

**PRAIRIE ISLAND NUCLEAR GENERATING PLANT**  
**CORE OPERATING LIMITS REPORT**

**Unit 2 - Cycle 16**

**Revision 1**

Note: This report is not part of the Technical Specifications.  
This report is referenced in Technical Specifications.

# PRAIRIE ISLAND NUCLEAR GENERATING PLANT

## CORE OPERATING LIMITS REPORT

Unit 2 - Cycle 16

Revision 1

This report provides the values of the limits for Unit 2 Cycle 16 as required by Technical Specification Section 6.7.A.6. These values have been established using NRC approved methodology and are established such that all applicable limits of the plant safety analysis are met.

### Heat Flux Hot Channel Factor Limits

$$F_Q^{RTP} = 2.40$$

K(Z) values are provided in Figure 1.

V(Z) values are provided in Figure 2.

Reference Technical Specification Sections: 3.10.B.1 and 3.10.B.2

### Nuclear Enthalpy Rise Hot Channel Factor Limits

$$F_{\Delta H}^{RTP} = 1.75$$

$$PFDH = 0.3$$

If the nuclear enthalpy rise hot channel factor exceeds its limit in Technical Specification 3.10.B.1, reduce reactor power and the high neutron flux trip setpoint by 3.33% for each percent that the measured nuclear enthalpy rise hot channel factor exceeds the 3.10.B.1 limit.

Reference Technical Specification Sections: 3.10.B.1, 3.10.B.2, and 3.10.B.3

### Linear Heat Generation Rate

The 95% probability level ECCS analysis calculation utilized a peak linear heat generation rate of 14.788 kw/ft.

The Appendix K ECCS analysis calculation utilized a peak linear heat generation rate of 15.167 kw/ft for the  $F_Q$  limit of 2.40.

Reference Technical Specification Section: 3.10.B

### Axial Flux Difference Limits

The Axial Flux difference limits are provided in Figure 3.

The Axial Flux Difference target band is  $\pm 5\%$ .

Reference Technical Specification Sections: 3.10.B.4 through 3.10.B.9

### Shutdown Rod Insertion Limits

The shutdown rods shall be fully withdrawn.

Reference Technical Specification Sections: 3.10.D

### Control Rod Insertion Limits

The control rod banks shall be limited in physical insertion as shown in Figures 4, 5, and 6.

Reference Technical Specification Sections: 3.10.D and 3.10.G

### Reactor Coolant Flow Limit

The reactor coolant system flow shall be  $\geq 178,000$  gpm.

Reference Technical Specification Sections: 3.10.J

### Penalty on $F_Q$ for Small Break LOCA - $K(z)$

The Small and Large Break LOCA analyses performed for this cycle are valid for  $F_Q \leq 2.80$  and  $F_Q \leq 2.40$ , respectively. For this combination of  $F_Q$  limits for the two LOCA analyses, the  $F_Q$  limit for the Large Break LOCA analysis is more limiting than the most limiting  $F_Q$  used in the Small Break LOCA analysis which incorporates the  $K(z)$  Methodology. Therefore, no  $F_Q$  penalty needs to be applied with respect to the Small Break LOCA analysis. Thus, for the equation in Technical Specification 3.10.B,  $K(z)$  is numerically equal to 1.  $K(z)$  is shown graphically in Figure 1.

### Transient Power Distribution Penalty for $F_Q$ - $V(z)$

The following data summarizes the bounding  $V(z)$  values for the middle 80% of the core for Prairie Island Unit 2 Cycle 16. The  $V(z)$  penalty takes the form of straight lines connecting the data points given for each exposure range in the table below. "z" is the core height in feet. The  $V(z)$  penalty for each exposure range is also shown in Figure 2.

