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November 29, 2000

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Docket No.: 50-315

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

Donald C. Cook Nuclear Plant Unit 1
CORE OPERATING LIMITS REPORT

Indiana Michigan Power Company, the licensee for Donald C. Cook Nuclear Plant Unit 1, is submitting the Core Operating Limits Report (COLR) for Unit 1, Cycle 17, in accordance with Technical Specification (T/S) 6.9.1.9.4. The Unit 1 COLR is updated to reflect the recently loaded Cycle 17 core. The core operating limits have been determined in accordance with the analytical methods specified in T/S 6.9.1.9.2.

The Unit 1 Cycle 17 COLR is provided as an attachment to this letter.

Should you have any questions, please contact Randall Crane, Acting Manager of Regulatory Licensing, at (616) 697-5020.

Sincerely,

A handwritten signature in black ink, appearing to read "Wayne J. Kropp", is written over a printed name.

Wayne J. Kropp
Director of Regulatory Affairs

/dmb

Attachment

ADD1

c: J. E. Dyer
MDEQ – DW & RPD
NRC Resident Inspector
R. Whale

**Donald C. Cook Nuclear Plant
Unit 1 Cycle 17**

**Core Operating Limits Report
Revision 0**

1.0 CORE OPERATING LIMITS REPORT

This Core Operating Limits Report (COLR) for Donald C. Cook Nuclear Plant Unit 1 Cycle 17 design has been prepared in accordance with the requirements of Technical Specification 6.9.1.9.

The Technical Specifications affected by this report are listed below:

3/4.1.1.4	Moderator Temperature Coefficient
3/4.1.3.1	Movable Control Assemblies Group Height
3/4.1.3.3	Rod Drop Time
3/4.1.3.4	Shutdown Rod Insertion Limits
3/4.1.3.5	Control Rod Insertion Limits
3/4.2.1	Axial Flux Difference (AFD)
3/4.2.2	Heat Flux Hot Channel Factor ($F_Q(Z)$)
3/4.2.3	Nuclear Enthalpy Rise Hot Channel Factor ($F_{\Delta H}^N$)
3/4.2.6	Allowable Power Level (APL)

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 Specifications 6.9.1.11.

2.1 Moderator Temperature Coefficient (Specification 3/4.1.1.4)

2.1.1 The Moderator Temperature Coefficient (MTC) limits are:

The BOL/ARO-MTC shall be less positive than the value given in Figure 1.

The EOL/ARO/RTP-MTC shall be less negative than $-4.54 \times 10^{-4} \Delta k/k/^\circ F$.

This limit is based on a T_{avg} program with HFP T_{avg} of 554.0 - 558.0 °F.

Where: ARO stands for All Rods Out
BOL stands for Beginning of Cycle Life
EOL stands for End of Cycle Life
RTP stands for Rated Thermal Power
HFP stands for Hot Full Thermal Power

2.1.2 The MTC Surveillance limit is:

The 300 ppm/ARO/RTP-MTC should be less negative than or equal to $-3.84 \times 10^{-4} \Delta k/k/^\circ F$ at a vessel average temperature of 554.0 – 558.0 °F.

2.2 Rod Drop Time Drop Height (Specification 3/4.1.3.3)

2.2.1 All rods shall be dropped from 225 steps.

2.3 Shutdown Rod Insertion Limit (Specification 3/4.1.3.4)

2.3.1 The shutdown rods shall be withdrawn to 225 steps.

2.4 Control Rod Insertion Limits (Specifications 3/4.1.3.5 and 3/4.1.3.1)

2.4.1 The control rod banks shall be limited in physical insertion as shown in Figure 2.

2.4.2 Successive Control Banks shall overlap by 97 steps. The sequence for Control Bank withdrawal shall be Control Bank A, Control Bank B, Control Bank C and Control Bank D.

