

Vogtle Electric Generating Plant Unit 1 and Unit 2

Core Operating Limits Report

Unit 2 Cycle 4

Revision 2

October 1994

Revision Insertion Instructions

<u>Item</u>	<u>Instructions</u>
Active COLR List	Replace
Unit 2 Report and Title Page	Replace

Vogtle Electric Generating Plant Unit 1 and Unit 2

Active Core Operating Limits Report List

October 1994

Unit 1 Cycle 6

September 1994

Unit 2 Cycle 4, Revision 2

October 1994

## COLR for VEGP UNIT 2 CYCLE 4

### 1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for VEGP UNIT 2 CYCLE 4 has been prepared in accordance with the requirements of Technical Specification 6.8.1.6.

The Technical Specifications affected by this report are listed below:

3/4.1.1.1	SHUTDOWN MARGIN - MODES 1 and 2
3/4.1.1.2	SHUTDOWN MARGIN - MODES 3, 4 and 5
3/4.1.1.3	Moderator Temperature Coefficient
3/4.1.3.5	Shutdown Rod Insertion Limit
3/4.1.3.6	Control Rod Insertion Limits
3/4.2.1	Axial Flux Difference
3/4.2.2	Heat Flux Hot Channel Factor - $F_Q(Z)$
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}^N$

## COLR for VEGP UNIT 2 CYCLE 4

### 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 the NRC-approved methodologies specified in Technical Specification 6.8.1.6.

#### 2.1 SHUTDOWN MARGIN - MODES 1 AND 2 (Specification 3/4.1.1.1)

2.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 1.3%  $\Delta k/k$ .

#### 2.2 SHUTDOWN MARGIN - MODES 3, 4 AND 5 (Specification 3/4.1.1.2)

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 3/4.1.1.3)

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  $-5.5 \times 10^{-4} \Delta k/k/^\circ F$ .\*

2.3.2 The MTC Surveillance limit is:

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

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 Rod Insertion Limit (Specification 3/4.1.3.5)

2.4.1 The shutdown rods shall be withdrawn to a position greater than or equal to 225 steps.

#### 2.5 Control Rod Insertion Limits (Specification 3/4.1.3.6)

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

\* Applicable over full-power T-average range of 584.4°F through 588.4°, inclusive.

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2.6 Axial Flux Difference (Specification 3/4.2.1)  
{RAOC methodology}

2.6.1 The Axial Flux Difference (AFD) Acceptable Operation Limits are provided in Figure 4.

2.7 Heat Flux Hot Channel Factor -  $F_q(Z)$  (Specification 3/4.2.2)  
{ $F_q$  methodology}

$$2.7.1 \quad F_q(Z) \leq \frac{F_q^{RTP}}{P} * K(Z) \quad \text{for } P > 0.5$$

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

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

$$2.7.2 \quad F_q^{RTP} = 2.50$$

2.7.3  $K(Z)$  is provided in Figure 5.

$$2.7.4 \quad F_q^C(Z) \leq \frac{F_q^{RTP} * K(Z)}{P * W(Z)} \quad \text{for } P > 0.5$$

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

2.7.5  $W(Z)$  values are provided in Figures 6 through 14.  $W(Z)$  values in Figures 6 through 8 are applicable up to 14,000 MWD/MTU.  $W(Z)$  values in Figures 9 through 14 are applicable beginning at 14,000 MWD/MTU through the end of Cycle 4.

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2.7.6 The  $F_q(Z)^C$  penalty factors are provided in Table 1.

2.8 Nuclear Enthalpy Rise Hot Channel Factor -  $F_{\Delta H}^N$  (Specification 3/4.2.3)

$$2.8.1 \quad F_{\Delta H}^N \leq F_{\Delta H}^{RTP} * (1 + PF_{\Delta H} * (1-P))$$

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

$$2.8.2a \quad F_{\Delta H}^{RTP} = 1.53 \text{ for LOPAR fuel, and}$$

$$2.8.2b \quad F_{\Delta H}^{RTP} = 1.65 \text{ for VANTAGE 5 fuel}$$

$$2.8.3 \quad PF_{\Delta H} = 0.3 \text{ for LOPAR and VANTAGE 5 fuel}$$

COLR for VEGP UNIT 2 CYCLE 4

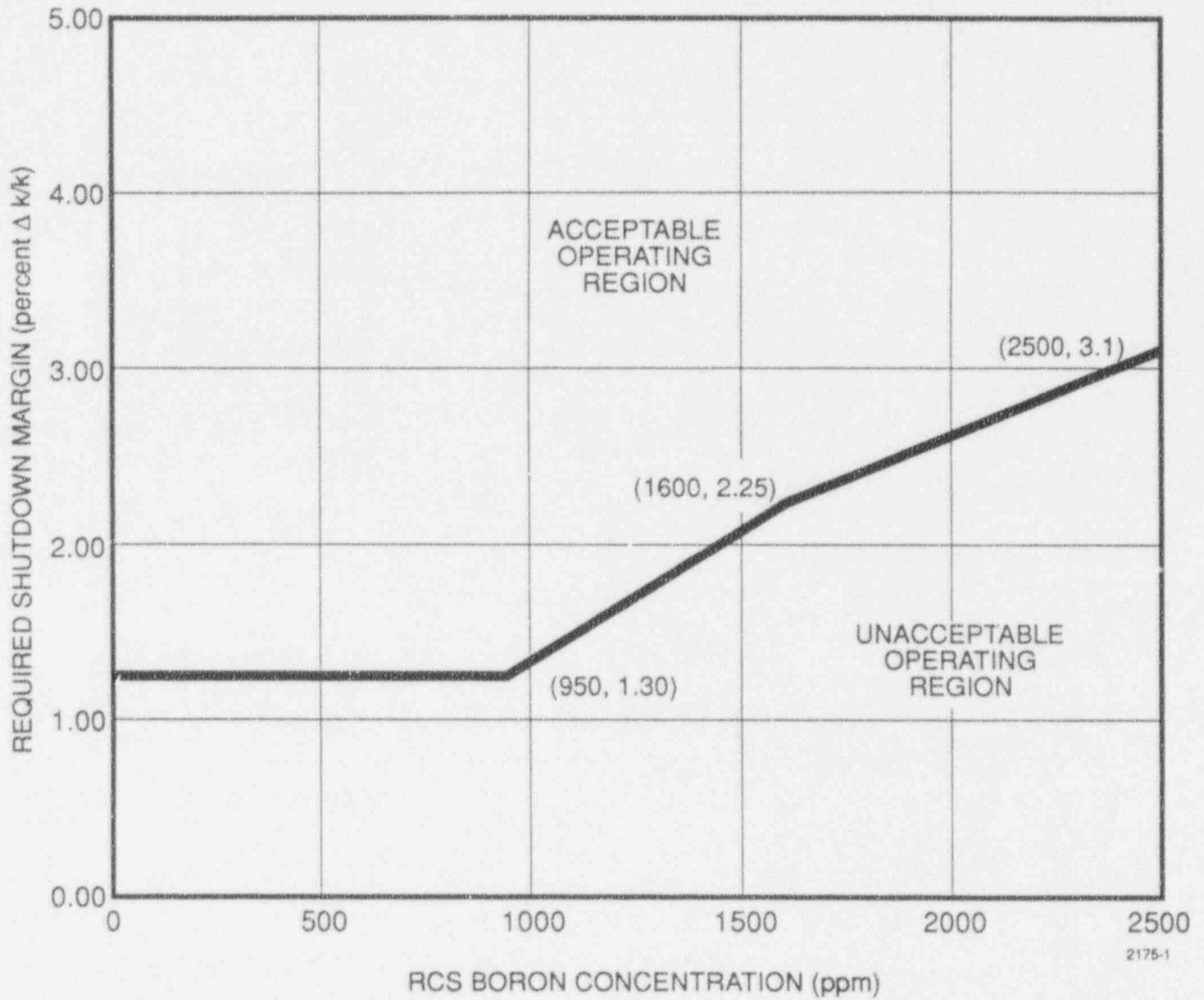


FIGURE 1

REQUIRED SHUTDOWN MARGIN FOR MODES 3 AND 4 (MODE 4 WITH AT LEAST ONE REACTOR COOLANT PUMP RUNNING)

