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SOUTHERN COMPANY
Energy to Serve Your World℠

October 31, 2008

Docket No.: 50-425

NL-08-1651

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

Vogtle Electric Generating Plant
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Supplement to Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 1

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 14 Core Operating Limits Report (COLR) (Enclosure 1), a supplement to Revision 0 of the Unit 2 Cycle 14 COLR (Enclosure 2), and Revision 1 of the Unit 2 Cycle 14 COLR (Enclosure 3).

Revision 0 of the VEGP Unit 2 Cycle 14 COLR was generated prior to the identification and discharge of a leaker fuel assembly and other fuel assemblies necessary to support the change in core design. The supplement to Revision 0 of the VEGP Unit 2 Cycle 14 COLR was generated for the original core configuration and issued to provide an interim COLR boron concentration requirement supporting Cycle 14 redesign for Modes 6 and 5. The supplement to Revision 0 was superseded when Westinghouse issued Revision 1 of the Unit 2 Cycle 14 COLR on October 10, 2008 to SNC.

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

Sincerely,

Mark J Ajluni

M. J. Ajluni
Manager, Nuclear Licensing

MJA/DRG/daj

Enclosures:
1. Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
2. Supplement to Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
3. Unit 2 Cycle 14 Core Operating Limits Report, Rev. 1

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. T. E. Tynan, Vice President – Vogtle
Mr. D. H. Jones, Vice President – Engineering
RType: CVC7000

U. S. Nuclear Regulatory Commission
Mr. L. A. Reyes, Regional Administrator
Mr. R. E. Martin, NRR Project Manager – Vogtle
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

Vogtle Electric Generating Plant
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Supplement to Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 1

Enclosure 1

Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for VEGP Unit 2 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% RTP with a linear ramp to 0 $\Delta k/k/°F$ at 100% 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

[1] Applicable for full-power T-average of 584.4 to 587.4°F.

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 rod 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 $$F_Q(Z) \leq \frac{F_Q^{RTP}}{P} \cdot K(Z) \quad for\ P > 0.5$$

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

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

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

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

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

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 1830 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
All Burnups	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.

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	1.4212	1.4032	1.2390	1.2513
	7	10.80	1.3966	1.3909	1.2330	1.2436
	8	10.60	1.3698	1.3747	1.2297	1.2324
	9	10.40	1.3450	1.3566	1.2266	1.2206
	10	10.20	1.3169	1.3418	1.2225	1.2106
	11	10.00	1.2872	1.3384	1.2267	1.2144
	12	9.80	1.2569	1.3312	1.2311	1.2181
	13	9.60	1.2284	1.3186	1.2336	1.2184
	14	9.40	1.2101	1.3035	1.2339	1.2177
	15	9.20	1.2047	1.2835	1.2293	1.2157
	16	9.00	1.2084	1.2637	1.2259	1.2156
	17	8.80	1.2124	1.2503	1.2194	1.2133
	18	8.60	1.2139	1.2454	1.2184	1.2129
	19	8.40	1.2140	1.2440	1.2251	1.2217
	20	8.20	1.2138	1.2398	1.2281	1.2386
	21	8.00	1.2180	1.2388	1.2345	1.2527
	22	7.80	1.2212	1.2364	1.2395	1.2634
	23	7.60	1.2208	1.2305	1.2409	1.2715
	24	7.40	1.2182	1.2226	1.2398	1.2767
	25	7.20	1.2132	1.2125	1.2362	1.2792
	26	7.00	1.2062	1.2006	1.2302	1.2791
	27	6.80	1.1973	1.1869	1.2221	1.2760
	28	6.60	1.1873	1.1724	1.2120	1.2718
	29	6.40	1.1770	1.1585	1.2008	1.2678
	30	6.20	1.1661	1.1464	1.1895	1.2625
	31	6.00	1.1543	1.1357	1.1757	1.2562
	32	5.80	1.1451	1.1269	1.1664	1.2468
	33	5.60	1.1389	1.1207	1.1667	1.2416
	34	5.40	1.1369	1.1197	1.1733	1.2424
	35	5.20	1.1437	1.1254	1.1777	1.2445
	36	5.00	1.1503	1.1309	1.1820	1.2444
	37	4.80	1.1555	1.1353	1.1864	1.2422
	38	4.60	1.1602	1.1392	1.1896	1.2377
	39	4.40	1.1640	1.1423	1.1915	1.2311
	40	4.20	1.1668	1.1446	1.1920	1.2222
	41	4.00	1.1687	1.1465	1.1911	1.2110
	42	3.80	1.1694	1.1494	1.1889	1.1995
	43	3.60	1.1699	1.1526	1.1855	1.1898
	44	3.40	1.1720	1.1546	1.1811	1.1812
	45	3.20	1.1750	1.1572	1.1764	1.1718
	46	3.00	1.1771	1.1612	1.1803	1.1765
	47	2.80	1.1881	1.1751	1.1877	1.1897
	48	2.60	1.2080	1.1977	1.1931	1.2023
	49	2.40	1.2259	1.2187	1.1987	1.2145
	50	2.20	1.2439	1.2399	1.2051	1.2264
	51	2.00	1.2619	1.2610	1.2120	1.2383
	52	1.80	1.2794	1.2816	1.2200	1.2501
	53	1.60	1.2966	1.3017	1.2295	1.2621
	54	1.40	1.3132	1.3207	1.2388	1.2742
	55	1.20	1.3291	1.3386	1.2481	1.2863
	56	1.00	1.3435	1.3544	1.2568	1.2977
*	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 584.4 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)