2.5 Axial Flux Difference (AFD) (Specification 3/4.2.1)

2.5.1 The Allowable Operation Limits are provided in Figure 3.

2.5.2 The AFD target band during base load operations is +3%, -3% (not applicable for this cycle).

2.5.3 The AFD target band is +5%, -5% for a cycle average accumulated burnup ≥ 0.0 MWD/MTU.

2.6 Heat Flux Hot Channel Factor - $F_Q(Z)$ (Specification 3.2.2)

$$F_Q(Z) \leq \frac{CF_Q}{P} * K(Z) \quad \text{for } P > 0.5$$

$$F_Q(Z) \leq 2 * CF_Q * K(Z) \quad \text{for } P \leq 0.5$$

where: $P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$

2.6.1 $CF_Q = 2.15$ for Westinghouse Fuel.

2.6.2 $K(Z)$ is provided in Figure 4 for Westinghouse Fuel.

2.7 Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}^N$ (Specification 3/4.2.3)

$$F_{\Delta H}^N \leq CF_{\Delta H} * (1 + PF_{\Delta H} *(1-P))$$

where: $P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$

2.7.1 $CF_{\Delta H} = 1.49$ for Westinghouse Fuel.

2.7.2 $PF_{\Delta H} = 0.3$

2.8 Allowable Power Level - APL (Specification 3.2.6)

$$APL = \min \text{ over } Z \text{ for } \frac{CF_Q * K(Z)}{F_Q(Z) * V(Z) * F_P}$$

2.8.1 $V(Z)$ is provided in Table 1 for $\pm 5\%$ AFD target band

2.8.2 CF_Q and $K(Z)$ are provided in COLR Sections 2.6.1 and 2.6.2, respectively

2.8.3 The following table shows F_P values which correspond to F_Q margin decreases that are greater than 2% per 31 Effective Full Power Days (EFPD). These values shall be used to adjust APL as per Surveillance Requirement 4.2.6.2. A 1.02 penalty factor shall be used at all cycle burnups that are outside this range when F_Q is increasing.

Burnup (MWD/MTU)	Penalty Multiplier
1713	1.0200
1855	1.0211
1997	1.0250
2139	1.0283
2282	1.0308
2424	1.0327
2566	1.0338
2708	1.0343
2850	1.0342
2992	1.0335
3134	1.0324
3276	1.0309
3418	1.0291
3560	1.0271
3703	1.0250
3845	1.0229
3987	1.0211
4129	1.0200

The burnup range only covers where F_P exceeds 1.02. Linear interpolation is adequate for intermediate cycle burnups.

FIGURE 1

MODERATOR TEMPERATURE COEFFICIENT (MTC)

