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Nine Mile Point Nuclear Station

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October 14, 2004
NMP1L 1871

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Nine Mile Point Unit 1
Docket No. 50-220
License No. DPR-63

Cycle 16 Core Operating Limits Report, Rev. 3

Gentlemen:

Attached is a copy of the Cycle 16 Core Operating Limits Report (COLR), Rev. 3, for Nine Mile Point Unit 1 (NMP1). This revision incorporates adjustments to the Minimum Critical Power Ratio (MCPR) limits. These adjustments were made to address the condition identified in the 10 CFR Part 21 Report submitted to the NRC by GE Nuclear Energy in a letter dated August 24, 2004.

This COLR revision is being submitted pursuant to NMP1 Technical Specification 6.6.5.d.

Very truly yours,

William C Holston

William C. Holston
Manager Engineering Services

WCH/RF/jm
Attachment

cc: Mr. S. J. Collins, NRC Regional Administrator, Region I
Mr. G. K. Hunegs, NRC Senior Resident Inspector
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A001

NINE MILE POINT UNIT 1

CORE OPERATING LIMITS REPORT

Document No.: COLR1-16

Revision 3

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This Controlled Document provides cycle specific core operating limits for use in conjunction with the Nine Mile Point Unit 1 Technical Specifications. Document pages may only be changed through a reissue of the entire document.

CORE OPERATING LIMITS REPORT

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CORE OPERATING LIMITS REPORT

1.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

1.1 Limits for Technical Specification 3.1.7.a(*)

During power operation, the APLHGR for each type of fuel as function of average planar exposure shall not exceed the limiting values shown in Tables 1a through 1e.

1.2 Limits for Technical Specification 3.1.7.e(*)

During partial loop operation with four recirculation loops in operation, the APLHGR as a function of average planar exposure shall not exceed 98 percent of the limiting values shown in Tables 1a through 1e.

During partial loop operation with three recirculation loops in operation, the APLHGR as a function of average planar exposure shall not exceed 98 percent of the limiting values shown in Tables 1a through 1e.

(*) When hand calculations are required, the APLHGR for the respective fuel type as a function of average planar exposure, shall not exceed the limits shown in Table 1f during five recirculation loop operation or 98 percent of the limits shown in Table 1f during four or three loop operation..

2.0 MINIMUM CRITICAL POWER RATIO (MCPR)

2.1 Limits for Technical Specification 3.1.7.c

During power operation, the operating MCPR at rated power and flow shall be greater than or equal to the Operating Limit MCPR of 1.47[1].

For core flows other than rated, the MCPR limit shall be the Operating Limit MCPR identified above times K_f where K_f is as shown in Figure 2a.

If the feedwater pump configuration as defined by Nuclear Engineering Report No. NER-1M-022 is such that a feedwater controller failure could result in maximum feedwater flow greater than that for two feedwater pumps (i.e., the shaft-driven pump plus one motor-driven pump), then the Operating Limit MCPR shall be 1.59.

Conservative limits for operation between 45% and 90% RTP[3] are required for operations without a backup pressure regulator. The MCPR based limit for operation without a backup pressure regulator is as shown in Figure 2b[2][4].

2.2 Limits for Technical Specification 3.1.7.e

During 3 loop operation, the Operating Limit MCPR shall be increased by 0.01.

NOTES:

(1) Based on a 1.09 MCPR Safety Limit (SLCPR).

(2) Based on an Operating Limit MCPR of 1.47.

(3) Below 45% and above 90% RTP no additional limits are required for operation without a backup pressure regulator.

(4) These limits are valid for 3, 4, or 5 loop operation (note that for 3 loop operation the limit for $70\% \leq P < 90\%$ becomes 1.48/FRTP).

3.0 LINEAR HEAT GENERATION RATE (LHGR)

3.1 Limits for Technical Specification 3.1.7.b

During power operation, the Linear Heat Generation Rate (LHGR) of any rod in any fuel assembly at any axial location shall not exceed 11.0 KW/FT.

Conservative limits for operation between 45% and 90% RTP[(1)] are required for operations without a backup pressure regulator. The LHGR based limit for operation without a backup pressure regulator is as shown in Figure 3.

NOTE: (1) Below 45% and above 90% RTP no additional limits are required for operation without a backup pressure regulator.

4.0 POWER/FLOW RELATIONSHIP DURING OPERATION

4.1 Limits for Technical Specification 3.1.7.d and e

The power/flow relationship shall not exceed the limiting values shown in Figure 4.

