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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
Cycle 17 Core Operating Limits Report Mid-Cycle Revision

The Beaver Valley Power Station (BVPS) Unit 1 Core Operating Limits Report (COLR) was revised on April 7, 2005. Pursuant to BVPS Unit 1 Technical Specification 6.9.5.d, attached is a copy of this mid-cycle revision to the BVPS Unit 1 COLR (Revision 45).

As identified in the previous FirstEnergy Nuclear Operating Company (FENOC) letter L-04-144 dated November 19, 2004, titled "10 CFR 50.46 Report of Changes or Errors in ECCS Evaluation Models," the BVPS Unit 1 containment metal mass had been previously under-estimated, which resulted in increased Loss of Coolant Accident (LOCA) peak clad temperature (PCT) effects. A compensatory measure taken by FENOC to address this newly identified LOCA analysis effect was to reduce the core design limit, F_Q, from 2.30 to 2.20 for the BVPS Unit 1 Cycle 17 fuel, which had already been designed and manufactured when this LOCA analysis discrepancy was identified. The reduction in F_Q improved the LOCA analysis PCT results. This reduction in F_Q, however, causes a reduction in available margin for meeting the required periodic Fxy surveillances performed during BVPS Unit 1 operation in Cycle 17.

The initial Cycle 17 COLR (previously submitted to the NRC by FENOC letter L-04-147, dated November 5, 2004) provided a single set of Fxy limits which were applicable throughout the whole BVPS Unit 1 Cycle 17 operation. This mid-cycle revision splits the current Fxy limits into two parts: for core burnups ≤ 8000 MWD/MTU and for core burnups > 8000 MWD/MTU. By splitting the Fxy limits into two parts, additional margin could be obtained for meeting Fxy surveillance limits during BVPS Unit 1 plant operation when core burnup is ≤ 8000 MWD/MTU.

An additional action is being considered to improve the Fxy surveillance margin for BVPS Unit 1 operation for core burnups > 8000 MWD/MTU, which may lead to another BVPS Unit 1 COLR mid-cycle revision. Any further COLR revisions will be provided to the NRC as required by BVPS Unit 1 Technical Specification 6.9.5.d.

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No regulatory commitments are contained in this submittal. If there are any questions concerning this matter, please contact Mr. Larry R. Freeland, Manager, Regulatory Compliance at 724-682-4284.

Sincerely,

L. William Pearce

Attachment

c: Mr. T. G. Colburn, NRR Senior Project Manager
Mr. P. C. Cataldo, NRC Sr. Resident Inspector
Mr. S. J. Collins, NRC Region I Administrator
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Central File - *Keywords: COLR*

4.1 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report provides the cycle specific parameter limits developed in accordance with the NRC approved methodologies specified in Technical Specification Administrative Control 6.9.5.

Specification 3.1.3.5 Shutdown Rod Insertion Limits

The shutdown rods shall be withdrawn to at least 225 steps.*

Specification 3.1.3.6 Control Rod Insertion Limits

Control Banks A and B shall be withdrawn to at least 225 steps.*

Control Banks C and D shall be limited in physical insertion as shown in Figure 4.1-1.*

Specification 3.2.1 Axial Flux Difference

NOTE: The target band is ±7% about the target flux from 0% to 100% RATED THERMAL POWER.

The indicated Axial Flux Difference:

a. Above 90% RATED THERMAL POWER shall be maintained within the ±7% target band about the target flux difference.

b. Between 50% and 90% RATED THERMAL POWER is within the limits shown on Figure 4.1-2.

c. Below 50% RATED THERMAL POWER may deviate outside the target band.

Specification 3.2.2 $F_Q(Z)$ and F_{xy} Limits

$$F_Q(Z) \leq \frac{CF_Q}{P} * K(Z) \qquad \text{for } P > 0.5$$

$$F_Q(Z) \leq \frac{CF_Q}{0.5} * K(Z) \qquad \text{for } P \leq 0.5$$

Where: $CF_Q = 2.20$ $\qquad P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$

K(Z) = the function obtained from Figure 4.1-3.

