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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. 50-445
SUBMITTAL OF UNIT 1, CYCLE 12
CORE OPERATING LIMITS REPORT

Gentlemen:

Enclosed is Revision 0 of the Core Operating Limits Reports for CPSES Unit 1, Cycle 12. 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: [signature]
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JDS/js
Enclosure

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ERX-05-004, Rev. 0

CPSES UNIT 1 CYCLE 12

CORE OPERATING LIMITS REPORT

October 2005

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1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for CPSES UNIT 1 CYCLE 12 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
LCO 3.2.1	HEAT FLUX HOT CHANNEL FACTOR
LCO 3.2.2	NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR
LCO 3.2.3	AXIAL FLUX DIFFERENCE
LCO 3.3.1	REACTOR TRIP SYSTEM INSTRUMENTATION
LCO 3.4.1	RCS PRESSURE, TEMPERATURE, AND FLOW DEPARTURE FROM NUCLEATE BOILING LIMITS
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, Items 3, 6 through 16 and 18. 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% Δk/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

maximum over Z $[F_Q^C(Z) / K(Z)]$,

the burnup dependent values in Table 1 shall be used instead of a constant 2% to increase $F_Q^W(Z)$ per Surveillance Requirement 3.2.1.2.a. A constant factor of 2% shall be used for all cycle burnups that are outside the range of Table 1.

2.9 NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR ($F^N_{\Delta H}$) (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;

$K_1 = 1.138$

$K_2 = 0.0139\ /°F$

$K_3 = 0.00071\ /psig$

$T_c^\circ = 559.7\ °F$

$P^1 \geq 2235\ psig$

$T_1 \geq 10\ sec$

$T_2 \leq 3\ sec$

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

$= 0\%$ when -65% RTP $< (q_t - q_b) < +7.4\%$ RTP

$= 2.335 \cdot \{(q_t - q_b) - 7.4\%\}$ when $(q_t - q_b) \geq +7.4\%$ 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 based on precision heat balance shall be ≥ 397,200 gpm

2.12.5 SR 3.4.1.4

The RCS total flow rate based on precision heat balance shall be ≥ 397,200 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 <u>BORON CONCENTRATION</u> (LCO 3.9.1)

2.13.1 The required refueling boron concentration is 1832 ppm.

3.0 <u>REFERENCES</u>

Technical Specification 5.6.5.

Table 1

$F_Q(Z)$ MARGIN DECREASES IN EXCESS OF 2 % PER 31 EFPD

Cycle Burnup (MWD/MTU)	Maximum Decrease In $F_Q(Z)$ Margin (Percent)
9320	2.00
9530	2.03
9730	2.15
9940	2.20
10150	2.20
10360	2.18
10570	2.11
10780	2.00

Note: All Cycle burnups outside the range of the table shall use a constant 2% decrease in $F_Q(Z)$ margin for compliance with the 3.2.1.2.a Surveillance Requirements. Linear interpolation is acceptable to determine the $F_Q(Z)$ margin decrease for cycle burnups which fall between the specified burnups.

