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TABULATED VALUES OF SCATTERED GAMMA-RAY FLUXES IN WATER INTERPOLATED FROM MOMENTS METHOD CALCULATIONS

D. K. Trubey

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D. K. Trubey

Date Issued

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ABSTRACT

Tables of scattered gamma-ray fluxes in water that are suitable for integration over source spectra have been generated on the IBM-7090 computer by Lagrangian interpolation of moments method results for point isotropic gamma-ray sources. Values of the fluxes were obtained for a consistent set of scattered gamma-ray energies taken in steps of 0.1 MeV from 0.1 to 1.0 MeV and in steps of 0.25 MeV from 0.25 to 10 MeV. One table was obtained for each scattered energy for various values of the source energy and of the distance from the source in mean free paths. Tables were then generated in which the distance from the source was converted from mean free paths to centimeters. The latter set may be integrated over any source spectrum to obtain the flux of scattered gamma rays in water, and, with small error, in any material in which the cross section is dominated by the Compton scattering cross section. This includes the low-Z materials such as aluminum and air.

TABULATED VALUES OF SCATTERED GAMMA-RAY FLUXES IN WATER INTERPOLATED FROM MOMENTS METHOD CALCULATIONS

In calculating the energy spectra of scattered gamma rays at various points in a medium, it is often convenient to use the kernel method, in which case the results of transport calculations performed for monoenergetic sources are integrated over the desired source spectrum. One transport calculation for which results are available is the moments method calculation of Goldstein and Wilkins,[1] who have tabulated values of

$$M(r,E,E_o) = 4\pi r^2 e^{\mu_o r} I_o(r,E,E_o) \quad , \tag{1}$$

where

r = distance from the source to the space point,

μ_o = total linear absorption coefficient evaluated at E_o,

I_o = scattered gamma-ray energy flux per source photon from a point isotropic source,

E_o = source energy,

E = scattered energy.

The tabulated values of $M(r,E,E_o)$ are grouped together for each source energy and are presented as a function of the scattered energy and of the distance from the source in mean free paths (mfp).

In a recent calculation undertaken by the author it was necessary to generate tables of gamma-ray fluxes from the Goldstein and Wilkins data which would be suitable for performing an integration over a particular source spectrum. Since the moments method results do not have a consistent set of scattered energies for each source energy, however, it was first necessary to obtain intermediate values from the moments method data. This was done on the IBM-7090 computer by Lagrangian interpolation,[2] with four data points used for each resulting value. In addition to the values given

[1] H. Goldstein and J. E. Wilkins, Jr., Calculation of the Penetration of Gamma Rays, NYO-3075 (June 30, 1954).

[2] S. K. Penny, IBM-7090 Gaussian Integration Package with Optional Point Quadrature, ORNL-3263 (Mar. 16, 1962).

in Ref. 1, the values for $E = E_o$ were calculated by evaluating the single-scattering limit

$$M(r,E_o,E_o) = \frac{4\pi\rho r}{25.33\ \mathrm{cm}^{-2}\ (E_o/0.511\ \mathrm{MeV})} \quad , \qquad (2)$$

where ρ = electron density (cm^{-3}) x 10^{-24} and r = distance (cm).

The results of the interpolation are given in the first 50 tables presented in this report (pages 8 through 32), each table giving values of $M(r,E,E_o)$ for a particular scattered energy for various values of the source energy and of the distance from the source in mean free paths. The scattered energy values are taken in steps of 0.1 MeV from 0.1 to 1.0 MeV and in steps of 0.25 MeV from 0.25 to 10 MeV.

In the table for E = 0.25 MeV (page 13), there are two entries for E_o = 0.25 MeV. The second one is actually for a source of 0.255 MeV. In the table for E = 10 MeV (page 32), there are two entries for E_o = 10 MeV. The first entry was evaluated by using Eq. 2, and the second entry was taken from Ref. 1. The slight discrepancy between the two is due to a small difference in the cross sections assumed. This discrepancy is apparent in other tables in which E coincides with a value of E_o calculated in Ref. 1.

The above tables are not yet suitable for integration over source energies, however, since the distances from the source are given in terms of mean free paths <u>at the source energy</u> and thus are not directly comparable for different source energies. Therefore, additional values of the function $M(r,E,E_o)$ were generated by further interpolation to obtain results that would correspond for distances from the source specified in centimeters. These values were then converted to the function $g(r,E,E_o)$, where

$$g(r,E,E_o) = 4\pi r^2\ I_o(r,E,E_o) = e^{-\mu_o r}\ M(r,E,E_o)\ .$$

Values of this function are given in the second set of 50 tables presented in this report (pages 33 through 57), one table being given for each scattered energy for various values of the source energy and of the distance from the source in centimeters. The values are printed in floating point notation; that is 1.56E-01 = 1.56 x 10^{-1}. The double entries in the tables for E = 0.25 and 10 MeV are explained as above.

The function $g(r,E,E_o)$ is also plotted for selected values of E in Figs. 1 through 22, both as a function of the distance for various source energies and as a function of the source energy for various distances. An index to the plots is given on page 58.

The function $g(r,E,E_o)$ may be integrated over any source spectrum to obtain the resulting flux of scattered gamma rays in water, and, with small error, in any material in which the cross section is dominated by the Compton scattering cross section. This includes the low-Z materials such as aluminum and air.

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DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.10 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.10	5.08	10.15	20.30	35.53	50.76	76.14	101.52
0.25	3.06	8.69	28.10	82.68	178.87	469.85	996.87
0.50	2.43	7.33	23.41	63.73	126.00	284.48	530.07
1.00	2.00	5.35	14.58	33.64	57.89	110.33	185.19
2.00	1.62	3.69	8.15	15.56	23.81	38.92	56.19
3.00	1.38	2.90	5.74	9.91	14.59	21.62	27.45
4.00	1.16	2.28	4.27	7.09	10.09	15.07	16.10
6.00	0.95	1.80	3.04	4.76	6.53	9.18	9.78
8.00	0.79	1.37	2.36	3.47	4.70	6.31	6.45
10.00	0.67	1.18	1.88	2.78	3.69	4.99	4.99

SCATTERED ENERGY 0.20 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.20	3.11	6.23	12.46	21.80	31.14	46.71	62.28
0.25	1.95	4.70	12.60	30.96	58.56	128.48	236.58
0.50	1.92	4.35	11.38	28.83	55.73	123.45	213.44
1.00	1.61	3.50	8.52	18.94	32.59	61.34	96.16
2.00	0.97	2.22	4.89	9.43	14.55	23.80	32.08
3.00	0.95	1.86	3.53	6.07	9.13	13.19	15.76
4.00	0.70	1.40	2.66	4.46	6.40	9.54	10.27
6.00	0.59	1.06	1.79	2.82	3.84	4.55	5.22
8.00	0.48	0.84	1.39	2.05	2.78	3.73	3.89
10.00	0.41	0.70	1.11	1.64	2.18	2.93	3.05

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.30 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.30	2.39	4.78	9.57	16.75	23.92	35.89	47.85
0.50	1.21	3.02	8.40	20.94	39.22	83.06	145.46
1.00	1.09	2.50	6.24	14.06	24.23	45.55	70.41
2.00	0.88	1.80	3.83	7.30	11.12	18.14	24.92
3.00	0.74	1.42	2.75	4.73	6.83	10.29	12.66
4.00	0.63	1.17	2.18	3.64	5.17	7.67	8.83
6.00	0.46	0.82	1.39	2.18	2.97	3.63	4.48
8.00	0.38	0.65	1.07	1.59	2.15	2.88	3.13
10.00	0.32	0.54	0.86	1.27	1.68	2.27	2.45

SCATTERED ENERGY 0.40 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.40	2.00	4.01	8.01	14.02	20.03	30.04	40.06
0.50	1.41	3.13	7.58	16.75	28.89	56.07	91.93
1.00	0.82	2.01	5.27	12.10	20.85	39.15	62.49
2.00	0.67	1.46	3.23	6.25	9.60	15.56	22.50
3.00	0.59	1.18	2.34	4.08	5.88	8.90	11.54
4.00	0.51	0.98	1.85	3.11	4.41	6.57	7.83
6.00	0.40	0.73	1.25	1.98	2.69	3.81	4.80
8.00	0.33	0.59	0.97	1.44	1.95	2.61	2.97
10.00	0.28	0.48	0.78	1.15	1.52	2.07	2.33

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.50	1.76	3.51	7.03	12.30	17.57	26.35	35.14
1.00	0.80	1.71	4.97	11.32	19.45	36.36	57.51
2.00	0.57	1.30	2.95	5.80	8.92	14.51	21.53
3.00	0.52	1.06	2.15	3.81	5.48	8.33	11.46
4.00	0.44	0.88	1.69	2.87	4.07	6.07	7.68
6.00	0.35	0.66	1.14	1.84	2.48	3.50	4.53
8.00	0.29	0.52	0.89	1.33	1.80	2.40	2.90
10.00	0.25	0.43	0.71	1.06	1.41	1.91	2.28

SCATTERED ENERGY 0.60 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.60	1.58	3.16	6.32	11.06	15.80	23.70	31.59
1.00	0.83	1.91	4.76	10.63	18.01	33.30	52.08
2.00	0.56	1.26	2.91	5.78	8.89	14.58	21.88
3.00	0.48	0.99	2.05	3.68	5.30	8.06	11.48
4.00	0.41	0.82	1.61	2.76	3.90	5.84	7.76
6.00	0.32	0.61	1.11	1.78	2.43	3.42	4.40
8.00	0.27	0.48	0.84	1.30	1.74	2.37	3.02
10.00	0.23	0.40	0.67	1.02	1.36	1.83	2.32

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.70 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.70	1.45	2.89	5.78	10.12	14.46	21.69	28.92
1.00	0.89	1.97	4.67	9.98	16.53	30.16	46.61
2.00	0.53	1.19	2.79	5.60	8.64	14.21	21.36
3.00	0.45	0.95	1.99	3.60	5.20	7.91	11.42
4.00	0.39	0.78	1.56	2.69	3.81	5.70	7.79
6.00	0.31	0.58	1.07	1.73	2.36	3.35	4.28
8.00	0.25	0.46	0.80	1.27	1.70	2.33	2.99
10.00	0.21	0.38	0.65	1.00	1.33	1.78	2.29

SCATTERED ENERGY 0.80 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.80	1.35	2.70	5.40	9.45	13.49	20.24	26.99
1.00	0.98	2.09	4.67	9.44	15.20	26.80	40.77
2.00	0.52	1.17	2.73	5.50	8.53	14.06	21.00
3.00	0.44	0.93	1.96	3.57	5.19	7.86	11.40
4.00	0.37	0.75	1.52	2.64	3.75	5.61	7.82
6.00	0.29	0.56	1.04	1.70	2.32	3.30	4.21
8.00	0.24	0.44	0.79	1.24	1.66	2.28	2.90
10.00	0.20	0.37	0.63	0.97	1.30	1.75	2.22

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.90 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.90	1.27	2.54	5.08	8.89	12.70	19.05	25.40
1.00	1.08	2.23	4.74	8.96	13.79	22.97	33.57
2.00	0.53	1.17	2.72	5.48	8.52	14.07	20.77
3.00	0.43	0.91	1.93	3.55	5.17	7.86	11.38
4.00	0.36	0.73	1.50	2.62	3.72	5.58	7.87
6.00	0.28	0.55	1.03	1.68	2.30	3.28	4.19
8.00	0.23	0.43	0.78	1.22	1.64	2.27	2.88
10.00	0.20	0.36	0.62	0.96	1.28	1.74	2.20

SCATTERED ENERGY 1.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
1.00	1.20	2.40	4.80	8.40	12.01	18.01	24.01
2.00	0.55	1.20	2.75	5.51	8.58	14.16	20.63
3.00	0.43	0.90	1.93	3.55	5.18	7.92	11.39
4.00	0.35	0.72	1.49	2.62	3.73	5.59	7.93
6.00	0.28	0.54	1.02	1.68	2.30	3.28	4.19
8.00	0.23	0.43	0.77	1.22	1.64	2.27	2.87
10.00	0.19	0.36	0.62	0.96	1.28	1.74	2.20

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.25	2.69	5.37	10.75	18.81	26.87	40.31	53.75
0.25	2.58	5.25	10.83	20.02	30.12	49.07	70.85
0.50	1.39	3.40	9.48	24.14	46.06	100.18	177.55
1.00	1.39	2.99	7.23	16.03	27.62	51.94	79.16
2.00	1.20	2.23	4.59	8.63	13.05	21.13	30.36
3.00	1.01	1.78	3.35	5.74	8.18	12.36	16.56
4.00	0.82	1.44	2.62	4.38	6.14	9.12	11.35
6.00	0.51	0.90	1.53	2.41	3.28	3.77	4.52
8.00	0.41	0.72	1.18	1.75	2.37	3.18	3.38
10.00	0.36	0.60	0.95	1.40	1.86	2.50	2.65

SCATTERED ENERGY 0.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.50	1.76	3.51	7.03	12.30	17.57	26.35	35.14
1.00	0.80	1.91	4.97	11.32	19.45	36.36	57.51
2.00	0.57	1.30	2.95	5.80	8.92	14.51	21.53
3.00	0.52	1.06	2.15	3.81	5.48	8.33	11.46
4.00	0.44	0.88	1.69	2.87	4.07	6.07	7.68
6.00	0.35	0.66	1.14	1.84	2.48	3.50	4.53
8.00	0.29	0.52	0.89	1.33	1.80	2.40	2.90
10.00	0.25	0.43	0.71	1.06	1.41	1.91	2.28

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
0.75	1.40	2.79	5.59	9.77	13.96	20.95	27.93
1.00	0.93	2.03	4.66	9.69	15.86	28.51	43.80
2.00	0.52	1.18	2.75	5.54	8.56	14.11	21.16
3.00	0.45	0.94	1.97	3.58	5.19	7.88	11.41
4.00	0.38	0.76	1.54	2.66	3.77	5.65	7.80
6.00	0.30	0.57	1.05	1.71	2.34	3.32	4.24
8.00	0.25	0.45	0.80	1.25	1.68	2.30	2.93
10.00	0.21	0.37	0.64	0.98	1.31	1.76	2.25

SCATTERED ENERGY 1.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
1.00	1.20	2.40	4.80	8.40	12.01	18.01	24.01
2.00	0.55	1.20	2.75	5.51	8.58	14.16	20.63
3.00	0.43	0.90	1.93	3.55	5.18	7.92	11.39
4.00	0.35	0.72	1.49	2.62	3.73	5.59	7.93
6.00	0.28	0.54	1.02	1.68	2.30	3.28	4.19
8.00	0.23	0.43	0.77	1.22	1.64	2.27	2.87
10.00	0.19	0.36	0.62	0.96	1.28	1.74	2.20

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 1.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
1.25	1.07	2.15	4.29	7.51	10.73	16.09	21.45
2.00	0.60	1.27	2.83	5.56	8.62	14.21	20.48
3.00	0.43	0.91	1.94	3.61	5.29	8.15	11.56
4.00	0.35	0.72	1.50	2.67	3.84	5.77	8.13
6.00	0.27	0.53	1.02	1.70	2.33	3.34	4.28
8.00	0.22	0.42	0.77	1.23	1.65	2.31	2.90
10.00	0.19	0.35	0.61	0.96	1.28	1.76	2.20

SCATTERED ENERGY 1.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
1.50	0.98	1.97	3.93	6.88	9.83	14.74	19.65
2.00	0.67	1.39	2.98	5.66	8.66	14.12	20.15
3.00	0.45	0.94	2.00	3.72	5.49	8.51	11.91
4.00	0.36	0.74	1.53	2.76	3.98	6.01	8.36
6.00	0.27	0.53	1.03	1.73	2.39	3.44	4.42
8.00	0.22	0.42	0.77	1.25	1.69	2.35	2.97
10.00	0.19	0.35	0.62	0.97	1.30	1.79	2.25

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 1.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
1.75	0.92	1.83	3.66	6.41	9.15	13.73	18.31
2.00	0.76	1.54	3.19	5.82	8.66	13.76	19.19
3.00	0.48	1.00	2.10	3.89	5.76	8.96	12.45
4.00	0.37	0.76	1.57	2.85	4.13	6.26	8.62
6.00	0.27	0.54	1.05	1.77	2.47	3.56	4.61
8.00	0.22	0.42	0.79	1.28	1.73	2.43	3.08
10.00	0.18	0.35	0.63	1.00	1.33	1.83	2.31

SCATTERED ENERGY 2.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
2.00	0.86	1.72	3.43	6.01	8.59	12.88	17.17
3.00	0.52	1.07	2.24	4.11	6.08	9.47	13.09
4.00	0.38	0.79	1.64	2.97	4.33	6.59	9.03
6.00	0.28	0.55	1.08	1.84	2.57	3.72	4.81
8.00	0.22	0.43	0.81	1.32	1.79	2.52	3.19
10.00	0.19	0.35	0.64	1.02	1.37	1.90	2.38

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 2.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
2.25	0.81	1.63	3.26	5.70	8.14	12.21	16.28
3.00	0.57	1.15	2.39	4.35	6.42	10.03	13.77
4.00	0.41	0.83	1.72	3.12	4.56	6.98	9.51
6.00	0.28	0.56	1.12	1.92	2.68	3.90	5.03
8.00	0.22	0.44	0.83	1.36	1.85	2.61	3.31
10.00	0.19	0.36	0.66	1.06	1.42	1.97	2.48

SCATTERED ENERGY 2.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
2.50	0.77	1.55	3.10	5.42	7.74	11.61	15.48
3.00	0.62	1.25	2.56	4.61	6.76	10.53	14.34
4.00	0.43	0.88	1.81	3.28	4.80	7.38	10.01
6.00	0.29	0.58	1.16	2.00	2.79	4.07	5.27
8.00	0.23	0.44	0.85	1.40	1.92	2.71	3.44
10.00	0.19	0.36	0.68	1.09	1.47	2.05	2.58

