Exelon Generation

R.E. Ginna Nuclear Power Plant
1503 Lake Rd.
Ontario, NY 14519-9364
www.exeloncorp.com

May 13, 2014

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

R.E. Ginna Nuclear Power Plant
Renewed Facility Operating License No. DPR-18
NRC Docket No. 50-244

Subject: Transmittal of Core Operating Limits Report (COLR) for Cycle 38

In accordance with the R.E. Ginna Nuclear Power Plant Improved Technical Specification 5.6.5.d, which requires the submittal of revisions to the COLR, the attached report is hereby submitted. Should you have questions regarding this matter, please contact Thomas Harding (585) 771-5219, or Thomas.HardingJr@cengllc.com.

Respectfully,

Thomas G. Mogren
Manager – Engineering Services
R.E. Ginna Nuclear Power Plant

TGM/JPO

Attachment: R.E. Ginna Nuclear Power Plant, Core Operating Limits Report, Cycle 38

cc: NRC Regional Administrator, Region I
NRC Project Manager, Ginna
NRC Senior Resident Inspector, Ginna

A001
NRR

ATTACHMENT

R.E. GINNA NUCLEAR POWER PLANT

CORE OPERATING LIMITS REPORT

CYCLE 38

Exelon Generation

R.E. Ginna Nuclear Power Plant

Core Operating Limits Report
COLR

Cycle 38

Revision 0

Responsible Manager: _____ for
Joe Lazzaro

Effective Date: May 7, 2014

Controlled Copy No. _____

Record Cat.# 4.43.2

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for the R.E. Ginna Nuclear Power Plant has been prepared in accordance with the requirements of Technical Specification 5.6.5.

The Technical Specifications affected by this report are listed below:

2.1 Safety Limits (SLs)

3.1.1 SHUTDOWN MARGIN (SDM)

3.1.3 MODERATOR TEMPERATURE COEFFICIENT (MTC)

3.1.5 Shutdown Bank Insertion Limit

3.1.6 Control Bank Insertion Limits

3.2.1 Heat Flux Hot Channel Factor ($F_Q(Z)$)

3.2.2 Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)

3.2.3 AXIAL FLUX DIFFERENCE (AFD)

3.3.1 Reactor Trip System (RTS) Instrumentation

3.4.1 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits

3.9.1 Boron Concentration

2.0 OPERATING LIMITS

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using the NRC-approved methodologies specified in Technical Specification 5.6.5. All items that appear in capitalized type are defined in Technical Specification 1.1, Definitions.

2.1 SAFETY LIMITS (SLs)[1]

(2.1)

2.1.1 In MODES 1 and 2, the combination of THERMAL POWER, Reactor Coolant System (RCS) average temperature, and pressurizer pressure shall not exceed the SLs specified in Figure COLR - 1.

2.2 SHUTDOWN MARGIN[1]

(LCO 3.1.1)

2.2.1 The SHUTDOWN MARGIN in MODE 2 with K_{eff} < 1.0 and MODES 3 and 4 shall be greater than or equal to the limits specified in Figure COLR - 2 for the number of reactor coolant pumps in operation.

2.2.2 The SHUTDOWN MARGIN in MODE 4 when both reactor coolant pumps are not in operation and in MODE 5 shall be greater than or equal to the one loop operation curve of Figure COLR - 2.

2.2.3 The SHUTDOWN MARGIN required in LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, LCO 3.1.8, and LCO 3.4.5 shall be greater than the limits specified in Figure COLR - 2 for the number of reactor coolant pumps in operation.

2.3 MODERATOR TEMPERATURE COEFFICIENT[1]

(LCO 3.1.3)

2.3.1 The Moderator Temperature Coefficient (MTC) limits are:

The BOL ARO/HZP - MTC shall be equal to or less positive than +5.0 pcm/°F for power levels below 70% RTP and less than or equal to 0 pcm/°F for power levels at or above 70% RTP.

The EOL ARO/RTP - MTC shall be less negative than –44.6 pcm/°F.

where:

ARO stands for All Rods Out

BOL stands for Beginning of Cycle Life

EOL stands for End of Cycle Life

HZP stands for Hot Zero Power

RTP stands for RATED THERMAL POWER

2.4 Shutdown Bank Insertion Limit[1]

(LCO 3.1.5)

2.4.1 The shutdown bank shall be fully withdrawn which is defined as ≥ 220 steps.

2.5 Control Bank Insertion Limits[1]

(LCO 3.1.6)

2.5.1 The control banks shall be limited in physical insertion as shown in Figure COLR - 3. Control Bank A shall be at least 220 steps withdrawn.

