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RANGE AND STOPPING-POWER TABLES FOR 2.5–500 MeV/NUCLEON HEAVY IONS IN SOLIDS

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Stopping powers and ranges are tabulated for all ions of atomic number $2 \leqslant Z \leqslant 103$ in the energy region $2.5 \leqslant E/A \leqslant 500$ MeV/u for 36 solid materials. The calculations use stopping powers for α particles and a new parameterization for the heavy-ion effective charge which is deduced from a set of about 600 experimental stopping-power values covering an energy range from 3 to 90 MeV/u for 15 incident heavy ions and 18 solid stopping materials. © 1990 Academic Press, Inc.

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INTRODUCTION

Stopping powers and ranges have played a crucial role in many aspects of heavy-ion physics. Requirements in nuclear, atomic, and solid-state physics and in applied areas involving particle–solid interactions have fostered ongoing revisions and new calculations of these quantities. Due to the complexity of the atomic structures of both projectile and target, the various studies have all had to adopt some approximations in order to simplify the calculations and/or to rely on a semiphenomenological treatment. Also, they must be based on experimental data as available.

In the 2–10 MeV/u energy range, the comparison between experimental stopping powers and calculations such as those tabulated by Northcliffe and Schilling[1] or the more recently published curves of Ziegler[2] has shown significant discrepancies, particularly for light stopping media and heavy projectiles.[3–7] In this energy domain the best agreement is generally obtained with the tables of Hubert et al.,[8] who proposed a new parameterization of the effective charge for heavy ions. With the new generation of accelerators, the energy domain from 20 to 100 MeV/u has been increasingly explored.[9–11] In this energy range, the tabulations of Hubert et al. show reasonable agreement with most of the data but tend to overestimate the stopping powers in light stopping media by 10%–15%. This is explained by their use of too crude an approximation for extrapolating the variation of the effective charge parameter with energy well above 10 MeV/u. Here, a better agreement is obtained with the values from Ziegler.[2]

On the basis of the considerable body of heavy-ion data now available between 3 and 90 MeV/u, the procedure of Hubert et al. for calculating stopping powers of solids has been revised. A new semiempirical formula for the heavy-ion effective charge has been derived from a set of about 600 experimental data points. These data cover projectiles from ^{16}O to ^{238}U and targets from Be to U in an energy range from 3 to 90 MeV/u. The effective charge parameterization formulae were derived in Ref. 12. Note that in order to take into account the systematic difference observed between gas and solid stopping powers for heavy ions,[13–15] it appears necessary to treat gases and solids separately. The present work is limited to solid media.

Generation of Electronic Stopping-Power Tables

Following the same principles as those in Ref. 8, the stopping power S for a given combination of stopping medium and heavy-ion species and velocity is calculated by means of the well-known scaling law

$$S/(\gamma Z_1)^2 = S_{\text{ref}}/Z_{\text{ref}}^2 \qquad (1)$$

in which γZ_1 is the heavy-ion effective charge (Z_1 being its atomic number) and S_{ref} is the stopping power of the same medium for a reference ion of the same velocity and of effective charge Z_{ref}. The tabulation is then gen-

erated based on the arguments of the effective charge parameter $\gamma(Z_1, E/A, Z_2)$. The variation with velocity is introduced through the E/A dependence, E being the incident energy and A the heavy-ion mass. The original aspect of this parameterization is that, as in Ref. 8, it includes a dependence on Z_2, the target atomic number, which is generally neglected.[1,2] This dependence is necessary in order to be able to reproduce the whole set of experimental stopping powers.

The effective charge parameterization is expressed by

$$\gamma = 1 - x_1 \exp(-x_2 (E/A)^{x_3} Z_1^{-x_4}), \tag{2}$$

where (E/A) is the energy per nucleon in MeV/u. For all stopping media except Be and C, the parameters x_1 to x_4 are given[12] by

$$x_1 = D + B \exp[-CZ_1] \tag{3}$$

$$x_2 = 8.144 + 0.09876 \ln Z_2 \tag{4}$$

$$x_3 = 0.3140 + 0.01072 \ln Z_2 \tag{5}$$

$$x_4 = 0.5218 + 0.02521 \ln Z_2 \tag{6}$$

with

$$B = 1.658 \tag{7}$$

$$C = 0.05170 \tag{8}$$

$$D = 1.164 + 0.2319 \exp(-0.004302 Z_2). \tag{9}$$

For Be and C, the parameters used (which lead to a better fit with experiment than the general formulae (3)–(9)) are given in Table A.

These effective charge parameterization formulae, which were derived in Ref. 12, have been obtained using Eq. (1) together with α particles as reference ions. For $E/A \geqslant 2.5$ MeV/u these helium ions are completely stripped, and fitted formulae for calculating their stopping powers are available for all elements.[16] However, these fitted formulae are strictly valid up to 75 MeV/u only. Above this energy the most recent stopping powers which can be used as reference values in Eq. (1) are those tabulated by Janni for protons.[17] As a matter of fact the proton stopping-power values of Ref. 17 scale very well to the α stopping powers for all stopping media up to about 200 MeV/u. Thus, to the extent that Eq. (1) is valid, the fitted formula from Ziegler[16] can be used in this energy domain.

At higher energy, increasing deviations, which may reach 8% at 500 MeV/u, are observed between the extrapolation of the fitted formula[16] and values scaled from Janni. To take this into account (i.e., to adopt the proton values as references) without modifying the general method adopted for the tabulation, the Ziegler formulae have been corrected for each medium beyond 150 MeV/u so that the resulting α stopping powers agree within 0.5% with a Z^2 scaling applied to the Janni values.

The low-energy limit of the present tabulation is set at 2.5 MeV/u so that:

(i) helium ions ($Z_{ref} = 2$) are fully stripped
(ii) nuclear stopping can be neglected
(iii) low-energy effects such as Z_1 and Z_2 oscillations are much reduced.

Note, however, that for the heaviest ions (U), Z_2 oscillations can be observed up to 4 MeV/u.[7] For such ions, the tabulation might be less accurate at low energies.

At the high-energy end, the tables have been extended to 500 MeV/u although the experimental data used in this work as a basis only cover the energy range 3–90 MeV/u. Above 100 MeV/u there exist only very few stopping-power and range measurements. The present extrapolation into the high-energy domain is in response to the great need for such estimates in the development of heavy-ion physics experiments at new accelerator facilities. Concerning the effective charge parameterization (Eqs.

TABLE A

Effective Charge Parameter Values for the Stopping Media Be and C as Derived from Fitting Procedure Using Eqs. (2) and (3)

Stopping medium	x_1			x_2	x_3	x_4
	D	B	C			
Be	2.045	2.000	0.04369	7.000	0.2643	0.4171
C	2.584	1.910	0.03958	6.933	0.2433	0.3969

Note. The values given here for Be are slightly different from those given in Ref. 12 due to the addition of new experimental data in the present fit.

(2)–(9)), the extrapolation should not lead to serious errors because the variability of effective charges versus incident energy is limited due to the existence of the $\gamma = 1$ high-energy asymptote (fully stripped ions). Larger uncertainties could be associated with deviations from the Z^2 scaling law (Eq. (1)) arising from correction terms in the energy-loss expressions. Ahlen[18] has given an extensive review of stopping-power theory with special emphasis on the higher-order Z corrections. For relativistic heavy ions it has been observed.[19–21] that the measured ranges are shorter than those predicted by the standard Bethe stopping theory. However, such effects should remain relatively small at the energies considered here, and the associated uncertainty in the stopping powers should not exceed 10% at 500 MeV/u.

Generation of Range Tables

The range values in this tabulation actually are integrated path lengths. They are related to the stopping power by the relation

$$R(E_0) = \int_0^{E_0} S^{-1} dE. \qquad (10)$$

A simple integration should therefore yield the range. However, since the proposed analytical formulae used to derive the stopping power are valid only above 2.5 MeV/u, the range was expressed as the sum of two terms:

$$R(E_0) = R(2.5) + \int_{2.5}^{E_0} S^{-1} dE. \qquad (11)$$

The last term is calculated by numerical integration of the reciprocal of the stopping power (Eqs. (1)–(9)); the first term represents the range for 2.5 MeV/u and must be established separately. Since there exist only a few experimental determinations of ranges in the relevant energy region, one must rely on calculated range values. The Northcliffe and Schilling tables[1] give the ranges in the spirit of Eq. (10), including the nuclear stopping power in the low-energy region. The range values for 2.5 MeV/u tabulated in Ref. 8 were taken from this table. The more recent handbook of range distributions by Littmark and Ziegler[22] is intended for the calculation of the true mean range (mean depth of penetration) which, due to multiple scattering, is somewhat shorter than the integrated path length. The calculations in Ref. 22 rely to a large extent on methods developed for calculating ion range distributions at relatively low energies. The accuracy of the calculated range values, above the energy region where the stopping power is maximum, is difficult to estimate (as suggested in Ref. 23) since they cannot be justified by experimental results. Hence, the values $R(2.5)$ in Eq. (11) were taken from the Northcliffe and Schilling tables.[1] Values for media other than those presented in Ref. 1 have been obtained through a cubic spline interpolation procedure.

As a matter of fact at incident energies well above the stopping-power maximum, the range is mainly determined by collisions occurring in the high-energy region of the ion's trajectories for which the stopping power is smaller. For example, a 50 MeV/u incident ^{40}Ar ion derives about 98% of its total path length in Al from collisions occurring before it slows down to 2.5 MeV/u. Therefore, even a significant error in the value $R(2.5)$ should result in a negligible error in the range of 50 MeV/u ions. Furthermore, if only energy losses (ΔE) in detectors, windows, or targets are needed, the uncertainties in these $R(2.5)$ values should be ignored since ΔE is then calculated from range differences.

Comparison of the Calculated Values with Experimental Data

A suitable means of estimating the accuracy of the present computed heavy-ion stopping powers is a comparison with available experimental data.

In the 3–90 MeV/u energy range, comparisons of the calculated stopping powers with measurements are presented for O, Ar, Kr, and Xe, in Figs. 1–4, respectively. For each ion, we have selected the stopping media for which the experimentally explored energy domain is the broadest. It can be seen that the experimental points fall near the calculated curves with deviations typically less than 5%. However, some experimental data present a dis-

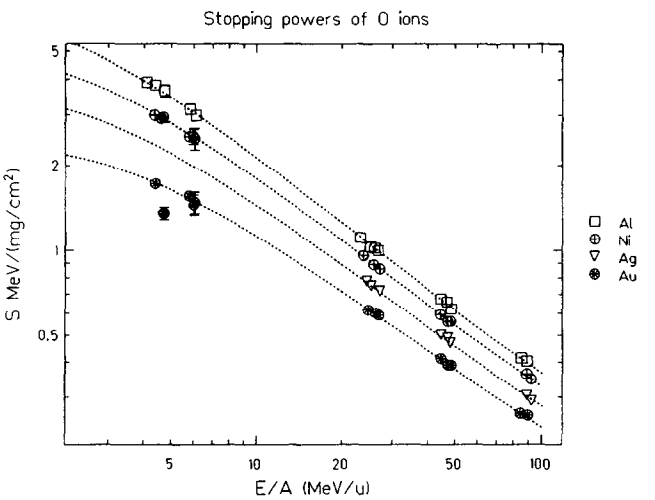

Figure 1. Comparisons of experimental stopping powers for O ions with the tabulated values (dotted lines). When not shown, the error bars are comparable to the size of the symbols. Data points are from Refs. 3, 10.

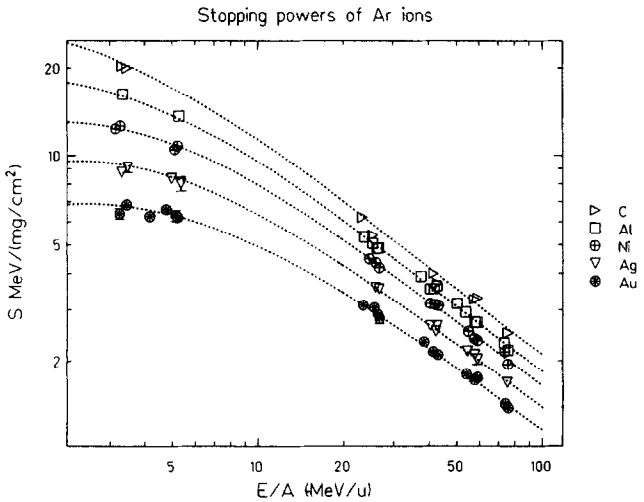

Figure 2. Same as Fig. 1 for Ar ions. Data points are from Refs. 3, 9.

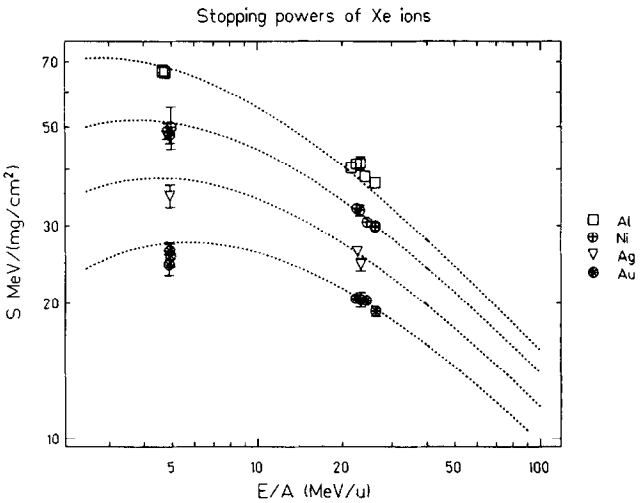

Figure 4. Same as Fig. 1 for Xe ions. Data points are from Refs. 4, 11.

crepancy in the 5%–10% range, in particular for the stopping medium C. This can be largely accounted for by such experimental effects as nonuniformity of the target thicknesses. An example of the agreement achieved between calculation and experiment for the heaviest ions Pb and U is given in Fig. 5. The calculated values are within the experimental error bars in most of the cases, except for the Ti and Zr stopping media where, at 10 MeV/u, the experimental values are 11% higher than the calculated values. For these latter cases, clearly the calculations do not reproduce the positions of the observed maxima in the stopping powers. As already noted, this may be due to the fact that maxima near $Z_2 \sim 22$ and

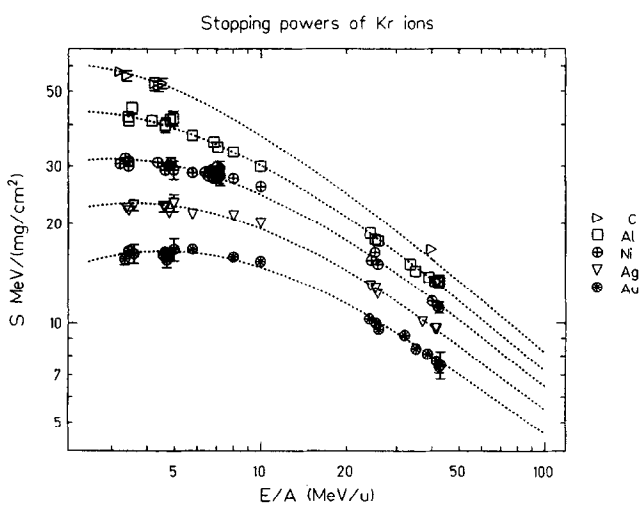

Figure 3. Same as Fig. 1 for Kr ions. Data points are from Refs. 3, 4, 6, 11.

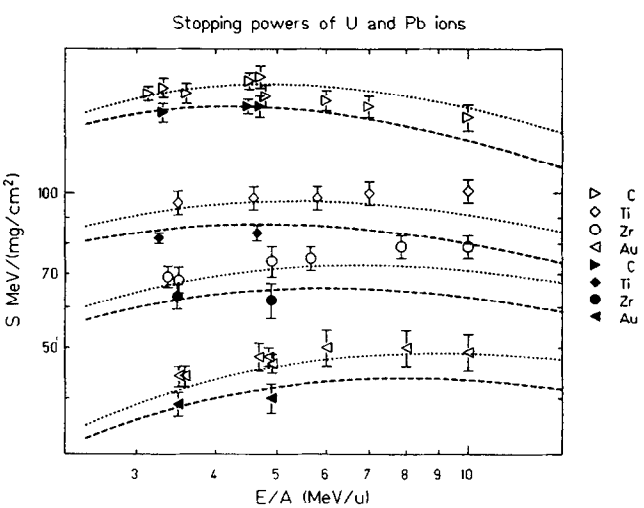

Figure 5. Comparisons of the stopping powers measured in C, Ti, Zr, and Au for the heavy ions Pb and U with the tabulated values. Closed symbols (data points from Ref. 4) and dashed lines are for Pb ions. Open symbols (data points from Refs. 4, 7, 12) and dotted lines are for U ions.

40 actually exist in the Z_2 oscillation of stopping powers[7] at low energies, whereas a smooth dependence of S on Z_2 is obtained by the scaling procedure of Eqs. (1)–(9).

A comparison of experimental stopping-power values for Au ions in Au medium from Ref. 25 with the present calculation is given in Fig. 6. These experimental results are particularly pertinent in view of the fact that they provide some data for a very heavy ion toward 150 MeV/u which have not been included in our database. It is reasonable to assume that under such conditions the comparison will give a realistic estimation of the accuracy of the calculation in an unfavorable case (very heavy projectile). From Fig. 6 one can see that the experimental and calculated values agree to within about 6%, the calculated values being slightly lower than the experimental values in most of the cases.

Recently, a few stopping powers have been measured with stable and radioactive beams in the 100–400 MeV/u energy range.[26] The measured energy losses for an ~150 MeV/u ^{15}N beam in C and ~130 MeV/u ^{8,9,11}Li beams in Al agree within 0.5% with the present calculations. For a 400 MeV/u ^{40}Ar beam in C and a 300 MeV/u ^{36}P beam in Al, the calculated energy losses are lower than the experimental values by 3% and 2%, respectively.

From these few comparisons above 100 MeV/u, it seems that the calculated values are in fair agreement (~5% or better) with experimental data.

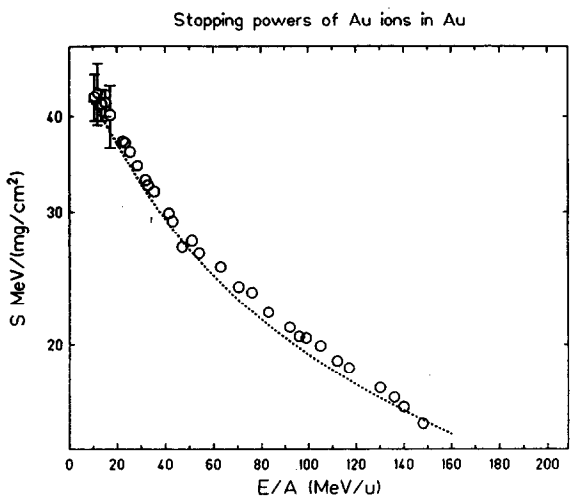

Figure 6. Comparisons of experimental stopping powers for Au ions in Au stopping medium with the tabulated values (dotted lines). Data points are read off Fig. 8 of Ref. 25. Except when shown the standard deviation of the data are comparable to the size of the symbols.

Associated Computer Files

Computer-readable files of the tables presented are available on line and may be obtained from HUBERTF AT FRCPN11.BITNET.

The computer programs for calculating the stopping powers and the ranges may also be obtained from HUBERTF AT FRCPN11.BITNET.

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EXPLANATION OF TABLE

TABLE I. Stopping Power and Range for Heavy Ions

E/A Energy of the incident ion per mass unit in MeV/nucleon

Electronic stopping powers and ranges are tabulated for ions of atomic number $2 \leq Z_1 \leq 103$ in the energy region $2.5 \leq E/A \leq 500$ MeV/u for 36 solid materials ($_4$Be, $_6$C, $_{12}$Mg, $_{13}$Al, $_{14}$Si, $_{20}$Ca, $_{22}$Ti, $_{24}$Cr, $_{26}$Fe, $_{28}$Ni, $_{29}$Cu, $_{32}$Ge, $_{34}$Se, $_{38}$Sr, $_{40}$Zr, $_{42}$Mo, $_{45}$Rh, $_{47}$Ag, $_{50}$Sn, $_{52}$Te, $_{56}$Ba, $_{57}$La, $_{59}$Pr, $_{62}$Sm, $_{64}$Gd, $_{67}$Ho, $_{69}$Tm, $_{71}$Lu, $_{73}$Ta, $_{75}$Re, $_{77}$Ir, $_{79}$Au, $_{82}$Pb, $_{83}$Bi, $_{90}$Th, $_{92}$U). For a given $^{A}_{Z_1}$ION, electronic stopping powers in units of MeV/(mg/cm^2) are given on the left page, and ranges in units of mg/cm^2 are given on the right page. For each ion the tabulation applies to the most abundant isotope and for each stopping medium to the natural isotopic composition. The tabulated stopping-power values for α particles have been calculated up to 150 MeV/u with the fitting formula given in Ref. 16. For higher energies, this formula has been modified in order to scale to the stopping-power values for protons tabulated in Ref. 17. The fitted values for α particles are given on the first page of Table I.

USE OF TABLE

Conversion for Different Isotopes of the Projectile

The tabulated stopping powers for a given $^{A}_{Z_1}$ION are valid for all ions having the same Z_1 values. The tabulated ranges are valid only for the A and Z_1 values specified. Conversions of the range tables for ions of the same Z_1 but different mass number A' are obtained by multiplying the tabulated range value by the atomic mass ratio, A'/A. Thus,

$$S(^{A'}_{Z_1}\text{ION}) = S(^{A}_{Z_1}\text{ION})$$

$$R(^{A'}_{Z_1}\text{ION}) = R(^{A}_{Z_1}\text{ION}) \times A'/A.$$

Conversion for Different Isotopic Compositions of the Medium

For a given atomic number of the medium Z_2, the stopping-power and range tables are valid only for the average atomic mass $\langle M \rangle$ corresponding to the natural abundance of this medium. For a different isotopic composition $\langle M' \rangle$ stopping powers are obtained by multiplying the tabulated values by the ratio $\langle M \rangle / \langle M' \rangle$ and ranges are obtained by dividing the tabulated values by the same ratio:

$$S(^{\langle M' \rangle}_{Z_2}\text{medium}) = S(^{\langle M \rangle}_{Z_2}\text{medium}) \times \langle M \rangle / \langle M' \rangle$$

$$R(^{\langle M' \rangle}_{Z_2}\text{medium}) = R(^{\langle M \rangle}_{Z_2}\text{medium}) \times \langle M' \rangle / \langle M \rangle.$$

Conversion to Other Units

Table B gives the multiplication factor for converting the units of range from mg/cm^2 to μm and 10^{20} atoms/cm^2 and the units of stopping power from MeV/(mg/cm^2) to MeV/μm and MeV/(10^{20} atoms/cm^2).

Interpolation to Other Target Media

Values for target elements not listed here can best be obtained by interpolation in Z_2 using ranges in units of 10^{20} atoms/cm^2 and stopping powers in units of MeV/(10^{20} atoms/cm^2).

TABLE B

Atomic Weights, Densities and Multiplication Factors for Converting Tabulated Ranges and Stopping Powers to Different Depth Units

Stopping medium	Atomic[a] weight $\langle M \rangle$	Density[a] ρ (g/cm^3)	Factor for conversion of range to: μm (=10/ρ)	Factor for conversion of range to: 10^{20} atoms/cm^2 (=6.022/$\langle M \rangle$)	Factor for conversion of stopping power to: MeV/μm (=ρ/10)	Factor for conversion of stopping power to: MeV/(10^{20} atoms/cm^2) (=$\langle M \rangle$/6.022)
$_{4}$Be	9.012	1.848	5.411	0.6682	0.1848	1.497
$_{6}$C	12.01	2.267	4.411	0.5014	0.2267	1.994
$_{12}$Mg	24.31	1.738	5.754	0.2477	0.1738	4.037
$_{13}$Al	26.98	2.699	3.705	0.2232	0.2699	4.480
$_{14}$Si	28.09	2.330	4.292	0.2144	0.2330	4.665
$_{20}$Ca	40.08	1.550	6.452	0.1502	0.1550	6.656
$_{22}$Ti	47.88	4.540	2.203	0.1258	0.4540	7.951
$_{24}$Cr	52.00	7.190	1.391	0.1158	0.7190	8.635
$_{26}$Fe	55.85	7.874	1.270	0.1078	0.7874	9.274
$_{28}$Ni	58.69	8.902	1.123	0.1026	0.8902	9.746
$_{29}$Cu	63.55	8.960	1.116	0.09476	0.8960	10.55
$_{32}$Ge	72.59	5.323	1.879	0.08296	0.5323	12.05
$_{34}$Se	78.96	4.790	2.088	0.07627	0.4790	13.11
$_{38}$Sr	87.62	2.540	3.937	0.06873	0.2540	14.55
$_{40}$Zr	91.22	6.506	1.537	0.06602	0.6506	15.15
$_{42}$Mo	95.94	10.22	0.9785	0.06277	1.022	15.93
$_{45}$Rh	102.9	12.41	0.8058	0.05852	1.241	17.09
$_{47}$Ag	107.9	10.50	0.9524	0.05581	1.050	17.92
$_{50}$Sn	118.7	7.283	1.373	0.05073	0.7283	19.71
$_{52}$Te	127.6	6.240	1.603	0.04719	0.6240	21.19
$_{56}$Ba	137.3	3.500	2.857	0.04386	0.3500	22.80
$_{57}$La	138.9	6.175	1.619	0.04335	0.6175	23.07
$_{59}$Pr	140.9	6.773	1.476	0.04274	0.6773	23.40
$_{62}$Sm	150.4	7.520	1.330	0.04004	0.7520	24.98
$_{64}$Gd	157.2	7.900	1.266	0.03831	0.7900	26.10
$_{67}$Ho	164.9	8.795	1.137	0.03652	0.8795	27.38
$_{69}$Tm	168.9	9.321	1.074	0.03565	0.9321	28.05
$_{71}$Lu	175.0	9.840	1.016	0.03441	0.9840	29.06
$_{73}$Ta	180.9	16.65	0.6006	0.03329	1.665	30.04
$_{75}$Re	186.2	21.02	0.4757	0.03234	2.102	30.92
$_{77}$Ir	192.2	22.42	0.4460	0.03133	2.242	31.92
$_{79}$Au	197.0	19.30	0.5181	0.03057	1.930	32.71
$_{82}$Pb	207.2	11.35	0.8811	0.02906	1.135	34.41
$_{83}$Bi	209.0	9.747	1.026	0.02881	0.9747	34.71
$_{90}$Th	232.0	11.72	0.8532	0.02596	1.172	38.53
$_{92}$U	238.0	18.95	0.5277	0.02530	1.895	39.52

Note. The density values may depend on the physical state of the material.

[a] R. C. Weast (Ed.), *CRC Handbook of Chemistry and Physics* (CRC Press, Boca Raton, FL, 1986–1987), 67th ed., B5–B43.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{4}_{2}$HE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	0.4474	0.4775	0.3917	0.3779	0.3866	0.3660	0.3199	0.3085	0.3022	0.2973	0.2799	0.2661	0.2546	0.2502	0.2487	0.2408	0.2175	0.2274
3.0	0.3905	0.4177	0.3452	0.3331	0.3411	0.3236	0.2835	0.2740	0.2688	0.2651	0.2497	0.2377	0.2278	0.2239	0.2227	0.2159	0.1971	0.2043
3.5	0.3474	0.3722	0.3094	0.2987	0.3060	0.2909	0.2553	0.2471	0.2427	0.2399	0.2261	0.2154	0.2067	0.2033	0.2022	0.1963	0.1807	0.1859
4.0	0.3135	0.3364	0.2810	0.2713	0.2781	0.2647	0.2328	0.2256	0.2217	0.2195	0.2070	0.1973	0.1896	0.1866	0.1856	0.1803	0.1671	0.1710
4.5	0.2860	0.3073	0.2577	0.2489	0.2553	0.2433	0.2143	0.2079	0.2045	0.2027	0.1912	0.1824	0.1755	0.1727	0.1719	0.1671	0.1557	0.1586
5.0	0.2634	0.2833	0.2384	0.2303	0.2363	0.2255	0.1988	0.1930	0.1900	0.1886	0.1780	0.1698	0.1635	0.1610	0.1602	0.1559	0.1460	0.1481
5.5	0.2443	0.2630	0.2220	0.2145	0.2202	0.2103	0.1856	0.1803	0.1776	0.1765	0.1666	0.1590	0.1532	0.1509	0.1502	0.1463	0.1375	0.1391
6.0	0.2280	0.2456	0.2079	0.2009	0.2063	0.1972	0.1742	0.1694	0.1669	0.1660	0.1567	0.1497	0.1443	0.1422	0.1416	0.1379	0.1302	0.1312
6.5	0.2138	0.2306	0.1967	0.1891	0.1942	0.1858	0.1643	0.1599	0.1576	0.1569	0.1481	0.1415	0.1365	0.1345	0.1340	0.1306	0.1236	0.1243
7.0	0.2015	0.2174	0.1849	0.1787	0.1836	0.1758	0.1555	0.1514	0.1493	0.1488	0.1405	0.1343	0.1296	0.1277	0.1273	0.1241	0.1178	0.1182
8.0	0.1810	0.1955	0.1669	0.1613	0.1658	0.1590	0.1408	0.1373	0.1354	0.1351	0.1276	0.1220	0.1179	0.1163	0.1159	0.1131	0.1078	0.1078
9.0	0.1645	0.1779	0.1524	0.1473	0.1515	0.1454	0.1289	0.1258	0.1242	0.1240	0.1171	0.1121	0.1083	0.1069	0.1066	0.1041	0.0996	0.0993
10.0	0.1510	0.1634	0.1404	0.1357	0.1396	0.1342	0.1191	0.1162	0.1148	0.1147	0.1084	0.1038	0.1004	0.0991	0.0988	0.0966	0.0927	0.0922
11.0	0.1397	0.1513	0.1303	0.1260	0.1297	0.1247	0.1107	0.1082	0.1069	0.1069	0.1011	0.0968	0.0936	0.0925	0.0922	0.0902	0.0868	0.0861
12.0	0.1301	0.1410	0.1217	0.1177	0.1212	0.1166	0.1036	0.1013	0.1001	0.1002	0.0947	0.0907	0.0878	0.0868	0.0866	0.0847	0.0818	0.0809
15.0	0.1084	0.1176	0.1021	0.0988	0.1017	0.0981	0.0873	0.0854	0.0845	0.0847	0.0801	0.0768	0.0744	0.0736	0.0735	0.0720	0.0699	0.0689
20.0	0.0856	0.0931	0.0813	0.0787	0.0811	0.0784	0.0699	0.0685	0.0679	0.0681	0.0645	0.0619	0.0600	0.0594	0.0594	0.0582	0.0568	0.0558
25.0	0.0714	0.0777	0.0681	0.0660	0.0680	0.0659	0.0586	0.0577	0.0572	0.0576	0.0544	0.0522	0.0507	0.0503	0.0503	0.0494	0.0484	0.0474
30.0	0.0615	0.0670	0.0590	0.0571	0.0589	0.0571	0.0511	0.0501	0.0497	0.0500	0.0474	0.0455	0.0442	0.0439	0.0438	0.0431	0.0423	0.0414
35.0	0.0543	0.0592	0.0522	0.0506	0.0522	0.0507	0.0454	0.0446	0.0442	0.0445	0.0421	0.0405	0.0393	0.0391	0.0391	0.0384	0.0378	0.0370
40.0	.04877	.05320	.04706	.04561	.04707	.04572	.04094	.04023	.03994	.04020	.03810	.03661	.03556	.03536	.03537	.03483	.03430	.03353
45.0	.04439	.04844	.04294	.04162	.04296	.04176	.03742	.03678	.03653	.03678	.03486	.03351	.03256	.03239	.03241	.03193	.03147	.03076
50.0	.04062	.04457	.03958	.03837	.03960	.03852	.03453	.03396	.03374	.03398	.03221	.03097	.03009	.02995	.02998	.02954	.02914	.02848
55.0	.03786	.04136	.03678	.03566	.03681	.03583	.03213	.03161	.03141	.03166	.03000	.02885	.02804	.02792	.02795	.02755	.02719	.02658
60.0	.03537	.03864	.03442	.03337	.03445	.03354	.03010	.02961	.02943	.02966	.02813	.02705	.02629	.02619	.02622	.02586	.02553	.02496
65.0	.03323	.03632	.03238	.03140	.03242	.03158	.02835	.02789	.02773	.02796	.02651	.02550	.02478	.02470	.02473	.02440	.02410	.02356
70.0	.03137	.03430	.03062	.02970	.03066	.02988	.02682	.02640	.02626	.02647	.02511	.02415	.02348	.02340	.02343	.02313	.02285	.02234
80.0	.02832	.03097	.02771	.02688	.02775	.02706	.02431	.02393	.02381	.02401	.02278	.02192	.02130	.02125	.02128	.02102	.02077	.02032
90.0	.02589	.02834	.02539	.02463	.02543	.02482	.02230	.02197	.02186	.02206	.02092	.02014	.01957	.01953	.01956	.01933	.01911	.01870
100.0	.02393	.02620	.02351	.02281	.02355	.02299	.02067	.02036	.02027	.02046	.01941	.01868	.01816	.01813	.01816	.01795	.01774	.01738
150.0	.01781	.01953	.01763	.01711	.01766	.01727	.01555	.01533	.01527	.01544	.01465	.01411	.01372	.01371	.01374	.01360	.01344	.01320
200.0	.01459	.01617	.01462	.01417	.01463	.01432	.01288	.01265	.01269	.01285	.01218	.01200	.01160	.01137	.01141	.01126	.01138	.01098
250.0	.01273	.01413	.01280	.01240	.01269	.01255	.01129	.01097	.01114	.01128	.01069	.01053	.01019	.00999	.01003	.00986	.01001	.00967
300.0	.01147	.01273	.01156	.01120	.01146	.01134	.01020	.00982	.01007	.01020	.00968	.00953	.00922	.00904	.00908	.00894	.00906	.00876
350.0	.01056	.01172	.01066	.01033	.01057	.01046	.00942	.00907	.00930	.00942	.00894	.00879	.00851	.00836	.00840	.00826	.00837	.00810
400.0	.00987	.01096	.00997	.00966	.00990	.00979	.00882	.00851	.00871	.00883	.00838	.00824	.00797	.00783	.00787	.00775	.00785	.00760
450.0	.00933	.01036	.00944	.00914	.00937	.00927	.00835	.00806	.00825	.00836	.00794	.00780	.00756	.00743	.00746	.00735	.00744	.00721
500.0	.00890	.00989	.00901	.00873	.00895	.00885	.00798	.00771	.00788	.00799	.00759	.00745	.00722	.00710	.00713	.00702	.00712	.00689

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	0.2143	0.2052	0.2073	0.2092	0.2080	0.1971	0.1917	0.1818	0.1784	0.1742	0.1713	0.1689	0.1631	0.1614	0.1602	0.1607	0.1551	0.1535
3.0	0.1926	0.1848	0.1864	0.1881	0.1873	0.1779	0.1731	0.1648	0.1619	0.1583	0.1557	0.1537	0.1487	0.1471	0.1459	0.1464	0.1411	0.1397
3.5	0.1757	0.1685	0.1699	0.1714	0.1709	0.1626	0.1583	0.1511	0.1487	0.1454	0.1432	0.1413	0.1370	0.1355	0.1344	0.1348	0.1298	0.1285
4.0	0.1618	0.1552	0.1564	0.1577	0.1575	0.1501	0.1462	0.1398	0.1377	0.1348	0.1328	0.1311	0.1273	0.1259	0.1248	0.1252	0.1204	0.1192
4.5	0.1502	0.1441	0.1452	0.1464	0.1463	0.1396	0.1360	0.1303	0.1285	0.1258	0.1240	0.1225	0.1190	0.1177	0.1166	0.1170	0.1125	0.1114
5.0	0.1404	0.1347	0.1357	0.1368	0.1368	0.1306	0.1274	0.1222	0.1205	0.1182	0.1164	0.1151	0.1119	0.1107	0.1097	0.1100	0.1057	0.1046
5.5	0.1319	0.1266	0.1275	0.1286	0.1286	0.1229	0.1199	0.1152	0.1137	0.1115	0.1099	0.1086	0.1058	0.1046	0.1036	0.1039	0.0998	0.0988
6.0	0.1245	0.1195	0.1203	0.1213	0.1215	0.1162	0.1134	0.1090	0.1077	0.1056	0.1041	0.1030	0.1003	0.0993	0.0983	0.0986	0.0947	0.0937
6.5	0.1180	0.1133	0.1141	0.1150	0.1152	0.1103	0.1076	0.1036	0.1024	0.1005	0.0990	0.0980	0.0955	0.0945	0.0935	0.0938	0.0901	0.0891
7.0	0.1123	0.1078	0.1085	0.1094	0.1096	0.1050	0.1025	0.0988	0.0976	0.0958	0.0945	0.0935	0.0912	0.0903	0.0893	0.0896	0.0860	0.0851
8.0	0.1025	0.0985	0.0990	0.0998	0.1001	0.0960	0.0938	0.0905	0.0895	0.0879	0.0867	0.0858	0.0838	0.0830	0.0820	0.0823	0.0790	0.0782
9.0	0.0944	0.0908	0.0913	0.0920	0.0924	0.0886	0.0866	0.0837	0.0828	0.0814	0.0803	0.0795	0.0777	0.0769	0.0760	0.0763	0.0732	0.0724
10.0	0.0877	0.0843	0.0848	0.0855	0.0858	0.0824	0.0806	0.0779	0.0772	0.0759	0.0749	0.0741	0.0725	0.0718	0.0710	0.0712	0.0683	0.0676
11.0	0.0820	0.0789	0.0793	0.0799	0.0803	0.0771	0.0754	0.0730	0.0724	0.0712	0.0702	0.0696	0.0681	0.0674	0.0666	0.0668	0.0641	0.0634
12.0	0.0771	0.0742	0.0745	0.0751	0.0755	0.0726	0.0710	0.0688	0.0682	0.0671	0.0662	0.0656	0.0642	0.0636	0.0629	0.0630	0.0605	0.0598
15.0	.06570	.06321	.06351	.06402	.06442	.06200	.06069	.05893	.05844	.05754	.05682	.05631	.05518	.05472	.05403	.05417	.05195	.05144
20.0	.05330	.05131	.05155	.05196	.05235	.05045	.04942	.04809	.04774	.04704	.04647	.04609	.04522	.04488	.04429	.04440	.04258	.04217
25.0	.04527	.04358	.04378	.04413	.04450	.04293	.04208	.04101	.04074	.04016	.03969	.03937	.03866	.03841	.03788	.03798	.03642	.03607
30.0	.03960	.03813	.03830	.03861	.03896	.03761	.03688	.03598	.03576	.03527	.03486	.03460	.03399	.03379	.03331	.03340	.03203	.03173
35.0	.03536	.03406	.03421	.03448	.03482	.03362	.03298	.03221	.03202	.03160	.03124	.03100	.03048	.03031	.02987	.02995	.02873	.02846
40.0	.03206	.03089	.03103	.03127	.03159	.03052	.02994	.02926	.02910	.02873	.02840	.02819	.02773	.02759	.02718	.02725	.02615	.02591
45.0	.02942	.02834	.02847	.02870	.02900	.02803	.02750	.02690	.02675	.02641	.02612	.02593	.02551	.02539	.02501	.02508	.02407	.02385
50.0	.02725	.02625	.02637	.02658	.02687	.02597	.02550	.02494	.02482	.02451	.02424	.02407	.02368	.02358	.02322	.02329	.02235	.02214
55.0	.02543	.02450	.02461	.02481	.02509	.02425	.02381	.02331	.02319	.02291	.02266	.02250	.02215	.02206	.02172	.02178	.02090	.02071
60.0	.02388	.02301	.02312	.02330	.02357	.02279	.02238	.02191	.02181	.02154	.02131	.02116	.02083	.02075	.02044	.02049	.01967	.01949
65.0	.02254	.02173	.02182	.02200	.02226	.02153	.02114	.02071	.02061	.02037	.02014	.02001	.01970	.01963	.01933	.01938	.01860	.01844
70.0	.02138	.02061	.02070	.02087	.02111	.02042	.02006	.01966	.01957	.01934	.01913	.01900	.01871	.01865	.01836	.01841	.01767	.01752
80.0	.01945	.01874	.01883	.01898	.01921	.01859	.01826	.01791	.01783	.01762	.01743	.01732	.01706	.01701	.01674	.01679	.01612	.01598
90.0	.01790	.01725	.01733	.01747	.01769	.01712	.01683	.01650	.01643	.01625	.01607	.01597	.01574	.01569	.01545	.01549	.01487	.01474
100.0	.01663	.01603	.01611	.01624	.01645	.01592	.01565	.01536	.01529	.01512	.01496	.01486	.01465	.01461	.01438	.01442	.01385	.01373
150.0	.01264	.01218	.01224	.01234	.01251	.01212	.01192	.01171	.01167	.01155	.01143	.01136	.01120	.01117	.01100	.01103	.01060	.01051
200.0	.01052	.01016	.01016	.01024	.01039	.01007	.00991	.00975	.00972	.00962	.00952	.00947	.00934	.00932	.00917	.00920	.00908	.00879
250.0	.00926	.00894	.00894	.00901	.00915	.00889	.00879	.00861	.00856	.00846	.00836	.00833	.00817	.00804	.00807	.00801	.00776	
300.0	.00839	.00810	.00802	.00804	.00816	.00798	.00790	.00776	.00777	.00768	.00757	.00756	.00748	.00742	.00731	.00733	.00728	.00705
350.0	.00776	.00750	.00742	.00744	.00755	.00738	.00731	.00719	.00719	.00711	.00701	.00700	.00693	.00688	.00677	.00679	.00674	.00654
400.0	.00728	.00703	.00696	.00698	.00709	.00693	.00686	.00675	.00675	.00668	.00659	.00657	.00651	.00646	.00636	.00638	.00633	.00614
450.0	.00690	.00667	.00660	.00663	.00673	.00658	.00651	.00640	.00641	.00634	.00625	.00624	.00618	.00614	.00604	.00606	.00601	.00583
500.0	.00660	.00638	.00632	.00634	.00643	.00629	.00623	.00613	.00613	.00607	.00598	.00597	.00591	.00587	.00578	.00580	.00575	.00559

