

Administrative Technical Requirements

Appendix A

LaSalle Unit 1 Cycle 8

Core Operating Limits Report

March 1996

L1C8 Core Operating Limits Report

Issuance of Changes Summary

Affected Section	Affected Pages	Summary of Changes	Date
All	All	Original Issue (Cycle 8)	3/96

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References

1. Commonwealth Edison Company Docket No. 50-373, LaSalle County Station, Unit 1 Facility Operating License, License No. NPF-11.
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. Supplemental Reload License Submittal for LaSalle County Station Unit 1 Reload 7 Cycle 8, Rev. 0, December 1995.
4. Neutronics Licensing Report for LaSalle Unit 1 Reload 7, Cycle 8, BND:95-163, December 7, 1995.
5. LaSalle County Station, Units 1 and 2, SAFER/GESTR LOCA Loss-of-Coolant-Accident Analysis, NEDC, 32258P, October 1993 (latest approved revision).
6. General Electric Standard Application for Reactor Fuel (GESTAR), NEDE-24011-P-A (latest approved version).
7. Extended Operating Domain and Equipment Out-of-Service for LaSalle County Station Units 1 and 2, NEDE-31455 (latest approved version).
8. Equipment Out-of-Service in the Increased Core Flow Domain for LaSalle County Station Units 1 and 2, GE-NE-187-62-1191 (latest approved version).
9. Evaluation of a Postulated Slow Turbine Control Valve Closure Event for LaSalle County Station, Unit 1 and 2, GE-NE-187-13-0792, February, 1993.
10. ARTS Improvement Program Analysis for LaSalle Units 1 and 2, NEDC-31531P, December 1993.
11. Letter from Hoa Hoang (GE) to Dave Henry (ComEd), "LaSalle Recirculation Pump Trip Out-of-Service with Feedwater Temperature Reduction," February 7, 1995.
12. Analysis of EFPC Coastdown With Load Following for LaSalle 1 and 2, GENE-637-016-0693, June, 1993.
13. GE document, DRF AOO-05525, "Safety Evaluation for Feedwater Temperature Variation at LaSalle County Station Units 1 and 2", February 8, 1993.
14. Letter from R. W. Tsai (ComEd, Nuclear Fuel Services) to D. A. Henry (ComEd, LaSalle Station), "LaSalle Units 1 and 2 Operating Limits with Multiple Equipment Out-of-Service (EOOS)", April 6, 1995.
15. Lattice-Dependent MAPLHGR Report for LaSalle County Station Unit 1 Reload 6 Cycle 7, 23A7231AA, Rev. 0, December 1993. (Reloaded exposed fuel only)
16. Lattice-Dependent MAPLHGR Report for LaSalle County Station Unit 1 Reload 7 Cycle 8, 24A5180AA, Rev. 0, December 1995. (New fuel only)

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

1.1 Tech Spec Reference:

Tech Spec 3.2.1

1.2 Description:

The MAPLHGR Limit is the product of the Fuel-Type MAPLHGR Limit and the minimum of either the power dependent MAPLHGR Factor, $MAPFAC_P$ or the flow dependent MAPLHGR Factor, $MAPFAC_F$. The Fuel-Type Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limits are determined from the tables listed below. $MAPFAC_P$ is determined from Figure 1.2-1 and $MAPFAC_F$ is determined from Figure 1.2-2. Below 30% power, two $MAPFAC_P$ curves are given, one for core flow greater than 50% and one for core flow equal to or less than 50%.

Table for Fuel-Type MAPLHGR Limits	Fuel Type	Cycle First Inserted	Number of Bundles
1.2-1	GE9B-P8CWB303-9GZ-100M-150-T	5	108
1.2-2	GE9B-P8CWB313-9GZ-100M-150-CECO	6	128
1.2-3	GE9B-P8CWB314-9GZ-100M-150-CECO	6	72
1.2-4	GE9B-P8CWB322-11GZ-100M-150-CECO	7	104
1.2-5	GE9B-P8CWB320-9GZ-100M-150-CECO	7	104
1.2-6	GE9B-P8CWB343-12GZ-80M-150-CECO	8	104
1.2-7	GE9B-P8CWB342-10GZ-80M-150-CECO	8	144

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Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) vs.
Average Planar Exposure for Fuel Type
GE9B-P8CWB303-9GZ-100M-150-T

Table 1.2-1

CMC Bundle Type 10

Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)				
	P8CWL071 NOG	P8CWL327 9G5.0	P8CWL338 4G5.0/5G4.0	P8CWL327 4G5.0/5G4.0	P8CWL071 9GE
0	12.74	11.98	11.35	12.01	12.74
200	12.67	12.05	11.39	12.08	12.67
1000	12.48	12.17	11.48	12.22	12.48
2000	12.42	12.37	11.67	12.43	12.42
3000	12.41	12.56	11.90	12.61	12.41
4000	12.44	12.69	12.16	12.78	12.44
5000	12.46	12.81	12.38	12.91	12.46
6000	12.49	12.92	12.58	13.03	12.49
7000	12.51	13.04	12.75	13.15	12.51
8000	12.54	13.16	12.94	13.27	12.54
9000	12.55	13.29	13.13	13.37	12.55
10000	12.57	13.41	13.29	13.47	12.57
12500	12.41	13.49	13.33	13.51	12.41
15000	12.04	13.18	13.05	13.20	12.04
20000	11.27	12.54	12.46	12.55	11.27
25000	10.49	11.84	11.87	11.84	10.49
35000	8.95	10.35	10.54	10.36	8.95
45000	6.15	9.02	9.14	9.02	6.15
46850	5.21	-	-	-	5.21
51460	-	-	5.90	-	-
51790	-	5.82	-	-	-
51850	-	-	-	5.81	-
CMC Lattice Type	28	21	22	23	24
Lattice No.	733	884	885	886	887

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

Table 1.2-2

CMC Bundle Type 11

Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)					
	P8CWL071 NOG	P8CWL339 7G4.0	P8CWL350 2G4.0/5G3.0	P8CWL350 4G4.0/5G3.0	P8CWL339 2G4.0/5G3.0	P8CWL071 9GE
0	12.74	12.34	11.79	11.32	12.35	12.74
200	12.67	12.39	11.84	11.40	12.40	12.67
1000	12.48	12.49	11.96	11.55	12.52	12.48
2000	12.42	12.63	12.12	11.73	12.68	12.42
3000	12.41	12.74	12.28	11.92	12.83	12.41
4000	12.44	12.85	12.40	12.11	12.96	12.44
5000	12.46	12.97	12.49	12.27	13.10	12.46
6000	12.49	13.10	12.58	12.39	13.19	12.49
7000	12.51	13.22	12.67	12.52	13.29	12.51
8000	12.54	13.34	12.76	12.65	13.37	12.54
9000	12.55	13.38	12.84	12.78	13.45	12.55
10000	12.57	13.38	12.91	12.89	13.41	12.57
12500	12.41	13.36	12.85	12.85	13.36	12.41
15000	12.04	13.01	12.56	12.56	13.01	12.04
20000	11.27	12.34	11.98	11.97	12.33	11.27
25000	10.49	11.69	11.38	11.37	11.69	10.49
35000	8.95	10.46	10.12	10.11	10.46	8.95
45000	6.15	9.12	8.53	8.50	9.13	6.15
46850	5.21	-	-	-	-	5.21
50360	-	-	-	5.84	-	-
50390	-	-	5.85	-	-	-
51860	-	5.84	-	-	-	-
51880	-	-	-	-	5.84	-
CMC Lattice Type	29	30	31	32	33	34
Lattice No.	733	1577	1578	1579	1580	1581

