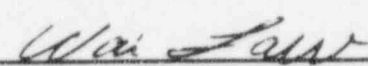


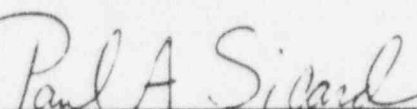
RIVER BEND STATION, CYCLE 7

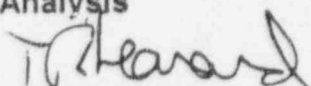
CORE OPERATING LIMITS REPORT (COLR)

February 1996

PREPARED BY:  Date: 12/12/95
Responsible Engineer

REVIEWED BY:  Date: 12/13/95
Review Engineer

APPROVED BY:  Date: 13 Dec 1995
Manager - Safety & Engineering
Analysis

APPROVED BY:  Date: 12/13/95
Director, Engineering
River Bend Nuclear Station

APPROVED BY:  Date: 1/12/96
Facilities Review Committee
River Bend Nuclear Station

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, APRM Gain and setpoint information, and the REACTOR PROTECTION SYSTEM (RPS) response time for APRM thermal time constant for River Bend Station, Cycle 7 as required by Technical Specifications. Technical Specifications require these values be determined using NRC-approved methodology and are established such that all applicable limits of the plant safety analysis are met.

Control Rods

The River Bend core utilizes both GE original equipment and ABB CR-82M bottom entry cruciform control rods. These Control Rod designs are discussed in more detail in reference 8.

TECHNICAL SPECIFICATION 3.2.1

POWER DISTRIBUTION LIMITS

AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)

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 and 7. 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 and is the reference core loading pattern in reference 3. 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 (MCPR)

The MCPR limits for use in Technical Specification 3.2.2 for flow dependent MCPR ($MCPR_f$) (reference 5, 9), power dependent MCPR ($MCPR_p$) (reference 5) are shown in Figures 8, 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.

TECHNICAL SPECIFICATION 3.2.3

POWER DISTRIBUTION LIMITS

LINEAR HEAT GENERATION RATE (LHGR)

The LHGR limits for use in Technical Specification 3.2.3 are 14.4 kw/ft for GE8x8EB and GE11 (Reference 6). The GE8x8EB fuel consists of fuel types: GE8B-P8SQB333-10GZ-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. The GE11 (9x9) fuel consists of GE11-P9SUB354-14GZ-120T-146-T, GE11-P9SUB354-13GZ-120T-146-T and GE11-P9SUB353-10GZ-120T-146-T. Core location by fuel type is provided in Figure 11.

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 (Reference 7):

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

The APRM Gain and Setpoint information below was transferred from Technical Specifications as part of implementation of Improved Technical Specifications in October of 1995. 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:

Two Recirculation Loop Operation

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

Single Recirculation Loop Operation

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

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) 24A5188, Rev. 0 "Supplemental Reload Licensing Report for River Bend Station Reload 6/Cycle 7" November 1995.
- 4) "Single-Loop Operation Analysis for River Bend Station, Unit 1," NEDO-31441, May 1987.
- 5) Letter, Hoa Hoang to Gary Scronce, "Additional Specifications for River Bend Station MCPR(P) and MCPR(F) Limits for Cycle 7 Application" 1ENOM-2395. December 7, 1995.
- 6) FC# 818R46, "RIVER BEND RELOAD 6 DESIGN EXPOSURE CYCLE SUMMARY" June 1995.
- 7) Letter, R.E. Kingston to G. W. Scronce, "Time Constant Values for Simulated Thermal Power Monitor" GFP-1032 November 30, 1995.
- 8) RBS USAR Section 4.1
- 9) Letter, Hoa Hoang to Gary Scronce, "River Bend Station MCPR(F) Limits for Cycle 7 Application" 1ENOM-2195. December 6, 1995.

FIGURE 1 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE8B-P8SQB333-10GZ-120-M-4WR-150-T

