

DEC 04 2000

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United States Nuclear Regulatory Commission
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Gentlemen:

**CORE OPERATING LIMITS REPORT - CYCLE 12, REVISION 1
SALEM GENERATING STATION UNIT NO. 2
FACILITY OPERATING LICENSE DPR-75
DOCKET NO. 50-311**

In accordance with section 6.9.1.9 of the Salem Unit 2 Technical Specifications, PSEG Nuclear LLC submits Revision 1 of the Core Operating Limits Report (COLR) for Salem Unit 2 Cycle 12 (Report NFS-0185, Rev. 1) as Attachment 1 to this letter.

Revision 1 of the COLR incorporates information required to support use of the Best Estimate Analyzer for Core Operations - Nuclear (BEACON). The NRC approved use of BEACON for core power distribution measurements by Amendment No. 218 to Facility Operating License No. DPR-75 for Salem Unit 2 on November 6, 2000.

Should you have any questions, please contact Mr. Paul Duke at (856) 339-1466.

Sincerely,

A handwritten signature in black ink, appearing to read "G. Salamon", with a long, sweeping horizontal line extending to the right.

G. Salamon
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Attachment

A001

DEC 04 2000

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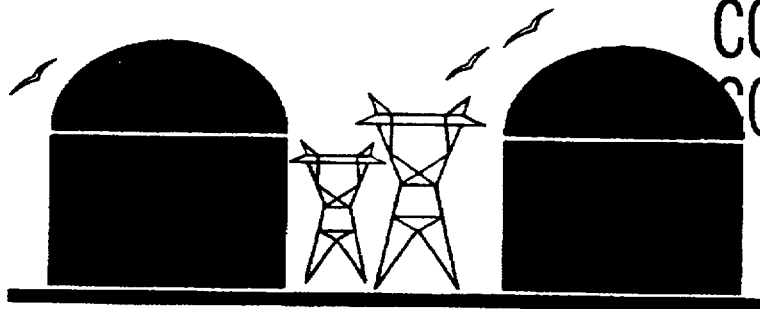
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Core Operating Limits Report for Salem Unit 2, Cycle 12

PSE&G
CONTROL

COPY # 0331



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1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for Salem Unit 2 Cycle 12 has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The Technical Specifications affected by this report are listed below:

- | | |
|-----------|---|
| 3/4.1.1.3 | Moderator Temperature Coefficient |
| 3/4.1.3.5 | Control Rod Insertion Limits |
| 3/4.2.1 | Axial Flux Difference |
| 3/4.2.2 | Heat Flux Hot Channel Factor - $F_Q(Z)$ |
| 3/4.2.3 | Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}^N$ |

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC-approved methodologies specified in Technical Specification 6.9.1.9.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

The BOL/ARO/HZP-MTC shall be less positive than $0 \Delta k/k/^{\circ}F$.

The EOL/ARO/RTP-MTC shall be less negative than $-4.7 \times 10^{-4} \Delta k/k/^{\circ}F$.

2.1.2 The MTC Surveillance limit is:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to $-4.0 \times 10^{-4} \Delta k/k/^{\circ}F$.

where: BOL stands for Beginning of Cycle Life

ARO stands for All Rods Out

HZP stands for Hot Zero THERMAL POWER

EOL stands for End of Cycle Life

RTP stands for Rated THERMAL POWER

2.2 Control Rod Insertion Limits (Specification 3/4.1.3.5)

2.2.1 The control rod banks shall be limited in physical insertion as shown in Figure 1.

2.3 Axial Flux Difference (Specification 3/4.2.1)

[Constant Axial Offset Control (CAOC) Methodology]

2.3.1 The Axial Flux Difference (AFD) target band is +6%, -9%.

2.3.2 The AFD Acceptable Operation Limits are provided in Figure 2.

2.4 Heat Flux Hot Channel Factor - $F_Q(Z)$ (Specification 3/4.2.2)

[F_{xy} Methodology]

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

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

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

$$2.4.1 \quad F_Q^{RTP} = 2.40$$

2.4.2 $K(Z)$ is provided in Figure 3.

$$2.4.3 \quad F_{xy}^L = F_{xy}^{RTP} [1.0 + PF_{xy}(1.0 - P)]$$

$$\text{where: } F_{xy}^{RTP} = 1.77 \quad \text{for the unrodded core planes}$$

$$2.13 \quad \text{for the core plane containing Bank D control rods}$$

$$PF_{xy} = 0.3$$

- 2.4.4 If the Power Distribution Monitoring System (PDMS) is used for core power distribution surveillance and is OPERABLE, as defined in Technical Specification 3.3.3.14, the uncertainty, U_{FQ} , to be applied to the Heat Flux Hot Channel Factor $F_Q(z)$ shall be calculated by the following formula:

$$U_{FQ} = \left(1.0 + \frac{U_Q}{100.0} \right) \bullet U_e$$

where:

U_Q = Uncertainty for power peaking factor as defined in equation 5-19 of Reference 1.