COLR for CPSES Unit 1 Cycle 12
FIGURE 1
REACTOR CORE SAFETY LIMITS

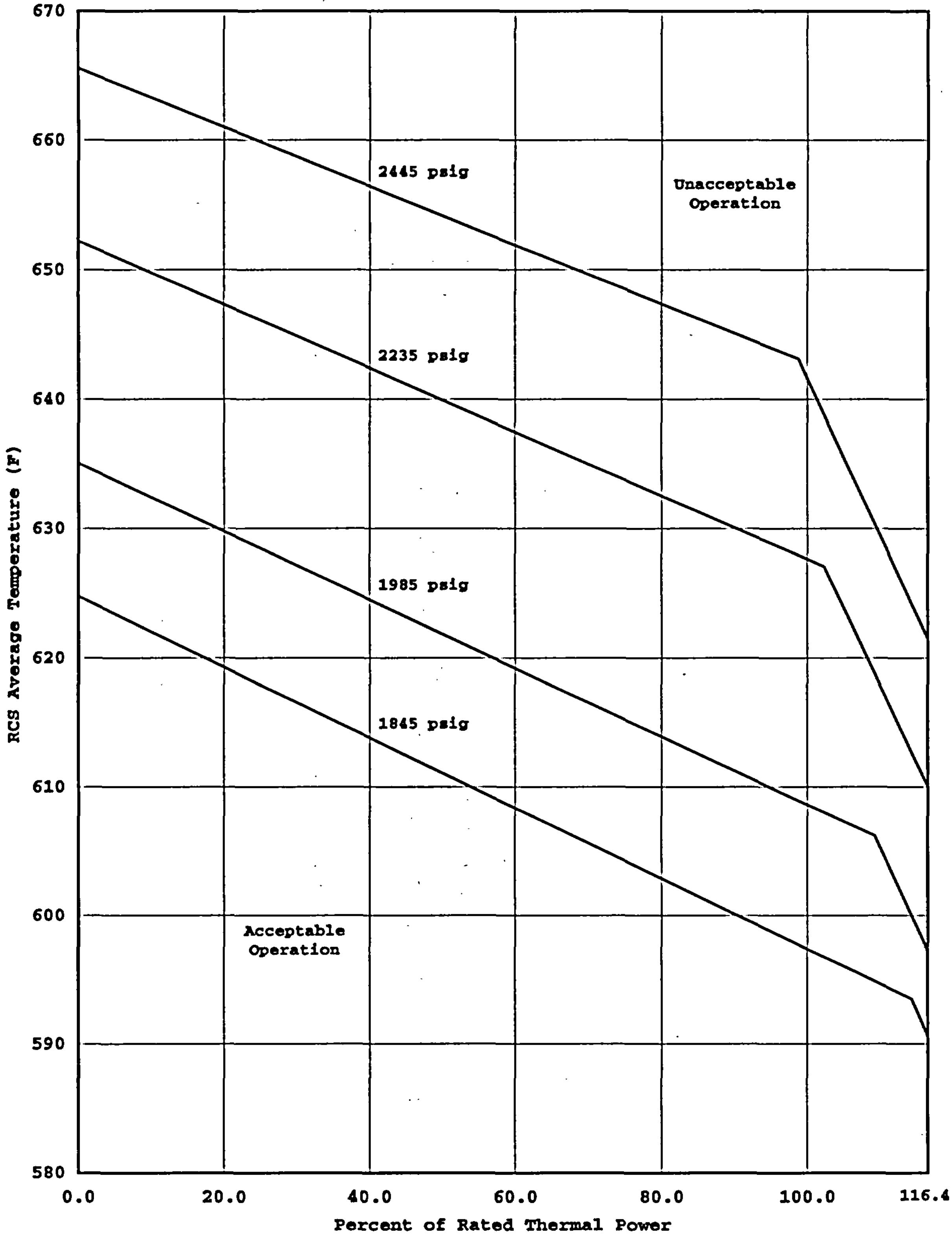
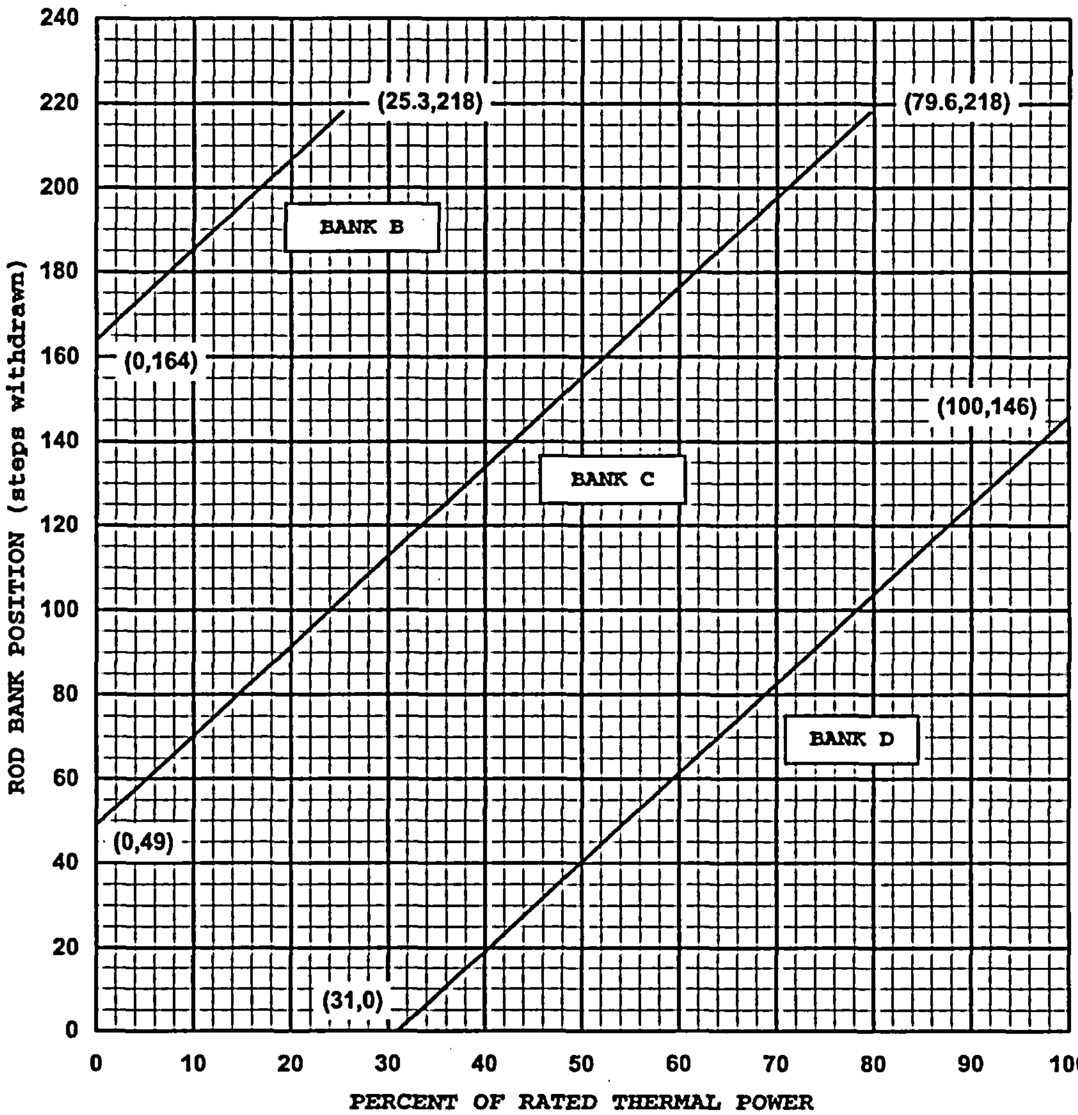