COLR for VEGP UNIT 2 CYCLE 4

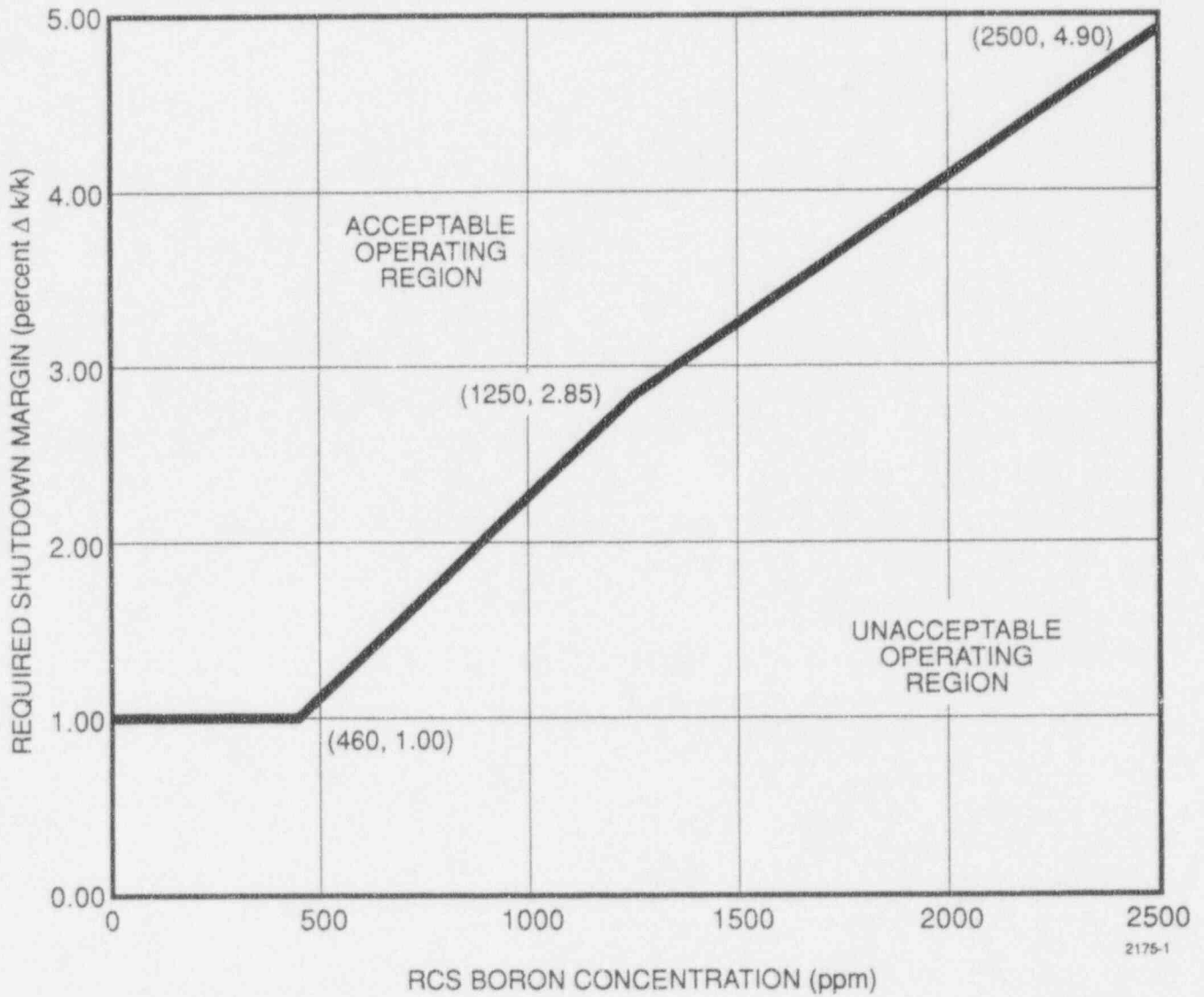
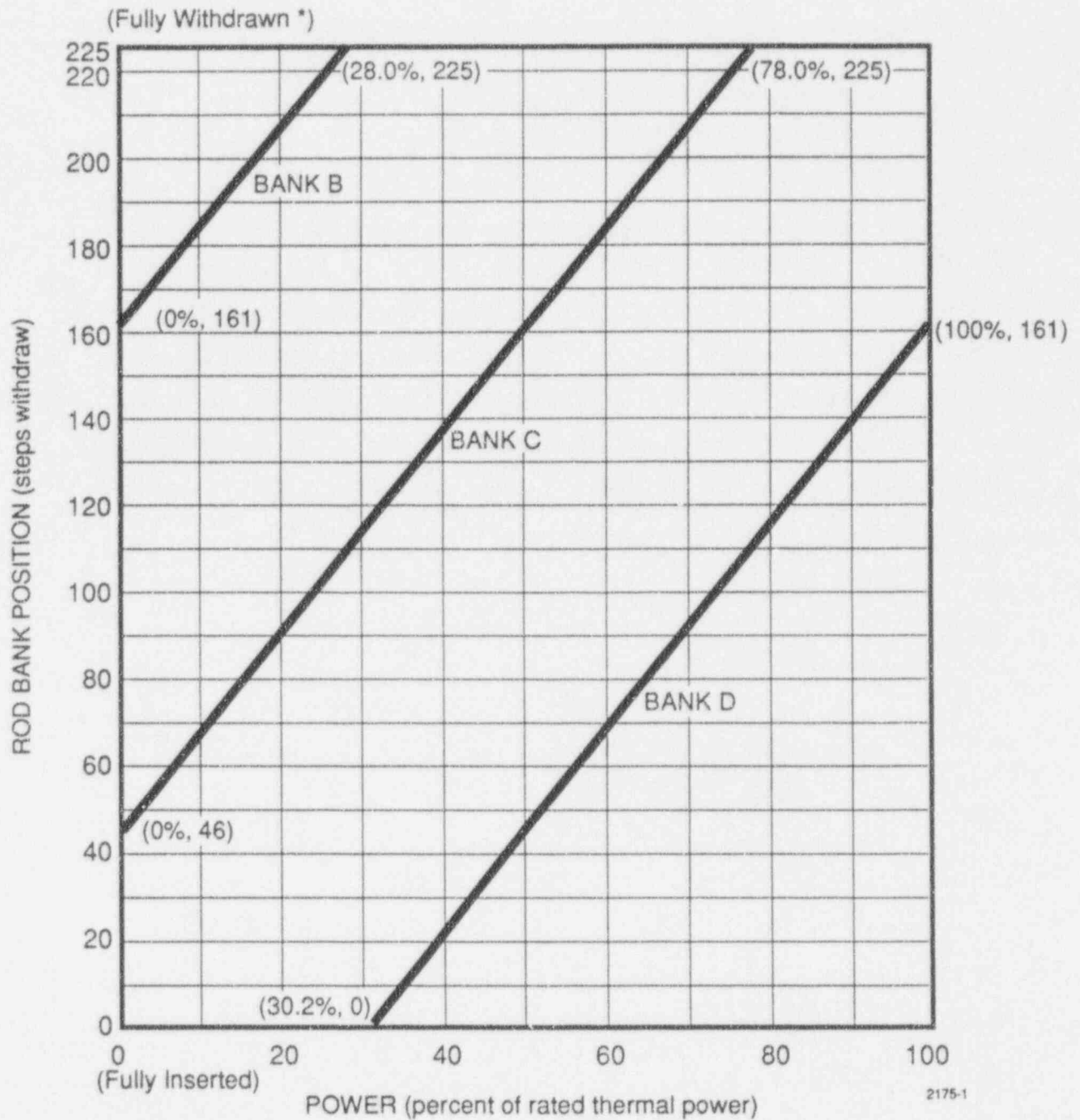


FIGURE 2

REQUIRED SHUTDOWN MARGIN FOR MODES 4 AND 5 (MODE 4 WITH NO REACTOR COOLANT PUMPS RUNNING)



COLR for VEGP UNIT 2 CYCLE 4



\* Fully withdrawn shall be the condition where control rods are at a position within the interval  $\geq 225$  and  $\leq 231$  steps withdrawn.

