CENTRAL ELECTRICITY GENERATING BOARD

Technology Planning
and Research Division

Berkeley Nuclear
Laboratories

Berkeley
Gloucestershire GL13 9PB

Please Reply to Mr. A. Tobias

Telephone 0453 812161
(CTN 247 2161)

2X

NUMÉRO : 845

CODE : CEGB

DATE : 28.7.86

Dr C Nordborg
NEA Data Bank
91191 Gif-sur-Yvette
CEDEX
France

8 July 1986

Dear Claes

Average Decay Energies for Short-Lived Nuclides in JEF1

Further to our recent telephone conversation regarding the above noted revisions for JEF1 I attach a table of values which I suggest are incorporated into the file. I have considered only those problem nuclides which were tabulated at the JEF Meeting last autumn. Revisions suggested in Professor Rudstam's note (issued at the recent May meeting) are far more exentsive than I believe should be undertaken at the present time and I would suggest that these are considered for JEF2.

In selecting average decay energies from available tabulations I have taken as my principal source of reference the various publications by Professor Rudstam's group at Studsvik (noted at the foot of the attached Table). These data were obtained from direct measurements, measured beta strength functions or extrapolations to them. A number of short-lived nuclides were not considered in these particular references so that an alternative data source had to be identified. For this group of nuclides I selected, wherever possible, the estimates of Yoshida (1983) obtained using the Gross theory of beta decay. For most of the remaining nuclides average decay energies were taken from ENDF/B-V and for two recently identified metastable states, where no other data are available, I suggest that the values from the corresponding ground state nuclides are used.

Examination of the preliminary JEF1 file shows that the CEA evaluations had already included many of the average decay energies given in the attached Table - I have indicated these with an asterisk. Therefore only those nuclides not marked by an asterisk require revision. Since little decay data are given for most of these nuclides I suggest that it is necessary to alter only the 3rd card image of the MT=457 section as we discussed. Please note that the average energies listed in the attached Table are given in MeV whereas the ENDF/B-V format requires them to be coded in eV.

As noted in previous correspondence there are a number of ground and metastable state assignments which need to be corrected in JEF1 before the average decay energies are revised. The ground and metastable state pairs which need to be interchanged are :-

Nb100/Nb100m, Nb104/Nb104m, In120/In120m, In124/In124m, In126/In126m, In127/In127m, In128/In128m, Sb128/Sb128m and In129/In129m.

For these pairs of nuclides it will be necessary to alter the LIS and LISO parameters in both the MT=451 and 457 sections as well as the Material numbers. I have examined the data for the precursors for these nuclides and it is my judgement that no changes are required to them.

I have also examined the decay data for In-118m which I had queried in my previous letter and can confirm that the data provided by CEA are in error. I have extracted the decay data for this nuclide from ENSDF and have processed it via COGEND. A listing of the ENDF/B-V data is enclosed. Perhaps you could revise the data for this nuclide manually.

With Regards,
Yours Sincerely,

Average Decay Energies for Short-Lived Nuclides in JEF1

Nuclide		E-Beta	E-Gamma	Reference
73-Cu		1.985	0.772	1
75-Zn	*	1.39 +/- 0.42	2.57 +/- 0.77	2, 3, 4
76-Zn	*	1.51 +/- 0.31	0.53 +/- 0.10	2, 3, 4
77-Zn	*	1.83 +/- 0.38	2.78 +/- 0.56	2, 3, 4
79-Zn		3.016	2.917	1
82-Ga		4.57 +/- 1.45	4.65 +/- 1.40	2, 3, 4
83-Ga	*	4.23 +/- 1.41	3.64 +/- 1.09	2, 3, 4
84-Ga		4.228	4.633	1
83-Ge	*	3.26 +/- 1.03	2.75 +/- 0.82	2, 3, 4
84-Ge	*	2.59 +/- 0.81	1.72 +/- 0.52	2, 3, 4
85-Ge		3.029	3.183	1
86-Ge		3.362	2.636	1
85-As	*	3.32 +/- 1.04	1.30 +/- 0.47	2, 3, 4
86-As	*	4.07 +/- 1.26	3.33 +/- 1.05	2, 3, 4
87-As	*	3.73 +/- 1.16	0.42 +/- 0.16	2, 3, 4
88-As		3.752	4.221	1
87-Se	*	2.84 +/- 0.91	2.23 +/- 0.75	2, 3, 4
88-Se	*	2.21 +/- 0.70	1.55 +/- 0.59	2, 3, 4
89-Se		3.33 +/- 1.05	2.59 +/- 0.85	2, 3, 4
90-Se		2.904	2.633	1
91-Se		3.12 +/- 0.99	3.88 +/- 1.16	2, 3, 4
92-Se		4.113	2.237	1
91-Br	*	3.17 +/- 1.00	2.41 +/- 0.78	2, 3, 4
92-Br	*	3.86 +/- 1.31	2.57 +/- 0.90	2, 3, 4
94-Kr	*	2.06 +/- 0.66	1.70 +/- 0.62	2, 3, 4
95-Kr		3.055	3.355	1
99-Rb	*	3.27 +/- 1.03	2.48 +/- 0.79	2, 3, 4
100-Rb		4.276	4.674	1
99-Sr		2.92 +/- 0.10	2.50 +/- 0.83	2, 3, 4
100-Sr		2.531	1.275	1
101-Y		2.691	1.523	1
102-Y		3.096	3.823	1
100-Zr		1.09 +/- 0.33	0.50 +/- 0.15	2, 3, 4
101-Zr		1.78 +/- 0.62	1.86 +/- 0.56	2, 3, 4
102-Zr	*	1.32 +/- 0.46	0.86 +/- 0.26	2, 3, 4
103-Zr		2.457	1.467	1
104-Zr		1.742	0.894	1
100-Nb		1.63 +/- 0.49	2.51 +/- 0.75	2, 3, 4
100m-Nb		1.72 +/- 0.52	2.30 +/- 0.69	2, 3, 4
101-Nb		1.31 +/- 0.39	1.52 +/- 0.45	2, 3, 4
102-Nb	*	1.93 +/- 0.66	2.84 +/- 0.85	2, 3, 4
102m-Nb	*	2.02 +/- 0.68	2.65 +/- 0.80	2, 3, 4
103-Nb	*	1.51 +/- 0.56	1.72 +/- 0.52	2, 3, 4
104-Nb		2.31 +/- 0.76	3.28 +/- 0.99	2, 3, 4
104m-Nb		2.37 +/- 0.77	3.15 +/- 0.95	2, 3, 4
105-Nb	*	1.95 +/- 0.66	2.20 +/- 0.66	2, 3, 4
106-Nb	*	2.80 +/- 0.89	4.09 +/- 1.23	2, 3, 4

