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10 CFR 50.36

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-00001

Re: St. Lucie Nuclear Plant, Unit 1
Docket 50-335
Cycle 31 Core Operating Limits Report

Pursuant to St. Lucie Unit 1 Technical Specification (TS) 6.9.1.11.d, Florida Power & Light Company (FPL) is submitting the Core Operating Limits Report (COLR) for operating cycle 31.

Should there be any questions concerning this submittal, please contact Timothy Falkiewicz at (772) 429-3756.

Sincerely,

Dianne Strand
General Manager Regulatory Affairs

Enclosure

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, St. Lucie Nuclear Plant
USNRC Resident Inspector, St. Lucie Nuclear Plant

ST. LUCIE UNIT 1, CYCLE 31

CORE OPERATING LIMITS REPORT

Revision 0

Prepared by: _____ 06/14/2022
E. A. Hernandez — Date

Verified by: _____ 6/14/22
R. Hunter — Date

Approved by: _____ 6/14/2022
J. N. Kabadi — Date

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1.0 INTRODUCTION

This CORE OPERATING LIMITS REPORT (COLR) describes the cycle-specific parameter limits for the operation of St. Lucie Unit 1. It contains the limits for the following, as provided in Section 2.0:

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 Parameters

Refueling Operations - Boron Concentration

SHUTDOWN MARGIN – T_{avg} Greater Than 200 ^{0}F

SHUTDOWN MARGIN – T_{avg} Less Than or Equal To 200 ^{0}F

This report also contains the necessary tables and 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 -32 pcm/^{0}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 $\leq$ 1.65

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

2.6 DNB Parameters (TS 3.2.5)

The following DNB-related parameters shall be maintained within the limits shown on Table 3.2-1:

a. Cold Leg Temperature
b. Pressurizer Pressure
c. AXIAL SHAPE INDEX

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 $\geq$ 1900 ppm, which includes a 50 ppm conservative allowance for uncertainties.

2.8 SHUTDOWN MARGIN – T_{avg} Greater Than 200 ^{0}F (TS 3.1.1.1)

The SHUTDOWN MARGIN shall be greater than or equal to 3600 pcm.

2.9 SHUTDOWN MARGIN – T_{avg} Less Than or Equal To 200 ^{0}F (TS 3.1.1.2)

The SHUTDOWN MARGIN shall be greater than or equal to 2000 pcm.

Table 3.2-1

DNB MARGIN LIMITS

PARAMETER	FOUR REACTOR COOLANT PUMPS OPERATING
Cold Leg Temperature	$\leq$ 551°F
Pressurizer Pressure*	$\geq$ 2225 psia
AXIAL SHAPE INDEX	COLR Figure 3.2-4

* Limit not applicable during either a THERMAL POWER ramp increase in excess of 5% per minute of RATED THERMAL POWER or a THERMAL POWER step increase of greater than 10% of RATED THERMAL POWER.

