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Exelon Nuclear

December 2, 2004

SVPLTR: #04-0080

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

Dresden Nuclear Power Station, Unit 3
Facility Operating License No. DPR-25
NRC Docket No. 50-249

Subject: Core Operating Limits Report for Unit 3 Cycle 19 Revision 0

The purpose of this letter is to transmit Revision 0 of the Core Operating Limits Report (COLR) for Dresden Nuclear Power Station (DNPS) Unit 3 operating cycle 19 (D3C19) in accordance with Technical Specifications Section 5.6.5, "CORE OPERATING LIMITS REPORT (COLR)."

The Unit 3 COLR is being issued for reload cycle parameters for operating cycle D3C19. This COLR contains proprietary information of the type that Global Nuclear Fuel – Americas, L.L.C. (GNF-A) maintains in confidence and withholds from public disclosure. The information has been handled and classified as proprietary to GNF-A as indicated in the affidavit included as Attachment A. Exelon Generation Company, LLC (EGC) hereby requests that Attachment B be withheld from public disclosure in accordance with 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," and 10 CFR 9.17, "Agency records exempt from public disclosure." The non-proprietary COLR version is contained in Attachment C to this letter. Should you have any questions concerning this letter, please contact Mr. P. Salas at (815) 416-2800.

Respectfully,

Danny Bost
Site Vice President
Dresden Nuclear Power Station

Attachments: A – GNF-A Proprietary Information Affidavit
B – COLR for Dresden Unit 3 Cycle 19, Revision 0, GNF-A Proprietary Version
C – COLR for Dresden Unit 3 Cycle 19, Revision 0, GNF-A Non-Proprietary Version

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station

APO1

Attachment A

GNF-A Proprietary Information Affidavit

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, "Core Operating Limits Report for Dresden Unit 3 Cycle 19, Revision 0,". 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 16th day of November, 2004.

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

Attachment C

COLR

for

Dresden Unit 3 Cycle 19

Revision 0

GNF-A Non-Proprietary Version

Core Operating Limits Report

for

Dresden Unit 3, Cycle 19

Revision 0

Table of Contents

List of Tables

1. References

1. Exelon Generation Company, LLC, Docket No. 50-249, Dresden Nuclear Power Station, Unit 3, Facility Operating License, License No. DPR-25.

2. Letter from D. M. Crutchfield to All Power Reactor Licensees and Applicants, Generic Letter 88-16; "Removal of Cycle-Specific Parameter Limits from Technical Specifications," October 3, 1988.

3. GNF Document, 0000-0025-1300-SRLR, Revision 1, "Supplemental Reload Licensing Report for Dresden 3 Reload 18 Cycle 19", October 2004.

4. GNF Document, 0000-0006-9848-SRLR, Revision 2, "Supplemental Reload Licensing Report for DRESDEN UNIT 3 Reload 17 Cycle 18", October 2003. (TODI NF0200124 Revision 1, December 2003)

5. Exelon TODI, TODI NF0400106, Revision 1, "Dresden Unit 3 Cycle 19 Final FRED", July 28, 2004.

6. GE Document, GE-NE-J11-03912-00-01-R2, "Dresden 2 and 3 Quad Cities 1 and 2 Equipment Out-Of-Service and Legacy Fuel Transient Analysis" September 2003. (TODI NFM0100091 Sequence 02)

7. Exelon TODI, Ops Ltr:04-06, Revision 1, "OPL-3 Parameters for Dresden Unit 3 Cycle 19 Transient Analysis," June 24, 2004.

8. Exelon Calculation Note, BNDG:02-001, Revision 0, "Determination of Generic $MCPR_F$ Limits," May 17, 2002.

9. GE Design Basis Document, DB-0012.03, Revision 0, "Fuel-Rod Thermal-Mechanical Performance Limits for GE14C," May 2000.

10. FANP Document, EMF-2563(P) Revision 1, "Fuel Mechanical Design Report Exposure Extension for ATRIUM-9B Fuel Assemblies at Dresden, Quad Cities, and LaSalle Units," August 2001 (TODI NFM0100107 Sequence 0).

11. GE Document, GE DRF C51-00217-01, "Instrument Setpoint Calculation Nuclear Instrumentation Rod Block Monitor Dresden 2 & 3", December 15, 1999.

