

NON-INTENT INSTRUCTION TEMPORARY CHANGE

PNPP No. 7309 Rev. 9/90

PAP-0522

TEMPORARY CHANGE NO.

TCN- 3

INSTRUCTION NO. PDB-P0001	REV. 1	INSTRUCTION TITLE CORE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR
CANCELS TCN(S): N/A	POWER PLANT, UNIT 2 CYCLE 4 (RELOAD 3)	
LIST EACH ATTACHED PAGE. 3		ADMIN. USE ONLY
PREPARER James M. Ruckel	DATE 3-4-93	INFORMATION ONLY
REASON CHANGES REFERENCE TO REVISION 2 FOR THE SUPPLEMENTAL RELOAD LICENSING REPORT. GENERAL ELECTRIC ISSUED A NEW REVISION TO DOCUMENT A CLARIFICATION PREVIOUSLY EXPLAINED PER TELECON.		

☐ CONDITIONAL APPROVAL

PLANT MANAGEMENT STAFF NA	DATE 	SS or US NA	DATE
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☒ FINAL APPROVAL ONLY

IN-DEPTH REVIEWER Kimberly K. Redwood	DATE 3/4/93
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FINAL APPROVAL	APPROVED David P. Daymont	DATE 3/5/93	APPROVED u4	DATE
	APPROVED u4	DATE 	APPROVED u4	DATE
	PORC MTG. NO. 93-032	PORC MTG. DATE 3-5-93	RECOMMENDED FOR: <input checked="" type="checkbox"/> APPROVAL <input type="checkbox"/> DISAPPROVAL	EFFECTIVE DATE 3-6-93

FOR CONDITIONAL TC'S ONLY:

DISAPPROVAL	DISAPPROVED	DATE
	REASON FOR DISAPPROVAL	

INTENT INSTRUCTION TEMPORARY CHANGE

PNPP No. 7310 Rev 2/92

PAP-0522

TEMPORARY CHANGE NO.

TCN-

2

INSTRUCTION NO PDB-F0001	REV 1	INSTRUCTION TITLE CORE OPERATING LIMITS REPORT	ADMIN. USE ONLY
FOR THE PERRY NUCLEAR POWER PLANT UNIT 1			
CANCELS TONIS: N/A			
LIST EACH ATTACHED PAGE 3, 30, 16, 17, 15			

REASON

THE SUPPLEMENTAL RELOAD LICENSING REPORT FOR RELOAD 3, CYCLE 4 WAS REVISED BASED ON THE FUEL CONFIGURATION RESULTING FROM THE CYCLE 4 MID CYCLE OUTAGE.

THE LOSS OF FEEDWATER HEATING TRANSIENT Δ CPR INCREASED FOR THE GE8X8EB/BP8X8R. FIGURES 3.2.2-1 AND 3.2.2-2 WERE REVISED AS APPROPRIATE. THE MCP_R AND MCP_P OFFSETS WERE REVISED FOR PLANNED FEEDWATER REDUCTION.

THE ROTATED BUNDLE ANALYSIS Δ CPR REMAINS THE MOST LIMITING.

PREPARED BY James M. Rinckel	DATE 12-17-93	IN-DEPTH REVIEWER [Signature]	DATE 12-17-93
PORC MTG NO ± 9302E	PORC MTG DATE 2/24/93	RECOMMENDED FOR APPROVAL <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	EFFECTIVE DATE 3-4-93
APPROVAL	APPROVED [Signature]	DATE 3/1/93	APPROVED NA
	APPROVED NA	DATE	APPROVED NA
	APPROVED NA	DATE	APPROVED NA

Ensure an approved 10CFR50.59 Applicability Check is attached prior to submittal for PORC Review or final approval if Non-PORC

INTENT INSTRUCTION TEMPORARY CHANGE

PNPP No. 7310 Rev. 2/92

PAP-0522

TEMPORARY CHANGE NO

TCN- 1

ADMIN. USE ONLY

INSTRUCTION NO. PDB F0001	REV. 1	INSTRUCTION TITLE Core Operating Limits Report	ADMIN. USE ONLY
for the Perry Nuclear Power Plant, Unit 1 Cycle 4			
CANCELS TCN(S): NA			
LIST EACH ATTACHED PAGE 3a, 15			
REASON: <div style="text-align: right; margin-right: 50px;"><i>QMF 5-21-92</i></div> Incorporate the preliminary Rotated Bundle Analysis evaluation MCPR penalty to the operating limit MCPR.			
PREPARER <i>James M. Linsell</i>		DATE 5-21-92	IN-DEPTH REVIEWER <i>[Signature]</i>
DATE 5-21-92		DATE 5-21-92	
PORC MTG. NO. 92-070	PORC MTG. DATE 5-21-92	RECOMMENDED FOR APPROVAL <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	EFFECTIVE DATE 5-22-92
A P P R O V A L	APPROVED <i>[Signature]</i>	DATE 5-21-92	APPROVED <i>[Signature]</i>
	DATE 5-21-92	DATE 5/21/92	DATE 5/21/92
	NA		NA
	NA		NA

Ensure an approved 10CFR50.59 Applicability Check is attached prior to submittal for PORC Review or final approval if Non-PORC.

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Rev.: 1

PLANT DATA BOOK ENTRY SUBMITTAL SHEET

TITLE: CORE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR POWER PLANT,
UNIT 1 CYCLE 4 (RELOAD 3)

PDB - F0001 /Rev. 1 EFFECTIVE DATE: 5-20-92

MPL: J11 TCN: N/A PAGES AFFECTED: N/A

SCOPE OF CHANGE: Incorporate new fuel type information for Cycle 4
including MCPR limits which are fuel type dependent
and delta T dependent.

REFERENCE: PY-CEI/NRR-1104 L
PY-CEI/NRR-1157 L
PY-NRR/CEI-0529 L

PREPARED BY: J. M. Rinckel *J. M. Rinckel* 4-27-92
Date

REVIEWED BY: *[Signature]* *P. W. Bradley* 4-30-92
Date

APPROVED BY: *[Signature]* *Brian D. Whitely* 4-30-92
Manager - Sponsoring Group Date

=====

TAB F USE ONLY

PORC MEETING NUMBER: 92-058 5-1-92
Date

APPROVED BY: *[Signature]* *Steven L. Kouchi* 5/12/92
PPTD Director Date

UNIT 1 CORE OPERATING LIMITS REPORT

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INTRODUCTION AND REFERENCES

INTRODUCTION

This Core Operating Limits Report for PNPP Unit 1 Cycle 4 is prepared in accordance with the requirements of PNPP Technical Specification 6.9.1.9. The core operating limits presented were developed using NRC-approved methods (Reference 2). Results from the reload analyses for the General Electric fuel in PNPP Unit 1 for Cycle 4 are documented in References 3, 4, 5 and 6.

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 type. (Technical Specification 3/4.2.3)

REFERENCES

1. J.R. Hall (USNRC) to M.D. Lyster (CEI), Amendment No. 33 to Facility Operating License No. NPF-58, September 13, 1990.
2. "General Electric Standard Application for Reactor Fuel-GESTAR II," NEDE-24011-P-A-10 and NEDE-24011-P-A-10-US (US Supplement), April 1991.
3. "Supplemental Reload Licensing Report for the Perry Nuclear Power Plant Unit 1, Reload 3, Cycle 4," GE Document 23A7147 Rev. 2 (February 1993). TC
3
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). TC
2
5. "Supplement 1 to the Supplemental Reload Licensing Submittal for the Perry Nuclear Power Plant Unit 1, Reload 2, Cycle 3," GE Document 23A6492AA Rev. 0 (September 1990).
6. "Supplement 1 to the Supplemental Reload Licensing Submittal for the Perry Nuclear Power Plant Unit 1, Reload 3, Cycle 4," GE Document 23A7147AA, Rev. 0 (January 1992).
7. Perry Nuclear Power Plant Updated Safety Analysis Report, Unit 1, Appendix 15B-Reload Safety Analysis.