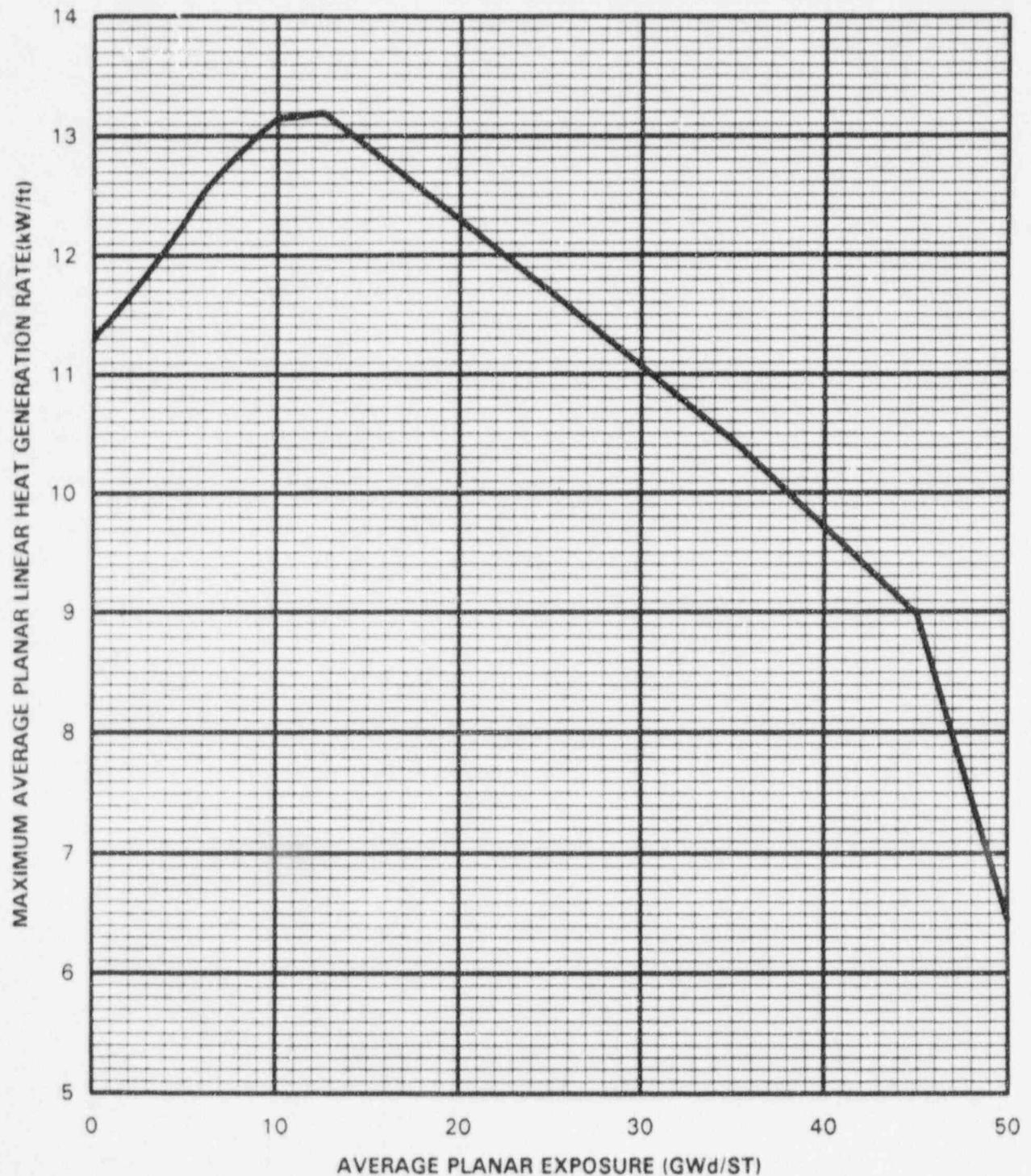


FIGURE 2 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE8B-P8SQB334-10GZ-120-M-4WR-150-T

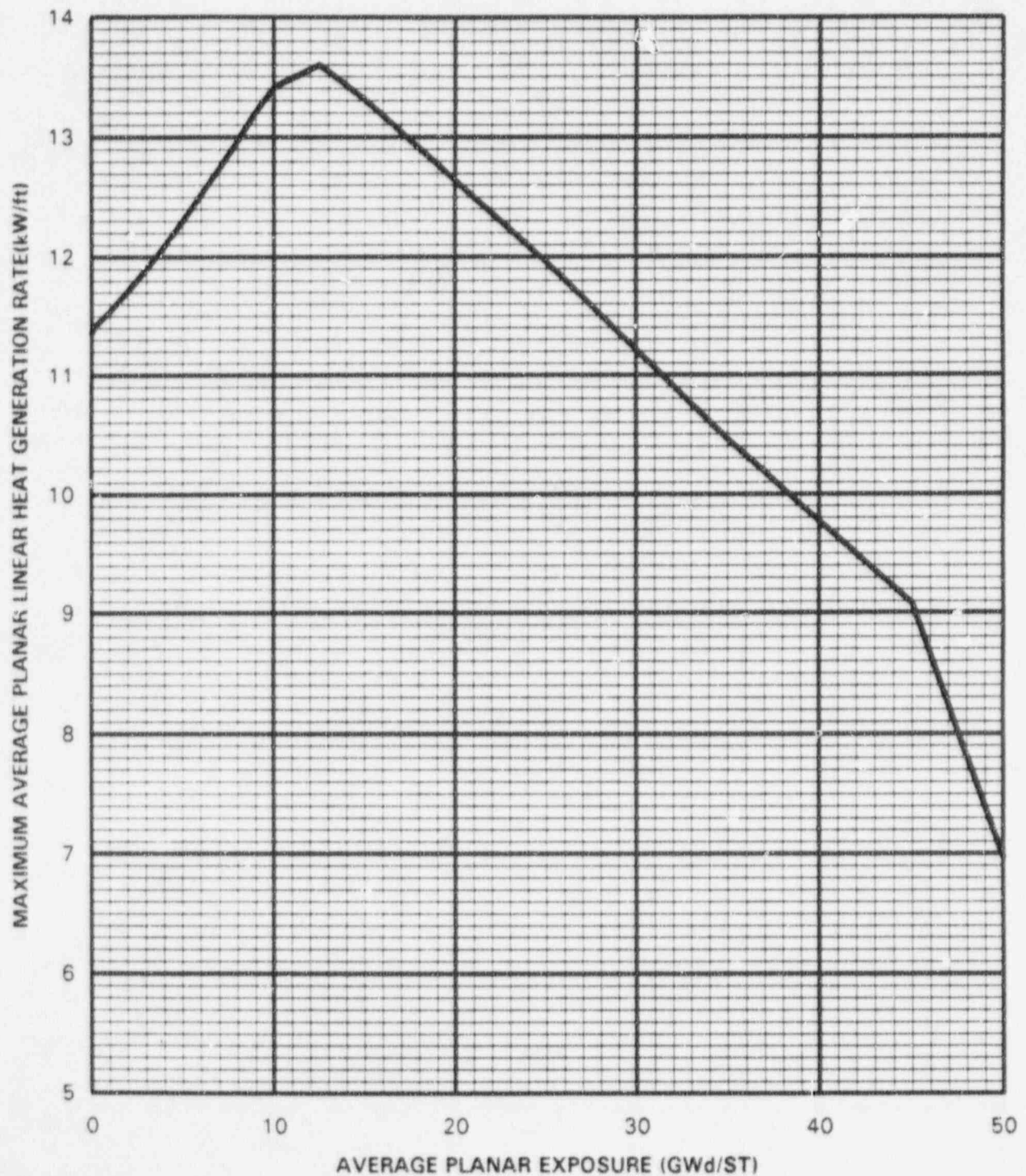


FIGURE 3 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE8B-P8SQB334-10GZ2-120-M-4WR-150-T