12. GNF Letter, FRL02EX-013, "Quad Cities Unit 1 Cycle 18 and Dresden Unit 3 Cycle 18 Pellet Based LHGR Limits," F. R. Lindquist to J. Nevling, September 30, 2002.

13. GNF Letter, MJM-EXN-EB3-04-015, "Transmittal of the Dresden 3 C19 SRLR / LHGR Limits and R-factors," Mark J. Mneimneh to Haksoo Kim, October 12, 2004.

14. Exelon Letter, NF-MW:02-0413, "Approval of GE Evaluation of Dresden and Quad Cities Pressure Regulator Out of Service Analysis", Carlos de la Hoz to Doug Wise and Alex Misak, October 22, 2002.

15. Exelon Letter, NF-MW:02-0081, "Approval of GE Evaluation of Dresden and Quad Cities Extended Final Feedwater Temperature Reduction," Carlos de la Hoz to Doug Wise and Alex Misak, August 27, 2002.

16. GE Document, GENE-0000-0029-7262-R0, "Evaluation Report BSP Stability Evaluation for Dresden Unit 3 C19," September 2004 (TODI NF0400244 Revision 0).

17. Exelon Letter, NF-MW:03-069, "Dresden and Quad Cities Operation with one TSV OOS," Candice Chou to Alex Misak and Doug Wise, July 28, 2003.

18. GNF Letter, MJM-EXN-EB3-04-025, "D3C19 GESTARII Compliance Assessment," Mark Mneimneh to Haksoo Kim, October 29, 2004.

19. GE Document, GE-NE-0000-0023-0064-R0, "Technical Assessment of the Effects of RWCU Flow on Core Inlet Enthalpy for the Dresden Generating Station," November 2003.

20. GE Document, GE-NE-0000-0034-6539-R0, "Dresden/Quad Cities Clarification on Required Turbine Bypass Capacity for PRC 04-23 Issue," November 17, 2004.

2. Terms and Definitions

APLHGR	Average planar linear heat generation rate
APRM	Average power range monitor
ATRM9	ATRIUM-9B fuel
BOC	Beginning of cycle
DLO	Dual loop operation
EOC	End of cycle
EOOS	Equipment out of service
EOR	End of rated conditions (i.e cycle exposure at 100% power, 100% flow, all-rods-out)
FANP	Framatome Advanced Nuclear Power
FWHOOS	Feedwater heater out of service
FW	Feedwater
GE14	GE14C fuel
GNF	Global Nuclear Fuel
ICF	Increased core flow
LHGR	Linear heat generation rate
LHGRFAC(F)	Flow dependent LHGR multiplier
LHGRFAC(P)	Power dependent LHGR multiplier
LPRM	Local power range monitor
MAPFAC(F)	Flow dependent MAPLHGR multiplier
MAPFAC(P)	Power dependent MAPLHGR multiplier
MAPLHGR	Maximum average planar linear heat generation rate
MCPR	Minimum critical power ratio
MCPR(F)	Flow dependent MCPR
MCPR(P)	Power dependent MCPR
OLMCPR	Operating limit minimum critical power ratio
PLUOOS	Power load unbalance out of service
PROOS	Pressure regulator out of service
RBM	Rod block monitor
SLMCPR	Safety limit minimum critical power ratio
SLO	Single loop operation
SRVOOS	Safety-relief valve out of service
TBPOOS	Turbine bypass valve out of service
TCV	Turbine control valve
TIP	Transversing Incore Probe

3. General Information

Power and flow dependent limits are listed for various power and flow levels. Linear interpolation is to be used to find intermediate values.

Rated core flow is 98 Mlb/hr. Operation up to 108% rated flow is licensed for this cycle. Licensed rated thermal power is 2957 MWth.

MCPR(P) and MCPR(F) values are independent of scram time.

For thermal limit monitoring above 100% rated power or 100% rated core flow, the 100% rated power and the 100% core flow thermal limit values, respectively, should be used unless otherwise indicated in the applicable table.

4. Average Planar Linear Heat Generation Rate

The MAPLHGR values for the most limiting lattice (excluding natural uranium) of each fuel type as a function of average planar exposure is given in Tables 4-1 and 4-2. During single loop operation, these limits are multiplied by the SLO multiplier listed in Table 4-3.

