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SVP-07-054

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

Quad Cities Nuclear Power Station, Unit 2
Renewed Facility Operating License No. DPR-30
NRC Docket No. 50-265

Subject: Core Operating Limits Report for Quad Cities Unit 2 Cycle 19 (Revision 4)

Reference: Letter from Timothy J. Tulon (Exelon Generation Company, LLC) to U. S. NRC, "Core Operating Limits Report for Quad Cities Unit 2 Cycle 19 (Revision 3)," dated January 23, 2007

In accordance with Technical Specifications Section 5.6.5.d, enclosed is Revision 4 of the Core Operating Limits Report (COLR) for Quad Cities Unit 2 Cycle 19.

Revision 4 incorporates updated Operating Limit Minimum Critical Power Ratio (OLMCPR) values and Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) limits resulting from recently performed licensing analyses. This revision to the COLR is applicable until the end of Cycle 19.

Should you have any questions concerning this letter, please contact Mr. W. J. Beck at (309) 227-2800.

Respectfully,

Timothy J. Tulon
Site Vice President
Quad Cities Nuclear Power Station

Attachment: Core Operating Limits Report for Quad Cities Unit 2 Cycle 19 (Revision 4)

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

A001

NRR

Attachment

Core Operating Limits Report

for

Quad Cities Unit 2 Cycle 19

(Revision 4)

Quad Cities Unit 2, Cycle 19

Core Operating Limits Report

Revision 4

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List of Tables

1. References

1. Exelon Generation Company, LLC and MidAmerican Energy Company, Docket No. 50-265, Quad Cities Nuclear Power Station; Unit 2, Renewed Facility Operating License, License No. DPR-30.

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. Westinghouse Document, WCAP-16537-P, Revision 6, "Quad Cities Nuclear Power Station Unit 2 Cycle 19 Reload Licensing Report", July 2007 (TODI NF0600093 Rev. 5)

4. GNF Document, J11-03918-SRLR, Revision 2, "Supplemental Reload Licensing Report for Quad Cities Unit 2 Reload 16 Cycle 17", October 2003. (TODI NFM0200001 Sequence 1)

5. Exelon TODI, NF0600005, Revision 1, "Quad Cities 2 Cycle 19 Licensing Generic Inputs Report," March 21, 2006.

6. GNF Engineering Calculation, e-Matrix 0000-0005-9064, "GE14 LHGR Limits with Gd Suppression for Quad Cities 2, Cycle 17, Bundles 2507 and 2508," July 1, 2002.

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8. GE Document, GE DRF C51-00217-01, "Instrument Setpoint Calculation Nuclear Instrumentation, Rod Block Monitor, Commonwealth Edison Company, Quad Cities 1 & 2," December 14, 1999.

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

10. 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.

11. GE Document, NEDO-33187 Revision 1, DRF 0000-0038-8843, "Safety Evaluation in Support of the New Steam Dryer for Quad Cities Unit 1 & 2," May 2005.

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13. GNF Document, 0000-0024-0751-SRLR, Revision 1, "Supplemental Reload Licensing Report for Quad Cities Unit 2 Reload 17 Cycle 18," April 2005. (TODI NF0400018 Revision 1).

14. GE Document, GE-NE-J11-03912-00-01-R3, "Dresden 2 and 3 Quad Cities 1 and 2 Equipment Out-Of-Service and Legacy Fuel Transient Analysis," September 2005. (TODI NFM0100091 Sequence 03)

15. Exelon TODI QDC-06-011, Revision 0, "Fast Transients Input Parameters Operating Parameter List for Westinghouse Quad Cities Unit 2 Cycle 19 Reload Analysis," February 16, 2006.

16. Exelon TODI NF0600004, Revision 1, "Quad Cities 2 Cycle 19 Reload Licensing Analysis Plan (RLAP)," March 23, 2006.

17. Technical Specifications for Quad Cities 1 and 2, Table 3.1.4-1, "Control Rod Scram Times"

18. GE Document MJM-EXN-EE2-06-052, "GE Compliance with TOP and MOP Limits for Quad Cities 2 Cycle 19 – Completion of Phase 1," May 17, 2006.

19. Westinghouse Document, NF-BEX-05-151, Revision 0, "Final Report Quad Cities 2 Cycle 19 Bundle Designs", October 12, 2005.

2. Terms and Definitions

APLHGR	Average planar linear heat generation rate
APRM	Average power range monitor
BOC	Beginning of cycle
DLO	Dual loop operation
EFPH	Effective full power hour
EOC	End of cycle
EOOS	Equipment out of service
EOFPL	End of full power life
FWTR	Feedwater temperature reduction
FWHOOS	Feedwater heater out of service
FWT	Feedwater temperature
GE14	GE14C fuel
GNF	Global Nuclear Fuel
ICF	Increased core flow
ISS	Intermediate scram speed
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
MAPRAT	Maximum average planar ratio
MCPR	Minimum critical power ratio
MCPR(F)	Flow dependent MCPR
MCPR(P)	Power dependent MCPR
MFLCPR	Maximum fraction of limiting critical power ratio
MFLPD	Maximum fraction of limiting power density
MSIV	Main steamline isolation valve
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
PROOS	Pressure regulator out of service
RBM	Rod block monitor
RWE	Rod withdrawal error
SLMCPR	Safety limit minimum critical power ratio
SLO	Single loop operation
SRVOOS	Safety-relief valve out of service
TBPOOS	Turbine bypass system out of service
TCV	Turbine control valve
TIP	Traversing incore probe
TSSS	Technical Specification scram speed

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.

LHGRFAC(P) and LHGRFAC(F) values are independent of scram speed.

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.

For both Base and EOOS DLO/SLO conditions, for operation at Nominal FWT, the OLMCPR limit is applicable to a variation of +/- 10°F in feedwater temperature. For operation outside of Nominal FWT, a feedwater temperature reduction of up to 120°F is supported for Base and EOOS DLO/SLO conditions for cycle operation through EOC.

