VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

October 20, 1989

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Serial No. 89-001A
PES/JYR:cdk
Docket No. 50-339
License No. NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNIT 2
RELOAD INFORMATION FOR CYCLE 7 TEMPERATURE REDUCTION

North Anna Unit 2 is currently scheduled to implement a 6°F RCS average temperature reduction between 5000 MWD/MTU and 7000 MWD/MTU of burnup. The purpose of this letter is to transmit to you the Core Surveillance Report containing specific power distribution limits applicable for Cycle 7 operation with this temperature reduction.

The Cycle 7 core with the temperature reduction was analyzed in accordance with the methodology documented in the approved topical report VEP-FRD-42, Revision 1-A, "Reload Nuclear Design Methodology," using NRC approved codes as referenced in the topical. The information in the report was developed in accordance with our topical report VEP-NE-1-A, "Relaxed Power Distribution Control Methodology and Associated FQ Surveillance Technical Specifications." These analyses were performed and reviewed by our technical staff. The results of these analyses indicated that no key analysis parameters would become more limiting during Cycle 7 operation with the reduced temperature conditions than the values assumed in the applicable safety analyses.

A review has been performed by both the Station Nuclear Safety and Operating Committee and the Safety Evaluation and Control Staff. It has been determined that no unreviewed safety question as defined in 10 CFR 50.59 will exist as a result of the 6°F RCS average temperature reduction implementation.

The Core Surveillance Report, which consists of the Cycle 7 N(z) function and the Axial Flux Difference Limits for operation past 5000 MWD/MTU, is included as Attachment 1. These limits are based upon the current total peaking factor (F_Q) limit of 2.19. Technical Specification 6.9.1.7 requires that the Report be provided to the NRC 60 days prior to cycle criticality unless a written waiver has been granted by the Staff. For reasons noted in our letter Serial No. 89-646, dated September 14, 1989, we were unable to meet the 60 day requirement. A written waiver was requested at that time, and this letter transmits the Core Surveillance Report for the temperature reduction as promised.

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This letter is provided for your information and planning. However, should you have questions, please contact us at your earliest convenience.

Very truly yours,

W. L. Stewart
Senior Vice President - Power

Attachment

1. Core Surveillance Report For North Anna 2, Cycle 7

cc: U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, N. W.
Suite 2900
Atlanta, Georgia 30323

Mr. J. L. Caldwell
NRC Senior Resident Inspector
North Anna Power Station

Attachment 1

Core Surveillance Report for North Anna 2 Cycle 7
With 6°F RCS Average Temperature Reduction

NORTH ANNA UNIT 2 CYCLE 7 CORE SURVEILLANCE REPORT FOR REDUCED TEMPERATURE OPERATION

This Core Surveillance Report is provided in accordance with Section 6.9.1.7 of the North Anna Unit 2 Technical Specifications.

The burnup-dependent Cycle 7 N(z) function for Technical Specification 4.2.2.2.C is shown in Figures 1-4. N(z) was calculated according to the procedure of VEP-NE-1-A.

The N(z) function* will be used to confirm that the heat flux hot channel factor, FQ(z), will be limited to the Technical Specifications values of

$$FQ(z) \leq \frac{2.19\ K(z)}{P}, \quad P > 0.5 \text{ and}$$

$$FQ(z) \leq 4.38\ K(Z), \quad P \leq 0.5.$$

The Cycle 7 Axial Flux Difference (AFD) limits for Technical Specification 3.2.1 are shown in Figure 5. These limits were calculated according to the methods of VEP-NE-1-A and are comparable to the previous Cycle 7 limits.

The limits on Axial Flux Difference assure that the FQ(z) upper bound envelope is not exceeded during either normal operation or in the event of xenon redistribution following power changes.