FIGURE 3  
ROD BANK INSERTION LIMITS VERSUS THERMAL POWER

COLR for VEGP UNIT 2 CYCLE 4

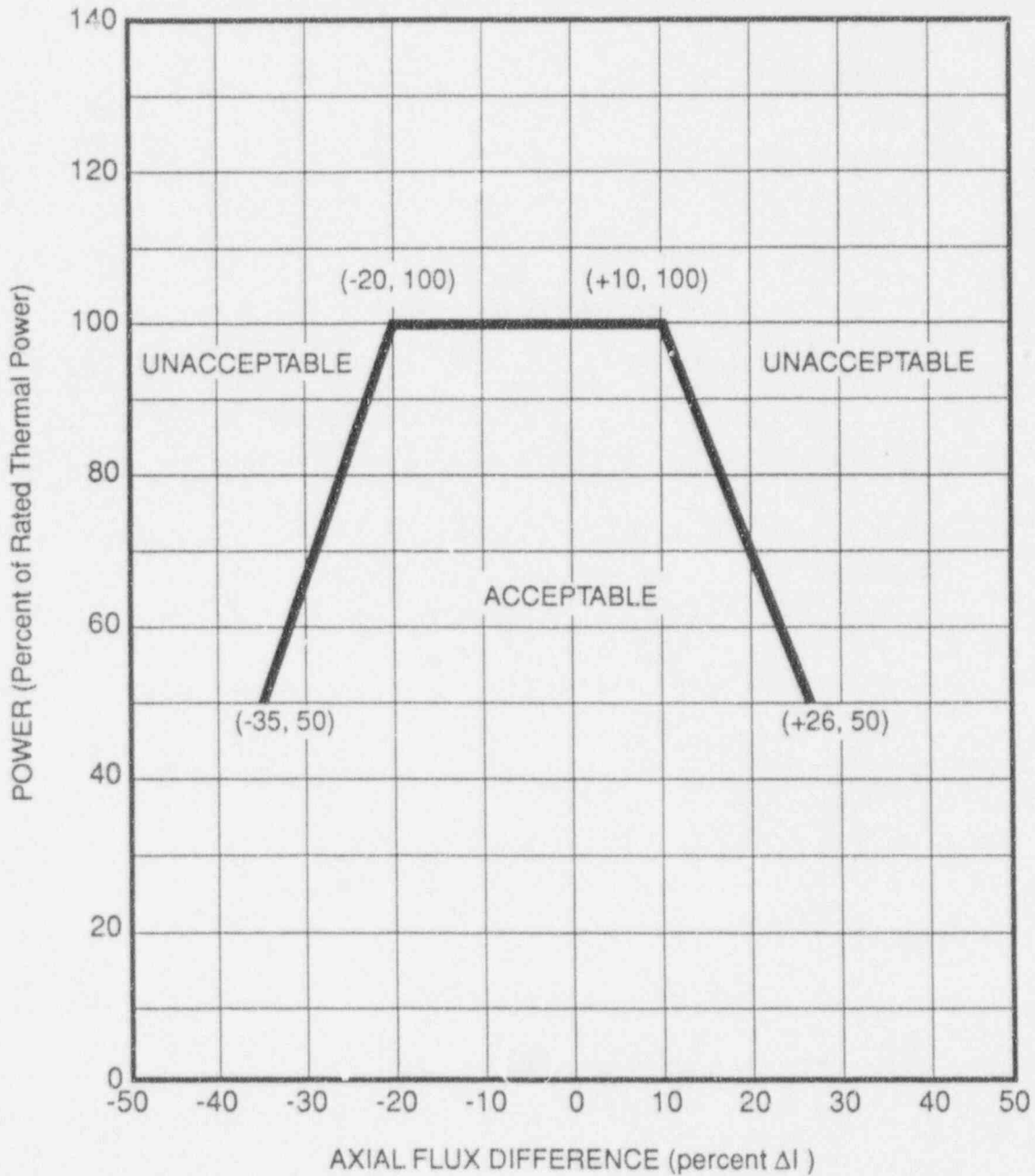


FIGURE 4

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

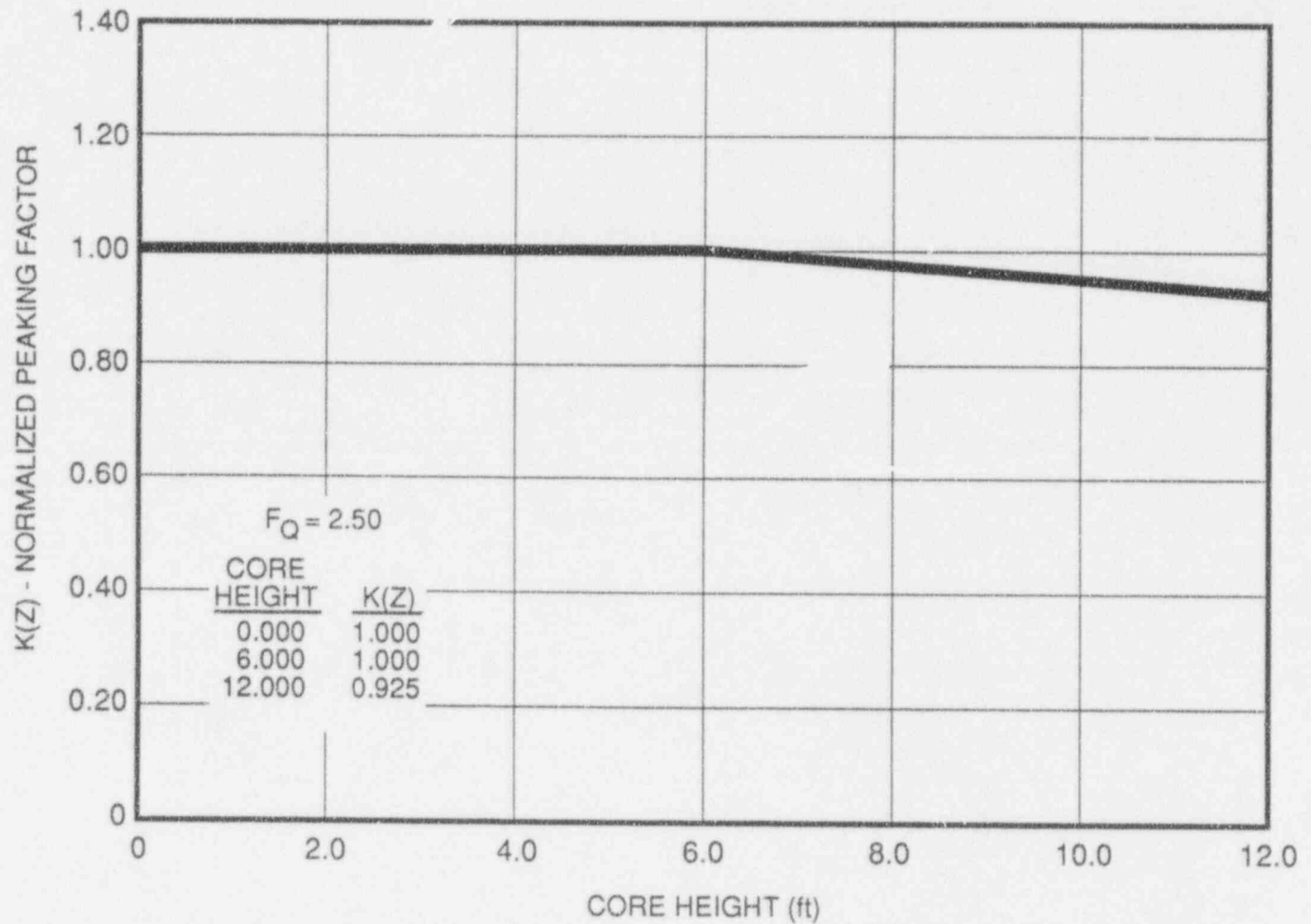


FIGURE 5

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

## COLR for VEGP UNIT 2 CYCLE 4

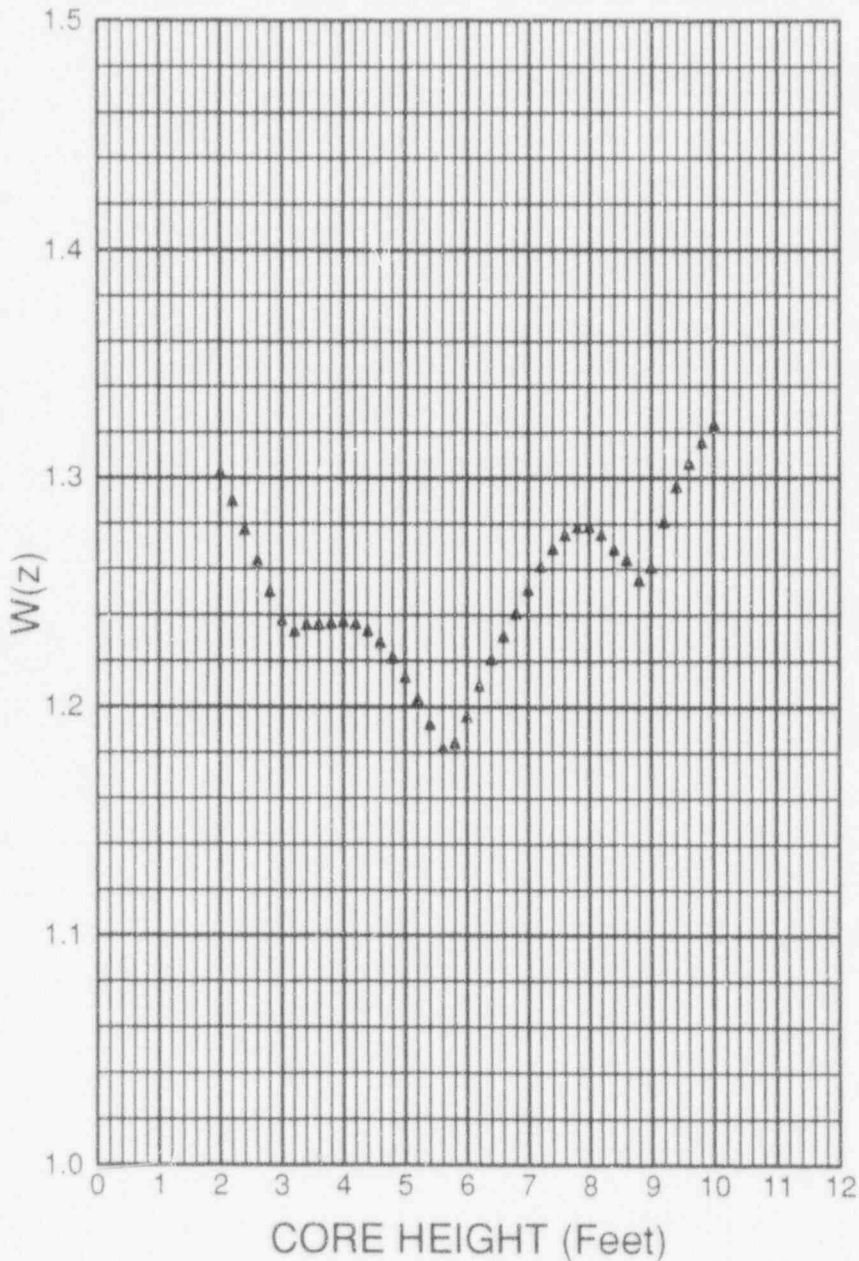


FIGURE 6

RAOC W(z) at 10000 MWD/MTU

This figure is referred to by Technical Specifications 4.2.2.2d, B3/4.2.2  
Data applicable over a temperature Range of 584.4 to 588.4 F.

Axial Point	Elevation (feet)	10K 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	1.3238
12	9.80	1.3161
13	9.60	1.3066
14	9.40	1.2966
15	9.20	1.2810
16	9.00	1.2613
17	8.80	1.2558
18	8.60	1.2646
19	8.40	1.2692
20	8.20	1.2755
21	8.00	1.2791
22	7.80	1.2786
23	7.60	1.2753
24	7.40	1.2695
25	7.20	1.2616
26	7.00	1.2517
27	6.80	1.2410
28	6.60	1.2313
29	6.40	1.2212
30	6.20	1.2096
31	6.00	1.1961
32	5.80	1.1845
33	5.60	1.1825
34	5.40	1.1927
35	5.20	1.2037
36	5.00	1.2135
37	4.80	1.2220
38	4.60	1.2286
39	4.40	1.2335
40	4.20	1.2365
41	4.00	1.2376
42	3.80	1.2370
43	3.60	1.2363
44	3.40	1.2364
45	3.20	1.2354
46	3.00	1.2383
47	2.80	1.2507
48	2.60	1.2642
49	2.40	1.2775
50	2.20	1.2903
51	2.00	1.3027
* 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 4.2.2.2