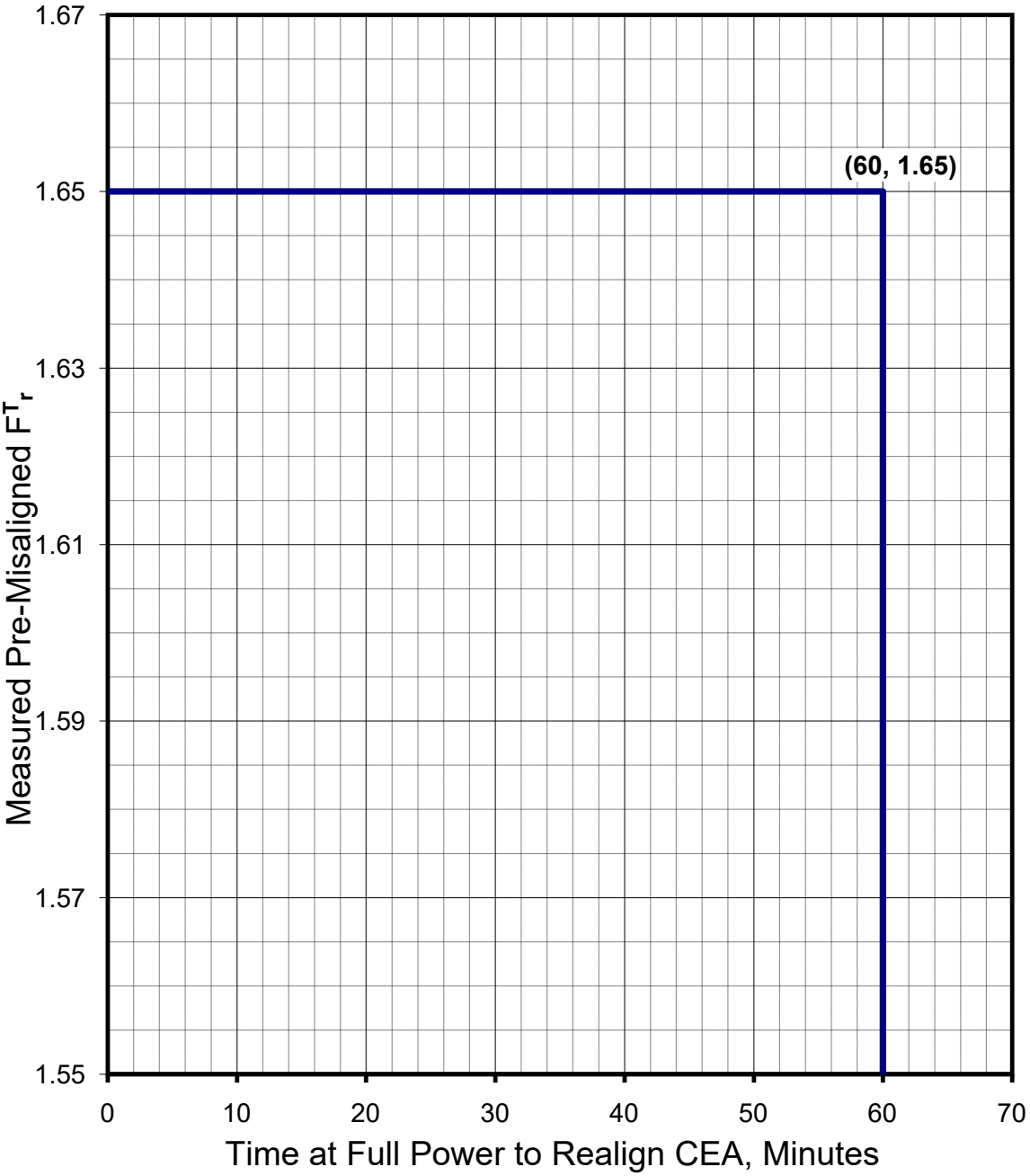


FIGURE 3.1-1a
Allowable Time to Realign CEA vs. Initial F_r^T

