ATTACHMENT 2

TECHNICAL SPECIFICATION CHANGES

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

BASES

AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within the allowed operational space defined by Figure 3.2-1.

APPLICABILITY: MODE 1 ABOVE 50% RATED THERMAL POWER

ACTION:

a. With the indicated AXIAL FLUX DIFFERENCE outside of the Figure 3.2-1 limits,

   1) Either restore the indicated AFD to within the Figure 3.2-1 limits within 15 minutes, or

   2) Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER within 30 minutes and reduce the Power Range Neutron Flux - High Trip setpoints to less than or equal to 55 percent of RATED THERMAL POWER within the next 4 hours.

b. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD is within the Figure 3.2-1 limits.

4.2.1.1 The indicated AXIAL FLUX DIFFERENCE shall be determined to be within its limits during POWER OPERATION above 50% of RATED THERMAL POWER by:

a. Monitoring the indicated AFD for each OPERABLE excore channel:

   1. At least once per 7 days when the AFD Monitor Alarm is OPERABLE, and

   2. At least once per hour for the first 24 hours after restoring the AFD Monitor Alarm to OPERABLE status.

b. Monitoring and logging the indicated AXIAL FLUX DIFFERENCE for each OPERABLE excore channel at least once per hour for the first 24 hours and at least once per 30 minutes thereafter, when the AXIAL FLUX DIFFERENCE Monitor Alarm is inoperable. The logged values of the indicated AXIAL FLUX DIFFERENCE shall be assumed to exist during the interval preceding each logging.

4.2.1.2 The indicated AFD shall be considered outside of its limit when at least 2 OPERABLE excore channels are indicating the AFD to be outside of the limit shown in Figure 3.2-1.

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Figure 3.2-1 is provided in the Core Surveillance Report as per Technical Specification 6.9.1.7.

Figure 3.2-1 - Axial Flux Difference Limits as a Function of Rated Thermal Power

HEAT FLUX HOT CHANNEL FACTOR - $F_Q(Z)$

LIMITING CONDITION FOR OPERATION

3.2.2 $F_Q(Z)$ shall be limited by the following relationships:

$$F_Q(Z) \le \frac{[2.15]}{P} [K(Z)] \text{ for } P > 0.5$$

$$F_Q(Z) \le [4.30] [K(Z)] \text{ for } P \le 0.5$$

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

and K(Z) is the function obtained from Figure 3.2-2 for a given core height location.

APPLICABILITY: MODE 1.

ACTION:

With $F_Q(Z)$ exceeding its limit:

a. Reduce THERMAL POWER at least 1% for each 1% $F_Q(Z)$ exceeds the limit within 15 minutes and similarly reduce the Power Range Neutron Flux-High Trip Setpoints within the next 4 hours; POWER OPERATION may proceed for up to a total of 72 hours; subsequent POWER OPERATION may proceed provided the Overpower ΔT Trip Setpoint (value of K_4) has been reduced at least 1% (in ΔT span) for each 1% $F_Q(Z)$ exceeds the limit.

b. Identify and correct the cause of the out of limit condition prior to increasing THERMAL POWER above the reduced limit required by a, above; THERMAL POWER may then be increased provided $F_Q(Z)$ is demonstrated through incore mapping to be within its limit.

SURVEILLANCE REQUIREMENTS

4.2.2.1 The provisions of Specification 4.0.4 are not icable.

4.2.2.2 $F_Q(Z)$ shall be evaluated to determine if $F_Q(Z)$ is within its limit by:

a. Using the movable incore detectors to obtain a power distribution map at any THERMAL POWER greater than 5% of RATED THERMAL POWER.

b. Increasing the measured $F_Q(Z)$ component of the power distribution map by 3% to account for manufacturing tolerances and further increasing the value by 5% to account for measurement uncertainties.

c. Satisfying the following relationship:

$$F_Q^M(z) \leq \frac{2.15 \times K(z)}{P \times N(z)} \text{ for } P > 0.5$$

$$F_Q^M(z) \leq \frac{2.15 \times K(z)}{N(z) \times 0.5} \text{ for } P \leq 0.5$$

where $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the allowances for manufacturing tolerances and measurement uncertainty, 2.15 is the F_Q limit, K(z) is given in Figure 3.2-2, P is the relative THERMAL POWER, and N(z) is the cycle dependent function that accounts for power distribution transients encountered during normal operation. This function is given in the Core Surveillance Report as per Specification 6.9.1.7.

d. Measuring $F_Q^M(z)$ according to the following schedule:

1. Upon achieving equilibrium conditions after exceeding the THERMAL POWER at which $F_Q(z)$ was last determined by 10% or more of RATED THERMAL POWER*, or

2. At least once per 31 effective full power days, whichever occurs first.

e. With measurements indicating

$$\underset{\text{over } z}{\text{maximum}} \left(\frac{F_Q^M(z)}{K(z)} \right)$$

has increased since the previous determination of $F_Q^M(z)$ either of the following actions shall be taken:

*During power escalation, the power level may be increased until a power level for extended operation has been achieved and a power distribution map obtained.

