

BRUNSWICK UNIT 2, CYCLE 11  
CORE OPERATING LIMITS REPORT  
MAY 1994

Controlled Copy 1

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Approved By: Kenneth E. Karcher Date: 5/27/94

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## INTRODUCTION AND SUMMARY

This report provides the values of the power distribution limits and control rod withdrawal block instrumentation setpoints for Brunswick Unit 2, Cycle 11 as required by Technical Specification 6.9.3.1. The values of the Average Planar Linear Heat Generation Rate (APLHGR) limits, along with associated core flow and core power adjustment factors are provided as required by Technical Specification 6.9.3.1.a. The values of the Minimum Critical Power Ratio (MCPR) limits, along with associated core flow and core power adjustment factors are provided as required by Technical Specifications 6.9.3.1.b and 6.9.3.1.c. The control rod block upscale trip setpoints and allowable values are provided as required by Technical Specification 6.9.3.1.d.

Per Technical Specification 6.9.3.2 and 6.9.3.3, these values have been determined using NRC-approved methodology and are established such that all applicable limits of the plant safety analysis are met.

Preparation of this report was performed in accordance with CP&L Nuclear Fuels Management & Safety Analysis Quality Assurance requirements as documented in Reference 1.

## APLHGR LIMITS

The limiting APLHGR value for the most limiting lattice (excluding natural uranium) of each fuel type as a function of planar average exposure is given in Figures 1 through 9. These values were determined with the SAFER/GESTR LOCA methodology described in GESTAR-II (Reference 2). Figures 1 through 9 are to be used when hand calculations are required as specified in Technical Specification 3.2.1.

The core flow and core power adjustments factors for use in Technical Specification 3.2.1 are presented in Figures 10 and 11. For any given flow/power state, the minimum of MAPLHGR(F) determined from Figure 10 and MAPLHGR(P) determined from Figure 11 is used to determine the governing limit.

### MCPR LIMITS

The ODYN OPTION A, ODYN OPTION B, and non-pressurization transient MCPR limits for use in Technical Specification 3.2.2.1 and 3.2.2.2 for each fuel type as a function of cycle average exposure are given in Table 1. These values were determined with the GEMINI methodology and GEXL-PLUS critical power correlation described in GESTAR-II (Reference 2) and are consistent with the Safety Limit MCPR of 1.07 specified by Technical Specification 2.1.2. The analysis was performed without End of Cycle-Recirculation Pump Trip (EOC-RPT) operable.

The core flow and core power adjustments factors for use in Technical Specification 3.2.2.1 are presented in Figures 12 and 13. For any given flow/power state, the maximum of MCPR(F) determined from Figure 12 and MCPR(P) determined from Figure 13 is used to determine the governing limit.

### ROD BLOCK INSTRUMENTATION SETPOINTS

The nominal trip setpoints and allowable values of the control rod withdrawal block instrumentation for use in Technical Specification 3.3.4 (Table 3.3.4-2) are presented in Table 2. These values were determined consistent with the bases of the ARTS program and the determination of MCPR limits with the GEMINI methodology and GEXL-PLUS critical power correlation described in GESTAR-II (Reference 2).

### REFERENCE(s)

- 1) CP&L Nuclear Fuels Management & Safety Analysis Quality Assurance File NF-2494.0026, "Preparation of the Brunswick Unit 2, Cycle 11 (B2C11) Core Operating Limits Report (COLR), Revision 0," (May 1994).
- 2) NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel," (latest approved version).

Figure 1

FUEL TYPE BP8DRB299 (BP8X8R)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