5.0 REFERENCES FOR TECHNICAL SPECIFICATIONS

Technical Specification 6.6.5.b:
NEDE 24011-P-A, "General Electric Standard Application for Reactor Fuel," U.S. Supplement, Revision 14, June 2000.

6.0 SOURCE DOCUMENTS

The Core Operating Limits contained in this report were obtained from the following documents:

CORE OPERATING LIMITS	REFERENCE
APLHGR Limits (Section 1.0) Table 1a through 1f and corresponding three and four loop multipliers	GE J11-02962MAP, Revision 0, January 1997, Lattice Dependent MAPLHGR Report for Nine Mile Point Nuclear Power Station Unit 1, Reload 14 Cycle 13 GE J11-02962SRLR, Revision 0, January 1997, Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 1 Reload 14 Cycle 13 GNF J11-03785ER, Revision 0, February 2001, Engineering Report for Nine Mile Point Nuclear Station Unit 1 Reload 16 0000-0012-7557ER, Revision 0, March 2003 Engineering Report for Nine Mile Point Nuclear Station Unit 1 Reload 17 EWG-N-04-016, June 23, 2004, NMP-1 Hydrogen/Oxygen Recombination MAPLHGR Setdown, Rev. 1 10 CFR 50.46 Notification Letter, 2003-05, May 13, 2003 (DER NM-2004-2374)
MCPR Limits (Section 2)	0000-0012-7557ER, Revision 0, March 2003 Engineering Report for Nine Mile Point Nuclear Station Unit 1 Reload 17 REK-NMP-EA1-04-066, August 24, 2004, PRC SC04-12 Impact on NMP1 Cycle 16 Safety and Operating Limits
Pressure Regulator Out-of-Service Restriction	GE-NE-J11-03433-16-01-00, "Pressure Regulator Out of Service Calculations for Nine Mile Point Unit 1 Cycle 14", March 2001
LHGR Limits (Section 3)	0000-0012-7557ER, Revision 0, March 2003 Engineering Report for Nine Mile Point Nuclear Station Unit 1 Reload 17
Pressure Regulator Out-of-Service Restriction	GE-NE-J11-03433-16-01-00, "Pressure Regulator Out of Service Calculations for Nine Mile Point Unit 1 Cycle 14", March 2001
Power/Flow Relationship (Section 4)	NMP1 Technical Specification Amendment 92, Figure 3.1.7.aa

Table 1a

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9DUB376-12GZ-100T-145-T-2583 (GE11)

Average Planar Exposure GWd/ST	MAPLHGR Limits (kw/ft)				
	Lattice 5662	Lattice 5663	Lattice 5664	Lattice 5665	Lattice 5666
0.00	9.26	8.47	8.50	9.31	9.77
0.20	9.21	8.51	8.54	9.26	9.75
1.00	9.07	8.58	8.62	9.14	9.67
2.00	9.04	8.69	8.74	9.12	9.66
3.00	9.07	8.80	8.87	9.14	9.69
4.00	9.11	8.93	9.01	9.19	9.73
5.00	9.16	9.07	9.16	9.23	9.77
6.00	9.20	9.17	9.32	9.28	9.75
7.00	9.23	9.24	9.48	9.31	9.71
8.00	9.26	9.31	9.57	9.34	9.68
9.00	9.28	9.39	9.64	9.36	9.64
10.00	9.29	9.47	9.61	9.38	9.61
12.50	9.31	9.57	9.57	9.39	9.57
15.00	9.30	9.53	9.53	9.39	9.53
17.50	8.97	9.53	9.53	9.08	9.53
20.00	8.64	8.88 *	8.88 *	8.75	9.08
25.00	7.98	8.61 *	8.61 *	8.09	8.70
30.00	7.34	8.33	8.40	7.45	8.05
35.00	6.70	7.78	7.85	6.81	7.42
40.00	6.07	7.24	7.29	6.18	6.80
45.00	5.45	6.70	6.72	5.56	6.17
45.02	5.44	--	--	--	--
45.48		--	--	5.50	--
48.07		--	--		5.79
49.34		6.22	--		
49.82			6.10		

NOTE: A "--" indicates that there is no entry for this box and the limit can be determined by linearly interpolating between the previous and next point in each column. MAPLHGRs are interpolated between exposure points for which explicit values are given. The exposure for the last MAPLHGR listed for a lattice is the maximum allowed nodal exposure for that lattice.