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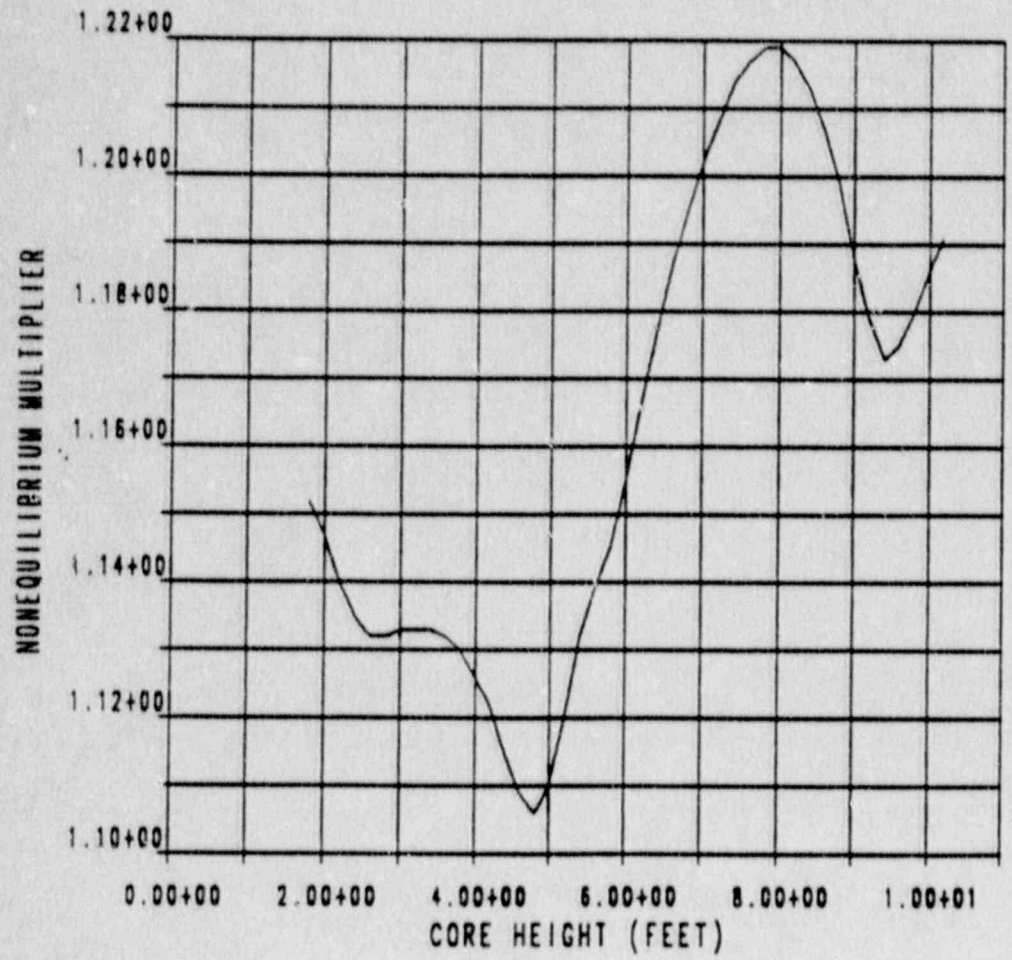
*The N(z) function, when applied to a power distribution measured under equilibrium conditions, demonstrates that the initial conditions assumed in the LOCA analysis are met, along with the ECCS acceptance criteria of 10CFR50.46.