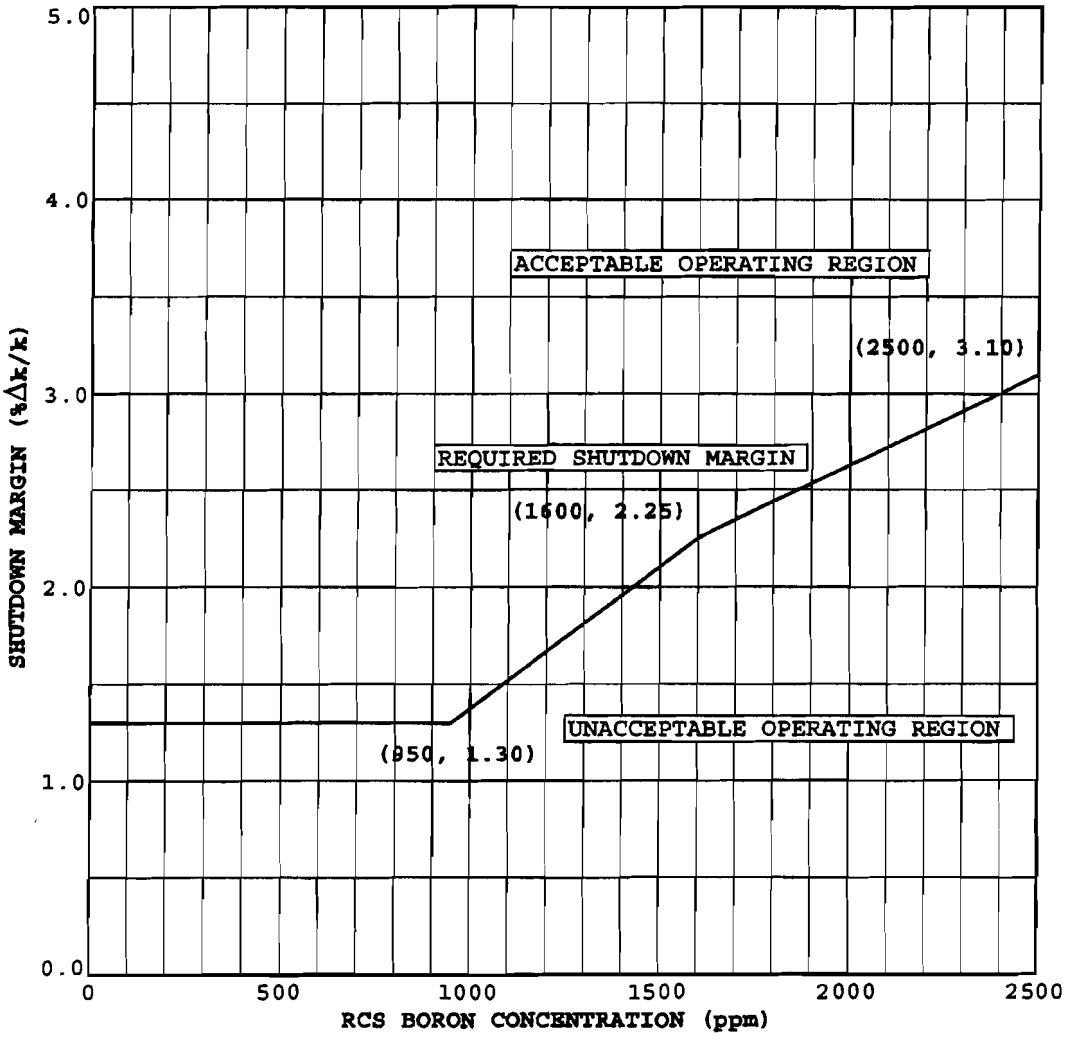


FIGURE 2
REQUIRED SHUTDOWN MARGIN FOR MODES 4 AND 5 (MODE 4 WHEN FIGURE 1 NOT APPLICABLE)