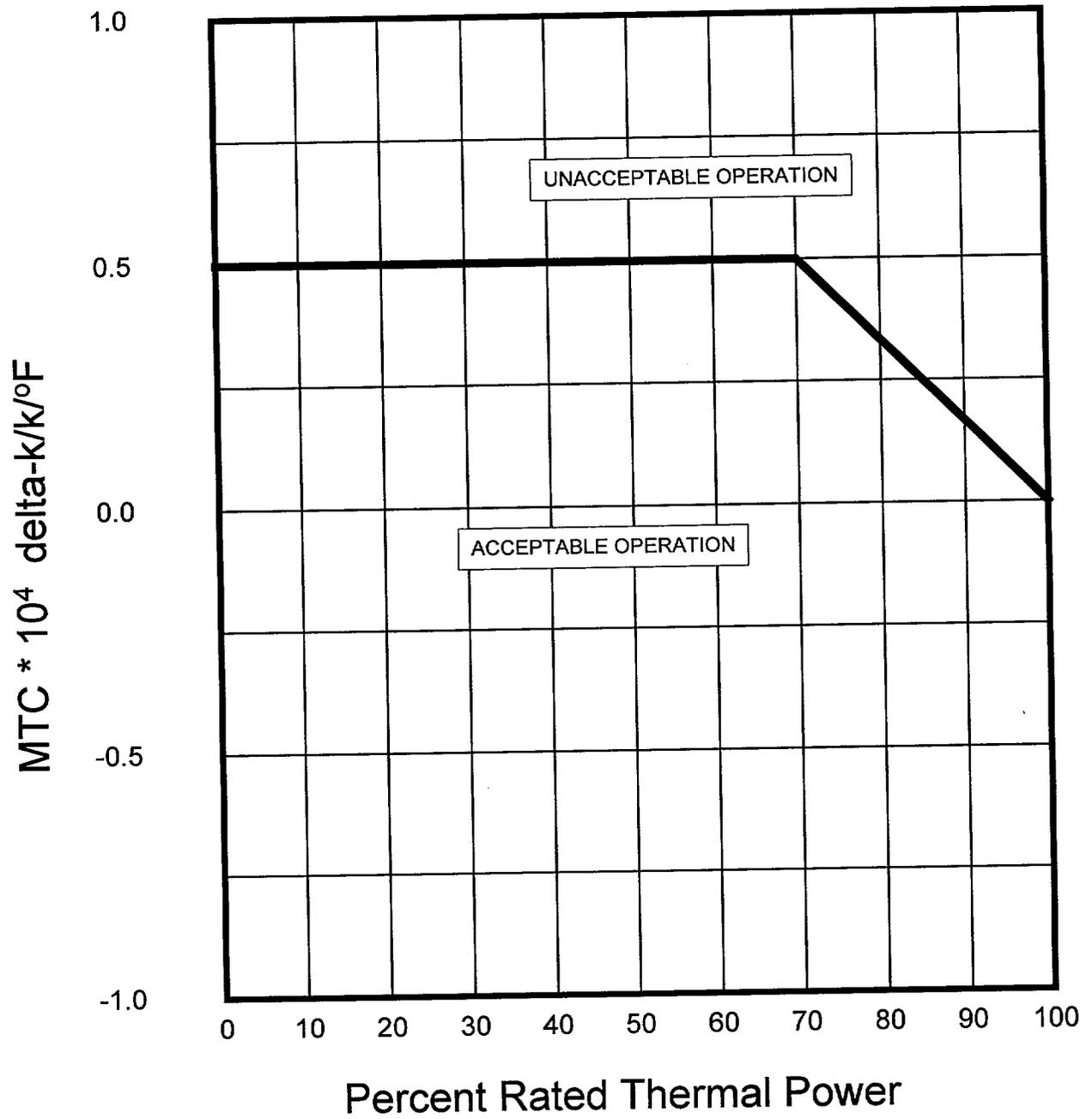


FIGURE 2

**ROD BANK INSERTION LIMITS VERSUS THERMAL POWER
(FOUR LOOP OPERATION)**

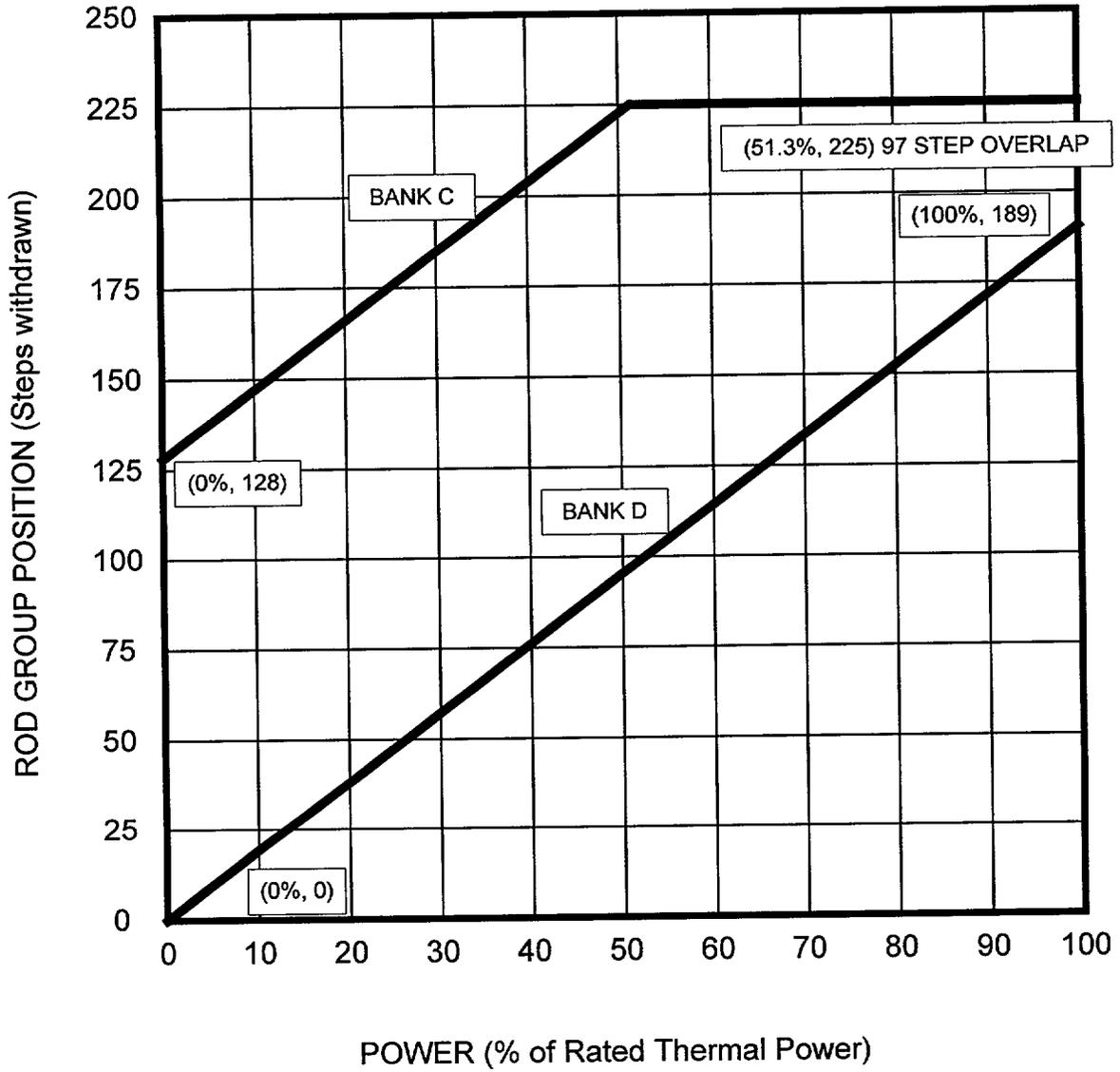


FIGURE 3

AXIAL FLUX DIFFERENCE AS A FUNCTION OF RATED THERMAL POWER

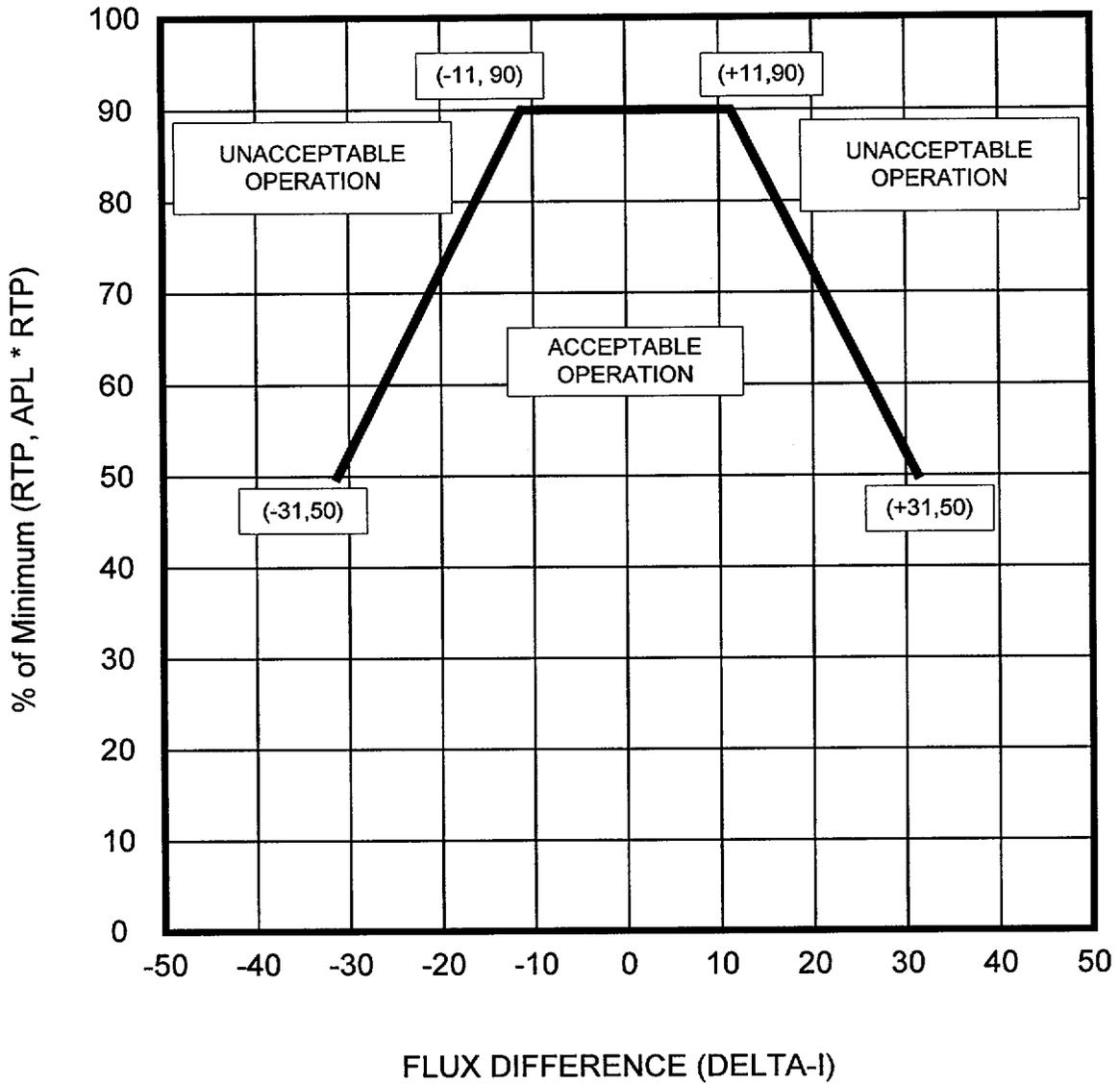


FIGURE 4

**K(Z) - NORMALIZED $F_0(Z)$ AS A FUNCTION OF CORE HEIGHT
(FOR WESTINGHOUSE FUEL)**

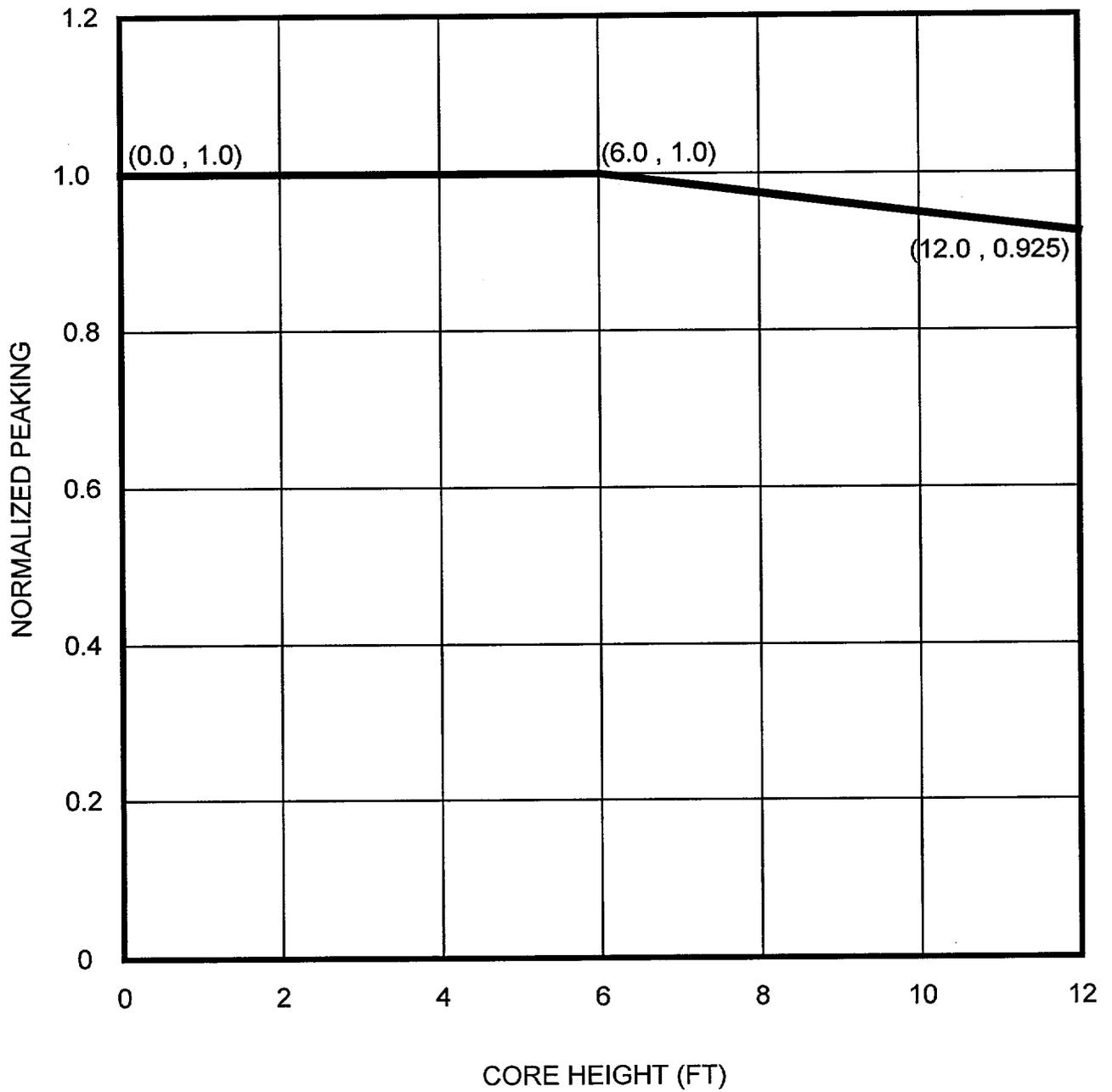


TABLE 1

DONALD C. COOK UNIT 1 CYCLE 17

V(Z) FUNCTION

PT	Height (FT.)	Burnup (MWD/MTU)												
		150.	1000.	2000.	4000.	6000.	8000.	10000.	12000.	14000.	16000.	18000.	19442.	
1	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	0.2000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
3	0.4000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.6000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	0.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	1.2000	1.1043	1.1041	1.1040	1.1044	1.1057	1.1077	1.1105	1.1142	1.1187	1.1240	1.1290	1.1323	1.1323
