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March 6, 2002

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Subject: Core Operating Limits Report Revision - LDC 02001

Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29

GNRO-2002/00026

Ladies and Gentlemen:

Entergy Operations, Inc. is submitting a Revision of the Core Operating Limits Report (COLR) for Grand Gulf Nuclear Station (GGNS) (reference: Licensing Document Change (LDC) 02001) as required by GGNS Technical Specification 5.6.5.

This change incorporates the Core Operating Limits Report (currently Engineering Standard MS-48.0) into Volume 1 of the Operating License Manual (OLM). The COLR is now a stand alone License Basis Document. Engineering Standard MS-48 is being cancelled. This change also resulted in a revision to COLR Figures 4-4 and 4-5 which were updated with additional information which was represented in Figures 3.3.1.1-1 and 3.3.1.1-2 located in Appendix 16B.1 of the Updated Final Safety Analysis Report. This added information was previously reviewed and approved via LDC 98037 which implemented Technical Specification Amendment 141.

GGNS Cycle-specific reload parameters for MCPR, LHGR, and MAPLHGR operating limits are controlled by the Core Operating Limits Report located in Volume 1 of the Operating License Manual. All changes to the COLR will be controlled by Nuclear Management Manual Procedure LI-113, License Basis Document (LBD) Control Program which implements GGNS Technical Specification 5.6.5. The analytical methods used to determine the Cycle 12 core operating limits were previously approved by the NRC and are listed in GGNS Technical Specification 5.6.5. This letter does not contain any commitments.

If you have any questions or require additional information, please contact Mike Larson (601) 437-6685.

Yours truly,

Charles A. Bottemiller
Manager, Plant Licensing

MJL
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Grand Gulf Nuclear Station

Core Operating Limits Report

CORE OPERATING LIMITS REPORT

REASON FOR REVISION

This revision places the COLR in the same Operating License Manual binder as the Technical Specifications. Also, this change will require the COLR to be controlled and updated the same way other License Basis Documents are and will result in elimination of duplicate COLR curves currently represented in the Technical Requirements Manual and UFSAR. In the past these duplicate curves have created confusion and required extra effort to keep all of the curves up-to-date with one another. This change also resulted in a revision to Figures 4-4 and 4-5 which were updated with additional information which was previously represented in UFSAR/TRM Figures 3.3.1.1-1 and 3.3.1.1-2. The additional information added was previously reviewed and approved via LDC 98037 which implemented Technical Specification Amendment 141.

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CORE OPERATING LIMITS REPORT

1.0 PURPOSE

On October 4, 1988, the NRC issued Generic Letter 88-16 [3.1.1] encouraging licensees to remove cycle-specific parameter limits from Technical Specifications and to place these limits in a formal report to be prepared by the licensee. As long as the parameter limits were developed with NRC-approved methodologies, the letter indicated that this would remove unnecessary burdens on licensee and NRC resources.

On October 29, 1992, Entergy Operations submitted a Proposed Amendment to the Grand Gulf Operating License requesting changes to the GGNS Technical Specifications to remove certain reactor physics parameter limits that change each fuel cycle [3.1.2]. This amendment committed to placing these operating limits in a separate Core Operating Limits Report (COLR) which is defined in Technical Specifications. This PCOL was approved by the NRC by SER dated January 21, 1993 [3.1.3].

The COLR is controlled as a License Basis Document and revised accordingly for each fuel cycle or remaining portion of a fuel cycle. This COLR reports the Cycle 12 core operating and stability limits.

2.0 SCOPE

As defined in Technical Specification 1.1, the COLR is the GGNS document that provides the core operating limits for the current fuel cycle. This document is prepared in accordance with Technical Specification 5.6.5 for each reload cycle using NRC-approved analytical methods.

The Cycle 12 core operating and stability limits included in this report are:

- the Average Planar Linear Heat Generation Rate (APLHGR),
- the Minimum Critical Power Ratio (MCPR) (including EOC-RPT inoperable),
- the Linear Heat Generation Rate (LHGR) limit, and
- the E1A stability limits.

3.0 REFERENCES

This section contains the background, cycle-specific, and methodology references used in the safety analysis of Grand Gulf Cycle 12.

3.1 Background References

3.1.1 MAEC-88/0313, Generic Letter 88-16, "Removal of Cycle-Specific Parameter Limits from Technical Specifications", October 4, 1988.

3.1.2 GNRO-92-00093, Proposed Amendment to Grand Gulf Operating License, PCOL-92/07, dated October 29, 1992.

3.1.3 GNRI-93-0008, Amendment 106 to Grand Gulf Operating License, January 21, 1993.

3.2 Current Cycle References

3.2.1 GEXI 2001-00156, K.V. Walters to J.B. Lee, "Transmittal of EMF-2541, Revision 4 (Grand Gulf Nuclear Station Cycle 12 Reload Analysis)," dated November 12, 2001.

3.2.2 GEXI 2000-00043, R.E. Kingston to J.B. Lee, "Transmittal of GGNS LHGR/MAPLHGR Relaxation Results," dated October 23, 2000.

3.2.3 GEXI 2001-00155, K.V. Walters to J.B. Lee, "Transmittal of EMF-2552(P), Revision 4 (Grand Gulf Nuclear Station Cycle 12 Plant Transient Analysis)," dated November 12, 2001.

3.2.4 GEXI 97-00035, R.E. Kingston to J.B. Lee, "Utilization of Power and Flow Dependent MAPLHGR and LHGR Limits," dated June 27, 1997.

3.2.5 NEDC-32910P, "Grand Gulf Nuclear Station SAFER/GESTR-LOCA Loss-of-Coolant Accident Analysis With Relaxed ECCS Parameters," dated September 1999.

3.2.6 CEO 2000-00094, Jim Head to M.D. Withrow, "Revised E1A Related COLR Input," dated April 20, 2000.

3.2.7 GEXI 2001-00085, K.V. Walters to J.B Lee, "Grand Gulf Nuclear Station Cycle 12 Interim Startup and Operations Report," dated April 30, 2001.

3.2.8 GEXI 2000-00116, K.V. Walters to J.B. Lee, "Technical Specification and COLR References for Grand Gulf Nuclear Station and River Bend Station," November 3, 2000.

3.3 Methodology References

3.3.1 XN-NF-81-58(P)(A) Revision 2 and Supplements 1 and 2, “RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model,” Exxon Nuclear Company, March 1984.

3.3.2 XN-NF-85-67(P)(A) Revision 1, “Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel,” Exxon Nuclear Company, September 1986.

3.3.3 EMF-85-74(P) Revision 0 Supplement 1 (P)(A) and Supplement 2 (P)(A), “RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model, Siemens Power Corporation,” February 1998.

3.3.4 ANF-89-98(P)(A) Revision 1 and Supplement 1, “Generic Mechanical Design Criteria for BWR Fuel Designs,” Advanced Nuclear Fuels Corporation, May 1995.

3.3.5 EMF-93-177(P)(A) and Supplement 1, “Mechanical Design for BWR Fuel Channels, Siemens Power Corporation,” August 1995.

3.3.6 XN-NF-80-19(P)(A) Volume 1 and Supplements 1 and 2, “Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis, Exxon Nuclear Company,” March 1983.

3.3.7 XN-NF-80-19(P)(A) Volume 4 Revision 1, “Exxon Nuclear Methodology for Boiling Water Reactors: Application of the ENC Methodology to BWR Reloads, Exxon Nuclear Company,” June 1986.

3.3.8 EMF-2158(P)(A) Revision 0, “Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-MICROBURN-B2, Siemens Power Corporation,” October 1999.

3.3.9 XN-NF-80-19(P)(A) Volume 3 Revision 2, “Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description,” Exxon Nuclear Company, January 1987.

3.3.10 XN-NF-84-105(P)(A), Volume 1 and Supplements 1 and 2, “XCOBRA-T: A Computer Code for BWR Transient Thermal Hydraulic Core Analysis,“ Exxon Nuclear Company, February 1987.

3.3.11 ANF-524(P)(A) Revision 2 and Supplements 1 and 2, “ANF Critical Power Methodology for Boiling Water Reactors,“ Advanced Nuclear Fuels Corporation, November 1990.

3.3.12 ANF-913 (P)(A), Volume 1, Revision 1 and Volume 1 Supplements 2, 3 and 4, “COTRANSA2: A Computer Program for Boiling Water Reactor Transient Analyses,“ Advanced Nuclear Fuels Corporation, August 1990.

3.3.13 XN-NF-825(P)(A) Supplement 2, “BWR/6 Generic Rod Withdrawal Error Analysis, $MCPR_p$ for Plant Operation Within the Extended Operating Domain,“ Exxon Nuclear Company, October 1986.

3.3.14 ANF-1358(P)(A) Revision 1, “The Loss of Feedwater Heating Transient in Boiling Water Reactors,“ Advanced Nuclear Fuels Corporation, September 1992.

3.3.15 EMF-1997(P)(A) Revision 0, “ANFB-10 Critical Power Correlation,” Siemens Power Corporation, July 1998.

3.3 Methodology References (continued)

3.3.16 EMF-1997(P), Supplement 1(P)(A), Revision 0, “ANFB-10 Critical Power Correlation: High Local Peaking Results, Siemens Power Corporation,“ July 1998.

3.3.17 EMF-2209(P)(A) Revision 1, “SPCB Critical Power Correlation, Siemens Power Corporation,“ July 2000.

3.3.18 EMF-2245(P)(A) Revision 0, “Application of Siemens Power Corporation’s Critical Power Correlations to Co-Resident Fuel,“ Siemens Power Corporation, August 2000.

3.3.19 XN-NF-80-19(P)(A), Volumes 2, 2A, 2B, and 2C, “Exxon Nuclear Methodology for Boiling Water Reactors: EXEM BWR ECCS Evaluation Model,“ Exxon Nuclear Company, September 1982.

3.3.20 ANF-91-048(P)(A), “Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR Evaluation Model, Advanced Nuclear Fuel Corporation,“ January 1993.

3.3.21 ANF-91-048(P)(A), Supplements 1 and 2, “BWR Jet Pump Model Revision for RELAX,“ Siemens Power Corporation, October 1997.

3.3.22 XN-CC-33(A) Revision 1, “HUXY: A Generalized Multirod Heatup Code with 10 CFR 50 Appendix K Heatup Option Users Manual,“ Exxon Nuclear Company, November 1975.

3.3.23 EMF-2292(P)(A) Revision 0, “ATRIUM-10: Appendix K Spray Heat Transfer Coefficients, Siemens Power Corporation,“ September 2000.

3.3.24 EMF-CC-074(P)(A) Volume 4 Revision 0, “BWR Stability Analysis-Assessment of STAIF with Input from MICROBURN-B2,“ Siemens Power Corporation, August 2000.

3.3.25 NEDE-24011-P-A, General Electric Standard Application for Reactor Fuel (GESTAR-II)

4.0 DEFINITIONS

4.1 Average Planar Linear Heat Generation Rate (APLHGR) - the APLHGR shall be applicable to a specific planar height and is equal to the sum of the linear heat generation rates for all the fuel rods in the specified bundle at the specified height divided by the number of fuel rods in the fuel bundle.

4.2 Average Planar Exposure - the Average Planar Exposure shall be applicable to a specific planar height and is equal to the sum of the exposure of all the fuel rods in the specified bundle at the specified height divided by the number of fuel rods in the fuel bundle.

4.3 Critical Power Ratio (CPR) - the ratio of that power in the assembly, which is calculated by application of the fuel vendor's appropriate boiling correlation, to cause some point in the assembly to experience boiling transition, divided by the actual assembly operating power.

4.4 Core Operating Limits Report (COLR) - The Grand Gulf Nuclear Station specific document that provides core operating limits for the current reload cycle in accordance with Technical Specification 5.6.5.

4.5 Linear Heat Generation Rate (LHGR) - the LHGR shall be the heat generation per unit length of fuel rod. It is the integral of the heat flux over the heat transfer area associated with the unit length.

4.6 Minimum Critical Power Ratio (MCPR) - the MCPR shall be the smallest CPR which exists in the core.

4.7 MCPR Safety Limit - the minimum value of the CPR at which the fuel could be operated with the expected number of rods in boiling transition not exceeding 0.1% of the fuel rods in the core.

4.8 Aligned Drive Flow – Adjusted FCTR card input drive flow signal that accounts for actual variations in the core flow to drive flow relationship.

4.9 Monitored Region – The area of the core power and flow operating domain where the reactor may be susceptible to reactor instabilities under conditions exceeding the licensing basis of the current reactor system.

4.10 Restricted Region – The area of the core power and flow operating domain where the reactor is susceptible to reactor instabilities in the absence of restrictions on core void distributions.

4.11 Setpoint "Setup" – A FCTR card feature that sets the normal "non-setup" E1A APRM flow–biased scram and control rod block trip reference setpoints associated with the Exclusion and Restricted Regions higher to permit required reactor maneuvering in the Restricted Region when stability controls are in effect.

4.12 Beginning of Cycle (BOC) – The nominal Cycle 12 BOC core average exposure (CAE) is assumed to be 19,658 MWd/MTU [3.2.1], which is conservative considering the actual Cycle 12 BOC CAE is 19,609 MWd/MTU [3.2.7].

4.13 Middle of Cycle (MOC) – The Cycle 12 MOC CAE is 30,840 MWd/MTU [3.2.1], which corresponds to a cycle exposure of 11,182 MWd/MTU (30,840-19,658).

4.14 End of Cycle (EOC) – The Cycle 12 EOC CAE is 32,536 MWd/MTU [3.2.1], which corresponds to a cycle exposure of 12,878 MWd/MTU (32,536-19,658).

4.15 Extended End of Cycle (EEOC) – The Cycle 12 EEOC CAE is 33,388 MWd/MTU [3.2.1], which corresponds to a cycle exposure of 13,730 MWd/MTU (33,388-19,658).

5.0 GENERAL REQUIREMENTS

The attached core operating limits are applicable for operation in the Maximum Extended Operating Domain (MEOD).

5.1 Average Planar Linear Heat Generation Rates

Consistent with Technical Specification 3.2.1, all APLHGRs for ATRIUM10 bundles shall not exceed the limits reported in Figure(s) 1 as a function of exposure [3.2.1]. All APLHGRs for GE11 lattices shall not exceed the MAPLHGR limits reported in Reference 3.2.2 as a function of exposure multiplied by the smaller of either the power-dependent or flow-dependent MAPLHGR factors reported in Figure(s) 1 [3.2.1]. For each GE11 bundle type, Figure(s) 1 reports the MAPLHGR for the most limiting enriched lattice at each exposure for reference purposes.

For Cycle 12 Single Loop Operation (SLO), a SLO MAPLHGR multiplier of 0.87 is required for ATRIUM-10 fuel [3.2.1]. However, there is no additional SLO MAPLHGR multiplier required for GE11 fuel since the flow-dependent MAPLHGR factor reported in Figure 1-4 at the maximum SLO core flow is less than the SLO multipliers applied in the LOCA analysis [3.2.5].

5.2 Minimum Critical Power Ratio

Consistent with Technical Specification 3.2.2, the MCPR shall be equal to or greater than the limits reported in Figure(s) 2 as functions of power, flow, and exposure [3.2.1]. Figure(s) 2 provides MCPR limits for normal feedwater temperature as well as reduced feedwater temperature due to operation with feedwater heaters out of service (FHOOS). Reference 3.2.3 indicates that the normal feedwater temperature limits in Figure(s) 2 are applicable for feedwater temperatures as low as 411.5 °F at rated power considering the power uprate feedwater temperature of 421.5 °F [3.2.1]. Figure(s) 2 also contains the MCPR limits required for Single Loop Operation and for operation with the EOC-RPT function inoperable [3.2.1].

5.3 Linear Heat Generation Rate

Consistent with Technical Specification 3.2.3, the LHGR for ATRIUM10 bundles shall not exceed the limits reported in Figure(s) 3 as a function of exposure multiplied by the smaller of either the power-dependent or flow-dependent LHGR factors reported in Figure(s) 3 [3.2.1]. All LHGRs for GE11 lattices shall not exceed the LHGR limits reported in References 3.2.2 as a function of exposure multiplied by the smaller of either the power-dependent or flow-dependent LHGR factors reported in Figure(s) 3 [3.2.1, 3.2.4]. For each GE11 bundle type, Figure(s) 3 reports the LHGR for the most limiting enriched lattice at each exposure for reference purposes.

5.4 Stability

The stability regions and allowable values specified in Technical Specifications are reported in Figure(s) 4 [3.2.6]. Since the maximum licensed GGNS feedwater temperature reduction is 50 °F at rated power operation, an alternate set of stability limits is not required.

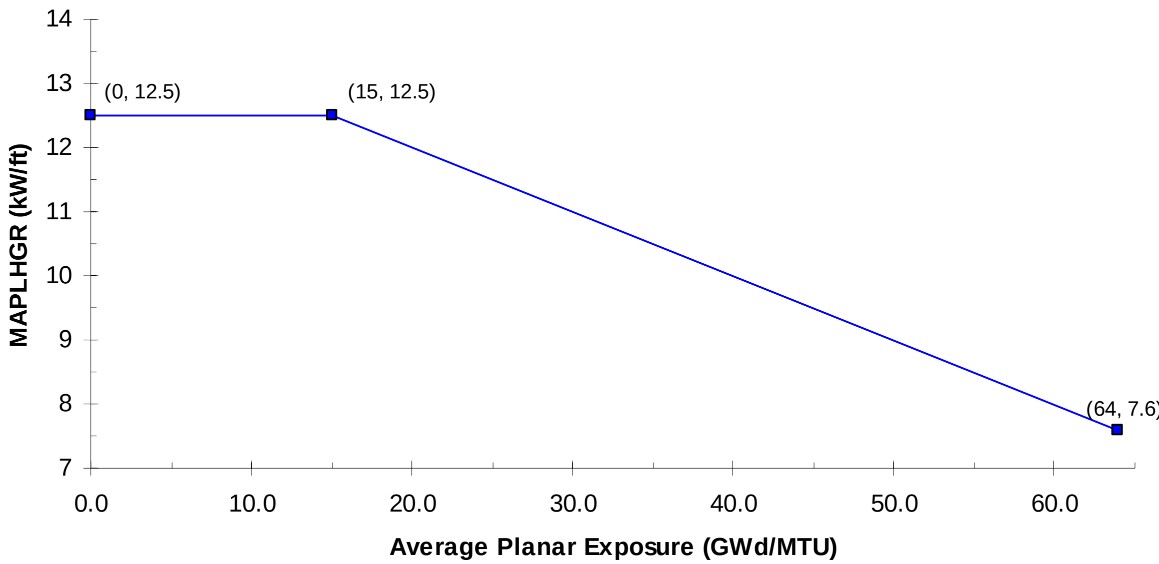

Figure 1-1
Maximum Average Planar Linear Heat Generation Rate for ATRIUM-10

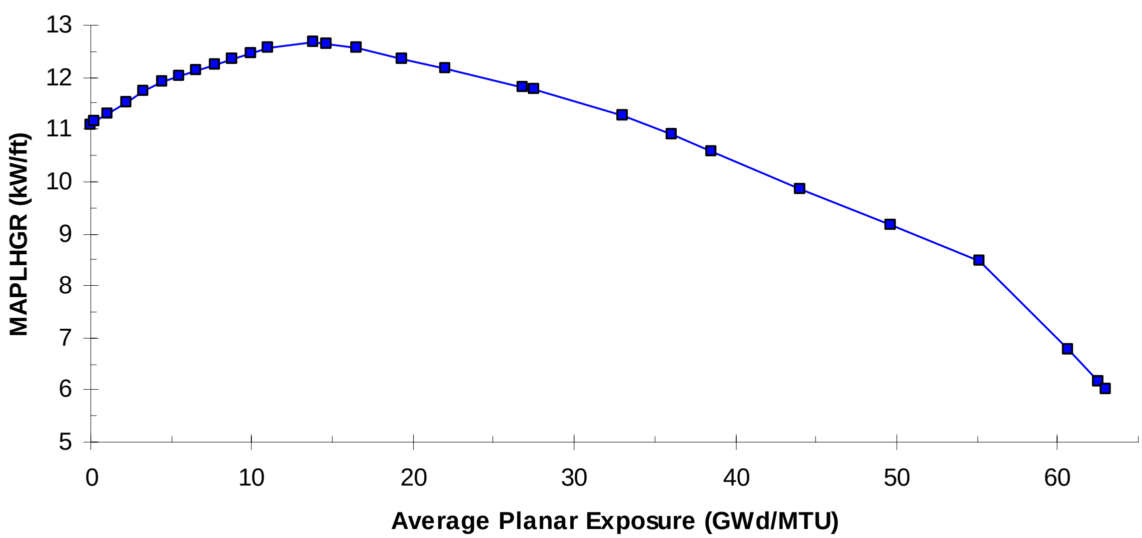

Figure 1-2a
Maximum Average Planar Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB371-12GZ1-120T-146-T

