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May 24, 2011
L-11-168

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT:
Perry Nuclear Power Plant, Unit No.1
Docket No. 50-440, License No. NPF-58
Core Operating Limits Report for Cycle 14

Enclosed please find the Perry Nuclear Power Plant, Unit No. 1 Core Operating Limits Report for Cycle 14, Revision 19. Submittal of this report is in accordance with PNPP Technical Specification 5.6.5, "Core Operating Limits Report (COLR)."

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Thomas A. Lentz, Manager – Fleet Licensing, at (330) 761-6071.

Sincerely,

Mark B. Bezilla

Enclosure:
CORE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR POWER PLANT UNIT 1 CYCLE 14 (RELOAD 13)

cc: NRC Region III Administrator
NRC Resident Inspector
NRC Project Manager

A001
NRR

Enclosure
CORE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR POWER PLANT UNIT 1 CYCLE 14 (RELOAD 13)

(21 Pages Follow)

CORE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR POWER PLANT UNIT 1 CYCLE 14 (RELOAD 13)

Functional Location (J11)

Plant Data Book

Effective Date: 5-22-11

Preparer: Patrick Curran / 5-21-11
Date

Approver: Paul W. Bordley / 5-21-11
Date

TABLE OF CONTENTS

1.0 INTRODUCTION

This Core Operating Limits Report for PNPP Unit 1 Cycle 14 is prepared in accordance with the requirements of PNPP Technical Specification Administrative Controls 5.6.5. The core operating limits presented were developed using NRC-approved methods (Reference 1 and Reference 2). Results from the reload analysis for the Global Nuclear Fuels fuel in PNPP Unit 1 for Cycle 14 are documented in References 3, 4, and 5.

The cycle-specific core operating limits for the following PNPP Unit 1 Technical Specifications are included in this report:

1. Average Planar Linear Heat Generation Rate (APLHGR) Limits for each fuel/lattice type, including the power and flow dependent MAPFAC curves with the single loop MAPLHGR reduction factor. (Technical Specification 3.2.1)

2. Minimum Critical Power Ratio Operating Limit including the power and flow dependent MCPR curves for Two Loop Operation and Single Loop Operation. (Technical Specification 3.2.2)

   Additional power dependent MCPR curves for Two Loop Operation and Single Loop Operation are provided for operation with one pressure regulator out of service.

3. Linear Heat Generation Rate (LHGR) Limits for each fuel/lattice type, including the power and flow dependent MAPFAC curves with the single loop MAPLHGR reduction factor. (Technical Specification 3.2.3)

4. The simulated thermal power time constant. (Technical Specification 3.3.1.1, SR 3.3.1.1.14)

5. Oscillation Power Range Monitor (OPRM) Instrumentation. (Technical Specification 3.3.1.3)

2.0 REFERENCES

2.1 Discretionary

None

2.2 Obligations

1. General Electric Standard Application for Reactor Fuel-GESTAR II, NEDE-24011-P-A-17 and NEDE-24011-P-A-17 (US Supplement), September 2010

2. Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications, Licensing Topical Report, NEDO-32465-A, August 1996.

3. Supplemental Reload Licensing Report for Perry 1 Reload 13 Cycle 14, GNF Document 0000-0088-8470-SRLR, Rev 0, December 2010

4. Fuel Bundle Information Report for Perry 1 Reload 13 Cycle 14, GNF Document 0000-0088-8470-FBIR, Rev 0, December 2010

5. Supplemental Reload Licensing Report for Perry Nuclear Power Plant Unit 1 Reload 8 Cycle 9, GNF Document J11-03754SRLR, Rev 1, January 2003

6. License Amendment 155, Perry Nuclear Power Plant, Unit 1 – Issuance of Amendment RE: License Amendment to Modify Technical Specification 2.1.1, "Reactor Core SLS," To Incorporate Revised Safety Limit Minimum Critical Power Ratio Values (TAC No. MC ME4925), April 18, 2011.

7. Calculation FM-012, OPRM Device Settings and Setpoints.

8. Technical Specification 2.1.1.2, Safety Limit MCPR

9. Technical Specification 3.2.1, Average Planar Linear Heat Generation Rate

10. Technical Specification 3.2.2, Minimum Critical Power Ratio

11. Technical Specification 3.2.3, Linear Heat Generation Rate

12. Technical Specification 3.3.1.1, Reactor Protection System Instrumentation

13. Technical Specification 5.6.5, Core Operating Limits Report

14. Perry Nuclear Power Plant Updated Safety Analysis Report, Unit 1, Appendix 15B-Reload Safety Analysis

15. Neutron Monitoring System Design Specification, 22A3739

Commitments addressed in this document:

None

3.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (T.S. 3.2.1)

All AVERAGE PLANAR LINEAR HEAT GENERATION RATES (APLHGRs) shall not exceed the result obtained from multiplying the applicable MAPLHGR limit, Figure 3.2.1-1, by the smaller of either the flow dependent MAPLHGR factor ($MAPFAC_f$), Figure 3.2.1-2 or the power dependent MAPLHGR factor ($MAPFAC_p$) Figure 3.2.1-3.

MAPLHGR Limits and $MAPFAC_f$ and $MAPFAC_p$ are defined in Reference 3.

For Two Loop Operation, $MAPFAC_f$ and $MAPFAC_p$ shall not exceed 1.0.

For Single Loop Operation, $MAPFAC_f$ and $MAPFAC_p$ shall not exceed 0.8.

The Single Loop Operation limits take effect when reset for single loop operation per LCO 3.4.1,"Recirculation Loops Operating". This is consistent with note "(b)" to Table 3.3.1.1-1 of the Technical Specifications. Use FTI-B0012 Single Loop Operation to implement the revised MAPLHGR Limits.

