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A SCANA COMPANY

November 25, 2015

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (UNIT 1)
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
CORE OPERATING LIMITS REPORT (COLR) FOR CYCLE 23

In accordance with Section 6.9.1.11 of the Virgil C. Summer Nuclear Station Technical Specifications, South Carolina Electric & Gas Company, acting for itself and as an agent for South Carolina Public Service Authority, hereby submits the Core Operating Limits Report for Cycle 23.

Should you have any questions, please call Bruce Thompson at (803) 931-5042.

Very truly yours,

Thomas D. Gatlin

TS/TDG/wt

Attachment: V. C. Summer Unit 1 Cycle 23 Core Operating Limits Report Revision 0

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SOUTH CAROLINA ELECTRIC & GAS COMPANY

VIRGIL C. SUMMER NUCLEAR STATION

UNIT 1

CORE OPERATING LIMITS REPORT

FOR

CYCLE 23

REVISION 0

NOVEMBER 2015

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1.0 Core Operating Limits Report

This Core Operating Limits Report (COLR) for V. C. Summer Station Cycle 23 has been prepared in accordance with the requirements of Technical Specification 6.9.1.11.

The Technical Specifications affected by this report are listed below:

3.1.1.3	Moderator Temperature Coefficient
3.1.3.5	Shutdown Rod Insertion Limits
3.1.3.6	Control Rod Insertion Limits
3.2.1	Axial Flux Difference
3.2.2	Heat Flux Hot Channel Factor – $F_Q(z)$
3.2.3	RCS Flow Rate and Nuclear Enthalpy Rise Hot Channel Factor
3.3.3.11	Power Distribution Monitoring System (PDMS)

2.0 Operating Limits

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the subsections which follow. These limits have been developed using the NRC-approved methodologies specified in Technical Specification 6.9.1.11.

2.1 Moderator Temperature Coefficient (Specification 3.1.1.3):

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:
The BOL/ARO-MTC shall be less positive than the limits shown in Figure 1.
The EOL/ARO/RTP-MTC shall be less negative than -4.8×10^{-4} $\Delta k/k/°F$ (-48 pcm/°F).
where: BOL stands for Beginning of Cycle Life
ARO stands for All Rods Out
RTP stands for RATED THERMAL POWER
EOL stands for End of Cycle Life

2.1.2 The MTC Surveillance limit is:
The 300 ppm/ARO/RTP-MTC should be less negative than or equal to -4.1×10^{-4} $\Delta k/k/°F$ (-41 pcm/°F).

2.1.3 The Revised Predicted near-EOL 300 ppm MTC shall be calculated using the following algorithm from Reference 2:

Revised Predicted MTC = Predicted MTC + AFD Correction*+ Predictive Correction**

*AFD Correction is 0.05 pcm/°F/%ΔAFD.

**Predictive Correction is -3 pcm/°F.

If the Revised Predicted MTC is less negative than the SR 4.1.1.3b limit of -4.1×10^{-4} $\Delta k/k/°F$, and all of the benchmark data contained in the surveillance procedure are met, then an MTC measurement in accordance with SR 4.1.1.3b is not required.

2.2 Shutdown Rod Insertion Limits (Specification 3.1.3.5):

The shutdown rods shall be withdrawn to at least 228 steps.

2.3 Control Rod Insertion Limits (Specification 3.1.3.6):

Control Bank A and B rods shall be withdrawn to at least 228 steps. Control Bank C and D Rod Insertion Limits are specified by Figure 2. Control rod overlap is 100 steps.

2.4 Axial Flux Difference (Specification 3.2.1):

2.4.1 The Axial Flux Difference (AFD) Limits for Relaxed Axial Offset Control (RAOC) operation for Cycle 23 are shown in Figure 3.

2.4.2 The Axial Flux Difference (AFD) target band during base load operations for Cycle 23 is: BOL - EOL (0 – 23,000 MWD/MTU): ±5% about a measured target value. The base load band will remain inside the RAOC band.

2.4.3 The minimum allowable power level for base load operation, APL^{ND}, is 75% of RATED THERMAL POWER.

2.5 Heat Flux Hot Channel Factor - $F_Q(z)$ (Specification 3.2.2):

$$F_Q(Z) \le \frac{F_Q^{RTP}}{P} \times K(Z) \qquad \text{for } P > 0.5$$

$$F_Q(Z) \le \frac{F_Q^{RTP}}{0.5} \times K(Z) \qquad \text{for } P \le 0.5 \qquad \text{where: } P = \frac{\text{Thermal Power}}{\text{Rated Thermal Power}}$$

2.5.1 $F_Q^{RTP} = 2.45$

2.5.2 K(z) is provided in Figure 4.

2.5.3 Elevation dependent W(z) values for RAOC operation at 150, 3000, 5000, 8000, 10000, 14000, and 20000 MWD/MTU are shown in Tables 1 through 7, respectively. This information is sufficient to determine W(z) versus core height in the range of 0 MWD/MTU to EOL burnup through the use of three point interpolation. Table 8 shows FQ margin decreases for RAOC operation that are greater than 2% per 31 Effective Full Power Days (EFPD). These values shall be used to increase $F_Q^M(z)$ as per Surveillance Requirement 4.2.2.2.e. A 2% penalty factor shall be used at all burnups that are outside the range of Table 8.

2.5.4 Elevation dependent $W(z)_{BL}$ values for Baseload operation between 75 and 100% of rated thermal power with the item 2.4.2 specified target band about a measured target value at 150, 3000, 5000, 8000, 10000, 14000, and 20000 MWD/MTU are shown in Tables 9 through 15, respectively. This information is sufficient to determine $W(z)_{BL}$ versus core height for burnups in the range of 0 MWD/MTU to EOL burnup through the use of three point interpolation. Table 16 shows FQ margin decreases for base load operation that are greater than 2% per 31 Effective Full Power Days (EFPD). These values shall be used to increase $F_Q^M(z)$ as per Surveillance Requirement 4.2.2.4.e. A 2% penalty factor shall be used at all burnups that are outside the range of Table 16.

2.6 RCS Flow Rate and Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}^N$ (Specification 3.2.3):

$$R = \frac{F_{\Delta H}^N}{F_{\Delta H}^{RTP} \times (1 + PF_{\Delta H}^N \times (1 - P))} \text{ where: } P = \frac{\text{Thermal Power}}{\text{Rated Thermal Power}}$$

2.6.1 $F_{\Delta H}^{RTP} = 1.62$

2.6.2 $PF_{\Delta H} = 0.3$

2.6.3 The Acceptable Operation Region from the combination of Reactor Coolant System total flow and R is provided in Figure 5.

