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Proprietary Information-
Withhold Under 10 CFR 2.390

SOUTHERN COMPANY

March 25, 2013

Docket Nos.: 50-366

NL-13-0590

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

Edwin I. Hatch Nuclear Plant – Unit 2
Cycle 23 Core Operating Limits Report, Version 1

Ladies and Gentlemen:

In accordance with Technical Specification 5.6.5.d., Southern Nuclear Operating Company (SNC) submits the enclosed Core Operating Limits Report (COLR) Version 1 for Edwin I. Hatch Nuclear Plant (HNP) Unit 2 Cycle 23.

The enclosed documentation contains proprietary information as defined by 10 CFR 2.390. Global Nuclear Fuel (GNF), as the owner of the proprietary information, has executed the enclosed affidavit, which identifies that the enclosed proprietary information has been handled and classified as proprietary, is customarily held in confidence, and has been withheld from public disclosure. The proprietary information was provided to HNP Unit 2 in a GNF transmittal that is referenced by the affidavit. The proprietary information has been faithfully reproduced in the enclosed documentation, such that, the affidavit remains applicable. This affidavit is provided in Enclosure 1 to this letter. GNF hereby requests that the enclosed proprietary information provided in Enclosure 2 to this letter be withheld from public disclosure in accordance with the provisions of 10 CFR 2.390 and 9.17. A non-proprietary version of the documentation also is provided as Enclosure 3.

This letter contains no NRC commitments. If you have any questions, please contact Ken McElroy at (205) 992-7369.

Respectfully submitted,

C. R. Pierce

C. R. Pierce
Regulatory Affairs Director

CRP/RMJ/lac

A001
NRR

Enclosures:
1. Global Nuclear Fuel – Americas Affidavit
2. HNP Unit 2 Cycle 23 Version 1 Core Operating Limits Report PROPRIETARY INFORMATION
3. HNP Unit 2 Cycle 23 Version 1 Core Operating Limits Report NON-PROPRIETARY INFORMATION

cc: Southern Nuclear Operating Company
Mr. S. E. Kuczynski, Chairman, President & CEO
Mr. D. G. Bost, Executive Vice President & Chief Nuclear Officer
Mr. D. R. Madison, Vice President – Hatch
Mr. B. L. Ivey, Vice President – Regulatory Affairs
Mr. B. J. Adams, Vice President – Fleet Operations
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U. S. Nuclear Regulatory Commission
Mr. V. M. McCree, Regional Administrator
Mr. R. E. Martin, NRR Senior Project Manager – Hatch
Mr. E. D. Morris, Senior Resident Inspector – Hatch

Edwin I. Hatch Nuclear Plant – Unit 2
Cycle 23 Core Operating Limits Report, Version 1

Enclosure 1

Global Nuclear Fuel – Americas Affidavit

Global Nuclear Fuel – Americas

AFFIDAVIT

I, Lukas Trosman, state as follows:

(1) I am Engineering Manager, Reload Design and Analysis, Global Nuclear Fuel – Americas, LLC ("GNF-A"), and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in Enclosure 1 of GNF's letter, VSP-SNC-GEN-13-023, Vickie S. Perry to Susan Hoxie-Key (Southern Nuclear Operating Company), entitled "Edwin I. Hatch Nuclear Plant Unit 2 Cycle 23 Core Operating Limits Report (COLR)," February 18, 2013. GNF proprietary information in Enclosure 1, which is entitled "Edwin I. Hatch Nuclear Plant Unit 2 Cycle 23 Core Operating Limits Report," is identified by a dotted underline inside double square brackets. [[This sentence is an example.{3}]] A "[[" marking at the beginning of a table, figure, or paragraph closed with a "]]" marking at the end of the table, figure or paragraph is used to indicate that the entire content between the double brackets is proprietary. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4), and 2.390(a)(4) for "trade secrets" (Exemption 4). The material for which exemption from disclosure is here sought also qualify under the narrower definition of "trade secret", within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals aspects of past, present, or future GNF-A customer-funded development plans and programs, resulting in potential products to GNF-A;

d. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b. above.

(5) To address 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in paragraphs (6) and (7) following.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC-approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed on this 18th day of February 2013.

Lukas Trosman
Engineering Manager, Reload Design and Analysis
Global Nuclear Fuel – Americas, LLC

Edwin I. Hatch Nuclear Plant – Unit 2
Cycle 23 Core Operating Limits Report, Version 1

Enclosure 3

HNP Unit 2 Cycle 23 Version 1 Core Operating Limits Report
NON-PROPRIETARY INFORMATION

SOUTHERN NUCLEAR OPERATING COMPANY
EDWIN I. HATCH NUCLEAR PLANT

Unit 2 Cycle 23
CORE OPERATING LIMITS REPORT

Version 1

Southern Nuclear Operating Company
Post Office Box 1295
Birmingham, Alabama 35201

Non-Proprietary Information

Edwin I. Hatch Nuclear Plant
Unit 2 Cycle 23 Core Operating Limits Report

TABLE OF CONTENTS

TABLES

FIGURES

1.0 INTRODUCTION

The Core Operating Limits Report (COLR) for Plant Hatch Unit 2 Cycle 23 is prepared in accordance with the requirements of Technical Specification 5.6.5. The core operating limits presented herein were developed using NRC-approved methods (References 1 through 6). Results from the reload analyses for the fuel in Unit 2 Cycle 23 are documented in References 3 through 5.

The following core operating limits are included in this report:

a. Average Planar Linear Heat Generation Rate (APLHGR) – Technical Specification 3.2.1

b. Minimum Critical Power Ratio (MCPR) – Technical Specification 3.2.2

c. Linear Heat Generation Rate (LHGR) – Technical Specification 3.2.3

Also included in this report is the maximum allowable scram setpoint for the Period Based Detection Algorithm (PBDA) in the Oscillation Power Range Monitor (OPRM).

Based upon the reload analysis for this cycle, the following operability requirement is defined for Unit 2 operation.

TABLE 1-1

Main Turbine Bypass System Operability

System	Operability Requirement
Main Turbine Bypass System Operable (Technical Specification 3.7.7)	At least two bypass valves must be operable

From a fuel thermal limits perspective, the following limitations are placed on Unit 2 operation.

TABLE 1-2

Equipment-Out-of-Service Limitations

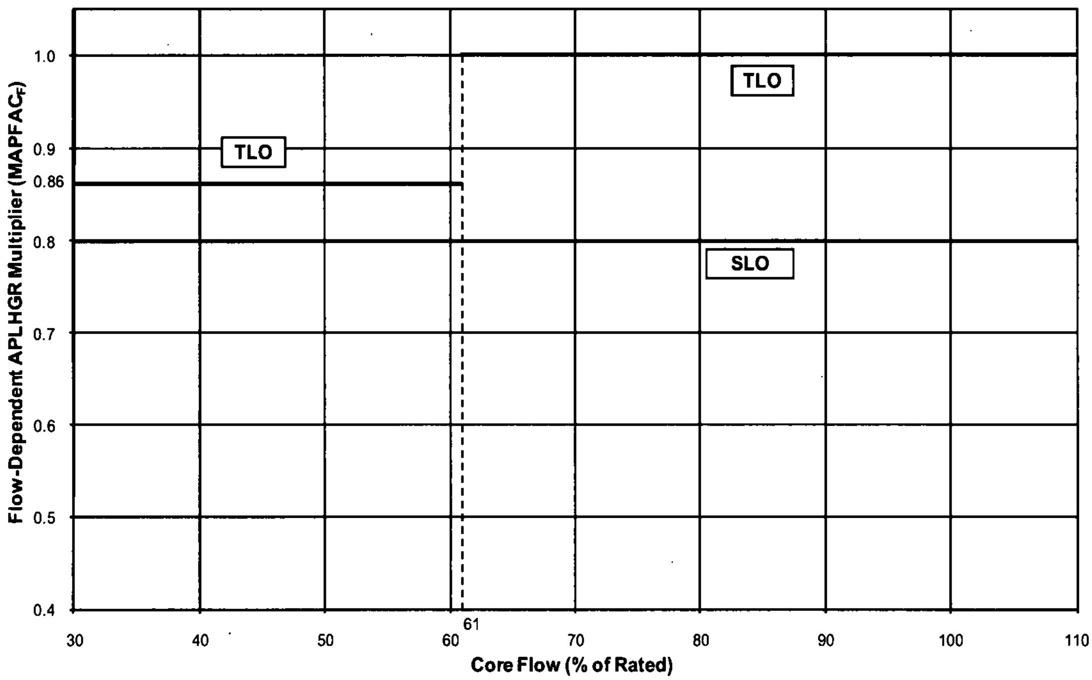
Equipment / Condition	Limitation
EOC-RPT Out of Service and Main Turbine Bypass System Inoperable simultaneously	Option B scram speeds must be met (in place) at CTP ≥ 48% RTP
Main Turbine Pressure Regulator System in TLCO 3.3.13.c	Option B scram speeds must be met (in place) at CTP ≥ 48% RTP
Single-Loop Operation (SLO)	• CTP must be ≤ 2000 MWth • Core Flow must be ≤ 56% of Rated
High Pressure Feedwater Heaters Out of Service and Main Turbine Pressure Regulator System in TLCO 3.3.13.c simultaneously	No Core Operating Limits available (Technical Specifications RAS 3.2.2. and 3.2.3 must be entered)

NOTE:

The power distribution limits in this report apply to plant operation with all equipment in service, unless otherwise specified.

2.0 APLHGR LIMITS (Technical Specification 3.2.1)

The APLHGR limit for each six inch axial segment of each fuel assembly in the core is the applicable APLHGR limit taken from Figure 2-2 multiplied by the flow-dependent multiplier, $MAPFAC_F$, from Figure 2-1.



