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SOUTHERN COMPANY
Energy to Serve Your World℠

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

Vogtle Electric Generating Plant
Unit 1 Cycle 13 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 0 of the Unit 1 Cycle 13 Core Operating Limits Report (COLR).

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

Sincerely,

Don E. Grissette

DEG/RJF/daj

Enclosure: Unit 1 Cycle 13 Core Operating Limits Report

cc: Southern Nuclear Operating Company
Mr. J. T. Gasser, Executive Vice President
Mr. W. F. Kitchens, General Manager – Plant Vogtle
RType: CVC7000

U. S. Nuclear Regulatory Commission
Dr. W. D. Travers, Regional Administrator
Mr. C. Gratton, NRR Project Manager – Vogtle
Mr. G. J. McCoy, Senior Resident Inspector – Vogtle

A001

VOGTLE ELECTRIC GENERATING PLANT (VEGP) UNIT 1 CYCLE 13

CORE OPERATING LIMITS REPORT

REVISION 0

MARCH 2005

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for VEGP UNIT 1 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 - $F^N_{\Delta H}$
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 $+0.7 \times 10^{-4}$ $\Delta k/k/^{\circ}F$ for power levels up to 70 percent RTP with a linear ramp to 0 $\Delta k/k/^{\circ}F$ at 100 percent RTP.

The EOL/ARO/RTP-MTC shall be less negative than -5.50×10^{-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 -4.75×10^{-4} $\Delta k/k/^{\circ}F$.[1]

The 60 ppm/ARO/RTP-MTC should be less negative than -5.35×10^{-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 $$F_Q(Z) \leq \frac{F_Q^{RTP}}{P} * K(Z) \quad \text{for } P > 0.5$$

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

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 Figures 6 through 9.

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 1935 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.

COLR for VEGP UNIT 1 CYCLE 13

TABLE 1

$F_Q(Z)$ PENALTY FACTOR

Cycle Burnup (MWD/MTU)	$F_Q(Z)$ Penalty Factor
30	1.036
150	1.036
363	1.038
577	1.037
790	1.035
1004	1.031
1217	1.024
1431	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.