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^4_2$HE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	13.83	13.43	16.22	16.76	16.61	17.81	20.38	21.55	22.08	22.78	24.27	24.94	27.27	26.83	27.32	28.37	29.16	29.93
3.0	18.63	17.92	21.68	22.41	22.13	23.64	27.03	28.44	29.11	29.92	31.85	32.90	35.59	35.30	35.83	37.16	38.64	39.22
3.5	24.07	23.00	27.81	28.77	28.33	30.17	34.48	36.14	36.96	37.86	40.28	41.76	44.82	44.68	45.27	46.86	49.45	49.60
4.0	30.14	28.66	34.60	35.80	35.20	37.38	42.69	44.62	45.59	46.59	49.63	51.47	54.94	54.96	55.60	57.63	60.97	60.73
4.5	36.82	34.89	42.04	43.51	42.71	45.27	51.66	53.87	54.99	56.08	59.60	62.02	65.91	66.12	66.81	69.06	73.37	72.88
5.0	44.12	41.67	50.11	51.87	50.86	53.82	61.36	63.86	65.15	66.31	70.45	73.39	77.73	78.12	78.87	81.46	86.65	85.94
5.5	52.01	49.01	58.81	60.87	59.64	63.01	71.78	74.59	76.05	77.28	82.07	85.57	90.37	90.96	91.77	94.71	100.77	99.89
6.0	60.49	56.88	68.13	70.51	69.03	72.83	82.91	86.04	87.67	88.97	94.45	98.54	103.83	104.63	105.49	108.80	115.72	114.70
6.5	69.55	65.29	78.05	80.78	79.02	83.29	94.74	98.19	100.01	101.37	107.58	112.28	118.08	119.09	120.02	123.71	131.50	130.37
7.0	79.19	74.23	88.57	91.66	89.62	94.36	107.25	111.05	113.05	114.47	121.45	126.80	133.13	134.36	135.34	139.43	148.08	146.88
8.0	100.17	93.66	111.37	115.25	112.58	118.31	134.32	138.84	141.22	142.72	151.36	158.08	165.53	167.22	168.32	173.24	183.61	182.36
9.0	123.38	115.14	136.49	141.23	137.84	144.65	164.04	169.31	172.10	173.67	184.11	192.32	200.97	203.14	204.36	210.15	222.23	221.07
10.0	148.79	138.63	163.87	169.54	165.37	173.32	196.35	202.43	205.63	207.24	219.63	229.44	239.37	242.04	243.37	250.09	263.88	262.92
11.0	176.35	164.09	193.47	200.15	195.13	204.27	231.21	238.13	241.77	243.39	257.87	269.39	280.67	283.86	285.30	292.99	308.48	307.84
12.0	206.03	191.49	225.26	233.02	227.06	237.46	268.57	276.38	280.46	282.07	298.78	312.11	324.81	328.54	330.10	338.79	356.98	355.77
15.0	307.5	285.1	333.4	344.8	335.6	350.2	395.3	405.9	411.4	412.9	437.1	456.4	473.9	479.3	481.1	493.1	515.3	517.1
20.0	516.8	477.7	554.7	573.4	557.5	580.0	653.1	669.2	677.3	678.0	717.2	748.6	775.3	783.7	786.0	804.1	834.7	841.7
25.0	773.8	714.1	824.7	852.3	828.0	859.6	966.3	988.7	999.7	999.0	1056.3	1102.0	1139.5	1151.1	1153.7	1178.7	1217.7	1232.1
30.0	1076.7	992.2	1141.2	1179.1	1144.8	1186.6	1332.2	1361.6	1375.7	1373.2	1451.4	1513.4	1563.4	1578.2	1581.0	1613.5	1661.0	1684.7
35.0	1423.5	1310.5	1502.3	1551.8	1506.1	1559.1	1748.6	1785.6	1803.0	1798.1	1899.9	1980.4	2044.3	2062.4	2065.2	2105.7	2161.9	2196.6
40.0	1813.	1668.	1906.	1969.	1910.	1975.	2213.	2259.	2280.	2272.	2400.	2501.	2580.	2601.	2604.	2653.	2718.	2765.
45.0	2243.	2062.	2352.	2428.	2355.	2434.	2725.	2779.	2804.	2792.	2949.	3072.	3168.	3193.	3195.	3254.	3328.	3389.
50.0	2714.	2493.	2837.	2929.	2841.	2933.	3282.	3346.	3374.	3359.	3547.	3694.	3808.	3836.	3838.	3905.	3989.	4065.
55.0	3223.	2959.	3362.	3470.	3365.	3472.	3883.	3957.	3989.	3969.	4190.	4363.	4497.	4528.	4529.	4607.	4700.	4793.
60.0	3770.	3460.	3924.	4051.	3927.	4049.	4526.	4611.	4647.	4622.	4879.	5080.	5234.	5268.	5268.	5357.	5459.	5570.
65.0	4354.	3994.	4524.	4669.	4526.	4664.	5212.	5307.	5348.	5317.	5612.	5842.	6018.	6055.	6054.	6153.	6266.	6395.
70.0	4973.	4561.	5159.	5324.	5161.	5315.	5937.	6045.	6089.	6053.	6388.	6648.	6848.	6887.	6886.	6996.	7118.	7267.
80.0	6318.	5790.	6535.	6742.	6534.	6724.	7506.	7639.	7691.	7642.	8063.	8389.	8639.	8684.	8679.	8813.	8967.	9148.
90.0	7797.	7142.	8045.	8299.	8042.	8270.	9227.	9385.	9447.	9382.	9898.	10295.	10600.	10650.	10642.	10800.	10968.	11202.
100.0	9405.	8611.	9683.	9988.	9678.	9946.	11091.	11279.	11349.	11267.	11885.	12360.	12724.	12778.	12766.	12950.	13142.	13423.
150.0	19238.	17585.	19650.	20257.	19629.	20126.	22407.	22759.	22877.	22660.	23911.	24849.	25571.	25642.	25604.	25927.	26271.	26808.
200.0	31735.	28927.	32208.	33208.	32202.	32950.	36657.	37220.	37358.	36995.	39004.	40190.	41435.	41786.	41703.	42195.	42456.	43541.
250.0	46469.	42211.	46883.	48352.	47001.	47928.	53308.	54258.	54242.	53676.	56595.	58052.	59901.	60628.	60466.	61266.	61267.	63024.
300.0	63057.	57159.	63364.	65362.	63621.	64737.	71987.	73604.	73169.	72369.	76304.	78071.	80593.	81723.	81487.	82619.	82321.	84809.
350.0	81257.	73556.	81416.	83992.	81818.	83134.	92425.	94822.	93870.	92806.	97846.	99960.	103212.	104769.	104407.	105924.	105316.	108587.
400.0	100868.	91220.	100839.	104041.	101394.	102919.	114400.	117613.	116118.	114764.	120988.	123485.	127520.	129518.	129039.	130963.	130010.	134105.
450.0	121726.	110004.	121471.	125339.	122183.	123931.	137728.	141785.	139728.	138061.	145536.	148451.	153309.	155763.	155155.	157497.	156191.	161153.
500.0	143688.	129779.	143173.	147743.	144045.	146021.	162254.	167172.	164540.	162540.	171325.	174690.	180407.	183328.	182585.	185355.	183687.	189552.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	30.60	31.74	31.86	32.72	32.60	34.92	36.61	39.00	39.72	40.63	42.38	42.25	43.56	44.49	42.67	43.00	44.21	45.21
3.0	40.46	42.02	42.05	42.82	42.75	45.61	47.61	50.58	51.50	52.70	54.64	54.68	56.41	57.49	55.77	56.06	57.75	58.89
3.5	51.34	53.37	53.30	53.97	53.94	57.38	59.70	63.27	64.41	65.89	68.05	68.27	70.44	71.66	70.07	70.30	72.54	73.84
4.0	63.21	65.76	65.59	66.15	66.14	70.20	72.86	77.04	78.40	80.19	82.57	82.97	85.59	86.99	85.53	85.71	88.55	90.01
4.5	76.05	79.14	78.87	79.32	79.33	84.03	87.05	91.87	93.45	95.55	98.17	98.77	101.85	103.42	102.12	102.25	105.75	107.38
5.0	89.83	93.50	93.13	93.46	93.48	98.85	102.26	107.73	109.53	111.96	114.83	115.63	119.19	120.95	119.81	119.89	124.10	125.92
5.5	104.54	108.83	108.35	108.56	108.56	114.65	118.45	124.60	126.62	129.40	132.52	133.52	137.58	139.54	138.58	138.61	143.58	145.60
6.0	120.16	125.09	124.51	124.58	124.57	131.39	135.61	142.45	144.71	147.84	151.23	152.44	157.00	159.18	158.41	158.38	164.16	166.40
6.5	136.67	142.28	141.59	141.52	141.49	149.07	153.72	161.28	163.76	167.26	170.93	172.36	177.44	179.83	179.28	179.19	185.83	188.29
7.0	154.05	160.38	159.57	159.36	159.29	167.67	172.77	181.05	183.78	187.65	191.61	193.27	198.88	201.50	201.17	201.02	208.57	211.26
8.0	191.4	199.3	198.2	197.7	197.5	207.6	213.6	223.4	226.6	231.3	235.8	238.0	244.7	247.8	248.0	247.7	257.2	260.4
9.0	232.1	241.6	240.3	239.5	239.2	251.0	258.0	269.4	273.1	278.6	283.8	286.4	294.3	297.9	298.6	298.2	309.8	313.6
10.0	276.1	287.4	285.8	284.6	284.1	297.8	306.0	319.0	323.2	329.5	335.5	338.6	347.7	351.8	353.1	352.5	366.5	370.8
11.0	323.3	336.4	334.7	333.0	332.3	348.0	357.3	372.0	376.7	384.0	390.6	394.3	404.7	409.3	411.3	410.6	427.0	431.9
12.0	373.6	388.8	386.7	384.7	383.7	401.5	412.0	428.5	433.7	441.9	449.3	453.6	465.2	470.4	473.2	472.3	491.3	496.9
15.0	542.8	564.7	561.8	558.4	556.4	581.0	595.5	617.6	624.5	635.8	645.7	651.7	667.5	674.5	679.8	678.3	706.2	713.9
20.0	883.1	918.3	913.7	907.5	903.1	941.0	963.0	995.7	1005.5	1022.6	1037.3	1046.7	1070.4	1080.5	1091.2	1088.6	1134.0	1146.0
25.0	1291.9	1342.9	1336.4	1326.9	1319.1	1372.5	1403.4	1447.8	1460.8	1484.5	1504.8	1518.0	1550.5	1564.0	1581.3	1577.5	1643.8	1660.8
30.0	1765.6	1834.9	1826.1	1812.8	1800.8	1871.6	1912.5	1969.9	1986.2	2017.3	2043.8	2061.3	2103.7	2120.6	2145.9	2140.6	2230.8	2253.5
35.0	2301.2	2391.0	2379.7	2362.0	2344.9	2435.2	2487.1	2558.5	2578.4	2617.5	2651.1	2673.2	2726.2	2746.6	2781.1	2774.1	2891.2	2920.2
40.0	2896.	3009.	2995.	2972.	2949.	3060.	3124.	3211.	3235.	3282.	3323.	3351.	3415.	3439.	3484.	3475.	3622.	3658.
45.0	3548.	3685.	3668.	3640.	3610.	3745.	3822.	3925.	3952.	4009.	4059.	4091.	4168.	4196.	4252.	4241.	4420.	4463.
50.0	4255.	4419.	4399.	4365.	4328.	4487.	4578.	4698.	4729.	4790.	4854.	4892.	4982.	5014.	5082.	5069.	5283.	5334.
55.0	5016.	5208.	5184.	5145.	5098.	5285.	5390.	5528.	5563.	5641.	5708.	5753.	5856.	5891.	5974.	5958.	6209.	6269.
60.0	5828.	6051.	6023.	5977.	5922.	6136.	6257.	6413.	6453.	6541.	6619.	6670.	6788.	6827.	6923.	6905.	7196.	7265.
65.0	6690.	6946.	6914.	6861.	6795.	7039.	7177.	7352.	7397.	7497.	7585.	7642.	7776.	7818.	7930.	7909.	8243.	8320.
70.0	7602.	7892.	7856.	7795.	7718.	7993.	8149.	8344.	8394.	8505.	8604.	8668.	8818.	8864.	8993.	8969.	9346.	9434.
80.0	9666.	9930.	9885.	9808.	9708.	10049.	10242.	10479.	10539.	10675.	10798.	10877.	11060.	11113.	11278.	11248.	11720.	11828.
90.0	11713.	12157.	12102.	12007.	11880.	12294.	12526.	12809.	12878.	13042.	13190.	13285.	13504.	13565.	13768.	13731.	14306.	14437.
100.0	14033.	14564.	14498.	14384.	14227.	14719.	14993.	15324.	15404.	15596.	15772.	15883.	16141.	16209.	16454.	16410.	17096.	17251.
150.0	28015.	29066.	28936.	28705.	28359.	29314.	29836.	30437.	30576.	30930.	31269.	31478.	31956.	32067.	32562.	32471.	33824.	34120.
200.0	45495.	47187.	46994.	46616.	46018.	47541.	48362.	49276.	49480.	50026.	50565.	50890.	51629.	51795.	52597.	52445.	54161.	55086.
250.0	65843.	68256.	68180.	67630.	66722.	68897.	69996.	71286.	71499.	72290.	73117.	73526.	74528.	74832.	75991.	75765.	77687.	79391.
300.0	88593.	91811.	91996.	91339.	90077.	92832.	94170.	95886.	96082.	97149.	98345.	98797.	100076.	100568.	102140.	101825.	103931.	106487.
350.0	113420.	117515.	117977.	117231.	115586.	118932.	120533.	122705.	122879.	124244.	125838.	126338.	127913.	128602.	130620.	130210.	132525.	135989.
400.0	140062.	145096.	145846.	145006.	142948.	146926.	148807.	151459.	151608.	153288.	155304.	155856.	157741.	158638.	161131.	160621.	163166.	167586.
450.0	168297.	174325.	175367.	174432.	171934.	176578.	178759.	181912.	182031.	184044.	186500.	187109.	189315.	190429.	193422.	192808.	195808.	201025.
500.0	197939.	205010.	206358.	205317.	202365.	207692.	210191.	213858.	213947.	216310.	219221.	219893.	222427.	223766.	227280.	226561.	229638.	236080.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{7}_{3}$LI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	0.980	1.041	0.889	0.839	0.858	0.812	0.710	0.685	0.671	0.660	0.621	0.591	0.565	0.555	0.552	0.534	0.482	0.505
3.0	0.861	0.917	0.770	0.743	0.760	0.721	0.632	0.611	0.599	0.591	0.557	0.530	0.508	0.499	0.496	0.481	0.439	0.455
3.5	0.769	0.821	0.692	0.668	0.684	0.650	0.571	0.552	0.542	0.536	0.505	0.481	0.462	0.454	0.452	0.439	0.404	0.416
4.0	0.696	0.745	0.629	0.608	0.623	0.593	0.521	0.505	0.497	0.492	0.464	0.442	0.425	0.418	0.416	0.404	0.374	0.383
4.5	0.637	0.682	0.578	0.558	0.572	0.546	0.480	0.466	0.458	0.455	0.429	0.409	0.393	0.387	0.385	0.375	0.349	0.356
5.0	0.5874	0.6302	0.5349	0.5167	0.5302	0.5060	0.4460	0.4331	0.4263	0.4232	0.3993	0.3811	0.3669	0.3612	0.3595	0.3498	0.3276	0.3323
5.5	0.5456	0.5860	0.4985	0.4816	0.4943	0.4722	0.4167	0.4049	0.3988	0.3963	0.3740	0.3571	0.3440	0.3388	0.3374	0.3284	0.3088	0.3133
6.0	0.5097	0.5480	0.4670	0.4513	0.4634	0.4430	0.3913	0.3806	0.3749	0.3730	0.3521	0.3363	0.3242	0.3194	0.3181	0.3098	0.2924	0.2947
6.5	0.4786	0.5150	0.4397	0.4249	0.4364	0.4176	0.3691	0.3592	0.3541	0.3525	0.3326	0.3180	0.3067	0.3023	0.3011	0.2935	0.2778	0.2793
7.0	0.4513	0.4861	0.4156	0.4017	0.4127	0.3952	0.3496	0.3404	0.3356	0.3344	0.3158	0.3018	0.2913	0.2871	0.2861	0.2789	0.2648	0.2656
8.0	0.4057	0.4376	0.3752	0.3628	0.3729	0.3575	0.3167	0.3086	0.3045	0.3038	0.2870	0.2744	0.2650	0.2614	0.2605	0.2542	0.2425	0.2424
9.0	0.3691	0.3986	0.3426	0.3313	0.3407	0.3270	0.2899	0.2828	0.2792	0.2788	0.2635	0.2521	0.2436	0.2404	0.2397	0.2340	0.2241	0.2233
10.0	0.3390	0.3664	0.3157	0.3053	0.3141	0.3018	0.2678	0.2614	0.2582	0.2580	0.2439	0.2334	0.2257	0.2229	0.2222	0.2172	0.2086	0.2073
11.0	0.3138	0.3395	0.2931	0.2835	0.2917	0.2805	0.2491	0.2433	0.2404	0.2404	0.2273	0.2176	0.2108	0.2080	0.2075	0.2028	0.1964	0.1938
12.0	0.2924	0.3165	0.2737	0.2648	0.2726	0.2623	0.2331	0.2278	0.2252	0.2254	0.2131	0.2041	0.1975	0.1952	0.1947	0.1905	0.1839	0.1821
15.0	0.2437	0.2643	0.2296	0.2222	0.2288	0.2207	0.1965	0.1922	0.1902	0.1906	0.1803	0.1728	0.1674	0.1656	0.1653	0.1620	0.1572	0.1550
20.0	0.1926	0.2093	0.1829	0.1770	0.1825	0.1764	0.1573	0.1542	0.1527	0.1533	0.1451	0.1392	0.1350	0.1337	0.1336	0.1310	0.1279	0.1256
25.0	0.1605	0.1747	0.1533	0.1484	0.1530	0.1482	0.1324	0.1298	0.1287	0.1293	0.1224	0.1175	0.1141	0.1131	0.1131	0.1111	0.1088	0.1066
30.0	0.1384	0.1507	0.1327	0.1285	0.1326	0.1285	0.1149	0.1128	0.1119	0.1125	0.1066	0.1024	0.0994	0.0987	0.0987	0.0970	0.0952	0.0932
35.0	0.1222	0.1332	0.1176	0.1139	0.1175	0.1140	0.1021	0.1002	0.0995	0.1001	0.0948	0.0911	0.0885	0.0879	0.0879	0.0865	0.0851	0.0832
40.0	0.1097	0.1197	0.1059	0.1026	0.1059	0.1029	0.0921	0.0905	0.0899	0.0905	0.0857	0.0824	0.0800	0.0796	0.0796	0.0784	0.0772	0.0754
45.0	0.0999	0.1090	0.0966	0.0936	0.0967	0.0940	0.0842	0.0828	0.0822	0.0828	0.0784	0.0754	0.0733	0.0729	0.0729	0.0718	0.0708	0.0692
50.0	0.0918	0.1003	0.0891	0.0863	0.0891	0.0867	0.0777	0.0764	0.0759	0.0765	0.0725	0.0697	0.0677	0.0674	0.0675	0.0665	0.0656	0.0641
55.0	0.0852	0.0931	0.0828	0.0802	0.0828	0.0806	0.0723	0.0711	0.0707	0.0712	0.0675	0.0649	0.0631	0.0628	0.0629	0.0620	0.0612	0.0598
60.0	0.0796	0.0869	0.0774	0.0751	0.0775	0.0755	0.0677	0.0666	0.0662	0.0667	0.0633	0.0609	0.0591	0.0589	0.0590	0.0582	0.0574	0.0561
65.0	.07476	.08171	.07287	.07066	.07295	.07106	.06378	.06276	.06240	.06290	.05965	.05738	.05577	.05557	.05564	.05490	.05422	.05301
70.0	.07059	.07718	.06890	.06682	.06898	.06723	.06035	.05941	.05908	.05956	.05649	.05434	.05282	.05265	.05272	.05204	.05141	.05027
80.0	.06371	.06969	.06234	.06047	.06243	.06088	.05469	.05385	.05357	.05403	.05125	.04931	.04794	.04781	.04788	.04728	.04673	.04571
90.0	.05826	.06376	.05714	.05543	.05722	.05584	.05018	.04942	.04918	.04962	.04708	.04531	.04404	.04394	.04402	.04349	.04299	.04208
100.0	.05383	.05894	.05290	.05132	.05298	.05173	.04650	.04581	.04560	.04602	.04367	.04203	.04086	.04078	.04086	.04038	.03992	.03910
150.0	.04007	.04394	.03966	.03850	.03972	.03886	.03498	.03449	.03437	.03473	.03297	.03175	.03087	.03084	.03091	.03059	.03024	.02970
200.0	.03282	.03639	.03290	.03188	.03270	.03222	.02897	.02846	.02856	.02891	.02740	.02700	.02611	.02558	.02568	.02534	.02501	.02471
250.0	.02865	.03179	.02880	.02791	.02856	.02823	.02540	.02487	.02506	.02537	.02406	.02369	.02292	.02247	.02257	.02219	.02251	.02175
300.0	.02582	.02865	.02601	.02520	.02580	.02551	.02296	.02210	.02266	.02295	.02177	.02143	.02074	.02035	.02044	.02011	.02039	.01971
350.0	.02376	.02638	.02398	.02323	.02379	.02353	.02119	.02042	.02092	.02120	.02011	.01979	.01915	.01880	.01889	.01859	.01884	.01823
400.0	.02221	.02466	.02244	.02174	.02227	.02203	.01984	.01914	.01960	.01986	.01885	.01854	.01794	.01763	.01771	.01743	.01767	.01710
450.0	.02100	.02332	.02124	.02057	.02108	.02086	.01879	.01814	.01857	.01882	.01786	.01756	.01700	.01671	.01679	.01653	.01675	.01622
500.0	.02003	.02224	.02027	.01964	.02013	.01992	.01794	.01734	.01774	.01798	.01707	.01677	.01624	.01597	.01605	.01580	.01601	.01551

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	0.4754	0.4553	0.4599	0.4640	0.4615	0.4374	0.4252	0.4032	0.3957	0.3864	0.3799	0.3746	0.3619	0.3581	0.3553	0.3565	0.3440	0.3406
3.0	0.4297	0.4118	0.4155	0.4192	0.4176	0.3966	0.3859	0.3672	0.3609	0.3528	0.3471	0.3425	0.3315	0.3279	0.3253	0.3264	0.3145	0.3113
3.5	0.3928	0.3766	0.3798	0.3830	0.3820	0.3635	0.3539	0.3377	0.3323	0.3251	0.3200	0.3159	0.3063	0.3030	0.3004	0.3014	0.2901	0.2872
4.0	0.3623	0.3475	0.3503	0.3533	0.3527	0.3361	0.3274	0.3131	0.3084	0.3019	0.2973	0.2936	0.2851	0.2819	0.2794	0.2803	0.2697	0.2669
4.5	0.3368	0.3231	0.3256	0.3283	0.3280	0.3129	0.3050	0.2922	0.2880	0.2822	0.2779	0.2746	0.2669	0.2640	0.2616	0.2624	0.2523	0.2497
5.0	0.3150	0.3023	0.3044	0.3070	0.3070	0.2931	0.2859	0.2742	0.2705	0.2652	0.2613	0.2582	0.2512	0.2485	0.2461	0.2469	0.2373	0.2348
5.5	0.2961	0.2843	0.2862	0.2886	0.2888	0.2760	0.2693	0.2586	0.2553	0.2503	0.2467	0.2439	0.2375	0.2349	0.2326	0.2333	0.2242	0.2219
6.0	0.2797	0.2686	0.2703	0.2725	0.2729	0.2610	0.2547	0.2450	0.2419	0.2373	0.2339	0.2313	0.2254	0.2230	0.2208	0.2214	0.2126	0.2105
6.5	0.2652	0.2547	0.2563	0.2584	0.2589	0.2478	0.2419	0.2328	0.2300	0.2258	0.2226	0.2202	0.2146	0.2124	0.2102	0.2108	0.2024	0.2003
7.0	0.2523	0.2424	0.2439	0.2458	0.2464	0.2360	0.2304	0.2220	0.2194	0.2154	0.2124	0.2102	0.2050	0.2029	0.2007	0.2013	0.1933	0.1913
8.0	0.2304	0.2214	0.2227	0.2245	0.2252	0.2158	0.2109	0.2035	0.2013	0.1977	0.1950	0.1930	0.1884	0.1865	0.1845	0.1850	0.1776	0.1757
9.0	0.2124	0.2041	0.2053	0.2069	0.2077	0.1993	0.1948	0.1882	0.1863	0.1830	0.1806	0.1788	0.1747	0.1730	0.1710	0.1715	0.1645	0.1629
10.0	0.1973	0.1897	0.1907	0.1923	0.1931	0.1854	0.1812	0.1753	0.1736	0.1707	0.1684	0.1668	0.1631	0.1615	0.1596	0.1601	0.1536	0.1520
11.0	0.1845	0.1774	0.1783	0.1798	0.1806	0.1735	0.1697	0.1643	0.1628	0.1601	0.1580	0.1565	0.1531	0.1517	0.1499	0.1503	0.1442	0.1427
12.0	0.1736	0.1668	0.1677	0.1690	0.1699	0.1633	0.1597	0.1548	0.1534	0.1509	0.1490	0.1476	0.1444	0.1431	0.1414	0.1418	0.1360	0.1346
15.0	0.1478	0.1422	0.1429	0.1440	0.1449	0.1395	0.1365	0.1326	0.1315	0.1295	0.1278	0.1267	0.1241	0.1231	0.1216	0.1219	0.1169	0.1157
20.0	0.1199	0.1154	0.1160	0.1169	0.1178	0.1135	0.1112	0.1082	0.1074	0.1058	0.1046	0.1037	0.1017	0.1010	0.0996	0.0999	0.0958	0.0949
25.0	0.1019	0.0981	0.0985	0.0993	0.1001	0.0966	0.0947	0.0923	0.0917	0.0904	0.0893	0.0886	0.0870	0.0864	0.0852	0.0854	0.0820	0.0812
30.0	0.0891	0.0858	0.0862	0.0869	0.0877	0.0846	0.0830	0.0810	0.0805	0.0794	0.0784	0.0778	0.0765	0.0760	0.0749	0.0751	0.0721	0.0714
35.0	0.0796	0.0766	0.0770	0.0776	0.0783	0.0757	0.0742	0.0725	0.0720	0.0711	0.0703	0.0698	0.0686	0.0682	0.0672	0.0674	0.0646	0.0640
40.0	.07214	.06950	.06981	.07036	.07108	.06867	.06737	.06584	.06548	.06463	.06390	.06344	.06239	.06208	.06116	.06132	.05883	.05829
45.0	.06619	.06377	.06406	.06467	.06525	.06306	.06189	.06051	.06019	.05943	.05877	.05835	.05740	.05713	.05628	.05643	.05415	.05365
50.0	.06131	.05907	.05934	.05981	.06046	.05844	.05737	.05613	.05584	.05515	.05453	.05415	.05328	.05306	.05225	.05239	.05028	.04982
55.0	.05721	.05513	.05538	.05582	.05644	.05457	.05358	.05244	.05218	.05155	.05098	.05062	.04983	.04963	.04887	.04900	.04703	.04661
60.0	.05373	.05178	.05201	.05243	.05302	.05128	.05035	.04930	.04907	.04848	.04794	.04762	.04688	.04670	.04598	.04611	.04425	.04386
65.0	.05072	.04889	.04911	.04950	.05007	.04843	.04757	.04659	.04637	.04582	.04532	.04502	.04433	.04417	.04349	.04361	.04186	.04149
70.0	.04811	.04636	.04657	.04695	.04750	.04595	.04514	.04423	.04402	.04351	.04304	.04275	.04210	.04195	.04130	.04142	.03976	.03941
80.0	.04375	.04217	.04236	.04270	.04323	.04183	.04109	.04029	.04011	.03965	.03922	.03896	.03838	.03826	.03767	.03777	.03626	.03595
90.0	.04027	.03882	.03900	.03931	.03981	.03852	.03786	.03713	.03697	.03656	.03617	.03593	.03541	.03530	.03475	.03485	.03346	.03317
100.0	.03743	.03608	.03624	.03653	.03700	.03582	.03521	.03454	.03440	.03402	.03366	.03345	.03296	.03287	.03236	.03245	.03116	.03089
150.0	.02843	.02741	.02753	.02776	.02814	.02726	.02681	.02635	.02626	.02599	.02571	.02556	.02521	.02514	.02475	.02483	.02384	.02364
200.0	.02366	.02286	.02295	.02304	.02338	.02265	.02229	.02193	.02186	.02165	.02142	.02130	.02102	.02096	.02064	.02071	.02044	.01977
250.0	.02062	.02011	.01989	.02006	.02036	.01979	.01969	.01935	.01926	.01904	.01876	.01873	.01852	.01839	.01810	.01816	.01803	.01746
300.0	.01888	.01823	.01804	.01810	.01837	.01795	.01777	.01747	.01748	.01729	.01704	.01701	.01682	.01670	.01644	.01650	.01638	.01587
350.0	.01746	.01686	.01669	.01674	.01700	.01661	.01645	.01617	.01618	.01601	.01578	.01576	.01558	.01547	.01523	.01528	.01517	.01471
400.0	.01638	.01582	.01566	.01571	.01595	.01559	.01544	.01518	.01520	.01503	.01482	.01479	.01464	.01454	.01431	.01436	.01425	.01382
450.0	.01553	.01501	.01486	.01491	.01513	.01480	.01465	.01441	.01442	.01427	.01407	.01404	.01390	.01381	.01359	.01364	.01353	.01313
500.0	.01486	.01435	.01421	.01426	.01448	.01416	.01401	.01379	.01380	.01365	.01346	.01344	.01331	.01322	.01301	.01305	.01295	.01257

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{7}_{3}$LI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	10.73	10.18	14.09	13.99	13.66	15.89	17.18	18.10	18.78	19.43	19.79	20.92	21.59	22.70	23.18	23.64	24.38	24.98
3.0	14.55	13.77	18.36	18.43	18.00	20.46	22.42	23.52	24.31	25.05	25.75	27.19	28.14	29.36	29.88	30.55	31.99	32.29
3.5	18.86	17.81	23.19	23.41	22.86	25.59	28.25	29.56	30.46	31.27	32.36	34.13	35.37	36.72	37.28	38.18	40.31	40.35
4.0	23.65	22.29	28.50	28.91	28.23	31.24	34.68	36.19	37.21	38.10	39.60	41.72	43.28	44.76	45.36	46.50	49.32	49.13
4.5	28.91	27.21	34.31	34.93	34.10	37.40	41.68	43.41	44.55	45.51	47.45	49.96	51.85	53.47	54.11	55.51	59.01	58.62
5.0	34.64	32.55	40.61	41.45	40.46	44.06	49.24	51.21	52.48	53.49	55.92	58.83	61.07	62.84	63.52	65.18	69.36	68.81
5.5	40.82	38.31	47.39	48.48	47.30	51.23	57.37	59.57	60.97	62.05	64.98	68.33	70.93	72.85	73.58	75.51	80.37	79.68
6.0	47.47	44.49	54.65	55.99	54.62	58.89	66.04	68.49	70.03	71.15	74.63	78.43	81.41	83.49	84.27	86.49	92.02	91.23
6.5	54.56	51.08	62.38	63.98	62.40	67.03	75.25	77.96	79.64	80.81	84.86	89.14	92.52	94.76	95.58	98.10	104.31	103.43
7.0	62.09	58.08	70.57	72.46	70.65	75.65	85.00	87.97	89.80	91.01	95.66	100.44	104.23	106.65	107.51	110.34	117.22	116.28
8.0	78.47	73.28	88.32	90.82	88.53	94.30	106.07	109.60	111.72	113.00	118.94	124.80	129.46	132.23	133.19	136.66	144.88	143.91
9.0	96.59	90.07	107.87	111.04	108.19	114.79	129.20	133.32	135.75	137.08	144.43	151.44	157.03	160.18	161.23	165.39	174.93	174.03
10.0	116.39	108.40	129.17	133.07	129.61	137.10	154.34	159.09	161.85	163.21	172.07	180.32	186.91	190.45	191.59	196.46	207.34	206.59
11.0	137.87	128.26	152.20	156.89	152.76	161.18	181.46	186.87	189.96	191.33	201.82	211.40	219.04	222.98	224.21	229.84	242.04	241.53
12.0	161.00	149.63	176.93	182.45	177.60	187.00	210.53	216.62	220.06	221.42	233.64	244.64	253.38	257.74	259.06	265.46	278.99	278.82
15.0	240.0	222.6	261.1	269.4	262.1	274.7	309.1	317.4	321.9	323.2	341.2	356.9	369.3	375.0	376.6	386.5	403.0	404.3
20.0	402.9	372.6	433.2	447.2	434.6	453.4	509.6	522.2	528.8	529.4	559.1	584.2	603.8	611.8	613.7	627.4	651.4	656.8
25.0	602.9	556.5	643.2	664.1	645.0	670.9	753.2	770.7	779.5	779.1	822.9	859.0	887.1	897.5	899.7	918.7	949.3	960.4
30.0	838.5	772.9	889.4	918.3	891.5	925.3	1037.8	1060.7	1072.0	1070.1	1130.1	1179.0	1216.8	1229.7	1232.0	1256.9	1294.0	1312.5
35.0	1108.3	1020.5	1170.2	1208.2	1172.4	1215.0	1361.7	1390.5	1404.3	1400.6	1479.0	1542.2	1590.8	1606.3	1608.6	1639.8	1683.6	1710.6
40.0	1411.	1298.	1484.	1532.	1487.	1539.	1723.	1759.	1775.	1769.	1868.	1947.	2007.	2025.	2028.	2066.	2116.	2153.
45.0	1746.	1606.	1831.	1890.	1833.	1895.	2121.	2163.	2183.	2174.	2295.	2391.	2465.	2486.	2488.	2533.	2590.	2638.
50.0	2112.	1940.	2209.	2280.	2211.	2283.	2554.	2604.	2626.	2614.	2760.	2875.	2963.	2986.	2987.	3040.	3104.	3164.
55.0	2508.	2303.	2617.	2701.	2618.	2702.	3022.	3079.	3104.	3089.	3260.	3396.	3499.	3524.	3525.	3585.	3657.	3730.
60.0	2933.	2692.	3054.	3152.	3055.	3151.	3522.	3588.	3616.	3597.	3796.	3953.	4072.	4100.	4100.	4168.	4248.	4334.
65.0	3387.	3108.	3520.	3633.	3521.	3630.	4055.	4130.	4161.	4138.	4366.	4545.	4682.	4712.	4711.	4788.	4875.	4976.
70.0	3869.	3549.	4015.	4142.	4015.	4136.	4620.	4703.	4738.	4710.	4970.	5172.	5327.	5359.	5358.	5443.	5539.	5655.
80.0	4915.	4505.	5084.	5245.	5083.	5232.	5840.	5943.	5984.	5946.	6273.	6527.	6720.	6756.	6753.	6856.	6969.	7117.
90.0	6065.	5556.	6259.	6456.	6256.	6434.	7178.	7301.	7350.	7299.	7699.	8009.	8246.	8286.	8280.	8402.	8533.	8715.
100.0	7317.	6699.	7533.	7770.	7529.	7738.	8628.	8774.	8829.	8765.	9245.	9615.	9897.	9941.	9932.	10074.	10224.	10443.
150.0	14964.	13678.	15285.	15757.	15268.	15656.	17429.	17703.	17795.	17642.	18599.	19329.	19890.	19946.	19916.	20168.	20435.	20853.
200.0	24684.	22600.	25053.	25830.	25047.	25630.	28513.	28951.	29058.	28776.	30337.	31261.	32228.	32503.	32438.	32821.	33024.	33868.
250.0	36144.	32832.	36466.	37608.	36557.	37279.	41463.	42210.	42190.	41750.	44020.	45153.	46590.	47157.	47031.	47653.	47854.	49021.
300.0	49046.	44459.	49285.	50839.	49484.	50353.	55992.	57249.	56912.	56289.	59349.	60723.	62684.	63565.	63366.	64261.	64030.	65965.
350.0	63201.	57211.	63325.	65329.	63638.	64662.	71887.	73752.	73012.	72184.	76104.	77748.	80277.	81490.	81208.	82388.	81915.	84459.
400.0	78454.	70951.	78432.	80922.	78863.	80052.	88979.	91479.	90316.	89263.	94103.	96046.	99183.	100738.	100366.	101862.	101121.	104306.
450.0	94677.	85580.	94471.	97487.	95032.	96384.	107124.	110279.	108669.	107373.	113196.	115464.	119241.	121151.	120679.	122499.	121484.	125343.
500.0	111758.	100940.	111358.	114913.	112036.	113575.	126200.	130025.	127978.	126422.	133254.	135872.	140317.	142591.	142013.	144167.	142869.	147432.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	26.12	27.00	28.93	29.43	30.41	31.82	32.68	33.80	34.49	35.17	35.87	36.62	37.37	38.04	38.89	39.19	41.82	42.66
3.0	33.87	35.10	36.95	37.37	38.40	40.24	41.33	42.91	43.76	44.66	45.52	46.40	47.48	48.27	49.20	49.47	52.48	53.42
3.5	42.40	43.99	45.77	46.12	47.17	49.47	50.81	52.86	53.88	55.00	56.03	57.06	58.48	59.38	60.41	60.64	64.08	65.14
4.0	51.69	53.68	55.38	55.64	56.71	59.49	61.10	63.63	64.82	66.18	67.39	68.56	70.33	71.36	72.50	72.69	76.60	77.79
4.5	61.72	64.13	65.75	65.93	67.01	70.29	72.19	75.21	76.57	78.18	79.57	80.89	83.03	84.20	85.45	85.60	90.03	91.36
5.0	72.47	75.34	76.88	76.96	78.05	81.86	84.05	87.59	89.12	90.99	92.57	94.04	96.55	97.87	99.25	99.36	104.34	105.82
5.5	83.94	87.28	88.74	88.73	89.81	94.17	96.67	100.73	102.45	104.58	106.36	107.99	110.89	112.37	113.89	113.95	119.53	121.16
6.0	96.11	99.96	101.33	101.22	102.28	107.21	110.04	114.64	116.54	118.94	120.94	122.73	126.02	127.66	129.34	129.36	135.56	137.36
6.5	108.96	113.35	114.63	114.41	115.46	120.98	124.16	129.31	131.38	134.07	136.28	138.25	141.94	143.75	145.59	145.67	152.44	154.42
7.0	122.60	127.44	128.64	128.30	129.32	135.46	138.98	144.71	146.96	149.95	152.38	154.53	158.63	160.62	162.64	162.66	170.14	172.30
8.0	151.6	157.7	158.7	158.1	159.1	166.5	170.8	177.7	180.3	183.9	186.8	189.3	194.3	196.6	199.1	198.9	208.0	210.5
9.0	183.2	190.7	191.5	190.6	191.5	200.3	205.3	213.5	216.5	220.7	224.2	227.0	232.9	235.7	238.5	238.2	249.0	251.9
10.0	217.5	226.3	226.9	225.8	226.5	236.8	242.6	252.0	256.5	260.4	264.3	267.6	274.4	277.6	280.9	280.5	293.0	296.5
11.0	254.2	264.4	264.9	263.5	264.0	275.8	282.6	293.3	297.1	302.7	307.3	311.0	318.8	322.3	326.2	325.6	340.1	344.0
12.0	293.3	305.2	305.4	303.6	303.9	317.4	325.1	337.2	341.4	347.8	352.9	357.1	365.9	369.9	374.3	373.6	390.1	394.5
15.0	425.0	442.0	441.6	438.7	438.3	457.1	467.8	484.3	489.8	498.6	505.6	511.2	523.2	528.6	535.0	533.9	557.3	563.4
20.0	689.6	717.0	715.2	710.3	707.9	737.0	753.7	778.4	786.2	799.5	810.2	818.4	836.6	844.4	855.0	853.0	890.0	899.5
25.0	1007.6	1047.3	1044.0	1036.5	1031.5	1072.6	1096.2	1130.1	1140.3	1158.7	1173.8	1185.0	1210.0	1220.5	1236.2	1233.3	1286.5	1299.8
30.0	1376.0	1429.9	1424.9	1414.4	1406.1	1460.9	1492.2	1536.1	1549.0	1573.1	1593.1	1607.6	1640.2	1653.3	1675.3	1671.2	1743.1	1760.8
35.0	1792.6	1862.4	1855.5	1841.6	1829.3	1899.2	1939.1	1994.0	2009.6	2039.9	2065.4	2083.5	2124.5	2140.3	2169.4	2164.0	2256.8	2279.4
40.0	2255.	2343.	2334.	2316.	2299.	2386.	2435.	2501.	2520.	2557.	2588.	2610.	2660.	2679.	2716.	2709.	2825.	2853.
45.0	2762.	2869.	2858.	2835.	2814.	2918.	2978.	3057.	3078.	3122.	3160.	3186.	3246.	3267.	3313.	3305.	3446.	3480.
50.0	3312.	3440.	3426.	3400.	3371.	3495.	3565.	3658.	3682.	3734.	3779.	3810.	3879.	3904.	3959.	3949.	4117.	4157.
55.0	3904.	4054.	4037.	4006.	3971.	4115.	4197.	4303.	4331.	4391.	4443.	4479.	4559.	4586.	4652.	4640.	4838.	4884.
60.0	4535.	4709.	4690.	4653.	4611.	4777.	4872.	4992.	5023.	5092.	5152.	5192.	5284.	5314.	5391.	5377.	5605.	5659.
65.0	5206.	5405.	5382.	5341.	5291.	5480.	5587.	5723.	5757.	5835.	5903.	5948.	6052.	6085.	6174.	6158.	6419.	6479.
70.0	5915.	6141.	6115.	6067.	6009.	6222.	6343.	6494.	6532.	6619.	6696.	6746.	6863.	6898.	7000.	6982.	7277.	7345.
80.0	7443.	7726.	7693.	7633.	7556.	7821.	7970.	8155.	8201.	8307.	8402.	8464.	8606.	8648.	8778.	8754.	9123.	9208.
90.0	9113.	9458.	9417.	9343.	9245.	9567.	9747.	9967.	10021.	10148.	10263.	10337.	10507.	10555.	10715.	10688.	11135.	11237.
100.0	10917.	11330.	11281.	11192.	11071.	11453.	11666.	11923.	11985.	12134.	12271.	12358.	12558.	12611.	12804.	12769.	13305.	13426.
150.0	21792.	22610.	22511.	22331.	22063.	22805.	23210.	23677.	23785.	24061.	24324.	24487.	24859.	24945.	25333.	25262.	26315.	26546.
200.0	36388.	36704.	36555.	36292.	35797.	36981.	37620.	38330.	38489.	38913.	39332.	39585.	40160.	40289.	40915.	40797.	42133.	42853.
250.0	51214.	51091.	51034.	52606.	51900.	53592.	54446.	55449.	55614.	56229.	56872.	57191.	57970.	58207.	59111.	58935.	60431.	61757.
300.0	66903.	71411.	71557.	71046.	70066.	72206.	73246.	74582.	74734.	75564.	76494.	76846.	77841.	78224.	79448.	79204.	80444.	82831.
350.0	88219.	91404.	91764.	91184.	89906.	92508.	93753.	96441.	95577.	96638.	97878.	98267.	99492.	100028.	101600.	101281.	103083.	105778.
400.0	108940.	112856.	113440.	112785.	111187.	114281.	115744.	117805.	117921.	119228.	120795.	121225.	122691.	123387.	125330.	124934.	126915.	130355.
450.0	130900.	135589.	136402.	135674.	133732.	137343.	139040.	141491.	141584.	143150.	145059.	145534.	147249.	148115.	150446.	149968.	152148.	156361.
500.0	153956.	159455.	160505.	159695.	157393.	161544.	163487.	166339.	166408.	168245.	170609.	171033.	173003.	174045.	176780.	176220.	178616.	183626.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{9}_{4}$BE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	1.701	1.803	1.515	1.461	1.495	1.414	1.236	1.191	1.167	1.148	1.080	1.027	0.982	0.965	0.959	0.929	0.839	0.877
3.0	1.502	1.596	1.348	1.300	1.331	1.263	1.106	1.069	1.048	1.034	0.974	0.927	0.888	0.873	0.868	0.842	0.768	0.796
3.5	1.346	1.434	1.215	1.173	1.202	1.142	1.003	0.970	0.953	0.942	0.888	0.845	0.811	0.798	0.794	0.770	0.709	0.730
4.0	1.222	1.304	1.108	1.070	1.097	1.044	0.918	0.890	0.874	0.866	0.816	0.778	0.748	0.735	0.732	0.711	0.659	0.674
4.5	1.120	1.197	1.020	0.985	1.010	0.963	0.848	0.822	0.809	0.802	0.756	0.721	0.694	0.683	0.680	0.661	0.616	0.627
5.0	1.034	1.107	0.945	0.913	0.937	0.894	0.788	0.765	0.753	0.748	0.706	0.673	0.648	0.638	0.636	0.618	0.579	0.587
5.5	0.962	1.031	0.882	0.852	0.874	0.835	0.737	0.716	0.705	0.701	0.662	0.632	0.609	0.599	0.597	0.581	0.546	0.552
6.0	0.899	0.965	0.827	0.799	0.820	0.784	0.693	0.674	0.664	0.660	0.623	0.595	0.574	0.565	0.563	0.548	0.518	0.522
6.5	0.845	0.908	0.779	0.753	0.773	0.740	0.654	0.636	0.627	0.624	0.590	0.563	0.543	0.536	0.533	0.520	0.492	0.495
7.0	0.798	0.858	0.737	0.712	0.732	0.701	0.620	0.603	0.595	0.593	0.560	0.535	0.516	0.509	0.507	0.494	0.469	0.471
8.0	0.7179	0.7733	0.6657	0.6436	0.6615	0.6342	0.5618	0.5475	0.5402	0.5389	0.5091	0.4868	0.4702	0.4638	0.4622	0.4510	0.4302	0.4299
9.0	0.6537	0.7050	0.6082	0.5881	0.6047	0.5804	0.5147	0.5020	0.4956	0.4949	0.4678	0.4474	0.4324	0.4267	0.4254	0.4154	0.3977	0.3963
10.0	0.6007	0.6486	0.5606	0.5421	0.5577	0.5358	0.4755	0.4642	0.4585	0.4582	0.4331	0.4145	0.4008	0.3958	0.3948	0.3856	0.3704	0.3682
11.0	0.5564	0.6013	0.5205	0.5035	0.5180	0.4982	0.4425	0.4322	0.4271	0.4271	0.4038	0.3866	0.3740	0.3695	0.3685	0.3603	0.3470	0.3442
12.0	0.5186	0.5609	0.4863	0.4704	0.4842	0.4660	0.4142	0.4047	0.4001	0.4004	0.3786	0.3626	0.3509	0.3468	0.3460	0.3384	0.3267	0.3235
15.0	0.4326	0.4688	0.4081	0.3949	0.4067	0.3922	0.3491	0.3416	0.3380	0.3387	0.3204	0.3071	0.2975	0.2944	0.2938	0.2878	0.2793	0.2755
20.0	0.3421	0.3716	0.3251	0.3147	0.3243	0.3135	0.2796	0.2740	0.2715	0.2724	0.2579	0.2474	0.2399	0.2377	0.2374	0.2329	0.2274	0.2233
25.0	0.2852	0.3102	0.2724	0.2638	0.2721	0.2634	0.2353	0.2308	0.2288	0.2299	0.2177	0.2089	0.2028	0.2011	0.2010	0.1974	0.1934	0.1895
30.0	0.2459	0.2678	0.2359	0.2285	0.2357	0.2285	0.2043	0.2006	0.1990	0.2001	0.1895	0.1820	0.1767	0.1754	0.1754	0.1724	0.1693	0.1657
35.0	0.2171	0.2366	0.2090	0.2025	0.2089	0.2027	0.1814	0.1782	0.1769	0.1779	0.1686	0.1620	0.1573	0.1563	0.1563	0.1538	0.1513	0.1479
40.0	0.1950	0.2127	0.1883	0.1824	0.1883	0.1829	0.1638	0.1609	0.1598	0.1608	0.1524	0.1464	0.1422	0.1414	0.1415	0.1393	0.1372	0.1341
45.0	0.1775	0.1937	0.1718	0.1665	0.1718	0.1670	0.1497	0.1471	0.1461	0.1471	0.1395	0.1340	0.1302	0.1296	0.1296	0.1277	0.1259	0.1230
50.0	0.1633	0.1782	0.1583	0.1535	0.1584	0.1541	0.1381	0.1358	0.1350	0.1359	0.1289	0.1239	0.1204	0.1198	0.1199	0.1182	0.1166	0.1139
55.0	0.1514	0.1654	0.1471	0.1426	0.1473	0.1433	0.1285	0.1264	0.1256	0.1266	0.1200	0.1154	0.1121	0.1117	0.1118	0.1102	0.1088	0.1063
60.0	0.1416	0.1545	0.1377	0.1335	0.1378	0.1342	0.1204	0.1184	0.1177	0.1187	0.1125	0.1082	0.1052	0.1047	0.1049	0.1034	0.1021	0.0998
65.0	0.1329	0.1453	0.1295	0.1256	0.1297	0.1263	0.1134	0.1116	0.1109	0.1118	0.1060	0.1020	0.0991	0.0988	0.0989	0.0976	0.0964	0.0942
70.0	0.1255	0.1372	0.1225	0.1188	0.1226	0.1195	0.1073	0.1056	0.1050	0.1059	0.1004	0.0966	0.0939	0.0936	0.0937	0.0925	0.0914	0.0894
80.0	0.1133	0.1239	0.1108	0.1076	0.1110	0.1082	0.0972	0.0957	0.0952	0.0961	0.0911	0.0877	0.0852	0.0850	0.0851	0.0841	0.0831	0.0813
90.0	0.1036	0.1134	0.1016	0.0985	0.1017	0.0993	0.0892	0.0879	0.0874	0.0882	0.0837	0.0805	0.0783	0.0781	0.0783	0.0773	0.0764	0.0748
100.0	0.0957	0.1048	0.0940	0.0912	0.0942	0.0920	0.0827	0.0814	0.0811	0.0818	0.0776	0.0747	0.0726	0.0725	0.0726	0.0718	0.0710	0.0695
150.0	.07124	.07812	.07051	.06844	.07062	.06908	.06219	.06132	.06109	.06175	.05861	.05645	.05488	.05483	.05495	.05439	.05376	.05280
200.0	.05835	.06470	.05849	.05668	.05812	.05728	.05151	.05060	.05078	.05139	.04872	.04799	.04642	.04547	.04565	.04506	.04453	.04394
250.0	.05094	.05651	.05121	.04962	.05077	.05019	.04516	.04387	.04455	.04510	.04277	.04212	.04075	.03995	.04012	.03946	.04002	.03866
300.0	.04590	.05094	.04624	.04480	.04586	.04535	.04082	.03930	.04029	.04081	.03871	.03810	.03686	.03617	.03634	.03575	.03625	.03504
350.0	.04225	.04690	.04263	.04130	.04229	.04184	.03767	.03630	.03720	.03768	.03575	.03518	.03404	.03342	.03358	.03304	.03360	.03241
400.0	.03949	.04384	.03989	.03865	.03959	.03917	.03527	.03403	.03485	.03531	.03351	.03295	.03190	.03134	.03149	.03099	.03141	.03040
450.0	.03733	.04145	.03776	.03657	.03748	.03708	.03340	.03225	.03301	.03346	.03175	.03122	.03022	.02970	.02985	.02938	.02978	.02883
500.0	.03560	.03954	.03604	.03491	.03578	.03541	.03190	.03083	.03154	.03197	.03035	.02982	.02888	.02840	.02854	.02810	.02847	.02757

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	0.8263	0.7914	0.7991	0.8063	0.8019	0.7599	0.7387	0.7006	0.6874	0.6712	0.6599	0.6506	0.6285	0.6219	0.6170	0.6192	0.5973	0.5914
3.0	0.7512	0.7199	0.7264	0.7328	0.7299	0.6932	0.6745	0.6418	0.6308	0.6165	0.6066	0.5985	0.5793	0.5731	0.5683	0.5703	0.5495	0.5439
3.5	0.6894	0.6610	0.6665	0.6723	0.6705	0.6379	0.6211	0.5926	0.5831	0.5705	0.5615	0.5543	0.5375	0.5316	0.5270	0.5288	0.5090	0.5038
4.0	0.6378	0.6117	0.6165	0.6218	0.6208	0.5915	0.5762	0.5510	0.5427	0.5313	0.5232	0.5167	0.5016	0.4962	0.4917	0.4933	0.4745	0.4697
4.5	0.5940	0.5699	0.5741	0.5790	0.5786	0.5519	0.5380	0.5153	0.5080	0.4976	0.4902	0.4843	0.4707	0.4656	0.4612	0.4627	0.4448	0.4403
5.0	0.5564	0.5340	0.5377	0.5422	0.5423	0.5178	0.5050	0.4844	0.4778	0.4684	0.4615	0.4561	0.4437	0.4389	0.4347	0.4360	0.4190	0.4148
5.5	0.5237	0.5028	0.5062	0.5104	0.5107	0.4881	0.4762	0.4574	0.4515	0.4427	0.4363	0.4314	0.4200	0.4155	0.4114	0.4126	0.3964	0.3923
6.0	0.4961	0.4764	0.4785	0.4824	0.4831	0.4620	0.4509	0.4336	0.4282	0.4201	0.4141	0.4096	0.3990	0.3947	0.3907	0.3919	0.3764	0.3725
6.5	0.4698	0.4512	0.4540	0.4577	0.4586	0.4389	0.4284	0.4124	0.4075	0.3999	0.3943	0.3900	0.3802	0.3762	0.3723	0.3734	0.3586	0.3549
7.0	0.4472	0.4296	0.4322	0.4357	0.4367	0.4182	0.4084	0.3935	0.3889	0.3818	0.3765	0.3725	0.3633	0.3596	0.3558	0.3568	0.3425	0.3390
8.0	0.4087	0.3927	0.3950	0.3982	0.3994	0.3829	0.3741	0.3610	0.3571	0.3507	0.3469	0.3424	0.3343	0.3309	0.3273	0.3282	0.3150	0.3116
9.0	0.3770	0.3623	0.3644	0.3673	0.3687	0.3537	0.3457	0.3340	0.3306	0.3249	0.3205	0.3173	0.3100	0.3070	0.3036	0.3044	0.2921	0.2891
10.0	0.3504	0.3368	0.3387	0.3414	0.3429	0.3292	0.3218	0.3113	0.3083	0.3030	0.2990	0.2961	0.2895	0.2868	0.2835	0.2843	0.2727	0.2699
11.0	0.3277	0.3151	0.3168	0.3193	0.3208	0.3082	0.3014	0.2919	0.2891	0.2843	0.2806	0.2780	0.2719	0.2694	0.2662	0.2669	0.2561	0.2535
12.0	0.3082	0.2964	0.2979	0.3003	0.3018	0.2901	0.2838	0.2750	0.2725	0.2681	0.2647	0.2622	0.2566	0.2543	0.2512	0.2519	0.2416	0.2392
15.0	0.2627	0.2527	0.2540	0.2560	0.2576	0.2479	0.2427	0.2356	0.2337	0.2301	0.2272	0.2252	0.2206	0.2188	0.2160	0.2166	0.2077	0.2057
20.0	0.2132	0.2052	0.2061	0.2078	0.2094	0.2018	0.1976	0.1923	0.1909	0.1881	0.1859	0.1843	0.1808	0.1795	0.1771	0.1776	0.1703	0.1686
25.0	0.1811	0.1743	0.1751	0.1765	0.1780	0.1717	0.1683	0.1640	0.1629	0.1606	0.1588	0.1575	0.1546	0.1536	0.1515	0.1519	0.1457	0.1443
30.0	0.1584	0.1525	0.1532	0.1544	0.1558	0.1504	0.1475	0.1439	0.1430	0.1411	0.1395	0.1384	0.1360	0.1352	0.1332	0.1336	0.1281	0.1269
35.0	0.1414	0.1362	0.1368	0.1379	0.1393	0.1345	0.1319	0.1288	0.1281	0.1264	0.1249	0.1240	0.1219	0.1213	0.1195	0.1198	0.1149	0.1139
40.0	0.1283	0.1236	0.1241	0.1251	0.1264	0.1221	0.1198	0.1171	0.1164	0.1149	0.1136	0.1128	0.1109	0.1104	0.1087	0.1090	0.1046	0.1036
45.0	0.1177	0.1134	0.1139	0.1148	0.1160	0.1121	0.1100	0.1076	0.1070	0.1057	0.1045	0.1037	0.1020	0.1016	0.1001	0.1003	0.0963	0.0954
50.0	0.1090	0.1050	0.1055	0.1063	0.1075	0.1039	0.1020	0.0998	0.0993	0.0980	0.0969	0.0963	0.0947	0.0943	0.0929	0.0931	0.0894	0.0886
55.0	0.1017	0.0980	0.0984	0.0992	0.1003	0.0970	0.0953	0.0932	0.0928	0.0916	0.0906	0.0900	0.0886	0.0882	0.0869	0.0871	0.0836	0.0829
60.0	0.0955	0.0920	0.0925	0.0932	0.0943	0.0912	0.0895	0.0877	0.0872	0.0862	0.0852	0.0847	0.0833	0.0830	0.0817	0.0820	0.0787	0.0780
65.0	.09018	.08691	.08730	.08800	.08902	.08610	.08457	.08283	.08244	.08146	.08058	.08003	.07880	.07852	.07731	.07752	.07441	.07375
70.0	.08552	.08243	.08280	.08346	.08445	.08169	.08025	.07863	.07826	.07735	.07651	.07599	.07484	.07458	.07343	.07363	.07068	.07006
80.0	.07778	.07497	.07531	.07592	.07685	.07436	.07306	.07162	.07130	.07049	.06973	.06927	.06824	.06802	.06697	.06715	.06447	.06391
90.0	.07160	.06902	.06933	.06989	.07076	.06849	.06730	.06601	.06573	.06499	.06430	.06388	.06295	.06276	.06178	.06195	.05948	.05897
100.0	.06653	.06414	.06443	.06495	.06578	.06368	.06259	.06141	.06116	.06048	.05984	.05946	.05860	.05844	.05762	.05769	.05539	.05492
150.0	.05055	.04873	.04895	.04935	.05003	.04846	.04767	.04685	.04668	.04620	.04571	.04543	.04482	.04470	.04401	.04414	.04238	.04203
200.0	.04206	.04062	.04083	.04096	.04156	.04027	.03963	.03899	.03886	.03848	.03809	.03786	.03737	.03726	.03670	.03681	.03633	.03515
250.0	.03702	.03576	.03537	.03566	.03620	.03518	.03483	.03422	.03424	.03386	.03336	.03330	.03293	.03269	.03217	.03228	.03206	.03104
300.0	.03366	.03242	.03206	.03218	.03268	.03191	.03160	.03106	.03108	.03073	.03029	.03023	.02991	.02970	.02923	.02933	.02912	.02821
350.0	.03104	.02998	.02967	.02977	.03022	.02953	.02924	.02875	.02877	.02846	.02805	.02800	.02770	.02751	.02708	.02717	.02697	.02615
400.0	.02912	.02813	.02784	.02794	.02836	.02772	.02745	.02699	.02702	.02672	.02634	.02630	.02603	.02585	.02545	.02553	.02533	.02457
450.0	.02762	.02668	.02641	.02650	.02691	.02630	.02604	.02561	.02564	.02536	.02501	.02496	.02471	.02454	.02416	.02424	.02405	.02334
500.0	.02641	.02551	.02527	.02535	.02574	.02517	.02491	.02451	.02454	.02427	.02394	.02389	.02365	.02349	.02313	.02321	.02301	.02235

