

Core Operating Limits Report

Dresden Station Unit 2

Cycle 12

Revision 1

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Issuance of Changes Summary

Affected Section	Affected Pages	Summary of Changes	Date
All	All	Original Issue	12/89
2.0	2-2	ANF 8X8 Exposure Extension	2/90
3.0	3-2	ANF 8X8 Exposure Extension	2/90
4.0	4-2	ANF 8X8 Exposure Extension	2/90

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References

1. Commonwealth Edison Company Docket No. 50-249, Dresden Nuclear Power Station, Unit 2, Facility Operating License DPR-19.
2. Letter from D. M. Crutchfield to All Power Reactor Licensees and Applicants, Generic Letter 88-16; Concerning the Removal of Cycle-Specific Parameter Limits from Technical Specifications.

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1.0 CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATION

1.1 Technical Specification Reference

Technical Specification 3.2.C - Control Rod Block Actuation

1.2 Description

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown in Table 1.2-1.

Table 1.2-1

Control Rod Withdrawal Block Instrumentation Setpoints

Trip Function	Trip Level Setting
Rod Block Monitor Upscale (Flow Bias)	Dual Loop Operation Less than or equal to (0.65 Wd plus 45) (See Note)
	Single Loop Operation Less than or equal to (0.65 Wd plus 41) (See Note)

Note: Wd - percent of drive flow required to produce a rated core flow of 98 Mlb/hr.

2.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE

2.1 Technical Specification References

Section 2.2: Technical Specification 3.5.I - Average Planar LHGR

Section 2.3: See Table 2.3-1

2.2 Description

The Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) versus Bundle Average Exposure for ANF 8x8 fuel is determined from Figure 2.2-1.

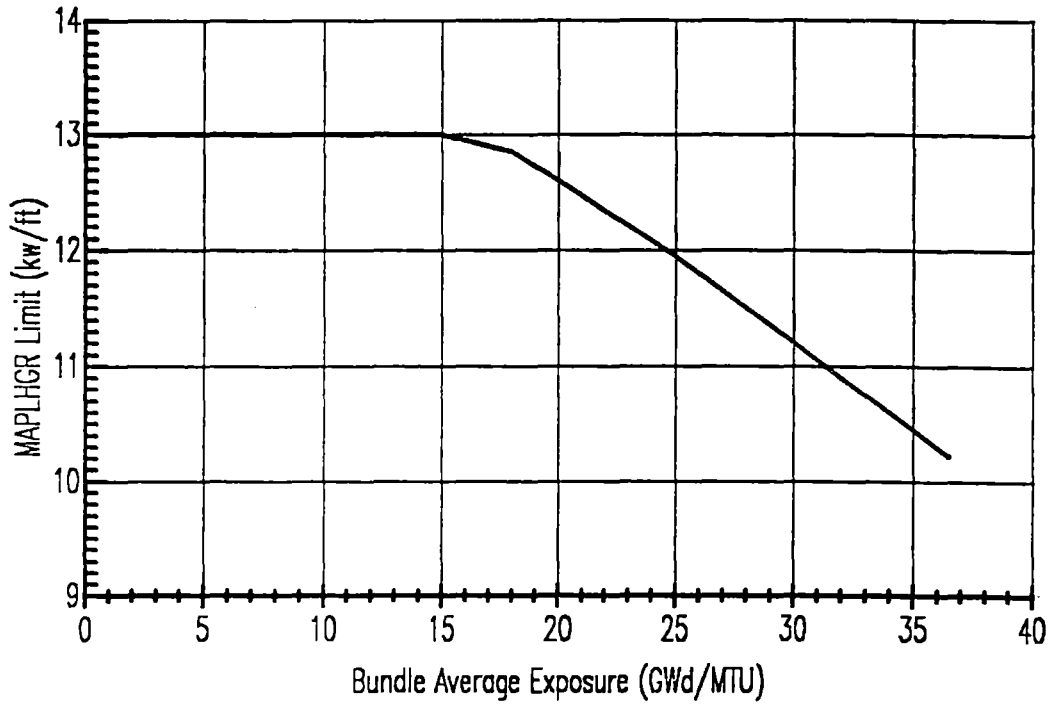
The Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) versus Bundle Average Exposure for ANF 9x9 fuel is determined from Figure 2.2-2.

The Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) versus Average Planar Exposure for the GE 8X8 LTAs is determined from Figure 2.2-3.

2.3 MAPLHGR Multipliers

The appropriate multiplicative factors to apply to the base MAPLHGR limits specified in Section 2.2 are shown in Table 2.3-1.

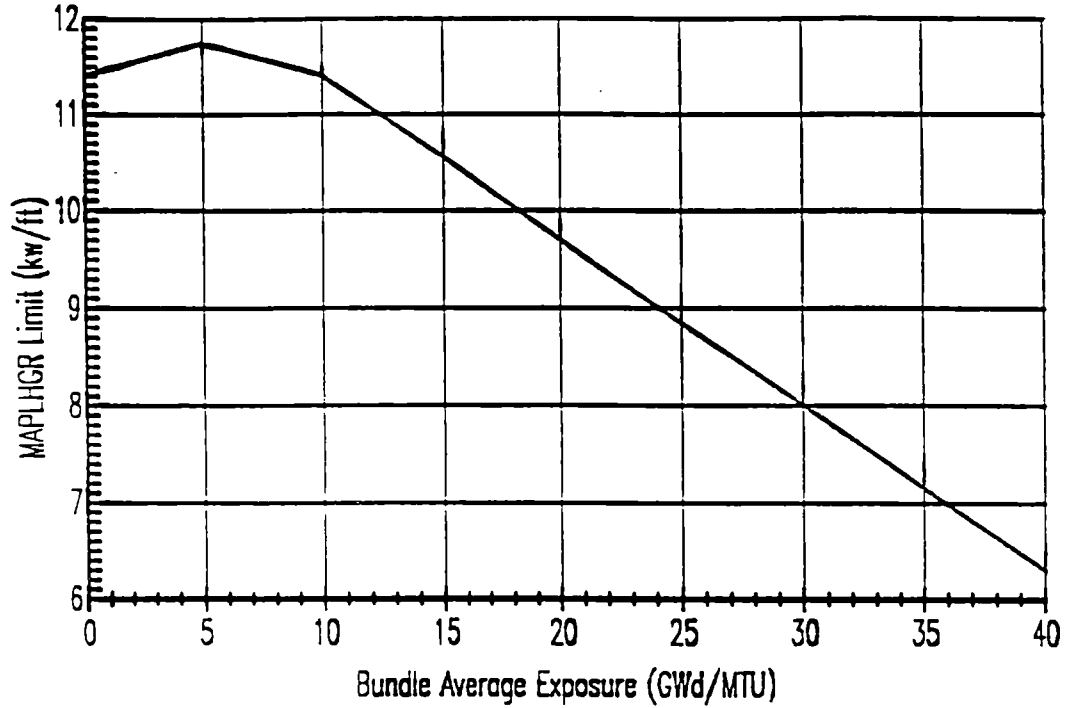
Figure 2.2-1
 MAPLHGR Limit vs. Bundle Average Exposure
 ANF 8x8 Fuel



The above graph is based on the following MAPLHGR summary for ANF 8x8 fuel design.

<u>Bundle Average Exposure (GWd/MTU)</u>	<u>MAPLHGR Limit, Kw/ft</u>
0	13.00
10	13.00
15	13.00
18	12.85
20	12.60
25	11.95
30	11.20
36.5	10.22

