V. C. Summer Nuclear Station
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DominionEnergy.com

Dominion Energy®

October 1, 2019

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

Serial No.: 19-404
VCS LIC/HK: Rev 0
Docket Nos.: 50-395
License No.: NPF-12

SOUTH CAROLINA ELECTRIC & GAS COMPANY
VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
CORE OPERATING LIMITS REPORT (COLR) FOR CYCLE 25

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 Revision 1 of the Core Operating Limits Report (COLR) for Cycle 25. Revision 1 was developed to revise COLR data based on a vendor methodology change. COLR figures related to the Fq burnup dependent penalty factor were updated.

Should you have any questions, please call Michael Moore at (803) 345-4752.

Sincerely,

George A. Lippard
Site Vice President
V.C. Summer Nuclear Station

Commitments contained in this letter: None

Attachment: Virgil C. Summer Nuclear Station Unit 1 Core Operating Limits Report for Cycle 25, Revision 1

In a letter dated July 30, 2019, South Carolina Electric & Gas Company (SCE&G) requested a License Amendment to amend the VC Summer Operating License to reflect the name change from SCE&G to Dominion Energy South Carolina (DESC). The amendment request is currently under review by the NRC.

cc: (Without Attachments unless noted)

G. J. Lindamood – Santee Cooper
L. Dudes – NRC Region II (with Attachment)
S. A. Williams – NRC Project Mgr.
NRC Senior Resident Inspector – VCSNS

bc: J. E. Stanley - VCS
R. R. Haselden – VCS
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C. D. Sly – IN2SE
M. S. Moore – VCS
J. A. Langan – MPS
D. R. Taylor – NAPS
B. A. Garber – SPS
James Roth – IN2SE
Stacey Nelson – IN2SE
W. S. Blair – RS
RTS (LTD 320)
File (0185 – RR 5000)
PRSF – (VCS)

Concurrences:
See Correspondence Routing and Approval CHOP Sheet for VCS (Attached)

Verification of Accuracy
None

Action Plan:
None

Changes to the UFSAR, USAR, QA Topical Report, ISFSI FSAR, DSAR or PSDAR:
None

VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12

ATTACHMENT

CORE OPERATING LIMITS REPORT (COLR) FOR CYCLE 25

Dominion Energy®

Subject:	Cycle 25 Core Operating Limits Report Rev. 1	**Date:**	September 4, 2019
To:	M. S. Moore		CGSS-19-0067
From:	Nathaniel Smith	**Ref:**	DC0 020S-034 Rev. 1

Attached is the V. C. Summer Nuclear Station Unit 1 Core Operating Limits Report (COLR) for Cycle 25. This report is based on the above reference and is being provided for issuance to the NRC in accordance with Technical Specification 6.9.1.11. Revision 1 was developed to revise COLR data based on a vendor methodology change. COLR figures related to the Fq burnup dependent penalty factor were updated.

Attachment

Reviewer:

Duane Twining
Nuclear Core Design II

c: NFM File 4.425.1
B. J. Vitiello
J. E. Stanley
D. V. Bryson
D. M. Twining
Filenet

DOMINION ENERGY SOUTH CAROLINA

VIRGIL C. SUMMER NUCLEAR STATION

UNIT 1

CORE OPERATING LIMITS REPORT

FOR

CYCLE 25

REVISION 1

AUGUST 2019

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1.0 Core Operating Limits Report

This Core Operating Limits Report (COLR) for V. C. Summer Station Cycle 25 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 25 are shown in Figure 3.

2.4.2 The Axial Flux Difference (AFD) target band during base load operations for Cycle 25 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 Axial Flux Difference (AFD) Limits for Alternate Relaxed Axial Offset Control (RAOC) operation for Cycle 25 are shown in Figure 5.

2.4.4 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 2, 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 3 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 3.

2.5.4 Elevation dependent W(z) values for Alternate RAOC operation at 150, 3000, 5000, 8000, 10000, 14000 and 20000 MWD/MTU are shown in Tables 4 through 5, 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 6 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 6.

2.5.5 Elevation dependent $W(z)_{BL}$ values for Baseload operation between 75 and 100% of rated thermal power with the Section 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 7 through 8, 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 9 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 9.

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 6.

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.

1) WCAP-12472-P-A, "BEACON Core Monitoring and Operations Support System," August, 1994, (W Proprietary)
WCAP-12472-P-A, Addendum 1-A, "BEACON Core Monitoring and Operations Support System," January 2000, (W Proprietary).

2) WCAP-13749-P-A, "Safety Evaluation Supporting the Conditional Exemption of the Most Negative EOL Moderator Temperature Coefficient," March 1997, (W Proprietary).

Figure 1. Moderator Temperature Coefficient Versus Power Level
V. C. Summer – Cycle 25

