

Dominion Resources Services, Inc.
Innsbrook Technical Center
5000 Dominion Boulevard, 2SE, Glen Allen, VA 23060



January 11, 2012

U. S. Nuclear Regulatory Commission
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One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

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VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNIT 2
CYCLE 22 CORE OPERATING LIMITS REPORT, REVISION 1

Pursuant to North Anna Technical Specification 5.6.5.d, attached is a copy of the Dominion Core Operating Limits Report for North Anna Unit 2 Cycle 22, Pattern ZAP, Revision 1.

If you have any questions regarding this submittal, please contact Mr. Thomas Shaub at (804) 273-2763.

Sincerely,

A handwritten signature in cursive script, appearing to read "T. R. Huber".

T. R. Huber, Director
Nuclear Licensing and Operations Support
Dominion Resources Services, Inc.
for Virginia Electric and Power Company

Attachment: Core Operating Limits Report for North Anna Unit 2 Cycle 22 Pattern ZAP,
Revision 1

Commitments made in this letter: None

cc: U.S. Nuclear Regulatory Commission - Region II
Marquis One Tower
245 Peachtree Center Ave., NE, Suite 1200
Atlanta, Georgia 30303-1257

Mr. J. E. Reasor, Jr.
Old Dominion Electric Cooperative
Innsbrook Corporate Center
4201 Dominion Blvd.
Suite 300
Glen Allen, Virginia 23060

NRC Senior Resident Inspector
North Anna Power Station

Dr. V. Sreenivas
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop O8 G-9A
11555 Rockville Pike
Rockville, Maryland 20852-2738

Ms. K. R. Cotton
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop O8 G-9A
11555 Rockville Pike
Rockville, Maryland 20852-2738

ATTACHMENT

**CORE OPERATING LIMITS REPORT FOR NORTH ANNA UNIT 2
CYCLE 22 PATTERN ZAP, REVISION 1**

**NORTH ANNA POWER STATION
VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)**

N2C22 CORE OPERATING LIMITS REPORT

INTRODUCTION

The Core Operating Limits Report (COLR) for North Anna Unit 2 Cycle 22 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 3.1.4	Rod Group Alignment Limits
TS 3.1.5	Shutdown Bank Insertion Limit
TS 3.1.6	Control Bank Insertion Limits
TS 3.1.9	Physics Test Exceptions-Mode 2
TS 3.2.1	Heat Flux Hot Channel Factor
TS 3.2.2	Nuclear Enthalpy Rise Hot Channel Factor ($F_{\Delta H}^N$)
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 3.5.6	Boron Injection Tank (BIT)
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. VEP-NE-2, Rev. 0-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)
3. 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)
4. 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)
5. 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)
6. BAW-10227P-A, Rev. 0, “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)
7. EMF-2103 (P) (A), Rev. 0, “Realistic Large Break LOCA Methodology for Pressurized Water Reactors,” April 2003.

(Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor and TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor)
8. EMF-96-029 (P) (A), Rev. 0 “Reactor Analysis System for PWRs,” January 1997.

(Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor and TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor)

9. BAW-10168P-A, Rev. 3, "RSG LOCA - BWNT Loss-of-Coolant Accident Evaluation Model for Recirculating Steam Generator Plants," December 1996. Volume II only (SBLOCA models).

(Methodology for TS 3.2.1 - Heat Flux Hot Channel Factor and TS 3.2.2 – Nuclear Enthalpy Rise Hot Channel Factor)

10. DOM-NAF-2, Rev. 0.2-P-A, "Reactor Core Thermal-Hydraulics Using the VIPRE-D Computer Code," including Appendix A, "Qualification of the F-ANP BWU CHF Correlations in the VIPRE-D Computer Code," August 2010.

