ATTACHMENT 1

TO

AEP:NRC:0538

PROPOSED TECHNICAL SPECIFICATION CHANGE

## Proposed Technical Specification Changes

1. The proposed revisions indicated by vertical lines in the right margin of pages 3/4 2-6,15,16,19,20 and B 3/4 2-2 are changes related to the new $F_Q$ limits.

2. The proposed revisions indicated on pages 3/4 2-3 and 2-17 are editorial changes to the existing Technical Specifications which rectify conflicts between certain peaking factor surveillance requirements. They are being submitted at this time for convenience since they involve the same Technical Specification sections as the changes discussed in 1 above.

SURVEILLANCE REQUIREMENTS (Continued)

4.2.1.2 The indicated AFD shall be considered outside of its ± 5% target band when at least 2 of 4 or 2 of 3 OPERABLE excore channels are indicating the AFD to be outside the target band. Penalty deviation outside of the ± 5% target band shall be accumulated on a time basis of:

a. A penalty deviation of one minute 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. A penalty deviation of one half minute for each one minute of POWER OPERATION outside of the target band at THERMAL POWER levels between 15% and 50% of RATED THERMAL POWER.

4.2.1.3 The target axial flux difference of each OPERABLE excore channel shall be determined in conjunction with the measurement of $F_Q^A(z)$ as defined in Specification 4.2.2.2.C. The provisions of Specification 4.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.2.2.1 The provisions of Specification 4.0.4 are not applicable.

4.2.2.2 $F_Q(Z;\ell)$ shall be determined to be within its limit by:

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

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

c. Satisfying the following relationship at the time of the target flux determination.

$$F_Q^M(Z) \leq \frac{F_Q^L(Z)}{P \times Ep(Z)} [K(Z)]/[V(Z)] \qquad \text{for } P > .5$$

$$F_Q^M(Z) \leq \frac{2F_Q^L(Z)}{Ep(Z)} [K(Z)]/[V(Z)] \qquad \text{for } P \leq .5$$

where: $F_Q^M(Z) = F_Q(Z,\ell)$ at $\ell$ for which $\frac{F_Q(Z,\ell)}{T(E_\ell)}$ is a maximum

$F_Q^L(Z) = F_Q^L(E_\ell)$ at $\ell$ for which $\frac{F_Q(Z,\ell)}{T(E_\ell)}$ is a maximum

$F_Q^M(Z)$ and $F_Q^L(Z)$ are functions of core height, Z, and correspond at each Z to the rod $\ell$ for which $\frac{F_Q(Z,\ell)}{T(E_\ell)}$ is a maximum at that Z.

V(Z) is the function defined in Figure 3.2-3, K(Z) is defined in Figure 3.2-2, T(E) is defined in Figures 3.2-3a and 3.2-3b, P is the fraction of RATED THERMAL POWER. $Ep(Z)$ is an uncertainty factor to account for the reduction in the $F_Q^L(E\ell)$ curve due to an accumulation of exposure prior to the next flux map.

$$E_p(Z) = 1.0 \qquad 0 \leq E_\ell \leq 12.0$$

$$E_p(Z) = 1.0 + [.0039 \times F_Q^M(Z)] \qquad 12.0 \leq E_\ell \leq 34.5$$

$$E_p(Z) = 1.0 + [.0085 \times F_Q^M(Z)] \qquad 34.5 \leq E_\ell \leq 42.2$$

d. Measuring $F_Q(Z,\ell)$ in conjunction with a target flux difference determination, according to the following schedule:

POWER DISTRIBUTION LIMITS

AXIAL POWER DISTRIBUTION

LIMITING CONDITION FOR OPERATION

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

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

Where:

a. $F_j(Z)$ is the normalized axial power distribution from thimble j at core elevation Z.

b. $P_L$ is the fraction of RATED THERMAL POWER.

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

d. $\bar{R}_j$, for thimble j, is determined from at least n=6 in-core flux maps covering the full configuration of permissible rod patterns at 100% or APL (whichever is less) of RATED THERMAL POWER in accordance with:

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

Where:

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

$R_{ij}$ and its associated $\sigma_j$ may be calculated on a full core or a limiting fuel batch basis as defined on page 83/4 3-3 of basis.

e. $F_{Qi\ell}^{Meas}$ is the limiting total peaking factor in flux map i. The limiting total peaking factor is that factor with least margin to the $F_Q^L(E)$ curve defined in Figure 3.2-3a for Exxon Nuclear Company fuel and in Figure 3.2-3b for Westinghouse fuel.

