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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555-0001

Vogtle Electric Generating Plant
Revision 1 of Unit 1 Cycle 14 Core Operating Limits Report

Ladies and Gentlemen:

Pursuant to the reporting requirements of Vogtle Electric Generating Plant (VEGP) Technical Specification 5.6.5 Southern Nuclear Operating Company (SNC) is submitting Revision 1 of the Unit 1 Cycle 14 Core Operating Limits Report (COLR).

This letter contains no NRC commitments. If you have any questions, please advise.

Sincerely,

T. E. Tynan
Vice President – Vogtle
Vogtle Electric Generating Plant
7821 River Road
Waynesboro, GA 30830

TET/RJF/daj

Enclosure: Unit 1 Cycle 14 Core Operating Limits Report

cc: Southern Nuclear Operating Company
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Dr. W. D. Travers, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Vogtle
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VOGTLE ELECTRIC GENERATING PLANT (VEGP) UNIT 1 CYCLE 14

CORE OPERATING LIMITS REPORT

REVISION 1

December 2006

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for VEGP UNIT 1 CYCLE 14 has been prepared in accordance with the requirements of Technical Specification 5.6.5.

The Technical Requirement affected by this report is listed below:

13.1.1	SHUTDOWN MARGIN - MODES 1 and 2

The Technical Specifications affected by this report are listed below:

3.1.1	SHUTDOWN MARGIN - MODES 3, 4 and 5
3.1.3	Moderator Temperature Coefficient
3.1.5	Shutdown Bank Insertion Limits
3.1.6	Control Bank Insertion Limits
3.2.1	Heat Flux Hot Channel Factor - $F_Q(Z)$
3.2.2	Nuclear Enthalpy Rise Hot Channel Factor - $F^N_{\Delta H}$
3.2.3	Axial Flux Difference
3.9.1	Boron Concentration

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in section 1.0 are presented in the following subsections. These limits have been developed using NRC-approved methodologies, including those specified in Technical Specification 5.6.5.

2.1 SHUTDOWN MARGIN - MODES 1 AND 2 (Technical Requirement 13.1.1)

2.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.30 percent $\Delta k/k$.

2.2 SHUTDOWN MARGIN - MODES 3, 4 AND 5 (Specification 3.1.1)

2.2.1 The SHUTDOWN MARGIN shall be greater than or equal to the limits shown in Figures 1 and 2.

2.3 Moderator Temperature Coefficient (Specification 3.1.3)

2.3.1 The Moderator Temperature Coefficient (MTC) limits are:

The BOL/ARO/HZP - MTC shall be less positive than $+0.7 \times 10^{-4}$ $\Delta k/k/°F$ for power levels up to 70 percent RTP with a linear ramp to 0 $\Delta k/k/°F$ at 100 percent RTP.

The EOL/ARO/RTP-MTC shall be less negative than -5.50×10^{-4} $\Delta k/k/°F$.[1]

2.3.2 The MTC Surveillance limits are:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to -4.75×10^{-4} $\Delta k/k/°F$.[1]

The 60 ppm/ARO/RTP-MTC should be less negative than -5.35×10^{-4} $\Delta k/k/°F$.[1]

where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
HZP stands for Hot Zero THERMAL POWER
EOL stands for End of Cycle Life
RTP stands for RATED THERMAL POWER

2.4 Shutdown Bank Insertion Limits (Specification 3.1.5)

2.4.1 The shutdown banks shall be withdrawn to a position greater than or equal to 225 steps.

[1]Applicable for full-power T-average of 586.4°F to 587.4°F.

2.5 Control Bank Insertion Limits (Specification 3.1.6)

2.5.1 The control banks shall be limited in physical insertion as shown in Figure 3.

2.6 Heat Flux Hot Channel Factor - $F_Q(Z)$ (Specification 3.2.1)

2.6.1 $$F_Q(Z) \leq \frac{F_Q^{RTP}}{P} * K(Z) \quad \text{for } P > 0.5$$

$$F_Q(Z) \leq \frac{F_Q^{RTP}}{0.5} * K(Z) \quad \text{for } P \leq 0.5$$

$$\text{where: } P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$$

2.6.2 $F_Q^{RTP} = 2.50$

2.6.3 K(Z) is provided in Figure 4.

2.6.4 $$F_Q(Z) \leq \frac{F_Q^{RTP} * K(Z)}{P * W(Z)} \quad \text{for } P > 0.5$$