Operating Conditions		$MAPFAC_F$
F	SLO / TLO	
$30 \leq F \leq 61$	TLO	0.86
$61 < F$	TLO	1.00
$30 \leq F$	SLO	0.80

F = Percent of Rated Core Flow

FIGURE 2-1

Flow-Dependent APLHGR Multiplier ($MAPFAC_F$) versus Core Flow

Average Planar Exposure (GWd/st)	APLHGR Limit (kW/ft)
0.00	12.82
14.51	12.82
19.13	12.82
57.61	8.00
63.50	5.00

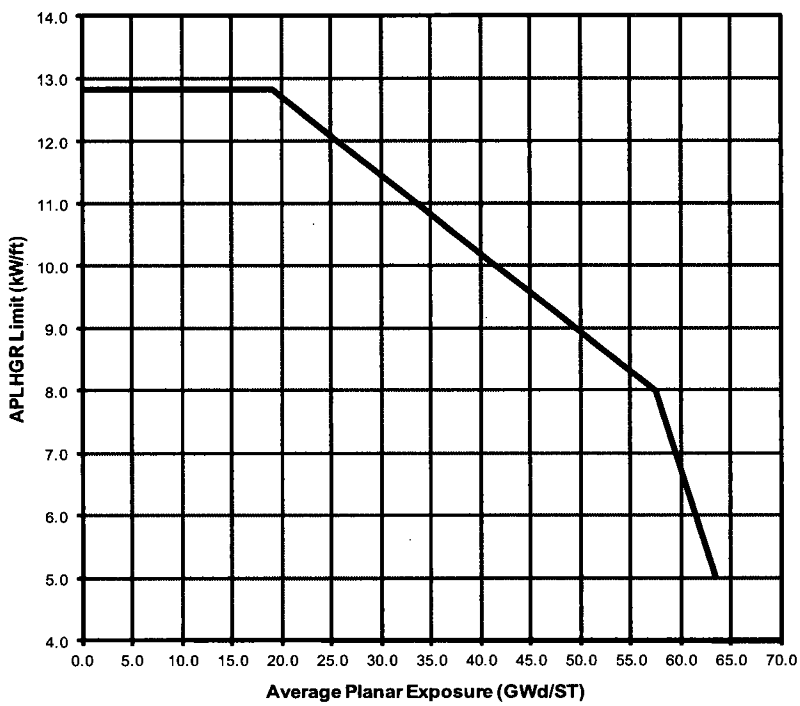


FIGURE 2-2

APLHGR Limit versus Average Planar Exposure

3.0 MCPR OPERATING LIMITS (Technical Specification 3.2.2)

The MCPR operating limits (OLMCPR) for each fuel type are a function of core power, core flow, average scram time, number of operating recirculation loops, EOC-RPT system status, operability of the main turbine bypass system, status of the high pressure feedwater heaters, the status of the main turbine pressure regulator system, and cycle exposure. Cycle exposures are defined in Table 3-1.

With both recirculation pumps in operation (TLO), the OLMCPRs are determined as follows:

a. For 24% ≤ power < 48%, the power-dependent MCPR limit, $MCPR_P$, as determined by Table 3-2.

b. For power ≥ 48%, the OLMCPRs are the greater of either:

   1) The flow-dependent MCPR limit, $MCPR_F$, from Figure 3-2,

      or

   2) The product of the power-dependent multiplier, K_P, and the rated-power OLMCPRs, as determined by Table 3-2.

As shown on the figures for absolute MCPR, the OLMCPR with only one recirculation pump in operation (SLO) is equal to the two loop (TLO) OLMCPR plus 0.02.

These limits apply to all modes of operation with feedwater temperature reduction, as well as operation with normal feedwater temperatures.

In the 3-4A, 3-4B, and 3-4C figures, Option A scram time OLMCPRs correspond to τ = 1.0, where τ is determined from scram time measurements performed in accordance with Technical Specifications Surveillance Requirements 3.1.4.1 and 3.1.4.2. Option B values correspond to τ = 0.0. For scram times between Option A and Option B, the rated-power OLMCPR corresponds to τ. If τ has not been determined, Option A limits must be used.

The average scram time of the control rods, τ, is defined as:

$$\tau = 0, \text{ or } \frac{\tau_{ave} - \tau_B}{\tau_A - \tau_B} \text{, whichever is greater.}$$

where: τ_A = 1.08 sec (Technical Specification 3.1.4, Table 3.1.4-1, scram time limit to notch 36).

$$\tau_B = \mu + 1.65 * \sigma * \left[\frac{N_1}{\sum_{i=1}^{n} N_i} \right]^{1/2}$$

where: μ = 0.822 sec (mean scram time used in the transient analysis).

σ = 0.018 sec (standard deviation of μ).

$$\tau_{ave} = \frac{\sum_{i=1}^{n} N_i \tau_i}{\sum_{i=1}^{n} N_i}$$

where: n = number of surveillance tests performed to date in the cycle.

N_i = number of active control rods measured in the *ith* surveillance test.

τ_i = average scram time to notch 36 of all rods in the *ith* surveillance test.

N_1 = total number of active rods measured in Technical Specifications Surveillance Requirement 3.1.4.1.

TABLE 3-1

Exposure Definitions

Exposure Label	Cycle Exposure	Definition
BOC	Beginning of Cycle Exposure	0 MWd/st
MOC1	First Middle of Cycle Exposure	EOR - 7566 MWd/st
MOC2	Second Middle of Cycle Exposure	EOR - 1566 MWd/st
EOR	End of Rated Exposure	Projected end of rated power with all control rods out at rated core flow and rated feedwater temperature
EOC	End of Cycle Exposure	Exposure at cycle shutdown

TABLE 3-2

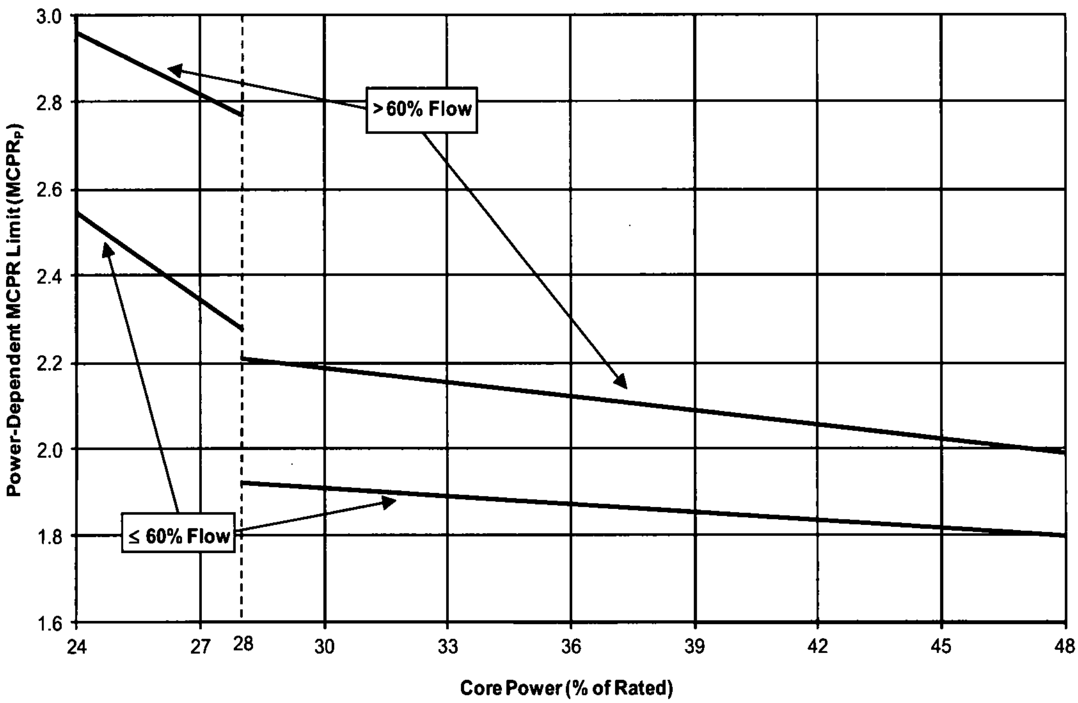
MCPR Operating Flexibility Options

Rated-power OLMCPRs			
Cycle Exposure	High Pressure Feedwater Heaters In Service	GE14C	GNF2 LTAs
BOC to MOC1	Yes	Figure 3-4A-1	Figure 3-4A-2
BOC to MOC1	No	Figure 3-4A-3	Figure 3-4A-4
MOC1 to MOC2	Yes/No	Figure 3-4B-1	Figure 3-4B-2
MOC2 to EOC	Yes/No	Figure 3-4C-1	Figure 3-4C-2

TABLE 3-2
(continued)

$MCPR_P$ from ≥ 24% to < 48% Power			
Main Turbine Bypass System Operable*			Figure 3-1A
Main Turbine Bypass System Inoperable			Figure 3-1B
K_P for Power ≥ 48% of Rated			
EOC-RPT System In Service	Main Turbine Bypass System Operable*	Main Turbine Pressure Regulator System Status	
Yes	Yes	TLCO 3.3.13.a or b	Figure 3-3A
No	Yes	TLCO 3.3.13.a or b	Figure 3-3A
Yes	No	TLCO 3.3.13.a or b	Figure 3-3A
No	No	TLCO 3.3.13.a or b	Figure 3-3B**
Yes/No	Yes/No	TLCO 3.3.13.c	Figure 3-3C**

* At least two bypass valves must be operable
** Option B scram speeds must be met (in place) at CTP ≥ 48% RTP