SURVEILLANCE REQUIREMENTS (Continued)

1. $F_Q^M(z)$ shall be increased by 2% over that specified in 4.2.2.2.c, or

2. $F_Q^M(z)$ shall be measured at least once per 7 effective full power days until 2 successive maps indicate that

$$\underset{\text{over } z}{\text{maximum}} \left(\frac{F_Q^M(z)}{K(z)} \right) \text{ is not increasing.}$$

f. With the relationships specified in 4.2.2.2.c above not being satisfied:

1. Calculate the percent $F_Q(z)$ exceeds its limit by substracting one from the measurement/limit ratio and multiplying by 100:

$$\left\{ \underset{\text{over } z}{\text{maximum}} \left(\frac{F_Q^M(z)}{\frac{2.15}{P \times N(z)} \times (K(z))} \right) -1 \right\} \times 100 \text{ for } P \geq 0.5$$

$$\left\{ \underset{\text{over } z}{\text{maximum}} \left(\frac{F_Q^M(z)}{\frac{2.15}{0.5 \times N(z)} \times (K(z))} \right) -1 \right\} \times 100 \text{ for } P < 0.5$$

2. Either of the following actions shall be taken:

   a. Power operation may continue provided the AFD limits of Figure 3.2-1 are reduced 1% AFD for each percent $F_Q(z)$ exceeded its limit, or

   b. Comply with the requirements of Specification 3.2.2 for $F_Q(z)$ exceeding its limit by the percent calculated above.

g. The limits specified in 4.2.2.2.c, 4.2.2.2.e, and 4.2.2.2.f above are not applicable in the following core plane regions:

1. Lower core region 0 to 15 percent inclusive.

2. Upper core region 85 to 100 percent inclusive.

4.2.2.3 When $F_Q(z)$ is measured for reasons other than meeting the requirements of Specification 4.2.2.2, an overall measured $F_Q(z)$ shall be obtained from a power distribution map and increased by 3% to account for manufacturing tolerances and further increased by 5% to account for measurement uncertainty.

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SPECIAL TEST EXCEPTIONS

GROUP HEIGHT, INSERTION AND POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION

3.10.2 The group height, insertion and power distribution limits of Specifications 3.1.3.1, 3.1.3.5, 3.1.3.6, and 3.2.4 may be suspended during the performance of PHYSICS TESTS provided:

a. The THERMAL POWER is maintained ≤ 85% of RATED THERMAL POWER, and

b. The limits of Specifications 3.2.2 and 3.2.3 are maintained and determined at the frequencies specified in Specification 4.10.2.2 below.

APPLICABILITY: MODE 1.

ACTION:

With any of the limits of Specifications 3.2.2 or 3.2.3 being exceeded while the requirements of Specifications 3.1.3.1, 3.1.3.5, 3.1.3.6 and 3.2.4 are suspended, either:

a. Reduce THERMAL POWER sufficient to satisfy the ACTION requirements of Specifications 3.2.2 and 3.2.3, or

b. Be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.10.2.1 The THERMAL POWER shall be determined to be ≤ 85% of RATED THERMAL POWER at least once per hour during PHYSICS TESTS.

4.10.2.2 The Surveillance Requirements of Specifications 4.2.2 and 4.2.3 shall be performed at the following frequencies during PHYSICS TESTS:

a. Specification 4.2.2 - At least once per 12 hours.

b. Specification 4.2.3 - At least once per 12 hours.

3/4.2 POWER DISTRIBUTION LIMITS

BASES

The specifications of this section provide assurance of fuel integrity during Condition I (Normal Operation) and II (Incidents of Moderate Frequency) events by: (a) maintaining the minimum DNBR in the core from going beyond the design limit DNBR during normal operation and in short term transients, and (b) limiting the fission gas release, fuel pellet temperature & cladding mechanical properties to within assumed design criteria. In addition, limiting the peak linear power density during Condition I events provides assurance that the initial conditions assumed for the LOCA analyses are met and the ECCS acceptance criteria limit of $2200^{\circ}F$ is not exceeded.

The definitions of certain hot channel and peaking factors as used in these specifications are as follows:

$F_Q(Z)$ Heat Flux Hot Channel Factor, is defined as the maximum local heat flux on the surface of a fuel rod at core elevation Z divided by the average fuel rod heat flux, allowing for manufacturing tolerances on fuel pellets and rods.

$F^N_{\Delta H}$ Nuclear Enthalpy Rise Hot Channel Factor, is defined as the ratio of the integral of linear power along the rod with the highest integrated power to the average rod power.

3/4 2.1 AXIAL FLUX DIFFERENCE (AFD)

The limits on AXIAL FLUX DIFFERENCE assure that the $F_Q(Z)$ upper bound envelope, as given in Specification 3.2.2, is not exceeded during either normal operation or in the event of xenon redistribution following power changes.

Provisions for monitoring the AFD on an automatic basis are derived from the plant process computer through the AFD Monitor Alarm. The computer determines the one minute average of each of the OPERABLE excore detector outputs and provides an alarm message immediately if the AFD for at least 2 of 4 or 2 of 3 OPERABLE excore channels are outside the allowed ΔI-power operating space and the THERMAL POWER is greater than 50% of RATED THERMAL POWER.

