Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

Dominion

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VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNIT 1
CORE OPERATING LIMITS REPORT

Pursuant to North Anna Technical Specification 5.6.5.d, attached is a copy of the Virginia Electric and Power Company's (Dominion) Core Operating Limits Report for North Anna Unit 1 Cycle 18 Pattern LM, Revision 1.

No new commitments are intended by this letter. If you have any questions or require additional information, please contact Mr. Tom Shaub at 804/273-2763.

Very truly yours,

C. L. Funderburk, Director
Nuclear Licensing & Operations Support
Dominion Resources Services, Inc.
for Virginia Electric and Power Company

Attachment

cc: U. S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, S.W., Suite 23 T85
Atlanta, Georgia 30303-8931

Mr. M. T. Widmann
NRC Senior Resident Inspector
North Anna Power Station

A001

CORE OPERATING LIMITS REPORT
North Anna Unit 1 Cycle 18 Pattern LM
Revision 1

September 2004

N1C18 CORE OPERATING LIMITS REPORT

INTRODUCTION

The Core Operating Limits Report (COLR) for North Anna Unit 1 Cycle 18 has been prepared in accordance with North Anna Technical Specification 5.6.5. The technical specifications affected by this report are listed below:

TS 2.1.1	Reactor Core Safety Limits
TS 3.1.1	Shutdown Margin (SDM)
TS 3.1.3	Moderator Temperature Coefficient (MTC)
TS 3.1.5	Shutdown Bank Insertion Limit
TS 3.1.6	Control Bank Insertion Limits
TS 3.2.1	Heat Flux Hot Channel Factor
TS 3.2.2	Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)
TS 3.2.3	Axial Flux Difference (AFD)
TS 3.3.1	Reactor Trip System (RTS) Instrumentation
TS 3.4.1	RCS Pressure, Temperature, and Flow DNB Limits
TS 3.9.1	Boron Concentration

In addition, a technical requirement (TR) in the NAPS Technical Requirements Manual (TRM) refers to the COLR:

TR 3.1.1 Boration Flow Paths – Operating

The analytical methods used to determine the core operating limits are those previously approved by the NRC and discussed in the documents listed in the References Section.

Cycle-specific values are presented **in bold.** Text in *italics* is provided for information only.

REFERENCES

1. VEP-FRD-42 Rev 2.1-A, Reload Nuclear Design Methodology, August 2003.

   (Methodology for TS 3.1.1 – Shutdown Margin, TS 3.1.3 – Moderator Temperature Coefficient, TS 3.1.5 – Shutdown Bank Insertion Limit, TS 3.1.6 - Control Bank Insertion Limits, TS 3.2.1 - Heat Flux Hot Channel Factor, TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor and TS 3.9.1- Boron Concentration)

2. WCAP-9220-P-A Rev 1, Westinghouse ECCS Evaluation Model – 1981 Version, February 1982.

   (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

3. WCAP-9561-P-A Rev 1 Add. 3, BART A-1: A Computer Code for the Best Estimate Analysis of Reflood Transients – Special Report: Thimble Modeling in W ECCS Evaluation Model, July 1986.

   (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

4. WCAP-10266-P-A Rev 2, The 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code, March 1987.

   (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

5. WCAP-10054-P-A, Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code, August 1985.

   (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

6. WCAP-10079-P-A, NOTRUMP, A Nodal Transient Small Break and General Network Code, August 1985.

   (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

7. WCAP-12610-P-A, VANTAGE+ Fuel Assembly - Reference Core Report, April 1995.

   (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

8. VEP-NE-2-A, Statistical DNBR Evaluation Methodology, June 1987.

   (Methodology for TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor and TS 3.4.1 – RCS Pressure, Temperature and Flow DNB Limits)

9. VEP-NE-3-A, Qualification of the WRB-1 CHF Correlation in the Virginia Power COBRA Code, July 1990.

   (Methodology for TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor and TS 3.4.1 – RCS Pressure, Temperature and Flow DNB Limits)

10. VEP-NE-1- Rev. 0.1-A, Relaxed Power Distribution Control Methodology and Associated FQ Surveillance Technical Specifications, August 2003.

    (Methodology for TS 3.2.1 – Heat Flux Hot Channel Factor and TS 3.2.3 – Axial Flux Difference)

11. WCAP-8745-P-A, Design Bases for the Thermal Overpower ΔT and Thermal Overtemperature ΔT Trip Functions, September 1986.

