RIVER BEND STATION, CYCLE 6

CORE OPERATING LIMITS REPORT (COLR)

October 1995

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SUMMARY OF CHANGES FOR REVISION 1

The COLR was revised to account for the change in the core as loaded configuration made in mid-cycle 6 to replace a leaking fuel bundle. Except for the revision number on each page the only pages effected by this revision are 1, 2, 4, 8 and 19. No core operating limits have changed.

SUMMARY OF CHANGES FOR REVISION 2

The COLR was revised to account for the implementation of Increased Core Flow (ICF) at River Bend Station. The only operating limit that is effected by ICF is $MCPR_f$ (Figure 9). The $MCPR_f$ curve is extended to be applicable at 107% core flow per reference 6.

Also, changes were made due to implementation of Improved Technical Specifications (ITS). No limits are impacted by these changes. ITS sections 3.2.4 and 5.6.5 state that the APRM Gain and Setpoints shall be documented in the COLR. This information is transferred from Technical Specifications to the COLR as part of the implementation of ITS.

Except for the revision number on each page the pages effected by this revision are 1-7 and 17.

INTRODUCTION AND SUMMARY

This report provides the values of the AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR) limits, the core flow dependent MINIMUM CRITICAL POWER RATIO (MCPR) limits, $MCPR_f$, the thermal power dependent MCPR limits $MCPR_p$, the LINEAR HEAT GENERATION RATE (LHGR) limits, and the REACTOR PROTECTION SYSTEM (RPS) response time for APRM thermal time constant for River Bend Station, Cycle 6 as required by Technical Specification 5.6.5. Technical Specifications requirements these values have been determined using NRC-approved methodology and are established such that all applicable limits of the plant safety analysis are met.

TECHNICAL SPECIFICATION 3.2.1

POWER DISTRIBUTION LIMITS

AVERAGE PLANAR LINEAR HEAT GENERATION RATE

The limiting APLHGR value for the most limiting lattice (excluding natural uranium) of each fuel type as a function of AVERAGE PLANAR EXPOSURE is given in Figures 1, 2, 3, 4, 5, 6, 7 and 8. These values were determined with the SAFE/REFLOOD LOCA methodology described in GESTAR-II (Reference 1). Core location by fuel type is provided in Figure 11, which is modified from the final core loading pattern in revision zero of this report per reference 3. This is verified as the as loaded core configuration per Reference 5. These figures are used if alternate calculations are required. The limits of these figures shall be reduced to a value of 0.84 times the two recirculation loop operation limit when in single loop operation (Reference 4).

TECHNICAL SPECIFICATION 3.2.2

POWER DISTRIBUTION LIMITS

MINIMUM CRITICAL POWER RATIO

The MCPR limits for use in Technical Specification 3.2.3 for $MCPR_f$ and $MCPR_p$ are shown in Figures 9 and 10. These values were determined with the GEMINI methodology and GEXL-PLUS critical power ratio correlation described in GESTAR-II (Reference 1) and are consistent with a Safety Limit MCPR of 1.07. Revision 2 extends the $MCPR_f$ curve to be applicable at increased core flow conditions (107% core flow) per reference 6.

TECHNICAL SPECIFICATION 3.2.3

POWER DISTRIBUTION LIMITS

LINEAR HEAT GENERATION RATE

The LHGR limits for use in Technical Specification 3.2.4 are 14.4 kw/ft for GE8x8EB fuel and 13.4 kw/ft for all other fuel types. The GE8x8EB fuel consists of fuel types GE8B-P8SQB322-8GZ-120M-4WR-150-T, GE8B-P8SQB322-9GZ-120M-4WR-150-T, GE8B-P8SQB333-10GZ-120M-4WR-150-T, GE8B-P8SQB331-11GZ-120M-4WR-150-T, GE8B-P8SQB334-10GZ-120M-4WR-150-T, GE8B-P8SQB334-10GZ2-120M-4WR-150-T and GE8B-P8SQB334-11GZ-120M-4WR-150-T. Core location by fuel type is provided in Figure 11.

The higher limit for GE8X8EB fuel is proprietary to GE and does not appear in Reference 1. The NRC SER on the GE8B design (Reference 2) recognizes the change to the LHGR limit, and the proprietary value is found in References 18 and 19 of Reference 2.

TECHNICAL SPECIFICATION TABLE 3.3.1.1-1

The simulated thermal power time constant for use in Technical Specification Table 3.3.1.1-1, SR 3.3.1.1.14, is:

6 ± 0.6 seconds.

The maximum simulated thermal power time constant for use in Technical Specification surveillance Table 3.3.1.1-1, SR 3.3.1.1.14 is:

6.6 seconds

TECHNICAL SPECIFICATION 3.2.4

POWER DISTRIBUTION LIMITS

Average Power Range Monitor (APRM) Gain and Setpoints

For APRM flow biased simulated thermal power-high scram trip setpoints and/or the flow biased neutron flux-upscale control rod block trip setpoint adjustment for the condition $T < 1.0$, the following relationships apply:

a. Two Recirculation Loop Operation

Trip Setpoint	Allowable Value
$S \leq (0.66W + 48\%)T$	$S \leq (0.66W + 51\%)T$
$S_{RB} \leq (0.66W + 42\%)T$	$S_{RB} \leq (0.66W + 45\%)T$

b. Single Recirculation Loop Operation

Trip Setpoint	Allowable Value
$S \leq (0.66W + 42.7\%)T$	$S \leq (0.66W + 45.7\%)T$
$S_{RB} \leq (0.66W + 36.7\%)T$	$S_{RB} \leq (0.66W + 39.7\%)T$

where: S and S_{RB} are in percent of rated thermal power,
W = Loop recirculation flow as a percentage of the loop recirculation flow which produces a rated core flow of 84.5 million lbs/hr,
T is defined in Technical Specification Basis section B 3.2.4

REFERENCES

1) NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," (latest approved version).

2) Letter, C.O. Thomas to J.S. Charnley, "Acceptance for Referencing of Licensing Topical Report," NEDE-24011-P-A-6, Amendment 10, General Electric Standard Application for Reload Fuel, May 28, 1985.

3) Letter, Charles J. Paone to Gary Scronce, "River Bend Verified Full Core Loading for Identified Leaker Replacement," GFP-928, File No: G25.4.3, September 27, 1994.

