NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT UNIT 2

ORIGINAL

CORE OPERATING LIMITS REPORT

Document No.: COLR2

Revision 0, Cycle 7

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This NMPC Controlled Document provides cycle specific core operating limits for use in conjunction with the Nine Mile Point Unit 2 Technical Specifications. Document pages may only be changed through a reissue of the entire document. This COLR must be signed by the Plant Manager to be valid.

NINE MILE POINT UNIT 2

CORE OPERATING LIMITS REPORT

Table of Contents

NOTE: The APRM setpoints previously in Section 6.0 have been relocated to the SAR.

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION

1.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

1.1 Limits for Technical Specification 3.2.1

During Operational Condition 1, when thermal power is greater than or equal to 25% of rated thermal power, the APLHGR(s) for each type of fuel as a function of AVERAGE PLANAR EXPOSURE shall not exceed the limits shown in Tables 1a, 1b, 1c, 1d and 1e.

The limits of Tables 1a, 1b, 1c, 1d, 1e and 1f shall be reduced to a value of .79 times the two recirculation loop operation limit when in single recirculation loop operation.

NOTE: When hand calculations are required, the APLHGR for fuel types P9CUB332, P9CUB349, P9CUB375, P9CUB414, and P9CUB413 as a function of average planar exposure shall not exceed the limits shown in Table 1f during two recirculation loop operation.

Table 1a

NINE MILE POINT UNIT 2

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9CUB332-13GZ-120M-146-T (GE11)

Average Planar Exposure, GWd/ST	MAPLHGR Limits (kw/ft)				
	Lattice 1727	Lattice 1728	Lattice 1729	Lattice 1730	Lattice 1723 and 1726
0.00	11.15	10.84	11.11	10.78	12.83
0.20	11.21	10.91	11.18	10.86	12.77
1.00	11.35	11.05	11.33	11.02	12.61
2.00	11.53	11.23	11.55	11.22	12.56
3.00	11.72	11.41	11.77	11.43	12.57
4.00	11.87	11.60	11.95	11.64	12.60
5.00	12.01	11.80	12.10	11.87	12.63
6.00	12.15	12.00	12.27	12.11	12.67
7.00	12.29	12.20	12.42	12.35	12.70
8.00	12.42	12.40	12.57	12.58	12.72
9.00	12.54	12.59	12.72	12.76	12.74
10.00	12.67	12.69	12.85	12.85	12.75
12.50	12.68	12.68	12.85	12.85	12.62
15.00	12.40	12.40	12.55	12.54	12.24
17.50	12.10	12.10	12.23	12.23	11.84
20.00	11.80	11.80	11.92	11.92	11.45
25.00	11.19	11.19	11.26	11.27	10.66
30.00	10.54	10.54	10.52	10.53	9.88
35.00	9.82	9.83	9.82	9.83	9.11
40.00	9.11	9.12	9.16	9.17	8.34
45.00	8.41	8.42	8.52	8.54	7.58
50.00	7.71	7.72	7.90	7.91	6.82
55.00	7.00	7.02	7.24	7.25	6.06
55.45	---	---	---	---	5.99
58.66	6.48	---	---	---	
58.74		6.48	---	---	
59.13			---	6.63	
59.20			6.62		

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

Table 1b

NINE MILE POINT UNIT 2

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9CUB349-10GZ1-120M-146-T (GE11)