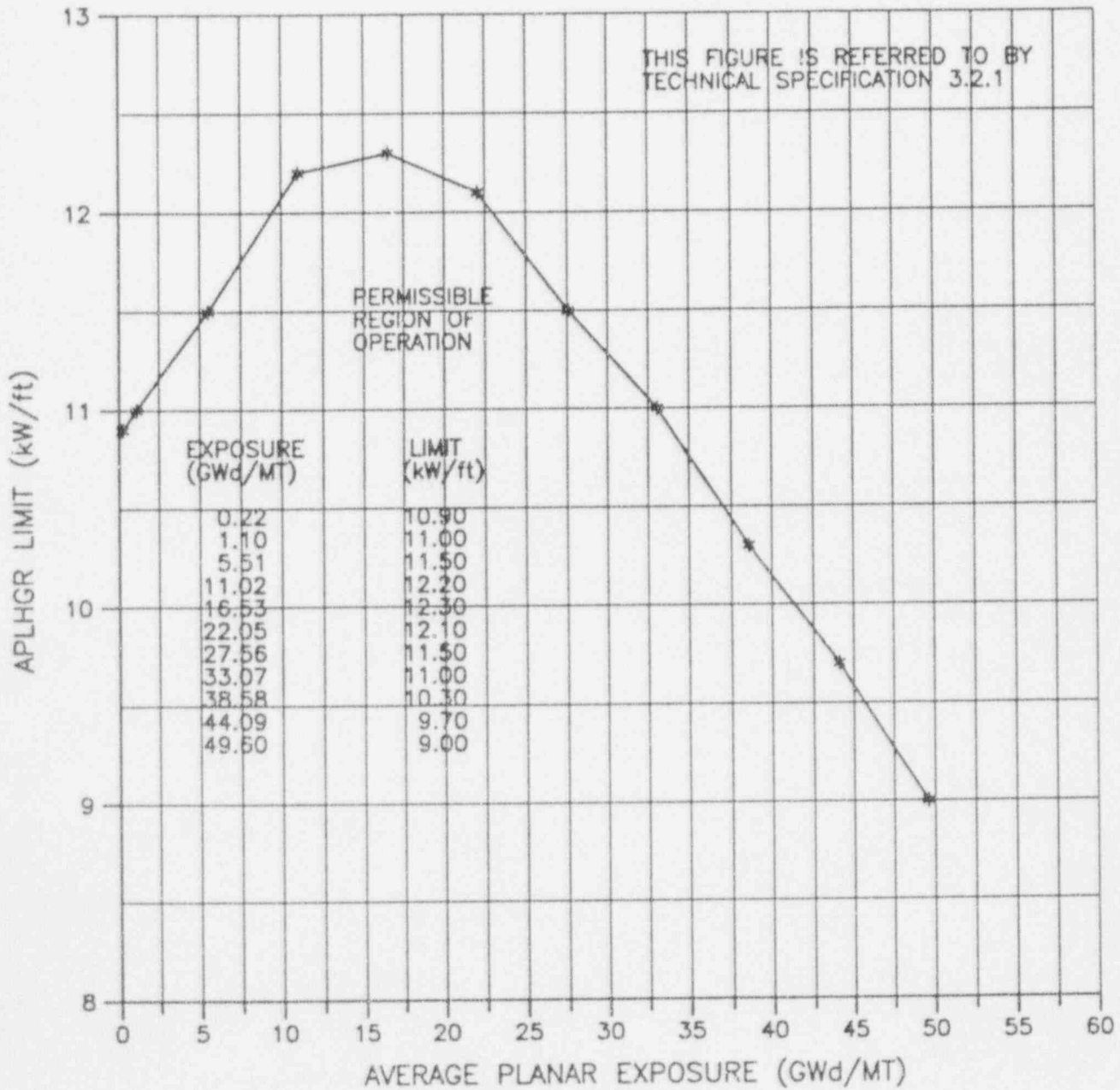


Figure 2

FUEL TYPE BD323A (GE8X8EB)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

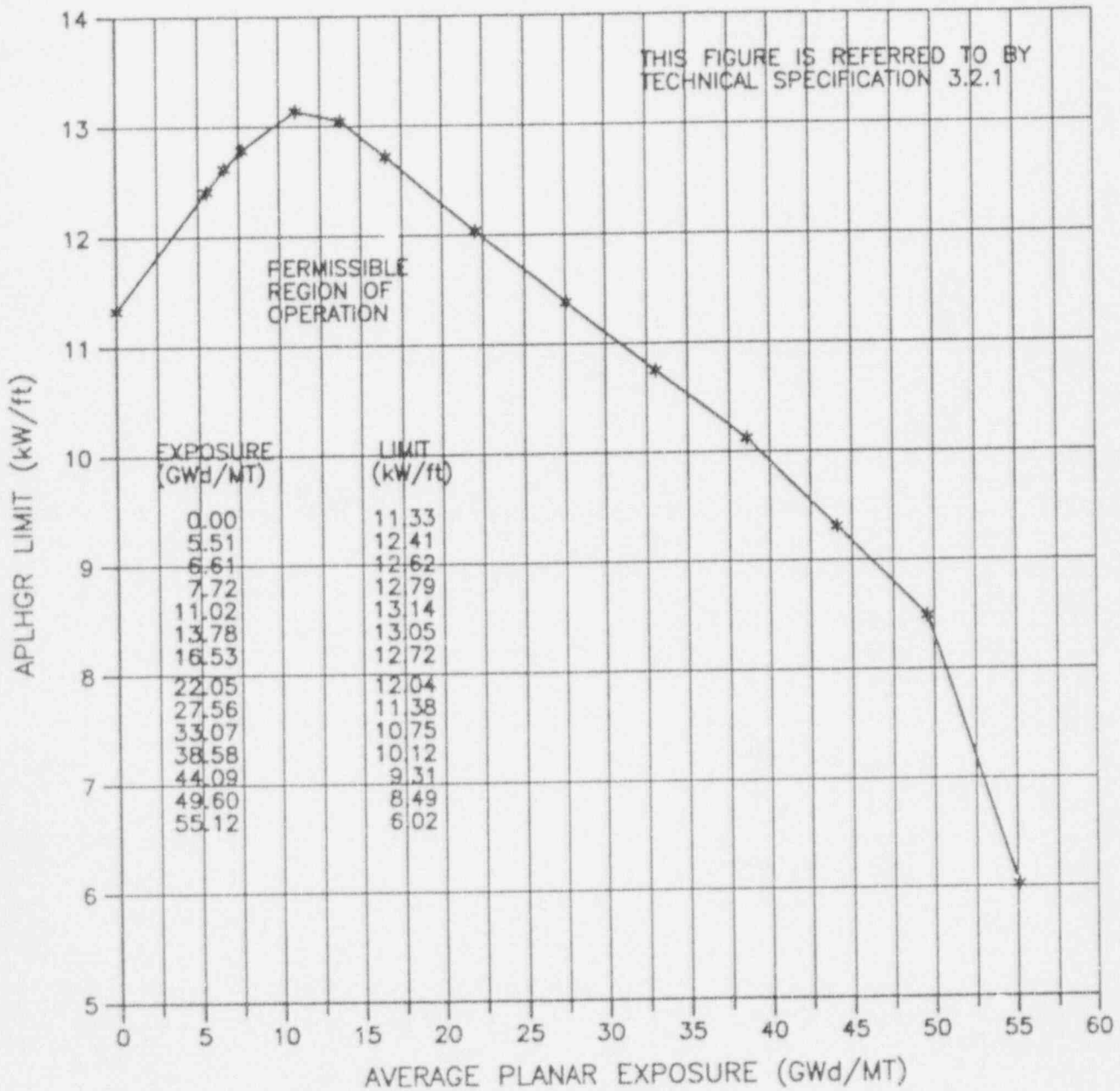


Figure 3

FUEL TYPE BD317A (GE8X8EB)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

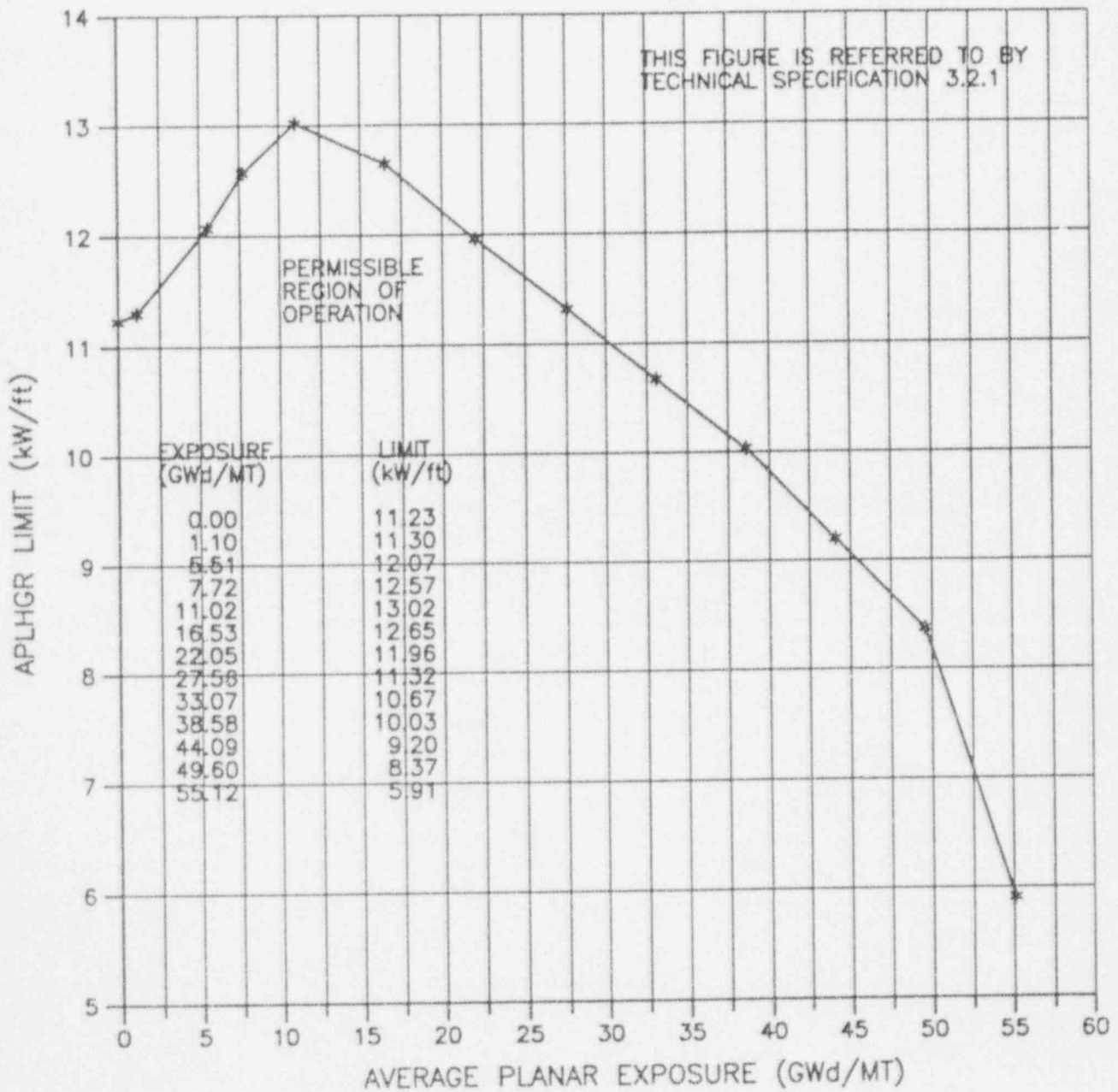


Figure 4

