ENCLOSURE (1) to L-97-280

ST. LUCIE UNIT 2 , CYCLE 10

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 2 Cycle 10. It contains the limits for the following as provided in Section 2.

Moderator Temperature Coefficient

CEA Position - Misalignment > 15 Inches

Regulating CEA Insertion Limits

Linear Heat Rate

TOTAL PLANAR RADIAL PEAKING FACTORS - F_{xy}^T

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 -30 pcm/^{0}F at RATED THERMAL POWER.

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

The time constraints for full power operation with one full-length CEA misaligned from any other CEA in its group by more than 15 inches 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. Less than or equal to 4 hours per 24 hour interval,

b. Less than or equal to 5 Effective Full Power Days per 30 Effective Full Power Days, and

c. Less than or equal to 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 PLANAR RADIAL PEAKING FACTORS - F_{xy}^T (TS 3.2.2)

The calculated value of F_{xy}^T shall be limited to $\leq$ 1.75.

The power dependent F_{xy}^T limits are shown on Figure 3.2-3.

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

The calculated value of F_r^T shall be limited to $\leq$ 1.70.

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

2.7 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.

2.8 Refueling Operations - Boron Concentration (TS 3.9.1)

With the reactor vessel head closure bolts less than fully tensioned or with the head removed, the boron concentration of all filled portions of the Reactor Coolant System and the refueling canal 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, or

b. A boron concentration of greater than or equal to 1720 ppm.