Figure 3.2.1-1
MAPLHGR Versus Average Planar Exposure
Fuel Type GE14

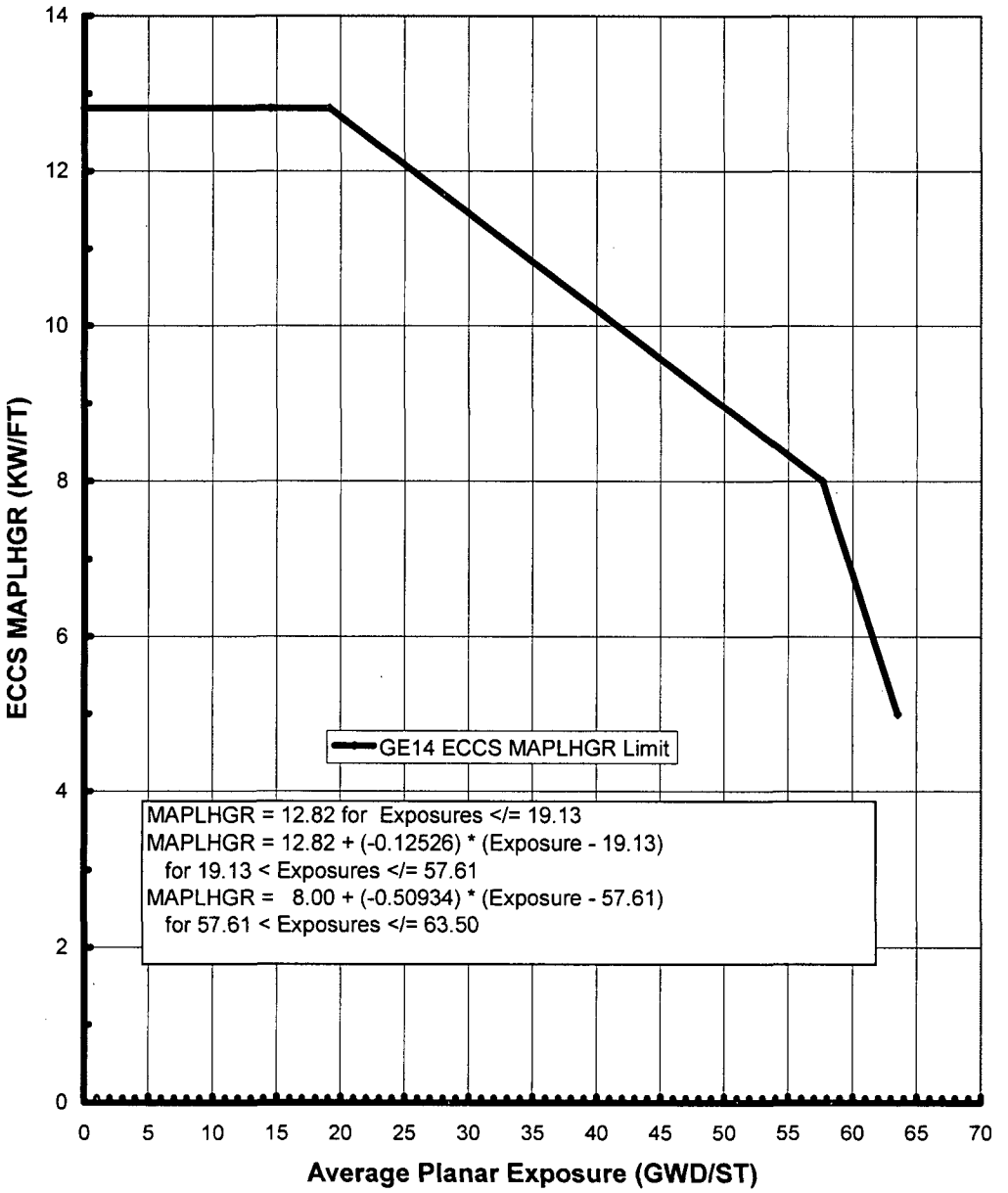


Figure 3.2.1-2
Flow Dependent MAPLHGR Factor ($MAPFAC_f$)
Fuel Type GE14

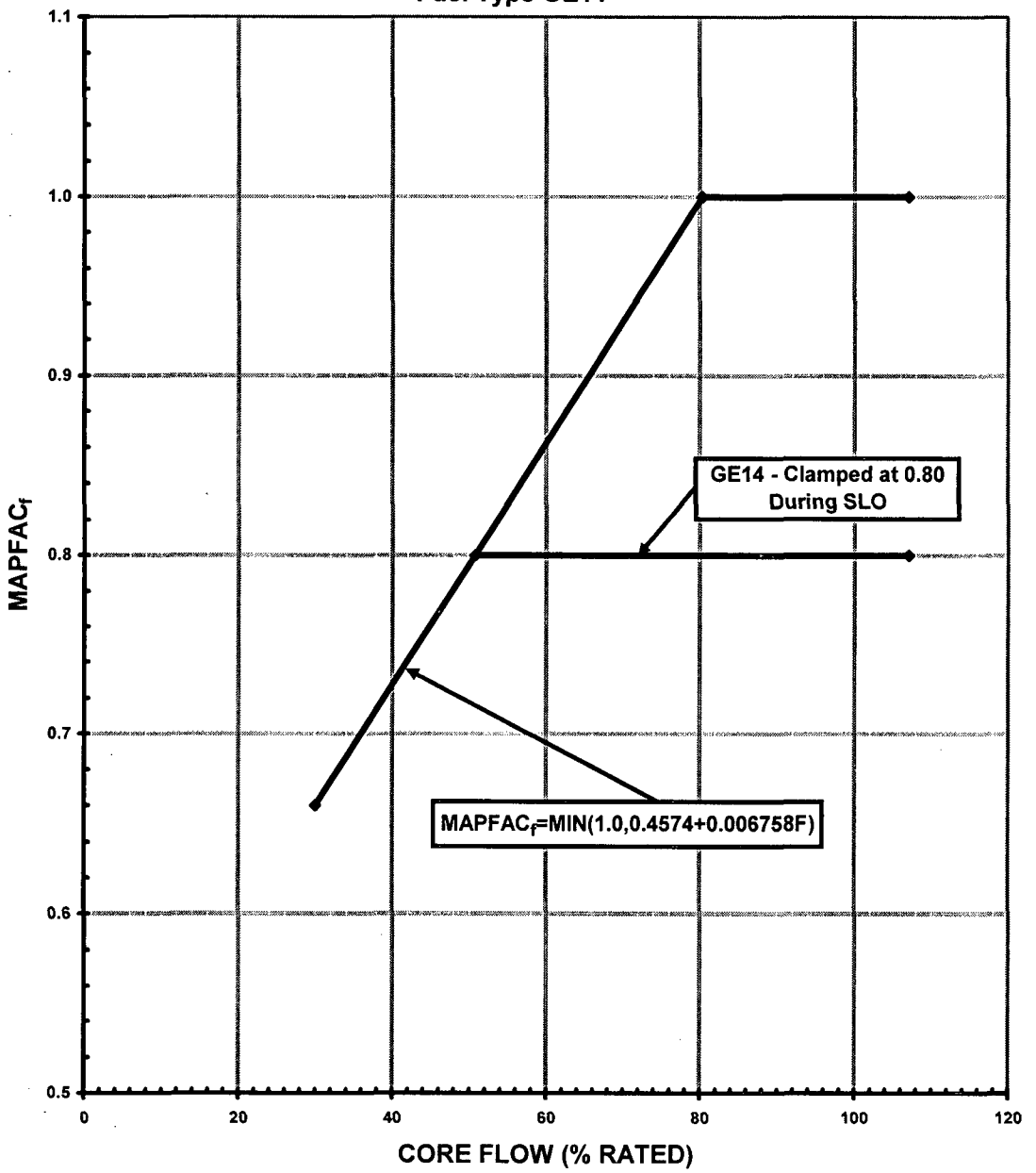
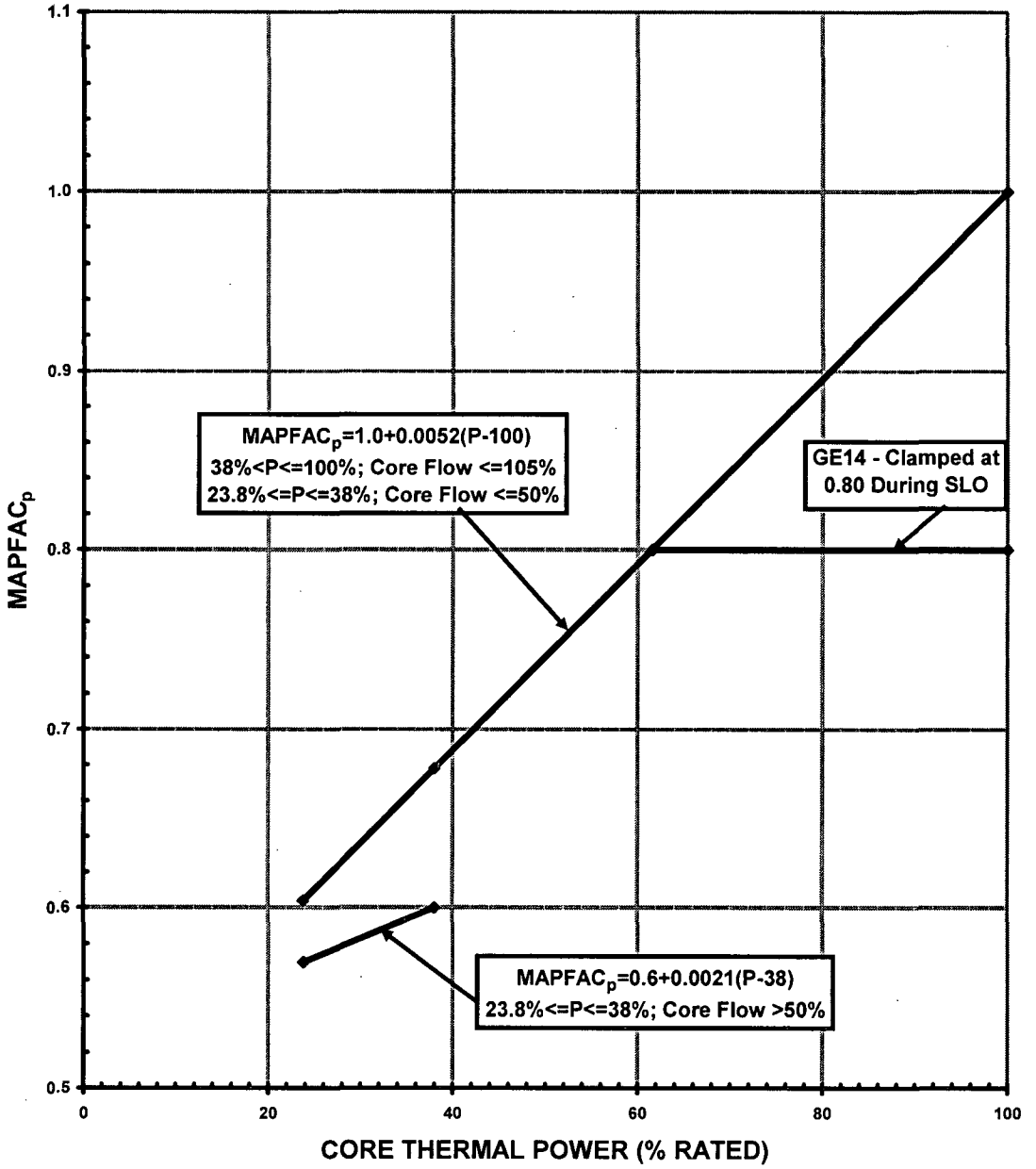