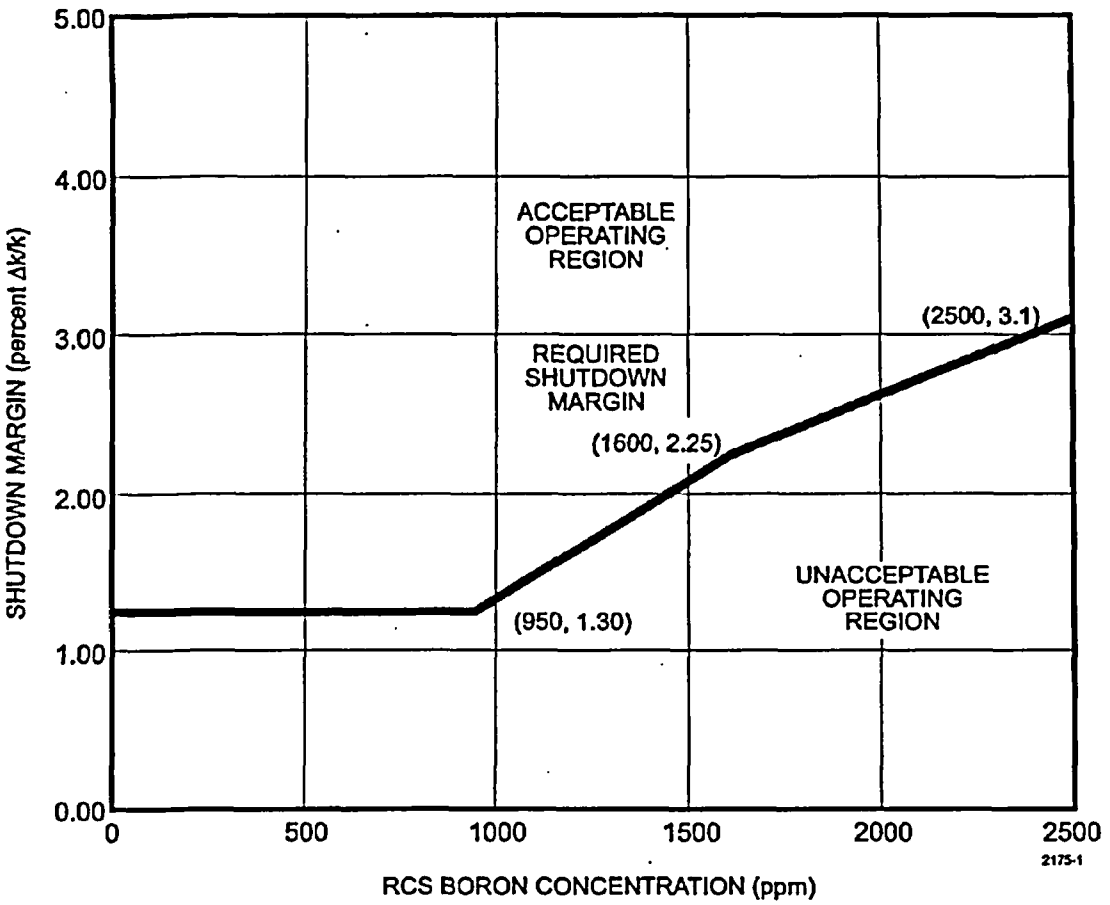


FIGURE 1

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

