

INTENT
INSTRUCTION TEMPORARY CHANGE

PNEP NO. 7310 Rev. 2/92

PAP-0522

TEMPORARY CHANGE NO.

TCN - 1

INSTRUCTION NO. PDB-P0001	REV. 2	INSTRUCTION TITLE Core Operating Limits Report for the Perry Nuclear Power Plant, Unit 1 Cycle 5 (Reload 4)	ADMIN. USE ONLY <div style="text-align: center; font-size: 2em; color: gray;">INFORMATION ONLY</div>
CANCELS TCN(S): NA			
LIST EACH ATTACHED PAGE 3, 4, 5, 6, 13			

REASON:

Incorporate T.S. Amendment 61, Single Loop Operation. Specifically, the power and flow dependent MAPLHC factors are limited to 0.80 during single loop operation.

Additionally, plant operation with the reactor recirculation system in single loop operation is permitted with normal feedwater temperature. Planned reduction of rated feedwater temperature from nominal rated feedwater temperature is not permitted during single loop operation until the evaluation is completed. Plant procedures will be updated at that time.

PREPARED BY <i>Jeannie M. Rinkel</i> Jeannie M. Rinkel	DATE 12-6-94	IN-DEPTH REVIEWER <i>Dean A. Hays</i>	DATE 1/4/95
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PORC MITG. NO.: 95-003	PORC MITG. DATE: 19 Jan 95	RECOMMENDED FOR APPROVAL <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	EFFECTIVE DATE 1-31-95 <i>4/16/95</i>
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APPROVAL	APPROVED <i>M. Bonner</i>	DATE 19 Jan 95	APPROVED NA	DATE
	APPROVED <i>Reddy</i>	DATE 1-19-95	APPROVED NA	DATE
	APPROVED <i>D. P. IGYARTO</i> <i>ON 1/21/95</i>	DATE 1/21/95	APPROVED NA	DATE

Designated Alternate
Briefing and approved 10CFR50.59 Application Check is attached prior to submittal for PORC review or final approval if Non-PORC.

9502230268 950214
PDR ADDCK 05000440
P PDR

PLANT DATA BOOK ENTRY SUBMITTAL SHEET

TITLE: COPE OPERATING LIMITS REPORT FOR THE PERRY NUCLEAR POWER PLANT,
UNIT 1 CYCLE 5 (RELOAD 4)

PDB - F0001 /Rev. 2 EFFECTIVE DATE: 7-2-94

MPL: J11

SCOPE OF CHANGE: Incorporate new fuel type information for Cycle 5
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: T. M. Rinckel Janna M. Rinckel 5-2-94
Date

REVIEWED BY: Paul H. Miller 5-12-94
Date

APPROVED BY: N/A Date
Manager Sponsoring Group

=====

TAB E, F, AND G USE ONLY

PORC MEETING NUMBER: 94-093 N80 26 May 94
Date

APPROVED BY: David P. Dwyer 6/16/94
General Manager, PNPPD Date

UNIT 1 CORE OPERATING LIMITS REPORT

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INTRODUCTION AND REFERENCESINTRODUCTION

This Core Operating Limits Report for PNPP Unit 1 Cycle 5 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 5 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 with the single loop MAPLHGR reduction factor. (Technical Specification 3/4.2.1) | TC-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)
4. The simulated thermal power time constant. (Technical Specification 3/4.3.1)

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 4, Cycle 5," GE Document 23A7227 Rev. 0 (April 1994).
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).
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.
8. R.J. Stransky (USNRC) to R.A. Stratman (CEI), Amendment No. 48 to Facility Operating License NPF-58, May 28, 1993.
9. J. B. Hopkins (USNRC) to R. A. Stratman (Centerior), Amendment No. 61 to Facility Operating License NPF - 58, June 2, 1994. | TC-1

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.