4. Average Planar Linear Heat Generation Rate

The MAPLHGR values for the most limiting lattice (excluding natural uranium) of the GE14 bundle types as a function of average planar exposure is given in Table 4-1. During single loop operation, these limits are multiplied by the SLO multiplier listed in Table 4-8.

For Optima2 fuel, lattice-specific MAPLHGR values for DLO and SLO are provided in Tables 4-2 through 4-7.

Table 4-1 MAPLHGR for bundle(s):
GE14-P10DNAB389-18GZ-100T-145-T6-2650
GE14-P10DNAB418-16GZ-100T-145-T6-2646
GE14-P10DNAB406-16GZ-100T-145-T6-2508
GE14-P10DNAB409-15GZ-100T-145-T6-2507
(Reference 4 and 13)

Avg. Planar Exposure (GWd/MT)	MAPLHGR (kW/ft)
0.00	11.68
16.00	11.68
22.05	11.34
55.12	8.19
63.50	6.97
70.00	4.36

Table 4-2 MAPLHGR for bundle/lattice:
OPT2-3.89-16GZ8.00-2G6.00
Lattices 91, 92, 93, and 98
(References 3 and 19)

Lattices 91: Opt2-B0.71 92: Opt2-B4.27-16G8.00-2G6.00 93: Opt2-BE4.38-14G8.00-2G6.00 98: Opt2-T0.71		
Avg. Planar Exposure (GWd/MT)	**DLO MAPLHGR (kW/ft)**	**SLO MAPLHGR (kW/ft)**
0.0	9.43	8.11
7.5	9.10	7.83
12.5	9.10	7.83
17.5	9.10	7.83
24.0	9.55	8.21
58.0	9.55	8.21
70.0	8.18	7.03

Table 4-3 MAPLHGR for bundle/lattice:
OPT2-3.89-16GZ8.00-2G6.00
Lattices 94 and 95
(Reference 3 and 19)

Lattices 94: Opt2-M4.38-14G8.00-2G6.00 95: Opt2-ME4.35-12G8.00-2G6.00		
Avg. Planar Exposure (GWd/MT)	**DLO MAPLHGR (kW/ft)**	**SLO MAPLHGR (kW/ft)**
0.0	9.74	8.38
7.5	9.30	8.00
12.5	9.30	8.00
17.5	9.30	8.00
24.0	9.68	8.33
58.0	9.68	8.33
70.0	8.31	7.15

Table 4-4 MAPLHGR for bundle/lattice:
OPT2-3.89-16GZ8.00-2G6.00
Lattices 96 and 97
(Reference 3 and 19)

Lattices 96: Opt2-T4.35-12G8.00-2G6.00 97: Opt2-T4.35-14G6.00		
Avg. Planar Exposure (GWd/MT)	**DLO MAPLHGR (kW/ft)**	**SLO MAPLHGR (kW/ft)**
0.0	10.31	8.86
7.5	9.64	8.29
12.5	9.64	8.29
17.5	9.64	8.29
24.0	9.96	8.57
58.0	9.96	8.57
70.0	8.59	7.39

Table 4-5 MAPLHGR for bundle/lattice:
OPT2-3.94-13GZ7.00-2G6.00
Lattices 91, 98, 99, and 100
(Reference 3 and 19)

Lattices 91: Opt2-B0.71 98: Opt2-T0.71 99: Opt2-B4.33-13G7.00-2G6.00 100: Opt2-BE4.43-12G7.00-2G6.00		
Avg. Planar Exposure (GWd/MT)	**DLO MAPLHGR (kW/ft)**	**SLO MAPLHGR (kW/ft)**
0.0	9.82	8.44
10.0	9.50	8.17
15.0	9.50	8.17
17.5	9.50	8.17
24.0	9.50	8.17
58.0	9.50	8.17
70.0	8.12	6.99

Table 4-6 MAPLHGR for bundle/lattice:
OPT2-3.94-13GZ7.00-2G6.00
Lattices 101 and 102
(References 3 and 19)

Lattices 101: Opt2-M4.43-12G7.00-2G6.00 102: Opt2-ME4.40-10G.00-2G6.00		
Avg. Planar Exposure (GWd/MT)	**DLO MAPLHGR (kW/ft)**	**SLO MAPLHGR (kW/ft)**
0.0	10.22	8.79
10.0	9.64	8.29
15.0	9.64	8.29
17.5	9.64	8.29
24.0	9.64	8.29
58.0	9.64	8.29
70.0	8.27	7.11

Table 4-7 MAPLHGR for bundle/lattice:
OPT2-3.94-13GZ7.00-2G6.00
Lattice 103
(Reference 3 and 19)

Lattice 103: Opt2-T4.40-10G7.00-2G6.00		
Avg. Planar Exposure (GWd/MT)	**DLO MAPLHGR (kW/ft)**	**SLO MAPLHGR (kW/ft)**
0.0	10.84	9.33
10.0	9.95	8.56
15.0	9.95	8.56
17.5	9.95	8.56
24.0	9.95	8.56
58.0	9.95	8.56
70.0	8.58	7.38

Table 4-8 MAPLHGR SLO multiplier for GE Fuel
(Reference 4 and 13)

Fuel Type	SLO Multiplier
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 Tables 5-7 and 5-8. 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 Tables 5-2 through 5-6 by the applicable MCPR multiplier K(P) given in Tables 5-7 and 5-8. 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 5-9, 5-10, 5-11, and 5-12 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

TSSS, ISS, and NSS refer to scram speeds. TSSS is the Technical Specification Scram Speed, ISS is the Intermediate Scram Speed, and NSS is the Nominal Scram Speed. The scram time values are shown in Table 5-1. Reference 3 indicates that TSSS control rod insertion time values used in the analysis are conservative in comparison to the values shown in Table 5-1.