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{9}_{4}$BE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	8.390	7.970	11.073	11.000	10.750	12.553	13.580	14.323	14.870	15.390	15.680	16.590	17.130	18.000	18.370	18.727	19.316	19.800
3.0	11.212	10.629	14.228	14.271	13.946	15.927	17.436	18.317	18.945	19.528	20.073	21.209	21.954	22.910	23.308	23.824	24.928	25.193
3.5	14.382	13.608	17.749	17.919	17.508	19.680	21.715	22.742	23.454	24.095	24.919	26.299	27.261	28.308	28.736	29.419	31.032	31.104
4.0	17.896	16.902	21.631	21.940	21.432	23.805	26.411	27.591	28.390	29.084	30.211	31.852	33.044	34.188	34.647	35.606	37.622	37.527
4.5	21.747	20.507	26.867	26.327	25.710	28.298	31.517	32.857	33.746	34.490	35.943	37.863	39.296	40.542	41.033	42.077	44.690	44.453
5.0	25.93	24.42	30.45	31.08	30.34	33.15	37.03	38.53	39.52	40.30	42.11	44.32	46.01	47.36	47.89	49.12	52.23	51.87
5.5	30.45	28.63	35.39	36.18	35.31	38.36	42.94	44.62	45.69	46.52	48.70	51.23	53.18	54.64	55.20	56.64	60.24	59.78
6.0	35.29	33.15	40.66	41.64	40.63	43.93	49.24	51.10	52.27	53.14	55.71	58.57	60.80	62.38	62.97	64.61	68.71	68.17
6.5	40.45	37.95	46.27	47.44	46.28	49.84	55.92	57.97	59.25	60.15	63.13	66.34	68.86	70.56	71.18	73.04	77.63	77.03
7.0	45.94	43.05	52.21	53.59	52.27	56.09	63.00	65.24	66.62	67.55	70.97	74.54	77.36	79.18	79.84	81.92	86.99	86.35
8.0	57.85	54.12	65.08	66.90	65.22	69.61	78.27	80.92	82.52	83.50	87.85	92.20	95.65	97.73	98.45	101.01	107.05	106.38
9.0	71.00	66.33	79.24	81.55	79.47	84.46	95.03	98.10	99.93	100.95	106.32	111.51	115.63	117.98	118.77	121.82	128.82	128.21
10.0	85.38	79.65	94.67	97.51	94.98	100.61	113.24	116.76	118.83	119.86	126.33	132.42	137.27	139.90	140.75	144.32	152.29	151.79
11.0	100.96	94.07	111.34	114.75	111.74	118.05	132.87	136.87	139.18	140.22	147.87	154.92	160.53	163.46	164.37	168.49	177.41	177.09
12.0	117.73	109.58	129.24	133.25	129.72	136.74	153.91	158.41	160.96	162.00	170.90	178.98	185.38	188.61	189.59	194.27	204.15	204.07
15.0	175.0	162.5	190.1	196.2	190.8	200.2	225.2	231.3	234.7	235.6	248.7	260.2	269.3	273.5	274.6	281.1	293.9	294.9
20.0	292.9	271.1	314.6	324.8	315.7	329.5	370.3	379.5	384.3	384.8	406.4	424.6	438.9	444.7	446.1	456.1	473.6	477.5
25.0	437.6	404.3	466.5	481.7	467.8	486.8	546.5	559.2	565.7	565.4	597.1	623.4	643.8	651.4	653.0	666.8	689.0	697.1
30.0	608.1	560.9	644.6	665.5	646.1	670.8	752.3	769.0	777.2	775.9	819.3	854.8	882.2	891.7	893.4	911.4	938.4	951.7
35.0	803.3	740.1	847.7	875.2	849.3	880.3	986.5	1007.5	1017.5	1014.9	1071.6	1117.5	1152.7	1164.0	1165.7	1188.3	1220.1	1239.7
40.0	1022.3	941.0	1074.9	1109.7	1076.6	1114.4	1248.0	1273.6	1285.7	1281.3	1352.8	1410.2	1454.1	1467.2	1468.8	1496.2	1533.0	1559.7
45.0	1264.5	1163.0	1325.5	1368.2	1327.1	1372.2	1535.8	1566.5	1580.5	1574.2	1661.9	1731.7	1785.1	1800.0	1801.4	1834.0	1875.8	1910.4
50.0	1529.1	1405.5	1598.7	1650.1	1600.1	1653.0	1849.1	1885.1	1901.3	1892.7	1997.9	2081.3	2144.8	2161.5	2162.7	2200.7	2247.6	2290.9
55.0	1815.5	1667.8	1893.8	1954.5	1895.0	1956.0	2187.1	2228.8	2247.1	2236.1	2360.1	2457.9	2532.5	2550.9	2551.7	2595.3	2647.5	2700.1
60.0	2123.2	1949.4	2210.2	2280.8	2211.1	2280.8	2549.1	2596.8	2617.4	2603.5	2747.6	2860.9	2947.1	2967.2	2967.5	3017.0	3074.8	3137.2
65.0	2452.	2250.	2547.	2629.	2548.	2627.	2935.	2988.	3011.	2994.	3160.	3289.	3388.	3410.	3410.	3465.	3529.	3601.
70.0	2800.	2569.	2905.	2997.	2905.	2993.	3343.	3403.	3428.	3408.	3596.	3743.	3855.	3878.	3877.	3939.	4008.	4092.
80.0	3556.	3260.	3678.	3795.	3678.	3786.	4225.	4300.	4330.	4302.	4538.	4722.	4862.	4889.	4886.	4961.	5043.	5150.
90.0	4389.	4021.	4528.	4670.	4526.	4655.	5193.	5282.	5317.	5281.	5570.	5795.	5966.	5995.	5990.	6079.	6173.	6305.
100.0	5293.	4848.	5450.	5621.	5446.	5598.	6242.	6347.	6387.	6341.	6688.	6956.	7160.	7192.	7185.	7288.	7397.	7555.
150.0	10824.	9895.	11056.	11397.	11043.	11324.	12607.	12805.	12872.	12761.	13453.	13981.	14387.	14428.	14406.	14588.	14781.	15084.
200.0	17854.	16275.	18120.	18682.	18116.	18538.	20623.	20939.	21016.	20813.	21943.	22810.	23310.	23509.	23462.	23739.	23886.	24496.
250.0	26142.	23747.	26374.	27200.	26440.	26963.	29989.	30529.	30514.	30196.	31838.	32658.	33697.	34107.	34016.	34466.	34467.	35455.
300.0	35473.	32156.	35645.	36769.	35789.	36418.	40496.	41405.	41162.	40711.	42924.	43918.	45336.	45971.	45830.	46477.	46310.	47709.
350.0	45710.	41379.	45799.	47248.	46025.	46766.	51992.	53341.	52806.	52207.	55042.	56231.	58060.	58937.	58733.	59592.	59245.	61084.
400.0	56741.	51315.	56724.	58525.	57036.	57896.	64353.	66161.	65319.	64558.	68059.	69464.	71733.	72858.	72588.	73670.	73135.	75438.
450.0	68474.	61881.	68330.	70505.	68730.	69708.	77475.	79757.	78600.	77663.	81867.	83507.	86239.	87621.	87279.	88596.	87862.	90653.
500.0	80827.	73004.	80537.	83108.	81028.	82140.	91271.	94037.	92557.	91432.	96374.	98266.	101482.	103116.	102708.	104269.	103328.	106827.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	20.72	21.43	23.00	23.40	24.20	25.35	26.04	26.95	27.51	28.05	28.62	29.22	29.82	30.36	31.05	31.30	33.43	34.11
3.0	26.44	27.40	28.91	29.26	30.09	31.55	32.42	33.67	34.35	35.06	35.74	36.44	37.28	37.90	38.66	38.88	41.29	42.05
3.5	32.70	33.93	35.38	35.68	36.53	38.33	39.36	40.97	41.77	42.65	43.46	44.26	45.35	46.06	46.88	47.08	49.81	50.65
4.0	39.49	41.02	42.41	42.65	43.51	45.66	46.91	48.85	49.78	50.83	51.76	52.67	54.03	54.83	55.73	55.89	58.97	59.91
4.5	46.81	48.64	49.98	50.15	51.02	53.54	55.00	57.30	58.36	59.59	60.66	61.67	63.29	64.20	65.18	65.32	68.77	69.81
5.0	54.64	56.81	58.08	58.19	59.06	61.96	63.64	66.32	67.49	68.91	70.12	71.25	73.14	74.16	75.24	75.34	79.20	80.35
5.5	62.98	65.49	66.71	66.75	67.62	70.92	72.82	75.88	77.19	78.80	80.16	81.40	83.57	84.70	85.89	85.96	90.25	91.51
6.0	71.82	74.70	75.86	75.82	76.68	80.40	82.53	85.99	87.43	89.24	90.75	92.11	94.57	95.82	97.11	97.15	101.90	103.28
6.5	81.16	84.42	85.52	85.40	86.25	90.39	92.77	96.63	98.20	100.22	101.89	103.38	106.13	107.50	108.92	108.92	114.15	115.66
7.0	90.98	94.65	95.68	95.48	96.30	100.90	103.54	107.81	109.51	111.74	113.57	115.19	118.24	119.74	121.28	121.25	127.00	128.64
8.0	112.1	116.6	117.5	117.1	117.9	123.4	126.6	131.7	133.7	136.4	138.5	140.4	144.1	145.9	147.7	147.6	154.4	156.4
9.0	135.0	140.5	141.2	140.7	141.4	147.9	151.6	157.7	159.9	163.0	165.6	167.7	172.1	174.1	176.3	176.1	184.1	186.4
10.0	159.8	166.3	166.9	166.1	166.7	174.3	178.6	185.6	188.1	191.8	194.7	197.1	202.1	204.5	207.0	206.7	216.0	218.6
11.0	186.4	193.9	194.4	193.4	193.8	202.6	207.6	215.5	218.3	222.4	225.8	228.5	234.2	236.9	239.7	239.4	250.1	253.0
12.0	214.7	223.4	223.7	222.5	222.8	232.7	238.3	247.2	250.4	255.0	258.8	261.9	268.3	271.3	274.6	274.1	286.3	289.6
15.0	310.0	322.4	322.2	320.2	320.0	333.7	341.6	353.7	357.7	364.1	369.3	373.4	382.2	386.1	390.9	390.1	407.3	411.8
20.0	501.4	521.3	520.2	516.6	515.0	536.2	548.4	566.4	572.1	581.8	589.7	595.6	608.9	614.6	622.3	620.9	648.0	654.9
25.0	731.4	760.2	758.0	752.6	749.1	779.0	796.2	820.8	828.2	841.6	852.6	860.8	879.0	886.6	898.1	896.0	934.7	944.5
30.0	997.8	1036.9	1033.5	1026.9	1020.0	1059.8	1082.5	1114.5	1123.8	1141.3	1155.9	1166.4	1190.1	1199.7	1215.6	1212.7	1265.0	1277.9
35.0	1299.1	1349.7	1344.9	1334.9	1326.1	1376.8	1405.8	1445.6	1456.9	1479.0	1497.4	1510.6	1540.3	1551.8	1572.9	1569.1	1636.5	1652.9
40.0	1634.	1697.	1691.	1678.	1666.	1728.	1764.	1813.	1826.	1853.	1876.	1892.	1928.	1941.	1968.	1963.	2047.	2068.
45.0	2000.	2078.	2070.	2054.	2038.	2114.	2157.	2214.	2230.	2262.	2289.	2308.	2351.	2367.	2400.	2394.	2496.	2521.
50.0	2398.	2491.	2481.	2462.	2441.	2531.	2582.	2649.	2667.	2704.	2737.	2759.	2809.	2827.	2867.	2860.	2982.	3011.
55.0	2826.	2934.	2923.	2900.	2875.	2980.	3039.	3116.	3136.	3179.	3217.	3243.	3301.	3321.	3369.	3360.	3503.	3537.
60.0	3283.	3409.	3395.	3368.	3338.	3458.	3527.	3614.	3637.	3686.	3730.	3759.	3825.	3847.	3903.	3893.	4058.	4097.
65.0	3768.	3912.	3896.	3865.	3830.	3967.	4044.	4142.	4167.	4224.	4273.	4306.	4381.	4405.	4469.	4458.	4647.	4690.
70.0	4281.	4444.	4425.	4391.	4349.	4503.	4590.	4700.	4728.	4791.	4846.	4883.	4967.	4993.	5067.	5054.	5267.	5317.
80.0	5386.	5590.	5567.	5523.	5468.	5660.	5768.	5901.	5935.	6011.	6080.	6125.	6228.	6258.	6352.	6335.	6603.	6664.
90.0	6593.	6843.	6814.	6760.	6690.	6922.	7053.	7212.	7251.	7343.	7426.	7480.	7603.	7637.	7753.	7732.	8058.	8131.
100.0	7898.	8197.	8162.	8097.	8010.	8287.	8441.	8626.	8671.	8779.	8878.	8941.	9086.	9125.	9264.	9239.	9627.	9714.
150.0	15763.	16355.	16283.	16153.	15969.	16496.	16789.	17127.	17205.	17405.	17595.	17713.	17982.	18045.	18325.	18274.	19036.	19203.
200.0	25596.	26548.	26440.	26228.	25892.	26749.	27210.	27724.	27839.	28146.	28449.	28633.	29048.	29142.	29594.	29509.	30476.	30997.
250.0	37041.	38399.	38358.	38048.	37538.	38762.	39380.	40103.	40225.	40670.	41134.	41365.	41929.	42100.	42754.	42626.	43709.	44668.
300.0	49838.	51648.	51754.	51385.	50676.	52225.	52977.	53942.	54052.	54653.	55326.	55580.	56300.	56577.	57462.	57285.	58472.	59909.
350.0	63804.	66108.	66368.	65949.	65025.	66907.	67807.	69028.	69126.	69894.	70790.	71072.	71958.	72346.	73482.	73252.	74555.	76505.
400.0	78790.	81622.	82045.	81571.	80415.	82653.	83711.	85202.	85286.	86231.	87365.	87676.	88736.	89240.	90645.	90358.	91791.	94279.
450.0	94672.	98063.	98651.	98125.	96720.	99332.	100559.	102332.	102399.	103532.	104913.	105256.	106496.	107123.	108808.	108463.	110040.	113087.
500.0	111345.	115323.	116083.	115497.	113832.	116834.	118239.	120303.	120352.	121681.	123318.	123697.	125123.	125876.	127854.	127449.	129181.	132806.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{11}_{5}$B IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	2.586	2.734	2.302	2.220	2.270	2.145	1.874	1.807	1.769	1.739	1.637	1.556	1.488	1.462	1.452	1.406	1.269	1.327
3.0	2.294	2.432	2.060	1.988	2.034	1.928	1.688	1.631	1.600	1.577	1.486	1.414	1.356	1.331	1.323	1.283	1.171	1.213
3.5	2.064	2.194	1.866	1.801	1.845	1.752	1.538	1.488	1.461	1.444	1.361	1.296	1.244	1.223	1.216	1.180	1.086	1.117
4.0	1.878	2.000	1.707	1.648	1.689	1.607	1.413	1.369	1.345	1.332	1.256	1.197	1.150	1.131	1.125	1.093	1.013	1.036
4.5	1.725	1.840	1.575	1.521	1.560	1.486	1.308	1.269	1.248	1.237	1.167	1.113	1.070	1.053	1.048	1.019	0.950	0.967
5.0	1.596	1.706	1.463	1.413	1.449	1.383	1.219	1.183	1.164	1.156	1.091	1.041	1.002	0.986	0.982	0.955	0.894	0.907
5.5	1.486	1.591	1.366	1.320	1.355	1.294	1.142	1.109	1.092	1.085	1.026	0.978	0.942	0.928	0.924	0.899	0.846	0.855
6.0	1.392	1.491	1.283	1.240	1.273	1.216	1.074	1.045	1.029	1.024	0.967	0.923	0.890	0.877	0.873	0.850	0.802	0.809
6.5	1.309	1.404	1.210	1.169	1.201	1.149	1.015	0.988	0.974	0.969	0.915	0.874	0.843	0.831	0.828	0.807	0.764	0.768
7.0	1.236	1.327	1.146	1.107	1.137	1.089	0.963	0.938	0.924	0.921	0.870	0.831	0.802	0.791	0.788	0.768	0.729	0.731
8.0	1.114	1.198	1.036	1.001	1.029	0.987	0.874	0.852	0.840	0.838	0.792	0.757	0.731	0.721	0.719	0.702	0.669	0.669
9.0	1.016	1.094	0.947	0.916	0.942	0.904	0.801	0.782	0.772	0.771	0.728	0.697	0.673	0.664	0.662	0.647	0.619	0.617
10.0	0.934	1.007	0.874	0.845	0.869	0.836	0.741	0.723	0.715	0.714	0.675	0.646	0.625	0.617	0.615	0.601	0.577	0.574
11.0	0.866	0.935	0.812	0.785	0.808	0.777	0.690	0.674	0.666	0.666	0.630	0.603	0.583	0.576	0.575	0.562	0.541	0.537
12.0	0.807	0.872	0.759	0.734	0.755	0.727	0.646	0.631	0.624	0.624	0.591	0.566	0.547	0.541	0.540	0.528	0.510	0.505
15.0	0.6743	0.7301	0.6370	0.6164	0.6349	0.6122	0.5450	0.5333	0.5277	0.5287	0.5002	0.4794	0.4645	0.4595	0.4587	0.4493	0.4361	0.4300
20.0	0.5338	0.5794	0.5077	0.4915	0.5066	0.4896	0.4368	0.4280	0.4240	0.4255	0.4027	0.3864	0.3747	0.3712	0.3708	0.3638	0.3551	0.3488
25.0	0.4452	0.4840	0.4256	0.4122	0.4250	0.4115	0.3676	0.3605	0.3574	0.3591	0.3400	0.3264	0.3167	0.3142	0.3140	0.3084	0.3021	0.2961
30.0	0.3841	0.4180	0.3686	0.3570	0.3683	0.3570	0.3193	0.3134	0.3109	0.3126	0.2961	0.2843	0.2760	0.2741	0.2740	0.2694	0.2645	0.2589
35.0	0.3391	0.3695	0.3265	0.3164	0.3264	0.3168	0.2835	0.2784	0.2764	0.2780	0.2634	0.2530	0.2457	0.2442	0.2442	0.2403	0.2363	0.2311
40.0	0.3046	0.3321	0.2941	0.2850	0.2942	0.2857	0.2559	0.2514	0.2496	0.2513	0.2381	0.2288	0.2223	0.2210	0.2211	0.2177	0.2144	0.2095
45.0	0.2773	0.3025	0.2684	0.2601	0.2685	0.2610	0.2338	0.2299	0.2283	0.2299	0.2179	0.2094	0.2035	0.2024	0.2026	0.1995	0.1967	0.1922
50.0	0.2551	0.2784	0.2474	0.2398	0.2475	0.2408	0.2158	0.2122	0.2109	0.2124	0.2013	0.1936	0.1881	0.1872	0.1874	0.1847	0.1821	0.1780
55.0	0.2366	0.2584	0.2299	0.2229	0.2301	0.2239	0.2008	0.1975	0.1963	0.1978	0.1875	0.1803	0.1752	0.1745	0.1747	0.1722	0.1700	0.1661
60.0	0.2210	0.2414	0.2151	0.2086	0.2153	0.2096	0.1881	0.1851	0.1840	0.1854	0.1758	0.1691	0.1643	0.1637	0.1639	0.1616	0.1596	0.1560
65.0	0.2076	0.2269	0.2024	0.1963	0.2026	0.1974	0.1772	0.1743	0.1733	0.1747	0.1657	0.1594	0.1549	0.1544	0.1546	0.1525	0.1506	0.1472
70.0	0.1961	0.2143	0.1914	0.1856	0.1916	0.1867	0.1676	0.1650	0.1641	0.1655	0.1569	0.1510	0.1467	0.1462	0.1465	0.1445	0.1428	0.1396
80.0	0.1770	0.1936	0.1732	0.1680	0.1734	0.1691	0.1519	0.1496	0.1488	0.1501	0.1424	0.1370	0.1332	0.1328	0.1330	0.1313	0.1298	0.1270
90.0	0.1618	0.1771	0.1587	0.1540	0.1589	0.1551	0.1394	0.1373	0.1366	0.1378	0.1308	0.1259	0.1223	0.1221	0.1223	0.1208	0.1194	0.1169
100.0	0.1495	0.1637	0.1469	0.1426	0.1472	0.1437	0.1292	0.1273	0.1267	0.1278	0.1213	0.1168	0.1135	0.1133	0.1136	0.1122	0.1109	0.1086
150.0	0.1113	0.1221	0.1102	0.1069	0.1103	0.1079	0.0972	0.0958	0.0955	0.0965	0.0916	0.0882	0.0857	0.0857	0.0859	0.0850	0.0840	0.0825
200.0	0.0912	0.1011	0.0914	0.0886	0.0908	0.0895	0.0805	0.0791	0.0793	0.0803	0.0761	0.0750	0.0725	0.0710	0.0713	0.0704	0.0711	0.0687
250.0	0.0796	0.0883	0.0800	0.0775	0.0793	0.0784	0.0706	0.0685	0.0696	0.0705	0.0668	0.0658	0.0637	0.0624	0.0627	0.0617	0.0625	0.0604
300.0	0.0717	0.0796	0.0722	0.0700	0.0717	0.0709	0.0638	0.0614	0.0630	0.0638	0.0605	0.0595	0.0576	0.0565	0.0568	0.0559	0.0566	0.0548
350.0	0.0660	0.0733	0.0666	0.0645	0.0661	0.0654	0.0589	0.0567	0.0581	0.0589	0.0559	0.0550	0.0532	0.0522	0.0525	0.0516	0.0523	0.0506
400.0	.06170	.06850	.06234	.06039	.06186	.06120	.05511	.05317	.05445	.05517	.05236	.05149	.04984	.04897	.04920	.04843	.04908	.04750
450.0	.05832	.06477	.05899	.05715	.05856	.05795	.05219	.05039	.05158	.05227	.04961	.04877	.04722	.04641	.04664	.04591	.04653	.04504
500.0	.05563	.06178	.05632	.05455	.05591	.05533	.04984	.04818	.04927	.04995	.04742	.04659	.04512	.04437	.04459	.04390	.04448	.04307

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	1.250	1.197	1.209	1.220	1.213	1.149	1.117	1.059	1.039	1.015	0.997	0.983	0.950	0.940	0.932	0.936	0.902	0.893
3.0	1.145	1.097	1.107	1.116	1.112	1.056	1.027	0.978	0.961	0.939	0.924	0.911	0.882	0.872	0.865	0.868	0.836	0.828
3.5	1.056	1.012	1.021	1.029	1.027	0.977	0.951	0.907	0.893	0.873	0.860	0.849	0.823	0.814	0.807	0.809	0.779	0.771
4.0	0.981	0.940	0.948	0.956	0.954	0.909	0.886	0.847	0.834	0.816	0.804	0.794	0.771	0.762	0.756	0.758	0.729	0.722
4.5	0.916	0.879	0.885	0.893	0.892	0.851	0.829	0.794	0.783	0.767	0.755	0.746	0.726	0.717	0.711	0.713	0.685	0.678
5.0	0.8597	0.8251	0.8309	0.8378	0.8378	0.8000	0.7801	0.7484	0.7382	0.7235	0.7129	0.7046	0.6854	0.6780	0.6715	0.6735	0.6472	0.6406
5.5	0.8107	0.7782	0.7835	0.7900	0.7905	0.7555	0.7370	0.7079	0.6987	0.6852	0.6752	0.6676	0.6499	0.6429	0.6366	0.6385	0.6134	0.6071
6.0	0.7675	0.7369	0.7417	0.7478	0.7487	0.7161	0.6988	0.6720	0.6637	0.6511	0.6418	0.6346	0.6183	0.6117	0.6056	0.6073	0.5833	0.5773
6.5	0.7291	0.7002	0.7046	0.7103	0.7116	0.6810	0.6648	0.6400	0.6323	0.6205	0.6118	0.6051	0.5899	0.5837	0.5777	0.5794	0.5563	0.5506
7.0	0.6947	0.6673	0.6714	0.6768	0.6784	0.6496	0.6343	0.6112	0.6041	0.5930	0.5848	0.5785	0.5643	0.5584	0.5526	0.5542	0.5320	0.5265
8.0	0.6358	0.6109	0.6144	0.6194	0.6213	0.5956	0.5818	0.5616	0.5554	0.5455	0.5381	0.5325	0.5199	0.5147	0.5091	0.5105	0.4899	0.4849
9.0	0.5870	0.5642	0.5673	0.5719	0.5741	0.5508	0.5383	0.5201	0.5148	0.5058	0.4991	0.4941	0.4827	0.4780	0.4726	0.4740	0.4548	0.4501
10.0	0.5460	0.5249	0.5277	0.5320	0.5343	0.5129	0.5015	0.4851	0.4803	0.4722	0.4660	0.4614	0.4511	0.4468	0.4417	0.4429	0.4249	0.4206
11.0	0.5110	0.4913	0.4939	0.4978	0.5002	0.4806	0.4700	0.4551	0.4508	0.4433	0.4376	0.4334	0.4239	0.4200	0.4151	0.4162	0.3992	0.3952
12.0	0.4807	0.4622	0.4646	0.4683	0.4706	0.4525	0.4427	0.4290	0.4251	0.4182	0.4128	0.4089	0.4002	0.3966	0.3919	0.3929	0.3769	0.3731
15.0	0.4100	0.3945	0.3964	0.3996	0.4021	0.3870	0.3788	0.3678	0.3648	0.3591	0.3546	0.3515	0.3444	0.3415	0.3372	0.3381	0.3243	0.3210
20.0	0.3330	0.3205	0.3220	0.3245	0.3270	0.3151	0.3087	0.3004	0.2982	0.2939	0.2903	0.2879	0.2824	0.2804	0.2766	0.2774	0.2660	0.2634
25.0	0.2828	0.2723	0.2736	0.2757	0.2781	0.2682	0.2629	0.2562	0.2545	0.2510	0.2480	0.2460	0.2416	0.2400	0.2367	0.2373	0.2276	0.2254
30.0	0.2474	0.2383	0.2394	0.2413	0.2435	0.2350	0.2304	0.2248	0.2235	0.2204	0.2179	0.2162	0.2124	0.2112	0.2082	0.2087	0.2002	0.1983
35.0	0.2210	0.2128	0.2138	0.2155	0.2176	0.2101	0.2061	0.2013	0.2001	0.1975	0.1952	0.1938	0.1905	0.1894	0.1867	0.1872	0.1796	0.1779
40.0	0.2004	0.1930	0.1939	0.1954	0.1974	0.1907	0.1871	0.1829	0.1819	0.1795	0.1775	0.1762	0.1733	0.1724	0.1699	0.1703	0.1634	0.1619
45.0	0.1839	0.1771	0.1779	0.1794	0.1812	0.1752	0.1719	0.1681	0.1672	0.1651	0.1632	0.1621	0.1594	0.1587	0.1563	0.1567	0.1504	0.1490
50.0	0.1703	0.1641	0.1648	0.1661	0.1679	0.1623	0.1594	0.1559	0.1551	0.1532	0.1515	0.1504	0.1480	0.1474	0.1451	0.1455	0.1397	0.1384
55.0	0.1589	0.1531	0.1538	0.1551	0.1568	0.1516	0.1486	0.1457	0.1449	0.1432	0.1416	0.1406	0.1384	0.1378	0.1357	0.1361	0.1306	0.1295
60.0	0.1492	0.1438	0.1445	0.1456	0.1473	0.1424	0.1399	0.1370	0.1363	0.1347	0.1332	0.1323	0.1302	0.1297	0.1277	0.1281	0.1229	0.1218
65.0	0.1409	0.1358	0.1364	0.1375	0.1391	0.1345	0.1321	0.1294	0.1288	0.1273	0.1259	0.1250	0.1231	0.1227	0.1208	0.1211	0.1163	0.1152
70.0	0.1336	0.1288	0.1294	0.1304	0.1320	0.1276	0.1254	0.1229	0.1223	0.1209	0.1195	0.1187	0.1169	0.1165	0.1147	0.1151	0.1104	0.1095
80.0	0.1215	0.1171	0.1177	0.1186	0.1201	0.1162	0.1142	0.1119	0.1114	0.1101	0.1090	0.1082	0.1066	0.1063	0.1046	0.1049	0.1007	0.0999
90.0	0.1119	0.1078	0.1083	0.1092	0.1106	0.1070	0.1052	0.1031	0.1027	0.1016	0.1005	0.0998	0.0984	0.0981	0.0965	0.0968	0.0929	0.0921
100.0	0.1040	0.1002	0.1007	0.1015	0.1028	0.0995	0.0978	0.0960	0.0956	0.0945	0.0935	0.0929	0.0916	0.0913	0.0899	0.0901	0.0865	0.0858
150.0	.07898	.07615	.07648	.07711	.07818	.07572	.07448	.07320	.07293	.07218	.07143	.07099	.07003	.06984	.06876	.06897	.06622	.06567
200.0	.06573	.06347	.06348	.06400	.06494	.06292	.06192	.06093	.06072	.06013	.05951	.05916	.05839	.05822	.05734	.05752	.05677	.05493
250.0	.05786	.05587	.05586	.05671	.05656	.05496	.05442	.05347	.05350	.05290	.05212	.05203	.05146	.05108	.05027	.05044	.05009	.04850
300.0	.05244	.05065	.05010	.05027	.05103	.04986	.04937	.04852	.04856	.04802	.04732	.04724	.04673	.04640	.04567	.04583	.04550	.04408
350.0	.04850	.04684	.04635	.04651	.04721	.04614	.04568	.04492	.04495	.04446	.04382	.04375	.04329	.04299	.04231	.04245	.04214	.04085
400.0	.04550	.04395	.04350	.04365	.04431	.04332	.04288	.04217	.04221	.04175	.04116	.04109	.04067	.04039	.03976	.03989	.03958	.03839
450.0	.04316	.04169	.04127	.04141	.04204	.04110	.04069	.04002	.04006	.03963	.03907	.03900	.03861	.03835	.03776	.03788	.03757	.03647
500.0	.04127	.03987	.03948	.03961	.04022	.03932	.03892	.03829	.03834	.03792	.03740	.03733	.03696	.03671	.03615	.03626	.03596	.03492

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{11}_{5}$B IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	7.100	6.750	9.409	9.350	9.140	10.707	11.590	12.229	12.700	13.150	13.400	14.200	14.660	15.397	15.710	16.012	16.513	16.930
3.0	9.363	8.887	11.939	11.973	11.703	13.415	14.686	15.437	15.974	16.475	16.930	17.912	18.538	19.344	19.681	20.111	21.028	21.269
3.5	11.895	11.271	14.748	14.883	14.546	16.411	18.104	18.971	19.576	20.124	20.802	21.980	22.780	23.660	24.021	24.586	25.909	25.997
4.0	14.692	13.900	17.832	18.079	17.664	19.692	21.839	22.828	23.503	24.094	25.013	26.400	27.383	28.341	28.727	29.432	31.156	31.111
4.5	17.751	16.770	21.190	21.556	21.056	23.255	25.888	27.004	27.751	28.381	29.560	31.169	32.343	33.383	33.794	34.646	36.767	36.608
5.0	21.07	19.88	24.82	25.31	24.72	27.09	30.25	31.50	32.32	32.98	34.44	36.28	37.66	38.78	39.22	40.22	42.74	42.48
5.5	24.64	23.22	28.71	29.34	28.64	31.21	34.91	36.30	37.20	37.90	39.64	41.74	43.32	44.54	45.00	46.16	49.06	48.73
6.0	28.47	26.79	32.87	33.64	32.83	35.60	39.88	41.41	42.39	43.12	45.17	47.53	49.33	50.64	51.13	52.45	55.74	55.35
6.5	32.55	30.59	37.28	38.21	37.29	40.25	45.15	46.83	47.88	48.64	51.02	53.65	55.68	57.08	57.60	59.10	62.77	62.33
7.0	36.87	34.62	41.96	43.05	42.00	45.17	50.72	52.54	53.68	54.46	57.19	60.11	62.37	63.87	64.41	66.09	70.15	69.67
8.0	46.26	43.36	52.07	53.52	52.18	55.80	62.72	64.87	66.18	67.00	70.46	73.99	76.75	78.45	79.05	81.09	86.91	85.42
9.0	56.61	52.98	63.19	65.01	63.36	67.46	75.88	78.36	79.85	80.70	84.96	89.15	92.44	94.36	95.00	97.43	103.01	102.56
10.0	67.91	63.47	75.29	77.53	75.53	80.13	90.16	93.00	94.67	95.54	100.66	105.56	109.42	111.55	112.25	115.09	121.43	121.06
11.0	80.15	74.81	88.37	91.05	88.67	93.80	105.56	108.77	110.63	111.50	117.55	123.20	127.65	130.02	130.77	134.04	141.12	140.90
12.0	93.32	87.00	102.39	105.55	102.76	108.45	122.05	125.65	127.71	128.57	135.60	142.05	147.14	149.74	150.54	154.25	162.08	162.05
15.0	138.3	128.5	150.1	154.8	150.6	158.1	177.9	182.8	185.4	186.2	196.6	205.7	212.8	216.2	217.1	222.3	232.3	233.2
20.0	230.6	213.8	247.5	255.5	248.3	259.3	291.4	298.7	302.6	303.0	320.0	334.4	345.6	350.3	351.4	359.2	373.0	376.1
25.0	344.0	318.1	366.4	378.3	367.4	382.4	429.3	439.3	444.5	444.3	469.2	489.9	505.9	512.0	513.2	524.1	541.6	547.9
30.0	477.4	440.8	505.7	522.1	506.8	526.4	590.4	603.5	609.9	609.0	643.1	671.0	692.5	699.9	701.3	715.5	736.7	747.1
35.0	630.2	581.0	664.6	686.1	665.8	690.3	773.6	790.0	798.0	795.9	840.4	876.5	904.1	913.0	914.4	932.1	957.1	972.4
40.0	801.6	738.3	842.4	869.6	843.6	873.4	978.1	998.3	1007.7	1004.4	1060.4	1105.4	1139.8	1150.1	1151.4	1173.0	1201.8	1222.7
45.0	991.1	912.1	1038.4	1071.8	1039.6	1076.1	1203.2	1227.3	1238.4	1233.5	1302.2	1356.9	1398.7	1410.5	1411.6	1437.2	1470.0	1497.1
50.0	1198.1	1101.8	1252.0	1292.3	1253.1	1294.7	1448.3	1476.6	1489.3	1482.7	1565.0	1630.3	1680.2	1693.3	1694.2	1724.0	1760.8	1794.7
55.0	1422.2	1307.0	1482.9	1530.4	1483.8	1531.8	1712.7	1745.4	1759.8	1751.2	1848.3	1926.0	1983.4	1997.9	1998.6	2032.7	2073.7	2114.8
60.0	1662.9	1527.4	1730.4	1785.6	1731.1	1785.8	1995.9	2033.3	2049.4	2038.6	2151.4	2240.2	2307.7	2323.6	2323.8	2362.6	2407.8	2456.7
65.0	1920.	1763.	1994.	2058.	1995.	2056.	2297.	2340.	2358.	2344.	2474.	2575.	2653.	2670.	2670.	2713.	2763.	2820.
70.0	2193.	2012.	2274.	2346.	2274.	2343.	2617.	2664.	2684.	2668.	2815.	2930.	3018.	3036.	3035.	3084.	3138.	3204.
80.0	2784.	2553.	2879.	2970.	2878.	2963.	3307.	3365.	3389.	3367.	3552.	3696.	3806.	3827.	3825.	3883.	3947.	4031.
90.0	3435.	3148.	3543.	3655.	3542.	3643.	4064.	4134.	4161.	4133.	4359.	4535.	4669.	4692.	4688.	4758.	4832.	4935.
100.0	4143.	3795.	4264.	4398.	4262.	4380.	4884.	4967.	4998.	4962.	5234.	5443.	5603.	5628.	5623.	5703.	5789.	5912.
150.0	8469.	7743.	8650.	8917.	8640.	8860.	9863.	10018.	10071.	9984.	10525.	10939.	11256.	11288.	11271.	11414.	11565.	11801.
200.0	13988.	12734.	14175.	14615.	14172.	14502.	16133.	16381.	16442.	16283.	17166.	17889.	18236.	18392.	18355.	18572.	18687.	19164.
250.0	20451.	18579.	20632.	21278.	20684.	21092.	23460.	23882.	23871.	23622.	24906.	25548.	26361.	26682.	26611.	26963.	26963.	27736.
300.0	27750.	25156.	27884.	28763.	27997.	28488.	31679.	32390.	32200.	31847.	33579.	34356.	35465.	35964.	35849.	36358.	36227.	37322.
350.0	35757.	32370.	35827.	36960.	36003.	36583.	40671.	41726.	41308.	40839.	43057.	43987.	45418.	46104.	45945.	46617.	46345.	47784.
400.0	44387.	40143.	44373.	45781.	44617.	45290.	50340.	51754.	51096.	50501.	53239.	54339.	56113.	56993.	56783.	57629.	57210.	59012.
450.0	53564.	48408.	53451.	55149.	53764.	54534.	60605.	62390.	61485.	60752.	64041.	65323.	67460.	68541.	68274.	69304.	68730.	70913.
500.0	63227.	57109.	63000.	65011.	63383.	64254.	71396.	73560.	72403.	71523.	75388.	76869.	79384.	80670.	80343.	81564.	80828.	83402.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.73	18.35	19.72	20.07	20.77	21.77	22.38	23.17	23.65	24.12	24.61	25.13	25.65	26.12	26.72	26.93	28.79	29.38
3.0	22.33	23.16	24.48	24.79	25.61	26.77	27.52	28.58	29.16	29.76	30.34	30.95	31.66	32.20	32.85	33.04	35.13	35.78
3.5	27.34	28.38	29.66	29.93	30.87	32.19	33.09	34.42	35.10	35.84	36.52	37.20	38.12	38.73	39.43	39.61	41.94	42.67
4.0	32.75	34.02	35.26	35.48	36.23	38.03	39.08	40.70	41.48	42.35	43.14	43.91	45.03	45.72	46.48	46.63	49.25	50.05
4.5	38.55	40.08	41.27	41.43	42.19	44.29	46.51	47.41	48.29	49.31	50.20	51.06	52.39	53.16	53.99	54.12	57.03	57.91
5.0	44.76	46.54	47.68	47.80	48.56	50.96	52.35	54.55	55.53	56.70	57.70	58.64	60.19	61.05	61.96	62.06	65.29	66.26
5.5	51.35	53.41	54.50	54.56	55.32	58.04	59.60	62.11	63.19	64.51	65.63	66.67	68.44	69.38	70.37	70.45	74.02	75.08
6.0	58.32	60.67	61.72	61.72	62.47	65.52	67.27	70.09	71.27	72.75	73.99	75.12	77.12	78.15	79.23	79.28	83.22	84.37
6.5	65.68	68.33	69.33	69.27	70.01	73.40	75.34	78.48	79.76	81.40	82.77	84.00	86.23	87.36	88.54	88.56	92.88	94.13
7.0	73.41	76.38	77.33	77.21	77.93	81.67	83.82	87.27	88.66	90.47	91.97	93.30	95.76	97.00	98.27	98.27	102.99	104.35
8.0	89.98	93.63	94.48	94.21	94.89	99.37	101.94	106.07	107.68	109.83	111.60	113.13	116.09	117.53	119.04	118.97	124.56	126.14
9.0	108.00	112.38	113.13	112.71	113.33	118.60	121.62	126.44	128.27	130.79	132.84	134.60	138.07	139.73	141.48	141.35	147.89	149.71
10.0	127.45	132.61	133.25	132.67	133.21	139.31	142.80	148.36	150.40	153.31	155.67	157.65	161.66	163.55	165.57	165.38	172.93	175.01
11.0	148.29	154.29	154.81	154.06	154.50	161.48	165.48	171.79	174.06	177.37	180.05	182.26	186.82	188.95	191.28	191.01	199.65	202.00
12.0	170.50	177.38	177.78	176.85	177.18	185.08	189.61	196.70	199.20	202.93	205.94	208.41	213.54	215.92	218.56	218.23	228.03	230.67
15.0	245.1	255.0	255.0	253.4	253.3	264.2	270.5	280.1	283.3	288.4	292.5	295.8	302.7	305.9	309.7	309.1	322.8	326.4
20.0	394.9	410.6	409.9	407.2	406.0	422.7	432.4	446.6	451.1	458.8	465.0	469.7	480.1	484.7	490.8	489.8	511.2	516.7
25.0	574.9	597.6	596.0	591.8	589.1	612.7	626.2	645.6	651.5	662.0	670.7	677.2	691.5	697.5	706.6	705.0	735.5	743.2
30.0	783.4	814.1	811.5	805.6	801.1	832.3	850.2	875.3	882.7	896.5	908.0	916.3	934.9	942.4	955.0	952.7	993.9	1004.0
35.0	1019.0	1058.8	1055.1	1047.3	1040.6	1080.3	1103.1	1134.4	1143.3	1160.6	1175.2	1185.5	1208.9	1217.9	1234.5	1231.5	1284.5	1297.4
40.0	1281.	1331.	1326.	1316.	1306.	1356.	1384.	1421.	1432.	1453.	1471.	1484.	1512.	1523.	1544.	1540.	1606.	1622.
45.0	1568.	1628.	1622.	1610.	1597.	1657.	1691.	1736.	1748.	1773.	1795.	1809.	1843.	1856.	1882.	1877.	1957.	1977.
50.0	1879.	1951.	1944.	1929.	1913.	1983.	2023.	2076.	2090.	2119.	2145.	2162.	2202.	2215.	2247.	2241.	2337.	2360.
55.0	2213.	2298.	2289.	2272.	2252.	2334.	2381.	2441.	2457.	2491.	2520.	2540.	2586.	2602.	2639.	2633.	2745.	2771.
60.0	2571.	2669.	2658.	2638.	2614.	2709.	2762.	2830.	2848.	2887.	2921.	2944.	2996.	3013.	3057.	3049.	3179.	3209.
65.0	2950.	3063.	3050.	3027.	2999.	3106.	3167.	3244.	3264.	3308.	3346.	3372.	3431.	3449.	3500.	3491.	3639.	3674.
70.0	3351.	3479.	3465.	3438.	3405.	3526.	3594.	3680.	3702.	3751.	3795.	3823.	3889.	3910.	3968.	3957.	4125.	4163.
80.0	4216.	4376.	4358.	4323.	4280.	4431.	4515.	4620.	4646.	4706.	4760.	4795.	4876.	4899.	4973.	4960.	5169.	5217.
90.0	5160.	5356.	5333.	5291.	5236.	5418.	5520.	5645.	5675.	5747.	5813.	5855.	5951.	5978.	6069.	6053.	6307.	6365.
100.0	6181.	6415.	6387.	6337.	6269.	6485.	6606.	6751.	6787.	6871.	6949.	6998.	7112.	7142.	7251.	7231.	7535.	7603.
150.0	12333.	12796.	12740.	12638.	12487.	12907.	13137.	13401.	13462.	13618.	13767.	13860.	14070.	14119.	14338.	14298.	14895.	15025.
200.0	20025.	20769.	20685.	20519.	20257.	20927.	21288.	21690.	21780.	22020.	22257.	22401.	22726.	22799.	23154.	23087.	23843.	24251.
250.0	28977.	30040.	30007.	29765.	29366.	30324.	30807.	31375.	31468.	31817.	32180.	32361.	32802.	32936.	33447.	33348.	34195.	34945.
300.0	38987.	40404.	40486.	40197.	39643.	40855.	41443.	42199.	42285.	42754.	43281.	43480.	44044.	44260.	44953.	44814.	45742.	46867.
350.0	49912.	51714.	51918.	51590.	50887.	52340.	53044.	53996.	54078.	54676.	55378.	55598.	56291.	56595.	57484.	57303.	58323.	59848.
400.0	61634.	63849.	64180.	63811.	62906.	64657.	65484.	66650.	66716.	67456.	68343.	68586.	69416.	69810.	70909.	70684.	71806.	73752.
450.0	74057.	76710.	77172.	76758.	75660.	77703.	78663.	80050.	80102.	80989.	82069.	82338.	83308.	83798.	85117.	84847.	86080.	88464.
500.0	87093.	90211.	90806.	90347.	89045.	91394.	92493.	94109.	94146.	95185.	96466.	96763.	97878.	98467.	100015.	99698.	101052.	103888.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{12}_{6}$C IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	3.615	3.613	3.205	3.089	3.159	2.981	2.603	2.509	2.456	2.414	2.272	2.158	2.064	2.026	2.013	1.948	1.758	1.838
3.0	3.221	3.408	2.887	2.785	2.850	2.698	2.362	2.281	2.236	2.205	2.077	1.975	1.892	1.859	1.848	1.791	1.634	1.693
3.5	2.909	3.085	2.628	2.536	2.597	2.464	2.162	2.092	2.053	2.029	1.912	1.820	1.747	1.717	1.707	1.657	1.524	1.568
4.0	2.654	2.821	2.413	2.329	2.387	2.269	1.994	1.932	1.898	1.879	1.772	1.688	1.622	1.595	1.587	1.541	1.428	1.461
4.5	2.443	2.602	2.232	2.155	2.210	2.104	1.852	1.796	1.766	1.751	1.652	1.575	1.515	1.490	1.483	1.441	1.343	1.368
5.0	2.266	2.416	2.078	2.007	2.058	1.962	1.730	1.679	1.652	1.640	1.547	1.476	1.421	1.399	1.392	1.354	1.268	1.286
5.5	2.113	2.256	1.944	1.878	1.928	1.840	1.623	1.577	1.553	1.543	1.456	1.390	1.339	1.319	1.313	1.278	1.202	1.216
6.0	1.981	2.116	1.828	1.767	1.814	1.733	1.530	1.488	1.466	1.458	1.376	1.314	1.267	1.248	1.243	1.210	1.142	1.151
6.5	1.866	1.997	1.726	1.668	1.713	1.638	1.448	1.409	1.389	1.382	1.305	1.247	1.203	1.185	1.180	1.150	1.089	1.095
7.0	1.763	1.890	1.636	1.581	1.624	1.554	1.375	1.339	1.320	1.315	1.242	1.187	1.145	1.129	1.124	1.096	1.040	1.044
8.0	1.592	1.709	1.482	1.433	1.473	1.412	1.250	1.218	1.202	1.199	1.133	1.083	1.046	1.032	1.028	1.003	0.957	0.956
9.0	1.452	1.562	1.357	1.312	1.349	1.295	1.148	1.120	1.105	1.104	1.043	0.998	0.964	0.952	0.949	0.926	0.887	0.884
10.0	1.337	1.440	1.253	1.212	1.246	1.197	1.063	1.037	1.024	1.024	0.968	0.926	0.895	0.884	0.882	0.861	0.827	0.822
11.0	1.240	1.337	1.165	1.127	1.159	1.115	0.990	0.967	0.955	0.955	0.903	0.865	0.837	0.826	0.824	0.806	0.776	0.770
12.0	1.157	1.249	1.089	1.054	1.084	1.044	0.928	0.906	0.896	0.897	0.848	0.812	0.786	0.777	0.775	0.758	0.732	0.724
15.0	0.968	1.047	0.916	0.886	0.913	0.880	0.783	0.767	0.758	0.760	0.719	0.689	0.668	0.660	0.659	0.646	0.627	0.618
20.0	0.767	0.832	0.730	0.707	0.729	0.704	0.628	0.616	0.610	0.612	0.579	0.556	0.539	0.534	0.533	0.523	0.511	0.502
25.0	0.640	0.696	0.613	0.593	0.612	0.592	0.529	0.519	0.514	0.517	0.489	0.470	0.456	0.452	0.452	0.444	0.436	0.426
30.0	0.553	0.601	0.531	0.514	0.530	0.514	0.460	0.451	0.448	0.450	0.426	0.409	0.397	0.395	0.394	0.388	0.381	0.373
35.0	0.488	0.531	0.470	0.455	0.470	0.456	0.408	0.401	0.398	0.400	0.379	0.364	0.354	0.352	0.352	0.346	0.340	0.333
40.0	0.4384	0.4779	0.4235	0.4104	0.4235	0.4114	0.3684	0.3620	0.3594	0.3618	0.3428	0.3295	0.3200	0.3182	0.3183	0.3134	0.3086	0.3017
45.0	0.3991	0.4353	0.3864	0.3745	0.3866	0.3758	0.3367	0.3310	0.3288	0.3310	0.3137	0.3016	0.2930	0.2915	0.2917	0.2873	0.2832	0.2768
50.0	0.3672	0.4007	0.3562	0.3453	0.3564	0.3467	0.3108	0.3056	0.3036	0.3058	0.2899	0.2787	0.2708	0.2696	0.2698	0.2659	0.2623	0.2563
55.0	0.3406	0.3719	0.3310	0.3209	0.3313	0.3224	0.2892	0.2844	0.2827	0.2848	0.2700	0.2596	0.2523	0.2512	0.2515	0.2480	0.2447	0.2392
60.0	0.3182	0.3475	0.3097	0.3003	0.3100	0.3019	0.2708	0.2665	0.2649	0.2670	0.2531	0.2434	0.2366	0.2357	0.2360	0.2327	0.2298	0.2246
65.0	0.2989	0.3266	0.2915	0.2826	0.2918	0.2842	0.2551	0.2510	0.2496	0.2516	0.2386	0.2295	0.2231	0.2223	0.2226	0.2196	0.2169	0.2120
70.0	0.2823	0.3085	0.2756	0.2673	0.2759	0.2689	0.2414	0.2376	0.2363	0.2383	0.2260	0.2174	0.2113	0.2106	0.2109	0.2081	0.2056	0.2011
80.0	0.2548	0.2787	0.2494	0.2419	0.2497	0.2435	0.2187	0.2154	0.2143	0.2161	0.2050	0.1973	0.1917	0.1912	0.1915	0.1891	0.1869	0.1828
90.0	0.2330	0.2550	0.2285	0.2217	0.2289	0.2234	0.2007	0.1977	0.1967	0.1985	0.1883	0.1812	0.1762	0.1758	0.1761	0.1740	0.1720	0.1683
100.0	0.2153	0.2357	0.2116	0.2053	0.2119	0.2069	0.1860	0.1832	0.1824	0.1841	0.1747	0.1681	0.1634	0.1631	0.1634	0.1615	0.1597	0.1564
150.0	0.1603	0.1758	0.1586	0.1540	0.1589	0.1554	0.1399	0.1380	0.1375	0.1389	0.1319	0.1270	0.1235	0.1234	0.1236	0.1224	0.1210	0.1186
200.0	0.1313	0.1456	0.1316	0.1275	0.1308	0.1289	0.1159	0.1139	0.1143	0.1156	0.1096	0.1080	0.1044	0.1023	0.1027	0.1014	0.1024	0.0989
250.0	0.1146	0.1271	0.1152	0.1116	0.1142	0.1129	0.1016	0.0987	0.1002	0.1015	0.0962	0.0948	0.0917	0.0899	0.0903	0.0888	0.0901	0.0870
300.0	0.1033	0.1146	0.1040	0.1008	0.1032	0.1020	0.0918	0.0884	0.0907	0.0918	0.0871	0.0857	0.0829	0.0814	0.0818	0.0804	0.0818	0.0789
350.0	0.0951	0.1055	0.0959	0.0929	0.0952	0.0941	0.0847	0.0817	0.0837	0.0848	0.0804	0.0791	0.0766	0.0752	0.0756	0.0744	0.0754	0.0729
400.0	.08884	.09865	.08976	.08696	.08907	.08813	.07936	.07656	.07841	.07945	.07539	.07415	.07177	.07051	.07085	.06973	.07068	.06840
450.0	.08399	.09327	.08495	.08229	.08432	.08344	.07515	.07257	.07427	.07528	.07145	.07023	.06800	.06683	.06716	.06611	.06700	.06486
500.0	.08010	.08897	.08110	.07855	.08051	.07968	.07178	.06937	.07096	.07193	.06828	.06709	.06497	.06389	.06421	.06321	.06406	.06202