2.5.2 The control rod banks shall be withdrawn maintaining a nominal 130 step tip-to-tip distance while moving in overlap through the active core region. The minimum allowable tip-to-tip distance shall never be less than 121 steps between two banks moving in the active core region.

2.6 Heat Flux Hot Channel Factor ($F_Q(Z)$)[2]

(LCO 3.2.1)

2.6.1 $F_Q(Z) \leq CFQ * K(Z) / P$ for $P > 0.5$

$F_Q(Z) \leq CFQ * K(Z) / 0.5$ for $P \leq 0.5$

where:

CFQ is the $F_Q(Z)$ limit

P = THERMAL POWER / RATED THERMAL POWER

Z is the height of the core

2.6.2 CFQ = 2.60

2.6.3 K(Z) is provided in Figure COLR - 4

2.6.4 W(Z) values are provided in Table COLR - 1. For W(Z) data at a desired burnup not listed in the table, but less than the maximum listed burnup, values at 3 or more burnup steps should be used to interpolate the W(Z) data to the

desired burnup with a polynomial type fit that uses the W(Z) data for the nearest three burnup steps.

For W(Z) data at a desired burnup outside of the listed burnup steps, a linear extrapolation of the W(Z) data for the nearest two burnup steps can be used. If data are listed for only two burnup steps, a linear fit can be used for both interpolation and extrapolation.

2.6.5 The $F_Q(Z)$ penalty factors are provided in Table COLR - 2.

2.6.6 Table COLR - 3 provides W(Z) values for the BOC startup flux map to be taken prior to exceeding 75% power. For part power surveillances during other times in life or at powers other than 75%, the W(Z) values in Table COLR - 1 should be used. The W(Z) values in Table COLR - 3 do not include the 1/P factor, where P is the surveillance power level. This factor will be applied by the INCORE-3D software.

2.7 Nuclear Enthalpy Rise Hot Channel Factor ($F^N_{\Delta H}$)[1]

(LCO 3.2.2)

2.7.1 $F^N_{\Delta H} \leq F^{RTP}_{\Delta H} * (1 + PF_{\Delta H} * (1-P))$

where:

$F^{RTP}_{\Delta H} = 1.72$

$PF_{\Delta H} = 0.3$, and

P = THERMAL POWER / RATED THERMAL POWER

2.8 AXIAL FLUX DIFFERENCE[3]

(LCO 3.2.3)

2.8.1 The AFD acceptable operation limits are provided in Figure COLR - 5.

2.9 Reactor Trip System (RTS) Instrumentation[5]

(LCO 3.3.1)

2.9.1 Overtemperature ΔT Setpoint Parameter Values

Parameter	Value
Overtemperature ΔT reactor trip setpoint	$K_1 \leq 1.19$
Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient	$K_2 \geq 0.00093$/psi
Overtemperature ΔT reactor trip heatup setpoint coefficient	$K_3 \geq 0.0185$/°F penalty
Measured lead time constant	$\tau_1 \geq 25$ seconds
Measured lag time constant	$\tau_2 \leq 5$ seconds

$f_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power range nuclear ion chambers. Selected gains are based on measured instrument response during plant startup tests, where q_t and q_b are percent RATED THERMAL POWER in the upper and lower halves of the core, respectively, and $q_t + q_b$ is the total percent RATED THERMAL POWER, such that:

- For $q_t - q_b$ between - 14% and +6%, $f_1(\Delta I) = 0$.
- For each percent that the magnitude of $q_t - q_b$ exceeds - 14% the ΔT trip setpoint shall be automatically reduced by an equivalent of 3.08% of RATED THERMAL POWER.
- For each percent that the magnitude of $q_t - q_b$ exceeds +6% the ΔT trip setpoint shall be automatically reduced by an equivalent of 2.27% of RATED THERMAL POWER.