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Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) vs. Average Planar Exposure for Fuel Type GE9B-P8CWB314-9GZ-100M-150-CECO

Table 1.2-3

CMC Bundle Type 12

Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)				
	P8CWL071 NOG	P8CWL339 7G4.0	P8CWL350 7G4.0	P8CWL350 9G4.0	P8CWL071 9GE
0	12.74	12.34	11.77	11.50	12.74
200	12.87	12.39	11.83	11.55	12.87
1000	12.48	12.49	11.94	11.66	12.48
2000	12.42	12.63	12.08	11.80	12.42
3000	12.41	12.74	12.22	11.93	12.41
4000	12.44	12.85	12.37	12.07	12.44
5000	12.46	12.97	12.47	12.20	12.46
6000	12.49	13.10	12.56	12.34	12.49
7000	12.51	13.22	12.65	12.49	12.51
8000	12.54	13.34	12.74	12.64	12.54
9000	12.55	13.38	12.83	12.79	12.55
10000	12.57	13.38	12.90	12.90	12.57
12500	12.41	13.36	12.84	12.84	12.41
15000	12.04	13.01	12.55	12.55	12.04
20000	11.27	12.34	11.97	11.97	11.27
25000	10.49	11.69	11.38	11.38	10.49
35000	8.95	10.46	10.12	10.11	8.95
45000	6.15	9.12	8.51	8.46	6.15
46850	5.21	-	-	-	5.21
50260	-	-	-	5.85	-
50370	-	-	5.84	-	-
51860	-	5.84	-	-	-
CMC Lattice Type	35	36	37	38	39
Lattice No.	733	1577	1582	1583	1584

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

Table 1.2-4

CMC Bundle Type 1

Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)					
	P8CWL071 NOG	P8CWL345 5G5.0/4G4.0	P8CWL382 9G4.0	P8CWL382 2G5.0/9G4.0	P8CWL345 9G4.0	P8CWL071 11GE
0	12.74	12.09	11.65	11.25	12.11	12.74
200	12.67	12.13	11.70	11.32	12.15	12.67
1000	12.48	12.22	11.83	11.46	12.25	12.48
2000	12.42	12.35	12.00	11.61	12.39	12.42
3000	12.41	12.48	12.14	11.77	12.54	12.41
4000	12.44	12.62	12.28	11.94	12.70	12.44
5000	12.46	12.77	12.43	12.11	12.86	12.46
6000	12.49	12.90	12.58	12.29	13.02	12.49
7000	12.51	13.03	12.73	12.46	13.19	12.51
8000	12.54	13.16	12.88	12.64	13.33	12.54
9000	12.55	13.30	13.01	12.82	13.43	12.55
10000	12.57	13.42	13.12	12.98	13.44	12.57
12500	12.41	13.41	13.08	13.04	13.40	12.41
15000	12.04	13.05	12.78	12.77	13.06	12.04
20000	11.27	12.38	12.16	12.16	12.40	11.27
25000	10.49	11.74	11.51	11.51	11.76	10.49
35000	8.95	10.52	10.22	10.22	10.53	8.95
45000	6.15	9.13	8.75	8.68	9.13	6.15
46850	5.21	-	-	-	-	5.21
50680	-	-	-	5.86	-	-
50830	-	-	5.85	-	-	-
51870	-	5.83	-	-	-	-
51910	-	-	-	-	5.83	-
CMC Lattice Type	40	41	42	43	44	45
Lattice No.	733	1817	1818	1819	1820	1821

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

Table 1.2-5

CMC Bundle Type 2

Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)					
	P8CWL071 NOG	P8CWL346 4G5.0/3G4.0	P8CWL358 7G4.0	P8CWL358 2G5.0/7G4.0	P8CWL346 7G4.0	P8CWL071 9GE2
0	12.74	12.05	11.62	11.10	12.09	12.74
200	12.87	12.09	11.64	11.15	12.14	12.67
1000	12.48	12.19	11.73	11.27	12.25	12.48
2000	12.42	12.32	11.86	11.44	12.39	12.42
3000	12.41	12.44	11.99	11.62	12.53	12.41
4000	12.44	12.57	12.13	11.80	12.67	12.44
5000	12.46	12.70	12.27	11.96	12.81	12.46
6000	12.49	12.83	12.42	12.09	12.89	12.49
7000	12.51	12.97	12.54	12.23	12.98	12.51
8000	12.54	13.07	12.62	12.37	13.07	12.54
9000	12.55	13.15	12.70	12.51	13.15	12.55
10000	12.57	13.20	12.77	12.66	13.22	12.57
12500	12.41	13.19	12.70	12.67	13.20	12.41
15000	12.04	12.89	12.40	12.40	12.90	12.04
20000	11.27	12.29	11.82	11.82	12.30	11.27
25000	10.49	11.69	11.25	11.25	11.70	10.49
35000	8.95	10.46	10.07	10.07	10.46	8.95
45000	6.15	9.09	8.35	8.26	9.09	6.15
46850	5.21	-	-	-	-	5.21
49790	-	-	-	5.87	-	-
49990	-	-	5.86	-	-	-
51490	-	-	-	-	5.88	-
51500	-	5.88	-	-	-	-
CMC Lattice Type	46	47	48	49	50	51
Lattice No.	733	1812	1813	1814	1815	1816

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Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) vs.
Average Planar Exposure for Fuel Type
GE9B-P8CWB343-12GZ-80M-150-CECO