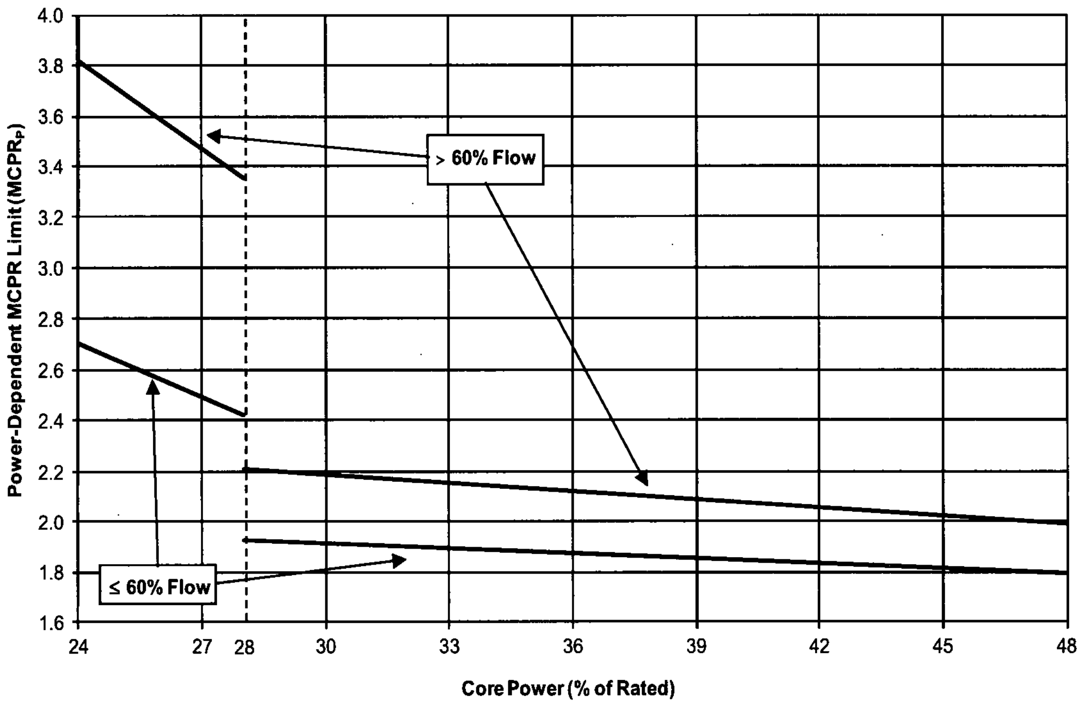
$MCPR_P(TLO) = A + B*P$
$MCPR_P(SLO) = MCPR_P(TLO) + 0.02$

F	P	A	B
F ≤ 60	24 ≤ P < 28	4.1620	-0.06735
F > 60	24 ≤ P < 28	4.1015	-0.04752
F ≤ 60	28 ≤ P < 48	2.1005	-0.00630
F > 60	28 ≤ P < 48	2.5093	-0.01077

P = Percent of Rated Core Power
F = Percent of Rated Core Flow

FIGURE 3-1A

Power-Dependent MCPR Limit ($MCPR_P$) versus Core Power from 24% to 48% of Rated Core Power



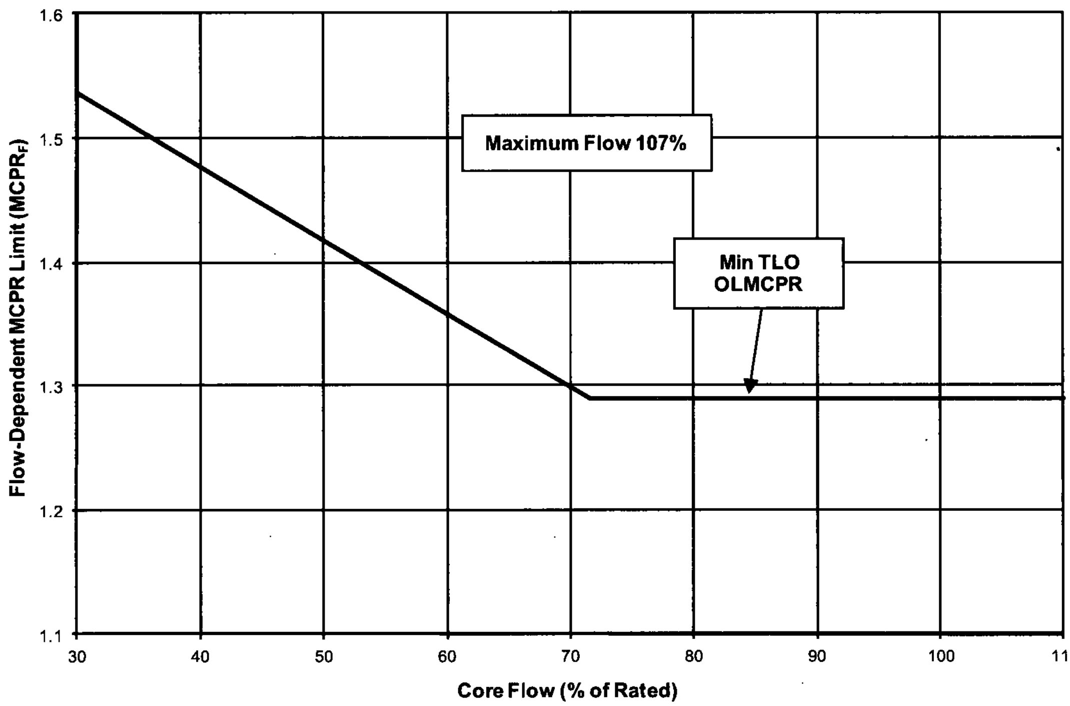
$MCPR_P(TLO) = A + B*P$
$MCPR_P(SLO) = MCPR_P(TLO) + 0.02$

F	P	A	B
F ≤ 60	24 ≤ P < 28	4.3996	-0.07070
F > 60	24 ≤ P < 28	6.6484	-0.11780
F ≤ 60	28 ≤ P < 48	2.1005	-0.00630
F > 60	28 ≤ P < 48	2.5093	-0.01077

P = Percent of Rated Core Power
F = Percent of Rated Core Flow

FIGURE 3-1B

Power-Dependent MCPR Limit ($MCPR_P$) versus Core Power from 24% to 48% of Rated Core Power
(Main Turbine Bypass System Inoperable)



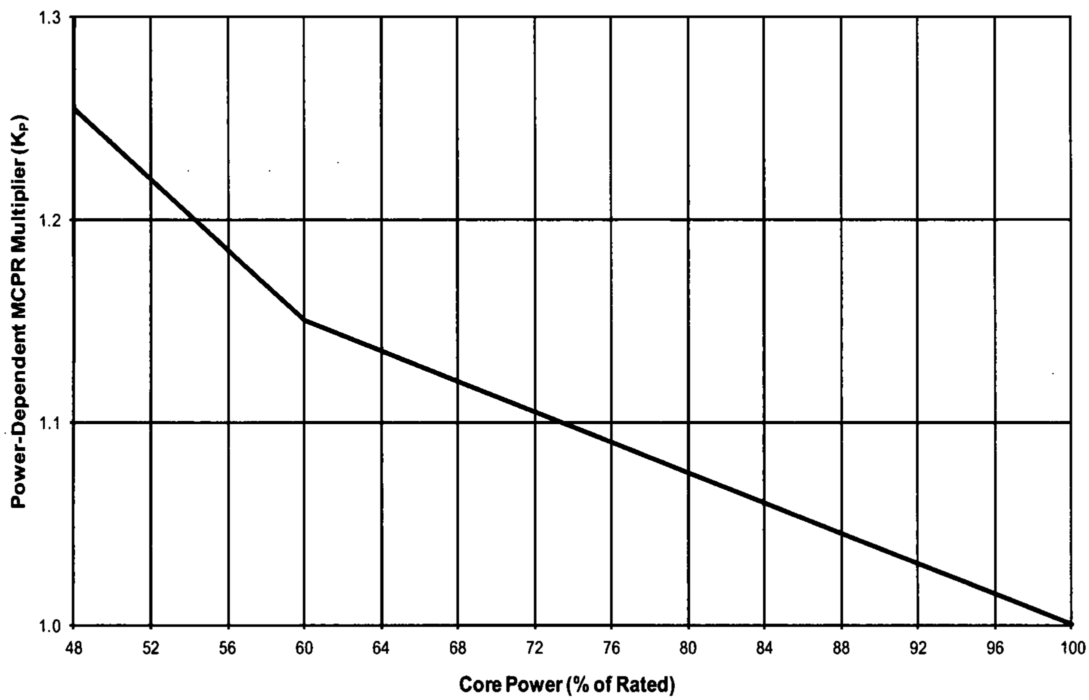
$MCPR_F(TLO) = A + B*F$
$MCPR_F(SLO) = MCPR_F(TLO) + 0.02$

