ENCLOSURE

SEQUOYAH NUCLEAR PLANT UNIT 2 CYCLE 6

CORE OPERATING LIMITS REPORT

REVISION 0

MARCH 18, 1992

(L36 920320 802)

QA RECORD

L36 920320 802

SEQUOYAH NUCLEAR PLANT UNIT 2, CYCLE 6

COPS OPERATING LIMITS REPORT

REVISION 0

MARCH 18, 1992

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1038U

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for Sequoyah Unit 2, Cycle 6, has been prepared in accordance with the requirements of Technical Specification (TS) 6.9.1.14.

The TSs affected by this report are listed below:

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
3/4.2.3 Nuclear Enthalpy Hot Channel Factor

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 TC 6.9.1.14.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.3) [3/4.1.1.3]

2.1.1 The moderator temperature coefficient (MTC) limits are:

The BOL/ARO/HZP-MTC shall be less positive than 0 $\Delta k/k/°F$ (BOL limit). With the measured BOL/ARO/HZP-MTC more positive than -1.2×10^{-5} $\Delta k/k/°F$ (as-measured MTC limit), establish control rod withdrawal limits to ensure the MTC remains less positive than 0 $\Delta k/k/°F$ for all times in core life.

The EOL/ARO/RTP-MTC shall be less negative than -4.0×10^{-4} $\Delta k/k/°F$.

2.1.2 The 300 ppm surveillance limit is:

The measured 300 ppm/ARO/RTP-MTC should be less negative than or equal to -3.1×10^{-4} $\Delta k/k/°F$.

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

2.2 Shutdown Rod Insertion Limit (Specification 3/4.1.3.5)
[3/4.1.3.5]

2.2.1 The shutdown rods shall be withdrawn to a position greater than or equal to 225 steps withdrawn.

2.3 Control Rod Insertion Limit (Specification 3/4.1.3.6)
[3/4.1.3.6]

2.3.1 The control rod banks shall be limited in physical insertion as shown in Figure 1.

2.4 Axial Flux Difference (Specification 3/4.2.1)
[3/4.2.1]

2.4.1 The axial flux difference (AFD) limits are provided in Figure 2.

2.5 Heat Flux Hot Channel Factor - $F_Q(Z)$ (Specification 3/4.2.2)
[3/4.2.2]

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

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

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

2.5.1 $F_Q^{RTP} = 2.32$

2.5.2 K(Z) is provided in Figure 3.

2.5.3 Note that the W(Z) values required by TS SR 4.2.2.2 are provided in Figures 4 through 8. This information is sufficient to determine W(Z) versus core height for all cycle burnups through the use of three point interpolation.