Table 1.2-6

CMC Bundle Type 4

Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)				
	P8CWL071 NOG	P8CWL363 10G5.0	P8CWL390 10G5.0	P8CWL390 12G5.0	P8CWL071 12GE
0	12.66	11.69	11.37	10.92	12.66
200	12.59	11.71	11.43	10.99	12.59
1000	12.40	11.78	11.55	11.13	12.40
2000	12.34	11.95	11.72	11.53	12.34
3000	12.34	12.16	11.91	11.54	12.34
4000	12.37	12.40	12.11	11.78	12.37
5000	12.40	12.67	12.32	12.00	12.40
6000	12.43	12.90	12.53	12.24	12.43
7000	12.48	13.05	12.76	12.49	12.48
8000	12.48	13.21	12.98	12.75	12.48
9000	12.50	13.37	13.13	13.01	12.50
10000	12.51	13.54	13.30	13.22	12.51
12500	12.35	13.75	13.60	13.57	12.35
15000	11.98	13.48	13.23	13.21	11.98
20000	11.20	12.71	12.40	12.37	11.20
25000	10.42	11.92	11.60	11.57	10.42
35000	8.87	10.36	10.09	10.08	8.87
45000	6.00	8.95	8.66	8.64	6.00
46610	5.19	-	-	-	5.19
51270	-	-	5.65	-	-
51300	-	-	-	5.63	-
52260	-	5.70	-	-	-
CMC Lattice Type	1	2	3	4	5
Lattice No.	732	2083	2084	2085	2086

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Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) vs.
Average Planar Exposure for Fuel Type
GE9B-P8CWB342-10GZ-80M-150-CECO

Table 1.2-7

CMC Bundle Type 5

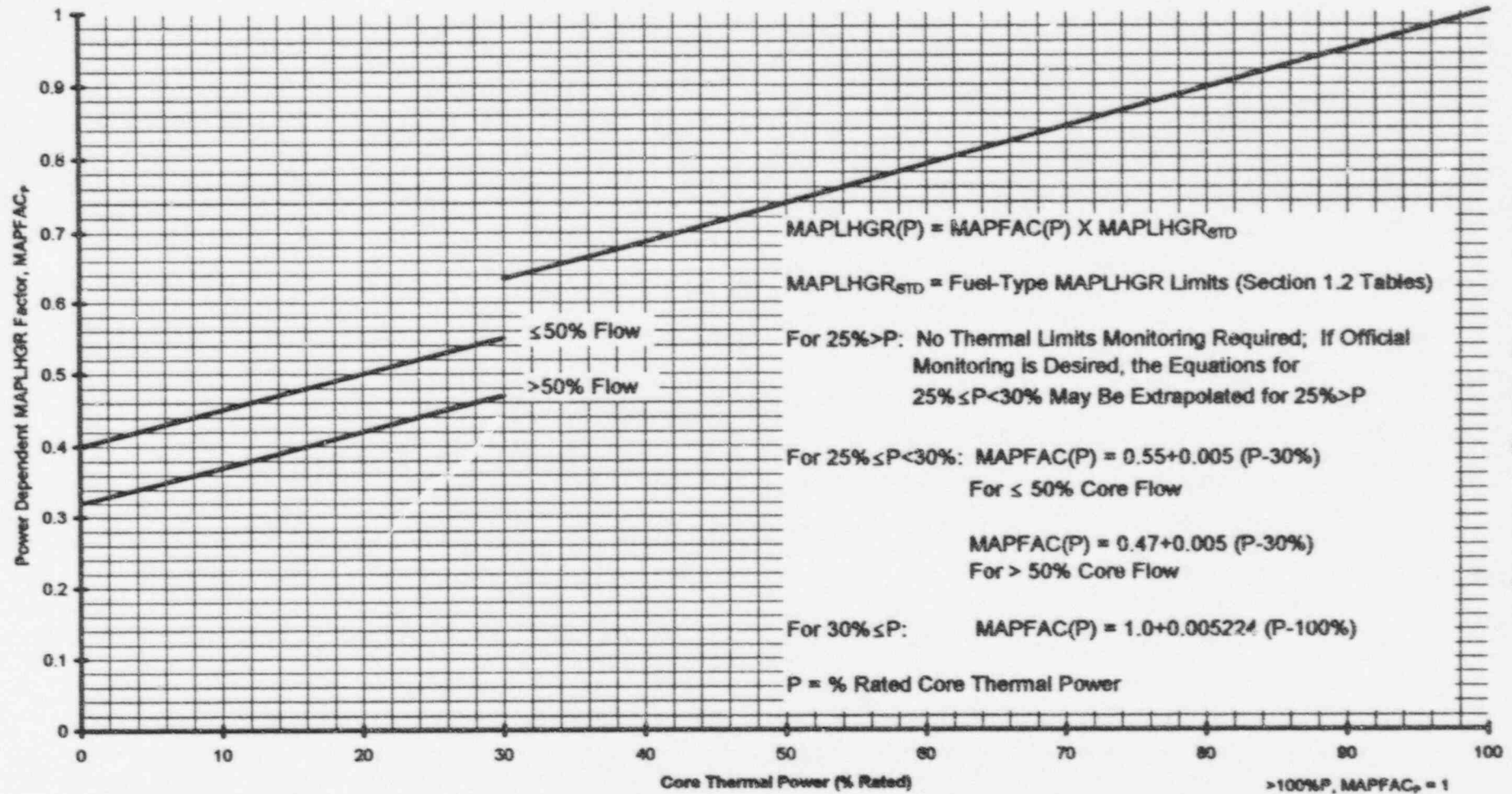
Exposure (MWD/ST)	Lattice Specific MAPLHGR (kw/ft)					
	P8CWL071 NOG	P8CWL363 8G5.0	P8CWL388 8G4.0	P8CWL388 2G5.0/8G4.0	P8CWL363 8G4.0	P8CWL071 10GE
0	12.66	12.04	12.25	11.72	12.09	12.66
200	12.59	12.08	12.28	11.77	12.12	12.59
1000	12.40	12.16	12.35	11.87	12.22	12.40
2000	12.34	12.28	12.45	12.00	12.37	12.34
3000	12.34	12.42	12.55	12.13	12.53	12.34
4000	12.37	12.57	12.65	12.27	12.70	12.37
5000	12.40	12.73	12.76	12.41	12.88	12.40
6000	12.43	12.89	12.87	12.56	13.07	12.43
7000	12.46	13.06	12.98	12.72	13.27	12.46
8000	12.48	13.24	13.10	12.88	13.47	12.48
9000	12.50	13.42	13.21	13.05	13.65	12.50
10000	12.51	13.61	13.31	13.21	13.76	12.51
12500	12.35	13.79	13.35	13.31	13.82	12.35
15000	11.98	13.50	13.06	13.05	13.51	11.98
20000	11.20	12.79	12.47	12.45	12.79	11.20
25000	10.42	11.95	11.67	11.63	11.95	10.42
35000	8.87	10.37	10.08	10.04	10.37	8.87
45000	6.00	8.96	8.66	8.63	8.96	6.00
46610	5.19	-	-	-	-	5.19
51070	-	-	5.69	-	-	-
51180	-	-	-	5.65	-	-
52160	-	5.72	-	-	5.72	-
CMC Lattice Type	6	7	8	9	10	11
Lattice No.	732	2087	2088	2089	2090	2091