4) "Single-Loop Operation Analysis for River Bend Station, Unit 1," NEDO-31441, May 1987.

5) Letter, Scott Young to Gary Scronce, "Cycle 6 Mid-Cycle Core Shuffle Core Verification Completion," RXE 94-091, September 29, 1994.

6) Letter, Hoa Hoang to Gary Scronce, "River Bend Station Increased Core Flow - Applicable MCPR(F) Limits for Cycle 6 RBC 46,235. September 5 1995.

FIGURE 1. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE BP8SRB299

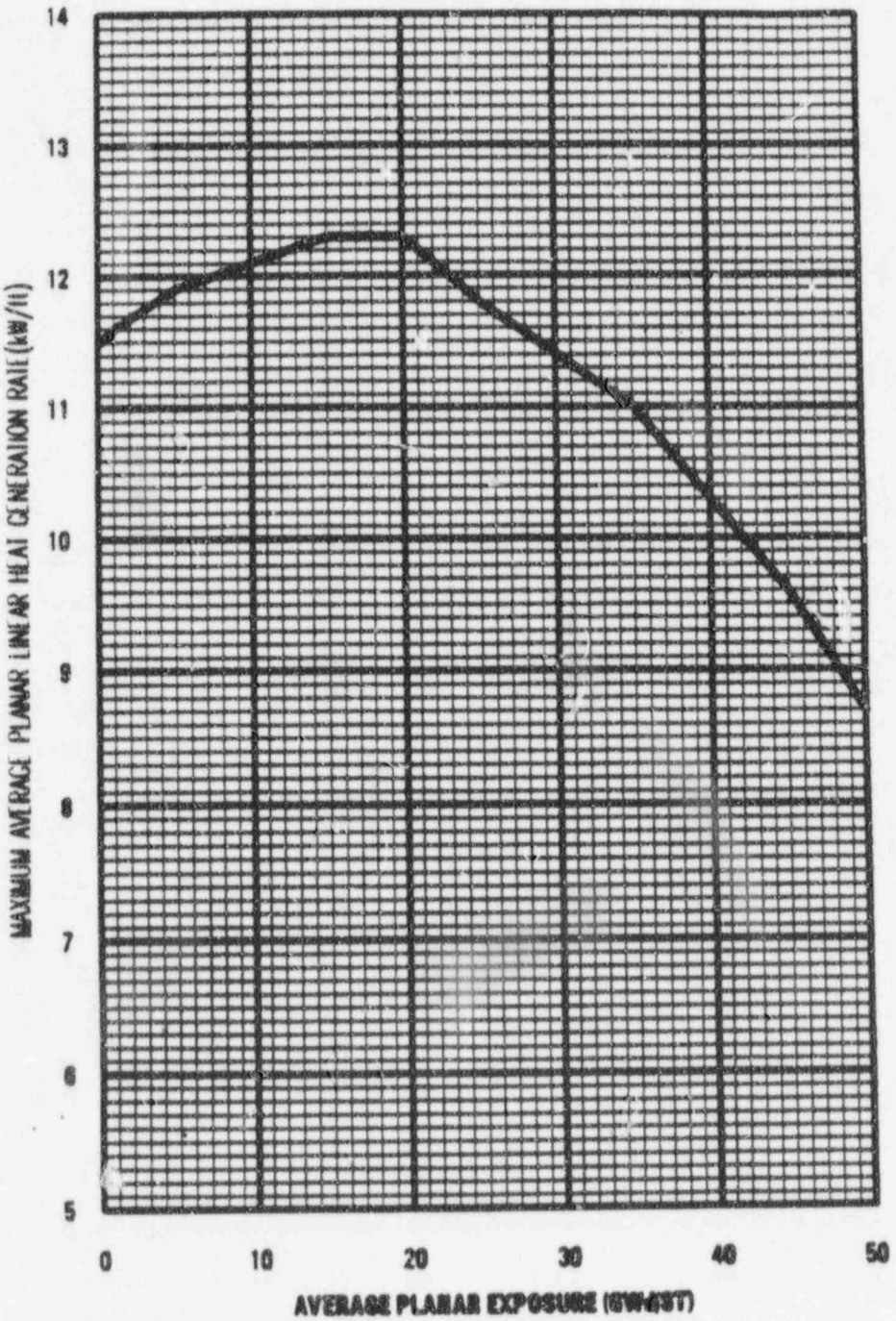


FIGURE 2. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE8B-P8SQB322-8GZ-120-M-4WR-150-T