Nuclide		E-Beta	E-Gamma	Reference
103-Mo	*	1.24 +/- 0.50	1.39 +/- 0.42	2, 3, 4
104-Mo		0.623	0.585	1
105-Mo	*	1.59 +/- 0.57	1.74 +/- 0.52	2, 3, 4
106-Mo	*	1.02 +/- 0.39	0.59 +/- 0.18	2, 3, 4
107-Mo	*	1.87 +/- 0.64	1.95 +/- 0.58	2, 3, 4
108-Mo	*	1.37 +/- 0.46	1.14 +/- 0.34	2, 3, 4
110-Mo		2.199	1.152	1
109-Tc	*	1.87 +/- 0.64	2.39 +/- 0.72	2, 3, 4
110-Tc	*	2.20 +/- 0.73	3.06 +/- 0.92	2, 3, 4
112-Tc		3.340	2.790	1
109-Ru	*	1.27 +/- 0.50	1.30 +/- 0.50	2, 3, 4
109m-Ru	*	1.27 +/- 0.50	1.30 +/- 0.50	2, 3, 4
110-Ru	*	0.58 +/- 0.25	0.22 +/- 0.06	2, 3, 4
111-Ru	*	1.65 +/- 0.58	2.11 +/- 0.63	2, 3, 4
112-Ru	*	1.07 +/- 0.39	0.72 +/- 0.21	2, 3, 4
113-Ru	*	1.98 +/- 0.67	2.54 +/- 0.76	2, 3, 4
111-Rh	*	1.02 +/- 0.46	1.05 +/- 0.31	2, 3, 4
112-Rh	*	1.93 +/- 0.66	2.68 +/- 0.80	2, 3, 4
113-Rh		1.57 +/- 0.56	1.60 +/- 0.48	2, 3, 4
114-Rh		2.29 +/- 0.75	3.13 +/- 0.94	2, 3, 4
115-Pd	*	1.36 +/- 0.51	1.44 +/- 0.43	2, 3, 4
117-Pd		1.70 +/- 0.59	1.81 +/- 0.54	2, 3, 4
118-Pd	*	1.12 +/- 0.40	1.13 +/- 0.34	2, 3, 4
119-Pd		2.111	1.337	1
120-Pd		1.343	0.814	1
114m-Ag		2.078	0.107	5
115m-Ag		0.82 +/- 0.25	1.16 +/- 0.35	2, 3, 4
121-Ag	*	1.61 +/- 0.58	2.03 +/- 0.61	2, 3, 4
122-Ag	*	2.34 +/- 0.76	3.51 +/- 1.05	2, 3, 4
123-Ag	*	2.21 +/- 0.73	2.66 +/- 0.80	2, 3, 4
125-Ag		2.591	1.815	1
122-Cd	*	0.83 +/- 0.28	0.51 +/- 0.15	2, 3, 4
123-Cd	*	1.78 +/- 0.60	1.91 +/- 0.57	2, 3, 4
125-Cd		2.10 +/- 0.68	1.92 +/- 0.58	2, 3, 4
128-Cd		1.831	1.003	1
132-In	*	3.28 +/- 1.02	2.96 +/- 0.89	2, 3, 4
131m-Sn		1.098	2.391	1
134-Sn	*	1.89 +/- 0.61	0.97 +/- 0.37	2, 3, 4
135-Sn		2.555	2.482	1
136-Sn		2.614	1.427	1
129m-Sb		0.408	1.365	5
135-Sb	*	2.39 +/- 0.78	1.48 +/- 0.52	2, 3, 4
136-Sb	*	2.79 +/- 0.89	1.77 +/- 0.58	2, 3, 4
137-Sb		2.573	2.389	1
138-Sb		3.030	3.578	1
137-Te	*	2.02 +/- 0.68	1.82 +/- 0.60	2, 3, 4
138-Te	*	1.57 +/- 0.52	1.09 +/- 0.45	2, 3, 4
139-Te		2.376	2.351	1
140-Te		2.336	1.275	1
141-Te		2.595	2.357	1
139-I		2.47 +/- 0.02	0.81 +/- 0.16	2, 3, 4
140-I	*	2.61 +/- 0.84	1.61 +/- 0.56	2, 3, 4
141-I		2.23 +/- 0.73	0.44 +/- 0.19	2, 3, 4

Nuclide		E-Beta	E-Gamma	Reference
142-Xe		1.35 +/- 0.41	1.08 +/- 0.32	2, 3, 4
143-Xe	*	2.01 +/- 0.67	2.42 +/- 0.73	2, 3, 4
144-Xe		1.606	0.923	1
145-Xe	*	1.88 +/- 0.70	2.34 +/- 0.70	2, 3, 4
147-Xe		2.749	2.704	6
136m-Cs		0.0	0.050	6
145-Cs	*	1.81 +/- 0.56	1.26 +/- 0.41	2, 3, 4
146-Cs		2.95 +/- 0.76	2.31 +/- 0.76	2, 3, 4
147-Cs		2.06 +/- 0.68	1.06 +/- 0.40	2, 3, 4
146-Ba		1.09 +/- 0.33	0.90 +/- 0.27	2, 3, 4
147-Ba		1.59 +/- 0.56	2.14 +/- 0.64	2, 3, 4
148-Ba	*	1.07 +/- 0.38	1.23 +/- 0.37	2, 3, 4
146-La		1.56 +/- 0.47	2.43 +/- 0.70	2, 3, 4
146m-La		1.56 +/- 0.47	2.43 +/- 0.70	2, 3, 4
149-La		1.783	1.087	1
150-La		2.037	2.547	1
148-Ce	*	0.54 +/- 0.23	0.41 +/- 0.12	2, 3, 4
149-Ce	*	1.12 +/- 0.45	1.53 +/- 0.46	2, 3, 4
150-Ce	*	0.70 +/- 0.28	0.63 +/- 0.19	2, 3, 4
151-Ce		1.440	0.877	1
150-Pr	*	1.25 +/- 0.48	2.34 +/- 0.70	2, 3, 4
151-Pr	*	0.96 +/- 0.42	1.44 +/- 0.43	2, 3, 4
152-Pr		1.549	2.119	1
153-Pr		1.700	1.027	1
153-Nd		0.969	0.623	1
154-Nd		0.517	0.585	1
155-Nd		1.366	0.834	1
156-Pm		1.314	1.894	1
157-Pm		1.451	0.841	1
158-Sm		0.408	0.555	1
159-Sm		1.127	0.689	1
161-Eu		1.132	0.732	1
162-Eu		1.403	2.018	1
163-Gd		0.985	0.685	1
164-Gd		0.718	0.647	1
165-Tb		0.792	0.597	1
166-Tb		0.947	1.611	1

NOTE: Nuclides flagged by an asterisk already include the tabulated decay energies in JEF1.