    (Methodology for TS 2.1.1 – Reactor Core Safety Limits and TS 3.3.1 – Reactor Trip System Instrumentation)

12. WCAP-14483-A, Generic Methodology for Expanded Core Operating Limits Report, January 1999.

    (Methodology for TS 2.1.1 – Reactor Core Safety Limits, TS 3.1.1 – Shutdown Margin, TS 3.3.1 – Reactor Trip System Instrumentation, TS 3.4.1 – RCS Pressure, Temperature, and Flow DNB Limits and TS 3.9.1 – Boron Concentration)

13. BAW-10227P-A, "Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel."

    (Methodology for TS 2.1.1 – Reactor Core Safety Limits, TS 3.2.1 - Heat Flux Hot Channel Factor)

14. BAW-10199P-A, "The BWU Critical Heat Flux Correlations."

    (Methodology for TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor and TS 3.4.1 – RCS Pressure, Temperature and Flow DNB Limits)

15. BAW-10170P-A, "Statistical Core Design For Mixing Vane Cores."

    (Methodology for TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor and TS 3.4.1 – RCS Pressure, Temperature and Flow DNB Limits)

16. EMF-2103 (P) (A), "Realistic Large Break LOCA Methodology for Pressurized Water Reactors."

    (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

17. EMF-96-029 (P) (A), "Reactor Analysis System for PWRs."

    (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

18. BAW-10168P-A, "RSG LOCA - BWNT Loss-of-Coolant Accident Evaluation Model for Recirculating Steam Generator Plants." Volume II only (SBLOCA models).

    (Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor)

2.0 SAFETY LIMITS (SLs)

2.1 SLs

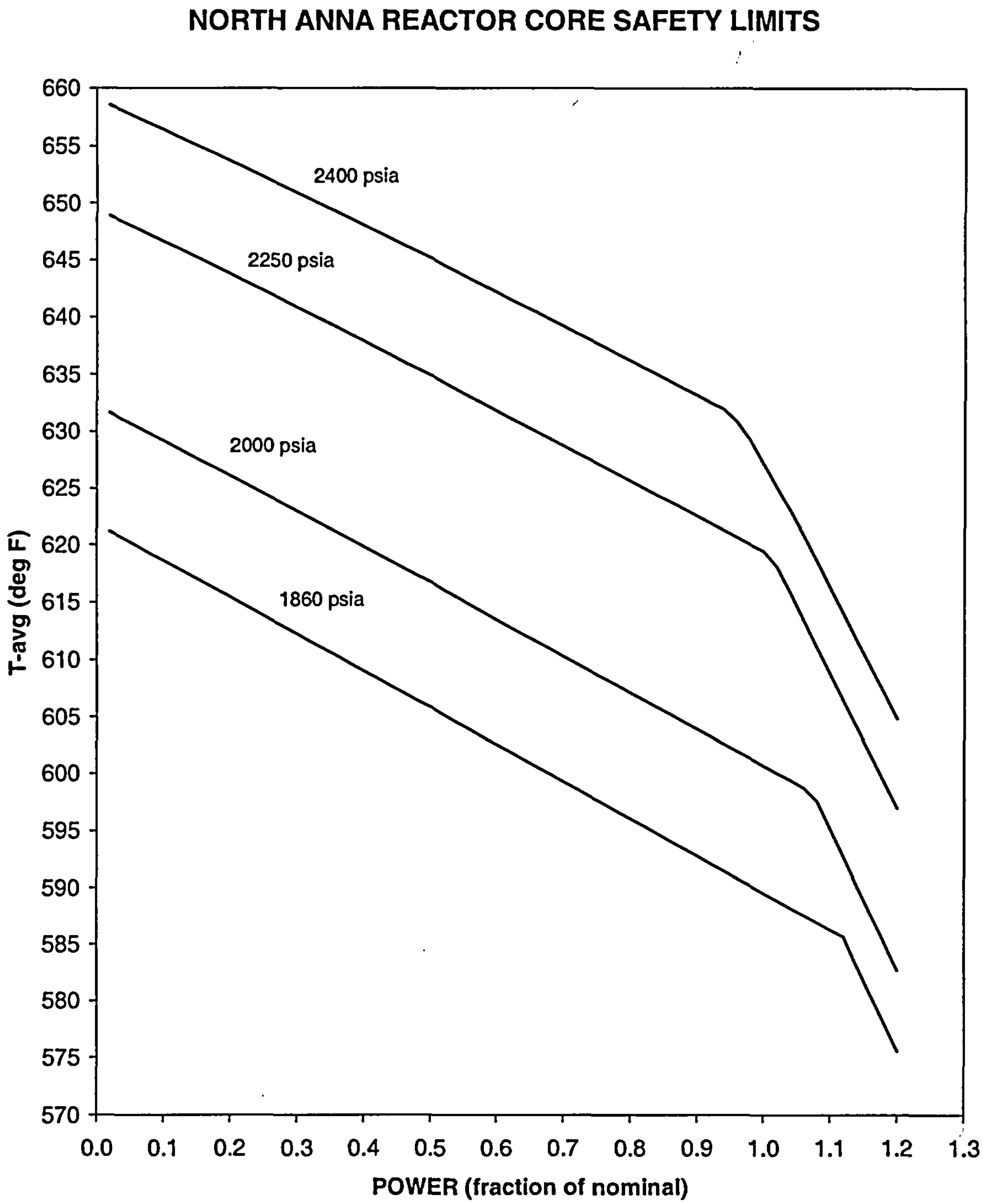
2.1.1 Reactor Core SLs

In MODES 1 and 2, the combination of THERMAL POWER, Reactor Coolant System (RCS) highest loop average temperature, and pressurizer pressure shall not exceed the limits specified in **COLR Figure 2.1-1**; and the following SLs shall not be exceeded.

