Exelon Generation Company, LLC
LaSalle County Station
2601 North 21st Road
Marseilles, IL 61341-9757

www.exeloncorp.com

Exelon Nuclear

July 3, 2003

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

LaSalle County Station, Unit 1
Facility Operating License No. NPF-11
NRC Docket No. 50-373

Subject: Unit 1 Cycle 10A Core Operating Limits Report (COLR)

Exelon Generation Company (EGC), LLC, in accordance with LaSalle County Station Technical Specifications (TS) Section 5.6.5, "Core Operating Limits Report," is submitting a revision to the Core Operating Limits Report (COLR). The revision is due to the implementation of new minimum critical power ratio (MCPR) operating limits and power-dependent limiting heat generation rate (LHGR) limit penalties for control blade history effects on the fresh fuel for LaSalle County Station Unit 1 Cycle 10A operations. The penalties are applied to specific core locations to ensure that control blade history effects on fresh fuel assemblies are properly accounted for in the calculation of maximum nodal LHGR and MCPR.

Additionally, associated administrative changes have also been incorporated.

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

Respectfully,

George P. Barnes

George P. Barnes
Site Vice President
LaSalle County Station

Attachment

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

A001

Section 1

Core Operating Limits Report

for

LaSalle Unit 1 Cycle 10A

Issuance of Changes Summary

Affected Sections	Affected Pages	Summary of Changes	Revision	Date
All	All	Original Issue LaSalle Unit 1 Cycle 10A	0	5/2002
References	iv	Updated Reference 16 to the control blade history letter for L1C10A.	1	9/2002
2.2.1	2-1 through 2-14	Updated MCPR(p) limits for fresh ATRIUM-10 fuel. Renumbered tables.		
3.2	3-1, 3-2, and 3-3	Updated steady-state LHGR limits for fresh ATRIUM-10 fuel.		
3.2	3-12	Deleted third bullet under Table 3-14.		
6	6-2	Updated footnote 4 to be consistent with the updated application of control blade history penalties.		
References	v	Add Reference 18 to include the revised LaSalle Unit 1 Cycle 10A CBH Study	2	5/2003
2.2.1	2-1 through 2-24	Updated MCPR(p) limits for fresh ATRIUM-10 fuel with calculated CBH penalties. Renumbered tables.		
3.2	3-1 through 3-14	Updated steady-state LHGR limits for fresh ATRIUM-10 fuel with appropriate CBH penalty.		
6	6-1 and 6-2	Updated the allowed mode of operations table to identify the appropriate POWERPLEX decks to be used and updated footnote 4 to be consistent with the application of the control blade history penalties. Removed ELLLA from the table and added standard power-flow map. Also added a key for the table and note 9 to define standard power-flow map.		

Technical Requirements Manual – Appendix I
L1C10A Core Operating Limits Report

Table of Contents

References iv

1. Average Planar Linear Heat Generation Rate (3.2.1) 1-1
   - 1.1 Technical Specification Reference 1-1
   - 1.2 Description 1-1

2. Minimum Critical Power Ratio (3.2.2) 2-1
   - 2.1 Technical Specification Reference 2-1
   - 2.2 Description 2-1

3. Linear Heat Generation Rate (3.2.3) 3-1
   - 3.1 Technical Specification Reference 3-1
   - 3.2 Description 3-1

4. Control Rod Withdrawal Block Instrumentation (3.3.2.1) 4-1
   - 4.1 Technical Specification Reference 4-1
   - 4.2 Description 4-1

5. Traversing In-Core Probe System (3.2.1, 3.2.2, 3.2.3) 5-1
   - 5.1 Technical Specification Reference 5-1
   - 5.2 Description 5-1
   - 5.3 Bases 5-1

6. Allowed Modes of Operation (B 3.2.2, B 3.2.3) 6-1

7. Methodology (5.6.5) 7-1

References

1. Exelon Generation Company, LLC Docket No. 50-373 LaSalle County Station, Unit 1, License No. NPF-11.

2. 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. EMF-2690 Revision 0, "LaSalle Unit 1 Cycle 10 Reload Analysis," Framatome ANP, Inc., January 2002.

4. 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.

5. J11-03692-LHGR Revision 1, "ComEd GE9/GE10 LHGR Improvement Program," [NDIT NFM0000067 Sequence 00], February 2000.

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

7. Letter from D. Garber to R. Chin, "POWERPLEX-II CMSS Startup Testing", DEG:00:254, December 5, 2000.

8. Letter from D. Garber to R. Chin "POWERPLEX-II CMSS Startup Testing", DEG:00:256, December 6, 2000.

9. Letter from J.H. Riddle to R. Chin "TIP Symmetry Testing", JHR:97:021, January 20, 1997 and letter from D.Garber to R. Chin "TIP Symmetry Testing", DEG:99:085, March 23, 1999.

10. NEDC-31531 P and Supplement 1, "ARTS Improvement Program Analysis for LaSalle Units 1 and 2," December 1993 and June 1998, respectively.

11. EMF-2533 Revision 0, "LaSalle Unit 1 Cycle 10 Principal Transient Analysis Parameters," April 2001.

12. 24A5180AA Revision 0, "Lattice-Dependent MAPLHGR Report for LaSalle County Station Unit 1 Reload 7 Cycle 8," December 1995.

13. NFM Calculation No. BSA-L-99-07, "LaSalle GE9 MAPFACf Thermal Limit Multiplier for 105% Maximum Core Flow," October 1999.

14. GE-NE-187-13-0792 Revision 2, "Evaluation of a Postulated Slow Turbine Control Valve Closure Event For LaSalle County Station Units 1 and 2," NDIT NFM-98-00146 Sequence 00, July 1998.

15. Letter from R. Jacobs to R. Tsai, NFM:BSA:99-087, "Review of L1C9 Transient Analysis Results for Compliance with the Fuel Mechanical Limits for GE9 Fuel," September 21, 1999.

16. Letter from D. E. Garber to F. W. Trikur, "Control Blade History Study for LaSalle Unit 1 Cycle 10A", DEG:02:110, July 17, 2002.

17. Letter from D. E. Garber to F. W. Trikur, "Licensing Letter Report for Impact of Revised Core Loading on LaSalle 1 Cycle 10 Licensing", DEG:02:094, May 23, 2002.

18. Letter from A. W. Will to F. W. Trikur, "LaSalle Unit 1 Cycle 10A CBH Study – Revision 1", AWW:03:048, April 18, 2003.

1. Average Planar Linear Heat Generation Rate (3.2.1)

1.1 Technical Specification Reference:

Section 3.2.1.

1.2 Description:

Tables 1-1 through 1-4 are used to determine the maximum average planar linear heat generation rate (MAPLHGR) limit for each fuel type. Limits given in Tables 1-1 through 1-4 are for Dual Reactor Recirculation Loop Operation.

