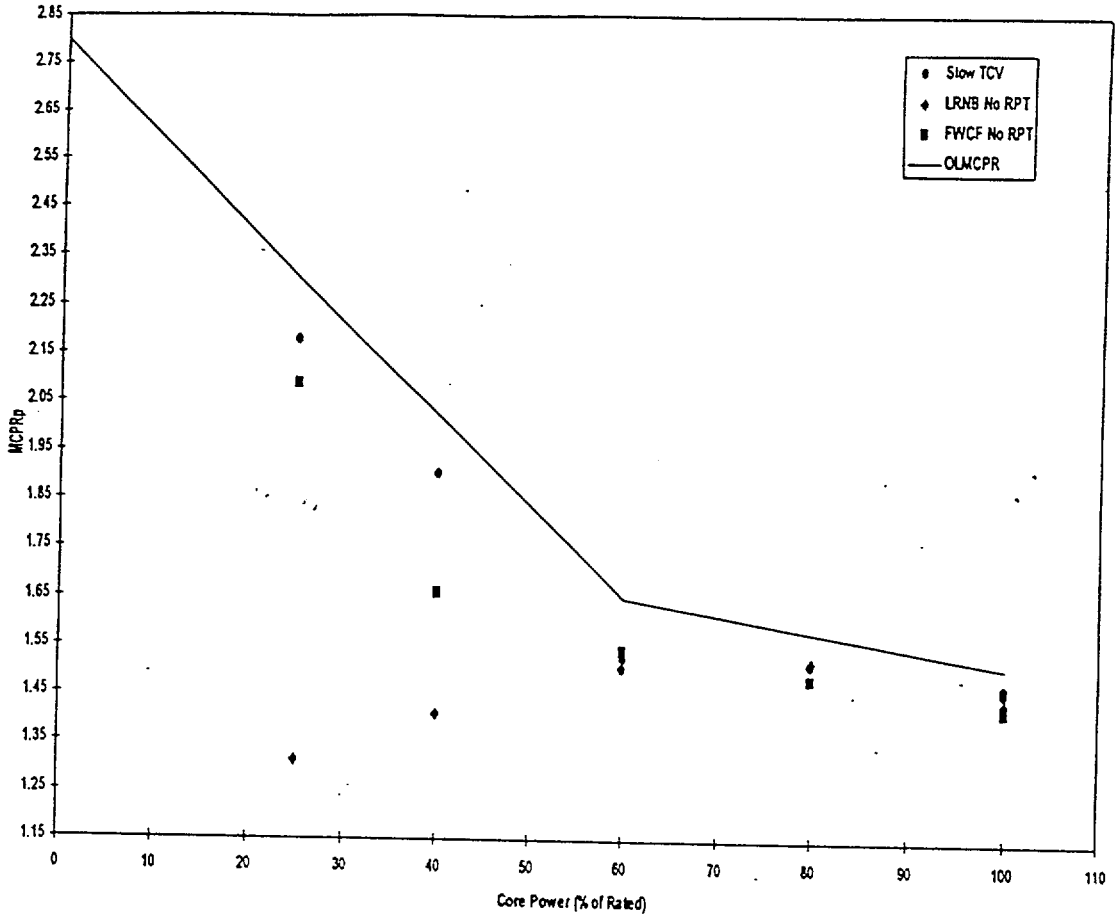
Power (% rated)	$LHGRFAC_p$
0	0.65
25	0.65
25	0.65
60	0.87
100	0.87

Figure 6.14 Combined FFTR/Coastdown Operation With Recirculation Pump Trip Out of Service Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



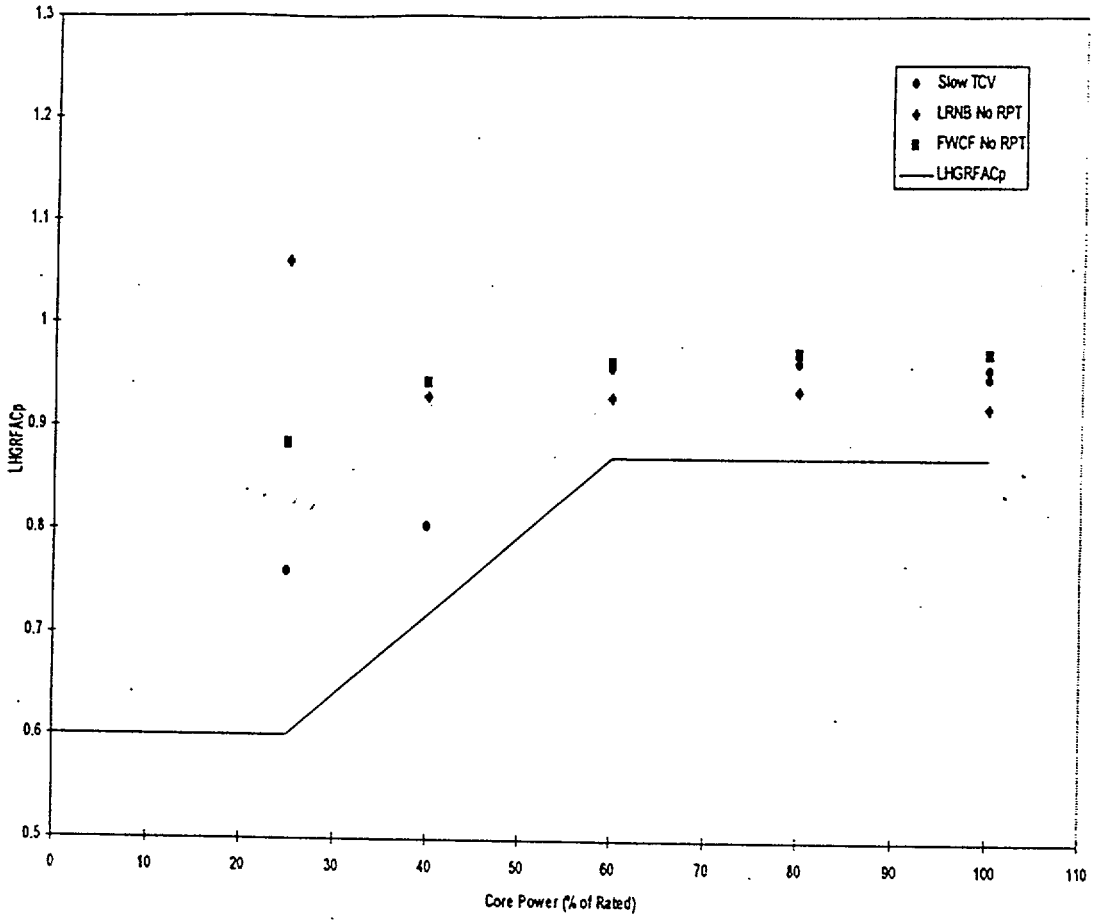
Power (% rated)	$MCPR_p$ Limit
0	2.70
25	2.20
25	2.20
60	1.62
100	1.49

Figure 6.15 Combined FFTR/Coastdown Operation With Recirculation Pump Trip Out of Service Power Dependent MCPR Limits for GE9 Fuel



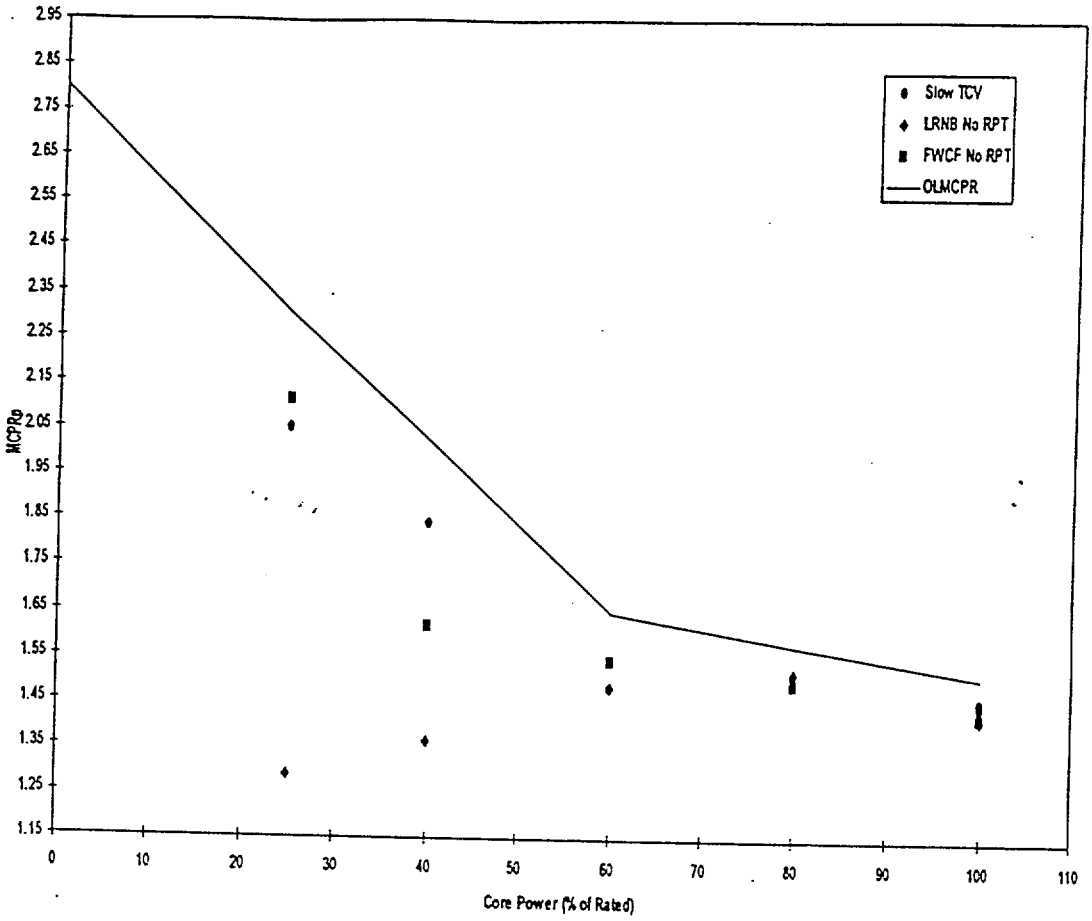
Power (% rated)	$MCPR_p$ Limit
0	2.80
25	2.30
25	2.30
60	1.65
100	1.51

Figure 6.16 Combined FFTR/Coastdown Operation With Turbine Control Valve Slow Closure and/or No RPT Power Dependent MCPR Limits for ATRIUM-9B Fuel



