

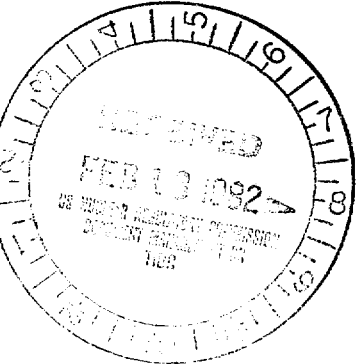
2/5/82

DCS - MS 016

Docket Nos. 50-338
50-339

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Mr. R. H. Leasburg
 Vice President - Nuclear Operations
 Virginia Electric and Power Company
 Post Office Box 26666
 Richmond, Virginia 23261

Dear Mr. Leasburg:

The Commission has issued the enclosed Amendment Nos. 37 and 17 to Facility Operating License Nos. NPF-4 and NPF-7 for the North Anna Power Station, Unit Nos. 1 and 2 (NA 1&2). The amendments are effective as of the date of issuance.

The amendments consist of changes to the Technical Specifications (TS) in response to your application transmitted by letter dated December 15, 1981 (Serial No. 627A) and in our discussions with you regarding your application.

These changes to the NA 1&2 TS remove the specific values of the F_{xy} and the axial power distribution surveillance limits (P_m) from the TS. These changes further specify that the specific values for F_{xy} and P_m shall be provided in a special Core Surveillance Report to the NRC 60 days prior to a reload cycle startup for either NA-1 or NA-2.

Copies of the related Safety Evaluation and the Notice of Issuance are also enclosed.

Sincerely,

Original signed by:

Leon B. Engle, Project Manager
 Operating Reactors Branch #3
 Division of Licensing

Enclosures:

1. Amendment No. 37 to NPF-4
2. Amendment No. 17 to NPF-7
3. Safety Evaluation
4. Notice of Issuance

cc: See next page

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OFFICE	DL: ORB #3	DL: ORB #3	LGB M/A	DL: ORB #3	DL: ORB #3	OELD OK	
SURNAME	P. Kreutzer	LEngle:ms	M. Virgilio	R. A. Clark	T. M. Dyak	D. Carrington	
DATE	1/26/82	1/26/82	1/26/82	1/26/82	1/26/82	1/29/82	



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

DISTRIBUTION:
Docket File
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PMKreutzer

Docket No. 50-338/339

Docketing and Service Section
Office of the Secretary of the Commission

SUBJECT: VIRGINIA ELECTRIC AND POWER COMPANY, North Anna Power Station,
Unit Nos. 1 and 2

Two signed originals of the Federal Register Notice identified below are enclosed for your transmittal to the Office of the Federal Register for publication. Additional conformed copies (12) of the Notice are enclosed for your use.

- Notice of Receipt of Application for Construction Permit(s) and Operating License(s).
- Notice of Receipt of Partial Application for Construction Permit(s) and Facility License(s): Time for Submission of Views on Antitrust Matters.
- Notice of Availability of Applicant's Environmental Report.
- Notice of Proposed Issuance of Amendment to Facility Operating License.
- Notice of Receipt of Application for Facility License(s); Notice of Availability of Applicant's Environmental Report; and Notice of Consideration of Issuance of Facility License(s) and Notice of Opportunity for Hearing.
- Notice of Availability of NRC Draft/Final Environmental Statement.
- Notice of Limited Work Authorization.
- Notice of Availability of Safety Evaluation Report.
- Notice of Issuance of Construction Permit(s).
- Notice of Issuance of Facility Operating License(s) or Amendment(s).

Other: Amendment Nos. 37 and 17
Referenced documents have been provided PDR.

Division of Licensing
Office of Nuclear Reactor Regulation

Enclosure:
As Stated

OFFICE →	ORB#3:DI2					
SURNAME →	PMKreutzer/ph					
DATE →	2/8/82					



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

February 5, 1982

Docket Nos. 50-338
50-339

Mr. R. H. Leasburg
Vice President - Nuclear Operations
Virginia Electric and Power Company
Post Office Box 26666
Richmond, Virginia 23261

Dear Mr. Leasburg:

The Commission has issued the enclosed Amendment Nos. 37 and 17 to Facility Operating License Nos. NPF-4 and NPF-7 for the North Anna Power Station, Unit Nos. 1 and 2 (NA 1&2). The amendments are effective as of the date of issuance.

The amendments consist of changes to the Technical Specifications (TS) in response to your application transmitted by letter dated December 15, 1981 (Serial No. 627A) and in our discussions with you regarding your application.

These changes to the NA 1&2 TS remove the specific values of the F_{xy} and the axial power distribution surveillance limits (P_m) from the TS. These changes further specify that the specific values for F_{xy} and P_m shall be provided in a special Core Surveillance Report to the NRC 60 days prior to a reload cycle startup for either NA-1 or NA-2.

Copies of the related Safety Evaluation and the Notice of Issuance are also enclosed.

Sincerely,

A handwritten signature in black ink that reads "Leon B. Engle".

Leon B. Engle, Project Manager
Operating Reactors Branch #3
Division of Licensing

Enclosures:

1. Amendment No. 37 to NPF-4
2. Amendment No. 17 to NPF-7
3. Safety Evaluation
4. Notice of Issuance

cc: See next page

Virginia Electric and Power Company

cc:

Richard M. Foster, Esquire
Musick, Williamson, Schwartz,
Leavenworth & Cope, P.C.
P. O. Box 4579
Boulder, Colorado 80306

Michael W. Maupin, Esquire
Hunton, Williams, Gay and Gibson
P. O. Box 1535
Richmond, Virginia 23212

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Mr. Edward Kube
Board of Supervisors
Louisa County Courthouse
P. O. Box 27
Louisa, Virginia 23093

Ellyn R. Weiss, Esquire
Sheldon, Harman, Roisman and Weiss
1725 I Street, N.W. Suite 506
Washington, D. C. 20006

Mr. W. R. Cartwright, Station Manager
P. O. Box 402
Mineral, Virginia 23117

Mr. Anthony Gambardella
Office of the Attorney General
11 South 12th Street - Room 308
Richmond, Virginia 23219

Resident Inspector/North Anna
c/o U.S.N.R.C.
Route 2, Box 78A
Mineral, Virginia 23117

Mr. J. H. Ferguson
Executive Vice President - Power
Virginia Electric and Power Company
Post Office Box 26666
Richmond, Virginia 23261

Mr. James Torson
501 Leroy
Socorro, New Mexico 87891

Mrs. Margaret Dietrich
Route 2, Box 568
Gordonsville, Virginia 22042

Mr. James C. Dunstance
State Corporation Commission
Commonwealth of Virginia
Blandon Building
Richmond, Virginia 23209

Mrs. June Allen
North Anna Environmental Coalition
8720 Lockmoor Circle
Wichita, Kansas 67207

U.S. Environmental Protection Agency
Region-III Office
ATTN: Regional Radiation Representative
Curtis Building
6th and Walnut Streets
Philadelphia, Pennsylvania 19106

Mr. Paul W. Purdom
Environmental Studies Institute
Drexel University
32nd and Chestnut Streets
Philadelphia, Pennsylvania 19104

Atomic Safety and Licensing
Appeal Board Panel
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Regional Administrator
Nuclear Regulatory Commission, Region II
Office of Inspection and Enforcement
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303



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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-338

NORTH ANNA POWER STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 37
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 (the licensee) dated December 15, 1981 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. 37, 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


Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: February 5, 1982

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 37 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.

Pages

3/4 2-1

3/4 2-2

3/4 2-4

3/4 2-7

3/4 2-16

3/4 2-17

3/4 2-18

B3/4 2-2

B 3/4 2-6

6-18

6-18a

3/4.2 POWER DISTRIBUTION LIMITS

AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within a $\pm 5\%$ target band (flux difference units) about the target flux difference.