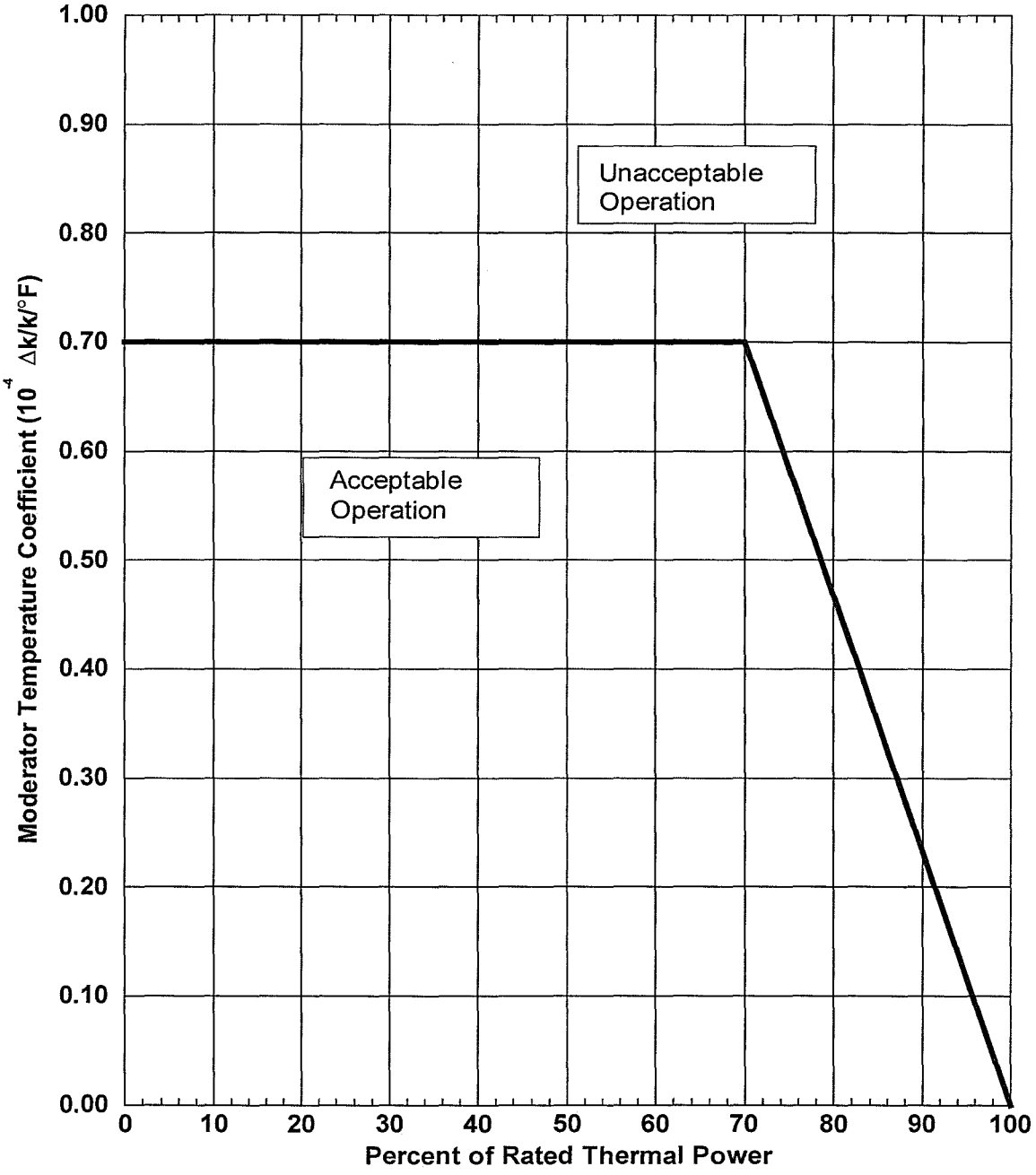


Figure 2. Rod Group Insertion Limits Versus Thermal Power for Three Loop Operation
V. C. Summer - Cycle 25

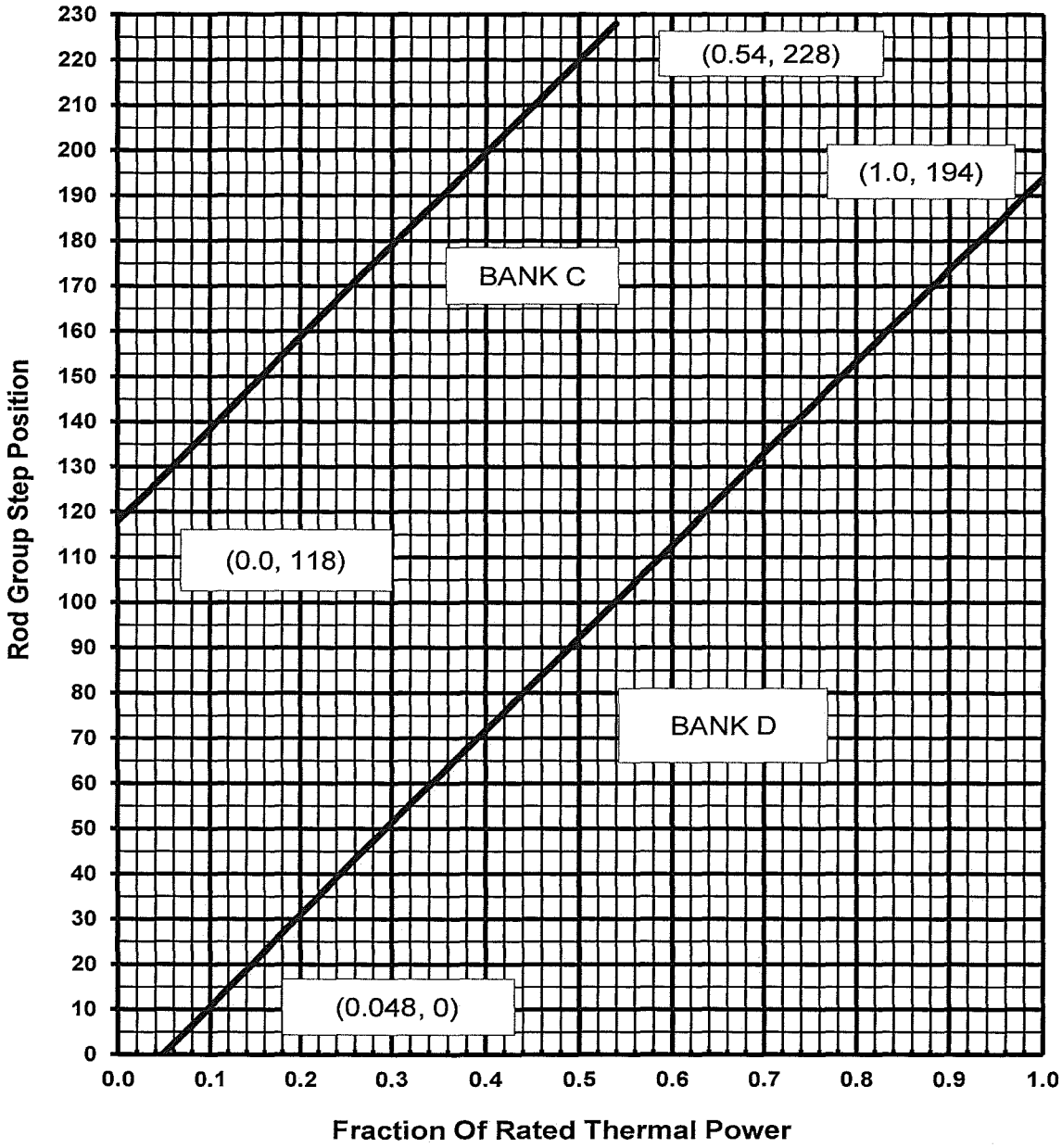


Figure 3. Axial Flux Difference Limits as a Function of Rated Thermal Power
V. C. Summer – Cycle 25