FIGURE 2

ROD BANK INSERTION LIMITS VERSUS THERMAL POWER



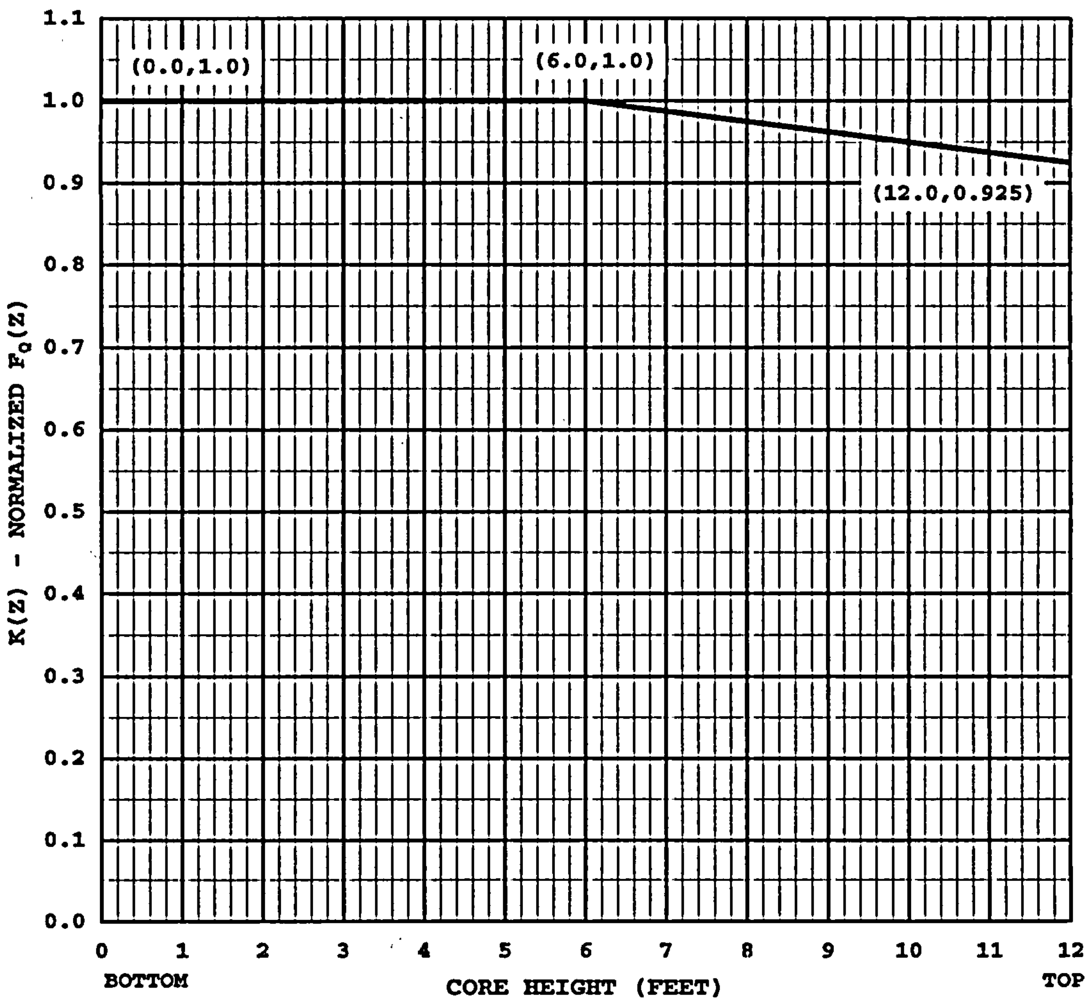
NOTES:

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

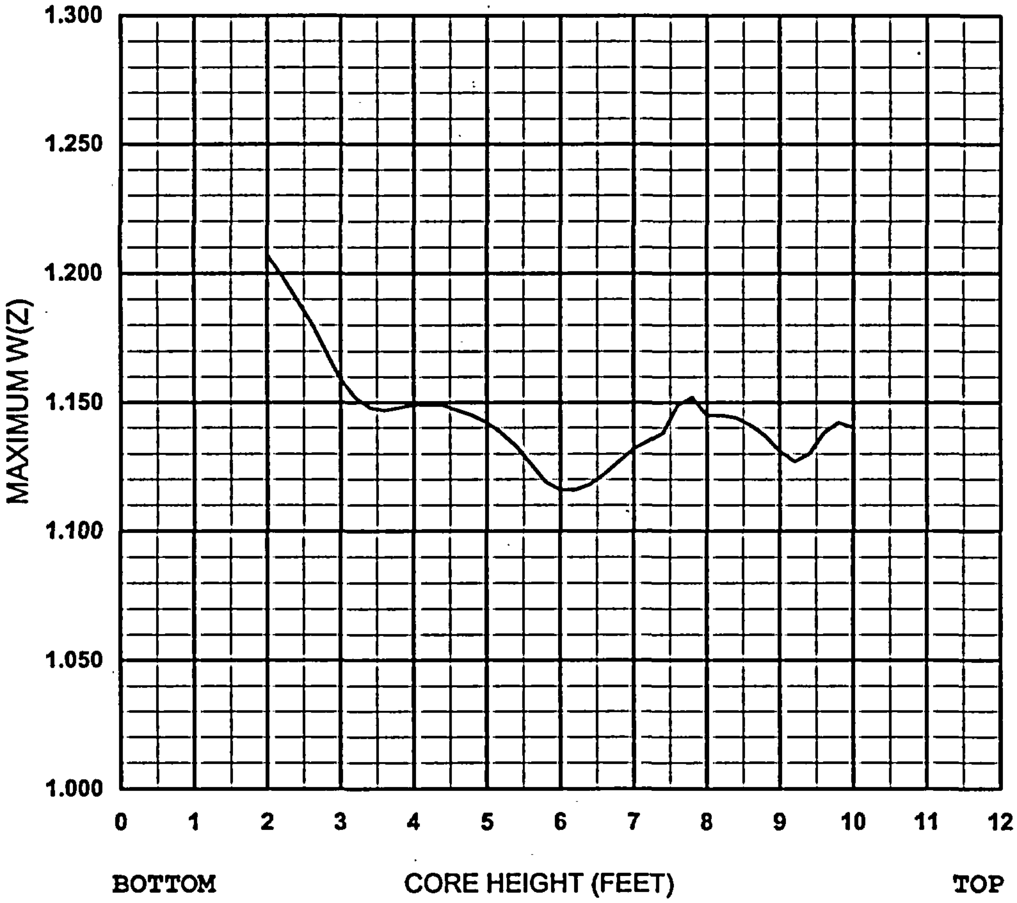


Axial Node	K(Z)	Axial Node	K(Z)	Axial Node	K(Z)	Axial Node	K(Z)
61	0.9250	53	0.9450	45	0.9650	37	0.9850
60	0.9275	52	0.9475	44	0.9675	36	0.9875
59	0.9300	51	0.9500	43	0.9700	35	0.9900
58	0.9325	50	0.9525	42	0.9725	34	0.9925
57	0.9350	49	0.9550	41	0.9750	33	0.9950
56	0.9375	48	0.9575	40	0.9775	32	0.9975
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)

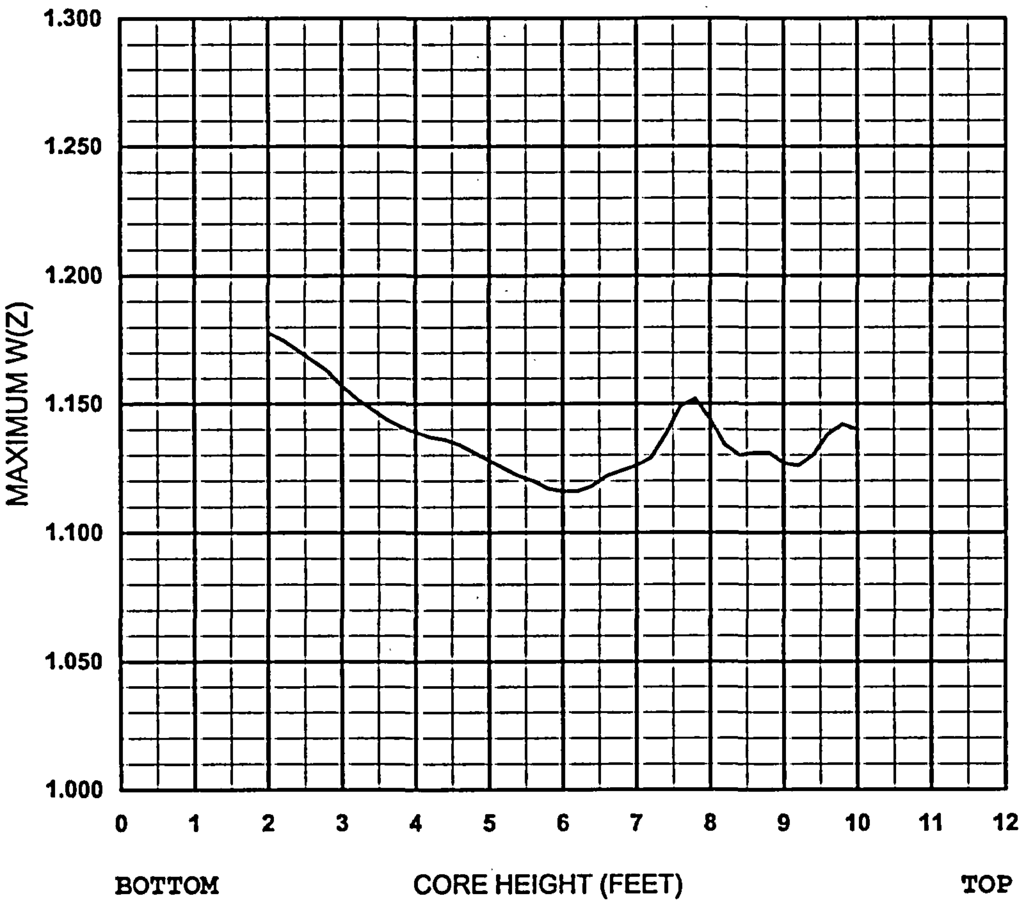


Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.145	30	1.119	19	1.147
51	1.140	40	1.152	29	1.126	18	1.148
50	1.142	39	1.149	28	1.133	17	1.152
49	1.138	38	1.138	27	1.138	16	1.159
48	1.130	37	1.135	26	1.142	15	1.170
47	1.127	36	1.132	25	1.145	14	1.181
46	1.131	35	1.127	24	1.147	13	1.190
45	1.137	34	1.122	23	1.149	12	1.199
44	1.141	33	1.118	22	1.149	11	1.207
43	1.144	32	1.116	21	1.149	1 - 10	---
42	1.145	31	1.116	20	1.148		