Table 4-1 MAPLHGR for bundle(s):
ATRM9-P9DATB362-12GZ-SPC100T-9WR-144-T6-2450
ATRM9-P9DATB378-13GZ-SPC100T-9WR-144-T6-2464
ATRM9-P9DATB378-11GZ-SPC100T-9WR-144-T6-2465
(Reference 4)

Planar Average Exposure (GWd/MTU)	MAPLHGR (kW/ft)
0.00	13.52
17.25	13.52
70.00	7.84

Table 4-2 MAPLHGR for bundle(s):
GE14-P10DNAB411-4G7.0/9G6.0-100T-145-T6-2553
GE14-P10DNAB408-16GZ-100T-145-T6-2554
GE14-P10DNAB396-18GZ-100T-145-T6-2808
GE14-P10DNAB406-18GZ-100T-145-T6-2809
(References 3 and 4)

Planar Average Exposure (GWd/MTU)	MAPLHGR (kW/ft)
0.00	11.68
16.00	11.68
55.12	8.01
63.50	6.97
70.00	4.36

Table 4-3 MAPLHGR SLO multiplier for GE and FANP Fuel
(Reference 3)

Fuel Type	SLO Multiplier
ATRM9	0.84
GE14	0.77

5. Operating Limit Minimum Critical Power Ratio

5.1. Manual Flow Control MCPR Limits

The OLMCPR is determined for a given power and flow condition by evaluating the power-dependent MCPR and the flow-dependent MCPR and selecting the greater of the two.

5.1.1. Power-Dependent MCPR

For operation at less than 38.5% core thermal power, the OLMCPR as a function of core thermal power is shown in Table 5-3. For operation at greater than 38.5% core thermal power, the OLMCPR as a function of core thermal power is determined by multiplying the applicable rated condition OLMCPR limit shown in Table 5-1 or 5-2 by the applicable MCPR multiplier K(P) given in Table 5-3. For operation at exactly 38.5% core thermal power, the OLMCPR as a function of core thermal power is the higher of either of the two methods evaluated at 38.5% core thermal power.

5.1.2. Flow-Dependent MCPR

Tables 5-4 and 5-5 give the MCPR(F) limit as a function of the flow based on the applicable plant condition. The MCPR(F) limit determined from these tables is the flow dependent OLMCPR.

5.2. Automatic Flow Control MCPR Limits

Automatic Flow Control MCPR Limits are not provided

5.3. Scram Time

Option A and Option B refer to scram speeds.

Option A scram speed is the Improved Technical Specification scram speed. The core average scram speed insertion time for 20% insertion must be less than or equal to the Technical Specification scram speed to utilize Option A MCPR limits. Reload analyses performed by (GNF) for Cycle 19 Option A MCPR limits utilized a 20% core average insertion time of 0.900 seconds (Reference 7).

To utilize the MCPR limits for the Option B scram speed, the core average scram insertion time for 20% insertion must be less than or equal to 0.694 seconds (Reference 7). If the core average scram insertion time does not meet the Option B criteria, but is within the Option A criteria, the appropriate MCPR value may be determined from a linear interpolation between the Option A and B limits with standard mathematical rounding to two decimal places. When performing a linear interpolation to determine MCPR limits, ensure that the time used for Option A is 0.900 seconds.

5.4. Recirculation Pump Motor Generator Settings

Cycle 19 was analyzed with a maximum core flow runout of 110%; therefore the recirculation pump motor generator scoop tube mechanical and electrical stops must be set to maintain core flow less than 110% (107.8 Mlb/hr) for all runout events (Reference 5). This value is consistent with the analyses of References 3 and 6.