2.9.2 Overpower ΔT Setpoint Parameter Values

Parameter	Value
Overpower ΔT reactor trip setpoint	$K_4 \leq 1.077$
Overpower ΔT reactor trip heatup setpoint penalty coefficient	$K_5 = 0/°F$ for $T < T'$ $\geq 0.0014/°F$ for $T \geq T'$
Overpower ΔT reactor trip thermal time delay setpoint penalty	$K_6 \geq 0.00/°F$ for increasing T $= 0.00/°F$ for decreasingT
Measured impulse/lag time constant	$\tau_3 = 0$ seconds
$f_2(\Delta I) = 0.0\%$ RTP for all ΔI	

2.10 RCS Pressure, Temperature, and Flow Departure from Nucleate Boiling (DNB) Limits[4]

(LCO 3.4.1)

2.10.1 The pressurizer pressure shall be ≥ 2205 psig.

2.10.2 The RCS average temperature shall be ≤ 577.5 °F.

2.10.3 The RCS total flow rate shall be ≥ 177,300 gpm (includes 4% minimum flow uncertainty per Revised Thermal Design Methodology).

2.11 Boron Concentration[1]

(LCO 3.9.1)

2.11.1 The boron concentrations of the hydraulically coupled Reactor Coolant System the refueling canal, and the refueling cavity shall be ≥ 2750 ppm. Boron concentration based on All Rods in less the highest worth rod with a K-effective of 0.95. A 100 ppm Factor of Safety has been included in this parameter.

3.0 REFERENCES

1. WCAP-9272-P-A, Westinghouse Reload Safety Evaluation Methodology, July 1985.

2. WCAP-10054-P-A and WCAP-10081-A, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," August 1985.

3. WCAP-10054-P-A, Addendum 2, Revision 1, "Addendum to the Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code: Safety Injection into the Broken Loop and COSI Condensation Model", Thompson, C.M., et. al., July 1997.

4. WCAP-11145-P-A, "Westinghouse Small Break LOCA ECCS Evaluation Model Generic Study with the NOTRUMP Code", Rupprecht, S. D., et. al., October 1986.

5. WCAP-10079-P-A, "NOTRUMP - A Nodal Transient Small Break and General Network Code", Meyer, P. E., August 1985.

6. WCAP-16009-P-A, "Realistic Large-Break LOCA Evaluation Methodology Using the Automated Statistical Treatment of Uncertainty Method (ASTRUM)", January 2005.

7. WCAP-12610-P-A, "VANTAGE + Fuel Assembly Reference Core Report," April 1995.

8. WCAP-10216-P-A, Revision 1A (Proprietary), Relaxation of Constant Axial Offset Control F_Q - Surveillance Technical Specification, February 1994.

9. WCAP-11397-P-A, "Revised Thermal Design Procedure", April 1989.

10. WCAP-14710-P-A, "1-D Heat Conduction Model for Annular Fuel Pellets," Shimeck, D. J., May 1998.

11. WCAP-8745, "Design Basis for the Thermal Overpower Delta T and Thermal Overtemperature Delta T Trip Functions", March 1977.