* As indicated by the group demand counter

The F_{xy} limits [$F_{xy}(L)$] for RATED THERMAL POWER within specific core planes shall be:

$F_{xy}(L) = F_{xy}(RTP)(1 + PF_{xy} * (1-P))$

Where: For all core planes containing D-Bank:

$F_{xy}(RTP) \leq 1.71$

For unrodded core planes with core burnup $\leq$ 8000 MWD/MTU:

$F_{xy}(RTP) \leq 1.75$ from 1.8 ft. elevation to 2.3 ft. elevation

$F_{xy}(RTP) \leq 1.75$ from 2.3 ft. elevation to 3.7 ft. elevation

$F_{xy}(RTP) \leq 1.79$ from 3.7 ft. elevation to 5.8 ft. elevation

$F_{xy}(RTP) \leq 1.81$ from 5.8 ft. elevation to 7.4 ft. elevation

$F_{xy}(RTP) \leq 1.75$ from 7.4 ft. elevation to 8.9 ft. elevation

$F_{xy}(RTP) \leq 1.74$ from 8.9 ft. elevation to 10.2 ft. elevation

For unrodded core planes with core burnup > 8000 MWD/MTU:

$F_{xy}(RTP) \leq 1.68$ from 1.8 ft. elevation to 2.3 ft. elevation

$F_{xy}(RTP) \leq 1.73$ from 2.3 ft. elevation to 3.7 ft. elevation

$F_{xy}(RTP) \leq 1.79$ from 3.7 ft. elevation to 5.8 ft. elevation

$F_{xy}(RTP) \leq 1.81$ from 5.8 ft. elevation to 7.4 ft. elevation

$F_{xy}(RTP) \leq 1.74$ from 7.4 ft. elevation to 8.9 ft. elevation

$F_{xy}(RTP) \leq 1.60$ from 8.9 ft. elevation to 10.2 ft. elevation

$PF_{xy} = 0.2$

$P = \dfrac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$

Figure 4.1-4 provides the maximum total peaking factor times relative power ($F_Q^T * P_{rel}$) as a function of axial core height during normal core operation.