U_e = Engineering uncertainty factor.
= 1.03

Note: U_{FQ} = PDMS Surveillance Report Core Monitor Fxy Uncertainty in %.

- 2.4.5 If the INCORE movable detectors are used for core power distribution surveillance, the uncertainty, U_{FQ} , to be applied to the Heat Flux Hot Channel Factor $F_Q(z)$ shall be calculated by the following formula:

$$U_{FQ} = U_{qu} \bullet U_e$$

where:

U_{qu} = Base F_Q measurement uncertainty.
= 1.05

U_e = Engineering uncertainty factor.
= 1.03

2.5 Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}^N$ (Specification 3/4.2.3)

$$F_{\Delta H}^N = F_{\Delta H}^{RTP} [1.0 + PF_{\Delta H} (1.0 - P)]$$

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

2.5.1 $F_{\Delta H}^{RTP} = 1.65$

2.5.2 $PF_{\Delta H} = 0.3$

- 2.5.3 If the Power Distribution Monitoring System (PDMS) is used for core power distribution surveillance and is OPERABLE, as defined in Technical Specification 3.3.3.14, the uncertainty, $U_{F_{\Delta H}}$, to be applied to the Nuclear Enthalpy Rise Hot Channel Factor, $F_{\Delta H}^N$, shall be calculated by the following formula:

$$U_{F_{\Delta H}} = 1.0 + \frac{U_{\Delta H}}{100.0}$$

where:

$U_{\Delta H}$ = Uncertainty for enthalpy rise as defined in equation 5-19 of Reference 1.

- 2.5.4 If the INCORE movable detectors are used for core power distribution surveillance, the uncertainty, $U_{F_{\Delta H}}$, to be applied to the Nuclear Enthalpy Rise Hot Channel Factor $F_{\Delta H}^N$ shall be calculated by the following formula:

$$U_{F_{\Delta H}} = U_{F_{\Delta Hm}}$$

where:

$U_{F_{\Delta Hm}}$ = Base $F_{\Delta H}$ measurement uncertainty.
= 1.04

3.0 REFERENCES

1. WCAP-12472-P-A, BEACON Core Monitoring and Operations Support System, August 1994.

FIGURE 1

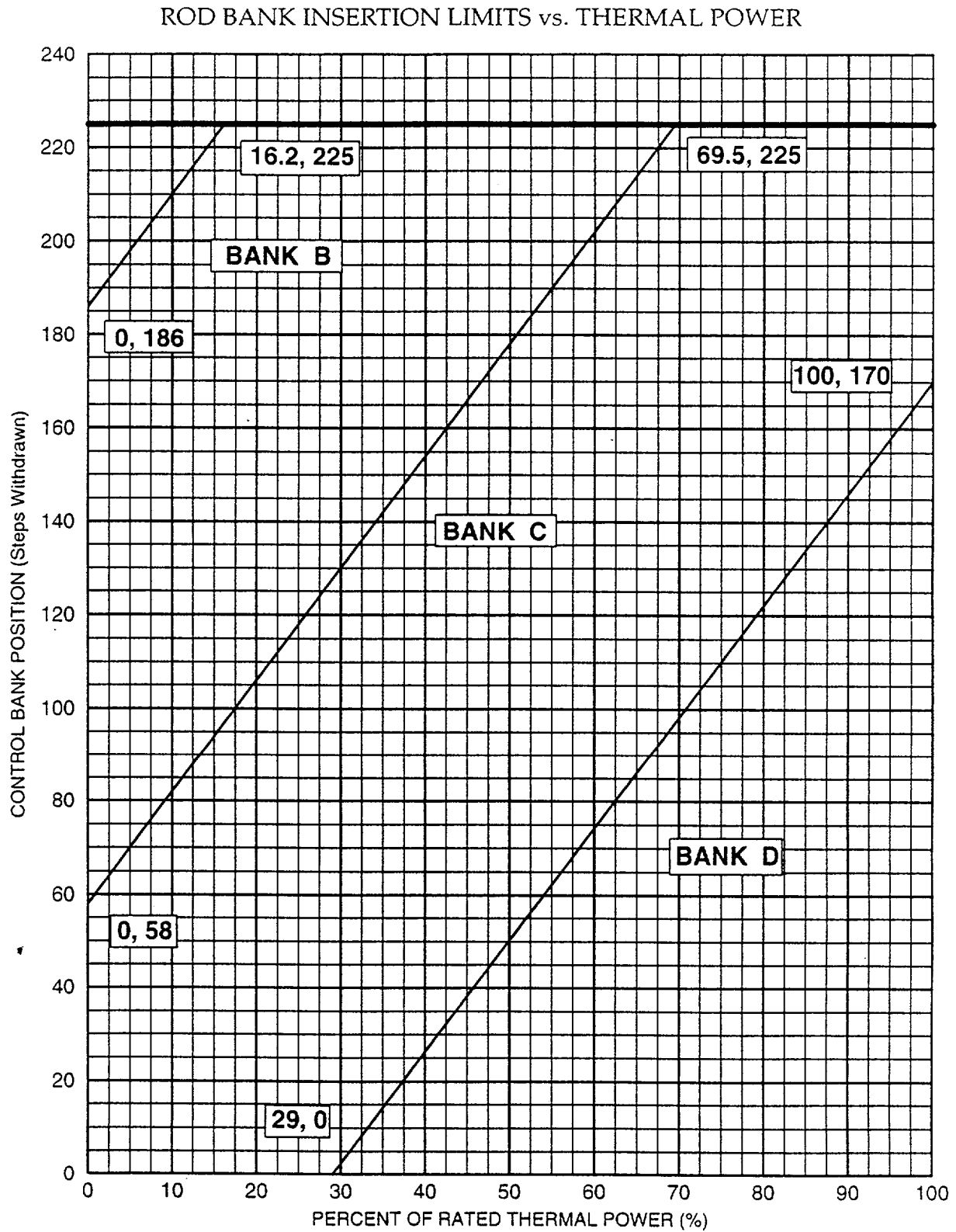


FIGURE 2

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF
RATED THERMAL POWER

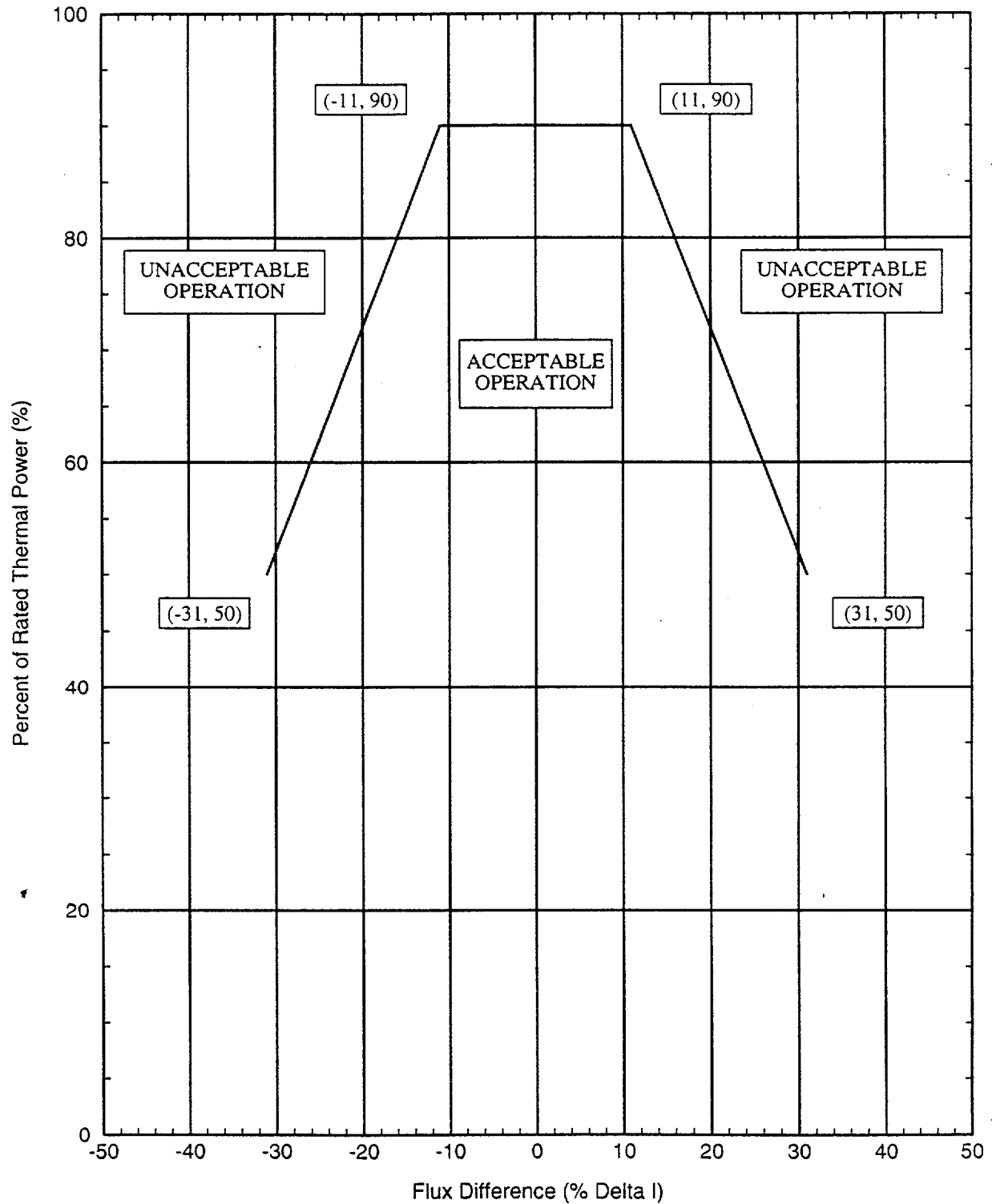


FIGURE 3

$K(Z)$ - NORMALIZED $F_0(Z)$ AS A FUNCTION OF CORE HEIGHT