The NSS scram times are based on a conservative interpretation of scram time surveillance measurements. In the event that plant surveillance shows these scram insertion times to be exceeded, the MCPR limits are to default to the values which correspond to the ISS scram time. The ISS times have been chosen to provide an intermediate value between the NSS and the TSSS, but the interpolation between these values is not supported by Westinghouse methodology. In the event that the ISS times are exceeded, MCPR limits for the TSSS apply.

Table 5-1 Scram Times
(References 3 and 17)

Control Rod Insertion Fraction (%)	TSSS (seconds)	ISS (seconds)	NSS (seconds)
5	0.48	0.350	0.324
20	0.89	0.715	0.694
50	1.98	1.482	1.459
90	3.44	2.658	2.635

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 16). This value is consistent with the analyses of Reference 3.

Table 5-2 MCPR TSSS Based Operating Limits – Nominal FWT and FWTR
(Reference 3)

EOOS Combination	Fuel Type	Cycle Exposure		
		≤ 11551 MWd/MT	>11551 to EOFPL+590 MWd/MT	> EOFPL + 590 MWd/MT
BASE	Optima2	1.87	1.84	1.74
	GE14	1.78	1.75	1.68
BASE SLO	Optima2	1.91	1.88	1.78
	GE14	1.80	1.77	1.70
PLUOOS	Optima2	2.03	1.99	1.89
	GE14	1.87	1.83	1.77
PLUOOS SLO	Optima2	2.07	2.03	1.93
	GE14	1.89	1.85	1.79
TBPOOS	Optima2	2.06	1.91	1.91
	GE14	1.94	1.82	1.81
TBPOOS SLO	Optima2	2.10	1.95	1.95
	GE14	1.96	1.84	1.83
TCV SLOW CLOSURE	Optima2	1.87	1.84	1.74
	GE14	1.78	1.75	1.68
TCV SLOW CLOSURE SLO	Optima2	1.91	1.88	1.78
	GE14	1.80	1.77	1.70
TCV STUCK CLOSED	Optima2	1.87	1.84	1.74
	GE14	1.78	1.75	1.68
TCV STUCK CLOSED SLO	Optima2	1.91	1.88	1.78
	GE14	1.80	1.77	1.70

Table 5-3 MCPR ISS Based Operating Limits – Nominal FWT
(Reference 3)

EOOS Combination	Fuel Type	Cycle Exposure ≤ 11551 MWd/MT	>11551 to EOFPL+590 MWd/MT	> EOFPL + 590 MWd/MT
BASE	Optima2	1.51	1.51	1.51
	GE14	1.64	1.64	1.64
BASE SLO	Optima2	1.54	1.54	1.54
	GE14	1.66	1.66	1.66
PLUOOS	Optima2	1.63	1.63	1.62
	GE14	1.64	1.64	1.64
PLUOOS SLO	Optima2	1.66	1.66	1.65
	GE14	1.66	1.66	1.66
TBPOOS	Optima2	1.62	1.64	1.62
	GE14	1.64	1.64	1.64
TBPOOS SLO	Optima2	1.65	1.67	1.65
	GE14	1.66	1.66	1.66
TCV SLOW CLOSURE	Optima2	1.56	1.51	1.51
	GE14	1.64	1.64	1.64
TCV SLOW CLOSURE SLO	Optima2	1.59	1.54	1.54
	GE14	1.66	1.66	1.66
TCV STUCK CLOSED	Optima2	1.51	1.51	1.51
	GE14	1.64	1.64	1.64
TCV STUCK CLOSED SLO	Optima2	1.54	1.54	1.54
	GE14	1.66	1.66	1.66

Table 5-4 MCPR ISS Based Operating Limits - FWTR
(Reference 3)

EOOS Combination	Fuel Type	Cycle Exposure ≤ 11551 MWd/MT	Cycle Exposure >11551 to EOFPL+590 MWd/MT	Cycle Exposure > EOFPL + 590 MWd/MT
BASE	Optima2	1.54	1.58	1.54
	GE14	1.64	1.64	1.64
BASE SLO	Optima2	1.57	1.61	1.57
	GE14	1.66	1.66	1.66
PLUOOS	Optima2	1.63	1.63	1.62
	GE14	1.64	1.64	1.64
PLUOOS SLO	Optima2	1.66	1.66	1.65
	GE14	1.66	1.66	1.66
TBPOOS	Optima2	1.65	1.71	1.67
	GE14	1.67	1.65	1.65
TBPOOS SLO	Optima2	1.68	1.75	1.71
	GE14	1.69	1.67	1.67
TCV SLOW CLOSURE	Optima2	1.56	1.58	1.54
	GE14	1.64	1.64	1.64
TCV SLOW CLOSURE SLO	Optima2	1.59	1.61	1.57
	GE14	1.66	1.66	1.66
TCV STUCK CLOSED	Optima2	1.54	1.58	1.54
	GE14	1.64	1.64	1.64
TCV STUCK CLOSED SLO	Optima2	1.57	1.61	1.57
	GE14	1.66	1.66	1.66

Table 5-5 MCPR NSS Based Operating Limits – Nominal FWT
(Reference 3)