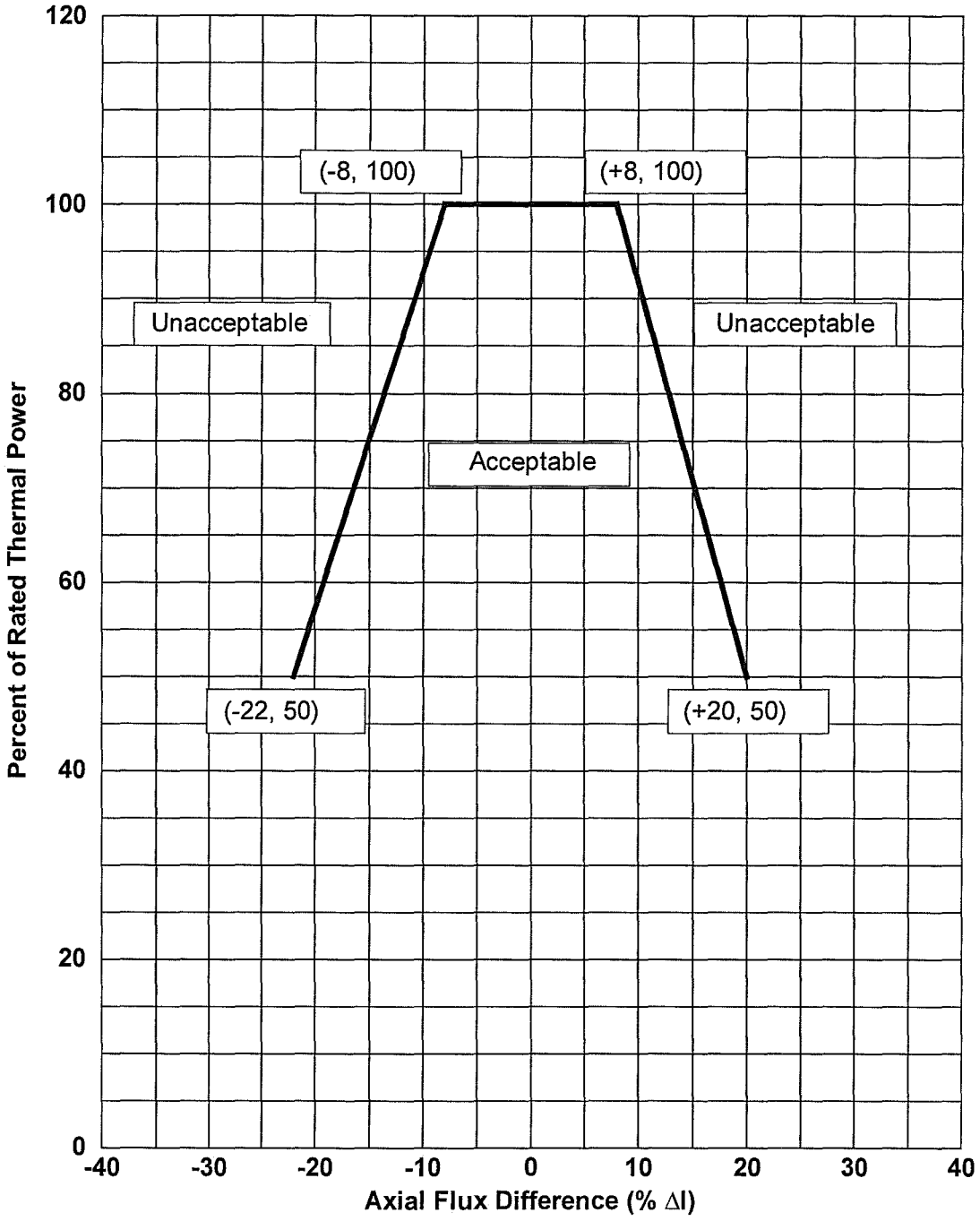


Figure 4. K(z) - Normalized $F_Q(z)$ as a Function of Core Height
V. C. Summer – Cycle 25

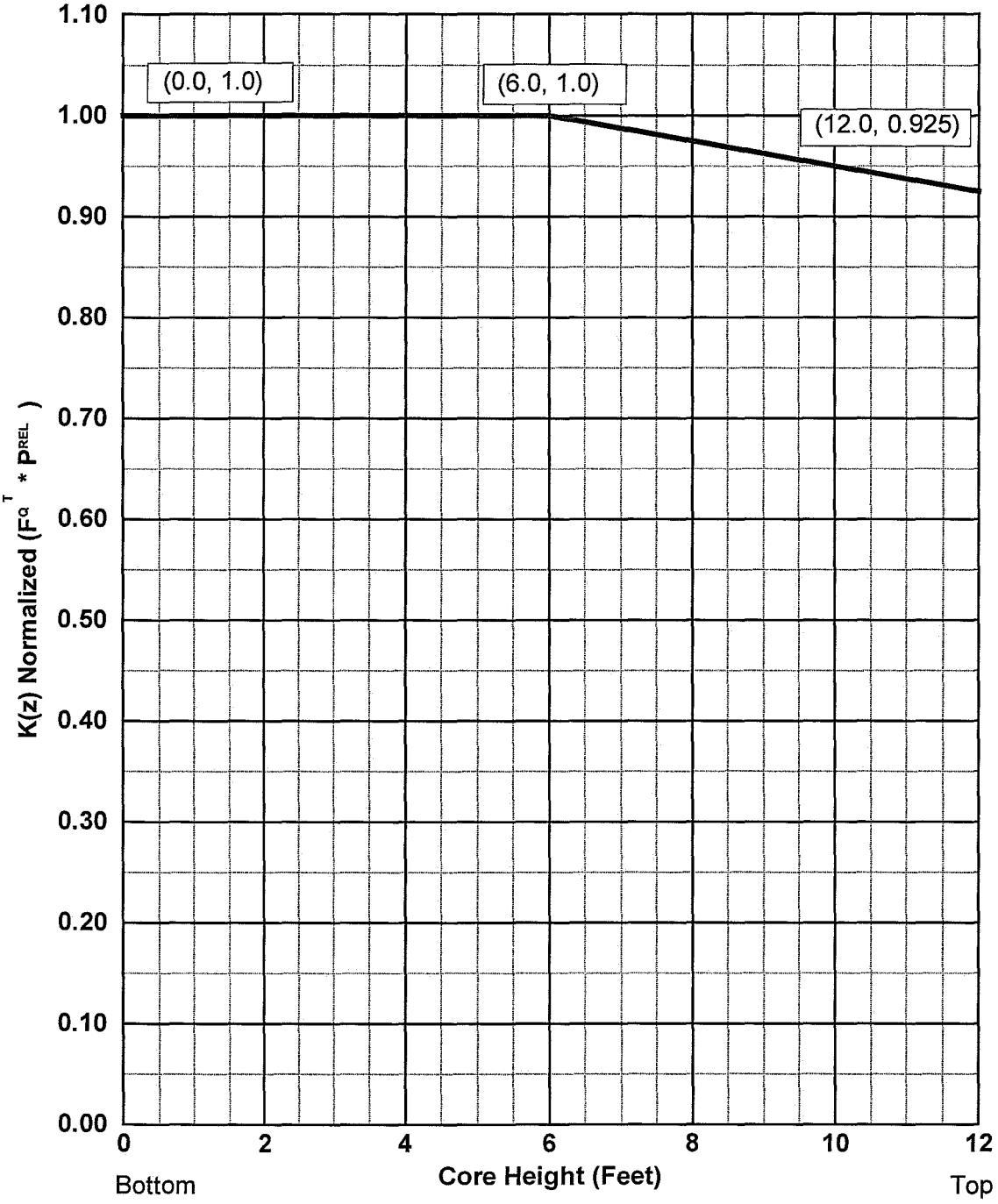


Figure 5. Axial Flux Difference Limit as a Function of Rated Thermal Power (Alternate RAOC)
V. C. Summer - Cycle 25

