

PLANT DATA BOOK ENTRY SUBMITTAL SHEET

TITLE: Unit 1 Core Operating Limits Report
Perry Nuclear Power Plant
Cycle 2 (Reload 1)

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SCOPE OF CHANGE: N/A

SAMPLE

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PREPARED BY: P. W. Bordley

REVIEWED BY: _____

PORC MEETING NO.: _____ Date _____

APPROVED BY: _____
Director - Perry Plant
Technical Department Date _____

UNIT 1 CORE OPERATING LIMITS REPORT

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SCOPE OF REVISION

Affected Revision	Summary of Changes	Date
0	Original Issue	5/15/90

INTRODUCTION AND REFERENCES

INTRODUCTION

This Core Operating Limits Report for PNPP Unit 1 Cycle 2 is prepared in accordance with the requirements of PNPP Technical Specification 6.9.1.9. The core operating limits presented here were developed using NRC-approved methods (Reference 2). Results from the reload analyses for the General Electric fuel in PNPP Unit 1 Cycle 2 are documented in References 3 and 4.

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. (Technical Specification 3/4.2.1)
2. Minimum Critical Power Ratio Operating Limit including the power and flow dependent MCPR curves. (Technical Specification 3/4.2.2)
3. Linear Heat Generation Rate (LHGR) Limit for each fuel/lattice type. (Technical Specification 3/4.2.3)

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REFERENCES

1. USNRC Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications," October 4, 1988.
2. "General Electric Standard Application for Reactor Fuel-GESTAR II," NEDE-24011-P-A (latest approved revision) and NEDE-24011-P-A-US (US Supplement - latest approved revision).
3. "Supplemental Reload Licensing Submittal for the Perry Nuclear Power Plant Unit 1, Reload 1, Cycle 2," GE Document 23A5948 Rev. 1. (November 1988).
4. "Supplement 1 to the Supplemental Reload Licensing Submittal for the Perry Nuclear Power Plant Unit 1, Reload 1, Cycle 2," GE Document 23A5948AA Rev. 0. (October 1988).

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_f) Figure 3.2.1-1, or the power dependent MAPLHGR factor (MAPFAC_p) Figure 3.2.1-2.

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* These applicable MAPLHGR values are:

1. Those that have been approved for the respective fuel and lattice type 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 as a function of the average planar exposure for the most limiting lattice (excluding natural uranium) shown in Figures 3.2.1-3 through Figure 3.2.1-6 for the applicable type of fuel.

