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Ref: Tech. Spec. 5.6.5

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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NO. 50-446
SUBMITTAL OF UNIT 2, CYCLE 10 CORE OPERATING LIMITS REPORT

Dear Sir or Madam:

Enclosed is Revision 0 of the Core Operating Limits Reports for CPSES Unit 2, Cycle 10. This report is prepared and submitted pursuant to Technical Specification 5.6.5.

This communication contains no new licensing basis commitments regarding CPSES Units 1 and 2.

A001

Should you have any questions, please contact Mr. J. D. Seawright at (254) 897-0140.

Sincerely,

TXU Generation Company LP

By: TXU Generation Management Company LLC,
Its General Partner

Mike Blevins

By: Fred W. Madden
Director, Oversight and Regulatory Affairs

RAS
Enclosure

c - B. S. Mallett, Region IV
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Resident Inspectors, CPSES

ERX-06-002, Rev. 0

CPSES UNIT 2 CYCLE 10

CORE OPERATING LIMITS REPORT

October 2006

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1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for CPSES UNIT 2 CYCLE 10 has been prepared in accordance with the requirements of Technical Specification 5.6.5.

The Technical Specifications affected by this report are listed below:

SL 2.1	SAFETY LIMITS
LCO 3.1.1	SHUTDOWN MARGIN
LCO 3.1.3	MODERATOR TEMPERATURE COEFFICIENT
LCO 3.1.4	ROD GROUP ALIGNMENT LIMITS
LCO 3.1.5	SHUTDOWN BANK INSERTION LIMITS
LCO 3.1.6	CONTROL BANK INSERTION LIMITS
LCO 3.1.8	PHYSICS TESTS EXCEPTIONS - MODE 2
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LCO 3.2.3	AXIAL FLUX DIFFERENCE
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LCO 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 the NRC-approved methodologies specified in Technical Specification 5.6.5b, Item 3 and Items 6 through 16. These limits have been determined such that all applicable limits of the safety analysis are met.

2.1 SAFETY LIMITS (SL 2.1)

2.1.1 In MODES 1 and 2, the combination of thermal power, reactor coolant system highest loop average temperature, and pressurizer pressure shall not exceed the safety limits specified in Figure 1.

2.2 SHUTDOWN MARGIN (SDM) (LCO 3.1.1)

2.2.1 The SDM shall be greater than or equal to 1.3% $\Delta k/k$ in MODE 2 with K_{eff} < 1.0, and in MODES 3, 4, and 5.

2.3 MODERATOR TEMPERATURE COEFFICIENT (MTC) (LCO 3.1.3)

2.3.1 The MTC upper and lower limits, respectively, are:

The BOL/ARO/HZP-MTC shall be less positive than +5 pcm/°F.
The EOL/ARO/RTP-MTC shall be less negative than -40 pcm/°F.

2.3.2 SR 3.1.3.2

The MTC surveillance limit is:

The 300 ppm/ARO/RTP-MTC shall be less negative than or equal to -31 pcm/°F.

The 60 ppm/ARO/RTP-MTC shall be less negative than or equal to -38 pcm/°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 ROD GROUP ALIGNMENT LIMITS (LCO 3.1.4)

2.4.1 The SDM shall be greater than or equal to 1.3% $\Delta k/k$ in MODES 1 and 2.

2.5 SHUTDOWN BANK INSERTION LIMITS (LCO 3.1.5)

2.5.1 The shutdown rods shall be fully withdrawn. Fully withdrawn shall be the condition where shutdown rods are at a position within the interval of 218 and 231 steps withdrawn, inclusive.

2.6 CONTROL BANK INSERTION LIMITS (LCO 3.1.6)

2.6.1 The control banks shall be limited in physical insertion as shown in Figure 2.

2.6.2 The control banks shall always be withdrawn and inserted in the prescribed sequence. For withdrawal, the sequence is control bank A, control bank B, control bank C, and control bank D. The insertion sequence is the reverse of the withdrawal sequence.