FUEL TYPE NBD330A (GE8X8NB)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

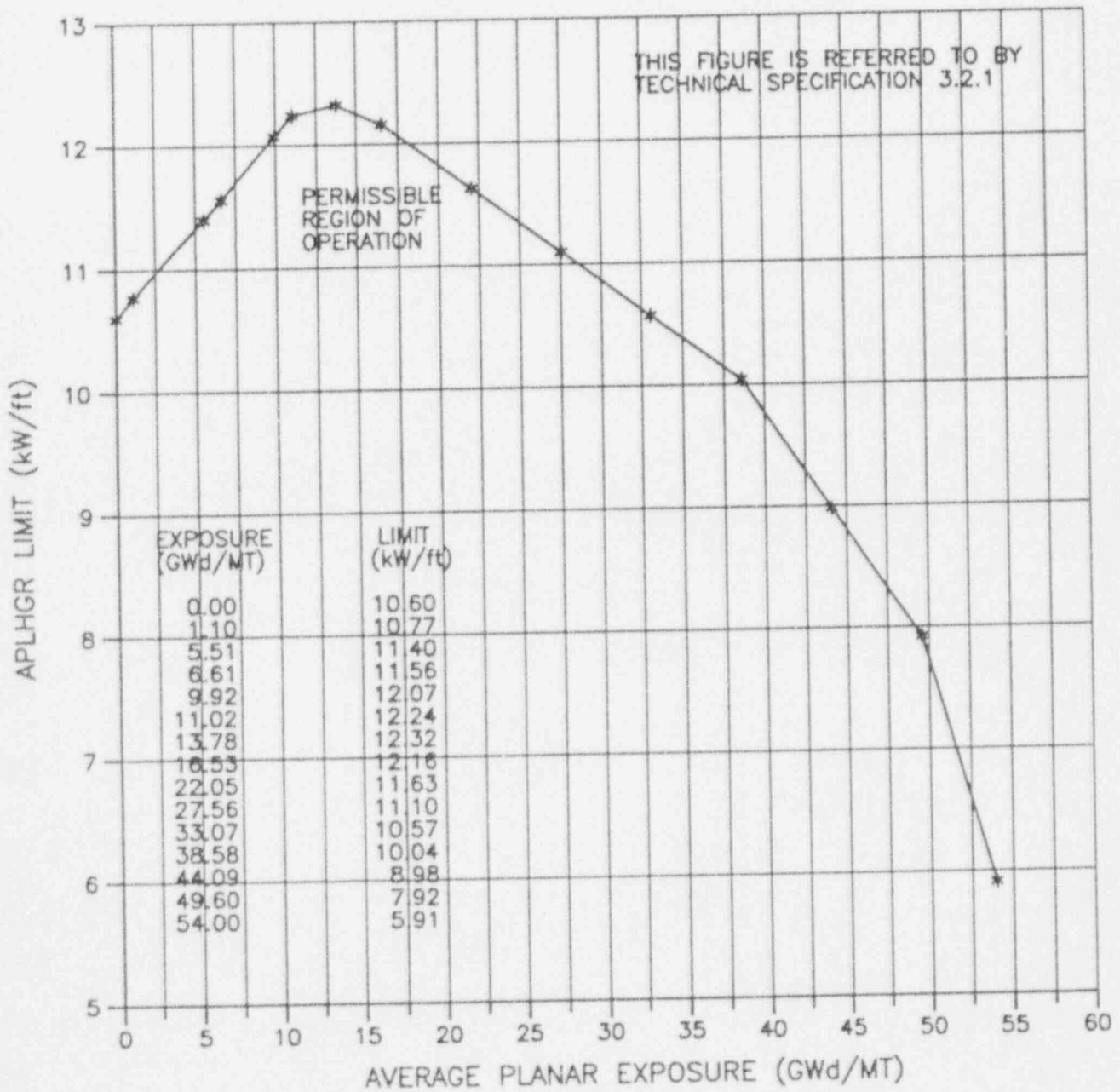




Figure 5

FUEL TYPE NBD329A (GE8X8NB)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

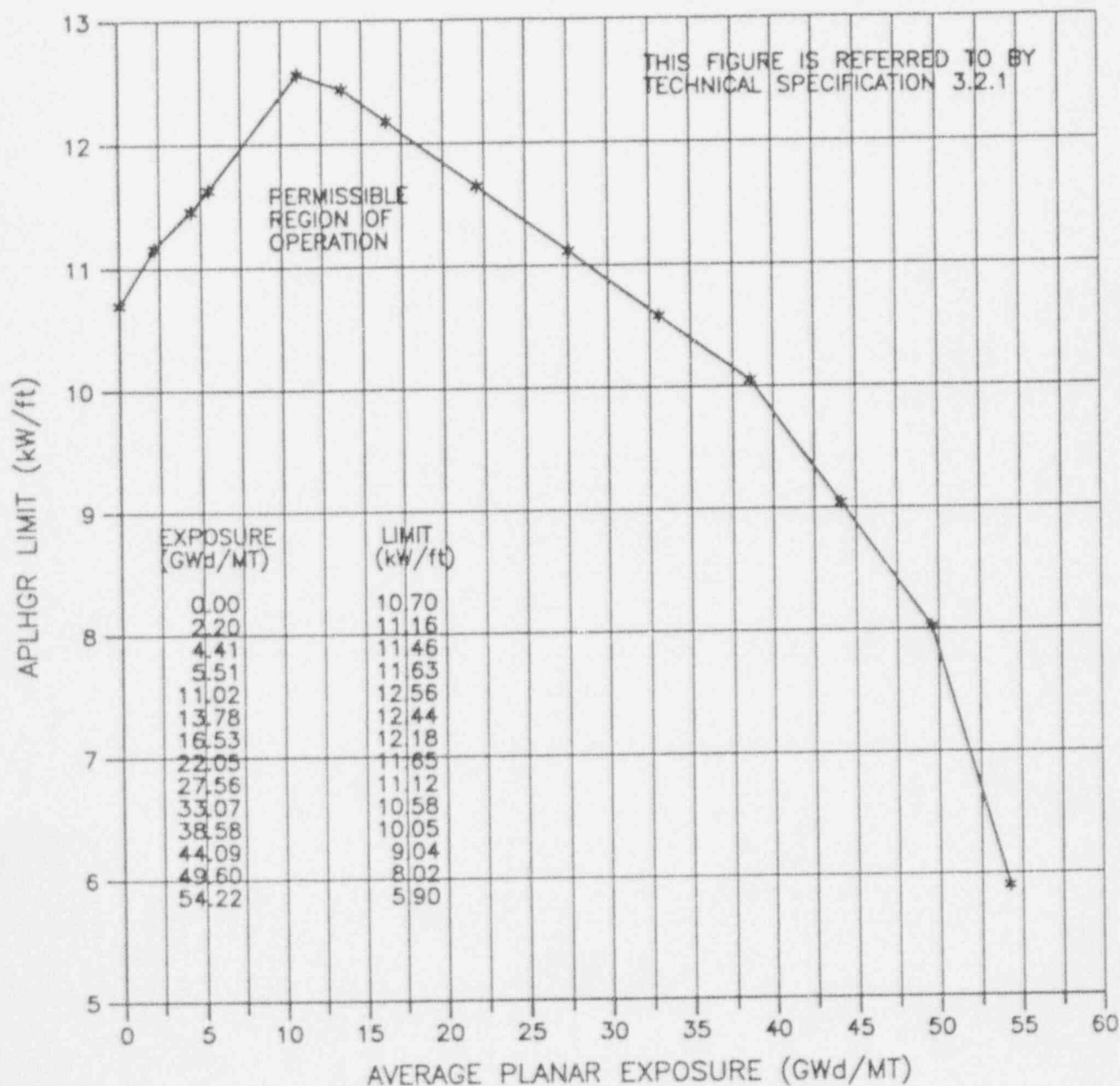


Figure 6

FUEL TYPE GE10-P8HXB329-12GZ1-100M-150-T (GE8X8NB-3)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

