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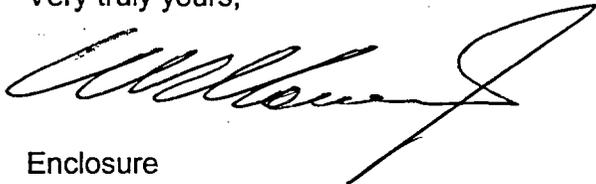
Perry Nuclear Power Plant  
Docket No. 50-440  
Submission of Core Operating Limits Report

Ladies and Gentlemen:

Enclosed is a copy of the Cycle 10 Core Operating Limits Report (COLR) for Perry Nuclear Power Plant (PNPP), Unit 1. The COLR is submitted in accordance with Technical Specification 5.6.5, "Core Operating Limits Report."

If you have questions or require additional information, please contact Mr. Vernon K. Higaki, Manager - Regulatory Affairs, at (440) 280-5294.

Very truly yours,



Enclosure

cc: NRC Project Manager  
NRC Resident Inspector  
NRC Region III

ADD 1

PERRY OPERATIONS MANUAL

Plant Data Book Entry

TITLE: CORE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR POWER PLANT UNIT 1  
CYCLE 10 (RELOAD 9)

PDB - F0001 /Rev. 10 MPL: J11 EFFECTIVE DATE: 5-21-03

SUMMARY OF LAST CHANGE: This incorporates the core thermal limits for  
Cycle 10.

Rev. 9 - Added clarification for Single Loop Operation. Added Pressure  
Regulator Out Of Service limits. Added power, flow and exposure dependent  
Linear Heat Generation Rate limits rather than using constant values.

Rev. 10 - The Y-axis label on Figure 3.2.1-2 of the Perry Unit 1 Cycle 10  
COLR is being corrected to read "MAPFAC<sub>p</sub>". Figure 3.2.1-2 is the Power  
Dependent MAPLHGR Factor (MAPFAC<sub>p</sub>), Fuel Types GE12 and GE14.

REFERENCES: Technical Specification 5.6.5, "Core Operating Limits Report"

COMMITMENTS: None

PREPARED BY: Mark Laris/John Pelcic 5-20-03  
Date

UNIT 1 CORE OPERATING LIMITS REPORT

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## INTRODUCTION AND REFERENCES

### INTRODUCTION

This Core Operating Limits Report for PNPP Unit 1 Cycle 10 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 2). Results from the reload analysis for the General Electric fuel in PNPP Unit 1 for Cycle 10 are documented in References 3, 4 and 15.

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) For Single Loop Operation the MCPR operating limits are increased by 0.01. (Reference 3)

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. (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)

### REFERENCES

1. Perry Nuclear Power Plant Updated Safety Analysis Report, Unit 1, Appendix 15B-Reload Safety Analysis.
2. "General Electric Standard Application for Reactor Fuel-GESTAR II", NEDE-24011-P-A-14 and NEDE-24011-P-A-14-US (US Supplement), June 2000.
3. "Supplemental Reload Licensing Report for Perry Nuclear Power Plant Unit 1 Reload 9 Cycle 10", GNF Document 0000-0004-4479SRLR, Rev 1, April 2003

4. "Fuel Bundle Information Report for Perry Nuclear Power Plant Unit 1 Reload 9 Cycle 10", GNF Document 0000-0004-4479FBIR, Rev 0, December 2002
5. License Amendment No. 61 to Facility Operating License NPF - 58, June 2, 1994.
6. Generic Letter 88-16, "REMOVAL OF CYCLE-SPECIFIC PARAMETERS FROM TECHNICAL SPECIFICATIONS"
7. Technical Specification 3.2.1, Average Planar Linear Heat Generation Rate
8. Technical Specification 3.2.2, Minimum Critical Power Ratio
9. Technical Specification 3.2.3, Linear Heat Generation Rate
10. Technical Specification 3.3.1.1, Reactor Protection System Instrumentation
11. Technical Specification 5.6.5, Core Operating Limits Report
12. Technical Specification 2.1.1.2, Safety Limit MCPR
13. License Amendment No. 33 to Facility Operating License NPF - 58, September 13, 1990.
14. License Amendment 112 to Facility Operating License NPF-58, June 1, 2000.
15. "Supplemental Reload Licensing Report for Perry Nuclear Power Plant Unit 1 Reload 8 Cycle 9", GNF Document J11-03754SRLR, Rev 1, January 2003
16. CR 03-01377, "Equation for OL MCPR(P) in the Core Operating Limits Report is Suspect."

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (TS 3.2.1)

All AVERAGE PLANAR LINEAR HEAT GENERATION RATES (APLHGRs) shall not exceed the result obtained from multiplying the applicable MAPLHGR values\* by the smaller of either the flow dependent MAPLHGR factor (MAPFAC<sub>f</sub>) Figure 3.2.1-1 or the power dependent MAPLHGR factor (MAPFAC<sub>p</sub>) Figure 3.2.1-2.

The following table lists the MAPLHGR limits as a function of exposure for GE14 fuel:

Exposure (GWD/st)	ECCS MAPLHGR Limit (KW/FT)
0.00	12.82
14.51	12.82
19.13	12.82
57.61	8.00
63.50	5.00

The following table lists the MAPLHGR limits as a function of exposure for GE12 fuel:

Exposure (GWD/st)	ECCS MAPLHGR Limit (KW/FT)
0.00	10.90
13.24	10.90
21.61	10.90
63.50	6.39

NOTE: 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.

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\* These applicable MAPLHGR values are:

1. Those for the respective fuel as a function of the average planar exposure (as described by the NRC approved methodology described in GESTAR-II)

or,

2. When hand calculations are required, the MAPLHGR limit as a function of the average planar exposure as shown in Figures 3.2.1-3 (GE12) and Figure 3.2.1-4 (GE14) for the applicable type of fuel.