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

2.0 SAFETY LIMITS (SLs)

2.1 SLs

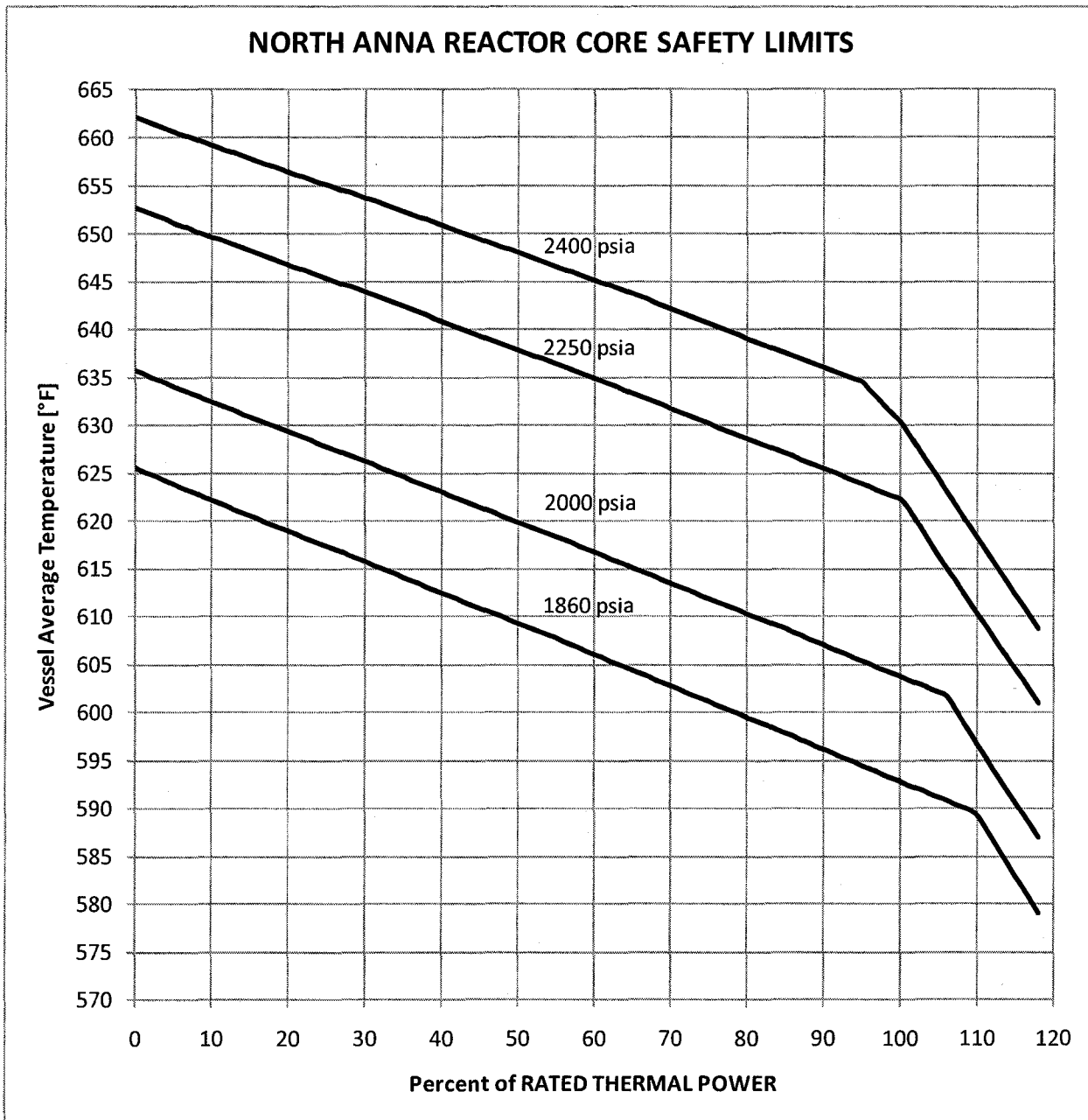
2.1.1 Reactor Core SLs

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 $< 5173^{\circ}\text{F}$, decreasing by 65°F per 10,000 MWD/MTU of burnup.