$$F_Q(Z) \leq \frac{F_Q^{RTP} * K(Z)}{0.5 * W(Z)} \quad \text{for } P \leq 0.5$$

2.6.5 W(Z) values are provided in Table 2.

2.6.6 The $F_Q(Z)$ penalty factors are provided in Table 1.

2.7 Nuclear Enthalpy Rise Hot Channel Factor - $F^N_{\Delta H}$ (Specification 3.2.2)

2.7.1 $F^N_{\Delta H} \leq F^{RTP}_{\Delta H} * (1 + PF_{\Delta H} * (1 - P))$

where: $P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$

2.7.2 $F^{RTP}_{\Delta H} = 1.65$

2.7.3 $PF_{\Delta H} = 0.3$

2.8 Axial Flux Difference (Specification 3.2.3)

2.8.1 The Axial Flux Difference (AFD) acceptable operation limits are provided in Figure 5.

2.9 Boron Concentration (Specification 3.9.1)

2.9.1 The boron concentration shall be greater than or equal to 1900 ppm.[1]

[1]This concentration bounds the condition of $k_{eff} \leq 0.95$ (all rods in less the most reactive rod) and subcriticality (all rods out) over the entire cycle. This concentration includes additional boron to address uncertainties and B^{10} depletion.

TABLE 1

$F_Q(Z)$ PENALTY FACTOR

Cycle Burnup (MWD/MTU)	$F_Q(Z)$ Penalty Factor
6124	1.020
6338	1.021
7831	1.021
8044	1.020

Notes:

1. The Penalty Factor, to be applied to $F_Q(Z)$ in accordance with SR 3.2.1.2, is the maximum factor by which $F_Q(Z)$ is expected to increase over a 39 EFPD interval (surveillance interval of 31 EFPD plus the maximum allowable extension not to exceed 25% of the surveillance interval per SR 3.0.2) starting from the burnup at which the $F_Q(Z)$ was determined.

2. Linear interpolation is adequate for intermediate cycle burnups.

3. For all cycle burnups outside the range of the table, a penalty factor of 1.020 shall be used.

Table 2
RAOC W(Z)