Flow Dependent MAPLHGR Factor (MAPFAC<sub>f</sub>), Fuel Types GE12 and GE14

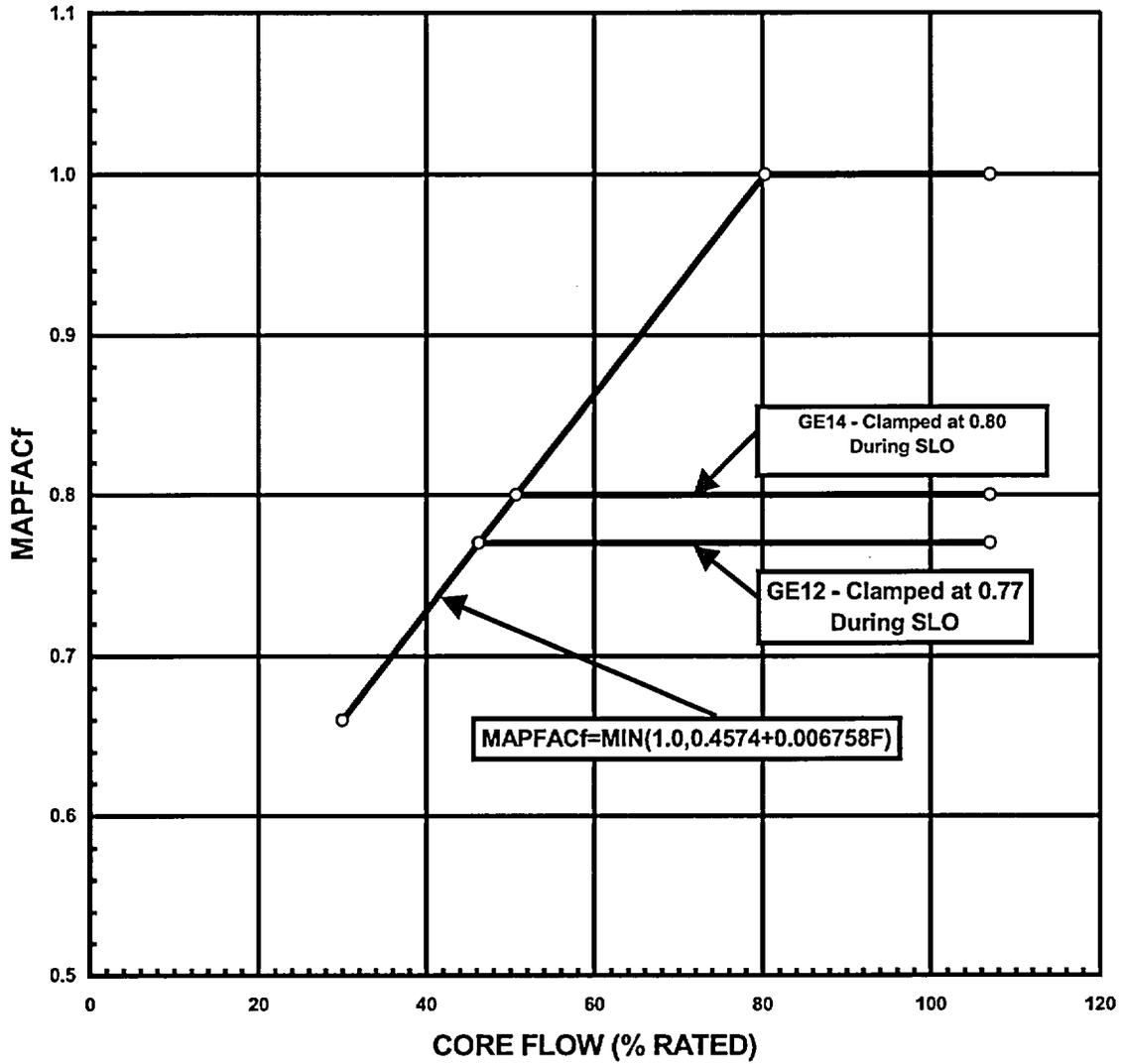


Figure 3.2.1-1

Power Dependent MAPLHGR Factor (MAPFAC<sub>p</sub>), Fuel Types GE12 and GE14

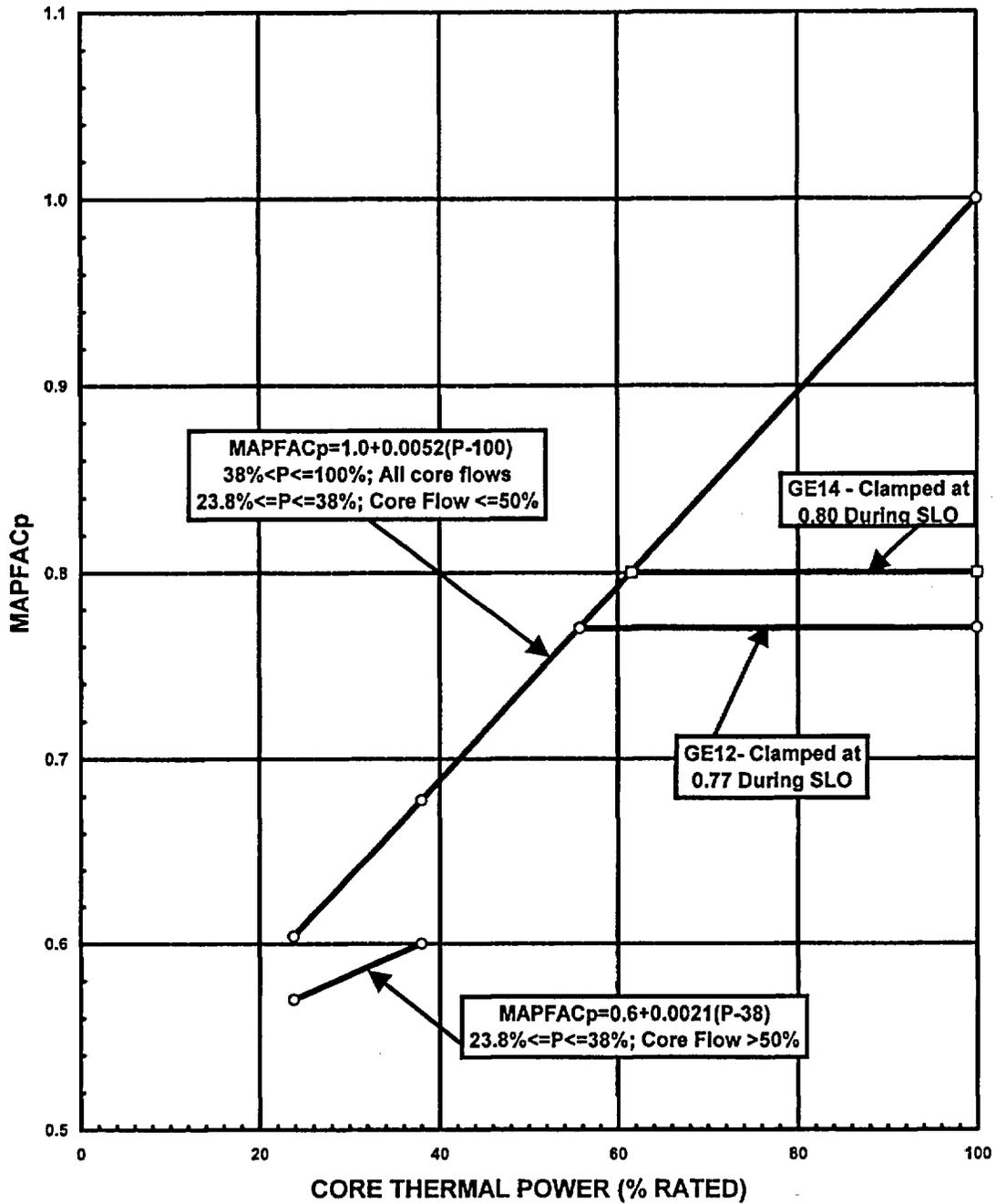
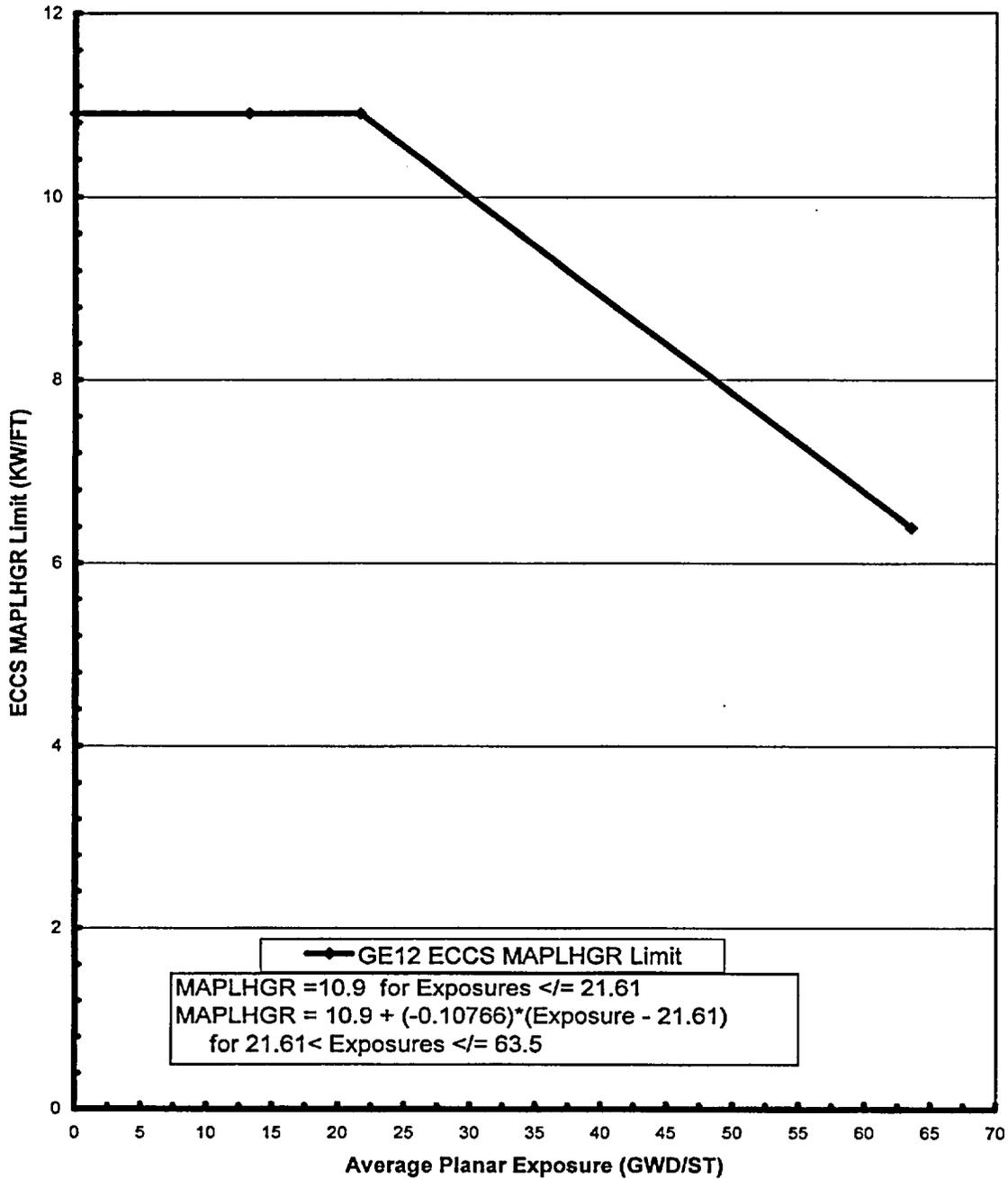