Power (% rated)	$LHGRFAC_p$
0	0.60
25	0.60
25	0.60
60	0.87
100	0.87

Figure 6.17 Combined FFTR/Coastdown Operation With Turbine Control Valve Slow Closure and/or No RPT Power Dependent LHGR Multipliers for ATRIUM-9B Fuel



Power (% rated)	MCPR Limit
0	2.80
25	2.30
25	2.30
60	1.65
100	1.51

Figure 6.18 Combined FFTR/Coastdown Operation With Turbine Control Valve Slow Closure and/or No RPT Power Dependent MCPR Limits for GE9 Fuel

Attachment 4

ARTS Improvement Program Analysis, Supplement 1 (Excerpts)

Administrative Technical Requirements - Appendix B
L2C8 Reload Transient Analysis Results

TOP/MOP and $MAPFAC_P$ Requirements

Limiting AOO	Power	Equipment Out of Service	TOP	MOP	Calculated $MAPFAC_P$	Generic $MAPFAC_P$
LRNBP	100	No EOOS	24.9	25.2	1.0	1.0
LRNBP	100	RPT OOS	30.3	30.6	1.0	1.0
FWCF	100	TBV OOS	28.7	30.0	1.0	1.0
FWCF	25	No EOOS	50.1	52.0	0.83	0.61
FWCF	25	RPT OOS	57.1	59.0	0.83	0.61
FWCF	25	TBV OOS	62.7	64.5	0.79	0.61

(a) Based on the GE9/10 LHGR Improvement Report, the MAPFACs are applied to LHGR (Reference 24)

Attachment 6

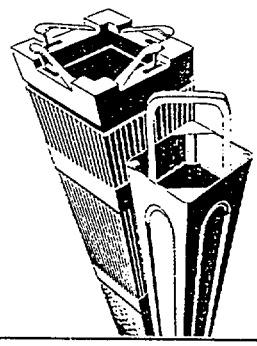
L2C8 Mid Cycle Uprate Licensing Report (Excerpts)

SIEMENS

EMF-2387
Revision 0

LaSalle Unit 2 Cycle 8 Mid-Cycle Power Uprate Licensing Report

April 2000



Siemens Power Corporation
Nuclear Division

Protection against violating the linear heat generation rate (LHGR) limits at rated and off-rated conditions is provided through the application of power- and flow-dependent LHGR factors ($LHGRFAC_p$ and $LHGRFAC_f$, respectively). These factors or multipliers are applied directly to the steady-state LHGR limit to ensure that the LHGR does not exceed the protection against power transient (PAPT) limit during postulated AOOs. Cycle 8 power- and flow-dependent LHGR multipliers are presented for ATRIUM-9B fuel.

Results of analyses that demonstrate compliance with the ASME Boiler and Pressure Vessel Code overpressurization limit are presented.

The analysis results presented in Reference 2 for power levels at and below 3323 MWt (rated power prior to power uprate) remain applicable and form the basis for the off-rated thermal limits. The Reference 2 results are not reproduced in this report. Consequently, this report must be used in conjunction with Reference 2.

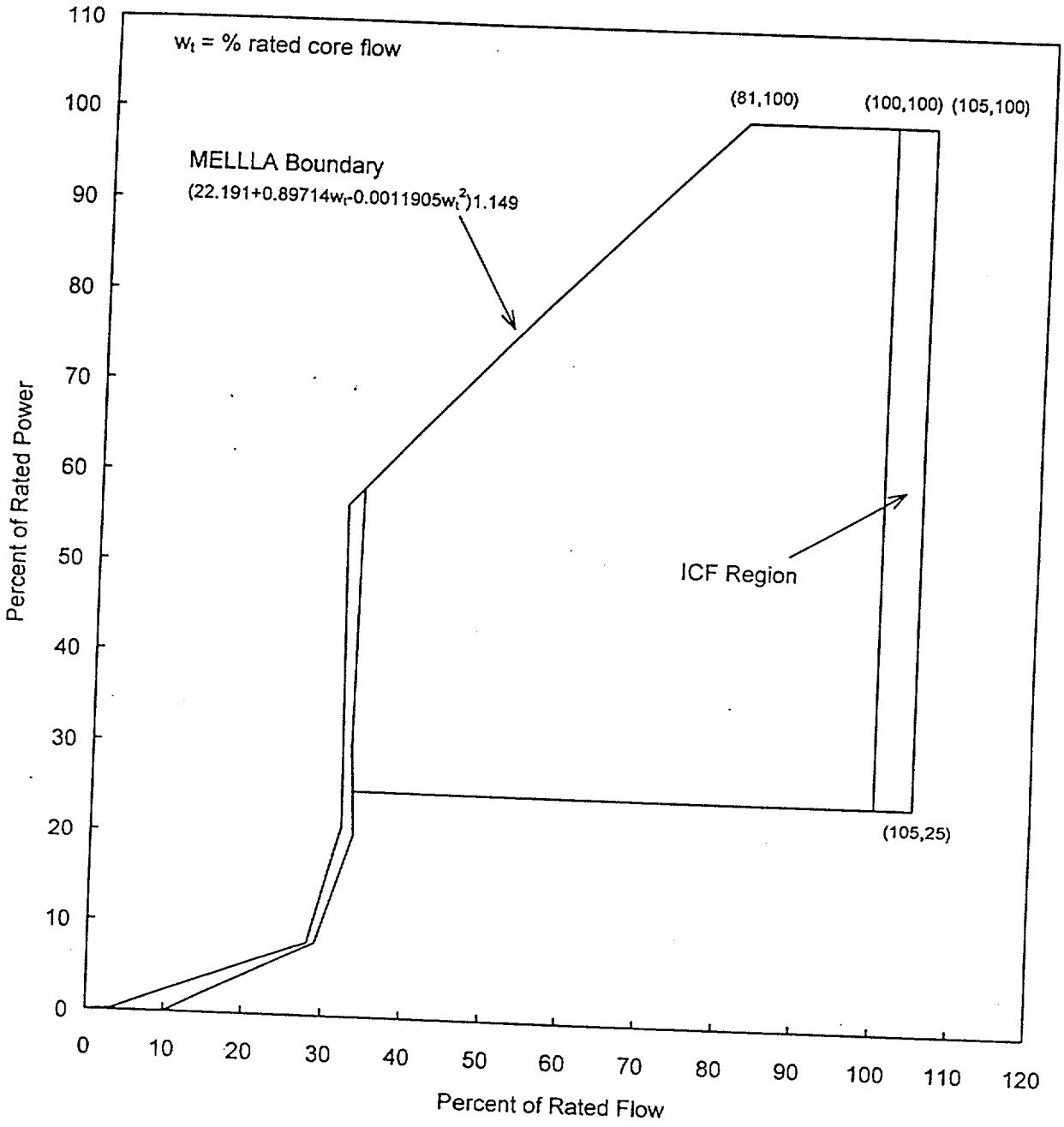


Figure 1.1 LaSalle County Nuclear Station Power/Flow Map for Uprated Power

Table 2.1 EOC Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times* *(Continued)*

EOOS/ EOD Condition	Power (% rated)	ATRIUM-9B		GE9
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Recirculation pump trip out of service (no RPT)	0	2.63	0.75	2.63
	25	2.13	0.75	2.13
	25	1.93	0.75	1.93
	57.2†	1.53	0.96	1.53
	95.2‡	1.49	1.00	1.51
	100	1.48	1.00	1.49
Turbine control valve (TCV) slow closure and/or no RPT	0	2.83	0.60	2.83
	25	2.33	0.60	2.33
	25	2.33	0.60	2.33
	76.2§	1.68	0.86	1.68
	76.2§	1.60	0.95	1.60
	95.2†	1.51	1.00	1.51
	100	1.48	1.00	1.49
TCV slow closure/ FHOOS and/or no RPT	0	2.83	0.60	2.83
	25	2.33	0.60	2.33
	25	2.33	0.60	2.33
	76.2§	1.68	0.86	1.68
	76.2§	1.60	0.93	1.60
	95.2‡	1.51	0.94	1.51
	100	1.48	0.97	1.49
Idle loop startup	0	2.50	0.40	2.50
	25	2.50	0.40	2.50
	25	2.50	0.40	2.50
	57.2†	2.50	0.40	2.50
	95.2‡	2.50	0.40	2.50
	100	2.50	0.40	2.50

* Limits support operation with any combination of 1 SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature, and up to 50% of the LPRMs out of service in the standard, ICF, and MELLLA regions of the power/flow map.

† 57.2% power corresponds to 1994 MWt.

‡ 95.2% power corresponds to 3323 MWt.

§ 76.2% power corresponds to 2658 MWt.

Table 2.3 Coastdown Operation Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times*

EOOS/ EOD Condition	Power (% rated)	ATRIUM-9B		GE9
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Base case operation	0	2.63	0.75	2.63
	25	2.13	0.75	2.13
	25	2.03	0.75	2.03
	57.2†	1.50	0.96	1.50
	95.2‡	1.44	0.97	1.45
	100	1.43	0.99	1.44
Single-loop operation	0	2.64	0.75	2.64
	25	2.14	0.75	2.14
	25	2.04	0.75	2.04
	57.2†	1.51	0.96	1.51
	95.2‡	1.45	0.97	1.46
	100	1.44	0.99	1.45
Turbine bypass valves out of service (TBVOOS)	0	2.63	0.75	2.63
	25	2.13	0.75	2.13
	25	2.03	0.75	2.03
	57.2†	1.58	0.95	1.59
	95.2‡	1.46	0.97	1.47
	100	1.46	0.98	1.47
Recirculation pump trip out of service (no RPT)	0	2.63	0.75	2.63
	25	2.13	0.75	2.13
	25	2.03	0.75	2.03
	57.2†	1.65	0.87	1.65
	95.2‡	1.51	0.87	1.52
	100	1.50	0.89	1.50

* Limits support operation with any combination of 1 SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature, and up to 50% of the LPRMs out of service in the standard, ICF, and MELLLA regions of the power/flow map.

† 57.2% power corresponds to 1994 MWt.

‡ 95.2% power corresponds to 3323 MWt.