	Axial Point	Elevation (feet)	150 MWD/MTU	4000 MWD/MTU	12000 MWD/MTU	18000 MWD/MTU
*	1	12.00	1.0000	1.0000	1.0000	1.0000
*	2	11.80	1.0000	1.0000	1.0000	1.0000
*	3	11.60	1.0000	1.0000	1.0000	1.0000
*	4	11.40	1.0000	1.0000	1.0000	1.0000
*	5	11.20	1.0000	1.0000	1.0000	1.0000
	6	11.00	1.1366	1.3091	1.2754	1.2820
	7	10.80	1.1321	1.2978	1.2728	1.2774
	8	10.60	1.1231	1.2795	1.2678	1.2692
	9	10.40	1.1169	1.2582	1.2629	1.2606
	10	10.20	1.1177	1.2344	1.2572	1.2496
	11	10.00	1.1211	1.2086	1.2499	1.2361
	12	9.80	1.1220	1.1786	1.2545	1.2312
	13	9.60	1.1202	1.1597	1.2632	1.2325
	14	9.40	1.1174	1.1534	1.2677	1.2410
	15	9.20	1.1147	1.1439	1.2728	1.2481
	16	9.00	1.1123	1.1425	1.2732	1.2512
	17	8.80	1.1160	1.1455	1.2709	1.2520
	18	8.60	1.1277	1.1507	1.2682	1.2555
	19	8.40	1.1390	1.1537	1.2670	1.2658
	20	8.20	1.1474	1.1554	1.2675	1.2754
	21	8.00	1.1556	1.1555	1.2651	1.2879
	22	7.80	1.1621	1.1576	1.2663	1.2982
	23	7.60	1.1661	1.1599	1.2685	1.3044
	24	7.40	1.1681	1.1597	1.2664	1.3075
	25	7.20	1.1681	1.1578	1.2617	1.3072
	26	7.00	1.1664	1.1543	1.2543	1.3038
	27	6.80	1.1629	1.1493	1.2445	1.2977
	28	6.60	1.1586	1.1436	1.2325	1.2887
	29	6.40	1.1545	1.1381	1.2184	1.2775
	30	6.20	1.1492	1.1316	1.2024	1.2656
	31	6.00	1.1423	1.1232	1.1883	1.2523
	32	5.80	1.1415	1.1213	1.1783	1.2414
	33	5.60	1.1467	1.1297	1.1753	1.2338
	34	5.40	1.1614	1.1433	1.1762	1.2300
	35	5.20	1.1744	1.1557	1.1767	1.2332
	36	5.00	1.1881	1.1672	1.1780	1.2350
	37	4.80	1.2020	1.1780	1.1788	1.2341
	38	4.60	1.2146	1.1879	1.1778	1.2314
	39	4.40	1.2262	1.1967	1.1754	1.2266
	40	4.20	1.2383	1.2044	1.1717	1.2196
	41	4.00	1.2508	1.2105	1.1668	1.2106
	42	3.80	1.2624	1.2173	1.1601	1.2000
	43	3.60	1.2723	1.2241	1.1543	1.1875
	44	3.40	1.2808	1.2300	1.1520	1.1741
	45	3.20	1.2879	1.2406	1.1485	1.1650
	46	3.00	1.2930	1.2530	1.1452	1.1624
	47	2.80	1.3082	1.2719	1.1448	1.1659
	48	2.60	1.3346	1.2972	1.1476	1.1780
	49	2.40	1.3596	1.3210	1.1520	1.1882
	50	2.20	1.3841	1.3446	1.1576	1.1983
	51	2.00	1.4081	1.3679	1.1637	1.2086
	52	1.80	1.4311	1.3903	1.1699	1.2189
	53	1.60	1.4531	1.4119	1.1766	1.2295
	54	1.40	1.4738	1.4322	1.1841	1.2402
	55	1.20	1.4930	1.4510	1.1916	1.2509
	56	1.00	1.5098	1.4674	1.1986	1.2611
*	57	0.80	1.0000	1.0000	1.0000	1.0000
*	58	0.60	1.0000	1.0000	1.0000	1.0000
*	59	0.40	1.0000	1.0000	1.0000	1.0000
*	60	0.20	1.0000	1.0000	1.0000	1.0000
*	61	0.00	1.0000	1.0000	1.0000	1.0000

* Top and Bottom 5 Points Excluded per Technical Specification B3.2.1.

These W(Z) values are consistent with Figure 5, and are valid over the HFP T_{avg} temperature range from 586.4 to 587.4°F.

