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Tables of Energy Deposition Distributions in Aluminum and Copper Irradiated by Point-Monodirectional Electron Beams With Energies From 1 to 60 MeV

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards
Washington, DC 20234

October 1982

Prepared for:

Office of Naval Research
Arlington, Virginia 22217

Space Science Data Center
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Greenbelt, Maryland 20771

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M. J. Berger and S. M. Seltzer

U.S. DEPARTMENT OF COMMERCE
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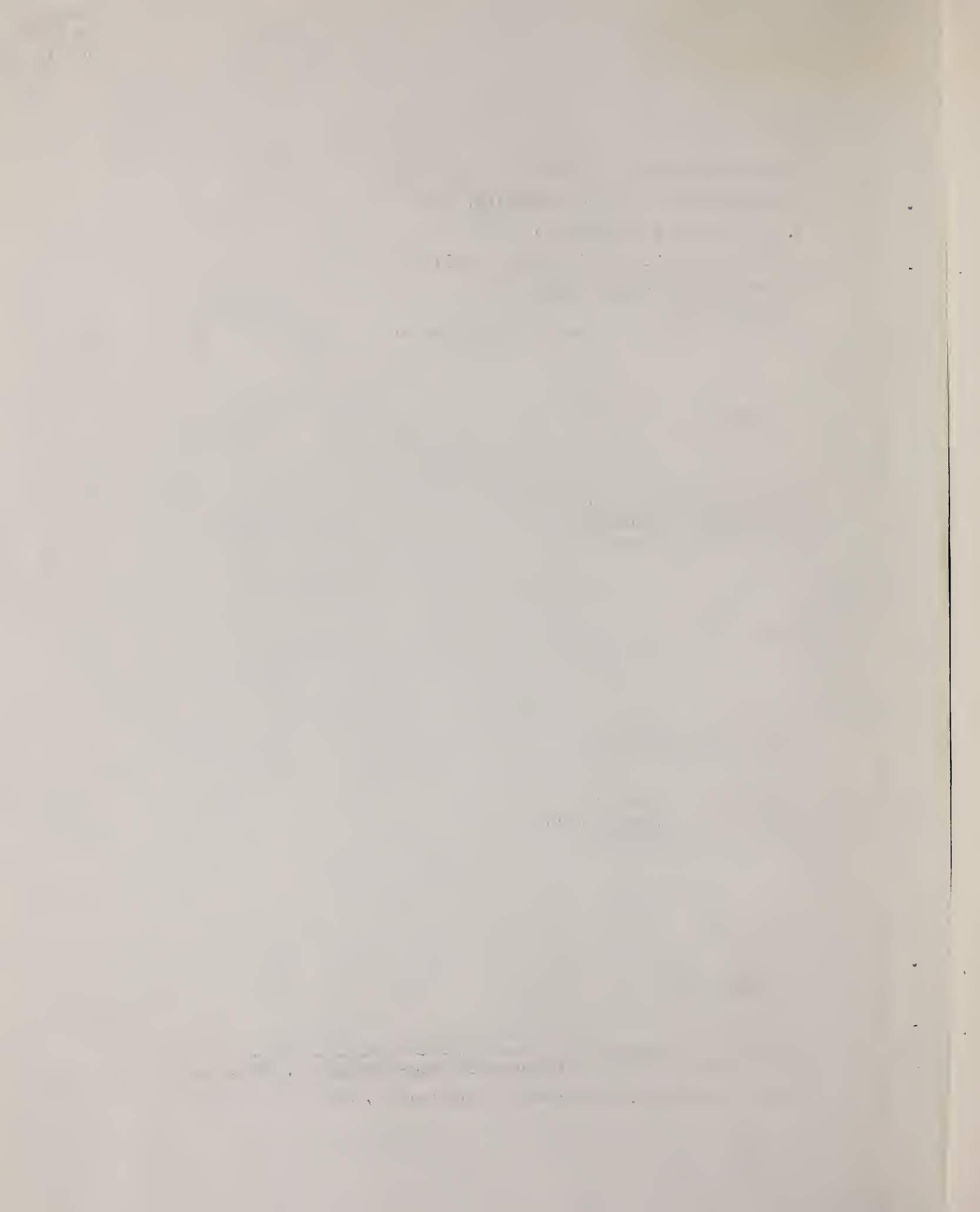
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U.S. DEPARTMENT OF COMMERCE, Malcolm Baldrige, *Secretary*
NATIONAL BUREAU OF STANDARDS, Ernest Ambler, *Director*



Tables of Energy Deposition Distributions in Aluminum and Copper Irradiated
by Point-Monodirectional Electron Beams with Energies from 1 to 60 MeV^{*}

M. J. Berger and S. M. Seltzer

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This report presents tables of energy deposition distributions in aluminum and copper media irradiated by monoenergetic point-monodirectional electron beams. The distributions are given as functions of the depth in the medium and of the radial distance from the incident beam. Results are given for 7 beam energies between 1 MeV and 60 MeV. As shown earlier in National Bureau of Standards Report NBSIR 82-2451 (1982), the tabulated results from monoenergetic, point-monodirectional sources can be used, by superposition, to obtain spatial distributions of the energy imparted to the medium by parallel beams with arbitrary spectra and finite arbitrary cross sections.

Key words: absorbed-dose distribution; aluminum; copper; electron; point-monodirectional beam; superposition.

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1. INTRODUCTION

The spatial distribution of energy imparted to a medium irradiated by an electron beam depends on the electron stopping power and on the multiple scattering of the electrons in the medium. Even when the incident beam is narrowly collimated (point-monodirectional), the distribution of imparted energy spreads laterally with depth in the medium, as the result of multiple scattering. The higher the atomic number of the medium, the greater are the effects of multiple scattering.

In a previous report [1]¹ we have presented comprehensive tables of the spatial distribution of imparted energy in a water medium irradiated by point-monodirectional monoenergetic electron beams with energies from 1 to 60 MeV. It was also shown in reference [1] how these "elementary" distributions can be combined by superposition to obtain the spatial distribution of imparted energy from parallel electron beams with finite cross sections of arbitrary shape. Of course one can also use weighted sums of elementary distributions for monoenergetic sources to obtain results for incident electron beams with arbitrary spectra.

The results for water were generated mainly with a view towards applications in biomedical dosimetry, for example in radiation treatment planning. In the present report the calculations are extended to other media of higher atomic number (aluminum and copper) to provide information of interest for radiation damage studies in terms of imparted energy.

2. CONDITIONS OF CALCULATION

The calculations were, as in reference [1], carried out with the Monte Carlo transport program ETRAN [2]. A point-monodirectional electron beam with kinetic energy T_0 was assumed to be incident along the z-axis onto a semi-infinite medium that occupies the region $z \geq 0$. The electron tracks simulated by random sampling were analyzed to obtain an estimate of the elementary distribution function $F(\rho, z)$. This distribution is defined such that $F(\rho, z)d\rho dz$ represents the average fraction of the incident beam energy that is deposited at depths between z and $z + dz$ and at radial distances between ρ and $\rho + d\rho$ from the z-axis. This distribution is normalized such that

$$\int_0^{\infty} dz \int_0^{\infty} F(\rho, z) d\rho = 1 \quad . \quad (1)$$

The Monte Carlo results were actually obtained, and were tabulated, in the form of the following histogram distributions:

¹Numbers in brackets indicate literature references at the end of this paper.

a) Distribution of imparted energy in depth intervals,

$$H_n = 100 \int_{z_{n-1}}^{z_n} dz \int_0^{\infty} d\rho' F(\rho', z) . \quad (2)$$

b) Cumulative radial distribution of imparted energy in indicated depth intervals,

$$\psi_n(\rho) = 100 \frac{\int_{z_{n-1}}^{z_n} dz \int_0^{\rho} d\rho' F(\rho', z)}{\int_{z_{n-1}}^{z_n} dz \int_0^{\infty} d\rho' F(\rho', z)} . \quad (3)$$

The boundaries of the depth intervals were chosen such that

$$z_n = nr_0/20, n = 0, 1, 2 \dots \quad (4)$$

where r_0 is the c.s.d.a. range (rectified pathlength computed in the continuous-slowing-down approximation) at the incident-beam energy T_0 . Similarly, tabular values of $\psi_n(\rho)$ are given for ρ -values that are specified fractions of r_0 . The distributions of imparted energy are thereby "scaled" in the sense that their dependence on the incident beam energy T_0 is minimized, which facilitates interpolation with respect to T_0 .

3. ELECTRON RANGES

The Monte Carlo calculations for this report were done some time ago, with the best cross sections then available for the electron energy loss per unit pathlength. Since then, the collision stopping power (mean energy loss per unit pathlength due to excitations and ionizations) and the radiative stopping power (mean energy loss per unit pathlength due to the emission of bremsstrahlung) have been revised [3]. For the collision stopping power, more up-to-date experimental values were used for the mean excitation energy (the key parameter of the Bethe stopping power formula). Moreover, the density-effect correction (reduction of energy loss due to the polarization of the medium) was improved. The universal approximation formula of Sternheimer and Peierls [4] was no longer used. Instead, the density-effect was evaluated according to the original method of Sternheimer [5], using up-to-date values of the mean excitation

energy and of the atomic binding energies needed for the modeling of the dispersion properties of the medium. In regard to the radiative stopping power, the principal changes consist of the use of the new theoretical cross sections of Pratt *et al.* [6] below 2 MeV, the re-evaluation of the cross sections of Davies, Bethe, Maximon, and Olsen [7] above 50 MeV, and the use of interpolation with respect to electron energy to cover the region from 2 to 50 MeV.

Fortunately the use of improved cross sections resulted in relatively small changes in the stopping powers for aluminum and copper compared to those used in the Monte Carlo calculations, and the corresponding changes of the c.s.d.a. ranges, shown in table 1, are equally small. It is expected to be a good approximation to assume that the scaled spatial distributions of imparted energy, expressed in terms of the variables ρ/r_0 and z/r_0 , are not affected by the change of cross sections. The appropriate adjustment to the new cross sections can then be made simply by using the new range values when converting the spatial distributions from the scaled form into unscaled distributions as functions of ρ and z .

4. RESULTS

Spatial distributions of imparted energy from point monodirectional electron beams, are given for 7 beam energies from 1 MeV to 60 MeV. The results at each energy are based on a sample of 10,000 tracks of primary electrons as well as the tracks of all generations of secondary electrons (including those set in motion by bremsstrahlung photons). Tables 2A and 2B give the histogram distributions H_n with respect to depth, for aluminum and copper. Tables 3A and 3B give the cumulative histogram distributions $\psi_n(\rho)$ with respect to radial distance from the incident beam, in various depth intervals, for aluminum and copper.

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Table 1. Electron ranges* in aluminum and copper

T ₀ (MeV)	Aluminum			Copper		
	r ₀ (g/cm ²)		Percent Difference	r ₀ (g/cm ²)		Percent Difference
	Old ^a	New ^b		Old ^a	New ^b	
60	23.68	23.56	- 0.5	20.27	20.29	0.1
40	18.00	17.90	- 0.6	16.20	16.24	0.2
20	10.63	10.56	- 0.7	10.36	10.43	0.7
10	5.898	5.861	- 0.6	6.116	6.183	1.1
5	3.107	3.092	- 0.5	3.358	3.408	1.5
2	1.221	1.224	0.2	1.364	1.384	1.8
1	0.5508	0.5546	0.7	0.6249	0.6367	1.9

* Ranges are computed in continuous-slowing-down approximation and represent rectified pathlengths traveled by electrons in the course of slowing down to rest.

^a Old: used in Monte Carlo calculations.

^b New: From reference [3].

TABLE 2A. Distribution of energy deposition in aluminum as a function of depth. The numbers in the column headed "Scaled depth interval" are the depth boundaries in units of the c.s.d.a. range r_0 . The other columns give the quantity H_n as defined by Eq (2), *i.e.*, the percentage of the beam energy that is deposited in the indicated depth interval.

Energy Deposition as a Function of Depth in Aluminum

Scaled depth interval	Beam energy, MeV						
	60	40	20	10	5	2	1
0.0 - 0.05	2.97	3.38	3.91	4.29	4.61	4.91	5.04
0.05 - 0.10	3.16	3.58	4.18	4.68	5.20	5.97	6.45
0.10 - 0.15	3.23	3.73	4.35	5.03	5.88	7.06	7.81
0.15 - 0.20	3.35	3.76	4.51	5.21	6.43	8.15	8.74
0.20 - 0.25	3.47	3.88	4.58	5.61	6.95	8.78	9.17
0.25 - 0.30	3.63	3.98	4.76	6.01	7.64	9.00	9.26
0.30 - 0.35	3.64	4.07	5.05	6.35	7.99	8.89	8.88
0.35 - 0.40	3.69	4.14	5.09	6.65	8.06	8.41	8.31
0.40 - 0.45	3.76	4.16	5.33	6.97	7.76	7.60	7.60
0.45 - 0.50	3.75	4.19	5.39	6.89	7.31	6.82	6.57
0.50 - 0.55	3.75	4.27	5.48	6.70	6.58	5.92	5.42
0.55 - 0.60	3.71	4.25	5.49	6.17	5.81	4.77	4.27
0.60 - 0.65	3.64	4.20	5.31	5.64	4.92	3.62	3.15
0.65 - 0.70	3.54	4.07	5.01	4.91	3.89	2.64	2.07
0.70 - 0.75	3.45	3.82	4.52	3.95	2.80	1.78	1.31
0.75 - 0.80	3.25	3.60	3.95	3.02	1.87	1.04	0.75
0.80 - 0.85	3.03	3.38	3.25	2.12	1.06	0.53	0.40
0.85 - 0.90	2.84	2.99	2.55	1.35	0.54	0.21	0.14
0.90 - 0.95	2.55	2.56	1.82	0.71	0.24	0.06	0.04
0.95 - 1.00	2.26	2.11	1.21	0.30	0.07	0.02	0.01
1.00 - 1.05	1.98	1.69	0.71	0.13	0.03	0.00	0.00
1.05 - 1.10	1.69	1.33	0.40	0.06	0.02	0.01	0.00
1.10 - 1.15	1.43	0.98	0.23	0.05	0.01	0.00	0.00
1.15 - 1.20	1.16	0.72	0.16	0.05	0.02	0.00	0.00
1.20 - 1.25	0.99	0.52	0.14	0.05	0.01	0.01	0.00
1.25 - 1.30	0.83	0.40	0.13	0.04	0.01	0.00	0.00
1.30 - 1.35	0.72	0.33	0.13	0.03	0.01	0.00	0.00
1.35 - 1.40	0.60	0.32	0.12	0.03	0.01	0.00	0.00
1.40 - 1.45	0.56	0.31	0.10	0.03	0.01	0.00	0.00
1.45 - 1.50	0.53	0.29	0.10	0.02	0.01	0.00	0.0
1.50 - 1.55	0.51	0.28	0.10	0.02	0.01	0.00	0.00
1.55 - 1.60	0.48	0.28	0.09	0.02	0.01	0.00	0.00
1.60 - 1.65	0.48	0.29	0.07	0.02	0.00	0.00	0.00
1.65 - 1.70	0.47	0.26	0.08	0.03	0.01	0.00	0.00
1.70 - 1.75	0.44	0.27	0.07	0.02	0.00	0.00	0.0
1.75 - 1.80	0.42	0.28	0.07	0.02	0.01	0.00	0.0
1.80 - 1.85	0.39	0.26	0.07	0.02	0.00	0.00	0.00
1.85 - 1.90	0.39	0.24	0.07	0.02	0.00	0.00	0.00
1.90 - 1.95	0.39	0.23	0.07	0.02	0.00	0.00	0.0
1.95 - 2.00	0.34	0.23	0.06	0.02	0.00	0.00	0.0

TABLE 2B. Distribution of energy deposition in copper as a function of depth. The numbers in the column headed "Scaled depth interval" are the depth boundaries in units of the c.s.d.a. range r_0 . The other columns give the quantity H_n as defined by Eq (2), *i.e.*, the percentage of the beam energy that is deposited in the indicated depth interval.