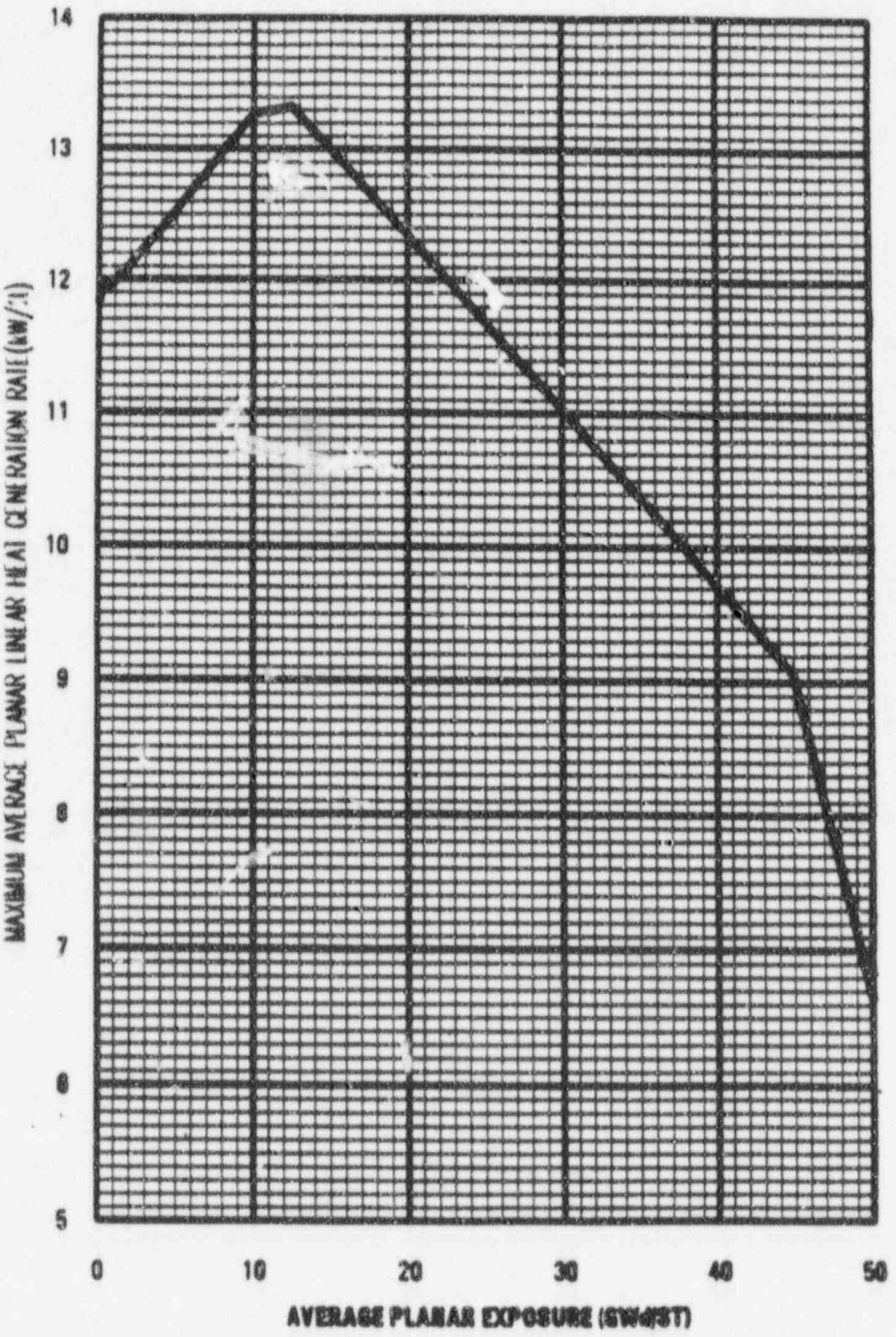


FIGURE 3. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE8B-P8SQB322-8GZ-120-M-4WR-150-T

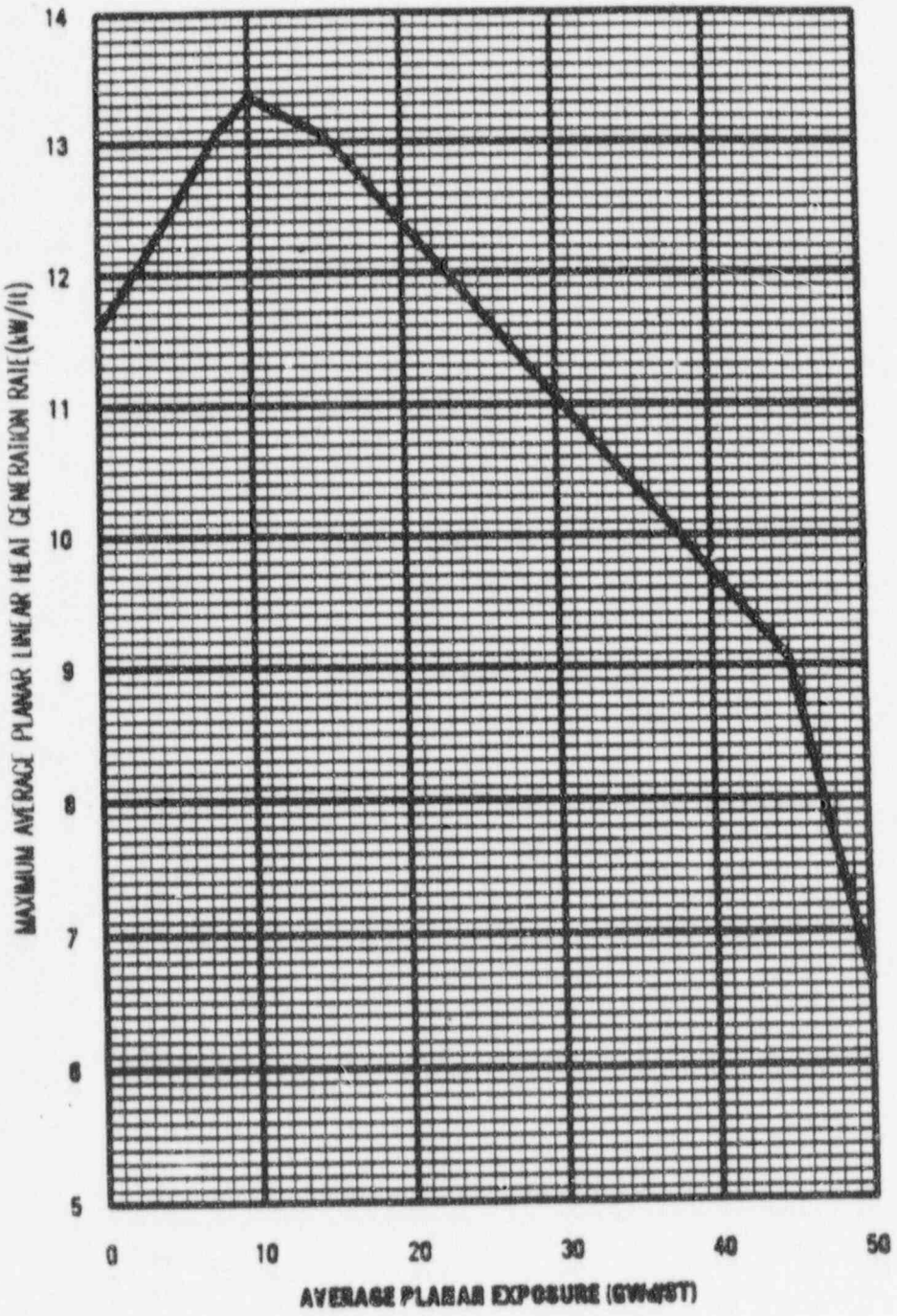


FIGURE 4. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE9B-P9SQB333-10GZ-120-M-4WR-150-T

