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Exelon Nuclear

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RA08-059

September 3, 2008

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

LaSalle County Station, Unit 2
Facility Operating License No. NPF-18
NRC Docket No. 50-374

Subject: Unit 2 Cycle 12, Revision 3 Core Operating Limits Report (COLR)

The purpose of this letter is to transmit Revision 3 to the LaSalle County Station (LSCS) Unit 2 Cycle 12 Core Operating Limits Report (COLR). This report is being submitted in accordance with LSCS Technical Specification 5.6.5, "Core Operating Limits (COLR)," item d.

The LaSalle Unit 2 Cycle 12 (L2C12) Core Operating Limits Report (COLR) has been revised to provide updated thermal limits applicable to operation with up to 14 peripheral control rods being fully inserted through end of cycle. The applicable AREVA document was added as reference 14 to the COLR. The revised thermal limits include BOC to NEOC ATRIUM-10 MCPRp operating limits for One TBVOOS NSS and use of the combined EOOS TSSS limits. Thermal limit sets for the base case, FHOOS, PROOS, PLUOOS and their respective SLO sets have been removed from the COLR. All thermal limit sets applicable to FFTR/Coastdown were also deleted from the COLR. The GE14 LHGRFAC(f) multipliers supporting SLO and One TBVOOS were included to provide additional margin. COLR Section 10, "Modes of Operation" was revised to provide additional clarification and to reflect the current thermal limit sets.

Exelon Generation Company, LLC (EGC) has performed a review of the relevant licensing documents, associated TS Bases, and applicable references in accordance with 10 CFR 50.59, "Changes, tests, and experiments." The review process concluded that these revisions do not require NRC review and approval.

Should you have any questions concerning this submittal, please contact Mr. Terrence W. Simpkin, Regulatory Assurance Manager, at (815) 415-2800.

Respectfully,

Daniel J. Enright
Site Vice President
LaSalle County Station

Attachment

cc: Regional Administrator - NRC Region III
NRC Senior Resident Inspector - LaSalle County Station

LaSalle Unit 2 Cycle 12

Core Operating Limits Report

Revision 3

Table of Contents

List of Tables

1. References

1. Exelon Generation Company, LLC, Docket No. 50-374, LaSalle County Station, Unit 2, Facility Operating License, License No. NPF-18.

2. NRC Letter from D. M. Crutchfield to All Power Reactor Licensees and Applicants, Generic Letter 88-16; Concerning the Removal of Cycle-Specific Parameter Limits from Tech Specs, October 3, 1988.

3. AREVA Report ANP-2571 Revision 1, "LaSalle Unit 2 Cycle 12 Reload Analysis," dated January 2007.

4. AREVA Document 51-9024526-000, "LaSalle Unit 2 Cycle 12 Principal Transient Analysis Parameters", dated June 26, 2006.

5. Nuclear Fuels Letter NFM:MW:01-0106, from A. Giancatarino to J. Nugent, "LaSalle Unit 1 and Unit 2 Rod Block Monitor COLR Setpoint Change," April 3, 2001.

6. Framatome ANP Letter from R. G. Grummer to N. J. Carr, "Plant Startup Testing with POWERPLEX-III", RGG:04:001, January 8, 2004.

7. GNF Report 0000-0034-6783-SRLR, Rev. 1, "Supplemental Reload Licensing Report for LaSalle Unit 2 Reload 10 Cycle 11," February 2005.

8. GNF Letter FRL-EXN-HA2-04-006, from F. Russell Lindquist to C. de la Hoz, "Transmittal of Peak Pellet LHGR Limits for LaSalle Unit 2 Cycle 11 GE14 Bundles with Gad Suppression," August 5, 2004.

9. GE Document GE-NE-0000-0022-8684-R2, "Exelon LaSalle Units 1 and 2 SAFER/GESTR Loss-of-Coolant-Accident Analysis for GE14 Fuel", November 2006.

10. Framatome ANP Letter from N. Carr to M. Hsiao, "Startup with TIP Equipment Out of Service", NJC:04:031, April 20, 2004.

11. Deleted

12. AREVA Letter FAB07-2256, "Transmittal of AREVA Support for L2C12 Operation With One Turbine Control Valve OOS and Two Turbine Bypass Valves OOS", from D.B. McBurney of AREVA to F.W. Trikur of Exelon, May 25, 2007.

