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WNP-2

Cycle 15

Core Operating Limits Report

October 1999

Energy Northwest

WNP-2
Cycle 15
Core Operating Limits Report

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WNP-2
Cycle 15
Core Operating Limits Report

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1.0 INTRODUCTION AND SUMMARY

This report provides the **Average Planar Linear Heat Generation Rate (APLHGR)** limits, the **Minimum Critical Power Ratio (MCPR)** limits, the **Linear Heat Generation Rate (LHGR)** limits and the **Power to Flow Map** for WNP-2, Cycle 15 as required by Technical Specification 5.6.5. As required by Technical Specification 5.6.5, these limits were determined using NRC-approved methodology and are established so that all applicable limits of the plant safety analysis are met. References 6.1, 6.2, 6.3, and 6.4 describe the LOCA analysis for rated power. The analysis was performed with a methodology that results in Single Loop Operation APLHGR limits as well as Two Loop Operation APLHGR LIMITS. The thermal limits for fuel given in this report are documented in the "WNP-2 Cycle 15 Reload Licensing Report" (Reference 6.3) and Reference 6.5. The basis for the power to flow map which addresses the instability operating region limits is documented in Reference 6.3.

The MCPR limit is the maximum of (a) the applicable exposure dependent, full power and full flow MCPR limit, (b) the applicable exposure and power dependent MCPR limit, and (c) the applicable flow dependent MCPR limit specified in this report. This stipulation assures that the safety limit MCPR will not be violated throughout the WNP-2 operating regime. Full power MCPR limits are specified to define operating limits at rated power and flow. Power dependent MCPR limits are specified to define operating limits at other than rated power conditions. A flow dependent MCPR is specified to define operating limits at other than rated flow conditions. The reduced flow MCPR limit, set by the limiting Recirculation Flow Increase event, provides bounding protection for all events at reduced flow.

The reload licensing analyses for this cycle provide operating limits for Extended Load Line Limit Analysis (ELLLA) operation which extends the power and flow operating regime for WNP-2 up to the 108% rod line which at full power corresponds to 88% of rated flow. The MCPR limits defined in this report are applicable up to 100% of rated thermal power along and below the 108% rod line. The minimum flow for operation at rated power is 88% of rated flow; the maximum is 106%.

Preparation, review, and approval of this report were performed in accordance with applicable Energy Northwest procedures. The specific topical report revisions and supplements which describe the methodology utilized in this cycle specific analysis are referenced in Technical Specification 5.6.5.

2.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR) LIMITS FOR USE IN TECHNICAL SPECIFICATION 3.2.1

The APLHGRs for use in Technical Specification 3.2.1, as a function of Average Planar Exposure, shall not exceed the limits shown in the following figures:

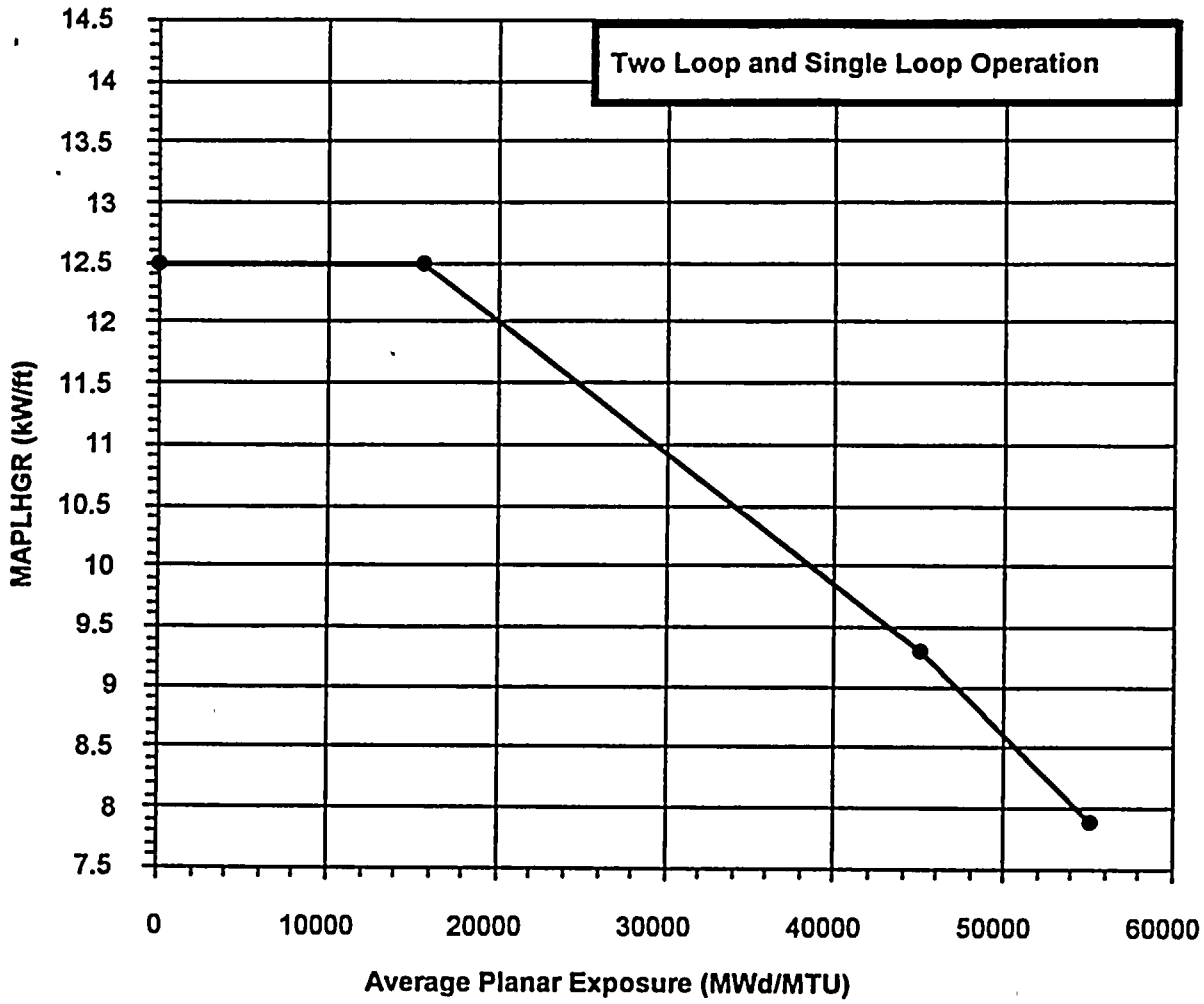
a. Figure 2.1 - SPC 9x9-9X reload fuel

b. Figure 2.2 - ABB SA- and SB-Type SVEA-96 reload fuel - Two Loop Operation

c. Figure 2.3 - ABB SA- and SB-Type SVEA-96 reload fuel - Single Loop Operation

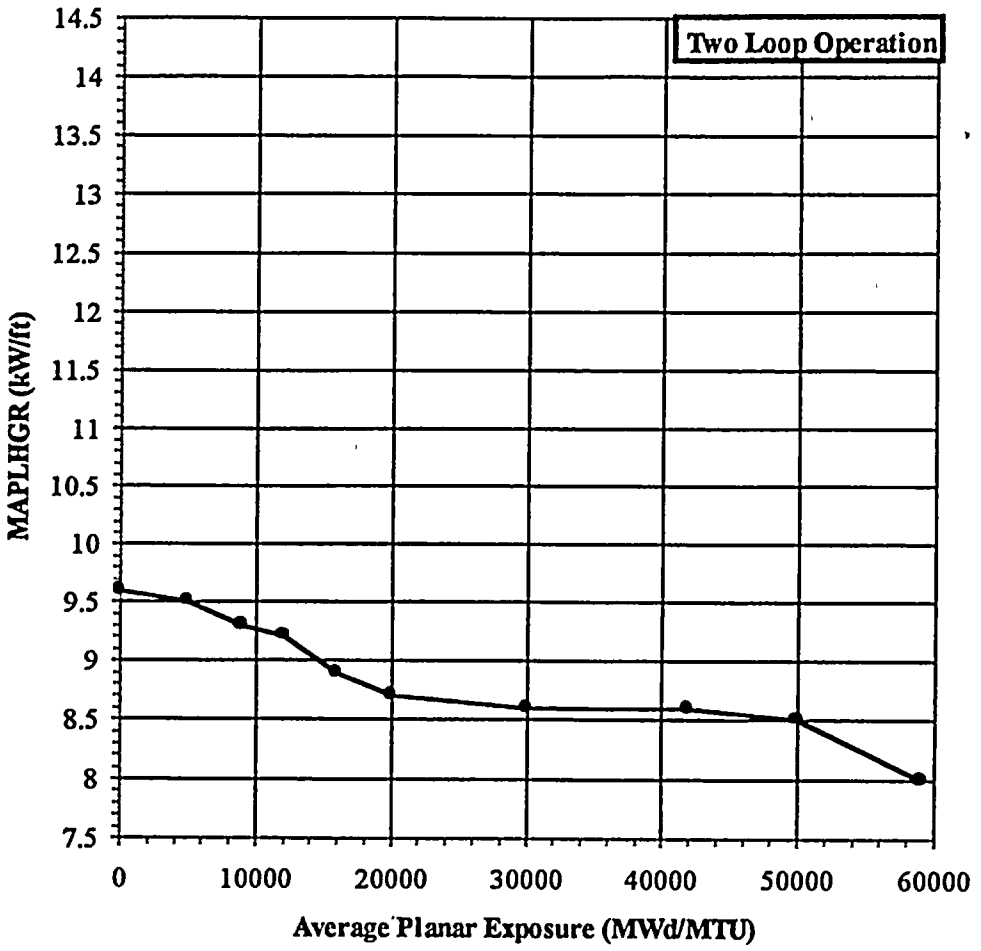
d. Figure 2.4 - ABB SC- and SD-Type SVEA-96 reload fuel - Two Loop Operation

e. Figure 2.5 - ABB SC- and SD-Type SVEA-96 reload fuel – Single Loop Operation



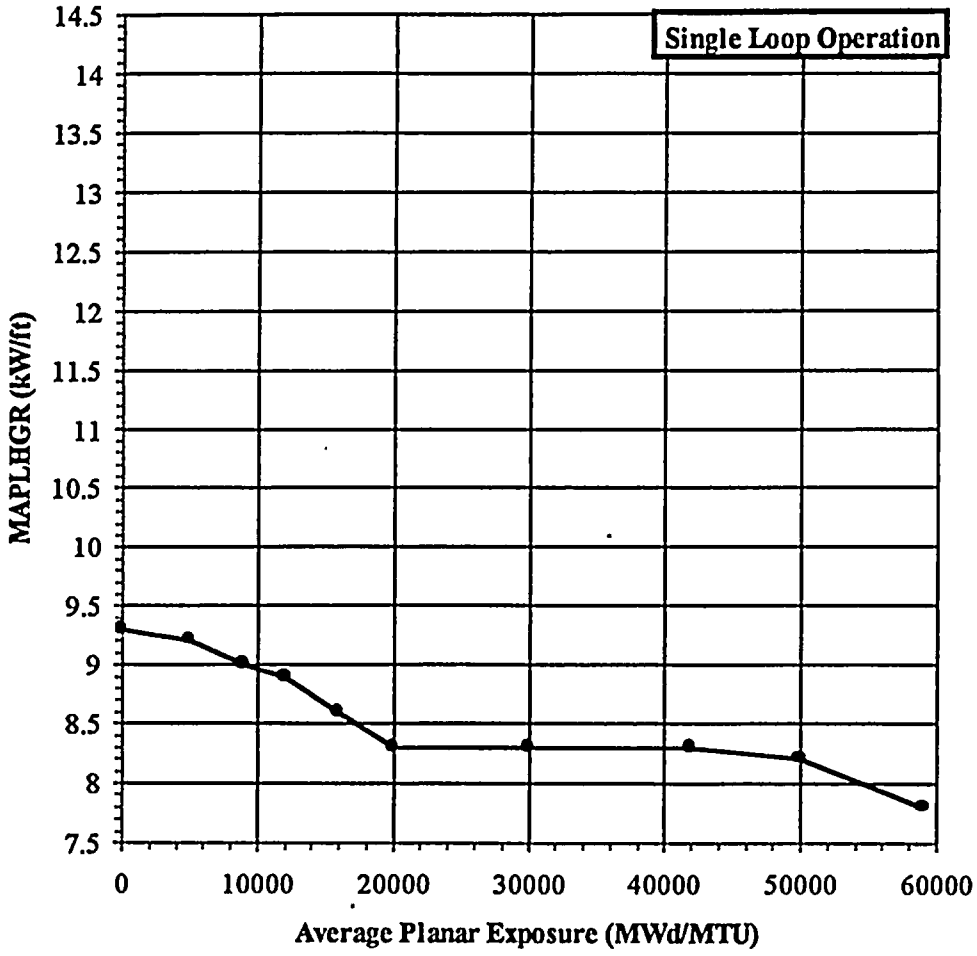
Average Planar Exposure (MWd/MTU)	MAPLHGR (kW/ft)
0	12.5
15500	12.5
45000	9.3
55000	7.9

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
Versus Average Planar Exposure
SPC 9x9-9X
Figure 2.1



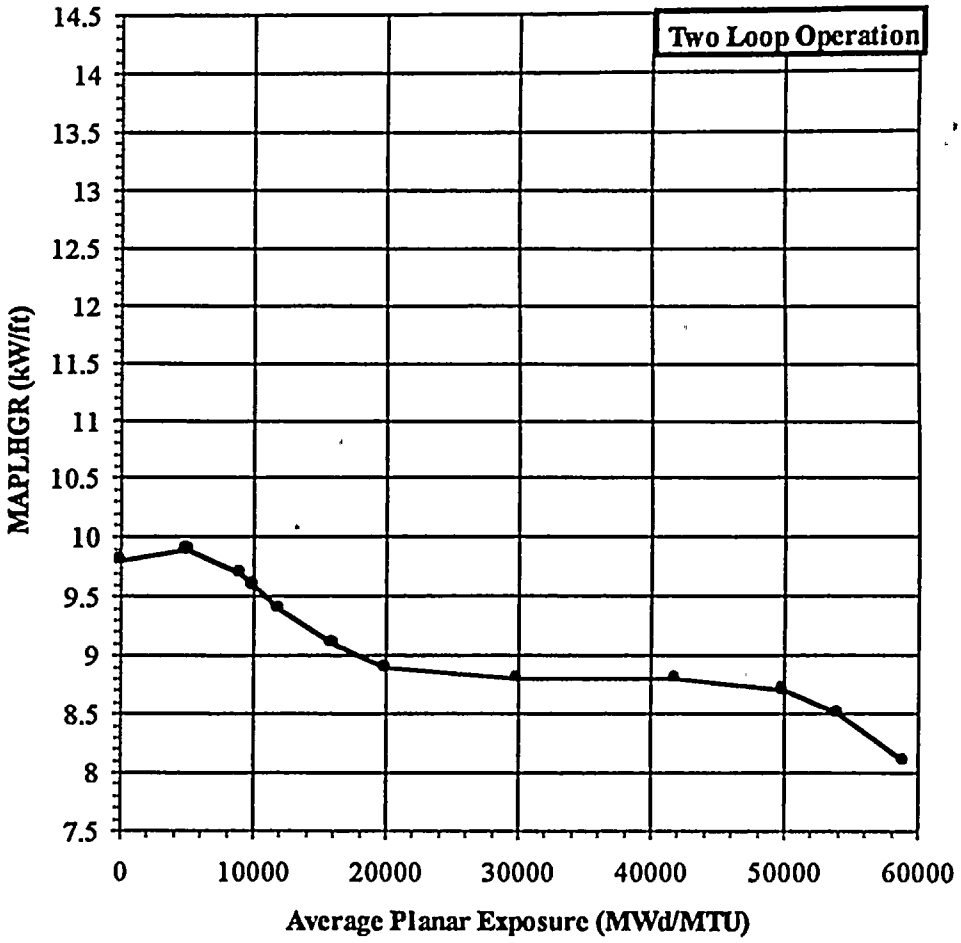
Average Planar Exposure (MWd/MTU)	MAPLHGR (kW/ft)
0	9.6
5000	9.5
9000	9.3
12000	9.2
16000	8.9
20000	8.7
30000	8.6
42000	8.6
50000	8.5
59000	8.0