Exposure Range GWD/MTU	(z, Bounding $V(z)$ )
0 - 2	0, 1.140
	3, 1.085
	9, 1.085
	12, 1.115
2 - 14	0, 1.127
	12, 1.127
14 - 17	0, 1.161
	12, 1.161
17 - 19.5	0, 1.220
	12, 1.220
19.5 - 21.5	0, 1.271
	12, 1.271

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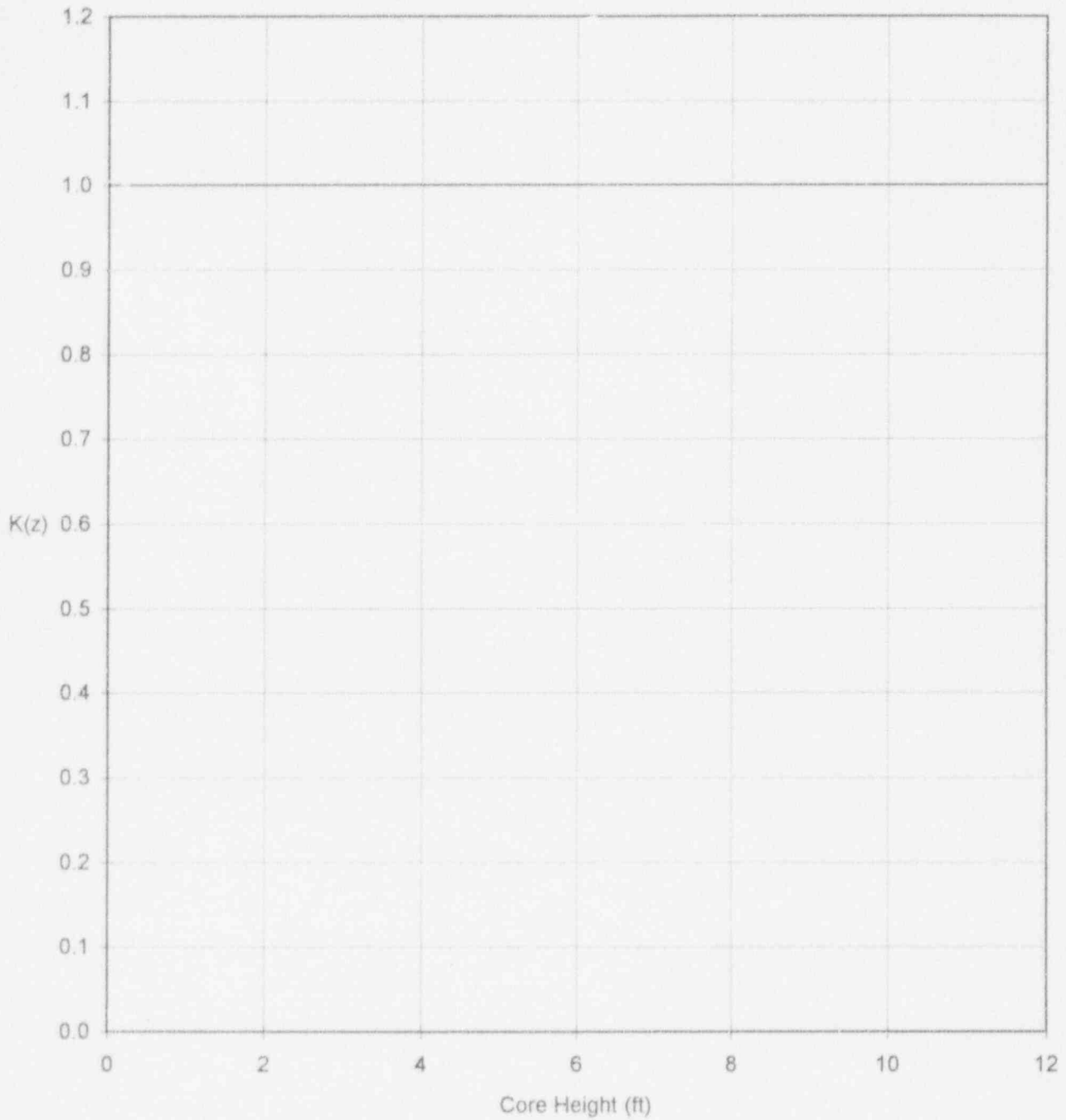


