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RCDeYoung
JMHendrie
D. Skovholt
R. Klecker
V. Stello
M. Jinks (4)
D. Ross
A. Dromerick
D. Vassallo
J. Lee

Docket Nos. 50-280
and 50-281

JUL 17 1973

Mr. Stanley Ragone
Vice President
Virginia Electric and
Power Company
P. O. Box 26666
Richmond, Virginia 23261

License Nos. DPR-32
and DPR-37

Change No. 8

Dear Mr. Ragone:

Your letter dated July 5, 1973 enclosed proposed Technical Specification Change No. 8, which supersedes your proposed Technical Specification Change No. 8 requested in your letter of June 4, 1973. The proposed changes are required in order to implement a reduced primary system pressure program to preclude fuel collapse during the first fuel cycle.

We have reviewed the report "Fuel Densification - Surry Units 1 and 2 - Low Pressure Analysis," dated April, 1973, concerning the reduction of the primary system pressure in order to reduce the clad creep rate. On the basis of our review, we have determined that the three areas requiring assessment were DNB, stored energy and creep collapse. The DNB analysis was performed using the methods as described in the FSAR. The methods are equally valid at the lower pressure since the experimental data base included the lower pressure. The staff concludes that the DNB margins are similar to those at high pressure because the coolant temperatures are reduced accordingly. For determining the stored energy only, the low pressure creep rate was used. This increases the stored energy and therefore, is conservative and acceptable. A reduction of the primary system pressure will reduce the creep rate and consequently the operation at the lower pressure for the same period as previously allowed for high pressure (9000 EFPH) is conservative and acceptable with respect to clad collapse. Therefore, we have determined that the effects of reduced primary system pressure at 92% of rated power have been adequately analyzed and that the reactor can be operated at 92% of rated power with a primary system pressure of 2000 psia.

We conclude that the proposed changes do not involve any significant hazards consideration and there is reasonable assurance that the health and safety of the public will not be endangered by operation of the reactor in the manner proposed.

OFFICE ▶						
SURNAME ▶						
DATE ▶						

Accordingly, pursuant to Section 50.59 of 10 CFR Part 50, the Technical Specifications of Facility Operating License Nos. DPR-32 and DPR-37 are hereby changed as follows: replace pages TS Figure 2.1.1, TS Figure 2.1.2, TS Figure 2.1-3, TS 2.3-1, TS 2.3-2, TS 2.3-5, TS 2.3-6, TS Figure 3.12-1, and TS Figure 3.12-2 with the revised pages (designated as Change No. 8 on the bottom of the page) TS Figure 2.1-1, TS Figure 2.1-2, TS Figure 2.1-3, TS 2.3-1, TS 2.3-2, TS 2.3-5, TS 2.3-6, TS Figure 3.12-1, and TS Figure 3.12-2 enclosed.

Sincerely,

Original signed by R. C. DeYoung

R. C. DeYoung, Assistant Director
for Pressurized Water Reactors
Directorate of Licensing

Enclosures:
As stated

cc: George D. Gibson, Esq.
Hunton, Williams, Gay,
and Gibson
P. O. Box 1535
Richmond, Virginia 23213

OFFICE ▶	PWR-1	PWR-1	CP:TR	OGC	AD:PWRs	RO
SURNAME ▶	ADromerick:ms	DBVassallo	DRoss		RCDeYoung	
DATE ▶	7/16/73	7/16/73	7/16/73	7/ /73	7/17/73	7/17/73