Figure 3.2.1-2

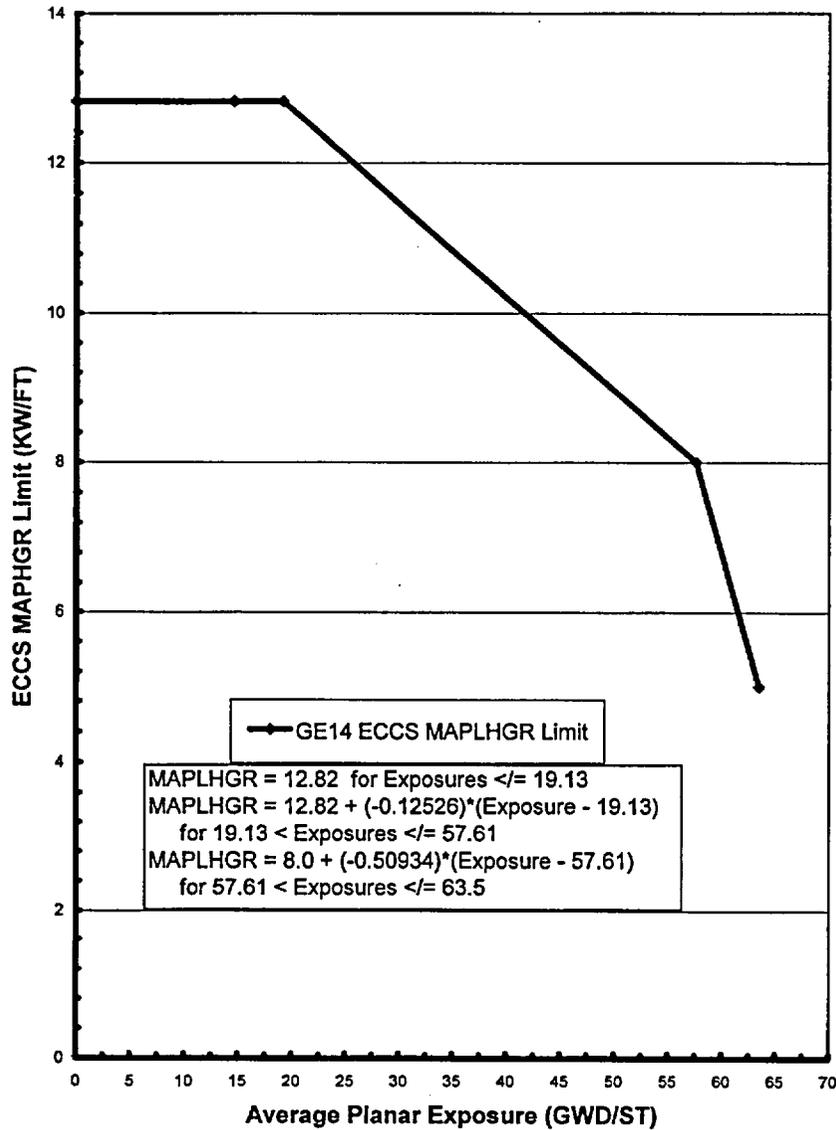
MAPLHGR Versus Average Planar Exposure, Fuel Type GE12



NOTE: 1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.