Table 5-1 MCPR Option A Based Operating Limits
(References 3 and 6)

EOOS Combination	Fuel Type	Cycle Exposure	
		< EOR - 1709 MWd/MT	≥ EOR - 1709 MWd/MT
BASE	ATRM9	1.46	1.60
	GE14	1.53	1.65
BASE SLO	ATRM9	1.47	1.61
	GE14	1.54	1.66
PLUOOS	ATRM9	1.55	1.60
	GE14	1.61	1.65
PLUOOS SLO	ATRM9	1.56	1.61
	GE14	1.62	1.66
TBPOOS	ATRM9	1.64	1.66
	GE14	1.71	1.73
TBPOOS SLO	ATRM9	1.65	1.67
	GE14	1.72	1.74
TCV SLOW CLOSURE	ATRM9	1.49	1.60
	GE14	1.56	1.65
TCV SLOW CLOSURE SLO	ATRM9	1.50	1.61
	GE14	1.57	1.66
TCV STUCK CLOSED	ATRM9	1.46	1.60
	GE14	1.53	1.65
TCV STUCK CLOSED SLO	ATRM9	1.47	1.61
	GE14	1.54	1.66

Table 5-2 MCPR Option B Based Operating Limits
(References 3 and 6)

EOOS Combination	Fuel Type	Cycle Exposure	
		< EOR - 1709 MWd/MT	≥ EOR - 1709 MWd/MT
BASE	ATRM9	1.40	1.43
	GE14C	1.42	1.48
BASE SLO	ATRM9	1.41	1.44
	GE14C	1.43	1.49
PLUOOS	ATRM9	1.40	1.43
	GE14C	1.44	1.48
PLUOOS SLO	ATRM9	1.41	1.44
	GE14C	1.45	1.49
TBPOOS	ATRM9	1.47	1.49
	GE14C	1.54	1.56
TBPOOS SLO	ATRM9	1.48	1.50
	GE14C	1.55	1.57
TCV SLOW CLOSURE	ATRM9	1.40	1.43
	GE14C	1.42	1.48
TCV SLOW CLOSURE SLO	ATRM9	1.41	1.44
	GE14C	1.43	1.49
TCV STUCK CLOSED	ATRM9	1.43	1.43
	GE14C	1.43	1.48
TCV STUCK CLOSED SLO	ATRM9	1.44	1.44
	GE14C	1.44	1.49

Table 5-3 MCPR(P) for GE and FANP Fuel

(Reference 6)

EOOS Combination	Core Flow (% of rated)	Core Thermal Power (% of rated)								
		0	25	38.5	38.5	45	60	70	70	100
		Operating Limit MCPR			Operating Limit MCPR Multiplier, Kp					
Base	≤ 60	3.16	2.58	2.27	1.32	1.28	1.15			1.00
	> 60	3.77	2.99	2.56						
Base SLO	≤ 60	3.17	2.59	2.28	1.32	1.28	1.15			1.00
	> 60	3.78	3.00	2.57						
PLUOOS	≤ 60	5.55	3.77	2.82	1.64		1.45	1.26	1.11	1.00
	> 60	6.79	4.62	3.45						
PLUOOS SLO	≤ 60	5.56	3.78	2.83	1.64		1.45	1.26	1.11	1.00
	> 60	6.80	4.63	3.46						
TBPOOS	≤ 60	5.55	3.77	2.82	1.37	1.28	1.15			1.00
	> 60	6.79	4.62	3.45						
TBPOOS SLO	≤ 60	5.56	3.78	2.83	1.37	1.28	1.15			1.00
	> 60	6.80	4.63	3.46						
TCV Slow Closure	≤ 60	5.55	3.77	2.82	1.64		1.45	1.26	1.11	1.00
	> 60	6.79	4.62	3.45						
TCV Slow Closure SLO	≤ 60	5.56	3.78	2.83	1.64		1.45	1.26	1.11	1.00
	> 60	6.80	4.63	3.46						
TCV Stuck Closed	≤ 60	3.16	2.58	2.27	1.32	1.28	1.15			1.00
	> 60	3.77	2.99	2.56						
TCV Stuck Closed SLO	≤ 60	3.17	2.59	2.28	1.32	1.28	1.15			1.00
	> 60	3.78	3.00	2.57						

Table 5-4 MCPR(F) Limits for GE and FANP Fuel
All EOOS except TCV Stuck Closed
DLO or SLO Operation
(Reference 8)

Flow (% rated)	MCPR(F) Limit
110.0	1.22
100.0	1.22
0.0	1.86

Table 5-5 MCPR(F) Limits for GE and FANP Fuel with TCV Stuck Closed
DLO or SLO Operation
(Reference 8)