13. AREVA Letter FAB07-2615, "Transmittal of AREVA Support for L1C12 and L2C12 Operation With More Than One Turbine Bypass Valve Closed Revision 1", from D. B. McBurney of AREVA to F. Trikur of Exelon, December 6, 2007.

14. AREVA Letter FAB08-2457, "Transmittal of AREVA Documents 51-9087462-000 and 51-9088103-000", from C. M. Powers of AREVA to C. de la Hoz of Exelon, August 22, 2008.

2. Terms and Definitions

APLHGR	Average planar linear heat generation rate
APRM	Average power range monitor
ATRM10	ATRIUM-10 fuel
BOC	Beginning of cycle
DLO	Dual loop operation
ELLLA	Extended load line limit analysis
EOC	End of cycle
EOOS	Equipment out of service
FFTR	Final feedwater temperature reduction
FHOOS	Feedwater heater out of service
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
MAPLHGR	Maximum average planar linear heat generation rate
MCPR	Minimum critical power ratio
MCPR(F)	Flow dependent MCPR
MCPR(P)	Power dependent MCPR
MELLLA	Maximum extended load line limit analysis
MSIV	Main steam isolation valve
MSIVOOS	Main steam isolation valve out of service
NEOC	Near end of cycle
NSS	Nominal scram speed
OLMCPR	Operating limit minimum critical power ratio
OPRM	Oscillation power range monitor
PBDA	Period based detection algorithm
PLUOOS	Power load unbalance out of service
PPD	Plant Parameter Document
PROOS	Pressure regulator out of service
RBM	Rod block monitor
RPT	Recirculation pump trip
RPTOOS	Recirculation pump trip out of service
RWE	Rod withdrawal error
SLMCPR	Safety limit minimum critical power ratio
SLO	Single loop operation
SRVOOS	Safety-relief valve out of service
TBVOOS	Turbine bypass valve out of service
TCV	Turbine control valve
TCVOOS	Turbine control valve out of service
TIP	Traversing Incore Probe
TSSS	Technical Specification scram speed
TSV	Turbine stop valve
TSVOOS	Turbine stop valve out of service

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 108.5 Mlb/hr. Operation up to 105% rated flow is licensed for this cycle. Licensed rated thermal power is 3489 MWth.

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

The OPRM PBDA trip settings are based, in part, on the cycle specific OLMCPR and the power dependent MCPR limits. Any change to the OLMCPR values and/or the power dependent MCPR limits should be evaluated for potential impact on the OPRM PBDA trip settings.

Core Exposure Definitions (Reference 3):

Exposure Nomenclature	Core Average Exposure (MWD/MTU)
NEOC12	31988
EOC12	34673
Maximum Core Exposure	38673

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):
A10-4061B-13GV80
A10-3561B-12GV80
A10-3982B-15GV80-100M
A10-4025B-15GV80-100M
(Reference 3)

Avg. Planar Exposure (GWd/MT)	MAPLHGR (kW/ft)
0.00	12.5
15.00	12.5
55.00	9.1
67.00	7.1

Table 4-2 MAPLHGR for bundle(s):
GE14-P10CNAB406-18GZ-120T-150-T6-2823
GE14-P10CNAB407-16GZ-120T-150-T6-2822
(Reference 7)

Avg. Planar Exposure (GWd/MT)	MAPLHGR (kW/ft)
0.00	13.40
16.00	13.40
63.50	8.00
70.00	5.00

Table 4-3 MAPLHGR SLO multiplier for GE and AREVA Fuel
(Reference 3 and 7)

Fuel Type	SLO Multiplier
ATRM10	0.82
GE14	0.78

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

The power-dependent MCPR limit, MCPR(P), is determined from Tables 5-1 through 5-12, and is dependent on exposure, fuel type, and scram speed, in addition to power level. Tables 5-1, 5-2, 5-5, 5-6, 5-9 and 5-10 are applicable to ATRIUM-10 fuel and Tables 5-3, 5-4, 5-7, 5-8, 5-11 and 5-12 are applicable to GE14 fuel.

5.1.2. Flow - Dependent MCPR

Tables 5-13, 5-14 and 5-15 give the MCPR(F) limit as a function of the core 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

NSS and TSSS refer to scram speeds.

To utilize the MCPR limits for Technical Specification Scram Speed (TSSS), the scram speed insertion time must be equal to or less than the values provided below.