2.6.3 A 115 step Tip-to-Tip relationship between each sequential control bank shall be maintained.

2.7 PHYSICS TESTS EXCEPTIONS - MODE 2 (LCO 3.1.8)

2.7.1 The SDM shall be greater than or equal to 1.3% $\Delta k/k$ in MODE 2 during PHYSICS TESTS.

2.8 HEAT FLUX HOT CHANNEL FACTOR ($F_Q(Z)$) (LCO 3.2.1)

2.8.1 $F_Q(Z) \leq \frac{F_Q^{RTP}}{P} [K(Z)]$ for $P > 0.5$

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

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

2.8.2 $F_Q^{RTP} = 2.42$

2.8.3 K(Z) is provided in Figure 3.

2.8.4 Maximum elevation dependent W(Z) values are given in Figure 4. Figures 5, 6, and 7 give burnup dependent values for W(Z). Figures 5, 6, and 7 can be used in place of Figure 4 to interpolate or extrapolate (via a three point fit) the W(Z) at a particular burnup.

2.8.5 SR 3.2.1.2

If the two most recent $F_Q(Z)$ evaluations show an increase in the expression

$$\text{maximum over Z} \quad [\ F_Q^C(Z)\ /\ K(Z)\ ],$$

$F_Q^W(Z)$ shall be increased by a constant factor of 2% per Surveillance Requirement 3.2.1.2.a. This requirement is for all cycle burnups.

2.9 <u>NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR ($F^N_{\Delta H}$)</u> (LCO 3.2.2)

2.9.1 $F^N_{\Delta H} \leq F^{RTP}_{\Delta H}\ [1 + PF_{\Delta H}\ (1-P)]$

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

2.9.2 $F^{RTP}_{\Delta H} = 1.55$

2.9.3 $PF_{\Delta H} = 0.3$

2.10 AXIAL FLUX DIFFERENCE (AFD) (LCO 3.2.3)

2.10.1 The AFD target band is +5%, -12% at 100% RTP linearly expanding to +20%, -17% at 50% RTP. Below 50% RTP, the AFD target band remains constant at +20%, -17%.

2.10.2 The AFD Acceptable Operation Limits are provided in Figure 8.

2.11 REACTOR TRIP SYSTEM (RTS) INSTRUMENTATION (LCO 3.3.1)

2.11.1 The numerical values pertaining to the Overtemperature N-16 reactor trip setpoint are listed below;

$K_1 = 1.13$

$K_2 = 0.0145\ /^{\circ}F$

$K_3 = 0.00075\ /psig$

$T_c^{\circ} = 560.5\ ^{\circ}F$

$P^1 \geq 2235\ psig$

$T_1 \geq 10\ sec$

$T_2 \leq 3\ sec$

$f_1(\Delta q) = 0.00 \cdot \{(q_t - q_b) + 65\%\}$ when $(q_t - q_b) \leq -65\%$ RTP

$= 0\%$ when -65% RTP $< (q_t - q_b) < +8.5\%$ RTP

$= 2.27 \cdot \{(q_t - q_b) - 8.5\%\}$ when $(q_t - q_b) \geq +8.5\%$ RTP

2.12 RCS PRESSURE, TEMPERATURE, AND FLOW DEPARTURE FROM NUCLEATE BOILING (DNB) LIMITS (LCO 3.4.1)

2.12.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the surveillance limits specified below:

2.12.2 SR 3.4.1.1

Pressurizer pressure ≥ 2220 psig (4 channels)

≥ 2222 psig (3 channels)

The pressurizer pressure limits correspond to the analytical limit of 2205 psig used in the safety analysis with allowance for measurement uncertainty. These uncertainties are based on the use of control board indications and the number of available channels.

2.12.3 SR 3.4.1.2

RCS average temperature ≤ 592 °F (4 channels)

≤ 592 °F (3 channels)

The RCS average temperature limits correspond to the analytical limit of 595.7 °F used in the safety analysis with allowance for measurement uncertainty. These uncertainties are based on the use of control board indications and the number of available channels.

2.12.4 SR 3.4.1.3

The RCS total flow rate shall be ≥ 408,000 gpm.

2.12.5 SR 3.4.1.4

The RCS total flow rate based on precision heat balance shall be ≥ 408,000 gpm.

The required RCS flow, based on an elbow tap differential pressure instrument measurement prior to MODE 1 after the refueling outage, shall be greater than 317,000 gpm.

2.13 BORON CONCENTRATION (LCO 3.9.1)

2.13.1 The required refueling boron concentration is ≥ 2063 ppm.

3.0 REFERENCES

Technical Specification 5.6.5.