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
Versus Average Planar Exposure - Two Loop Operation
ABB SA- and SB-Type SVEA-96
Figure 2.2



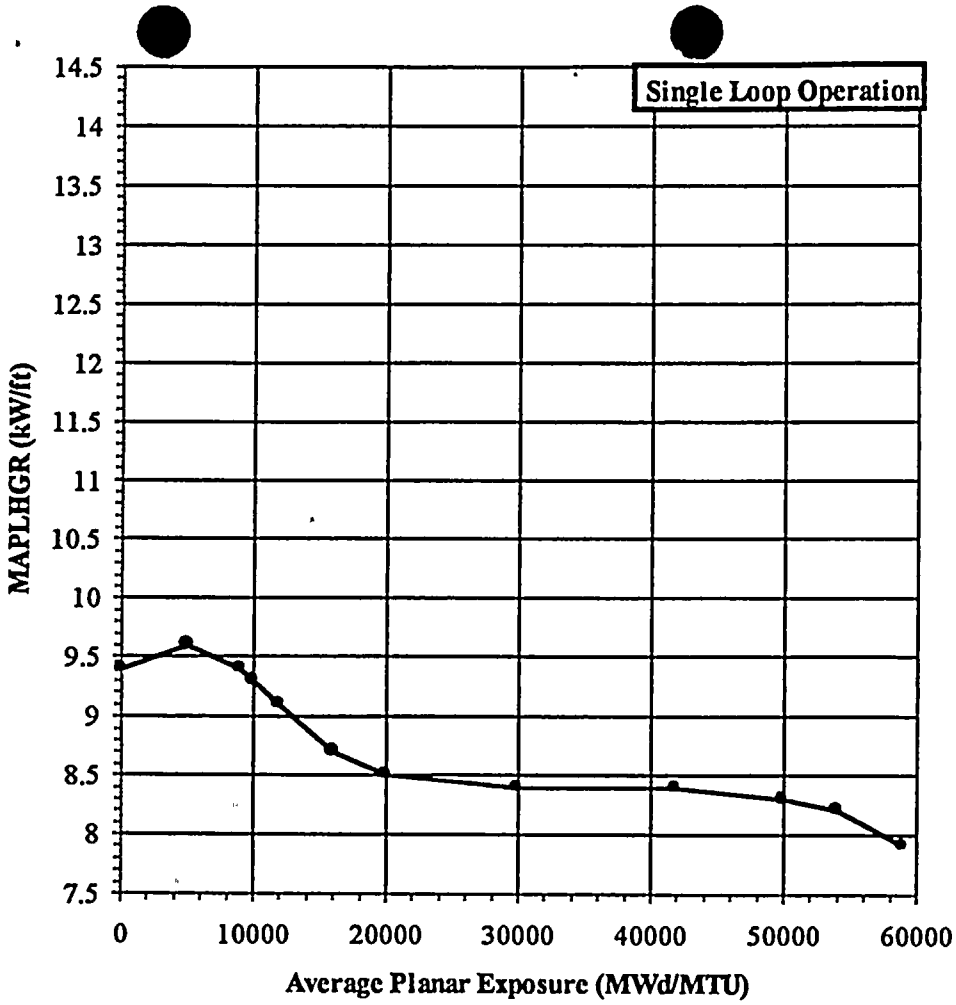
Average Planar Exposure (MWd/MTU)	MAPLHGR (kW/ft)
0	9.3
5000	9.2
9000	9.0
12000	8.9
16000	8.6
20000	8.3
30000	8.3
42000	8.3
50000	8.2
59000	7.8

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
Versus Average Planar Exposure - Single Loop Operation
ABB SA- and SB-Type SVEA-96
Figure 2.3



Average Planar Exposure (MWd/MTU)	MAPLHGR (kW/ft)
0	9.8
5000	9.9
9000	9.7
10000	9.6
12000	9.4
16000	9.1
20000	8.9
30000	8.8
42000	8.8
50000	8.7
54000	8.5
59000	8.1

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
Versus Average Planar Exposure - Two Loop Operation
ABB SC- and SD-Type SVEA-96
Figure 2.4



Average Planar Exposure (MWd/MTU)	MAPLHGR (kW/ft)
0	9.4
5000	9.6
9000	9.4
10000	9.3
12000	9.1
16000	8.7
20000	8.5
30000	8.4
42000	8.4
50000	8.3
54000	8.2
59000	7.9

Maximum Average Planar Linear Heat Generation Rate (MAPLHGR)
Versus Average Planar Exposure - Single Loop Operation
ABB SC- and SD-Type SVEA-96
Figure 2.5

3.0 MINIMUM CRITICAL POWER RATIO (MCPR) LIMIT FOR USE IN TECHNICAL SPECIFICATION 3.2.2

The MCPR limit for use in Technical Specification 3.2.2 shall be greater than or equal to the bounding limits determined from Table 3.1a, Table 3.1b, Table 3.2a, Table 3.2b and Figures 3.1 through 3.34. For the purposes of cycle extension, the feedwater temperature entering the reactor vessel shall not be reduced to less than 355°F. The MCPR limits given apply to both two loop and single loop operation.

The MCPR safety limit for SPC 9x9-9X is 1.10 for two loop operation and 1.11 for single loop operation. Note: ATRIUM-9X and SPC 9x9-9X are equivalent terms for the same fuel type and may be used interchangeably.

The MCPR safety limit for SVEA-96 is 1.10 for two loop operation and 1.12 for single loop operation.

Table 3.1a

WNP-2 Cycle 15 MCPR Operating Limits
Two Loop and Single Loop Operation
Turbine Bypass System Operable

Cycle Exposure ≤9000 MWd/MTU

Condition	Limit	SLMCPR = 1.10 (2) SPC 9x9-9X	SLMCPR = 1.10 (2) ABB SVEA-96
NSS (1)	Full Power Flow Dependent (4) Power Dependent (5)	1.39 (3) Fig. 3.1 Fig. 3.3	1.33 (3) Fig. 3.2 Fig. 3.7
TSSS (1)	Full Power Flow Dependent (4) Power Dependent (5)	1.39 (3) Fig. 3.1 Fig. 3.11	1.33 (3) Fig. 3.2 Fig. 3.15
NSS (1) RPT Inop.	Full Power Flow Dependent (4) Power Dependent (5)	1.39 (3) Fig. 3.1 Fig. 3.27	1.33 (3) Fig. 3.2 Fig. 3.31

Table 3.1b

WNP-2 Cycle 15 MCPR Operating Limits
Two Loop and Single Loop Operation
Turbine Bypass System Operable

Cycle Exposure >9000 MWd/MTU

Condition	Limit	SLMCPR		FFTR SLMCPR	
		1.10 (2)	1.10 (2)	1.10 (2)	1.10 (2)
		SPC 9x9-9X	ABB SVEA-96	SPC 9x9-9X	ABB SVEA-96
NSS (1)	Full Power	1.39	1.40	1.39	1.40
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.4	Fig. 3.8	Fig. 3.19	Fig. 3.21
TSSS (1)	Full Power	1.42	1.43	1.42	1.43
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.12	Fig. 3.16	Fig. 3.23	Fig. 3.25
NSS (1) RPT Inop.	Full Power	1.45	1.45	Not Analyzed	
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2		
	Power Dependent (5)	Fig. 3.28	Fig. 3.32		

Table 3.2a

WNP-2 Cycle 15 MCPR Operating Limits
Two Loop and Single Loop Operation
Turbine Bypass System Inoperable

Cycle Exposure ≤9000 MWd/MTU

Condition	Limit	SLMCPR = 1.10 (2) SPC 9x9-9X	SLMCPR = 1.10 (2) ABB SVEA-96
NSS (1)	Full Power	1.39 (3)	1.33 (3)
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.5	Fig. 3.9
TSSS (1)	Full Power	1.39 (3)	1.37
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.13	Fig. 3.17
NSS (1) RPT Inop.	Full Power	1.39 (3)	1.33 (3)
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.29	Fig. 3.33

Table 3.2b

WNP-2 Cycle 15 MCPR Operating Limits
Two Loop and Single Loop Operation
Turbine Bypass System Inoperable

Cycle Exposure >9000 MWd/MTU

Condition	Limit	SLMCPR		FFTR SLMCPR	
		1.10 (2)	1.10 (2)	1.10 (2)	1.10 (2)
		SPC 9x9-9X	ABB SVEA-96	SPC 9x9-9X	ABB SVEA-96
NSS (1)	Full Power	1.42	1.44	1.45	1.46
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.6	Fig. 3.10	Fig. 3.20	Fig. 3.22
TSSS (1)	Full Power	1.45	1.47	1.48	1.48
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2	Fig. 3.1	Fig. 3.2
	Power Dependent (5)	Fig. 3.14	Fig. 3.18	Fig. 3.24	Fig. 3.26
NSS (1) RPT Inop.	Full Power	1.48	1.48	Not Analyzed	
	Flow Dependent (4)	Fig. 3.1	Fig. 3.2		
	Power Dependent (5)	Fig. 3.30	Fig. 3.34		

Notes for Tables 3. la, 3.1b, 3.2a, and 3.2b

Note 1: The scram insertion times must meet the requirements of Technical Specification 3.1.4. The NSS MCPR values are based on the ABB transient analysis performed using the control rod insertion times shown below (defined as normal scram speed: NSS). In the event that SRs 3.1.4.1, 3.1.4.2, 3.1.4.3 and 3.1.4.4 show the NSS insertion times have been exceeded, the MCPR limit shall be determined from the applicable Technical Specification Scram Speed (TSSS) MCPR limits in Tables 3.1a, 3.1b, 3.2a, and 3.2b. The NSS and TSSS MCPR limits include up to eight declared "slow" rods.

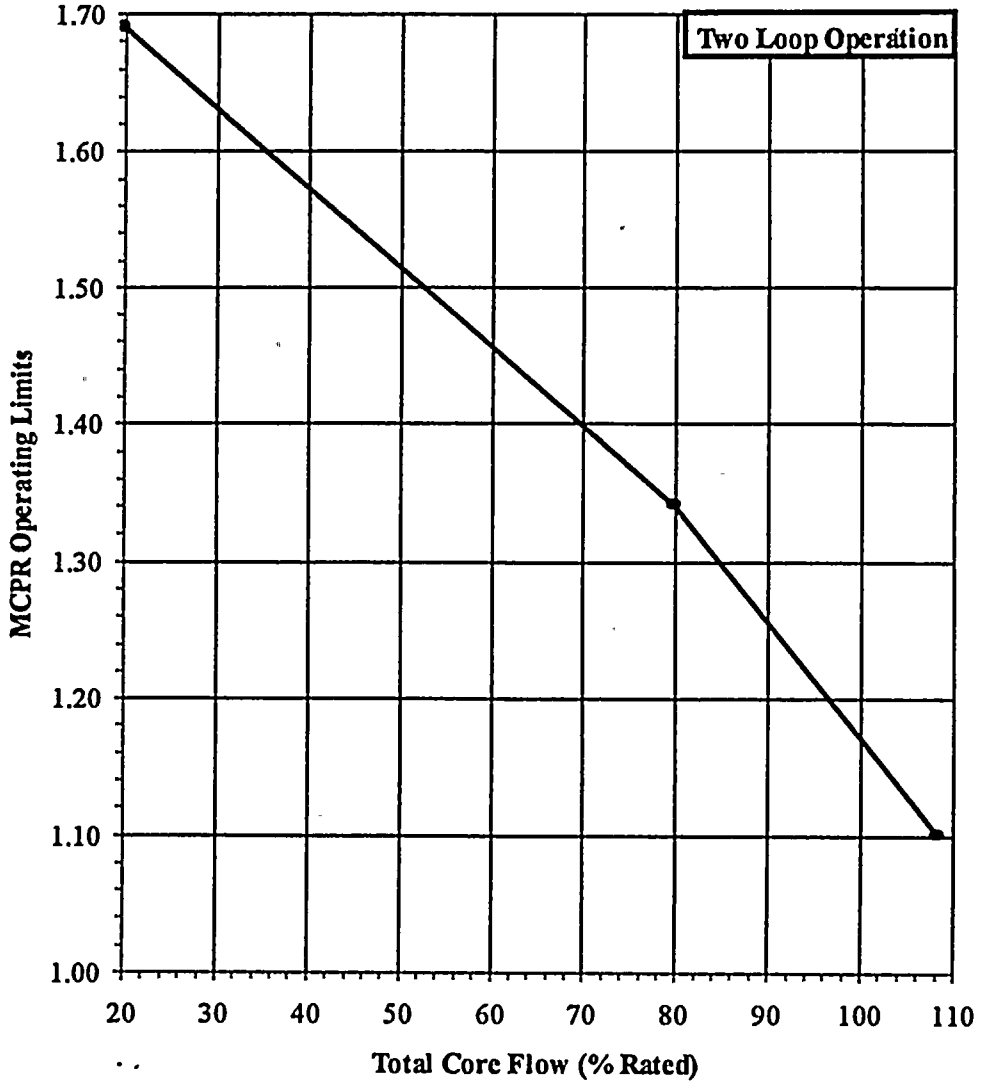
Position Inserted From Fully Withdrawn	Slowest measured average control rod insertion times (seconds) to specified notches for all operable control rods for each group of four control rods arranged in a two-by-two array. (Excluding rods which have been declared "slow" and that meet the "slow" control rod separation criteria.)
Notch 45	0.430
Notch 39	0.720
Notch 25	1.600
Notch 5	2.950

Note 2: For Single Loop Operation (SLO), the 9x9-9x SLMCPR increases by 0.01 and the SVEA-96 SLMCPR increases by 0.02. The increases are included in the MCPR operating limits.

Note 3: For the noted full power MCPR limits, the Rod Withdrawal Error (RWE) event is limiting. The RWE analysis was performed with a nominal Rod Block Monitor (RBM) setpoint of 1.06.

Note 4: Flow dependent MCPRs are not applicable for SLO.