2.1.1.1 The departure from nucleate boiling ratio (DNBR) shall be maintained greater than or equal to the 95/95 DNBR criterion for the DNB correlations and methodologies specified in **the References Section.**

2.1.1.2 The peak fuel centerline temperature shall be maintained < 5080°F, decreasing by 58°F per 10,000 MWD/MTU of burnup, for Westinghouse fuel and < 5173°F, decreasing by 65°F per 10,000 MWD/MTU of burnup, for AREVA fuel.

COLR Figure 2.1-1



3.1 REACTIVITY CONTROL SYSTEMS

3.1.1 SHUTDOWN MARGIN (SDM)

LCO 3.1.1 SDM shall be ≥ **1.77 % Δk/k.**

3.1.3 Moderator Temperature Coefficient (MTC)

LCO 3.1.3 The MTC shall be maintained within the limits specified **below. The upper limit of MTC is +0.6 x 10^{-4} Δk/k/°F, when < 70% RTP, and 0.0 Δk/k/°F when ≥ 70% RTP.**

The BOC/ARO-MTC shall be ≤ +0.6 x 10^{-4} Δk/k/°F (upper limit), when < 70% RTP, and ≤ 0.0 Δk/k/°F when ≥ 70% RTP.

The EOC/ARO/RTP-MTC shall be less negative than –5.0 x 10^{-4} Δk/k/°F (lower limit).

The MTC surveillance limits are:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to –4.0 x 10^{-4} Δk/k/°F [Note 2].

The 60 ppm/ARO/RTP-MTC should be less negative than or equal to –4.7 x 10^{-4} Δk/k/°F [Note 3].

SR 3.1.3.2 Verify MTC is within **–5.0 x 10^{-4} Δk/k/°F (lower limit).**

Note 2: If the MTC is more negative than **–4.0 x 10^{-4} Δk/k/°F**, SR 3.1.3.2 shall be repeated once per 14 EFPD during the remainder of the fuel cycle.

Note 3: SR 3.1.3.2 need not be repeated if the MTC measured at the equivalent of equilibrium RTP-ARO boron concentration of ≤ 60 ppm is less negative than **–4.7 x 10^{-4} Δk/k/°F.**

3.1.4 Rod Group Alignment Limits

Required Action A.1.1 Verify SDM to be ≥ **1.77 % Δk/k.**

Required Action B.1.1 Verify SDM to be ≥ **1.77 % Δk/k.**

Required Action D.1.1 Verify SDM to be ≥ **1.77 % Δk/k.**

3.1.5 Shutdown Bank Insertion Limits

LCO 3.1.5 Each shutdown bank shall be **withdrawn to at least 230 steps.**

Required Action A.1.1 Verify SDM to be ≥ **1.77 % Δk/k.**

Required Action B.1 Verify SDM to be ≥ **1.77 % Δk/k.**

SR 3.1.5.1 Verify each shutdown bank is **withdrawn to at least 230 steps.**

3.1.6 Control Bank Insertion Limits

LCO 3.1.6 Control banks shall be **limited in physical insertion as shown in COLR Figure 3.1-1. Sequence of withdrawal shall be A, B, C and D, in that order; and the overlap limit during withdrawal shall be 102 steps.**

Required Action A.1.1 Verify SDM to be ≥ **1.77 % Δk/k.**

Required Action B.1.1 Verify SDM to be ≥ **1.77 % Δk/k.**

Required Action C.1 Verify SDM to be ≥ **1.77 % Δk/k.**

SR 3.1.6.1 Verify estimated critical control bank position is within the insertion limits specified in **COLR Figure 3.1-1.**

SR 3.1.6.2 Verify each control bank is within the insertion limits specified in **COLR Figure 3.1-1.**

