NEXTera ENERGY SEABROOK

April 17th, 2026
L-2026-070

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

RE: Seabrook Nuclear Plant Unit 1
Docket No. 50-443
Renewed Facility Operating License NPF-86

Seabrook Reload Cycle 25 Core Operating Limit Report

Pursuant to Technical Specification 6.8.1.6.c, NextEra Energy Seabrook, LLC has enclosed the latest revision of the Seabrook Station Core Operating Limits Report (COLR) for Reload Cycle 25.

Should you have any questions regarding this submission, please contact Ms. Maribel Valdez, Fleet Licensing Manager, at (561) 904-5164.

Sincerely,

Kenneth A. Mack
Director, Licensing and Regulatory Compliance

Enclosure: Seabrook Reload Cycle 25 Core Operating Limits Report

cc: NRC Region I Administrator
NRC Project Manager, Seabrook
NRC Senior Resident Inspector, Seabrook
NHDES Headquarters

ENCLOSURE

Seabrook Reload Cycle 25
Core Operating Limits Report
(20 pages follow)

1.0 Core Operating Limits Report (COLR)

This Core Operating Limits Report for Seabrook Station Unit 1, Cycle 25 has been prepared in accordance with the requirements of Technical Specification 6.8.1.6.

The Technical Specifications affected by this report are:

1)	2.2.1	Limiting Safety System Settings
2)	2.1	Safety Limits
3)	3.1.1.1	Shutdown Margin Limit for MODES 1, 2, 3, 4
4)	3.1.1.2	Shutdown Margin Limit for MODE 5
5)	3.1.1.3	Moderator Temperature Coefficient
6)	3.1.2.7	Minimum Boron Concentration for MODES 4, 5, 6
7)	3.1.3.5	Shutdown Bank Insertion Limit
8)	3.1.3.6	Control Rod Insertion Limits
9)	3.2.1	Axial Flux Difference
10)	3.2.2	Heat Flux Hot Channel Factor
11)	3.2.3	Nuclear Enthalpy Rise Hot Channel Factor
12)	3.2.5	DNB Parameters
13)	3.5.1.1	Boron Concentration Limits for MODES 1, 2, 3
14)	3.5.4	Boron Concentration Limits for MODES 1, 2, 3, 4
15)	3.9.1	Boron Concentration Limits for MODE 6

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 6.8.1.6.

2.1 Limiting Safety System Settings: (Specification 2.2.1)

2.1.1 Cycle Dependent Overtemperature ΔT Trip Setpoint Parameters and Function Modifier:

2.1.1.1 K_1 = 1.210

2.1.1.2 K_2 = 0.021 / °F

2.1.1.3 K_3 = 0.0011 / psig

T = Measured RCS T_{avg} (°F), and

T' = Indicated RCS T_{avg} at RATED THERMAL POWER (Calibration temperature for ΔT instrumentation, ≤ 589.1°F).

P' = Nominal RCS operating pressure, 2235 psig

2.1.1.4 Channel Total Allowance (TA) = N.A.

2.1.1.5 Channel Z = N.A.

2.1.1.6 Channel Sensor Error (S) = N.A.

2.1.1.7 Allowable Value – The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 0.5% of ΔT span. Note that 0.5% of ΔT span is applicable to OTΔT input channels ΔT, Tavg and Pressurizer Pressure; 0.25% of ΔT span is applicable to ΔI.

2.1.1.8 $f_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range neutron ion chambers; with nominal gains to be selected based on measured instrument response during plant startup tests calibrations such that:

(1) For $q_t - q_b$ between –20% and +8%, $f_1(\Delta I) \geq 0$; 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 THERMAL POWER in percent RATED THERMAL POWER;

(2) For each percent that the magnitude of $q_t - q_b$ exceeds –20%, the ΔT Trip Setpoint shall be automatically reduced by $\geq$ 2.87% of its value at RATED THERMAL POWER.

(3) For each percent that the magnitude of $q_t - q_b$ exceeds +8%, the ΔT Trip Setpoint shall be automatically reduced by $\geq$ 1.71% of its value at RATED THERMAL POWER.

See Figure 5.

2.1.1.9 $\tau_1 = 0$ seconds

2.1.1.10 $\tau_2 = 0$ seconds

2.1.1.11 $\tau_3 \leq 2$ seconds

2.1.1.12 $\tau_4 \geq 28$ seconds

2.1.1.13 $\tau_5 \leq 4$ seconds

2.1.1.14 $\tau_6 \leq 2$ seconds

2.1.2 Cycle Dependent Overpower ΔT Trip Setpoint Parameters and Function Modifier:

2.1.2.1 K_4 = 1.116

2.1.2.2 K_5 = 0.020 / °F for increasing average temperature and K_5 = 0.0 for decreasing average temperature.

2.1.2.3 K_6 = 0.00175 / °F for T > T'' and K_6 = 0.0 for T ≤ T'',

where:

T = Measured T_{avg} (°F), and

T'' = Indicated T_{avg} at RATED THERMAL POWER (Calibration temperature for ΔT instrumentation, ≤ 589.1 °F).

2.1.2.4 Channel Total Allowance (TA) = N.A.

2.1.2.5 Channel Z = N.A.

2.1.2.6 Channel Sensor Error (S) = N.A.

2.1.2.7 Allowable Value – The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 0.5% of ΔT span. Note that 0.5% of ΔT span is applicable to OPΔT input channels ΔT and Tavg.

2.1.2.8 $f_2(\Delta I)$ is disabled.

2.1.2.9 τ_1 as defined in 2.1.1.9, above.

2.1.2.10 τ_2 as defined in 2.1.1.10, above.

2.1.2.11 τ_3 as defined in 2.1.1.11, above.

2.1.2.12 τ_6 as defined in 2.1.1.14, above.

2.1.2.13 τ_7 ≥ 10 seconds. It is recognized that exactly equal values cannot always be dialed into the numerator and denominator in the protection system hardware, even if the nominal values are the same (10 seconds). Thus given the inequality sign in the COLR (greater than or equal to) the intent of the definition of this time constant applies primarily to the rate time constant (i.e. the Tau value in the numerator). The lag time constant (denominator Tau value) may be less than 10 seconds or less than the value of the numerator Tau value (e.g., if the numerator is set at 10.5, the denominator may be set to 10 or 9.5) and still satisfy the intent of the anticipatory protective feature.

2.2 Safety Limits: (Specification 2.1.1)

2.2.1 In Modes 1 and 2, the combination of Thermal Power, reactor coolant system highest loop average temperature and pressurizer pressure shall not exceed the limits in Figure 6.

2.3 Shutdown Margin Limit for MODES 1, 2, 3, and 4: (Specification 3.1.1.1)

2.3.1 The Shutdown Margin shall be greater than or equal to

1.3% ΔK/K, in MODES 1, 2 and 3.

2.3.2 The Shutdown Margin shall be greater than or equal to

2.3% ΔK/K, in MODE 4.

2.3.3 The Boric Acid Storage System boron concentration

shall be greater than or equal to 7000 ppm.

2.4 Shutdown Margin Limit for MODE 5: (Specification 3.1.1.2)

2.4.1 The Shutdown Margin shall be greater than or equal to 2.3% ΔK/K.

2.4.2 The RCS boron concentration shall be greater than or equal to 2000 ppm when the reactor coolant loops are in a drained condition.

2.4.3 The Boric Acid Storage System boron concentration shall be greater than or equal to 7000 ppm.

2.5 Moderator Temperature Coefficient: (Specification 3.1.1.3)

2.5.1 The Moderator Temperature Coefficient (MTC) shall be less positive than $+4.429 \times 10^{-5}$ΔK/K/°F for Beginning of Cycle Life (BOL), All Rods Out (ARO), Hot Zero Thermal Power conditions.

2.5.2 MTC shall be less negative than -5.5×10^{-4} ΔK/K/°F for End of Cycle Life (EOL), ARO, Rated Thermal Power conditions.

2.5.3 The 300 ppm ARO, Rated Thermal Power MTC shall be less negative than -4.6×10^{-4} ΔK/K/°F (300 ppm Surveillance Limit).

2.5.4 The Revised Predicted near-EOL 300 ppm MTC shall be calculated using the algorithm contained in WCAP 13749-P-A:

Revised Predicted MTC = Predicted MTC + AFD Correction – 3 PCM/degree F

If the Revised Predicted MTC is less negative than the SR 4.1.1.3.b 300 ppm surveillance limit and all the benchmark data contained in the surveillance procedure are met, then an MTC measurement in accordance with SR 4.1.1.3.b is not required to be performed.

2.6 Minimum Boron Concentration for MODES 4, 5, 6 (Specification 3.1.2.7)

2.6.1 The Boric Acid Storage System boron concentration shall be greater than or equal to 7000 ppm.

2.7 Shutdown Bank Insertion Limit: (Specification 3.1.3.5)

2.7.1 The shutdown banks shall be fully withdrawn. The fully withdrawn position is defined as the interval within 225 steps withdrawn to the mechanical fully withdrawn position inclusive.

2.8 Control Rod Insertion Limits: (Specification 3.1.3.6)

2.8.1 The control rod banks shall be limited in physical insertion as specified in Figure 1. Control Bank A shall be at least 225 steps withdrawn.

2.9 Axial Flux Difference: (Specification 3.2.1)

2.9.1 The indicated AFD must be within the Acceptable Operation Limits specified in Figures 2a or 2b.

2.10 Heat Flux Hot Channel Factor: (Specification 3.2.2)

2.10.1 $F_Q^W(z) \leq (F_Q^{RTP} / P) * K(z)$ for $P > 0.5$

2.10.2 $F_Q^W(z) \leq (F_Q^{RTP} / 0.5) * K(z)$ for $P \leq 0.5$

2.10.3 $F^{RTP}_Q = 2.50$

2.10.4 $F_Q^W(z) = F_Q^M(z) * [W(z) / P] * Rj$ for $P > 0.5$

2.10.5 $F_Q^W(z) = F_Q^M(z) * [W(z) / 0.5] * Rj$ for $P \leq 0.5$

$F_Q^M(z)$ is the measured $F_Q(z)$ increased by the allowances for manufacturing tolerances (3%) and measurement uncertainty (5%).

For non-surveillance conditions, confirm

$F_Q^M(z) \leq (F_Q^{RTP} / P) * K(z)$ for $P > 0.5$

$F_Q^M(z) \leq (F_Q^{RTP} / 0.5) * K(z)$ for $P \leq 0.5$

2.10.6 P = (Thermal Power) / (Rated Thermal Power)

2.10.7 K(z) is specified in Figure 3.

2.10.8 W(z) is specified in Tables 1a and 1b, applicable to the RAOC Operating Spaces (ROS) in Figures 2a and 2b, respectively.

The W(z) data is applied over the cycle as follows:

BU < 150 MWD/MTU,	linear extrapolation of 150 and 3000 MWD/MTU W(z) data
150 ≤ BU < 6500 MWD/MTU,	quadratic interpolation of 150, 3000, and 10000 MWD/MTU W(z) data
6500 ≤ BU < 18000 MWD/MTU,	quadratic interpolation of 3000, 10000, and 18000 MWD/MTU W(z) data
BU ≥ 18000 MWD/MTU,	linear extrapolation of 10000 and 18000 MWD/MTU W(z) data

Note: The $F_Q(Z)$ surveillance exclusion zone is:

- Lower core region from 0 to 10%, inclusive, and
- Upper core region from 90 to 100%, inclusive.

2.10.9 Rj is the penalty factor that accounts for the potential decreases in transient F_Q margin between surveillances. This factor is specified in Table 2.

2.10.10 Table 3 provides the required limits on THERMAL POWER and the required AFD reductions for the operating spaces defined in Figures 2a and 2b, in the event that additional margin is required.

2.11 Nuclear Enthalpy Rise Hot Channel Factor: (Specification 3.2.3)

2.11.1 $F^N_{\Delta H} \leq F^N_{\Delta H}(RTP) \times (1 + PF \times (1 - P))$

where P = THERMAL POWER / RATED THERMAL POWER.

2.11.2 For $F^N_{\Delta H}$ measured by the fixed incore detectors:

$F^N_{\Delta H}(RTP) = 1.586$.

2.11.3 Power Factor Multiplier for $F^N_{\Delta H}$ = PF = 0.3.

2.12 DNB Parameters (Specification 3.2.5)

2.12.1 The Reactor Coolant System Tavg shall be less than or equal to 595.1 degrees F.

2.12.2 The Pressurizer Pressure shall be greater than or equal to 2185 PSIG.

Note: Technical Specification Bases 3/4.2.5, "DNB Parameters" indicates that the limits on DNB-related parameters assure consistency with the normal steady-state envelope of operation assumed in the transient and accident analyses. Operating procedures include allowances for measurement and indication uncertainty so that the limits in the COLR for T_{avg} and pressurizer pressure are not exceeded. Consistent with the Bases, the values of these DNB parameters are the limiting T_{avg} and pressurizer pressure assumed in the transient and accident analyses.

2.13 Accumulator Boron Concentration Limits for MODES 1,2,3 (Specification 3.5.1.1)

2.13.1 Each Accumulator shall have a boron concentration between 2400 and 2600 ppm.

2.14 Refueling Water Storage Tank Boron Concentration Limits for MODES 1, 2, 3, 4 (Specification 3.5.4)

2.14.1 The RWST shall have a boron concentration between 2500 and 2600 ppm.

2.15 Refueling Boron Concentration Limits for MODE 6 (Specification 3.9.1)

2.15.1 The Refueling Boron Concentration shall be greater than or equal to 2240 ppm.

2.15.2 The Boric Acid Storage System boron concentration shall be greater than or equal to 7000 ppm.

Figure 1: Control Bank Insertion Limits Versus Thermal Power

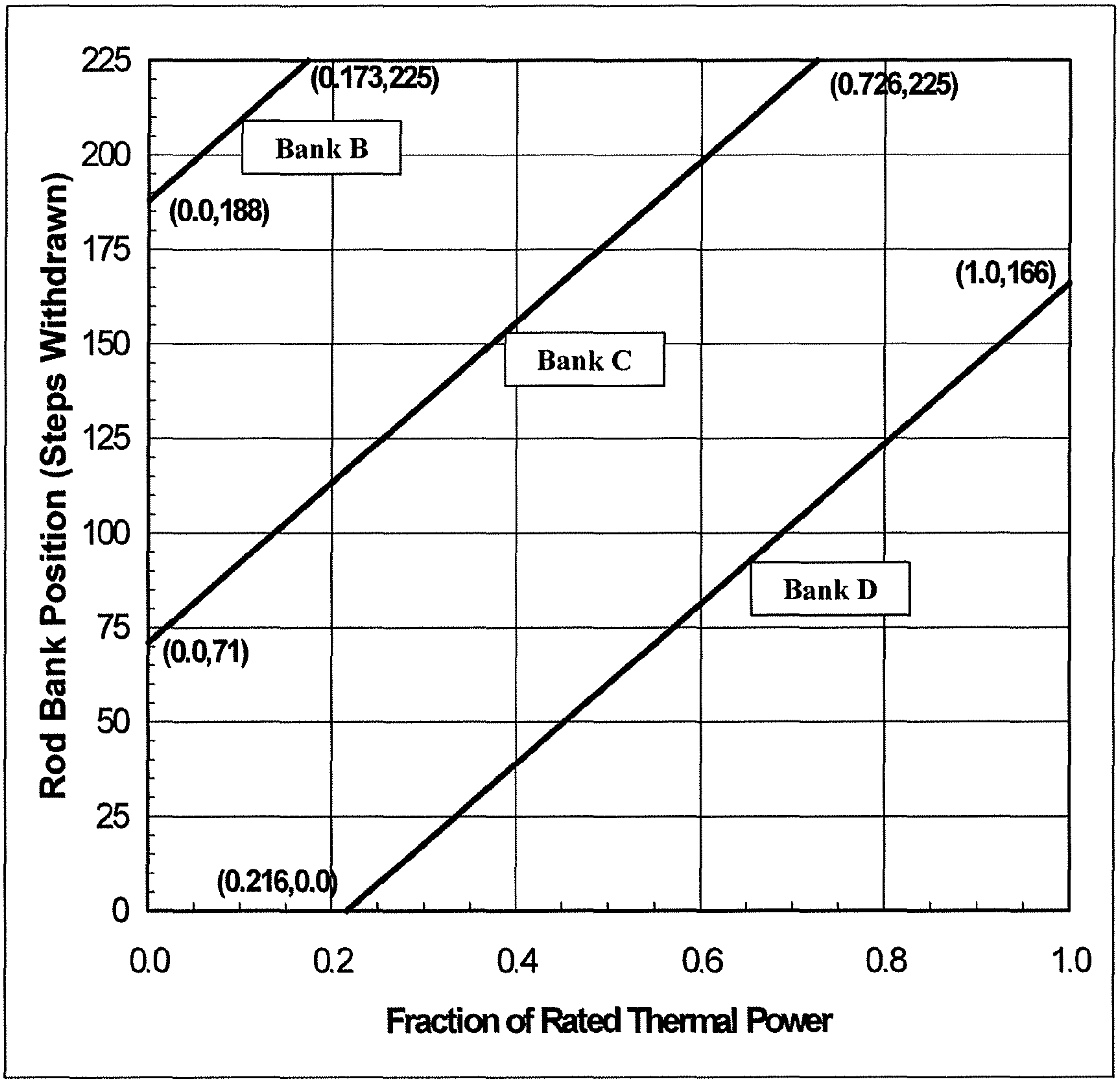

Figure 2a: Axial Flux Difference Operating Limits Versus Thermal Power, ROS1

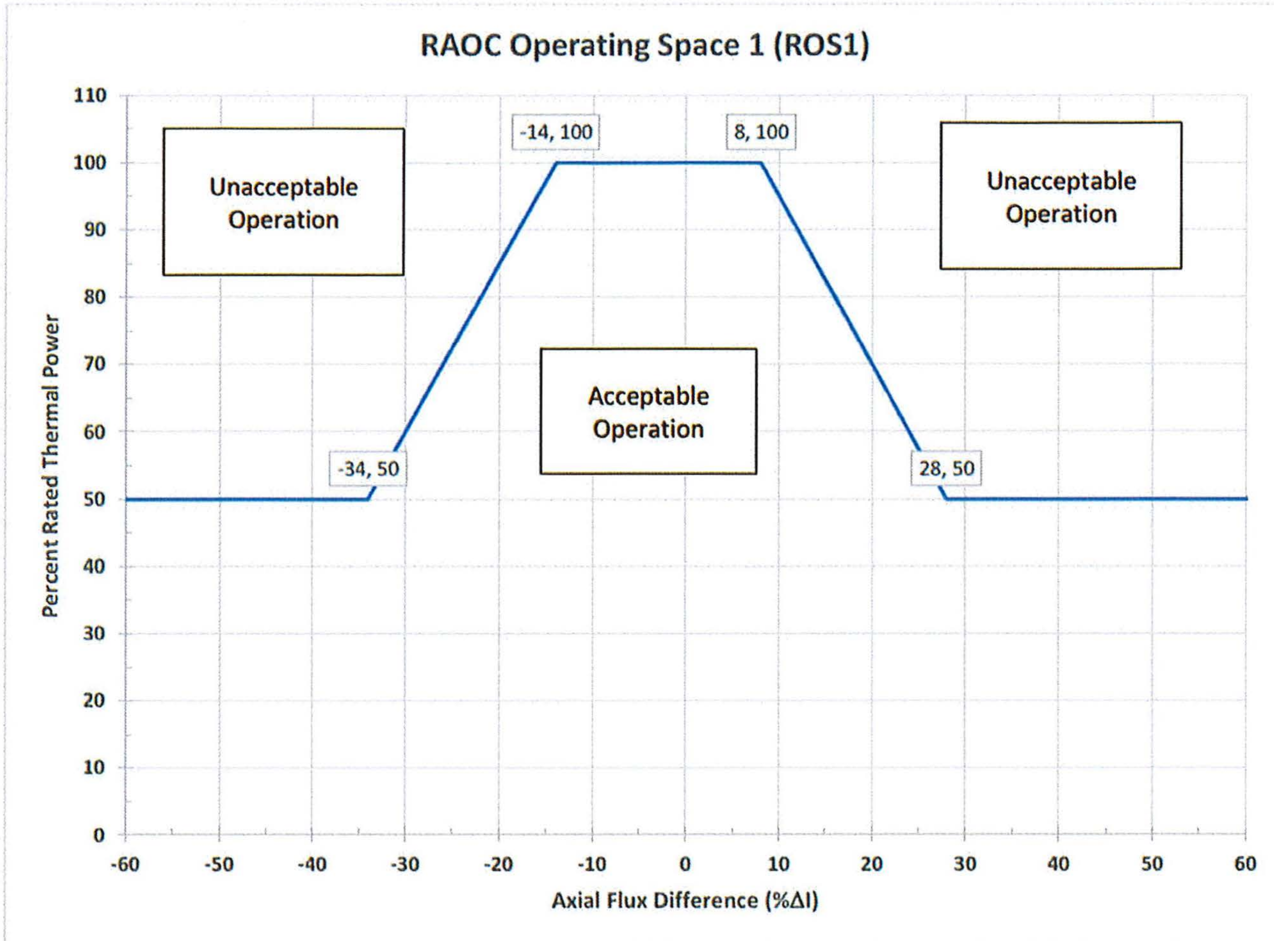

Figure 2b: Axial Flux Difference Operating Limits Versus Thermal Power, ROS2

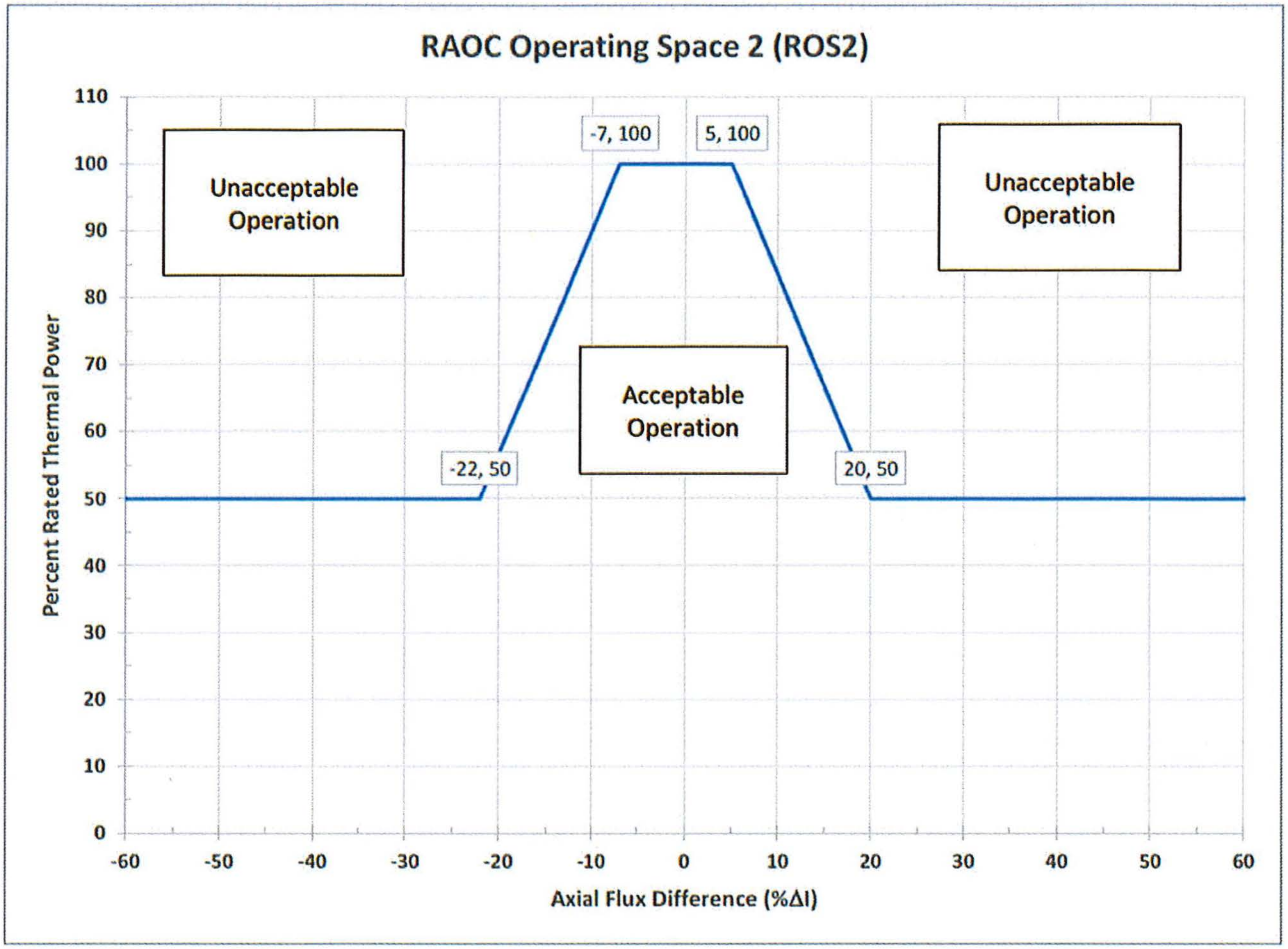

Figure 3: K(Z) Versus Core Height

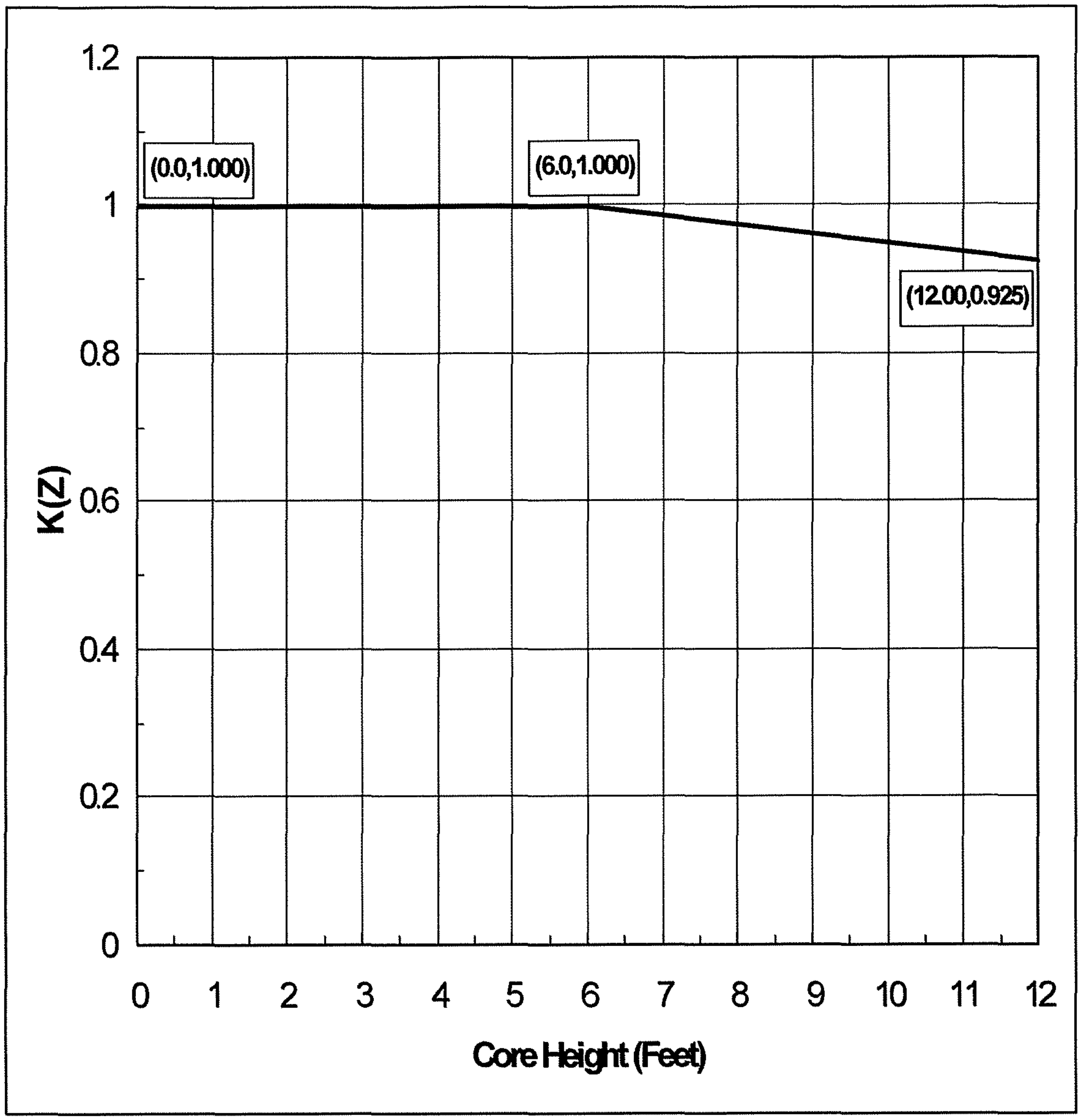

Figure 4: Deleted

Figure 5: $f_1(\Delta I)$ Function

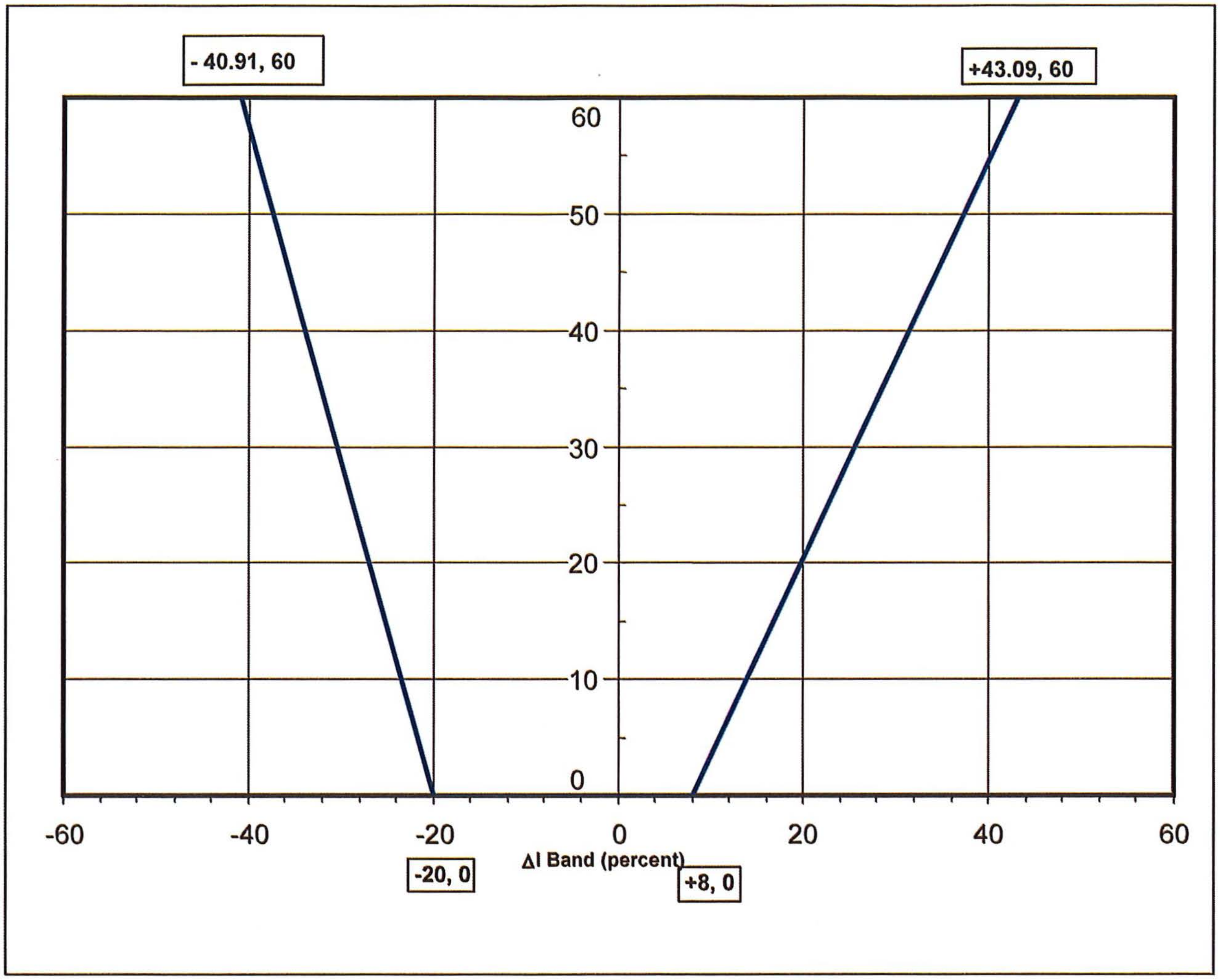

Figure 6: Safety Limits

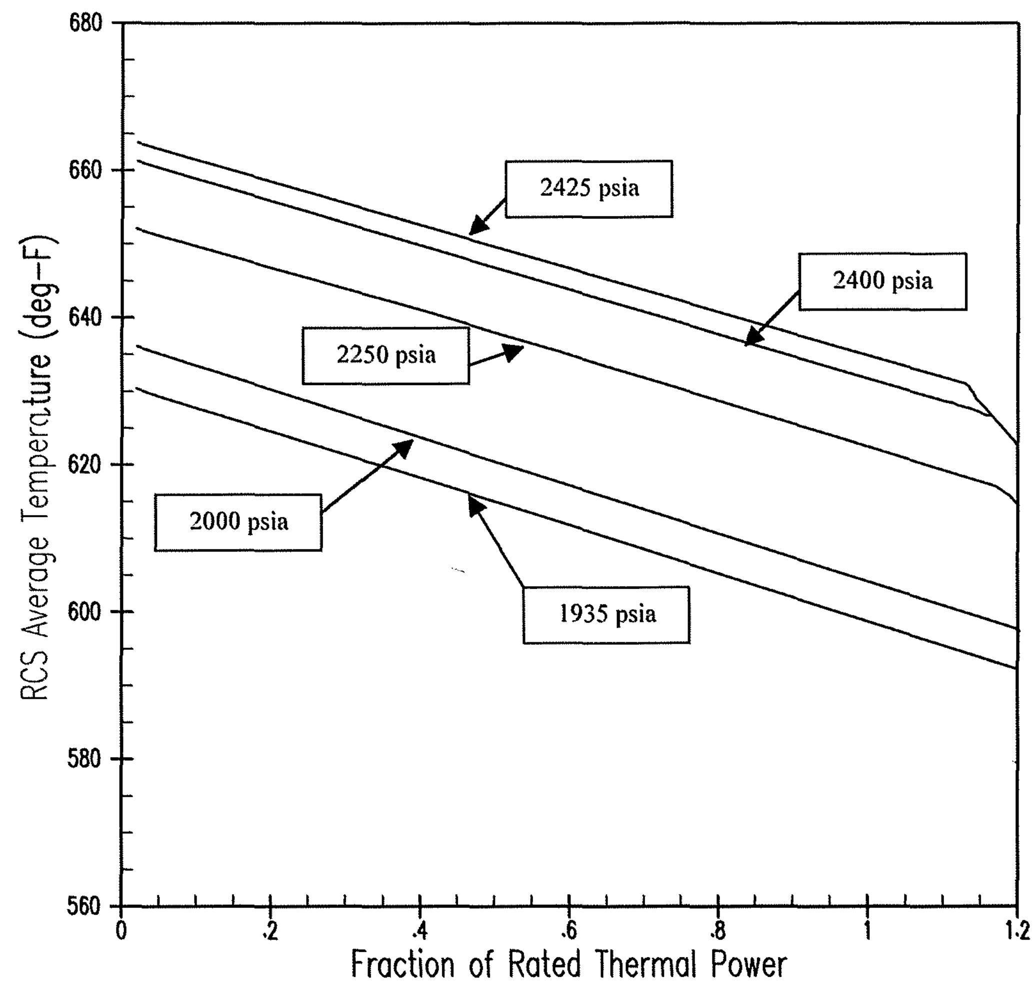

Table 1a: W(Z,BU) versus Axial Height for ROS1

(Sheet 1 of 2)

HEIGHT (Z) (Feet)	W(Z,BU) 150 MWD/MTU	W(Z,BU) 3000 MWD/MTU	W(Z,BU) 10000 MWD/MTU	W(Z,BU) 18000 MWD/MTU
≤1.0	1.0000	1.0000	1.0000	1.0000
1.2	1.3956	1.3745	1.2633	1.2855
1.4	1.3809	1.3584	1.2532	1.2739
1.6	1.3640	1.3401	1.2413	1.2605
1.8	1.3452	1.3195	1.2278	1.2455
2.0	1.3249	1.3028	1.2146	1.2297
2.2	1.3040	1.2883	1.2018	1.2126
2.4	1.2819	1.2722	1.1897	1.1959
2.6	1.2596	1.2557	1.1795	1.1825
2.8	1.2480	1.2387	1.1690	1.1685
3.0	1.2389	1.2239	1.1599	1.1583
3.2	1.2271	1.2121	1.1535	1.1521
3.4	1.2163	1.2008	1.1478	1.1497
3.6	1.2097	1.1888	1.1421	1.1506
3.8	1.2034	1.1827	1.1382	1.1516
4.0	1.1963	1.1778	1.1346	1.1523
4.2	1.1888	1.1716	1.1303	1.1525
4.4	1.1806	1.1650	1.1260	1.1520
4.6	1.1718	1.1577	1.1218	1.1508
4.8	1.1623	1.1498	1.1176	1.1488
5.0	1.1522	1.1413	1.1128	1.1457
5.2	1.1417	1.1322	1.1078	1.1425
5.4	1.1302	1.1224	1.1017	1.1390
5.6	1.1181	1.1119	1.0950	1.1369
5.8	1.1121	1.1024	1.0966	1.1450
6.0	1.1117	1.1009	1.1076	1.1558
6.2	1.1132	1.1034	1.1212	1.1637
6.4	1.1175	1.1036	1.1327	1.1708
6.6	1.1214	1.1032	1.1435	1.1779
6.8	1.1242	1.1032	1.1531	1.1863
7.0	1.1272	1.1070	1.1613	1.1935
7.2	1.1308	1.1123	1.1681	1.1987
7.4	1.1335	1.1159	1.1733	1.2020
7.6	1.1351	1.1186	1.1768	1.2034
7.8	1.1356	1.1203	1.1788	1.2029
8.0	1.1348	1.1203	1.1783	1.1993
8.2	1.1330	1.1214	1.1789	1.1974
8.4	1.1298	1.1262	1.1826	1.1976
8.6	1.1254	1.1299	1.1841	1.1965
8.8	1.1240	1.1363	1.1858	1.1983

Table 1a: W(Z,BU) versus Axial Height for ROS1

(Sheet 2 of 2)

HEIGHT (Z) (Feet)	W(Z,BU) 150 MWD/MTU	W(Z,BU) 3000 MWD/MTU	W(Z,BU) 10000 MWD/MTU	W(Z,BU) 18000 MWD/MTU
9.0	1.1219	1.1503	1.1915	1.1999
9.2	1.1295	1.1682	1.2021	1.2022
9.4	1.1579	1.1878	1.2136	1.2132
9.6	1.1811	1.2143	1.2247	1.2360
9.8	1.2037	1.2421	1.2475	1.2576
10.0	1.2251	1.2690	1.2722	1.2771
10.2	1.2428	1.2938	1.2947	1.2944
10.4	1.2533	1.3149	1.3160	1.3111
10.6	1.2616	1.3319	1.3342	1.3302
10.8	1.2946	1.3460	1.3496	1.3423
≥11.0	1.0000	1.0000	1.0000	1.0000

Note: The FQ(Z) surveillance exclusion zone is 10%.