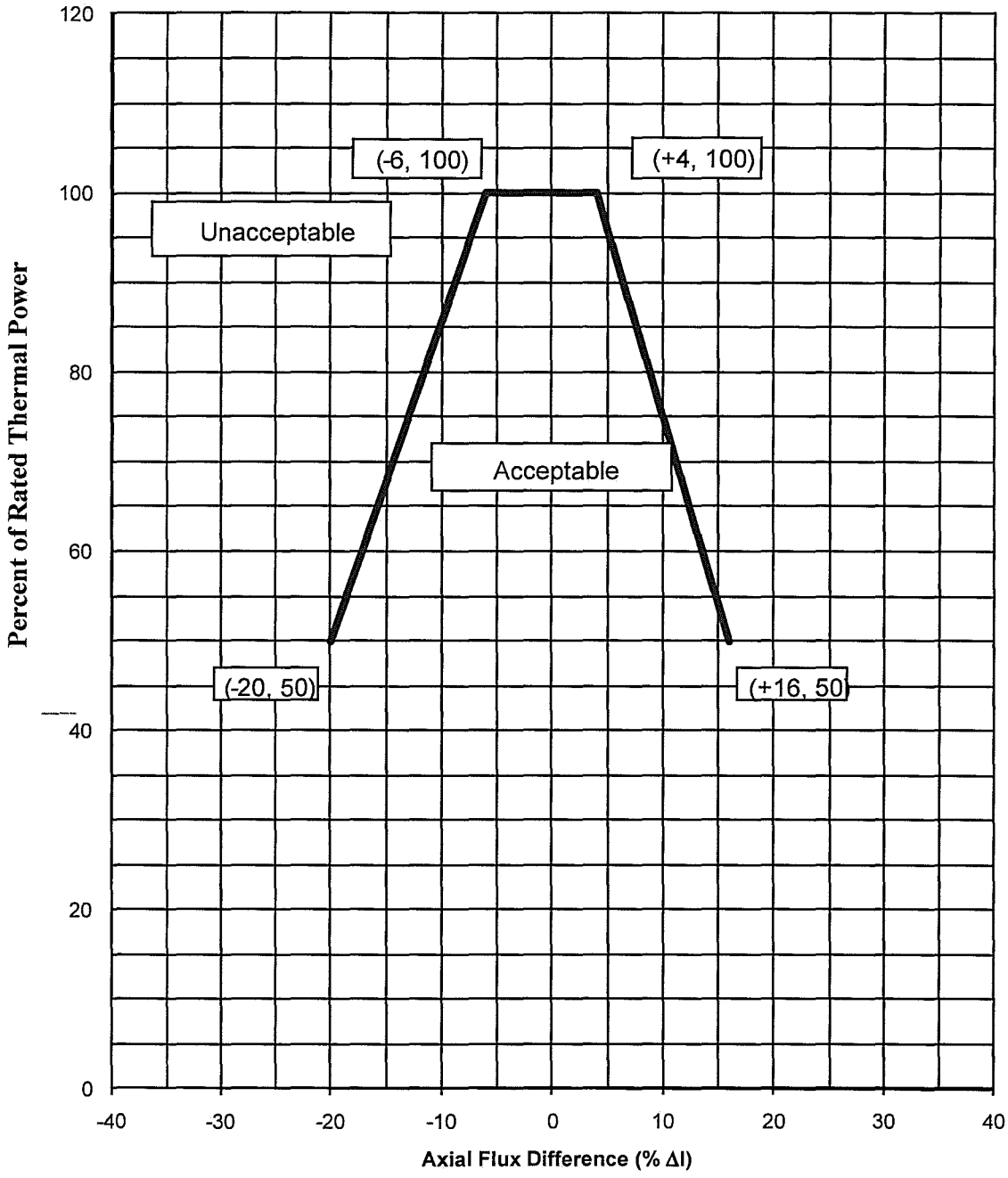


Table 1. RAOC W(z) at 150, 3000, 5000, 8000 MWD/MTU
V. C. Summer – Cycle 25

Core Height (ft)	W(z) 150 MWd/ MTU	W(z) 3000 MWd/ MTU	W(z) 5000 MWd/ MTU	W(z) 8000 MWd/ MTU	Core Height (ft)	W(z) 150 MWd/ MTU	W(z) 3000 MWd/ MTU	W(z) 5000 MWd/ MTU	W(z) 8000 MWd/ MTU
0.000	1.333	1.454	1.393	1.263	6.140	1.136	1.113	1.106	1.114
0.140	1.335	1.455	1.395	1.264	6.279	1.142	1.118	1.110	1.123
0.279	1.337	1.456	1.396	1.266	6.419	1.147	1.122	1.116	1.132
0.419	1.346	1.462	1.401	1.272	6.558	1.152	1.126	1.122	1.140
0.558	1.360	1.472	1.411	1.284	6.698	1.156	1.130	1.127	1.148
0.698	1.362	1.470	1.409	1.285	6.837	1.160	1.133	1.132	1.155
0.837	1.355	1.461	1.401	1.279	6.977	1.163	1.136	1.136	1.162
0.977	1.347	1.450	1.391	1.273	7.116	1.166	1.138	1.140	1.168
1.116	1.338	1.437	1.380	1.265	7.256	1.168	1.139	1.143	1.174
1.256	1.328	1.422	1.366	1.255	7.395	1.170	1.141	1.146	1.179
1.395	1.316	1.406	1.351	1.244	7.535	1.171	1.141	1.148	1.182
1.535	1.303	1.388	1.335	1.232	7.674	1.171	1.140	1.149	1.185
1.674	1.289	1.370	1.318	1.220	7.814	1.170	1.140	1.150	1.188
1.814	1.275	1.350	1.299	1.206	7.953	1.169	1.138	1.151	1.190
1.953	1.260	1.329	1.281	1.193	8.093	1.167	1.136	1.150	1.190
2.093	1.245	1.308	1.261	1.179	8.233	1.164	1.133	1.149	1.191
2.233	1.229	1.287	1.241	1.165	8.372	1.160	1.130	1.147	1.190
2.372	1.213	1.266	1.222	1.150	8.512	1.156	1.126	1.145	1.189
2.512	1.198	1.245	1.203	1.137	8.651	1.151	1.122	1.142	1.186
2.651	1.182	1.225	1.184	1.124	8.791	1.145	1.120	1.140	1.185
2.791	1.168	1.204	1.165	1.110	8.930	1.138	1.119	1.140	1.186
2.930	1.158	1.183	1.147	1.098	9.070	1.131	1.117	1.139	1.190
3.070	1.148	1.173	1.139	1.090	9.209	1.127	1.113	1.135	1.192
3.209	1.142	1.169	1.137	1.087	9.349	1.127	1.113	1.136	1.193
3.349	1.138	1.164	1.134	1.087	9.488	1.129	1.118	1.142	1.194
3.488	1.135	1.159	1.130	1.087	9.628	1.130	1.124	1.149	1.194
3.628	1.130	1.154	1.127	1.087	9.767	1.129	1.129	1.155	1.200
3.767	1.126	1.149	1.123	1.087	9.907	1.129	1.134	1.162	1.208
3.907	1.124	1.143	1.119	1.087	10.046	1.127	1.139	1.168	1.215
4.046	1.122	1.137	1.115	1.087	10.186	1.127	1.143	1.174	1.222
4.186	1.120	1.131	1.111	1.086	10.326	1.131	1.147	1.179	1.228
4.326	1.118	1.125	1.107	1.086	10.465	1.135	1.150	1.183	1.233
4.465	1.115	1.121	1.105	1.085	10.605	1.139	1.152	1.186	1.236
4.605	1.113	1.118	1.104	1.085	10.744	1.142	1.153	1.188	1.239
4.744	1.112	1.114	1.101	1.084	10.884	1.144	1.153	1.188	1.240
4.884	1.111	1.111	1.099	1.084	11.023	1.146	1.151	1.187	1.239
5.023	1.111	1.107	1.097	1.083	11.163	1.146	1.149	1.185	1.238
5.163	1.110	1.104	1.095	1.083	11.302	1.146	1.144	1.181	1.233
5.302	1.109	1.099	1.092	1.084	11.442	1.143	1.138	1.170	1.224
5.442	1.110	1.095	1.089	1.085	11.581	1.126	1.123	1.152	1.208
5.581	1.111	1.095	1.089	1.086	11.721	1.106	1.106	1.134	1.191
5.721	1.116	1.098	1.091	1.089	11.860	1.088	1.089	1.117	1.174
5.860	1.124	1.103	1.096	1.095	12.000	1.068	1.070	1.098	1.154
6.000	1.130	1.108	1.101	1.105					