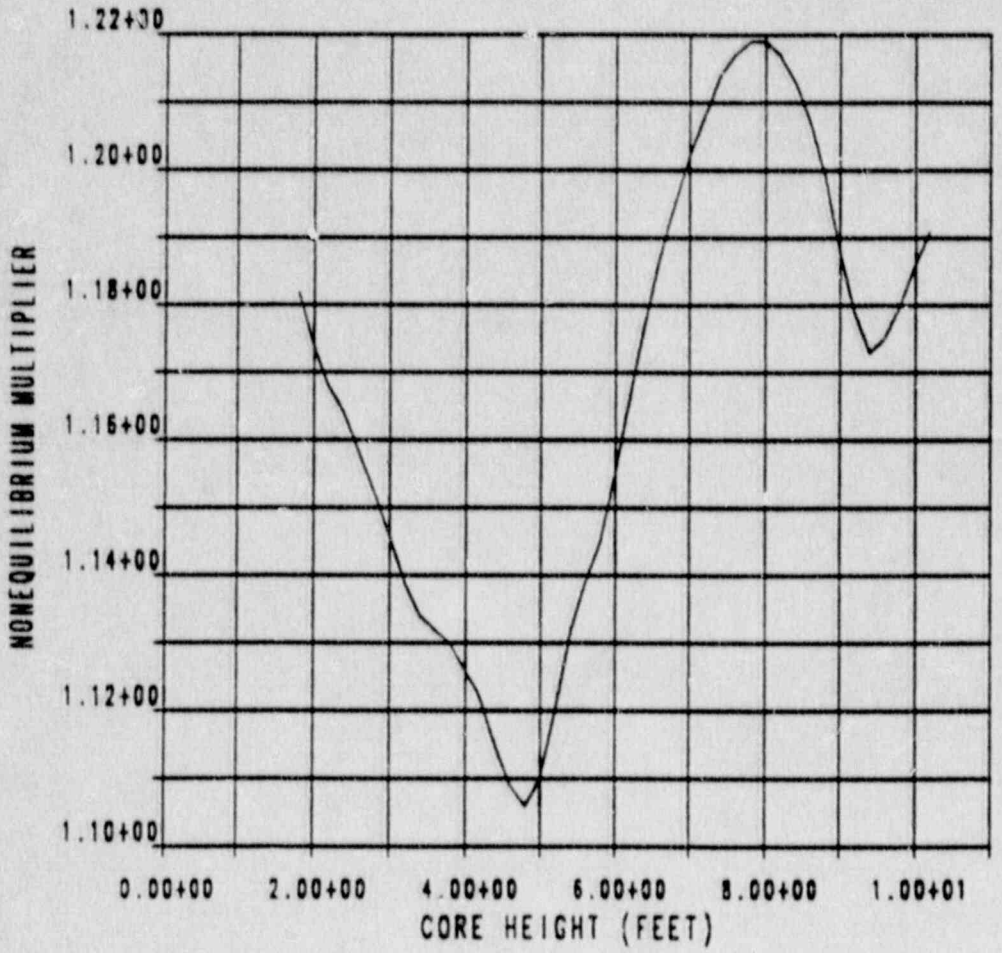
FIGURE 1 - N(Z) FUNCTION FOR N2C7 AT 2893 MW
REDUCED TEMPERATURE OPERATION
FROM 5000 to 7000 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



N2C7/JU N(Z) FUNCTION AT 5000-7000 MWD/MTU BURNUP

HEIGHT	NZ5
10.20	1.191
10.00	1.186
9.80	1.180
9.60	1.175
9.40	1.173
9.20	1.179
9.00	1.188
8.80	1.199
8.60	1.207
8.40	1.213
8.20	1.217
8.00	1.219
7.80	1.219
7.60	1.217
7.40	1.214
7.20	1.208
7.00	1.202
6.80	1.195
6.60	1.187
6.40	1.177
6.20	1.166
6.00	1.155
5.80	1.145
5.60	1.139
5.40	1.132
5.20	1.120
5.00	1.110
4.80	1.106
4.60	1.109
4.40	1.115
4.20	1.122
4.00	1.126
3.80	1.130
3.60	1.132
3.40	1.133
3.20	1.133
3.00	1.133
2.80	1.132
2.60	1.132
2.40	1.135
2.20	1.140
2.00	1.147
1.80	1.152