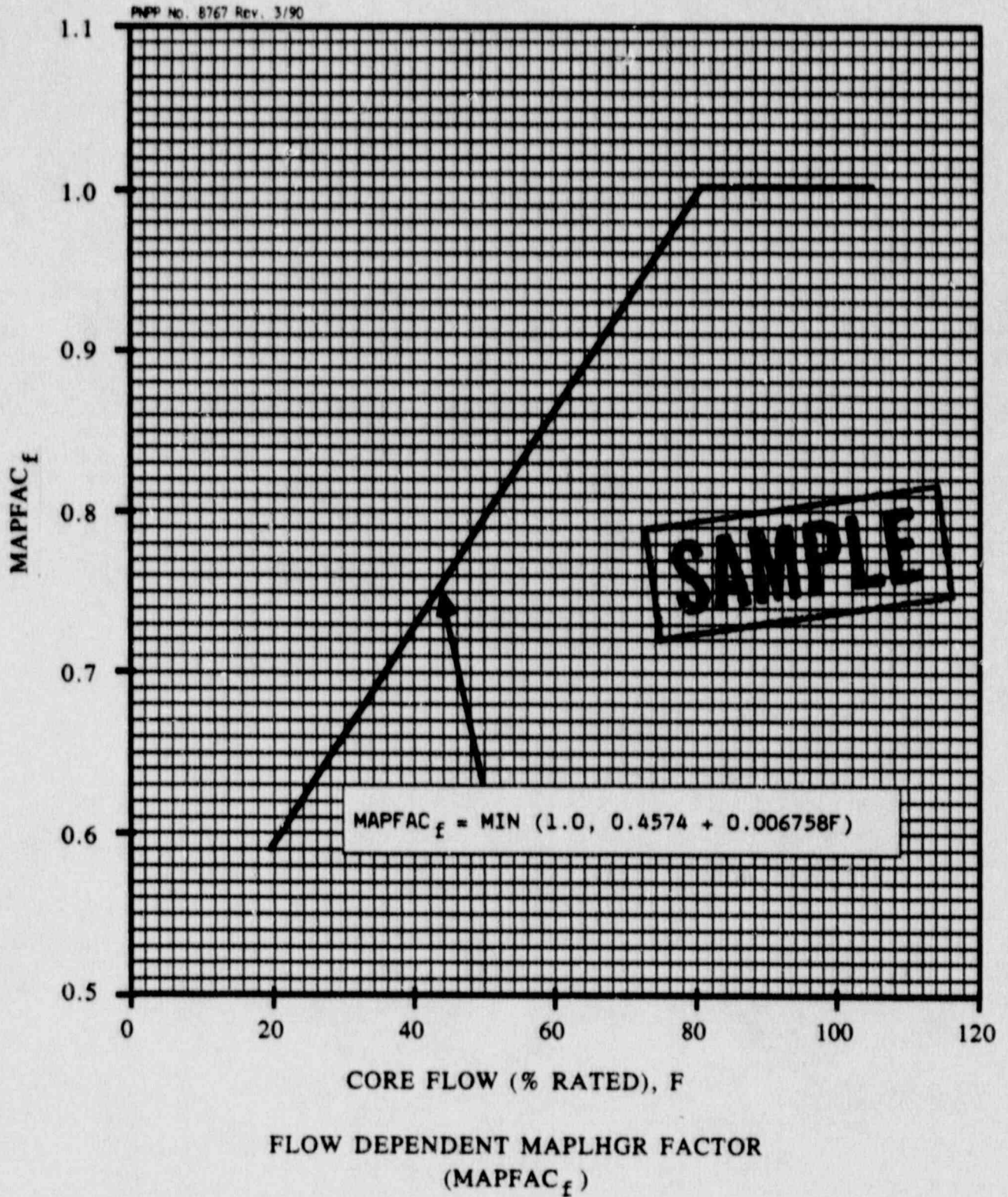


FIGURE 3.2.1-1

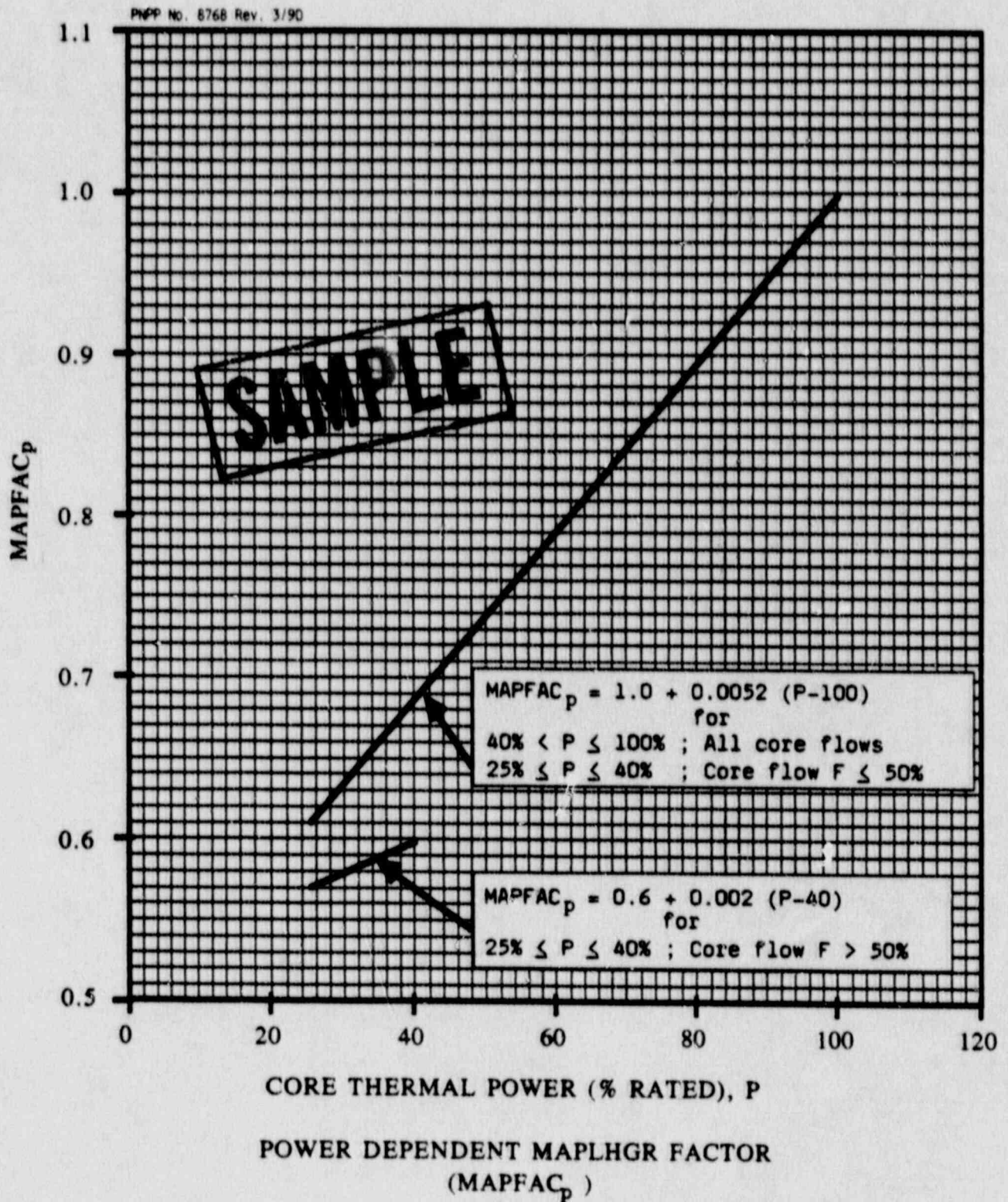
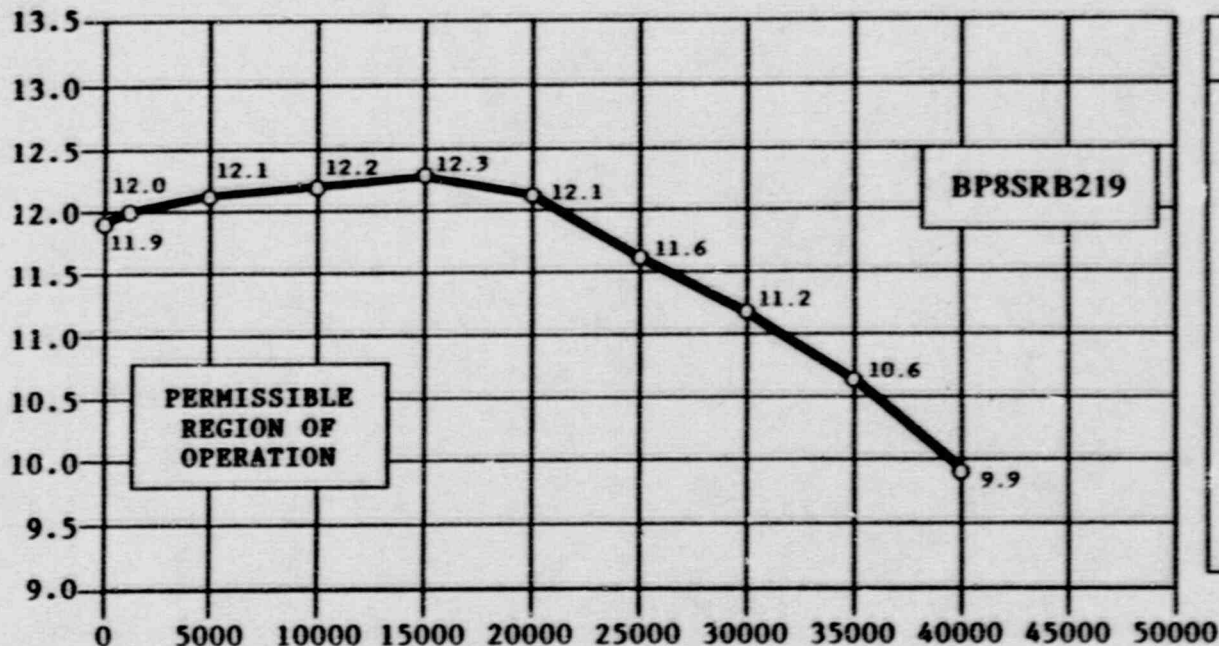


FIGURE 3.2.1-2

MAXIMUM AVERAGE PLANAR LINEAR
HEAT GENERATION RATE (kW/ft)



AVERAGE PLANAR EXPOSURE (MWd/t)

MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, BP8x8R

FUEL TYPE BP8SRB219

FIGURE 3.2.1-3

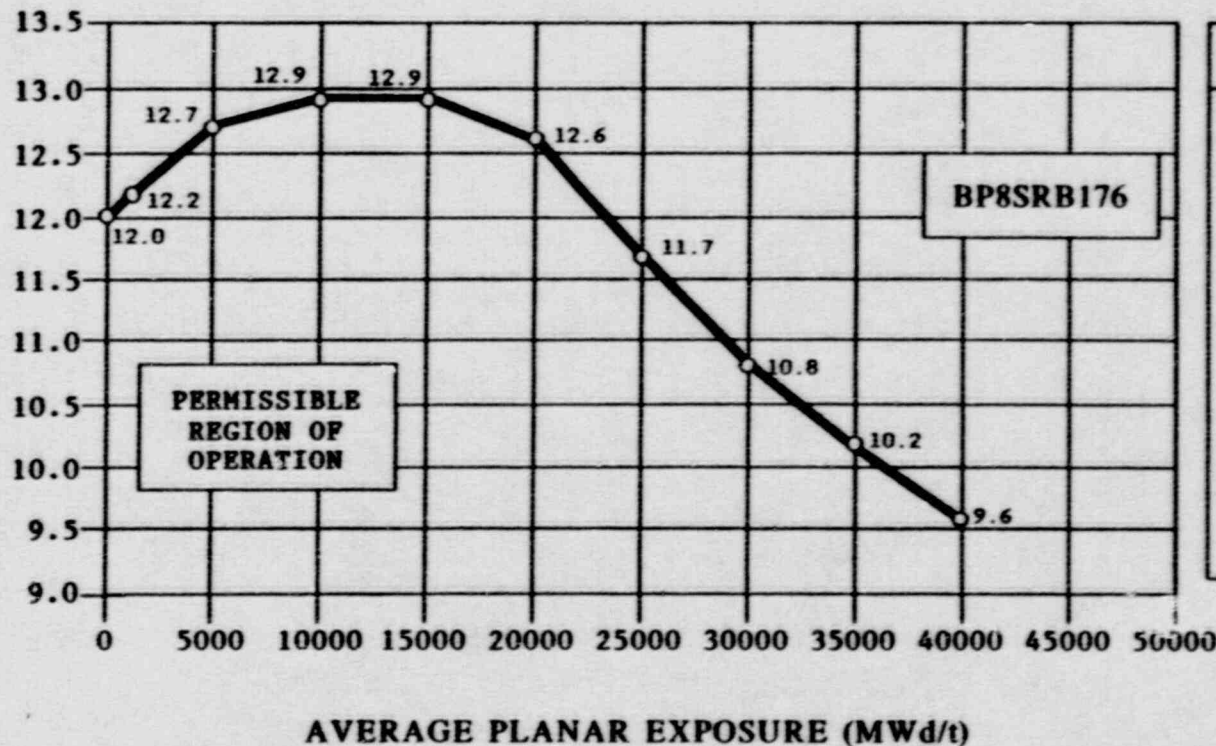
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Note: Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.

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EXPOSURE (MWd/t)	MAPLHGR (kW/ft)
0.0	11.9
1.0	12.0
5.0	12.1
10.0	12.2
15.0	12.3
20.0	12.1
25.0	11.6
30.0	11.2
35.0	10.6
40.0	9.9

MAXIMUM AVERAGE PLANAR LINEAR
HEAT GENERATION RATE (kW/ft)