For Single Reactor Recirculation Loop Operation (SLO), the MAPLHGR limits given in Tables 1-1 through 1-4 must be multiplied by a SLO MAPLHGR multiplier. The SLO MAPLHGR multiplier for ATRIUM-10 and ATRIUM-9B fuel is 0.90 (Reference 3 Page 7-1). The SLO MAPLHGR multipliers for GE9B fuel are shown in Table 1-5 ($MAPFAC_P$) and Table 1-6 ($MAPFAC_F$). The SLO MAPLHGR limit for the GE9B fuel is the product of the MAPLHGR limit from Table 1-3 or 1-4 and the minimum of either the SLO $MAPFAC_P$ or SLO $MAPFAC_F$ as found in Tables 1-5 and 1-6, respectively.

Table 1-1
Maximum Average Planar Linear Heat Generation Rate
(MAPLHGR) for ATRIUM-10 Fuel
A10-4039B-15GV75-100M
A10-4037B-16GV75-100M
(Bundle types 10, 11, 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 31, 32, 41, 43, 45 and 49)
(Reference 3 Section 7.2.1)

Planar Average Exposure (GWd/MT)	MAPLHGR (kW/ft)
0.0	12.5
15.0	12.5
55.0	9.1
64.0	7.6

Table 1-2
Maximum Average Planar Linear Heat Generation Rate
(MAPLHGR) for ATRIUM-9B Fuel
SPCA9-393B-16GZ-100M
SPCA9-396B-12GZB-100M
SPCA9-384B-11GZ-80M
SPCA9-396B-12GZC-100M
(Bundle types 6, 7, 8 and 9)
(Reference 3 Section 7.2.1)

Planar Average Exposure (GWd/MT)	MAPLHGR (kW/ft)
0.0	13.5
20.0	13.5
64.3	9.07

Table 1-3
Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) for GE9B Fuel
GE9B-P8CWB342-10GZ-80M-150
(Bundle 3867, bundle type 5)
(References 5 and 12)

Planar Average Exposure (GWd/ST)	Lattice Specific MAPLHGR limit (kW/ft)					
0	12.66	12.04	12.25	11.72	12.09	12.66
0.200	12.59	12.08	12.28	11.77	12.12	12.59
1.000	12.40	12.16	12.35	11.87	12.22	12.40
2.000	12.34	12.28	12.45	12.00	12.37	12.34
3.000	12.34	12.42	12.55	12.13	12.53	12.34
4.000	12.37	12.57	12.65	12.27	12.70	12.37
5.000	12.40	12.73	12.76	12.41	12.88	12.40
6.000	12.43	12.89	12.87	12.56	13.07	12.43
7.000	12.46	13.06	12.98	12.72	13.27	12.46
8.000	12.48	13.24	13.10	12.88	13.47	12.48
9.000	12.50	13.42	13.21	13.05	13.65	12.50
10.000	12.51	13.61	13.31	13.21	13.76	12.51
12.500	12.35	13.79	13.35	13.31	13.82	12.35
15.000	11.98	13.50	13.06	13.05	13.51	11.98
20.000	11.20	12.79	12.47	12.45	12.79	11.20
25.000	10.42	11.95	11.67	11.63	11.95	10.42
27.2156	12.314	12.314	12.314	12.314	12.314	12.314
48.0808	10.800	10.800	10.800	10.800	10.800	10.800
58.9671	6.000	6.000	6.000	6.000	6.000	6.000
Lattice No.	732	2087	2088	2089	2090	2091

Table 1-4
Maximum Average Planar Linear Heat Generation Rate (MAPLHGR) for GE9B Fuel
GE9B-P8CWB343-12GZ-80M-150
(Bundle 3866, bundle type 4)
(References 5 and 12)

Planar Average Exposure (GWd/ST)	Lattice Specific MAPLHGR limit (kW/ft)				
0	12.66	11.69	11.37	10.92	12.66
0.200	12.59	11.71	11.43	10.99	12.59
1.000	12.40	11.78	11.55	11.13	12.40
2.000	12.34	11.95	11.72	11.33	12.34
3.000	12.34	12.16	11.91	11.54	12.34
4.000	12.37	12.40	12.11	11.76	12.37
5.000	12.40	12.67	12.32	12.00	12.40
6.000	12.43	12.90	12.53	12.24	12.43
7.000	12.46	13.05	12.76	12.49	12.46
8.000	12.48	13.21	12.98	12.75	12.48
9.000	12.50	13.37	13.13	13.01	12.50
10.000	12.51	13.54	13.30	13.22	12.51
12.500	12.35	13.76	13.60	13.57	12.35
15.000	11.98	13.48	13.23	13.21	11.98
20.000	11.20	12.71	12.40	12.37	11.20
25.000	10.42	11.92	11.60	11.57	10.42
27.2156	12.314	12.314	12.314	12.314	12.314
48.0808	10.800	10.800	10.800	10.800	10.800
58.9671	6.000	6.000	6.000	6.000	6.000
Lattice No.	732	2083	2084	2085	2086

Table 1-5
SLO $MAPFAC_P$ multiplier for GE9B Fuel
(References 5 and 10)

Core Thermal Power (% of rated)	$MAPFAC_P$ multiplier
0	0.4776
25	0.6082
100	1.0000

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MAPFAC_P$ multiplier should be applied.

Table 1-6
SLO $MAPFAC_F$ multiplier for GE9B Fuel
(References 5 and 13)

Core Flow (% of rated)	$MAPFAC_F$ multiplier
0	0.4672
25	0.6373
78.28	1.0000
105	1.0000

- Values are interpolated between relevant flow values.
- For core thermal monitoring at greater than 105% rated core flow, utilize $MAPFAC_F$ multiplier for 105% rated core flow.

2. Minimum Critical Power Ratio (3.2.2)

2.1 Technical Specification Reference:

Section 3.2.2.

2.2 Description:

MCPR limits from BOC to Coastdown are applicable up to a core average exposure of 31,495.1 MWd/MTU (which is the licensing basis exposure used by FANP). (Reference 3). Limits beyond the EOC exposure are not provided.

2.2.1 Manual Flow Control MCPR Limits

The Operating Limit MCPR (OLMCPR) is determined from either section 2.2.1.1 or 2.2.1.2, whichever is greater at any given power and flow condition.

2.2.1.1 Power-Dependent MCPR

The power-dependent MCPR value, $MCPR_P$, is determined from Tables 2-1 through 2-20, and is dependent on exposure (See Section 6, Note 4 for implementation details), fuel type and scram speed, in addition to power level. Tables 2-1, 2-1a, 2-2, 2-2a, and 2-5 through 2-18 are applicable to ATRIUM-10 fuel and Tables 2-3, 2-4, 2-19, and 2-20 are applicable to both ATRIUM-9B and GE9B fuel types.

2.2.1.2 Flow-Dependent MCPR

The flow dependent MCPR value, $MCPR_F$, is determined from Table 2-21 for all fuel types in Cycle 10A.

2.2.2 Automatic Flow Control MCPR Limits

Automatic Flow Control is not supported for L1C10A.

2.2.3 Nominal Scram Speeds

To utilize the MCPR limits for Nominal Scram Speeds (NSS), the core average scram speed insertion time must be equal to or less than the following values (Reference 11 Section 7.7).