Figure 1 HOT CHANNEL FACTOR NORMALIZED  
OPERATING ENVELOPE

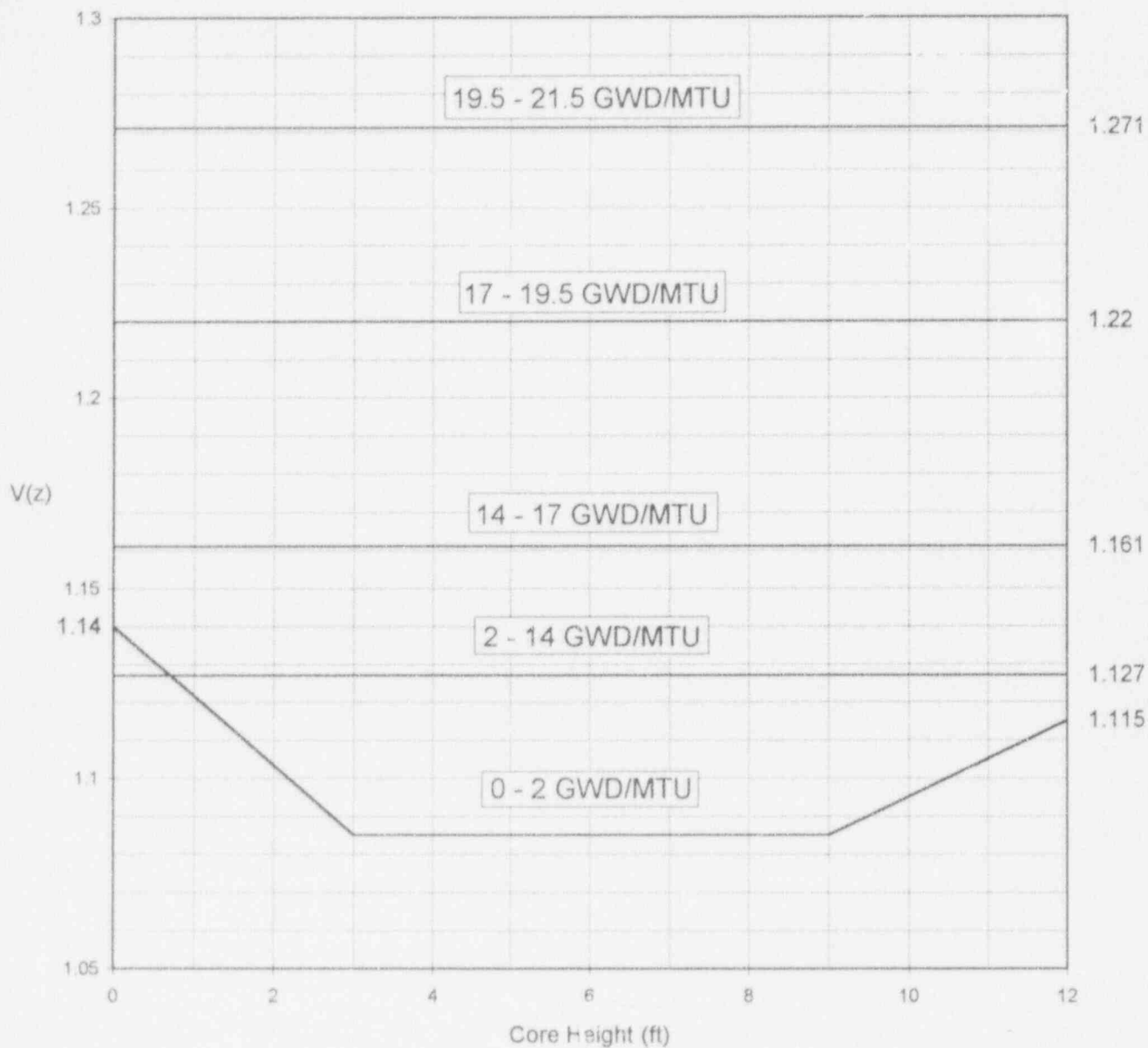


Figure 2 BOUNDING  $V(Z)$  VALUES