Flow	A	B
$30 \le F \le 71.574$	1.713	-0.00591
$71.574 < F$	1.290	0.00000

F = Percent of Rated Core Flow

FIGURE 3-2

Flow-Dependent MCPR Limit ($MCPR_F$) versus Core Flow



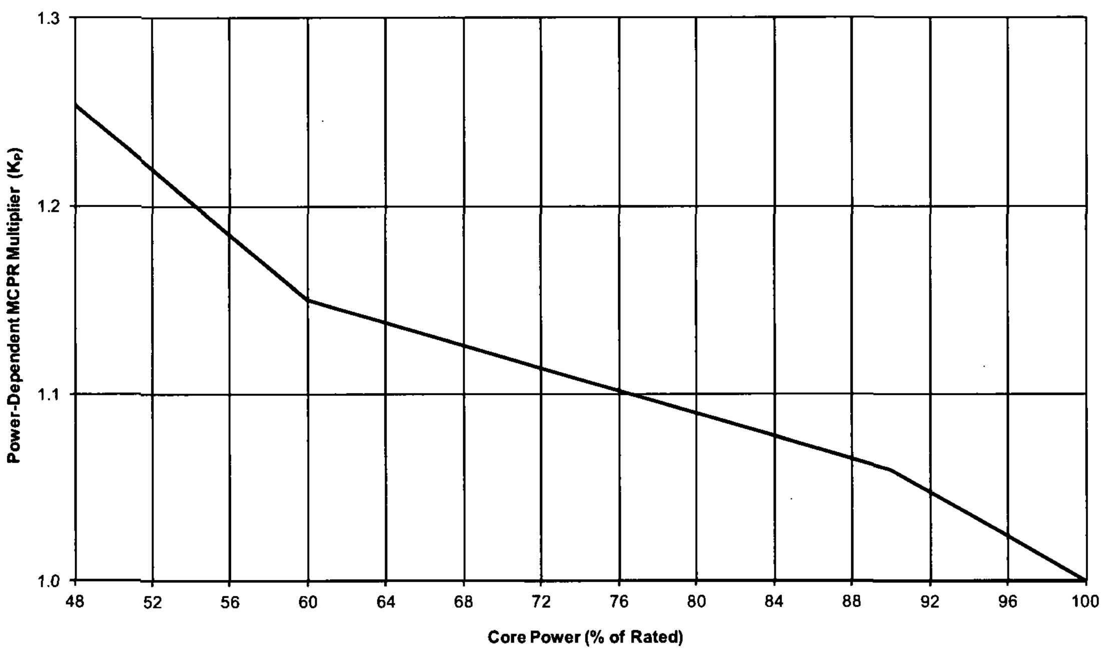
$K_P = A + B*P$

P	A	B
48 ≤ P < 60	1.6702	-0.00867
60 ≤ P	1.3750	-0.00375

P = Percent of Rated Core Power

FIGURE 3-3A

Power-Dependent MCPR Multiplier (K_P) versus Core Power



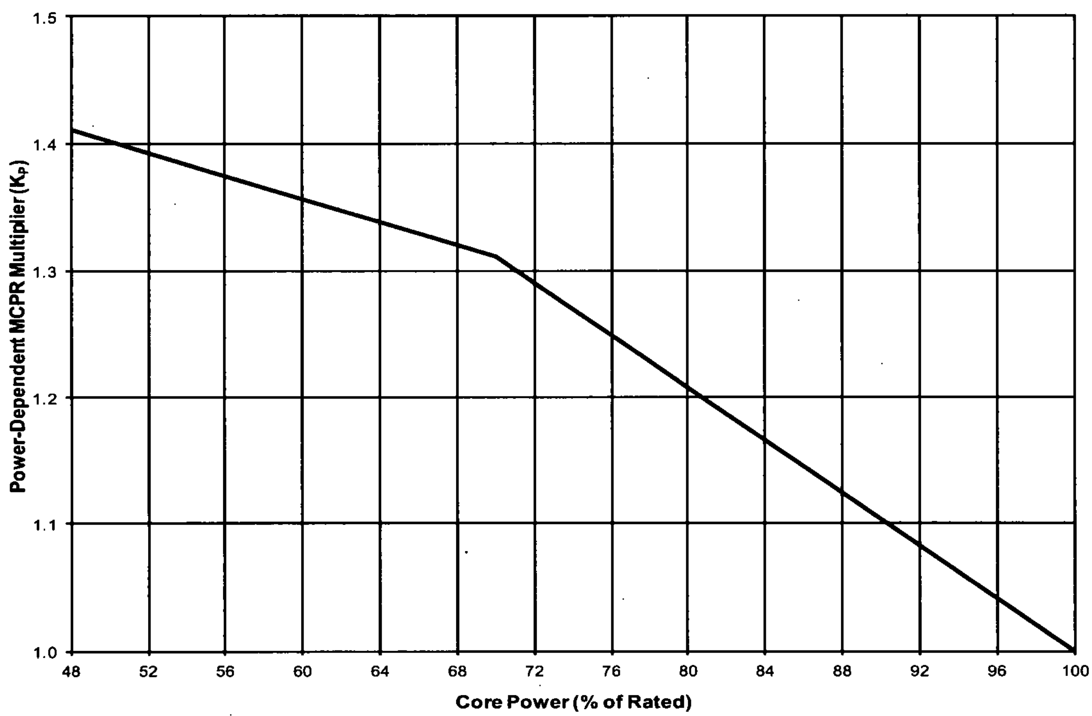
$K_P = A + B*P$

P	A	B
48 ≤ P < 60	1.6702	-0.00867
60 ≤ P < 90	1.3308	-0.00301
90 ≤ P	1.5961	-0.00596

P = Percent of Rated Core Power

FIGURE 3-3B

Power-Dependent MCPR Multiplier (K_P) versus Core Power
(EOC-RPT System Out of Service and Main Turbine Bypass System Inoperable Simultaneously)



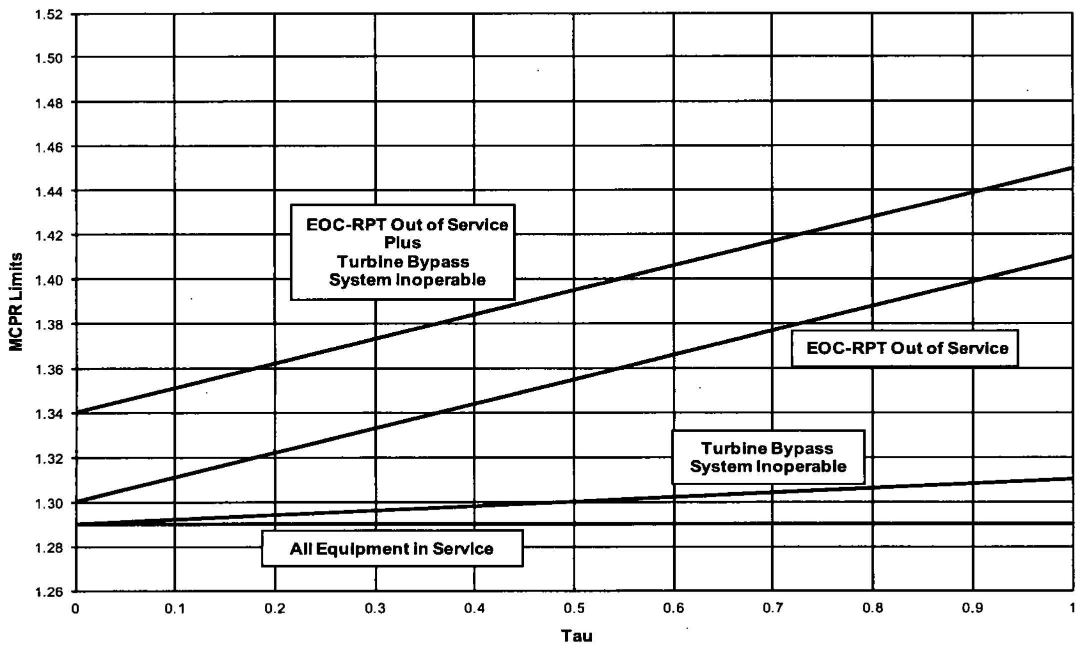
$K_P = A + B*P$

P	A	B
$48 \le P < 70$	1.6268	-0.00451
$70 \le P$	2.0367	-0.01037

P = Percent of Rated Core Power

FIGURE 3-3C

Power-Dependent MCPR Multiplier (K_P) versus Core Power
(Main Turbine Pressure Regulator System in TLCO 3.3.13.c)

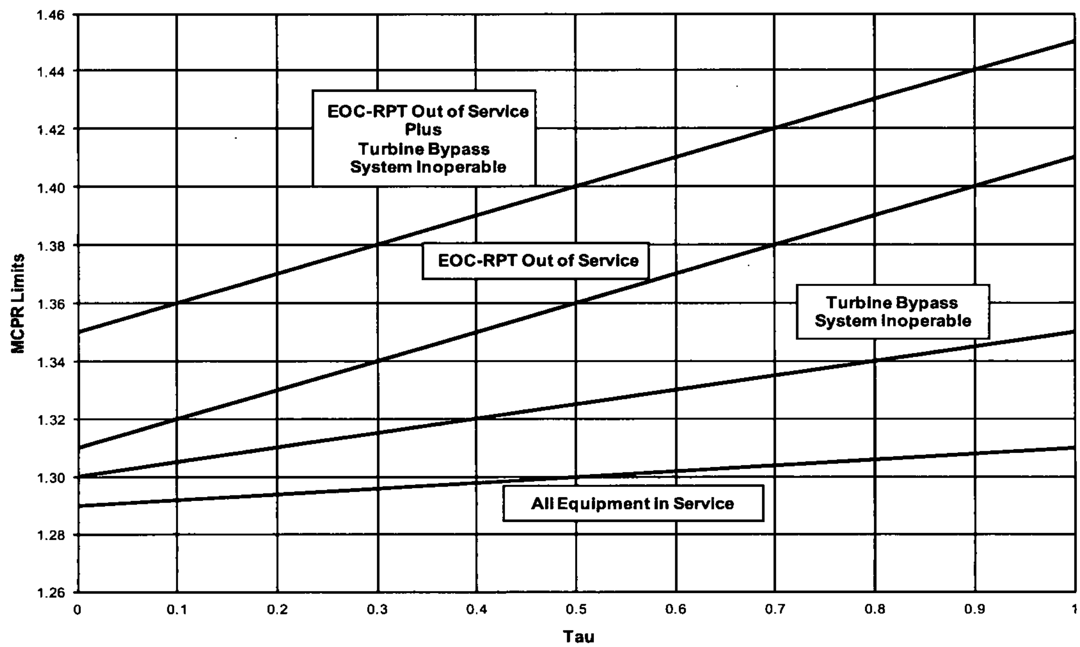


OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	Main Turbine Bypass System	$\tau = 0.0$	$\tau = 1.0$
In Service	Operable	1.29	1.29
Out of Service	Operable	1.30	1.41
In Service	Inoperable	1.29	1.31
Out of Service	Inoperable	1.34	1.45