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a. abnormal perturbations in the radial power shape, such as from rod misalignment, effect $F^N_{\Delta H}$ more directly than F_Q,

b. although rod movement has a direct influence upon limiting F_Q to within its limit, such control is not readily available to limit $F^N_{\Delta H}$, and

c. errors in prediction for control power shape detected during startup physics tests can be compensated for in F_Q by restricting axial flux distributions. This compensation for $F^N_{\Delta H}$ is less readily available.

Fuel rod bowing reduces the value of the DNB ratio. Credit is available to offset this reduction in the margin available between the safety analysis design DNBR values (1.57 and 1.59 for thimble and typical cells, respectively) and the limiting design DNBR values (1.39 for thimble cells and 1.42 for typical cells). The applicable value of rod bow penalties can be obtained from the FSAR.

The hot channel factor $F^M_{Q(Z)}$ is measured periodically and increased by a cycle and height dependent power factor, N(Z), to provide assurance that the limit on the hot channel factor, $F_Q(Z)$, is met. N(Z) accounts for the non-equilibrium effects of normal operation transients and was determined from expected power control maneuvers over the full range of burnup conditions in the core. The N(Z) function for normal operation is provided in the Core Surveillance Report per Specification 6.9.1.7.

3/4.2.4 QUADRANT POWER TILT RATIO

The quadrant power tilt ratio limit assures that the radial power distribution satisfies the design values used in the power capability analysis. Radial power distribution measurements are made during startup testing and periodically during power operation.

The limit of 1.02 at which corrective action is required provides DNB and linear heat generation rate protection with x-y plane power tilts.

The two hour time allowance for operation with a tilt condition greater than 1.02 but less than 1.09 is provided to allow identification and correction of a dropped or misaligned rod. In the event such action does not correct the tilt, the margin for uncertainty on F_Q is reinstated by reducing the power by 3 percent for each percent of tilt in excess of 1.0.

For purposes of monitoring QUADRANT POWER TILT RATIO when one excore detector is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the QUADRANT POWER TILT RATIO. The incore detector monitoring is done with a full incore flux map or two sets of 4 symmetric thimbles. The two sets of 4 symmetric thimbles is a unique set of 8 detector locations. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8.

3/4.2.5 DNB PARAMETERS

The limits on the DNB related parameters assure that each of the parameters are maintained within the normal steady state envelope of operation assumed in the transient and accident analyses. The limits are consistent with the initial FSAR assumptions and have been analytically demonstrated adequate to maintain a minimum DNBR greater than the design limit throughout each analyzed transient. Measurement uncertainties must be accounted for during the periodic surveillance.

The 12 hour periodic surveillance of these parameters thru instrument readout is sufficient to ensure that the parameters are restored within their limits following load changes and other expected transient operation. The 18 month periodic measurement of the RCS total flow rate is adequate to detect flow degradation and ensure correlation of the flow indication channels with measured flow such that the indicated percent flow will provide sufficient verification of flow rate on a 12 hour basis.

3/4.3.3.6 POST-ACCIDENT INSTRUMENTATION

The OPERABILITY of the post-accident instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess these variables following an accident.

3/4.3.3.7 FIRE DETECTION INSTRUMENTATION

OPERABILITY of the fire detection instrumentation ensures that adequate warning capability is available for the prompt detection of fires. This capability is required in order to detect and locate fires in their early stages. Prompt detection of fires will reduce the potential for damage to safety related equipment and is an integral element in the overall facility fire protection program.

In the event that a portion of the fire detection instrumentation is inoperable, the establishment of frequent fire patrols in the affected areas is required to provide detection capability until the inoperable instrumentation is restored to OPERABILITY.

3/4.3.3.9 LOOSE PARTS MONITORING SYSTEM

OPERABILITY of the Loose Parts Monitoring System provides assurance that loose parts within the RCS will be detected. This capability is designed to ensure that loose parts will not collect and create undesirable flow blockages.

CORE SURVEILLANCE REPORT

6.9.1.7 The N(Z) function for normal operation and the Axial Flux Difference limits (T.S. Figure 3.2-1) shall be provided to the NRC in accordance with the applicable provisions of 10CFR50.4 at least 60 days prior to cycle initial criticality unless otherwise approved by the Commission by letter. In the event that this information would be submitted at some other time during the core life, it shall be submitted 60 days prior to the date the information would become effective unless otherwise approved by the Commission by letter.

Any information needed to support N(Z) and/or the Axial Flux Difference limits will be by request from the NRC and need not be included in this report.

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT*

6.9.1.8 Routine Radiological Environmental Operating Reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 1 of each year. The initial report shall be submitted prior to May 1 of the year following initial criticality.

The Annual Radiological Environmental Operating Reports shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison (as appropriate) with preoperational studies, operational controls, and previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of land use censuses required by Specification 3.12.2.