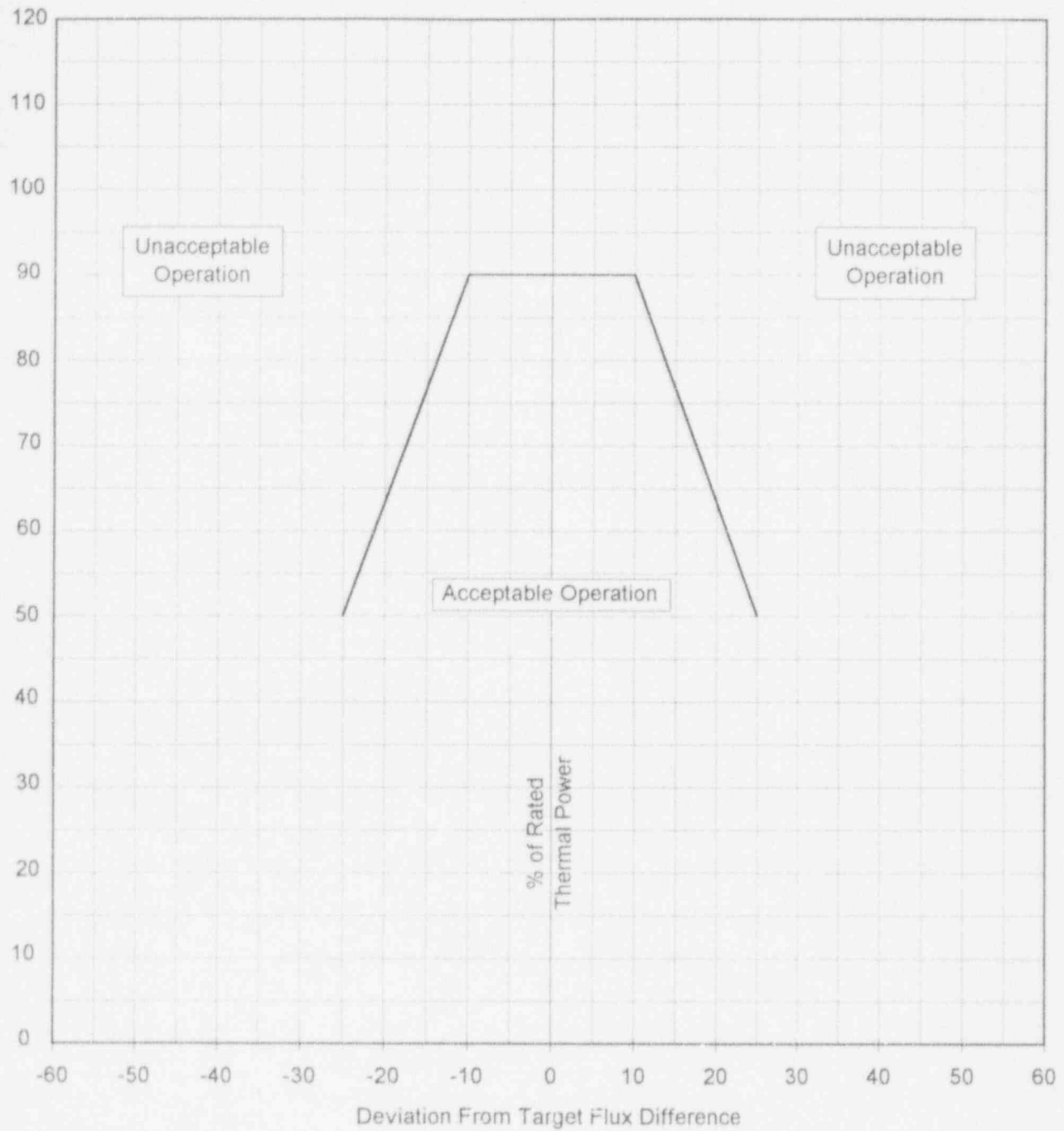


Figure 3 DEVIATION FROM TARGET FLUX DIFFERENCE  
AS A FUNCTION OF THERMAL POWER