FIGURE 3-4A-1

GE14C MCPR Limits versus Average Scram Time
(BOC to MOC1)

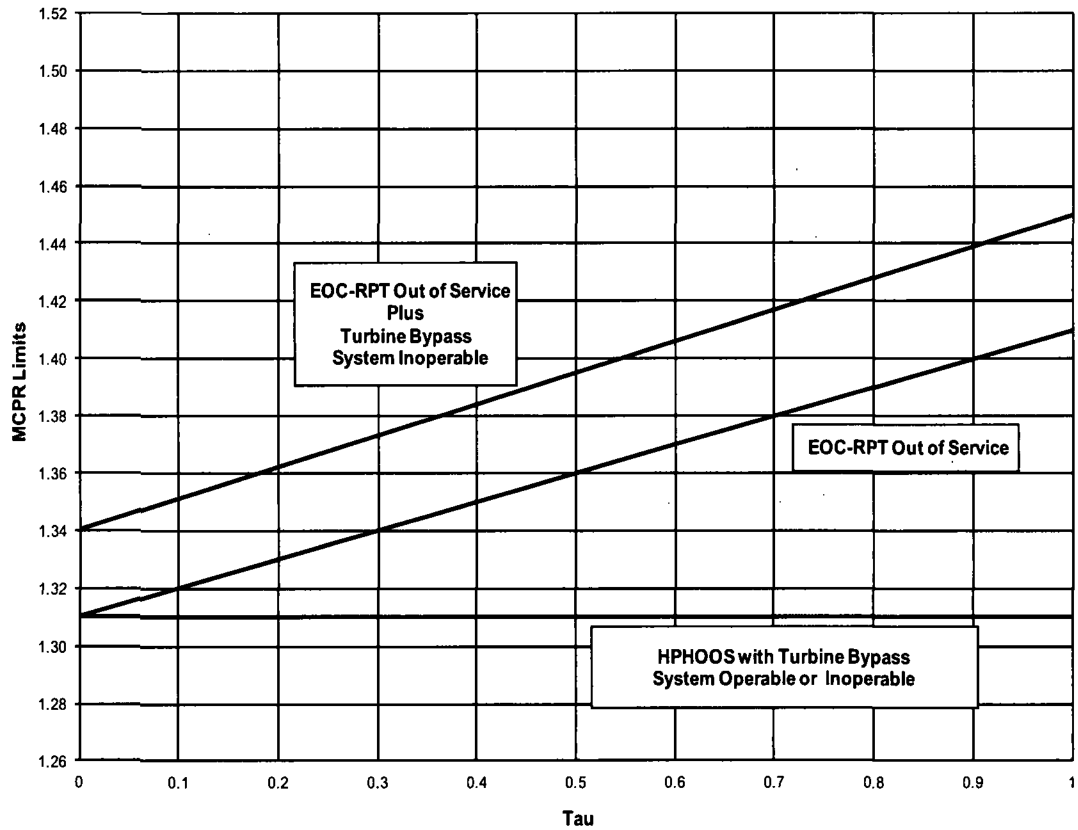


OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	Main Turbine Bypass System	$\tau = 0.0$	$\tau = 1.0$
In Service	Operable	1.29	1.31
Out of Service	Operable	1.31	1.41
In Service	Inoperable	1.30	1.35
Out of Service	Inoperable	1.35	1.45

FIGURE 3-4A-2

GNF2 LTA MCPR Limits versus Average Scram Time
(BOC to MOC1)

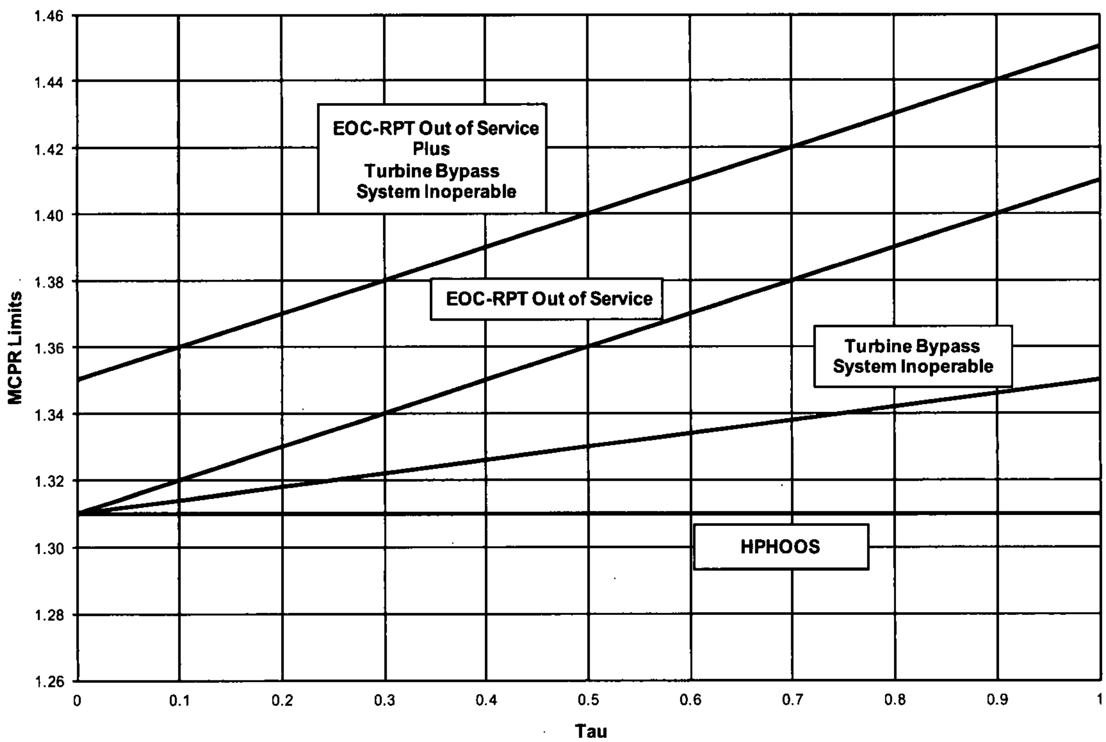


OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	Main Turbine Bypass System	$\tau = 0.0$	$\tau = 1.0$
In Service	Operable/Inoperable	1.31	1.31
Out of Service	Operable	1.31	1.41
Out of Service	Inoperable	1.34	1.45

FIGURE 3-4A-3

GE14C MCPR Limits versus Average Scram Time
(High Pressure Heaters Out of Service)
(BOC to MOC1)

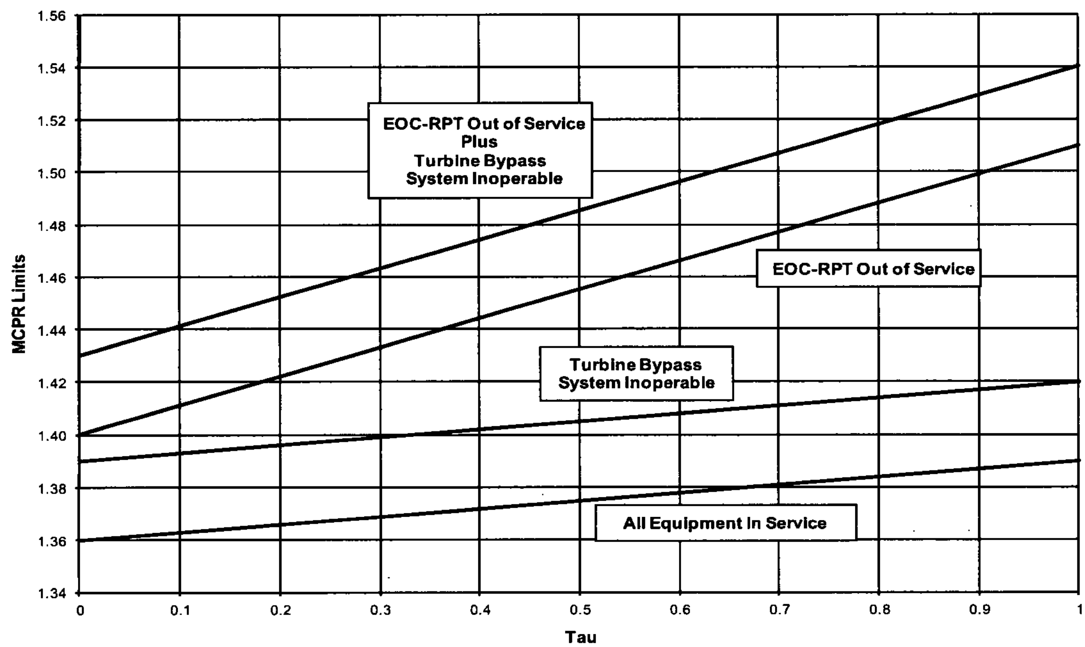


$OLMCPR_{(SLO)} = OLMCPR_{(TLO)} + 0.02$

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	Main Turbine Bypass System	$\tau = 0.0$	$\tau = 1.0$
In Service	Operable	1.31	1.31
Out of Service	Operable	1.31	1.41
In Service	Inoperable	1.31	1.35
Out of Service	Inoperable	1.35	1.45