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 2.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
2.75	0.74	1.49	2.97	5.20	7.43	11.15	14.86
3.00	0.67	1.35	2.74	4.88	7.08	10.88	14.70
4.00	0.45	0.92	1.90	3.44	5.02	7.71	10.47
6.00	0.30	0.60	1.20	2.08	2.91	4.26	5.52
8.00	0.23	0.46	0.87	1.45	2.00	2.82	3.59
10.00	0.19	0.37	0.70	1.13	1.52	2.13	2.69

SCATTERED ENERGY 3.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
3.00	0.71	1.43	2.85	4.99	7.13	10.69	14.25
4.00	0.48	0.98	2.00	3.60	5.24	8.04	10.91
6.00	0.31	0.62	1.24	2.16	3.04	4.45	5.78
8.00	0.24	0.47	0.90	1.51	2.08	2.95	3.76
10.00	0.20	0.38	0.72	1.17	1.58	2.21	2.79

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 3.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
3.25	0.69	1.38	2.75	4.82	6.88	10.32	13.76
4.00	0.52	1.04	2.11	3.77	5.48	8.37	11.34
6.00	0.32	0.65	1.29	2.24	3.17	4.65	6.05
8.00	0.24	0.48	0.93	1.57	2.17	3.08	3.93
10.00	0.20	0.39	0.73	1.20	1.64	2.29	2.90

SCATTERED ENERGY 3.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
3.50	0.66	1.33	2.66	4.65	6.65	9.97	13.30
4.00	0.55	1.10	2.23	3.96	5.72	8.70	11.75
6.00	0.33	0.67	1.34	2.33	3.30	4.85	6.32
8.00	0.25	0.49	0.96	1.63	2.25	3.21	4.10
10.00	0.20	0.40	0.75	1.24	1.69	2.38	3.01

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 3.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
3.75	0.64	1.28	2.57	4.50	6.42	9.64	12.85
4.00	0.59	1.17	2.36	4.16	5.98	9.05	12.14
6.00	0.35	0.70	1.39	2.43	3.44	5.07	6.61
8.00	0.26	0.51	0.99	1.69	2.33	3.34	4.27
10.00	0.21	0.40	0.77	1.28	1.75	2.47	3.12

SCATTERED ENERGY 4.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
4.00	0.63	1.25	2.51	4.39	6.27	9.40	12.53
6.00	0.36	0.73	1.45	2.53	3.58	5.29	6.92
8.00	0.26	0.52	1.03	1.75	2.42	3.47	4.44
10.00	0.21	0.41	0.80	1.32	1.81	2.55	3.23

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 4.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
4.25	0.61	1.22	2.43	4.25	6.08	9.12	12.15
6.00	0.38	0.76	1.51	2.63	3.74	5.53	7.25
8.00	0.27	0.54	1.06	1.81	2.51	3.61	4.62
10.00	0.22	0.42	0.82	1.36	1.87	2.65	3.35

SCATTERED ENERGY 4.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
4.50	0.59	1.18	2.36	4.14	5.91	8.87	11.82
6.00	0.39	0.80	1.58	2.75	3.90	5.78	7.60
8.00	0.28	0.56	1.09	1.87	2.60	3.75	4.81
10.00	0.22	0.43	0.84	1.40	1.93	2.74	3.48

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 4.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
4.75	0.58	1.15	2.31	4.04	5.77	8.65	11.54
6.00	0.41	0.83	1.64	2.87	4.07	6.05	7.97
8.00	0.29	0.57	1.13	1.93	2.70	3.89	5.00
10.00	0.23	0.44	0.86	1.45	1.99	2.84	3.61

SCATTERED ENERGY 5.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
5.00	0.56	1.13	2.26	3.95	5.64	8.46	11.28
6.00	0.43	0.87	1.72	3.00	4.26	6.34	8.37
8.00	0.30	0.59	1.16	2.00	2.80	4.05	5.21
10.00	0.23	0.46	0.89	1.49	2.06	2.94	3.74

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 5.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
5.25	0.55	1.10	2.20	3.85	5.50	8.25	10.99
6.00	0.45	0.91	1.79	3.13	4.45	6.65	8.80
8.00	0.31	0.61	1.20	2.07	2.90	4.20	5.42
10.00	0.24	0.47	0.91	1.53	2.13	3.04	3.87

SCATTERED ENERGY 5.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
5.50	0.54	1.07	2.15	3.76	5.37	8.05	10.74
6.00	0.47	0.95	1.87	3.28	4.66	6.97	9.27
8.00	0.32	0.63	1.24	2.14	3.01	4.37	5.65
10.00	0.24	0.48	0.93	1.58	2.19	3.14	4.02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 5.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
5.75	0.53	1.05	2.10	3.68	5.25	7.88	10.51
6.00	0.49	0.99	1.96	3.43	4.89	7.32	9.76
8.00	0.33	0.65	1.28	2.21	3.12	4.54	5.88
10.00	0.25	0.49	0.96	1.63	2.26	3.25	4.16

SCATTERED ENERGY 6.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
6.00	0.51	1.03	2.06	3.60	5.15	7.72	10.30
8.00	0.34	0.67	1.32	2.29	3.23	4.73	6.14
10.00	0.25	0.50	0.99	1.68	2.34	3.37	4.31

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 6.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
6.25	0.50	1.01	2.01	3.52	5.03	7.55	10.07
8.00	0.35	0.69	1.37	2.37	3.36	4.92	6.40
10.00	0.26	0.52	1.01	1.73	2.41	3.48	4.47

SCATTERED ENERGY 6.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
6.50	0.49	0.99	1.97	3.45	4.93	7.39	9.85
8.00	0.36	0.72	1.42	2.46	3.48	5.12	6.69
10.00	0.27	0.53	1.04	1.78	2.49	3.60	4.63

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 6.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
6.75	0.48	0.97	1.93	3.38	4.83	7.24	9.66
8.00	0.37	0.74	1.47	2.55	3.62	5.34	6.99
10.00	0.27	0.54	1.07	1.83	2.57	3.72	4.80

SCATTERED ENERGY 7.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
7.00	0.47	0.95	1.90	3.32	4.74	7.11	9.48
8.00	0.38	0.77	1.52	2.64	3.76	5.56	7.30
10.00	0.28	0.56	1.10	1.89	2.65	3.85	4.98

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 7.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
7.25	0.47	0.93	1.86	3.26	4.66	6.98	9.31
8.00	0.40	0.79	1.58	2.74	3.90	5.80	7.64
10.00	0.29	0.57	1.13	1.94	2.73	3.98	5.16

SCATTERED ENERGY 7.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
7.50	0.46	0.92	1.83	3.20	4.58	6.87	9.16
8.00	0.41	0.82	1.63	2.84	4.06	6.05	8.00
10.00	0.30	0.59	1.16	2.00	2.82	4.12	5.35

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 7.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
7.75	0.45	0.90	1.79	3.14	4.49	6.73	8.97
8.00	0.42	0.85	1.70	2.95	4.22	6.31	8.38
10.00	0.30	0.61	1.20	2.06	2.91	4.26	5.55

SCATTERED ENERGY 8.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
8.00	0.44	0.88	1.77	3.09	4.42	6.63	8.84
10.00	0.31	0.62	1.23	2.12	3.00	4.41	5.76

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 8.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
8.25	0.43	0.87	1.74	3.04	4.34	6.51	8.68
10.00	0.32	0.64	1.26	2.19	3.10	4.56	5.97

SCATTERED ENERGY 8.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
8.50	0.43	0.85	1.70	2.98	4.26	6.39	8.52
10.00	0.33	0.66	1.30	2.25	3.19	4.72	6.19

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 8.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
8.75	0.42	0.84	1.68	2.93	4.19	6.28	8.38
10.00	0.34	0.67	1.34	2.32	3.29	4.88	6.42

SCATTERED ENERGY 9.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
9.00	0.41	0.83	1.65	2.89	4.13	6.20	8.27
10.00	0.35	0.69	1.38	2.39	3.40	5.04	6.66

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 9.25 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
9.25	0.41	0.81	1.63	2.85	4.07	6.10	8.14
10.00	0.36	0.71	1.41	2.46	3.51	5.22	6.90

SCATTERED ENERGY 9.50 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
9.50	0.40	0.80	1.60	2.79	3.99	5.98	7.98
10.00	0.37	0.73	1.46	2.54	3.62	5.40	7.16

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 9.75 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
9.75	0.39	0.79	1.57	2.75	3.93	5.89	7.86
10.00	0.37	0.75	1.50	2.61	3.73	5.58	7.43

SCATTERED ENERGY 10.00 MEV

SOURCE E(MEV)	MFP 1	2	4	7	10	15	20
10.00	0.39	0.77	1.55	2.71	3.87	5.81	7.74
10.00	0.38	0.77	1.54	2.69	3.85	5.77	7.70

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.10 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.10	6.01E-01	4.26E-02	4.97E-04	4.74E-06	1.68E-09	5.29E-13
0.25	1.02E 00	2.85E-01	2.10E-02	1.11E-03	5.97E-06	2.52E-08
0.50	1.00E 00	4.61E-01	6.86E-02	7.43E-03	1.32E-04	1.95E-06
1.00	7.88E-01	5.19E-01	1.41E-01	2.89E-02	1.56E-03	7.15E-05
2.00	5.96E-01	5.06E-01	2.19E-01	7.54E-02	1.03E-02	1.24E-03
3.00	4.85E-01	4.64E-01	2.53E-01	1.09E-01	2.24E-02	4.18E-03
4.00	4.00E-01	4.03E-01	2.49E-01	1.25E-01	3.30E-02	7.89E-03
6.00	3.09E-01	3.48E-01	2.54E-01	1.49E-01	5.07E-02	1.61E-02
8.00	2.55E-01	2.92E-01	2.24E-01	1.44E-01	5.96E-02	2.21E-02
10.00	2.05E-01	2.49E-01	2.07E-01	1.41E-01	6.24E-02	2.51E-02

SCATTERED ENERGY 0.20 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.20	5.58E-01	7.34E-02	2.17E-03	5.23E-05	8.72E-08	1.29E-10
0.25	5.23E-01	1.20E-01	7.23E-03	3.31E-04	1.46E-06	5.37E-09
0.50	6.03E-01	2.26E-01	3.11E-02	3.29E-03	5.77E-05	7.93E-07
1.00	5.71E-01	3.18E-01	8.10E-02	1.63E-02	8.78E-04	4.00E-05
2.00	3.54E-01	3.04E-01	1.32E-01	4.54E-02	6.27E-03	7.59E-04
3.00	3.43E-01	3.06E-01	1.58E-01	6.72E-02	1.37E-02	2.58E-03
4.00	2.41E-01	2.45E-01	1.54E-01	7.74E-02	2.06E-02	4.96E-03
6.00	1.96E-01	2.13E-01	1.50E-01	8.71E-02	2.99E-02	9.52E-03
8.00	1.55E-01	1.79E-01	1.37E-01	8.78E-02	3.54E-02	1.30E-02
10.00	1.29E-01	1.54E-01	1.25E-01	8.33E-02	3.68E-02	1.48E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.30 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.30	5.33E-01	1.01E-01	5.11E-03	2.12E-04	8.69E-07	3.17E-09
0.50	4.17E-01	1.66E-01	2.27E-02	2.32E-03	3.89E-05	5.38E-07
1.00	3.98E-01	2.30E-01	5.97E-02	1.21E-02	6.53E-04	2.98E-05
2.00	3.24E-01	2.47E-01	1.04E-01	3.54E-02	4.84E-03	5.81E-04
3.00	2.70E-01	2.36E-01	1.22E-01	5.22E-02	1.07E-02	1.98E-03
4.00	2.24E-01	2.15E-01	1.28E-01	6.36E-02	1.69E-02	4.05E-03
6.00	1.53E-01	1.65E-01	1.16E-01	6.71E-02	2.31E-02	7.37E-03
8.00	1.20E-01	1.39E-01	1.07E-01	6.82E-02	2.74E-02	1.00E-02
10.00	1.02E-01	1.20E-01	9.66E-02	6.43E-02	2.84E-02	1.15E-02

SCATTERED ENERGY 0.40 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.40	5.09E-01	1.22E-01	8.86E-03	5.25E-04	3.92E-06	2.60E-08
0.50	4.34E-01	1.51E-01	1.83E-02	1.72E-03	2.64E-05	3.43E-07
1.00	3.10E-01	1.90E-01	5.09E-02	1.04E-02	5.61E-04	2.55E-05
2.00	2.46E-01	2.01E-01	8.68E-02	3.00E-02	4.15E-03	5.01E-04
3.00	2.13E-01	1.93E-01	1.03E-01	4.45E-02	9.22E-03	1.71E-03
4.00	1.76E-01	1.75E-01	1.07E-01	5.38E-02	1.44E-02	3.46E-03
6.00	1.32E-01	1.45E-01	1.04E-01	6.06E-02	2.09E-02	6.69E-03
8.00	1.05E-01	1.22E-01	9.53E-02	6.13E-02	2.48E-02	9.11E-03
10.00	8.84E-02	1.05E-01	8.56E-02	5.75E-02	2.55E-02	1.04E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.50	4.91E-01	1.42E-01	1.36E-02	1.07E-03	1.27E-05	1.34E-07
1.00	2.98E-01	1.80E-01	4.78E-02	9.72E-03	5.24E-04	2.37E-05
2.00	2.10E-01	1.78E-01	7.87E-02	2.76E-02	3.85E-03	4.66E-04
3.00	1.85E-01	1.71E-01	9.31E-02	4.09E-02	8.58E-03	1.59E-03
4.00	1.53E-01	1.54E-01	9.64E-02	4.89E-02	1.32E-02	3.19E-03
6.00	1.13E-01	1.27E-01	9.29E-02	5.49E-02	1.91E-02	6.16E-03
8.00	9.09E-02	1.07E-01	8.42E-02	5.48E-02	2.26E-02	8.40E-03
10.00	7.62E-02	9.20E-02	7.59E-02	5.17E-02	2.32E-02	9.50E-03

SCATTERED ENERGY 0.60 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.60	4.71E-01	1.57E-01	1.87E-02	1.81E-03	3.07E-05	4.63E-07
1.00	3.03E-01	1.76E-01	4.55E-02	9.13E-03	4.84E-04	2.18E-05
2.00	2.05E-01	1.72E-01	7.72E-02	2.73E-02	3.84E-03	4.64E-04
3.00	1.71E-01	1.60E-01	8.78E-02	3.90E-02	8.26E-03	1.54E-03
4.00	1.40E-01	1.43E-01	9.04E-02	4.64E-02	1.26E-02	3.07E-03
6.00	1.05E-01	1.17E-01	8.58E-02	5.16E-02	1.85E-02	5.97E-03
8.00	8.32E-02	9.80E-02	7.78E-02	5.09E-02	2.11E-02	7.98E-03
10.00	6.85E-02	8.34E-02	6.98E-02	4.81E-02	2.19E-02	9.03E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.70 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.70	4.55E-01	1.71E-01	2.45E-02	2.86E-03	6.61E-05	1.36E-06
1.00	3.20E-01	1.77E-01	4.38E-02	8.56E-03	4.43E-04	1.97E-05
2.00	1.93E-01	1.64E-01	7.40E-02	2.63E-02	3.72E-03	4.51E-04
3.00	1.61E-01	1.52E-01	8.44E-02	3.78E-02	8.05E-03	1.51E-03
4.00	1.32E-01	1.36E-01	8.65E-02	4.48E-02	1.23E-02	2.99E-03
6.00	9.93E-02	1.11E-01	8.17E-02	4.94E-02	1.78E-02	5.79E-03
8.00	7.82E-02	9.25E-02	7.39E-02	4.86E-02	2.03E-02	7.70E-03
10.00	6.41E-02	7.86E-02	6.61E-02	4.58E-02	2.10E-02	8.71E-03

SCATTERED ENERGY 0.80 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.80	4.40E-01	1.82E-01	3.01E-02	4.06E-03	1.19E-04	3.10E-06
1.00	3.45E-01	1.83E-01	4.29E-02	8.09E-03	4.05E-04	1.76E-05
2.00	1.90E-01	1.60E-01	7.25E-02	2.58E-02	3.66E-03	4.45E-04
3.00	1.56E-01	1.48E-01	8.26E-02	3.71E-02	7.96E-03	1.50E-03
4.00	1.26E-01	1.30E-01	8.34E-02	4.35E-02	1.20E-02	2.93E-03
6.00	9.46E-02	1.07E-01	7.90E-02	4.80E-02	1.74E-02	5.67E-03
8.00	7.46E-02	8.87E-02	7.13E-02	4.72E-02	1.98E-02	7.54E-03
10.00	6.16E-02	7.57E-02	6.40E-02	4.45E-02	2.04E-02	8.50E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.90 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.90	4.27E-01	1.93E-01	3.64E-02	5.60E-03	2.05E-04	6.64E-06
1.00	3.76E-01	1.91E-01	4.25E-02	7.67E-03	3.65E-04	1.52E-05
2.00	1.93E-01	1.61E-01	7.23E-02	2.57E-02	3.65E-03	4.45E-04
3.00	1.52E-01	1.45E-01	8.13E-02	3.67E-02	7.91E-03	1.49E-03
4.00	1.22E-01	1.26E-01	8.14E-02	4.27E-02	1.19E-02	2.91E-03
6.00	9.15E-02	1.04E-01	7.73E-02	4.72E-02	1.72E-02	5.61E-03
8.00	7.22E-02	8.61E-02	6.96E-02	4.62E-02	1.95E-02	7.44E-03
10.00	5.97E-02	7.35E-02	6.24E-02	4.35E-02	2.01E-02	8.38E-03