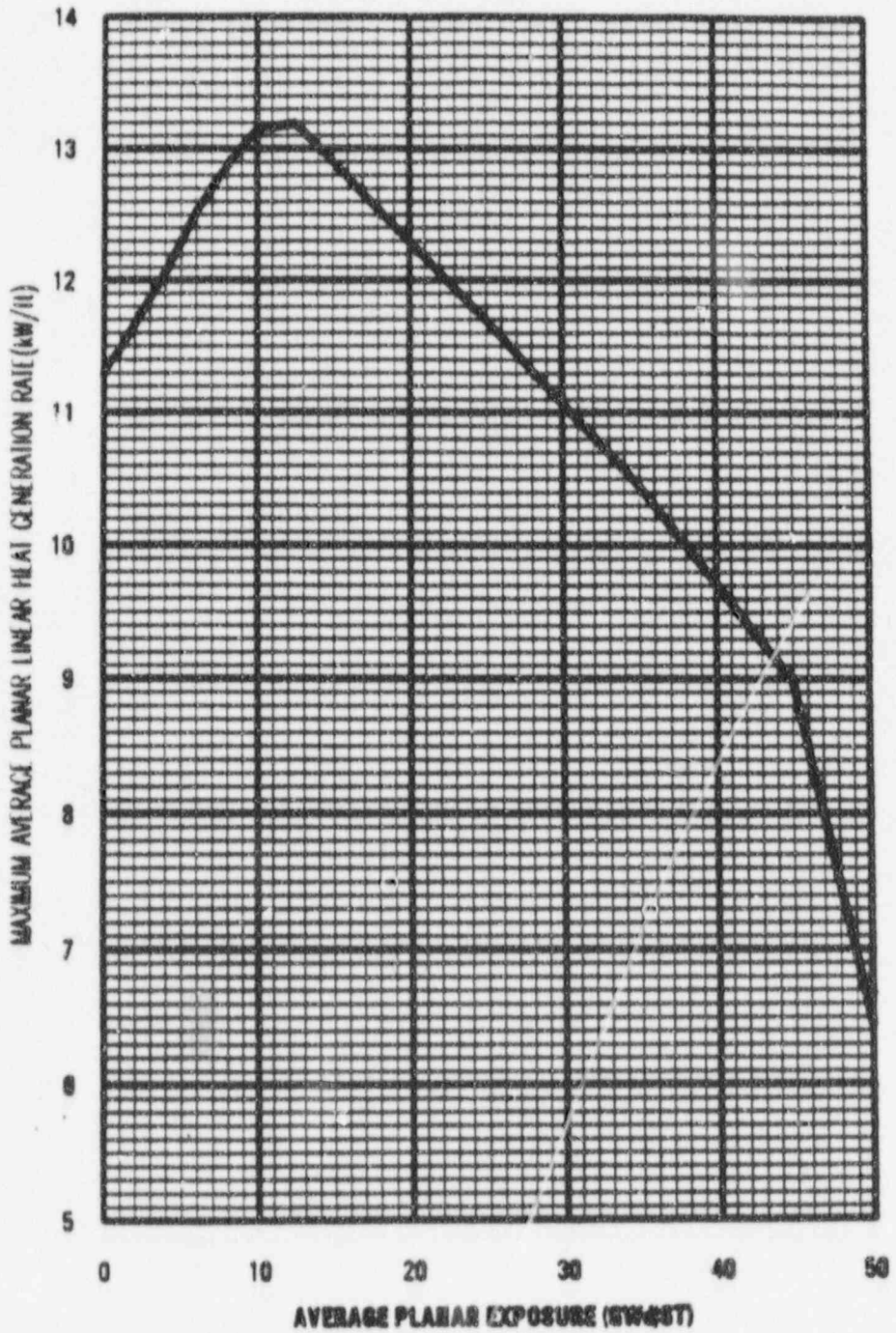


FIGURE 5. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE89-P8SQB331-11GZ-120-M-4WR-150-T