2.6 Nuclear Enthalpy Rise Hot Channel Factor - $F^{N}_{\Delta H}$ (Specification 3/4.2.3) [3/4.2.3]

$$F^{N}_{\Delta H} \leq F^{RTP}_{\Delta H} * (1+PF_{\Delta H} * [1-P])$$

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

2.6.1 $F^{RTP}_{\Delta H} = 1.55$

2.6.2 $PF_{\Delta H} = 0.3$

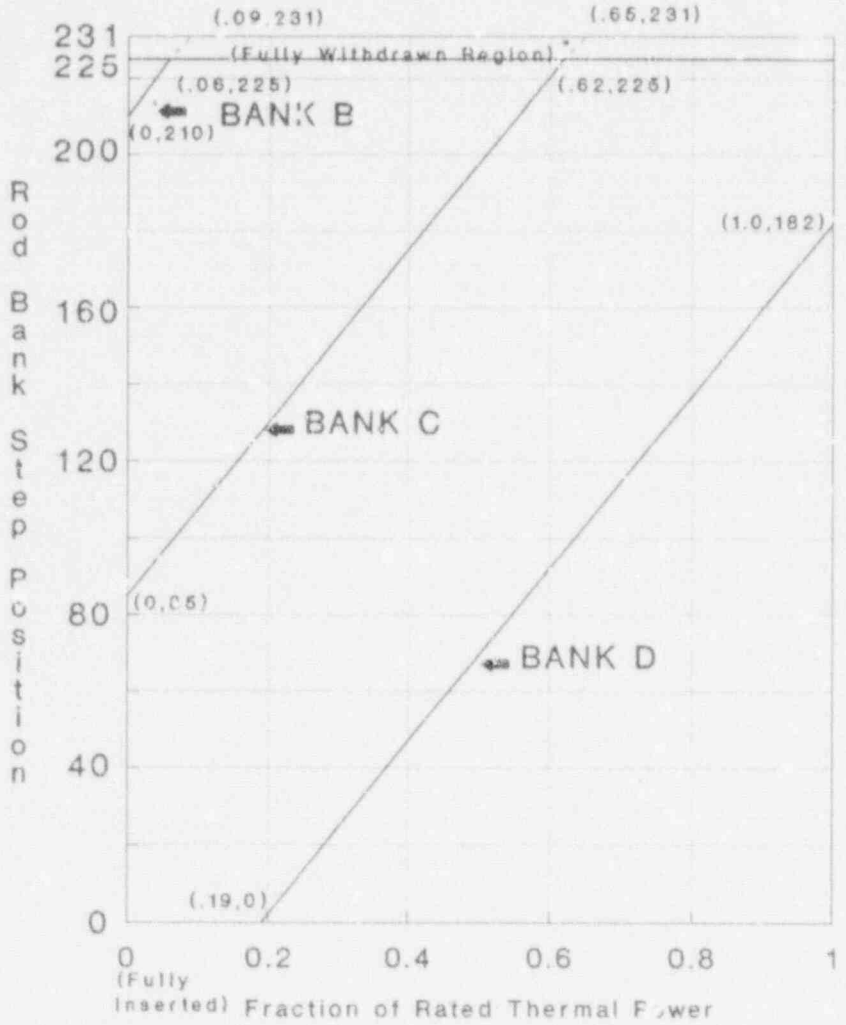


FIGURE 1

Rod Bank Insertion Limits Versus Thermal Power Four Loop Operation

* Fully withdrawn region shall be the condition where shutdown and control banks are at a position within the interval of ≥ 225 and ≤ 231 steps withdrawn, inclusive.