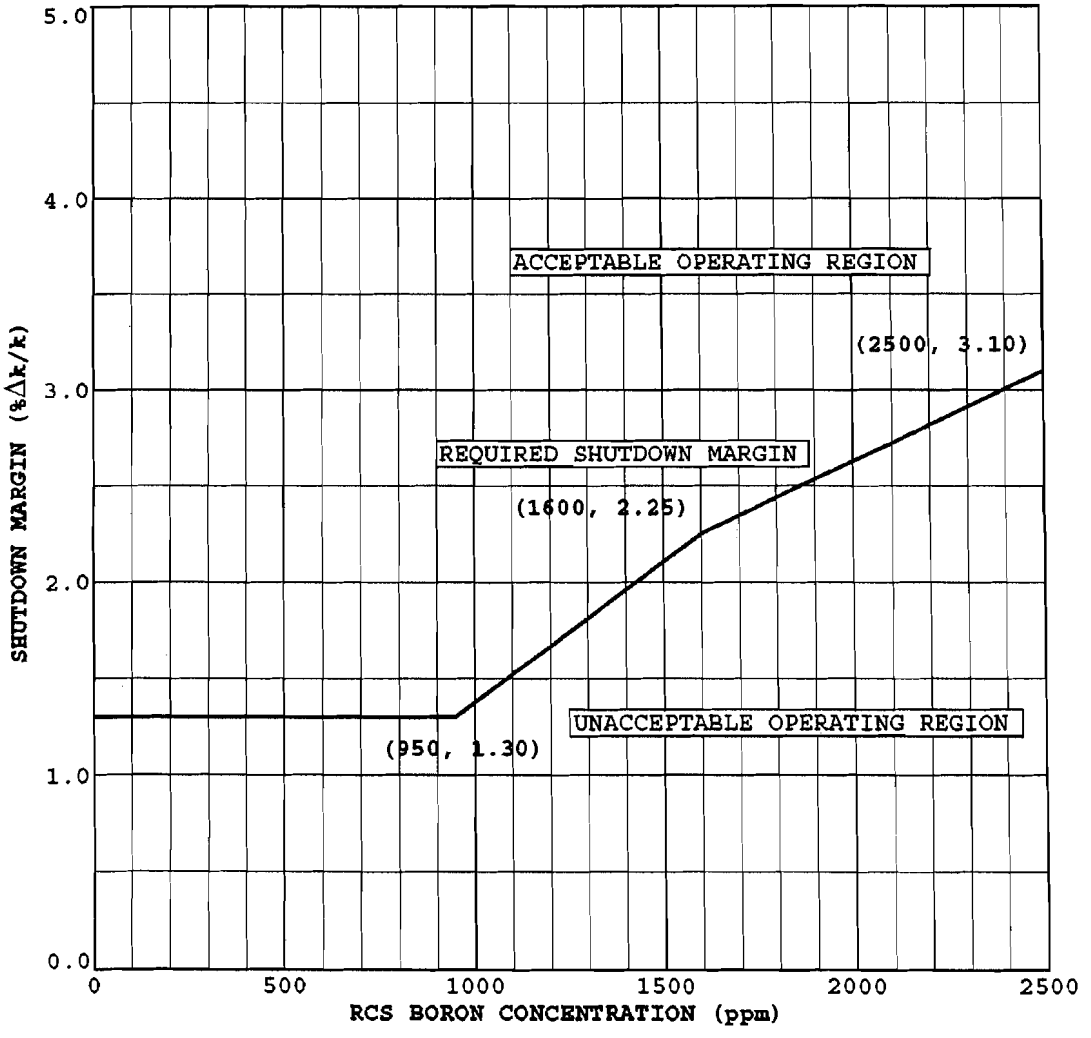


FIGURE 1

REQUIRED SHUTDOWN MARGIN FOR MODES 3 AND 4 (FOUR LOOPS FILLED AND VENTED AND AT LEAST ONE REACTOR COOLANT PUMP RUNNING)

