1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for North Anna Unit 1 Cycle 9 has been prepared in accordance with the requirements of Technical Specification 6.9.1.7.

The Technical Specifications affected by this report are listed below:

3/4.1.1.4	Moderator Temperature Coefficient
3/4.1.3.5	Shutdown Bank Insertion Limit
3/4.1.3.6	Control Bank Insertion Limits
3/4.2.1	Axial Flux Difference
3/4.2.2	Heat Flux Hot Channel Factor
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor and Power Factor Multiplier

The cycle specific parameter limits for the specifications listed above are presented in the following sections. These limits have been developed using the NRC-approved methodologies specified in Technical Specifications 6.9.1.7.

2.0 Operating Limits

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.4)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

The BOC/ARO-MTC shall be less positive than or equal to +0.6E-4 $\Delta k/k/^{\circ}F$ below 70 percent of RATED THERMAL POWER.

The BOC/ARO-MTC shall be less positive than or equal to 0.0E-4 $\Delta k/k/^{\circ}F$ at or above 70 percent of RATED THERMAL POWER.

The EOC/ARO/RTP-MTC shall be less negative than -5.0E-4 $\Delta k/k/^{\circ}F$.

2.1.2 The MTC Surveillance limits are:

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

The 60 ppm/ARO/RTP-MTC should be less negative than or equal to -4.7E-04 $\Delta k/k/^{\circ}F$.

where: BOC - Beginning of Cycle
ARO - All Rods Out
EOC - End of Cycle
RTP - RATED THERMAL POWER

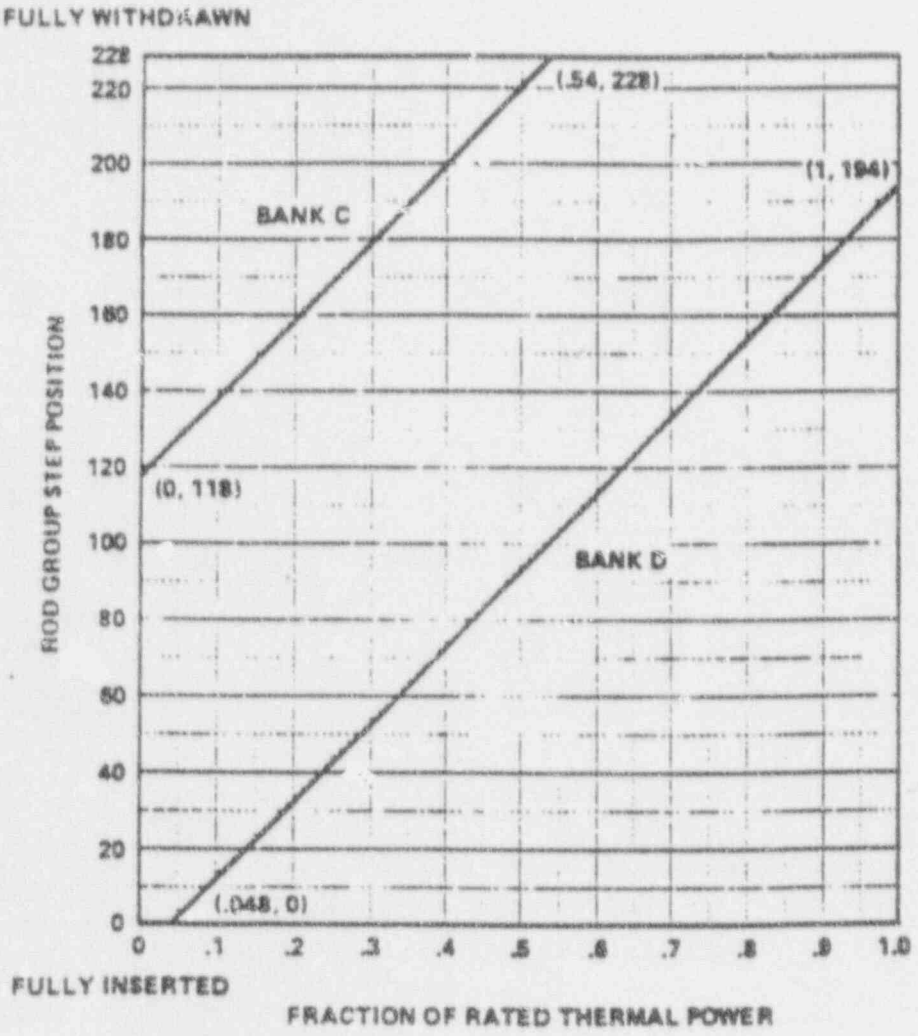
2.2 Shutdown Bank Insertion Limit (Specification 3/4.1.3.5)