Average Planar Exposure, GWd/ST	MAPLHGR Limits (kw/ft)				
	Lattice 1941	Lattice 1942	Lattice 1943	Lattice 1944	Lattice 1723 and 1945
0.00	11.41	11.62	11.11	11.35	12.83
0.20	11.46	11.67	11.17	11.40	12.77
1.00	11.58	11.78	11.31	11.53	12.61
2.00	11.75	11.93	11.52	11.72	12.56
3.00	11.93	12.10	11.74	11.93	12.57
4.00	12.09	12.24	11.98	12.15	12.60
5.00	12.25	12.39	12.23	12.38	12.63
6.00	12.42	12.53	12.49	12.63	12.67
7.00	12.59	12.61	12.73	12.84	12.70
8.00	12.73	12.69	12.78	12.90	12.72
9.00	12.83	12.78	12.82	12.92	12.74
10.00	12.89	12.87	12.85	12.93	12.75
12.50	12.84	12.86	12.77	12.80	12.62
15.00	12.48	12.49	12.39	12.40	12.24
17.50	12.12	12.13	12.00	12.00	11.84
20.00	11.76	11.76	11.61	11.61	11.45
25.00	11.03	11.03	10.84	10.84	10.66
30.00	10.31	10.31	10.10	10.10	9.88
35.00	9.59	9.60	9.40	9.41	9.11
40.00	8.89	8.90	8.75	8.75	8.34
45.00	8.20	8.21	8.12	8.13	7.58
50.00	7.51	7.51	7.51	7.52	6.82
55.00	6.81	6.81	6.89	6.90	6.06
55.45	---	---	---	---	5.99
57.39	---	---	6.58	---	
57.45	---	---		6.59	
57.66	---	6.43			
57.71	6.43				

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

Table 1c

NINE MILE POINT UNIT 2

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9CUB375-12GZ-120T-146-T (GE11)

Average Planar Exposure, GWd/ST	MAPLHGR Limits (kw/ft)					
	Lattice 2275	Lattice 2270	Lattice 2271	Lattice 2272	Lattice 2273	Lattice 2274
0.00	12.78	11.34	11.57	11.12	11.37	13.38
0.20	12.72	11.39	11.61	11.18	11.42	13.35
1.00	12.55	11.49	11.68	11.29	11.52	13.26
2.00	12.49	11.63	11.76	11.46	11.67	13.23
3.00	12.49	11.78	11.85	11.64	11.84	13.24
4.00	12.52	11.94	11.94	11.83	11.97	13.27
5.00	12.55	12.02	12.03	12.02	12.07	13.29
6.00	12.58	12.11	12.12	12.13	12.17	13.32
7.00	12.60	12.20	12.21	12.24	12.27	13.34
8.00	12.63	12.30	12.31	12.36	12.38	13.35
9.00	12.64	12.39	12.41	12.48	12.49	13.36
10.00	12.65	12.49	12.52	12.61	12.61	13.37
12.50	12.51	12.52	12.55	12.71	12.70	13.33
15.00	12.12	12.37	12.38	12.55	12.55	12.94
17.50	11.73	12.09	12.10	12.26	12.26	12.54
20.00	11.33	11.73	11.74	11.93	11.93	12.15
25.00	10.54	11.00	11.01	11.21	11.22	11.36
30.00	9.76	10.28	10.29	10.44	10.46	10.59
35.00	8.99	9.56	9.57	9.70	9.71	9.82
40.00	8.22	8.85	8.85	8.98	8.99	9.06
45.00	7.46	8.14	8.15	8.28	8.29	8.30
50.00	6.70	7.45	7.45	7.61	7.61	7.54
54.96	5.94	---	---	---	---	---
55.00	---	6.75	6.74	6.94	6.94	6.79
57.43	---	---	6.40	---	---	---
57.56	---	6.39	---	---	---	---
58.27	---	---	---	---	6.50	---
58.32	---	---	---	---	---	6.28
58.41	---	---	---	6.48	---	---

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

Table 1d

NINE MILE POINT UNIT 2

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9CUB413-12GZ-120T-146-T (GE11)