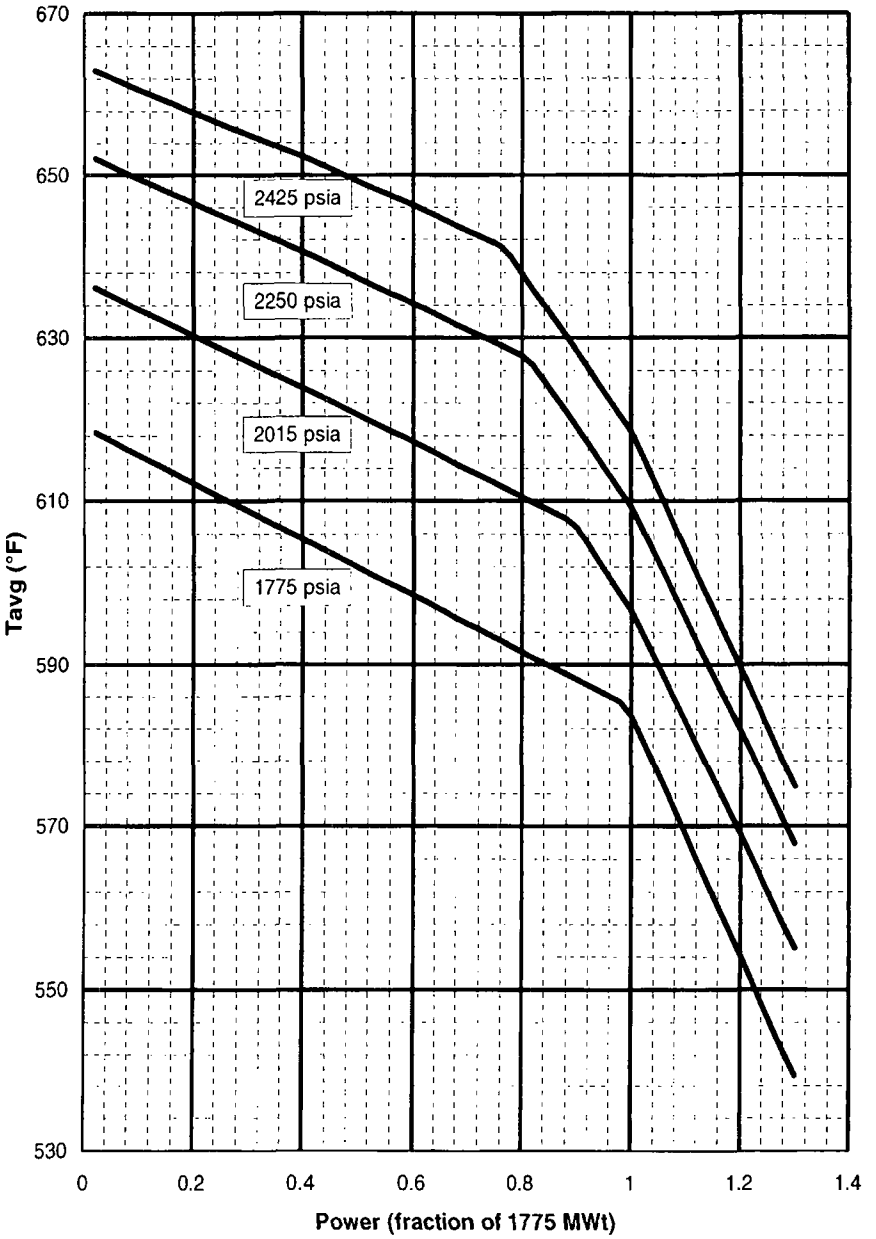


Figure COLR - 1
Reactor Safety Limits

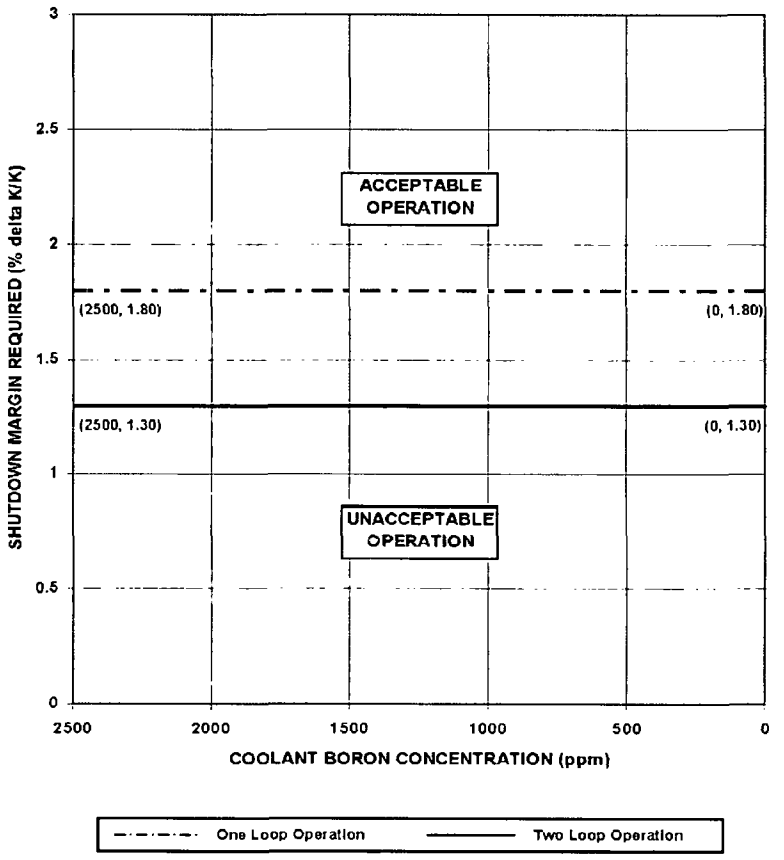
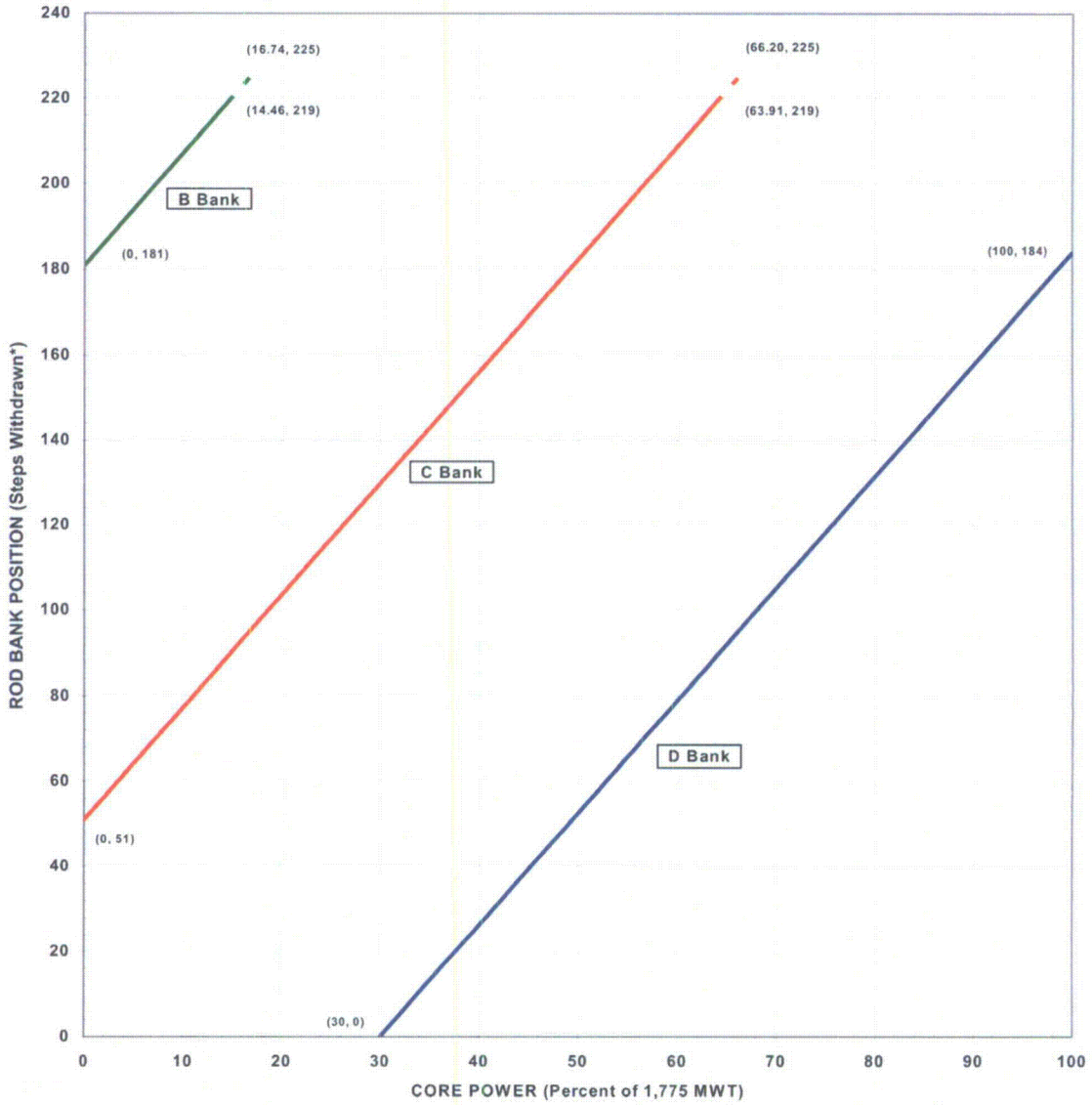


Figure COLR - 2
REQUIRED SHUTDOWN MARGIN



* The top of the active fuel corresponds to 219. The ARO parking position may be any position above the corresponding top of active fuel for each respective bank. The control rod tip-to-tip distance is defined as 130 steps while rods are moving in overlap. The bank positions are given as follows:

- **Bank D: (184/70) * (P-100) + 184** **(for $30 \leq P \leq 100$)**
- **Bank C: (184/70) * (P-100) + 184 + 130** **(for $0 \leq P \leq 66.20$)**
- **Bank B: (184/70) * (P-100) + 184 + 130 + 130** **(for $0 \leq P \leq 16.74$)**

Where P is defined as the core power (in percent).