APPLICABILITY: MODE 1 ABOVE 50% RATED THERMAL POWER*

ACTION:

- a. With the indicated AXIAL FLUX DIFFERENCE outside of the $\pm 5\%$ target band about the target flux difference and with THERMAL POWER:
 1. Above $P_f\%$ of RATED THERMAL POWER, within 15 minutes, where $P_f = (0.9 \times P_m)$; the value for P_m is established in the Core Surveillance Report per Technical Specification 6.9.1.10.
 - a) Either restore the indicated AFD to within the target band limits, or
 - b). Reduce THERMAL POWER to less than $P_f\%$ of RATED THERMAL POWER.
 2. Between 50% and $P_f\%$ of RATED THERMAL POWER:
 - a) POWER OPERATION may continue provided:
 - 1) The indicated AFD has not been outside of the $\pm 5\%$ target band for more than 1 hour penalty deviation cumulative during the previous 24 hours, and
 - 2) The indicated AFD is within the limits shown on Figure 3.2-1. Otherwise, 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% of RATED THERMAL POWER within the next 4 hours.
 - b) Surveillance testing of the Power Range Neutron Flux Channels may be performed pursuant to Specification 4.3.1.1.1 provided the indicated AFD is maintained within the limits of Figure 3.2-1. A total of 16 hours of operation may be accumulated with the AFD outside of the target band during this testing without penalty deviation.

*See Special Test Exception 3.10.2.

POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

- b. THERMAL POWER shall not be increased above P_f % of RATED THERMAL POWER unless the indicated AFD is within the $\pm 5\%$ target band and ACTION 2.a.1, above has been satisfied.
- c. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD has not been outside of the $\pm 5\%$ target band for more than 1 hour penalty deviation cumulative during the previous 24 hours.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The indicated AXIAL FLUX DIFFERENCE shall be determined to be within its limits during POWER OPERATION above 15% 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 $\pm 5\%$ target band when at least 2 OPERABLE excore channels are indicating the AFD to be outside the target band. Penalty deviation outside of the $\pm 5\%$ target band shall be accumulated on a time basis of:

- a. One minute penalty deviation for each one minute of POWER OPERATION outside of the target band at THERMAL POWER levels equal to or above 50% of RATED THERMAL POWER, and
- b. One-half minute penalty deviation for each one minute of POWER OPERATION outside of the target band at THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

4.2.1.3 The target flux difference of each OPERABLE excore channel shall be determined by measurement at least once per 92 Effective Full Power Days. The provisions of Specification 4.0.4 are not applicable.

4.2.1.4 The target flux difference shall be updated at least once per 31 Effective Full Power Days by either determining the target flux difference pursuant to 4.2.1.3 above or by linear interpolation between the most recently measured value and 0 percent at the end of the cycle life. The provisions of Specification 4.0.4 are not applicable.

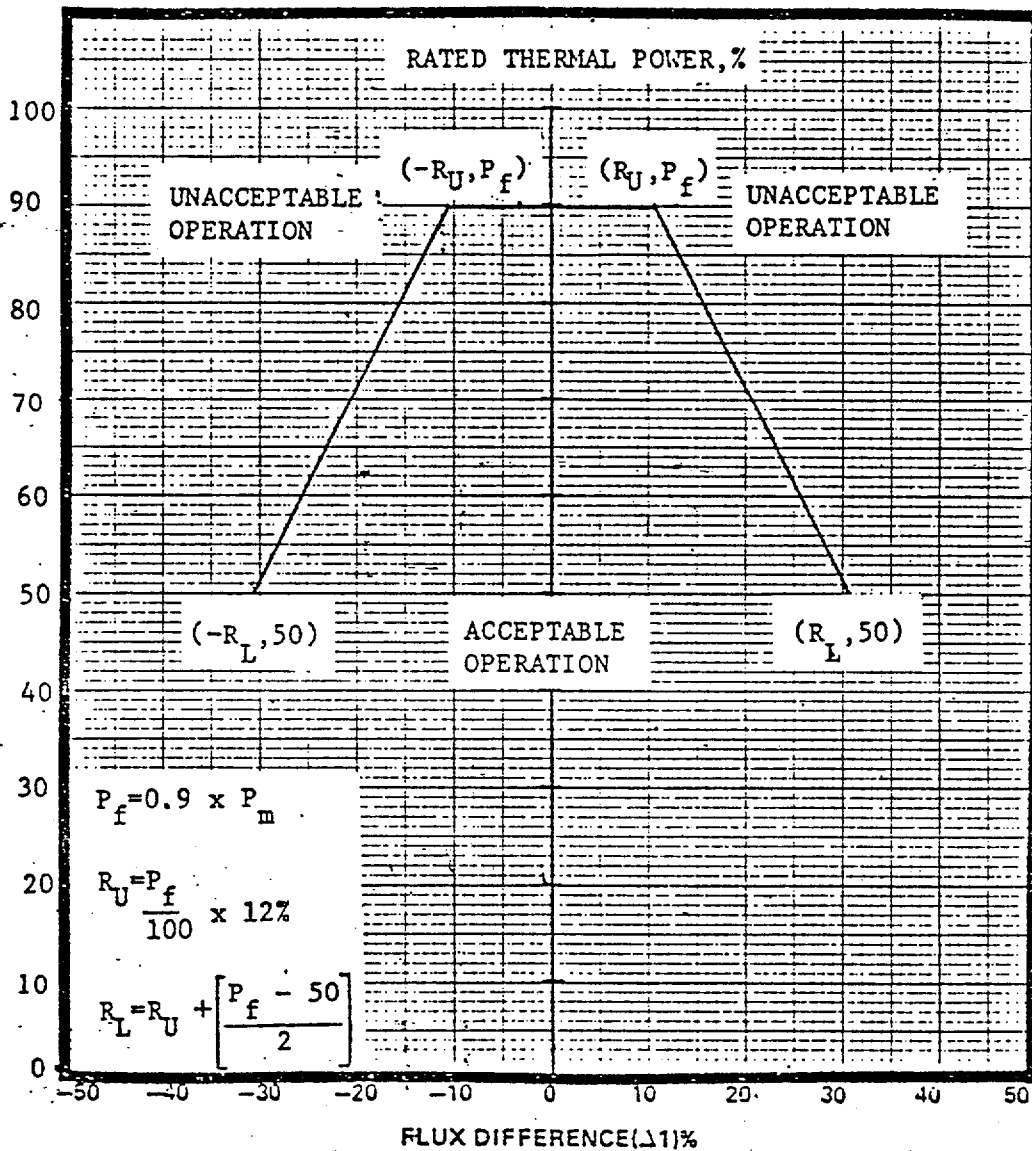


Figure 3.2-1 Axial Flux Difference Limits as a Function of Rated Thermal Power

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

- (b) At least once per 31 EFPD, whichever occurs first.
2. When the F_{xy}^C is less than or equal to the F_{xy}^{RTP} limit for the appropriate measured core plane, additional power distribution maps shall be taken and F_{xy}^C compared to F_{xy}^{RTP} and F_{xy}^L at least once per 31 EFPD.
- e. The F_{xy} limits for Rated Thermal Power (F_{xy}^{RTP}) shall be provided for all core planes containing Bank "D" control rods and all unrodded core planes, in a Core Surveillance Report per Technical Specification 6.9.1.10.
- f. The F_{xy} limits of e, above, are not applicable in the following core plane regions as measured in percent of core height from the bottom of the fuel:
1. Lower core region from 0 to 15%, inclusive.
 2. Upper core region from 85 to 100%, inclusive.
 3. Grid plane regions at 17.8 ±2%, 32.1 ±2%, 46.4±2%, 60.6±2% and 74.9±2%, inclusive (17 x 17 fuel elements).
 4. Core plane regions within ±2% of core height (±2.88 inches) about the bank demand position of the bank "D" control rods.
- g. With F_{xy}^C exceeding F_{xy}^L the effects of F_{xy} on $F_Q(Z)$ shall be evaluated to determine if $F_Q(Z)$ is within its limit.

4.2.2.3 When $F_Q(Z)$ is measured for other than F_{xy} determination, 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.