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TC	8.	Deleted
1,2	9.	Deleted

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.

* These applicable MAPLHGR values are:

1. Those 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 shown in Figures 3.2.1-3 through Figure 3.2.1-10 for the applicable type of fuel.

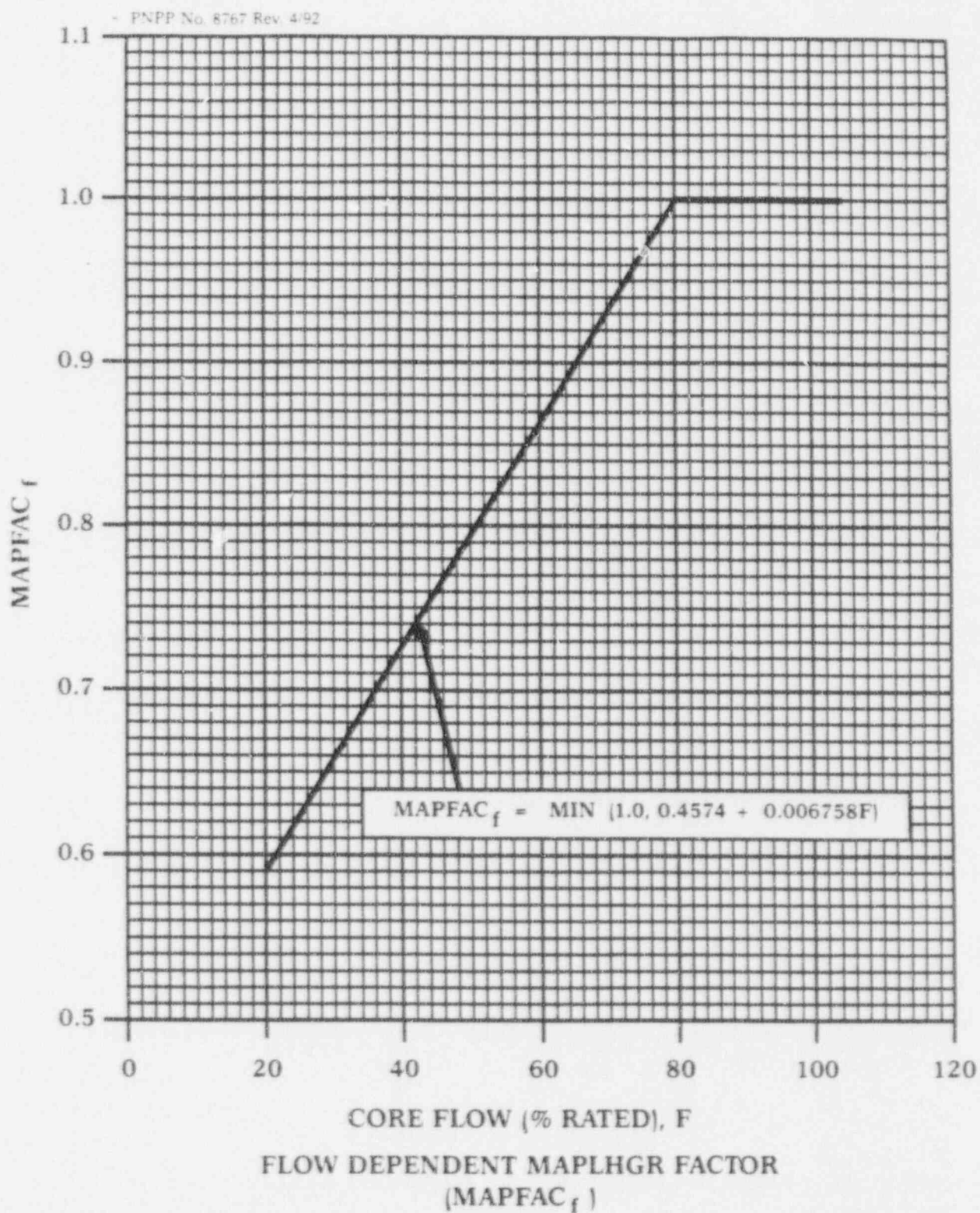


FIGURE 3.2.1-1

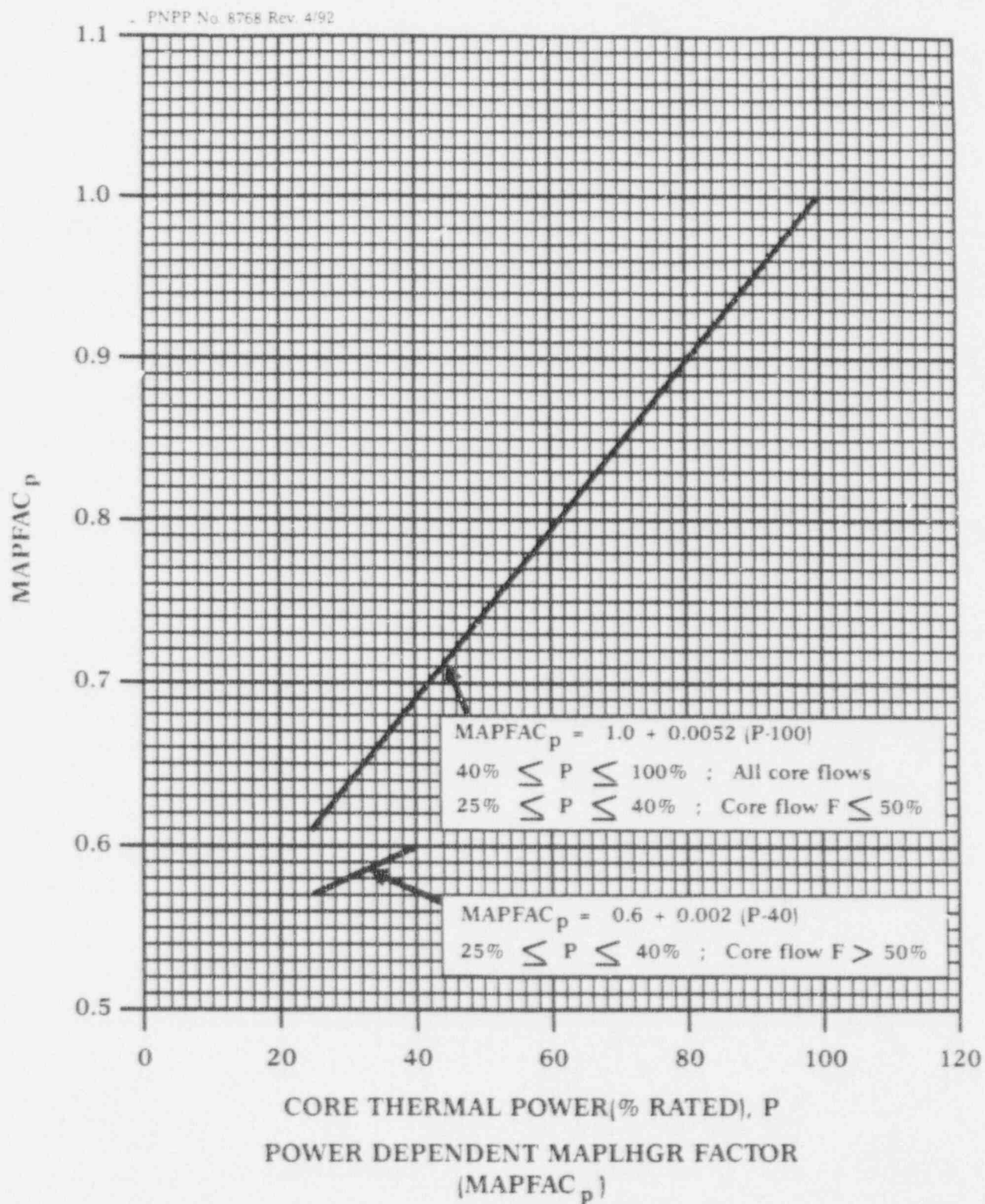


FIGURE 3.2.1-2

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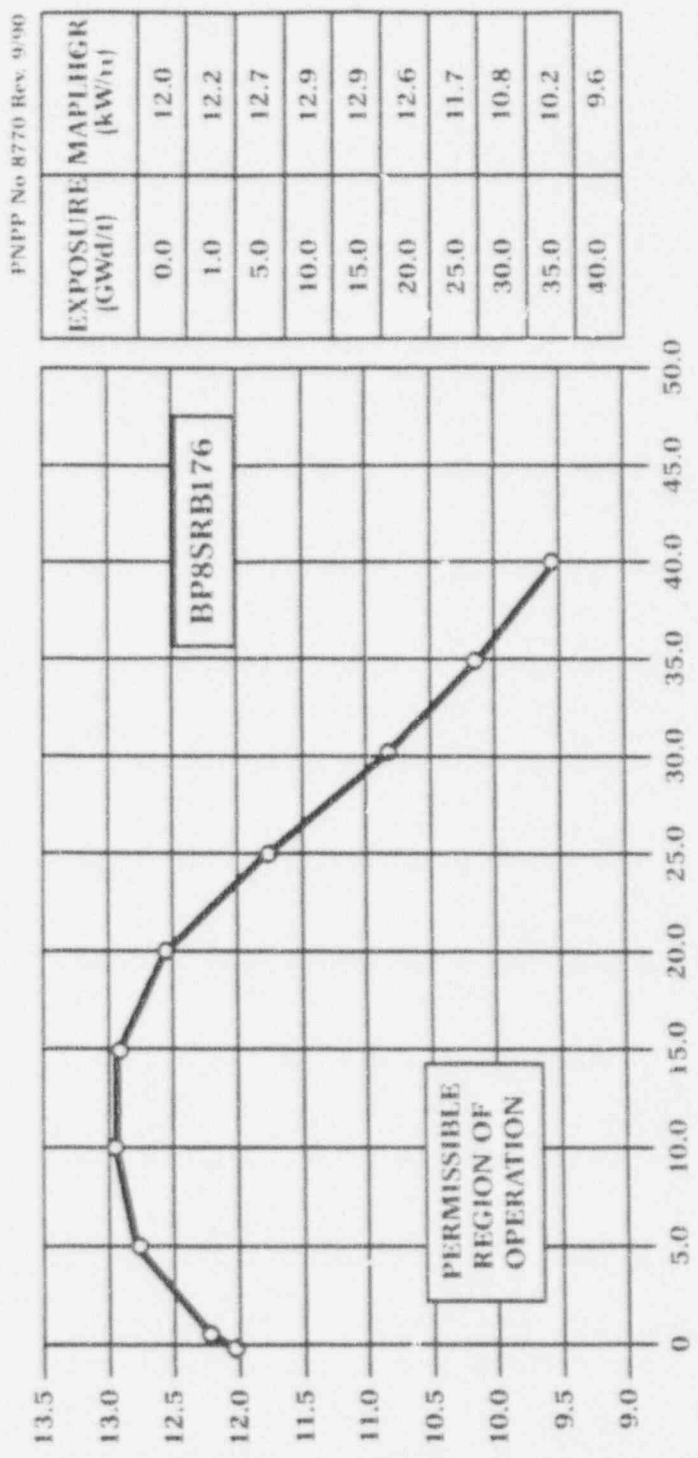
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Figure 3.2.1-3