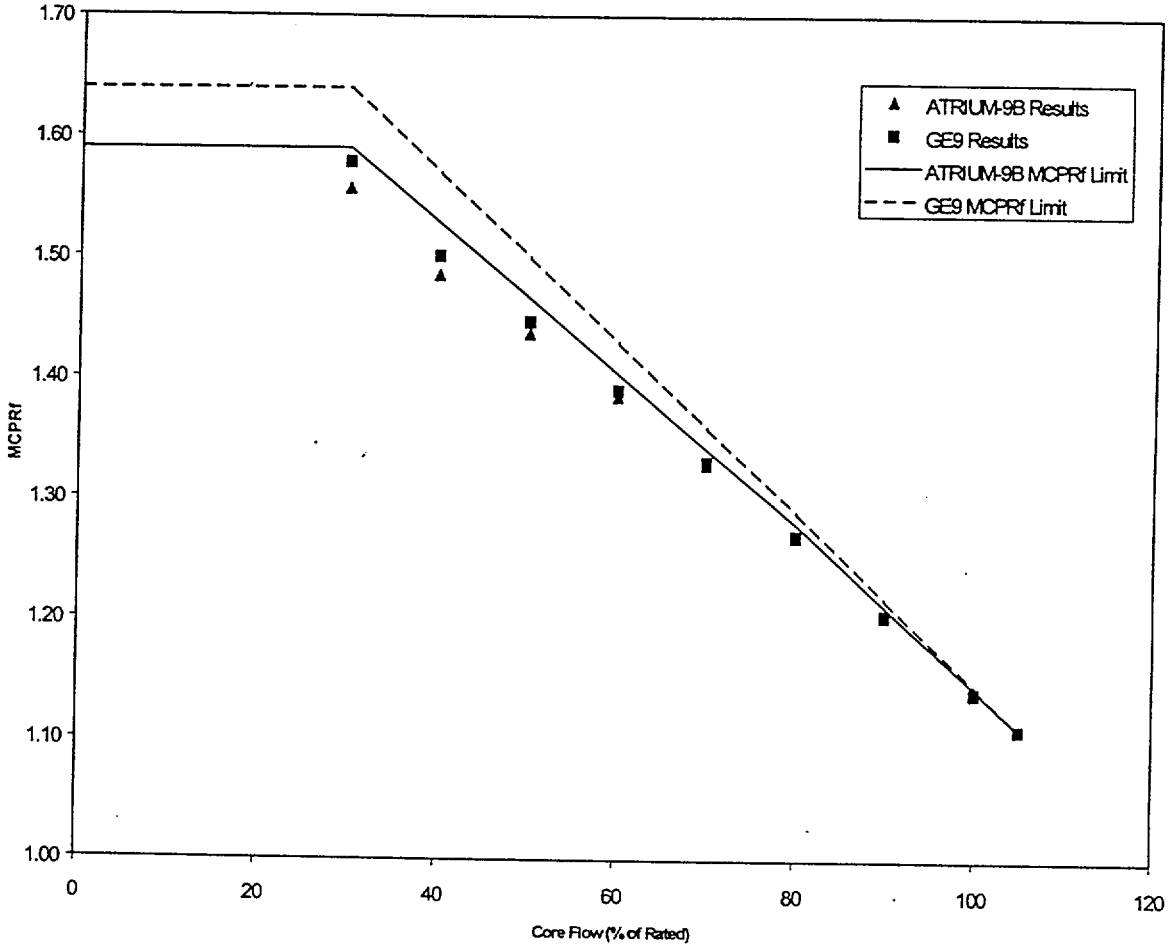
Table 2.4 FFTR/Coastdown Operation Base Case and EOOS $MCPR_p$ Limits and $LHGRFAC_p$ Multipliers for TSSS Insertion Times *

EOOS/ EOD Condition	Power (% rated)	ATRIUM-9B		GE9
		$MCPR_p$	$LHGRFAC_p$	$MCPR_p$
Base case operation	0	2.73	0.65	2.73
	25	2.23	0.65	2.23
	25	2.23	0.65	2.23
	57.2†	1.55	0.96	1.55
	95.2‡	1.44	0.97	1.45
	100	1.43	0.99	1.44
Single-loop operation	0	2.74	0.65	2.74
	25	2.24	0.65	2.24
	25	2.24	0.65	2.24
	57.2†	1.56	0.96	1.56
	95.2‡	1.45	0.97	1.46
	100	1.44	0.99	1.45
Turbine bypass valves out of service (TBVOOS)	0	2.73	0.65	2.73
	25	2.23	0.65	2.23
	25	2.23	0.65	2.23
	57.2†	1.58	0.95	1.59
	95.2‡	1.46	0.97	1.47
	100	1.46	0.98	1.47
Recirculation pump trip out of service (no RPT)	0	2.73	0.65	2.73
	25	2.23	0.65	2.23
	25	2.23	0.65	2.23
	57.2†	1.65	0.87	1.65
	95.2‡	1.51	0.87	1.52
	100	1.50	0.89	1.50

* Limits support operation with any combination of 1 SRVOOS, up to 2 TIPOOS (or the equivalent number of TIP channels), up to a 13°F reduction in feedwater temperature, and up to 50% of the LPRMs out of service in the standard, ICF, and MELLLA regions of the power/flow map.

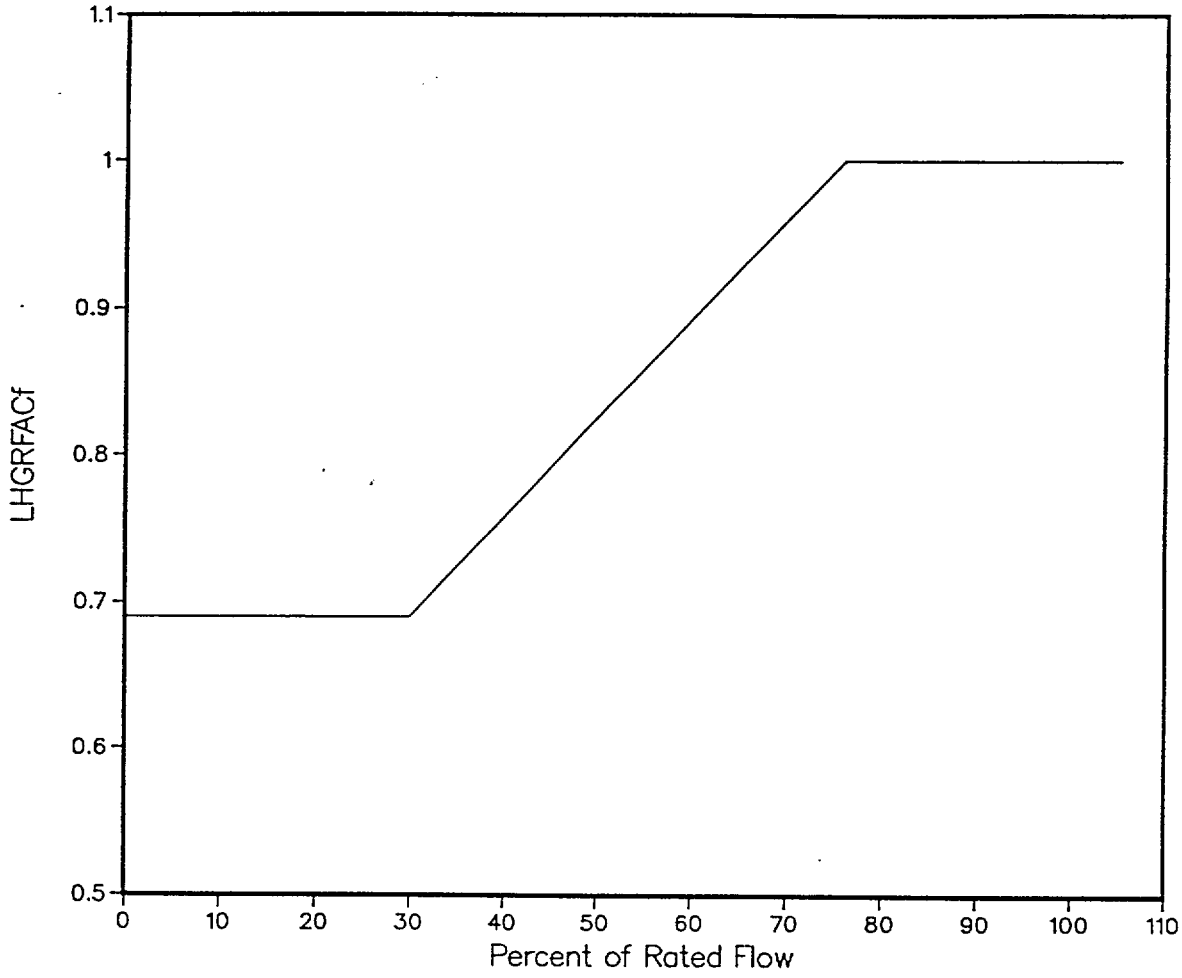
† 57.2% power corresponds to 1994 MWt.

‡ 95.2% power corresponds to 3323 MWt.



Flow (% rated)	$MCPR_f$ ATRIUM-9B	$MCPR_f$ GE9 (penalty included)
0	1.59	1.64
30	1.59	1.64
80	1.28	1.29
105	1.11	1.11

Figure 2.1 Flow-Dependent MCPR Limits for Manual Flow Control Mode



Flow (% rated)	$LHGRFAC_f$
0	0.69
30	0.69
76	1.00
105	1.00

Figure 2.2 Flow-Dependent LHGRFAC Multipliers for ATRIUM-9B Fuel

Table 4.1 Hydrodynamic Stability Results

Power / Flow (%)*	Maximum Global	Maximum Regional
30.1 / 26.6	0.68	0.59
31.6 / 29.2	0.49	0.55
61.9 / 45.0	0.57	0.88
73.6 / 50.0	0.65	1.02
78.2 / 60.0	0.40	0.67
82.4 / 60.0	0.48	0.78

* % power is based on 3489 MWt as rated. % flow is based on 108.5 Mlb/hr as rated.

Table 4.2 Licensing Basis Power Shape

State Conditions for Power Shape Evaluation	
Power (MWt)	3489.0
Core pressure (psia)	1020.0
Inlet subcooling (Btu/lbm)	18.20
Flow (Mlb/hr)	108.5

Core Axial Power Profile		
Node		Power
Top	25	0.162
	24	0.319
	23	0.718
	22	0.909
	21	1.066
	20	1.188
	19	1.263
	18	1.309
	17	1.332
	16	1.347
	15	1.351
	14	1.341
	13	1.324
	12	1.304
	11	1.277
	10	1.244
	9	1.200
	8	1.133
	7	1.056
	6	0.969
	5	0.880
	4	0.802
	3	0.726
	2	0.595
Bottom	1	0.186

Licensing axial exposure ratio (EOFP)
Average bottom 8 ft/12 ft = 1.0107

Table 5.1 LaSalle Unit 2 Plant Conditions at Uprated Power and Rated Flow

Reactor thermal power	3489 MWt
Total core flow	108.5 Mlbm/hr
Core active flow	93.8 Mlbm/hr
Core bypass flow*	14.7 Mlbm/hr
Core inlet enthalpy	524.1 Btu/lbm
Vessel pressures	
Steam dome	1002.6 psia
Core exit (upper plenum)	1014 psia
Lower plenum	1040 psia
Turbine pressure	951 psia
Feedwater/steam flow	15.145 Mlbm/hr
Feedwater enthalpy	406.6 Btu/lbm
Recirculating pump flow (per pump)	15.83 Mlbm/hr
Core average gap coefficient (EOC)	1190 Btu/ hr-ft^2-°F

* Includes water channel flow.