LIMITING CONDITION FOR OPERATION (Continued)

$T(E)$ is the ratio of the exposure dependent $F_Q^L(E_\ell)$ to 2.10 and is defined in Figure 3.2-3a for fuel supplied by Exxon Nuclear Company and in Figure 3.2-3b for fuel supplied by Westinghouse Electric Corporation.

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

$\sigma_j$ 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.

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

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.

The factor 1.03 is the engineering uncertainty factor.

g. $F_p$ is an uncertainty factor for Exxon fuel to account for the reduction in the $F_Q^L(E_\ell)$ curve due to an accumulation of exposure prior to the next flux map. The following $F_p$ factor shall apply:

| | |
|---|---|
| $F_p = 1.0$ | $0 \leq E_\ell \leq 12$ |
| $F_p = 1.0 + [.0015 \times W]$ | $12 < E_\ell \leq 34.5$ |
| $F_p = 1.0 + [.0030 \times W]$ | $34.5 < E_\ell \leq 42.2$ |

where W is the number of effective full power weeks (rounded up to the next highest integer) since the last full core flux map.

LIMITING CONDITION FOR OPERATION (Continued)

Applicability: Mode #1 above the percent of RATED THERMAL POWER indicated by the relationship.

$$APL = \min \text{ over } Z \text{ of } \frac{F_Q^L(E_\ell)\ K(Z)}{F_Q(Z,\ell) \times V(Z) \times Ep\ (Z)} \times 100\% \qquad P > .5$$

where $F_Q(Z,\ell)$ is the measured $F_Q(Z,\ell)$, including a 3% manufacturing tolerance uncertainty and a 5% measurement uncertainty, at the time of target flux determination from a power distribution map using the moveable in-core detectors. The above limit is not applicable in the following core plane regions.

1) Lower core region 0 to 10% inclusive.

2) Upper core region 90% to 100% inclusive.

ACTION:

a. With a $F_j(Z)$ factor exceeding $[F_j(Z)]_S$ by $\leq$ 4 percent, reduce THERMAL POWER 1 percent for every percent by which the $F_j(Z)$ factor exceeds its limit within 15 minutes and within the next 2 hours either reduce the $F_j(Z)$ factor to within its limit or reduce THERMAL POWER to APL 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 APL or less of RATED THERMAL POWER within 15 minutes.

# The APDMS may be out of service: 1) when in-core maps are being taken as part of the Augmented Startup Test Program or 2) when surveillance for determining power distribution maps is being performed.