Figure 3.2.1-3

MAPLHGR Versus Average Planar Exposure, Fuel Type GE14



NOTE: 1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.

Figure 3.2.1-4

MINIMUM CRITICAL POWER RATIO (TS 3.2.2)

The MINIMUM CRITICAL POWER RATIO (MCPR) shall be equal to or greater than the higher of the  $MCPR_f$  and  $MCPR_p$  limits at the indicated core flow and THERMAL POWER as specified in Figures 3.2.2-1 and 3.2.2-2 for Two Loop Operation and Figures 3.2.2-3 and 3.2.2-4 for Single Loop Operation.

The MCPR Safety Limit for Cycle 10 is 1.10. The MCPR Safety Limit for Single Loop Operation is 1.11 <TECHNICAL SPECIFICATIONS 2.1.1.2>. During Single Loop Operation, the Maximum Fraction of Limiting Critical Power Ratio (MFLCPR) shall be equal to or less than 0.99. Use FTI-B12 Single Loop Operation to implement this revised MFLCPR.

NOTE 1: For Cycle 10 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.

NOTE 2: 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.

NOTE 3: Figures 3.2.2-1 and 3.2.2-2 depict the limiting fuel type for Two Loop Operation. Figures 3.2.2-3 and 3.2.2-4 depict the limiting fuel type for Single Loop operation. Specific values are found in References 3 and 15.

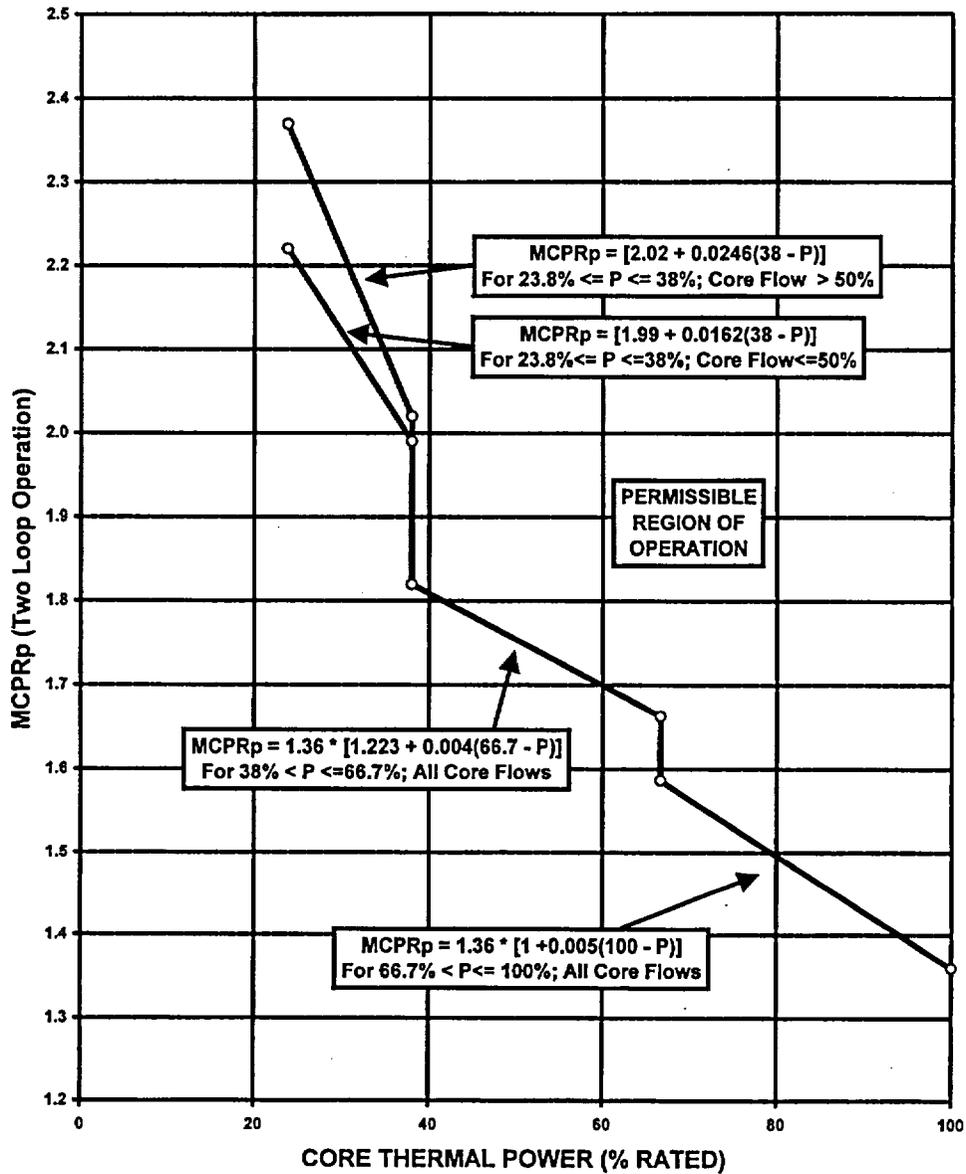
Figures 3.2.2-5 and 3.2.2-6 depict power dependent MCPR curves for Two Loop Operation and Single Loop Operation are provided for operation with one pressure regulator out of service. This may be implemented as either a change to the core monitoring software or appropriate administrative limit.

NOTE 4: There are a total of 19 safety/relief valves, the two lowest setpoint valves are assumed to be out-of-service in the transient analysis.

NOTE 5: The MCPR operating limit is increased 0.01 to account for the increase in the single loop MCPR safety limit with the reactor recirculation system in Single Loop Operation.

NOTE 6: 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.