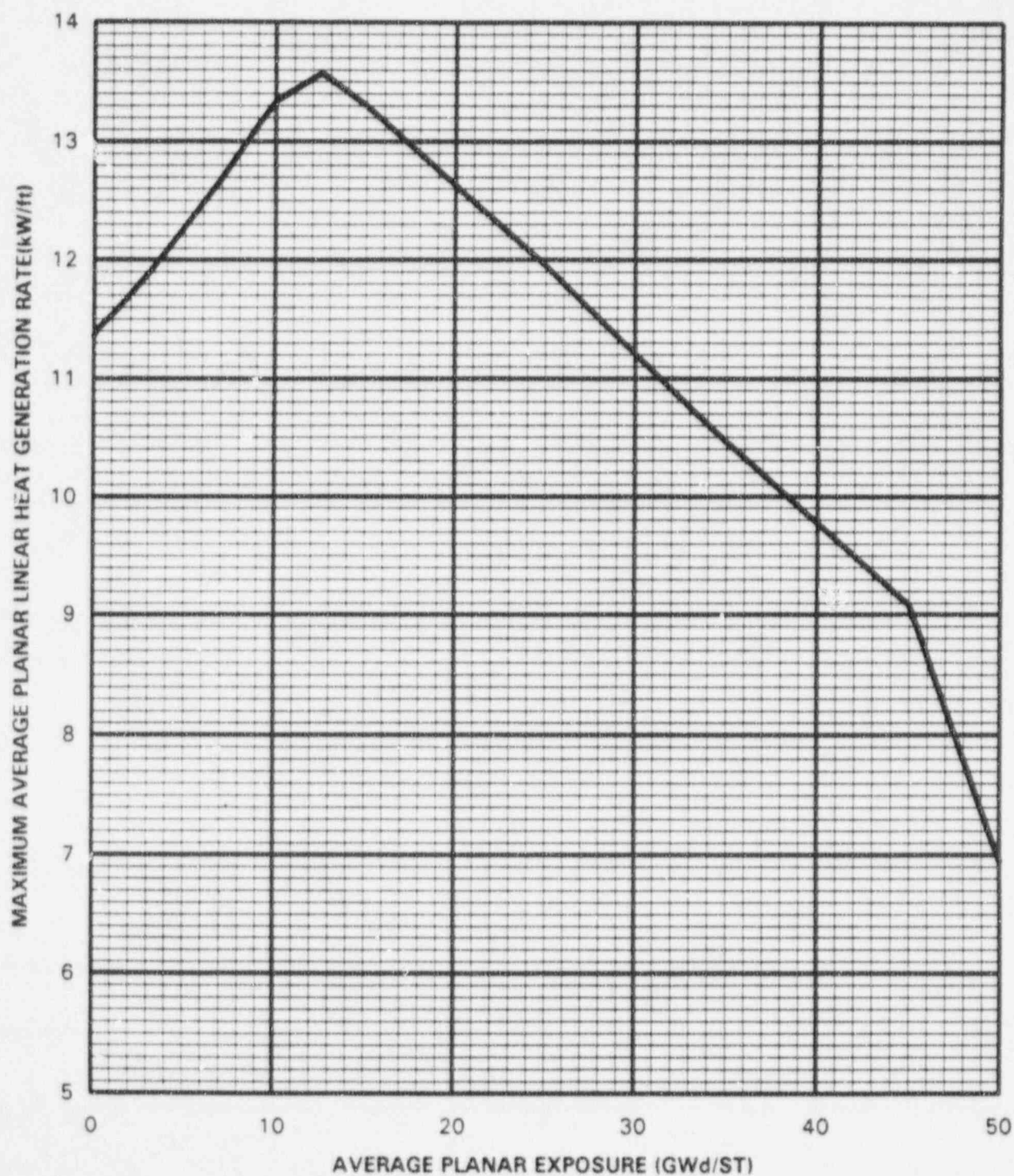


FIGURE 4 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE8B-P8SQB334-11GZ-120-M-4WR-150-T