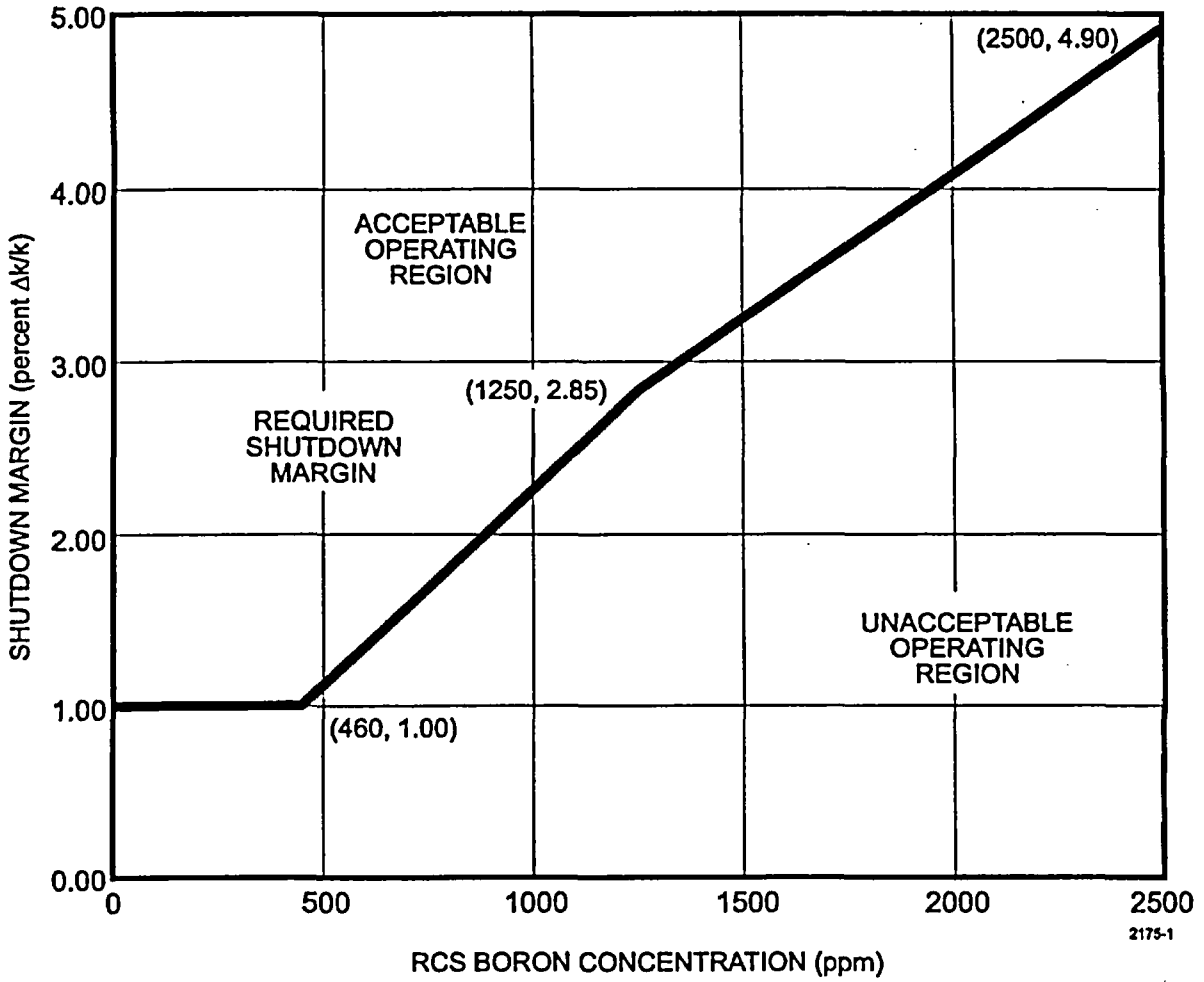
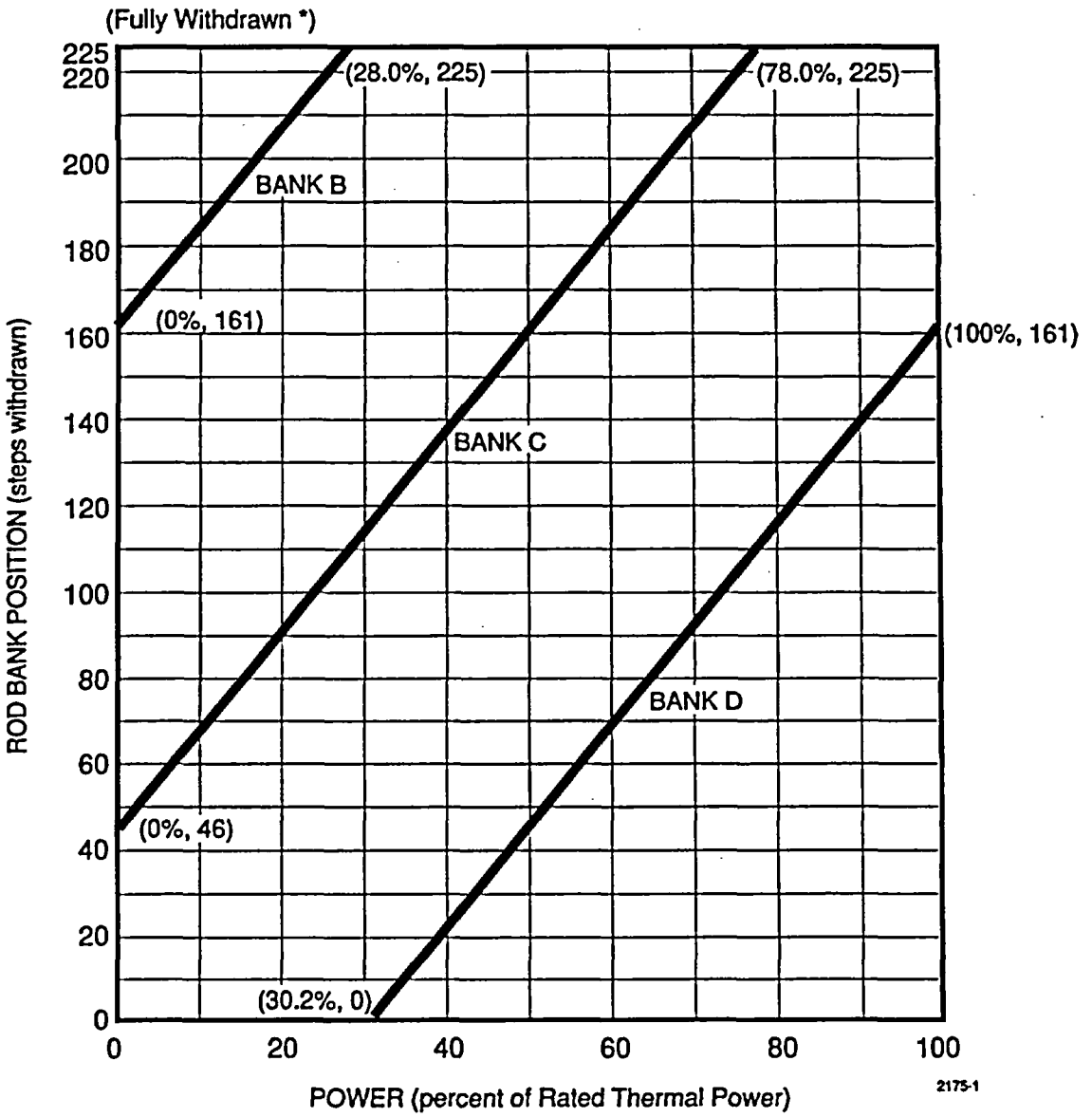