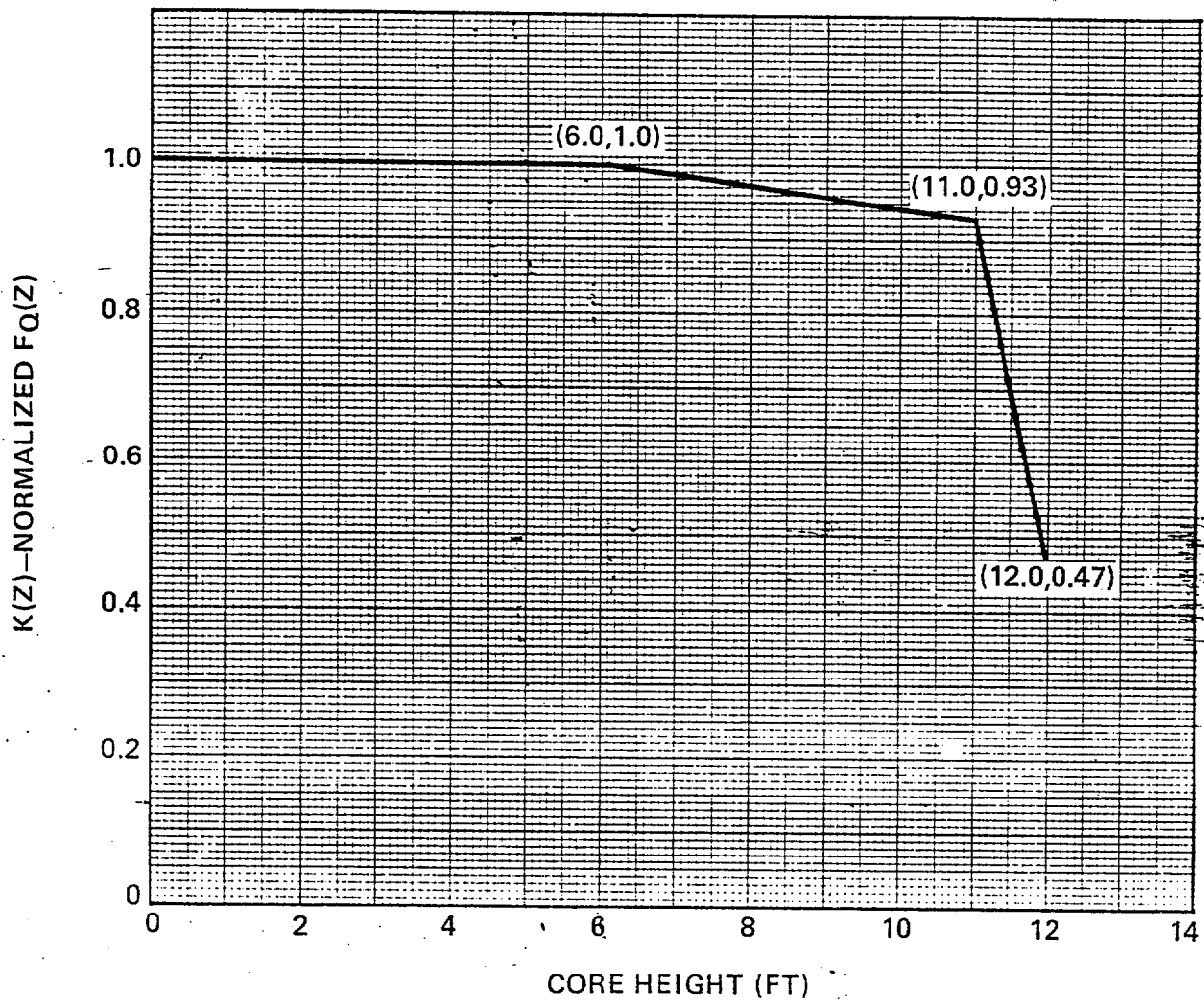


Figure 3.2-2 $K(Z) - \text{Normalized } F_Q(Z)$ as a Function of Core Height

TABLE 3.2-1

DNB PARAMETERS

<u>PARAMETER</u>	<u>LIMITS</u>		
	<u>3 Loops In Operation</u>	<u>2 Loops In Operation** & Loop Stop Valves Open</u>	<u>2 Loops In Operation** & Isolated Loop Stop Valves Closed</u>
Reactor Coolant System T_{avg}	$\leq 585^{\circ}F$		
Pressurizer Pressure	≥ 2205 psig*		
Reactor Coolant System Total Flow Rate	$\geq 278,400$ gpm		

*Limit not applicable during either a THERMAL POWER ramp increase in excess of 5% RATED THERMAL POWER per minute or a THERMAL POWER step increase in excess of 10% RATED THERMAL POWER.

**Values dependent on NRC approval of ECCS evaluation for these conditions

POWER DISTRIBUTION LIMITS

AXIAL POWER DISTRIBUTION

LIMITING CONDITION FOR OPERATION

3.2.6 The axial power distribution shall be limited by the following relationship:

$$[F_j(Z)]_S = \frac{[2.10] [K(Z)]}{(\bar{R}_j)(P_L)(1.03)(1 + \sigma_j)(1.07)}$$

Where:

- $F_j(Z)$ is the normalized axial power distribution from thimble j at core elevation Z .
- P_L is the fraction of RATED THERMAL POWER.
- $K(Z)$ is the function obtained from Figure 3.2-2 for a given core height location.
- \bar{R}_j , for thimble j , is determined from at least $n=6$ in-core flux maps covering the full configuration of permissible rod patterns above $p\%$ of RATED THERMAL POWER in accordance with:

$$\bar{R}_j = \frac{1}{n} \sum_{i=1}^n R_{ij}$$

Where:

$$R_{ij} = \frac{F_{Qi}^{Meas}}{[F_{ij}(Z)]_{Max}}$$

and $[F_{ij}(Z)]_{Max}$ is the maximum value of the normalized axial distribution at elevation Z from thimble j in map i which had a measured peaking factor without uncertainties or densification allowance of F_Q^{Meas} .

POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

- e. σ_j is the standard deviation associated with thimble j, expressed as a fraction or percentage of R_j , and is derived from n flux maps from the relationship below, or 0.02, (2%) whichever is greater.

$$\sigma_j = \frac{\left[\frac{1}{n-1} \sum_{i=1}^n (\bar{R}_j - R_{ij})^2 \right]^{1/2}}{\bar{R}_j}$$

- f. The factor 1.07 is comprised of 1.02 and 1.05 to account for the axial power distribution instrumentation accuracy and the measurement uncertainty associated with F_Q using the movable detector system, respectively.
- g. The factor 1.03 is the engineering uncertainty factor.

APPLICABILITY: MODE 1 ABOVE P_m % OF RATED THERMAL POWER[#], where the value for P_m is established in the Core Surveillance Report per Technical Specification 6.9.1.10.

ACTION:

- a. With a $F_j(Z)$ factor exceeding $[F_j(Z)]_S$ by ≤ 4 percent, reduce THERMAL POWER one percent for every percent by which the $F_j(Z)$ factor exceeds its limit within 15 minutes and within the next two hours either reduce the $F_j(Z)$ factor to within its limit or reduce THERMAL POWER to P_m % or less of RATED THERMAL POWER.
- b. With a $F_j(Z)$ factor exceeding $[F_j(Z)]_S$ by > 4 percent, reduce THERMAL POWER to P_m % or less of RATED THERMAL POWER within 15 minutes.

[#] The APDMS may be out of service when surveillance for determining power distribution maps is being performed.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS

4.2.6.1 $F_j(Z)$ shall be determined to be within its limit by:

- a. Either using the APDMS to monitor the thimbles required per Specification 3.3.3.8 at the following frequencies.
 1. At least once per 8 hours, and
 2. Immediately and at intervals of 10, 30, 60, 90, 120, 240 and 480 minutes following:
 - a) Increasing the THERMAL POWER above P_m % of RATED THERMAL POWER, or
 - b) Movement of control bank "D" more than an accumulated total of 5 steps in any one direction.
- b. Or using the movable incore detectors at the following frequencies when the APDMS is inoperable:
 1. At least once per 8 hours, and
 2. At intervals of 30, 60, 90, 120, 240 and 480 minutes following:
 - a) Increasing the THERMAL POWER above P_m % of RATED THERMAL POWER, or
 - b) Movement of control bank "D" more than an accumulated total of 5 steps in any one direction.