* Revised per EWG-N-04-016, NMP-1 Hydrogen/Oxygen Recombination MAPLHGR Setdown, Rev. 1

Table 1b

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9DUB376-12GZ-100T-145-T-2584 (GE11)

Average Planar Exposure GWd/ST	MAPLHGR Limits (kw/ft)				
	Lattice 5662	Lattice 5663	Lattice 5667	Lattice 5665	Lattice 5666
0.00	9.26	8.47	8.54	9.31	9.77
0.20	9.21	8.51	8.58	9.26	9.75
1.00	9.07	8.58	8.67	9.14	9.67
2.00	9.04	8.69	8.81	9.12	9.66
3.00	9.07	8.80	8.97	9.14	9.69
4.00	9.11	8.93	9.13	9.19	9.73
5.00	9.16	9.07	9.31	9.23	9.70
6.00	9.20	9.17	9.41	9.28	9.69
7.00	9.23	9.24	9.47	9.31	9.69
8.00	9.26	9.31	9.55	9.34	9.68
9.00	9.28	9.39	9.64	9.36	9.68
10.00	9.29	9.47	9.67	9.38	9.67
12.50	9.31	9.60	9.60	9.39	9.60
15.00	9.30	9.53	9.53	9.39	9.53
17.50	8.97	9.53	9.53	9.08	9.53
20.00	8.64	8.88 *	8.88 *	8.75	9.08
25.00	7.98	8.61 *	8.61 *	8.09	8.70
30.00	7.34	8.33	8.41	7.45	8.05
35.00	6.70	7.78	7.74	6.81	7.42
40.00	6.07	7.24	7.11	6.18	6.80
45.00	5.45	6.70	6.52	5.56	6.17
45.02	5.44	--	--	--	--
45.48		--	--	5.50	--
48.07		--	--		5.79
49.34		6.22	--		
49.83			5.99		

NOTE: A "--" indicates that there is no entry for this box and the limit can be determined by linearly interpolating between the previous and next point in each column. MAPLHGRs are interpolated between exposure points for which explicit values are given. The exposure for the last MAPLHGR listed for a lattice is the maximum allowed nodal exposure for that lattice.

* Revised per EWG-N-04-016, NMP-1 Hydrogen/Oxygen Recombination MAPLHGR Setdown, Rev. 1

Table 1c

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9DUB362-13GZ-100T-145-T-2414 (GE11)

Average Planar Exposure GWd/ST	MAPLHGR Limits (kw/ft)					
	Lattice 8047	Lattice 8048	Lattice 8049	Lattice 8050	Lattice 8051	Lattice 8052
0.00	8.80	8.66	8.79	8.64	8.80	8.80
0.20	8.82	8.71	8.82	8.67	8.82	8.82
1.00	8.89	8.79	8.89	8.74	8.89	8.89
2.00	8.97	8.90	8.97	8.82	8.97	8.97
3.00	9.06	9.01	9.05	8.91	9.06	9.06
4.00	9.11	9.12	9.13	9.00	9.14	9.14
5.00	9.16	9.20	9.22	9.09	9.22	9.22
6.00	9.20	9.29	9.29	9.19	9.28	9.29
7.00	9.23	9.36	9.36	9.29	9.31	9.36
8.00	9.26	9.42	9.42	9.40	9.34	9.42
9.00	9.28	9.49	9.49	9.49	9.36	9.49
10.00	9.29	9.56	9.56	9.56	9.38	9.56
12.50	9.31	9.53	9.53	9.53	9.39	9.53
15.00	9.30	9.50	9.50	9.50	9.39	9.50
17.50	8.97	9.49	9.49	9.49	9.08	9.49
20.00	8.64	9.44	9.44	9.33	8.75	9.43
25.00	7.98	8.58 *	8.58 *	8.58 *	8.09	8.76
30.00	7.34	8.32	8.32	8.20	7.45	8.14
35.00	6.70	7.76	7.76	7.64	6.81	7.51
40.00	6.07	7.20	7.20	7.11	6.18	6.88
45.00	5.45	6.64	6.64	6.53	5.56	6.26
45.02	5.44	--	--	--	--	--
45.48		--	--	--	5.50	--
48.44		--	--	--		5.83
48.78		--	--	6.17		
49.20		--	6.19			
49.25		6.18				

NOTE: A "--" indicates that there is no entry for this box and the limit can be determined by linearly interpolating between the previous and next point in each column. MAPLHGRs are interpolated between exposure points for which explicit values are given. The exposure for the last MAPLHGR listed for a lattice is the maximum allowed nodal exposure for that lattice.