FIGURE 2

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

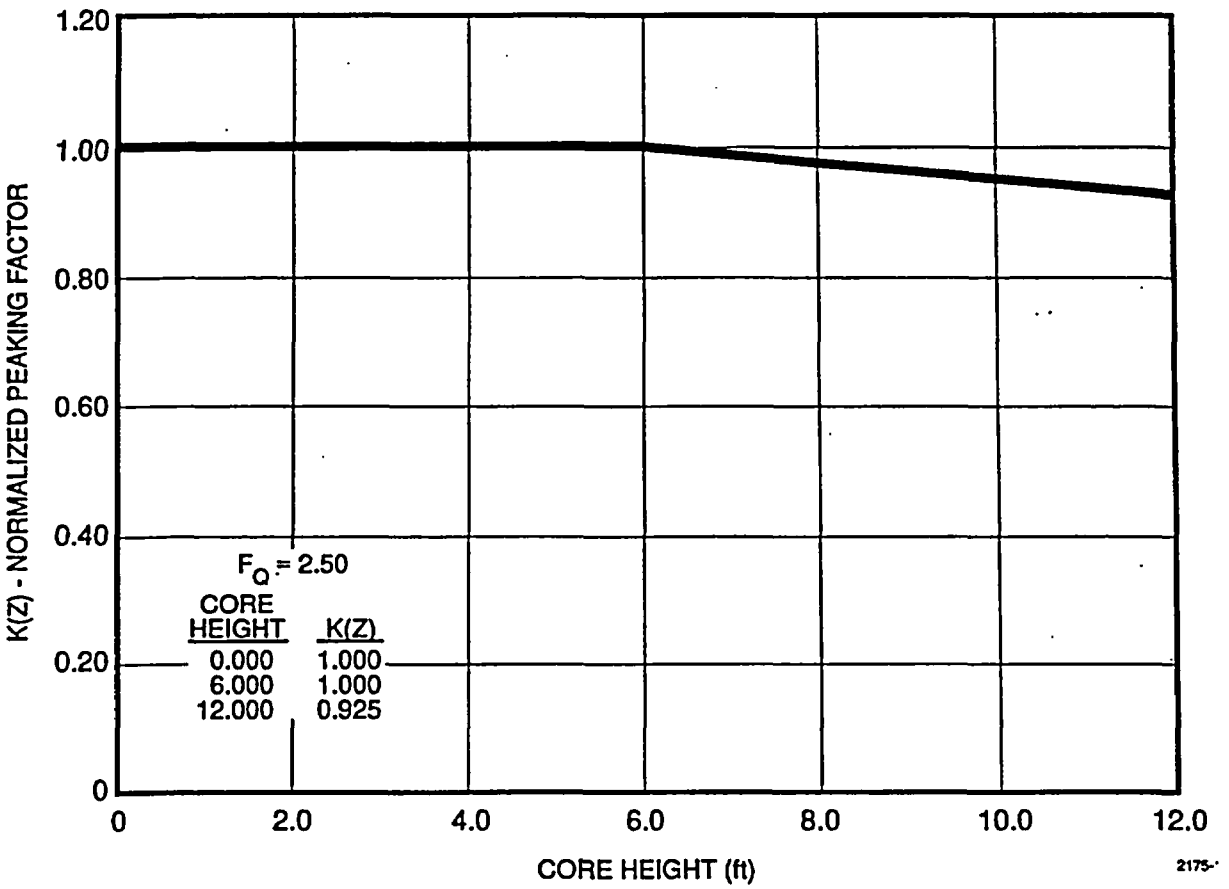


FIGURE 4

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

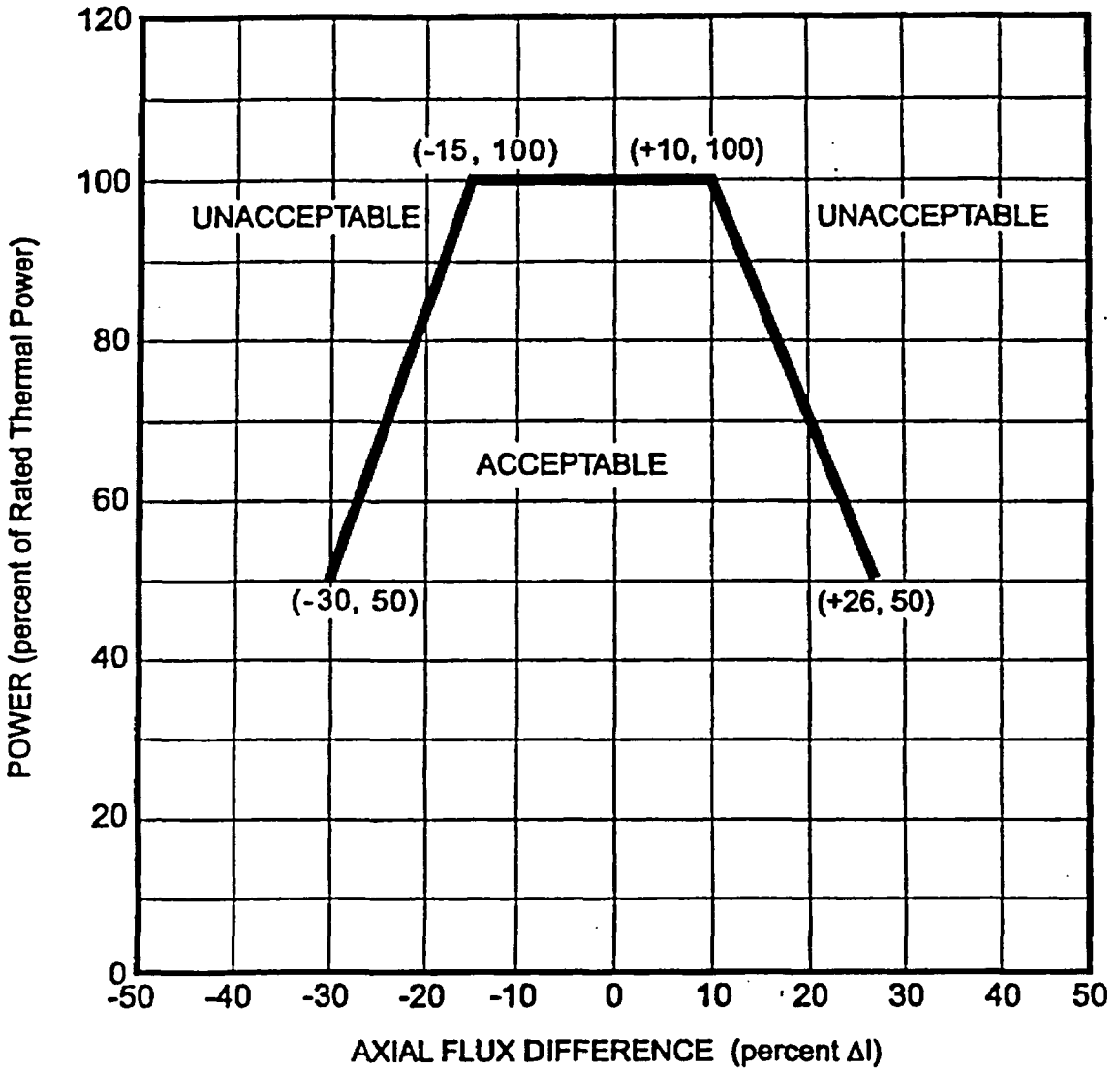
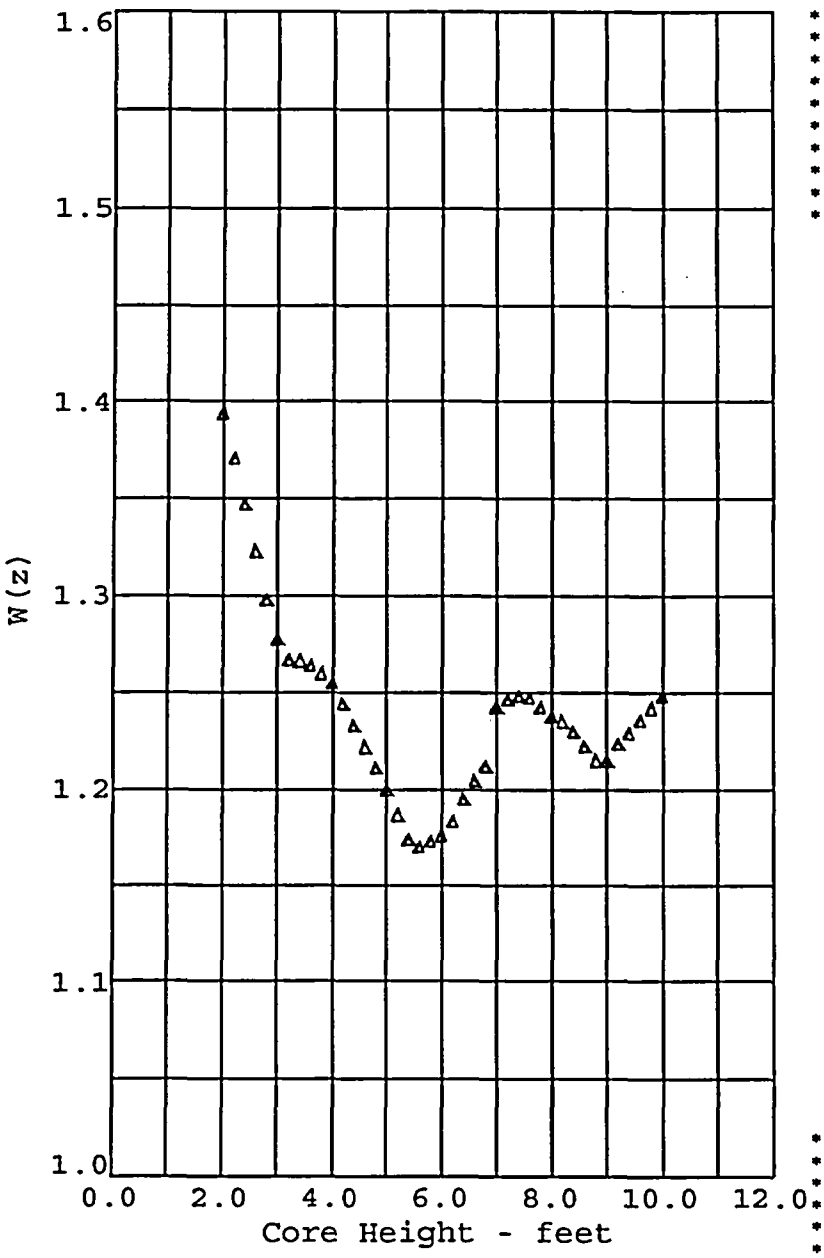