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	1.731	1.658	1.673	1.688	1.678	1.590	1.545	1.465	1.437	1.403	1.379	1.360	1.313	1.299	1.289	1.293	1.247	1.234
3.0	1.597	1.530	1.544	1.557	1.551	1.472	1.432	1.363	1.339	1.309	1.287	1.270	1.229	1.216	1.206	1.210	1.165	1.153
3.5	1.482	1.420	1.432	1.444	1.440	1.370	1.334	1.272	1.252	1.224	1.205	1.190	1.153	1.141	1.131	1.134	1.091	1.080
4.0	1.382	1.325	1.336	1.347	1.344	1.281	1.248	1.193	1.175	1.150	1.132	1.118	1.085	1.073	1.064	1.067	1.026	1.016
4.5	1.295	1.242	1.251	1.262	1.261	1.202	1.172	1.123	1.106	1.084	1.068	1.055	1.025	1.014	1.004	1.007	0.968	0.958
5.0	1.219	1.170	1.178	1.188	1.188	1.134	1.106	1.061	1.046	1.025	1.010	0.998	0.971	0.961	0.951	0.954	0.917	0.907
5.5	1.152	1.106	1.113	1.122	1.123	1.073	1.047	1.005	0.992	0.973	0.959	0.948	0.923	0.913	0.904	0.907	0.871	0.862
6.0	1.092	1.049	1.055	1.064	1.065	1.019	0.994	0.956	0.944	0.926	0.913	0.903	0.880	0.870	0.861	0.864	0.830	0.821
6.5	1.039	0.998	1.004	1.012	1.014	0.971	0.947	0.912	0.901	0.884	0.872	0.862	0.841	0.832	0.823	0.825	0.793	0.784
7.0	0.991	0.952	0.958	0.966	0.968	0.927	0.905	0.872	0.862	0.846	0.834	0.825	0.805	0.797	0.788	0.791	0.759	0.751
8.0	0.9090	0.8734	0.8785	0.8856	0.8883	0.8515	0.8318	0.8027	0.7940	0.7798	0.7692	0.7613	0.7432	0.7357	0.7277	0.7297	0.7003	0.6931
9.0	0.8405	0.8078	0.8123	0.8189	0.8219	0.7885	0.7706	0.7446	0.7370	0.7242	0.7145	0.7073	0.6911	0.6843	0.6766	0.6786	0.6510	0.6444
10.0	0.7826	0.7524	0.7564	0.7625	0.7658	0.7352	0.7188	0.6953	0.6884	0.6768	0.6679	0.6613	0.6466	0.6404	0.6330	0.6348	0.6089	0.6028
11.0	0.7330	0.7048	0.7085	0.7141	0.7176	0.6894	0.6742	0.6528	0.6466	0.6359	0.6276	0.6216	0.6081	0.6025	0.5954	0.5970	0.5726	0.5668
12.0	0.6900	0.6635	0.6669	0.6723	0.6758	0.6496	0.6354	0.6157	0.6102	0.6003	0.5925	0.5870	0.5745	0.5693	0.5625	0.5640	0.5409	0.5365
15.0	0.5894	0.5670	0.5698	0.5743	0.5779	0.5562	0.5444	0.5286	0.5243	0.5161	0.5097	0.5052	0.4950	0.4909	0.4847	0.4860	0.4660	0.4614
20.0	0.4790	0.4611	0.4632	0.4669	0.4704	0.4534	0.4441	0.4322	0.4290	0.4228	0.4177	0.4142	0.4063	0.4034	0.3980	0.3990	0.3827	0.3789
25.0	0.4071	0.3920	0.3938	0.3969	0.4002	0.3861	0.3784	0.3688	0.3663	0.3612	0.3569	0.3541	0.3477	0.3454	0.3406	0.3415	0.3276	0.3244
30.0	0.3562	0.3430	0.3446	0.3473	0.3505	0.3383	0.3317	0.3237	0.3217	0.3173	0.3136	0.3112	0.3058	0.3040	0.2997	0.3005	0.2882	0.2855
35.0	0.3182	0.3065	0.3078	0.3103	0.3133	0.3025	0.2968	0.2898	0.2881	0.2843	0.2811	0.2790	0.2742	0.2728	0.2688	0.2695	0.2585	0.2561
40.0	0.2885	0.2780	0.2792	0.2814	0.2843	0.2746	0.2695	0.2633	0.2619	0.2585	0.2556	0.2537	0.2495	0.2483	0.2446	0.2452	0.2353	0.2331
45.0	0.2647	0.2551	0.2562	0.2583	0.2610	0.2522	0.2475	0.2420	0.2407	0.2377	0.2350	0.2334	0.2296	0.2285	0.2251	0.2257	0.2166	0.2146
50.0	0.2452	0.2363	0.2373	0.2392	0.2416	0.2336	0.2295	0.2245	0.2233	0.2206	0.2181	0.2166	0.2131	0.2122	0.2090	0.2096	0.2011	0.1993
55.0	0.2288	0.2205	0.2215	0.2233	0.2258	0.2183	0.2143	0.2098	0.2087	0.2062	0.2039	0.2025	0.1993	0.1985	0.1955	0.1960	0.1881	0.1864
60.0	0.2149	0.2071	0.2080	0.2097	0.2121	0.2051	0.2014	0.1972	0.1963	0.1939	0.1918	0.1906	0.1875	0.1868	0.1839	0.1844	0.1770	0.1754
65.0	0.2029	0.1955	0.1964	0.1980	0.2003	0.1937	0.1903	0.1864	0.1855	0.1833	0.1813	0.1801	0.1773	0.1767	0.1739	0.1744	0.1674	0.1659
70.0	0.1924	0.1855	0.1863	0.1878	0.1900	0.1838	0.1806	0.1769	0.1761	0.1740	0.1721	0.1710	0.1684	0.1678	0.1652	0.1657	0.1590	0.1576
80.0	0.1750	0.1687	0.1695	0.1708	0.1729	0.1673	0.1644	0.1611	0.1604	0.1586	0.1569	0.1559	0.1535	0.1531	0.1507	0.1511	0.1451	0.1438
90.0	0.1611	0.1553	0.1560	0.1573	0.1592	0.1541	0.1514	0.1485	0.1479	0.1462	0.1447	0.1437	0.1416	0.1412	0.1390	0.1394	0.1338	0.1327
100.0	0.1497	0.1443	0.1450	0.1461	0.1480	0.1433	0.1408	0.1382	0.1376	0.1361	0.1346	0.1338	0.1319	0.1315	0.1294	0.1298	0.1246	0.1236
150.0	0.1137	0.1096	0.1101	0.1110	0.1126	0.1090	0.1073	0.1054	0.1050	0.1039	0.1029	0.1022	0.1008	0.1006	0.0990	0.0993	0.0954	0.0946
200.0	0.0946	0.0914	0.0914	0.0922	0.0936	0.0906	0.0892	0.0877	0.0874	0.0866	0.0857	0.0852	0.0841	0.0838	0.0826	0.0828	0.0817	0.0791
250.0	0.0833	0.0805	0.0796	0.0802	0.0815	0.0791	0.0784	0.0770	0.0770	0.0762	0.0751	0.0749	0.0741	0.0735	0.0724	0.0726	0.0721	0.0698
300.0	0.0755	0.0729	0.0721	0.0724	0.0735	0.0718	0.0711	0.0699	0.0699	0.0692	0.0681	0.0680	0.0673	0.0668	0.0658	0.0660	0.0655	0.0635
350.0	0.0698	0.0675	0.0667	0.0670	0.0680	0.0664	0.0658	0.0647	0.0647	0.0640	0.0631	0.0630	0.0623	0.0619	0.0609	0.0611	0.0607	0.0588
400.0	.06552	.06329	.06265	.06286	.06381	.06238	.06175	.06073	.06079	.06013	.05927	.05917	.05856	.05816	.05725	.05744	.05700	.05529
450.0	.06214	.06003	.05943	.05963	.06054	.05918	.05859	.05763	.05769	.05707	.05627	.05616	.05560	.05522	.05437	.05454	.05411	.05251
500.0	.05942	.05741	.05686	.05704	.05791	.05662	.05606	.05514	.05521	.05461	.05385	.05375	.05322	.05286	.05206	.05221	.05178	.05028

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{12}_{6}C$ IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.790	5.510	7.706	7.660	7.490	8.786	9.510	10.031	10.420	10.800	11.010	11.670	12.050	12.655	12.910	13.157	13.568	13.910
3.0	7.551	7.177	9.682	9.708	9.493	10.904	11.933	12.542	12.983	13.404	13.775	14.578	15.089	15.749	16.024	16.371	17.109	17.314
3.5	9.514	9.030	11.863	11.969	11.701	13.234	14.591	15.291	15.786	16.243	16.789	17.745	18.392	19.110	19.405	19.857	20.912	20.998
4.0	11.676	11.066	14.248	14.440	14.113	15.774	17.483	18.279	18.827	19.319	20.051	21.171	21.959	22.739	23.053	23.615	24.981	24.965
4.5	14.034	13.283	16.835	17.121	16.727	18.522	20.607	21.502	22.107	22.629	23.561	24.853	25.790	26.634	26.967	27.643	29.316	29.212
5.0	16.59	15.68	19.62	20.01	19.54	21.48	23.96	24.96	25.62	26.17	27.32	28.79	29.88	30.79	31.15	31.94	33.92	33.74
5.5	19.33	18.25	22.61	23.10	22.56	24.64	27.54	28.65	29.37	29.94	31.32	32.98	34.23	35.21	35.59	36.50	38.78	38.54
6.0	22.27	21.00	25.79	26.40	25.77	28.00	31.35	32.57	33.35	33.95	35.55	37.42	38.84	39.89	40.29	41.33	43.90	43.62
6.5	25.39	23.91	29.17	29.89	29.17	31.56	35.39	36.71	37.55	38.17	40.03	42.11	43.70	44.83	45.24	46.42	49.29	48.96
7.0	28.70	27.00	32.74	33.59	32.77	35.32	39.64	41.08	41.99	42.63	44.75	47.04	48.82	50.02	50.45	51.76	54.92	54.58
8.0	35.87	33.69	40.46	41.57	40.54	43.43	48.80	50.49	51.53	52.20	54.88	57.64	59.80	61.15	61.63	63.22	66.96	66.60
9.0	43.78	41.05	48.93	50.33	49.06	52.32	58.83	60.77	61.95	62.64	65.93	69.20	71.76	73.27	73.79	75.68	80.00	79.67
10.0	52.39	49.06	58.14	59.86	58.33	61.96	69.70	71.92	73.23	73.94	77.88	81.69	84.68	86.37	86.92	89.12	94.02	93.76
11.0	61.72	57.71	68.08	70.14	68.32	72.36	81.41	83.91	85.37	86.08	90.73	95.11	98.55	100.42	101.01	103.53	109.00	108.85
12.0	71.74	67.01	78.74	81.16	79.03	83.49	93.94	96.74	98.35	99.05	104.45	109.44	113.36	115.40	116.04	118.90	124.94	124.93
15.0	105.91	98.63	114.95	118.58	115.37	121.22	136.35	140.10	142.19	142.84	150.74	157.76	163.26	165.87	166.60	170.55	178.29	178.93
20.0	176.09	163.42	188.86	194.94	189.48	197.98	222.48	228.06	231.02	231.43	244.34	255.37	263.95	267.56	268.45	274.44	284.99	287.37
25.0	262.11	242.66	278.97	288.00	279.75	291.29	327.00	334.67	338.60	338.54	357.49	373.28	385.50	390.16	391.15	399.43	412.79	417.84
30.0	363.31	335.74	384.54	396.99	385.42	400.37	449.04	459.04	464.00	463.32	489.24	510.50	526.87	532.61	533.66	544.45	560.63	568.59
35.0	479.13	442.14	504.94	521.28	505.89	524.57	587.87	600.43	606.49	605.00	638.79	666.20	687.22	694.05	695.10	708.59	727.64	739.30
40.0	609.1	561.4	639.6	660.3	640.6	663.3	742.9	758.2	765.4	762.9	805.5	839.7	865.8	873.7	874.7	891.1	913.1	928.9
45.0	752.7	693.1	788.1	813.5	789.1	816.1	913.4	931.8	940.2	936.5	988.6	1030.2	1062.0	1071.0	1071.9	1091.3	1116.2	1136.8
50.0	909.6	837.0	950.0	980.5	950.9	982.5	1099.1	1120.6	1130.2	1125.3	1187.8	1237.4	1275.3	1285.3	1286.0	1308.6	1336.6	1362.3
55.0	1079.4	992.5	1124.9	1160.9	1125.6	1162.1	1299.4	1324.2	1335.2	1328.7	1402.4	1460.6	1504.9	1516.0	1516.5	1542.4	1573.6	1604.8
60.0	1261.8	1159.6	1312.4	1354.3	1313.0	1354.6	1513.9	1542.3	1554.6	1546.5	1632.0	1699.4	1750.7	1762.7	1762.9	1792.4	1826.8	1863.8
65.0	1456.	1338.	1512.	1560.	1513.	1560.	1742.	1774.	1788.	1778.	1876.	1953.	2012.	2025.	2025.	2058.	2096.	2139.
70.0	1663.	1527.	1724.	1779.	1724.	1777.	1984.	2020.	2035.	2023.	2135.	2222.	2289.	2302.	2302.	2339.	2380.	2430.
80.0	2111.	1937.	2183.	2252.	2182.	2246.	2507.	2552.	2569.	2553.	2693.	2803.	2886.	2901.	2900.	2944.	2993.	3056.
90.0	2604.	2388.	2686.	2770.	2685.	2762.	3081.	3134.	3155.	3133.	3305.	3438.	3539.	3557.	3554.	3607.	3663.	3741.
100.0	3141.	2878.	3232.	3333.	3230.	3320.	3702.	3765.	3789.	3761.	3967.	4126.	4247.	4266.	4262.	4323.	4388.	4482.
150.0	6418.	5869.	6554.	6757.	6547.	6714.	7474.	7592.	7631.	7566.	7976.	8289.	8530.	8554.	8541.	8649.	8764.	8943.
200.0	10584.	9650.	10740.	11074.	10738.	10988.	12224.	12412.	12468.	12337.	13007.	13403.	13817.	13936.	13908.	14072.	14169.	14521.
250.0	15496.	14078.	15632.	16122.	15671.	15981.	17774.	18095.	18086.	17898.	18871.	19357.	19973.	20212.	20162.	20429.	20429.	21015.
300.0	21025.	19061.	21126.	21792.	21211.	21584.	24001.	24540.	24396.	24129.	25440.	26030.	26870.	27248.	27163.	27546.	27448.	28277.
350.0	27091.	24526.	27143.	28002.	27275.	27716.	30813.	31613.	31296.	30941.	32621.	33326.	34410.	34930.	34809.	35318.	35113.	36203.
400.0	33629.	30413.	33617.	34684.	33802.	34312.	38138.	39210.	38712.	38260.	40335.	41168.	42513.	43179.	43020.	43661.	43344.	44709.
450.0	40581.	36676.	40495.	41784.	40732.	41315.	45915.	47263.	46582.	46026.	48518.	49490.	51109.	51928.	51725.	52506.	52071.	53725.
500.0	47902.	43267.	47729.	49252.	48019.	48679.	54086.	55729.	54853.	54186.	57114.	58236.	60142.	61116.	60864.	61793.	61236.	63191.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.57	15.09	16.23	16.52	17.11	17.94	18.45	19.11	19.51	19.90	20.30	20.73	21.16	21.55	22.05	22.23	23.77	24.26
3.0	18.18	18.86	19.96	20.23	20.83	21.87	22.49	23.36	23.83	24.33	24.80	25.30	25.88	26.33	26.87	27.03	28.75	29.29
3.5	22.08	22.93	24.00	24.23	24.85	26.10	26.83	27.92	28.47	29.07	29.62	30.18	30.93	31.42	32.01	32.15	34.07	34.67
4.0	26.28	27.30	28.34	28.54	29.16	30.63	31.48	32.79	33.42	34.13	34.76	35.39	36.29	36.85	37.48	37.61	39.75	40.40
4.5	30.77	31.98	32.99	33.14	33.77	35.47	36.45	37.98	38.69	39.50	40.22	40.92	41.98	42.60	43.29	43.40	45.77	46.48
5.0	35.54	36.96	37.93	38.05	38.68	40.61	41.72	43.48	44.26	45.20	46.00	46.76	48.00	48.69	49.43	49.52	52.14	52.92
5.5	40.61	42.24	43.18	43.25	43.88	46.05	47.30	49.29	50.16	51.21	52.10	52.93	54.34	55.09	55.90	55.97	58.85	59.71
6.0	45.96	47.82	48.72	48.74	49.37	51.79	53.18	55.41	56.36	57.53	58.52	59.42	61.00	61.83	62.70	62.76	65.91	66.84
6.5	51.60	53.68	54.55	54.52	55.14	57.82	59.37	61.84	62.86	64.16	65.24	66.22	67.99	68.88	69.83	69.86	73.32	74.32
7.0	57.51	59.84	60.66	60.59	61.20	64.15	65.85	68.57	69.67	71.10	72.28	73.34	75.27	76.26	77.28	77.29	81.06	82.14
8.0	70.16	73.01	73.76	73.58	74.15	77.67	79.69	82.93	84.19	85.89	87.28	88.49	90.80	91.94	93.14	93.11	97.53	98.79
9.0	83.90	87.31	87.98	87.68	88.21	92.33	94.69	98.46	99.90	101.87	103.48	104.86	107.56	108.87	110.26	110.17	115.32	116.76
10.0	98.71	102.72	103.30	102.88	103.35	108.10	110.83	115.15	116.75	119.02	120.86	122.41	125.52	127.01	128.60	128.47	134.39	136.02
11.0	114.56	119.20	119.70	119.15	119.54	124.97	128.08	132.97	134.75	137.32	139.41	141.14	144.67	146.34	148.16	147.97	154.72	156.56
12.0	131.45	136.76	137.17	136.48	136.79	142.91	146.42	151.91	153.88	156.75	159.09	161.02	164.98	166.84	168.91	168.66	176.29	178.36
15.0	188.1	195.7	195.8	194.6	194.6	203.0	207.9	215.2	217.7	221.7	224.8	227.4	232.7	235.2	238.1	237.7	248.2	251.0
20.0	301.8	313.8	313.3	311.3	310.4	323.3	330.6	341.5	345.0	350.9	355.7	359.3	367.3	370.8	376.5	374.7	391.2	395.4
25.0	438.2	455.5	454.4	451.2	449.2	467.2	477.7	492.4	496.9	505.0	511.6	516.6	527.5	532.1	539.1	537.9	561.3	567.1
30.0	596.2	619.6	617.7	613.3	609.9	633.7	647.4	666.5	672.2	682.7	691.4	697.8	712.0	717.8	727.4	725.6	757.0	764.8
35.0	774.8	805.0	802.3	796.4	791.3	821.6	839.0	862.8	869.6	882.8	893.9	901.8	919.6	926.5	939.2	936.9	977.3	987.1
40.0	973.1	1010.9	1007.3	999.8	992.7	1030.1	1051.5	1080.3	1088.4	1104.5	1118.1	1127.7	1149.3	1157.4	1173.5	1170.6	1220.9	1233.0
45.0	1190.4	1236.5	1231.9	1222.6	1213.2	1258.3	1284.1	1318.2	1327.6	1346.8	1363.2	1374.5	1400.3	1409.6	1429.5	1425.9	1487.0	1501.6
50.0	1426.2	1481.1	1476.4	1464.2	1452.3	1505.7	1536.1	1575.9	1586.6	1609.1	1628.4	1641.6	1671.8	1682.3	1706.4	1702.1	1774.7	1792.0
55.0	1679.7	1744.2	1737.4	1724.1	1709.4	1771.5	1806.8	1852.6	1864.7	1890.6	1913.1	1928.4	1963.1	1974.9	2003.4	1998.3	2083.4	2103.5
60.0	1950.4	2025.1	2017.0	2001.5	1983.7	2055.3	2095.9	2147.8	2161.4	2190.9	2216.7	2234.1	2273.7	2286.7	2320.1	2314.1	2412.4	2435.5
65.0	2238.	2323.	2314.	2296.	2275.	2356.	2402.	2461.	2476.	2510.	2539.	2558.	2603.	2617.	2656.	2649.	2761.	2788.
70.0	2542.	2639.	2628.	2607.	2583.	2675.	2726.	2791.	2808.	2845.	2878.	2900.	2951.	2966.	3010.	3002.	3129.	3158.
80.0	3197.	3318.	3304.	3278.	3248.	3360.	3424.	3503.	3523.	3569.	3610.	3637.	3698.	3716.	3771.	3762.	3920.	3957.
90.0	3912.	4060.	4043.	4011.	3970.	4108.	4185.	4280.	4303.	4358.	4407.	4439.	4512.	4533.	4602.	4589.	4782.	4826.
100.0	4686.	4863.	4842.	4804.	4752.	4916.	5008.	5118.	5145.	5209.	5268.	5305.	5391.	5414.	5497.	5482.	5712.	5764.
150.0	9346.	9697.	9655.	9578.	9463.	9781.	9955.	10166.	10202.	10321.	10433.	10503.	10663.	10700.	10867.	10836.	11288.	11387.
200.0	15173.	15737.	15674.	15548.	15349.	15857.	16131.	16436.	16504.	16686.	16865.	16974.	17221.	17276.	17545.	17494.	18067.	18376.
250.0	21956.	22760.	22736.	22553.	22251.	22976.	23342.	23772.	23843.	24107.	24383.	24519.	24854.	24955.	25343.	25268.	25909.	26478.
300.0	29539.	30612.	30675.	30456.	30036.	30954.	31400.	31972.	32038.	32394.	32792.	32944.	33370.	33534.	34059.	33954.	34657.	35510.
350.0	37815.	39180.	39335.	39086.	38539.	39655.	40188.	40912.	40970.	41425.	41957.	42122.	42649.	42879.	43552.	43416.	44189.	45344.
400.0	46695.	48374.	48625.	48345.	47659.	48986.	49613.	50497.	50546.	51107.	51778.	51963.	52591.	52891.	53723.	53553.	54402.	55877.
450.0	56107.	58117.	58466.	58153.	57322.	58869.	59597.	60648.	60687.	61359.	62177.	62381.	63116.	63487.	64487.	64282.	65216.	67022.
500.0	65988.	68345.	68795.	68448.	67461.	69241.	70074.	71298.	71326.	72114.	73084.	73308.	74154.	74601.	75773.	75533.	76569.	78708.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{14}_{7}$N IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.771	5.019	4.201	4.049	4.138	3.899	3.403	3.279	3.208	3.152	2.967	2.817	2.693	2.642	2.625	2.540	2.292	2.395
3.0	4.271	4.507	3.809	3.673	3.758	3.553	3.110	3.003	2.943	2.900	2.731	2.597	2.488	2.443	2.428	2.353	2.146	2.223
3.5	3.870	4.095	3.485	3.362	3.442	3.262	2.862	2.768	2.716	2.683	2.528	2.407	2.309	2.268	2.255	2.188	2.013	2.071
4.0	3.541	3.755	3.212	3.100	3.176	3.016	2.651	2.567	2.522	2.496	2.353	2.242	2.153	2.117	2.105	2.046	1.894	1.938
4.5	3.267	3.471	2.980	2.877	2.949	2.806	2.469	2.395	2.354	2.334	2.201	2.098	2.018	1.984	1.974	1.919	1.788	1.821
5.0	3.034	3.229	2.781	2.685	2.754	2.624	2.312	2.245	2.208	2.192	2.068	1.972	1.898	1.868	1.859	1.808	1.693	1.717
5.5	2.834	3.021	2.608	2.519	2.585	2.466	2.175	2.113	2.080	2.067	1.951	1.862	1.793	1.765	1.757	1.710	1.608	1.626
6.0	2.661	2.840	2.456	2.373	2.436	2.326	2.054	1.997	1.967	1.956	1.847	1.763	1.700	1.674	1.667	1.623	1.531	1.544
6.5	2.508	2.681	2.323	2.244	2.304	2.203	1.947	1.894	1.866	1.858	1.754	1.675	1.616	1.592	1.585	1.545	1.462	1.470
7.0	2.374	2.539	2.203	2.129	2.187	2.093	1.851	1.802	1.776	1.769	1.671	1.597	1.541	1.518	1.512	1.474	1.399	1.404
8.0	2.146	2.300	2.001	1.934	1.987	1.904	1.687	1.644	1.621	1.617	1.528	1.461	1.411	1.391	1.386	1.353	1.290	1.289
9.0	1.961	2.105	1.834	1.773	1.823	1.750	1.551	1.513	1.493	1.491	1.409	1.348	1.302	1.285	1.281	1.251	1.198	1.193
10.0	1.807	1.943	1.695	1.640	1.686	1.620	1.437	1.403	1.386	1.385	1.309	1.252	1.211	1.196	1.192	1.165	1.119	1.112
11.0	1.677	1.806	1.578	1.526	1.570	1.509	1.340	1.309	1.294	1.294	1.223	1.171	1.133	1.119	1.116	1.091	1.051	1.042
12.0	1.566	1.688	1.476	1.428	1.470	1.414	1.257	1.228	1.214	1.215	1.149	1.100	1.065	1.052	1.050	1.027	0.991	0.981
15.0	1.312	1.417	1.243	1.203	1.239	1.194	1.063	1.040	1.029	1.031	0.976	0.935	0.906	0.896	0.895	0.876	0.851	0.839
20.0	1.041	1.128	0.993	0.961	0.991	0.957	0.854	0.837	0.829	0.832	0.787	0.755	0.733	0.726	0.725	0.711	0.694	0.682
25.0	0.870	0.944	0.833	0.807	0.832	0.805	0.719	0.706	0.700	0.703	0.666	0.639	0.620	0.615	0.615	0.604	0.591	0.580
30.0	0.751	0.817	0.722	0.699	0.721	0.699	0.625	0.614	0.609	0.612	0.580	0.557	0.541	0.537	0.537	0.528	0.518	0.507
35.0	0.664	0.722	0.640	0.620	0.639	0.621	0.555	0.545	0.541	0.545	0.516	0.496	0.481	0.478	0.478	0.471	0.463	0.453
40.0	0.5963	0.6496	0.5763	0.5585	0.5763	0.5598	0.5013	0.4926	0.4891	0.4923	0.4665	0.4483	0.4355	0.4330	0.4332	0.4265	0.4200	0.4106
45.0	0.5430	0.5919	0.5259	0.5097	0.5261	0.5114	0.4582	0.4504	0.4474	0.4505	0.4270	0.4104	0.3987	0.3967	0.3969	0.3910	0.3854	0.3767
50.0	0.4995	0.5449	0.4848	0.4699	0.4851	0.4718	0.4230	0.4159	0.4132	0.4162	0.3946	0.3793	0.3686	0.3669	0.3672	0.3619	0.3570	0.3488
55.0	0.4634	0.5058	0.4505	0.4368	0.4509	0.4388	0.3936	0.3871	0.3847	0.3876	0.3675	0.3534	0.3434	0.3419	0.3423	0.3375	0.3331	0.3255
60.0	0.4329	0.4727	0.4216	0.4087	0.4220	0.4109	0.3686	0.3627	0.3605	0.3633	0.3445	0.3313	0.3220	0.3208	0.3211	0.3167	0.3127	0.3057
65.0	0.4068	0.4444	0.3967	0.3847	0.3971	0.3869	0.3472	0.3417	0.3397	0.3425	0.3247	0.3124	0.3036	0.3025	0.3029	0.2989	0.2952	0.2886
70.0	0.3841	0.4198	0.3761	0.3638	0.3755	0.3660	0.3286	0.3234	0.3216	0.3243	0.3075	0.2959	0.2876	0.2866	0.2870	0.2833	0.2799	0.2737
80.0	0.3467	0.3792	0.3394	0.3292	0.3399	0.3315	0.2977	0.2932	0.2916	0.2942	0.2790	0.2685	0.2610	0.2603	0.2607	0.2574	0.2544	0.2489
90.0	0.3171	0.3470	0.3111	0.3018	0.3115	0.3040	0.2732	0.2691	0.2678	0.2702	0.2563	0.2467	0.2398	0.2392	0.2397	0.2368	0.2340	0.2291
100.0	0.2930	0.3208	0.2880	0.2794	0.2884	0.2816	0.2532	0.2494	0.2483	0.2506	0.2377	0.2288	0.2225	0.2220	0.2225	0.2199	0.2173	0.2129
150.0	0.2182	0.2392	0.2159	0.2096	0.2163	0.2116	0.1905	0.1878	0.1871	0.1891	0.1795	0.1729	0.1681	0.1679	0.1683	0.1666	0.1646	0.1617
200.0	0.1787	0.1981	0.1791	0.1736	0.1780	0.1754	0.1578	0.1550	0.1555	0.1574	0.1492	0.1470	0.1421	0.1392	0.1398	0.1380	0.1394	0.1346
250.0	0.1560	0.1731	0.1568	0.1520	0.1555	0.1537	0.1383	0.1343	0.1364	0.1381	0.1310	0.1290	0.1248	0.1223	0.1229	0.1208	0.1226	0.1184
300.0	0.1408	0.1560	0.1416	0.1372	0.1404	0.1389	0.1250	0.1203	0.1234	0.1250	0.1185	0.1167	0.1129	0.1108	0.1113	0.1095	0.1110	0.1073
350.0	0.1294	0.1436	0.1306	0.1266	0.1295	0.1281	0.1153	0.1112	0.1139	0.1154	0.1095	0.1077	0.1043	0.1024	0.1028	0.1012	0.1026	0.0992
400.0	0.1209	0.1343	0.1222	0.1184	0.1212	0.1200	0.1080	0.1042	0.1067	0.1081	0.1026	0.1009	0.0977	0.0960	0.0964	0.0949	0.0962	0.0931
450.0	0.1143	0.1270	0.1156	0.1120	0.1148	0.1136	0.1023	0.0988	0.1011	0.1025	0.0972	0.0956	0.0926	0.0910	0.0914	0.0900	0.0912	0.0883
500.0	0.1090	0.1211	0.1104	0.1069	0.1096	0.1085	0.0977	0.0944	0.0966	0.0979	0.0929	0.0913	0.0884	0.0870	0.0874	0.0860	0.0872	0.0844

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	2.255	2.159	2.178	2.198	2.185	2.069	2.011	1.906	1.870	1.825	1.794	1.768	1.707	1.689	1.675	1.681	1.620	1.604
3.0	2.097	2.009	2.026	2.043	2.035	1.931	1.879	1.787	1.756	1.716	1.688	1.665	1.611	1.593	1.580	1.585	1.526	1.511
3.5	1.956	1.875	1.890	1.906	1.901	1.808	1.760	1.678	1.651	1.615	1.589	1.569	1.521	1.504	1.491	1.495	1.439	1.424
4.0	1.833	1.757	1.770	1.785	1.782	1.698	1.654	1.581	1.557	1.524	1.500	1.481	1.438	1.422	1.409	1.413	1.359	1.345
4.5	1.724	1.653	1.665	1.679	1.677	1.600	1.559	1.493	1.472	1.442	1.420	1.403	1.363	1.348	1.335	1.339	1.287	1.274
5.0	1.627	1.561	1.572	1.586	1.586	1.513	1.475	1.415	1.396	1.368	1.347	1.332	1.295	1.281	1.269	1.273	1.223	1.210
5.5	1.541	1.479	1.489	1.501	1.502	1.435	1.400	1.345	1.327	1.301	1.282	1.268	1.234	1.221	1.209	1.212	1.164	1.152
6.0	1.465	1.406	1.415	1.427	1.428	1.366	1.333	1.282	1.265	1.241	1.224	1.210	1.179	1.166	1.154	1.158	1.112	1.100
6.5	1.396	1.340	1.348	1.359	1.362	1.303	1.272	1.224	1.210	1.187	1.170	1.157	1.128	1.116	1.105	1.108	1.064	1.053
7.0	1.333	1.281	1.288	1.299	1.302	1.246	1.217	1.172	1.159	1.138	1.122	1.110	1.082	1.071	1.060	1.063	1.020	1.010
8.0	1.225	1.177	1.184	1.194	1.197	1.148	1.121	1.082	1.070	1.051	1.037	1.026	1.001	0.991	0.981	0.983	0.944	0.934
9.0	1.135	1.091	1.097	1.106	1.110	1.065	1.040	1.005	0.995	0.978	0.965	0.955	0.933	0.924	0.913	0.916	0.879	0.870
10.0	1.058	1.017	1.023	1.031	1.035	0.994	0.972	0.940	0.931	0.915	0.903	0.894	0.874	0.866	0.856	0.858	0.823	0.815
11.0	0.992	0.954	0.959	0.967	0.971	0.933	0.912	0.883	0.875	0.861	0.849	0.841	0.823	0.815	0.806	0.808	0.775	0.767
12.0	0.935	0.899	0.904	0.911	0.915	0.880	0.861	0.834	0.827	0.813	0.803	0.795	0.778	0.771	0.762	0.764	0.733	0.725
15.0	0.7998	0.7694	0.7732	0.7793	0.7842	0.7547	0.7388	0.7173	0.7114	0.7004	0.6916	0.6855	0.6717	0.6661	0.6577	0.6594	0.6324	0.6261
20.0	0.6510	0.6266	0.6295	0.6345	0.6393	0.6161	0.6035	0.5873	0.5831	0.5745	0.5676	0.5628	0.5522	0.5482	0.5408	0.5423	0.5200	0.5149
25.0	0.5536	0.5330	0.5355	0.5397	0.5443	0.5260	0.5146	0.5015	0.4982	0.4912	0.4854	0.4815	0.4728	0.4698	0.4632	0.4645	0.4455	0.4412
30.0	0.4846	0.4667	0.4688	0.4725	0.4768	0.4602	0.4513	0.4403	0.4376	0.4317	0.4267	0.4234	0.4160	0.4136	0.4077	0.4087	0.3921	0.3883
35.0	0.4329	0.4170	0.4188	0.4222	0.4262	0.4116	0.4038	0.3943	0.3920	0.3868	0.3824	0.3796	0.3731	0.3711	0.3657	0.3667	0.3518	0.3485
40.0	0.3926	0.3782	0.3799	0.3829	0.3868	0.3737	0.3667	0.3583	0.3564	0.3518	0.3478	0.3452	0.3395	0.3378	0.3329	0.3337	0.3202	0.3172
45.0	0.3603	0.3471	0.3487	0.3515	0.3552	0.3432	0.3368	0.3294	0.3276	0.3235	0.3199	0.3176	0.3124	0.3110	0.3063	0.3071	0.2947	0.2920
50.0	0.3337	0.3216	0.3230	0.3256	0.3291	0.3181	0.3123	0.3055	0.3040	0.3002	0.2969	0.2948	0.2901	0.2888	0.2844	0.2852	0.2737	0.2712
55.0	0.3114	0.3001	0.3015	0.3039	0.3073	0.2971	0.2917	0.2855	0.2841	0.2806	0.2775	0.2756	0.2712	0.2702	0.2660	0.2668	0.2560	0.2537
60.0	0.2925	0.2819	0.2831	0.2854	0.2887	0.2792	0.2741	0.2684	0.2671	0.2639	0.2610	0.2592	0.2552	0.2542	0.2503	0.2510	0.2409	0.2388
65.0	0.2761	0.2661	0.2673	0.2695	0.2726	0.2637	0.2590	0.2537	0.2525	0.2495	0.2468	0.2451	0.2413	0.2405	0.2367	0.2374	0.2279	0.2259
70.0	0.2619	0.2524	0.2536	0.2556	0.2586	0.2502	0.2457	0.2408	0.2397	0.2369	0.2343	0.2327	0.2292	0.2284	0.2249	0.2255	0.2165	0.2146
80.0	0.2382	0.2296	0.2306	0.2325	0.2353	0.2277	0.2237	0.2193	0.2184	0.2159	0.2135	0.2121	0.2090	0.2083	0.2051	0.2056	0.1974	0.1957
90.0	0.2193	0.2114	0.2123	0.2140	0.2167	0.2097	0.2061	0.2022	0.2013	0.1990	0.1969	0.1956	0.1928	0.1922	0.1892	0.1897	0.1822	0.1806
100.0	0.2038	0.1964	0.1973	0.1989	0.2015	0.1950	0.1917	0.1881	0.1873	0.1852	0.1833	0.1821	0.1795	0.1790	0.1762	0.1767	0.1696	0.1682
150.0	0.1548	0.1492	0.1499	0.1511	0.1532	0.1484	0.1460	0.1435	0.1429	0.1415	0.1400	0.1391	0.1373	0.1369	0.1348	0.1352	0.1298	0.1287
200.0	0.1288	0.1244	0.1244	0.1254	0.1273	0.1233	0.1214	0.1194	0.1190	0.1179	0.1166	0.1160	0.1144	0.1141	0.1124	0.1127	0.1113	0.1077
250.0	0.1134	0.1095	0.1083	0.1092	0.1109	0.1077	0.1067	0.1048	0.1049	0.1037	0.1022	0.1020	0.1009	0.1001	0.0985	0.0989	0.0982	0.0951
300.0	0.1028	0.0993	0.0982	0.0985	0.1000	0.0977	0.0968	0.0951	0.0952	0.0941	0.0928	0.0926	0.0916	0.0909	0.0895	0.0898	0.0892	0.0864
350.0	0.0951	0.0918	0.0909	0.0912	0.0925	0.0904	0.0895	0.0880	0.0881	0.0871	0.0859	0.0857	0.0848	0.0843	0.0829	0.0832	0.0826	0.0801
400.0	.08918	.08615	.08527	.08556	.08685	.08490	.08405	.08266	.08274	.08184	.08068	.08053	.07971	.07916	.07793	.07818	.07758	.07525
450.0	.08458	.08170	.08090	.08117	.08240	.08056	.07975	.07844	.07852	.07767	.07659	.07644	.07567	.07516	.07400	.07424	.07364	.07147
500.0	.08088	.07814	.07739	.07764	.07882	.07707	.07629	.07506	.07514	.07433	.07330	.07316	.07244	.07195	.07085	.07107	.07048	.06844