Figure 3.2.1-3
Power Dependent MAPLHGR Factor ($MAPFAC_p$)
Fuel Type GE14



4.0 MINIMUM CRITICAL POWER RATIO (T.S. 3.2.2)

The MINIMUM CRITICAL POWER RATIO (MCPR) shall be equal to or greater than the higher of the flow dependent MCPR ($MCPR_f$) and power dependent MCPR ($MCPR_p$) limits at the indicated core flow and THERMAL POWER.

The MCPR Safety Limit for Cycle 14 for Two Loop Operation is 1.10 and the MCPR Safety Limit for Single Loop Operation is 1.11 <TECHNICAL SPECIFICATIONS 2.1.1.2> (Reference 3 and 6). The change in Safety Limit from Two Loop Operations to Single Loop Operations is accomplished by increasing the Cycle 14 $MCPR_f$ and $MCPR_p$ limits by 0.01. 3DMONICORE PANACEA Version 11 uses this approach to calculate Single Loop Operation Limits.

The Single Loop Operation limits take effect when reset for single loop operation per LCO 3.4.1,"Recirculation Loops Operating". This is consistent with note "(b)" to Table 3.3.1.1-1 of the Technical Specifications. Use FTI-B0012 Single Loop Operation to implement the revised MCPR Limits.

During Two Loop Operation, the resulting limit from $MCPR_f$ and $MCPR_p$ shall not be less than the OLMCPR of 1.35. During Single Loop Operation, the resulting limit from $MCPR_f$ and $MCPR_p$ shall not be less than the OLMCPR of 1.36.

For Cycle 14 no change to MCPR limits is required for planned reduction of feedwater temperature to as low as 325.5°F. Final feedwater temperature may be reduced to 255.5°F after all control rods are withdrawn at the end of cycle if the OPRMs are OPERABLE.

Planned reduction of rated feedwater temperature from nominal rated feedwater temperature is not permitted during plant operation with the reactor recirculation system in Single Loop Operation.

The 3DMONICORE Computer software should automatically shift between 2 LOOP ON and ONE LOOP ON modes of operation on transfer to Single Loop Operations. As such the Safety Limit change should occur automatically. The guidance in FTI-B0012 can be used to verify proper

functioning of the 3DMONICORE System. If the 3DMONICORE System is not functioning properly, FTI-B0012 will implement administrative limits until such time as 3DMONICORE is properly calculating MCPR values.

The $MCPR_f$ and $MCPR_p$ Limits are based on whether the plant is operating in Two Loop or Single Loop Operations and whether Two Pressure Regulators or One Pressure Regulator is in service. Select $MCPR_f$ / $MCPR_p$ Limit Curves based on plant conditions:

$MCPR_f$

Figure 3.2.2-1, $MCPR_f$ – Two Loop Operations
Figure 3.2.2-2, $MCPR_f$ – Single Loop Operations

$MCPR_p$

Figure 3.2.2-3, $MCPR_p$ – Two Loop Operations
Figure 3.2.2-4, $MCPR_p$ – Single Loop Operations
Figure 3.2.2-5, $MCPR_p$ – Two Loop Operations / Pressure Regulator Out of Service
Figure 3.2.2-6, $MCPR_p$ – Single Loop Operations / Pressure Regulator Out of Service
Figure 3.2.2-7 Maximum Fraction Limiting Critical Power Ratio Limit (MFLCPR) With One Pressure Regulator Out Of Service

The 3DMONICORE Software will not automatically shift to the Pressure Regulator Out of Service Thermal Limits. The 3DMONICORE databank will be manually changed using a software change request. Until such time as 3DMONICORE databank is updated for the Pressure Regulator Out of Service Thermal Limits, an MFLCPR Administrative Limit will be issued to Operations. Figure 3.2.2-7 can be used as a guide in establishing the MFLCPR Administrative Limit. The graph is the ratio of $MCPR_p$ to $MCPR_p$ – Pressure Regulator Out Of Service.