EOOS Combination	Fuel Type	Cycle Exposure ≤ 11551 MWd/MT	>11551 to EOFPL+590 MWd/MT	> EOFPL + 590 MWd/MT
BASE	Optima2	1.51	1.51	1.51
	GE14	1.64	1.64	1.64
BASE SLO	Optima2	1.54	1.54	1.54
	GE14	1.66	1.66	1.66
PLUOOS	Optima2	1.61	1.62	1.61
	GE14	1.64	1.64	1.64
PLUOOS SLO	Optima2	1.64	1.65	1.64
	GE14	1.66	1.66	1.66
TBPOOS	Optima2	1.61	1.63	1.61
	GE14	1.64	1.64	1.64
TBPOOS SLO	Optima2	1.64	1.66	1.64
	GE14	1.66	1.66	1.66
TCV SLOW CLOSURE	Optima2	1.56	1.51	1.51
	GE14	1.64	1.64	1.64
TCV SLOW CLOSURE SLO	Optima2	1.59	1.54	1.54
	GE14	1.66	1.66	1.66
TCV STUCK CLOSED	Optima2	1.51	1.51	1.51
	GE14	1.64	1.64	1.64
TCV STUCK CLOSED SLO	Optima2	1.54	1.54	1.54
	GE14	1.66	1.66	1.66

Table 5-6 MCPR NSS Based Operating Limits – FWTR
(Reference 3)

EOOS Combination	Fuel Type	Cycle Exposure ≤ 11551 MWd/MT	>11551 to EOFPL+590 MWd/MT	> EOFPL + 590 MWd/MT
BASE	Optima2	1.53	1.57	1.54
	GE14	1.64	1.64	1.64
BASE SLO	Optima2	1.56	1.60	1.57
	GE14	1.66	1.66	1.66
PLUOOS	Optima2	1.61	1.62	1.61
	GE14	1.64	1.64	1.64
PLUOOS SLO	Optima2	1.64	1.65	1.64
	GE14	1.66	1.66	1.66
TBPOOS	Optima2	1.64	1.69	1.67
	GE14	1.66	1.65	1.64
TBPOOS SLO	Optima2	1.67	1.73	1.71
	GE14	1.68	1.67	1.66
TCV SLOW CLOSURE	Optima2	1.56	1.57	1.54
	GE14	1.64	1.64	1.64
TCV SLOW CLOSURE SLO	Optima2	1.59	1.60	1.57
	GE14	1.66	1.66	1.66
TCV STUCK CLOSED	Optima2	1.53	1.57	1.54
	GE14	1.64	1.64	1.64
TCV STUCK CLOSED SLO	Optima2	1.56	1.60	1.57
	GE14	1.66	1.66	1.66

Table 5-7 MCPR(P) for GE and Westinghouse Fuel – Nominal FWT
(Reference 3)

EOOS Combination	Core Flow (% of Rated)	Core Thermal Power (% of rated) 0	25	38.5	38.5	41	50	60	80	100
		Operating Limit MCPR			Operating Limit MCPR Multiplier, Kp					
Base	≤60	2.54	2.35	2.25	1.33	1.30	1.21	1.14	1.06	1.00
	>60	2.59	2.56	2.55						
Base SLO	≤60	2.59	2.40	2.30	1.33	1.30	1.21	1.14	1.06	1.00
	>60	2.64	2.61	2.60						
PLUOOS	≤60	2.54	2.35	2.25	1.58	1.56	1.51	1.33	1.10	1.00
	>60	2.59	2.56	2.55						
PLUOOS SLO	≤60	2.59	2.40	2.30	1.58	1.56	1.51	1.33	1.10	1.00
	>60	2.64	2.61	2.60						
TBPOOS	≤60	4.01	3.12	2.64	1.35	1.32	1.23	1.16	1.08	1.00
	>60	4.01	3.49	3.20						
TBPOOS SLO	≤60	4.09	3.18	2.69	1.35	1.32	1.23	1.16	1.08	1.00
	>60	4.09	3.56	3.26						
TCV SLOW CLOSURE	≤60	2.54	2.35	2.25	1.64	1.62	1.55	1.45	1.10	1.00
	>60	2.59	2.56	2.55						
TCV SLOW CLOSURE SLO	≤60	2.59	2.40	2.30	1.64	1.62	1.55	1.45	1.10	1.00
	>60	2.64	2.61	2.60						
TCV STUCK CLOSED	≤60	3.97	3.08	2.60	1.33	1.30	1.22	1.16	1.08	1.00
	>60	4.06	3.43	3.10						
TCV STUCK CLOSED SLO	≤60	4.05	3.14	2.65	1.33	1.30	1.22	1.16	1.08	1.00
	>60	4.14	3.50	3.16						

Table 5-8 MCPR(P) for GE and Westinghouse Fuel - FWTR
(Reference 3)

EOOS Combination	Core Flow (% of Rated)	Core Thermal Power (% of rated)								
		0	25	38.5	38.5	41	50	60	80	100
		Operating Limit MCPR			Operating Limit MCPR Multiplier, Kp					
Base	≤60	2.76	2.54	2.43	1.46	1.43	1.30	1.22	1.10	1.00
	>60	2.82	2.78	2.76						
Base SLO	≤60	2.81	2.59	2.48	1.46	1.43	1.30	1.22	1.10	1.00
	>60	2.88	2.84	2.81						
PLUOOS	≤60	2.76	2.54	2.43	1.58	1.56	1.51	1.33	1.10	1.00
	>60	2.82	2.78	2.76						
PLUOOS SLO	≤60	2.81	2.59	2.48	1.58	1.56	1.51	1.33	1.10	1.00
	>60	2.88	2.84	2.81						
TBPOOS	≤60	4.44	3.42	2.87	1.46	1.43	1.30	1.22	1.10	1.00
	>60	4.45	3.84	3.52						
TBPOOS SLO	≤60	4.52	3.49	2.93	1.46	1.43	1.30	1.22	1.10	1.00
	>60	4.54	3.91	3.59						
TCV SLOW CLOSURE	≤60	2.76	2.54	2.43	1.64	1.62	1.55	1.45	1.10	1.00
	>60	2.82	2.78	2.76						
TCV SLOW CLOSURE SLO	≤60	2.81	2.59	2.48	1.64	1.62	1.55	1.45	1.10	1.00
	>60	2.88	2.84	2.81						
TCV STUCK CLOSED	≤60	4.39	3.37	2.82	1.46	1.43	1.30	1.22	1.10	1.00
	>60	4.50	3.78	3.39						
TCV STUCK CLOSED SLO	≤60	4.47	3.44	2.88	1.46	1.43	1.30	1.22	1.10	1.00
	>60	4.59	3.85	3.46						

