

SEP 11 2002

LRN-02-0317



U.S. Nuclear Regulatory Commission
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Gentlemen:

**CORE OPERATING LIMITS REPORT – CYCLE 11/RELOAD 10, REVISION 1
HOPE CREEK GENERATING STATION
FACILITY OPERATING LICENSE NPF-57
DOCKET NO. 50-354**

In accordance with section 6.9.1.9 of the Hope Creek Technical Specifications, PSEG Nuclear LLC submits Revision 1 of the Core Operating Limits Report (COLR) for Hope Creek Cycle 11/Reload 10 (NFS-0202, Rev. 1) in Attachment 1 to this letter.

If you have any questions or require additional information, please contact Mr. Michael Mosier at (856) 339-5434.

Sincerely,

A handwritten signature in black ink, appearing to read "G. Salamon", written over a horizontal line.

for G. Salamon
Manager – Nuclear Safety & Licensing

Attachment

A001

SEP 11 2002

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ATTACHMENT 1

HOPE CREEK GENERATING STATION

CORE OPERATING LIMITS REPORT

CYCLE 11/RELOAD 10

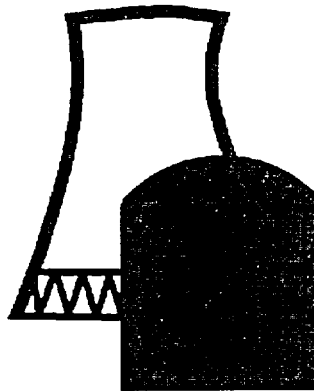
REVISION 1

Hope Creek Generating Station

Core Operating Limits Report

Cycle 11/ Reload 10

Effective Date: 8/13/02



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1.0 INTRODUCTION

The purpose of this report is to provide the Core Operating Limits for Hope Creek Generation Station Unit 1 Cycle 11/ Reload 10 operation. In addition, this report will provide cycle information on single recirculation loop operation, nominal scram speed and determination of the Core Maximum Fraction of Limiting Power Density. Finally, this report also provides a reference to the most recent revision of the implemented approved methodology. The limits presented here correspond to the core thermal limits for Average Planar Linear Heat Generation Rate (APLHGR), Minimum Critical Power Ratio (MCPR), Power dependent MCPR ($MCPR_p$), Flow dependent MCPR ($MCPR_f$) and Linear Heat Generation Rate (LHGR).

These operating limit values have been determined using NRC approved methods contained in the Reference Safety Report for Boiling Water Reactor Reload Fuel [1], CENPD-300-P-A (Revision 0), and GESTAR-II [5], NEDE-24011-P-A (Revision 13) and are established such that all applicable fuel thermal-mechanical, core thermal-hydraulic, ECCS, and nuclear limits such as shutdown margin, and transient and accident analysis limits are met.

Hope Creek Technical Specifications Section 3.2 references this report as the source for certain LIMITING CONDITIONS FOR OPERATION. These are included in section 2 of this document. Hope Creek Technical Specification 6.9.1.9 also requires that this report, including any mid cycle revisions, shall be provided, upon issuance, to the NRC.

In addition, the operating limit LCO values or Related Reload Licensing Analysis Information in section 2.2 MINIMUM CRITICAL POWER RATIO also include a conservative penalty to account for the potential effects of a condition being evaluated or pending resolution through a corrective action program. The conservative penalty is associated with the failure of LPRM 16-41C, which resulted in a degraded RBM channel 'A' for the partially inserted control rod 14-47, as documented in corrective action order 70025990.

This document is specific to Hope Creek Generating Station Unit 1 Cycle 11 / Reload 10 and shall not be applicable to any other core or cycle design. The thermal limits contained in this report are applicable whether the Crossflow™ correction factor is applied or not applied. This report is applicable for cycle 11 operation from the date of issuance through the end of effective full power capability or a cycle exposure of 12626MWd/MTU, whichever occurs first [2] and for coastdown operation at reduced power to a cycle exposure of 13616MWd/MTU. End of effective full power capability is reached when 100% rated power can no longer be maintained by increasing core flow (up to 105% of rated core flow), at rated feedwater temperatures, in the all-rods-out configuration.

2.0 TECHNICAL SPECIFICATIONS THAT REFERENCE THE COLR

The TECHNICAL SPECIFICATIONS THAT REFERENCE THE COLR presented in this section are referenced by the Hope Creek Technical Specifications.

<u>Tech. Spec.</u>	<u>Title</u>
2.1	Safety Limit Bases
3/4.2.1	Average Planar Linear Generation Rate
3/4.2.3	Minimum Critical Power Ratio
3/4.2.4	Linear Heat Generation Rate
3/4.4.1	Recirculation System Recirculation Loops
3/4.2b	Power Distribution Bases
3/4.2.1b	Average Planar Linear Heat Generation Rate
6.9.1.9	Administrative Controls, Core Operating Limits Report

2.1 AVERAGE PLANAR LINEAR HEAT GENERATION RATE

LIMITING CONDITION FOR OPERATION:

All AVERAGE PLANAR LINEAR HEAT GENERATION RATES (APLHGRs) for each type of fuel as a function of AVERAGE PLANAR EXPOSURE shall not exceed the limits specified in Table 2.1-1, Table 2.1-3, Table 2.1-5, Table 2.1-7, Table 2.1-9, Table 2.1-11 and Table 2.1-13.

When the Technical Specification Section 3/4.4.1 ACTION statement a.1.d is entered from that section's LCO, reduce the Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limit to a value specified in Table 2.1-2, Table 2.1-4, Table 2.1-6, Table 2.1-8, Table 2.1-10, Table 2.1-12 and Table 2.1-14.

When hand calculations are required, all AVERAGE PLANAR LINEAR HEAT GENERATION RATES (APLHGRs) for each type of fuel as a function of AVERAGE EXPOSURE shall not exceed the limits specified in Figures 2.1-2, 2.1-4, 2.1-6, 2.1-8, 2.1-10, 2.1-12 and 2.1-14.

NOTE

Figures 2.1-2, 2.1-4, 2.1-6, 2.1-8, 2.1-10, 2.1-12 and 2.1-14 graphically represent the limiting column of Tables 2.1-1 through 2.1-14.

6 inches	2408 (NATU)	LT31 ¹
6 inches	2124 (NATU)	LT11
18 inches	2405	LT28
18 inches	2407	LT30
42 inches	2406	LT29
54 inches	2405	LT28
6 inches	2124 (NATU)	LT11

NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

1. These lattice designators (prefixed with LT) are used in the Core Monitoring System.

Figure 2.1-1: Lattice Definitions for Fuel bundle HE08

Table 2.1-1: APLHGR Data for Fuel Bundle HE08
(Two Recirculation Loop Operation)

Lattice Exposure		Lattice APLHGR Limit (Kw/ft) ¹					
GWD/STU	MWD/MTU	#2124	#2405	#2406	#2407	#2408	Limiting
0.00	0.0	12.66	12.68	12.10	11.63	12.72	11.63
0.20	220.5	12.59	12.71	12.14	11.69	12.74	11.69
1.00	1102.3	12.40	12.79	12.24	11.85	12.83	11.85
2.00	2204.6	12.34	12.91	12.40	12.07	12.86	12.07
3.00	3306.9	12.34	13.02	12.57	12.32	12.86	12.32
4.00	4409.2	12.37	13.14	12.76	12.59	12.89	12.59
5.00	5511.5	12.40	13.26	12.95	12.86	12.92	12.86
6.00	6613.8	12.43	13.38	13.15	13.12	12.94	13.12
7.00	7716.1	12.46	13.51	13.36	13.36	12.97	13.36
8.00	8818.4	12.48	13.63	13.54	13.53	12.99	13.53
9.00	9920.7	12.50	13.62	13.62	13.62	13.00	13.62
10.00	11023.0	12.52	13.59	13.59	13.59	13.01	13.59
12.50	13778.8	12.36	13.57	13.57	13.57	12.92	13.57
15.00	16534.5	11.98	13.48	13.49	13.48	12.53	13.48
20.00	22046.0	11.20	12.65	12.87	12.86	11.75	12.65
25.00	27557.5	10.42	11.85	12.13	12.10	10.97	11.85
35.00	38580.5	8.87	10.28	10.49	10.55	9.43	10.28
45.00	49603.5	6.01	8.96	9.10	9.16	7.18	8.96
46.61	51378.2	5.18	8.26	8.39	8.44		8.26
48.53	53494.6		7.43	7.55	7.57	5.38	7.43
52.23	57573.1		5.82				5.82
52.92	58333.7				5.60		
52.98	58399.9			5.59			

1. See Figure 2.1-1 for the Lattice Definitions for this fuel Assembly.

Table 2.1-2: APLHGR Data for Fuel Bundle HE08
(Single Recirculation Loop Operation)

Lattice Exposure		Lattice APLHGR Limit (Kw/ft) ¹					
GWD/STU	MWD/MTU	#2124	#2405	#2406	#2407	#2408	Limiting
0.00	0.0	10.89	10.90	10.41	10.00	10.94	10.00
0.20	220.5	10.83	10.93	10.44	10.05	10.96	10.05
1.00	1102.3	10.66	11.00	10.53	10.19	11.03	10.19
2.00	2204.6	10.61	11.10	10.66	10.38	11.06	10.38
3.00	3306.9	10.61	11.20	10.81	10.60	11.06	10.60
4.00	4409.2	10.64	11.30	10.97	10.83	11.09	10.83
5.00	5511.5	10.66	11.40	11.14	11.06	11.11	11.06
6.00	6613.8	10.69	11.51	11.31	11.28	11.13	11.28
7.00	7716.1	10.72	11.62	11.49	11.49	11.15	11.49
8.00	8818.4	10.73	11.72	11.64	11.64	11.17	11.64
9.00	9920.7	10.75	11.71	11.71	11.71	11.18	11.71
10.00	11023.0	10.77	11.69	11.69	11.69	11.19	11.69
12.50	13778.8	10.63	11.67	11.67	11.67	11.11	11.67
15.00	16534.5	10.30	11.59	11.60	11.59	10.78	11.59
20.00	22046.0	9.63	10.88	11.07	11.06	10.11	10.88
25.00	27557.5	8.96	10.19	10.43	10.41	9.43	10.19
35.00	38580.5	7.63	8.84	9.02	9.07	8.11	8.84
45.00	49603.5	5.17	7.71	7.83	7.88	6.17	7.71
46.61	51378.2	4.45	7.10	7.22	7.26		7.10
48.53	53494.6		6.39	6.49	6.51	4.63	6.39
52.23	57573.1		5.01				5.01
52.92	58333.7				4.82		
52.98	58399.9			4.81			

1. See Figure 2.1-1 for the Lattice Definitions for this fuel Assembly.

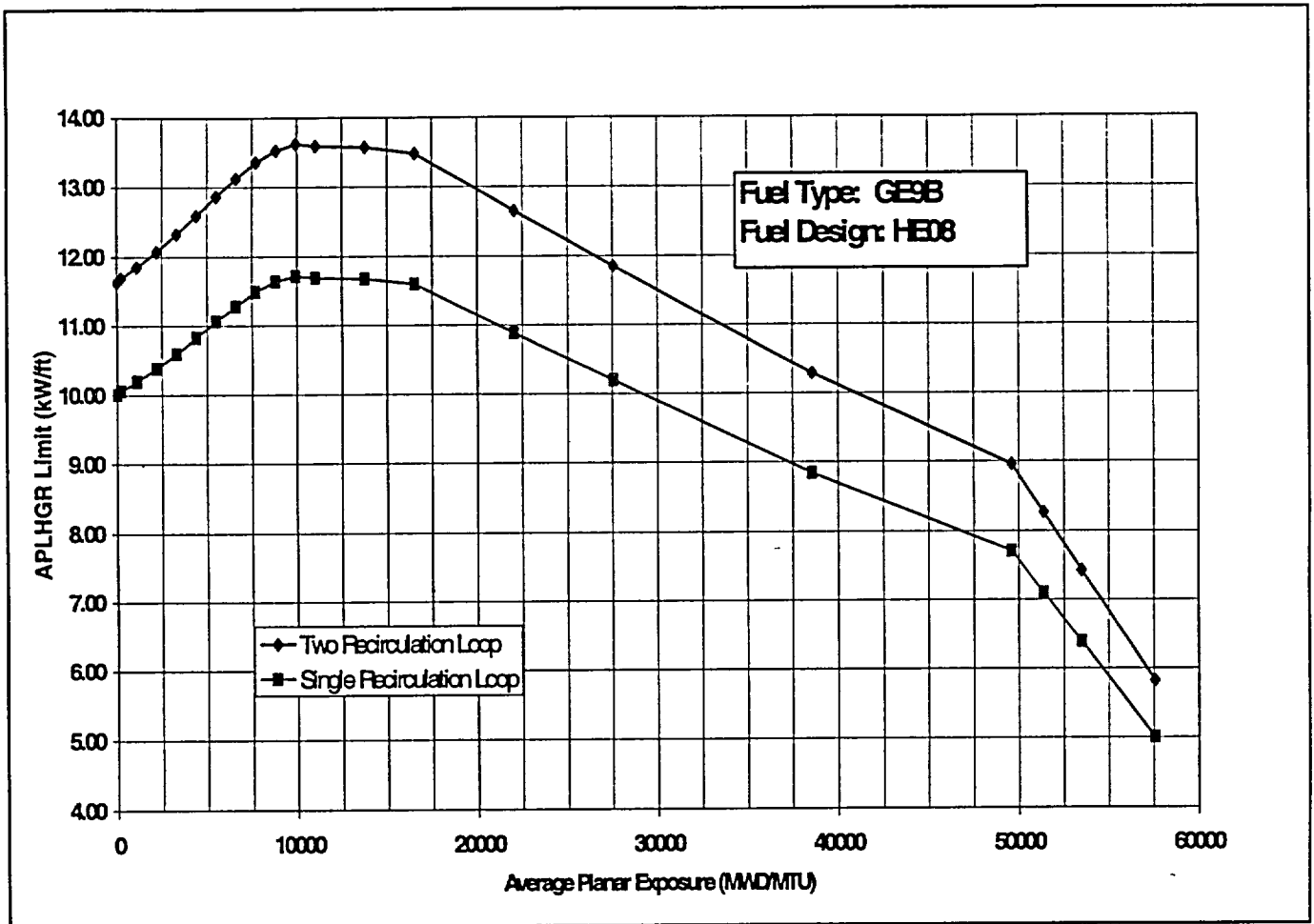


Figure 2.1-2: APLHGR Limit for Fuel Bundle HE08

6 inches	2404 (NATU)	LT27 ¹
6 inches	2124 (NATU)	LT11
18 inches	2403	LT26
60 inches	2402	LT25
54 inches	2401	LT24
6 inches	2124 (NATU)	LT11

NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

1. These lattice designators (prefixed with LT) are used in the Core Monitoring System.

Figure 2.1-3: Lattice Definitions for Fuel bundle HD08

Table 2.1-3: APLHGR Data for Fuel Bundle HD08
(Two Recirculation Loop Operation)

Lattice Exposure		Lattice APLHGR Limit (Kw/ft) ¹					
GWD/STU	MWD/MTU	#2124	#2401	#2402	#2403	#2404	Limiting
0.00	0.0	12.20	12.05	11.80	12.09	12.20	11.80
0.20	220.5	12.23	12.10	11.83	12.14	12.23	11.83
1.00	1102.3	12.35	12.21	11.93	12.26	12.35	11.93
2.00	2204.6	12.34	12.35	12.08	12.41	12.50	12.08
3.00	3306.9	12.34	12.49	12.23	12.57	12.65	12.23
4.00	4409.2	12.37	12.63	12.39	12.73	12.79	12.39
5.00	5511.5	12.40	12.78	12.55	12.89	12.85	12.55
6.00	6613.8	12.43	12.93	12.66	13.05	12.88	12.66
7.00	7716.1	12.46	13.07	12.77	13.22	12.90	12.77
8.00	8818.4	12.48	13.20	12.88	13.38	12.92	12.88
9.00	9920.7	12.50	13.33	12.99	13.51	12.94	12.99
10.00	11023.0	12.52	13.48	13.10	13.59	12.95	13.10
12.50	13778.8	12.36	13.61	13.16	13.62	12.85	13.16
15.00	16534.5	11.98	13.29	12.87	13.29	12.46	12.87
20.00	22046.0	11.20	12.62	12.26	12.63	11.68	12.26
25.00	27557.5	10.42	11.84	11.66	11.94	10.90	11.66
35.00	38580.5	8.87	10.42	10.36	10.50	9.36	10.36
45.00	49603.5	6.01	9.20	9.00	9.24	7.03	9.00
46.61	51378.2	5.18	8.45	8.20	8.49		8.20
48.28	53219.0		7.68	7.36	7.71	5.36	7.36
51.23	56470.8			5.89			5.89
52.25	57595.2		5.84				
52.27	57617.2				5.84		

1. See Figure 2.1-3 for the Lattice Definitions for this fuel Assembly.

Table 2.1-4: APLHGR Data for Fuel Bundle HD08
(Single Recirculation Loop Operation)

Lattice Exposure		Lattice APLHGR Limit (Kw/ft) ¹					
GWD/STU	MWD/MTU	#2124	#2401	#2402	#2403	#2404	Limiting
0.00	0.0	10.49	10.36	10.15	10.40	10.49	10.15
0.20	220.5	10.52	10.41	10.17	10.44	10.52	10.17
1.00	1102.3	10.62	10.50	10.26	10.54	10.62	10.26
2.00	2204.6	10.61	10.62	10.39	10.67	10.75	10.39
3.00	3306.9	10.61	10.74	10.52	10.81	10.88	10.52
4.00	4409.2	10.64	10.86	10.66	10.95	11.00	10.66
5.00	5511.5	10.66	10.99	10.79	11.09	11.05	10.79
6.00	6613.8	10.69	11.12	10.89	11.22	11.08	10.89
7.00	7716.1	10.72	11.24	10.98	11.37	11.09	10.98
8.00	8818.4	10.73	11.35	11.08	11.51	11.11	11.08
9.00	9920.7	10.75	11.46	11.17	11.62	11.13	11.17
10.00	11023.0	10.77	11.59	11.27	11.69	11.14	11.27
12.50	13778.8	10.63	11.70	11.32	11.71	11.05	11.32
15.00	16534.5	10.30	11.43	11.07	11.43	10.72	11.07
20.00	22046.0	9.63	10.85	10.54	10.86	10.04	10.54
25.00	27557.5	8.96	10.18	10.03	10.27	9.37	10.03
35.00	38580.5	7.63	8.96	8.91	9.03	8.05	8.91
45.00	49603.5	5.17	7.91	7.74	7.95	6.05	7.74
46.61	51378.2	4.45	7.27	7.05	7.30		7.05
48.28	53219.0		6.60	6.33	6.63	4.61	6.33
51.23	56470.8			5.07			5.07
52.25	57595.2		5.02				
52.27	57617.2				5.02		

1. See Figure 2.1-3 for the Lattice Definitions for this fuel Assembly.

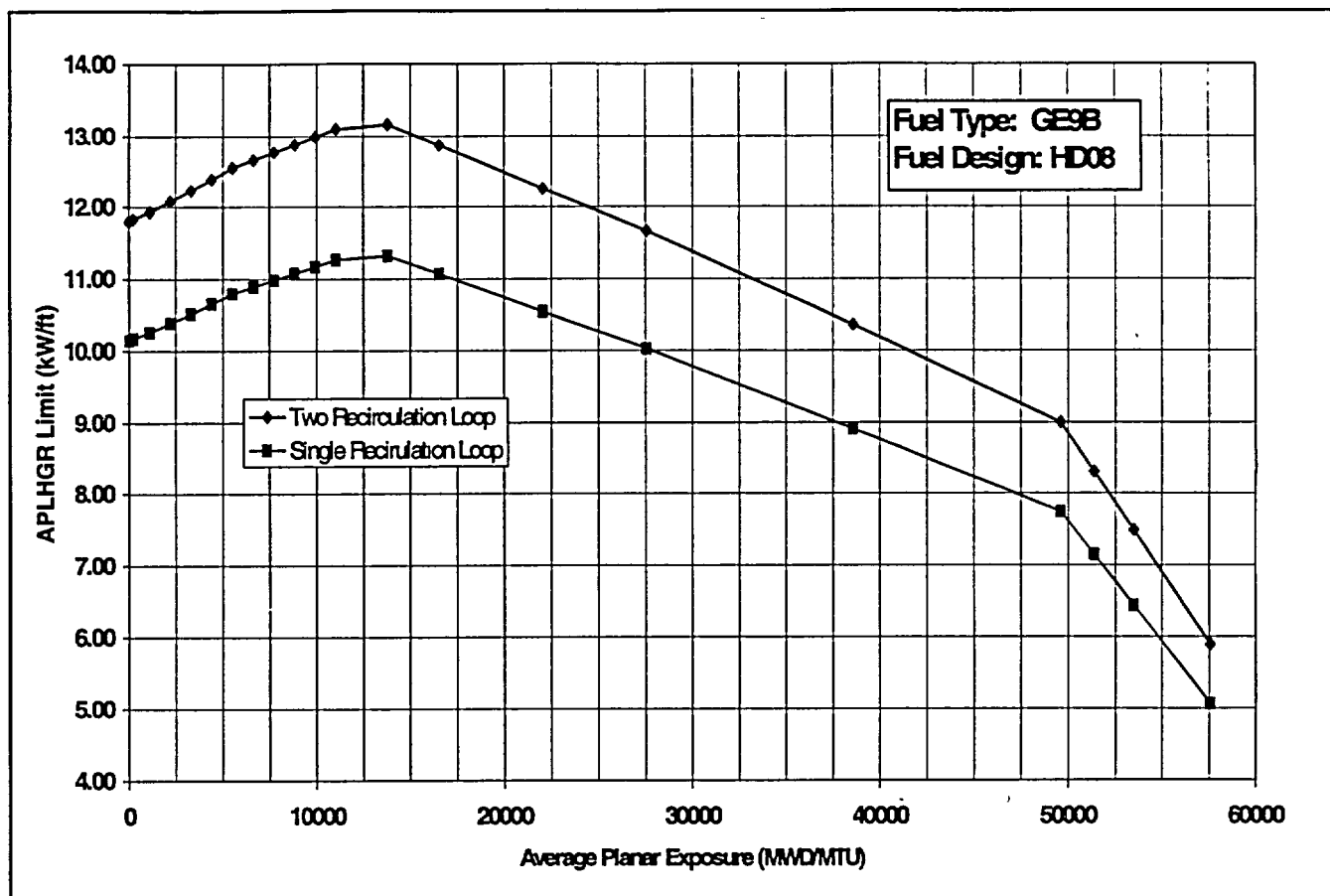
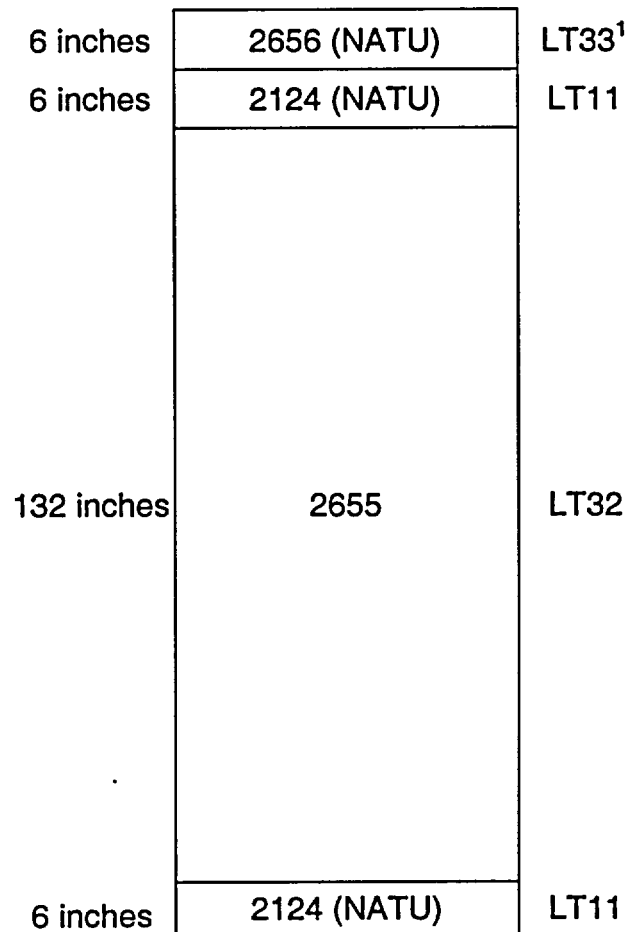


Figure 2.1-4: APLHGR Limit for Fuel Bundle HD08



NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

1. These lattice designators (prefixed with LT) are used in the Core Monitoring System.

Figure 2.1-5: Lattice Definitions for Fuel bundle HF09

Table 2.1-5: APLHGR Data for Fuel Bundle HF09
(Two Recirculation Loop Operation)

Lattice Exposure		Lattice APLHGR Limit (Kw/ft) ¹			
GWD/STU	MWD/MTU	#2124	#2655	#2656	Limiting
0.00	0.0	11.89	11.87	11.89	11.87
0.20	220.5	11.92	11.91	11.92	11.91
1.00	1102.3	12.05	12.03	12.05	12.03
2.00	2204.6	12.27	12.21	12.27	12.21
3.00	3306.9	12.34	12.40	12.49	12.40
4.00	4409.2	12.37	12.62	12.69	12.62
5.00	5511.5	12.40	12.85	12.73	12.85
6.00	6613.8	12.43	13.01	12.76	13.01
7.00	7716.1	12.46	13.15	12.79	13.15
8.00	8818.4	12.48	13.30	12.81	13.30
9.00	9920.7	12.50	13.43	12.83	13.43
10.00	11023.0	12.52	13.50	12.85	13.50
12.50	13778.8	12.36	13.49	12.73	13.49
15.00	16534.5	11.98	13.17	12.34	13.17
20.00	22046.0	11.20	12.54	11.56	12.54
25.00	27557.5	10.42	11.75	10.78	11.75
35.00	38580.5	8.87	10.30	9.23	10.30
45.00	49603.5	6.00	9.03	6.76	9.03
46.61	51378.2	5.18	8.29		8.29
47.85	52745.1		7.71	5.31	7.71
52.05	57374.7		5.77		5.77

1. See Figure 2.1-5 for the Lattice Definitions for this fuel Assembly.

Table 2.1-6: APLHGR Data for Fuel Bundle HF09
(Single Recirculation Loop Operation)

Lattice Exposure		Lattice APLHGR Limit (Kw/ft) ¹			
GWD/STU	MWD/MTU	#2124	#2655	#2656	Limiting
0.00	0.0	10.23	10.21	10.23	10.21
0.20	220.5	10.25	10.24	10.25	10.24
1.00	1102.3	10.36	10.35	10.36	10.35
2.00	2204.6	10.55	10.50	10.55	10.50
3.00	3306.9	10.61	10.66	10.74	10.66
4.00	4409.2	10.64	10.85	10.91	10.85
5.00	5511.5	10.66	11.05	10.95	11.05
6.00	6613.8	10.69	11.19	10.97	11.19
7.00	7716.1	10.72	11.31	11.00	11.31
8.00	8818.4	10.73	11.44	11.02	11.44
9.00	9920.7	10.75	11.55	11.03	11.55
10.00	11023.0	10.77	11.61	11.05	11.61
12.50	13778.8	10.63	11.60	10.95	11.60
15.00	16534.5	10.30	11.33	10.61	11.33
20.00	22046.0	9.63	10.78	9.94	10.78
25.00	27557.5	8.96	10.11	9.27	10.11
35.00	38580.5	7.63	8.86	7.94	8.86
45.00	49603.5	5.16	7.77	5.81	7.77
46.61	51378.2	4.45	7.13		7.13
47.85	52745.1		6.63	4.57	6.63
52.05	57374.7		4.96		4.96