Average Planar Exposure, GWd/ST	MAPLHGR Limits (kw/ft)			
	Lattice 2275	Lattice 2545	Lattice 2549	Lattice 2274
0.00	12.78	11.43	11.45	13.38
0.20	12.72	11.46	11.49	13.35
1.00	12.55	11.53	11.57	13.26
2.00	12.49	11.61	11.68	13.23
3.00	12.49	11.69	11.78	13.24
4.00	12.52	11.77	11.89	13.27
5.00	12.55	11.86	12.01	13.29
6.00	12.58	11.94	12.12	13.32
7.00	12.60	12.03	12.24	13.34
8.00	12.63	12.11	12.36	13.35
9.00	12.64	12.20	12.48	13.36
10.00	12.65	12.29	12.60	13.37
12.50	12.51	12.26	12.65	13.33
15.00	12.12	12.11	12.44	12.94
17.50	11.73	11.90	12.13	12.54
20.00	11.33	11.61	11.80	12.15
25.00	10.54	10.98	11.09	11.36
30.00	9.76	10.36	10.28	10.59
35.00	8.99	9.75	9.51	9.82
40.00	8.22	9.12	8.79	9.06
45.00	7.46	8.42	8.11	8.30
50.00	6.70	7.75	7.47	7.54
54.96	5.94	---	---	---
55.00	---	7.09	6.84	6.79
58.06	---	6.64	---	---
58.32	---	---	---	6.28
58.66	---	---	6.46	---

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

Table 1c

NINE MILE POINT UNIT 2

MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE
Bundle Type: GE11-P9CUB414-13GZ-120T-146-T (GE11)

Average Planar Exposure, GWd/ST	MAPLHGR Limits (kw/ft)				
	Lattice 2275	Lattice 2545	Lattice 2546	Lattice 2547	Lattice 2548
0.00	12.78	11.43	11.25	11.41	13.40
0.20	12.72	11.46	11.30	11.45	13.39
1.00	12.55	11.53	11.39	11.52	13.30
2.00	12.49	11.61	11.50	11.61	13.27
3.00	12.49	11.69	11.62	11.71	13.28
4.00	12.52	11.77	11.74	11.80	13.30
5.00	12.55	11.86	11.87	11.90	13.33
6.00	12.58	11.94	11.99	12.01	13.35
7.00	12.60	12.03	12.10	12.11	13.37
8.00	12.63	12.11	12.21	12.22	13.38
9.00	12.64	12.20	12.32	12.33	13.39
10.00	12.65	12.29	12.44	12.44	13.40
12.50	12.51	12.26	12.48	12.49	13.36
15.00	12.12	12.11	12.36	12.36	12.97
17.50	11.73	11.90	12.11	12.12	12.57
20.00	11.33	11.61	11.79	11.80	12.17
25.00	10.54	10.97	11.08	11.08	11.39
30.00	9.76	10.22	10.28	10.28	10.62
35.00	8.99	9.47	9.51	9.51	9.85
40.00	8.22	8.72	8.79	8.79	9.09
45.00	7.46	7.97	8.11	8.11	8.33
50.00	6.70	7.23	7.46	7.43	7.57
54.96	5.94	---	---	---	---
55.00	---	6.49	6.84	6.71	6.81
57.19	---	6.17	---	---	---
58.28	---	---	---	6.24	---
58.42	---	---	---	---	6.29
58.58	---	---	6.47	---	---

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

Table 1f

NINE MILE POINT UNIT 2

MOST LIMITING MAPLHGR VERSUS AVERAGE PLANAR EXPOSURE

Average Planar Exposure, GWd/ST	MAPLHGR Limits (kw/ft)				
	P9CUB332 (GE11)	P9CUB349 (GE11)	P9CUB375 (GE11)	P9CUB413 (GE11)	P9CUB414 (GE11)
0.00	10.78	11.11	11.12	11.43	11.25
0.20	10.86	11.17	11.18	11.46	11.30
1.00	11.02	11.31	11.29	11.53	11.39
2.00	11.22	11.52	11.46	11.61	11.50
3.00	11.41	11.74	11.64	11.69	11.62
4.00	11.60	11.98	11.83	11.77	11.74
5.00	11.80	12.23	12.02	11.86	11.86
6.00	12.00	12.42	12.11	11.94	11.94
7.00	12.20	12.59	12.20	12.03	12.03
8.00	12.40	12.69	12.30	12.11	12.11
9.00	12.54	12.78	12.39	12.20	12.20
10.00	12.67	12.85	12.49	12.29	12.29
12.50	12.68	12.77	12.52	12.26	12.26
15.00	12.40	12.39	12.37	12.11	12.11
17.50	12.10	12.00	12.09	11.90	11.90
20.00	11.80	11.61	11.73	11.61	11.61
25.00	11.19	10.84	11.00	10.98	10.97
30.00	10.52	10.10	10.28	10.28	10.22
35.00	9.82	9.40	9.56	9.51	9.47
40.00	9.11	8.75	8.85	8.79	8.72
45.00	8.41	8.12	8.14	8.11	7.97
50.00	7.71	7.51	7.45	7.47	7.23
55.00	7.00	6.81	6.74	6.84	6.49
57.19	---	---	---	---	6.17
57.39	---	6.47	---	---	---
57.43	---	---	6.40	---	---
58.06	---	---	---	6.52	---
58.66	6.48	---	---	---	---