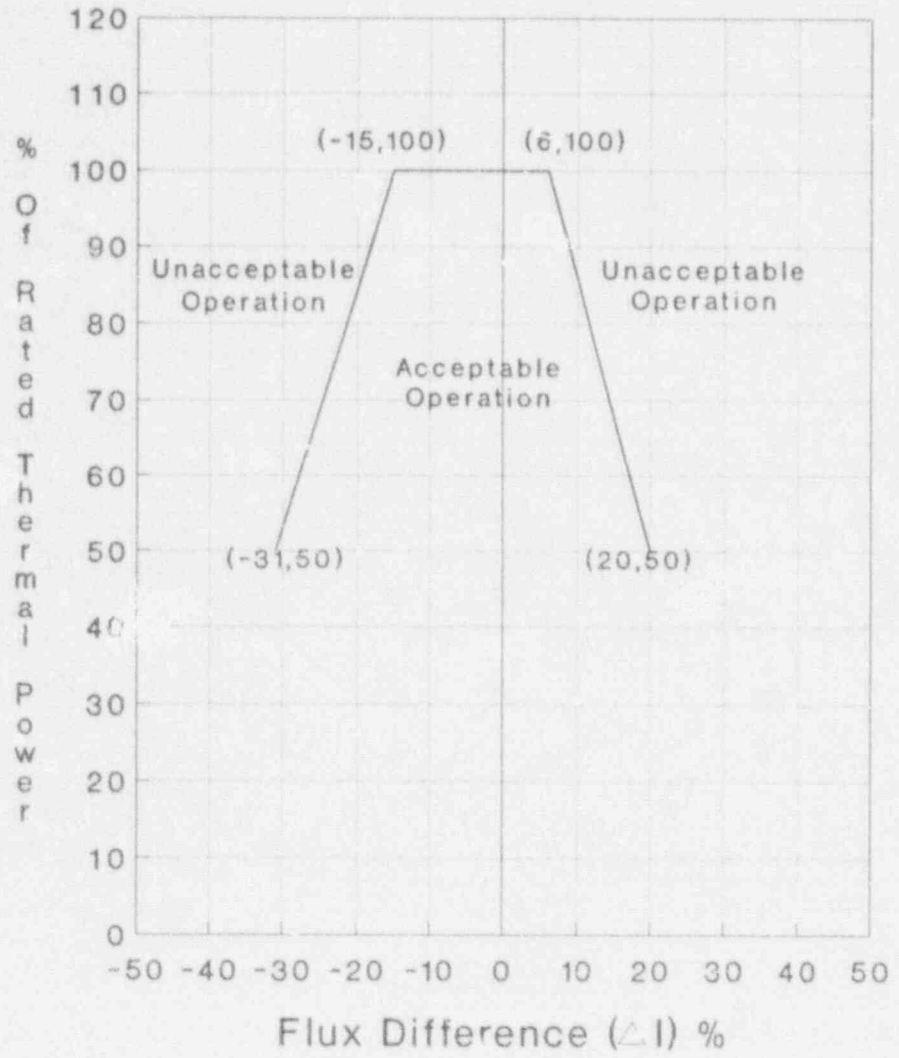


FIGURE 2

Axial Flux Difference Limits As
A Function Of Rated Thermal Power