2.2.1 The shutdown rods shall be withdrawn to at least 228 steps.

2.3 Control Bank Insertion Limits (Specification 3/4.1.3.6)

2.3.1 The control rod banks shall be limited in physical insertion as shown in Figure 1.

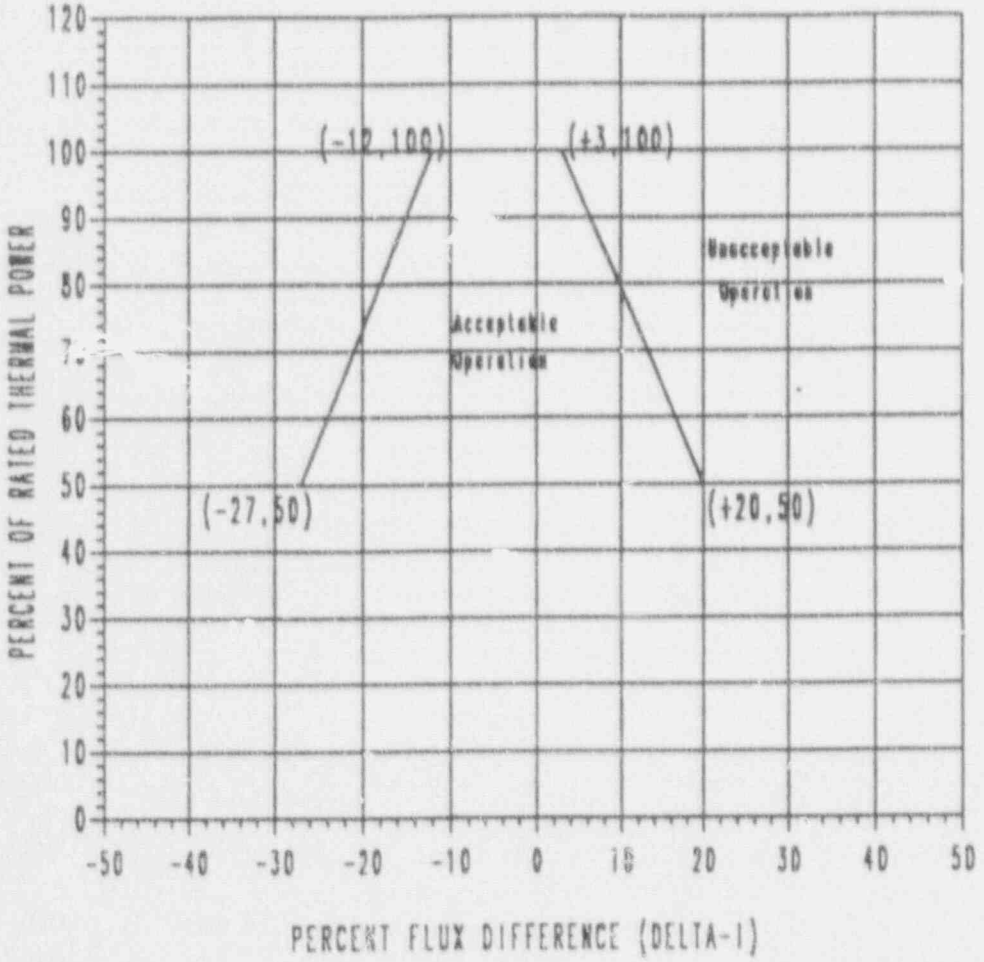
FIGURE 1
NORTH ANNA UNIT 1 CYCLE 9
CONTROL ROD BANK INSERTION LIMITS VS. PERCENT RATED THERMAL POWER



2.4 Axial Flux Difference (Specification 3/4.2.1)

2.4.1 The AXIAL FLUX DIFFERENCE Limits are provided in Figure 2.

FIGURE 2
AXIAL FLUX DIFFERENCE LIMITS
AS A FUNCTION OF RATED THERMAL POWER



2.5 Heat Flux Hot Channel Factor-FQ(Z) (Specification 3/4.2.2)

2.5.1 The $F_Q(Z)$ limits are:

$$F_Q(Z) \leq \frac{2.19}{P} * K(Z) \quad \text{for } P > 0.5$$

$$F_Q(Z) \leq 4.38 * K(Z) \quad \text{for } P \leq 0.5$$

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

K(Z) is provided in Figure 3

2.5.2 The $F_Q(Z)$ Surveillance limits are:

$$F_Q(Z)^M \leq \frac{2.19}{P} * \frac{K(Z)}{N(Z)} \quad \text{for } P > 0.5$$

$$F_Q(Z)^M \leq 4.38 * \frac{K(Z)}{N(Z)} \quad \text{for } P \leq 0.5$$

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

K(Z) is provided in Figure 3, and

N(Z) values are provided in Figures 4 and 5.