COLR for CPSES Unit 2 Cycle 10

FIGURE 1

REACTOR CORE SAFETY LIMITS

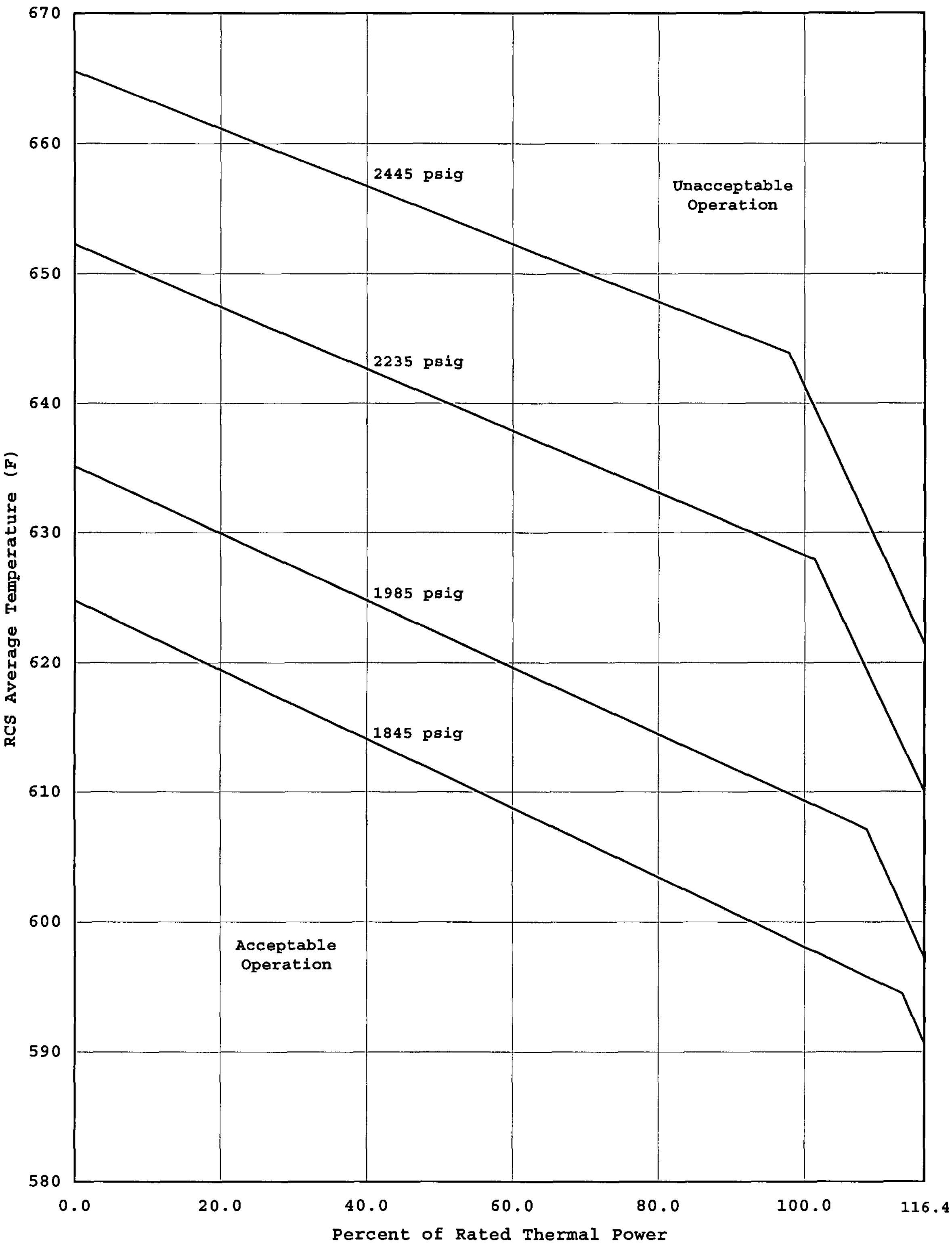
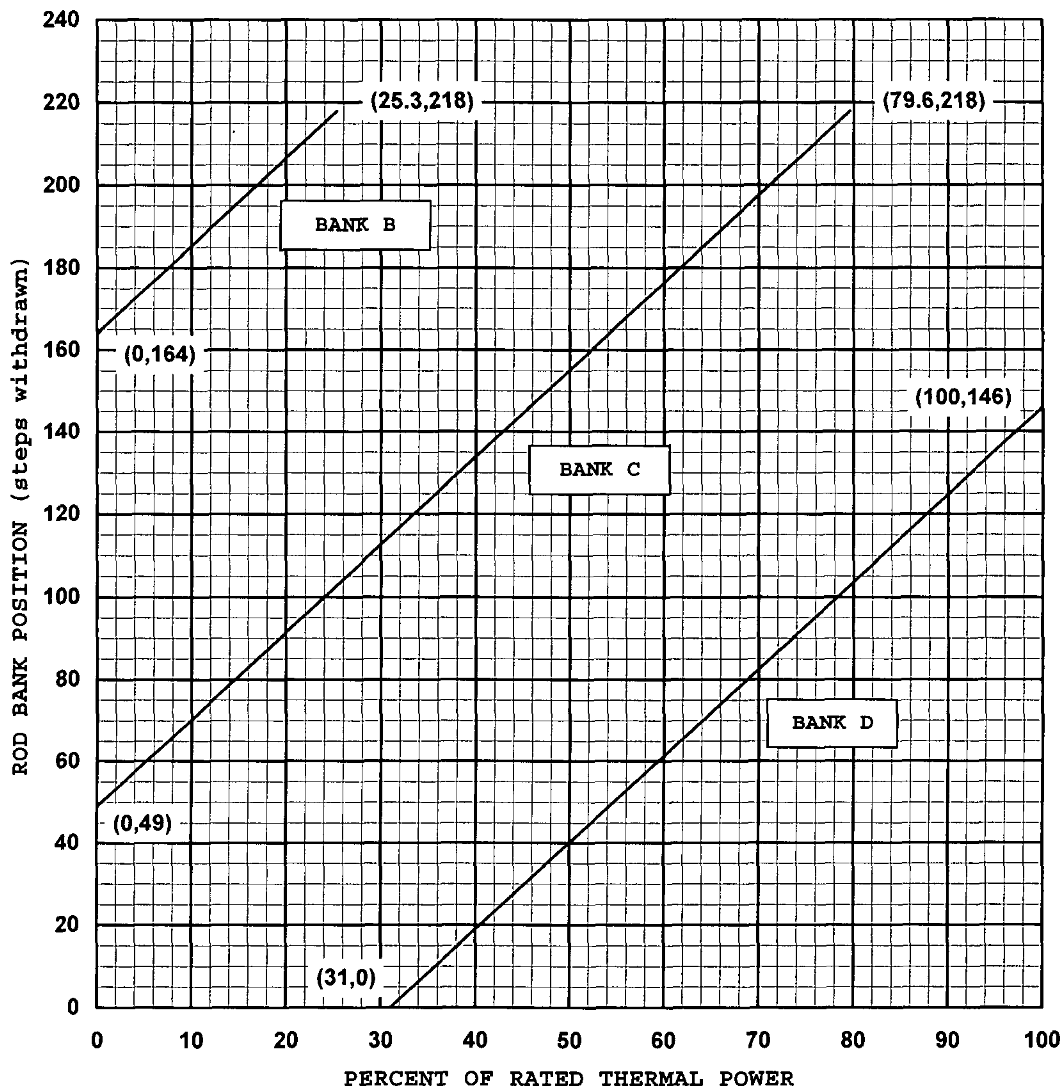