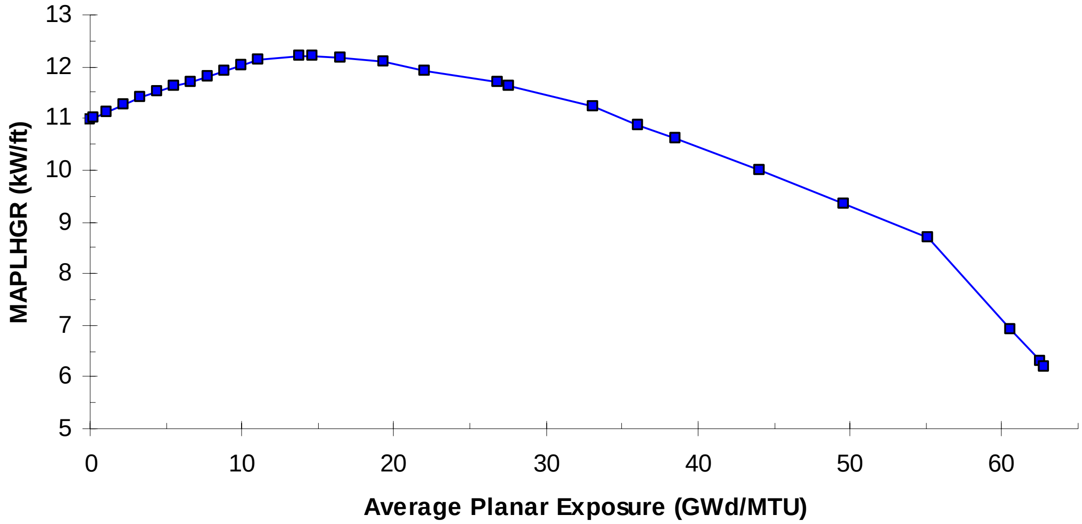

Figure 1-2B
Maximum Average Planar Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB391-13GZ-120T-146-T

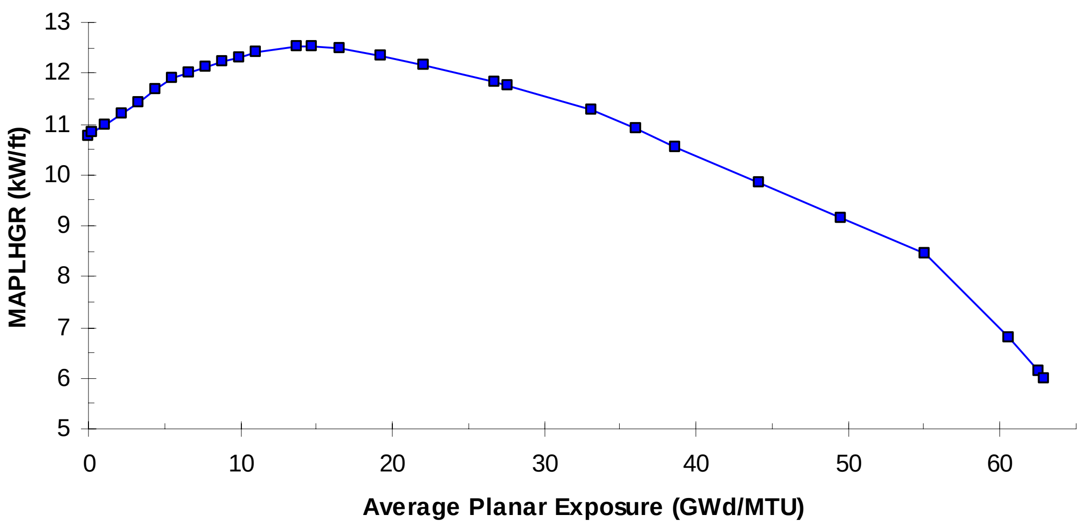

Figure 1-2c
Maximum Average Planar Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB370-14GZ1-120T-146-T

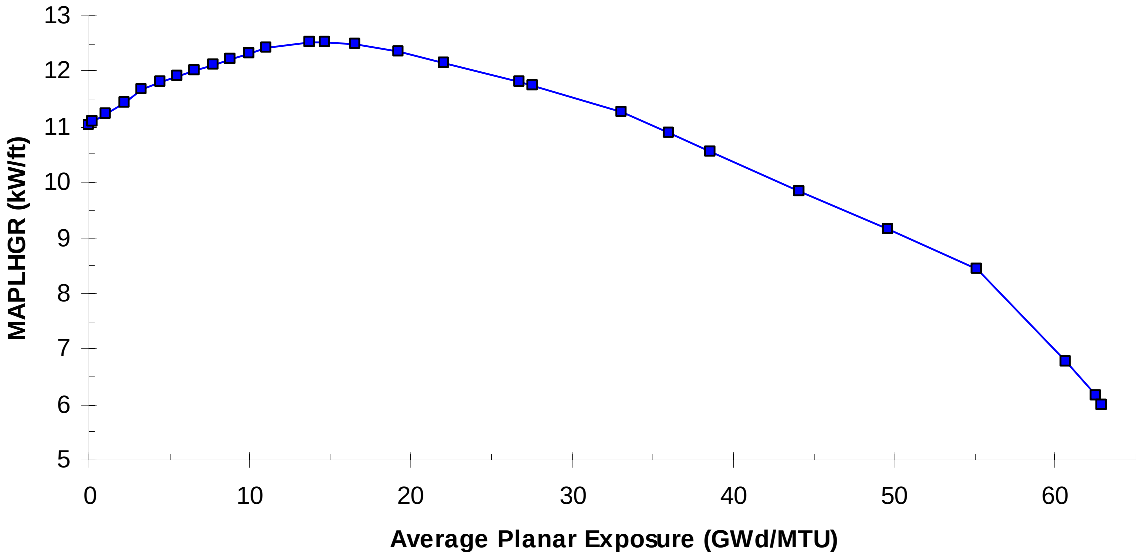

Figure 1-2d
Maximum Average Planar Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB370-12GZ1-120T-146-T

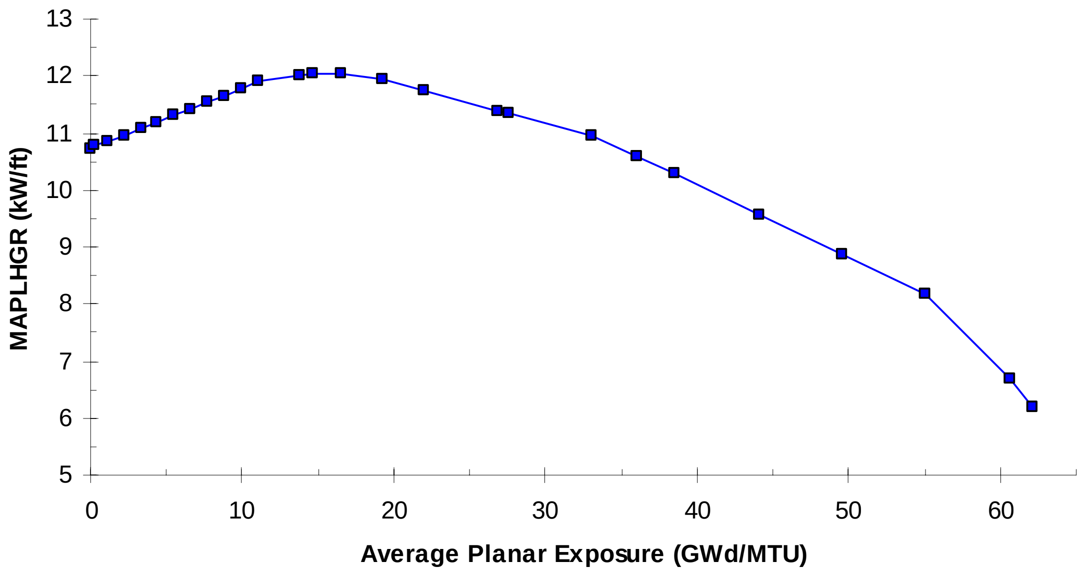

Figure 1-2e
Maximum Average Planar Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB386-13GZ-120T-146-T

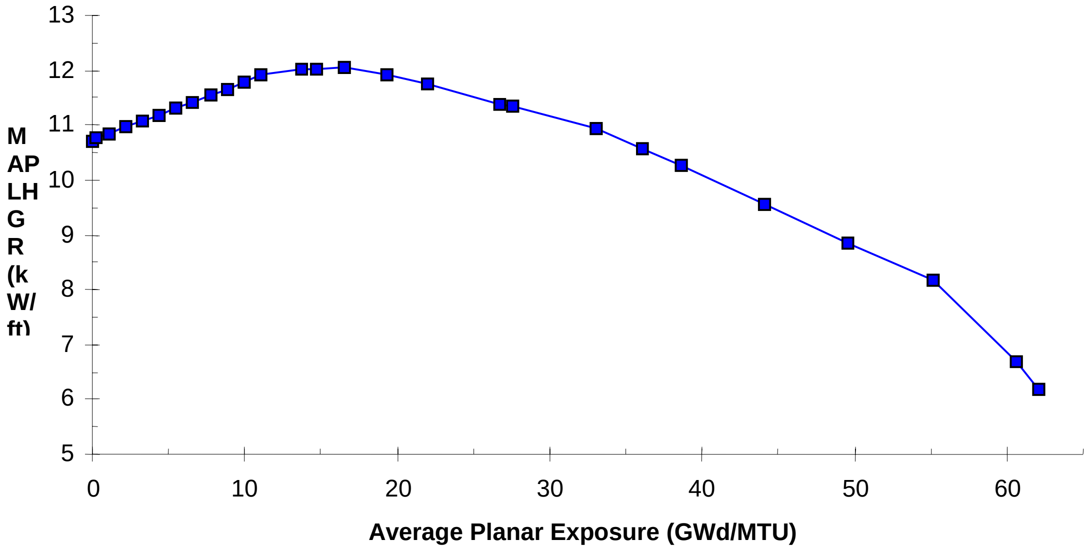

Figure 1-2f
Maximum Average Planar Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB387-15GZ-120T-146-T

Table 1-1 MAPLHGRs for Limiting Enriched Lattices of GE11 Bundles

Exposure (GWd/MTU)	GE Bundle Type GE11-P9SUB371-12GZ1-120T-146-T	GE Bundle Type GE11-P9SUB391-13GZ-120T-146-T	GE Bundle Type GE11-P9SUB370-14GZ1-120T-146-T	GE Bundle Type GE11-P9SUB370-12GZ1-120T-146-T	GE Bundle Type GE11-P9SUB386-13GZ-120T-146-T	GE Bundle Type GE11-P9SUB387-15GZ-120T-146-T
0.00	11.09	10.97	10.75	11.03	10.86	10.71
0.22	11.16	11.01	10.82	11.10	10.93	10.77
1.10	11.30	11.12	10.98	11.24	11.03	10.85
2.20	11.50	11.25	11.20	11.45	11.16	10.96
3.31	11.72	11.39	11.43	11.67	11.29	11.07
4.41	11.92	11.50	11.68	11.81	11.42	11.18
5.51	12.02	11.61	11.90	11.91	11.53	11.30
6.61	12.13	11.71	12.01	12.01	11.63	11.42
7.72	12.23	11.82	12.11	12.11	11.73	11.54
8.82	12.34	11.92	12.22	12.22	11.83	11.66
9.92	12.45	12.03	12.32	12.32	11.93	11.79
11.02	12.55	12.12	12.42	12.42	12.03	11.91
13.78	12.67	12.20	12.53	12.53	12.10	12.02
14.66	12.63	12.20	12.52	12.52	12.10	12.03
16.53	12.55	12.18	12.50	12.50	12.10	12.05
19.29	12.36	12.08	12.35	12.35	12.01	11.93
22.05	12.16	11.93	12.15	12.15	11.87	11.74
26.79	11.81	11.68	11.81	11.81	11.62	11.39
27.56	11.76	11.63	11.75	11.75	11.57	11.34
33.07	11.28	11.21	11.27	11.27	11.14	10.94
36.05	10.89	10.88	10.89	10.89	10.81	10.58
38.58	10.56	10.60	10.55	10.55	10.53	10.28
44.09	9.85	9.99	9.85	9.85	9.86	9.57
49.60	9.15	9.35	9.15	9.15	9.18	8.86
55.12	8.46	8.68	8.45	8.45	8.52	8.16
60.63	6.79	6.92	6.78	6.78	6.81	6.69
62.14						6.18
62.48					6.18	
62.50	6.16	6.29	6.15	6.15		
62.77		6.20				
62.93			6.00	6.00		
62.95	6.01					
63.52						

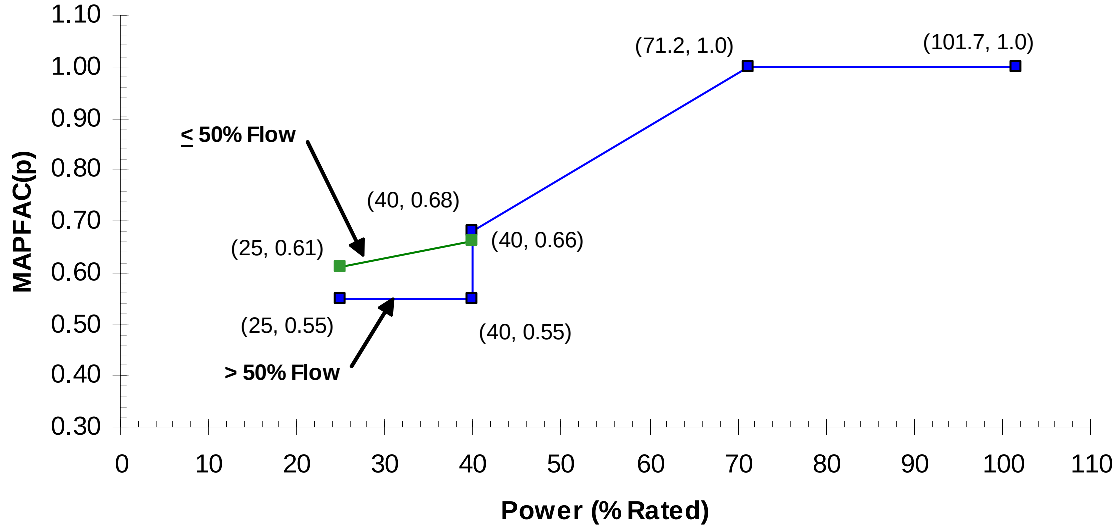

Figure 1-3
Cycle 12 Power-Dependent MAPLHGR Factor for GE11 BOC-EEOC

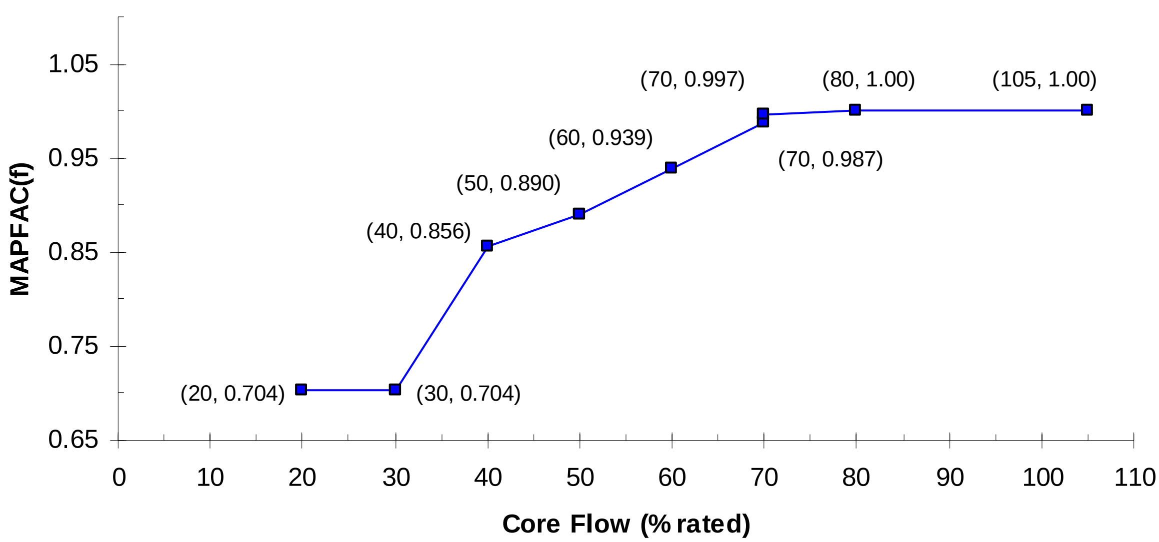

Figure 1-4
Cycle 12 Flow-Dependent MAPLHGR Factor for GE11

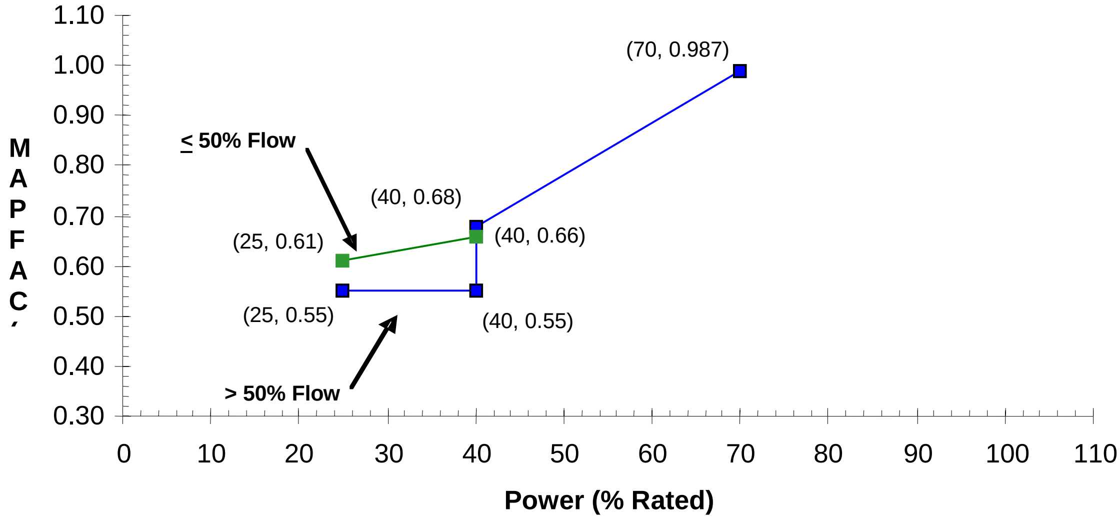

Figure 1-5
Cycle 12 Power-Dependent MAPLHGR Factor for GE11
BOC-EEOC Single Loop Operation