SCATTERED ENERGY 1.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
1.00	4.13E-01	2.00E-01	4.20E-02	7.18E-03	3.13E-04	1.21E-05
2.00	2.00E-01	1.65E-01	7.31E-02	2.59E-02	3.67E-03	4.48E-04
3.00	1.51E-01	1.44E-01	8.09E-02	3.66E-02	7.91E-03	1.50E-03
4.00	1.19E-01	1.24E-01	8.03E-02	4.23E-02	1.18E-02	2.90E-03
6.00	8.93E-02	1.01E-01	7.60E-02	4.66E-02	1.71E-02	5.59E-03
8.00	7.05E-02	8.43E-02	6.84E-02	4.55E-02	1.93E-02	7.39E-03
10.00	5.83E-02	7.20E-02	6.13E-02	4.29E-02	1.99E-02	8.32E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.25	5.46E-01	8.80E-02	3.52E-03	1.15E-04	3.19E-07	7.86E-10
0.25	5.42E-01	9.27E-02	4.07E-03	1.45E-04	4.63E-07	1.31E-09
0.50	4.70E-01	1.88E-01	2.61E-02	2.72E-03	4.68E-05	6.56E-07
1.00	4.91E-01	2.71E-01	6.86E-02	1.38E-02	7.45E-04	3.39E-05
2.00	4.41E-01	3.07E-01	1.25E-01	4.22E-02	5.72E-03	6.82E-04
3.00	3.76E-01	3.04E-01	1.50E-01	6.38E-02	1.30E-02	2.39E-03
4.00	2.95E-01	2.73E-01	1.56E-01	7.68E-02	2.03E-02	4.87E-03
6.00	1.70E-01	1.83E-01	1.28E-01	7.41E-02	2.55E-02	8.12E-03
8.00	1.33E-01	1.53E-01	1.18E-01	7.51E-02	3.02E-02	1.11E-02
10.00	1.12E-01	1.33E-01	1.07E-01	7.11E-02	3.13E-02	1.27E-02

SCATTERED ENERGY 0.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.50	4.91E-01	1.42E-01	1.36E-02	1.07E-03	1.27E-05	1.34E-07
1.00	2.98E-01	1.80E-01	4.78E-02	9.72E-03	5.24E-04	2.37E-05
2.00	2.10E-01	1.78E-01	7.87E-02	2.76E-02	3.85E-03	4.66E-04
3.00	1.85E-01	1.71E-01	9.31E-02	4.09E-02	8.58E-03	1.59E-03
4.00	1.53E-01	1.54E-01	9.64E-02	4.89E-02	1.32E-02	3.19E-03
6.00	1.13E-01	1.27E-01	9.29E-02	5.49E-02	1.91E-02	6.16E-03
8.00	9.09E-02	1.07E-01	8.42E-02	5.48E-02	2.26E-02	8.40E-03
10.00	7.62E-02	9.20E-02	7.59E-02	5.17E-02	2.32E-02	9.50E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 0.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
0.75	4.47E-01	1.77E-01	2.72E-02	3.42E-03	8.90E-05	2.06E-06
1.00	3.32E-01	1.80E-01	4.33E-02	8.32E-03	4.24E-04	1.87E-05
2.00	1.91E-01	1.61E-01	7.30E-02	2.60E-02	3.68E-03	4.47E-04
3.00	1.58E-01	1.50E-01	8.34E-02	3.74E-02	8.00E-03	1.50E-03
4.00	1.29E-01	1.32E-01	8.48E-02	4.41E-02	1.21E-02	2.96E-03
6.00	9.66E-02	1.09E-01	8.03E-02	4.86E-02	1.76E-02	5.71E-03
8.00	7.62E-02	9.04E-02	7.26E-02	4.79E-02	2.01E-02	7.61E-03
10.00	6.29E-02	7.71E-02	6.50E-02	4.51E-02	2.07E-02	8.59E-03

SCATTERED ENERGY 1.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
1.00	4.13E-01	2.00E-01	4.20E-02	7.18E-03	3.13E-04	1.21E-05
2.00	2.00E-01	1.65E-01	7.31E-02	2.59E-02	3.67E-03	4.48E-04
3.00	1.51E-01	1.44E-01	8.09E-02	3.66E-02	7.91E-03	1.50E-03
4.00	1.19E-01	1.24E-01	8.03E-02	4.23E-02	1.18E-02	2.90E-03
6.00	8.93E-02	1.01E-01	7.60E-02	4.66E-02	1.71E-02	5.59E-03
8.00	7.05E-02	8.43E-02	6.84E-02	4.55E-02	1.93E-02	7.39E-03
10.00	5.83E-02	7.20E-02	6.13E-02	4.29E-02	1.99E-02	8.32E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 1.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
1.25	3.83E-01	2.18E-01	5.76E-02	1.24E-02	8.01E-04	4.59E-05
2.00	2.19E-01	1.75E-01	7.57E-02	2.64E-02	3.69E-03	4.50E-04
3.00	1.53E-01	1.45E-01	8.14E-02	3.69E-02	8.01E-03	1.52E-03
4.00	1.18E-01	1.23E-01	8.05E-02	4.25E-02	1.20E-02	2.97E-03
6.00	8.67E-02	9.90E-02	7.48E-02	4.61E-02	1.70E-02	5.63E-03
8.00	6.83E-02	8.21E-02	6.70E-02	4.49E-02	1.93E-02	7.40E-03
10.00	5.59E-02	6.95E-02	5.97E-02	4.21E-02	1.97E-02	8.28E-03

SCATTERED ENERGY 1.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
1.50	3.58E-01	2.26E-01	7.02E-02	1.78E-02	1.50E-03	1.12E-04
2.00	2.46E-01	1.91E-01	8.05E-02	2.75E-02	3.76E-03	4.52E-04
3.00	1.61E-01	1.51E-01	8.43E-02	3.80E-02	8.25E-03	1.57E-03
4.00	1.21E-01	1.26E-01	8.23E-02	4.35E-02	1.23E-02	3.06E-03
6.00	8.57E-02	9.84E-02	7.48E-02	4.64E-02	1.73E-02	5.71E-03
8.00	6.69E-02	8.08E-02	6.64E-02	4.48E-02	1.93E-02	7.48E-03
10.00	5.47E-02	6.83E-02	5.91E-02	4.19E-02	1.97E-02	8.35E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 1.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
1.75	3.36E-01	2.33E-01	8.32E-02	2.42E-02	2.57E-03	2.42E-04
2.00	2.79E-01	2.12E-01	8.69E-02	2.90E-02	3.85E-03	4.53E-04
3.00	1.72E-01	1.60E-01	8.88E-02	3.99E-02	8.65E-03	1.65E-03
4.00	1.25E-01	1.30E-01	8.46E-02	4.47E-02	1.26E-02	3.15E-03
6.00	8.63E-02	9.93E-02	7.57E-02	4.70E-02	1.76E-02	5.84E-03
8.00	6.68E-02	8.09E-02	6.69E-02	4.53E-02	1.97E-02	7.64E-03
10.00	5.43E-02	6.80E-02	5.91E-02	4.21E-02	2.00E-02	8.49E-03

SCATTERED ENERGY 2.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
2.00	3.16E-01	2.36E-01	9.44E-02	3.08E-02	3.95E-03	4.50E-04
3.00	1.86E-01	1.72E-01	9.47E-02	4.25E-02	9.14E-03	1.74E-03
4.00	1.31E-01	1.36E-01	8.82E-02	4.65E-02	1.32E-02	3.29E-03
6.00	8.75E-02	1.01E-01	7.73E-02	4.82E-02	1.81E-02	6.05E-03
8.00	6.73E-02	8.17E-02	6.79E-02	4.61E-02	2.01E-02	7.84E-03
10.00	5.45E-02	6.84E-02	5.97E-02	4.27E-02	2.03E-02	8.68E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 2.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
2.25	2.99E-01	2.36E-01	1.03E-01	3.66E-02	5.42E-03	7.12E-04
3.00	2.02E-01	1.86E-01	1.02E-01	4.54E-02	9.71E-03	1.84E-03
4.00	1.38E-01	1.43E-01	9.26E-02	4.89E-02	1.38E-02	3.46E-03
6.00	8.94E-02	1.03E-01	7.94E-02	4.97E-02	1.88E-02	6.29E-03
8.00	6.77E-02	8.26E-02	6.88E-02	4.69E-02	2.06E-02	8.03E-03
10.00	5.48E-02	6.91E-02	6.06E-02	4.35E-02	2.08E-02	8.92E-03

SCATTERED ENERGY 2.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
2.50	2.82E-01	2.36E-01	1.11E-01	4.29E-02	7.26E-03	1.09E-03
3.00	2.21E-01	2.02E-01	1.10E-01	4.86E-02	1.03E-02	1.94E-03
4.00	1.47E-01	1.51E-01	9.77E-02	5.15E-02	1.46E-02	3.64E-03
6.00	9.19E-02	1.06E-01	8.18E-02	5.13E-02	1.94E-02	6.52E-03
8.00	6.85E-02	8.38E-02	7.01E-02	4.79E-02	2.11E-02	8.26E-03
10.00	5.53E-02	6.99E-02	6.16E-02	4.44E-02	2.14E-02	9.19E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 2.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
2.75	2.69E-01	2.34E-01	1.18E-01	4.85E-02	9.12E-03	1.53E-03
3.00	2.41E-01	2.20E-01	1.19E-01	5.21E-02	1.10E-02	2.05E-03
4.00	1.56E-01	1.60E-01	1.03E-01	5.41E-02	1.52E-02	3.80E-03
6.00	9.49E-02	1.10E-01	8.45E-02	5.30E-02	2.01E-02	6.76E-03
8.00	6.97E-02	8.55E-02	7.17E-02	4.92E-02	2.17E-02	8.53E-03
10.00	5.60E-02	7.09E-02	6.27E-02	4.53E-02	2.19E-02	9.45E-03

SCATTERED ENERGY 3.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
3.00	2.55E-01	2.32E-01	1.24E-01	5.42E-02	1.13E-02	2.08E-03
4.00	1.66E-01	1.70E-01	1.09E-01	5.70E-02	1.60E-02	3.98E-03
6.00	9.83E-02	1.14E-01	8.75E-02	5.49E-02	2.08E-02	7.01E-03
8.00	7.13E-02	8.75E-02	7.36E-02	5.06E-02	2.24E-02	8.83E-03
10.00	5.68E-02	7.20E-02	6.38E-02	4.62E-02	2.24E-02	9.72E-03

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 3.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
3.25	2.44E-01	2.29E-01	1.28E-01	5.86E-02	1.32E-02	2.63E-03
4.00	1.77E-01	1.81E-01	1.15E-01	6.01E-02	1.68E-02	4.18E-03
6.00	1.02E-01	1.18E-01	9.08E-02	5.70E-02	2.16E-02	7.28E-03
8.00	7.30E-02	8.98E-02	7.57E-02	5.21E-02	2.31E-02	9.15E-03
10.00	5.77E-02	7.33E-02	6.51E-02	4.72E-02	2.30E-02	9.98E-03

SCATTERED ENERGY 3.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
3.50	2.34E-01	2.25E-01	1.32E-01	6.32E-02	1.53E-02	3.29E-03
4.00	1.89E-01	1.93E-01	1.22E-01	6.36E-02	1.77E-02	4.38E-03
6.00	1.06E-01	1.23E-01	9.45E-02	5.92E-02	2.25E-02	7.57E-03
8.00	7.49E-02	9.21E-02	7.78E-02	5.36E-02	2.39E-02	9.46E-03
10.00	5.88E-02	7.47E-02	6.64E-02	4.83E-02	2.36E-02	1.03E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 3.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
3.75	2.23E-01	2.22E-01	1.36E-01	6.76E-02	1.76E-02	4.06E-03
4.00	2.02E-01	2.05E-01	1.30E-01	6.75E-02	1.87E-02	4.62E-03
6.00	1.10E-01	1.27E-01	9.84E-02	6.17E-02	2.33E-02	7.87E-03
8.00	7.68E-02	9.46E-02	8.00E-02	5.52E-02	2.46E-02	9.77E-03
10.00	5.99E-02	7.62E-02	6.78E-02	4.94E-02	2.42E-02	1.05E-02

SCATTERED ENERGY 4.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
4.00	2.16E-01	2.19E-01	1.39E-01	7.19E-02	1.98E-02	4.87E-03
6.00	1.14E-01	1.33E-01	1.03E-01	6.43E-02	2.43E-02	8.19E-03
8.00	7.89E-02	9.72E-02	8.23E-02	5.68E-02	2.54E-02	1.01E-02
10.00	6.10E-02	7.77E-02	6.93E-02	5.05E-02	2.48E-02	1.08E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 4.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
4.25	2.07E-01	2.15E-01	1.40E-01	7.46E-02	2.16E-02	5.58E-03
6.00	1.19E-01	1.38E-01	1.07E-01	6.70E-02	2.53E-02	8.54E-03
8.00	8.11E-02	10.00E-02	8.47E-02	5.85E-02	2.62E-02	1.04E-02
10.00	6.21E-02	7.93E-02	7.08E-02	5.17E-02	2.54E-02	1.11E-02

SCATTERED ENERGY 4.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
4.50	1.99E-01	2.11E-01	1.41E-01	7.76E-02	2.36E-02	6.38E-03
6.00	1.24E-01	1.45E-01	1.12E-01	7.00E-02	2.64E-02	8.90E-03
8.00	8.34E-02	1.03E-01	8.72E-02	6.03E-02	2.70E-02	1.07E-02
10.00	6.34E-02	8.10E-02	7.24E-02	5.30E-02	2.61E-02	1.14E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 4.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
4.75	1.92E-01	2.07E-01	1.43E-01	8.06E-02	2.57E-02	7.28E-03
6.00	1.29E-01	1.51E-01	1.17E-01	7.30E-02	2.75E-02	9.29E-03
8.00	8.59E-02	1.06E-01	8.99E-02	6.22E-02	2.78E-02	1.11E-02
10.00	6.47E-02	8.27E-02	7.41E-02	5.43E-02	2.68E-02	1.18E-02

SCATTERED ENERGY 5.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
5.00	1.86E-01	2.04E-01	1.45E-01	8.38E-02	2.79E-02	8.27E-03
6.00	1.35E-01	1.58E-01	1.22E-01	7.63E-02	2.87E-02	9.70E-03
8.00	8.86E-02	1.09E-01	9.27E-02	6.41E-02	2.87E-02	1.15E-02
10.00	6.60E-02	8.46E-02	7.59E-02	5.56E-02	2.75E-02	1.21E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 5.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
5.25	1.80E-01	1.99E-01	1.44E-01	8.54E-02	2.95E-02	9.03E-03
6.00	1.41E-01	1.65E-01	1.27E-01	7.96E-02	3.00E-02	1.01E-02
8.00	9.13E-02	1.13E-01	9.56E-02	6.62E-02	2.96E-02	1.18E-02
10.00	6.75E-02	8.65E-02	7.77E-02	5.70E-02	2.82E-02	1.24E-02

SCATTERED ENERGY 5.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
5.50	1.74E-01	1.96E-01	1.44E-01	8.71E-02	3.11E-02	9.84E-03
6.00	1.48E-01	1.72E-01	1.33E-01	8.32E-02	3.14E-02	1.06E-02
8.00	9.42E-02	1.16E-01	9.87E-02	6.83E-02	3.06E-02	1.22E-02
10.00	6.90E-02	8.85E-02	7.96E-02	5.85E-02	2.90E-02	1.28E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 5.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
5.75	1.68E-01	1.92E-01	1.45E-01	8.89E-02	3.27E-02	1.07E-02
6.00	1.55E-01	1.80E-01	1.39E-01	8.68E-02	3.28E-02	1.11E-02
8.00	9.73E-02	1.20E-01	1.02E-01	7.05E-02	3.16E-02	1.26E-02
10.00	7.05E-02	9.06E-02	8.16E-02	6.00E-02	2.97E-02	1.31E-02

SCATTERED ENERGY 6.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
6.00	1.63E-01	1.89E-01	1.45E-01	9.08E-02	3.45E-02	1.17E-02
8.00	1.00E-01	1.24E-01	1.05E-01	7.29E-02	3.27E-02	1.31E-02
10.00	7.22E-02	9.28E-02	8.37E-02	6.16E-02	3.05E-02	1.35E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 6.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
6.25	1.58E-01	1.85E-01	1.44E-01	9.14E-02	3.56E-02	1.23E-02
8.00	1.04E-01	1.28E-01	1.09E-01	7.53E-02	3.38E-02	1.35E-02
10.00	7.39E-02	9.51E-02	8.58E-02	6.32E-02	3.14E-02	1.38E-02

SCATTERED ENERGY 6.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
6.50	1.54E-01	1.81E-01	1.43E-01	9.22E-02	3.67E-02	1.30E-02
8.00	1.07E-01	1.32E-01	1.12E-01	7.79E-02	3.50E-02	1.40E-02
10.00	7.57E-02	9.75E-02	8.81E-02	6.49E-02	3.22E-02	1.42E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 6.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
6.75	1.49E-01	1.78E-01	1.42E-01	9.29E-02	3.79E-02	1.37E-02
8.00	1.11E-01	1.37E-01	1.16E-01	8.06E-02	3.62E-02	1.45E-02
10.00	7.76E-02	9.99E-02	9.04E-02	6.66E-02	3.31E-02	1.46E-02