FIGURE 2

ROD BANK INSERTION LIMITS VERSUS THERMAL POWER



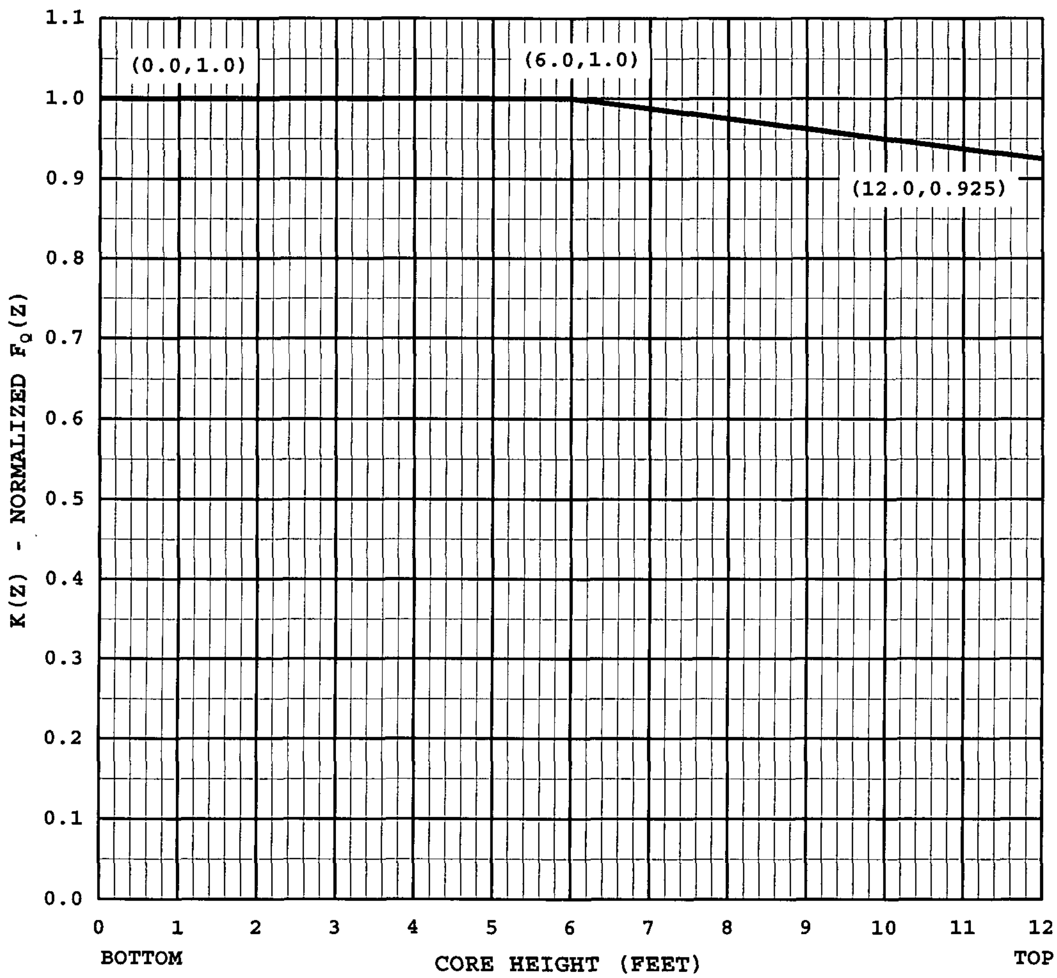
NOTES:

1. Fully withdrawn shall be the condition where control rods are at a position within the interval of 218 and 231 steps withdrawn, inclusive.