# COLR for VEGP UNIT 2 CYCLE 4

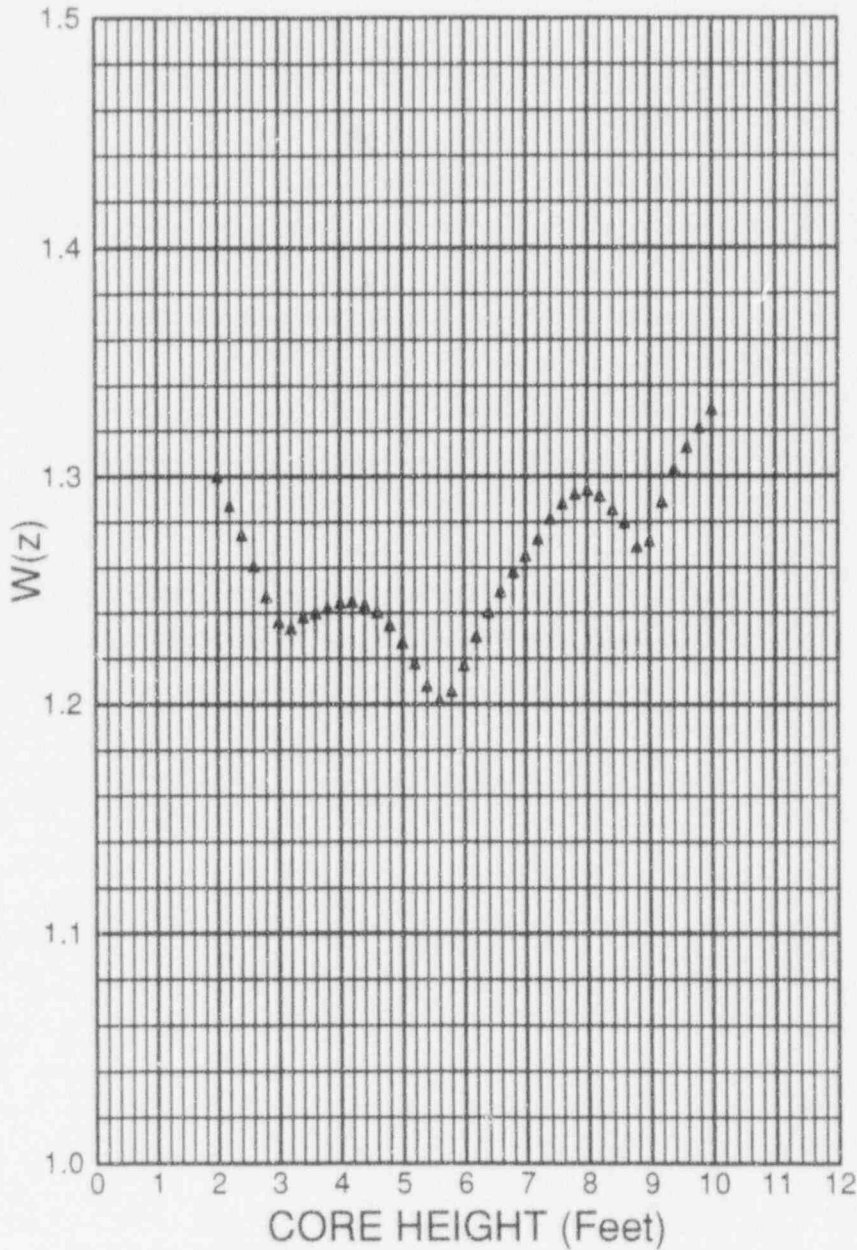


FIGURE 7

RAOC W(z) at 12000 MWD/MTU

This figure is referred to by Technical Specifications 4.2.2.2d, B3/4.2.2  
Data applicable over a temperature Range of 584.4 to 588.4 F.

Axial Point	Elevation (feet)	12K 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	1.3297
12	9.80	1.3216
13	9.60	1.3129
14	9.40	1.3035
15	9.20	1.2891
16	9.00	1.2721
17	8.80	1.2693
18	8.60	1.2799
19	8.40	1.2857
20	8.20	1.2917
21	8.00	1.2942
22	7.80	1.2925
23	7.60	1.2885
24	7.40	1.2819
25	7.20	1.2729
26	7.00	1.2654
27	6.80	1.2584
28	6.60	1.2499
29	6.40	1.2408
30	6.20	1.2302
31	6.00	1.2175
32	5.80	1.2060
33	5.60	1.2020
34	5.40	1.2085
35	5.20	1.2183
36	5.00	1.2274
37	4.80	1.2349
38	4.60	1.2405
39	4.40	1.2440
40	4.20	1.2455
41	4.00	1.2448
42	3.80	1.2426
43	3.60	1.2404
44	3.40	1.2387
45	3.20	1.2336
46	3.00	1.2363
47	2.80	1.2475
48	2.60	1.2609
49	2.40	1.2745
50	2.20	1.2875
51	2.00	1.3002
* 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 4.2.2.2

# COLR for VEGP UNIT 2 CYCLE 4

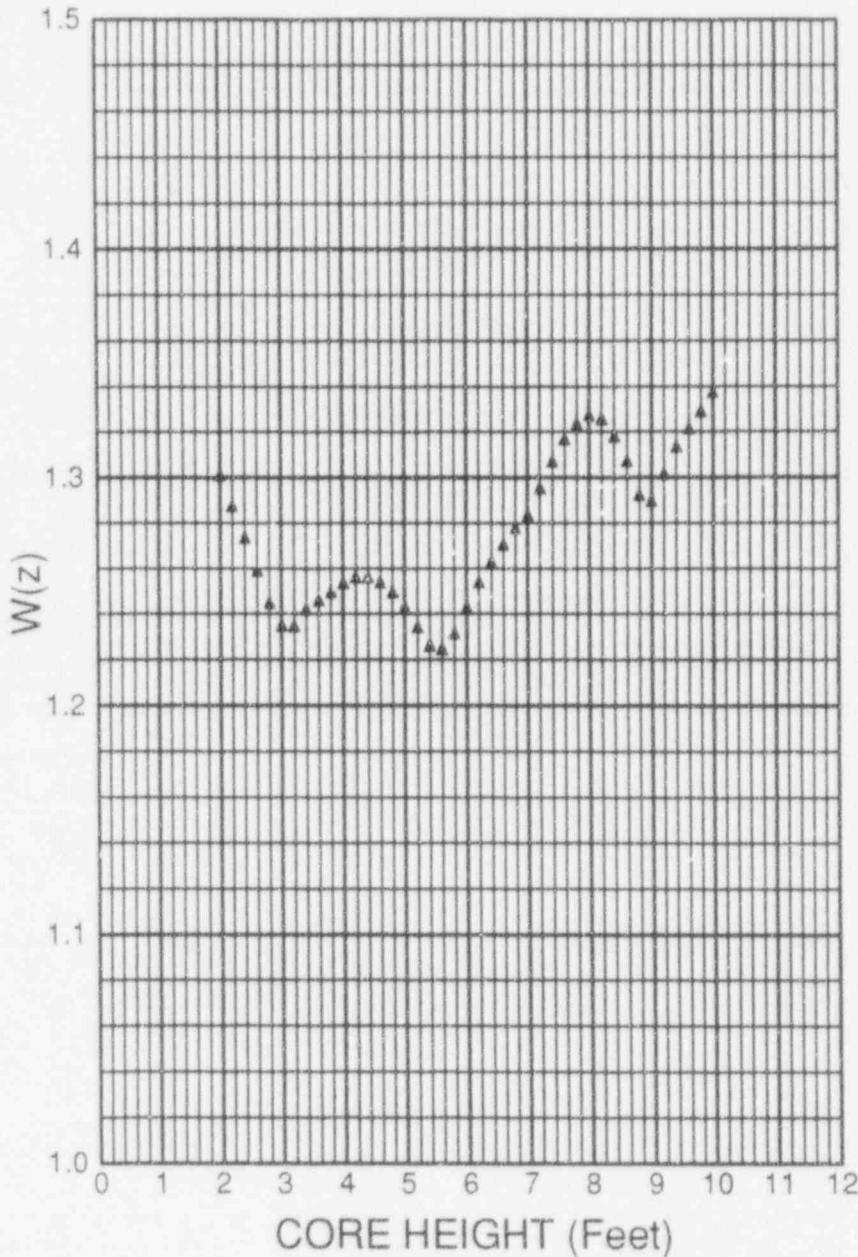


FIGURE 8

RAOC W(z) at 14000 MWD/MTU

This figure is referred to by Technical Specifications 4.2.2.2d, B3/4.2.2  
Data applicable over a temperature Range of 584.4 to 588.4 F.