2.7 Power Distribution Measurement Uncertainty (Specifications 3.2.2 and 3.2.3):

If the Power Distribution Monitoring System (PDMS) is OPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, $U_{F\Delta H}$, to be applied to the Nuclear Enthalpy Rise Hot Channel Factor $F^N_{\Delta H}$ shall be calculated by the following formula:

$$U_{F\Delta H} = 1.0 + \frac{U_{\Delta H}}{100.0}$$

where: $U_{\Delta H}$ = Uncertainty for enthalpy rise as defined in equation (5-19) in Reference 1 or 4.0, whichever is larger.

If the Power Distribution Monitoring System is OPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, U_{FQ}, to be applied to the Heat Flux Hot Channel Factor $F_Q(z)$ shall be calculated by the following formula:

$$U_{FQ} = \left(1.0 + \frac{U_Q}{100.0}\right) \cdot U_e$$

where: U_Q = Uncertainty for $F_Q(z)$ = 5.0 when confirming $F_Q(z)$ for RAOC or Base Load operation, or as defined in equation (5-19) in Reference 1 for all other purposes.

U_e = Engineering uncertainty factor.

= 1.03

If the Power Distribution Monitoring System is INOPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, $U_{F\Delta H}$, to be applied to the Nuclear Enthalpy Rise Hot Channel Factor $F^N_{\Delta H}$ shall be calculated by the following formula:

$$U_{F\Delta H} = U_{F\Delta Hm}$$

where: $U_{F\Delta Hm}$ = Base $F_{\Delta H}$ measurement uncertainty.

= 1.04

If the Power Distribution Monitoring System is INOPERABLE, as defined in Technical Specification 3.3.3.11, the uncertainty, U_{FQ}, to be applied to the Heat Flux Hot Channel Factor $F_Q(z)$ shall be calculated by the following formula:

$$U_{FQ} = U_{qu} \cdot U_e$$

where: U_{qu} = Base F_Q measurement uncertainty.

= 1.05

U_e = Engineering uncertainty factor.

= 1.03

3.0 References

The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC. These methods are listed in Technical Specification Section 6.9.1.11.

Figure 1. Moderator Temperature Coefficient Versus Power Level
V.C. Summer – Cycle 23

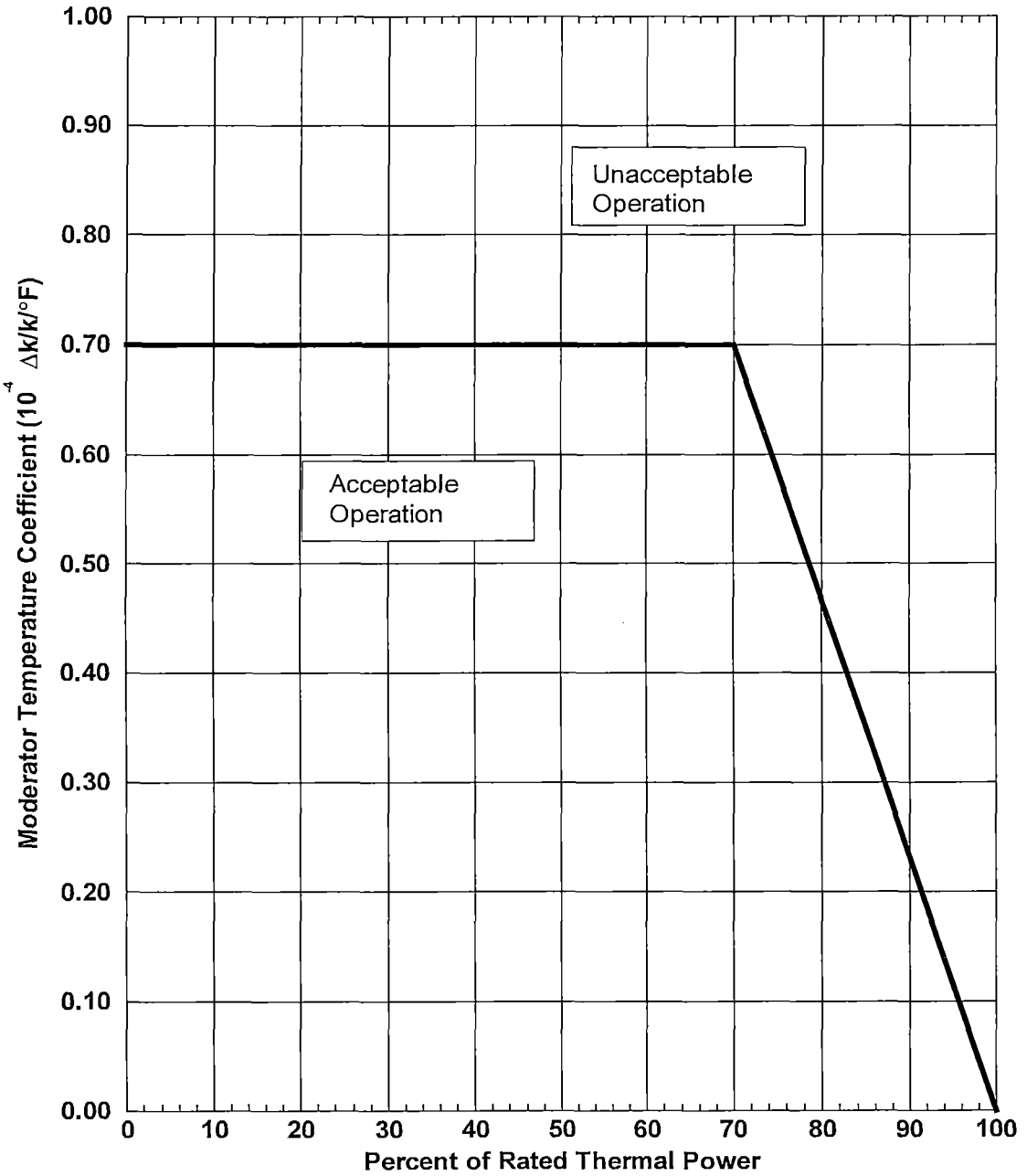


Figure 2. Rod Group Insertion Limits Versus Thermal Power for Three Loop Operation
V. C. Summer - Cycle 23