2. Control Bank A shall be fully withdrawn.

FIGURE 3

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

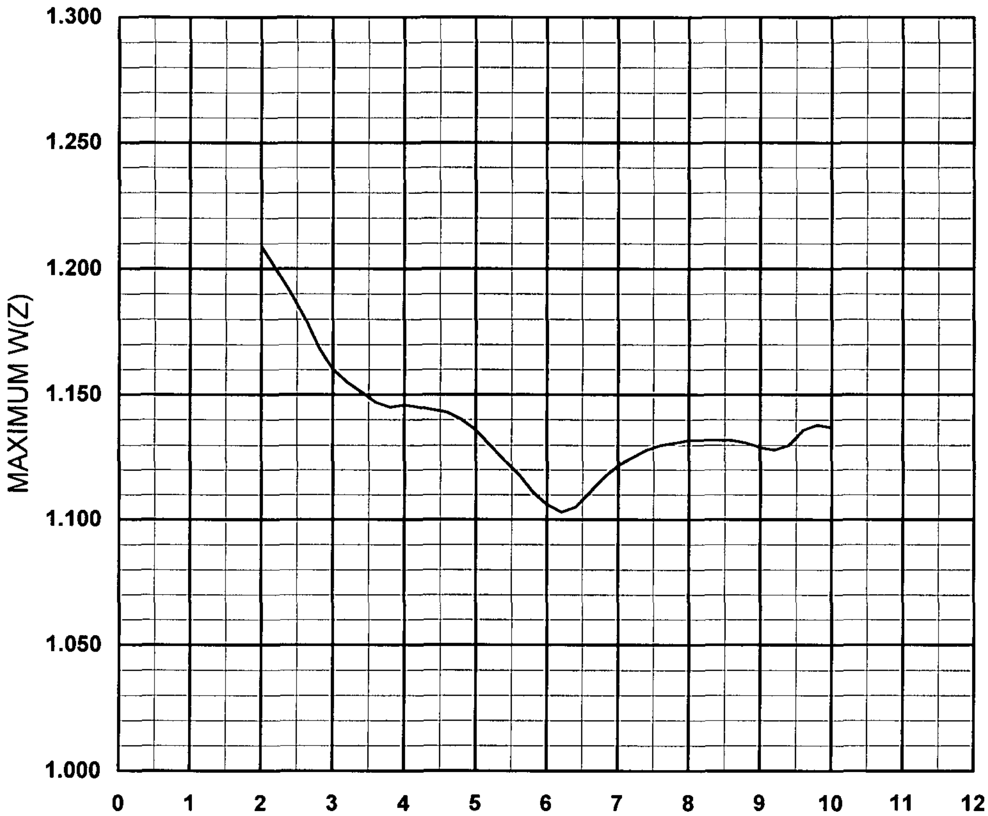


Axial Node	K(Z)	Axial Node	K(Z)	Axial Node	K(Z)	Axial Node	K(Z)
61	0.9250	53	0.9450	45	0.9650	37	0.9850
60	0.9275	52	0.9475	44	0.9675	36	0.9875
59	0.9300	51	0.9500	43	0.9700	35	0.9900
58	0.9325	50	0.9525	42	0.9725	34	0.9925
57	0.9350	49	0.9550	41	0.9750	33	0.9950
56	0.9375	48	0.9575	40	0.9775	32	0.9975
55	0.9400	47	0.9600	39	0.9800	1 - 31	1.0000
54	0.9425	46	0.9625	38	0.9825		

Core Height (ft) = (Node - 1) * 0.2

FIGURE 4

W(Z) AS A FUNCTION OF CORE HEIGHT
(MAXIMUM)

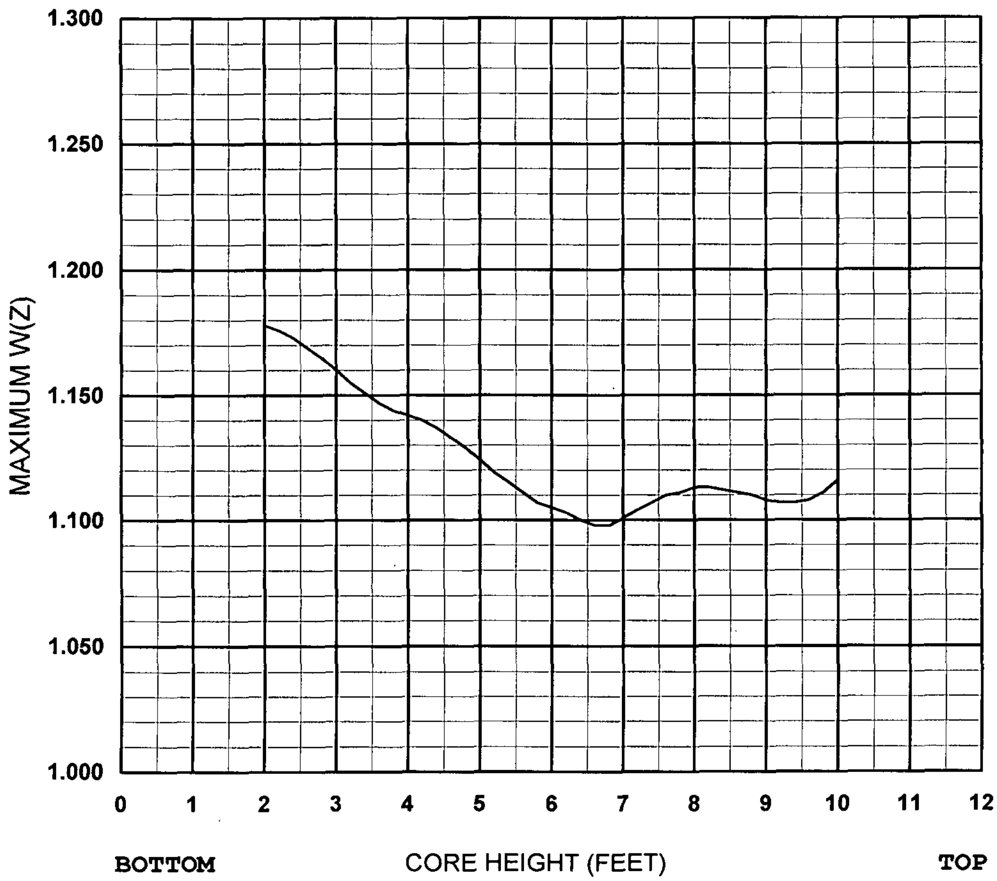


Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.132	30	1.111	19	1.147
51	1.137	40	1.131	29	1.118	18	1.151
50	1.138	39	1.130	28	1.124	17	1.155
49	1.136	38	1.128	27	1.130	16	1.160
48	1.130	37	1.125	26	1.136	15	1.169
47	1.128	36	1.122	25	1.140	14	1.181
46	1.129	35	1.117	24	1.143	13	1.191
45	1.131	34	1.111	23	1.144	12	1.200
44	1.132	33	1.105	22	1.145	11	1.209
43	1.132	32	1.103	21	1.146	1 - 10	---
42	1.132	31	1.106	20	1.145		