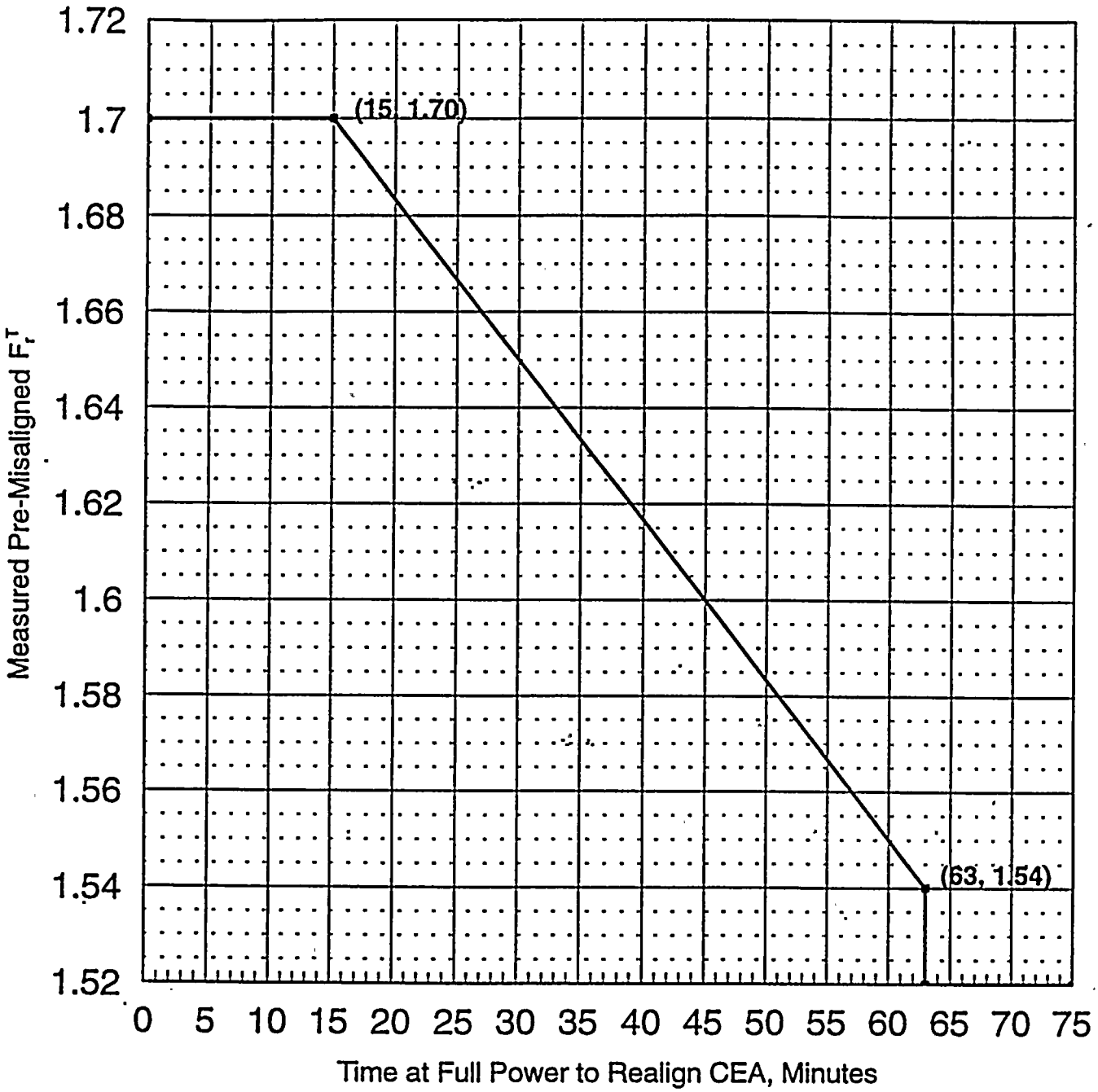


FIGURE 3.1-1a
Allowable Time to Realign CEA vs. Initial F_r^T