Specification 3.2.3 $F^N_{\Delta H}$

$F^N_{\Delta H} \leq CF_{\Delta H} * (1 + PF_{\Delta H} (1-P))$

Where: $CF_{\Delta H} = 1.62$

$PF_{\Delta H} = 0.3$

$$P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$$

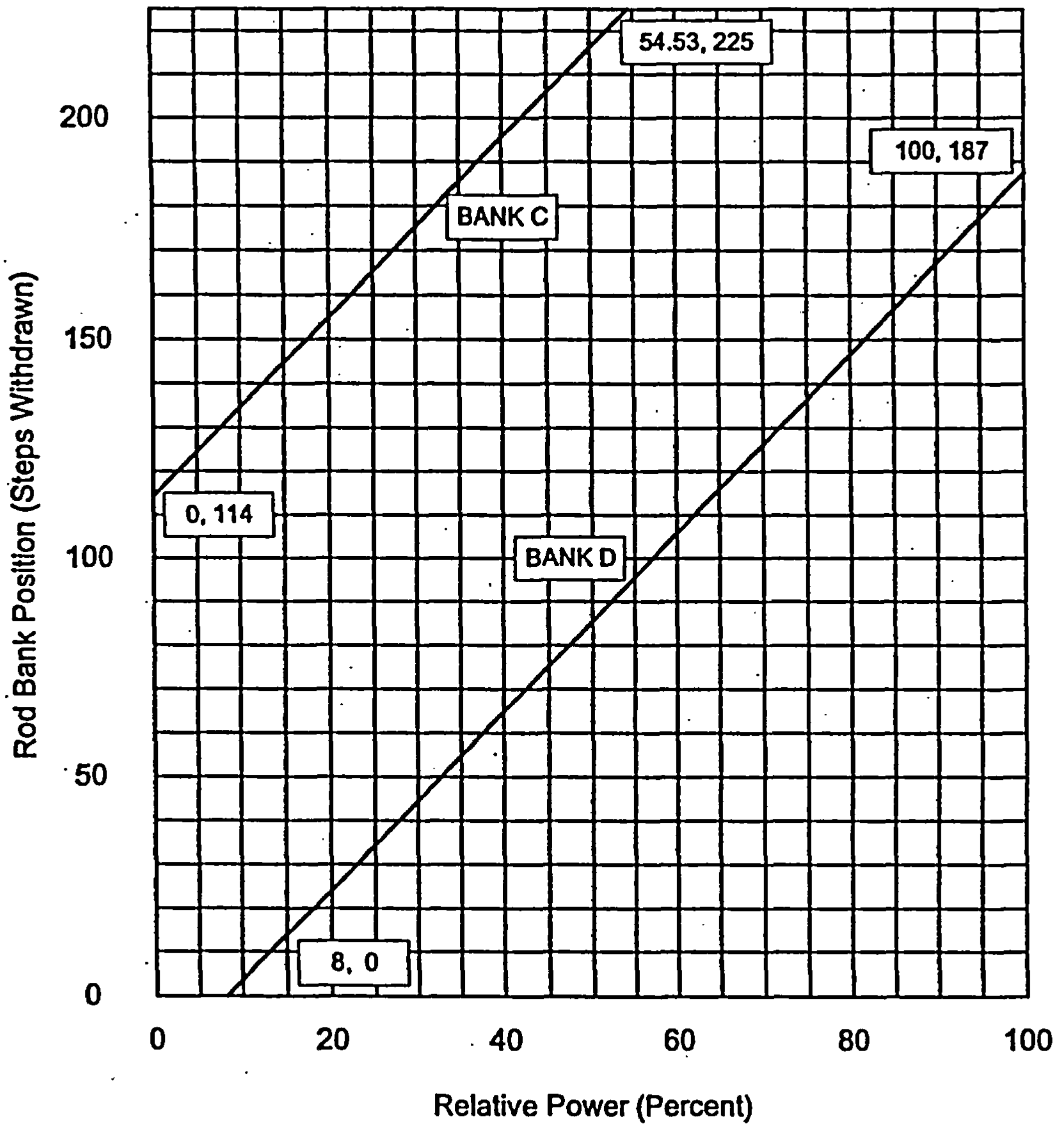

FIGURE 4.1-1
CONTROL ROD INSERTION LIMITS

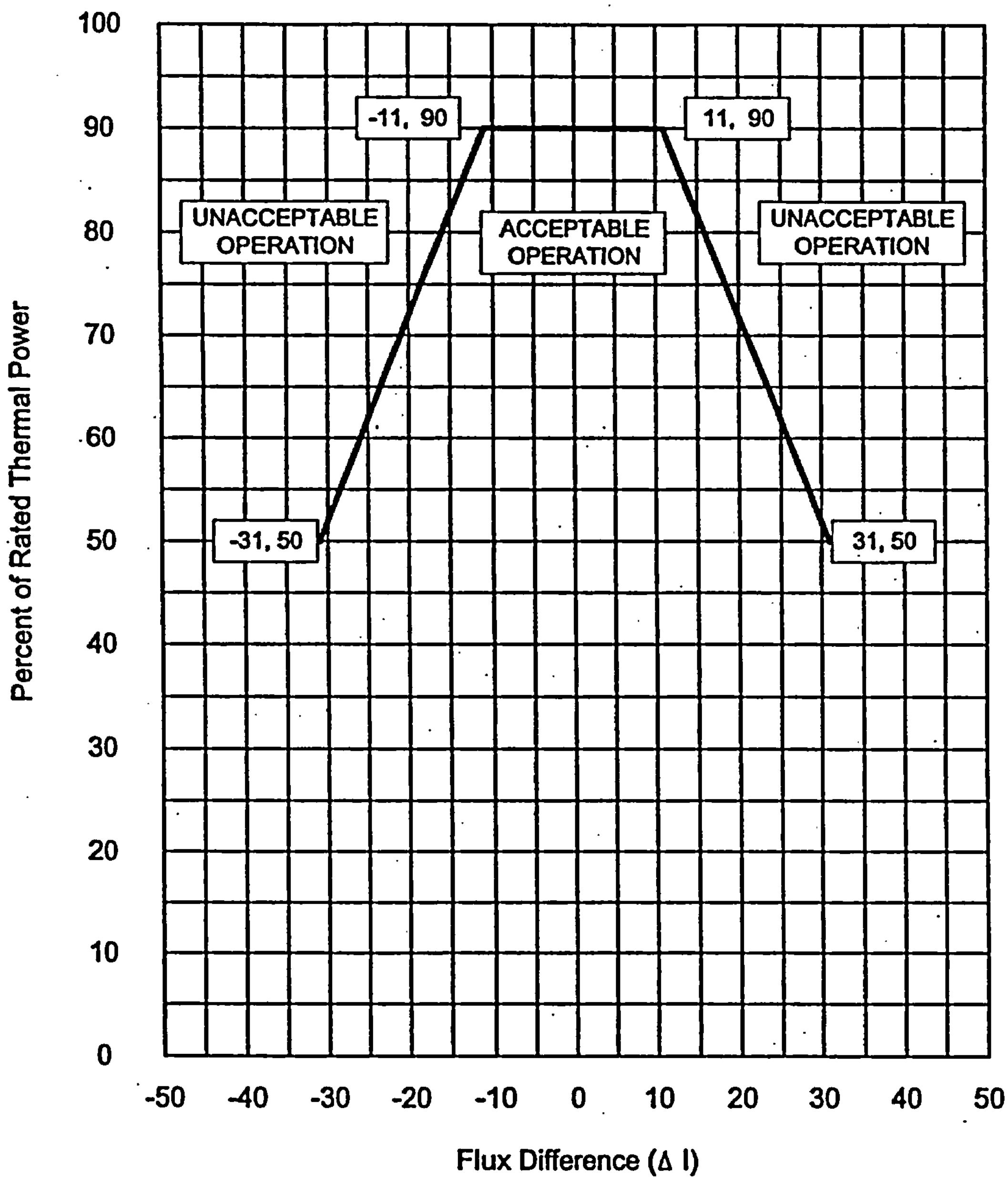

