

GEORGIA POWER COMPANY
EDWIN I. HATCH NUCLEAR PLANT

UNIT 1 FUEL CYCLE 16
CORE OPERATING LIMITS REPORT

REVISION 0

Southern Nuclear Operating Company
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Post Office Box 1295
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DATE: October 25, 1994

RE: Hatch Project Support - Licensing
Core Operating Limits Report for Hatch 1 Cycle 16
Revision 0
File: Fuel Cycle Technical
Log: HL-4726

FROM: S. J. Bethay *S. J. Bethay*

TO: ALL UNIT 1 TECHNICAL SPECIFICATIONS MANUAL HOLDERS

By amendment 168 to the Unit 1 Technical Specifications, the NRC authorized relocation of certain fuel-related limits from the Technical Specifications to the adjunct Core Operating Limits Report (COLR). This letter transmits to all Unit 1 Technical Specifications manual holders a copy of Revision 0 of the COLR for Hatch 1 Cycle 16. This document should be utilized in conjunction with the Unit 1 Technical Specifications, as referred to in the Specifications. Normally, the shift technical advisor or reactor engineer will use this report. Where necessary, the fuel limits from the COLR are included in plant procedures.

Please discard Revision 1 of the COLR for Hatch 1 Cycle 15, which was issued in May 1993, since it is no longer applicable. If you have questions regarding Revision 0 of the Unit 1 COLR for Cycle 16, please contact me at extension 8-821-7392 or telephone number (205) 877-7392.

SRP/sp
colrwp

Enclosure

cc: NORMS

**EDWIN I. HATCH NUCLEAR PLANT
UNIT 1 FUEL CYCLE 16
CORE OPERATING LIMITS REPORT**

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**EDWIN I. HATCH NUCLEAR PLANT
UNIT 1 FUEL CYCLE 16
CORE OPERATING LIMITS REPORT**

1.0 INTRODUCTION

The Core Operating Limits Report (COLR) for Plant Hatch Unit 1 Cycle 16 is prepared in accordance with the requirements of Technical Specification 6.9.1.11. The core operating limits presented herein were developed using NRC-approved methods (References 1 and 2). Results from the reload analyses for the General Electric (GE) fuel in Unit 1 Cycle 16 are documented in References 3 and 4.

The following cycle-specific core operating limits are included in this report:

- a. **Operation with a Limiting Control Rod Pattern** (for a Rod Withdrawal Error (RWE)) - Technical Specification 3.3.F.
- b. **Average Planar Linear Heat Generation Rate (APLHGR)** - Technical Specification 3.11.A.
- c. **Minimum Critical Power Ratio (MCPR)** - Technical Specifications 3.11.C and 4.11.C.
- d. **Linear Heat Generation Rate (LHGR)** - Technical Specification 3.11.B.

2.0 LIMITING CONTROL ROD PATTERN (Technical Specification 3.3.F)

Both Rod Block Monitor (RBM) channels shall be operable as specified in Technical Specification 3.3.F and when:

- a. THERMAL POWER is $< 90\%$ of RATED THERMAL POWER and the MCPR is < 1.70
- or
- b. THERMAL POWER is $\geq 90\%$ of RATED THERMAL POWER and the MCPR is < 1.40 .

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3.0 APLHGR LIMITS (Technical Specification 3.11.A)

The APLHGR limits are given by the applicable rated-power, rated-flow limit taken from Figures 3-3 through 3-8, multiplied by the smaller of either:

- a. The factor given by Figure 3-1

or

- b. The factor given by Figure 3-2.

For the fuel types whose APLHGR limits are shown in Figures 3-3 through 3-8, the APLHGR limit shall be applied to each axial location in the fuel assembly.

As required by GESTAR Amendment 19, the hand-calculated APLHGR values for a multi-lattice (i.e., GE9-330, GE9-331, and GE13-LUA) fuel must be less than or equal to the APLHGR limits shown in Figures 3-4, 3-7, and 3-8, respectively. When APLHGR values are determined by the process computer, the lattice-dependent APLHGR limits are used. Under these conditions, some axial locations may have APLHGR values exceeding the values shown in Figures 3-4, 3-7, and 3-8.