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, BP8x8R

FUEL TYPE BP8SRB176

FIGURE 3.2.1-4

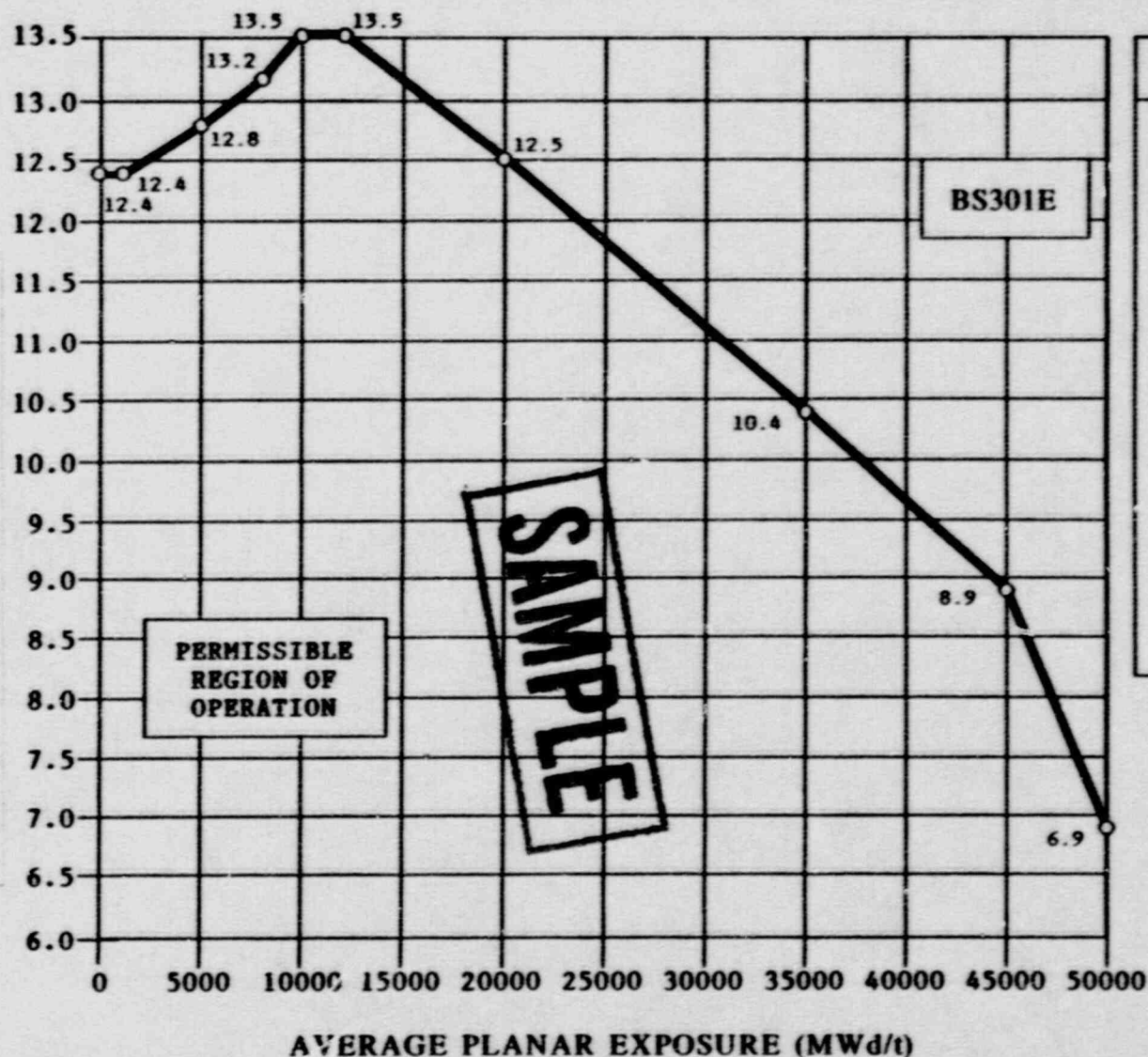
SAMPLE

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

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EXPOSURE (MWd/t)	MAPLHGR (kW/ft)
0.0	12.0
1.0	12.2
5.0	12.7
10.0	12.9
15.0	12.9
20.0	12.6
25.0	11.7
30.0	10.8
35.0	10.2
40.0	9.6

MAXIMUM AVERAGE PLANAR LINEAR
HEAT GENERATION RATE (kW/ft)



