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2CAN100305

October 4, 2003

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

Subject: ANO-2 Cycle 17 Core Operating Limits Report
Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6

Dear Sir or Madam:

Arkansas Nuclear One, Unit 2 (ANO-2) Technical Specification 6.9.5.3 requires submittal of the Core Operating Limits Report (COLR) for each reload cycle. Attached is Revision 0 of the COLR for ANO-2 Cycle 17. This completes the reporting requirement for the referenced specification. This submittal contains no commitments. Should you have any questions, please contact me.

Sincerely,

A handwritten signature in cursive script that reads "Sherrie R. Cotton".

Sherrie R. Cotton
Director, Nuclear Safety Assurance

SRC/dbb
Attachment

A001

cc: Mr. Bruce S. Mallett
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Attachment 1**2CAN100305****ANO-2 Cycle 17 Core Operating Limits Report**

ENTERGY OPERATIONS
ARKANSAS NUCLEAR ONE - UNIT 2
CORE OPERATING LIMITS REPORT
FOR CYCLE 17

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I. INTRODUCTION

This CORE OPERATING LIMITS REPORT (COLR) has been prepared in accordance with the requirements of Arkansas Nuclear One - Unit 2 (ANO-2) Technical Specification 6.9.5 for ANO-2 Cycle 17. This is Revision 0 of the Cycle 17 COLR.

II. SUMMARY OF CHANGES

The COLR changes for the ANO-2 Cycle 17 reload are required to support the Cycle 17 reload. These changes are listed in the table below with reference to the pertinent section of the current Cycle 16 COLR.

Cycle 16 COLR Section and Item			Cycle 17 Change
3.1.1.4	Moderator Temperature Coefficient	Text	Modified the breakpoints that specify the times in cycle at which a less positive (burnup dependent) MTC was credited in the safety analyses. Changed the second breakpoint from 353.2 EFPD to 394.7 EFPD.
3/4.2.1	Linear Heat Rate	Text	Modified the limit of 13.7 kW/ft (for burnups up to 187 EFPD) to 13.5 kW/ft (for burnups up to <i>and including</i> 200 EFPD) and modified the limit of 12.6 kW/ft (for burnups exceeding 187 EFPD) to 12.7 kW/ft (for burnups exceeding 200 EFPD).

III. AFFECTED TECHNICAL SPECIFICATIONS

- 1) 3/4.1.1.1 Shutdown Margin - $T_{avg} > 200^{\circ}\text{F}$
- 2) 3/4.1.1.2 Shutdown Margin - $T_{avg} \leq 200^{\circ}\text{F}$
- 3) 3.1.1.4 Moderator Temperature Coefficient
- 4) 3.1.3.1 CEA Position
- 5) 3.1.3.6 Regulating CEA Insertion Limits
- 6) 3/4.2.1 Linear Heat Rate
- 7) 3.2.3 Azimuthal Power Tilt - T_q
- 8) 3/4.2.4 DNBR Margin
- 9) 3.2.7 Axial Shape Index

IV. CORE OPERATING LIMITS

The cycle-specific operating limits for the specifications listed are presented below.

1) **3/4.1.1.1 - SHUTDOWN MARGIN- $T_{avg} > 200^{\circ}\text{F}$**

The SHUTDOWN MARGIN shall be greater than or equal to 5.0 % $\Delta k/k$ in Modes 1, 2, 3, and 4.

2) **3/4.1.1.2 - SHUTDOWN MARGIN - $T_{avg} \leq 200^{\circ}\text{F}$**

The SHUTDOWN MARGIN shall be greater than or equal to 5.0% $\Delta k/k$ in Mode 5.

