H. B. Robinson Unit 2, Cycle 18

CORE OPERATING LIMITS REPORT

Revision 0

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1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for H. B. Robinson Unit 2, Cycle 18 has been prepared in accordance with the requirements of Technical Specification 6.9.3.3.

The Technical Specifications affected by this report are listed below:

3.1.3.1	Moderator Temperature Coefficient
3.1.3.3	
3.10.1.2	Shutdown Rod Insertion Limits
3.10.1.3	Control Rod Insertion Limits
3.10.1.4	
3.10.2.1	Heat Flux Hot Channel Factor
3.10.2.2	
3.10.2.2.1	
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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 6.9.3.3 and the COLR Section 3.0.

2.1 Moderator Temperature Coefficient (Technical Specifications 3.1.3.1 and 3.1.3.3)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

a) The MTC shall be less than or equal to +5.0 pcm/°F at less than 50% of rated power, or

b) The MTC shall be less than or equal to 0.0 pcm/°F at 50% of rated power and above.

2.2 Shutdown Rod Insertion Limits (Technical Specification 3.10.1.2)

2.2.1 The shutdown rods shall be withdrawn to at least 225 steps.

2.3 Control Rod Insertion Limits (Technical Specifications 3.10.1.3 and 3.10.1.4)

2.3.1 The control rods shall be limited in physical insertion as shown in Figure 1.0.

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2.4 Heat Flux Hot Channel Factor - $F_Q(Z)$ (Technical Specifications 3.10.2.1, 3.10.2.2, 3.10.2.2.1, and 3.10.2.2.2)

$F_Q(Z) \le (F_Q^{RTP}/P) \times K(Z)$ for $P > 0.5$

$F_Q(Z) < (F_Q^{RTP}/0.5) \times K(Z)$ for $P \le 0.5$

where: P = (Thermal Power / Rated Thermal Power)

2.4.1 F_Q^{RTP} = 2.50 for ANF-12, ROB-13, ROB-14, and ROB-15 reload batches

F_Q^{RTP} = 2.32 for XN-6 reload batch

2.4.2 K(Z) is specified in Figure 2.0

2.5 Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}$ (Technical Specification 3.10.2.1)

$F_{\Delta H} < F_{\Delta H}^{RTP} (1 + PF_{\Delta H}(1-P))$

where: P = (Thermal Power / Rated Thermal Power)

2.5.1 $F_{\Delta H}^{RTP}$ = 1.80 for ANF-12, ROB-13, ROB-14, and ROB-15 reload batches

$F_{\Delta H}^{RTP}$ = 1.65 for XN-6 reload batch

2.5.2 $PF_{\Delta H}$ = 0.2

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2.6 Axial Flux Difference (Technical Specifications 3.10.2.2, 3.10.2.2.1, 3.10.2.2.2, 3.10.2.7, 3.10.2.9, 3.10.2.11)

2.6.1 The axial flux difference target bands are ± 3% and ± 5% about the target AFD.

2.6.2 V(Z) values for the ± 3% and ± 5% target bands are specified in Figure 3.0.

2.6.3 The AFD Acceptable Operation Limits are specified in Figure 4.0.

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3.0 METHODOLOGY REFERENCES

a) XN-75-27(A), and Supplements 1, 2, 3, and 4 "Exxon Nuclear Neutronics Design Methods for Pressurized Water Reactors," Exxon Nuclear Company.

b) XN-NF-84-73(P), Revision 5, "Advanced Nuclear Fuels Methodology for Pressurized Water Reactors: Analysis of Chapter 15 Events," Advanced Nuclear Fuels Corporation.

c) XN-NF-82-21(A), Revision 1, "Application of Exxon Nuclear Company PWR Thermal Margin Methodology to Mixed Core Configurations," Exxon Nuclear Company.

d) XN-NF-84-093(A), and Supplement 1, "Steamline Break Methodology for PWRs," Advanced Nuclear Fuels Corporation.

e) XN-75-32(A) Supplements 1, 2, 3, and 4, "Computational Procedure for Evaluating Fuel Rod Bow,"Exxon Nuclear Company.

f) XN-NF-82-49(A), Revision 1 Supplement 1, "Exxon Nuclear Company Evaluation Model Revised EXEM PWR Small Break Model," Siemens Power Corporation.

g) XN-NF-82-20(A), Revision 1 and Supplements 1, 2, 3, and 4, "Exxon Nuclear Company Evaluation Model EXEM/PWR ECCS Model Updates," Exxon Nuclear Company.

XN-NF-82-07(A), Revision 1, Exxon Nuclear Company ECCS Cladding Swelling and Rupture Model," Exxon Nuclear Company.