COLR Figure 2.1-1



3.1 REACTIVITY CONTROL SYSTEMS

3.1.1 SHUTDOWN MARGIN (SDM)

LCO 3.1.1 SDM shall be $\geq 1.77\% \Delta k/k$.

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 $+0.6 \times 10^{-4} \Delta k/k/^\circ F$, when $< 70\%$ RTP, and $0.0 \Delta k/k/^\circ F$ when $\geq 70\%$ RTP.

The BOC/ARO-MTC shall be $\leq +0.6 \times 10^{-4} \Delta k/k/^\circ F$ (upper limit), when $< 70\%$ RTP, and $\leq 0.0 \Delta k/k/^\circ F$ when $\geq 70\%$ RTP.

The EOC/ARO/RTP-MTC shall be less negative than $-5.0 \times 10^{-4} \Delta k/k/^\circ F$ (lower limit).

The MTC surveillance limits are:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to $-4.0 \times 10^{-4} \Delta k/k/^\circ F$ [Note 2].

The 60 ppm/ARO/RTP-MTC should be less negative than or equal to $-4.7 \times 10^{-4} \Delta k/k/^\circ F$ [Note 3].

SR 3.1.3.2 Verify MTC is within $-5.0 \times 10^{-4} \Delta k/k/^\circ F$ (lower limit).

Note 2: If the MTC is more negative than $-4.0 \times 10^{-4} \Delta k/k/^\circ F$, 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 $-4.7 \times 10^{-4} \Delta k/k/^\circ F$.

3.1.4 Rod Group Alignment Limits

Required Action A.1.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

Required Action B.1.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

Required Action D.1.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

3.1.5 Shutdown Bank Insertion Limits

LCO 3.1.5 Each shutdown bank shall be withdrawn to at least **228** steps.

Required Action A.1.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

Required Action B.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

SR 3.1.5.1 Verify each shutdown bank is withdrawn to at least **228** 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 **100** steps.

Required Action A.1.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

Required Action B.1.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

Required Action C.1 Verify SDM to be $\geq 1.77\% \Delta k/k$.

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**.