3) **3.1.1.4 - MODERATOR TEMPERATURE COEFFICIENT**

The Moderator Temperature Coefficient (MTC) shall be in accordance with Figure 1. The Beginning of Cycle (BOC) positive COLR MTC limit line of Figure 1 is from BOC to 124.9 EFPD. From 394.7 EFPD to End of Cycle (EOC) the positive COLR MTC limit line is linear from an MTC of $0.0 \text{ E-4 } \Delta k/k/^{\circ}\text{F}$ at 0% power to an MTC of $-1.0 \text{ E-4 } \Delta k/k/^{\circ}\text{F}$ at 100% power which is bounded by the BOC positive MTC limit. Between 124.9 EFPD and 394.7 EFPD the positive MTC limit may be interpolated linearly with burnup.

4) **3.1.3.1 - CEA POSITION**

With one or more CEAs trippable but misaligned from any other CEAs in its group by more than the Technical Specification 3.1.3.1 allowed value, the minimum required core power reduction for Modes 1 and 2 is specified in Figure 2.

5) **3.1.3.6 - REGULATING CEA INSERTION LIMITS**

The regulating CEA groups (Groups 6 and P) shall be limited to the withdrawal and insertion limits shown on Figure 3. Figure 3 assumes that Groups 1 through 5 are at or above the Programmed Insertion Limit.

6) 3/4.2.1 - LINEAR HEAT RATE

With COLSS out of service, the linear heat rate shall be maintained ≤ 13.5 kW/ft for cycle burnup up to and including 200 EFPD; and ≤ 12.7 kW/ft for burnup exceeding 200 EFPD.

7) 3.2.3 - AZIMUTHAL POWER TILT- T_q

The measured AZIMUTHAL POWER TILT shall be maintained ≤ 0.03 .

8) 3/4.2.4 - DNBR MARGIN

The DNBR limit shall be maintained by one of the following methods:

- a) With COLSS in service and neither CEAC operable - Maintain COLSS calculated core power less than or equal to COLSS calculated core power operating limit based on DNBR decreased by 10%.
- b) With COLSS out of service and at least one CEAC operable - Operate within the Region of Acceptable Operation shown on Figure 4, using any operable CPC channel.
- c) With COLSS out of service and neither CEAC operable - Operate within the Region of Acceptable Operation shown on Figure 5, using any operable CPC channel.

9) 3.2.7 - AXIAL SHAPE INDEX

The core average AXIAL SHAPE INDEX (ASI) shall be maintained within the following limits:

- a) COLSS IN SERVICE
- $-0.27 \leq ASI \leq +0.27$
- b) COLSS OUT OF SERVICE (CPC)
- $-0.20 \leq ASI \leq +0.20$