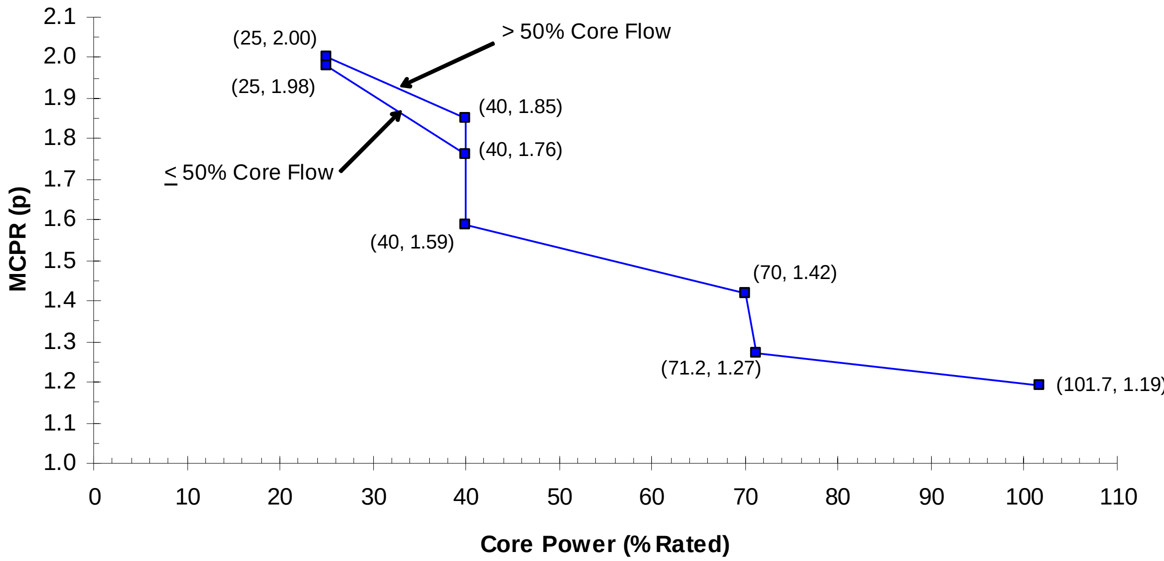

Figure 2-1a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 BOC to MOC with Normal Feedwater Temperature

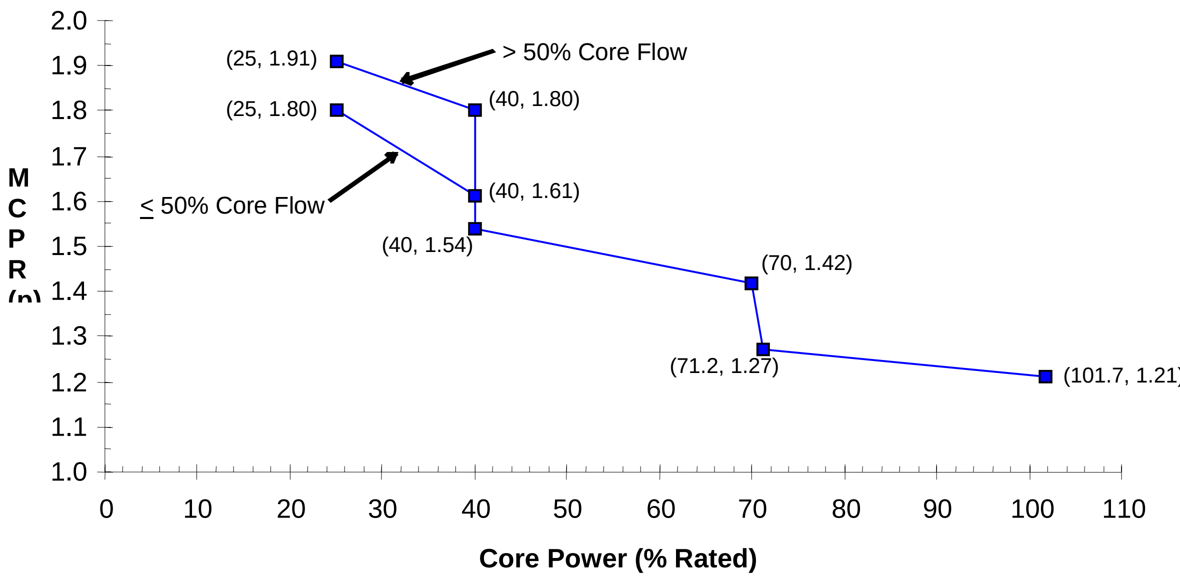

Figure 2-1b Cycle 12 Power-Dependent MCPR Limit for GE11 BOC to MOC with Normal Feedwater Temperature

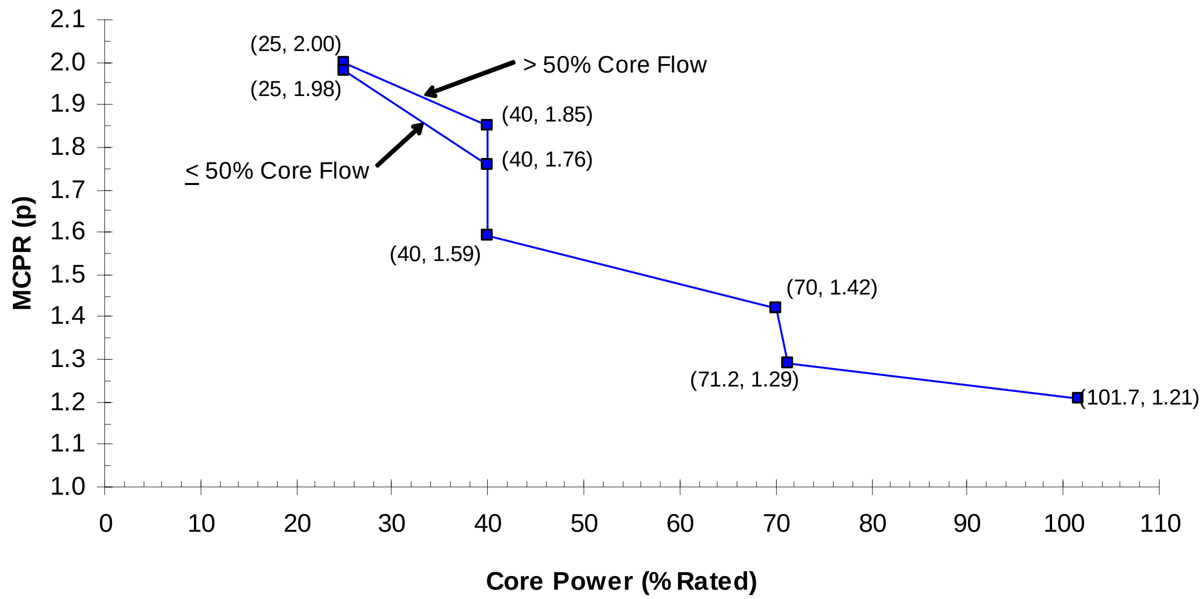

Figure 2-2a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 BOC to MOC with Reduced Feedwater Temperature

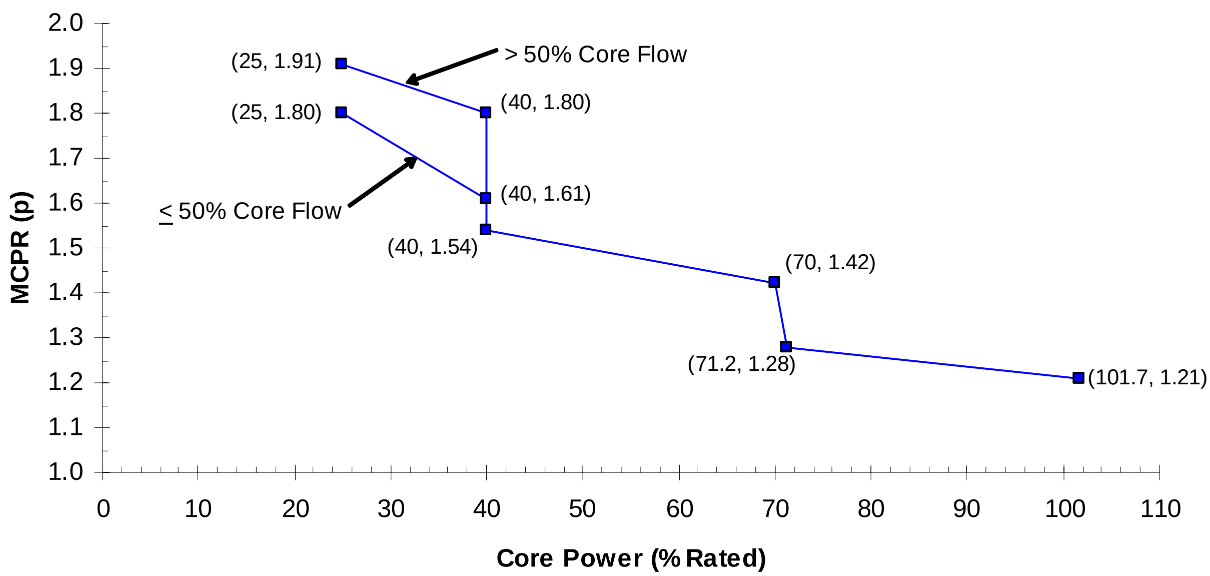

Figure 2-2b Cycle 12 Power-Dependent MCPR Limit for GE11 BOC to MOC with Reduced Feedwater Temperature

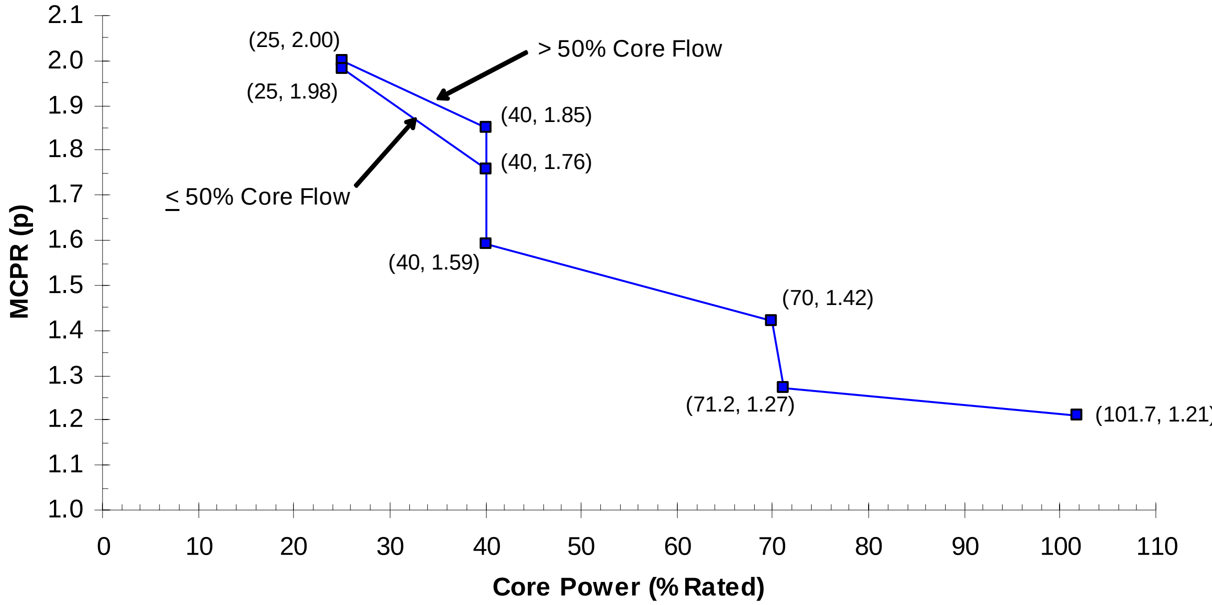

Figure 2-3a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 BOC to MOC with Normal Feedwater Temperature and EOC-RPT Inoperable

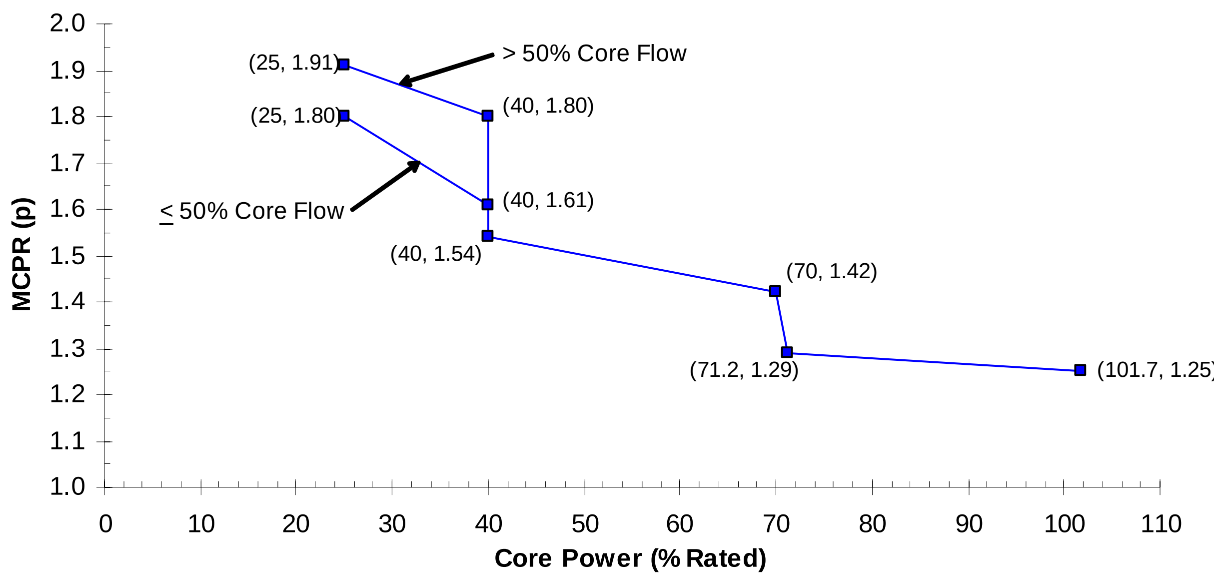

Figure 2-3b Cycle 12 Power-Dependent MCPR Limit for GE11 BOC to MOC with Normal Feedwater Temperature and EOC-RPT Inoperable

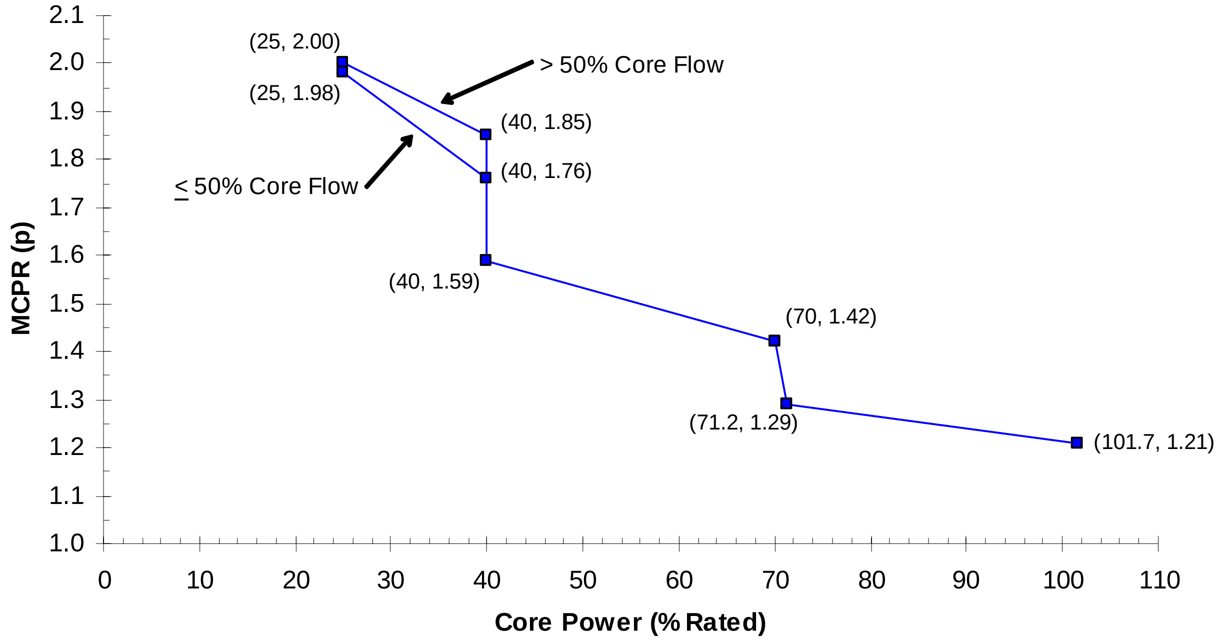

Figure 2-4a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 BOC to MOC with Reduced Feedwater Temperature and EOC-RPT Inoperable

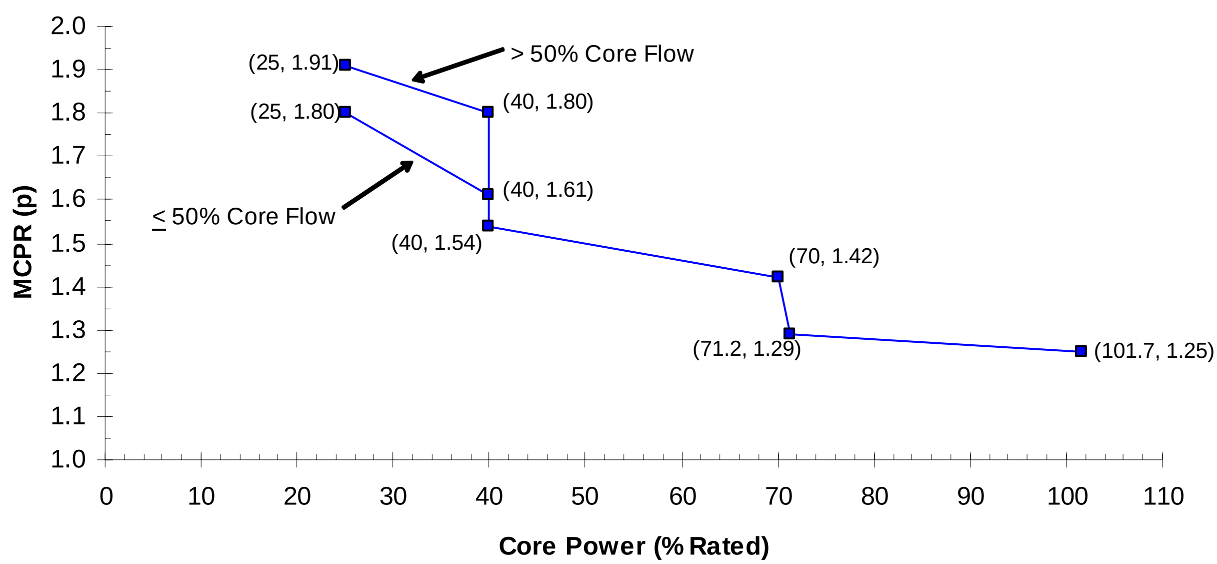

Figure 2-4b Cycle 12 Power-Dependent MCPR Limit for GE11 BOC to MOC with Reduced Feedwater Temperature and EOC-RPT Inoperable