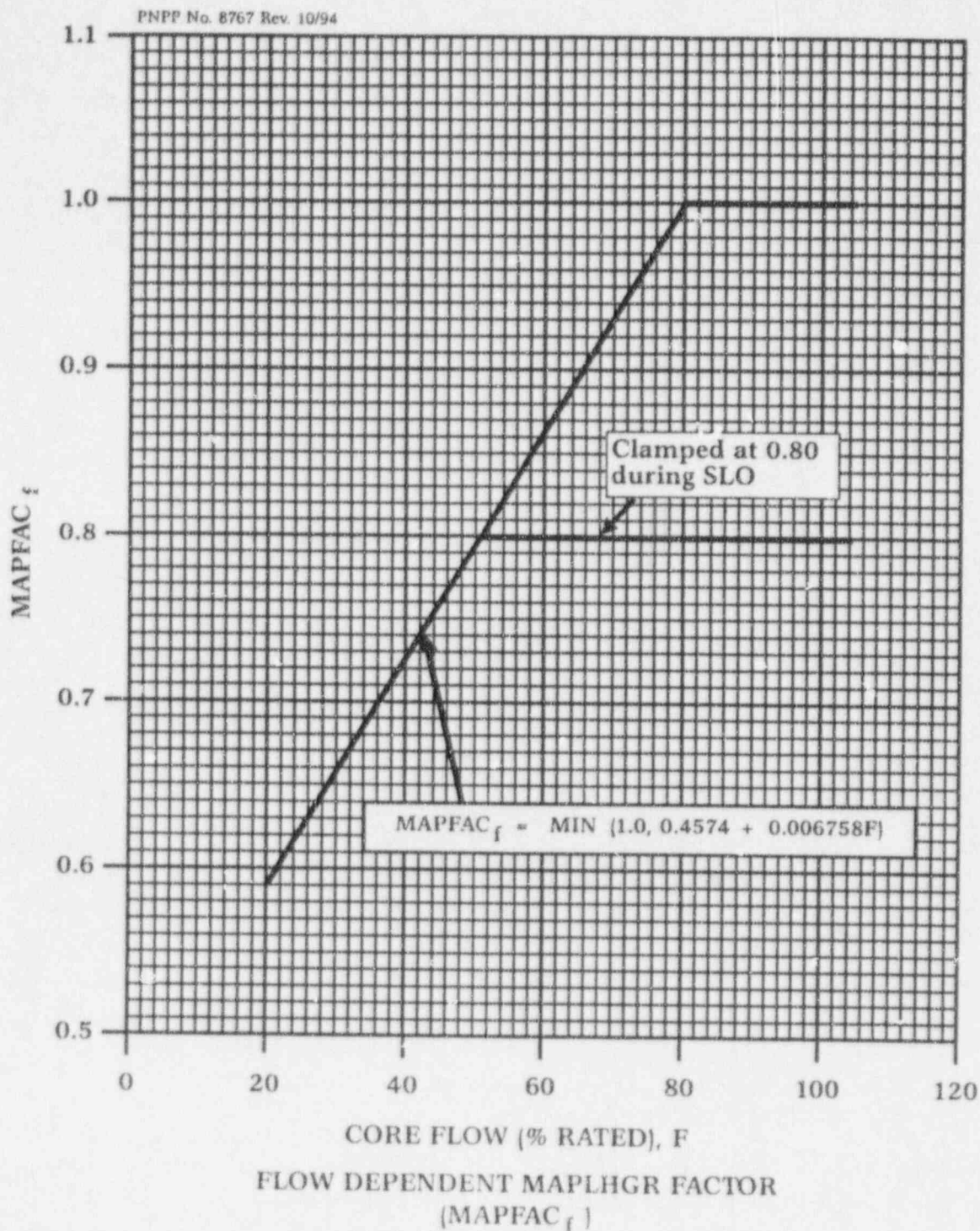


Figure 3.2.1-1

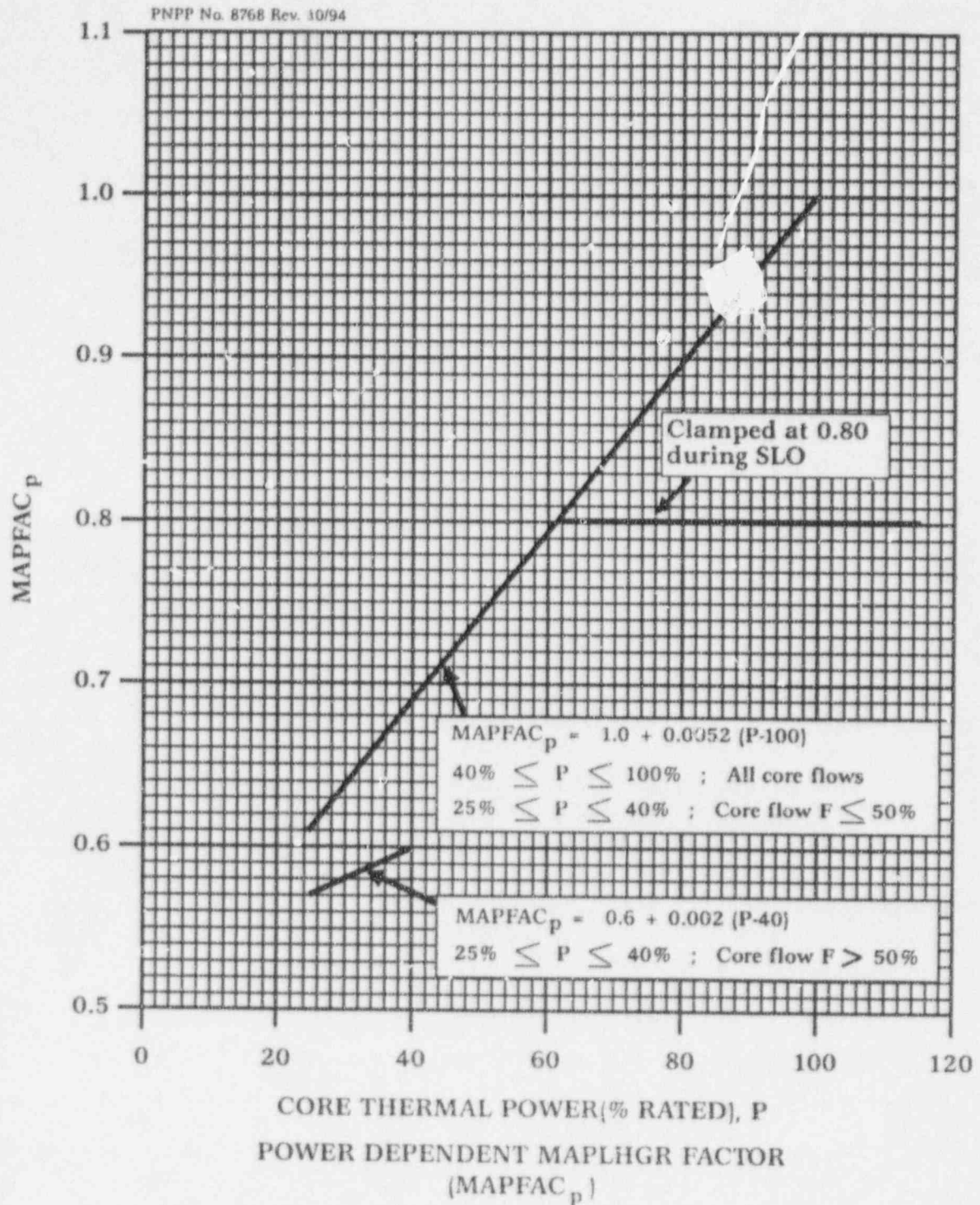
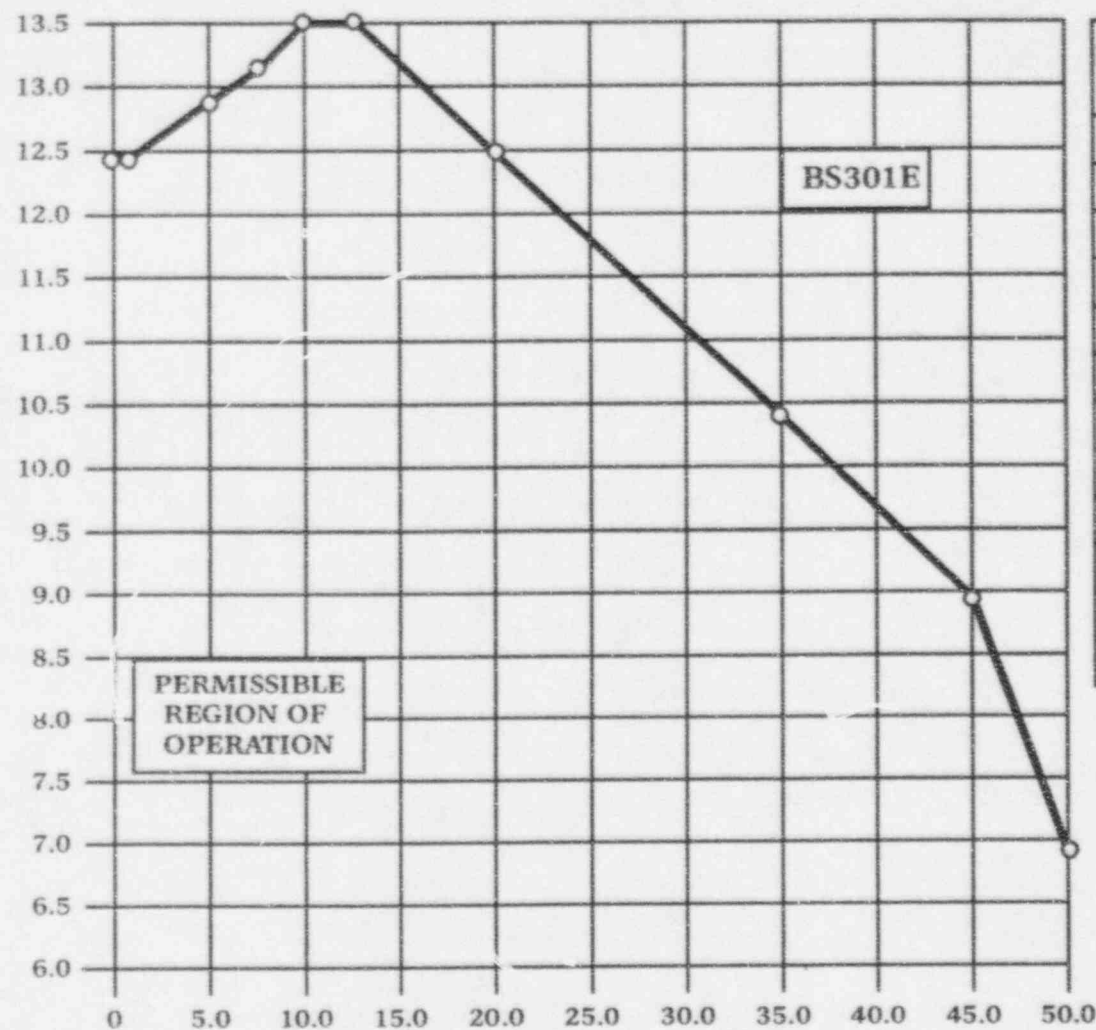