Table 5.2 LaSalle Unit 2
Power Uprate Parameters

Reactor thermal power	3489 MWt
Steam flow	15.145 Mlbm/hr
MELLLA boundary*	$P = (22.191+0.89714w_t-0.0011905w_t^2)1.149$
Steam dome pressure at 3489 MWt	
Lower bound	1002.6 psia
Upper bound	1034.7 psia
Feedwater temperature at 3489 MWt	
Nominal	426.5°F
Upper bound	426.5°F
Lower bound	413.5°F
FHOOS/FFTR	326.5°F
Feedwater temperature at 3558.78 MWt	
Nominal	428.5°F
Upper bound	428.5°F
Lower bound	415.5°F
FHOOS/FFTR	328.5°F

* w_t = % rated core flow.

Table 5.3 LaSalle Unit 2 Cycle 8
Power Uprate Analysis State Points

Power (% of rated)	Power (MWt)	Flow (% of rated)
100	3489	105
100	3489	81
76.2	2658	52.9
57.2	1994	32

Table 5.4 Scram Speed Insertion Times

Control Rod Position (notch)	TSSS Time (sec)	NSS Time (sec)
48 (*full-out*)	0.000	0.000
48*	0.200*	0.200*
45	0.430	0.380
39	0.860	0.680
25	1.930	1.680
5	3.490	2.680
0 (*full-in*)	3.880	2.804

* As indicated in Reference 12, the delay between scram signal and control rod motion is conservatively modeled. Sensitivity analyses indicate that using no delay provides conservative results.

Table 5.5 EOC Base Case LRNB Transient Results

Power / Flow	ATRIUM-9B		GE9 ΔCPR	Peak Neutron Flux (% rated)	Peak Heat Flux (% rated)
	ΔCPR	$LHGRFAC_p$			
TSSS Insertion Times					
100 / 105	0.292	1.001	0.313	364.61	122.71
100 / 81	0.277	1.000	0.295	397.35	122.03
76.2 / 52.9	0.246	1.083	0.240	189.61	85.74
57.2 / 32	0.097	1.216	0.079	86.60	59.34
NSS Insertion Times					
100 / 105	0.258	1.025	0.293	309.39	118.43
100 / 81	0.200	1.033	0.212	299.30	115.21
76.2 / 52.9	0.126	1.157	0.123	140.14	80.27
57.2 / 32	0.076	1.297	0.070	62.81	57.10

Table 5.6 EOC Base Case FWCF Transient Results

Power / Flow	ATRIUM-9B		GE9 ΔCPR	Peak Neutron Flux (% rated)	Peak Heat Flux (% rated)
	ΔCPR	$LHGRFAC_p$			
TSSS Insertion Times					
100 / 105	0.260	1.057	0.293	286.47	120.61
100 / 81	0.224	1.073	0.234	257.37	117.65
76.2 / 52.9	0.152	1.168	0.148	125.15	83.34
57.2 / 32	0.075	1.275	0.069	67.39	58.43
NSS Insertion Times					
100 / 105	0.227	1.084	0.263	245.15	116.77
100 / 81	0.163	1.116	0.179	204.86	112.29
76.2 / 52.9	0.119	1.230	0.116	95.48	79.69
57.2 / 32	0.070	1.321	0.065	59.86	58.29

Table 5.7 Input for MCPR Safety Limit Analysis

Plant Measurement Uncertainties			
Parameter	Value	Uncertainty (%) (Reference 8)	Statistical Treatment
Feedwater flow rate* (Mlbm/hr)	20.3	1.76	Convoluted
Feedwater temperature (°F)	426.5	0.76	Convoluted
Core pressure (psia)	1031	0.50	Convoluted
Total core flow (Mlbm/hr)	113.9	2.50	Convoluted
Core power* (MWt)	4676	—	—

* Feedwater flow rate and core power were increased above design values to attain desired core MCPR for safety limit evaluation consistent with Reference 8 methodology.

Table 5.8 Flow-Dependent MCPR Results

Core Flow (% rated)	ATRIUM-9B	GE9
30	1.556	1.578
40	1.485	1.501
50	1.437	1.447
60	1.385	1.391
70	1.329	1.331
80	1.269	1.270
90	1.204	1.205
100	1.140	1.141
105	1.110	1.110