* Revised per EWG-N-04-016, NMP-1 Hydrogen/Oxygen Recombination MAPLHGR Setdown, Rev. 1

Table 1d

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9DUB340-12GZ1-100T-145-T (GE11)

Average Planar Exposure GWd/ST	MAPLHGR Limits (kw/ft)					
	Lattice 2361	Lattice 2419	Lattice 2420	Lattice 2364	Lattice 2366	Lattice 2367
0.00	9.28	8.39	8.53	8.45	9.34	9.79
0.20	9.23	8.42	8.55	8.49	9.29	9.77
1.00	9.10	8.48	8.60	8.60	9.16	9.69
2.00	9.07	8.62	8.73	8.75	9.14	9.68
3.00	9.10	8.75	8.90	8.92	9.17	9.71
4.00	9.14	8.84	8.98	9.09	9.21	9.75
5.00	9.18	8.94	9.06	9.20	9.26	9.79
6.00	9.22	9.02	9.14	9.29	9.30	9.82
7.00	9.26	9.10	9.21	9.37	9.34	9.85
8.00	9.28	9.19	9.28	9.45	9.36	9.87
9.00	9.30	9.27	9.34	9.51	9.38	9.89
10.00	9.32	9.34	9.40	9.55	9.40	9.90
12.50	9.33	9.44	9.44	9.41	9.42	9.90
15.00	9.32	9.45	9.45	9.47	9.41	9.89
17.50	9.00	9.18	9.18	9.29	9.11	9.70
20.00	8.67	8.90	8.91	9.00	8.77	9.37
25.00	8.01	8.35	8.36	8.42	8.12	8.71
30.00	7.37	7.82	7.83	7.88	7.48	8.07
35.00	6.73	7.31	7.31	7.36	6.84	7.44
40.00	6.10	6.80	6.81	6.84	6.21	6.82
45.00	5.48	6.29	6.30	6.33	5.59	6.19
45.18	5.45	--	--	--	--	--
45.64		--	--	--	5.51	--
47.13		6.07	--	--		--
47.21			6.07	--		--
47.77				6.05		--
48.19						5.79

NOTE: A "--" indicates that there is no entry for this box and the limit can be determined by linearly interpolating between the previous and next point in each column. MAPLHGRs are interpolated between exposure points for which explicit values are given. The exposure for the last MAPLHGR listed for a lattice is the maximum allowed nodal exposure for that lattice.

Table 1e

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9DUB339-12GZ-100T-145-T-2334 (GE11)

Average Planar Exposure GWd/ST	MAPLHGR Limits (kw/ft)					
	Lattice 2718	Lattice 2719	Lattice 2720	Lattice 2721	Lattice 2722	Lattice 2723
0.00	8.88	8.72	8.85	8.60	8.88	8.88
0.20	8.90	8.75	8.90	8.65	8.90	8.90
1.00	8.96	8.81	8.96	8.76	8.96	8.96
2.00	9.04	8.88	9.03	8.92	9.05	9.05
3.00	9.07	8.96	9.10	9.08	9.14	9.14
4.00	9.11	9.04	9.17	9.23	9.19	9.23
5.00	9.16	9.12	9.24	9.32	9.23	9.32
6.00	9.20	9.20	9.32	9.39	9.28	9.39
7.00	9.23	9.29	9.39	9.46	9.31	9.46
8.00	9.26	9.38	9.47	9.52	9.34	9.52
9.00	9.28	9.47	9.55	9.59	9.36	9.59
10.00	9.29	9.56	9.63	9.66	9.38	9.66
12.50	9.31	9.62	9.62	9.62	9.39	9.62
15.00	9.30	9.57	9.57	9.57	9.39	9.57
17.50	8.97	9.33	9.33	9.33	9.08	9.33
20.00	8.64	8.64 *	8.64 *	8.64 *	8.75	8.85
25.00	7.98	8.46 *	8.46 *	8.46 *	8.09	8.68
30.00	7.34	8.18 *	8.18 *	8.18 *	7.45	8.05
35.00	6.70	7.72	7.73	7.90	6.81	7.42
40.00	6.07	7.23	7.24	7.33	6.18	6.80
45.00	5.45	6.76	6.76	6.79	5.56	6.17
45.02	5.44	--	--	--	--	--
45.48		--	--	--	5.50	--
48.07		--	--	--		5.79
49.70		6.28	--	--		
49.75			6.28	--		
50.00				6.28		

NOTE: A "--" indicates that there is no entry for this box and the limit can be determined by linearly interpolating between the previous and next point in each column. MAPLHGRs are interpolated between exposure points for which explicit values are given. The exposure for the last MAPLHGR listed for a lattice is the maximum allowed nodal exposure for that lattice.