The Cycle 14 COLR depicted $MCPR_f$ curves are slightly greater than the data tables contained in Cycle 14 Supplemental Reload Licensing Report (SRLR) (Reference 3). The Cycle 14 SRLR used a double round down to estimate the value for $MCPR_f$ at 30% flow. The Cycle 14 COLR uses the equation contained in the Cycle 9 Supplemental Reload Licensing Report (Reference 5). Using the equation provides for slightly greater values of $MCPR_f$ which are more conservative.

Figure 3.2.2-1
Flow Dependent MCPR ($MCPR_f$) - Two Loop Operation
Fuel Type GE14

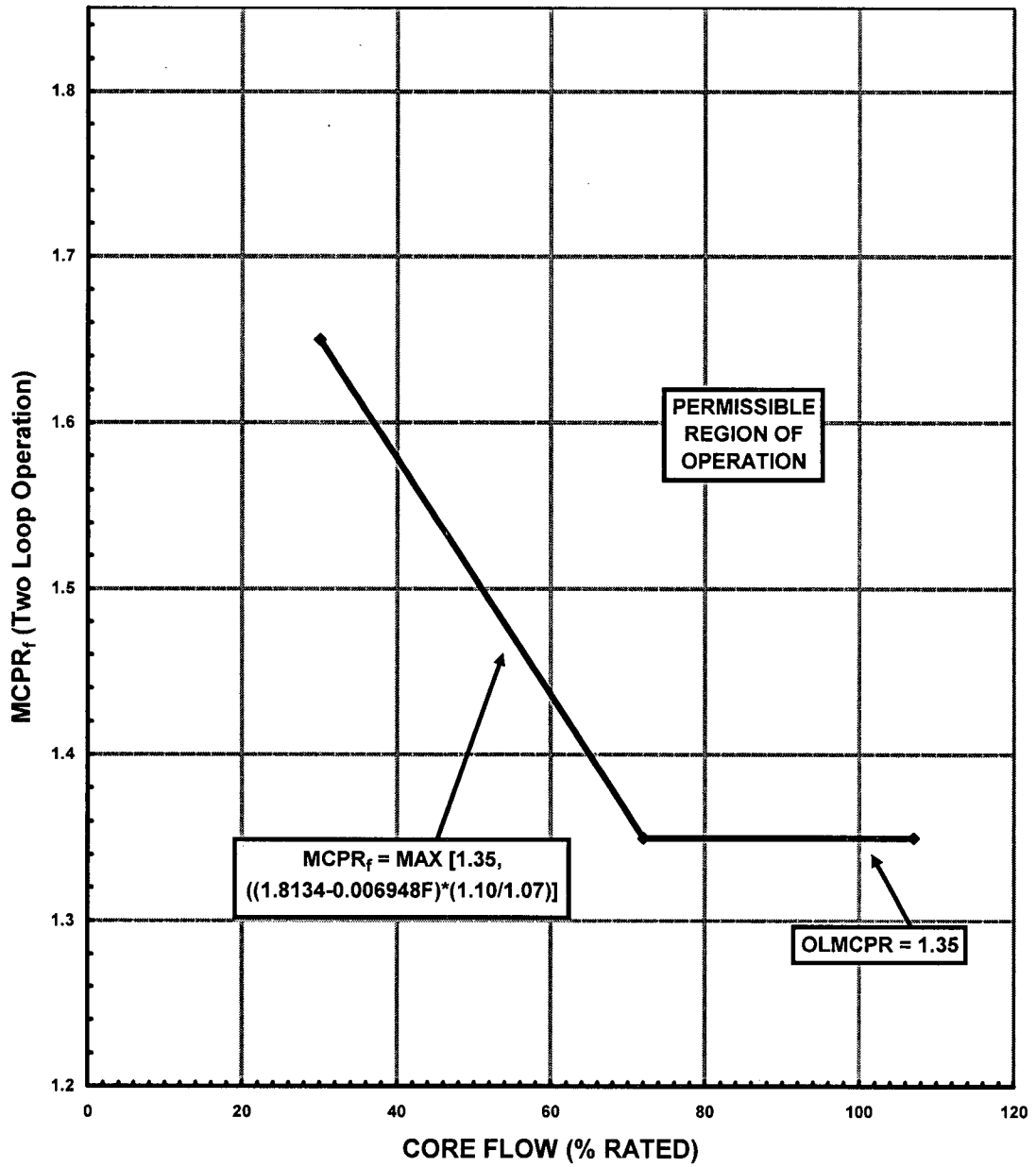


Figure 3.2.2-2
Flow Dependent MCPR ($MCPR_f$) - Single Loop Operation
Fuel Type GE14