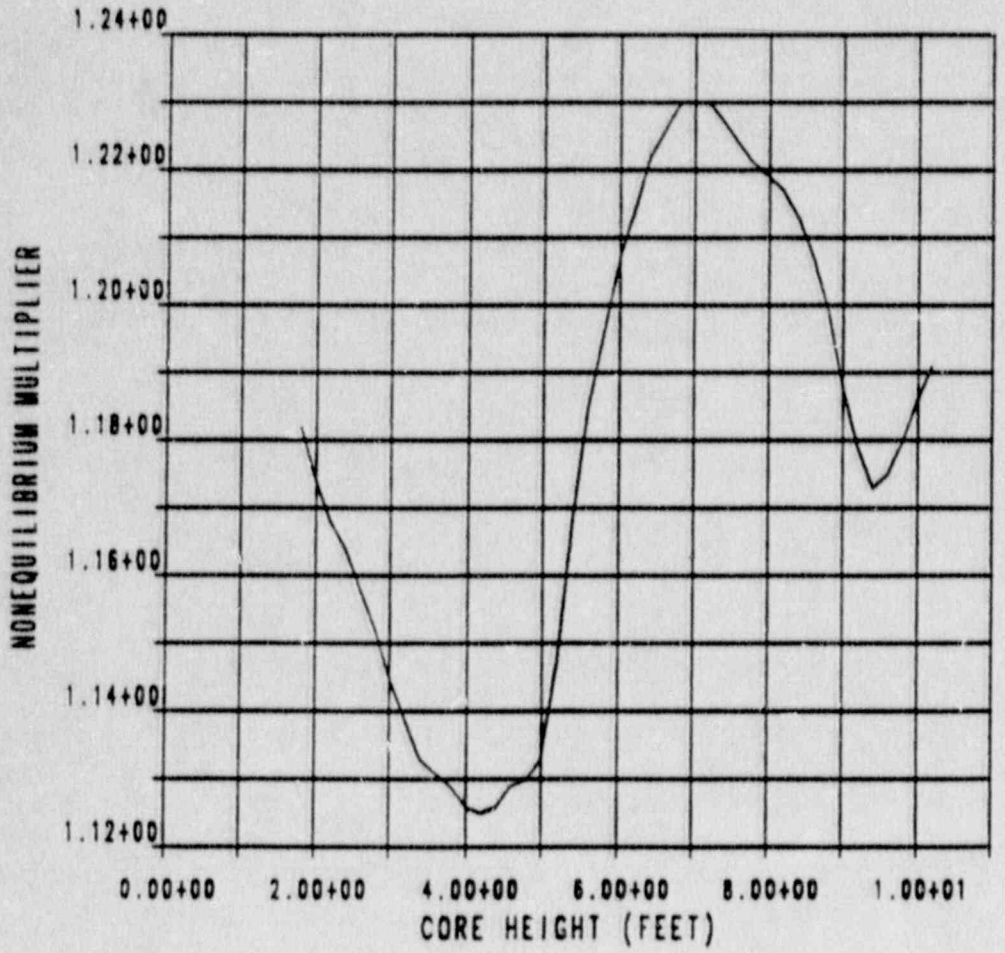
FIGURE 2 - N(Z) FUNCTION FOR N2C7 AT 2893 MW
REDUCED TEMPERATURE OPERATION
FROM 7000 to 9000 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



N2C7/JU N(Z) FUNCTION AT 7000-9000 MWD/MTU BURNUP

HEIGHT	NZ6
10.20	1.191
10.00	1.186
9.80	1.180
9.60	1.175
9.40	1.173
9.20	1.179
9.00	1.188
8.80	1.199
8.60	1.207
8.40	1.213
8.20	1.217
8.00	1.219
7.80	1.219
7.60	1.217
7.40	1.214
7.20	1.208
7.00	1.202
6.80	1.195
6.60	1.187
6.40	1.177
6.20	1.166
6.00	1.155
5.80	1.145
5.60	1.139
5.40	1.132
5.20	1.120
5.00	1.110
4.80	1.106
4.60	1.109
4.40	1.115
4.20	1.122
4.00	1.126
3.80	1.130
3.60	1.132
3.40	1.134
3.20	1.139
3.00	1.146
2.80	1.152
2.60	1.158
2.40	1.164
2.20	1.168
2.00	1.174
1.80	1.182