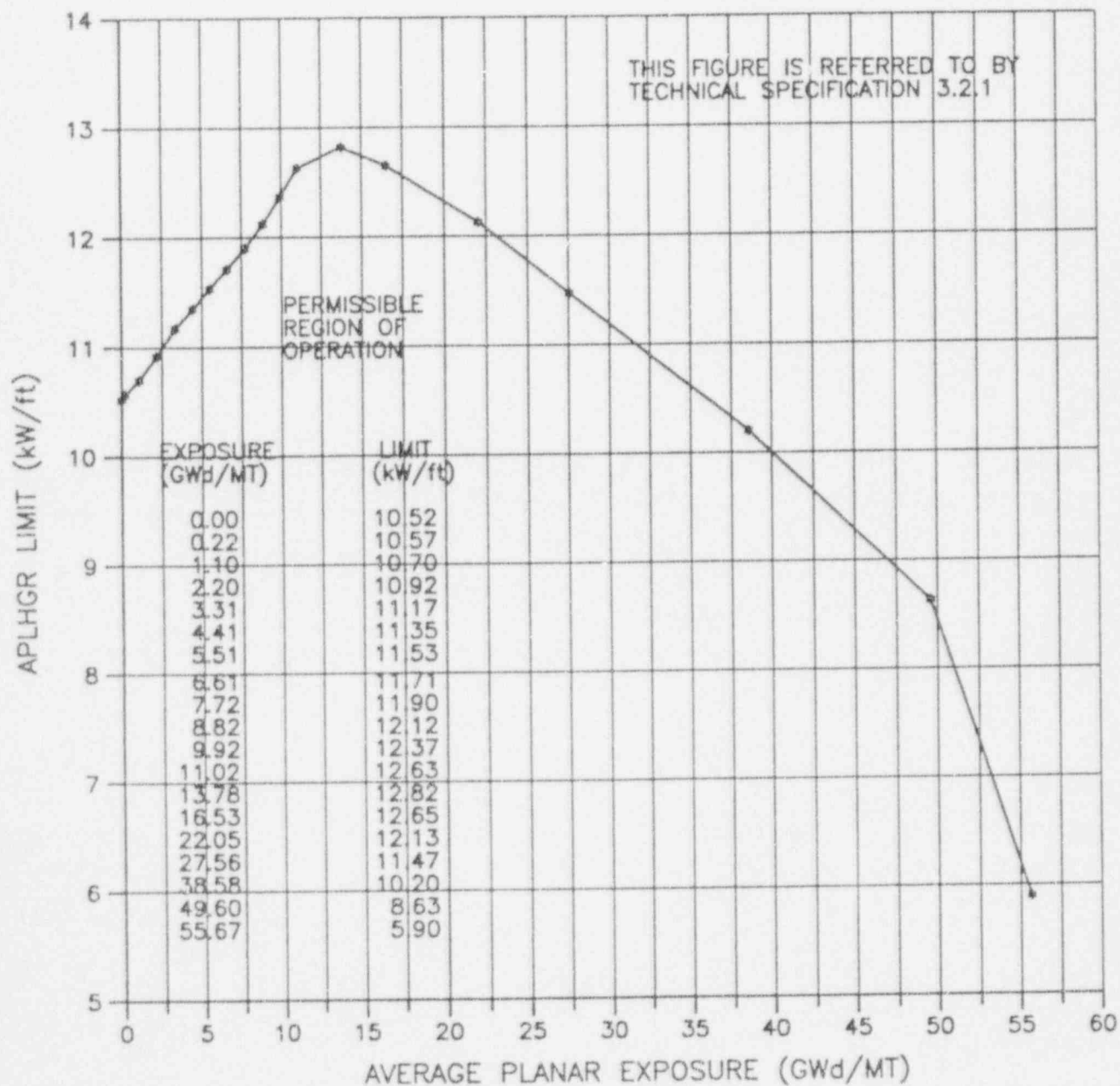


Figure 7

FUEL TYPE GE10-P8HXB324-12GZ-70M-150-T (GE8X8NB-3)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

