ST. LUCIE UNIT 1, CYCLE 15

CORE OPERATING LIMITS REPORT

Revision 0

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1.0 INTRODUCTION

This CORE OPERATING LIMITS REPORT (COLR) describes the cycle-specific parameter limits for operation of St. Lucie Unit 1 Cycle 15. It contains the limits for the following as provided in Section 2.

Moderator Temperature Coefficient

Full Length CEA Position - Misalignment > 15 Inches

Regulating CEA Insertion Limits

Linear Heat Rate

TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T

DNB Parameter - AXIAL SHAPE INDEX

Refueling Operations - Boron Concentration

This report also contains the necessary figures which give the limits for the above listed parameters.

Terms appearing in capitalized type are DEFINED TERMS as defined in Section 1.0 of the Technical Specifications.

This report is prepared in accordance with the requirements of Technical Specification 6.9.1.11.

2.0 CORE OPERATING LIMITS

2.1 Moderator Temperature Coefficient (TS 3.1.1.4)

The moderator temperature coefficient (MTC) shall be less negative than -28 pcm/°F at RATED THERMAL POWER.

2.2 Full Length CEA Position - Misalignment > 15 Inches (TS 3.1.3.1)

The time constraints for full power operation with the misalignment of one full length CEA by 15 or more inches from any other CEA in its group are shown in Figure 3.1-1a.

2.3 Regulating CEA Insertion Limits (TS 3.1.3.6)

The regulating CEA groups shall be limited to the withdrawal sequence and to the insertion limits shown on Figure 3.1-2, with CEA insertion between the Long Term Steady State Insertion Limits and the Power Dependent Insertion Limits restricted to:

a. ≤ 4 hours per 24 hour interval,

b. ≤ 5 Effective Full Power Days per 30 Effective Full Power Day interval, and

c. ≤ 14 Effective Full Power Days per calendar year.

2.4 Linear Heat Rate (TS 3.2.1)

The linear heat rate shall not exceed the limits shown on Figure 3.2-1.

The AXIAL SHAPE INDEX power dependent control limits are shown on Figure 3.2-2.

During operation, with the linear heat rate being monitored by the Excore Detector Monitoring System, the AXIAL SHAPE INDEX shall be maintained within the limits of Figure 3.2-2.

During operation, with the linear heat rate being monitored by the Incore Detector Monitoring System, the Local Power Density alarm setpoints shall be adjusted to less than or equal to the limits shown on Figure 3.2-1.

2.5 TOTAL INTEGRATED RADIAL PEAKING FACTOR - F_r^T (TS 3.2.3)

The calculated value of F_r^T shall be limited to ≤ 1.70.

The power dependent F_r^T limits are shown on Figure 3.2-3.

2.6 DNB Parameters - AXIAL SHAPE INDEX (TS 3.2.5)

The AXIAL SHAPE INDEX shall be maintained within the limits specified in Figure 3.2-4.

2.7 Refueling Operations - Boron Concentration (TS 3.9.1)

With the reactor vessel head unbolted or removed, the boron concentration of all filled portions of the Reactor Coolant System and the refueling cavity shall be maintained uniform and sufficient to ensure that the more restrictive of the following reactivity conditions is met:

a. Either a K_{eff} of 0.95 or less, which includes a 1000 pcm conservative allowance for uncertainties, or

b. A boron concentration of ≥ 1720 ppm, which includes a 50 ppm conservative allowance for uncertainties.