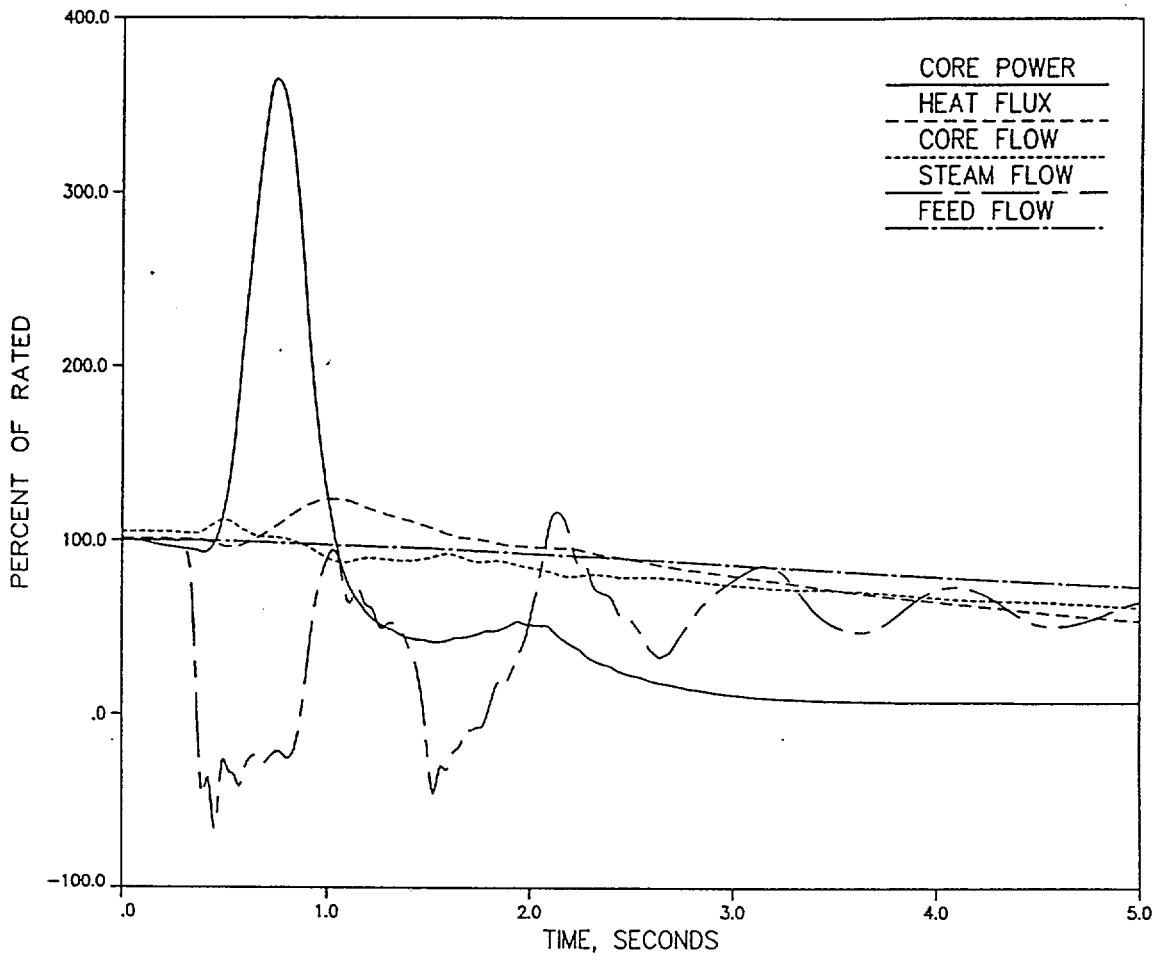


Figure 5.1 EOC Load Rejection No Bypass at 100/105 - TSSS Key Parameters

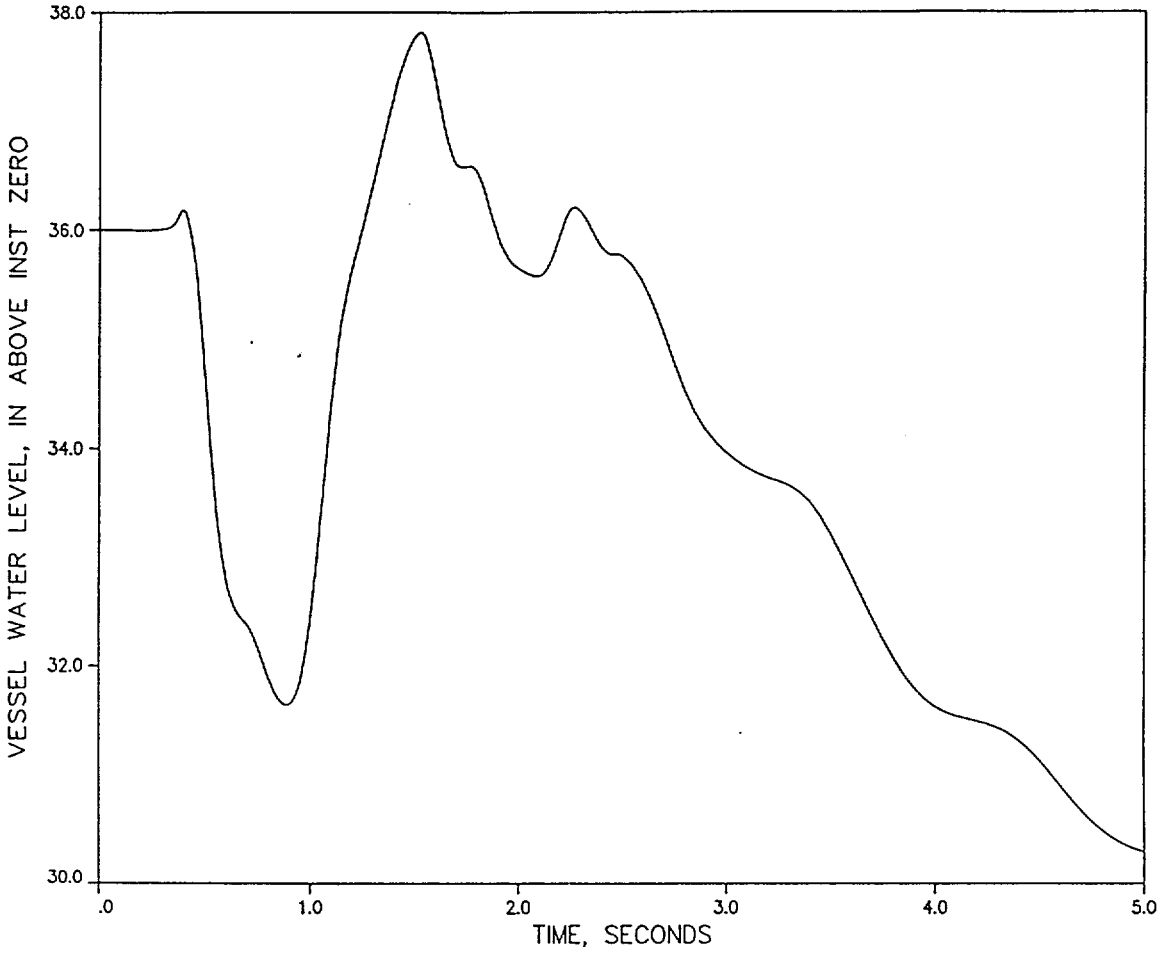


Figure 5.2 EOC Load Rejection No Bypass at 100/105 - TSSS Vessel Water Level

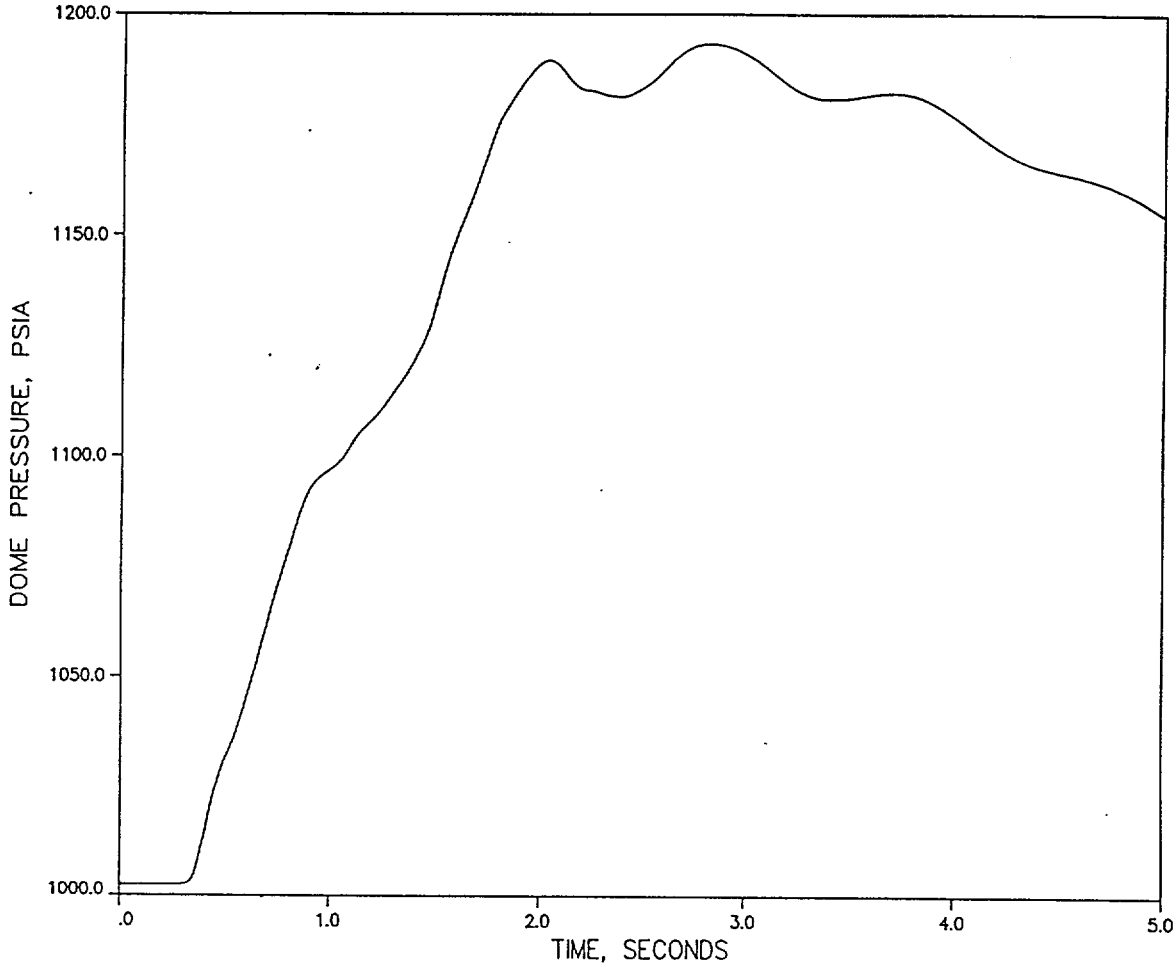


Figure 5.3 EOC Load Rejection No Bypass at 100/105 - TSSS Dome Pressure

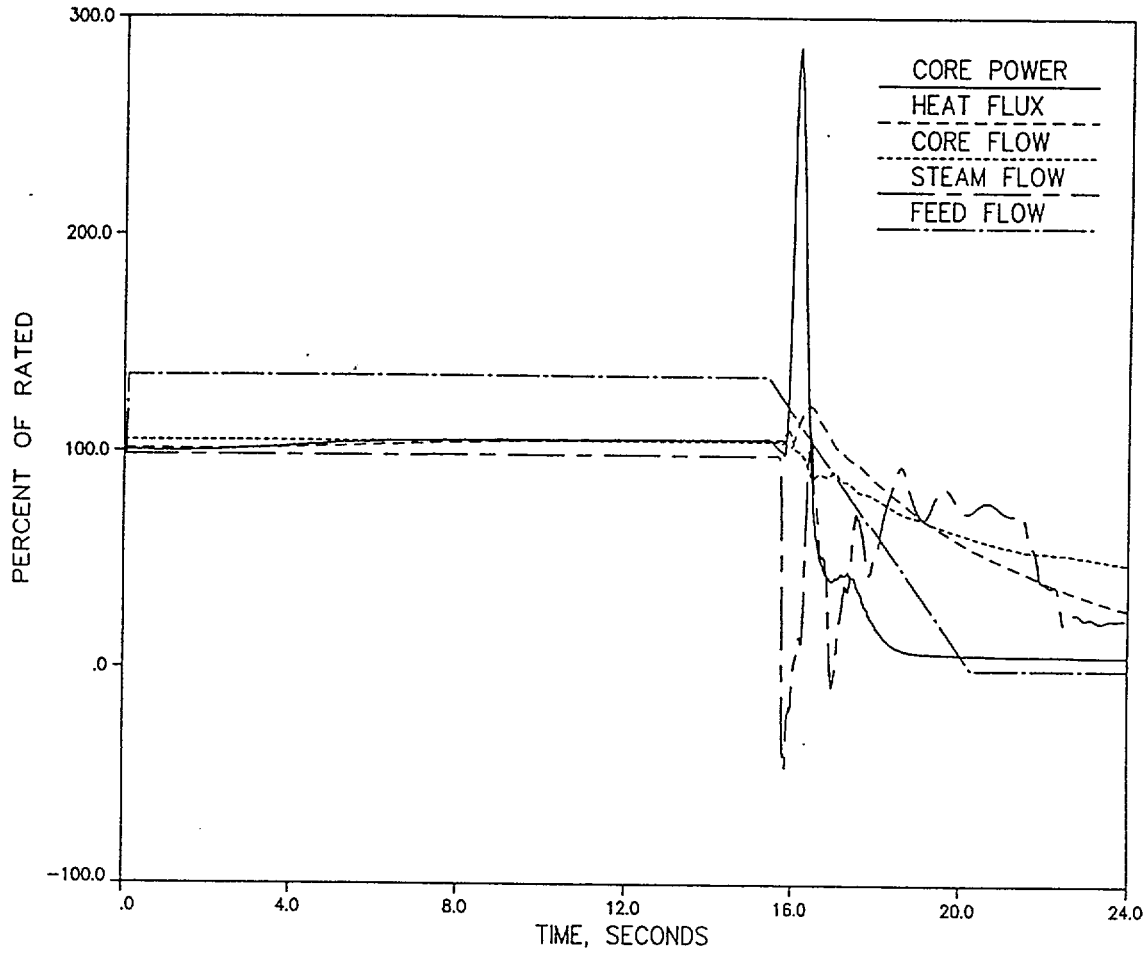


Figure 5.4 EOC Feedwater Controller Failure at 100/105 - TSSS Key Parameters

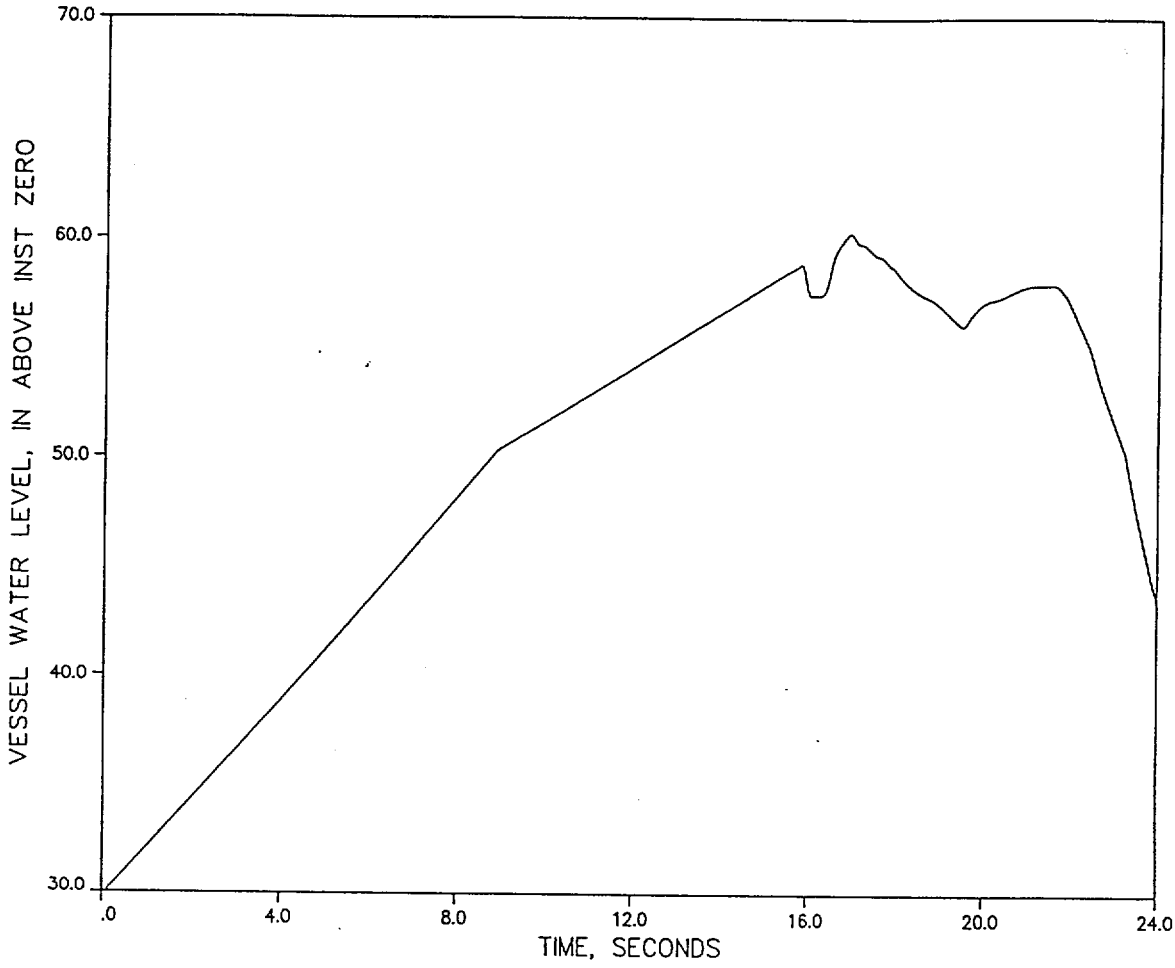


Figure 5.5 EOC Feedwater Controller Failure at 100/105 - TSSS Vessel Water Level

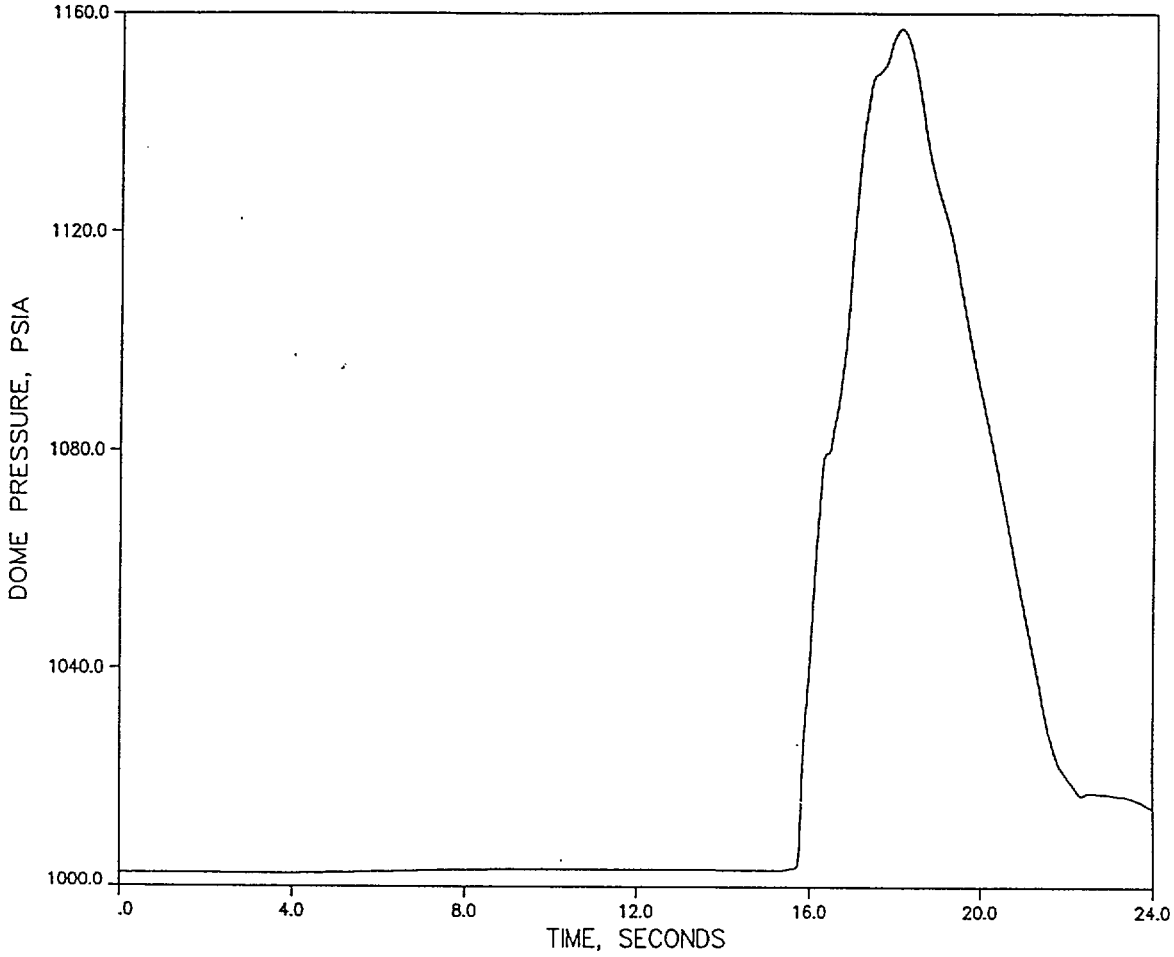


Figure 5.6 EOC Feedwater Controller Failure at 100/105 - TSSS Dome Pressure

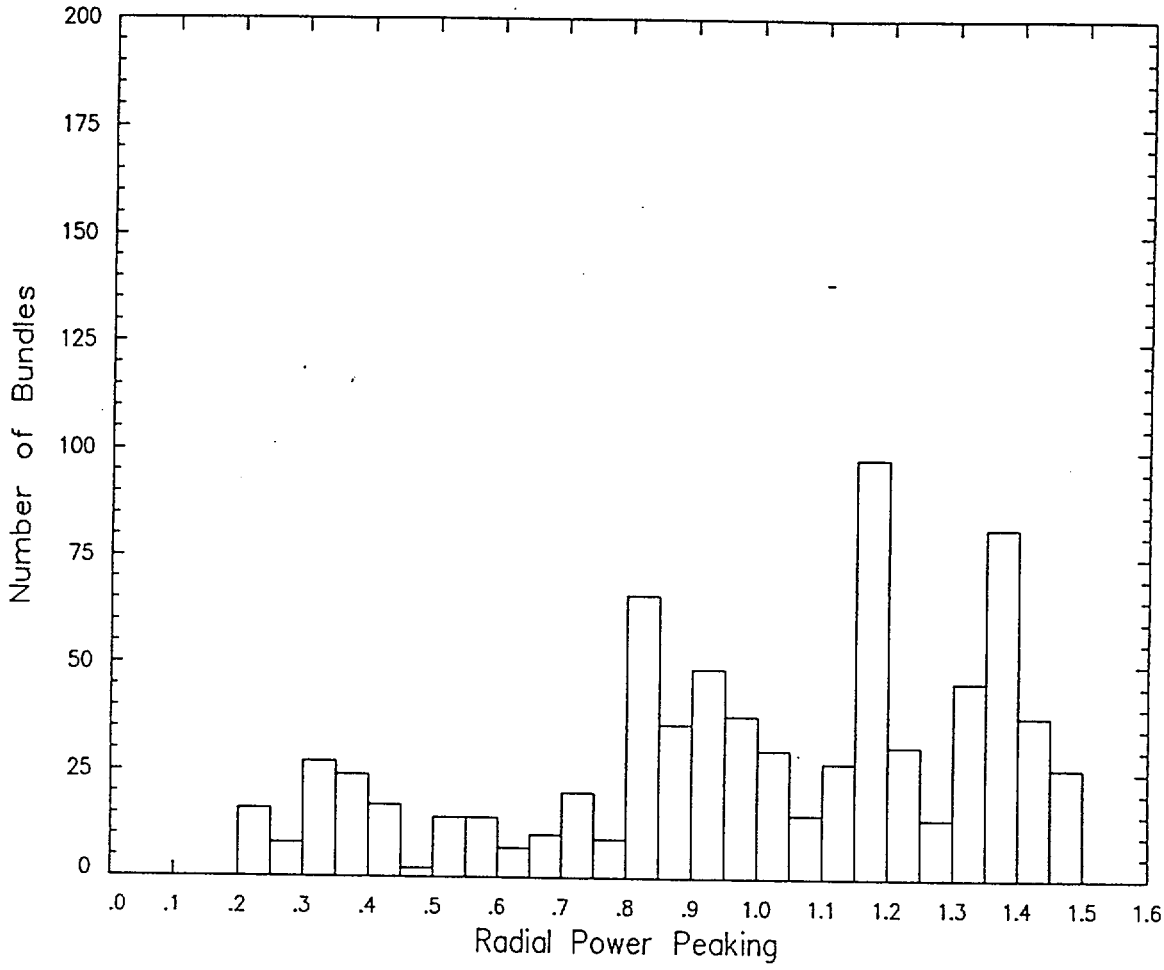


Figure 5.7 Radial Power Distribution for SLMCPR Determination

Table 6.1 EOC With EOOS Transient Results

Event	Power/ Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
FHOOS				
FWCF	100 / 105	0.270	1.044	0.302