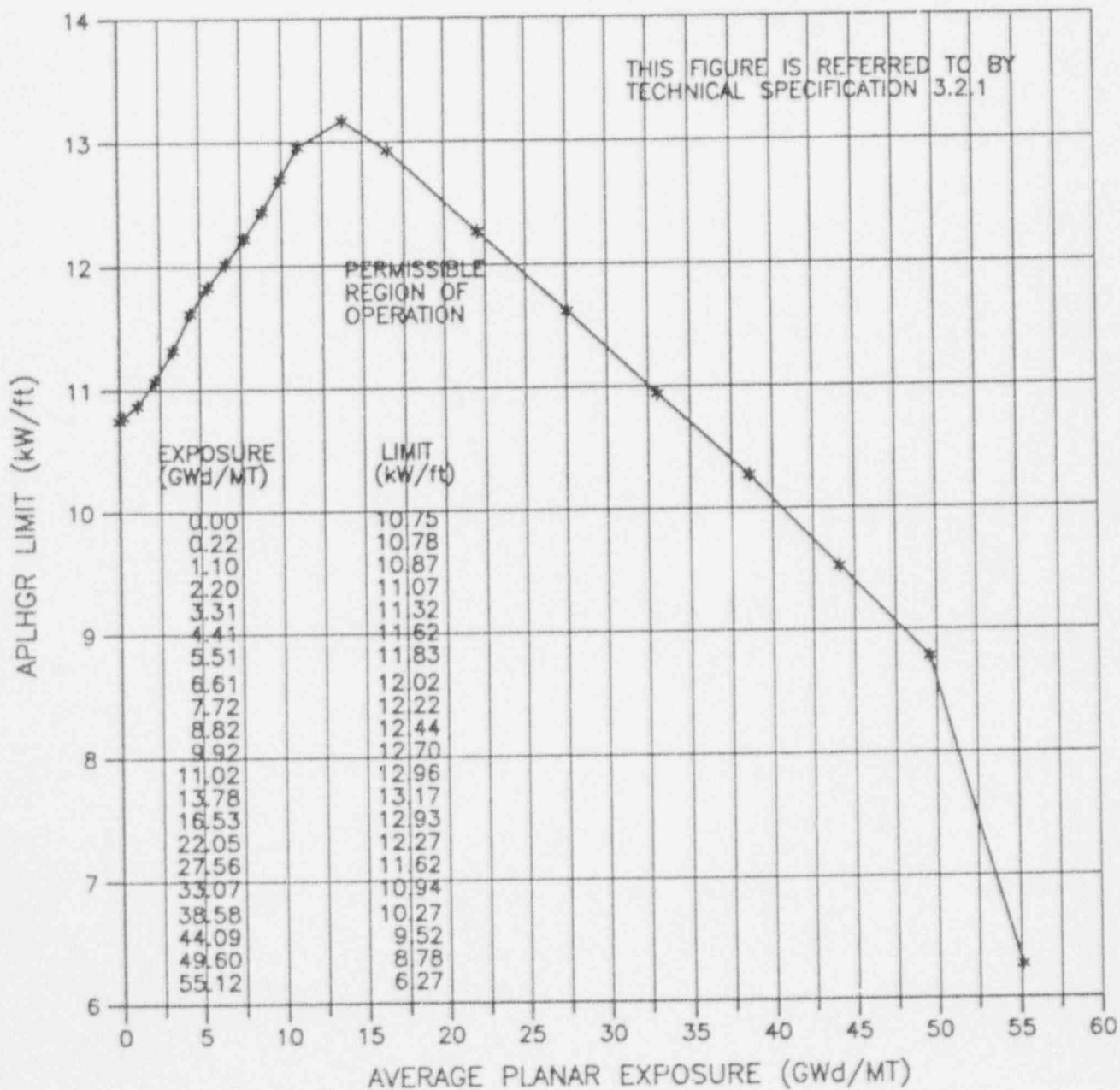


Figure 8

FUEL TYPE GE10-P8HXB320-11GZ-100M-150-T (GE8X8NB-3)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

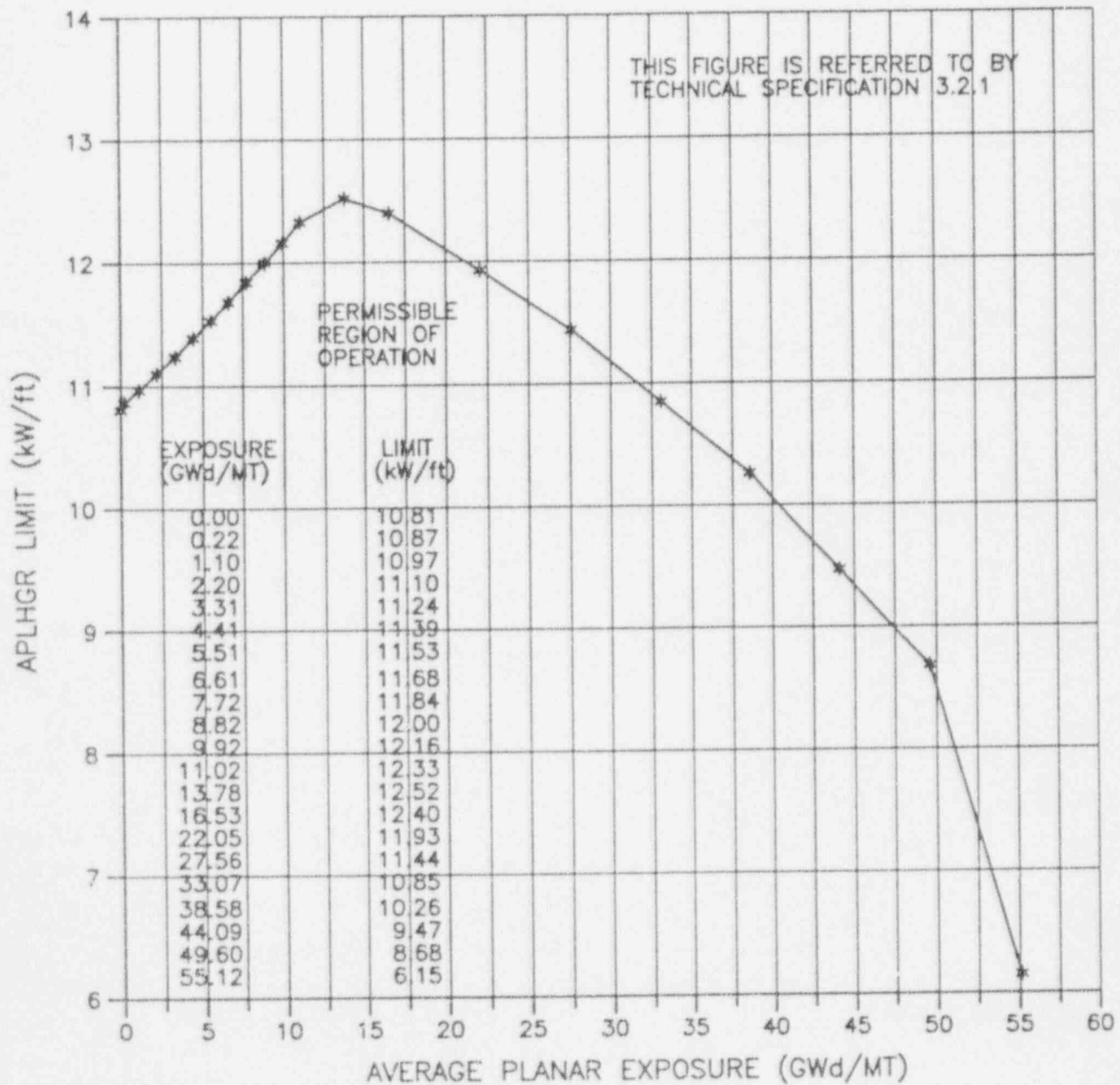


Figure 9

FUEL TYPE GE10-P8HXB322-11GZ-70M-150-T (GE8X8NB-3)  
 AVERAGE PLANAR LINEAR HEAT  
 GENERATION RATE (APLHGR) LIMIT  
 VERSUS AVERAGE PLANAR EXPOSURE