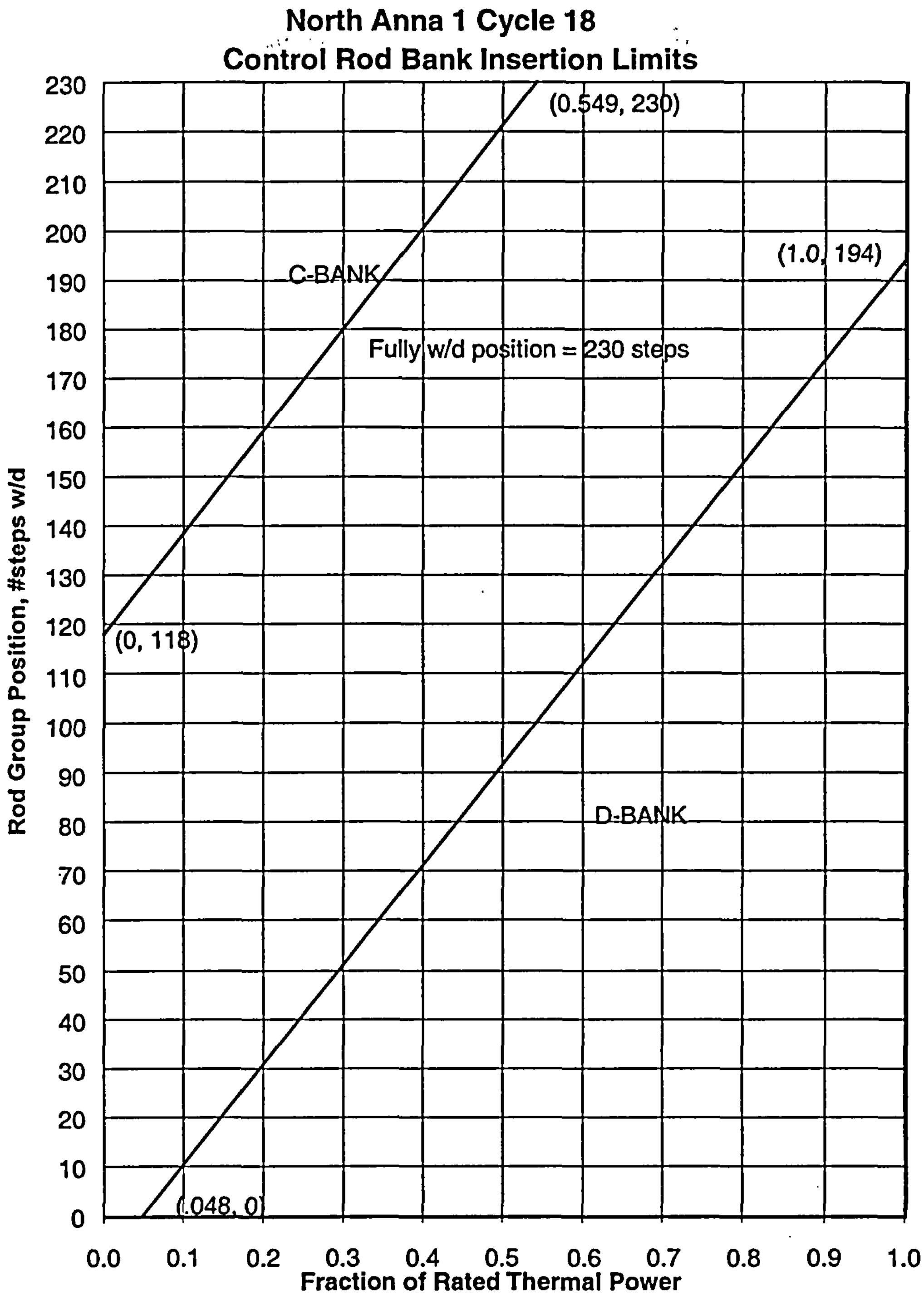
SR 3.1.6.3 Verify each control bank not fully withdrawn from the core is within the sequence and overlap limits specified in **LCO 3.1.6 above.**

3.1.9 PHYSICS TESTS Exceptions – MODE 2

LCO 3.1.9.b SDM is ≥ **1.77 % Δk/k.**

SR 3.1.9.4 Verify SDM to be ≥ **1.77 % Δk/k.**

COLR Figure 3.1-1



3.2 POWER DISTRIBUTION LIMITS

3.2.1 Heat Flux Hot Channel Factor ($F_Q(Z)$)

LCO 3.2.1 $F_Q(Z)$, as approximated by $F_Q^M(Z)$, shall be within the limits specified below.

The change in the $F_Q(Z)$ limit for coastdown operation is accommodated by defining a variable quantity, CFQ as indicated below. Then, the following expressions apply to both normal operation and Tavg coastdown regimes.

CFQ = 2.19, for normal operation at full power;

CFQ = 2.15, for flux map immediately preceding EOC temperature coastdown and during subsequent power coastdown operation.

The Measured Heat Flux Hot Channel Factor, $F_Q^M(Z)$, shall be limited by the following relationships:

$$F_Q^M(Z) \le \frac{CFQ}{P}\,\frac{K(Z)}{N(Z)} \qquad for\ P > 0.5$$

$$F_Q^M(Z) \le \frac{CFQ}{0.5}\,\frac{K(Z)}{N(Z)} \qquad for\ P \le 0.5$$

where: $P = \frac{THERMAL\ POWER}{RATED\ THERMAL\ POWER}$ **; and**

K(Z) is provided in COLR Figure 3.2-1 (exception noted below), and N(Z) is a cycle-specific non-equilibrium multiplier on $F_Q^M(Z)$ to account for power distribution transients during normal operation, provided in COLR Table 3.2-1.