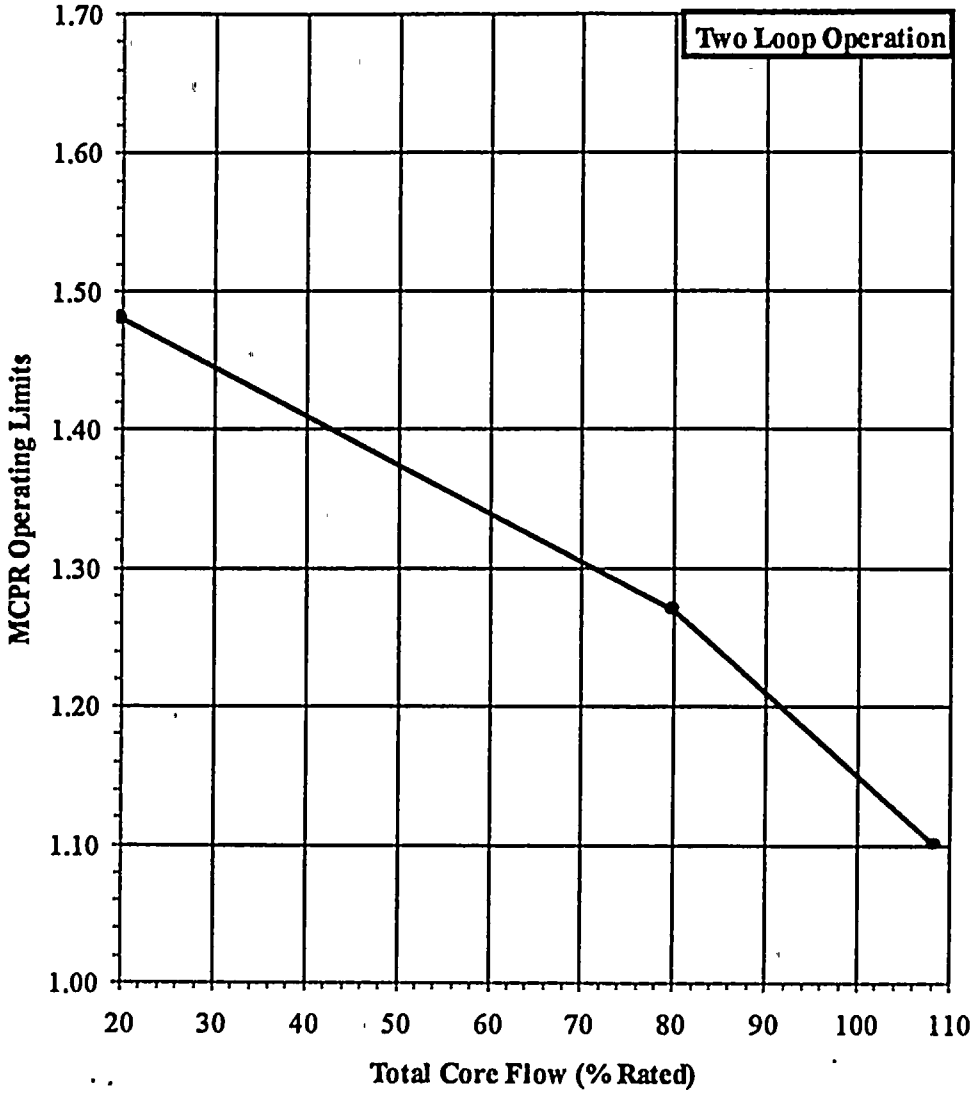
Note 5: Power dependent MCPR limits are provided for core thermal powers greater than or equal to 25 % of rated power at all core flows. The power dependent MCPR limits for core thermal powers less than or equal to 30% of rated power are subdivided by core flow. Limits are provided for core flows greater than 50% of rated flow and less than or equal to 50% of rated flow, respectively. A step change in the power dependent MCPR limits occurs at 30% of rated power because direct scram on turbine throttle valve closure is automatically bypassed below 30% of rated power and not applicable per Technical Specification 3.3.1.1.



Total Core Flow Rate	Operating Limit MCPR
108.5%	1.10
80%	1.34
20%	1.69

Reduced Flow MCPR Operating Limit Versus Total Core Flow
SPC 9x9-9X

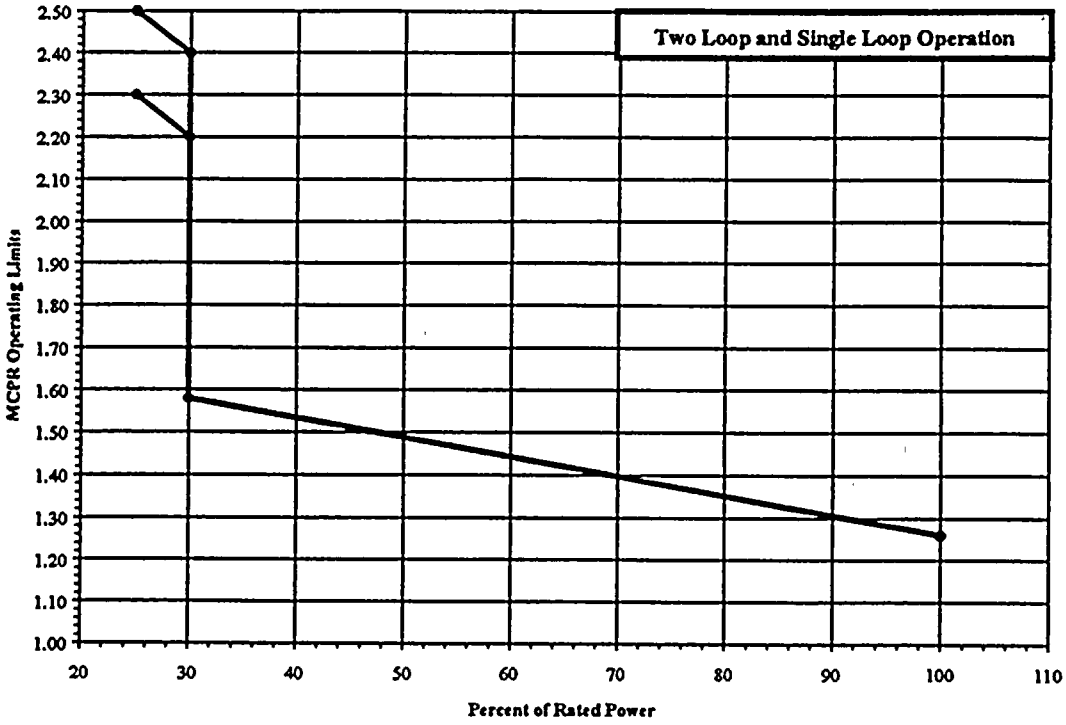
Figure 3.1



Total Core Flow Rate	Operating Limit MCPR
108.5%	1.10
80%	1.27
20%	1.48

Reduced Flow MCPR Operating Limit Versus Total Core Flow
ABB SVEA-96

Figure 3.2



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.26
	30%	1.58
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

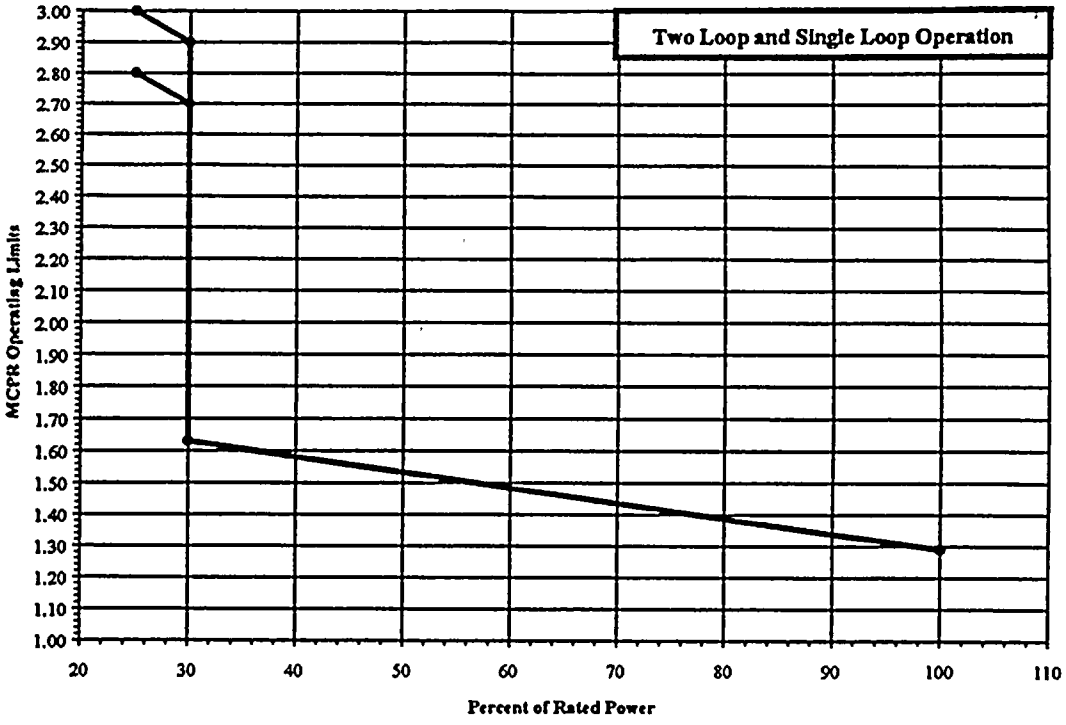
Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Operable, SPC 9x9-9X
Cycle Exposures ≤9000 MWd/MTU

Figure 3.3

Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.39
	30%	1.59
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Operable, SPC 9x9-9X
Cycle Exposures >9000 MWd/MTU

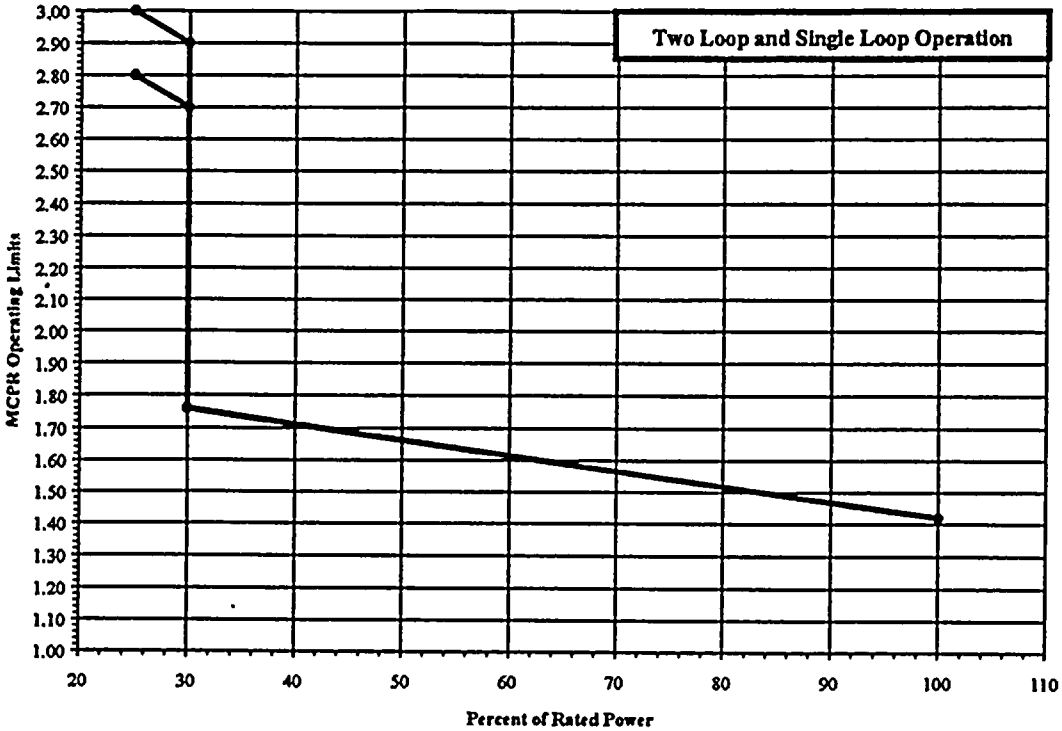
Figure 3.4



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.29
	30%	1.63
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Inoperable, SPC 9x9-9X
Cycle Exposures ≤9000 MWd/MTU

Figure 3.5



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.42
	30%	1.76
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

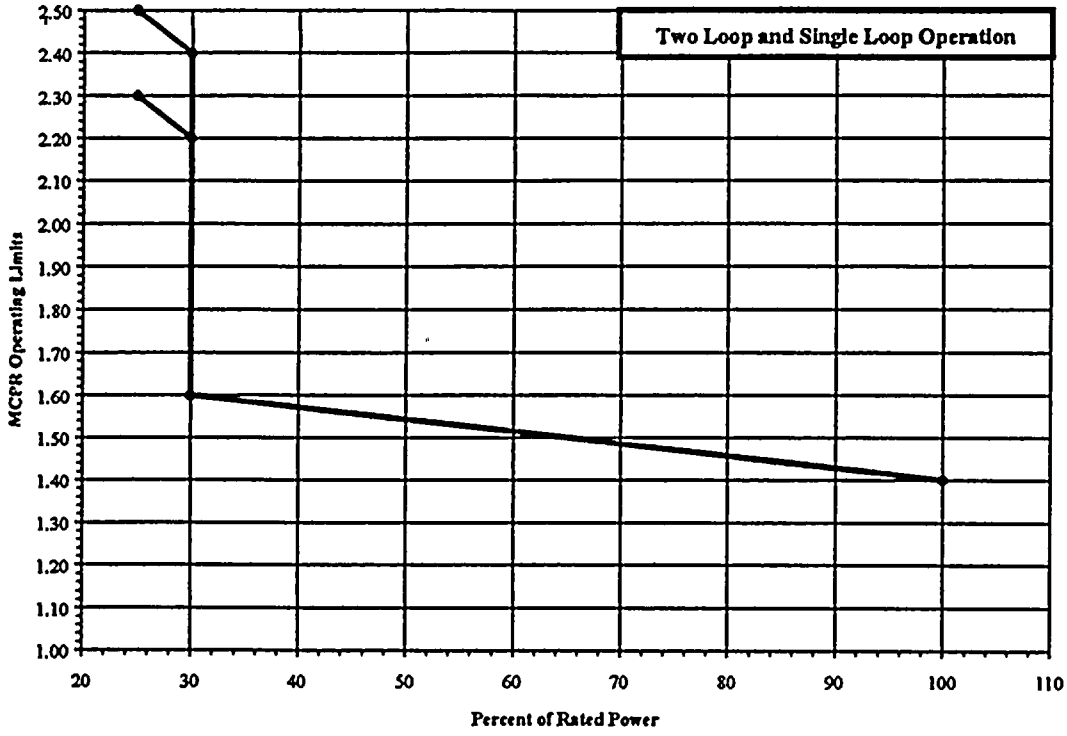
Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Inoperable, SPC 9x9-9X
Cycle Exposures >9000 MWd/MTU

Figure 3.6

Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.27
	30%	1.59
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Operable, ABB SVEA-96
Cycle Exposures ≤9000 MWd/MTU