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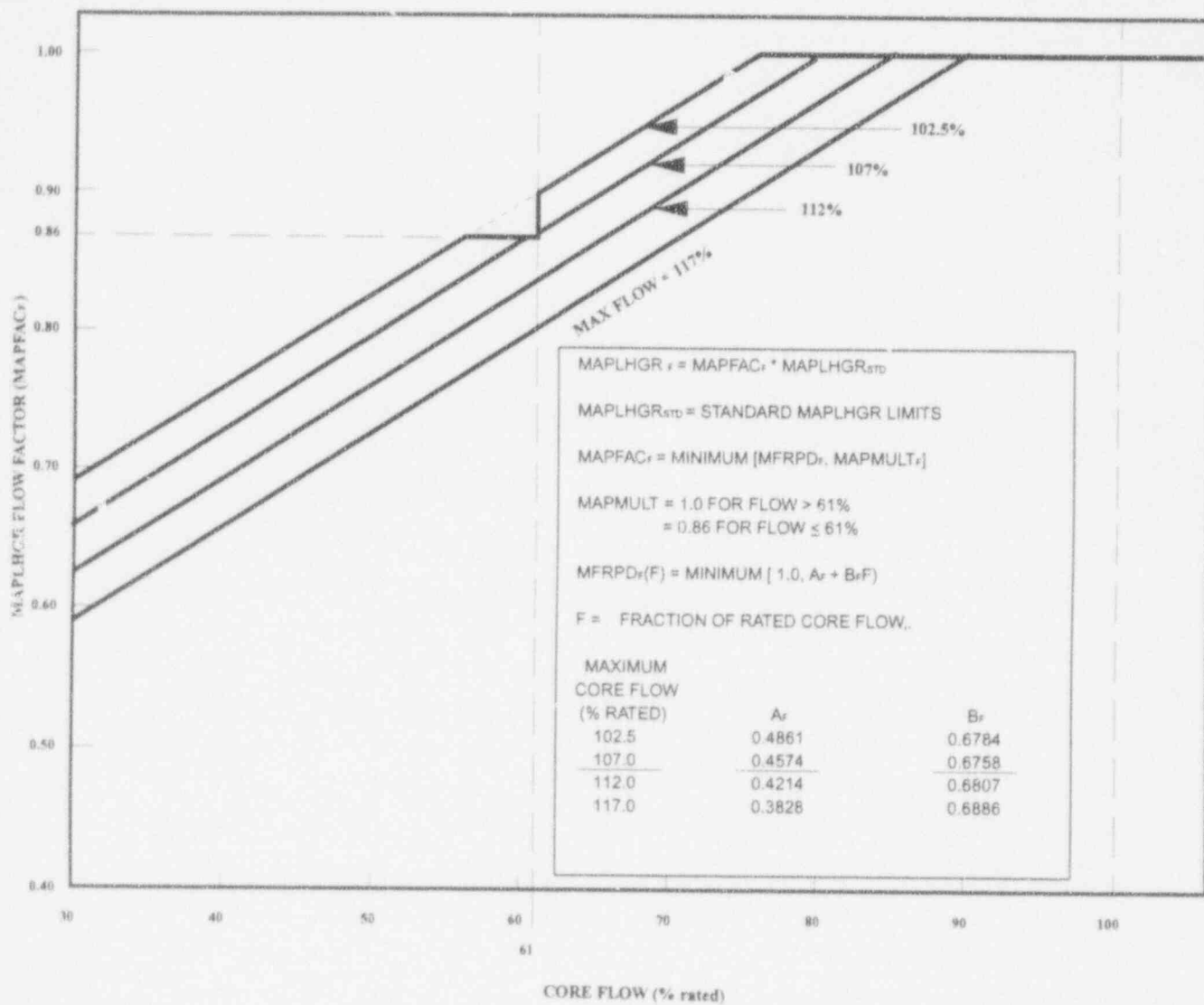


FIGURE 3-1

MAPFAC_F

Plant Hatch Unit 1 Fuel Cycle 16
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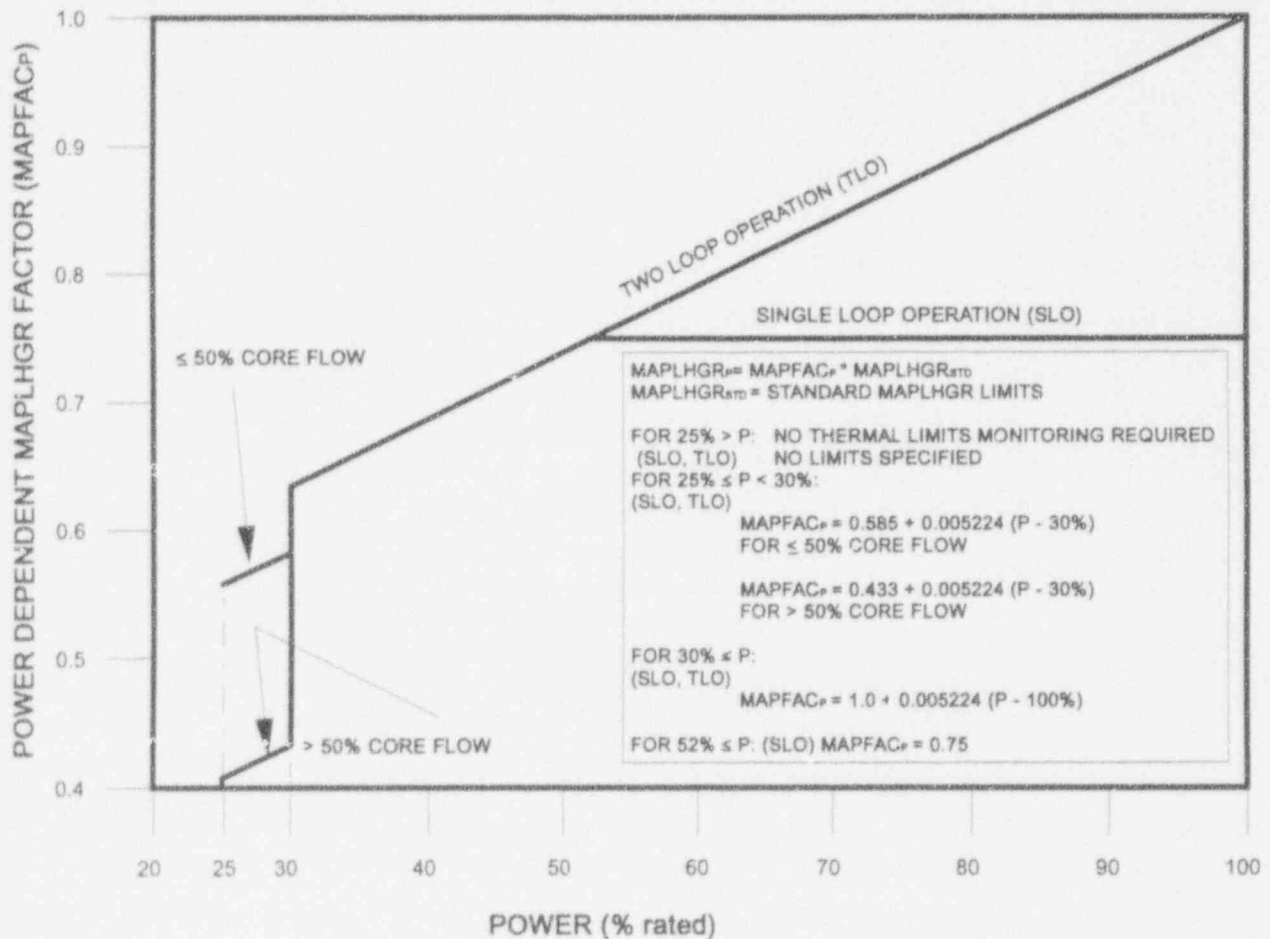