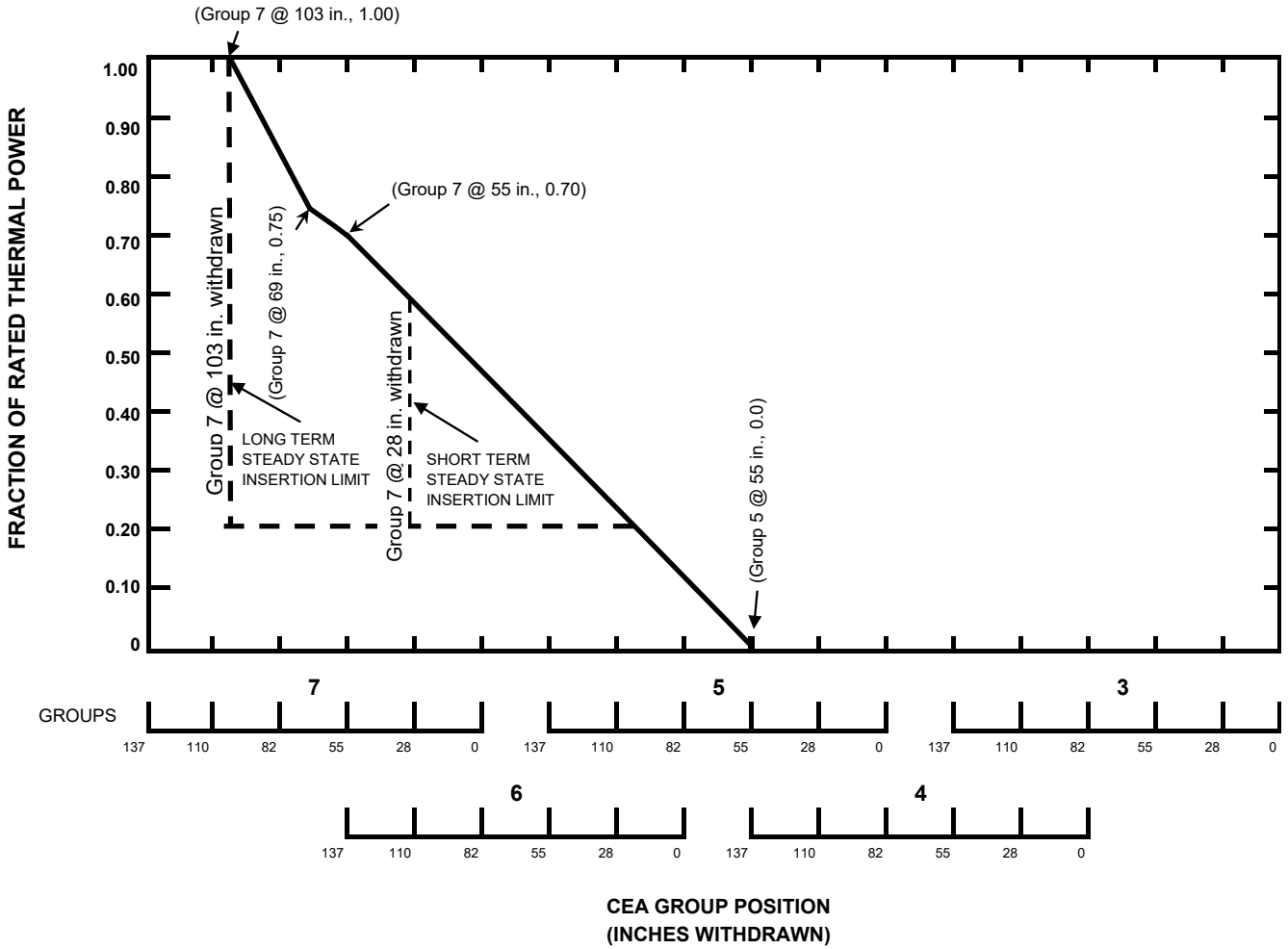


FIGURE 3.1-2
CEA Insertion Limits vs. THERMAL POWER
(4 Reactor Coolant Pumps Operating)