REV 2

Axial Point	Elevation (feet)	14K 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	1.3379
12	9.80	1.3293
13	9.60	1.3217
14	9.40	1.3137
15	9.20	1.3019
16	9.00	1.2902
17	8.80	1.2926
18	8.60	1.3075
19	8.40	1.3183
20	8.20	1.3261
21	8.00	1.3278
22	7.80	1.3241
23	7.60	1.3171
24	7.40	1.3074
25	7.20	1.2956
26	7.00	1.2838
27	6.80	1.2781
28	6.60	1.2710
29	6.40	1.2634
30	6.20	1.2543
31	6.00	1.2432
32	5.80	1.2319
33	5.60	1.2249
34	5.40	1.2265
35	5.20	1.2347
36	5.00	1.2433
37	4.80	1.2499
38	4.60	1.2543
39	4.40	1.2565
40	4.20	1.2564
41	4.00	1.2539
42	3.80	1.2499
43	3.60	1.2462
44	3.40	1.2423
45	3.20	1.2350
46	3.00	1.2352
47	2.80	1.2451
48	2.60	1.2592
49	2.40	1.2738
50	2.20	1.2877
51	2.00	1.3013
* 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 4.2.2.2



## COLR for VEGP UNIT 2 CYCLE 4

FIGURE 9

RAOC W(z)'s Set 1 (Most Conservative Set)

Axial Point *****	Elevation *****	14000 W(z) *****	15500 W(z) *****	17000 W(z) *****
* 1	12.0	1.0000	1.0000	1.0000
* 2	11.8	1.0000	1.0000	1.0000
* 3	11.6	1.0000	1.0000	1.0000
* 4	11.4	1.0000	1.0000	1.0000
* 5	11.2	1.0000	1.0000	1.0000
* 6	11.0	1.0000	1.0000	1.0000
* 7	10.8	1.0000	1.0000	1.0000
* 8	10.6	1.0000	1.0000	1.0000
* 9	10.4	1.0000	1.0000	1.0000
* 10	10.2	1.0000	1.0000	1.0000
11	10.0	1.3238	1.3156	1.2882
12	9.8	1.3059	1.3000	1.2787
13	9.6	1.2843	1.2852	1.2781
14	9.4	1.2623	1.2676	1.2721
15	9.2	1.2616	1.2651	1.2668
16	9.0	1.2696	1.2758	1.2795
17	8.8	1.2827	1.2935	1.3010
18	8.6	1.3012	1.3130	1.3181
19	8.4	1.3178	1.3298	1.3323
20	8.2	1.3297	1.3424	1.3453
21	8.0	1.3425	1.3554	1.3574
22	7.8	1.3539	1.3668	1.3672
23	7.6	1.3600	1.3734	1.3734
24	7.4	1.3623	1.3761	1.3759
25	7.2	1.3608	1.3750	1.3749
26	7.0	1.3558	1.3704	1.3706
27	6.8	1.3475	1.3626	1.3634
28	6.6	1.3362	1.3517	1.3533
29	6.4	1.3223	1.3379	1.3407
30	6.2	1.3060	1.3214	1.3256
31	6.0	1.2874	1.3030	1.3091
32	5.8	1.2672	1.2834	1.2921
33	5.6	1.2442	1.2608	1.2731
34	5.4	1.2228	1.2383	1.2541
35	5.2	1.2245	1.2357	1.2482
36	5.0	1.2313	1.2424	1.2534
37	4.8	1.2366	1.2484	1.2610
38	4.6	1.2398	1.2527	1.2680
39	4.4	1.2411	1.2552	1.2732
40	4.2	1.2403	1.2554	1.2759
41	4.0	1.2358	1.2528	1.2761
42	3.8	1.2339	1.2498	1.2737
43	3.6	1.2340	1.2482	1.2691
44	3.4	1.2345	1.2460	1.2623
45	3.2	1.2334	1.2420	1.2541
46	3.0	1.2339	1.2435	1.2580
47	2.8	1.2411	1.2546	1.2745
48	2.6	1.2540	1.2709	1.2947
49	2.4	1.2658	1.2855	1.3133
50	2.2	1.2773	1.2996	1.3312
51	2.0	1.2889	1.3136	1.3487
* 52	1.8	1.0000	1.0000	1.0000
* 53	1.6	1.0000	1.0000	1.0000
* 54	1.4	1.0000	1.0000	1.0000
* 55	1.2	1.0000	1.0000	1.0000
* 56	1.0	1.0000	1.0000	1.0000
* 57	0.8	1.0000	1.0000	1.0000
* 58	0.6	1.0000	1.0000	1.0000
* 59	0.4	1.0000	1.0000	1.0000
* 60	0.2	1.0000	1.0000	1.0000
* 61	0.0	1.0000	1.0000	1.0000

\* Top and Bottom 15% Excluded  
per Technical Specification  
4.2.2.2.

This table is referred to  
by Technical Specification  
4.2.2.2d, B3/4.2.2. Data  
is applicable over a temp-  
erature range of 584.4 to  
588.4°F.

## COLR for VEGP UNIT 2 CYCLE 4

FIGURE 10

RAOC W(z)'s Set 2 (High AOA Model)

Axial Point *****	Elevation *****	14000 W(z) *****	15500 W(z) *****	17000 W(z) *****
* 1	12.0	1.0000	1.0000	1.0000
* 2	11.8	1.0000	1.0000	1.0000
* 3	11.6	1.0000	1.0000	1.0000
* 4	11.4	1.0000	1.0000	1.0000
* 5	11.2	1.0000	1.0000	1.0000
* 6	11.0	1.0000	1.0000	1.0000
* 7	10.8	1.0000	1.0000	1.0000
* 8	10.6	1.0000	1.0000	1.0000
* 9	10.4	1.0000	1.0000	1.0000
* 10	10.2	1.0000	1.0000	1.0000
11	10.0	1.3238	1.3156	1.2882
12	9.8	1.3059	1.3000	1.2787
13	9.6	1.2843	1.2852	1.2781
14	9.4	1.2623	1.2676	1.2721
15	9.2	1.2616	1.2651	1.2668
16	9.0	1.2696	1.2758	1.2795
17	8.8	1.2827	1.2935	1.3010
18	8.6	1.3012	1.3130	1.3181
19	8.4	1.3178	1.3298	1.3323
20	8.2	1.3297	1.3424	1.3453
21	8.0	1.3425	1.3554	1.3574
22	7.8	1.3539	1.3668	1.3672
23	7.6	1.3600	1.3734	1.3734
24	7.4	1.3623	1.3761	1.3759
25	7.2	1.3608	1.3750	1.3749
26	7.0	1.3558	1.3704	1.3706
27	6.8	1.3475	1.3626	1.3634
28	6.6	1.3362	1.3517	1.3533
29	6.4	1.3223	1.3379	1.3407
30	6.2	1.3060	1.3214	1.3256
31	6.0	1.2874	1.3030	1.3091
32	5.8	1.2672	1.2834	1.2921
33	5.6	1.2442	1.2608	1.2731
34	5.4	1.2228	1.2383	1.2541
35	5.2	1.2229	1.2353	1.2482
36	5.0	1.2284	1.2393	1.2497
37	4.8	1.2313	1.2415	1.2517
38	4.6	1.2324	1.2422	1.2528
39	4.4	1.2314	1.2410	1.2524
40	4.2	1.2284	1.2376	1.2494
41	4.0	1.2231	1.2317	1.2438
42	3.8	1.2165	1.2241	1.2359
43	3.6	1.2093	1.2153	1.2255
44	3.4	1.2010	1.2051	1.2133
45	3.2	1.1931	1.1960	1.2040
46	3.0	1.1909	1.1921	1.1987
47	2.8	1.1982	1.1974	1.2003
48	2.6	1.2116	1.2096	1.2095
49	2.4	1.2236	1.2215	1.2214
50	2.2	1.2352	1.2335	1.2337
51	2.0	1.2469	1.2455	1.2460
* 52	1.8	1.0000	1.0000	1.0000
* 53	1.6	1.0000	1.0000	1.0000
* 54	1.4	1.0000	1.0000	1.0000
* 55	1.2	1.0000	1.0000	1.0000
* 56	1.0	1.0000	1.0000	1.0000
* 57	0.8	1.0000	1.0000	1.0000
* 58	0.6	1.0000	1.0000	1.0000
* 59	0.4	1.0000	1.0000	1.0000
* 60	0.2	1.0000	1.0000	1.0000
* 61	0.0	1.0000	1.0000	1.0000

\* Top and Bottom 15% Excluded  
per Technical Specification  
4.2.2.2.

This table is referred to  
by Technical Specification  
4.2.2.2d, B3/4.2.2. Data  
is applicable over a temp-  
erature range of 584.4 to  
588.4F.