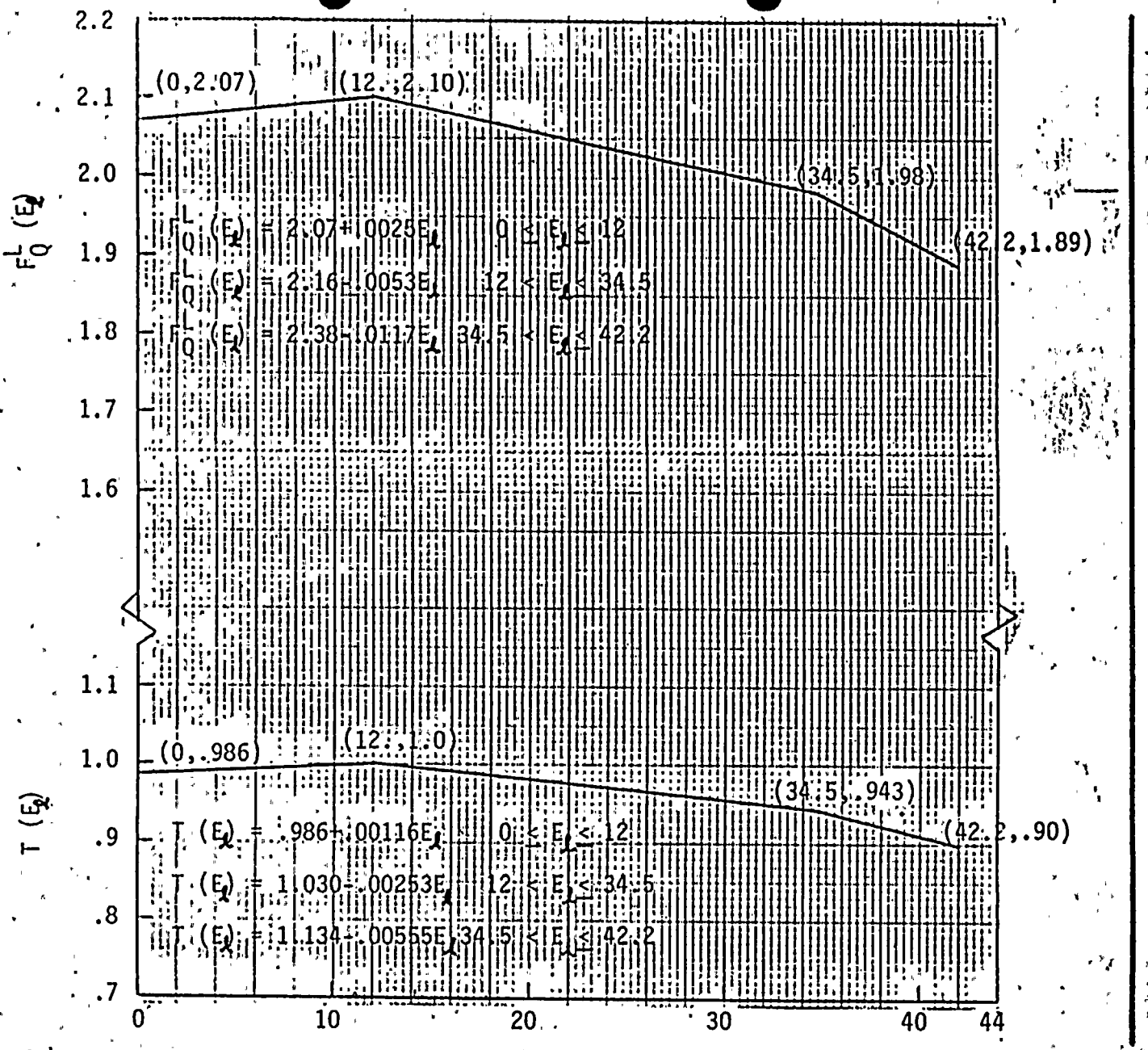


Figure 3.2.3a

Exposure Dependent $F_Q$ Limit, $F_Q^L(E_L)$, and Normalized Limit T $(E_L)$ as a Function of Peak Pellet Burnup for Exxon Nuclear Company Fuel.