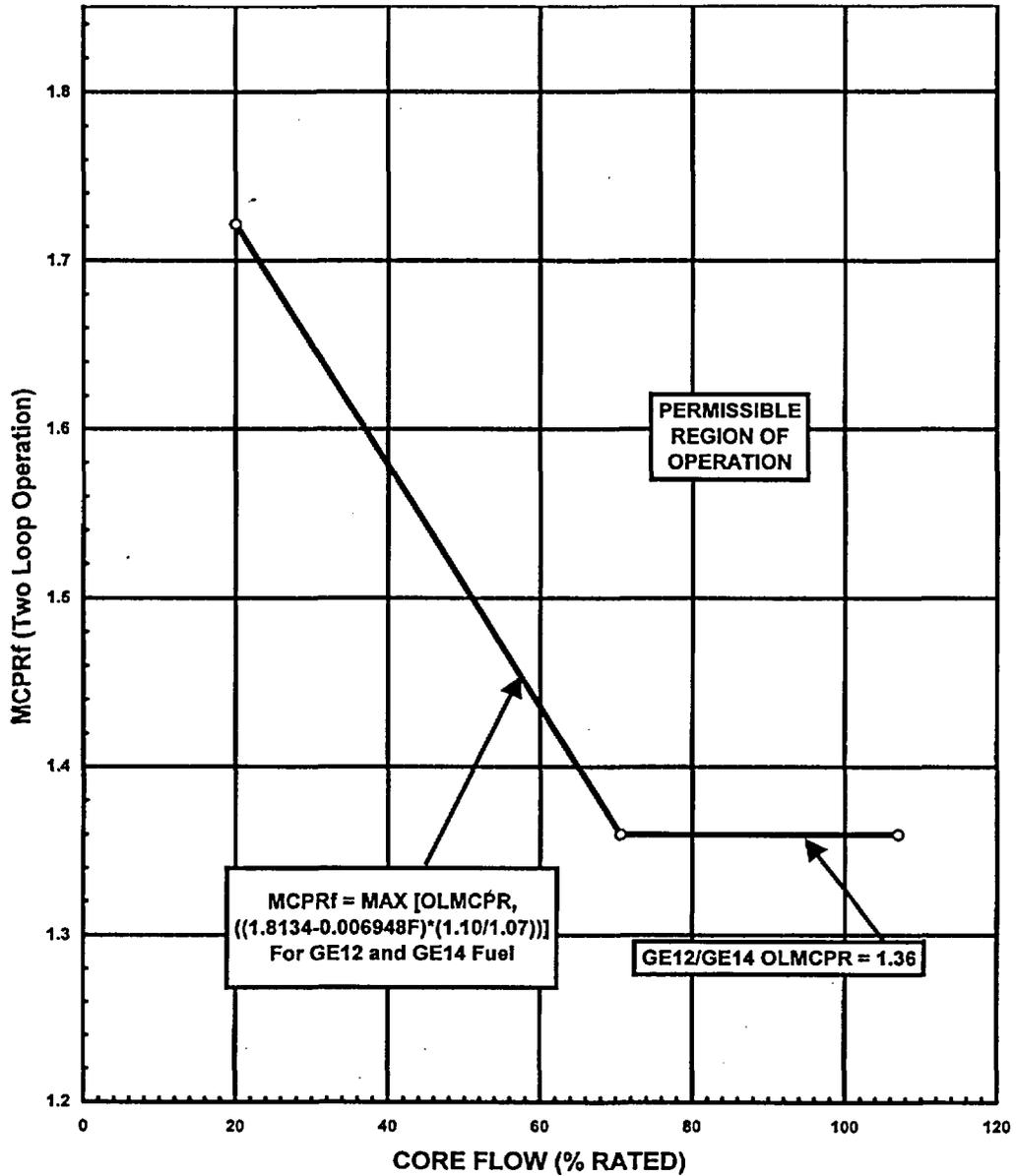
Power Dependent MCPR Limit (MCPR<sub>p</sub>),  
 Fuel Type GE12 and GE14 (Two Loop Operation)\*



\* Refer to NOTE 3 on Page 10

Figure 3.2.2-1

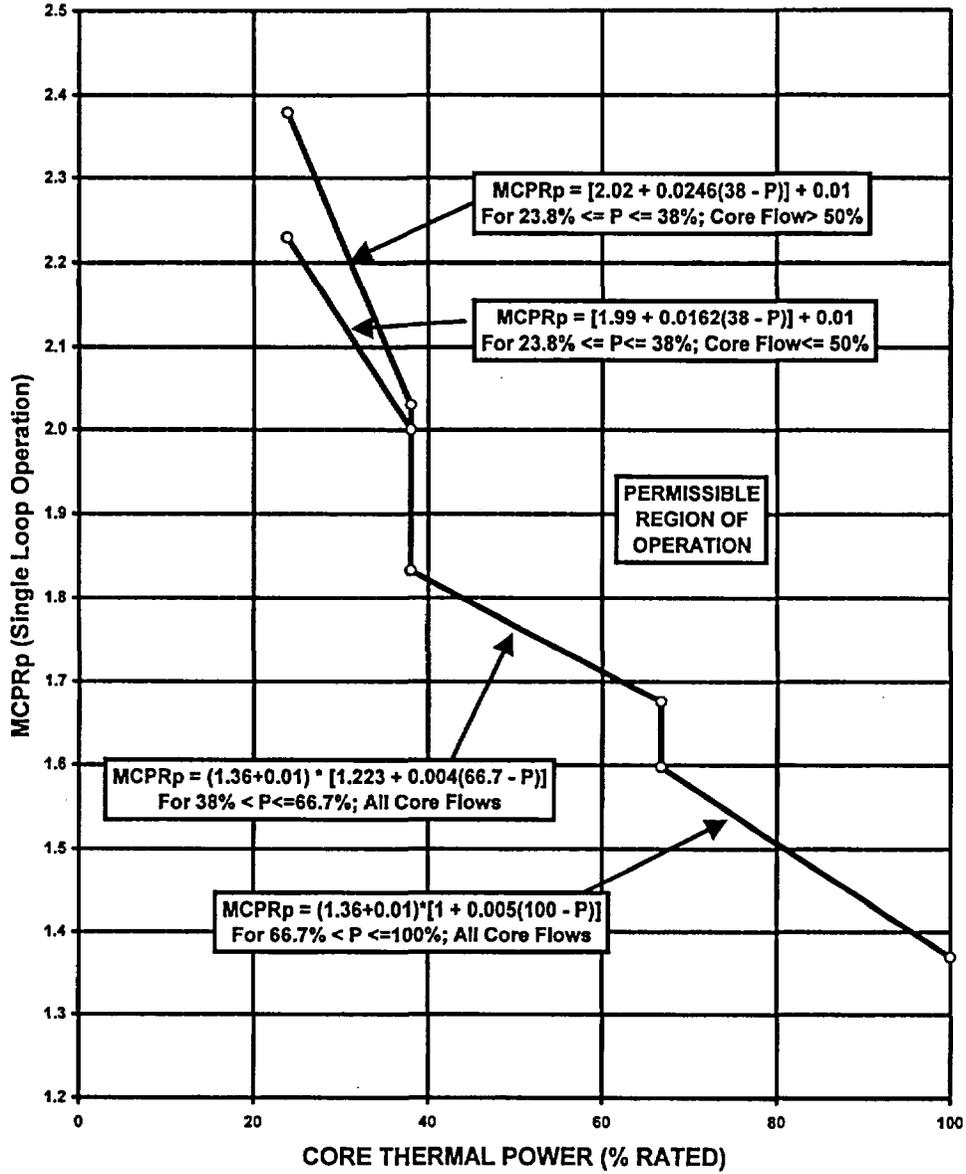
Flow Dependent MCPR Limit (MCPR<sub>f</sub>),  
 Fuel Type GE12 and GE14 (Two Loop Operation)\*