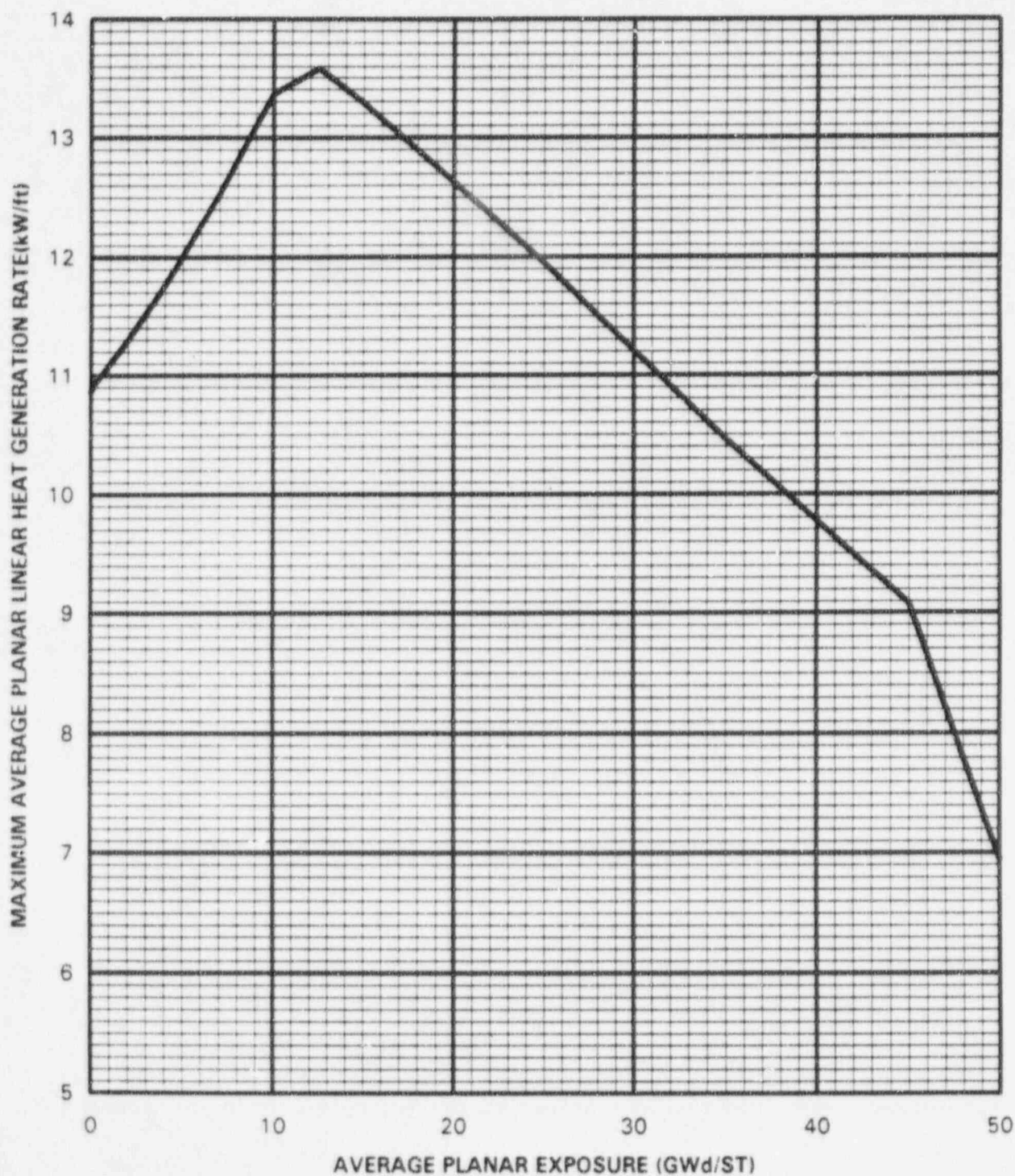


FIGURE 5 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE11-P9SUB354-14GZ-120T-146-T

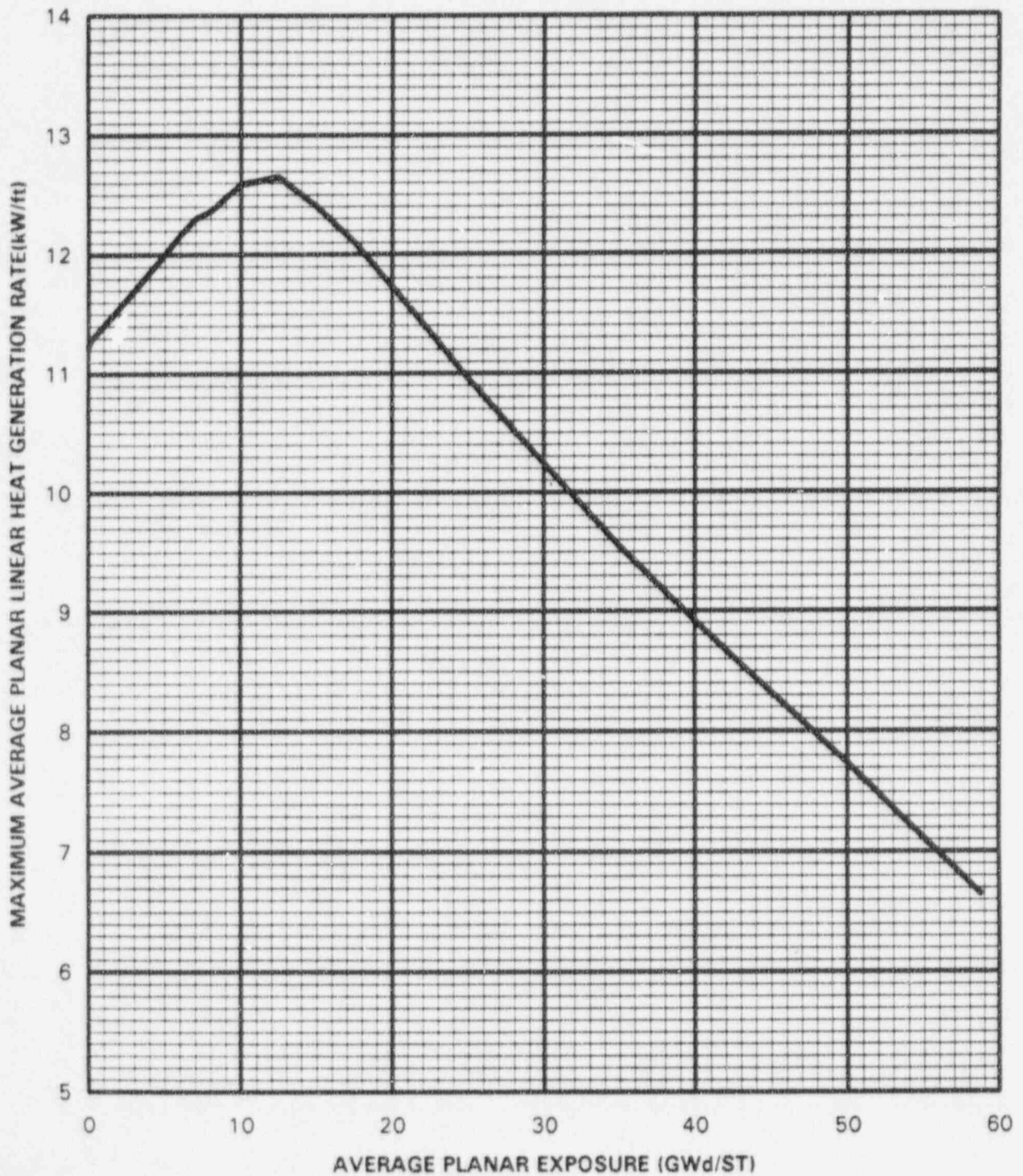


FIGURE 6 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE11-P9SUB354-13GZ-120T-146-T