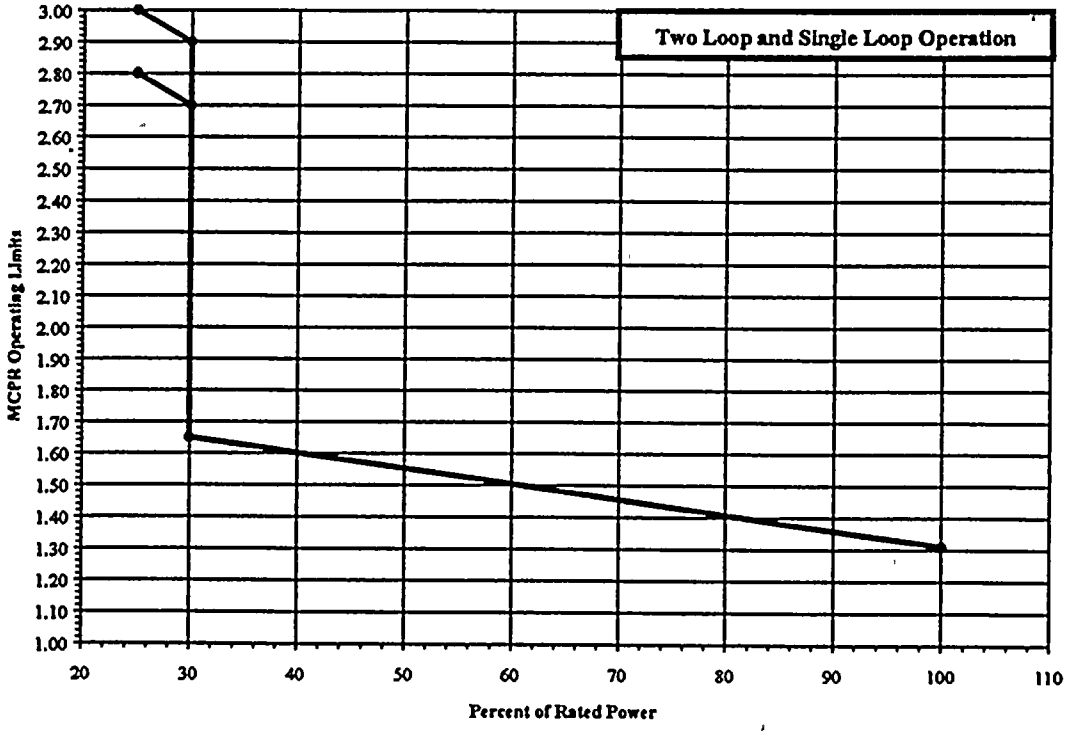
Figure 3.7



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.40
	30%	1.60
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Operable, ABB SVEA-96
Cycle Exposures >9000 MWd/MTU

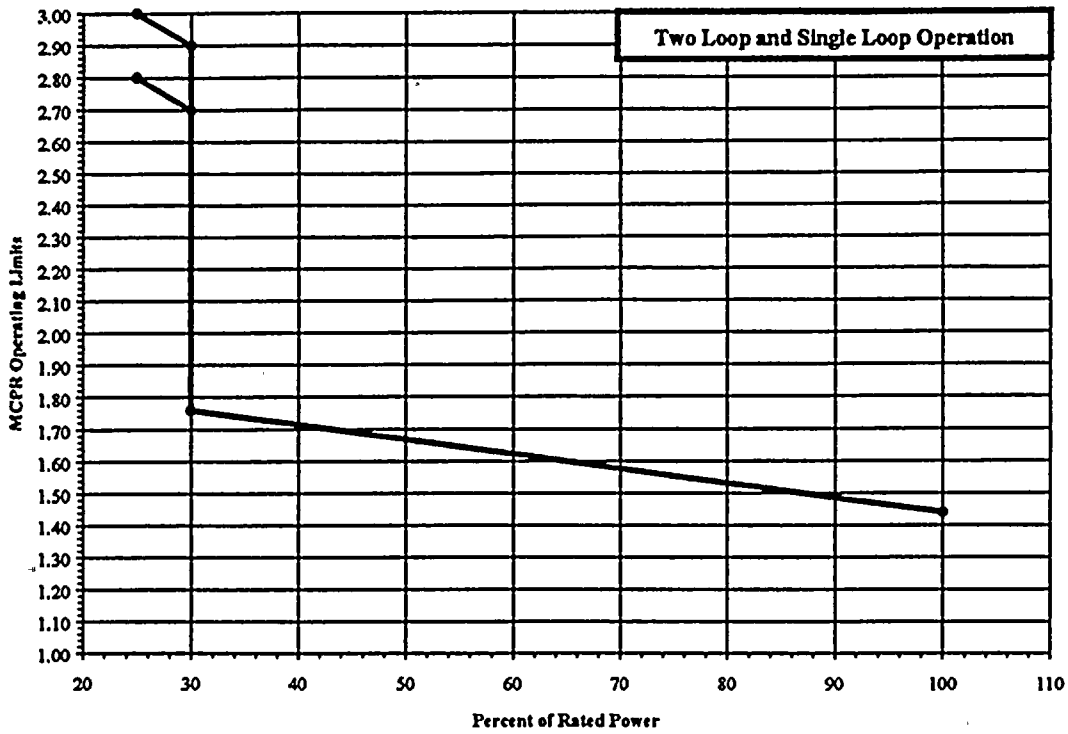
Figure 3.8



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.31
	30%	1.65
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Inoperable, ABB SVEA-96
Cycle Exposures ≤9000 MWd/MTU

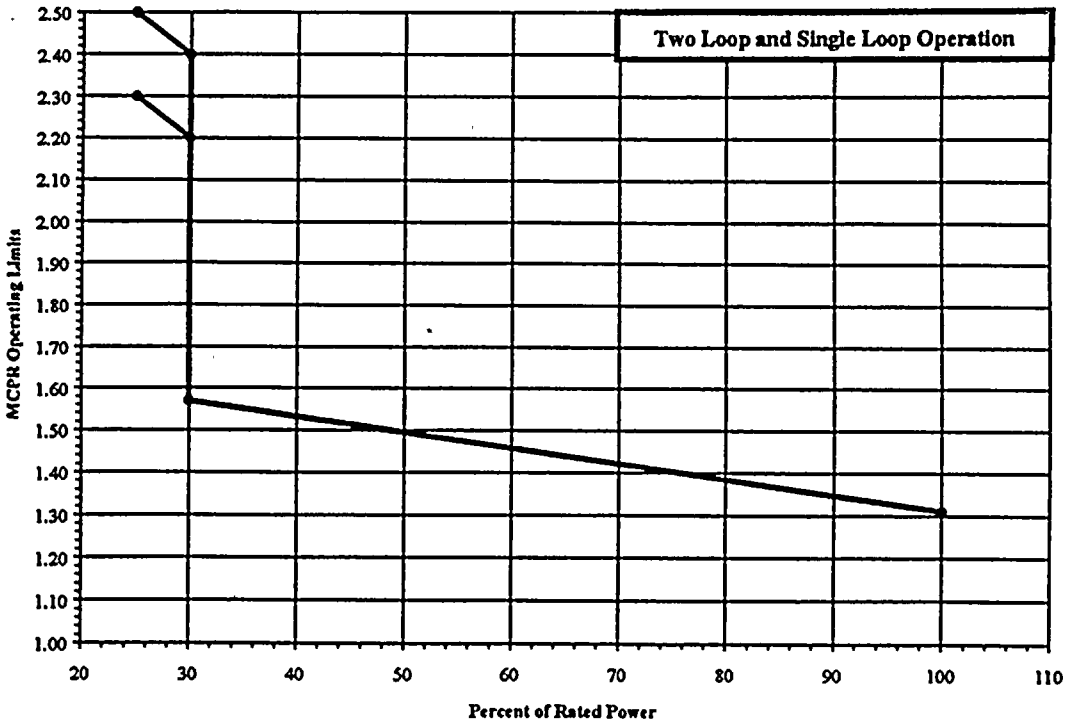
Figure 3.9



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.44
	30%	1.76
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Inoperable, ABB SVEA-96
Cycle Exposures >9000 MWd/MTU

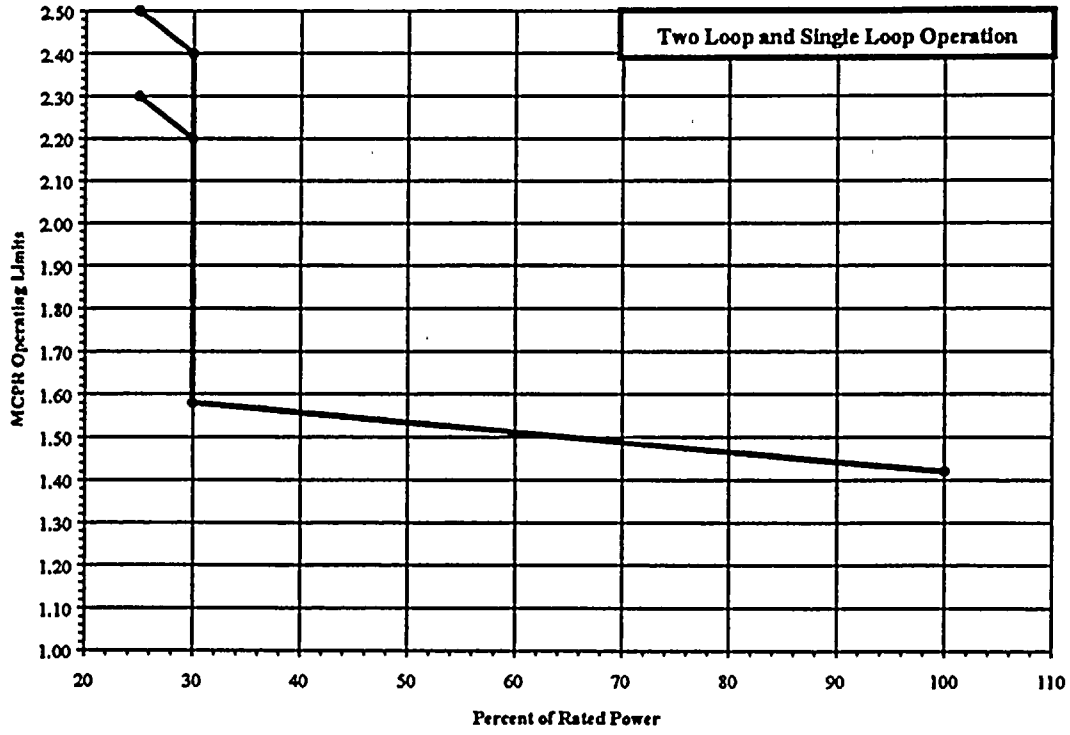
Figure 3.10



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.31
	30%	1.57
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Operable, SPC 9x9-9X
Cycle Exposures ≤9000 MWd/MTU

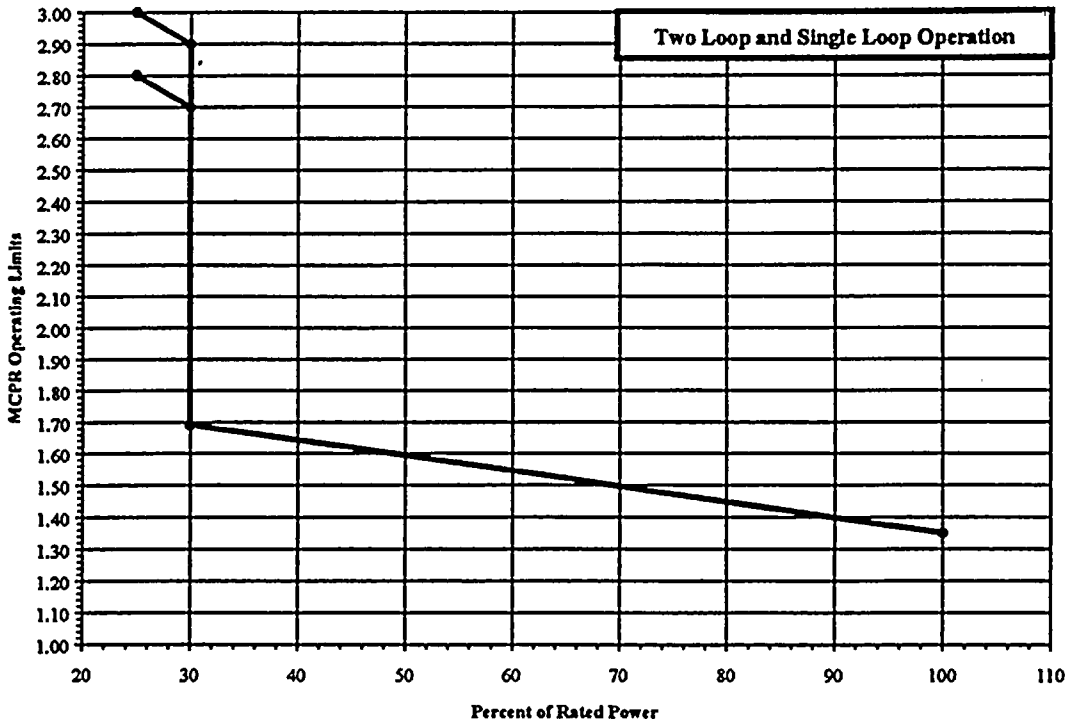
Figure 3.11



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.42
	30%	1.58
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Operable, SPC 9x9-9X
Cycle Exposures >9000 MWd/MTU

Figure 3.12



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.35
	30%	1.69
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

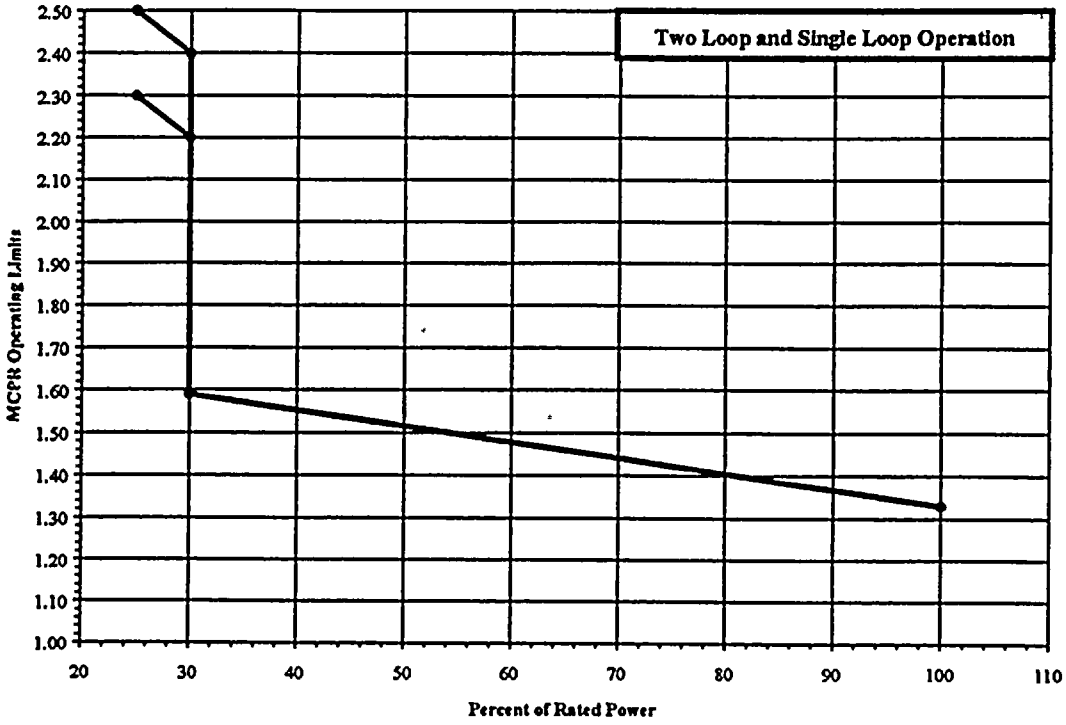
Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Inoperable, SPC 9x9-9X
Cycle Exposures ≤9000 MWd/MTU

Figure 3.13

Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.45
	30%	1.77
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Inoperable, SPC 9x9-9X
Cycle Exposures >9000 MWd/MTU