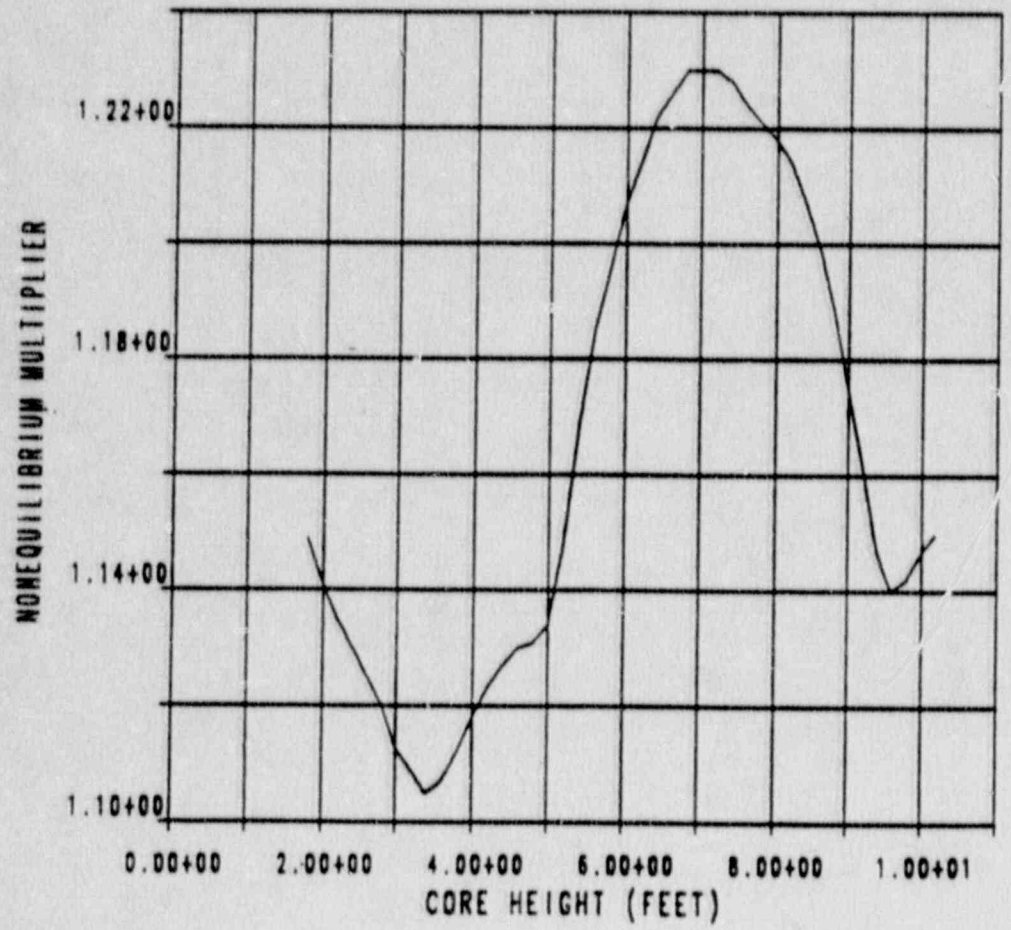
FIGURE 3 - N(Z) FUNCTION FOR N2C7 AT 2893 MW
REDUCED TEMPERATURE OPERATION
FROM 9000 to 15600 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



N2C7/JU N(Z) FUNCTION AT 9000-15600 MWD/MTU BURNUP

HEIGHT	NZ7
10.20	1.191
10.00	1.186
9.80	1.180
9.60	1.175
9.40	1.173
9.20	1.179
9.00	1.188
8.80	1.199
8.60	1.207
8.40	1.213
8.20	1.217
8.00	1.219
7.80	1.221
7.60	1.224
7.40	1.227
7.20	1.230
7.00	1.230
6.80	1.230
6.60	1.226
6.40	1.222
6.20	1.214
6.00	1.207
5.80	1.196
5.60	1.185
5.40	1.169
5.20	1.147
5.00	1.133
4.80	1.130
4.60	1.129
4.40	1.126
4.20	1.125
4.00	1.126
3.80	1.129
3.60	1.131
3.40	1.133
3.20	1.139
3.00	1.145
2.80	1.152
2.60	1.158
2.40	1.164
2.20	1.168
2.00	1.174
1.80	1.182

FIGURE 4 - N(Z) FUNCTION FOR N2C7 AT 2893 MW
REDUCED TEMPERATURE OPERATION
FROM 15600 MWD/MTU BURNUP TO EOL
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



N2C7/JU N(Z) FUNCTION AT 15600-17700 MWD/MTU BURNUP

HEIGHT	NZ8
10.20	1.150
10.00	1.147
9.80	1.142
9.60	1.140
9.40	1.147
9.20	1.162
9.00	1.175
8.80	1.188
8.60	1.199
8.40	1.207
8.20	1.214
8.00	1.218
7.80	1.221
7.60	1.224
7.40	1.228
7.20	1.230
7.00	1.230
6.80	1.230
6.60	1.226
6.40	1.222
6.20	1.214
6.00	1.207
5.80	1.196
5.60	1.185
5.40	1.169
5.20	1.148
5.00	1.134
4.80	1.131
4.60	1.130
4.40	1.127
4.20	1.123
4.00	1.118
3.80	1.112
3.60	1.107
3.40	1.105
3.20	1.109
3.00	1.113
2.80	1.120
2.60	1.125
2.40	1.130
2.20	1.135
2.00	1.141
1.80	1.149

FIGURE 9 - AXIAL FLUX DIFFERENCE LIMITS
AS A FUNCTION OF RATED THERMAL POWER
FROM 150 MWD/MTU BURNUP TO EOC
FOR NORTH ANNA UNIT 2 CYCLE 7
REDUCED TEMPERATURE OPERATION