Notch Position	Time (sec)
45	0.380
39	0.680
25	1.680
05	2.680

Table 2-1
$MCPR_p$

For BOC to Second Cycle 10A Sequence Exchange - Applicable to all ATRIUM-10 Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.70	2.20	2.07	1.52			1.43
EOOS Case 1	2.86	2.36	2.36	1.59			1.47
EOOS Case 2	2.86	2.36	2.36		1.81	1.74	1.54
EOOS Case 3	2.86	2.36	2.36	1.59			1.47
Single Loop Operation (SLO)	2.71	2.21	2.08	1.53			1.44
SLO with EOOS Case 1	2.87	2.37	2.37	1.60			1.48
SLO with EOOS Case 2	2.87	2.37	2.37		1.82	1.75	1.55
SLO with EOOS Case 3	2.87	2.37	2.37	1.60			1.48

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-1a
$MCPR_p$

For Second Cycle 10A Sequence Exchange to the Sequence Exchange at 8,800 MWd/MT Cycle Exposure - Applicable to all ATRIUM-10 Fuel Except Those Located in Cells 7B, 7C, 8A, 9A, 10B, and 10C

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.70	2.20	2.07	1.52			1.43
EOOS Case 1	2.86	2.36	2.36	1.59			1.47
EOOS Case 2	2.86	2.36	2.36		1.81	1.74	1.54
EOOS Case 3	2.86	2.36	2.36	1.59			1.47
Single Loop Operation (SLO)	2.71	2.21	2.08	1.53			1.44
SLO with EOOS Case 1	2.87	2.37	2.37	1.60			1.48
SLO with EOOS Case 2	2.87	2.37	2.37		1.82	1.75	1.55
SLO with EOOS Case 3	2.87	2.37	2.37	1.60			1.48

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-2
$MCPR_P$

For BOC to Second Cycle 10A Sequence Exchange - Applicable to all ATRIUM-10 Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.70	2.20	2.15	1.55	[illegible]	[illegible]	1.46
EOOS Case 1	2.95	2.45	2.45	1.62	[illegible]	[illegible]	1.51
EOOS Case 2	2.95	2.45	2.45	[illegible]	1.82	1.74	1.59
EOOS Case 3	2.95	2.45	2.45	1.62	[illegible]	[illegible]	1.51
Single Loop Operation (SLO)	2.71	2.21	2.16	1.56	[illegible]	[illegible]	1.47
SLO with EOOS Case 1	2.96	2.46	2.46	1.63	[illegible]	[illegible]	1.52
SLO with EOOS Case 2	2.96	2.46	2.46	[illegible]	1.83	1.75	1.60
SLO with EOOS Case 3	2.96	2.46	2.46	1.63	[illegible]	[illegible]	1.52

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-2a
$MCPR_P$

For Second Cycle 10A Sequence Exchange to the Sequence Exchange at 8,800 MWd/MT Cycle Exposure - Applicable to all ATRIUM-10 Fuel Except Those Located in Cells 7B, 7C, 8A, 9A, 10B, and 10C

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.70	2.20	2.15	1.55			1.46
EOOS Case 1	2.95	2.45	2.45	1.62			1.51
EOOS Case 2	2.95	2.45	2.45		1.82	1.74	1.59
EOOS Case 3	2.95	2.45	2.45	1.62			1.51
Single Loop Operation (SLO)	2.71	2.21	2.16	1.56			1.47
SLO with EOOS Case 1	2.96	2.46	2.46	1.63			1.52
SLO with EOOS Case 2	2.96	2.46	2.46		1.83	1.75	1.60
SLO with EOOS Case 3	2.96	2.46	2.46	1.63			1.52

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-3
$MCPR_P$

For BOC to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) - For ATRIUM-9B and GE9B Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.70	2.20	1.95	1.50			1.42
EOOS Case 1	2.70	2.20	2.15	1.58			1.45
EOOS Case 2	2.70	2.20	2.15		1.86	1.67	1.52
EOOS Case 3	2.70	2.20	2.15	1.58			1.45
Single Loop Operation (SLO)	2.71	2.21	1.96	1.51			1.43
SLO with EOOS Case 1	2.71	2.21	2.16	1.59			1.46
SLO with EOOS Case 2	2.71	2.21	2.16		1.87	1.68	1.53
SLO with EOOS Case 3	2.71	2.21	2.16	1.59			1.46

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-4
$MCPR_P$

For BOC to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) - For ATRIUM-9B and GE9B Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.70	2.20	1.96	1.54			1.44
EOOS Case 1	2.70	2.20	2.19	1.62			1.48
EOOS Case 2	2.70	2.20	2.19		1.86	1.73	1.59
EOOS Case 3	2.70	2.20	2.19	1.62			1.48
Single Loop Operation (SLO)	2.71	2.21	1.97	1.55			1.45
SLO with EOOS Case 1	2.71	2.21	2.20	1.63			1.49
SLO with EOOS Case 2	2.71	2.21	2.20		1.87	1.74	1.60
SLO with EOOS Case 3	2.71	2.21	2.20	1.63			1.49

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-5
$MCPR_P$

For Second Cycle 10A Sequence Exchange to Sequence Exchange at 8,800 MWd/MT Cycle Exposure - For ATRIUM-10 Fuel Located in 9A, 10B, and 10C Cells

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.74	2.24	2.11	1.56			1.47
EOOS Case 1	2.90	2.40	2.40	1.63			1.51
EOOS Case 2	2.90	2.40	2.40		1.85	1.78	1.58
EOOS Case 3	2.90	2.40	2.40	1.63			1.51
Single Loop Operation (SLO)	2.75	2.25	2.12	1.57			1.48
SLO with EOOS Case 1	2.91	2.41	2.41	1.64			1.52
SLO with EOOS Case 2	2.91	2.41	2.41		1.86	1.79	1.59
SLO with EOOS Case 3	2.91	2.41	2.41	1.64			1.52

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-6
$MCPR_P$

For Second Cycle 10A Sequence Exchange to Sequence Exchange at 8,800 MWd/MT Cycle Exposure - For ATRIUM-10 Fuel Located in 9A, 10B, and 10C Cells

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.74	2.24	2.19	1.59			1.50
EOOS Case 1	2.99	2.49	2.49	1.66			1.55
EOOS Case 2	2.99	2.49	2.49		1.86	1.78	1.63
EOOS Case 3	2.99	2.49	2.49	1.66			1.55
Single Loop Operation (SLO)	2.75	2.25	2.20	1.60			1.51
SLO with EOOS Case 1	3.00	2.50	2.50	1.67			1.56
SLO with EOOS Case 2	3.00	2.50	2.50		1.87	1.79	1.64
SLO with EOOS Case 3	3.00	2.50	2.50	1.67			1.56

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-7

$MCPR_P$

For Second Cycle 10A Sequence Exchange to Sequence Exchange at 8,800 MWd/MT Cycle Exposure – For ATRIUM-10 Fuel Located in 7B, 7C, and 8A Cells

Nominal Scram Speeds (NSS)

(Reference 3 Table 5.1 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)								
	0	25	25(25.1)	40	40(40.1)	60	80	80(80.1)	100
	$MCPR_P$								
Base Case Operation	2.73	2.23	2.10	1.87	1.84	1.52			1.43
EOOS Case 1	2.89	2.39	2.39			1.62			1.50
EOOS Case 2	2.89	2.39	2.39				1.84	1.77	1.57
EOOS Case 3	2.89	2.39	2.39			1.62			1.50
Single Loop Operation (SLO)	2.74	2.24	2.11	1.88	1.85	1.53			1.44
SLO with EOOS Case 1	2.90	2.40	2.40			1.63			1.51
SLO with EOOS Case 2	2.90	2.40	2.40				1.85	1.78	1.58
SLO with EOOS Case 3	2.90	2.40	2.40			1.63			1.51

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.
- The 40% and 40(40.1)% values were determined from interpolation of the Reference 3 values followed by application of the Reference 16 penalties.