Figure COLR-3
CONTROL BANK INSERTION LIMITS

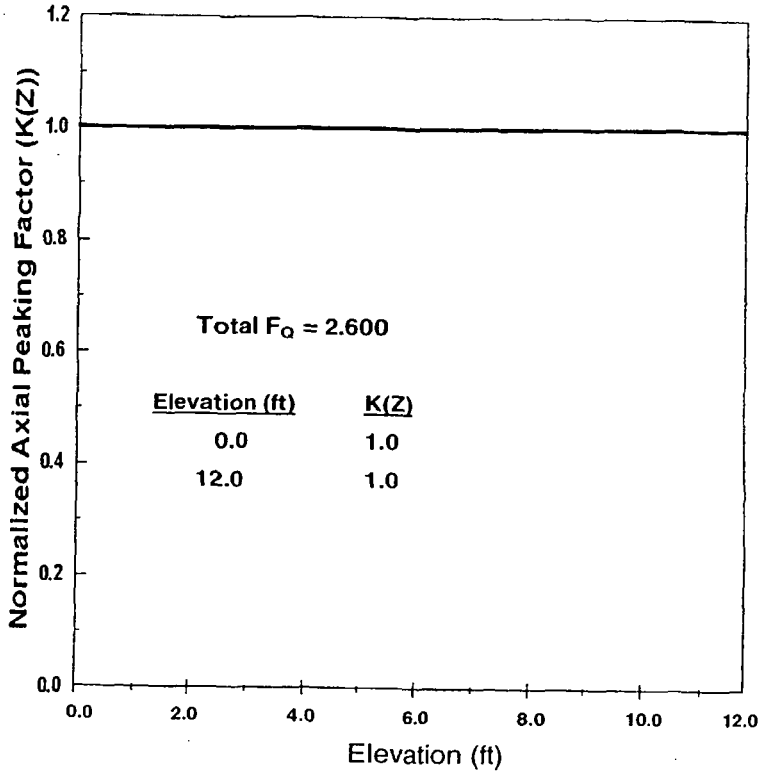


Figure COLR - 4
K(Z) - NORMALIZED $F_Q(Z)$ AS A FUNCTION OF CORE HEIGHT

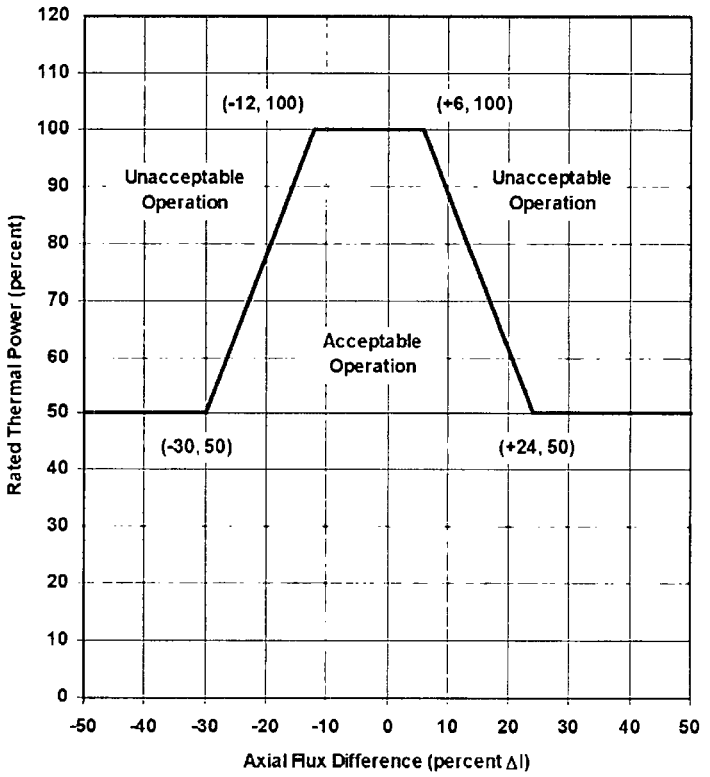


Figure COLR - 5
AXIAL FLUX DIFFERENCE ACCEPTABLE OPERATION LIMITS AS A FUNCTION OF RATED THERMAL POWER

Table COLR - 1
RAOC Summary of W(Z) with HFP %AFD Band of -12/+6%
(TOP 8% and BOTTOM 8% EXCLUDED)