		Energy Deposition as a Function of Depth in Copper						
		Beam energy, MeV						
Scaled depth interval		60	40	20	10	5	2	1
0.0 - 0.05		2.23	2.66	3.48	4.41	5.62	7.12	7.61
0.05 - 0.10		2.47	2.95	3.90	5.31	7.37	9.70	10.73
0.10 - 0.15		2.64	3.13	4.32	6.16	8.68	11.33	12.01
0.15 - 0.20		2.84	3.42	4.65	6.84	9.56	11.43	11.63
0.20 - 0.25		3.02	3.60	5.06	7.50	9.67	10.56	10.54
0.25 - 0.30		3.20	3.75	5.40	7.81	9.32	9.38	9.04
0.30 - 0.35		3.36	3.96	5.64	7.74	8.55	7.82	7.37
0.35 - 0.40		3.44	4.04	5.78	7.42	7.62	6.28	5.43
0.40 - 0.45		3.60	4.16	5.84	6.80	6.38	4.87	4.18
0.45 - 0.50		3.55	4.13	5.57	6.05	5.16	3.45	2.87
0.50 - 0.55		3.55	4.11	5.08	5.19	3.94	2.44	1.87
0.55 - 0.60		3.41	3.83	4.69	4.13	2.85	1.52	1.07
0.60 - 0.65		3.33	3.60	4.08	3.32	1.88	0.91	0.58
0.65 - 0.70		3.14	3.42	3.45	2.42	1.18	0.41	0.27
0.70 - 0.75		2.94	3.08	2.86	1.73	0.65	0.17	0.08
0.75 - 0.80		2.76	2.78	2.24	1.12	0.33	0.06	0.03
0.80 - 0.85		2.58	2.41	1.73	0.70	0.14	0.02	0.02
0.85 - 0.90		2.33	2.01	1.24	0.36	0.08	0.02	0.00
0.90 - 0.95		2.15	1.72	0.92	0.19	0.03	0.01	0.00
0.95 - 1.00		1.86	1.44	0.65	0.14	0.04	0.01	0.00
1.00 - 1.05		1.70	1.25	0.41	0.10	0.03	0.01	0.00
1.05 - 1.10		1.52	1.06	0.33	0.09	0.03	0.00	0.00
1.10 - 1.15		1.37	0.93	0.27	0.08	0.02	0.01	0.00
1.15 - 1.20		1.19	0.84	0.23	0.10	0.03	0.00	0.00
1.20 - 1.25		1.03	0.74	0.20	0.08	0.02	0.00	0.00
1.25 - 1.30		0.94	0.63	0.20	0.07	0.03	0.00	0.00
1.30 - 1.35		0.89	0.57	0.19	0.06	0.01	0.00	0.00
1.35 - 1.40		0.79	0.55	0.17	0.05	0.02	0.00	0.00
1.40 - 1.45		0.76	0.55	0.17	0.05	0.02	0.00	0.00
1.45 - 1.50		0.70	0.53	0.19	0.06	0.02	0.00	0.00
1.50 - 1.55		0.66	0.52	0.17	0.06	0.02	0.00	0.00
1.55 - 1.60		0.61	0.47	0.16	0.05	0.01	0.00	0.00
1.60 - 1.65		0.60	0.45	0.16	0.05	0.01	0.00	0.00
1.65 - 1.70		0.60	0.43	0.14	0.05	0.01	0.00	0.0
1.70 - 1.75		0.59	0.40	0.14	0.04	0.01	0.00	0.00
1.75 - 1.80		0.55	0.38	0.14	0.03	0.01	0.00	0.00
1.80 - 1.85		0.53	0.38	0.14	0.04	0.01	0.00	0.00
1.85 - 1.90		0.55	0.34	0.15	0.04	0.01	0.00	0.00
1.90 - 1.95		0.52	0.33	0.15	0.03	0.01	0.00	0.00
1.95 - 2.00		0.48	0.30	0.13	0.02	0.01	0.00	0.00

TABLE 3A. Normalized cumulative radial distribution of deposited energy in aluminum. The numbers in the column headed "Scaled radius" represent the scaled radial distance from the z-axis, ρ/r_0 . The "Scaled depth intervals" have the same meaning as in Table 2A. The entries for each depth interval are the quantities $\Psi_n(\rho)$ as defined by Eq (3). The percentage of the incident beam energy deposited in the indicated depth interval, at radial distances $\leq \rho$, is equal to $H_n \Psi_n(\rho)/100$, where H_n is given in Table 2A.

TABLE 3A

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 60 MeV

Scaled radius	0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60					
	0.0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	0.0	0.05	0.10	0.15			
0.005	94.44	78.23	36.79	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	0.0	0.05	0.10	0.15		
0.010	96.66	91.09	73.60	36.79	42.75	21.52	5.79	3.08	1.92	0.77	0.54	0.36	0.25	0.15	0.08	0.04	0.02	0.01	0.005	0.002	0.001	0.000	0.000	0.000	0.000	0.000	0.000	
0.015	97.66	94.04	87.12	73.60	66.02	40.50	21.52	11.58	6.99	3.09	1.89	1.03	0.60	0.40	0.25	0.15	0.08	0.04	0.02	0.01	0.005	0.002	0.001	0.000	0.000	0.000	0.000	0.000
0.020	98.23	95.32	91.52	87.12	79.34	56.93	40.50	23.43	14.61	6.73	4.41	2.43	1.40	0.85	0.50	0.30	0.18	0.10	0.05	0.02	0.01	0.005	0.002	0.001	0.000	0.000	0.000	0.000
0.025	98.58	96.18	93.76	91.52	86.09	69.61	56.93	36.10	23.37	11.19	7.65	4.41	2.43	1.40	0.85	0.50	0.30	0.18	0.10	0.05	0.02	0.01	0.005	0.002	0.001	0.000	0.000	0.000
0.030	98.81	96.85	94.86	93.76	89.75	78.05	69.61	48.80	33.29	16.22	11.54	6.61	3.64	2.15	1.25	0.75	0.45	0.25	0.15	0.08	0.04	0.02	0.01	0.005	0.002	0.001	0.000	0.000
0.035	99.01	97.30	95.60	94.86	91.85	83.49	78.05	59.90	43.10	22.06	15.61	8.61	4.85	2.80	1.60	0.95	0.55	0.30	0.18	0.10	0.05	0.02	0.01	0.005	0.002	0.001	0.000	0.000
0.040	99.16	97.75	96.24	95.60	93.12	87.07	83.49	68.55	52.02	28.20	20.42	11.95	6.76	3.95	2.20	1.30	0.75	0.45	0.25	0.15	0.08	0.04	0.02	0.01	0.005	0.002	0.001	0.000
0.045	99.25	98.03	96.75	96.24	94.15	89.50	87.07	75.26	60.34	34.41	25.30	15.74	9.32	5.50	3.10	1.80	1.00	0.55	0.30	0.18	0.10	0.05	0.02	0.01	0.005	0.002	0.001	0.000
0.050	99.33	98.32	97.19	96.75	94.96	91.25	89.50	80.03	67.12	40.65	30.46	19.51	12.05	7.50	4.20	2.40	1.40	0.80	0.45	0.25	0.15	0.08	0.04	0.02	0.01	0.005	0.002	0.001
0.060	99.41	98.66	97.80	97.80	96.09	93.37	91.25	83.71	72.84	46.46	35.30	23.51	15.25	9.50	5.50	3.00	1.70	1.00	0.55	0.30	0.18	0.10	0.05	0.02	0.01	0.005	0.002	0.001
0.070	99.47	98.86	98.22	98.22	96.81	94.76	93.37	88.38	81.03	57.36	45.36	36.12	29.49	18.00	10.50	6.00	3.50	2.00	1.10	0.60	0.35	0.20	0.12	0.07	0.04	0.02	0.01	0.005
0.080	99.53	99.01	98.49	98.49	97.34	95.77	94.76	91.18	85.87	66.32	54.81	44.33	36.68	24.00	14.00	8.00	4.50	2.50	1.40	0.80	0.45	0.25	0.15	0.08	0.04	0.02	0.01	0.005
0.090	99.54	99.11	98.67	98.67	97.75	96.45	95.77	93.06	89.24	78.46	69.74	59.10	43.78	30.00	18.00	10.00	5.50	3.00	1.70	1.00	0.55	0.30	0.18	0.10	0.05	0.02	0.01	0.005
0.100	99.57	99.21	98.75	98.75	98.09	97.04	96.45	95.26	92.85	82.65	75.17	64.97	56.90	40.00	24.00	13.00	7.00	4.00	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02	0.01
0.110	99.58	99.31	98.91	98.91	98.35	97.49	97.04	95.93	93.94	85.56	79.59	70.07	62.14	45.00	27.00	15.00	8.00	4.50	2.50	1.40	0.80	0.45	0.25	0.15	0.08	0.04	0.02	0.01
0.120	99.60	99.34	98.99	98.99	98.59	97.79	97.49	96.46	94.92	87.94	83.02	74.48	66.85	48.00	29.00	16.00	9.00	5.00	2.80	1.60	0.90	0.50	0.30	0.18	0.10	0.05	0.02	0.01
0.130	99.60	99.38	99.08	99.08	98.76	98.01	98.01	96.85	95.69	89.83	85.66	78.28	71.16	52.00	31.00	17.00	9.50	5.50	3.00	1.70	1.00	0.55	0.30	0.18	0.10	0.05	0.02	0.01
0.140	99.62	99.42	99.16	99.16	98.89	98.24	98.24	97.08	96.31	91.29	87.57	81.27	74.86	55.00	33.00	19.00	10.00	5.50	3.00	1.70	1.00	0.55	0.30	0.18	0.10	0.05	0.02	0.01
0.150	99.63	99.43	99.21	99.21	98.97	98.39	98.39	97.38	96.82	92.45	89.49	83.82	77.93	58.00	35.00	20.00	11.00	6.00	3.50	2.00	1.10	0.60	0.35	0.20	0.12	0.07	0.04	0.02
0.160	99.64	99.45	99.24	99.24	99.02	98.55	98.55	97.62	97.22	93.37	90.96	85.92	80.54	60.00	37.00	21.00	12.00	6.50	3.50	2.00	1.10	0.60	0.35	0.20	0.12	0.07	0.04	0.02
0.170	99.64	99.46	99.30	99.30	99.08	98.66	98.66	97.85	97.50	94.21	92.11	87.73	82.96	62.00	39.00	22.00	13.00	7.00	4.00	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.180	99.65	99.48	99.34	99.34	99.16	98.77	98.77	98.03	97.77	94.86	93.00	89.20	85.20	64.00	41.00	23.00	14.00	7.50	4.00	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.190	99.66	99.51	99.37	99.37	99.20	98.85	98.85	98.17	97.97	95.38	93.77	90.41	86.99	66.00	43.00	24.00	14.00	7.50	4.00	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.200	99.66	99.53	99.40	99.40	99.23	98.93	98.93	98.30	98.12	95.82	94.51	91.39	88.48	68.00	45.00	25.00	15.00	8.00	4.00	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.220	99.68	99.56	99.43	99.43	99.29	99.06	99.06	98.49	98.36	96.57	95.51	93.03	90.78	70.00	47.00	26.00	16.00	8.50	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.240	99.69	99.58	99.47	99.47	99.34	99.13	99.13	98.63	98.58	97.07	96.22	94.19	92.43	72.00	49.00	27.00	17.00	9.00	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.260	99.70	99.60	99.51	99.51	99.37	99.18	99.18	98.75	98.76	97.57	96.79	95.16	93.79	74.00	51.00	28.00	18.00	9.50	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.280	99.71	99.61	99.54	99.54	99.38	99.26	99.26	98.87	98.91	97.91	97.19	95.85	94.80	76.00	53.00	29.00	19.00	10.00	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.300	99.72	99.63	99.58	99.58	99.42	99.32	99.32	98.97	99.00	98.18	97.64	96.41	95.53	78.00	55.00	30.00	20.00	10.50	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.320	99.72	99.64	99.59	99.59	99.45	99.37	99.37	99.06	99.06	98.37	97.92	96.84	96.27	80.00	57.00	31.00	21.00	11.00	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.340	99.73	99.65	99.62	99.62	99.48	99.42	99.42	99.13	99.12	98.56	98.17	97.23	96.73	82.00	59.00	32.00	22.00	11.50	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.360	99.74	99.66	99.63	99.63	99.51	99.46	99.46	99.22	99.20	98.71	98.34	97.58	97.15	84.00	61.00	33.00	23.00	12.00	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.380	99.75	99.68	99.65	99.65	99.55	99.50	99.50	99.29	99.27	98.84	98.53	97.84	97.53	86.00	63.00	34.00	24.00	12.50	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.400	99.76	99.69	99.67	99.67	99.59	99.55	99.55	99.33	99.32	98.94	98.67	98.06	97.78	88.00	65.00	35.00	25.00	13.00	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.420	99.77	99.70	99.68	99.68	99.62	99.57	99.57	99.40	99.36	99.04	98.79	98.28	97.96	90.00	67.00	36.00	26.00	13.50	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.440	99.78	99.72	99.70	99.70	99.64	99.60	99.60	99.45	99.40	99.14	98.91	98.51	98.22	92.00	69.00	37.00	27.00	14.00	4.50	2.20	1.20	0.70	0.40	0.25	0.15	0.08	0.04	0.02
0.460	99.79	99.73	99.71	99.71	99.66	99.63	99.63	99.49	99.46	99.17	98.93	98.53	98.24	94.00	71.00	38.00	28.00	14.50	4.50	2.								