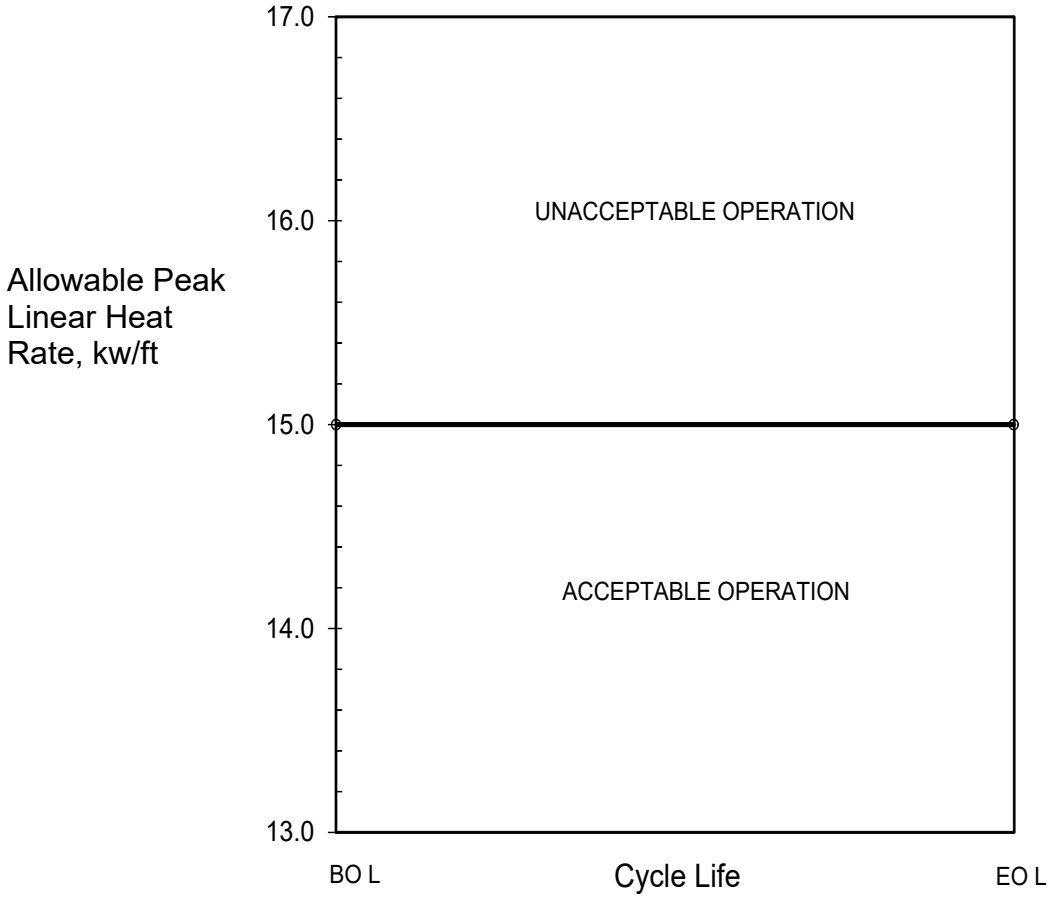
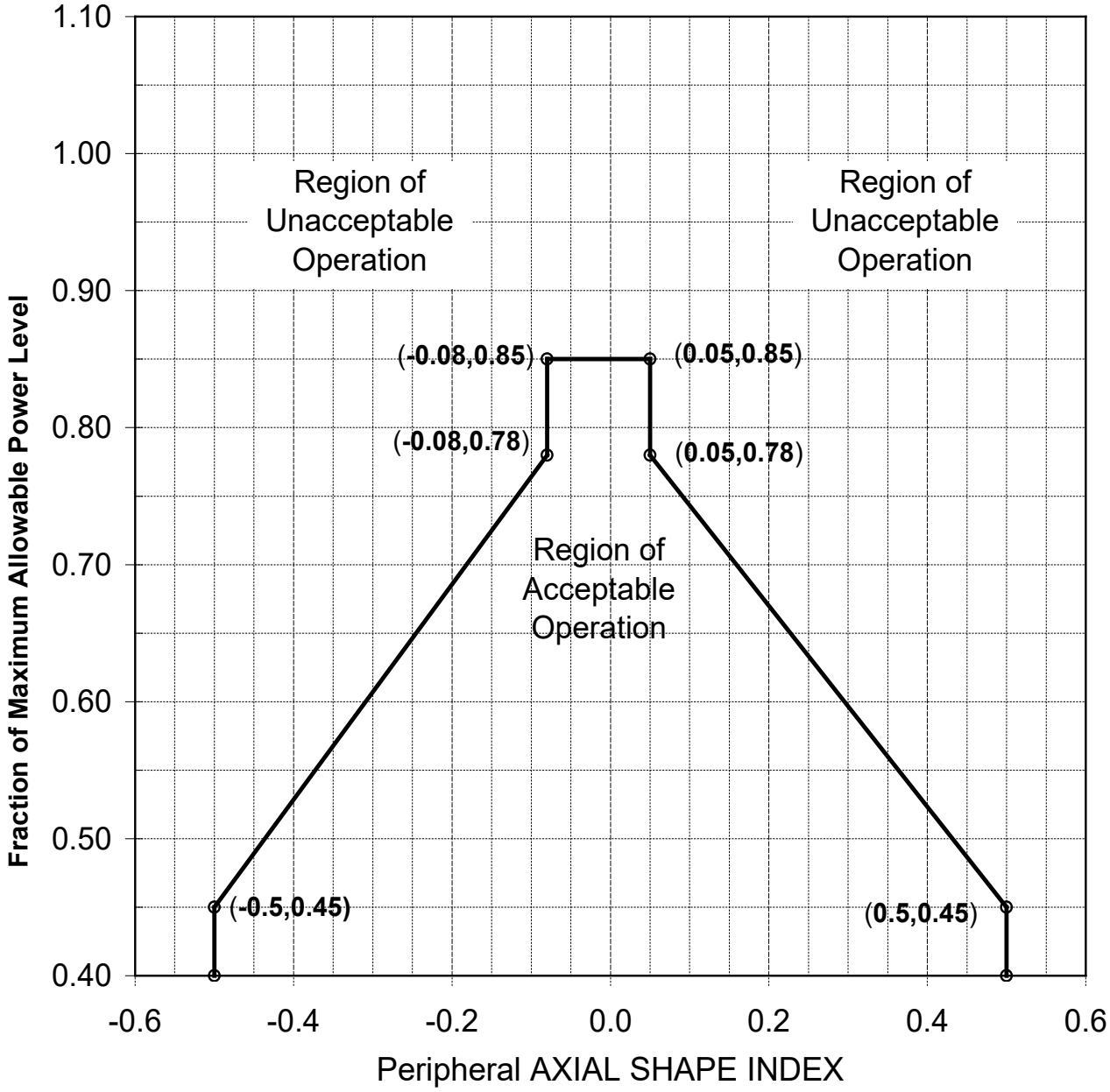