COLR For Sequoyah Unit 2 Cycle 6

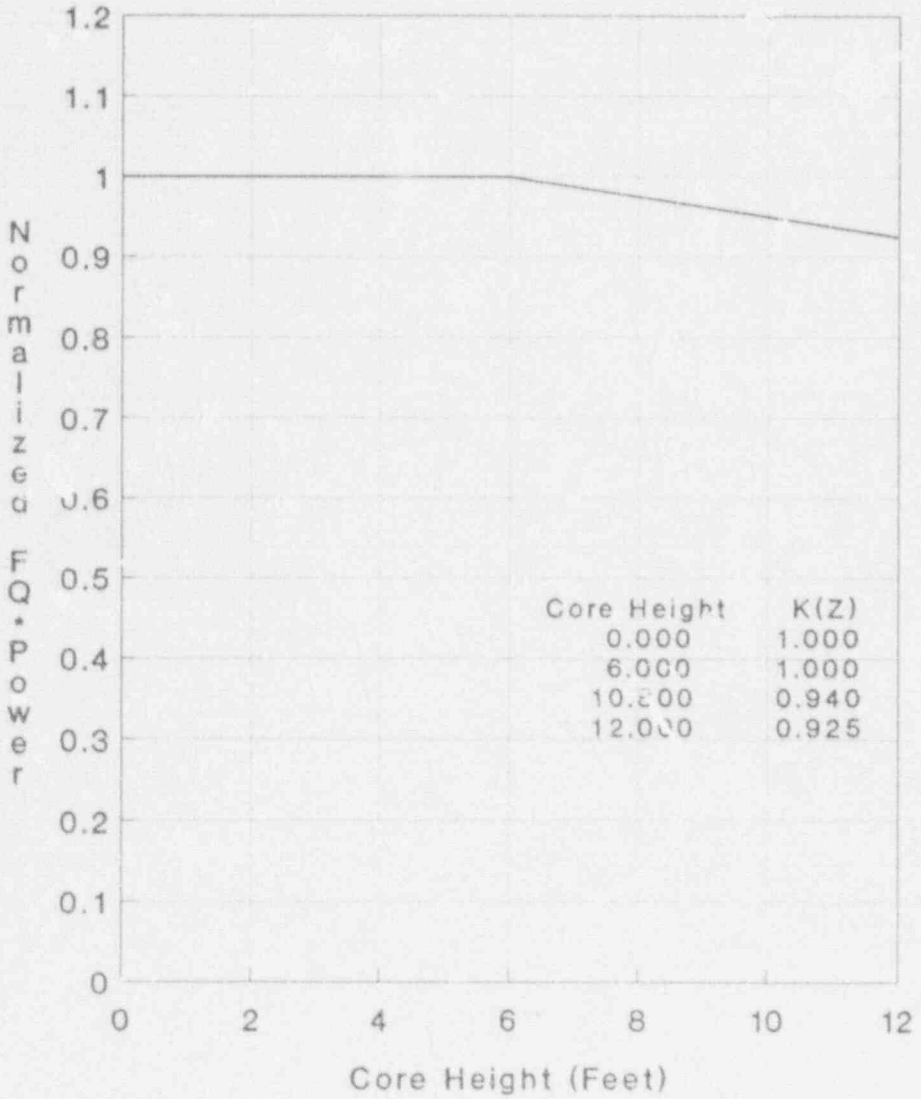
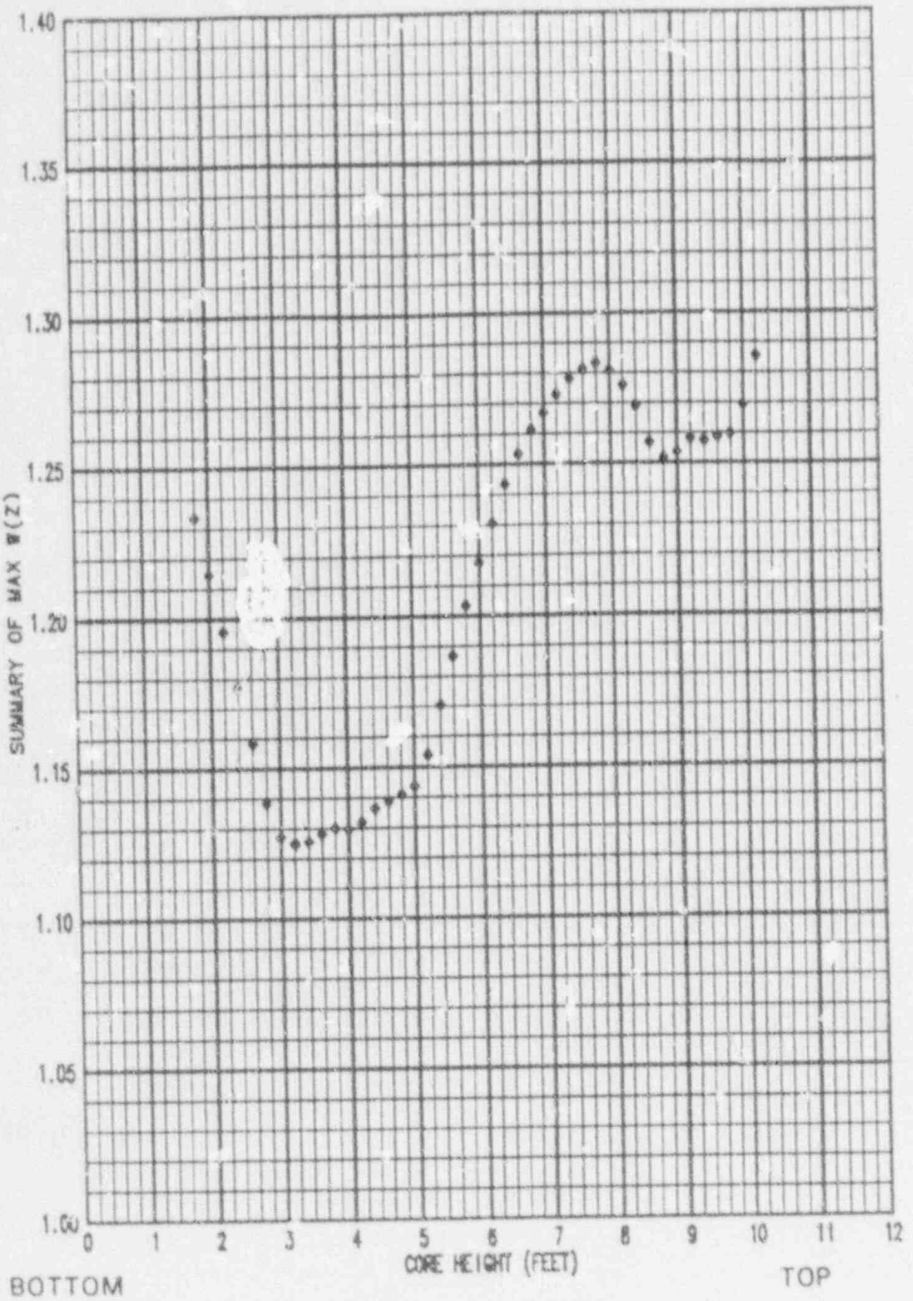