The discussion in the Bases Section B 3.2.1 for this LCO requires the application of a cycle dependent non-equilibrium multiplier, N(Z), to the measured peaking factor, $F_Q^M(Z)$, before comparing it to the limit. N(Z) accounts for power distribution transients encountered during normal operation. As function N(Z) is dependent on the predicted equilibrium $F_Q(Z)$ and is sensitive to the axial power distribution, it is typically generated from the actual EOC burnup distribution that can only be obtained after the shutdown of the previous cycle. The cycle-specific N(Z) function is presented in **COLR Table 3.2-1.**

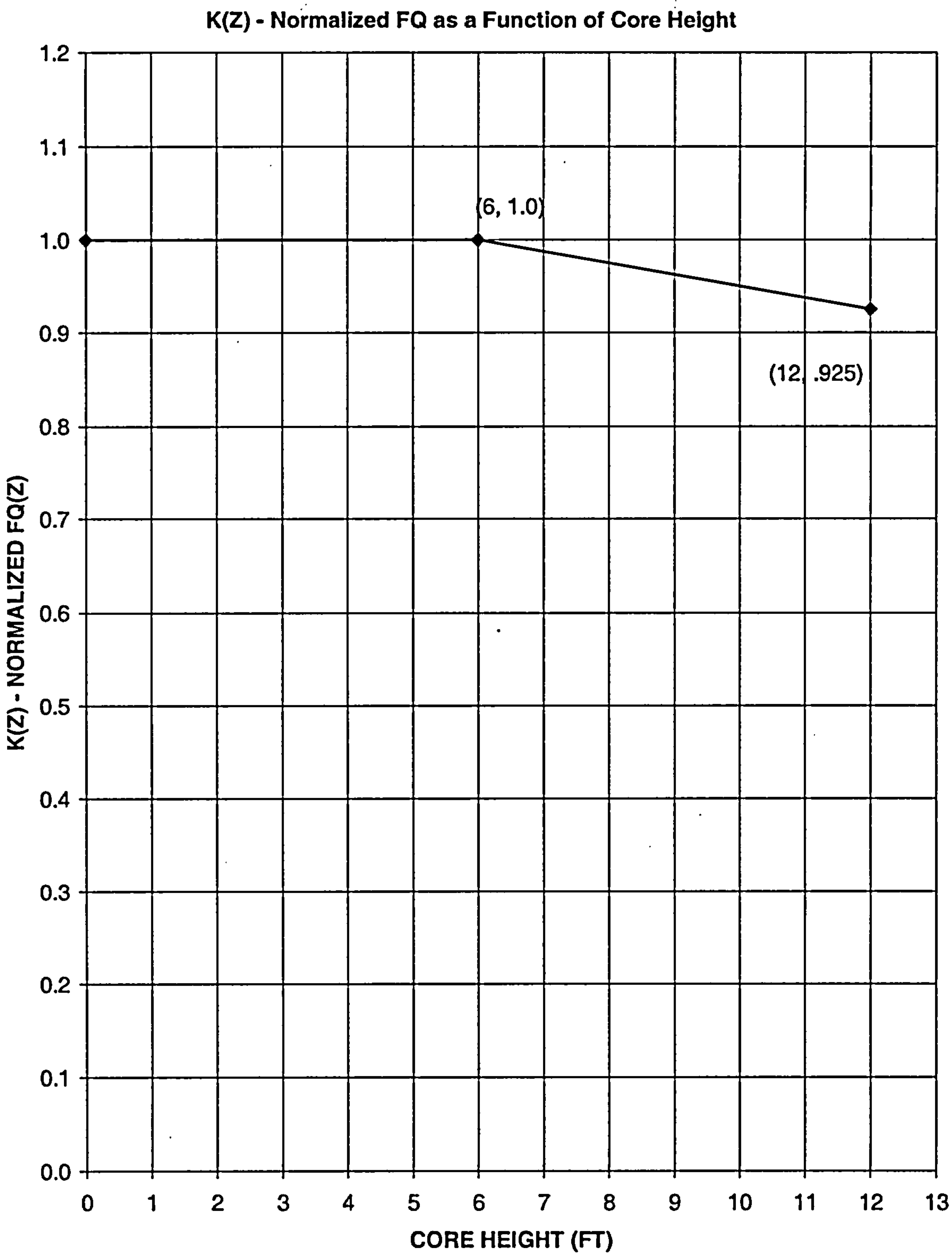
COLR Table 3.2-1
N1C18 Normal Operation N(Z)