PERRY UNIT 1

CYCLE 4
CORE OPERATING
LIMITS REPORT

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



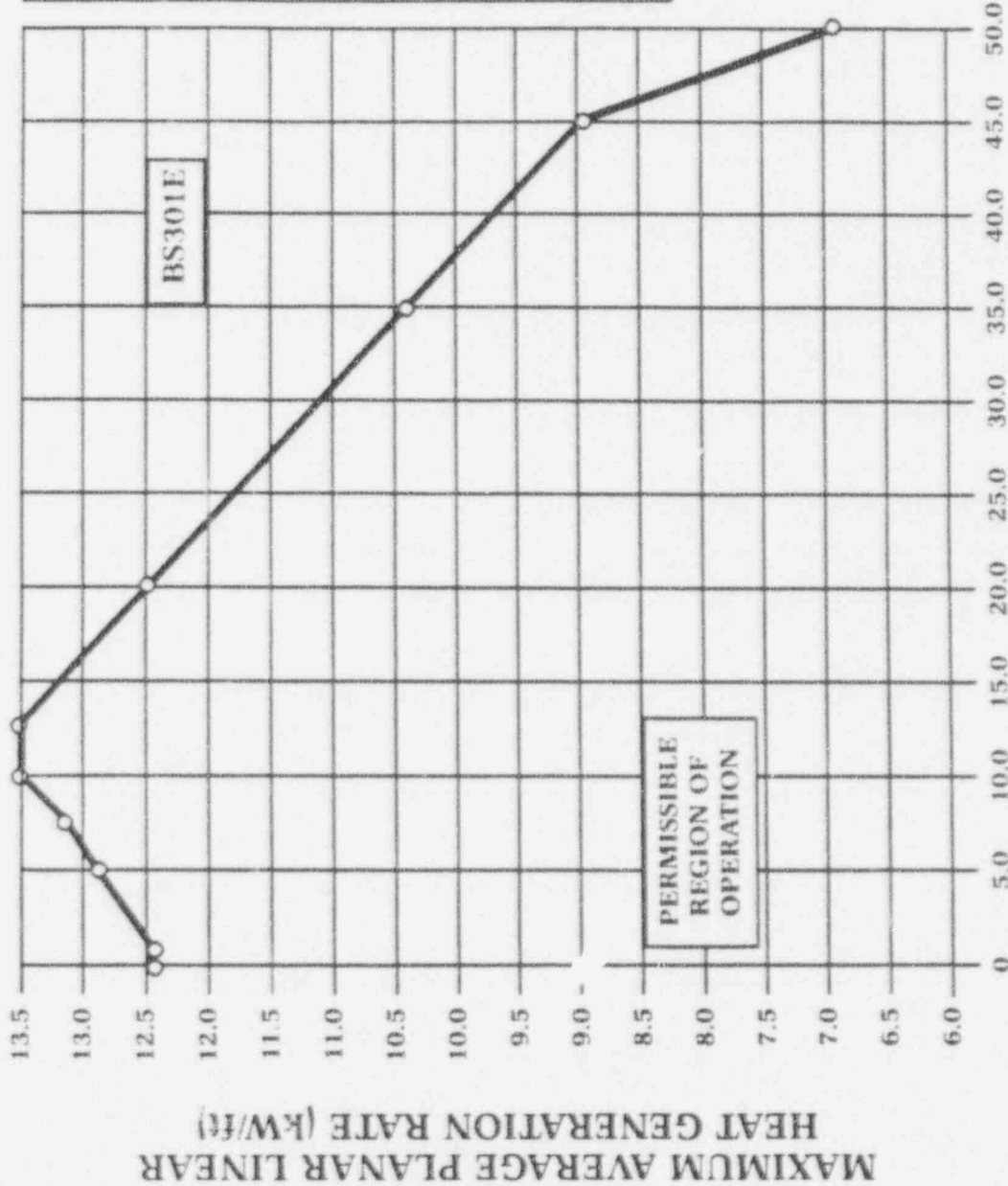
AVERAGE PLANAR EXPOSURE (GWd/t)

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

MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, BP8x8R
FUEL TYPE BP8SRB176

FIGURE 3.2.1-4

EXPOSURE (GWd/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



AVERAGE PLANAR EXPOSURE (GWd/t)

MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8EB
FUEL TYPE BS301E

Note: 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 Reference 4.