FIGURE 3-4A-4

GNF2 LTA MCPR Limits versus Average Scram Time
(High Pressure Heaters Out of Service)
(BOC to MOC1)

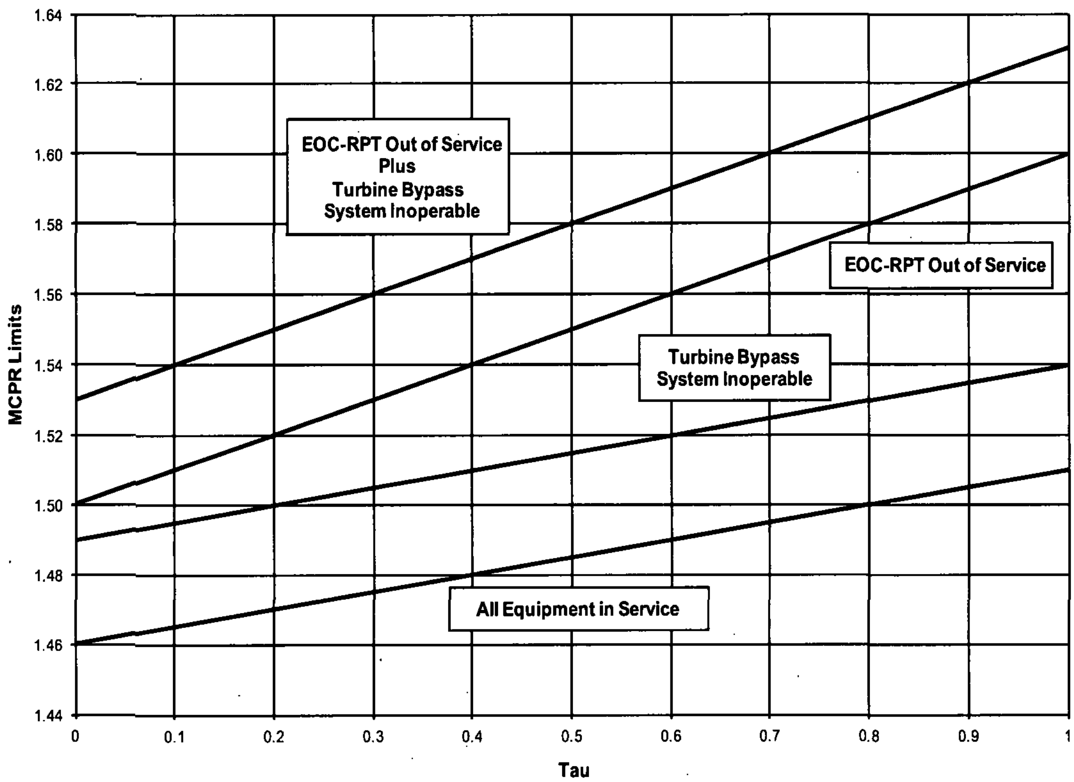


OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	**Main Turbine Bypass System**	**τ = 0.0**	**τ = 1.0**
In Service	Operable	1.36	1.39
Out of Service	Operable	1.40	1.51
In Service	Inoperable	1.39	1.42
Out of Service	Inoperable	1.43	1.54

FIGURE 3-4B-1

GE14C MCPR Limits versus Average Scram Time
(MOC1 to MOC2)

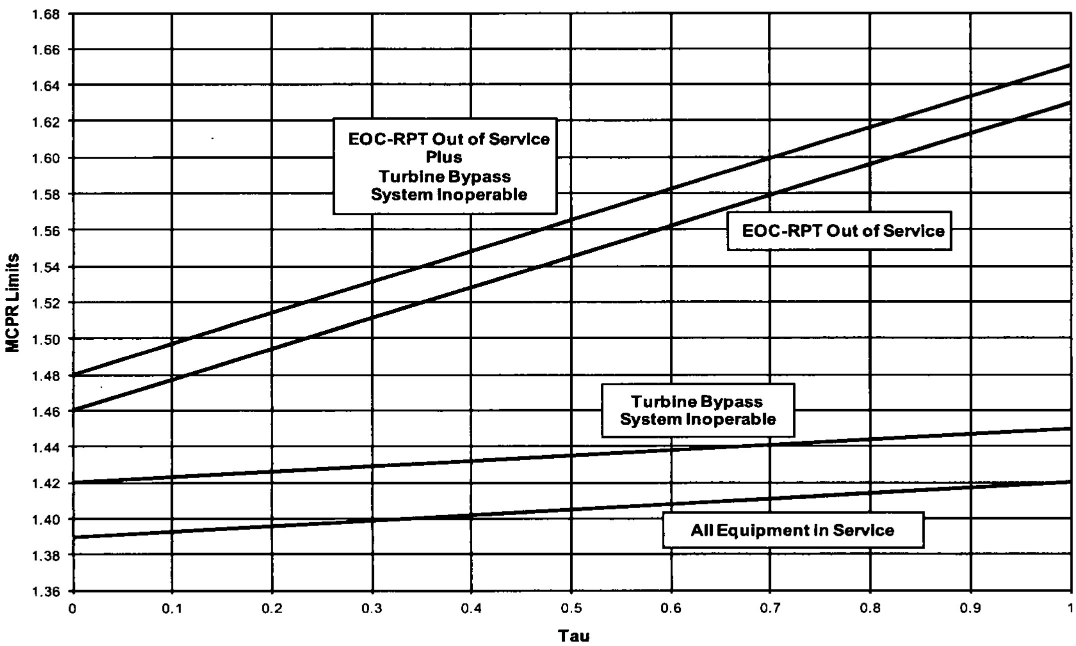


OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	Main Turbine Bypass System	τ = 0.0	τ = 1.0
In Service	Operable	1.41	1.46
Out of Service	Operable	1.43	1.53
In Service	Inoperable	1.43	1.48
Out of Service	Inoperable	1.45	1.55

FIGURE 3-4B-2

GNF2 LTA MCPR Limits versus Average Scram Time
(MOC1 to MOC2)

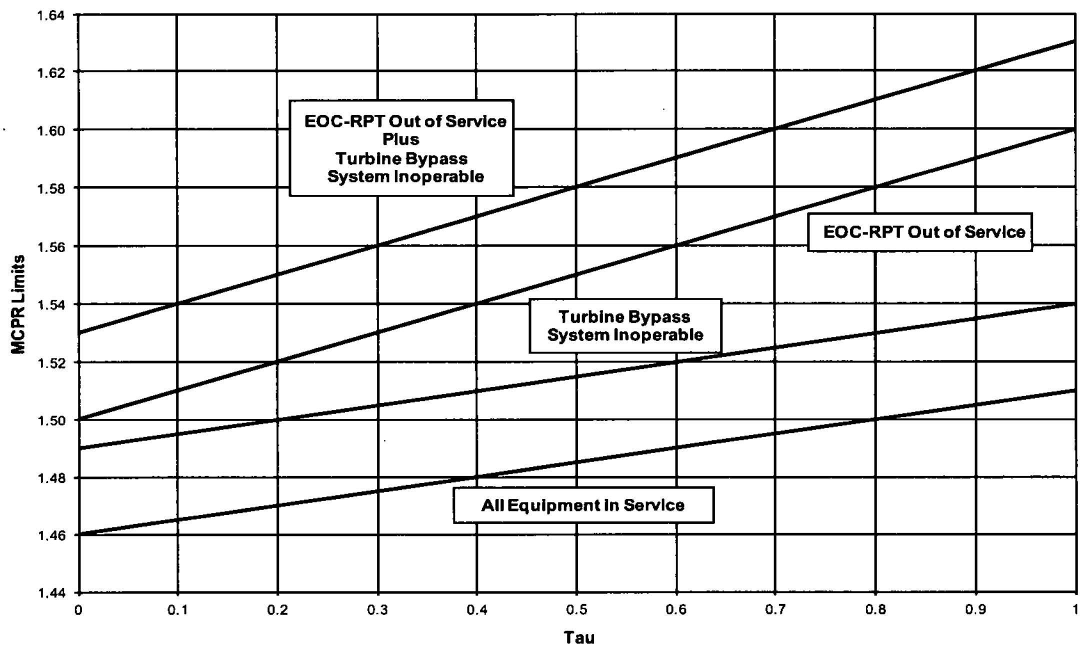


OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	**Main Turbine Bypass System**	**τ = 0.0**	**τ = 1.0**
In Service	Operable	1.39	1.42
Out of Service	Operable	1.46	1.63
In Service	Inoperable	1.42	1.45
Out of Service	Inoperable	1.48	1.65

FIGURE 3-4C-1

GE14C MCPR Limits versus Average Scram Time
(MOC2 to EOC)



OLMCPR(SLO) = OLMCPR(TLO) + 0.02

Operating Conditions		OLMCPR(TLO)	
EOC-RPT	**Main Turbine Bypass System**	**τ = 0.0**	**τ = 1.0**
In Service	Operable	1.46	1.51
Out of Service	Operable	1.50	1.60
In Service	Inoperable	1.49	1.54
Out of Service	Inoperable	1.53	1.63

FIGURE 3-4C-2

GNF2 LTA MCPR Limits versus Average Scram Time
(MOC2 to EOC)

4.0 LHGR LIMITS (Technical Specification 3.2.3)

The LHGR limit for each six inch axial segment of each fuel rod in the core is the applicable rated-power, rated-flow LHGR limit taken from Table 4-2 multiplied by the smaller of either:

a. The flow-dependent multiplier, $LHGRFAC_F$, from Figure 4-1,

or

b. The power-dependent multiplier, $LHGRFAC_P$, as determined by Table 4-1.