4.2.6.2 When the movable incore detectors are used to monitor $F_j(Z)$, at least 2 thimbles shall be monitored and an $F_j(Z)$ accuracy equivalent to that obtained from the APDMS shall be maintained.

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 > 1.30 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°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.

$F_{\Delta H}^N$ 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.

$F_{xy}(Z)$ Radial Peaking Factor, is defined as the ratio of peak power density to average power density in the horizontal plane at core elevation Z .

3/4.2.1 AXIAL FLUX DIFFERENCE (AFD)

The limits on AXIAL FLUX DIFFERENCE assure that the $F_Q(Z)$ upper bound envelope of 2.10 times the normalized axial peaking factor is not exceeded during either normal operation or in the event of xenon redistribution following power changes.

Target flux difference is determined at equilibrium xenon conditions. The full length rods may be positioned within the core in accordance with their respective insertion limits and should be inserted near their normal position for steady state operation at high power levels. The value of the target flux difference obtained under these conditions divided by the fraction of RATED THERMAL POWER is the target flux difference at RATED THERMAL POWER for the associated core burnup conditions. Target flux differences for other THERMAL POWER levels are obtained by multiplying the RATED THERMAL POWER value by the appropriate fractional THERMAL POWER level. The periodic updating of the target flux difference value is necessary to reflect core burnup considerations.

POWER DISTRIBUTION LIMITS

BASES

Although it is intended that the plant will be operated with the AXIAL FLUX DIFFERENCE within the + 5% target band about the target flux difference, during rapid plant THERMAL POWER reductions, control rod motion will cause the AFD to deviate outside of the target band at reduced THERMAL POWER levels. This deviation will not affect the xenon redistribution sufficiently to change the envelope of peaking factors which may be reached on a subsequent return to RATED THERMAL POWER (with the AFD within the target band) provided the time duration of the deviation is limited. Accordingly, a 1 hour penalty deviation limit cumulative during the previous 24 hours is provided for operation outside of the target band but within the limits of Figure 3.2-1 while at THERMAL POWER levels between 50% and $P_f\%$ of RATED THERMAL POWER. For THERMAL POWER levels between 15% and 50% of rated THERMAL POWER, deviations of the AFD outside of the target band are less significant. The penalty of 2 hours actual time reflects this reduced significance.

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 target band and the THERMAL POWER is greater than $P_f\%$ of RATED THERMAL POWER. During operation at THERMAL POWER levels between 50% and $P_f\%$ and 15% and 50% RATED THERMAL POWER, the computer outputs an alarm message when the penalty deviation accumulates beyond the limits of 1 hour and 2 hours, respectively.

Figure B 3/4 2-1 shows a typical monthly target band.

POWER DISTRIBUTION LIMITS

BASES

- a. abnormal perturbations in the radial power shape, such as from rod misalignment, effect $F_{\Delta H}^N$ 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 $F_{\Delta H}^N$, 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 $F_{\Delta H}^N$ is less readily available.

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.

POWER DISTRIBUTION LIMITS

BASES

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 of 1.30 throughout each analyzed transient.

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.

3/4.2.6 AXIAL POWER DISTRIBUTION

The limit on axial power distribution ensures that F_Q will be controlled and monitored on a more exact basis through use of the APDMS when operating above $P_m\%$ of RATED THERMAL POWER. This additional limitation on F_Q is necessary in order to provide assurance that peak clad temperatures will remain below the ECCS acceptance criteria limit of 2200°F in the event of a LOCA. The value for P_m is based on the cycle dependent potential violation of the $F_Q \times K(Z)$ limit, where $K(Z)$ is the graph shown in Figure 3.2-2. The amount of potential violation is determined by subtracting 1 from the maximum ratio of the predicted $F_Q(Z)$ analysis (flyspeck) results for a particular fuel cycle to the $F_Q \times K(Z)$ limit. This amount of potential violation, in percent, is subtracted from 100% to determine the value for P_m . If P_m is equal to 100%, no axial power distribution surveillance is required. P_m will not exceed 100%.

ADMINISTRATIVE CONTROLS

- b. Operation of the unit or affected systems when any parameter or operation subject to a limiting condition for operation is less conservative than the least conservative aspect of the limiting condition for operation established in the technical specifications.
- c. Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment.
- d. Reactivity anomalies involving disagreement with the predicted value of reactivity balance under steady-state conditions during power operation greater than or equal to 1% $\Delta k/k$; a calculated reactivity balance indicating a shutdown margin less conservative than specified in the technical specifications; short-term reactivity increases that correspond to a reactor period of less than 5 seconds or, if subcritical, an unplanned reactivity insertion of more than 0.5% $\Delta k/k$; or occurrence of any unplanned criticality.
- e. Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents analyzed in the SAR.
- f. Personnel error or procedural inadequacy which prevents or could prevent, by itself, the fulfillment of the functional requirements of systems required to cope with accidents analyzed in the SAR.
- g. Conditions arising from natural or man-made events that, as a direct result of the event, require plant shutdown, operation of safety systems, or other protective measures required by technical specifications.
- h. Errors discovered in the transient or accident analyses or in the methods used for such analyses as described in the safety analysis report or in the bases for the technical specifications that have or could have permitted reactor operation in a manner less conservative than assumed in the analyses.
- i. Performance of structures, systems, or components that requires remedial action or corrective measures to prevent operation in a manner less conservative than that assumed in the accident analyses in the safety analysis report or technical specifications bases; or discovery during plant life of conditions

ADMINISTRATIVE CONTROLS

not specifically considered in the safety analysis report or technical specifications that require remedial action or corrective measures to prevent the existence or development of an unsafe condition.

THIRTY-DAY WRITTEN REPORT

6.9.1.9 The types of events listed below shall be the subject of written reports to the Director of the Regional Office within 30 days of occurrence of the event. The written report shall include, as a minimum, a completed copy of the licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

- a. Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.
- b. Conditions leading to operation in a degraded mode permitted by a limiting condition for operation, or plant shutdown required by a limiting condition for operation.
- c. Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.
- d. Abnormal degradation of systems other than those specified in item 6.9.1.8(c) above designed to contain radioactive material resulting from the fission process.

CORE SURVEILLANCE REPORT

6.9.1.10 The F_{xy} limit for Rated Thermal Power (F_{xy}^{RTP}) in all core planes containing Bank "D" control rods and in all unrodded core planes, the surveillance power level, P_m , for Technical Specifications 3.2.1 and 3.2.6, and the F_0 flyspeck basis as determined using the definitions and methodology in WCAP 8385 and Westinghouse letter to NRC dated April 6, 1978, Serial No. NS-CE-1749 shall be provided to the Regional Administrator, Region II, with a copy to:

Director, Office of Nuclear Reactor Regulation
Attention: Chief, Core Performance Branch
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

ADMINISTRATIVE CONTROLS (Continued)

at least 60 days prior to cycle initial criticality. In the event that the limits would be submitted at some other time during core life, they shall be submitted 60 days prior to the date the limits would become effective unless otherwise approved by the Commission.

Any additional information needed to support the F^{RTP} and P_m submittal will be by request from the NRC and need not be included in this report.

SPECIAL REPORTS

6.9.2 Special reports shall be submitted to the Regional Administrator, Region II, within the time period specified for each report. These reports shall be submitted covering the activities identified below pursuant to the requirement of the applicable reference specification:

- a. Inservice Inspection Program Reviews shall be reported within 90 days of completion. Specification 4.4.10.1.



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

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-339

NORTH ANNA POWER STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 17
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 (the licensee) dated December 15, 1981 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. 17, 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



Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: February 5, 1982

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 17 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 contains vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Pages

3/4 2-1

3/4 2-2

3/4 2-4

3/4 2-7

3/4 2-17

3/4 2-18

3/4 2-19

3/4 2-20

B3/4 2-2

B3/4 2-6

6-18

6-18a

3/4.2 POWER DISTRIBUTION LIMITS

AXIAL FLUX DIFFERENCE (AFD)

LIMITING CONDITION FOR OPERATION

3.2.1 The indicated AXIAL FLUX DIFFERENCE (AFD) shall be maintained within a $\pm 5\%$ target band (flux difference units) about the target flux difference.

