VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

October 16, 1979

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Albert Schwencer, Chief
Operating Reactors Branch No. 1
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Serial No. 820
FR/RWC: plc

Docket No. 50-281

License No. DPR-37

Dear Mr. Denton:

SUPPLEMENTAL INFORMATION TO AMENDMENT TO THE OPERATING LICENSE
TECHNICAL SPECIFICATIONS CHANGE NO. 78
SURRY POWER STATION - UNIT NO. 2

Pursuant to 10 CFR 50.90, the Virginia Electric and Power Company, in our letter of May 31, 1979 (Serial No. 388), requested an amendment to Operating License DPR-37. The amendment requested was Change No. 78 to the Technical Specifications which was based on a LOCA-ECCS analysis which will support the continued full rated power operation of both Surry Unit Nos. 1 and 2 after replacement of their respective steam generators.

Transmitted herewith is supplemental information to our May 31, 1979 submittal regarding power distribution monitoring requirements. Attachment 1 provides a safety evaluation which supports elimination of the requirement for frequent axial power distribution surveillance based on the maximum analytically predicted total peaking factor values for Cycle 5 of Surry Unit 2 which are less than the limit established by the LOCA-ECCS submittal of May 31, 1979. Attachment 1 also supports a related modification of the Axial Flux Difference limits. Attachment 2 provides the appropriate additional changes to the Technical Specifications.

This proposed amendment has been reviewed and approved by both the Station Nuclear Safety and Operating Committee and the System Nuclear Safety and Operating Committee. It has been determined that this request does not involve an unreviewed safety question as defined in 10 CFR 50.59.

Your review of the attached Technical Specifications change is requested by December 1, 1979. Should you have questions, we would be happy to meet with you at your earliest convenience.

Very truly yours,

W L Stewart for
C. M. Stallings
Vice President-Power Supply
and Production Operations

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Attachments:
(1) Safety Analysis
(2) Proposed Technical Specifications

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cc: Mr. James P. O'Reilly, Director, Office of Inspections and Enforcement Region II

ATTACHMENT 1

ATTACHMENT 1

SAFETY EVALUATION (TOTAL PEAKING FACTOR) FOR SURRY UNIT NO. 2

The maximum total peaking factor values ($F_Q(Z)$) obtainable during Cycle 5 routine steady-state and assumed load follow (Condition I) operation have been determined to be less limiting than the allowable LOCA-ECCS total peaking factor limits defined in Reference 1. These analytically predicted total peaking factor values were determined using the methodology documented in Reference 2. Since violations of the current LOCA-ECCS allowable total peaking factor values are not predicted, the requirement for frequent axial power distribution surveillance currently in the Technical Specifications can be eliminated.

Axial flux difference requirements are an integral part of the methodology used to determine the total peaking factor, ($F_Q(Z)$), values associated with Condition I operation. Based on the results of the Cycle 5 peaking factor analysis for Condition I operation, which demonstrate that all Condition I $F_Q(Z)$ values will be below the LOCA-ECCS limiting $F_Q(Z)$ values, the axial flux difference limits have been modified in accordance with the methodology developed by Westinghouse and presented in Reference 3.

References

1. Letter from Vepco (C. M. Stallings) to NRC (H. R. Denton) dated May 31, 1979, Serial No. 388.

2. Letter from Westinghouse (C. Eicheldinger) to NRC (J. F. Stolz) dated April 6, 1978, Serial No. NS-CE-1749.

3. T. Morita, et. al., "Power Distribution Control and Load Following Procedures," WCAP-8385, Westinghouse Electric Corporation, September, 1974.

ATTACHMENT 2

Unit 1	Unit 2
$F_Q \leq 2.05 \times K(Z)$	$F_Q \leq 2.19 \times K(Z)$
$F^N_{\Delta H} \leq 1.55$	$F^N_{\Delta H} \leq 1.55$
$F^N_{\Delta H}\Big\vert_{\text{Assm.}}^{\text{LOCA}} \leq 1.38$	$F^N_{\Delta H}\Big\vert_{\text{Assm.}}^{\text{LOCA}} \leq 1.476$
$F^N_{\Delta H}\Big\vert_{\text{Rod}}^{\text{LOCA}} \leq 1.45$	$F^N_{\Delta H}\Big\vert_{\text{Rod}}^{\text{LOCA}} \leq 1.55$

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3. The reference equilibrium indicated axial flux difference (called the target flux difference) at a given power level P_o, is that indicated axial flux difference with the core in equilibrium xenon conditions (small or no oscillation) and the control rods more than 190 steps withdrawn. The target flux difference at any other power level, P, is equal to the target value at P_o multiplied by the ratio, P/P_o. The target flux difference shall be measured at least once per equivalent full power quarter. The target flux difference must be updated during each effective full power month of operation either by actual measurement, or by linear interpolation using the most recent value and the value predicted for the end of the cycle life.