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{14}_{7}$N IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.280	5.030	7.038	7.000	6.850	8.047	8.710	9.190	9.550	9.900	10.090	10.700	11.050	11.605	11.840	12.067	12.444	12.760
3.0	6.833	6.504	8.790	8.817	8.627	9.929	10.864	11.423	11.830	12.217	12.551	13.290	13.756	14.362	14.615	14.932	15.602	15.795
3.5	8.557	8.135	10.713	10.811	10.575	11.987	13.212	13.853	14.308	14.728	15.216	16.091	16.679	17.338	17.608	18.019	18.971	19.059
4.0	10.450	9.922	12.807	12.981	12.694	14.220	15.756	16.481	16.984	17.435	18.088	19.107	19.820	20.534	20.822	21.330	22.557	22.555
4.5	12.510	11.863	15.072	15.327	14.983	16.628	18.494	19.306	19.859	20.337	21.166	22.337	23.181	23.952	24.257	24.865	26.362	26.284
5.0	14.74	13.95	17.50	17.85	17.44	19.21	21.42	22.33	22.93	23.43	24.45	25.78	26.76	27.59	27.91	28.62	30.39	30.24
5.5	17.12	16.20	20.11	20.54	20.06	21.96	24.55	25.54	26.20	26.72	27.94	29.43	30.55	31.45	31.79	32.61	34.63	34.44
6.0	19.67	18.59	22.87	23.40	22.86	24.89	27.86	28.95	29.66	30.21	31.63	33.30	34.57	35.52	35.88	36.81	39.09	38.86
6.5	22.39	21.13	25.80	26.44	25.81	27.98	31.36	32.55	33.31	33.88	35.52	37.37	38.79	39.81	40.19	41.23	43.77	43.51
7.0	25.26	23.81	28.90	29.64	28.93	31.24	35.05	36.34	37.16	37.74	39.61	41.65	43.23	44.31	44.71	45.87	48.67	48.38
8.0	31.47	29.61	35.58	36.55	35.65	38.26	42.98	44.49	45.42	46.03	48.38	50.83	52.74	53.96	54.39	55.79	59.10	58.80
9.0	38.30	35.98	42.89	44.12	43.02	45.94	51.65	53.37	54.42	55.05	57.93	60.82	63.08	64.44	64.90	66.57	70.37	70.09
10.0	46.74	42.91	50.84	52.34	51.01	54.26	61.03	62.99	64.16	64.80	68.25	71.60	74.23	75.74	76.24	78.17	82.47	82.26
11.0	53.79	50.39	59.40	61.19	59.62	63.22	71.13	73.33	74.63	75.27	79.32	83.17	86.19	87.85	88.39	90.60	95.39	95.27
12.0	62.43	58.41	68.58	70.68	68.84	72.81	81.92	84.38	85.81	86.45	91.14	95.52	98.95	100.76	101.33	103.83	109.12	109.12
15.0	91.86	85.69	99.72	102.86	100.10	105.26	118.39	121.68	123.52	124.11	130.96	137.08	141.87	144.17	144.83	148.27	156.02	155.58
20.0	152.21	141.45	163.20	168.44	163.75	171.19	192.37	197.22	199.82	200.19	211.36	220.92	228.36	231.53	232.32	237.51	246.67	248.73
25.0	226.10	209.57	240.52	248.30	241.20	251.26	282.06	288.71	292.16	292.12	308.45	322.11	332.66	336.73	337.61	344.77	356.34	360.52
30.0	312.97	289.54	331.06	341.78	331.84	344.82	386.74	395.39	399.70	399.15	421.46	439.80	453.93	458.92	459.84	469.16	483.15	490.10
35.0	412.36	380.89	434.31	448.36	435.14	451.32	505.78	516.63	521.88	520.64	549.70	573.32	591.43	597.35	598.28	609.91	626.36	636.38
40.0	523.8	483.3	549.8	567.5	550.6	570.3	638.7	651.9	658.1	656.0	692.6	722.0	744.6	751.4	752.3	766.4	785.3	799.0
45.0	647.0	596.3	677.1	698.9	677.9	701.3	784.9	800.7	807.9	804.9	849.6	885.4	912.7	920.5	921.3	938.0	959.5	977.2
50.0	781.6	719.7	815.9	842.1	816.6	843.9	944.1	962.6	970.9	966.7	1020.3	1063.0	1095.5	1104.2	1104.8	1124.3	1148.4	1170.5
55.0	927.2	853.1	965.8	996.7	966.4	997.9	1115.8	1137.1	1146.6	1141.1	1204.3	1254.3	1292.4	1302.0	1302.4	1324.8	1351.6	1378.4
60.0	1083.6	996.4	1126.5	1162.5	1127.0	1162.9	1299.7	1324.1	1334.7	1327.7	1401.2	1459.1	1503.1	1513.5	1513.7	1539.0	1568.6	1600.4
65.0	1250.	1149.	1298.	1339.	1298.	1339.	1495.	1523.	1535.	1526.	1611.	1677.	1727.	1738.	1738.	1767.	1799.	1836.
70.0	1428.	1311.	1479.	1526.	1479.	1525.	1703.	1734.	1747.	1736.	1832.	1907.	1964.	1976.	1976.	2007.	2043.	2086.
80.0	1812.	1663.	1872.	1932.	1872.	1927.	2151.	2189.	2205.	2190.	2311.	2405.	2476.	2490.	2488.	2527.	2568.	2623.
90.0	2235.	2049.	2304.	2376.	2303.	2369.	2643.	2688.	2706.	2688.	2835.	2949.	3036.	3051.	3049.	3094.	3143.	3210.
100.0	2694.	2469.	2772.	2859.	2770.	2848.	3175.	3229.	3250.	3226.	3403.	3539.	3643.	3659.	3656.	3708.	3764.	3844.
150.0	5504.	5034.	5620.	5793.	5613.	5756.	6408.	6509.	6543.	6487.	6839.	7108.	7314.	7335.	7324.	7417.	7515.	7669.
200.0	9075.	8275.	9208.	9493.	9206.	9420.	10480.	10641.	10681.	10577.	11151.	11491.	11846.	11947.	11924.	12065.	12139.	12450.
250.0	13285.	12070.	13400.	13820.	13434.	13700.	15237.	15512.	15505.	15343.	16177.	16594.	17122.	17331.	17284.	17513.	17514.	18016.
300.0	18024.	16342.	18110.	18680.	18183.	18502.	20574.	21036.	20913.	20684.	21809.	22314.	23034.	23358.	23285.	23614.	23629.	24240.
350.0	23224.	21026.	23267.	24003.	23382.	23769.	26414.	27099.	26827.	26523.	27963.	28568.	29497.	29943.	29839.	30276.	30099.	31034.
400.0	28827.	26072.	28816.	29731.	28975.	29412.	32692.	33611.	33184.	32797.	34575.	35289.	36442.	37014.	36877.	37427.	37155.	38325.
450.0	34787.	31440.	34711.	35816.	34915.	35415.	39358.	40617.	39929.	39453.	41589.	42422.	43810.	44512.	44339.	45008.	44635.	46053.
500.0	41059.	37090.	40912.	42218.	41161.	41727.	46365.	47770.	47019.	46447.	48957.	49919.	51553.	52388.	52176.	52968.	52491.	54167.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.37	13.85	14.91	15.18	15.73	16.50	16.96	17.55	17.92	18.28	18.67	19.10	19.51	19.83	20.29	20.62	25.51	27.34
3.0	16.59	17.21	18.24	18.49	19.05	20.00	20.56	21.35	21.78	22.24	22.69	23.18	23.73	24.10	24.59	24.91	29.96	31.84
3.5	20.05	20.82	21.82	22.04	22.61	23.75	24.41	25.39	25.89	26.44	26.97	27.51	28.20	28.62	29.16	29.46	34.69	36.61
4.0	23.75	24.68	25.65	25.83	26.42	27.75	28.52	29.69	30.26	30.91	31.50	32.10	32.94	33.41	33.99	34.27	39.69	41.67
4.5	27.69	28.79	29.73	29.88	30.47	32.00	32.88	34.25	34.89	35.63	36.30	36.96	37.94	38.47	39.09	39.36	44.99	47.02
5.0	31.87	33.15	34.06	34.17	34.76	36.50	37.50	39.07	39.77	40.62	41.36	42.09	43.21	43.79	44.47	44.73	50.57	52.66
5.5	36.29	37.75	38.64	38.71	39.30	41.25	42.37	44.14	44.92	45.87	46.69	47.48	48.75	49.39	50.13	50.36	56.44	58.59
6.0	40.95	42.61	43.46	43.50	44.08	46.25	47.50	49.48	50.32	51.38	52.28	53.13	54.55	55.26	56.06	56.27	62.59	64.81
6.5	45.85	47.71	48.53	48.53	49.10	51.50	52.87	55.07	55.98	57.14	58.13	59.05	60.62	61.40	62.26	62.46	69.03	71.32
7.0	50.98	53.06	53.84	53.80	54.36	56.99	58.50	60.91	61.90	63.17	64.24	65.22	66.96	67.80	68.73	68.91	75.75	78.11
8.0	61.95	64.47	65.19	65.05	65.59	68.71	70.50	73.35	74.48	75.99	77.24	78.36	80.42	81.40	82.47	82.62	90.04	92.54
9.0	73.83	76.83	77.49	77.25	77.74	81.39	83.47	86.79	88.06	89.81	91.25	92.51	94.91	96.04	97.28	97.38	105.42	108.09
10.0	86.61	90.13	90.71	90.37	90.81	95.01	97.41	101.20	102.62	104.62	106.26	107.68	110.43	111.70	113.12	113.18	121.89	124.73
11.0	100.28	104.35	104.86	104.40	104.78	109.55	112.28	116.57	118.14	120.40	122.26	123.83	126.94	128.38	129.99	130.00	139.43	142.44
12.0	114.83	119.48	119.91	119.33	119.64	126.01	128.09	132.89	134.61	137.15	139.22	140.95	144.44	146.04	147.87	147.83	158.02	161.22
15.0	163.6	170.2	170.3	169.4	169.4	176.7	180.9	187.4	189.6	193.0	195.8	198.0	202.7	204.8	207.4	207.2	219.9	223.8
20.0	261.2	271.6	271.3	269.5	268.9	280.0	286.4	295.9	298.9	304.0	308.2	311.4	318.3	321.3	325.4	324.9	342.7	347.8
25.0	378.3	393.2	392.4	389.6	388.0	403.6	412.5	425.3	429.3	436.3	442.0	446.4	455.8	459.8	465.8	464.9	488.7	495.2
30.0	513.8	533.9	532.5	528.6	525.8	546.4	558.2	574.7	579.6	588.7	596.2	601.8	614.1	619.0	627.3	626.0	656.6	664.7
35.0	666.9	692.9	690.7	685.7	681.4	707.5	722.5	743.0	748.9	760.3	769.9	776.7	792.1	798.0	808.9	807.2	845.5	855.3
40.0	837.0	869.5	866.5	860.0	854.0	886.2	904.7	929.5	936.5	950.3	962.1	970.4	989.0	996.0	1009.9	1007.6	1054.3	1066.2
45.0	1023.3	1062.9	1059.0	1051.1	1043.1	1081.9	1104.1	1133.5	1141.6	1158.1	1172.2	1182.0	1204.2	1212.2	1229.3	1226.4	1282.4	1296.4
50.0	1225.4	1272.6	1267.8	1258.2	1248.0	1294.0	1320.1	1354.3	1363.6	1382.9	1399.6	1411.0	1436.9	1446.0	1466.7	1463.2	1529.1	1545.4
55.0	1442.7	1498.1	1492.3	1480.9	1468.3	1521.8	1552.2	1591.5	1602.0	1624.3	1643.6	1656.8	1686.7	1696.8	1721.3	1717.1	1793.8	1812.4
60.0	1674.7	1738.9	1732.1	1718.8	1703.5	1765.1	1799.9	1844.6	1856.3	1881.7	1903.9	1918.9	1952.9	1964.0	1992.7	1987.8	2075.8	2097.0
65.0	1921.	1995.	1987.	1971.	1953.	2023.	2063.	2113.	2126.	2155.	2180.	2197.	2235.	2247.	2280.	2275.	2375.	2399.
70.0	2182.	2265.	2256.	2238.	2217.	2296.	2340.	2396.	2411.	2443.	2471.	2490.	2533.	2546.	2584.	2577.	2690.	2717.
80.0	2743.	2847.	2835.	2813.	2785.	2883.	2939.	3006.	3024.	3063.	3098.	3121.	3174.	3189.	3237.	3228.	3368.	3401.
90.0	3356.	3483.	3469.	3442.	3406.	3525.	3591.	3672.	3692.	3739.	3782.	3809.	3872.	3890.	3949.	3939.	4107.	4146.
100.0	4019.	4171.	4153.	4121.	4077.	4218.	4296.	4391.	4414.	4469.	4519.	4551.	4625.	4645.	4716.	4703.	4904.	4950.
150.0	8014.	8315.	8279.	8213.	8115.	8388.	8537.	8709.	8748.	8850.	8947.	9007.	9144.	9176.	9318.	9292.	9684.	9770.
200.0	13008.	13492.	13438.	13330.	13160.	13595.	13830.	14091.	14150.	14306.	14460.	14553.	14765.	14812.	15042.	14999.	15494.	15760.
250.0	18822.	19512.	19491.	19334.	19075.	19697.	20011.	20380.	20441.	20667.	20903.	21021.	21307.	21395.	21727.	21662.	22216.	22706.
300.0	25322.	26241.	26296.	26108.	25748.	26536.	26918.	27408.	27465.	27770.	28112.	28242.	28607.	28748.	29198.	29108.	29714.	30446.
350.0	32416.	33586.	33719.	33506.	33037.	33993.	34450.	35071.	35121.	35511.	35967.	36110.	36561.	36757.	37335.	37218.	37884.	38876.
400.0	40028.	41466.	41682.	41442.	40854.	41991.	42529.	43286.	43329.	43810.	44385.	44544.	45083.	45339.	46053.	45907.	46639.	47904.
450.0	48095.	49818.	50117.	49849.	49136.	50463.	51086.	51987.	52022.	52597.	53299.	53473.	54104.	54422.	55279.	55103.	55907.	57457.
500.0	56564.	58585.	58971.	58673.	57827.	59353.	60067.	61116.	61141.	61816.	62648.	62840.	63565.	63947.	64952.	64747.	65630.	67473.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{16}_{8}$O IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.038	6.336	5.272	5.079	5.189	4.881	4.258	4.101	4.011	3.940	3.707	3.519	3.362	3.297	3.275	3.168	2.857	2.988
3.0	5.430	5.716	4.812	4.638	4.744	4.478	3.918	3.782	3.705	3.650	3.438	3.267	3.129	3.071	3.051	2.956	2.696	2.792
3.5	4.937	5.211	4.423	4.266	4.367	4.133	3.624	3.505	3.438	3.395	3.199	3.044	2.920	2.868	2.851	2.765	2.544	2.616
4.0	4.529	4.792	4.092	3.948	4.045	3.837	3.371	3.264	3.206	3.172	2.990	2.848	2.735	2.688	2.673	2.596	2.404	2.469
4.5	4.188	4.440	3.809	3.676	3.768	3.581	3.151	3.055	3.003	2.976	2.806	2.675	2.572	2.528	2.515	2.445	2.277	2.319
5.0	3.896	4.138	3.563	3.440	3.528	3.359	2.959	2.871	2.824	2.803	2.644	2.522	2.427	2.387	2.378	2.311	2.163	2.193
5.5	3.645	3.878	3.349	3.234	3.318	3.163	2.789	2.710	2.667	2.649	2.500	2.386	2.298	2.261	2.251	2.191	2.059	2.081
6.0	3.426	3.650	3.160	3.052	3.133	2.990	2.639	2.566	2.527	2.513	2.372	2.264	2.182	2.148	2.139	2.083	1.965	1.981
6.5	3.234	3.449	2.992	2.891	2.968	2.836	2.506	2.437	2.402	2.390	2.257	2.155	2.078	2.047	2.039	1.986	1.880	1.890
7.0	3.063	3.271	2.842	2.746	2.821	2.698	2.385	2.322	2.289	2.280	2.153	2.057	1.984	1.955	1.948	1.899	1.802	1.807
8.0	2.774	2.968	2.586	2.500	2.569	2.460	2.179	2.123	2.094	2.088	1.973	1.886	1.821	1.796	1.789	1.746	1.665	1.664
9.0	2.538	2.720	2.375	2.296	2.361	2.264	2.007	1.958	1.932	1.929	1.823	1.743	1.685	1.662	1.657	1.618	1.549	1.543
10.0	2.342	2.514	2.198	2.126	2.186	2.099	1.863	1.818	1.795	1.794	1.696	1.623	1.569	1.549	1.544	1.509	1.449	1.440
11.0	2.175	2.338	2.048	1.980	2.037	1.958	1.739	1.698	1.678	1.678	1.586	1.519	1.469	1.451	1.447	1.415	1.362	1.351
12.0	2.033	2.188	1.918	1.855	1.909	1.837	1.632	1.595	1.577	1.577	1.491	1.428	1.382	1.366	1.363	1.333	1.287	1.274
15.0	1.705	1.840	1.618	1.565	1.612	1.554	1.383	1.354	1.339	1.342	1.269	1.217	1.179	1.166	1.164	1.140	1.106	1.091
20.0	1.356	1.468	1.294	1.253	1.291	1.248	1.113	1.091	1.080	1.084	1.026	0.984	0.955	0.946	0.945	0.927	0.905	0.889
25.0	1.134	1.230	1.087	1.052	1.085	1.051	0.938	0.920	0.913	0.917	0.868	0.833	0.809	0.802	0.802	0.787	0.771	0.756
30.0	0.979	1.064	0.942	0.912	0.941	0.912	0.816	0.801	0.795	0.799	0.757	0.727	0.705	0.700	0.700	0.688	0.676	0.662
35.0	0.866	0.942	0.835	0.809	0.835	0.810	0.725	0.712	0.707	0.711	0.674	0.647	0.628	0.624	0.624	0.614	0.604	0.591
40.0	0.7781	0.8472	0.7524	0.7292	0.7525	0.7309	0.6545	0.6432	0.6386	0.6427	0.6091	0.5853	0.5686	0.5653	0.5655	0.5568	0.5483	0.5360
45.0	0.7086	0.7722	0.6867	0.6656	0.6870	0.6677	0.5983	0.5882	0.5842	0.5882	0.5575	0.5359	0.5206	0.5179	0.5183	0.5105	0.5032	0.4918
50.0	0.6520	0.7110	0.6330	0.6136	0.6334	0.6161	0.5523	0.5431	0.5396	0.5435	0.5152	0.4954	0.4813	0.4791	0.4795	0.4725	0.4661	0.4555
55.0	0.6049	0.6601	0.5884	0.5704	0.5888	0.5731	0.5140	0.5055	0.5024	0.5062	0.4799	0.4615	0.4484	0.4465	0.4470	0.4407	0.4350	0.4251
60.0	0.5652	0.6170	0.5505	0.5338	0.5511	0.5366	0.4814	0.4737	0.4708	0.4746	0.4499	0.4327	0.4205	0.4189	0.4194	0.4137	0.4084	0.3992
65.0	0.5311	0.5800	0.5181	0.5024	0.5186	0.5052	0.4534	0.4462	0.4437	0.4472	0.4241	0.4080	0.3965	0.3951	0.3956	0.3903	0.3855	0.3769
70.0	0.5015	0.5480	0.4899	0.4751	0.4905	0.4780	0.4291	0.4224	0.4201	0.4235	0.4016	0.3864	0.3756	0.3743	0.3749	0.3700	0.3655	0.3574
80.0	0.4528	0.4950	0.4433	0.4300	0.4439	0.4329	0.3889	0.3829	0.3809	0.3842	0.3644	0.3507	0.3408	0.3399	0.3405	0.3362	0.3323	0.3250
90.0	0.4141	0.4530	0.4063	0.3941	0.4069	0.3971	0.3568	0.3514	0.3497	0.3529	0.3347	0.3222	0.3132	0.3125	0.3130	0.3092	0.3057	0.2992
100.0	0.3827	0.4188	0.3761	0.3649	0.3767	0.3678	0.3307	0.3258	0.3242	0.3273	0.3105	0.2989	0.2906	0.2900	0.2905	0.2872	0.2839	0.2780
150.0	0.2849	0.3124	0.2820	0.2738	0.2825	0.2763	0.2488	0.2453	0.2444	0.2470	0.2344	0.2258	0.2195	0.2193	0.2198	0.2176	0.2150	0.2112
200.0	0.2334	0.2587	0.2340	0.2267	0.2325	0.2291	0.2060	0.2024	0.2031	0.2055	0.1949	0.1920	0.1857	0.1819	0.1826	0.1802	0.1821	0.1757
250.0	0.2037	0.2260	0.2048	0.1985	0.2031	0.2008	0.1806	0.1755	0.1782	0.1804	0.1711	0.1685	0.1630	0.1598	0.1605	0.1578	0.1601	0.1547
300.0	0.1836	0.2037	0.1849	0.1792	0.1834	0.1814	0.1633	0.1572	0.1612	0.1632	0.1548	0.1524	0.1475	0.1447	0.1453	0.1430	0.1450	0.1402
350.0	0.1690	0.1876	0.1705	0.1652	0.1692	0.1673	0.1507	0.1452	0.1488	0.1507	0.1430	0.1407	0.1362	0.1337	0.1343	0.1322	0.1340	0.1296
400.0	0.1579	0.1754	0.1596	0.1546	0.1584	0.1567	0.1411	0.1361	0.1394	0.1412	0.1340	0.1318	0.1276	0.1254	0.1260	0.1240	0.1256	0.1216
450.0	0.1493	0.1658	0.1510	0.1463	0.1499	0.1483	0.1336	0.1290	0.1320	0.1338	0.1270	0.1249	0.1209	0.1188	0.1194	0.1175	0.1191	0.1153
500.0	0.1424	0.1582	0.1442	0.1398	0.1431	0.1417	0.1278	0.1233	0.1261	0.1279	0.1214	0.1193	0.1155	0.1136	0.1142	0.1124	0.1139	0.1103

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	2.811	2.690	2.713	2.737	2.721	2.576	2.503	2.372	2.327	2.271	2.232	2.199	2.124	2.100	2.083	2.090	2.014	1.993
3.0	2.633	2.522	2.542	2.564	2.553	2.423	2.357	2.241	2.202	2.152	2.116	2.087	2.020	1.997	1.980	1.986	1.912	1.892
3.5	2.471	2.368	2.386	2.406	2.399	2.281	2.220	2.118	2.083	2.037	2.005	1.979	1.918	1.898	1.879	1.885	1.813	1.795
4.0	2.325	2.229	2.245	2.264	2.260	2.152	2.096	2.004	1.973	1.931	1.901	1.877	1.822	1.802	1.785	1.791	1.721	1.703
4.5	2.195	2.105	2.119	2.137	2.135	2.036	1.984	1.900	1.872	1.834	1.806	1.784	1.734	1.714	1.698	1.703	1.637	1.620
5.0	2.078	1.994	2.007	2.023	2.023	1.931	1.883	1.806	1.781	1.745	1.719	1.699	1.653	1.635	1.619	1.623	1.559	1.543
5.5	1.973	1.894	1.906	1.922	1.923	1.837	1.792	1.721	1.698	1.665	1.641	1.622	1.579	1.562	1.546	1.550	1.489	1.474
6.0	1.879	1.804	1.815	1.830	1.832	1.752	1.709	1.643	1.623	1.592	1.569	1.551	1.511	1.495	1.480	1.484	1.425	1.410
6.5	1.794	1.722	1.733	1.747	1.750	1.674	1.634	1.573	1.554	1.525	1.503	1.487	1.449	1.434	1.419	1.423	1.366	1.352
7.0	1.716	1.648	1.658	1.672	1.675	1.604	1.566	1.509	1.491	1.464	1.443	1.428	1.392	1.378	1.363	1.367	1.312	1.298
8.0	1.581	1.519	1.528	1.540	1.545	1.481	1.446	1.396	1.380	1.356	1.337	1.323	1.292	1.279	1.265	1.268	1.217	1.204
9.0	1.468	1.410	1.418	1.430	1.435	1.376	1.345	1.300	1.286	1.264	1.247	1.234	1.206	1.194	1.181	1.184	1.136	1.124
10.0	1.371	1.317	1.324	1.335	1.341	1.287	1.258	1.217	1.205	1.185	1.169	1.158	1.132	1.121	1.108	1.111	1.066	1.055
11.0	1.287	1.237	1.243	1.253	1.259	1.210	1.183	1.145	1.135	1.116	1.101	1.091	1.067	1.057	1.044	1.047	1.004	0.994
12.0	1.213	1.167	1.173	1.182	1.188	1.142	1.117	1.082	1.073	1.055	1.042	1.032	1.010	1.001	0.989	0.991	0.951	0.941
15.0	1.040	1.001	1.006	1.014	1.020	0.982	0.961	0.933	0.925	0.911	0.899	0.891	0.873	0.866	0.855	0.858	0.822	0.814
20.0	0.848	0.816	0.820	0.827	0.833	0.803	0.786	0.765	0.760	0.749	0.740	0.733	0.720	0.714	0.705	0.707	0.678	0.671
25.0	0.722	0.695	0.698	0.704	0.710	0.685	0.671	0.654	0.650	0.641	0.633	0.628	0.617	0.613	0.604	0.606	0.581	0.575
30.0	0.632	0.609	0.612	0.617	0.622	0.601	0.589	0.575	0.571	0.563	0.557	0.552	0.543	0.540	0.532	0.533	0.512	0.507
35.0	0.565	0.544	0.547	0.551	0.556	0.537	0.527	0.515	0.512	0.505	0.499	0.495	0.487	0.484	0.477	0.479	0.459	0.455
40.0	0.5126	0.4938	0.4960	0.5000	0.5050	0.4879	0.4787	0.4678	0.4652	0.4593	0.4541	0.4507	0.4433	0.4411	0.4346	0.4357	0.4180	0.4142
45.0	0.4704	0.4533	0.4553	0.4589	0.4637	0.4482	0.4398	0.4301	0.4278	0.4224	0.4177	0.4147	0.4079	0.4061	0.4000	0.4011	0.3848	0.3813
50.0	0.4358	0.4199	0.4218	0.4251	0.4298	0.4154	0.4078	0.3990	0.3969	0.3920	0.3876	0.3849	0.3788	0.3771	0.3714	0.3724	0.3574	0.3542
55.0	0.4067	0.3919	0.3937	0.3968	0.4013	0.3880	0.3809	0.3728	0.3710	0.3664	0.3624	0.3599	0.3542	0.3528	0.3474	0.3484	0.3343	0.3313
60.0	0.3820	0.3681	0.3698	0.3727	0.3770	0.3646	0.3580	0.3505	0.3488	0.3446	0.3409	0.3385	0.3333	0.3320	0.3269	0.3278	0.3146	0.3118
65.0	0.3607	0.3476	0.3491	0.3519	0.3560	0.3444	0.3382	0.3313	0.3297	0.3258	0.3223	0.3201	0.3152	0.3140	0.3092	0.3100	0.2976	0.2950
70.0	0.3420	0.3297	0.3311	0.3338	0.3378	0.3267	0.3209	0.3145	0.3130	0.3094	0.3060	0.3039	0.2993	0.2983	0.2937	0.2945	0.2827	0.2802
80.0	0.3111	0.2999	0.3012	0.3037	0.3074	0.2974	0.2922	0.2865	0.2852	0.2819	0.2789	0.2771	0.2729	0.2721	0.2678	0.2686	0.2579	0.2556
90.0	0.2864	0.2781	0.2773	0.2795	0.2830	0.2739	0.2692	0.2640	0.2629	0.2600	0.2572	0.2555	0.2518	0.2510	0.2471	0.2478	0.2379	0.2359
100.0	0.2661	0.2585	0.2577	0.2598	0.2631	0.2547	0.2503	0.2456	0.2446	0.2419	0.2394	0.2378	0.2344	0.2337	0.2301	0.2307	0.2215	0.2197
150.0	0.2022	0.1949	0.1958	0.1974	0.2001	0.1938	0.1907	0.1874	0.1867	0.1848	0.1829	0.1817	0.1793	0.1788	0.1760	0.1766	0.1695	0.1681
200.0	0.1683	0.1625	0.1625	0.1638	0.1662	0.1611	0.1585	0.1560	0.1555	0.1539	0.1524	0.1514	0.1495	0.1490	0.1468	0.1472	0.1453	0.1406
250.0	0.1481	0.1430	0.1416	0.1426	0.1448	0.1407	0.1393	0.1369	0.1370	0.1354	0.1334	0.1332	0.1317	0.1308	0.1287	0.1291	0.1282	0.1242
300.0	0.1342	0.1297	0.1283	0.1287	0.1306	0.1276	0.1264	0.1242	0.1243	0.1229	0.1211	0.1209	0.1196	0.1188	0.1169	0.1173	0.1165	0.1128
350.0	0.1242	0.1199	0.1187	0.1191	0.1209	0.1181	0.1170	0.1150	0.1151	0.1138	0.1122	0.1120	0.1108	0.1100	0.1083	0.1087	0.1079	0.1046
400.0	0.1165	0.1125	0.1114	0.1117	0.1134	0.1109	0.1098	0.1080	0.1081	0.1069	0.1054	0.1052	0.1041	0.1034	0.1018	0.1021	0.1013	0.0983
450.0	0.1105	0.1067	0.1057	0.1060	0.1076	0.1052	0.1042	0.1025	0.1026	0.1015	0.1000	0.0998	0.0988	0.0982	0.0967	0.0970	0.0962	0.0934
500.0	0.1056	0.1021	0.1011	0.1014	0.1030	0.1007	0.0998	0.0980	0.0981	0.0971	0.0957	0.0956	0.0946	0.0940	0.0925	0.0928	0.0921	0.0894

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{16}_{8}O$ IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.970	4.740	6.625	6.590	6.450	7.597	8.230	8.688	9.030	9.360	9.540	10.120	10.450	10.970	11.190	11.403	11.760	12.060
3.0	6.369	6.071	8.215	8.240	8.064	9.310	10.190	10.721	11.106	11.471	11.782	12.481	12.918	13.485	13.722	14.018	14.643	14.831
3.5	7.916	7.539	9.951	10.040	9.823	11.171	12.314	12.920	13.349	13.744	14.196	15.019	15.566	16.183	16.436	16.817	17.699	17.792
4.0	9.610	9.141	11.833	11.991	11.728	13.181	14.605	15.286	15.760	16.183	16.784	17.737	18.398	19.066	19.335	19.805	20.935	20.948
4.5	11.448	10.877	13.860	14.092	13.778	15.340	17.061	17.821	18.340	18.789	19.547	20.637	21.416	22.136	22.422	22.982	24.355	24.300
5.0	13.43	12.74	16.03	16.34	15.97	17.65	19.68	20.52	21.09	21.56	22.48	23.72	24.62	25.39	25.70	26.35	27.96	27.85
5.5	15.55	14.74	18.35	18.74	18.31	20.10	22.47	23.39	24.00	24.50	25.60	26.98	28.01	28.84	29.16	29.91	31.75	31.59
6.0	17.82	16.87	20.81	21.29	20.80	22.71	25.42	26.43	27.09	27.60	28.88	30.43	31.58	32.47	32.80	33.66	35.73	35.54
6.5	20.22	19.13	23.41	23.98	23.42	25.46	28.53	29.63	30.34	30.86	32.34	34.05	35.34	36.29	36.64	37.59	39.89	39.67
7.0	22.77	21.51	26.16	26.82	26.19	28.36	31.80	32.99	33.75	34.29	36.97	37.85	39.28	40.29	40.65	41.71	44.24	44.00
8.0	28.26	26.65	32.07	32.94	32.14	34.57	38.83	40.21	41.07	41.63	43.75	45.98	47.71	48.83	49.23	50.50	53.49	53.24
9.0	34.30	32.29	38.53	39.62	38.64	41.35	46.49	48.06	49.03	49.61	52.19	54.81	56.85	58.10	58.53	60.03	63.46	63.23
10.0	40.87	38.41	45.54	46.87	45.69	48.70	54.77	56.55	57.62	58.22	61.30	64.33	66.70	68.08	68.64	70.28	74.15	73.97
11.0	47.96	45.02	53.08	54.68	53.28	56.59	63.66	65.66	66.85	67.45	71.06	74.53	77.24	78.76	79.25	81.24	85.54	85.45
12.0	55.58	52.09	61.16	63.03	61.39	65.03	73.17	75.39	76.69	77.29	81.47	85.40	88.48	90.13	90.65	92.89	97.63	97.65
15.0	81.47	76.12	88.53	91.31	88.87	93.56	105.23	108.19	109.85	110.40	116.48	121.95	126.22	128.30	128.91	131.97	138.00	138.51
20.0	134.47	125.16	144.22	148.86	144.72	151.42	170.15	174.48	176.80	177.17	187.03	195.53	202.13	204.97	205.69	210.30	218.44	220.26
25.0	199.29	184.98	211.99	218.84	212.60	221.60	248.76	254.67	257.72	257.75	272.14	284.22	293.55	297.19	297.98	304.32	314.57	318.25
30.0	275.46	255.13	291.30	300.73	291.99	303.55	340.50	348.11	351.94	351.50	371.13	387.32	399.77	404.22	405.06	413.27	425.65	431.68
35.0	362.54	335.23	381.70	394.04	382.44	396.80	444.69	454.27	458.92	457.88	483.52	504.23	520.17	525.43	526.27	536.52	551.06	559.85
40.0	460.2	424.9	482.8	498.4	483.5	500.9	561.0	572.7	578.2	576.4	608.5	634.4	654.2	660.3	661.1	673.5	690.2	702.2
45.0	568.1	524.0	594.2	613.4	595.0	615.6	689.0	702.9	709.3	706.7	746.0	777.4	801.4	808.3	809.0	823.7	842.7	858.2
50.0	685.9	632.1	715.7	738.7	716.4	740.5	828.3	844.6	852.0	848.3	895.4	932.9	961.4	969.1	969.7	986.8	1008.0	1027.4
55.0	813.4	748.9	846.9	874.0	847.5	875.2	978.6	997.4	1005.7	1000.9	1056.4	1100.3	1133.7	1142.2	1142.6	1162.2	1185.8	1209.3
60.0	950.3	874.4	987.6	1019.1	988.0	1019.6	1139.5	1161.0	1170.3	1164.3	1228.7	1279.4	1318.1	1327.3	1327.5	1349.7	1375.8	1403.6
65.0	1096.	1008.	1137.	1174.	1138.	1173.	1311.	1335.	1345.	1338.	1412.	1470.	1514.	1524.	1524.	1549.	1577.	1610.
70.0	1251.	1150.	1296.	1337.	1296.	1336.	1492.	1519.	1531.	1522.	1606.	1672.	1722.	1732.	1732.	1760.	1791.	1828.
80.0	1588.	1458.	1640.	1692.	1640.	1688.	1885.	1918.	1931.	1919.	2025.	2107.	2169.	2181.	2180.	2214.	2250.	2298.
90.0	1958.	1796.	2018.	2081.	2017.	2075.	2315.	2355.	2370.	2354.	2483.	2584.	2660.	2673.	2671.	2711.	2753.	2812.
100.0	2360.	2164.	2427.	2504.	2426.	2494.	2781.	2828.	2846.	2826.	2980.	3100.	3191.	3205.	3202.	3248.	3297.	3367.
150.0	4819.	4408.	4919.	5071.	4914.	5039.	5610.	5698.	5728.	5679.	5987.	6222.	6403.	6421.	6411.	6493.	6579.	6713.
200.0	7943.	7244.	8059.	8309.	8057.	8245.	9172.	9313.	9348.	9258.	9760.	10057.	10368.	10457.	10437.	10560.	10625.	10897.
250.0	11627.	10566.	11727.	12095.	11757.	11989.	13335.	13576.	13569.	13428.	14158.	14523.	14985.	15167.	15127.	15327.	15328.	15767.
300.0	15774.	14303.	15848.	16347.	15912.	16192.	18005.	18409.	18301.	18101.	19085.	19527.	20158.	20441.	20378.	20661.	20592.	21214.
350.0	20324.	18402.	20361.	21005.	20461.	20791.	23114.	23714.	23476.	23210.	24471.	25000.	25813.	26203.	26112.	26494.	26340.	27159.
400.0	25227.	22817.	25216.	26017.	25355.	25738.	28608.	29412.	29038.	28700.	30256.	30881.	31890.	32390.	32270.	32752.	32514.	33538.
450.0	30441.	27513.	30374.	31341.	30552.	30990.	34440.	35455.	34941.	34524.	36393.	37122.	38337.	38951.	38800.	39385.	39036.	40300.
500.0	35929.	32458.	35800.	36943.	36018.	36513.	40572.	41801.	41144.	40644.	42841.	43682.	45111.	45843.	45657.	46351.	45933.	47399.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.64	13.10	14.10	14.37	14.88	15.62	16.07	16.65	17.00	17.34	17.70	18.08	18.46	18.81	19.25	19.41	20.77	21.20
3.0	15.58	16.17	17.15	17.39	17.92	18.83	19.36	20.12	20.53	20.96	21.38	21.82	22.33	22.72	23.19	23.33	24.84	25.32
3.5	18.72	19.44	20.40	20.61	21.15	22.23	22.86	23.79	24.27	24.78	25.27	25.75	26.39	26.83	27.34	27.47	29.14	29.66
4.0	22.06	22.93	23.86	24.04	24.59	25.84	26.57	27.68	28.22	28.82	29.36	29.91	30.67	31.16	31.71	31.82	33.67	34.24
4.5	25.60	26.62	27.53	27.68	28.23	29.66	30.50	31.78	32.38	33.07	33.68	34.28	35.17	35.71	36.30	36.40	38.44	39.05
5.0	29.35	30.53	31.41	31.52	32.08	33.70	34.64	36.10	36.76	37.54	38.22	38.87	39.90	40.49	41.13	41.22	43.45	44.12
5.5	33.30	34.65	35.50	35.58	36.14	37.95	38.99	40.64	41.36	42.24	42.99	43.69	44.86	45.50	46.19	46.26	48.70	49.42
6.0	37.46	38.98	39.80	39.85	40.41	42.41	43.57	45.40	46.18	47.15	47.98	48.74	50.04	50.73	51.48	51.54	54.19	54.97
6.5	41.82	43.52	44.31	44.33	44.88	47.08	48.35	50.37	51.22	52.29	53.19	54.01	55.44	56.20	57.00	57.04	59.93	60.77
7.0	46.38	48.26	49.04	49.01	49.55	51.97	53.36	55.57	56.48	57.64	58.62	59.50	61.08	61.89	62.75	62.78	65.91	66.81
8.0	56.10	58.38	59.10	58.99	59.51	62.36	64.00	66.60	67.64	69.01	70.15	71.15	73.02	73.96	74.95	74.94	78.58	79.61
9.0	66.61	69.32	69.97	69.78	70.26	73.57	75.47	78.49	79.66	81.24	82.55	83.68	85.84	86.91	88.05	88.01	92.20	93.37
10.0	77.90	81.07	81.66	81.37	81.80	85.60	87.78	91.22	92.52	94.33	95.81	97.07	99.55	100.75	102.05	101.97	106.75	108.08
11.0	89.95	93.61	94.13	93.75	94.13	98.43	100.90	104.78	106.21	108.25	109.92	111.32	114.12	115.46	116.93	116.81	122.22	123.71
12.0	102.76	106.93	107.39	106.90	107.21	112.05	114.83	119.16	120.72	123.00	124.87	126.41	129.54	131.02	132.68	132.52	138.60	140.26
15.0	145.6	151.5	151.7	150.9	151.0	157.5	161.3	167.1	169.1	172.1	174.6	176.6	180.8	182.7	186.0	184.7	193.1	195.3
20.0	231.3	240.6	240.4	238.8	238.3	248.2	253.9	262.3	265.0	269.6	273.3	276.1	282.3	286.0	288.7	288.1	300.8	304.1
25.0	333.9	347.1	346.5	344.1	342.7	356.5	364.4	376.8	379.3	385.5	390.6	394.4	402.8	406.4	411.7	410.8	428.8	433.3
30.0	452.7	470.4	469.2	465.9	463.4	481.6	492.0	506.6	511.0	519.0	525.7	530.6	541.4	545.9	553.2	551.9	575.9	581.9
35.0	586.7	609.7	607.8	603.4	599.6	622.7	635.9	654.0	659.3	669.3	677.7	683.8	697.3	702.6	712.2	710.5	741.3	748.8
40.0	735.6	764.4	761.7	756.0	750.8	779.2	796.4	817.3	823.5	835.7	846.0	853.3	869.7	875.9	888.1	886.0	924.1	933.4
45.0	898.7	933.5	930.2	923.2	916.3	950.4	969.9	995.8	1003.0	1017.5	1029.9	1038.5	1058.1	1065.2	1080.2	1077.6	1123.8	1134.9
50.0	1075.8	1117.0	1112.9	1104.5	1095.7	1136.0	1159.0	1189.1	1197.3	1214.3	1228.9	1239.0	1261.8	1269.8	1288.6	1285.4	1339.7	1352.8
55.0	1265.7	1314.4	1309.4	1299.4	1288.5	1335.5	1362.1	1396.7	1405.9	1425.5	1442.5	1454.1	1480.3	1489.2	1510.8	1507.0	1571.3	1586.5
60.0	1468.8	1525.1	1519.2	1507.6	1494.3	1548.3	1578.9	1618.1	1628.5	1650.8	1670.3	1683.4	1713.3	1723.1	1748.3	1743.9	1818.1	1835.5
65.0	1684.	1749.	1742.	1729.	1713.	1774.	1809.	1853.	1864.	1890.	1912.	1927.	1960.	1971.	2000.	1995.	2080.	2099.
70.0	1912.	1985.	1977.	1962.	1944.	2013.	2052.	2101.	2114.	2142.	2167.	2183.	2221.	2233.	2266.	2260.	2356.	2378.
80.0	2404.	2495.	2485.	2465.	2441.	2527.	2575.	2635.	2650.	2684.	2715.	2735.	2781.	2795.	2837.	2830.	2949.	2976.
90.0	2940.	3052.	3039.	3015.	2984.	3088.	3146.	3217.	3235.	3276.	3313.	3337.	3392.	3408.	3460.	3450.	3596.	3629.
100.0	3520.	3653.	3638.	3609.	3571.	3695.	3764.	3846.	3866.	3915.	3959.	3987.	4052.	4069.	4131.	4120.	4293.	4332.
150.0	7016.	7279.	7248.	7190.	7104.	7343.	7474.	7624.	7659.	7748.	7833.	7886.	8006.	8033.	8158.	8136.	8475.	8549.
200.0	11386.	11810.	11762.	11668.	11519.	11900.	12106.	12334.	12385.	12522.	12657.	12739.	12924.	12965.	13167.	13129.	13559.	13791.
250.0	16473.	17077.	17059.	16921.	16695.	17239.	17514.	17837.	17890.	18069.	18295.	18398.	18649.	18725.	19016.	18959.	19441.	19867.
300.0	22161.	22965.	23013.	22848.	22534.	23223.	23567.	23987.	24036.	24303.	24603.	24716.	25036.	25159.	25553.	25474.	26002.	26642.
350.0	28367.	29392.	29508.	29322.	28911.	29748.	30148.	30691.	30735.	31077.	31475.	31601.	31995.	32167.	32673.	32571.	33150.	34018.
400.0	35028.	36287.	36475.	36265.	35751.	36746.	37217.	37880.	37918.	38338.	38842.	38980.	39452.	39676.	40301.	40173.	40811.	41918.
450.0	42087.	43594.	43857.	43622.	42998.	44159.	44705.	45493.	45523.	46027.	46641.	46794.	47346.	47625.	48374.	48220.	48921.	50276.
500.0	49497.	51263.	51603.	51343.	50603.	51938.	52563.	53481.	53503.	54094.	54821.	54990.	55624.	55959.	56838.	56659.	57428.	59040.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{19}_{9}F$ IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	7.405	7.749	6.403	6.166	6.298	5.913	5.156	4.963	4.852	4.764	4.462	4.252	4.062	3.981	3.953	3.823	3.447	3.601
3.0	6.687	7.021	5.880	5.666	5.793	5.460	4.776	4.607	4.512	4.444	4.184	3.975	3.806	3.733	3.709	3.593	3.275	3.392
3.5	6.099	6.423	5.430	5.236	5.358	5.065	4.440	4.292	4.209	4.155	3.915	3.724	3.571	3.505	3.484	3.379	3.107	3.196
4.0	5.611	5.923	5.043	4.865	4.982	4.721	4.146	4.014	3.941	3.898	3.674	3.498	3.359	3.300	3.281	3.185	2.950	3.016
4.5	5.198	5.499	4.708	4.543	4.656	4.421	3.888	3.769	3.703	3.669	3.460	3.297	3.169	3.115	3.098	3.011	2.804	2.855
5.0	4.845	5.135	4.416	4.262	4.370	4.157	3.661	3.552	3.493	3.466	3.269	3.117	2.999	2.950	2.935	2.854	2.671	2.709
5.5	4.540	4.819	4.159	4.015	4.119	3.923	3.459	3.360	3.306	3.284	3.099	2.956	2.846	2.801	2.788	2.713	2.550	2.577
6.0	4.273	4.542	3.931	3.797	3.896	3.716	3.280	3.188	3.139	3.121	2.946	2.811	2.709	2.667	2.655	2.585	2.438	2.457
6.5	4.037	4.298	3.729	3.602	3.697	3.530	3.119	3.033	2.988	2.974	2.807	2.681	2.585	2.545	2.534	2.469	2.337	2.349
7.0	3.828	4.080	3.547	3.427	3.519	3.363	2.974	2.894	2.852	2.840	2.682	2.562	2.472	2.436	2.425	2.364	2.243	2.260
8.0	3.473	3.709	3.235	3.126	3.212	3.075	2.722	2.652	2.616	2.609	2.464	2.355	2.274	2.242	2.234	2.180	2.078	2.077
9.0	3.181	3.404	2.976	2.877	2.957	2.835	2.513	2.450	2.419	2.414	2.281	2.182	2.108	2.080	2.073	2.024	1.937	1.930
10.0	2.938	3.149	2.758	2.667	2.742	2.632	2.336	2.279	2.251	2.249	2.125	2.034	1.966	1.941	1.935	1.891	1.816	1.804
11.0	2.732	2.932	2.572	2.487	2.559	2.459	2.183	2.132	2.106	2.106	1.991	1.906	1.844	1.821	1.816	1.775	1.709	1.695
12.0	2.555	2.745	2.411	2.332	2.400	2.308	2.051	2.004	1.981	1.982	1.874	1.794	1.737	1.716	1.711	1.674	1.616	1.600
15.0	2.147	2.314	2.038	1.972	2.031	1.957	1.742	1.705	1.687	1.690	1.599	1.532	1.484	1.468	1.465	1.435	1.393	1.374
20.0	1.710	1.849	1.633	1.581	1.630	1.575	1.405	1.376	1.363	1.368	1.295	1.242	1.205	1.194	1.192	1.170	1.142	1.121
25.0	1.431	1.551	1.373	1.330	1.371	1.327	1.186	1.163	1.153	1.158	1.097	1.063	1.021	1.013	1.013	0.995	0.974	0.955
30.0	1.237	1.343	1.191	1.154	1.190	1.153	1.031	1.012	1.004	1.010	0.956	0.918	0.892	0.885	0.885	0.870	0.854	0.836
35.0	1.094	1.189	1.056	1.023	1.056	1.024	0.917	0.900	0.894	0.899	0.852	0.818	0.795	0.790	0.790	0.777	0.764	0.747
40.0	0.984	1.070	0.952	0.922	0.952	0.924	0.828	0.814	0.808	0.813	0.770	0.740	0.719	0.715	0.715	0.704	0.694	0.678
45.0	0.896	0.976	0.869	0.842	0.869	0.845	0.757	0.744	0.739	0.744	0.705	0.678	0.659	0.655	0.656	0.646	0.637	0.622
50.0	0.825	0.899	0.801	0.776	0.801	0.780	0.699	0.687	0.683	0.688	0.652	0.627	0.609	0.606	0.607	0.598	0.590	0.576
55.0	0.765	0.834	0.744	0.722	0.745	0.725	0.650	0.640	0.636	0.640	0.607	0.584	0.567	0.565	0.566	0.558	0.550	0.538
60.0	0.715	0.780	0.697	0.675	0.697	0.679	0.609	0.599	0.596	0.600	0.569	0.548	0.532	0.530	0.531	0.523	0.517	0.505
65.0	0.6718	0.7335	0.6556	0.6357	0.6563	0.6393	0.5738	0.5647	0.5614	0.5660	0.5367	0.5162	0.5017	0.5000	0.5006	0.4939	0.4879	0.4769
70.0	0.6345	0.6930	0.6199	0.6012	0.6207	0.6049	0.5431	0.5345	0.5316	0.5360	0.5083	0.4890	0.4753	0.4737	0.4744	0.4682	0.4626	0.4523
80.0	0.5729	0.6262	0.5610	0.5441	0.5618	0.5479	0.4921	0.4845	0.4820	0.4862	0.4612	0.4438	0.4314	0.4302	0.4309	0.4255	0.4205	0.4114
90.0	0.5240	0.5731	0.5142	0.4988	0.5149	0.5025	0.4516	0.4448	0.4426	0.4466	0.4236	0.4077	0.3963	0.3954	0.3961	0.3914	0.3869	0.3786
100.0	0.4843	0.5299	0.4760	0.4619	0.4768	0.4655	0.4185	0.4123	0.4104	0.4142	0.3930	0.3783	0.3677	0.3670	0.3677	0.3634	0.3593	0.3519
150.0	0.3606	0.3953	0.3569	0.3465	0.3575	0.3497	0.3148	0.3104	0.3093	0.3126	0.2967	0.2858	0.2778	0.2776	0.2782	0.2753	0.2721	0.2673
200.0	0.2954	0.3275	0.2961	0.2869	0.2943	0.2900	0.2608	0.2562	0.2571	0.2601	0.2466	0.2430	0.2350	0.2302	0.2311	0.2281	0.2305	0.2224
250.0	0.2579	0.2861	0.2592	0.2512	0.2570	0.2541	0.2286	0.2221	0.2255	0.2283	0.2165	0.2132	0.2063	0.2022	0.2031	0.1998	0.2026	0.1957
300.0	0.2324	0.2579	0.2341	0.2268	0.2322	0.2296	0.2066	0.1989	0.2040	0.2066	0.1960	0.1929	0.1866	0.1831	0.1840	0.1810	0.1835	0.1774
350.0	0.2139	0.2374	0.2158	0.2091	0.2141	0.2118	0.1907	0.1838	0.1883	0.1908	0.1810	0.1781	0.1723	0.1692	0.1700	0.1673	0.1696	0.1641
400.0	0.1999	0.2219	0.2020	0.1957	0.2004	0.1983	0.1786	0.1723	0.1764	0.1788	0.1696	0.1668	0.1615	0.1586	0.1594	0.1569	0.1590	0.1539
450.0	0.1890	0.2099	0.1911	0.1852	0.1897	0.1877	0.1691	0.1633	0.1671	0.1694	0.1608	0.1580	0.1530	0.1504	0.1511	0.1488	0.1507	0.1459
500.0	0.1802	0.2002	0.1825	0.1767	0.1812	0.1793	0.1615	0.1561	0.1597	0.1618	0.1536	0.1510	0.1462	0.1438	0.1445	0.1422	0.1441	0.1395

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	3.389	3.243	3.270	3.298	3.278	3.103	3.014	2.856	2.801	2.733	2.686	2.646	2.555	2.527	2.505	2.514	2.421	2.396
3.0	3.198	3.062	3.086	3.112	3.098	2.940	2.859	2.719	2.671	2.609	2.566	2.530	2.448	2.421	2.400	2.407	2.316	2.292
3.5	3.017	2.891	2.912	2.937	2.928	2.784	2.709	2.583	2.541	2.485	2.445	2.413	2.338	2.312	2.291	2.298	2.210	2.187
4.0	2.852	2.734	2.753	2.776	2.770	2.638	2.569	2.455	2.417	2.366	2.329	2.300	2.232	2.207	2.186	2.193	2.107	2.085
4.5	2.702	2.591	2.608	2.630	2.627	2.505	2.441	2.337	2.303	2.255	2.221	2.194	2.132	2.108	2.088	2.094	2.012	1.991
5.0	2.566	2.461	2.477	2.497	2.497	2.383	2.323	2.228	2.197	2.153	2.121	2.096	2.038	2.016	1.996	2.002	1.923	1.903
5.5	2.442	2.344	2.359	2.378	2.379	2.273	2.217	2.128	2.100	2.059	2.029	2.006	1.952	1.931	1.911	1.917	1.841	1.821
6.0	2.331	2.237	2.251	2.269	2.272	2.172	2.119	2.037	2.012	1.973	1.946	1.923	1.873	1.853	1.834	1.839	1.765	1.747
6.5	2.229	2.140	2.153	2.170	2.174	2.080	2.030	1.954	1.930	1.894	1.867	1.846	1.800	1.780	1.762	1.767	1.696	1.678
7.0	2.137	2.052	2.064	2.080	2.085	1.996	1.949	1.877	1.855	1.821	1.795	1.776	1.732	1.714	1.695	1.700	1.632	1.615
8.0	1.974	1.896	1.907	1.922	1.928	1.848	1.805	1.741	1.722	1.691	1.668	1.651	1.611	1.595	1.577	1.582	1.518	1.502
9.0	1.836	1.764	1.773	1.788	1.794	1.721	1.682	1.625	1.608	1.580	1.559	1.543	1.507	1.493	1.476	1.480	1.419	1.405
10.0	1.717	1.650	1.659	1.672	1.679	1.612	1.576	1.524	1.509	1.484	1.464	1.450	1.417	1.404	1.387	1.391	1.334	1.321
11.0	1.614	1.552	1.560	1.572	1.580	1.517	1.484	1.437	1.423	1.399	1.381	1.368	1.338	1.325	1.310	1.313	1.259	1.247
12.0	1.524	1.465	1.473	1.484	1.492	1.434	1.403	1.359	1.347	1.325	1.308	1.296	1.268	1.256	1.241	1.245	1.194	1.181
15.0	1.310	1.260	1.266	1.276	1.284	1.236	1.209	1.174	1.165	1.147	1.132	1.122	1.099	1.090	1.077	1.079	1.035	1.025
20.0	1.070	1.030	1.035	1.043	1.051	1.013	0.992	0.966	0.958	0.944	0.933	0.925	0.908	0.901	0.889	0.891	0.855	0.846
25.0	0.912	0.878	0.882	0.889	0.897	0.865	0.848	0.826	0.821	0.809	0.800	0.793	0.779	0.774	0.763	0.765	0.734	0.727
30.0	0.799	0.770	0.773	0.779	0.786	0.759	0.744	0.726	0.722	0.712	0.704	0.698	0.686	0.682	0.672	0.674	0.647	0.640
35.0	0.715	0.688	0.691	0.697	0.704	0.679	0.666	0.651	0.647	0.639	0.631	0.626	0.616	0.613	0.604	0.605	0.581	0.575
40.0	0.6483	0.6246	0.6274	0.6324	0.6388	0.6171	0.6055	0.5917	0.5884	0.5809	0.5743	0.5701	0.5607	0.5579	0.5496	0.5511	0.5287	0.5239
45.0	0.5951	0.5734	0.5760	0.5805	0.5866	0.5669	0.5564	0.5441	0.5412	0.5343	0.5284	0.5246	0.5161	0.5137	0.5060	0.5073	0.4868	0.4824
50.0	0.5513	0.5313	0.5336	0.5379	0.5437	0.5256	0.5159	0.5048	0.5022	0.4959	0.4904	0.4870	0.4792	0.4772	0.4699	0.4712	0.4522	0.4481
55.0	0.5146	0.4959	0.4981	0.5021	0.5077	0.4909	0.4820	0.4717	0.4694	0.4637	0.4585	0.4554	0.4482	0.4464	0.4396	0.4408	0.4230	0.4192
60.0	0.4834	0.4658	0.4679	0.4717	0.4770	0.4613	0.4530	0.4436	0.4414	0.4361	0.4313	0.4284	0.4217	0.4201	0.4137	0.4148	0.3981	0.3946
65.0	0.4564	0.4398	0.4418	0.4454	0.4506	0.4358	0.4280	0.4192	0.4172	0.4123	0.4078	0.4050	0.3988	0.3974	0.3913	0.3923	0.3766	0.3733
70.0	0.4328	0.4172	0.4191	0.4224	0.4274	0.4135	0.4061	0.3979	0.3961	0.3915	0.3872	0.3846	0.3788	0.3775	0.3717	0.3727	0.3577	0.3546
80.0	0.3937	0.3795	0.3812	0.3843	0.3890	0.3764	0.3698	0.3625	0.3609	0.3568	0.3530	0.3506	0.3454	0.3443	0.3390	0.3399	0.3263	0.3235
90.0	0.3624	0.3494	0.3509	0.3538	0.3582	0.3467	0.3407	0.3342	0.3327	0.3290	0.3255	0.3234	0.3186	0.3177	0.3127	0.3136	0.3011	0.2985
100.0	0.3366	0.3247	0.3261	0.3288	0.3330	0.3223	0.3166	0.3109	0.3096	0.3062	0.3029	0.3010	0.2966	0.2958	0.2912	0.2920	0.2804	0.2780
150.0	0.2559	0.2467	0.2478	0.2498	0.2533	0.2453	0.2413	0.2372	0.2363	0.2339	0.2314	0.2300	0.2269	0.2263	0.2228	0.2234	0.2146	0.2128
200.0	0.2130	0.2057	0.2057	0.2074	0.2104	0.2039	0.2006	0.1974	0.1967	0.1948	0.1928	0.1917	0.1892	0.1886	0.1858	0.1864	0.1839	0.1780
250.0	0.1874	0.1810	0.1790	0.1805	0.1833	0.1781	0.1763	0.1732	0.1733	0.1714	0.1689	0.1686	0.1667	0.1655	0.1629	0.1634	0.1623	0.1572
300.0	0.1699	0.1641	0.1623	0.1639	0.1663	0.1616	0.1600	0.1572	0.1573	0.1556	0.1533	0.1531	0.1514	0.1503	0.1480	0.1485	0.1474	0.1428
350.0	0.1571	0.1516	0.1502	0.1507	0.1530	0.1495	0.1480	0.1455	0.1457	0.1441	0.1420	0.1417	0.1403	0.1393	0.1371	0.1376	0.1365	0.1324
400.0	0.1474	0.1424	0.1410	0.1414	0.1436	0.1403	0.1389	0.1366	0.1368	0.1353	0.1334	0.1331	0.1318	0.1309	0.1288	0.1292	0.1282	0.1244
450.0	0.1398	0.1351	0.1337	0.1342	0.1362	0.1332	0.1318	0.1297	0.1298	0.1284	0.1266	0.1264	0.1251	0.1242	0.1223	0.1227	0.1217	0.1181
500.0	0.1337	0.1292	0.1279	0.1283	0.1303	0.1274	0.1261	0.1241	0.1242	0.1229	0.1212	0.1209	0.1197	0.1189	0.1171	0.1175	0.1165	0.1131