Table 2-8
$MCPR_P$

For Second Cycle 10A Sequence Exchange to Sequence Exchange at 8,800 MWd/MT Cycle Exposure - For ATRIUM-10 Fuel Located in 7B, 7C, and 8A Cells

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2 and Reference 16 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)								
	0	25	25(25.1)	40	40(40.1)	60	80	80(80.1)	100
	$MCPR_P$								
Base Case Operation	2.73	2.23	2.18	1.93	1.90	1.55			1.46
EOOS Case 1	2.98	2.48	2.48			1.65			1.54
EOOS Case 2	2.98	2.48	2.48				1.85	1.77	1.62
EOOS Case 3	2.98	2.48	2.48			1.65			1.54
Single Loop Operation (SLO)	2.74	2.24	2.19	1.94	1.91	1.56			1.47
SLO with EOOS Case 1	2.99	2.49	2.49			1.66			1.55
SLO with EOOS Case 2	2.99	2.49	2.49				1.86	1.78	1.63
SLO with EOOS Case 3	2.99	2.49	2.49			1.66			1.55

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.
- The 40% and 40(40.1)% values were determined from interpolation of the Reference 3 values followed by application of the Reference 16 penalties.

Table 2-9
$MCPR_p$

For Sequence Exchange at 8,800 MWd/MT Cycle Exposure to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis)
Applicable to all ATRIUM-10 Fuel Except Those Located in Cells 7C, 10A, and 10C

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.70	2.20	2.07	1.52			1.43
EOOS Case 1	2.86	2.36	2.36	1.59			1.47
EOOS Case 2	2.86	2.36	2.36		1.81	1.74	1.54
EOOS Case 3	2.86	2.36	2.36	1.59			1.47
Single Loop Operation (SLO)	2.71	2.21	2.08	1.53			1.44
SLO with EOOS Case 1	2.87	2.37	2.37	1.60			1.48
SLO with EOOS Case 2	2.87	2.37	2.37		1.82	1.75	1.55
SLO with EOOS Case 3	2.87	2.37	2.37	1.60			1.48

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-10
$MCPR_P$

For Sequence Exchange at 8,800 MWd/MT Cycle Exposure to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis)
Applicable to all ATRIUM-10 Fuel Except Those Located in Cells 7C, 10A, and 10C

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.70	2.20	2.15	1.55			1.46
EOOS Case 1	2.95	2.45	2.45	1.62			1.51
EOOS Case 2	2.95	2.45	2.45		1.82	1.74	1.59
EOOS Case 3	2.95	2.45	2.45	1.62			1.51
Single Loop Operation (SLO)	2.71	2.21	2.16	1.56			1.47
SLO with EOOS Case 1	2.96	2.46	2.46	1.63			1.52
SLO with EOOS Case 2	2.96	2.46	2.46		1.83	1.75	1.60
SLO with EOOS Case 3	2.96	2.46	2.46	1.63			1.52

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-11
$MCPR_P$

For Sequence Exchange at 8,800 MWd/MT Cycle Exposure to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) For ATRIUM-10 Fuel Located in Cell 10C

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1, Reference 18 Table 4.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.73	2.23	2.10	1.55			1.46
EOOS Case 1	2.89	2.39	2.39	1.62			1.50
EOOS Case 2	2.89	2.39	2.39		1.84	1.77	1.57
EOOS Case 3	2.89	2.39	2.39	1.62			1.50
Single Loop Operation (SLO)	2.74	2.24	2.11	1.56			1.47
SLO with EOOS Case 1	2.90	2.40	2.40	1.63			1.51
SLO with EOOS Case 2	2.90	2.40	2.40		1.85	1.78	1.58
SLO with EOOS Case 3	2.90	2.40	2.40	1.63			1.51

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-12
$MCPR_P$

For Sequence Exchange at 8,800 MWd/MT Cycle Exposure to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) For ATRIUM-10 Fuel Located in Cell 10C

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2, Reference 18 Table 4.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.73	2.23	2.18	1.58			1.49
EOOS Case 1	2.98	2.48	2.48	1.65			1.54
EOOS Case 2	2.98	2.48	2.48		1.85	1.77	1.62
EOOS Case 3	2.98	2.48	2.48	1.65			1.54
Single Loop Operation (SLO)	2.74	2.24	2.19	1.59			1.50
SLO with EOOS Case 1	2.99	2.49	2.49	1.66			1.55
SLO with EOOS Case 2	2.99	2.49	2.49		1.86	1.78	1.63
SLO with EOOS Case 3	2.99	2.49	2.49	1.66			1.55

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-13
$MCPR_p$

For Sequence Exchange at 8,800 MWd/MT Cycle Exposure to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) For ATRIUM-10 Fuel Located in Cells 7C and 10A

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1, Reference 18 Table 4.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.71	2.21	2.08	1.53	[redacted]		1.44
EOOS Case 1	2.87	2.37	2.37	1.60	[redacted]		1.48
EOOS Case 2	2.87	2.37	2.37	[redacted]	1.82	1.75	1.55
EOOS Case 3	2.87	2.37	2.37	1.60	[redacted]		1.48
Single Loop Operation (SLO)	2.72	2.22	2.09	1.54	[redacted]		1.45
SLO with EOOS Case 1	2.88	2.38	2.38	1.61	[redacted]		1.49
SLO with EOOS Case 2	2.88	2.38	2.38	[redacted]	1.83	1.76	1.56
SLO with EOOS Case 3	2.88	2.38	2.38	1.61	[redacted]		1.49

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-14
$MCPR_p$

For Sequence Exchange at 8,800 MWd/MT Cycle Exposure to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) For ATRIUM-10 Fuel Located in Cells 7C and 10A

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2, Reference 18 Table 4.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.71	2.21	2.16	1.56			1.47
EOOS Case 1	2.96	2.46	2.46	1.63			1.52
EOOS Case 2	2.96	2.46	2.46		1.83	1.75	1.60
EOOS Case 3	2.96	2.46	2.46	1.63			1.52
Single Loop Operation (SLO)	2.72	2.22	2.17	1.57			1.48
SLO with EOOS Case 1	2.97	2.47	2.47	1.64			1.53
SLO with EOOS Case 2	2.97	2.47	2.47		1.84	1.76	1.61
SLO with EOOS Case 3	2.97	2.47	2.47	1.64			1.53

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-15
$MCPR_p$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - Applicable to all ATRIUM-10 Fuel Except Those Located in Cells 7C, 9A, and 9B