TABLE 3A. Continued

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 40 Mev

Scaled radius	0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60	
	0.0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15
0.005	94.21	69.35	25.42	9.26	3.89	2.25	1.16	0.62	0.52	0.34	0.22	0.14												
0.010	96.71	89.12	61.74	30.14	14.15	7.78	4.48	2.64	1.79	1.24	0.79	0.64												
0.015	97.75	93.31	80.76	52.34	28.27	15.98	9.72	5.74	3.99	2.95	1.74	1.31												
0.020	98.24	95.12	88.80	69.36	44.05	26.08	15.95	10.20	6.93	5.25	3.38	2.22												
0.025	98.62	96.07	92.07	79.86	57.11	36.55	23.47	15.70	10.69	7.76	5.16	3.65												
0.030	98.89	96.69	93.66	86.01	67.69	47.07	31.49	21.50	14.77	10.49	7.31	5.21												
0.035	99.11	97.27	94.80	89.68	75.37	56.11	39.38	27.52	19.19	14.07	9.95	7.09												
0.040	99.22	97.67	95.60	91.94	80.93	64.32	46.60	33.63	24.21	17.78	12.82	9.19												
0.045	99.30	97.95	96.17	93.38	85.06	70.33	53.69	39.92	29.30	21.40	15.73	11.41												
0.050	99.35	98.14	96.64	94.32	87.93	75.60	59.74	45.65	34.17	25.27	18.83	13.77												
0.060	99.45	98.50	97.34	95.70	91.20	83.04	69.89	55.88	44.11	33.05	25.54	19.24												
0.070	99.52	98.73	97.86	96.59	93.18	87.60	77.64	64.95	52.86	41.17	32.59	24.86												
0.080	99.56	98.91	98.23	97.27	94.48	90.41	82.96	72.00	60.63	48.68	39.31	30.49												
0.090	99.61	99.06	98.45	97.77	95.42	92.30	86.57	77.71	67.08	55.74	45.47	35.99												
0.100	99.63	99.15	98.62	97.98	96.11	93.59	89.23	81.88	72.69	61.84	51.78	41.71												
0.110	99.65	99.22	98.74	98.27	96.66	94.54	91.14	84.84	76.98	67.00	57.23	47.15												
0.120	99.67	99.28	98.87	98.46	97.06	95.28	92.41	87.29	80.59	71.71	62.27	52.16												
0.130	99.68	99.31	98.94	98.62	97.50	95.87	93.51	89.09	83.41	75.44	66.43	56.75												
0.140	99.69	99.36	99.04	98.76	97.79	96.36	94.30	90.59	85.64	78.89	70.30	61.03												
0.150	99.69	99.38	99.11	98.88	98.01	96.78	94.95	91.86	87.28	81.40	73.71	64.63												
0.160	99.71	99.42	99.17	98.97	98.21	97.08	95.59	92.76	88.78	83.69	76.75	68.12												
0.170	99.71	99.44	99.28	99.03	98.36	97.31	96.05	93.52	89.94	85.59	79.15	71.22												
0.180	99.71	99.48	99.30	99.08	98.50	97.57	96.44	94.14	91.90	88.13	81.61	73.92												
0.190	99.72	99.51	99.32	99.12	98.62	97.78	96.80	94.64	92.78	88.43	83.54	76.44												
0.200	99.72	99.52	99.35	99.15	98.70	98.02	97.07	95.10	92.57	89.52	85.23	78.65												
0.220	99.72	99.55	99.40	99.20	98.84	98.33	97.49	95.88	93.81	91.51	87.75	82.42												
0.240	99.73	99.57	99.43	99.25	98.94	98.53	97.88	96.47	94.72	92.86	89.85	85.49												
0.260	99.74	99.59	99.47	99.29	99.05	98.72	98.13	96.91	95.50	94.13	91.57	87.92												
0.280	99.75	99.62	99.51	99.35	99.15	98.89	98.33	97.28	96.11	95.01	92.73	89.98												
0.300	99.76	99.63	99.55	99.41	99.23	99.01	98.50	97.52	96.62	95.69	93.72	91.52												
0.320	99.77	99.64	99.57	99.45	99.29	99.09	98.65	97.73	97.06	96.21	94.67	92.84												
0.340	99.78	99.65	99.61	99.47	99.36	99.15	98.76	97.94	97.42	96.66	95.40	93.83												
0.360	99.79	99.67	99.64	99.49	99.43	99.23	98.83	98.15	97.72	97.07	95.89	94.68												
0.380	99.80	99.68	99.66	99.51	99.47	99.30	98.92	98.34	97.94	97.37	96.31	95.31												
0.400	99.81	99.69	99.67	99.53	99.50	99.33	99.01	98.50	98.13	97.72	96.66	95.87												
0.420	99.83	99.70	99.70	99.56	99.53	99.42	99.19	98.62	98.32	98.00	97.05	96.37												
0.440	99.83	99.71	99.71	99.57	99.55	99.46	99.19	98.79	98.49	98.21	97.44	96.79												
0.460	99.84	99.73	99.72	99.59	99.57	99.50	99.24	98.91	98.63	98.43	97.73	97.16												
0.480	99.85	99.74	99.74	99.60	99.59	99.53	99.31	99.06	98.78	98.63	97.98	97.54												
0.500	99.85	99.75	99.75	99.62	99.62	99.57	99.37	99.17	98.90	98.79	98.20	97.90												
0.550	99.87	99.79	99.77	99.66	99.70	99.67	99.50	99.33	99.21	99.08	98.67	98.57												
0.600	99.88	99.83	99.82	99.68	99.78	99.74	99.60	99.47	99.42	99.30	99.01	99.00												
0.650	99.89	99.86	99.86	99.75	99.81	99.79	99.72	99.63	99.59	99.49	99.23	99.55												
0.700	99.90	99.88	99.89	99.80	99.84	99.86	99.78	99.73	99.69	99.63	99.42	99.58												
0.750	99.92	99.90	99.92	99.85	99.88	99.91	99.82	99.80	99.77	99.80	99.58	99.72												
0.800	99.93	99.94	99.94	99.90	99.90	99.93	99.88	99.88	99.84	99.88	99.72	99.82												
0.850	99.96	99.95	99.95	99.93	99.93	99.95	99.94	99.93	99.90	99.91	99.87	99.91												
0.900	99.98	99.97	99.97	99.96	99.96	99.97	99.96	99.96	99.93	99.95	99.92	99.95												
0.950	99.99	99.99	99.99	99.98	99.98	99.99	99.98	99.98	99.97	99.97	99.96	99.98												
1.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00												

TABLE 3A. Continued

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 20 MeV

Scaled radius	Scaled depth interval		Scaled depth interval		Scaled depth interval		Scaled depth interval		Scaled depth interval				
	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
0.005	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
0.010	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	
0.015	0.07	0.04	0.05	0.02	0.03	0.01	0.02	0.04	0.03	0.03	0.02	0.02	0.02
0.020	0.20	0.18	0.17	0.06	0.14	0.14	0.16	0.12	0.15	0.14	0.10	0.02	0.02
0.025	0.48	0.38	0.33	0.18	0.26	0.24	0.35	0.32	0.26	0.54	0.23	0.03	0.03
0.030	0.82	0.67	0.55	0.35	0.43	0.45	0.57	0.52	0.55	0.78	0.45	0.24	0.24
0.035	1.24	1.05	0.83	0.59	0.70	0.67	0.82	0.82	0.82	1.13	0.85	0.47	0.47
0.040	1.82	1.48	1.18	0.93	1.01	0.95	1.30	1.21	1.04	1.78	1.57	0.63	0.63
0.045	2.44	1.93	1.54	1.43	1.50	1.25	1.60	1.62	1.40	2.63	2.21	0.78	0.78
0.050	3.13	2.57	2.15	1.97	1.98	1.61	2.04	2.22	2.03	3.62	2.60	1.34	1.34
0.060	3.96	3.33	2.73	2.52	2.45	2.10	2.47	2.84	2.84	4.35	3.29	1.79	1.79
0.070	4.85	4.03	3.39	3.09	3.08	2.55	3.01	3.40	3.63	5.35	3.70	2.14	2.14
0.080	6.98	5.60	4.83	4.40	4.22	3.55	4.25	4.78	5.41	7.44	4.86	3.02	3.02
0.090	9.32	7.50	6.65	6.17	5.66	4.90	5.90	6.71	7.24	9.93	6.82	4.08	4.08
0.100	11.99	9.76	8.69	7.93	7.29	6.34	7.67	8.76	9.70	12.20	8.98	5.17	5.17
0.110	14.79	11.97	10.95	9.86	9.22	8.30	9.73	10.92	11.83	14.47	10.29	6.51	6.51
0.120	17.92	14.63	13.19	12.11	11.34	10.26	11.87	12.88	13.88	16.54	11.74	8.64	8.64
0.130	21.04	17.17	15.73	14.24	13.54	12.13	14.34	15.11	16.59	19.19	13.40	10.40	10.40
0.140	24.05	19.72	18.17	16.39	15.81	14.49	16.79	17.34	19.85	22.40	15.31	13.25	13.25
0.150	27.11	22.43	20.79	18.63	18.40	16.77	19.61	20.00	22.59	25.33	17.13	15.94	15.94
0.160	30.13	25.29	23.57	21.20	20.78	19.26	22.27	22.68	25.27	28.34	19.67	17.53	17.53
0.170	33.22	27.97	26.21	23.76	23.14	21.97	25.05	25.33	27.89	30.94	21.82	20.28	20.28
0.180	36.34	30.81	28.95	26.30	25.87	24.65	27.93	28.03	30.26	33.69	23.79	22.59	22.59
0.190	39.34	33.67	31.81	29.11	28.55	27.74	30.74	30.93	32.76	36.87	26.32	24.59	24.59
0.200	42.27	36.53	34.71	31.65	31.34	30.32	33.45	34.36	35.77	39.74	28.46	26.47	26.47
0.220	48.14	42.21	40.16	37.21	36.18	35.49	38.10	37.38	38.80	41.77	31.98	28.59	28.59
0.240	53.72	47.65	45.27	42.63	42.00	40.84	44.35	46.71	47.79	49.11	34.55	31.28	31.28
0.260	58.66	52.89	50.21	48.00	47.67	46.56	50.44	52.36	53.71	54.76	38.99	34.78	34.78
0.280	63.32	58.00	55.36	53.24	53.21	52.02	55.55	57.59	58.94	59.71	44.04	39.20	39.20
0.300	67.51	62.59	60.08	58.63	58.74	57.19	60.70	62.34	63.64	63.84	48.96	42.56	42.56
0.320	71.22	66.80	64.75	63.38	63.50	62.66	65.94	67.10	68.69	68.03	53.50	45.99	45.99
0.340	74.72	70.92	68.83	67.56	67.80	67.69	70.52	71.95	71.80	71.38	58.52	49.50	49.50
0.360	78.05	74.44	72.65	71.46	71.72	72.30	74.64	76.01	76.02	74.44	61.76	52.97	52.97
0.380	80.82	77.71	76.05	75.01	75.45	76.50	78.64	79.75	79.90	76.85	64.45	55.61	55.61
0.400	83.18	80.90	79.23	78.16	78.61	80.25	82.37	83.16	82.99	79.47	66.58	58.35	58.35
0.420	85.39	83.50	82.15	81.29	81.62	83.50	85.22	86.38	85.44	81.90	68.79	60.15	60.15
0.440	87.28	85.80	84.89	84.13	84.50	86.15	87.86	89.16	87.86	84.13	70.37	63.33	63.33
0.460	89.15	88.00	87.20	86.71	86.92	88.27	90.14	91.17	89.77	85.53	72.46	65.82	65.82
0.480	90.73	89.91	89.26	88.72	89.24	90.49	91.95	92.68	91.36	87.96	75.70	68.04	68.04
0.500	92.15	91.53	91.08	90.59	91.23	92.44	93.50	94.94	93.05	90.16	78.87	70.43	70.43
0.550	93.44	92.93	92.65	92.25	92.89	94.01	94.76	95.05	94.02	91.45	81.15	72.81	72.81
0.600	95.86	95.85	95.93	95.71	96.02	96.49	96.80	96.88	95.64	93.13	83.24	74.45	74.45
0.650	97.65	97.69	97.87	97.77	97.92	97.87	98.13	97.86	96.83	93.13	86.58	78.09	78.09
0.700	98.64	98.66	98.81	98.77	98.92	98.79	98.72	98.43	96.83	94.23	88.68	82.92	82.92
0.750	99.21	99.33	99.41	99.30	99.44	99.16	99.03	98.70	97.65	95.63	91.41	87.13	87.13
0.800	99.59	99.70	99.72	99.62	99.61	99.42	99.33	99.04	98.48	96.58	92.97	89.98	89.98
0.850	99.80	99.81	99.80	99.81	99.80	99.64	99.54	99.39	98.87	97.13	94.57	93.16	93.16
0.900	99.87	99.91	99.88	99.87	99.86	99.71	99.74	99.56	99.45	97.67	95.77	95.38	95.38
0.950	99.92	99.94	99.91	99.92	99.94	99.84	99.86	99.72	99.76	98.54	97.06	96.97	96.97
1.000	99.99	99.98	99.97	99.96	99.97	99.96	99.96	99.88	99.92	99.81	99.34	98.08	98.08
1.050	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.75	99.75
1.100	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.34	99.34
1.150	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.81	98.81
1.200	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	98.15	98.15
1.250	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	97.45	97.45
1.300	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	96.75	96.75
1.350	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	96.05	96.05
1.400	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	95.35	95.35
1.450	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	94.65	94.65
1.500	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	93.95	93.95
1.550	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	93.25	93.25
1.600	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	92.55	92.55
1.650	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	91.85	91.85
1.700	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	91.15	91.15
1.750	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	90.45	90.45
1.800	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	89.75	89.75
1.850	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	89.05	89.05
1.900	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	88.35	88.35
1.950	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	87.65	87.65
2.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	86.95	86.95

TABLE 3A. Continued

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 10 MeV

Scaled radius	0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60	
	0.05	0.10	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	0.05	0.60
0.005	89.33	37.19	6.98	1.97	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	0.05	0.60
0.010	92.96	68.67	23.87	7.82	1.97	3.64	1.01	0.37	0.24	0.17	0.10	0.09	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
0.015	94.27	82.15	42.54	16.98	0.20	7.86	3.64	1.84	0.92	0.57	0.40	0.31	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
0.020	95.03	87.86	58.32	27.17	0.25	12.78	7.86	3.91	2.06	1.28	0.85	0.62	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
0.025	95.64	90.32	69.95	37.04	0.30	18.44	12.78	6.65	3.69	2.27	1.43	1.00	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
0.030	96.00	91.67	77.45	47.28	0.35	24.80	18.44	9.90	5.47	3.35	2.14	1.41	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
0.035	96.28	92.54	82.17	55.88	0.40	31.18	24.80	13.75	7.79	4.77	3.02	2.07	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48
0.040	96.51	93.27	85.28	62.61	0.45	37.44	31.18	17.67	10.32	6.51	4.20	2.71	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
0.045	96.69	93.76	87.35	68.17	0.50	43.44	37.44	21.91	13.15	8.26	5.33	3.55	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61
0.050	96.79	94.14	88.85	72.86	0.55	49.26	43.44	26.17	15.89	9.98	6.59	4.44	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
0.060	97.00	94.69	90.63	79.45	0.60	58.82	49.26	30.57	18.89	11.94	7.95	5.47	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94	3.94
0.070	97.05	95.14	91.84	83.44	0.65	66.49	58.82	39.26	24.99	16.49	11.01	7.84	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72	5.72
0.080	97.18	95.41	92.55	85.97	0.70	72.17	66.49	46.83	31.39	21.12	14.37	10.42	7.67	7.67	7.67	7.67	7.67	7.67	7.67	7.67	7.67	7.67	7.67	7.67
0.090	97.27	95.61	93.14	87.52	0.75	76.65	72.17	53.71	38.02	26.24	18.10	13.31	9.84	9.84	9.84	9.84	9.84	9.84	9.84	9.84	9.84	9.84	9.84	9.84
0.100	97.35	95.87	93.57	88.78	0.80	79.63	76.65	59.50	43.65	31.10	21.95	16.05	12.35	12.35	12.35	12.35	12.35	12.35	12.35	12.35	12.35	12.35	12.35	12.35
0.110	97.43	96.02	93.95	89.62	0.85	81.80	79.63	64.25	48.84	36.01	25.79	19.32	14.81	14.81	14.81	14.81	14.81	14.81	14.81	14.81	14.81	14.81	14.81	14.81
0.120	97.49	96.15	94.22	90.32	0.90	83.60	81.80	68.06	53.54	40.58	29.73	22.55	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67	17.67
0.130	97.54	96.26	94.43	90.89	0.95	84.78	83.60	71.53	57.60	44.60	33.58	25.44	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40	20.40
0.140	97.59	96.36	94.62	91.29	1.00	85.97	84.78	74.13	61.24	48.37	37.35	28.65	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11
0.150	97.65	96.43	94.71	91.72	1.05	86.75	85.97	76.12	64.59	52.06	40.81	31.86	25.71	25.71	25.71	25.71	25.71	25.71	25.71	25.71	25.71	25.71	25.71	25.71
0.160	97.71	96.51	94.84	92.03	1.10	87.48	86.75	78.00	67.55	55.22	44.31	35.24	28.54	28.54	28.54	28.54	28.54	28.54	28.54	28.54	28.54	28.54	28.54	28.54
0.170	97.74	96.54	94.97	92.25	1.15	87.48	87.48	79.40	69.97	58.32	47.57	38.31	31.44	31.44	31.44	31.44	31.44	31.44	31.44	31.44	31.44	31.44	31.44	31.44
0.180	97.77	96.60	95.09	92.50	1.20	88.79	88.22	80.47	72.09	61.07	50.50	41.28	34.26	34.26	34.26	34.26	34.26	34.26	34.26	34.26	34.26	34.26	34.26	34.26
0.190	97.82	96.64	95.18	92.71	1.25	89.23	88.79	81.59	73.91	63.68	53.28	44.07	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09	37.09
0.200	97.88	96.74	95.30	92.90	1.30	89.59	89.23	82.45	75.69	65.96	55.85	46.80	39.74	39.74	39.74	39.74	39.74	39.74	39.74	39.74	39.74	39.74	39.74	39.74
0.220	97.91	96.85	95.48	93.29	1.35	90.59	89.59	83.28	77.08	68.16	58.41	49.51	42.44	42.44	42.44	42.44	42.44	42.44	42.44	42.44	42.44	42.44	42.44	42.44
0.240	97.99	96.94	95.69	93.68	1.40	90.87	90.59	84.68	79.20	71.86	62.84	54.56	47.32	47.32	47.32	47.32	47.32	47.32	47.32	47.32	47.32	47.32	47.32	47.32
0.260	98.07	97.03	95.90	94.02	1.45	91.38	90.87	85.86	81.19	74.69	66.75	59.01	51.90	51.90	51.90	51.90	51.90	51.90	51.90	51.90	51.90	51.90	51.90	51.90
0.280	98.14	97.13	96.05	94.30	1.50	91.94	91.38	86.93	82.88	77.17	69.95	63.05	56.48	56.48	56.48	56.48	56.48	56.48	56.48	56.48	56.48	56.48	56.48	56.48
0.300	98.21	97.24	96.21	94.61	1.55	92.36	91.94	87.78	84.24	79.27	73.00	66.60	60.77	60.77	60.77	60.77	60.77	60.77	60.77	60.77	60.77	60.77	60.77	60.77
0.320	98.29	97.51	96.39	94.86	1.60	92.84	92.36	88.65	85.48	81.25	75.63	69.96	64.57	64.57	64.57	64.57	64.57	64.57	64.57	64.57	64.57	64.57	64.57	64.57
0.340	98.35	97.70	96.53	95.13	1.65	93.36	92.84	89.39	86.64	82.91	77.98	73.07	68.31	68.31	68.31	68.31	68.31	68.31	68.31	68.31	68.31	68.31	68.31	68.31
0.360	98.46	97.81	96.72	95.43	1.70	93.80	93.36	90.17	87.61	84.46	80.14	76.02	71.79	71.79	71.79	71.79	71.79	71.79	71.79	71.79	71.79	71.79	71.79	71.79
0.380	98.54	97.90	96.92	95.67	1.75	94.33	93.80	91.02	88.62	85.90	82.11	78.55	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
0.400	98.63	97.98	97.11	96.00	1.80	94.72	94.33	91.62	89.66	87.31	83.97	81.14	78.03	78.03	78.03	78.03	78.03	78.03	78.03	78.03	78.03	78.03	78.03	78.03
0.420	98.73	98.14	97.29	96.27	1.85	95.15	94.72	92.21	90.72	88.64	85.60	83.47	81.01	81.01	81.01	81.01	81.01	81.01	81.01	81.01	81.01	81.01	81.01	81.01
0.440	98.74	98.28	97.43	96.57	1.90	95.50	95.15	92.80	91.63	89.82	87.29	85.42	83.21	83.21	83.21	83.21	83.21	83.21	83.21	83.21	83.21	83.21	83.21	83.21
0.460	98.90	98.40	97.66	96.88	1.95	95.98	95.50	93.44	92.55	90.95	88.80	87.25	85.92	85.92	85.92	85.92	85.92	85.92	85.92	85.92	85.92	85.92	85.92	85.92
0.480	99.04	98.51	97.86	97.10	2.00	96.36	95.98	94.06	93.30	91.99	90.26	88.97	88.00	88.00	88.00	88.00	88.00	88.00	88.00	88.00	88.00	88.00	88.00	88.00
0.500	99.11	98.69	98.06	97.35	2.05	96.65	96.36	95.26	94.71	93.87	92.86	91.93	91.75	91.75	91.75	91.75	91.75	91.75	91.75	91.75	91.75	91.75	91.75	91.75
0.550	99.42	99.09	98.56	97.90	2.10	97.53	96.65	96.65	96.43	95.86	95.49	94.79	94.94	94.94	94.94	94.94	94.94	94.94	94.94	94.94	94.94	94.94	94.94	94.94
0.600	99.61	99.30	99.02	98.44	2.15	98.27	97.53	97.80	97.86	97.48	97.34	97.06	97.17	97.17	97.17	97.17	97.17	97.17	97.17	97.17	97.17	97.17	97.17	97.17
0.650	99.76	99.54	99.36	99.04	2.20	98.98	98.27	98.74	98.92	98.79	98.52	98.39	98.70	98.70	98.70	98.70	98.70	98.70	98.70	98.70	98.70	98.70	98.70	98.70
0.700	99.86	99.64	99.50	99.52	2.25	99.48	98.98	99.35	99.48	99.41	99.26	99.37	99.56	99.56	99.56	99.56	99.56	99.56	99.56	99.56	99.56	99.56	99.56	99.56
0.750	99.93	99.77	99.65	99.70	2.30	99.71	99.48	99.72	99.80	99.74	99.70	99.67	99.83	99.83	99.83	99.83	99.83	99.83	99.83	99.83	99.83	99.83	99.83	99.83
0.800	99.98	99.90	99.85	99.83	2.35	99.86	99.86	99.87	99.90	99.92	99.87	99.88	99.93	99.93	99.93	99.93	99.93	99.93	99.93	99.93	99.93	99.93	99.93	99.93
0.850	99.99	99.95	99.94	99.93	2.40	99.91	99.91	99.96	99.97	99.96	99.96	99.95	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96
0.900	99.99	99.98	99.97	99.98	2.45	99.98	99.98	99.99	99.99	99.98	99.98													