FIGURE 4.1-2
AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER

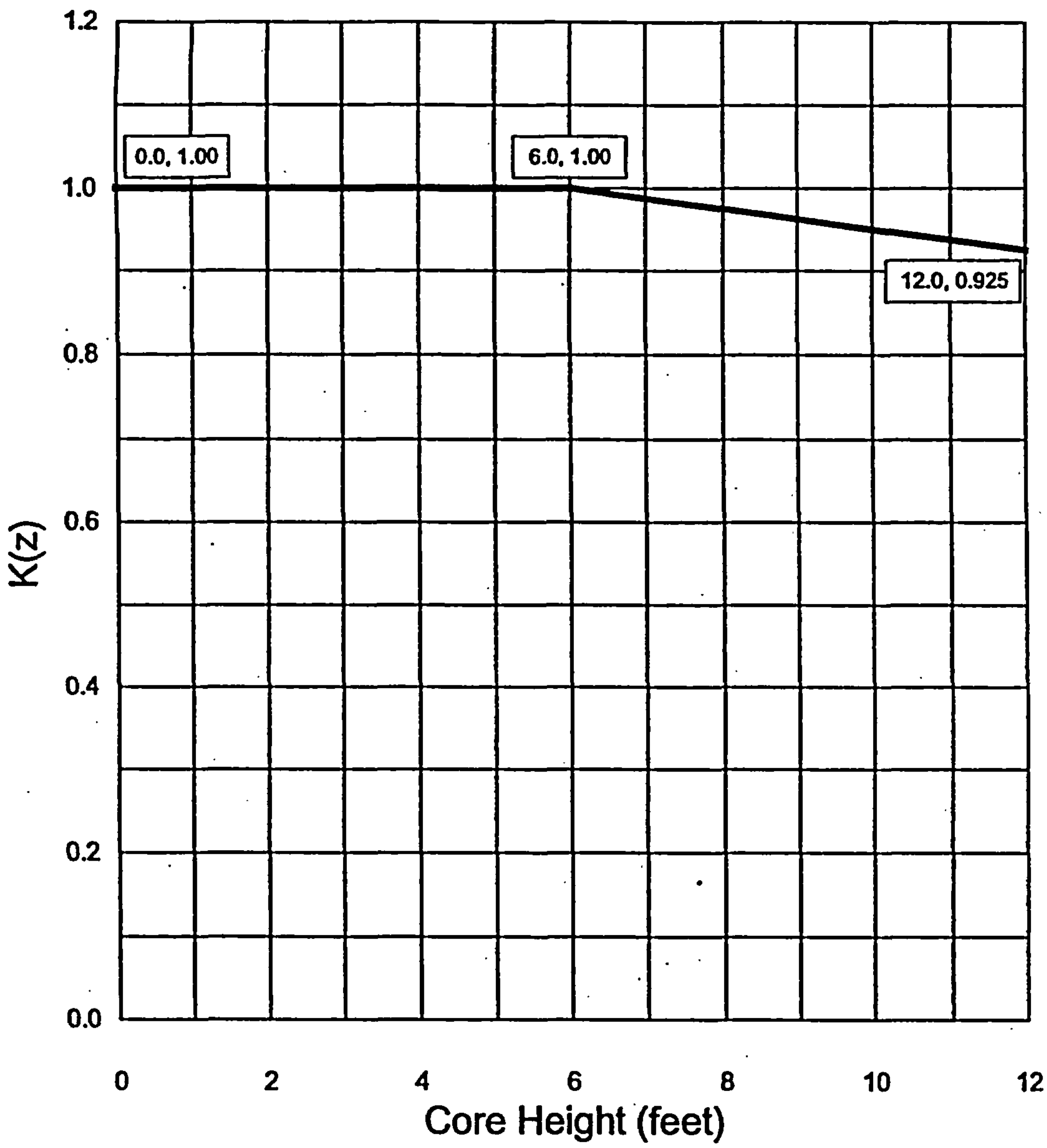

FIGURE 4.1-3
F_QT NORMALIZED OPERATING ENVELOPE, K(Z)