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{19}_{9}$F IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.040	4.820	6.744	6.710	6.570	7.747	8.390	8.853	9.200	9.540	9.730	10.330	10.670	11.200	11.420	11.633	11.993	12.300
3.0	6.392	6.110	8.293	8.318	8.144	9.420	10.306	10.841	11.231	11.605	11.924	12.641	13.087	13.664	13.902	14.197	14.820	15.018
3.5	7.881	7.526	9.976	10.064	9.850	11.227	12.370	12.979	13.412	13.817	14.272	15.111	15.665	16.291	16.545	16.924	17.798	17.905
4.0	9.506	9.067	11.792	11.948	11.690	13.171	14.586	15.269	15.746	16.178	16.778	17.745	18.409	19.086	19.356	19.821	20.937	20.966
4.5	11.267	10.733	13.743	13.970	13.664	15.262	16.953	17.713	18.234	18.691	19.444	20.543	21.322	22.060	22.337	22.889	24.241	24.204
5.0	13.16	12.52	15.83	16.13	15.77	17.47	19.47	20.31	20.88	21.36	22.27	23.51	24.40	25.19	25.49	26.13	27.71	27.62
5.5	15.19	14.43	18.05	18.43	18.01	19.82	22.14	23.06	23.67	24.17	25.26	26.64	27.66	28.49	28.81	29.55	31.35	31.22
6.0	17.35	16.46	20.40	20.86	20.38	22.31	24.96	25.97	26.62	27.14	28.40	29.94	31.08	31.97	32.30	33.13	35.17	35.00
6.5	19.63	18.62	22.88	23.43	22.89	24.94	27.94	29.02	29.73	30.26	31.71	33.40	34.67	35.62	35.97	36.90	39.15	38.95
7.0	22.05	20.88	25.49	26.14	25.52	27.69	31.06	32.23	32.98	33.53	35.17	37.02	38.43	39.43	39.80	40.83	43.30	43.08
8.0	27.27	25.78	31.11	31.95	31.18	33.61	37.74	39.09	39.94	40.52	42.57	44.77	46.45	47.57	47.97	49.21	52.10	51.88
9.0	32.99	31.13	37.24	38.29	37.35	40.05	45.01	46.55	47.50	48.10	50.59	53.15	55.14	56.38	56.81	58.26	61.58	61.38
10.0	39.21	36.94	43.88	45.16	44.03	47.01	52.86	54.60	55.65	56.26	59.22	62.18	64.47	65.84	66.30	67.98	71.72	71.57
11.0	45.92	43.20	51.01	52.54	51.20	54.48	61.28	63.22	64.38	64.99	68.46	71.84	74.46	75.95	76.44	78.36	82.51	82.43
12.0	53.12	49.90	58.65	60.43	58.88	62.46	70.26	72.42	73.69	74.30	78.31	82.12	85.08	86.71	87.23	89.38	93.94	93.98
15.0	77.56	72.61	84.47	87.12	84.80	89.38	100.53	103.37	104.99	105.56	111.36	116.62	120.72	122.75	123.35	126.28	132.06	132.56
20.0	127.51	118.87	136.91	141.30	137.39	143.87	161.66	165.81	168.05	168.44	177.81	185.92	192.22	194.97	196.67	200.06	207.84	209.58
25.0	188.52	175.22	200.63	207.11	201.22	209.87	235.60	241.22	244.15	244.22	257.85	269.34	278.20	281.70	282.48	288.49	298.26	301.74
30.0	260.14	241.25	275.15	284.05	275.82	286.88	321.76	329.03	332.69	332.32	350.87	366.22	378.02	382.28	383.10	390.89	402.65	408.34
35.0	341.99	316.59	360.05	371.69	360.77	374.53	419.66	428.74	433.17	432.24	456.34	476.03	491.11	496.14	496.96	506.65	520.44	528.73
40.0	433.7	400.9	455.0	469.7	455.7	472.2	528.9	539.9	545.2	543.5	573.8	598.3	617.0	622.8	623.6	636.3	651.1	662.4
45.0	535.1	494.0	559.6	577.6	560.3	579.9	649.0	662.2	668.3	665.8	702.8	732.5	755.2	761.7	762.7	776.3	794.3	808.8
50.0	645.7	595.6	673.6	695.2	674.2	697.1	779.8	795.2	802.1	798.8	843.1	878.4	905.3	912.6	913.2	929.3	949.4	967.6
55.0	765.4	705.4	796.7	822.2	797.3	823.5	920.8	938.6	946.5	942.0	994.2	1035.6	1067.1	1075.1	1075.5	1094.0	1116.3	1138.4
60.0	894.0	823.2	928.7	958.4	929.2	959.0	1071.9	1092.1	1100.9	1095.3	1155.9	1203.7	1240.1	1248.8	1249.0	1270.0	1294.6	1320.7
65.0	1031.1	948.8	1069.4	1103.4	1069.7	1103.3	1232.6	1255.5	1265.3	1258.4	1327.8	1382.5	1424.0	1433.4	1433.5	1456.9	1483.9	1514.4
70.0	1176.7	1082.1	1218.5	1257.2	1218.6	1256.1	1402.9	1428.5	1439.3	1431.0	1509.8	1571.7	1618.7	1628.7	1628.5	1654.5	1683.9	1719.1
80.0	1492.4	1371.1	1541.2	1589.9	1540.9	1586.7	1771.0	1802.4	1815.2	1803.7	1902.9	1980.2	2039.0	2050.3	2049.4	2080.9	2115.4	2160.2
90.0	1839.6	1688.6	1895.4	1955.1	1894.6	1949.3	2174.6	2212.4	2227.1	2212.0	2333.3	2427.4	2499.0	2511.5	2509.8	2547.0	2587.0	2642.2
100.0	2217.2	2033.8	2279.8	2351.3	2278.4	2342.5	2612.1	2656.4	2673.3	2654.4	2799.6	2911.7	2997.2	3010.7	3008.1	3061.3	3097.1	3163.2
150.0	4524.	4140.	4618.	4760.	4613.	4731.	5266.	5349.	5377.	5331.	5620.	5841.	6011.	6028.	6019.	6096.	6177.	6303.
200.0	7456.	6801.	7564.	7798.	7562.	7739.	8609.	8742.	8774.	8690.	9161.	9440.	9732.	9816.	9796.	9912.	9973.	10228.
250.0	10912.	9918.	11006.	11350.	11033.	11252.	12515.	12740.	12735.	12602.	13287.	13630.	14063.	14235.	14197.	14385.	14386.	14798.
300.0	14804.	13425.	14872.	15341.	14932.	15195.	16896.	17276.	17175.	16987.	17910.	18325.	18917.	19183.	19123.	19394.	19324.	19908.
350.0	19073.	17271.	19106.	19711.	19200.	19510.	21690.	22253.	22030.	21781.	22964.	23460.	24223.	24589.	24506.	24863.	24718.	25486.
400.0	23673.	21413.	23662.	24413.	23792.	24152.	26845.	27599.	27249.	26932.	28392.	28978.	29925.	30394.	30282.	30734.	30511.	31471.
450.0	28566.	25819.	28502.	29409.	28669.	29080.	32316.	33269.	32787.	32396.	34150.	34834.	35974.	36551.	36408.	36958.	36652.	37816.
500.0	33715.	30459.	33592.	34665.	33797.	34262.	38070.	39224.	38607.	38138.	40199.	40989.	42330.	43017.	42842.	43493.	43101.	44478.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.90	13.37	14.41	14.67	15.21	15.96	16.42	17.01	17.37	17.72	18.09	18.48	18.87	19.22	19.67	19.83	21.24	21.69
3.0	15.79	16.39	17.40	17.64	18.19	19.11	19.66	20.42	20.85	21.28	21.71	22.15	22.66	23.06	23.54	23.69	25.25	25.74
3.5	18.84	19.58	20.57	20.78	21.34	22.43	23.07	24.01	24.49	25.01	25.50	25.99	26.63	27.07	27.59	27.73	29.45	29.99
4.0	22.08	22.96	23.92	24.11	24.68	25.94	26.67	27.78	28.33	28.93	29.48	30.03	30.79	31.28	31.84	31.96	33.85	34.43
4.5	25.51	26.53	27.47	27.63	28.20	29.63	30.47	31.75	32.35	33.04	33.66	34.26	35.15	35.69	36.29	36.40	38.47	39.10
5.0	29.12	30.29	31.21	31.34	31.91	33.52	34.46	35.91	36.58	37.36	38.04	38.69	39.71	40.30	40.94	41.04	43.30	43.98
5.5	32.91	34.25	35.14	35.24	35.81	37.61	38.64	40.28	41.00	41.87	42.62	43.33	44.47	45.11	45.81	45.89	48.35	49.08
6.0	36.90	38.40	39.26	39.33	39.90	41.88	43.03	44.84	45.62	46.58	47.40	48.16	49.44	50.14	50.88	50.95	53.62	54.41
6.5	41.07	42.74	43.58	43.61	44.17	46.35	47.61	49.60	50.45	51.50	52.39	53.21	54.62	55.37	56.17	56.22	59.11	59.96
7.0	45.42	47.27	48.09	48.08	48.64	51.02	52.39	54.56	55.47	56.62	57.58	58.45	60.00	60.81	61.67	61.70	64.83	65.73
8.0	54.68	56.91	57.68	57.59	58.12	60.92	62.53	65.08	66.11	67.45	68.57	69.56	71.38	72.31	73.29	73.30	76.91	77.94
9.0	64.67	67.31	68.01	67.85	68.35	71.58	73.44	76.38	77.53	79.08	80.36	81.47	83.58	84.63	85.75	85.73	89.86	91.03
10.0	75.38	78.45	79.10	78.84	79.30	83.00	85.12	88.46	89.74	91.50	92.94	94.18	96.58	97.76	99.04	98.98	103.68	104.99
11.0	86.80	90.33	90.92	90.57	90.97	95.15	97.55	101.31	102.71	104.69	106.31	107.68	110.39	111.70	113.14	113.04	118.34	119.80
12.0	98.92	102.94	103.46	103.01	103.35	108.04	110.73	114.91	116.44	118.65	120.46	121.96	124.98	126.43	128.05	127.91	133.84	135.46
15.0	139.4	145.0	145.3	144.6	144.7	151.0	154.6	160.2	162.1	165.0	167.4	169.4	173.4	175.3	177.5	177.2	185.3	187.4
20.0	220.1	228.9	228.8	227.4	226.9	236.4	241.9	249.9	252.5	256.8	260.4	263.1	269.0	271.6	275.2	274.6	286.8	290.0
25.0	316.6	329.2	328.6	326.4	325.2	338.3	345.8	356.7	360.0	365.9	370.8	374.4	382.4	385.8	390.9	390.1	407.2	411.6
30.0	428.2	445.0	444.0	440.9	438.6	455.8	465.7	479.6	483.8	491.4	497.7	502.4	512.7	516.9	523.9	522.7	545.5	551.1
35.0	554.2	575.8	574.2	570.0	566.6	588.4	600.9	618.0	623.0	632.5	640.5	646.3	659.1	664.1	673.2	671.7	700.8	707.9
40.0	693.9	720.9	718.6	713.4	708.5	735.3	750.6	771.4	777.2	788.8	798.6	805.5	821.0	826.9	838.4	836.4	872.5	881.3
45.0	847.1	879.9	876.9	870.3	863.8	896.1	914.5	939.0	945.7	959.5	971.2	979.4	997.8	1004.5	1018.7	1016.3	1060.0	1070.4
50.0	1013.1	1052.1	1048.4	1040.5	1032.2	1070.3	1092.0	1120.4	1128.1	1144.2	1158.0	1167.5	1189.0	1196.6	1213.7	1210.7	1262.6	1275.0
55.0	1191.5	1237.4	1232.8	1223.4	1213.2	1257.5	1282.6	1315.2	1324.0	1342.4	1358.5	1369.4	1394.1	1402.6	1422.9	1419.3	1480.0	1494.3
60.0	1382.1	1436.1	1429.7	1418.8	1406.3	1457.2	1486.1	1523.1	1532.8	1553.8	1572.2	1584.6	1612.8	1622.1	1645.8	1641.6	1711.6	1728.0
65.0	1585.	1645.	1639.	1626.	1611.	1669.	1702.	1743.	1754.	1778.	1799.	1813.	1845.	1855.	1882.	1877.	1957.	1976.
70.0	1798.	1867.	1860.	1845.	1828.	1893.	1930.	1976.	1988.	2015.	2038.	2054.	2089.	2100.	2131.	2126.	2216.	2237.
80.0	2259.	2345.	2336.	2318.	2295.	2375.	2421.	2477.	2491.	2524.	2553.	2572.	2615.	2628.	2667.	2660.	2773.	2799.
90.0	2763.	2868.	2856.	2833.	2804.	2902.	2957.	3024.	3040.	3079.	3114.	3137.	3188.	3203.	3252.	3243.	3380.	3411.
100.0	3307.	3432.	3418.	3391.	3356.	3471.	3536.	3614.	3633.	3678.	3720.	3746.	3807.	3823.	3882.	3871.	4034.	4071.
150.0	6587.	6834.	6805.	6751.	6670.	6894.	7017.	7159.	7192.	7275.	7355.	7404.	7517.	7543.	7660.	7639.	7958.	8028.
200.0	10687.	11085.	11040.	10952.	10812.	11170.	11363.	11578.	11626.	11754.	11881.	11958.	12132.	12171.	12360.	12324.	12728.	12946.
250.0	15460.	16027.	16010.	15881.	15669.	16180.	16438.	16741.	16791.	16977.	17171.	17267.	17505.	17574.	17848.	17795.	18247.	18647.
300.0	20797.	21552.	21597.	21443.	21148.	21794.	22108.	22511.	22557.	22808.	23089.	23195.	23496.	23611.	23981.	23907.	24403.	25003.
350.0	26621.	27582.	27692.	27516.	27132.	27917.	28292.	28802.	28843.	29164.	29538.	29656.	30027.	30188.	30662.	30567.	31110.	31924.
400.0	32870.	34051.	34228.	34031.	33549.	34483.	34925.	35547.	35582.	35978.	36449.	36581.	37022.	37233.	37819.	37699.	38298.	39335.
450.0	39493.	40907.	41154.	40934.	40348.	41438.	41950.	42691.	42718.	43193.	43768.	43912.	44428.	44690.	45394.	45250.	45907.	47180.
500.0	46446.	48105.	48423.	48179.	47484.	48737.	49323.	50185.	50205.	50760.	51442.	51601.	52196.	52510.	53337.	53166.	53889.	55401.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{20}_{10}$NE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	8.862	9.245	7.583	7.299	7.462	6.983	6.086	5.856	5.723	5.617	5.283	5.009	4.784	4.686	4.651	4.498	4.054	4.234
3.0	8.034	8.413	7.003	6.746	6.896	6.488	5.672	5.470	5.356	5.273	4.964	4.714	4.511	4.423	4.393	4.255	3.878	4.015
3.5	7.351	7.721	6.497	6.262	6.407	6.048	5.299	5.120	5.020	4.955	4.667	4.438	4.254	4.175	4.148	4.023	3.698	3.803
4.0	6.778	7.138	6.056	5.840	5.979	5.659	4.968	4.808	4.719	4.667	4.398	4.186	4.018	3.946	3.923	3.808	3.525	3.605
4.5	6.293	6.641	5.670	5.470	5.604	5.315	4.674	4.529	4.449	4.407	4.155	3.958	3.804	3.738	3.717	3.612	3.363	3.423
5.0	5.876	6.213	5.331	5.145	5.274	5.011	4.412	4.280	4.208	4.174	3.937	3.753	3.610	3.549	3.531	3.433	3.213	3.257
5.5	5.513	5.840	5.032	4.857	4.982	4.740	4.179	4.057	3.992	3.964	3.740	3.567	3.435	3.378	3.362	3.271	3.074	3.107
6.0	5.196	5.512	4.765	4.601	4.721	4.498	3.970	3.857	3.797	3.775	3.563	3.399	3.275	3.223	3.209	3.124	2.946	2.969
6.5	4.915	5.221	4.526	4.371	4.487	4.281	3.781	3.677	3.622	3.603	3.401	3.247	3.130	3.082	3.069	2.990	2.829	2.843
7.0	4.664	4.962	4.312	4.165	4.276	4.084	3.610	3.513	3.462	3.447	3.255	3.108	2.998	2.953	2.941	2.867	2.720	2.728
8.0	4.238	4.518	3.941	3.808	3.912	3.743	3.314	3.228	3.184	3.174	2.998	2.865	2.766	2.727	2.717	2.650	2.527	2.525
9.0	3.887	4.152	3.632	3.511	3.609	3.458	3.065	2.988	2.949	2.943	2.781	2.659	2.569	2.534	2.526	2.466	2.360	2.351
10.0	3.594	3.846	3.371	3.259	3.352	3.216	2.853	2.784	2.749	2.748	2.595	2.483	2.400	2.369	2.362	2.307	2.216	2.202
11.0	3.345	3.584	3.148	3.044	3.131	3.007	2.670	2.607	2.576	2.575	2.434	2.330	2.254	2.226	2.219	2.170	2.089	2.072
12.0	3.131	3.359	2.954	2.857	2.940	2.826	2.512	2.454	2.425	2.426	2.294	2.196	2.125	2.100	2.094	2.049	1.977	1.957
15.0	2.636	2.836	2.502	2.421	2.493	2.402	2.138	2.092	2.070	2.074	1.962	1.880	1.821	1.801	1.798	1.761	1.709	1.685
20.0	2.103	2.271	2.009	1.945	2.006	1.937	1.728	1.693	1.677	1.683	1.593	1.528	1.482	1.468	1.466	1.438	1.404	1.379
25.0	1.762	1.907	1.691	1.638	1.689	1.636	1.460	1.432	1.420	1.426	1.351	1.296	1.258	1.248	1.247	1.225	1.200	1.176
30.0	1.524	1.653	1.468	1.422	1.467	1.422	1.271	1.248	1.238	1.244	1.179	1.132	1.099	1.091	1.091	1.072	1.053	1.031
35.0	1.348	1.464	1.302	1.262	1.302	1.263	1.130	1.110	1.102	1.109	1.050	1.009	0.980	0.974	0.974	0.958	0.942	0.922
40.0	1.213	1.319	1.174	1.138	1.174	1.140	1.021	1.003	0.996	1.003	0.950	0.913	0.887	0.882	0.882	0.869	0.855	0.836
45.0	1.105	1.203	1.072	1.039	1.072	1.042	0.934	0.918	0.912	0.918	0.870	0.836	0.813	0.808	0.809	0.797	0.785	0.768
50.0	1.017	1.108	0.988	0.958	0.989	0.962	0.862	0.848	0.842	0.849	0.804	0.773	0.751	0.748	0.749	0.738	0.728	0.711
55.0	0.944	1.029	0.919	0.891	0.919	0.895	0.803	0.789	0.785	0.790	0.749	0.721	0.700	0.697	0.698	0.688	0.679	0.664
60.0	0.882	0.962	0.860	0.834	0.861	0.838	0.752	0.740	0.735	0.741	0.703	0.676	0.657	0.654	0.655	0.646	0.638	0.623
65.0	0.8289	0.9047	0.8092	0.7846	0.8101	0.7891	0.7082	0.6970	0.6930	0.6985	0.6624	0.6372	0.6193	0.6171	0.6179	0.6096	0.6021	0.5886
70.0	0.7829	0.8549	0.7652	0.7421	0.7661	0.7466	0.6703	0.6598	0.6561	0.6615	0.6274	0.6036	0.5866	0.5847	0.5856	0.5779	0.5710	0.5583
80.0	0.7070	0.7725	0.6925	0.6717	0.6934	0.6763	0.6075	0.5981	0.5950	0.6002	0.5693	0.5478	0.5325	0.5310	0.5319	0.5252	0.5191	0.5078
90.0	0.6467	0.7071	0.6347	0.6158	0.6357	0.6203	0.5575	0.5490	0.5464	0.5513	0.5230	0.5033	0.4893	0.4881	0.4890	0.4831	0.4776	0.4674
100.0	0.5977	0.6539	0.5877	0.5702	0.5886	0.5747	0.5166	0.5089	0.5066	0.5113	0.4851	0.4670	0.4540	0.4531	0.4539	0.4486	0.4435	0.4344
150.0	0.4451	0.4879	0.4407	0.4278	0.4414	0.4318	0.3887	0.3832	0.3818	0.3859	0.3663	0.3528	0.3430	0.3427	0.3434	0.3399	0.3360	0.3300
200.0	0.3646	0.4042	0.3656	0.3542	0.3633	0.3580	0.3219	0.3162	0.3174	0.3212	0.3045	0.2999	0.2901	0.2842	0.2853	0.2816	0.2846	0.2746
250.0	0.3183	0.3531	0.3200	0.3101	0.3173	0.3137	0.2822	0.2742	0.2784	0.2819	0.2673	0.2633	0.2547	0.2497	0.2508	0.2466	0.2501	0.2416
300.0	0.2869	0.3183	0.2890	0.2800	0.2866	0.2835	0.2551	0.2456	0.2518	0.2550	0.2419	0.2381	0.2304	0.2261	0.2271	0.2234	0.2265	0.2190
350.0	0.2640	0.2931	0.2664	0.2581	0.2643	0.2615	0.2354	0.2269	0.2325	0.2355	0.2234	0.2198	0.2128	0.2089	0.2099	0.2065	0.2094	0.2025
400.0	0.2468	0.2740	0.2493	0.2416	0.2474	0.2448	0.2205	0.2127	0.2178	0.2207	0.2094	0.2060	0.1994	0.1959	0.1968	0.1937	0.1963	0.1900
450.0	0.2333	0.2591	0.2360	0.2286	0.2342	0.2318	0.2088	0.2016	0.2063	0.2091	0.1985	0.1951	0.1889	0.1857	0.1866	0.1837	0.1861	0.1802
500.0	0.2226	0.2471	0.2253	0.2182	0.2236	0.2213	0.1994	0.1927	0.1971	0.1998	0.1897	0.1864	0.1805	0.1775	0.1784	0.1756	0.1779	0.1723

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	3.983	3.811	3.841	3.874	3.849	3.643	3.539	3.352	3.287	3.207	3.151	3.104	2.997	2.964	2.938	2.947	2.838	2.808
3.0	3.784	3.623	3.650	3.681	3.664	3.476	3.380	3.213	3.156	3.083	3.032	2.989	2.892	2.859	2.834	2.843	2.735	2.706
3.5	3.590	3.439	3.463	3.492	3.481	3.309	3.220	3.070	3.019	2.952	2.904	2.866	2.777	2.746	2.720	2.729	2.623	2.596
4.0	3.407	3.266	3.288	3.315	3.308	3.149	3.067	2.930	2.885	2.823	2.779	2.744	2.663	2.632	2.607	2.615	2.513	2.487
4.5	3.239	3.106	3.126	3.152	3.148	3.001	2.924	2.799	2.758	2.701	2.660	2.627	2.552	2.524	2.499	2.506	2.407	2.382
5.0	3.085	2.959	2.978	3.002	3.001	2.864	2.792	2.677	2.640	2.587	2.548	2.517	2.448	2.421	2.397	2.404	2.308	2.284
5.5	2.944	2.825	2.842	2.865	2.866	2.738	2.670	2.564	2.530	2.480	2.444	2.415	2.351	2.325	2.301	2.308	2.216	2.192
6.0	2.816	2.703	2.718	2.740	2.743	2.622	2.559	2.460	2.428	2.382	2.347	2.320	2.260	2.236	2.213	2.219	2.130	2.107
6.5	2.698	2.590	2.605	2.626	2.630	2.516	2.456	2.363	2.334	2.290	2.258	2.233	2.176	2.153	2.130	2.136	2.050	2.028
7.0	2.590	2.487	2.501	2.521	2.526	2.418	2.361	2.274	2.247	2.206	2.175	2.151	2.098	2.076	2.053	2.059	1.976	1.955
8.0	2.399	2.305	2.317	2.336	2.342	2.245	2.193	2.115	2.092	2.056	2.026	2.006	1.957	1.937	1.916	1.921	1.843	1.824
9.0	2.236	2.149	2.160	2.177	2.185	2.096	2.048	1.979	1.958	1.924	1.898	1.879	1.835	1.817	1.796	1.801	1.728	1.710
10.0	2.095	2.014	2.024	2.040	2.049	1.967	1.923	1.859	1.841	1.810	1.786	1.768	1.728	1.712	1.692	1.696	1.627	1.610
11.0	1.972	1.896	1.906	1.921	1.930	1.854	1.813	1.755	1.738	1.709	1.687	1.671	1.634	1.619	1.600	1.604	1.538	1.523
12.0	1.864	1.793	1.802	1.818	1.825	1.754	1.716	1.663	1.647	1.620	1.599	1.584	1.551	1.537	1.518	1.522	1.460	1.445
15.0	1.607	1.545	1.553	1.565	1.575	1.516	1.483	1.440	1.428	1.406	1.389	1.376	1.348	1.337	1.320	1.324	1.269	1.257
20.0	1.316	1.267	1.273	1.283	1.292	1.245	1.220	1.187	1.179	1.161	1.147	1.138	1.116	1.108	1.093	1.096	1.051	1.041
25.0	1.123	1.081	1.086	1.095	1.104	1.065	1.044	1.017	1.011	0.996	0.985	0.977	0.959	0.953	0.940	0.942	0.903	0.895
30.0	0.985	0.949	0.953	0.960	0.969	0.935	0.917	0.895	0.889	0.877	0.867	0.861	0.846	0.841	0.829	0.831	0.797	0.789
35.0	0.881	0.849	0.852	0.859	0.867	0.838	0.822	0.802	0.798	0.787	0.778	0.772	0.759	0.755	0.744	0.746	0.716	0.709
40.0	0.7997	0.7704	0.7738	0.7800	0.7879	0.7612	0.7468	0.7299	0.7258	0.7165	0.7084	0.7032	0.6915	0.6881	0.6779	0.6797	0.6522	0.6461
45.0	0.7342	0.7074	0.7106	0.7162	0.7237	0.6994	0.6864	0.6712	0.6677	0.6592	0.6518	0.6472	0.6367	0.6337	0.6243	0.6269	0.6006	0.5951
50.0	0.6803	0.6555	0.6585	0.6637	0.6709	0.6485	0.6366	0.6228	0.6196	0.6120	0.6052	0.6009	0.5913	0.5888	0.5799	0.5814	0.5580	0.5529
55.0	0.6351	0.6120	0.6147	0.6197	0.6265	0.6058	0.5948	0.5822	0.5792	0.5722	0.5659	0.5620	0.5531	0.5509	0.5425	0.5440	0.5221	0.5174
60.0	0.5965	0.5749	0.5775	0.5821	0.5887	0.5693	0.5591	0.5474	0.5448	0.5382	0.5323	0.5287	0.5205	0.5185	0.5106	0.5119	0.4914	0.4870
65.0	0.5633	0.5429	0.5453	0.5497	0.5561	0.5379	0.5282	0.5174	0.5150	0.5089	0.5033	0.4999	0.4922	0.4905	0.4829	0.4842	0.4648	0.4607
70.0	0.5343	0.5149	0.5173	0.5214	0.5276	0.5104	0.5013	0.4912	0.4889	0.4832	0.4780	0.4748	0.4676	0.4659	0.4587	0.4600	0.4416	0.4377
80.0	0.4860	0.4685	0.4706	0.4744	0.4801	0.4646	0.4565	0.4475	0.4455	0.4404	0.4357	0.4328	0.4264	0.4250	0.4184	0.4196	0.4028	0.3993
90.0	0.4474	0.4313	0.4332	0.4367	0.4422	0.4280	0.4206	0.4125	0.4107	0.4061	0.4018	0.3992	0.3933	0.3922	0.3861	0.3871	0.3717	0.3685
100.0	0.4158	0.4008	0.4026	0.4059	0.4111	0.3979	0.3911	0.3838	0.3822	0.3780	0.3740	0.3716	0.3662	0.3652	0.3595	0.3605	0.3461	0.3432
150.0	0.3159	0.3046	0.3069	0.3084	0.3127	0.3029	0.2979	0.2928	0.2917	0.2887	0.2857	0.2840	0.2801	0.2794	0.2750	0.2759	0.2649	0.2627
200.0	0.2629	0.2539	0.2539	0.2560	0.2597	0.2517	0.2477	0.2437	0.2429	0.2405	0.2380	0.2366	0.2336	0.2329	0.2294	0.2301	0.2271	0.2197
250.0	0.2314	0.2235	0.2210	0.2226	0.2263	0.2196	0.2177	0.2139	0.2140	0.2116	0.2085	0.2081	0.2058	0.2043	0.2011	0.2018	0.2004	0.1940
300.0	0.2098	0.2026	0.2004	0.2011	0.2041	0.1994	0.1975	0.1941	0.1942	0.1921	0.1893	0.1890	0.1869	0.1856	0.1827	0.1833	0.1820	0.1763
350.0	0.1940	0.1874	0.1854	0.1860	0.1889	0.1846	0.1827	0.1797	0.1798	0.1779	0.1753	0.1750	0.1732	0.1719	0.1693	0.1698	0.1686	0.1634
400.0	0.1820	0.1758	0.1740	0.1746	0.1773	0.1733	0.1715	0.1687	0.1689	0.1670	0.1646	0.1643	0.1627	0.1615	0.1590	0.1596	0.1583	0.1536
450.0	0.1726	0.1667	0.1651	0.1656	0.1682	0.1644	0.1627	0.1601	0.1603	0.1585	0.1563	0.1560	0.1544	0.1534	0.1510	0.1515	0.1503	0.1459
500.0	0.1651	0.1595	0.1579	0.1585	0.1609	0.1573	0.1557	0.1532	0.1533	0.1517	0.1496	0.1493	0.1478	0.1468	0.1446	0.1450	0.1438	0.1397

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

20
NE IONS
10

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.660	4.460	6.251	6.220	6.090	7.187	7.790	8.228	8.550	8.860	9.040	9.590	9.910	10.399	10.600	10.796	11.133	11.420
3.0	5.847	5.595	7.624	7.646	7.486	8.673	9.493	9.995	10.357	10.698	10.993	11.648	12.063	12.596	12.812	13.082	13.654	13.845
3.5	7.149	6.837	9.108	9.185	8.991	10.271	11.318	11.885	12.286	12.655	13.071	13.835	14.346	14.923	15.155	15.500	16.295	16.405
4.0	8.567	8.185	10.703	10.840	10.608	11.981	13.268	13.902	14.342	14.735	15.279	16.156	16.765	17.388	17.635	18.055	19.065	19.106
4.5	10.100	9.639	12.411	12.610	12.336	13.805	15.344	16.046	16.525	16.941	17.619	18.614	19.324	19.993	20.254	20.753	21.969	21.954
5.0	11.75	11.20	14.23	14.50	14.18	15.74	17.55	18.32	18.84	19.27	20.09	21.21	22.02	22.74	23.02	23.59	25.01	24.95
5.5	13.50	12.86	16.16	16.50	16.13	17.80	19.88	20.72	21.28	21.73	22.70	23.94	24.86	25.63	25.92	26.58	28.19	28.09
6.0	15.37	14.62	18.21	18.61	18.19	19.96	22.33	23.25	23.85	24.32	25.44	26.82	27.85	28.66	28.96	29.71	31.52	31.39
6.5	17.35	16.49	20.36	20.84	20.36	22.24	24.91	25.90	26.54	27.03	28.31	29.83	30.97	31.83	32.15	32.98	34.98	34.83
7.0	19.44	18.45	22.62	23.19	22.65	24.63	27.62	28.69	29.37	29.87	31.32	32.98	34.23	35.15	35.48	36.40	38.59	38.42
8.0	23.95	22.68	27.48	28.22	27.54	29.75	33.41	34.63	35.40	35.92	37.73	39.68	41.19	42.20	42.56	43.66	46.22	46.05
9.0	28.88	27.30	32.77	33.69	32.87	35.32	39.69	41.08	41.95	42.47	44.66	46.93	48.69	49.82	50.20	51.49	54.42	54.26
10.0	34.23	32.31	38.49	39.61	38.63	41.32	46.46	48.02	48.96	49.51	52.11	54.72	56.75	57.98	58.40	59.88	63.17	63.06
11.0	40.01	37.70	44.64	45.96	44.80	47.76	53.71	55.44	56.48	57.03	60.07	63.04	65.35	66.70	67.14	68.82	72.47	72.43
12.0	46.19	43.47	51.20	52.75	51.40	54.62	61.44	63.36	64.49	65.04	68.54	71.89	74.50	75.95	76.42	78.31	82.32	82.36
15.0	67.16	62.99	73.35	75.65	73.65	77.73	87.42	89.93	91.36	91.88	96.92	101.52	105.10	106.91	107.44	110.01	115.06	115.51
20.0	109.95	102.67	118.26	122.05	118.68	124.40	139.79	143.42	145.38	145.75	153.85	160.89	166.36	168.78	169.41	173.22	179.99	181.50
25.0	162.15	150.93	172.74	178.32	173.26	180.83	203.01	207.90	210.46	210.56	222.30	232.23	239.89	242.96	243.66	248.86	257.32	260.33
30.0	223.38	207.42	236.40	244.04	236.99	246.62	276.62	282.92	286.10	285.83	301.77	315.01	325.18	328.90	329.63	336.34	346.52	351.41
35.0	293.31	271.84	308.88	318.87	309.52	321.40	360.21	368.06	371.90	371.14	391.83	408.76	421.74	426.12	426.85	435.19	447.10	454.21
40.0	371.7	343.9	389.9	402.5	390.5	404.9	453.4	462.9	467.5	466.1	492.1	513.1	529.2	534.2	534.9	545.0	558.6	568.3
45.0	458.2	423.4	479.2	494.6	479.8	496.7	556.0	567.3	572.5	570.5	602.2	627.7	647.1	652.8	653.4	665.3	680.8	693.2
50.0	552.6	510.1	576.4	594.9	577.0	596.7	667.5	680.7	686.7	683.9	721.8	752.1	775.2	781.5	782.0	795.9	813.2	828.7
55.0	654.8	603.9	681.4	703.3	681.9	704.6	787.8	803.0	809.8	806.1	850.7	886.2	913.5	920.1	920.5	936.3	955.5	974.4
60.0	764.5	704.5	794.0	819.4	794.4	820.1	916.6	934.0	941.6	936.8	988.6	1029.6	1060.7	1068.3	1068.5	1086.4	1107.5	1129.9
65.0	881.5	811.7	914.0	943.1	914.3	943.2	1053.8	1073.3	1081.8	1075.9	1135.3	1182.1	1217.6	1225.7	1225.8	1245.8	1269.0	1295.1
70.0	1005.7	925.5	1041.1	1074.2	1041.3	1073.5	1199.0	1220.9	1230.1	1223.1	1290.5	1343.4	1383.6	1392.3	1392.1	1414.4	1439.6	1469.6
80.0	1275.0	1172.0	1316.3	1358.0	1316.1	1355.4	1512.9	1539.8	1550.7	1541.0	1625.7	1691.8	1742.0	1751.8	1751.0	1778.0	1807.5	1845.8
90.0	1571.1	1443.0	1618.5	1669.4	1617.8	1664.6	1857.0	1889.2	1901.9	1889.1	1992.7	2073.1	2134.3	2145.0	2143.6	2175.5	2209.7	2256.8
100.0	1893.1	1737.4	1946.2	2007.2	1945.0	2000.0	2230.0	2267.9	2282.5	2266.2	2390.1	2486.0	2559.1	2570.7	2568.5	2605.4	2644.7	2701.1
150.0	3861.	3534.	3940.	4061.	3935.	4036.	4493.	4564.	4586.	4549.	4796.	4984.	5129.	5144.	5136.	5201.	5270.	5378.
200.0	6360.	5803.	6451.	6651.	6450.	6601.	7344.	7456.	7484.	7412.	7814.	8052.	8301.	8373.	8356.	8455.	8508.	8725.
250.0	9308.	8461.	9386.	9680.	9410.	9596.	10674.	10866.	10861.	10748.	11332.	11625.	11995.	12141.	12109.	12269.	12270.	12621.
300.0	12625.	11451.	12683.	13082.	12734.	12958.	14409.	14733.	14647.	14487.	15275.	15628.	16133.	16360.	16309.	16540.	16481.	16979.
350.0	16265.	14730.	16293.	16808.	16373.	16638.	18497.	18977.	18787.	18574.	19583.	20006.	20657.	20969.	20897.	21203.	21080.	21734.
400.0	20188.	18264.	20178.	20818.	20288.	20596.	22892.	23536.	23237.	22966.	24211.	24711.	25519.	25919.	25823.	26208.	26018.	26838.
450.0	24359.	22019.	24304.	25078.	24446.	24797.	27558.	28370.	27958.	27625.	29121.	29704.	30676.	31168.	31047.	31515.	31265.	32247.
500.0	28752.	25975.	28644.	29558.	28819.	29215.	32463.	33447.	32921.	32521.	34279.	34952.	36096.	36681.	36533.	37088.	36754.	37927.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.98	12.42	13.39	13.64	14.14	14.85	15.28	15.84	16.18	16.51	16.85	17.22	17.58	17.91	18.33	18.48	19.80	20.22
3.0	14.56	15.11	16.06	16.29	16.80	17.66	18.17	18.88	19.28	19.69	20.08	20.50	20.98	21.34	21.79	21.93	23.39	23.85
3.5	17.27	17.94	18.87	19.08	19.60	20.61	21.20	22.07	22.52	23.00	23.45	23.91	24.50	24.91	25.40	25.52	27.12	27.62
4.0	20.13	20.93	21.84	22.02	22.55	23.71	24.38	25.40	25.91	26.46	26.97	27.48	28.18	28.63	29.15	29.27	31.02	31.55
4.5	23.14	24.07	24.96	25.11	25.65	26.96	27.72	28.89	29.45	30.09	30.65	31.21	32.02	32.61	33.07	33.17	35.08	35.66
5.0	26.30	27.37	28.24	28.36	28.90	30.37	31.23	32.55	33.16	33.87	34.49	35.09	36.02	36.56	37.15	37.25	39.32	39.95
5.5	29.62	30.83	31.67	31.78	32.31	33.94	34.89	36.37	37.03	37.82	38.50	39.15	40.19	40.77	41.41	41.49	43.75	44.42
6.0	33.10	34.45	35.27	35.34	35.88	37.68	38.72	40.35	41.07	41.93	42.68	43.38	44.53	45.16	45.85	45.91	48.35	49.07
6.5	36.73	38.23	39.03	39.07	39.60	41.57	42.71	44.50	45.27	46.22	47.03	47.77	49.04	49.72	50.45	50.51	53.14	53.91
7.0	40.51	42.17	42.95	42.96	43.48	45.63	46.86	48.81	49.63	50.67	51.54	52.33	53.72	54.45	55.23	55.28	58.11	58.93
8.0	48.54	50.53	51.26	51.21	51.71	54.22	55.66	57.94	58.86	60.07	61.07	61.97	63.59	64.43	65.32	65.34	68.60	69.53
9.0	57.18	59.52	60.21	60.08	60.56	63.44	65.10	67.72	68.75	70.13	71.28	72.28	74.15	75.10	76.11	76.10	79.81	80.86
10.0	66.43	69.14	69.78	69.58	70.02	73.30	75.18	78.15	79.29	80.86	82.15	83.26	85.39	86.44	87.59	87.54	91.75	92.92
11.0	76.27	79.38	79.97	79.69	80.08	83.78	85.90	89.23	90.48	92.23	93.68	94.90	97.29	98.46	99.75	99.67	104.39	105.70
12.0	86.70	90.23	90.77	90.40	90.74	94.87	97.25	100.94	102.30	104.26	105.86	107.20	109.86	111.15	112.59	112.48	117.75	119.19
15.0	121.5	126.4	126.8	126.1	126.2	131.8	136.0	139.8	141.5	144.1	146.2	148.0	151.5	153.1	155.1	154.9	162.0	163.9
20.0	190.7	198.3	198.3	197.1	196.7	205.0	209.7	216.7	219.0	222.8	225.9	228.3	233.4	235.7	238.8	238.3	249.0	251.8
25.0	273.2	284.0	283.7	281.8	280.8	292.1	298.7	308.1	311.0	316.1	320.3	323.5	330.4	333.4	337.8	337.1	352.0	355.8
30.0	368.5	383.0	382.2	379.6	377.7	392.6	401.1	413.1	416.7	423.3	428.8	432.8	441.7	445.4	451.4	450.4	470.1	475.0
35.0	476.1	494.7	493.4	489.9	487.0	505.8	516.5	531.3	535.7	543.9	550.8	555.7	566.8	571.1	579.0	577.7	602.8	608.9
40.0	595.4	618.6	616.7	612.2	608.1	631.2	644.3	662.2	667.3	677.2	685.6	691.6	704.9	710.0	720.0	718.3	749.3	756.9
45.0	726.1	754.2	751.7	746.2	740.7	768.4	784.2	805.2	811.1	822.9	832.9	840.0	855.8	861.6	873.8	871.7	909.3	918.3
50.0	867.7	901.2	898.0	891.3	884.3	917.0	935.6	960.0	966.7	980.4	992.3	1000.5	1018.9	1025.5	1040.2	1037.6	1082.2	1092.8
55.0	1019.9	1059.2	1055.3	1047.4	1038.7	1076.6	1098.2	1126.2	1133.7	1149.6	1163.3	1172.7	1193.9	1201.2	1218.6	1215.6	1267.6	1279.9
60.0	1182.5	1227.9	1223.3	1214.0	1203.4	1247.0	1271.7	1303.4	1311.8	1329.9	1345.6	1356.3	1380.4	1388.4	1408.8	1405.2	1465.2	1479.2
65.0	1355.	1407.	1402.	1391.	1378.	1428.	1456.	1491.	1501.	1521.	1539.	1551.	1578.	1587.	1610.	1606.	1675.	1690.
70.0	1537.	1596.	1590.	1578.	1563.	1619.	1650.	1690.	1700.	1723.	1743.	1756.	1787.	1796.	1823.	1818.	1895.	1913.
80.0	1931.	2004.	1996.	1980.	1961.	2030.	2069.	2117.	2129.	2157.	2182.	2198.	2235.	2246.	2280.	2274.	2370.	2392.
90.0	2360.	2449.	2439.	2420.	2396.	2479.	2526.	2583.	2597.	2630.	2660.	2680.	2724.	2737.	2778.	2771.	2888.	2914.
100.0	2824.	2931.	2919.	2896.	2865.	2964.	3020.	3086.	3103.	3141.	3177.	3200.	3252.	3266.	3315.	3307.	3446.	3477.
150.0	5621.	5832.	5807.	5760.	5692.	5883.	5989.	6109.	6137.	6208.	6276.	6319.	6415.	6437.	6537.	6519.	6791.	6851.
200.0	9117.	9456.	9418.	9343.	9223.	9529.	9693.	9877.	9918.	10028.	10136.	10201.	10349.	10383.	10544.	10514.	10859.	11044.
250.0	13186.	13670.	13655.	13545.	13364.	13800.	14020.	14279.	14322.	14480.	14646.	14728.	14929.	14990.	15223.	15176.	15564.	15907.
300.0	17736.	18381.	18419.	18287.	18035.	18587.	18855.	19199.	19238.	19452.	19692.	19783.	20039.	20138.	20453.	20390.	20813.	21325.
350.0	22702.	23522.	23615.	23466.	23134.	23808.	24128.	24563.	24600.	24871.	25190.	25291.	25606.	25744.	26149.	26067.	26532.	27225.
400.0	28031.	29038.	29189.	29021.	28609.	29406.	29784.	30314.	30344.	30680.	31083.	31194.	31572.	31752.	32251.	32149.	32660.	33545.
450.0	33677.	34884.	35094.	34906.	34407.	35337.	35774.	36404.	36428.	36833.	37323.	37447.	37887.	38110.	38709.	38587.	39148.	40232.
500.0	39606.	41021.	41292.	41083.	40491.	41559.	42060.	42795.	42813.	43284.	43869.	44002.	44511.	44777.	45481.	45337.	45954.	47244.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{23}_{11}$NA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	10.40	10.82	8.80	8.47	8.64	8.08	7.04	6.77	6.62	6.49	6.10	5.78	5.52	5.41	5.36	5.19	4.67	4.88
3.0	9.46	9.88	8.17	7.87	8.04	7.55	6.60	6.36	6.23	6.13	5.77	5.48	5.24	5.14	5.10	4.94	4.50	4.66
3.5	8.68	9.10	7.61	7.34	7.50	7.07	6.20	5.98	5.87	5.79	5.45	5.18	4.96	4.87	4.84	4.69	4.31	4.43
4.0	8.03	8.43	7.12	6.87	7.03	6.64	5.83	5.64	5.53	5.47	5.16	4.90	4.71	4.62	4.59	4.46	4.13	4.22
4.5	7.47	7.86	6.69	6.46	6.61	6.26	5.50	5.33	5.23	5.18	4.89	4.65	4.47	4.39	4.37	4.24	3.95	4.02
5.0	6.982	7.366	6.303	6.081	6.232	5.915	5.207	5.050	4.964	4.922	4.642	4.423	4.255	4.182	4.159	4.044	3.783	3.835
5.5	6.560	6.934	5.961	5.753	5.899	5.608	4.942	4.798	4.719	4.686	4.420	4.215	4.057	3.990	3.970	3.862	3.629	3.666
6.0	6.190	6.553	5.655	5.469	5.600	5.332	4.704	4.570	4.498	4.470	4.219	4.024	3.877	3.814	3.796	3.696	3.485	3.511
6.5	5.861	6.214	5.380	5.195	5.331	5.082	4.488	4.363	4.297	4.274	4.035	3.851	3.712	3.654	3.637	3.543	3.352	3.369
7.0	5.568	5.911	5.132	4.956	5.088	4.856	4.292	4.175	4.114	4.095	3.867	3.692	3.561	3.506	3.492	3.403	3.228	3.237
8.0	5.067	5.392	4.701	4.542	4.666	4.461	3.949	3.846	3.792	3.780	3.571	3.412	3.294	3.246	3.234	3.154	3.007	3.004
9.0	4.654	4.962	4.341	4.195	4.312	4.129	3.659	3.567	3.520	3.513	3.319	3.173	3.066	3.023	3.013	2.941	2.815	2.804
10.0	4.308	4.601	4.035	3.901	4.011	3.846	3.412	3.329	3.286	3.283	3.102	2.968	2.869	2.831	2.822	2.757	2.647	2.630
11.0	4.013	4.293	3.772	3.647	3.752	3.602	3.198	3.122	3.084	3.083	2.914	2.789	2.697	2.663	2.656	2.596	2.499	2.479
12.0	3.759	4.026	3.544	3.427	3.526	3.389	3.011	2.941	2.907	2.908	2.749	2.632	2.547	2.516	2.509	2.454	2.369	2.345
15.0	3.169	3.406	3.008	2.911	2.997	2.887	2.570	2.514	2.487	2.492	2.357	2.259	2.188	2.164	2.160	2.115	2.053	2.024
20.0	2.533	2.733	2.422	2.344	2.416	2.334	2.082	2.040	2.020	2.027	1.919	1.840	1.785	1.768	1.766	1.732	1.691	1.661
25.0	2.125	2.298	2.041	1.976	2.038	1.972	1.762	1.728	1.713	1.721	1.629	1.564	1.518	1.505	1.504	1.477	1.447	1.418
30.0	1.839	1.993	1.773	1.717	1.771	1.717	1.535	1.507	1.495	1.503	1.423	1.367	1.327	1.317	1.317	1.295	1.271	1.244
35.0	1.628	1.767	1.573	1.524	1.573	1.526	1.366	1.341	1.331	1.339	1.269	1.219	1.184	1.176	1.176	1.157	1.138	1.113
40.0	1.465	1.592	1.419	1.375	1.419	1.378	1.234	1.213	1.204	1.212	1.149	1.104	1.072	1.066	1.066	1.050	1.034	1.011
45.0	1.335	1.452	1.296	1.256	1.296	1.260	1.129	1.110	1.102	1.110	1.052	1.011	0.982	0.977	0.978	0.963	0.950	0.928
50.0	1.229	1.338	1.195	1.158	1.196	1.163	1.043	1.025	1.019	1.026	0.973	0.935	0.909	0.904	0.905	0.892	0.880	0.860
55.0	1.141	1.243	1.111	1.077	1.112	1.082	0.971	0.955	0.949	0.956	0.906	0.871	0.847	0.843	0.844	0.832	0.821	0.803
60.0	1.066	1.163	1.040	1.008	1.041	1.014	0.909	0.895	0.889	0.896	0.850	0.817	0.794	0.791	0.792	0.781	0.771	0.754
65.0	1.002	1.093	0.979	0.949	0.980	0.955	0.857	0.843	0.838	0.845	0.801	0.771	0.749	0.746	0.747	0.737	0.728	0.712
70.0	0.947	1.033	0.926	0.898	0.927	0.903	0.811	0.798	0.794	0.800	0.759	0.730	0.710	0.707	0.708	0.699	0.691	0.675
80.0	0.855	0.934	0.838	0.813	0.839	0.818	0.735	0.724	0.720	0.726	0.689	0.663	0.644	0.642	0.643	0.635	0.628	0.614
90.0	0.782	0.855	0.768	0.745	0.769	0.751	0.674	0.664	0.661	0.667	0.633	0.609	0.592	0.591	0.592	0.585	0.578	0.566
100.0	0.723	0.791	0.711	0.690	0.712	0.695	0.625	0.616	0.613	0.619	0.587	0.565	0.549	0.548	0.549	0.543	0.537	0.526
150.0	0.5385	0.5902	0.5332	0.5176	0.5340	0.5224	0.4703	0.4637	0.4620	0.4669	0.4432	0.4269	0.4150	0.4146	0.4155	0.4113	0.4065	0.3993
200.0	0.4412	0.4890	0.4424	0.4286	0.4396	0.4332	0.3895	0.3827	0.3840	0.3886	0.3684	0.3629	0.3510	0.3438	0.3452	0.3407	0.3443	0.3323
250.0	0.3852	0.4273	0.3873	0.3752	0.3840	0.3796	0.3415	0.3317	0.3369	0.3411	0.3235	0.3185	0.3081	0.3021	0.3034	0.2984	0.3027	0.2924
300.0	0.3471	0.3852	0.3497	0.3388	0.3468	0.3430	0.3087	0.2972	0.3047	0.3086	0.2927	0.2881	0.2788	0.2736	0.2748	0.2703	0.2741	0.2650
350.0	0.3195	0.3546	0.3224	0.3123	0.3198	0.3164	0.2848	0.2745	0.2813	0.2850	0.2704	0.2660	0.2574	0.2528	0.2540	0.2499	0.2533	0.2451
400.0	0.2986	0.3315	0.3017	0.2923	0.2994	0.2962	0.2668	0.2573	0.2635	0.2670	0.2534	0.2492	0.2412	0.2370	0.2381	0.2344	0.2375	0.2299
450.0	0.2823	0.3135	0.2855	0.2766	0.2834	0.2805	0.2526	0.2439	0.2496	0.2530	0.2401	0.2361	0.2286	0.2246	0.2257	0.2222	0.2252	0.2180
500.0	0.2692	0.2990	0.2726	0.2640	0.2706	0.2678	0.2412	0.2332	0.2385	0.2418	0.2295	0.2255	0.2184	0.2147	0.2158	0.2125	0.2153	0.2085