To utilize the MCPR limits for Nominal Scram Speed (NSS), the scram speed insertion time must be equal to or less than the values provided below (Reference 4).

Notch Position	TSSS Time (sec.)	NSS Time (sec.)
45	0.53	0.38
39	0.85	0.68
25	1.90	1.68
05	3.45	2.68

5.4. Recirculation Flow Control Valve Settings

Cycle 12 was analyzed with a maximum core flow runout of 108%; therefore the recirculation pump flow control valve must be set to maintain core flow less than 108% (117.18 Mlb/hr) for all runout events (Reference 4). This value is consistent with the analyses of Reference 3.

Table 5-1 MCPR(P) for ATRIUM-10 Fuel
BOC to NEOC
Nominal Scram Speed (NSS)
(References 3, 13, and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS	2.10	2.10	1.54			1.41
One TBVOOS SLO	2.11	2.11	1.55			1.42
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS						
Combined EOOS SLO						

Table 5-2 MCPR(P) for ATRIUM-10 Fuel
BOC to NEOC
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS						
One TBVOOS SLO						
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS	2.32	2.32		1.69	1.54	1.47
Combined EOOS SLO	2.33	2.33		1.70	1.55	1.48

Table 5-3 MCPR(P) for GE14 Fuel
BOC to NEOC
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS	2.10	2.10	1.50			1.40
One TBVOOS SLO	2.11	2.11	1.51			1.41
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS						
Combined EOOS SLO						

Table 5-4 MCPR(P) for GE14 Fuel
BOC to NEOC
Technical Specification Scram Speed (TSSS)
(Reference 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS						
One TBVOOS SLO						
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS	2.30	2.30		1.72	1.52	1.48
Combined EOOS SLO	2.31	2.31		1.73	1.53	1.49

Table 5-5 MCPR(P) for ATRIUM-10 Fuel
NEOC to EOC
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS	2.10	2.10	1.54			1.43
One TBVOOS SLO	2.11	2.11	1.55			1.44
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS						
Combined EOOS SLO						

Table 5-6 MCPR(P) for ATRIUM-10 Fuel
NEOC to EOC
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS						
One TBVOOS SLO						
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS	2.32	2.32		1.69	1.57	1.52
Combined EOOS SLO	2.33	2.33		1.70	1.58	1.53

Table 5-7 MCPR(P) for GE14 Fuel
NEOC to EOC
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS	2.10	2.10	1.50			1.41
One TBVOOS SLO	2.11	2.11	1.51			1.42
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS						
Combined EOOS SLO						

Table 5-8 MCPR(P) for GE14 Fuel
NEOC to EOC
Technical Specification Scram Speed (TSSS)
(Reference 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$MCPR_P$					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS						
One TBVOOS SLO						
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS	2.30	2.30		1.72	1.54	1.52
Combined EOOS SLO	2.31	2.31		1.73	1.55	1.53

Table 5-9 MCPR(P) for ATRIUM-10 Fuel
FFTR/Coastdown Operation
Nominal Scram Speed (NSS)
(Reference 3, 13 and 14)

Table Intentionally Deleted

Table 5-10 MCPR(P) for ATRIUM-10 Fuel
FFTR/Coastdown Operation
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

Table Intentionally Deleted

Table 5-11 MCPR(P) for GE14 Fuel
FFTR/Coastdown Operation
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

Table Intentionally Deleted

Table 5-12 MCPR(P) for GE14 Fuel
FFTR/Coastdown Operation
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

Table Intentionally Deleted

Table 5-13 MCPR(F) Limits for AREVA and GE Fuel, DLO and SLO Supports Base Case

(References 3, 13 and 14)

Table Intentionally Deleted

Table 5-14 MCPR(F) Limits for AREVA and GE Fuel, DLO and SLO Supports Combined EOOS

(References 3, 13 and 14)

Flow (% rated)	MCPR(F) Limit
108.0	1.11
100.0	1.30
30.0	1.75
0.0	1.75

Table 5-15 MCPR(F) Limits for AREVA and GE Fuel, DLO and SLO Supports One TBVOOS

(Reference 13 and 14)

Flow (% rated)	MCPR(F) Limit
108.0	1.11
100.0	1.28
30.0	1.65
0.0	1.65

6. Linear Heat Generation Rate

The linear heat generation rate (LHGR) limit is the product of the exposure dependent LHGR limit from Tables 6-1 through 6-5 and the minimum of: the power dependent LHGR Factor, LHGRFAC(P), or the core flow dependent LHGR Factor, LHGRFAC(F) as applicable. The LHGRFAC(P) is determined from Tables 6-6 through 6-13. The LHGRFAC(F) is determined from Table 6-14 through 6-21.