References:

1. Yoshida, T., 1983, JAERI-M83-127
2. Rudstam, G. and Aleklett, K., 1979, NFL-7
3. Aleklett, K. and Rudstam, G., 1982, Nuc. Sci. Eng., Vol.80, pp74-91
4. Rudstam, G., 1986, Priv. Comm. to JEF Decay Data Working Group
5. Preliminary JEF1 File - Decay energies of g.s. nuclide assumed.
6. England, T.R., Wilson, W. B., Schenter, R. E. and Mann, F. M., 1984, EPRI-NP-3787

CENTRAL ELECTRICITY GENERATING BOARD

Technology Planning
and Research Division

Berkeley Nuclear
Laboratories

Berkeley
Gloucestershire GL13 9PB

Please Reply to Mr. A. Tobias

Telephone 0453 812161
(CTN 247 2161)

22 July 1986

To : Members of JEF Working Group
From: A. Tobias

Decay Heat Predictions Using JEF1 Decay Data and Fission Yields

As you may recall, at the JEF working group meeting held last October, there was some discussion on short lived fission products which have inadequate spectral data for the determination of average decay energies. It was then agreed that Professor Rudstam's directly measured average beta energies, together with corresponding gamma estimates, be incorporated within JEF1. It was also agreed that these changes were to be implemented by the NEA Data Bank once revised values were made available by Professor Rudstam. In addition to providing revised values, Professor Rudstam distributed a paper at the May meeting on fission yields which proposed some additional changes to JEF1. In particular, this suggested that the uncertainties in average gamma energies had been underestimated and that many average gamma energies could be revised on the basis of newly measured branching fractions.

I believe that considerable effort would be required to implement all of the proposed changes into the decay data file and would further delay the release of JEF1. Consequently, I have suggested to the Data Bank that corrections are made to erroneous state assignments and that revised average decay energies are included only for the list of nuclides initially identified. I enclose a copy of the letter to the Data Bank which outlines my suggested changes to the JEF1 decay data file; I understand that these changes have now been made.

I have amended my copy of JEF1 as described in the letter to the Data Bank and, in conjunction with the adopted JEF1 fission yields, have carried out decay heat calculations using the FISP6 code. I enclose tabulations of the predicted decay heat levels following a fission pulse and infinite irradiation (1.0E13 s) in each of U235, U238, Pu239 and Pu241. Preliminary comparisons between these JEF1 results and those obtained with both the UK and French data libraries show relatively small differences. Within the next month or so I hope to undertake a more detailed examination of these predictions and will distribute a note in due course.

Alan Tobias

DECAY HEAT PREDICTIONS FOR A FISSION PULSE IN U235

TIME S	BETA MEV/F/S	GAMMA MEV/F/S	TOTAL MEV/F/S
1.000E 00	4.4343E-01	2.5240E-01	6.9582E-01
1.500E 00	3.5755E-01	2.0931E-01	5.6686E-01
2.000E 00	3.0091E-01	1.8061E-01	4.8151E-01
3.000E 00	2.2912E-01	1.4315E-01	3.7227E-01
5.000E 00	1.5408E-01	1.0144E-01	2.5552E-01
8.000E 00	1.0127E-01	6.9969E-02	1.7123E-01
1.000E 01	8.1447E-02	5.7617E-02	1.3906E-01
1.500E 01	5.3234E-02	3.9265E-02	9.2499E-02
2.000E 01	3.8607E-02	2.9231E-02	6.7837E-02
3.000E 01	2.4291E-02	1.8991E-02	4.3282E-02
5.000E 01	1.3740E-02	1.1327E-02	2.5067E-02
8.000E 01	8.0489E-03	7.2026E-03	1.5252E-02
1.000E 02	6.1444E-03	5.7434E-03	1.1888E-02
1.500E 02	3.6801E-03	3.6679E-03	7.3480E-03
2.000E 02	2.5508E-03	2.6013E-03	5.1521E-03
3.000E 02	1.5537E-03	1.5892E-03	3.1429E-03
5.000E 02	8.7914E-04	8.9751E-04	1.7766E-03
8.000E 02	5.4115E-04	5.6496E-04	1.1061E-03
1.000E 03	4.3069E-04	4.5847E-04	8.8917E-04
1.500E 03	2.8019E-04	3.1382E-04	5.9401E-04
2.000E 03	2.0078E-04	2.3684E-04	4.3762E-04
3.000E 03	1.1851E-04	1.5428E-04	2.7279E-04
5.000E 03	5.7430E-05	8.4734E-05	1.4216E-04
8.000E 03	3.0497E-05	4.5964E-05	7.6461E-05
1.000E 04	2.3242E-05	3.3609E-05	5.6851E-05
1.500E 04	1.4705E-05	1.8234E-05	3.2940E-05
2.000E 04	1.0760E-05	1.1590E-05	2.2350E-05
3.000E 04	6.8809E-06	6.3393E-06	1.3220E-05
5.000E 04	3.6228E-06	3.2534E-06	6.8762E-06
8.000E 04	1.7786E-06	1.7981E-06	3.5767E-06
1.000E 05	1.2413E-06	1.3487E-06	2.5900E-06
1.500E 05	6.4219E-07	7.8825E-07	1.4304E-06
2.000E 05	4.0172E-07	5.3948E-07	9.4120E-07
3.000E 05	2.1629E-07	3.3091E-07	5.4720E-07
5.000E 05	1.1587E-07	1.9848E-07	3.1436E-07
8.000E 05	7.2259E-08	1.2740E-07	1.9966E-07
1.000E 06	5.8186E-08	1.0130E-07	1.5948E-07
1.500E 06	3.9163E-08	6.4472E-08	1.0364E-07
2.000E 06	2.9384E-08	4.5809E-08	7.5194E-08
3.000E 06	1.9065E-08	2.7068E-08	4.6133E-08
5.000E 06	1.0451E-08	1.2777E-08	2.3227E-08
8.000E 06	6.0145E-09	6.7116E-09	1.2726E-08
1.000E 07	4.6503E-09	5.1028E-09	9.7531E-09
1.500E 07	2.8360E-09	2.8708E-09	5.7069E-09
2.000E 07	1.9426E-09	1.6287E-09	3.5714E-09
3.000E 07	1.1447E-09	5.2774E-10	1.6724E-09
5.000E 07	6.0329E-10	8.9572E-11	6.9286E-10
8.000E 07	2.9457E-10	3.7775E-11	3.3234E-10
1.000E 08	1.9545E-10	3.1748E-11	2.2720E-10
1.500E 08	9.2793E-11	2.5625E-11	1.1842E-10
2.000E 08	6.4494E-11	2.3320E-11	8.7814E-11
3.000E 08	5.1142E-11	2.1121E-11	7.2264E-11
5.000E 08	4.2667E-11	1.8134E-11	6.0801E-11
8.000E 08	3.3792E-11	1.4538E-11	4.8330E-11
1.000E 09	2.9018E-11	1.2555E-11	4.1572E-11