Core Height (ft) = (Node - 1) * 0.2

FIGURE 5

W(Z) AS A FUNCTION OF CORE HEIGHT
(150 MWD/MTU)

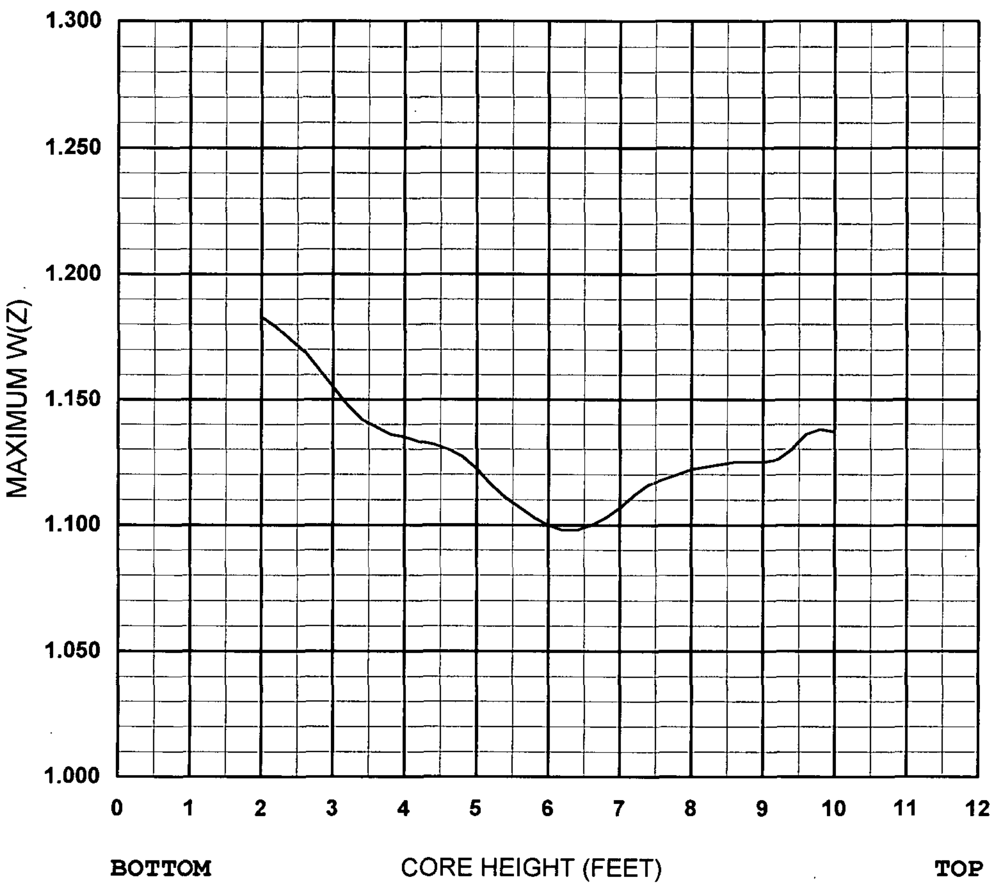


Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.113	30	1.107	19	1.147
51	1.116	40	1.111	29	1.111	18	1.151
50	1.111	39	1.110	28	1.115	17	1.155
49	1.108	38	1.107	27	1.119	16	1.160
48	1.107	37	1.104	26	1.124	15	1.165
47	1.107	36	1.101	25	1.129	14	1.169
46	1.108	35	1.098	24	1.133	13	1.173
45	1.110	34	1.098	23	1.137	12	1.176
44	1.111	33	1.100	22	1.140	11	1.178
43	1.112	32	1.103	21	1.142	1 - 10	---
42	1.113	31	1.105	20	1.144		

Core Height (ft) = (Node - 1) * 0.2

FIGURE 6

W(Z) AS A FUNCTION OF CORE HEIGHT
(10,000 MWD/MTU)