APPLICABILITY: MODE 1 ABOVE 50% RATED THERMAL POWER*

ACTION:

- a. With the indicated AXIAL FLUX DIFFERENCE outside of the $\pm 5\%$ target band about the target flux difference and with THERMAL POWER:
 1. Above $P_f\%$ of RATED THERMAL POWER, within 15 minutes, where $P_f = (0.9 \times P_m)$; the value for P_m is established in the Core Surveillance Report per Technical Specification 6.9.1.10.
 - a) Either restore the indicated AFD to within the target band limits, or
 - b) Reduce THERMAL POWER to less than $P_f\%$ of RATED THERMAL POWER.
 2. Between 50% and $P_f\%$ of RATED THERMAL POWER:
 - a) POWER OPERATION may continue provided:
 - 1) The indicated AFD has not been outside of the $\pm 5\%$ target band for more than 1 hour penalty deviation cumulative during the previous 24 hours, and
 - 2) The indicated AFD is within the limits shown on Figure 3.2-1. Otherwise, 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% of RATED THERMAL POWER within the next 4 hours.
 - b) Surveillance testing of the Power Range Neutron Flux Channels may be performed pursuant to Specification 4.3.1.1.1 provided the indicated AFD is maintained within the limits of Figure 3.2-1. A total of 16 hours of operation may be accumulated with the AFD outside of the target band during this testing without penalty deviation.

*See Special Test Exception 3.10.2.

POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

- b. THERMAL POWER shall not be increased above P_r % of RATED THERMAL POWER unless the indicated AFD is within the $\pm 5\%$ target band and ACTION 2.a.1, above has been satisfied.
- c. THERMAL POWER shall not be increased above 50% of RATED THERMAL POWER unless the indicated AFD has not been outside of the $\pm 5\%$ target band for more than 1 hour penalty deviation cumulative during the previous 24 hours.

SURVEILLANCE REQUIREMENTS

4.2.1.1 The indicated AXIAL FLUX DIFFERENCE shall be determined to be within its limits during POWER OPERATION above 15% 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 $\pm 5\%$ target band when at least 2 OPERABLE excore channels are indicating the AFD to be outside the target band. Penalty deviation outside of the $\pm 5\%$ target band shall be accumulated on a time basis of:

- a. One minute penalty deviation for each one minute of POWER OPERATION outside of the target band at THERMAL POWER levels equal to or above 50% of RATED THERMAL POWER, and
- b. One-half minute penalty deviation for each one minute of POWER OPERATION outside of the target band at THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER.

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

4.2.1.3 The target flux difference of each OPERABLE excore channel shall be determined by measurement at least once per 92 Effective Full Power Days. The provisions of Specification 4.0.4 are not applicable.

4.2.1.4 The target flux difference shall be updated at least once per 31 Effective Full Power Days by either determining the target flux difference pursuant to 4.2.1.3 above or by linear interpolation between the most recently measured value and 0 percent at the end of the cycle life. The provisions of Specification 4.0.4 are not applicable.

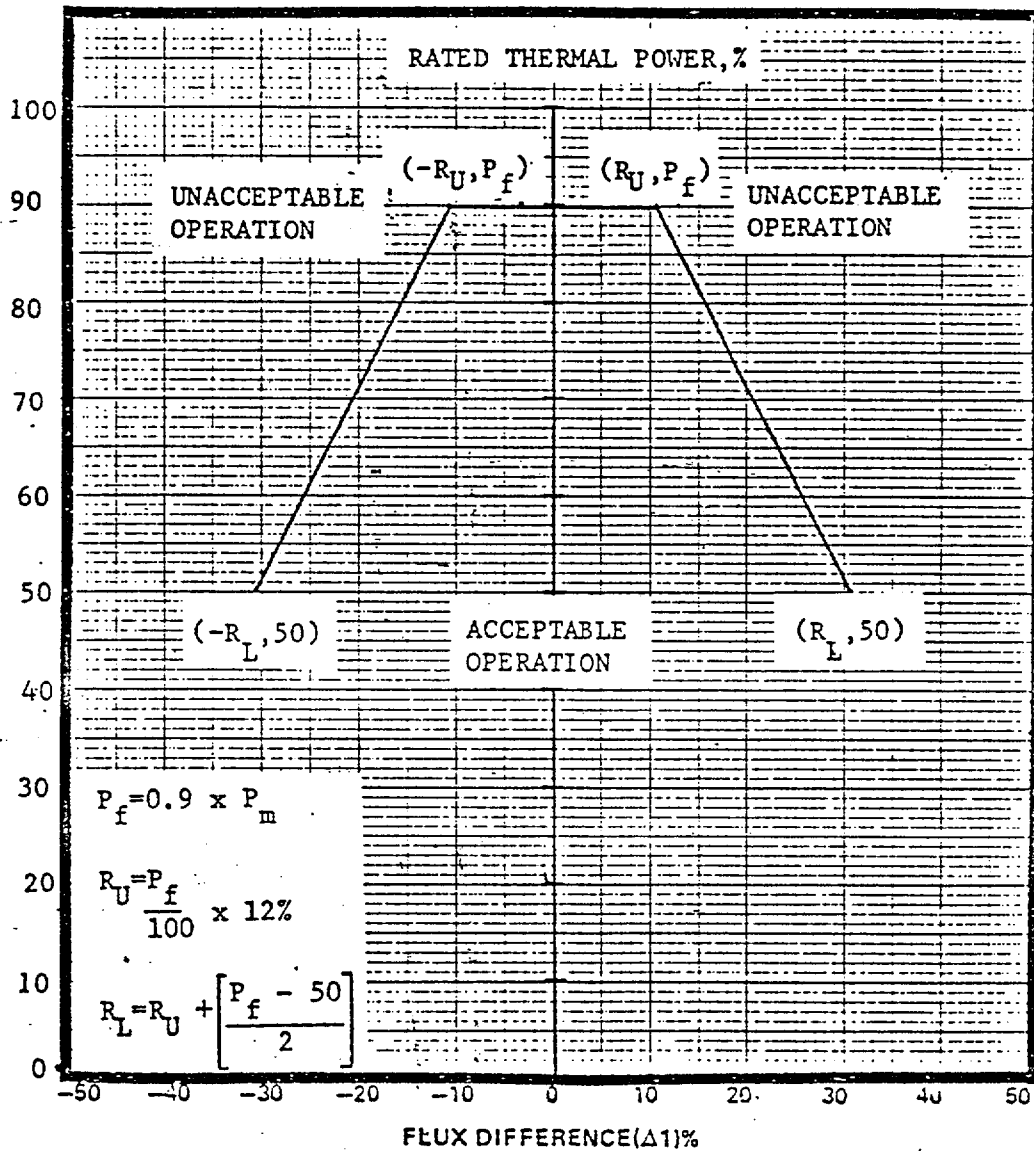


Figure 3.2-1 Axial Flux Difference Limits as a Function of Rated Thermal Power

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

- (b) At least once per 31 EFPD, whichever occurs first.
2. When the F_{xy}^C is less than or equal to the F_{xy}^{RTP} limit for the appropriate measured core plane, additional power distribution maps shall be taken and F_{xy}^C compared to F_{xy}^{RTP} and F_{xy}^L at least once per 31 EFPD.
- e. The F_{xy} limits for Rated Thermal Power (F_{xy}^{RTP}) shall be provided for all core planes containing Bank "D" control rods and all unrodded core planes, in a Core Surveillance Report per Technical Specification 6.9.1.10.
- f. The F_{xy} limits of e, above, are not applicable in the following core plane regions as measured in percent of core height from the bottom of the fuel:
1. Lower core region from 0 to 15%, inclusive.
 2. Upper core region from 85 to 100%, inclusive.
 3. Grid plane regions at 17.8 ±2%, 32.1 ±2%, 46.4±2%, 60.6±2% and 74.9±2%, inclusive (17 x 17 fuel elements).
 4. Core plane regions within ±2% of core height (±2.88 inches) about the bank demand position of the bank "D" control rods.
- g. With F_{xy}^C exceeding F_{xy}^L :
1. The effects of F_{xy}^C on $F_Q(Z)$ shall be evaluated to determine if $F_Q(Z)$ is within its limit, and
 2. The $F_Q(Z)$ limit shall be reduced at least 1% for each 1% F_{xy}^C exceeds F_{xy}^L .