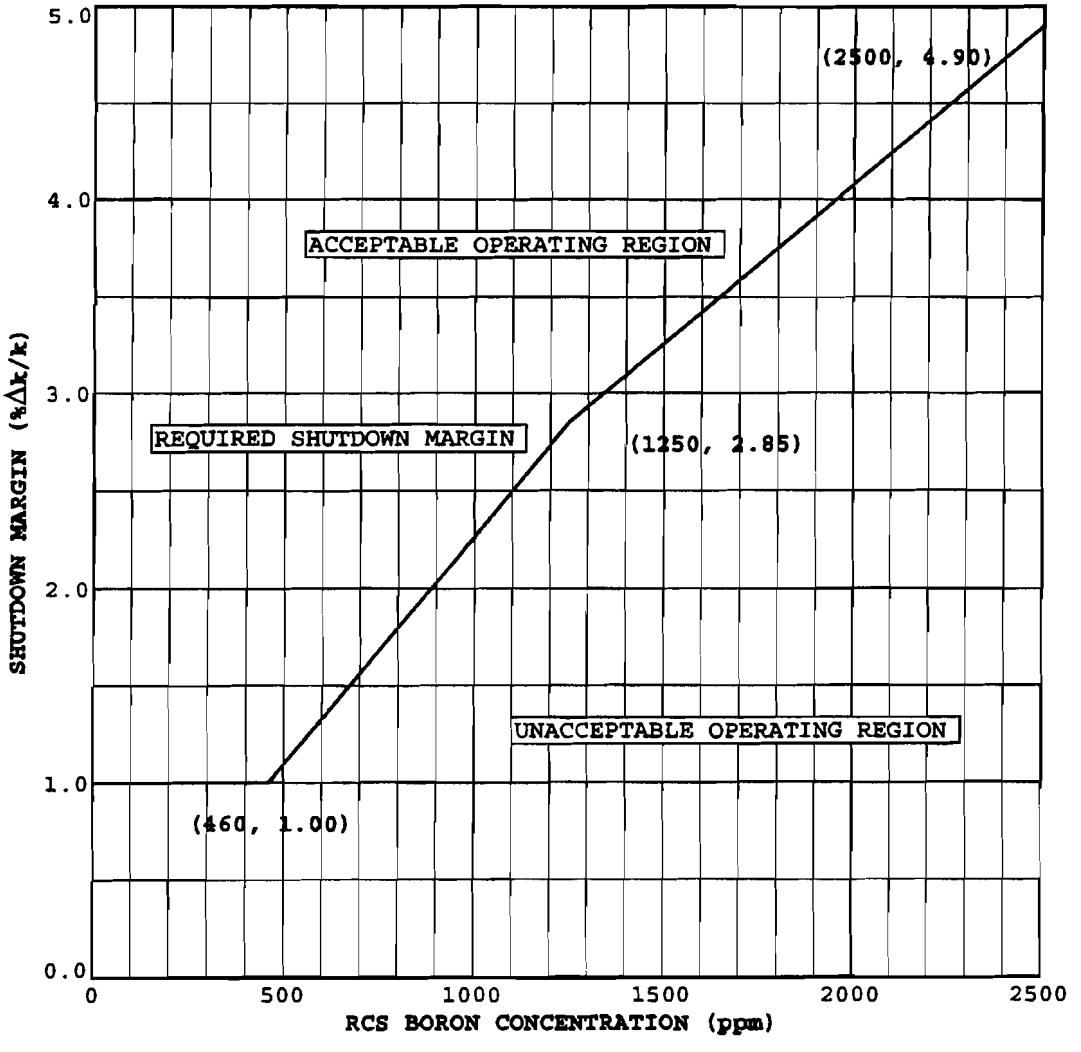
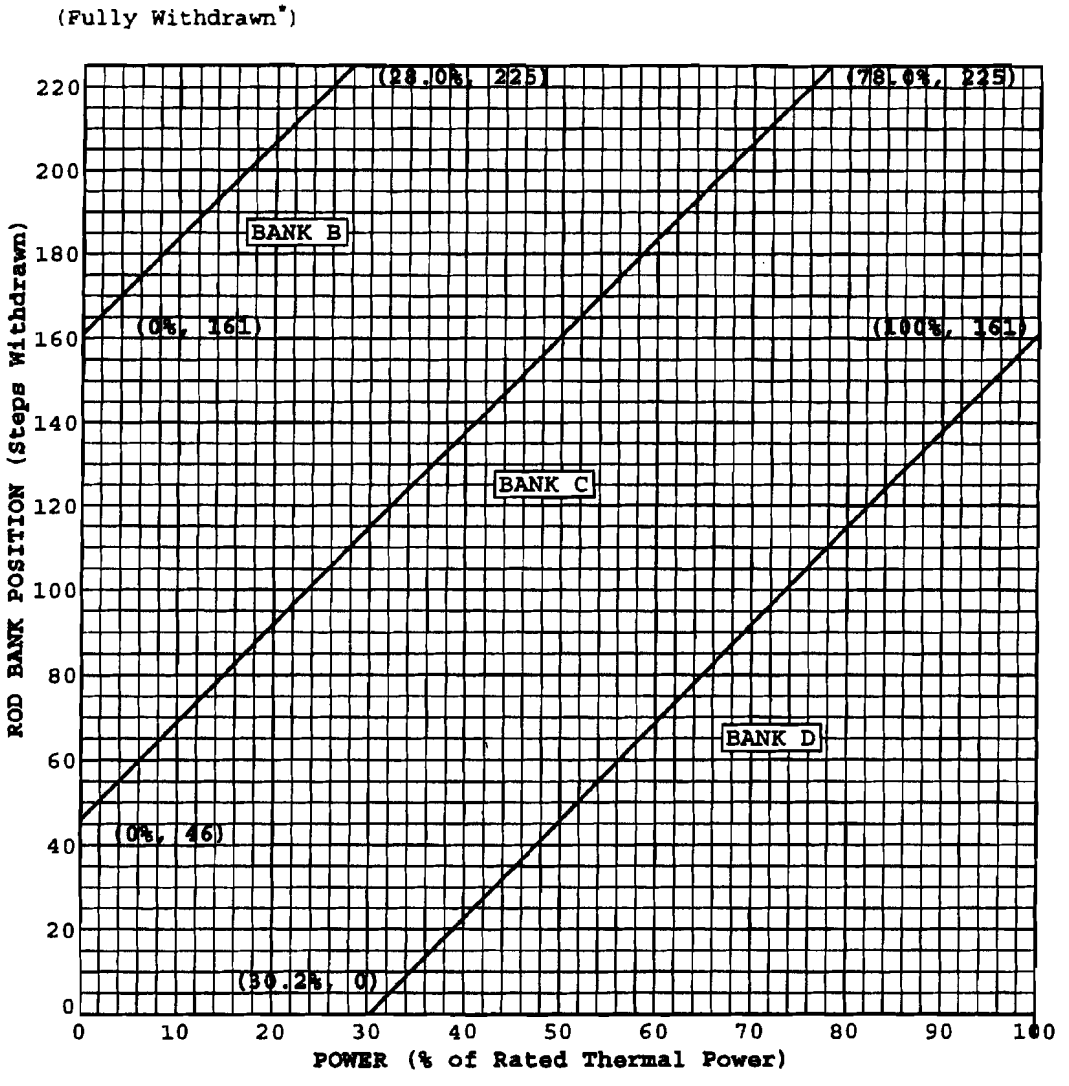


FIGURE 3
ROD BANK INSERTION LIMITS VERSUS % OF RATED THERMAL POWER



*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 4
K(Z) - NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT

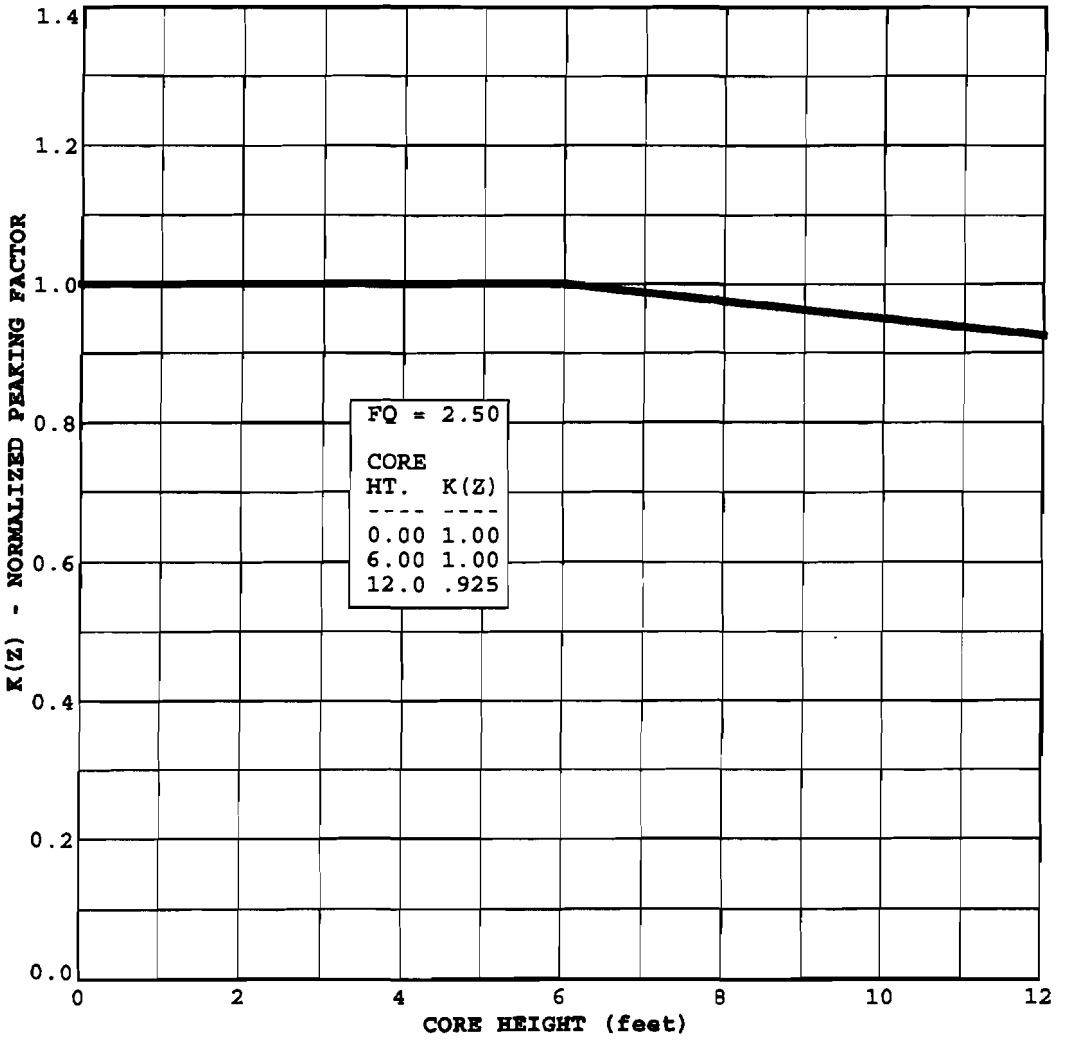
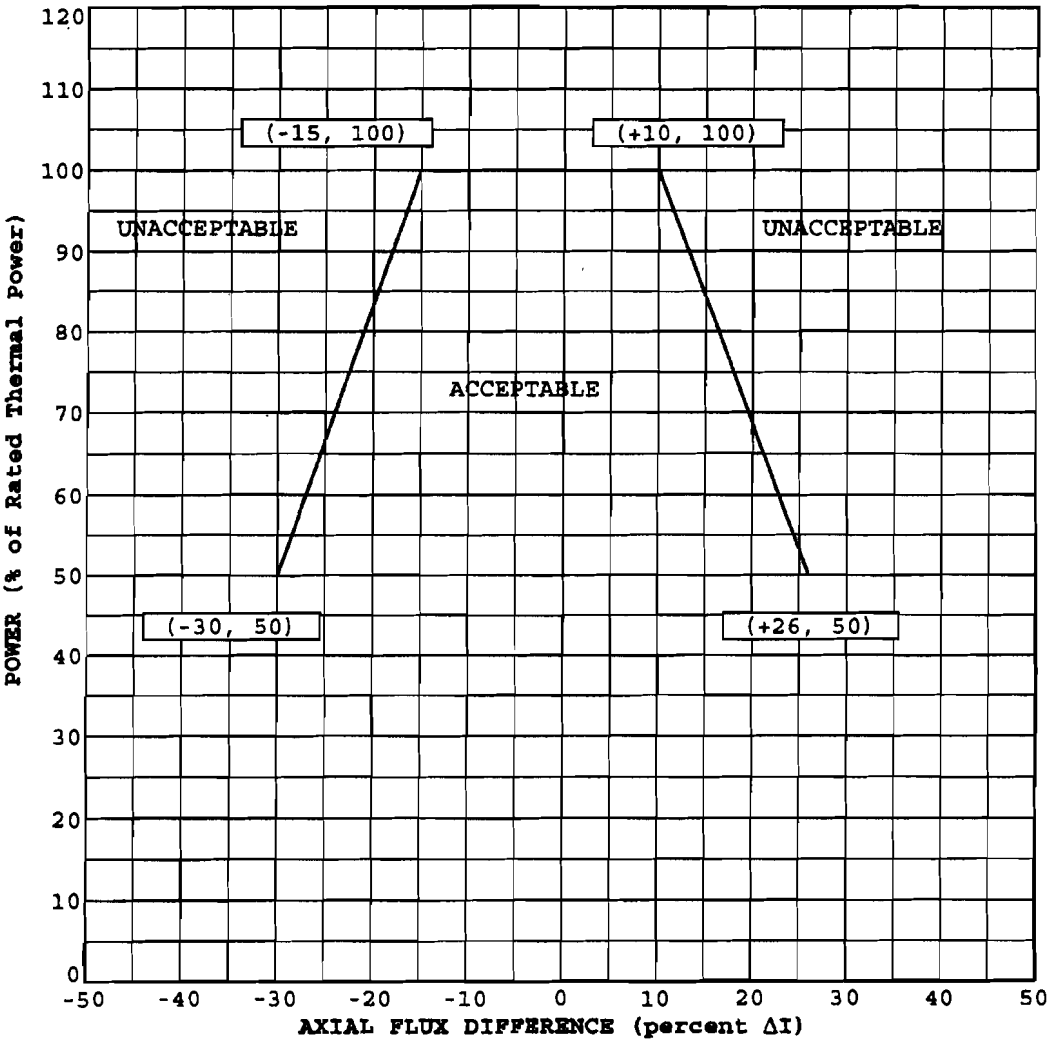


FIGURE 5
AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF % OF RATED THERMAL POWER FOR RAOC



Vogtle Electric Generating Plant
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Supplement to Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 1

Enclosure 2

Supplement to
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0

Intracompany Correspondence

SOUTHERN COMPANY

DATE: October 8, 2008

TO: N. J. Stringfellow

CAV-NF-1590
KC-2140
NC-2714

FROM: R. M. Joyce

RE: **VOGTLE ELECTRIC GENERATING PLANT – UNIT 2**
CYCLE 14 INTERIM COLR BORON CONCENTRATION REQUIREMENT

Attached are the pages of the original (pre-redesign) Vogtle 2 Cycle 14 Core Operating Limits Report Rev. 0 and Nuclear Design Report Revision 0 that remain bounding for Modes 6 and 5 of the Cycle 14 redesign (excluding cold rod drop testing), per Westinghouse letter NF-GP-08-69. The attached interim COLR boron concentration requirement is supported by the attached Unit 2 Cycle 14 Reload Evaluation.

