

QUAD CITIES UNIT 1 CYCLE 13

CORE OPERATING LIMITS REPORT



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REFERENCES

1. Commonwealth Edison Company and Iowa-Illinois Gas and Electric Company Docket No. 50-254, Quad Cities Station, Unit 1 Facility Operating License, License No. DPR-29.
2. Letter from D. M. Crutchfield to All Power Reactor Licenses and Applicants, Generic Letter 88-16; Concerning the Removal of Cycle-Specific Parameter Limits from Technical Specifications.
3. Supplemental Reload Licensing Report for Quad Cities Nuclear Power Station, Unit 1 Reload 12 Cycle 13, 23A7176, Revision 0, Class I, April 1992.
4. Quad Cities Nuclear Power Station, Units 1 and 2, SAFER/GESTR - LOCA Loss-of-Coolant Accident Analysis, NEDC-31345P, Revision 2, Class III, July 1989 (as amended).
5. General Electric Standard Application for Reactor fuel (GESTAR), NEDE-24011-P-A-10, Class III, February 1991.
6. Extended Operating Domain and Equipment Out-Of-Service for Quad Cities Nuclear Power Station Units 1 and 2, NEDC-31449, Revision 1, Class II, July 1992.
7. General Electric Procedure Y1003V43, 'Thermal-Mechanical Limit Evaluation,' Revision 4, February 1991.

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**1.0 CONTROL ROD WITHDRAWAL BLOCK INSTRUMENTATION (3.2/4.2)**

**1.1. TECHNICAL SPECIFICATION REFERENCE:**

Technical Specification Table 3.2-3 and 3.6.H

**1.2. DESCRIPTION:**

The Rod Withdrawal Block Monitor Upscale Instrumentation Trip Setpoint for two recirculation loop operation is determined from the following relationship:

$$\leq (0.65)Wd + 43\% \text{ **}$$

\*\* Clamped, with an allowable value not to exceed the allowable value for recirculation loop drive flow (Wd) of 100%.

Wd is the percent of drive flow required to produce a rated core flow of 98 million lb/hr. Trip level setting is in percent of rated power (2511 MWth).

## 2.0 AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR) (3.5/4.5)

### 2.1 TECHNICAL SPECIFICATION REFERENCE:

Technical Specification 3.5.1

### 2.2 DESCRIPTION:

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE7B-P8DRB299-7G4.0-80M-145-T is determined from Figure 2-1.

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE7B-P8DRB282-7G3.0-80M-145-T is determined from Figure 2-2.

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE8B-P8DQB300-7G4-80M-4WR-145-T is determined from Figure 2-3.

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE8B-P8DQB300-9G4-80M-4WR-145-T is determined from Figure 2-4.

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE8B-P8DWB301-9GZ-80M-4WR-145-T is determined from Figure 2-5.

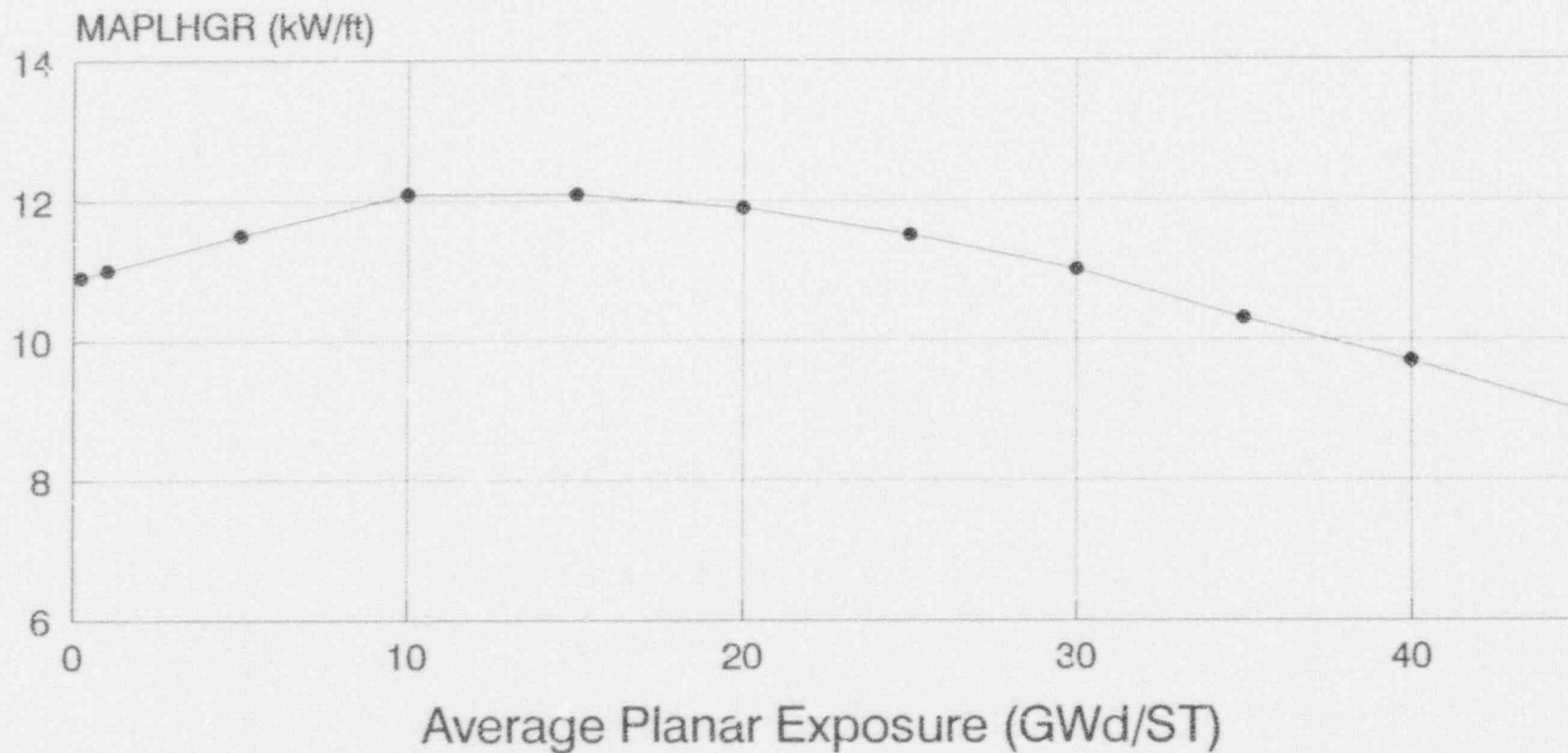
The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE9B-P8DWB258-4G4/3G3-80M-145-T is determined from Figure 2-6.

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE9B-P8DWB258-9GZ-80M-145-T is determined from Figure 2-7.

The Maximum Average Planar Linear Heat Generation Rates (MAPLHGR) versus Average Planar Exposure for GE9B-P8DWB305-7GZ-80M-145-T is determined from Figure 2-8.

# MAPLHGR vs. Average Planar Exposure

## GE7B-P8DRB299-7G4.0-80M-145-T

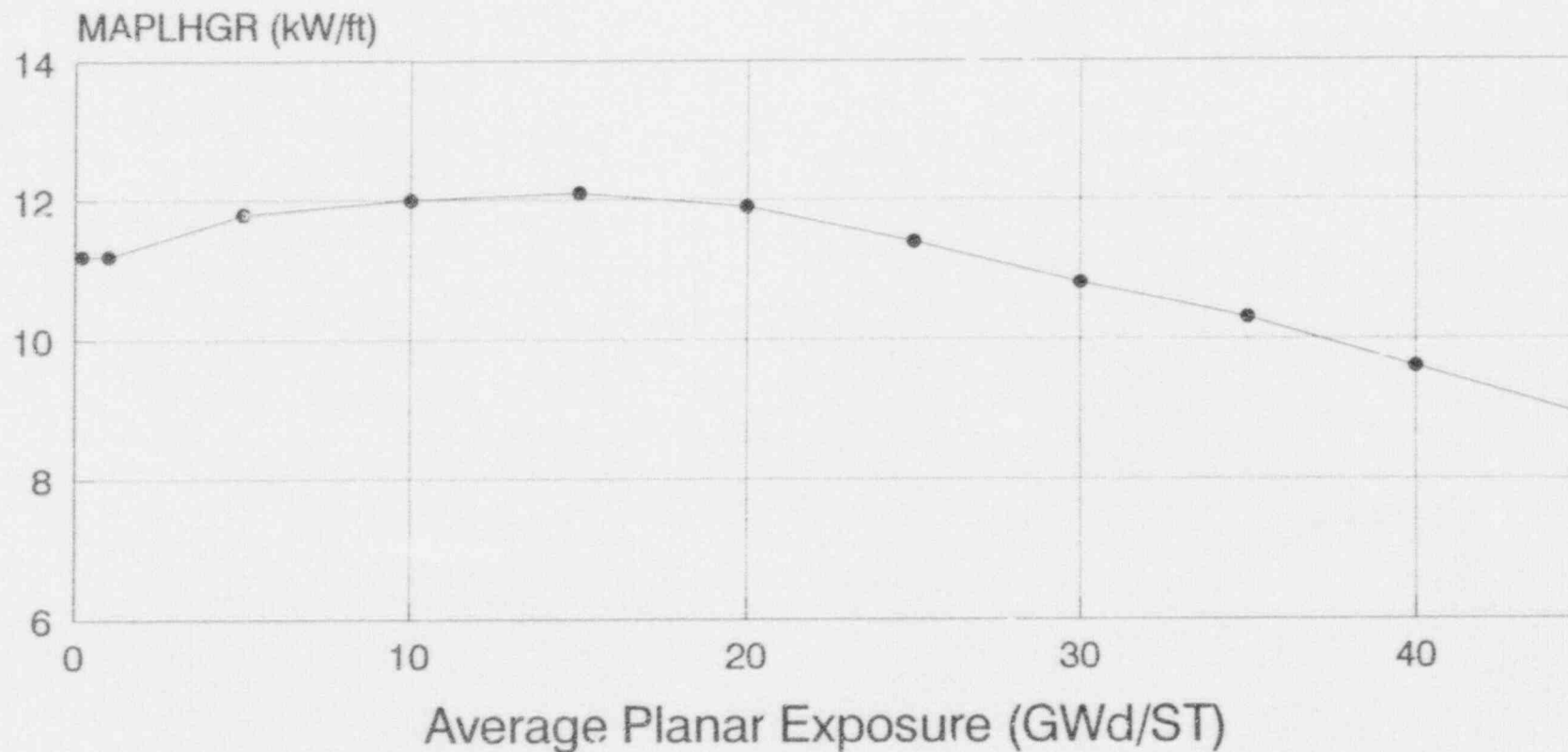


• Figure 2-1



# MAPLHGR vs. Average Planar Exposure

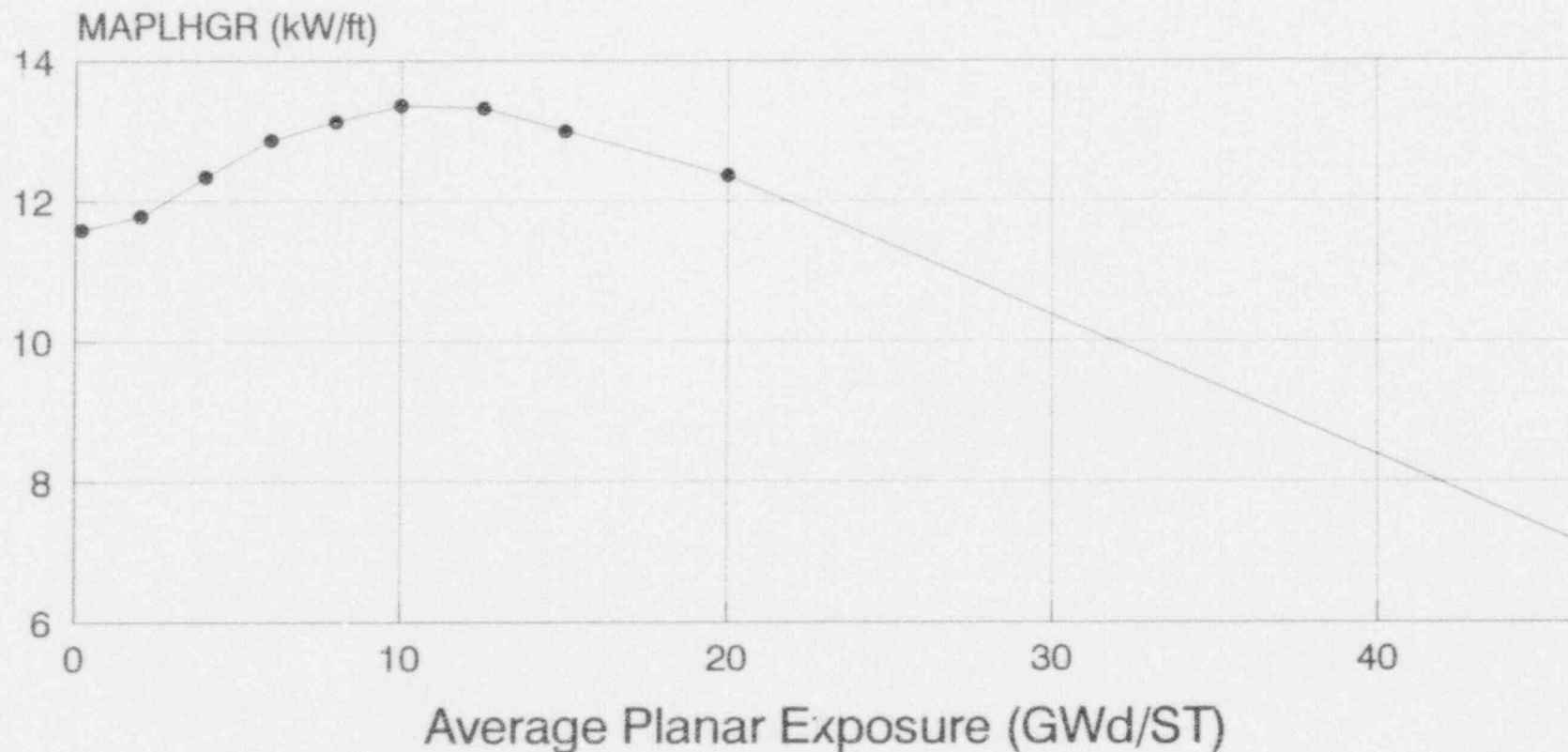
## GE7B-P8DRB282-7G3.0-80M-145-T



• Figure 2-2

# MAPLHGR vs Average Planar Exposure

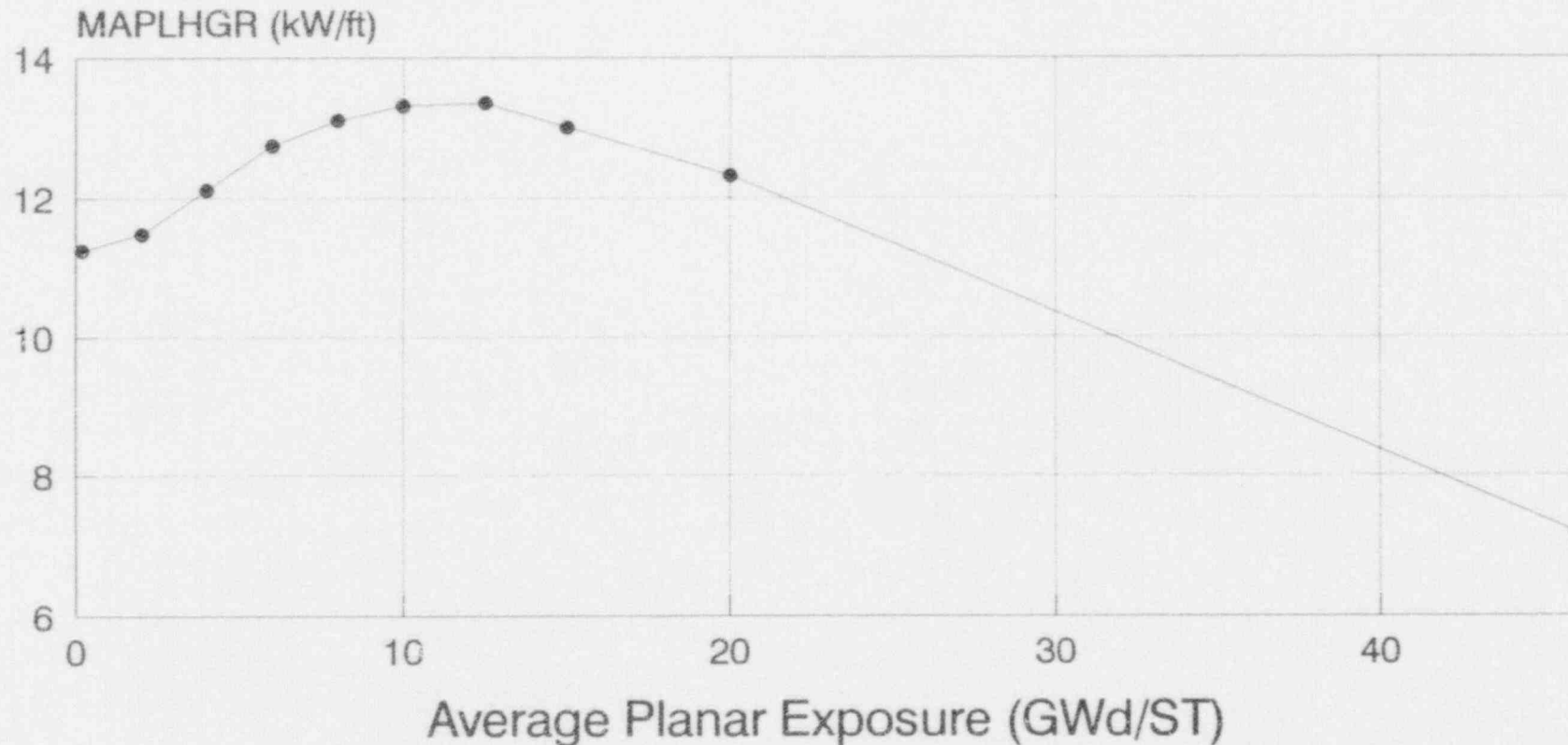
## GE8B-P8DQB300-7G4-80M-4WR-145-T



• Figure 2-3

# MAPLHGR vs Average Planar Exposure

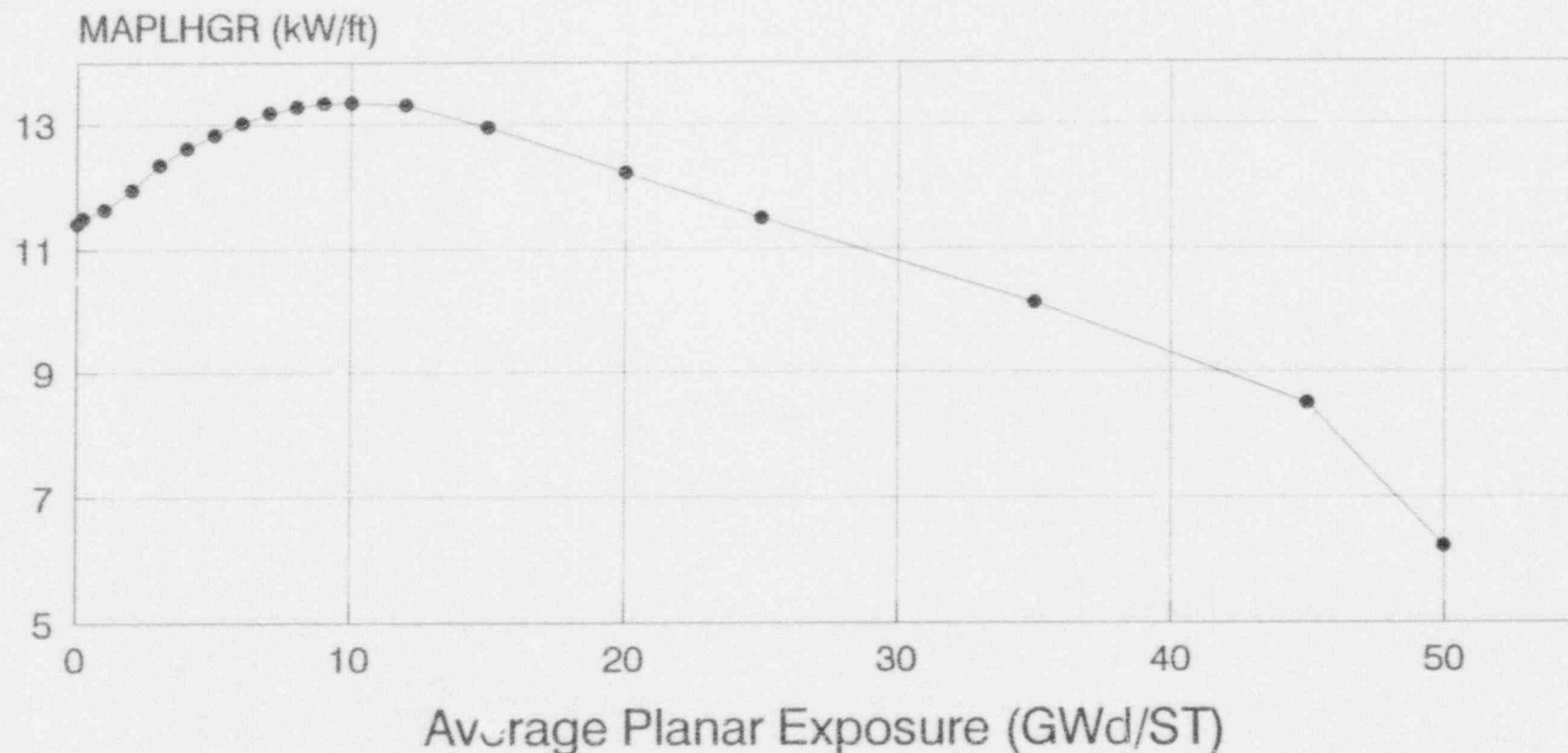
## GE8B-P8DQB300-9G4-80M-4WR-145-T



• Figure 2-4

# MAPLHGR vs. Average Planar Exposure

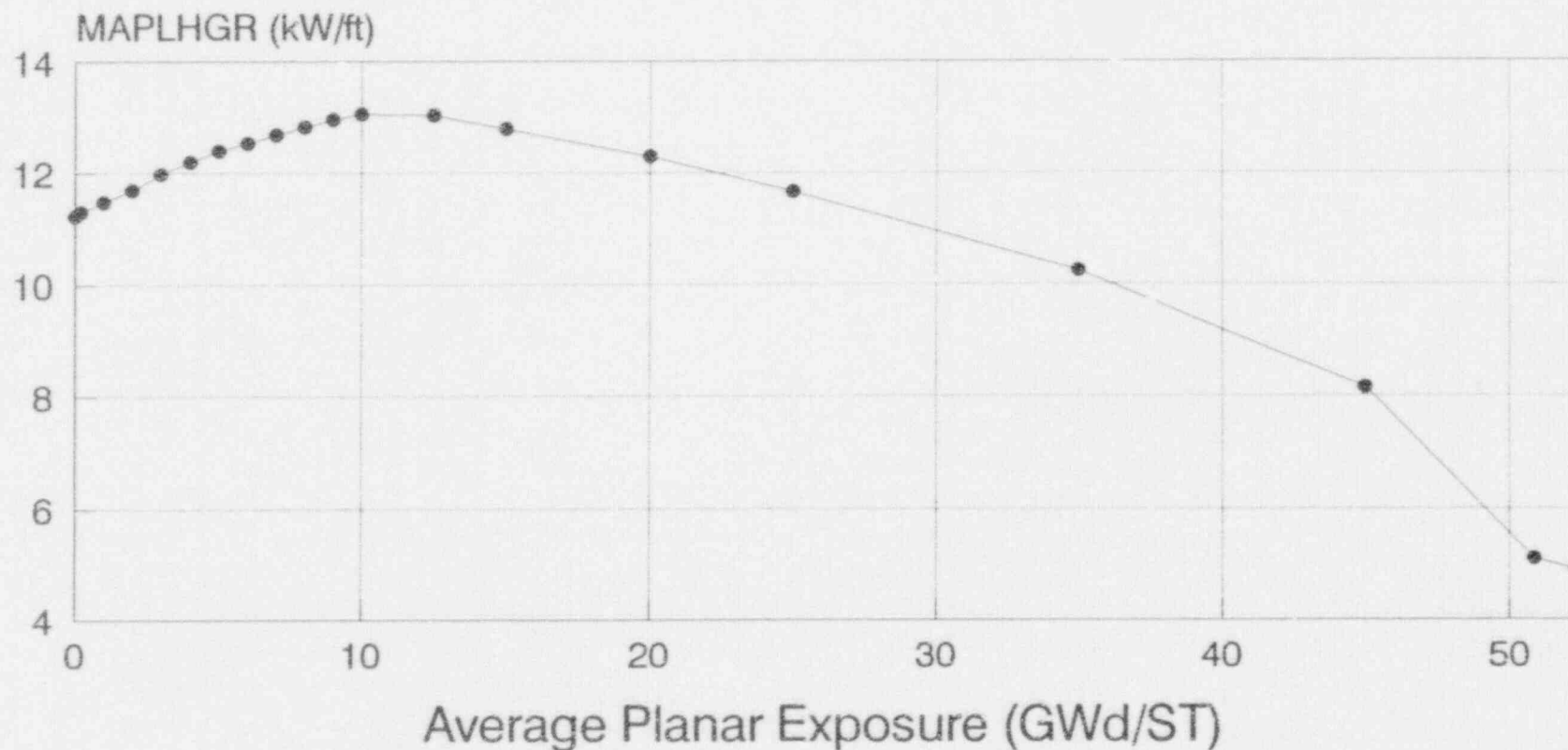
## GE8B-P8DWB301-9GZ-80M-4WR-145-T



• Figure 2-5

# MAPLHGR vs. Average Planar Exposure

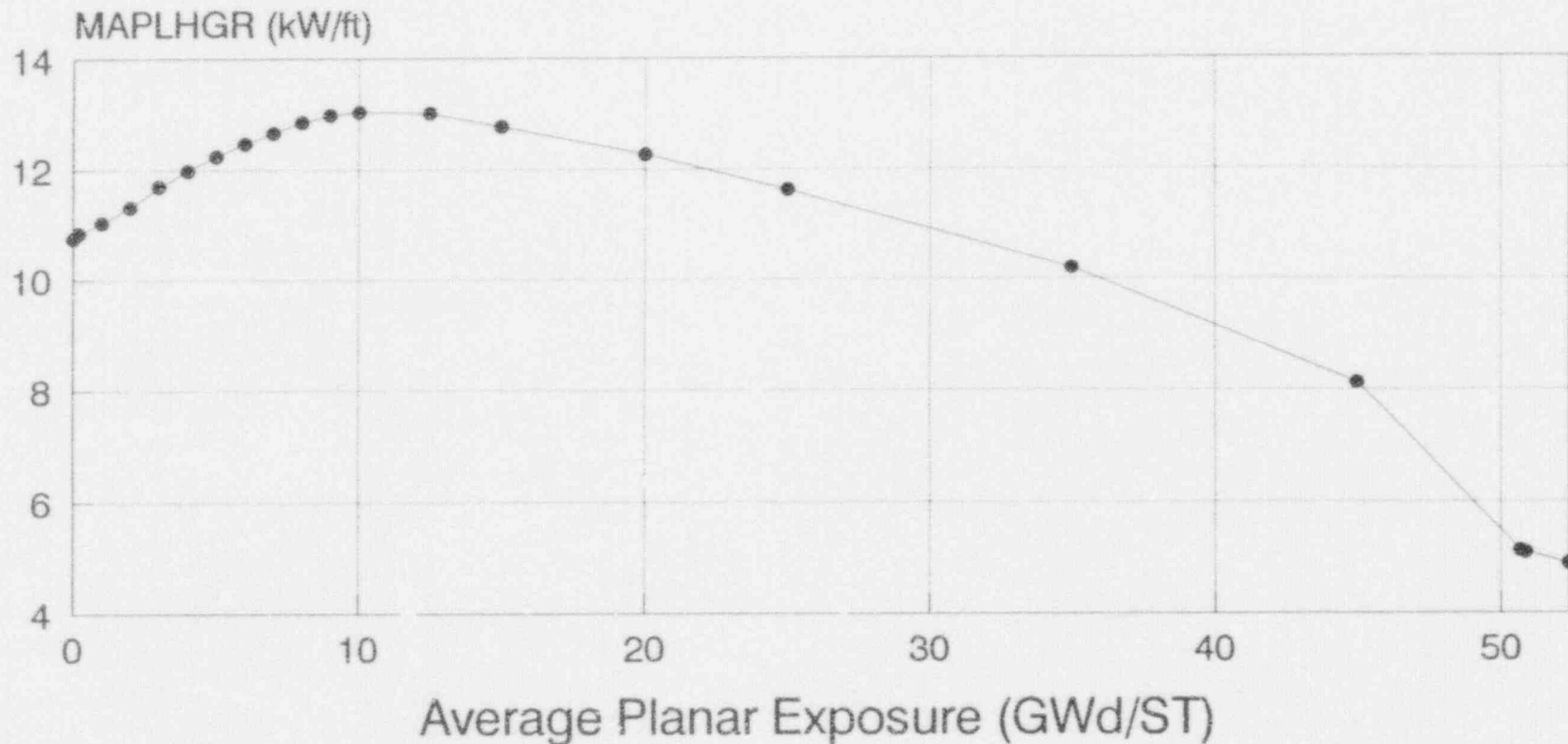
## GE9B-P8DWB258-4G4/3G3-80M-145-T



• Figure 2-6

# MAPLHGR vs. Average Planar Exposure

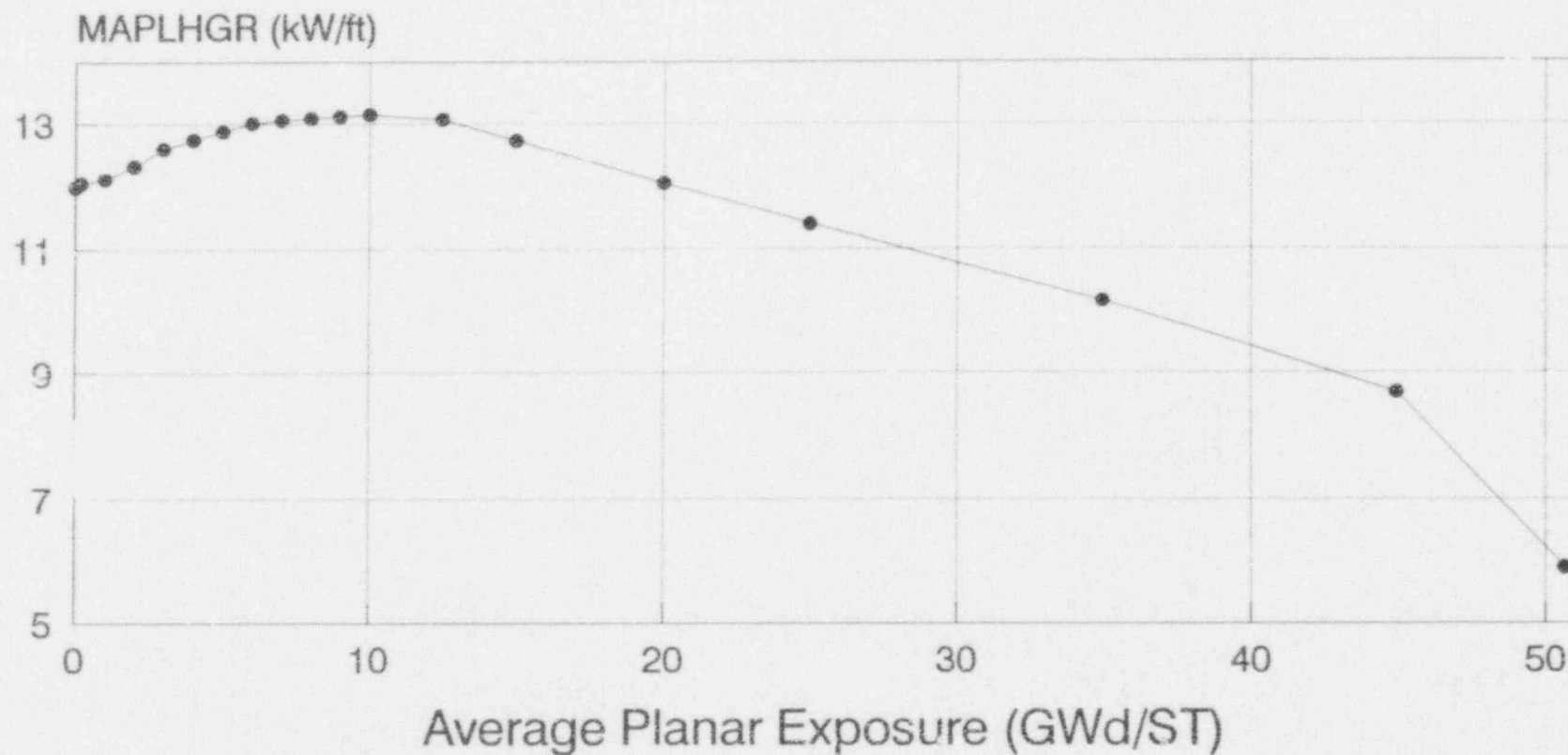
## GE9B-P8DWB258-9GZ-80M-145-T



• Figure 2-7

# MAPLHGR vs. Average Planar Exposure

## GE9B-P8DWB305-7GZ-80M-145-T



• Figure 2-8

3.0 LINEAR HEAT GENERATION RATE (LHGR) (3.5/4.5)

3.1 TECHNICAL SPECIFICATION REFERENCE:

Technical Specification 3.5.J

3.2 DESCRIPTION:

A. The LHGR limit is 13.4 Kw/ft for fuel types:

1. GE7B-BP8DRB299-7G4.0-80M-145-T
2. GE7B-BP8DRB282-7G3.0-80M-145-T

B. The LHGR limit is 14.4 Kw/ft for fuel types:

1. GE8B-P8DQB300-7G4-80M-4WR-145-T
2. GE8B-P8DQB300-9G4-80M-4WR-145-T
3. GE8B-P8DWB301-9GZ-80M-4WR-145-T
4. GE9B-P8DWB258-4G4/3G3-80M-145-T
5. GE9B-P8DWB258-9GZ-80M-145-T
6. GE9B-P8DWB305-7GZ-80M-145-T



**4.0 MINIMUM CRITICAL POWER RATIO (MCPR) (3.5/4.5)****4.1 TECHNICAL SPECIFICATION REFERENCE:**

Technical Specifications 3.5.K and 3.6.H

**4.2 DESCRIPTION:**

During steady-state operation at rated core flow, the Operating Limit MCPR (OLMCPR) shall be greater than or equal:

$$1.27 \text{ for } t_{ave} \leq 0.68 \text{ seconds}$$

$$1.37 \text{ for } t_{ave} \geq 0.86 \text{ seconds}$$

$$(0.556)t_{ave} + 0.892 \text{ for } 0.68 < t_{ave} < 0.86 \text{ seconds}$$

where  $t_{ave}$  = mean 20% scram insertion time for all surveillance data from Technical Specification 4.3.C which has been generated in the current cycle.

For core flows other than rated, these nominal values of OLMCPR shall be increased by a factor of  $K_f$  where  $K_f$  is as shown in Figure 4-1.

A cycle independent OLMCPR of 1.31 (Option B) was calculated (Reference 6) for operation with a Feedwater Heater Out-of-Service (FWHOOS). Therefore, the OLMCPR, calculated using the above information, shall be increased by 0.04 whenever operating with a FWHOOS. This event, which conservatively bounds the requirements detailed within the EOD/EOOS document (Reference 6), goes beyond all normal operating conditions in the SRLR (Reference 3).