Figure 3.2.1-2

Figure 3.2.1-3

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

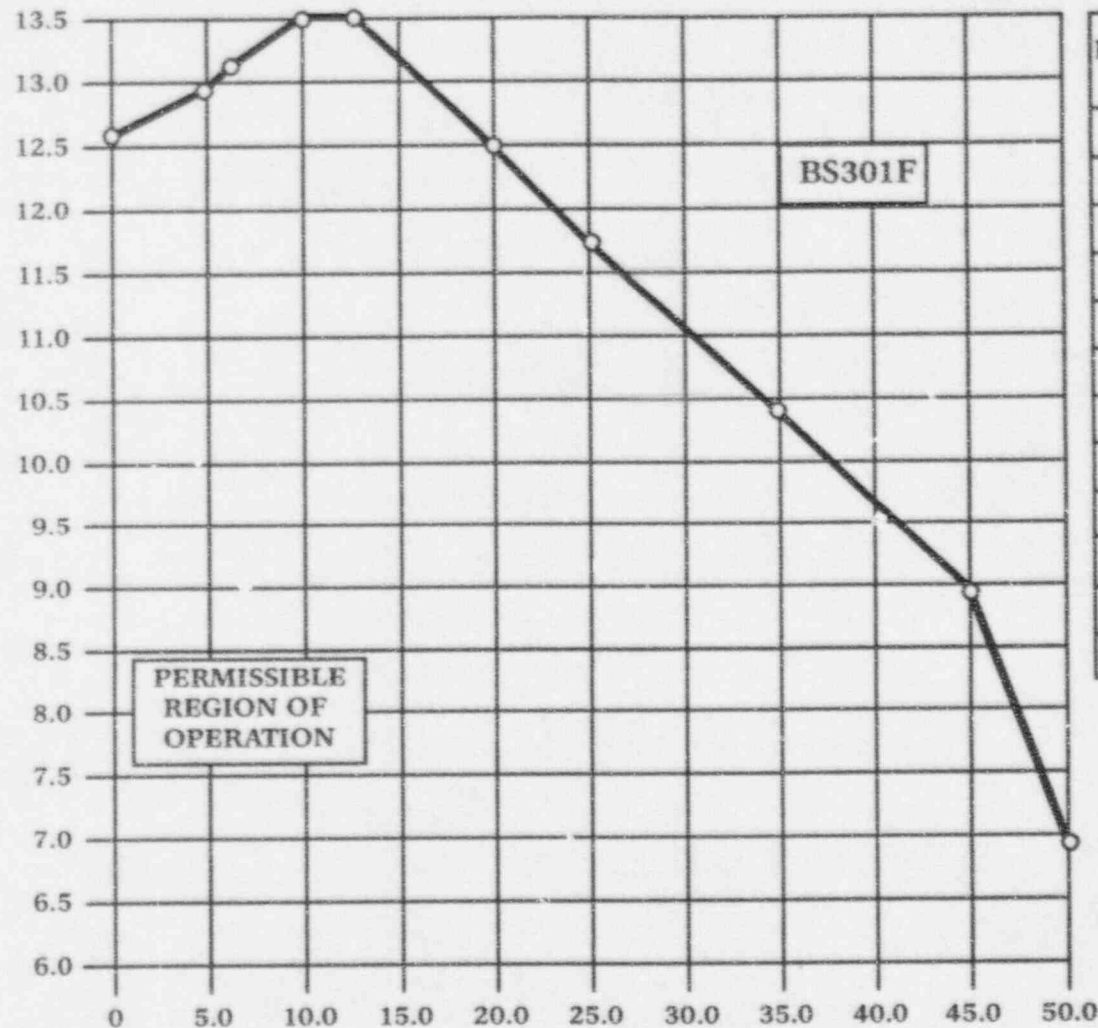
PNPP No 8771 Rev. 4/94

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

- 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 3.2.1-4

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

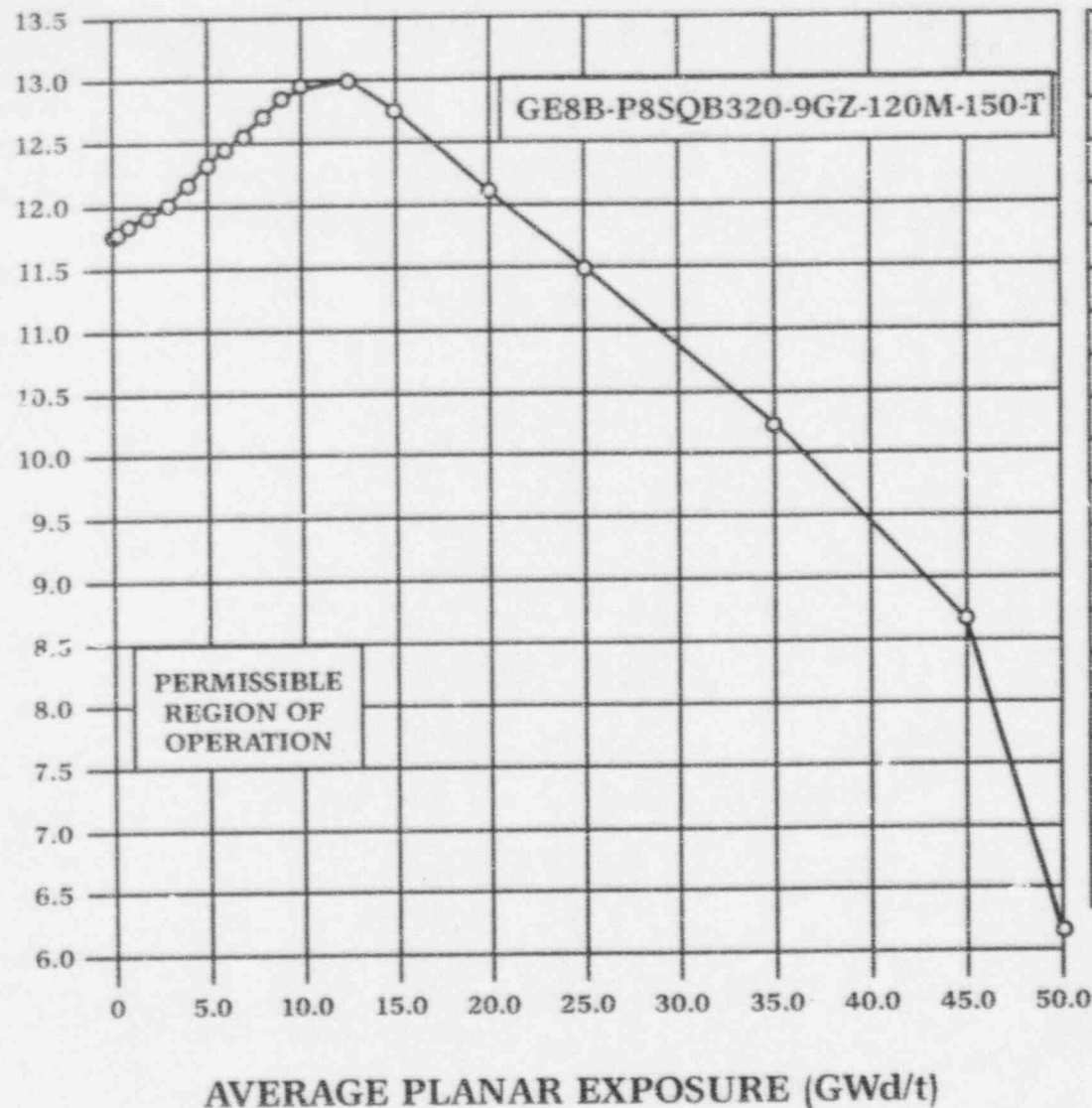
- Notes: 1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.
2. This curve is a composite the most limiting enrich lattices. For lattice specific values consult Reference 4.

PNPP No 8772 Rev. 4/94

EXPOSURE (GWd/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

Figure 3.2.1-5

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



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8A3EB
FUEL TYPE GE8B-P8SQB320-9GZ-120M-150-T