FIGURE 3-2

MAPFAC_p

Plant Hatch Unit 1 Fuel Cycle 16
Core Operating Limits Report

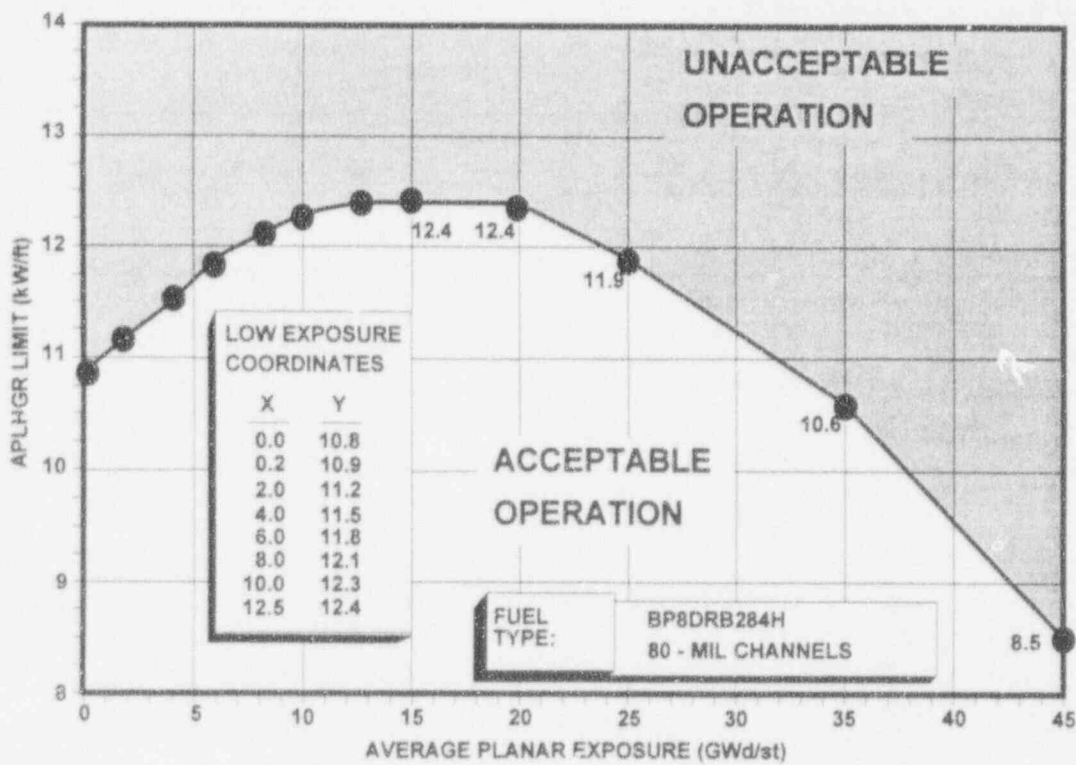


FIGURE 3-3
APLHGR LIMITS
VERSUS
AVERAGE PLANAR EXPOSURE
(Fuel Type: BP8DRB284H)