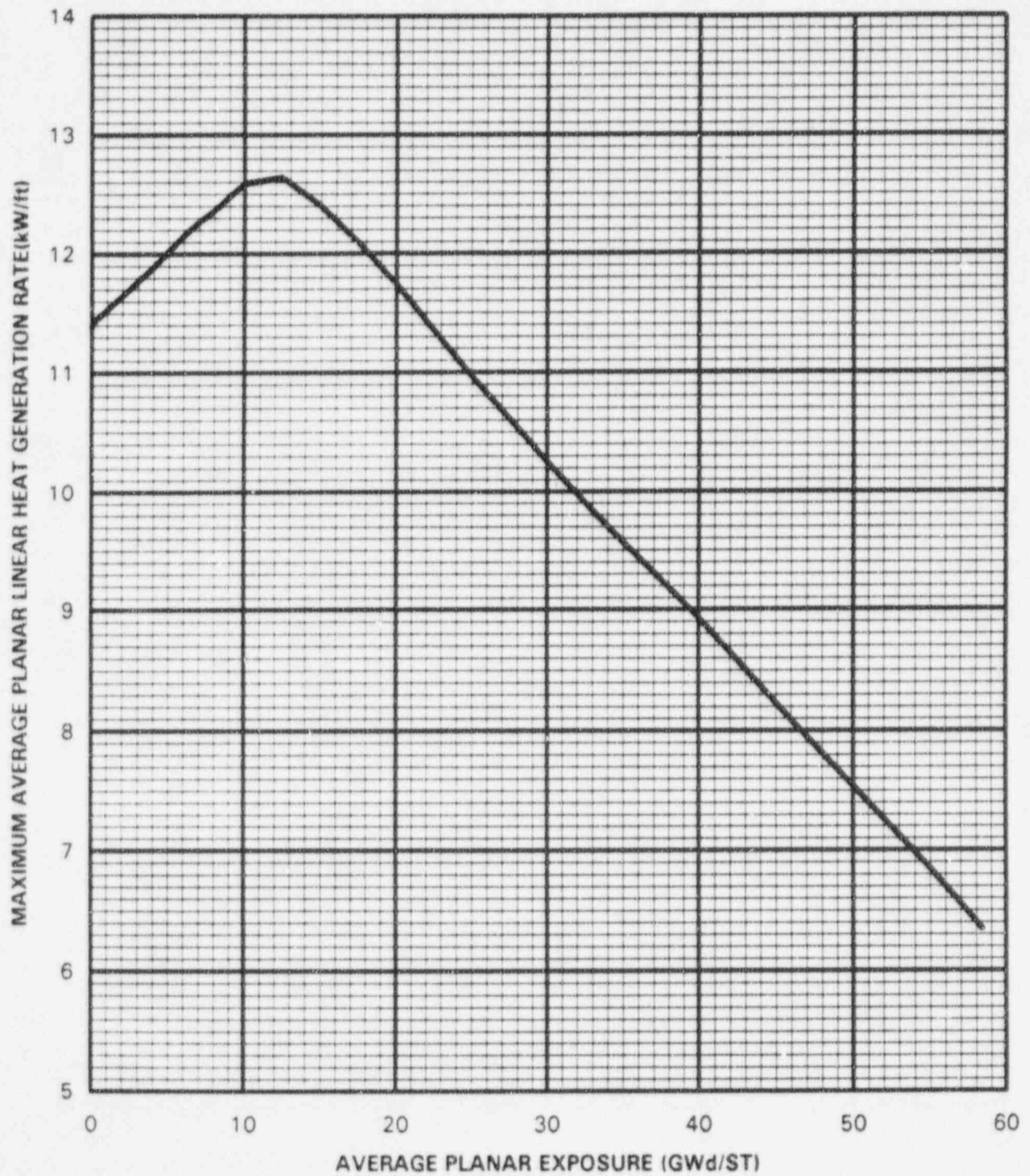


FIGURE 7 MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS AVERAGE PLANAR
EXPOSURE GE11-P9SUB353-10GZ-146-T

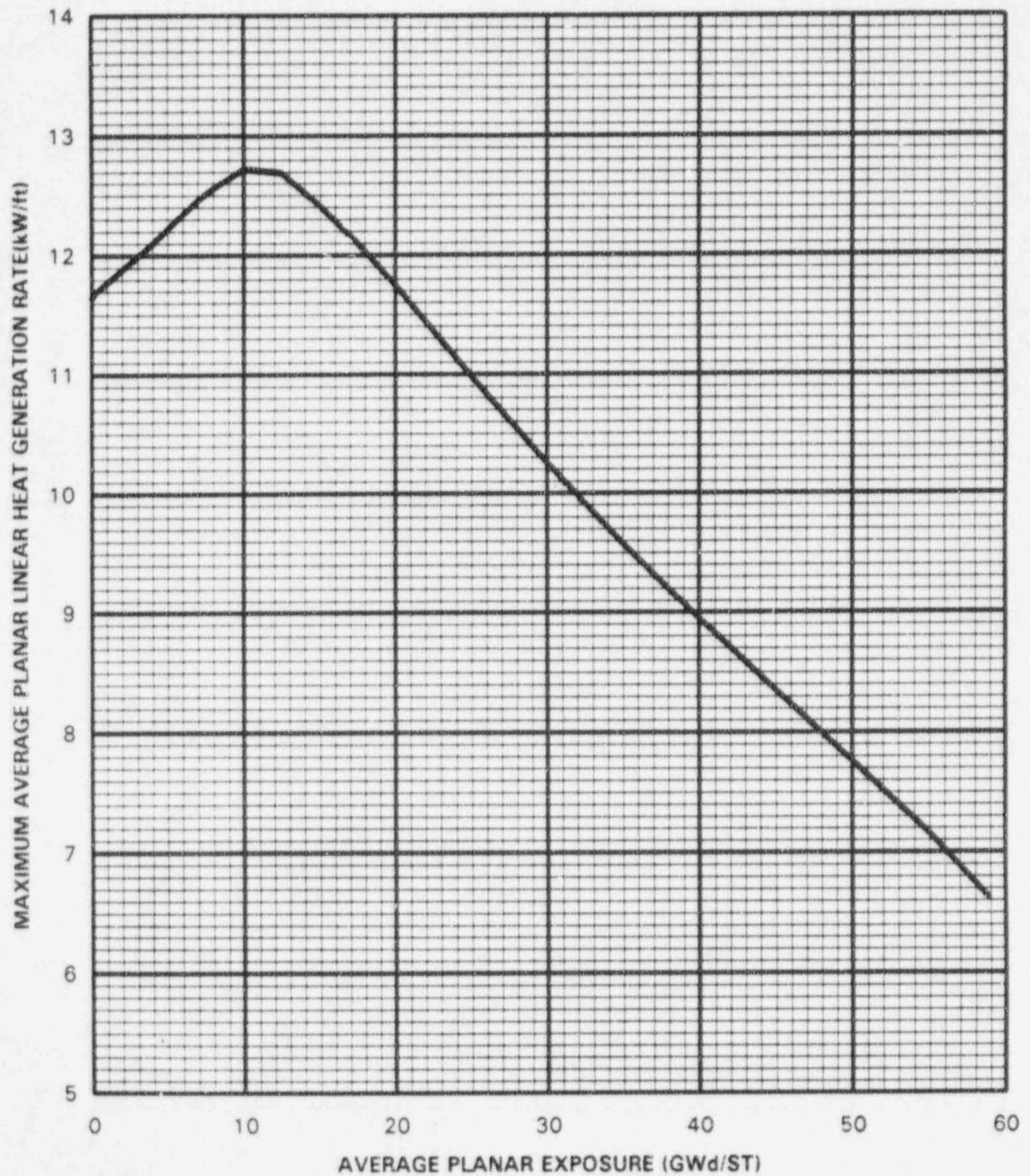


FIGURE 8 OPERATING LIMIT MCPR_f (MCPR_f) VERSUS CORE FLOW