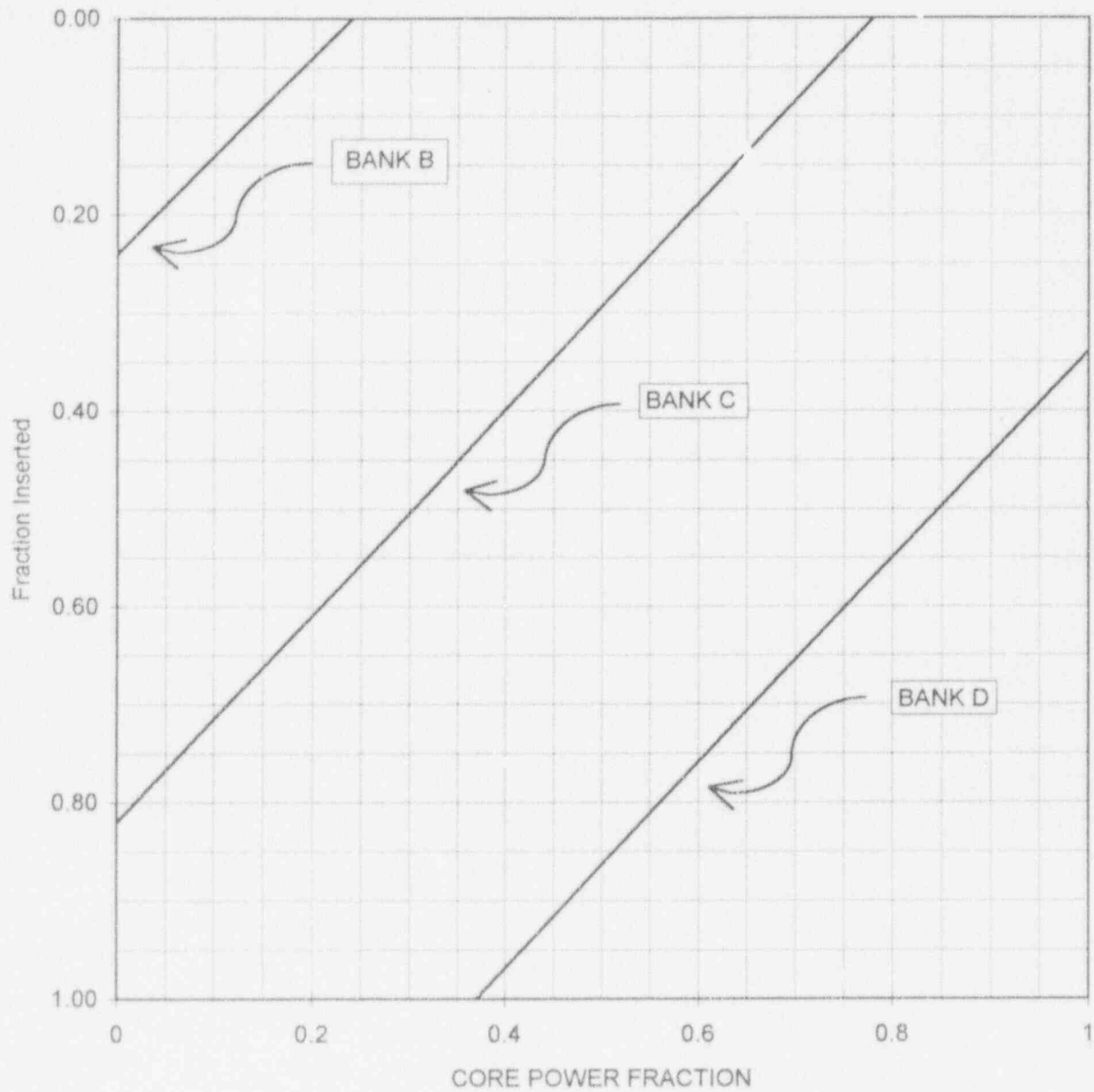


Figure 4 CONTROL BANK INSERTION LIMITS

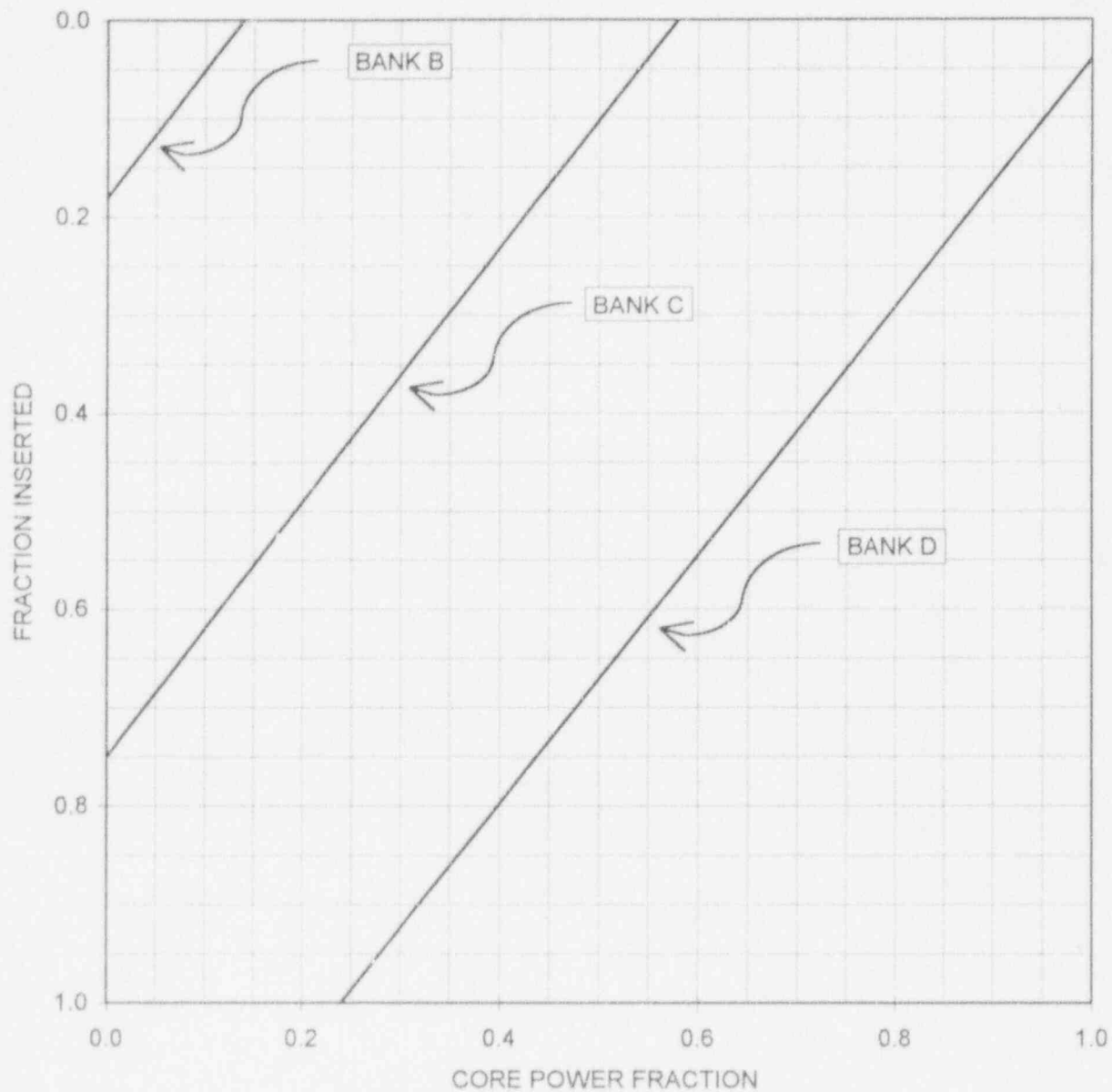


Figure 5 INSERTION LIMITS  
100 STEP OVERLAP WITH ONE  
BOTTOMED ROD  
(Technical Specification 3.10.G.3)