FIGURE 3
K(Z) - NORMALIZED FQ AS A FUNCTION OF CORE HEIGHT

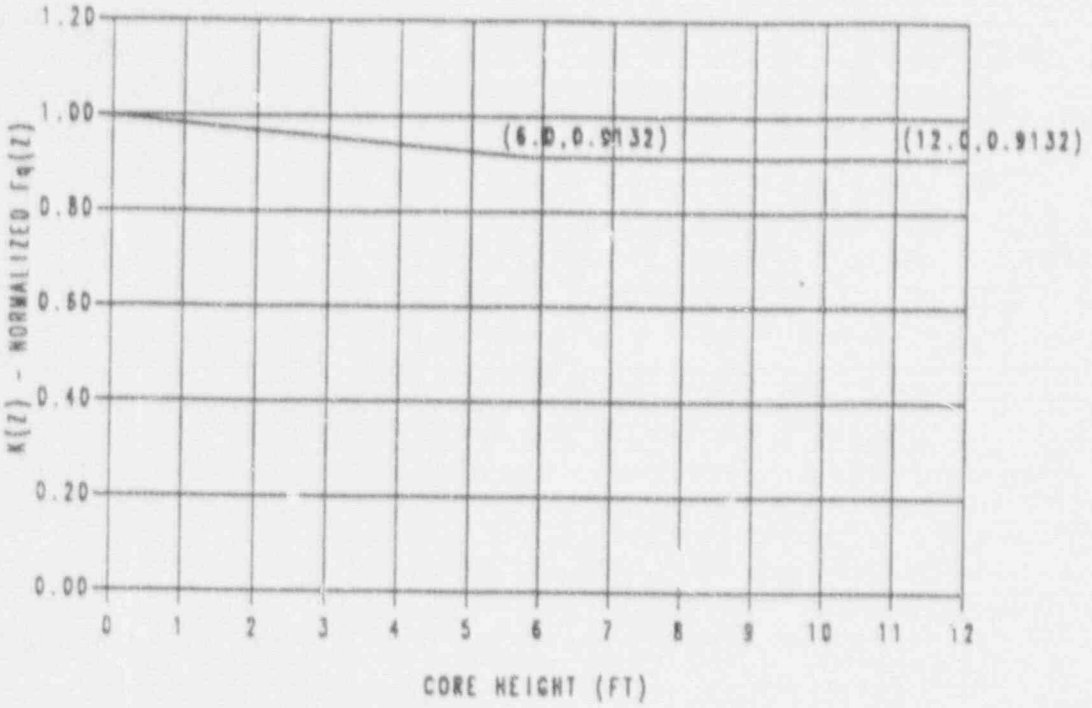
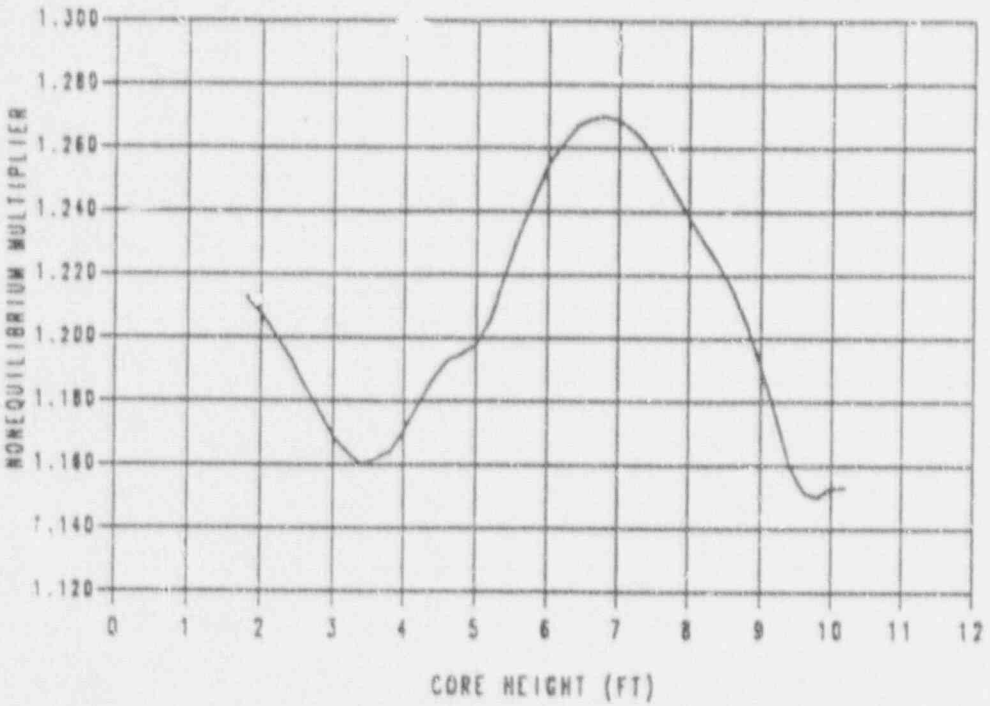
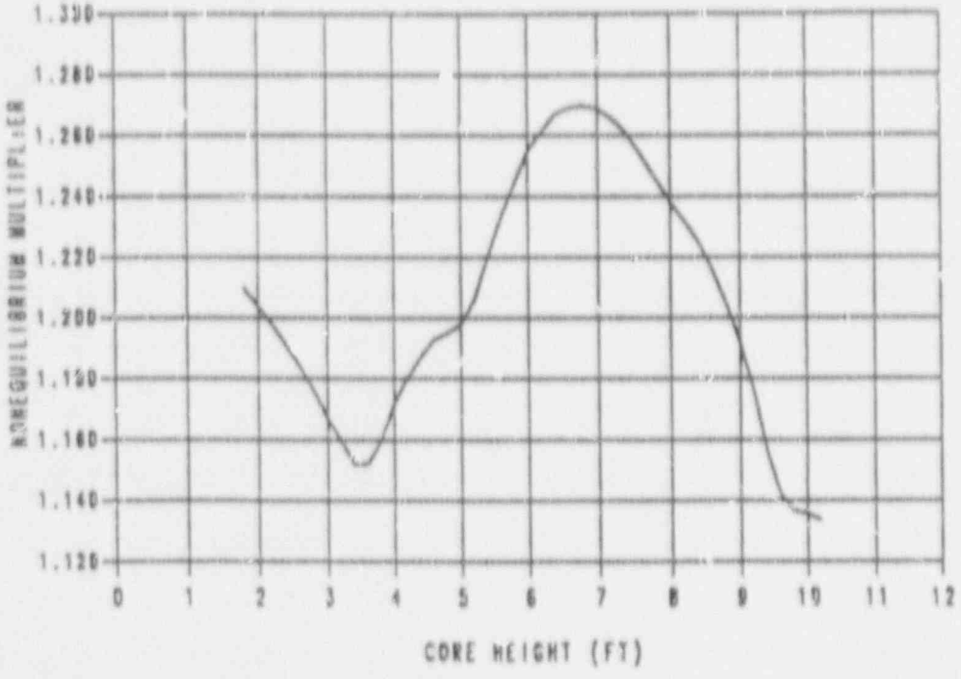