FIGURE 3.2.1-5

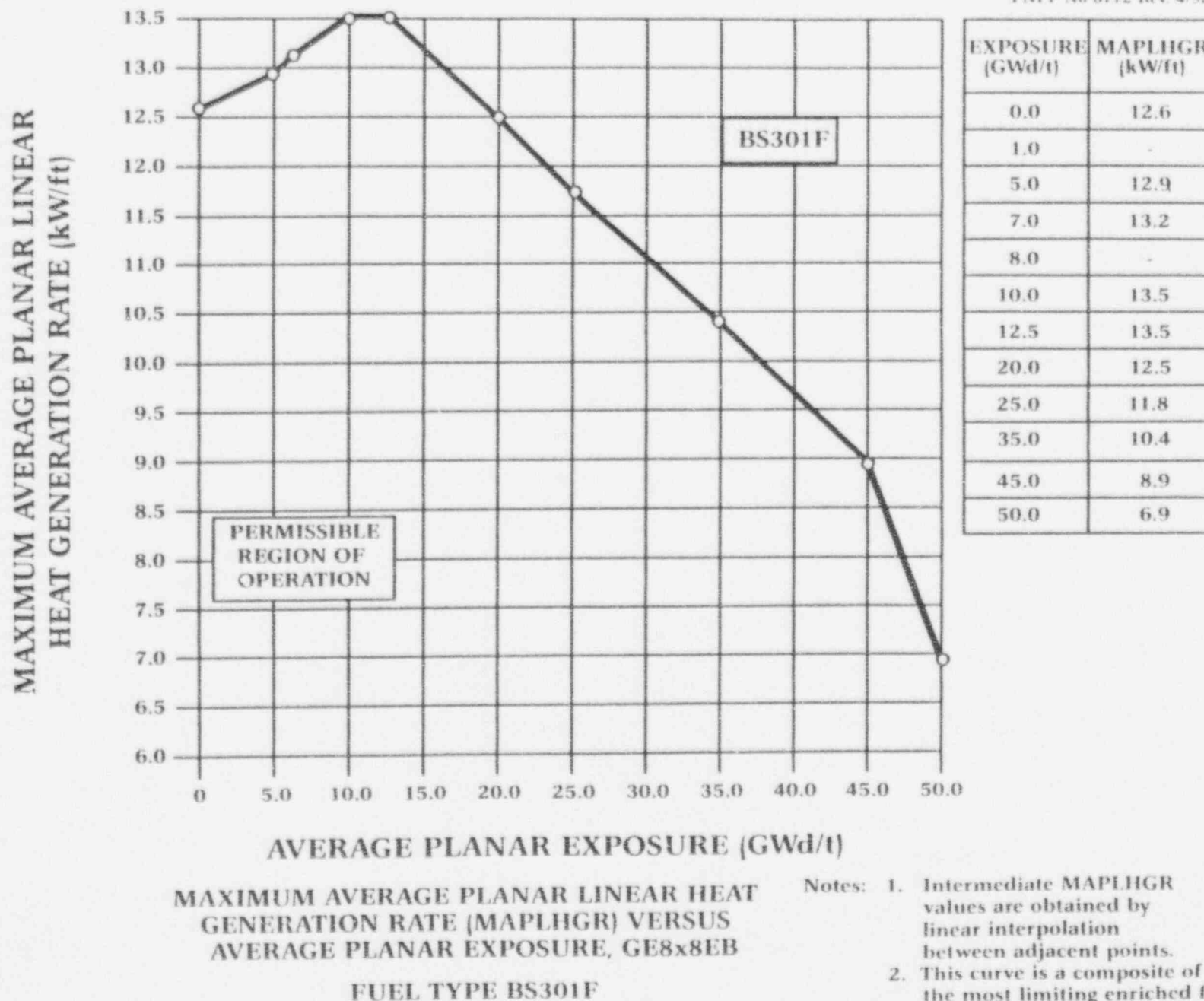
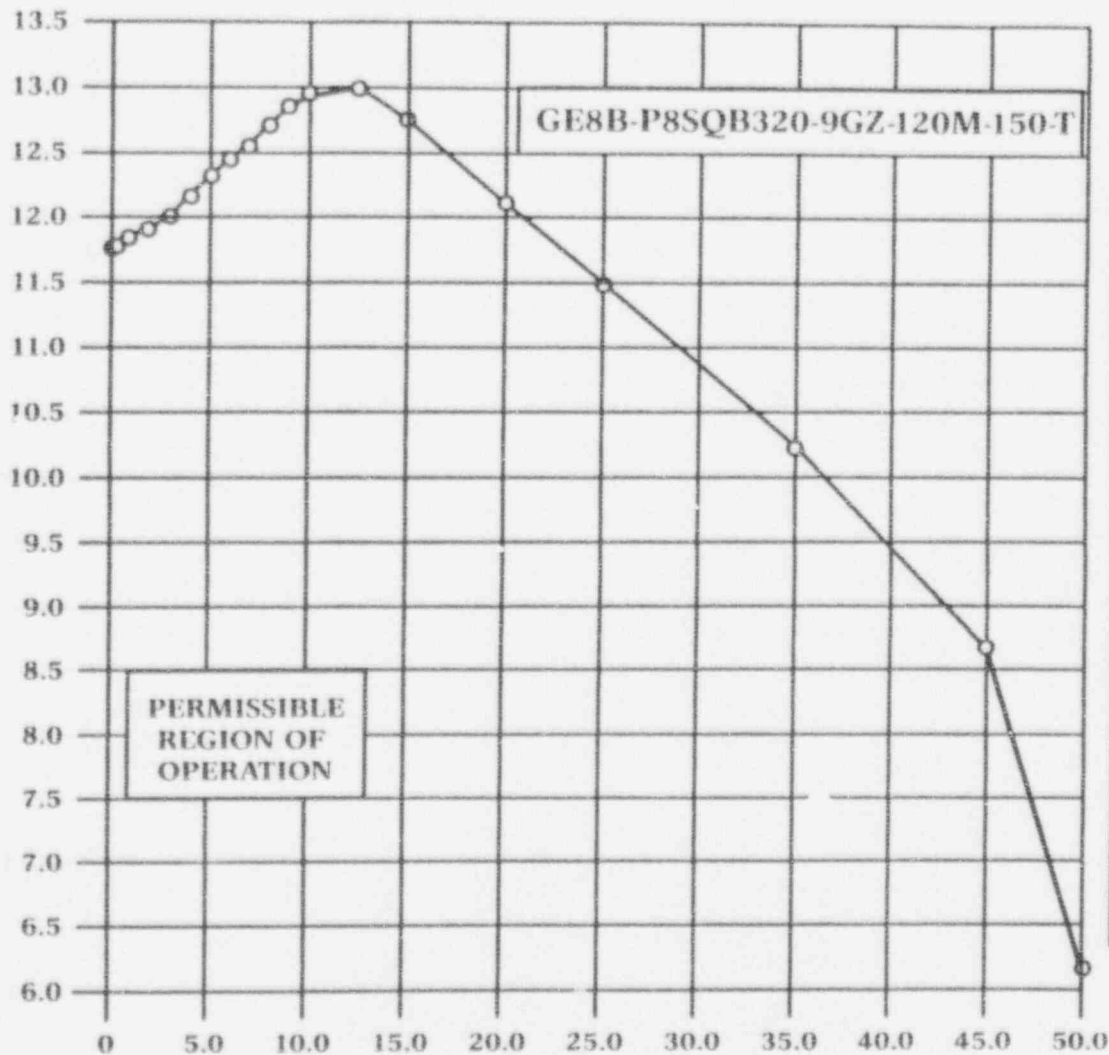


FIGURE 3.2.1-6

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



EXPOSURE (GWd/t)	MAPLHGR (kW/ft)
0.0	11.75
0.2	11.78
1.0	11.83
2.0	11.91
3.0	12.02
4.0	12.17
5.0	12.32
6.0	12.44
7.0	12.56
8.0	12.70
9.0	12.84
10.0	12.97
12.5	13.00
15.0	12.73
20.0	12.10
25.0	11.48
35.0	10.23
45.0	8.66
50.0	6.16