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8EB

FUEL TYPE BS301E

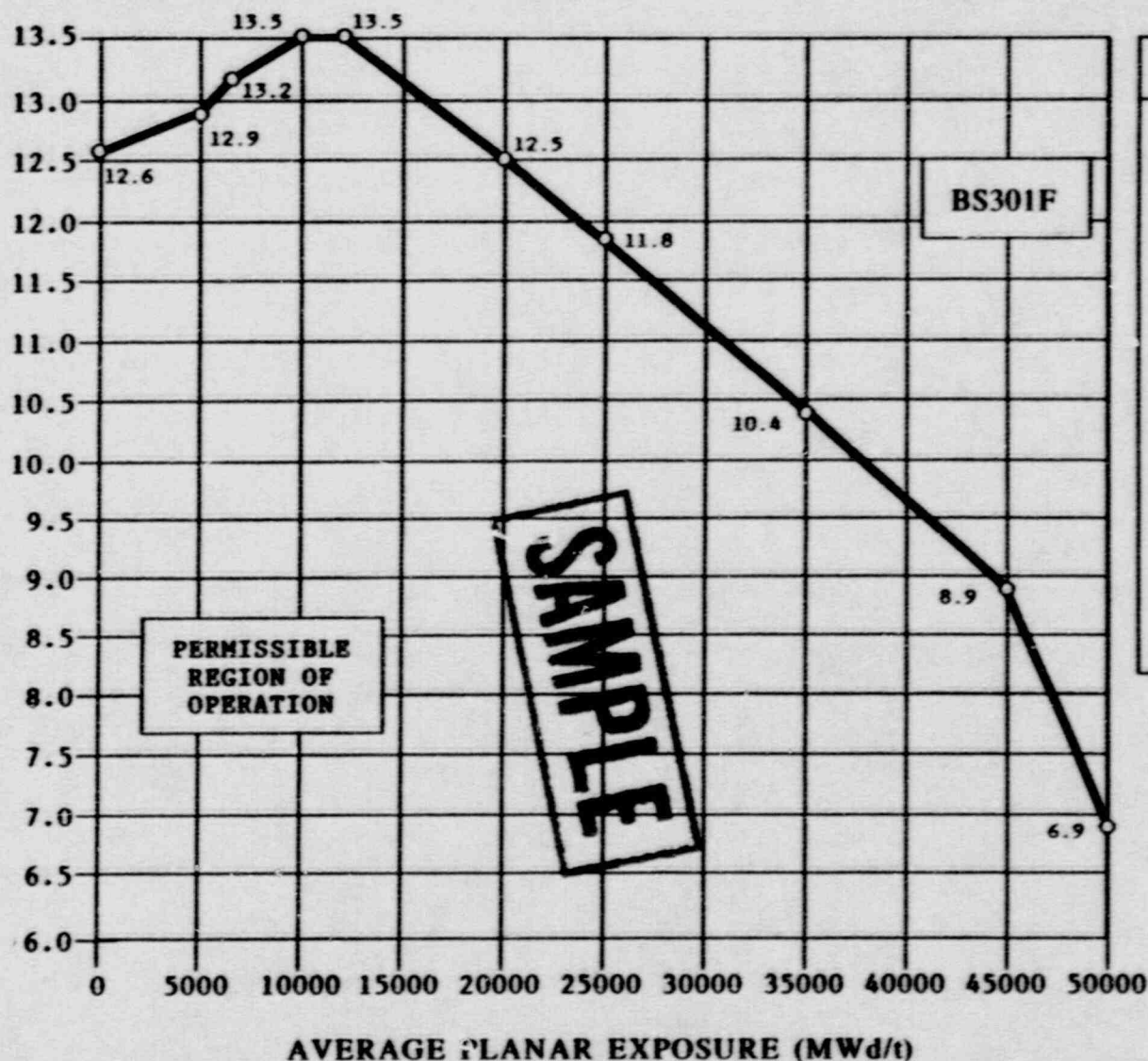
FIGURE 3.2.1-5

- Notes:
1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.
 2. This curve is a composite of the most limiting enriched fuel lattices. For lattice specific values consult Supplement 1 to the Supplemental Reload Licensing Submittal.

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EXPOSURE (MWd/t)	MAPLHGR (kW/ft)
0.0	12.4
1.0	12.4
5.0	12.8
7.0	-
8.0	13.2
10.0	13.5
12.5	13.5
20.0	12.5
25.0	-
35.0	10.4
45.0	8.9
50.0	6.9

MAXIMUM AVERAGE PLANAR LINEAR
HEAT GENERATION RATE (kW/ft)



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8EB

FUEL TYPE BS301F

FIGURE 3.2.1-6

- Notes:
1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.
 2. This curve is a composite of the most limiting enriched fuel lattices. For lattice specific values consult Supplement 1 to the Supplemental Reload Licensing Submittal.