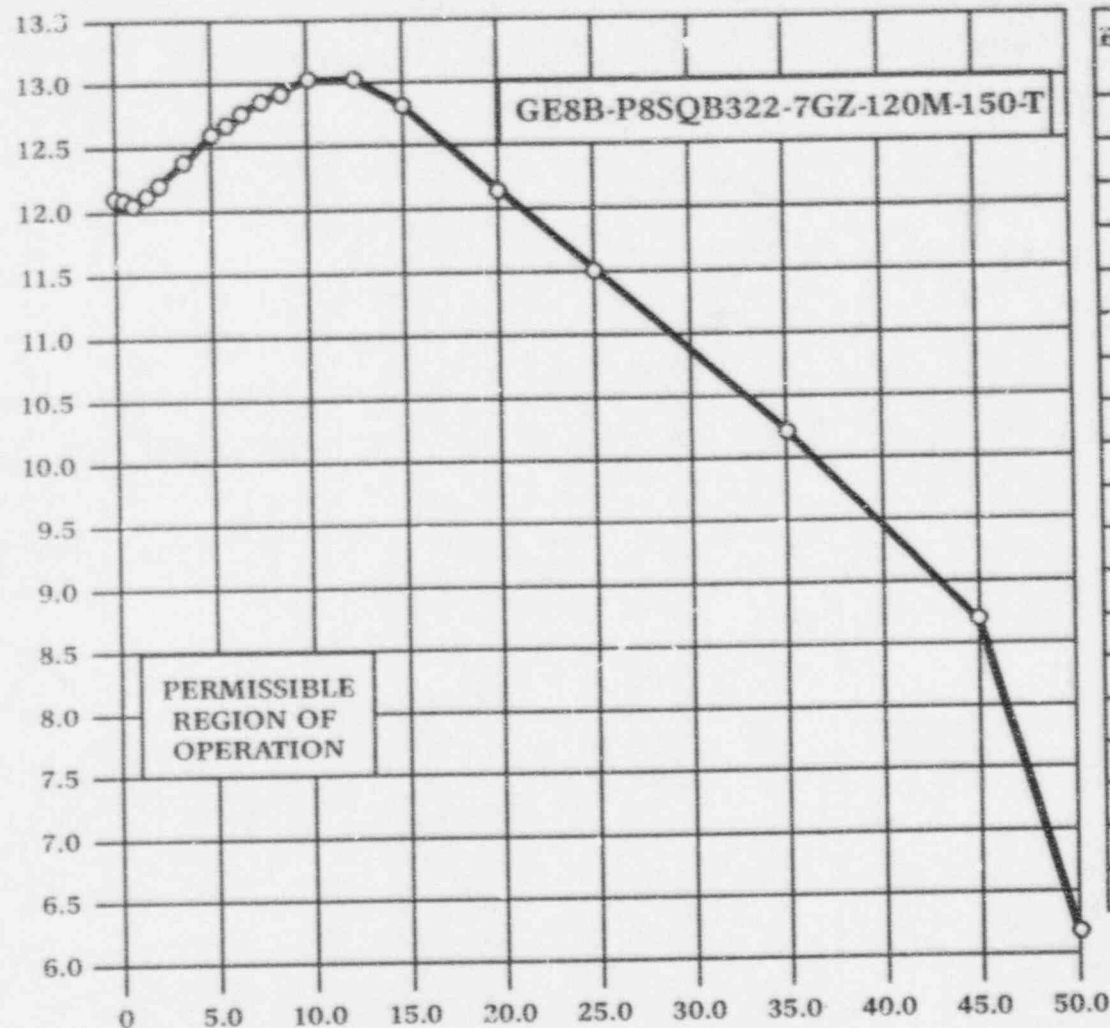
- Notes: 1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.
2. This curve is a composite of the most limiting enriched fuel lattices. For lattice specific values consult Reference 5.

PNPP No 8880 Rev. 4/94

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

Figure 3.2.1-6

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



AVERAGE PLANAR EXPOSURE (GWd/t)

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

FUEL TYPE GE8B-P8SQB322-7GZ-120M-150-T

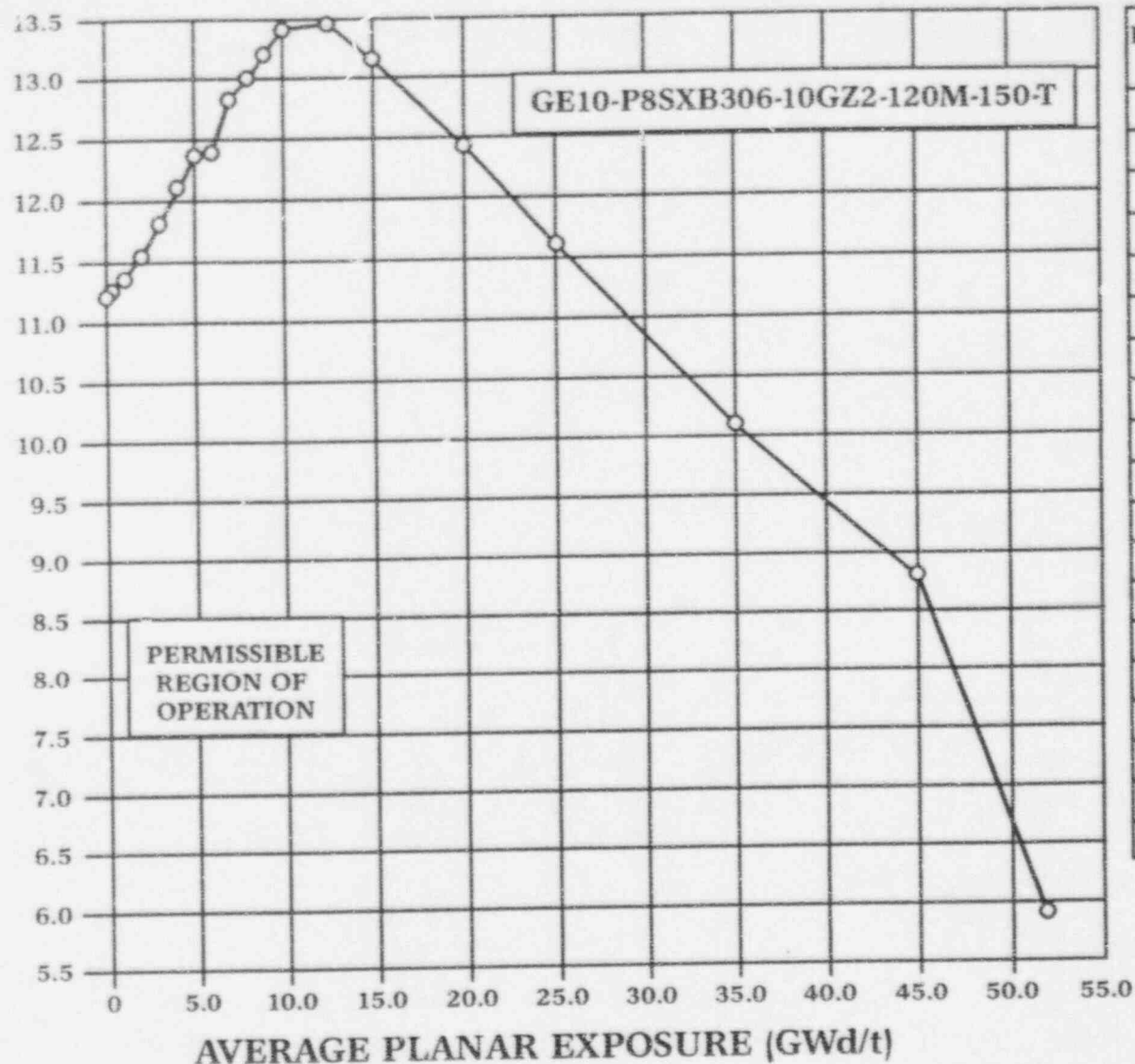
PNPP No 8879 Rev. 4/94

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

- 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)



MAXIMUM AVERAGE PLANAR LINEAR HEAT
GENERATION RATE (MAPLHGR) VERSUS
AVERAGE PLANAR EXPOSURE, GE8x8NB-1
FUEL TYPE GE10-P8SXB306-10GZ2-120M-150T