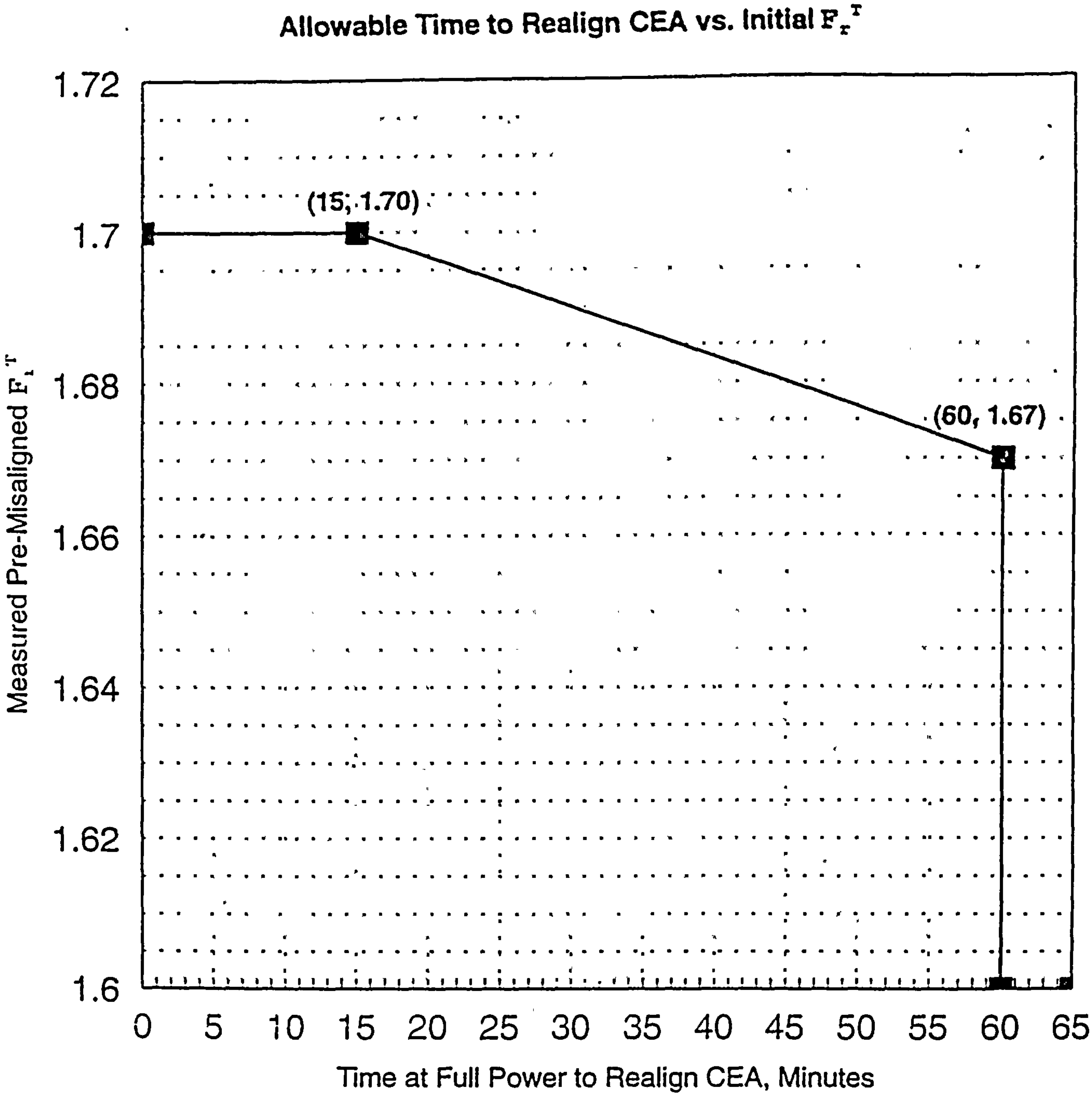


FIGURE 3.1-1a
Allowable Time to Realign CEA vs. Initial F_r^T