Table 5-9 MCPR(F) Limits for GE Fuel, DLO Operation
(Reference 3)

Flow (% rated)	MCPR(F) Limit
110.0	1.23
100.0	1.23
80.0	1.42
60.0	1.62
40.0	1.82
20.0	1.93
0.0	2.04

Table 5-10 MCPR(F) Limits for GE Fuel, SLO Operation
(Reference 3)

Flow (% rated)	MCPR(F) Limit
110.0	1.24
100.0	1.24
80.0	1.44
60.0	1.63
40.0	1.84
20.0	1.95
0.0	2.06

Table 5-11 MCPR(F) Limits for Westinghouse Fuel, DLO Operation
(Reference 3)

Flow (% rated)	MCPR(F) Limit
110.0	1.17
100.0	1.17
80.0	1.35
60.0	1.51
40.0	1.59
20.0	1.67
0.0	1.75

Table 5-12 MCPR(F) Limits for Westinghouse Fuel, SLO Operation
(Reference 3)

Flow (% rated)	MCPR(F) Limit
110.0	1.19
100.0	1.19
80.0	1.37
60.0	1.54
40.0	1.62
20.0	1.70
0.0	1.78

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-P10DNAB409-15GZ-100T-145-T6-2507
GE14-P10DNAB406-16GZ-100T-145-T6-2508
GE14-P10DNAB418-16GZ-100T-145-T6-2646
GE14-P10DNAB389-18GZ-100T-145-T6-2650

The thermal mechanical operating limit at rated conditions for the Optima2 fuel is established in terms of the maximum LHGR given in Table 6-17 as a function of rod nodal exposure. The limit applies to all Optima2 bundle designs.

The linear heat generation rate (LHGR) limit is the product of the exposure dependent LHGR limit from Tables 6-1 through 6-17 and the minimum of: the power dependent LHGR factor, LHGRFAC(P) or the flow dependent LHGR factor, LHGRFAC(F) where applicable. The LHGRFAC(P) is determined from Table 6-18, 6-19, or 6-20. The LHGRFAC(F) is determined from Table 6-21, 6-22, 6-23, 6-24, or 6-25.

Table 6-1: LHGR Limit for GE14-P10DNAB418-16GZ-100T-145-T6-2646
(Reference 7)

Lattices 5963, 5970, 5971, 5974 and 5975 Composite Limit kW/ft

5963: P10DNAL071-NOG-100T-T6-5963
5970: P10DNAL465-16G7.0-100T-T6-5970
5971: P10DNAL465-13G7.0/3G6.0-100T-T6-5971
5974: P10DNAL071-NOG-100T-V-T6-5974
5975: P10DNAL071-16GE-100T-V-T6-5975

UO2 Pellet Burnup (GWd/MTU)	Composite 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-P10DNAB418-16GZ-100T-145-T6-2646, Lattice 5972
(Reference 7)

Lattice 5972 Composite Limit kW/ft P10DNAL461-12G7.0/3G6.0-100T-E-T6-5972	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
15.9515	13.4000
17.2857	13.2538
18.1089	13.1602
19.4140	13.0119
20.7050	12.8651
23.2463	12.5762
26.9800	12.1517
33.0780	11.4585
39.0585	10.7786
44.9195	10.0506
50.6634	9.3499
56.3043	8.7427
61.8691	8.1854
67.3941	6.2027
70.0000	5.0000

Table 6-3: LHGR Limit for GE14-P10DNAB418-16GZ-100T-145-T6-2646, Lattice 5973
(Reference 7)

Lattice 5973 Composite Limit kW/ft P10DNAL461-12G7.0/3G6.0-100T-V-T6-5973	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
14.6537	13.4000
16.0077	13.3991
17.3409	13.2476
18.1982	13.1501
19.5019	13.0019
20.7905	12.8554
23.3251	12.5672
27.0482	12.1440
33.1306	11.4525
39.0945	10.7607
44.9367	9.9688
50.6595	9.2608
56.2772	8.6476
61.8172	8.1267
67.3169	6.2384
70.0000	5.0000

Table 6-4: LHGR Limit for GE14-P10DNAB389-18GZ-100T-145-T6-2650
(Reference 7)

Lattices 5963, 5994, 5995, 5998 and 5999 Composite Limit kW/ft 5963: P10DNAL071-NOG-100T-T6-5963 5994: P10DNAL430-17G8.0/1G3.0-100T-T6-5994 5995: P10DNAL431-9G8.0/8G6.0/1G3.0-100T-T6-5995 5998: P10DNAL071-NOG-100T-V-T6-5998 5999: P10DNAL071-18GE-100T-V-T6-5999	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0	13.4
16.0	13.4
63.5	8.0
70.0	5.0

Table 6-5: LHGR Limit for GE14-P10DNAB389-18GZ-100T-145-T6-2650, Lattice 5996
(Reference 7)

Lattice 5996 Composite Limit kW/ft P10DNAL430-7G8.0/8G6.0-100T-E-T6-5996	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
14.8906	13.4000
16.2580	13.3707
17.6015	13.2179
18.9215	13.0679
19.4423	13.0087
20.7453	12.8605
23.3142	12.5685
27.0881	12.1395
33.2434	11.4389
39.2913	10.5936
45.2308	9.8060
51.0564	9.1014
56.7750	8.4943
61.9432	8.0319
67.9800	5.9323
70.0000	5.0000

Table 6-6: LHGR Limit for GE14-P10DNAB389-18GZ-100T-145-T6-2650, Lattice 5997
(Reference 7)