* Revised per EWG-N-04-016, NMP-1 Hydrogen/Oxygen Recombination MAPLHGR Setdown, Rev. 1

Table 1f
Most Limiting MAPLHGR vs. Average Planar Exposure

Average Planar Exposure (GWd/ST)	MAPLHGR Limits (kw/ft)				
	P9DUB339	P9DUB362	P9DUB340	P9DUB376 (2583)	P9DUB376 (2584)
0.00	8.60	8.64	8.39	8.47	8.47
0.20	8.65	8.67	8.42	8.51	8.51
1.00	8.76	8.74	8.48	8.58	8.58
2.00	8.88	8.82	8.62	8.69	8.69
3.00	8.96	8.91	8.75	8.80	8.80
4.00	9.04	9.00	8.84	8.93	8.93
5.00	9.12	9.09	8.94	9.07	9.07
6.00	9.20	9.19	9.02	9.17	9.17
7.00	9.29	9.29	9.10	9.24	9.24
8.00	9.38	9.40	9.19	9.31	9.31
9.00	9.47	9.49	9.27	9.39	9.39
10.00	9.56	9.56	9.34	9.47	9.47
12.50	9.62	9.53	9.41	9.57	9.60
15.00	9.57	9.50	9.45	9.53	9.53
17.50	9.33	9.49	9.18	9.53	9.53
20.00	8.64 *	9.33	8.90	8.88 *	8.88 *
25.00	8.46 *	8.58 *	8.35	8.61 *	8.61 *
30.00	8.18 *	8.20	7.82	8.33	8.33
35.00	7.72	7.64	7.31	7.78	7.74
40.00	7.23	7.11	6.80	7.24	7.11
45.00	6.76	6.53	6.29	6.70	6.52
47.13	--	--	6.07	--	--
47.16	--	--		--	--
48.78	--	6.17		--	--
49.34	--			6.16	6.04
49.82	--				
49.83	--				
49.70	6.28				

NOTE: A "--" indicates that there is no entry for this box and the limit can be determined by linearly interpolating between the previous and next point in each column. MAPLHGRs are interpolated between exposure points for which explicit values are given. The exposure for the last MAPLHGR listed for a lattice is the maximum allowed nodal exposure for that lattice.

* Revised per EWG-N-04-016, NMP-1 Hydrogen/Oxygen Recombination MAPLHGR Setdown, Rev. 1