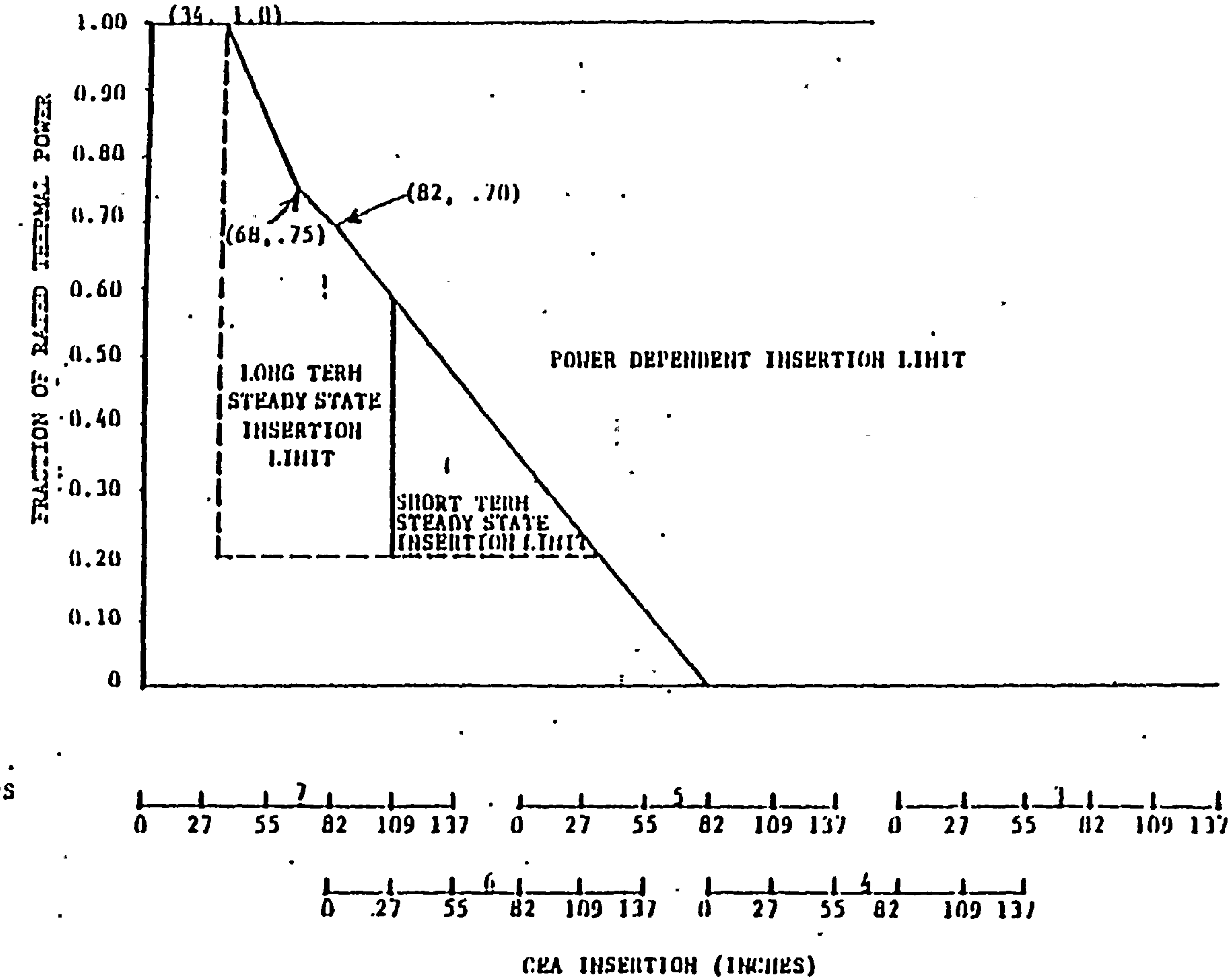


FIGURE 3.1-2
CEA Insertion Limits vs. THERMAL POWER
(4 Reactor Coolant Pumps Operating)

