



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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-281

SURRY POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 58
License No. DPR-37

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Virginia Electric and Power Company (the licensee) dated May 31, 1979, as supplemented October 16 and 25, 1979, and January 11 and February 20, 1980, 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.

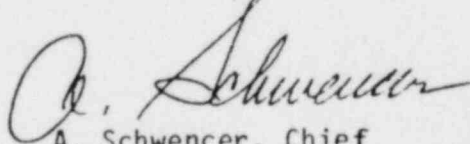
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to the license amendment, and paragraph 3.B of Facility Operating License No. DPR-37 is amended to read as follows:

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 58, 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 its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Attachment:
Changes to the
Technical Specifications

Date of Issuance: May 15, 1980

ATTACHMENT TO LICENSE AMENDMENT NO. 58

FACILITY OPERATING LICENSE NO. DPR-37

DOCKET NO. 50-281

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and certain vertical lines indicating the area of change.

Remove

3.12-4
3.12-4a
3.12-4b
3.12-5
3.12-6
3.12-14
3.12-17
3.12-18
3.12-19
3.12-20
3.12-21

TS Table 3.12-1B
TS Figure 3.12-8

TS Figure 3.12-10

Insert

3.12-4
3.12-4a
3.12-4b
3.12-5
3.12-6
3.12-14
3.12-17
3.12-18
3.12-19
3.12-20
3.12-21

TS Table 3.12-1B
TS Figure 3.12-8a
TS Figure 3.12-8b
TS Figure 3.12-10

Unit 1

$$F_Q(Z) \leq 2.05/P \times K(Z) \text{ for } P > 0.5$$

$$F_Q(Z) \leq 4.10 \times K(Z) \text{ for } P \leq 0.5$$

$$F_{\Delta H}^N \leq 1.55 (1 + 0.2(1-P)) \times T(BU)$$

$$F_{\Delta H}^N \Big|_{\text{Assm.}}^{\text{LOCA}} \leq 1.38/P$$

$$F_{\Delta H}^N \Big|_{\text{Rod}}^{\text{LOCA}} \leq 1.45/P$$

Unit 2

$$F_Q(Z) \leq 2.19/P \times K(Z) \text{ for } P > 0.5$$

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

$$F_{\Delta H}^N \leq 1.55 (1 + 0.2(1-P)) \times T(BU)$$

$$F_{\Delta H}^N \Big|_{\text{Assm.}}^{\text{LOCA}} \leq 1.476/P$$

$$F_{\Delta H}^N \Big|_{\text{Rod}}^{\text{LOCA}} \leq 1.53/P$$

where P is the fraction of rated power at which the core is operating, $K(Z)$ is the function given in TS Figure 3.12-8a for Unit 1 and Figure 3.12-8b for Unit 2, Z is the core height location of F_Q , and $T(BU)$ is the interim thimble cell rod bow penalty on $F_{\Delta H}^N$ given in TS Figure 3.12-9.

2. Prior to exceeding 75% power following each core loading, and during each effective full power month of operation thereafter, power distribution maps using the movable detector system, shall be made to confirm that the hot channel factor limits of this specification are satisfied. For the purpose of this confirmation:
 - a. The measurement of total peaking factor, F_Q^{Meas} , shall be increased by eight percent to account for manufacturing tolerances, measurement error, and the effects of rod bow. The measurement of enthalpy rise hot channel factor, the hot assembly enthalpy rise factor, $F_{\Delta H}^N \Big|_{\text{Assm.}}^{\text{LOCA}}$, and the hot rod enthalpy rise factor, $F_{\Delta H}^N \Big|_{\text{Rod}}^{\text{LOCA}}$, shall be increased by four percent to account for measurement error. If any measured hot channel factor exceeds its limit specified under 3.12.B.1, the reactor power and high neutron flux trip setpoint shall be reduced until the limits under 3.12.B.1 are met. If the hot channel factors cannot be brought to within the limits listed below within 24 hours, the Overpower ΔT and Overtemperature ΔT trip setpoints shall be similarly reduced.

$$\text{Unit 1}$$

$$F_Q \leq 2.05 \times K(Z)$$

$$F_{\Delta H}^N \leq 1.55$$

$$F_{\Delta H}^N \left| \begin{array}{l} \text{LOCA} \\ \text{Assm.} \end{array} \right. \leq 1.38$$

$$F_{\Delta H}^N \left| \begin{array}{l} \text{LOCA} \\ \text{Rod} \end{array} \right. \leq 1.45$$

$$\text{Unit 2}$$

$$F_Q \leq 2.19 \times K(Z)$$

$$F_{\Delta H}^N \leq 1.55$$

$$F_{\Delta H}^N \left| \begin{array}{l} \text{LOCA} \\ \text{Assm.} \end{array} \right. \leq 1.476$$

$$F_{\Delta H}^N \left| \begin{array}{l} \text{LOCA} \\ \text{Rod} \end{array} \right. \leq 1.55$$

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3. The reference equilibrium indicated axial flux difference (called the target flux difference) at a given power level P_0 , 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_0 multiplied by the ratio, P/P_0 . 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.