SCATTERED ENERGY 7.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
7.00	1.45E-01	1.74E-01	1.41E-01	9.38E-02	3.91E-02	1.45E-02
8.00	1.14E-01	1.41E-01	1.20E-01	8.33E-02	3.75E-02	1.50E-02
10.00	7.95E-02	1.02E-01	9.27E-02	6.84E-02	3.40E-02	1.50E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 7.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
7.25	1.42E-01	1.71E-01	1.41E-01	9.46E-02	4.03E-02	1.53E-02
8.00	1.18E-01	1.46E-01	1.24E-01	8.62E-02	3.89E-02	1.56E-02
10.00	8.15E-02	1.05E-01	9.52E-02	7.03E-02	3.50E-02	1.55E-02

SCATTERED ENERGY 7.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
7.50	1.38E-01	1.68E-01	1.40E-01	9.55E-02	4.16E-02	1.61E-02
8.00	1.22E-01	1.51E-01	1.28E-01	8.93E-02	4.03E-02	1.62E-02
10.00	8.36E-02	1.08E-01	9.77E-02	7.22E-02	3.59E-02	1.59E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 7.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
7.75	1.34E-01	1.65E-01	1.39E-01	9.54E-02	4.22E-02	1.66E-02
8.00	1.26E-01	1.56E-01	1.33E-01	9.24E-02	4.18E-02	1.68E-02
10.00	8.58E-02	1.11E-01	1.00E-01	7.41E-02	3.69E-02	1.64E-02

SCATTERED ENERGY 8.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
8.00	1.31E-01	1.62E-01	1.38E-01	9.63E-02	4.35E-02	1.75E-02
10.00	8.80E-02	1.14E-01	1.03E-01	7.61E-02	3.80E-02	1.68E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 8.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
8.25	1.28E-01	1.59E-01	1.37E-01	9.60E-02	4.40E-02	1.79E-02
10.00	9.03E-02	1.17E-01	1.06E-01	7.82E-02	3.90E-02	1.73E-02

SCATTERED ENERGY 8.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
8.50	1.25E-01	1.56E-01	1.35E-01	9.58E-02	4.45E-02	1.84E-02
10.00	9.27E-02	1.20E-01	1.09E-01	8.03E-02	4.01E-02	1.78E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 8.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
8.75	1.22E-01	1.54E-01	1.34E-01	9.61E-02	4.54E-02	1.91E-02
10.00	9.52E-02	1.23E-01	1.12E-01	8.25E-02	4.12E-02	1.83E-02

SCATTERED ENERGY 9.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
9.00	1.20E-01	1.51E-01	1.34E-01	9.62E-02	4.61E-02	1.96E-02
10.00	9.78E-02	1.26E-01	1.15E-01	8.48E-02	4.24E-02	1.88E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 9.25 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
9.25	1.17E-01	1.49E-01	1.32E-01	9.61E-02	4.66E-02	2.01E-02
10.00	1.00E-01	1.30E-01	1.18E-01	8.71E-02	4.36E-02	1.94E-02

SCATTERED ENERGY 9.50 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
9.50	1.14E-01	1.46E-01	1.30E-01	9.51E-02	4.65E-02	2.02E-02
10.00	1.03E-01	1.33E-01	1.21E-01	8.95E-02	4.48E-02	1.99E-02

DIFFERENTIAL ENERGY SPECTRA

POINT ISOTROPIC SOURCE IN WATER

SCATTERED ENERGY 9.75 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
9.75	1.12E-01	1.44E-01	1.29E-01	9.50E-02	4.71E-02	2.07E-02
10.00	1.16E-01	1.37E-01	1.24E-01	9.19E-02	4.61E-02	2.05E-02

SCATTERED ENERGY 10.00 MEV

SOURCE E(MEV)	DISTANCE (CM) 20	40	70	100	150	200
10.00	1.09E-01	1.41E-01	1.28E-01	9.49E-02	4.76E-02	2.12E-02
10.00	1.09E-01	1.40E-01	1.27E-01	9.44E-02	4.74E-02	2.11E-02

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Fig. 1.

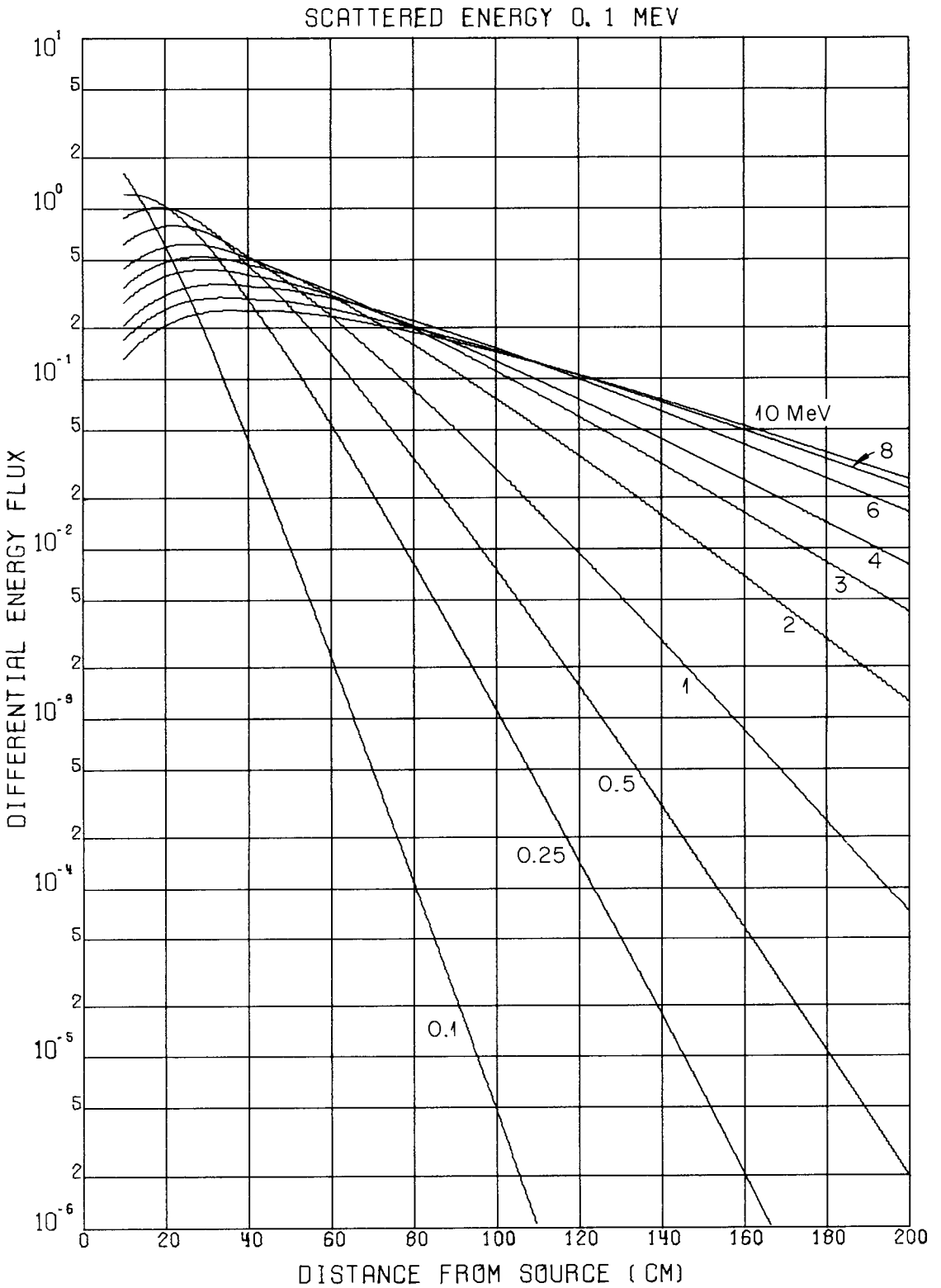

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Fig. 2.

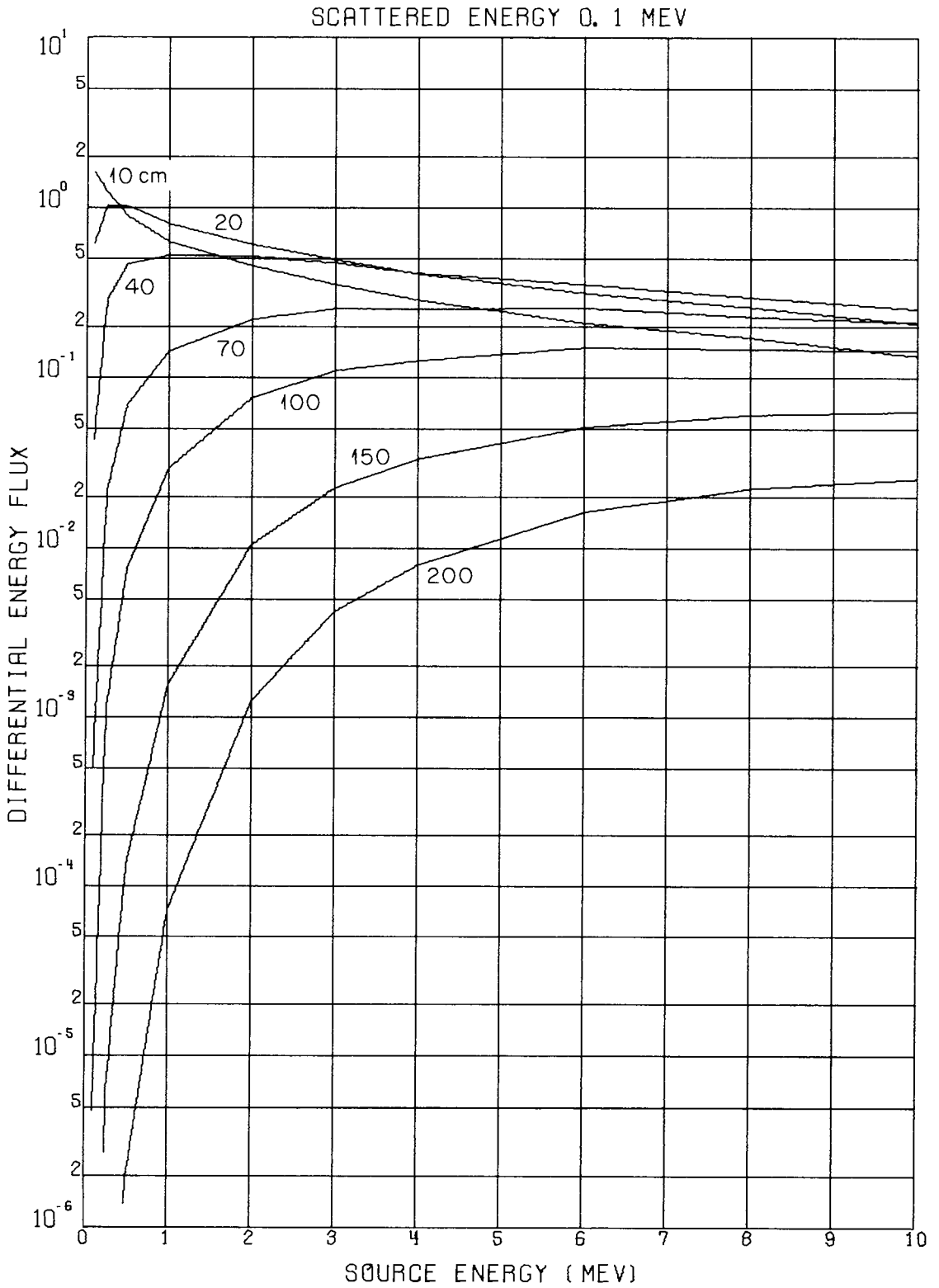

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Fig. 3.

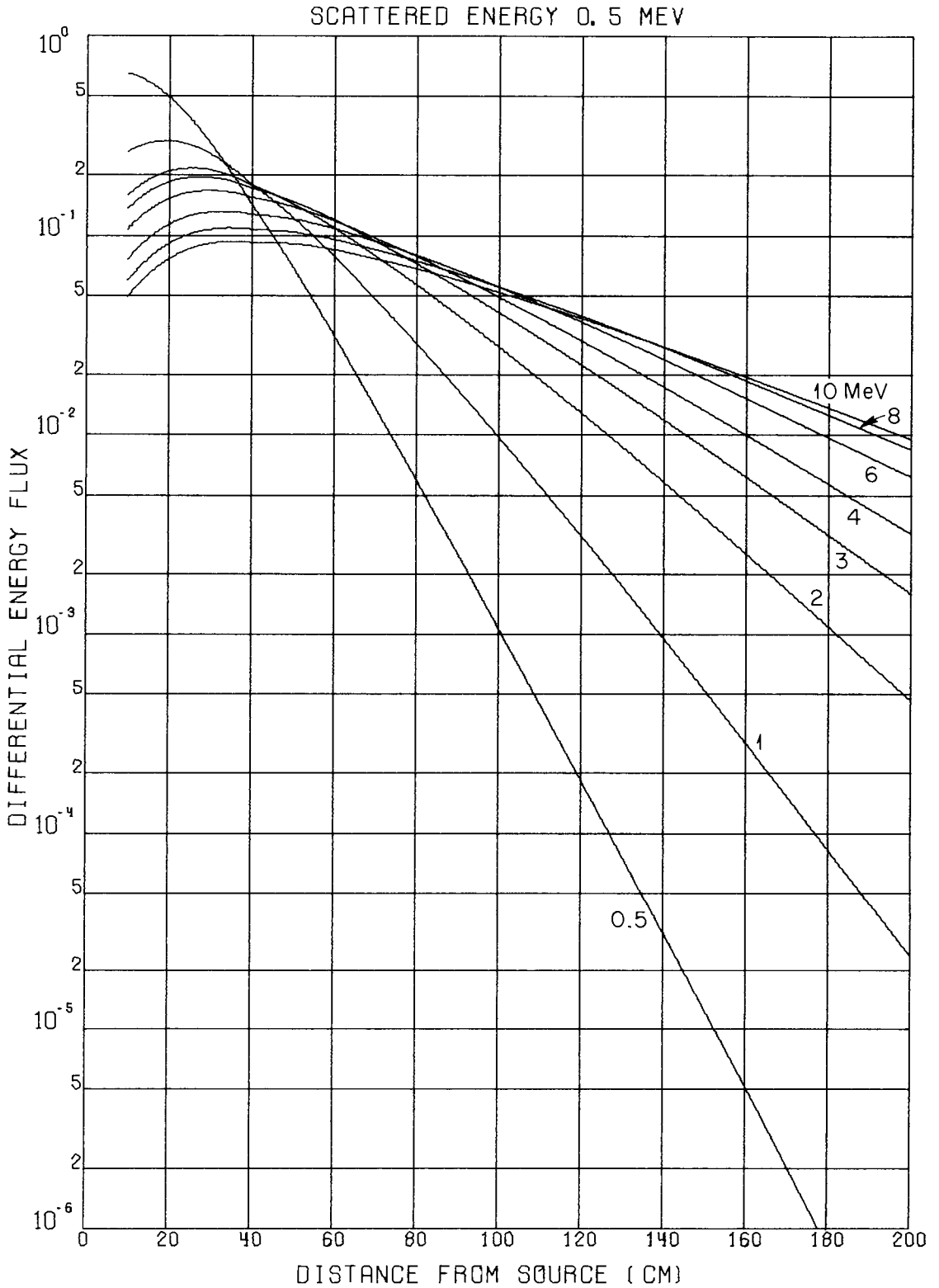

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Fig. 4.

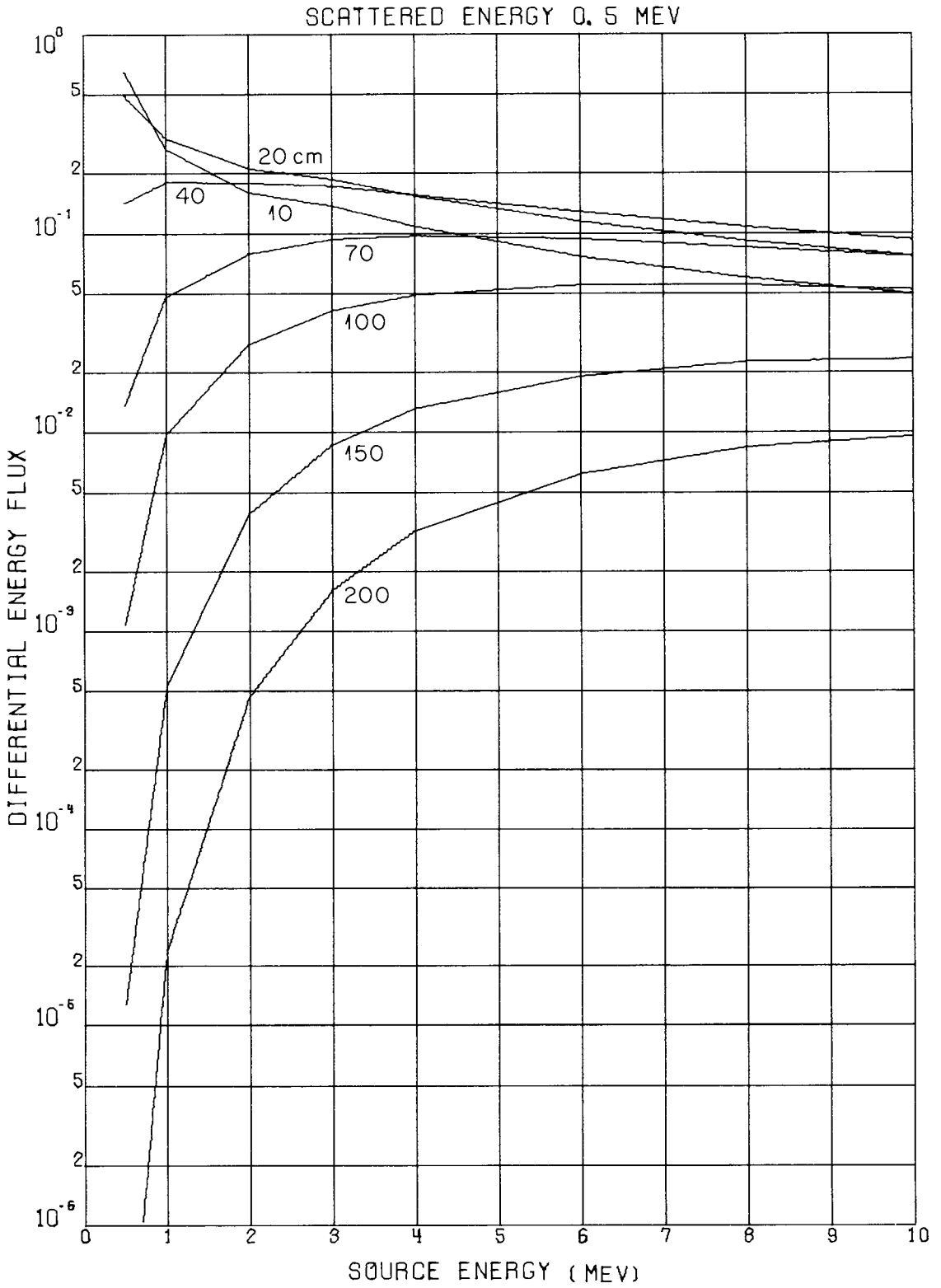

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Fig. 5.