4.2.2.3 When $F_Q(Z)$ is measured for other than F_{xy} determination, 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.

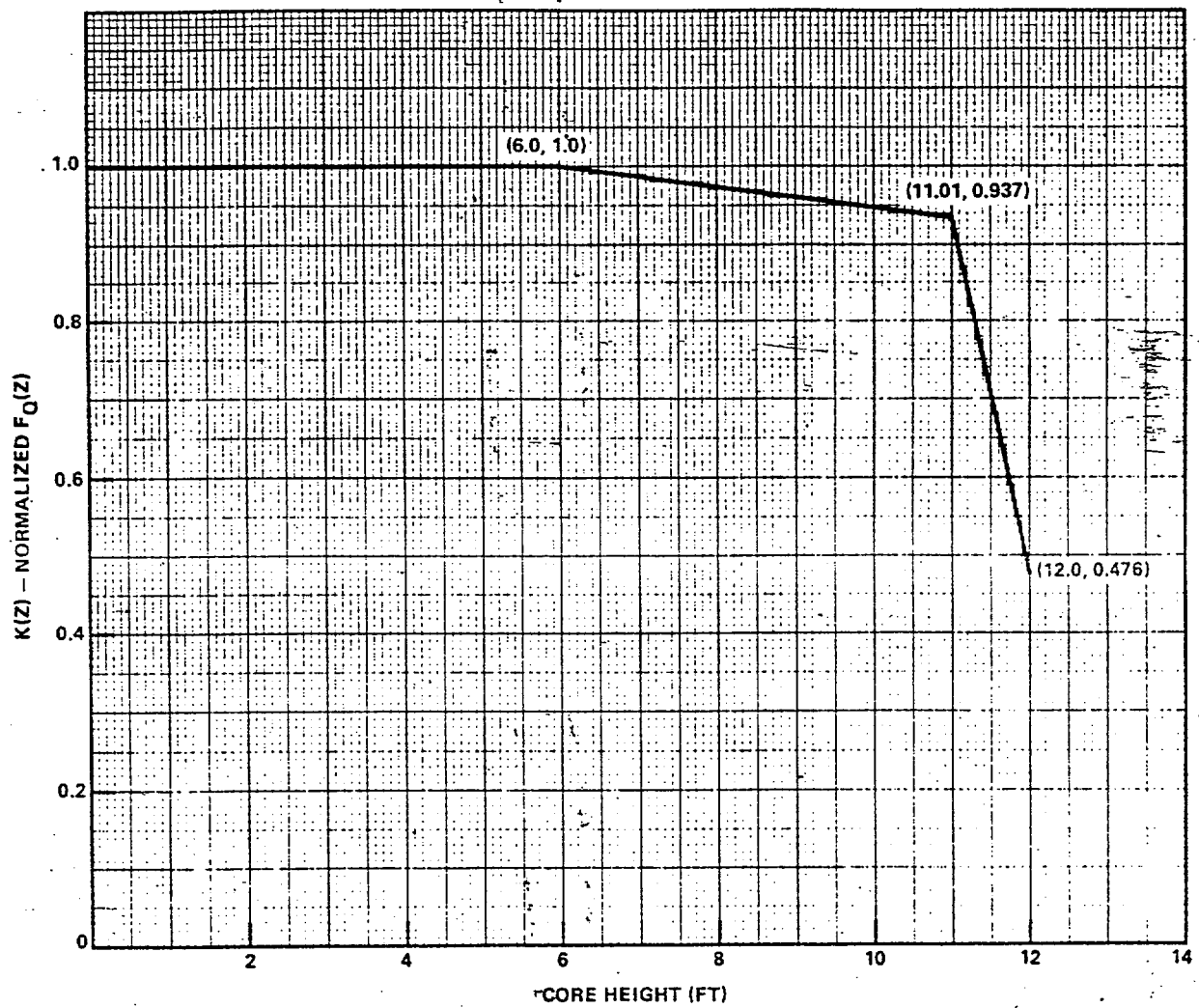


Figure 3.2-2 $K(Z)$ - Normalized $F_Q(Z)$ as a Function of Core Height

POWER DISTRIBUTION LIMITS

AXIAL POWER DISTRIBUTION

LIMITING CONDITION FOR OPERATION

3.2.6 The axial power distribution shall be limited by the following relationship:

$$[F_j(Z)]_S = \frac{[2.10] [K(Z)]}{(\bar{R}_j)(P_L)(1.03)(1 + \sigma_j)(1.07)}$$

Where:

- $F_j(Z)$ is the normalized axial power distribution from thimble j at core elevation Z .
- P_L is the fraction of RATED THERMAL POWER.
- $K(Z)$ is the function obtained from Figure 3.2-2 for a given core height location.
- \bar{R}_j , for thimble j , is determined from at least $n=6$ in-core flux maps covering the full configuration of permissible rod patterns above $P_m\%$ of RATED THERMAL POWER in accordance with:

$$\bar{R}_j = \frac{1}{n} \sum_{i=1}^n R_{ij}$$

Where:

$$R_{ij} = \frac{F_{Q_i}^{Meas}}{[F_{ij}(Z)]_{Max}}$$

and $[F_{ij}(Z)]_{Max}$ is the maximum value of the normalized axial distribution at elevation Z from thimble j in map

POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION (Continued)

i which had a measured peaking factor without uncertainties or densification allowance of F_Q^{Meas}

- e. σ_j is the standard deviation associated with thimble j, expressed as a fraction or percentage of \bar{R}_j , and is derived from n flux maps from the relationship below; or 0.02, (2%) whichever is greater.

$$\sigma_j = \frac{\left[\frac{1}{n-1} \sum_{i=1}^n (\bar{R}_j - R_{ij})^2 \right]^{1/2}}{\bar{R}_j}$$

- f. The factor 1.07 is comprised of 1.02 and 1.05 to account for the axial power distribution instrumentation accuracy and the measurement uncertainty associated with F_Q using the movable detector system, respectively.
- g. The factor 1.03 is the engineering uncertainty factor.

APPLICABILITY: MODE 1 ABOVE P_m % OF RATED THERMAL POWER[#], where the value for P_m is established in the Core Surveillance Report per Technical Specification 6.9.1.10.

ACTION:

- a. With a $F_j(Z)$ factor exceeding $F_j(Z)_S$ by less than or equal to 4 percent, reduce THERMAL POWER one percent for every percent by which

[#] The APDMS may be out of service when surveillance for determining power distribution maps is being performed.

POWER DISTRIBUTION LIMITS

ACTION (Continued)

which the $F_j(Z)$ factor exceeds its limit within 15 minutes and within the next two hours either reduce the $F_j(Z)$ factor to within its limit or reduce THERMAL POWER to $P_m\%$ or less of RATED THERMAL POWER.

- b. With a $F_j(Z)$ factor exceeding $[F_j(Z)]_S$ by greater than 4 percent, reduce THERMAL POWER to $P_m\%$ or less of RATED THERMAL POWER within 15 minutes.