If you have any questions, please contact me at extension 6468.

Approved by:

Adel Alapour
Supervisor, Vogtle Core Analysis

cc w/o attachments

B. E. Hunt	B. J. Kern
K. S. Folk	C. M. Comfort
R. G. Cocherell	J. A. Wehrenberg
M. A. Slivka	T. M. Hickox
J. V. Iannucci	

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

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

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 1830 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.

Vogtle Electric Generating Plant
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Supplement to Unit 2 Cycle 14 Core Operating Limits Report, Rev. 0
Unit 2 Cycle 14 Core Operating Limits Report, Rev. 1

Enclosure 3

Unit 2 Cycle 14 Core Operating Limits Report, Rev. 1

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for VEGP UNIT 2 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 $+0.7 \times 10^{-4}$ $\Delta k/k/^{o}F$ for power levels up to 70% RTP with a linear ramp to 0 $\Delta k/k/^{o}F$ at 100% RTP.

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

The 60 ppm/ARO/RTP-MTC should be less negative than -5.35×10^{-4} $\Delta k/k/^{o}F$.[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 584.4°F to 587.4°F.

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

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

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

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

2.6.2 $F_Q^{RTP} = 2.50$

2.6.3 $K(Z)^{RTP}$ is provided in Figure 4.

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

$F_Q(Z) \leq \frac{F_Q^{RTP} * K(Z)}{0.5 * W(Z)}$ 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: $P = \dfrac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$

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 1830 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
All Burnups	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.

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	1.3504	1.3970	1.2131	1.2744
	7	10.80	1.3328	1.3770	1.2114	1.2623
	8	10.60	1.3138	1.3581	1.2120	1.2516
	9	10.40	1.2923	1.3458	1.2161	1.2417
	10	10.20	1.2769	1.3415	1.2205	1.2313
	11	10.00	1.2661	1.3346	1.2253	1.2196
	12	9.80	1.2548	1.3270	1.2311	1.2054
	13	9.60	1.2439	1.3172	1.2349	1.2009
	14	9.40	1.2360	1.3036	1.2358	1.2033
	15	9.20	1.2302	1.2890	1.2357	1.2068
	16	9.00	1.2226	1.2754	1.2305	1.2129
	17	8.80	1.2214	1.2676	1.2236	1.2177
	18	8.60	1.2276	1.2652	1.2220	1.2229
	19	8.40	1.2348	1.2631	1.2264	1.2340
	20	8.20	1.2386	1.2585	1.2300	1.2515
	21	8.00	1.2432	1.2566	1.2304	1.2661
	22	7.80	1.2456	1.2531	1.2346	1.2772
	23	7.60	1.2446	1.2461	1.2401	1.2856
	24	7.40	1.2409	1.2368	1.2413	1.2909
	25	7.20	1.2347	1.2252	1.2400	1.2933
	26	7.00	1.2264	1.2118	1.2361	1.2930
	27	6.80	1.2160	1.1966	1.2297	1.2896
	28	6.60	1.2044	1.1805	1.2212	1.2850
	29	6.40	1.1925	1.1651	1.2108	1.2808
	30	6.20	1.1799	1.1514	1.1986	1.2751
	31	6.00	1.1657	1.1391	1.1842	1.2680
	32	5.80	1.1529	1.1296	1.1724	1.2574
	33	5.60	1.1439	1.1227	1.1701	1.2486
	34	5.40	1.1406	1.1194	1.1762	1.2473
	35	5.20	1.1452	1.1236	1.1799	1.2484
	36	5.00	1.1499	1.1279	1.1835	1.2481
	37	4.80	1.1533	1.1309	1.1871	1.2471
	38	4.60	1.1560	1.1336	1.1896	1.2453
	39	4.40	1.1578	1.1354	1.1906	1.2409
	40	4.20	1.1588	1.1363	1.1902	1.2342
	41	4.00	1.1583	1.1388	1.1892	1.2255
	42	3.80	1.1594	1.1430	1.1879	1.2145
	43	3.60	1.1629	1.1473	1.1854	1.2026
	44	3.40	1.1646	1.1504	1.1820	1.1922
	45	3.20	1.1652	1.1527	1.1819	1.1831
	46	3.00	1.1674	1.1535	1.1857	1.1782
	47	2.80	1.1741	1.1630	1.1941	1.1803
	48	2.60	1.1853	1.1820	1.2047	1.1934
	49	2.40	1.1994	1.2000	1.2166	1.2044
	50	2.20	1.2163	1.2203	1.2282	1.2153
	51	2.00	1.2335	1.2411	1.2395	1.2264
	52	1.80	1.2503	1.2612	1.2507	1.2376
	53	1.60	1.2669	1.2808	1.2617	1.2490
	54	1.40	1.2831	1.2996	1.2725	1.2606
	55	1.20	1.2985	1.3173	1.2828	1.2722
	56	1.00	1.3127	1.3330	1.2922	1.2834
*	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 584.4 to 587.4°F.