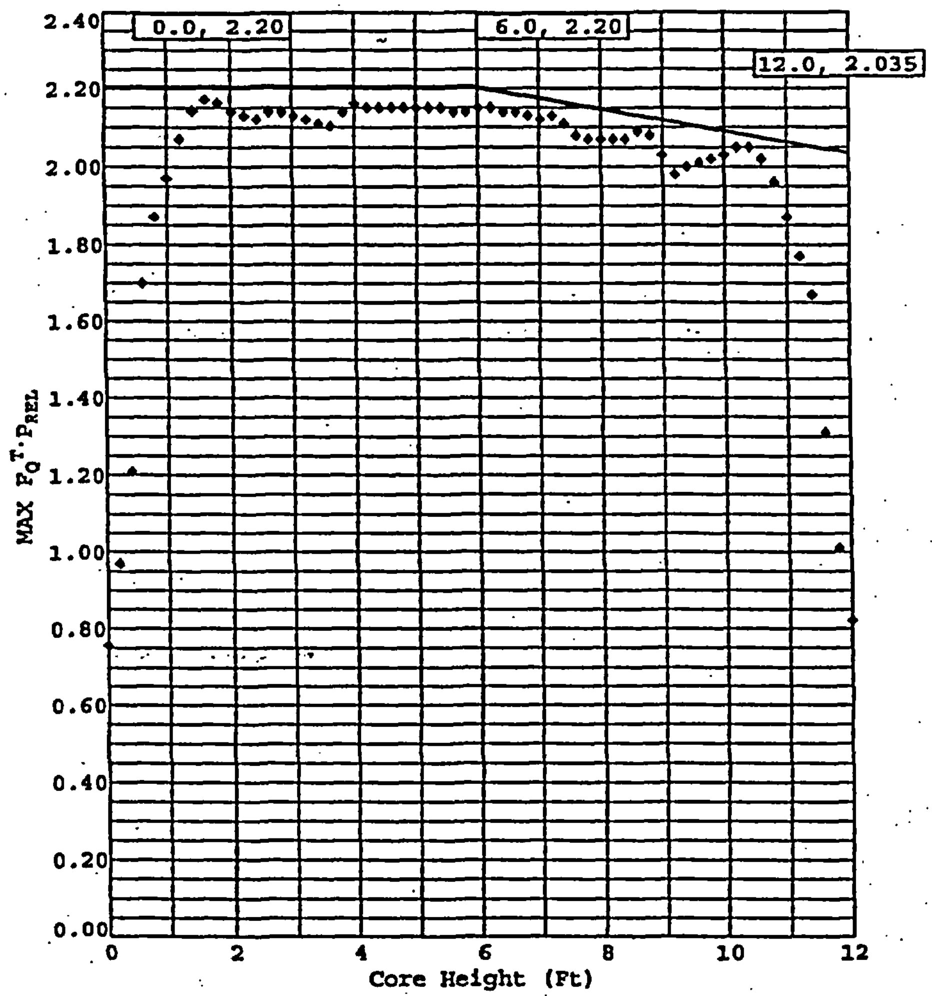

FIGURE 4.1-4
MAXIMUM (F_QT*PREL) VS AXIAL CORE HEIGHT DURING NORMAL OPERATION

Specification 3.3.1.1 Reactor Trip System Instrumentation Setpoints, Table 3.3-1 Table Notations A and B

Overtemperature ΔT Setpoint Parameter Values:

Parameter	Value
Overtemperature ΔT reactor trip setpoint	$K1 \leq 1.259$
Overtemperature ΔT reactor trip setpoint Tavg coefficient	$K2 \geq 0.01655$/°F
Overtemperature ΔT reactor trip setpoint pressure coefficient	$K3 \geq 0.000801$/psia
Tavg at RATED THERMAL POWER	$T' \leq 576.2$°F
Nominal Pressurizer Pressure	$P' \geq 2250$ psia
Measured reactor vessel average temperature lead/lag time constants	$\tau_1 \geq 30$ secs $\tau_2 \leq 4$ secs

f (ΔI) is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between -36 percent and +15 percent, f (ΔI) = 0 (where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER).

(ii) for each percent that the magnitude of $(q_t - q_b)$ exceeds -36 percent, the ΔT trip setpoint shall be automatically reduced by 2.08 percent of its value at RATED THERMAL POWER.

(iii) for each percent that the magnitude of $(q_t - q_b)$ exceeds +15 percent, the ΔT trip setpoint shall be automatically reduced by 1.59 percent of its value at RATED THERMAL POWER.

Overpower ΔT Setpoint Parameter Values:

Parameter	Value
Overpower ΔT reactor trip setpoint	$K4 \leq 1.0916$
Overpower ΔT reactor trip setpoint Tavg rate/lag coefficient	$K5 \geq 0.02$/°F for increasing average temperature

Overpower ΔT Setpoint Parameter Values (continued):

Parameter	Value
Overpower ΔT reactor trip setpoint Tavg heatup coefficient	$K6 \geq 0.00128/°F$ for $T > T''$ $K6 = 0/°F$ for $T \leq T''$
Tavg at RATED THERMAL POWER	$T'' \leq 576.2°F$
Measured reactor vessel average temperature rate/lag time constant	$\tau_3 \geq 0$ secs

Specification 3.2.5 DNB Parameters

Parameter	Indicated Value
Reactor Coolant System Tavg	Tavg ≤ 580.0°F(1)
Pressurizer Pressure	Pressure ≥ 2215 psia(2)
Reactor Coolant System Total Flow Rate	Flow ≥ 267,400 gpm(3)

(1) The Reactor Coolant System (RCS) T_{avg} value includes allowances for rod control operation and verification via control board indication.

(2) The pressurizer pressure value includes allowances for pressurizer pressure control operation and verification via control board indication.

(3) The RCS total flow rate includes allowances for normalization of the cold leg elbow taps with a beginning of cycle precision RCS flow calorimetric measurement and verification on a periodic basis via control board indication.