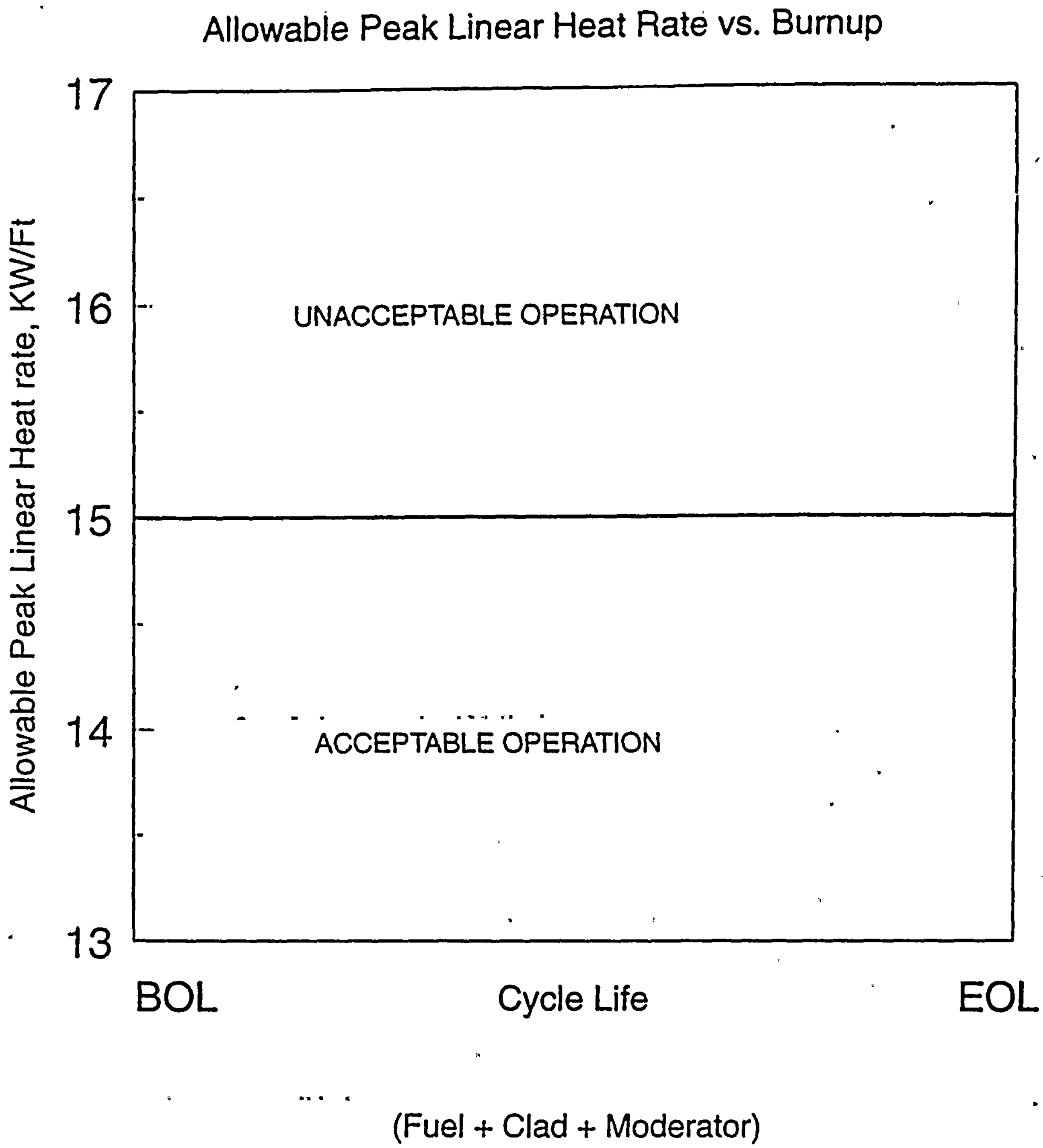