\* Refer to NOTE 3 on Page 10

Figure 3.2.2-2

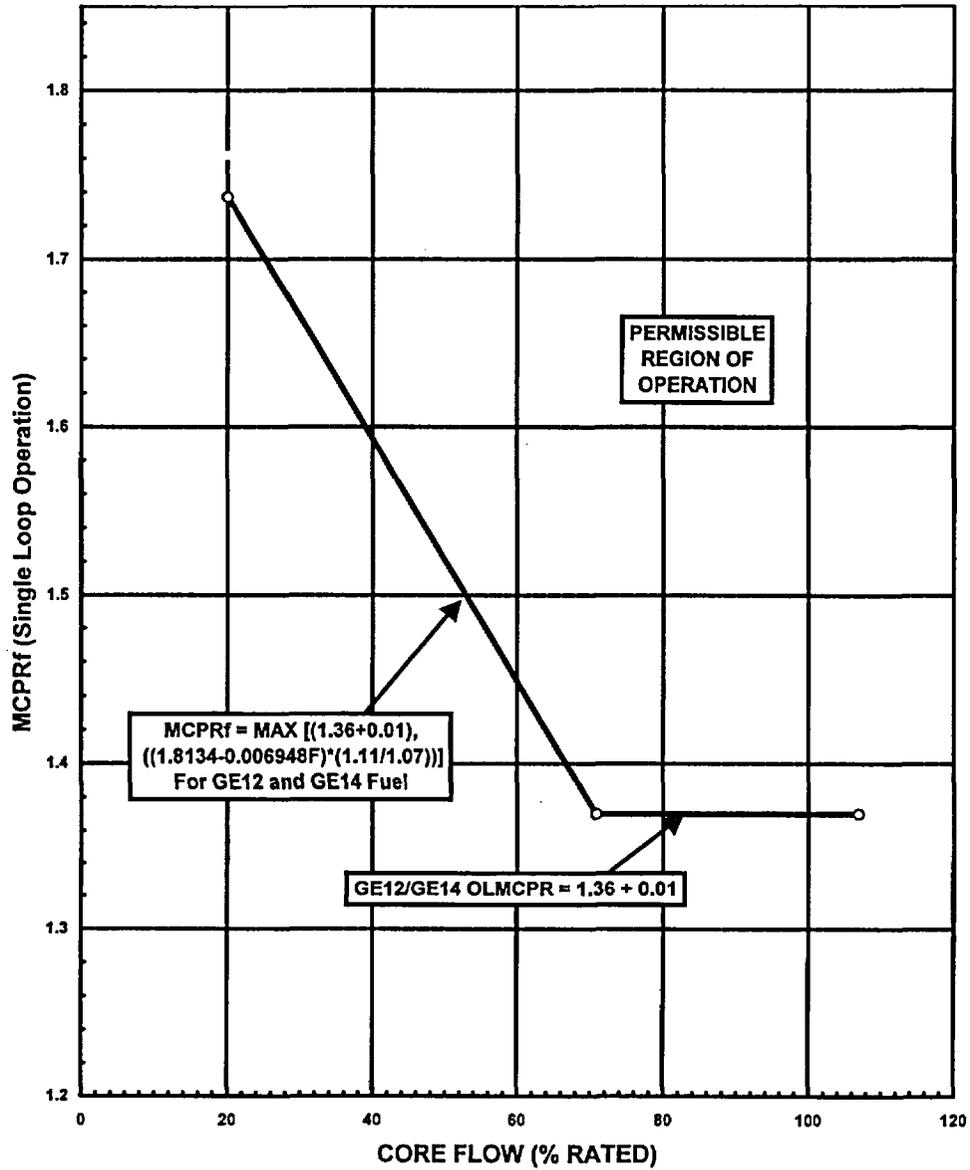
Power Dependent MCPR Limit (MCPR<sub>p</sub>),  
Fuel Type GE12 and GE14 (Single Loop Operation)\*



\* Refer to NOTE 3 and NOTE 5 on Page 10

Figure 3.2.2-3

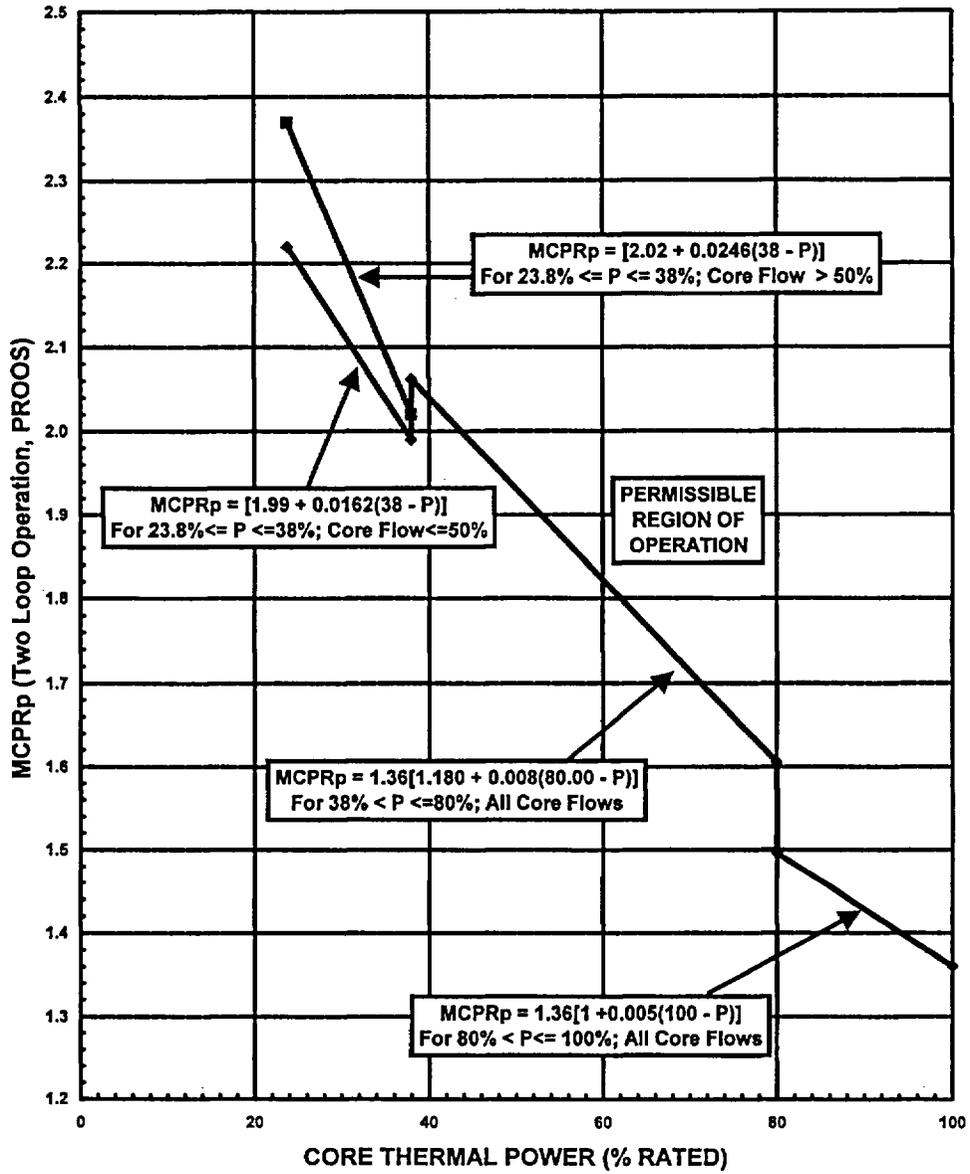
Flow Dependent MCPR Limit ( $MCPR_f$ ),  
Fuel Type GE12 and GE14 (Single Loop Operation)\*