NODE	HEIGHT (FEET)	*0 to 1000* MWD/MTU	*1000 to 3000* MWD/MTU	*3000 to 5000* MWD/MTU	*5000 to 7000* MWD/MTU	*7000 to 9000* MWD/MTU
10	10.2	1.107	1.124	1.124	1.124	1.125
11	10.0	1.109	1.123	1.123	1.123	1.123
12	9.8	1.113	1.123	1.125	1.125	1.123
13	9.6	1.118	1.127	1.131	1.131	1.126
14	9.4	1.119	1.128	1.133	1.133	1.126
15	9.2	1.121	1.132	1.136	1.136	1.132
16	9.0	1.131	1.146	1.149	1.149	1.148
17	8.8	1.143	1.159	1.162	1.162	1.165
18	8.6	1.151	1.165	1.167	1.167	1.171
19	8.4	1.157	1.166	1.168	1.170	1.174
20	8.2	1.163	1.169	1.170	1.177	1.180
21	8.0	1.165	1.170	1.170	1.181	1.185
22	7.8	1.166	1.170	1.170	1.183	1.188
23	7.6	1.164	1.167	1.167	1.183	1.191
24	7.4	1.162	1.163	1.162	1.184	1.194
25	7.2	1.157	1.158	1.159	1.182	1.196
26	7.0	1.153	1.155	1.159	1.179	1.196
27	6.8	1.151	1.151	1.160	1.178	1.197
28	6.6	1.148	1.146	1.159	1.176	1.195
29	6.4	1.143	1.141	1.156	1.169	1.191
30	6.2	1.136	1.136	1.151	1.159	1.183
31	6.0	1.135	1.135	1.150	1.154	1.182
32	5.8	1.132	1.132	1.145	1.146	1.174
33	5.6	1.120	1.119	1.129	1.129	1.154
34	5.4	1.110	1.110	1.116	1.116	1.135
35	5.2	1.105	1.112	1.114	1.111	1.127
36	5.0	1.104	1.118	1.117	1.109	1.121
37	4.8	1.104	1.122	1.122	1.107	1.113
38	4.6	1.106	1.126	1.126	1.108	1.111
39	4.4	1.110	1.128	1.128	1.111	1.115
40	4.2	1.117	1.130	1.130	1.117	1.120
41	4.0	1.124	1.134	1.134	1.124	1.124
42	3.8	1.129	1.135	1.135	1.129	1.128
43	3.6	1.134	1.135	1.135	1.132	1.132
44	3.4	1.136	1.135	1.134	1.136	1.136
45	3.2	1.141	1.138	1.137	1.140	1.141
46	3.0	1.148	1.143	1.142	1.145	1.144
47	2.8	1.160	1.152	1.151	1.151	1.148
48	2.6	1.169	1.161	1.159	1.157	1.153
49	2.4	1.183	1.174	1.170	1.167	1.162
50	2.2	1.202	1.191	1.186	1.184	1.178
51	2.0	1.214	1.202	1.197	1.195	1.189
52	1.8	1.217	1.204	1.199	1.198	1.191

COLR Table 3.2-1 (cont.)
N1C18 Normal Operation N(Z)

NODE	HEIGHT (FEET)	9000 to 11000 MWD/MTU	11000 to 13000 MWD/MTU	13000 to 15000 MWD/MTU	15000 to 17000 MWD/MTU	17000 to 18750 MWD/MTU
10	10.2	1.127	1.132	1.132	1.118	1.118
11	10.0	1.125	1.129	1.129	1.117	1.117
12	9.8	1.124	1.126	1.126	1.115	1.115
13	9.6	1.126	1.125	1.125	1.115	1.115
14	9.4	1.126	1.119	1.119	1.115	1.115
15	9.2	1.132	1.123	1.123	1.122	1.122
16	9.0	1.147	1.143	1.142	1.141	1.141
17	8.8	1.165	1.166	1.166	1.162	1.162
18	8.6	1.171	1.173	1.173	1.168	1.168
19	8.4	1.174	1.178	1.178	1.174	1.174
20	8.2	1.180	1.188	1.188	1.187	1.187
21	8.0	1.185	1.194	1.194	1.196	1.196
22	7.8	1.188	1.196	1.196	1.197	1.197
23	7.6	1.191	1.197	1.197	1.201	1.201
24	7.4	1.194	1.201	1.201	1.208	1.208
25	7.2	1.196	1.202	1.202	1.213	1.213
26	7.0	1.196	1.201	1.201	1.216	1.216
27	6.8	1.197	1.201	1.201	1.219	1.219
28	6.6	1.195	1.200	1.200	1.218	1.218
29	6.4	1.191	1.195	1.195	1.218	1.218
30	6.2	1.183	1.187	1.187	1.215	1.215
31	6.0	1.182	1.185	1.185	1.217	1.217
32	5.8	1.174	1.176	1.176	1.211	1.211
33	5.6	1.154	1.154	1.156	1.196	1.196
34	5.4	1.136	1.136	1.138	1.180	1.180
35	5.2	1.130	1.131	1.132	1.174	1.174
36	5.0	1.125	1.129	1.130	1.165	1.165
37	4.8	1.115	1.122	1.127	1.148	1.148
38	4.6	1.111	1.117	1.125	1.136	1.138
39	4.4	1.115	1.116	1.123	1.131	1.136
40	4.2	1.120	1.116	1.120	1.135	1.139
41	4.0	1.124	1.118	1.118	1.144	1.145
42	3.8	1.126	1.119	1.117	1.150	1.150
43	3.6	1.126	1.122	1.121	1.153	1.153
44	3.4	1.126	1.124	1.128	1.155	1.154
45	3.2	1.127	1.127	1.138	1.154	1.154
46	3.0	1.127	1.131	1.147	1.153	1.157
47	2.8	1.128	1.135	1.154	1.154	1.160
48	2.6	1.127	1.135	1.156	1.153	1.160
49	2.4	1.130	1.139	1.160	1.161	1.166
50	2.2	1.139	1.149	1.173	1.177	1.179
51	2.0	1.146	1.155	1.182	1.190	1.190
52	1.8	1.146	1.156	1.184	1.193	1.193