SURVEILLANCE REQUIREMENTS

4.2.6.1 $F_j(Z)$ shall be determined to be within its limit by:

- a. Either using the APDMS to monitor the thimbles required per Specification 3.3.3.8 at the following frequencies.
 1. At least once per 8 hours, and
 2. Immediately and at intervals of 10, 30, 60, 90, 120, 240 and 480 minutes following:
 - a) Increasing the THERMAL POWER above $P_m\%$ of RATED THERMAL POWER, or
 - b) Movement of control bank "D" more than an accumulated total of 5 steps in any one direction.
- b. Or using the movable incore detectors at the following frequencies when the APDMS is inoperable:
 1. At least once per 8 hours, and
 2. At intervals of 30, 60, 90, 120, 240 and 480 minutes following:

POWER DISTRIBUTION LIMITS

SURVEILLANCE REQUIREMENTS (Continued)

- a) Increasing the THERMAL POWER above $p_m\%$ of RATED THERMAL POWER, or
- b) Movement of control bank "D" more than an accumulated total of 5 steps in any one direction.

4.2.6.2 When the movable incore detectors are used to monitor $F_j(Z)$, at least 2 thimbles shall be monitored and an $F_j(Z)$ accuracy equivalent to that obtained from the APDMS shall be maintained.

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 greater than or equal to 1.30 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°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.

$F_{\Delta H}^N$ 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.

$F_{xy}(Z)$ Radial Peaking Factor, is defined as the ratio of peak power density to average power density in the horizontal plane at core elevation Z.

3/4.2.1 AXIAL FLUX DIFFERENCE (AFD)

The limits on AXIAL FLUX DIFFERENCE assure that the $F_Q(Z)$ upper bound envelope of 2.10 times the normalized axial peaking factor is not exceeded during either normal operation or in the event of xenon redistribution following power changes.

Target flux difference is determined at equilibrium xenon conditions. The full length rods may be positioned within the core in accordance with their respective insertion limits and should be inserted near their normal position for steady state operation at high power levels. The value of the target flux difference obtained under these conditions divided by the fraction of RATED THERMAL POWER is the target flux difference at RATED THERMAL POWER for the associated core burnup conditions. Target flux differences for other

POWER DISTRIBUTION LIMITS

BASES

THERMAL POWER levels are obtained by multiplying the RATED THERMAL POWER value by the appropriate fractional THERMAL POWER level. The periodic updating of the target flux difference value is necessary to reflect core burnup considerations.

Although it is intended that the plant will be operated with the AXIAL FLUX DIFFERENCE within the + 5% target band about the target flux difference, during rapid plant THERMAL POWER reductions, control rod motion will cause the AFD to deviate outside of the target band at reduced THERMAL POWER levels. This deviation will not affect the xenon redistribution sufficiently to change the envelope of peaking factors which may be reached on a subsequent return to RATED THERMAL POWER (with the AFD within the target band) provided the time duration of the deviation is limited. Accordingly, a 1 hour penalty deviation limit cumulative during the previous 24 hours is provided for operation outside of the target band but within the limits of Figure-3.2-1 while at THERMAL POWER levels between 50% and P_c % of RATED THERMAL POWER. For THERMAL POWER levels between 15% and 50% of rated THERMAL POWER, deviations of the AFD outside of the target band are less significant. The penalty of 2 hours actual time reflects this reduced significance.

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 target band and the THERMAL POWER is greater than P_c % of RATED THERMAL POWER. During operation at THERMAL POWER levels between 50% and P_c % and 15% and 50% RATED THERMAL POWER, the computer outputs an alarm message when the penalty deviation accumulates beyond the limits of 1 hour and 2 hours, respectively.

Figure B 3/4 2-1 shows a typical monthly target band.

POWER DISTRIBUTION LIMITS

BASES

When $F_{\Delta H}^N$ is measured, 4% is the appropriate experimental error allowance for a full core map taken with the incore detection system. The specified limit for $F_{\Delta H}^N$ also contains an 8% allowance for uncertainties which means that normal operation will result in $F_{\Delta H}^N$ less than or equal to 1.55/1.08. The 8% allowance is based on the following considerations:

- a. abnormal perturbations in the radial power shape, such as from rod misalignment, effect $F_{\Delta H}^N$ 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 $F_{\Delta H}^N$, 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 $F_{\Delta H}^N$ is less readily available.

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.

POWER DISTRIBUTION LIMITS

BASES

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 of 1.30 throughout each analyzed transient.

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.

3/4.2.6 AXIAL POWER DISTRIBUTION

The limit on axial power distribution ensures that F_Q will be controlled and monitored on a more exact basis through use of the APDMS when operating above P_m % of RATED THERMAL POWER. This additional limitation on F_Q is necessary in order to provide assurance that peak clad temperatures will remain below the ECCS acceptance criteria limit of 2200°F in the event of a LOCA. The value for P_m is based on the cycle dependent potential violation of the $F_Q \times K(Z)$ limit, where $K(Z)$ is the graph shown in Figure 3.2-2. The amount of potential violation is determined by subtracting 1 from the maximum ratio of the predicted $F_Q(Z)$ analysis (flyspeck) results for a particular fuel cycle to the $F_Q \times K(Z)$ limit. This amount of potential violation, in percent, is subtracted from 100% to determine the value for P_m . If P_m is equal to 100%, no axial power distribution surveillance is required. P_m will not exceed 100%.

ADMINISTRATIVE CONTROLS

- b. Operation of the unit or affected systems when any parameter or operation subject to a limiting condition for operation is less conservative than the least conservative aspect of the limiting condition for operation established in the technical specifications.
- c. Abnormal degradation discovered in fuel cladding, reactor coolant pressure boundary, or primary containment.
- d. Reactivity anomalies involving disagreement with the predicted value of reactivity balance under steady-state conditions during power operation greater than or equal to 1% delta k/k; a calculated reactivity balance indicating a shutdown margin less conservative than specified in the technical specifications; short-term reactivity increases that correspond to a reactor period of less than 5 seconds or, if subcritical, an unplanned reactivity insertion of more than 0.5% delta k/k; or occurrence of any unplanned criticality.
- e. Failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents analyzed in the SAR.
- f. Personnel error or procedural inadequacy which prevents or could prevent, by itself, the fulfillment of the functional requirements of systems required to cope with accidents analyzed in the SAR.
- g. Conditions arising from natural or man-made events that, as a direct result of the event, require plant shutdown, operation of safety systems, or other protective measures required by technical specifications.
- h. Errors discovered in the transient or accident analyses or in the methods used for such analyses as described in the safety analysis report or in the bases for the technical specifications that have or could have permitted reactor operation in a manner less conservative than assumed in the analyses.
- i. Performance of structures, systems, or components that requires remedial action or corrective measures to prevent operation in a manner less conservative than that assumed in the accident analyses in the safety analysis report or technical specifications bases; or discovery during plant life of conditions not specifically considered in the safety analysis report or technical specifications that require remedial action or corrective measures to prevent the existence or development of an unsafe condition.

ADMINISTRATIVE CONTROLS

THIRTY-DAY WRITTEN REPORT

6.9.1.9 The types of events listed below shall be the subject of written reports to the Director of the Regional Office within 30 days of occurrence of the event. The written report shall include, as a minimum, a completed copy of the licensee event report form. Information provided on the licensee event report form shall be supplemented, as needed, by additional narrative material to provide complete explanation of the circumstances surrounding the event.

- a. Reactor protection system or engineered safety feature instrument settings which are found to be less conservative than those established by the technical specifications but which do not prevent the fulfillment of the functional requirements of affected systems.
- b. Conditions leading to operation in a degraded mode permitted by a limiting condition for operation, or plant shutdown required by a limiting condition for operation.
- c. Observed inadequacies in the implementation of administrative or procedural controls which threaten to cause reduction of degree of redundancy provided in reactor protection systems or engineered safety feature systems.
- d. Abnormal degradation of systems other than those specified in item 6.9.1.8(c) above designed to contain radioactive material resulting from the fission process.

CORE SURVEILLANCE REPORT

6.9.1.10 The F_{xy} limit for Rated Thermal Power (F_{xy}^{RTP}) in all core planes containing Bank "D" control rods and in all unrodded core planes, the surveillance power level, P_s , for Technical Specifications 3.2.1 and 3.2.6, and the F_0 flyspeck basis as determined using the definitions and methodology in WCAP-8385 and Westinghouse letter to NRC dated April 6, 1978, Serial No. NS-CE-1749 shall be provided to the Regional Administrator, Region II, with a copy to:

Director, Office of Nuclear Reactor Regulation
Attention: Chief, Core Performance Branch
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

at least 60 days prior to cycle initial criticality. In the event that the limits would be submitted at some other time during core life, they shall be submitted 60 days prior to the date the limits would become effective unless otherwise exempted by the Commission.