Height (feet)	150 MWD/MTU	3000 MWD/MTU	10000 MWD/MTU	16000 MWD/MTU
(Bottom) 0.00	1.0000	1.0000	1.0000	1.0000
0.17	1.0000	1.0000	1.0000	1.0000
0.33	1.0000	1.0000	1.0000	1.0000
0.50	1.0000	1.0000	1.0000	1.0000
0.67	1.0000	1.0000	1.0000	1.0000
0.83	1.0000	1.0000	1.0000	1.0000
1.00	1.4136	1.3502	1.2666	1.2605
1.17	1.4023	1.3394	1.2598	1.2531
1.33	1.3895	1.3273	1.2517	1.2445
1.50	1.3744	1.3130	1.2420	1.2344
1.67	1.3580	1.2973	1.2313	1.2234
1.83	1.3412	1.2815	1.2203	1.2122
2.00	1.3224	1.2637	1.2078	1.1998
2.17	1.3028	1.2455	1.1948	1.1867
2.33	1.2840	1.2280	1.1824	1.1744
2.50	1.2642	1.2092	1.1692	1.1634
2.67	1.2438	1.1939	1.1558	1.1546
2.83	1.2256	1.1844	1.1436	1.1479
3.00	1.2133	1.1756	1.1331	1.1422
3.17	1.2054	1.1686	1.1267	1.1383
3.33	1.1984	1.1640	1.1241	1.1360
3.50	1.1918	1.1592	1.1219	1.1336
3.67	1.1851	1.1538	1.1195	1.1308
3.83	1.1783	1.1484	1.1171	1.1276
4.00	1.1705	1.1421	1.1141	1.1233
4.17	1.1623	1.1352	1.1107	1.1193
4.33	1.1541	1.1290	1.1071	1.1172
4.50	1.1451	1.1241	1.1028	1.1170
4.67	1.1359	1.1201	1.0990	1.1173
4.83	1.1278	1.1156	1.0968	1.1168
5.00	1.1210	1.1105	1.0947	1.1160
5.17	1.1151	1.1051	1.0917	1.1145
5.33	1.1089	1.0998	1.0887	1.1127
5.50	1.1016	1.0941	1.0883	1.1117
5.67	1.0952	1.0875	1.0904	1.1111
5.83	1.0920	1.0816	1.0932	1.1104

Table COLR - 1 (Continued)
RAOC Summary of W(Z) with HFP %AFD Band of -12/+6%
(TOP 8% and BOTTOM 8% EXCLUDED)

Height (feet)	150 MWD/MTU	3000 MWD/MTU	10000 MWD/MTU	16000 MWD/MTU
6.00	1.0937	1.0826	1.0961	1.1105
6.17	1.0979	1.0889	1.1001	1.1130
6.33	1.1007	1.0945	1.1060	1.1181
6.50	1.1031	1.1000	1.1120	1.1232
6.67	1.1051	1.1051	1.1172	1.1272
6.83	1.1066	1.1095	1.1216	1.1305
7.00	1.1076	1.1137	1.1257	1.1334
7.17	1.1081	1.1173	1.1291	1.1355
7.33	1.1079	1.1201	1.1317	1.1367
7.50	1.1072	1.1224	1.1338	1.1372
7.67	1.1057	1.1241	1.1350	1.1369
7.83	1.1038	1.1250	1.1355	1.1358
8.00	1.1010	1.1253	1.1353	1.1337
8.17	1.0975	1.1248	1.1341	1.1308
8.33	1.0935	1.1236	1.1320	1.1282
8.50	1.0885	1.1214	1.1304	1.1271
8.67	1.0828	1.1185	1.1302	1.1268
8.83	1.0786	1.1182	1.1322	1.1281
9.00	1.0803	1.1218	1.1392	1.1323
9.17	1.0870	1.1323	1.1498	1.1390
9.33	1.0925	1.1411	1.1592	1.1456
9.50	1.0988	1.1498	1.1688	1.1524
9.67	1.1063	1.1580	1.1785	1.1588
9.83	1.1134	1.1645	1.1873	1.1661
10.00	1.1196	1.1730	1.1961	1.1819
10.17	1.1266	1.1832	1.2046	1.2046
10.33	1.1373	1.1914	1.2124	1.2239
10.50	1.1467	1.1981	1.2171	1.2402
10.67	1.1497	1.2017	1.2182	1.2531
10.83	1.1474	1.2006	1.2183	1.2624
11.00	1.1400	1.1953	1.2138	1.2638
11.17	1.0000	1.0000	1.0000	1.0000
11.33	1.0000	1.0000	1.0000	1.0000
11.50	1.0000	1.0000	1.0000	1.0000
11.67	1.0000	1.0000	1.0000	1.0000
11.83	1.0000	1.0000	1.0000	1.0000
12.00 (Top)	1.0000	1.0000	1.0000	1.0000