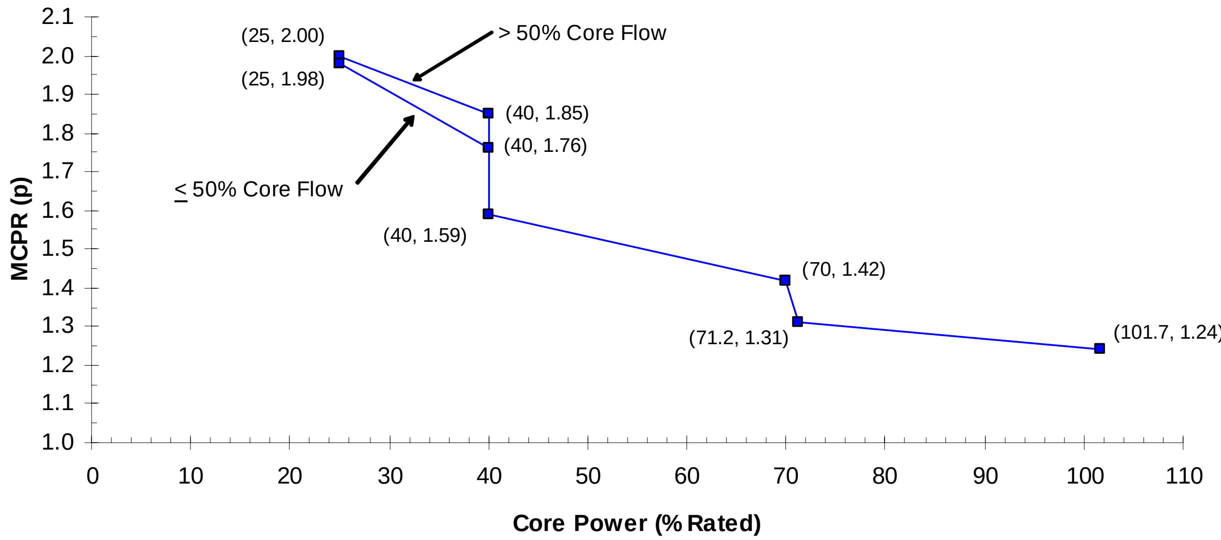

Figure 2-5a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 MOC to EOC with Normal Feedwater Temperature

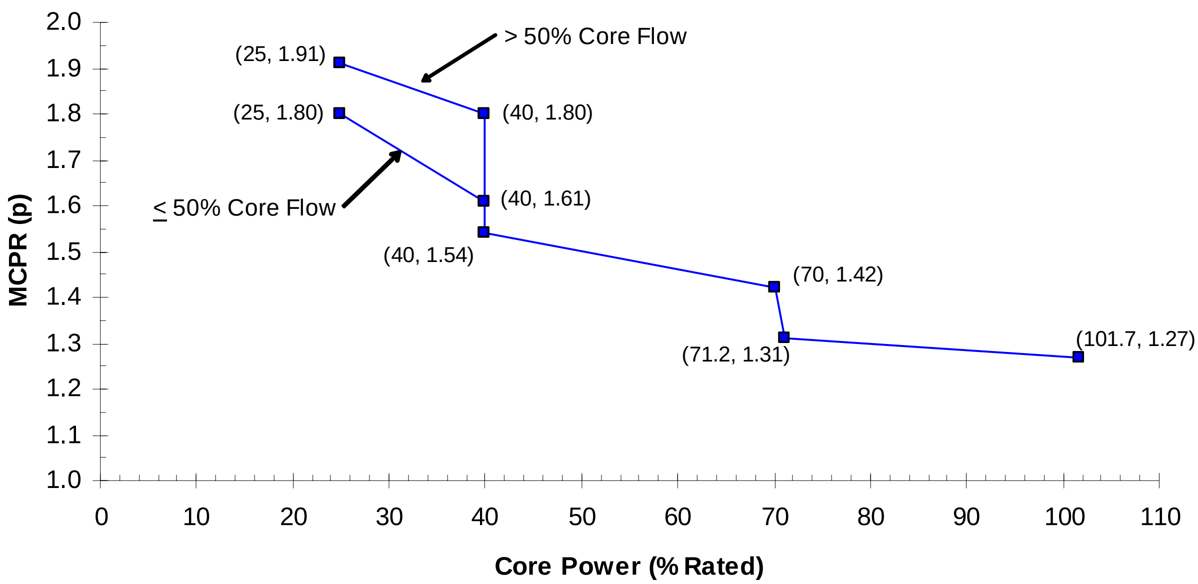

Figure 2-5b Cycle 12 Power-Dependent MCPR Limit for GE11 MOC to EOC with Normal Feedwater Temperature

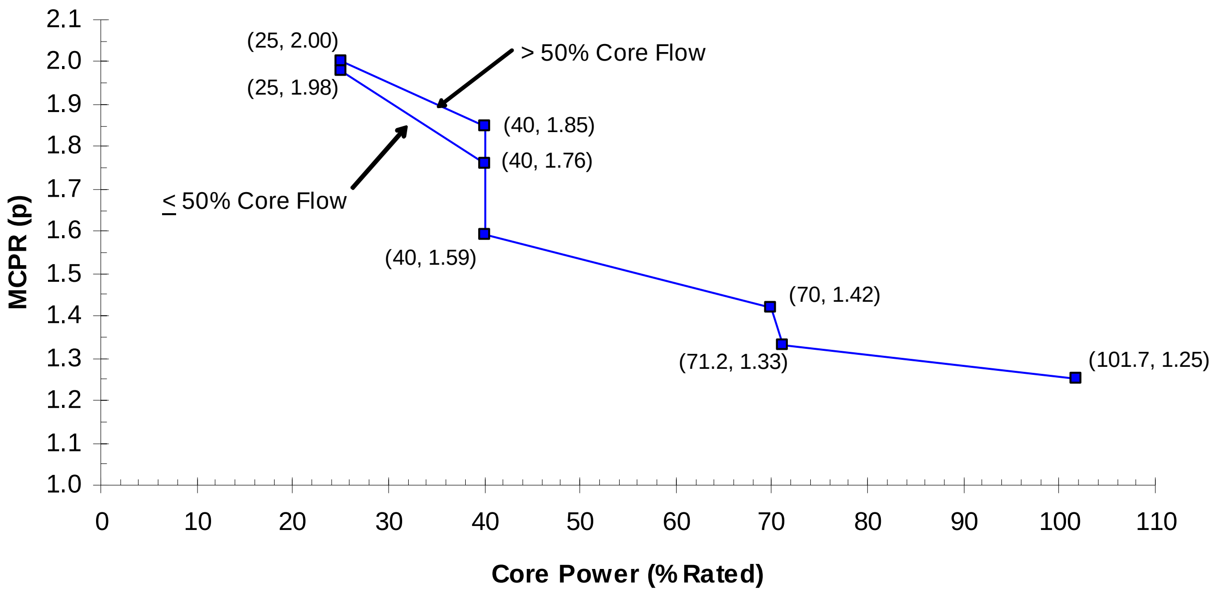

Figure 2-6a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 MOC to EOC with Reduced Feedwater Temperature

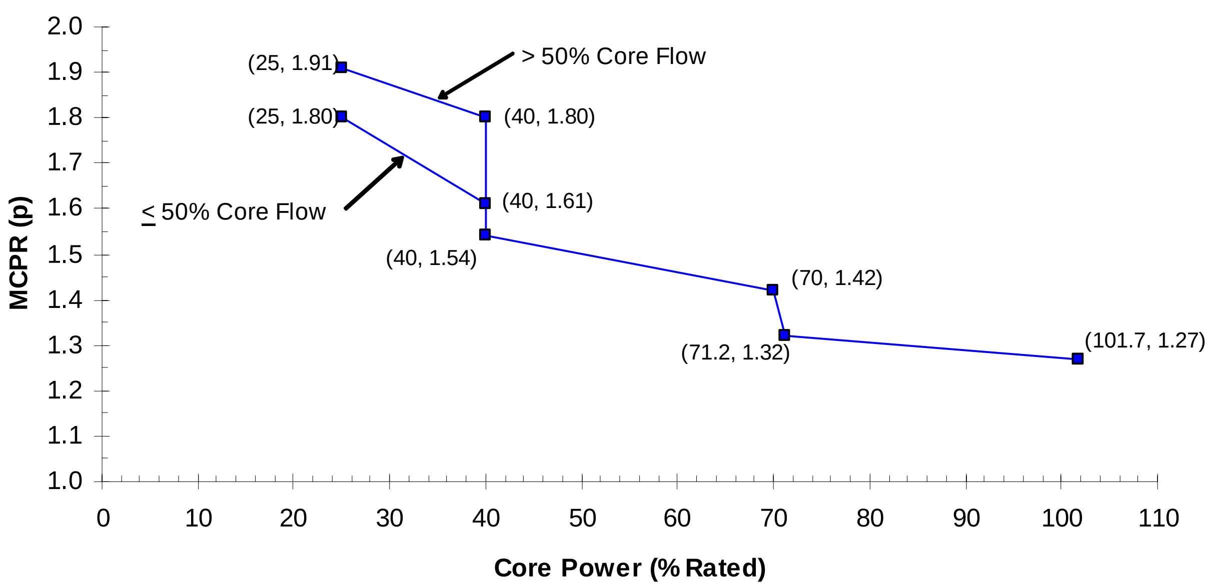

Figure 2-6b Cycle 12 Power-Dependent MCPR Limit for GE11 MOC to EOC with Reduced Feedwater Temperature

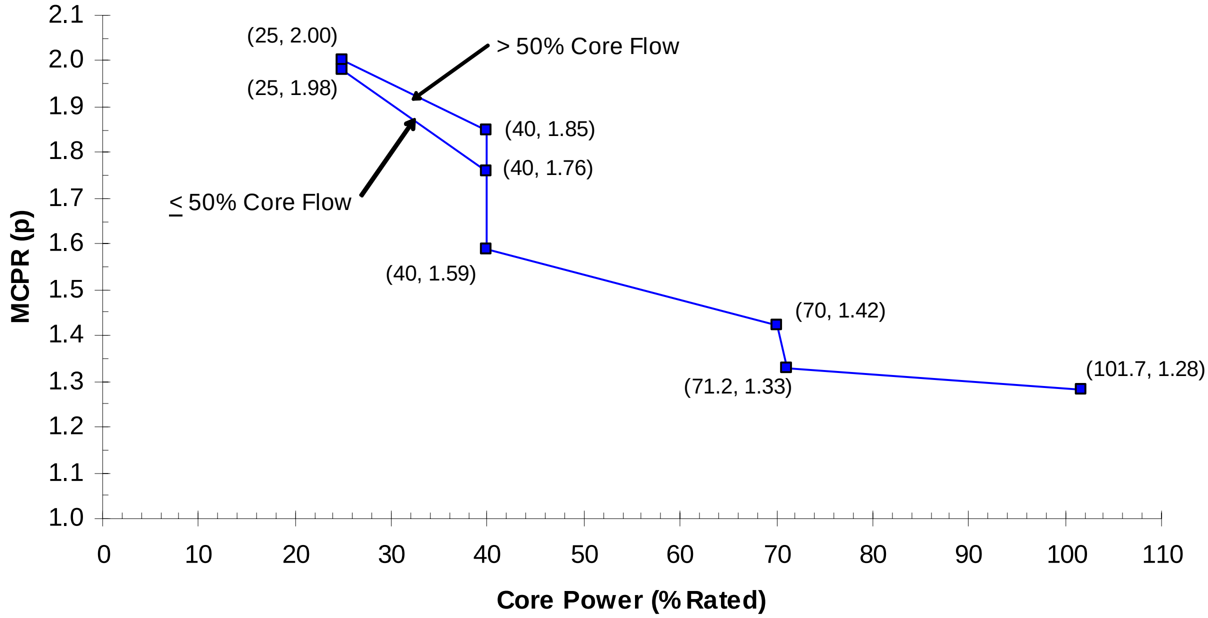

Figure 2-7a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 MOC to EOC with Normal Feedwater Temperature and EOC-RPT Inoperable

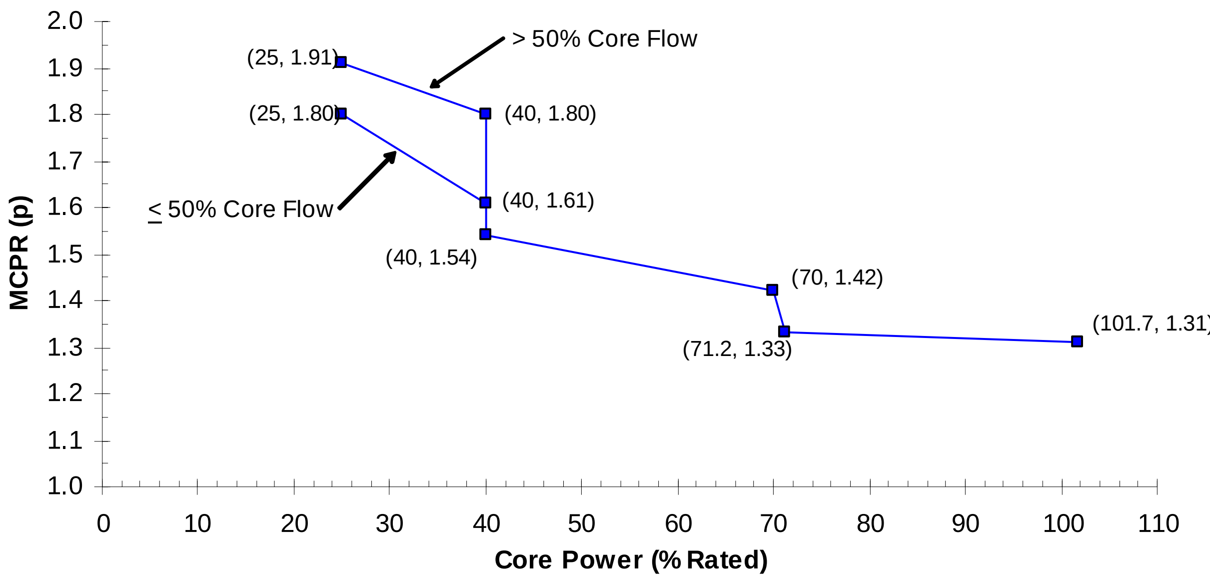

Figure 2-7b Cycle 12 Power-Dependent MCPR Limit for GE11 MOC to EOC with Normal Feedwater Temperature and EOC-RPT Inoperable

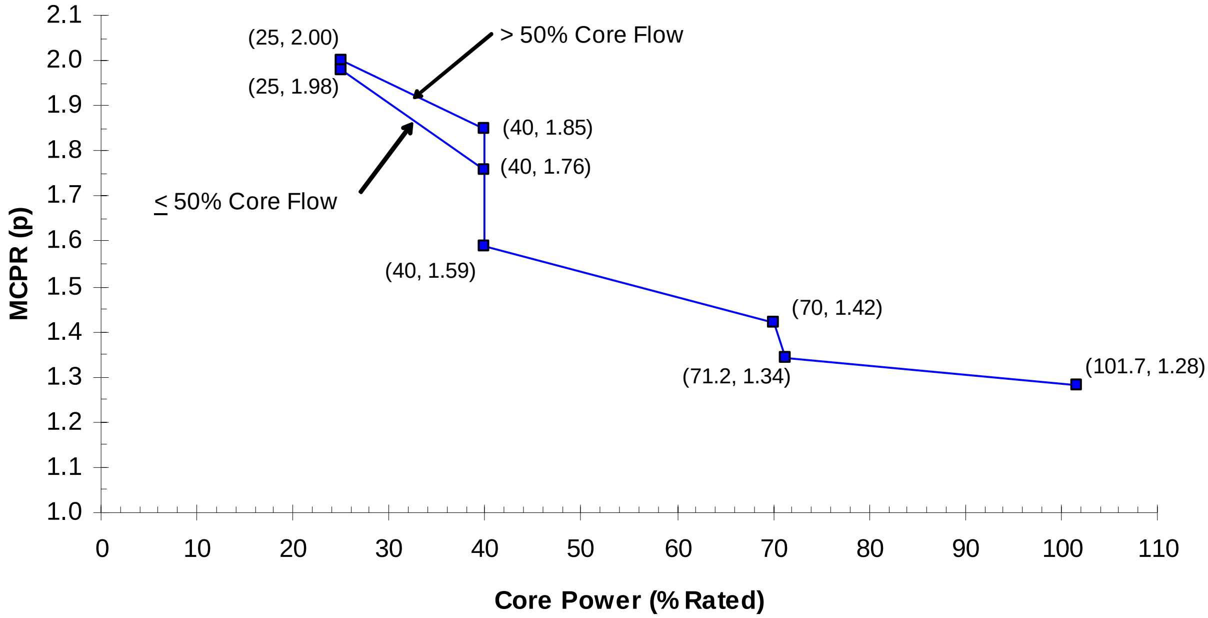

Figure 2-8a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 MOC to EOC with Reduced Feedwater Temperature and EOC-RPT Inoperable

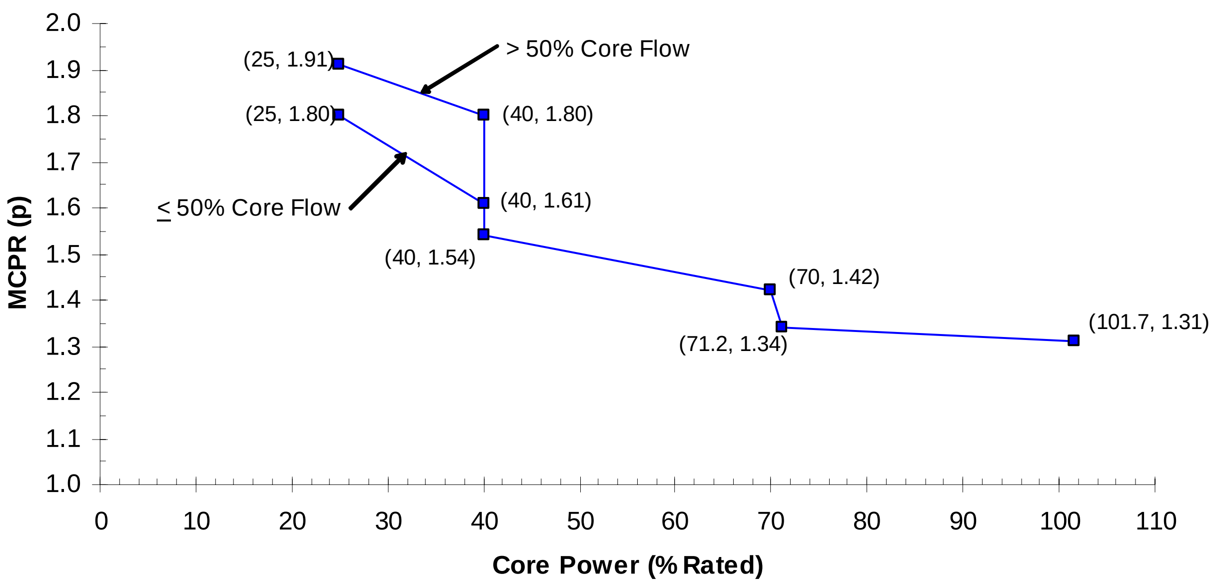

Figure 2-8b Cycle 12 Power-Dependent MCPR Limit for GE11 MOC to EOC with Reduced Feedwater Temperature and EOC-RPT Inoperable