FIGURE 5

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



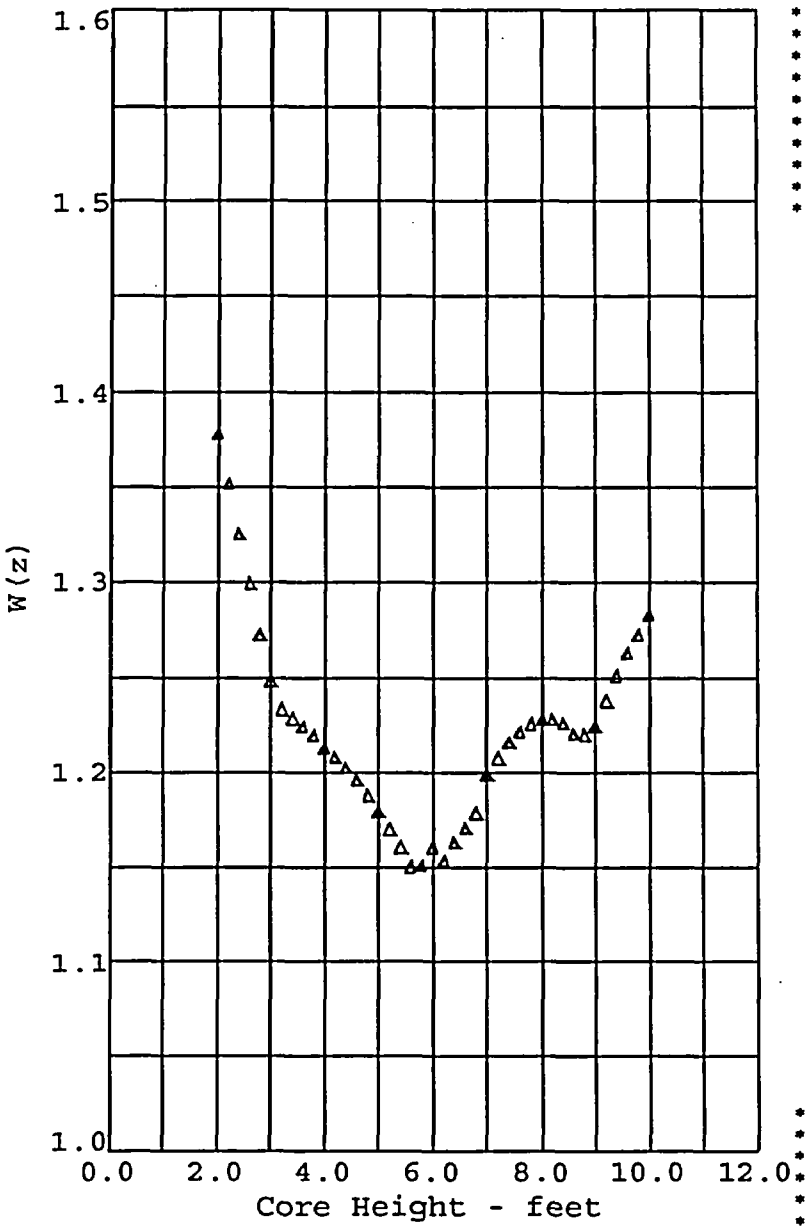
This figure is referred to by Specification B3.2.1

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.