V. LIST OF FIGURES

Figure 1 Moderator Temperature Coefficient

Figure 2 Required Power Reduction After Inward CEA Deviation

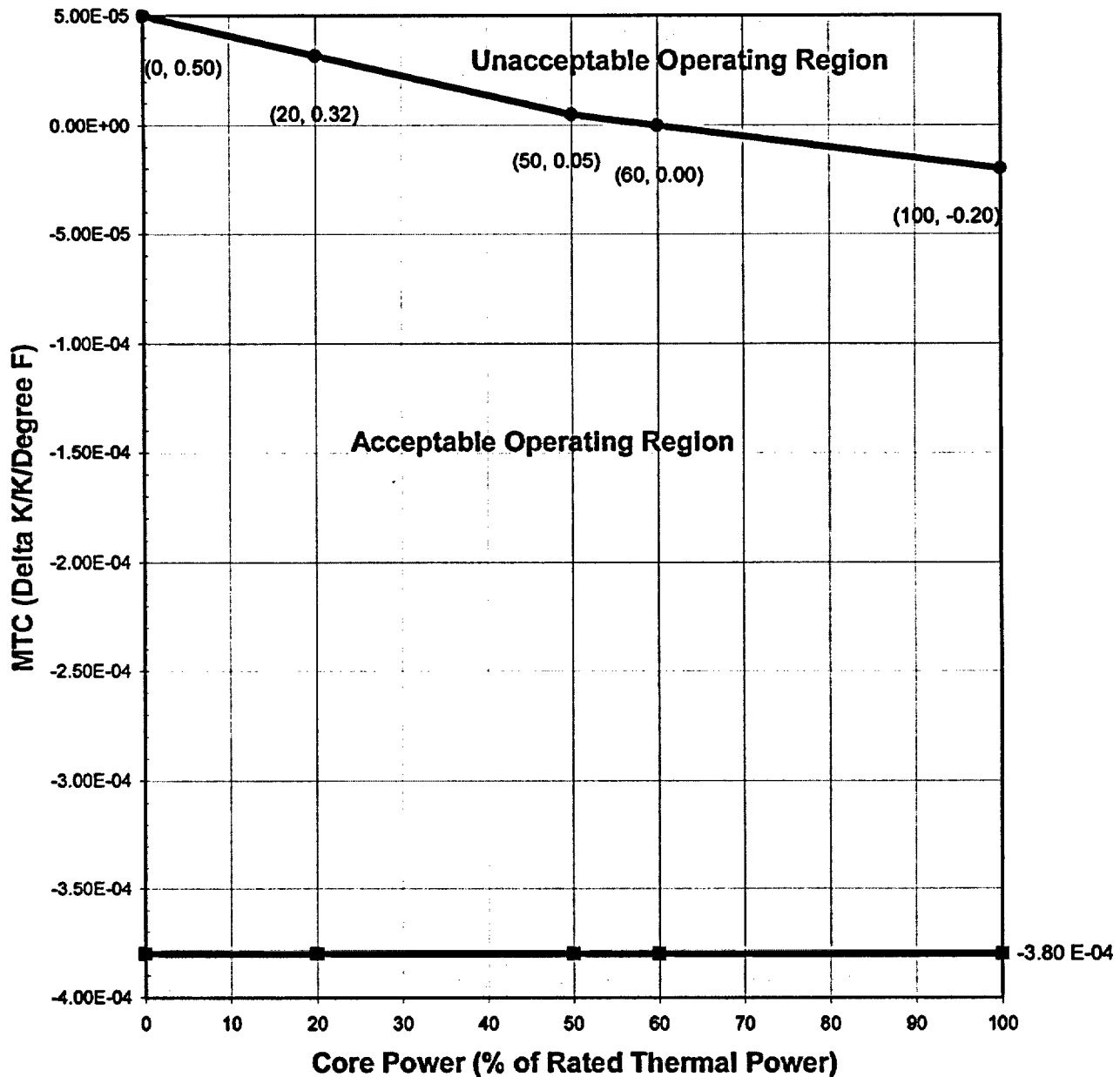
Figure 3 CEA Insertion Limits Versus Thermal Power