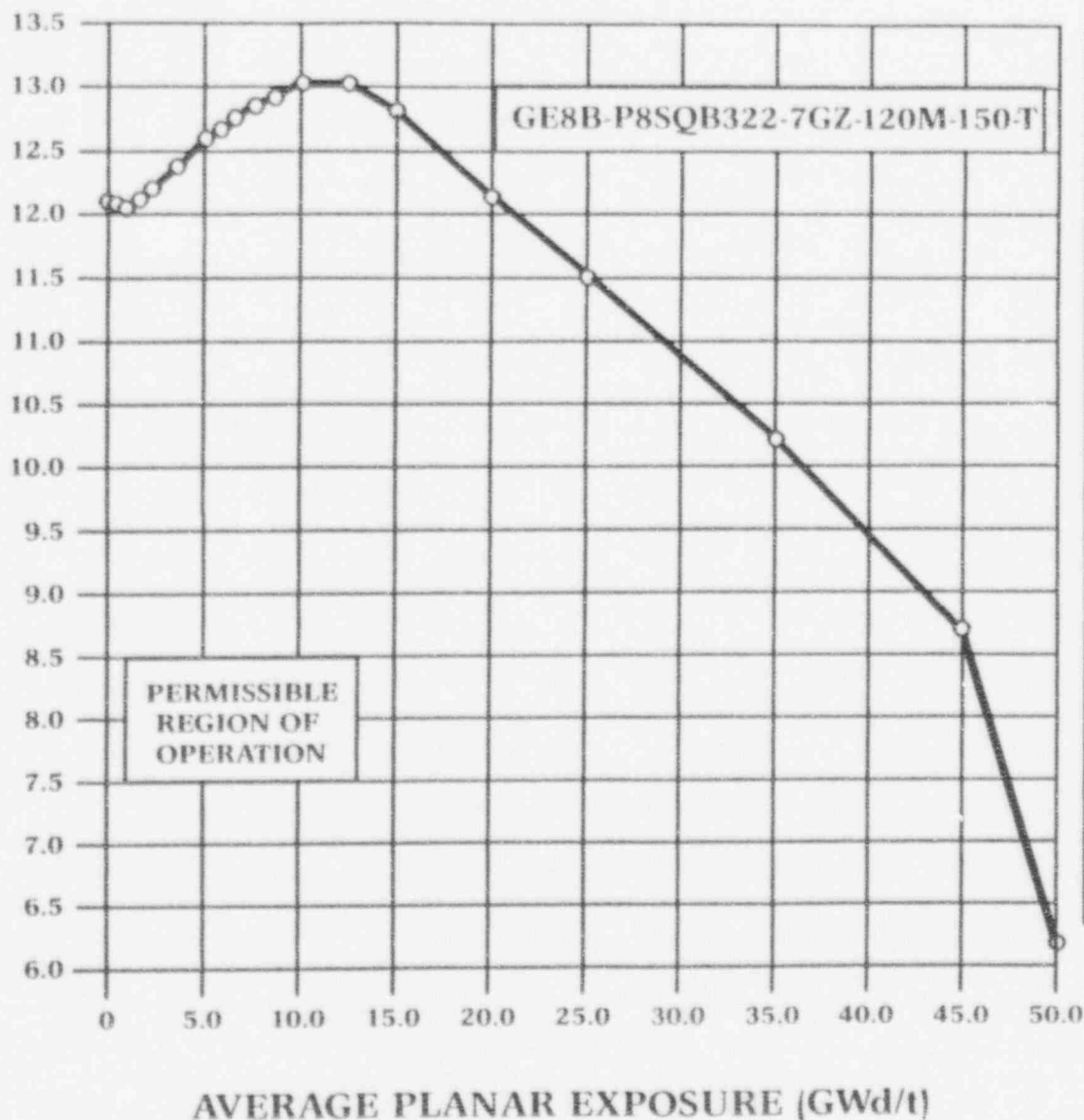
AVERAGE PLANAR EXPOSURE (GWd/t)

MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8EB
FUEL TYPE GE8B-P8SQB320-9GZ-120M-150-T

- 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 Reference 5.

FIGURE 3.2.1-7

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



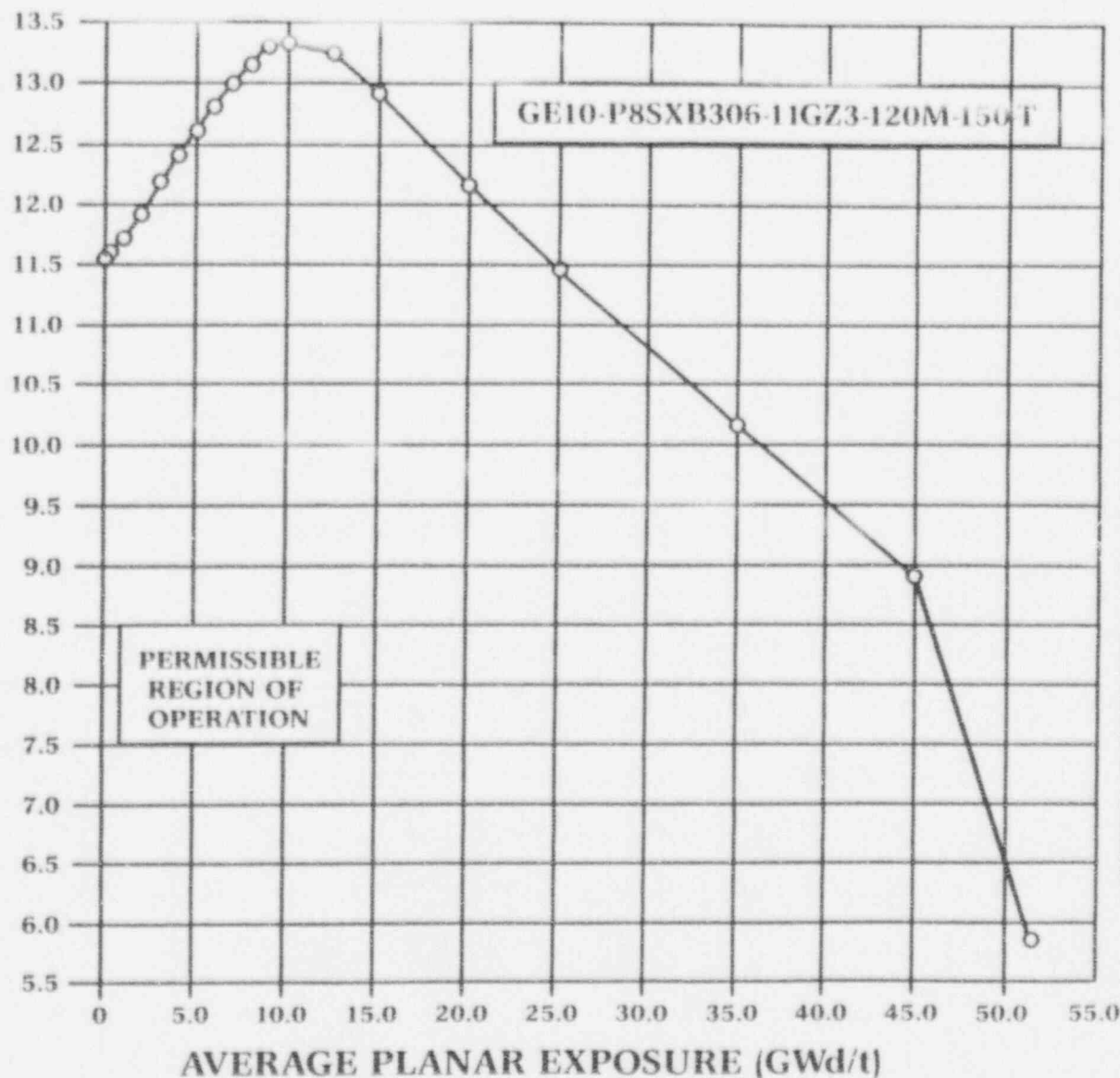
EXPOSURE (GWd/t)	MAPLHGR (kW/ft)
0.0	12.11
0.2	12.10
1.0	12.09
2.0	12.16
3.0	12.28
4.0	12.42
5.0	12.58
6.0	12.67
7.0	12.75
8.0	12.83
9.0	12.92
10.0	13.02
12.5	13.07
15.0	12.79
20.0	12.19
25.0	11.56
35.0	10.29
45.0	8.77
50.0	6.27

MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8EB
FUEL TYPE GE8B-P8SQB322-7GZ-120M-150-T

- 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 Reference 5.

