January 17, 1989

Docket Nos. 50-338
and 50-339

DISTRIBUTION
See attached sheet

Mr. W. R. Cartwright
Vice President - Nuclear
Virginia Electric and Power Company
5000 Dominion Blvd.
Glen Allen, Virginia 23060

Dear Mr. Cartwright:

SUBJECT: NORTH ANNA UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS RE: STEAM GENERATOR TUBE PLUGGING (TAC NOS. 69802 AND 69803)

The Commission has issued the enclosed Amendment Nos. 114 and 97 to Facility Operating License Nos. NPF-4 and NPF-7 for the North Anna Power Station, Units No. 1 and No. 2 (NA-1&2). The amendments revise the Technical Specifications (TS) in response to your letter dated September 30, 1988.

The amendments allow an increase in the steam generator tube plugging from 7 percent and 15 percent to 18 percent. Also, the maximum FQ limit is increased from 2.15 to a value of 2.19.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by

Leon B. Engle, Project Manager
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 114 to NPF-4
2. Amendment No. 97 to NPF-7
3. Safety Evaluation

cc w/enclosures:
See next page

LA:PDII-2	PM:PDII-2	D:PDII-2	OGC
DMiller	LEngle:bd	HBerkow	MYoung
01/9/89	01/09/89	01/9/89	01/11/89

cc:
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Division of Energy Regulation
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c/o Executive Vice President
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Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
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Atlanta, Georgia 30323

Mr. G. E. Kane
P. O. Box 402
Mineral, Virginia 23117

DATED: January 17, 1989

AMENDMENT NO. 114 TO FACILITY OPERATING LICENSE NO. NPF-4-NORTH ANNA UNIT 1
AMENDMENT NO. 97 TO FACILITY OPERATING LICENSE NO. NPF-7-NORTH ANNA UNIT 2

[redacted]
NRC & Local PDRs
PDII-2 Reading
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G. Lainas, 14/H/3
H. Berkow
D. Miller
L. Engle
OGC-WF
D. Hagan, 3302 MNBB
E. Jordan, 3302 MNBB
B. Grimes, 9/A/2
T. Meek (8), P1-137
Wanda Jones, P-130A
E. Butcher, 11/F/23
ACRS (10)
GPA/PA
ARM/LFMB
B. Wilson, R-II

cc: Plant Service list

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-338

NORTH ANNA POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 114
License No. NPF-4

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company et al., (the licensee) dated September 30, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.D.(2) of Facility Operating License No. NPF-4 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 114 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 17, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 114

TO FACILITY OPERATING LICENSE NO. NPF-4

DOCKET NO. 50-338

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

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POWER DISTRIBUTION LIMITS

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:

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

$$F_Q(Z) \leq [4.38] [K(Z)] \text{ for } P \leq 0.5$$

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.

4.2.2.1 The provisions of Specification 4.0.4 are not applicable.

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:

$$F_Q^M(z) \leq \frac{2.19 \times K(z)}{P \times N(z)} \text{ for } P > 0.5$$

$$F_Q^M(z) \leq \frac{2.19 \times K(z)}{N(z) \times 0.5} \text{ for } P \leq 0.5$$

where $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the allowances for manufacturing tolerances and measurement uncertainty, 2.19 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

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

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

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

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 subtracting one from the measurement/limit ratio and multiplying by 100:

$$\left\{\text{maximum over } z \left(\frac{F_Q^M(z)}{\frac{2.19 \times K(z)}{P \times N(z)}}\right) - 1\right\} \times 100 \text{ for } P \geq 0.5$$

$$\left\{\text{maximum over } z \left(\frac{F_Q^M(z)}{\frac{2.19 \times K(z)}{0.5 \times N(z)}}\right) - 1\right\} \times 100 \text{ for } P < 0.5$$

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 limits, 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 then 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.