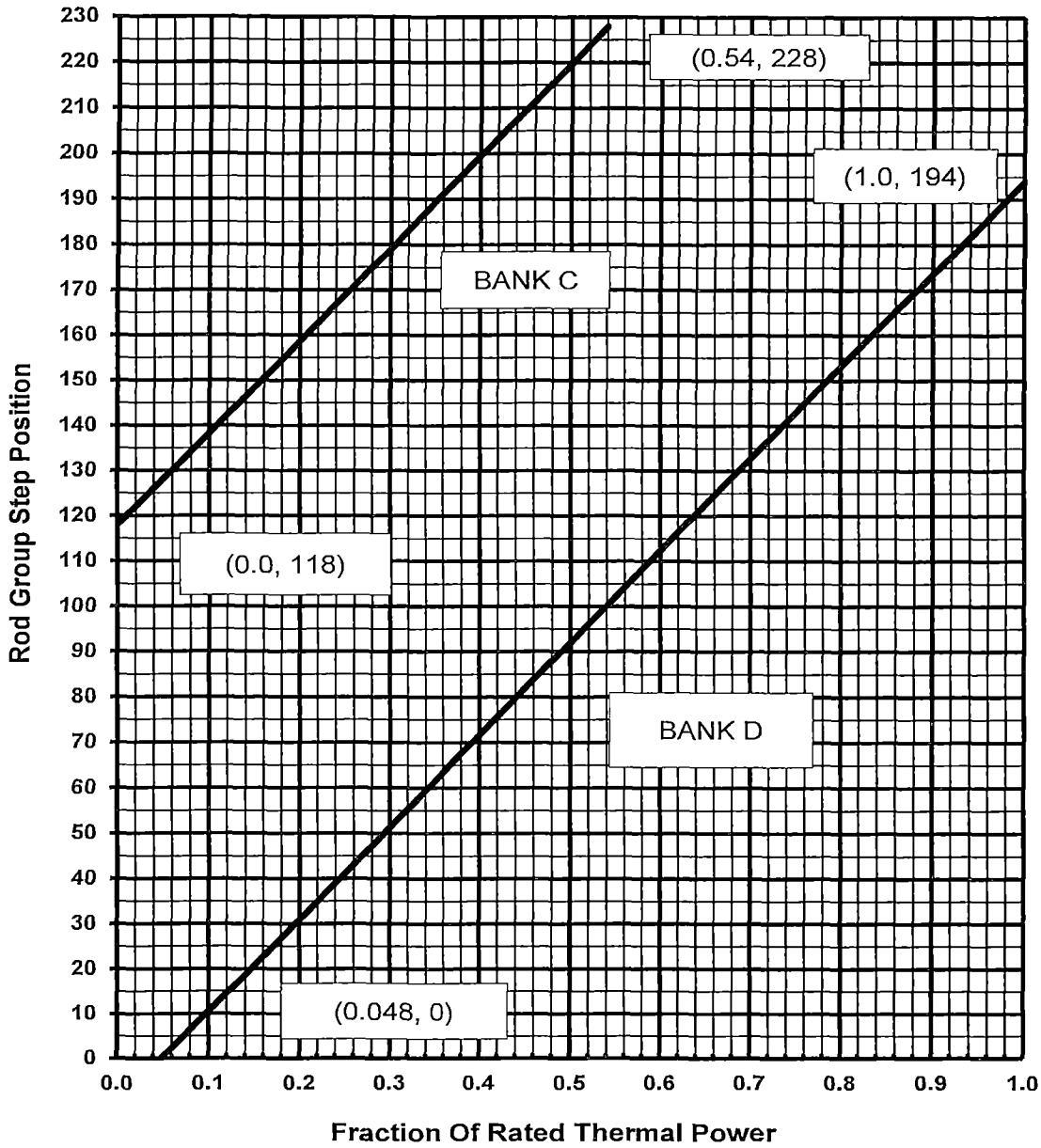


Figure 3. Axial Flux Difference Limits as a Function of Rated Thermal Power
V. C. Summer – Cycle 23

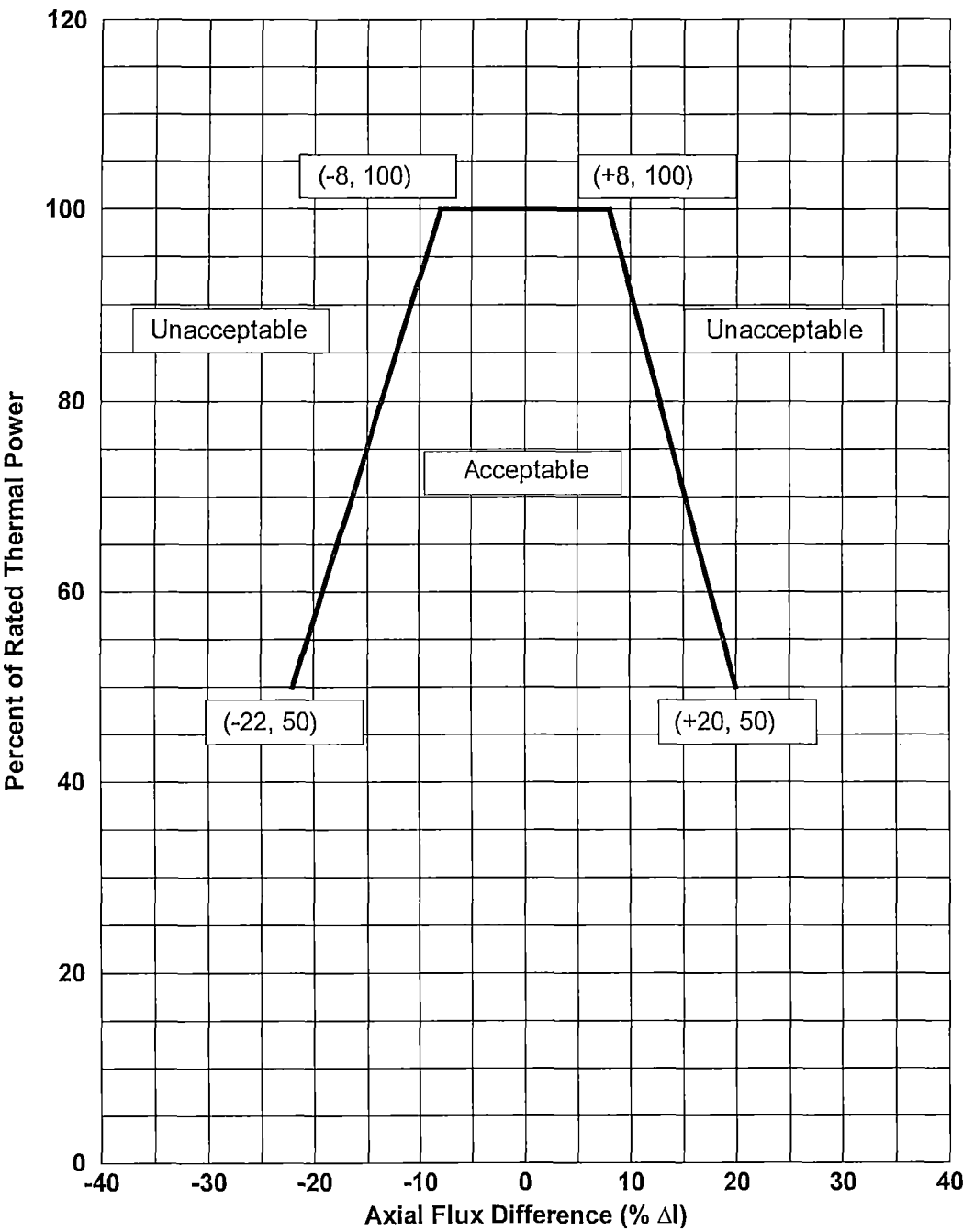


Figure 4. K(z) - Normalized $F_Q(z)$ as a Function of Core Height
V. C. Summer – Cycle 23