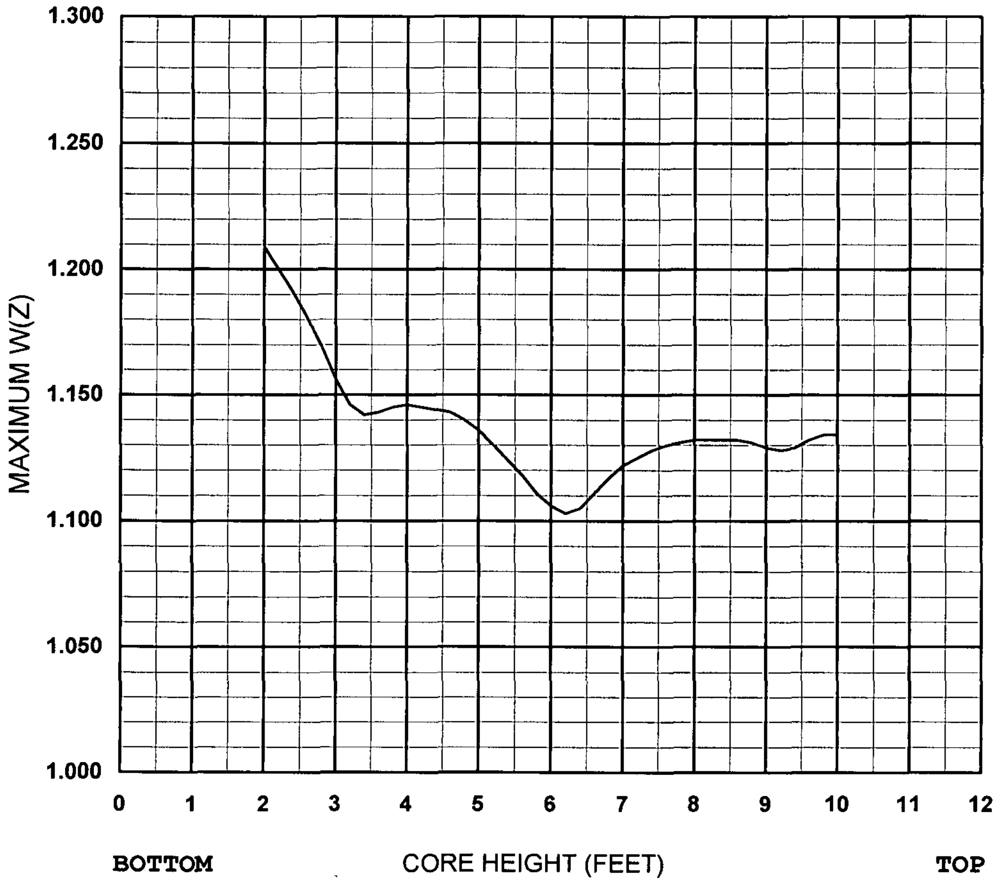


Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.122	30	1.103	19	1.139
51	1.137	40	1.120	29	1.107	18	1.142
50	1.138	39	1.118	28	1.111	17	1.148
49	1.136	38	1.116	27	1.116	16	1.155
48	1.130	37	1.112	26	1.122	15	1.162
47	1.126	36	1.107	25	1.127	14	1.169
46	1.125	35	1.103	24	1.130	13	1.174
45	1.125	34	1.100	23	1.132	12	1.179
44	1.125	33	1.098	22	1.133	11	1.183
43	1.124	32	1.098	21	1.135	1 - 10	---
42	1.123	31	1.100	20	1.136		

Core Height (ft) = (Node - 1) * 0.2

FIGURE 7

W(Z) AS A FUNCTION OF CORE HEIGHT
(20,000 MWD/MTU)



Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.132	30	1.111	19	1.143
51	1.134	40	1.131	29	1.118	18	1.142
50	1.134	39	1.130	28	1.124	17	1.146
49	1.132	38	1.128	27	1.130	16	1.156
48	1.129	37	1.125	26	1.136	15	1.169
47	1.128	36	1.122	25	1.140	14	1.181
46	1.129	35	1.117	24	1.143	13	1.191
45	1.131	34	1.111	23	1.144	12	1.200
44	1.132	33	1.105	22	1.145	11	1.209
43	1.132	32	1.103	21	1.146	1 - 10	---
42	1.132	31	1.106	20	1.145		

Core Height (ft) = (Node - 1) * 0.2

FIGURE 8

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER