

# INFO ONLY

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON SEG PLANT

PLANT OPERATING MANUAL

VOLUME 6

PART 5

FUEL MANAGEMENT PROCEDURE

FMP-001

CORE OPERATING LIMITS REPORT (COLR)

REVISION 1

Effective Date \_\_\_\_\_

RECOMMENDED BY:

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Manager - NSSS

11/4/93

Date

APPROVED BY:

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4 NOV 93

Date

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Date

Page 1 of 16

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LIST OF EFFECTIVE PAGES

<u>EFFECTIVE PAGES</u>	<u>REVISION</u>
Cover Sheet	1
LEP	1
Table of Contents	1
4 through 6	0
7 through 16	1

## TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>
1.0	Purpose
2.0	References
3.0	Responsibilities
4.0	Definitions/Abbreviations
5.0	General
5.1	Background Information
5.2	Revision of the COLR
5.3	Core Operating Limits Report
6.0	Procedure
7.0	<u>ATTACHMENTS</u>
7.1	H. B. Robinson Unit 2, Cycle 16 Core Operating Limits Report

5.0

GENERAL (Continued)

The NRC endorsed the COLR concept by encouraging licensees to develop such a document in Generic Letter 88-16 which provided guidance for relocation of specific numerical values for various core operating limits and/or restrictions to a COLR and indicated that these values could be changed without prior NRC approval so long as an NRC-approved methodology is followed. Future changes and updates would be allowable provided a safety review is performed in accordance with the provisions of 10 CFR 50.59, the COLR is suitably revised, and the NRC is promptly informed of the revision.

The use of a COLR at H. B. Robinson was accepted by the NRC per License Amendment 141. The amendment established requirements for a cycle-specific COLR and for notification of the NRC (Technical Specification 6.9.3.3.d) when revisions are made. Since the COLR is cycle-specific, the COLR will be revised at least once per cycle, that is, at the beginning of the cycle.

5.2

Revision of the COLR

This procedure will be controlled and revised in accordance with TMM-100. Changes to this procedure will require PNSC concurrence and notification to the NRC as part of the revision process.

5.3

Core Operating Limits Report (COLR)

The Core Operating Limits Report is provided in ATTACHMENT 7.1.

6.0

PROCEDURE

None

7.0

ATTACHMENTS

7.1

H. B. Robinson Unit 2, Cycle 16 Core Operating Limits Report

H. B. Robinson Unit 2, Cycle 16

CORE OPERATING LIMITS REPORT

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

1.0

CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for H. B. Robinson Unit 2, Cycle 16 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

3.10.2.2.2

3.10.2.1 Nuclear Enthalpy Rise Hot Channel Factor

3.10.2.2 Axial Flux Difference

3.10.2.2.1

3.10.2.2.2

3.10.2.7

3.10.2.9

3.10.2.11

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

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.

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.

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

- 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)

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

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

where:  $P = (\text{Thermal Power} / \text{Rated Thermal Power})$

- 2.4.1  $F_Q^{RTP} = 2.40$  for  $x < 9000$  MWD/MTU  
2.32 for  $x \geq 9000$  MWD/MTU

Where:  $x = \text{cycle exposure}$

- 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:  $P = (\text{Thermal Power} / \text{Rated Thermal Power})$

- 2.5.1  $F_{\Delta H}^{RTP} = 1.70$

- 2.5.2  $PF_{\Delta H} = 0.2$



H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

- 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  $\pm 3\%$  and  $\pm 5\%$  about the target AFD.
- 2.6.2      V(Z) values for the  $\pm 3\%$  and  $\pm 5\%$  target bands are specified in Figure 3.0.
- 2.6.3      The AFD Acceptable Operation Limits are specified in Figure 4.0.

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

Control Group Insertion Limits For  
Three-Loop Operation

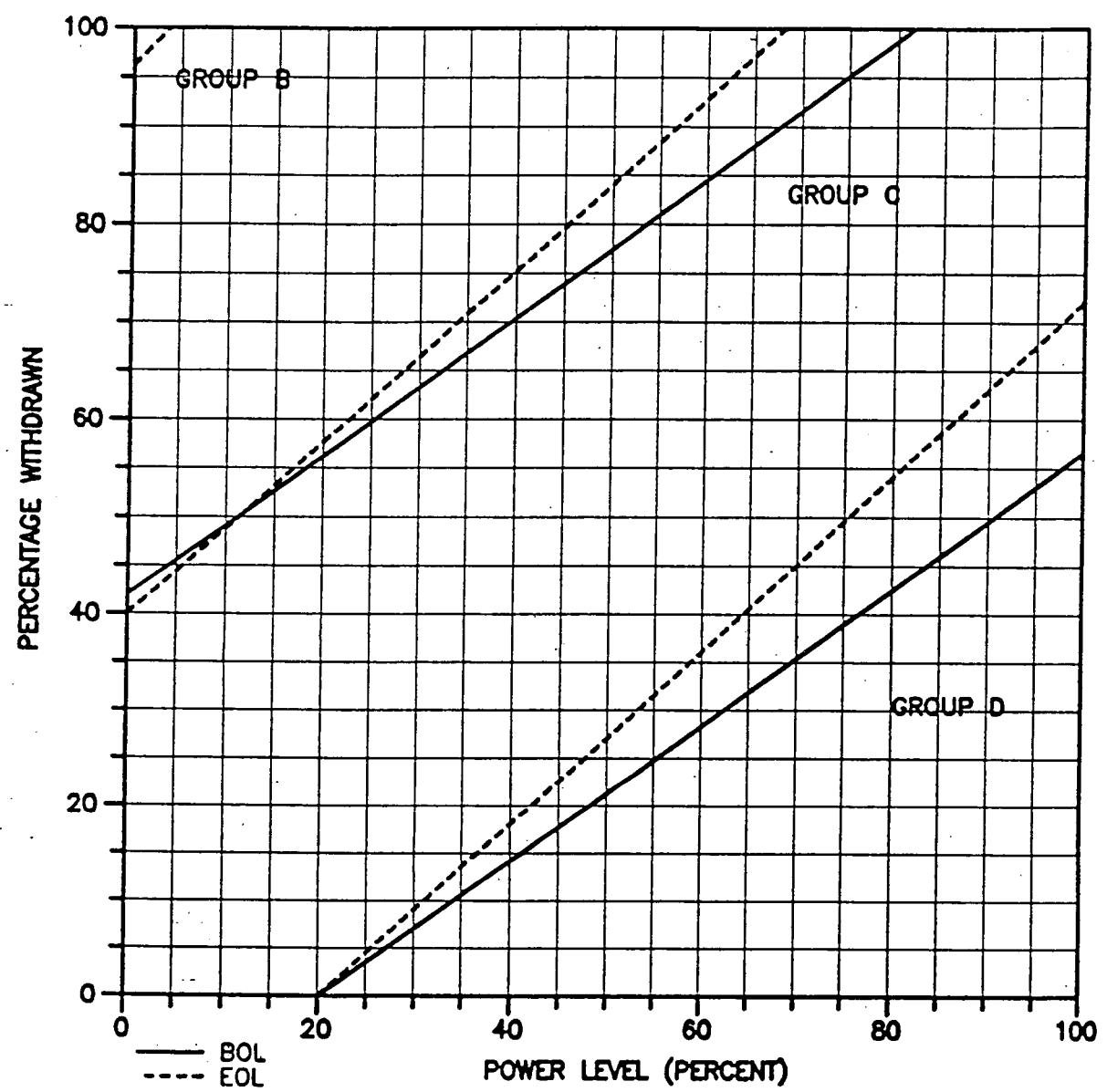


Figure 1.0

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

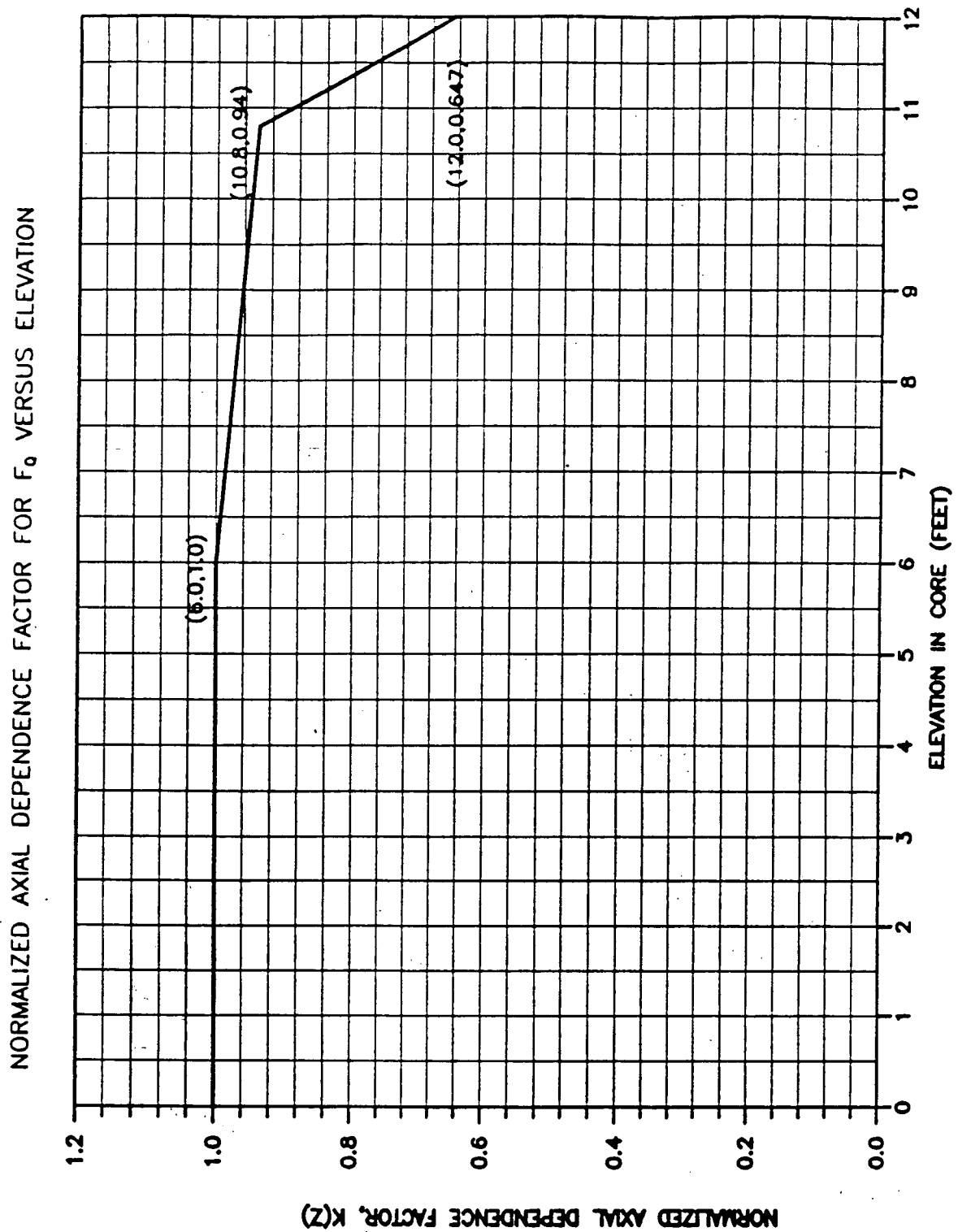
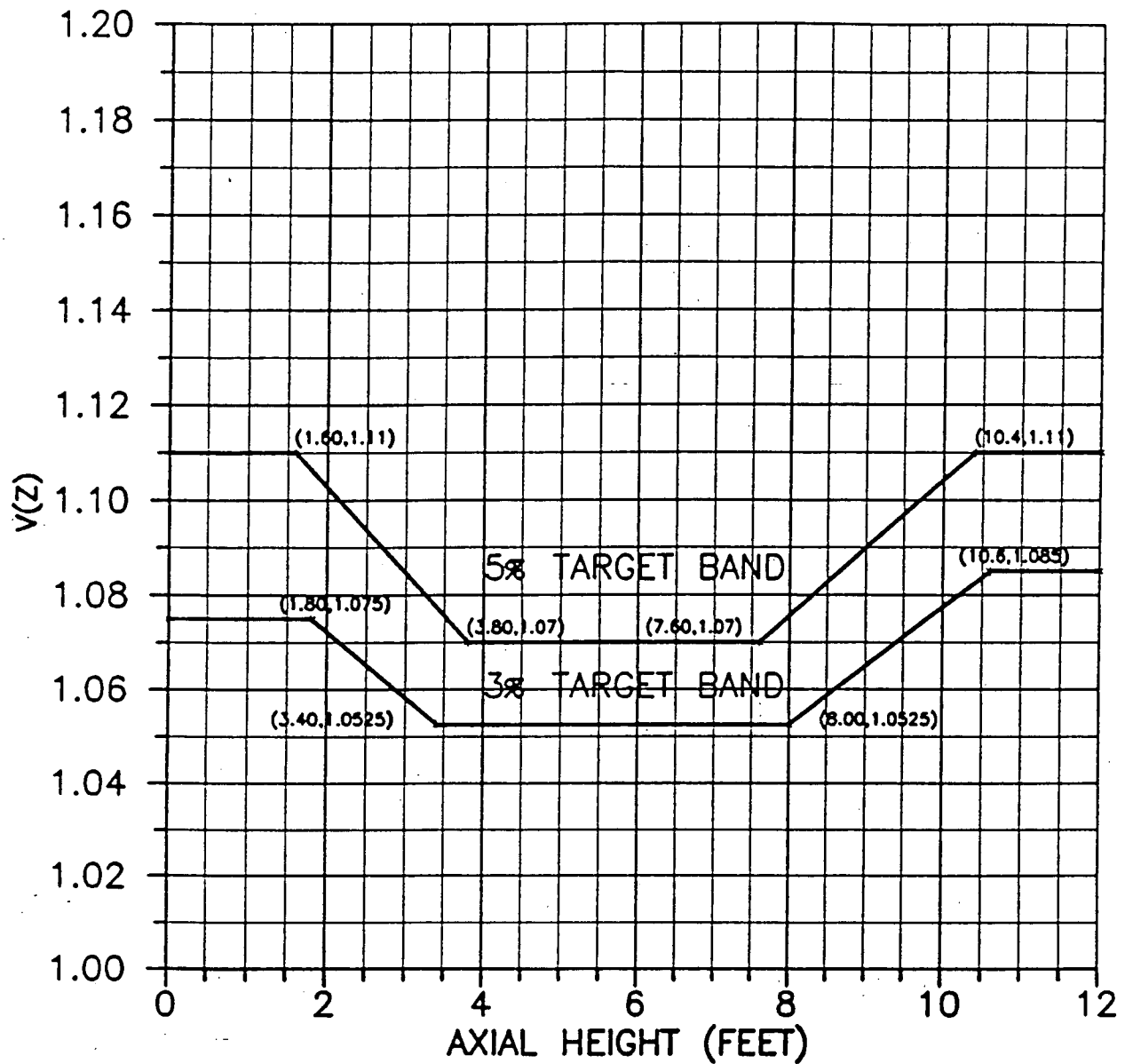


Figure 2.0

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report



$V(Z)$  AS A FUNCTION OF CORE HEIGHT

Figure 3.0

H. B. Robinson Unit 2, Cycle 16  
Core Operating Limits Report