FIGURE 3.2.1-8

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



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8NB-3
FUEL TYPE GE10-P8SXB306-11GZ3-120M-150T

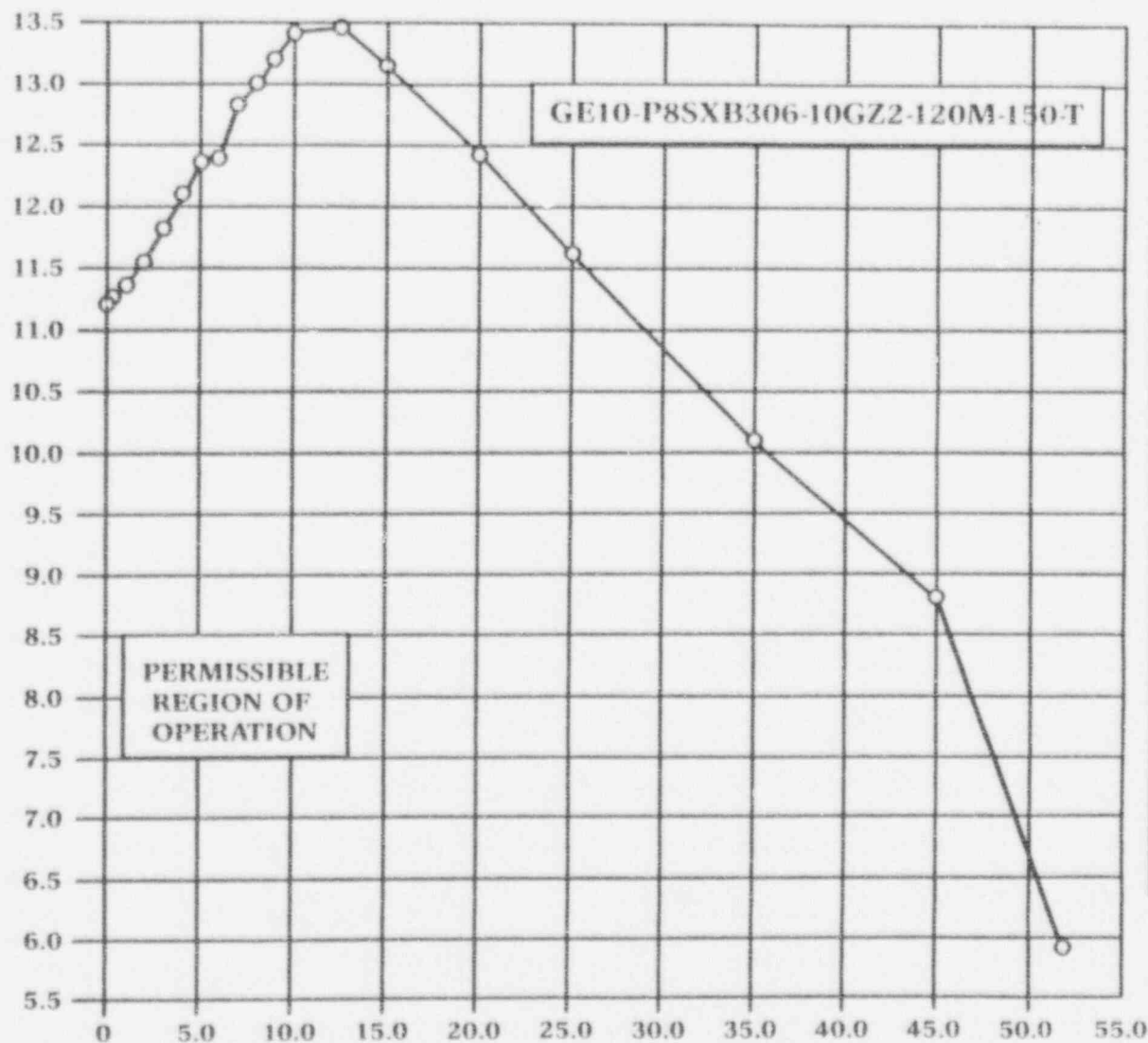
FIGURE 3.2.1-9

PNPP No 9268

EXPOSURE (GWd/ST)	MAPLHGR (kW/ft)
0.0	11.55
0.2	11.61
1.0	11.71
2.0	11.92
3.0	12.17
4.0	12.41
5.0	12.61
6.0	12.81
7.0	12.99
8.6	13.16
9.0	13.31
10.0	13.34
12.5	13.23
15.0	12.92
20.0	12.16
25.0	11.44
35.0	10.14
45.0	8.90
51.7	5.87

- 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 Reference 6.

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



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8NB-3
FUEL TYPE GE10-P8SXB306-10GZ2-120M-150T

- 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 Reference 6.

FIGURE 3.2.1-10

MINIMUM CRITICAL POWER RATIO (TS 3.2.2)

The MINIMUM CRITICAL POWER RATIO (MCPR) shall be equal to or greater than the $MCPR_f$, $MCPR_p$, and OLMCPR limits at the indicated core flow, THERMAL POWER, ΔT^p and core average exposure compared to the End of Cycle Exposure (EOCE)** as specified in Figures 3.2.2-1 through 3.2.2-4.

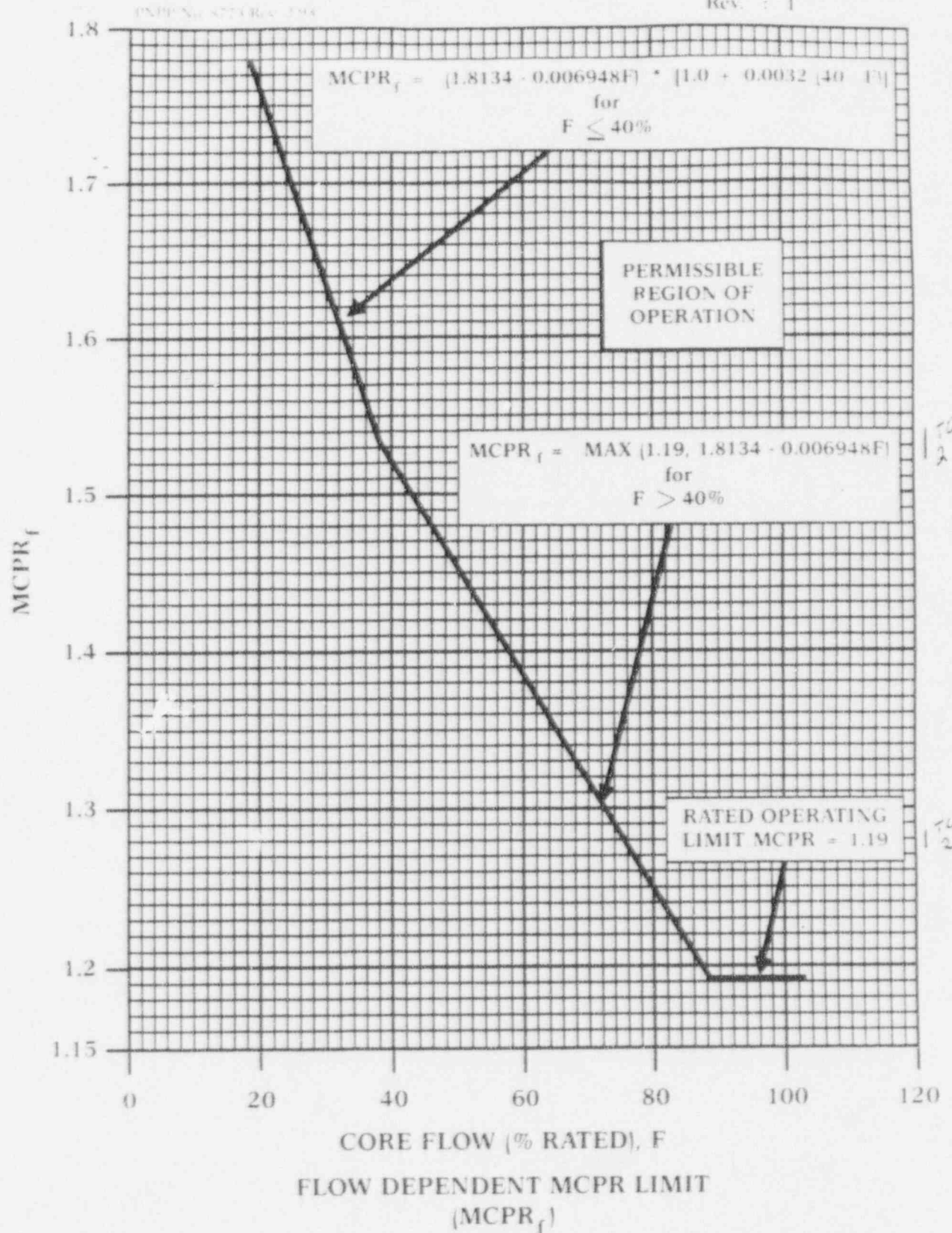
NOTE: MCPR limits are fuel type dependent and ΔT dependent. The $MCPR_f$ and $MCPR_p$ limits are applicable for all core average exposures, nominal rated feedwater temperature (420°F), and all core flows less than or equal to 105% core flow. For planned reduction of rated feedwater temperature from rated feedwater temperature (420°F), increase the appropriate $MCPR_f$ and $MCPR_p$ limits by the following offset:

FW Temperature ***	GE8X8EB, BP8X8R (Fig. 3.2.2-1, 3.2.2-2)	GE8X8NB-3 (Fig. 3.2.2-3, 3.2.2-4)
420 to 370°F	0.0	0.0
420 to 320°F	0.0	0.0
420 to 250°F	0.01	0.0

OLMCPR, operating limit MCPR,	based on Rotated (Bundle Analysis)
GE8B-P8SQB301-5GZ-120M-150-T	1.19
GE8B-P8SQB301-7GZ-120M-150-T	1.20
GE8B-P8SQB320-9GZ-120M-150-T	1.21
GE8B-P8SQB322-7GZ-120M-150-T	1.21
GE10-P8SQB306-10GZ2-120M-150-T	1.21
GE10-P8SQB306-11GZ3-120M-150-T	1.23

There are a total of 19 safety/relief valves, the two lowest setpoint valves are assumed to be out-of-service in the transient analyses.

- * This ΔT 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.
- *** Partial feedwater heating to 320°F during the cycle with final feedwater temperature reduction to 250°F after ALL RODS OUT at end of cycle.



FUEL TYPE GE8X8EB, BP8X8R

FIGURE 3.2.2-1

CYCLE 4
CORE OPERATING
LIMITS REPORT

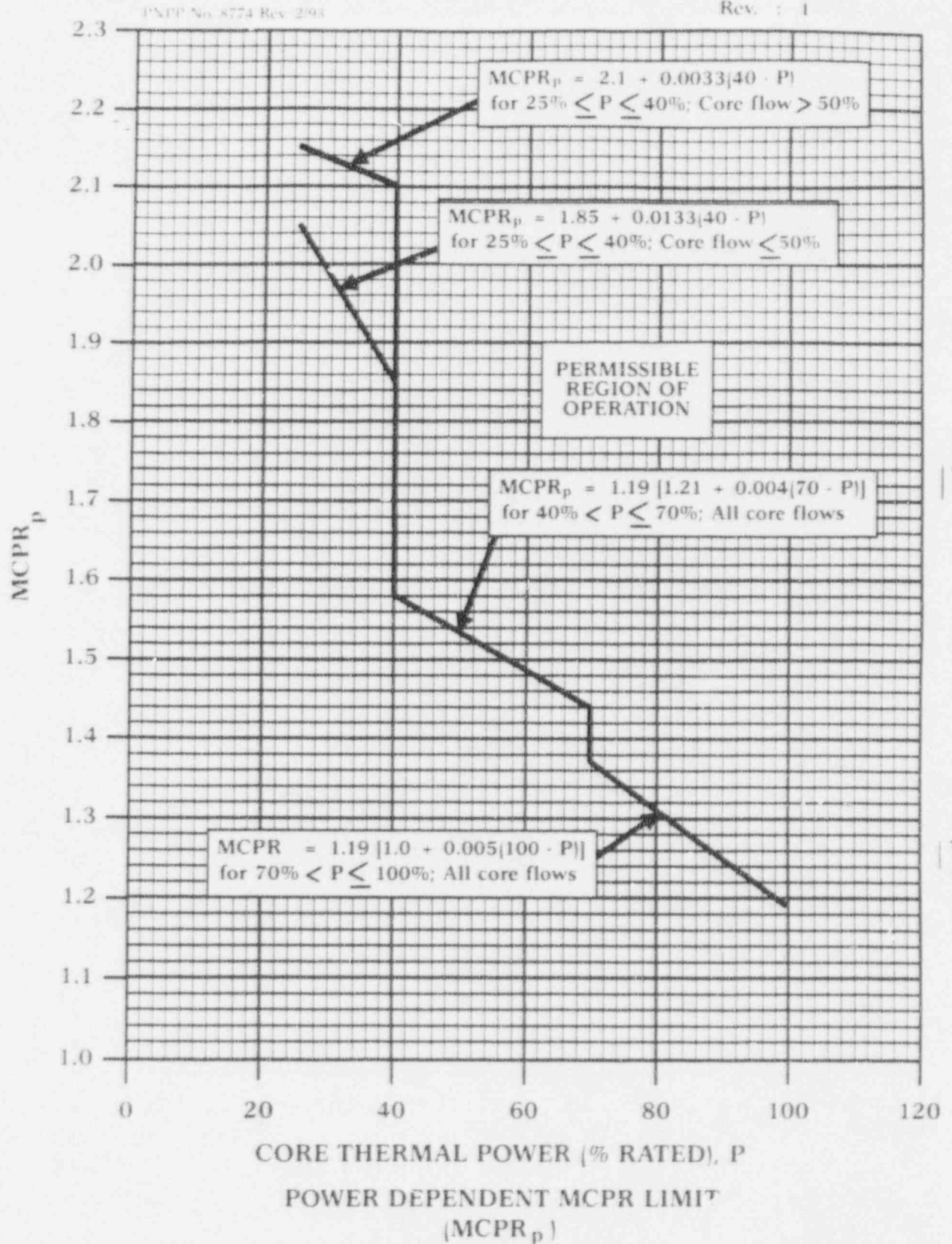