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.70	2.20	2.07	1.52			1.47
EOOS Case 1	2.86	2.36	2.36	1.59			1.47
EOOS Case 2	2.86	2.36	2.36		1.81	1.74	1.59
EOOS Case 3	2.86	2.36	2.36	1.59			1.47
Single Loop Operation (SLO)	2.71	2.21	2.08	1.53			1.48
SLO with EOOS Case 1	2.87	2.37	2.37	1.60			1.48
SLO with EOOS Case 2	2.87	2.37	2.37		1.82	1.75	1.60
SLO with EOOS Case 3	2.87	2.37	2.37	1.60			1.48

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-16
$MCPR_p$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - Applicable to ATRIUM-10 Fuel Except Those Located in Cells 7C, 9A, and 9B

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.4)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.70	2.20	2.15	1.55			1.50
EOOS Case 1	2.95	2.45	2.45	1.62			1.51
EOOS Case 2	2.95	2.45	2.45		1.82	1.74	1.64
EOOS Case 3	2.95	2.45	2.45	1.62			1.51
Single Loop Operation (SLO)	2.71	2.21	2.16	1.56			1.51
SLO with EOOS Case 1	2.96	2.46	2.46	1.63			1.52
SLO with EOOS Case 2	2.96	2.46	2.46		1.83	1.75	1.65
SLO with EOOS Case 3	2.96	2.46	2.46	1.63			1.52

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-17
$MCPR_p$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-10 Fuel Located in Cells 7C, 9A, and 9B

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.3, Reference 18 Table 4.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.71	2.21	2.08	1.53			1.48
EOOS Case 1	2.87	2.37	2.37	1.60			1.48
EOOS Case 2	2.87	2.37	2.37		1.82	1.75	1.60
EOOS Case 3	2.87	2.37	2.37	1.60			1.48
Single Loop Operation (SLO)	2.72	2.22	2.09	1.54			1.49
SLO with EOOS Case 1	2.88	2.38	2.38	1.61			1.49
SLO with EOOS Case 2	2.88	2.38	2.38		1.83	1.76	1.61
SLO with EOOS Case 3	2.88	2.38	2.38	1.61			1.49

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-18
$MCPR_P$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-10 Fuel Located in Cells 7C, 9A, and 9B

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.4, Reference 18 Table 4.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.71	2.21	2.16	1.56			1.51
EOOS Case 1	2.96	2.46	2.46	1.63			1.52
EOOS Case 2	2.96	2.46	2.46		1.83	1.75	1.65
EOOS Case 3	2.96	2.46	2.46	1.63			1.52
Single Loop Operation (SLO)	2.72	2.22	2.17	1.57			1.52
SLO with EOOS Case 1	2.97	2.47	2.47	1.64			1.53
SLO with EOOS Case 2	2.97	2.47	2.47		1.84	1.76	1.66
SLO with EOOS Case 3	2.97	2.47	2.47	1.64			1.53

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-19
$MCPR_p$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-9B and GE9B Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.3)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_p$						
Base Case Operation	2.70	2.20	1.95	1.50			1.43
EOOS Case 1	2.70	2.20	2.15	1.58			1.45
EOOS Case 2	2.70	2.20	2.15		1.86	1.67	1.58
EOOS Case 3	2.70	2.20	2.15	1.58			1.45
Single Loop Operation (SLO)	2.71	2.21	1.96	1.51			1.44
SLO with EOOS Case 1	2.71	2.21	2.16	1.59			1.46
SLO with EOOS Case 2	2.71	2.21	2.16		1.87	1.68	1.59
SLO with EOOS Case 3	2.71	2.21	2.16	1.59			1.46

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_p$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-20
$MCPR_P$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-9B and GE9B Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.4)

EOOS Combination	Core Thermal Power (% of rated)						
	0	25	25(25.1)	60	80	80(80.1)	100
	$MCPR_P$						
Base Case Operation	2.70	2.20	1.96	1.54			1.44
EOOS Case 1	2.70	2.20	2.19	1.62			1.48
EOOS Case 2	2.70	2.20	2.19		1.86	1.73	1.65
EOOS Case 3	2.70	2.20	2.19	1.62			1.48
Single Loop Operation (SLO)	2.71	2.21	1.97	1.55			1.45
SLO with EOOS Case 1	2.71	2.21	2.20	1.63			1.49
SLO with EOOS Case 2	2.71	2.21	2.20		1.87	1.74	1.66
SLO with EOOS Case 3	2.71	2.21	2.20	1.63			1.49

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $MCPR_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 2-21
$MCPR_F$ limits for ATRIUM-10, ATRIUM-9B, and GE9B Fuel
(Reference 3 Figure 5.1)

Flow (% of rated)	$MCPR_F$
0	1.63
30	1.63
100	1.19
105	1.11

- Values are interpolated between relevant flow values.
- Values presented are applicable to all Operating Domains and EOOS conditions in Section 6.
- For thermal limit monitoring at greater than 105% rated core flow, utilize the $MCPR_F$ limit for 105% rated core flow.

3. Linear Heat Generation Rate (3.2.3)

3.1 Technical Specification Reference:

Section 3.2.3.

3.2 Description:

The LHGR Limit is the product of the LHGR Limit from Tables 3-1, 3-2a, 3-2b, 3-3a, 3-3b, 3-4a, 3-4b, 3-5, 3-6 or 3-7 and the minimum of either the power dependent LHGR Factor, $LHGRFAC_P$, or the flow dependent LHGR Factor, $LHGRFAC_F$. The applicable power dependent LHGR Factor ($LHGRFAC_P$) is determined from Table 3-8, 3-9, 3-10 or 3-11 for ATRIUM-10 fuel, Table 3-12, 3-13, 3-14 or 3-15 for ATRIUM-9B fuel or Table 3-16 or 3-17 for GE9B fuel. The applicable flow dependent LHGR Factor ($LHGRFAC_F$) is determined from Table 3-18 for ATRIUM-10 and ATRIUM-9B fuels or Table 3-19 for GE9B fuel.

Table 3-1
Steady-State LHGR Limits for all ATRIUM-10 Fuel
Except those Located in Cell Locations 7B, 7C, 8A, and 10A
Applicable from BOC to the Sequence Exchange at 8,800 MWd/MT
A10-4039B-15GV75-100M and A10-4037B-16GV75-100M
(Bundle types 10, 11, 20, 24, 26, 27, 28, 29, 31, 32, 41, 45, and 49)
(Reference 3 Section 7.2.3)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.4
15.0	13.4
55.0	9.1
64.0	7.3

Table 3-2a
Steady-State LHGR Limits for ATRIUM-10 Fuel
Located in Cell Locations 7B, 7C, and 8A
Applicable from BOC to the Sequence Exchange at 8,800 MWd/MT
A10-4039B-15GV75-100M and A10-4037B-16GV75-100M
(Bundle types 21, 22, 23, and 43)
(Reference 3 Section 7.2.3 and Reference 16 Section 2.0)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.3
15.0	13.3
55.0	9.0
64.0	7.2