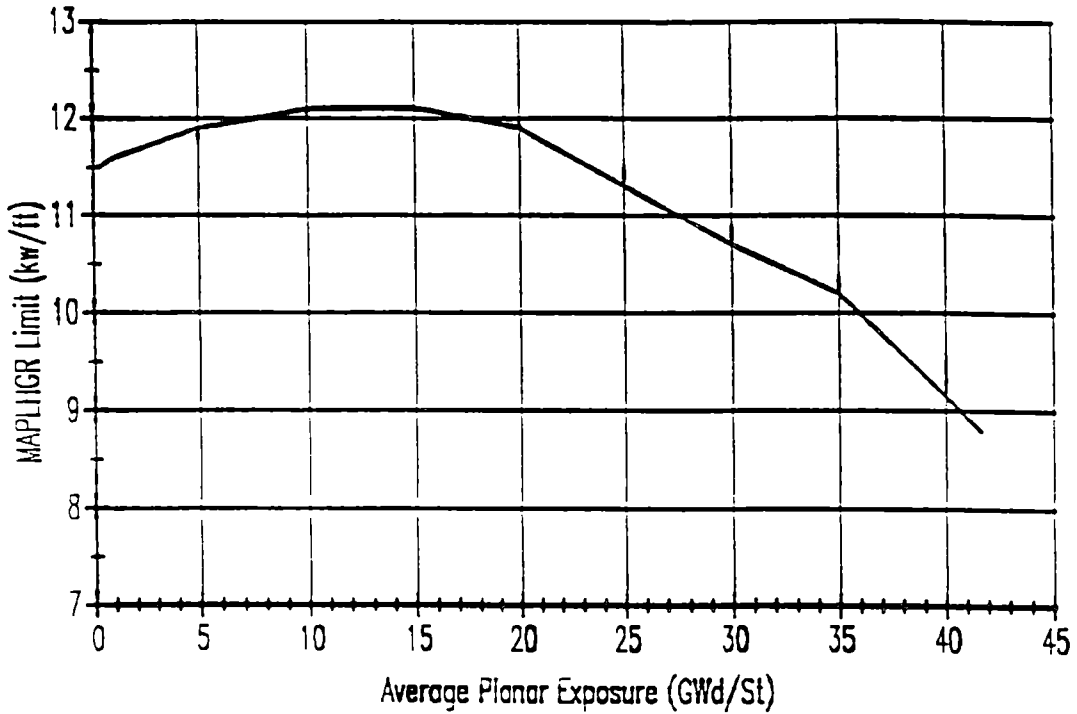
Figure 2.2-2
 MAPLHGR Limit vs. Bundle Average Exposure
 ANF 9x9 Fuel



The above graph is based on the following MAPLHGR summary for ANF 9x9 fuel design.

<u>Bundle Average Exposure (GWD/MTU)</u>	<u>MAPLHGR Limit, Kw/ft</u>
0	11.40
5	11.75
10	11.40
15	10.55
20	9.70
25	8.85
30	8.00
35	7.15
40	6.30

Figure 2.2-3
 MAPLHGR Limit vs. Average Planar Exposure
 GE 8X8 LTAs



The above graph is based on the following MAPLHGR summary for the GE LTA fuel design.

<u>Average Planar Exposure (GWD/STU)</u>	<u>MAPLHGR Limit, Kw/ft</u>
0.2	11.5
1.0	11.6
5.0	11.9
10.0	12.1
15.0	12.1
20.0	11.9
25.0	11.3
30.0	10.7
35.0	10.2
41.6	8.8

Table 2.3-1
MAPLHGR Multipliers

Specification	Title of TS	Scenario	Multiplicative Factors	
			8x8	9x9
3.5.D.2	Automatic Pressure Relief Subsystems	One Relief Valve Out of Service.	0.89	0.76
3.5.I and 3.6.H.3.f	Average Planar LHGR Recirc Pump Flow Limitations	Single Loop Operation	0.91	0.91
3.5.I and 3.6.H.3.f	Average Planar LHGR Recirc Pump Flow Limitations	Single Loop Operation and One Relief Valve Out of Service.	0.89	0.76