8	1.4000	1.1033	1.1032	1.1033	1.1039	1.1052	1.1071	1.1098	1.1132	1.1174	1.1222	1.1267	1.1298	1.1298
9	1.6000	1.1021	1.1021	1.1023	1.1031	1.1044	1.1063	1.1088	1.1120	1.1157	1.1200	1.1240	1.1268	1.1268
10	1.8000	1.1006	1.1008	1.1011	1.1020	1.1033	1.1052	1.1074	1.1102	1.1135	1.1172	1.1207	1.1231	1.1231
11	2.0000	1.0989	1.0991	1.0995	1.1006	1.1020	1.1037	1.1057	1.1081	1.1108	1.1139	1.1167	1.1187	1.1187
12	2.2000	1.0969	1.0973	1.0978	1.0989	1.1003	1.1018	1.1036	1.1055	1.1077	1.1100	1.1123	1.1139	1.1139
13	2.4000	1.0946	1.0951	1.0957	1.0970	1.0983	1.0997	1.1011	1.1026	1.1042	1.1058	1.1073	1.1085	1.1085
14	2.6000	1.0922	1.0928	1.0935	1.0948	1.0960	1.0972	1.0983	1.0994	1.1003	1.1012	1.1021	1.1028	1.1028
15	2.8000	1.0897	1.0904	1.0911	1.0924	1.0936	1.0945	1.0953	1.0958	1.0962	1.0963	1.0965	1.0968	1.0968
16	3.0000	1.0872	1.0879	1.0887	1.0900	1.0910	1.0917	1.0921	1.0921	1.0918	1.0912	1.0908	1.0905	1.0905
17	3.2000	1.0848	1.0855	1.0863	1.0875	1.0884	1.0889	1.0890	1.0887	1.0879	1.0868	1.0859	1.0854	1.0854
18	3.4000	1.0832	1.0837	1.0842	1.0851	1.0857	1.0861	1.0863	1.0862	1.0858	1.0852	1.0847	1.0844	1.0844