FIGURE 3.2-1
Allowable Peak Linear Heat Rate vs. Burnup



(Not Applicable Below 40% Power)

Note: AXIAL SHAPE INDEX limits for Linear Heat Rate when using Excore Detector Monitoring System)

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

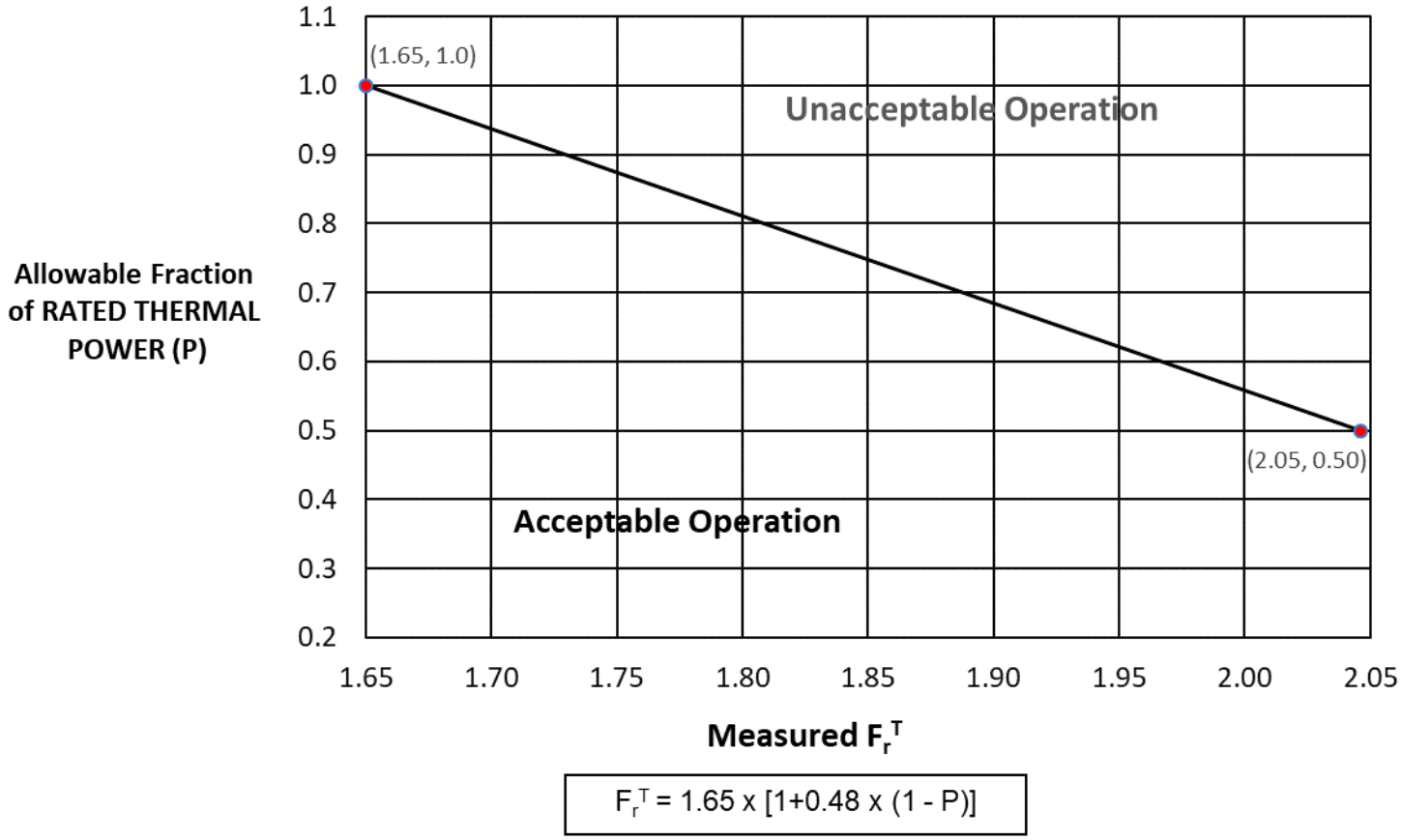
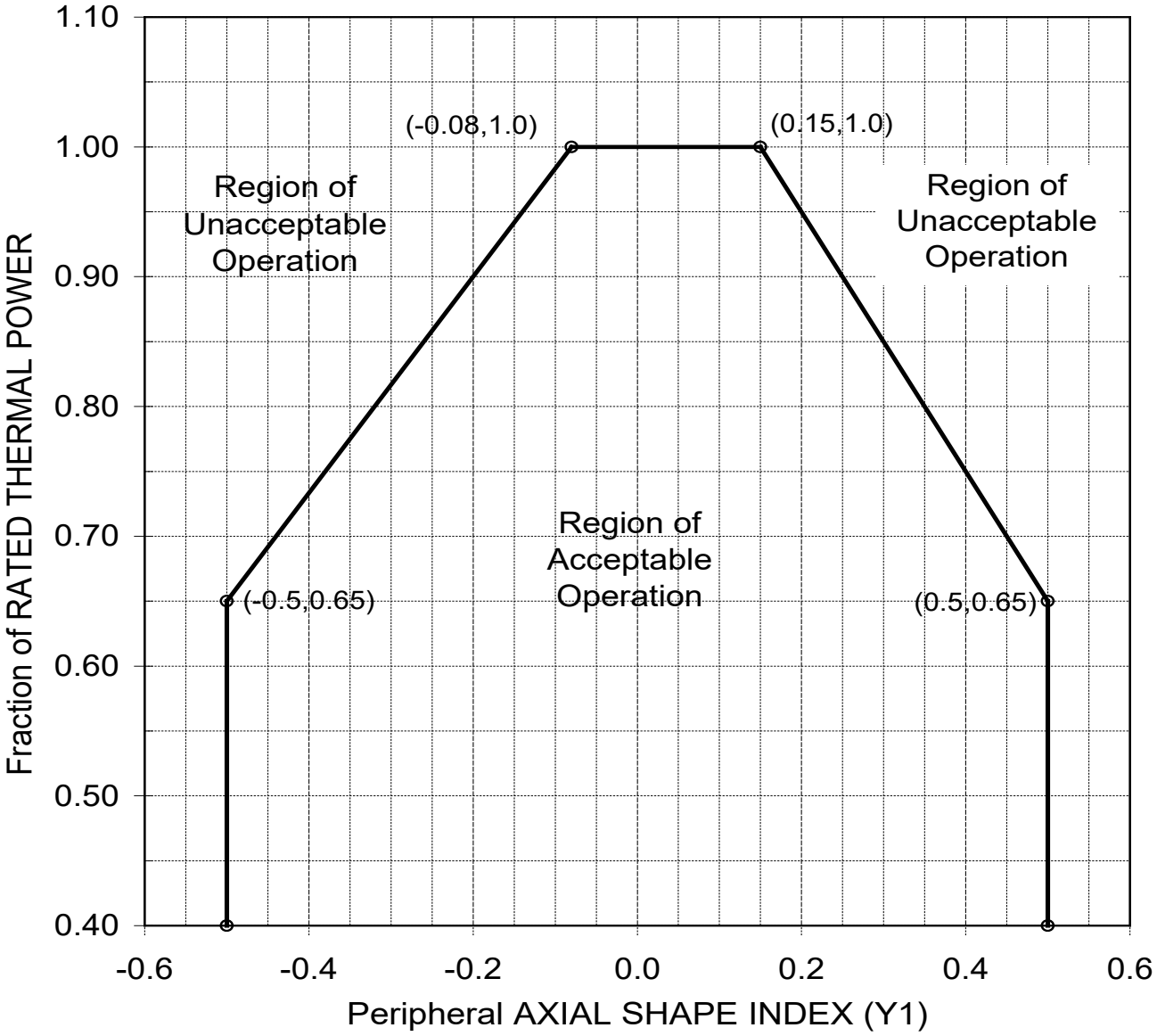