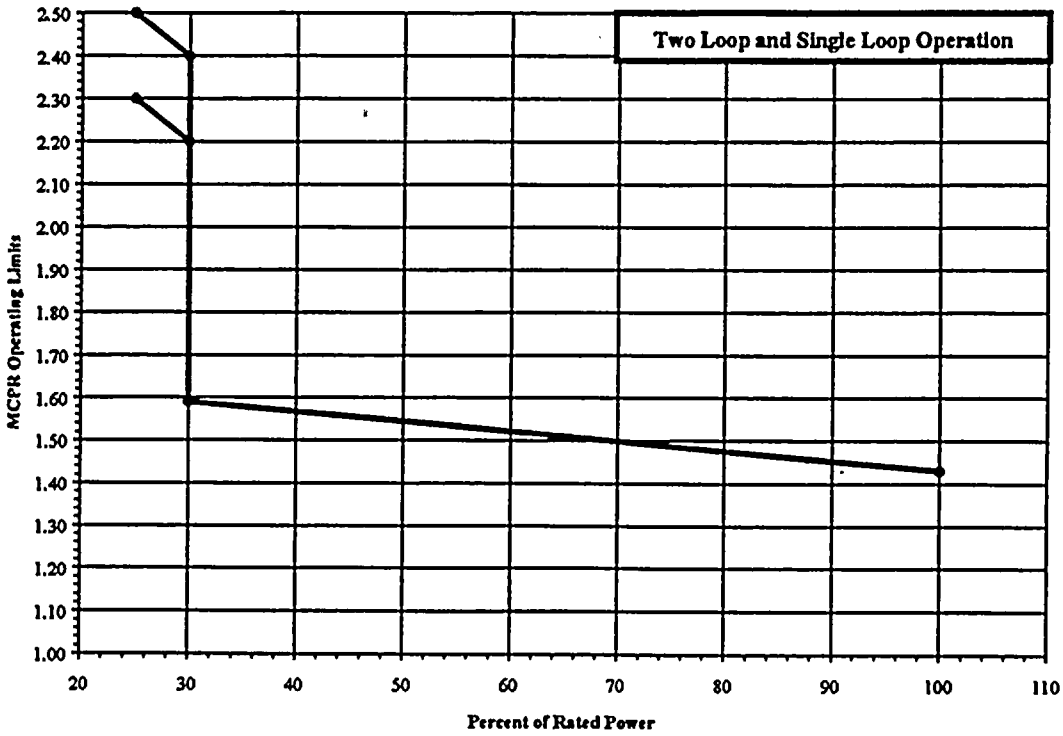
Figure 3.14



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.33
	30%	1.59
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Operable, ABB SVEA-96
Cycle Exposures ≤9000 MWd/MTU

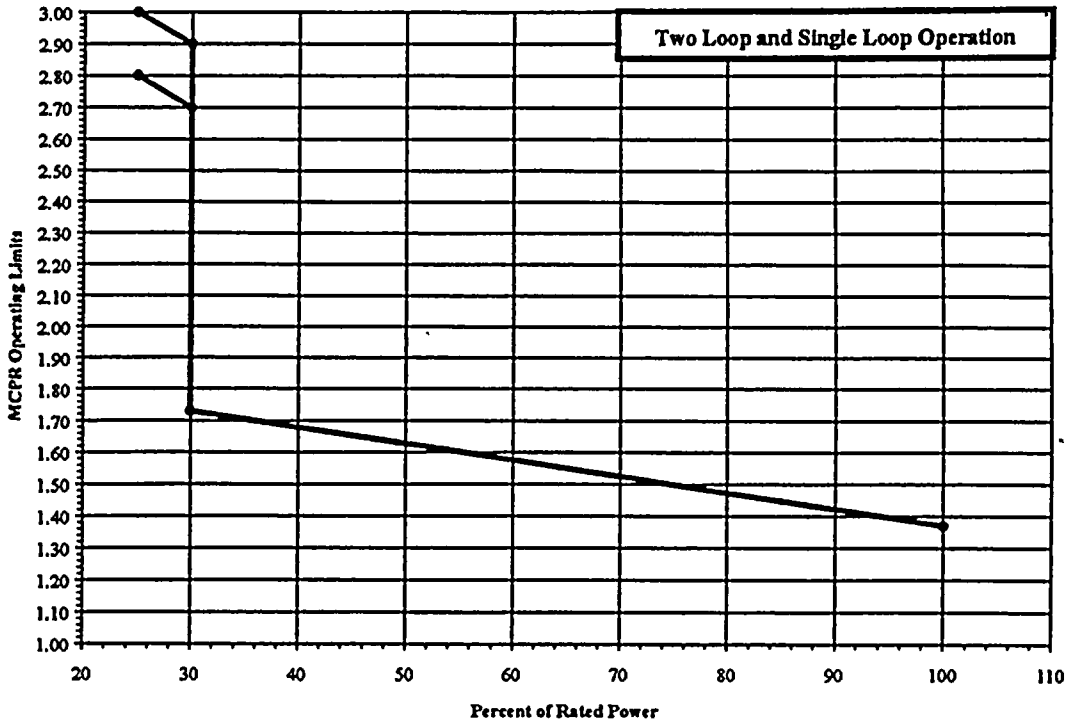
Figure 3.15



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.43
	30%	1.59
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Operable, ABB SVEA-96
Cycle Exposures >9000 MWd/MTU

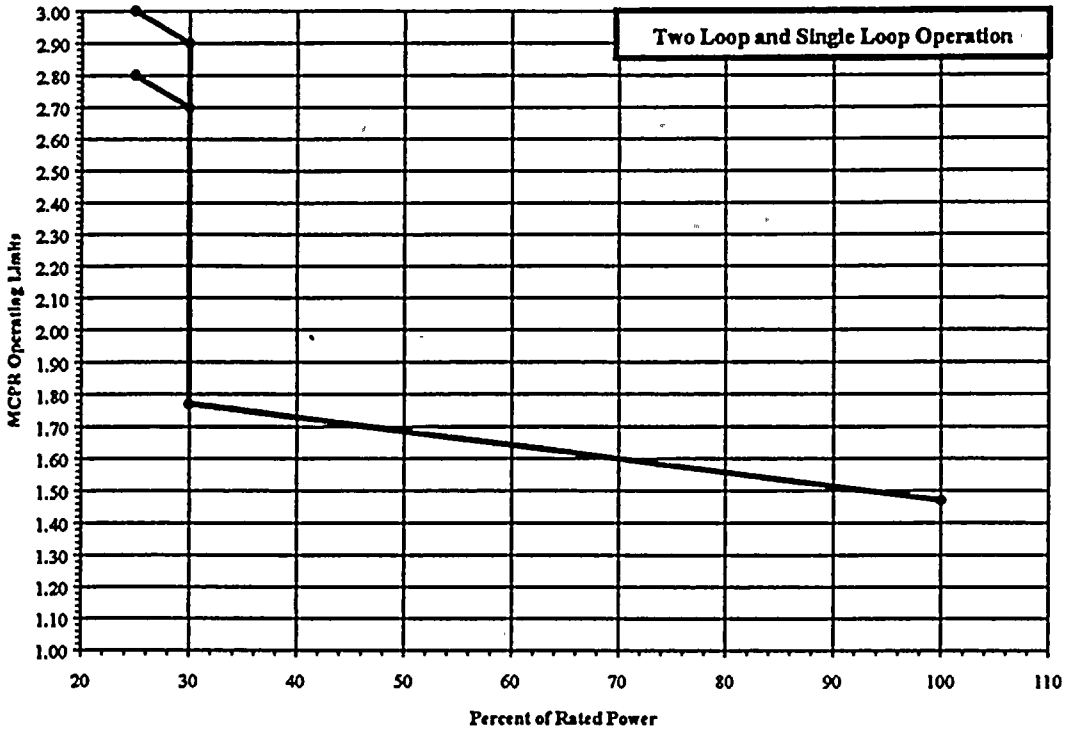
Figure 3.16



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.37
	30%	1.73
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Inoperable, ABB SVEA-96
Cycle Exposures ≤9000 MWd/MTU

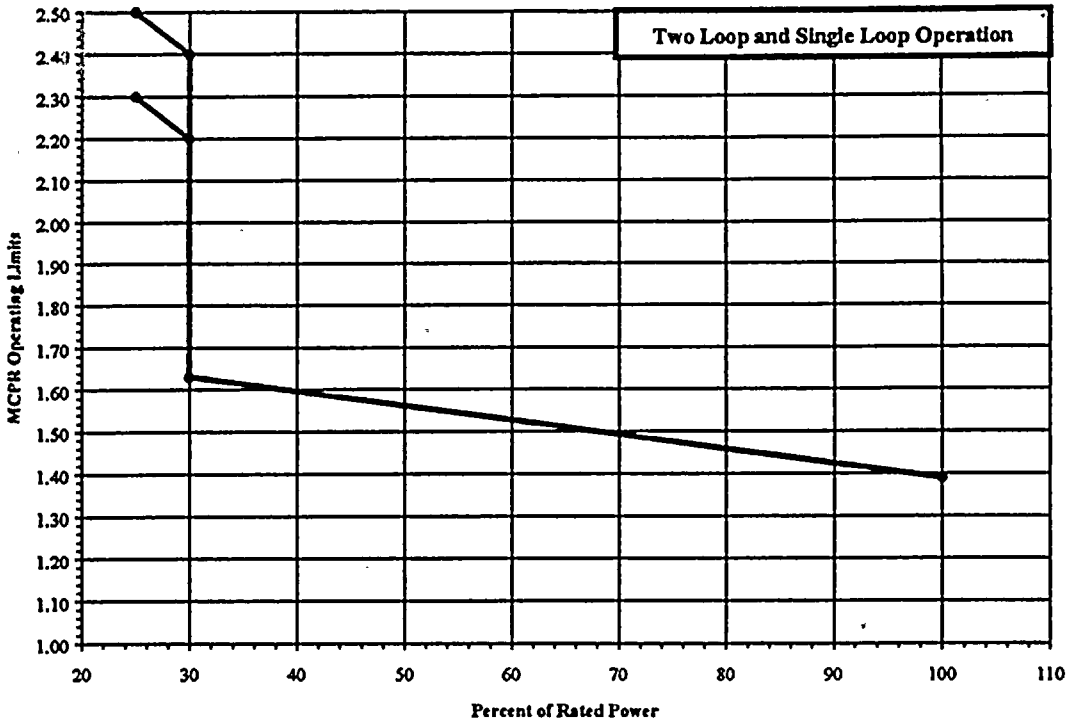
Figure 3.17



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.47
	30%	1.77
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Inoperable, ABB SVEA-96
Cycle Exposures >9000 MWd/MTU

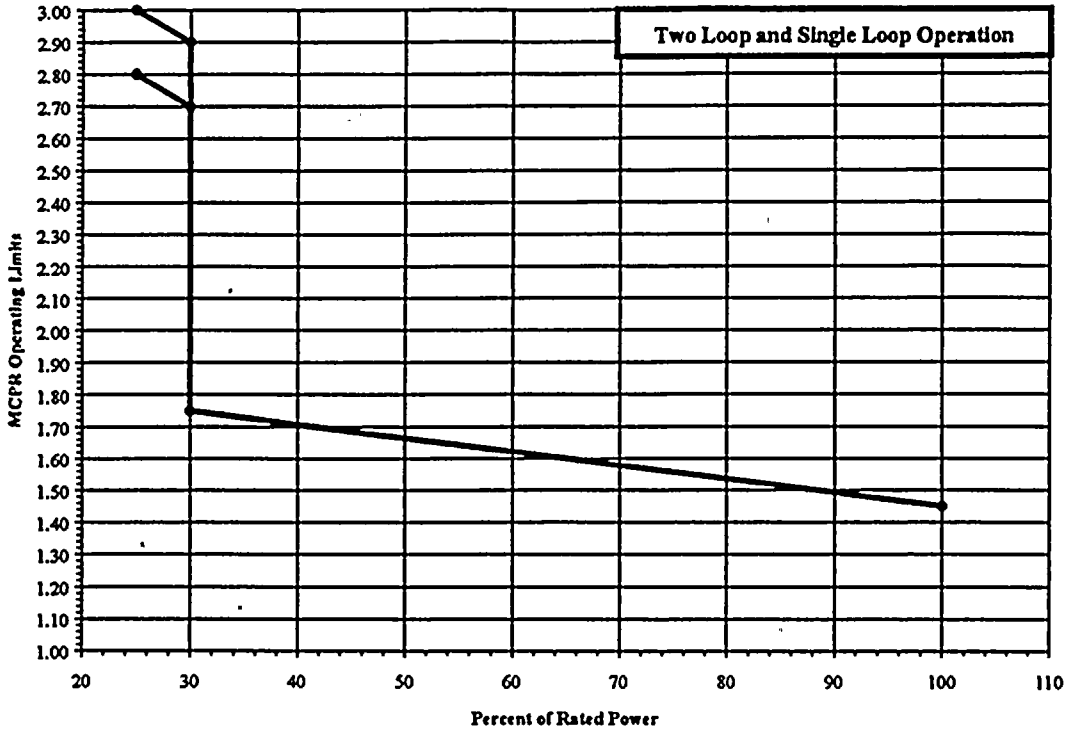
Figure 3.18



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.39
	30%	1.63
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Operable, SPC 9x9-9X
FFTR Operation

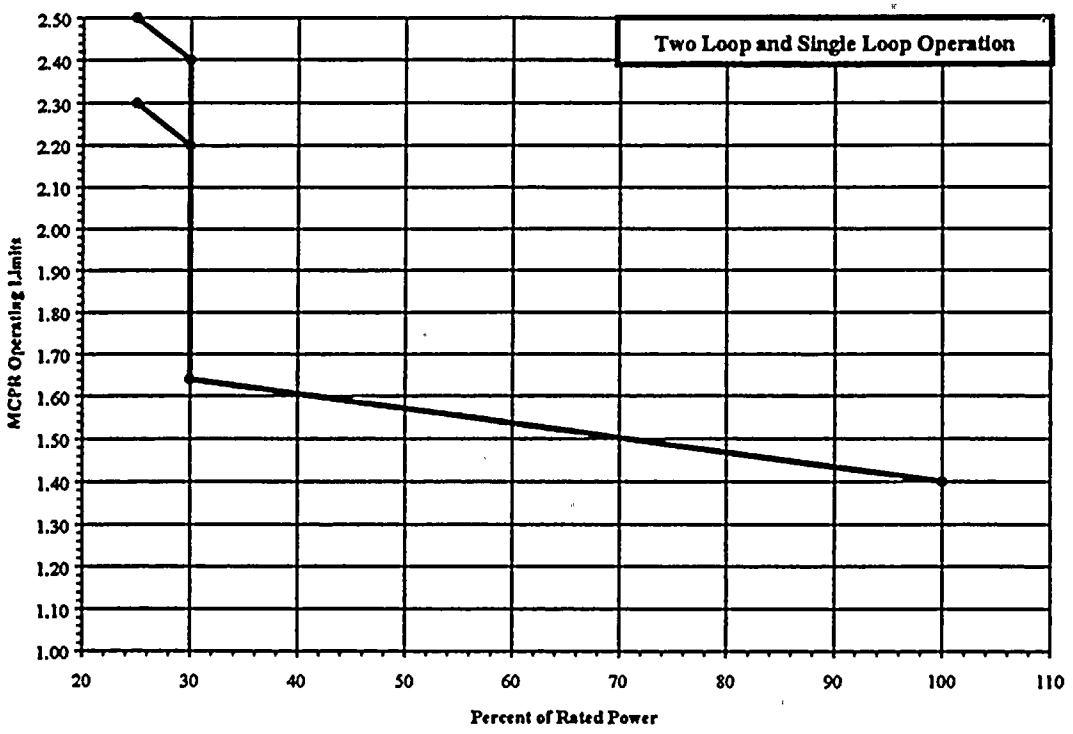
Figure 3.19



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.45
	30%	1.75
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Inoperable, SPC 9x9-9X
FFTR Operation

Figure 3.20



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.40
	30%	1.64
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