No Bypass				
FWCF	100 / 105	0.328	1.000	0.338
No RPT				
LRNB	100 / 105	0.361	1.000	0.374
LRNB	100 / 81	0.325	1.000	0.345
LRNB	76.2 / 52.9	0.257	1.005	0.249
FWCF	100 / 105	0.322	1.000	0.332
No RPT With FHOOS				
LRNB	100 / 105	0.313	0.978	0.336
FWCF	100 / 105	0.322	0.973	0.337

Table 6.2 EOC Turbine Control Valve Slow Closure Analysis Results

Event	Slow Valve(s) Characteristics	Power/ Flow (%rated/%rated)	ATRIUM-9B		GE9
			ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	1 TCV closing at 2.0 sec	100 / 105*	0.359	1.000	0.352
LRNB	1 TCV closing at 2.7 sec	100 / 105*	0.355	1.000	0.349
LRNB	1 TCV closing at 2.0 sec	100 / 81*	0.331	1.000	0.354
LRNB	1 TCV closing at 2.0 sec	76.2 / 105†	0.529	0.884	0.519
LRNB	1 TCV closing at 2.0 sec	76.2 / 52.9*	0.476	0.956	0.433
LRNB	1 TCV closing at 2.0 sec	76.2 / 52.9†	0.556	0.922	0.495
LRNB	1 TCV closing at 2.0 sec	57.2 / 32†	0.668	0.885	0.522

* Scram initiated by high-neutron flux.
† Scram initiated by high-dome pressure.