FIGURE 3

K(Z) - Normalized Fq(Z) as a Function of Core Height

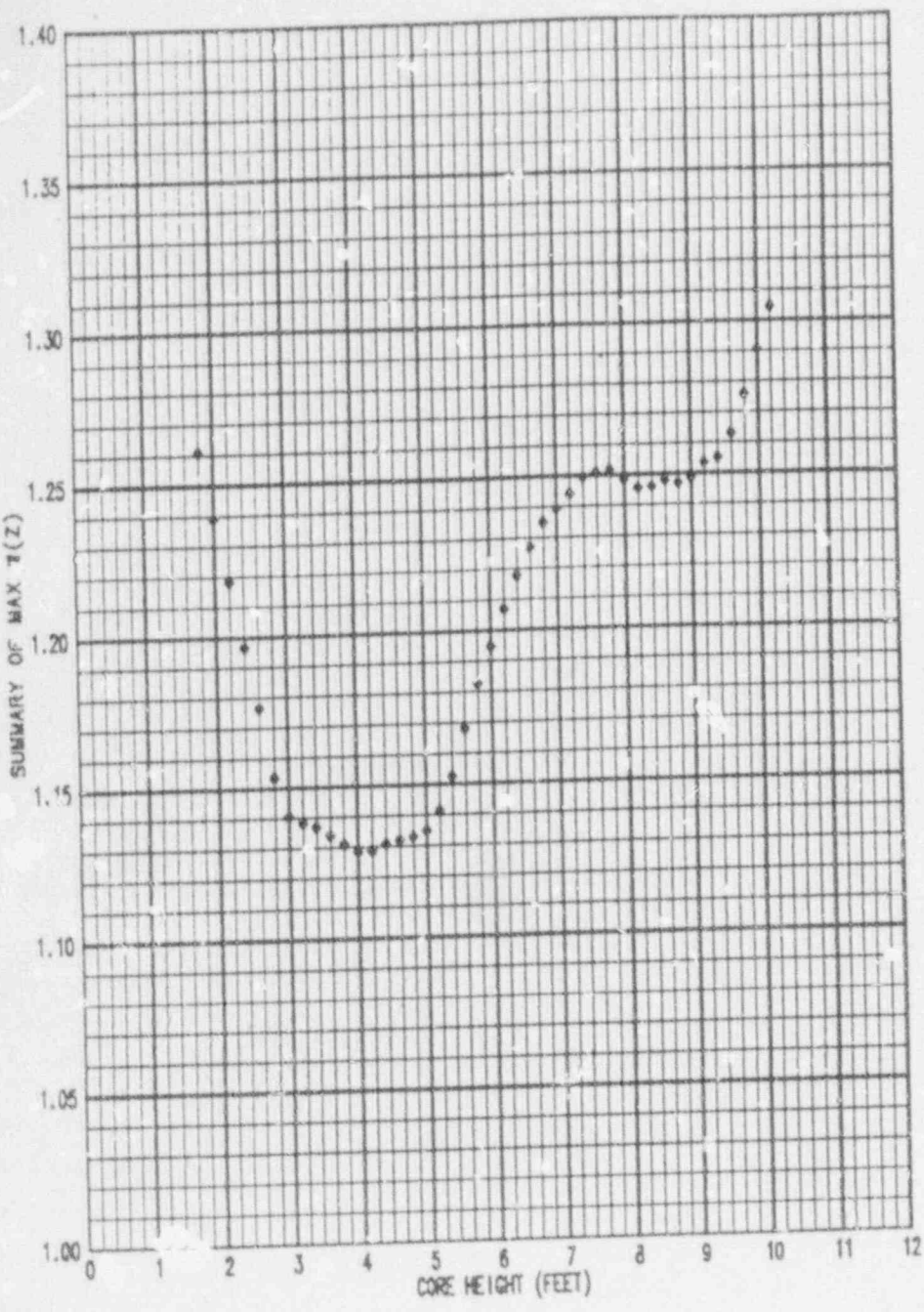


Height (Feet)	MAX W(Z)
0.000	1.0000
0.200	1.0000
0.400	1.0000
0.600	1.0000
0.800	1.0000
1.000	1.0000
1.200	1.0000
1.400	1.0000
1.600	1.0000
1.800	1.2337
2.000	1.2148
2.200	1.1958
2.400	1.1771
2.600	1.1584
2.800	1.1385
3.000	1.1272
3.200	1.1250
3.400	1.1257
3.600	1.1282
3.800	1.1301
4.000	1.1297
4.200	1.1320
4.400	1.1365
4.600	1.1388
4.800	1.1411
5.000	1.1436
5.200	1.1540
5.400	1.1704
5.600	1.1868
5.800	1.2034
6.000	1.2177
6.200	1.2306
6.400	1.2434
6.600	1.2533
6.800	1.2614
7.000	1.2669
7.200	1.2729
7.400	1.2782
7.600	1.2814
7.800	1.2833
8.000	1.2809
8.200	1.2759
8.400	1.2688
8.600	1.2570
8.800	1.2518
9.000	1.2536
9.200	1.2581
9.400	1.2574
9.600	1.2587
9.800	1.2597
10.000	1.2693
10.200	1.2855
10.400	1.0000
10.600	1.0000
10.800	1.0000
11.000	1.0000
11.200	1.0000
11.400	1.0000
11.600	1.0000
11.800	1.0000
12.000	1.0000