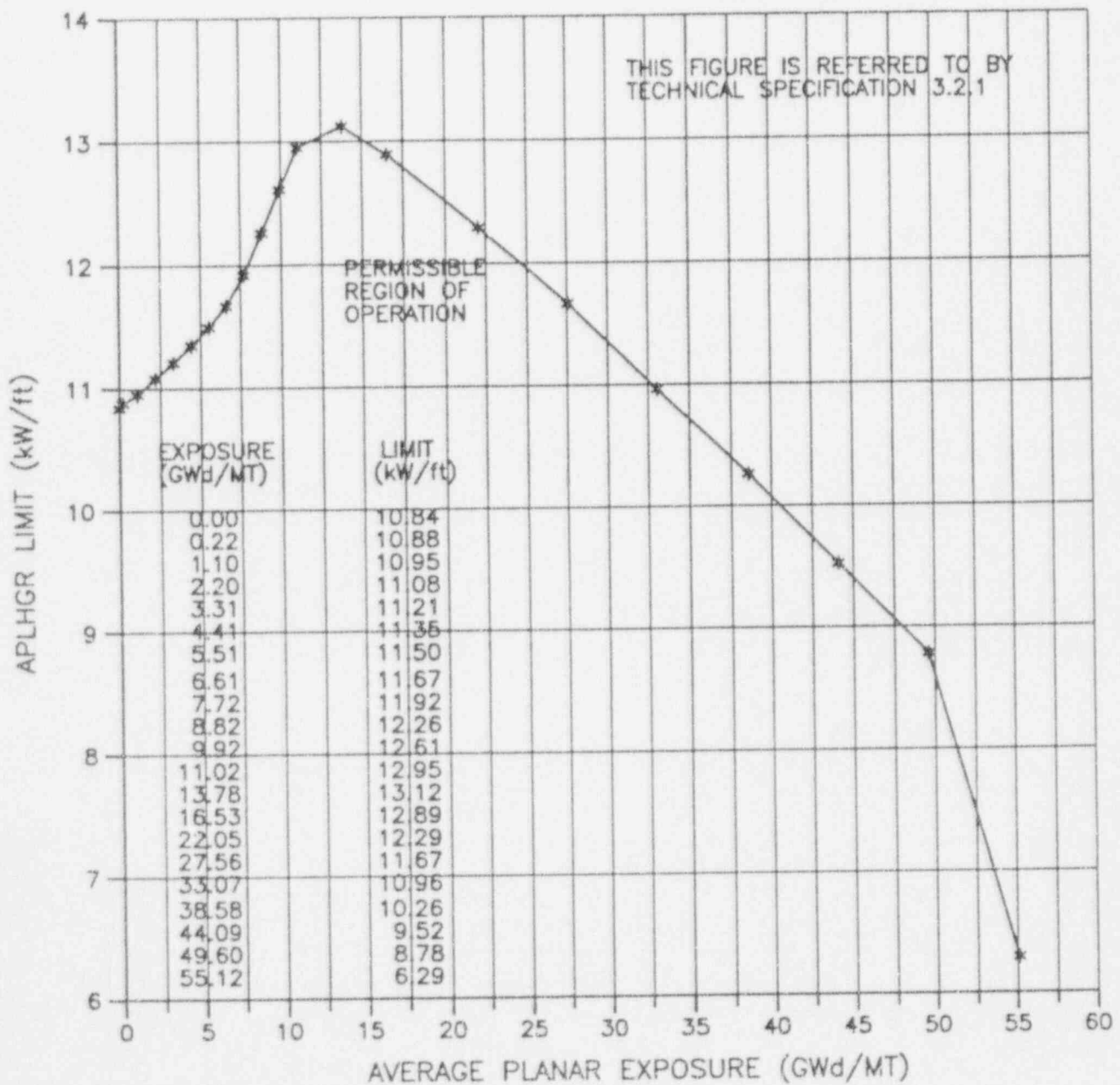
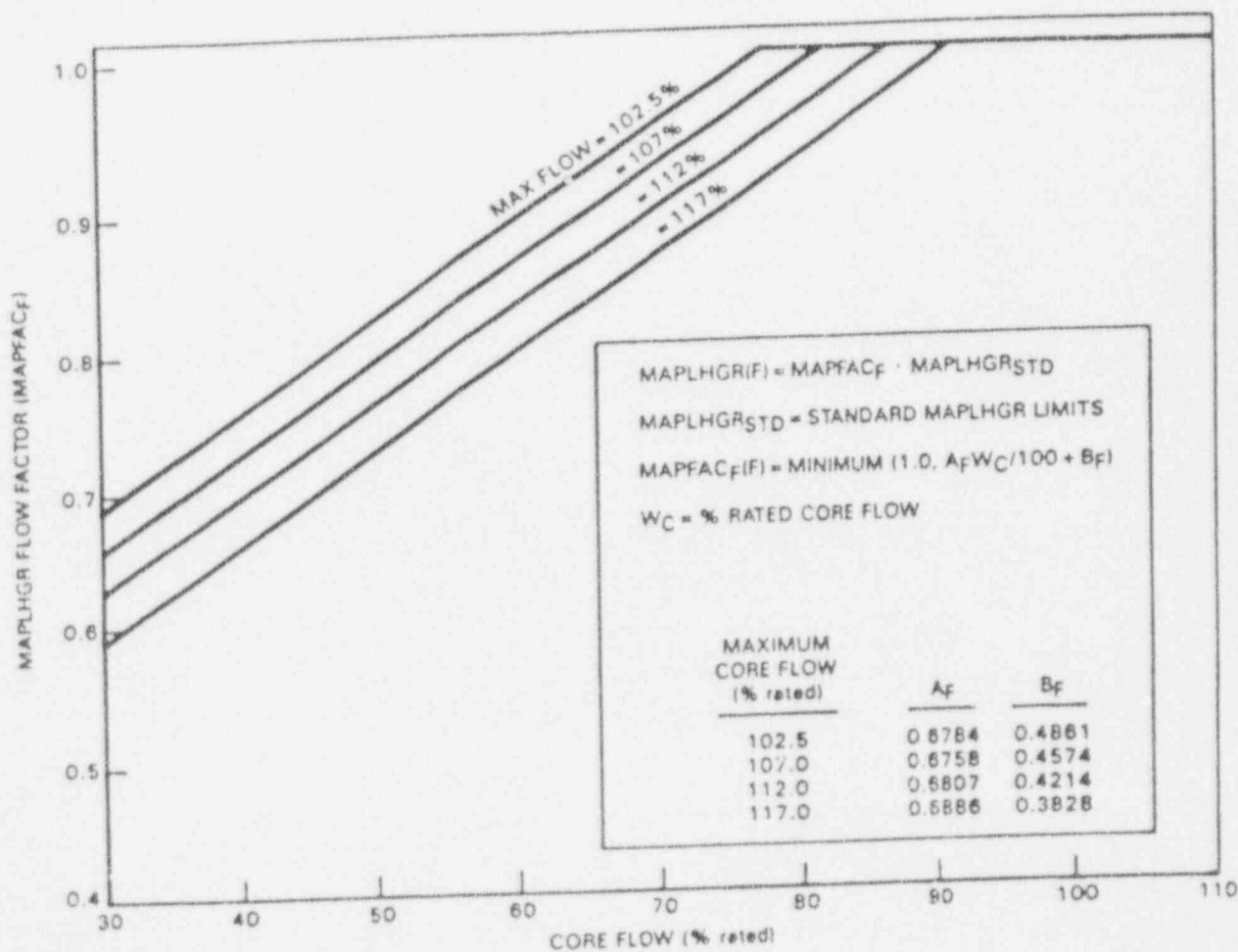


Figure 10

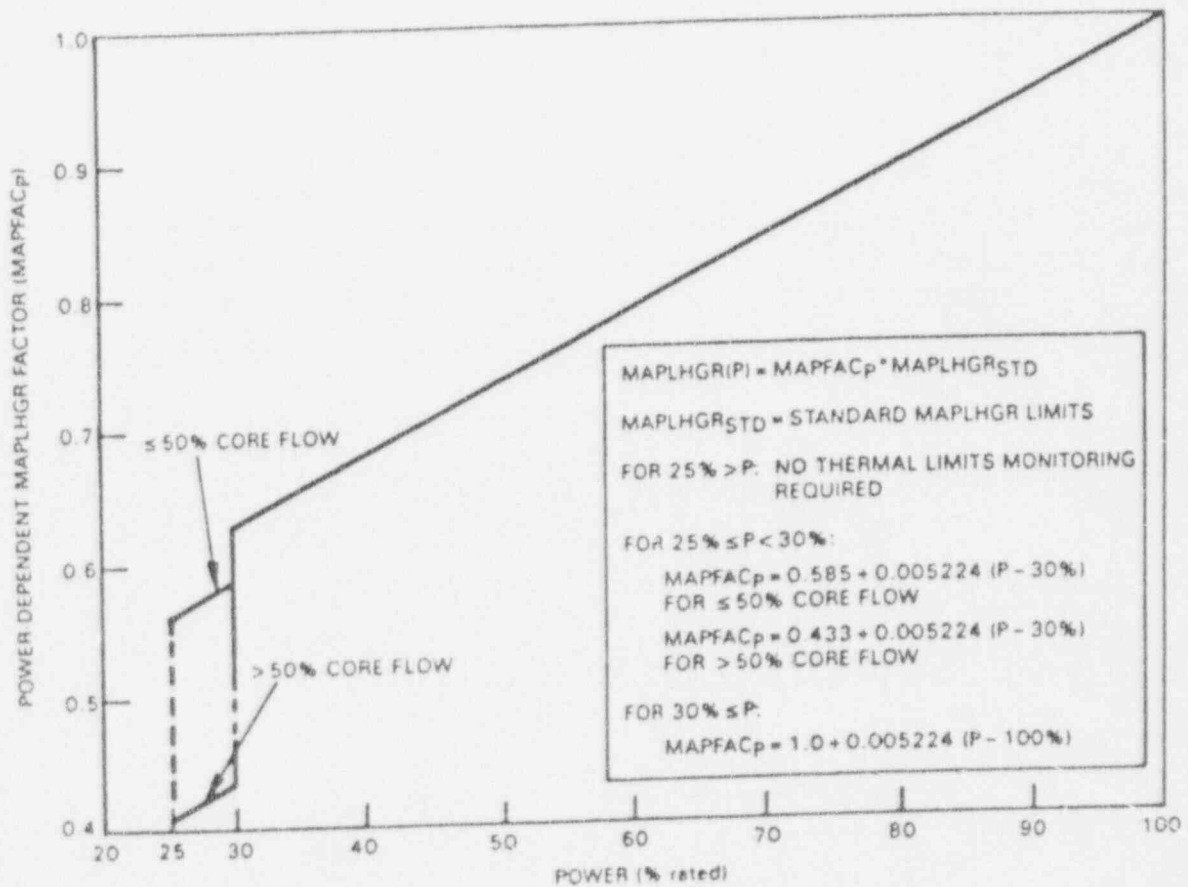
Flow - Dependent MAPLHGR Limit, MAPLHGR (F)