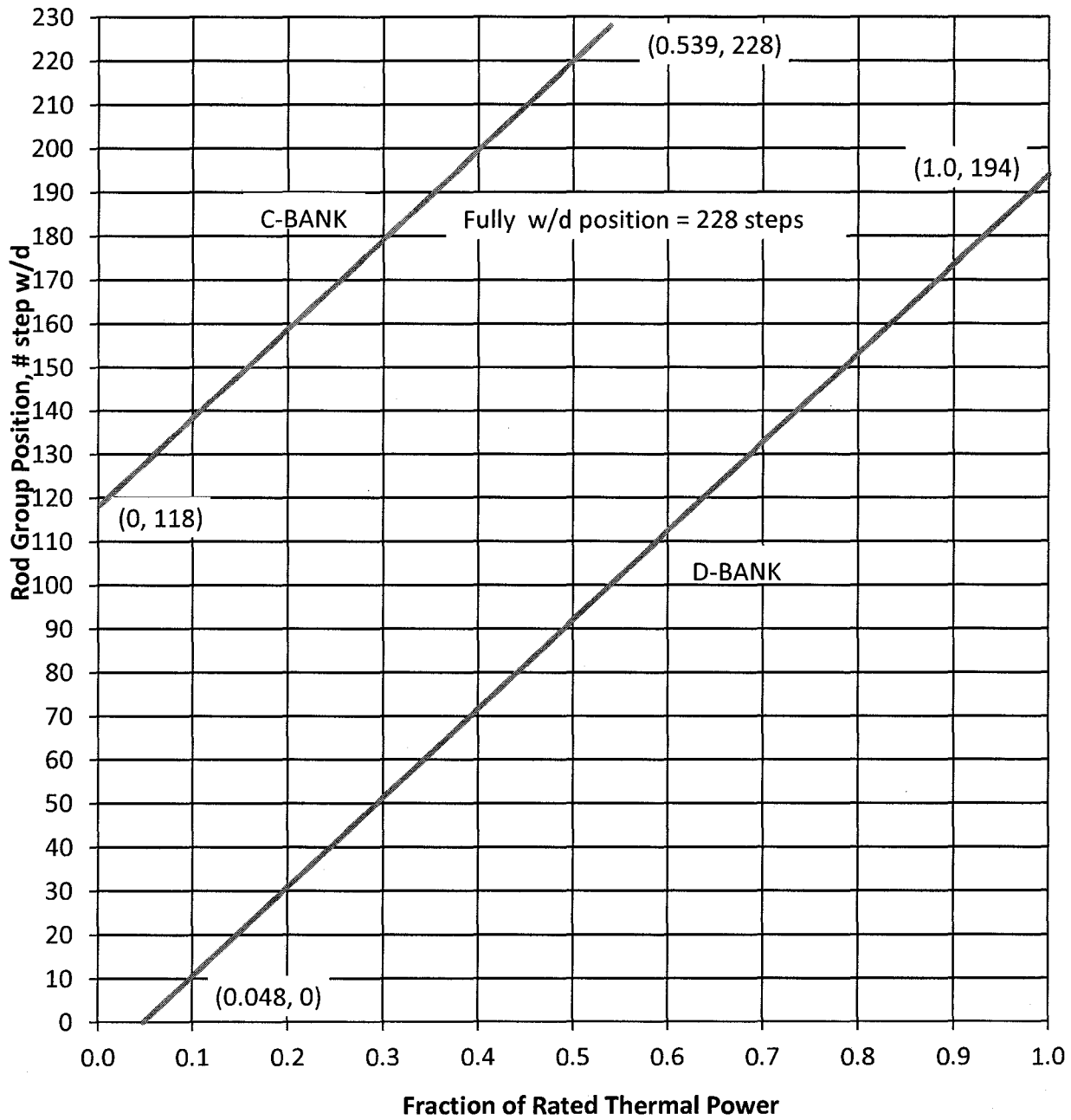
3.1.9 PHYSICS TESTS Exceptions – MODE 2

LCO 3.1.9.b SDM is $\geq 1.77\% \Delta k/k$.

SR 3.1.9.4 Verify SDM to be $\geq 1.77\% \Delta k/k$.

COLR Figure 3.1-1

North Anna 2 Cycle 22 Control Rod Bank Insertion Limits



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.