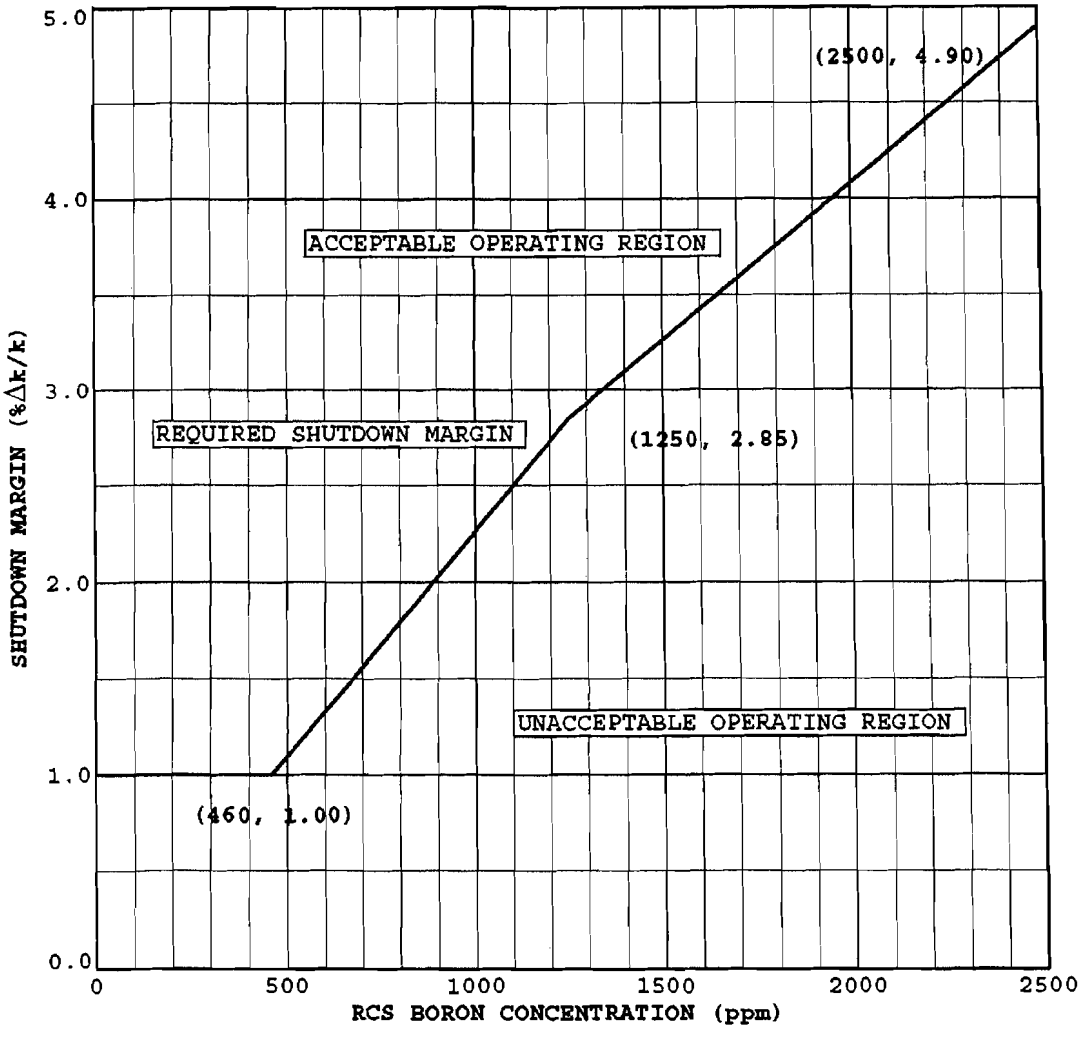
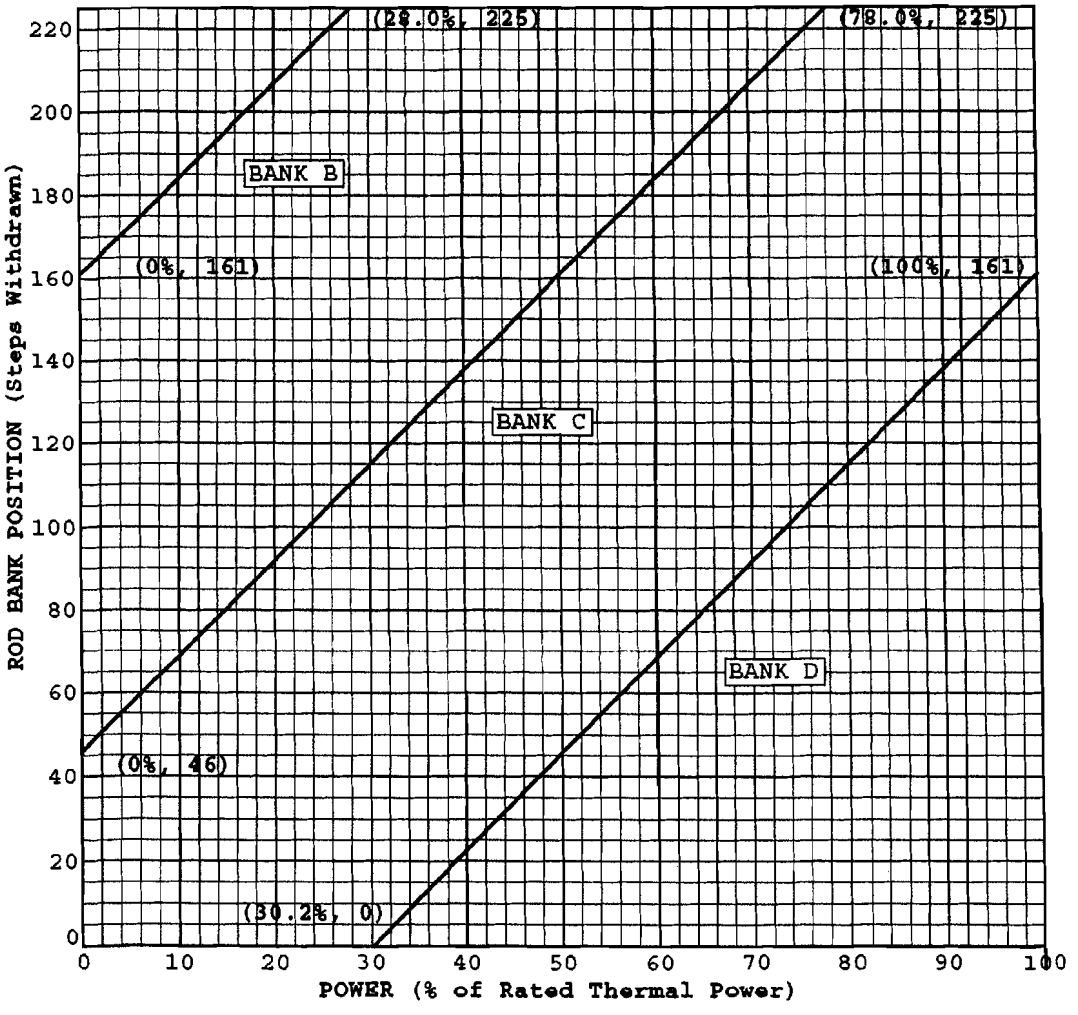