DECAY HEAT PREDICTIONS FOR A FISSION PULSE IN U238

TIME S	BETA MEV/F/S	GAMMA MEV/F/S	TOTAL MEV/F/S
1.000E 00	8.4765E-01	4.6007E-01	1.3077E 00
1.500E 00	6.6208E-01	3.7282E-01	1.0349E 00
2.000E 00	5.4066E-01	3.1513E-01	8.5579E-01
3.000E 00	3.8973E-01	2.4033E-01	6.3006E-01
5.000E 00	2.4051E-01	1.5954E-01	4.0004E-01
8.000E 00	1.4512E-01	1.0236E-01	2.4748E-01
1.000E 01	1.1238E-01	8.1308E-02	1.9369E-01
1.500E 01	6.9389E-02	5.2064E-02	1.2145E-01
2.000E 01	4.8831E-02	3.7297E-02	8.6128E-02
3.000E 01	2.9789E-02	2.3253E-02	5.3042E-02
5.000E 01	1.6471E-02	1.3463E-02	2.9934E-02
8.000E 01	9.5031E-03	8.3582E-03	1.7861E-02
1.000E 02	7.1894E-03	6.5687E-03	1.3758E-02
1.500E 02	4.2166E-03	4.0655E-03	8.2822E-03
2.000E 02	2.8688E-03	2.8111E-03	5.6800E-03
3.000E 02	1.6953E-03	1.6498E-03	3.3451E-03
5.000E 02	9.3123E-04	8.8633E-04	1.8176E-03
8.000E 02	5.6891E-04	5.4442E-04	1.1133E-03
1.000E 03	4.5192E-04	4.4066E-04	8.9259E-04
1.500E 03	2.9120E-04	3.0231E-04	5.9350E-04
2.000E 03	2.0587E-04	2.2794E-04	4.3380E-04
3.000E 03	1.1782E-04	1.4613E-04	2.6395E-04
5.000E 03	5.3625E-05	7.6498E-05	1.3012E-04
8.000E 03	2.6665E-05	3.9563E-05	6.6228E-05
1.000E 04	1.9896E-05	2.8617E-05	4.8514E-05
1.500E 04	1.2442E-05	1.5705E-05	2.8147E-05
2.000E 04	9.1590E-06	1.0276E-05	1.9435E-05
3.000E 04	5.9531E-06	5.9205E-06	1.1874E-05
5.000E 04	3.2310E-06	3.1922E-06	6.4232E-06
8.000E 04	1.6500E-06	1.7995E-06	3.4494E-06
1.000E 05	1.1746E-06	1.3566E-06	2.5311E-06
1.500E 05	6.2849E-07	8.0547E-07	1.4340E-06
2.000E 05	4.0236E-07	5.6222E-07	9.6459E-07
3.000E 05	2.2215E-07	3.5477E-07	5.7691E-07
5.000E 05	1.1862E-07	2.1500E-07	3.3362E-07
8.000E 05	7.1527E-08	1.3556E-07	2.0709E-07
1.000E 06	5.6436E-08	1.0635E-07	1.6278E-07
1.500E 06	3.6649E-08	6.6015E-08	1.0266E-07
2.000E 06	2.6937E-08	4.6298E-08	7.3234E-08
3.000E 06	1.7111E-08	2.7091E-08	4.4202E-08
5.000E 06	9.2657E-09	1.2597E-08	2.1863E-08
8.000E 06	5.4426E-09	6.3680E-09	1.1811E-08
1.000E 07	4.3196E-09	4.7308E-09	9.0505E-09
1.500E 07	2.8482E-09	2.5775E-09	5.4258E-09
2.000E 07	2.1064E-09	1.4570E-09	3.5635E-09
3.000E 07	1.3847E-09	5.0329E-10	1.8880E-09
5.000E 07	7.8802E-10	1.2035E-10	9.0837E-10
8.000E 07	3.8863E-10	5.7413E-11	4.4604E-10
1.000E 08	2.5136E-10	4.4384E-11	2.9574E-10
1.500E 08	9.9600E-11	2.9411E-11	1.2901E-10
2.000E 08	5.3938E-11	2.4041E-11	7.7978E-11
3.000E 08	3.3321E-11	2.0423E-11	5.3744E-11
5.000E 08	2.6294E-11	1.7305E-11	4.3599E-11
8.000E 08	2.0752E-11	1.3850E-11	3.4602E-11
1.000E 09	1.7826E-11	1.1958E-11	2.9784E-11

