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GGNS TS 5.6.5

GNRO2022-00020

August 17, 2022

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

SUBJECT: Grand Gulf Nuclear Station (GGNS) Core Operating Limits Report (COLR) Cycle 24, Revision 1

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

In accordance with 10 CFR 50.36 and GGNS Technical Specification Section 5.6.5.d, GGNS is required to provide to the Nuclear Regulatory Commission any updates to the COLR. Revision 1 of the GGNS Cycle 24 COLR is attached to this letter.

There are no commitments contained in this submittal. If you have any questions or need additional information, please contact Jeff Hardy at 802-380-5124.

Sincerely,

JH/ram

Attachment: Core Operating Limits Report (COLR) Cycle 24, Revision 1

cc: NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Grand Gulf Nuclear Station

Core Operating Limits Report

Cycle 24

Revision 1

CORE OPERATING LIMITS REPORT

REASON FOR REVISION

Revision 0:
The Cycle 24 core operating limits are updated to provide cycle-specific MCPR and LHGRFAC multiplier values, independent of fuel type. Figure 1-1 and 1-2 provides the APLHGR limits for the GNF2 and GNF3 fuel types, respectively. Figures 2-1 through 2-5 are updated with new MCPR limits and Figures 3-1 through 3-4 are updated with new LHGRFAC limits. No other core operating limits are changed. These limits are based on a core power of 4408 MWt.

Revision 1:
The Cycle 24 core operating limit reports is updated due to the F024-02 core shuffle to replace two failed fuel bundles. This revision is to update the GESTAR analysis reference which concludes that the Cycle 24 SRLR is still applicable to the core. There are no changes to the Cycle 24 limits in this revision.

CORE OPERATING LIMITS REPORT

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CORE OPERATING LIMITS REPORT

1.0 PURPOSE

The COLR is controlled as a License Basis Document and revised accordingly for each fuel cycle or remaining portion of a fuel cycle. Any revisions to the COLR must be submitted to the NRC for information as required by Tech Spec 5.6.5 and tracked by Licensing Commitment 29132. This COLR reports the Cycle 24 core operating limits and stability setpoint confirmation and regions.

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 24 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 DSS-CD stability setpoint confirmation and regions.

CORE OPERATING LIMITS REPORT

3.0 REFERENCES

This section contains the cycle-specific references used in the safety analysis of Grand Gulf Cycle 24.

Methodology references are documented in Technical Specification 5.6.5b

3.1 Current Cycle References

3.1.1 ECH-NE-22-00002 Revision 0, Supplemental Reload Licensing Report for Grand Gulf-1 Reload 23 Cycle 24, March 2022.

3.1.2 ECH-NE-10-00021 Revision 5, GNF2 Fuel Design Cycle-Independent Analyses for Entergy Grand Gulf Nuclear Station, February 2020.

3.1.3 ECH-NE-22-00001 Revision 0, Fuel Bundle Information Report for Grand Gulf-1 Reload 23 Cycle 24, November 2019.

3.1.4 NEDC-32910P, Revision 1, Grand Gulf Nuclear Station SAFER/GESTR-LOCA Accident Analysis With Relaxed ECCS Parameters, October 1999 (GEXI-1999-00174).

3.1.5 GGNS-NE-12-00022 Revision 0, Grand Gulf Nuclear Station MELLLA+ Task T0407, ECCS-LOCA Performance, September 2012.

3.1.6 GGNS-SA-09-00002 Revision 1, Grand Gulf Nuclear Station GNF2 ECCS-LOCA Evaluation, December 2009.

3.1.7 NEDC-33173P-A, Revision 5, Applicability of GE Methods to Expanded Operating Domains (with Supplements 5P-A Rev. 1, and 6P-A Rev. 1), October 2019.

3.1.8 NEDC-33006P-A, Revision 3, GE BWR Maximum Extended Load Line Limit Analysis Plus, June 2009.

3.1.9 ECH-NE-22-00010, Revision 1, GGNS Cycle 24 GESTAR Assessment, July 2022.

3.1.10 ECH-NE-20-00006 Revision 0, GNF3 Fuel Design Cycle-Independent Analyses for Grand Gulf Nuclear Station, February 2020.

3.1.11 GGNS-SA-19-00001 Revision 0 Grand Gulf Nuclear Station GNF3 ECCS-LOCA Evaluation Revision 1, October 2019.

3.1.12 GEH-GGNS-AEP-632, GGNS MELLLA+ Final DSS-CD Settings Report, October 23, 2013.

3.1.13 NEDE-24011-P-A-31, General Electric Standard Application for Reactor Fuel (GESTAR-II), November 2020, (KGO-ENO-GEN-21-039).

3.1.14 ECH-NE-21-00025, Grand Gulf Nuclear Station TRACG Implementation for Reload Transient Analysis (T1309), December 2020.

3.1.15 NEDO-33612-A, Revision 0, Safety Analysis Report for GGNS Maximum Extended Load Line Limit Analysis Plus, September 2013.

3.1.16 NEDC-33292P, Revision 3, GEXL17 Correlation for GNF2 Fuel, June 2009 (RA-ENO-GEN-10-034).

3.1.17 NEDC-33880P, Revision 1, GEXL21 Correlation for GNF3 Fuel, November 2017 (KGO-ENO-GEN-20-031).

3.1.18 NEDC-33840P-A, Revision 1, The PRIME Model for Transient Analysis of Fuel Rod Thermal - Mechanical Performance, August 2017.

3.1.19 GGNS-NE-10-00076, Revision 0 (GEH 0000-0121-1122-R0), GGNS EPU Option B Scram Times, September 2010.

3.1.20 NEDC-33270P, Revision 9, GNF2 Advantage Generic Compliance with NEDE-24011-P-A (GESTAR II), Dec 2017. (KGO-ENO-JB1-18-068).

3.1.21 NEDC-33879P, Revision 4, GNF3 Generic Compliance with NEDE-24011-P-A (GESTAR II), August 2020.

3.1.22 GGNS-SA-21-00002, Revision 0 (GEH 0000-0158-7807-R1), Grand Gulf Nuclear Station PRNM System DSS-CD Settings, April 2020

3.1.23 SC 21-04 Revision 1, Fuel Support Side Entry Orifice Meta-Stable Flow for 2 Beam Locations in the BWR/6 Reactors, June 2021.

3.1.24 GNF006N2281 Revision 0, Nuclear Design Report for Grand Gulf Nuclear Station Cycle 24, August 2021.

CORE OPERATING LIMITS REPORT

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 at the specified height.

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 at the specified height.

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 - cycle specific SLMCPR, known as $MCPR_{99.9\%}$, is the minimum value of the CPR at which the fuel could be operated to ensure that 99.9% percent of the fuel in the core is not susceptible to the boiling transition.

4.8 Oscillation Power Range Monitor (OPRM) - Provides automatic detection and suppression of reactor core thermal-hydraulic instabilities through monitoring neutron flux changes.

4.9 Backup Stability Protection (BSP) Boundary - Defines the operation domain where potential instability events can be effectively addressed by specific operator action. Region of the power and flow operating domain that is not expected to be susceptible to instability events associated with a high initial growth rate.

4.10 Backup Stability Protection (BSP) Scram Region - The area of the core power and flow operating domain where the reactor is susceptible to reactor instabilities under conditions exceeding the licensing basis of the current reactor system. An immediate manual scram is required upon entry.

4.11 Backup Stability Protection (BSP) Controlled Entry Region - The area of the core power and flow operating domain where the reactor is susceptible to reactor instabilities. Compliance with at least one alternate stability control is required upon entry.

4.12 Automated Backup Stability Protection (ABSP) Scram Region - An automated reactor scram region that bounds the BSP Scram Region and is initiated by the APRM flow-biased scram setpoint upon entry.

4.13 End of Rated (EOR) - The Cycle exposure corresponding to all rods out, 100% power, 100% flow, and normal feedwater temperature [3.1.1].

4.14 Middle of Cycle (MOC) - The Cycle 24 MOC Core Average Exposure (CAE) is MOC = EOR-3,996 MWd/ST [3.1.1].

4.15 End of Cycle (EOC) - The Cycle 24 EOC CAE is 32,487 MWd/ST [3.1.24].

4.16 Maximum Extended Load Line Limit Analysis Plus (MELLLA+) - The GGNS MELLLA+ operating domain is depicted in Figure 4.

4.17 Maximum Number of OPRM Cells Along an Instability Symmetry Axis (M_{AX}) - An OPRM configuration constant representing maximum number of OPRM cells along an instability symmetry axis. It is used to calculate the number of

unresponsive OPRM cells. Per [3.1.12] the GGNS specific value is five (M_{AX} = 5).

4.18 Application Conditions - The combination of equipment out of service conditions for which LHGRFAC and MCPR limits are determined [3.1.1]. The Application Conditions are specified in Table 6.

4.19 $MCPR_{95/95}$ Safety Limit - Cycle-independent Technical Specification (TS) 2.1.1 SLMCPR, ensures there is a 95 percent probability at a 95 percent confidence level that no fuel rods will be susceptible to transition boiling.

5.0 GENERAL REQUIREMENTS

5.1 Average Planar Linear Heat Generation Rates

Consistent with Technical Specification 3.2.1, all APLHGRs shall not exceed the fuel type and exposure-dependent limits reported in Figures 1-1 and 1-2 [3.1.1].

5.2 Minimum Critical Power Ratio

For Cycle 24, the cycle-specific MCPR Safety Limit ($MCPR_{99.9\%}$), is 1.12 for Two Loop Operation (TLO), and 1.12 for Single Loop Operation (SLO) [3.1.1].

GEH Safety Communication 21-04 [3.1.23] identifies a metastable flow condition that may exist in a BWR/6 in core locations fed by a side entry orifice adjacent to two core support cross beams. The vendor has been unable to determine the frequency of occurrence of this flow condition, if any. This flow condition results in a higher loss coefficient and lower CPR (applied as higher MCPR limits). To be conservative, it is assumed this condition always exists, so an MCPR penalty is always applied. All MCPR limits in the COLR Figures apply the penalty recommended by SC 21-04 Rev. 1 [3.1.23].

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, exposure, and scram speed [3.1.1, 3.1.2, 3.1.10, 3.1.19]. For operation at powers ≥35.4%, the power-dependent MCPR shall be determined based on scram time surveillance data as follows. [3.1.19]

1) If the average scram time (τ_{AVE}) satisfies the following:

$$\tau_{AVE} \leq \tau_B ,$$

then the power dependent MCPR shall be equal to or greater than the Option B limits reported in Figure(s) 2 as a function of exposure.

2) If the average scram time

$$\tau_{AVE} > \tau_B \text{ and } \tau \leq 0.2 ,$$

then the power-dependent MCPR shall be equal to or greater than the Tau = 0.2 limits reported in Figure(s) 2 as a function of exposure,

3) If the average scram time

$$\tau_{AVE} > \tau_B \text{ and } \tau > 0.2 ,$$

then the power-dependent MCPR shall be equal to or greater than the Option A limits reported in Figure(s) 2 as a function of exposure.

In the above equations:

τ_{AVE} = average scram time to the 20% insertion position as calculated by equation 1 of Reference 3.1.19,

τ_B = adjusted analysis mean scram time for 20% insertion as calculated by equation 3 of Reference 3.1.19

and

$$\tau = \frac{\tau_{AVE} - \tau_B}{\tau_A - \tau_B},$$

where

τ_A = the technical specification limit on core average scram time to the 20 percent insertion position (0.503 seconds).

The limits determined above support operation with Turbine Bypass Valves Out of Service as described in Technical Specification 3.7.7. Additional MCPR operating limits are provided to support operation with EOC-RPT inoperable as described in Technical Specification 3.3.4.1.

Rated Operating Limit MCPR values (equipment in service, 100% power, OLMCPR's) are provided in Table 7. These can be used with the Kp factors in Figures 6 and 7 to determine the appropriate power-dependent OLMCPR at a certain power level. The SC 21-04 Rev. 1 Attachment 5 [3.1.23] penalties must be applied after determining a power-dependent OLMCPR. The MCPR graphs in Figures 2-1 through 2-5 already incorporate the Kp factors and the SC 21-04 Rev. 1 [3.1.23] penalties.

When using Table 7 and Figures 6 & 7 to calculate power-dependent OLMCPR's, an intermediate OLMCPR should be calculated using the appropriate rated OLMCPR and Kp factors (see Figures 6 & 7). This intermediate value should be rounded to two decimals, then the SC 21-04 Rev. 1 [3.1.23] Attachment 5 penalties should be applied, and the final value rounded again to two decimals. For assistance in using Table 7 and Figures 6 & 7 to determine an OLMCPR value, contact Reactor Engineering or the BWR Core Design department.

When calculating SLO MCPR's, 0.03 should be added to Table 7 values before applying Kp factors. If the value after adding 0.03 is less than 1.29, it should be increased to 1.29 before applying Kp factors.

Note that all MCPR Figures (2-1 through 2-5) already apply the Kp factors and the SC 21-04 Rev. 1 penalties.

5.3 Linear Heat Generation Rate

Consistent with Technical Specification 3.2.3, the LHGRs for any GNF2 or GNF3 fuel rod at any axial location shall not exceed the nodal exposure-dependent limits reported in Reference 3.1.3 (by reference reported in [3.1.20] for GNF2 and [3.1.21] for GNF3) multiplied by the smaller of either the power-dependent or flow-dependent LHGR factors reported in Figures 3-1 and 3-2, and Figures 3-3 and 3-4, respectively [3.1.1]. The limits determined above support operation with Turbine Bypass Valves Out of Service as described in Technical Specification 3.7.7.

5.4 Stability

The OPRM Upscale Confirmation Density Algorithm (CDA) Amplitude Discriminator setpoint is reported in Table 1.

The Backup Stability Protection (BSP) regions boundaries are reported in Figures 4 and 5 [3.1.1]. BSP measures support operation with the OPRM upscale trip function

inoperable as described in Technical Specification 3.3.1.1 Condition J. The endpoints for the BSP region boundaries are provided for normal (NFWT) and reduced (RFWT) feedwater temperature operations in Tables 2 and 3, respectively. Figures 4 and 5 depict the BSP region boundaries for NFWT and RFWT operations. Note that Figures 4 and 5 also depict the MELLLA+ and MELLLA domains, consistent with feedwater temperature operating limitations.

The ABSP APRM Simulated Thermal Power (STP) setpoints associated with the ABSP Scram Region are provided in Table 4. The ABSP setpoints are applicable to TLO and SLO, and to both normal and reduced feedwater temperature operations.

The BSP Boundary and Manual BSP region boundaries for normal feedwater temperature operations are valid for reductions in normal feedwater temperature as much as (and including) -10.0 °F [3.1.1].

5.5 Applicability

The following core operating limits are applicable for operation in the Maximum Extended Operating Domain (MEOD), with Feedwater Heaters Out of Service (FWHOOS), Turbine Bypass Out of Service (TBVOOS), EOC-RPT inoperable, and Pressure Regulator Out of Service (PROOS). For operation with one of the previous conditions mentioned, the alternate MCPR limits described in Section 5.2 above must be implemented. Table 6 provides an applicability condition list of events related to the Figures. For SLO, the following additional requirements must be satisfied.

1. THE APLHGRs shall not exceed the exposure-dependent limits determined in accordance with Section 5.1 reduced by a 0.83 SLO multiplier for GNF2 fuel bundles, and reduced by a 0.90 SLO multiplier for GNF3 fuel bundles. [3.1.1].

2. THE LHGRs shall not exceed the smaller of the nodal exposure-dependent limits determined in accordance with Section 5.3 above or the nodal exposure-dependent limits reported in Reference 3.1.3. During SLO operation the SLO values will be used from Figures 3-3 and 3-4 [3.1.1].

3. The MCPR shall be equal to or greater than the limits determined in accordance with Section 5.2. Due to the application of SC 21-04 Rev. 1 penalties to the MCPR limits, a flat adder is not appropriate for SLO limits. SLO MCPR operating limits are displayed in Figures 2-1 through 2-4 "C" & "D" and Figure 2-5B [3.1.1].

5.6 Limitations and Conditions

As required by Limitation and Condition 9.10/9.11 of licensing topical report NEDC-33173P-A [3.1.7], the limiting Thermal and Mechanical Overpower results are reported in Table 5. The results are summarized as a percent margin to both of these limits. The results are confirmed to meet the required 10% margin to the design limits [3.1.1].

As required by Limitation and Condition 12.10.b of licensing topical report NEDC-33006P-A [3.1.8], the off-rated limits assumed in the ECCS-LOCA analyses are confirmed to be consistent with the off-rated LHGR multipliers provided Figures 3-1 through 3-4. These off-rated LHGR multipliers provide adequate protection for MELLLA+ operation.

As required by Limitation and Condition 12.5.c of licensing topical report NEDC-33006P-A [3.1.8], the plant specific power/flow map specifying the GGNS licensed MELLLA+ operating domain is included as Figure 4.

As required by Limitation and Condition 12.5.b of licensing topical report NEDC-33006P-A [3.1.8], operation with Feedwater Heaters Out of Service (FWHOOS) is prohibited while in the MELLLA+ operating domain [3.1.1]. In addition, as required by Limitation and Condition 12.5.a of licensing topical report NEDC-33006P-A [3.1.8], and described in GGNS TS 3.4.1 LCO, SLO is prohibited in the MELLLA+ operating domain [3.1.1].Therefore, operations with RFWT and/or SLO must adhere to the operating domain shown in Figure 5.

Table 1
OPRM Upscale CDA Amplitude Discriminator Setpoint

Amplitude Discriminator Trip
1.10

Table 2
BSP Endpoints for Normal Feedwater Temperature

Endpoint	Power(%)	Flow(%)	Definition
A1	72.3	44.2	Scram Region Boundary, HFCL
B1	34.2	25.2	Scram Region Boundary, NCL
A2	67.3	50.0	Controlled Entry Region Boundary, HFCL
B2	26.4	24.4	Controlled Entry Region Boundary, NCL

Table 3
BSP Endpoints for Reduced Feedwater Temperature

Endpoint	Power(%)	Flow(%)	Definition
A1'	67.5	50.2	Scram Region Boundary, HFCL
B1'	28.2	24.5	Scram Region Boundary, NCL
A2'	69.7	52.9	Controlled Entry Region Boundary, HFCL
B2'	26.4	24.4	Controlled Entry Region Boundary, NCL

Table 4
ABSP Setpoints for the Scram Region

Parameter	Symbol	Value
Slope of ABSP APRM flow-biased trip linear segment	m_{TRIP}	0.77
ABSP APRM flow-biased trip setpoint power intercept. Constant Power Line for Trip from zero Drive Flow to Flow Breakpoint.	$P_{BSP-TRIP}$	31.0% RTP[1]
ABSP APRM flow-biased trip setpoint drive flow intercept. Constant Flow Line for Trip.	$W_{BSP-TRIP}$	39.0% RDF[2]
Flow Breakpoint value	$W_{BSP-BREAK}$	7.5% RDF[2]

1. RTP - Rated Thermal Power 2. RDF - Recirculation Drive Flow

Table 5
Margin to Thermal Overpower and Mechanical Overpower Limits

Criteria	GNF3
Thermal Overpower Margin	30.21%
Mechanical Overpower Margin	49.54%

Table 6
Application Conditions

Application Condition	FWH OOS	EOC-RPT	PR OOS	TBV OOS
1				X
2	X			X
3		X		X
4	X	X		X
5			X	X
6	X		X	X
7		X	X	X
8	X	X	X	X

Table 7
Rated OLMCPR Summary Table

Application Condition	GNF3 OPT A BOC-MOC	GNF3 OPT A MOC-EOC	GNF3 OPT B BOC-MOC	GNF3 OPT B MOC-EOC
1	1.33	1.36	1.25	1.28
2	1.33	1.36	1.25	1.28
3	1.33	1.37	1.25	1.29
4	1.33	1.37	1.25	1.29
5	1.35	1.37	1.35	1.37
6	1.35	1.41	1.35	1.41
7	1.35	1.37	1.35	1.37
8	1.35	1.41	1.35	1.41

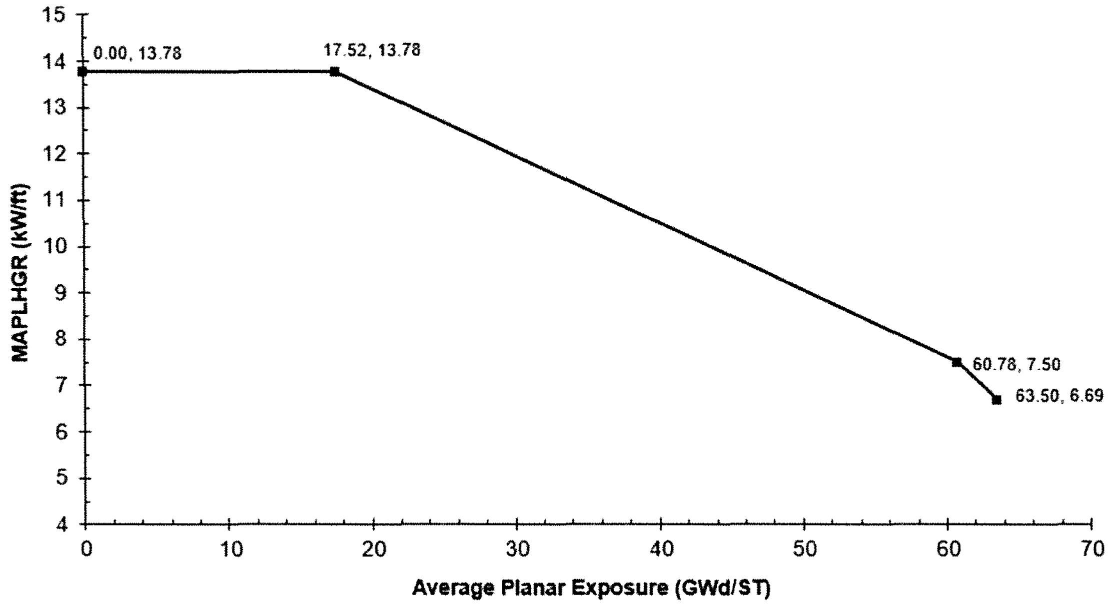

Figure 1-1
GNF2 Maximum Average Planar Linear Heat Generation Rate
Note: Actual Limits described in Sections 5.1 and 5.5

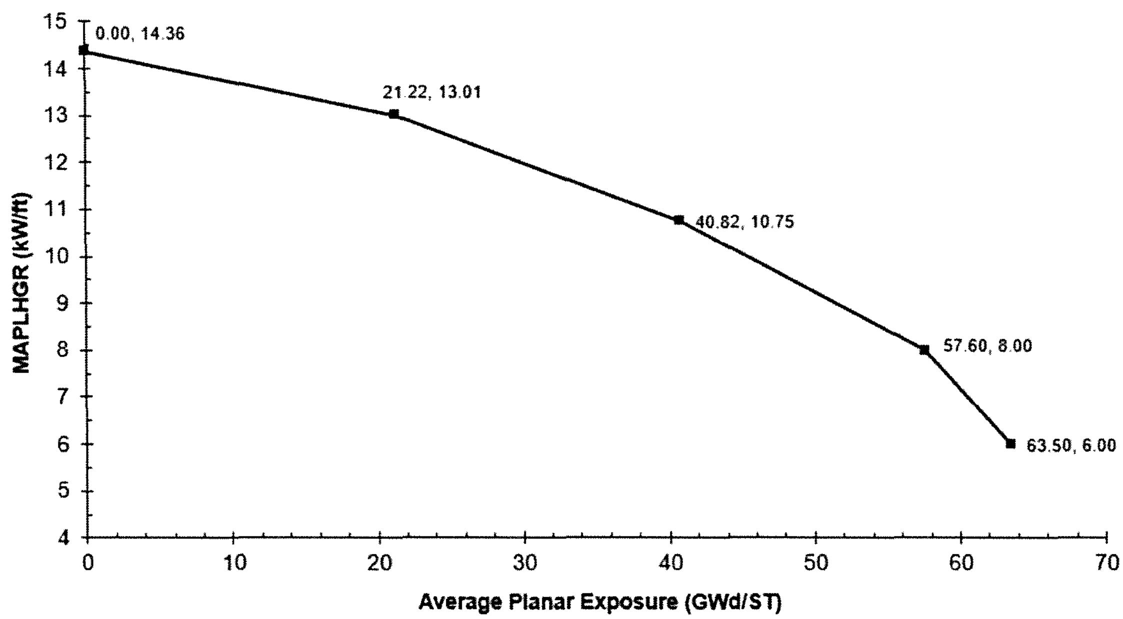

Figure 1-2
GNF3 Maximum Average Planar Linear Heat Generation Rate
Note: Actual Limits described in Sections 5.1 and 5.5

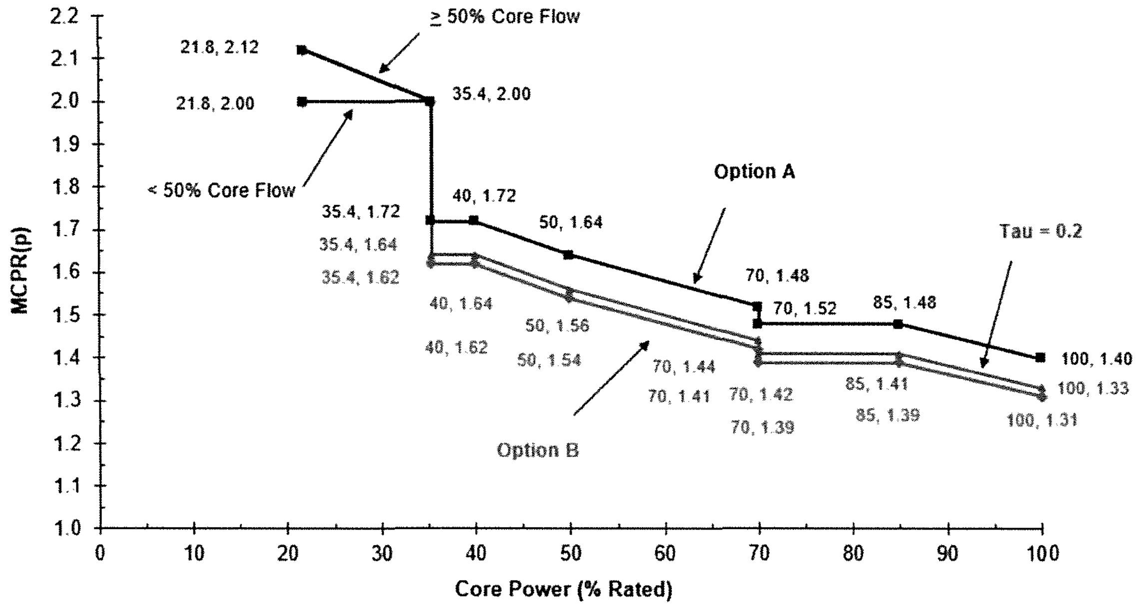

Figure 2-1A
Cycle 24 Power-Dependent MCPR Limits, EIS or FWH OOS
BOC to MOC, TLO

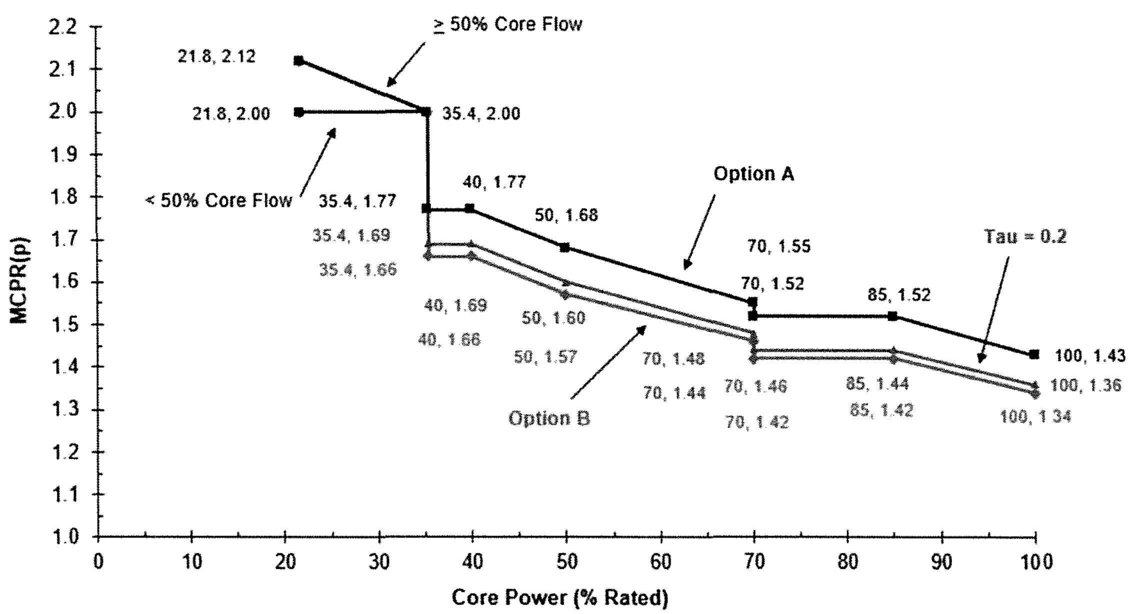

Figure 2-1B
Cycle 24 Power-Dependent MCPR Limits, EIS or FWH OOS
MOC to EOC, TLO

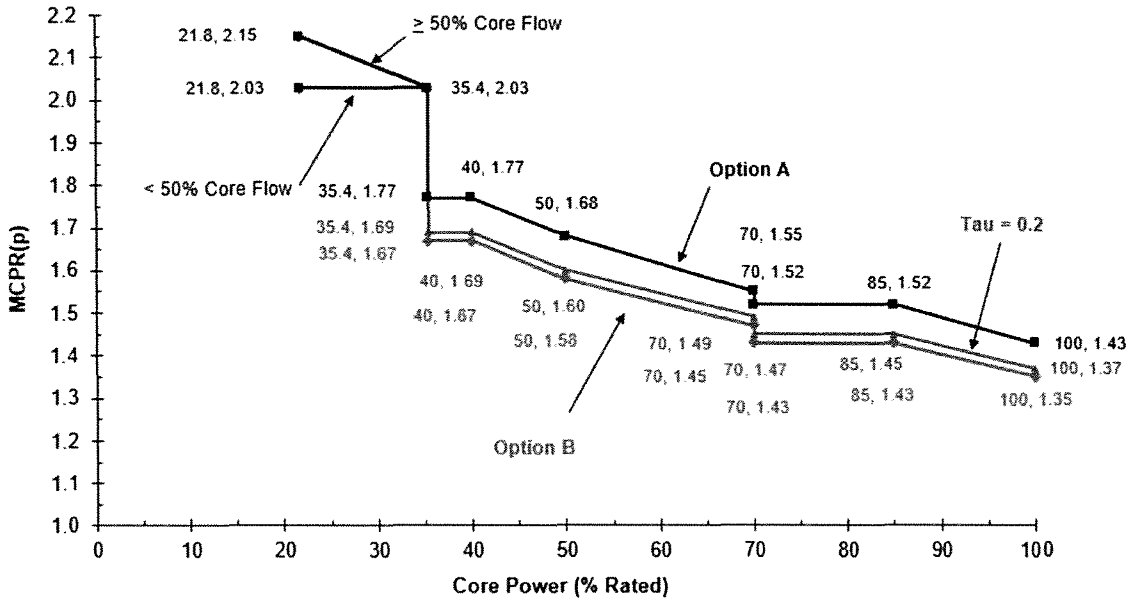

Figure 2-1C
Cycle 24 Power-Dependent MCPR Limits, EIS or FWH OOS
BOC to MOC, SLO

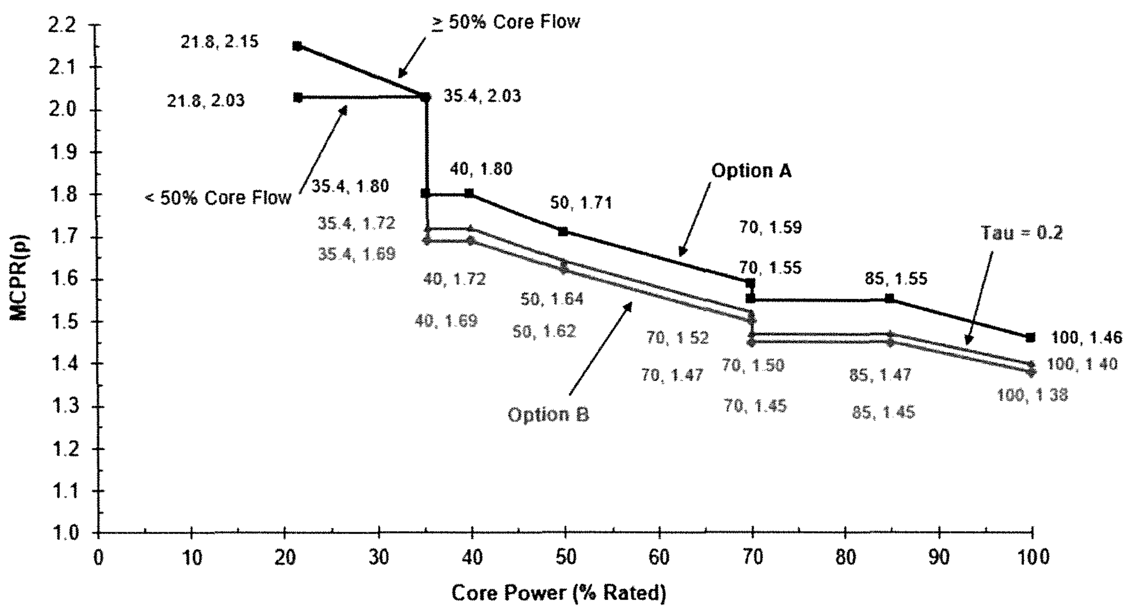

Figure 2-1D
Cycle 24 Power-Dependent MCPR Limits, EIS or FWH OOS
MOC to EOC, SLO

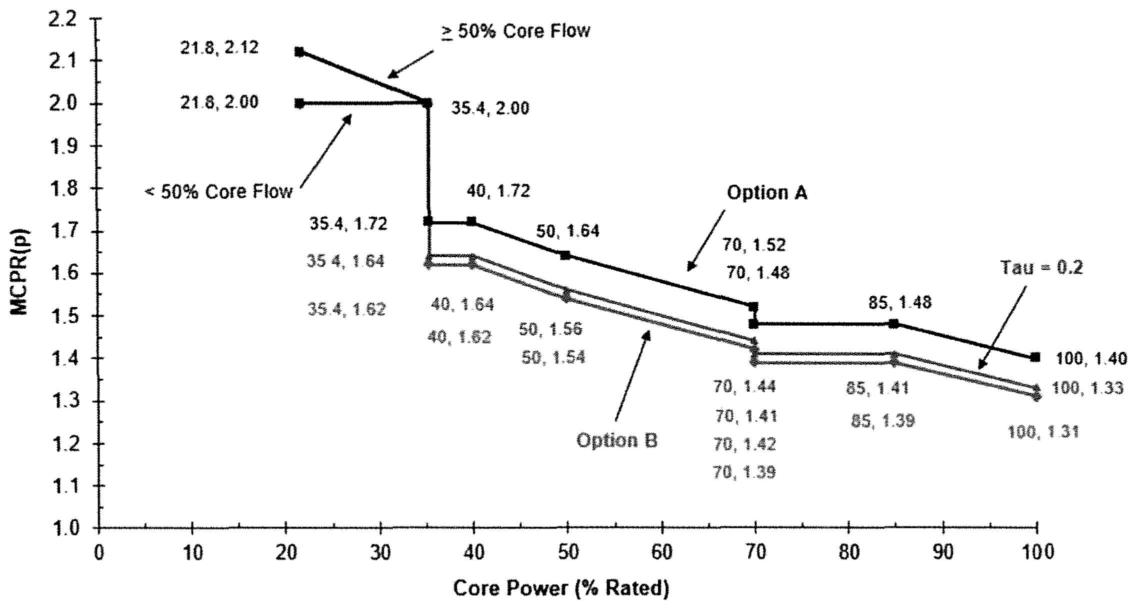

Figure 2-2A
Cycle 24 Power-Dependent MCPR Limits with EOC-RPT OOS, or EOC-RPT & FWH OOS
BOC to MOC, TLO

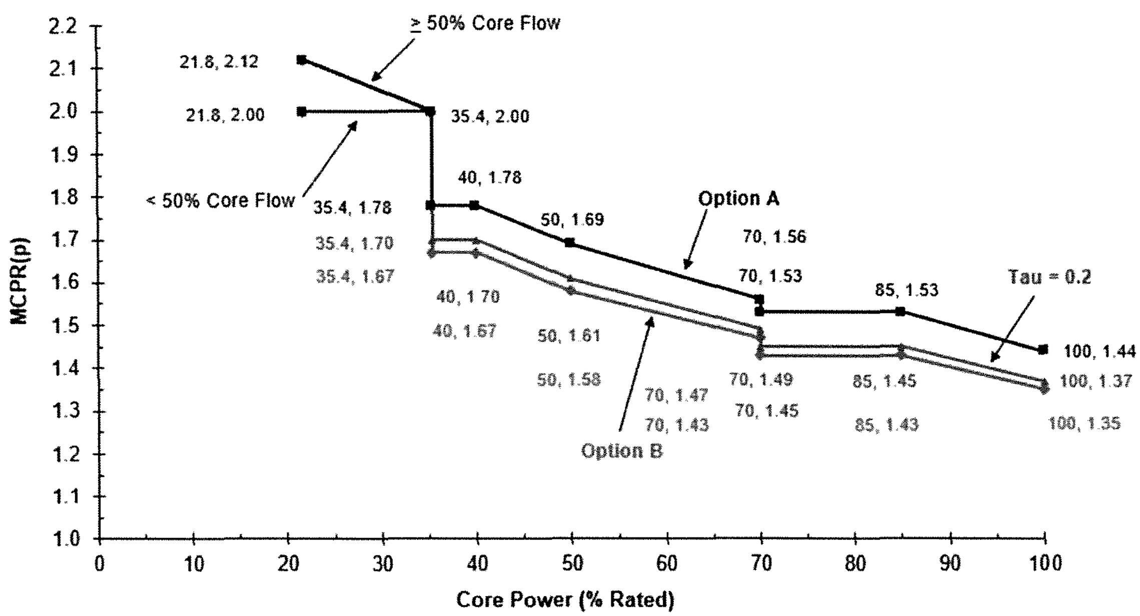

Figure 2-2B
Cycle 24 Power-Dependent MCPR Limits with EOC-RPT OOS, or EOC-RPT & FWH OOS
MOC to EOC, TLO

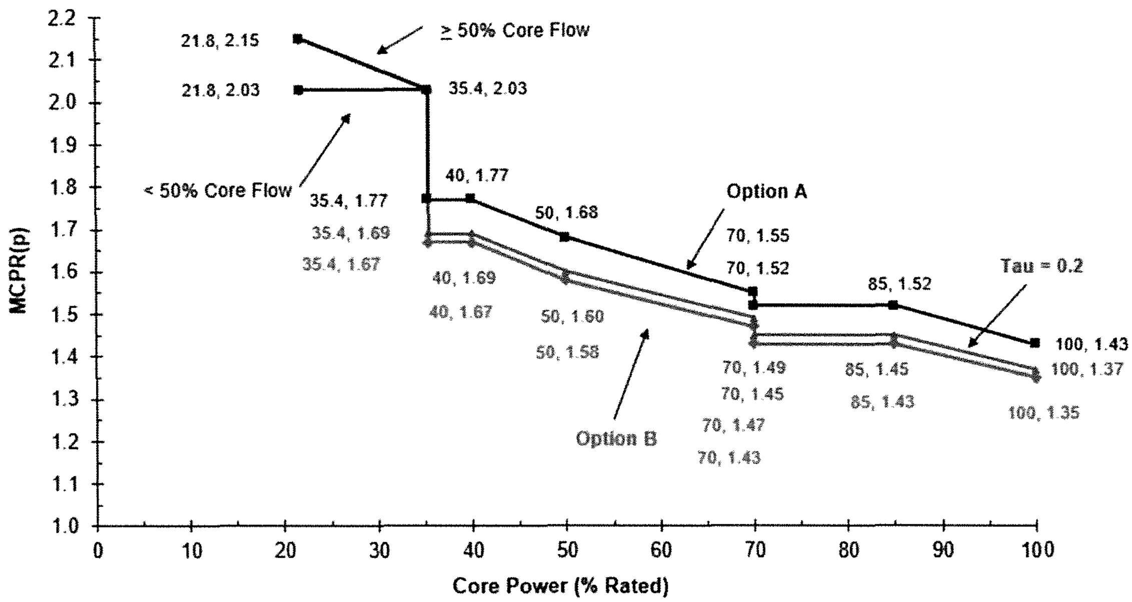

Figure 2-2C
Cycle 24 Power-Dependent MCPR Limits with EOC-RPT OOS, or EOC-RPT & FWH OOS
BOC to MOC, SLO

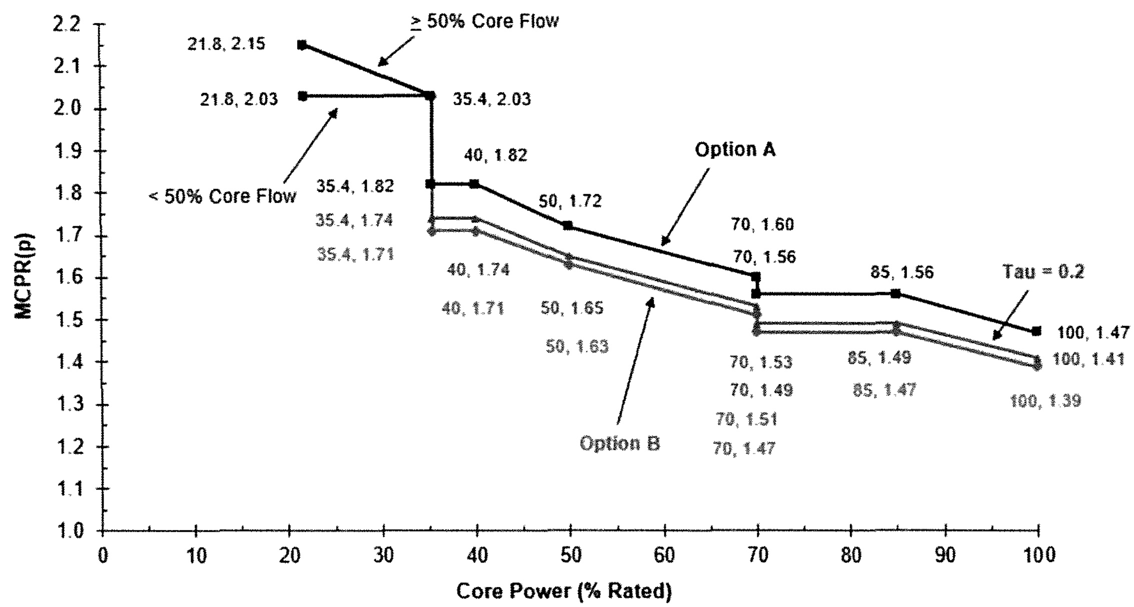

Figure 2-2D
Cycle 24 Power-Dependent MCPR Limits with EOC-RPT OOS, or EOC-RPT & FWH OOS
MOC to EOC, SLO

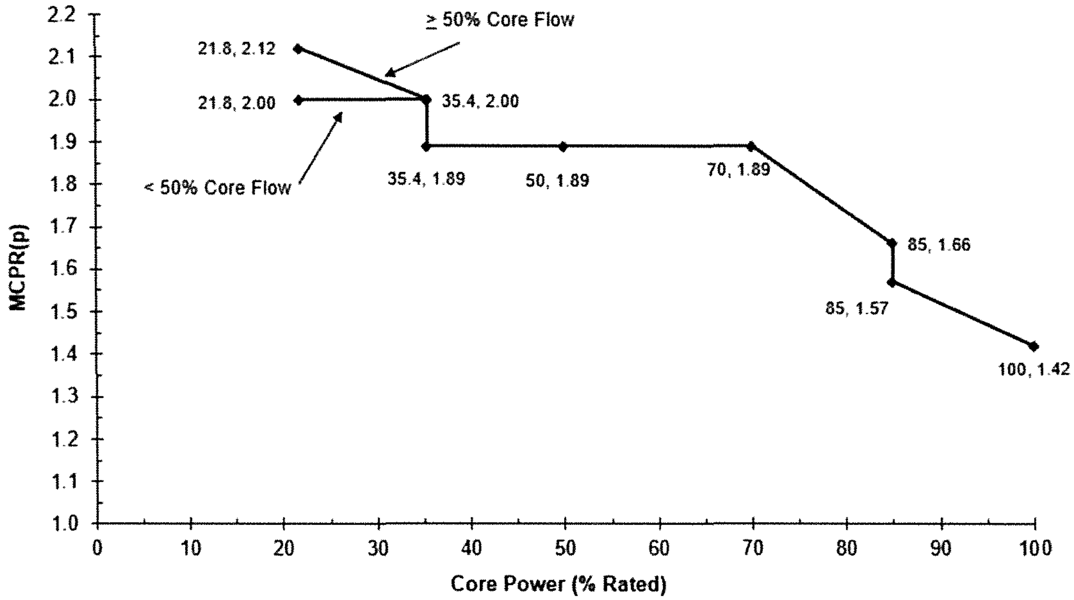

Figure 2-3A
Cycle 24 Power-Dependent MCPR Limits with PR OOS or PR & EOC RPT OOS
BOC to MOC, TLO

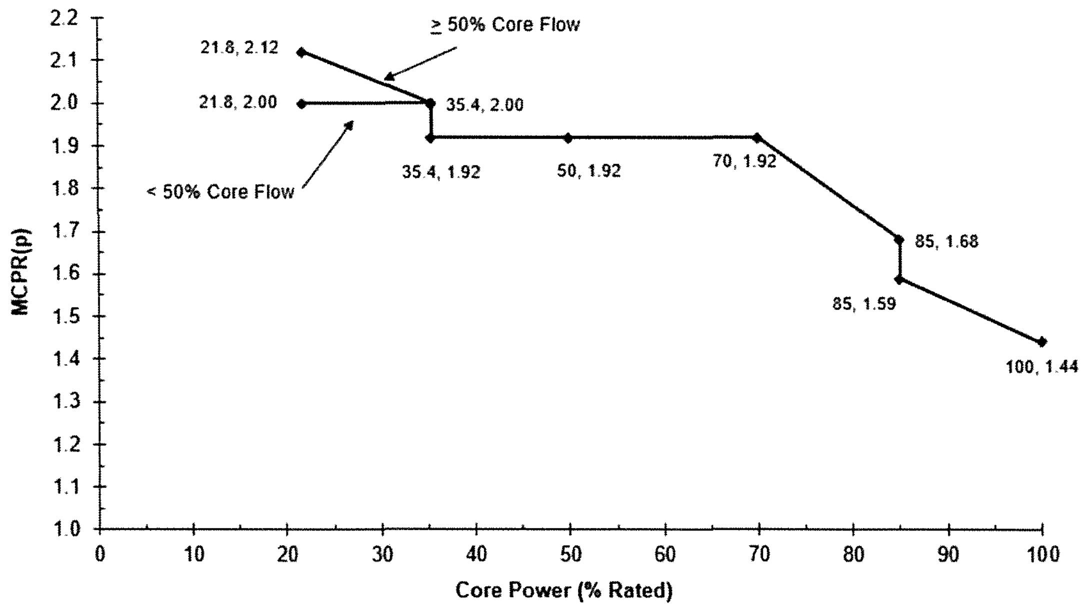

Figure 2-3B
Cycle 24 Power-Dependent MCPR Limits with PR OOS or PR & EOC RPT OOS
MOC to EOC, TLO

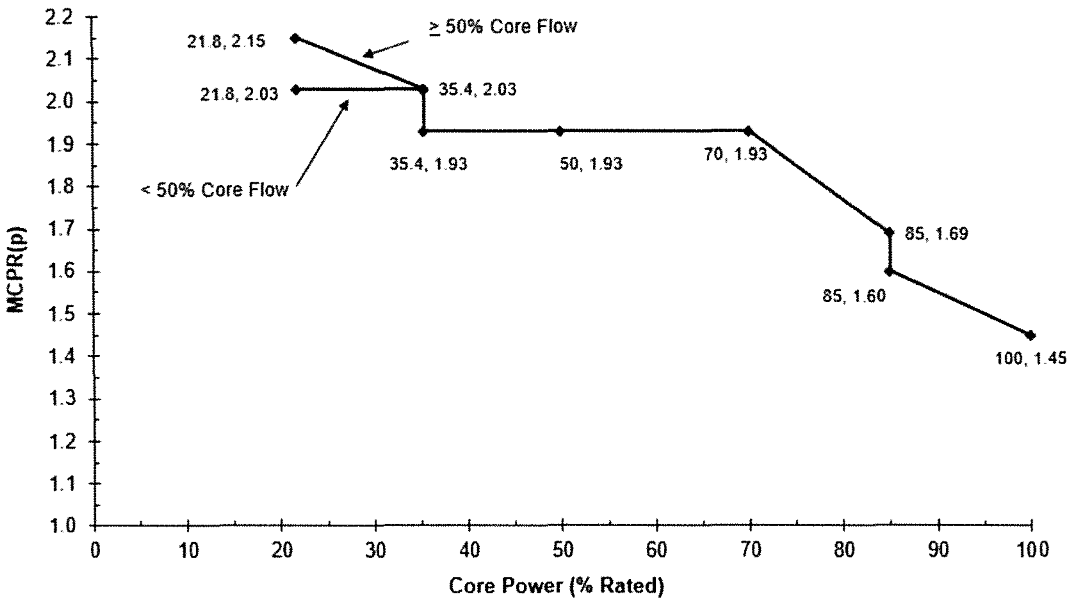

Figure 2-3C
Cycle 24 Power-Dependent MCPR Limits with PR OOS or PR & EOC RPT OOS
BOC to MOC, SLO

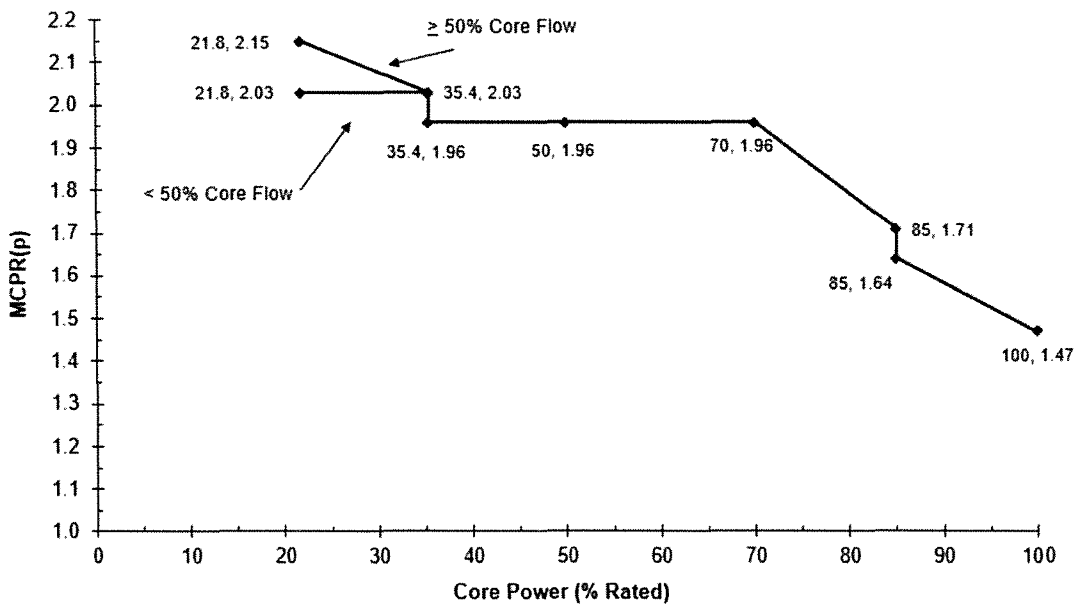

Figure 2-3D
Cycle 24 Power-Dependent MCPR Limits with PR OOS or PR & EOC RPT OOS
MOC to EOC, SLO

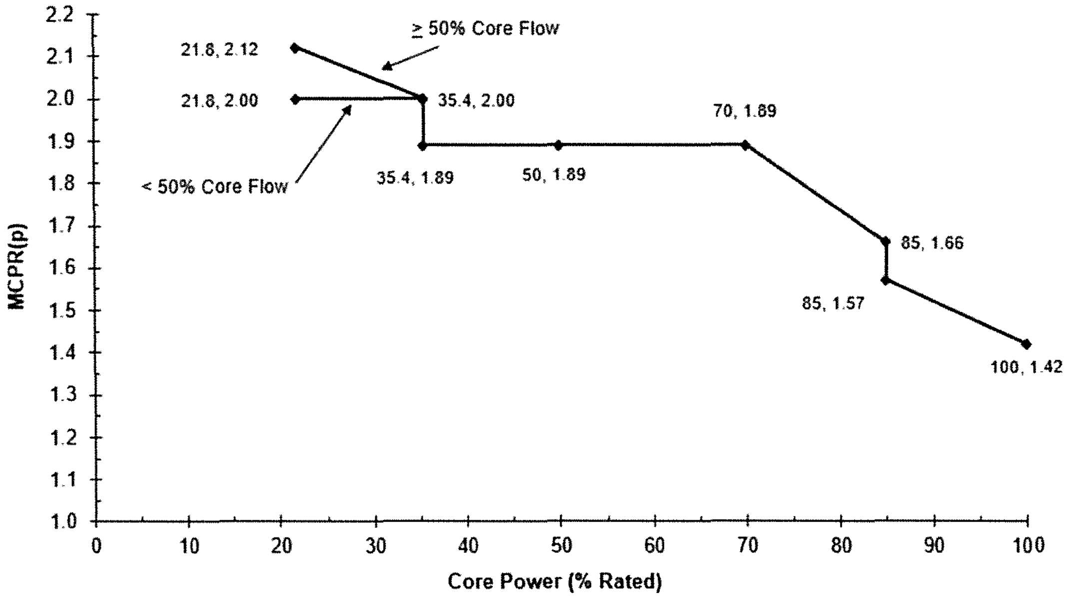

Figure 2-4A
Cycle 24 Power-Dependent MCPR Limits with PR & FWH OOS or PR & FWH & EOC-RPT OOS
BOC to MOC, TLO

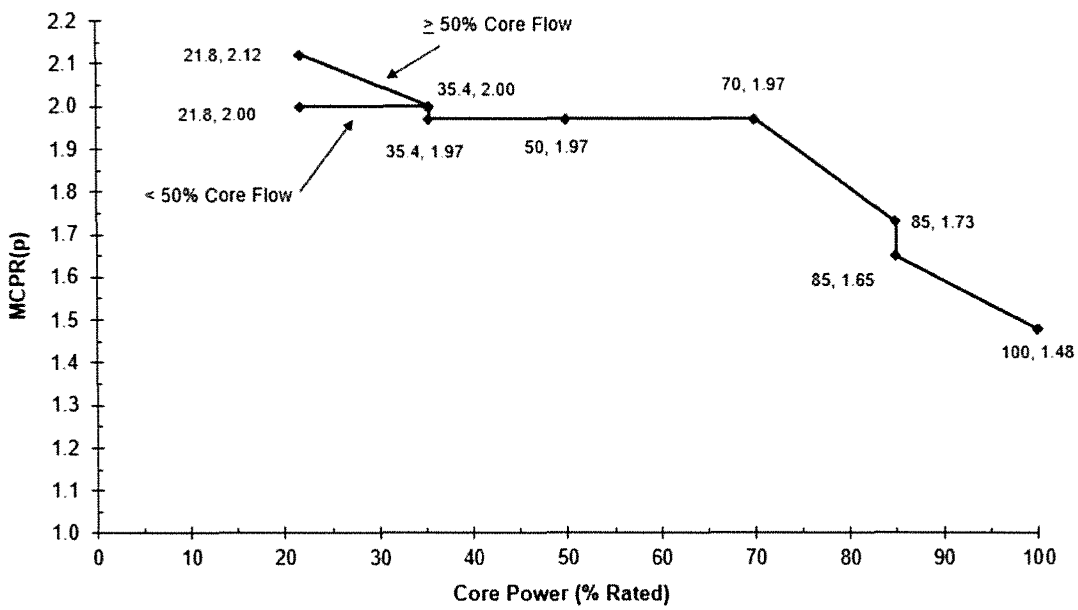

Figure 2-4B
Cycle 24 Power-Dependent MCPR Limits with PR & FWH OOS or PR & FWH & EOC-RPT OOS
MOC to EOC, TLO

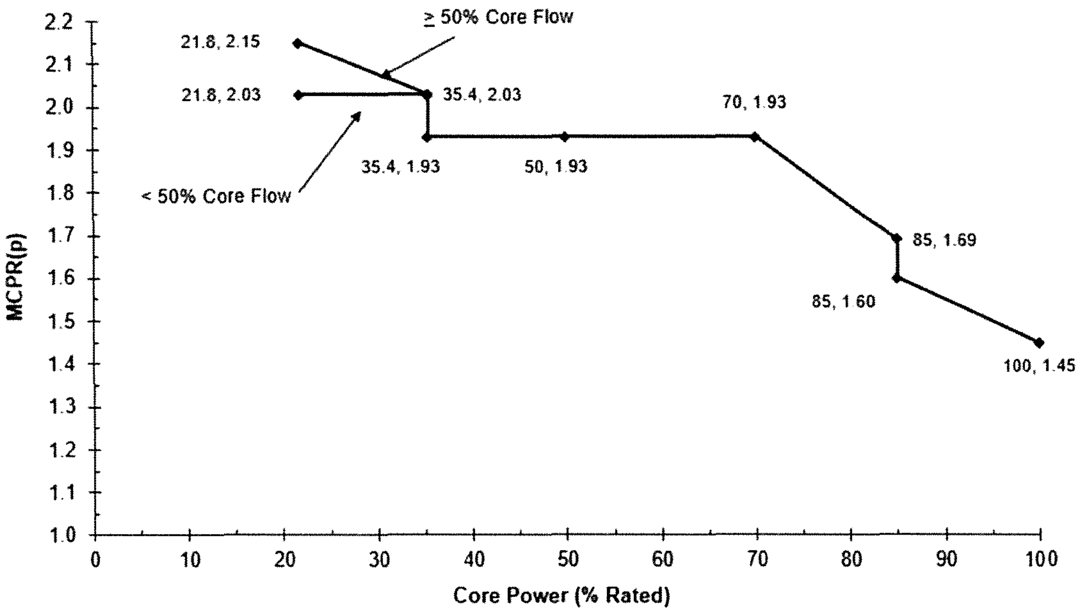

Figure 2-4C
Cycle 24 Power-Dependent MCPR Limits with PR & FWH OOS or PR & FWH & EOC-RPT OOS
BOC to MOC, SLO

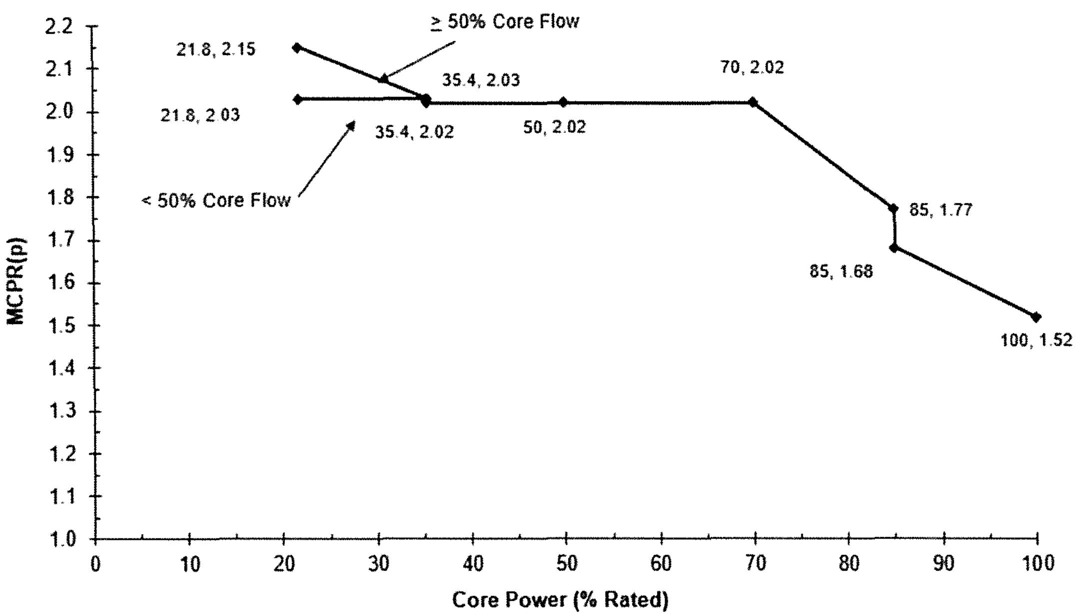

Figure 2-4D
Cycle 24 Power-Dependent MCPR Limits with PR & FWH OOS or PR & FWH & EOC-RPT OOS
MOC to EOC, SLO

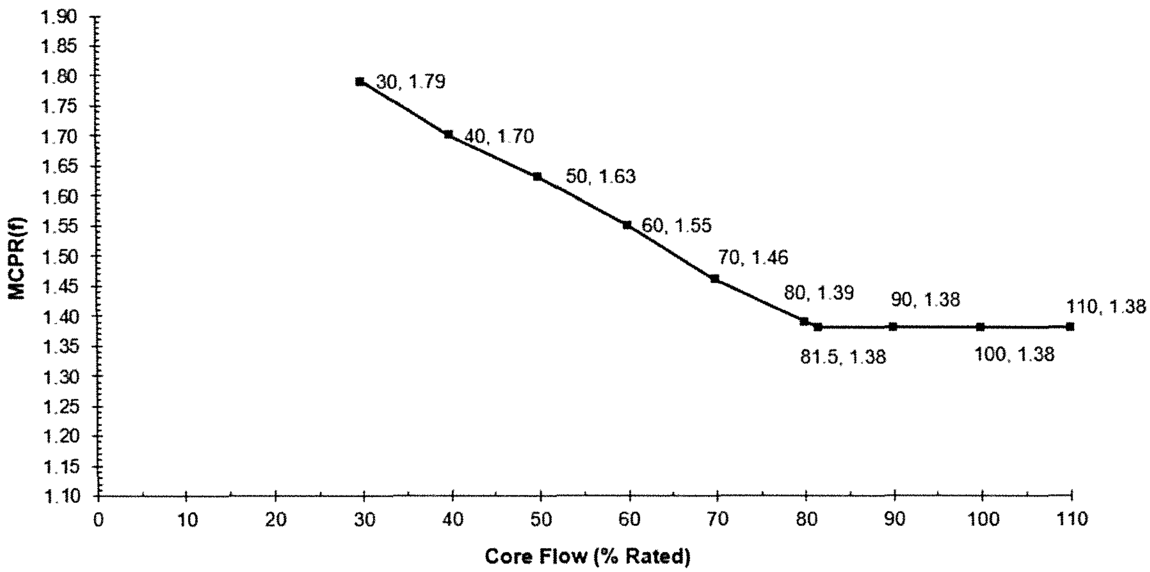

Figure 2-5A
Cycle 24 Flow-Dependent MCPR Limits, TLO, All Application Conditions

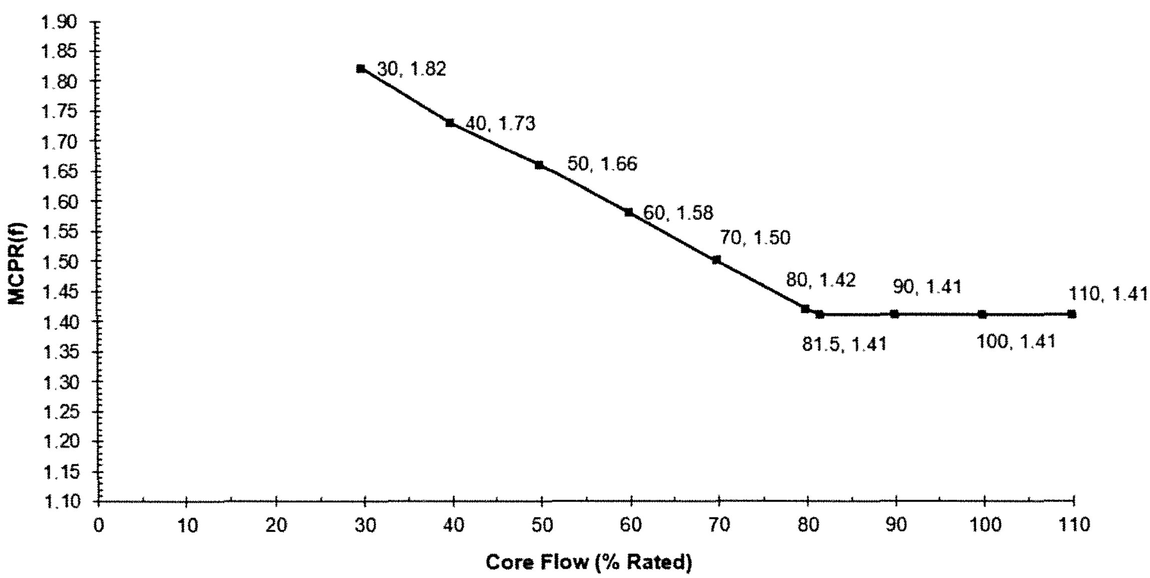

Figure 2-5B
Cycle 24 Flow-Dependent MCPR Limits, SLO, All Application Conditions

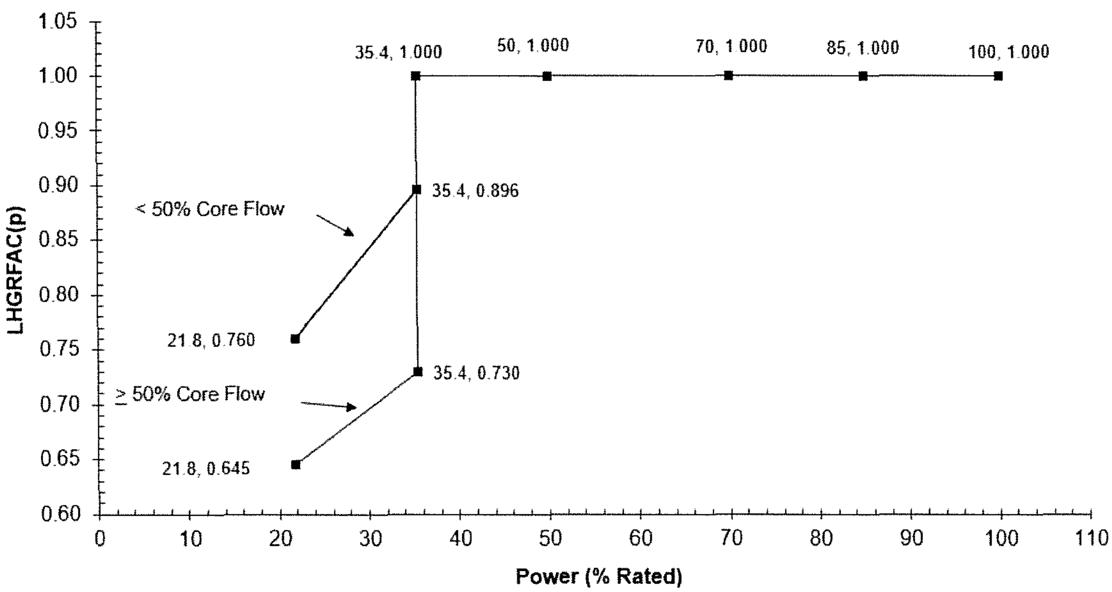

Figure 3-1
Cycle 24 Power-Dependent LHGR Factor, EIS, FWH OOS, EOC-RPT OOS, EOC-RPT & FWH OOS
Note: These factors to be applied to the exposure-dependent limits as descibed in Section 5.3

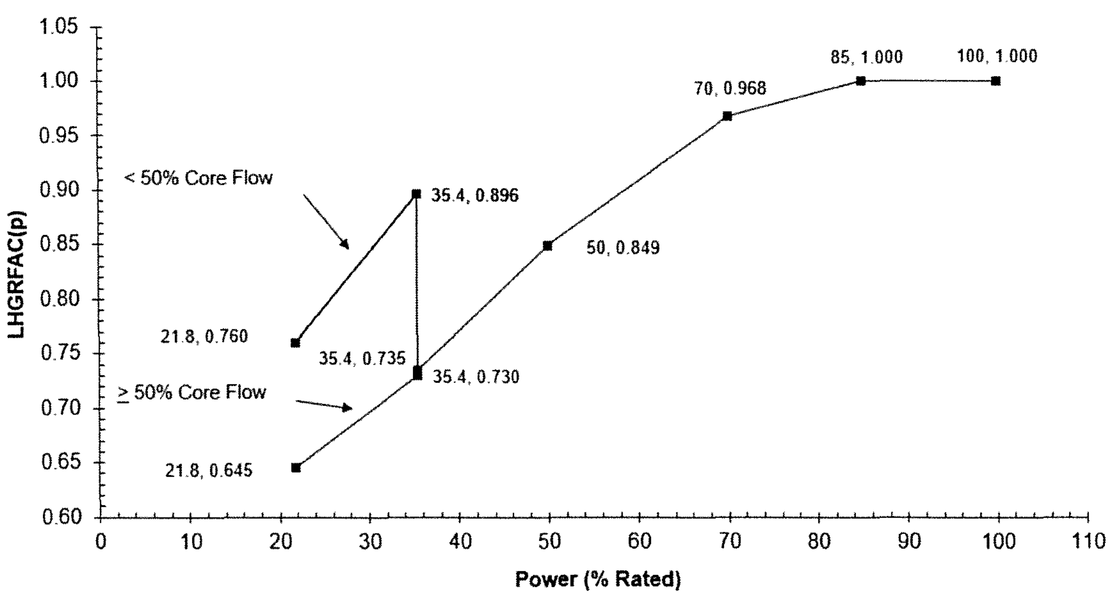

Figure 3-2
Cycle 24 Power-Dependent LHGR Factor PR OOS, PR & FWH OOS, PR & EOC-RPT OOS, PR & EOC-RPT & FWH OOS
Note: These factors to be applied to the exposure-dependent limits as descibed in Section 5.3

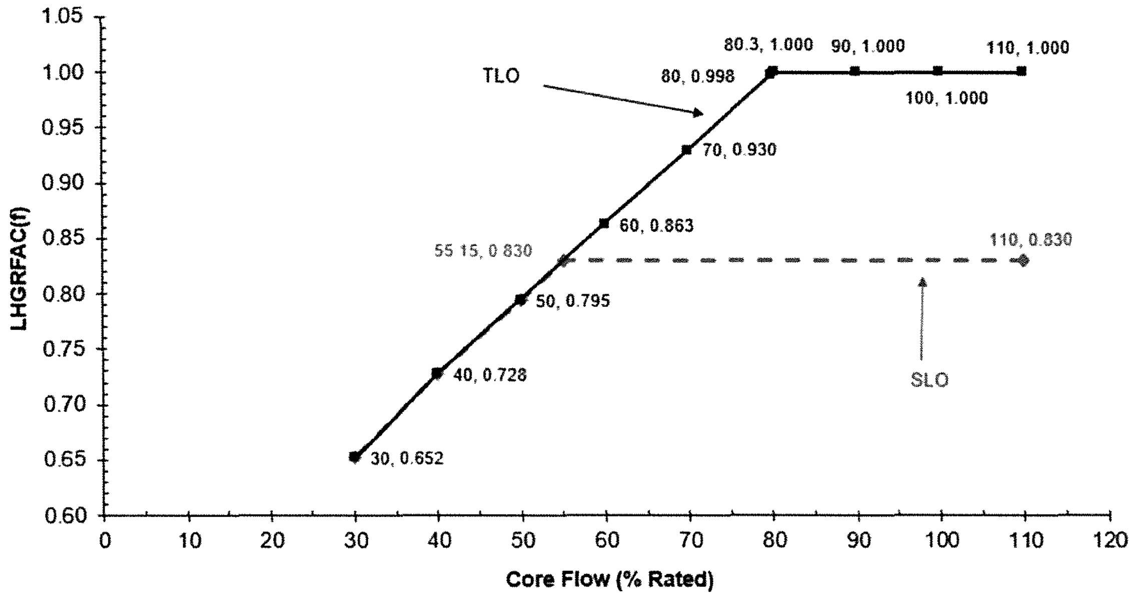

Figure 3-3
Cycle 24 GNF2 Flow-Dependent LHGR Factor
Note: These factors to be applied to the exposure-dependent limits as descibed in Section 5.3

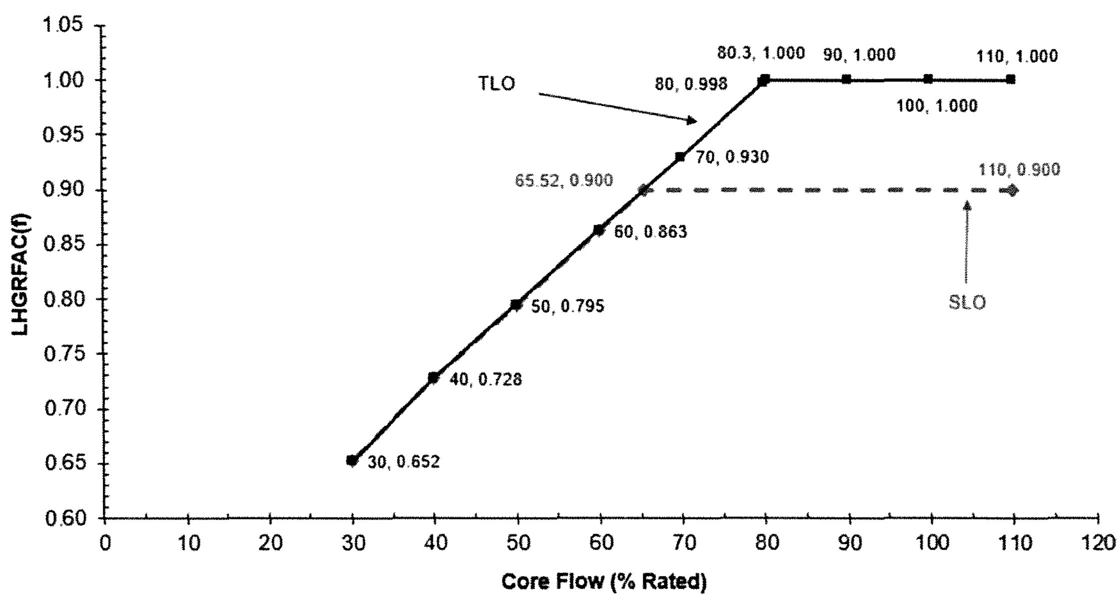

Figure 3-4
Cycle GNF3 24 Flow-Dependent LHGR Factor
Note: These factors to be applied to the exposure-dependent limits as descibed in Section 5.3

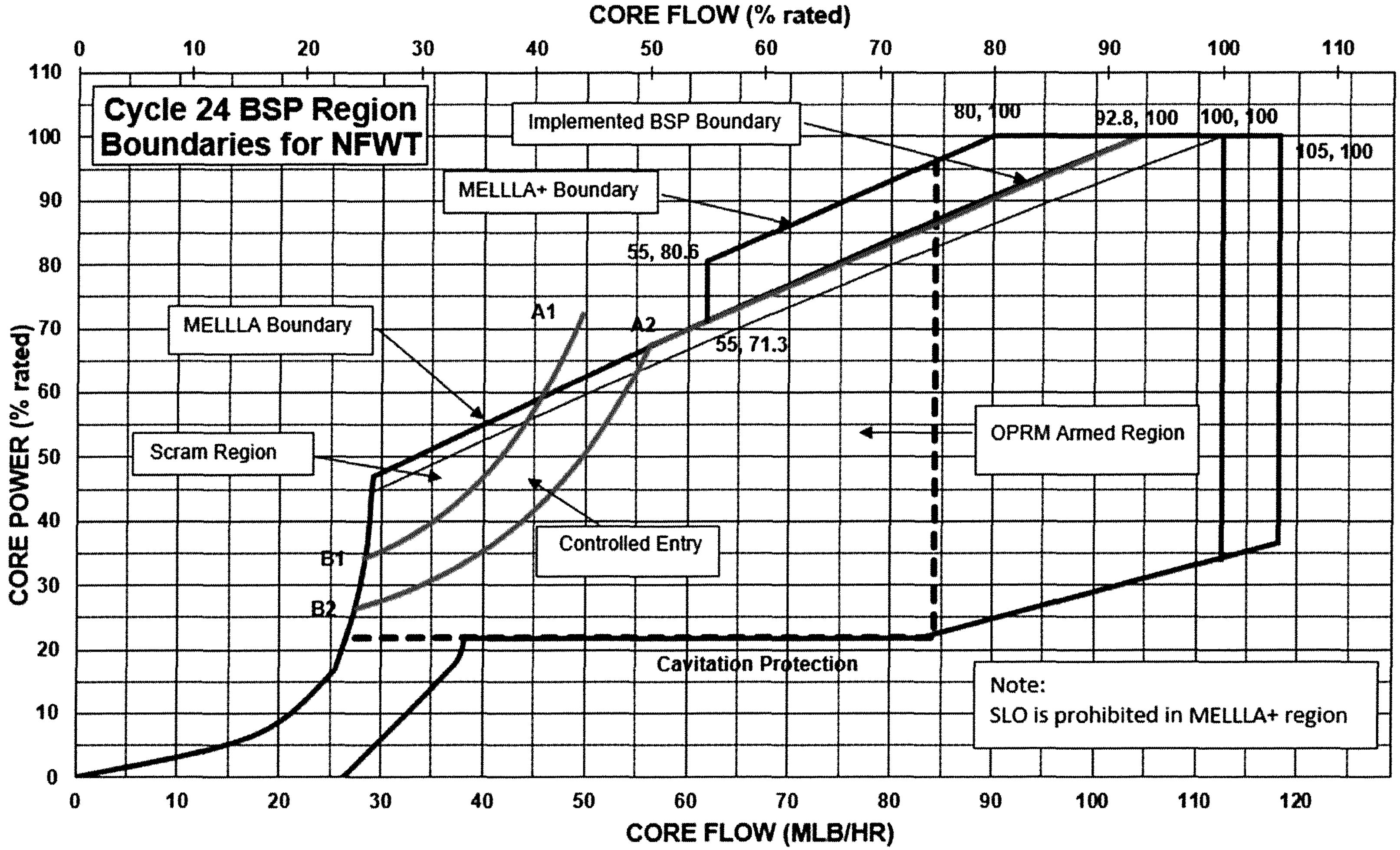

Figure 4 Backup Stability Protection Region Boundaries for Normal Feedwater Temperature (NFWT)

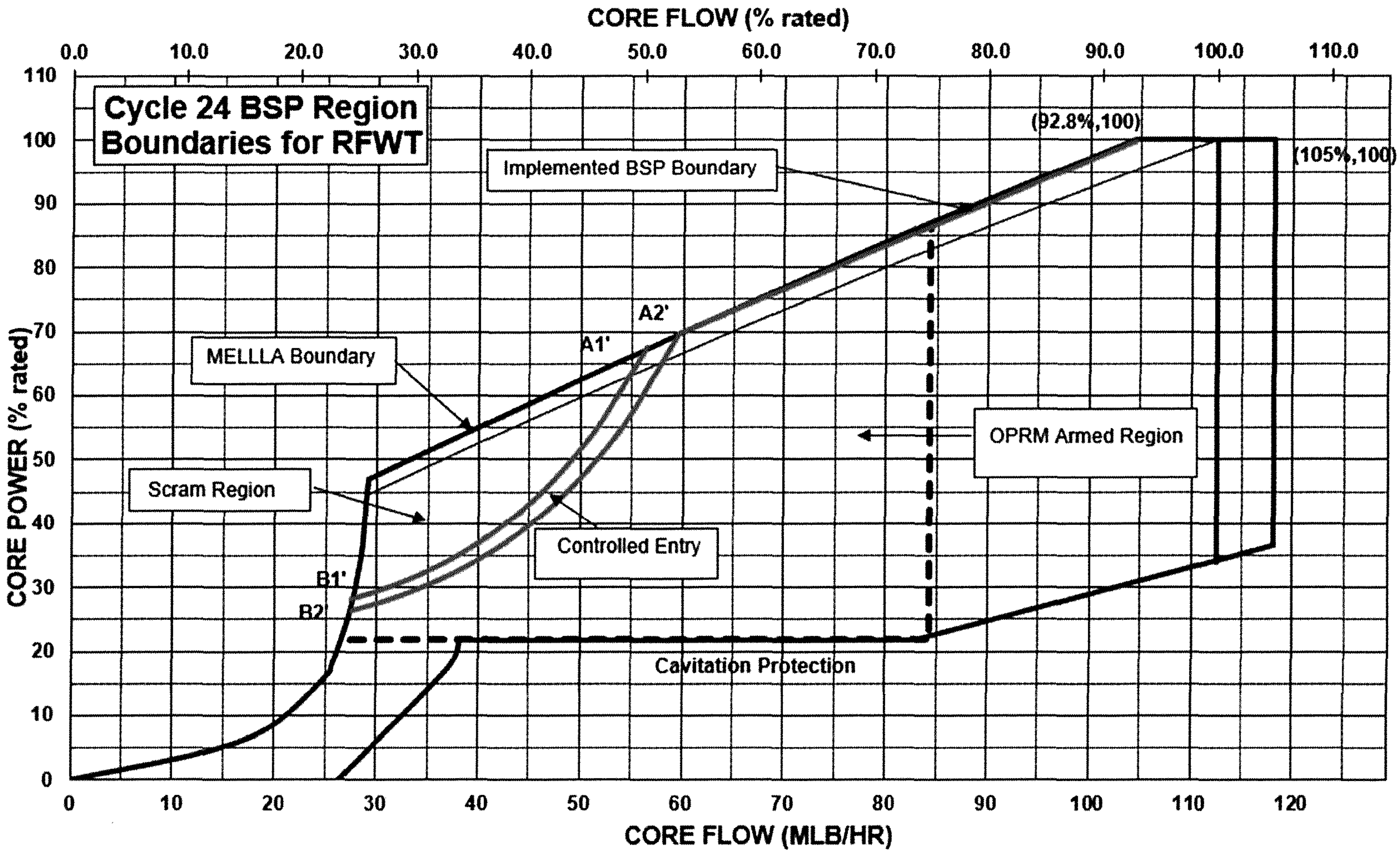

Figure 5 Backup Stability Protection Region Boundaries for Reduced Feedwater Temperature (RFWT)

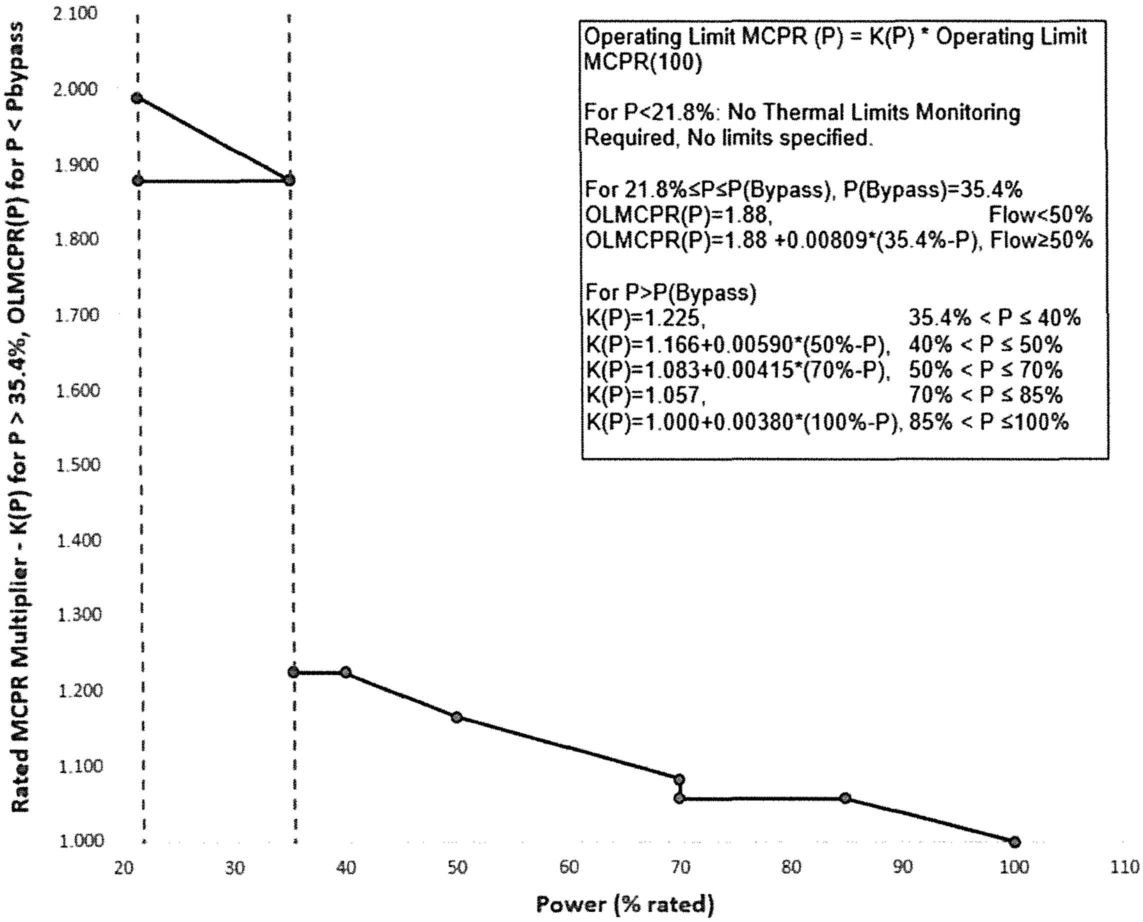

Figure 6

$MCPR_p$ Limit and K(P) Multiplier for EIS, FWH OOS, EOC-RPT OOS, FWH & EOC-RPT OOS

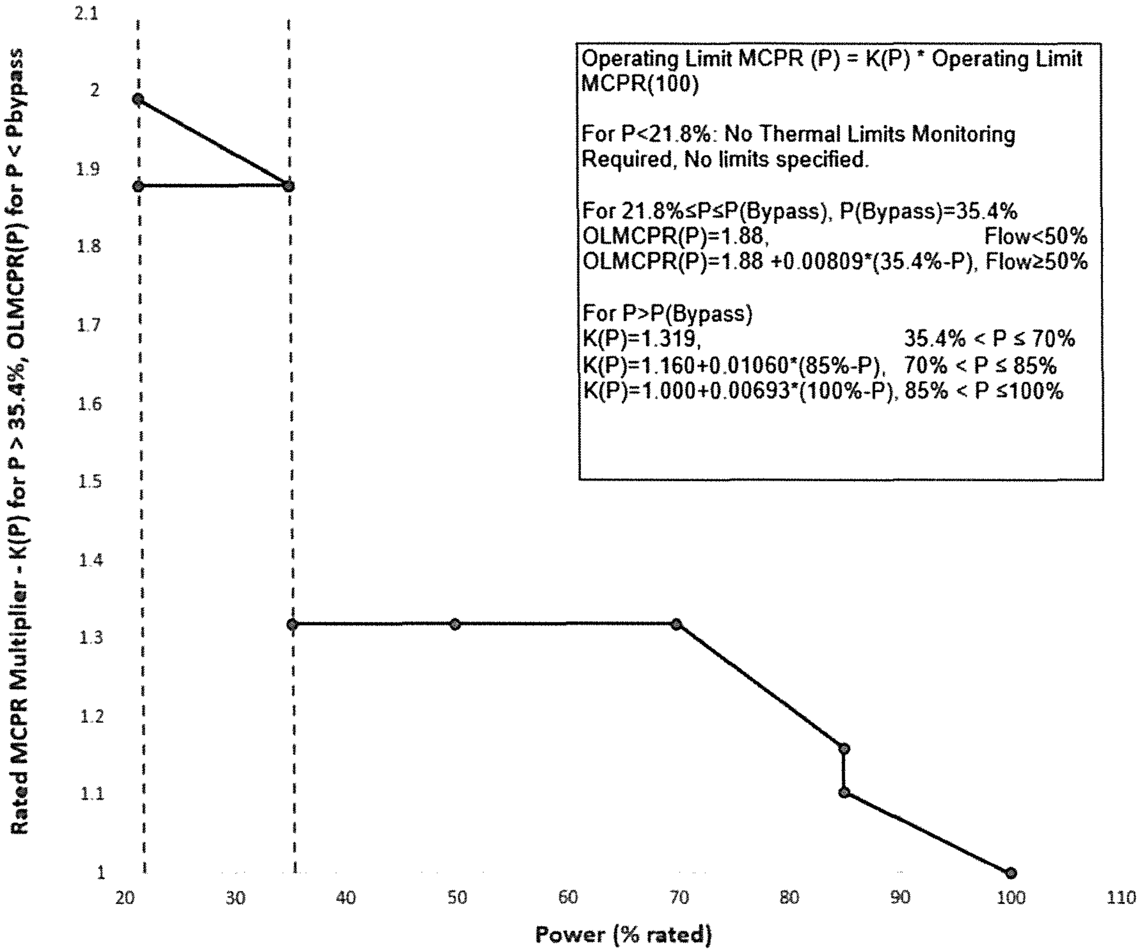

Figure 7

$MCPR_p$ Limit and K(P) Multiplier for PR OOS, PR & FWH OOS, PR & EOC-RPT OOS, PR & FWH & EOC-RPT OOS