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

Vogtle Electric Generating Plant
Unit 2 Cycle 13 Core Operating Limits Report, Rev. 0

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 0 of the Unit 2 Cycle 13 Core Operating Limits Report (COLR).

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

Sincerely,

A handwritten signature in black ink, appearing to read "B. J. George". The signature is fluid and cursive.

B. J. George
Manager, Nuclear Licensing

BJG/LPH/phr

Enclosure: Unit 2 Cycle 13 Core Operating Limits Report, Rev. 0

cc: Southern Nuclear Operating Company
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U. S. Nuclear Regulatory Commission
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Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

Enclosure

**Vogtle Electric Generating Plant
Unit 2 Cycle 13 Core Operating Limits Report, Rev. 0**

VOGTLE ELECTRIC GENERATING PLANT (VEGP) UNIT 2 CYCLE 13

CORE OPERATING LIMITS REPORT

REVISION 0

March 2007

COLR for VEGP UNIT 2 CYCLE 13

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for VEGP UNIT 2 CYCLE 13 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 - $F_{\Delta H}^N$

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 $+0.7 \times 10^{-4} \Delta k/k/^\circ F$ for power levels up to 70% RTP with a linear ramp to 0 $\Delta k/k/^\circ F$ at 100% RTP.

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

2.3.2 The MTC Surveillance limits are:

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

The 60 ppm/ARO/RTP-MTC should be less negative than $-5.35 \times 10^{-4} \Delta k/k/^\circ F$.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.

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.

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

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

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

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

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

$$2.6.2 \quad F_Q^{RTP} = 2.50$$

2.6.3 $K(Z)$ is provided in Figure 4.

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

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

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 - $F_{\Delta H}^N$ (Specification 3.2.2)

2.7.1 $F_{\Delta H}^N \leq F_{\Delta H}^{RTP} * (1 + PF_{\Delta H} * (1-P))$

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

2.7.2 $F_{\Delta H}^{RTP} = 1.65$

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 1920 ppm.¹

¹This concentration bounds the condition of $k_{\text{eff}} \leq 0.95$ (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.

COLR for VEGP UNIT 2 CYCLE 13

TABLE 1

$F_Q(Z)$ PENALTY FACTOR

<u>Cycle Burnup (MWD/MTU)</u>	<u>$F_Q(Z)$ Penalty Factor</u>
30	1.0225
150	1.0225
363	1.0230
577	1.0221
790	1.0200

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.

COLR for VEGP UNIT 2 CYCLE 13

TABLE 2

RAOC W(Z)

Axial Point	Elevation (feet)	150 MWD/MTU	4000 MWD/MTU	12000 MWD/MTU	20000 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	1.2937	1.3738	1.2499	1.2350
7	10.80	1.2798	1.3599	1.2446	1.2272
8	10.60	1.2603	1.3439	1.2392	1.2154
9	10.40	1.2399	1.3271	1.2346	1.2063
10	10.20	1.2240	1.3128	1.2291	1.2025
11	10.00	1.2184	1.2928	1.2238	1.2053
12	9.80	1.2150	1.2639	1.2239	1.2084
13	9.60	1.2088	1.2416	1.2253	1.2110
14	9.40	1.2016	1.2296	1.2237	1.2126
15	9.20	1.1947	1.2132	1.2219	1.2126
16	9.00	1.1840	1.1984	1.2229	1.2200
17	8.80	1.1840	1.1944	1.2248	1.2367
18	8.60	1.1928	1.1951	1.2303	1.2540
19	8.40	1.2007	1.1981	1.2385	1.2673
20	8.20	1.2064	1.1988	1.2435	1.2805
21	8.00	1.2078	1.2017	1.2502	1.2899
22	7.80	1.2112	1.2031	1.2549	1.3010
23	7.60	1.2150	1.2014	1.2561	1.3120
24	7.40	1.2148	1.1977	1.2547	1.3181
25	7.20	1.2123	1.1918	1.2506	1.3207
26	7.00	1.2074	1.1841	1.2440	1.3199
27	6.80	1.2004	1.1746	1.2352	1.3158
28	6.60	1.1917	1.1645	1.2242	1.3087
29	6.40	1.1813	1.1545	1.2121	1.2989
30	6.20	1.1695	1.1438	1.1998	1.2866
31	6.00	1.1586	1.1369	1.1848	1.2712
32	5.80	1.1499	1.1311	1.1746	1.2568
33	5.60	1.1459	1.1289	1.1730	1.2479
34	5.40	1.1461	1.1317	1.1771	1.2457
35	5.20	1.1548	1.1401	1.1827	1.2474
36	5.00	1.1633	1.1481	1.1871	1.2476
37	4.80	1.1704	1.1550	1.1901	1.2453
38	4.60	1.1769	1.1613	1.1918	1.2410
39	4.40	1.1824	1.1666	1.1920	1.2343
40	4.20	1.1870	1.1708	1.1907	1.2253
41	4.00	1.1901	1.1763	1.1881	1.2144
42	3.80	1.1942	1.1817	1.1842	1.2011
43	3.60	1.2000	1.1858	1.1791	1.1872
44	3.40	1.2058	1.1888	1.1731	1.1755
45	3.20	1.2119	1.1919	1.1675	1.1656
46	3.00	1.2187	1.1973	1.1723	1.1630
47	2.80	1.2291	1.2095	1.1812	1.1642
48	2.60	1.2433	1.2263	1.1882	1.1700
49	2.40	1.2590	1.2422	1.1959	1.1768
50	2.20	1.2783	1.2612	1.2042	1.1859
51	2.00	1.2978	1.2814	1.2126	1.1955
52	1.80	1.3164	1.3012	1.2209	1.2052
53	1.60	1.3346	1.3203	1.2294	1.2153
54	1.40	1.3519	1.3384	1.2379	1.2258
55	1.20	1.3682	1.3553	1.2463	1.2364
56	1.00	1.3828	1.3701	1.2540	1.2468
* 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.