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Sincerely,

Original signed by R. C. DeYoung

R. C. DeYoung, Assistant Director
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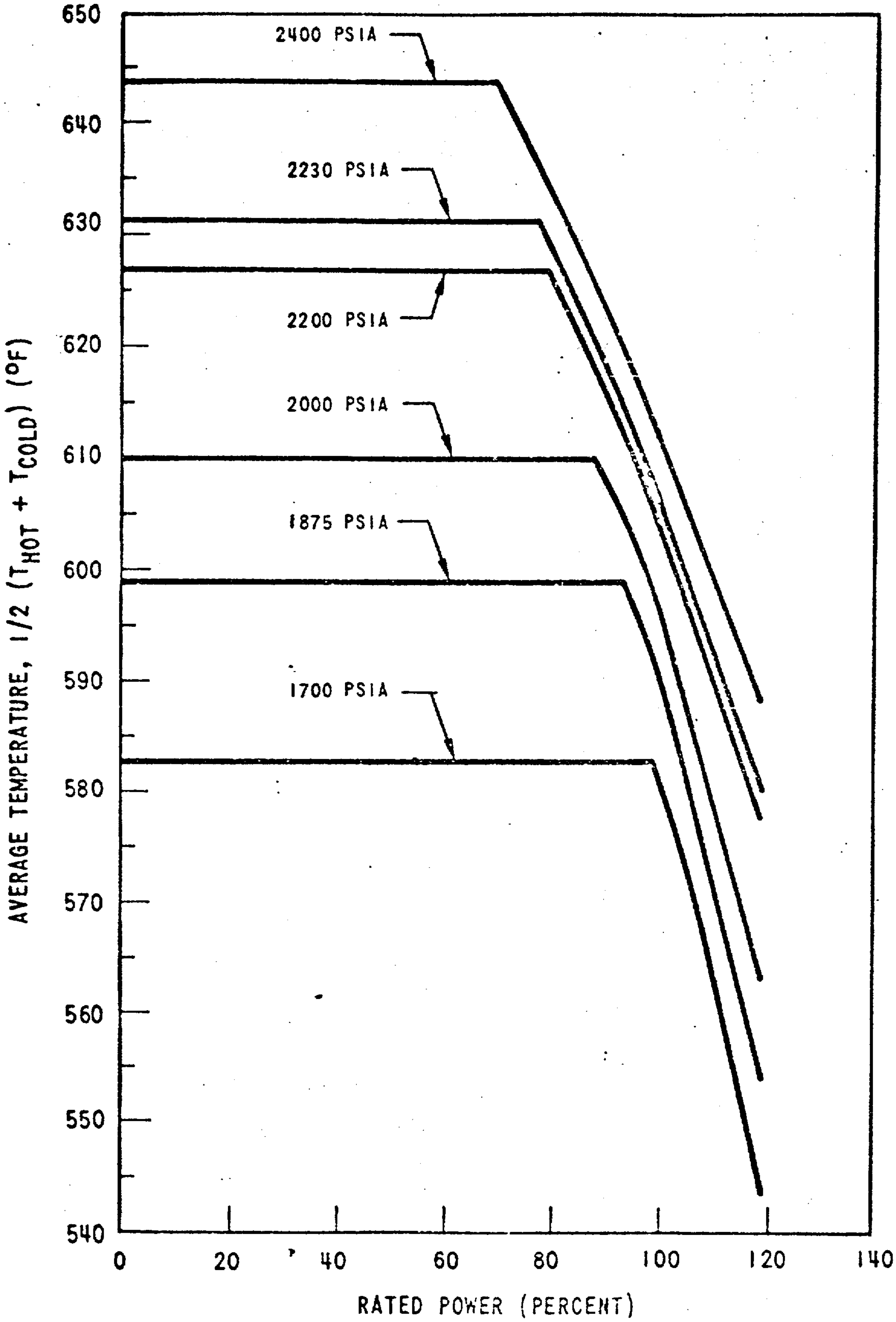

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Figure 2.1-1 Reactor Core Thermal & Hydraulic Safety Limits - Three Loop Operation, 100% Flow