	Axial Point	Elevation (feet)	BOL W(Z)
*	1	12.00	1.0000
*	2	11.80	1.0000
*	3	11.60	1.0000
*	4	11.40	1.0000
*	5	11.20	1.0000
*	6	11.00	1.0000
*	7	10.80	1.0000
*	8	10.60	1.0000
*	9	10.40	1.0000
*	10	10.20	1.0000
	11	10.00	1.2472
	12	9.80	1.2413
	13	9.60	1.2350
	14	9.40	1.2285
	15	9.20	1.2228
	16	9.00	1.2142
	17	8.80	1.2147
	18	8.60	1.2222
	19	8.40	1.2293
	20	8.20	1.2348
	21	8.00	1.2370
	22	7.80	1.2417
	23	7.60	1.2464
	24	7.40	1.2473
	25	7.20	1.2457
	26	7.00	1.2418
	27	6.80	1.2115
	28	6.60	1.2038
	29	6.40	1.1943
	30	6.20	1.1833
	31	6.00	1.1759
	32	5.80	1.1727
	33	5.60	1.1699
	34	5.40	1.1736
	35	5.20	1.1865
	36	5.00	1.1994
	37	4.80	1.2107
	38	4.60	1.2215
	39	4.40	1.2323
	40	4.20	1.2438
	41	4.00	1.2543
	42	3.80	1.2592
	43	3.60	1.2633
	44	3.40	1.2659
	45	3.20	1.2666
	46	3.00	1.2767
	47	2.80	1.2976
	48	2.60	1.3227
	49	2.40	1.3467
	50	2.20	1.3703
	51	2.00	1.3935
*	52	1.80	1.0000
*	53	1.60	1.0000
*	54	1.40	1.0000
*	55	1.20	1.0000
*	56	1.00	1.0000
*	57	0.80	1.0000
*	58	0.60	1.0000
*	59	0.40	1.0000
*	60	0.20	1.0000
*	61	0.00	1.0000

* Top and Bottom 15% Excluded per Technical Specification B3.2.1

FIGURE 6 RAOC W(Z) AT 150 MWD/MTU



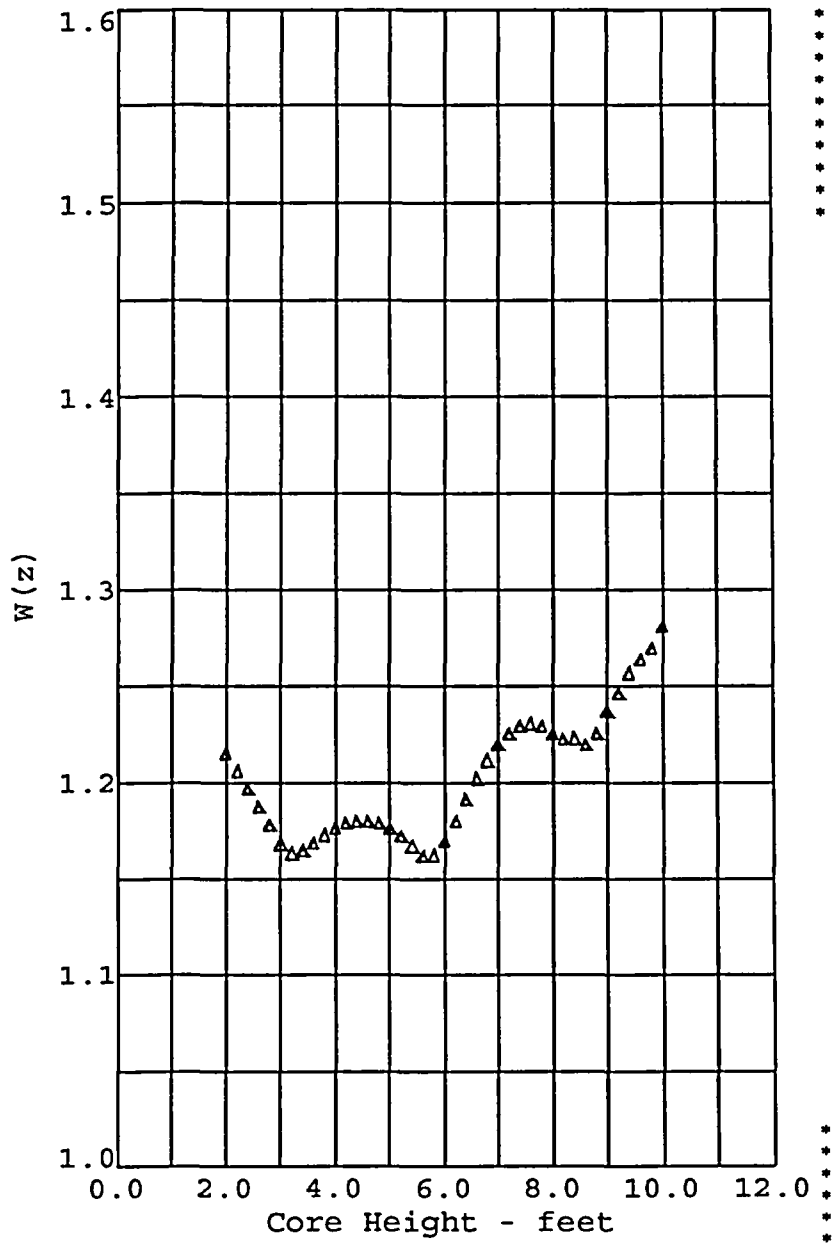
This figure is referred to by Specification B3.2.1