Table 6-1: LHGR Limit for GE14-P10CNAB406-18GZ-120T-150-T6-2823
(Reference 8)

Lattices 6806, 6812, 6813, 6814 and 6816 LHGR Limit kW/ft **6806: P10CNAL071-NOG-120T-T6-6806** **6812: P10CNAL435-18G7.0-120T-T6-6812** **6813: P10CNAL435-6G7.0/9G6.0-120T-T6-6813** **6814: P10CNAL429-6G7.0/9G6.0-120T-E-T6-6814** **6816: P10CNAL071-18GE-120T-V-T6-6816**	
UO2 Pellet Burnup (GWd/MTU)	**LHGR Limit (kW/ft)**
0.0	13.4
16.0	13.4
63.5	8.0
70.0	5.0

Table 6-2: LHGR Limit for GE14-P10CNAB407-16GZ-120T-150-T6-2822
(Reference 8)

Lattices 6806, 6807, 6808, 6809 and 6811 LHGR Limit kW/ft **6806: P10CNAL071-NOG-120T-T6-6806** **6807: P10CNAL437-6G8.0/10G7.0-120T-T6-6807** **6808: P10CNAL437-2G8.0/7G7.0/5G6.0-120T-T6-6808** **6809: P10CNAL430-2G8.0/7G7.0/5G6.0-120T-E-T6-6809** **6811: P10CNAL071-16GE-120T-V-T6-6811**	
UO2 Pellet Burnup (GWd/MTU)	**LHGR Limit (kW/ft)**
0.0	13.4
16.0	13.4
63.5	8.0
70.0	5.0

Table 6-3 LHGR Limit for: GE14-P10CNAB406-18GZ-120T-150-T6-2823, Lattice 6815
(Reference 8)

Lattice 6815 LHGR Limit kW/ft P10CNAL429-6G7.0/9G6.0-120T-V-T6-6815	
UO2 Pellet Burnup (GWd/MTU)	**LHGR Limit (kW/ft)**
0.0	13.40
16.0	13.40
17.3	13.25
18.5	13.11
19.8	12.97
21.8	12.74
25.5	12.32
31.5	11.63
37.6	10.95
43.5	10.27
49.4	9.61
55.1	8.89
60.8	8.24
66.5	6.63
70.0	5.00

Table 6-4 LHGR Limit for GE14-P10CNAB407-16GZ-120T-150-T6-2822, Lattice 6810
(Reference 8)

Lattice 6810 LHGR Limit kW/ft P10CNAL430-2G8.0/7G7.0/5G6.0-120T-V-T6-6810	
UO2 Pellet Burnup (GWd/MTU)	**LHGR Limit (kW/ft)**
0.0	13.40
14.8	13.40
16.1	13.39
17.4	13.24
18.6	13.10
19.9	12.96
21.7	12.75
25.4	12.33
31.4	11.64
37.4	10.96
43.4	10.29
49.2	9.62
55.0	8.91
60.7	8.26
66.4	6.68
70.0	5.00

Table 6-5 LHGR Limit for AREVA ATRIUM-10 Fuel
A10-4061B-13GV80
A10-3561B-12GV80
A10-3982B-15GV80-100M
A10-4025B-15GV80-100M
(Reference 3)

Pellet Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.00	13.40
17.70	13.40
61.10	9.10
70.40	7.30

Table 6-6 LHGRFAC(P) for ATRIUM-10 Fuel
BOC to NEOC
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$LHGRFAC_P$ Multiplier					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS	0.72	0.72	0.97			1.00
One TBVOOS SLO	0.72	0.72	0.97			1.00
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS						
Combined EOOS SLO						

Table 6-7 LHGRFAC(P) for ATRIUM-10 Fuel
BOC to NEOC
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$LHGRFAC_P$ Multiplier					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS						
One TBVOOS SLO						
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS	0.64	0.64		0.88	0.93	0.97
Combined EOOS SLO	0.64	0.64		0.88	0.93	0.97

Table 6-8 LHGRFAC(P) for ATRIUM-10 Fuel
NEOC to EOC
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$LHGRFAC_P$ Multiplier					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS	0.72	0.72	0.97			1.00
One TBVOOS SLO	0.72	0.72	0.97			1.00
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS						
Combined EOOS SLO						