3.0 LOCAL STEADY STATE LHGR

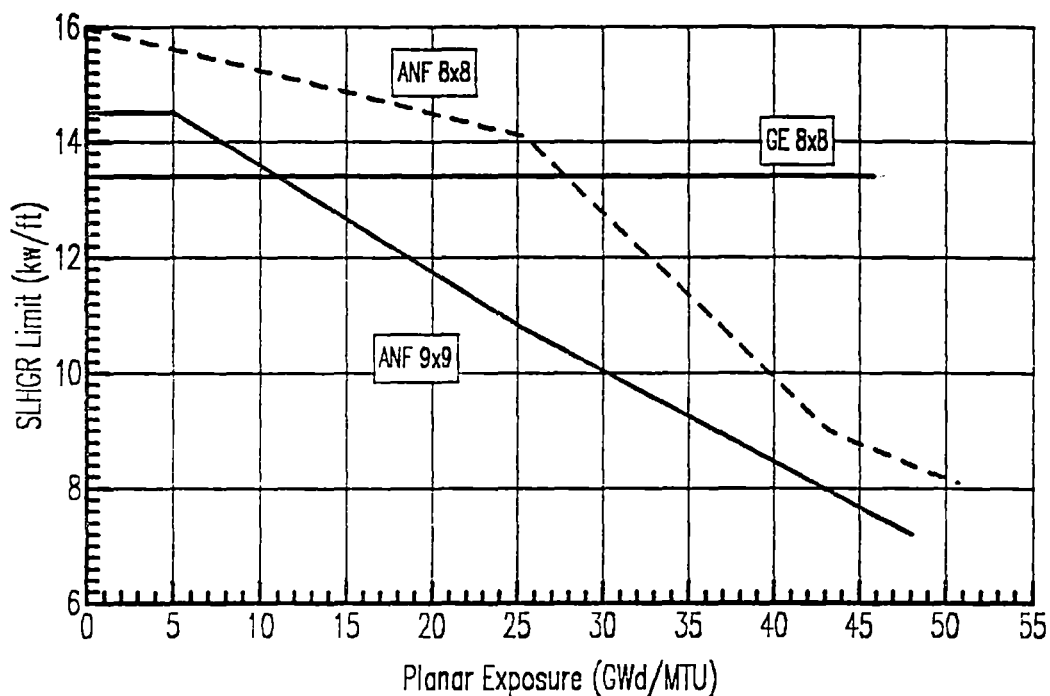
3.1 Technical Specification Reference

Technical Specification 3.5.J - Local Steady State LHGR

3.2 Description

The Local Steady State LHGR (SLHGR) limit versus Average Planar Exposure for all resident fuel is determined from Figure 3.2-1.

Figure 3.2-1
Steady State Linear Heat Generation Rate (SLHGR) Limit
vs. Planar Exposure