XN-NF-81-58(A), Revision 2 and Supplements 1, 2, 3, and 4, "RODEX2 Fuel Rod Thermal Response Evaluation Model," Exxon Nuclear Company.

XN-NF-85-16(A), Volume 1 and Supplements 1, 2, and 3, Volume 2, Revision 1, and Supplement 1, "PWR 17x17 Fuel Cooling Test Program," Exxon Nuclear Company.

XN-NF-85-105(A), and Supplement 1, "Scaling of FCTF Based Reflood Heat Transfer Correlation for Other Bundle Designs," Exxon Nuclear Company.

h) XN-NF-78-44(A), "A Generic Analysis of the Control Rod Ejection Transient for Pressurized Water Reactors," Exxon Nuclear Company.

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i) XN-NF-621(A) Revision 1, "Exxon Nuclear DNB Correlation for PWR Fuel Designs," Exxon Nuclear Company.

j) ANF-1224(A) and Supplement 1, "Departure from Nucleate Boiling Correlation for High Thermal Performance Fuel," Advanced Nuclear Fuels Corporation.

k) XN-NF-82-06(A), Revision 1 and Supplements 2, 4, and 5, "Qualification of Exxon Nuclear Fuel for Extended Burnup (PWR)," Exxon Nuclear Company.

l) Not Used

m) Not Used

n) Not Used

o) Not Used

p) ANF-88-054(A), "PDC-3: Advanced Nuclear Fuels Corporation Power Distribution Control for Pressurized Water Reactors and Application of PDC-3 to H. B. Robinson Unit 2," Advanced Nuclear Fuels Corporation.

q) ANF-88-133(A), and Supplement 1, "Qualification of Advanced Nuclear Fuels PWR Design Methodology for Rod Burnups of 62 GWd/MTU," Advanced Nuclear Fuels Corporation.

r) ANF-89-151 (P) (A), and correspondence "ANF-RELAP Methodology for Pressurized Water Reactors: Analysis of Non-LOCA Chapter 15 Events," Advanced Nuclear Fuels Corporation.

s) EMF-92-081 (P) (A), and Supplement 1, "Statistical Setpoint/Transient Methodology for Westinghouse Type Reactors," Siemens Power Corporation.

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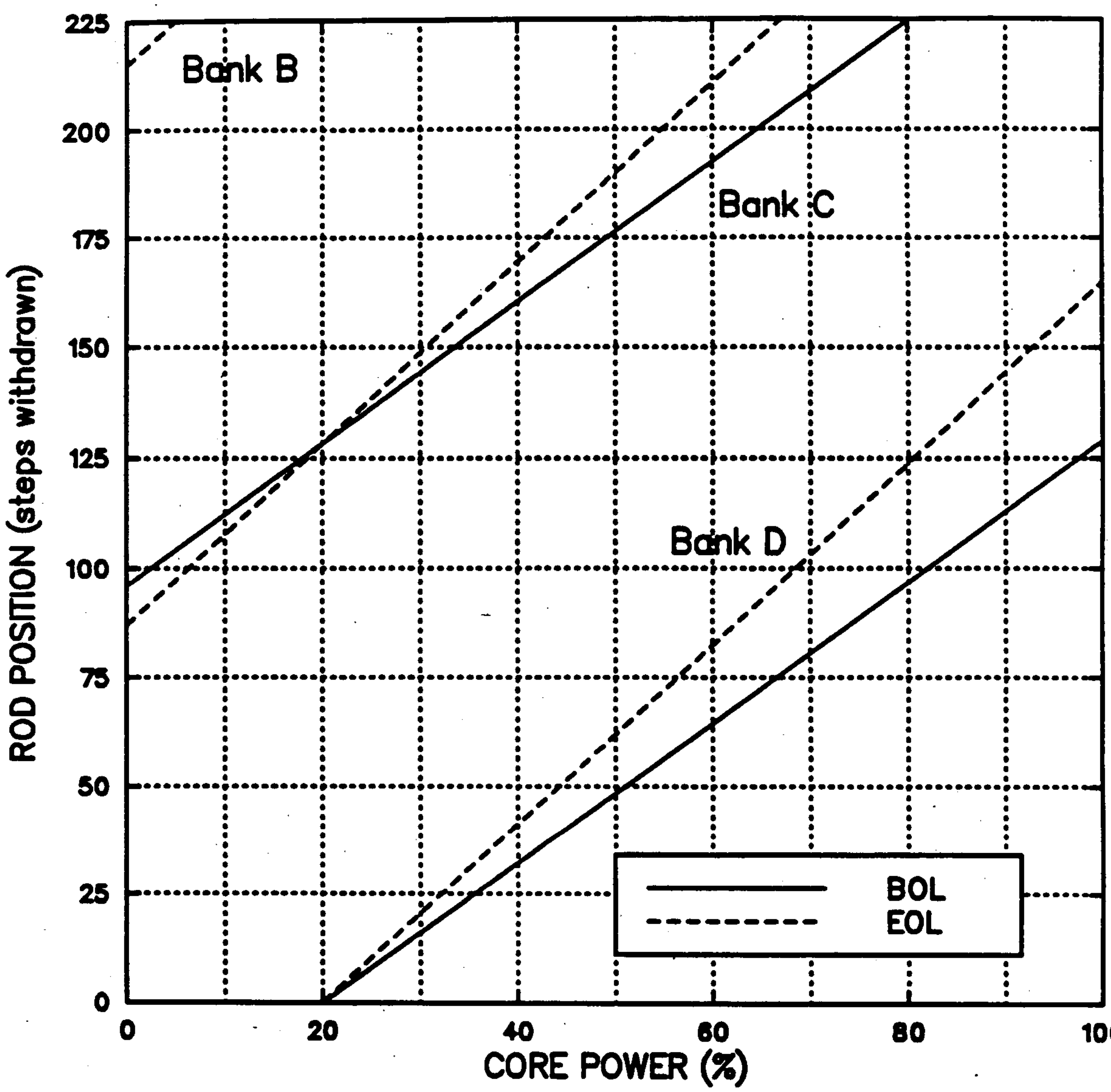
Control Group Insertion Limits For Three Loop Operation



Note 1: The breakpoint point between BOL and EOL RIL occurs at 50% of the Cycle as defined by burnup
Note 2: Control Bank A must be withdrawn from the core prior to power operation

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Normalized Axial Dependence Factor K(Z) For F_Q Versus Elevation

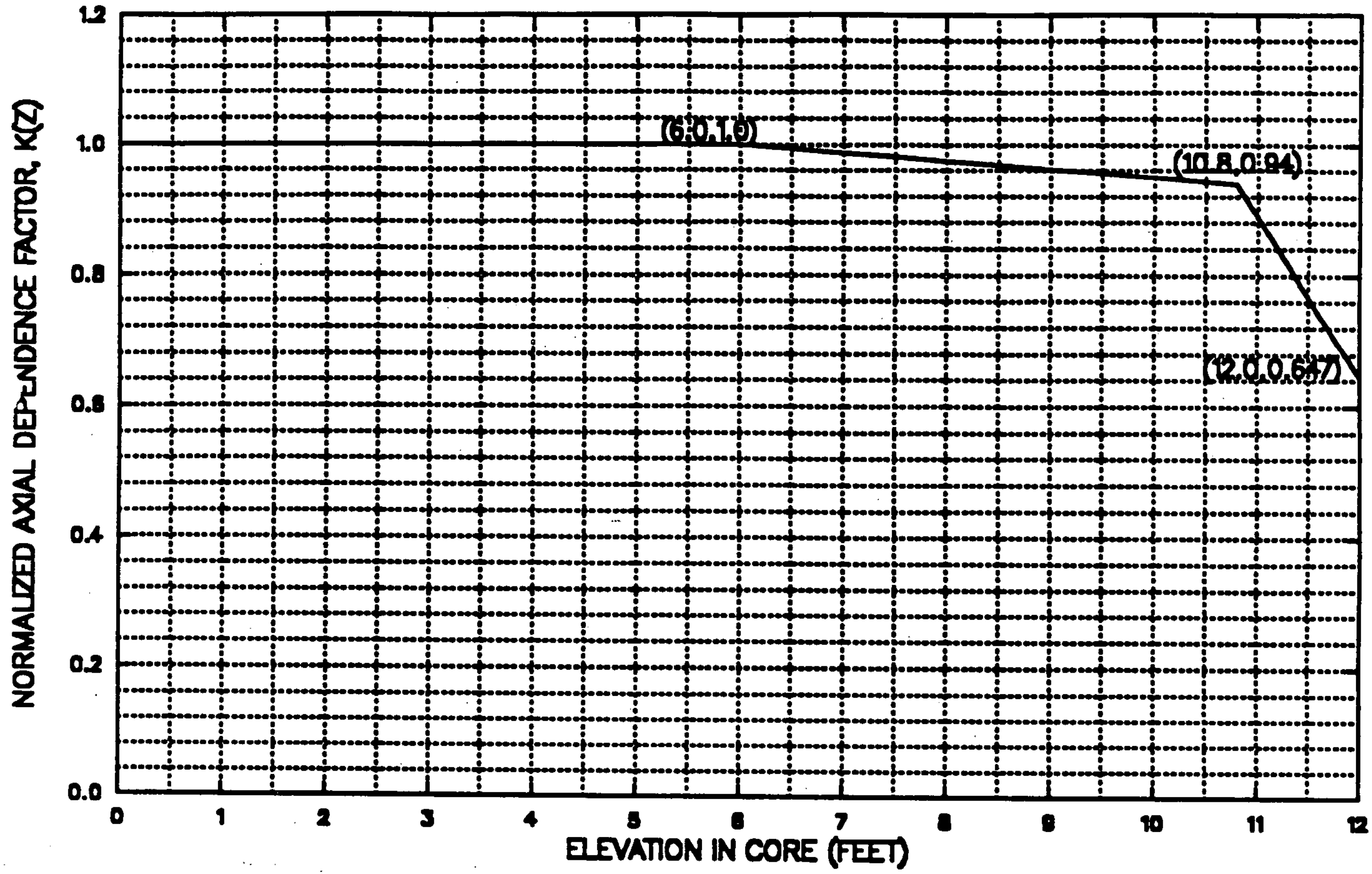

Figure 2.0

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V(Z) as a Function of Core Height