Flow (% rated)	MCPR(F) Limit
110.0	1.27
108.9	1.27
0.00	1.97

6. Linear Heat Generation Rate

The maximum LHGR shall not exceed the zero exposure limit of 13.4 (kW/ft) for the following fuel bundles (Reference 9):

GE14-P10DNAB411-4G7.0/9G6.0-100T-145-T6-2553
GE14-P10DNAB408-16GZ-100T-145-T6-2554
GE14-P10DNAB396-18GZ-100T-145-T6-2808
GE14-P10DNAB406-18GZ-100T-145-T6-2809

The linear heat generation rate (LHGR) limit is the product of the exposure dependent LHGR limit from Tables 6-1 through 6-16 and the minimum of: the power dependent LHGR Factor, LHGRFAC(P), the flow dependent LHGR Factor, LHGRFAC(F), or the single loop operation (SLO) multiplication factor where applicable. The LHGRFAC(P) is determined from Table 6-17. The LHGRFAC(F) is determined from Table 6-18 or 6-19. The SLO multiplication factor is determined from Table 6-20.

Table 6-1: LHGR Limit for GE14-P10DNAB411-4G7.0/9G6.0-100T-145-T6-2553
(Reference 12)

Lattices 5500, 5501, 5504, and 5505 Composite Limit kW/ft **5500: P10DNAL071-NOG-100T-T6-5500** **5501: P10DNAL458-4G7.0/9G6.0-100T-T6-5501** **5504: P10DNAL071-NOG-100T-V-T6-5504** **5505: P10DNAL071-13GE-100T-V-T6-5505**	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0	13.4
[[	
	{3}]]

Table 6-2: LHGR Limit for: GE14-P10DNAB411-4G7.0/9G6.0-100T-145-T6-2553, Lattice 5502
(Reference 12)

Lattice 5502 Composite Limit kW/ft P10DNAL453-4G7.0/9G6.0-100T-E-T6-5502	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.00	13.40
[[	
	[3]]]

Table 6-3: LHGR Limit for: GE14-P10DNAB411-4G7.0/9G6.0-100T-145-T6-2553, Lattice 5503
(Reference 12)

Lattice 5503 Composite Limit kW/ft P10DNAL453-4G7.0/9G6.0-100T-V-T6-5503	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.00	13.40
[[	
	{3]]

Table 6-4: LHGR Limit for GE14-P10DNAB408-16GZ-100T-145-T6-2554
(Reference 12)

Lattices 5500, 5504, and 5510 Composite Limit kW/ft 5500: P10DNAL071-NOG-100T-T6-5500 5504: P10DNAL071-NOG-100T-V-T6-5504 5510: P10DNAL071-16GE-100T-V-T6-5510	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.0	13.4
[[	
	{3}]]

Table 6-5: LHGR Limit for GE14-P10DNAB408-16GZ-100T-145-T6-2554, Lattice 5506
(Reference 12)

Lattice 5506 Composite Limit kW/ft P10DNAL453-6G7.0/10G6.0-100T-T6-5506	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.00	13.40
[[	
	{3}]]

Table 6-6: LHGR Limit for GE14-P10DNAB408-16GZ-100T-145-T6-2554, Lattice 5507
(Reference 12)

Lattice 5507 Composite Limit kW/ft P10DNAL453-4G7.0/10G6.0-100T-T6-5507	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.00	13.40
[[	
	{3]]

Table 6-7: LHGR Limit for GE14-P10DNAB408-16GZ-100T-145-T6-2554, Lattice 5508
(Reference 12)

Lattice 5508 Composite Limit kW/ft P10DNAL449-4G7.0/10G6.0-100T-E-T6-5508	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.00	13.3349
[[	
	[(3)]]

Table 6-8: LHGR Limit for GE14-P10DNAB408-16GZ-100T-145-T6-2554, Lattice 5509
(Reference 12)

Lattice 5509 Composite Limit kW/ft P10DNAL449-4G7.0/10G6.0-100T-V-T6-5509	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.00	13.2336
[[	
	{3}]]

Table 6-9: LHGR Limit for GE14-P10DNAB396-18GZ-100T-145-T6-2808
(Reference 13)