Figure 2a NMP-1 K(f) Curve for MCPR

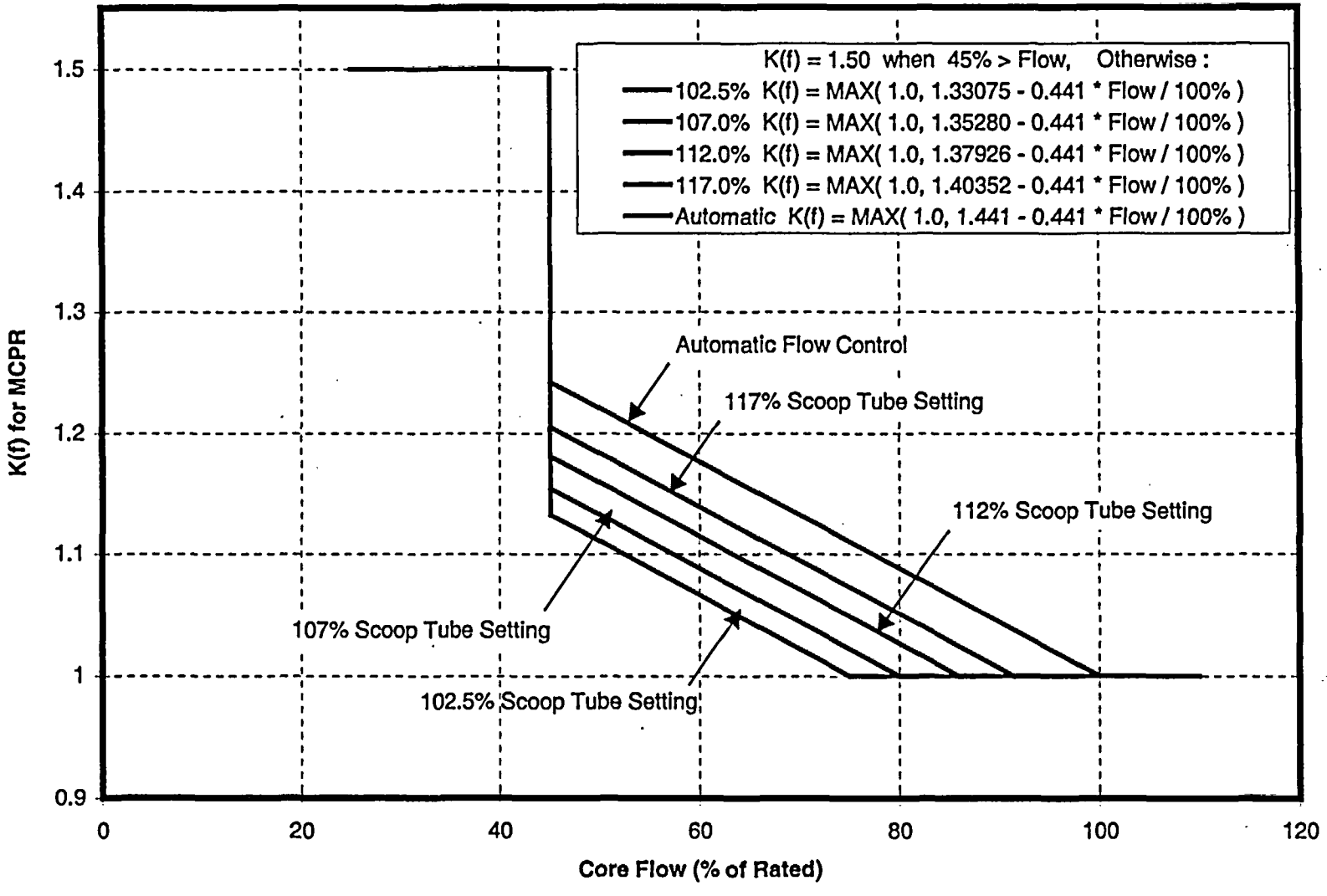

Figure 2b: MCPR Limits for Operation Between 45% and 90% RTP Without a Backup Pressure Regulator