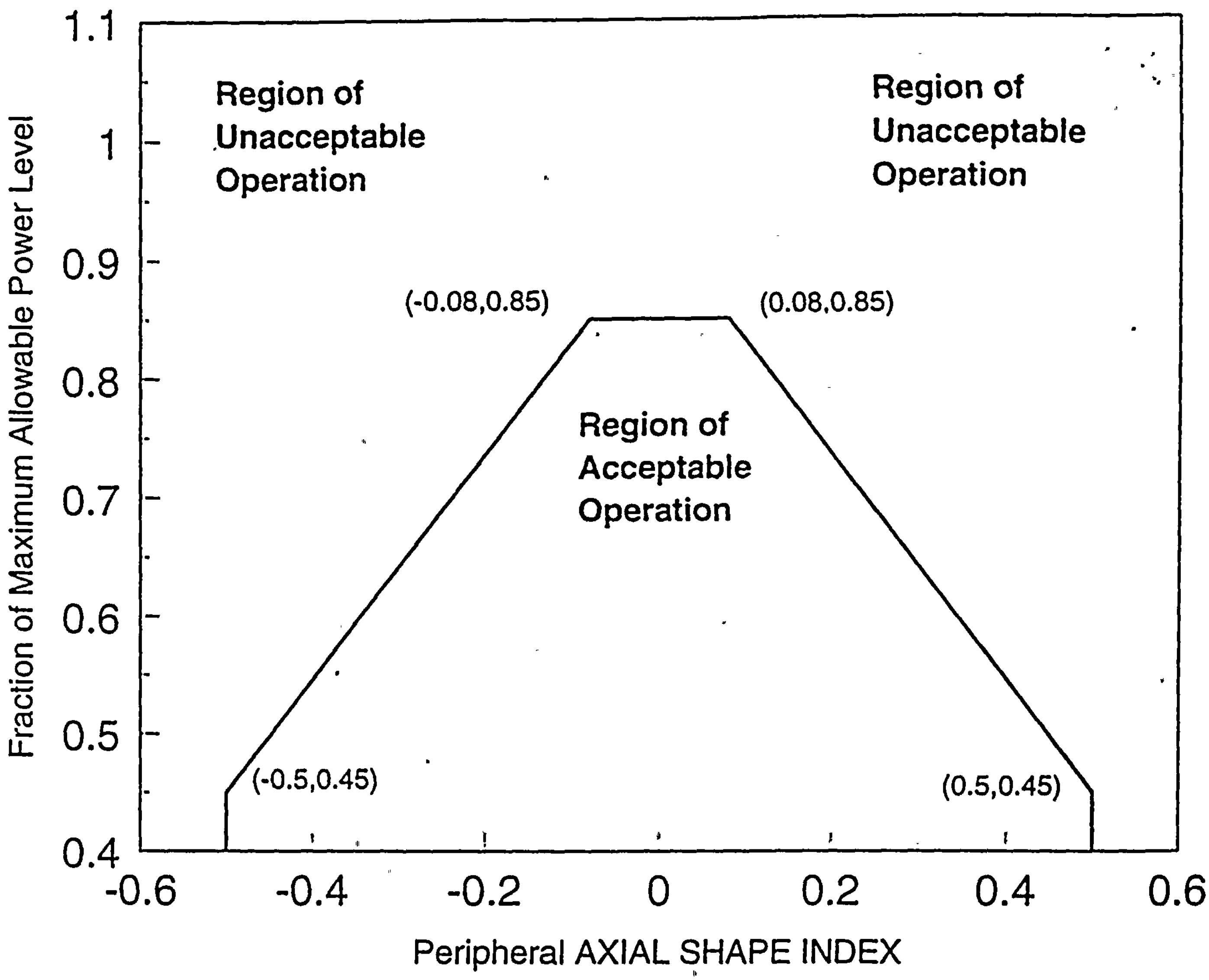