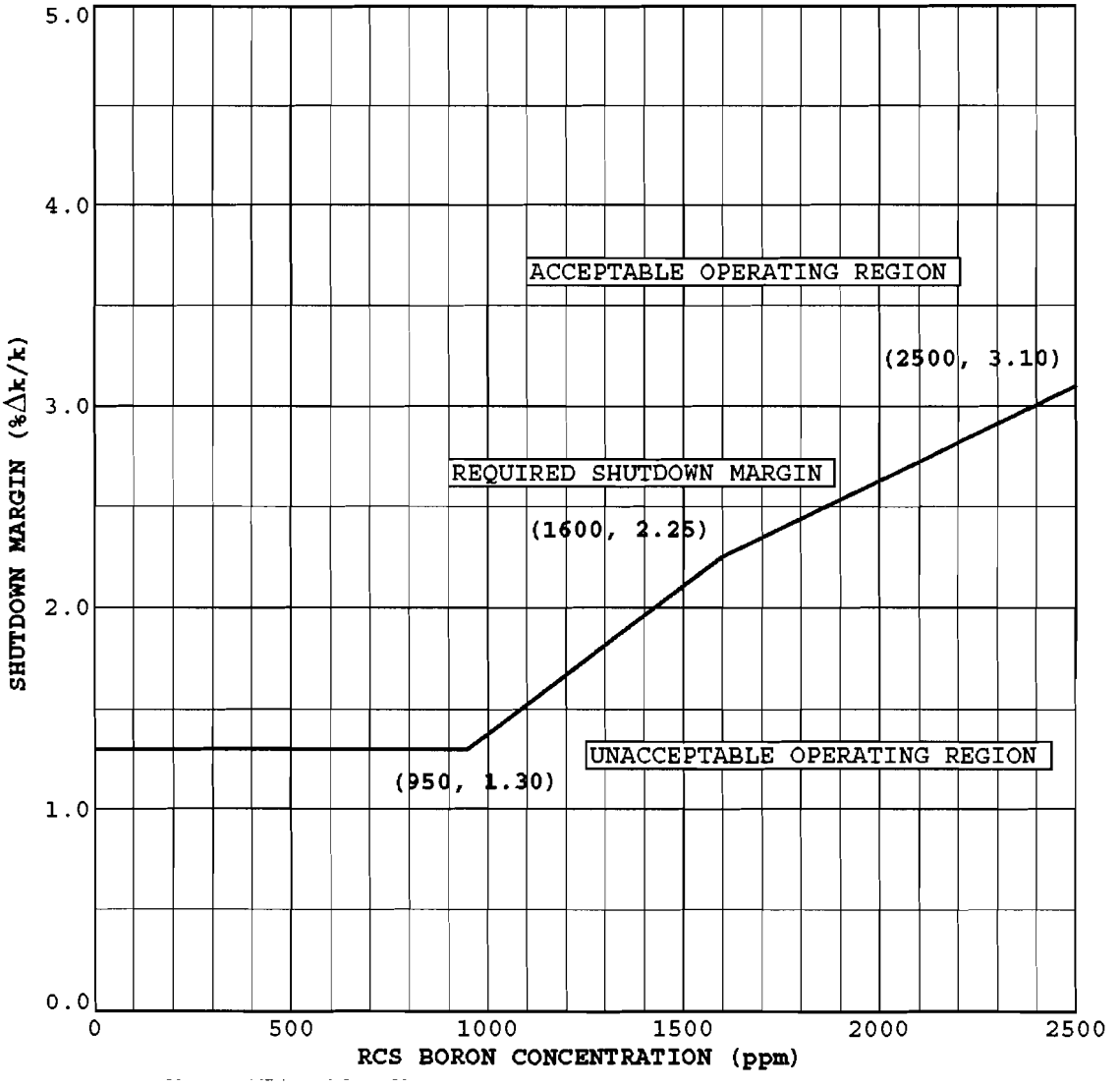


FIGURE 1

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