$$\mathbf{CFQ = 2.32}$$

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

$$F_Q^M(Z) \leq \frac{CFQ}{P} \frac{K(Z)}{N(Z)} \quad \text{for } P > 0.5$$

$$F_Q^M(Z) \leq \frac{CFQ}{0.5} \frac{K(Z)}{N(Z)} \quad \text{for } P \leq 0.5$$

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

$K(Z)$ is provided in **COLR Figure 3.2-1**,

$N(Z)$ 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

N2C22 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	9000 to 11000 MWD/MTU
10	10.2	1.101	1.111	1.112	1.123	1.135	1.138
11	10.0	1.100	1.119	1.119	1.127	1.134	1.138
12	9.8	1.103	1.125	1.125	1.134	1.136	1.136
13	9.6	1.110	1.131	1.131	1.141	1.141	1.136
14	9.4	1.112	1.133	1.133	1.141	1.141	1.135
15	9.2	1.116	1.135	1.135	1.142	1.142	1.138
16	9.0	1.130	1.146	1.146	1.152	1.152	1.151
17	8.8	1.144	1.157	1.157	1.165	1.165	1.166
18	8.6	1.151	1.160	1.159	1.171	1.171	1.171
19	8.4	1.154	1.160	1.161	1.175	1.175	1.174
20	8.2	1.159	1.161	1.166	1.180	1.181	1.181
21	8.0	1.161	1.161	1.171	1.184	1.185	1.185
22	7.8	1.162	1.161	1.173	1.185	1.187	1.187
23	7.6	1.160	1.160	1.173	1.184	1.187	1.187
24	7.4	1.157	1.157	1.173	1.181	1.187	1.187
25	7.2	1.155	1.155	1.173	1.178	1.186	1.186
26	7.0	1.153	1.153	1.173	1.176	1.185	1.185
27	6.8	1.152	1.152	1.173	1.173	1.184	1.184
28	6.6	1.148	1.148	1.169	1.169	1.181	1.181
29	6.4	1.142	1.142	1.164	1.163	1.175	1.175
30	6.2	1.134	1.134	1.155	1.155	1.165	1.165
31	6.0	1.127	1.129	1.149	1.149	1.161	1.162
32	5.8	1.120	1.123	1.139	1.141	1.153	1.155
33	5.6	1.110	1.111	1.118	1.125	1.135	1.137
34	5.4	1.103	1.103	1.103	1.112	1.119	1.121
35	5.2	1.100	1.100	1.101	1.109	1.115	1.118
36	5.0	1.100	1.100	1.104	1.108	1.113	1.117
37	4.8	1.101	1.098	1.102	1.104	1.106	1.113
38	4.6	1.102	1.099	1.100	1.100	1.103	1.109
39	4.4	1.103	1.102	1.097	1.097	1.103	1.105
40	4.2	1.110	1.110	1.101	1.101	1.103	1.103
41	4.0	1.122	1.122	1.111	1.111	1.103	1.103
42	3.8	1.132	1.132	1.120	1.119	1.106	1.104
43	3.6	1.140	1.140	1.128	1.125	1.114	1.110
44	3.4	1.145	1.145	1.134	1.132	1.123	1.120
45	3.2	1.150	1.150	1.141	1.139	1.134	1.134
46	3.0	1.154	1.154	1.148	1.148	1.144	1.144
47	2.8	1.161	1.161	1.157	1.157	1.153	1.153
48	2.6	1.170	1.170	1.164	1.164	1.156	1.156
49	2.4	1.184	1.184	1.175	1.175	1.164	1.163
50	2.2	1.201	1.201	1.192	1.192	1.181	1.180
51	2.0	1.212	1.212	1.204	1.204	1.192	1.192
52	1.8	1.214	1.214	1.207	1.207	1.194	1.194

These decks are generated for normal operation flux maps that are typically taken at full power ARO. Additional N(z) decks may be generated for the specific plant conditions at the time of the flux map, if necessary, consistent with the methodology described in the RPDC topical (Reference 3). EOR is defined as Hot Full Power End of Reactivity.