Table 6-9 LHGRFAC(P) for ATRIUM-10 Fuel
NEOC to EOC
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	60	80	80(80.1)	100
	$LHGRFAC_P$ Multiplier					
Base Case						
Base Case SLO						
FHOOS						
FHOOS SLO						
TBVOOS						
TBVOOS SLO						
One TBVOOS						
One TBVOOS SLO						
PROOS						
PROOS SLO						
PLUOOS						
PLUOOS SLO						
Combined EOOS	0.64	0.64		0.88	0.93	0.95
Combined EOOS SLO	0.64	0.64		0.88	0.93	0.95

Table 6-10 LHGRFAC(P) for ATRIUM-10 Fuel
FFTR/Coastdown Operation
Nominal Scram Speed (NSS)
(References 3, 13 and 14)

Table Intentionally Deleted

Table 6-11 LHGRFAC(P) for ATRIUM-10 Fuel
FFTR/Coastdown Operation
Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

Table Intentionally Deleted

Table 6-12 LHGRFAC(P) for GE14 Fuel
DLO, All Exposures
Nominal Scram Speed (NSS)/Technical Specification Scram Speed (TSSS)
(References 3, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)				
	0	25	40	60	100
	$LHGRFAC_P$ Multiplier				
Base Case					
FHOOS					
TBVOOS					
One TBVOOS	0.54	0.54		0.79	1.00
PROOS					
PLUOOS					
Combined EOOS	0.40	0.40	0.50		0.97

Table 6-13 LHGRFAC(P) for GE14 Fuel
SLO, All Exposures
Nominal Scram Speed (NSS)/Technical Specification Scram Speed (TSSS)
(References 3, 7, 13 and 14)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	40	CP *	60	100
	$LHGRFAC_P$ Multiplier					
Base Case SLO						
FHOOS SLO						
TBVOOS SLO						
One TBVOOS SLO	0.54	0.54		0.78	0.78	0.78
PROOS SLO						
PLUOOS SLO						
Combined EOOS SLO	0.40	0.40	0.50	0.78		0.78

* CP is the cutoff power level and equal to 58.60% for One TBVOOS SLO; and 75.74% for Combined EOOS SLO conditions.

Table 6-14 LHGRFAC(F) Multipliers for ATRIUM-10 Fuel, DLO and SLO Supports Base Case, FHOOS, PROOS and PLUOOS
(Reference 3,13 and 14)

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Table 6-15 LHGRFAC(F) Multipliers for GE14 Fuel, DLO Supports Base Case, FHOOS, PROOS and PLUOOS
(Reference 3. 13 and 14)

Table Intentionally Deleted

Table 6-16 LHGRFAC(F) Multipliers for GE14 Fuel, SLO Supports Base Case, FHOOS, PROOS and PLUOOS
(Reference 3, 7, 13 and 14)

Table Intentionally Deleted

Table 6-17 LHGRFAC(F) Multipliers for ATRIUM-10 Fuel, DLO and SLO Supports One TBVOOS, and Combined EOOS
(Reference 3, 13 and 14)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	1.00
80.00	1.00
30.00	0.75
0.00	0.75

Table 6-18 LHGRFAC(F) Multipliers for GE14 Fuel, DLO Supports Combined EOOS
(Reference 3, 13 and 14)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	1.00
100.20	1.00
30.00	0.41
0.00	0.41

Table 6-19 LHGRFAC(F) Multipliers for GE14 Fuel, SLO Supports Combined EOOS
(Reference 3, 7, 13 and 14)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	0.78
100.20	0.78
74.02	0.78
30.00	0.41
0.00	0.41

Table 6-20 LHGRFAC(F) Multipliers for GE14 Fuel, DLO Supports One TBVOOS
(Reference 13 and 14)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	1.00
83.6	1.00
55.00	0.76
45.00	0.54
30.00	0.41
0.00	0.41

Table 6-21 LHGRFAC(F) Multipliers for GE14 Fuel, SLO Supports One TBVOOS
(Reference 7, 13, and 14)

Flow (% rated)	LHGRFAC(F) Multiplier
108.00	0.78
83.6	0.78
57.38	0.78
55.00	0.76
45.00	0.54
30.00	0.41
0.00	0.41

7. Rod Block Monitor

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown below (Reference 5):

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	0.66 W_d + 54.0%
Single Recirculation Loop Operation	0.66 W_d + 48.7%

The setpoint may be lower/higher and will still comply with the rod withdrawal error (RWE) analysis because RWE is analyzed unblocked. The allowable value is clamped with a maximum value not to exceed the allowable value for a recirculation loop drive flow (W_d) of 100%.