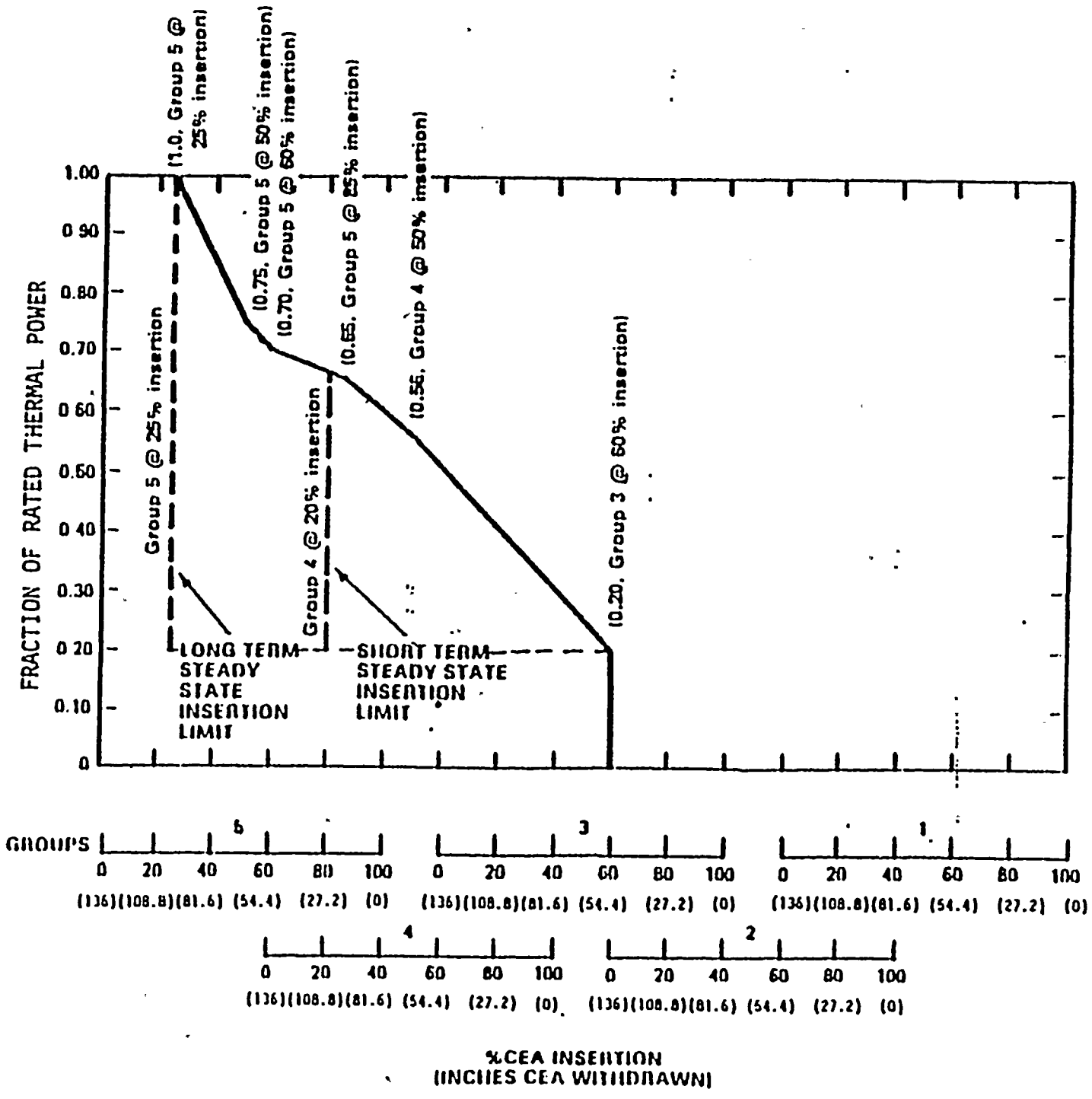


FIGURE 3.1-2
CEA Group Insertion Limits vs. THERMAL POWER