19	3.6000	1.0831	1.0831	1.0830	1.0831	1.0834	1.0839	1.0845	1.0854	1.0864	1.0877	1.0889	1.0896	1.0896
20	3.8000	1.0841	1.0835	1.0829	1.0822	1.0821	1.0826	1.0837	1.0855	1.0880	1.0911	1.0939	1.0957	1.0957
21	4.0000	1.0856	1.0846	1.0836	1.0824	1.0820	1.0826	1.0841	1.0866	1.0900	1.0944	1.0983	1.1009	1.1009
22	4.2000	1.0871	1.0858	1.0845	1.0828	1.0823	1.0829	1.0848	1.0878	1.0921	1.0976	1.1025	1.1057	1.1057
23	4.4000	1.0884	1.0868	1.0853	1.0832	1.0826	1.0832	1.0853	1.0889	1.0940	1.1005	1.1062	1.1100	1.1100
24	4.6000	1.0896	1.0879	1.0862	1.0841	1.0835	1.0843	1.0866	1.0906	1.0961	1.1031	1.1093	1.1134	1.1134
25	4.8000	1.0905	1.0888	1.0871	1.0849	1.0843	1.0852	1.0877	1.0919	1.0978	1.1053	1.1119	1.1163	1.1163
26	5.0000	1.0912	1.0894	1.0877	1.0855	1.0849	1.0859	1.0885	1.0930	1.0991	1.1070	1.1140	1.1186	1.1186
27	5.2000	1.0917	1.0898	1.0880	1.0858	1.0853	1.0863	1.0891	1.0937	1.1001	1.1081	1.1153	1.1201	1.1201
28	5.4000	1.0918	1.0899	1.0881	1.0859	1.0854	1.0865	1.0893	1.0940	1.1005	1.1087	1.1160	1.1208	1.1208