Lattices 6739, 6741, 6744, and 6745 Composite Limit kW/ft 6739: P10DNAL071-NOG-100T-T6-6739 6741: P10DNAL439-18G8.0-100T-T6-6741 6744: P10DNAL071-NOG-100T-V-T6-6744 6745: P10DNAL071-18GE-100T-V-T6-6745	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.0	13.4
[[	
	{3}]]

Table 6-10: LHGR Limit for GE14-P10DNAB396-18GZ-100T-145-T6-2808, Lattice 6740
(Reference 13)

Lattice 6740 Composite Limit kW/ft P10DNAL444-18G8.0-100T-T6-6740	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.00	13.40
[[	
	{3}]]

Table 6-11: LHGR Limit for GE14-P10DNAB396-18GZ-100T-145-T6-2808, Lattice 6742
(Reference 13)

Lattice 6742 Composite Limit kW/ft P10DNAL432-15G7.0-100T-E-T6-6742	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.00	13.40
[[	
	[3]]]

Table 6-12: LHGR Limit for GE14-P10DNAB396-18GZ-100T-145-T6-2808, Lattice 6743
(Reference 13)

Lattice 6743 Composite Limit kW/ft P10DNAL432-15G7.0-100T-V-T6-6743	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.00	13.40
[[	
	[3]]]

Table 6-13: LHGR Limit for GE14-P10DNAB406-18GZ-100T-145-T6-2809
(Reference 13)

Lattices 6739, 6746, 6747, 6750, and 6751 Composite Limit kW/ft 6739: P10DNAL071-NOG-100T-T6-6739 6746: P10DNAL451-12G5.0/6G2.0-100T-T6-6746 6747: P10DNAL451-12G5.0/6G2.0-100T-T6-6747 6750: P10DNAL071-NOG-100T-V-T6-6750 6751: P10DNAL071-18GE-100T-V-T6-6751	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.0	13.4
[[	
	{3}]]

Table 6-14: LHGR Limit for GE14-P10DNAB406-18GZ-100T-145-T6-2809, Lattice 6748
(Reference 13)

Lattice 6748 Composite Limit kW/ft P10DNAL446-12G5.0/5G2.0-100T-E-T6-6748	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.00	13.40
[[	
	{3}]]

Table 6-15 LHGR Limit for GE14-P10DNAB406-18GZ-100T-145-T6-2809, Lattice 6749
(Reference 13)

Lattice 6749 Composite Limit kW/ft P10DNAL446-12G5.0/5G2.0-100T-V-T6-6749	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.00	13.40
[[	
	{3]]

Table 6-16: LHGR Limit for FANP ATRM-9 Fuel
ATRM9-P9DATB362-12GZ-SPC100T-9WR-144-T6-2450
ATRM9-P9DATB378-13GZ-SPC100T-9WR-144-T6-2464
ATRM9-P9DATB378-11GZ-SPC100T-9WR-144-T6-2465
(Reference 10)

Nodal Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.00	14.40
15.00	14.40
64.30	7.90

Table 6-17 LHGRFAC(P) for GE and FANP Fuel
(Reference 6)

EOOS Combination	Core Flow (% of rated)	Core Thermal Power (% of rated)							
		0	25	38.5	38.5	70	70	80	100
		LHGRFAC(P) Multiplier							
Base	≤ 60	0.50	0.56	0.59	0.68			0.86	1.00
	> 60								
Base SLO	≤ 60	0.50	0.56	0.59	0.68			0.86	1.00
	> 60								
PLUOOS	≤ 60	0.22	0.39	0.48	0.54	0.73	0.78		1.00
	> 60	0.33		0.42					
PLUOOS SLO	≤ 60	0.22	0.39	0.48	0.54	0.73	0.78		1.00
	> 60	0.33		0.42					
TBPOOS	≤ 60	0.22	0.39	0.48	0.54				1.00
	> 60	0.33		0.42					
TBPOOS SLO	≤ 60	0.22	0.39	0.48	0.54				1.00
	> 60	0.33		0.42					
TCV Slow Closure	≤ 60	0.22	0.39	0.48	0.54	0.73	0.78		1.00
	> 60	0.33		0.42					
TCV Slow Closure SLO	≤ 60	0.22	0.39	0.48	0.54	0.73	0.78		1.00
	> 60	0.33		0.42					
TCV Stuck Closed	≤ 60	0.50	0.56	0.59	0.68			0.86	1.00
	> 60								
TCV Stuck Closed SLO	≤ 60	0.50	0.56	0.59	0.68			0.86	1.00
	> 60								