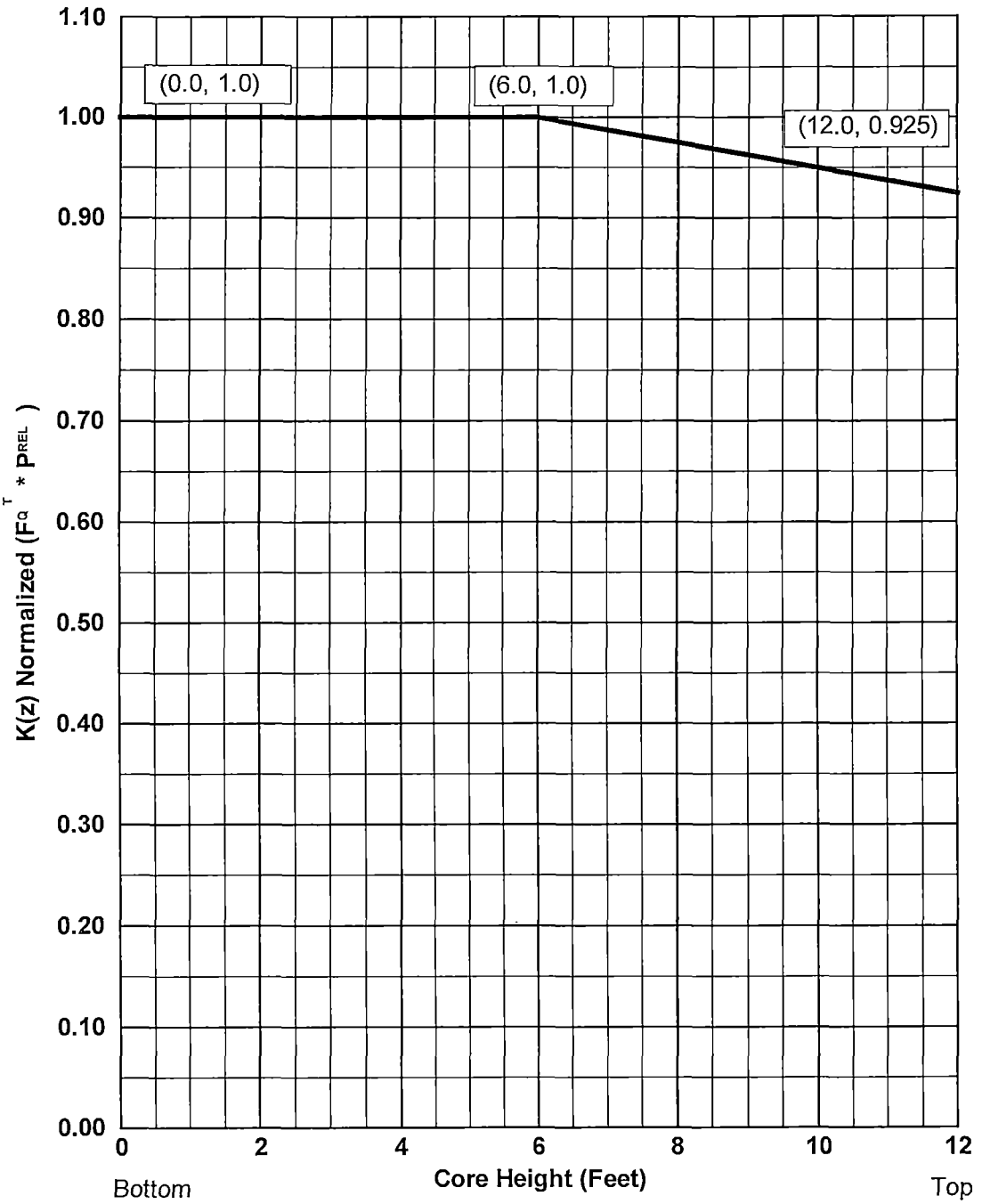


Table 1. RAOC W(z) at 150 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.229	6.140	1.160
0.140	1.230	6.279	1.166
0.279	1.232	6.419	1.172
0.419	1.241	6.558	1.177
0.558	1.256	6.698	1.182
0.698	1.260	6.837	1.186
0.837	1.255	6.977	1.190
0.977	1.249	7.116	1.193
1.116	1.242	7.256	1.195
1.256	1.234	7.395	1.197
1.395	1.225	7.535	1.197
1.535	1.215	7.674	1.197
1.674	1.205	7.814	1.196
1.814	1.194	7.953	1.194
1.953	1.183	8.093	1.191
2.093	1.171	8.233	1.188
2.233	1.159	8.372	1.183
2.372	1.147	8.512	1.178
2.512	1.136	8.651	1.173
2.651	1.123	8.791	1.171
2.791	1.114	8.930	1.174
2.930	1.111	9.070	1.175
3.070	1.109	9.209	1.176
3.209	1.108	9.349	1.175
3.349	1.106	9.488	1.175
3.488	1.104	9.628	1.176
3.628	1.104	9.767	1.180
3.767	1.104	9.907	1.183
3.907	1.107	10.046	1.186
4.046	1.108	10.186	1.188
4.186	1.110	10.326	1.191
4.326	1.112	10.465	1.196
4.465	1.113	10.605	1.199
4.605	1.114	10.744	1.202
4.744	1.114	10.884	1.204
4.884	1.115	11.023	1.205
5.023	1.115	11.163	1.205
5.163	1.115	11.302	1.205
5.302	1.117	11.442	1.201
5.442	1.121	11.581	1.184
5.581	1.129	11.721	1.164
5.721	1.137	11.860	1.145
5.860	1.145	12.000	1.124
6.000	1.153		

Table 2. RAOC W(z) at 3000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.370	6.140	1.120
0.140	1.371	6.279	1.125
0.279	1.372	6.419	1.131
0.419	1.378	6.558	1.135
0.558	1.389	6.698	1.140
0.698	1.388	6.837	1.144
0.837	1.379	6.977	1.147
0.977	1.370	7.116	1.150
1.116	1.358	7.256	1.152
1.256	1.345	7.395	1.154
1.395	1.330	7.535	1.155
1.535	1.315	7.674	1.155
1.674	1.298	7.814	1.155
1.814	1.280	7.953	1.153
1.953	1.262	8.093	1.152
2.093	1.244	8.233	1.149
2.233	1.225	8.372	1.146
2.372	1.206	8.512	1.143
2.512	1.188	8.651	1.138
2.651	1.170	8.791	1.138
2.791	1.152	8.930	1.146
2.930	1.134	9.070	1.152
3.070	1.128	9.209	1.158
3.209	1.127	9.349	1.163
3.349	1.124	9.488	1.168
3.488	1.122	9.628	1.172
3.628	1.119	9.767	1.176
3.767	1.117	9.907	1.178
3.907	1.114	10.046	1.180
4.046	1.110	10.186	1.179
4.186	1.107	10.326	1.179
4.326	1.104	10.465	1.177
4.465	1.100	10.605	1.173
4.605	1.096	10.744	1.173
4.744	1.093	10.884	1.174
4.884	1.092	11.023	1.174
5.023	1.091	11.163	1.174
5.163	1.091	11.302	1.173
5.302	1.093	11.442	1.170
5.442	1.095	11.581	1.154
5.581	1.097	11.721	1.136
5.721	1.101	11.860	1.119
5.860	1.108	12.000	1.099
6.000	1.114		