4. Except as modified by 3.12.B.4.a, b, c, or d below, the indicated axial flux difference shall be maintained within a $\pm 5\%$ band about the target flux difference (defines the target band on axial flux difference).

   a. At a power level greater than 90 percent of rated power, if the indicated axial flux difference deviates from its target band, within 15 minutes either restore the indicated axial flux difference to within the target band, or reduce the reactor power to less than 90 percent of rated power.

   b. At a power level no greater than 90 percent of rated power,

      (1) The indicated axial flux difference may deviate from its target band for a maximum of one hour (cumulative) in any 24-hour period provided the flux difference is within the limits shown on Figure 3.12-10.

One minute penalty is accumulated for each one minute of operation outside of the target band at power levels equal to or above 50% of rated power.

(2) If 3.12.B.4.b(1) is violated, then the reactor power shall be reduced to less than 50% power within 30 minutes and the high neutron flux setpoint shall be reduced to no greater than 55% power within the next four hours.

(3) A power increase to a level greater than 90 percent of rated power is contingent upon the indicated axial flux difference being within its target band.

(4) Surveillance testing of the Power Range Neutron Flux Channels may be performed pursuant to Table 4.1-1 provided the indicated AFD is maintained within the limits of Figure 3.12-10. A total of 16 hours of operation may be accumulated with the AFD outside of the target band during this testing without penalty deviation.

c. At a power level no greater than 50 percent of rated power,

(1) The indicated axial flux difference may deviate from its target band.

(2) A power increase to a level greater than 50 percent of rated power is contingent upon the indicated axial flux difference not being outside its target band for more than one hour accumulated penalty during the preceding 24-hour period. One half minute penalty is accumulated for each one minute of operation outside of the target band at power levels between 15% and 50% of rated power.

d. The axial flux difference limits of Specifications 3.12.B.4.a, b, and c may be suspended during the performance of physics tests provided:

(1) The power level is maintained at or below 85% of rated power, and

(2) The limits of Specification 3.12.B.1 are maintained.

The power level shall be determined to be $\leq$ 85% of rated power at least once per hour during physics tests. Verification that the limits of Specification 3.12.B.1 are being met shall be demonstrated through in-core flux mapping at least once per 12 hours.

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The procedures for axial power distribution control are designed to minimize the effects of xenon redistribution on the axial power distribution during load-follow maneuvers. Basically, control of flux difference is required to limit the difference between the current value of flux difference (ΔI) and a reference value which corresponds to the full power equilibrium value of axial offset (axial offset = ΔI/fractional power). The reference value of flux difference varies with power level and burnup, but expressed as axial offset it varies only with burnup.

The technical specifications on power distribution control given in 3.12.B.4 together with the surveillance requirements given in 3.12.B.2 assure that the Limiting Condition for Operation for the heat flux hot channel factor is met.

The target (or reference) value of flux difference is determined as follows. At any time that equilibrium xenon conditions have been established, the indicated flux difference is noted with the full length rod control bank more than 190 steps withdrawn (i.e. normal full power operating position appropriate for the time in life, usually withdrawn farther as burnup proceeds). This value, divided by the fraction of full power at which the core was operating is the full power value of the target flux difference. Values for all other core power levels are obtained by multiplying the full power value by the fractional power. Since the indicated equilibrium value was noted, no allowances for excore detector error are necessary and indicated deviation of $\pm 5\%$ ΔI are permitted from the indicated reference value. During periods where extensive load following is required, it may be impractical to establish the required core conditions for measuring the target flux difference every month. For this reason, the specification provides two methods for updating the target flux difference.

Strict control of the flux difference (and rod position) is not as necessary during part power operation. This is because xenon distribution control at part power is not as significant as the control at full power and allowance has been made in predicting the heat flux peaking factors for less strict control at part power. Strict control of the flux difference is not always possible during certain physics tests or during excore detector calibrations. Therefore, the specifications on power distribution control are less restrictive during physics tests and excore detector calibrations; this is acceptable due to the low probability of a significant accident occurring during these operations.