Table 7.1 Coastdown Operation Transient Results

Event	Power/ Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	100 / 105	0.312	0.996	0.321
FWCF	100 / 105	0.275	1.056	0.290

Table 7.2 Coastdown With EOOS Transient Results

Event	Power/ Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
No Bypass				
FWCF	100/105	0.344	0.989	0.351
No RPT				
LRNB	100/105	0.381	0.894	0.388
FWCF	100/105	0.339	0.974	0.346
Slow TCV Closure				
LRNB	100/105*	0.403	0.921	0.391
LRNB	76.2/105†	0.540	0.927	0.535

* Scram initiated by high-neutron flux.

† Scram initiated by high-dome pressure.

Table 7.3 FFTR/Coastdown Operation Transient Results

Event	Power/ Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
LRNB	100 / 105	0.274	1.032	0.289
FWCF	100 / 105	0.284	1.063	0.292

Table 7.4 FFTR/Coastdown With EOOS Transient Results

Event	Power/ Flow (%rated/%rated)	ATRIUM-9B		GE9
		ΔCPR	$LHGRFAC_p$	ΔCPR
No Bypass				
FWCF	100 / 105	0.342	1.009	0.349
No RPT				
LRNB	100 / 105	0.344	0.926	0.342
FWCF	100 / 105	0.339	0.974	0.346
Slow TCV Closure				
LRNB	100 / 105*	0.379	0.953	0.373
LRNB	76.2 / 105†	0.559	0.934	0.549

* Scram initiated by high-neutron flux.

† Scram initiated by high-dome pressure.

Table 8.1 ASME Overpressurization Analysis Results
102%P/105%F

Event	Peak Neutron Flux (%rated)	Peak Heat Flux (%rated)	Maximum Vessel Pressure Lower Plenum (psig)	Maximum Dome Pressure (psig)
MSIV	387. 8	132.7	1317.8	1288.6