1. See Figure 2.1-5 for the Lattice Definitions for this fuel Assembly.

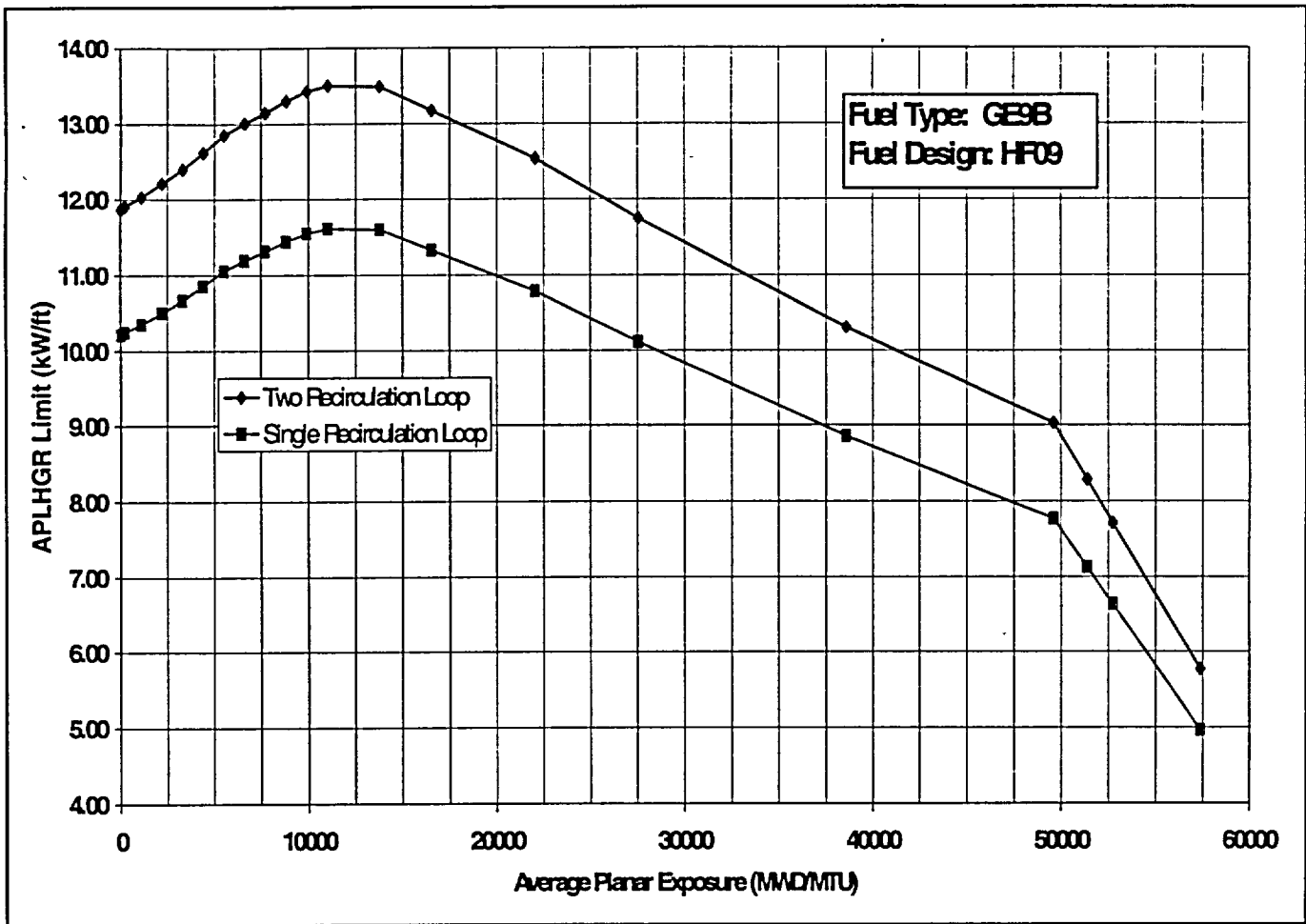
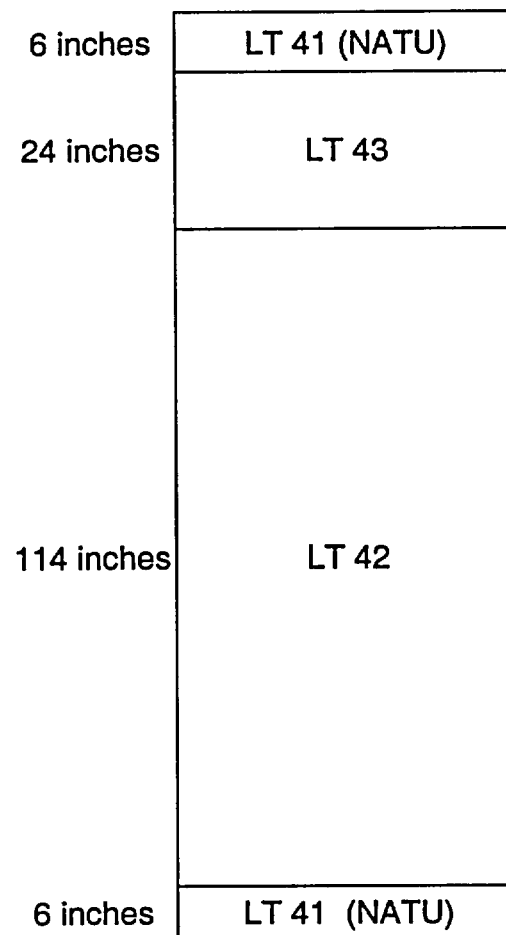


Figure 2.1-6: APLHGR Limit for Fuel Bundle HF09



NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

Figure 2.1-7: Lattice Definitions for Fuel bundle PA10

Table 2.1-7: APLHGR Data for Fuel Bundle PA10
(Two Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹		
	LT 41, 42	LT 43	Limiting
0	9.1	9.1	9.1
350	9.1	9.1	9.1
1000	9.2	9.2	9.2
7000	-----	9.2	9.2
9500	9.2	8.9	8.9
10000	9.1	-----	8.9
14000	8.5	8.5	8.5
18000	8.0	8.0	8.0
22000	7.6	7.6	7.6
24000	7.7	7.7	7.7
26000	8.4	8.4	8.4
28000	8.4	8.4	8.4
34000	8.4	8.4	8.4
42000	8.4	8.4	8.4
52000	8.2	8.2	8.2

1. See Figure 2.1-7 for the Lattice Definitions for this fuel Assembly.

Table 2.1-8: APLHGR Data for Fuel Bundle PA10
(Single Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹		
	LT 41, 42	LT 43	Limiting
0	8.2	8.2	8.2
350	8.2	8.2	8.2
1000	8.3	8.3	8.3
7000	-----	8.3	8.3
9500	8.3	8.0	8.0
10000	8.2	-----	8.0
14000	7.7	7.7	7.7
18000	7.2	7.2	7.2
22000	6.8	6.8	6.8
24000	6.9	6.9	6.9
26000	7.6	7.6	7.6
28000	7.6	7.6	7.6
34000	7.6	7.6	7.6
42000	7.6	7.6	7.6
52000	7.4	7.4	7.4

1. See Figure 2.1-7 for the Lattice Definitions for this fuel Assembly.

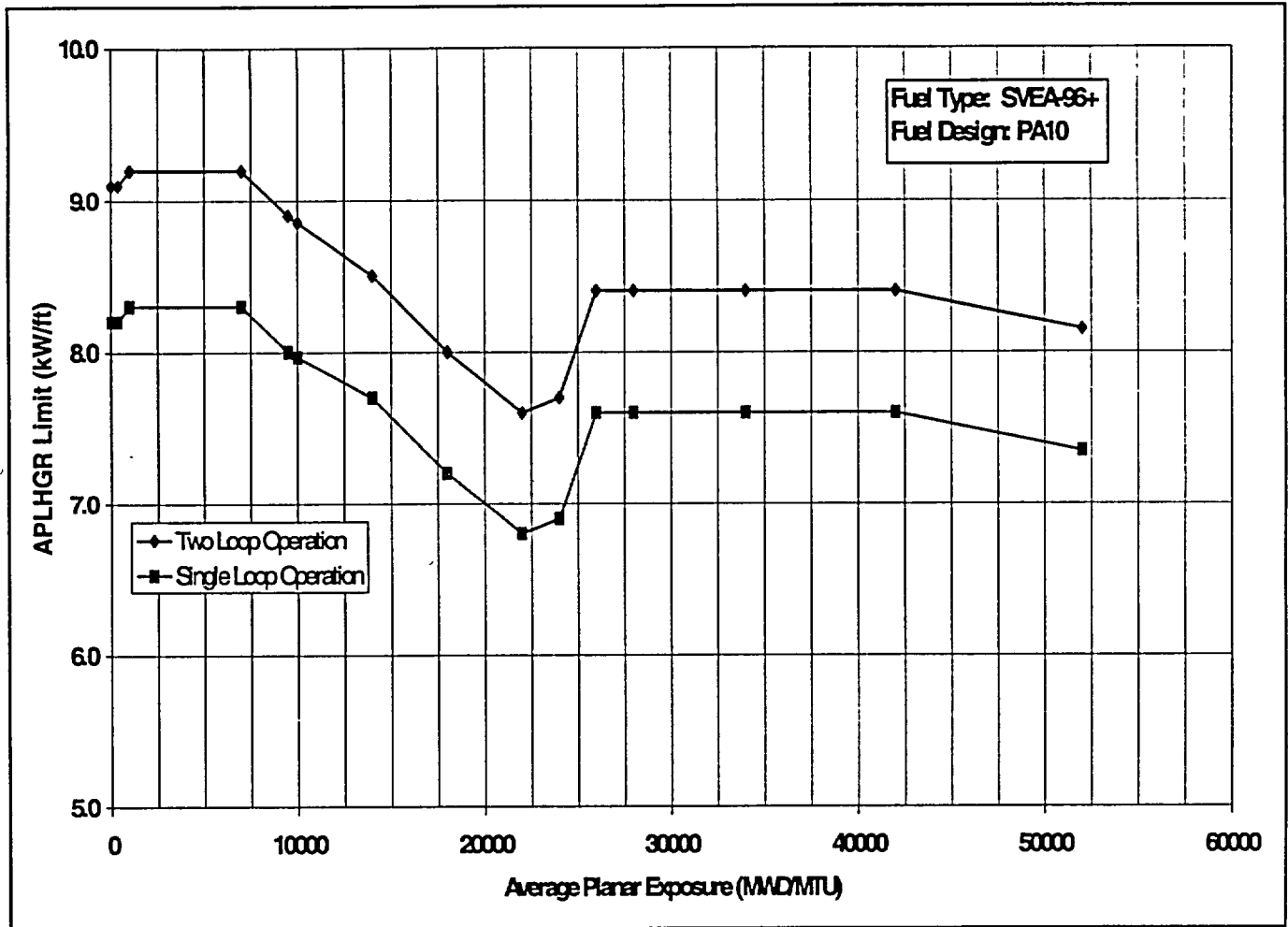
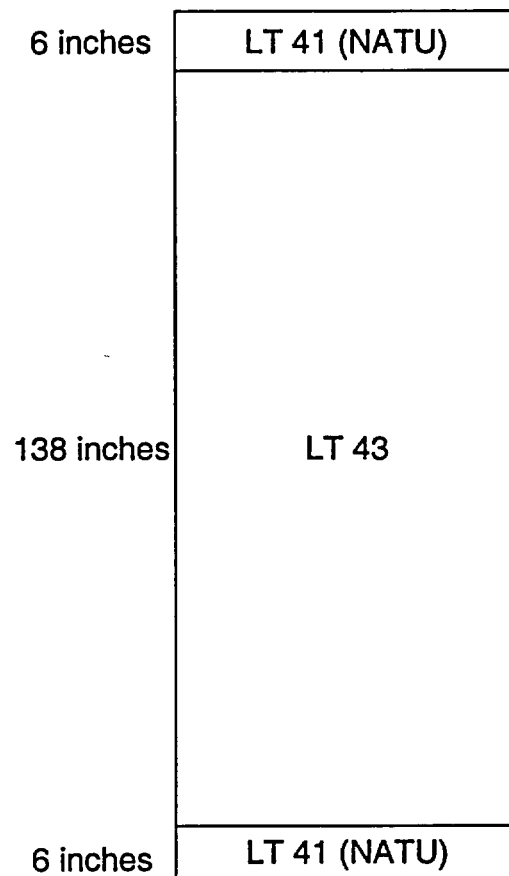


Figure 2.1-8: APLHGR Limit for Fuel Bundle PA10



NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

Figure 2.1-9: Lattice Definitions for Fuel bundle PB10

Table 2.1-9: APLHGR Data for Fuel Bundle PB10
(Two Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹		
	LT 41	LT 43	Limiting
0	9.1	9.1	9.1
350	9.1	9.1	9.1
1000	9.2	9.2	9.2
7000	-----	9.2	9.2
9500	9.2	8.9	8.9
10000	9.1	-----	8.9
14000	8.5	8.5	8.5
18000	8.0	8.0	8.0
22000	7.6	7.6	7.6
24000	7.7	7.7	7.7
26000	8.4	8.4	8.4
28000	8.4	8.4	8.4
34000	8.4	8.4	8.4
42000	8.4	8.4	8.4
52000	8.2	8.2	8.2