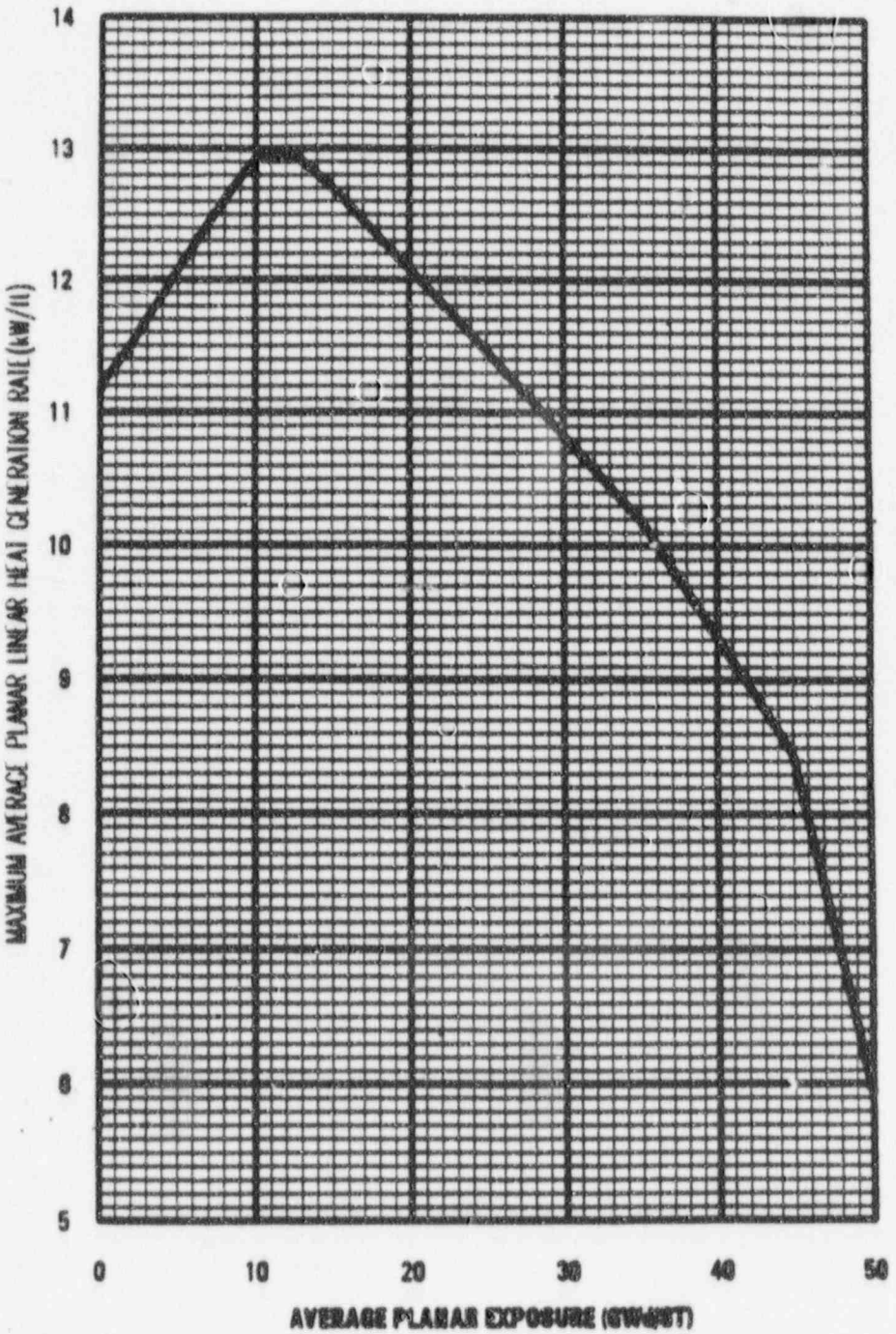


FIGURE 8. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE8B-P8GQB334-10GZ-120-M-4WR-150-T

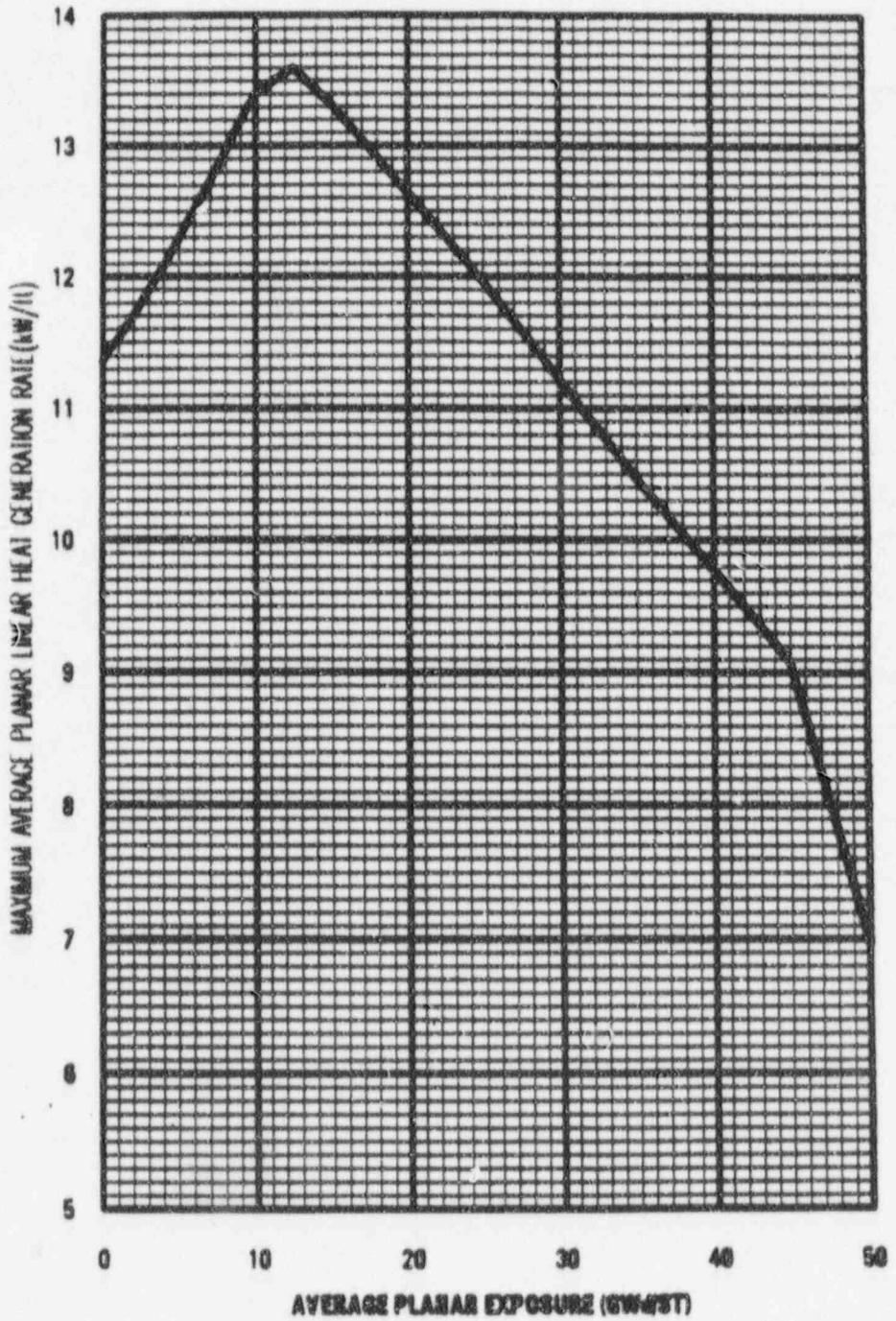


FIGURE 7. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE88-P8SQB334-10GZ2-120-M-4WR-150-T