FIGURE 4
N(Z) FUNCTION FOR N1C9
FROM 9000 to 16600 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
As PER TECH SPEC 4.2.2.2.G



HEIGHT (FEET)	N(Z)
10.20	1.153
10.00	1.153
9.80	1.150
9.60	1.152
9.40	1.160
9.20	1.176
9.00	1.191
8.80	1.205
8.60	1.216
8.40	1.224
8.20	1.231
8.00	1.238
7.80	1.246
7.60	1.254
7.40	1.261
7.20	1.266
7.00	1.269
6.80	1.270
6.60	1.269
6.40	1.267
6.20	1.261
6.00	1.255
5.80	1.244
5.60	1.233
5.40	1.220
5.20	1.206
5.00	1.198
4.80	1.195
4.60	1.193
4.40	1.187
4.20	1.179
4.00	1.171
3.80	1.164
3.60	1.162
3.40	1.160
3.20	1.164
3.00	1.169
2.80	1.177
2.60	1.185
2.40	1.194
2.20	1.201
2.00	1.208
1.80	1.213

FIGURE 5
N(Z) FUNCTION FOR N1C9
FROM 16600 MWD/MTU BURNUP TO EOL
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



HEIGHT (FEET)	N(Z)
10.20	1.134
10.00	1.136
9.80	1.137
9.60	1.142
9.40	1.156
9.20	1.176
9.00	1.192
8.80	1.205
8.60	1.216
8.40	1.225
8.20	1.232
8.00	1.238
7.80	1.246
7.60	1.254
7.40	1.261
7.20	1.265
7.00	1.269
6.80	1.270
6.60	1.269
6.40	1.267
6.20	1.261
6.00	1.255
5.80	1 244
5.60	1.233
5.40	1.220
5.20	1.206
5.00	1.198
4.80	1.195
4.60	1.193
4.40	1.187
4.20	1.180
4.00	1.172
3.80	1.160
3.60	1.152
3.40	1.152
3.20	1.160
3.00	1.167
2.80	1.176
2.60	1.184
2.40	1.191
2.20	1.198
2.00	1.204
1.80	1.210

2.6 Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}(N)$ and Power Factor Multiplier (Specification 3/4.2.3)

$$F_{\Delta H}(N) \leq 1.49 * (1 + 0.3 * (1 - P))$$

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