$F_Q(Z)$, Height Dependent 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_Q^E , Engineering Heat Flux Hot Channel Factor, is defined as the allowance on heat flux required for manufacturing tolerances. The engineering factor allows for local variations in enrichment, pellet density and diameter, surface area of the fuel rod and eccentricity of the gap between pellet and clad. Combined statistically the net effect is a factor of 1.03 to be applied to fuel rod surface heat flux.

$F_{\Delta H}^N$, 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 for both LOCA and non-LOCA considerations.

$F_{\Delta H}^N \Big|_{\text{Assm.}}^{\text{LOCA}}$, Hot Assembly Nuclear Enthalpy Rise Factor, is defined as the ratio of the integral of linear power along the assembly with the highest integrated power to the average assembly power.

It should be noted that the enthalpy rise factors are based on integrals and are used as such in the DNB and LOCA calculations. Local heat fluxes are obtained by using hot channel and adjacent channel explicit power shapes which take into account variations in radial (x-y) power shapes throughout the core. Thus, the radial power shape at the point of maximum heat flux is not necessarily directly related to the enthalpy rise factors. The results of the loss of coolant accident analyses are conservative with respect to the ECCS acceptance criteria as specified in 10 CFR 50.46 using an upper bound envelope of 2.05 (Unit 1) or 2.19 (Unit 2) times the hot channel factor normalized operating envelope given by TS Figures 3.12-8a and 3.12-8b.

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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 ± 13.8 percent (± 10.8 percent indicated) where for every 2 percent below rated power, the permissible flux difference boundary is extended by 1 percent.

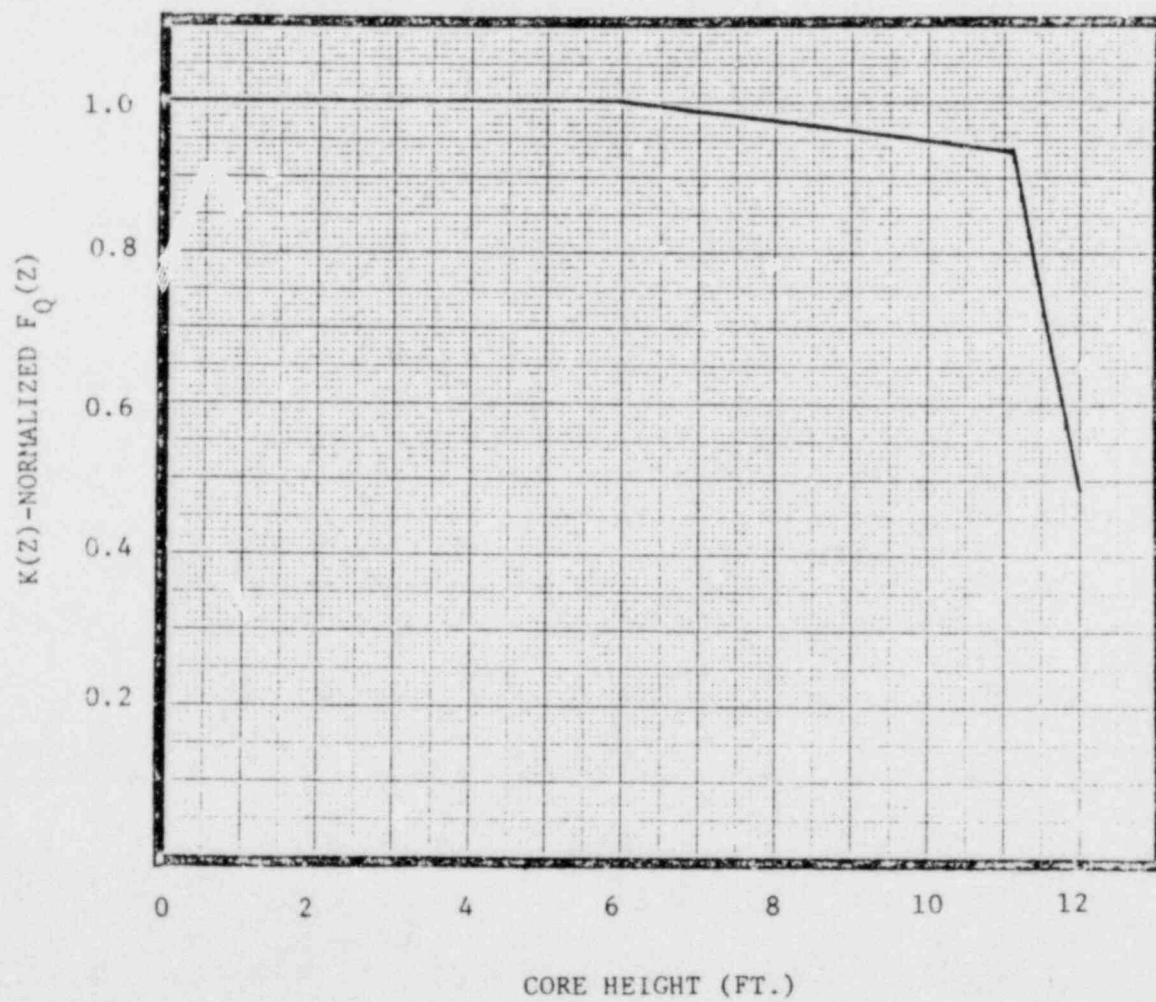
As discussed above, the essence of the procedure is to maintain the xenon distribution in the core as close to the equilibrium full power condition