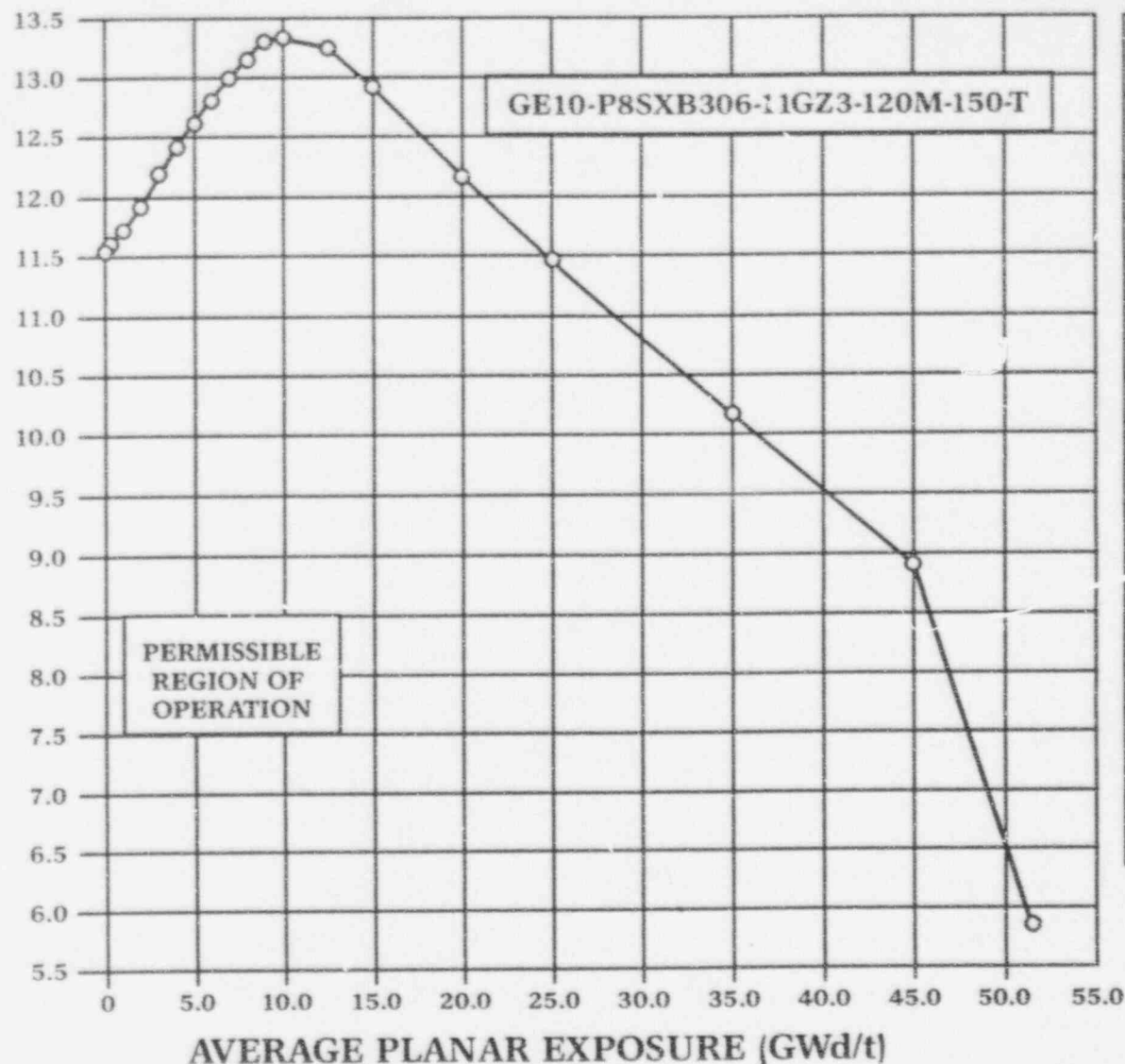
- Notes: 1. Intermediate MAPLHGR values are obtained by linear interpolation between adjacent points.
2. This curve is a composite of the most limiting enriched fuel lattices. For lattice specific values consult Reference 6.

PNPP No 9267 Rev. 4/94

EXPOSURE (GWd/ST)	MAPLHGR (kW/ft)
0.0	11.21
0.2	11.26
1.0	11.36
2.0	11.56
3.0	11.81
4.0	12.08
5.0	12.35
6.0	12.57
7.0	12.80
8.0	13.00
9.0	13.20
10.0	13.37
12.5	13.45
15.0	13.14
20.0	12.40
25.0	11.61
35.0	10.12
45.0	8.83
52.1	5.87

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-1
FUEL TYPE GE10-P8SXB306-11GZ3-120M-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.

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
8.0	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

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 3.2.2-7.

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 $OLMCPR$ limits by the following:

FW Temperature ***	GE8X8EB	GE8X8NB-1
420 to 370°F	0.0	0.0
420 to 320°F	0.0	0.0
420 to 250°F	0.0	0.0

OLMCPR, operating limit MCPR

GE8B-P8SQB301-5GZ-120M-150-T	1.19
GE8B-P8SQB301-7GZ-120M-150-T	1.19
GE8B-P8SQB320-9GZ-120M-150-T	1.19
GE8B-P8SQB322-7GZ-120M-150-T	1.19
GE10-P8SXB306-10GZ2-120M-150-T	1.22
GE10-P8SXB306-11GZ3-120M-150-T	1.22

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.

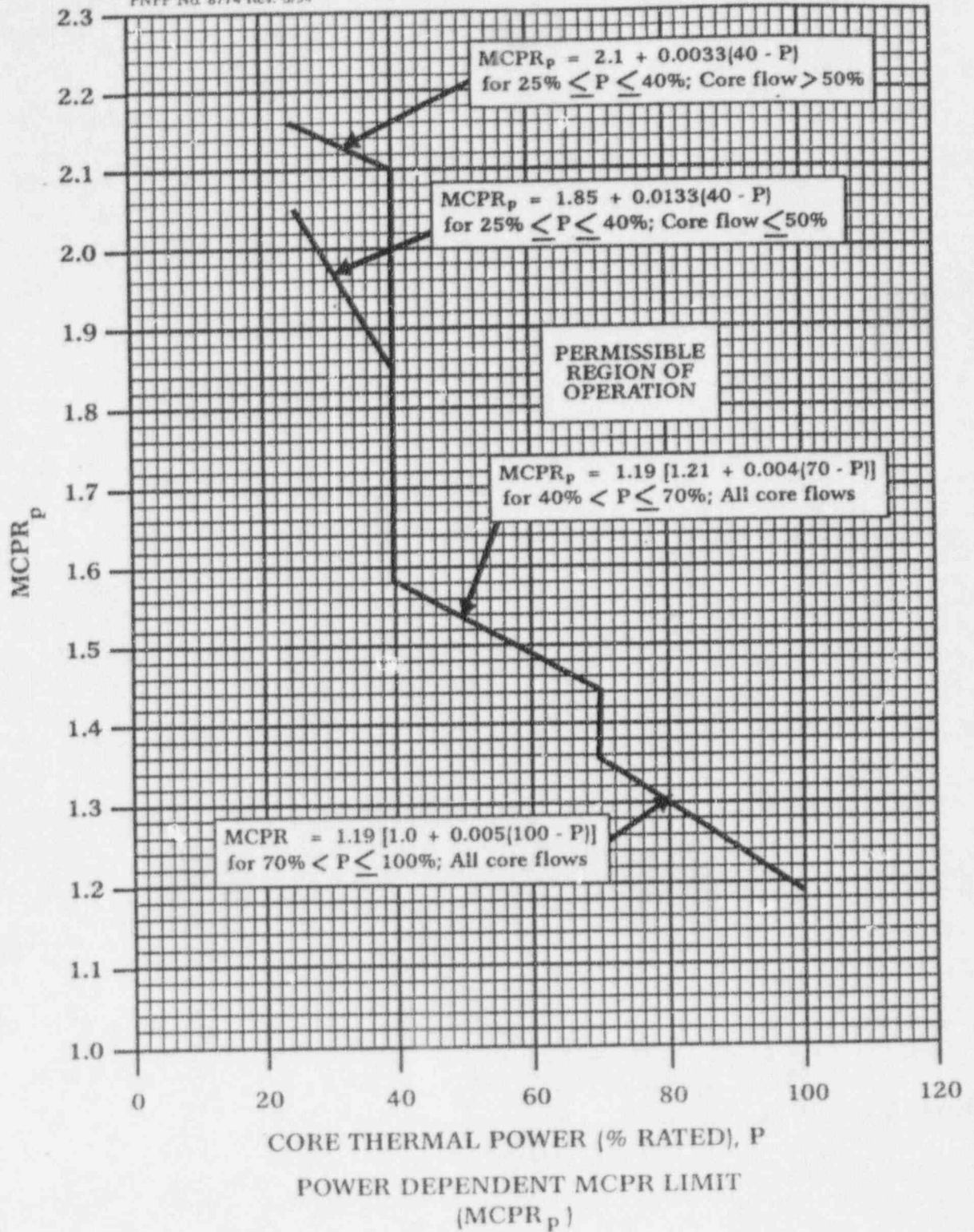
- * This ΔT refers to the planned reduction of rated feedwater temperature from nominal rated feedwater temperature (420°F), such as prolonged removal of feedwater heater(s) from service.

Planned reduction of rated feedwater temperature from nominal rated feedwater temperature is not permitted during plant operation with the reactor recirculation system in single loop operation. TC-1

- ** 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.