Plant Hatch Unit 1 Fuel Cycle 16
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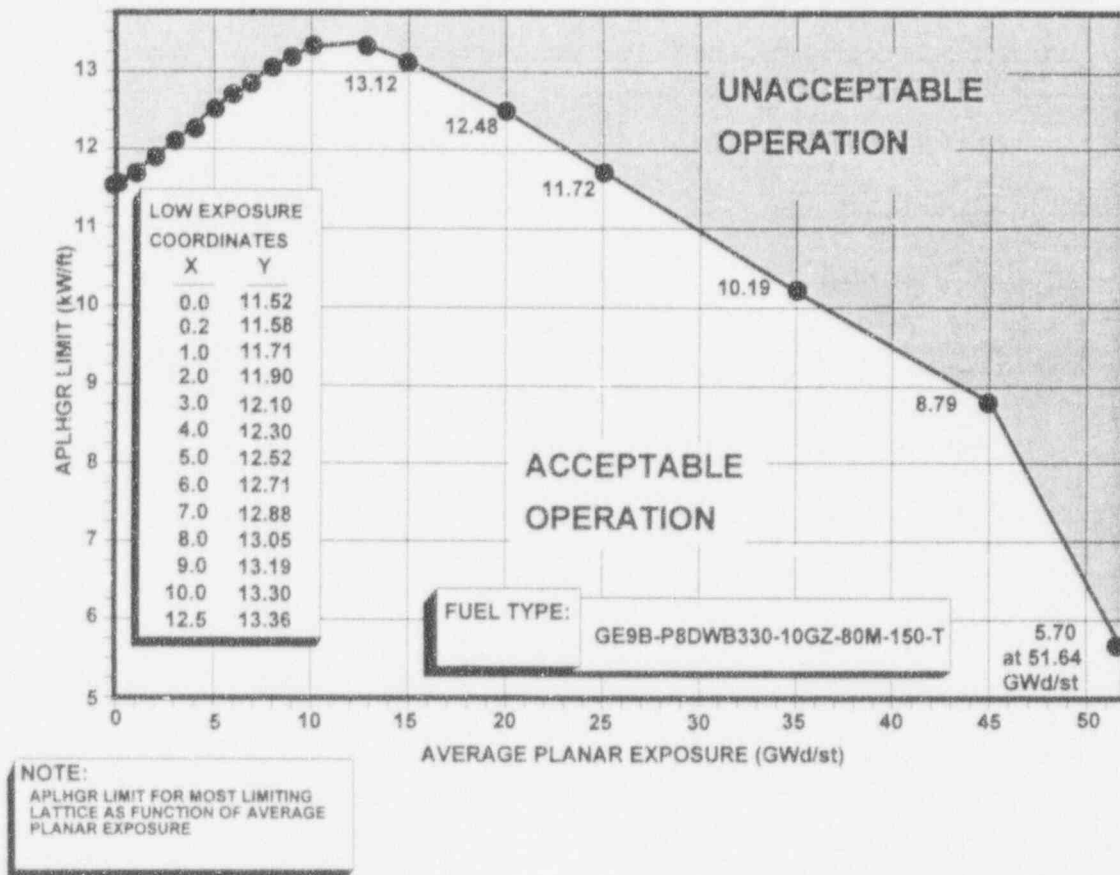


FIGURE 3-4
APLHGR LIMITS
VERSUS
AVERAGE PLANAR EXPOSURE
(Fuel Type: GE9B-P8DWB330-10GZ-80M-150-T)

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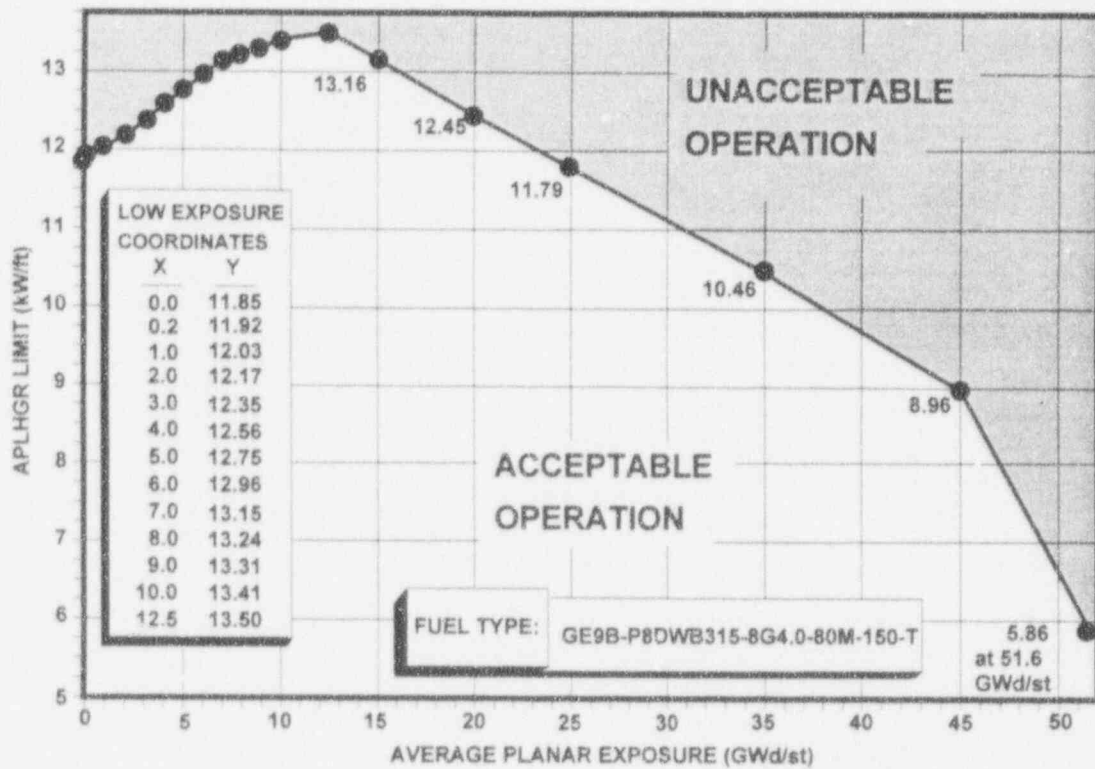


FIGURE 3-5

APLHGR LIMITS
VERSUS
AVERAGE PLANAR EXPOSURE
(Fuel Type: GE9B-P8DWB315-8G4.0-80M-150-T)