Figure 4 DNBR Margin Operating Limit Based on Core Protection Calculators

Figure 5 DNBR Margin Operating Limit Based on Core Protection Calculators

FIGURE 1

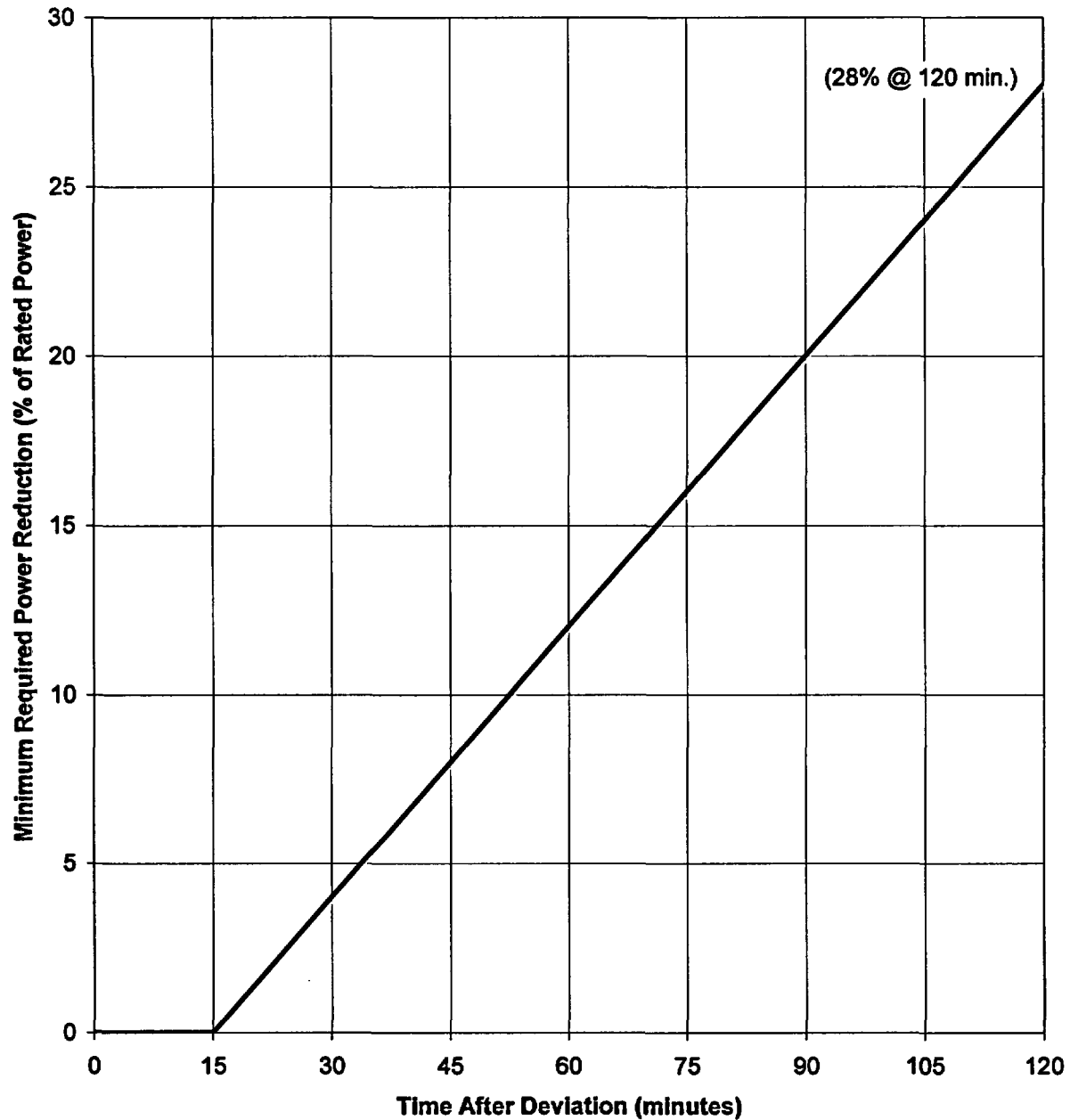
MODERATOR TEMPERATURE COEFFICIENT

Note:

Per Technical Specification 3.1.1.4.a. and b., the Moderator Temperature Coefficient (MTC) maximum upper design limit shall be less positive than $+0.5 \times 10^{-4} \Delta k/k/^{\circ}\text{F}$ whenever THERMAL POWER is $\leq 70\%$ of RATED THERMAL POWER and less positive than $0.0 \times 10^{-4} \Delta k/k/^{\circ}\text{F}$ whenever THERMAL POWER is $> 70\%$ of RATED THERMAL POWER. Therefore, the actual MTC must be less than the COLR upper limit at zero power. At all other powers, the actual MTC may be equal to the COLR upper limit.