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

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION

2.0 AVERAGE POWER RANGE MONITOR SETPOINTS

2.1 Limits for Technical Specification 3.2.2

During OPERATIONAL CONDITION 1, when THERMAL POWER is greater than or equal to 25% of RATED THERMAL POWER, the Average Power Range Monitor (APRM) flow-biased simulated thermal power-upscale scram trip setpoint(s) shall be established according to the following relationship:

Trip Setpoint	Allowable Value
$S \leq (0.58\ (W - \Delta W) + 59\%)T$	$S \leq (0.58\ (W - \Delta W) + 62\%)T$

Where:

S is in percent of RATED THERMAL POWER

W = Loop Recirculation Flow as a Percentage of the loop recirculation flow which procedures a rated core flow of 108.5 MLB/HR

T = The ratio FRACTION OF RATED THERMAL POWER divided by the CORE MAXIMUM FRACTION OF LIMITING POWER DENSITY

T is applied only if less than or equal to 1.0

ΔW is defined as the difference in indicated drive flow (in percent of drive flow which procedures rated core flow) between two loop and single loop operation at the same core flow

$\Delta W = 0$ for two loop operation
$\Delta W = 5\%$ for single loop operation

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION

3.0 MINIMUM CRITICAL POWER RATIO (ODYN OPTION

3.1 Limits for Technical Specification 3.2.3

During Operational Condition 1, when thermal power is greater than or equal to 25% or rated thermal power, the Minimum Critical Power Ratio (MCPR) shall be equal to or greater than the appropriate MCPR limit from Figure 3a times the K(f) shown in Figure 3b with tau (or "τ") as defined in Technical Specification 3.2.3.