Plant Hatch Unit 1 Fuel Cycle 16
Core Operating Limits Report

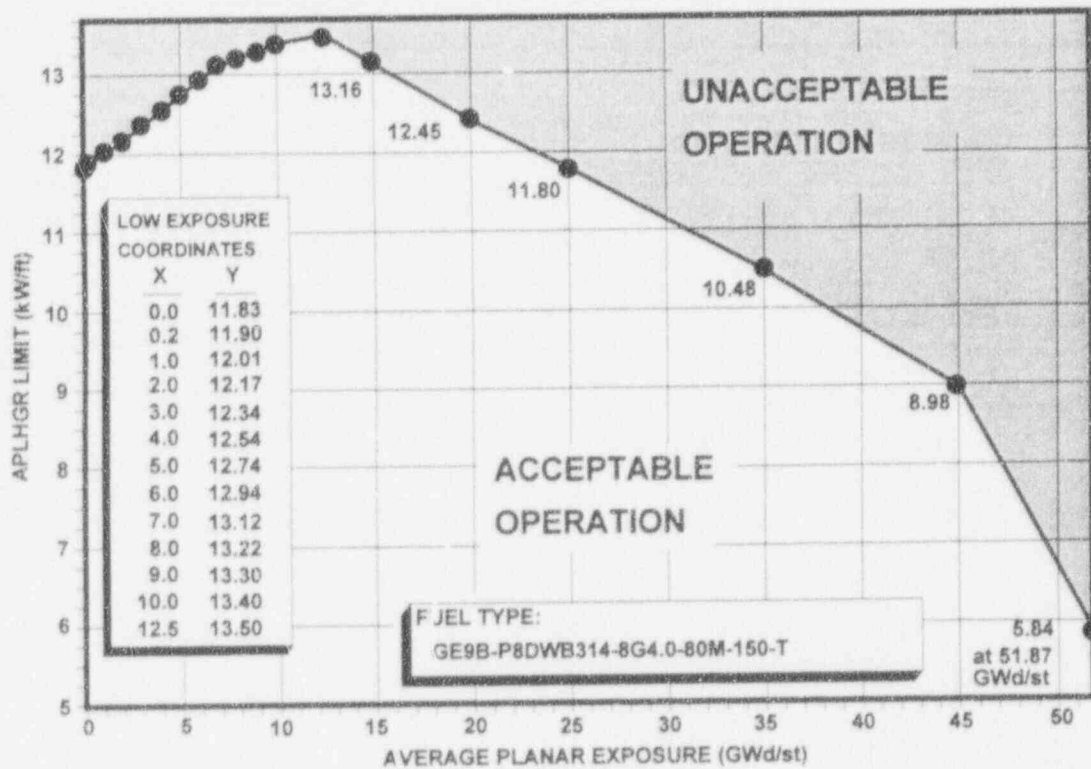


FIGURE 3-6

APLHGR LIMITS
VERSUS
AVERAGE PLANAR EXPOSURE
(Fuel Type: GE9B-P8DWB314-8G4.0-80M-150-T)

Plant Hatch Unit 1 Fuel Cycle 16
Core Operating Limits Report

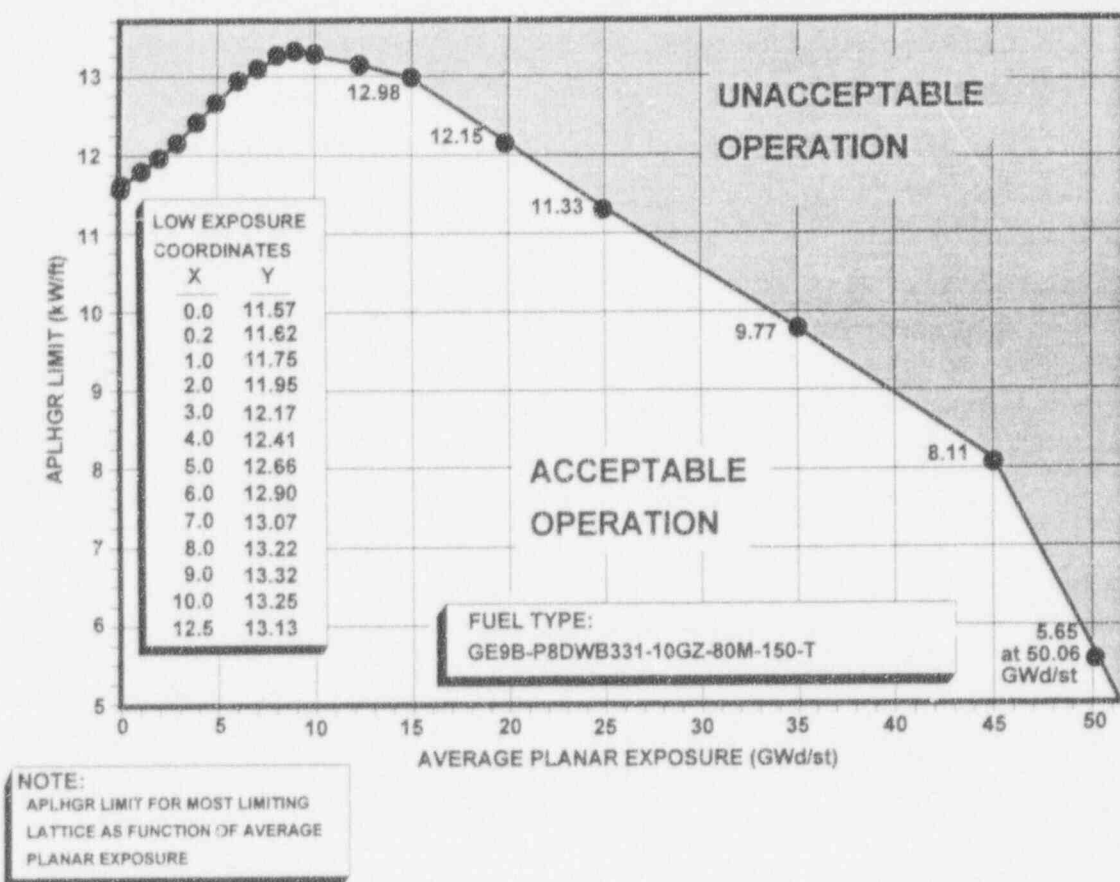


FIGURE 3-7

APLHGR LIMITS
VERSUS
AVERAGE PLANAR EXPOSURE
(Fuel Type: GE9B-P8DWB331-10GZ-80M-150-T)