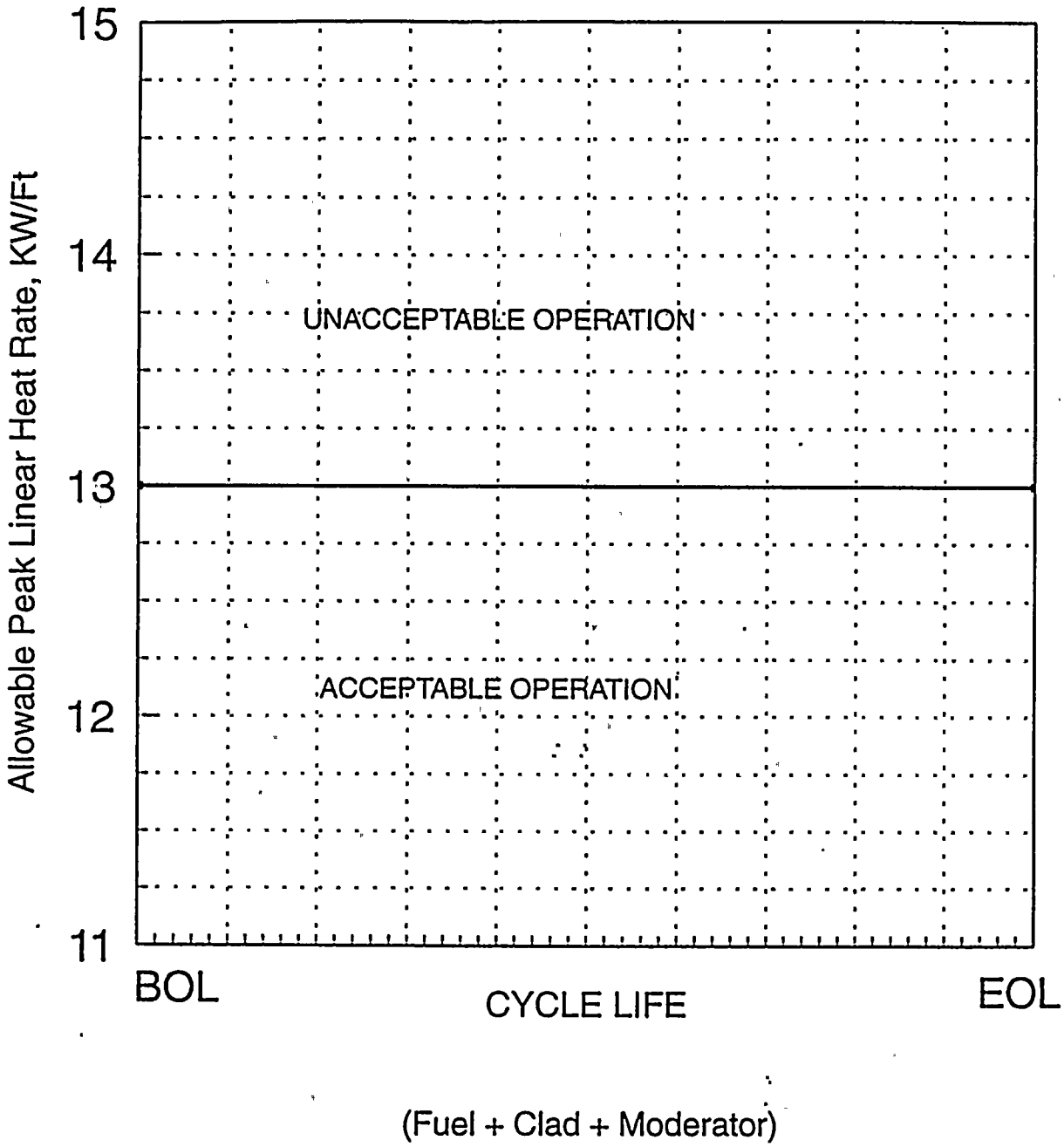
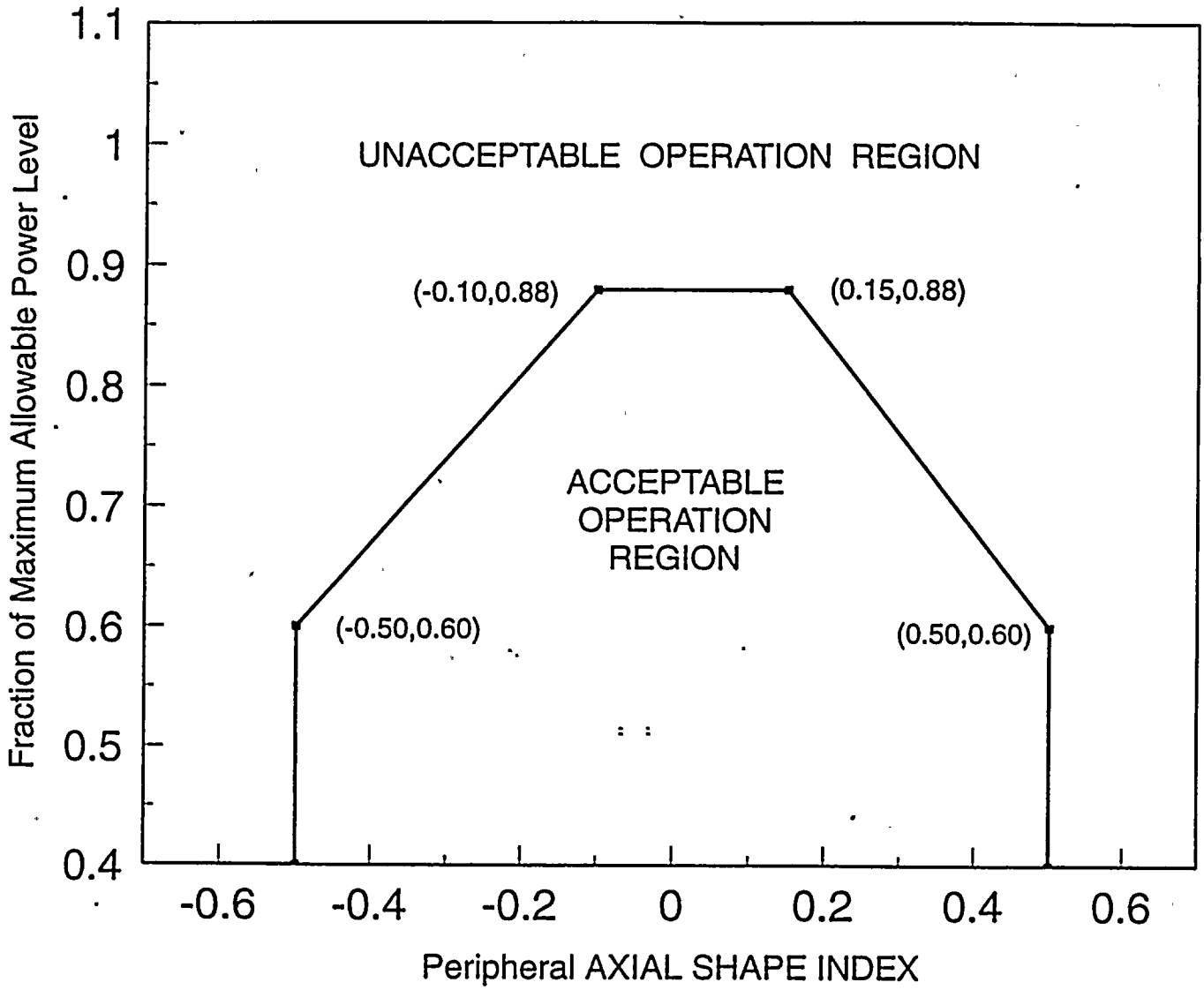