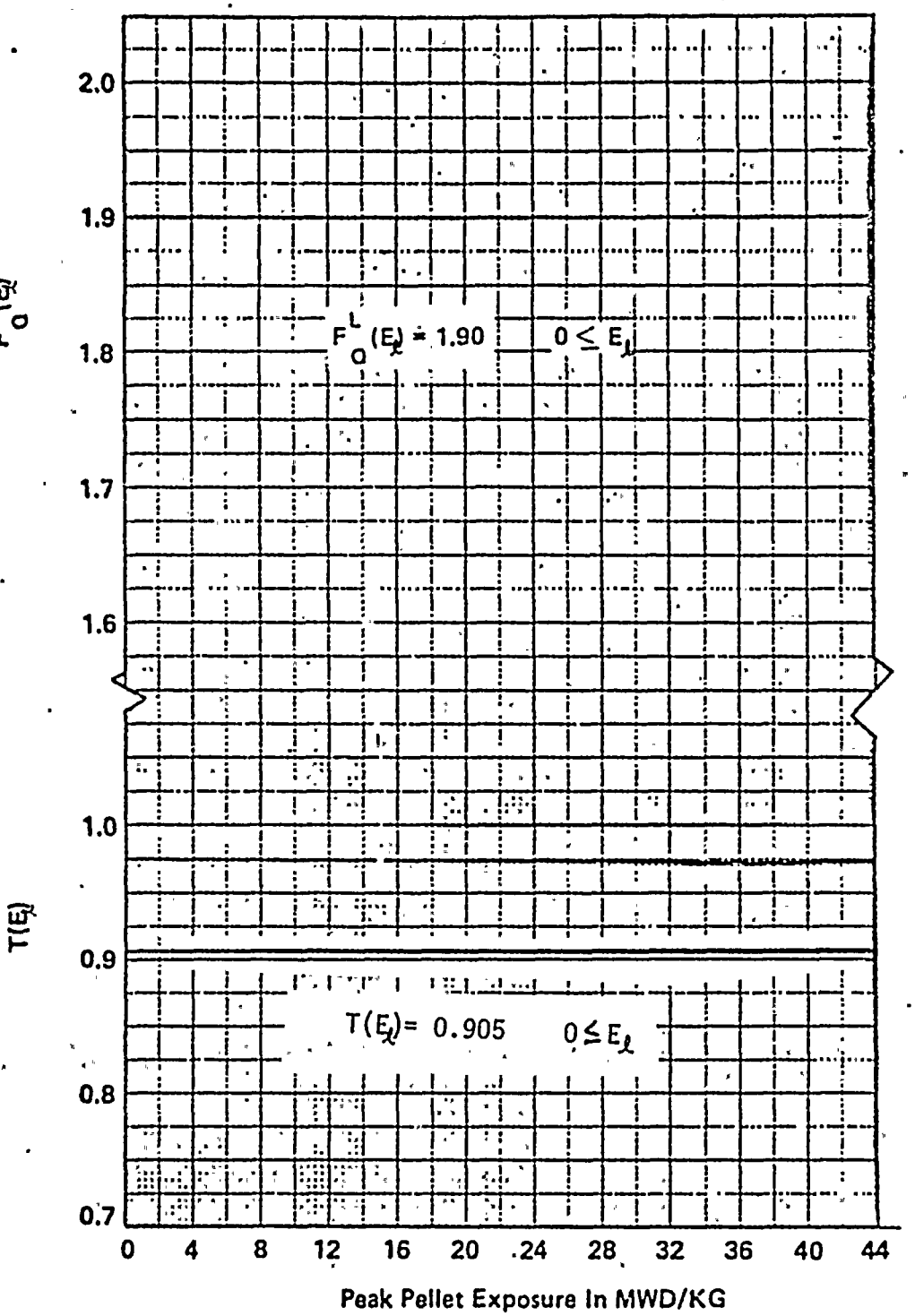


**Figure 3.2 - 3b**

**$F_Q$ Limit, $F_Q^L(E_\ell)$, and Normalized Limit $T(E_\ell)$ as a Function of Peak Pellet Burnup for Westinghouse Fuel**

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 above 50% of RATED THERMAL POWER. For THERMAL POWER levels below 50% of RATED THERMAL POWER, deviations 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 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 90% or 0.9 x APL of RATED THERMAL POWER (whichever is less). During operation at THERMAL POWER levels between 15% and 90% or 0.9 x APL of RATED THERMAL POWER (whichever is less), the computer outputs an alarm message when the penalty deviation accumulates beyond the limits of 1 hour and 2 hours, respectively.

The upper bound limit (90% or 0.9 x APL of RATED THERMAL POWER (whichever is less)) on AXIAL FLUX DIFFERENCE assures that the $F_Q(Z,t)$ envelope of 2.10 times K(Z) x T(E) is not exceeded during either normal operation or in the event of xenon redistribution following power changes. The lower bound limit (50% of RATED THERMAL POWER) is based on the fact that at THERMAL POWER levels below 50% of RATED THERMAL POWER, the average linear heat generation rate is half of its nominal operating value and below that value, perturbations in localized flux distributions cannot affect the results of ECCS or DNBR analyses in a manner which would adversely affect the health and safety of the public.

Figure B 3/4 2-1 shows a typical monthly target band near the beginning of core life.

The bases and methodology for establishing these limits is presented in topical report XN-NF-77-57, "Exxon Nuclear Power Distribution Control for PWR's-Phase II" and Supplement 1 to that report.

ATTACHMENT 2

TO

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SAFETY EVALUATION

## Safety Evaluation of Proposed $F_Q$ Limit

American Electric Power Service Corporation staff members have reviewed the ECCS reanalysis summarized in Attachment 3 to this letter. We have found the analysis to be acceptable and concur with the conclusion that the reanalysis results demonstrate the operation of the reactor at the increased peaking factor limits will insure compliance with the NRC acceptance criteria as defined in 10 CFR 50.46.

The PNSRC and AEPSC NSDRC have also reviewed the proposed change and concur with this evaluation. The reviews of these committees have concluded that the subject change will not adversely affect the health and safety of the public.

ATTACHMENT 3

TO

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EXXON REPORT