DECAY HEAT PREDICTIONS FOR A FISSION PULSE IN PU239

TIME S	BETA MEV/F/S	GAMMA MEV/F/S	TOTAL MEV/F/S
1.000E 00	3.0408E-01	2.0610E-01	5.1018E-01
1.500E 00	2.5135E-01	1.7646E-01	4.2781E-01
2.000E 00	2.1418E-01	1.5446E-01	3.6864E-01
3.000E 00	1.6506E-01	1.2343E-01	2.8848E-01
5.000E 00	1.1241E-01	8.7166E-02	1.9958E-01
8.000E 00	7.5114E-02	5.9546E-02	1.3466E-01
1.000E 01	6.1133E-02	4.8731E-02	1.0986E-01
1.500E 01	4.1122E-02	3.2682E-02	7.3804E-02
2.000E 01	3.0542E-02	2.3948E-02	5.4489E-02
3.000E 01	1.9869E-02	1.5179E-02	3.5048E-02
5.000E 01	1.1644E-02	8.8586E-03	2.0503E-02
8.000E 01	7.0092E-03	5.5703E-03	1.2579E-02
1.000E 02	5.4172E-03	4.4142E-03	9.8314E-03
1.500E 02	3.3220E-03	2.7867E-03	6.1087E-03
2.000E 02	2.3486E-03	1.9757E-03	4.3242E-03
3.000E 02	1.4787E-03	1.2377E-03	2.7164E-03
5.000E 02	8.7229E-04	7.4781E-04	1.6201E-03
8.000E 02	5.4843E-04	5.0063E-04	1.0491E-03
1.000E 03	4.3600E-04	4.1480E-04	8.5080E-04
1.500E 03	2.7819E-04	2.8995E-04	5.6814E-04
2.000E 03	1.9516E-04	2.1980E-04	4.1496E-04
3.000E 03	1.1116E-04	1.4234E-04	2.5350E-04
5.000E 03	5.0538E-05	7.5903E-05	1.2644E-04
8.000E 03	2.4885E-05	3.9647E-05	6.4532E-05
1.000E 04	1.8374E-05	2.8592E-05	4.6966E-05
1.500E 04	1.1184E-05	1.5381E-05	2.6565E-05
2.000E 04	8.0817E-06	9.8814E-06	1.7963E-05
3.000E 04	5.1866E-06	5.6081E-06	1.0795E-05
5.000E 04	2.8514E-06	3.0353E-06	5.8867E-06
8.000E 04	1.5053E-06	1.7299E-06	3.2352E-06
1.000E 05	1.0919E-06	1.3137E-06	2.4055E-06
1.500E 05	6.0379E-07	7.9521E-07	1.3990E-06
2.000E 05	3.9415E-07	5.6248E-07	9.5663E-07
3.000E 05	2.2022E-07	3.5645E-07	5.7667E-07
5.000E 05	1.1572E-07	2.1191E-07	3.2763E-07
8.000E 05	6.7937E-08	1.3065E-07	1.9859E-07
1.000E 06	5.2874E-08	1.0160E-07	1.5447E-07
1.500E 06	3.3448E-08	6.2316E-08	9.5764E-08
2.000E 06	2.4141E-08	4.3541E-08	6.7682E-08
3.000E 06	1.5005E-08	2.5591E-08	4.0596E-08
5.000E 06	7.9901E-09	1.2154E-08	2.0144E-08
8.000E 06	4.7315E-09	6.2616E-09	1.0993E-08
1.000E 07	3.8158E-09	4.6630E-09	8.4787E-09
1.500E 07	2.6402E-09	2.5383E-09	5.1784E-09
2.000E 07	2.0389E-09	1.4408E-09	3.4797E-09
3.000E 07	1.4147E-09	5.1438E-10	1.9290E-09
5.000E 07	8.3337E-10	1.3871E-10	9.7208E-10
8.000E 07	4.1553E-10	6.9482E-11	4.8502E-10
1.000E 08	2.6830E-10	5.3335E-11	3.2163E-10
1.500E 08	1.0188E-10	3.4239E-11	1.3612E-10
2.000E 08	5.0387E-11	2.7244E-11	7.7631E-11
3.000E 08	2.7200E-11	2.2572E-11	4.9772E-11
5.000E 08	2.0722E-11	1.8901E-11	3.9623E-11
8.000E 08	1.6321E-11	1.5076E-11	3.1396E-11
1.000E 09	1.4019E-11	1.3009E-11	2.7028E-11

DECAY HEAT PREDICTIONS FOR A FISSION PULSE IN PU241

TIME S	BETA MEV/F/S	GAMMA MEV/F/S	TOTAL MEV/F/S
1.000E 00	4.8879E-01	2.9871E-01	7.8750E-01
1.500E 00	3.9652E-01	2.5112E-01	6.4764E-01
2.000E 00	3.3286E-01	2.1717E-01	5.5002E-01
3.000E 00	2.4996E-01	1.7054E-01	4.2050E-01
5.000E 00	1.6292E-01	1.1720E-01	2.8012E-01
8.000E 00	1.0374E-01	7.7482E-02	1.8122E-01
1.000E 01	8.2606E-02	6.2403E-02	1.4501E-01
1.500E 01	5.3891E-02	4.0993E-02	9.4884E-02
2.000E 01	3.9541E-02	2.9977E-02	6.9518E-02
3.000E 01	2.5570E-02	1.9325E-02	4.4895E-02
5.000E 01	1.4933E-02	1.1568E-02	2.6501E-02
8.000E 01	8.8779E-03	7.2313E-03	1.6109E-02
1.000E 02	6.8045E-03	5.6646E-03	1.2469E-02
1.500E 02	4.1065E-03	3.4744E-03	7.5810E-03
2.000E 02	2.8677E-03	2.3997E-03	5.2674E-03
3.000E 02	1.7668E-03	1.4336E-03	3.2004E-03
5.000E 02	1.0052E-03	8.0718E-04	1.8124E-03
8.000E 02	6.0778E-04	5.1448E-04	1.1223E-03
1.000E 03	4.7415E-04	4.2055E-04	8.9471E-04
1.500E 03	2.9337E-04	2.9049E-04	5.8385E-04
2.000E 03	2.0244E-04	2.1959E-04	4.2203E-04
3.000E 03	1.1340E-04	1.4205E-04	2.5545E-04
5.000E 03	5.0550E-05	7.5600E-05	1.2615E-04
8.000E 03	2.4278E-05	3.9220E-05	6.3498E-05
1.000E 04	1.7667E-05	2.8113E-05	4.5780E-05
1.500E 04	1.0455E-05	1.4862E-05	2.5317E-05
2.000E 04	7.4194E-06	9.4036E-06	1.6823E-05
3.000E 04	4.6968E-06	5.2750E-06	9.9718E-06
5.000E 04	2.6101E-06	2.8665E-06	5.4766E-06
8.000E 04	1.4129E-06	1.6241E-06	3.0370E-06
1.000E 05	1.0356E-06	1.2236E-06	2.2593E-06
1.500E 05	5.7894E-07	7.2991E-07	1.3089E-06
2.000E 05	3.7919E-07	5.1423E-07	8.9342E-07
3.000E 05	2.1263E-07	3.2849E-07	5.4112E-07
5.000E 05	1.1253E-07	2.0060E-07	3.1313E-07
8.000E 05	6.6826E-08	1.2756E-07	1.9439E-07
1.000E 06	5.2378E-08	1.0067E-07	1.5304E-07
1.500E 06	3.3562E-08	6.3144E-08	9.6707E-08
2.000E 06	2.4365E-08	4.4425E-08	6.8789E-08
3.000E 06	1.5158E-08	2.5826E-08	4.0984E-08
5.000E 06	8.0735E-09	1.1637E-08	1.9710E-08
8.000E 06	4.9097E-09	5.6143E-09	1.0524E-08
1.000E 07	4.0637E-09	4.0998E-09	8.1635E-09
1.500E 07	2.9872E-09	2.2147E-09	5.2019E-09
2.000E 07	2.4100E-09	1.2778E-09	3.6878E-09
3.000E 07	1.7512E-09	4.9337E-10	2.2446E-09
5.000E 07	1.0568E-09	1.6165E-10	1.2184E-09
8.000E 07	5.2787E-10	8.3442E-11	6.1132E-10
1.000E 08	3.3856E-10	6.2012E-11	4.0057E-10
1.500E 08	1.2212E-10	3.6561E-11	1.5868E-10
2.000E 08	5.4337E-11	2.7591E-11	8.1927E-11
3.000E 08	2.4232E-11	2.2244E-11	4.6476E-11
5.000E 08	1.7426E-11	1.8685E-11	3.6111E-11
8.000E 08	1.3705E-11	1.4940E-11	2.8645E-11
1.000E 09	1.1779E-11	1.2896E-11	2.4675E-11