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

FIGURE 5

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

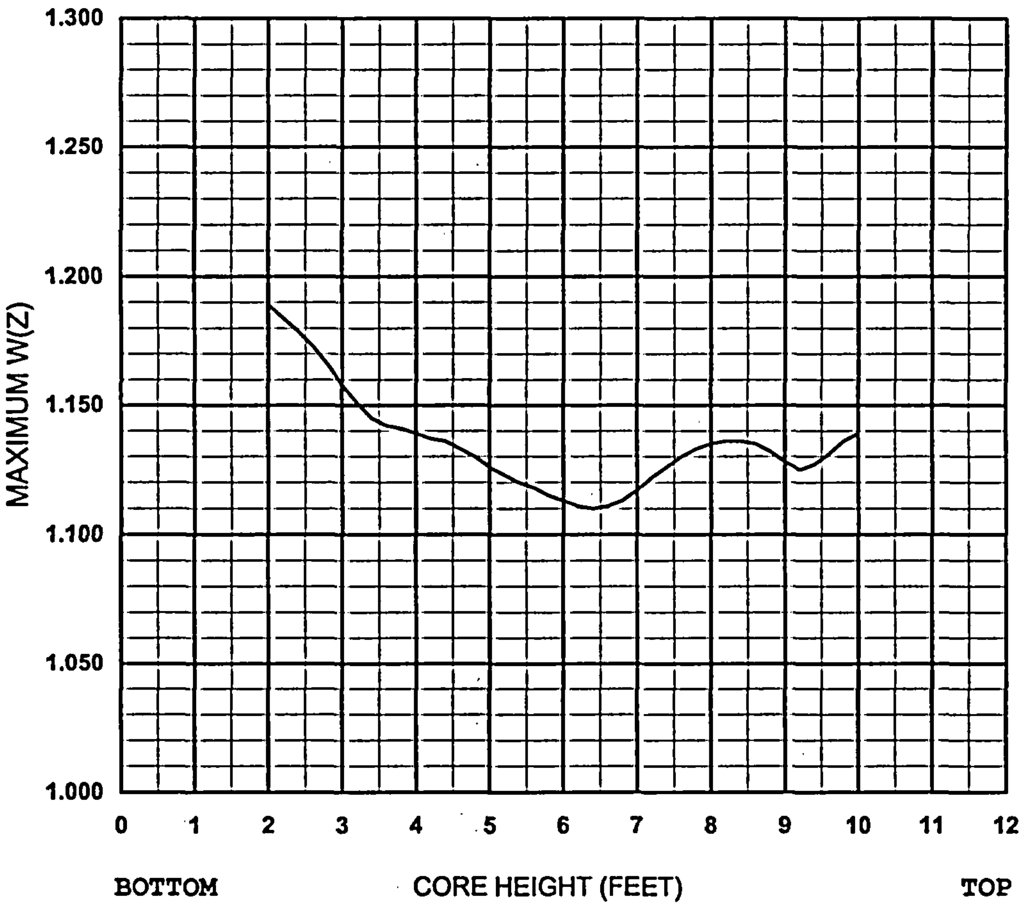


Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.144	30	1.117	19	1.144
51	1.140	40	1.152	29	1.120	18	1.148
50	1.142	39	1.149	28	1.122	17	1.152
49	1.138	38	1.138	27	1.125	16	1.157
48	1.130	37	1.129	26	1.128	15	1.163
47	1.126	36	1.126	25	1.131	14	1.167
46	1.127	35	1.124	24	1.134	13	1.171
45	1.131	34	1.122	23	1.136	12	1.175
44	1.131	33	1.118	22	1.137	11	1.178
43	1.130	32	1.116	21	1.139	1 - 10	---
42	1.134	31	1.116	20	1.141		