Table 3. RAOC W(z) at 5000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.378	6.140	1.113
0.140	1.379	6.279	1.119
0.279	1.380	6.419	1.124
0.419	1.385	6.558	1.129
0.558	1.394	6.698	1.134
0.698	1.393	6.837	1.138
0.837	1.384	6.977	1.141
0.977	1.374	7.116	1.144
1.116	1.362	7.256	1.147
1.256	1.348	7.395	1.149
1.395	1.332	7.535	1.150
1.535	1.316	7.674	1.150
1.674	1.298	7.814	1.150
1.814	1.279	7.953	1.150
1.953	1.260	8.093	1.148
2.093	1.240	8.233	1.146
2.233	1.220	8.372	1.144
2.372	1.200	8.512	1.140
2.512	1.181	8.651	1.136
2.651	1.161	8.791	1.136
2.791	1.144	8.930	1.143
2.930	1.137	9.070	1.150
3.070	1.133	9.209	1.156
3.209	1.130	9.349	1.162
3.349	1.127	9.488	1.168
3.488	1.125	9.628	1.173
3.628	1.122	9.767	1.177
3.767	1.119	9.907	1.181
3.907	1.116	10.046	1.183
4.046	1.113	10.186	1.186
4.186	1.109	10.326	1.192
4.326	1.105	10.465	1.198
4.465	1.101	10.605	1.203
4.605	1.097	10.744	1.208
4.744	1.093	10.884	1.212
4.884	1.089	11.023	1.215
5.023	1.087	11.163	1.216
5.163	1.087	11.302	1.217
5.302	1.087	11.442	1.215
5.442	1.090	11.581	1.201
5.581	1.091	11.721	1.184
5.721	1.095	11.860	1.167
5.860	1.101	12.000	1.148
6.000	1.107		

Table 4. RAOC W(z) at 8000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.346	6.140	1.110
0.140	1.347	6.279	1.117
0.279	1.348	6.419	1.124
0.419	1.353	6.558	1.130
0.558	1.363	6.698	1.136
0.698	1.362	6.837	1.142
0.837	1.355	6.977	1.147
0.977	1.346	7.116	1.151
1.116	1.335	7.256	1.156
1.256	1.322	7.395	1.159
1.395	1.308	7.535	1.161
1.535	1.292	7.674	1.163
1.674	1.276	7.814	1.164
1.814	1.258	7.953	1.165
1.953	1.240	8.093	1.165
2.093	1.222	8.233	1.164
2.233	1.203	8.372	1.163
2.372	1.185	8.512	1.160
2.512	1.166	8.651	1.157
2.651	1.149	8.791	1.156
2.791	1.131	8.930	1.160
2.930	1.114	9.070	1.168
3.070	1.109	9.209	1.174
3.209	1.108	9.349	1.180
3.349	1.106	9.488	1.186
3.488	1.104	9.628	1.191
3.628	1.102	9.767	1.195
3.767	1.099	9.907	1.199
3.907	1.097	10.046	1.201
4.046	1.094	10.186	1.206
4.186	1.091	10.326	1.214
4.326	1.088	10.465	1.221
4.465	1.087	10.605	1.226
4.605	1.087	10.744	1.232
4.744	1.086	10.884	1.236
4.884	1.086	11.023	1.239
5.023	1.085	11.163	1.240
5.163	1.085	11.302	1.240
5.302	1.087	11.442	1.239
5.442	1.088	11.581	1.225
5.581	1.088	11.721	1.208
5.721	1.092	11.860	1.191
5.860	1.098	12.000	1.170
6.000	1.103		

Table 5. RAOC W(z) at 10000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.275	6.140	1.120
0.140	1.276	6.279	1.127
0.279	1.278	6.419	1.135
0.419	1.284	6.558	1.142
0.558	1.295	6.698	1.148
0.698	1.295	6.837	1.154
0.837	1.289	6.977	1.159
0.977	1.282	7.116	1.164
1.116	1.274	7.256	1.168
1.256	1.263	7.395	1.172
1.395	1.251	7.535	1.174
1.535	1.238	7.674	1.176
1.674	1.224	7.814	1.177
1.814	1.209	7.953	1.177
1.953	1.195	8.093	1.177
2.093	1.179	8.233	1.176
2.233	1.164	8.372	1.174
2.372	1.148	8.512	1.172
2.512	1.133	8.651	1.168
2.651	1.120	8.791	1.167
2.791	1.108	8.930	1.169
2.930	1.097	9.070	1.176
3.070	1.090	9.209	1.182
3.209	1.088	9.349	1.187
3.349	1.088	9.488	1.192
3.488	1.089	9.628	1.196
3.628	1.089	9.767	1.199
3.767	1.090	9.907	1.202
3.907	1.091	10.046	1.205
4.046	1.091	10.186	1.211
4.186	1.091	10.326	1.218
4.326	1.091	10.465	1.224
4.465	1.091	10.605	1.229
4.605	1.091	10.744	1.234
4.744	1.091	10.884	1.238
4.884	1.090	11.023	1.240
5.023	1.090	11.163	1.241
5.163	1.089	11.302	1.241
5.302	1.089	11.442	1.238
5.442	1.089	11.581	1.224
5.581	1.090	11.721	1.206
5.721	1.095	11.860	1.189
5.860	1.103	12.000	1.168
6.000	1.112		

Table 6. RAOC W(z) at 14000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.202	6.140	1.139
0.140	1.203	6.279	1.146
0.279	1.205	6.419	1.153
0.419	1.213	6.558	1.159
0.558	1.226	6.698	1.164
0.698	1.229	6.837	1.169
0.837	1.227	6.977	1.173
0.977	1.223	7.116	1.177
1.116	1.217	7.256	1.180
1.256	1.210	7.395	1.183
1.395	1.202	7.535	1.183
1.535	1.193	7.674	1.183
1.674	1.184	7.814	1.183
1.814	1.174	7.953	1.181
1.953	1.164	8.093	1.179
2.093	1.153	8.233	1.177
2.233	1.143	8.372	1.173
2.372	1.131	8.512	1.169
2.512	1.120	8.651	1.164
2.651	1.109	8.791	1.164
2.791	1.099	8.930	1.169
2.930	1.089	9.070	1.174
3.070	1.089	9.209	1.177
3.209	1.090	9.349	1.180
3.349	1.090	9.488	1.182
3.488	1.091	9.628	1.184
3.628	1.091	9.767	1.185
3.767	1.092	9.907	1.189
3.907	1.093	10.046	1.195
4.046	1.095	10.186	1.201
4.186	1.098	10.326	1.207
4.326	1.100	10.465	1.212
4.465	1.102	10.605	1.216
4.605	1.104	10.744	1.220
4.744	1.106	10.884	1.223
4.884	1.108	11.023	1.224
5.023	1.109	11.163	1.224
5.163	1.110	11.302	1.222
5.302	1.111	11.442	1.219
5.442	1.112	11.581	1.202
5.581	1.112	11.721	1.183
5.721	1.115	11.860	1.165
5.860	1.124	12.000	1.144
6.000	1.132		