Figure 1.2-1: Power-Dependent MAPLHGR Multiplier, MAPFAC_P

LaSalle Unit 1 Cycle 8

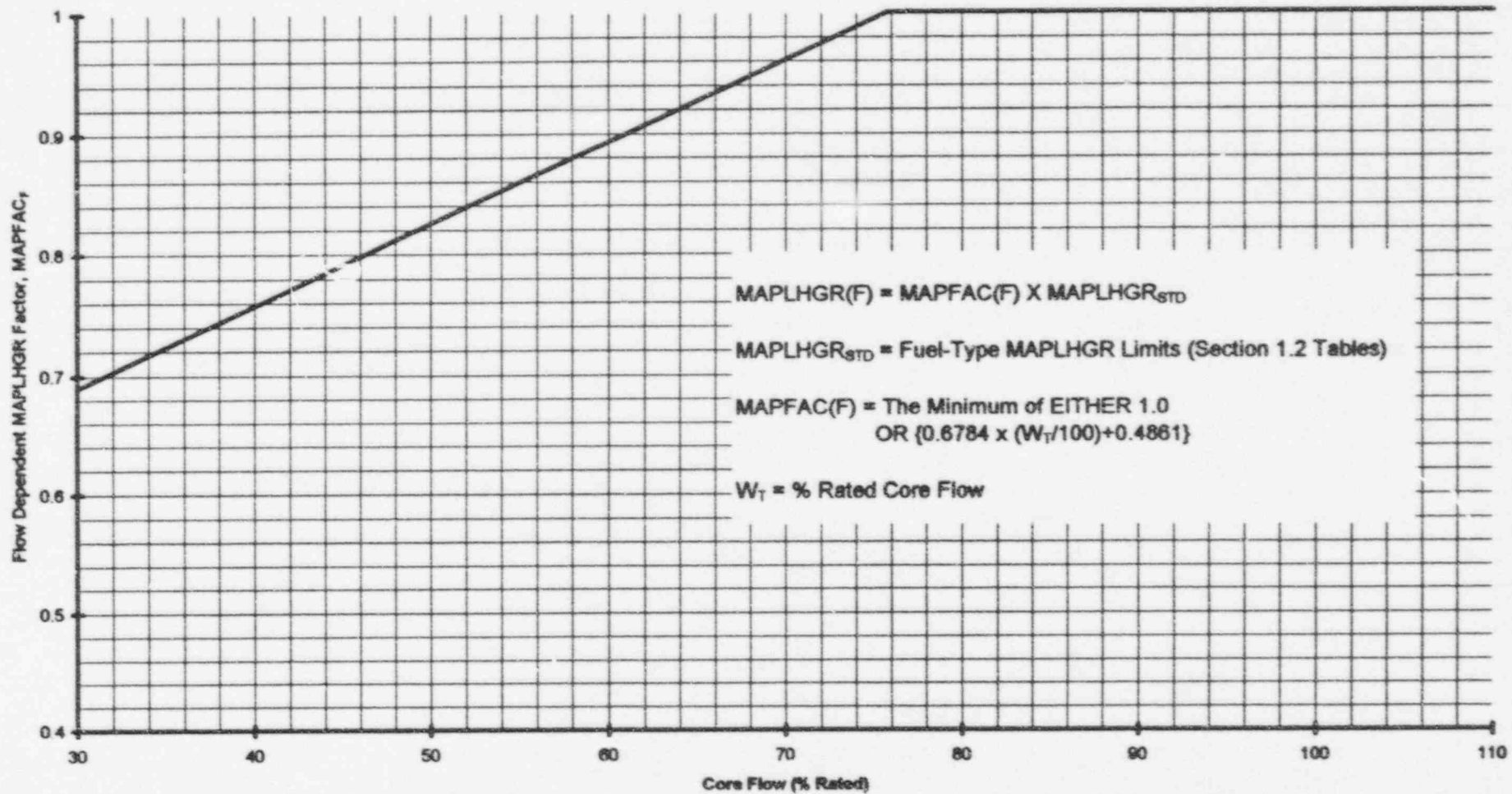
1-9

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Figure 1.2-2: Flow-Dependent MAPLHGR Multiplier, MAPFAC_F



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2.0 Minimum Critical Power Ratio (3/4.2.3)

2.1 Tech Spec Reference:

Tech Spec 3.2.3.

2.2 Description:

A. Manual Flow Control MCPR Limits

The Governing MCPR Operating Limit while in Manual Flow Control is either determined from 2.2.A.1 or 2.2.A.2, whichever is greater at any given power, flow condition.

1. Power-Dependent MCPR ($MCPR_P$)

a. Core Thermal Power $\geq 30\%$:

The $MCPR_P$ limit is the product of the full power MCPR limit (OL_{MCPR}) as a function of τ (determined from Figure 2.2-1* for the applicable operating configuration) and a power-dependent MCPR multiplier (K_P) (determined from Figure 2.2-3/2.2-4, K_P does not change due to EOOS configurations).

b. Core Thermal Power $\geq 25\%$, but $< 30\%$:

The $MCPR_P$ limit is determined from Figure 2.2-3 unless operating with EOOS, then Figure 2.2-4 shall be used to determine the $MCPR_P$ limit. In both figures, two separate curves are given for $MCPR_P$, one for core flow above 50%, and one for core flow equal to or less than 50%.

c. Core Thermal Power $< 25\%$:

No Thermal Limits Monitoring Required.

2. Flow-Dependent MCPR ($MCPR_F$)

Figure 2.2-5 gives the $MCPR_F$ limit as a function of flow. The limits in this figure are applicable for all currently allowed EOOS combinations.

B. Automatic Flow Control MCPR Limits

The Governing MCPR Operating Limit while in Automatic Flow Control is either determined from 2.2.B.1 or 2.2.B.2, whichever is greater at any given power, flow condition.

1. Power-Dependent MCPR ($MCPR_P$)

$MCPR_P$ while in Automatic Flow Control is determined from 2.2.A.1, the same as for Manual Flow Control.

* If, during Unit Coastdown, power operation exceeding the equilibrium power level is desired, then Figure 2.2-2 shall be used.