DECAY HEAT PREDICTIONS FOR AN INFINITE IRRADIATION IN U235
(1.0E13 s)

TIME S	BETA MEV/F	GAMMA MEV/F	TOTAL MEV/F
0.000E 00	6.6623E 00	5.7804E 00	1.2443E 01
1.000E 00	6.0366E 00	5.4360E 00	1.1473E 01
1.500E 00	5.8380E 00	5.3214E 00	1.1159E 01
2.000E 00	5.6742E 00	5.2243E 00	1.0899E 01
3.000E 00	5.4125E 00	5.0640E 00	1.0476E 01
5.000E 00	5.0386E 00	4.8241E 00	9.8627E 00
8.000E 00	4.6656E 00	4.5724E 00	9.2381E 00
1.000E 01	4.4842E 00	4.4456E 00	8.9298E 00
1.500E 01	4.1562E 00	4.2086E 00	8.3648E 00
2.000E 01	3.9300E 00	4.0395E 00	7.9696E 00
3.000E 01	3.6259E 00	3.8055E 00	7.4313E 00
5.000E 01	3.2649E 00	3.5165E 00	6.7814E 00
8.000E 01	2.9512E 00	3.2478E 00	6.1990E 00
1.000E 02	2.8107E 00	3.1193E 00	5.9300E 00
1.500E 02	2.5741E 00	2.8904E 00	5.4645E 00
2.000E 02	2.4215E 00	2.7363E 00	5.1577E 00
3.000E 02	2.2242E 00	2.5344E 00	4.7586E 00
5.000E 02	1.9942E 00	2.2997E 00	4.2938E 00
8.000E 02	1.7894E 00	2.0888E 00	3.8782E 00
1.000E 03	1.6931E 00	1.9872E 00	3.6803E 00
1.500E 03	1.5201E 00	1.7987E 00	3.3188E 00
2.000E 03	1.4016E 00	1.6627E 00	3.0643E 00
3.000E 03	1.2474E 00	1.4722E 00	2.7196E 00
5.000E 03	1.0836E 00	1.2446E 00	2.3283E 00
8.000E 03	9.5986E-01	1.0581E 00	2.0179E 00
1.000E 04	9.0680E-01	9.7948E-01	1.8863E 00
1.500E 04	8.1525E-01	8.5579E-01	1.6710E 00
2.000E 04	7.5259E-01	7.8327E-01	1.5359E 00
3.000E 04	6.6696E-01	6.9851E-01	1.3655E 00
5.000E 04	5.6701E-01	6.0908E-01	1.1761E 00
8.000E 04	4.9076E-01	5.3709E-01	1.0278E 00
1.000E 05	4.6106E-01	5.0598E-01	9.6705E-01
1.500E 05	4.1659E-01	4.5468E-01	8.7127E-01
2.000E 05	3.9125E-01	4.2222E-01	8.1347E-01
3.000E 05	3.6213E-01	3.8050E-01	7.4263E-01
5.000E 05	3.3125E-01	3.3020E-01	6.6144E-01
8.000E 05	3.0414E-01	2.8280E-01	5.8694E-01
1.000E 06	2.9120E-01	2.6009E-01	5.5130E-01
1.500E 06	2.6749E-01	2.1983E-01	4.8732E-01
2.000E 06	2.5057E-01	1.9271E-01	4.4327E-01
3.000E 06	2.2698E-01	1.5751E-01	3.8449E-01
5.000E 06	1.9894E-01	1.2046E-01	3.1940E-01
8.000E 06	1.7542E-01	9.3177E-02	2.6860E-01
1.000E 07	1.6486E-01	8.1496E-02	2.4636E-01
1.500E 07	1.4675E-01	6.2175E-02	2.0892E-01
2.000E 07	1.3503E-01	5.1211E-02	1.8624E-01
3.000E 07	1.2025E-01	4.1478E-02	1.6173E-01
5.000E 07	1.0376E-01	3.6897E-02	1.4065E-01
8.000E 07	9.0979E-02	3.5301E-02	1.2628E-01
1.000E 08	8.6169E-02	3.4613E-02	1.2078E-01
1.500E 08	7.9515E-02	3.3207E-02	1.1272E-01
2.000E 08	7.5723E-02	3.1991E-02	1.0771E-01
3.000E 08	7.0115E-02	2.9779E-02	9.9895E-02
5.000E 08	6.0812E-02	2.5866E-02	8.6678E-02
8.000E 08	4.9405E-02	2.0986E-02	7.0391E-02
1.000E 09	4.3137E-02	1.8281E-02	6.1418E-02

DECAY HEAT PREDICTIONS FOR AN INFINITE IRRADIATION IN U238
(1.0E13 s)