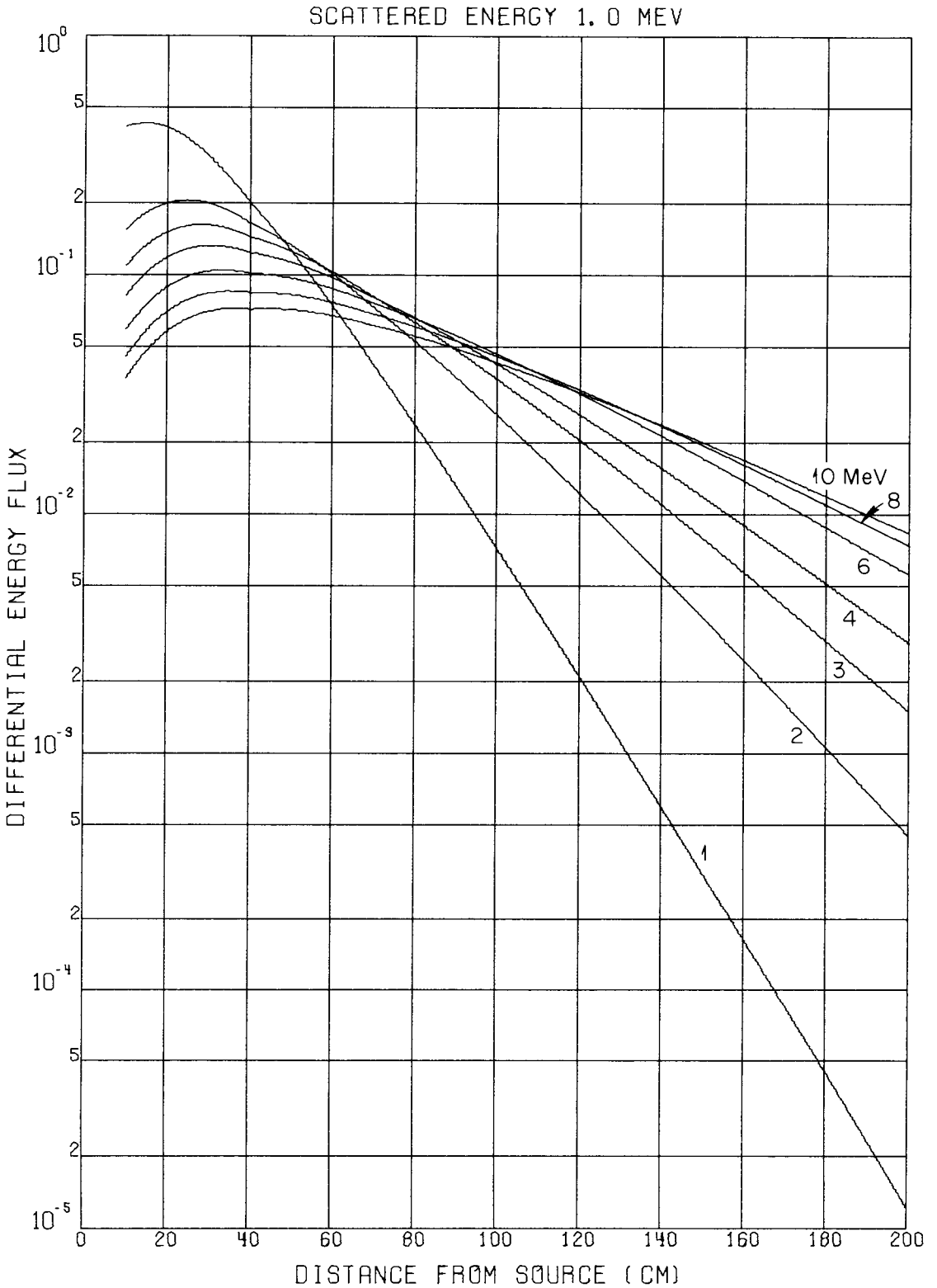

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Fig. 6.

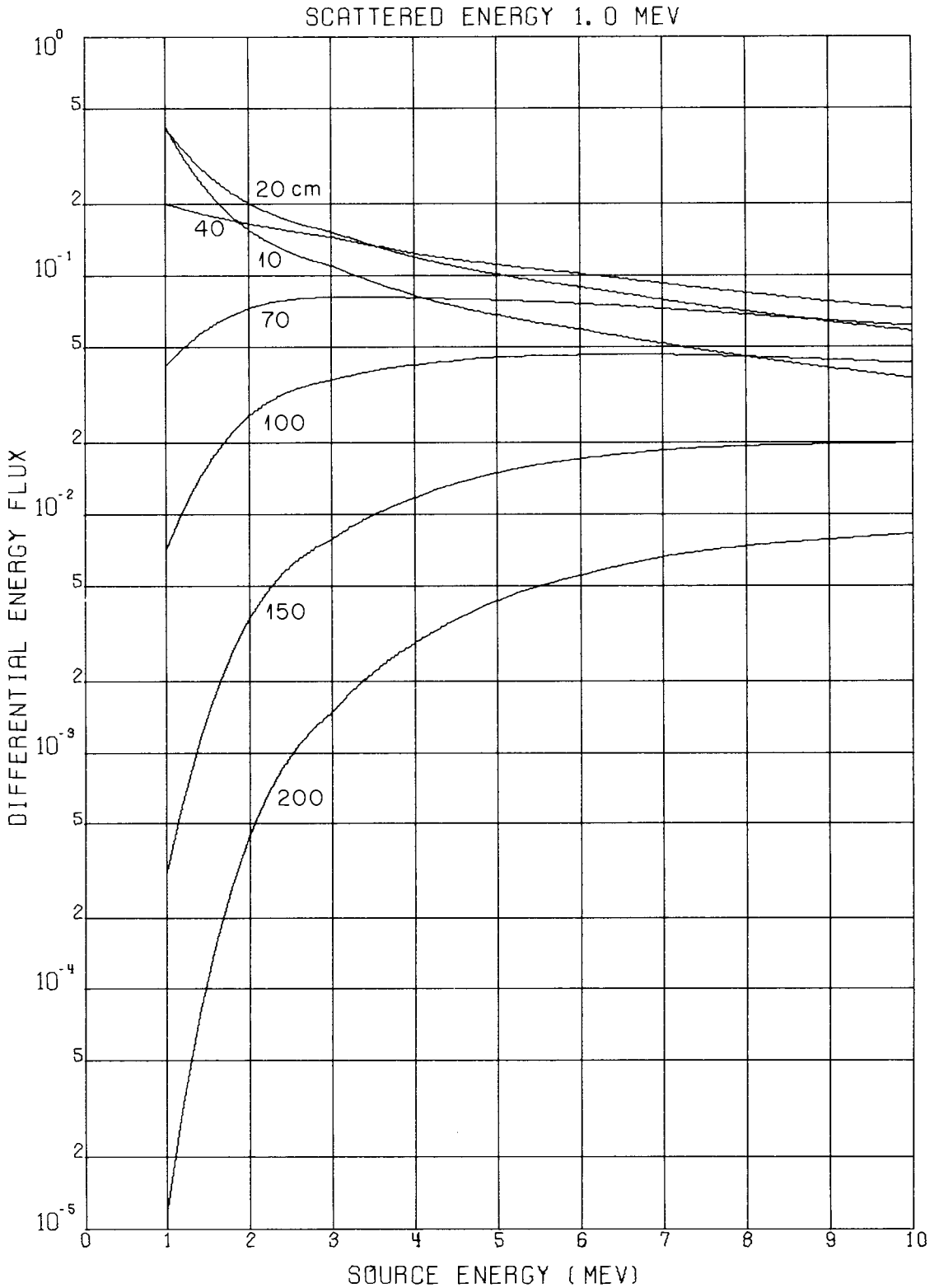

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Fig. 7.

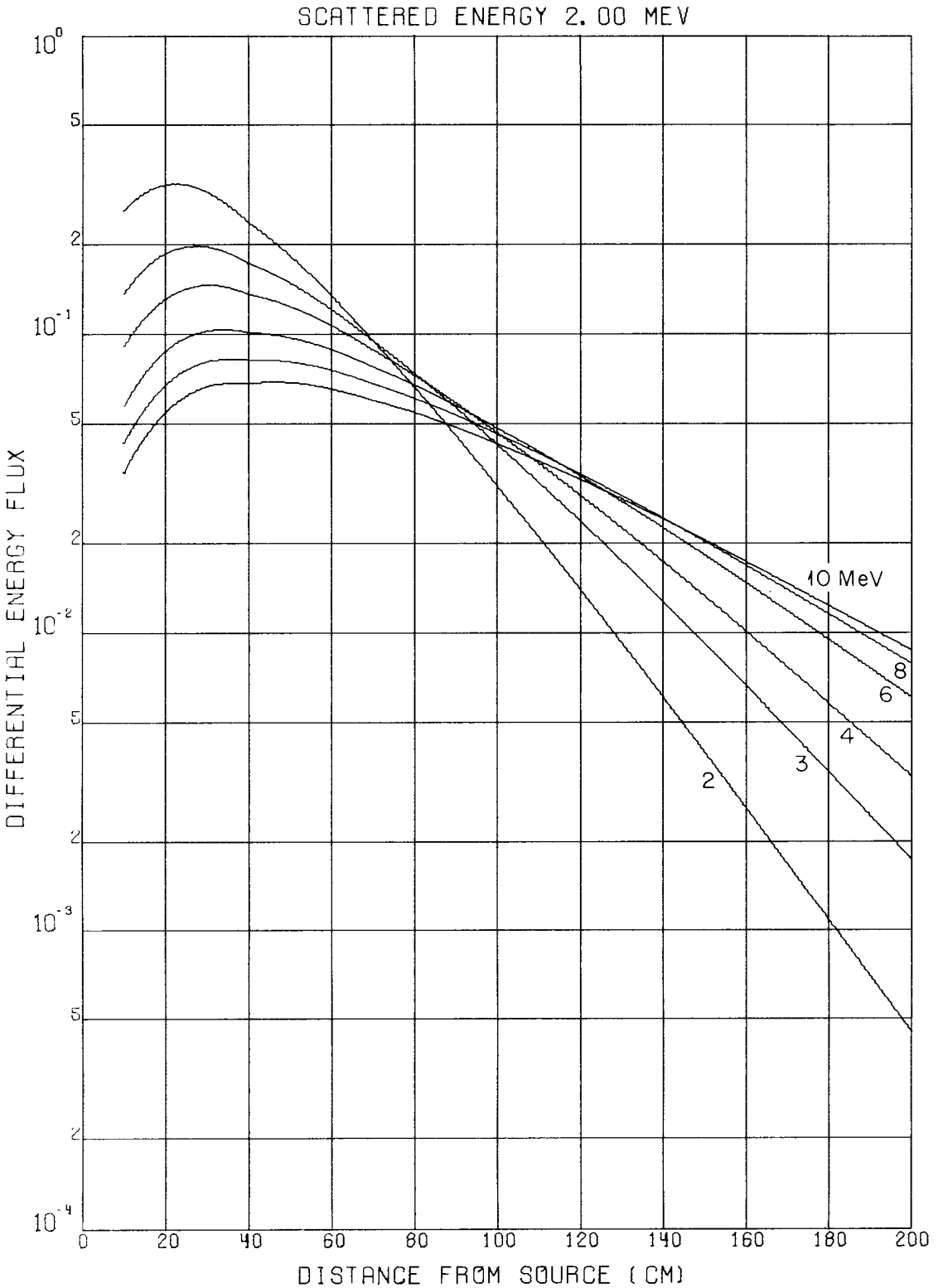

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Fig. 8.

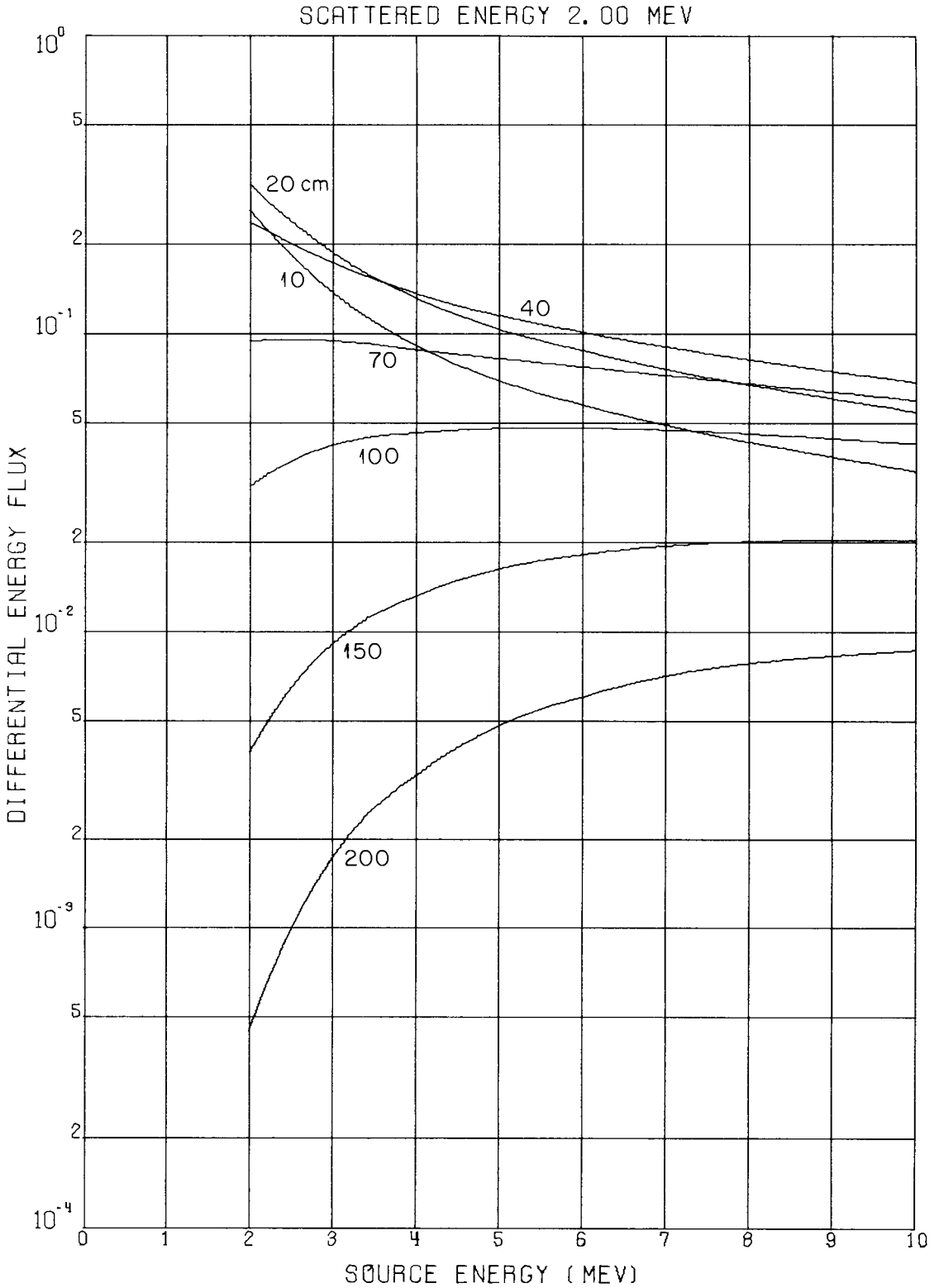

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Fig. 9.