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2. Flow-Dependent MCPR (MCPR_F)

- a. With Total Core Flow <40% of Rated:

MCPR_F is the value determined by the equation given below:

$$\text{MCPR}_F = [(-0.787) \times (W_T/100) + 1.967] \times [1 + 0.0032 \times (40 - W_T)] + \text{OLMCPR}^* - 1.2$$

- b. With Total Core Flow ≥ 40% but < 100% of Rated:

MCPR_F is the value determined by the equation given below:

$$\text{MCPR}_F = [(-0.787) \times (W_T/100) + 1.967] + \text{OLMCPR}^* - 1.2$$

- c. With Total Core Flow ≥ 100% of Rated:

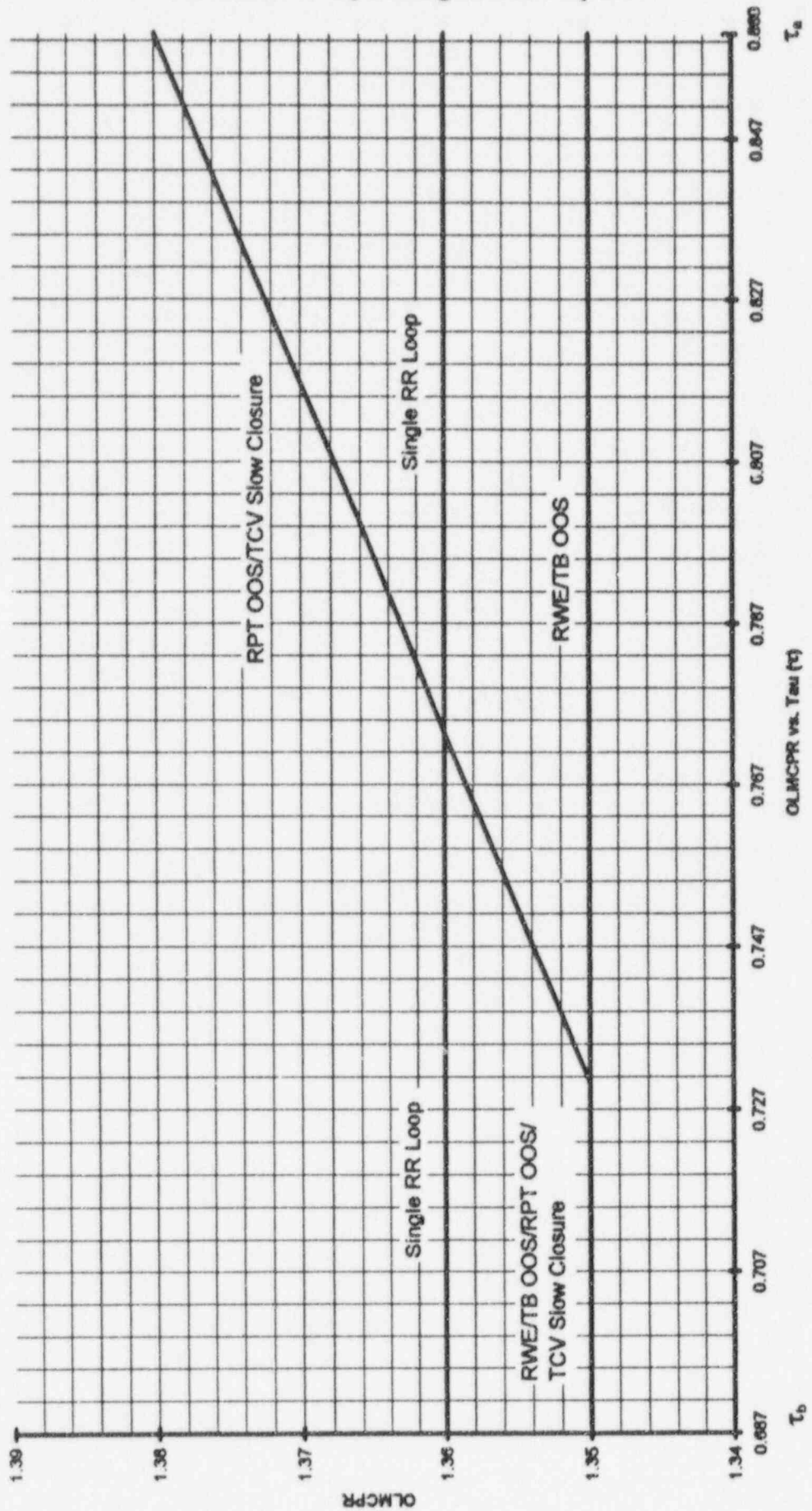
MCPR_F is the full power MCPR Limit (OLMCPR) given in Figure 2.2-1**.

* OLMCPR is the full power MCPR limit determined from Figure 2.2-1.**

** If, during Unit Coastdown, power operation exceeding the equilibrium power level is desired, then Figure 2.2-2 shall be used.

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Figure 2.2-1: Operating Limit MCPR (all fuel types)



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Figure 2.2-2: Operating Limit MCPR (all fuel types) During Coastdown