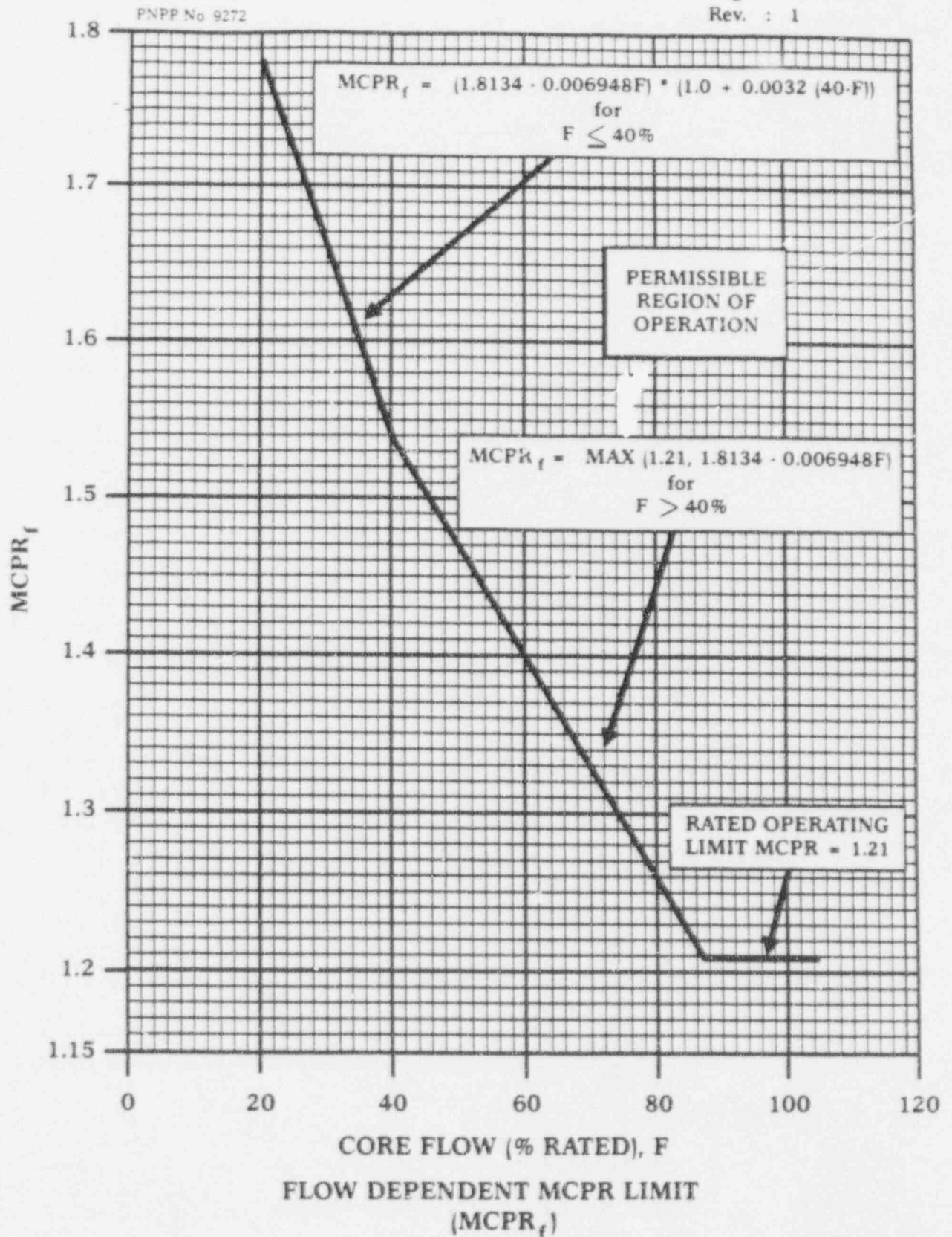
FIGURE 3.2.2-2

(See Note Page 15)

PERRY - UNIT 1

TC/VAX/Page 5 of 5

CYCLE 4
CORE OPERATING
LIMITS REPORT



FUEL TYPE: GE8 x 8NB - 3

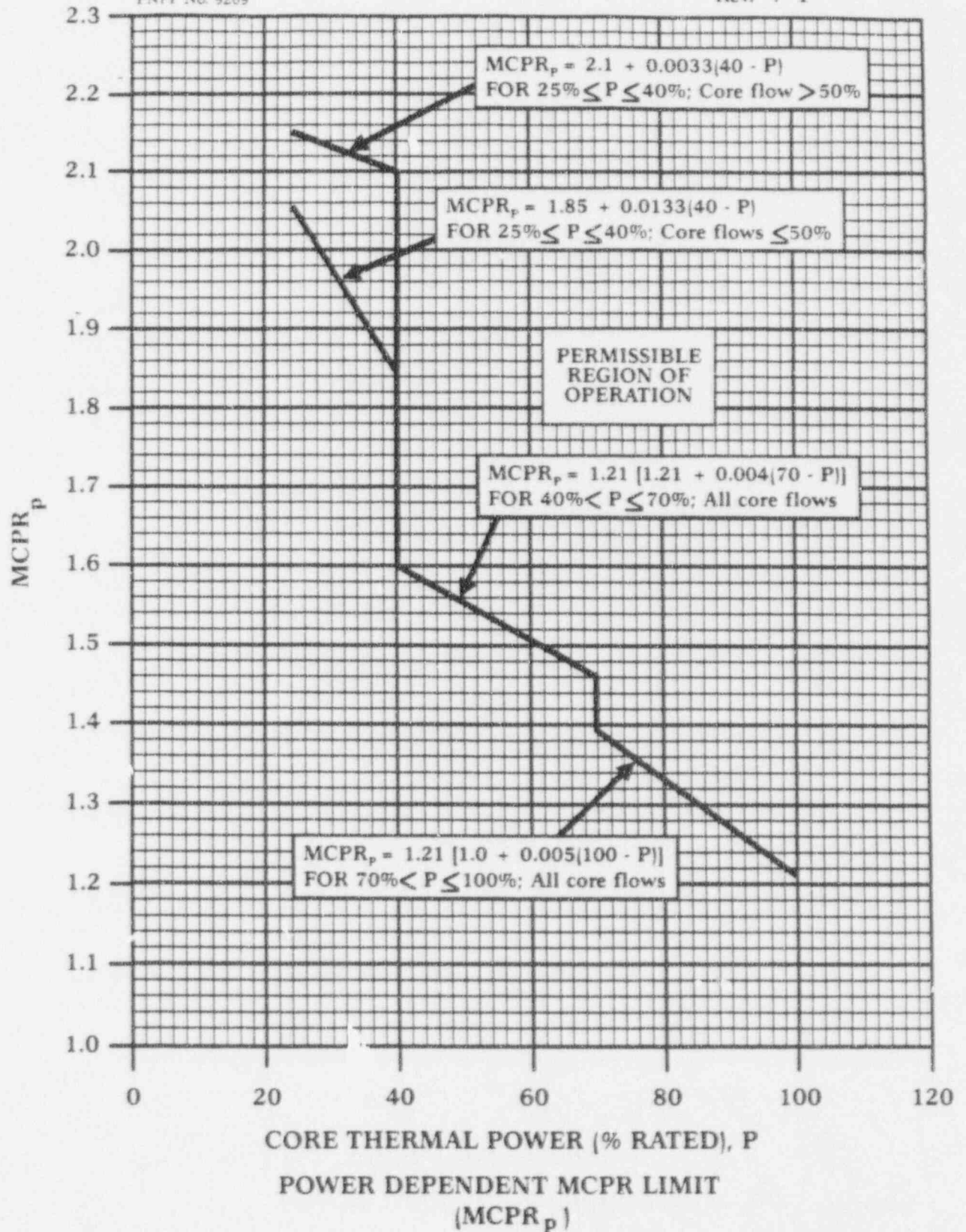
FIGURE 3.2.2-3

(See Note on page 15)

PERRY - UNIT 1

CYCLE 4
CORE OPERATING
LIMITS REPORT

PNPP No. 9269



FUEL TYPE: GE8 x 8NB - 3

FIGURE 3.2.2-4

(See Note on page 15)

PERRY - UNIT 1

CYCLE 4
CORE OPERATING
LIMITS REPORT

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. Deleted
 - 2. BP8SRB176 (BP8X8R)
- b. 14.4 kw/ft for the following fuel types:
 - 1. GE8B-P8SQB301-7G2-120M-150-T (BS301E) (GE8X8EB)
 - 2. GE8B-P8SQB301-5G2-120M-150-T (BS301F) (GE8X8EB)
 - 3. GE8B-P8SQB320-9GZ-120M-150-T (GE8X8EB)
 - 4. GE8B-P8SQB322-7GZ-120M-150-T (GE8X8EB)
 - 5. GE8B-P8SXB306-10GZ2-120M-150-T (GE8X8NB-3)
 - 6. GE8B-P8SXB306-11GZ3-120M-150-T (GE8X8NB-3)