W_d – percent of recirculation loop drive flow required to produce a rated core flow of 108.5 Mlb/hr.

8. Traversing In-Core Probe System

8.1 Description:

When the traversing in-core probe (TIP) system (for the required measurement locations) is used for recalibration of the LPRM detectors and monitoring thermal limits, the TIP system shall be operable with the following:

1. movable detectors, drives and readout equipment to map the core in the required measurement locations, and
2. indexing equipment to allow all required detectors to be calibrated in a common location.

The following applies for use of the SUBTIP methodology:

The total number of failed and bypassed LPRMs does not exceed 50% (Reference 10). With one or more TIP measurement locations inoperable, the TIP data for an inoperable measurement location may be replaced by data obtained from a 3-dimensional BWR core monitoring software system adjusted using the previously calculated uncertainties, provided the following conditions are met:

(A) When there is not a prior complete TIP-calibrated data set available:

1. To comply with Technical Specification SR 3.3.1.1.8, LPRMs, within their calibration frequency, in locations without a TIP trace are not recalibrated,
2. LPRMs in locations without a TIP trace will not be used by POWERPLEX in any core power distribution calculations, and
3. The total number of out-of-service TIPs does not exceed 42% (18 channels).

(B) When there is a prior complete TIP-calibrated data set available:

1. All TIP traces have previously been obtained at least once in the current operating cycle when the reactor core was operating above 20% power, (Reference 6) and
2. The total number of simulated channels (measurement locations) does not exceed 42% (18 channels).

Otherwise, with the TIP system inoperable, suspend use of the system for the above applicable monitoring or calibration functions.

8.2 Bases:

The operability of the TIP system with the above specified minimum complement of equipment ensures that the measurements obtained from use of this equipment accurately represent the spatial neutron flux distribution of the reactor core. The normalization of the required detectors is performed internal to the core monitoring software system.

Substitute TIP data, if needed, is 3-dimensional BWR core monitoring software calculated data which is adjusted based on axial and radial factors calculated from previous TIP sets. Since the simulation and adjustment process could introduce uncertainty, a maximum of 18 channels may be simulated to ensure that the uncertainties assumed in the substitution process methodology remain valid.

9. Stability Protection Setpoints

The OPRM PBDA Trip Settings (Reference 3 and 14):

PBDA Trip Amplitude Setpoint (Sp)	Corresponding Maximum Confirmation Count Setpoint (Np)
1.11	14

The PBDA is the only OPRM setting credited in the safety analysis as documented in the licensing basis for the OPRM system.

The OPRM PBDA trip settings are based, in part, on the cycle specific OLMCPR and the power dependent MCPR limits. Any change to the OLMCPR values and/or the power dependent MCPR limits should be evaluated for potential impact on the OPRM PBDA trip settings.

The OPRM PBDA trip settings are applicable when the OPRM system is declared operable, and the associated Technical Specifications are implemented.

10. Modes of Operation

The allowed modes of operation with combinations of equipment out-of-service are as described below:

Equipment Out of Service Options[1, 2]	ELLLA	MELLLA	ICF	FFTR/ Coastdown[4]
Base Case				
Base Case SLO				
FHOOS				
FHOOS SLO				
TBVOOS				
TBVOOS SLO				
One TBVOOS[10]	Yes	Yes	Yes	No
One TBVOOS SLO[10]	Yes	No[6]	N/A	No
PROOS				
PROOS SLO				
PLUOOS				
PLUOOS SLO				
Combined EOOS[9]	Yes	Yes	Yes	No
Combined EOOS SLO[9]	Yes	No[6]	N/A	No

[1] Limits support operation with any combination of One SRVOOS, up to Two TIP machines OOS (or the equivalent number of TIP channels), up to a 20°F reduction in feedwater temperature (except for conditions with FHOOS), and up to 50% of the LPRMs OOS with an LPRM calibration frequency of 1250 effective full power hours (EFPH) (1000 EFPH +25%). All limits support PLUOOS $\leq$ 60% RTP.