TABLE 3A. Continued

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 5 Mev																								
Scaled radius	0.0		0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55	
	0.005	0.010	0.015	0.020	0.025	0.030	0.035	0.040	0.045	0.050	0.055	0.060	0.065	0.070	0.075	0.080	0.085	0.090	0.095	0.100	0.105	0.110	0.115	0.120
0.005	83.30	24.56	3.28	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10
0.010	88.15	53.29	13.07	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15
0.015	89.68	68.50	25.59	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
0.020	90.52	77.19	38.00	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25
0.025	91.09	81.21	49.10	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30
0.030	91.47	83.63	57.77	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35
0.035	91.77	85.09	64.60	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40
0.040	92.02	86.07	69.33	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45
0.045	92.19	86.74	72.58	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50
0.050	92.31	87.30	75.20	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55
0.060	92.51	88.11	78.69	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60
0.070	92.70	88.70	80.92	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65
0.080	92.83	89.15	82.33	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70
0.090	92.97	89.46	83.34	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75
0.100	93.09	89.65	84.10	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80
0.110	93.15	89.87	84.75	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85
0.120	93.30	90.08	85.29	0.90	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90
0.130	93.40	90.34	85.80	0.95	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95
0.140	93.51	90.52	86.14	1.00	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00
0.150	93.63	90.68	86.48	1.05	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05
0.160	93.73	90.83	86.78	1.10	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10
0.170	93.83	90.96	87.06	1.15	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15
0.180	93.93	91.10	87.29	1.20	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20
0.190	93.97	91.27	87.54	1.25	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25
0.200	94.06	91.39	87.73	1.30	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30
0.220	94.28	91.52	88.15	1.35	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35
0.240	94.47	91.78	88.61	1.40	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40
0.260	94.62	92.06	89.14	1.45	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45
0.280	94.81	92.35	89.65	1.50	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50
0.300	95.04	92.81	90.04	1.55	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55
0.320	95.38	93.12	90.58	1.60	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60
0.340	95.62	93.33	91.08	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65
0.360	95.87	93.72	91.69	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70
0.380	96.08	94.07	92.26	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75
0.400	96.37	94.53	92.82	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80
0.420	96.65	94.95	93.48	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85
0.440	96.91	95.42	94.05	1.90	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90
0.460	97.12	95.84	94.53	1.95	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95
0.480	97.45	96.23	95.11	2.00	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00
0.500	97.69	96.67	95.69	2.05	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.550	98.31	97.60	97.06	2.10	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.600	98.91	98.49	98.07	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15
0.650	99.36	99.17	98.90	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20
0.700	99.68	99.63	99.33	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25
0.750	99.82	99.84	99.71	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30
0.800	99.90	99.94	99.93	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.850	99.98	99.99	99.97	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.900	99.98	99.99	100.00	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.950	99.99	100.00	100.00	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
1.000	100.00	100.00	100.00	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.55

TABLE 3A. Continued

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 2 MeV

Scaled radius	Scaled depth interval											
	0.0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55
0.005	74.64	15.97	2.11	0.52	0.20	0.06	0.05	0.05	0.03	0.0	0.02	0.03
0.010	79.50	38.35	7.50	1.95	0.86	0.42	0.21	0.20	0.14	0.09	0.10	0.06
0.015	80.90	52.75	15.14	4.38	1.85	0.95	0.52	0.39	0.30	0.22	0.24	0.18
0.020	81.72	61.77	23.35	7.56	3.17	1.59	0.90	0.71	0.55	0.48	0.39	0.41
0.025	82.22	66.50	30.99	10.99	4.78	2.43	1.38	1.13	0.78	0.71	0.55	0.62
0.030	82.61	69.55	38.18	15.12	6.84	3.41	1.96	1.63	1.19	1.06	0.79	0.89
0.035	82.93	71.43	44.11	18.90	8.80	4.58	2.62	2.18	1.56	1.40	1.11	1.20
0.040	83.25	72.60	49.32	23.06	10.94	5.93	3.52	2.79	2.11	1.81	1.56	1.52
0.045	83.42	73.53	52.97	26.81	13.43	7.37	4.57	3.36	2.66	2.23	1.90	1.90
0.050	83.52	74.22	56.21	30.56	15.83	8.84	5.51	4.12	3.23	2.79	2.32	2.33
0.060	83.86	75.26	60.90	37.47	20.89	11.90	7.60	5.70	4.55	3.95	3.36	3.27
0.070	84.08	76.05	63.71	43.03	26.01	15.44	9.91	7.55	6.11	5.27	4.46	4.35
0.080	84.19	76.69	65.65	47.62	30.77	19.02	12.67	9.61	7.91	6.85	5.70	5.44
0.090	84.40	77.24	67.32	51.20	34.95	22.83	15.69	11.66	9.84	8.51	7.25	6.76
0.100	84.56	77.60	68.55	54.18	38.78	26.43	18.72	13.99	11.67	10.44	8.94	8.37
0.110	84.74	77.88	69.57	56.54	42.33	30.01	21.61	16.28	13.79	12.52	10.61	10.03
0.120	84.92	78.23	70.47	58.53	45.37	33.40	24.73	18.75	16.18	14.61	12.42	11.88
0.130	85.10	78.55	71.21	60.34	48.12	36.16	27.72	21.13	18.43	16.75	14.45	13.82
0.140	85.26	78.88	71.80	61.85	50.39	38.99	30.58	23.85	20.91	18.88	16.89	15.84
0.150	85.43	79.24	72.52	63.40	52.81	41.62	33.30	26.44	23.31	20.95	19.16	18.25
0.160	85.61	79.51	73.17	64.64	54.69	44.19	35.98	29.30	25.89	23.37	21.61	20.88
0.170	85.78	79.82	73.75	65.74	56.47	46.55	38.61	31.96	28.42	25.85	24.01	23.53
0.180	85.89	80.17	74.22	66.72	58.24	48.82	40.87	34.69	30.99	28.41	26.40	26.17
0.190	86.05	80.44	74.66	67.63	59.81	50.92	43.23	37.29	33.20	30.82	28.90	28.55
0.200	86.27	80.80	75.19	68.54	61.34	52.72	45.51	39.83	35.67	33.22	31.29	31.11
0.220	86.59	81.52	76.25	70.27	64.12	56.47	49.95	44.43	40.57	37.75	36.04	36.75
0.240	86.94	82.31	77.39	71.95	66.73	60.02	54.10	49.03	45.20	42.68	40.91	41.89
0.260	87.35	83.02	78.53	73.61	69.19	63.25	58.02	53.37	49.94	47.39	45.79	47.01
0.280	87.95	83.88	79.82	75.36	71.48	66.15	62.03	57.32	54.68	51.92	50.93	52.02
0.300	88.73	84.73	81.11	76.93	73.76	69.08	65.44	61.46	59.06	56.52	55.62	57.31
0.320	89.42	85.69	82.18	78.78	75.92	71.92	68.73	65.39	63.20	61.19	60.41	62.10
0.340	90.20	86.82	83.45	80.35	78.06	74.76	71.90	69.18	66.96	65.41	65.14	66.54
0.360	90.89	87.84	84.94	81.90	79.96	77.31	74.93	72.78	70.68	69.39	69.43	70.89
0.380	91.86	88.98	86.39	83.51	82.00	79.85	78.02	75.98	74.34	73.47	73.50	75.23
0.400	92.70	90.01	87.67	85.08	84.02	82.13	80.63	78.71	77.70	77.33	77.13	79.02
0.420	93.51	91.07	88.82	86.66	85.73	84.33	83.10	81.53	80.78	80.58	80.64	82.52
0.440	94.25	92.04	89.98	88.09	87.47	86.35	85.25	84.14	83.42	83.21	83.89	85.83
0.460	94.99	93.02	91.30	89.42	89.10	88.06	87.28	86.31	85.82	85.88	86.83	88.57
0.480	95.93	93.95	92.54	90.74	90.51	89.80	89.28	88.35	88.05	88.37	89.28	90.91
0.500	96.63	94.68	93.45	92.14	91.78	91.32	91.10	90.29	89.99	90.43	91.18	92.83
0.550	97.72	96.29	95.84	95.13	94.89	94.51	94.63	94.51	94.42	94.42	95.09	96.26
0.600	98.79	97.84	97.60	97.15	97.21	96.86	97.03	96.92	97.14	97.10	97.60	98.51
0.650	99.43	98.85	98.61	98.54	98.59	98.50	98.51	98.51	98.72	98.76	99.08	99.37
0.700	99.71	99.54	99.37	99.22	99.40	99.39	99.37	99.37	99.57	99.56	99.64	99.83
0.750	99.85	99.77	99.72	99.63	99.74	99.82	99.77	99.76	99.87	99.83	99.88	99.95
0.800	99.95	99.92	99.90	99.89	99.92	99.96	99.95	99.95	99.96	99.94	99.99	99.97
0.850	100.00	99.99	99.97	99.96	99.96	99.97	100.00	99.98	99.98	99.99	100.00	99.97
0.900	100.00	100.00	100.00	100.00	100.00	99.99	100.00	99.99	99.99	99.99	100.00	99.98
0.950	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 3A. Continued

Cumulative Radial Energy-Deposition Distribution in Aluminum, Beam Energy = 1 MeV