Lattice 5997 Composite Limit kW/ft P10DNAL430-7G8.0/8G6.0-100T-V-T6-5997	
UO2 Pellet Burnup (GWd/MTU)	Composite Limit (kW/ft)
0.0000	13.4000
14.9485	13.4000
16.3156	13.3641
17.6577	13.1592
18.9752	12.9330
19.3601	12.9427
20.6567	12.8235
23.2117	12.5211
26.9637	12.0810
33.0874	11.3527
39.1088	10.5071
45.0238	9.6894
50.6192	8.9710
56.3453	8.3308
62.0012	7.7843
67.6125	6.1019
70.0000	5.0000

Table 6-7: LHGR Limit for GE14-P10DNAB409-15GZ-100T-145-T6-2507
(References 6 and 7)

Lattices 5254, 5259, and 5260 Composite Limit kW/ft 5254: P10DNAL071-NOG-100T-T6-5254 5259: P10DNAL071-NOG-100T-V-T6-5259 5260: P10DNAL071-15GE-100T-V-T6-5260	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0	13.4
16.0	13.4
63.5	8.0
70.0	5.0

Table 6-8: LHGR Limit for GE14-P10DNAB409-15GZ-100T-145-T6-2507, Lattice 5255
(Reference 6)

Lattice 5255 Composite Limit kW/ft P10DNAL457-10G7.0/5G6.0-100T-T6-5255	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
26.5600	12.1995
32.4838	11.3566
38.2923	10.5548
42.6374	10.0194
48.4082	9.4042
54.1266	8.8227
59.7952	8.2658
66.1221	6.7898
70.0000	5.0000

Table 6-9: LHGR Limit for GE14-P10DNAB409-15GZ-100T-145-T6-2507, Lattice 5256
(Reference 6)

Lattice 5256 Composite Limit kW/ft P10DNAL457-10G7.0/4G6.0-100T-T6-5256	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
26.4377	12.2134
32.3724	11.3683
38.1915	10.5646
42.5345	10.0279
48.3153	9.4117
54.0433	8.8293
59.7208	8.2716
66.0634	6.8169
70.0000	5.0000

Table 6-10: LHGR Limit for GE14-P10DNAB409-15GZ-100T-145-T6-2507, Lattice 5257
(Reference 6)

Lattice 5257 Composite Limit kW/ft P10DNAL446-10G7.0/4G6.0-100T-E-T6-5257	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
22.4684	12.6646
25.9797	12.2498
31.8383	11.5023
36.4126	10.9965
42.2318	10.3946
48.0000	9.7621
63.5000	8.0000
70.0000	5.0000

Table 6-11: LHGR Limit for GE14-P10DNAB409-15GZ-100T-145-T6-2507, Lattice 5258

(Reference 6)

Lattice 5258 Composite Limit kW/ft P10DNAL446-10G7.0/4G6.0-100T-V-T6-5258	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
17.7371	13.2025
18.9898	13.0548
20.2266	12.9195
22.6600	12.6287
26.2497	12.1583
32.1571	11.4142
37.9780	10.6863
42.3297	10.1829
48.0873	9.5889
53.7859	9.0048
59.4266	8.4220
65.0184	7.2992
70.0000	5.0000

Table 6-12: LHGR Limit for GE14-P10DNAB406-16GZ-100T-145-T6-2508
(References 6 and 7)

Lattices 5254, 5259, and 5265 Composite Limit kW/ft 5254: P10DNAL071-NOG-100T-T6-5254 5259: P10DNAL071-NOG-100T-V-T6-5259 5265: P10DNAL071-16GE-100T-V-T6-5265	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0	13.4
16.0	13.4
63.5	8.0
70.0	5.0

Table 6-13: LHGR Limit for GE14-P10DNAB406-16GZ-100T-145-T6-2508, Lattice 5261
(Reference 6)

Lattice 5261 Composite Limit kW/ft P10DNAL452-12G7.0/4G6.0-100T-T6-5261	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
26.5529	12.2003
32.5158	11.3596
38.3655	10.5487
42.8529	9.9603
48.6317	9.3489
54.3587	8.7722
60.0364	8.1569
66.3477	6.6857
70.0000	5.0000

Table 6-14: LHGR Limit for GE14-P10DNAB406-16GZ-100T-145-T6-2508, Lattice 5262
(Reference 6)

Lattice 5262 Composite Limit kW/ft P10DNAL452-12G7.0/2G6.0-100T-T6-5262	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
26.3186	12.2269
32.3063	11.3814
38.1786	10.5659
42.6528	9.9762
48.4524	9.3633
54.1986	8.7853
59.8932	8.1683
66.2385	6.7361
70.0000	5.0000

Table 6-15: LHGR Limit for GE14-P10DNAB406-16GZ-100T-145-T6-2508, Lattice 5263
(Reference 6)

Lattice 5263 Composite Limit kW/ft P10DNAL444-12G7.0/2G6.0-100T-E-T6-5263	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
22.2147	12.6935
25.7994	12.2602
31.6822	11.4670
36.3906	10.8097
42.2210	10.0473
48.0018	9.3234
53.7263	8.6493
59.3943	8.0286
65.0127	7.3018
70.0000	5.0000

Table 6-16: LHGR Limit for GE14-P10DNAB406-16GZ-100T-145-T6-2508, Lattice 5264
(Reference 6)

Lattice 5264 Composite Limit kW/ft P10DNAL444-12G7.0/2G6.0-100T-V-T6-5264	
UO2 Pellet Burnup (GWd/MTU)	**Composite Limit (kW/ft)**
0.0000	13.4000
16.0000	13.4000
17.3980	13.2411
18.6393	13.0830
19.8662	12.8680
22.2850	12.5549
25.8608	12.0511
31.7287	11.2541
36.4936	10.7218
42.3157	9.9690
48.0855	9.2457
53.7969	8.5723
59.4504	7.9532
65.0537	7.2829
70.0000	5.0000