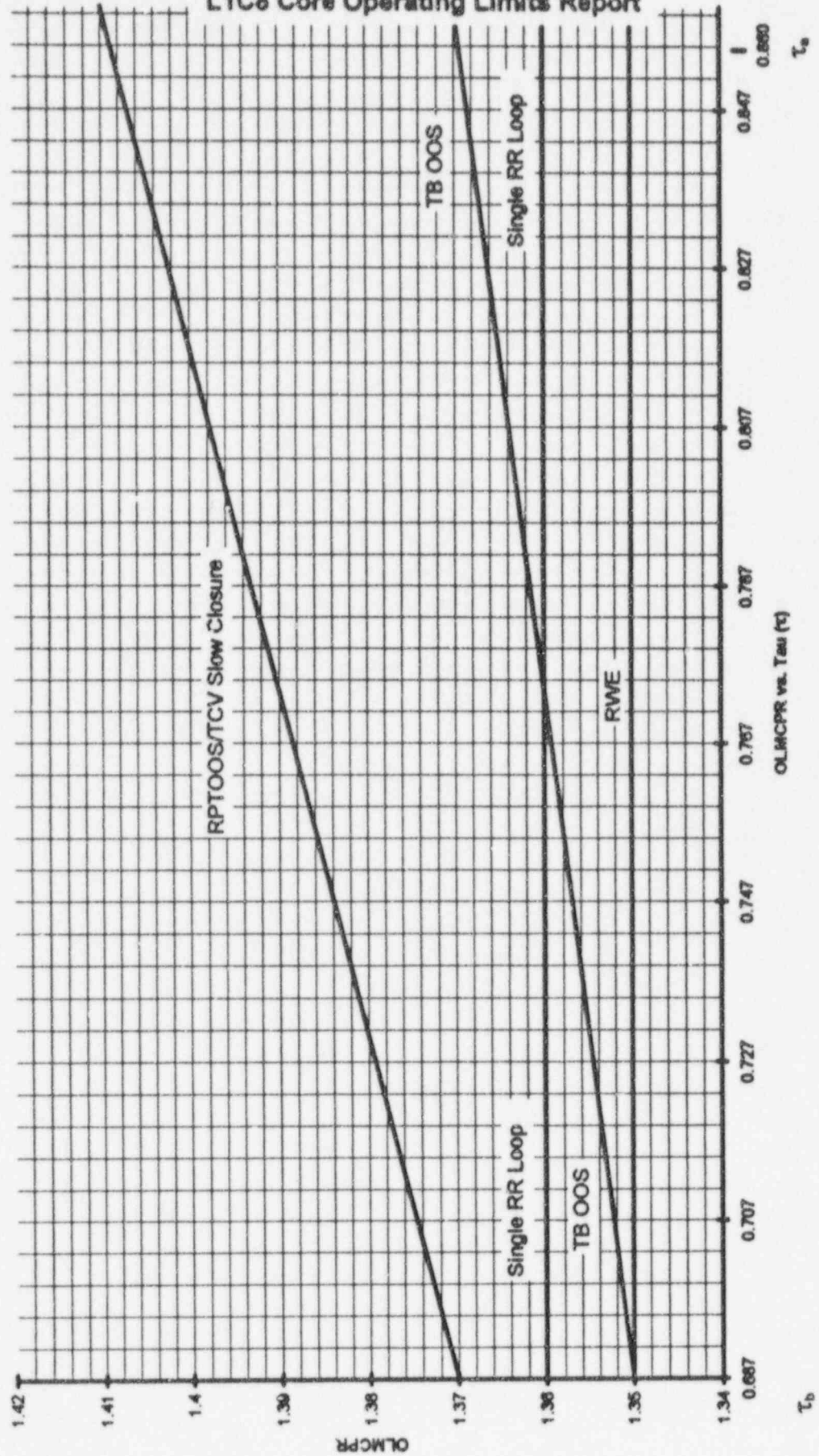


Figure 2.2-3: Power-Dependent MCPR Limits

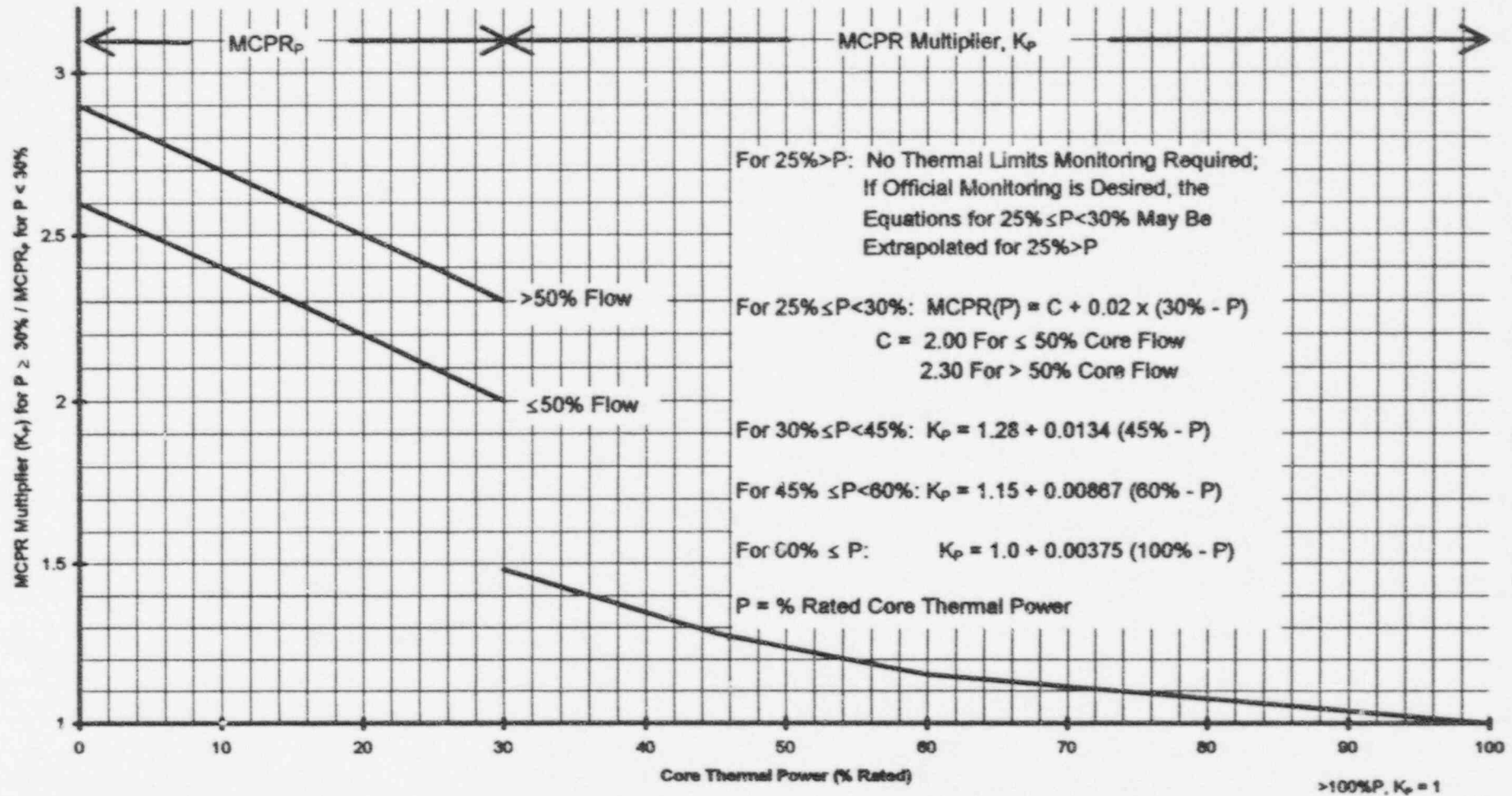


Figure 2.2-4: Power-Dependent MCPR Limits for EOOS Conditions

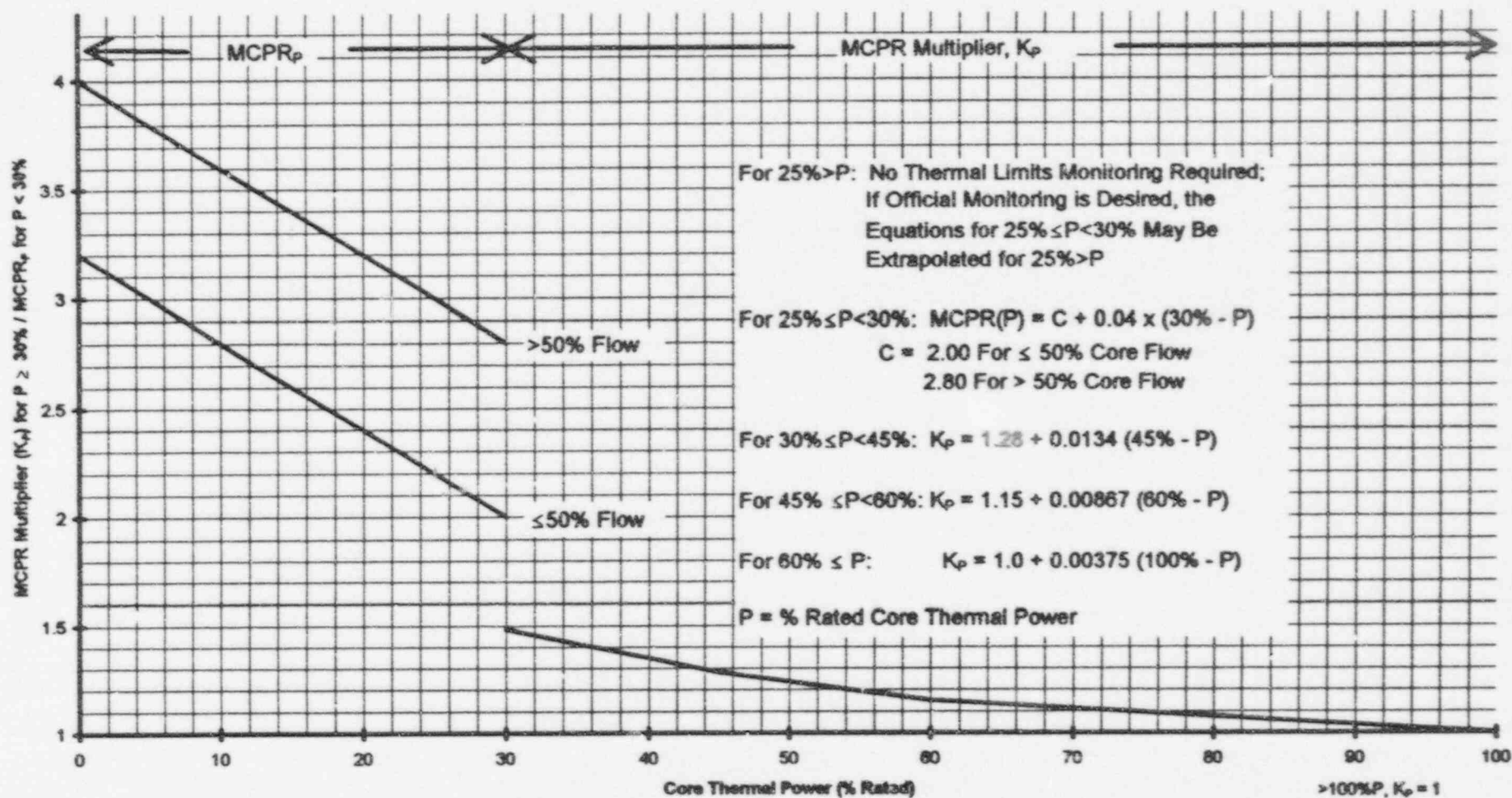


Figure 2.2-5: Manual Flow Control Flow-Dependent MCPR Limit, $MCPR_F$

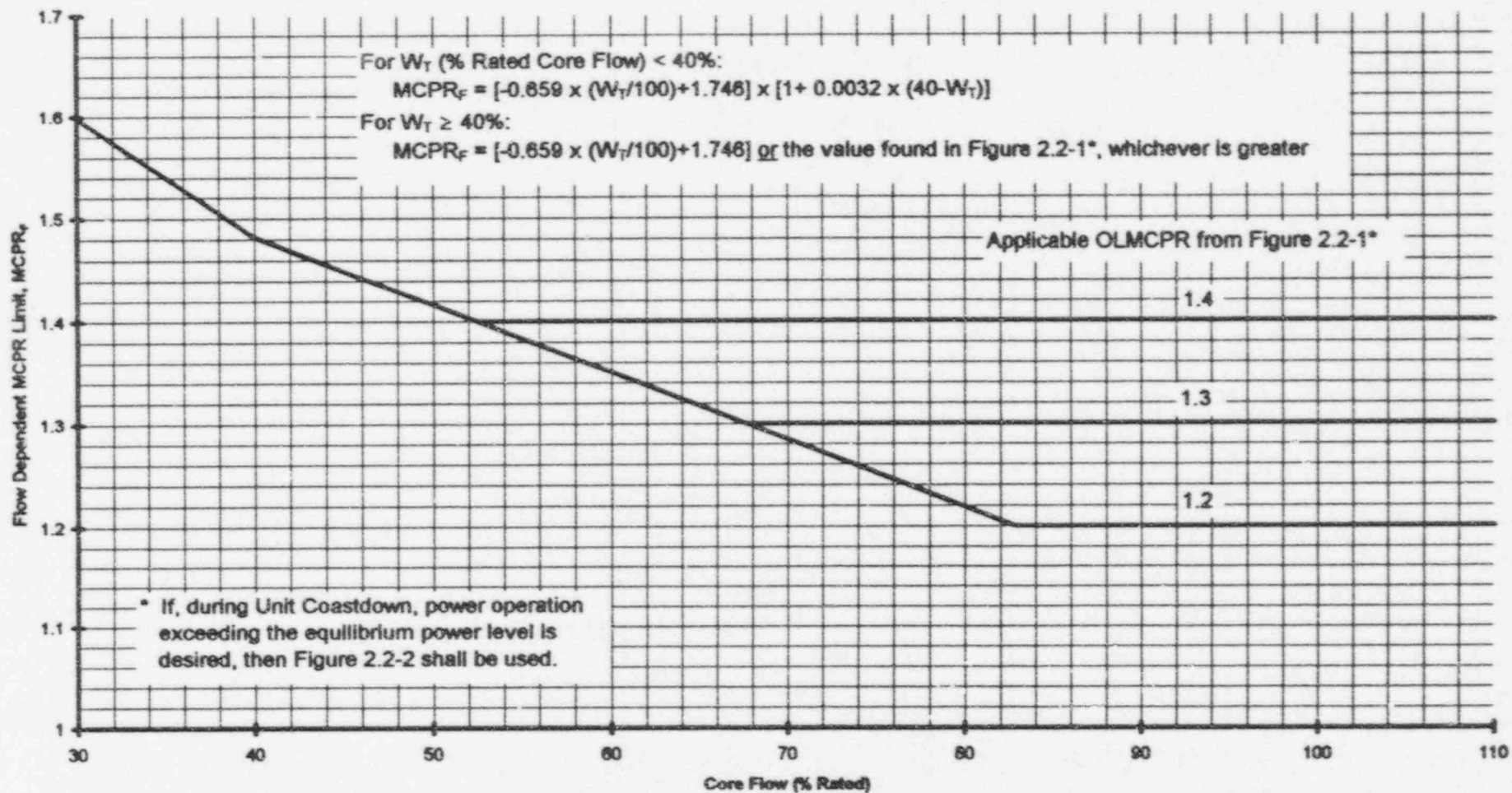
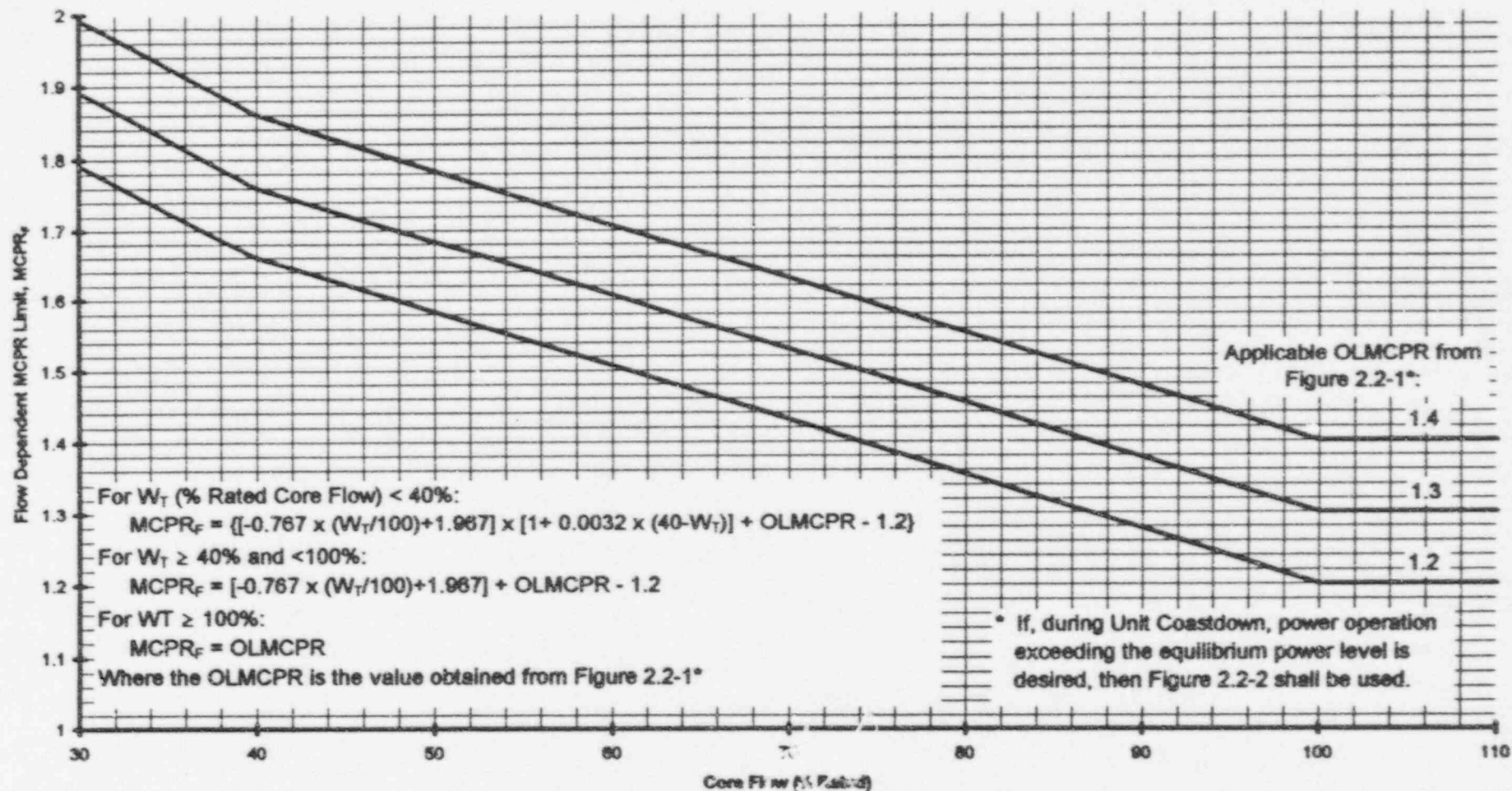


Figure 2.2-6: Automatic Flow Control Flow-Dependent MCPR Limit, $MCPR_F$



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3.0 Linear Heat Generation Rate (3/4.2.4)

3.1 Tech Spec Reference:

Tech Spec 3.2.4.

3.2 Description:

The LHGR Limit is 14.4 kw/ft for fuel types:

1. GE9B-P8CWB333-9GZ-100M-150-T
2. GE9B-P8CWB313-9GZ-100M-150-CECO
3. GE9B-P8CWB314-9GZ-100M-150-CECO
4. GE9B-P8CWB322-11GZ-100M-150-CECO
5. GE9B-P8CWB320-9GZ-100M-150-CECO
