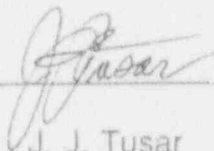
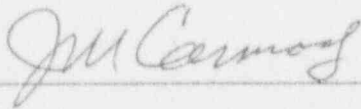


CORE OPERATING LIMITS REPORT
FOR
PEACH BOTTOM UNIT 2
RELOAD 9, CYCLE 10

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INTRODUCTION AND SUMMARY

This report provides the cycle-specific parameter limits for: Maximum Average Planar Linear Heat Generation Rate (MAPLHGR); Minimum Critical Power Ratio (MCPR); Flow Adjustment Factor (K_f); Linear Heat Generation Rate (LHGR); and Rod Block Monitor (RBM) flow biased upscale setpoints for Peach Bottom Atomic Power Station (PBAPS) Unit 2, Cycle 10, Reload 9. These values have been determined using NRC-approved methodology and are established such that all applicable limits of the plant safety analysis are met.

This report is submitted in accordance with Technical Specification 6.9.1.e of Reference 1. Preparation of this report was performed in accordance with PECO Procedure FM-105, "Reload Licensing Documentation".

MAPLHGR LIMITS

The limiting MAPLHGR values for the most limiting lattice (excluding natural uranium) of each fuel type as a function of average planar exposure are provided in Figures 1 through 8. These figures are used when hand calculations are required as specified in Technical Specification 3.5.I. The ABB Atom, Inc. (ABB) and Siemens Power Corporation (SPC) Qualification Fuel Bundles (QFBs) were previously monitored to the GE9B-P8DWB320 (fuel type GE8x8NB) MAPLHGR limits (see Revision 0 of the PB2R9 COLR). The MAPLHGR limits for the ABB QFB have been increased (i.e., relaxed) by 7% while the SPC QFB limits have been increased from 2% to 5% (exposure dependent). These changes have been made in accordance with the information provided in References 5 and 6 and are intended to meet a commitment to the NRC that the QFBs will not lead the core with respect to thermal limits (Reference 9). The ABB and SPC MAPLHGR limits are illustrated in Figures 7a and 7b, respectively.

The reduction factors for use during single recirculation loop operation are given in Table 1. The reduction factor for the ABB QFBs was provided in Reference 5 as 0.68. Due to a very conservative evaluation of single loop operation, ABB required that the reduction factor be reduced proportionately with the 7% increase in the MAPLHGR limit (i.e., 0.73/1.07) to maintain margins. The reduction factor for the Reload 8 GE9B bundles and the SPC QFBs is 0.73 as documented in References 2 and 4, respectively.

MCPR LIMITS

The MCPR values for use in Technical Specification 3.5.K for each fuel type are given in Figures 9 through 12 and in Table 2. The top portion of Table 2 is used when the requirement of 4.5.K.2.a is met. When this requirement cannot be met, the Operating Limit MCPR values as a function of Tau are provided in Figures 9 through 12. When the surveillance requirement of specification 4.5.K.2 is not performed, the bottom portion of Table 2 is used. The K_f core flow adjustment factor for use in Technical Specification 3.5.K is given in Figure 13.

The MCPR values shown in Figures 9 through 12 and Table 2 are the bounding values for the applicable fuel types which may be used in any of the following operating domains (or intermediate conditions) on the power/flow map:

- Standard (rated power and core flow)
- Extended Load Line (down to 87% of rated core flow)
- Increased Core Flow (up to 105% of rated core flow)
- EOC Feedwater Temperature Reduction (maximum 48 °F delta T)
- Power Coastdown (up to 110% of rated core flow)

Note in these figures that the term EOC (End-of-Cycle) refers to the cycle exposure at which operation at "rated conditions" is no longer possible (i.e., the cycle exposure at which cycle extension begins) as assumed during the cycle-specific reload licensing (Reference 2).

The MCPR limits to be used during cycle extension (Increased Core Flow (ICF), Final Feedwater Temperature Reduction and Power Coastdown) following EOC are the EOC-2000 MWd/ST to EOC limits.

The MCPR values shown in Figure 9 and Table 2 conservatively bound and are applicable to the following fuel types: BP8x8R, LTA310, GE8x8EB and GE8x8NB. Of the four fuel types, LTA310 is the most limiting for MCPR and has been conservatively selected as the limit for all four fuel types. The MCPR values for the other three fuel types fall on or below the limit shown in Figure 9.

Figure 12 provides the Operating Limit MCPRs (OLMCPRs) for the GE11 fuel (F9HUB334 and LUA307) in Cycle 10. These limits have changed (decreased) from COLR, Revision 0, to partially offset the penalties associated with asymmetric control rod patterns from EOC-2000 MWd/ST to EOC. Note that the current failed fuel locations are (14,39), (46,39), (46,31), (54,31) and (30,23). Figure 12 provides GE11 OLMCPRs for operation with no restrictions on control rod patterns. The OLMCPR decrease is based on reduced conservatism associated with the use of General Electric's latest NRC-approved analytical methods for reload licensing (ODYNM09V pressurization event code) and the updated Cycle 10 operating history. PBAPS Unit 2 Cycle 10 was originally licensed with the ODYNK03V code and a conservative projection of Cycle 10 operation (e.g., power shape).

ROD BLOCK MONITOR SETPOINTS

The N value for the RBM flow biased upscale setpoints for use in Technical Specification 3.2.C is given in Table 3.

LINEAR HEAT GENERATION RATES

The LHGR value for use in Technical Specification 3.5.J for each fuel type is given in Table 4. The ABB and SPC QFBs were previously monitored conservatively to the Reload 8 GE9B (GE8x8NB) LHGR limits (see Revision 0 of the PB2R9 COLR). The LHGR limit for the ABB QFBs has been conservatively set at 16.3 kW/ft based on data provided in Reference 3. The LHGR limit for the SPC QFBs has been conservatively increased to 14.7 kW/ft based on the information provided in Reference 6.

QUALIFICATION FUEL BUNDLES

PBAPS Unit 2 Cycle 10 will be the second cycle of irradiation for the QFBs. Four QFBs reside in the core from each of the following fuel vendors: ABB, GE and SPC. The corresponding QFB fuel types are as follows: SVEA-96 from ABB, GE11 from GE and 9x9-9X+ from SPC. The thermal limits for the ABB and SPC QFBs are based on data provided in References 3 through 6. Specific values for the GE11 QFBs (LUA307) are provided in References 2 and 7. The GE11 QFBs (LUA307) and the GE11 Reload 9 bundles (P9HUB334) have the same MCPR values throughout Cycle 10.

REFERENCES

1) "Technical Specifications and Bases for Peach Bottom Atomic Power Station Unit 2", Docket No. 50-277 Appendix A to License No. DPR-44.

2) "Supplemental Reload Licensing Report for Peach Bottom Atomic Power Station Unit 2, Reload 9, cycle 10", General Electric Company Document No. 23A7188, Revision 0, September 1992.

3) ABB Atom Report BR 90-004, "Supplemental Lead Fuel Assembly Licensing Report, SVEA-96 LFAs for Peach Bottom-2, Summary", October 1990.

4) ANF-90-133(P), Revision 2, "Peach Bottom 9x9-9X+ Qualification Fuel Assembly Safety Analysis Report", August 1992.

5) Letter from D. Ebeling-Koning to A. M. Olson, "Revised Peach Bottom-2 SVEA-96 Lead Fuel Assembly (LFA) LOCA Limits", dated February 14, 1994.

6) Letter from H. G. Shaw to H. J. Diamond, "Relaxation of LHGR and MAPLHGR Limits for the 9x9-9X+ Qualification Fuel Assembly for Peach Bottom Unit 2", dated February 11, 1994.

7) "Loss-of-Coolant Accident Analysis for Peach Bottom Atomic Power Station Unit 2", NEDE-24081-P-2, December 177 (as amended).

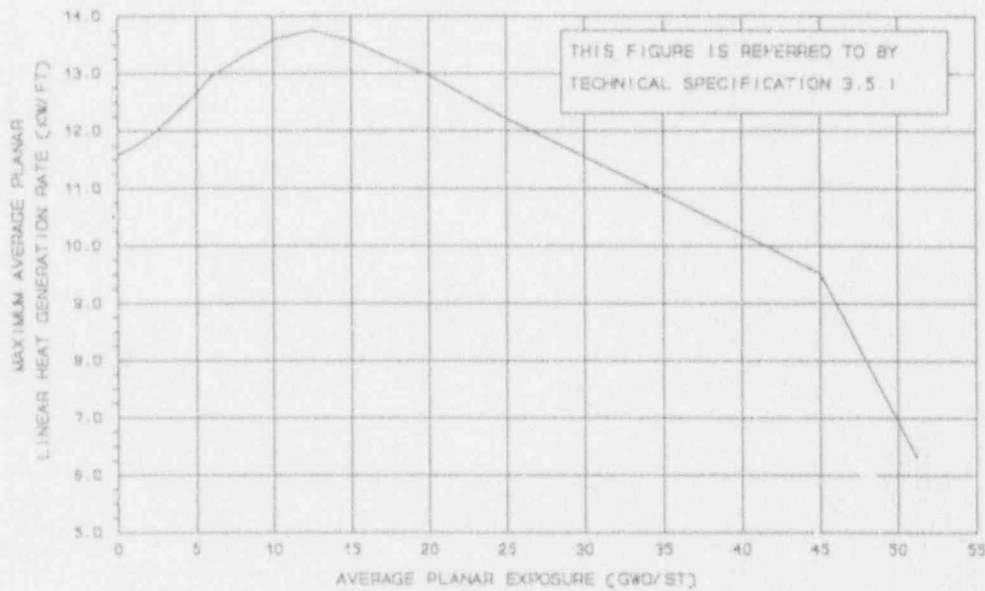
8) "Lattice-Specific MAPLHGR Report for Peach Bottom Atomic Power Station Unit 2 Reload 9 Cycle 10", General Electric Company Document No. 23A7188AA, Revision 0, September 1992.

9) Letter from G. A. Hunger, Jr., to the U. S. Nuclear Regulatory Commission, "Peach Bottom Atomic Power Station, Unit 2 Qualification Fuel Bundles in Operating Cycle 9", dated November 21, 1990.

10) Letter from G. R. Hull to H. J. Diamond, "Peach Bottom 2 Cycle 10 Stub Rod Analysis", dated March 10, 1994.

FIGURE 7a

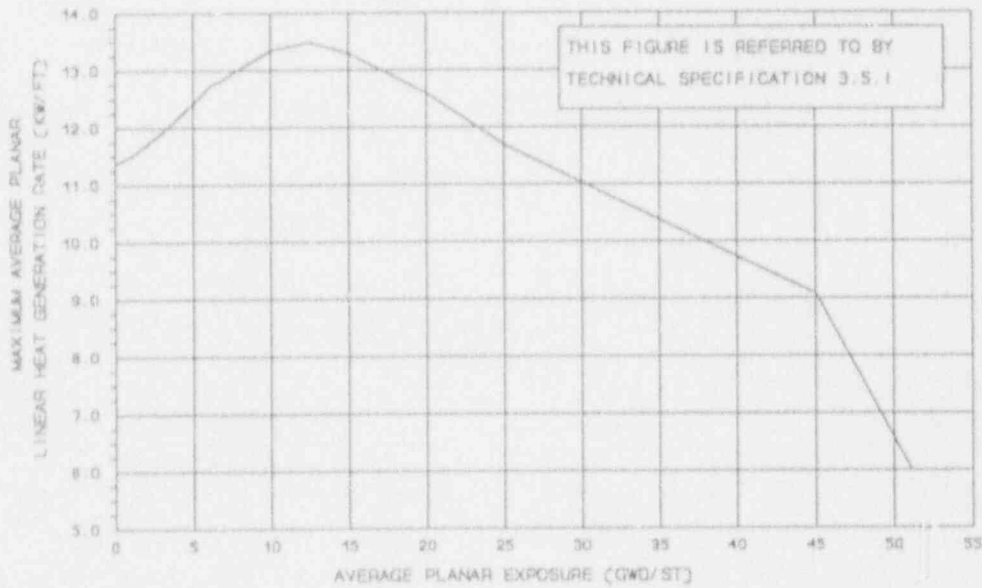
MAXIMUM AVERAGE PLANAR LINEAR HEAT
 GENERATION RATE (MAPLHGR) VERSUS
 AVERAGE PLANAR EXPOSURE
 FUEL TYPE ABB QFB (SVEA-96)



<u>Avg Plan Exposure (GWd/ST)</u>	<u>MAPLHGR (kW/ft)</u>	<u>Avg Plan Exposure (GWd/ST)</u>	<u>MAPLHGR (kW/ft)</u>	<u>Avg Plan Exposure (GWd/ST)</u>	<u>MAPLHGR (kW/ft)</u>
0.0	11.58	6.0	12.96	15.0	13.56
1.0	11.72	7.0	13.12	20.0	12.96
2.0	11.91	8.0	13.29	25.0	12.21
3.0	12.13	9.0	13.44	35.0	10.89
4.0	12.39	10.0	13.60	45.0	9.52
5.0	12.66	12.5	13.75	51.08	6.31

FIGURE 7b

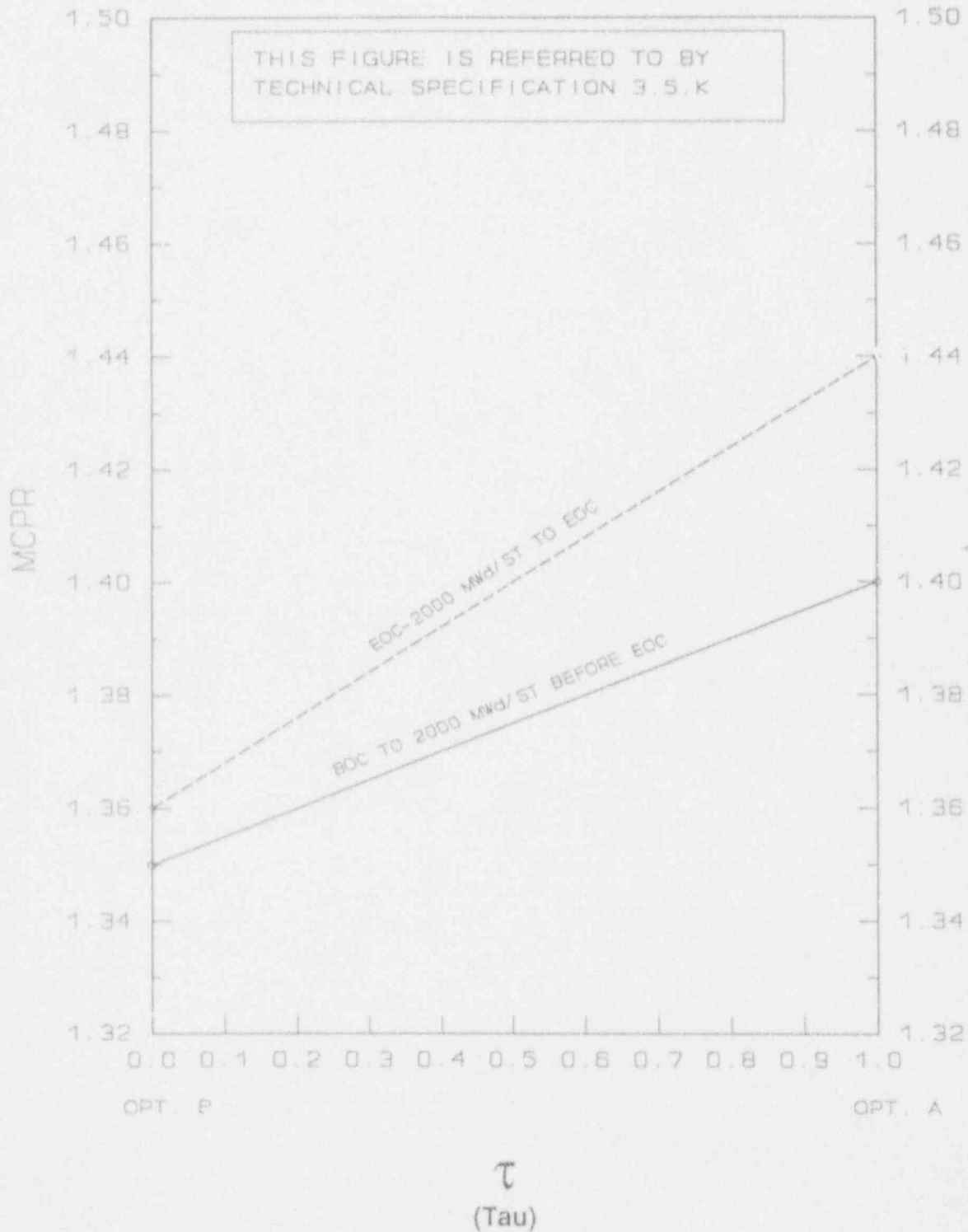
MAXIMUM AVERAGE PLANAR LINEAR HEAT
 GENERATION RATE (MAPLHGR) VERSUS
 AVERAGE PLANAR EXPOSURE
 FUEL TYPE SPC QFB (9x9-9X+)



Avg Plan Exposure (GWd/ST)	MAPLHGR (kW/ft)	Avg Plan Exposure (GWd/ST)	MAPLHGR (kW/ft)	Avg Plan Exposure (GWd/ST)	MAPLHGR (kW/ft)
0.0	11.36	6.0	12.72	15.0	13.30
1.0	11.50	7.0	12.87	20.0	12.59
2.0	11.69	8.0	13.04	25.0	11.70
3.0	11.91	9.0	13.19	35.0	10.38
4.0	12.16	10.0	13.35	45.0	9.08
5.0	12.42	12.5	13.49	51.08	6.02

FIGURE 12

M CPR OPERATING LIMIT VERSUS TAU
FUEL TYPES: P9HUB334 (GE11), LUA307



Note: The limits are bounding for operating conditions as described on pages 3 and 4, MCPR Limits Section.

TABLE 1

SINGLE LOOP REDUCTION FACTORS

<u>FUEL TYPE</u>	<u>REDUCTION FACTOR</u>
BP8x8R	0.79
GE8x8EB	0.73
LTA310	0.73
GE8x8NB	0.73
LUA307	0.73
GE11	0.73
ABB QFB (SVEA-96)	0.68
SPC QFB (9x9-9X+)	0.73

TABLE 2

OPERATING LIMIT MCPR VALUES*
 FOR VARIOUS CORE EXPOSURES

<u>FUEL TYPE</u>	<u>BOUNDING MCPR OPERATING LIMITS**</u> <u>FOR INCREMENTAL CYCLE CORE AVERAGE EXPOSURE</u>	
	<u>BOC TO 2000 MWd/ST</u> <u>BEFORE EOC</u>	<u>2000 MWd/ST BEFORE EOC</u> <u>TO EOC</u>
<u>Technical Specification</u>		
<u>4.5 K.2 is met</u>		
BP8x8R	1.34	1.34
GE8x8EB	1.34	1.34
LTA310	1.34	1.34
GE8x8NB	1.34	1.34
ABB QFB	1.42	1.43
SPC QFB	1.40	1.41
LUA307	1.35	1.36
GE11	1.35	1.36
<u>Technical Specification</u>		
<u>4.5 K.2 is not performed</u>		
BP8x8R	1.36	1.36
GE8x8EB	1.36	1.36
LTA310	1.36	1.36
GE8x8NB	1.36	1.36
ABB QFB	1.52	1.49
SPC QFB	1.47	1.45
LUA307	1.40	1.44
GE11	1.40	1.44

* These values shall be increased by 0.01 for single loop operation.

** Applicable for operating conditions on the power/flow map as described on pages 3 and 4, MCPR Limits Section.

TABLE 4

DESIGN LINEAR HEAT GENERATION RATE LIMITS

<u>FUEL TYPE</u>	<u>LHGR LIMIT</u>
BP8x8R	13.4 kW/ft
GE8x8EB	14.4 kW/ft
LTA310	14.4 kW/ft
GE8x8NB	14.4 kW/ft
LUA307	14.4 kW/ft
GE11	14.4 kW/ft
ABB QFB (SVEA-96)	16.3 kW/ft
SPC QFB (9x9-9X+)	14.7 kW/ft