COLR for VEGP UNIT 2 CYCLE 13

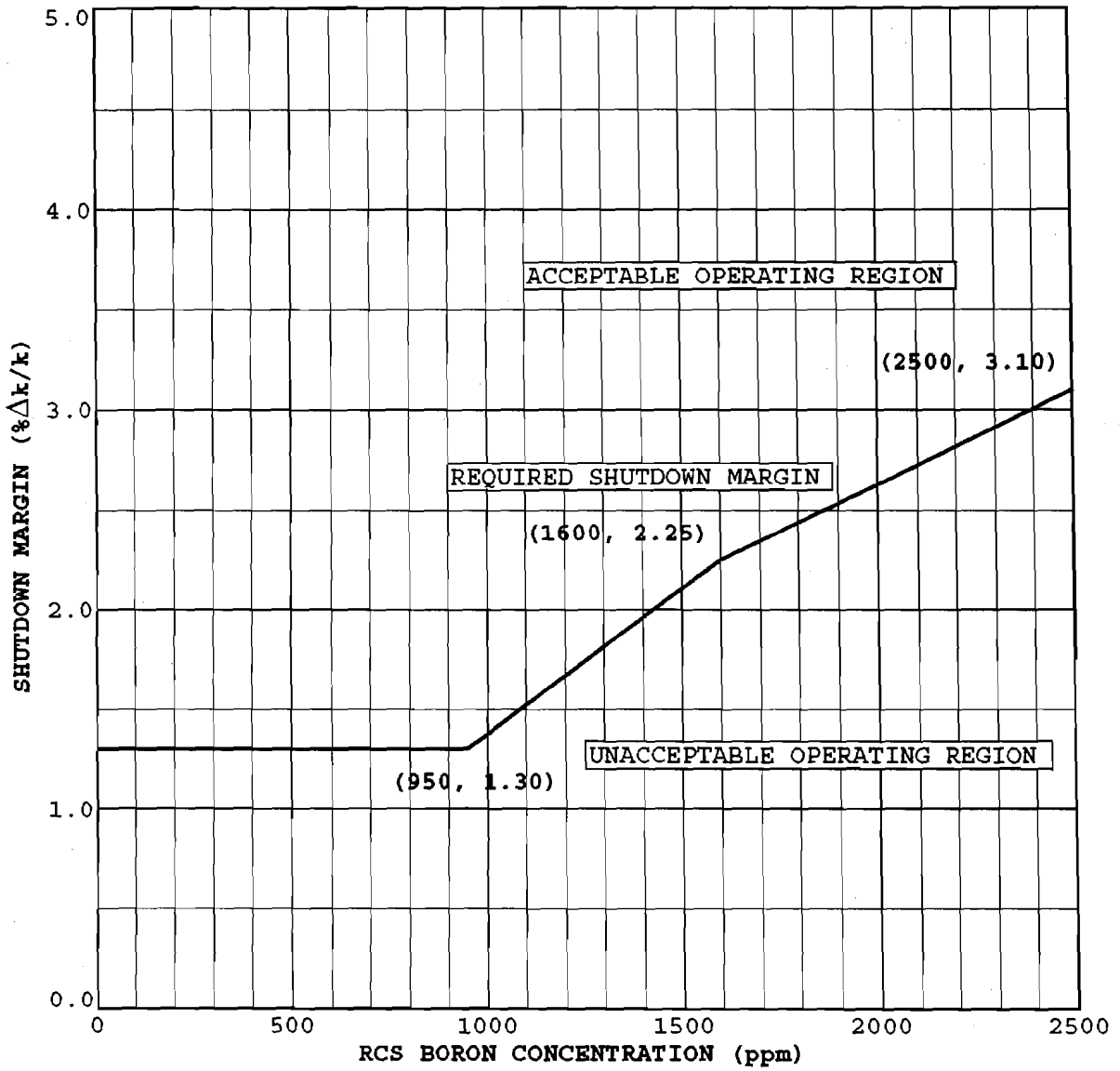


FIGURE 1