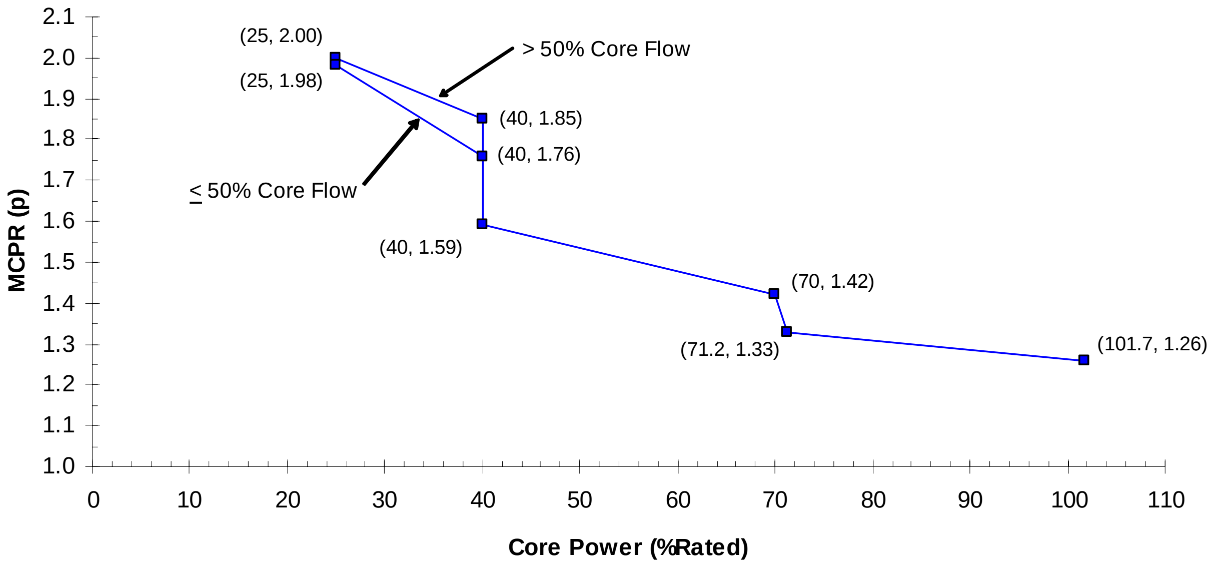

Figure 2-9a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 EOC to EEOC with Normal Feedwater Temperature

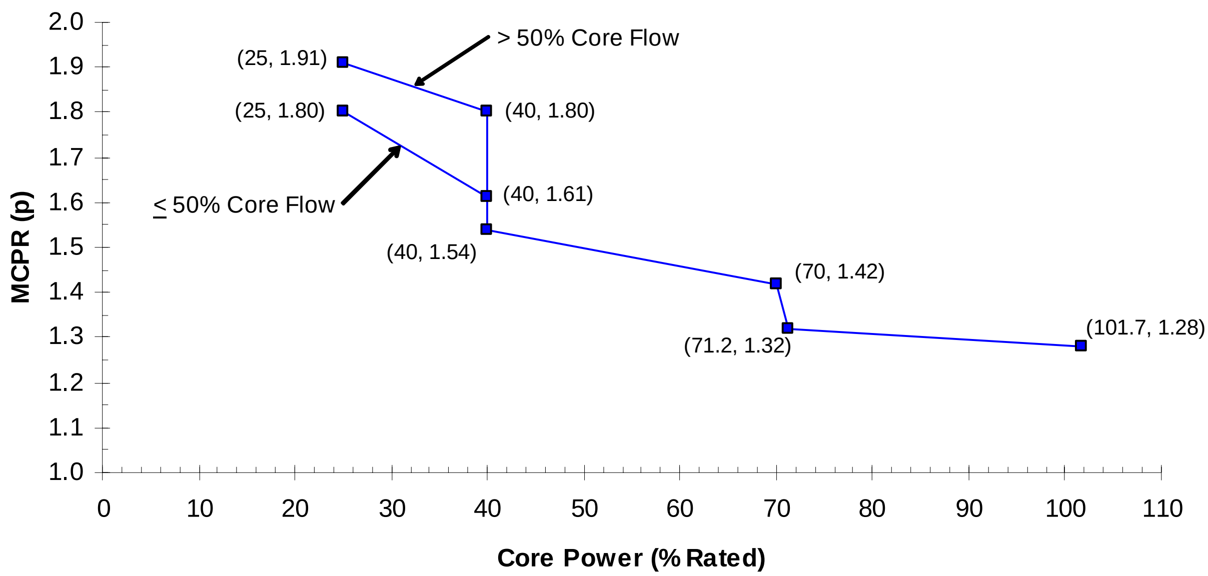

Figure 2-9b Cycle 12 Power-Dependent MCPR Limit for GE11 EOC to EEOC with Normal Feedwater Temperature

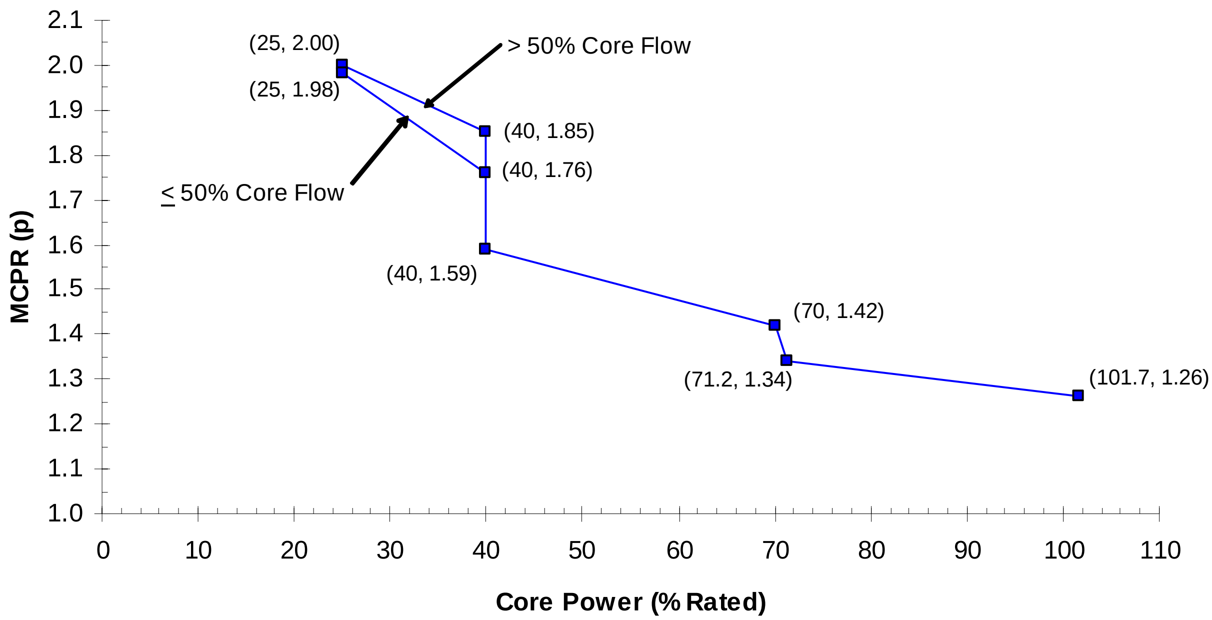

Figure 2-10a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 EOC to EEOC with Reduced Feedwater Temperature

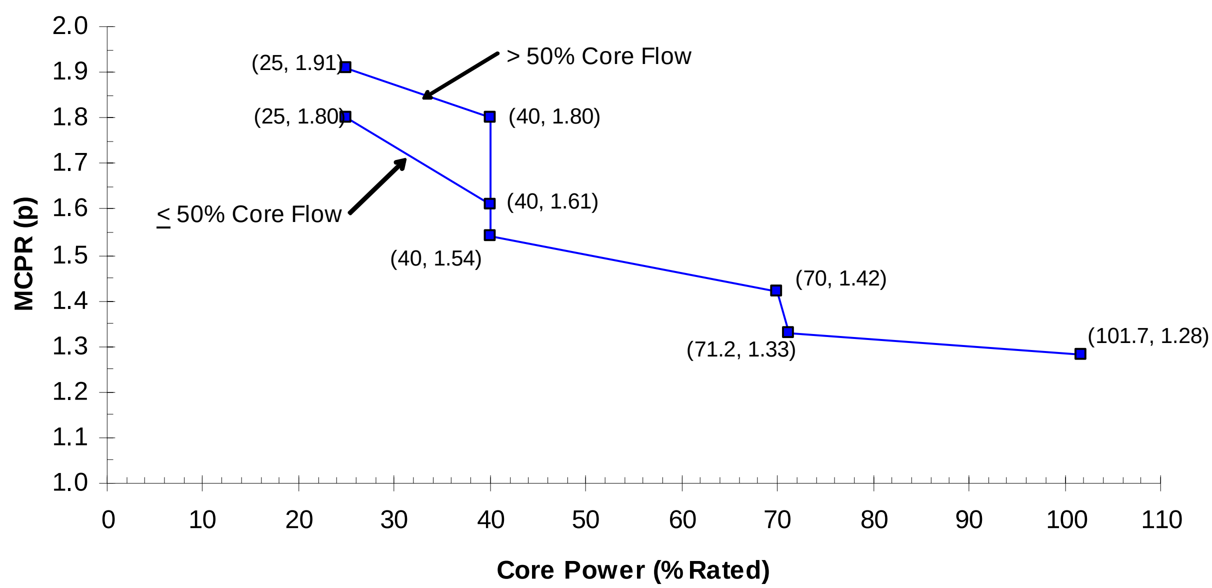

Figure 2-10b Cycle 12 Power-Dependent MCPR Limit for GE11 EOC to EEOC with Reduced Feedwater Temperature

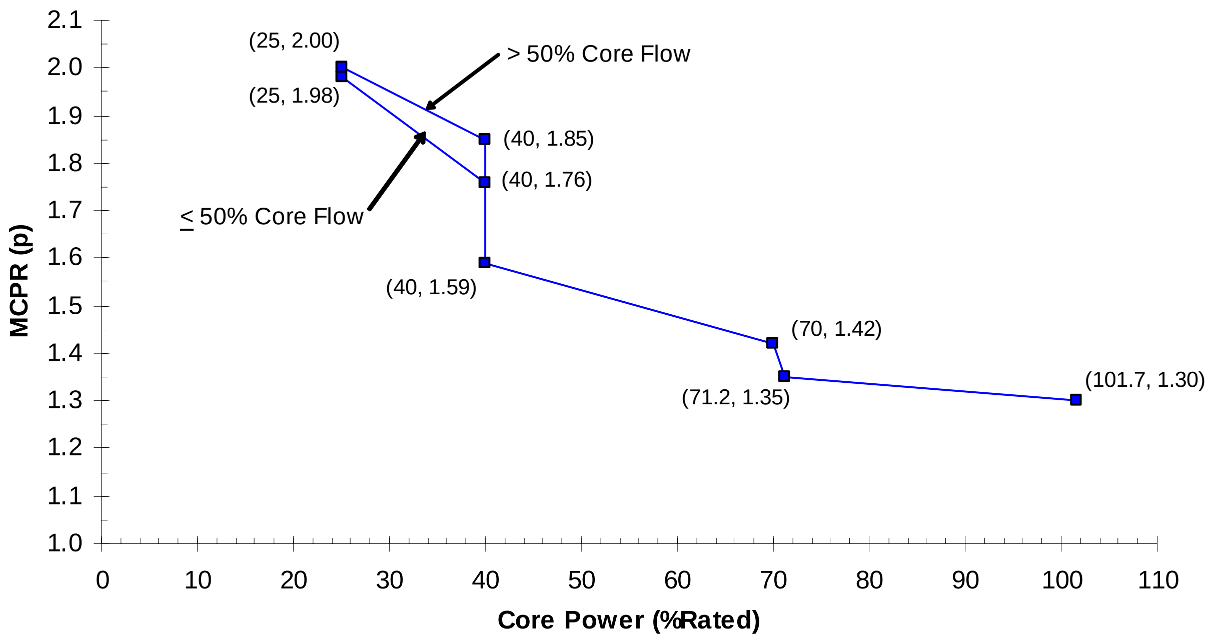

Figure 2-11a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 EOC to EEOC with Normal Feedwater Temperature and EOC-RPT Inoperable

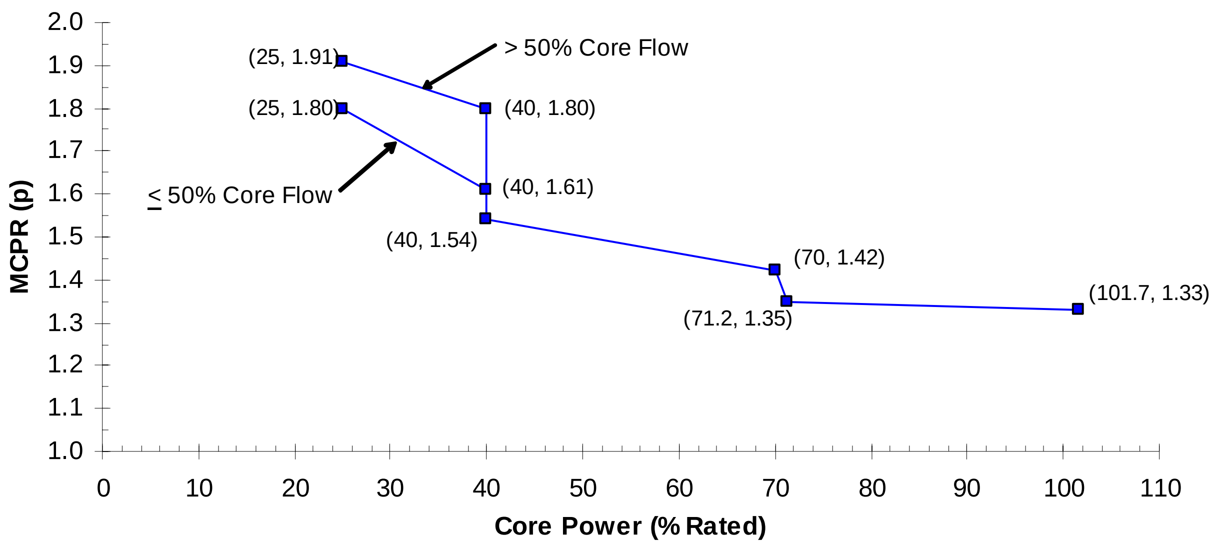

Figure 2-11b Cycle 12 Power-Dependent MCPR Limit for GE11 EOC to EEOC with Normal Feedwater Temperature and EOC-RPT Inoperable

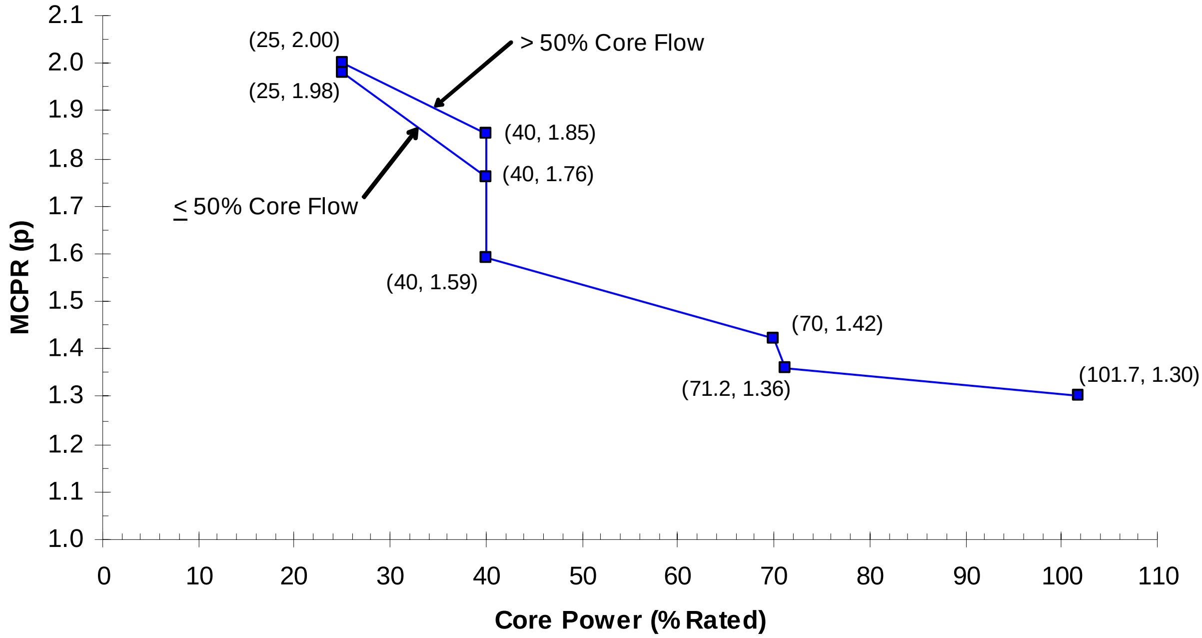

Figure 2-12a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 EOC to EEOC with Reduced Feedwater Temperature and EOC-RPT Inoperable

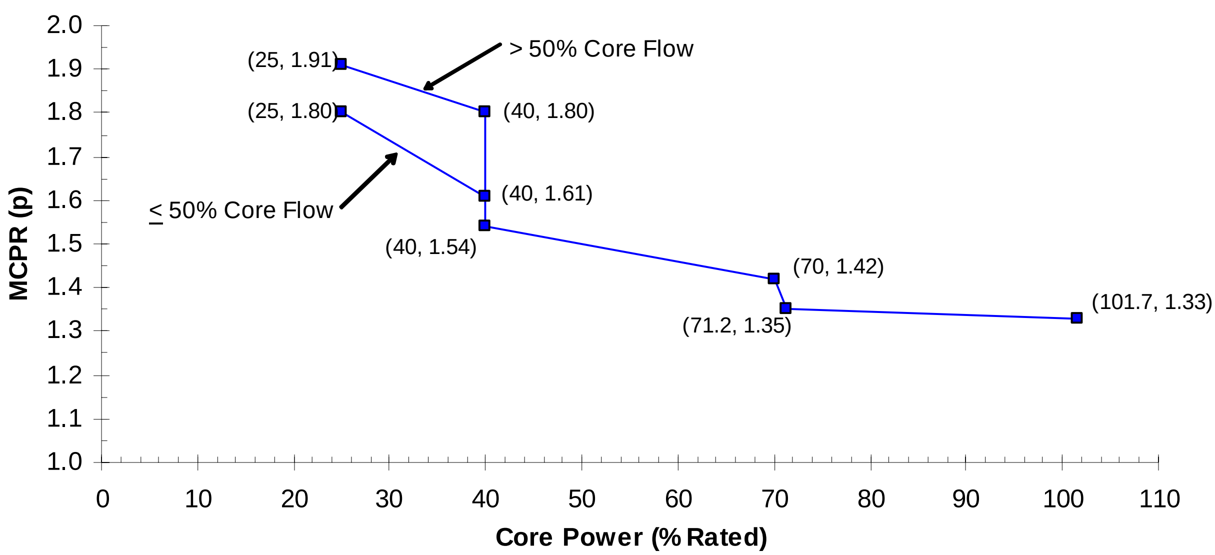

Figure 2-12b Cycle 12 Power-Dependent MCPR Limit for GE11 EOC to EEOC with Reduced Feedwater Temperature and EOC-RPT Inoperable

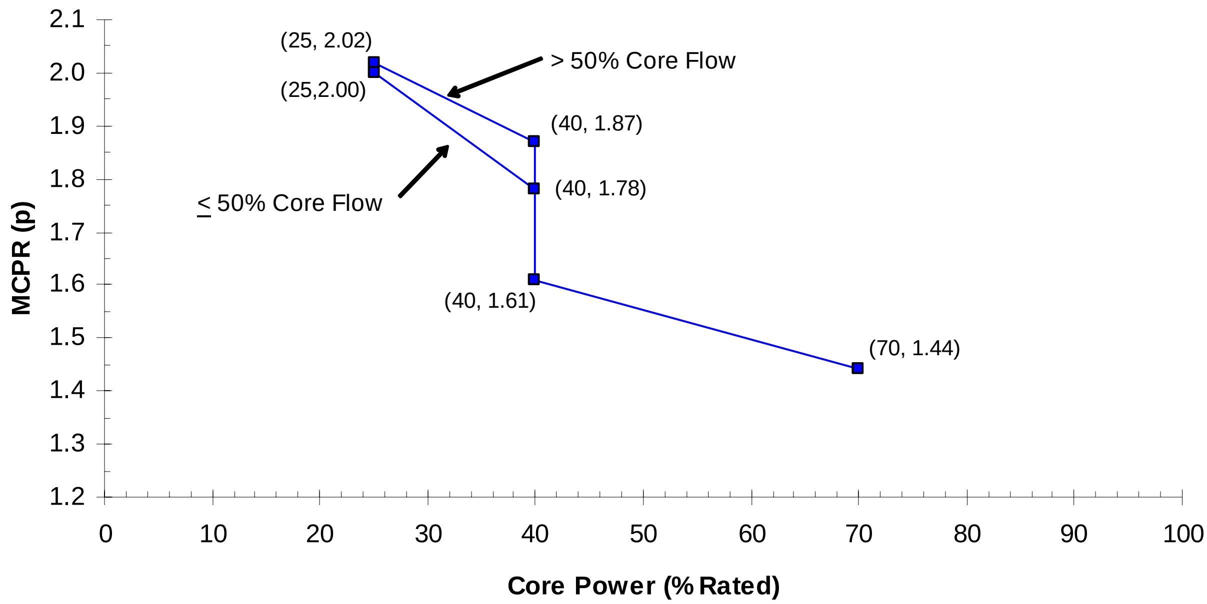

Figure 2-13a Cycle 12 Power-Dependent MCPR Limit for ATRIUM-10 BOC-EEOC Single Loop Operation with or without EOC-RPT

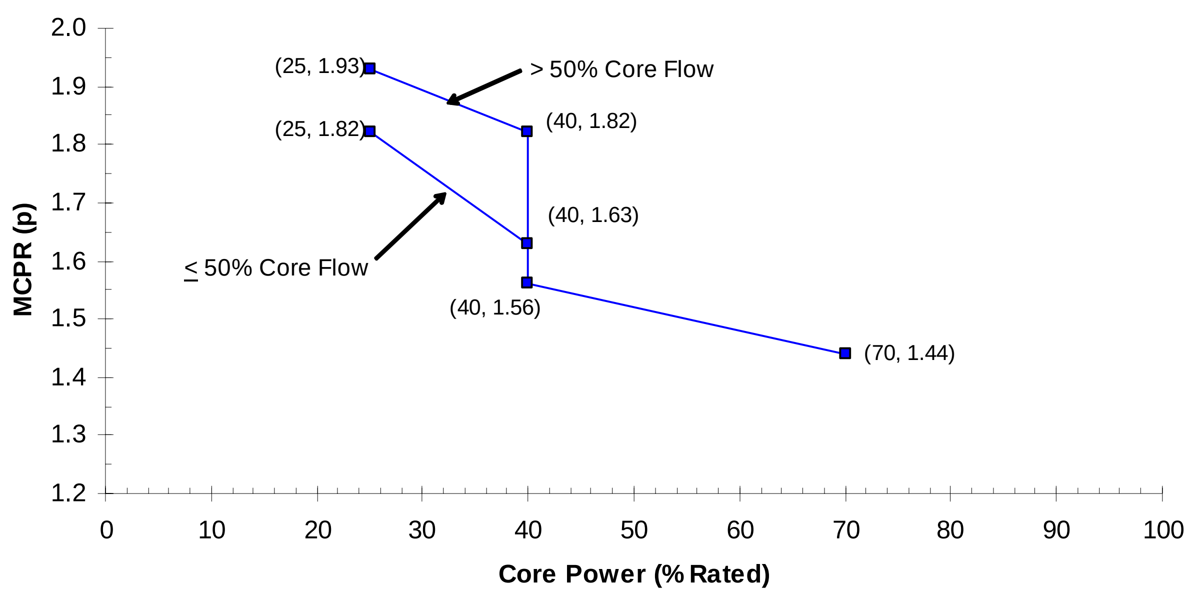

Figure 2-13b Cycle 12 Power-Dependent MCPR Limit for GE11 BOC-EEOC Single Loop Operation with or without EOC-RPT

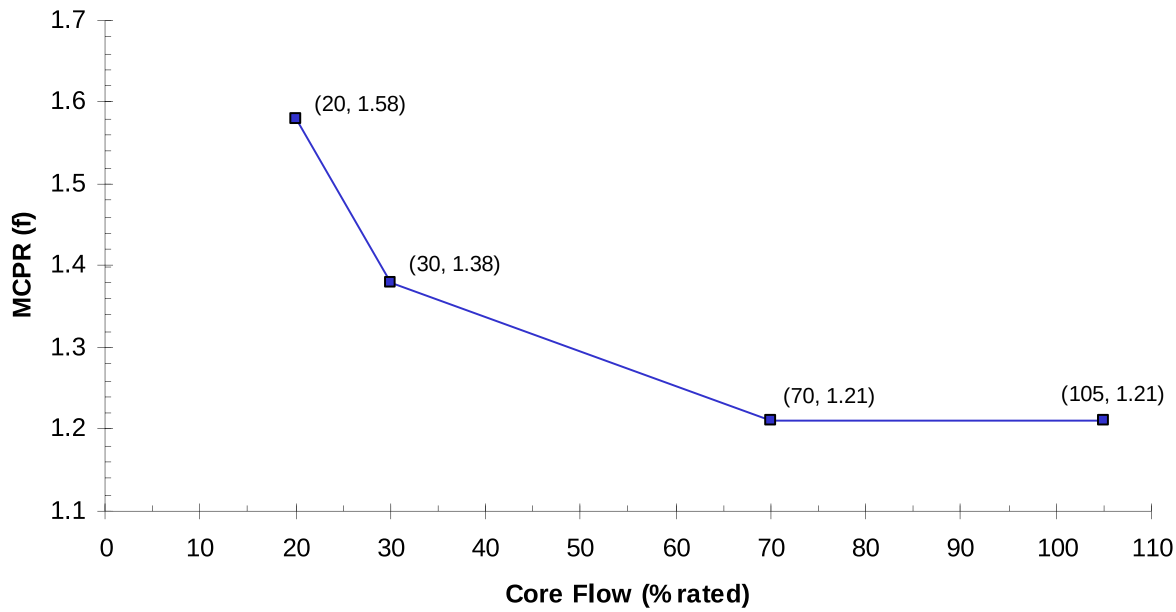

Figure 2-14 a Cycle 12 Flow-Dependent MCPR Limit for ATRIUM-10

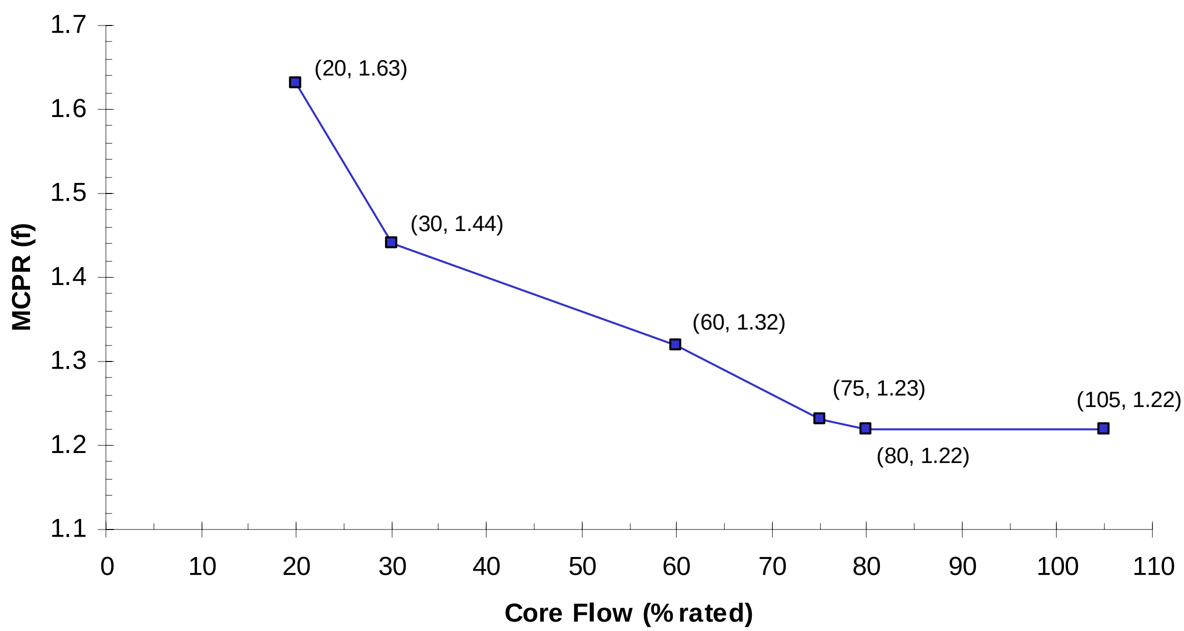

Figure 2-14b Cycle 12 Flow-Dependent MCPR Limit for GE11

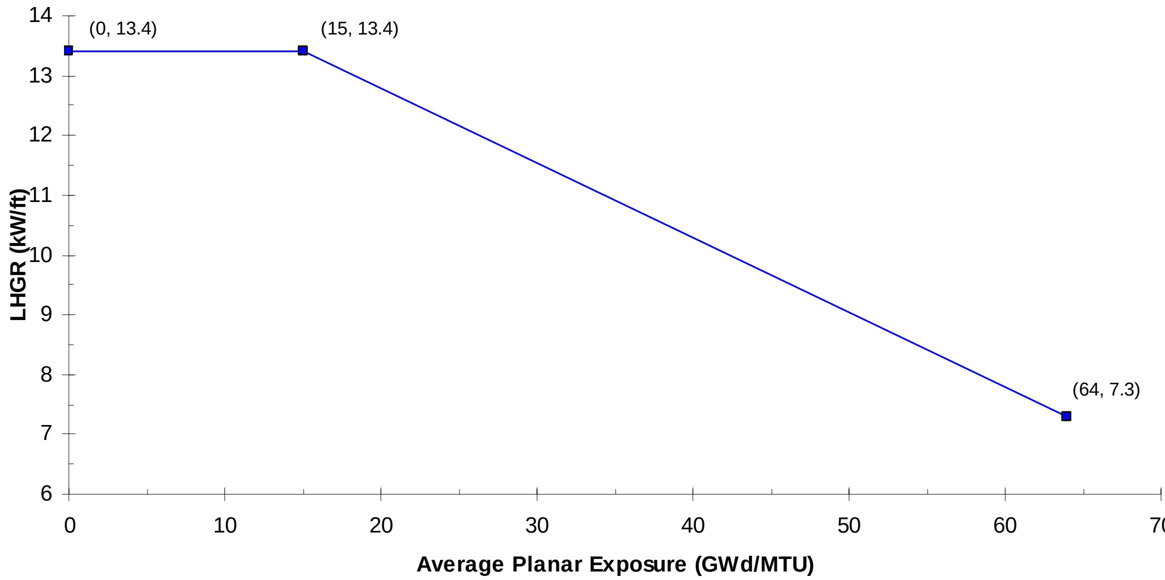

Figure 3-1
Maximum Linear Heat Generation Rate for ATRIUM-10

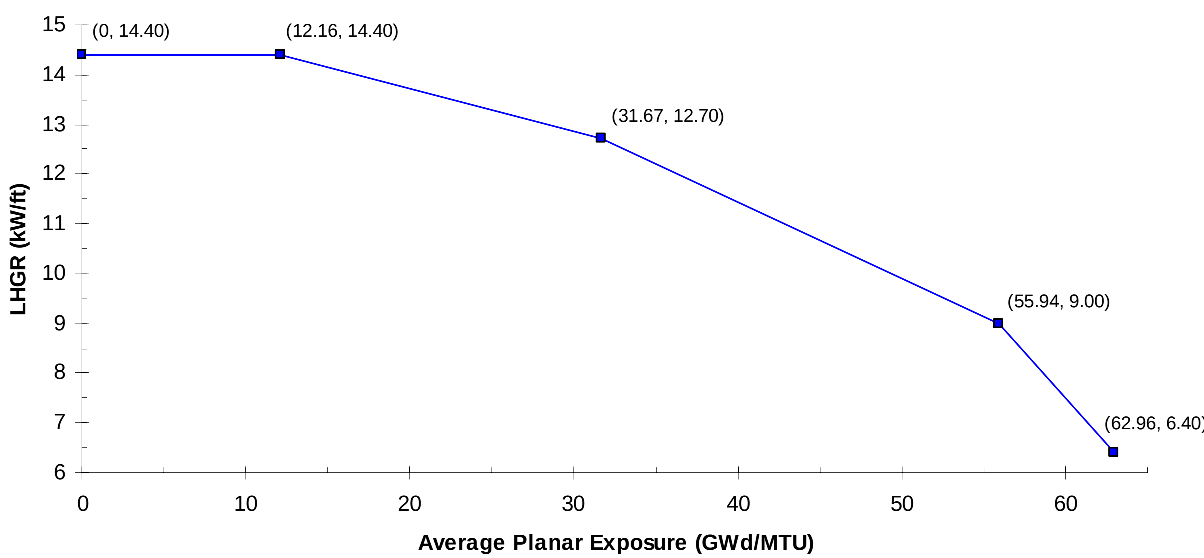

Figure 3-2a
Maximum Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB371-12GZ1-120T-146-T

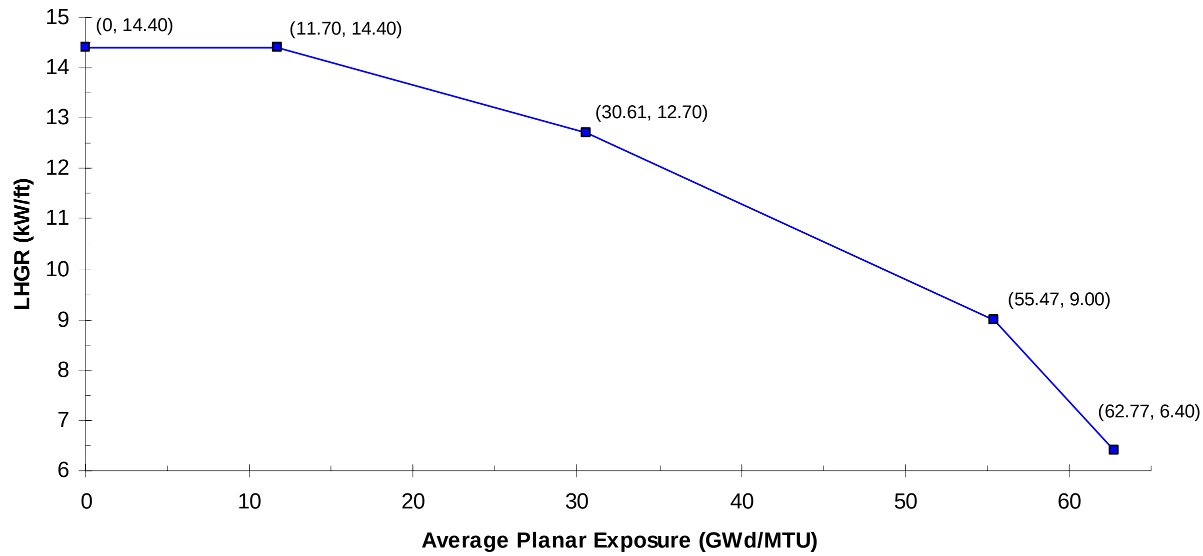

Figure 3-2b
Maximum Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB391-13GZ-120T-146-T

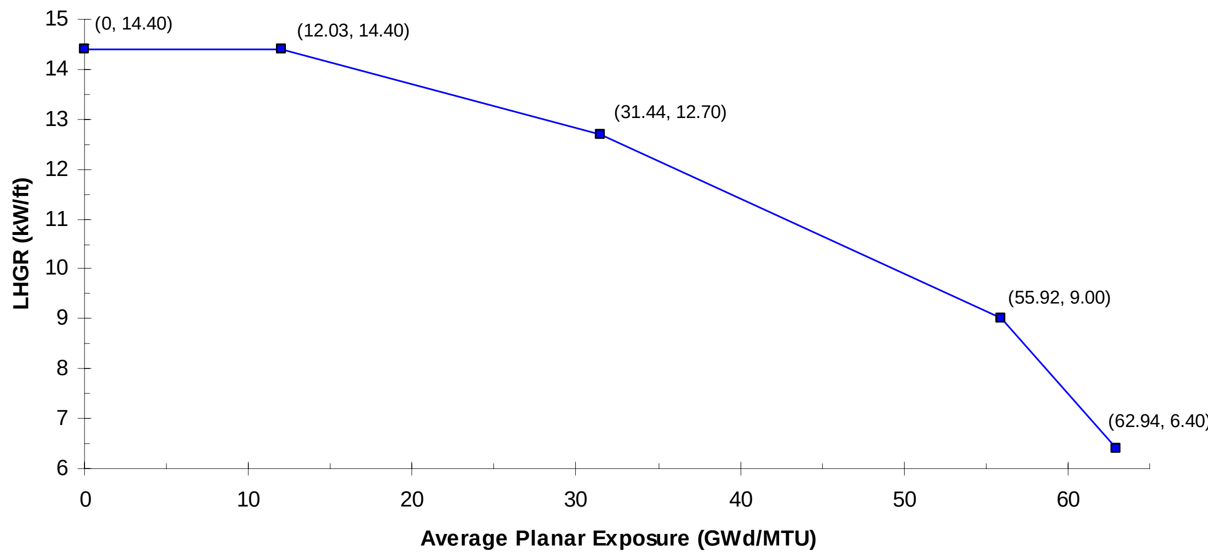

Figure 3-2c
Maximum Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB370-14GZ1-120T-146-T

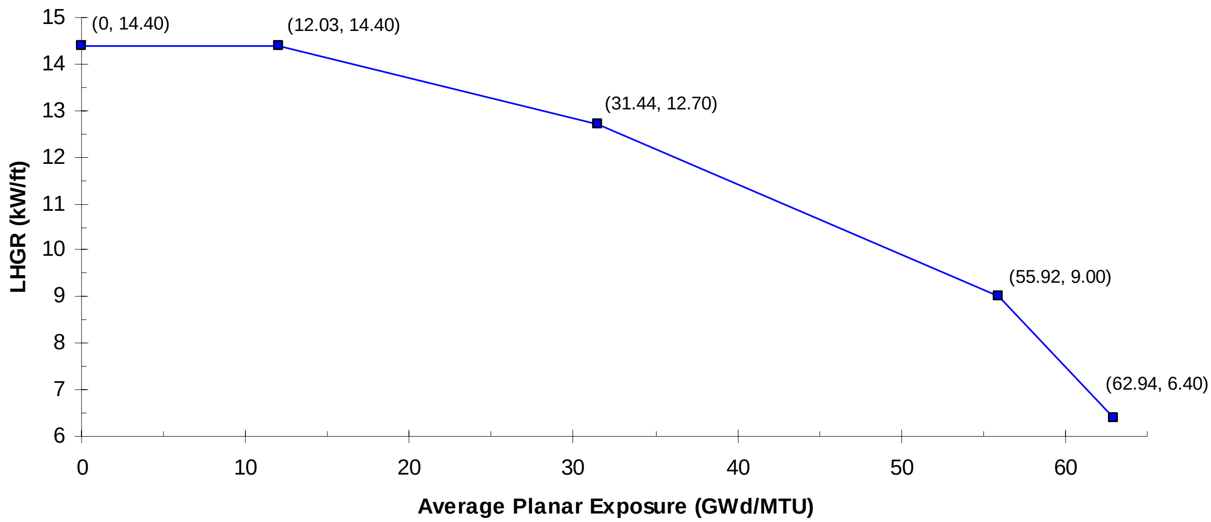

Figure 3-2d
Maximum Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB370-12GZ1-120T-146-T

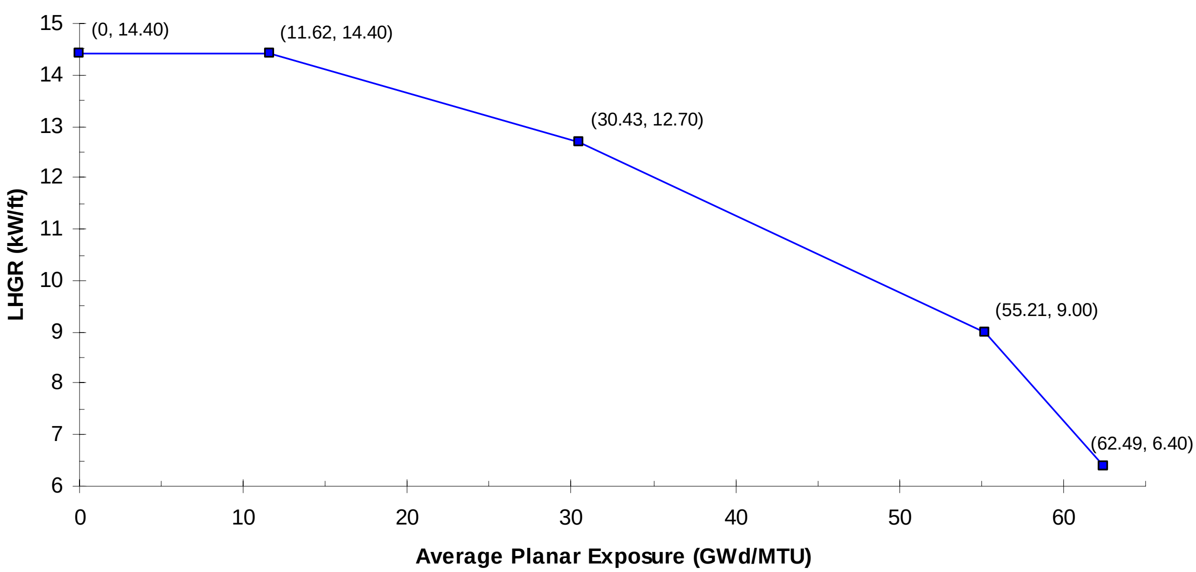

Figure 3-2e
Maximum Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB386-13GZ-120T-146-T

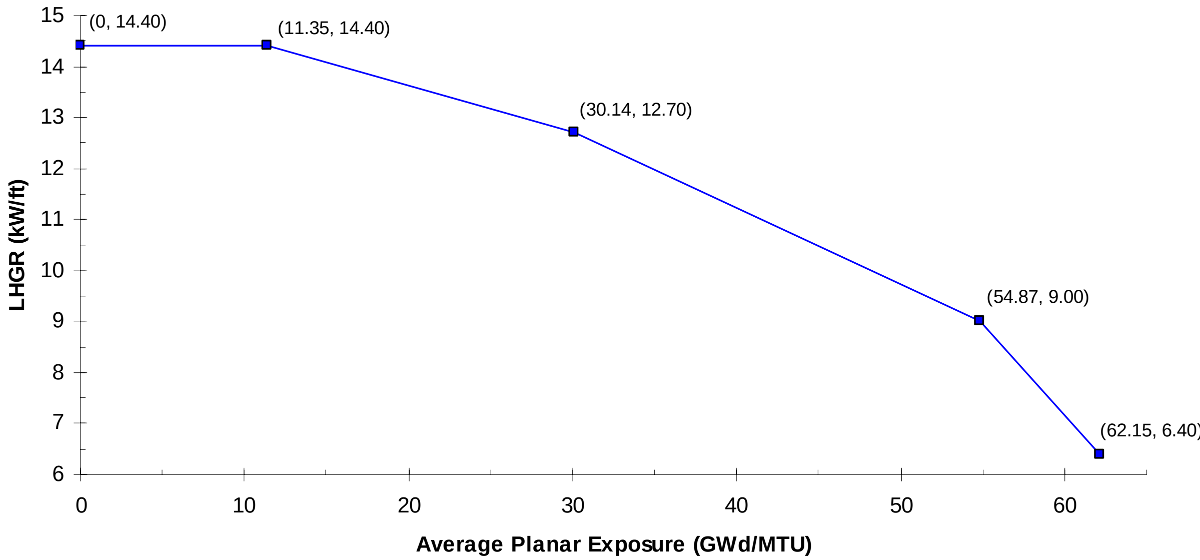

Figure 3-2f
Maximum Linear Heat Generation Rate for Limiting Enriched Lattice of GE Bundle Type GE11-P9SUB387-15GZ-120T-146-T

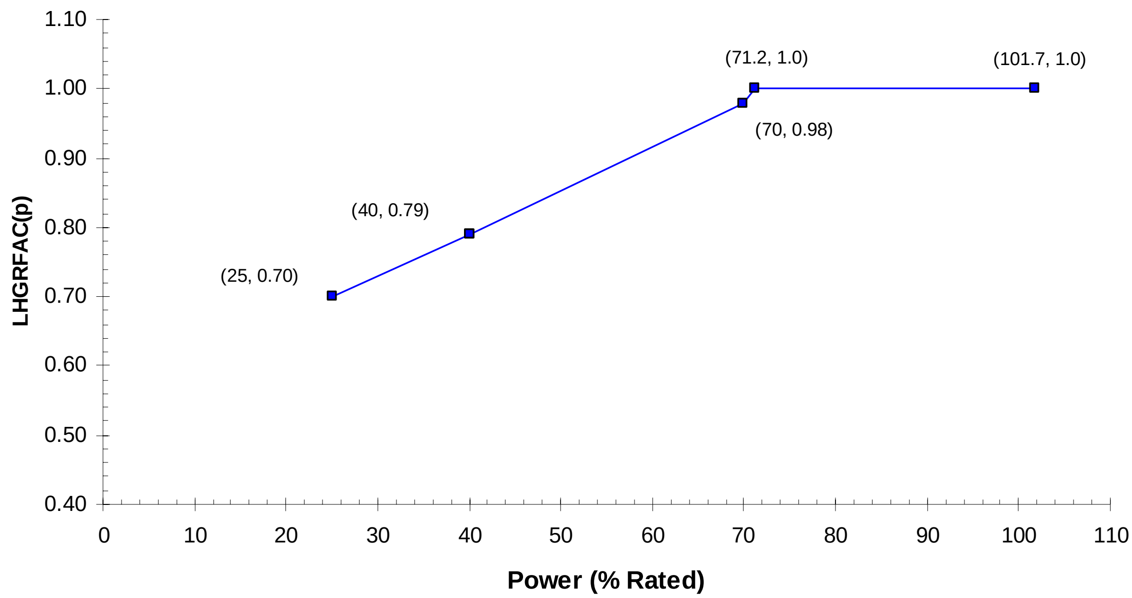

Figure 3-3
Cycle 12 Power-Dependent LHGR Factor for ATRIUM-10 BOC-EEOC

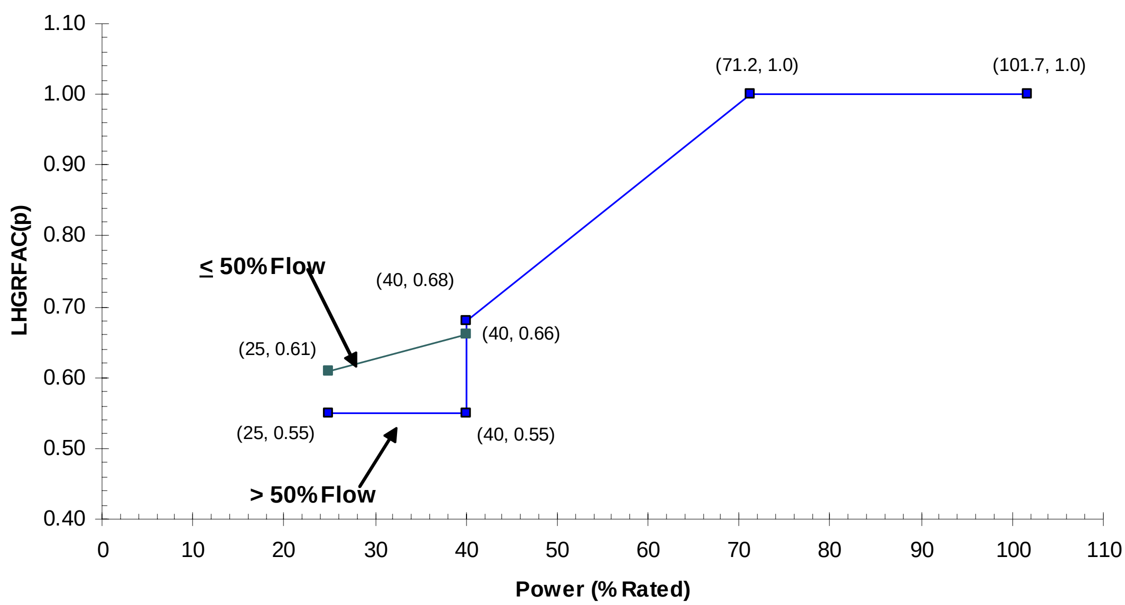

Figure 3-4
Cycle 12 Power-Dependent LHGR Factor for GE11 BOC-EEOC

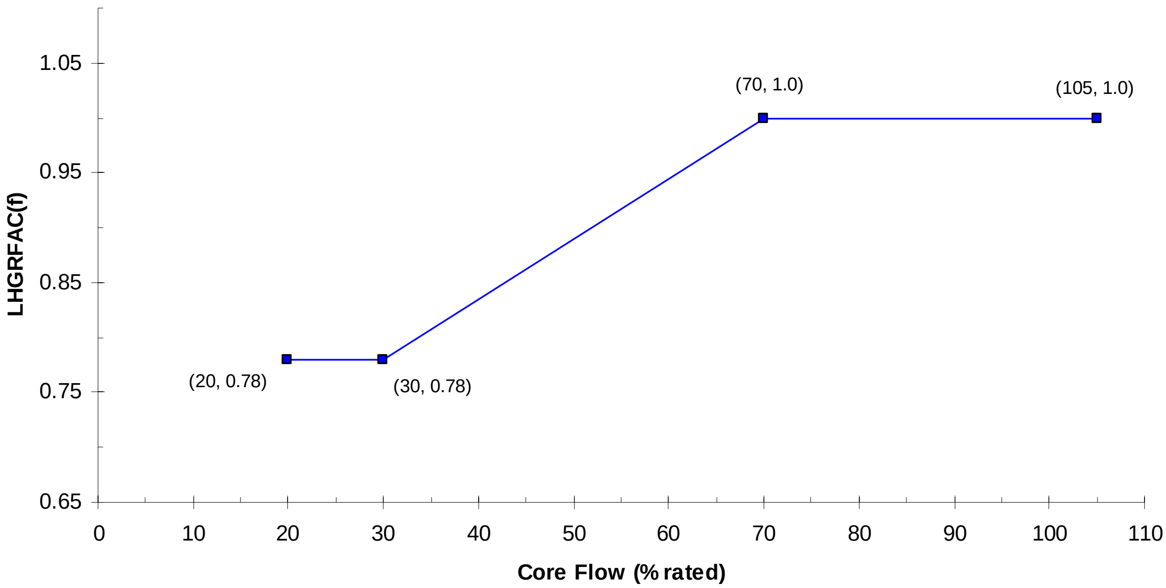

Figure 3-5
Cycle 12 Flow-Dependent LHGR Factor for ATRIUM-10

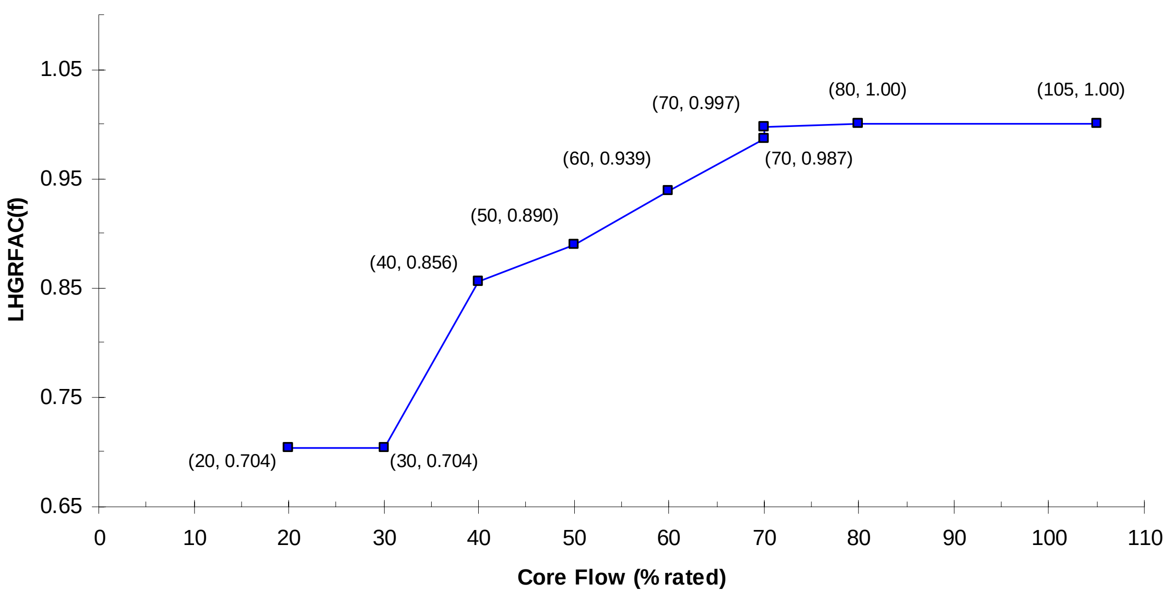

Figure 3-6
Cycle 12 Flow-Dependent LHGR Factor for GE11

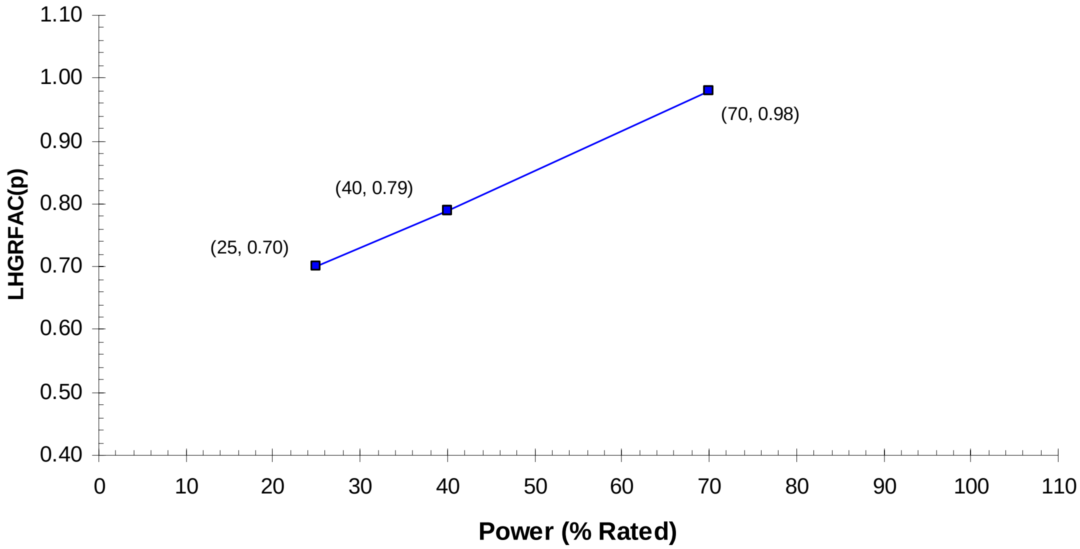

Figure 3-7
Cycle 12 Power-Dependent LHGR Factor for ATRIUM-10
BOC-EEOC Single Loop Operation

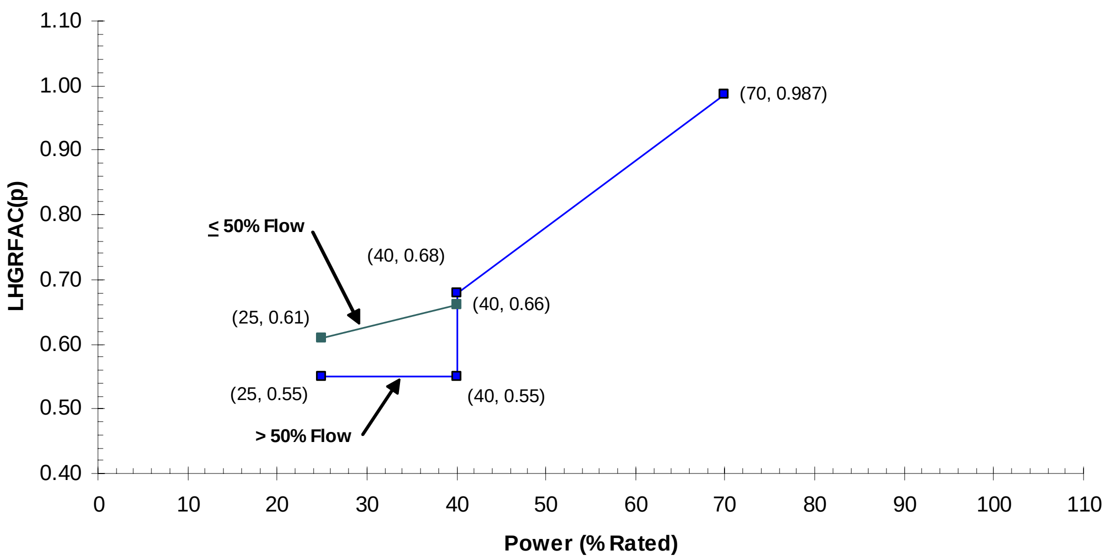

Figure 3-8
Cycle 12 Power-Dependent LHGR Factor for GE11
BOC-EEOC Single Loop Operation

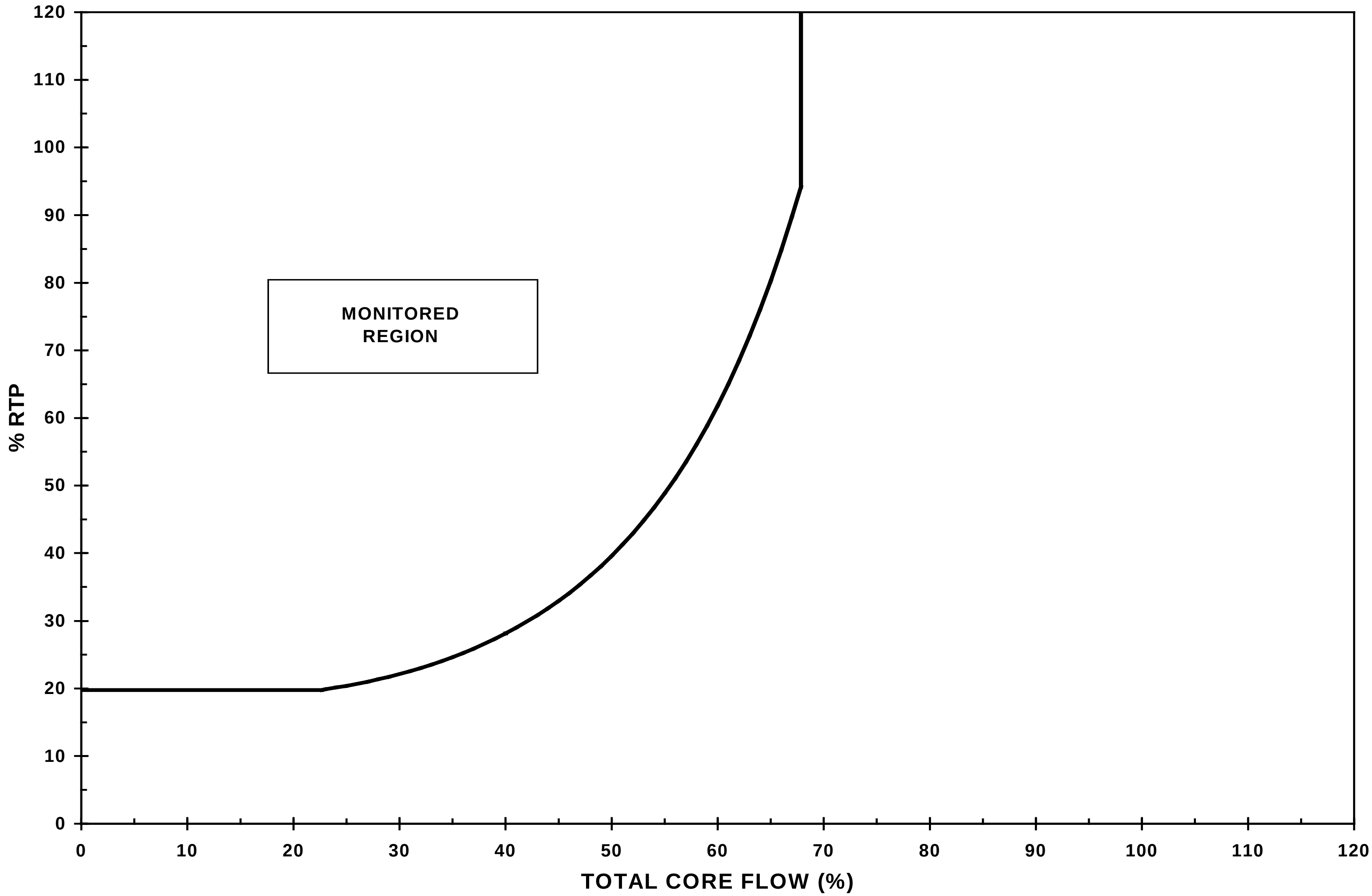

Figure 4-1 Monitored Region Boundary

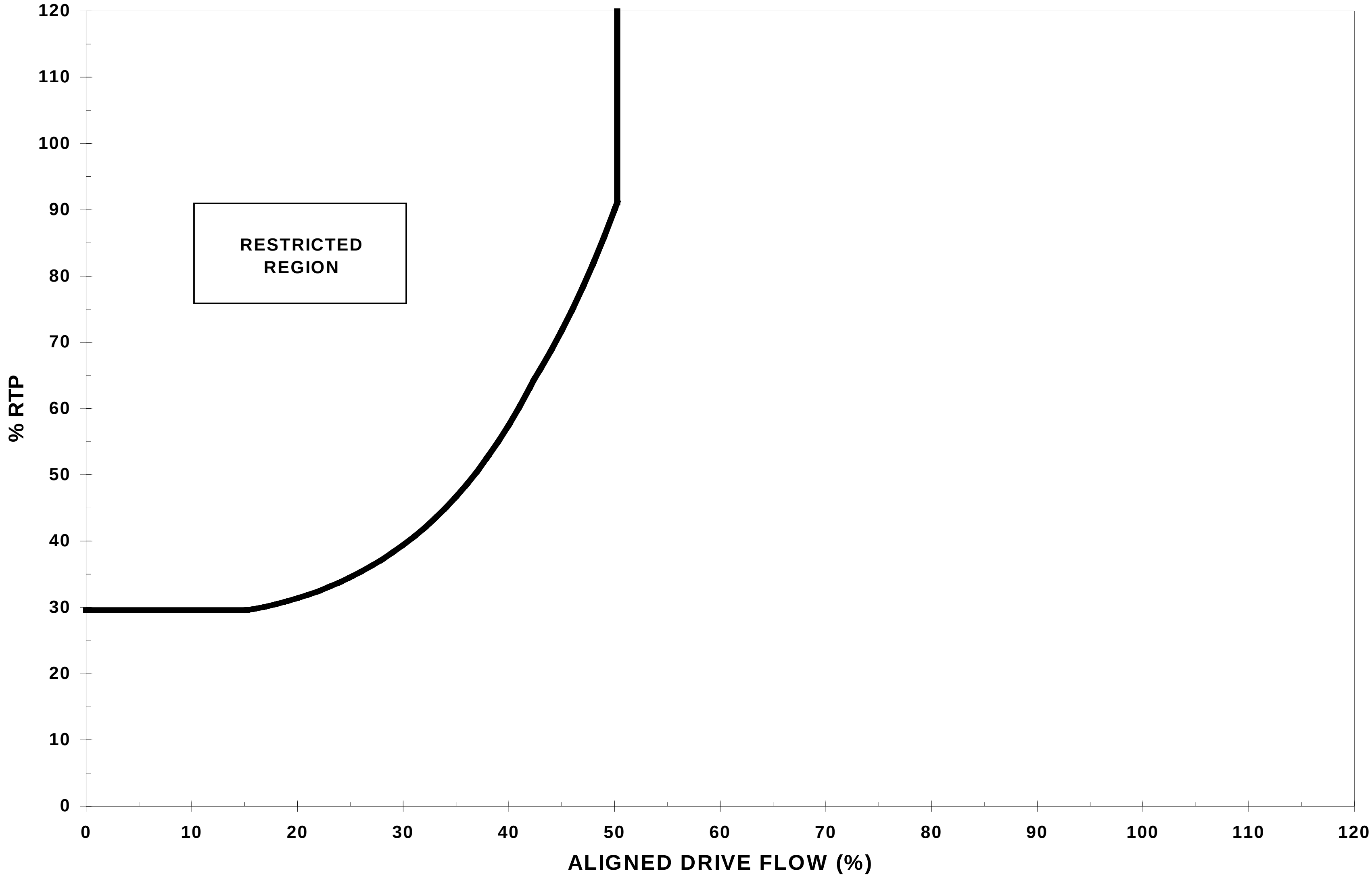

Figure 4-2 Restricted Region Boundary for Two-Loop Operation

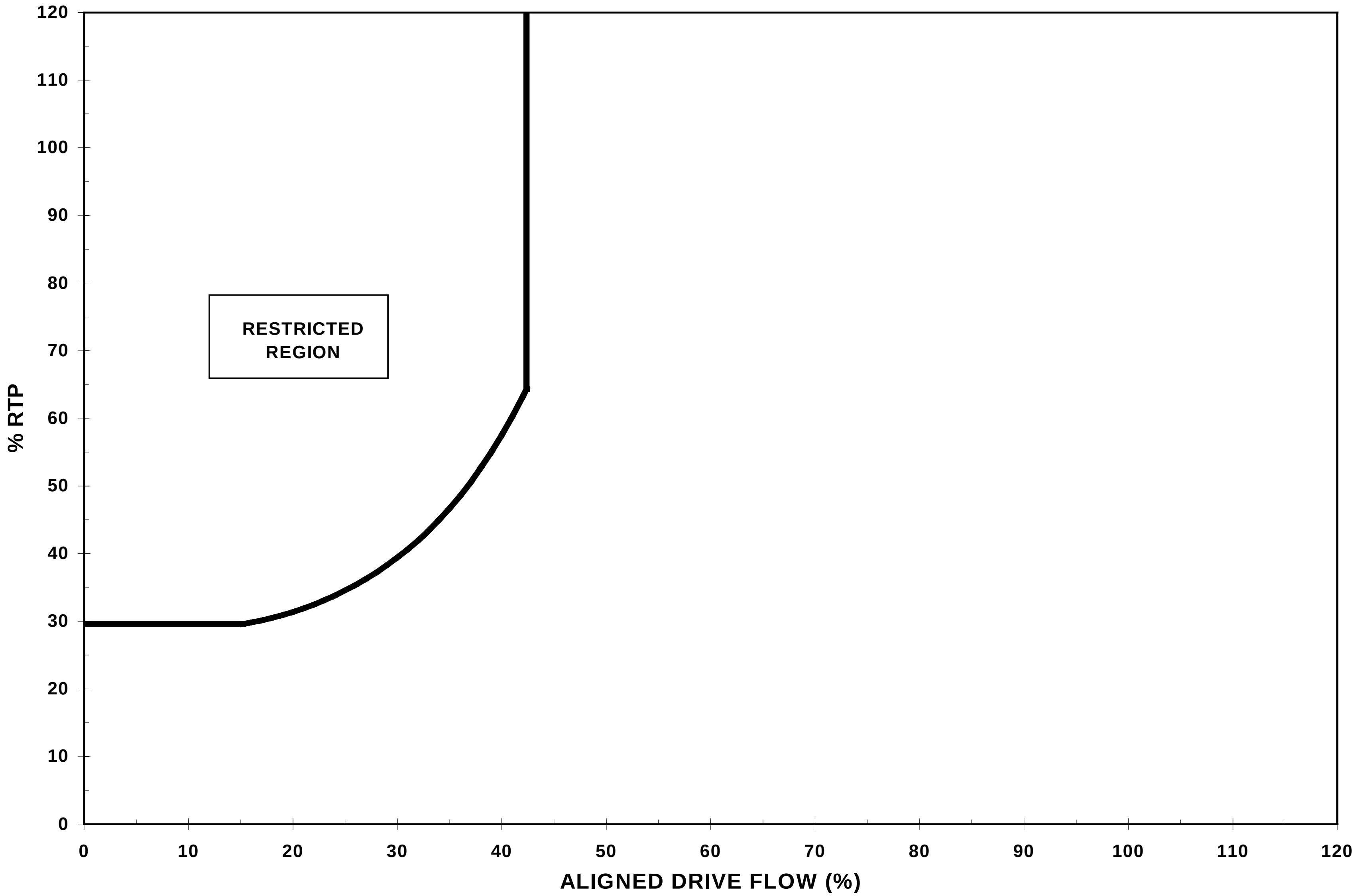

Figure 4-3 Restricted Region Boundary for Single-Loop Operation

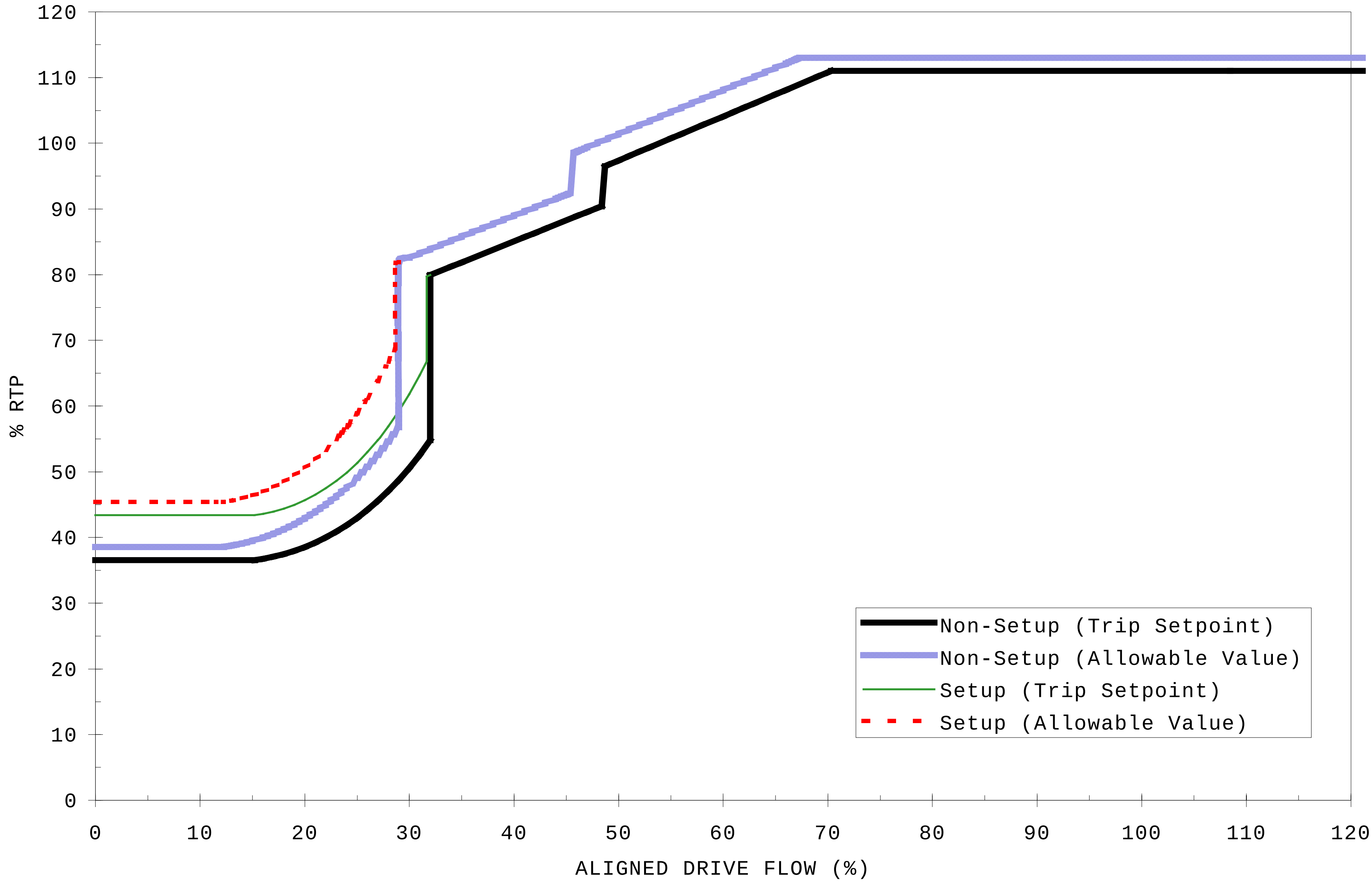

Figure 4-4 APRM Flow-Biased Simulated Thermal Power – High Scram Allowable Values for Two-Loop Operation

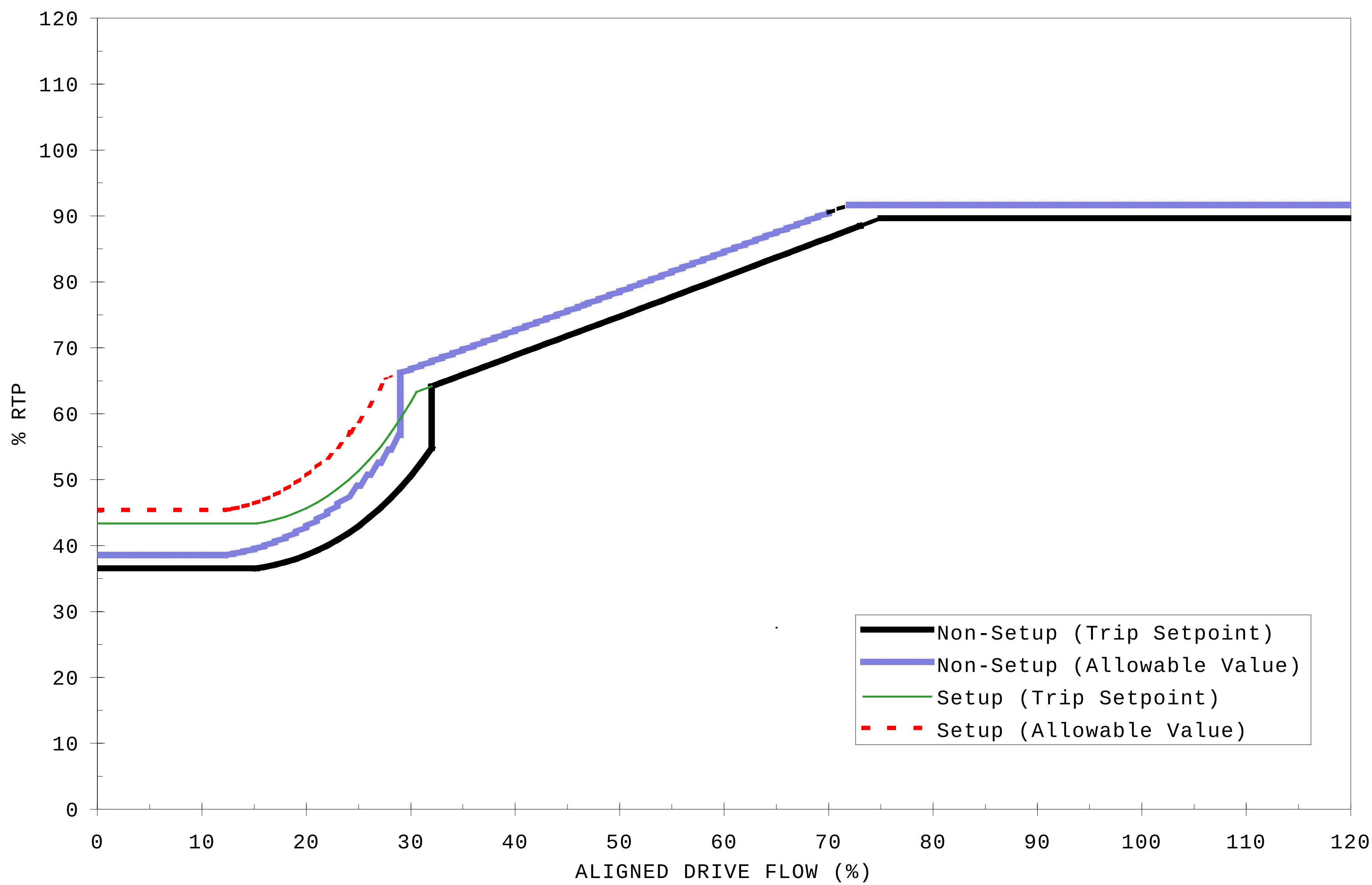

Figure 4-5 APRM Flow-Biased Simulated Thermal Power – High Scram Allowable Values for Single-Loop Operation