The Annual Radiological Environmental Operating Reports shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the Table and Figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the radiological environmental monitoring program; at least two legible maps** covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor; the results of licensee participation in the Interlaboratory Comparison Program, required by Specification 3.12.3; discussion of all deviations from the sampling scheduled of Table 4.12-1 and discussion of all analyses in which the LLD required by Table 4.12-3 was not achievable.

* A single submittal may be made for a multiple unit station.

** One map shall cover stations near the SITE BOUNDARY; a second shall include the more distant stations.

ATTACHMENT 3

CORE SURVEILLANCE REPORT

NORTH ANNA UNIT 1 CYCLE 7 CORE SURVEILLANCE REPORT

This Core Surveillance Report is provided in accordance with Section 6.9.1.7 of the North Anna Unit 1 Technical Specifications.

The burnup-dependent Cycle 7 N(z) function for Technical Specification 4.2.2.2.G is shown in Figures 1-4. N(z) was calculated according to the procedure of VEP-NE-1-A for burnups greater than 3000 MWD/MTU.

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

$$FQ(z) \leq \frac{2.15\ K(z)}{P}, \quad P > 0.5 \text{ and}$$

$$FQ(z) \leq 4.30\ \ K(Z), \quad P \leq 0.5.$$

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.

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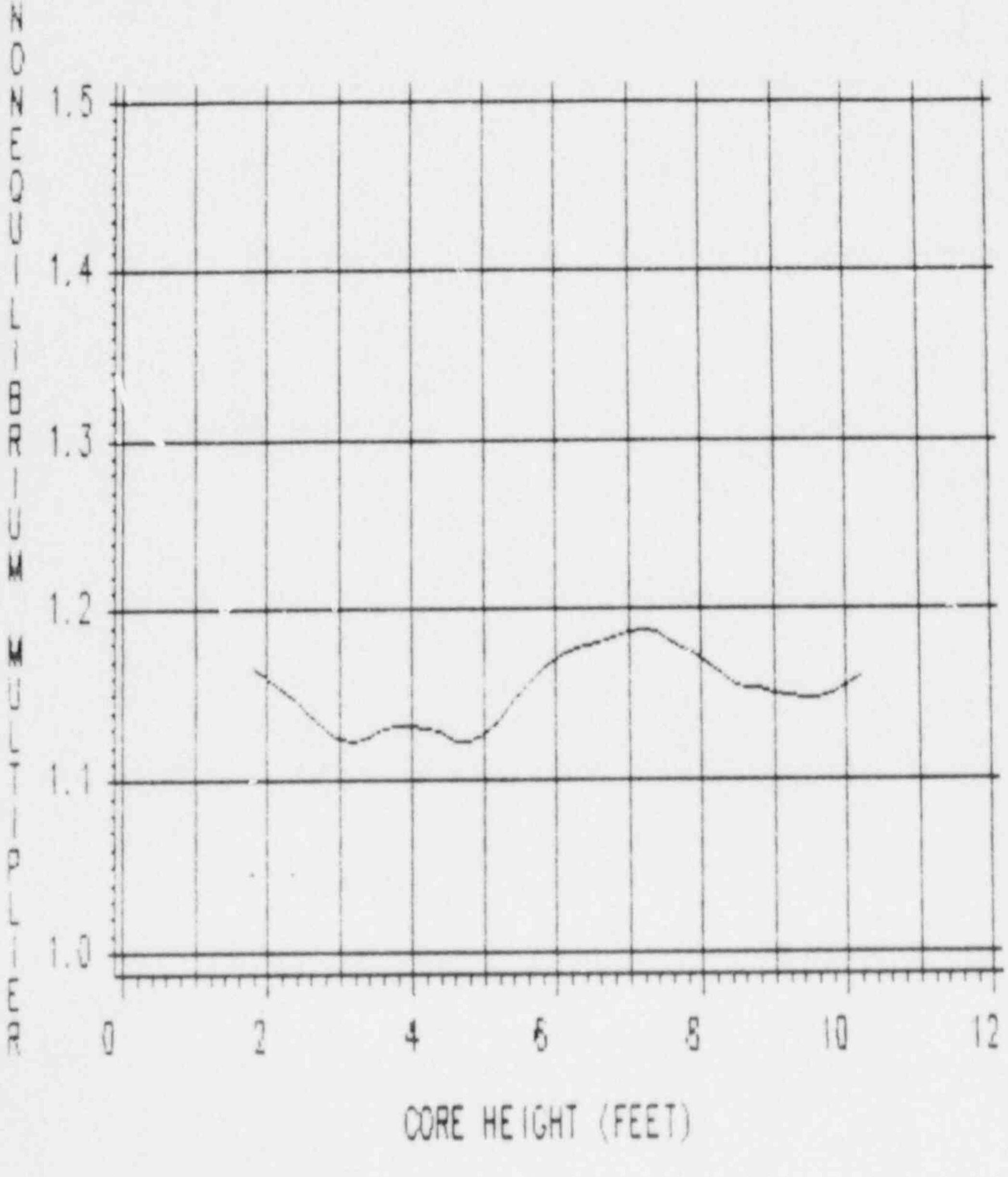
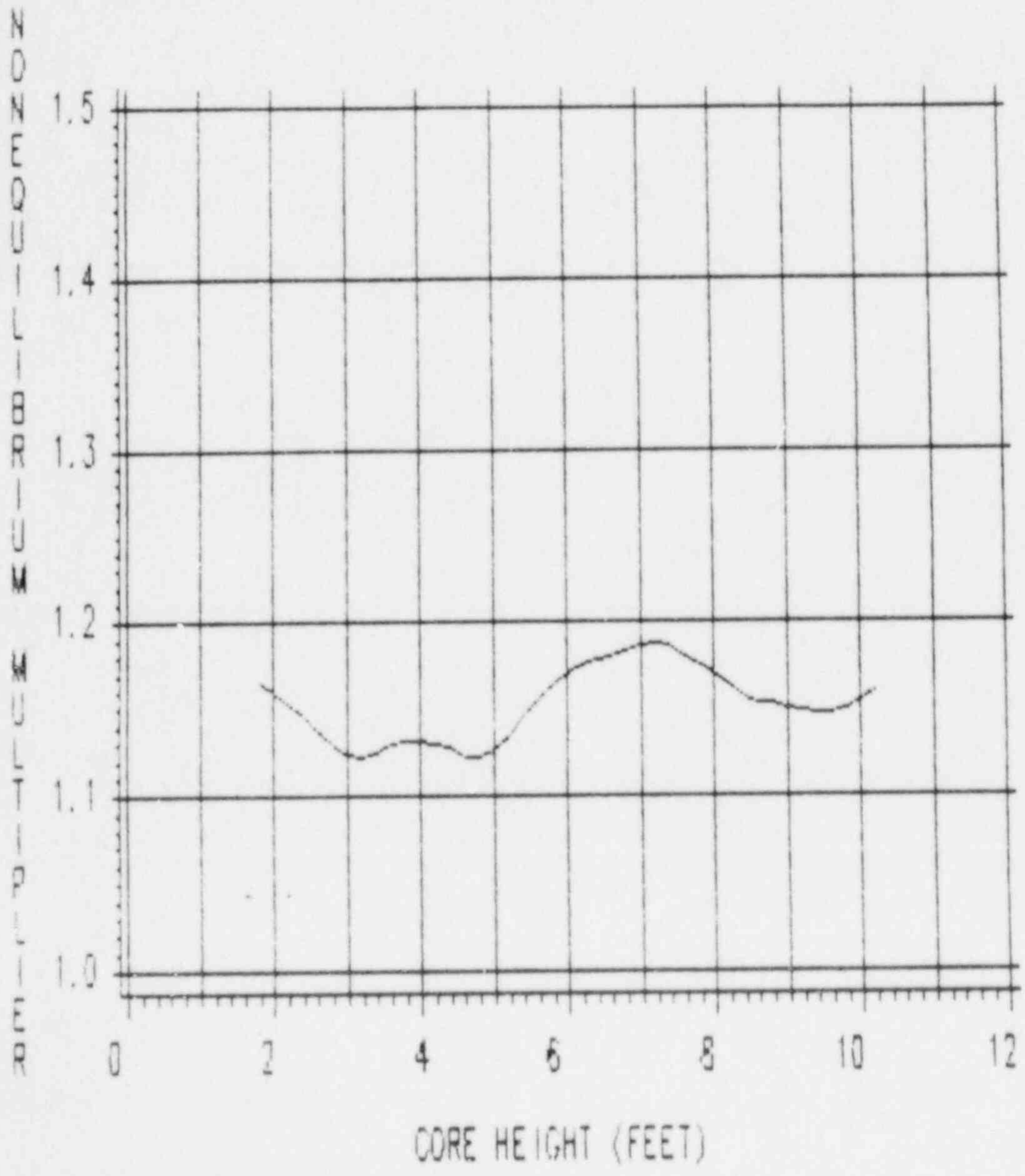
*The N(z) function, when applied to a power distribution measured under equilibrium conditions, demonstrates that the initial conditions assumed in the LOCA analysis are met, along with the ECCS acceptance criteria of 10CFR50.46.

FIGURE 1 - N(Z) FUNCTION FOR N1C7 AT 2893 MW
FROM 3000 to 5000 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