FIGURE 4

SEQUOYAH UNIT 2 CYCLE 6
RAOC SUMMARY OF MAX W(Z) AT 150 MWD/MTU

* TOP AND BOTTOM 15% EXCLUDED AS PER TECH SPEC 4.2.2.G

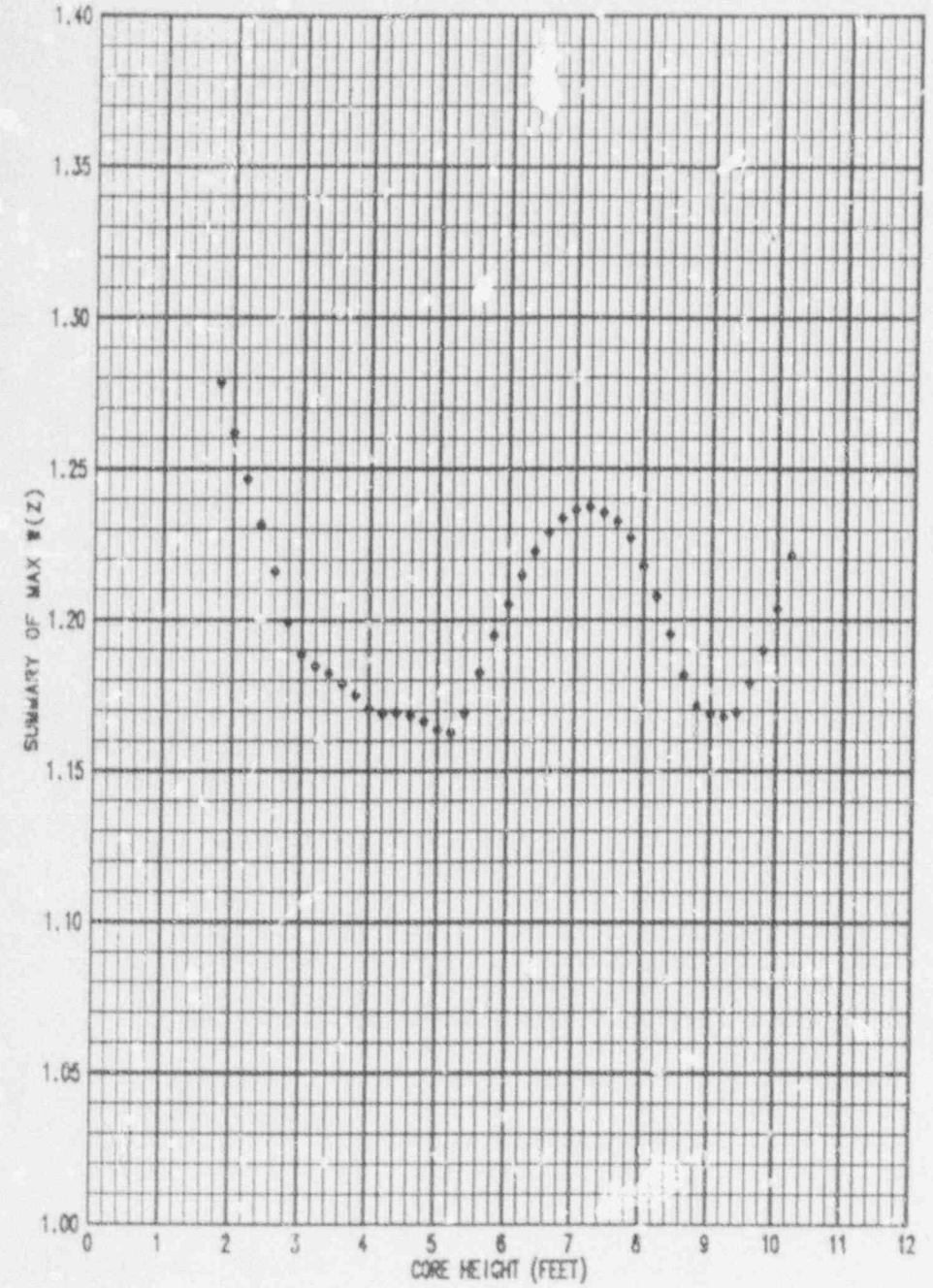


Height (Feet)	MAX W(Z)
0.000	1.0000
0.200	1.0000
0.400	1.0000
0.600	1.0000
0.800	1.0000
1.000	1.0000
1.200	1.0000
1.400	1.0000
1.600	1.0000
1.800	1.2609
2.000	1.2391
2.200	1.2184
2.400	1.1967
2.600	1.1765
2.800	1.1535
3.000	1.1405
3.200	1.1384
3.400	1.1369
3.600	1.1339
3.800	1.1311
4.000	1.1285
4.200	1.1288
4.400	1.1309
4.600	1.1320
4.800	1.1330
5.000	1.1350
5.200	1.1414
5.400	1.1525
5.600	1.1680
5.800	1.1826
6.000	1.1947
6.200	1.2069
6.400	1.2177
6.600	1.2270
6.800	1.2349
7.000	1.2392
7.200	1.2441
7.400	1.2493
7.600	1.2509
7.800	1.2518
8.000	1.2484
8.200	1.2455
8.400	1.2459
8.600	1.2479
8.800	1.2469
9.000	1.2485
9.200	1.2534
9.400	1.2551
9.600	1.2630
9.800	1.2760
10.000	1.2906
10.200	1.3045
10.400	1.0000
10.600	1.0000
10.800	1.0000
11.000	1.0000
11.200	1.0000
11.400	1.0000
11.600	1.0000
11.800	1.0000
12.000	1.0000

FIGURE 5

SEQUOYAH UNIT 2 CYCLE 6
RAOC SUMMARY OF MAX W(Z) AT 4000 MWD/MTU

* TOP AND BOTTOM 15% EXCLUDED AS PER TECH SPEC 4.2.2.G



Height (Feet)	MAX W(Z)
0.000	1.0000
0.200	1.0000
0.400	1.0000
0.600	1.0000
0.800	1.0000
1.000	1.0000
1.200	1.0000
1.400	1.0000
1.600	1.0000
1.800	1.2785
2.000	1.2619
2.200	1.2465
2.400	1.2314
2.600	1.2160
2.800	1.1993
3.000	1.1885
3.200	1.1847
3.400	1.1824
3.600	1.1786
3.800	1.1750
4.000	1.1706
4.200	1.1689
4.400	1.1692
4.600	1.1683
4.800	1.1664
5.000	1.1636
5.200	1.1626
5.400	1.1691
5.600	1.1824
5.800	1.1948
6.000	1.2052
6.200	1.2147
6.400	1.2225
6.600	1.2290
6.800	1.2338
7.000	1.2363
7.200	1.2373
7.400	1.2354
7.600	1.2325
7.800	1.2271
8.000	1.2178
8.200	1.2078
8.400	1.1952
8.600	1.1817
8.800	1.1716
9.000	1.1687
9.200	1.1678
9.400	1.1693
9.600	1.1789
9.800	1.1890
10.000	1.2038
10.200	1.2213
10.400	1.0000
10.600	1.0000
10.800	1.0000
11.000	1.0000
11.200	1.0000
11.400	1.0000
11.600	1.0000
11.800	1.0000
12.000	1.0000

