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.

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

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

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

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

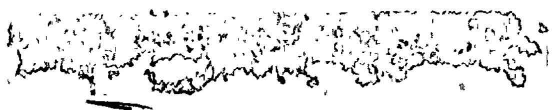
V(Z) is the function defined in Figure 3.2-3, K(Z) is defined in Figure 3.2-2, T(Eℓ) is defined in Figures 3.2-3a and 3.2-3b, P is the fraction of RATED THERMAL POWER. Ep(Z) is an uncertainty factor to account for the reduction in the $F_Q^L(E\ell)$ curve due to an accumulation of exposure prior to the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

$E_p(Z) = 1.0 \qquad 0 \leq E\ell \leq 17.62$

$E_p(Z) = 1.0 + [.0040XF_Q^M(Z)] \qquad 17.62 < E\ell \leq 34.5$

$E_p(Z) = 1.0 + [.0093XF_Q^M(Z)] \qquad 34.5 < E\ell \leq 42.2$

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



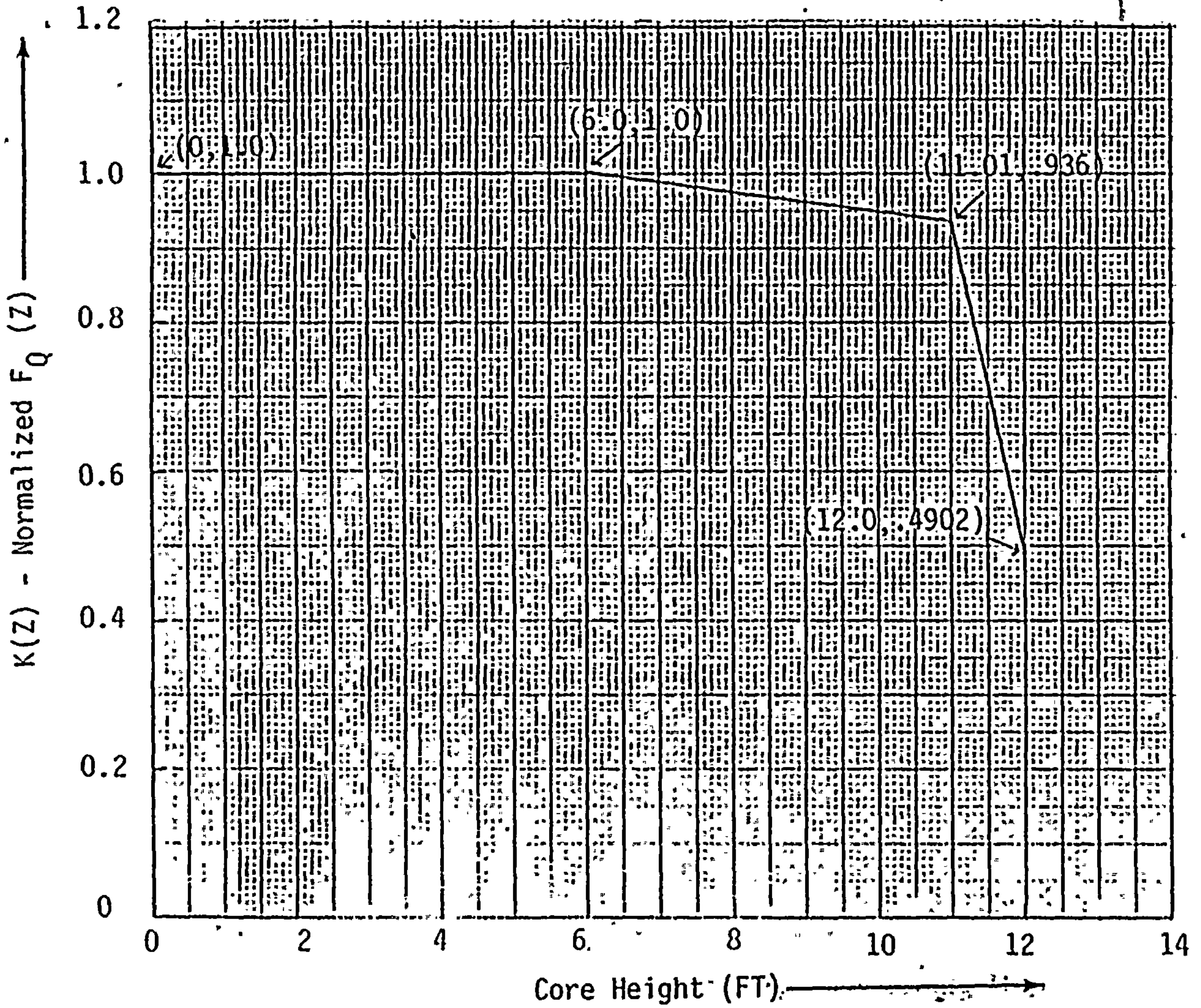


Figure 3-2-2 K(Z) - Normalized F_Q (Z) As A Function of Core Height

LIMITING CONDITION FOR OPERATION

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

$$[F_j(Z)]_S = \frac{[2.04][K(Z)]}{(\overline{R}_j)(P_L)(1.03)(1 + \sigma_j)(1.07)\ F_p}$$

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. $\overline{R}_j$, 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:

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

Where:

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

R_{ij} and its associated σ_j may be calculated on a full core or a limiting fuel batch basis as defined on page B3/4 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 $F_Q^L(E\ell)$ 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)

$T(E\ell)$ is the ratio of the exposure dependent $F_Q^L(E)$ to 2.04 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 $F_{Qi\ell}^{Meas}$.

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

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

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 $F_Q^L(E)$ curve due to an accumulation of exposure prior to the next flux map. The following F_p factor shall apply:

$F_p = 1.0$	$0 \leq E\ell \leq 17.62$
$F_p = 1.0 + [.0015 \times W]$	$17.62 < E_\ell \leq 34.5$
$F_p = 1.0 + [0.0033 \times W]$	$34.5 < E\ell \leq 42.2$