ADMINISTRATIVE CONTROLS (Continued)

Any additional information needed to support the F^{RTP} and P^{xy} submittal will be by request from the NRC and need not be included in this report.

SPECIAL REPORTS

6.9.2 Special reports shall be submitted to the Regional Administrator, Region II, within the time period specified for each report.

6.10 RECORD RETENTION

In addition to the applicable record retention requirements of Title 10, Code of Federal Regulations, the following records shall be retained for at least the minimum period indicated.

6.10.1 The following records shall be retained for at least five years:

- a. Records and logs of facility operation covering time interval at each power level.
- b. Records and logs of principal maintenance activities, inspections, repair and replacement of principal items of equipment related to nuclear safety.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NOS. 37 AND 17 TO

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

VIRGINIA ELECTRIC AND POWER COMPANY

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

DOCKET NOS. 50-338 AND 50-339

Introduction:

By letter dated December 15, 1981 (Serial No. 627A), the Virginia Electric and Power Company (the licensee) requested changes to the Technical Specifications (TS) for the North Anna Power Station, Units 1 & 2 (NA-1&2). The proposed changes would remove specific values of the F_{xy} and the axial power distribution surveillance limits, P_m , from the NA-1&2 TS. The specific values for these limits would be provided to the NRC in a special Core Surveillance Report 60 days prior to a reload cycle startup for either NA-1 or NA-2.

Discussion:

The TS contain limits on the total heat flux peaking factor $F_Q \times K(Z)$, which are established by the Loss of Coolant Accident (LOCA) analysis. A specific evaluation is made during each reload analysis as to whether the analytically predicted total heat flux peaking factor (F_Q) values as a function of core height are below the $F_Q \times K(Z)$ limit curve. The NRC approved Westinghouse methodology used in the generation of the analytically predicted F_Q values is well established, and this methodology has been used and approved in almost all of the safety reload evaluations for Westinghouse reactors in the past several years.

For predicting the F_Q values, load following calculations are performed for the axial power distribution. These calculations are combined with the predicted axially dependent maximum values of the horizontal plane peaking factor, F_{xy} , to obtain the F_Q values. If the predicted values of F_Q fall below the $F_Q \times K(Z)$ limit, then the operation of a given facility will not exceed the peaking factor limits assumed in the LOCA analysis. Power distribution TS have been written to ensure that facility operation is in conformance with the peaking factor analysis. Most of these TS are not cycle dependent and, therefore, will not be discussed in this safety evaluation.

Two of the parameters specified in the NA-1&2 TS are a function of F_Q values predicted for each fuel cycle, and are, therefore, the subject of the licensee's proposed change. The first is the set of axially dependent F_{xy} values. The second is an axial power distribution limit, P_m , expressed as a percentage of full power level.

When the P_m limit is exceeded, axial power distribution surveillance is required. This surveillance occurs in those cases where the predicted F_Q exceeds the $F_{QxK}(Z)$ limit curve. In such cases, adherence to the assumptions in the predicted peaking factor analysis will not ensure that the operating F_Q value will not exceed the $F_{QxK}(Z)$ limit. To ensure that this limit will not be exceeded, the axial power limit, P_m , is designated as a power level fraction which is the limiting ratio of the predicted F_Q values to the $F_{QxK}(Z)$ limit curve as a function of core elevation. Above the power level, P_m , conformance with the $F_{QxK}(Z)$ limit is ensured by axial power distribution surveillance which measures the actual F_Q values in the reactor as a function of core elevation.

Axial power distribution surveillance requirements have been stipulated in the NA-1&2 TS since initial issuance as Appendix A to the facility operating licenses for NA-1&2. The licensee's proposed changes would remove the specific values of F_{xy} and P_m from the NA-1&2 TS. Both quantities will remain in the TS as generalized parameters. However, a Section 6.9.1.10 would be added to the NA-1&2 TS which would require a Core Surveillance Report be submitted to the NRC 60 days prior to a specific need for NA-1&2. This report would include the specific values for F_{xy} , P_m , and the results of the F_Q analysis supporting the values for F_{xy} and P_m . The report would be specified to be sent to the Regional Administrator, Region 2 with a copy to be sent to the Chief of the Core Performance Branch in the Office of Nuclear Reactor Regulation. Existence of the Core Surveillance Report would allow cognizant NRC personnel to maintain records of trends in the affected parameters, and to request further information should any concerns develop.

Evaluation:

The licensee's proposed changes as discussed above are administrative in nature because the affected parameters, F_{xy} and P_m , will continue to be specified and will be determined by the same NRC approved Westinghouse methodology used in prior approved changes. Therefore, these changes do not result in any unreviewed safety question and do not involve a significant decrease in a safety margin. Based on the above, we find these changes to be acceptable.

Also, a similar change, but for F_{xy} only (since P_m was not cycle dependent) has already been approved and implemented in the TS for the Joseph M. Farley Nuclear Plant, Unit No. 2.

The proposed changes require that several NA-1&2 TS be modified where the parameters F_{xy} , P_m , and a Figure 3.2-1 (a curve which is a function of P_m) are specified. All of these changes have been reviewed and are acceptable.

Finally, the licensee's December 15, 1981 submittal has provided Core Surveillance Reports for NA-1&2 with the current $F_0 \times K(Z)$ limits where $F_0 = 2.10$, and for a proposed limit of $F_0 \times K(Z)$ where $F_0 = 2.14$. The report for the current limit ($F_0 = 2.10$) is acceptable for implementation on the date that the above proposed changes become effective by issuance of the respective license amendments for NA-1&2. The reports for the proposed $F_0 \times K(Z)$ limit where $F_0 = 2.14$ (not yet approved) are acceptable for use in the present NA-1&2 operating cycles 60 days after the date they were submitted, which was December 15, 1981.

Environmental Consideration:

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

Conclusion:

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: FEB 5 1982

Principal Contributors:

M. S. Dunenfeld

L. B. Engle

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NOS. 50-338 AND 50-339VIRGINIA ELECTRIC AND POWER COMPANYNOTICE OF ISSUANCE OF AMENDMENTS TO FACILITYOPERATING LICENSES

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendments No. 37 and No. 17 to Facility Operating License Nos. NPF-4 and NPF-7 issued to the Virginia Electric and Power Company (the licensee) for operation of the North Anna Power Station, Units No. 1 and No. 2 (the facility) located in Louisa County, Virginia. The amendments are effective as of the date of issuance.

The amendments revise the NA-1&2 Technical Specifications by removing the specific values of the F_{xy} and the axial power distribution surveillance limits, P_m , and specifying that the specific values for these limits shall be provided in a special Core Surveillance Report to the NRC 60 days prior to a reload cycle startup for either NA-1 or NA-2.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of the amendments was not required since the amendments do not involve a significant hazards consideration.

The Commission has determined that the issuance of the amendments will not result in any significant environmental impact and that pursuant


- 2 -

to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of the amendments.

For further details with respect to this action, see (1) the application for amendments dated December 15, 1981, (2) Amendment No. 37 and No. 17 to Facility Operating Licenses No. NPF-4 and NPF-7 and (3) the Commission's related Safety Evaluation. These items are available for public inspection at the Commission's Public Document Room, 1717 H Street, NW., Washington, D. C. 20555 and at the Board of Supervisor's Office, Louisa County Courthouse, Louisa, Virginia 23093 and at the Alderman Library, Manuscripts Department, University of Virginia, Charlottesville, Virginia 22901. A copy of items (2) and (3) may be obtained upon request to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

Dated at Bethesda, Maryland this 5th day of February, 1982.

FOR THE NUCLEAR REGULATORY COMMISSION


Robert A. Clark, Chief
Operating Reactors Branch #3
Division of Licensing