TIME S	BETA MEV/F	GAMMA MEV/F	TOTAL MEV/F
0.000E 00	8.7184E 00	6.9859E 00	1.5704E 01
1.000E 00	7.4668E 00	6.3235E 00	1.3790E 01
1.500E 00	7.0933E 00	6.1170E 00	1.3210E 01
2.000E 00	6.7944E 00	5.9458E 00	1.2740E 01
3.000E 00	6.3365E 00	5.6713E 00	1.2008E 01
5.000E 00	5.7269E 00	5.2811E 00	1.1008E 01
8.000E 00	5.1691E 00	4.8994E 00	1.0068E 01
1.000E 01	4.9140E 00	4.7171E 00	9.6311E 00
1.500E 01	4.4747E 00	4.3931E 00	8.8678E 00
2.000E 01	4.1845E 00	4.1733E 00	8.3578E 00
3.000E 01	3.8060E 00	3.8811E 00	7.6871E 00
5.000E 01	3.3688E 00	3.5330E 00	6.9017E 00
8.000E 01	2.9955E 00	3.2172E 00	6.2127E 00
1.000E 02	2.8304E 00	3.0691E 00	5.8995E 00
1.500E 02	2.5562E 00	2.8113E 00	5.3674E 00
2.000E 02	2.3828E 00	2.6425E 00	5.0254E 00
3.000E 02	2.1642E 00	2.4286E 00	4.5928E 00
5.000E 02	1.9173E 00	2.1910E 00	4.1083E 00
8.000E 02	1.7015E 00	1.9858E 00	3.6873E 00
1.000E 03	1.6003E 00	1.8881E 00	3.4883E 00
1.500E 03	1.4195E 00	1.7067E 00	3.1262E 00
2.000E 03	1.2971E 00	1.5757E 00	2.8728E 00
3.000E 03	1.1412E 00	1.3935E 00	2.5347E 00
5.000E 03	9.8281E-01	1.1826E 00	2.1654E 00
8.000E 03	8.7099E-01	1.0182E 00	1.8892E 00
1.000E 04	8.2512E-01	9.5100E-01	1.7761E 00
1.500E 04	7.4740E-01	8.4545E-01	1.5929E 00
2.000E 04	6.9426E-01	7.8217E-01	1.4764E 00
3.000E 04	6.2081E-01	7.0510E-01	1.3259E 00
5.000E 04	5.3314E-01	6.1933E-01	1.1525E 00
8.000E 04	4.6388E-01	5.4788E-01	1.0118E 00
1.000E 05	4.3607E-01	5.1668E-01	9.5275E-01
1.500E 05	3.9329E-01	4.6474E-01	8.5803E-01
2.000E 05	3.6821E-01	4.3125E-01	7.9947E-01
3.000E 05	3.3865E-01	3.8713E-01	7.2578E-01
5.000E 05	3.0686E-01	3.3276E-01	6.3962E-01
8.000E 05	2.7954E-01	2.8179E-01	5.6133E-01
1.000E 06	2.6685E-01	2.5779E-01	5.2464E-01
1.500E 06	2.4427E-01	2.1605E-01	4.6032E-01
2.000E 06	2.2861E-01	1.8847E-01	4.1708E-01
3.000E 06	2.0722E-01	1.5309E-01	3.6031E-01
5.000E 06	1.8226E-01	1.1622E-01	2.9847E-01
8.000E 06	1.6127E-01	8.9759E-02	2.5102E-01
1.000E 07	1.5159E-01	7.8803E-02	2.3040E-01
1.500E 07	1.3416E-01	6.1197E-02	1.9536E-01
2.000E 07	1.2195E-01	5.1389E-02	1.7334E-01
3.000E 07	1.0500E-01	4.2520E-02	1.4752E-01
5.000E 07	8.4143E-02	3.7619E-02	1.2176E-01
8.000E 07	6.7292E-02	3.5240E-02	1.0253E-01
1.000E 08	6.1007E-02	3.4233E-02	9.5240E-02
1.500E 08	5.2990E-02	3.2455E-02	8.5445E-02
2.000E 08	4.9368E-02	3.1140E-02	8.0507E-02
3.000E 08	4.5320E-02	2.8951E-02	7.4271E-02
5.000E 08	3.9498E-02	2.5201E-02	6.4699E-02
8.000E 08	3.2486E-02	2.0549E-02	5.3035E-02
1.000E 09	2.8636E-02	1.7973E-02	4.6609E-02

DECAY HEAT PREDICTIONS FOR AN INFINITE IRRADIATION IN PU239
(1.0E13 s)

TIME S	BETA MEV/F	GAMMA MEV/F	TOTAL MEV/F
0.000E 00	5.4342E 00	4.9173E 00	1.0352E 01
1.000E 00	5.0397E 00	4.6627E 00	9.7024E 00
1.500E 00	4.9017E 00	4.5675E 00	9.4692E 00
2.000E 00	4.7858E 00	4.4850E 00	9.2708E 00
3.000E 00	4.5983E 00	4.3471E 00	8.9454E 00
5.000E 00	4.3272E 00	4.1405E 00	8.4677E 00
8.000E 00	4.0530E 00	3.9252E 00	7.9782E 00
1.000E 01	3.9177E 00	3.8176E 00	7.7353E 00
1.500E 01	3.6681E 00	3.6186E 00	7.2867E 00
2.000E 01	3.4913E 00	3.4790E 00	6.9703E 00
3.000E 01	3.2466E 00	3.2896E 00	6.5362E 00
5.000E 01	2.9459E 00	3.0614E 00	6.0073E 00
8.000E 01	2.6764E 00	2.8524E 00	5.5288E 00
1.000E 02	2.5533E 00	2.7533E 00	5.3066E 00
1.500E 02	2.3423E 00	2.5785E 00	4.9208E 00
2.000E 02	2.2032E 00	2.4615E 00	4.6647E 00
3.000E 02	2.0187E 00	2.3067E 00	4.3254E 00
5.000E 02	1.7950E 00	2.1180E 00	3.9130E 00
8.000E 02	1.5892E 00	1.9365E 00	3.5257E 00
1.000E 03	1.4915E 00	1.8455E 00	3.3370E 00
1.500E 03	1.3179E 00	1.6728E 00	2.9907E 00
2.000E 03	1.2014E 00	1.5468E 00	2.7482E 00
3.000E 03	1.0540E 00	1.3703E 00	2.4244E 00
5.000E 03	9.0469E-01	1.1630E 00	2.0677E 00
8.000E 03	7.9967E-01	9.9892E-01	1.7986E 00
1.000E 04	7.5707E-01	9.3163E-01	1.6887E 00
1.500E 04	6.8620E-01	8.2705E-01	1.5133E 00
2.000E 04	6.3889E-01	7.6564E-01	1.4045E 00
3.000E 04	5.7460E-01	6.9218E-01	1.2668E 00
5.000E 04	4.9792E-01	6.1090E-01	1.1088E 00
8.000E 04	4.3588E-01	5.4262E-01	9.7850E-01
1.000E 05	4.1027E-01	5.1252E-01	9.2279E-01
1.500E 05	3.6985E-01	4.6176E-01	8.3162E-01
2.000E 05	3.4552E-01	4.2848E-01	7.7400E-01
3.000E 05	3.1634E-01	3.8416E-01	7.0050E-01
5.000E 05	2.8500E-01	3.2997E-01	6.1498E-01
8.000E 05	2.5869E-01	2.8031E-01	5.3900E-01
1.000E 06	2.4672E-01	2.5729E-01	5.0401E-01
1.500E 06	2.2584E-01	2.1766E-01	4.4350E-01
2.000E 06	2.1167E-01	1.9169E-01	4.0336E-01
3.000E 06	1.9272E-01	1.5838E-01	3.5110E-01
5.000E 06	1.7104E-01	1.2323E-01	2.9426E-01
8.000E 06	1.5291E-01	9.7436E-02	2.5035E-01
1.000E 07	1.4444E-01	8.6646E-02	2.3109E-01
1.500E 07	1.2869E-01	6.9300E-02	1.9799E-01
2.000E 07	1.1713E-01	5.9629E-02	1.7676E-01
3.000E 07	1.0025E-01	5.0763E-02	1.5101E-01
5.000E 07	7.8504E-02	4.5517E-02	1.2402E-01
8.000E 07	6.0569E-02	4.2681E-02	1.0325E-01
1.000E 08	5.3850E-02	4.1467E-02	9.5316E-02
1.500E 08	4.5404E-02	3.9360E-02	8.4764E-02
2.000E 08	4.1837E-02	3.7850E-02	7.9687E-02
3.000E 08	3.8323E-02	3.5405E-02	7.3728E-02
5.000E 08	3.3691E-02	3.1292E-02	6.4983E-02
8.000E 08	2.8173E-02	2.6221E-02	5.4395E-02
1.000E 09	2.5146E-02	2.3418E-02	4.8564E-02