Scaled radius	0.60		0.65		0.70		0.75		0.80		0.85		Scaled depth interval		1.00		1.05		1.10		1.15	
	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	0.90	0.95	1.00	1.05	1.10	1.15	1.20			
0.005	0.02	0.01	0.03	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
0.010	0.08	0.09	0.14	0.19	0.25	0.30	0.37	0.44	0.51	0.58	0.65	0.72	0.79	0.86	0.93	1.00	1.07	1.14	1.21	1.28	1.35	1.42
0.015	0.20	0.20	0.37	0.30	0.44	0.46	0.58	0.65	0.72	0.79	0.86	0.93	1.00	1.07	1.14	1.21	1.28	1.35	1.42	1.49	1.56	1.63
0.020	0.35	0.36	0.58	0.41	0.57	0.51	0.68	0.72	0.79	0.86	0.93	1.00	1.07	1.14	1.21	1.28	1.35	1.42	1.49	1.56	1.63	1.70
0.025	0.63	0.51	0.89	0.65	0.82	0.75	0.96	1.01	1.08	1.15	1.22	1.29	1.36	1.43	1.50	1.57	1.64	1.71	1.78	1.85	1.92	1.99
0.030	0.89	0.75	1.04	0.89	1.08	1.01	1.22	1.29	1.36	1.43	1.50	1.57	1.64	1.71	1.78	1.85	1.92	1.99	2.06	2.13	2.20	2.27
0.035	1.15	0.99	1.25	1.21	1.50	1.42	1.63	1.70	1.77	1.84	1.91	1.98	2.05	2.12	2.19	2.26	2.33	2.40	2.47	2.54	2.61	2.68
0.040	1.51	1.33	1.56	1.47	1.96	1.89	2.10	2.17	2.24	2.31	2.38	2.45	2.52	2.59	2.66	2.73	2.80	2.87	2.94	3.01	3.08	3.15
0.045	1.86	1.75	1.99	1.99	2.89	2.89	3.10	3.17	3.24	3.31	3.38	3.45	3.52	3.59	3.66	3.73	3.80	3.87	3.94	4.01	4.08	4.15
0.050	2.35	2.24	2.28	2.42	3.62	3.62	3.83	3.90	4.07	4.14	4.21	4.28	4.35	4.42	4.49	4.56	4.63	4.70	4.77	4.84	4.91	4.98
0.060	3.51	3.21	3.33	3.59	4.70	4.70	4.91	5.08	5.25	5.42	5.59	5.76	5.93	6.10	6.27	6.44	6.61	6.78	6.95	7.12	7.29	7.46
0.070	4.67	4.49	4.50	5.02	6.66	6.66	6.87	7.04	7.21	7.38	7.55	7.72	7.89	8.06	8.23	8.40	8.57	8.74	8.91	9.08	9.25	9.42
0.080	5.94	6.26	5.83	7.08	8.97	8.97	9.18	9.35	9.52	9.69	9.86	10.03	10.20	10.37	10.54	10.71	10.88	11.05	11.22	11.39	11.56	11.73
0.090	7.50	8.23	8.14	9.47	12.64	12.64	12.85	13.02	13.19	13.36	13.53	13.70	13.87	14.04	14.21	14.38	14.55	14.72	14.89	15.06	15.23	15.40
0.100	9.13	10.05	10.04	12.04	16.83	16.83	17.04	17.21	17.38	17.55	17.72	17.89	18.06	18.23	18.40	18.57	18.74	18.91	19.08	19.25	19.42	19.59
0.110	10.76	12.06	12.17	14.42	19.83	19.83	20.04	20.21	20.38	20.55	20.72	20.89	21.06	21.23	21.40	21.57	21.74	21.91	22.08	22.25	22.42	22.59
0.120	12.67	13.93	14.32	17.04	22.74	22.74	22.95	23.12	23.29	23.46	23.63	23.80	23.97	24.14	24.31	24.48	24.65	24.82	24.99	25.16	25.33	25.50
0.130	14.93	15.89	16.56	19.35	26.71	26.71	26.92	27.09	27.26	27.43	27.60	27.77	27.94	28.11	28.28	28.45	28.62	28.79	28.96	29.13	29.30	29.47
0.140	17.21	18.06	18.70	22.54	30.26	30.26	30.47	30.64	30.81	30.98	31.15	31.32	31.49	31.66	31.83	32.00	32.17	32.34	32.51	32.68	32.85	33.02
0.150	19.68	20.36	20.89	25.87	33.66	33.66	33.87	34.04	34.21	34.38	34.55	34.72	34.89	35.06	35.23	35.40	35.57	35.74	35.91	36.08	36.25	36.42
0.160	21.83	22.65	23.43	29.40	37.74	37.74	37.95	38.12	38.29	38.46	38.63	38.80	38.97	39.14	39.31	39.48	39.65	39.82	39.99	40.16	40.33	40.50
0.170	24.02	25.34	25.96	32.04	40.46	40.46	40.67	40.84	41.01	41.18	41.35	41.52	41.69	41.86	42.03	42.20	42.37	42.54	42.71	42.88	43.05	43.22
0.180	26.33	27.78	28.40	35.47	43.18	43.18	43.39	43.56	43.73	43.90	44.07	44.24	44.41	44.58	44.75	44.92	45.09	45.26	45.43	45.60	45.77	45.94
0.190	29.03	30.12	31.46	38.41	46.67	46.67	46.88	47.05	47.22	47.39	47.56	47.73	47.90	48.07	48.24	48.41	48.58	48.75	48.92	49.09	49.26	49.43
0.200	31.67	32.83	34.29	41.12	50.88	50.88	51.09	51.26	51.43	51.60	51.77	51.94	52.11	52.28	52.45	52.62	52.79	52.96	53.13	53.30	53.47	53.64
0.220	36.82	39.08	41.31	47.10	56.95	56.95	57.16	57.33	57.50	57.67	57.84	58.01	58.18	58.35	58.52	58.69	58.86	59.03	59.20	59.37	59.54	59.71
0.240	42.31	45.68	47.71	52.88	63.33	63.33	63.54	63.71	63.88	64.05	64.22	64.39	64.56	64.73	64.90	65.07	65.24	65.41	65.58	65.75	65.92	66.09
0.260	48.30	51.48	53.57	58.06	68.35	68.35	68.56	68.73	68.90	69.07	69.24	69.41	69.58	69.75	69.92	70.09	70.26	70.43	70.60	70.77	70.94	71.11
0.280	53.95	57.09	59.33	63.72	72.93	72.93	73.14	73.31	73.48	73.65	73.82	73.99	74.16	74.33	74.50	74.67	74.84	75.01	75.18	75.35	75.52	75.69
0.300	58.98	62.02	64.60	69.61	78.22	78.22	78.43	78.60	78.77	78.94	79.11	79.28	79.45	79.62	79.79	79.96	80.13	80.30	80.47	80.64	80.81	80.98
0.320	64.46	66.84	69.55	74.46	83.35	83.35	83.56	83.73	83.90	84.07	84.24	84.41	84.58	84.75	84.92	85.09	85.26	85.43	85.60	85.77	85.94	86.11
0.340	69.48	72.09	75.54	78.71	86.12	86.12	86.33	86.50	86.67	86.84	87.01	87.18	87.35	87.52	87.69	87.86	88.03	88.20	88.37	88.54	88.71	88.88
0.360	74.00	76.67	80.10	82.98	89.32	89.32	89.53	89.70	89.87	90.04	90.21	90.38	90.55	90.72	90.89	91.06	91.23	91.40	91.57	91.74	91.91	92.08
0.380	78.40	81.08	84.25	86.76	92.90	92.90	93.11	93.28	93.45	93.62	93.79	93.96	94.13	94.30	94.47	94.64	94.81	94.98	95.15	95.32	95.49	95.66
0.400	82.31	84.30	87.28	90.47	96.71	96.71	96.92	97.09	97.26	97.43	97.60	97.77	97.94	98.11	98.28	98.45	98.62	98.79	98.96	99.13	99.30	99.47
0.420	85.68	87.56	89.45	92.53	98.15	98.15	98.36	98.53	98.70	98.87	99.04	99.21	99.38	99.55	99.72	99.89	100.06	100.23	100.40	100.57	100.74	100.91
0.440	88.82	90.14	91.99	94.35	98.15	98.15	98.36	98.53	98.70	98.87	99.04	99.21	99.38	99.55	99.72	99.89	100.06	100.23	100.40	100.57	100.74	100.91
0.460	91.49	92.17	94.08	95.42	98.15	98.15	98.36	98.53	98.70	98.87	99.04	99.21	99.38	99.55	99.72	99.89	100.06	100.23	100.40	100.57	100.74	100.91
0.480	93.41	94.15	95.83	96.64	98.15	98.15	98.36	98.53	98.70	98.87	99.04	99.21	99.38	99.55	99.72	99.89	100.06	100.23	100.40	100.57	100.74	100.91
0.500	94.67	95.49	96.94	97.52	98.15	98.15	98.36	98.53	98.70	98.87	99.04	99.21	99.38	99.55	99.72	99.89	100.06	100.23	100.40	100.57	100.74	100.91
0.550	97.48	97.90	98.50	99.04	99.40	99.40	99.61	99.78	99.95	100.12	100.29	100.46	100.63	100.80	100.97	101.14	101.31	101.48	101.65	101.82	101.99	102.16
0.600	98.81	99.13	99.59	99.62	99.87	99.87	99.99	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0.650	99.68	99.72	99.88	99.82	99.91	99.91	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96
0.700	99.98	99.93	99.96	99.82	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96
0.750	100.00	99.98	99.96	100.00	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96	99.96
0.800	100.00	99.98	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0.850	100.00	99.98	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0.900	100.00	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0.950	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 3B. Normalized cumulative radial distribution of deposited energy in copper. The numbers in the column headed "Scaled radius" represent the scaled radial distance from the z-axis, ρ/r_0 . The "Scaled depth intervals" have the same meaning as in Table 2B. The entries for each depth interval are the quantities $\Psi_n(\rho)$ as defined by Eq (3). The percentage of the incident beam energy deposited in the indicated depth interval, at radial distances $\leq \rho$, is equal to $H_n \Psi_n(\rho)/100$, where H_n is given in Table 2B.

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 40 MeV

Scaled radius	0.0		0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60			
0.005	89.83	44.71	10.77	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60														
0.010	93.75	76.14	34.35	14.16	27.01	13.70	7.66	4.53	2.78	1.73	1.35	1.00	0.96															
0.015	95.26	86.01	56.19	27.01	40.36	21.56	12.85	7.59	4.71	3.18	2.40	1.76	1.50															
0.020	96.05	89.58	70.34	40.36	53.35	30.44	18.33	11.44	6.96	5.00	3.68	2.59	2.22															
0.025	96.67	91.45	78.86	53.35	62.93	39.73	24.54	15.38	9.69	7.07	5.04	3.52	3.08															
0.030	97.03	92.29	83.94	62.93	69.92	48.22	30.59	19.53	12.84	9.20	6.76	4.62	4.01															
0.035	97.30	93.23	86.60	69.92	75.31	55.55	36.80	24.27	16.20	11.82	8.47	5.98	5.00															
0.040	97.51	93.89	88.42	75.31	79.06	61.71	43.15	29.18	20.01	14.19	10.41	7.60	6.19															
0.045	97.68	94.37	89.70	79.06	81.98	66.78	48.40	34.00	23.68	16.84	12.48	9.15	7.53															
0.050	97.82	94.87	90.76	81.98																								
0.060	98.04	95.49	92.21	85.54	74.62	58.14	43.05	31.29	22.26	16.96	12.74	10.32																
0.070	98.18	96.09	93.32	87.87	79.22	65.63	51.04	38.38	28.33	21.50	16.70	13.57																
0.080	98.32	96.53	94.05	89.47	82.58	71.39	58.09	45.22	33.94	26.19	20.75	16.92																
0.090	98.42	96.87	94.74	90.71	84.71	76.04	63.57	51.54	39.51	31.00	24.78	20.49																
0.100	98.50	97.10	95.33	91.73	86.57	79.48	68.21	57.16	45.09	35.83	29.01	24.16																
0.110	98.58	97.35	95.75	92.49	87.93	82.15	72.20	61.74	50.25	40.59	33.22	27.79																
0.120	98.63	97.53	96.09	93.20	89.13	83.94	75.49	65.90	54.66	44.82	37.20	31.30																
0.130	98.67	97.70	96.35	93.72	90.11	85.54	78.27	69.48	59.06	48.75	40.96	34.90																
0.140	98.69	97.84	96.61	94.19	90.93	86.93	80.40	72.54	62.87	52.59	44.63	38.43																
0.150	98.71	97.96	96.82	94.61	91.69	87.97	82.38	75.33	66.38	56.21	48.09	41.87																
0.160	98.75	98.10	97.03	94.92	92.23	88.99	83.91	77.46	69.16	59.91	51.54	45.21																
0.170	98.77	98.18	97.22	95.23	92.74	89.85	85.21	79.44	71.90	63.14	54.96	48.56																
0.180	98.78	98.24	97.43	95.53	93.25	90.53	86.34	81.16	74.31	66.01	58.02	51.55																
0.190	98.80	98.35	97.57	95.75	93.65	91.08	87.37	82.49	76.45	68.66	60.71	54.45																
0.200	98.82	98.46	97.67	95.93	93.99	91.70	88.11	83.85	78.36	71.09	63.25	57.14																
0.220	98.84	98.62	97.88	96.39	94.68	92.74	89.66	86.03	81.57	75.02	68.07	62.37																
0.240	98.88	98.72	98.08	96.76	95.16	93.56	90.89	87.73	83.98	78.32	71.88	67.00																
0.260	98.90	98.78	98.23	97.09	95.64	94.31	91.90	89.23	86.01	81.34	75.36	70.92																
0.280	98.97	98.81	98.37	97.32	96.04	94.87	92.81	90.55	87.80	83.60	78.36	74.25																
0.300	99.00	98.86	98.47	97.53	96.36	95.41	93.61	91.67	89.29	85.73	80.78	77.22																
0.320	99.03	98.90	98.59	97.67	96.70	95.80	94.15	92.67	90.46	87.49	83.10	79.96																
0.340	99.05	98.95	98.71	97.85	96.98	96.12	94.65	93.65	91.54	89.16	85.12	82.45																
0.360	99.09	98.99	98.80	98.00	97.19	96.46	95.15	94.34	92.49	90.48	86.88	84.65																
0.380	99.12	99.04	98.88	98.17	97.46	96.71	95.51	94.96	93.32	91.68	88.50	86.54																
0.400	99.14	99.09	98.96	98.38	97.61	96.96	95.90	95.35	94.13	92.68	90.07	88.23																
0.420	99.19	99.14	99.02	98.52	97.76	97.18	96.27	95.76	94.81	93.67	91.27	89.69																
0.440	99.26	99.17	99.12	98.62	97.92	97.43	96.52	96.24	95.47	94.44	92.28	90.90																
0.460	99.30	99.19	99.14	98.68	98.06	97.69	96.84	96.62	95.97	95.16	93.24	92.08																
0.480	99.32	99.22	99.19	98.79	98.26	97.93	97.12	96.94	96.42	95.77	94.21	93.08																
0.500	99.36	99.28	99.28	98.88	98.47	98.08	97.37	97.23	96.81	96.36	94.96	93.96																
0.550	99.46	99.42	99.36	99.10	98.82	98.47	97.95	97.88	97.63	97.24	96.28	95.49																
0.600	99.56	99.48	99.42	99.33	99.12	98.85	98.49	98.35	98.30	97.93	97.42	96.78																
0.650	99.67	99.60	99.56	99.50	99.36	99.09	98.86	98.74	98.72	98.55	98.21	97.72																
0.700	99.76	99.68	99.67	99.57	99.49	99.30	99.08	98.99	98.97	98.97	98.71	98.41																
0.750	99.82	99.71	99.71	99.68	99.56	99.43	99.37	99.30	99.35	99.32	99.15	98.90																
0.800	99.86	99.77	99.77	99.75	99.68	99.58	99.52	99.55	99.59	99.59	99.41	99.27																
0.850	99.90	99.86	99.83	99.84	99.80	99.72	99.70	99.73	99.71	99.74	99.55	99.56																
0.900	99.95	99.93	99.91	99.90	99.88	99.83	99.83	99.83	99.84	99.86	99.86	99.86																
0.950	99.98	99.97	99.95	99.95	99.94	99.93	99.96	99.93	99.95	99.93	99.93	99.93																
1.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00																

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 20 MeV

Scaled radius	0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60																											
	0.0	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	0.0	0.05	0.10	0.15																									
0.005	83.66	25.68	4.72	1.46	0.61	0.32	0.12	0.06	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01																								
0.010	90.47	57.54	17.38	5.71	2.43	1.14	0.63	0.46	0.35	0.28	0.22	0.17	0.13	0.10	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02																								
0.015	92.21	74.46	33.13	12.26	5.33	2.63	1.37	0.78	0.58	0.45	0.35	0.28	0.22	0.17	0.13	0.10	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02																							
0.020	93.26	82.09	47.39	20.05	9.21	4.51	2.45	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02																							
0.025	93.99	86.16	58.90	28.55	14.04	7.24	4.09	2.57	1.87	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03	0.02	0.02																							
0.030	94.41	88.30	67.64	36.98	19.18	10.35	5.88	3.79	2.61	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03	0.02																							
0.035	94.78	89.68	73.42	44.53	24.76	13.64	7.82	5.11	3.43	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																							
0.040	95.01	90.47	77.36	51.95	30.42	17.23	10.16	6.64	4.55	3.40	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																						
0.045	95.28	91.13	80.41	57.95	35.71	20.83	12.59	8.36	5.69	4.22	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																					
0.050	95.51	91.62	82.35	62.61	40.53	24.47	15.34	10.10	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																				
0.060	95.80	92.40	84.99	70.13	49.51	32.01	20.57	13.80	9.63	7.33	5.99	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																			
0.070	96.08	92.98	86.71	74.99	56.51	39.21	25.98	17.89	12.60	9.88	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																	
0.080	96.28	93.46	87.93	78.46	62.33	45.20	31.41	22.06	15.95	12.57	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03																
0.090	96.43	93.80	88.78	80.77	66.95	50.68	36.68	26.40	19.16	15.34	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03															
0.100	96.54	94.10	89.49	82.53	70.41	55.71	41.58	30.80	22.50	18.14	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03														
0.110	96.62	94.42	90.03	83.83	73.34	59.87	46.19	35.01	25.98	21.08	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03													
0.120	96.72	94.55	90.32	84.87	75.61	63.55	50.29	39.06	29.72	23.94	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03												
0.130	96.81	94.74	90.79	85.75	77.41	66.48	54.04	43.13	33.08	27.07	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03											
0.140	96.84	94.91	91.08	86.40	78.93	69.10	57.48	46.84	36.52	30.00	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03										
0.150	96.88	95.02	91.47	87.05	80.31	71.25	60.41	50.12	39.79	32.97	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03									
0.160	96.91	95.11	91.76	87.62	81.45	73.16	63.18	53.10	42.90	35.97	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03								
0.170	96.94	95.20	92.08	88.13	82.49	74.82	65.51	55.82	45.78	38.81	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03							
0.180	96.97	95.26	92.36	88.69	83.41	76.29	67.48	58.45	48.66	41.67	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03						
0.190	97.03	95.38	92.62	89.16	84.24	77.61	69.26	61.00	51.32	44.42	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03					
0.200	97.07	95.51	92.82	89.56	85.02	78.84	70.85	63.37	53.95	47.22	42.19	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03				
0.220	97.17	95.74	93.31	90.26	86.22	81.03	73.76	67.27	58.88	52.37	47.31	42.19	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03			
0.240	97.24	95.97	93.75	90.96	87.34	82.84	76.21	70.63	62.96	57.07	52.26	47.31	42.19	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03		
0.260	97.30	96.17	94.08	91.61	88.27	84.37	78.47	73.40	66.51	61.29	56.79	52.26	47.31	42.19	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03	
0.280	97.38	96.34	94.46	92.16	89.14	85.79	80.46	75.93	69.88	65.09	61.18	56.79	52.26	47.31	42.19	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47	2.57	1.84	1.40	1.00	0.78	0.62	0.50	0.40	0.32	0.25	0.19	0.14	0.10	0.08	0.06	0.05	0.04	0.03
0.300	97.48	96.49	94.88	92.69	90.00	87.00	82.25	78.33	72.89	68.60	65.27	60.87	56.79	52.26	47.31	42.19	39.48	36.77	33.98	31.49	28.63	25.97	23.29	20.44	18.03	15.52	12.95	10.42	8.15	6.85	5.14	4.20	3.47																	