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.

Axial Point	Elevation (feet)	MOL-1 W(Z)
1	12.00	1.0000
2	11.80	1.0000
3	11.60	1.0000
4	11.40	1.0000
5	11.20	1.0000
6	11.00	1.0000
7	10.80	1.0000
8	10.60	1.0000
9	10.40	1.0000
10	10.20	1.0000
11	10.00	1.2825
12	9.80	1.2720
13	9.60	1.2625
14	9.40	1.2507
15	9.20	1.2375
16	9.00	1.2241
17	8.80	1.2196
18	8.60	1.2203
19	8.40	1.2258
20	8.20	1.2278
21	8.00	1.2277
22	7.80	1.2254
23	7.60	1.2212
24	7.40	1.2150
25	7.20	1.2072
26	7.00	1.1982
27	6.80	1.1780
28	6.60	1.1702
29	6.40	1.1622
30	6.20	1.1531
31	6.00	1.1599
32	5.80	1.1504
33	5.60	1.1496
34	5.40	1.1599
35	5.20	1.1695
36	5.00	1.1786
37	4.80	1.1874
38	4.60	1.1952
39	4.40	1.2020
40	4.20	1.2080
41	4.00	1.2128
42	3.80	1.2189
43	3.60	1.2241
44	3.40	1.2282
45	3.20	1.2330
46	3.00	1.2478
47	2.80	1.2719
48	2.60	1.2989
49	2.40	1.3253
50	2.20	1.3518
51	2.00	1.3779
52	1.80	1.0000
53	1.60	1.0000
54	1.40	1.0000
55	1.20	1.0000
56	1.00	1.0000
57	0.80	1.0000
58	0.60	1.0000
59	0.40	1.0000
60	0.20	1.0000
61	0.00	1.0000

Top and Bottom 15% Excluded per Technical Specification B3.2.1

FIGURE 7 RAOC W(Z) AT 4000 MWD/MTU



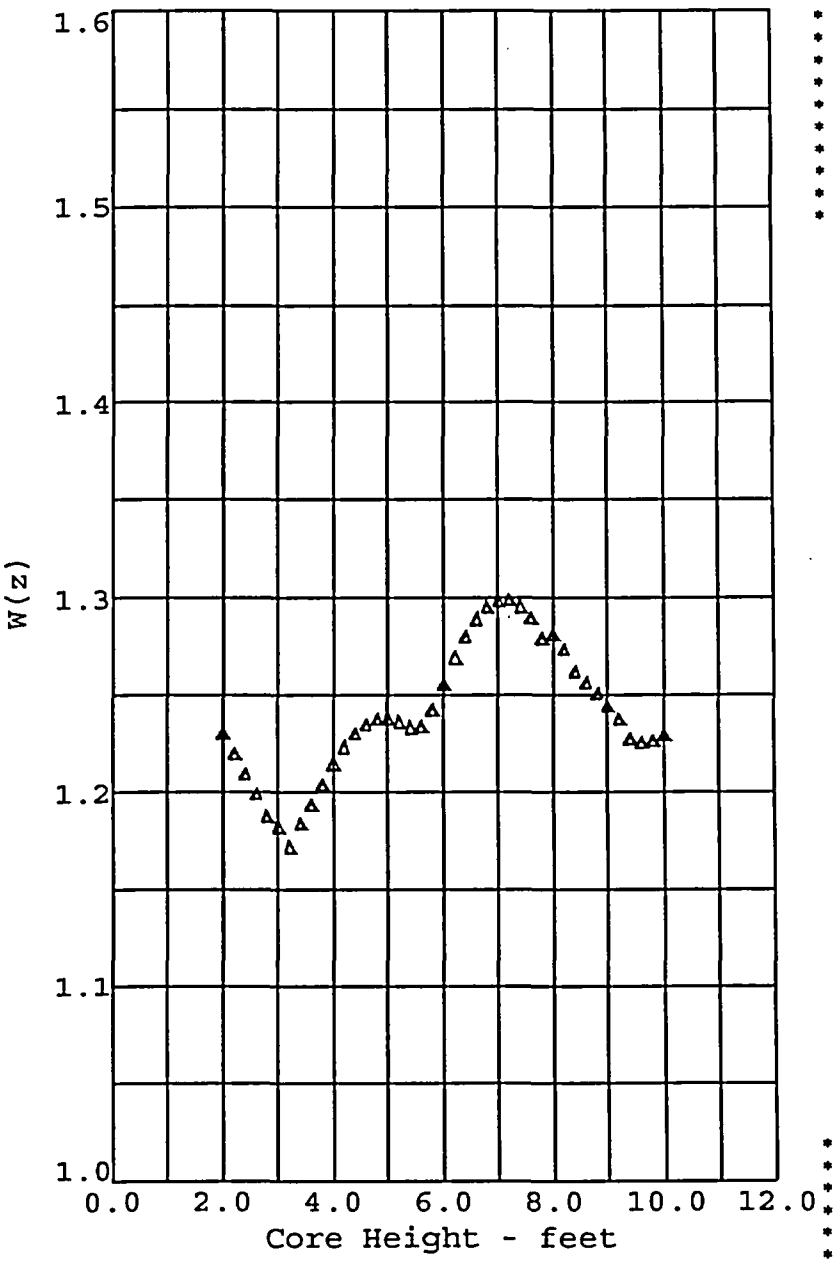
This figure is referred to by Specification B3.2.1