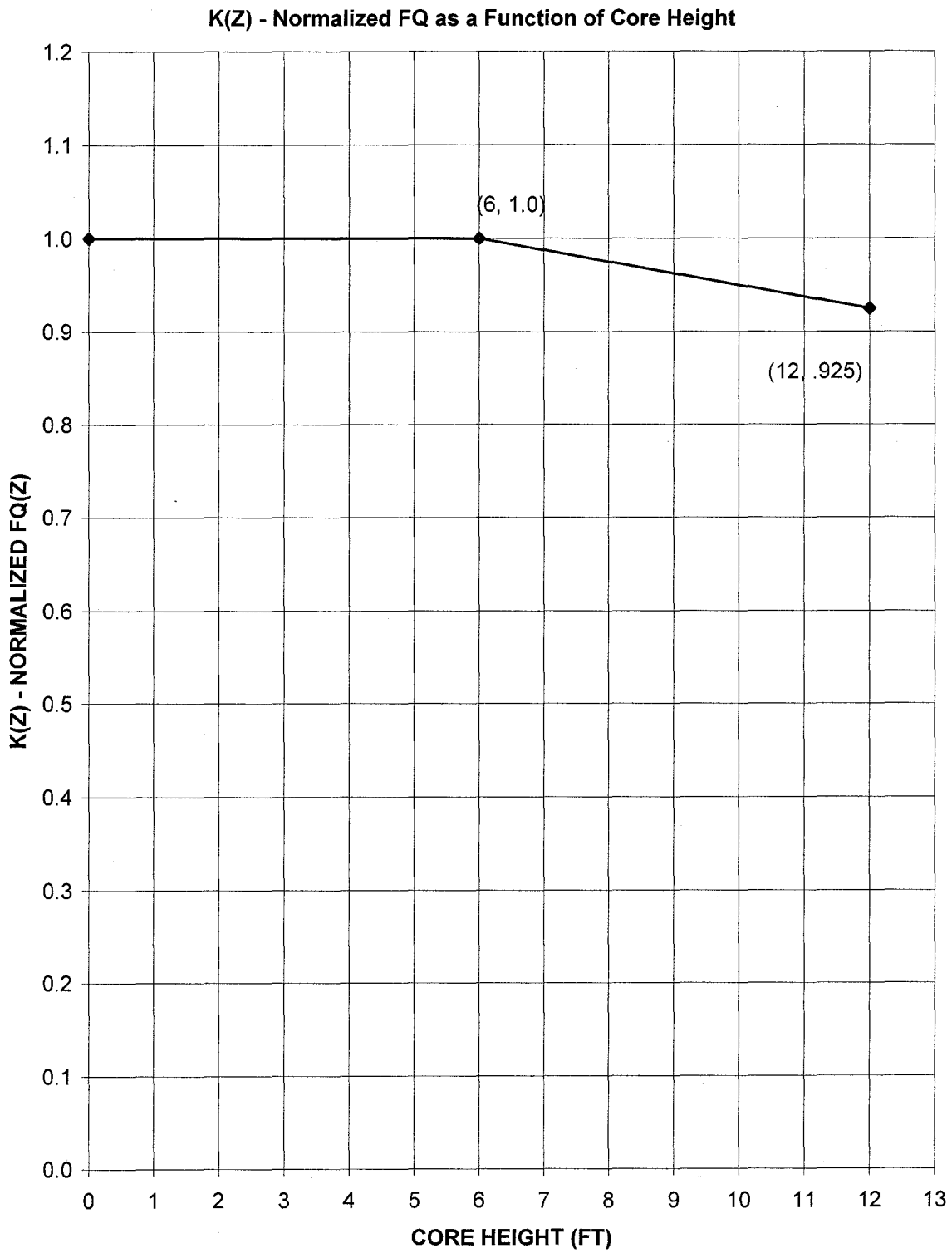
COLR Table 3.2-1 (continued)

N2C22 Normal Operation N(Z)

NODE	HEIGHT (FEET)	11000 to 13000	13000 to 15000	15000 to 17000	17000 to 19000	19000 to EOR
		MWD/MTU	MWD/MTU	MWD/MTU	MWD/MTU	MWD/MTU
10	10.2	1.138	1.126	1.107	1.114	1.117
11	10.0	1.138	1.124	1.106	1.114	1.117
12	9.8	1.136	1.121	1.105	1.113	1.116
13	9.6	1.136	1.120	1.108	1.112	1.115
14	9.4	1.135	1.115	1.107	1.109	1.112
15	9.2	1.138	1.117	1.112	1.113	1.115
16	9.0	1.151	1.135	1.128	1.126	1.127
17	8.8	1.166	1.155	1.146	1.141	1.142
18	8.6	1.170	1.161	1.151	1.146	1.148
19	8.4	1.173	1.165	1.157	1.154	1.157
20	8.2	1.178	1.175	1.170	1.171	1.174
21	8.0	1.181	1.182	1.180	1.183	1.187
22	7.8	1.183	1.184	1.183	1.186	1.190
23	7.6	1.187	1.187	1.188	1.192	1.196
24	7.4	1.191	1.191	1.196	1.202	1.206
25	7.2	1.194	1.194	1.201	1.207	1.212
26	7.0	1.193	1.193	1.201	1.208	1.212
27	6.8	1.194	1.193	1.202	1.209	1.214
28	6.6	1.192	1.192	1.202	1.210	1.215
29	6.4	1.188	1.188	1.201	1.210	1.215
30	6.2	1.180	1.182	1.196	1.206	1.211
31	6.0	1.178	1.183	1.196	1.206	1.212
32	5.8	1.170	1.180	1.188	1.199	1.205
33	5.6	1.150	1.169	1.172	1.182	1.188
34	5.4	1.133	1.158	1.157	1.166	1.171
35	5.2	1.129	1.154	1.152	1.160	1.165
36	5.0	1.127	1.147	1.148	1.156	1.161
37	4.8	1.121	1.134	1.140	1.149	1.153
38	4.6	1.115	1.122	1.133	1.144	1.147
39	4.4	1.109	1.114	1.128	1.139	1.142
40	4.2	1.104	1.113	1.123	1.130	1.132
41	4.0	1.103	1.118	1.120	1.121	1.122
42	3.8	1.107	1.125	1.123	1.123	1.123
43	3.6	1.116	1.131	1.130	1.135	1.135
44	3.4	1.122	1.135	1.137	1.144	1.144
45	3.2	1.128	1.138	1.144	1.153	1.153
46	3.0	1.137	1.140	1.151	1.160	1.160
47	2.8	1.145	1.142	1.156	1.165	1.165
48	2.6	1.147	1.142	1.157	1.167	1.166
49	2.4	1.151	1.147	1.160	1.170	1.171
50	2.2	1.165	1.159	1.167	1.179	1.183
51	2.0	1.175	1.167	1.173	1.187	1.195
52	1.8	1.176	1.168	1.176	1.193	1.202