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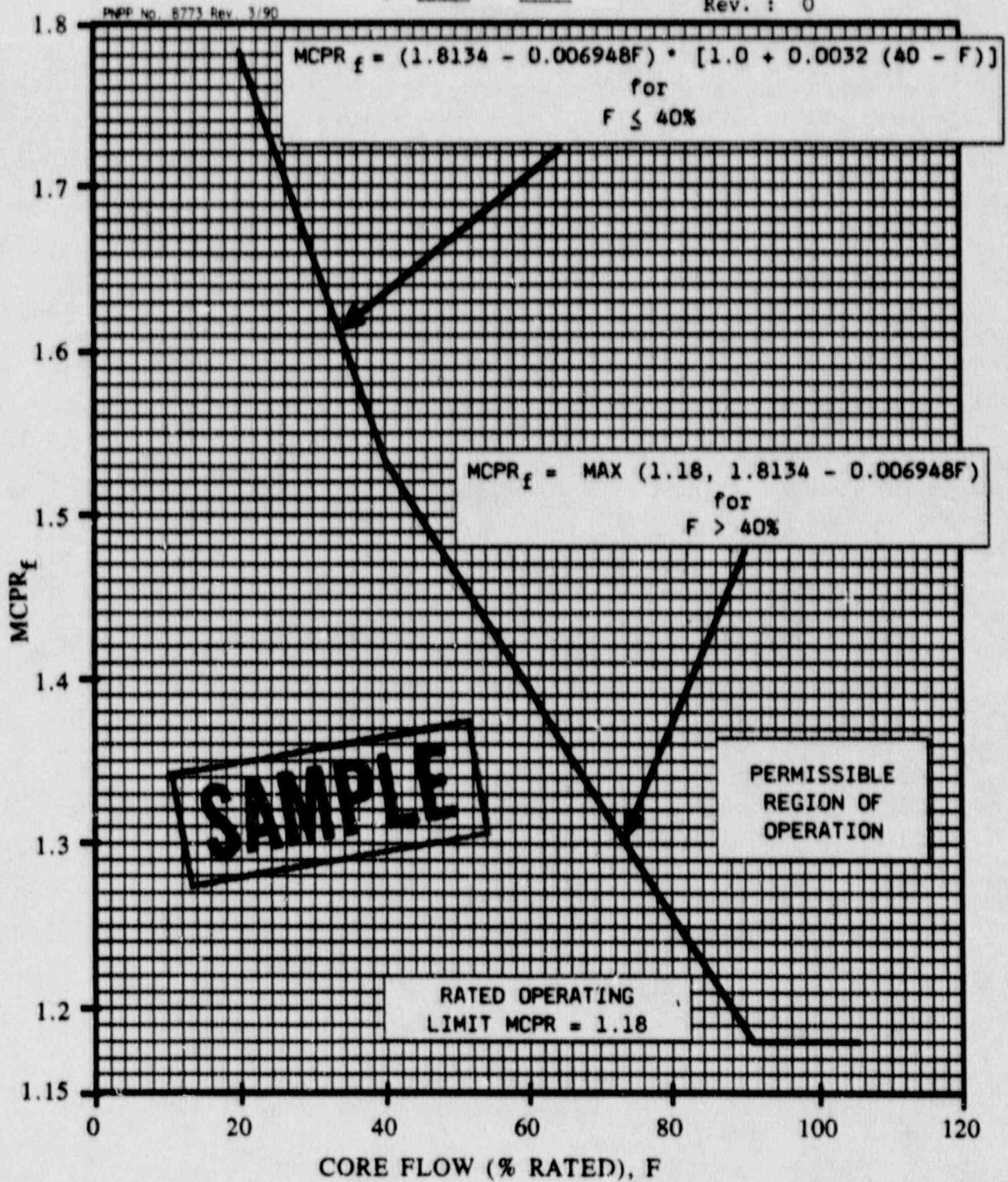
EXPOSURE (MWd/t)	MAPLHGR (kW/ft)
0.0	12.6
1.0	-
5.0	12.9
7.0	13.2
8.0	-
10.0	13.5
12.5	13.5
20.0	12.5
25.0	11.8
35.0	10.4
45.0	8.9
50.0	6.9

MINIMUM CRITICAL POWER RATIO (TS 3.2.2)

The MINIMUM CRITICAL POWER RATIO (MCPR) shall be equal to or greater than both the MCPR_f and MCPR_D limits at the indicated core flow, THERMAL POWER, delta T* and core average exposure compared to the End of Cycle Exposure (EOCE)** as specified in Figures 3.2.2-1 and 3.2.2-2.

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- * This delta T refers to the planned reduction of rated feedwater temperature from nominal rated feedwater temperature (420°F), such as prolonged removal of feedwater heater(s) from service.
- ** End of Cycle Exposure (EOCE) is defined as 1) the core average exposures at which there is no longer sufficient reactivity to achieve RATED THERMAL POWER with rated core flow, all control rods withdrawn, all feedwater heaters in service and equilibrium Xenon, or 2) as specified by the fuel vendor.