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

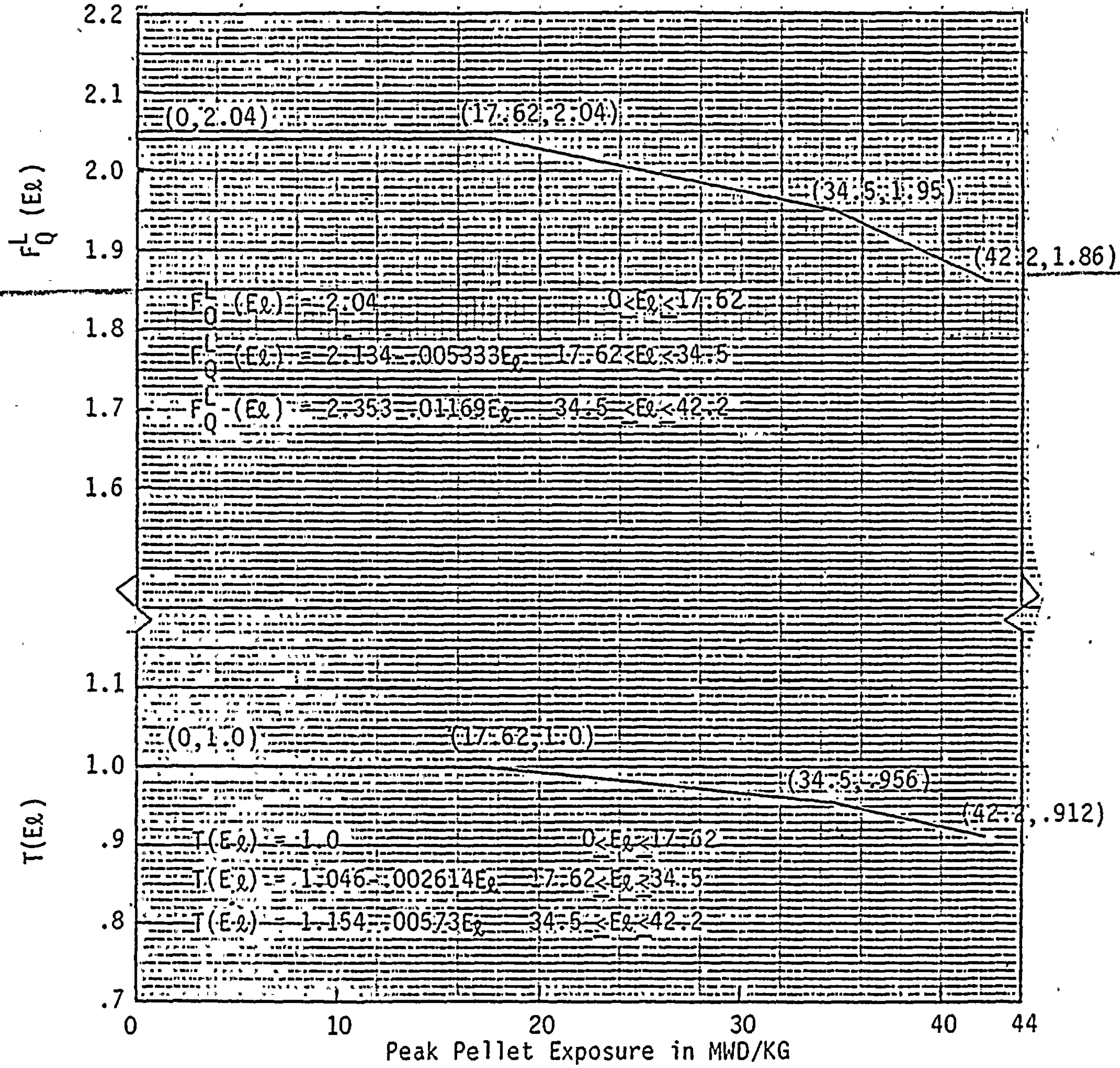


Figure 3.2.3a

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

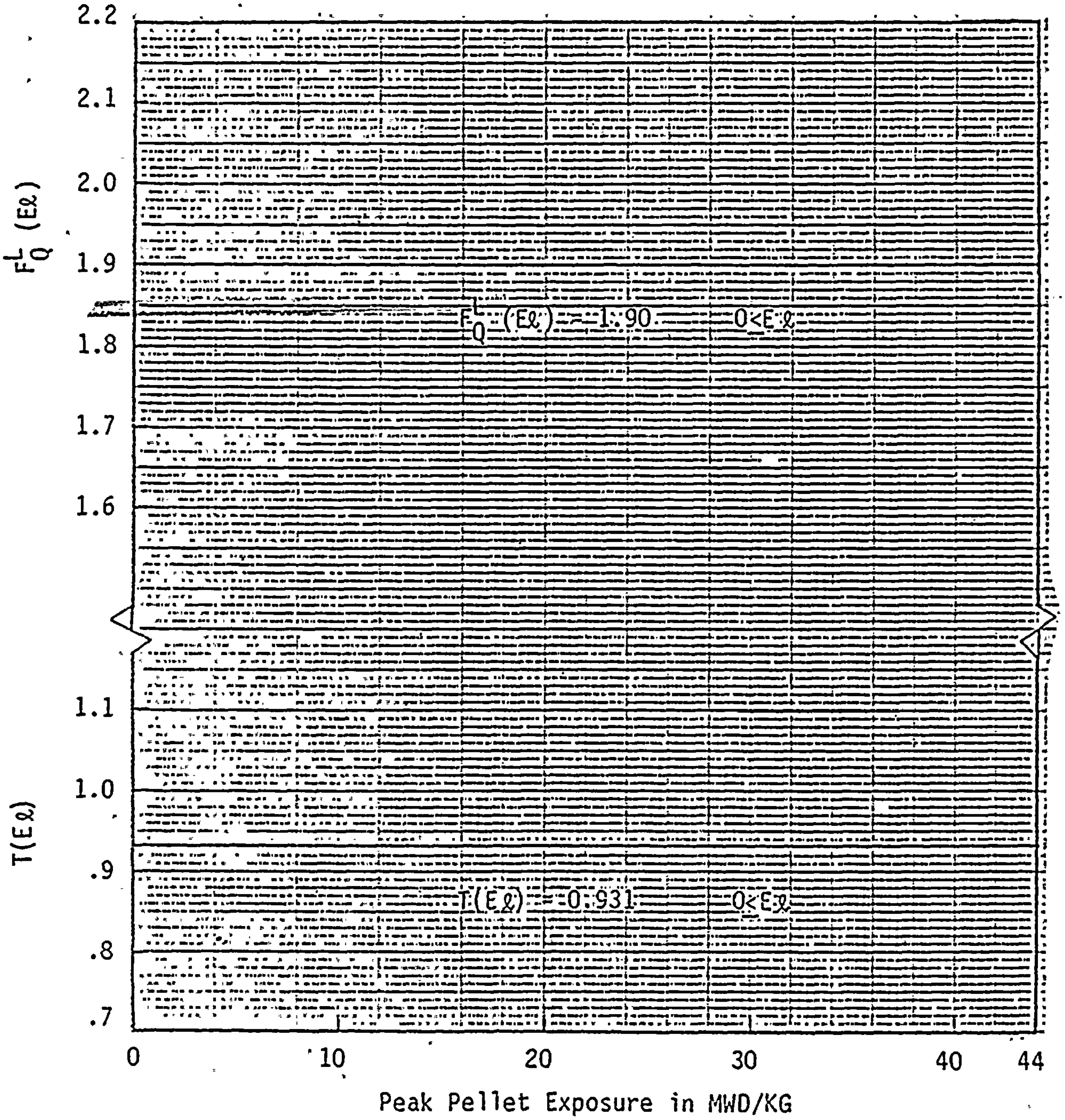


Figure 3-2-3b

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 (whichever is less) of RATED THERMAL POWER. During operation at THERMAL POWER levels between 15% and 90% or 0.9 x APL (whichever is less) of RATED THERMAL POWER, 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 (whichever is less) of RATED THERMAL POWER, on AXIAL FLUX DIFFERENCE assures that the $F_Q(Z,\ell)$ envelope of 2.04 times K(Z) x T(Eℓ) 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 No. 3 to AEP:NRC:0665

Summary of the Effect on the D. C. Cook Unit 2 ECCS Analysis

Westinghouse has evaluated the impact on Unit 2 of assuming no single failure by calculating the response to maximum safeguards, which assumed minimum injection line resistances, enhanced ECCS pumps' performance and no single failure which results in the highest amount of flow delivered to the RCS. The higher safety injection flow results in a faster lower plenum filling and earlier bottom of core recovery which are beneficial to predicted core cooling. The higher amounts of safety injection flow under maximum safeguards will result in enchanced downcomer overfilling which will increase the maximum possible downcomer water level and result in a greater spillage from the reactor vessel cold leg stub to the containment. This effect is deleterious to predicted core cooling. The higher safety injection flow also results in higher spillage from the broken loop. The increased spillage reduces the containment pressure which is also deleterious to predicted core cooling. The higher safety injection flow is sufficient to condense all of the steam flow in the intact loops which reduces the pressure drop in the intact loops cold leg and in the cold leg stub of the broken loop. The net effect of the condensation of the steam in the intact loops is a penalty in core reflood rate. All of these effects combine to impact the flooding rate which affects the peak cladding temperature. Westinghouse sensitivity calculations indicate a +96 ^{o}F penalty on PCT for Unit 2. However, the previous ECCS analysis results indicated a 161^{o}F margin to 10.CFR.50.46 ECCS Acceptance Criteria. Therefore, even in the worst case, a 65^{o}F margin still exists and Technical Specifications limits do not need to be modified.