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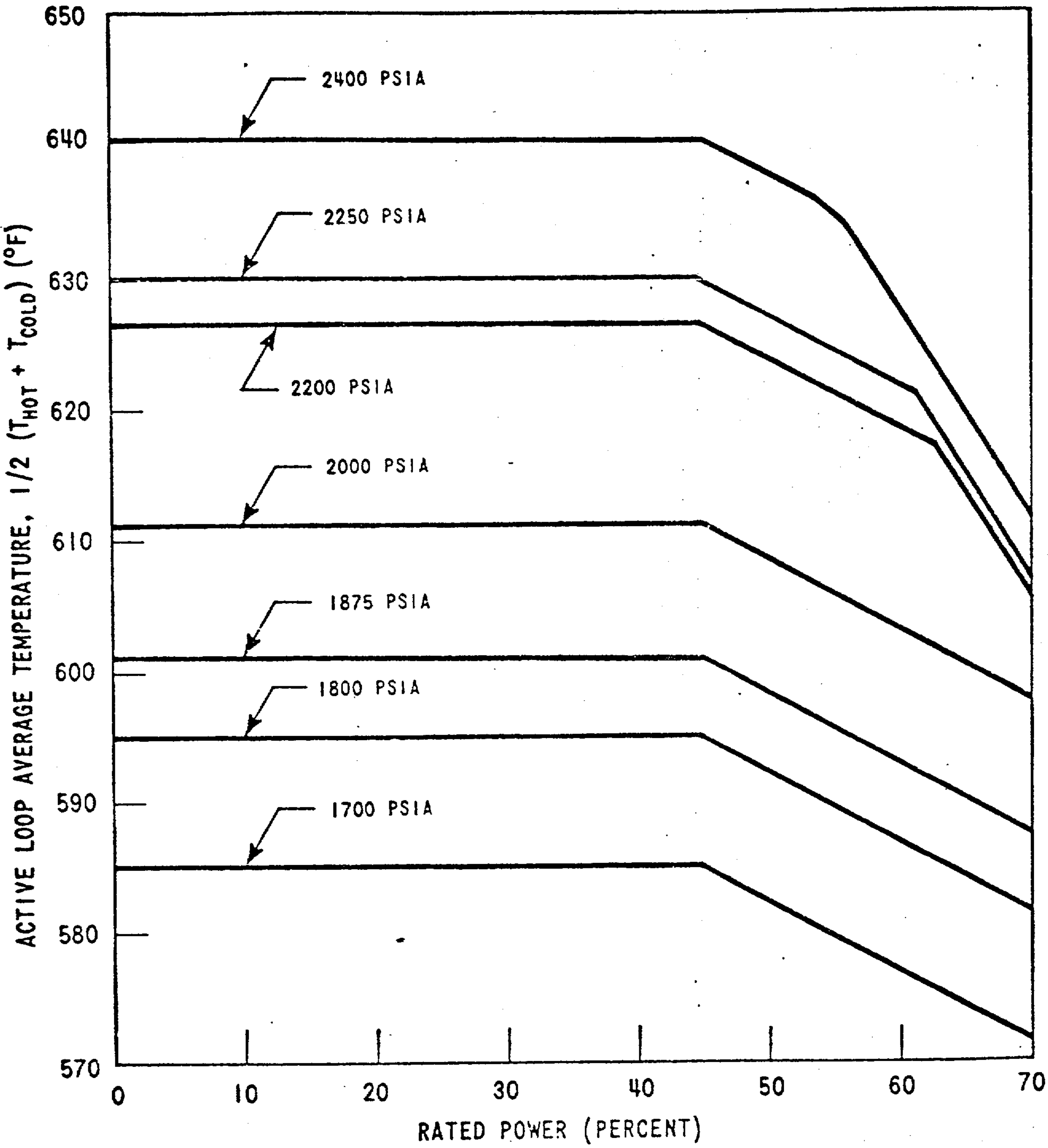

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Figure 2.1-2. Reactor Core Thermal and Hydraulic Safety Limits, Two Loop Operation, Loop Stop Valves Open