FIGURE 6

SEQUOYAH UNIT 2 CYCLE 6
RAOC SUMMARY OF MAX W(Z) AT 7000 MWD/MTU

* TOP AND BOTTOM 15% EXCLUDED AS PER TECH SPEC 4.2.2.G

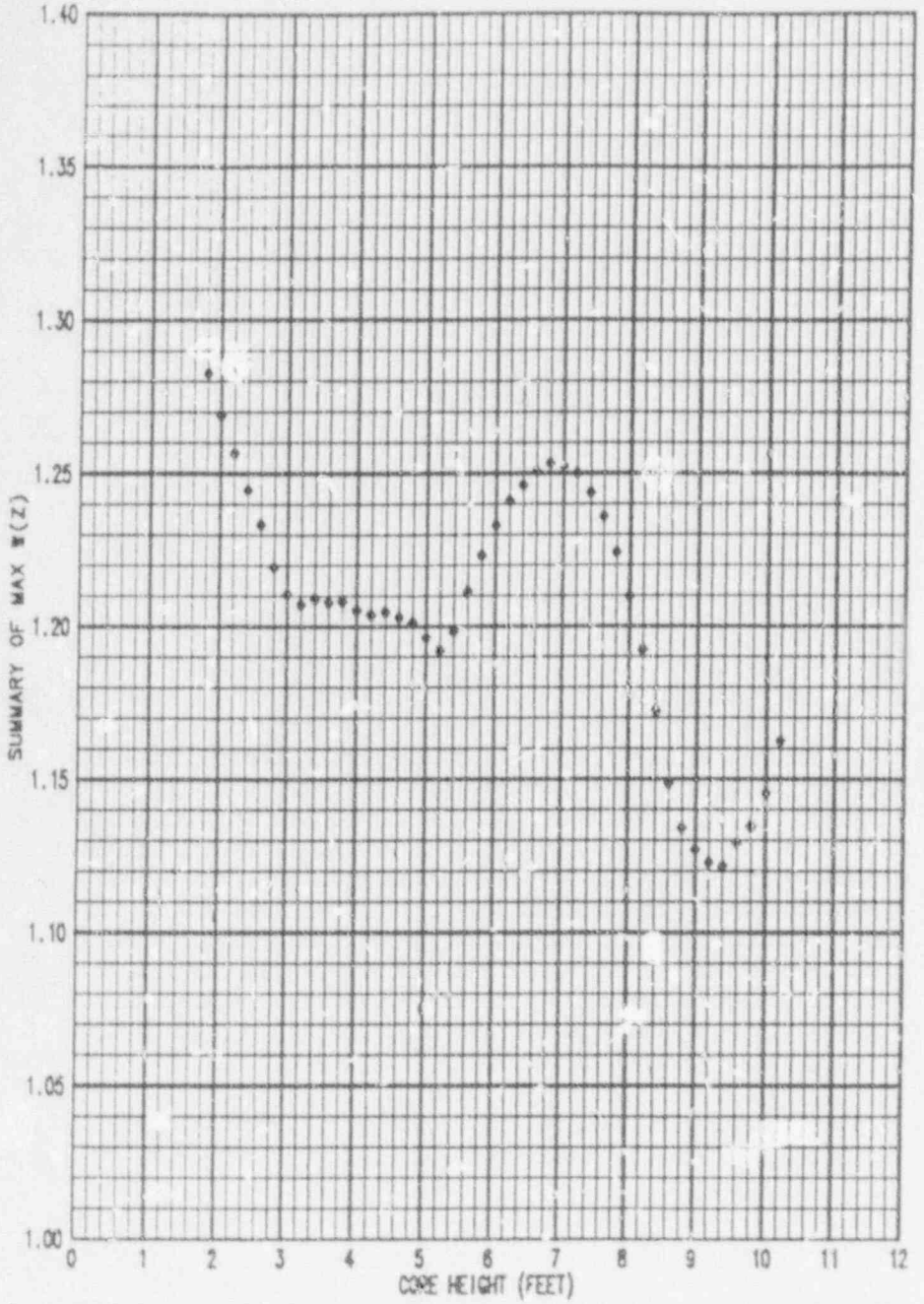
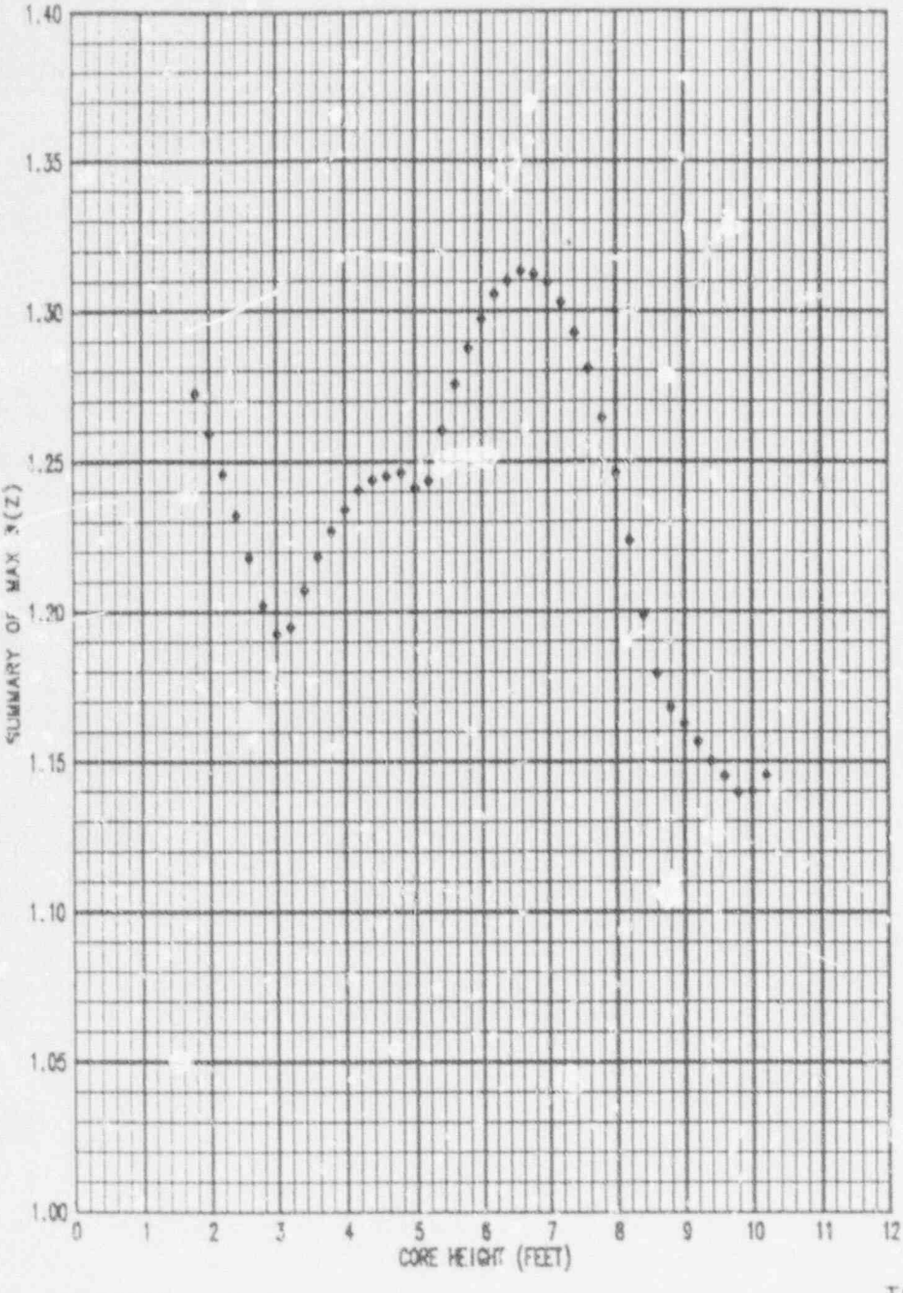