Table 2. RAOC W(z) at 10000, 14000, 20000 MWD/MTU
V. C. Summer – Cycle 25

Core Height (ft)	W(z) 10000 MWd/ MTU	W(z) 14000 MWd/ MTU	W(z) 20000 MWd/ MTU	Core Height (ft)	W(z) 10000 MWd/ MTU	W(z) 14000 MWd/ MTU	W(z) 20000 MWd/ MTU
0.000	1.226	1.174	1.183	6.140	1.125	1.145	1.192
0.140	1.228	1.177	1.185	6.279	1.135	1.153	1.199
0.279	1.230	1.179	1.188	6.419	1.145	1.161	1.205
0.419	1.237	1.187	1.196	6.558	1.154	1.169	1.211
0.558	1.249	1.202	1.211	6.698	1.162	1.176	1.215
0.698	1.251	1.206	1.216	6.837	1.170	1.182	1.219
0.837	1.247	1.203	1.213	6.977	1.178	1.187	1.222
0.977	1.242	1.200	1.210	7.116	1.184	1.191	1.223
1.116	1.235	1.195	1.204	7.256	1.191	1.196	1.225
1.256	1.226	1.189	1.197	7.395	1.197	1.200	1.225
1.395	1.217	1.181	1.189	7.535	1.200	1.201	1.223
1.535	1.206	1.173	1.181	7.674	1.203	1.202	1.220
1.674	1.195	1.165	1.172	7.814	1.206	1.202	1.217
1.814	1.183	1.155	1.162	7.953	1.208	1.201	1.212
1.953	1.171	1.146	1.153	8.093	1.209	1.200	1.207
2.093	1.159	1.137	1.143	8.233	1.209	1.198	1.201
2.233	1.146	1.127	1.133	8.372	1.208	1.195	1.195
2.372	1.133	1.117	1.121	8.512	1.206	1.191	1.195
2.512	1.120	1.107	1.111	8.651	1.203	1.187	1.197
2.651	1.108	1.097	1.099	8.791	1.202	1.188	1.198
2.791	1.096	1.087	1.089	8.930	1.202	1.193	1.198
2.930	1.085	1.078	1.083	9.070	1.208	1.199	1.198
3.070	1.082	1.076	1.081	9.209	1.213	1.202	1.195
3.209	1.081	1.077	1.081	9.349	1.216	1.205	1.191
3.349	1.080	1.078	1.085	9.488	1.219	1.208	1.186
3.488	1.079	1.079	1.091	9.628	1.221	1.210	1.180
3.628	1.078	1.080	1.098	9.767	1.221	1.213	1.179
3.767	1.077	1.081	1.105	9.907	1.221	1.219	1.180
3.907	1.076	1.082	1.112	10.046	1.226	1.226	1.182
4.046	1.074	1.082	1.118	10.186	1.232	1.232	1.187
4.186	1.072	1.082	1.124	10.326	1.238	1.238	1.192
4.326	1.071	1.083	1.129	10.465	1.242	1.243	1.196
4.465	1.073	1.085	1.134	10.605	1.245	1.247	1.200
4.605	1.075	1.088	1.139	10.744	1.248	1.252	1.203
4.744	1.077	1.091	1.143	10.884	1.248	1.255	1.206
4.884	1.078	1.094	1.147	11.023	1.247	1.255	1.206
5.023	1.080	1.097	1.151	11.163	1.245	1.255	1.205
5.163	1.082	1.100	1.154	11.302	1.240	1.254	1.202
5.302	1.084	1.102	1.156	11.442	1.233	1.250	1.198
5.442	1.085	1.104	1.157	11.581	1.217	1.233	1.178
5.581	1.087	1.109	1.160	11.721	1.200	1.213	1.157
5.721	1.094	1.117	1.166	11.860	1.182	1.194	1.137
5.860	1.105	1.127	1.176	12.000	1.161	1.172	1.114
6.000	1.115	1.136	1.184				

Table 3. RAOC FQ Margin Decrease in Excess of 2% Per 31 EFPD V. C. Summer - Cycle 25

Cycle Burnup (MWD/MTU)	Maximum Decrease in FQ Margin
580	1.0200
794	1.0289
1009	1.0340
1224	1.0327
1439	1.0329
1654	1.0331
1868	1.0337
2083	1.0347
2298	1.0359
2513	1.0367
2728	1.0368
2942	1.0359
3157	1.0338
3372	1.0304
3587	1.0261
3801	1.0215
4016	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 4. Alternate RAOC W(z) at 150, 3000, 5000, 8000 MWD/MTU
V. C. Summer – Cycle 25