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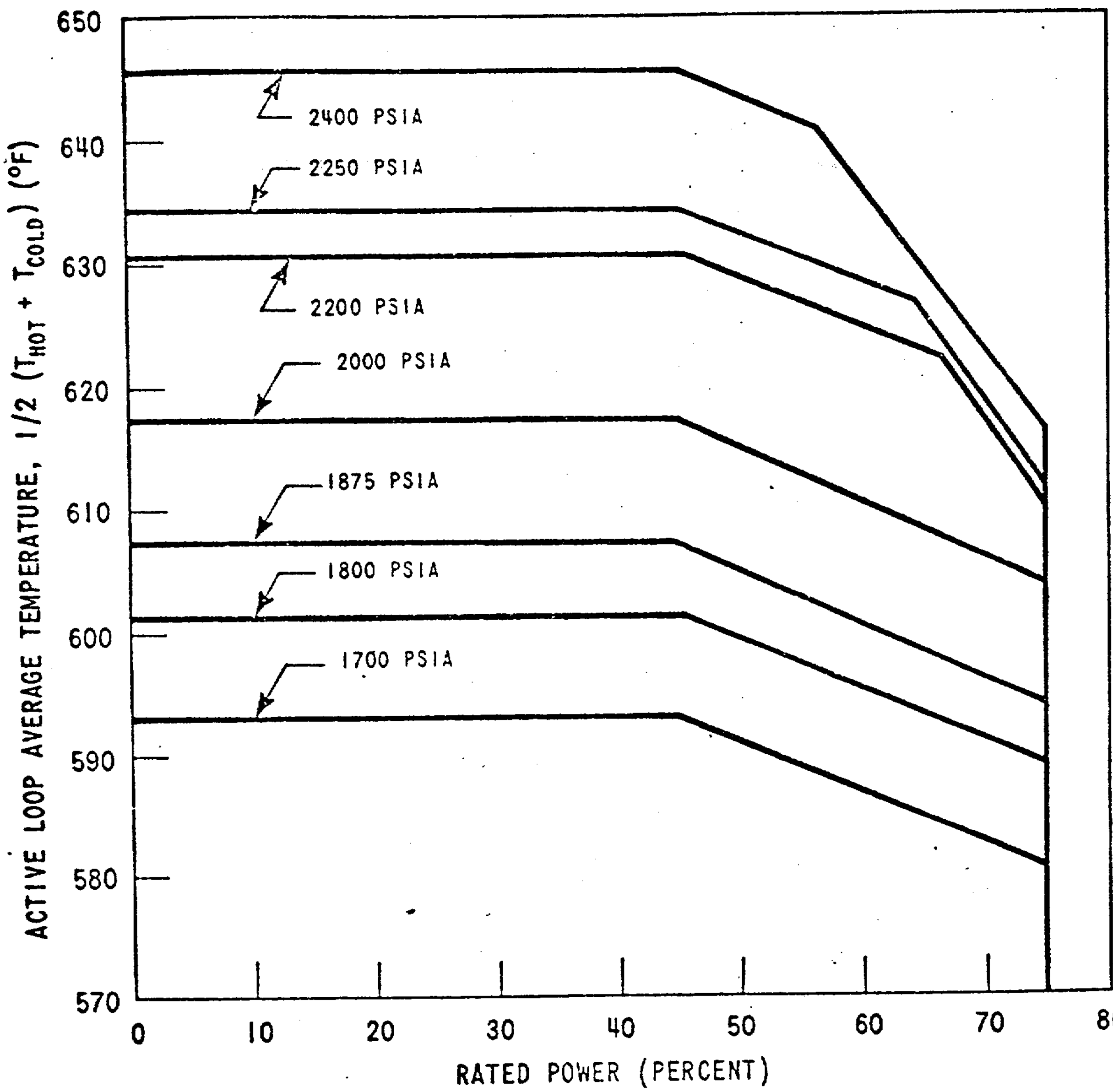

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Figure 2.1-3. Reactor Core Thermal and Hydraulic Safety Limits, Two Loop Operation, Loop Stop Valves Closed

2.3 LIMITING SAFETY SYSTEM SETTINGS, PROTECTIVE INSTRUMENTATION

Applicability

Applies to trip and permissive settings for instruments monitoring reactor power; and reactor coolant pressure, temperature, and flow; and pressurizer level

Objective

To provide for automatic protective action in the event that the principal process variables approach a safety limit.

Specification

A. Protective instrumentation settings for reactor trip shall be as follows:

1. Startup protection

   (a) High flux, power range (low set point) - $\leq$ 25% of rated power.

   (b) High flux, intermediate range (high set point) - current equivalent to $\leq$ 25% of full power.

   (c) High flux, source range (high set point) - neutron flux $\leq 10^6$ counts/sec.

2. Core Protection

   (a) High flux, power range (high set point) - $\leq$ 102% of rated power.

   (b) High pressurizer pressure - $\leq$ 2385 psig.