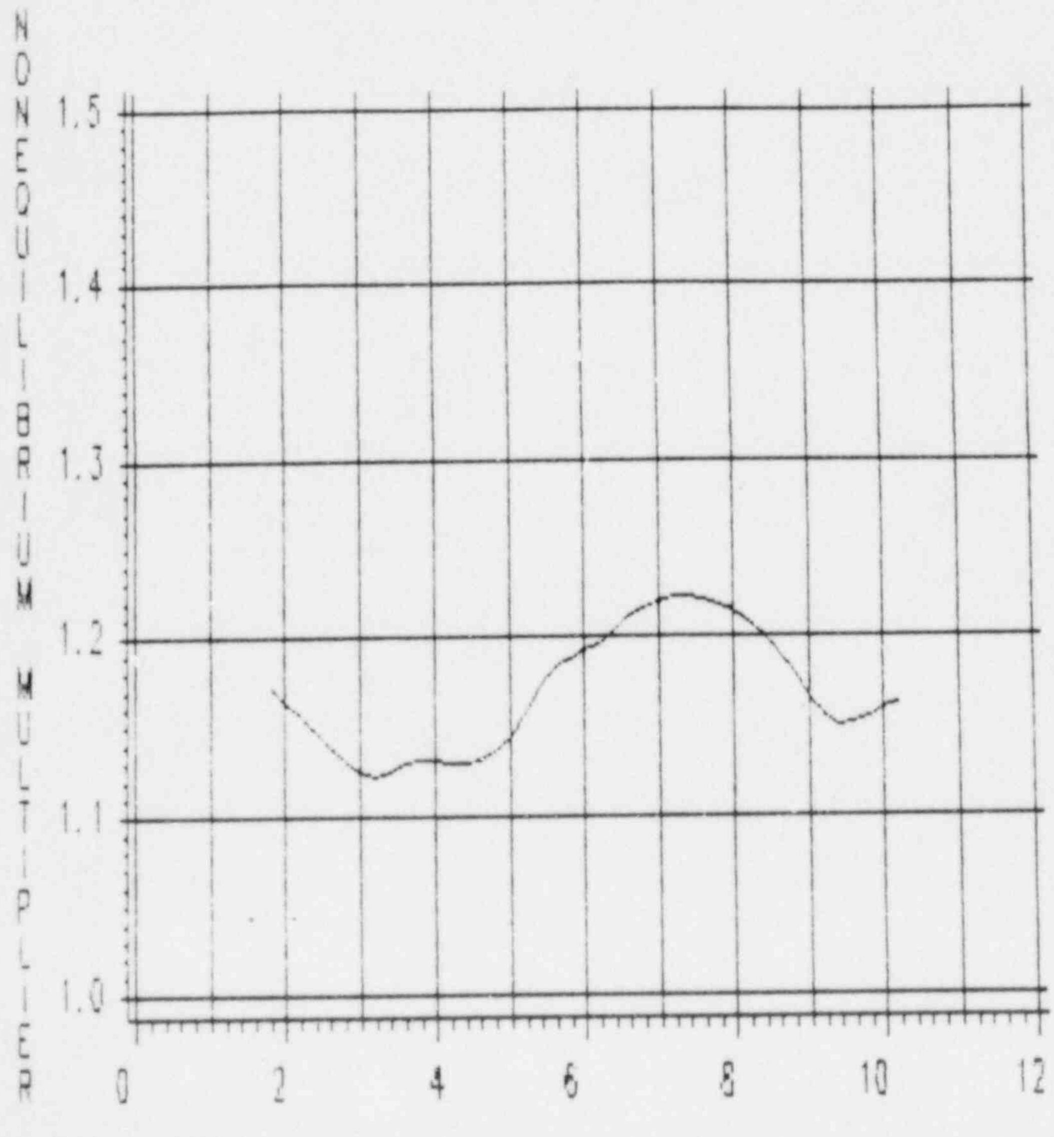
HEIGHT (FEET)	N(Z)
1.8	1.166
2.0	1.160
2.2	1.153
2.4	1.146
2.6	1.138
2.8	1.131
3.0	1.124
3.2	1.123
3.4	1.126
3.6	1.130
3.8	1.132
4.0	1.132
4.2	1.131
4.4	1.128
4.6	1.123
4.8	1.122
5.0	1.127
5.2	1.135
5.4	1.146
5.6	1.156
5.8	1.164
6.0	1.171
6.2	1.175
6.4	1.178
6.6	1.180
6.8	1.184
7.0	1.187
7.2	1.188
7.4	1.186
7.6	1.181
7.8	1.176
8.0	1.171
8.2	1.164
8.4	1.157
8.6	1.154
8.8	1.154
9.0	1.151
9.2	1.149
9.4	1.147
9.6	1.148
9.8	1.151
10.0	1.156
10.2	1.160

FIGURE 2 - N(Z) FUNCTION FOR N1C7 AT 2893 MW
FROM 5000 to 7000 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