Table 6-17: LHGR Limit for Westinghouse Optima2 Fuel
OPT2-3.89-16GZ8.00-2G6.00
OPT2-3.94-13GZ7.00-2G6.00
(Reference 3)

Rod Nodal Exposure (GWd/MTU)	LHGR Limit (kW/ft)
0.00	13.11
14.00	13.11
72.00	6.48

Table 6-18 LHGRFAC(P) for GE Fuel, DLO
(Reference 3, 14, and 18)

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								
PLUOOS	≤ 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					
TCV Slow Closure	≤ 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								

Table 6-19 LHGRFAC(P) for GE Fuel, SLO
(Reference 3, 13, 14, and 18)

EOOS Combination	Core Flow (% of rated)	Core Thermal Power (% of rated)						
		0	25	38.5	38.5	70	CP*	100
		LHGRFAC(P) Multiplier						
Base SLO	≤ 60	0.50	0.56	0.59	0.68		0.77	0.77
	> 60							
PLUOOS SLO	≤ 60	0.22	0.39	0.48	0.54	0.73	0.77	0.77
	> 60	0.33		0.42				
TBPOOS SLO	≤ 60	0.22	0.39	0.48	0.54		0.77	0.77
	> 60	0.33		0.42				
TCV Slow Closure SLO	≤ 60	0.22	0.39	0.48	0.54	0.73	0.77	0.77
	> 60	0.33		0.42				
TCV Stuck Closed SLO	≤ 60	0.50	0.56	0.59	0.68		0.77	0.77
	> 60							

* CP is the cutoff power level and is equal to 59.25% for Base Case SLO and TCV Stuck Closed SLO, 70% for PLUOOS SLO, 69.25% for TBPOOS SLO, and 70% for TCV Slow Closure SLO.

Table 6-20 LHGRFAC(P) for Westinghouse Fuel
(Reference 3)

EOOS Combination	Core Thermal Power (% of rated)									
	0	25	38.5	38.5	41	50	60	80	100	102
	LHGRFAC(P) Multiplier									
Base	0.50	0.50	0.50	0.70	0.72	0.76	0.82	0.91	1.00	1.00
Base SLO	0.50	0.50	0.50	0.70	0.72	0.76	0.82	0.91	1.00	1.00
PLUOOS	0.50	0.50	0.50	0.61	0.61	0.64	0.72	0.90	1.00	1.00
PLUOOS SLO	0.50	0.50	0.50	0.61	0.61	0.64	0.72	0.90	1.00	1.00
TBPOOS	0.43	0.43	0.43	0.70	0.72	0.76	0.82	0.91	1.00	1.00
TBPOOS SLO	0.43	0.43	0.43	0.70	0.72	0.76	0.82	0.91	1.00	1.00
TCV Slow Closure	0.50	0.50	0.50	0.50	0.50	0.52	0.58	0.79	1.00	1.00
TCV Slow Closure SLO	0.50	0.50	0.50	0.50	0.50	0.52	0.58	0.79	1.00	1.00
TCV Stuck Closed	0.38	0.38	0.38	0.70	0.71	0.76	0.81	0.91	1.00	1.00
TCV Stuck Closed SLO	0.38	0.38	0.38	0.70	0.71	0.76	0.81	0.91	1.00	1.00

Table 6-21 LHGRFAC(F) Multipliers, GE Fuel, DLO, All Cases Except TCV Stuck Closed
(Reference 3)

Flow (% rated)	LHGRFAC(F) Multiplier
100.00	1.00
80.00	1.00
50.00	0.77
40.00	0.64
30.00	0.55
0.00	0.28

Table 6-22 LHGRFAC(F) Multipliers, GE Fuel, DLO, TCV Stuck Closed
(Reference 14 and 18)

Flow (% rated)	LHGRFAC(F) Multiplier
100.00	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 6-23 LHGRFAC(F) Multipliers, GE Fuel, SLO, All Cases Except TCV Stuck Closed
(Reference 3 and 13)

Flow (% rated)	LHGRFAC(F) Multiplier
100.00	0.77
80.00	0.77
50.00	0.77
40.00	0.64
30.00	0.55
0.00	0.28

Table 6-24 LHGRFAC(F) Multipliers, GE Fuel, SLO, TCV Stuck Closed
(Reference 14 and 18)

Flow (% rated)	LHGRFAC(F) Multiplier
100.00	0.77
98.30	0.77
68.30	0.77
50.00	0.63
40.00	0.50
30.00	0.41
0.00	0.14

Table 6-25 LHGRFAC(F) Multipliers, Westinghouse Fuel
(Reference 3)

Flow (% rated)	LHGRFAC(F) Multiplier
110.00	1.00
100.00	1.00
80.00	1.00
60.00	0.80
40.00	0.59
20.00	0.43
0.00	0.27

7. Rod Block Monitor

The rod block monitor upscale instrumentation setpoints are determined from the relationships shown below (Reference 8):

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	$0.65\ W_d + 56.1\%$
Single Recirculation Loop Operation	$0.65\ W_d + 51.4\%$

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 98 Mlb/hr.

8. Stability Protection Setpoints

The OPRM PBDA trip settings (Reference 3):

PBDA Trip Amplitude Setpoint (Sp)	Corresponding Maximum Confirmation Count Setpoint (Np)
1.16	17

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.