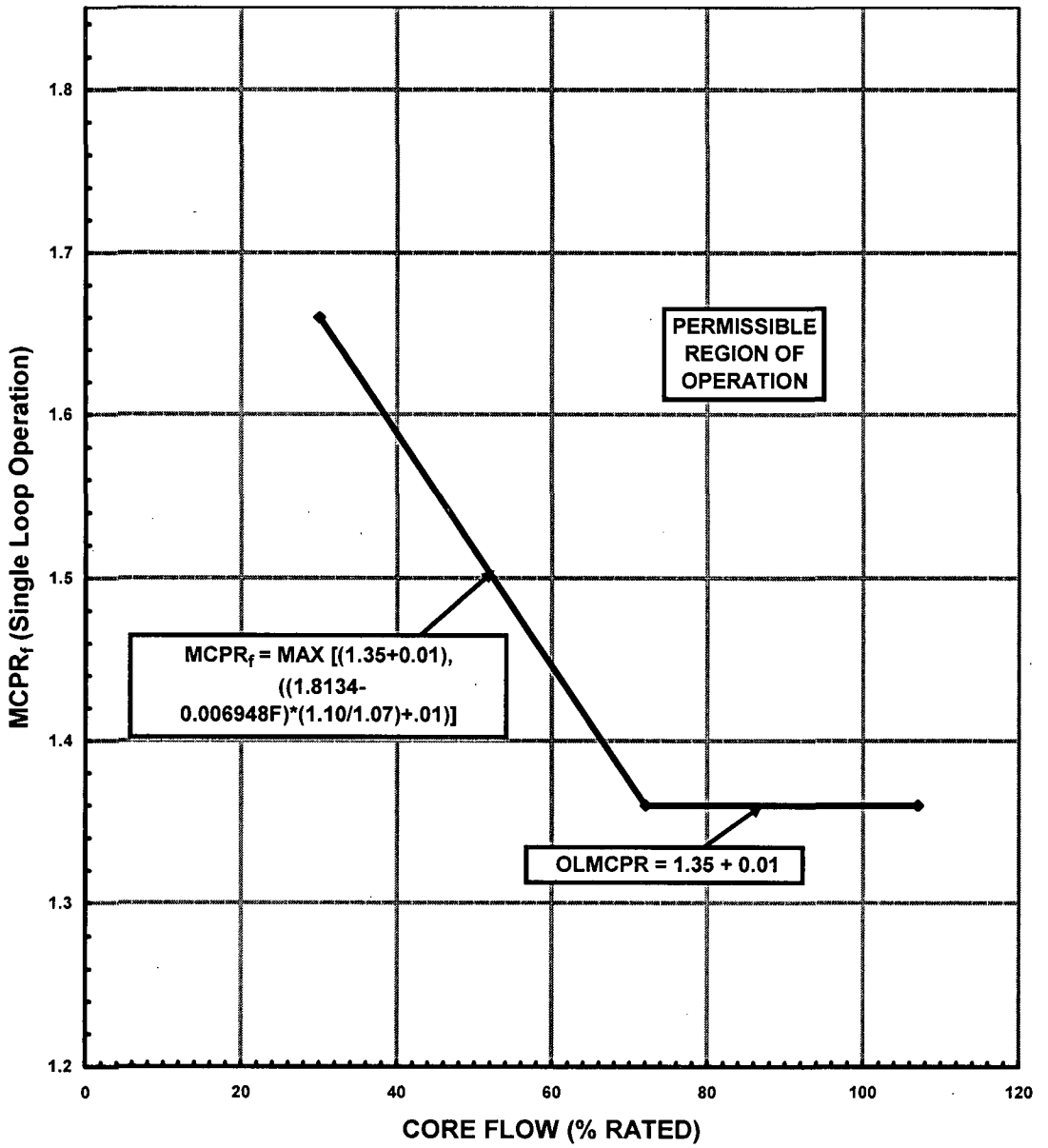


Figure 3.2.2-3
Power Dependent MCPR Limit ($MCPR_p$) - Two Loop Operation
Fuel Type GE14

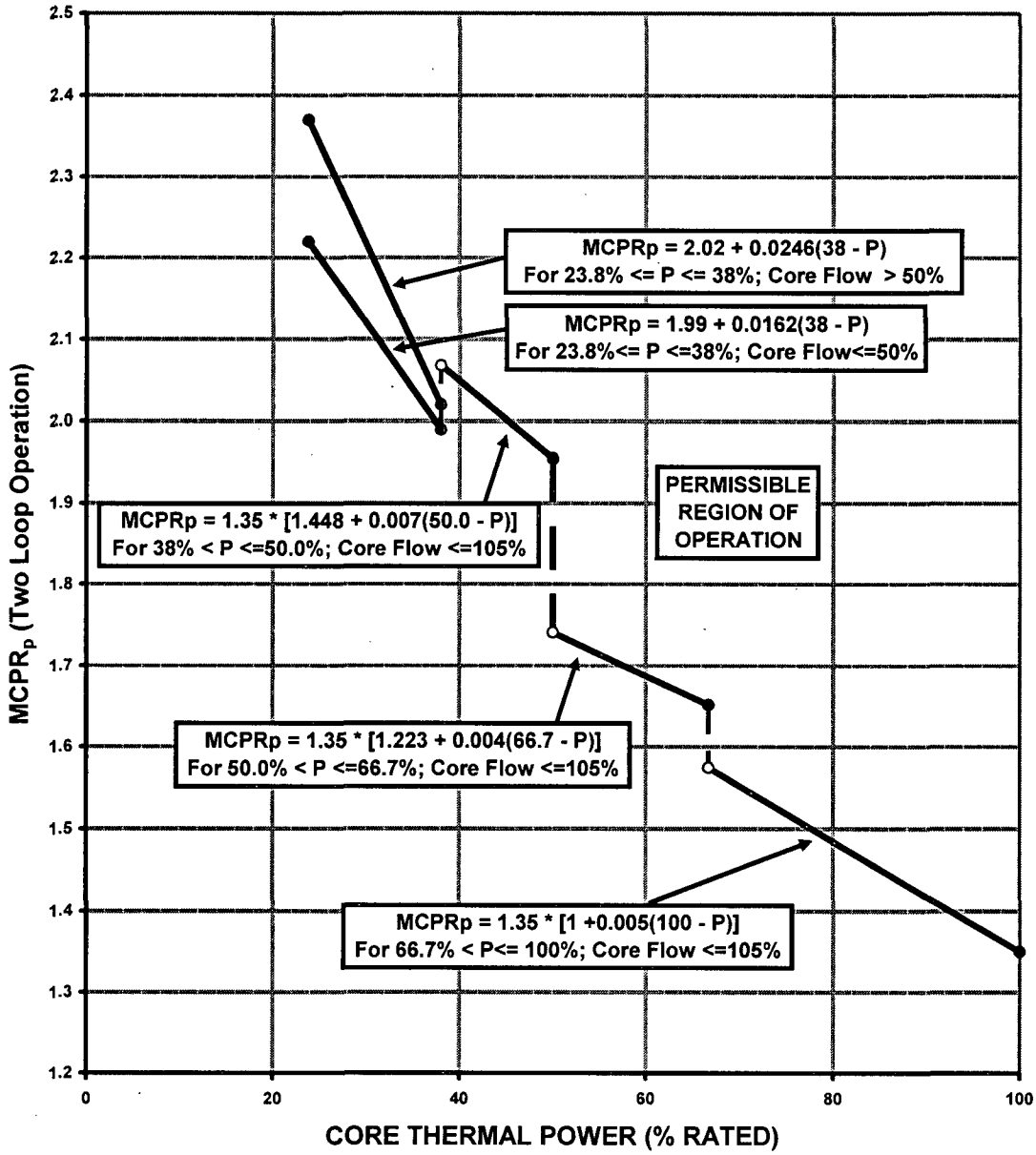


Figure 3.2.2-4
Power Dependent MCPR Limit ($MCPR_p$) - Single Loop Operation
Fuel Type GE14