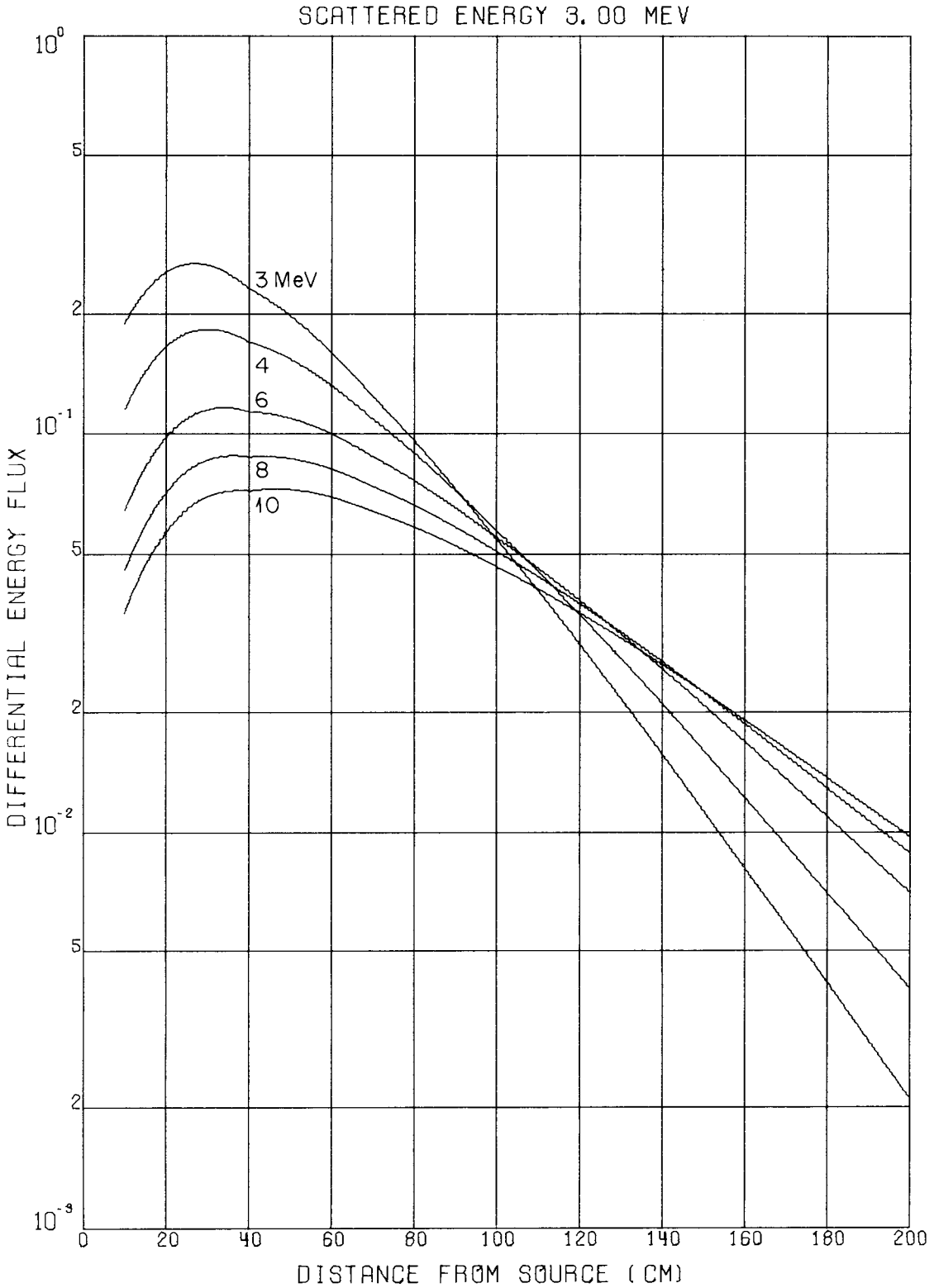

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Fig. 10.

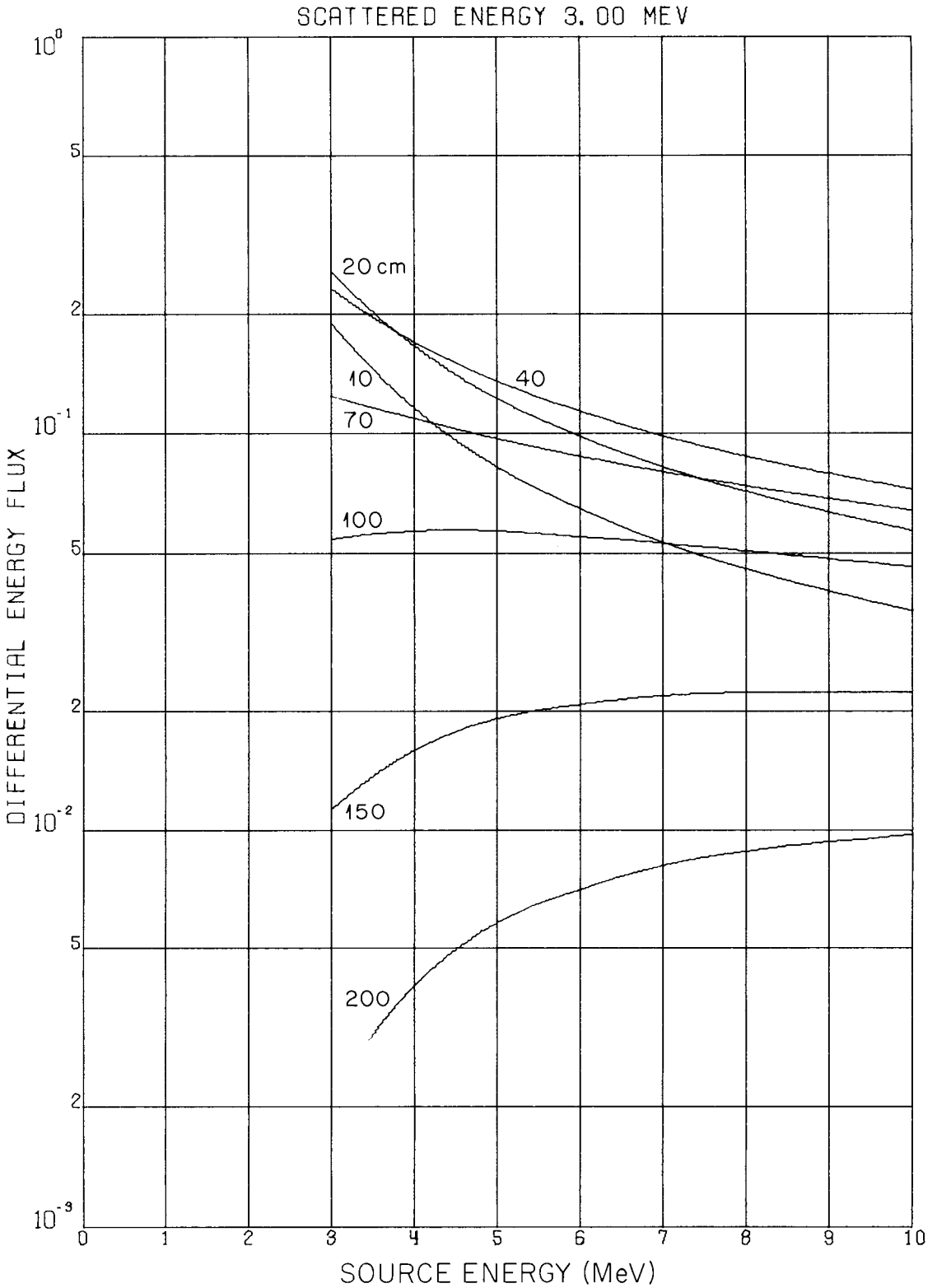

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Fig. 11.

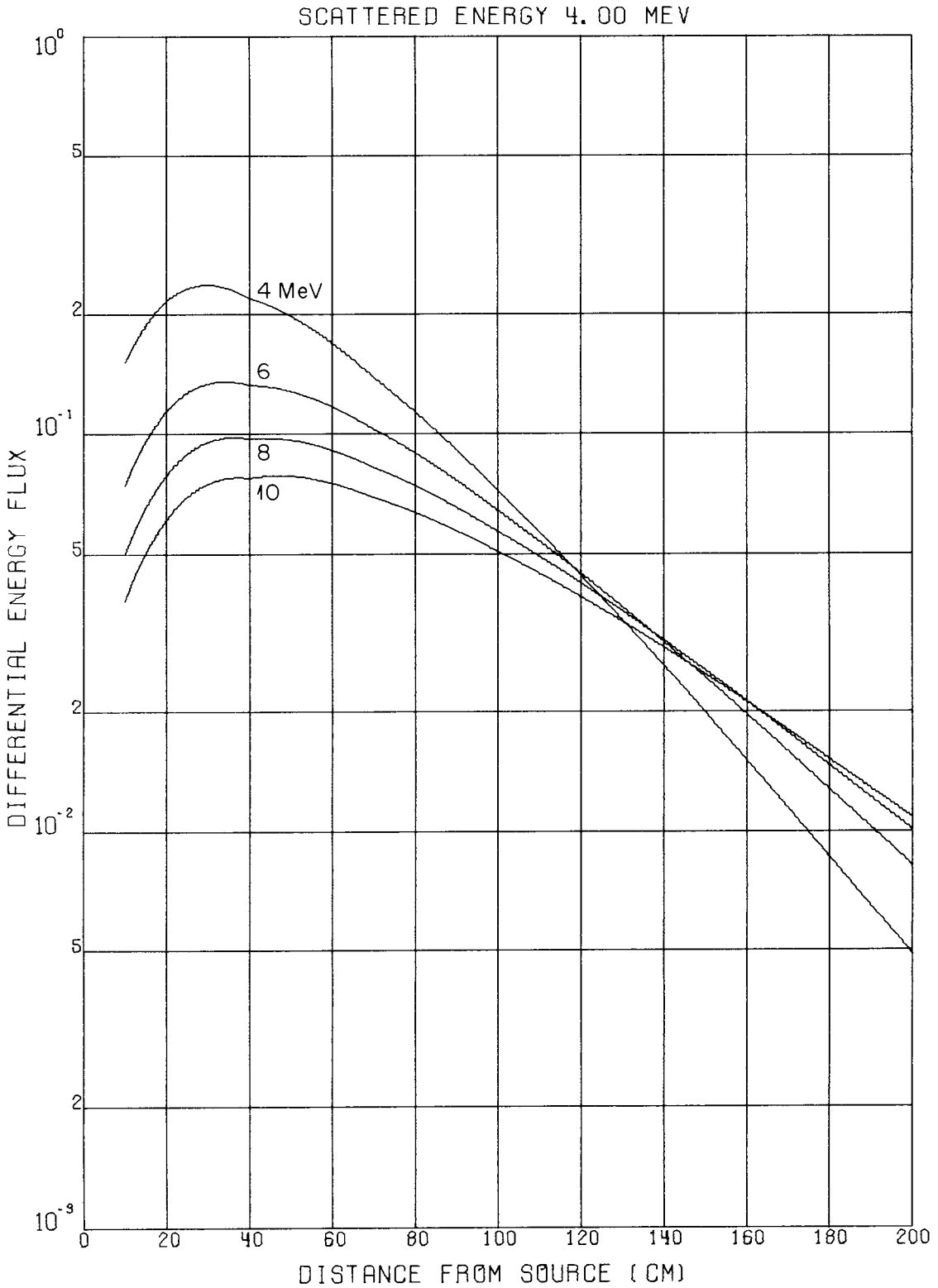

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Fig. 12.

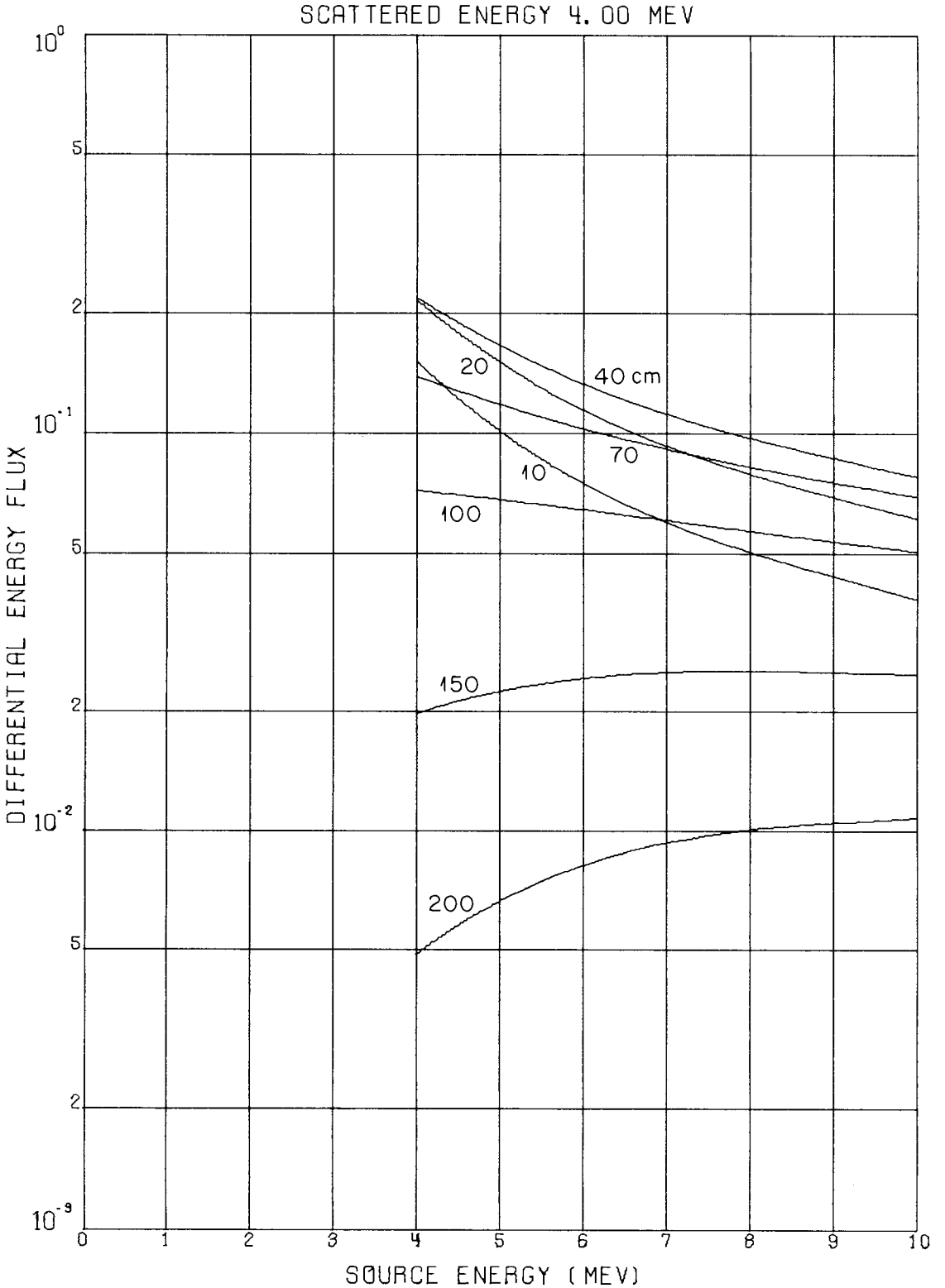

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Fig. 13.

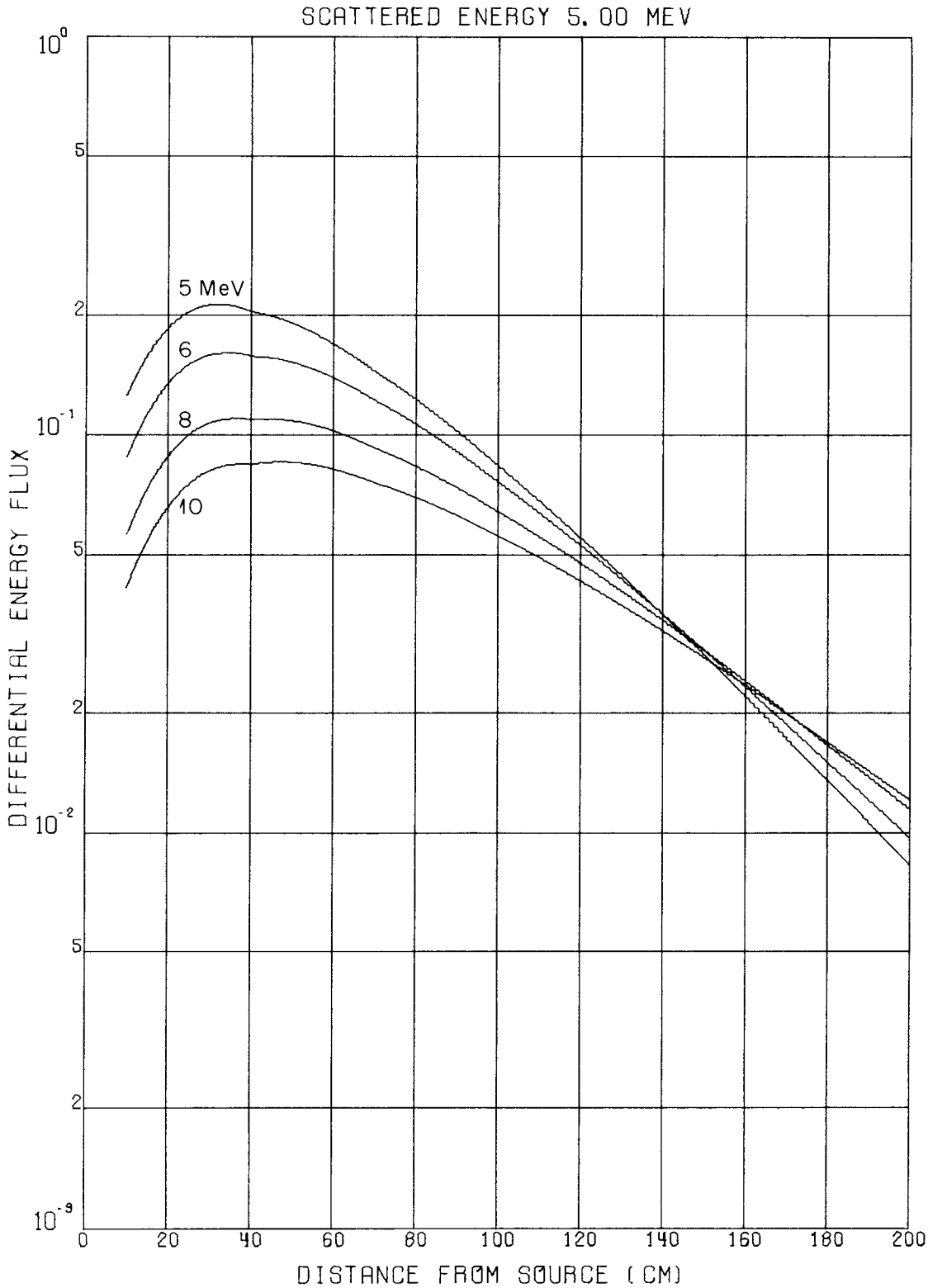

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Fig. 14.