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HOT CHANNEL FACTOR NORMALIZEDOPERATING ENVELOPE

SURREY POWER STATION

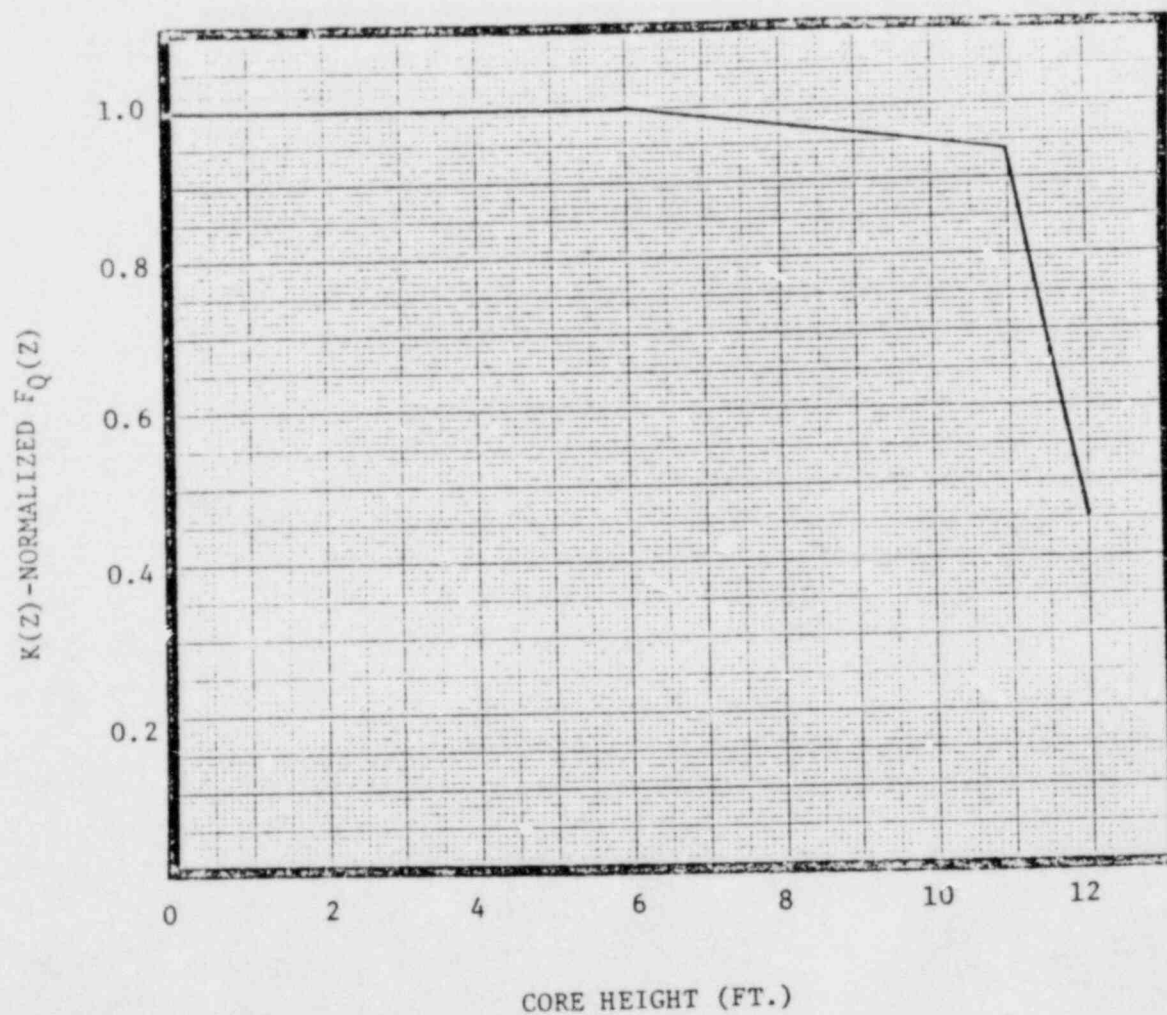
UNIT NO. 1



HOT CHANNEL FACTOR NORMALIZEDOPERATING ENVELOPE

SURREY POWER STATION

UNIT NO. 2



AXIAL FLUX DIFFERENCE LIMITS
AS A FUNCTION OF RATED POWER
SURRY POWER STATION