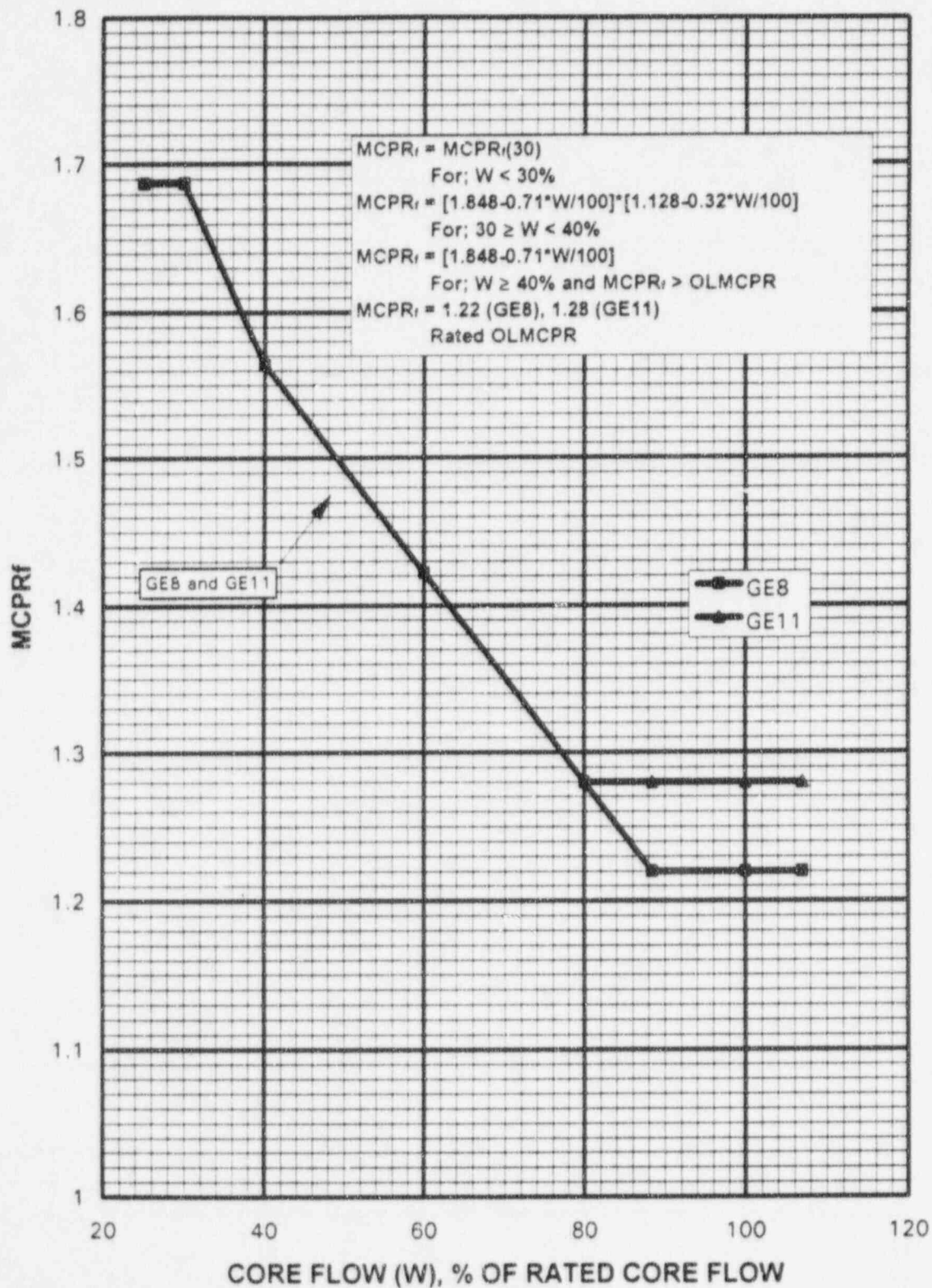


FIGURE 9 OPERATING LIMIT MCPR (MCPR_p)
VERSUS THERMAL POWER FOR EXPOSURES
LESS THAN EOC-3350 MWd/ST

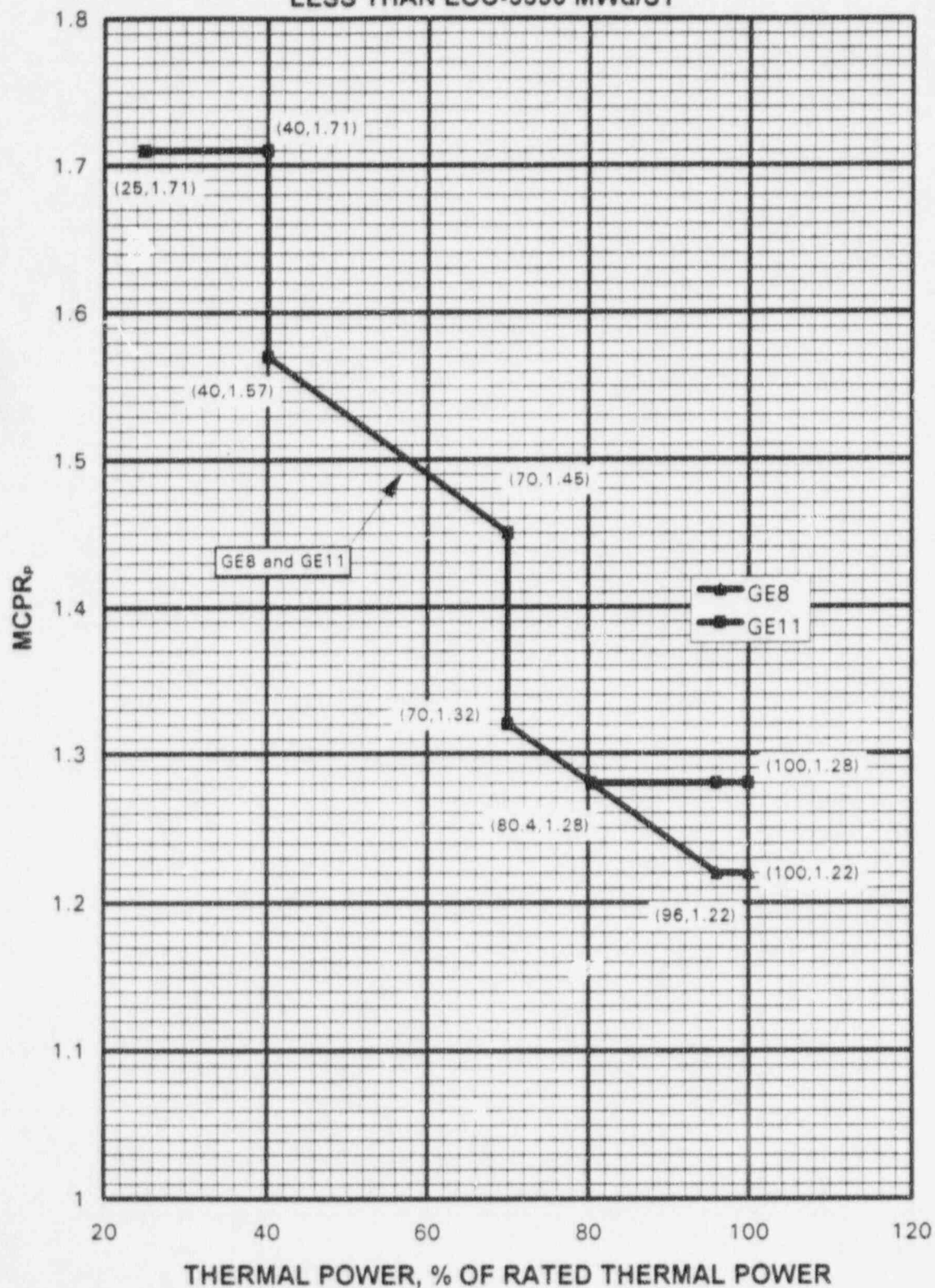


FIGURE 10 OPERATING LIMIT MCPR (MCPR_o)
VERSUS THERMAL POWER FOR EXPOSURES