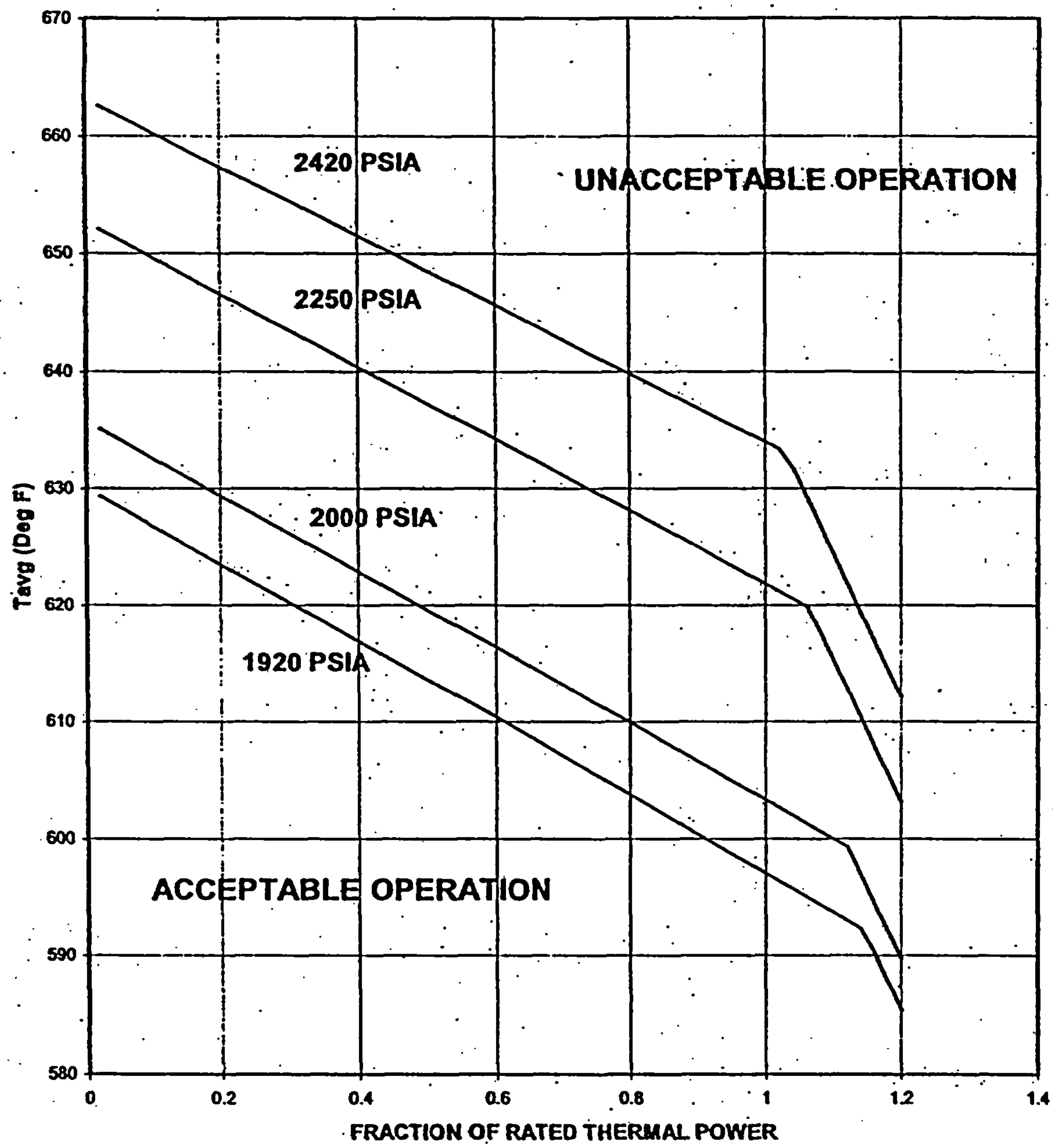

Figure 4.1-5
REACTOR CORE SAFETY LIMIT
THREE LOOP OPERATION
(Technical Specification Safety Limit 2.1.1)