Table 4-2 shows the exposure-dependent LHGR limits for all fuel types in the core, including the UO_2 rods which contain no gadolinium. The LHGR limit is based on initial Gd content in a six inch segment of a fuel rod and the maximum initial Gd content anywhere in the same rod. The second column in Table 4-2 shows the segment Gd concentration and the third column shows the maximum Gd concentration for that rod. For exposures between the values shown in Table 4-2, the LHGR limit is based on linear interpolation. For illustration purposes, Figures 4-3A and 4-3B show the LHGR limits for UO_2 rods and the most limiting Gd rods for each fuel type.

TABLE 4-1

LHGR Operating Flexibility Options

$LHGRFAC_P$		
Main Turbine Pressure Regulator System Status	High Pressure Feedwater Heaters	
TLCO 3.3.13.a or b	In Service	Figure 4-2A
TLCO 3.3.13.c	In Service	Figure 4-2B*
TCLO 3.3.13.a or b	Out of Service	Figure 4-2C

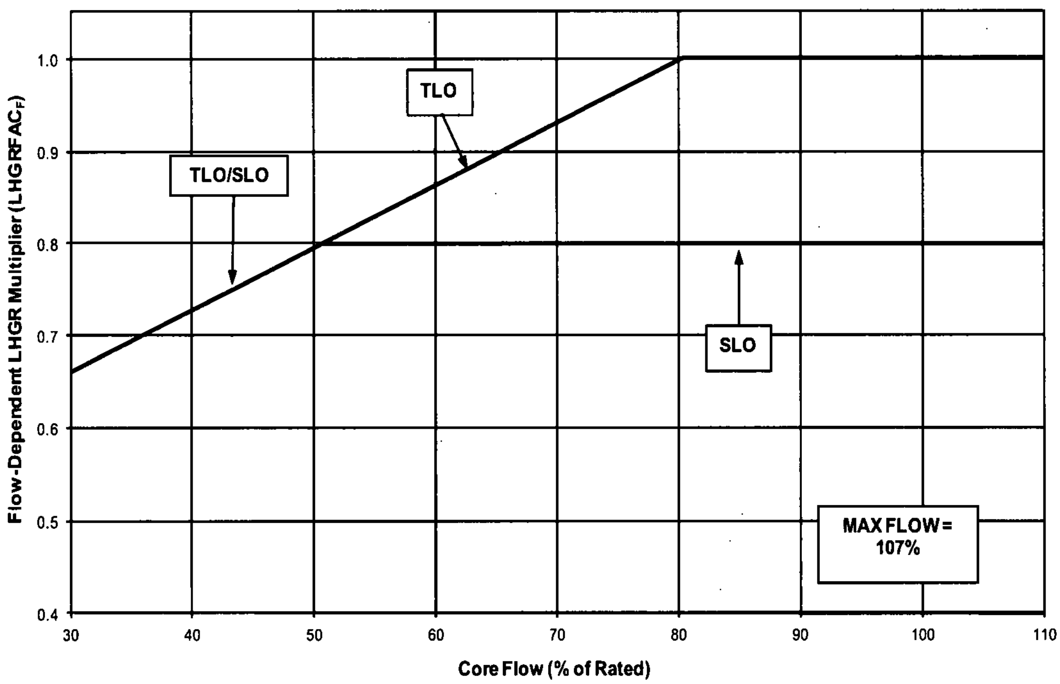
* Option B scram speeds must be met (in place) at CTP ≥ 48% RTP

TABLE 4-2

LHGR Limit versus Peak Pellet Exposure

Fuel Type	Six Inch Segment Gd (w/o)	Rod Max. Gd (w/o)	LHGR limit at BOL (kW/ft)	LHGR limit at Knee 1 (kW/ft)	Exp. at Knee 1 (GWd/st)	LHGR limit at Knee 2 (kW/ft)	Exp. at Knee 2 (GWd/st)	LHGR limit at EOL (kW/ft)	Exp. at EOL (GWd/st)
GE14	0.00	0.00	13.400	13.400	14.515	8.000	57.607	5.000	63.504
	0.00	4.00	13.100	13.100	14.190	7.821	56.317	4.888	62.082
	0.00	6.00	13.100	13.100	14.190	7.821	56.317	4.888	62.082
	4.00	4.00	12.800	12.800	12.510	7.642	55.928	4.776	61.869
	5.00	5.00	12.521	12.521	12.389	7.475	55.443	4.672	61.335
	5.00	6.00	12.400	12.400	12.247	7.403	54.884	4.627	60.718
	5.00	7.00	12.300	12.300	12.132	7.343	54.424	4.590	60.212
	6.00	6.00	12.255	12.255	12.276	7.316	54.999	4.572	60.845
	6.00	7.00	12.100	12.100	12.095	7.224	54.275	4.515	60.047
	6.00	8.00	12.100	12.100	12.095	7.224	54.275	4.515	60.047
	7.00	7.00	12.000	12.000	12.174	7.164	54.589	4.478	60.394
	7.00	8.00	11.900	11.900	12.055	7.104	54.117	4.440	59.873
	8.00	8.00	11.755	11.755	12.079	7.018	54.215	4.386	59.981
GNF2 LTAs	[[								
									]]

BOL = Beginning of Life (zero exposure)
EOL = End of Life (maximum licensed pellet exposure)



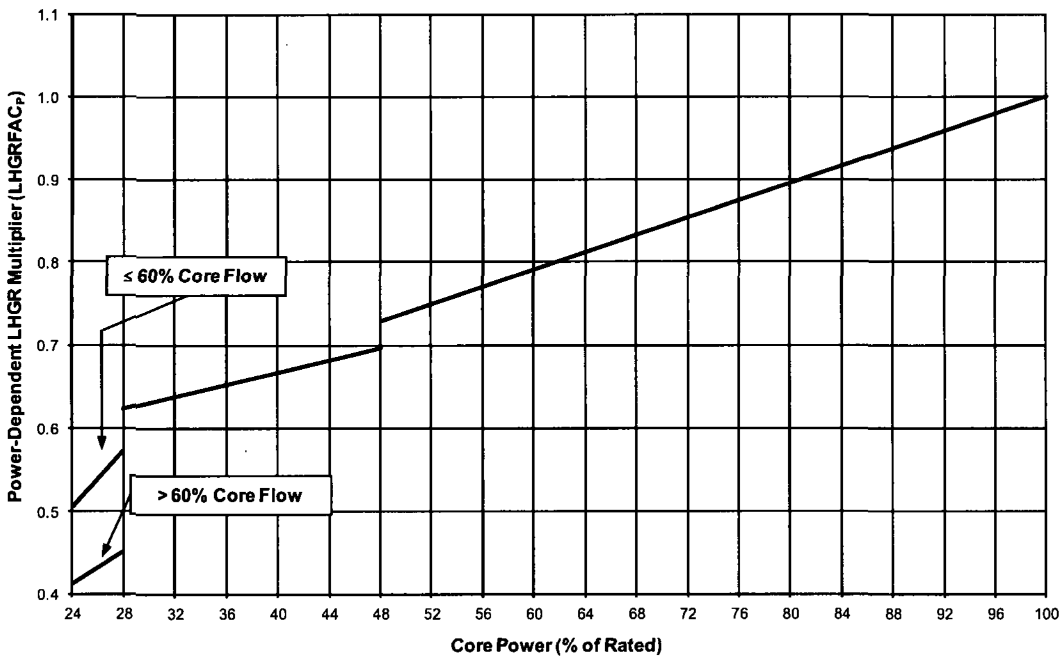
$LHGRFAC_F = A + B*F$

Operating Conditions		Values of Variables	
F	SLO / TLO	A	B
30 ≤ F < 50.70	SLO / TLO	0.4574	0.006758
50.70 ≤ F < 80.29	TLO	0.4574	0.006758
50.70 ≤ F	SLO	0.8000	0.000000
80.29 ≤ F	TLO	1.0000	0.000000

F = Percent of Rated Core Flow

FIGURE 4-1

Flow-Dependent LHGR Multiplier ($LHGRFAC_F$) versus Core Flow



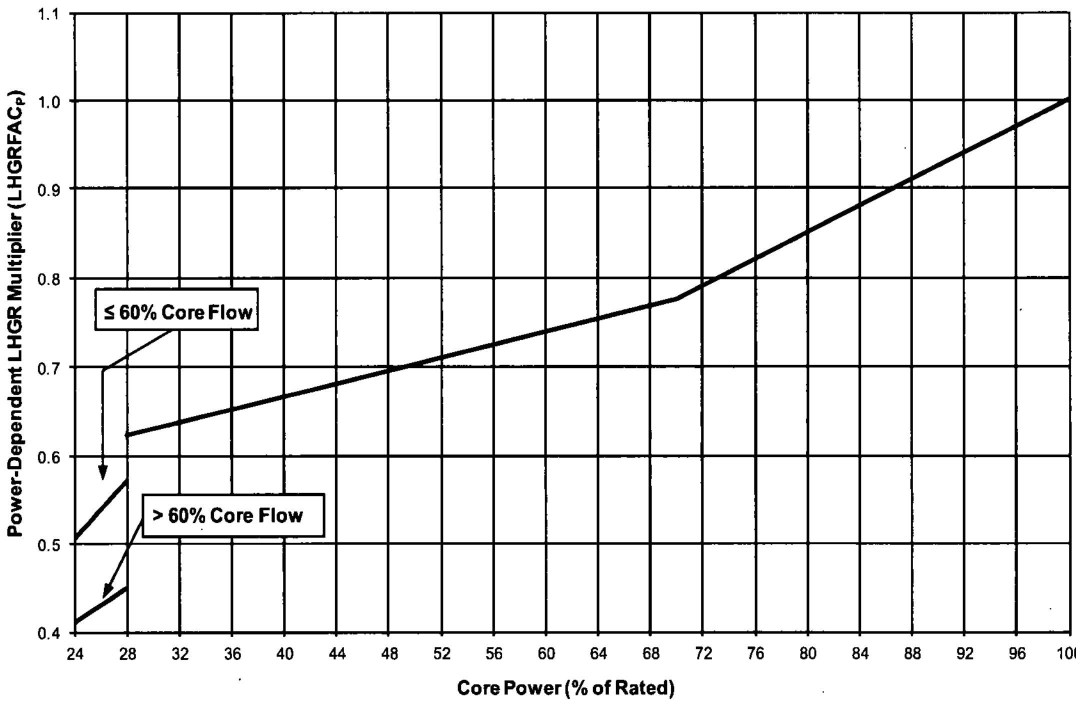
$LHGRFAC_P = A + B*P$

Operating Conditions		Values of Variables	
P	F	A	B
24 ≤ P < 28	F > 60	0.17924	0.009670
24 ≤ P < 28	F ≤ 60	0.10366	0.016741
28 ≤ P < 48	All	0.52261	0.003617
48 ≤ P	All	0.47760	0.005224