3.2 Coefficients for Tau Equation, Technical Specification 3.2.3

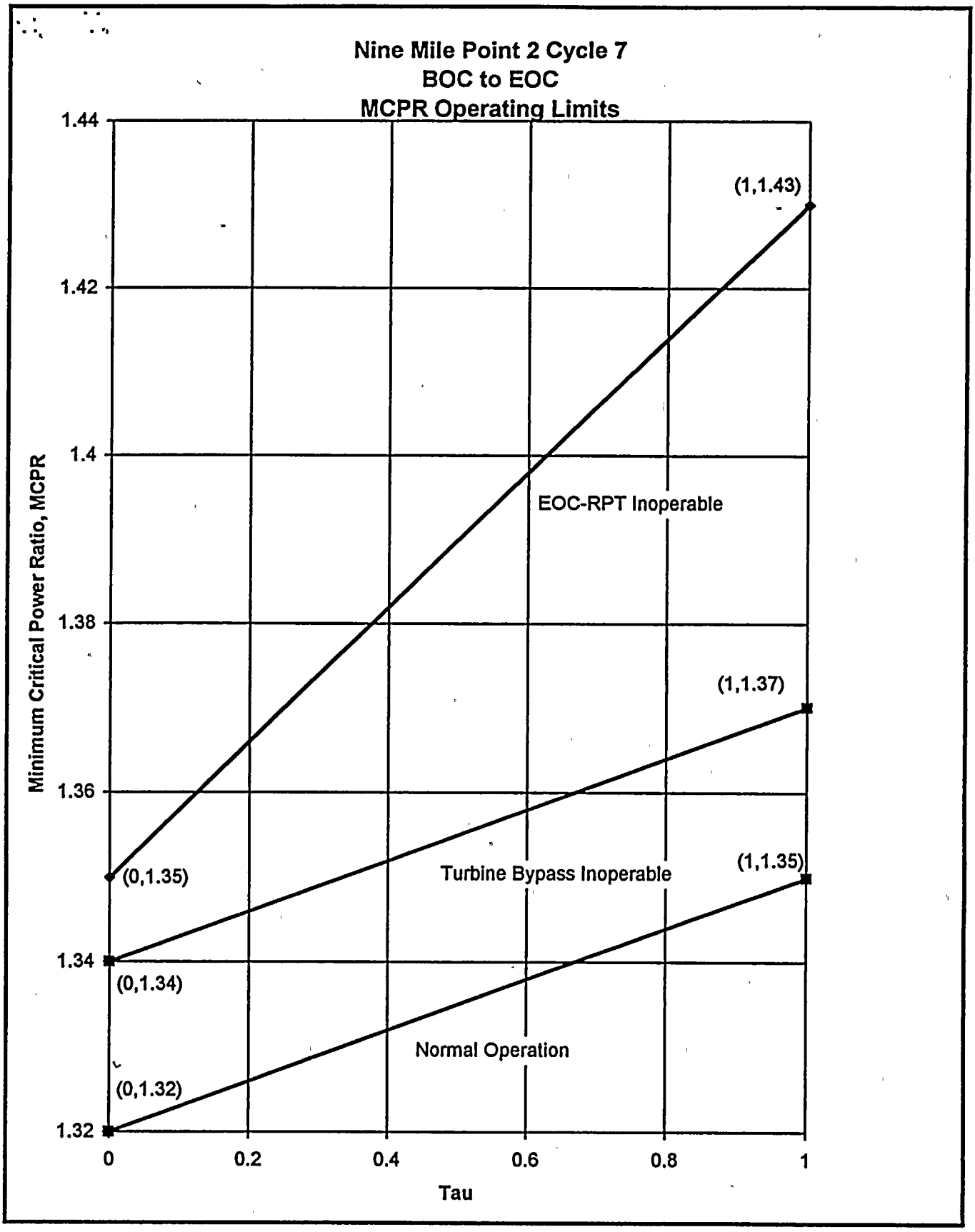
The following coefficients must be used with tau equation specified in Technical Specification 3.2.3:

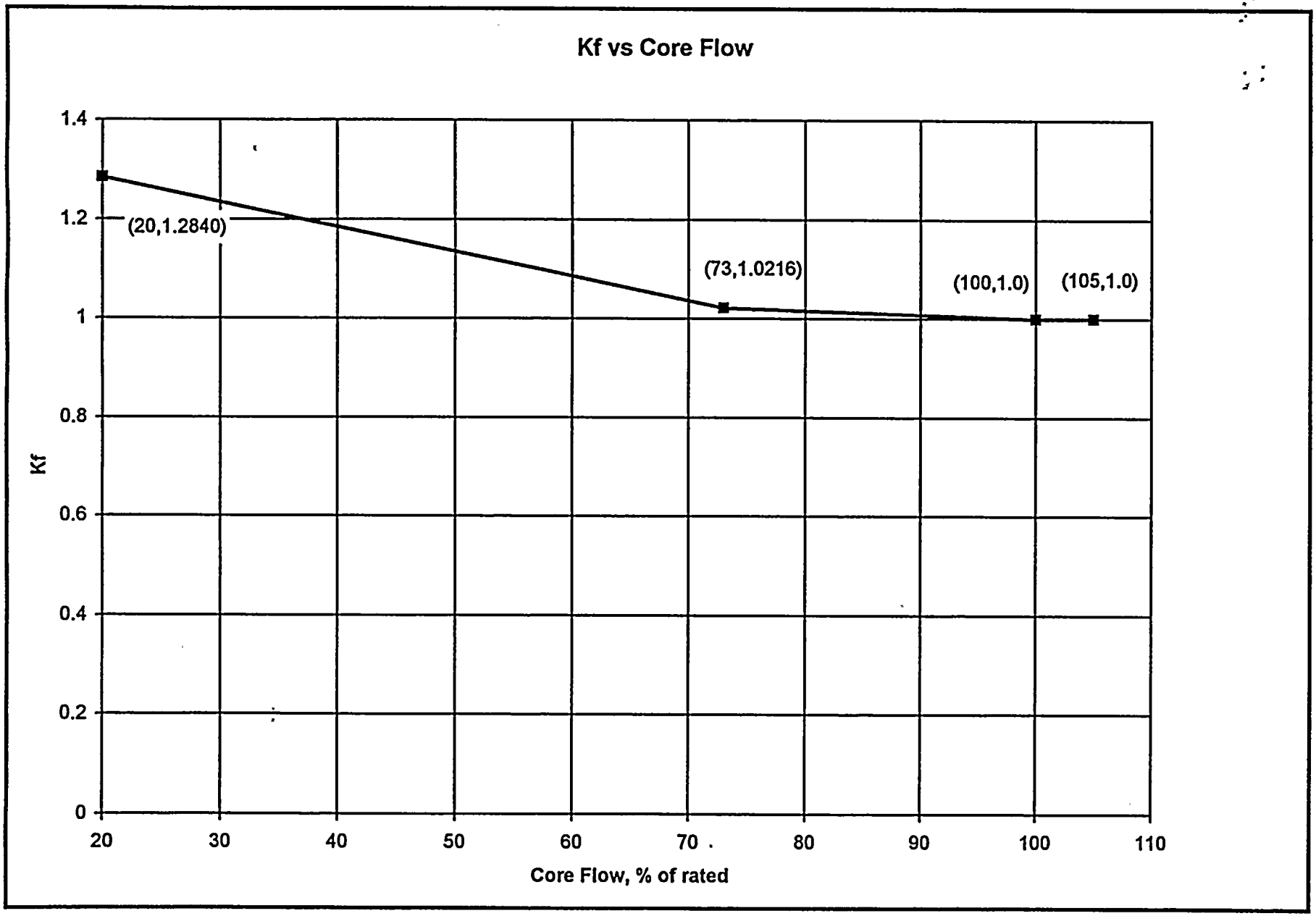
$x = 0.672$
$y = 1.65$
$z = 0.016$

NOTE: The MCPR Operating Limits in Figure 3a are based on a 1.09 Safety Limit MCPR (SLMCPR) for two recirculation loop operation and a 1.10 Safety Limit MCPR for single loop operation.

The Operating Limit MCPR values for Turbine Bypass Out of Service and EOC-RPT Out of Service are higher (more limiting) than for the standard normal operation case, and are therefore specifically identified in Figure 3a. The OLMCPR values for all other analyzed EOOS transient events are bounded by the Normal Operation limits.

With a pressure regulator out of service, interim operating limits have been established which require the operating limit MCPR multiplied by the K(f) shown in figure 3b divided by the actual MCPR to be less than or equal to the fraction of rated power.


Nine Mile Point 2 Cycle 7
BOC to EOC
MCPR Operating Limits
Minimum Critical Power Ratio, MCPR
Tau
1.44
1.42
1.4
1.38
1.36
1.34
1.32
0
0.2
0.4
0.6
0.8
1
(1,1.43)
EOC-RPT Inoperable
(1,1.37)
Turbine Bypass Inoperable
(1,1.35)
(0,1.35)
(0,1.34)
Normal Operation
(0,1.32)


Kf vs Core Flow
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Kf
(20,1.2840)
(73,1.0216)
(100,1.0)
(105,1.0)
20
30
40
50
60
70
80
90
100
110
Core Flow, % of rated

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION

4.0 LINEAR HEAT GENERATION RATE (LHGR)

4.1 Limits for Technical Specification 3.2.4

During OPERATIONAL CONDITION 1, when THERMAL POWER is greater than or equal to 25% of RATED THERMAL POWER, the LHGR shall not exceed the limits in the table below.