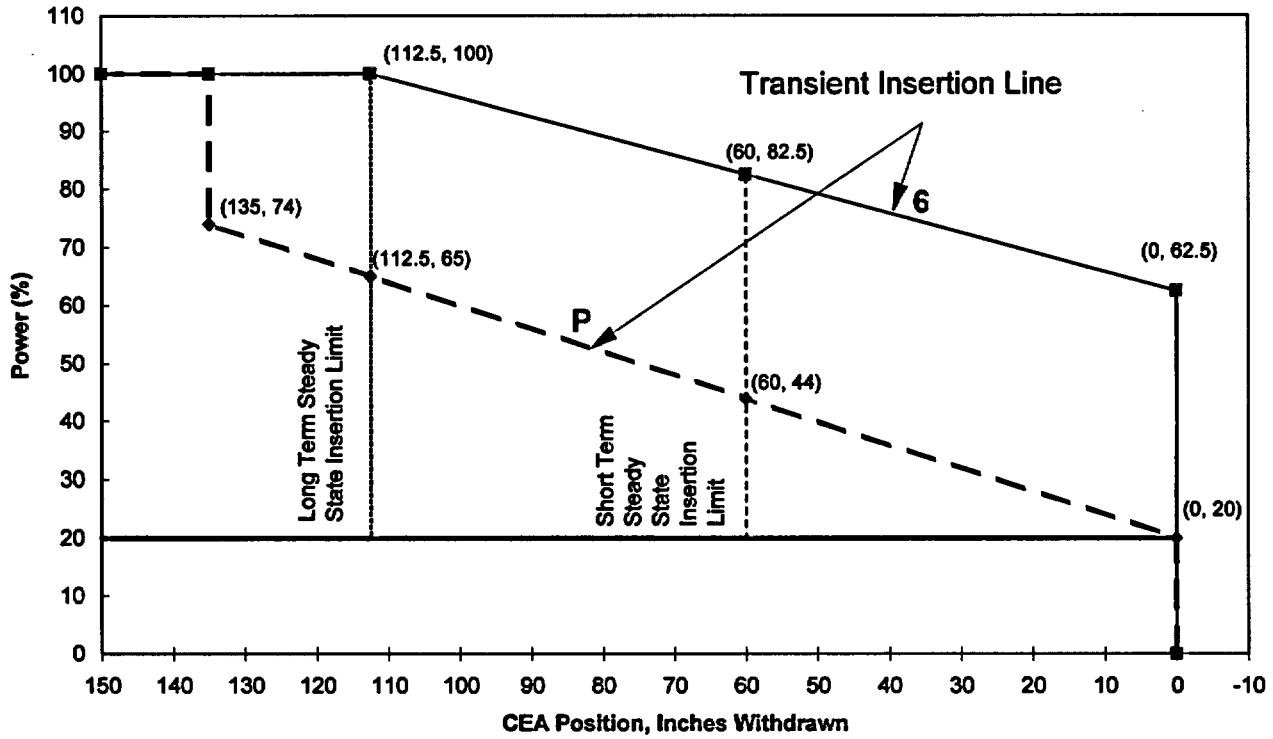
FIGURE 2

REQUIRED POWER REDUCTION AFTER INWARD CEA DEVIATION*



***When core power is reduced to 60% of rated power per this limit curve, further reduction is not required**

FIGURE 3