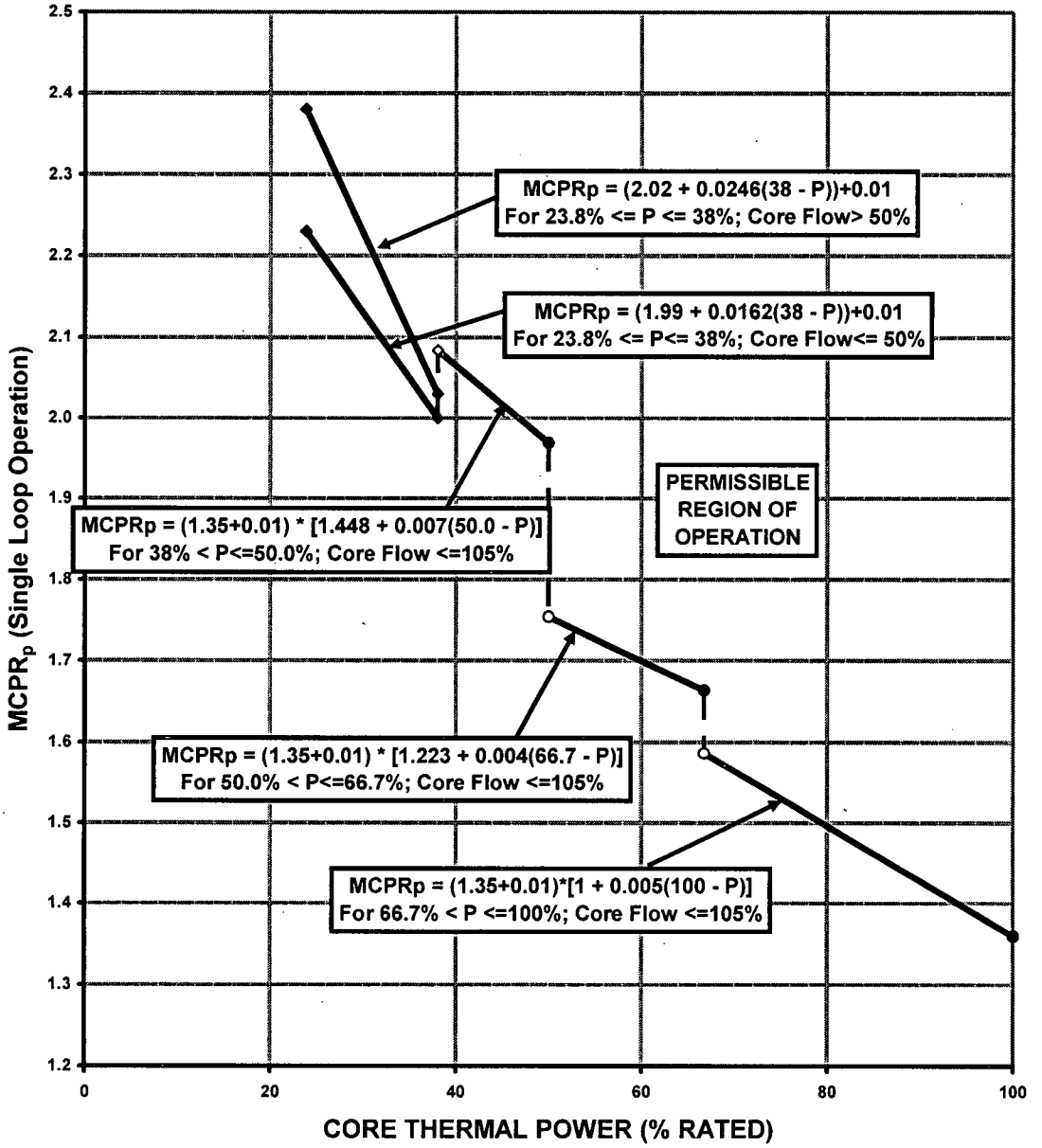


Figure 3.2.2-5
Power Dependent MCPR Limit ($MCPR_p$) - Two Loop Operation
Pressure Regulator Out Of Service / Fuel Type GE14

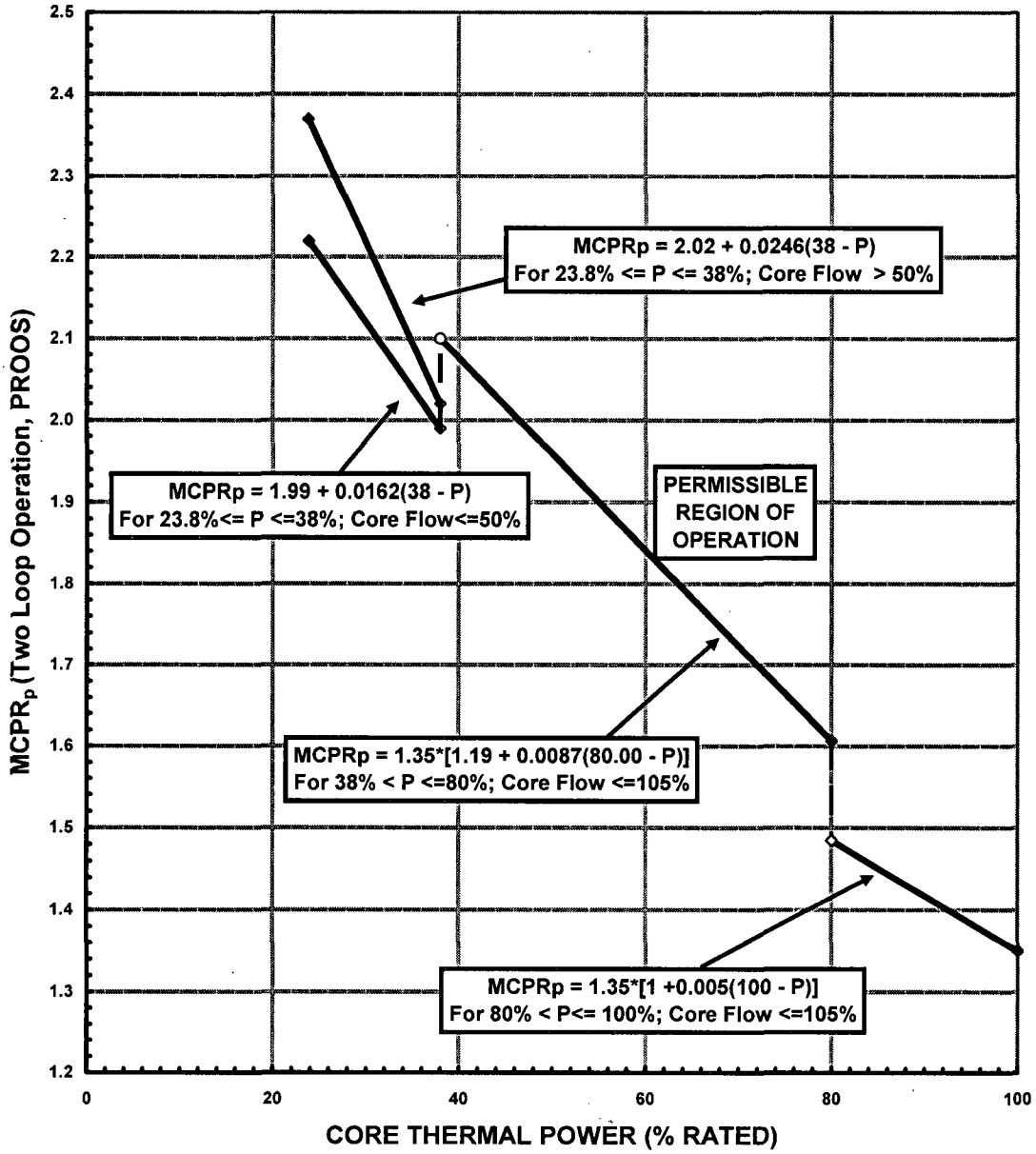


Figure 3.2.2-6
Power Dependent MCPR Limit ($MCPR_p$) - Single Loop Operation
Pressure Regulator Out Of Service / Fuel Type GE14