FIGURE 2

REQUIRED SHUTDOWN MARGIN FOR MODES 4 AND 5 (MODE 4 WHEN FIGURE 1 NOT APPLICABLE)

(Fully Withdrawn*)



*Fully withdrawn shall be the condition where control rods are at a position within the interval ≥ 225 and ≤ 231 steps withdrawn.

NOTE: The Rod Bank Insertion Limits are based on the control bank withdrawal sequence A, B, C, D and a control bank tip-to-tip distance of 115 steps.

FIGURE 3

ROD BANK INSERTION LIMITS VERSUS % OF RATED THERMAL POWER

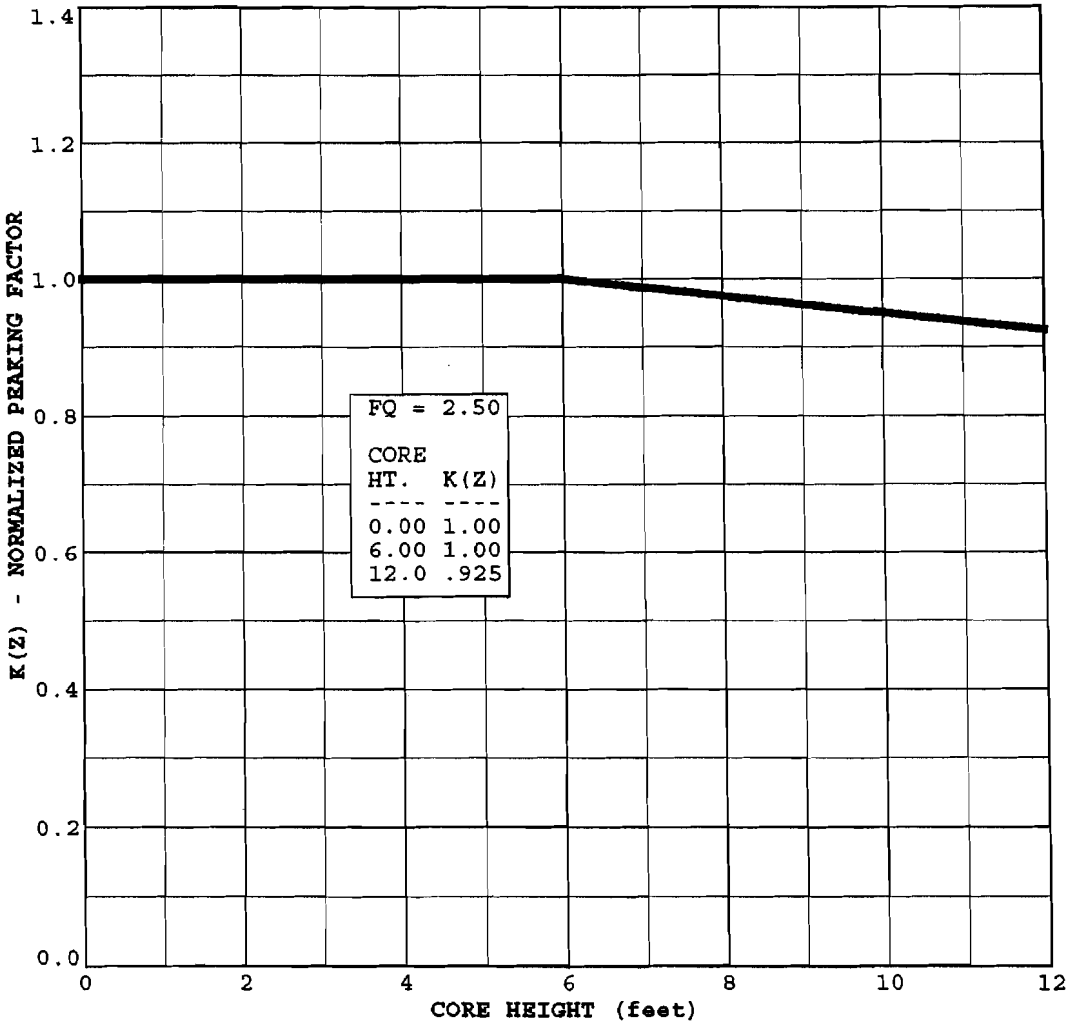


FIGURE 4

K(Z) – NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT

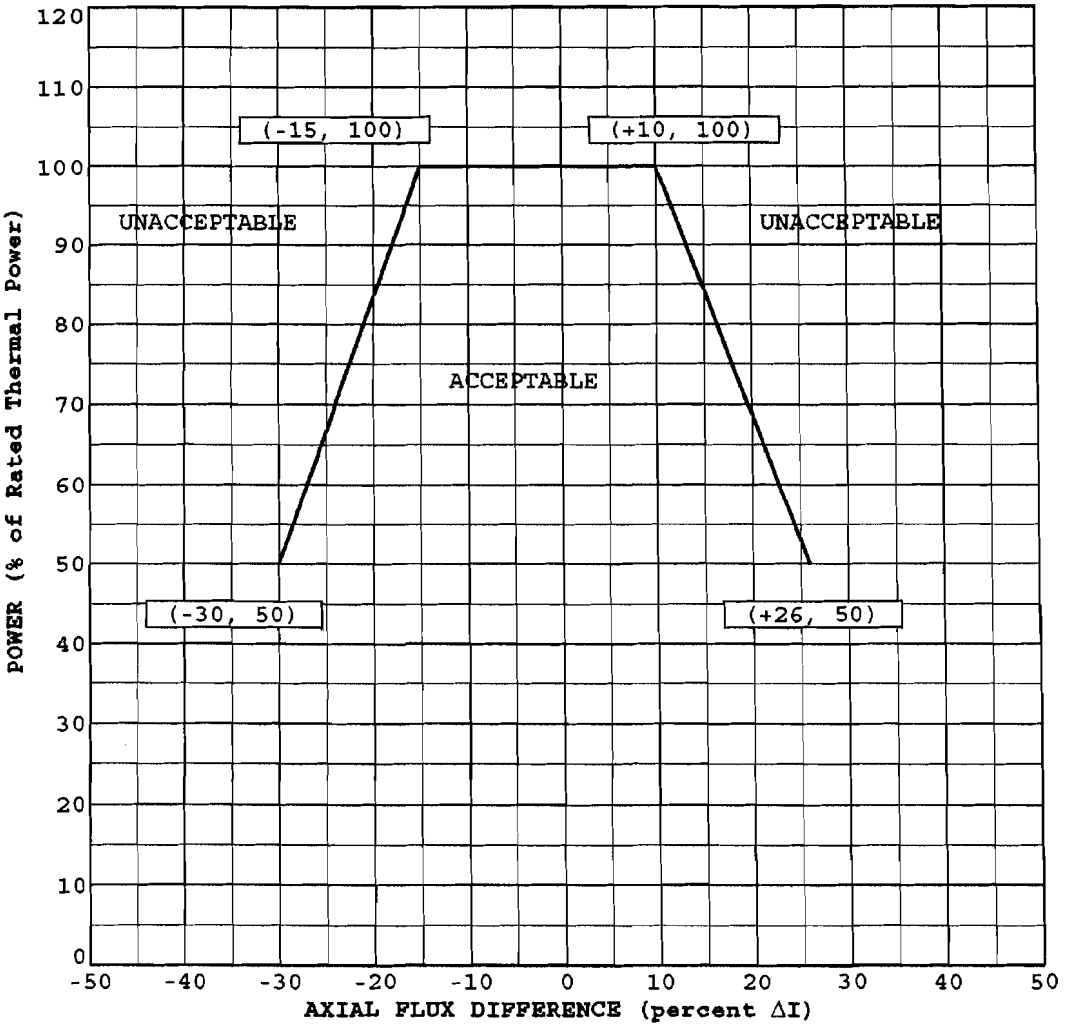


FIGURE 5

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF % OF RATED THERMAL POWER FOR RAOC