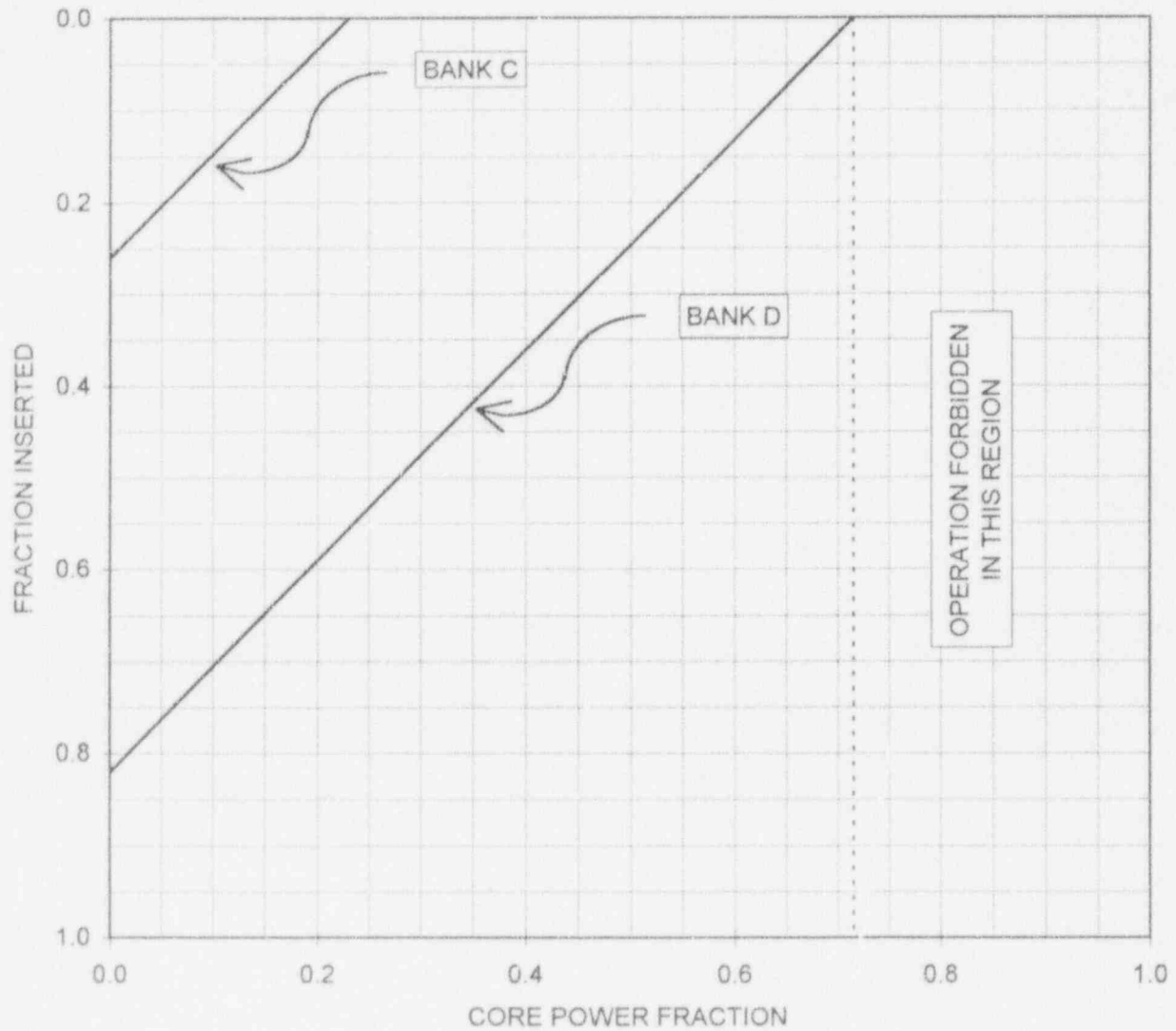


Figure 6 INSERTION LIMITS -  
100 STEP OVERLAP WITH ONE  
INOPERABLE ROD  
(Technical Specification 3.10.G.4)