Core Height (ft)	W(z) 150 MWd/ MTU	W(z) 3000 MWd/ MTU	W(z) 5000 MWd/ MTU	W(z) 8000 MWd/ MTU	Core Height (ft)	W(z) 150 MWd/ MTU	W(z) 3000 MWd/ MTU	W(z) 5000 MWd/ MTU	W(z) 8000 MWd/ MTU
0.000	1.268	1.387	1.357	1.238	6.140	1.122	1.103	1.101	1.104
0.140	1.270	1.389	1.359	1.240	6.279	1.124	1.104	1.103	1.109
0.279	1.272	1.390	1.360	1.242	6.419	1.126	1.105	1.106	1.113
0.419	1.281	1.396	1.365	1.249	6.558	1.128	1.106	1.108	1.118
0.558	1.295	1.406	1.375	1.260	6.698	1.129	1.106	1.110	1.122
0.698	1.298	1.405	1.374	1.261	6.837	1.130	1.106	1.111	1.126
0.837	1.292	1.397	1.366	1.256	6.977	1.130	1.106	1.112	1.129
0.977	1.285	1.387	1.357	1.250	7.116	1.130	1.105	1.113	1.132
1.116	1.277	1.375	1.346	1.242	7.256	1.129	1.104	1.113	1.134
1.256	1.268	1.362	1.333	1.232	7.395	1.128	1.103	1.113	1.136
1.395	1.257	1.347	1.319	1.221	7.535	1.126	1.100	1.111	1.137
1.535	1.246	1.331	1.304	1.210	7.674	1.124	1.098	1.110	1.137
1.674	1.234	1.314	1.287	1.197	7.814	1.121	1.094	1.108	1.137
1.814	1.222	1.296	1.270	1.184	7.953	1.118	1.091	1.105	1.136
1.953	1.208	1.277	1.252	1.170	8.093	1.113	1.087	1.102	1.134
2.093	1.195	1.258	1.234	1.157	8.233	1.109	1.082	1.099	1.132
2.233	1.181	1.238	1.215	1.142	8.372	1.104	1.077	1.095	1.130
2.372	1.167	1.219	1.197	1.128	8.512	1.098	1.072	1.091	1.127
2.512	1.154	1.201	1.179	1.115	8.651	1.091	1.066	1.085	1.123
2.651	1.140	1.182	1.161	1.101	8.791	1.086	1.063	1.083	1.118
2.791	1.129	1.164	1.143	1.088	8.930	1.084	1.062	1.083	1.115
2.930	1.126	1.148	1.126	1.078	9.070	1.083	1.064	1.086	1.121
3.070	1.123	1.144	1.120	1.076	9.209	1.082	1.066	1.089	1.125
3.209	1.120	1.143	1.119	1.076	9.349	1.080	1.068	1.092	1.129
3.349	1.117	1.140	1.117	1.075	9.488	1.078	1.069	1.095	1.133
3.488	1.114	1.138	1.116	1.074	9.628	1.079	1.070	1.097	1.136
3.628	1.111	1.136	1.115	1.073	9.767	1.082	1.073	1.098	1.139
3.767	1.109	1.133	1.113	1.072	9.907	1.084	1.079	1.100	1.141
3.907	1.110	1.130	1.112	1.071	10.046	1.087	1.084	1.106	1.143
4.046	1.111	1.127	1.110	1.071	10.186	1.089	1.089	1.112	1.145
4.186	1.111	1.124	1.107	1.072	10.326	1.093	1.094	1.117	1.148
4.326	1.112	1.121	1.105	1.074	10.465	1.097	1.099	1.122	1.150
4.465	1.112	1.117	1.103	1.075	10.605	1.100	1.102	1.127	1.154
4.605	1.112	1.113	1.100	1.077	10.744	1.103	1.106	1.131	1.158
4.744	1.112	1.109	1.097	1.079	10.884	1.105	1.109	1.134	1.161
4.884	1.111	1.105	1.094	1.080	11.023	1.106	1.110	1.136	1.163
5.023	1.111	1.101	1.091	1.082	11.163	1.107	1.111	1.137	1.163
5.163	1.110	1.096	1.088	1.083	11.302	1.106	1.111	1.137	1.162
5.302	1.109	1.093	1.086	1.084	11.442	1.104	1.108	1.135	1.159
5.442	1.110	1.094	1.086	1.085	11.581	1.087	1.095	1.121	1.145
5.581	1.111	1.095	1.088	1.086	11.721	1.068	1.079	1.105	1.129
5.721	1.114	1.097	1.091	1.088	11.860	1.051	1.064	1.089	1.112
5.860	1.116	1.099	1.094	1.092	12.000	1.031	1.046	1.070	1.092
6.000	1.119	1.101	1.098	1.098					

Table 5. Alternate RAOC W(z) at 10000, 14000, 20000 MWD/MTU
V. C. Summer – Cycle 25

Core Height (ft)	W(z) 10000 MWd/ MTU	W(z) 14000 MWd/ MTU	W(z) 20000 MWd/ MTU	Core Height (ft)	W(z) 10000 MWd/ MTU	W(z) 14000 MWd/ MTU	W(z) 20000 MWd/ MTU
0.000	1.167	1.146	1.183	6.140	1.110	1.134	1.181
0.140	1.169	1.149	1.185	6.279	1.116	1.140	1.185
0.279	1.171	1.151	1.188	6.419	1.122	1.146	1.189
0.419	1.179	1.160	1.196	6.558	1.127	1.151	1.192
0.558	1.191	1.174	1.211	6.698	1.131	1.156	1.195
0.698	1.193	1.178	1.216	6.837	1.136	1.160	1.196
0.837	1.190	1.176	1.213	6.977	1.139	1.163	1.197
0.977	1.185	1.173	1.210	7.116	1.142	1.166	1.196
1.116	1.179	1.169	1.204	7.256	1.145	1.169	1.196
1.256	1.172	1.162	1.197	7.395	1.148	1.171	1.194
1.395	1.163	1.155	1.189	7.535	1.149	1.170	1.190
1.535	1.154	1.148	1.181	7.674	1.149	1.170	1.186
1.674	1.144	1.140	1.172	7.814	1.149	1.169	1.181
1.814	1.133	1.131	1.162	7.953	1.148	1.168	1.175
1.953	1.122	1.122	1.153	8.093	1.147	1.165	1.168
2.093	1.111	1.114	1.143	8.233	1.145	1.162	1.161
2.233	1.100	1.104	1.133	8.372	1.142	1.158	1.154
2.372	1.088	1.094	1.121	8.512	1.139	1.154	1.150
2.512	1.079	1.085	1.110	8.651	1.135	1.148	1.150
2.651	1.071	1.076	1.100	8.791	1.129	1.147	1.150
2.791	1.062	1.067	1.089	8.930	1.126	1.148	1.149
2.930	1.054	1.060	1.079	9.070	1.132	1.149	1.148
3.070	1.052	1.059	1.067	9.209	1.139	1.148	1.145
3.209	1.053	1.061	1.064	9.349	1.145	1.146	1.139
3.349	1.055	1.062	1.068	9.488	1.151	1.145	1.135
3.488	1.057	1.064	1.073	9.628	1.157	1.148	1.135
3.628	1.059	1.065	1.079	9.767	1.163	1.153	1.137
3.767	1.062	1.067	1.084	9.907	1.169	1.160	1.141
3.907	1.065	1.071	1.090	10.046	1.174	1.165	1.144
4.046	1.067	1.074	1.094	10.186	1.179	1.170	1.147
4.186	1.068	1.078	1.099	10.326	1.183	1.175	1.153
4.326	1.071	1.081	1.106	10.465	1.187	1.178	1.158
4.465	1.073	1.085	1.114	10.605	1.189	1.181	1.161
4.605	1.075	1.088	1.121	10.744	1.191	1.183	1.166
4.744	1.077	1.091	1.128	10.884	1.190	1.183	1.169
4.884	1.078	1.094	1.134	11.023	1.188	1.182	1.169
5.023	1.080	1.097	1.140	11.163	1.186	1.183	1.169
5.163	1.082	1.100	1.145	11.302	1.181	1.182	1.167
5.302	1.084	1.102	1.150	11.442	1.173	1.180	1.162
5.442	1.085	1.104	1.154	11.581	1.157	1.164	1.143
5.581	1.087	1.107	1.158	11.721	1.140	1.146	1.123
5.721	1.091	1.112	1.163	11.860	1.122	1.128	1.104
5.860	1.098	1.120	1.169	12.000	1.102	1.108	1.082
6.000	1.104	1.127	1.175				