Plant Hatch Unit 1 Fuel Cycle 16
Core Operating Limits Report

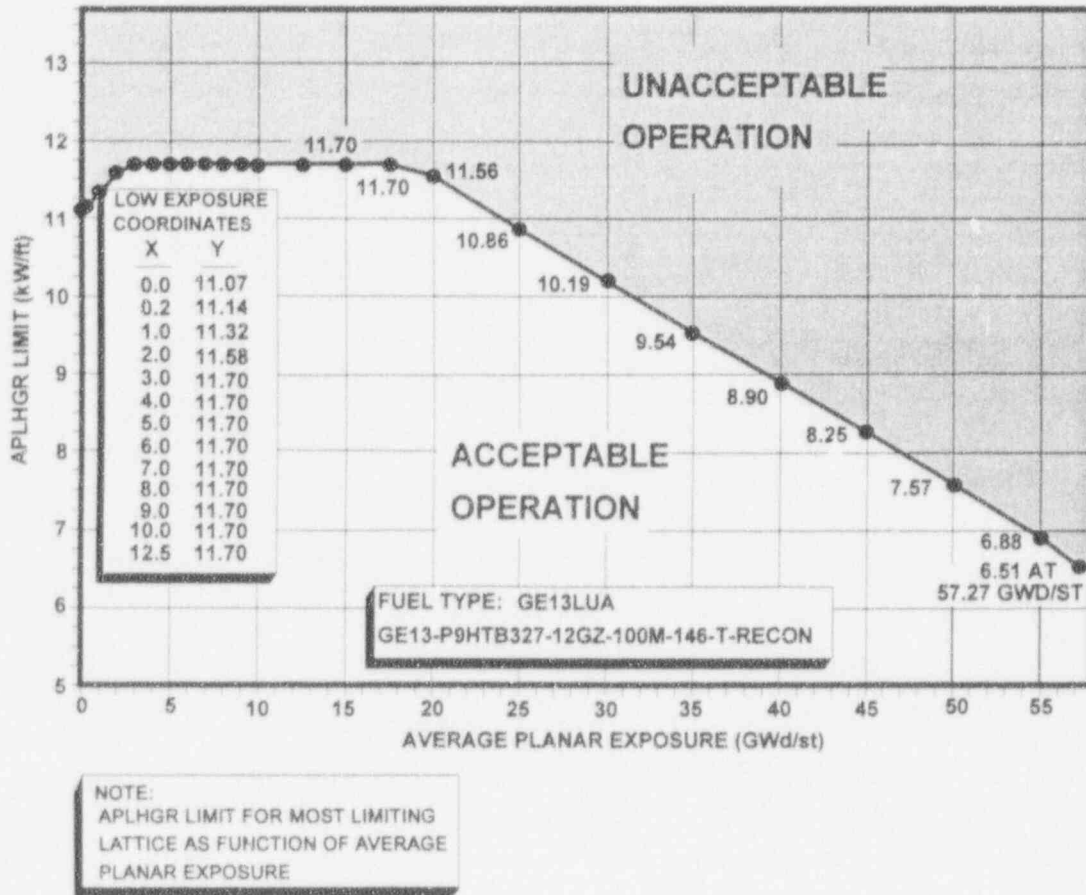


FIGURE 3-8

APLHGR LIMITS
VERSUS
AVERAGE PLANAR EXPOSURE
(GE13-LUA -- GE13-P9HTB327-12GZ-100M-146-T-RECON)

4.0 MCPR OPERATING LIMITS (Technical Specifications 3.11.C and 4.11.C)

The MCPR operating limit (OLMCPR) is a function of fuel design, average scram time, core flow, number of operating recirculation loops, operability of end-of-cycle recirculation pump trip (EOC-RPT) system, and core power. Note that in Figure 4-3, the rated-power and rated-flow OLMCPR is fuel-type dependent; e.g., the Option B limits are 1.29 for GE7 and GE9 fuels, and 1.41 for GE13 fuel. The values shown in Figure 4-3 apply to all combinations of operating strategies for all exposures when the EOC-RPT system is operable.

4.1 Two Recirculation Loop Operation

For $25\% \leq \text{power} < 30\%$, the OLMCPR is given in Figure 4-1. For power $\geq 30\%$, the OLMCPR is the greater of either:

- a. The applicable limit determined from Figure 4-2
- or
- b. The appropriate K_p given in Figure 4-1, multiplied by the appropriate limit shown in Figure 4-3 where the scram time dependence is given in Technical Specification 4.11.C.2.

4.2 Single Recirculation Loop Operation

For single-loop operation, the OLMCPR shall be 0.01 greater than the two-loop value which is determined as specified in Section 4.1.