DECAY HEAT PREDICTIONS FOR AN INFINITE IRRADIATION IN PU241
(1.0E13 s)

TIME S	BETA MEV/F	GAMMA MEV/F	TOTAL MEV/F
0.000E 00	6.8441E 00	5.7407E 00	2.3585E 01
1.000E 00	6.1835E 00	5.3546E 00	1.1538E 01
1.500E 00	5.9637E 00	5.2179E 00	1.1182E 01
2.000E 00	5.7822E 00	5.1013E 00	1.0883E 01
3.000E 00	5.4944E 00	4.9092E 00	1.0404E 01
5.000E 00	5.0926E 00	4.6273E 00	9.7199E 00
8.000E 00	4.7046E 00	4.3426E 00	9.0472E 00
1.000E 01	4.5198E 00	4.2037E 00	8.7234E 00
1.500E 01	4.1880E 00	3.9518E 00	8.1399E 00
2.000E 01	3.9580E 00	3.7770E 00	7.7350E 00
3.000E 01	3.6423E 00	3.5383E 00	7.1807E 00
5.000E 01	3.2558E 00	3.2436E 00	6.4994E 00
8.000E 01	2.9121E 00	2.9708E 00	5.8829E 00
1.000E 02	2.7568E 00	2.8429E 00	5.5997E 00
1.500E 02	2.4938E 00	2.6215E 00	5.1154E 00
2.000E 02	2.3229E 00	2.4775E 00	4.8004E 00
3.000E 02	2.0999E 00	2.2937E 00	4.3935E 00
5.000E 02	1.8372E 00	2.0826E 00	3.9198E 00
8.000E 02	1.6046E 00	1.8919E 00	3.4965E 00
1.000E 03	1.4973E 00	1.7991E 00	3.2964E 00
1.500E 03	1.3114E 00	1.6253E 00	2.9367E 00
2.000E 03	1.1897E 00	1.4992E 00	2.6889E 00
3.000E 03	1.0381E 00	1.3230E 00	2.3611E 00
5.000E 03	8.8713E-01	1.1162E 00	2.0034E 00
8.000E 03	7.8325E-01	9.5328E-01	1.7365E 00
1.000E 04	7.4199E-01	8.8690E-01	1.6289E 00
1.500E 04	6.7479E-01	7.8486E-01	1.4597E 00
2.000E 04	6.3097E-01	7.2596E-01	1.3569E 00
3.000E 04	5.7243E-01	6.5657E-01	1.2290E 00
5.000E 04	5.0280E-01	5.7999E-01	1.0828E 00
8.000E 04	4.4532E-01	5.1559E-01	9.6092E-01
1.000E 05	4.2116E-01	4.8744E-01	9.0860E-01
1.500E 05	3.8259E-01	4.4053E-01	8.2312E-01
2.000E 05	3.5921E-01	4.1006E-01	7.6927E-01
3.000E 05	3.3109E-01	3.6943E-01	7.0052E-01
5.000E 05	3.0074E-01	3.1888E-01	6.1962E-01
8.000E 05	2.7501E-01	2.7114E-01	5.4616E-01
1.000E 06	2.6321E-01	2.4849E-01	5.1170E-01
1.500E 06	2.4238E-01	2.0877E-01	4.5114E-01
2.000E 06	2.2812E-01	1.8233E-01	4.1045E-01
3.000E 06	2.0897E-01	1.4845E-01	3.5742E-01
5.000E 06	1.8708E-01	1.1374E-01	3.0083E-01
8.000E 06	1.6859E-01	8.9838E-02	2.5842E-01
1.000E 07	1.5969E-01	8.0266E-02	2.3995E-01
1.500E 07	1.4241E-01	6.5114E-02	2.0752E-01
2.000E 07	1.2903E-01	5.6625E-02	1.8566E-01
3.000E 07	1.0857E-01	4.8537E-02	1.5710E-01
5.000E 07	8.1246E-02	4.3058E-02	1.2430E-01
8.000E 07	5.8454E-02	3.9651E-02	9.8105E-02
1.000E 08	4.9941E-02	3.8214E-02	8.8154E-02
1.500E 08	3.9461E-02	3.5862E-02	7.5323E-02
2.000E 08	3.5365E-02	3.4295E-02	6.9659E-02
3.000E 08	3.1925E-02	3.1864E-02	6.3789E-02
5.000E 08	2.7968E-02	2.7807E-02	5.5775E-02
8.000E 08	2.3333E-02	2.2787E-02	4.6120E-02
1.000E 09	2.0790E-02	2.0008E-02	4.0798E-02