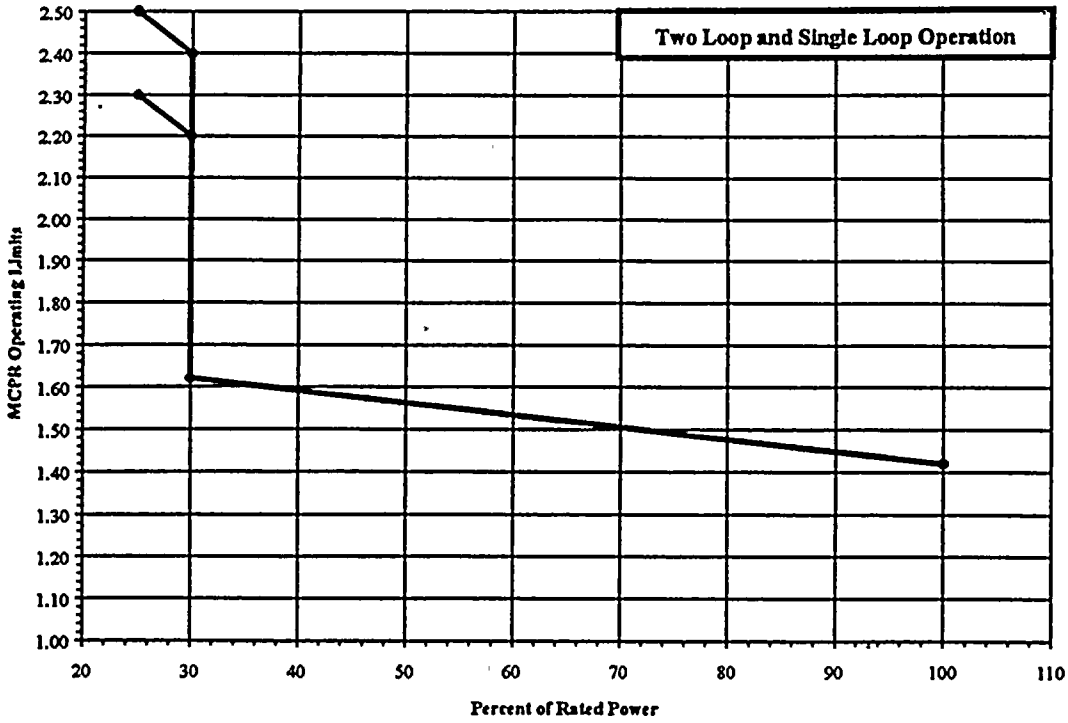
Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Operable, ABB SVEA-96
FFTR Operation

Figure 3.21

Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.46
	30%	1.78
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Operable, Turbine Bypass Inoperable, ABB SVEA-96
FFTR Operation

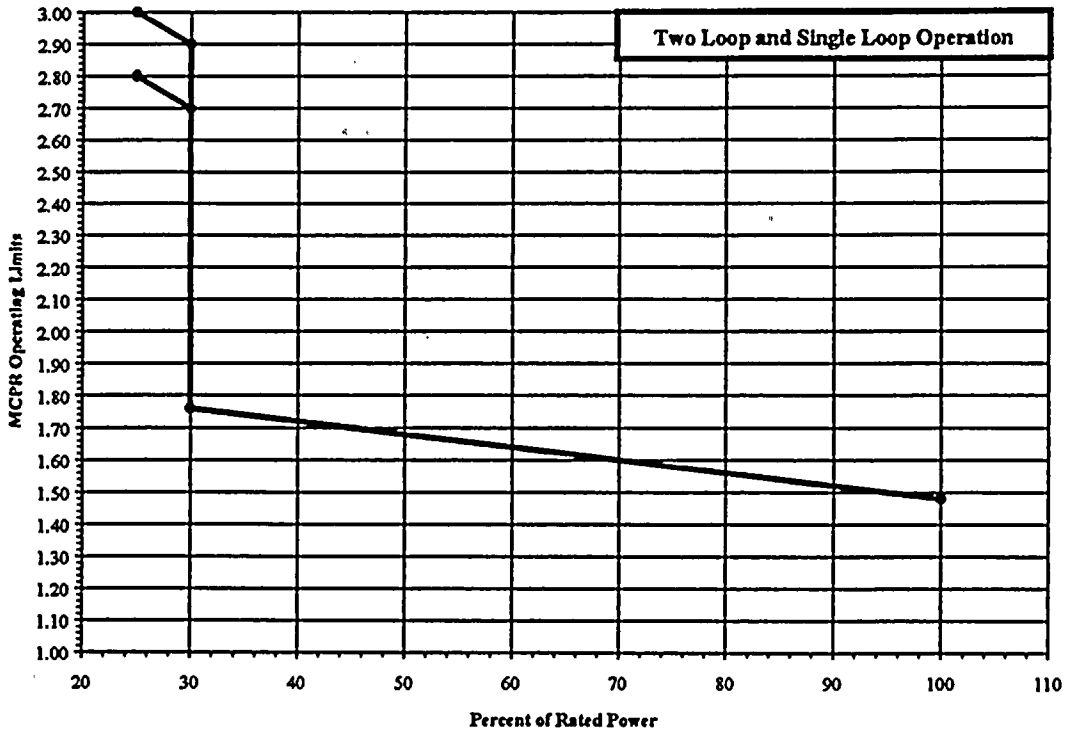
Figure 3.22



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.42
	30%	1.62
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Operable, SPC 9x9-9X
FFTR Operation

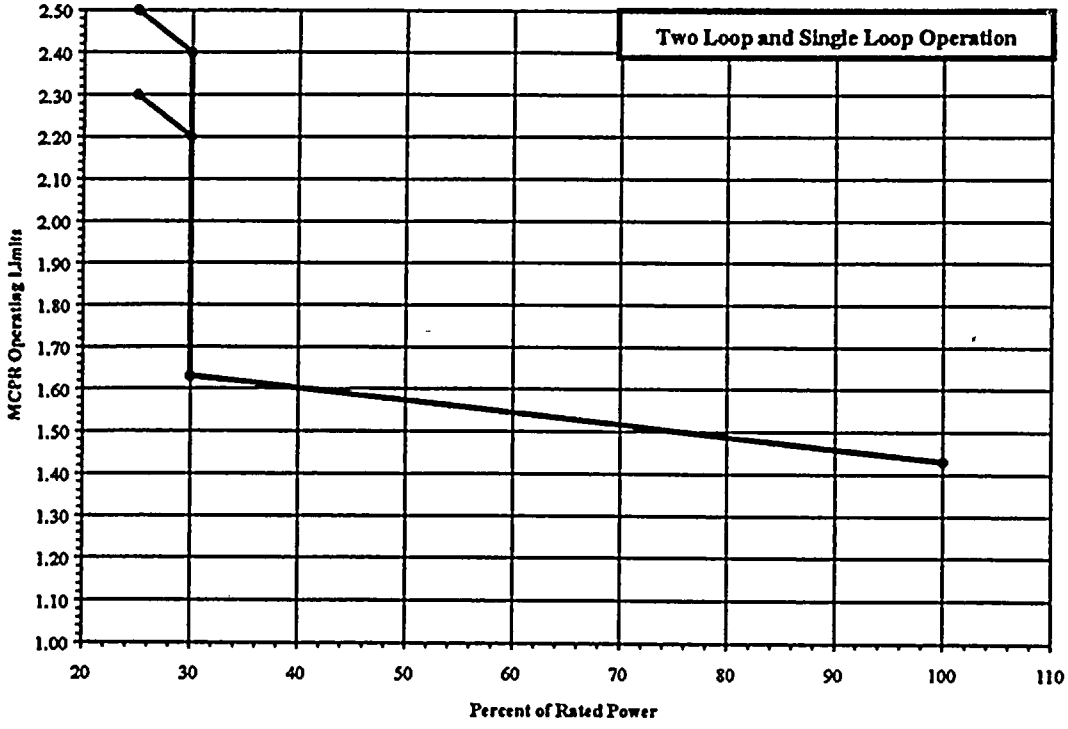
Figure 3.23



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.48
	30%	1.76
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Inoperable, SPC 9x9-9X
FFTR Operation

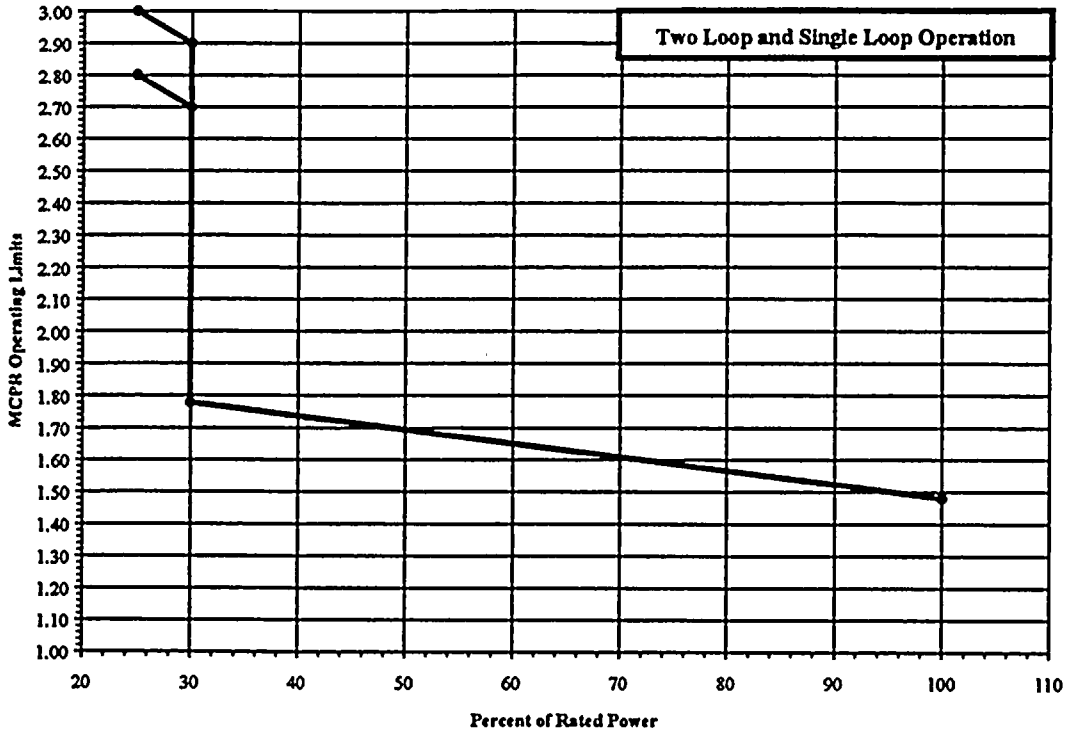
Figure 3.24



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.43
	30%	1.63
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Operable, ABB SVEA-96
FFTR Operation

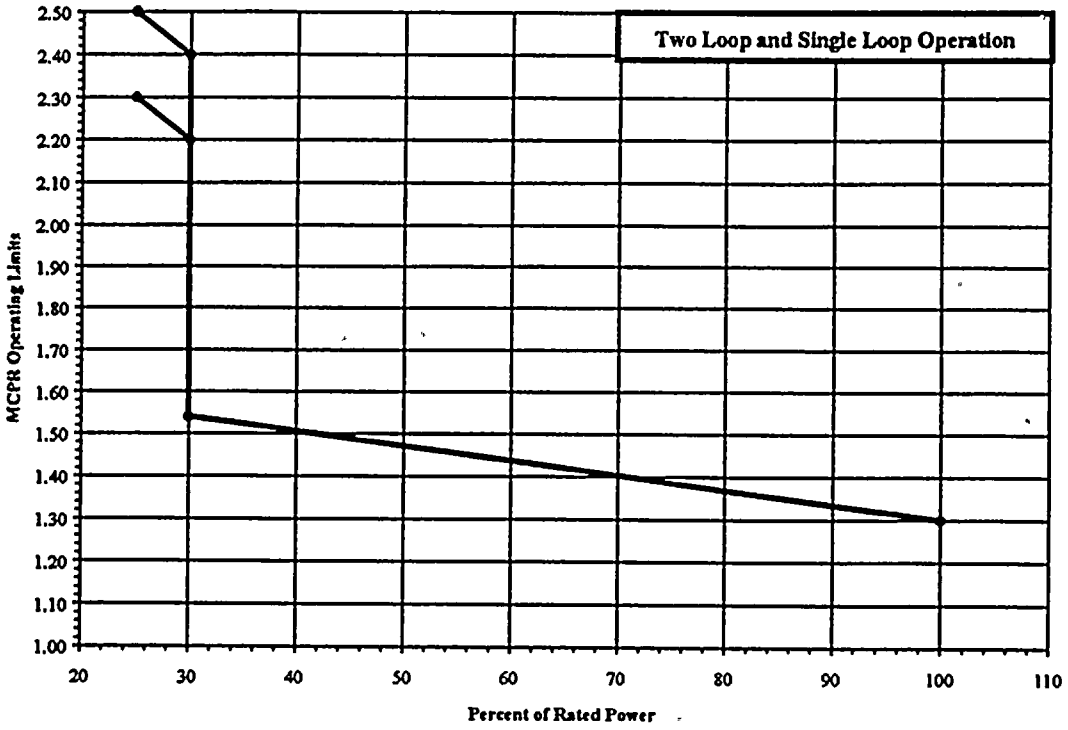
Figure 3.25



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.48
	30%	1.78
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
TSSS, RPT Operable, Turbine Bypass Inoperable, ABB SVEA-96
FFTR Operation

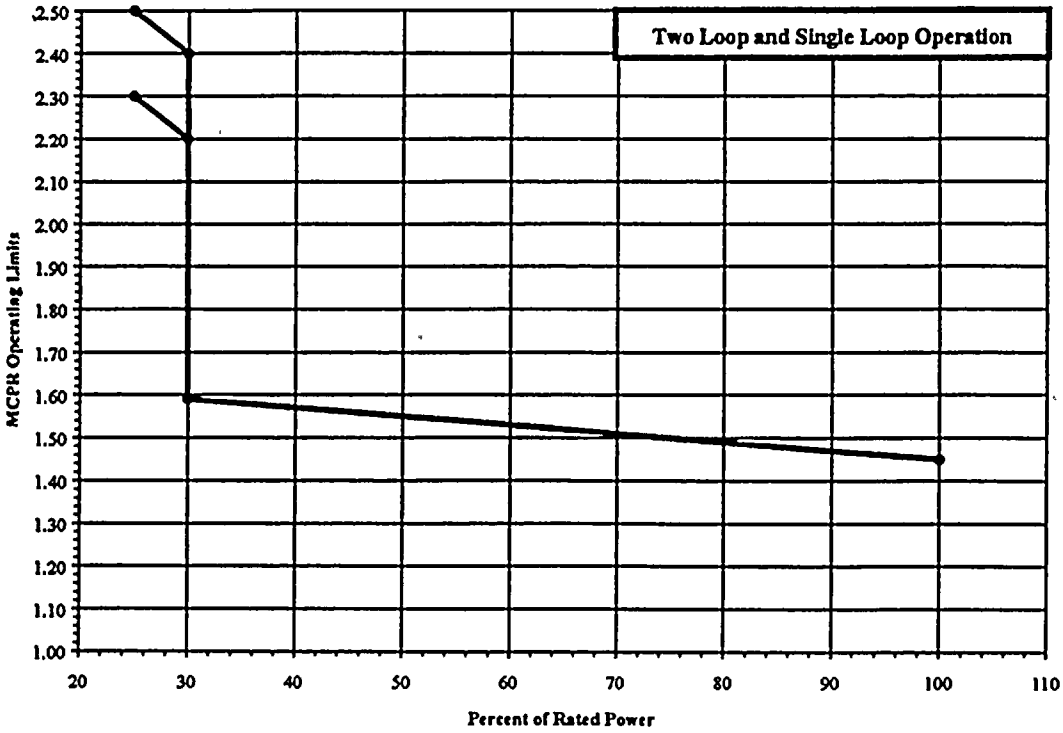
Figure 3.26



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.30
	30%	1.54
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Operable, SPC 9x9-9X
Cycle Exposures ≤9000 MWd/MTU