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.

	Axial Point	Elevation (feet)	MOL-2 W(Z)
*	1	12.00	1.0000
*	2	11.80	1.0000
*	3	11.60	1.0000
*	4	11.40	1.0000
*	5	11.20	1.0000
*	6	11.00	1.0000
*	7	10.80	1.0000
*	8	10.60	1.0000
*	9	10.40	1.0000
*	10	10.20	1.0000
	11	10.00	1.2807
	12	9.80	1.2691
	13	9.60	1.2636
	14	9.40	1.2564
	15	9.20	1.2455
	16	9.00	1.2362
	17	8.80	1.2246
	18	8.60	1.2193
	19	8.40	1.2223
	20	8.20	1.2219
	21	8.00	1.2246
	22	7.80	1.2289
	23	7.60	1.2299
	24	7.40	1.2287
	25	7.20	1.2250
	26	7.00	1.2191
	27	6.80	1.2113
	28	6.60	1.2016
	29	6.40	1.1906
	30	6.20	1.1795
	31	6.00	1.1690
	32	5.80	1.1618
	33	5.60	1.1612
	34	5.40	1.1668
	35	5.20	1.1719
	36	5.00	1.1758
	37	4.80	1.1784
	38	4.60	1.1798
	39	4.40	1.1798
	40	4.20	1.1785
	41	4.00	1.1761
	42	3.80	1.1723
	43	3.60	1.1680
	44	3.40	1.1642
	45	3.20	1.1630
	46	3.00	1.1675
	47	2.80	1.1773
	48	2.60	1.1870
	49	2.40	1.1964
	50	2.20	1.2056
	51	2.00	1.2148
*	52	1.80	1.0000
*	53	1.60	1.0000
*	54	1.40	1.0000
*	55	1.20	1.0000
*	56	1.00	1.0000
*	57	0.80	1.0000
*	58	0.60	1.0000
*	59	0.40	1.0000
*	60	0.20	1.0000
*	61	0.00	1.0000

* Top and Bottom 15% Excluded per Technical Specification B3.2.1

FIGURE 8 RAOC W(Z) AT 12000 MWD/MTU



This figure is referred to by 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.

	Axial Point	Elevation (feet)	EOL W(Z)
*	1	12.00	1.0000
*	2	11.80	1.0000
*	3	11.60	1.0000
*	4	11.40	1.0000
*	5	11.20	1.0000
*	6	11.00	1.0000
*	7	10.80	1.0000
*	8	10.60	1.0000
*	9	10.40	1.0000
*	10	10.20	1.0000
	11	10.00	1.2291
	12	9.80	1.2263
	13	9.60	1.2249
	14	9.40	1.2267
	15	9.20	1.2374
	16	9.00	1.2443
	17	8.80	1.2508
	18	8.60	1.2561
	19	8.40	1.2618
	20	8.20	1.2733
	21	8.00	1.2810
	22	7.80	1.2788
	23	7.60	1.2896
	24	7.40	1.2957
	25	7.20	1.2986
	26	7.00	1.2983
	27	6.80	1.2950
	28	6.60	1.2889
	29	6.40	1.2802
	30	6.20	1.2691
	31	6.00	1.2554
	32	5.80	1.2420
	33	5.60	1.2339
	34	5.40	1.2332
	35	5.20	1.2361
	36	5.00	1.2378
	37	4.80	1.2372
	38	4.60	1.2345
	39	4.40	1.2298
	40	4.20	1.2229
	41	4.00	1.2141
	42	3.80	1.2033
	43	3.60	1.1927
	44	3.40	1.1833
	45	3.20	1.1718
	46	3.00	1.1820
	47	2.80	1.1870
	48	2.60	1.1987
	49	2.40	1.2090
	50	2.20	1.2193
	51	2.00	1.2296
*	52	1.80	1.0000
*	53	1.60	1.0000
*	54	1.40	1.0000
*	55	1.20	1.0000
*	56	1.00	1.0000
*	57	0.80	1.0000
*	58	0.60	1.0000
*	59	0.40	1.0000
*	60	0.20	1.0000
*	61	0.00	1.0000

* Top and Bottom 15% Excluded per Technical Specification B3.2.1

FIGURE 9 RAOC W(Z) AT 20000 MWD/MTU