Table 6. Alternate RAOC FQ Margin Decrease In Excess of 2% Per 31 EFPD V. C. Summer - Cycle 25

Cycle Burnup (MWD/MTU)	Maximum Decrease in FQ Margin
365	1.0200
580	1.0220
794	1.0337
1009	1.0358
1224	1.0372
1439	1.0385
1654	1.0395
1868	1.0407
2083	1.0421
2298	1.0437
2513	1.0445
2728	1.0433
2942	1.0412
3157	1.0379
3372	1.0334
3587	1.0278
3801	1.0221
4016	1.0200
11319	1.0200
11534	1.0206
11749	1.0216
11964	1.0228
12178	1.0242
12393	1.0243
12608	1.0228
12823	1.0212
13038	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 7. Baseload W(z) at 150, 3000, 5000, 8000 MWD/MTU
V. C. Summer – Cycle 25

Core Height (ft)	W(z) 150 MWd/ MTU	W(z) 3000 MWd/ MTU	W(z) 5000 MWd/ MTU	W(z) 8000 MWd/ MTU	Core Height (ft)	W(z) 150 MWd/ MTU	W(z) 3000 MWd/ MTU	W(z) 5000 MWd/ MTU	W(z) 8000 MWd/ MTU
0.000	1.124	1.111	1.108	1.112	6.140	1.052	1.054	1.053	1.052
0.140	1.125	1.112	1.108	1.112	6.279	1.052	1.052	1.051	1.052
0.279	1.125	1.112	1.109	1.113	6.419	1.052	1.050	1.050	1.051
0.419	1.126	1.113	1.110	1.114	6.558	1.053	1.050	1.050	1.050
0.558	1.127	1.115	1.112	1.115	6.698	1.056	1.049	1.049	1.049
0.698	1.127	1.115	1.112	1.116	6.837	1.058	1.049	1.048	1.050
0.837	1.126	1.115	1.112	1.116	6.977	1.060	1.049	1.048	1.052
0.977	1.125	1.115	1.112	1.116	7.116	1.062	1.050	1.049	1.054
1.116	1.124	1.114	1.112	1.115	7.256	1.065	1.053	1.052	1.057
1.256	1.122	1.114	1.111	1.115	7.395	1.067	1.056	1.055	1.059
1.395	1.121	1.113	1.111	1.114	7.535	1.069	1.058	1.057	1.061
1.535	1.119	1.112	1.110	1.113	7.674	1.071	1.060	1.059	1.062
1.674	1.117	1.111	1.109	1.112	7.814	1.072	1.062	1.061	1.064
1.814	1.115	1.110	1.108	1.111	7.953	1.074	1.064	1.063	1.066
1.953	1.113	1.109	1.107	1.110	8.093	1.076	1.066	1.065	1.068
2.093	1.110	1.107	1.106	1.108	8.233	1.077	1.068	1.067	1.069
2.233	1.107	1.106	1.104	1.106	8.372	1.079	1.070	1.069	1.071
2.372	1.105	1.104	1.103	1.105	8.512	1.080	1.072	1.071	1.072
2.512	1.102	1.103	1.102	1.103	8.651	1.081	1.074	1.072	1.074
2.651	1.099	1.101	1.100	1.100	8.791	1.083	1.076	1.074	1.075
2.791	1.096	1.099	1.098	1.098	8.930	1.084	1.078	1.076	1.077
2.930	1.093	1.097	1.096	1.096	9.070	1.085	1.080	1.078	1.078
3.070	1.090	1.095	1.094	1.093	9.209	1.086	1.081	1.079	1.079
3.209	1.086	1.092	1.092	1.090	9.349	1.087	1.083	1.081	1.080
3.349	1.083	1.090	1.090	1.088	9.488	1.088	1.084	1.082	1.081
3.488	1.081	1.087	1.088	1.085	9.628	1.089	1.086	1.084	1.083
3.628	1.079	1.085	1.085	1.082	9.767	1.090	1.087	1.085	1.084
3.767	1.078	1.083	1.083	1.080	9.907	1.091	1.089	1.087	1.085
3.907	1.076	1.081	1.081	1.079	10.046	1.091	1.090	1.088	1.086
4.046	1.075	1.079	1.079	1.077	10.186	1.092	1.091	1.089	1.087
4.186	1.073	1.078	1.077	1.076	10.326	1.093	1.093	1.091	1.088
4.326	1.072	1.076	1.075	1.074	10.465	1.094	1.094	1.092	1.089
4.465	1.070	1.075	1.074	1.073	10.605	1.095	1.095	1.093	1.090
4.605	1.068	1.073	1.072	1.071	10.744	1.096	1.097	1.095	1.091
4.744	1.067	1.072	1.071	1.069	10.884	1.096	1.098	1.096	1.092
4.884	1.065	1.070	1.069	1.068	11.023	1.097	1.099	1.097	1.093
5.023	1.063	1.068	1.068	1.066	11.163	1.097	1.100	1.098	1.094
5.163	1.062	1.067	1.066	1.064	11.302	1.098	1.100	1.098	1.095
5.302	1.060	1.065	1.064	1.062	11.442	1.098	1.101	1.099	1.095
5.442	1.058	1.063	1.062	1.060	11.581	1.098	1.101	1.099	1.095
5.581	1.056	1.061	1.060	1.057	11.721	1.097	1.100	1.099	1.095
5.721	1.055	1.059	1.059	1.055	11.860	1.097	1.100	1.099	1.095
5.860	1.053	1.058	1.057	1.053	12.000	1.097	1.101	1.099	1.095
6.000	1.052	1.056	1.055	1.053					