Table 6-18 LHGRFAC(F) Multipliers, all cases except TCV Stuck Closed
(Reference 6)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	1.00
80.00	1.00
50.00	0.77
40.00	0.64
30.00	0.55
0.00	0.28

Table 6-19 LHGRFAC(F) Multipliers for TCV Stuck Closed
(Reference 6)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	1.00
98.30	1.00
80.00	0.86
50.00	0.63
40.00	0.50
30.00	0.41
0.00	0.14

Table 6-20 LHGR SLO multiplier for GE and FANP Fuel
(Reference 3)

Fuel Type	SLO Multiplier
ATRM9	0.84
GE14	0.77

7. Rod Block Monitor

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown below (Reference 11):

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	0.65 W_d + 55%
Single Recirculation Loop Operation	0.65 W_d + 51%

The setpoint may be lower/higher and will still comply with the rod withdrawal error (RWE) analysis because RWE is analyzed unblocked.

W_d – percent of recirculation loop drive flow required to produce a rated core flow of 98 Mlb/hr.

8. Modes of Operation

The allowed Modes of Operation with the combinations of EOOS are as described below:

	Operating Region		
EOOS Options[1,2,5,6,8]	Standard	MELLLA	Coastdown[3]
Base, Option A or B	Yes	Yes	Yes
Base SLO, Option A or B	Yes	Yes	Yes
TBPOOS, Option A or B	Yes	Yes	Yes
TBPOOS SLO, Option A or B	Yes	Yes	Yes
PLUOOS, Option A or B	Yes	Yes	Yes
PLUOOS SLO, Option A or B	Yes	Yes	Yes
TCV Slow Closure[4], Option A or B	Yes	Yes	Yes
TCV Slow Closure SLO[4], Option A or B	Yes	Yes	Yes
TCV Stuck Closed[7], Option A or B	Yes	Yes	Yes
TCV Stuck Closed SLO[7], Option A or B	Yes	Yes	Yes

[1] Each OOS Option may be combined with up to 18 TIP channels OOS (provided the requirements for utilizing SUBTIP methodology are met) with all TIPS available at startup from a refuel outage and up to 50% of the LPRMs OOS with an LPRM calibration frequency of 2500 Effective Full Power Hours (EFPH) (2000 EFPH +25%).

[2] Each EOOS Option except TBPOOS requires the opening profile for the Turbine Bypass Valves provided in Reference 7 to be met. These conditions also support 1 Turbine Bypass Valve OOS (TBPOOS) if the assumed opening profile (Reference 7) for the remaining 8 Turbine Bypass Valves is met. If the opening profile is **not** met with 8 or 9 operating Turbine Bypass Valves, or if more than one Turbine Bypass Valve is OOS, utilize the TBPOOS condition. Operation with three or more TBPOOS is **not** an analyzed out-of-service option between P-Bypass and 42% of rated power. (Reference 20)

[3] Coastdown operation is defined as any cycle exposure beyond the full power, all rods out condition with plant power slowly lowering to a lesser value while core flow is held constant. Up to a 15% overpower is analyzed per Reference 6.

[4] For operation with a Pressure Regulator Out-Of-Service (PROOS), the TCV Slow Closure limits should be applied (Reference 3) and the operational notes from Reference 14 reviewed. PROOS and TCV Slow Closure is **not** an analyzed out-of-service combination.

[5] A single MSIV may be taken OOS (shut) under any and all OOS Options, so long as core thermal power is maintained ≤75% of 2957 MWth (Reference 3).

[6] The cycle specific stability analysis may impose restrictions on the Power-to-Flow map and/or restrict the applicable temperature for feedwater temperature reduction. See Reference 16.

[7] For operation with a Turbine Stop Valve out-of-service (TSV OOS), the TCV Stuck Closed limits should be applied (Reference 17). TSV OOS and TCV Stuck Closed is **not** an analyzed out-of-service combination.