COLR Figure 3.2-1



3.2.2 Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)

LCO 3.2.2 $F^N_{\Delta H}$ shall be within the limits specified **below**.

$$F^N_{\Delta H} \leq 1.49\{1 + 0.3(1 - P)\}$$

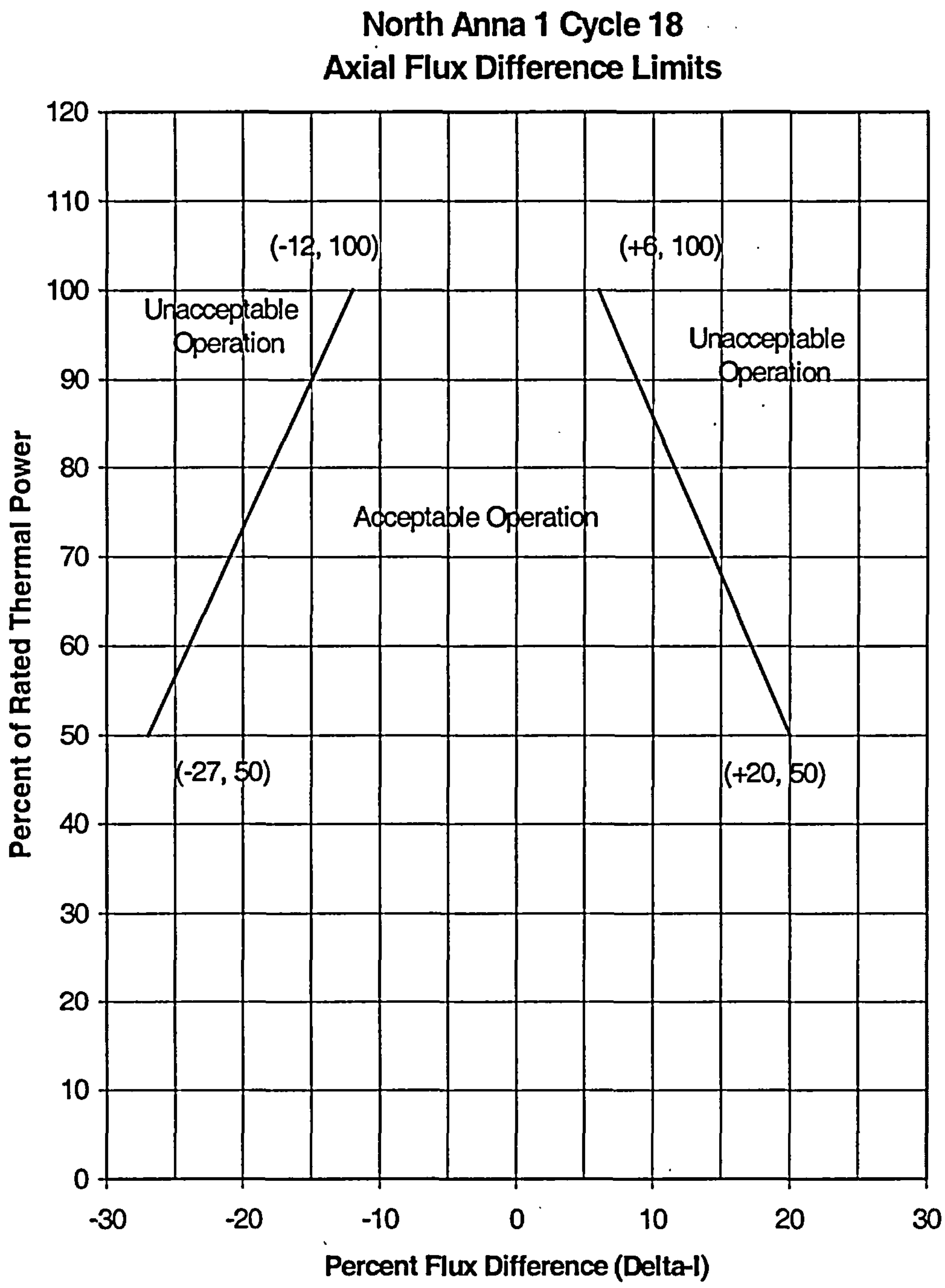
where: $$P = \frac{THERMAL\ POWER}{RATED\ THERMAL\ POWER}$$

SR 3.2.2.1 Verify $F^N_{\Delta H}$ is within limits specified **above**.

3.2.3 AXIAL FLUX DIFFERENCE (AFD)

LCO 3.2.3 The AFD in % flux difference units shall be maintained within the limits specified in **COLR Figure 3.2-2**.