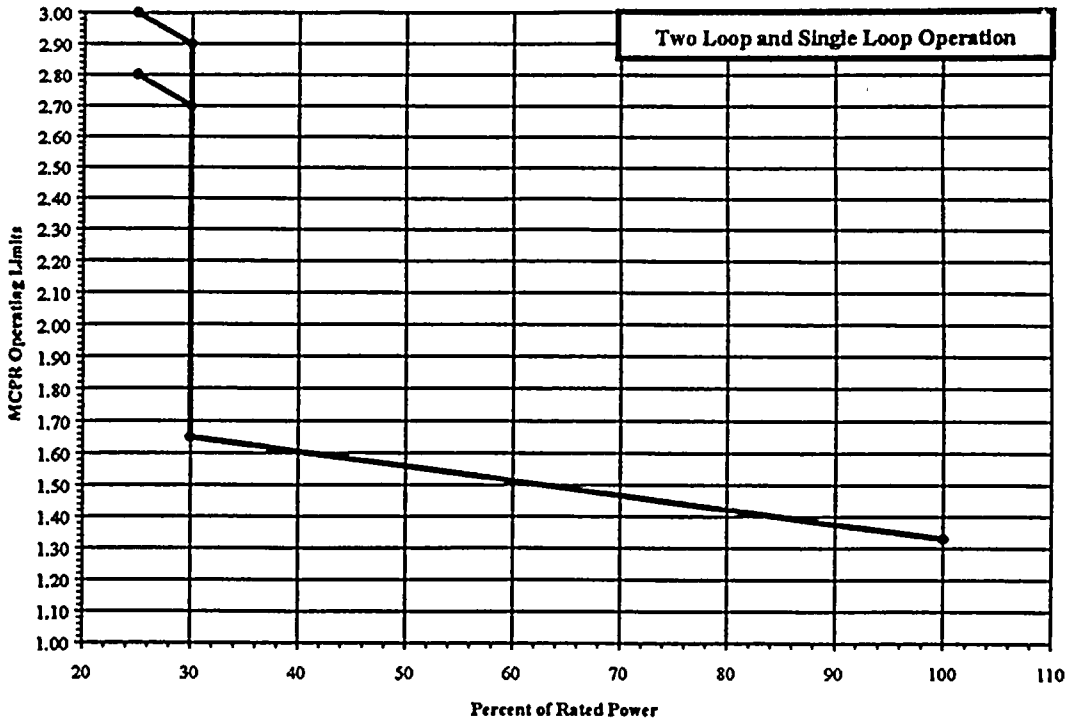
Figure 3.27



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.45
	30%	1.59
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Operable, SPC 9x9-9X
Cycle Exposures >9000 MWd/MTU

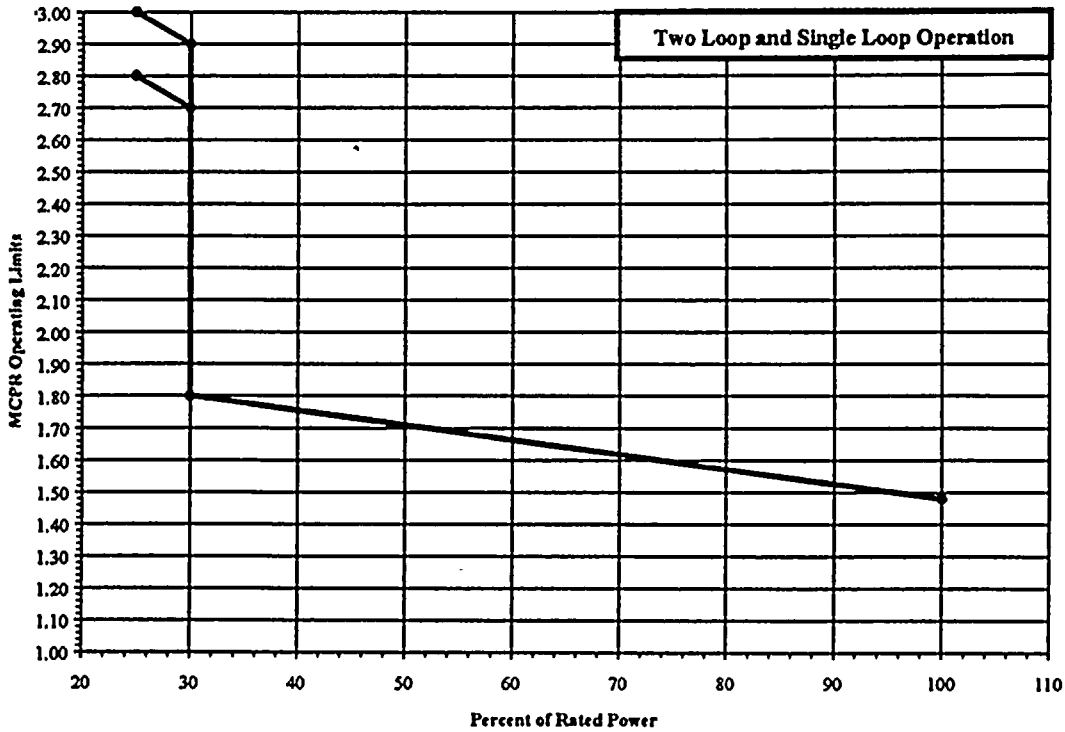
Figure 3.28



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.33
	30%	1.65
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Inoperable, SPC 9x9-9X
Cycle Exposures ≤9000 MWd/MTU

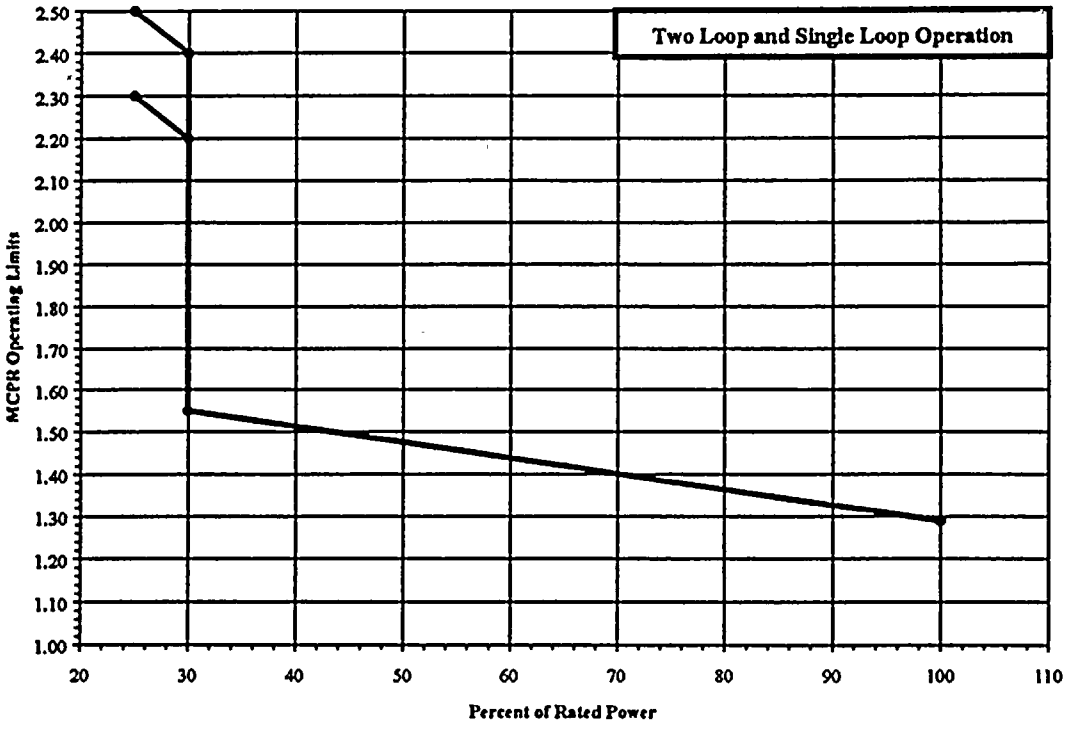
Figure 3.29



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.48
	30%	1.80
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Inoperable, SPC 9x9-9X
Cycle Exposures >9000 MWd/MTU

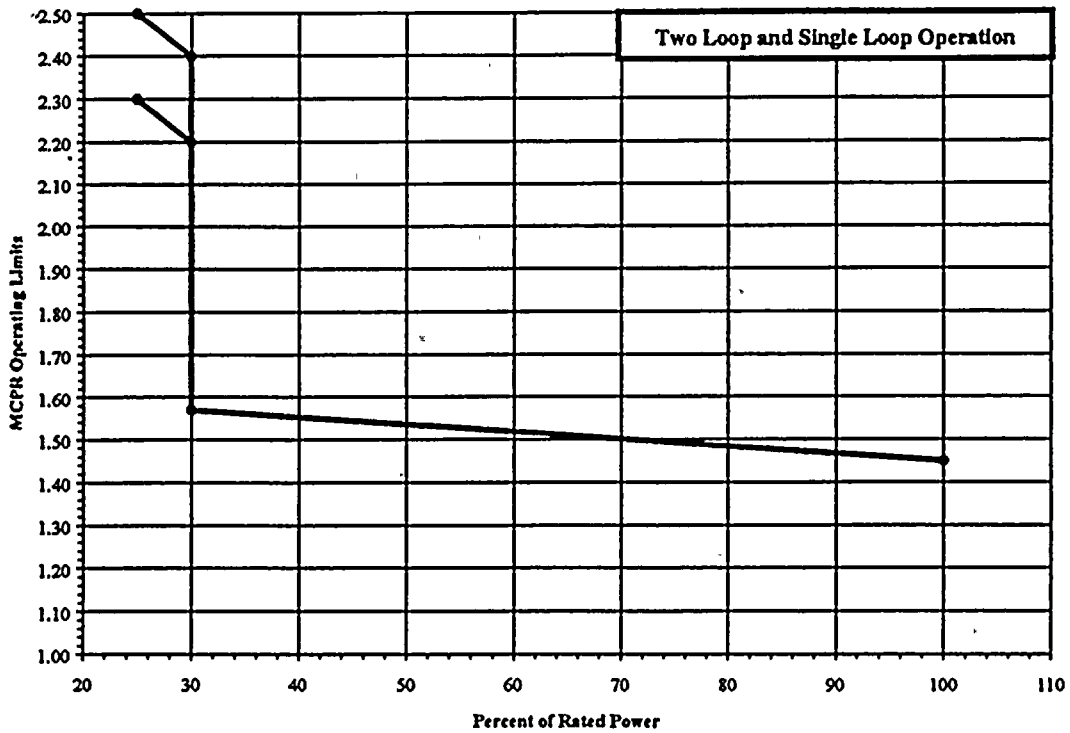
Figure 3.30



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.29
	30%	1.55
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Operable, ABB SVEA-96
Cycle Exposures ≤9000 MWd/MTU

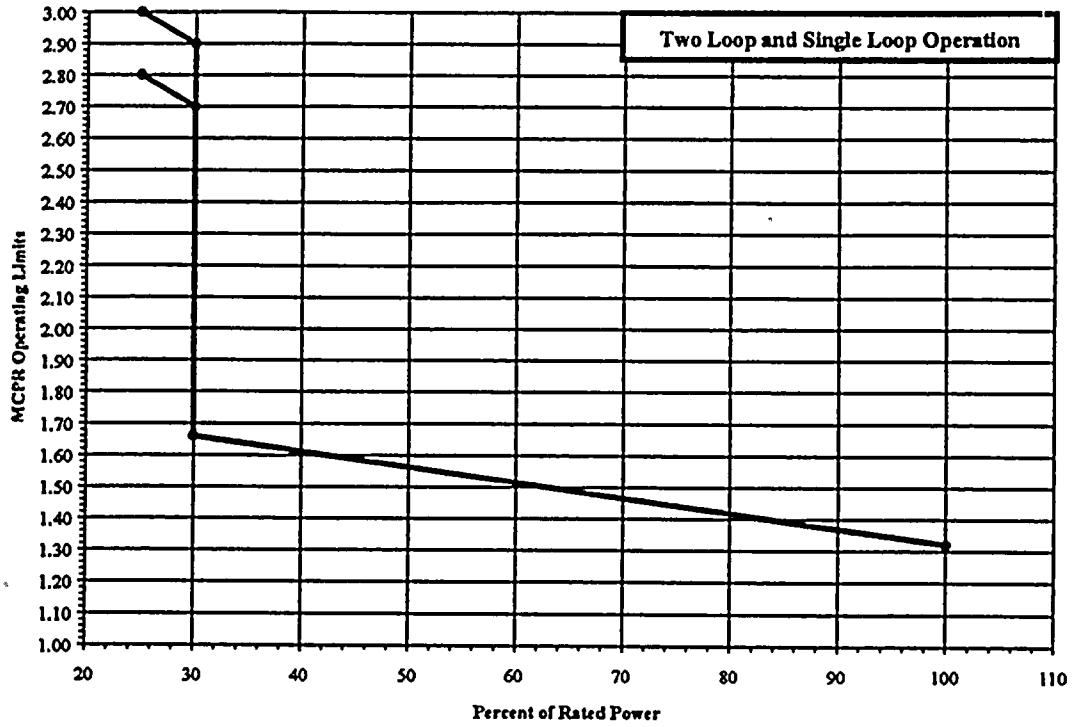
Figure 3.31



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.45
	30%	1.57
Core Flow ≤50%, Power ≤30%	30%	2.20
	25%	2.30
Core Flow >50%, Power ≤30%	30%	2.40
	25%	2.50

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Operable, ABB SVEA-96
Cycle Exposures >9000 MWd/MTU

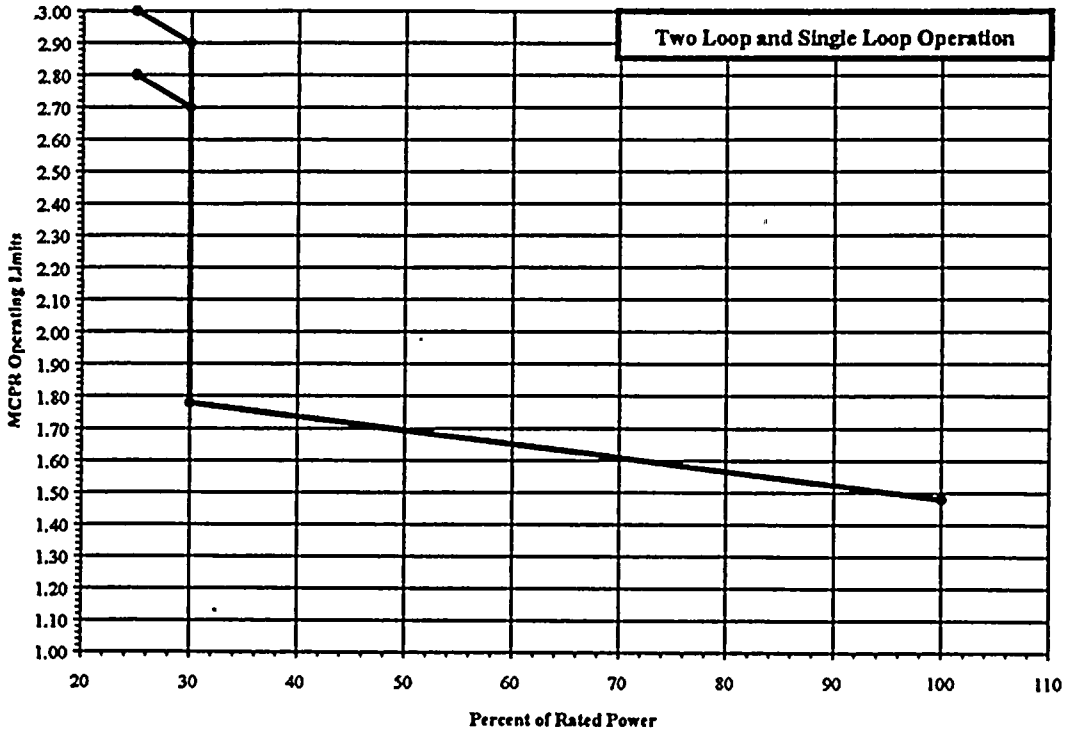
Figure 3.32



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.32
	30%	1.66
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Inoperable, ABB SVEA-96
Cycle Exposures ≤9000 MWd/MTU