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

COLR for VEGP UNIT 2 CYCLE 13

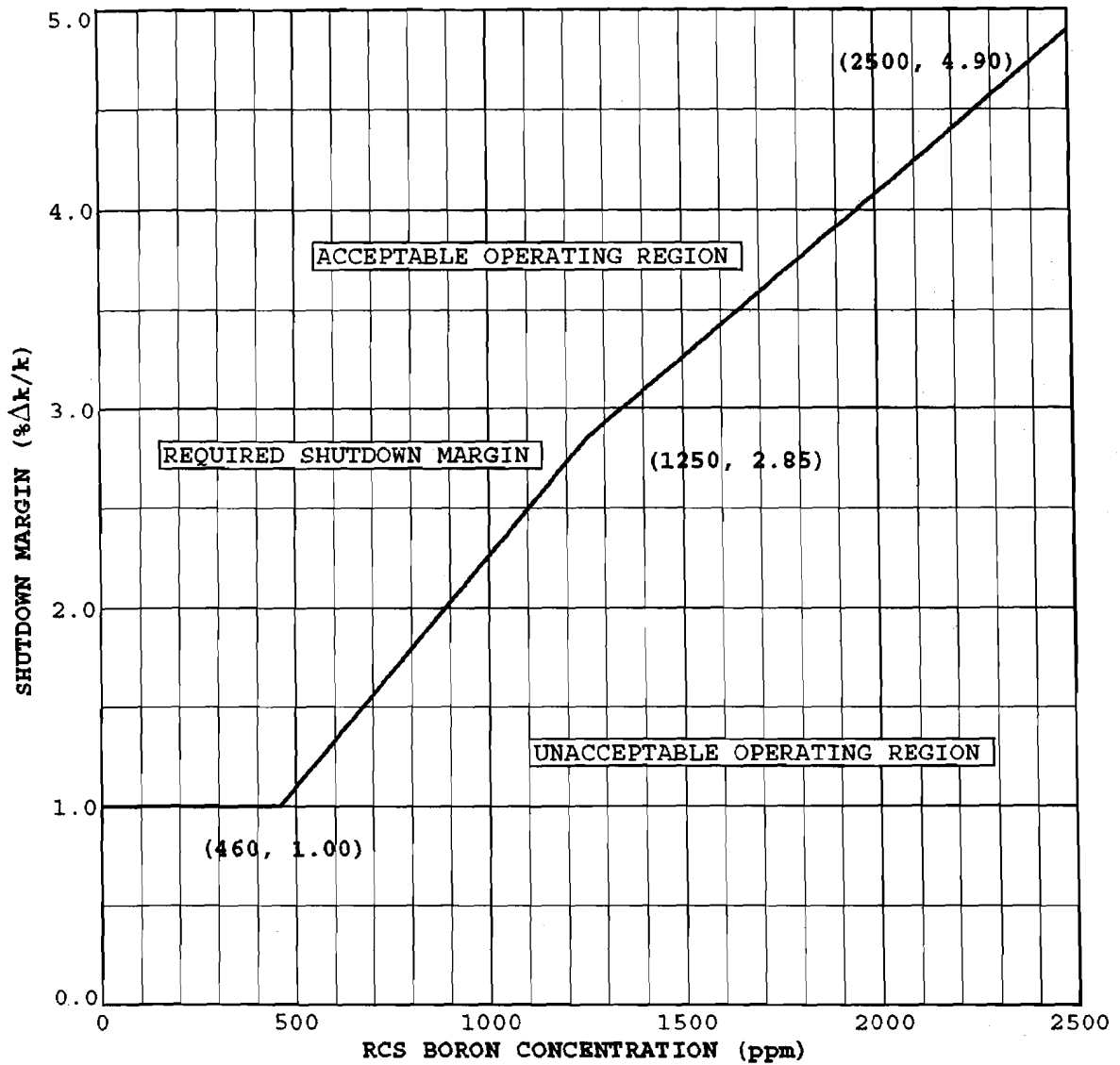
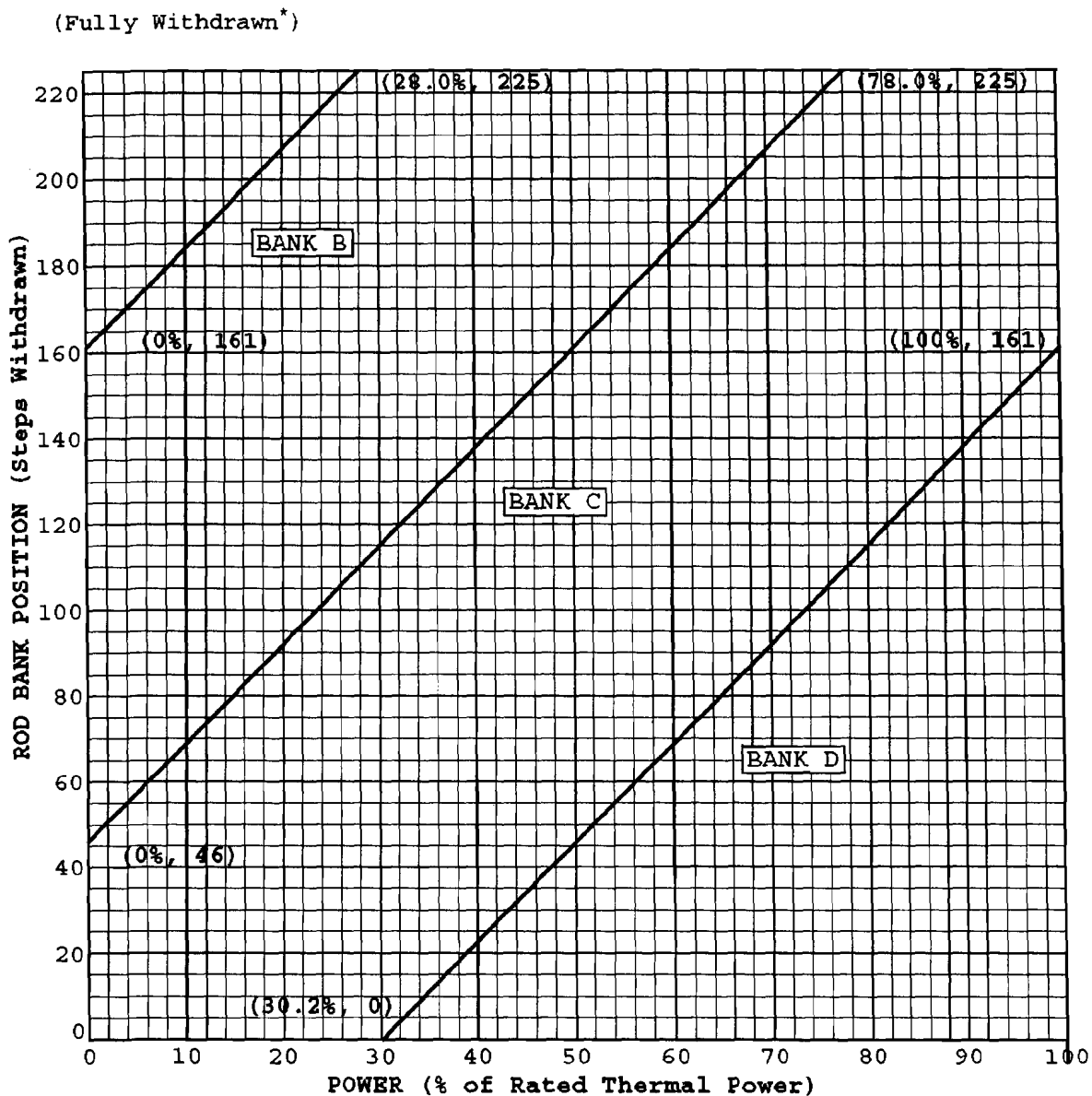