FIGURE 3.2-1
Allowable Peak Linear Heat Rate vs. Burnup



(Not Applicable Below 40% Power)

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

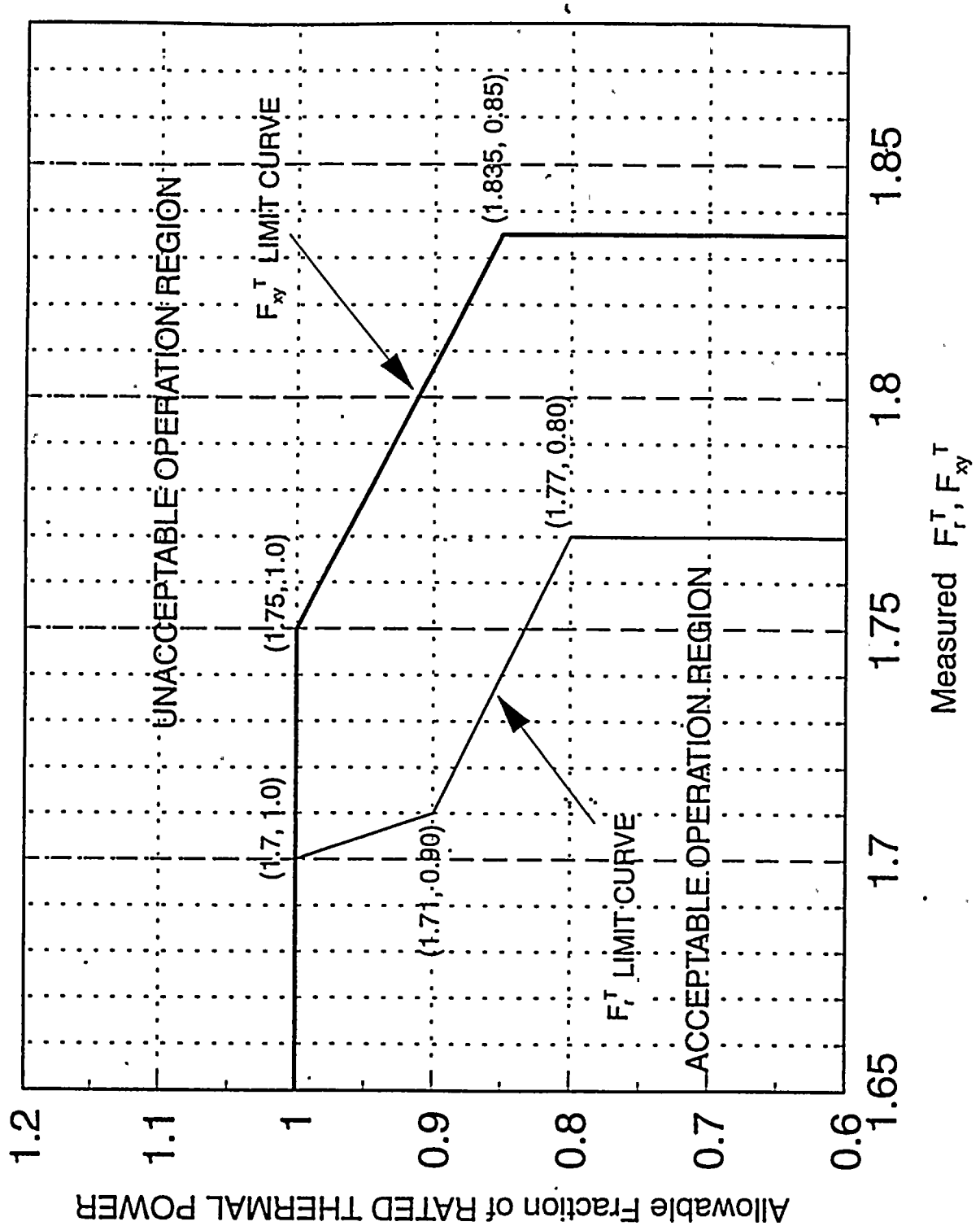
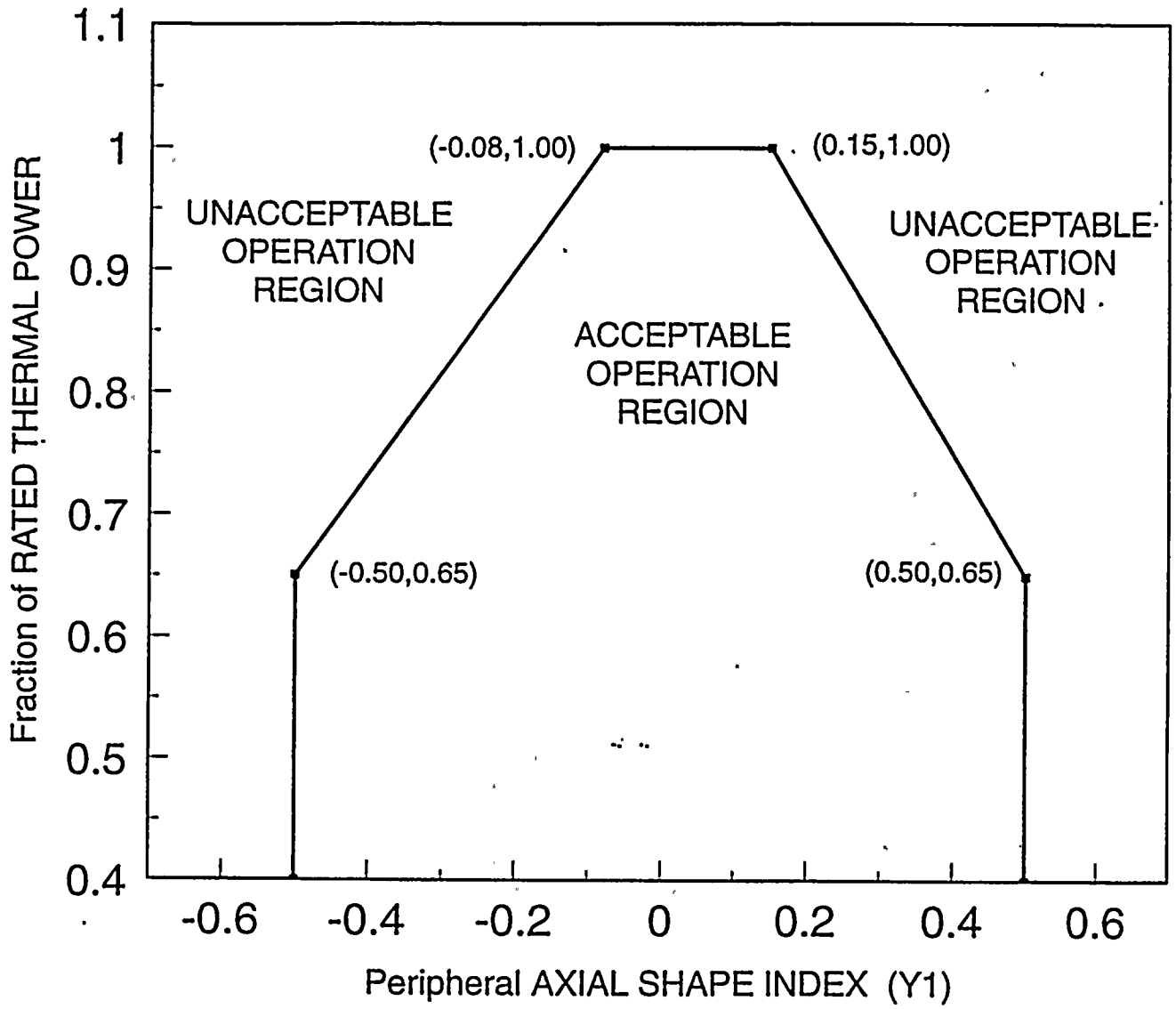