TABLE 3B. Continued

Scaled radius	Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 20 Mev												
	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	1.20
0.005	0.04	0.02	0.03	0.03	0.04	0.03	0.03	0.02	0.01	0.02	0.04	0.0	0.0
0.010	0.11	0.10	0.12	0.08	0.10	0.07	0.09	0.09	0.03	0.04	0.04	0.04	0.10
0.015	0.31	0.27	0.25	0.23	0.35	0.18	0.25	0.25	0.08	0.05	0.22	0.20	0.29
0.020	0.57	0.46	0.42	0.39	0.58	0.37	0.58	0.42	0.34	0.27	0.46	0.69	0.94
0.025	0.87	0.70	0.61	0.58	0.92	0.65	0.54	0.48	0.48	0.47	0.52	0.58	0.94
0.030	1.17	1.06	0.88	0.79	1.21	0.98	0.73	0.67	0.73	0.67	0.82	1.15	1.53
0.035	1.62	1.45	1.23	1.08	1.55	1.34	1.24	0.91	0.91	0.80	0.88	1.53	1.73
0.040	2.04	1.89	1.60	1.49	1.87	1.70	1.73	1.13	1.13	1.04	1.15	1.73	2.10
0.045	2.52	2.26	2.09	1.98	2.41	2.14	2.08	1.34	1.34	1.44	1.59	2.10	2.68
0.050	3.01	2.75	2.57	2.38	3.14	2.64	2.56	1.73	1.73	1.96	2.06	2.68	
0.060	4.31	3.91	3.66	3.42	4.42	3.79	3.58	2.58	2.58	2.61	3.40	4.34	
0.070	5.67	5.42	4.99	4.81	5.81	5.09	4.62	3.32	3.32	3.61	4.34	5.01	
0.080	7.20	6.98	6.27	6.14	7.23	6.42	5.89	4.22	4.22	4.63	5.39	6.18	
0.090	8.95	8.60	7.95	7.36	8.99	7.82	7.29	5.73	5.73	5.97	6.48	7.90	
0.100	10.79	10.38	9.49	9.01	10.91	9.34	9.01	7.40	7.40	7.23	7.33	9.31	
0.110	12.57	12.22	11.15	10.47	12.43	11.13	10.90	9.40	9.40	9.09	8.23	10.93	
0.120	14.83	14.10	12.86	12.28	14.30	12.88	13.14	11.49	11.49	11.04	9.59	12.16	
0.130	16.97	16.15	14.77	14.33	16.23	14.77	14.97	13.70	13.70	12.90	11.28	13.67	
0.140	19.17	18.30	16.84	16.63	18.20	16.74	16.87	16.11	16.11	14.71	12.97	15.11	
0.150	21.61	20.55	19.03	18.71	20.48	18.71	18.90	18.70	18.70	16.45	14.76	16.11	
0.160	24.16	22.73	20.95	21.09	22.73	21.25	21.13	20.77	20.77	18.01	16.90	17.60	
0.170	26.79	25.05	23.06	23.27	25.04	23.86	23.42	22.94	22.94	20.03	18.09	18.93	
0.180	29.20	27.40	25.29	25.36	27.28	26.27	25.45	25.47	25.47	21.78	19.86	20.24	
0.190	31.54	29.70	27.69	27.43	29.75	28.76	27.73	28.06	28.06	23.60	21.94	22.39	
0.200	33.85	31.97	30.25	29.74	32.23	31.04	30.32	30.54	30.54	25.74	24.08	24.47	
0.220	38.85	37.03	35.16	34.39	37.03	35.55	34.90	34.49	34.49	30.07	28.23	28.16	
0.240	43.62	42.06	39.87	39.13	41.70	39.99	40.02	38.49	38.49	34.32	31.89	30.84	
0.260	48.50	46.96	44.68	44.10	46.39	44.63	44.69	42.53	42.53	38.51	36.52	33.21	
0.280	53.05	51.55	49.60	49.12	51.05	49.29	49.44	47.21	47.21	42.24	40.79	35.73	
0.300	57.41	56.14	54.32	53.83	55.64	54.36	54.68	51.97	51.97	46.52	44.65	39.21	
0.320	61.57	60.26	58.63	58.25	59.99	58.88	58.99	56.52	56.52	50.01	48.01	42.49	
0.340	65.78	64.30	63.13	62.63	64.25	63.45	63.37	60.85	60.85	53.29	51.18	45.54	
0.360	69.81	68.04	67.03	66.23	68.13	67.79	66.95	64.41	64.41	56.85	53.58	48.01	
0.380	73.17	71.61	70.59	69.76	71.47	71.65	70.07	67.73	67.73	58.87	55.41	49.82	
0.400	76.49	75.18	73.98	72.92	74.74	74.85	72.83	70.28	70.28	60.31	57.56	51.61	
0.420	79.18	78.21	77.16	76.29	77.93	77.87	75.69	73.01	73.01	62.30	59.69	53.72	
0.440	81.87	80.90	80.28	79.47	80.77	80.84	78.33	76.06	76.06	64.79	61.48	56.27	
0.460	84.30	83.41	83.17	82.04	83.03	83.51	80.73	78.36	78.36	67.11	63.67	57.53	
0.480	86.46	85.81	85.52	84.43	85.17	85.50	82.90	80.30	80.30	68.36	65.66	59.76	
0.500	88.40	87.92	87.50	86.68	87.05	87.43	84.76	81.79	81.79	69.75	66.94	62.18	
0.550	92.10	92.32	91.89	91.13	91.52	91.21	88.63	85.20	85.20	74.34	71.31	65.96	
0.600	94.56	95.29	95.16	94.31	94.39	93.84	91.17	87.87	87.87	79.18	76.77	70.88	
0.650	96.62	97.11	96.83	96.33	95.95	95.52	93.08	90.58	90.58	84.34	81.76	77.75	
0.700	98.05	98.26	97.99	97.67	96.92	96.69	94.93	92.66	92.66	87.44	85.76	83.63	
0.750	98.93	98.95	98.67	98.42	97.78	97.51	95.85	94.45	94.45	89.16	88.95	88.09	
0.800	99.36	99.30	99.21	98.93	98.47	98.15	96.87	96.06	96.06	91.52	91.11	90.35	
0.850	99.69	99.52	99.48	99.38	98.93	98.68	97.86	96.93	96.93	94.71	93.87	92.72	
0.900	99.88	99.69	99.65	99.61	99.44	99.21	98.02	97.05	97.05	96.74	96.72	96.37	
0.950	99.95	99.88	99.84	99.80	99.72	99.73	99.40	98.77	98.77	98.55	98.20	98.27	
1.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 10 MeV

Scaled radius	0.0		0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60					
	0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60		0.65		0.70			
0.005	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19	70.19		
0.010	83.29	34.28	7.50	2.04	0.53	0.22	0.05	0.02	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
0.015	84.47	50.45	15.41	7.50	4.84	2.14	1.02	0.48	0.25	0.13	0.08	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
0.020	85.19	61.23	24.16	15.41	8.24	3.67	1.83	0.87	0.56	0.31	0.21	0.15	0.11	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	
0.025	85.68	68.14	32.82	24.16	12.66	5.73	2.74	1.33	0.73	0.42	0.28	0.19	0.13	0.10	0.09	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
0.030	86.08	72.07	40.56	32.82	17.34	8.02	3.98	2.04	1.06	0.58	0.35	0.23	0.16	0.12	0.10	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
0.035	86.46	74.70	47.55	40.56	21.84	10.56	5.45	2.84	1.44	0.71	0.46	0.30	0.21	0.16	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
0.040	86.67	76.37	52.78	47.55	26.35	13.40	7.14	3.43	1.77	0.87	0.51	0.34	0.23	0.17	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
0.045	86.85	77.59	57.39	52.78	30.66	16.38	8.87	4.43	2.29	1.06	0.58	0.36	0.24	0.18	0.14	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
0.050	87.24	78.54	60.86	57.39	35.05	19.29	10.70	5.51	2.89	1.27	0.65	0.40	0.27	0.20	0.15	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
0.060	87.54	79.75	66.13	60.86	42.78	25.27	14.49	6.87	3.60	1.54	0.78	0.48	0.31	0.22	0.17	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
0.070	87.75	80.69	69.36	66.13	49.27	31.02	18.71	9.48	4.05	1.84	0.87	0.51	0.34	0.24	0.18	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
0.080	87.91	81.34	71.72	69.36	54.43	36.20	23.02	12.36	5.41	2.14	1.06	0.61	0.39	0.26	0.19	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
0.090	88.10	82.30	73.45	71.72	58.34	41.32	26.96	15.55	6.66	2.44	1.21	0.70	0.45	0.31	0.23	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
0.100	88.19	82.60	74.75	73.45	61.56	45.54	31.07	19.51	7.80	2.74	1.33	0.78	0.51	0.35	0.25	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
0.110	88.32	82.96	75.70	74.75	64.09	49.35	35.10	22.20	8.91	3.03	1.44	0.81	0.53	0.37	0.26	0.20	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
0.120	88.45	83.29	76.52	75.70	66.15	52.59	38.71	25.54	10.20	3.32	1.54	0.87	0.55	0.39	0.27	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
0.130	88.61	83.67	77.25	76.52	67.94	55.35	41.96	28.24	11.17	3.60	1.65	0.91	0.57	0.40	0.29	0.22	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
0.140	88.74	83.93	77.91	77.25	69.44	57.88	45.06	31.10	12.94	3.88	1.77	0.95	0.61	0.43	0.30	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22
0.150	88.94	84.18	78.48	77.91	70.57	60.15	47.79	33.91	14.95	4.17	1.88	1.00	0.65	0.45	0.31	0.24	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
0.160	89.13	84.54	79.06	78.48	71.69	62.24	50.22	36.54	16.83	4.45	2.00	1.11	0.69	0.47	0.32	0.25	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
0.170	89.31	84.83	80.18	79.06	73.62	65.64	54.74	39.17	18.94	4.74	2.14	1.17	0.73	0.50	0.34	0.26	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.180	89.50	85.12	80.64	80.18	74.51	67.09	56.81	41.85	21.98	5.03	2.29	1.21	0.77	0.53	0.36	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
0.190	89.68	85.39	81.10	80.64	75.25	68.43	58.73	44.51	24.94	5.32	2.44	1.27	0.81	0.55	0.38	0.28	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
0.200	89.94	85.98	81.91	81.10	76.80	70.88	62.52	49.48	26.87	5.61	2.60	1.33	0.85	0.57	0.40	0.29	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
0.220	90.31	86.53	82.85	81.91	78.80	73.20	66.04	55.58	31.02	6.13	2.84	1.44	0.91	0.61	0.43	0.31	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
0.240	90.66	87.16	83.83	82.85	80.24	75.25	68.98	59.45	33.91	6.40	3.03	1.54	0.95	0.65	0.45	0.33	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
0.260	91.01	87.81	84.74	83.83	81.11	77.14	71.68	63.19	36.20	6.87	3.22	1.65	0.99	0.69	0.47	0.34	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
0.280	91.47	88.48	85.69	84.74	82.54	78.79	74.29	66.74	38.71	7.14	3.40	1.77	1.00	0.73	0.51	0.36	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
0.300	91.95	89.14	86.60	85.69	83.74	80.32	76.66	69.95	41.32	7.42	3.59	1.88	1.06	0.77	0.53	0.37	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
0.320	92.53	89.77	87.69	86.60	84.83	81.31	79.08	73.15	44.51	7.71	3.78	2.00	1.11	0.81	0.57	0.40	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
0.340	92.99	90.51	88.70	87.69	85.01	82.05	79.08	76.08	47.79	8.02	3.97	2.14	1.21	0.85	0.61	0.43	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
0.360	93.55	91.34	89.76	88.70	86.33	83.85	81.24	78.52	50.22	8.32	4.17	2.29	1.33	0.89	0.63	0.45	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
0.380	94.15	92.11	90.72	89.76	87.54	85.42	83.11	80.91	52.59	8.60	4.45	2.44	1.44	0.95	0.65	0.47	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
0.400	94.66	92.89	91.57	90.72	88.82	86.97	85.00	83.06	55.58	8.84	4.74	2.60	1.54	1.00	0.73	0.51	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
0.420	95.19	93.60	92.33	91.57	90.02	88.40	86.64	85.12	58.73	9.06	5.03	2.74	1.65	1.06	0.77	0.53	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
0.440	95.67	94.33	93.19	92.33	91.20	89.73	88.30	86.94	62.52	9.28	5.32	2.84	1.77	1.11	0.81	0.														