29	5.6000	1.0915	1.0896	1.0879	1.0857	1.0852	1.0863	1.0892	1.0939	1.1004	1.1086	1.1160	1.1208	1.1208
30	5.8000	1.0908	1.0890	1.0873	1.0851	1.0846	1.0857	1.0886	1.0933	1.0997	1.1078	1.1151	1.1199	1.1199
31	6.0000	1.0897	1.0879	1.0863	1.0842	1.0837	1.0848	1.0876	1.0921	1.0984	1.1064	1.1135	1.1181	1.1181
32	6.2000	1.0881	1.0864	1.0848	1.0827	1.0823	1.0833	1.0860	1.0903	1.0964	1.1040	1.1108	1.1153	1.1153
33	6.4000	1.0861	1.0844	1.0828	1.0809	1.0804	1.0814	1.0839	1.0881	1.0939	1.1012	1.1078	1.1121	1.1121
34	6.6000	1.0839	1.0822	1.0806	1.0785	1.0780	1.0790	1.0815	1.0857	1.0916	1.0989	1.1055	1.1098	1.1098
35	6.8000	1.0818	1.0799	1.0780	1.0756	1.0747	1.0755	1.0780	1.0822	1.0882	1.0959	1.1027	1.1072	1.1072
36	7.0000	1.0785	1.0772	1.0761	1.0746	1.0744	1.0754	1.0777	1.0812	1.0861	1.0923	1.0978	1.1014	1.1014
37	7.2000	1.0770	1.0766	1.0764	1.0763	1.0769	1.0780	1.0798	1.0822	1.0852	1.0889	1.0923	1.0945	1.0945
38	7.4000	1.0792	1.0790	1.0788	1.0786	1.0789	1.0796	1.0806	1.0821	1.0840	1.0863	1.0884	1.0898	1.0898