   (c) Low pressurizer pressure - $\geq$ 1715 psig. 8

(d) Overtemperature ΔT

$$\Delta T \leq \Delta T_0 \; [K_1 - K_2 \; (T - T') + K_3 \; (P - P') - f \; (\Delta I)]$$

where

ΔT_0 = Indicated ΔT at rated thermal power, °F

T = Average coolant temperature, °F

T' = 574.4°F

P = Pressurizer pressure, psig

P' = 2235 psig

K_1 = 1.07 (for 3 loop operation and 2 loop operation with the loop stop valves closed in the inoperable loop)

= 1.12 (for 2 loop operation with the loop stop valves open in the inoperable loop)

K_2 = 0.0094 (for 3 loop operation and 2 loop operation with the loop stop valves closed in the inoperable loop) 8

= 0.139 (for 2 loop operation with the loop stop valves open in the inoperable loop)

K_3 = 0.00076 (for 3 loop operation and 2 loop operation with the loop stop valves closed in the inoperable loop)

= 0.000944 (for 2 loop operation with the loop stop valves open in the inoperable loop)

ΔI = $q_t - q_b$, where q_t and q_b are the percent power in the top and bottom halves of the core respectively, and $q_t + q_b$ is total core power in percent of rated power

$f(\Delta I)$ = function of ΔI, percent of rated core power as shown in Figure 2.3-1

(e) Overpower ΔT

$$\Delta T \leq \Delta T_0 \quad [K_4 - K_5 \frac{dT}{dt} - K_6 \; (T - T') - f \; (\Delta I)]$$

range for a power excursion beginning from low power. This trip value was used in the safety analysis. (1) The intermediate range high flux, low setpoint and source range high flux, high setpoint trips provide additional protection against uncontrolled startup excursions. As power level increases, during startup, these trips are blocked to prevent unnecessary plant trips.

The high and low pressurizer pressure reactor trips limit the pressure range in which reactor operation is permitted. The high pressurizer pressure reactor trip is also a backup to the pressurizer code safety valves for overpressure protection, and is therefore set lower than the set pressure for these valves (2485 psig). The low pressurizer pressure reactor trip also trips the reactor in the unlikely event of a loss-of-coolant accident. (3)

The overtemperature ΔT reactor trip provides core protection against DNB for all combinations of pressure, power, coolant temperature, and axial power distribution, provided only that the transient is slow with respect to piping transit delays from the core to the temperature detectors (about 3 seconds), and pressure is within the range between high and low pressure reactor trips. With normal axial power distribution, the reactor trip limit, with allowance for errors, (2) is always below the core safety limit as shown on TS Figure 2.1-1. If axial peaks are greater than design, as indicated by the difference between top and bottom power range nuclear detectors, the reactor trip limit is automatically reduced. (4) (5)

The overpower and overtemperature protection system setpoints have been revised to include effects of fuel densification and reduced pressure operation on core safety limits. The revised setpoints in the Technical Specifications will 8
ensure that the combination of power, temperature, and pressure will not exceed

the revised core safety limits as shown in Figures 2.1-1, 2, and 3.

In order to operate with a reactor coolant loop out of service (two-loop operation) and with the stop valves of the inactive loop open, the overtemperature ΔT trip setpoint calculation has to be modified by the adjustment of the variables K_1, K_2 and K_3. This adjustment, based on limits for two-loop operation, provides sufficient margin to DNB for the aforementioned transients during two loop operation. The required adjustment and subsequent mandatory calibrations are made in the protective system racks by qualified technicians* in the same manner as adjustments before initial startup and normal calibrations for three-loop operation. For two-loop operation with the inactive loop stop valves closed, the overtemperature ΔT trip setpoints used for three-loop operation are adequate to protect against DNB for all combinations of pressure, power, coolant temperature, and axial power distribution provided only that the transient is slow with respect to transit delays from the core to the temperature detectors. 8

The overpower ΔT reactor trip prevents power density anywhere in the core from exceeding 112% of design power density as discussed in Section 7 and specified in Section 14.2.2 of the FSAR and includes corrections for axial power distribution, change in density and heat capacity of water with temperature, and dynamic compensation for piping delays from the core to the loop temperature detectors. The specified setpoints meet this requirement and include allowance for instrument errors.[2]

The low flow reactor trip protects the core against DNB in the event of a sudden loss of power to one or more reactor coolant pumps. The setpoint

*As used here, a qualified technican means a technician who meets the requirements of ANS-3. He shall have aminimum of two years of working experience in his speciality and at least one year of related technical training.