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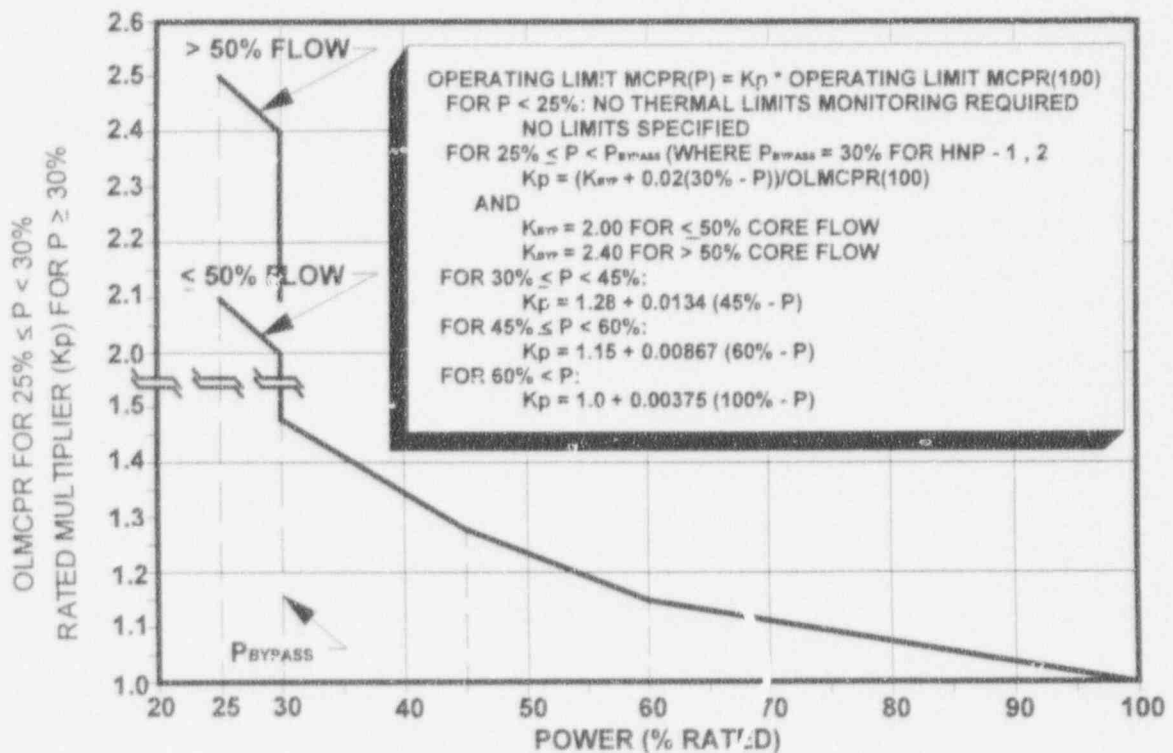


FIGURE 4-1

POWER-DEPENDENT MCPR MULTIPLIER (K_p)