GREATER THAN OR EQUAL TO EOC-3350 MWd/ST

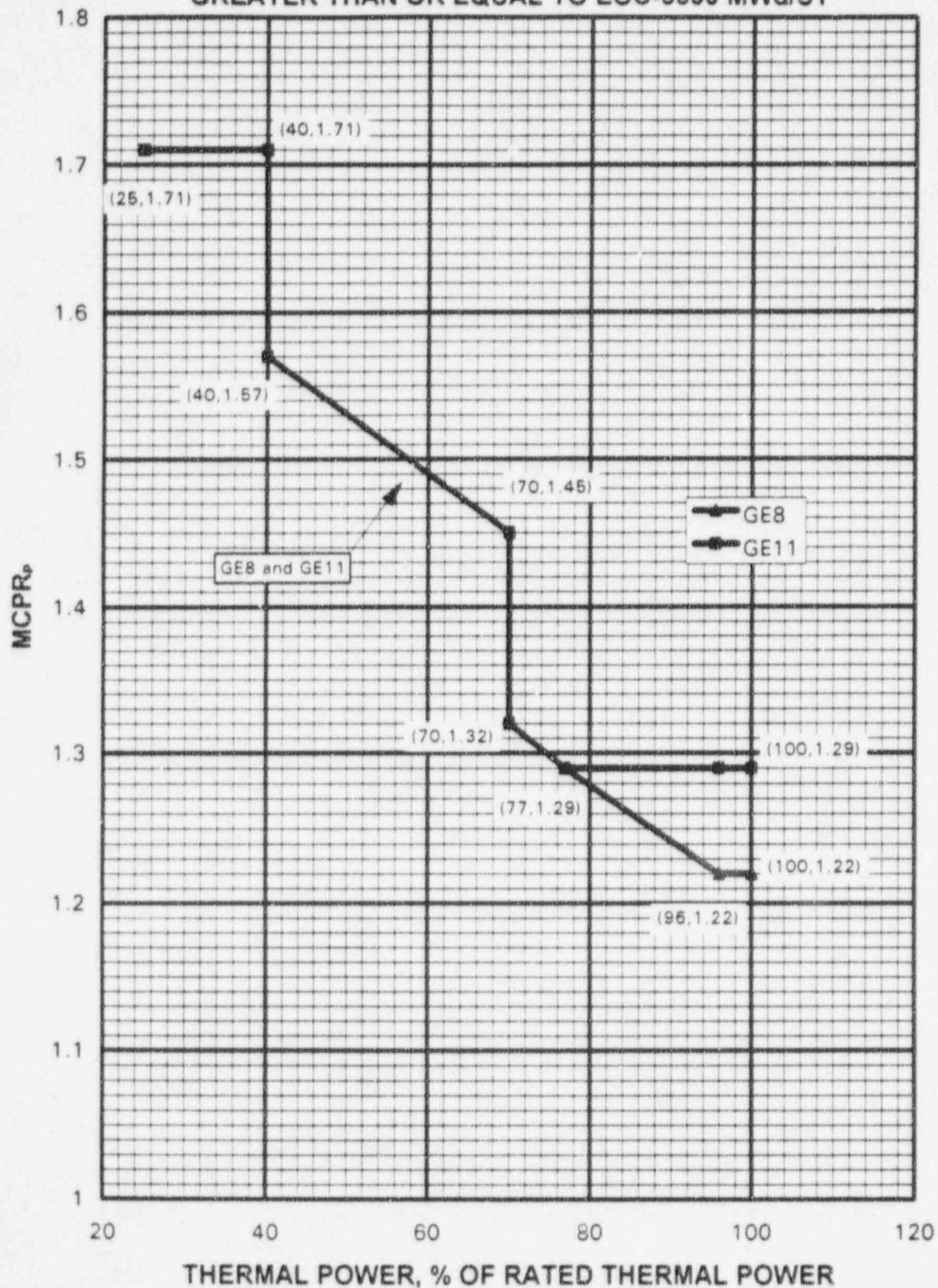
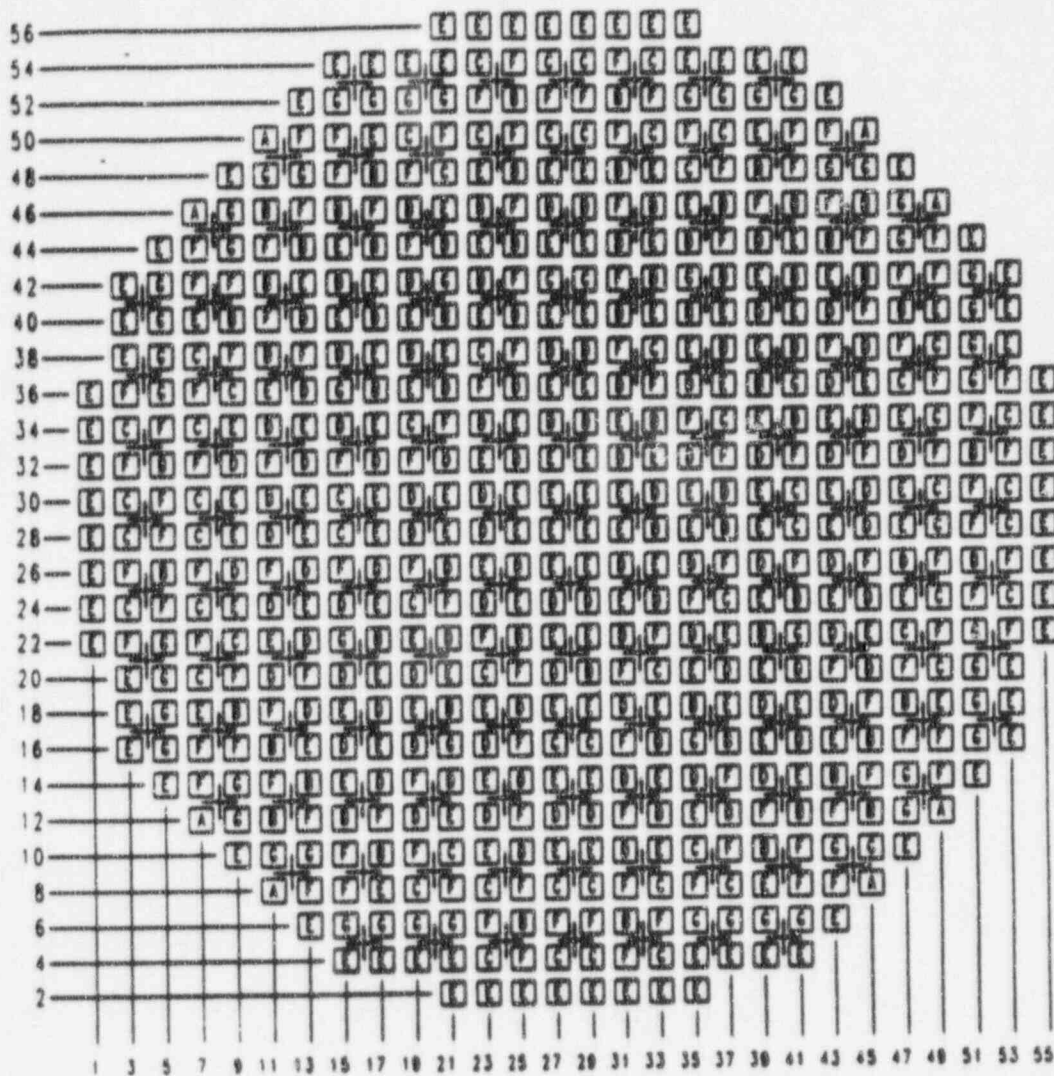


FIGURE 11 REFERENCE CORE LOADING PATTERN



Fuel Type			
A=GE8B-P8SQB333-10GZ-120M-4WR-150-T	(Cycle 4)	E=GE8B-P8SQB334-10GZ-120M-4WR-150-T	(Cycle 5)
B=GE11-P9SUB354-14GZ-120T-146-T	(Cycle 7)	F=GE8B-P8SQB334-10GZ-120M-4WR-150-T	(Cycle 6)
C=GE11-P9SUB354-13GZ-120T-146-T	(Cycle 7)	G=GE8B-P8SQB334-11GZ-120M-4WR-150-T	(Cycle 6)
D=GE11-P9SUB353-10GZ-120T-146-T	(Cycle 7)		