\* Refer to NOTE 3 and NOTE 5 on Page 10

Figure 3.2.2-4

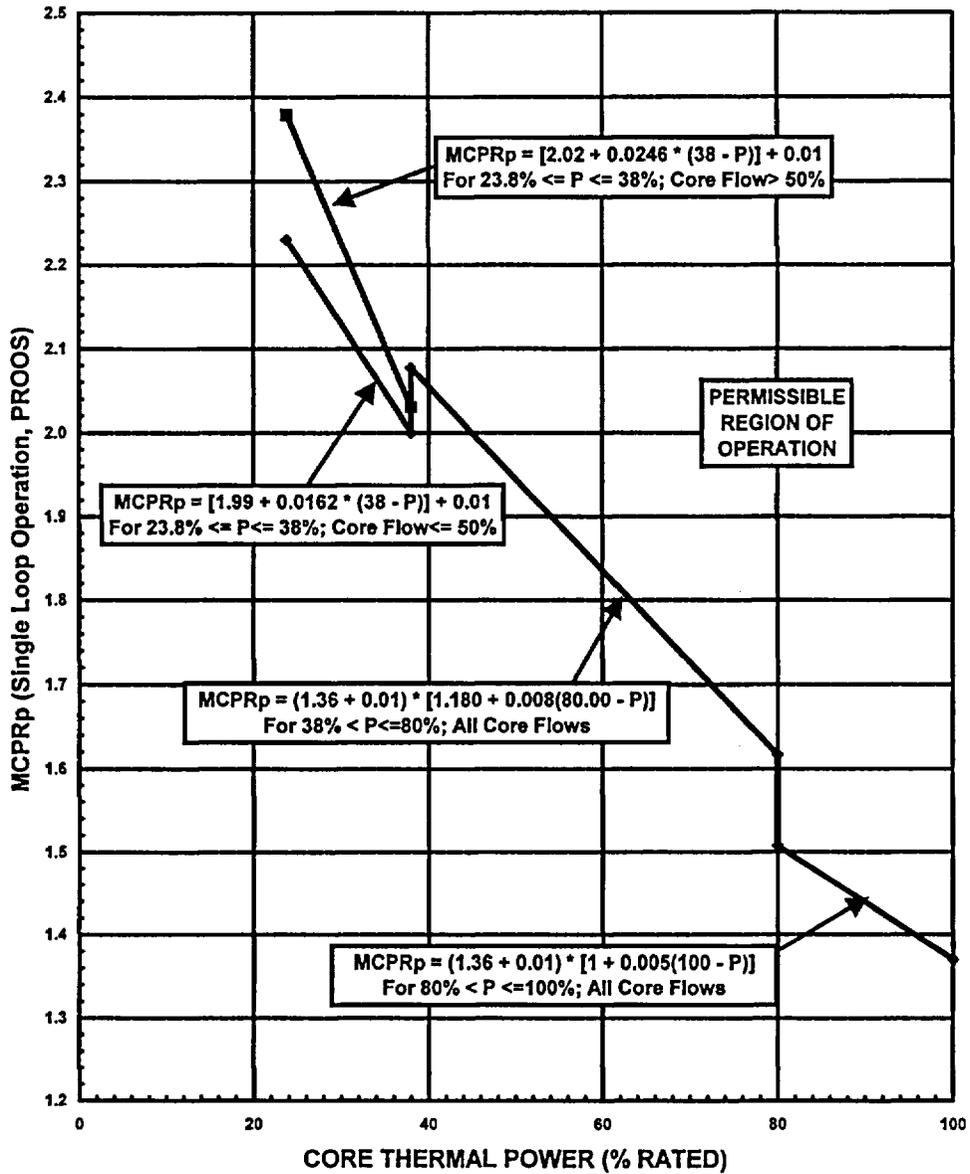
Power Dependent MCPR Limit (MCPR<sub>p</sub>),  
Fuel Type GE12 and GE14 (Two Loop Operation)\*  
Pressure Regulator Out Of Service



\* Refer to NOTE 3 on Page 10

Figure 3.2.2-5

Power Dependent MCPR Limit (MCPR<sub>p</sub>),  
Fuel Type GE12 and GE14 (Single Loop Operation)\*  
Pressure Regulator Out Of Service



\* Refer to NOTE 3 and NOTE 5 on Page 10

Figure 3.2.2-6

LINEAR HEAT GENERATION RATE (TS 3.2.3)

All LINEAR HEAT GENERATION RATES (LHGRs) shall not exceed the result obtained from multiplying the applicable LHGR values\* by the smaller of either the flow dependent MAPLHGR factor (MAPFAC<sub>f</sub>) Figure 3.2.1-1 or the power dependent MAPLHGR factor (MAPFAC<sub>p</sub>) Figure 3.2.1-2.

NOTE: The SLO MAPFAC<sub>p</sub> and MAPFAC<sub>f</sub> clamps are not applicable to LHGR. |