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	4.589	4.390	4.423	4.460	4.431	4.193	4.072	3.856	3.781	3.688	3.624	3.570	3.446	3.407	3.377	3.387	3.260	3.226
3.0	4.388	4.200	4.230	4.265	4.245	4.027	3.915	3.721	3.654	3.569	3.509	3.460	3.347	3.309	3.279	3.289	3.163	3.129
3.5	4.183	4.007	4.034	4.067	4.063	3.852	3.749	3.573	3.513	3.435	3.379	3.334	3.231	3.194	3.164	3.174	3.050	3.018
4.0	3.986	3.821	3.845	3.877	3.868	3.682	3.585	3.425	3.372	3.299	3.247	3.205	3.111	3.075	3.046	3.055	2.934	2.903
4.5	3.802	3.646	3.668	3.698	3.693	3.520	3.430	3.283	3.235	3.167	3.118	3.080	2.992	2.958	2.929	2.938	2.821	2.791
5.0	3.632	3.483	3.504	3.533	3.531	3.369	3.284	3.149	3.105	3.042	2.996	2.960	2.878	2.846	2.818	2.826	2.713	2.684
5.5	3.474	3.334	3.353	3.380	3.381	3.229	3.149	3.023	2.983	2.924	2.881	2.847	2.771	2.740	2.712	2.720	2.611	2.583
6.0	3.330	3.196	3.214	3.240	3.243	3.100	3.024	2.906	2.869	2.814	2.773	2.741	2.670	2.641	2.613	2.621	2.515	2.488
6.5	3.196	3.068	3.085	3.110	3.115	2.980	2.908	2.798	2.763	2.711	2.672	2.643	2.575	2.548	2.521	2.528	2.425	2.400
7.0	3.073	2.951	2.967	2.991	2.997	2.868	2.800	2.697	2.665	2.616	2.578	2.550	2.487	2.461	2.434	2.441	2.342	2.317
8.0	2.855	2.742	2.756	2.778	2.786	2.670	2.608	2.516	2.488	2.443	2.409	2.384	2.327	2.303	2.278	2.284	2.191	2.168
9.0	2.666	2.562	2.575	2.596	2.605	2.498	2.441	2.358	2.333	2.293	2.262	2.239	2.187	2.165	2.140	2.146	2.058	2.037
10.0	2.503	2.405	2.418	2.437	2.447	2.349	2.296	2.220	2.198	2.161	2.132	2.111	2.063	2.043	2.020	2.025	1.942	1.922
11.0	2.360	2.268	2.280	2.298	2.308	2.217	2.168	2.099	2.079	2.044	2.017	1.998	1.954	1.936	1.913	1.918	1.839	1.820
12.0	2.233	2.147	2.158	2.175	2.186	2.101	2.055	1.991	1.973	1.940	1.915	1.897	1.856	1.840	1.817	1.822	1.747	1.729
15.0	1.930	1.856	1.865	1.880	1.891	1.820	1.781	1.730	1.715	1.688	1.667	1.652	1.619	1.606	1.585	1.589	1.524	1.509
20.0	1.585	1.526	1.533	1.545	1.556	1.500	1.469	1.430	1.419	1.398	1.381	1.370	1.344	1.334	1.316	1.320	1.265	1.253
25.0	1.355	1.304	1.310	1.321	1.332	1.285	1.259	1.227	1.219	1.202	1.187	1.178	1.157	1.149	1.133	1.136	1.090	1.079
30.0	1.189	1.145	1.150	1.159	1.170	1.129	1.107	1.081	1.074	1.059	1.047	1.039	1.021	1.015	1.000	1.003	0.962	0.953
35.0	1.064	1.025	1.030	1.038	1.048	1.012	0.993	0.969	0.964	0.951	0.940	0.933	0.917	0.912	0.899	0.901	0.865	0.857
40.0	0.9665	0.9310	0.9352	0.9426	0.9522	0.9199	0.9026	0.8820	0.8771	0.8658	0.8560	0.8498	0.8357	0.8316	0.8193	0.8214	0.7881	0.7808
45.0	0.8576	0.8552	0.8590	0.8658	0.8749	0.8455	0.8298	0.8114	0.8071	0.7969	0.7880	0.7823	0.7696	0.7661	0.7546	0.7566	0.7260	0.7194
50.0	0.8226	0.7926	0.7962	0.8025	0.8112	0.7842	0.7698	0.7531	0.7492	0.7399	0.7317	0.7266	0.7149	0.7119	0.7011	0.7030	0.6746	0.6685
55.0	0.7680	0.7401	0.7434	0.7494	0.7577	0.7326	0.7193	0.7040	0.7005	0.6919	0.6843	0.6796	0.6689	0.6662	0.6560	0.6578	0.6313	0.6257
60.0	0.7215	0.6953	0.6984	0.7040	0.7120	0.6886	0.6762	0.6621	0.6589	0.6510	0.6436	0.6394	0.6295	0.6271	0.6175	0.6192	0.5943	0.5890
65.0	0.6813	0.6566	0.6596	0.6649	0.6726	0.6506	0.6389	0.6258	0.6229	0.6155	0.6088	0.6047	0.5954	0.5933	0.5841	0.5857	0.5622	0.5572
70.0	0.6463	0.6229	0.6257	0.6307	0.6382	0.6174	0.6064	0.5942	0.5914	0.5845	0.5782	0.5743	0.5656	0.5636	0.5549	0.5564	0.5341	0.5295
80.0	0.5880	0.5667	0.5693	0.5739	0.5809	0.5621	0.5522	0.5414	0.5390	0.5328	0.5271	0.5236	0.5158	0.5142	0.5062	0.5078	0.4873	0.4831
90.0	0.5413	0.5218	0.5241	0.5284	0.5350	0.5178	0.5088	0.4991	0.4969	0.4914	0.4861	0.4830	0.4759	0.4745	0.4671	0.4684	0.4497	0.4458
100.0	0.5031	0.4849	0.4871	0.4911	0.4974	0.4814	0.4732	0.4643	0.4624	0.4573	0.4524	0.4496	0.4431	0.4418	0.4349	0.4362	0.4188	0.4152
150.0	0.3822	0.3685	0.3702	0.3732	0.3784	0.3665	0.3605	0.3543	0.3530	0.3493	0.3457	0.3436	0.3389	0.3380	0.3328	0.3338	0.3205	0.3178
200.0	0.3181	0.3072	0.3072	0.3098	0.3143	0.3045	0.2997	0.2949	0.2939	0.2910	0.2880	0.2863	0.2826	0.2818	0.2775	0.2784	0.2747	0.2658
250.0	0.2800	0.2704	0.2675	0.2696	0.2738	0.2660	0.2634	0.2588	0.2589	0.2560	0.2523	0.2518	0.2491	0.2472	0.2433	0.2441	0.2424	0.2348
300.0	0.2538	0.2451	0.2425	0.2433	0.2470	0.2413	0.2389	0.2348	0.2350	0.2324	0.2290	0.2287	0.2262	0.2246	0.2210	0.2218	0.2202	0.2134
350.0	0.2347	0.2267	0.2243	0.2261	0.2285	0.2233	0.2211	0.2174	0.2176	0.2152	0.2121	0.2117	0.2095	0.2081	0.2048	0.2055	0.2040	0.1977
400.0	0.2202	0.2127	0.2106	0.2113	0.2145	0.2097	0.2076	0.2041	0.2043	0.2021	0.1992	0.1989	0.1968	0.1955	0.1924	0.1931	0.1916	0.1858
450.0	0.2089	0.2018	0.1998	0.2004	0.2035	0.1989	0.1969	0.1937	0.1939	0.1918	0.1891	0.1888	0.1869	0.1856	0.1827	0.1833	0.1819	0.1765
500.0	0.1997	0.1930	0.1911	0.1917	0.1946	0.1903	0.1884	0.1853	0.1856	0.1836	0.1810	0.1807	0.1789	0.1777	0.1750	0.1755	0.1740	0.1690

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

23 11 NA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.800	4.590	6.439	6.410	6.280	7.412	8.030	8.480	8.820	9.150	9.330	9.910	10.230	10.729	10.940	11.145	11.493	11.790
3.0	5.961	5.704	7.795	7.819	7.660	8.884	9.717	10.232	10.612	10.973	11.268	11.953	12.368	12.911	13.138	13.417	14.000	14.202
3.5	7.231	6.918	9.254	9.333	9.141	10.458	11.516	12.096	12.515	12.904	13.319	14.112	14.622	15.211	15.454	15.807	16.611	16.733
4.0	8.609	8.232	10.817	10.955	10.726	12.136	13.430	14.076	14.534	14.949	15.489	16.394	17.002	17.636	17.894	18.322	19.338	19.393
4.5	10.096	9.646	12.484	12.684	12.414	13.921	15.462	16.175	16.672	17.109	17.781	18.802	19.509	20.189	20.462	20.967	22.187	22.187
5.0	11.69	11.16	14.26	14.52	14.21	15.81	17.61	18.39	18.93	19.39	20.20	21.34	22.15	22.87	23.16	23.74	25.16	25.12
5.5	13.39	12.77	16.13	16.47	16.10	17.81	19.88	20.73	21.31	21.78	22.74	24.00	24.91	25.69	25.99	26.65	28.27	28.18
6.0	15.20	14.47	18.11	18.52	18.11	19.91	22.27	23.19	23.80	24.30	25.40	26.80	27.82	28.64	28.96	29.70	31.50	31.39
6.5	17.11	16.28	20.20	20.68	20.21	22.12	24.77	25.76	26.42	26.93	28.19	29.72	30.85	31.72	32.05	32.88	34.87	34.73
7.0	19.12	18.18	22.39	22.95	22.42	24.44	27.39	28.46	29.16	29.68	31.10	32.77	34.01	34.93	35.28	36.19	38.36	38.22
8.0	23.45	22.25	27.08	27.80	27.15	29.38	32.98	34.20	34.98	35.53	37.29	39.25	40.73	41.76	42.13	43.22	45.75	45.60
9.0	28.20	26.70	32.17	33.07	32.28	34.75	39.04	40.42	41.28	41.84	43.98	46.25	47.98	49.10	49.50	50.77	53.66	53.53
10.0	33.34	31.52	37.67	38.76	37.81	40.52	45.55	47.10	48.05	48.62	51.15	53.75	55.74	56.97	57.39	58.85	62.09	62.00
11.0	38.87	36.70	43.57	44.86	43.75	46.71	52.52	54.24	55.28	55.85	58.81	61.75	64.01	65.35	65.80	67.46	71.04	71.01
12.0	44.80	42.24	49.87	51.37	50.07	53.29	59.94	61.83	62.96	63.54	66.94	70.24	72.79	74.24	74.71	76.57	80.49	80.56
15.0	64.87	60.94	71.08	73.30	71.38	75.43	84.83	87.29	88.71	89.26	94.13	98.63	102.11	103.91	104.45	106.95	111.88	112.33
20.0	105.75	98.80	113.97	117.62	114.40	120.02	134.86	138.40	140.34	140.74	148.54	155.38	160.66	163.05	163.68	167.38	173.95	175.41
25.0	155.54	144.99	165.92	171.28	166.44	173.84	195.16	199.91	202.40	202.56	213.83	223.43	230.81	233.82	234.51	239.53	247.73	250.62
30.0	213.90	198.88	226.56	233.89	227.15	236.52	265.29	271.38	274.48	274.27	289.55	302.30	312.07	315.70	316.43	322.90	332.72	337.41
35.0	280.51	260.29	295.57	305.12	296.20	307.72	344.88	352.44	356.17	355.50	375.29	391.57	404.01	408.27	409.00	417.02	428.49	435.30
40.0	355.1	329.0	372.7	384.7	373.3	387.1	433.6	442.7	447.1	445.9	470.7	490.9	506.3	511.1	511.8	521.5	534.7	543.9
45.0	437.5	404.7	457.6	472.3	458.2	474.5	531.1	542.0	547.1	545.2	575.5	599.9	618.5	623.9	624.6	636.0	650.9	662.8
50.0	527.3	487.3	550.1	567.7	550.7	569.6	637.2	649.9	655.7	653.0	689.3	718.2	740.3	746.4	746.9	760.2	776.8	791.6
55.0	624.5	576.5	649.9	670.8	650.5	672.2	751.6	766.2	772.8	769.3	811.8	845.7	871.5	878.2	878.6	893.8	912.2	930.1
60.0	728.9	672.2	757.0	781.2	757.4	782.1	874.1	890.7	898.0	893.6	943.0	982.1	1011.8	1019.1	1019.3	1036.5	1056.7	1078.1
65.0	840.2	774.3	871.1	898.8	871.4	899.1	1004.5	1023.2	1031.3	1025.8	1082.4	1127.1	1161.0	1168.8	1168.9	1188.1	1210.2	1235.1
70.0	958.3	882.5	991.9	1023.5	992.1	1023.0	1142.6	1163.5	1172.4	1165.7	1230.0	1280.4	1318.8	1327.1	1327.0	1348.3	1372.4	1401.0
80.0	1214.4	1117.0	1253.5	1293.2	1253.4	1291.0	1441.0	1466.6	1477.1	1467.9	1548.6	1611.6	1659.5	1668.9	1668.2	1693.9	1722.2	1758.7
90.0	1496.0	1374.7	1540.7	1589.2	1540.1	1584.8	1768.1	1798.8	1811.0	1798.8	1897.4	1974.1	2032.4	2042.7	2041.4	2071.8	2104.5	2149.3
100.0	1802.1	1654.7	1852.4	1910.3	1851.2	1903.5	2122.7	2158.8	2172.7	2157.3	2275.2	2366.6	2436.2	2447.3	2445.3	2480.5	2518.0	2571.6
150.0	3672.	3363.	3747.	3863.	3743.	3839.	4274.	4341.	4364.	4327.	4561.	4741.	4879.	4894.	4886.	4948.	5014.	5116.
200.0	6049.	5520.	6134.	6324.	6133.	6277.	6983.	7090.	7117.	7048.	7430.	7657.	7894.	7962.	7946.	8040.	8090.	8298.
250.0	8850.	8046.	8924.	9202.	8946.	9124.	10148.	10331.	10326.	10219.	10774.	11052.	11404.	11543.	11512.	11665.	11666.	12000.
300.0	12003.	10888.	12057.	12436.	12103.	12319.	13698.	14006.	13924.	13772.	14521.	14857.	15337.	15553.	15505.	15724.	15668.	16141.
350.0	15462.	14005.	15488.	15978.	15564.	15816.	17583.	18040.	17859.	17657.	18615.	19018.	19637.	19934.	19865.	20156.	20039.	20661.
400.0	19190.	17363.	19180.	19788.	19285.	19577.	21760.	22372.	22088.	21831.	23014.	23490.	24257.	24639.	24547.	24913.	24733.	25513.
450.0	23155.	20933.	23102.	23837.	23237.	23570.	26195.	26966.	26576.	26259.	27681.	28235.	29159.	29627.	29512.	29957.	29710.	30653.
500.0	27330.	24693.	27227.	28095.	27392.	27769.	30857.	31792.	31292.	30913.	32583.	33223.	34310.	34867.	34725.	35253.	34936.	36052.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.37	12.83	13.84	14.10	14.61	15.35	15.80	16.38	16.73	17.07	17.42	17.80	18.17	18.51	18.95	19.11	20.48	20.91
3.0	14.93	15.50	16.49	16.73	17.26	18.15	18.68	19.41	19.82	20.23	20.64	21.07	21.55	21.93	22.40	22.55	24.05	24.53
3.5	17.62	18.31	19.28	19.49	20.04	21.07	21.68	22.57	23.03	23.52	23.98	24.45	25.05	25.47	25.97	26.11	27.76	28.27
4.0	20.43	21.25	22.20	22.39	22.94	24.12	24.82	25.85	26.37	26.93	27.45	27.97	28.68	29.14	29.68	29.80	31.60	32.15
4.5	23.39	24.33	25.26	25.43	25.98	27.32	28.10	29.28	29.85	30.49	31.07	31.63	32.45	32.95	33.53	33.64	35.60	36.19
5.0	26.48	27.56	28.47	28.61	29.17	30.66	31.52	32.86	33.48	34.20	34.83	35.44	36.37	36.92	37.53	37.63	39.75	40.40
5.5	29.72	30.93	31.82	31.94	32.50	34.15	35.10	36.59	37.26	38.05	38.75	39.40	40.44	41.03	41.69	41.78	44.08	44.76
6.0	33.10	34.46	35.33	35.41	35.97	37.78	38.83	40.47	41.19	42.06	42.81	43.52	44.67	45.31	46.01	46.09	48.57	49.30
6.5	36.63	38.13	38.98	39.04	39.59	41.57	42.71	44.50	45.28	46.23	47.04	47.79	49.05	49.74	50.49	50.56	53.22	54.01
7.0	40.30	41.95	42.78	42.81	43.36	45.50	46.74	48.69	49.52	50.55	51.42	52.22	53.60	54.34	55.14	55.19	58.05	58.88
8.0	48.07	50.04	50.83	50.79	51.32	53.82	55.26	57.53	58.45	59.65	60.66	61.55	63.16	64.00	64.91	64.94	68.21	69.15
9.0	56.41	58.73	59.47	59.36	59.87	62.73	64.38	66.97	68.00	69.37	70.51	71.51	73.36	74.31	75.33	75.33	79.05	80.10
10.0	65.32	68.00	68.69	68.51	68.98	72.23	74.10	77.03	78.16	79.71	80.99	82.10	84.20	85.25	86.40	86.37	90.56	91.73
11.0	74.79	77.85	78.49	78.24	78.66	82.31	84.41	87.69	88.93	90.66	92.09	93.31	95.65	96.82	98.11	98.04	102.73	104.03
12.0	84.81	88.27	88.87	88.53	88.91	92.98	95.32	98.95	100.29	102.22	103.80	105.12	107.74	109.01	110.45	110.35	115.57	117.00
15.0	118.2	122.9	123.4	122.8	122.9	128.4	131.5	136.2	137.9	140.4	142.5	144.2	147.6	149.3	151.2	151.0	158.0	159.8
20.0	184.3	191.7	191.8	190.6	190.3	198.4	203.0	209.8	212.0	215.7	218.7	221.0	226.0	228.2	231.2	230.8	241.2	243.9
25.0	263.0	273.5	273.2	271.5	270.5	281.5	287.8	296.9	299.8	304.7	308.8	311.9	318.6	321.4	325.7	325.1	339.5	343.1
30.0	353.9	367.8	367.1	364.6	362.9	377.2	385.5	397.0	400.5	406.9	412.2	416.1	424.6	428.2	434.0	433.1	452.1	456.8
35.0	456.3	474.1	473.0	469.7	466.9	485.0	495.3	509.6	513.8	521.7	528.3	533.1	543.7	547.9	555.5	554.2	578.4	584.3
40.0	569.8	592.0	590.4	586.1	582.2	604.4	617.0	634.1	639.0	648.6	656.7	662.4	675.2	680.1	689.7	688.1	717.9	725.1
45.0	694.2	721.1	718.8	713.5	708.4	734.9	750.0	770.2	775.9	787.2	796.8	803.6	818.8	824.4	836.1	834.1	870.1	878.8
50.0	828.9	860.9	858.0	851.6	845.0	876.3	894.1	917.5	923.9	937.1	948.4	956.3	973.9	980.2	994.3	991.9	1034.5	1044.7
55.0	973.7	1011.1	1007.6	1000.0	991.8	1028.1	1048.7	1075.5	1082.7	1097.9	1111.1	1120.1	1140.4	1147.3	1164.0	1161.1	1210.9	1222.7
60.0	1128.2	1171.5	1167.3	1158.5	1148.4	1190.1	1213.7	1244.1	1252.1	1269.4	1284.4	1294.6	1317.7	1325.4	1344.8	1341.4	1398.8	1412.2
65.0	1292.	1342.	1337.	1327.	1315.	1362.	1389.	1423.	1432.	1451.	1468.	1480.	1506.	1514.	1536.	1533.	1598.	1613.
70.0	1466.	1522.	1516.	1504.	1490.	1544.	1574.	1611.	1621.	1643.	1662.	1675.	1704.	1713.	1738.	1734.	1808.	1825.
80.0	1839.	1909.	1902.	1887.	1869.	1935.	1972.	2018.	2029.	2056.	2079.	2095.	2130.	2141.	2173.	2167.	2259.	2280.
90.0	2248.	2333.	2323.	2305.	2282.	2361.	2406.	2461.	2474.	2506.	2534.	2553.	2596.	2607.	2647.	2640.	2751.	2776.
100.0	2689.	2791.	2779.	2757.	2728.	2823.	2875.	2939.	2954.	2991.	3025.	3047.	3096.	3110.	3157.	3149.	3282.	3311.
150.0	5347.	5548.	5524.	5480.	5415.	5597.	5697.	5812.	5839.	5906.	5971.	6011.	6103.	6124.	6220.	6202.	6461.	6518.
200.0	8670.	8992.	8956.	8885.	8771.	9062.	9218.	9393.	9432.	9536.	9639.	9701.	9843.	9877.	10031.	10002.	10327.	10504.
250.0	12537.	12997.	12983.	12879.	12707.	13122.	13331.	13577.	13619.	13768.	13926.	14004.	14195.	14253.	14475.	14432.	14799.	15124.
300.0	16862.	17475.	17510.	17386.	17146.	17671.	17926.	18253.	18292.	18494.	18721.	18808.	19052.	19147.	19447.	19387.	19788.	20274.
350.0	21581.	22360.	22449.	22308.	21995.	22632.	22938.	23350.	23384.	23644.	23950.	24043.	24343.	24474.	24859.	24781.	25223.	25884.
400.0	26646.	27603.	27747.	27587.	27196.	27955.	28311.	28816.	28845.	29165.	29548.	29654.	30015.	30183.	30658.	30565.	31047.	31889.
450.0	32012.	33160.	33359.	33180.	32706.	33591.	34006.	34605.	34628.	35011.	35478.	35595.	36014.	36226.	36796.	36680.	37214.	38244.
500.0	37647.	38992.	39249.	39051.	38489.	39505.	39980.	40678.	40697.	41144.	41698.	41826.	42309.	42563.	43233.	43096.	43682.	44908.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{24}_{12}$MG IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	12.01	12.45	10.05	9.67	9.86	9.21	8.02	7.71	7.53	7.38	6.94	6.57	6.27	6.14	6.09	5.89	5.30	5.54
3.0	10.97	11.42	9.38	9.03	9.22	8.65	7.56	7.28	7.12	7.01	6.60	6.26	5.99	5.86	5.82	5.64	5.13	5.31
3.5	10.09	10.54	8.78	8.45	8.64	8.14	7.12	6.88	6.74	6.65	6.26	5.95	5.70	5.59	5.55	5.38	4.94	5.08
4.0	9.35	9.79	8.23	7.94	8.12	7.67	6.73	6.50	6.38	6.31	5.94	5.65	5.42	5.32	5.29	5.13	4.75	4.85
4.5	8.71	9.15	7.75	7.48	7.66	7.24	6.37	6.16	6.05	5.99	5.65	5.38	5.17	5.07	5.04	4.90	4.56	4.64
5.0	8.160	8.589	7.324	7.065	7.239	6.863	6.040	5.856	5.755	5.705	5.380	5.125	4.929	4.842	4.816	4.682	4.379	4.439
5.5	7.678	8.096	6.941	6.697	6.866	6.521	5.746	5.576	5.483	5.443	5.134	4.894	4.710	4.631	4.607	4.481	4.209	4.253
6.0	7.252	7.661	6.596	6.366	6.529	6.211	5.478	5.321	5.236	5.203	4.909	4.682	4.510	4.436	4.414	4.297	4.051	4.081
6.5	6.875	7.273	6.285	6.067	6.226	5.929	5.236	5.088	5.010	4.983	4.703	4.488	4.325	4.256	4.237	4.127	3.903	3.922
7.0	6.537	6.926	6.003	5.796	5.950	5.673	5.013	4.876	4.803	4.781	4.514	4.309	4.155	4.091	4.073	3.969	3.765	3.775
8.0	5.958	6.327	5.511	5.324	5.468	5.225	4.624	4.502	4.439	4.425	4.179	3.992	3.853	3.797	3.782	3.689	3.516	3.513
9.0	5.479	5.831	5.098	4.926	5.063	4.845	4.293	4.185	4.129	4.120	3.892	3.721	3.594	3.544	3.531	3.447	3.298	3.286
10.0	5.076	5.413	4.746	4.587	4.716	4.520	4.009	3.911	3.861	3.856	3.644	3.485	3.369	3.324	3.313	3.237	3.107	3.088
11.0	4.733	5.055	4.443	4.295	4.417	4.239	3.763	3.673	3.628	3.627	3.428	3.280	3.172	3.132	3.123	3.052	2.938	2.914
12.0	4.437	4.745	4.178	4.040	4.157	3.993	3.547	3.465	3.424	3.425	3.238	3.099	2.999	2.962	2.954	2.889	2.788	2.760
15.0	3.747	4.022	3.555	3.440	3.542	3.411	3.036	2.969	2.937	2.943	2.784	2.667	2.583	2.555	2.550	2.497	2.423	2.389
20.0	3.001	3.233	2.869	2.777	2.862	2.764	2.465	2.415	2.392	2.400	2.272	2.179	2.113	2.093	2.091	2.061	2.002	1.966
25.0	2.520	2.723	2.421	2.344	2.417	2.339	2.089	2.049	2.031	2.041	1.932	1.855	1.800	1.785	1.784	1.752	1.716	1.682
30.0	2.183	2.364	2.105	2.039	2.103	2.038	1.822	1.789	1.774	1.784	1.690	1.622	1.575	1.564	1.563	1.537	1.509	1.477
35.0	1.933	2.097	1.869	1.811	1.868	1.813	1.622	1.593	1.581	1.591	1.507	1.448	1.406	1.397	1.397	1.375	1.352	1.322
40.0	1.740	1.890	1.687	1.634	1.687	1.638	1.467	1.441	1.431	1.440	1.365	1.312	1.274	1.267	1.267	1.247	1.229	1.201
45.0	1.586	1.725	1.541	1.493	1.541	1.498	1.342	1.319	1.310	1.319	1.250	1.202	1.168	1.162	1.162	1.145	1.129	1.103
50.0	1.461	1.590	1.421	1.378	1.422	1.383	1.240	1.219	1.211	1.220	1.156	1.112	1.080	1.075	1.076	1.061	1.046	1.022
55.0	1.356	1.477	1.321	1.281	1.322	1.287	1.154	1.135	1.128	1.137	1.078	1.036	1.007	1.003	1.004	0.990	0.977	0.955
60.0	1.268	1.382	1.237	1.199	1.238	1.206	1.082	1.064	1.058	1.066	1.011	0.972	0.945	0.941	0.942	0.929	0.918	0.897
65.0	1.192	1.300	1.164	1.129	1.166	1.135	1.019	1.003	0.997	1.005	0.953	0.917	0.891	0.888	0.889	0.877	0.866	0.847
70.0	1.126	1.228	1.101	1.068	1.103	1.074	0.965	0.949	0.944	0.952	0.903	0.869	0.844	0.841	0.843	0.832	0.822	0.803
80.0	1.017	1.110	0.997	0.967	0.998	0.973	0.874	0.861	0.856	0.864	0.819	0.788	0.766	0.764	0.766	0.756	0.747	0.731
90.0	0.930	1.017	0.914	0.886	0.915	0.893	0.802	0.790	0.786	0.794	0.753	0.725	0.704	0.703	0.704	0.695	0.687	0.673
100.0	0.860	0.941	0.846	0.821	0.847	0.827	0.744	0.733	0.729	0.736	0.698	0.672	0.654	0.652	0.653	0.646	0.639	0.625
150.0	0.6408	0.7022	0.6345	0.6159	0.6355	0.6217	0.5597	0.5518	0.5498	0.5557	0.5274	0.5080	0.4938	0.4934	0.4945	0.4895	0.4838	0.4752
200.0	0.5250	0.5819	0.5264	0.5101	0.5231	0.5155	0.4636	0.4554	0.4570	0.4625	0.4385	0.4319	0.4177	0.4092	0.4109	0.4055	0.4098	0.3954
250.0	0.4584	0.5084	0.4609	0.4466	0.4570	0.4517	0.4064	0.3948	0.4010	0.4059	0.3850	0.3791	0.3667	0.3596	0.3611	0.3551	0.3602	0.3480
300.0	0.4130	0.4583	0.4161	0.4032	0.4127	0.4082	0.3674	0.3537	0.3626	0.3672	0.3484	0.3429	0.3318	0.3256	0.3270	0.3217	0.3262	0.3154
350.0	0.3802	0.4220	0.3837	0.3717	0.3806	0.3765	0.3390	0.3267	0.3348	0.3391	0.3218	0.3166	0.3064	0.3008	0.3022	0.2974	0.3015	0.2917
400.0	0.3554	0.3945	0.3591	0.3478	0.3563	0.3525	0.3175	0.3062	0.3136	0.3178	0.3016	0.2966	0.2871	0.2820	0.2834	0.2789	0.2827	0.2736
450.0	0.3359	0.3731	0.3398	0.3292	0.3373	0.3338	0.3006	0.2903	0.2971	0.3011	0.2858	0.2809	0.2720	0.2673	0.2687	0.2645	0.2680	0.2596
500.0	0.3204	0.3558	0.3244	0.3142	0.3221	0.3187	0.2871	0.2775	0.2838	0.2877	0.2731	0.2684	0.2599	0.2556	0.2568	0.2529	0.2562	0.2481

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	5.204	4.976	5.012	5.054	5.020	4.749	4.611	4.367	4.280	4.175	4.101	4.040	3.899	3.855	3.820	3.832	3.687	3.647
3.0	5.004	4.790	4.822	4.862	4.838	4.589	4.460	4.239	4.162	4.065	3.996	3.940	3.811	3.767	3.732	3.743	3.599	3.560
3.5	4.793	4.591	4.620	4.658	4.642	4.411	4.291	4.090	4.021	3.931	3.867	3.815	3.696	3.654	3.619	3.630	3.487	3.450
4.0	4.585	4.394	4.421	4.457	4.447	4.232	4.120	3.936	3.874	3.790	3.730	3.682	3.573	3.532	3.497	3.508	3.368	3.333
4.5	4.387	4.206	4.231	4.266	4.260	4.060	3.955	3.785	3.729	3.651	3.594	3.549	3.448	3.409	3.375	3.385	3.249	3.215
5.0	4.202	4.030	4.053	4.086	4.084	3.896	3.797	3.640	3.589	3.516	3.463	3.421	3.326	3.289	3.256	3.265	3.134	3.100
5.5	4.029	3.866	3.887	3.919	3.919	3.743	3.650	3.503	3.456	3.388	3.338	3.298	3.210	3.174	3.141	3.150	3.023	2.991
6.0	3.869	3.713	3.734	3.763	3.767	3.600	3.512	3.375	3.332	3.267	3.219	3.183	3.099	3.066	3.033	3.042	2.918	2.887
6.5	3.721	3.572	3.591	3.620	3.625	3.467	3.383	3.255	3.216	3.154	3.108	3.073	2.995	2.963	2.931	2.939	2.820	2.790
7.0	3.583	3.441	3.459	3.486	3.493	3.343	3.263	3.143	3.105	3.047	3.004	2.971	2.897	2.866	2.835	2.843	2.727	2.698
8.0	3.337	3.205	3.222	3.247	3.256	3.120	3.047	2.939	2.907	2.854	2.815	2.785	2.718	2.690	2.660	2.667	2.558	2.531
9.0	3.124	3.001	3.016	3.040	3.051	2.926	2.859	2.761	2.732	2.685	2.648	2.621	2.560	2.535	2.506	2.512	2.409	2.384
10.0	2.937	2.823	2.837	2.859	2.871	2.756	2.693	2.605	2.579	2.535	2.501	2.476	2.420	2.397	2.369	2.375	2.277	2.254
11.0	2.774	2.666	2.679	2.700	2.713	2.605	2.547	2.466	2.442	2.401	2.370	2.347	2.295	2.274	2.247	2.253	2.160	2.138
12.0	2.628	2.527	2.539	2.559	2.572	2.472	2.417	2.342	2.321	2.283	2.253	2.232	2.184	2.164	2.138	2.143	2.055	2.034
15.0	2.277	2.191	2.201	2.218	2.232	2.148	2.102	2.041	2.024	1.992	1.967	1.950	1.910	1.894	1.870	1.875	1.798	1.780
20.0	1.876	1.806	1.814	1.828	1.842	1.775	1.739	1.692	1.680	1.655	1.635	1.621	1.590	1.579	1.558	1.562	1.497	1.483
25.0	1.606	1.546	1.553	1.566	1.579	1.523	1.493	1.455	1.445	1.425	1.408	1.397	1.371	1.362	1.343	1.347	1.292	1.279
30.0	1.411	1.359	1.365	1.376	1.389	1.340	1.314	1.282	1.274	1.257	1.242	1.233	1.211	1.204	1.187	1.190	1.142	1.131
35.0	1.264	1.218	1.223	1.233	1.245	1.202	1.179	1.151	1.145	1.129	1.117	1.108	1.089	1.083	1.068	1.071	1.027	1.017
40.0	1.148	1.106	1.111	1.120	1.131	1.093	1.072	1.048	1.042	1.029	1.017	1.010	0.993	0.988	0.973	0.976	0.936	0.928
45.0	1.055	1.017	1.021	1.029	1.040	1.005	0.986	0.965	0.959	0.947	0.937	0.930	0.915	0.911	0.897	0.899	0.863	0.855
50.0	0.978	0.942	0.947	0.954	0.964	0.932	0.915	0.895	0.891	0.880	0.870	0.864	0.850	0.846	0.834	0.836	0.802	0.795
55.0	0.913	0.880	0.884	0.891	0.901	0.871	0.855	0.837	0.833	0.823	0.814	0.808	0.795	0.792	0.780	0.782	0.751	0.744
60.0	0.858	0.827	0.831	0.837	0.847	0.819	0.804	0.787	0.784	0.774	0.766	0.760	0.749	0.746	0.734	0.736	0.707	0.701
65.0	0.8105	0.7811	0.7846	0.7909	0.8001	0.7738	0.7600	0.7444	0.7409	0.7321	0.7242	0.7193	0.7082	0.7057	0.6948	0.6967	0.6687	0.6628
70.0	0.7688	0.7410	0.7443	0.7503	0.7592	0.7344	0.7214	0.7068	0.7036	0.6953	0.6878	0.6832	0.6728	0.6705	0.6601	0.6619	0.6354	0.6298
80.0	0.6995	0.6743	0.6773	0.6828	0.6911	0.6687	0.6570	0.6441	0.6413	0.6339	0.6271	0.6230	0.6137	0.6117	0.6022	0.6039	0.5798	0.5747
90.0	0.6441	0.6208	0.6236	0.6287	0.6365	0.6161	0.6054	0.5938	0.5913	0.5846	0.5784	0.5746	0.5662	0.5645	0.5557	0.5573	0.5351	0.5306
100.0	0.5986	0.5770	0.5796	0.5843	0.5918	0.5729	0.5631	0.5525	0.5502	0.5442	0.5384	0.5349	0.5272	0.5257	0.5175	0.5190	0.4983	0.4941
150.0	0.4549	0.4386	0.4405	0.4441	0.4503	0.4361	0.4290	0.4216	0.4200	0.4157	0.4114	0.4089	0.4033	0.4023	0.3960	0.3972	0.3814	0.3782
200.0	0.3786	0.3656	0.3666	0.3686	0.3740	0.3624	0.3567	0.3509	0.3498	0.3464	0.3428	0.3407	0.3363	0.3353	0.3303	0.3313	0.3270	0.3164
250.0	0.3332	0.3218	0.3183	0.3209	0.3258	0.3166	0.3134	0.3080	0.3081	0.3047	0.3002	0.2997	0.2964	0.2942	0.2896	0.2905	0.2885	0.2794
300.0	0.3020	0.2917	0.2886	0.2896	0.2939	0.2872	0.2844	0.2795	0.2797	0.2766	0.2726	0.2721	0.2692	0.2673	0.2631	0.2640	0.2621	0.2539
350.0	0.2793	0.2698	0.2670	0.2679	0.2719	0.2658	0.2631	0.2587	0.2589	0.2561	0.2524	0.2520	0.2493	0.2476	0.2437	0.2445	0.2427	0.2353
400.0	0.2621	0.2532	0.2506	0.2514	0.2552	0.2495	0.2470	0.2429	0.2431	0.2405	0.2371	0.2367	0.2342	0.2326	0.2290	0.2298	0.2280	0.2211
450.0	0.2486	0.2401	0.2377	0.2385	0.2422	0.2367	0.2344	0.2306	0.2308	0.2283	0.2251	0.2246	0.2224	0.2209	0.2175	0.2182	0.2164	0.2100
500.0	0.2377	0.2296	0.2274	0.2282	0.2316	0.2265	0.2242	0.2206	0.2208	0.2184	0.2154	0.2150	0.2129	0.2115	0.2082	0.2089	0.2071	0.2011

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{24}_{12}$MG IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.510	4.320	6.056	6.030	5.910	6.986	7.570	7.994	8.310	8.620	8.800	9.350	9.660	10.128	10.320	10.510	10.839	11.120
3.0	5.557	5.327	7.292	7.315	7.168	8.331	9.112	9.596	9.949	10.288	10.573	11.220	11.618	12.127	12.335	12.593	13.137	13.332
3.5	6.699	6.422	8.615	8.688	8.513	9.762	10.748	11.292	11.681	12.046	12.441	13.187	13.672	14.224	14.446	14.772	15.519	15.642
4.0	7.935	7.604	10.027	10.154	9.946	11.282	12.482	13.086	13.511	13.900	14.409	15.258	15.831	16.425	16.662	17.057	17.997	18.059
4.5	9.266	8.873	11.529	11.713	11.468	12.893	14.317	14.982	15.443	15.852	16.480	17.435	18.099	18.735	18.986	19.451	20.576	20.588
5.0	10.69	10.23	13.12	13.36	13.08	14.60	16.25	16.98	17.48	17.91	18.66	19.72	20.48	21.16	21.42	21.96	23.26	23.23
5.5	12.21	11.67	14.81	15.11	14.78	16.39	18.29	19.08	19.61	20.06	20.94	22.12	22.97	23.69	23.97	24.58	26.06	26.00
6.0	13.82	13.19	16.58	16.95	16.58	18.28	20.43	21.28	21.85	22.31	23.33	24.63	25.57	26.34	26.63	27.31	28.96	28.88
6.5	15.52	14.80	18.44	18.88	18.46	20.25	22.67	23.59	24.20	24.67	25.83	27.24	28.29	29.10	29.41	30.16	31.98	31.88
7.0	17.31	16.49	20.40	20.90	20.43	22.32	25.01	26.00	26.64	27.13	28.44	29.97	31.12	31.98	32.30	33.13	35.11	35.00
8.0	21.16	20.12	24.58	25.23	24.64	26.74	30.00	31.13	31.85	32.35	33.97	35.76	37.12	38.07	38.42	39.41	41.71	41.59
9.0	25.36	24.07	29.11	29.93	29.21	31.51	35.39	36.66	37.46	37.98	39.92	42.00	43.58	44.62	44.99	46.14	48.77	48.66
10.0	29.92	28.35	33.99	34.97	34.12	36.64	41.18	42.60	43.47	44.00	46.30	48.66	50.48	51.62	52.01	53.33	56.27	56.20
11.0	34.82	32.94	39.22	40.38	39.38	42.13	47.37	48.93	49.89	50.42	53.09	55.77	57.82	59.06	59.47	60.97	64.21	64.20
12.0	40.06	37.84	44.79	46.14	44.99	47.96	53.94	55.66	56.75	57.24	60.30	63.30	65.61	66.94	67.38	69.05	72.60	72.67
15.0	57.79	54.39	63.54	65.53	63.82	67.54	75.95	78.18	79.48	79.99	84.36	88.42	91.56	93.20	93.69	95.94	100.38	100.79
20.0	93.82	87.89	101.36	104.61	101.76	106.87	120.09	123.27	125.02	125.41	132.36	138.49	143.22	145.39	145.97	149.27	155.16	156.47
25.0	137.66	128.51	147.09	151.84	147.57	154.26	173.18	177.42	179.67	179.84	189.85	198.41	204.99	207.71	208.35	212.82	220.14	222.71
30.0	188.98	175.96	200.40	206.89	200.95	209.37	234.85	240.28	243.05	242.91	256.44	267.78	276.46	279.73	280.40	286.14	294.90	299.05
35.0	247.53	229.98	261.03	269.47	261.61	271.93	304.78	311.50	314.83	314.29	331.79	346.22	357.25	361.07	361.75	368.86	379.06	385.08
40.0	313.1	290.4	328.7	339.3	329.3	341.7	382.7	390.8	394.7	393.7	415.6	433.4	447.1	451.4	452.1	460.6	472.3	480.4
45.0	385.4	356.9	403.3	416.2	403.8	418.4	468.3	477.9	482.5	480.8	507.5	529.1	545.6	550.5	551.1	561.1	574.3	584.8
50.0	464.3	429.5	484.4	500.0	485.0	501.8	561.4	572.6	577.8	575.5	607.4	633.0	652.5	657.9	658.4	670.1	684.9	697.9
55.0	549.6	507.8	572.1	590.4	572.6	591.9	661.8	674.7	680.5	677.5	715.0	744.9	767.6	773.6	774.0	787.4	803.7	819.5
60.0	641.2	591.9	666.0	687.3	666.4	688.3	769.3	784.3	790.4	786.6	830.0	864.5	890.7	897.2	897.5	912.6	930.5	949.3
65.0	738.9	681.5	766.1	790.5	766.4	790.9	883.7	900.2	907.4	902.6	952.4	991.7	1021.6	1028.5	1028.6	1045.6	1065.2	1087.0
70.0	842.5	776.5	872.1	899.8	872.3	899.6	1004.8	1023.2	1031.1	1025.3	1081.8	1126.3	1160.0	1167.4	1167.4	1186.1	1207.5	1232.6
80.0	1087.2	982.4	1101.5	1136.4	1101.4	1134.6	1266.5	1289.1	1298.4	1290.4	1361.3	1416.7	1458.9	1467.2	1466.6	1489.3	1514.2	1546.3
90.0	1314.3	1208.5	1353.3	1396.0	1352.9	1392.4	1553.4	1580.4	1591.2	1580.6	1667.2	1734.6	1785.9	1795.1	1793.9	1820.6	1851.1	1888.9
100.0	1582.8	1454.2	1626.6	1677.6	1625.7	1671.9	1864.3	1896.1	1908.4	1894.9	1998.5	2078.9	2140.0	2149.9	2148.1	2179.1	2212.1	2259.2
150.0	3223.	2952.	3288.	3390.	3284.	3369.	3751.	3810.	3830.	3797.	4003.	4161.	4282.	4294.	4288.	4342.	4401.	4490.
200.0	5307.	4844.	5381.	5548.	5380.	5506.	6126.	6220.	6244.	6183.	6519.	6718.	6926.	6985.	6971.	7054.	7098.	7279.
250.0	7763.	7059.	7827.	8072.	7847.	8003.	8901.	9062.	9058.	8964.	9451.	9695.	10003.	10125.	10099.	10232.	10233.	10527.
300.0	10528.	9552.	10574.	10907.	10617.	10804.	12014.	12284.	12212.	12079.	12736.	13031.	13452.	13641.	13599.	13791.	13743.	14157.
350.0	13561.	12285.	13582.	14012.	13650.	13871.	15421.	15821.	15663.	15485.	16327.	16679.	17222.	17482.	17422.	17677.	17575.	18121.
400.0	16830.	15229.	16820.	17354.	16912.	17168.	19083.	19619.	19371.	19145.	20183.	20600.	21273.	21608.	21527.	21849.	21691.	22374.
450.0	20307.	18360.	20258.	20903.	20377.	20670.	22971.	23648.	23305.	23028.	24275.	24761.	25571.	25982.	25880.	26271.	26054.	26882.
500.0	23967.	21656.	23875.	24637.	24021.	24352.	27059.	27879.	27441.	27108.	28573.	29134.	30088.	30576.	30452.	30915.	30637.	31615.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.67	12.10	13.06	13.31	13.80	14.51	14.93	15.48	15.80	16.13	16.46	16.82	17.17	17.50	17.92	18.07	19.36	19.77
3.0	14.02	14.56	15.50	15.73	16.24	17.08	17.57	18.26	18.65	19.04	19.42	19.82	20.28	20.65	21.10	21.24	22.65	23.10
3.5	16.47	17.12	18.05	18.25	18.77	19.74	20.32	21.15	21.58	22.04	22.47	22.92	23.48	23.88	24.36	24.49	26.04	26.52
4.0	19.03	19.79	20.70	20.89	21.41	22.52	23.17	24.14	24.62	25.15	25.63	26.12	26.78	27.22	27.73	27.85	29.54	30.06
4.5	21.71	22.58	23.48	23.64	24.17	25.42	26.14	27.25	27.78	28.37	28.91	29.44	30.20	30.68	31.23	31.34	33.17	33.72
5.0	24.50	25.50	26.37	26.51	27.05	28.43	29.24	30.48	31.06	31.72	32.31	32.88	33.74	34.26	34.85	34.95	36.93	37.53
5.5	27.42	28.54	29.40	29.51	30.05	31.58	32.46	33.84	34.46	35.20	35.84	36.45	37.42	37.98	38.60	38.69	40.83	41.47
6.0	30.46	31.71	32.55	32.64	33.17	34.85	35.82	37.33	38.00	38.81	39.50	40.16	41.22	41.82	42.49	42.57	44.87	45.55
6.5	33.62	35.00	35.83	35.89	36.42	38.24	39.30	40.95	41.67	42.54	43.30	44.00	45.16	45.81	46.51	46.58	49.05	49.78
7.0	36.91	38.43	39.23	39.27	39.79	41.77	42.91	44.70	45.47	46.42	47.23	47.97	49.24	49.92	50.67	50.73	53.38	54.15
8.0	43.85	45.66	46.42	46.41	46.91	49.21	50.53	52.60	53.46	54.56	55.48	56.32	57.79	58.57	59.42	59.45	62.47	63.34
9.0	51.29	53.40	54.13	54.05	54.53	57.15	58.66	61.03	61.98	63.23	64.28	65.20	66.89	67.77	68.72	68.73	72.14	73.11
10.0	59.22	61.65	62.34	62.19	62.64	65.61	67.32	69.99	71.03	72.44	73.61	74.63	76.54	77.51	78.57	78.55	82.39	83.47
11.0	67.63	70.40	71.05	70.83	71.25	74.57	76.48	79.46	80.59	82.17	83.47	84.59	86.72	87.79	88.98	88.93	93.22	94.41
12.0	76.52	79.65	80.25	79.97	80.34	84.03	86.16	89.45	90.68	92.42	93.86	95.08	97.45	98.61	99.94	99.86	104.62	105.92
15.0	106.0	110.3	110.8	110.3	110.5	115.4	118.2	122.5	124.0	126.3	128.2	129.7	132.8	134.3	136.0	135.9	142.2	143.9
20.0	164.4	171.0	171.2	170.2	170.0	177.2	181.3	187.4	189.4	192.7	195.4	197.5	202.0	204.0	206.7	206.3	215.7	218.1
25.0	233.8	243.1	242.9	241.4	240.6	250.4	256.0	264.1	266.7	271.1	274.8	277.5	283.5	286.1	289.9	289.4	302.3	305.5
30.0	313.7	326.0	325.5	323.3	321.8	334.6	341.9	352.2	355.3	361.0	365.7	369.2	376.8	380.0	385.2	384.4	401.3	405.5
35.0	403.7	419.5	418.6	416.6	413.3	429.3	438.5	451.1	454.9	461.9	467.8	472.1	481.5	485.2	492.0	490.9	512.3	517.6
40.0	503.4	523.0	521.6	517.9	514.5	534.2	545.4	560.5	564.9	573.4	580.5	585.7	597.0	601.4	609.8	608.4	634.9	641.3
45.0	612.6	636.3	634.4	629.8	625.3	648.8	662.2	680.0	685.0	695.0	703.6	709.6	723.0	728.0	738.4	736.6	768.5	776.2
50.0	730.8	759.0	756.6	751.0	745.2	772.8	788.6	809.3	815.0	826.6	836.7	843.6	859.2	864.8	877.3	875.2	912.9	921.9
55.0	857.9	890.9	887.9	881.2	874.0	906.1	924.3	948.0	954.4	967.8	979.4	987.4	1005.3	1011.5	1026.2	1023.7	1067.6	1078.0
60.0	993.5	1031.6	1028.0	1020.2	1011.5	1048.3	1069.1	1095.9	1103.0	1118.2	1131.5	1140.5	1160.9	1167.7	1184.8	1181.9	1232.4	1244.3
65.0	1137.	1181.	1177.	1168.	1157.	1199.	1223.	1253.	1261.	1278.	1293.	1303.	1326.	1333.	1353.	1350.	1407.	1421.
70.0	1290.	1339.	1334.	1324.	1311.	1358.	1385.	1418.	1427.	1446.	1463.	1474.	1500.	1508.	1530.	1526.	1591.	1606.
80.0	1617.	1679.	1672.	1659.	1645.	1701.	1734.	1774.	1785.	1808.	1829.	1843.	1874.	1883.	1911.	1906.	1987.	2006.
90.0	1975.	2050.	2042.	2026.	2006.	2076.	2115.	2165.	2175.	2203.	2228.	2244.	2281.	2292.	2327.	2321.	2419.	2441.
100.0	2362.	2452.	2442.	2423.	2397.	2480.	2526.	2582.	2596.	2629.	2658.	2677.	2721.	2733.	2775.	2767.	2884.	2910.
150.0	4693.	4869.	4848.	4810.	4763.	4913.	5000.	5102.	5125.	5185.	5242.	5277.	5357.	5376.	5460.	5445.	5672.	5722.
200.0	7606.	7889.	7858.	7795.	7696.	7951.	8090.	8242.	8276.	8367.	8458.	8512.	8636.	8664.	8799.	8774.	9062.	9217.
250.0	10998.	11402.	11389.	11298.	11147.	11510.	11694.	11910.	11946.	12078.	12216.	12285.	12453.	12504.	12698.	12661.	12983.	13268.
300.0	14789.	15327.	15359.	15250.	15039.	15499.	15723.	16011.	16043.	16223.	16421.	16497.	16714.	16793.	17056.	17004.	17357.	17783.
350.0	18927.	19612.	19689.	19565.	19291.	19850.	20117.	20480.	20509.	20737.	21003.	21087.	21350.	21466.	21803.	21735.	22123.	22701.
400.0	23368.	24208.	24334.	24194.	23851.	24516.	24829.	25272.	25297.	25580.	25914.	26010.	26322.	26472.	26888.	26803.	27230.	27967.
450.0	28074.	29080.	29255.	29098.	28683.	29457.	29821.	30348.	30368.	30704.	31114.	31216.	31584.	31770.	32273.	32171.	32636.	33540.
500.0	33015.	34194.	34419.	34245.	33753.	34644.	35060.	35673.	35688.	36082.	36567.	36680.	37103.	37326.	37913.	37793.	38308.	39383.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{27}_{13}$AL IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	13.69	14.14	11.33	10.90	11.11	10.35	9.01	8.66	8.45	8.28	7.79	7.37	7.03	6.88	6.82	6.69	5.94	6.20
3.0	12.54	13.01	10.63	10.23	10.44	9.78	8.54	8.22	8.04	7.91	7.44	7.06	6.75	6.61	6.56	6.35	5.78	5.98
3.5	11.57	12.06	9.98	9.61	9.82	9.23	8.08	7.80	7.64	7.53	7.09	6.73	6.45	6.32	6.28	6.08	5.59	5.74
4.0	10.74	11.22	9.39	9.05	9.26	8.73	7.65	7.40	7.26	7.17	6.75	6.42	6.16	6.04	6.00	5.82	5.39	5.51
4.5	10.03	10.50	8.86	8.54	8.75	8.27	7.26	7.03	6.90	6.83	6.44	6.13	5.89	5.78	5.74	5.58	5.19	5.28
5.0	9.405	9.876	8.392	8.093	8.290	7.851	6.907	6.695	6.577	6.520	6.147	5.854	5.629	5.528	5.497	5.343	4.996	5.064
5.5	8.861	9.323	7.967	7.686	7.876	7.474	6.583	6.387	6.280	6.233	5.879	5.602	5.391	5.298	5.270	5.126	4.814	4.863
6.0	8.380	8.832	7.584	7.318	7.504	7.131	6.288	6.106	6.008	5.968	5.631	5.369	5.171	5.084	5.059	4.924	4.641	4.675
6.5	7.951	8.394	7.236	6.985	7.166	6.819	6.019	5.849	5.758	5.726	5.403	5.155	4.967	4.887	4.864	4.737	4.479	4.501
7.0	7.567	8.000	6.920	6.681	6.857	6.533	5.772	5.613	5.528	5.502	5.193	4.957	4.779	4.704	4.683	4.563	4.327	4.339
8.0	6.907	7.321	6.368	6.151	6.316	6.031	5.336	5.195	5.121	5.104	4.820	4.603	4.443	4.377	4.359	4.251	4.051	4.047
9.0	6.360	6.756	5.901	5.702	5.859	5.603	4.964	4.838	4.772	4.761	4.498	4.299	4.152	4.093	4.078	3.981	3.809	3.794
10.0	5.898	6.278	5.502	5.317	5.466	5.236	4.643	4.529	4.470	4.464	4.218	4.034	3.899	3.846	3.833	3.744	3.594	3.571
11.0	5.504	5.869	5.156	4.985	5.126	4.917	4.364	4.259	4.207	4.204	3.974	3.802	3.676	3.629	3.618	3.536	3.404	3.375
12.0	5.163	5.513	4.855	4.694	4.829	4.636	4.118	4.022	3.974	3.975	3.758	3.597	3.480	3.436	3.427	3.351	3.234	3.201
15.0	4.369	4.682	4.141	4.006	4.124	3.971	3.534	3.456	3.419	3.424	3.239	3.103	3.006	2.972	2.966	2.905	2.818	2.779
20.0	3.504	3.772	3.350	3.242	3.341	3.226	2.877	2.819	2.792	2.801	2.651	2.543	2.466	2.442	2.439	2.393	2.335	2.293
25.0	2.946	3.180	2.831	2.741	2.826	2.735	2.443	2.395	2.375	2.385	2.259	2.168	2.103	2.086	2.085	2.047	2.005	1.965
30.0	2.554	2.763	2.464	2.386	2.461	2.385	2.133	2.093	2.076	2.087	1.977	1.898	1.843	1.830	1.829	1.798	1.766	1.728
35.0	2.263	2.453	2.189	2.121	2.188	2.123	1.900	1.866	1.852	1.863	1.765	1.695	1.646	1.636	1.636	1.609	1.583	1.548
40.0	2.038	2.212	1.976	1.915	1.976	1.919	1.719	1.689	1.677	1.687	1.599	1.537	1.492	1.484	1.484	1.461	1.439	1.407
45.0	1.859	2.019	1.806	1.750	1.806	1.756	1.573	1.546	1.536	1.546	1.466	1.409	1.369	1.361	1.362	1.342	1.323	1.293
50.0	1.712	1.862	1.666	1.615	1.667	1.621	1.453	1.429	1.420	1.430	1.356	1.303	1.266	1.261	1.262	1.243	1.226	1.199
55.0	1.590	1.730	1.550	1.502	1.551	1.509	1.353	1.331	1.323	1.333	1.264	1.215	1.181	1.176	1.177	1.160	1.145	1.119
60.0	1.486	1.619	1.451	1.407	1.452	1.414	1.268	1.248	1.241	1.250	1.185	1.140	1.108	1.104	1.105	1.090	1.076	1.052
65.0	1.397	1.523	1.366	1.324	1.367	1.332	1.196	1.176	1.169	1.179	1.118	1.075	1.045	1.041	1.043	1.029	1.016	0.993
70.0	1.320	1.440	1.292	1.253	1.293	1.260	1.132	1.114	1.108	1.117	1.059	1.019	0.990	0.987	0.988	0.976	0.964	0.942
80.0	1.193	1.302	1.189	1.134	1.171	1.142	1.026	1.010	1.005	1.013	0.961	0.925	0.899	0.897	0.898	0.887	0.876	0.857
90.0	1.091	1.192	1.072	1.040	1.074	1.048	0.942	0.927	0.923	0.931	0.883	0.850	0.826	0.824	0.826	0.816	0.807	0.789
100.0	1.009	1.103	0.993	0.963	0.994	0.971	0.873	0.860	0.856	0.864	0.819	0.789	0.767	0.765	0.767	0.758	0.749	0.734
150.0	0.7619	0.8239	0.7446	0.7228	0.7458	0.7296	0.6568	0.6476	0.6452	0.6521	0.6189	0.5961	0.5795	0.5790	0.5803	0.5744	0.5677	0.5576
200.0	0.6161	0.6828	0.6178	0.5987	0.6139	0.6050	0.5441	0.5344	0.5363	0.5428	0.5146	0.5069	0.4902	0.4802	0.4822	0.4759	0.4809	0.4641
250.0	0.5379	0.5966	0.5409	0.5241	0.5363	0.5302	0.4770	0.4633	0.4706	0.4764	0.4518	0.4449	0.4304	0.4220	0.4238	0.4188	0.4227	0.4084
300.0	0.4847	0.5379	0.4884	0.4732	0.4844	0.4790	0.4312	0.4151	0.4256	0.4310	0.4088	0.4024	0.3894	0.3821	0.3838	0.3776	0.3829	0.3702
350.0	0.4462	0.4963	0.4503	0.4362	0.4467	0.4419	0.3978	0.3834	0.3929	0.3980	0.3776	0.3715	0.3596	0.3530	0.3547	0.3490	0.3538	0.3423
400.0	0.4170	0.4630	0.4214	0.4082	0.4182	0.4137	0.3726	0.3594	0.3681	0.3730	0.3539	0.3481	0.3369	0.3310	0.3326	0.3274	0.3318	0.3211
450.0	0.3943	0.4378	0.3988	0.3863	0.3958	0.3917	0.3528	0.3407	0.3487	0.3534	0.3354	0.3297	0.3192	0.3138	0.3153	0.3104	0.3145	0.3045
500.0	0.3760	0.4176	0.3807	0.3687	0.3780	0.3741	0.3369	0.3257	0.3331	0.3377	0.3205	0.3150	0.3050	0.2999	0.3014	0.2968	0.3007	0.2912