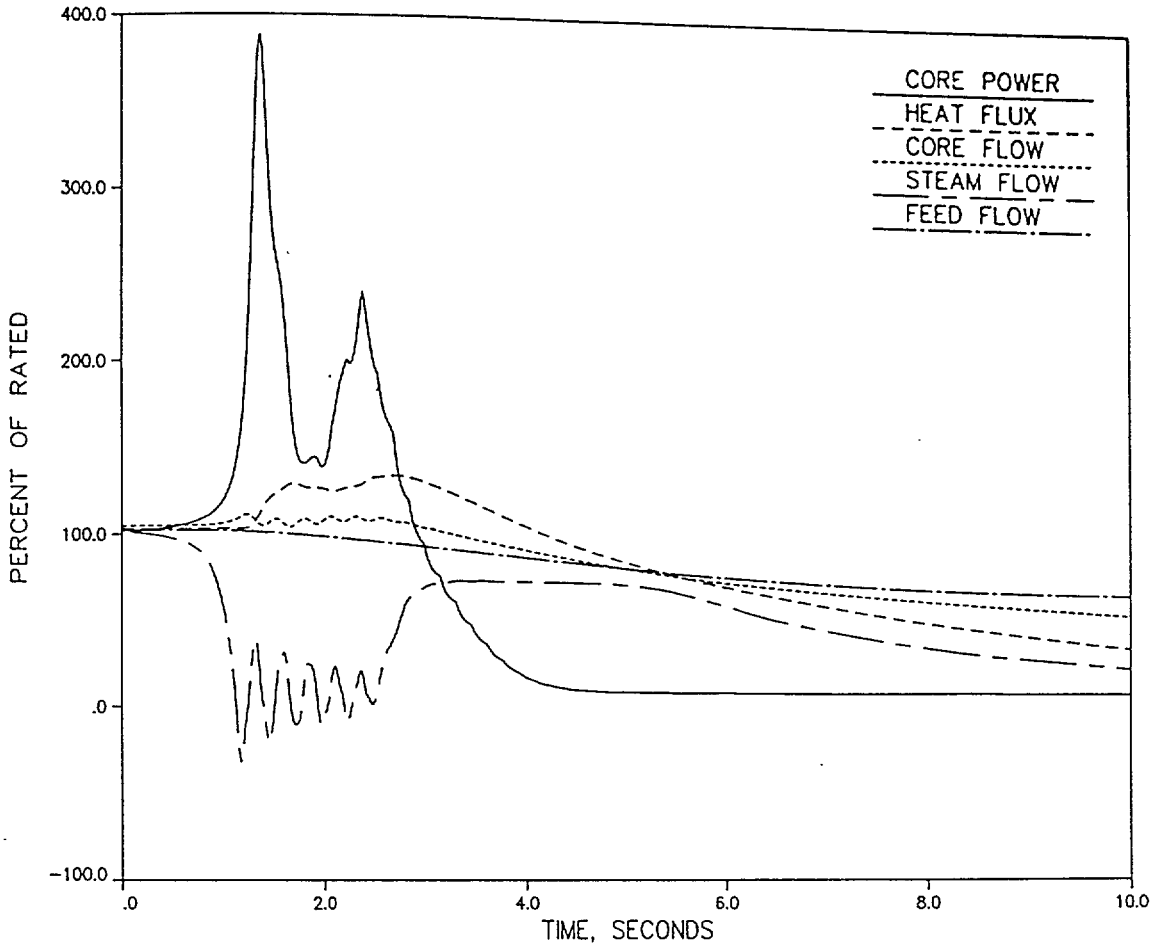


Figure 8.1 Overpressurization Event at 102/105 - MSIV Closure Key Parameters

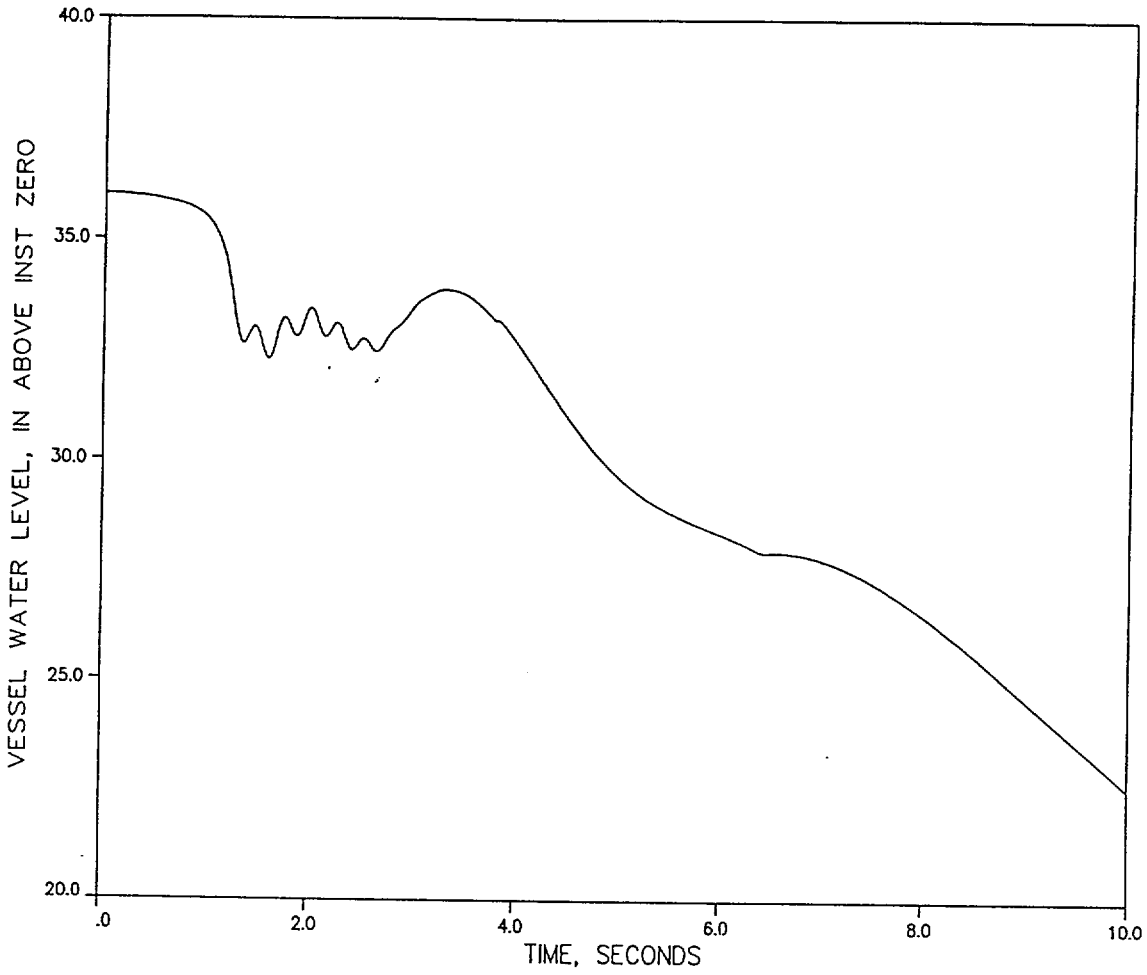


Figure 8.2 Overpressurization Event at 102/105 - MSIV Closure Vessel Water Level

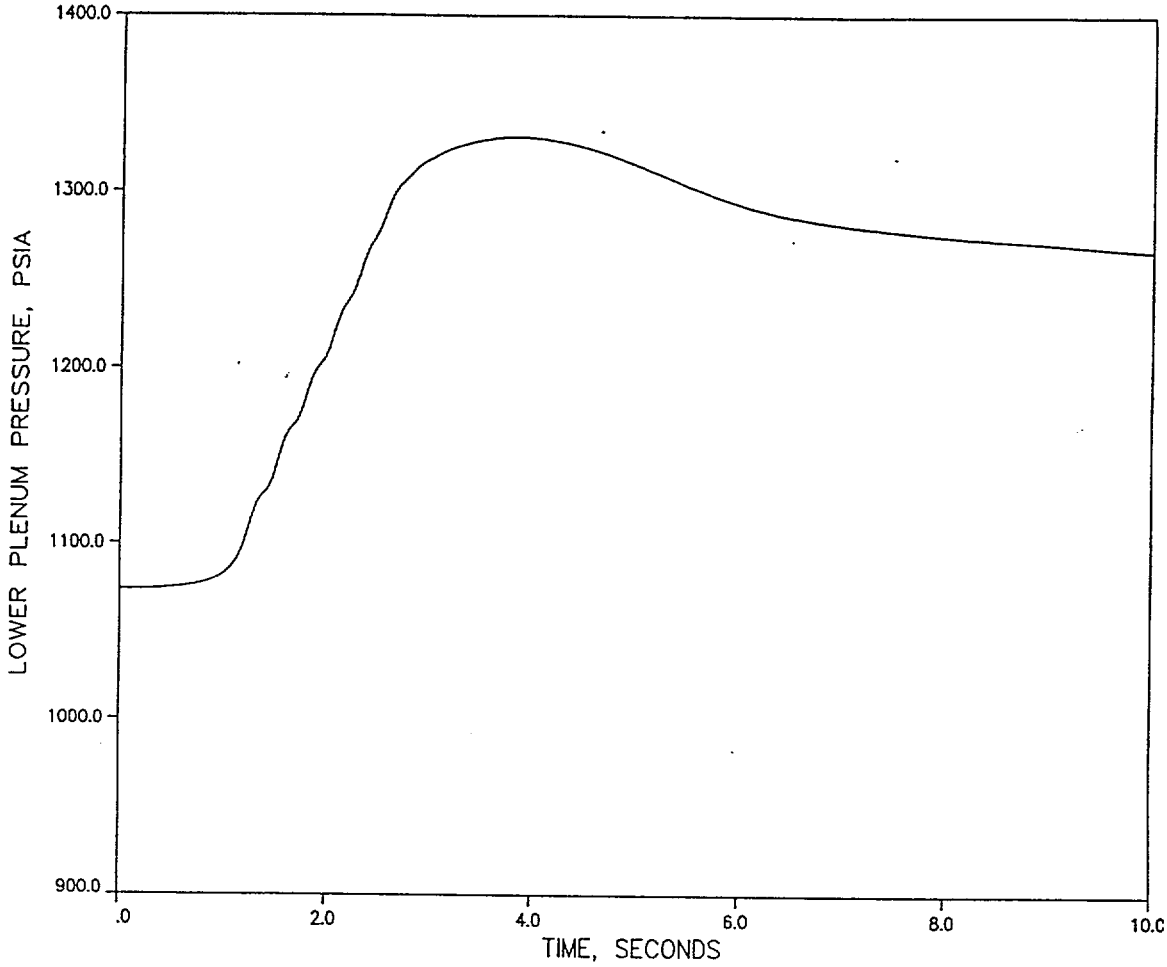


Figure 8.3 Overpressurization Event at 102/105 - MSIV Closure Lower Plenum Pressure

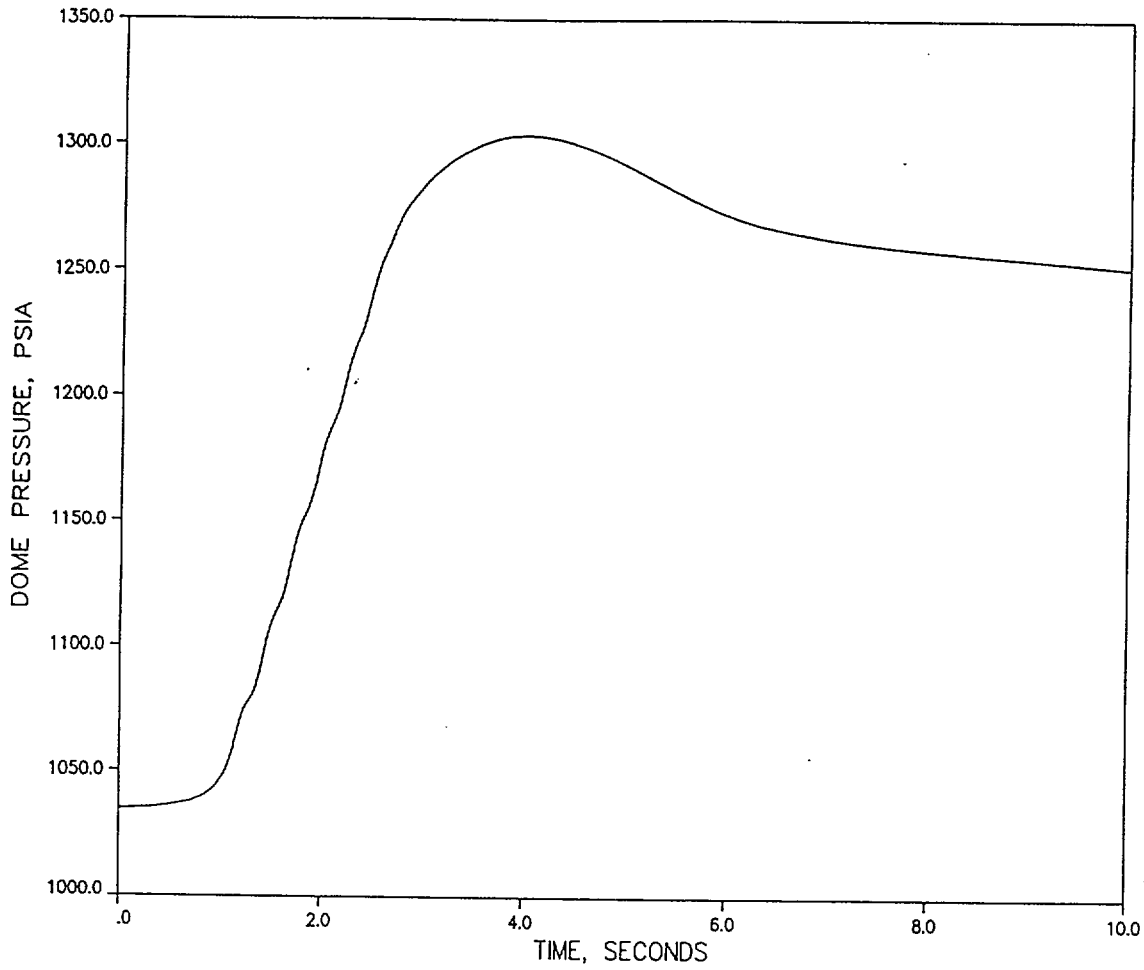


Figure 8.4 Overpressurization Event at 102/105 - MSIV Closure Dome Pressure

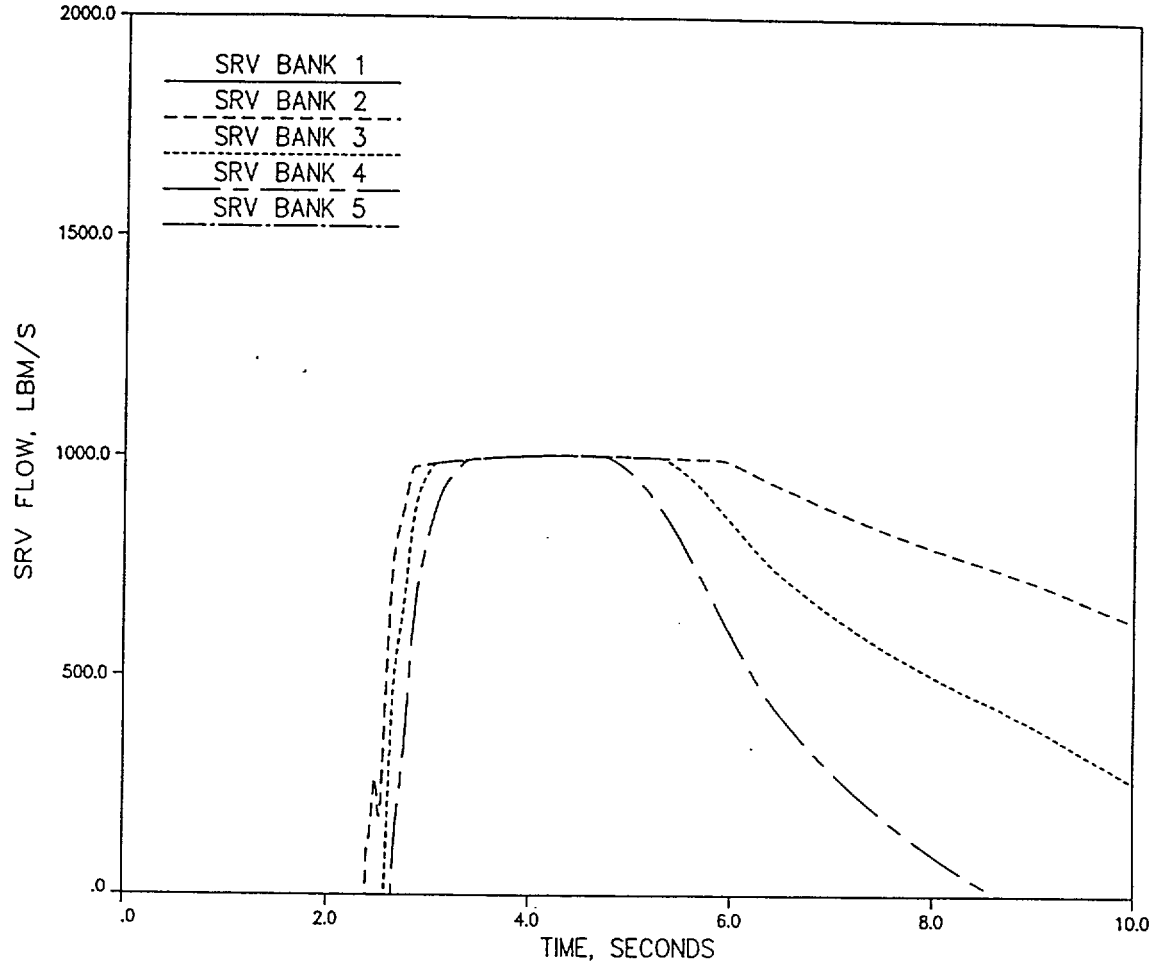


Figure 8.5 Overpressurization Event at 102/105 - MSIV Closure Safety/Relief Valve Flow Rates

9.0 Postulated Accidents

9.1 *LOCA*

The LOCA results presented in References 1, 6, and 7 are based on a rated core power of 3722 MWt, which is greater than 102% of the planned power uprate to 3489 MWt. Therefore, the LOCA analysis results and conclusions provided in References 1, 6, and 7 are applicable to the L2C8 mid-cycle power uprate.

9.2 *Control Rod Drop Accident*

The control rod drop accident has been evaluated for the mid-cycle 5% power uprate. The results of this evaluation are bound by the results presented in Reference 1.

9.3 *Spent Fuel Cask Drop Accident*

The spent fuel cask drop accident has been evaluated for the mid-cycle 5% power uprate. The results of this evaluation indicate the conclusions presented in Reference 1 remain applicable.