Figure 3.33



Range	Power	Operating Limit MCPR
All Core Flows, Power >30%	100%	1.48
	30%	1.78
Core Flow ≤50%, Power ≤30%	30%	2.70
	25%	2.80
Core Flow >50%, Power ≤30%	30%	2.90
	25%	3.00

Reduced Power MCPR Operating Limit Versus Percent of Rated Power
NSS, RPT Inoperable, Turbine Bypass Inoperable, ABB SVEA-96
Cycle Exposures >9000 MWd/MTU

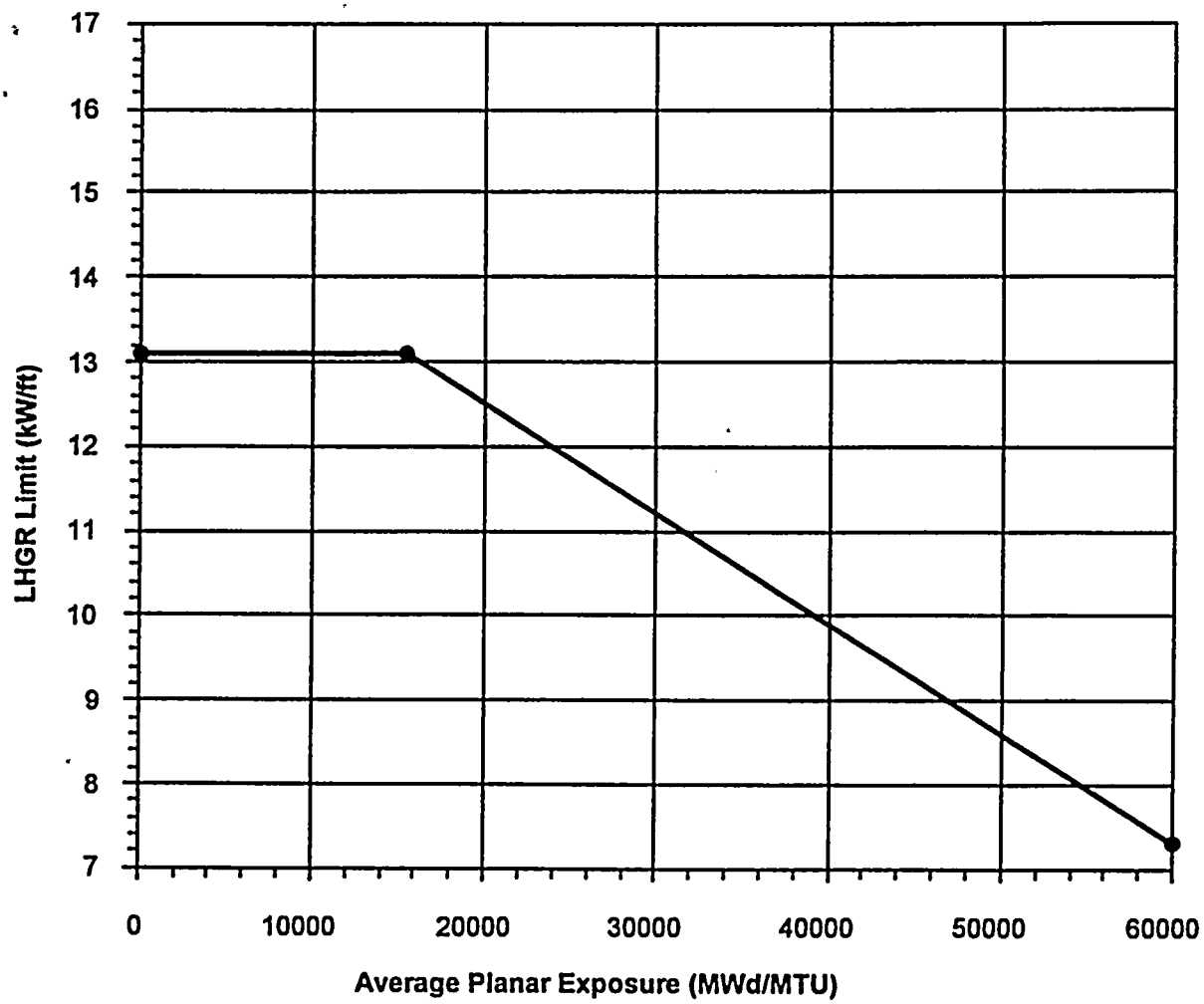
Figure 3.34

4.0 LINEAR HEAT GENERATION RATE (LHGR) LIMITS FOR USE IN TECHNICAL SPECIFICATION 3.2.3

The LHGRs for use in Technical Specification 3.2.3, as a function of Average Planar Exposure, shall not exceed the limits shown in the following figures:

a. Figure 4.1 - SPC 9x9-9X reload fuel

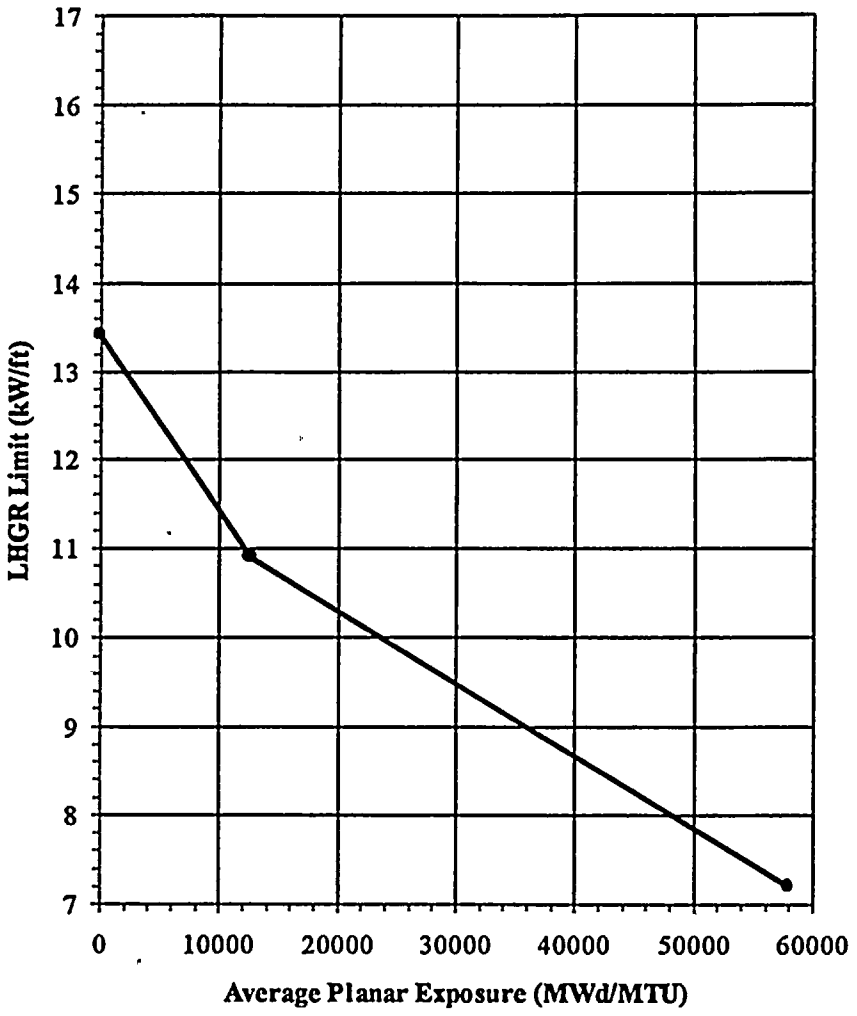
b. Figure 4.2 - ABB SVEA-96 reload fuel



Average Planar Exposure (MWd/MTU)	LHGR (kW/ft)
0	13.1
15500	13.1
60000	7.3

Linear Heat Generation Rate (LHGR) Versus Average Planar Exposure
SPC 9x9-9X

Figure 4.1



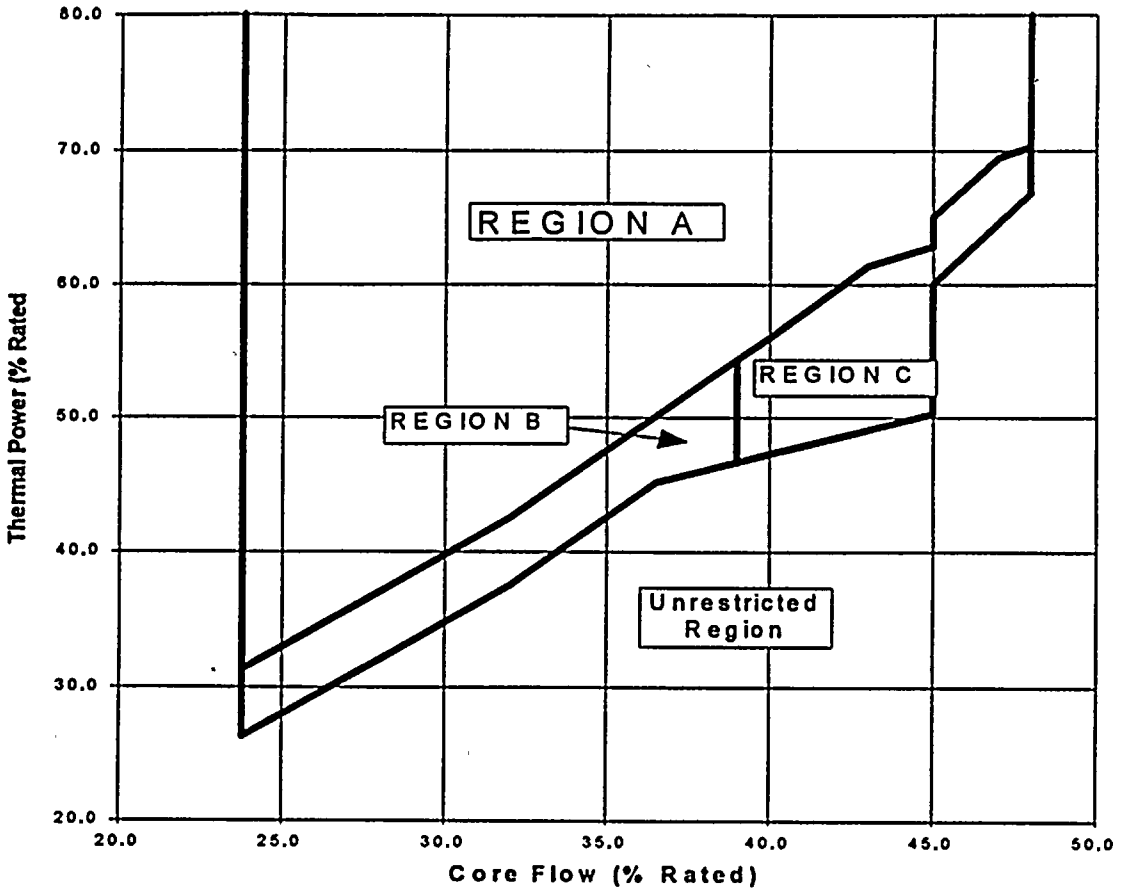
Average Planar Exposure (MWd/MTU)	LHGR (kW/ft)
0	13.4
12628	10.9
58087	7.2

Linear Heat Generation Rate (LHGR) Versus Average Planar Exposure
ABB SVEA-96

Figure 4.2

5.0 POWER/FLOW INSTABILITY

The power/flow conditions for use in Technical Specification 3.4.1 shall conform to the limits shown in Figure 5.1.



Region A		Region B		Region C	
Core Flow	Power	Core Flow	Power	Core Flow	Power
% Rated	% Rated	% Rated	% Rated	% Rated	% Rated
23.8	31.3	23.8	31.3	39.0	46.7
32.0	42.5	23.8	26.3	40.0	47.3
40.0	56.0	32.0	37.5	43.0	49.1
43.0	61.3	36.5	45.1	45.0	50.3
45.0	62.8	39.0	46.7	45.0	60.0
45.0	65.0	39.0	54.3	48.0	66.8
47.0	69.5			48.0	70.3
48.0	70.3				

Operating Region Limits of Specification 3.4.1

Figure 5.1

6.0 REFERENCES

6.1 NEDO-32269, "Washington Public Power Supply System Nuclear Project 2, Supplement to SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," GE Nuclear Energy, September 1993.

6.2 Letter, Kaveh Taghavi (GE) to J. D. Fisher (WPPSS), "Extended MAPLHGR Curve for SNP 9x9-9X," October 4, 1995.

6.3 CE NPSD-835-P, Rev. 1, "WNP-2 Cycle 15 Reload Licensing Report," ABB Combustion Engineering Nuclear Power, August 1999.

6.4 CE NPSD-801-P, Rev. 4, "WNP-2 LOCA Analysis Report," ABB Combustion Engineering Nuclear Power, May 1999.

6.5 Letter KVW-95:050, K. V. Walters (Siemens Power Corporation) to R. A. Vopalensky (WPPSS), "WNP-2 Fuel Misorientation Error Analysis," October 16, 1995.

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1999 ANNUAL OPERATING REPORT

The annual operating report for calendar year 1999 is attached. If you have any questions or desire additional information pertaining to this report, please contact either me or WA Kiel at (509) 377-4490.

Respectfully,

D. W. Coleman

DW Coleman
Manager, Regulatory Affairs
Mail Drop PE20

Attachment

cc: EW Merschoff, NRC - Region IV
JS Cushing, NRC - NRR
REIRS Project Manager, NRC – NRR
NRC Resident Inspector - 927N
DL Williams - BPA - 1399
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INSERVICE INSPECTION SUMMARY REPORT
R-14 MAINTENANCE AND REFUELING OUTAGE

The WNP-2 Inservice Inspection Summary Report for the R-14 Maintenance and Refueling Outage is attached. This report is submitted in accordance with Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Article IWA-6240. Pursuant to ASME Code Section XI, Article IWA-6230, the NIS-1 Owner's Data Report for inservice inspection and NIS-2 Owner's Reports for repairs and replacements are included.

Should you have any questions or require additional information pertaining to this report, please contact PJ Inserra at (509) 377-4147.

Respectfully,

RL Webring
Vice President, Operations Support/PIO
Mail Drop PE08

Attachments

A047 1/1

cc: EW Merschoff - NRC-RIV
JS Cushing - NRC-NRR
TC Poindexter - Winston & Strawn
NRC Sr. Resident Inspector - 927N
DL Williams - BPA/1399

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