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 10 MeV

Scaled radius	0.60		0.65		0.70		0.75		0.80		0.85		0.90		0.95		1.00		1.05		1.10		1.15		1.20		
	0.65		0.70		0.75		0.80		0.85		0.90		0.95		1.00		1.05		1.10		1.15		1.20		1.25		1.30
		Scaled depth		interval		0.80		0.85		0.90		0.95		1.00		1.05		1.10		1.15		1.20		1.25		1.30	
0.005	0.01	0.02	0.03	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.010	0.05	0.09	0.13	0.10	0.09	0.10	0.03	0.04	0.03	0.04	0.03	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.015	0.17	0.20	0.28	0.19	0.26	0.19	0.08	0.15	0.08	0.15	0.08	0.15	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
0.020	0.35	0.36	0.50	0.30	0.49	0.30	0.13	0.49	0.13	0.49	0.13	0.49	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
0.025	0.50	0.53	0.75	0.53	0.67	0.53	0.37	0.91	0.37	0.91	0.37	0.91	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
0.030	0.84	0.83	0.97	0.87	0.96	0.87	0.39	1.19	0.39	1.19	0.39	1.19	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
0.035	1.13	1.11	1.27	1.31	1.46	1.31	0.81	1.19	0.81	1.19	0.81	1.19	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68
0.040	1.53	1.40	1.69	1.79	1.87	1.79	1.55	1.92	1.55	1.92	1.55	1.92	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86	2.86
0.045	1.87	1.83	2.08	2.24	2.32	2.24	2.32	2.61	2.32	2.61	2.32	2.61	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12
0.050	2.30	2.25	2.54	2.99	2.89	2.99	3.24	3.38	3.24	3.38	3.24	3.38	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08	4.08
0.060	3.36	3.30	4.03	4.30	3.90	4.30	4.59	5.44	4.59	5.44	4.59	5.44	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40	6.40
0.070	4.42	4.57	5.29	5.57	5.24	5.57	6.16	7.45	6.16	7.45	6.16	7.45	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81	8.81
0.080	5.82	5.93	6.71	7.32	6.44	7.32	7.55	8.85	7.55	8.85	7.55	8.85	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30	10.30
0.090	7.26	7.45	8.29	8.91	8.04	8.91	9.39	10.25	9.39	10.25	9.39	10.25	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66	11.66
0.100	8.81	9.53	9.89	10.92	10.38	10.92	10.68	12.10	10.68	12.10	10.68	12.10	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30	13.30
0.110	10.41	11.30	11.68	12.75	11.99	12.75	12.39	14.71	12.39	14.71	12.39	14.71	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44	16.44
0.120	12.41	13.34	13.44	14.98	13.39	14.98	14.48	17.32	14.48	17.32	14.48	17.32	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11	19.11
0.130	14.37	15.31	15.17	17.38	15.27	17.38	16.45	19.31	16.45	19.31	16.45	19.31	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94	20.94
0.140	16.61	17.38	16.90	19.49	17.16	19.49	17.16	19.31	17.16	19.31	17.16	19.31	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89	22.89
0.150	19.04	19.72	18.93	21.54	20.02	21.54	20.02	24.04	20.02	24.04	20.02	24.04	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79	25.79
0.160	21.30	22.18	20.97	23.80	22.70	23.80	22.70	26.79	22.70	26.79	22.70	26.79	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29	28.29
0.170	23.80	24.38	23.47	26.39	25.39	26.39	25.39	29.69	25.39	29.69	25.39	29.69	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
0.180	26.53	27.10	25.88	29.26	28.17	29.26	28.17	32.11	28.17	32.11	28.17	32.11	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23	31.23
0.190	29.05	29.69	28.33	31.85	30.75	31.85	30.75	34.90	30.75	34.90	30.75	34.90	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91	35.91
0.200	31.74	32.35	30.87	34.59	33.37	34.59	33.37	38.52	33.37	38.52	33.37	38.52	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09	40.09
0.220	37.22	37.65	37.20	39.59	38.52	39.59	38.52	43.64	38.52	43.64	38.52	43.64	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86	45.86
0.240	42.60	42.57	43.08	43.97	43.64	43.97	43.64	47.97	43.64	47.97	43.64	47.97	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04	50.04
0.260	48.10	47.92	49.02	49.60	49.60	49.60	49.60	53.14	49.60	53.14	49.60	53.14	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38	54.38
0.280	53.05	53.15	54.39	55.09	55.09	55.09	55.09	58.31	55.09	58.31	55.09	58.31	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32	59.32
0.300	57.94	58.18	59.45	60.87	60.87	60.87	60.87	63.35	60.87	63.35	60.87	63.35	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22	64.22
0.320	62.51	62.99	64.59	66.00	66.00	66.00	66.00	67.44	66.00	67.44	66.00	67.44	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97	67.97
0.340	67.47	67.97	69.27	70.50	70.50	70.50	70.50	71.11	70.50	71.11	70.50	71.11	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47	71.47
0.360	72.28	72.13	73.26	74.23	74.23	74.23	74.23	74.58	74.23	74.58	74.23	74.58	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67	74.67
0.380	76.22	75.83	76.89	77.29	77.29	77.29	77.29	77.88	77.29	77.88	77.29	77.88	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47	77.47
0.400	80.07	80.19	80.77	80.93	80.93	80.93	80.93	81.09	80.93	81.09	80.93	81.09	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06	81.06
0.420	83.11	84.10	84.10	83.77	83.77	83.77	83.77	83.68	83.77	83.68	83.77	83.68	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84	81.84
0.440	85.79	87.02	87.04	86.52	86.52	86.52	86.52	86.26	86.52	86.26	86.52	86.26	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66	82.66
0.460	88.21	89.11	89.23	88.82	88.82	88.82	88.82	88.58	88.82	88.58	88.82	88.58	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19	85.19
0.480	90.14	91.12	91.06	90.55	90.55	90.55	90.55	90.64	90.55	90.64	90.55	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64	90.64
0.500	92.07	92.82	92.63	92.26	92.26	92.26	92.26	92.80	92.26	92.80	92.26	92.80	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79	92.79
0.550	95.51	95.67	95.12	95.56	95.56	95.56	95.56	96.41	95.56	96.41	95.56	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41
0.600	97.40	97.28	96.52	97.27	97.27	97.27	97.27	97.54	97.27	97.54	97.27	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54	97.54
0.650	98.44	98.27	97.54	97.71	97.71	97.71	97.71	98.26	97.71																		

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 5 MeV

Scaled radius	0.60		0.65		0.70		0.75		0.80		0.85		0.90		0.95		1.00		1.05		1.10		1.15					
	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15	0.80	0.85	0.90	0.95	1.00	1.05	1.10	1.15
0.005																												
0.010	0.01	0.06	0.04	0.01	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.015	0.08	0.13	0.08	0.11	0.33	0.33	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
0.020	0.18	0.26	0.14	0.34	0.87	0.87	0.00	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63
0.025	0.36	0.42	0.31	0.70	0.98	0.98	0.00	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69
0.030	0.59	0.65	0.56	1.03	1.22	1.22	0.00	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71	2.71
0.035	0.83	0.80	0.81	1.35	1.52	1.52	0.00	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08	3.08
0.040	1.08	1.15	1.25	2.08	1.76	1.76	0.00	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19	3.19
0.045	1.44	1.32	1.71	2.43	2.57	2.57	0.00	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
0.050	1.95	1.80	2.48	2.86	2.71	2.71	0.00	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
	2.46	2.23	3.04	3.22	3.28	3.28	0.22	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
0.060	3.52	3.47	4.08	4.82	3.94	3.94	0.24	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
0.070	4.92	4.93	5.61	6.54	4.79	4.79	0.36	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88	4.88
0.080	6.45	6.31	7.12	7.97	6.44	6.44	0.47	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63	5.63
0.090	7.98	8.02	9.02	10.59	8.19	8.19	0.64	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84
0.100	9.66	9.87	11.41	13.31	9.63	9.63	0.89	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84
0.110	11.60	11.72	13.88	16.45	12.16	12.16	2.32	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84	5.84
0.120	13.62	13.75	16.49	19.38	13.65	13.65	4.62	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90
0.130	16.25	16.02	19.23	22.61	15.75	15.75	6.66	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21
0.140	18.77	18.24	21.73	25.79	17.80	17.80	7.71	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08	7.08
0.150	21.39	20.98	24.52	28.96	20.25	20.25	8.12	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01	10.01
0.160	23.85	23.18	26.80	31.19	23.59	23.59	9.36	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31	13.31
0.170	26.27	25.84	30.06	34.16	26.32	26.32	12.87	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22	15.22
0.180	28.88	29.09	32.74	37.61	29.22	29.22	16.17	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66	16.66
0.190	31.75	32.13	36.05	40.91	32.62	32.62	19.39	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10	17.10
0.200	34.48	35.30	39.29	44.02	34.86	34.86	24.64	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75	17.75
0.220	40.54	40.61	45.08	52.13	38.19	38.19	30.66	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
0.240	47.06	47.00	51.22	57.82	46.44	46.44	35.81	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19
0.260	52.95	53.14	56.74	62.68	52.91	52.91	42.52	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51	29.51
0.280	58.40	59.38	62.08	68.38	56.95	56.95	46.87	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84	29.84
0.300	63.52	65.61	68.74	73.87	61.69	61.69	48.25	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42	34.42
0.320	69.29	70.60	72.47	76.65	65.86	65.86	51.90	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55	35.55
0.340	74.20	75.14	76.58	80.14	69.78	69.78	56.22	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90	36.90
0.360	78.60	79.65	79.90	83.08	73.33	73.33	59.05	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86	37.86
0.380	82.35	83.49	82.87	85.51	76.01	76.01	61.03	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02	41.02
0.400	85.39	86.62	85.47	88.65	80.29	80.29	63.56	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33	44.33
0.420	88.06	89.09	88.31	90.33	81.34	81.34	66.38	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70	46.70
0.440	90.34	91.16	91.37	92.33	82.44	82.44	66.97	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96	46.96
0.460	92.10	93.23	93.08	93.46	83.79	83.79	69.43	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81	48.81
0.480	93.89	94.39	94.09	94.22	84.37	84.37	72.04	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27	50.27
0.500	95.47	95.62	94.97	95.13	84.71	84.71	73.83	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60	50.60
0.550	97.75	98.00	96.18	96.10	88.23	88.23	77.37	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94	54.94
0.600	98.95	98.77	97.36	97.13	90.33	90.33	78.39	64																				

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 2 MeV

Scaled radius	0.0		0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60			
	Scaled depth interval		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60		0.65		0.70		0.75		0.80	
0.005	40.15	3.02	0.40	0.14	0.06	0.04	0.03	0.02	0.01	0.01	0.04	0.02	0.01	0.01	0.04	0.02	0.01	0.01	0.04	0.02	0.01	0.04	0.02	0.01	0.01	0.04	0.02	
0.010	50.69	9.91	1.63	0.49	0.31	0.12	0.10	0.11	0.06	0.11	0.19	0.12	0.10	0.11	0.19	0.12	0.10	0.11	0.19	0.12	0.10	0.11	0.19	0.12	0.10	0.11	0.19	0.12
0.015	55.22	17.38	3.47	1.18	0.66	0.40	0.29	0.28	0.20	0.31	0.40	0.29	0.28	0.20	0.31	0.40	0.29	0.28	0.20	0.31	0.40	0.29	0.28	0.20	0.31	0.40	0.29	0.28
0.020	57.40	24.28	5.94	2.12	1.17	0.69	0.52	0.60	0.41	0.52	0.69	0.52	0.60	0.41	0.52	0.69	0.52	0.60	0.41	0.52	0.69	0.52	0.60	0.41	0.52	0.69	0.52	0.60
0.025	58.50	30.11	8.87	3.22	1.80	1.14	0.84	0.89	0.68	0.84	1.14	0.84	0.89	0.68	0.84	1.14	0.84	0.89	0.68	0.84	1.14	0.84	0.89	0.68	0.84	1.14	0.84	0.89
0.030	59.09	34.68	11.76	4.45	2.51	1.68	1.32	1.24	0.99	1.32	1.68	1.32	1.24	0.99	1.32	1.68	1.32	1.24	0.99	1.32	1.68	1.32	1.24	0.99	1.32	1.68	1.32	1.24
0.035	59.67	38.19	14.98	5.95	3.37	2.30	1.90	1.72	1.35	1.90	2.30	1.90	1.72	1.35	1.90	2.30	1.90	1.72	1.35	1.90	2.30	1.90	1.72	1.35	1.90	2.30	1.90	1.72
0.040	60.10	40.98	17.92	7.57	4.27	3.02	2.55	2.20	1.84	2.55	3.02	2.55	2.20	1.84	2.55	3.02	2.55	2.20	1.84	2.55	3.02	2.55	2.20	1.84	2.55	3.02	2.55	2.20
0.045	60.41	43.42	20.64	9.39	5.34	3.79	3.21	2.75	2.20	3.21	3.79	3.21	2.75	2.20	3.21	3.79	3.21	2.75	2.20	3.21	3.79	3.21	2.75	2.20	3.21	3.79	3.21	2.75
0.050	60.72	45.21	23.24	11.22	6.52	4.65	3.90	3.31	2.84	3.90	4.65	3.90	3.31	2.84	3.90	4.65	3.90	3.31	2.84	3.90	4.65	3.90	3.31	2.84	3.90	4.65	3.90	3.31
0.060	61.33	48.09	28.12	14.98	8.82	6.56	5.40	4.71	4.11	5.40	6.56	5.40	4.71	4.11	5.40	6.56	5.40	4.71	4.11	5.40	6.56	5.40	4.71	4.11	5.40	6.56	5.40	4.71
0.070	61.86	50.25	32.57	18.70	11.54	8.55	7.04	6.44	5.68	7.04	8.55	7.04	6.44	5.68	7.04	8.55	7.04	6.44	5.68	7.04	8.55	7.04	6.44	5.68	7.04	8.55	7.04	6.44
0.080	62.34	51.91	36.51	22.30	14.43	10.86	8.77	8.23	7.30	8.77	10.86	8.77	8.23	7.30	8.77	10.86	8.77	8.23	7.30	8.77	10.86	8.77	8.23	7.30	8.77	10.86	8.77	8.23
0.090	62.86	53.38	39.90	26.04	17.56	13.22	10.95	10.13	9.20	10.95	13.22	10.95	10.13	9.20	10.95	13.22	10.95	10.13	9.20	10.95	13.22	10.95	10.13	9.20	10.95	13.22	10.95	10.13
0.100	63.43	54.77	42.91	29.47	20.50	15.74	13.10	12.14	11.28	13.10	15.74	13.10	12.14	11.28	13.10	15.74	13.10	12.14	11.28	13.10	15.74	13.10	12.14	11.28	13.10	15.74	13.10	12.14
0.110	63.91	56.07	45.47	32.57	23.56	18.45	15.49	14.46	13.63	15.49	18.45	15.49	14.46	13.63	15.49	18.45	15.49	14.46	13.63	15.49	18.45	15.49	14.46	13.63	15.49	18.45	15.49	14.46
0.120	64.58	57.21	47.76	35.70	26.60	21.28	17.96	16.78	16.03	17.96	21.28	17.96	16.78	16.03	17.96	21.28	17.96	16.78	16.03	17.96	21.28	17.96	16.78	16.03	17.96	21.28	17.96	16.78
0.130	65.28	58.48	50.04	38.58	29.62	24.14	20.59	19.40	18.18	20.59	24.14	20.59	19.40	18.18	20.59	24.14	20.59	19.40	18.18	20.59	24.14	20.59	19.40	18.18	20.59	24.14	20.59	19.40
0.140	66.03	59.66	52.00	41.37	32.59	27.06	23.24	21.87	20.56	23.24	27.06	23.24	21.87	20.56	23.24	27.06	23.24	21.87	20.56	23.24	27.06	23.24	21.87	20.56	23.24	27.06	23.24	21.87
0.150	66.89	60.84	53.79	44.22	35.69	29.80	26.07	24.42	23.20	26.07	29.80	26.07	24.42	23.20	26.07	29.80	26.07	24.42	23.20	26.07	29.80	26.07	24.42	23.20	26.07	29.80	26.07	24.42
0.160	67.78	62.07	55.58	46.81	38.49	32.50	28.81	26.99	26.11	32.50	38.49	28.81	26.99	26.11	32.50	38.49	28.81	26.99	26.11	32.50	38.49	28.81	26.99	26.11	32.50	38.49	28.81	26.99
0.170	68.68	63.22	57.24	49.26	41.43	35.40	31.69	29.55	29.11	35.40	41.43	31.69	29.55	29.11	35.40	41.43	31.69	29.55	29.11	35.40	41.43	31.69	29.55	29.11	35.40	41.43	31.69	29.55
0.180	69.56	64.34	58.92	51.85	44.20	38.20	34.48	32.33	32.05	38.20	44.20	34.48	32.33	32.05	38.20	44.20	34.48	32.33	32.05	38.20	44.20	34.48	32.33	32.05	38.20	44.20	34.48	32.33
0.190	70.58	65.56	60.64	54.23	46.89	40.88	37.37	35.16	34.98	46.89	40.88	37.37	35.16	34.98	46.89	40.88	37.37	35.16	34.98	46.89	40.88	37.37	35.16	34.98	46.89	40.88	37.37	35.16
0.200	71.56	66.81	62.34	56.46	49.39	43.73	40.18	37.92	38.87	49.39	43.73	40.18	37.92	38.87	49.39	43.73	40.18	37.92	38.87	49.39	43.73	40.18	37.92	38.87	49.39	43.73	40.18	37.92
0.220	73.61	69.41	65.48	60.67	54.23	48.93	45.78	43.90	44.19	54.23	48.93	45.78	43.90	44.19	54.23	48.93	45.78	43.90	44.19	54.23	48.93	45.78	43.90	44.19	54.23	48.93	45.78	43.90
0.240	75.83	72.26	68.43	64.78	59.08	54.25	51.27	49.75	50.38	59.08	54.25	51.27	49.75	50.38	59.08	54.25	51.27	49.75	50.38	59.08	54.25	51.27	49.75	50.38	59.08	54.25	51.27	49.75
0.260	78.16	75.03	71.84	68.45	63.78	59.23	56.50	55.03	55.99	63.78	59.23	56.50	55.03	55.99	63.78	59.23	56.50	55.03	55.99	63.78	59.23	56.50	55.03	55.99	63.78	59.23	56.50	55.03
0.280	80.37	77.56	74.76	71.81	68.07	63.72	61.53	60.61	62.13	68.07	63.72	61.53	60.61	62.13	68.07	63.72	61.53	60.61	62.13	68.07	63.72	61.53	60.61	62.13	68.07	63.72	61.53	60.61
0.300	82.43	79.98	77.57	75.16	72.05	68.25	66.16	65.78	67.54	72.05	68.25	66.16	65.78	67.54	72.05	68.25	66.16	65.78	67.54	72.05	68.25	66.16	65.78	67.54	72.05	68.25	66.16	65.78
0.320	84.73	82.24	80.27	78.32	75.63	72.63	70.46	70.16	72.24	75.63	72.63	70.46	70.16	72.24	75.63	72.63	70.46	70.16	72.24	75.63	72.63	70.46	70.16	72.24	75.63	72.63	70.46	70.16
0.340	86.69	84.40	82.79	81.32	78.95	76.44	74.48	74.38	77.02	78.95	76.44	74.48	74.38	77.02	78.95	76.44	74.48	74.38	77.02	78.95	76.44	74.48	74.38	77.02	78.95	76.44	74.48	74.38
0.360	88.53	86.50	85.05	84.04	82.07	79.80	78.28	78.70	80.62	82.07	79.80	78.28	78.70	80.62	82.07	79.80	78.28	78.70	80.62	82.07	79.80	78.28	78.70	80.62	82.07	79.80	78.28	78.70
0.380	90.06	88.59	87.30	86.36	84.99	82.76	81.72	82.19	84.02	84.99	82.76	81.72	82.19	84.02	84.99	82.76	81.72	82.19	84.02	84.99	82.76	81.72	82.19	84.02	84.99	82.76	81.72	82.19
0.400	91.48	90.33	89.43	88.66	87.49	85.44	85.08	85.51	86.94	87.49	85.44	85.08	85.51	86.94	87.49	85.44	85.08	85.51	86.94	87.49	85.44	85.08	85.51	86.94	87.49	85.44	85.08	85.51
0.420	92.87	91.90	91.31	90.62	89.65	87.91	87.91	87.97	89.32	89.65	87.91	87.91	87.97	89.32	89.65	87.91	87.91	87.97	89.32	89.65	87.91	87.91	87.97	89.32	89.65	87.91	87.91	87.97
0.440	94.04	93.41	93.00	92.33	91.55	90.13	90.44	90.27	91.38	91.55	90.13	90.44	90.27	91.38	91.55	90.13	90.44	90.27	91.38	91.55	90.13	90.44	90.27	91.38	91.55	90.13	90.44	90.27
0.460	95.08	94.51	94.28	93.73	93.25	92.09	92.45	92.20	93.19	93.25	92.09	92.45	92.20	93.19	93.25	92.09	92.45	92.20	93.19	93.25	92.09	92.45	92.20	93.19	93.25	92.09	92.45	92.20
0.480	96.16	95.61	95.45	94.94	94.56	93.87	94.08	93.98	94.57	94.56	93.87	94.08	93.98	94.57	94.56	93.87	94.08	93.98	94.57	94.56	93.87	94.08	93.98	94.57	94.56	93.87	94.08	93.98
0.500	96.97	96.64	96.54	96.04	95.79	95.29	95.34	95.34	95.91	95.79	95.29	95.34	95.34	95.91	95.79	95.29	95.34	95.34	95.91	95.79	95.29	95.34	95.34	95.91	95.79	95.29	95.34	95.34
0.550	98.58	98.34	98.21	97.85	97.93	97.68	97.59	97.76	98.25	97.93	97.68	97.59	97.76	98.25	97.93	97.68	97.59	97.76	98.25	97.93	97.68	97.59	97.76	98.25	97.93	97.68	97.59	97.76
0.600	99.39	99.22	99.20	99.00	98.97	98.98	98.93	99.10	99.46	98.97	98.98																	