GE 8X8 Fuel	
Exposure	LHGR
0.0	13.4
45.8	13.4

ANF 8x8 Fuel	
Exposure	LHGR
0.0	16.0
25.4	14.1
43.2	9.0
50.7	8.1

ANF 9x9 Fuel	
Exposure	LHGR
0.0	14.5
5.0	14.5
25.2	10.8
48.0	7.2

4.0 LOCAL TRANSIENT LHGR

4.1 Technical Specification Reference

Technical Specification 3.5.K - Local Transient LHGR

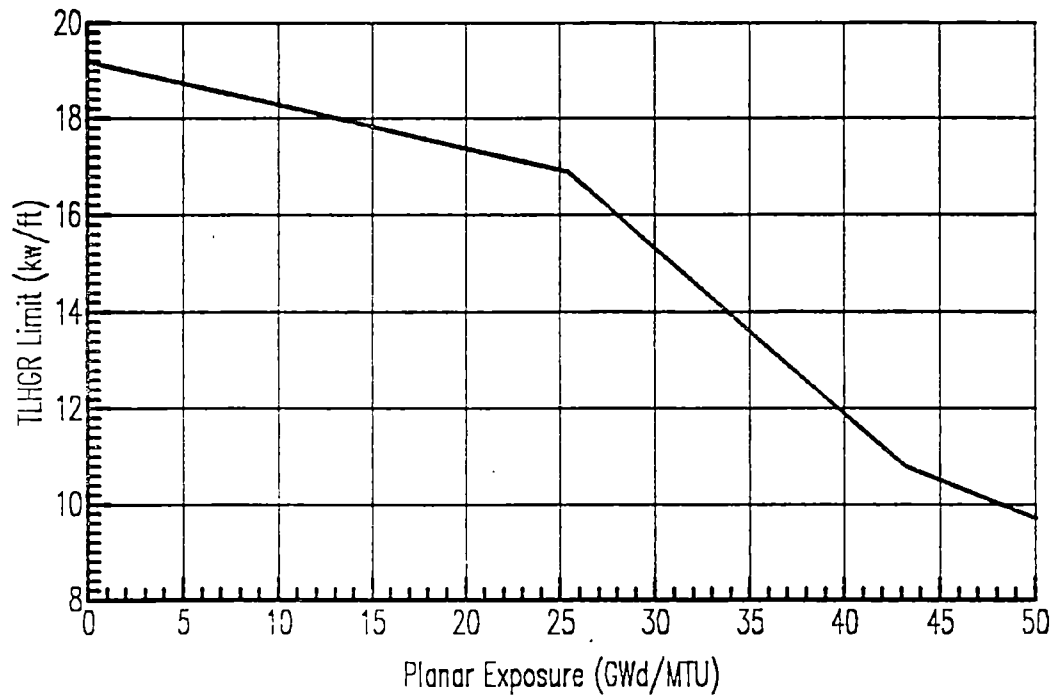
4.2 Description

The Local Transient LHGR (TLHGR) limit versus Average Planar Exposure for ANF 8x8 fuel is determined from Figure 4.2-1.

The TLHGR limit versus Average Planar Exposure for ANF 9x9 fuel is determined from Figure 4.2-2.

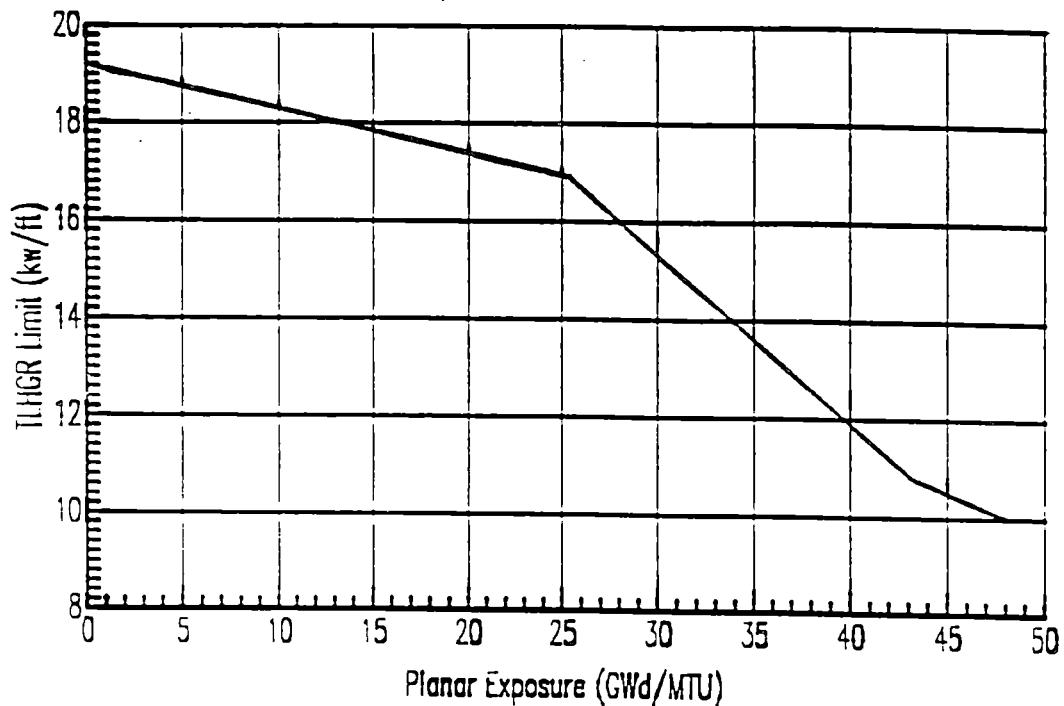
For core modeling purposes, the TLHGR limit versus Average Planar Exposure for the GE 8X8 LTAs is 1.2 * (SLHGR Limit). The SLHGR limit is determined from Figure 3.2-1

Figure 4.2-1
 Transient Linear Heat Generation Rate (TLHGR) Limit
 vs. Planar Exposure for ANF 8x8 Fuel