CEA INSERTION LIMITS VERSUS THERMAL POWER
Groups 6 and P PDIL

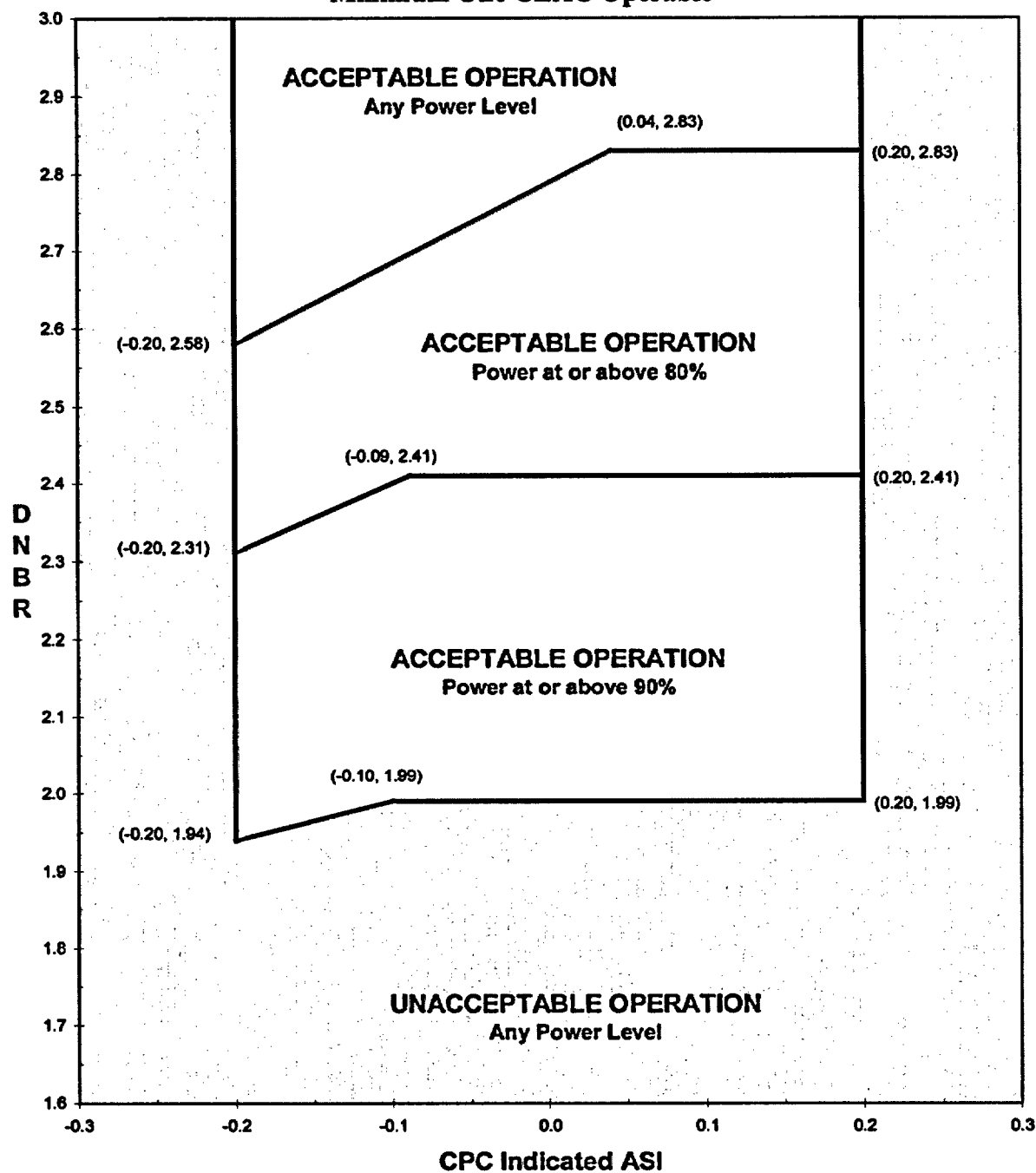


Note: Regulating Groups 1 through 5 at or above the Programmed Insertion Limit.