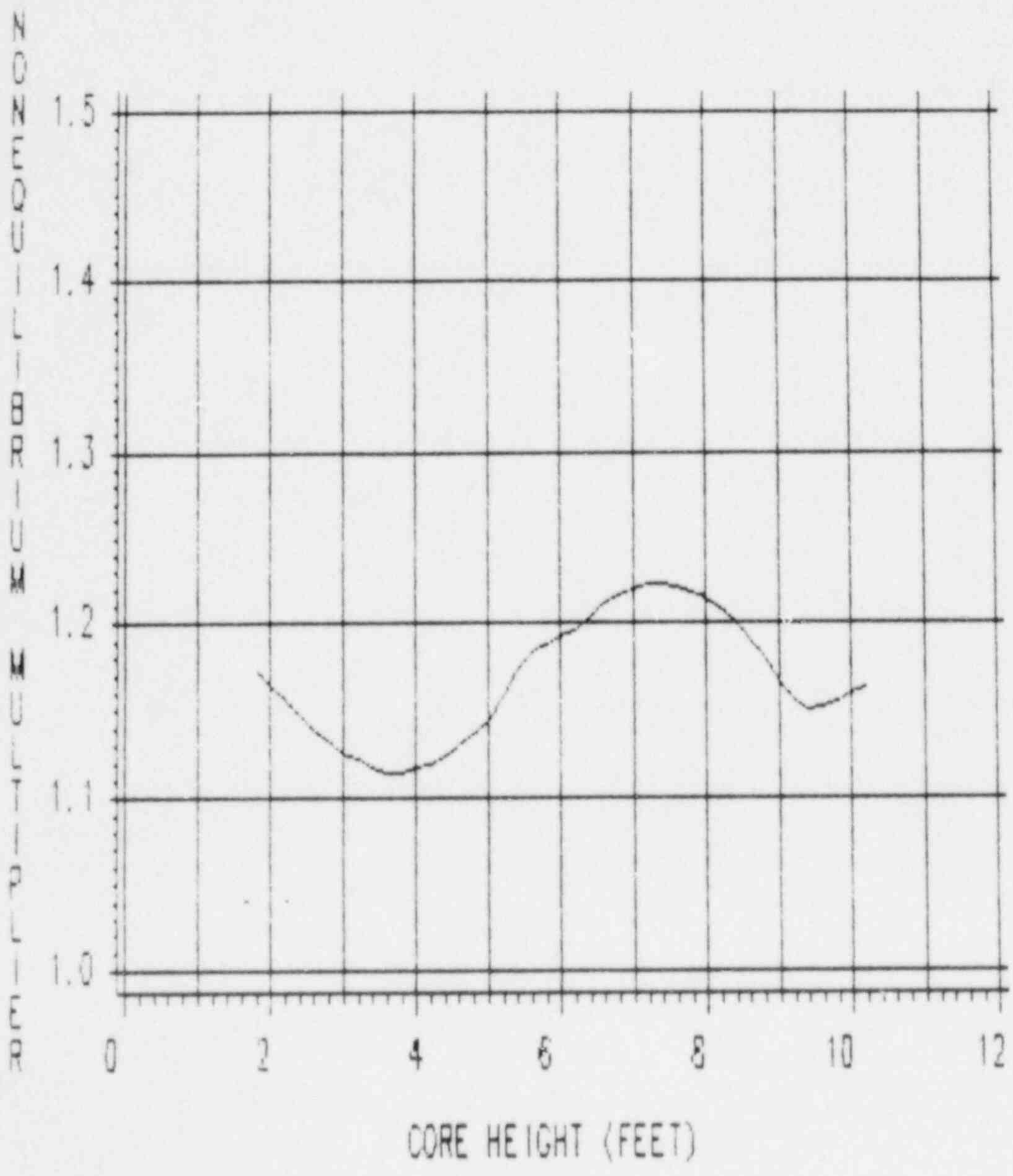
HEIGHT (FEET)	N(Z)
1.8	1.166
2.0	1.160
2.2	1.153
2.4	1.146
2.6	1.138
2.8	1.131
3.0	1.124
3.2	1.123
3.4	1.126
3.6	1.130
3.8	1.132
4.0	1.132
4.2	1.131
4.4	1.128
4.6	1.123
4.8	1.122
5.0	1.127
5.2	1.135
5.4	1.146
5.6	1.156
5.8	1.164
6.0	1.171
6.2	1.175
6.4	1.178
6.6	1.180
6.8	1.184
7.0	1.187
7.2	1.188
7.4	1.186
7.6	1.181
7.8	1.176
8.0	1.171
8.2	1.164
8.4	1.157
8.6	1.154
8.8	1.154
9.0	1.151
9.2	1.149
9.4	1.147
9.6	1.148
9.8	1.151
10.0	1.156
10.2	1.160

FIGURE 3 - N(Z) FUNCTION FOR N1C7 AT 2893 MW
FROM 7000 to 15000 MWD/MTU BURNUP
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