## COLR for VEGP UNIT 2 CYCLE 4

FIGURE 11

RAOC  $W(z)$  's Set 3 ("75% AOA" - Fitted)

Axial Point	Elevation	14000 $W(z)$	15500 $W(z)$	17000 $W(z)$
*****	*****	*****	*****	*****
* 1	12.0	1.0000	1.0000	1.0000
* 2	11.8	1.0000	1.0000	1.0000
* 3	11.6	1.0000	1.0000	1.0000
* 4	11.4	1.0000	1.0000	1.0000
* 5	11.2	1.0000	1.0000	1.0000
* 6	11.0	1.0000	1.0000	1.0000
* 7	10.8	1.0000	1.0000	1.0000
* 8	10.6	1.0000	1.0000	1.0000
* 9	10.4	1.0000	1.0000	1.0000
* 10	10.2	1.0000	1.0000	1.0000
11	10.0	1.3028	1.2920	1.2648
12	9.8	1.2834	1.2758	1.2564
13	9.6	1.2648	1.2631	1.2561
14	9.4	1.2545	1.2539	1.2507
15	9.2	1.2537	1.2512	1.2453
16	9.0	1.2617	1.2605	1.2545
17	8.8	1.2770	1.2794	1.2751
18	8.6	1.2951	1.3002	1.2962
19	8.4	1.3108	1.3176	1.3136
20	8.2	1.3246	1.3324	1.3289
21	8.0	1.3374	1.3459	1.3421
22	7.8	1.3473	1.3564	1.3523
23	7.6	1.3527	1.3628	1.3591
24	7.4	1.3544	1.3653	1.3622
25	7.2	1.3525	1.3642	1.3620
26	7.0	1.3472	1.3598	1.3586
27	6.8	1.3389	1.3523	1.3523
28	6.6	1.3277	1.3419	1.3433
29	6.4	1.3140	1.3287	1.3318
30	6.2	1.2980	1.3129	1.3179
31	6.0	1.2802	1.2954	1.3024
32	5.8	1.2611	1.2765	1.2851
33	5.6	1.2398	1.2554	1.2670
34	5.4	1.2207	1.2363	1.2526
35	5.2	1.2219	1.2349	1.2493
36	5.0	1.2270	1.2391	1.2518
37	4.8	1.2301	1.2420	1.2549
38	4.6	1.2323	1.2436	1.2564
39	4.4	1.2323	1.2431	1.2561
40	4.2	1.2302	1.2403	1.2531
41	4.0	1.2259	1.2352	1.2477
42	3.8	1.2204	1.2282	1.2397
43	3.6	1.2141	1.2202	1.2297
44	3.4	1.2068	1.2115	1.2194
45	3.2	1.2000	1.2035	1.2107
46	3.0	1.1988	1.2009	1.2072
47	2.8	1.2059	1.2074	1.2123
48	2.6	1.2182	1.2199	1.2245
49	2.4	1.2297	1.2321	1.2377
50	2.2	1.2410	1.2442	1.2509
51	2.0	1.2523	1.2563	1.2640
* 52	1.8	1.0000	1.0000	1.0000
* 53	1.6	1.0000	1.0000	1.0000
* 54	1.4	1.0000	1.0000	1.0000
* 55	1.2	1.0000	1.0000	1.0000
* 56	1.0	1.0000	1.0000	1.0000
* 57	0.8	1.0000	1.0000	1.0000
* 58	0.6	1.0000	1.0000	1.0000
* 59	0.4	1.0000	1.0000	1.0000
* 60	0.2	1.0000	1.0000	1.0000
* 61	0.0	1.0000	1.0000	1.0000

\* Top and Bottom 15% Excluded  
per Technical Specification  
4.2.2.2.

This table is referred to  
by Technical Specification  
4.2.2.2d, B3/4.2.2. Data  
is applicable over a temp-  
erature range of 584.4 to  
588.4F.

## COLR for VEGP UNIT 2 CYCLE 4

FIGURE 12

RAOC W(x)'s Set 4 (Best Estimate AOA Model)

Axial Point *****	Elevation *****	14000 W(x) *****	15500 W(x) *****	17000 W(x) *****
* 1	12.0	1.0000	1.0000	1.0000
* 2	11.8	1.0000	1.0000	1.0000
* 3	11.6	1.0000	1.0000	1.0000
* 4	11.4	1.0000	1.0000	1.0000
* 5	11.2	1.0000	1.0000	1.0000
* 6	11.0	1.0000	1.0000	1.0000
* 7	10.8	1.0000	1.0000	1.0000
* 8	10.6	1.0000	1.0000	1.0000
* 9	10.4	1.0000	1.0000	1.0000
* 10	10.2	1.0000	1.0000	1.0000
11	10.0	1.2818	1.2683	1.2413
12	9.8	1.2609	1.2516	1.2341
13	9.6	1.2453	1.2410	1.2341
14	9.4	1.2457	1.2401	1.2293
15	9.2	1.2458	1.2373	1.2237
16	9.0	1.2538	1.2452	1.2294
17	8.8	1.2712	1.2652	1.2492
18	8.6	1.2890	1.2874	1.2742
19	8.4	1.3037	1.3054	1.2949
20	8.2	1.3195	1.3224	1.3114
21	8.0	1.3322	1.3363	1.3167
22	7.8	1.3406	1.3460	1.3174
23	7.6	1.3454	1.3521	1.3441
24	7.4	1.3465	1.3545	1.3485
25	7.2	1.3442	1.3534	1.3490
26	7.0	1.3386	1.3492	1.3465
27	6.8	1.3302	1.3420	1.3411
28	6.6	1.3191	1.3320	1.3332
29	6.4	1.3057	1.3194	1.3228
30	6.2	1.2899	1.3043	1.3101
31	6.0	1.2729	1.2877	1.2956
32	5.8	1.2550	1.2696	1.2781
33	5.6	1.2354	1.2499	1.2609
34	5.4	1.2186	1.2342	1.2511
35	5.2	1.2208	1.2345	1.2503
36	5.0	1.2257	1.2390	1.2540
37	4.8	1.2290	1.2425	1.2581
38	4.6	1.2322	1.2450	1.2601
39	4.4	1.2332	1.2452	1.2598
40	4.2	1.2321	1.2431	1.2569
41	4.0	1.2288	1.2387	1.2516
42	3.8	1.2242	1.2323	1.2434
43	3.6	1.2189	1.2252	1.2338
44	3.4	1.2125	1.2178	1.2255
45	3.2	1.2069	1.2109	1.2174
46	3.0	1.2068	1.2098	1.2157
47	2.8	1.2136	1.2174	1.2243
48	2.6	1.2247	1.2303	1.2396
49	2.4	1.2358	1.2428	1.2540
50	2.2	1.2467	1.2549	1.2681
51	2.0	1.2576	1.2670	1.2819
* 52	1.8	1.0000	1.0000	1.0000
* 53	1.6	1.0000	1.0000	1.0000
* 54	1.4	1.0000	1.0000	1.0000
* 55	1.2	1.0000	1.0000	1.0000
* 56	1.0	1.0000	1.0000	1.0000
* 57	0.8	1.0000	1.0000	1.0000
* 58	0.6	1.0000	1.0000	1.0000
* 59	0.4	1.0000	1.0000	1.0000
* 60	0.2	1.0000	1.0000	1.0000
* 61	0.0	1.0000	1.0000	1.0000

\* Top and Bottom 15% Excluded  
per Technical Specification  
4.2.2.2.

This table is referred to  
by Technical Specification  
4.2.2.2d, B3/4.2.2. Data  
is applicable over a temp-  
erature range of 584.4 to  
588.4F.