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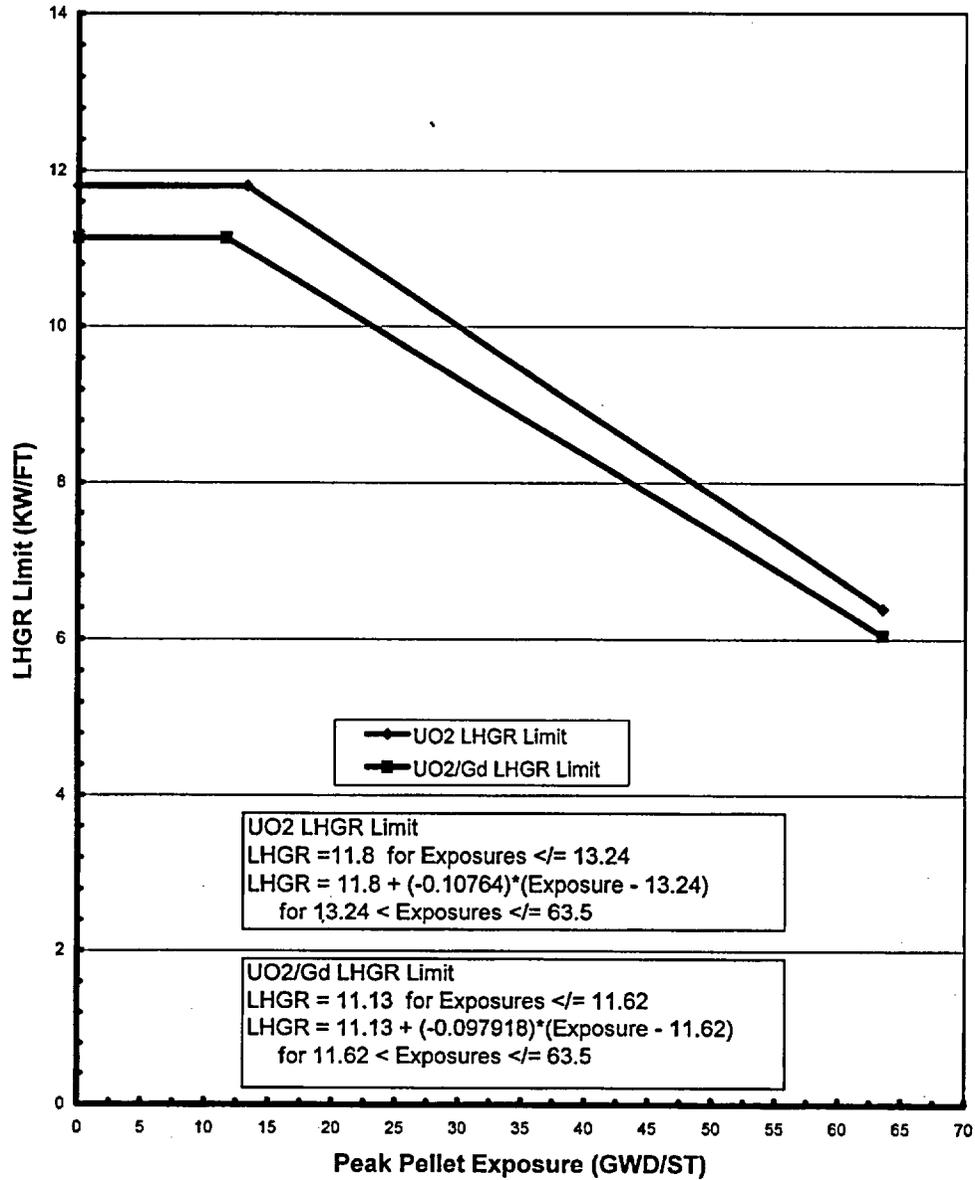
\* These applicable LHGR values are:

1. Those for the respective fuel type and Gadolinium content as a function of the average planar exposure (as described by the NRC approved methodology described in GESTAR-II)

or,

2. When hand calculations are required, the LHGR as a function of the average planar exposure shown in Figures 3.2.3-1 (GE12) and Figure 3.2.3-2 (GE14) for the applicable type of fuel.

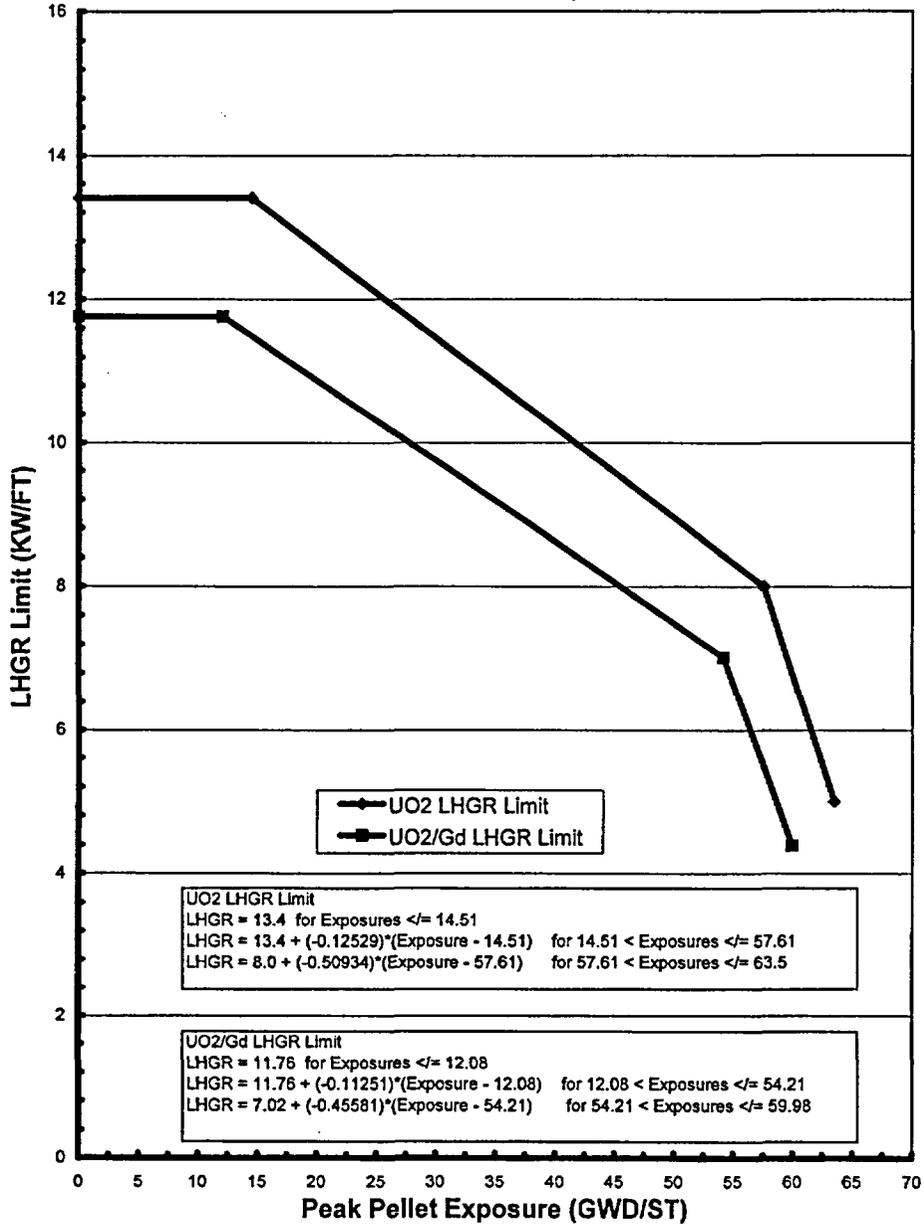
LHGR Versus Average Planar Exposure, Fuel Type GE12



NOTE: 1. Intermediate LHGR values are obtained by linear interpolation between adjacent points.

Figure 3.2.3-1

LHGR Versus Average Planar Exposure, Fuel Type GE14



NOTE: 1. Intermediate LHGR values are obtained by linear interpolation between adjacent points.

Figure 3.2.3-2

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REACTOR PROTECTION SYSTEM INSTRUMENTATION (TS 3.3.1.1)

The simulated thermal power time constant shall be  $6 \pm 0.6$  seconds.

OSCILLATION POWER RANGE MONITOR (OPRM) INSTRUMENTATION (TS 3.3.1.3)

This page was not updated for Cycle 10 Operations. The OPRM's are inoperable due to the setpoint methodology issues identified in CR 01-2582.

Current Settings:

1. Confirmation Count Setpoint ( $N_p = N_2$ ): 12
2. Amplitude Setpoint (Sp): 1.09

Reference: Calculation: FM12, Revision 0