Table 7. RAOC W(z) at 20000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.217	6.140	1.198
0.140	1.219	6.279	1.206
0.279	1.221	6.419	1.213
0.419	1.228	6.558	1.219
0.558	1.243	6.698	1.224
0.698	1.247	6.837	1.228
0.837	1.243	6.977	1.232
0.977	1.239	7.116	1.234
1.116	1.233	7.256	1.236
1.256	1.226	7.395	1.237
1.395	1.217	7.535	1.234
1.535	1.208	7.674	1.232
1.674	1.199	7.814	1.229
1.814	1.188	7.953	1.225
1.953	1.178	8.093	1.220
2.093	1.168	8.233	1.214
2.233	1.157	8.372	1.207
2.372	1.145	8.512	1.205
2.512	1.133	8.651	1.202
2.651	1.122	8.791	1.198
2.791	1.110	8.930	1.193
2.930	1.098	9.070	1.188
3.070	1.092	9.209	1.180
3.209	1.087	9.349	1.173
3.349	1.083	9.488	1.173
3.488	1.087	9.628	1.177
3.628	1.093	9.767	1.183
3.767	1.101	9.907	1.189
3.907	1.110	10.046	1.194
4.046	1.116	10.186	1.199
4.186	1.122	10.326	1.204
4.326	1.128	10.465	1.208
4.465	1.134	10.605	1.212
4.605	1.139	10.744	1.216
4.744	1.144	10.884	1.218
4.884	1.149	11.023	1.219
5.023	1.153	11.163	1.218
5.163	1.156	11.302	1.215
5.302	1.159	11.442	1.210
5.442	1.162	11.581	1.191
5.581	1.166	11.721	1.170
5.721	1.172	11.860	1.150
5.860	1.180	12.000	1.127
6.000	1.189		

Table 8. RAOC FQ Margin Decreases in Excess of 2% Per 31 EFPD – Cycle 23

Cycle Burnup (MWD/MTU)	Maximum Decrease in FQ Margin
1009	1.0200
1181	1.0212
1353	1.0214
1525	1.0217
1697	1.0224
1868	1.0234
2040	1.0247
2212	1.0261
2384	1.0280
2556	1.0293
2728	1.0301
2899	1.0299
3071	1.0286
3243	1.0265
3415	1.0236
3587	1.0205
3759	1.0200

Note: All cycle burnups outside the range of this table shall use a 1.020 decrease in margin for compliance with Specification 4.2.2.2.e. Linear interpolation is adequate for intermediate cycle burnups.

Table 9. BASELOAD W(z) at 150 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.132	6.140	1.054
0.140	1.132	6.279	1.056
0.279	1.133	6.419	1.059
0.419	1.134	6.558	1.061
0.558	1.135	6.698	1.063
0.698	1.134	6.837	1.065
0.837	1.133	6.977	1.067
0.977	1.132	7.116	1.069
1.116	1.130	7.256	1.071
1.256	1.128	7.395	1.073
1.395	1.126	7.535	1.074
1.535	1.124	7.674	1.076
1.674	1.121	7.814	1.077
1.814	1.119	7.953	1.078
1.953	1.116	8.093	1.080
2.093	1.112	8.233	1.081
2.233	1.109	8.372	1.082
2.372	1.105	8.512	1.083
2.512	1.102	8.651	1.083
2.651	1.098	8.791	1.084
2.791	1.094	8.930	1.085
2.930	1.091	9.070	1.086
3.070	1.087	9.209	1.086
3.209	1.084	9.349	1.087
3.349	1.082	9.488	1.087
3.488	1.081	9.628	1.088
3.628	1.079	9.767	1.088
3.767	1.078	9.907	1.089
3.907	1.076	10.046	1.089
4.046	1.075	10.186	1.090
4.186	1.073	10.326	1.090
4.326	1.072	10.465	1.091
4.465	1.070	10.605	1.091
4.605	1.068	10.744	1.092
4.744	1.066	10.884	1.092
4.884	1.065	11.023	1.093
5.023	1.063	11.163	1.093
5.163	1.061	11.302	1.093
5.302	1.059	11.442	1.093
5.442	1.057	11.581	1.093
5.581	1.054	11.721	1.092
5.721	1.054	11.860	1.092
5.860	1.054	12.000	1.092
6.000	1.054		

Table 10. BASELOAD W(z) at 3000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.114	6.140	1.052
0.140	1.115	6.279	1.051
0.279	1.115	6.419	1.051
0.419	1.116	6.558	1.050
0.558	1.118	6.698	1.050
0.698	1.118	6.837	1.050
0.837	1.118	6.977	1.052
0.977	1.117	7.116	1.054
1.116	1.117	7.256	1.056
1.256	1.116	7.395	1.059
1.395	1.116	7.535	1.061
1.535	1.115	7.674	1.062
1.674	1.113	7.814	1.064
1.814	1.112	7.953	1.066
1.953	1.111	8.093	1.068
2.093	1.109	8.233	1.070
2.233	1.107	8.372	1.072
2.372	1.105	8.512	1.073
2.512	1.103	8.651	1.075
2.651	1.101	8.791	1.076
2.791	1.099	8.930	1.078
2.930	1.097	9.070	1.079
3.070	1.094	9.209	1.081
3.209	1.092	9.349	1.082
3.349	1.089	9.488	1.083
3.488	1.086	9.628	1.085
3.628	1.083	9.767	1.086
3.767	1.081	9.907	1.087
3.907	1.080	10.046	1.088
4.046	1.078	10.186	1.089
4.186	1.077	10.326	1.090
4.326	1.076	10.465	1.092
4.465	1.074	10.605	1.093
4.605	1.073	10.744	1.094
4.744	1.071	10.884	1.095
4.884	1.069	11.023	1.096
5.023	1.068	11.163	1.097
5.163	1.066	11.302	1.097
5.302	1.064	11.442	1.098
5.442	1.062	11.581	1.098
5.581	1.060	11.721	1.097
5.721	1.058	11.860	1.097
5.860	1.056	12.000	1.098
6.000	1.054		