These decks are generated for normal operation flux maps that are typically taken at full power ARO. Additional N(z) decks may be generated for the specific plant conditions at the time of the flux map, if necessary, consistent with the methodology described in the RPDC topical (Reference 3). EOR is defined as Hot Full Power End of Reactivity.

COLR Figure 3.2-1



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

LCO 3.2.2 $F_{\Delta H}^N$ shall be within the limits specified below.

$$F_{\Delta H}^N \leq 1.587\{1 + 0.3(1 - P)\}$$

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

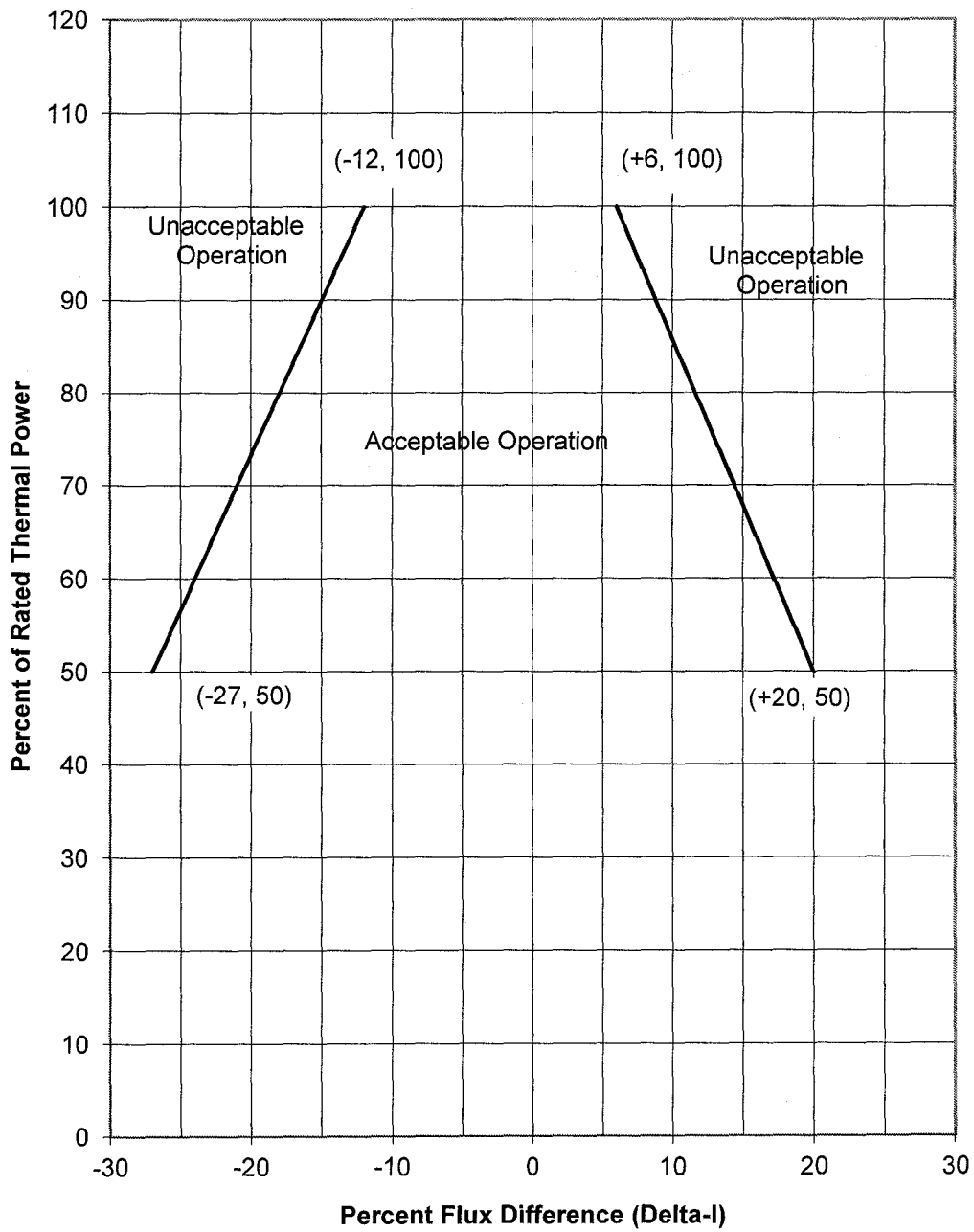
SR 3.2.2.1 Verify $F_{\Delta H}^N$ is within limits specified above.