Fuel Type	LHGR Limits
P9CUB332 (GE11)	14.4 KW/FT
P9CUB349 (GE11)	14.4 KW/FT
P9CUB375 (GE11)	14.4 KW/FT
P9CUB413 (GE11)	14.4 KW/FT
P9CUB414 (GE11)	14.4 KW/FT

NOTE: With a pressure regulator out of service, interim operating limits have been established which require the ratio of actual maximum LHGR and the LHGR limit to be less than or equal to the fraction of rated power.

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION

5.0 ROD BLOCK MONITOR (RBM)

5.1 Setpoints for Technical Specification Table 3.3.6-2 (Item 1)

Trip Function	Trip Setpoint	Allowable Value
RBM Upscale	≤0.66 (W - ΔW) + 44% with a maximum of 110%	≤0.66 (W - ΔW) + 47% with a maximum of 113%

NOTE: W = Loop Recirculation Flow as a percentage of the loop recirculation flow which produces a rated core flow of 108.5 MLB/HR. ΔW is defined as the difference in indicated drive flow (in percent of drive flow which procedures rated core flow) between two loop and single loop operation at the same core flow. ΔW = 0 for two loop operation. ΔW = 5% for single loop operation.

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION

6.0 SOURCE DOCUMENTS

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

CORE OPERATING LIMIT	REFERENCE
APLHGR LIMITS (Section 1)	
Tables 1a and 1f	Lattice Dependent MAPLHG Report for NMP2 Reload 3, Cycle 4, 23A7228AA, Rev 0, October 1993 "Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 2 Reload 3, Cycle 4", 23A7228, Rev 0, November 1993
Tables 1b and 1f	Lattice Dependent MAPLHGR Report for NMP2 Reload 4, Cycle 5, 24A5174AA, Rev 0, April 1995 "Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 2, Reload 4, Cycle 5, 24A5174, Rev 1, June 1996
Tables 1c and 1f	Lattice Dependent MAPLHGR Report for NMP2 Reload 5, Cycle 6, J11-02854MAP, Rev 0, July 1996 "Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 2, Reload 5, Cycle 6", J11-02854SRLR, Rev 0, July 1996
Tables 1d, 1e and 1f	Lattice Dependent MAPLHGR Report for NMP2 Reload 6, Cycle 7, J11-03211MAP, Rev 0, February 1998
and corresponding single loop multiplier	"Supplemental Reload Licensing Report for Nine Mile Point Nuclear Power Station Unit 2, Reload 6, Cycle 7" J11-03211SRLR, Rev 0, February 1998

NINE MILE POINT UNIT 2
LIMITING CONDITION FOR OPERATION (Cont)

6.0 SOURCE DOCUMENTS (Cont)

CORE OPERATING LIMIT	REFERENCE
APRM SETPOINTS (Section 2)	"Power Uprate Licensing Evaluation for Nine Mile Point Nuclear Power Station Unit 2", NEDC-31994P, Rev 1, May 1993
MCPR LIMITS (Section 3)	
Figures 3a and 3b	"Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 2 Reload 6, Cycle 7, J11-03211SRLR, Rev 0, February 1998
Coefficients for Tau equation	GE Engineering Report for Nine Mile Point Nuclear Station Unit 2 Reload 2, Cycle 3, NFD92-016, January 1992
Pressure Regulator Out of Service	Letter from E. Bakke (GE) to B. D'Angelo (NMPC) dated April 22, 1998. Subject: Interim Operating Limits with Pressure Regulator Out of Service
LHGR LIMITS (Section 4)	"Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 2 Reload 6, Cycle 7", J11-03211SRLR, Rev 0, February 1998
	Letter from K. Faynshtein (GE) to B. D'Angelo (NMPC) dated March 6, 1998. Subject: Interim Operating Limits with Pressure Regulator Out of Service
RBM SETPOINTS (Section 5)	NMP2 Technical Specification Amendment 0
	"Supplemental Reload Licensing Report for Nine Mile Point Nuclear Station Unit 2 Reload 6, Cycle 7", J11-03211SRLR, Rev 0, February 1998