P = Percent of Rated Core Power
F = Percent of Rated Core Flow

FIGURE 4-2A

Power-Dependent LHGR Multiplier ($LHGRFAC_P$) versus Core Power
(Main Turbine Bypass System Operable or Inoperable)



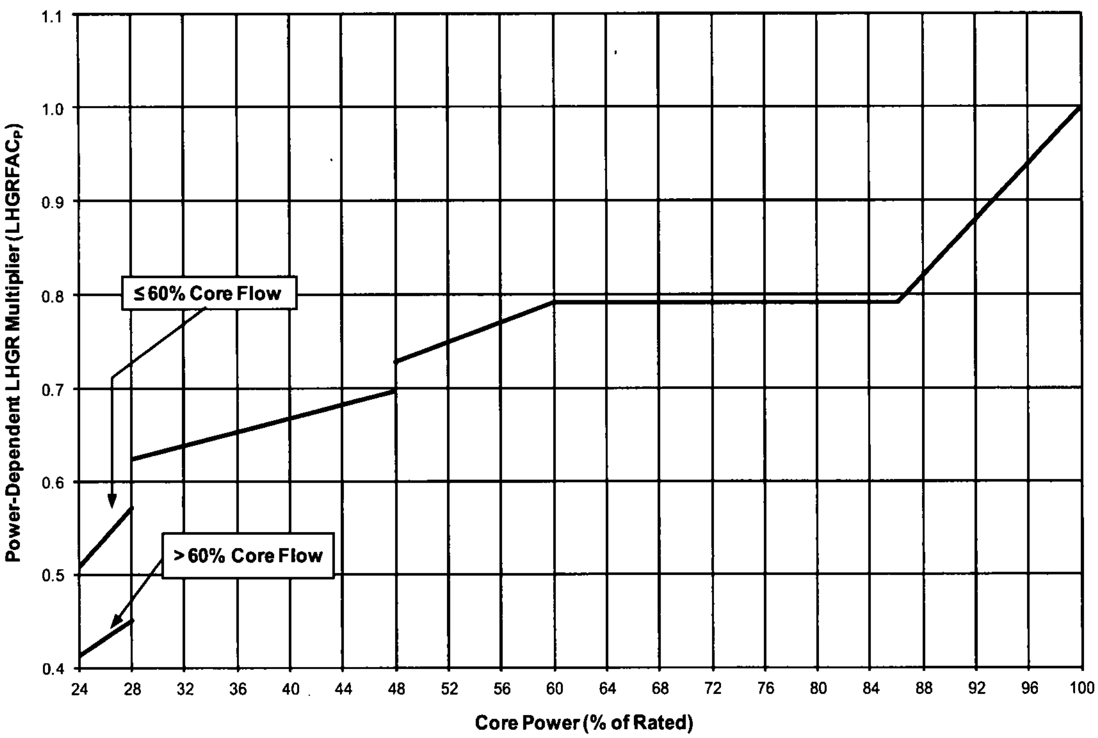
$LHGRFAC_P = A + B*P$

Operating Conditions		Values of Variables	
P	F	A	B
24 ≤ P < 28	F > 60	0.17924	0.009670
24 ≤ P < 28	F ≤ 60	0.10366	0.016741
28 ≤ P < 70	All	0.52261	0.003617
70 ≤ P	All	0.25270	0.007473

P = Percent of Rated Core Power
F = Percent of Rated Core Flow

FIGURE 4-2B

Power-Dependent LHGR Multiplier ($LHGRFAC_P$) versus Core Power
(Main Turbine Bypass System Operable or Inoperable and Main Turbine Pressure Regulator System in TLCO 3.3.13.c)



$LHGRFAC_P = A + B*P$

Operating Conditions		Values of Variables	
P	F	A	B
24 ≤ P < 28	F > 60	0.17924	0.009670
24 ≤ P < 28	F ≤ 60	0.10366	0.016741
28 ≤ P < 48	All	0.52261	0.003617
48 ≤ P < 60.04	All	0.47760	0.005224
60.04 ≤ P < 86.06	All	0.79100	0.000000
86.06 ≤ P	All	-0.49800	0.014980

P = Percent of Rated Core Power
F = Percent of Rated Core Flow

FIGURE 4-2C

Power-Dependent LHGR Multiplier ($LHGRFAC_P$) versus Core Power
(Main Turbine Bypass System Operable or Inoperable and High Pressure Heaters Out of Service)

UO2 Rods	
Peak Pellet Exposure (GWd/st)	LHGR (kW/ft)
0.000	13.400
14.515	13.400
57.607	8.000
63.504	5.000

Limiting Gd Rods	
Peak Pellet Exposure (GWd/st)	LHGR (kW/ft)
0.000	11.755
12.079	11.755
54.215	7.018
59.981	4.386

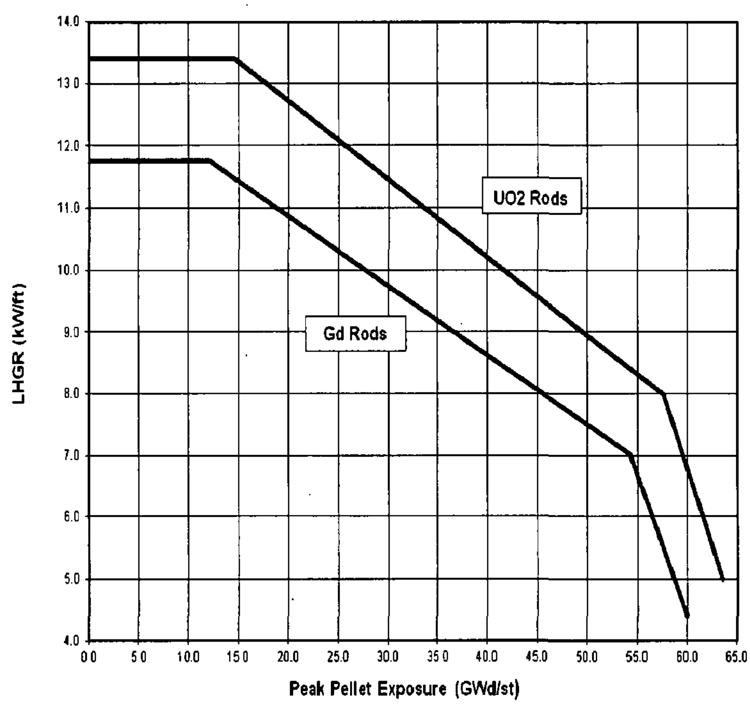


FIGURE 4-3A

GE14C LHGR versus Peak Pellet Exposure

[[

UO2 Rods	
Peak Pellet Exposure (GWd/st)	LHGR (kW/ft)
[[	
	]]

Limiting Gd Rods	
Peak Pellet Exposure (GWd/st)	LHGR (kW/ft)
[[	
	]]

]]

FIGURE 4-3B

GNF2 LTA LHGR versus Peak Pellet Exposure

5.0 PBDA AMPLITUDE SETPOINT

The amplitude trip setpoint in the Period Based Detection Algorithm in the OPRM system shall not exceed the value reported in the Table below. This applies to instruments 2C51K615 A, B, C, and D.

TABLE 5-1

OPRM Setpoint

OLMCPR	OPRM Setpoint
≥ 1.29	1.12

6.0 REFERENCES

1. "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A-19, May 2012, and the US Supplement, NEDE-24011-P-A-19-US, May 2012.

2. GNF letter MEF-SNC-GEN-12-117, "Hatch 2 Reload 22 Cycle 23 Supplemental Reload Licensing Report and Fuel Bundle Information Report," M. Fitzpatrick to S. Hoxie-Key, December 7, 2012.

3. Global Nuclear Fuel document 0000-0145-7166-SRLR, "Supplemental Reload Licensing Report for Edwin I. Hatch Nuclear Power Plant Unit 2, Reload 22 Cycle 23," Revision 0, December 2012.

4. Global Nuclear Fuel document 0000-0145-7166-FBIR-P, "Fuel Bundle Information Report for Edwin I. Hatch Nuclear Power Plant Unit 2, Reload 22 Cycle 23," Revision 0, December 2012.

5. SNC Nuclear Fuel document NF-13-005 "Hatch-2 Cycle 23 Reload Licensing Analysis Report," Version 1, January 2013.

6. GNF Document DB-0012.03, "Fuel-Rod Thermal-Mechanical Performance Limits for GE14C," Rev. 2, September 2006.