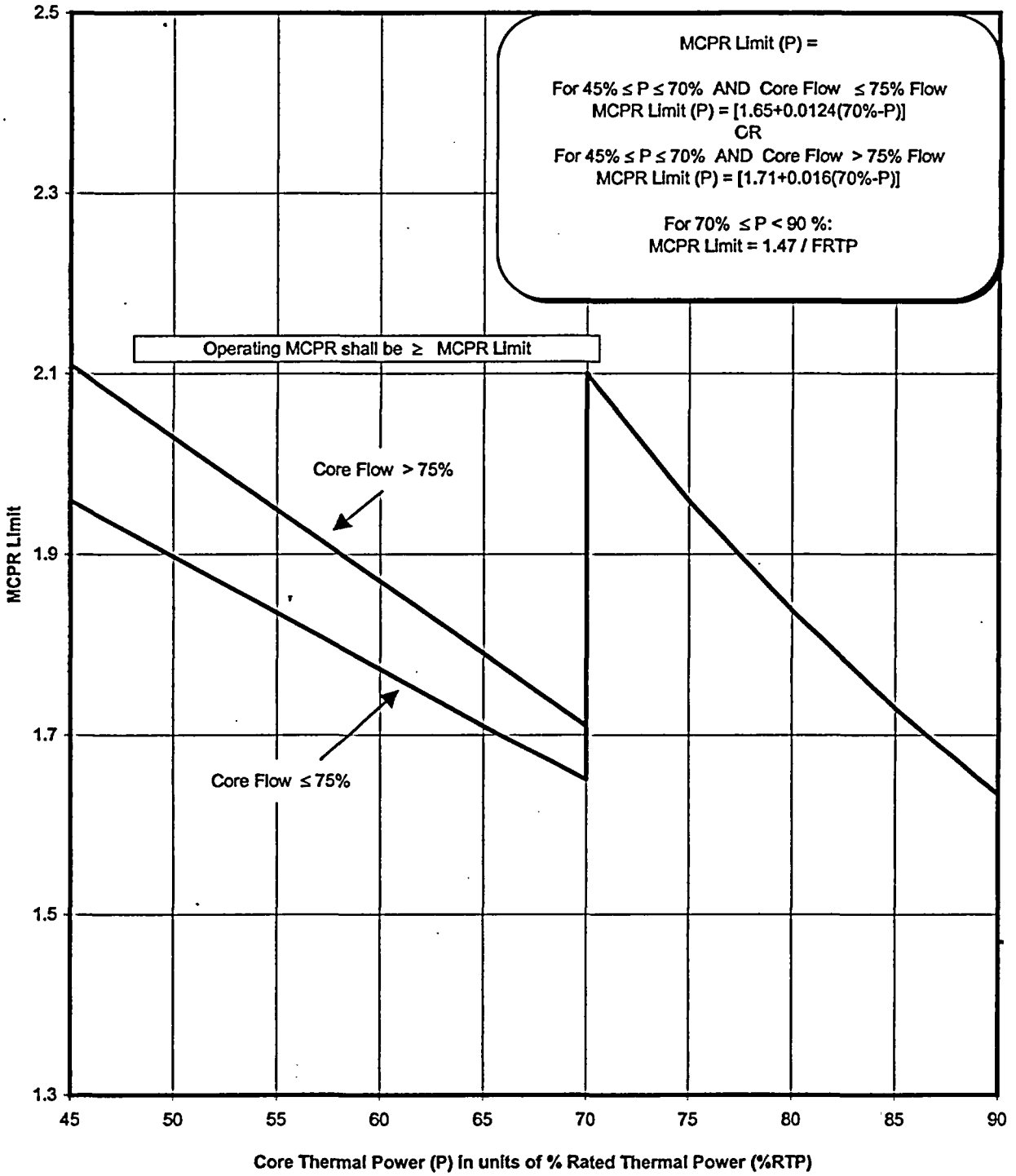

Figure 3: LHGR Limits for Operation Between 45% and 90% RTP Without a Backup Pressure Regulator