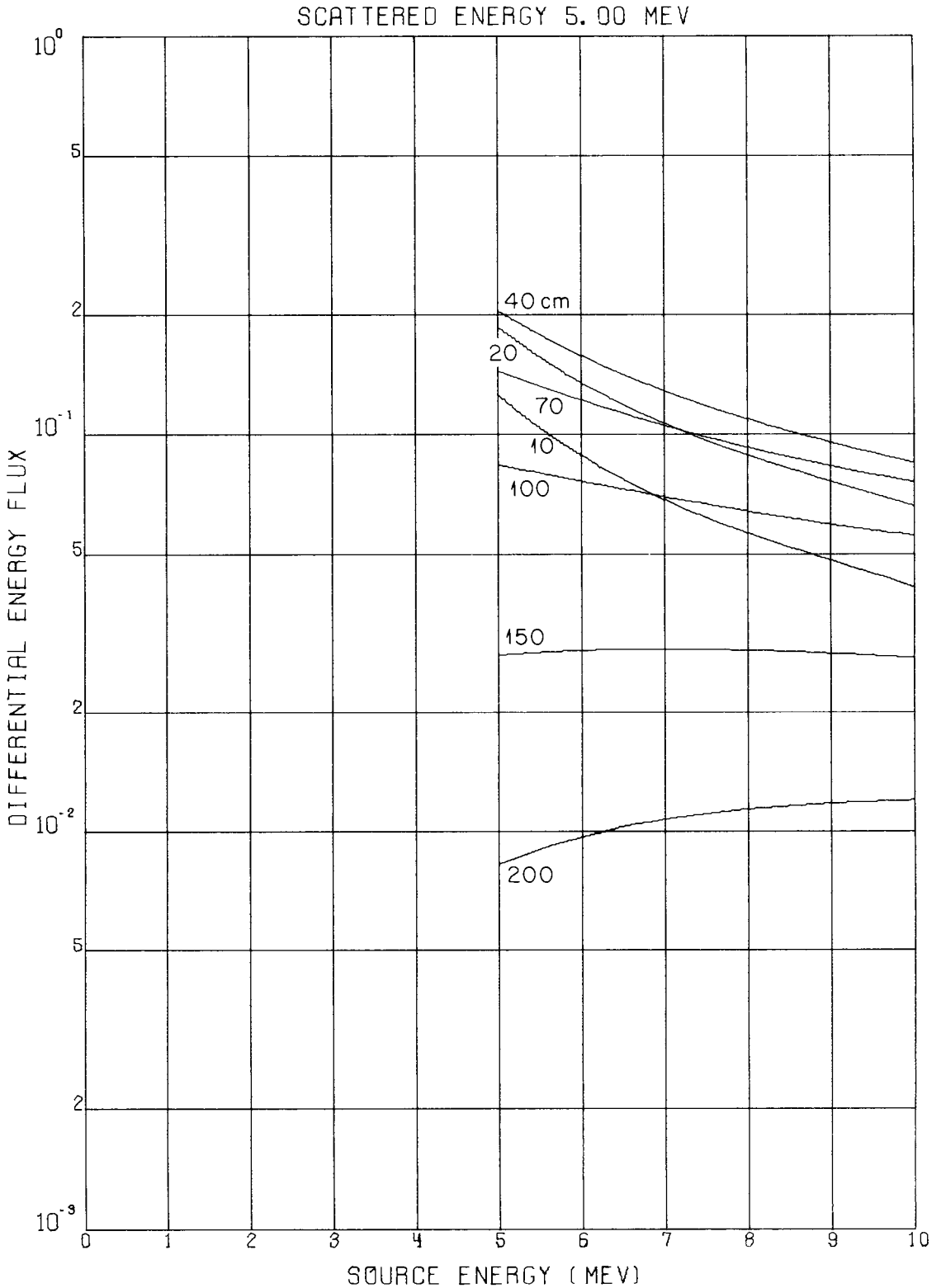

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Fig. 15.

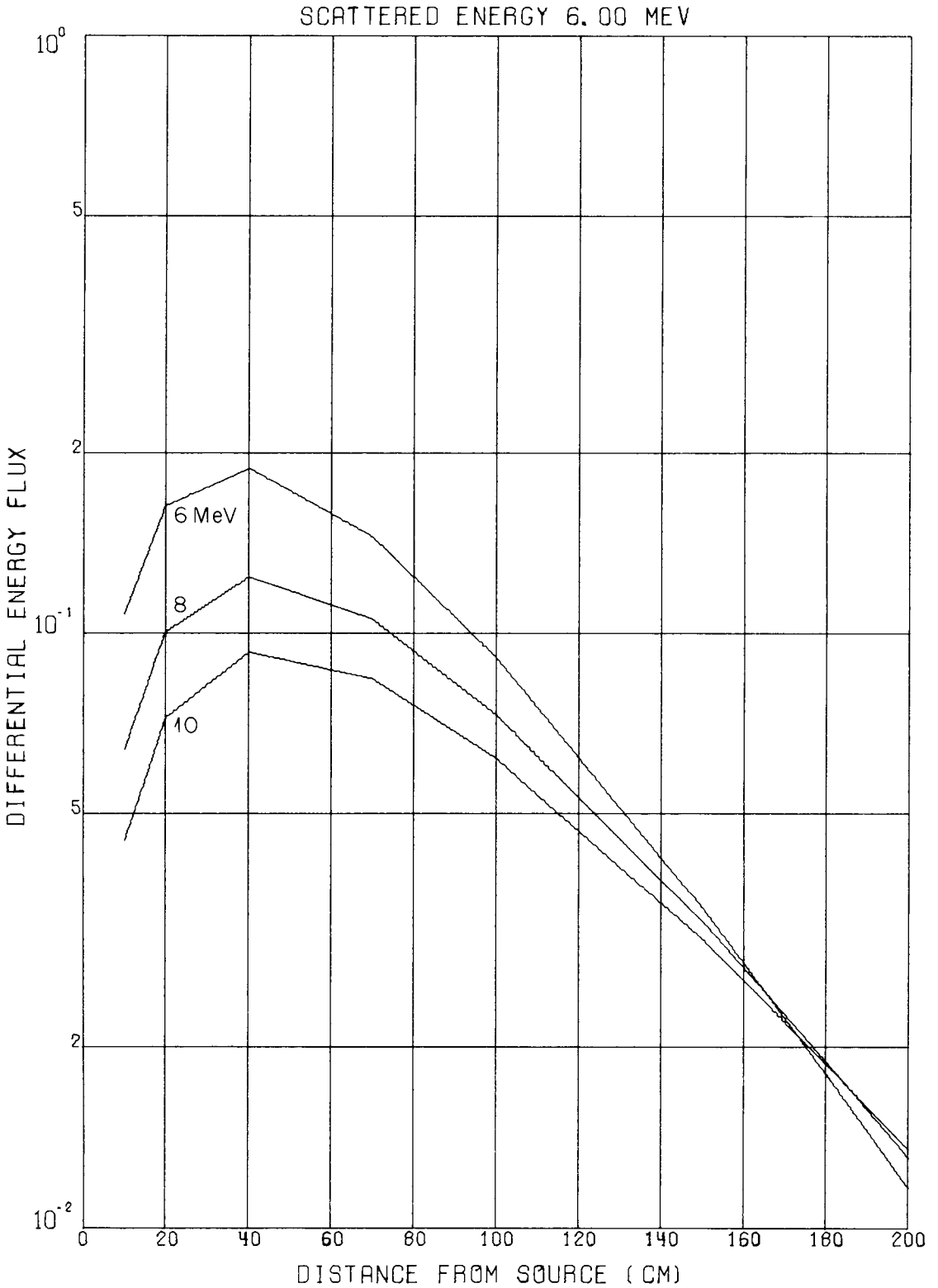

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Fig. 16.

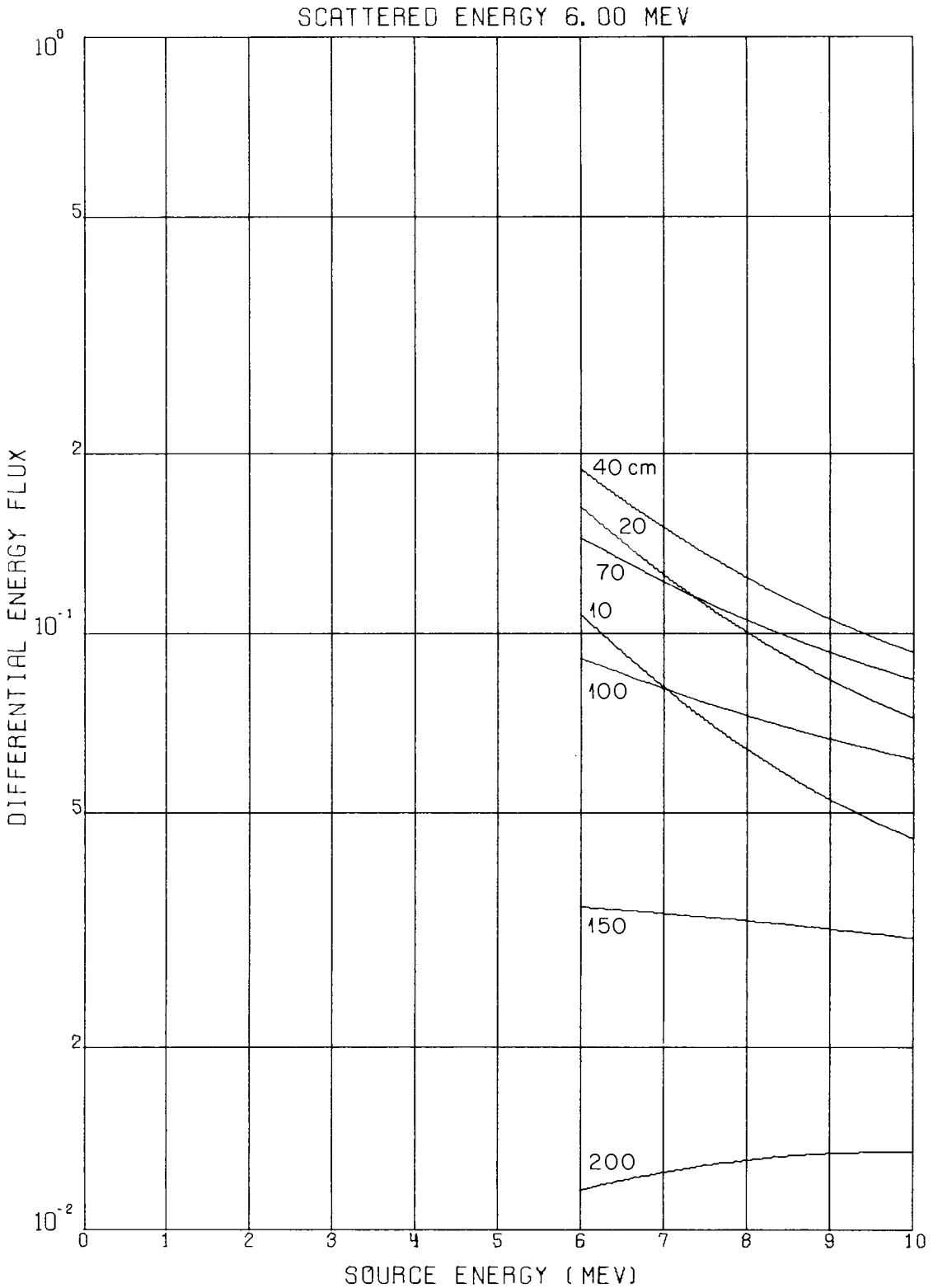

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Fig. 17.

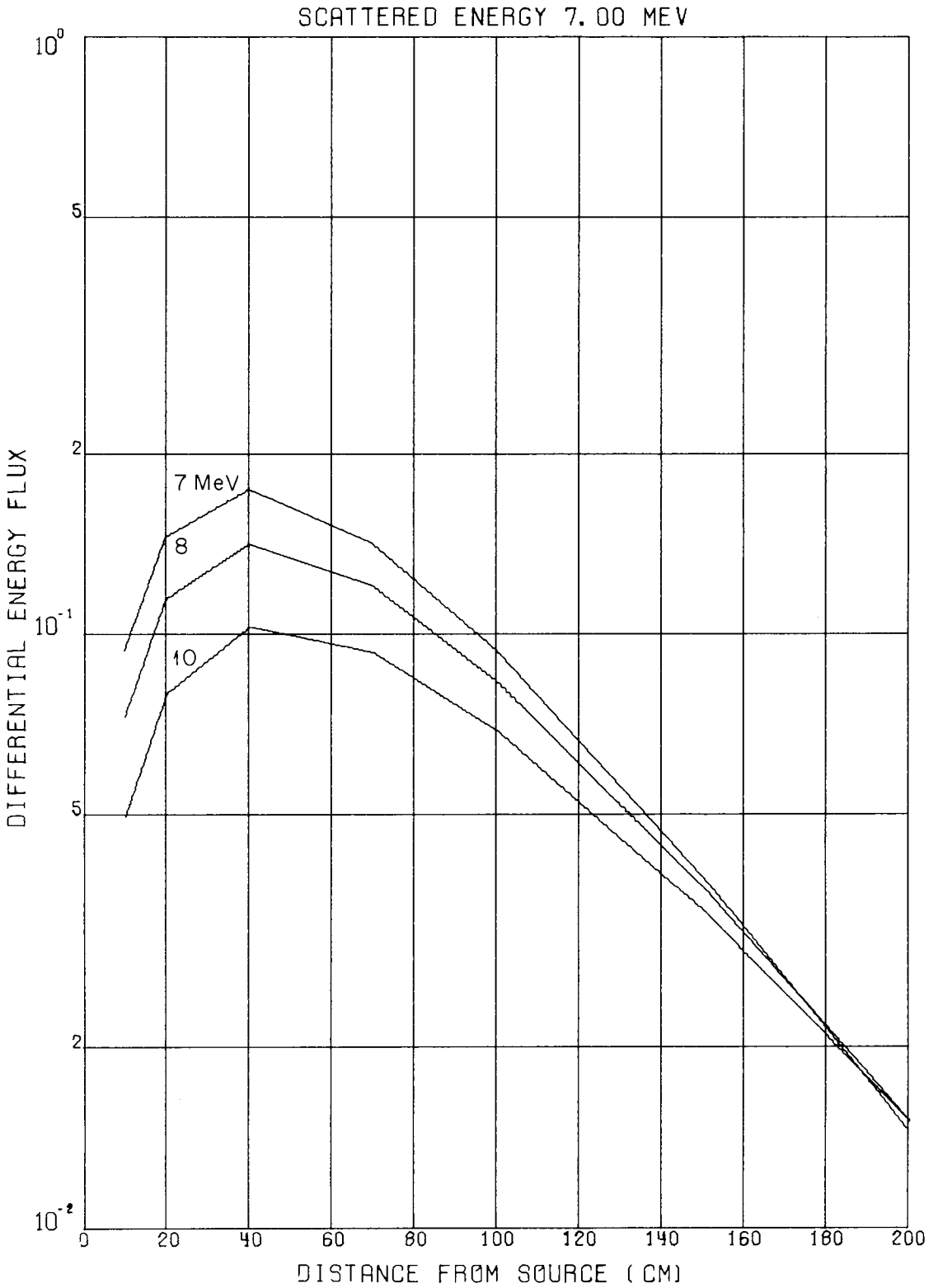

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Fig. 18.