FIGURE 3.2-1
Allowable Peak Linear Heat Rate vs. Burnup



(Not Applicable Below 40% Power)

FIGURE 3.2-2
AXIAL SHAPE INDEX vs. Maximum Allowable Power Level

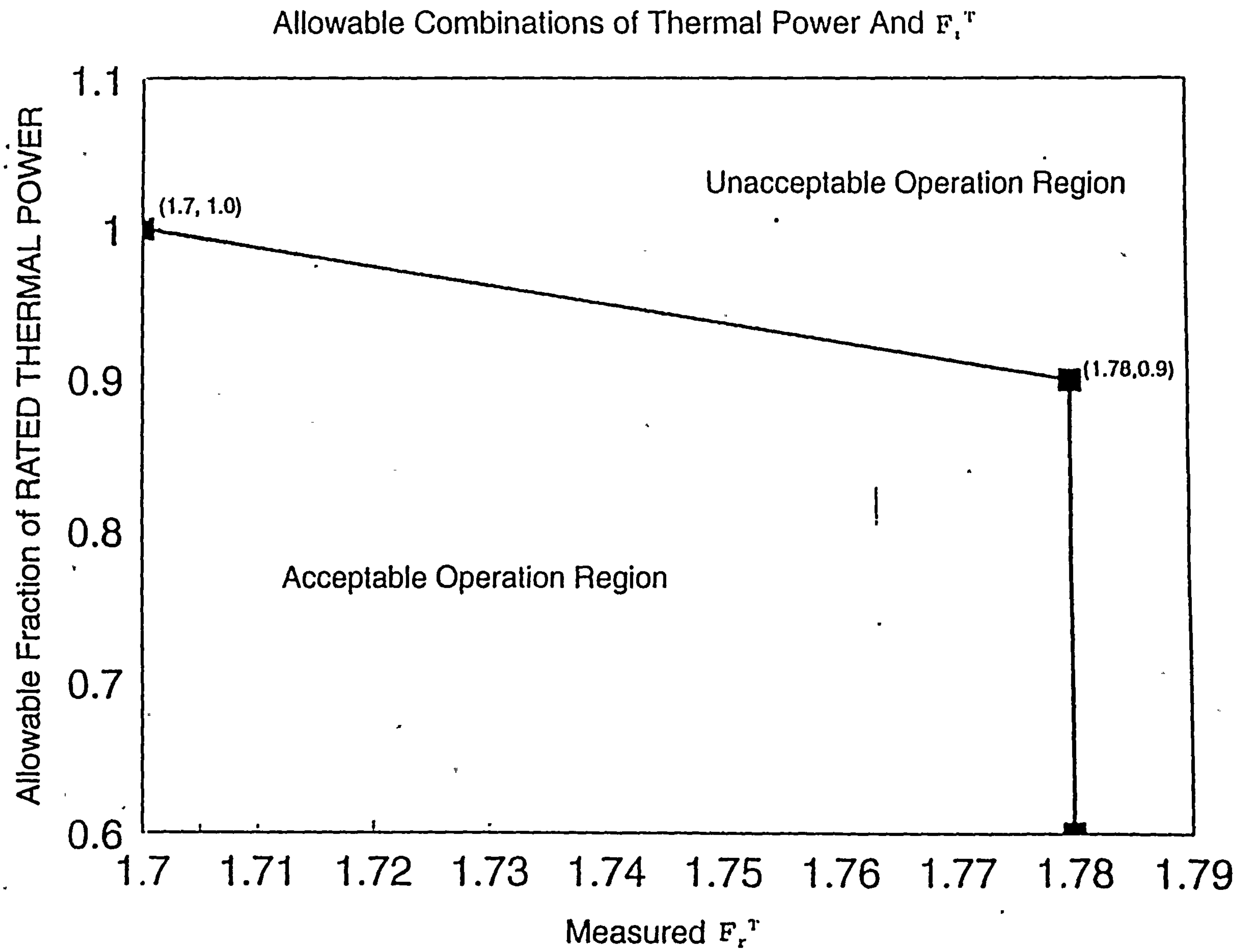
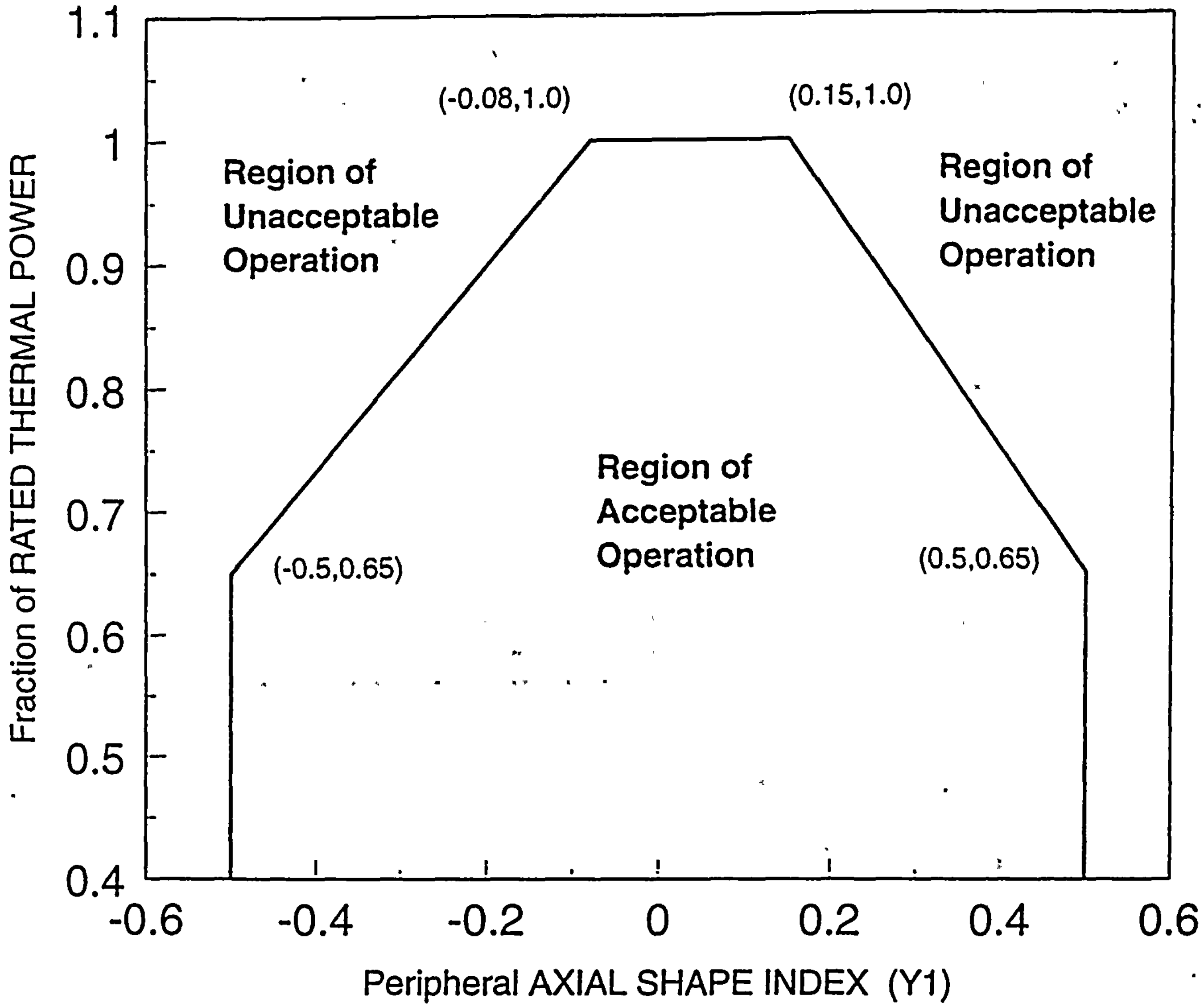