This figure is referred to by  
 Technical Specification 3.2.1

Figure 11

Power - Dependent MAPLHGR Limit, MAPLHGR (P)



This figure is referred to by  
 Technical Specification 3.2.1

Table 1

**MCPR Limits**  
 (EOC-RPT Not Required)

Non-pressurization Transient MCPR Limits

Exposure Range: BOC11 to EOC11

<u>GE8x8NB-3</u>	<u>GE8x8NB-3</u>	<u>BP8x8R/GE8x8EB/GE8x8NB</u>
GE10-P8HXB324-12GZ-70M-150-T	GE10-P8HXB322-11GZ-70M-150-T/ GE10-P8HXB320-11GZ-100M-150-T/ GE10-P8HXB329-12GZ1-100M-150-T	All
1.31	1.25	1.20

Pressurization Transient MCPR Limits

MCPR - Option A

	<u>GE8x8NB/GE8x8NB-3</u>	<u>BP8x8R/GE8x8EB</u>
Exposure Range: BOC11 to EOC11-3000 MWd/MT	1.34	1.33
Exposure Range: EOC11-3000 MWd/MT to EOC11	1.35	1.33

MCPR - Option B

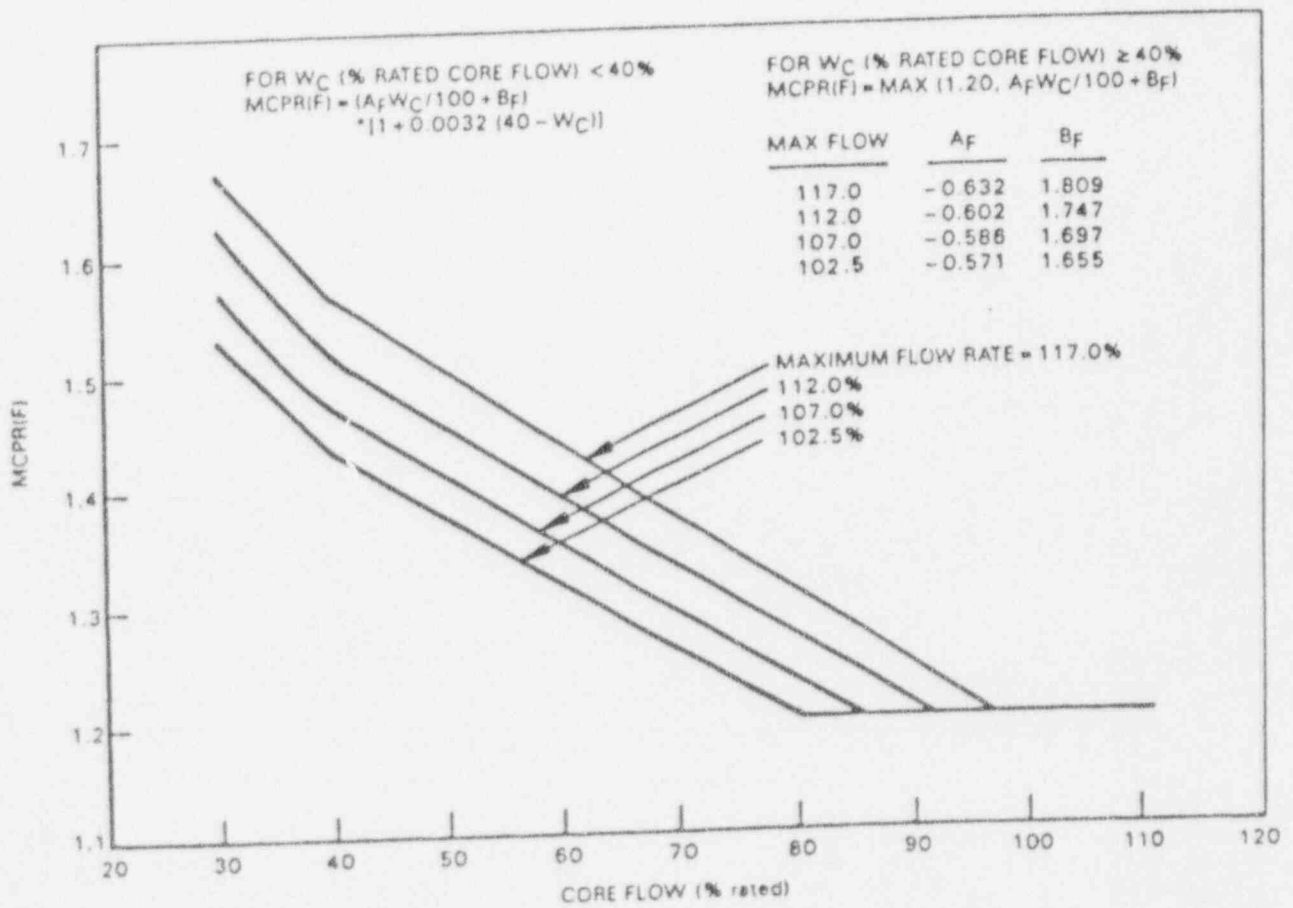
	<u>GE8x8NB/GE8x8NB-3</u>	<u>BP8x8R/GE8x8EB</u>
Exposure Range: BOC11 to EOC11-3000 MWd/MT	1.27	1.26
Exposure Range: EOC11-3000 MWd/MT to EOC11	1.31	1.29