[8] Each EOOS option allows operation with up to a 10°F reduction in feedwater temperature (Final Feedwater Temperature Reduction or Feedwater Heaters OOS) throughout the cycle. For operation with reduced feedwater temperature greater than 10°F and less than or equal to 120°F, the penalties from Reference 19 shall be applied.

9. Methodology

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. ANF-1125 (P)(A) and Supplements 1 and 2, "Critical Power Correlation – ANFB," April 1990.
2. ANF-524 (P)(A) Revision 2 and Supplements 1 and 2, "ANF Critical Power Methodology for Boiling Water Reactors," November 1990.
3. XN-NF-79-71 (P)(A) Revision 2 and Supplements 1, 2 & 3, "Exxon Nuclear Plant Transient Methodology for Boiling Water Reactors," March 1986.
4. XN-NF-80-19 (P)(A) Volume 1 Supplements 1 and 2, "Exxon Nuclear Methodology for Boiling Water Reactors – Neutronic Methods for Design and Analysis," March 1993.
5. XN-NF-80-19 (P)(A) Volume 1 Supplement 3, Supplement 3 Appendix F, and Supplement 4, "Exxon Nuclear Methodology for Boiling Water Reactors," November 1990.
6. XN-NF-80-19 (P)(A) Volumes 2, 2A, 2B and 2C, "Exxon Nuclear Methodology for Boiling Water Reactors: EXEM BWR ECCS Evaluation Model," September 1982.
7. XN-NF-80-19 (P)(A) Volume 3 Revision 2, "Exxon Nuclear Methodology for Boiling Water Reactors, THERMEX: Thermal Limits Methodology Summary Description," January 1987.
8. 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," June 1986.
9. XN-NF-85-67 (P)(A) Revision 1, "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel," September 1986.
10. ANF-913 (P)(A) Volume 1 Revision 1, and Volume 1 Supplements 2, 3, 4, "COTRANSA2: A Computer Program for Boiling Water Reactor Transients Analysis," August 1990.
11. XN-NF-82-06- (P)(A) Revision 1 and Supplements 2, 4 and 5, "Qualification of Exxon Nuclear Fuel for Extended Burnup," October 1986.
12. XN-NF-82-06- (P)(A) Supplement 1 Revision 2, "Qualification of Exxon Nuclear Fuel for Extended Burnup Supplement 1 Extended Burnup Qualification of ENC 9x9 BWR Fuel," May 1988.
13. ANF-89-14(P)(A) Revision 1 and Supplements 1 & 2, "Advanced Nuclear Fuels Corporation Generic Mechanical Design for Advanced Nuclear Fuels Corporation 9X9 – IX and 9x9 – 9X BWR Reload Fuel," October 1991.
14. ANF-89-14(P), "Advanced Nuclear Fuels Corporation Generic Mechanical Design for Advanced Nuclear Fuels Corporation 9X9 – IX and 9x9 – 9X BWR Reload Fuel," May 1989.
15. ANF-89-98 (P)(A), "Generic Mechanical Design Criteria for BWR Fuel Designs," Revision 1 and Revision 1 Supplement 1, May 1995.
16. ANF-91-048 (P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR ECCS Evaluation Model," January 1993.

17. Commonwealth Edison Company Topical Report NFSR-0091, "Benchmark of CASMO/MICROBURN BWR Nuclear Design Methods," Revision 0 and Supplements on Neutronics Licensing Analysis (Supplement 1) and La Salle County Unit 2 benchmarking (Supplement 2), December 1991, March 1992, and May 1992, respectively.

18. EMF-85-74 (P) Revision 0 and Supplement 1(P)(A) and Supplement 2(P)(A), "RODEX2A (BWR) Fuel Rod Thermal-Mechanical Evaluation Model," February 1998.

19. NEDE-24011-P-A-14 Revision 14, "General Electric Standard Application for Reactor Fuel (GESTAR)," June 2000.

20. NEDC-32981P Revision 0, "GEXL96 Correlation for ATRIUM-9B Fuel", September 2000.

21. ANF-1125(P)(A), Supplement 1 Appendix E, "ANFB Critical Power Correlation Determination of ATRIUM-9B Additive Constant uncertainties," September 1998.

22. ANF-91-048(P)(A), Supplements 1 and 2, "BWR Jet Pump Model Revision for RELAX," October 1997.