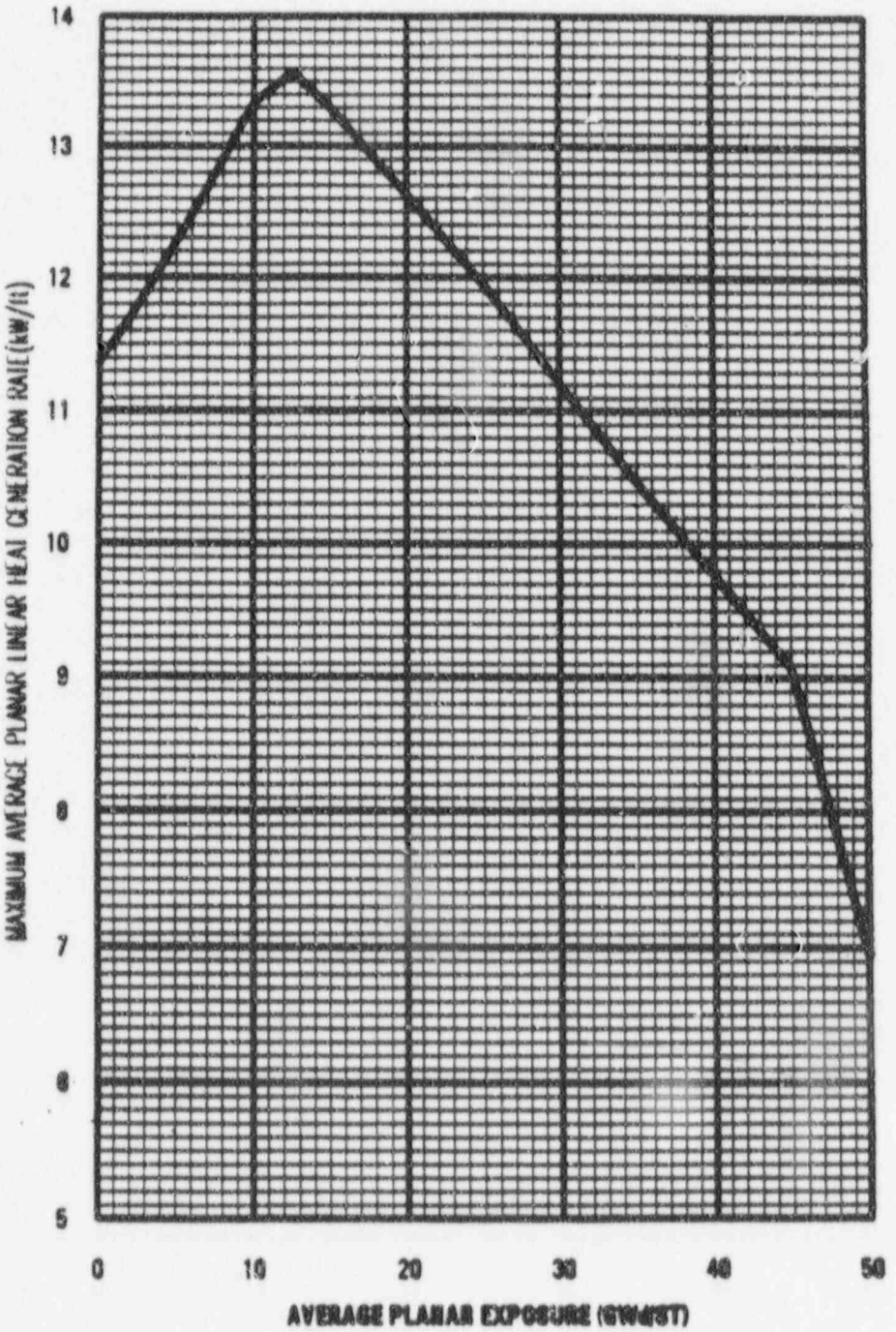


FIGURE 8. MAXIMUM AVERAGE PLANAR LINEAR HEAT GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR EXPOSURE GE8B-P8SQB334-11GZ-120-M-4WR-150-T