[2] Note that operation with One MSIVOOS is supported as long as core thermal power is maintained $\leq$ 75% of 3489 MWt.

[3] Deleted.

[4] FFTR/Coastdown thermal limits are not being provided. The thermal limits for NEOC – EOC will be applicable for power coastdown to the EOC licensing basis core average exposure of 34,673 MWD/MTU (Reference 14).

[5] Deleted.

[6] The SLO boundary was not moved up with the incorporation of MELLLA. The power-flow boundary for SLO at power uprated conditions remains the ELLLA boundary for pre-uprate conditions.

[7] Deleted.

[8] Deleted.

[9] This combination consists of any of the following (apply the Combined EOOS option):

(a) Any combination of TCV slow closure, no RPT, in combination with one (or more) TBVOOS. However, three of the four TBV that consist of TBV #1, #2, #3, or #4 must be capable of fully opening via the pressure control system in this EOOS (Reference 13).

(b) At core thermal powers of less than or equal to 85% of rated, any combination of One TCV or TSV stuck closed, TCV slow closure, no RPT and One TBVOOS. However, three of the four TBV that consist of TBV #1, #2, #3, or #4 must be capable of fully opening via the pressure control system in this EOOS (Reference 12).

(c) Any combination of TCV slow closure, no RPT and/or FHOOS, in combination with one TBVOOS and TSSS. However, three of the four TBV that consist of TBV #1, #2, #3 or #4 must be capable of fully opening via the pressure control system in this EOOS (Reference 14).

(d) At core thermal powers of less than or equal to 85% of rated, any combination of one TCV or TSV stuck closed, TCV slow closure, no RPT and/or FHOOS, and one TBVOOS and TSSS. However, three of the four TBV that consist of TBV #1, #2, #3 or #4 must be capable of fully opening via the pressure control system in this EOOS (Reference 14).

(e) PLUOOS or PROOS with or without FHOOS and in combination with one (or more) TBVOOS. However, three of the four TBV that consist of TBV#1, #2, #3, or #4 must be capable of fully opening via the pressure control system in this EOOS (Reference 14).

[10] The one TBVOOS condition assumes that one turbine bypass valve does <u>not</u> trip open on turbine control valve fast closure or on turbine stop valve closure. It also assumes that three of the four TBV that consist of TBV #1, #2, #3, or #4 must be capable of fully opening via the pressure control system in this EOOS. The #5 TBV is not credited in this analysis.

11. 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. XN-NF-81-58 (P)(A), Revision 2 and Supplements 1 and 2, "RODEX2 Fuel Rod Thermal-Mechanical Response Evaluation Model," March 1984.

2. ANF-524 (P)(A) Revision 2 and Supplements 1 and 2, "ANF Critical Power Methodology for Boiling Water Reactors," November 1990. [XN-NF-524 (P)(A)]

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

4. XN-NF-84-105 (P)(A), Volume 1 and Volume 1 Supplements 1 and 2; Volume 1 Supplement 4, "XCOBRA-T: A Computer Code for BWR Transient Thermal-Hydraulic Core Analysis," February 1987 and June 1988, respectively.

5. EMF-2209 (P)(A), Revision 2, "SPCB Critical Power Correlation," September 2003.

6. ANF-89-98 (P)(A), Revision 1 and Revision 1 Supplement 1, "Generic Mechanical Design Criteria for BWR Fuel Designs," May 1995.

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

8. EMF-CC-074 (P) Volume 4 Revision 0, "BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2," August 2000.

9. ANF-CC-33(P)(A) Supplement 1 Revision 1 and Supplement 2, "HUXY: A Generalized Multirod Heatup Code with 10CFR50, Appendix K Heatup Option," August 1986 and January 1991, respectively.

10. 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.

11. 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.

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

13. NEDE-24011-P-A-14, June 2000 and the U.S. Supplement NEDE-24011-P-A-14-US, June 2000, "General Electric Standard Application for Reactor Fuel".

14. EMF-2158(P)(A), Revision 0, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2", Siemens Power Corporation, October 1999.

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

16. EMF-2361(P)(A), Revision 0, "EXEM BWR-2000 ECCS Evaluation Model", May 2001.

17. NEDO-32465-A, "BWR Owner's Group Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications", August 1996.

18. ANF-1358(P)(A), Revision 3, "The Loss of Feedwater Heating Transient in Boiling Water Reactors", Framatome ANP, September 2005.