FIGURE 2

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

COLR for VEGP UNIT 2 CYCLE 13



*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

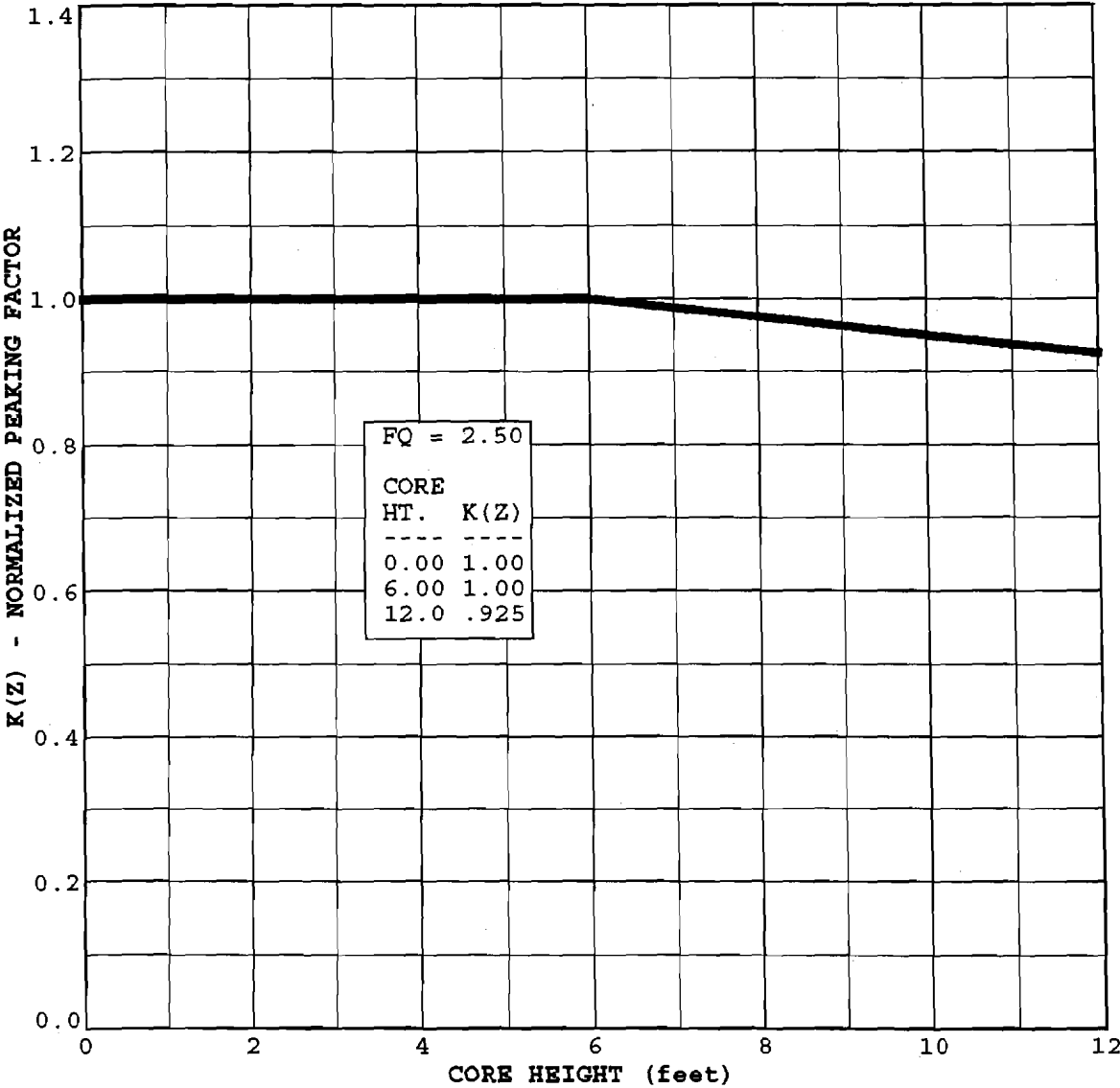