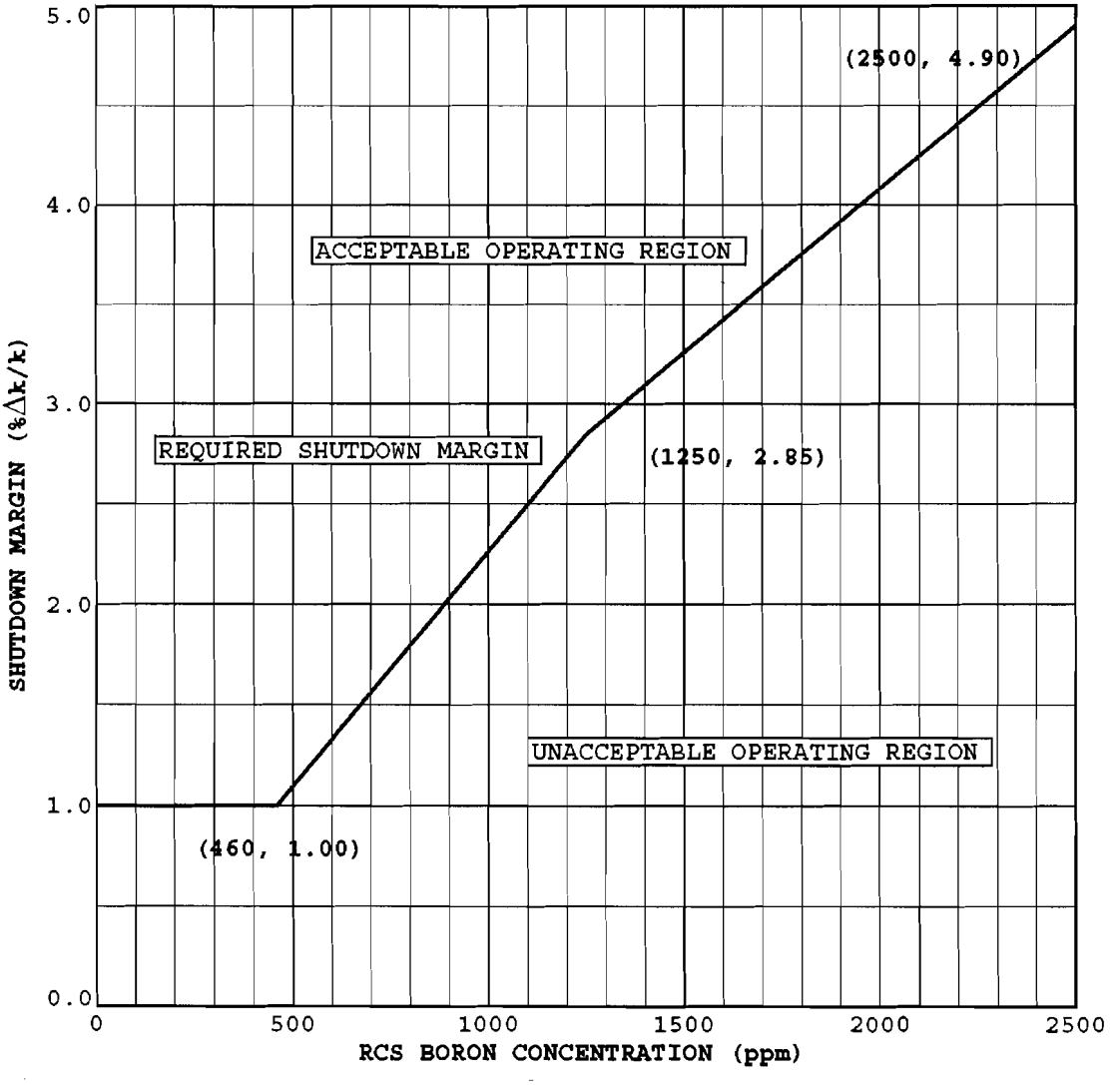
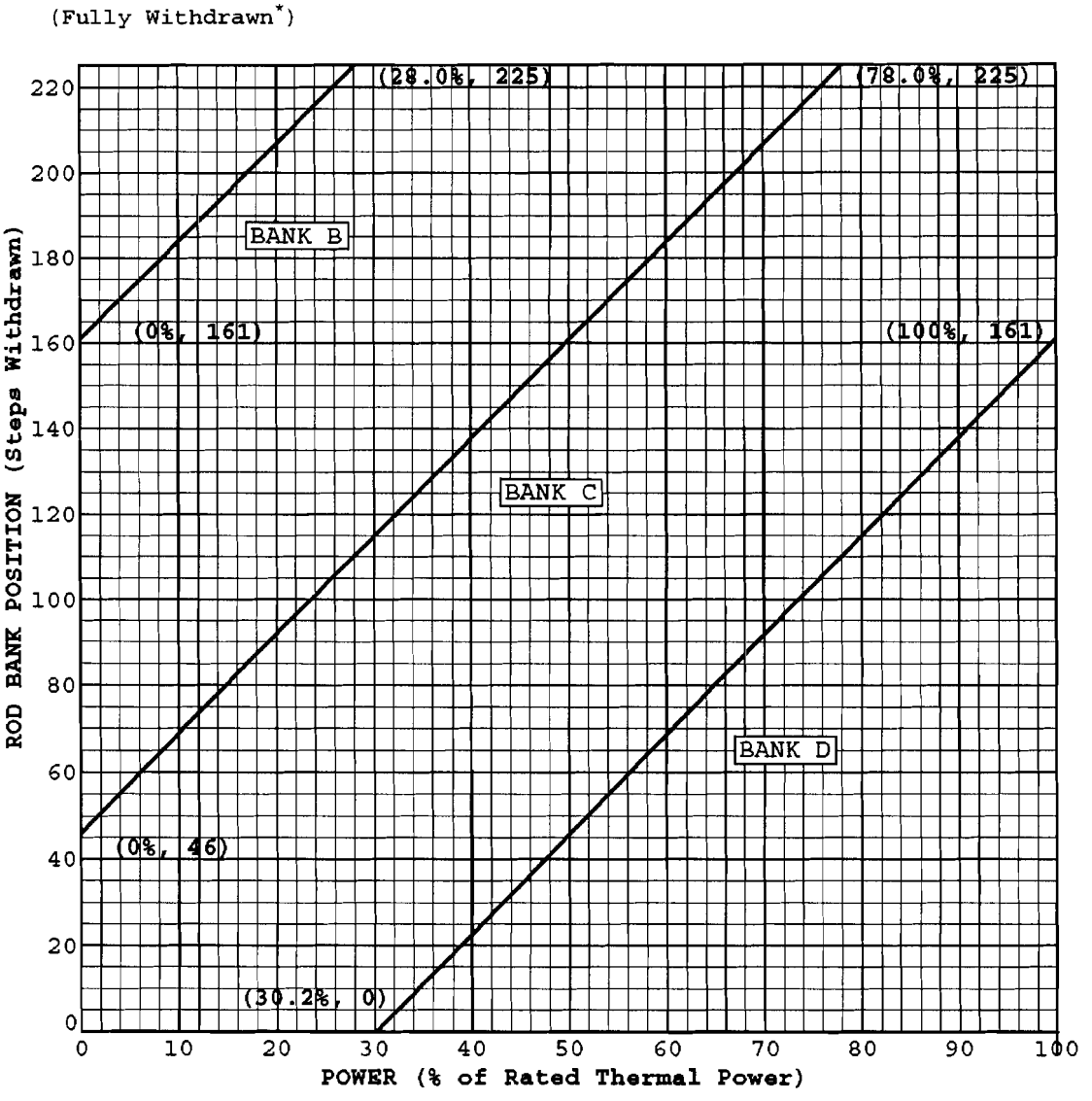