FIGURE 3.2-3
Allowable Combinations of THERMAL POWER and F_r^T



(AXIAL SHAPE INDEX limits for DNB)

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) and Supplements 1 through 5, [also issued as XN-NF-75-27(A)], "Exxon Nuclear Neutronic(s) Design Methods for Pressurized Water Reactors," Exxon Nuclear Company, Inc. / Advanced Nuclear Fuels Corporation, Report and Supplement 1 dated April 1977, Supplement 2 dated December 1980, Supplement 3 dated September 1981 (P), Supplement 4 dated December 1986 (P), and Supplement 5 dated February 1987 (P).

4. Deleted.

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

6. Deleted.

7. XN-75-32(P)(A) Supplements 1 through 4, "Computational Procedure for Evaluating Fuel Rod Bowing," Exxon Nuclear Company, Inc., October 1983.

8. Deleted.

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

10. XN-NF-621(P)(A) Revision 1, "Exxon Nuclear DNB Correlation for PWR Fuel Designs," Exxon Nuclear Company, Inc., September 1983.

11. Deleted.

12. XN-NF-82-06(P)(A) Revision 1, and Supplements 2, 4 and 5, “Qualification of Exxon Nuclear Fuel for Extended Burnup,” Exxon Nuclear Company, Inc., October 1986.

13. ANF-88-133(P)(A) and Supplement 1, “Qualification of Advanced Nuclear Fuels’ PWR Design Methodology for Rod Burnups of 62 GWd/MTU,” Advanced Nuclear

Fuels Corporation, December 1991.

14. XN-NF-85-92(P)(A), "Exxon Nuclear Uranium Dioxide/Gadolinia Irradiation Examination and Thermal Conductivity Results," Exxon Nuclear Company, Inc., November 1986.

15. Deleted.

16. Deleted.

17. EMF-92-116(P)(A), Revision 0, and Supplement 1(P)(A), Revision 0, "Generic Mechanical Design Criteria for PWR Fuel Design," February 1999 and February 2015.

18. EMF-92-153(P)(A) Revision 1, "HTP: Departure from Nucleate Boiling Correlation for High Thermal Performance Fuel," Siemens Power Corporation, January 2005.

19. EMF-96-029(P)(A) Volumes 1 and 2, "Reactor Analysis System for PWRs Volume 1 – Methodology Description, Volume 2 – Benchmarking Results," Siemens Power Corporation, January 1997.

20. EMF-1961(P)(A), Revision 0, "Statistical Setpoint/Transient Methodology for Combustion Engineering Type Reactors," Siemens Power Corporation, July 2000.

21. EMF-2310(P)(A), "SRP Chapter 15 Non-LOCA Methodology for Pressurized Water Reactors," Revision 1, as supplemented by ANP-3000(P), "St. Lucie Unit 1 EPU – Information to Support License Amendment Request, " Revision 0.

22. EMF-2328(P)(A), "PWR Small Break LOCA Evaluation Model, S-RELAP5 Based," Revision 0, as supplemented by ANP-3000(P), "St. Lucie Unit 1 EPU – Information to Support License Amendment Request, " Revision 0.

23. EMF-2103(P)(A), "Realistic Large Break LOCA Methodology for Pressurized Water Reactors," Revision 0, as supplemented by ANP-2903(P), "St. Lucie Nuclear Plant Unit 1 EPU Cycle Realistic Large Break LOCA Summary Report with Zr-4 Fuel Cladding, " Revision 1.

24. BAW-10240(P)(A) Revision 0, "Incorporation of M5 Properties in Framatome ANP Approved Methods," Framatome ANP, Inc., May 2004.