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

FIGURE 6

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

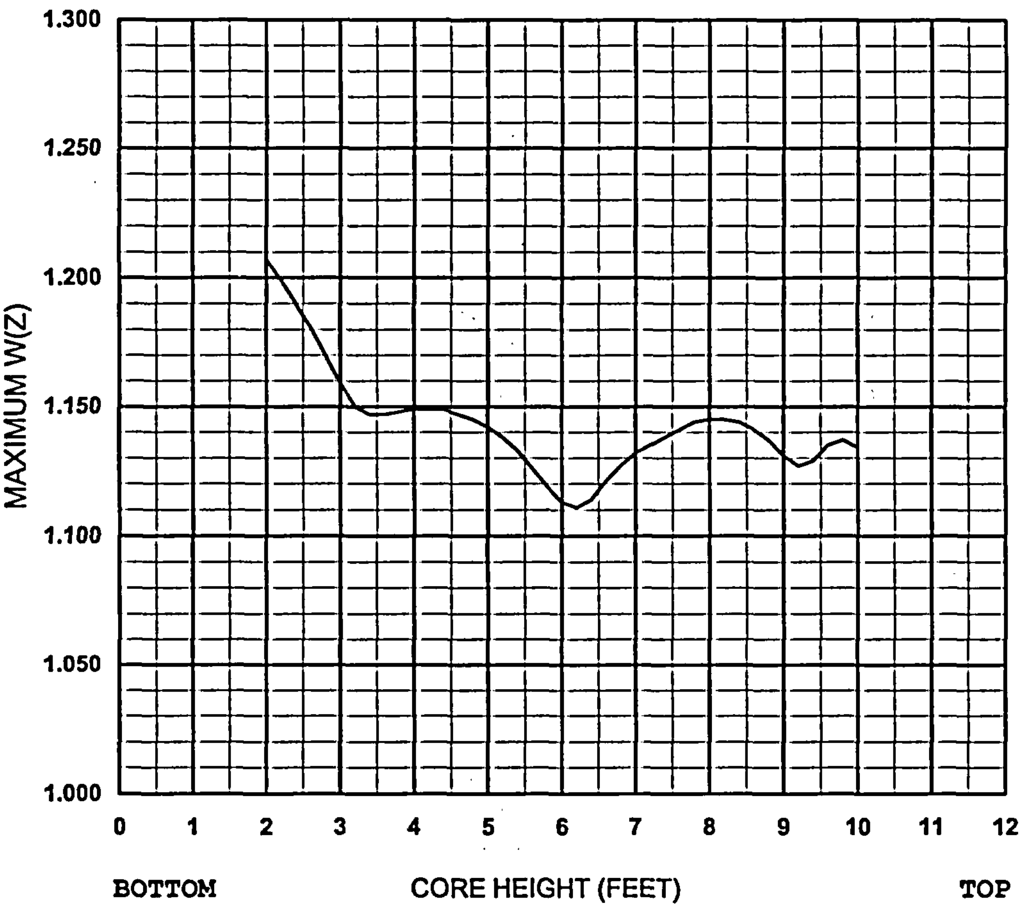


Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.135	30	1.115	19	1.142
51	1.139	40	1.133	29	1.118	18	1.145
50	1.136	39	1.130	28	1.120	17	1.151
49	1.131	38	1.126	27	1.123	16	1.158
48	1.127	37	1.122	26	1.126	15	1.166
47	1.125	36	1.117	25	1.130	14	1.173
46	1.128	35	1.113	24	1.133	13	1.179
45	1.132	34	1.111	23	1.136	12	1.184
44	1.135	33	1.110	22	1.137	11	1.189
43	1.136	32	1.111	21	1.139	1 - 10	---
42	1.136	31	1.113	20	1.141		

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

FIGURE 7

W(Z) AS A FUNCTION OF CORE HEIGHT
(19,000 MWD/MTU)



Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)	Axial Node	W(Z)
52 - 61	---	41	1.145	30	1.119	19	1.147
51	1.134	40	1.144	29	1.126	18	1.147
50	1.137	39	1.141	28	1.133	17	1.150
49	1.135	38	1.138	27	1.138	16	1.159
48	1.129	37	1.135	26	1.142	15	1.170
47	1.127	36	1.132	25	1.145	14	1.181
46	1.131	35	1.127	24	1.147	13	1.190
45	1.137	34	1.121	23	1.149	12	1.199
44	1.141	33	1.114	22	1.149	11	1.207
43	1.144	32	1.111	21	1.149	1 - 10	---
42	1.145	31	1.113	20	1.148		

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

FIGURE 8

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER