COOPER NUCLEAR STATION

CORE OPERATING LIMITS REPORT

Non Proprietary Version

Cycle 23

Revision 1

	Print	Sign	Date
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REVISION HISTORY

Revision	Date	Description
0	05Feb05	Original issue
1		Changes to correct errors in COLR Rev 0. Also, completed update and change in format of COLR

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1. INTRODUCTION

The Core Operating Limits Report (COLR) provides the limits for operation of the Cooper Nuclear Station for Cycle 23. Cooper Nuclear Station Technical Specification 5.6.5(a) requires the COLR to contain the following limits:

- The Average Planar Linear Heat Generation Rate for Specification 3.2.1,
- The Minimum Critical Power Ratio for Specifications 3.2.2 and 3.7.7,
- The three Rod Block Monitor Upscale Allowable Values for Specification 3.3.2.1,
- The power/flow map defining the Stability Exclusion Region for Specification 3.4.1.

In addition, the following information is required to be in the COLR:

- Turbine Bypass System response time for Surveillance Requirement 3.7.7.3,
- Maximum allowable Linear Heat Generation Rate (LHGR) for Technical Requirements Manual Specification T3.2.1.

The analytical methods used to determine the core operating limits are those previously reviewed and approved by the NRC as required by Technical Specification 5.6.5(b). These methods are:

- NEDE-24011-P-A-14, "General Electric Standard Application for Reactor Fuel", June 2000 (Reference 1),
- NEDE-23785-1-P-A, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident", Volume III, Revision 1, October 1984 (Reference 2),
- NEDO-31960-A and NEDO-31960-A Supplement 1, "BWR Owner's Group Long-Term Stability Solutions Licensing Methodology", November 1995 (Reference 3).

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2. AVERAGE PLANAR LINEAR HEAT GENERATION RATE

2.1 Technical Specification Reference

Technical Specification 3.2.1.

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2.2 Two Recirculation Loop Operation

During steady-state power operation, the maximum Average Planar Linear Heat Generation Rate (MAPLHGR), as a function of fuel bundle type, axial location, and average planar exposure, shall not exceed the applicable limiting value.

The maximum allowable Average Planar Linear Heat Generation Rate with two recirculation loops in operation is defined as follows:

MAPLHGR Limit = minimum [MAPLHGR(P), MAPLHGR(F)]

where,

MAPLHGR(P) = $MAPLHGR_{STD}$ * MAPFAC(P),

MAPLHGR(F) = $MAPLHGR_{STD}$ * MAPFAC(F),

$MAPLHGR_{STD}$ = Fuel bundle type, exposure and lattice dependent MAPLHGR values for rated core power and flow conditions represented by the values shown in Table 2-1,

MAPFAC(P) = Core power dependent multiplier shown in Figure 2-1,

MAPFAC(F) = Core flow rate dependent multiplier shown in Figure 2-2.

The $MAPLHGR_{STD}$ values presented in Table 2-1 are a composite of the most limiting values for the enriched fuel lattices in each fuel bundle type from the exposure and lattice dependent values defined in Reference 6. The values in Table 2-1 are intended only for use in hand calculations as described in Technical Specification 3.2.1. The actual lattice specific $MAPLHGR_{STD}$ values defined in Reference 6 are utilized in the process computer. The process computer will be used to verify the lattice specific MAPLHGR limits for each fuel bundle type are not violated.

The MAPFAC(P) and MAPFAC(F) multipliers presented in Figure 2-1 and Figure 2-2, respectively, are defined in Reference 5.

No thermal limits monitoring is required below 25% of rated power. Therefore, the MAPLHGR limit defined above is only applicable for core conditions at or above 25% of rated power.

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2.3 Single Recirculation Loop Operation

The maximum allowable Average Planar Linear Heat Generation Rate with one recirculation loop in operation (SLO) is defined as follows:

MAPLHGR Limit = minimum [MAPLHGR(P), MAPLHGR(F), MAPLHGR(SLO)]

where,

MAPLHGR(SLO) = $MAPLHGR_{STD}$ * MAPFAC(SLO),

MAPFAC(SLO) = Single loop operation MAPLHGR multiplier,

and MAPLHGR(P) and MAPLHGR(F) are as defined in Section 2.2 above.

As shown above, it is not necessary to apply both the off-rated (MAPFAC(P) and MAPFAC(F)) and SLO multiplier corrections at the same time.

The single loop operation MAPLHGR multiplier for each fuel bundle type are defined in Reference 6 as shown in the table below.

Fuel Bundle Type	SLO MAPLHGR Multiplier
All GE14B bundles	0.91
All GE14C bundles	0.91

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Table 2-1

Composite $MAPLHGR_{STD}$ Values By Fuel Bundle Type

Average Planar Exposure (GWd/MT)	$MAPLHGR_{STD}$ Values (in kW/ft) by GNF Fuel Bundle Design Number					
	EDB-3881	EDB-2476	EDB-2611	EDB-2569	EDB-2800	EDB-2801
0.00	9.17	9.29	9.42	9.60	9.31	8.89
0.22	9.24	9.35	9.50	9.61	9.40	8.99
1.10	9.38	9.47	9.64	9.68	9.55	9.15
2.20	9.59	9.64	9.84	9.83	9.72	9.36
3.31	9.82	9.83	10.05	10.01	9.90	9.58
4.41	9.95	10.02	10.27	10.21	10.08	9.77
5.51	10.08	10.22	10.47	10.43	10.23	9.97
6.61	10.19	10.42	10.64	10.63	10.37	10.13
7.72	10.27	10.55	10.77	10.84	10.51	10.28
8.82	10.35	10.66	10.91	11.05	10.65	10.43
9.92	10.42	10.78	11.04	11.24	10.79	10.58
11.02	10.50	10.89	11.16	11.32	10.94	10.73
12.13	10.58	10.99	11.26	11.40	11.08	10.89
13.23	10.68	11.07	11.35	11.42	11.21	11.04
14.33	10.78	11.11	11.42	11.42	11.33	11.18
15.43	10.87	11.15	11.42	11.42	11.42	11.30
16.53	10.83	11.06	11.42	11.42	11.42	11.29
18.74	10.71	10.86	11.26	11.36	11.33	11.25
22.05	10.48	10.57	10.95	11.02	11.13	11.10
27.56	10.06	10.11	10.41	10.45	10.66	10.63
32.22	9.70	--	--	--	--	--
33.07	9.63	9.67	9.89	9.90	10.11	10.08
33.42	--	9.64	9.86	9.87	10.07	10.05
38.58	9.17	9.24	9.38	9.40	9.57	9.55
44.09	8.67	8.79	8.87	8.90	9.04	9.02
49.60	8.08	8.25	8.35	8.38	8.50	8.47
55.12	7.45	7.69	7.78	7.81	7.95	7.91
60.63	6.81	5.49	5.87	6.07	6.43	6.35
61.94	--	4.89	--	--	--	--
62.65	6.56	--	--	--	--	--
62.92	--	--	4.83	--	--	--
63.37	--	--	--	4.82	--	--
63.50	--	--	--	--	5.13	5.04
63.97	--	--	--	--	--	4.83
64.16	--	--	--	--	4.83	--

GNF Bundle #	GNF Fuel Bundle Identification
EDB-3881	GE14-P10HNAB385-14GZ-100T-148-T6-3881 (GE14B)
EDB-2476	GE14-P10HNAB379-17GZ-100T-150-T6-2476 (GE14C)
EDB-2611	GE14-P10DNAB393-17GZ-100T-150-T6-2611 (GE14C)
EDB-2569	GE14-P10DNAB398-16GZ-100T-150-T6-2569 (GE14C)
EDB-2800	GE14-P10DNAB395-14GZ-100T-150-T6-2800 (GE14C)
EDB-2801	GE14-P10DNAB393-17GZ-100T-150-T6-2801 (GE14C)

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Figure 2-1

Power Dependent MAPFAC(P) and LHGRFAC(P) Multiplier

(GNF Proprietary Information)
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Figure 2-2

Flow Dependent MAPFAC(F) and LHGRFAC(F) Multiplier

(GNF Proprietary Infomation)
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3. MINIMUM CRITICAL POWER RATIO

3.1 Technical Specification Reference

Technical Specifications 3.2.2 and 3.7.7.

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3.2 Two Recirculation Loop Operation

During steady-state power operation, the minimum Critical Power Ratio (MCPR) shall be greater than or equal to the Operating Limit MCPR (OLMCPR) defined as a function of cycle exposure and plant conditions.

The Operating Limit MCPR with two recirculation loops in operation is defined as follows:

OLMCPR = maximum [MCPR(P), MCPR(F)]

where,

MCPR(P) = Core power dependent MCPR shown in Figure 3-1,

MCPR(F) = Core flow rate dependent MCPR shown in Figure 3-2.

The MCPR(P) and MCPR(F) graphs presented in Figure 3-1 and Figure 3-2, respectively, are defined in Reference 6.

As shown in Figure 3-1, the MCPR(P) value is calculated as follows:

For $P \geq P(Bypass)$, MCPR(P) = OLMCPR(100) * K_P

For $P < P(Bypass)$, MCPR(P) = MCPR(P) as a function of core flow

where,

P(Bypass) = P(Bypass) is the core power level below which the Turbine Stop Valve closure and Turbine Control Value fast closure scrams are assumed to be bypassed. P(Bypass) is currently set at 30% of rated power.

OLMCPR(100) = OLMCPR for rated core power and flow conditions. OLMCPR(100) is defined as a function of scram time surveillance data as defined in Section 3.3.

K_P = Core power dependent OLMCPR multiplier.

No thermal limits monitoring is required below 25% of rated power. Therefore, the OLMCPR limit defined above is only applicable for core conditions at or above 25% of rated power.

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3.3 Application of Scram Time Surveillance Data to OLMCPR(100)

The OLMCPR(100) value applicable to the MCPR(P) calculation presented in Section 3.2 is determined based on scram time surveillance data recorded for the current operating cycle and the following methodology defined in Reference 7, Reference 11, and Reference 12.

3.3.1 Mean Scram Time (τ_{ave})

The mean scram time for control rod insertion to notch 36 is calculated as follows:

$$\tau_{ave} = \frac{\sum_{i=1}^{n} N_i \tau_i}{\sum_{i=1}^{n} N_i}$$

where,

i = Scram time test sequential identification number,

n = Number of scram time tests performed to date in the cycle (including beginning of cycle),

N_i = Number of control rods measured in test i,

τ_i = Average insertion time to notch 36 measured in test i,

3.3.2 20% Insertion Conformance Limit Scram Time (τ_B)

The 20% insertion conformance limit scram time is calculated as follows:

$$\tau_B = \mu + 1.65\sigma \sqrt{\frac{N_1}{\sum_{i=1}^{n} N_i}}$$

where,

μ = Mean of the distribution for average scram time insertion to position 36 used in the ODYN Option B analysis,

σ = Standard deviation of the distribution for average scram time insertion to position 36 used in the ODYN Option B analysis,

N_1 = Total number of control rods measured during the first surveillance test performed at beginning of cycle.

The values for μ, σ and N_1 are given below.

μ = 0.830

σ = 0.019

N_1 = 137

Using the values given above, Reference 7 defines the 20% insertion conformance limit scram time as,

$$\tau_B = 0.830 + 0.367\sqrt{\frac{1}{\sum_{i=1}^{n} N_i}}$$

3.3.3 Scram Time Quality Factor (τ)

The scram time quality factor is calculated as follows:

If $\tau_{ave} \le \tau_B$, $\tau = 0$.

If $\tau_{ave} > \tau_B$, $\tau = \dfrac{\tau_{ave} - \tau_B}{\tau_A - \tau_B}$

where,

τ_A = Technical Specification limit for 20% insertion (notch 36)
= 1.08 seconds (Technical Specification Table 3.1.4-1),

3.3.4 Calculation of OLMCPR(100)

The OLMCPR for rated power and core flow conditions is calculated as follows based on the calculated values for τ_{ave}, τ_B, and τ:

$$OLMCPR(100) = OLMCPR_B + \tau * (OLMCPR_A - OLMCPR_B)$$

where,

$OLMCPR_A$ = Option A OLMCPR value given in Table 3-1,

$OLMCPR_B$ = Option B OLMCPR value given in Table 3-1.

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3.4 Single Recirculation Loop Operation

The Operating Limit MCPR with a single recirculation loop in operation is defined as follows:

$$OLMCPR = \text{maximum } [MCPR(SL\text{-}P), MCPR(SL\text{-}F)]$$

where,

For P ≥ P(Bypass), $MCPR(SL\text{-}P) = [OLMCPR(100) + \Delta OLMCPR(SLO)] * K_P$

For P < P(Bypass), $MCPR(SL\text{-}P) = MCPR(P) + \Delta OLMCPR(SLO)$,

For all core flows, $MCPR(SL\text{-}F) = MCPR(F) + \Delta OLMCPR(SLO)$,

$\Delta OLMCPR(SLO) = 0.02$ from Reference 6 Appendix H,

and OLMCPR(100), MCPR(P), and MCPR(F) are as defined in Section 3.2.

The increase in the OLMCPR for single loop operation corresponds to an increase in the safety limit MCPR (SLMCPR) for single loop operation as described in Reference 6 Appendix H.

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3.5 Use of Full Arc Turbine Control Valve

The Operating Limit MCPR when using full arc turbine control valve mode (CNS operating procedures refer to this as single valve mode) is defined as follows:

$$OLMCPR \text{ (single valve mode)} = OLMCPR + \Delta OLMCPR \text{ (single valve mode)}$$

where,

OLMCPR = OLMCPR as calculated in Section 3.2 for two recirculation loop operation or in Section 3.4 for single loop operation.

ΔOLMCPR (single valve mode) = 0.03 from Reference 6 Appendix E.

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Table 3-1

OLMCPR Values for OLMCPR(100) Calculation

Equipment Status	Applicable Cycle Exposure Range	$OLMCPR_A$	$OLMCPR_B$
Equipment In-Service	BOC to EOR-2.480 GWd/MT	1.50	1.39
	EOR-2.480 GWd/MT to EOC	1.62	1.45
Turbine Bypass Valve Out of Service (TBVOOS)	BOC to EOC	1.63	1.46

NOTES:

1. The range of OLMCPR values are defined as follows:

   $OLMCPR_A$ = Option A OLMCPR from Reference 6 based on Option A analysis using full core scram times defined in Technical Specification Table 3.1.4-1.

   $OLMCPR_B$ = Option B OLMCPR from Reference 6 based on Option B analysis described in Reference 1.

2. The OLMCPR values presented above apply to rated power operation based on a two loop operation Safety Limit MCPR (SLMCPR) of 1.12.

3. The OLMCPR values presented above bound Increased Core Flow (ICF) operation to 105% of rated flow throughout the cycle.

4. Exposure ranges are defined as follows:

   BOC = Beginning of cycle,

   EOC = End of cycle,

   EOR = End of rated power operation at rated core flow and all rods withdrawn. EOR is projected to be 14.054 GWd/MT in Reference 6 Appendix H. The EOR exposure will vary based on actual cycle operations.

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Figure 3-1

Power Dependent K(P) and MCPR(P) for GE14 Fuel with Safety Limit = 1.12

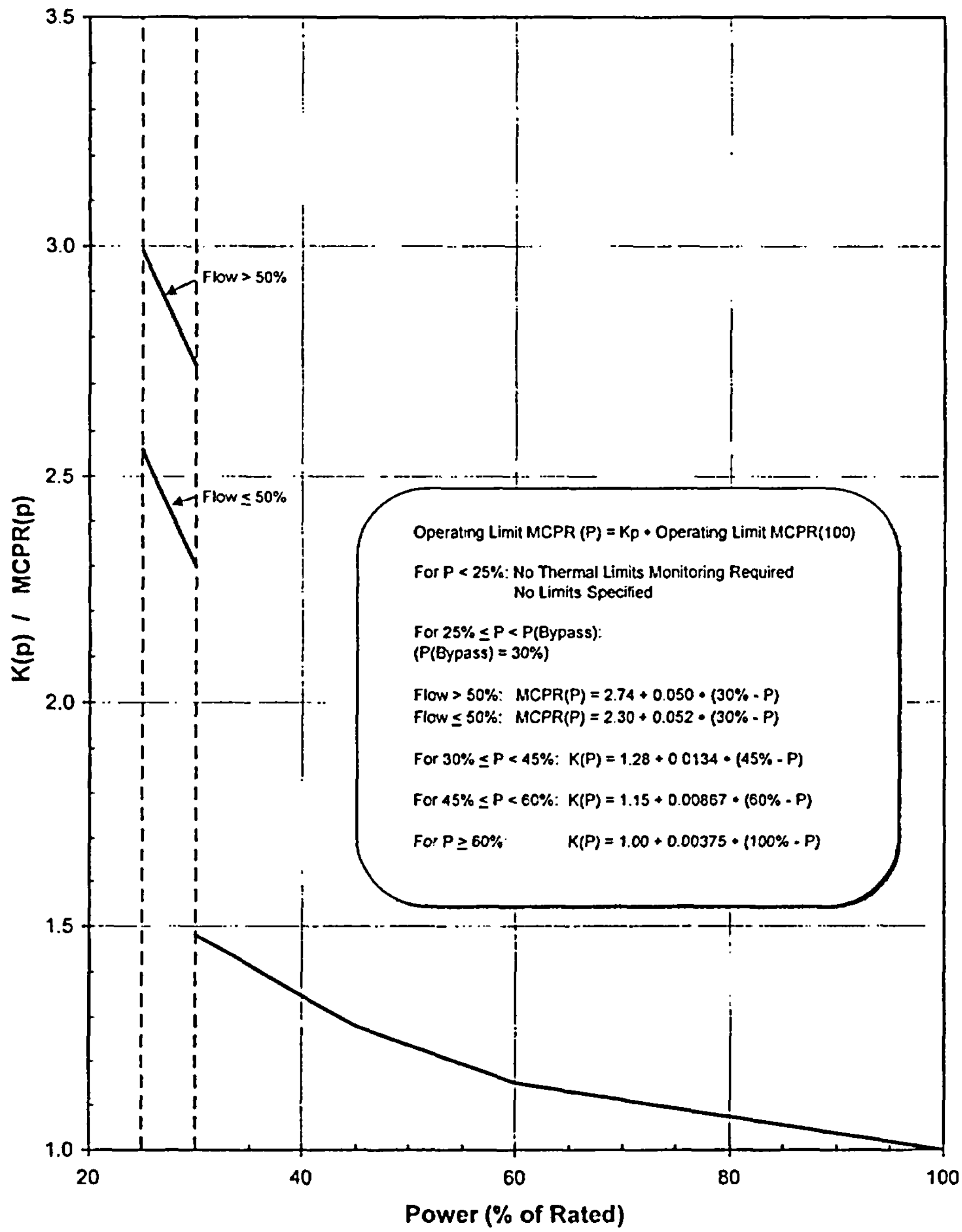

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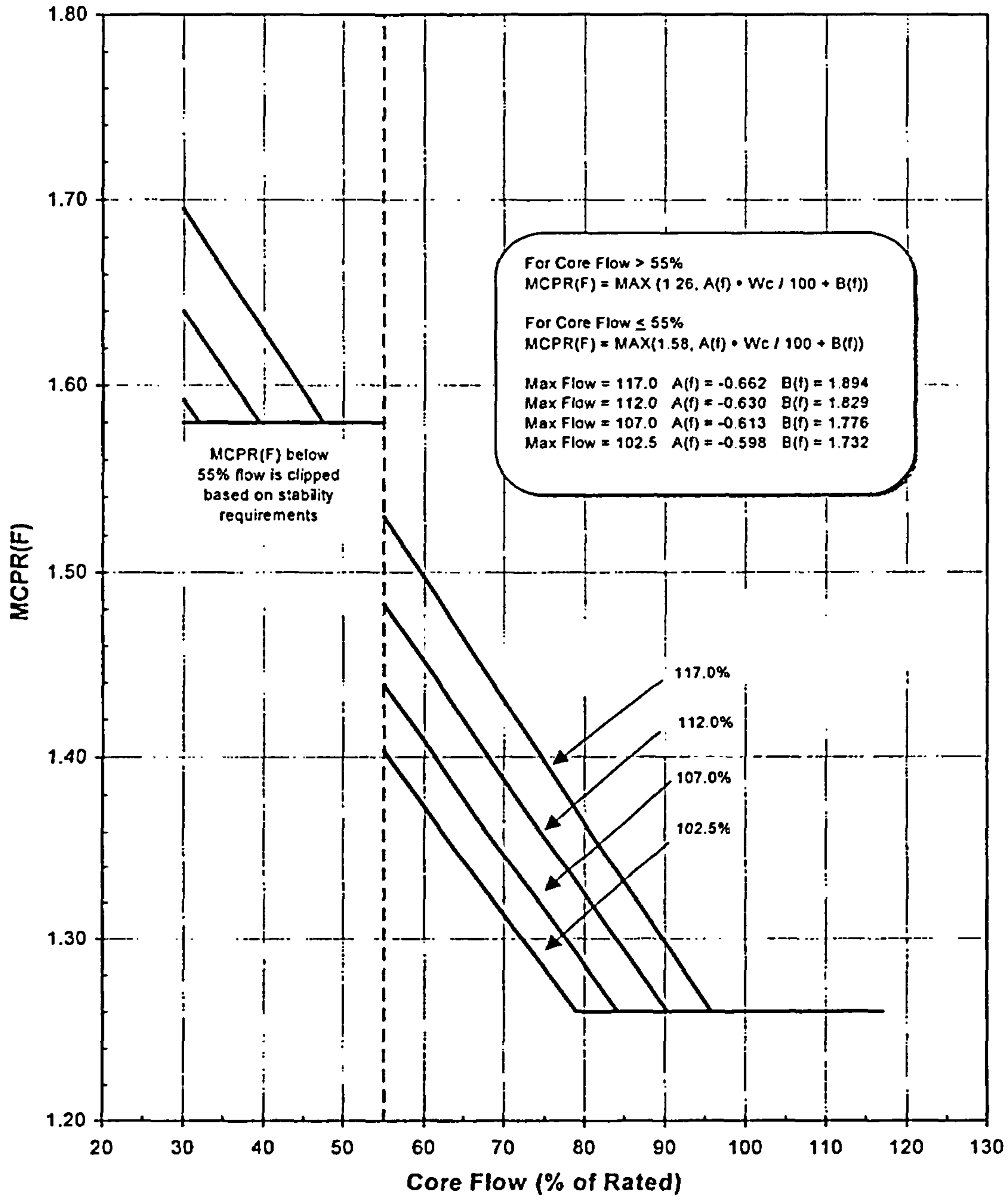
Figure 3-2

Flow Dependent MCPR(F) for GE14 Fuel with Safety Limit = 1.12



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4. TURBINE BYPASS SYSTEM RESPONSE TIME

4.1 Technical Specification Reference

Technical Specification 3.7.7.3.

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4.2 System Response Time

The system response time for the Turbine Bypass System to be at 80% of rated bypass flow is 0.3 seconds. This was obtained from Reference 8.

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5. ROD BLOCK MONITOR TRIP SETPOINTS

5.1 Technical Specification Reference

Technical Specification 3.3.2.1.

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5.2 Trip Setpoints

The allowable values for the power dependent Rod Block Monitor (RBM) upscale trip setpoints are defined in Table 5-1, along with the applicable reactor power ranges associated with each trip setpoint. The Analytical Limit (AL) and Technical Specification Allowable Value (AV) presented in Table 5-1 were determined in Reference 9 and Reference 4.

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Table 5-1

Rod Block Monitor Channel Settings

Trip Function	Analytical Limit [1]	Allowable Value [1]
Low Power Setpoint (LPSP)	30.0%	**27.5%**
Intermediate Power Setpoint (IPSP)	65.0%	**62.5%**
High Power Setpoint (HPSP)	85.0%	**82.5%**
Downscale Trip Setpoint (DTSP)	89.0%	**92.0%**

Trip Function	Applicable Core Power Range	MCPR Limit [2]	Analytical Limit [3]	Allowable Value [3]
Low Trip Setpoint (LTSP)	LPSP ≤ P ≤ IPSP	1.31	≤ 120.0 / 125	**≤ 117.0 / 125**
Intermediate Trip Setpoint (ITSP)	IPSP < P ≤ HPSP	1.31	≤ 115.2 / 125	**≤ 112.5 / 125**
High Trip Setpoint (HTSP)	HPSP < P	1.31	≤ 110.2 / 125	**≤ 107.5 / 125**

NOTES:

1. Setpoints are given in units of percent of rated power.
2. The RBM trip level settings associated with the MCPR limit were verified in Reference 6 to bound the cycle specific Rod Withdrawal Error (RWE) analysis for an RBM setpoint of 111% of reference level. The MCPR limit is based on an adjusted MCPR limit from the generic analysis documented in Reference 4 performed for an Analyzed Trip Level Setting (without RBM filter) of 111.0% of the reference level or an Analyzed Trip Level Setting (with RBM filter) of 110.2% of the reference level. The generic MCPR limit of 1.25 was calculated in Reference 4 for an SLMCPR of 1.07. The MCPR limit documented above was calculated by multiplying the generic limit of 1.25 by the ratio of the SLMCPR values (1.12/1.07).
3. RBM trip setpoints are given in units of divisions of full scale.

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6. MAXIMUM LINEAR HEAT GENERATION RATE

6.1 Technical Requirements Manual Reference

Technical Requirements Manual Specification T3.2.1.

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6.2 Two Recirculation Loop Operation

During steady-state power operation, the maximum Linear Heat Generation Rate (LHGR) in any fuel rod in any fuel bundle at any axial location shall not exceed the applicable limiting value.

The maximum allowable Linear Heat Generation Rate with two recirculation loops in operation is defined as follows:

LHGR Limit = minimum [LHGR(P), LHGR(F)]

where,

LHGR(P) = $LHGR_{STD}$ * LHGRFAC(P),

LHGR(F) = $LHGR_{STD}$ * LHGRFAC(F),

$LHGR_{STD}$ = Fuel bundle type, fuel rod type, and peak pellet exposure dependent maximum LHGR values for rated core power and flow conditions represented by the values shown in Table 6-1,

LHGRFAC(P) = Core power dependent multiplier shown in Figure 2-1,

LHGRFAC(F) = Core flow rate dependent multiplier shown in Figure 2-2.

The $LHGR_{STD}$ values presented in Table 6-1 represent the maximum allowable peak pellet power (LHGR) for both UO_2 only fuel rods and UO_2 fuel rods containing gadolinia. The peak pellet powers are defined as a function of pellet exposure. The maximum allowable LHGR values for the UO_2 fuel rods containing gadolinia are a function of both the gadolinium concentration in the pellet and the maximum gadolinium concentration in the entire fuel rod. Therefore, only the most bounding LHGR value for all gadolinium concentrations occurring in the bundle design is presented in Table 6-1. The actual pellet specific $LHGR_{STD}$ values defined in Reference 10 are utilized in the process computer. The process computer will be used to verify the pellet specific LHGR limits for each fuel bundle type are not violated.

Reference 6 Appendix D defines the LHGRFAC(P) and LHGRFAC(F) multipliers to be identical to the MAPFAC(P) and MAPFAC(F) multipliers presented in Figure 2-1 and Figure 2-2, respectively.

No thermal limits monitoring is required below 25% of rated power. Therefore, the LHGR limit defined above is only applicable for core conditions at or above 25% of rated power.

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6.3 Single Recirculation Loop Operation

The maximum allowable Linear Heat Generation Rate with one recirculation loop in operation (SLO) is defined as follows:

LHGR Limit = minimum [LHGR(P), LHGR(F), LHGR(SLO)]

where,

LHGR(SLO) = $LHGR_{STD}$ * LHGRFAC(SLO),

LHGRFAC(SLO) = Single loop operation PLHGR multiplier.

and LHGR(P) and LHGR(F) are as defined in Section 6.2 above.

As shown above, it is not necessary to apply both the off-rated (LHGRFAC(P) and LHGRFAC(F)) and SLO multiplier corrections at the same time.

The single loop operation peak LHGR (PLHGR) multipliers for each fuel bundle type are defined in Reference 6 as shown in the table below.

Fuel Bundle Type	**SLO PLHGR Multiplier**
All GE14B bundles	0.91
All GE14C bundles	0.91

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Table 6-1

Bounding $LHGR_{STD}$ Values By Fuel Bundle Type

UO_2 Only Fuel Rods

(GNF Proprietary Information)

Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ Values (in kW/ft) by GNF Fuel Bundle Design Number					
	EDB-3881	EDB-2476	EDB-2611	EDB-2569	EDB-2800	EDB-2801
0.00	13.40	13.40	13.40	13.40	13.40	13.40
[[						
						[3]]]

UO_2 Fuel Rods Containing Gadolinia

(GNF Proprietary Information)

EDB-3881 (6.0 w/o Gd)*		EDB-2476 (5.0 w/o Gd)*		EDB-2611 (5.0 w/o Gd)*		EDB-2569 (4.0 w/o Gd)*	
Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ (kW/ft)	Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ (kW/ft)	Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ (kW/ft)	Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ (kW/ft)
[[							
							[3]]]

EDB-2800 (6.0 w/o Gd)*		EDB-2801 (6.0 w/o Gd)*	
Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ (kW/ft)	Peak Pellet Exposure (GWd/MT)	$LHGR_{STD}$ (kW/ft)
[[			
			[3]]]

* Bounding gadolinium concentration occurring in the bundle design.

(The information bracketed and identified by the superscript is proprietary [[...[3]]].)

Bundle Types

GNF Bundle #	GNF Fuel Bundle Identification
EDB-3881	GE14-P10HNAB385-14GZ-100T-148-T6-3881 (GE14B)
EDB-2476	GE14-P10HNAB379-17GZ-100T-150-T6-2476 (GE14C)
EDB-2611	GE14-P10DNAB393-17GZ-100T-150-T6-2611 (GE14C)
EDB-2569	GE14-P10DNAB398-16GZ-100T-150-T6-2569 (GE14C)
EDB-2800	GE14-P10DNAB395-14GZ-100T-150-T6-2800 (GE14C)
EDB-2801	GE14-P10DNAB393-17GZ-100T-150-T6-2801 (GE14C)

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7. STABILITY POWER/FLOW MAP

7.1 Technical Specification Reference

Technical Specification 3.4.1.

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7.2 Stability Exclusion Region

The stability region is represented by the Exclusion Region boundaries defined in Reference 6. A detailed view of the Exclusion Region of the power/flow map is presented in Figure 7-1.

Intentional operation within the Exclusion Region is prohibited. The Exclusion Region is defined in the table below.

Exclusion Region	Power (% of Rated)	Flow (% of Rated)
A	85.6	58.8
B	36.3	32.5

Point "A" is on the highest flow control line and point "B" is on the natural circulation line (see Figure 7-1).

The region boundaries are defined using the generic shape function given in Reference 6. The calculation of the region boundaries as a function of core thermal power and core flow rate is summarized below.

$$P = P_B \times \left(\frac{P_A}{P_B}\right)^{\frac{1}{2}\left[\frac{W-W_B}{W_A-W_B}+\left(\frac{W-W_B}{W_A-W_B}\right)^2\right]}$$

where,

P = Core thermal power (% of rated) on the region boundary,

W = Core flow rate (% of rated) corresponding to power, P, on the region boundary,

P_A = Core thermal power (% of rated) at point A,

P_B = Core thermal power (% of rated) at point B,

W_A = Core flow rate (% of rated) at point A,

W_B = Core flow rate (% of rated) at point B.

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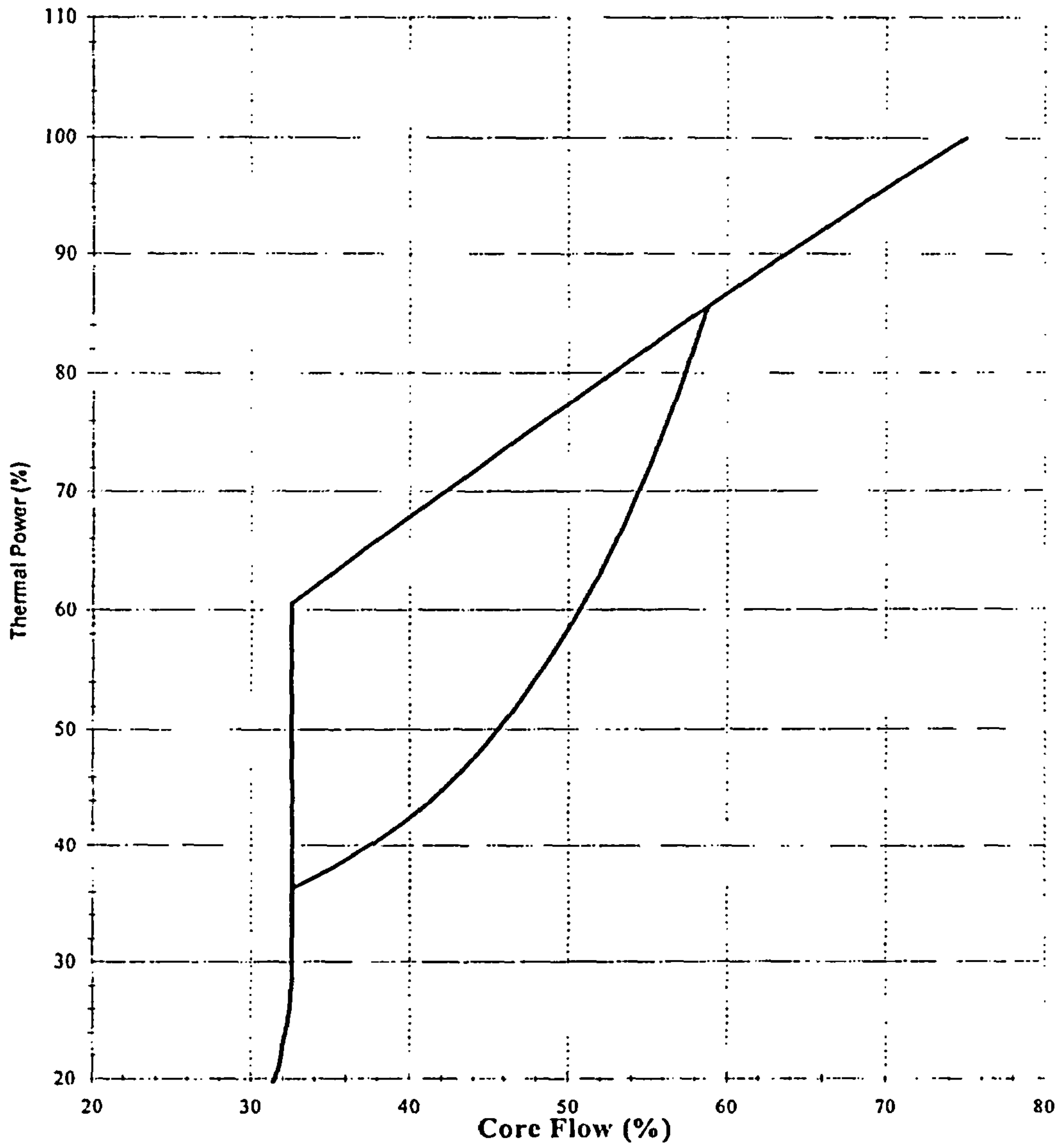
Figure 7-1

Stability Exclusion Region Map



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8. REFERENCES

The following references are identified in this report:

1. NEDE-24011-P-A-14, "General Electric Standard Application for Reactor Fuel", June 2000.
2. NEDE-23785-1-P-A, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident", Volume III, Revision 1, October 1984.
3. NEDO-31960-A and NEDO-31960-A Supplement 1, "BWR Owner's Group Long-Term Stability Solutions Licensing Methodology", November 1995.
4. NEDC-31892P, "Extended Load Line Limit and ARTS Improvement Program Analyses for Cooper Nuclear Station Cycle 14", Revision 1, May 1991.
5. GE-NE-L12-00867-12, "Project Task Report Cooper Nuclear Station MIG Project Task 900: Transient Analysis", Revision 1, May 2000.
6. 0000-0025-0510-SRLR, "Supplemental Reload Licensing Report for Cooper Nuclear Station Reload 22 Cycle 23", Revision 1, February 2005.
7. CNS Procedure 10.9, "Control Rod Scram Time Evaluation", current revision.
8. GE Design Specification 22A2859, "Turbine-Generator and Steam Bypass System", Paragraph 4.3.8, Revision 3.
9. NEDC 98-024, "APRM - RBM Setpoint Calculation", current revision.
10. 0000-0025-0510-FBIR, "Fuel Bundle Information Report for Cooper Nuclear Station Reload 22 Cycle 23", Revision 0, November 2004.
11. GE Letter DTI:NPPD 81-029, "ODYN Option B Scram Time Surveillance Procedures," March 29, 1981.
12. GE Letter DGC:89-190, "Cooper Reload 13 Technical Specification Changes," November 30, 1989.

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Correspondence Number: NLS2005098

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		

ENCLOSURE 2

AFFIDAVIT

COOPER NUCLEAR STATION

DOCKET No. 50-298, DPR-46

Affidavit

I, Jens G. M. Andersen, state as follows:

(1) I am Fellow and project manager, TRACG Development, Global Nuclear Fuel – Americas, L.L.C. ("GNF-A") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in the attachment, "Cooper Nuclear Station, Core Operating Limits Report, Cycle 23, Revision 1." GNF proprietary information is indicated by enclosing it in double brackets. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of GNF-A, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future GNF-A customer–funded development plans and programs, of potential commercial value to GNF-A;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b., above.

(5) To address the 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit–making opportunities. The fuel design and licensing methodology is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC–approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A or its licensor.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 1st day of June, 2005.

Jens G. M. Andersen

Jens G. M. Andersen
Global Nuclear Fuel – Americas, LLC

ENCLOSURE 3

CORE OPERATING LIMITS REPORT

CYCLE 23, REVISION 1

NON-PROPRIETARY VERSION

COOPER NUCLEAR STATION

DOCKET No. 50-298, DPR-46