<u>Exposure</u>	<u>LHGR</u>
0.0	19.2
25.4	16.9
43.2	10.8
50.0	9.7

Figure 4.2-2
 Transient Linear Heat Generation Rate (TLHGR) Limit
 vs. Planar Exposure for ANF 9x9 Fuel



<u>Exposure</u>	<u>LHGR</u>
0.0	19.2
25.4	16.9
43.2	10.8
48.0	10.0

5.0 MINIMUM CRITICAL POWER RATIO OPERATING LIMIT

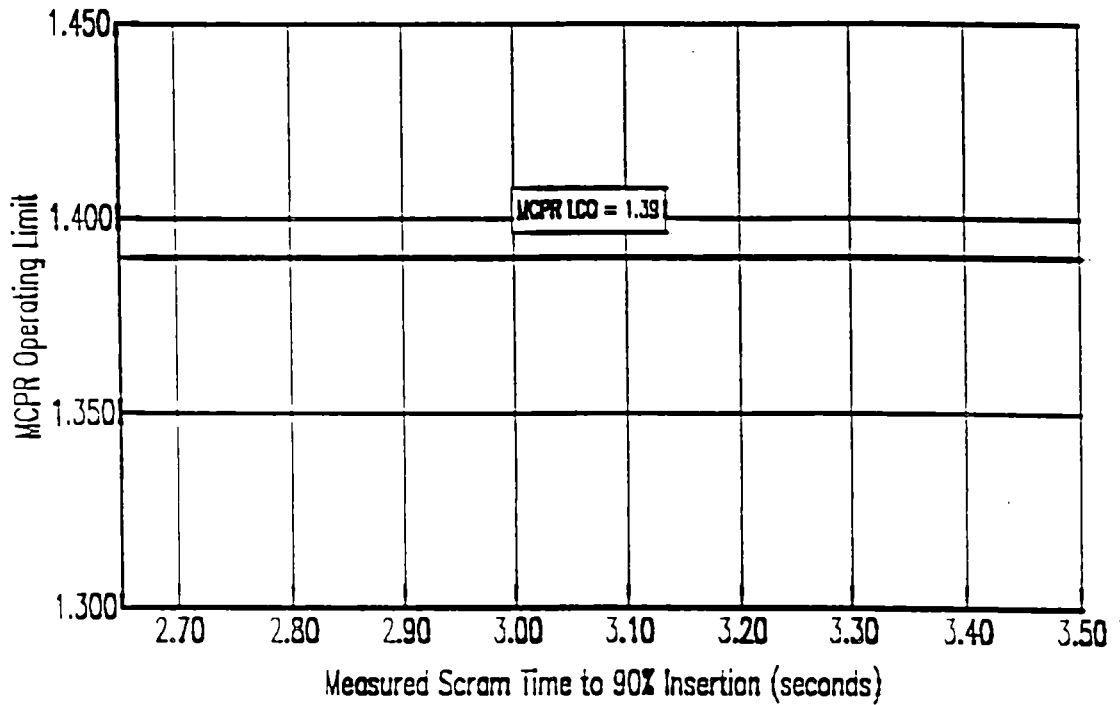
5.1 Technical Specification References

Technical Specification 3.5.L - Minimum Critical Power Ratio (MCPR)

5.2 Description

- a. The MCPR Operating Limit at rated flow versus measured scram time is shown in Figure 5.2-1. The MCPR Operating Limit is 1.39 or greater whenever the measured 90% insertion time is 3.50 seconds or less.
- b. During Manual Flow Control, the MCPR Operating Limit at reduced flow rates can be determined from:
 - i. Figure 5.2-2 using the appropriate flow rate, or
 - ii. The rated flow MCPR Operating Limit determined via Figure 5.2-1,whichever is greater.
- c. During Automatic Flow Control, the MCPR Operating Limit at reduced flow rates can be determined from Figure 5.2-3 using the appropriate flow rate and rated flow MCPR Operating Limit, which is obtained from Figure 5.2-1. Linear interpolation between the curves on Figure 5.2-3 is permissible.