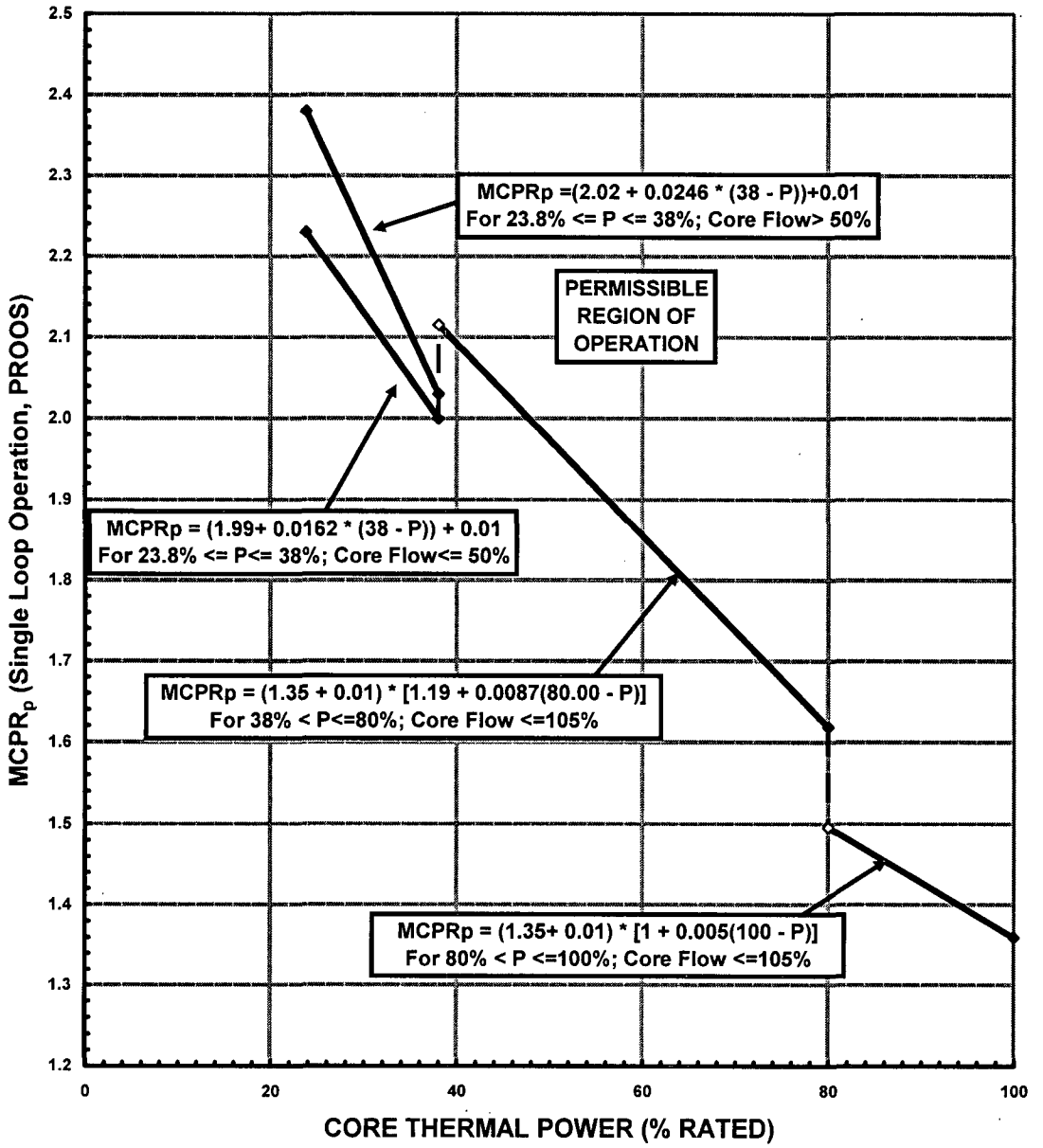
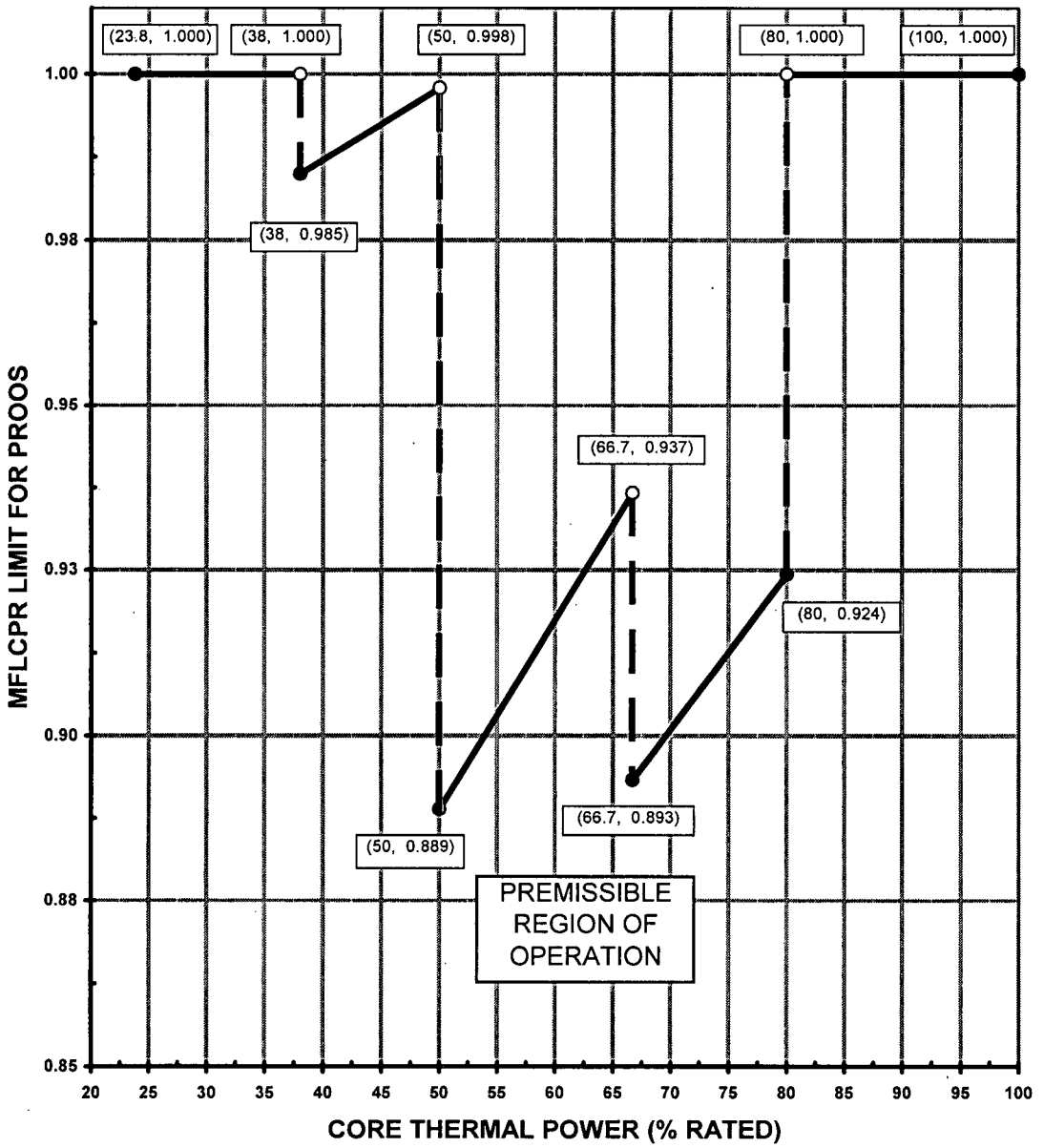