Table 11. BASELOAD W(z) at 5000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.110	6.140	1.052
0.140	1.111	6.279	1.051
0.279	1.111	6.419	1.051
0.419	1.112	6.558	1.050
0.558	1.114	6.698	1.049
0.698	1.115	6.837	1.049
0.837	1.115	6.977	1.049
0.977	1.114	7.116	1.051
1.116	1.114	7.256	1.054
1.256	1.114	7.395	1.056
1.395	1.113	7.535	1.058
1.535	1.112	7.674	1.060
1.674	1.112	7.814	1.062
1.814	1.111	7.953	1.064
1.953	1.109	8.093	1.066
2.093	1.108	8.233	1.067
2.233	1.106	8.372	1.069
2.372	1.105	8.512	1.071
2.512	1.103	8.651	1.072
2.651	1.101	8.791	1.074
2.791	1.099	8.930	1.076
2.930	1.097	9.070	1.077
3.070	1.095	9.209	1.079
3.209	1.093	9.349	1.080
3.349	1.090	9.488	1.081
3.488	1.088	9.628	1.083
3.628	1.085	9.767	1.084
3.767	1.082	9.907	1.085
3.907	1.080	10.046	1.086
4.046	1.079	10.186	1.088
4.186	1.078	10.326	1.089
4.326	1.076	10.465	1.090
4.465	1.075	10.605	1.091
4.605	1.073	10.744	1.092
4.744	1.072	10.884	1.093
4.884	1.070	11.023	1.094
5.023	1.068	11.163	1.095
5.163	1.066	11.302	1.096
5.302	1.065	11.442	1.097
5.442	1.063	11.581	1.097
5.581	1.060	11.721	1.096
5.721	1.058	11.860	1.096
5.860	1.056	12.000	1.097
6.000	1.054		

Table 12. BASELOAD W(z) at 8000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.114	6.140	1.053
0.140	1.114	6.279	1.052
0.279	1.115	6.419	1.052
0.419	1.116	6.558	1.051
0.558	1.117	6.698	1.050
0.698	1.117	6.837	1.050
0.837	1.117	6.977	1.052
0.977	1.117	7.116	1.055
1.116	1.117	7.256	1.057
1.256	1.117	7.395	1.059
1.395	1.116	7.535	1.061
1.535	1.115	7.674	1.062
1.674	1.114	7.814	1.064
1.814	1.113	7.953	1.066
1.953	1.111	8.093	1.068
2.093	1.110	8.233	1.069
2.233	1.108	8.372	1.071
2.372	1.106	8.512	1.072
2.512	1.104	8.651	1.073
2.651	1.102	8.791	1.075
2.791	1.099	8.930	1.076
2.930	1.097	9.070	1.077
3.070	1.094	9.209	1.079
3.209	1.091	9.349	1.080
3.349	1.088	9.488	1.081
3.488	1.085	9.628	1.082
3.628	1.083	9.767	1.083
3.767	1.081	9.907	1.084
3.907	1.079	10.046	1.085
4.046	1.078	10.186	1.086
4.186	1.076	10.326	1.087
4.326	1.075	10.465	1.088
4.465	1.074	10.605	1.089
4.605	1.072	10.744	1.090
4.744	1.071	10.884	1.091
4.884	1.069	11.023	1.092
5.023	1.067	11.163	1.093
5.163	1.066	11.302	1.093
5.302	1.064	11.442	1.094
5.442	1.062	11.581	1.094
5.581	1.060	11.721	1.093
5.721	1.058	11.860	1.094
5.860	1.056	12.000	1.094
6.000	1.054		

Table 13. BASELOAD W(z) at 10000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.119	6.140	1.054
0.140	1.119	6.279	1.053
0.279	1.120	6.419	1.052
0.419	1.121	6.558	1.051
0.558	1.122	6.698	1.052
0.698	1.122	6.837	1.054
0.837	1.122	6.977	1.056
0.977	1.122	7.116	1.058
1.116	1.122	7.256	1.060
1.256	1.121	7.395	1.062
1.395	1.120	7.535	1.064
1.535	1.119	7.674	1.065
1.674	1.118	7.814	1.067
1.814	1.116	7.953	1.068
1.953	1.114	8.093	1.070
2.093	1.112	8.233	1.071
2.233	1.110	8.372	1.072
2.372	1.108	8.512	1.074
2.512	1.105	8.651	1.075
2.651	1.103	8.791	1.076
2.791	1.100	8.930	1.077
2.930	1.097	9.070	1.078
3.070	1.094	9.209	1.079
3.209	1.091	9.349	1.079
3.349	1.087	9.488	1.080
3.488	1.084	9.628	1.081
3.628	1.082	9.767	1.082
3.767	1.080	9.907	1.083
3.907	1.078	10.046	1.083
4.046	1.077	10.186	1.084
4.186	1.076	10.326	1.085
4.326	1.075	10.465	1.086
4.465	1.073	10.605	1.087
4.605	1.072	10.744	1.088
4.744	1.070	10.884	1.088
4.884	1.068	11.023	1.089
5.023	1.067	11.163	1.090
5.163	1.065	11.302	1.090
5.302	1.063	11.442	1.091
5.442	1.061	11.581	1.091
5.581	1.059	11.721	1.094
5.721	1.057	11.860	1.098
5.860	1.055	12.000	1.099
6.000	1.055		

Table 14. BASELOAD W(z) at 14000 MWD/MTU
V. C. Summer – Cycle 23

Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.133	6.140	1.055
0.140	1.133	6.279	1.055
0.279	1.134	6.419	1.057
0.419	1.135	6.558	1.059
0.558	1.136	6.698	1.061
0.698	1.136	6.837	1.063
0.837	1.136	6.977	1.065
0.977	1.135	7.116	1.066
1.116	1.134	7.256	1.068
1.256	1.133	7.395	1.070
1.395	1.132	7.535	1.071
1.535	1.130	7.674	1.072
1.674	1.128	7.814	1.073
1.814	1.125	7.953	1.073
1.953	1.123	8.093	1.074
2.093	1.120	8.233	1.075
2.233	1.116	8.372	1.076
2.372	1.113	8.512	1.076
2.512	1.110	8.651	1.076
2.651	1.106	8.791	1.077
2.791	1.102	8.930	1.077
2.930	1.098	9.070	1.078
3.070	1.094	9.209	1.078
3.209	1.089	9.349	1.078
3.349	1.084	9.488	1.078
3.488	1.082	9.628	1.078
3.628	1.081	9.767	1.079
3.767	1.079	9.907	1.081
3.907	1.078	10.046	1.083
4.046	1.076	10.186	1.084
4.186	1.075	10.326	1.086
4.326	1.074	10.465	1.087
4.465	1.072	10.605	1.088
4.605	1.070	10.744	1.089
4.744	1.069	10.884	1.090
4.884	1.067	11.023	1.090
5.023	1.065	11.163	1.090
5.163	1.063	11.302	1.090
5.302	1.061	11.442	1.090
5.442	1.059	11.581	1.095
5.581	1.058	11.721	1.102
5.721	1.058	11.860	1.103
5.860	1.057	12.000	1.102
6.000	1.056		

Table 15. BASELOAD W(z) at 20000 MWD/MTU
V. C. Summer – Cycle 23

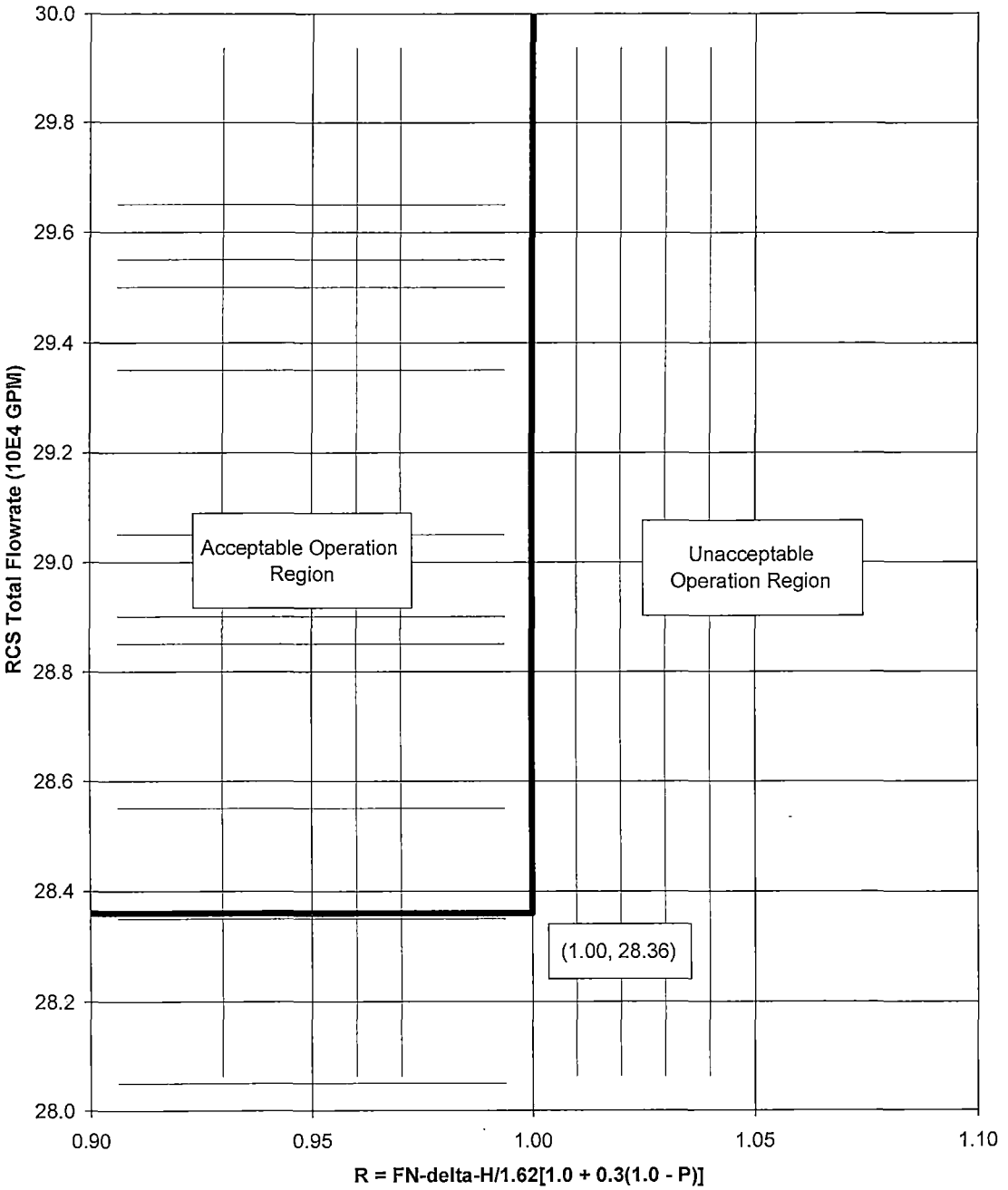
Core Height (ft)	W(z)	Core Height (ft)	W(z)
0.000	1.156	6.140	1.068
0.140	1.156	6.279	1.070
0.279	1.157	6.419	1.072
0.419	1.157	6.558	1.074
0.558	1.159	6.698	1.075
0.698	1.158	6.837	1.076
0.837	1.157	6.977	1.077
0.977	1.156	7.116	1.078
1.116	1.154	7.256	1.078
1.256	1.152	7.395	1.079
1.395	1.149	7.535	1.079
1.535	1.146	7.674	1.079
1.674	1.143	7.814	1.079
1.814	1.139	7.953	1.079
1.953	1.135	8.093	1.079
2.093	1.130	8.233	1.078
2.233	1.125	8.372	1.078
2.372	1.119	8.512	1.077
2.512	1.114	8.651	1.077
2.651	1.109	8.791	1.076
2.791	1.103	8.930	1.076
2.930	1.097	9.070	1.077
3.070	1.091	9.209	1.079
3.209	1.086	9.349	1.082
3.349	1.083	9.488	1.085
3.488	1.080	9.628	1.088
3.628	1.078	9.767	1.091
3.767	1.076	9.907	1.094
3.907	1.073	10.046	1.097
4.046	1.071	10.186	1.099
4.186	1.068	10.326	1.101
4.326	1.066	10.465	1.103
4.465	1.066	10.605	1.104
4.605	1.066	10.744	1.106
4.744	1.065	10.884	1.107
4.884	1.065	11.023	1.107
5.023	1.065	11.163	1.108
5.163	1.064	11.302	1.108
5.302	1.064	11.442	1.113
5.442	1.063	11.581	1.123
5.581	1.062	11.721	1.128
5.721	1.062	11.860	1.128
5.860	1.064	12.000	1.126
6.000	1.066		

Table 16. BASE LOAD FQ Margin Decreases in Excess of 2% Per 31 EFPD – Cycle 23

Cycle Burnup (MWD/MTU)	Maximum Decrease in FQ Margin
666	1.0200
837	1.0204
1009	1.0242
1181	1.0328
1353	1.0380
1525	1.0377
1697	1.0369
1868	1.0365
2040	1.0363
2212	1.0362
2384	1.0359
2556	1.0353
2728	1.0340
2899	1.0322
3071	1.0301
3243	1.0270
3415	1.0239
3587	1.0208
3759	1.0200
3930	1.0200

Note: All cycle burnups outside the range of this table shall use a 1.020 decrease in margin for compliance with Specification 4.2.2.4.e. Linear interpolation is adequate for intermediate cycle burnups.

Figure 5. RCS Total Flowrate vs. R for Three Loop Operation
V. C. Summer – Cycle 23



Measurement Uncertainty of 2.1% for Flow (includes 0.1% for feedwater venturi fouling) is included in this figure.