This table is referred to by  
 Technical Specifications 3.2.2.1 and 3.2.2.2



Figure 12

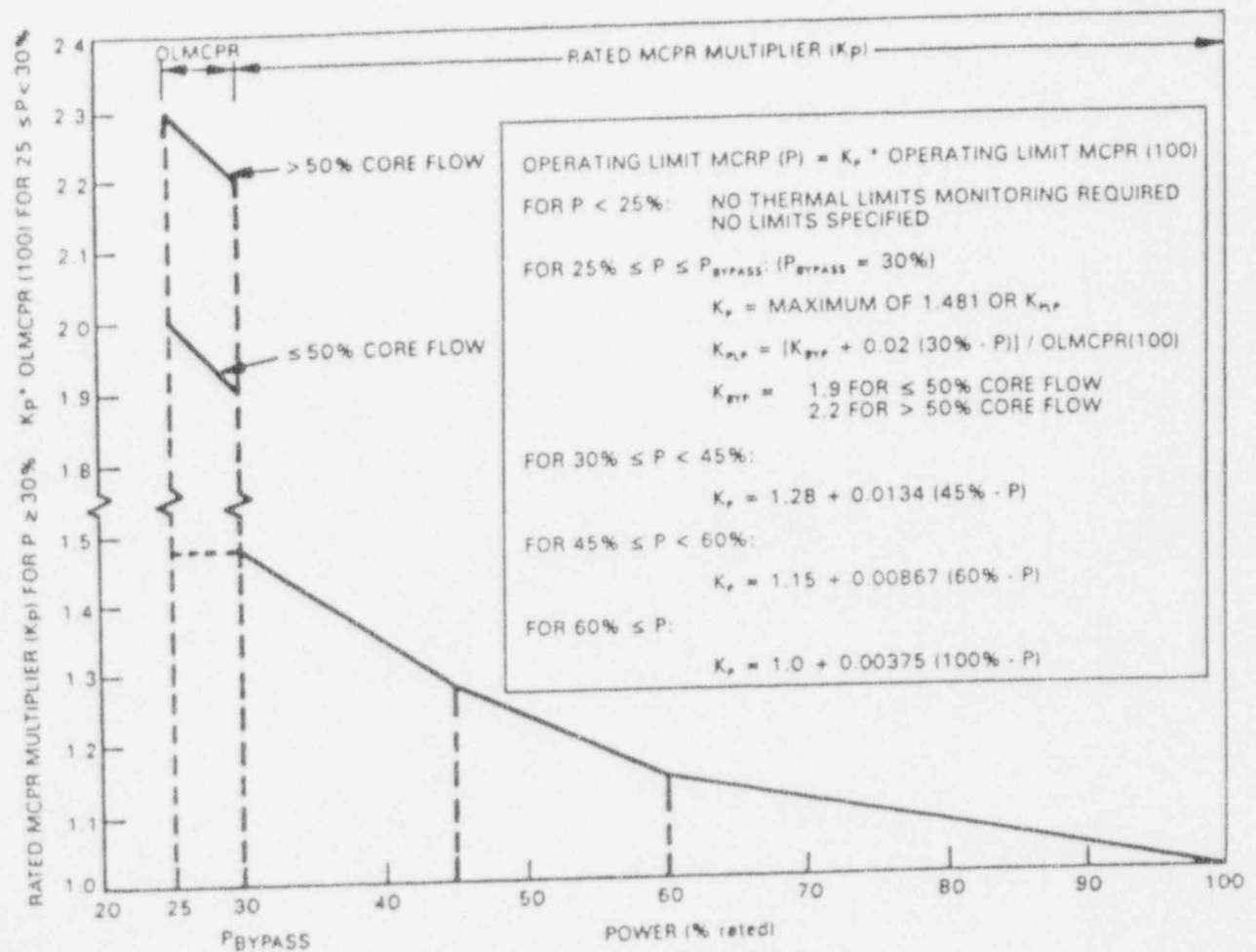
Flow - Dependent MCPR Limit, MCPR (F)



This figure is referred to by  
 Technical Specification 3.2.2.1

Figure 13

Power - Dependent MCPR Limit, MCPR (P)



This figure is referred to by  
 Technical Specification 3.2.2.1

Table 2

RBM System Setpoints

<u>Setpoint</u>	<u>Trip Setpoint</u>	<u>Allowable Value</u>
Low Power Setpoint (LPSP <sup>a</sup> )	27.0	≤ 29.0
Intermediate Power Setpoint (IPSP <sup>a</sup> )	62.0	≤ 64.0
High Power Setpoint (HPSP <sup>a</sup> )	82.0	≤ 84.0
Low Trip Setpoint (LTSP <sup>b</sup> )	≤ 115.1	≤ 115.5
Intermediate Trip Setpoint (ITSP <sup>b</sup> )	≤ 109.3	≤ 109.7
High Trip Setpoint (HTSP <sup>b</sup> )	≤ 105.5	≤ 105.9
$t_{\text{d}}$	≤ 2.0 seconds	≤ 2.0 seconds

<sup>a</sup> Setpoints in percent of Rated Thermal Power.

<sup>b</sup> Setpoints relative to a full scale reading of 125. For example, ≤ 115.1 means ≤ 115.1/125.0 of full scale.

This table is referred to by  
 Technical Specification 3.3.4 (Table 3.3.4-2)

ENCLOSURE 2

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2  
NRC DOCKET NO. 50-324  
OPERATING LICENSE NO. DPR-62  
SUPPLEMENTAL RELOAD LICENSING REPORT

ENCLOSURE 3

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2  
NRC DOCKET NO. 50-324  
OPERATING LICENSE NO. DPR-62  
LOSS-OF-COOLANT ACCIDENT ANALYSIS REPORT

## General Electric Company

### AFFIDAVIT

**I, James F. Klapproth**, being duly sworn, depose and state as follows:

- (1) I am Fuel Licensing Manager, General Electric Company ("GE") 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 the attached document entitled "Loss-of-Coolant Accident Analysis Report for Brunswick Steam Electric Plant Unit 2 Reload 10 Cycle 11", NEDC-31624P, Supplement 2, Revision 2, April 1994.
- (3) In making this application for withholding of proprietary information of which it is the owner, GE 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), 2.790(a)(4), and 2.790(d)(1) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information", and some portions 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 General Electric's competitors without license from General Electric 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 cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;
- d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;
- e. 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 both paragraphs 4.a and 4.b, above.

- (5) The information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GE, 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 GE, 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. Access to such documents within GE 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 GE 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), above, is classified as proprietary because it would provide other parties, including competitors, with information related to General Electric fuel designs and analysis results which were developed at a considerable expense to General Electric.

- c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of General Electric, its customers, or its suppliers;
- d. Information which reveals aspects of past, present, or future General Electric customer-funded development plans and programs, of potential commercial value to General Electric;
- e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

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- (8) The information identified in paragraph (2), above, is classified as proprietary because it would provide other parties, including competitors, with information related to General Electric fuel designs and analysis results which were developed at a considerable expense to General Electric.



- (9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GE's competitive position and foreclose or reduce the availability of profit-making opportunities. The information is part of GE's comprehensive BWR 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.

The research, development, engineering, and analytical costs comprise a substantial investment of time and money by GE.

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.

GE's competitive advantage will be lost if its competitors are able to use the results of the GE 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 GE 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 GE of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing these very valuable analytical tools.

STATE OF CALIFORNIA        )  
  )  
  )        SS:  
COUNTY OF SANTA CLARA    )

James F. Klapproth, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information, and belief.

Executed at San Jose, California, this 27<sup>th</sup> day of May 1994.

James F. Klapproth  
James F. Klapproth  
General Electric Company

Subscribed and sworn before me this 27<sup>th</sup> day of May 1994.

Mary L. Kendall  
Notary Public, State of California



STATE OF CALIFORNIA        )  
  )  
COUNTY OF SANTA CLARA    )        SS:

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Notary Public, State of California