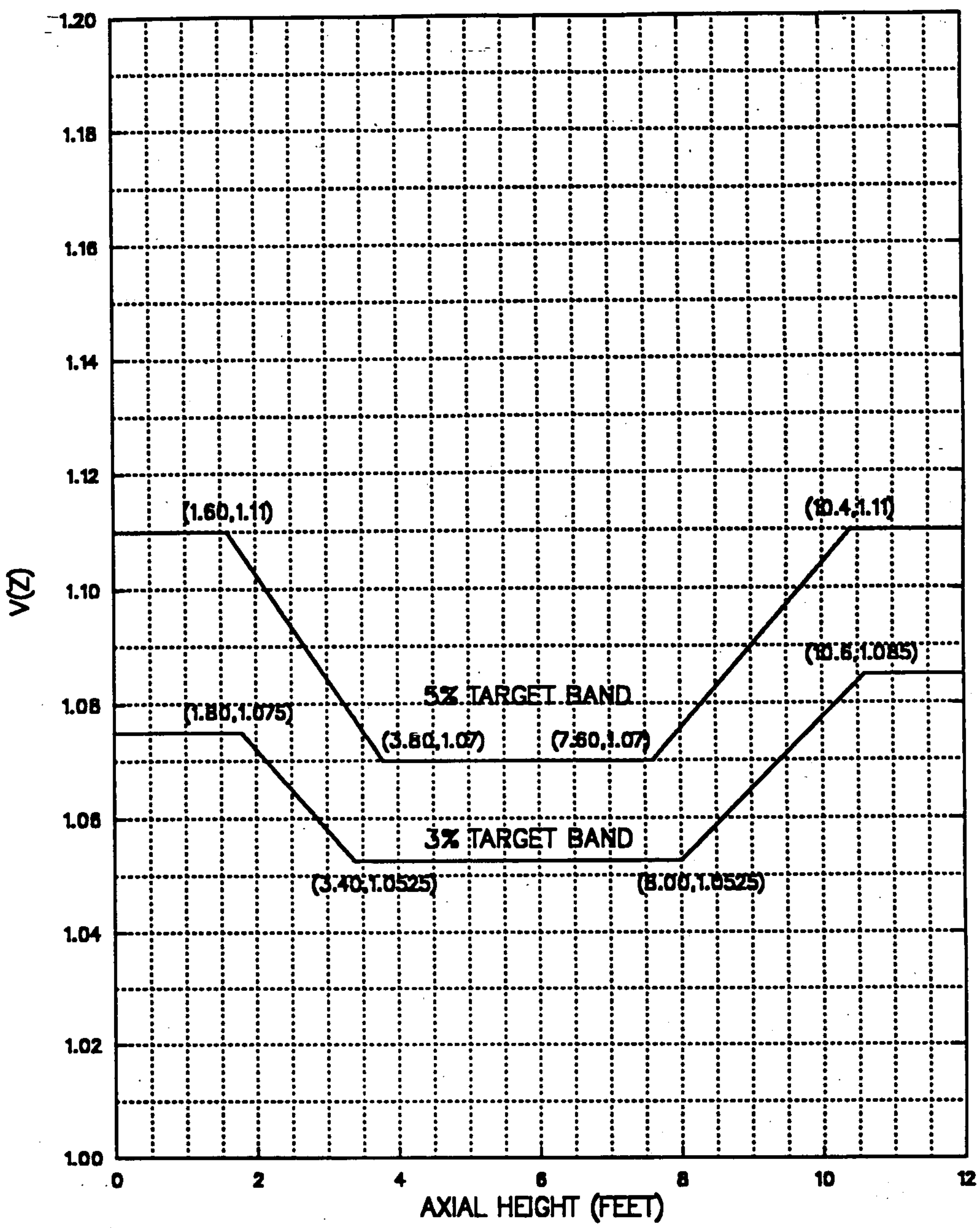

Figure 3.0

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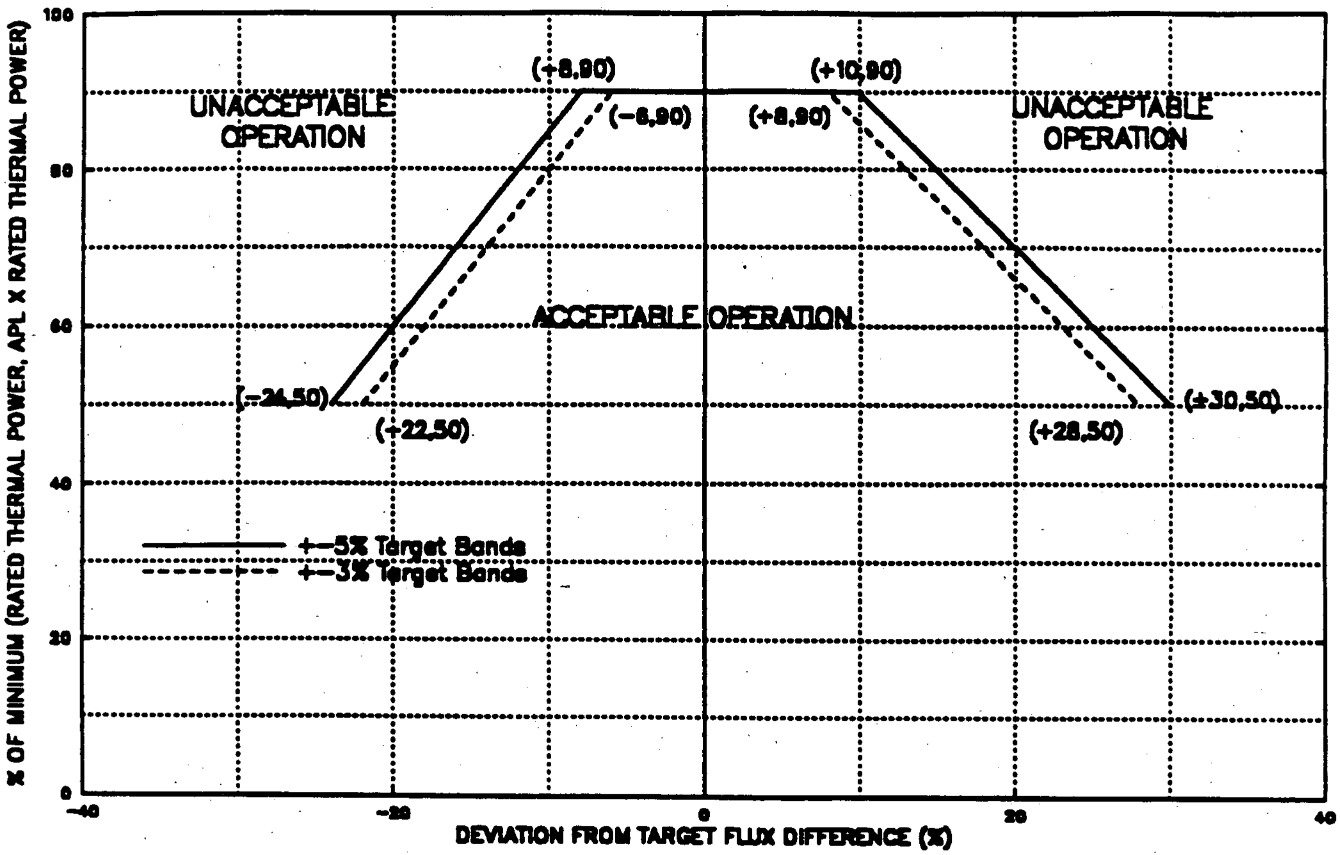
Allowable Deviation from Target Flux Difference



Note: For power levels above 90%, power operation is allowed within two target bands (±3% and ±5%)

Figure 4.0