FIGURE 4

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

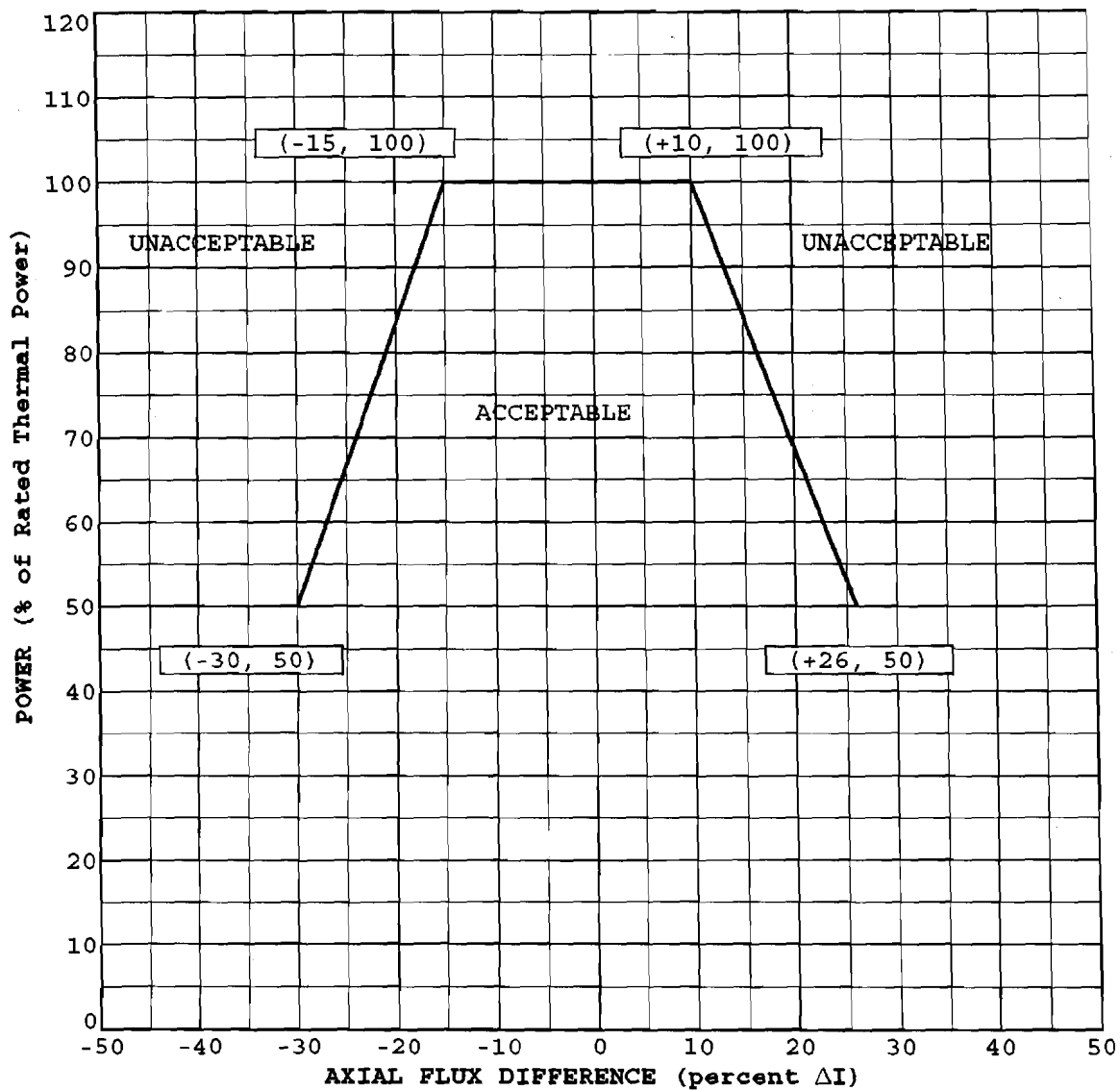


FIGURE 5

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