FLOW DEPENDENT MCPR FACTOR
 ($MCPR_f$)

FIGURE 3.2.2-1

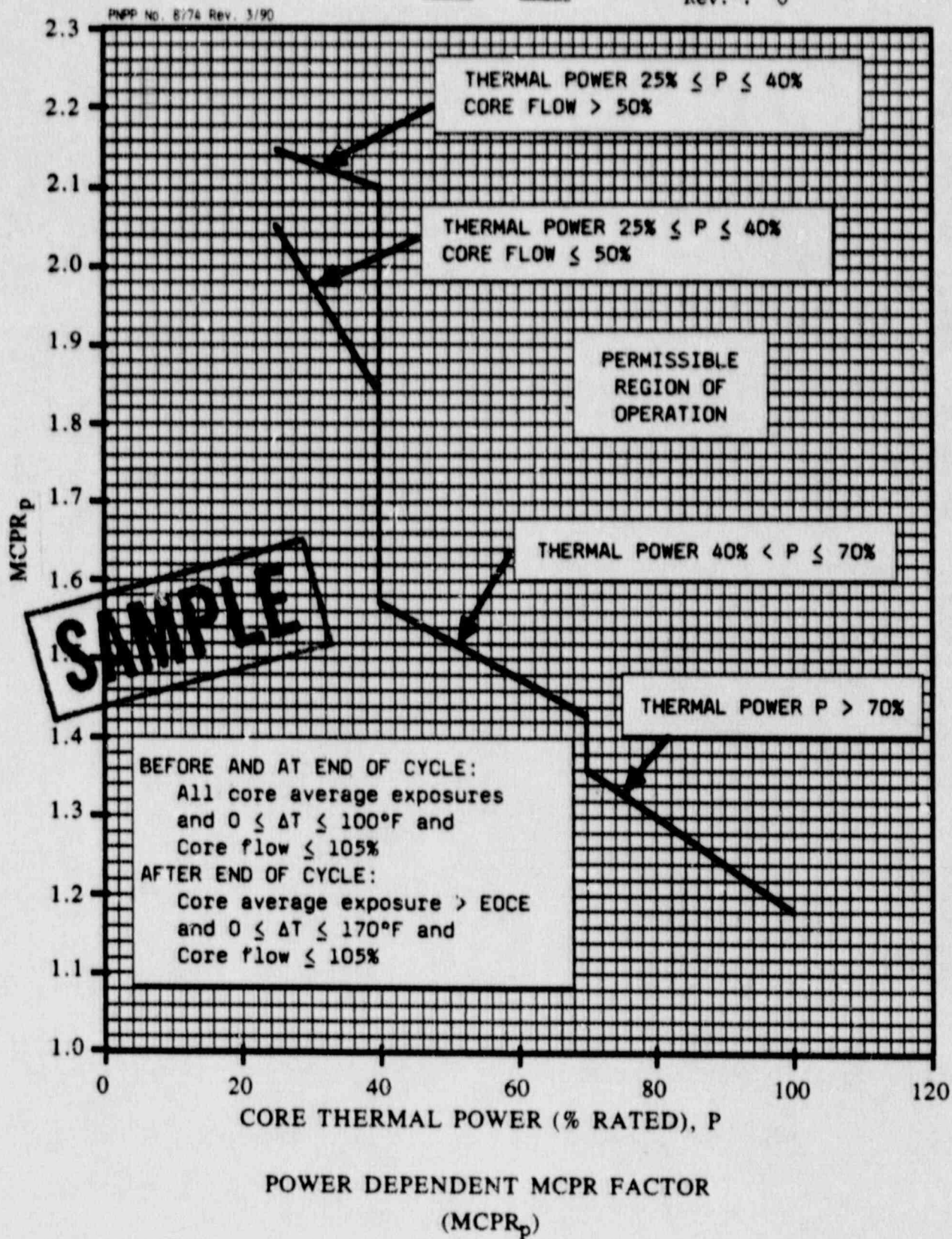


FIGURE 3.2.2-2

LINEAR HEAT GENERATION RATE (TS 3.2.3)

The LINEAR HEAT GENERATION RATE (LHGR) shall not exceed:

a. 13.4 kw/ft for the following fuel types:

1. BP8SRB219
2. BP8SRB176

b. 14.4 kw/ft for the following fuel types:

1. BS301E
2. BS301F

SAMPLE