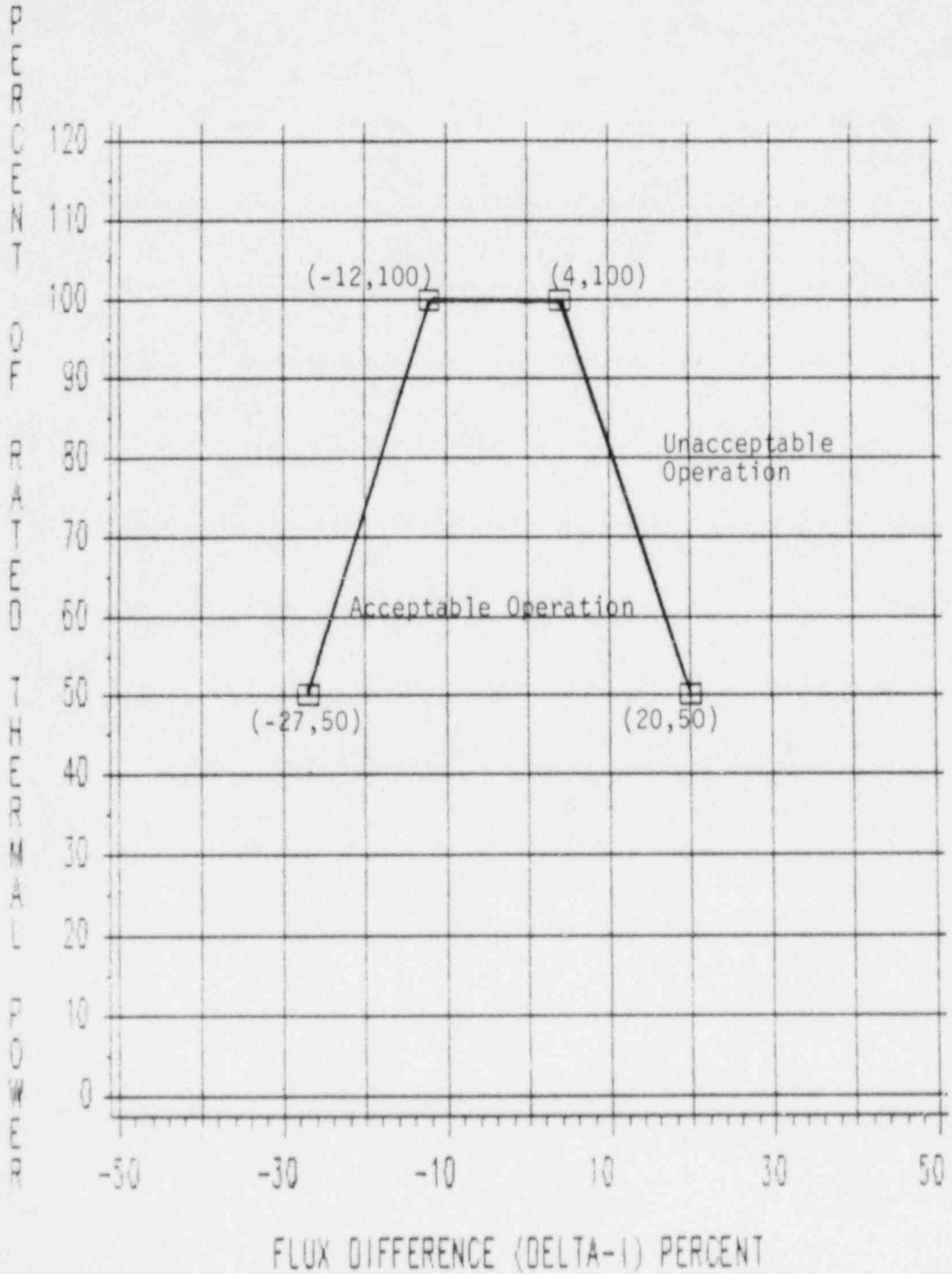
HEIGHT (FEET)	N(Z)
1.8	1.173
2.0	1.165
2.2	1.157
2.4	1.148
2.6	1.139
2.8	1.132
3.0	1.125
3.2	1.123
3.4	1.125
3.6	1.130
3.8	1.132
4.0	1.132
4.2	1.130
4.4	1.130
4.6	1.132
4.8	1.136
5.0	1.145
5.2	1.158
5.4	1.173
5.6	1.183
5.8	1.188
6.0	1.193
6.2	1.196
6.4	1.204
6.6	1.211
6.8	1.217
7.0	1.220
7.2	1.222
7.4	1.222
7.6	1.221
7.8	1.218
8.0	1.214
8.2	1.209
8.4	1.201
8.6	1.192
8.8	1.181
9.0	1.166
9.2	1.155
9.4	1.150
9.6	1.152
9.8	1.155
10.0	1.160
10.2	1.163

FIGURE 4 - N(Z) FUNCTION FOR N1C7 AT 2893 MW
FROM 15000 MWD/MTU BURNUP TO EOL
TOP AND BOTTOM 15 PERCENT EXCLUDED
AS PER TECH SPEC 4.2.2.2.G



HEIGHT (FEET)	N(Z)
1.8	1.173
2.0	1.165
2.2	1.157
2.4	1.148
2.6	1.140
2.8	1.133
3.0	1.126
3.2	1.123
3.4	1.117
3.6	1.114
3.8	1.115
4.0	1.117
4.2	1.119
4.4	1.124
4.6	1.130
4.8	1.137
5.0	1.145
5.2	1.158
5.4	1.173
5.6	1.183
5.8	1.188
6.0	1.193
6.2	1.196
6.4	1.204
6.6	1.211
6.8	1.217
7.0	1.220
7.2	1.222
7.4	1.222
7.6	1.221
7.8	1.218
8.0	1.214
8.2	1.209
8.4	1.201
8.6	1.192
8.8	1.181
9.0	1.166
9.2	1.155
9.4	1.150
9.6	1.152
9.8	1.155
10.0	1.160
10.2	1.163

FIGURE 5 - AXIAL FLUX DIFFERENCE LIMITS
AS A FUNCTION OF RATED THERMAL POWER
FROM 3000 MWD/MTU BURNUP to EOL
FOR NORTH ANNA UNIT 1 CYCLE 7



ATTACHMENT 4

APPLICATION FEE