Figure 3.2.2-7
Maximum Fraction Limiting Critical Power Ratio Limit (MFLCPR)
With One Pressure Regulator Out Of Service / Fuel Type GE14



5.0 LINEAR HEAT GENERATION RATE (T.S. 3.2.3)

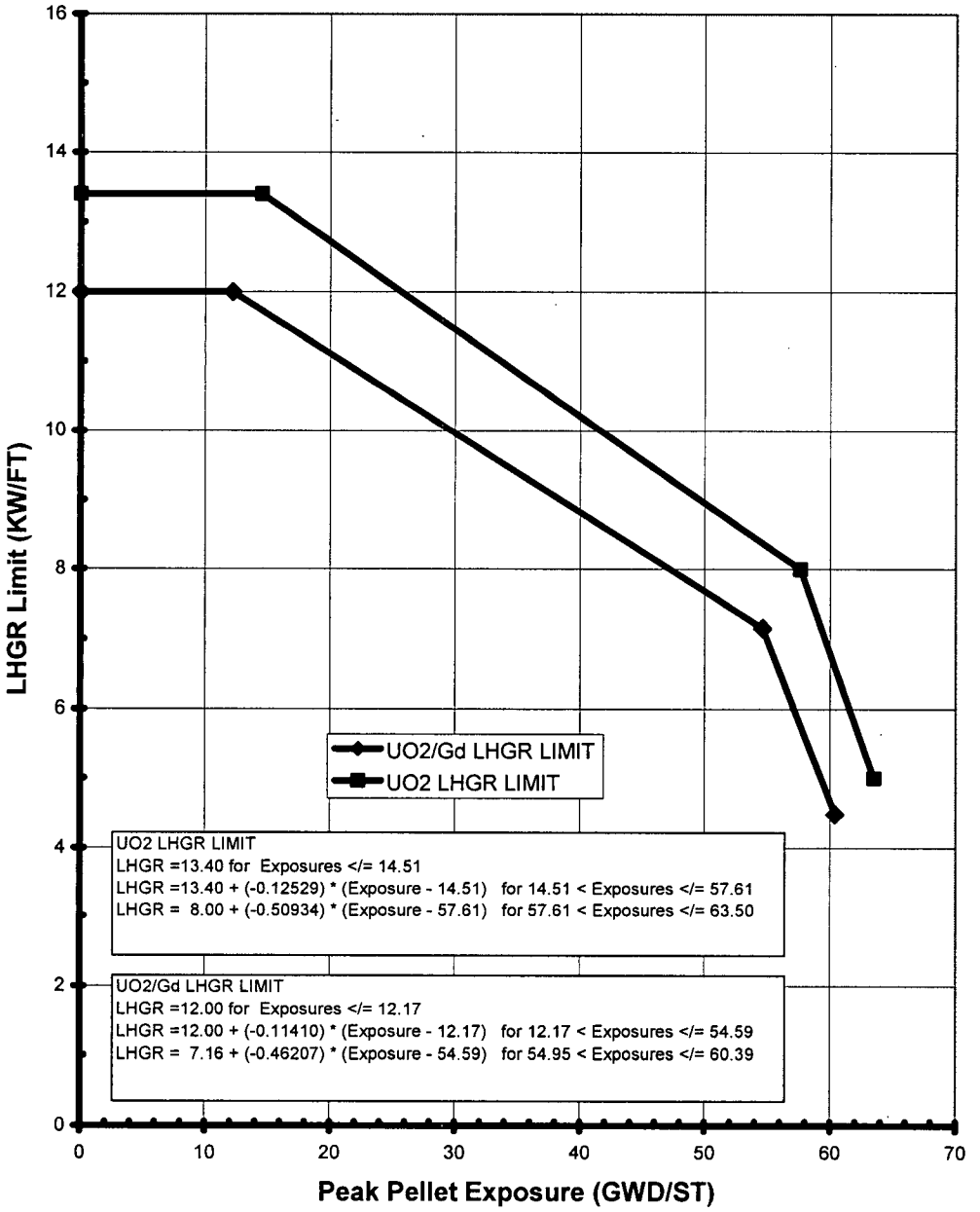
All LINEAR HEAT GENERATION RATES (LHGRs) shall not exceed the result obtained from multiplying the applicable LHGR limit, Figure 3.2.3-1, by the smaller of either the flow dependent MAPLHGR factor ($MAPFAC_f$), Figure 3.2.1-2 or the power dependent MAPLHGR factor ($MAPFAC_p$) Figure 3.2.1-3.

LHGR Limits and $MAPFAC_f$ and $MAPFAC_p$ are defined in References 3 and 4.

For Two Loop Operation, $MAPFAC_f$ and $MAPFAC_p$ shall not exceed 1.0.

For Single Loop Operation, $MAPFAC_f$ and $MAPFAC_p$ shall not exceed 0.8. The Single Loop Operation limits take effect when reset for single loop operation per LCO 3.4.1,"Recirculation Loops Operating". This is consistent with note "(b)" to Table 3.3.1.1-1 of the Technical Specifications. Use FTI-B0012 Single Loop Operation to implement the revised MAPLHGR Limits.

Figure 3.2.3-1
LHGR Versus Peak Pellet Exposure
Fuel Type GE14



6.0 REACTOR PROTECTION SYSTEM INSTRUMENTATION (T.S. 3.3.1.1)

The simulated thermal power time constant shall be 6 +/-0.6 seconds (Reference 15).

7.0 OSCILLATION POWER RANGE MONITOR (OPRM) INSTRUMENTATION (T.S. 3.3.1.3)

These are the Cycle 14 OPRM setpoints for operable OPRMs.

Current Settings:

1. Confirmation Count Setpoint ($N_p = N_2$): 12

2. Amplitude Setpoint (Sp): 1.10

Reference: Calculation: FM-012, Revision 4, Addendum 1

8.0 SCOPE OF REVISION

Rev. 19

1. Corrected page numbers in the Table of Contrents.
2. On Page 11 corrected MCPRf to $MCPR_f$ and added "(SRLR)" in the text.