TABLE 3B. Continued

Cumulative Radial Energy-Deposition Distribution in Copper, Beam Energy = 1 Mev

Scaled radius	0.05		0.10		0.15		0.20		0.25		0.30		0.35		0.40		0.45		0.50		0.55		0.60	
	0.05	0.10	0.10	0.15	0.15	0.20	0.20	0.25	0.25	0.30	0.30	0.35	0.35	0.40	0.40	0.45	0.45	0.50	0.50	0.55	0.55	0.60	0.60	
0.005	34.12	2.10	0.28	0.10	0.15	0.06	0.20	0.25	0.05	0.14	0.05	0.04	0.03	0.03	0.03	0.40	0.45	0.45	0.50	0.50	0.55	0.55	0.60	
0.010	43.94	6.90	1.15	0.42	0.42	0.21	0.25	0.30	0.14	0.21	0.13	0.12	0.10	0.10	0.09	0.45	0.50	0.50	0.50	0.50	0.55	0.55	0.60	
0.015	48.12	12.88	2.40	0.95	0.95	0.47	0.47	0.50	0.35	0.47	0.27	0.28	0.27	0.27	0.15	0.50	0.55	0.55	0.55	0.55	0.60	0.60	0.60	
0.020	50.37	18.33	4.21	1.62	1.62	0.79	0.79	0.83	0.62	0.79	0.50	0.48	0.48	0.48	0.32	0.55	0.60	0.60	0.60	0.60	0.65	0.65	0.65	
0.025	51.67	23.25	6.41	2.55	2.55	1.30	1.30	1.42	1.02	1.30	0.79	0.83	0.83	0.83	0.65	0.65	0.70	0.70	0.70	0.70	0.75	0.75	0.75	
0.030	52.47	27.34	8.74	3.56	3.56	1.99	1.99	2.17	1.47	1.99	1.21	1.23	1.23	1.23	0.85	0.85	0.90	0.90	0.90	0.90	0.95	0.95	0.95	
0.035	53.07	30.43	11.35	4.75	4.75	2.67	2.67	2.91	2.06	2.67	1.71	1.67	1.67	1.67	1.00	1.00	1.05	1.05	1.05	1.05	1.10	1.10	1.10	
0.040	53.44	33.28	13.83	5.99	5.99	3.46	3.46	3.75	2.65	3.46	2.26	2.12	2.12	2.12	1.20	1.20	1.25	1.25	1.25	1.25	1.30	1.30	1.30	
0.045	53.93	35.48	16.28	7.42	7.42	4.34	4.34	4.68	3.33	4.34	2.77	2.72	2.72	2.72	1.40	1.40	1.45	1.45	1.45	1.45	1.50	1.50	1.50	
0.050	54.30	37.45	18.53	8.84	8.84	5.44	5.44	5.82	4.10	5.44	3.41	3.32	3.32	3.32	1.60	1.60	1.65	1.65	1.65	1.65	1.70	1.70	1.70	
0.060	55.01	40.84	22.72	11.97	11.97	7.82	7.82	8.34	5.59	7.82	4.74	4.67	4.67	4.67	1.80	1.80	1.85	1.85	1.85	1.85	1.90	1.90	1.90	
0.070	55.75	43.48	26.73	15.10	15.10	10.19	10.19	10.76	7.71	10.19	6.27	6.32	6.32	6.32	2.00	2.00	2.05	2.05	2.05	2.05	2.10	2.10	2.10	
0.080	56.47	45.66	30.33	18.48	18.48	12.93	12.93	13.61	10.01	12.93	8.19	8.36	8.36	8.36	2.20	2.20	2.25	2.25	2.25	2.25	2.30	2.30	2.30	
0.090	57.16	47.57	33.70	21.64	21.64	15.63	15.63	16.39	12.37	15.63	10.06	10.29	10.29	10.29	2.40	2.40	2.45	2.45	2.45	2.45	2.50	2.50	2.50	
0.100	57.90	49.38	36.86	24.89	24.89	18.52	18.52	19.35	15.03	18.52	12.34	12.20	12.20	12.20	2.60	2.60	2.65	2.65	2.65	2.65	2.70	2.70	2.70	
0.110	58.76	51.09	39.77	28.04	28.04	21.49	21.49	22.37	17.78	21.49	14.66	14.27	14.27	14.27	2.80	2.80	2.85	2.85	2.85	2.85	2.90	2.90	2.90	
0.120	59.70	52.80	42.49	31.26	31.26	24.28	24.28	25.27	20.57	24.28	17.17	16.88	16.88	16.88	3.00	3.00	3.05	3.05	3.05	3.05	3.10	3.10	3.10	
0.130	60.69	54.43	44.98	34.12	34.12	27.27	27.27	28.22	23.43	27.27	19.89	19.66	19.66	19.66	3.20	3.20	3.25	3.25	3.25	3.25	3.30	3.30	3.30	
0.140	61.77	56.17	47.50	37.06	37.06	30.45	30.45	31.43	26.34	30.45	22.58	22.30	22.30	22.30	3.40	3.40	3.45	3.45	3.45	3.45	3.50	3.50	3.50	
0.150	62.90	57.81	50.03	39.93	39.93	33.69	33.69	34.71	29.17	33.69	25.44	25.09	25.09	25.09	3.60	3.60	3.65	3.65	3.65	3.65	3.70	3.70	3.70	
0.160	64.14	59.38	52.27	42.78	42.78	36.57	36.57	37.84	32.02	36.57	28.43	28.02	28.02	28.02	3.80	3.80	3.85	3.85	3.85	3.85	3.90	3.90	3.90	
0.170	65.30	61.00	54.44	45.45	45.45	39.59	39.59	40.76	35.09	39.59	31.30	30.94	30.94	30.94	4.00	4.00	4.05	4.05	4.05	4.05	4.10	4.10	4.10	
0.180	66.56	62.53	56.56	48.06	48.06	42.51	42.51	43.76	37.89	42.51	34.31	33.82	33.82	33.82	4.20	4.20	4.25	4.25	4.25	4.25	4.30	4.30	4.30	
0.190	67.96	64.09	58.71	50.71	50.71	45.36	45.36	46.61	40.79	45.36	37.03	37.00	37.00	37.00	4.40	4.40	4.45	4.45	4.45	4.45	4.50	4.50	4.50	
0.200	69.25	65.76	60.68	53.19	53.19	48.18	48.18	49.07	43.59	48.18	39.96	40.01	40.01	40.01	4.60	4.60	4.65	4.65	4.65	4.65	4.70	4.70	4.70	
0.220	72.09	68.60	64.51	57.95	57.95	53.69	53.69	54.64	49.24	53.69	45.84	45.94	45.94	45.94	4.80	4.80	4.85	4.85	4.85	4.85	4.90	4.90	4.90	
0.240	74.80	71.52	68.11	62.37	62.37	58.70	58.70	59.74	54.35	58.70	51.91	51.90	51.90	51.90	5.00	5.00	5.05	5.05	5.05	5.05	5.10	5.10	5.10	
0.260	77.66	74.60	71.53	66.55	66.55	63.37	63.37	64.46	59.67	63.37	57.60	57.80	57.80	57.80	5.20	5.20	5.25	5.25	5.25	5.25	5.30	5.30	5.30	
0.280	80.16	77.56	74.95	70.53	70.53	67.66	67.66	68.79	64.62	67.66	63.36	63.12	63.12	63.12	5.40	5.40	5.45	5.45	5.45	5.45	5.50	5.50	5.50	
0.300	82.57	80.31	78.12	74.38	74.38	71.83	71.83	73.00	69.37	71.83	68.51	68.14	68.14	68.14	5.60	5.60	5.65	5.65	5.65	5.65	5.70	5.70	5.70	
0.320	84.95	83.16	81.20	77.73	77.73	75.68	75.68	76.88	73.68	75.68	73.09	72.70	72.70	72.70	5.80	5.80	5.85	5.85	5.85	5.85	5.90	5.90	5.90	
0.340	87.16	85.66	83.90	80.94	80.94	79.15	79.15	80.39	77.34	79.15	77.18	76.76	76.76	76.76	6.00	6.00	6.05	6.05	6.05	6.05	6.10	6.10	6.10	
0.360	89.17	87.83	86.46	83.92	83.92	82.39	82.39	83.66	80.61	82.39	80.92	80.62	80.62	80.62	6.20	6.20	6.25	6.25	6.25	6.25	6.30	6.30	6.30	
0.380	91.05	89.65	88.62	86.41	86.41	85.33	85.33	86.61	83.71	85.33	84.36	83.77	83.77	83.77	6.40	6.40	6.45	6.45	6.45	6.45	6.50	6.50	6.50	
0.400	92.62	91.29	90.52	88.66	88.66	88.02	88.02	89.29	86.53	88.02	87.44	86.94	86.94	86.94	6.60	6.60	6.65	6.65	6.65	6.65	6.70	6.70	6.70	
0.420	93.91	92.86	92.20	90.86	90.86	90.26	90.26	91.44	89.09	90.26	90.16	89.82	89.82	89.82	6.80	6.80	6.85	6.85	6.85	6.85	6.90	6.90	6.90	
0.440	95.05	94.29	93.61	92.63	92.63	92.24	92.24	93.24	91.44	92.24	92.13	92.39	92.39	92.39	7.00	7.00	7.05	7.05	7.05	7.05	7.10	7.10	7.10	
0.460	96.07	95.27	94.83	94.22	94.22	93.95	93.95	94.71	93.24	93.95	93.80	94.50	94.50	94.50	7.20	7.20	7.25	7.25	7.25	7.25	7.30	7.30	7.30	
0.480	96.97	96.20	95.92	95.53	95.53	95.21	95.21	95.82	94.71	95.21	95.13	95.86	95.86	95.86	7.40	7.40	7.45	7.45	7.45	7.45	7.50	7.50	7.50	
0.500	97.75	96.95	96.82	96.48	96.48	96.24	96.24	96.82	96.06	96.24	96.24	96.95	96.95	96.95	7.60	7.60	7.65	7.65	7.65	7.65	7.70	7.70	7.70	
0.550	98.70	98.35	98.34	98.17	98.17	98.10	98.10	98.59	98.15	98.10	98.35	98.59	98.59	98.59	7.80	7.80	7.85	7.85	7.85	7.85	7.90	7.90	7.90	
0.600	99.49	99.33	99.34	99.14	99.14	99.17	99.17	99.39	99.30	99.17	99.32	99.39	99.39	99.39	8.00	8.00	8.05	8.05	8.05	8.05	8.10	8.10	8.10	
0.650	99.77	99.75	99.72	99.70	99.70	99.64	99.64	99.73	99.73	99.64	99.75	99.77	99.77	99.77	8.20	8.20	8.25	8.25	8.25	8.25	8.30	8.30	8.30	
0.700	99.90	99.91	99.90	99.91	99.91	99.89	99.89	99.91	99.91	99.89	99.98	99.94	99.94	99.94	8.40	8.40	8.45	8.45	8.45	8.45	8.50	8.50	8.50	
0.750	99.93	99.95	99.95	99.98	99.98	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.99	99.99	8.60	8.60	8.65	8.65	8.65	8.65	8.70	8.70	8.70	
0.800	99.96	99.98	99.99	99.99	99.99	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	8.80	8.80	8.85	8.85	8.85	8.85	8.90	8.90	8.90	
0.850	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	9.00	9.00	9.05	9.05	9.05	9.05	9.10	9.10	9.10	
0.900	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	9.20	9.20	9.25	9.25	9.25	9.25	9.30	9.30	9.30	
0.950	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	9.40	9.40	9.45	9.45	9.45	9.45	9.50	9.50	9.50	
1.000	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	9.60	9.60	9.65	9.65	9.65	9.65	9.70	9.70	9.70	

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11. ABSTRACT <i>(A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here)</i> This report presents tables of energy deposition distributions in aluminum and copper media irradiated by monoenergetic point-monodirectional electron beams. The distributions are given as functions of the depth in the medium and of the radial distance from the incident beam. Results are given for 7 beam energies between 1 MeV and 60 MeV. As shown earlier in National Bureau of Standards Report NBSIR 82-2451 (1982), the tabulated results from monoenergetic, point-monodirectional sources can be used, by superposition, to obtain spatial distributions of the energy imparted to the medium by parallel beams with arbitrary spectrum and finite arbitrary cross section.			
12. KEY WORDS <i>(Six to twelve entries; alphabetical order; capitalize only proper names; and separate key words by semicolons)</i> absorbed-dose distribution; aluminum; copper; electron; point-monodirectional beam; superposition.			
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