FIGURE 2

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



*Fully withdrawn 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

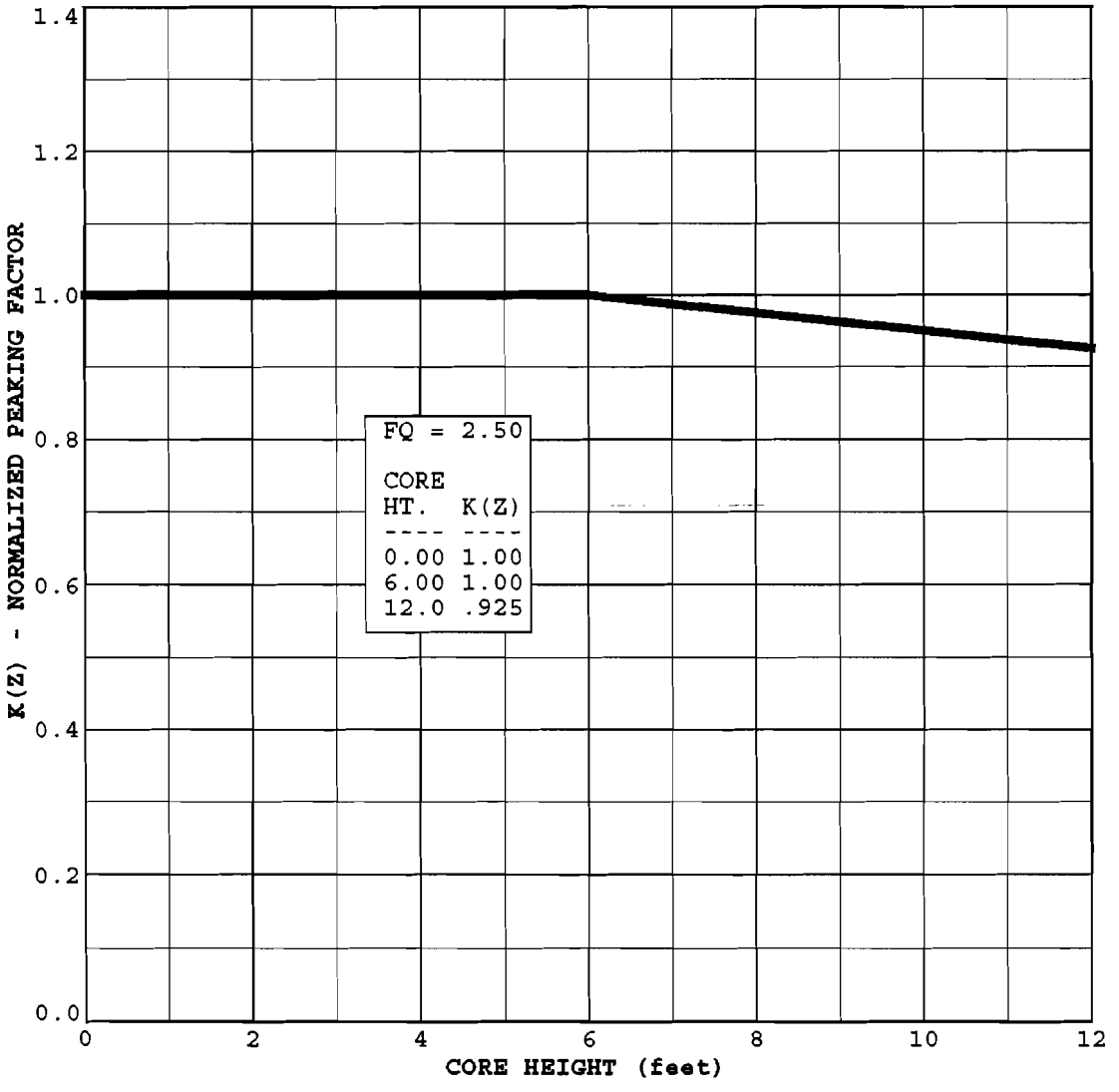


FIGURE 4

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

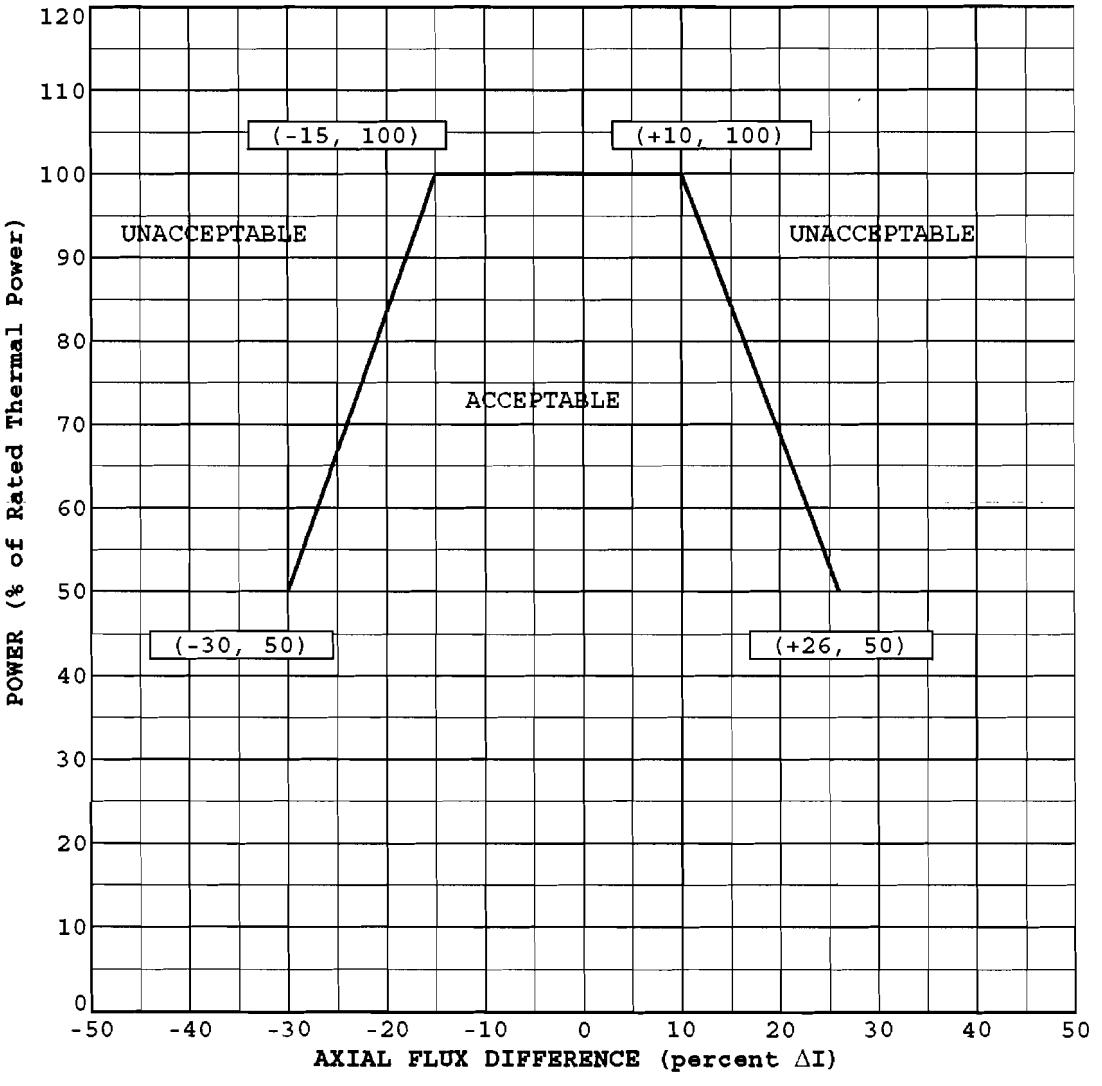


FIGURE 5

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