6. GE9B-P8CWB343-12GZ-80M-150-CECO
7. GE9B-P8CWB342-10GZ-80M-150-CECO

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4.0 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:

<u>ROD BLOCK MONITOR UPSCALE TRIP FUNCTION</u>	<u>TRIP SETPOINT</u>	<u>ALLOWABLE VALUE</u>
Two Recirculation Loop Operation*	$\leq 0.66 W + 45\%^{**}$	$\leq 0.66 W + 48\%^{**}$
Single Recirculation Loop Operation*	$\leq 0.66 W + 39.7\%^{**}$	$\leq 0.66 W + 42.7\%^{**}$

* This setpoint may be lower and will still comply with the RWE Analysis.

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

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5.0 Allowed Modes of Operation (B 3/4.2.3)

5.1 Tech Spec Reference:

Tech Spec Bases Section B 3/4.2.3.

5.2 Description:

The Allowed Modes of Operation with combinations of Equipment Out-of-Service are as described in Table 5.1 below.

TABLE 5.1

Inoperable Equipment	MCPR Adjustment Required with Core Thermal Power < 30% per COLR Section 2.07	MCPR Adjustment Required with Core Thermal Power ≥ 30% per COLR Section 2.07	OPERATING REGION			
			Standard	ELLLA	ICF	FFWTR
None	No	No	Yes	Yes	Yes	Yes
One SRV Only	Yes	No	Yes	Yes	Yes	Yes
Feedwater Heater(s)/One SRV*	Yes	No	Yes	No**	Yes	N/A
Turbine Bypass/One SRV	Yes	Yes	Yes	Yes	Yes	Yes
EOC-RPT/TCV Slow Closure/One SRV	Yes	Yes	Yes	Yes	Yes	Yes
EOC-RPT/TCV Slow Closure/One SRV/Feedwater Heater(s)*	Yes	Yes	Yes	No**	Yes	N/A
Single RR Loop/One SRV	Yes	Yes	Yes	Yes	N/A	No

* Up to 100°F Reduction in Feedwater Temperature Allowed with Feedwater Heaters Out-of-Service. Up to 13°F Reduction in Feedwater Temperature Allowed without Feedwater Heaters considered Out-of-Service.

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