Table COLR - 2
Penalty factor for increasing F_Q

Cycle Burnup MWD/MTU[(a)]	Penalty Factor (%)	Penalty Multiplier
≥ 150	2.00	1.0200

(a) A penalty multiplier is not required for part power surveillances during startup. The penalty factor should be applied beginning with the first full power surveillance.

Table COLR - 3
Part-Power W(Z) generated at 150 MWD/MTU, 75% Power
(Top 8% and Bottom 8% Excluded)

Height (feet)	HFP ARO	75% D at 180
(Bottom) 0.00	1.0000	1.0000
0.17	1.0000	1.0000
0.33	1.0000	1.0000
0.50	1.0000	1.0000
0.67	1.0000	1.0000
0.83	1.0000	1.0000
1.00	1.4136	1.4700
1.17	1.4023	1.4546
1.33	1.3895	1.4378
1.50	1.3744	1.4186
1.67	1.3580	1.3981
1.83	1.3412	1.3772
2.00	1.3224	1.3542
2.17	1.3028	1.3307
2.33	1.2840	1.3081
2.50	1.2642	1.2845
2.67	1.2438	1.2602
2.83	1.2256	1.2381
3.00	1.2133	1.2223
3.17	1.2054	1.2110
3.33	1.1984	1.2008
3.50	1.1918	1.1910
3.67	1.1851	1.1812
3.83	1.1783	1.1712
4.00	1.1705	1.1602
4.17	1.1623	1.1489
4.33	1.1541	1.1377
4.50	1.1451	1.1259
4.67	1.1359	1.1139
4.83	1.1278	1.1029
5.00	1.1210	1.0934
5.17	1.1151	1.0849
5.33	1.1089	1.0764
5.50	1.1016	1.0668
5.67	1.0952	1.0583
5.83	1.0920	1.0527
6.00	1.0937	1.0520

Table COLR - 3 (Continued)
Part-Power W(Z) generated at 150 MWD/MTU, 75% Power
(Top 8% and Bottom 8% Excluded)

Height (feet)	HFP ARO	75% D at 180
6.17	1.0979	1.0540
6.33	1.1007	1.0545
6.50	1.1031	1.0549
6.67	1.1051	1.0552
6.83	1.1066	1.0555
7.00	1.1076	1.0559
7.17	1.1081	1.0557
7.33	1.1079	1.0546
7.50	1.1072	1.0525
7.67	1.1057	1.0500
7.83	1.1038	1.0475
8.00	1.1010	1.0449
8.17	1.0975	1.0417
8.33	1.0935	1.0384
8.50	1.0885	1.0347
8.67	1.0828	1.0304
8.83	1.0786	1.0271
9.00	1.0803	1.0285
9.17	1.0870	1.0346
9.33	1.0925	1.0399
9.50	1.0988	1.0465
9.67	1.1063	1.0544
9.83	1.1134	1.0622
10.00	1.1196	1.0693
10.17	1.1266	1.0775
10.33	1.1373	1.0894
10.50	1.1467	1.0995
10.67	1.1497	1.1028
10.83	1.1474	1.1035
11.00	1.1400	1.1025
11.17	1.0000	1.0000
11.33	1.0000	1.0000
11.50	1.0000	1.0000
11.67	1.0000	1.0000
11.83	1.0000	1.0000
12.00 (Top)	1.0000	1.0000

END NOTES

1. (Limits generated using Reference 1)
2. (Limits generated using References 1 through 8 and 10)
3. (Limits generated using References 1 and 8)
4. (Limits generated using Reference 9)
5. (Limits generated using Reference 11)