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

North Anna 2 Cycle 22
Axial Flux Difference Limits



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.

$$K_1 \leq 1.2715$$

$$K_2 \geq 0.02172 / ^\circ\text{F}$$

$$K_3 \geq 0.001144 / \text{psig}$$

$\tau_1, \tau_2 =$ time constants utilized in the lead-lag controller for T_{avg}

$$\tau_1 \geq 23.75 \text{ sec}$$

$$\tau_2 \leq 4.4 \text{ sec}$$

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

$$f_1(\Delta I) \geq \begin{cases} 0.0165 \{-35 - (q_t - q_b)\} & \text{when } (q_t - q_b) < -35\% \text{ RTP} \\ 0 & \text{when } -35\% \text{ RTP} \leq (q_t - q_b) \leq +3\% \text{ RTP} \\ 0.0198 \{(q_t - q_b) - 3\} & \text{when } (q_t - q_b) > +3\% \text{ RTP} \end{cases}$$

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.

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.

$$K_4 \leq 1.0865$$

$$K_5 \geq 0.0197 \text{ /}^\circ\text{F for increasing } T_{\text{avg}}$$

$$0 \text{ /}^\circ\text{F for decreasing } T_{\text{avg}}$$

$$K_6 \geq 0.00162 \text{ /}^\circ\text{F when } T > T'$$

$$0 \text{ /}^\circ\text{F when } T \leq T'$$

τ_3 = time constant utilized in the rate lag controller for T_{avg}

$$\tau_3 \geq 9.5 \text{ sec}$$

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

$$f_2(\Delta I) = 0, \text{ for all } \Delta I.$$

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 $\geq 90\%$ RTP.

Verify by precision heat balance that RCS total flow rate is \geq **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 \geq **2600 ppm**.

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

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TRM 3.1 REACTIVITY CONTROL SYSTEMS

TR 3.1.1 Boration Flow Paths – Operating

Required Action D.2 Borate to a SHUTDOWN MARGIN $\geq 1.77\% \Delta k/k$ at 200 °F,
after xenon decay.