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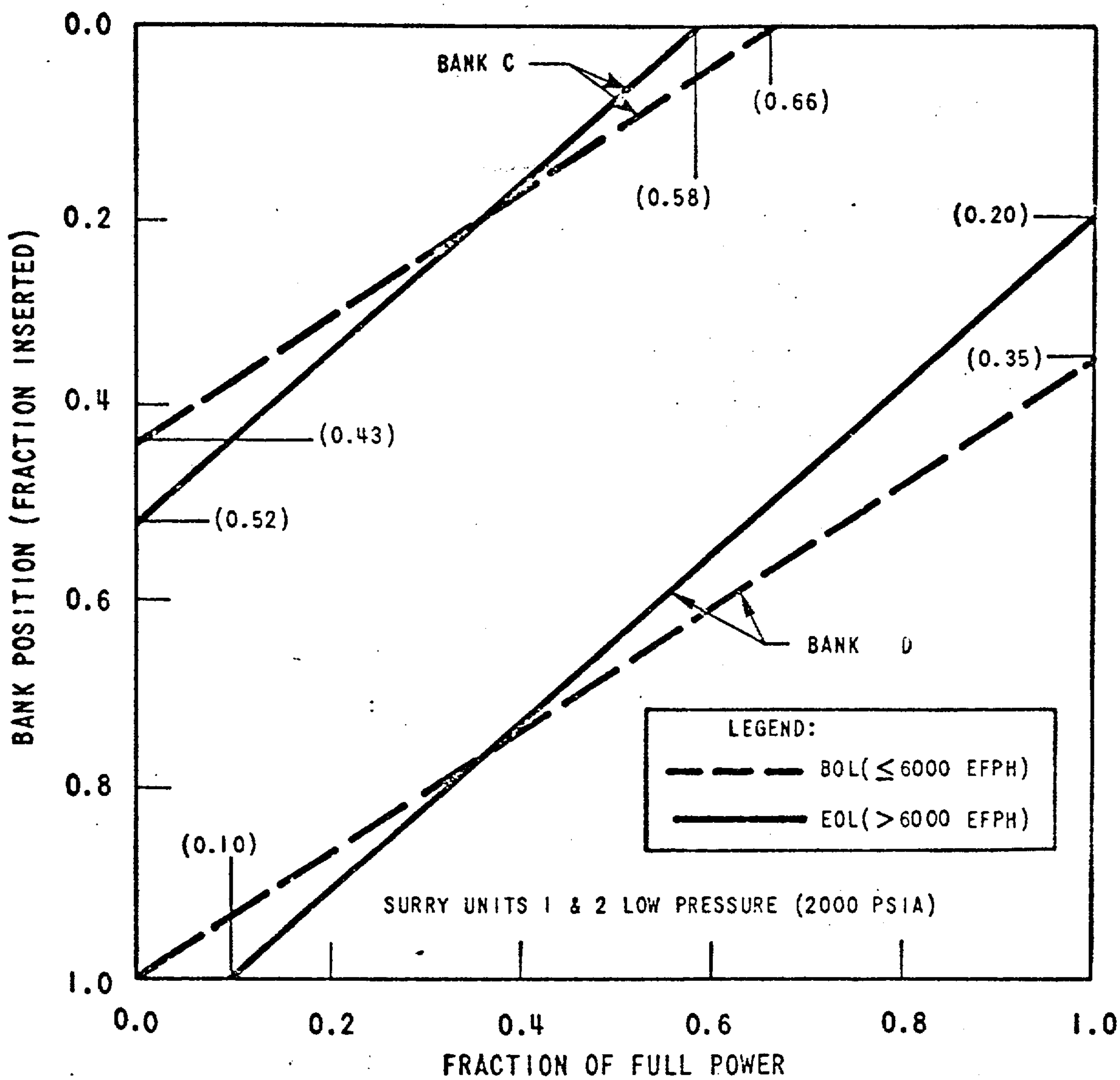

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Figure 3.12-1 Control Bank Insertion Limits for Normal 3 Loop Operation

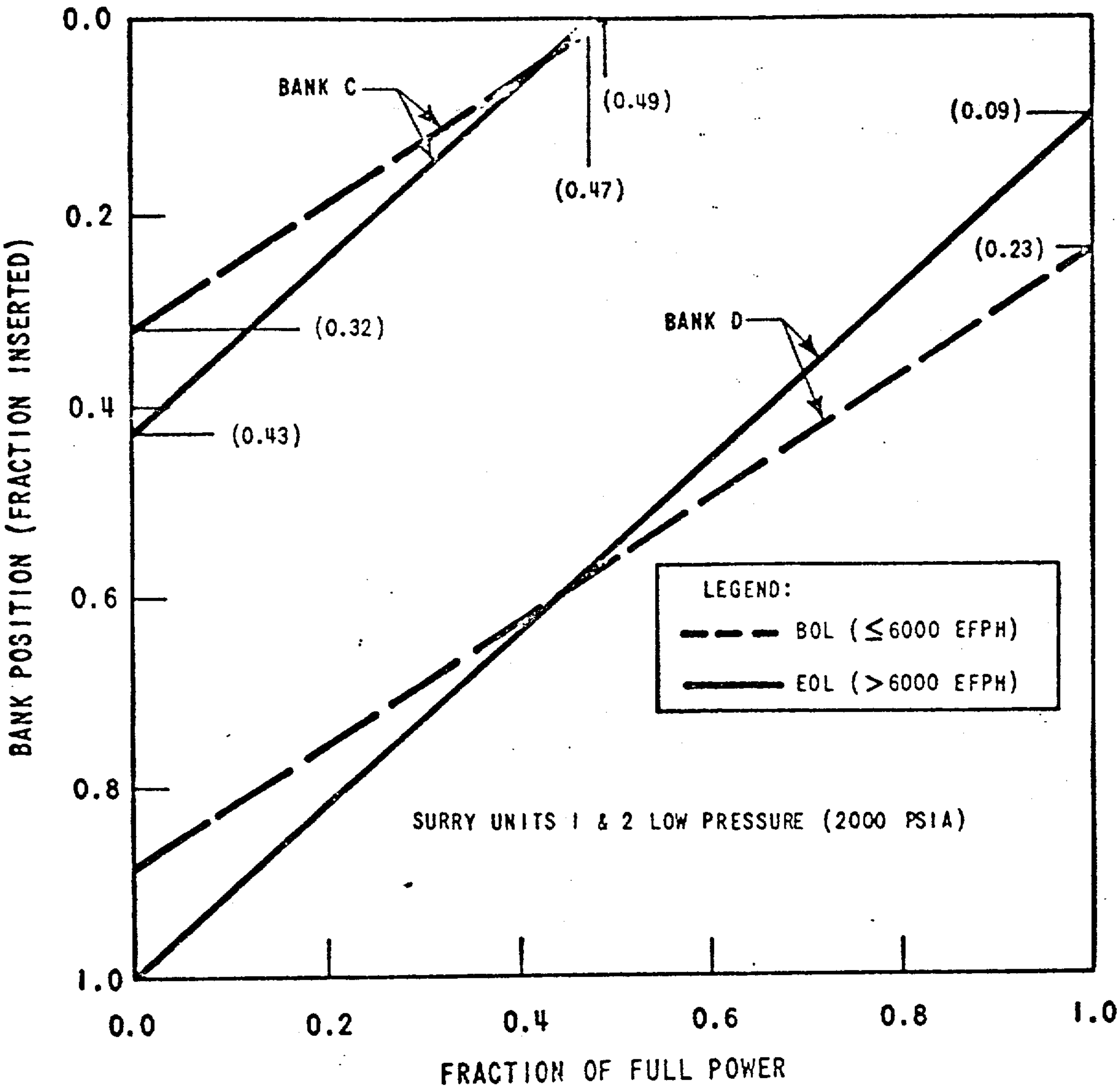

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Figure 3.12-2 Control Bank Insertion Limits for 3 Loop Operation with One Bottomed Rod