## COLR for VEGP UNIT 2 CYCLE 4

FIGURE 13

RAOC W(z)'s Set 5 ("25% AOA" - Fitted)

Axial Point	Elevation	14000 W(z)	15500 W(z)	17000 W(z)
*****	*****	*****	*****	*****
* 1	12.0	1.0000	1.0000	1.0000
* 2	11.8	1.0000	1.0000	1.0000
* 3	11.6	1.0000	1.0000	1.0000
* 4	11.4	1.0000	1.0000	1.0000
* 5	11.2	1.0000	1.0000	1.0000
* 6	11.0	1.0000	1.0000	1.0000
* 7	10.8	1.0000	1.0000	1.0000
* 8	10.6	1.0000	1.0000	1.0000
* 9	10.4	1.0000	1.0000	1.0000
* 10	10.2	1.0000	1.0000	1.0000
11	10.0	1.2580	1.2369	1.1999
12	9.8	1.2386	1.2233	1.1983
13	9.6	1.2233	1.2139	1.2008
14	9.4	1.2220	1.2137	1.2027
15	9.2	1.2216	1.2137	1.2032
16	9.0	1.2276	1.2197	1.2080
17	8.8	1.2413	1.2341	1.2201
18	8.6	1.2578	1.2515	1.2352
19	8.4	1.2734	1.2673	1.2489
20	8.2	1.2900	1.2847	1.2662
21	8.0	1.3037	1.2996	1.2817
22	7.8	1.3133	1.3105	1.2934
23	7.6	1.3194	1.3179	1.3022
24	7.4	1.3219	1.3219	1.3077
25	7.2	1.3210	1.3225	1.3102
26	7.0	1.3170	1.3202	1.3099
27	6.8	1.3102	1.3149	1.3068
28	6.6	1.3006	1.3069	1.3016
29	6.4	1.2887	1.2968	1.2950
30	6.2	1.2752	1.2850	1.2869
31	6.0	1.2604	1.2719	1.2777
32	5.8	1.2437	1.2567	1.2658
33	5.6	1.2273	1.2414	1.2536
34	5.4	1.2186	1.2326	1.2473
35	5.2	1.2227	1.2351	1.2485
36	5.0	1.2285	1.2407	1.2537
37	4.8	1.2328	1.2454	1.2595
38	4.6	1.2360	1.2488	1.2640
39	4.4	1.2371	1.2502	1.2665
40	4.2	1.2362	1.2493	1.2664
41	4.0	1.2328	1.2458	1.2638
42	3.8	1.2291	1.2411	1.2586
43	3.6	1.2265	1.2367	1.2514
44	3.4	1.2235	1.2319	1.2439
45	3.2	1.2202	1.2264	1.2358
46	3.0	1.2203	1.2266	1.2369
47	2.8	1.2273	1.2360	1.2494
48	2.6	1.2393	1.2506	1.2671
49	2.4	1.2508	1.2641	1.2836
50	2.2	1.2620	1.2773	1.2996
51	2.0	1.2733	1.2903	1.3153
* 52	1.8	1.0000	1.0000	1.0000
* 53	1.6	1.0000	1.0000	1.0000
* 54	1.4	1.0000	1.0000	1.0000
* 55	1.2	1.0000	1.0000	1.0000
* 56	1.0	1.0000	1.0000	1.0000
* 57	0.8	1.0000	1.0000	1.0000
* 58	0.6	1.0000	1.0000	1.0000
* 59	0.4	1.0000	1.0000	1.0000
* 60	0.2	1.0000	1.0000	1.0000
* 61	0.0	1.0000	1.0000	1.0000

\* Top and Bottom 15% Excluded  
per Technical Specification  
4.2.2.2.

This table is referred to  
by Technical Specification  
4.2.2.2d, B3/4.2.2. Data  
is applicable over a temp-  
erature range of 584.4 to  
588.4F.

FIGURE 14

RAOC W(z)'s Set 6 (BOC Skew Model)

Axial Point	Elevation	14000 W(z)	15500 W(z)	17000 W(z)
*****	*****	*****	*****	*****
* 1	12.0	1.0000	1.0000	1.0000
* 2	11.8	1.0000	1.0000	1.0000
* 3	11.6	1.0000	1.0000	1.0000
* 4	11.4	1.0000	1.0000	1.0000
* 5	11.2	1.0000	1.0000	1.0000
* 6	11.0	1.0000	1.0000	1.0000
* 7	10.8	1.0000	1.0000	1.0000
* 8	10.6	1.0000	1.0000	1.0000
* 9	10.4	1.0000	1.0000	1.0000
* 10	10.2	1.0000	1.0000	1.0000
11	10.0	1.2341	1.3054	1.1585
12	9.8	1.2162	1.1950	1.1624
13	9.6	1.2012	1.1868	1.1675
14	9.4	1.1972	1.1873	1.1760
15	9.2	1.1974	1.1900	1.1827
16	9.0	1.2013	1.1942	1.1866
17	8.8	1.2113	1.2030	1.1910
18	8.6	1.2265	1.2155	1.1962
19	8.4	1.2430	1.2291	1.2029
20	8.2	1.2605	1.2470	1.2200
21	8.0	1.2751	1.2629	1.2367
22	7.8	1.2859	1.2749	1.2494
23	7.6	1.2933	1.2837	1.2596
24	7.4	1.2972	1.2892	1.2668
25	7.2	1.2978	1.2916	1.2713
26	7.0	1.2954	1.2911	1.2732
27	6.8	1.2901	1.2877	1.2725
28	6.6	1.2821	1.2818	1.2699
29	6.4	1.2717	1.2741	1.2671
30	6.2	1.2605	1.2657	1.2637
31	6.0	1.2479	1.2561	1.2597
32	5.8	1.2333	1.2438	1.2534
33	5.6	1.2192	1.2328	1.2462
34	5.4	1.2185	1.2310	1.2434
35	5.2	1.2245	1.2357	1.2466
36	5.0	1.2313	1.2424	1.2534
37	4.8	1.2366	1.2484	1.2610
38	4.6	1.2398	1.2527	1.2680
39	4.4	1.2411	1.2552	1.2732
40	4.2	1.2403	1.2554	1.2759
41	4.0	1.2368	1.2528	1.2761
42	3.8	1.2339	1.2498	1.2737
43	3.6	1.2340	1.2482	1.2691
44	3.4	1.2345	1.2460	1.2623
45	3.2	1.2334	1.2420	1.2541
46	3.0	1.2339	1.2435	1.2580
47	2.8	1.2411	1.2546	1.2745
48	2.6	1.2540	1.2709	1.2947
49	2.4	1.2658	1.2855	1.3133
50	2.2	1.2773	1.2996	1.3312
51	2.0	1.2889	1.3136	1.3467
* 52	1.8	1.0000	1.0000	1.0000
* 53	1.6	1.0000	1.0000	1.0000
* 54	1.4	1.0000	1.0000	1.0000
* 55	1.2	1.0000	1.0000	1.0000
* 56	1.0	1.0000	1.0000	1.0000
* 57	0.8	1.0000	1.0000	1.0000
* 58	0.6	1.0000	1.0000	1.0000
* 59	0.4	1.0000	1.0000	1.0000
* 60	0.2	1.0000	1.0000	1.0000
* 61	0.0	1.0000	1.0000	1.0000

\* Top and Bottom 15% Excluded  
per Technical Specification  
4.2.2.2.

This table is referred to  
by Technical Specification  
4.2.2.2d, B3/4.2.2. Data  
is applicable over a temp-  
erature range of 584.4 to  
588.4F.

COLR for VEGP UNIT 2 CYCLE 4

TABLE 1

$F_o^c(Z)$  PENALTY FACTOR

Cycle	$F_o^c(Z)$
Burnup	Penalty
(MWD/MTU)	Factor
"All Burnups"	1.0200

Note:

The Penalty Factor, to be applied to  $F_o^c(Z)$  in accordance with surveillance requirement 4.2.2.2.f, is the maximum factor by which  $F_o^c(Z)$  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 Technical Specification 4.0.2) starting from the burnup at which the  $F_o^c(Z)$  was determined.