FIGURE 3.2-3
Allowable Combinations of THERMAL POWER and F_r^T, F_{xy}^T



(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 (NRC SER dated June 9, 1995), & Supplement 1, August 1997

3. CENPD-199-P, Rev. 1-P-A, "C-E Setpoint Methodology: CE Local Power Density and DNB LSSS and LCO Setpoint Methodology for Analog Protection Systems," January 1986

4. CENPD-266-P-A, "The ROCS and DIT Computer Code for Nuclear Design," April 1983

5. CENPD-275-P-A, "C-E Methodology for Core Designs Containing Gadolinia-Urania Burnable Absorbers," May 1988

6. CENPD-188-A, "HERMITE: A Multi-Dimensional Space - Time Kinetics Code for PWR Transients,: July 1976

7. CENPD-153-P, Rev. 1-P-A, "Evaluation of Uncertainty in the Nuclear Power Peaking Measured by the Self-Powered, Fixed Incore Detector System," May 1980

8. CEN-123(F)-P, "Statistical Combination of Uncertainties Methodology Part 1: C-E Calculated Local Power Density and Thermal Margin/Low Pressure LSSS for Calvert Cliffs Units I and II," December 1979

9. CEN-123(F)-P, "Statistical Combination of Uncertainties Methodology Part 2: Combination of System Parameter Uncertainties in Thermal Margin Analyses for Calvert Cliffs Units 1 and 2," January 1980

10. CEN-123(F)-P, "Statistical Combination of Uncertainties Methodology Part 3: C-E Calculated Departure from Nucleate Boiling and Linear Heat Rate Limiting Conditions for Operation for Calvert Cliffs Units 1 and 2," February 1980

11. CEN-191(B)-P, "CETOP-D Code Structure and Modeling Methods for Calvert Cliffs Units 1 and 2," December 1981

12. Letter, J. W. Miller (NRC) to J. R. Williams, Jr. (FPL), Docket No. 50-389, Regarding

Unit 2 Cycle 2 License Approval (Amendment No. 8 to NPF-16 and SER), November 9, 1984 (Approval of CEN-123(F)-P (three parts) and CEN-191(B)-P)

13. CEN-371(F)-P, "Extended Statistical Combination of Uncertainties," July 1989

14. Letter, J. A. Norris (NRC) to J. H. Goldberg (FPL), Docket No. 50-389, "St. Lucie Unit 2 - Change to Technical Specification Bases Sections '2.1.1 Reactor Core' and '3/4.2.5 DNB Parameters' (TAC No. M87722)," March 14, 1994 (Approval of CEN-371(F)-P)

15. CENPD-161-P-A, "TORC Code, A Computer Code for Determining the Thermal Margin of a Reactor Core," April 1986

16. CENPD-162-P-A, "Critical Heat Flux Correlation for C-E Fuel Assemblies with Standard Spacer Grids Part 1, Uniform Axial Power Distribution," April 1975