Figure 5.2-1
MCPR Limit vs. Measured Scram Time to 90% Insertion
Rated Flow Conditions

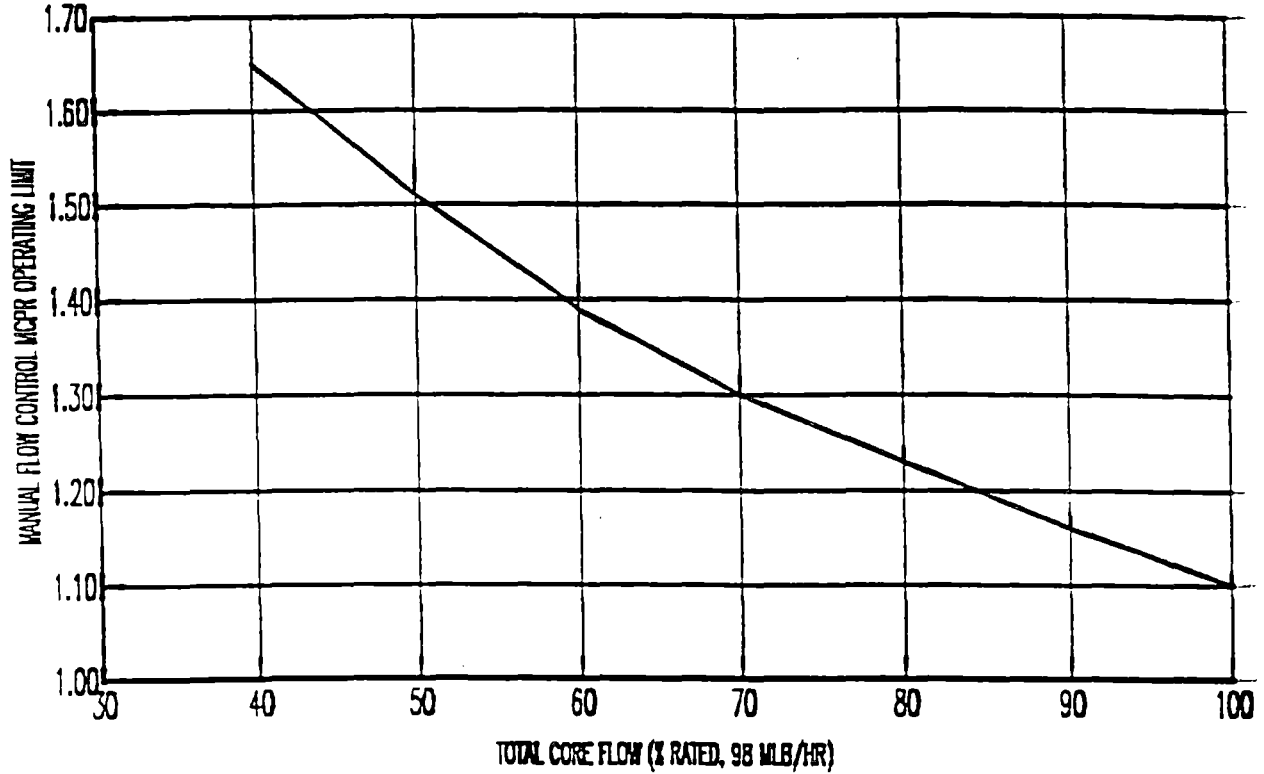


The above graph demonstrates the following dependence of the MCPR Operating Limit versus measured scram time to 90% insertion for all resident fuel types:

$$\text{MCPR LCO} = 1.39$$

Note that the MCPR Operating Limit is not a function of scram time assuming the Technical Specification scram time limit of 3.50 seconds to 90% insertion (3.3.C) is met.