The W(z) values in this table were generated assuming a base case surveillance at full power.

Table 1b: W(Z,BU) versus Axial Height for ROS2

(Sheet 1 of 2)

HEIGHT (Z) (Feet)	W(Z,BU) 150 MWD/MTU	W(Z,BU) 3000 MWD/MTU	W(Z,BU) 10000 MWD/MTU	W(Z,BU) 18000 MWD/MTU
≤1.0	1.0000	1.0000	1.0000	1.0000
1.2	1.2523	1.2958	1.1724	1.1601
1.4	1.2409	1.2816	1.1629	1.1521
1.6	1.2276	1.2652	1.1518	1.1428
1.8	1.2130	1.2472	1.1395	1.1324
2.0	1.1977	1.2280	1.1264	1.1213
2.2	1.1810	1.2081	1.1131	1.1098
2.4	1.1656	1.1879	1.0994	1.0983
2.6	1.1563	1.1679	1.0860	1.0874
2.8	1.1491	1.1475	1.0782	1.0769
3.0	1.1416	1.1329	1.0753	1.0731
3.2	1.1361	1.1264	1.0741	1.0732
3.4	1.1341	1.1239	1.0728	1.0777
3.6	1.1326	1.1205	1.0714	1.0832
3.8	1.1309	1.1167	1.0717	1.0890
4.0	1.1288	1.1124	1.0742	1.0948
4.2	1.1265	1.1094	1.0774	1.1003
4.4	1.1238	1.1084	1.0803	1.1054
4.6	1.1206	1.1068	1.0831	1.1101
4.8	1.1172	1.1050	1.0856	1.1141
5.0	1.1127	1.1025	1.0879	1.1175
5.2	1.1105	1.1009	1.0897	1.1202
5.4	1.1106	1.1005	1.0911	1.1218
5.6	1.1104	1.0993	1.0920	1.1238
5.8	1.1111	1.0998	1.0922	1.1318
6.0	1.1115	1.1016	1.0923	1.1402
6.2	1.1128	1.1031	1.0956	1.1467
6.4	1.1159	1.1035	1.1022	1.1523
6.6	1.1191	1.1032	1.1074	1.1566
6.8	1.1213	1.1030	1.1145	1.1593
7.0	1.1223	1.1032	1.1214	1.1605
7.2	1.1221	1.1035	1.1271	1.1602
7.4	1.1206	1.1027	1.1319	1.1581
7.6	1.1177	1.1010	1.1358	1.1543
7.8	1.1136	1.0983	1.1386	1.1489
8.0	1.1070	1.0947	1.1404	1.1409
8.2	1.1031	1.0904	1.1414	1.1344
8.4	1.1026	1.0852	1.1414	1.1306
8.6	1.1023	1.0801	1.1404	1.1255
8.8	1.1030	1.0810	1.1407	1.1253

Table 1b: W(Z,BU) versus Axial Height for ROS2

(Sheet 2 of 2)

HEIGHT (Z) (Feet)	W(Z,BU) 150 MWD/MTU	W(Z,BU) 3000 MWD/MTU	W(Z,BU) 10000 MWD/MTU	W(Z,BU) 18000 MWD/MTU
9.0	1.1070	1.0858	1.1424	1.1287
9.2	1.1156	1.0956	1.1484	1.1335
9.4	1.1250	1.1143	1.1584	1.1404
9.6	1.1278	1.1400	1.1673	1.1525
9.8	1.1296	1.1652	1.1751	1.1698
10.0	1.1334	1.1891	1.1837	1.1869
10.2	1.1422	1.2114	1.1938	1.2020
10.4	1.1516	1.2304	1.2070	1.2156
10.6	1.1580	1.2456	1.2235	1.2262
10.8	1.1874	1.2582	1.2376	1.2312
≥11.0	1.0000	1.0000	1.0000	1.0000

Note: The FQ(Z) surveillance exclusion zone is 10%.

The W(z) values in this table were generated assuming a base case surveillance at full power.

Table 2: Rj Margin Decrease Factors for ROS1 (Figure 2a) and ROS2 (Figure 2b)

Cycle Burnup Range (MWD/MTU)	Rj	
	ROS1	ROS2
0 <= BU < 150	1.000	1.000
150 <= BU < 3000	1.019	1.040
3000 <= BU < 18000	1.017	1.017
18000 <= BU < EOL	1.002	1.002

Table 3: Required THERMAL POWER Limits and AFD Reductions

RAOC Operating Space	Required $F_Q^W(z)$ Margin Improvement	Required THERMAL POWER Limit (%RTP)[1]	Required AFD Reduction (%AFD)
ROS1 (Figure 2a)	> 0%	≤ 50%	N/A
ROS2 (Figure 2b)	> 0%	≤ 50%	N/A

Note 1: Should ROS1 not provide sufficient margin to the $F_Q^W(z)$ limit, ROS2 may be used. Should none of the RAOC Operating Spaces provided sufficient margin to the $F_Q^W(z)$ limit, the THERMAL POWER is limited to less than 50%.