In some instances of rapid unit power reduction automatic rod motion will cause the flux difference to deviate from the target band when the reduced power level is reached. This does not necessarily affect the xenon distribution sufficiently to change the envelope of peaking factors which can be reached on a subsequent return to full power within the target band; however, to simplify the specification, a limitation of one hour in any period of 24 hours is placed on operation outside the band. This ensures that the resulting xenon distributions are not significantly different from those resulting from operation within the target band. The instantaneous consequences of being outside the band, provided rod insertion limits are observed, is not worse than a 10 percent increment in peaking factor for the allowable flux difference at 90% power, in the range $\pm$ 13.8 percent ($\pm$10.8 percent indicated) where for every 2 percent below rated power, the permissible flux difference boundary is extended by 1 percent.

As discussed above, the essence of the procedure is to maintain the xenon distribution in the core as close to the equilibrium full power condition

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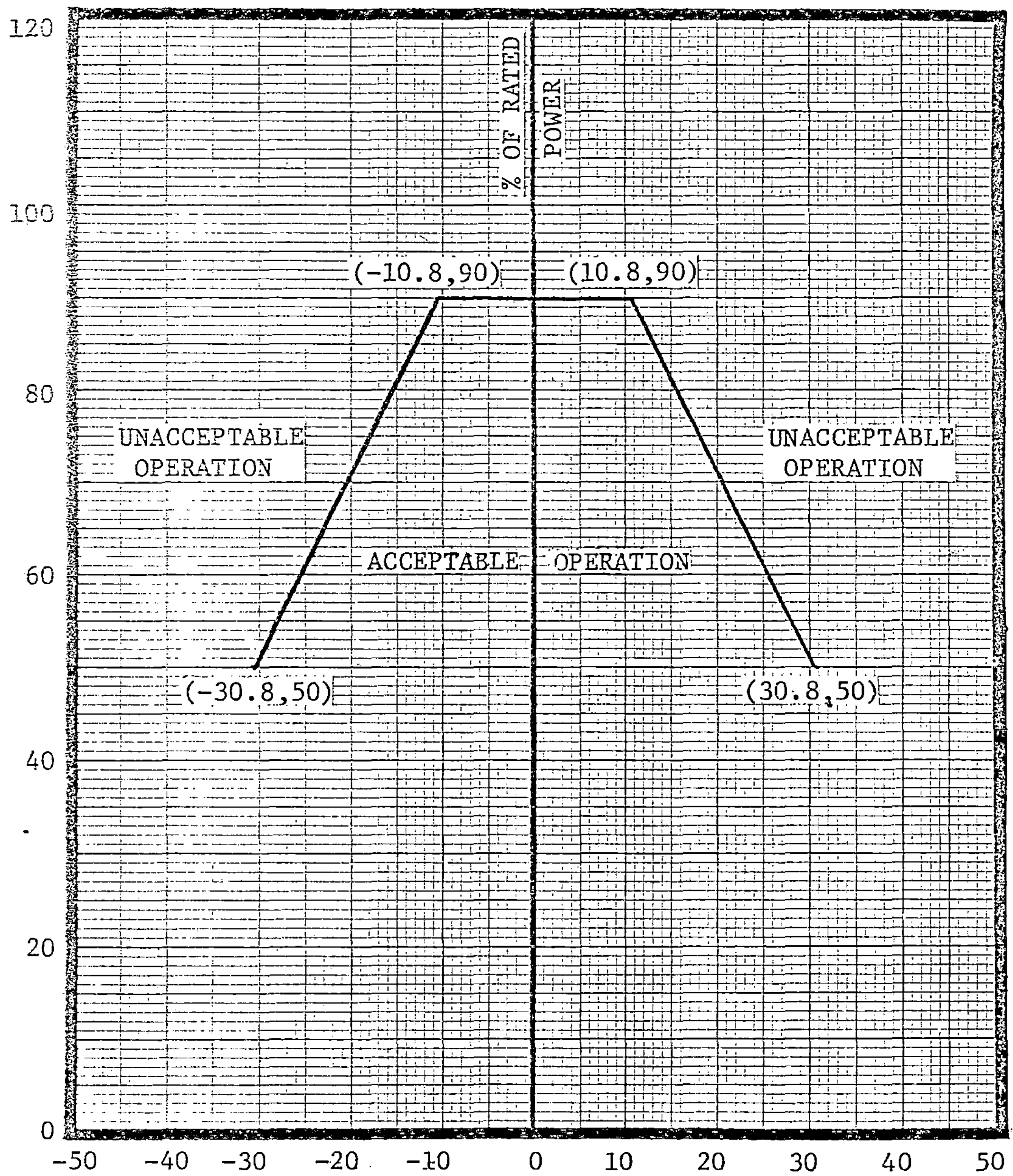
AXIAL FLUX DIFFERENCE LIMITS

AS A FUNCTION OF RATED POWER

SURRY POWER STATION



FLUX DIFFERENCE (ΔI) %