FIGURE 3.2-3
Allowable Combinations of THERMAL POWER and F_r^T



(Not Applicable Below 40% Power)

FIGURE 3.2-4
AXIAL SHAPE INDEX Operating Limits vs. THERMAL POWER
(Four Reactor Coolant Pumps Operating)

3.0 LIST OF APPROVED METHODS

The analytical methods used to determine the core operating limits are those previously approved by the NRC, and are listed below.

1. WCAP-11596-P-A, "Qualification of the PHOENIX-P/ANC Nuclear Design System for Pressurized Water Reactor Cores," June 1988 (Westinghouse Proprietary)

2. NF-TR-95-01, "Nuclear Physics Methodology for Reload Design of Turkey Point & St. Lucie Nuclear Plants," Florida Power & Light Company, January 1995

3. XN-75-27(A), Rev. 0 and Supplement 1 through 5, "Exxon Nuclear Neutronics Design Methods for Pressurized Water Reactors," Exxon Nuclear Company, Rev. 0 dated June 1975, Supplement 1 dated September 1976, Supplement 2 dated December 1980, Supplement 3 dated September 1981, Supplement 4 dated December 1986, Supplement 5 dated February 1987.

4. ANF-84-73(P), Rev. 3, "Advanced Nuclear Fuels Methodology for Pressurized Water Reactors: Analysis of Chapter 15 Events," Advanced Nuclear Fuel Corporation, dated May 1988

5. XN-NF-82-21(A), Rev. 1, "Application of Exxon Nuclear Company PWR Thermal Margin Methodology to Mixed Core Configurations," Exxon Nuclear Company, dated September 1983

6. ANF-84-93(A), Rev. 0 and Supplement 1, "Steamline Break Methodology for PWR's," Advanced Nuclear Fuels Corporation, Rev. 0 dated March 1989, Supplement 1 dated March 1989

7. XN-75-32(A), Supplements 1, 2, 3, and 4, "Computational Procedure for Evaluating Fuel Rod Bowing," Exxon Nuclear Company, dated October 1983

8. XN-NF-82-49(A), Rev. 1 and Supplement 1, "Exxon Nuclear Company Evaluation Model EXEM PWR Small Break Model," Advanced Nuclear Fuels Corporation, Rev. 1 dated April 1989, Supplement 1 dated December 1994

9. XN-NF-78-44(A), "A Generic Analysis of the Control Rod Ejection Transient for Pressurized Water Reactors," Exxon Nuclear Company, dated October 1983

10. XN-NF-621(A), Rev. 1, "Exxon Nuclear DNB Correlation of PWR Fuel Design," Exxon Nuclear Company, dated September 1983

11. EXEM PWR Large Break LOCA Evaluation Model as defined by:

   a. XN-NF-82-20(A), Rev. 1 and Supplements 1 through 4, "Exxon Nuclear Company Evaluation Model EXEM/PWR ECCS Model Updates," Exxon Nuclear Company, all dated January 1990

   b. XN-NF-82-07(A), Rev. 1, "Exxon Nuclear Company ECCS Cladding Swelling and Rupture Model," Exxon Nuclear Company, dated November 1982

   c. XN-NF-81-58(A), Rev. 2 and Supplements 1 through 4, "RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model," Exxon Nuclear Company, Rev. 2 and Supplement 1 and 2 dated March 1984, Supplements 3 and 4 dated June 1990

   d. XN-NF-85-16(A), Volume 1 through Supplement 3; Volume 2, Rev. 1 and Supplement 1, "PWR 17x17 Fuel Cooling Tests Program," Exxon Nuclear Company, all dated February 1990

   e. XN-NF-85-105(A), Rev. 0 and Supplement 1, "Scaling of FCTF Based Reflood Heat Transfer Correlation for Other Bundle Designs," Exxon Nuclear Company, all dated January 1990

Insert

The APRM system is divided into four APRM channels and four 2-out-of-4 voter channels. Each APRM channel provides inputs to each of the four voter channels. The four voter channels are divided into two groups of two each, with each group of two providing inputs to one RPS trip system. The system is designed to allow one APRM channel, but no voter channels, to be bypassed. Note (l) to Table 3.3.1-1 states that the Minimum Operable Channels in Table 3.3.1-1 for the APRM Functional Units (except the 2-out-of-4 voter Functional Unit) are the total number of APRM channels required and are not on a trip system basis. Therefore, when only one required APRM is inoperable, Action a is the only Action required to be entered. This Action requires the APRM to be restored to operable status or placed in the tripped condition within 12 hours. As stated in Action a, footnote *, placing either trip system in trip is not applicable since the APRM channels are not on a trip system basis. When two or more required APRMs are inoperable, Action b is entered. Action b.1 requires verification of trip capability in the affected functional unit within one hour (i.e., one APRM operable and one APRM in the tripped condition). Action b.2, as stated in footnote **, is not applicable since the APRM channels are not on a trip system basis. Action b.3 requires that the remaining required inoperable APRM be restored to operable status within 12 hours.