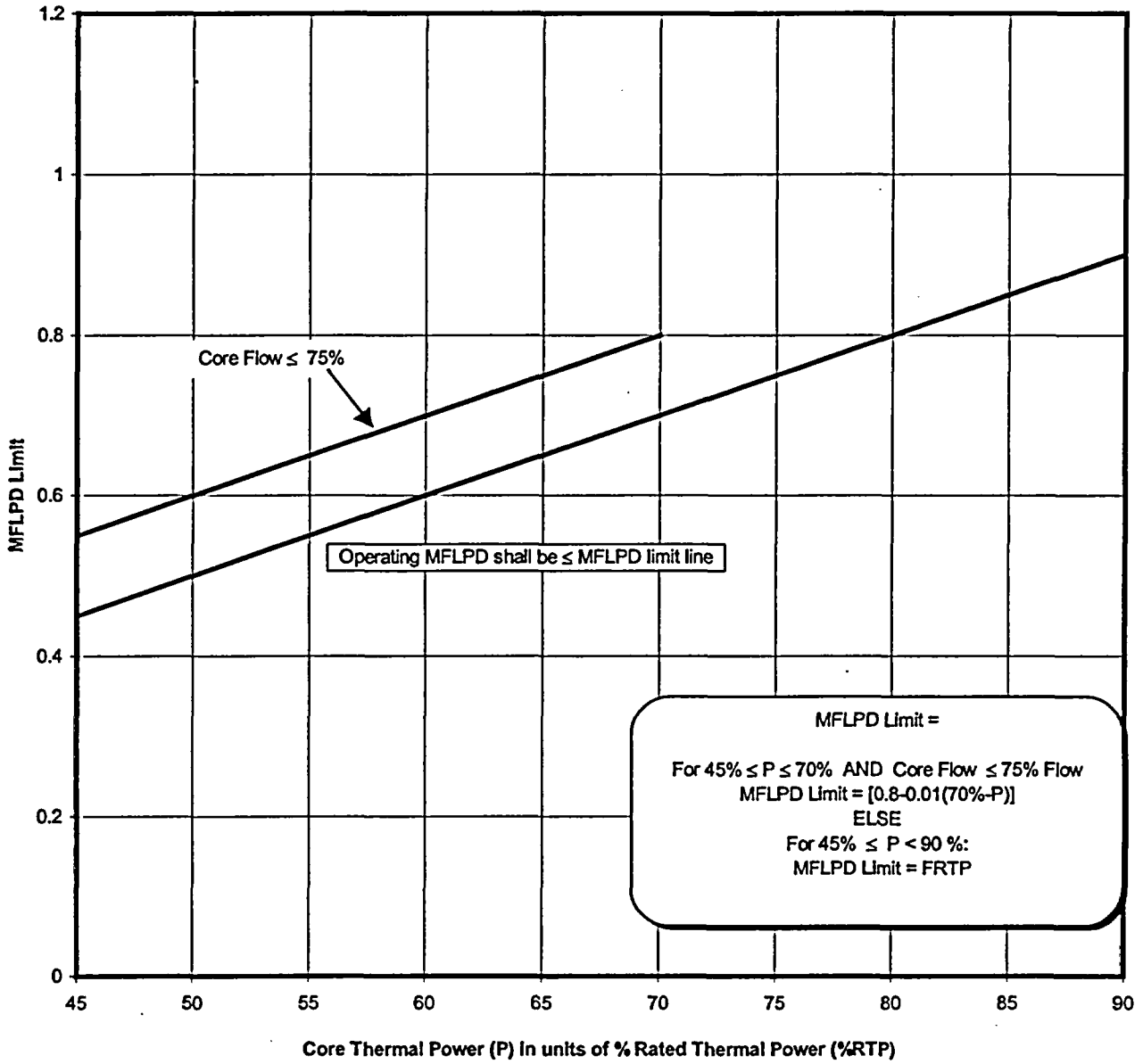
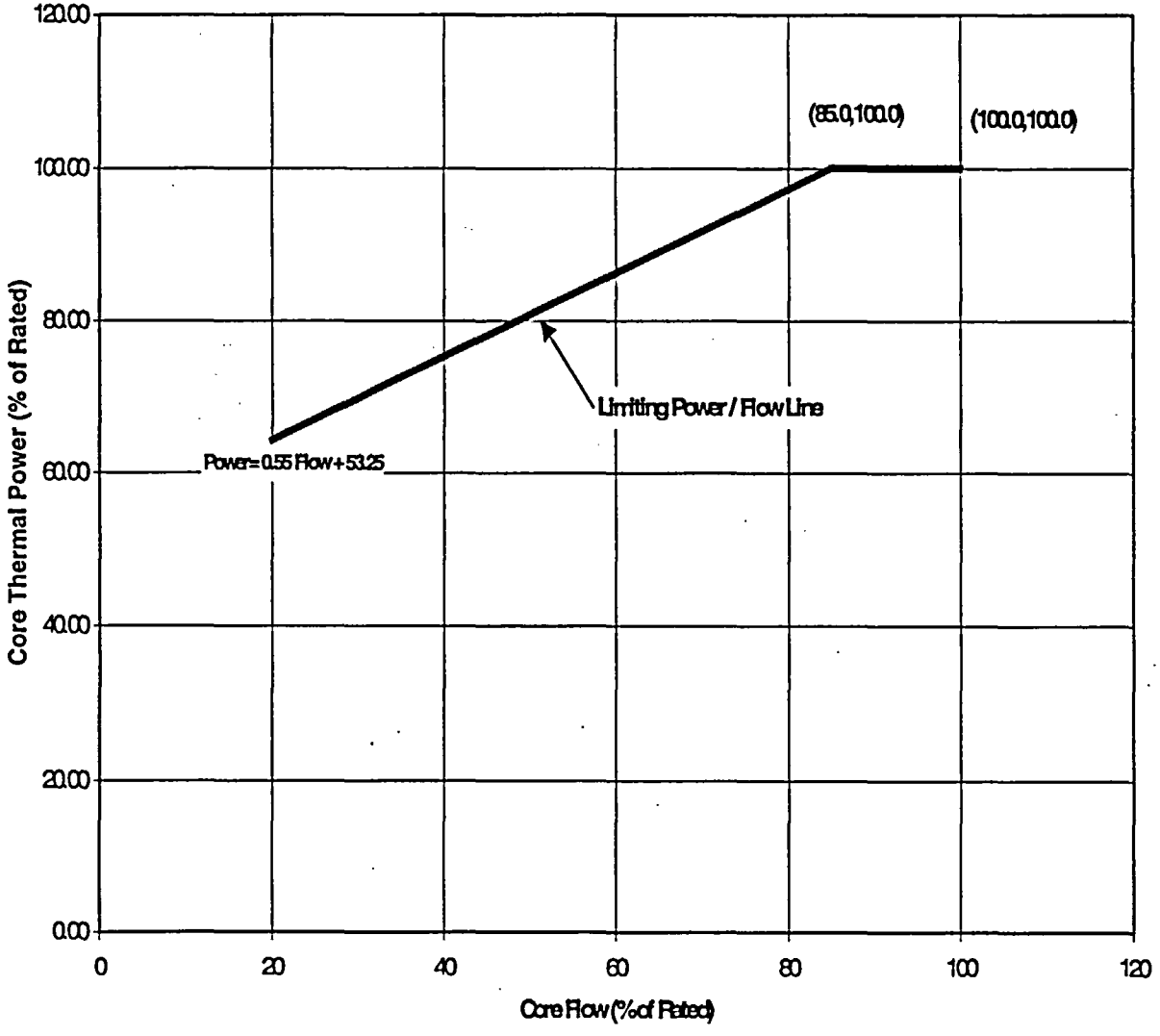
Figure 4 Limiting Power / Flow Line