Plant Hatch Unit 1 Fuel Cycle 16
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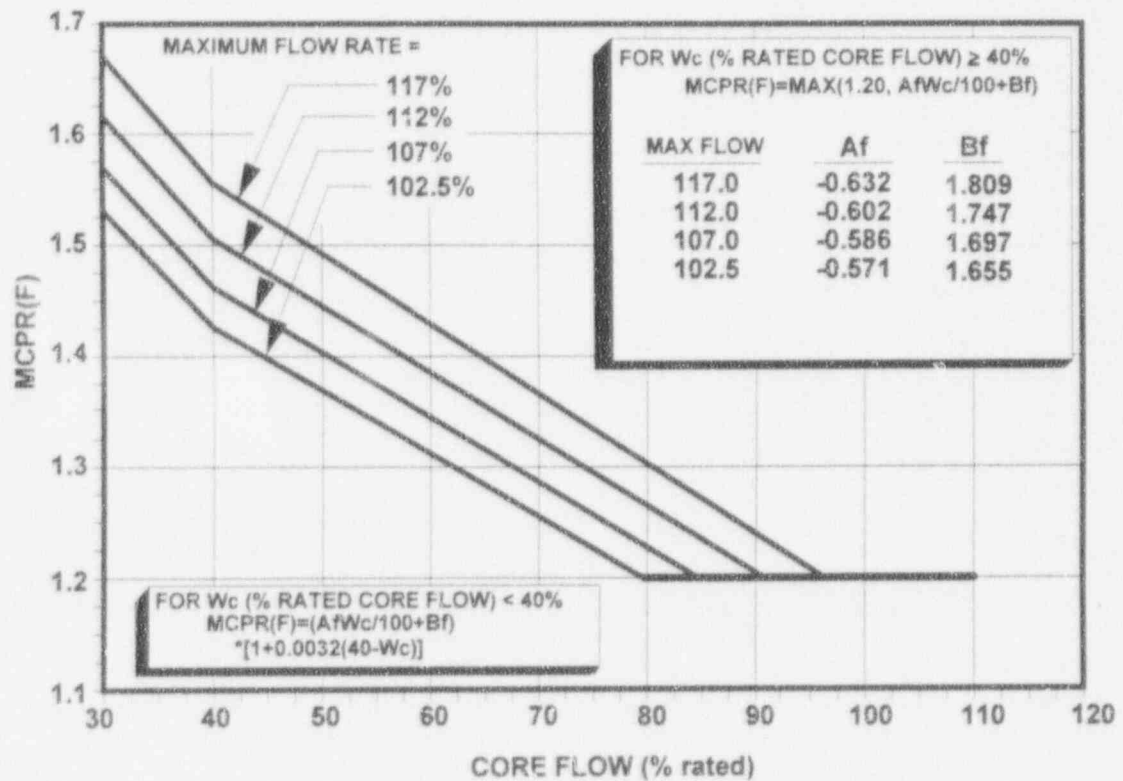
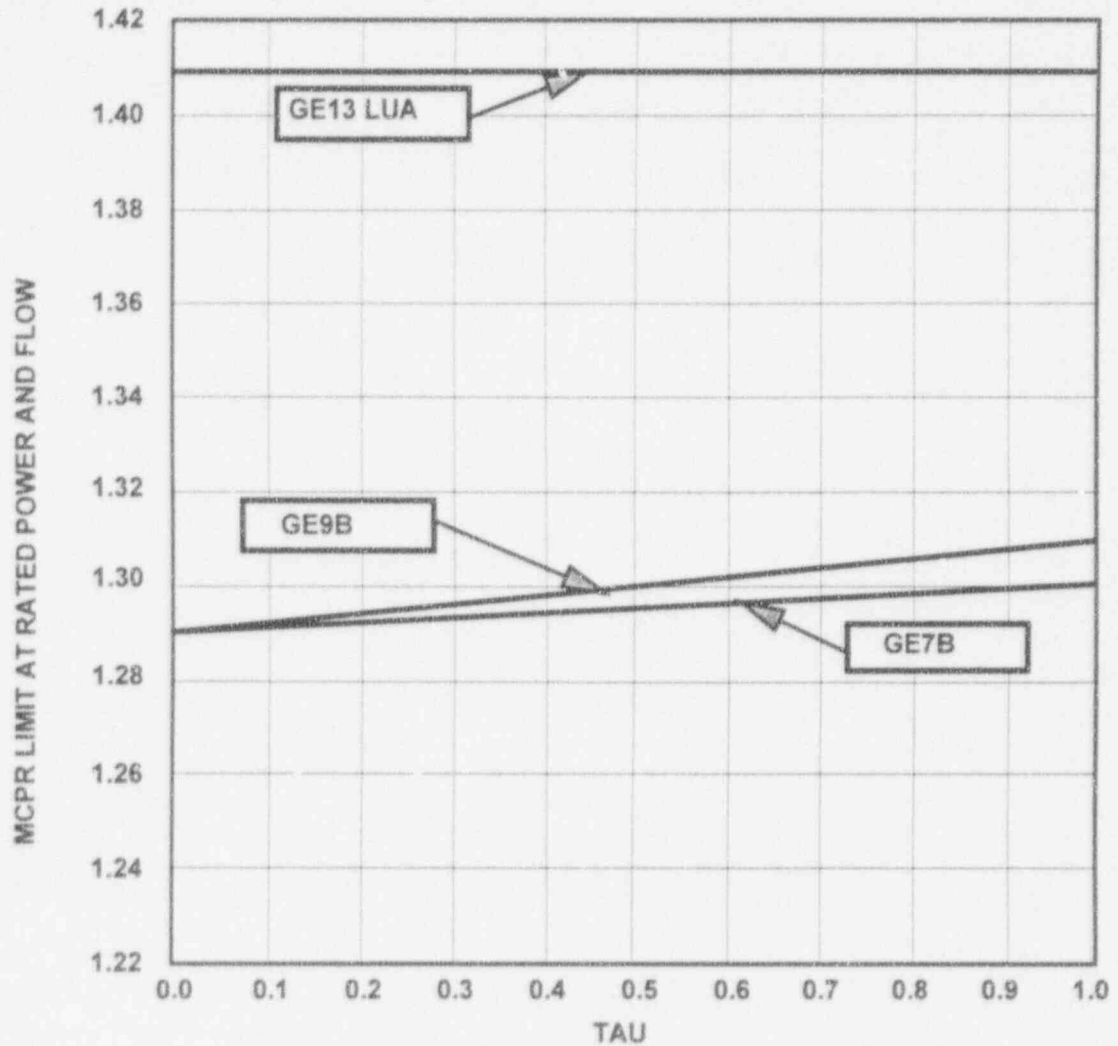


FIGURE 4-2

FLOW-DEPENDENT MCPR LIMITS ($MCPR_F$)

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Note: MCPR limits are applicable to all exposures less than end-of-cycle minus 2000 MWD/st when the EOC-RPT system is inoperable, and applicable to all exposures when the EOC-RPT system is operable.

FIGURE 4-3

MCPR LIMITS AS FUNCTION OF AVERAGE SCRAM TIME
AND FUEL TYPE

Plant Hatch Unit 1 Fuel Cycle 16 Core Operating Limits Report

5.0 LHGR LIMITS (Technical Specification 3.11.B)

The LHGR limit is 13.4 kW/ft for all GE7 fuel. The LHGR limit for GE9 and GE13 fuels is 14.4 kW/ft.

6.0 REFERENCES

1. "General Electric Standard Application for Reactor Fuel," NEDE-24011-P-A-10-US, March 1991.
2. Letter, L. P. Crocker (NRC) to W. G. Hairston (GPC), "Issuance of Amendment No. 168 to Facility Operating License DPR-57 and Amendment 106 to Facility Operating License NPF-5 - Edwin I. Hatch Nuclear Plant, Units 1 and 2 (TACS 73614/73615)," December 29, 1989.
3. "Supplemental Reload Licensing Submittal for Edwin I. Hatch Nuclear Plant Unit 1, Reload 15, Cycle 16," General Electric Document 24A5156, Revision 0, September 1994.
4. "Edwin I. Hatch Nuclear Plant Units 1 and 2 SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis," NEDC-31376-P, December 1986.
5. Edwin I. Hatch Nuclear Plant Unit 1 Technical Specifications, Bases 3.3.F and 3.11.A, B, and C.