17. CENPD-207-P-A, "Critical Heat Flux Correlation for C-E Fuel Assemblies with Standard Spacer Grids Part 2, Non-uniform Axial Power Distribution," December 1984

18. CENPD-206-P-A, "TORC Code, Verification and Simplified Modeling Methods," June 1981

19. CENPD-225-P-A, "Fuel and Poison Rod Bowing," June 1983

20. CENPD-139-P-A, "C-E Fuel Evaluation Model Topical Report," July 1974

21. CEN-161(B)-P-A, "Improvements to Fuel Evaluation Model," August 1989

22. CEN-161(B)-P, Supplement 1-P-A, "Improvements to Fuel Evaluation Model," January 1992

23. CENPD-132, Supplement 3-P-A, "Calculative Methods for the C-E Large Break LOCA Evaluation Model for the Analysis of C-E and W Designed NSSS," June 1985

24. CENPD-133, Supplement 5-A, "CEFLASH-4A, A FORTRAN77 Digital Computer Program for Reactor Blowdown Analysis," June 1985

25. CENPD-134, Supplement 2-A, "COMPERC-II, a Program for Emergency Refill-Reflood of the Core," June 1985

26. CENPD-135-P, Supplement 5, "STRIKIN-II, A Cylindrical Geometry Fuel Rod Heat Transfer Program," April 1977

27. Letter, R. L. Baer (NRC) to A. E. Scherer (CE), "Evaluation of Topical Report

CENPD-135, Supplement #5," September 6, 1978

28. CENPD-137, Supplement 1-P, "Calculative Methods for the C-E Small Break LOCA Evaluation Model," January 1977

29. CENPD-133, Supplement 3-P, "CEFLASH-4AS, A Computer Program for the Reactor Blowdown Analysis of the Small Break Loss of Coolant Accident," January 1977

30. Letter, K. Kniel (NRC) to A. E. Scherer (CE), "Evaluation of Topical Reports CENPD-133, Supplement 3-P and CENPD-137, Supplement 1-P," September 27, 1977

31. CENPD-138, Supplement 2-P, "PARCH, A FORTRAN-IV Digital Program to Evaluate Pool Boiling, Axial Rod and Coolant Heatup," January 1977

32. Letter, C. Aniel (NRC) to A. E. Scherer (CE), "Evaluation of Topical Report CENPD-138, Supplement 2-P," April 10, 1978

33. Letter, W. H. Bohlke (FPL) to Document Control Desk (NRC), "St. Lucie Unit 2, Docket No. 50-389, Proposed License Amendment, MTC Change from -27 pcm to -30 pcm," L-91-325, December 17, 1991

34. Letter, J. A. Norris (NRC) to J. H. Goldberg (FPL), "St. Lucie Unit 2 - Issuance of Amendment Re: Moderator Temperature Coefficient (TAC No. M82517)," July 15, 1992

35. Letter, J. W. Williams, Jr. (FPL) to D. G. Eisenhut (NRC), "St. Lucie Unit No. 2, Docket No. 50-389, Proposed License Amendment, Cycle 2 Reload," L-84-148, June 4, 1984

36. Letter, J. R. Miller (NRC) to J. W. Williams, Jr. (FPL), Docket No. 50-389, Regarding Unit 2 Cycle 2 License Approval (Amendment No. 8 to NPF-16 and SER), November 9, 1984 (Approval of Methodology contained in L-84-148)

37. Letter, A. E. Scherer Enclosure 1-P to LD-82-001, "CESEC-Digital Simulation of a Combustion Engineering Nuclear Steam Supply System," December 1981

38. Safety Evaluation Report, "CESEC Digital Simulation of a Combustion Engineering Steam Supply System (TAC No.: 01142)," October 27, 1983

39. CENPD-282-P-A, Volumes 1, 2, and 3, Supplement 1-P, "Technical Manual for the CENTS Code," March 1994