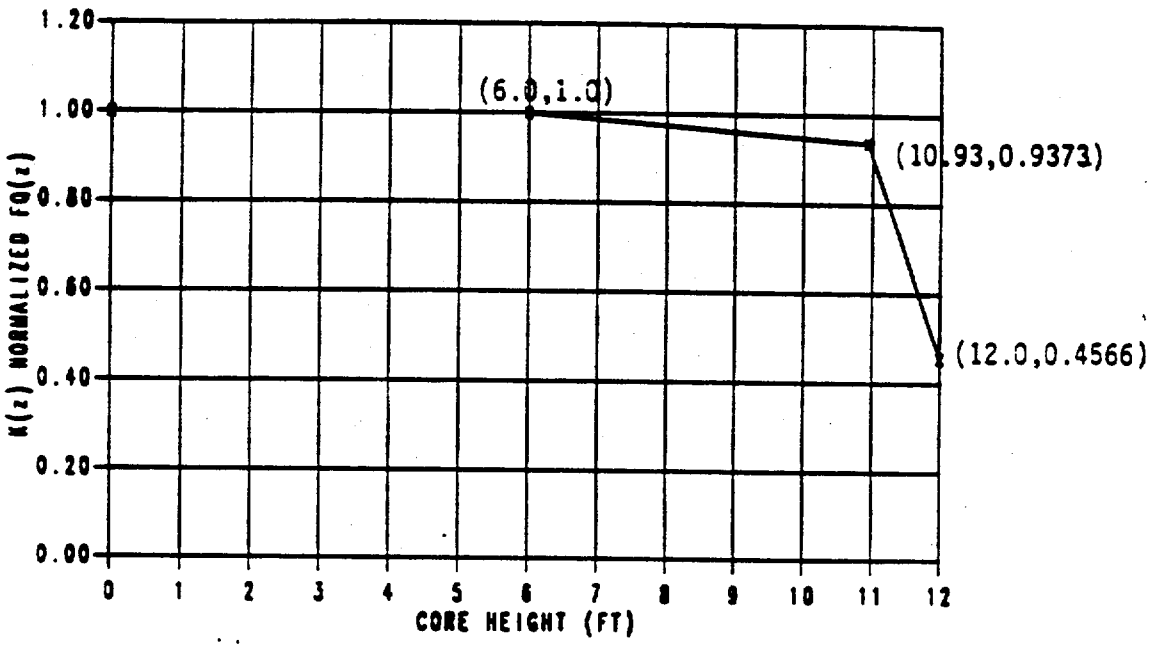

Figure 3.2-2 NORMALIZED FQ(z) AS A FUNCTION OF CORE HEIGHT

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

DOCKET NO. 50-339

NORTH ANNA POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 97
License No. NPF-7

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company, et al., (the licensee) dated September 30, 1988, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-7 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 97 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of the date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 17, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 97

TO FACILITY OPERATING LICENSE NO. NPF-7

DOCKET NO. 50-339

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages as indicated. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Page
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POWER DISTRIBUTION LIMITS

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:

$$F_Q(Z) \leq \left[\frac{2.19}{P}\right] [K(Z)] \text{ for } P > 0.5$$

$$F_Q(Z) \leq [4.38] [K(Z)] \text{ for } P \leq 0.5$$

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 Setpoints (value of K_4) have 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 applicable.

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:

$$F_Q^M(z) \leq \frac{2.19 \times K(z)}{P \times N(z)} \text{ for } P > 0.5$$

$$F_Q^M(z) \leq \frac{2.19 \times K(z)}{N(z) \times 0.5} \text{ for } P \leq 0.5$$

where $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the allowances for manufacturing tolerances and measurement uncertainty, 2.19 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

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

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.

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

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

f. With the realtionships 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:

$$\left\{ \text{maximum over } z \left(\frac{F_Q^M(z)}{\frac{2.19 \times K(z)}{P \times N(z)}} \right) - 1 \right\} \times 100 \quad \text{for } P \geq 0.5$$

$$\left\{ \text{maximum over } z \left(\frac{F_Q^M(z)}{\frac{2.19 \times K(z)}{0.5 \times N(z)}} \right) - 1 \right\} \times 100 \quad \text{for } P < 0.5$$

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.

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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.

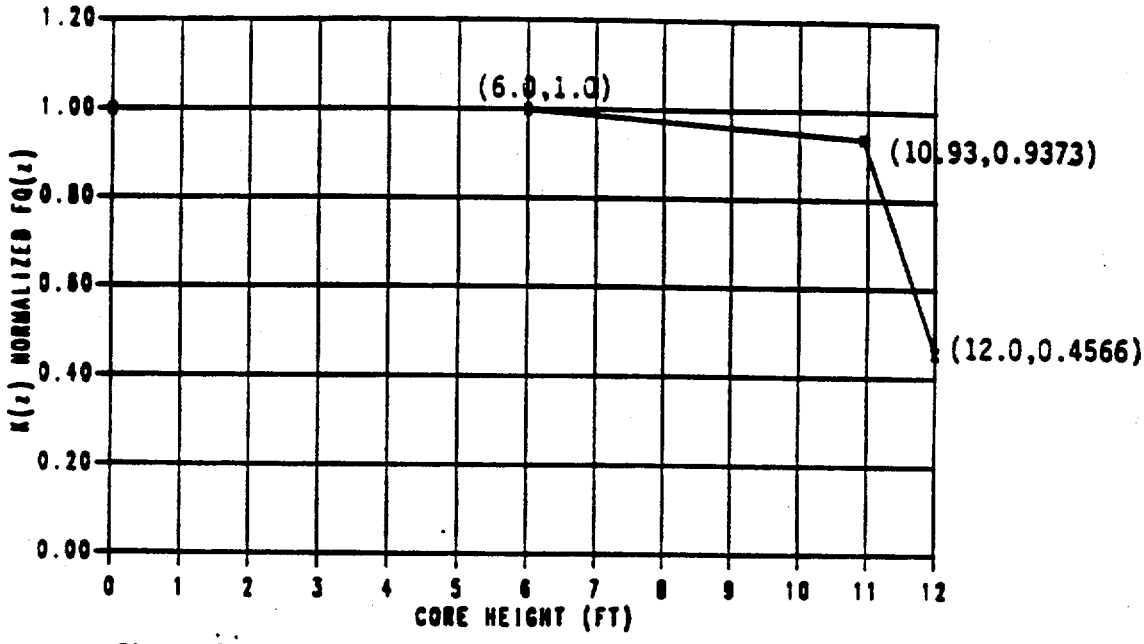

Figure 3.2-2 NORMALIZED FQ(z) AS A FUNCTION OF CORE HEIGHT

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 114 AND 97 TO

FACILITY OPERATING LICENSE NOS. NPF-4 AND NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY

OLD DOMINION ELECTRIC COOPERATIVE

NORTH ANNA POWER STATION, UNITS NO. 1 AND NO. 2

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

By letter dated September 30, 1988, the Virginia Electric and Power Company (the licensee) proposed an amendment to the operating licenses for North Anna Power Station, Units No. 1 and 2 (NA-1&2). The proposed changes would increase the maximum FQ limit from 2.15 to 2.19 and increase the allowed steam generator (SG) tube plugging from 7% and 15% to 18% with the associated NA-1&2 Technical Specification (TS) changes. Enclosed with the licensee's letter were evaluations of the effect of these changes on the plant safety analyses. Our discussion and evaluation of the proposed amendment follows.

2.0 DISCUSSION

2.1 LOCA Analyses

Revised large break Loss of Coolant Accident (LOCA) evaluations were performed using the increased FQ limit and SG tube plugging limit. These analyses were performed with the NRC-approved 1981 Westinghouse evaluation model BART and included the approved corrections for thimble tube modeling.

Analyses were performed for double-ended cold-leg guillotine breaks with discharge coefficients of 0.6 and 0.4. The double-ended cold-leg guillotine break has been determined to be the limiting break size and location based on the sensitivity studies reported in WCAP-8356, "Westinghouse ECCS Sensitivity Studies," July 1974. For the limiting case, a discharge coefficient of 0.4, the results were a peak cladding temperature of 2165°F, a maximum local cladding oxidation of 5.77% and a whole core metal-water reaction of less than 0.3%.

The staff has concluded that these calculations were performed for the worst case break, used an approved evaluation model which satisfies the requirements of Appendix K to 10 CFR Part 50, and met the requirements of 10 CFR 50.46. Thus, the staff finds these analyses acceptable.

2.2 Non-LOCA Safety Evaluation

The effect of the increased SG tube plugging limit of 18% on non-LOCA safety analyses was evaluated by the licensee. Increased SG tube plugging may affect these analyses by reducing primary system flow, resulting in more severe pump coastdown characteristics and reducing primary system inventory. The increased FQ limit has no effect on the non-LOCA analyses.

The licensee estimated the effects of the increased SG tube plugging on the reactor coolant system (RCS) flow rate and pump coastdown characteristics. The estimated flow rate with 18% tube plugging would be approximately equal to the thermal design flow used in the safety analysis. The licensee also stated that, while measured flow exceeds the thermal design flow, all non-LOCA events in which flow rate is an important parameter would be unaffected. Since assurance is provided that the actual RCS flow rate is at least equal to the thermal design flow as specified by TS 3.2.5, the staff finds the licensee's evaluation acceptable.

The impact of the reduced primary system inventory primarily affects the uncontrolled boron dilution events. The licensee concluded:

- For uncontrolled dilution events during startup, time to criticality is 37 minutes. This is sufficient time to recognize the high count rate signal and terminate the dilution flow.

- For uncontrolled dilution at power, the operator has greater than 15 minutes after the over-temperature delta-T alarm or trip to terminate the event and reborate.

- Dilution times for the refueling mode of operation are not impacted as the SG volumes are not part of the active system.

These times for operator action satisfy the acceptance criteria of Standard Review Plan (SRP) 15.4.6 which specifies a minimum of 15 minutes for operator action during startup and power operation. Thus, the staff finds the results acceptable.

2.3 Technical Specification Changes

The licensee proposed TS changes for the NA-1&2 TS 3.2.2, "Heat Flux Hot Channel Factor - FQ(Z)," and associated Surveillance Requirements 4.2.2.2.c and f. These changes are straightforward and simply replace the old FQ values with values based on an FQ of 2.19. These changes are acceptable.

3.0 EVALUATION

Based upon the licensee's revised LOCA analysis and evaluation of the impact of the proposed changes on the non-LOCA safety analyses, the staff finds the proposed increase in the FQ limit to 2.19 and the increased SG tube plugging limit of 18% satisfies the requirements of 10 CFR 50.46 and Appendix K to 10 CFR Part 50. Also, the proposed changes fall within the acceptance criteria of SRP 15.4.6. Therefore, the staff finds the proposed changes to the NA-1&2 TS to be acceptable.

4.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to surveillance requirements. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously published a proposed finding that the amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR §51.22(c)(9). Pursuant to 10 CFR §51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

We have concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: January 17, 1989

Principal Contributor:

R. Jones