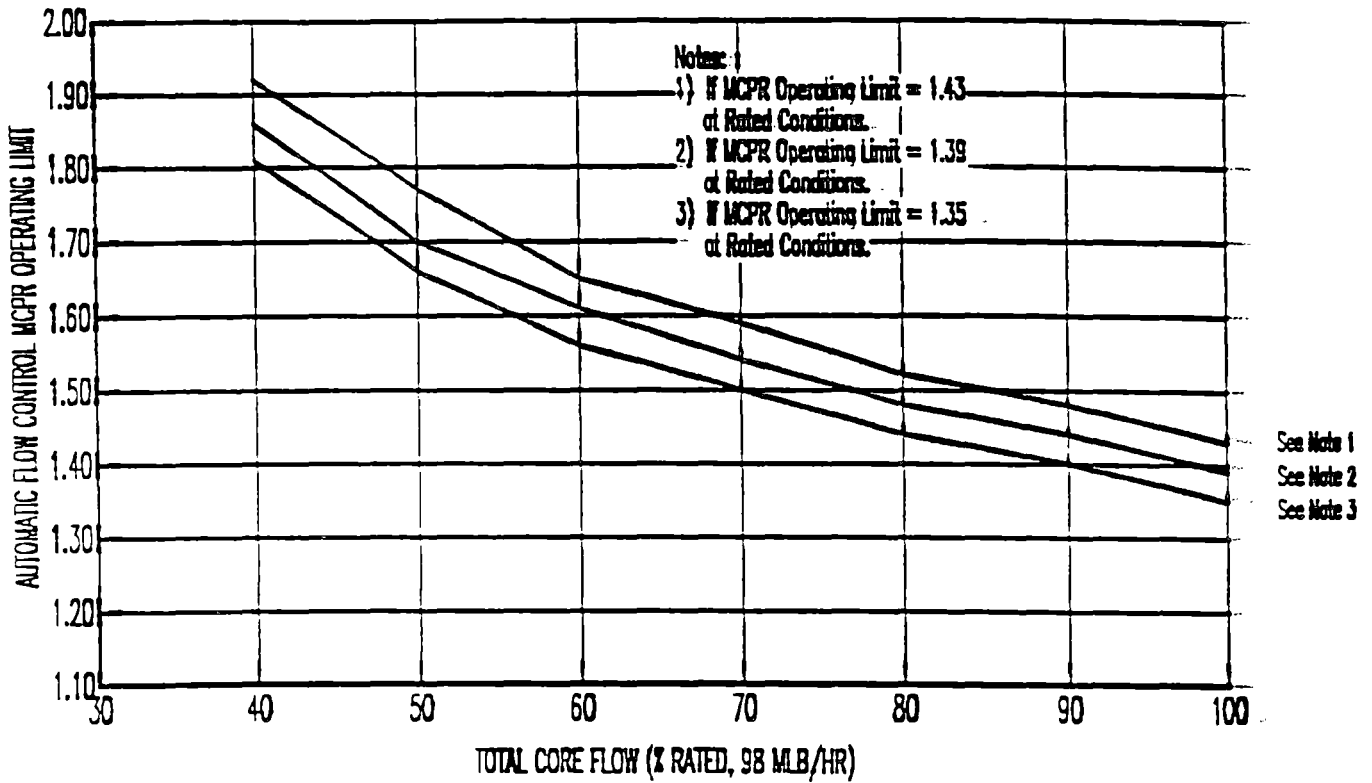
Figure 5.2-2
 MCPR Operating Limit for Manual Flow Control



The above curve is based on the following MCPR operating limit summary for Manual Flow Control and all fuel types:

<u>Total Core Flow (% Rated)</u>	<u>MCPR Operating Limit</u>
100	1.10
90	1.16
80	1.23
70	1.30
60	1.39
50	1.51
40	1.65

Figure 5.2-3
 MCPR Operating Limit for Automatic Flow Control



The above curve is based on the following MCPR operating limit summary for Automatic Flow Control and all fuel types:

Total Core Flow (% Rated)	MCPR Operating Limit*		
	1.35	1.39	1.43
100	1.35	1.39	1.43
90	1.40	1.44	1.48
80	1.44	1.48	1.52
70	1.50	1.54	1.59
60	1.56	1.61	1.65
50	1.66	1.70	1.75
40	1.81	1.86	1.92

* Column Headers are MCPR operating limits at rated flow.

Enclosure F
Core Operating Limits Report
Dresden Unit 3