Table 3-2b
Steady-State LHGR Limits for ATRIUM-10 Fuel
Located in Cell Locations 10A
Applicable from BOC to the Sequence Exchange at 8,800 MWd/MT
A10-4039B-15GV75-100M
(Bundle type 30)
(Reference 3 Section 7.2.3 and Reference 18 Section 2.0)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.0
15.0	13.0
55.0	8.7
64.0	6.9

Table 3-3a
Steady-State LHGR Limits for all ATRIUM-10 Fuel
Except those Located in Cell Locations 8A, 9D, 10A, 10B, and 10C
Applicable from Sequence Exchange at 8,800 MWd/MT to 12,405.6 MWd/MT
(MOC Licensing Basis)
A10-4039B-15GV75-100M and A10-4037B-16GV75-100M
(Bundle types 10, 11, 20, 21, 22, 24, 26, 27, 29, 31, 43, 45, and 49)
(Reference 3 Section 7.2.3 and Reference 18 Table 4.2)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.4
15.0	13.4
55.0	9.1
64.0	7.3

Table 3-3b
Steady-State LHGR Limits for ATRIUM-10 Fuel
Located in Cell Locations 8A, 9D, 10A, 10B, and 10C
Applicable from the Sequence Exchange at 8,800 MWd/MT to 12,405.6 MWd/MT
(MOC Licensing Basis)
A10-4039B-15GV75-100M and A10-3037B-16GV75-100M
(Bundle types 23, 28, 30, 32, and 41)
(Reference 3 Section 7.2.3 and Reference 18 Table 4.2)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.0
15.0	13.0
55.0	8.7
64.0	6.9

Table 3-4a
Steady-State LHGR Limits for all ATRIUM-10 Fuel
Except those Located in Cell Locations 8A, and 9D
Applicable from 12,405.6 MWd/MT (MOC Licensing Basis) to EOC
A10-4039B-15GV75-100M and A10-4037B-16GV75-100M
(Bundle types 10, 11, 20, 21, 22, 24, 26, 27, 29, 30, 31, 32, 41, 43, 45, and 49)
(Reference 3 Section 7.2.3 and Reference 18 Table 4.2)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.4
15.0	13.4
55.0	9.1
64.0	7.3

Table 3-4b
Steady-State LHGR Limits for ATRIUM-10 Fuel
Located in Cell Locations 8A, and 9D
Applicable from 12,405.6 MWd/MT (MOC Licensing Basis) to EOC
A10-4039B-15GV75-100M
(Bundle types 23, and 28)
(Reference 3 Section 7.2.3 and Reference 18 Table 4.2)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	13.0
15.0	13.0
55.0	8.7
64.0	6.9

Table 3-5
Steady-State LHGR Limits for ATRIUM-9B Fuel
SPCA9-393B-16GZ-100M
SPCA9-396B-12GZB-100M
SPCA9-384B-11GZ-80M
SPCA9-396B-12GZC-100M
(Bundle types 6, 7, 8 and 9)
(Reference 3 Section 7.2.3)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.0	14.4
15.0	14.4
64.3	7.9

Table 3-6
LHGR Limits for GE9B Fuel
GE9B-P8CWB343-12GZ-80M-150
(Bundle 3866, bundle type 4)
(Reference 5 Page 47)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.00	14.40
12.33	14.40
27.86	12.31
49.76	10.80
61.18	6.00

Table 3-7
LHGR Limits for GE9B Fuel
GE9B-P8CWB342-10GZ-80M-150
(Bundle 3867, bundle type 5)
(Reference 5 Page 47)

Average Planar Exposure (GWd/MT)	LHGR Limit (kW/ft)
0.00	14.40
12.71	14.40
27.52	12.31
49.54	10.80
60.95	6.00

Table 3-8
$LHGRFAC_P$

For BOC to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) - For ATRIUM-10 Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)				
	0	25	60	80	100
	$LHGRFAC_P$ multiplier				
Base Case Operation	0.75	0.75	1.00		1.00
EOOS Case 1	0.66	0.66	0.94	0.94	0.95
EOOS Case 2	0.65	0.65		0.88	0.89
EOOS Case 3	0.66	0.66	0.77	0.77	0.83
Single Loop Operation (SLO)	0.75	0.75	1.00		1.00
SLO with EOOS Case 1	0.66	0.66	0.94	0.94	0.95
SLO with EOOS Case 2	0.65	0.65		0.88	0.89
SLO with EOOS Case 3	0.66	0.66	0.77	0.77	0.83

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-9
$LHGRFAC_P$

For BOC to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) - For ATRIUM-10 Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	40	60	80	100
	$LHGRFAC_P$ multiplier					
Base Case Operation	0.74	0.74		1.00		1.00
EOOS Case 1	0.64	0.64		0.94	0.94	0.95
EOOS Case 2	0.64	0.64			0.87	0.87
EOOS Case 3	0.64	0.64	0.77	0.77	0.77	0.83
Single Loop Operation (SLO)	0.74	0.74		1.00		1.00
SLO with EOOS Case 1	0.64	0.64		0.94	0.94	0.95
SLO with EOOS Case 2	0.64	0.64			0.87	0.87
SLO with EOOS Case 3	0.64	0.64	0.77	0.77	0.77	0.83

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-10
LHGRFAC$_P$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) – For ATRIUM-10 Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.3)

EOOS Combination	Core Thermal Power (% of rated)				
	0	25	60	80	100
	LHGRFAC$_P$ multiplier				
Base Case Operation	0.75	0.75	1.00		1.00
EOOS Case 1	0.66	0.66	0.94	0.94	0.95
EOOS Case 2	0.65	0.65		0.84	0.84
EOOS Case 3	0.65	0.65	0.77	0.77	0.83
Single Loop Operation (SLO)	0.75	0.75	1.00		1.00
SLO with EOOS Case 1	0.66	0.66	0.94	0.94	0.95
SLO with EOOS Case 2	0.65	0.65		0.84	0.84
SLO with EOOS Case 3	0.65	0.65	0.77	0.77	0.83

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power LHGRFAC$_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-11
$LHGRFAC_P$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-10 Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.4)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	40	60	80	100
	$LHGRFAC_P$ multiplier					
Base Case Operation	0.74	0.74		1.00		1.00
EOOS Case 1	0.64	0.64		0.94	0.94	0.95
EOOS Case 2	0.64	0.64			0.82	0.82
EOOS Case 3	0.64	0.64	0.77	0.77	0.77	0.83
Single Loop Operation (SLO)	0.74	0.74		1.00		1.00
SLO with EOOS Case 1	0.64	0.64		0.94	0.94	0.95
SLO with EOOS Case 2	0.64	0.64			0.82	0.82
SLO with EOOS Case 3	0.64	0.64	0.77	0.77	0.77	0.83

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-12
$LHGRFAC_P$

For BOC to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) - For ATRIUM-9B Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.1)

EOOS Combination	Core Thermal Power (% of rated)				
	0	25	60	80	100
	$LHGRFAC_P$ multiplier				
Base Case Operation	0.77	0.77	1.00		1.00
EOOS Case 1	0.69	0.69	0.90	0.90	0.90
EOOS Case 2	0.67	0.67		0.79	0.79
EOOS Case 3	0.69	0.69	0.77	0.77	0.80
Single Loop Operation (SLO)	0.77	0.77	1.00		1.00
SLO with EOOS Case 1	0.69	0.69	0.90	0.90	0.90
SLO with EOOS Case 2	0.67	0.67		0.79	0.79
SLO with EOOS Case 3	0.69	0.69	0.77	0.77	0.80