1. See Figure 2.1-9 for the Lattice Definitions for this fuel Assembly.

Table 2.1-10: APLHGR Data for Fuel Bundle PB10
(Single Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹		
	LT 41	LT 43	Limiting
0	8.2	8.2	8.2
350	8.2	8.2	8.2
1000	8.3	8.3	8.3
7000	-----	8.3	8.3
9500	8.3	8.0	8.0
10000	8.2	-----	8.0
14000	7.7	7.7	7.7
18000	7.2	7.2	7.2
22000	6.8	6.8	6.8
24000	6.9	6.9	6.9
26000	7.6	7.6	7.6
28000	7.6	7.6	7.6
34000	7.6	7.6	7.6
42000	7.6	7.6	7.6
52000	7.4	7.4	7.4

1. See Figure 2.1-9 for the Lattice Definitions for this fuel Assembly.

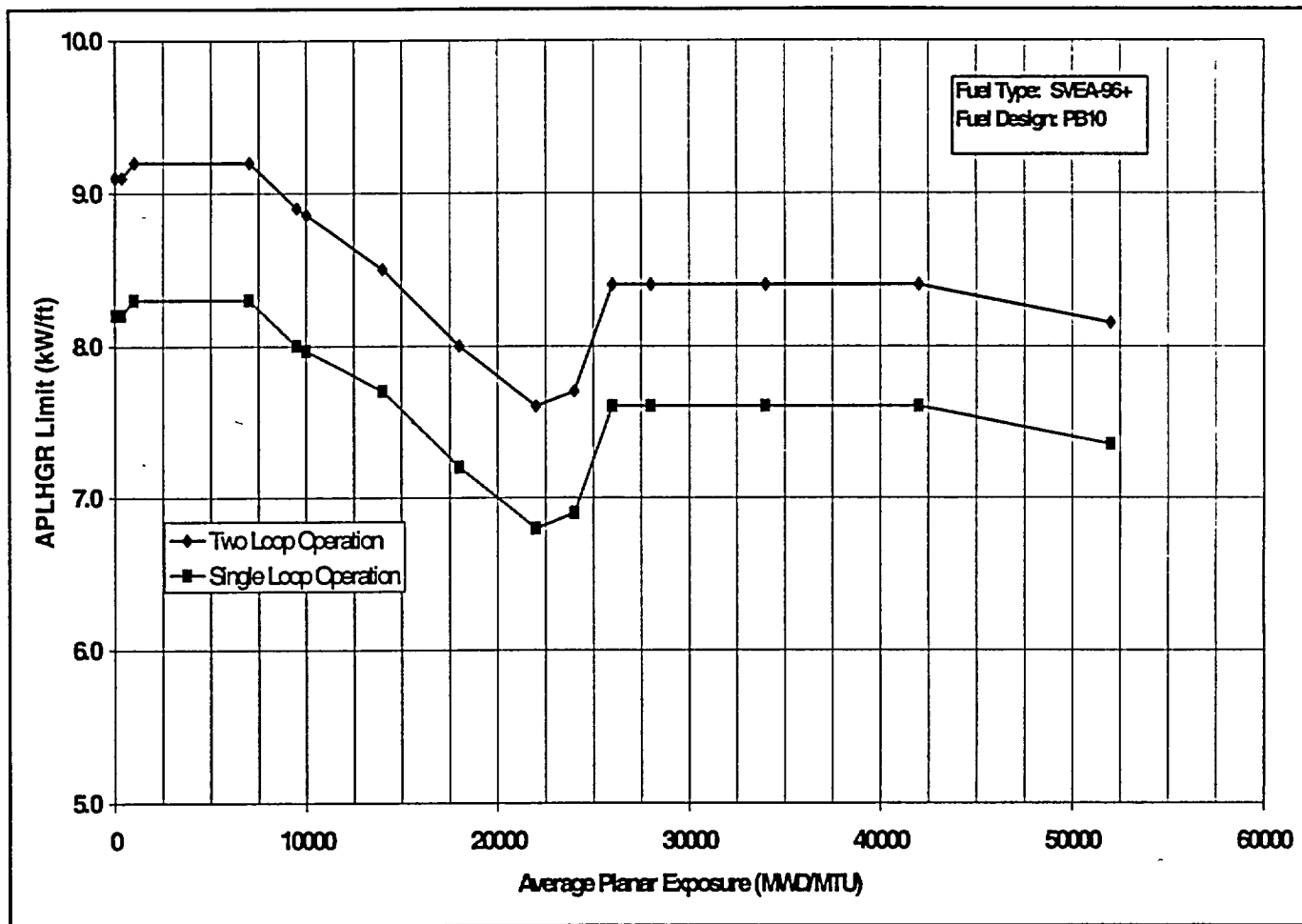
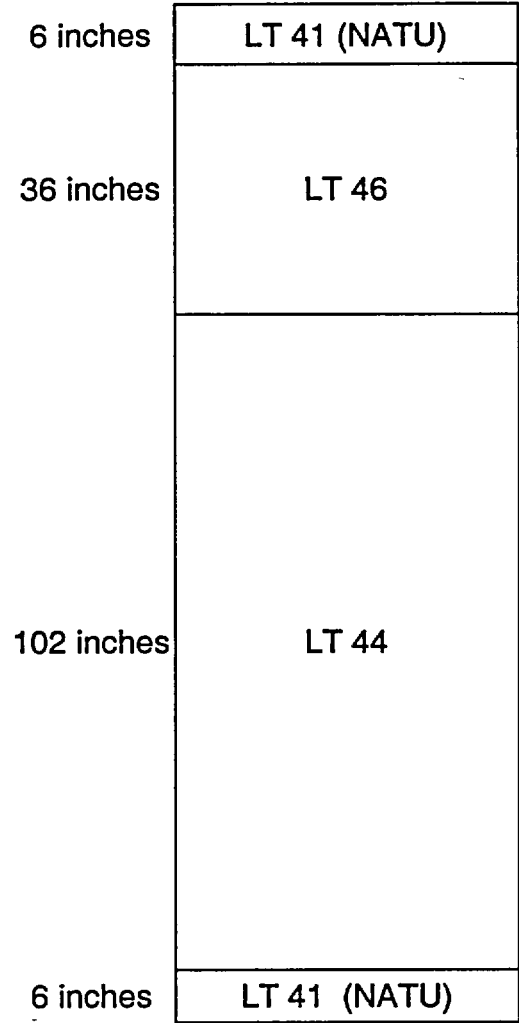


Figure 2.1-10: APLHGR Limit for Fuel Bundle PB10



NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

Figure 2.1-11: Lattice Definitions for Fuel bundle PC11

Table 2.1-11: APLHGR Data for Fuel Bundle PC11
(Two Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹			
	LT 41	LT 44	LT46	Limiting
0	9.1	9.2	9.2	9.2
350	9.1	9.2	9.2	9.2
1000	9.2	9.2	9.2	9.2
9500	9.2	9.2	9.2	9.2
10000	9.1	9.1	9.1	9.1
14000	8.5	8.7	8.7	8.7
18000	8.0	8.2	8.2	8.2
22000	7.6	7.8	7.8	7.8
24000	7.7	7.7	7.7	7.7
26000	8.4	8.4	8.4	8.4
28000	8.4	8.4	8.4	8.4
34000	8.4	8.4	8.4	8.4
42000	8.4	8.4	8.4	8.4
54000	8.1	8.1	8.1	8.1
59000	7.9	7.9	7.9	7.9

1. See Figure 2.1-11 for the Lattice Definitions for this fuel Assembly.

Table 2.1-12: APLHGR Data for Fuel Bundle PC11
(Single Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹			
	LT 41	LT 44	LT46	Limiting
0	8.2	8.3	8.3	8.3
350	8.2	8.3	8.3	8.3
1000	8.3	8.3	8.3	8.3
9500	8.3	8.3	8.3	8.3
10000	8.2	8.2	8.2	8.2
14000	7.7	7.8	7.8	7.8
18000	7.2	7.4	7.4	7.4
22000	6.8	7.0	7.0	7.0
24000	6.9	6.9	6.9	6.9
26000	7.6	7.6	7.6	7.6
28000	7.6	7.6	7.6	7.6
34000	7.6	7.6	7.6	7.6
42000	7.6	7.6	7.6	7.6
54000	7.3	7.3	7.3	7.3
59000	7.1	7.1	7.1	7.1

1. See Figure 2.1-11 for the Lattice Definitions for this fuel Assembly.

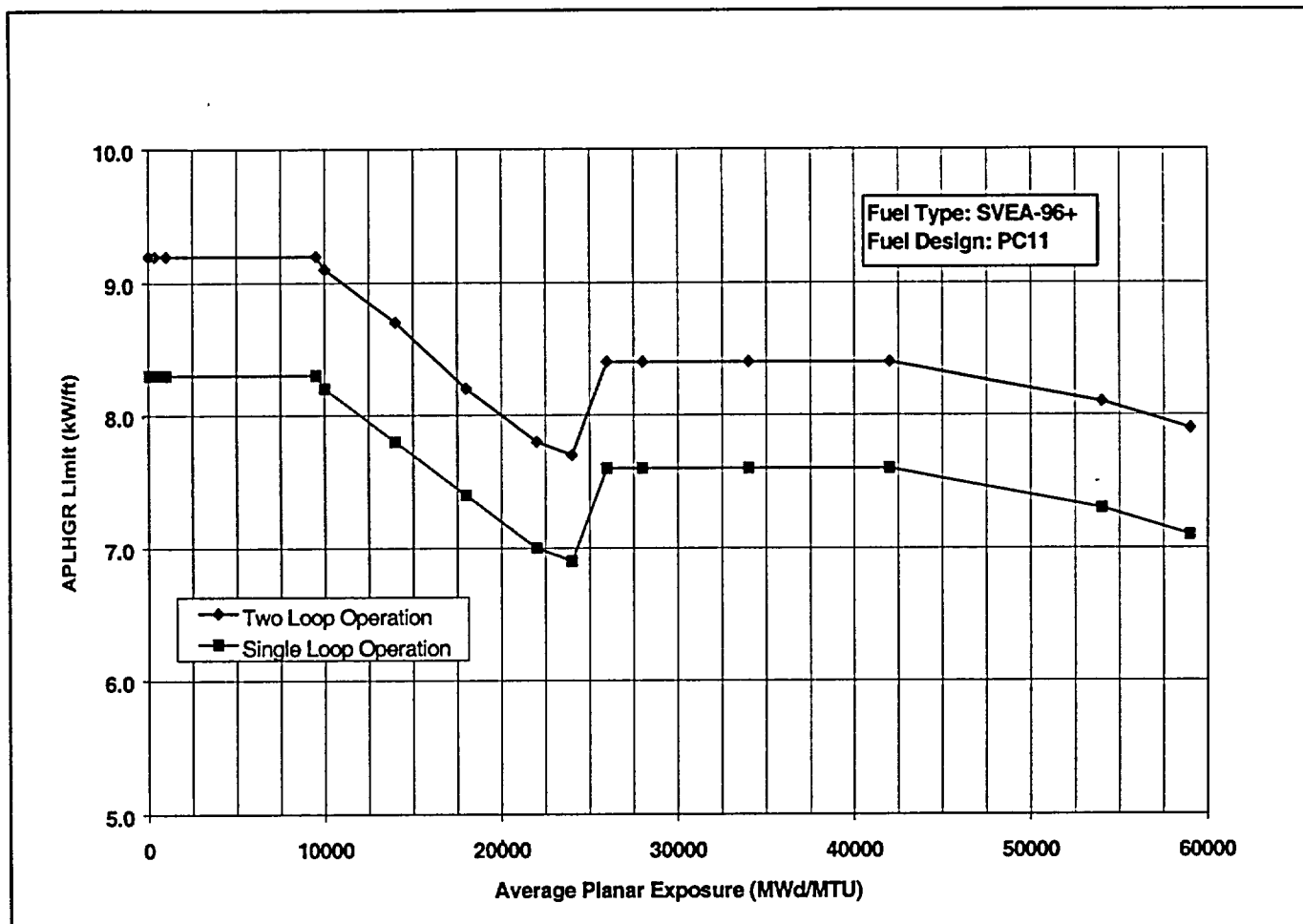
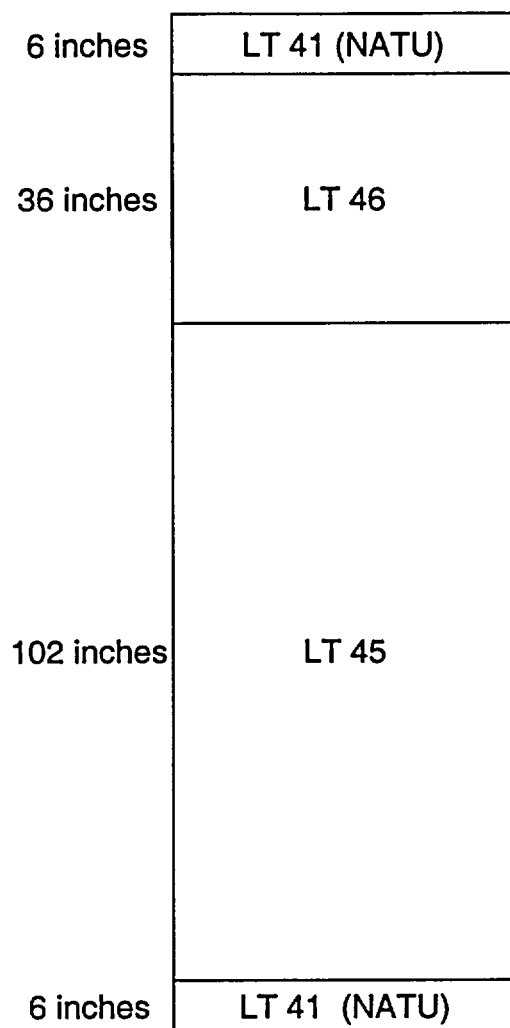


Figure 2.1-12: APLHGR Limit for Fuel Bundle PC11



NATU = Natural Uranium Lattices, which are not included in the determination of the most limiting lattice APLHGR values.

Figure 2.1-13: Lattice Definitions for Fuel bundle PD11

Table 2.1-13: APLHGR Data for Fuel Bundle PD11
(Two Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹			
	LT 41	LT 45	LT46	Limiting
0	9.1	9.2	9.2	9.2
350	9.1	9.2	9.2	9.2
1000	9.2	9.2	9.2	9.2
9500	9.2	9.2	9.2	9.2
10000	9.1	9.1	9.1	9.1
14000	8.5	8.7	8.7	8.7
18000	8.0	8.2	8.2	8.2
22000	7.6	7.8	7.8	7.8
24000	7.7	7.7	7.7	7.7
26000	8.4	8.4	8.4	8.4
28000	8.4	8.4	8.4	8.4
34000	8.4	8.4	8.4	8.4
42000	8.4	8.4	8.4	8.4
54000	8.1	8.1	8.1	8.1
59000	7.9	7.9	7.9	7.9

1. See Figure 2.1-13 for the Lattice Definitions for this fuel Assembly.

Table 2.1-14: APLHGR Data for Fuel Bundle PD11
(Single Recirculation Loop Operation)

Exposure MWD/MTU	Lattice APLHGR Limit (Kw/ft) ¹			
	LT 41	LT 45	LT46	Limiting
0	8.2	8.3	8.3	8.3
350	8.2	8.3	8.3	8.3
1000	8.3	8.3	8.3	8.3
9500	8.3	8.3	8.3	8.3
10000	8.2	8.2	8.2	8.2
14000	7.7	7.8	7.8	7.8
18000	7.2	7.4	7.4	7.4
22000	6.8	7.0	7.0	7.0
24000	6.9	6.9	6.9	6.9
26000	7.6	7.6	7.6	7.6
28000	7.6	7.6	7.6	7.6
34000	7.6	7.6	7.6	7.6
42000	7.6	7.6	7.6	7.6
54000	7.3	7.3	7.3	7.3
59000	7.1	7.1	7.1	7.1

1. See Figure 2.1-13 for the Lattice Definitions for this fuel Assembly.

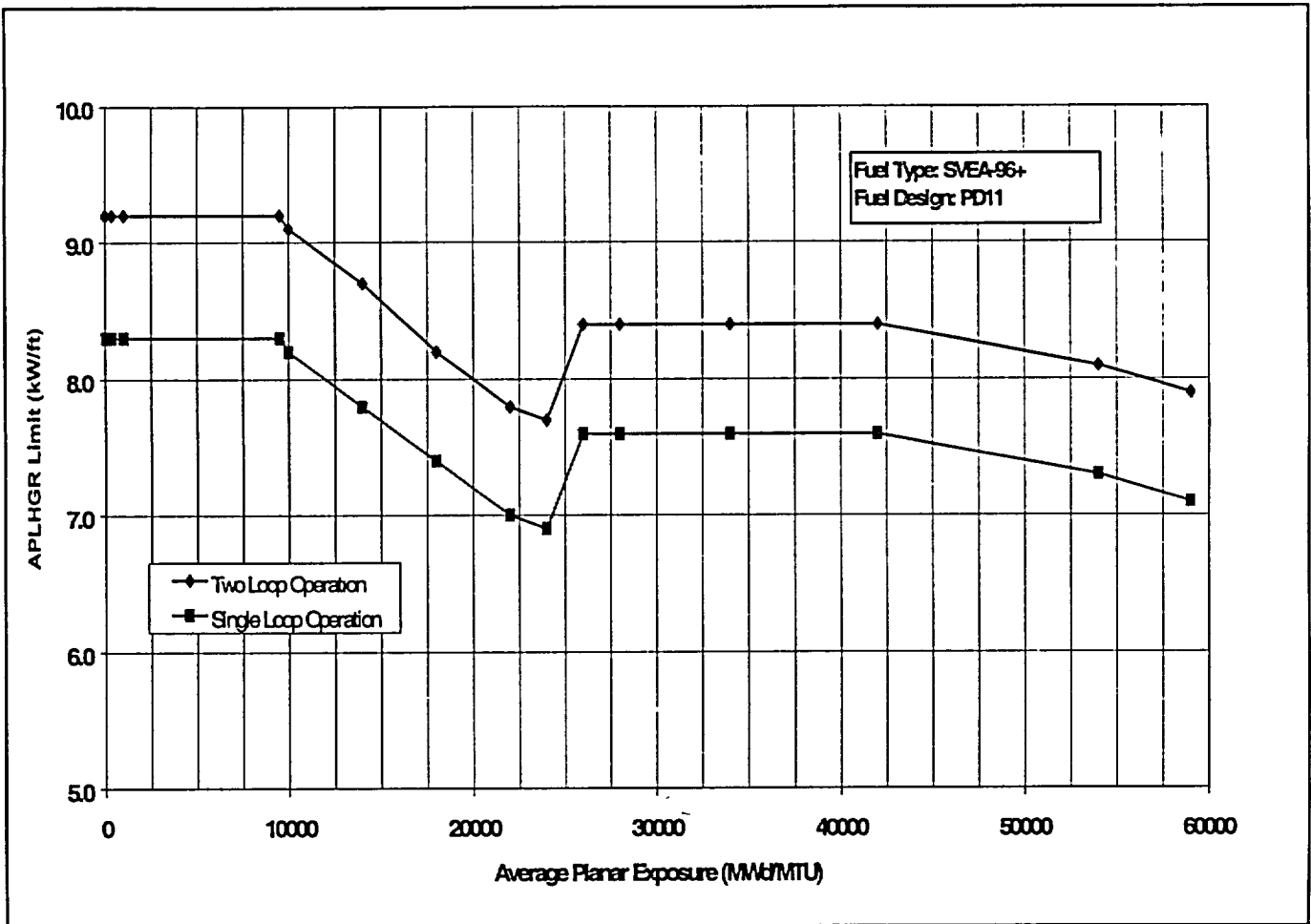


Figure 2.1-14: APLHGR Limit for Fuel Bundle PD11

2.2 MINIMUM CRITICAL POWER RATIO

LIMITING CONDITION FOR OPERATION

The MINIMUM CRITICAL POWER RATIO (MCPR) shall be equal to or greater than the MCPR limit specified in Table 2.2-2 and Table 2.2-3, or shall be greater than 1.45 for any control rod withdrawal while the position of rod 14-47 is above notch 44. The conservative requirement for MCPR greater than 1.45 for any control rod withdrawal while the position of rod 14-47 is above notch 44 is due to the degradation of RBM channel 'A' for this rod as described in notification 20107097.

The Technical Specification Scram Speed (TSSS) is defined by Hope Creek Technical Specification 3.1.3.3. The Nominal Scram Speed (NSS) is defined in reference [4] and is repeated below in Table 2.2-1.

Table 2.2-1: Nominal Scram Speed

Position Inserted from fully withdrawn	Average Scram Insertion Time (seconds)
Notch 45	0.375
Notch 39	0.673
Notch 25	1.399
Notch 5	2.526

NOTE

The Operating Limit MCPR determined with NSS shall be used when the control rod insertion time is less-than or equal-to that documented in Table 2.2.1. If the control rod insertion time is greater-than that assumed for the NSS then the Operating Limit MCPR shall be determined with the TSSS.

The Operating limit MCPR is the maximum of the 'Full Power,' 'Power Dependent' and 'Flow Dependent' values presented in Tables 2.2.2 and 2.2.3 for the various operating conditions, or 1.45 for any control rod withdrawal while the position of rod 14-47 is above notch 44.

The MCPR limit is a function of core average scram speed, Cycle Exposure, EOC-RPT operability and Main Turbine Bypass operability.

EOC-RPT system operability is defined by Hope Creek Technical Specification 3.3.4.2.

Main Turbine Bypass operability is defined by Hope Creek Technical Specification 3.7.7.

Table 2.2-2: Hope Creek Cycle 11 MCPR Operating limits:
Cycle Exposure $\leq 8664\text{MWd/MTU}$

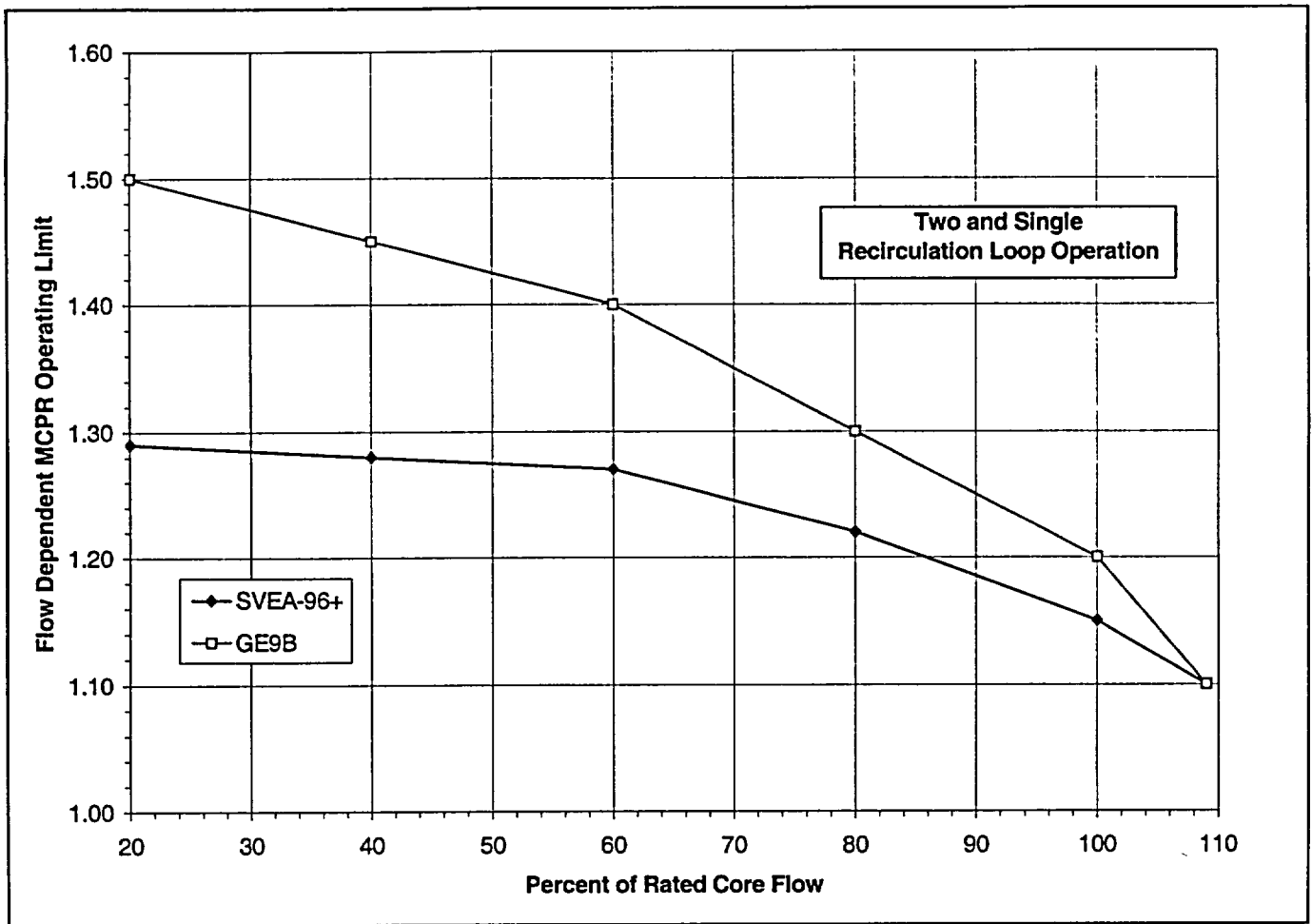
Main Turbine Bypass Operable Cycle Exposure $\leq 8664\text{MWd/MTU}$			
Conditions	Limit	SVEA-96+ ⁽³⁾	GE9B ⁽⁴⁾
NSS ⁽¹⁾ EOC-RPT Operable	Full Power	1.31 ⁽⁵⁾	1.31 ⁽⁵⁾
	Flow Dependent	Figure 2.2.1	Figure 2.2.1
	Power Dependent ⁽²⁾	Figure 2.2.2	Figure 2.2.2
TSSS ⁽¹⁾ EOC-RPT Operable	Full Power	1.35 ⁽⁵⁾	1.45
	Flow Dependent	Figure 2.2.1	Figure 2.2.1
	Power Dependent ⁽²⁾	Figure 2.2.3	Figure 2.2.3
NSS ⁽¹⁾ EOC-RPT Inoperable	Full Power	1.31 ⁽⁵⁾	1.31 ⁽⁵⁾
	Flow Dependent	Figure 2.2.1	Figure 2.2.1
	Power Dependent ⁽²⁾	Figure 2.2.4	Figure 2.2.4
TSSS ⁽¹⁾ EOC-RPT Inoperable	Full Power	1.38 ⁽⁵⁾	1.52
	Flow Dependent	Figure 2.2.1	Figure 2.2.1
	Power Dependent ⁽²⁾	Figure 2.2.5	Figure 2.2.5

1. The TSSS MCPR values are based on the required speed of Technical Specification 3.1.3.3. The NSS MCPR values are based on the Westinghouse transient analysis performed using the control rod insertion times shown in Table 2.2-1. Administrative controls have been established to control the determination of the MCPR operating limit with regard to scram speed.
2. Power dependent MCPR limits are provided for core thermal powers greater than or equal to 25% of rated power at all core flows. A step change in the power dependent MCPR limits occurs at 30% of rated power because direct scram on turbine control valve closure is automatically bypassed below 30% of rated power.
3. Fuel design PA10, PB10, PC11, and PD11 are SVEA-96+ fuel assemblies.
4. Fuel design HD08, HE08 and HF09 are GE9B fuel assemblies.
5. As stated in section 2.2, an MCPR limit of 1.45 is applicable for withdrawal of any control rod while the position of rod 14-47 is above notch 44. This conservative penalty is due to the RBM degradation described in notification 20107097.

Table 2.2-3: Hope Creek Cycle 11 MCPR Operating limits:
Cycle Exposure > 8664MWd/MTU

Main Turbine Bypass Operable 8664MWd/MTU < Cycle Exposure ≤ 12626MWd/MTU			
Conditions	Limit	SVEA-96+ ⁽³⁾	GE9B ⁽⁴⁾
NSS ⁽¹⁾ EOC-RPT Operable	Full Power ⁽⁵⁾	1.40 ⁽⁶⁾	1.52
	Flow Dependent ⁽⁵⁾	Figure 2.2.1	Figure 2.2.1
	Power Dependent ^(2,5)	Figure 2.2.6	Figure 2.2.6
TSSS ⁽¹⁾ EOC-RPT Operable	Full Power ⁽⁵⁾	1.47	1.61
	Flow Dependent ⁽⁵⁾	Figure 2.2.1	Figure 2.2.1
	Power Dependent ^(2,5)	Figure 2.2.7	Figure 2.2.7
NSS ⁽¹⁾ EOC-RPT Inoperable	Full Power ⁽⁵⁾	1.43 ⁽⁶⁾	1.57
	Flow Dependent ⁽⁵⁾	Figure 2.2.1	Figure 2.2.1
	Power Dependent ^(2,5)	Figure 2.2.8	Figure 2.2.8
TSSS ⁽¹⁾ EOC-RPT Inoperable	Full Power ⁽⁵⁾	1.50	1.67
	Flow Dependent ⁽⁵⁾	Figure 2.2.1	Figure 2.2.1
	Power Dependent ^(2,5)	Figure 2.2.9	Figure 2.2.9

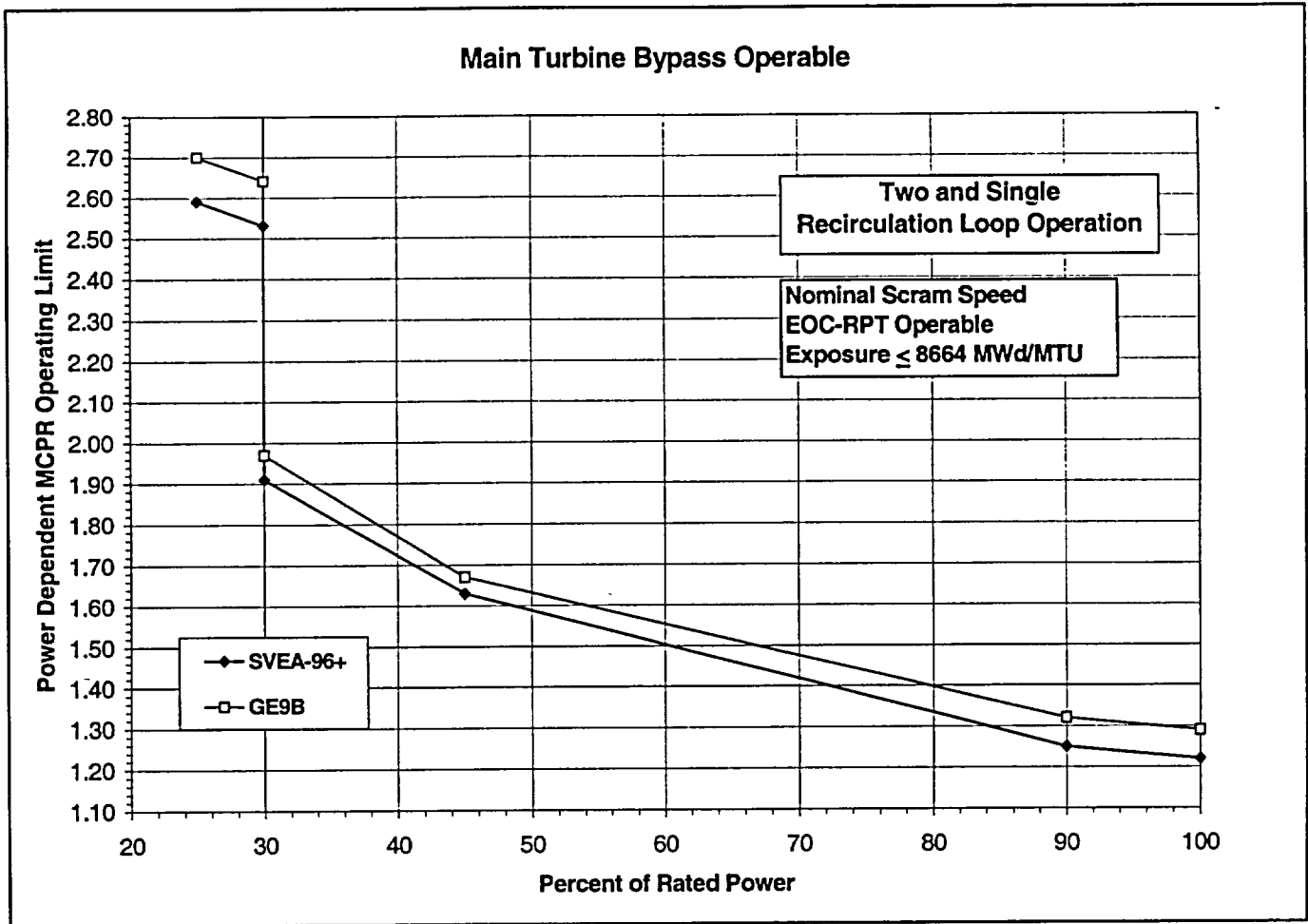
1. See note 1 in Table 2.2-2
2. See note 2 in Table 2.2-2
3. Fuel design PA10, PB10, PC11, and PD11 are SVEA-96+ fuel assemblies.
4. Fuel design HD08, HE08 and HF09 are GE9B fuel assemblies.
5. All full-power and power-dependent MCPR LCO values shall be increased by 0.02 for coastdown operation at reduced power to a cycle exposure of 13616MWd/MTU. The flow-dependent MCPR LCO values remain applicable during coastdown operation.
6. As stated in section 2.2, an MCPR limit of 1.45 is applicable for withdrawal of any control rod while the position of rod 14-47 is above notch 44. This conservative penalty is due to the RBM degradation described in notification 20107097.



Initial Flow (% Rated Flow)	MCPR _f	
	SVEA-96+	GE9B
20	1.29	1.50
40	1.28	1.45
60	1.27	1.40
80	1.22	1.30
100	1.15	1.20
109	1.10	1.10

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

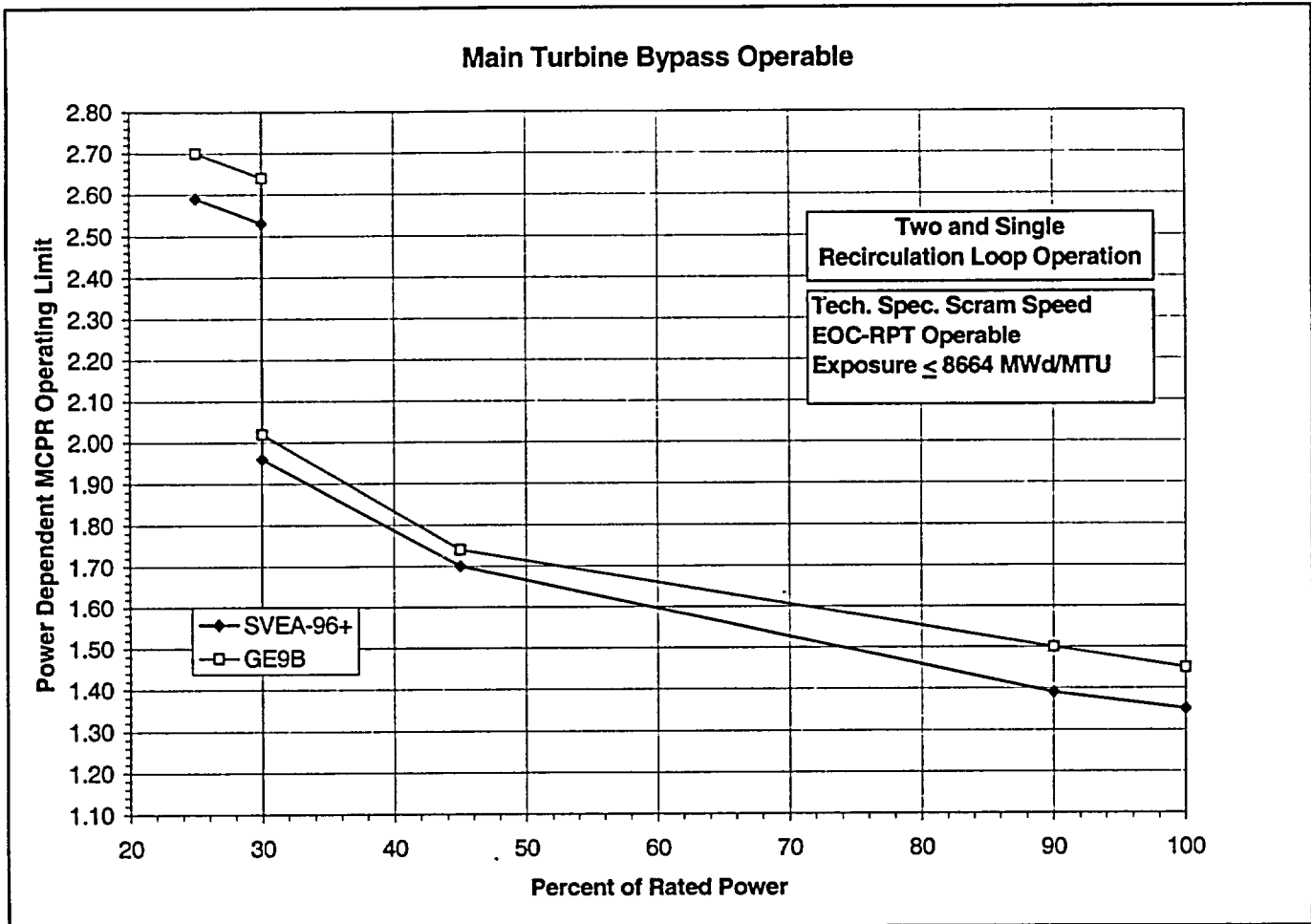
Figure 2.2-1: Flow Dependent MCPR Limit



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power $\geq 30\%$, Credit Direct Scrams	100	1.22	1.29
	90	1.25	1.32
	45	1.63	1.67
	30	1.91	1.97
All Core Flows, Power $< 30\%$, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

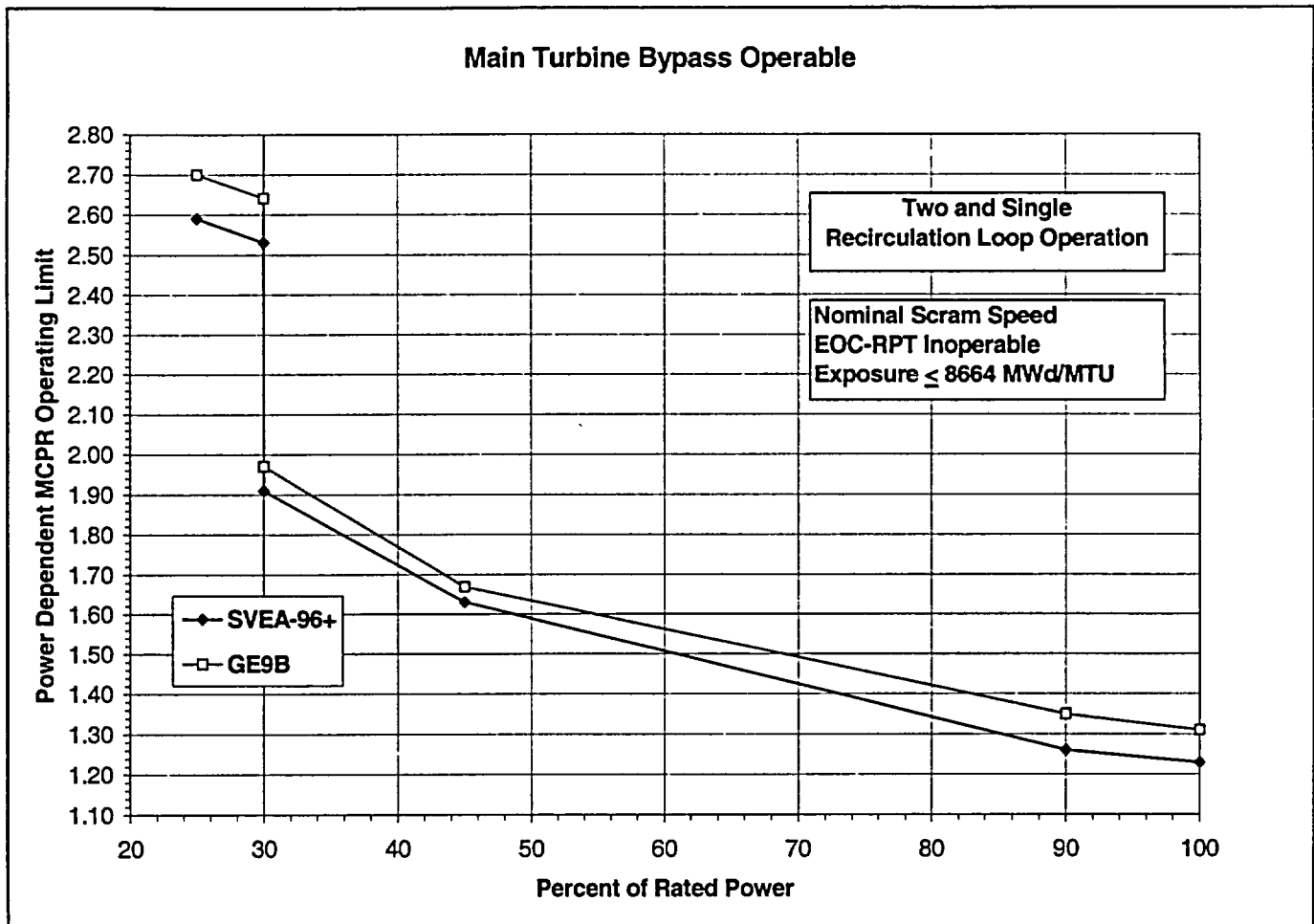
Figure 2.2-2: Power Dependent MCPR Limit:
NSS, Cycle Exposure ≤ 8664 MWd/MTU, EOC-RPT Operable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power $\geq 30\%$, Credit Direct Scrams	100	1.35	1.45
	90	1.39	1.50
	45	1.70	1.74
	30	1.96	2.02
All Core Flows, Power $< 30\%$, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

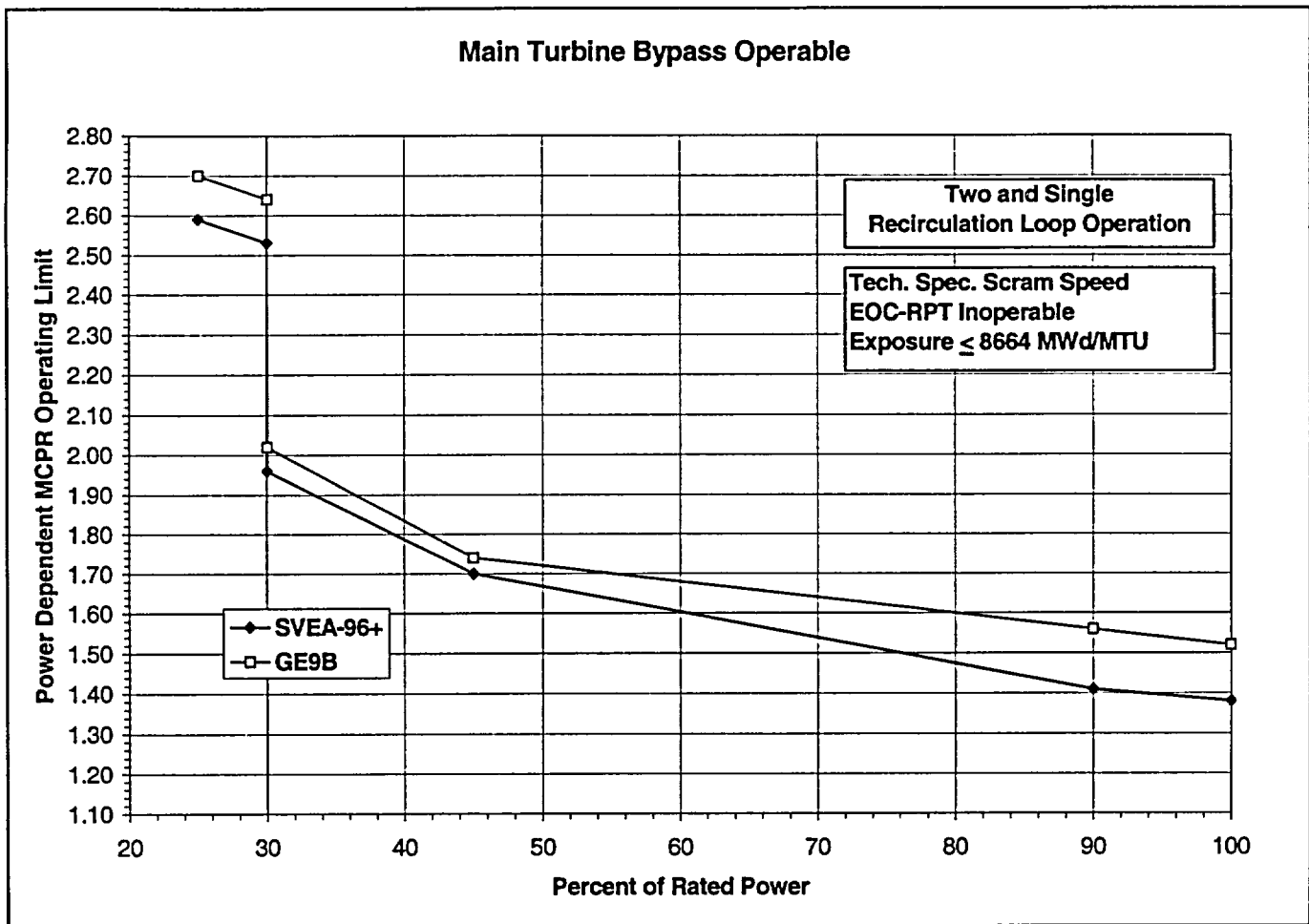
Figure 2.2-3: Power Dependent MCPR Limit:
TSSS, Cycle Exposure ≤ 8664 MWd/MTU, EOC-RPT Operable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power $\geq 30\%$, Credit Direct Scrams	100	1.23	1.31
	90	1.26	1.35
	45	1.63	1.67
	30	1.91	1.97
All Core Flows, Power $< 30\%$, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal when the position of rod 14-47 is above notch 44.

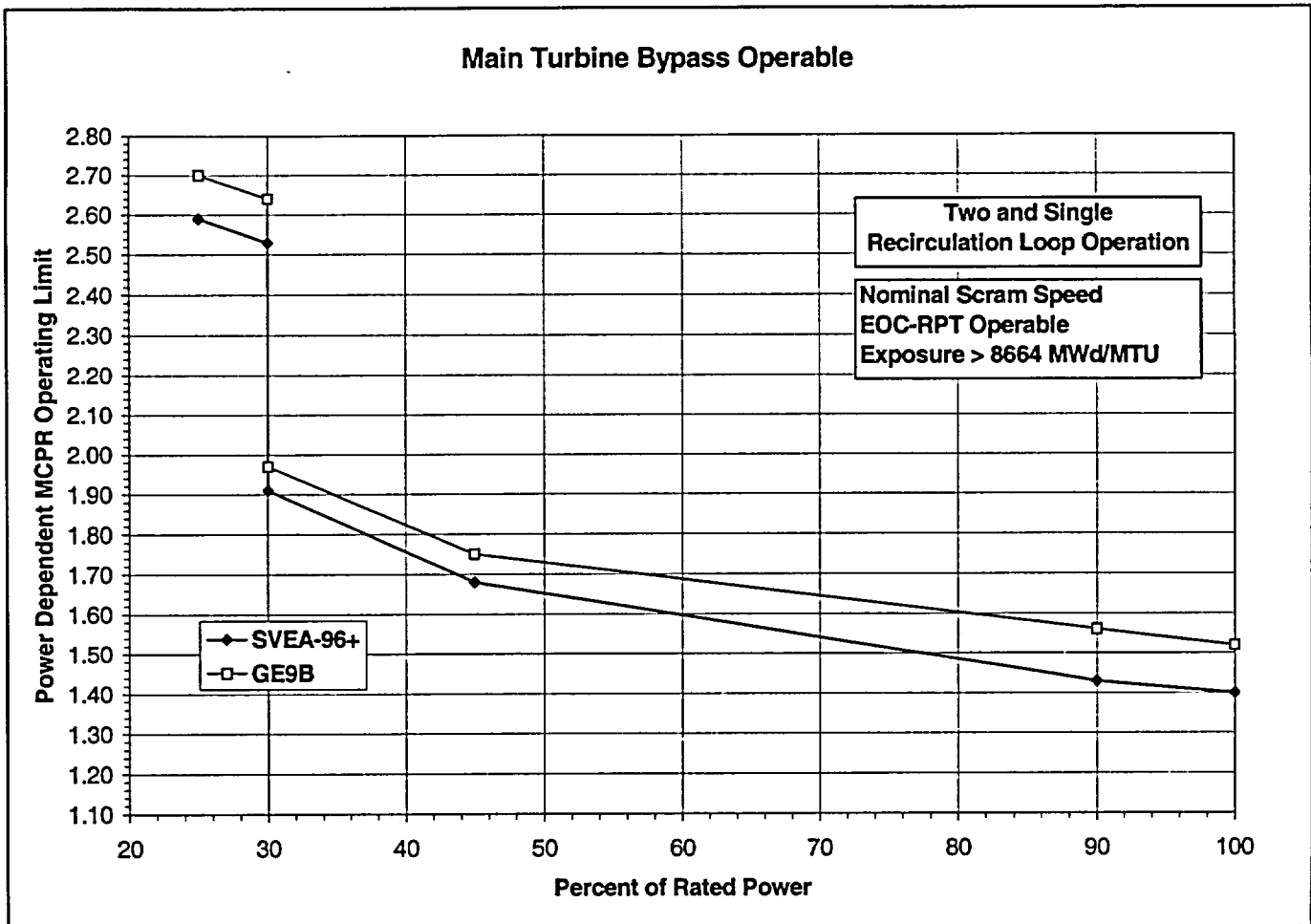
Figure 2.2-4: Power Dependent MCPR Limit:
NSS, Cycle Exposure ≤ 8664 MWd/MTU, EOC-RPT Inoperable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power $\geq 30\%$, Credit Direct Scrams	100	1.38	1.52
	90	1.41	1.56
	45	1.70	1.74
	30	1.96	2.02
All Core Flows, Power $< 30\%$, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

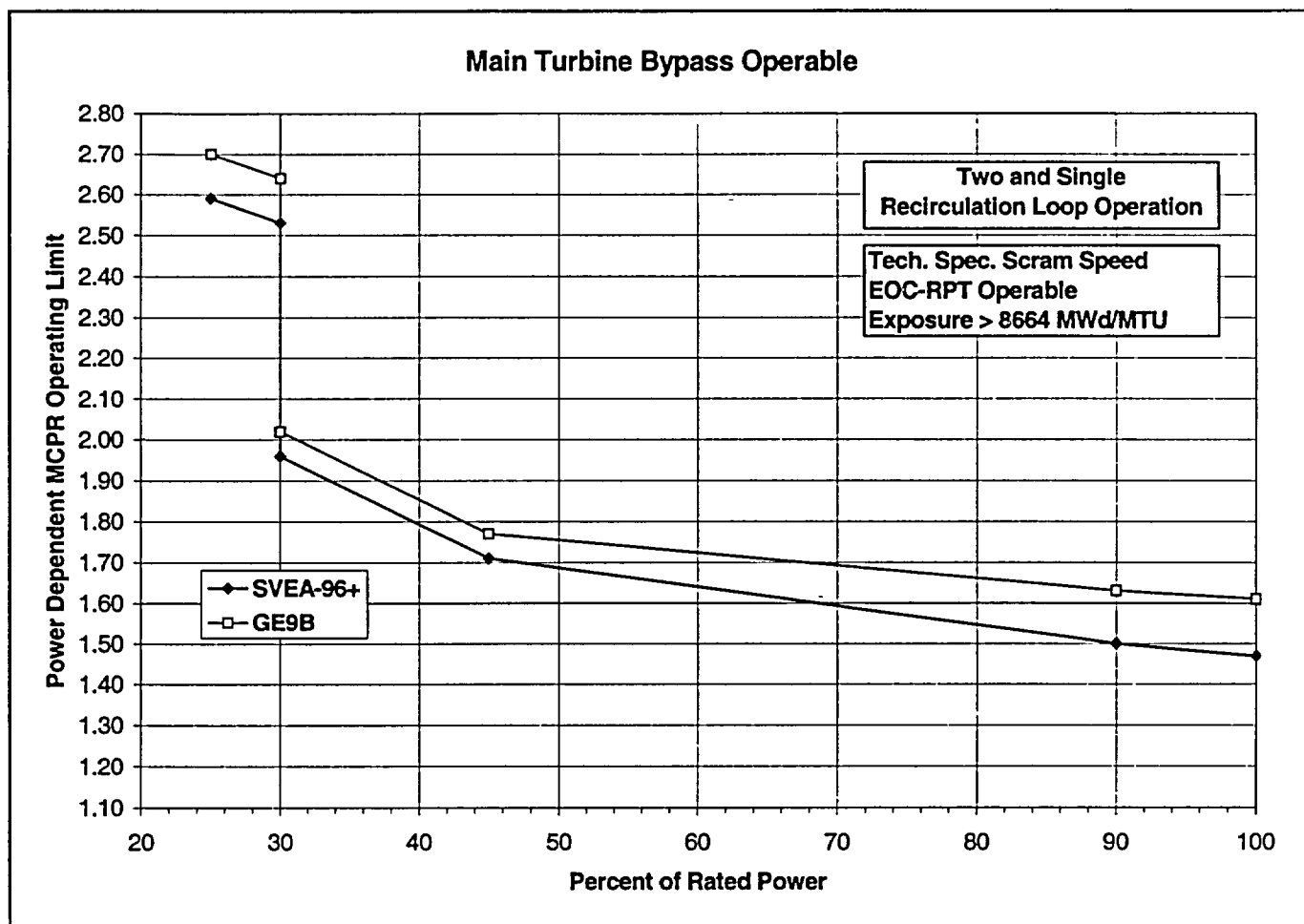
Figure 2.2-5: Power Dependent MCPR Limit:
TSSS, Cycle Exposure ≤ 8664 MWd/MTU, EOC-RPT Inoperable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power ≥ 30%, Credit Direct Scrams	100	1.40	1.52
	90	1.43	1.56
	45	1.68	1.75
	30	1.91	1.97
All Core Flows, Power < 30%, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

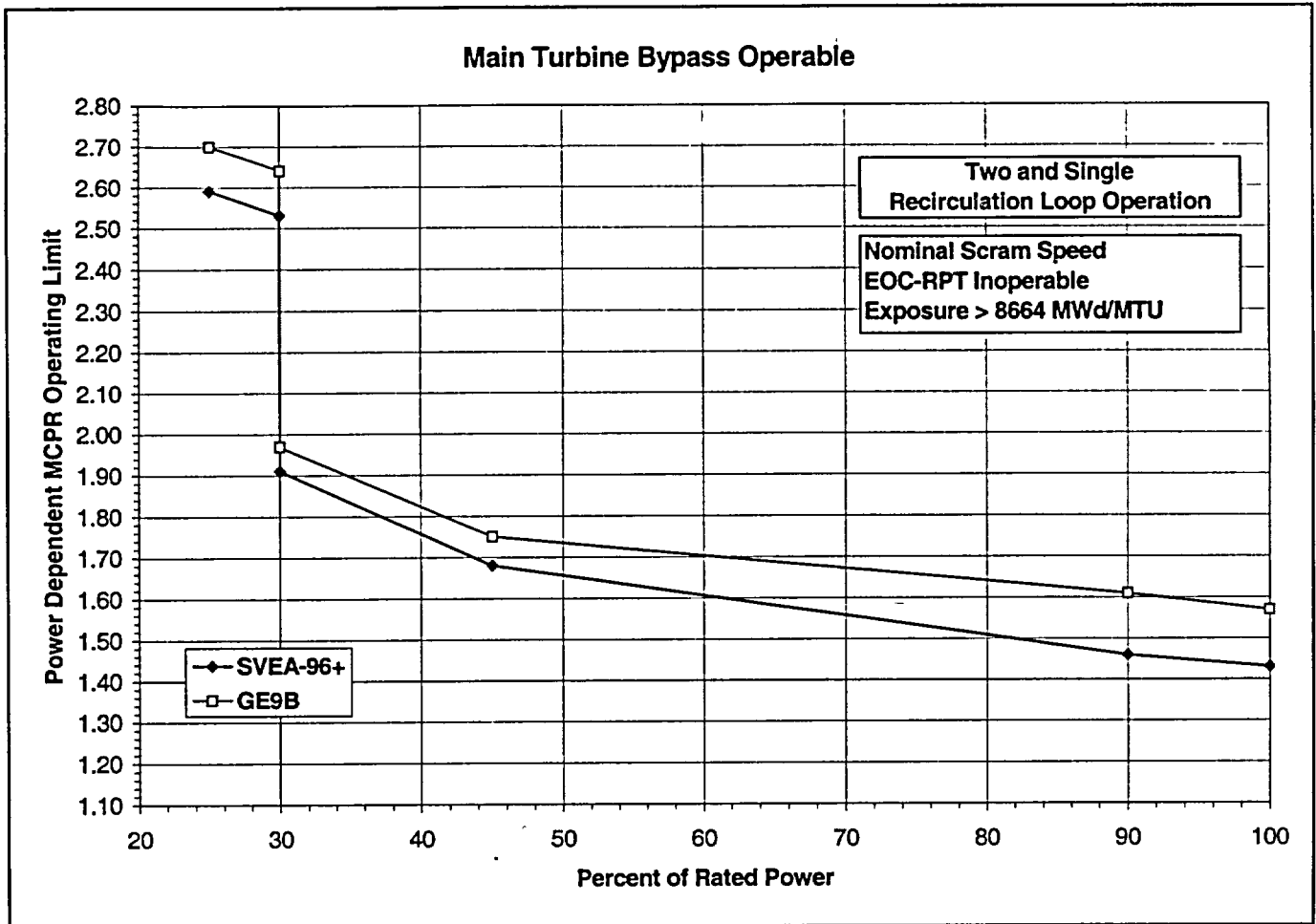
Figure 2.2-6: Power Dependent MCPR Limit:
NSS, Cycle Exposure > 8664MWd/MTU, EOC-RPT Operable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power ≥ 30%, Credit Direct Scrams	100	1.47	1.61
	90	1.50	1.63
	45	1.71	1.77
	30	1.96	2.02
All Core Flows, Power < 30%, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

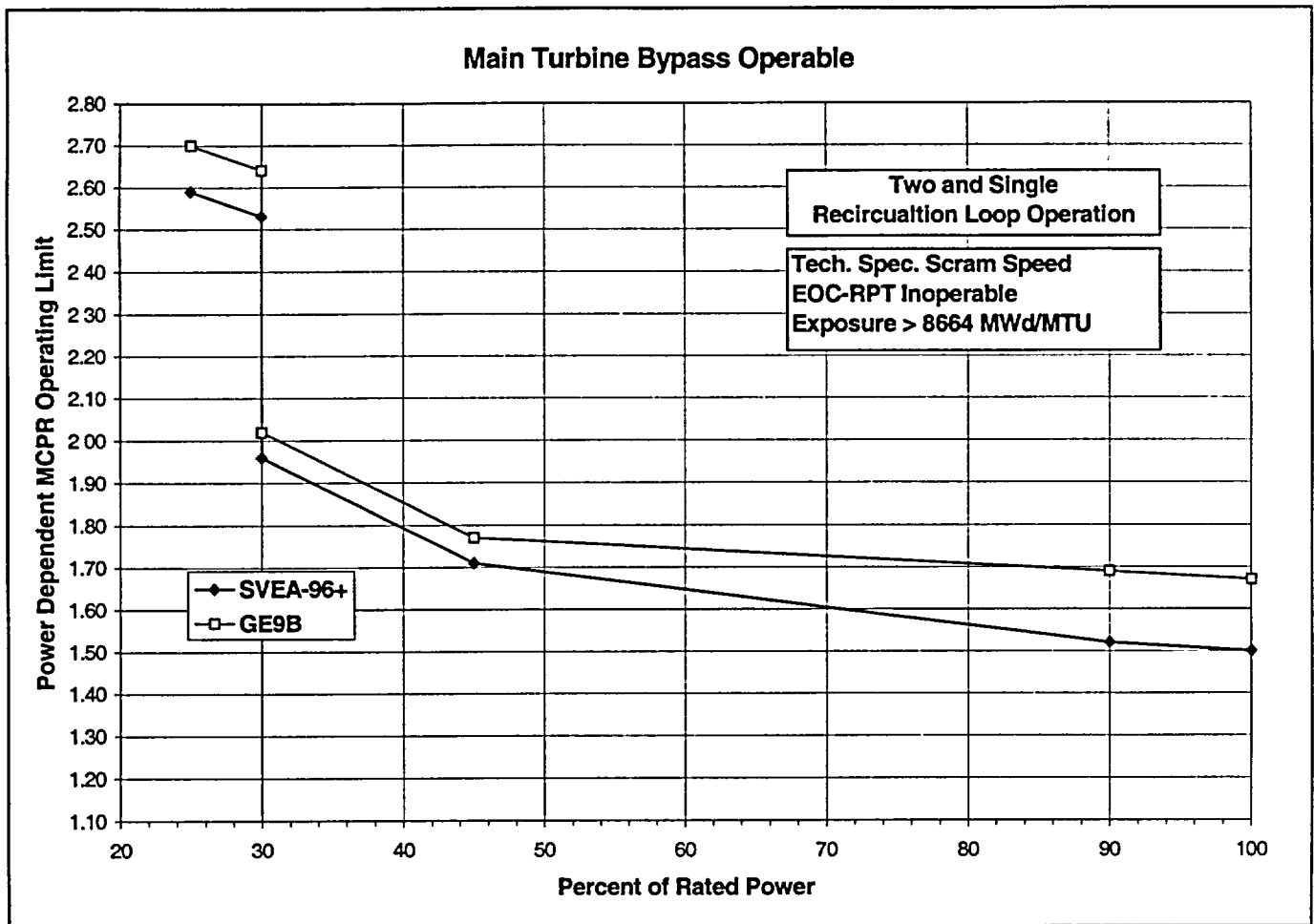
Figure 2.2-7: Power Dependent MCPR Limit:
TSSS, Cycle Exposure > 8664MWd/MTU, EOC-RPT Operable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power ≥ 30%, Credit Direct Scrams	100	1.43	1.57
	90	1.46	1.61
	45	1.68	1.75
	30	1.91	1.97
All Core Flows, Power < 30%, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

Figure 2.2-8: Power Dependent MCPR Limit:
NSS, Cycle Exposure > 8664MWd/MTU, EOC-RPT Inoperable



Notes	Initial Power (% of Rated)	MCPR _p	
		SVEA-96+	GE9B
All Core Flows, Power ≥ 30%, Credit Direct Scrams	100	1.50	1.67
	90	1.52	1.69
	45	1.71	1.77
	30	1.96	2.02
All Core Flows, Power < 30%, Bypass Direct Scrams	30	2.53	2.64
	25	2.59	2.70

As noted in section 2.2, a conservative limit of MCPR > 1.45 shall be used for any control rod withdrawal while the position of rod 14-47 is above notch 44.

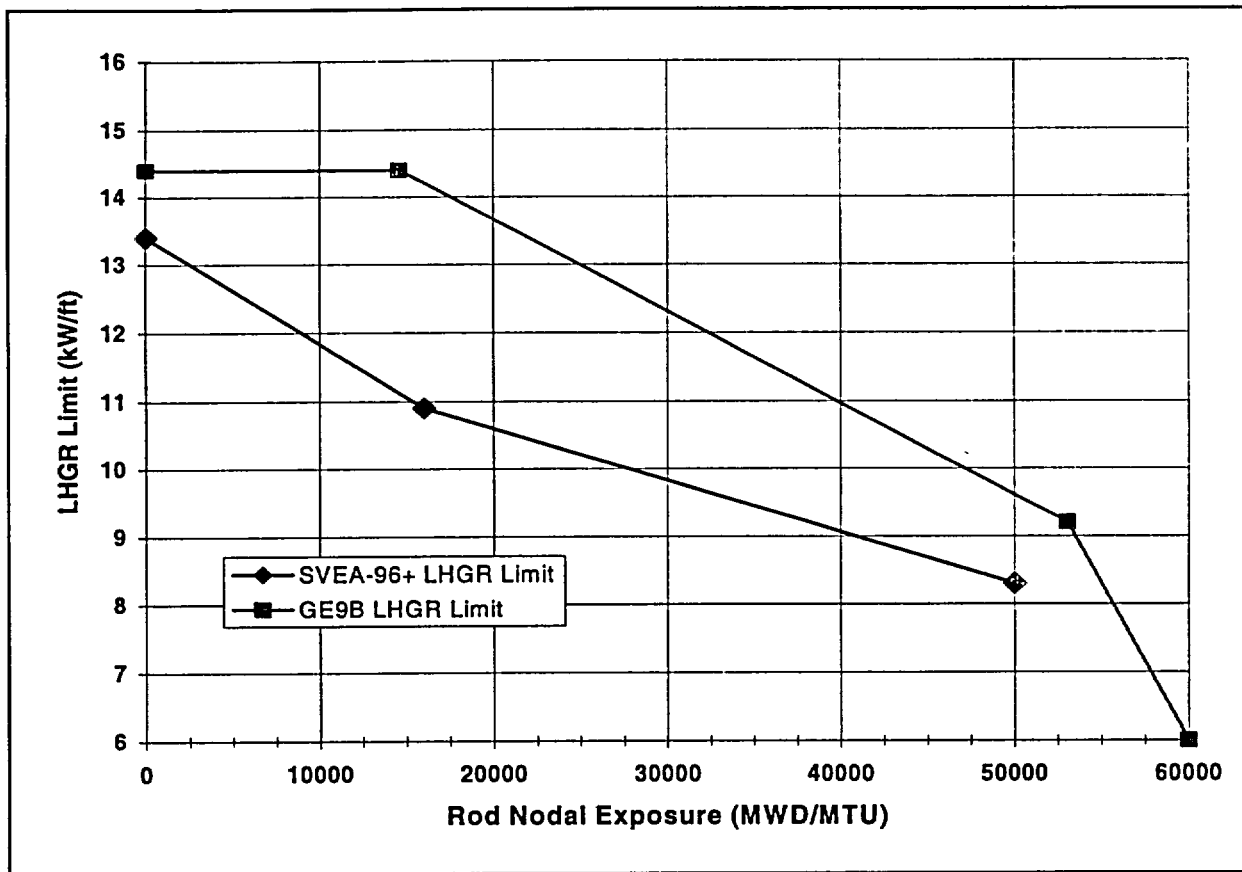
Figure 2.2-9: Power Dependent MCPR Limit:
TSSS, Cycle Exposure > 8664MWd/MTU, EOC-RPT Inoperable

2.3 LINEAR HEAT GENERATION RATE

LIMITING CONDITION FOR OPERATION

The LINEAR HEAT GENERATION RATE (LHGR) shall not exceed the limit specified in Figure 2.3-1.

The CORE MAXIMUM FRACTION OF LIMITING POWER DENSITY as implemented in Technical Specification Section 3/4.2.2 shall use a FRACTION OF LIMITING POWER DENSITY that is based on a specified LHGR equal to the exposure dependent LHGR in Figure 2.3-1 for the SVEA-96+ fuel assemblies and a constant LHGR of 14.4kw/ft for the GE9B fuel assemblies.



Rod Nodal Exposure (MWD/MTU)	LHGR Limit (kW / ft)	LHGR Limit (kW / ft)
	SVEA-96+	GE9B
0	13.4	14.4
14591	-----	14.4
16000	10.9	-----
50000	8.3	-----
53000	Not Applicable	9.2
60000	Not Applicable	6.0

Figure 2.3-1: Exposure Dependent LHGR Limits

3.0 REFERENCES

1. "Reference Safety Report for Boiling Water Reactor Reload Fuel," ABB Combustion Engineering Nuclear Operations, CENPD-300-P-A, Revision 0, July 1996.
2. Nuclear Fuel Section Vendor Technical Document, NFVD-AB-2001-008-00, "HCGS Cycle 11 Reload Licensing Report," Westinghouse Electric Company LLC, WCAP-15717 Rev. 0, August 2001.
3. Nuclear Fuel Section Design Input File, HCA.5-0039, "Cycle 10 GE9B Operating Limit and COLR Related Information."
4. Nuclear Fuel Section Vendor Technical Document, NFVD-AB-2001-006-00, "Conditions for Design: PSEG Nuclear LLC: Hope Creek: Cycle 11 Reload Analysis," Westinghouse Electric Company LLC, CE NPSD-885-P, Rev. 0, May 2001.
5. "General Electric Standard Application for Reactor Fuel," General Electric Company, NEDE-24011-P-A, Revision 13, August 1996, and the U.S. Supplement NEDE-24011-P-A-US, Revision 13, August 1996.