39	7.6000	1.0805	1.0804	1.0803	1.0802	1.0803	1.0806	1.0812	1.0819	1.0829	1.0840	1.0851	1.0858	1.0858
40	7.8000	1.0814	1.0814	1.0814	1.0814	1.0813	1.0813	1.0812	1.0811	1.0810	1.0809	1.0808	1.0803	1.0803
42	8.2000	1.0819	1.0815	1.0811	1.0804	1.0800	1.0799	1.0799	1.0803	1.0808	1.0816	1.0823	1.0827	1.0827
43	8.4000	1.0812	1.0809	1.0805	1.0801	1.0798	1.0799	1.0801	1.0807	1.0815	1.0826	1.0835	1.0841	1.0841
44	8.6000	1.0801	1.0801	1.0802	1.0805	1.0809	1.0816	1.0825	1.0835	1.0848	1.0862	1.0876	1.0885	1.0885
45	8.8000	1.0815	1.0814	1.0813	1.0815	1.0821	1.0831	1.0844	1.0853	1.0863	1.0885	1.0911	1.0936	1.0952
46	9.0000	1.0842	1.0840	1.0838	1.0839	1.0846	1.0857	1.0875	1.0898	1.0927	1.0961	1.0992	1.1013	1.1013
47	9.2000	1.0864	1.0864	1.0866	1.0874	1.0885	1.0901	1.0921	1.0946	1.0975	1.1008	1.1040	1.1061	1.1061
48	9.4000	1.0891	1.0896	1.0901	1.0915	1.0931	1.0950	1.0971	1.0996	1.1023	1.1053	1.1081	1.1101	1.1101
49	9.6000	1.0938	1.0943	1.0950	1.0964	1.0980	1.0999	1.1019	1.1042	1.1066	1.1093	1.1118	1.1136	1.1136
50	9.8000	1.0984	1.0990	1.0996	1.1011	1.1027	1.1045	1.1065	1.1086	1.1109	1.1134	1.1158	1.1175	1.1175
51	10.0000	1.1027	1.1032	1.1039	1.1054	1.1070	1.1088	1.1107	1.1128	1.1151	1.1176	1.1199	1.1216	1.1216
52	10.2000	1.1068	1.1073	1.1080	1.1095	1.1111	1.1128	1.1147	1.1168	1.1189	1.1212	1.1235	1.1250	1.1250
53	10.4000	1.1105	1.1111	1.1118	1.1133	1.1149	1.1166	1.1183	1.1202	1.1222	1.1244	1.1264	1.1279	1.1279
54	10.6000	1.1139	1.1144	1.1151	1.1165	1.1180	1.1197	1.1214	1.1233	1.1253	1.1275	1.1295	1.1310	1.1310
55	10.8000	1.1168	1.1173	1.1180	1.1193	1.1208	1.1224	1.1242	1.1260	1.1280	1.1302	1.1323	1.1337	1.1337
56	11.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
57	11.2000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
58	11.4000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
59	11.6000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
60	11.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
61	12.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Top and bottom 10% of core excluded as per Technical Specifications.