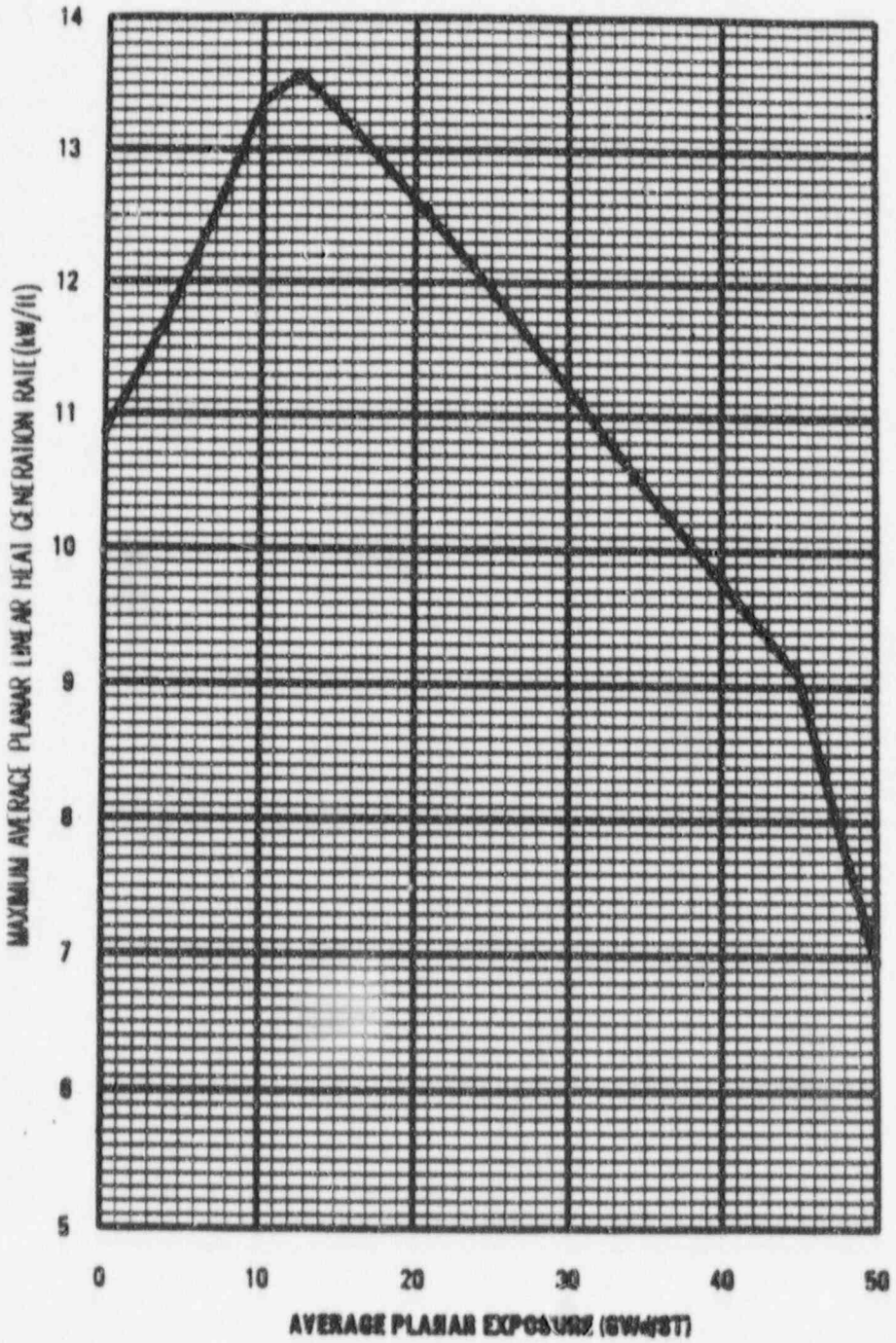


FIGURE 9. $MCPR_f$

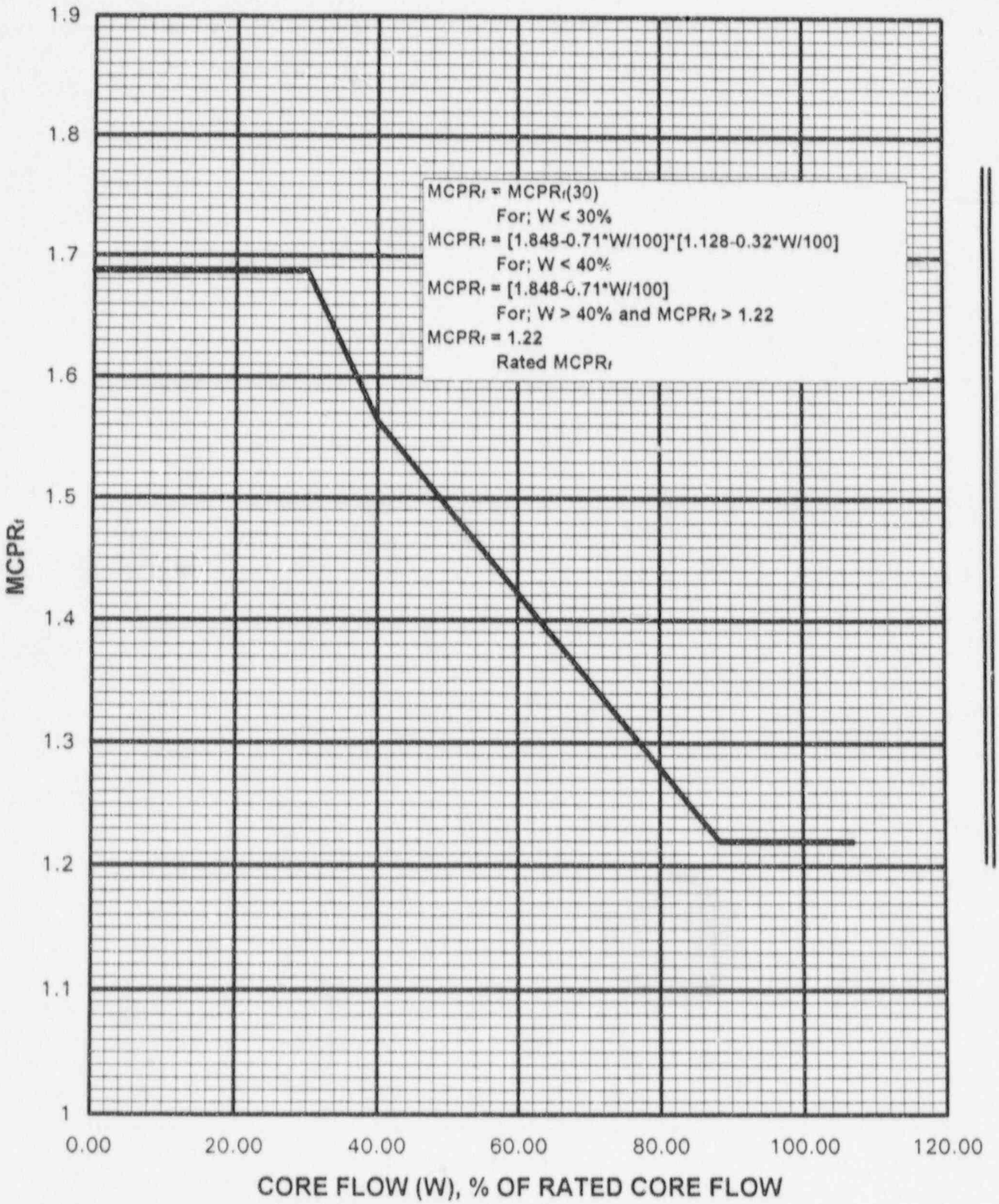
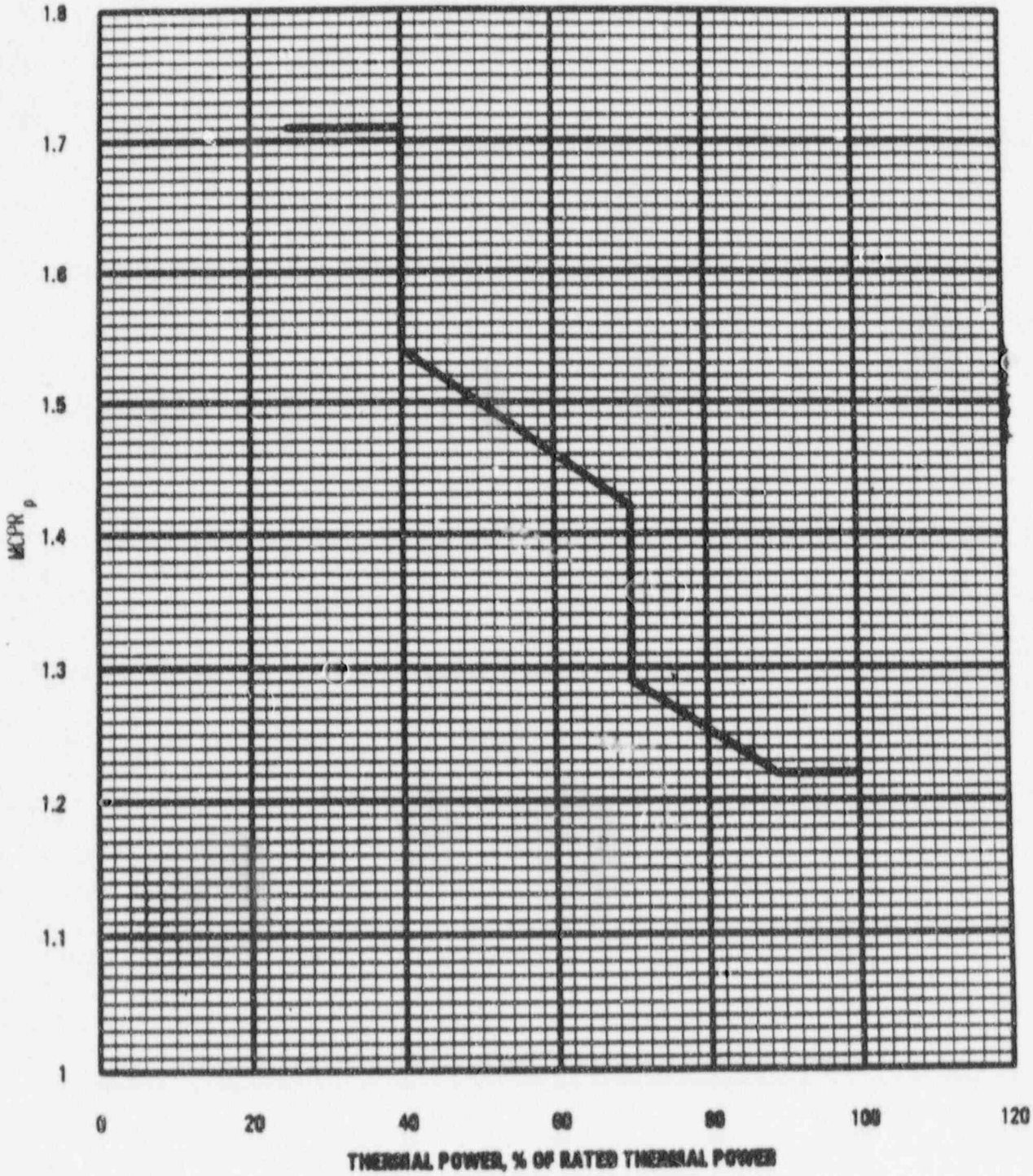
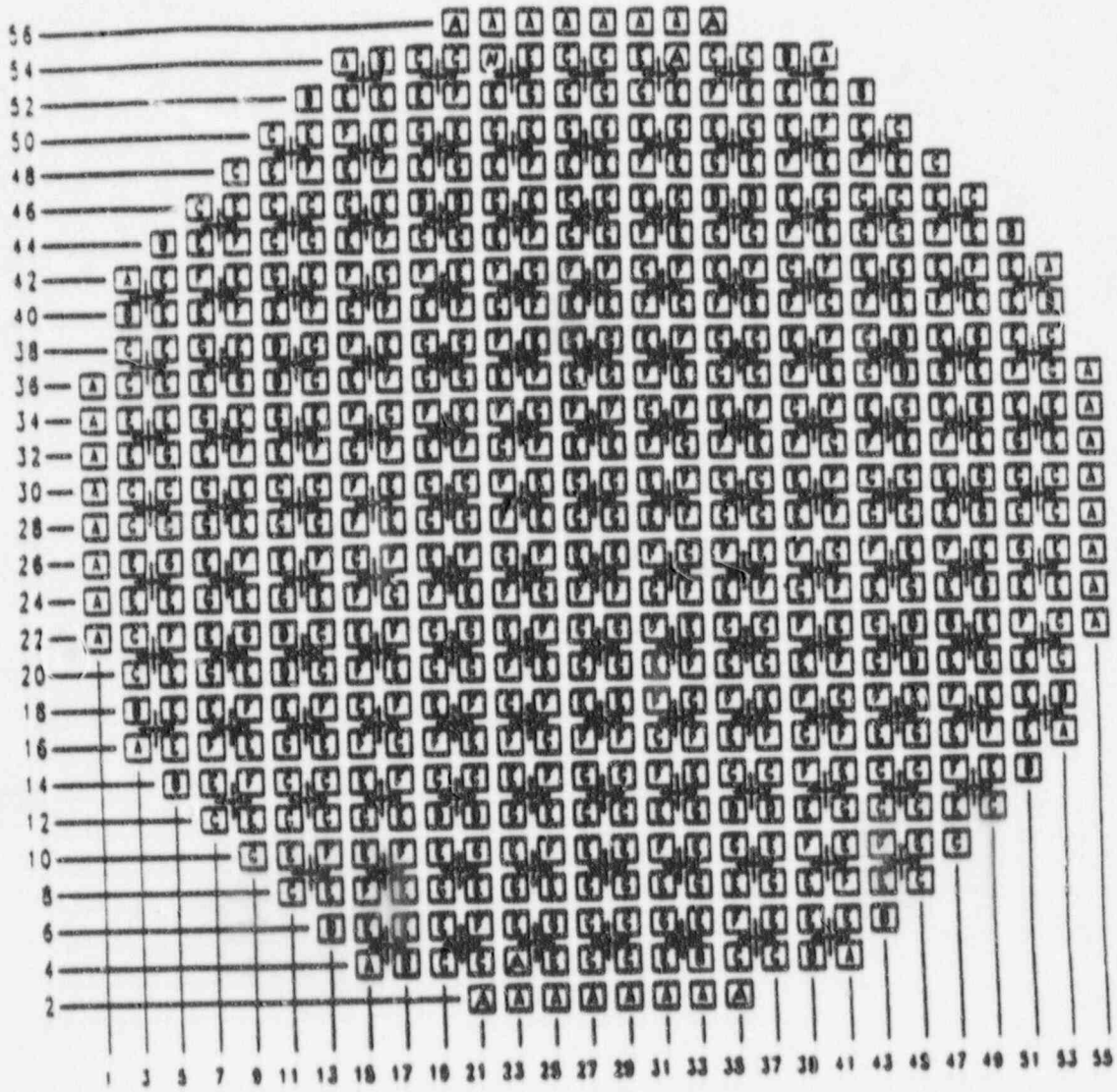


FIGURE 18. $MCPR_p$





Fuel Type	
A=GE8B-P8SQB322-8GZ-12084-4WR-150-T B=GE8B-P8SQB322-9GZ-12084-4WR-150-T C=GE8B-P8SQB333-10GZ-12084-4WR-150-T D=GE8B-P8SQB331-11GZ-12084-4WR-150-T	E=GE8B-P8SQB334-10GZ-12084-4WR-150-T F=GE8B-P8SQB334-10GZ2-12084-4WR-150-T G=GE8B-P8SQB334-11GZ-12084-4WR-150-T H=BP8SRB299

Figure 11 Final Core Loading Pattern