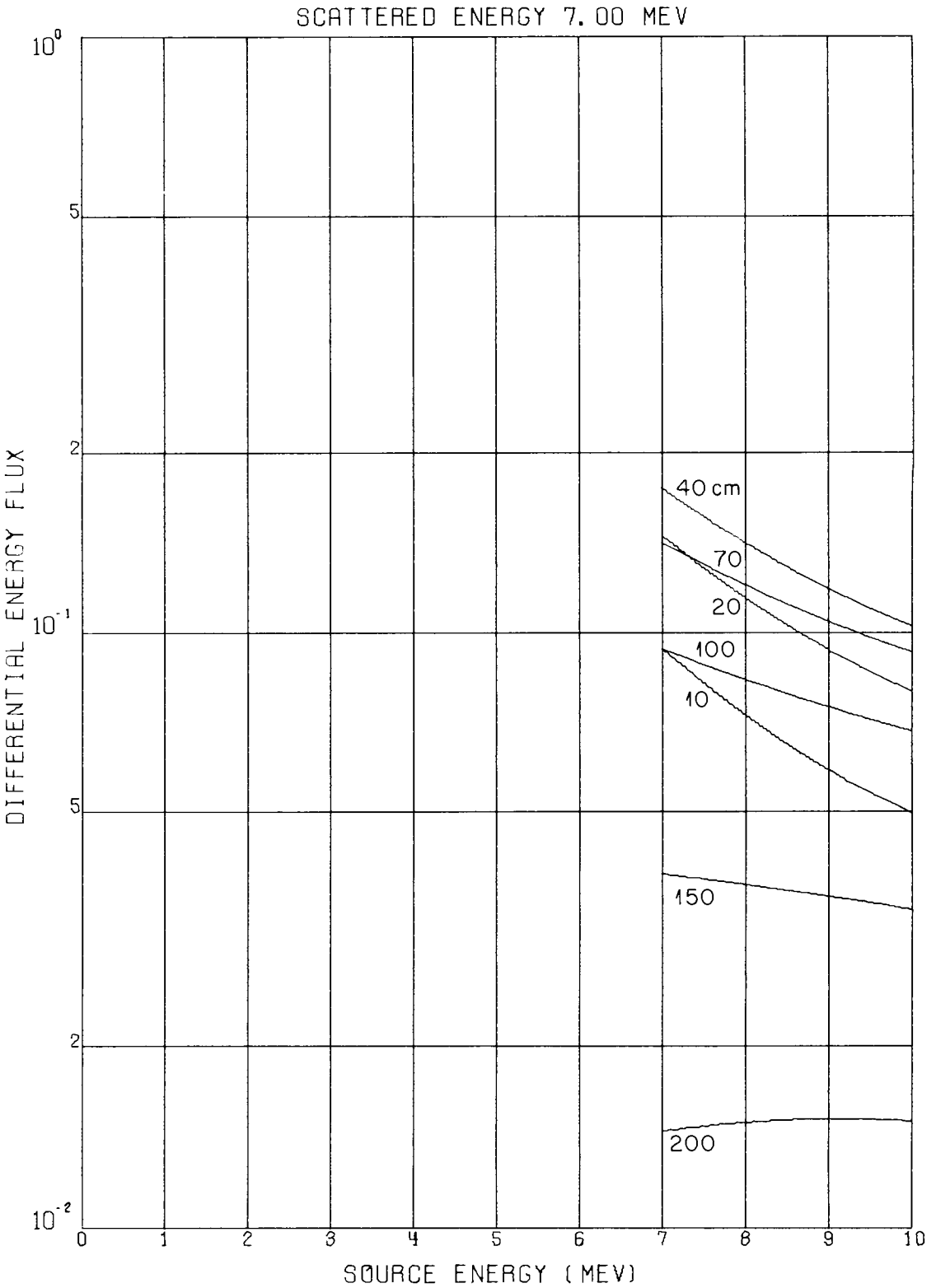

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Fig. 19.

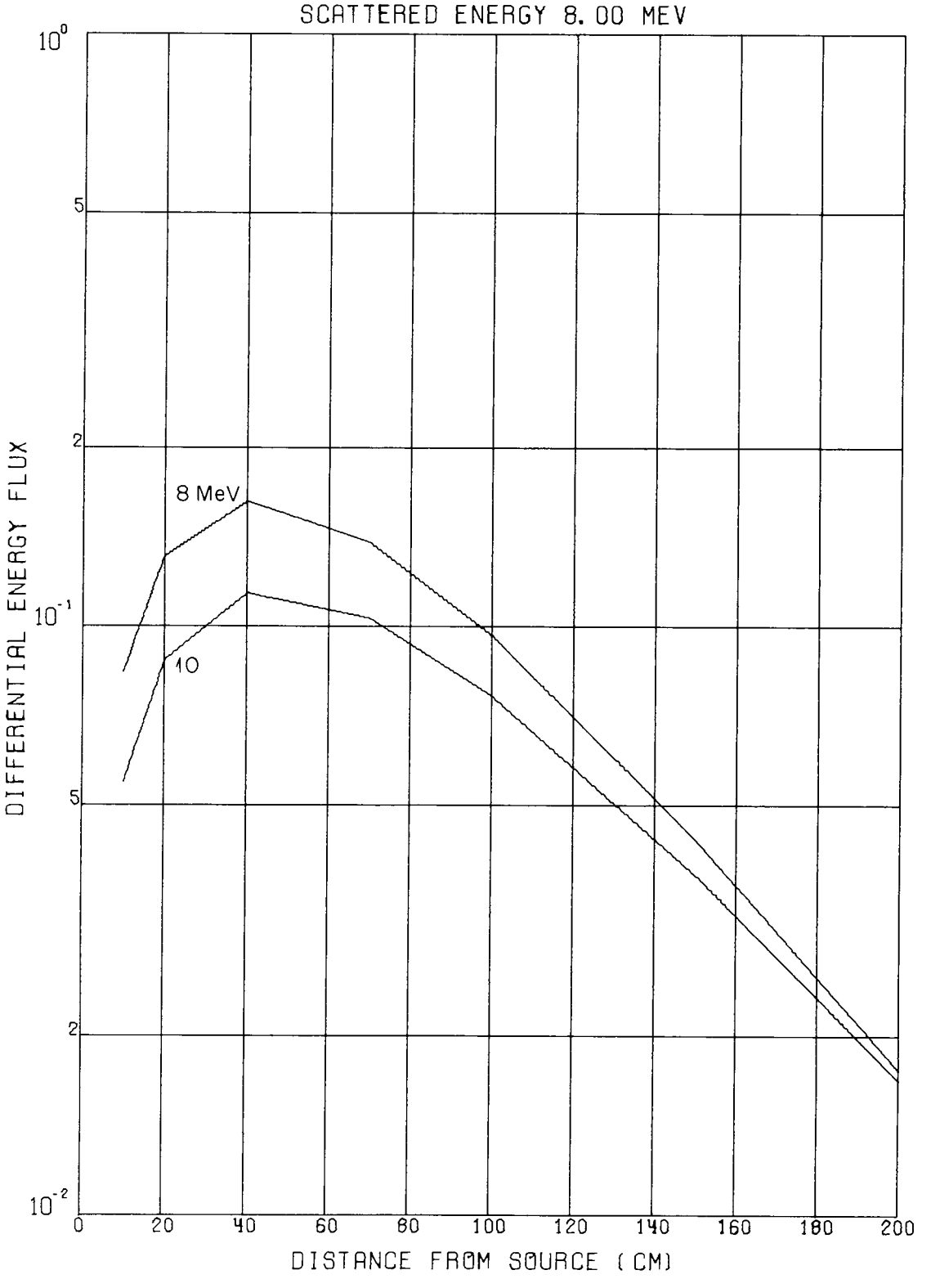

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Fig. 20.

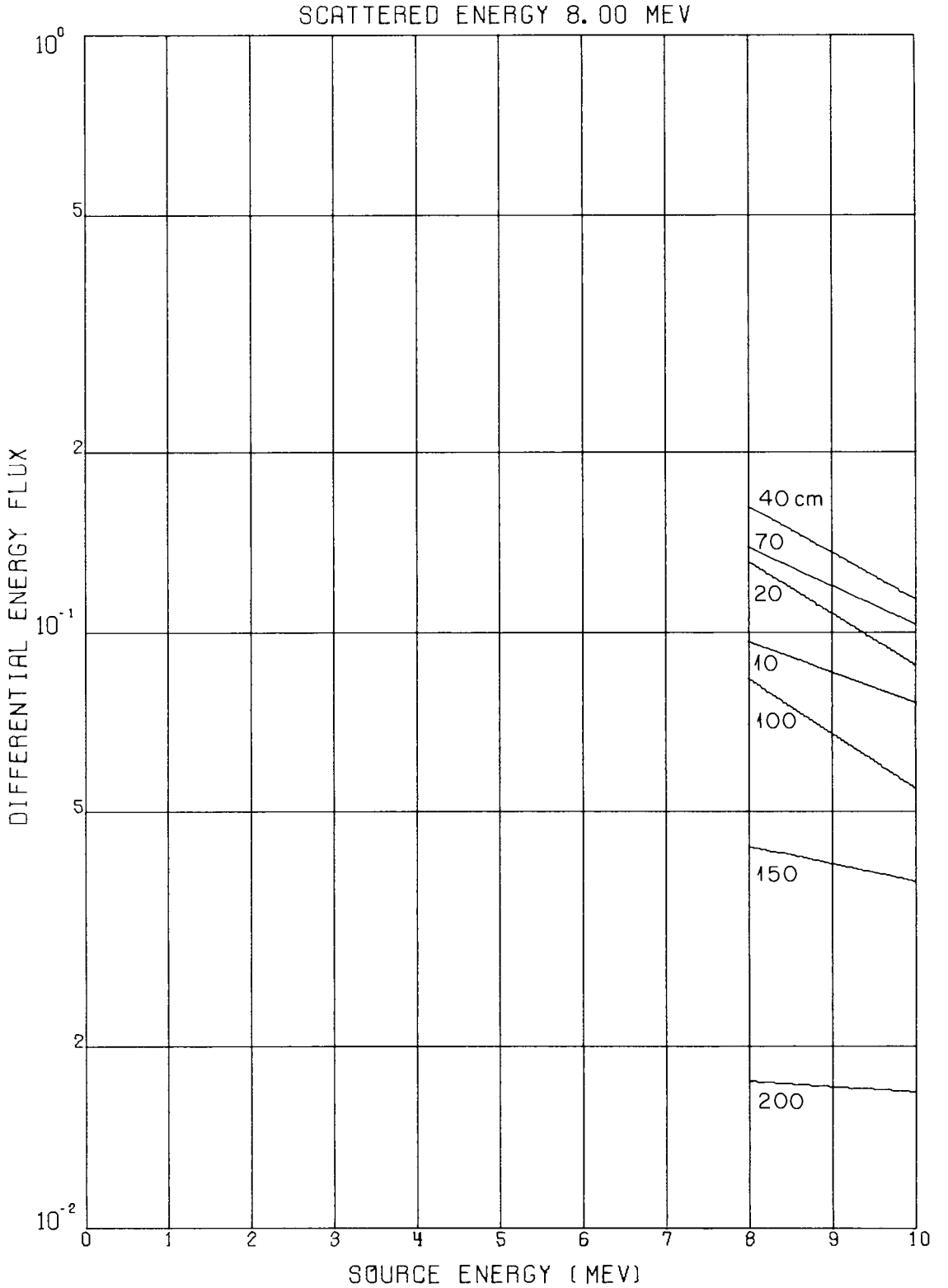

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Fig. 21.

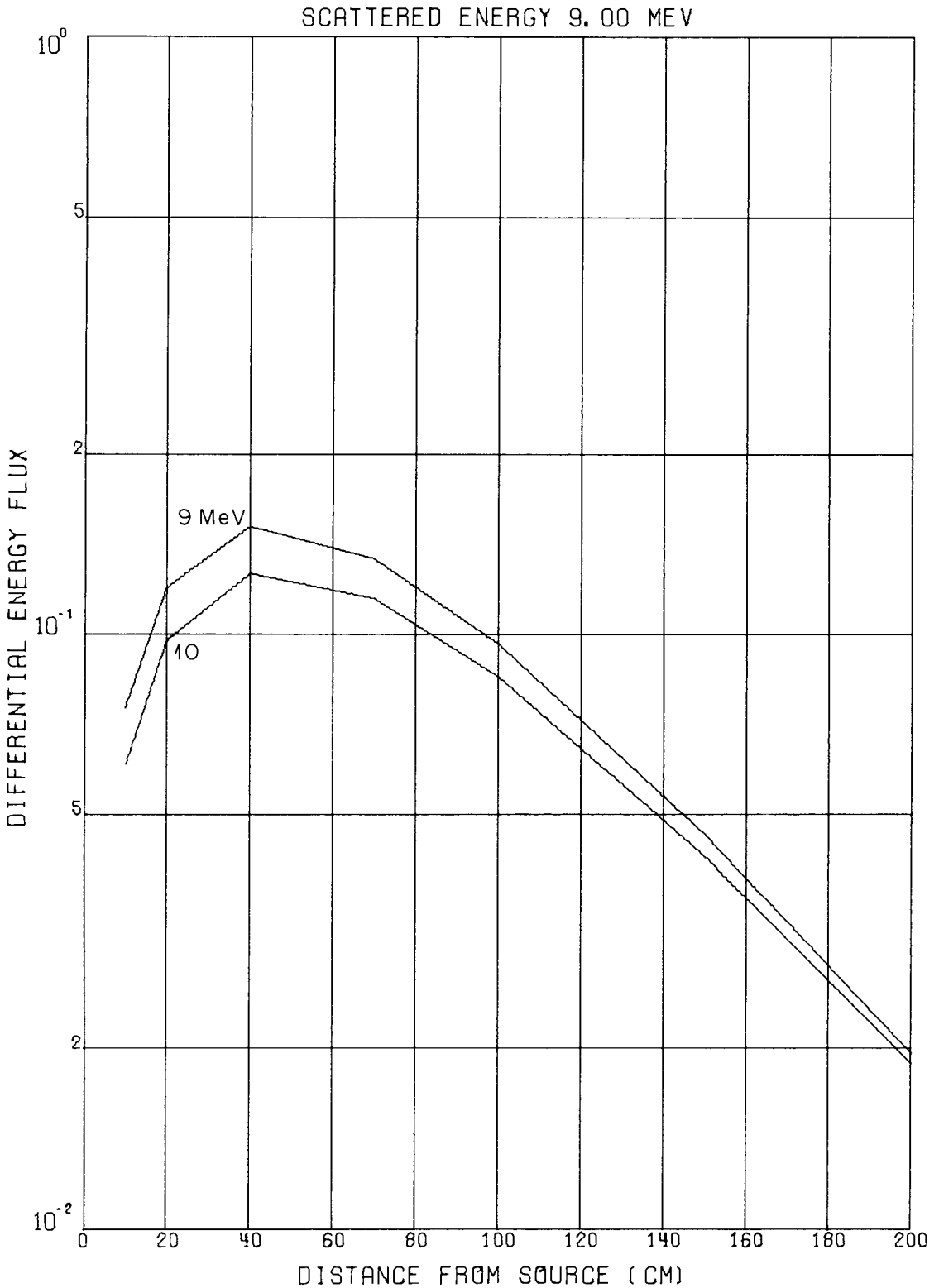

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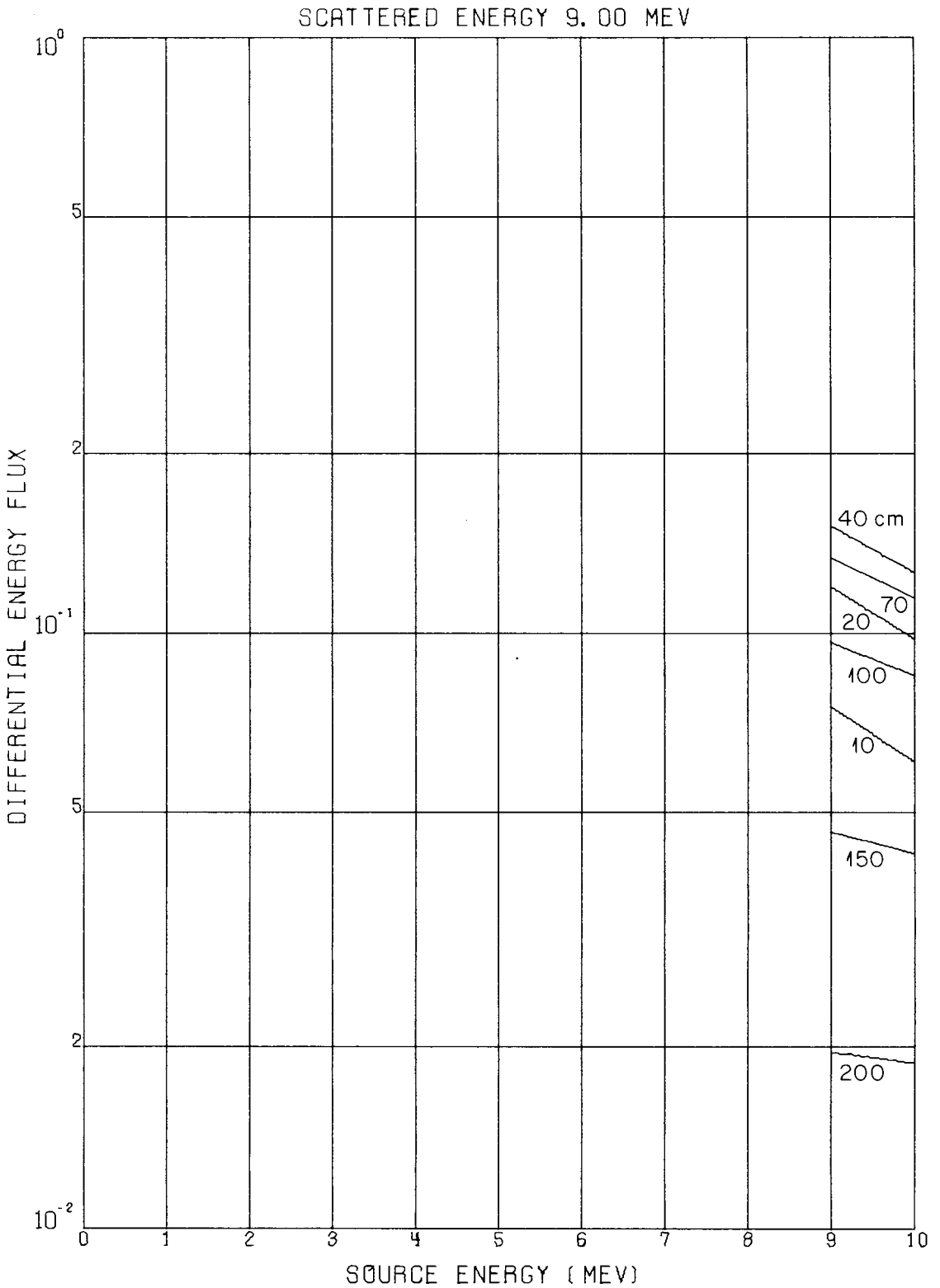
Fig. 22.



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