Table 8. Baseload W(z) at 10000, 14000, 20000 MWD/MTU
V. C. Summer – Cycle 25

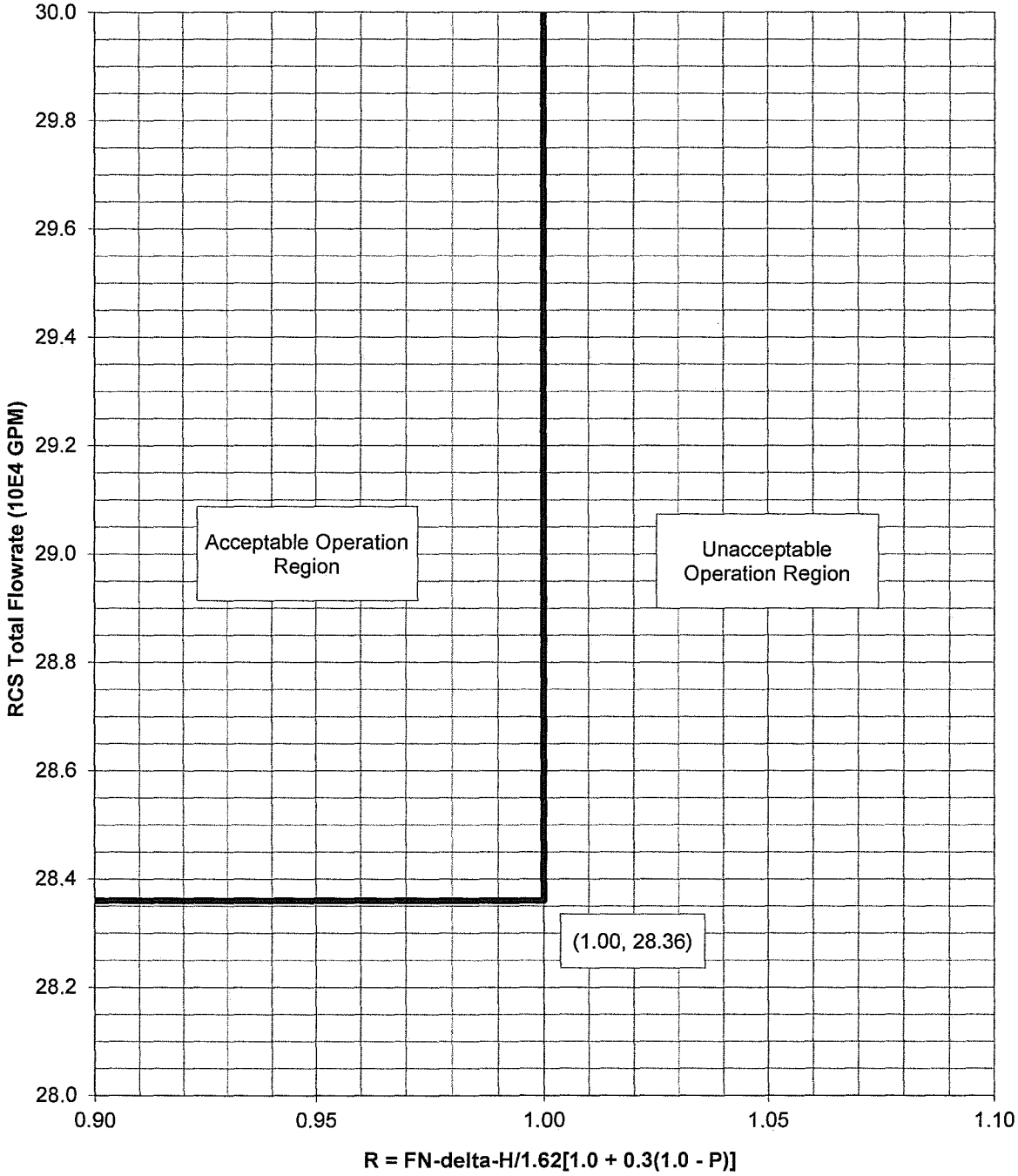
Core Height (ft)	W(z) 10000 MWd/ MTU	W(z) 14000 MWd/ MTU	W(z) 20000 MWd/ MTU	Core Height (ft)	W(z) 10000 MWd/ MTU	W(z) 14000 MWd/ MTU	W(z) 20000 MWd/ MTU
0.000	1.117	1.128	1.154	6.140	1.053	1.054	1.067
0.140	1.118	1.128	1.155	6.279	1.052	1.055	1.070
0.279	1.118	1.129	1.155	6.419	1.051	1.057	1.071
0.419	1.120	1.130	1.156	6.558	1.051	1.059	1.073
0.558	1.121	1.131	1.157	6.698	1.052	1.061	1.075
0.698	1.121	1.131	1.157	6.837	1.054	1.063	1.076
0.837	1.121	1.131	1.156	6.977	1.057	1.065	1.077
0.977	1.121	1.131	1.155	7.116	1.059	1.067	1.078
1.116	1.121	1.130	1.153	7.256	1.061	1.068	1.079
1.256	1.120	1.129	1.151	7.395	1.063	1.070	1.079
1.395	1.119	1.128	1.148	7.535	1.064	1.071	1.080
1.535	1.118	1.126	1.145	7.674	1.066	1.072	1.080
1.674	1.117	1.124	1.142	7.814	1.067	1.073	1.080
1.814	1.115	1.122	1.138	7.953	1.069	1.074	1.080
1.953	1.113	1.119	1.134	8.093	1.070	1.075	1.080
2.093	1.111	1.117	1.129	8.233	1.072	1.076	1.080
2.233	1.109	1.114	1.124	8.372	1.073	1.077	1.079
2.372	1.107	1.111	1.119	8.512	1.074	1.077	1.079
2.512	1.104	1.107	1.113	8.651	1.076	1.078	1.078
2.651	1.102	1.104	1.108	8.791	1.077	1.078	1.078
2.791	1.099	1.100	1.102	8.930	1.078	1.079	1.077
2.930	1.096	1.096	1.097	9.070	1.079	1.079	1.077
3.070	1.093	1.092	1.090	9.209	1.080	1.080	1.077
3.209	1.090	1.088	1.086	9.349	1.081	1.080	1.078
3.349	1.086	1.084	1.083	9.488	1.082	1.080	1.082
3.488	1.083	1.081	1.080	9.628	1.082	1.080	1.085
3.628	1.081	1.080	1.078	9.767	1.083	1.081	1.087
3.767	1.079	1.079	1.076	9.907	1.084	1.081	1.090
3.907	1.078	1.077	1.073	10.046	1.085	1.081	1.093
4.046	1.076	1.076	1.071	10.186	1.086	1.082	1.095
4.186	1.075	1.075	1.069	10.326	1.087	1.084	1.097
4.326	1.074	1.073	1.068	10.465	1.088	1.085	1.099
4.465	1.073	1.072	1.067	10.605	1.088	1.086	1.100
4.605	1.071	1.070	1.066	10.744	1.089	1.087	1.102
4.744	1.070	1.069	1.064	10.884	1.090	1.087	1.103
4.884	1.068	1.067	1.063	11.023	1.091	1.088	1.103
5.023	1.066	1.065	1.063	11.163	1.092	1.088	1.104
5.163	1.065	1.063	1.063	11.302	1.092	1.088	1.104
5.302	1.063	1.061	1.062	11.442	1.093	1.088	1.107
5.442	1.061	1.059	1.062	11.581	1.093	1.094	1.118
5.581	1.059	1.058	1.061	11.721	1.092	1.102	1.124
5.721	1.057	1.057	1.061	11.860	1.092	1.104	1.123
5.860	1.055	1.056	1.063	12.000	1.093	1.104	1.117
6.000	1.054	1.055	1.065				

Table 9. Baseload FQ Margin Decrease In Excess of 2% Per 31 EFPD V. C. Summer - Cycle 25

Cycle Burnup (MWD/MTU)	Maximum Decrease in FQ Margin
150	1.0228
365	1.0274
580	1.0302
794	1.0303
1009	1.0265
1224	1.0234
1439	1.0226
1654	1.0213
1868	1.0214
2083	1.0224
2298	1.0238
2513	1.0250
2728	1.0255
2942	1.0250
3157	1.0232
3372	1.0200
8097	1.0200
8312	1.0207
8527	1.0229
8742	1.0218
8957	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 6. RCS Total Flowrate vs. R for Three Loop Operation
V. C. Summer - Cycle 25



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