PNPP No. 8774 Rev. 5/94



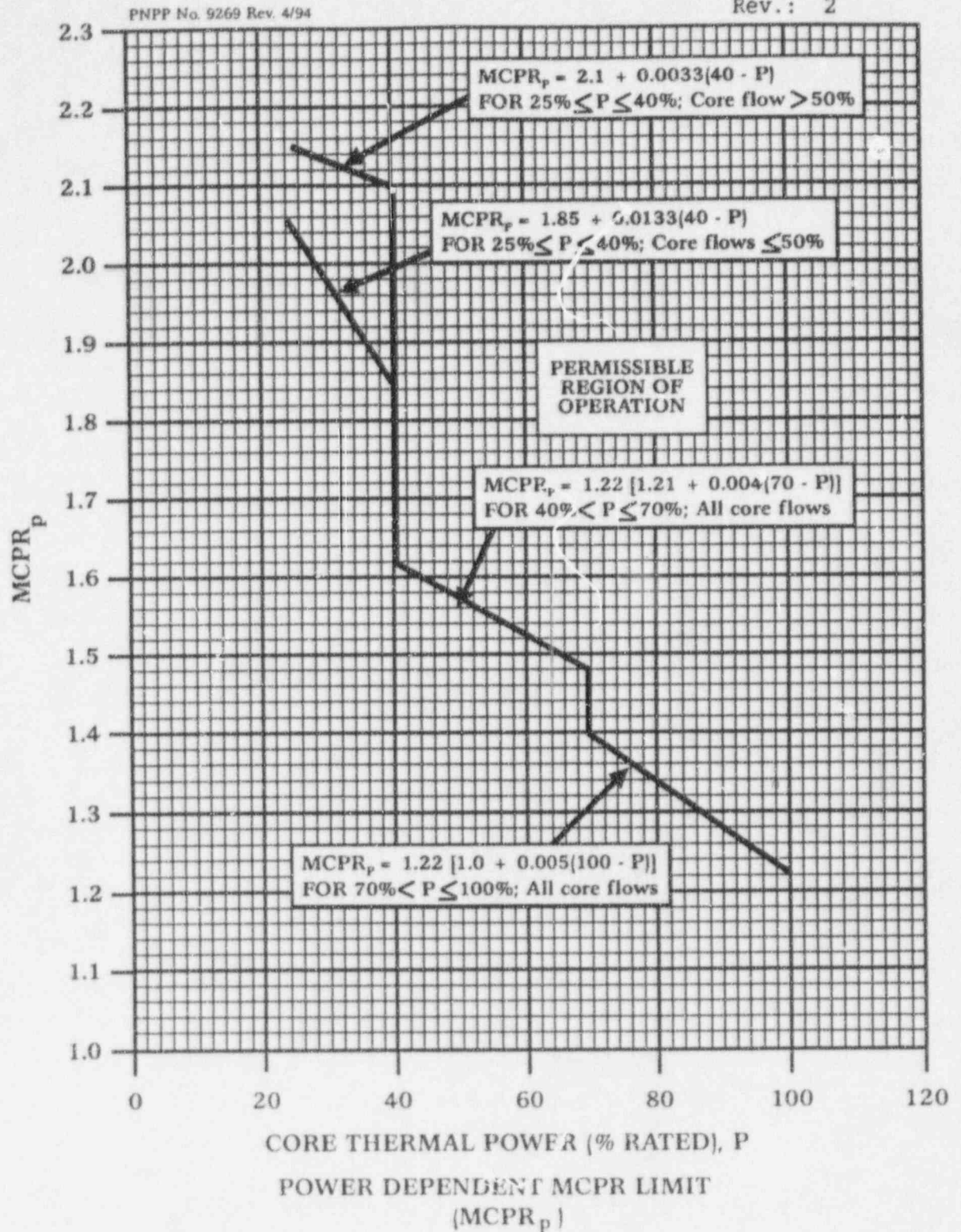
CORE THERMAL POWER (% RATED), P

POWER DEPENDENT MCPR LIMIT
($MCPR_p$)

FUEL TYPE GE8X8EB

Figure 3.2.2-1

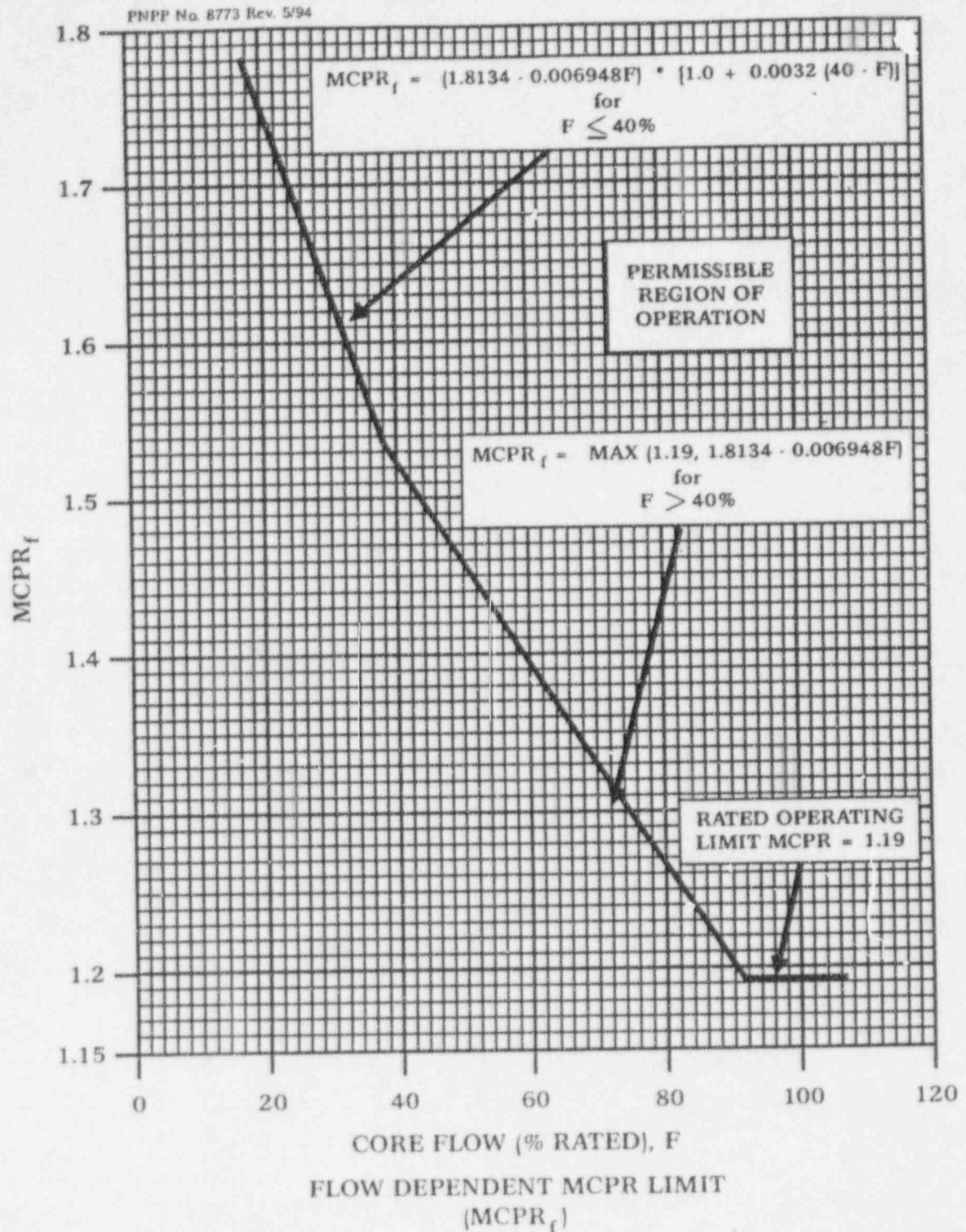
(See Note Page 13)



FUEL TYPE: GE8 x 8NB - 1

Figure 3.2.2-2

(See Note Page 13)



FUEL TYPE GE8B-P8SQB301-5GZ-120M-150T

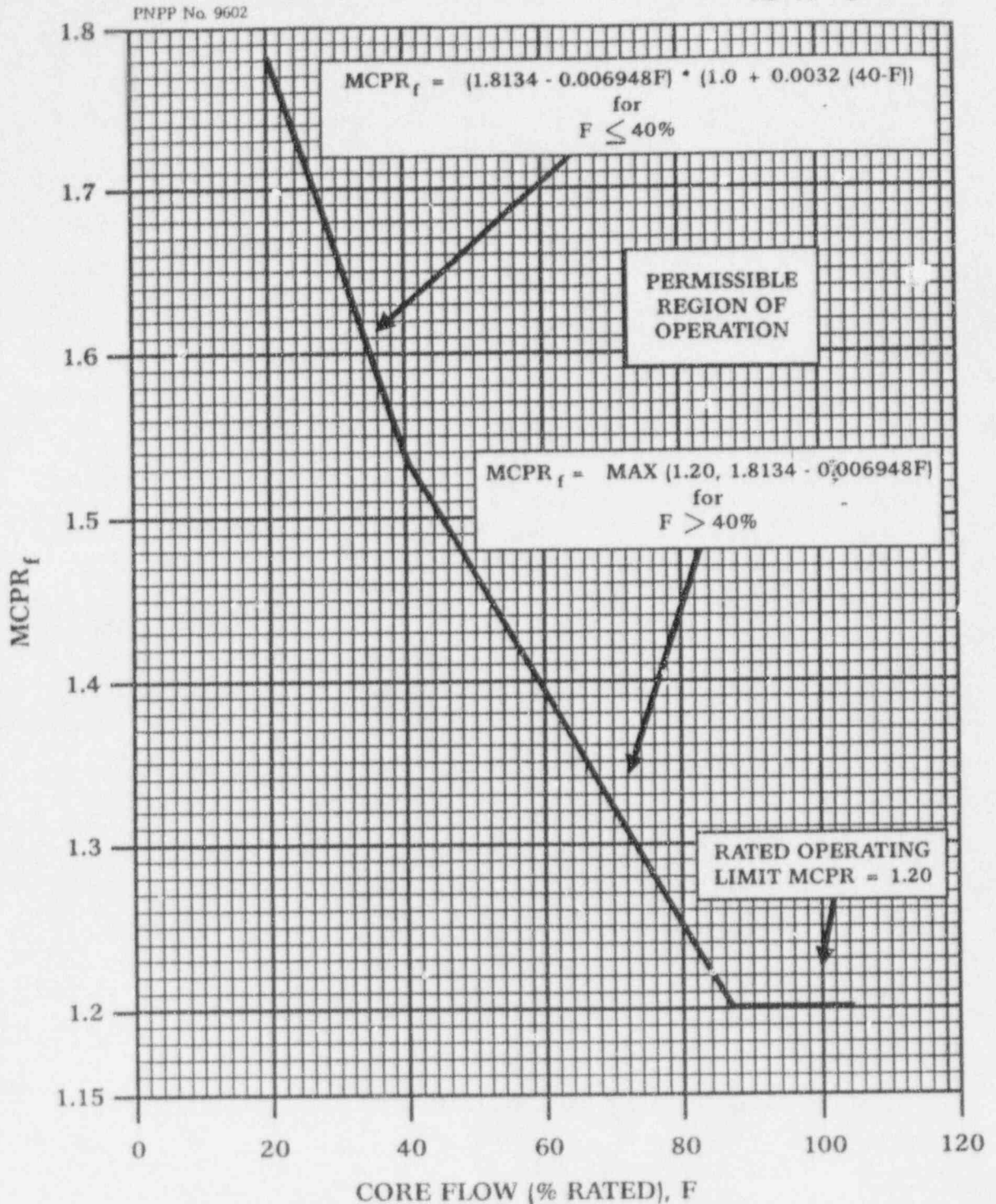
Figure 3.2.2-3

(See Note Page 13)

Includes Rotated Bundle Analysis results.

PERRY UNIT 1

CYCLE 5
CORE OPERATING
LIMITS REPORT



FLOW DEPENDENT MCPR LIMIT
(MCPR_f)

FUEL TYPE: GE8-P8SQB301-7GZ-120M-150T

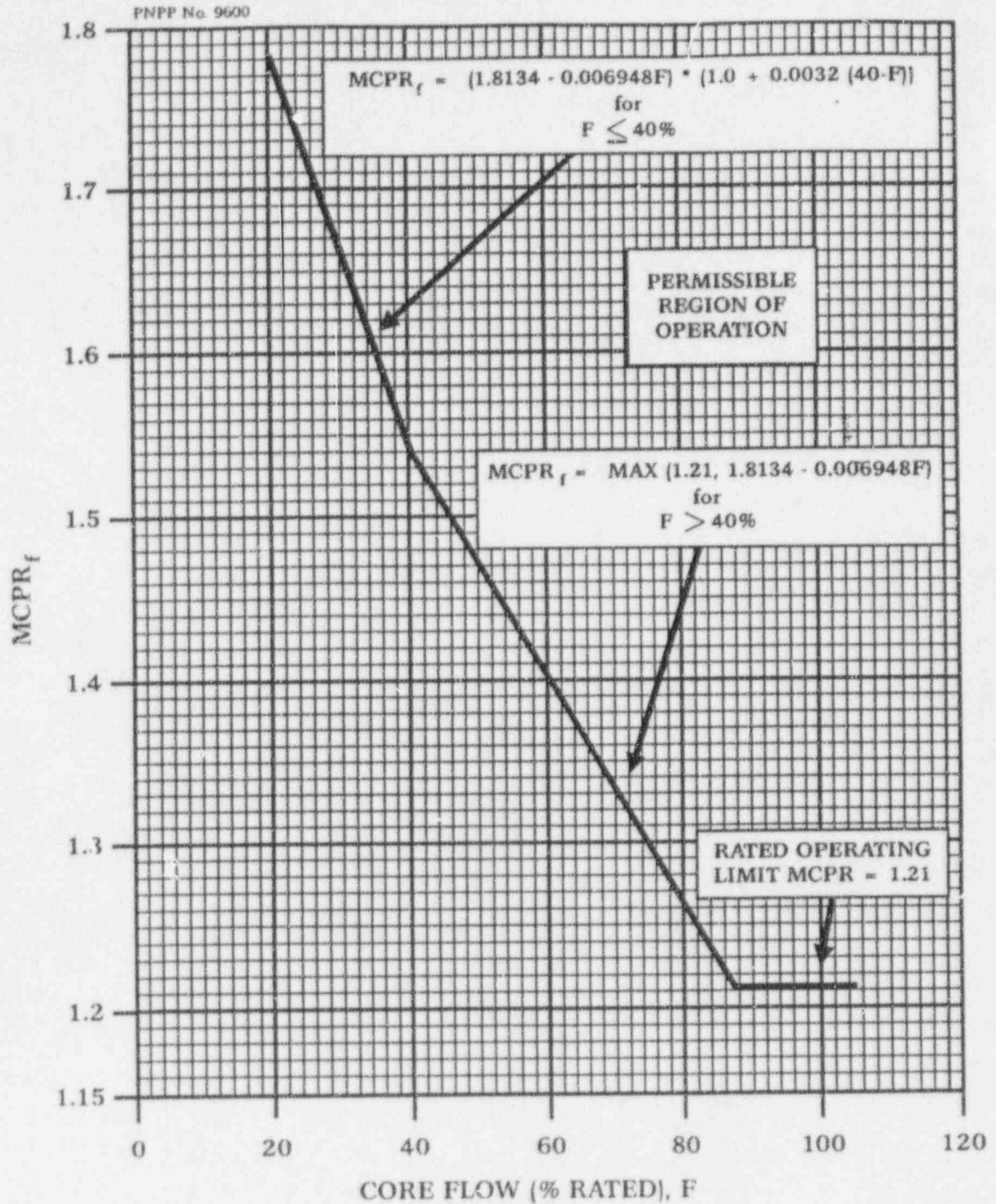
Figure 3.2.2-4

(See Note Page 13)

Includes Rotated Bundle Analysis results.

PERRY UNIT 1

CYCLE 5
CORE OPERATING
LIMITS REPORT



FLOW DEPENDENT MCPR LIMIT
(MCPR_f)

FUEL TYPE: GE8B-P8SQB320-9GZ-120M-150T
GE8B-P8SQB322-7GZ-120M-150T

Figure 3.2.2-5

(See Note Page 13)

Includes Rotated Bundle Analysis results.

PERRY UNIT 1

CYCLE 5
CORE OPERATING
LIMITS REPORT

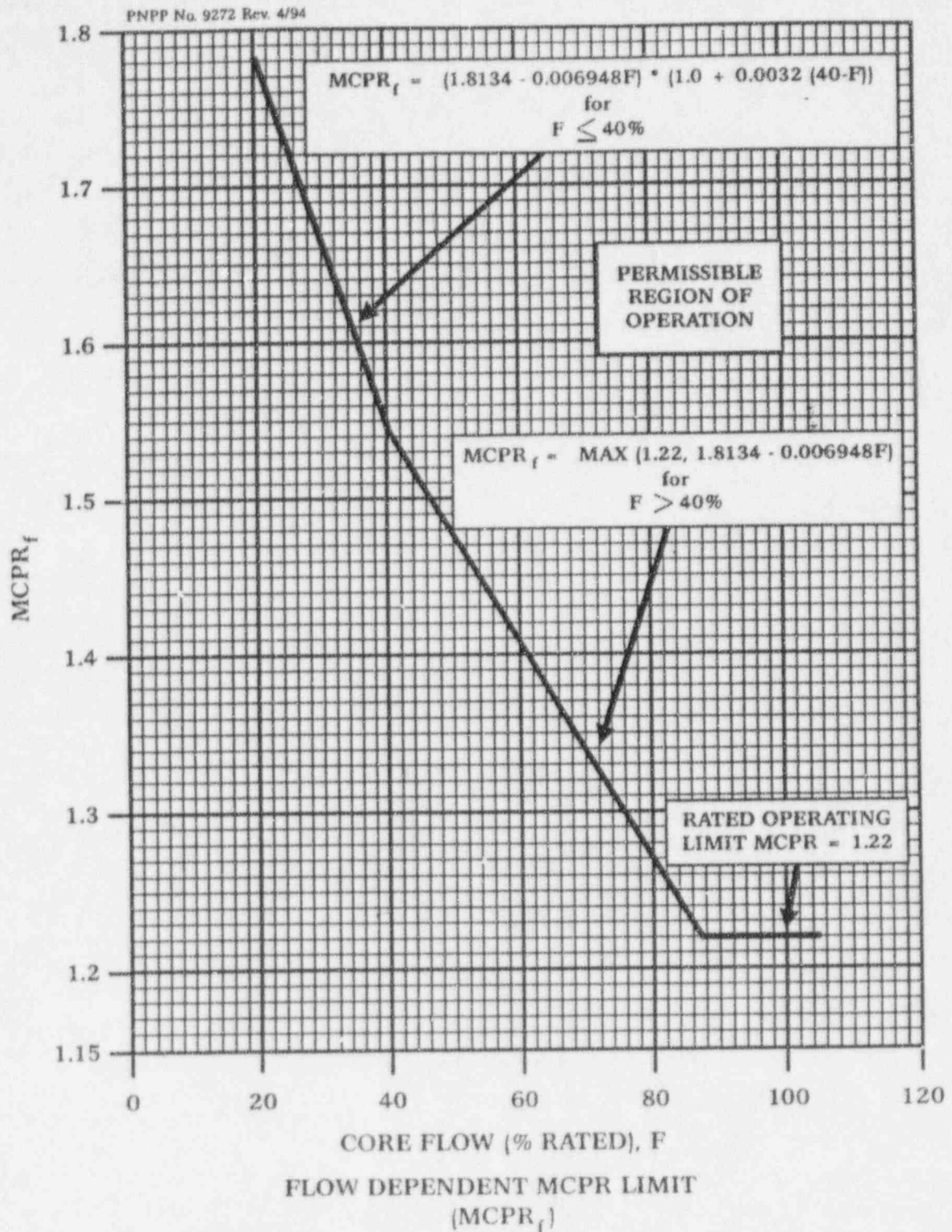


Figure 3.2.2-6

(See Note Page 13)

Includes Rotated Bundle Analysis results.

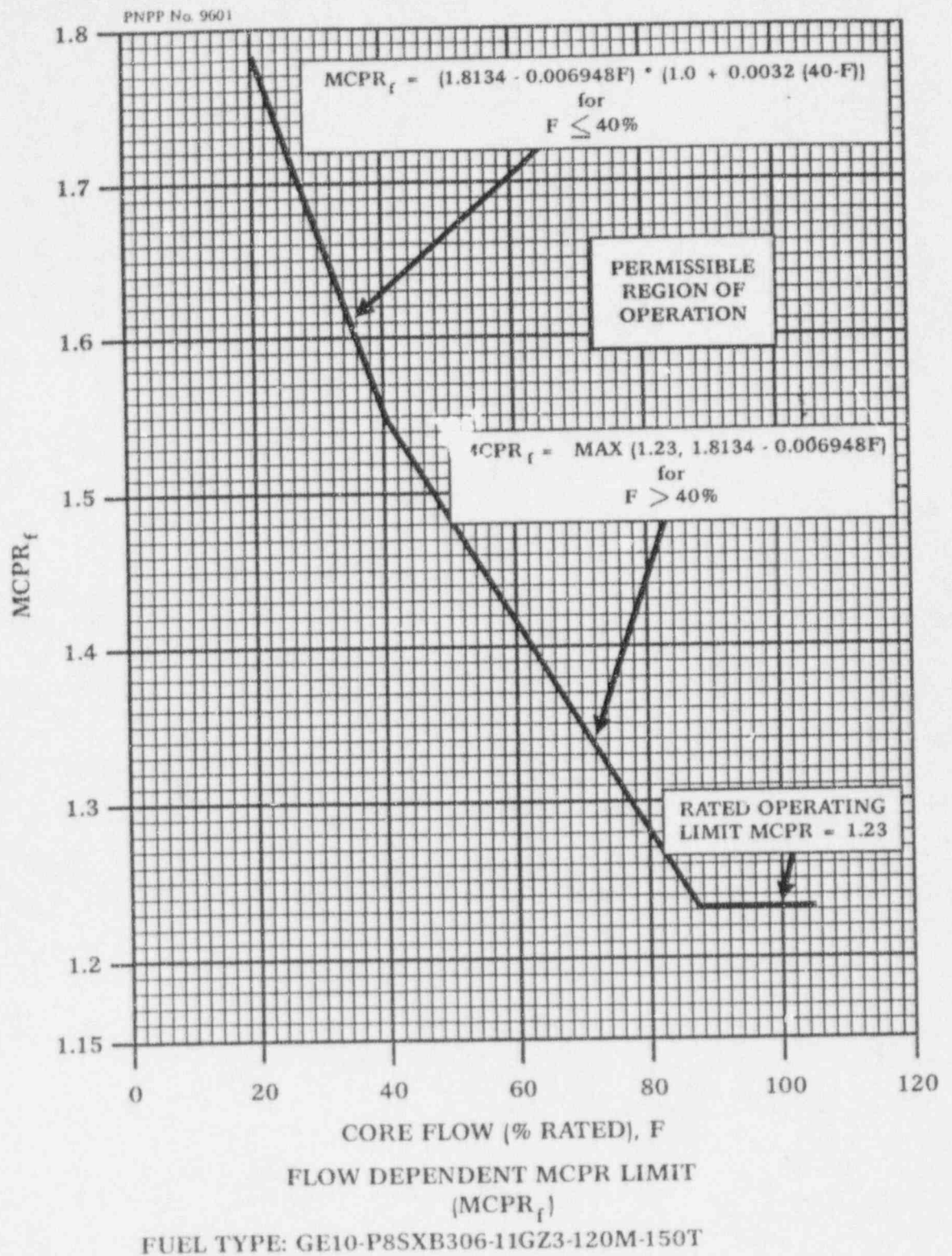


Figure 3.2.2-7

(See Note Page 13)

Includes Rotated Bundle Analysis results.

LINEAR HEAT GENERATION RATE (TS 3.2.3)

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

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

1. GE8B-P8SQB301-7GZ-120M-150-T (BS301E) (GE8X8EB)
2. GE8B-P8SQB301-5GZ-120M-150-T (BS301F) (GE8X8EB)
3. GE8B-P8SQB320-9GZ-120M-150-T (GE8X8EB)
4. GE8B-P8SQB322-7GZ-120M-150-T (GE8X8EB)
5. GE10-P8SXB306-10GZ2-120M-150-T (GE8X8NB-1)
6. GE10-P8SXB306-11GZ3-120M-150-T (GE8X8NB-1)

REACTOR PROTECTION SYSTEM INSTRUMENTATION (TS 3.3.1)

The simulated thermal power time constant shall be 6 ± 0.6 seconds.