COLR Figure 3.2-2



3.3 INSTRUMENTATION

3.3.1 Reactor Trip System (RTS) Instrumentation

TS Table 3.3.1-1 Note 1: Overtemperature ΔT

The Overtemperature ΔT Function Allowable Value shall not exceed the following nominal trip setpoint by more than 2% of ΔT span, **with the numerical values of the parameters as specified below.**

$$\Delta T \leq \Delta T_0\left\{K_1 - K_2\frac{(1+\tau_1 s)}{(1+\tau_2 s)}[T-T'] + K_3(P-P') - f_1(\Delta I)\right\}$$

where: ΔT is measured RCS ΔT, °F.

ΔT_0 is the indicated ΔT at RTP, °F.

s is the Laplace transform operator, sec^{-1}.

T is the measured RCS average temperature, °F.

T' is the nominal T_{avg} at RTP, **≤ 586.8 °F.**

P is the measured pressurizer pressure, psig.

P' is the nominal RCS operating pressure, **≥ 2235 psig.**

K_1 **≤ 1.2715** K_2 **≥ 0.02172 /°F** K_3 **≥ 0.001144 /psig**

τ_1, τ_2 = time constants utilized in the lead-lag controller for T_{avg}

τ_1 **≥ 23.75 sec** τ_2 **≤ 4.4 sec**

$(1+\tau_1 s)/(1+\tau_2 s)$ = function generated by the lead-lag controller for T_{avg} dynamic compensation

$f_1(\Delta I)$ ≥ **0.0165{−35 − ($q_t - q_b$)}** when ($q_t - q_b$) < −35% RTP

0 when −35% RTP ≤ ($q_t - q_b$) ≤ +3% RTP

0.0198{($q_t - q_b$) − 3} when ($q_t - q_b$) > +3% RTP

[See footnote]#

Where q_t and q_b are percent RTP in the upper and lower halves of the core, respectively, and $q_t + q_b$ is the total THERMAL POWER in percent RTP.

#Footnote: $f_1(\Delta I)$ is dimensionless, as shown in the setpoint equation and discussed in Plant Issue N-2002-1161-R2.

TS Table 3.3.1-1 Note 2: Overpower ΔT

The Overpower ΔT Function Allowable Value shall not exceed the following nominal trip setpoint by more than 2% of ΔT span, **with the numerical values of the parameters as specified below.**

$$\Delta T \leq \Delta T_0 \left\{ K_4 - K_5 \left[\frac{\tau_3 s}{1+\tau_3 s} \right] T - K_6 [T - T'] - f_2(\Delta I) \right\}$$

where: ΔT is measured RCS ΔT, °F.
ΔT_0 is the indicated ΔT at RTP, °F.

s is the Laplace transform operator, sec^{-1}.
T is the measured RCS average temperature, °F.
T' is the nominal T_{avg} at RTP, **≤ 586.8 °F.**

K_4 **≤ 1.0865**
K_5 **≥ 0.0197 /°F** for increasing T_{avg}
0 /°F for decreasing T_{avg}

K_6 **≥ 0.00162 /°F** when T > T'
0 /°F when T ≤ T'

τ_3 = time constant utilized in the rate lag controller for T_{avg}
τ_3 **≥ 9.5 sec**

$\tau_3 s/(1+\tau_3 s)$ = function generated by the rate lag controller for T_{avg} dynamic compensation

$f_2(\Delta I)$ = **0, for all ΔI.**

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

LCO 3.4.1 RCS DNB parameters for pressurizer pressure, RCS average temperature, and RCS total flow rate shall be within the limits specified below:

a. Pressurizer pressure is greater than or equal to **2205 psig**;

b. RCS average temperature is less than or equal to **591 °F**; and

c. RCS total flow rate is greater than or equal to **295,000 gpm**.

SR 3.4.1.1 Verify pressurizer pressure is greater than or equal to **2205 psig**.

SR 3.4.1.2 Verify RCS average temperature is less than or equal to **591 °F**.

SR 3.4.1.3 Verify RCS total flow rate is greater than or equal to **295,000 gpm**.

SR 3.4.1.4 -----------------------------NOTE--

Not required to be performed until 30 days after ≥ 90% RTP.

Verify by precision heat balance that RCS total flow rate is ≥ **295,000 gpm**.

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.6 Boron Injection Tank (BIT)

Required Action B.2 Borate to an SDM $\geq$ **1.77 % $\Delta k/k$ at 200 °F.**

3.9 REFUELING OPERATIONS

3.9.1 Boron Concentration

LCO 3.9.1 Boron concentrations of the Reactor Coolant System (RCS), the refueling canal, and the refueling cavity shall be maintained ≥ **2600 ppm.**

Note: The refueling boron concentration satisfies the more restrictive of the following conditions: (a) $k_{eff} \leq 0.95$*, or (b) boron concentration ≥2600 ppm.*

SR 3.9.1.1 Verify boron concentration is within the limit specified **above.**

TRM 3.1 REACTIVITY CONTROL SYSTEMS

TR 3.1.1 Boration Flow Paths – Operating

Required Action E.2 Borate to a SHUTDOWN MARGIN ≥ **1.77 % Δk/k at 200 °F, after xenon decay.**