FIGURE 4

**DNBR MARGIN OPERATING LIMIT
BASED ON CORE PROTECTION CALCULATORS**

**ANO-2 Cycle Independent COOS Limit Lines
Minimum One CEAC Operable**

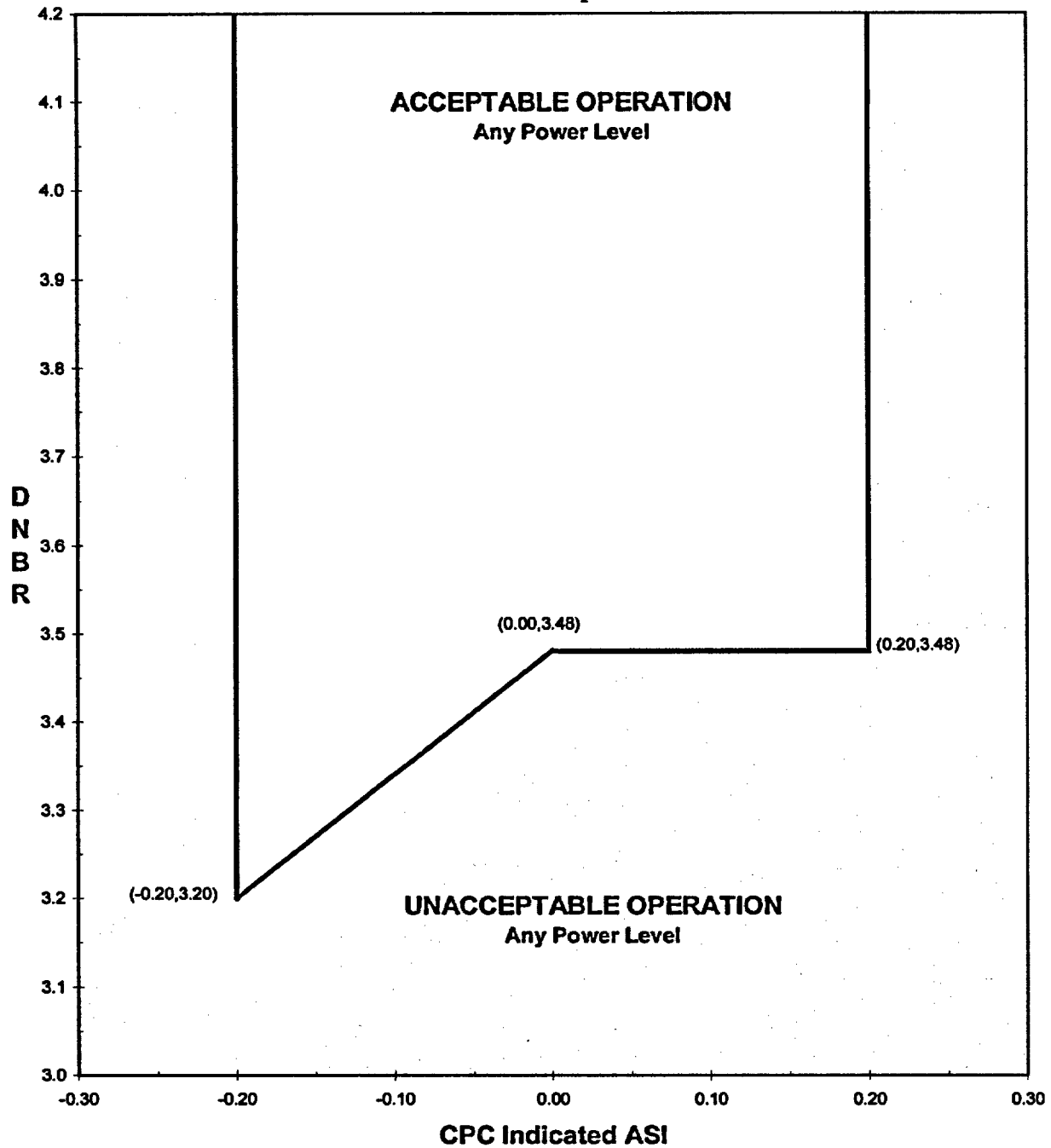


NOTE: DNBR greater than indicated at the top of the figure is acceptable, provided the indicated ASI limits remain between the bounds that are shown for lower DNBR.

FIGURE 5

**DNBR MARGIN OPERATING LIMIT
BASED ON CORE PROTECTION CALCULATORS**

**ANO-2 Cycle Independent COOS Limit Line
Both CEACs Inoperable**



NOTE: DNBR greater than indicated at the top of the figure is acceptable, provided the indicated ASI limits remain between the bounds that are shown for lower DNBR.