FIGURE 7

SEQUOYAH UNIT 2 CYCLE 6
RAOC SUMMARY OF MAX W(Z) AT 10000 MWD/MTU

Height (Feet)	MAX W(Z)
0.000	1.0000
0.200	1.0000
0.400	1.0000
0.600	1.0000
0.800	1.0000
1.000	1.0000
1.200	1.0000
1.400	1.0000
1.600	1.0000
1.800	1.2827
2.000	1.2690
2.200	1.2568
2.400	1.2447
2.600	1.2333
2.800	1.2194
3.000	1.2105
3.200	1.2073
3.400	1.2090
3.600	1.2078
3.800	1.2082
4.000	1.2053
4.200	1.2038
4.400	1.2047
4.600	1.2029
4.800	1.2013
5.000	1.1963
5.200	1.1921
5.400	1.1983
5.600	1.2114
5.800	1.2232
6.000	1.2330
6.200	1.2411
6.400	1.2462
6.600	1.2507
6.800	1.2532
7.000	1.2523
7.200	1.2501
7.400	1.2437
7.600	1.2359
7.800	1.2242
8.000	1.2098
8.200	1.1923
8.400	1.1721
8.600	1.1488
8.800	1.1341
9.000	1.1271
9.200	1.1229
9.400	1.1217
9.600	1.1291
9.800	1.1345
10.000	1.1454
10.200	1.1824
10.400	1.0000
10.600	1.0000
10.800	1.0000
11.000	1.0000
11.200	1.0000
11.400	1.0000
11.600	1.0000
11.800	1.0000
12.000	1.0000

* TOP AND BOTTOM 15% EXCLUDED AS PER TECH SPEC 4.2.2.G



Height (Feet)	MAX W(Z)
0.000	1.0000
0.200	1.0000
0.400	1.0000
0.600	1.0000
0.800	1.0000
1.000	1.0000
1.200	1.0000
1.400	1.0000
1.600	1.0000
1.800	1.2728
2.000	1.2593
2.200	1.2459
2.400	1.2322
2.600	1.2180
2.800	1.2022
3.000	1.1927
3.200	1.1949
3.400	1.2072
3.600	1.2183
3.800	1.2269
4.000	1.2340
4.200	1.2405
4.400	1.2438
4.600	1.2451
4.800	1.2463
5.000	1.2414
5.200	1.2437
5.400	1.2604
5.600	1.2759
5.800	1.2877
6.000	1.2973
6.200	1.3056
6.400	1.3101
6.600	1.3132
6.800	1.3122
7.000	1.3098
7.200	1.3027
7.400	1.2927
7.600	1.2807
7.800	1.2643
8.000	1.2462
8.200	1.2234
8.400	1.1985
8.600	1.1792
8.800	1.1679
9.000	1.1625
9.200	1.1566
9.400	1.1501
9.600	1.1451
9.800	1.1397
10.000	1.1402
10.200	1.1454
10.400	1.0000
10.600	1.0000
10.800	1.0000
11.000	1.0000
11.200	1.0000
11.400	1.0000
11.600	1.0000
11.800	1.0000
12.000	1.0000

FIGURE 8

SEQUOYAH UNIT 2 CYCLE 6
RAOC SUMMARY OF MAX W(Z) AT 14000 MWD/MTU

* TOP AND BOTTOM 15% EXCLUDED AS PER TECH SPEC 4.2.2.G