9. Modes of Operation

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

EOOS Options[1,2,7,9]	Operating Region [8]			
	Standard	MELLLA	ICF[5]	Coastdown[3]
Base, TSSS, ISS, or NSS	Yes	Yes	Yes	Yes
Base SLO, TSSS, ISS, or NSS	Yes	Yes	No	Yes
TBPOOS, TSSS, ISS, or NSS	Yes	Yes	Yes	Yes
TBPOOS SLO, TSSS, ISS, or NSS	Yes	Yes	No	Yes
PLUOOS[4,6], TSSS, ISS, or NSS	Yes	Yes	Yes	Yes
PLUOOS SLO[4,6], TSSS, ISS, or NSS	Yes	Yes	No	Yes
TCV Slow Closure[6], TSSS, ISS, or NSS	Yes	Yes	Yes	Yes
TCV Slow Closure SLO[6], TSSS, ISS, or NSS	Yes	Yes	No	Yes
TCV Stuck Closed[10], TSSS, ISS, or NSS	Yes	Yes	Yes	Yes
TCV Stuck Closed SLO[10], TSSS, ISS, or NSS	Yes	Yes	No	Yes

[1] Each OOS Option may be combined with up to 18 TIP channels OOS provided the requirements (as clarified in Reference 12) for utilizing SUBTIP methodology are met and up to 50% of the LPRMs OOS with an LPRM calibration frequency of 2500 Effective Full Power Hours (EFPH) (2000 EFPH +25%). For operation under all limit sets, a 120°F reduction in feedwater temperature throughout the cycle was analyzed and is subject to the restrictions in Reference 10 (Feedwater Temperature Reduction or Feedwater Heaters OOS).

[2] Each EOOS option except TBPOOS requires the opening profile for the turbine bypass valves provided in Reference 15 to be met. These conditions also support Turbine Bypass flow of 29.6% of vessel rated steam flow, equivalent to 1 Turbine Bypass Valve OOS, if the assumed opening profile (Reference 15) 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 the Turbine Bypass Valve system can not pass an equivalent of 29.6% of vessel rated steam flow, utilize the TBPOOS condition.

[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. Coastdown analysis has been performed with bounding assumption of full power operation up to cycle exposure of 16,000 MWD/MTU.

[4] If the Base Case limit set (DLO only) is being used and the PLU is taken OOS for a surveillance and the surveillance is done at ≥80% rated reactor power, an administrative limit of 0.98 on MFLPD and 0.88 on MFLCPR for scram time greater than ISS but less than or equal to TSSS, or 0.89 on MFLCPR for scram time greater than NSS but less than or equal to ISS, or 0.89 on MFLCPR for scram time less than or equal to NSS limit can be used instead of the PLUOOS (DLO) thermal limit set. If the Base Case limit set (DLO only) is being used and the PLU is taken OOS for a surveillance and the surveillance is done at ≥95% rated reactor power, an administrative limit of 0.99 on MFLPD and 0.91 on MFLCPR for scram time greater than ISS but less than or equal to TSSS, or 0.91 on MFLCPR for scram time greater than NSS but less than or equal to ISS, or 0.92 on MFLCPR for scram time less than or equal to NSS limit can be used instead of the PLUOOS (DLO) thermal limit set. The MAPRAT limit is not impacted by PLUOOS and thus continue to monitor to 1.00 in this condition.

[5] Operation up to 108% rated core flow is licensed for this cycle.

[6] For operation with a pressure regulator out-of-service (PROOS), the TCV Slow Closure limits should be applied. For operation with a PROOS and TCV slow closure, the TCV slow closure limits are applicable. For operation with a PROOS and PLUOOS, the PLUOOS limits are applicable. (Reference 3)

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

[8] 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 10.

[9] For Base DLO and Base SLO cases, as well as all EOOS conditions, operation for both nominal and up to 120°F reduction in Feedwater temperature are supported. For both Base DLO/SLO and EOOS conditions, for operation at nominal feedwater temperature, the OLMCPR limit is applicable to a variation of +/- 10°F in feedwater temperature, and an operating steam dome pressure region bounded by the maximum value of 1020 psia and the minimum pressure curve in Reference 3 report.

[10] For operation with a Turbine Stop Valve stuck closed, the TCV Stuck Closed limits should be applied (Reference 3). TSV Stuck Closed and TCV Stuck Closed is not an analyzed out-of-service combination. For TSV Stuck Closed or TCV Stuck Closed, operation above 80% rated core thermal power is not an analyzed out-of-service combination.

10. 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. Commonwealth Edison Topical Report NFSR-0085, Revision 0, "Benchmark of BWR Nuclear Design Methods," November 1990.

2. Commonwealth Edison Topical Report NFSR-0085, Supplement 1 Revision 0, "Benchmark of BWR Nuclear Design Methods - Quad Cities Gamma Scan Comparisons," April 1991.

3. Commonwealth Edison Topical Report NFSR-0085, Supplement 2 Revision 0, "Benchmark of BWR Nuclear Design Methods – Neutronic Licensing Analyses," April 1991.

4. 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.

5. Westinghouse Topical Report CENPD-300-P-A, "Reference Safety Report for Boiling Water Reactor Reload Fuel," July 1996.

6. Westinghouse Topical Report CENPD-390-P-A, "The Advanced PHOENIX and POLCA Codes for Nuclear Design of Boiling Water Reactors," December 2000.

7. Westinghouse Report WCAP-16081-P-A, "10x10 SVEA Fuel Critical Power Experiments and CPR Correlation: SVEA-96 Optima2," March 2005.

8. Westinghouse Report WCAP-15682-P-A, "Westinghouse BWR ECCS Evaluation Model: Supplement 2 to Code Description, Qualification and Application," April 2003.

9. Westinghouse Report WCAP-16078-P-A, "Westinghouse BWR ECCS Evaluation Model: Supplement 3 to Code Description, Qualification and Application to SVEA-96 Optima2 Fuel," November 2004.

10. Westinghouse Topical Report WCAP-15836-P-A, "Fuel Rod Design Methods for Boiling Water Reactors – Supplement 1," June 2002.

11. Westinghouse Topical Report WCAP-15942-P-A, "Fuel Assembly Mechanical Design Methodology for Boiling Water Reactors, Supplement 1 to CENP-287," October 2004.

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

13. NEDO-32465-A, "Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications", August 1996.