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-13
$LHGRFAC_P$

For BOC to 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) - For ATRIUM-9B Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.2)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	40	60	80	100
	$LHGRFAC_P$ multiplier					
Base Case Operation	0.76	0.76		1.00		1.00
EOOS Case 1	0.69	0.69		0.89	0.91	0.92
EOOS Case 2	0.67	0.67			0.76	0.76
EOOS Case 3	0.69	0.69	0.77	0.77	0.77	0.80
Single Loop Operation (SLO)	0.76	0.76		1.00		1.00
SLO with EOOS Case 1	0.69	0.69		0.89	0.91	0.92
SLO with EOOS Case 2	0.67	0.67			0.76	0.76
SLO with EOOS Case 3	0.69	0.69	0.77	0.77	0.77	0.80

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-14
$LHGRFAC_P$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-9B Fuel

Nominal Scram Speeds (NSS)
(Reference 3 Table 5.3)

EOOS Combination	Core Thermal Power (% of rated)				
	0	25	60	80	100
	$LHGRFAC_P$ multiplier				
Base Case Operation	0.76	0.76	1.00		1.00
EOOS Case 1	0.69	0.69	0.90	0.90	0.90
EOOS Case 2	0.67	0.67		0.79	0.79
EOOS Case 3	0.69	0.69	0.77	0.77	0.80
Single Loop Operation (SLO)	0.76	0.76	1.00		1.00
SLO with EOOS Case 1	0.69	0.69	0.90	0.90	0.90
SLO with EOOS Case 2	0.67	0.67		0.79	0.79
SLO with EOOS Case 3	0.69	0.69	0.77	0.77	0.80

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6.

Table 3-15
$LHGRFAC_P$

For 12,405.6 MWd/MT Cycle Exposure (MOC Licensing Basis) to Coastdown (EOC) - For ATRIUM-9B Fuel

Technical Specification Scram Speeds (TSSS)
(Reference 3 Table 5.4)

EOOS Combination	Core Thermal Power (% of rated)					
	0	25	40	60	80	100
	$LHGRFAC_P$ multiplier					
Base Case Operation	0.76	0.76		1.00		1.00
EOOS Case 1	0.69	0.69		0.89	0.91	0.92
EOOS Case 2	0.67	0.67			0.76	0.76
EOOS Case 3	0.69	0.69	0.77	0.77	0.77	0.80
Single Loop Operation (SLO)	0.76	0.76		1.00		1.00
SLO with EOOS Case 1	0.69	0.69		0.89	0.91	0.92
SLO with EOOS Case 2	0.67	0.67			0.76	0.76
SLO with EOOS Case 3	0.69	0.69	0.77	0.77	0.77	0.80

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power $LHGRFAC_P$ multiplier should be applied.
- Allowable EOOS conditions are listed in Section 6

Table 3-16
LHGRFAC$_P$ multipliers for GE9B Fuel except TCV Slow Closure
(References 3, 5, 10 and 15)

Core Thermal Power (% of rated)	LHGRFAC$_P$ Multiplier
0	0.4776
25	0.6082
100	1.0000

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power LHGRFAC$_P$ multiplier should be applied.

Table 3-17
LHGRFAC$_P$ multipliers for GE9B Fuel for TCV Slow Closure
(References 3, 5, 14 and 15)

Core Thermal Power (% of rated)	LHGRFAC$_P$ Multiplier
0	0.2000
25	0.4000
100	1.0000

- Values are interpolated between relevant power levels.
- For thermal limit monitoring at greater than 100% core thermal power, the 100% core thermal power LHGRFAC$_P$ multiplier should be applied.

Table 3-18
LHGRFAC$_F$ multipliers for ATRIUM-10 and ATRIUM-9B Fuel
(Reference 3 Figure 5.2)

Core Flow (% of rated)	LHGRFAC$_F$ Multiplier
0	0.72
30	0.72
68	1.00
105	1.00

- Values are interpolated between relevant flow values.
- For thermal limit monitoring above 105% rated core flow, utilize the 105% rated core flow LHGRFAC$_F$ multiplier.
- Values presented in Table 3-18 are applicable to all Operating Domains and EOOS conditions in Section 6.

Table 3-19
LHGRFAC$_F$ multipliers for GE9B Fuel
(References 3, 5, 13 and 15)

Core Flow (% of rated)	LHGRFAC$_F$ Multiplier
0	0.4672
25	0.6373
78.28	1.0000
105	1.0000

- Values are interpolated between relevant flow values.
- For thermal limit monitoring above 105% rated core flow, utilize the 105% rated core flow LHGRFAC$_F$ multiplier.
- Values presented in Table 3-19 are applicable to all Operating Domains and EOOS conditions in Section 6.

4. Control Rod Withdrawal Block Instrumentation (3.3.2.1)

4.1 Technical Specification Reference:

Table 3.3.2.1-1

4.2 Description:

The Rod Block Monitor Upscale Instrumentation Setpoints are determined from the relationships shown below (Reference 6):

ROD BLOCK MONITOR UPSCALE TRIP FUNCTION	ALLOWABLE VALUE
Two Recirculation Loop Operation	0.66 W_d + 54%
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 flow (W_d) of 100%.

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

5. Traversing In-Core Probe System (3.2.1, 3.2.2, 3.2.3)

5.1 Technical Specification Reference:

Technical Specification Sections 3.2.1, 3.2.2, 3.2.3 for thermal limits require the TIP system for recalibration of the LPRM detectors and monitoring thermal limits.

5.2 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:

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:

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, (References 7, 8 and 9) 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.

5.3 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.

6. Allowed Modes of Operation (B 3.2.2, B 3.2.3)

The Allowed Modes of Operation with combinations of Equipment Out-of-Service are described below:

Equipment Out of Service Options[1,4]	MELLLA Region	Standard[9] Power-Flow Region (100% Rod Line)	ICF[7] Region	Coastdown[3]	POWERPLEX Thermal Limit Set Number[4]
Base Case Operation – NSS	Yes	Yes	Yes	No	1, 17, 33, 49
EOOS Case 1 – NSS TBVOOS[2], or	Yes	Yes	Yes	No	2, 18, 34, 50
FHOOS[5]	No[8]				
EOOS Case 2 – NSS Any combination of: TCV slow closure, no RPT,	Yes	Yes	Yes	No	3, 19, 35, 51
FHOOS[5]	No[8]				
EOOS Case 3 – NSS TBVOOS with 1 TCV stuck closed	Yes	Yes	Yes	No	4, 20, 36, 52
Single Loop Operation (SLO) – NSS	No[6]	Yes	N/A	No	5, 21, 37, 53
SLO with EOOS Case 1 – NSS FHOOS[5], or TBVOOS[2]	No[6]	Yes	N/A	No	6, 22, 38, 54
SLO with EOOS Case 2 – NSS Any combination of: TCV slow closure, no RPT, FHOOS[5]	No[6]	Yes	N/A	No	7, 23, 39, 55
SLO with EOOS Case 3 – NSS TBVOOS with 1 TCV stuck closed	No[6]	Yes	N/A	No	8, 24, 40, 56
Base Case Operation – TSSS	Yes	Yes	Yes	No	9, 25, 41, 57
EOOS Case 1 – TSSS TBVOOS[2], or	Yes	Yes	Yes	No	10, 26, 42, 58
FHOOS[5]	No[8]				
EOOS Case 2 – TSSS Any combination of: TCV slow closure, no RPT,	Yes	Yes	Yes	No	11, 27, 43, 59
FHOOS[5]	No[8]				
EOOS Case 3 - TSSS TBVOOS with 1 TCV stuck closed	Yes	Yes	Yes	No	12, 28, 44, 60
Single Loop Operation (SLO) – TSSS	No[6]	Yes	N/A	No	13, 29, 45, 61
SLO with EOOS Case 1 – TSSS FHOOS[5], or TBVOOS[2]	No[6]	Yes	N/A	No	14, 30, 46, 62
SLO with EOOS Case 2 – TSSS Any combination of: TCV slow closure, no RPT, FHOOS[5]	No[6]	Yes	N/A	No	15, 31, 47, 63
SLO with EOOS Case 3 – TSSS TBVOOS with 1 TCV stuck closed	No[6]	Yes	N/A	No	16, 32, 48, 64

Key: NSS – Nominal Scram Speed, TSSS – Tech Spec Scram Speed, OOS - Equipment Out Of Service, FHOOS – Feedwater Heater OOS, TBVOOS – Turbine Bypass Valve OOS, TCV –

Turbine Control Valve, RPT – Recirculation Pump Trip, MELLLA – Maximum Extended Load Line Limit Analysis [above 100% Load Line (Flow Control Line, FCL) to MELLLA boundary], ICF – Increased Core Flow (>100% core flow).

[1] Each OOS Option may be combined with 1 SRVOOS, 1 TCV stuck closed (except TBVOOS conditions), a 20°F reduction in feedwater temperature (without feedwater heaters considered OOS), up to 2 TIP OOS (or the equivalent number of TIP channels, 42% of the total number of channels with 100% available at startup), and up to 50% of the LPRMs OOS with an LPRM calibration frequency of 1250 Effective Full Power Hours (EFPH) (1000 EFPH +25%) (Reference 3 Tables 1.1 and 5.1 through 5.4).

[2] All EOOS options support 1 TCV stuck closed except EOOS Case 1 TBVOOS. If TBVOOS is being utilized while 1 TCV is stuck closed, utilize EOOS Case 3 with the applicable scram speed (Reference 3 Tables 1.1 and 5.1 through 5.4).

[3] Coastdown limits are not provided. Coastdown limits will not be required based on current burnup projections. Feedwater heaters OOS (FHOOS) may be intentionally entered to maintain core thermal power provided the end of cycle exposure corresponding to a core average exposure of 31,495.1 MWd/MTU is not exceeded.

[4] Four sets of thermal limits are provided. The first set of thermal limits, from 1 through 16, are provided for use from the beginning of cycle until the second Cycle 10A sequence exchange (from A1 to A2) at approximately 6000 MWd/MTU. The second set of thermal limits, from 17 through 32, are provided for use from the second Cycle 10A sequence exchange (from A1 to A2) at approximately 6000 MWd/MTU until approximately 8800 MWd/MTU. This is the defined as the approximate burnup where the pre-summer 2003 sequence exchange (from A2 to A1) takes place. The third set of thermal limits, from 33 through 48, are provided for use from the pre-summer 2003 sequence exchange (from A2 to A1) at approximately 8800 MWd/MTU until approximately 12,405.6 MWd/MTU defined as the middle of cycle (MOC) licensing basis. The fourth set of thermal limits, from 49 through 64, are applicable from approximately 12,405.6 MWd/MTU defined as the MOC licensing basis. The licensing basis end of cycle burnup corresponds to a core average exposure of 31,495.1 MWd/MTU. Note that the nominal exposures at the beginning and end of the sequence exchanges may be adjusted by ±200 MWd/MTU without affecting the magnitude of the control blade history penalties included in the thermal limit sets (Reference 16 and 18). The thermal limit sets are to be changed when the sequence exchange is performed and not at the specific cycle exposures.

[5] Feedwater heaters OOS (FHOOS) supports a reduction of up to 100°F in feedwater temperature. FHOOS may be an intentionally entered mode of operation or an actual OOS condition. Feedwater heaters OOS (FHOOS) may be intentionally entered to maintain core thermal power provided the end of cycle exposure corresponding to a core average exposure of 31,495.1 MWd/MTU is not exceeded.

[6] The SLO boundary was not moved up with the incorporation of MELLLA and power uprate. The 100% rod line (FCL) bounds this value.

[7] ICF is analyzed up to 105% rated core flow.

[8] If operating with FHOOS (alone or in combination with other EOOS), operation in the MELLLA region is supported by current transient analyses (UFSAR Chapter 15), but is administratively limited to less than 100% rod line (FCL) due to thermal-hydraulic stability concerns.

[9] The Standard Power-Flow Region is that part of the Power-Flow map region below 100% rod line (FCL) up to 100% core flow.

7. **Methodology (5.6.5)**

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. Letter from Ashok C. Thadini (NRC) to R.A. Copeland (SPC), "Acceptance for Referencing of ULTRAFLOW™ Spacer on 9x9-IX/X BWR Fuel Design," July 28, 1993.

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

4. XN-NF-80-19 (P)(A) Volume 1 Supplement 3, Supplement 3 Appendix F, and Supplement 4, "Advanced Nuclear Fuels Methodology for Boiling Water Reactors: Benchmark Results for CASMO-3G/MICROBURN-B Calculation Methodology," November 1990.

5. XN-NF-85-67 (P)(A) Revision 1, "Generic Mechanical Design for Exxon Nuclear Jet Pump BWR Reload Fuel," September 1986.

6. 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.

7. 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.

8. ANF-89-014 (P)(A) Revision 1 and Supplements 1 & 2, "Generic Mechanical Design for Advanced Nuclear Fuels Corporation 9X9 – IX and 9x9 – 9X BWR Reload Fuel," October 1991.

9. EMF-2209 (P)(A), Revision 1, "SPCB Critical Power Correlation," July 2000.

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

11. ANF-91-048 (P)(A), "Advanced Nuclear Fuels Corporation Methodology for Boiling Water Reactors EXEM BWR ECCS Evaluation Model," January 1993.

12. 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.

13. 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.

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

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

16. ANF-1125 (P)(A) and ANF-1125(P)(A) Supplements 1 and 2, "ANFB Critical Power Correlation," Advanced Nuclear Fuels Corporation, April 1990.

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

18. EMF-1125 (P)(A) Supplement 1 Appendix C, "ANFB Critical Power Correlation Application for Co-Resident Fuel," August 1997.

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

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

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

22. 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.

23. 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.

24. 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.

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

26. 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.

27. 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.