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	5.824	5.569	5.607	5.653	5.614	5.310	5.155	4.880	4.783	4.665	4.582	4.513	4.355	4.305	4.265	4.279	4.115	4.071
3.0	5.632	5.390	5.424	5.469	5.441	5.159	5.015	4.764	4.678	4.568	4.490	4.426	4.281	4.231	4.191	4.204	4.040	3.997
3.5	5.418	5.188	5.220	5.262	5.243	4.982	4.846	4.617	4.540	4.438	4.365	4.305	4.171	4.123	4.083	4.095	3.933	3.891
4.0	5.201	4.984	5.013	5.054	5.041	4.797	4.670	4.460	4.390	4.295	4.226	4.171	4.047	4.000	3.960	3.972	3.813	3.773
4.5	4.992	4.785	4.812	4.851	4.844	4.616	4.496	4.302	4.238	4.149	4.084	4.033	3.918	3.873	3.834	3.845	3.690	3.651
5.0	4.793	4.596	4.622	4.659	4.656	4.441	4.328	4.149	4.090	4.007	3.945	3.897	3.790	3.747	3.708	3.719	3.568	3.530
5.5	4.606	4.419	4.443	4.478	4.479	4.276	4.169	4.002	3.948	3.869	3.812	3.767	3.665	3.624	3.586	3.596	3.450	3.414
6.0	4.432	4.253	4.275	4.309	4.312	4.121	4.020	3.863	3.813	3.739	3.684	3.642	3.546	3.507	3.470	3.480	3.338	3.302
6.5	4.269	4.098	4.119	4.152	4.157	3.976	3.879	3.732	3.686	3.615	3.563	3.523	3.433	3.396	3.359	3.368	3.231	3.197
7.0	4.118	3.953	3.973	4.005	4.012	3.840	3.748	3.609	3.566	3.499	3.449	3.411	3.326	3.290	3.254	3.263	3.129	3.096
8.0	3.845	3.693	3.711	3.740	3.750	3.593	3.509	3.384	3.347	3.286	3.240	3.206	3.129	3.097	3.062	3.070	2.944	2.913
9.0	3.606	3.465	3.482	3.509	3.521	3.377	3.299	3.187	3.153	3.097	3.055	3.024	2.954	2.924	2.890	2.898	2.779	2.750
10.0	3.397	3.265	3.280	3.306	3.320	3.186	3.114	3.011	2.981	2.930	2.890	2.862	2.797	2.770	2.737	2.745	2.631	2.604
11.0	3.212	3.088	3.103	3.127	3.141	3.017	2.949	2.855	2.828	2.780	2.743	2.717	2.657	2.632	2.600	2.607	2.500	2.474
12.0	3.048	2.930	2.944	2.967	2.982	2.866	2.803	2.715	2.690	2.646	2.612	2.587	2.531	2.508	2.477	2.484	2.381	2.357
15.0	2.649	2.548	2.560	2.580	2.596	2.498	2.444	2.373	2.353	2.316	2.287	2.267	2.221	2.202	2.174	2.180	2.090	2.069
20.0	2.189	2.107	2.116	2.133	2.149	2.070	2.028	1.973	1.959	1.930	1.907	1.891	1.855	1.841	1.816	1.821	1.746	1.729
25.0	1.877	1.807	1.815	1.829	1.845	1.779	1.744	1.700	1.688	1.665	1.645	1.632	1.602	1.592	1.569	1.574	1.509	1.494
30.0	1.651	1.590	1.597	1.610	1.625	1.568	1.538	1.500	1.491	1.471	1.453	1.442	1.417	1.409	1.389	1.392	1.335	1.323
35.0	1.480	1.426	1.432	1.443	1.457	1.407	1.380	1.348	1.340	1.322	1.307	1.297	1.275	1.268	1.250	1.253	1.202	1.191
40.0	1.345	1.296	1.302	1.312	1.325	1.280	1.256	1.228	1.221	1.205	1.191	1.183	1.163	1.157	1.140	1.143	1.097	1.087
45.0	1.236	1.191	1.197	1.206	1.219	1.178	1.156	1.130	1.124	1.110	1.098	1.090	1.072	1.067	1.051	1.054	1.011	1.002
50.0	1.147	1.105	1.110	1.119	1.131	1.093	1.073	1.050	1.044	1.031	1.020	1.013	0.996	0.992	0.977	0.980	0.940	0.932
55.0	1.071	1.032	1.037	1.045	1.056	1.021	1.003	0.982	0.977	0.965	0.954	0.948	0.933	0.929	0.915	0.917	0.880	0.872
60.0	1.006	0.970	0.974	0.982	0.993	0.960	0.943	0.923	0.919	0.908	0.898	0.892	0.878	0.875	0.861	0.864	0.829	0.821
65.0	0.9506	0.9161	0.9202	0.9276	0.9384	0.9076	0.8914	0.8731	0.8690	0.8587	0.8493	0.8436	0.8306	0.8276	0.8149	0.8171	0.7843	0.7774
70.0	0.9018	0.8692	0.8731	0.8801	0.8905	0.8614	0.8462	0.8291	0.8253	0.8156	0.8068	0.8013	0.7892	0.7865	0.7743	0.7764	0.7453	0.7388
80.0	0.8207	0.7910	0.7946	0.8010	0.8108	0.7845	0.7708	0.7556	0.7523	0.7437	0.7357	0.7308	0.7200	0.7177	0.7065	0.7085	0.6802	0.6743
90.0	0.7557	0.7284	0.7317	0.7376	0.7469	0.7228	0.7103	0.6967	0.6937	0.6859	0.6786	0.6742	0.6643	0.6624	0.6520	0.6539	0.6278	0.6224
100.0	0.7024	0.6771	0.6801	0.6856	0.6944	0.6722	0.6607	0.6483	0.6456	0.6385	0.6317	0.6277	0.6186	0.6169	0.6072	0.6090	0.5847	0.5797
150.0	0.5338	0.5147	0.5169	0.5212	0.5284	0.5118	0.5034	0.4948	0.4929	0.4879	0.4828	0.4798	0.4733	0.4721	0.4648	0.4661	0.4476	0.4439
200.0	0.4443	0.4291	0.4291	0.4326	0.4390	0.4253	0.4186	0.4118	0.4105	0.4065	0.4023	0.3999	0.3947	0.3935	0.3876	0.3888	0.3837	0.3713
250.0	0.3910	0.3777	0.3735	0.3766	0.3824	0.3716	0.3679	0.3614	0.3616	0.3576	0.3523	0.3517	0.3478	0.3453	0.3398	0.3410	0.3386	0.3279
300.0	0.3545	0.3424	0.3387	0.3398	0.3449	0.3371	0.3337	0.3280	0.3283	0.3246	0.3199	0.3194	0.3159	0.3137	0.3087	0.3098	0.3076	0.2980
350.0	0.3278	0.3167	0.3133	0.3144	0.3192	0.3119	0.3088	0.3036	0.3039	0.3006	0.2962	0.2957	0.2926	0.2906	0.2860	0.2870	0.2849	0.2762
400.0	0.3076	0.2971	0.2941	0.2951	0.2996	0.2928	0.2899	0.2851	0.2854	0.2823	0.2783	0.2778	0.2749	0.2730	0.2688	0.2696	0.2676	0.2595
450.0	0.2917	0.2818	0.2790	0.2799	0.2842	0.2778	0.2750	0.2705	0.2708	0.2679	0.2641	0.2636	0.2610	0.2592	0.2552	0.2560	0.2540	0.2466
500.0	0.2790	0.2695	0.2669	0.2678	0.2719	0.2658	0.2631	0.2589	0.2592	0.2564	0.2528	0.2523	0.2498	0.2482	0.2444	0.2451	0.2431	0.2360

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{27}_{13}$AL IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.620	4.420	6.204	6.180	6.060	7.172	7.770	8.204	8.630	8.850	9.030	9.600	9.920	10.402	10.600	10.794	11.130	11.420
3.0	5.651	5.416	7.434	7.459	7.314	8.614	9.309	9.804	10.167	10.517	10.803	11.471	11.878	12.404	12.617	12.880	13.433	13.636
3.5	6.773	6.495	8.746	8.822	8.647	9.935	10.935	11.490	11.890	12.267	12.661	13.429	13.924	14.492	14.721	15.052	15.808	15.940
4.0	7.985	7.656	10.141	10.270	10.064	11.440	12.653	13.268	13.704	14.104	14.612	15.482	16.066	16.677	16.920	17.320	18.268	18.340
4.5	9.287	8.901	11.621	11.806	11.565	13.030	14.464	15.140	15.613	16.034	16.660	17.635	18.309	18.963	19.220	19.689	20.821	20.844
5.0	10.68	10.23	13.19	13.43	13.15	14.71	16.37	17.11	17.62	18.06	18.81	19.89	20.65	21.35	21.62	22.16	23.47	23.46
5.5	12.16	11.63	14.84	15.14	14.82	16.47	18.37	19.17	19.72	20.18	21.05	22.25	23.11	23.85	24.13	24.74	26.23	26.18
6.0	13.72	13.12	16.58	16.94	16.58	18.32	20.47	21.34	21.92	22.39	23.40	24.71	25.66	26.45	26.75	27.43	29.08	29.01
6.5	15.38	14.69	18.40	18.83	18.42	20.26	22.67	23.60	24.21	24.70	25.85	27.28	28.33	29.16	29.47	30.23	32.04	31.95
7.0	17.12	16.34	20.31	20.81	20.35	22.28	24.96	25.95	26.61	27.11	28.40	29.95	31.10	31.97	32.30	33.13	35.11	35.01
8.0	20.86	19.87	24.38	25.02	24.45	26.58	29.83	30.96	31.68	32.20	33.80	35.60	36.96	37.93	38.28	39.27	41.56	41.45
9.0	24.94	23.71	28.79	29.59	28.89	31.23	35.08	36.35	37.15	37.69	39.60	41.68	43.25	44.31	44.69	45.83	48.44	48.35
10.0	29.35	27.86	33.53	34.49	33.67	36.22	40.71	42.12	43.00	43.54	45.80	48.16	49.97	51.12	51.52	52.83	55.74	55.69
11.0	34.09	32.31	38.60	39.74	38.77	41.54	46.71	48.27	49.23	49.78	52.40	55.06	57.10	58.35	58.77	60.25	63.46	63.47
12.0	39.18	37.06	44.00	45.33	44.20	47.20	53.08	54.79	55.83	56.39	59.39	62.37	64.65	66.00	66.44	68.10	71.60	71.69
15.0	56.28	53.07	62.13	64.07	62.42	66.14	74.38	76.59	77.88	78.41	82.68	86.69	89.78	91.42	91.92	94.14	98.51	98.92
20.0	91.02	85.41	98.61	101.77	99.01	104.09	116.98	120.10	121.83	122.25	129.01	135.02	139.65	141.81	142.39	145.63	151.40	152.69
25.0	133.22	124.55	142.63	147.24	143.12	149.72	168.10	172.25	174.47	174.67	184.38	192.74	199.15	201.84	202.48	206.84	214.00	216.50
30.0	182.58	170.22	193.89	200.17	194.45	202.73	227.41	232.71	235.43	235.34	248.44	259.46	267.90	271.12	271.80	277.38	285.92	289.94
35.0	238.86	222.19	252.14	260.30	252.74	262.84	294.61	301.15	304.41	303.93	320.85	334.85	345.55	349.31	349.99	356.88	366.82	372.63
40.0	301.8	280.2	317.1	327.4	317.8	329.8	369.4	377.3	381.1	380.2	401.3	418.6	431.8	436.1	436.7	445.0	456.4	464.2
45.0	371.3	344.2	388.7	401.2	389.3	403.5	451.6	461.0	465.4	463.9	489.6	510.5	526.4	531.2	531.8	541.5	554.3	564.4
50.0	447.0	413.9	466.6	481.6	467.2	483.6	541.0	551.9	556.9	554.7	585.5	610.2	629.0	634.3	634.9	646.2	660.4	673.0
55.0	528.9	489.2	550.7	568.3	551.4	569.9	637.3	649.8	655.4	652.6	688.7	717.6	739.5	745.3	745.7	758.6	774.4	789.6
60.0	616.8	569.9	640.8	661.3	641.2	662.7	740.4	754.6	760.9	757.2	799.1	832.3	857.6	863.9	864.2	878.8	896.1	914.2
65.0	710.6	655.9	736.8	760.3	737.1	760.9	850.1	866.1	873.0	868.5	916.4	954.3	983.1	989.9	990.0	1006.3	1025.3	1046.3
70.0	810.0	747.1	838.5	865.1	838.7	865.1	966.3	984.1	991.7	986.2	1040.5	1083.4	1115.9	1123.1	1123.1	1141.1	1161.8	1185.9
80.0	1025.5	944.6	1058.5	1092.0	1058.4	1090.5	1217.3	1239.1	1248.1	1240.4	1308.6	1361.9	1402.5	1410.5	1410.1	1431.9	1456.0	1486.7
90.0	1262.5	1161.6	1299.9	1340.9	1299.5	1337.6	1492.4	1518.4	1528.8	1518.7	1601.9	1666.8	1716.1	1724.9	1723.9	1749.6	1777.5	1815.3
100.0	1520.0	1397.3	1561.9	1610.9	1561.1	1605.6	1790.5	1821.1	1832.9	1820.0	1919.6	1996.8	2055.6	2065.2	2063.5	2093.3	2125.1	2170.4
150.0	3093.	2834.	3155.	3252.	3151.	3233.	3599.	3656.	3675.	3644.	3842.	3993.	4109.	4121.	4115.	4167.	4223.	4309.
200.0	5090.	4648.	5161.	5321.	5160.	5282.	5876.	5966.	5989.	5931.	6253.	6444.	6643.	6700.	6687.	6767.	6809.	6983.
250.0	7445.	6772.	7506.	7741.	7525.	7674.	8536.	8690.	8686.	8597.	9064.	9298.	9594.	9711.	9686.	9813.	9815.	10096.
300.0	10096.	9161.	10139.	10459.	10180.	10361.	11520.	11780.	11711.	11583.	12212.	12496.	12899.	13081.	13040.	13225.	13178.	13576.
350.0	13003.	11781.	13023.	13436.	13087.	13299.	14786.	15169.	15018.	14848.	15654.	15993.	16513.	16763.	16706.	16950.	16852.	17375.
400.0	16137.	14604.	16126.	16638.	16215.	16460.	18296.	18811.	18572.	18356.	19351.	19761.	20397.	20717.	20641.	20948.	20797.	21452.
450.0	19469.	17605.	19422.	20041.	19536.	19817.	22023.	22672.	22344.	22078.	23274.	23740.	24517.	24910.	24814.	25188.	24980.	25775.
500.0	22978.	20765.	22890.	23620.	23029.	23346.	25942.	26728.	26308.	25990.	27393.	27932.	28846.	29314.	29196.	29639.	29373.	30310.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.99	12.44	13.42	13.68	14.18	14.91	15.34	15.90	16.24	16.58	16.92	17.28	17.65	17.98	18.41	18.56	19.90	20.32
3.0	14.35	14.90	15.87	16.10	16.62	17.48	17.99	18.70	19.10	19.50	19.89	20.30	20.77	21.14	21.60	21.74	23.20	23.66
3.5	16.79	17.45	18.41	18.62	19.15	20.14	20.73	21.58	22.02	22.50	22.94	23.39	23.96	24.37	24.86	25.00	26.59	27.09
4.0	19.33	20.11	21.05	21.24	21.78	22.91	23.57	24.55	25.05	25.59	26.08	26.58	27.25	27.69	28.22	28.34	30.07	30.61
4.5	21.98	22.87	23.79	23.97	24.51	25.78	26.51	27.64	28.18	28.79	29.33	29.87	30.64	31.12	31.68	31.80	33.67	34.25
5.0	24.74	25.75	26.66	26.81	27.35	28.76	29.58	30.83	31.42	32.10	32.70	33.28	34.14	34.67	35.26	35.37	37.39	38.01
5.5	27.62	28.75	29.64	29.76	30.31	31.86	32.75	34.15	34.78	35.53	36.18	36.80	37.77	38.33	38.96	39.06	41.24	41.90
6.0	30.60	31.86	32.74	32.84	33.38	35.07	36.05	37.58	38.26	39.08	39.78	40.44	41.51	42.12	42.79	42.88	45.22	45.92
6.5	33.71	35.10	35.95	36.03	36.57	38.41	39.47	41.14	41.86	42.75	43.51	44.21	45.38	46.03	46.75	46.82	49.33	50.07
7.0	36.93	38.45	39.29	39.34	39.88	41.86	43.01	44.81	45.59	46.54	47.36	48.11	49.38	50.07	50.83	50.89	53.58	54.36
8.0	43.72	45.52	46.33	46.32	46.84	49.14	50.46	52.54	53.41	54.51	55.44	56.28	57.75	58.53	59.39	59.43	62.48	63.36
9.0	50.97	53.07	53.84	53.78	54.28	56.89	58.40	60.77	61.72	62.98	64.03	64.95	66.63	67.51	68.47	68.48	71.92	72.90
10.0	58.69	61.11	61.83	61.71	62.18	65.13	66.83	69.49	70.53	71.94	73.12	74.14	76.03	77.00	78.07	78.06	81.91	83.00
11.0	66.87	69.61	70.30	70.11	70.54	73.84	75.74	78.70	79.84	81.41	82.71	83.82	85.94	87.00	88.19	88.16	92.44	93.64
12.0	75.50	78.59	79.24	78.97	79.37	83.03	85.14	88.40	89.63	91.37	92.80	94.01	96.35	97.51	98.83	98.77	103.51	104.82
15.0	104.1	108.3	108.8	108.3	108.6	113.4	116.2	120.4	121.9	124.2	126.0	127.5	130.6	132.1	133.8	133.7	139.9	141.6
20.0	160.4	166.9	167.1	166.2	166.0	173.1	177.1	183.1	185.1	188.3	191.0	193.1	197.4	199.4	202.1	201.7	210.9	213.3
25.0	227.3	236.3	236.3	234.8	234.1	243.6	249.1	257.0	259.6	263.9	267.5	270.2	276.0	278.5	282.3	281.8	294.4	297.6
30.0	304.2	316.2	315.7	313.6	312.2	324.6	331.8	341.8	344.9	350.4	355.0	358.4	365.8	368.9	374.0	373.2	389.7	393.8
35.0	390.7	406.0	405.2	402.4	400.1	415.7	424.6	436.9	440.5	447.4	453.1	457.3	466.4	470.1	476.6	475.6	496.4	501.6
40.0	486.5	505.4	504.2	500.6	497.4	516.4	527.3	542.0	546.2	554.4	561.4	566.4	577.4	581.6	589.8	588.5	614.1	620.4
45.0	591.3	614.2	612.5	608.0	603.7	626.5	639.4	656.7	661.8	671.3	679.6	686.4	698.4	703.2	713.3	711.6	742.4	749.9
50.0	704.7	732.0	729.7	724.4	718.9	745.8	760.8	780.8	786.3	797.6	807.3	814.0	829.1	834.6	846.6	844.6	881.0	889.7
55.0	826.7	858.5	855.7	849.3	842.5	873.4	891.0	913.9	920.1	933.0	944.3	952.0	969.3	975.3	989.5	987.1	1029.5	1039.6
60.0	956.8	993.6	990.1	982.7	974.3	1009.8	1029.9	1055.7	1062.7	1077.3	1090.2	1098.9	1118.6	1125.1	1141.7	1138.9	1187.7	1199.2
65.0	1095.	1137.	1133.	1124.	1114.	1154.	1177.	1206.	1214.	1230.	1245.	1255.	1277.	1284.	1303.	1300.	1355.	1368.
70.0	1241.	1288.	1283.	1274.	1262.	1307.	1333.	1365.	1373.	1392.	1408.	1419.	1444.	1451.	1473.	1469.	1532.	1546.
80.0	1555.	1614.	1608.	1596.	1580.	1636.	1668.	1707.	1716.	1739.	1759.	1772.	1802.	1811.	1839.	1834.	1912.	1929.
90.0	1898.	1970.	1963.	1947.	1929.	1995.	2033.	2079.	2091.	2117.	2142.	2157.	2193.	2203.	2237.	2231.	2325.	2347.
100.0	2269.	2355.	2346.	2327.	2303.	2383.	2427.	2481.	2494.	2526.	2554.	2573.	2615.	2626.	2666.	2659.	2771.	2797.
150.0	4504.	4673.	4653.	4616.	4561.	4715.	4799.	4896.	4919.	4976.	5031.	5065.	5142.	5160.	5240.	5226.	5444.	5492.
200.0	7297.	7568.	7538.	7478.	7383.	7627.	7759.	7906.	7939.	8027.	8114.	8166.	8285.	8312.	8441.	8417.	8694.	8842.
250.0	10548.	10934.	10923.	10835.	10691.	11040.	11216.	11423.	11457.	11584.	11717.	11783.	11944.	11993.	12179.	12143.	12453.	12725.
300.0	14182.	14698.	14728.	14623.	14422.	14863.	15078.	15353.	15385.	15556.	15748.	15820.	16026.	16105.	16357.	16307.	16646.	17054.
350.0	18150.	18804.	18879.	18760.	18498.	19034.	19290.	19638.	19666.	19885.	20140.	20220.	20473.	20583.	20907.	20842.	21214.	21768.
400.0	22405.	23211.	23331.	23197.	22869.	23506.	23809.	24232.	24256.	24525.	24848.	24936.	25238.	25382.	25782.	25700.	26109.	26816.
450.0	26916.	27880.	28049.	27899.	27501.	28243.	28592.	29097.	29116.	29442.	29832.	29933.	30287.	30461.	30940.	30842.	31292.	32158.
500.0	31652.	32784.	32999.	32833.	32360.	33214.	33614.	34202.	34216.	34598.	35059.	35167.	35573.	35787.	36350.	36235.	36729.	37759.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{28}_{14}$SI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	15.43	15.88	12.64	12.14	12.38	11.52	10.02	9.62	9.39	9.20	8.65	8.18	7.80	7.63	7.56	7.31	6.58	6.86
3.0	14.18	14.67	11.90	11.45	11.69	10.92	9.53	9.18	8.97	8.82	8.30	7.87	7.52	7.36	7.31	7.07	6.44	6.66
3.5	13.11	13.62	11.21	10.79	11.03	10.35	9.06	8.74	8.56	8.43	7.94	7.54	7.22	7.07	7.02	6.80	6.25	6.42
4.0	12.20	12.71	10.58	10.19	10.43	9.82	8.61	8.32	8.15	8.06	7.59	7.21	6.92	6.78	6.74	6.53	6.04	6.18
4.5	11.41	11.92	10.01	9.65	9.88	9.32	8.19	7.93	7.78	7.70	7.25	6.90	6.63	6.50	6.46	6.27	5.84	5.94
5.0	10.72	11.22	9.50	9.16	9.38	8.87	7.80	7.56	7.43	7.36	6.94	6.61	6.35	6.24	6.20	6.03	5.63	5.71
5.5	10.11	10.61	9.04	8.71	8.93	8.46	7.45	7.23	7.11	7.05	6.65	6.34	6.10	5.99	5.96	5.79	5.44	5.49
6.0	9.57	10.06	8.61	8.31	8.52	8.09	7.13	6.92	6.81	6.76	6.38	6.08	5.86	5.76	5.73	5.57	5.25	5.29
6.5	9.09	9.57	8.23	7.94	8.15	7.75	6.84	6.64	6.54	6.50	6.13	5.85	5.64	5.54	5.52	5.37	5.08	5.10
7.0	8.66	9.13	7.88	7.61	7.81	7.43	6.56	6.38	6.28	6.25	5.90	5.63	5.43	5.34	5.32	5.18	4.91	4.93
8.0	7.912	8.371	7.268	7.019	7.207	6.876	6.082	5.921	5.835	5.814	5.490	5.243	5.060	4.983	4.962	4.839	4.611	4.606
9.0	7.294	7.734	6.747	6.518	6.696	6.400	5.669	5.524	5.448	5.435	5.134	4.906	4.738	4.670	4.652	4.541	4.344	4.326
10.0	6.772	7.195	6.300	6.087	6.257	5.990	5.311	5.179	5.112	5.104	4.823	4.611	4.456	4.395	4.380	4.278	4.106	4.080
11.0	6.324	6.732	5.911	5.714	5.875	5.632	4.998	4.878	4.817	4.813	4.549	4.352	4.208	4.153	4.140	4.046	3.894	3.861
12.0	5.937	6.329	5.571	5.386	5.540	5.317	4.722	4.611	4.556	4.556	4.307	4.122	3.987	3.937	3.926	3.839	3.704	3.666
15.0	5.032	5.385	4.764	4.608	4.744	4.565	4.062	3.973	3.930	3.936	3.723	3.566	3.454	3.415	3.408	3.337	3.237	3.192
20.0	4.044	4.347	3.863	3.739	3.853	3.720	3.317	3.249	3.218	3.229	3.056	2.931	2.841	2.814	2.811	2.757	2.690	2.642
25.0	3.403	3.670	3.270	3.166	3.265	3.158	2.820	2.766	2.742	2.754	2.608	2.503	2.428	2.408	2.406	2.363	2.315	2.268
30.0	2.953	3.192	2.849	2.759	2.846	2.757	2.465	2.420	2.400	2.413	2.285	2.194	2.130	2.115	2.114	2.078	2.040	1.997
35.0	2.618	2.835	2.533	2.464	2.532	2.456	2.198	2.159	2.142	2.155	2.042	1.961	1.904	1.892	1.892	1.862	1.831	1.791
40.0	2.359	2.558	2.288	2.217	2.288	2.221	1.989	1.955	1.941	1.953	1.851	1.778	1.727	1.717	1.718	1.691	1.666	1.628
45.0	2.152	2.336	2.091	2.027	2.092	2.033	1.821	1.790	1.778	1.790	1.697	1.631	1.585	1.576	1.577	1.564	1.531	1.497
50.0	1.982	2.155	1.930	1.871	1.931	1.878	1.684	1.655	1.646	1.657	1.570	1.510	1.467	1.460	1.461	1.440	1.420	1.388
55.0	1.841	2.003	1.795	1.741	1.797	1.748	1.568	1.542	1.533	1.544	1.464	1.408	1.368	1.362	1.364	1.344	1.327	1.297
60.0	1.722	1.874	1.681	1.630	1.683	1.638	1.470	1.446	1.437	1.449	1.374	1.321	1.284	1.279	1.280	1.263	1.247	1.219
65.0	1.619	1.764	1.583	1.535	1.584	1.543	1.385	1.363	1.355	1.366	1.295	1.246	1.211	1.207	1.208	1.192	1.178	1.151
70.0	1.530	1.668	1.497	1.452	1.499	1.461	1.311	1.291	1.284	1.294	1.227	1.181	1.148	1.144	1.146	1.131	1.117	1.092
80.0	1.382	1.508	1.356	1.315	1.357	1.324	1.189	1.171	1.165	1.175	1.114	1.072	1.042	1.039	1.041	1.028	1.016	0.994
90.0	1.265	1.382	1.243	1.206	1.245	1.215	1.092	1.075	1.070	1.080	1.024	0.986	0.958	0.956	0.958	0.946	0.936	0.915
100.0	1.170	1.278	1.151	1.117	1.153	1.126	1.012	0.997	0.992	1.001	0.950	0.915	0.889	0.887	0.889	0.879	0.869	0.851
150.0	0.8719	0.9551	0.8635	0.8383	0.8649	0.8461	0.7617	0.7510	0.7482	0.7562	0.7178	0.6913	0.6721	0.6715	0.6730	0.6661	0.6584	0.6467
200.0	0.7144	0.7917	0.7165	0.6943	0.7120	0.7016	0.6310	0.6198	0.6220	0.6294	0.5968	0.5879	0.5686	0.5669	0.5692	0.5619	0.5577	0.5382
250.0	0.6238	0.6918	0.6273	0.6078	0.6220	0.6148	0.5532	0.5373	0.5457	0.5525	0.5240	0.5160	0.4991	0.4894	0.4915	0.4833	0.4903	0.4736
300.0	0.5622	0.6237	0.5664	0.5488	0.5618	0.5556	0.5000	0.4814	0.4936	0.4999	0.4742	0.4667	0.4516	0.4431	0.4451	0.4379	0.4440	0.4293
350.0	0.5175	0.5744	0.5222	0.5059	0.5181	0.5125	0.4614	0.4446	0.4556	0.4616	0.4379	0.4309	0.4170	0.4094	0.4114	0.4048	0.4104	0.3970
400.0	0.4837	0.5370	0.4887	0.4734	0.4850	0.4798	0.4321	0.4168	0.4269	0.4326	0.4105	0.4037	0.3908	0.3839	0.3857	0.3797	0.3848	0.3724
450.0	0.4572	0.5077	0.4626	0.4480	0.4591	0.4543	0.4092	0.3951	0.4044	0.4098	0.3890	0.3824	0.3702	0.3639	0.3657	0.3600	0.3648	0.3531
500.0	0.4361	0.4843	0.4415	0.4277	0.4384	0.4338	0.3908	0.3777	0.3863	0.3916	0.3718	0.3653	0.3537	0.3478	0.3496	0.3442	0.3487	0.3377

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	6.449	6.165	6.205	6.256	6.212	5.874	5.702	5.397	5.289	5.158	5.066	4.988	4.814	4.758	4.713	4.728	4.545	4.496
3.0	6.268	5.998	6.035	6.084	6.052	5.737	5.576	5.296	5.200	5.077	4.990	4.918	4.757	4.701	4.656	4.670	4.486	4.438
3.5	6.054	5.797	5.831	5.878	5.856	5.562	5.411	5.154	5.067	4.953	4.871	4.804	4.654	4.600	4.555	4.568	4.386	4.339
4.0	5.832	5.587	5.619	5.664	5.649	5.375	5.232	4.996	4.916	4.810	4.732	4.670	4.531	4.478	4.433	4.446	4.268	4.222
4.5	5.613	5.380	5.409	5.452	5.444	5.186	5.051	4.833	4.760	4.660	4.587	4.529	4.399	4.348	4.304	4.316	4.142	4.097
5.0	5.402	5.180	5.208	5.249	5.245	5.003	4.875	4.672	4.606	4.511	4.442	4.388	4.266	4.217	4.174	4.185	4.016	3.972
5.5	5.203	4.990	5.016	5.056	5.056	4.827	4.706	4.516	4.455	4.366	4.301	4.250	4.135	4.089	4.046	4.057	3.891	3.850
6.0	5.015	4.812	4.836	4.875	4.878	4.661	4.546	4.368	4.311	4.227	4.165	4.116	4.009	3.964	3.922	3.932	3.771	3.731
6.5	4.839	4.644	4.667	4.704	4.710	4.504	4.394	4.227	4.174	4.094	4.035	3.989	3.887	3.845	3.803	3.813	3.657	3.618
7.0	4.674	4.487	4.509	4.544	4.552	4.356	4.251	4.093	4.044	3.968	3.911	3.868	3.772	3.731	3.690	3.700	3.547	3.510
8.0	4.375	4.201	4.222	4.255	4.266	4.087	3.991	3.849	3.806	3.737	3.684	3.645	3.557	3.520	3.481	3.490	3.346	3.311
9.0	4.112	3.950	3.969	4.000	4.014	3.849	3.760	3.631	3.593	3.530	3.481	3.445	3.365	3.331	3.293	3.301	3.165	3.132
10.0	3.880	3.729	3.746	3.776	3.791	3.638	3.555	3.438	3.403	3.344	3.299	3.266	3.193	3.162	3.124	3.132	3.003	2.972
11.0	3.675	3.532	3.548	3.576	3.592	3.450	3.373	3.264	3.233	3.179	3.136	3.106	3.038	3.009	2.972	2.980	2.857	2.827
12.0	3.491	3.356	3.372	3.398	3.416	3.281	3.209	3.109	3.080	3.029	2.990	2.961	2.897	2.871	2.836	2.843	2.725	2.697
15.0	3.043	2.927	2.940	2.963	2.981	2.868	2.807	2.725	2.702	2.660	2.626	2.602	2.550	2.528	2.496	2.502	2.399	2.375
20.0	2.522	2.427	2.438	2.457	2.475	2.385	2.336	2.273	2.256	2.223	2.196	2.178	2.136	2.120	2.092	2.097	2.011	1.991
25.0	2.167	2.086	2.095	2.112	2.129	2.054	2.013	1.962	1.948	1.921	1.898	1.883	1.849	1.837	1.811	1.816	1.741	1.724
30.0	1.908	1.838	1.846	1.860	1.877	1.812	1.777	1.733	1.723	1.699	1.679	1.666	1.637	1.628	1.604	1.609	1.543	1.528
35.0	1.712	1.649	1.656	1.669	1.685	1.627	1.596	1.559	1.550	1.529	1.512	1.500	1.475	1.467	1.446	1.449	1.390	1.377
40.0	1.557	1.500	1.506	1.518	1.534	1.482	1.454	1.421	1.413	1.395	1.379	1.369	1.346	1.339	1.319	1.323	1.269	1.257
45.0	1.432	1.379	1.385	1.396	1.411	1.364	1.338	1.309	1.302	1.285	1.271	1.262	1.241	1.235	1.217	1.220	1.171	1.160
50.0	1.328	1.279	1.285	1.295	1.309	1.266	1.242	1.216	1.209	1.194	1.181	1.173	1.154	1.149	1.132	1.135	1.089	1.079
55.0	1.241	1.195	1.201	1.210	1.224	1.183	1.162	1.137	1.131	1.118	1.105	1.098	1.080	1.076	1.060	1.062	1.020	1.010
60.0	1.166	1.124	1.129	1.138	1.151	1.113	1.093	1.070	1.065	1.052	1.040	1.033	1.017	1.013	0.998	1.001	0.960	0.952
65.0	1.102	1.062	1.066	1.075	1.087	1.052	1.033	1.012	1.007	0.995	0.984	0.978	0.963	0.959	0.944	0.947	0.909	0.901
70.0	1.045	1.007	1.012	1.020	1.032	0.998	0.981	0.961	0.956	0.945	0.935	0.929	0.915	0.911	0.897	0.900	0.864	0.856
80.0	0.951	0.917	0.921	0.929	0.940	0.909	0.893	0.876	0.872	0.862	0.853	0.847	0.835	0.832	0.819	0.821	0.788	0.782
90.0	0.876	0.845	0.848	0.855	0.866	0.838	0.824	0.808	0.804	0.795	0.787	0.782	0.770	0.768	0.756	0.758	0.728	0.722
100.0	0.814	0.785	0.789	0.795	0.805	0.779	0.766	0.752	0.749	0.740	0.732	0.728	0.717	0.715	0.704	0.706	0.678	0.672
150.0	0.6191	0.5968	0.5995	0.6044	0.6128	0.5935	0.5838	0.5737	0.5717	0.5658	0.5599	0.5565	0.5489	0.5474	0.5390	0.5406	0.5191	0.5148
200.0	0.5153	0.4976	0.4976	0.5017	0.5091	0.4933	0.4854	0.4776	0.4760	0.4714	0.4665	0.4638	0.4577	0.4564	0.4495	0.4509	0.4450	0.4306
250.0	0.4535	0.4380	0.4332	0.4368	0.4434	0.4309	0.4266	0.4192	0.4194	0.4147	0.4086	0.4079	0.4034	0.4004	0.3941	0.3955	0.3927	0.3803
300.0	0.4111	0.3971	0.3928	0.3941	0.4000	0.3909	0.3870	0.3804	0.3807	0.3765	0.3710	0.3704	0.3664	0.3638	0.3581	0.3593	0.3567	0.3456
350.0	0.3802	0.3673	0.3634	0.3646	0.3701	0.3618	0.3582	0.3521	0.3524	0.3486	0.3436	0.3430	0.3394	0.3370	0.3317	0.3328	0.3304	0.3203
400.0	0.3567	0.3446	0.3411	0.3422	0.3474	0.3396	0.3362	0.3306	0.3309	0.3274	0.3227	0.3221	0.3188	0.3166	0.3117	0.3127	0.3103	0.3010
450.0	0.3363	0.3268	0.3236	0.3247	0.3296	0.3222	0.3190	0.3138	0.3141	0.3107	0.3063	0.3058	0.3027	0.3006	0.2960	0.2969	0.2946	0.2859
500.0	0.3235	0.3126	0.3095	0.3106	0.3153	0.3083	0.3052	0.3002	0.3006	0.2973	0.2932	0.2926	0.2898	0.2878	0.2834	0.2843	0.2819	0.2737

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{28}_{14}$SI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.400	4.210	5.927	5.900	5.780	6.847	7.420	7.830	8.140	8.450	8.620	9.170	9.470	9.929	10.120	10.306	10.626	10.900
3.0	5.347	5.128	7.068	7.087	6.944	8.095	8.852	9.319	9.665	10.003	10.272	10.914	11.296	11.796	12.002	12.253	12.776	12.970
3.5	6.375	6.119	8.280	8.347	8.177	9.412	10.369	10.883	11.262	11.626	11.996	12.731	13.195	13.736	13.957	14.271	14.983	15.111
4.0	7.483	7.184	9.566	9.682	9.483	10.801	11.945	12.525	12.939	13.325	13.800	14.630	15.177	15.757	15.992	16.371	17.261	17.334
4.5	8.670	8.322	10.926	11.094	10.863	12.265	13.614	14.250	14.697	15.103	15.687	16.615	17.245	17.866	18.115	18.558	19.618	19.646
5.0	9.937	9.533	12.362	12.584	12.318	13.804	15.365	16.058	16.539	16.963	17.661	18.689	19.403	20.065	20.327	20.835	22.060	22.051
5.5	11.283	10.817	13.873	14.151	13.848	15.420	17.201	17.952	18.467	18.907	19.722	20.854	21.654	22.357	22.631	23.205	24.589	24.552
6.0	12.707	12.172	15.461	15.796	15.453	17.112	19.122	19.932	20.480	20.934	21.871	23.109	23.997	24.741	25.028	25.670	27.209	27.149
6.5	14.209	13.599	17.124	17.520	17.134	18.881	21.128	21.997	22.578	23.046	24.109	25.457	26.435	27.220	27.520	28.229	29.920	29.844
7.0	15.788	15.097	18.862	19.321	18.890	20.727	23.218	24.147	24.763	25.243	26.437	27.896	28.966	29.793	30.105	30.883	32.723	32.637
8.0	19.18	18.30	22.56	23.16	22.63	24.65	27.65	28.71	29.39	29.89	31.36	33.05	34.31	35.22	35.56	36.48	38.61	38.52
9.0	22.86	21.79	26.57	27.30	26.66	28.87	32.42	33.61	34.36	34.87	36.64	38.58	40.03	41.03	41.39	42.45	44.87	44.79
10.0	26.85	25.54	30.86	31.75	30.99	33.40	37.53	38.84	39.67	40.19	42.27	44.47	46.13	47.22	47.60	48.81	51.50	51.46
11.0	31.13	29.57	35.45	36.50	35.61	38.22	42.97	44.42	45.31	45.84	48.25	50.72	52.60	53.77	54.17	55.54	58.51	58.52
12.0	35.71	33.86	40.34	41.55	40.52	43.34	48.73	50.32	51.29	51.83	54.57	57.33	59.44	60.70	61.12	62.65	65.88	65.96
15.0	51.13	48.30	56.70	58.47	56.96	60.44	67.97	70.01	71.21	71.72	75.61	79.31	82.14	83.67	84.15	86.18	90.20	90.59
20.0	82.38	77.43	89.53	92.40	89.91	94.62	106.34	109.20	110.80	111.21	117.35	122.86	127.07	129.08	129.63	132.59	137.87	139.04
25.0	120.28	112.63	129.08	133.26	129.54	135.63	152.28	156.08	158.11	158.34	167.13	174.74	180.56	183.05	183.66	187.63	194.15	196.42
30.0	164.57	153.65	175.08	180.75	175.60	183.20	205.52	210.34	212.83	212.79	224.63	234.64	242.28	246.25	245.88	250.95	258.73	262.36
35.0	215.04	200.29	227.31	234.67	227.86	237.11	265.78	271.72	274.69	274.31	289.57	302.25	311.92	315.37	316.01	322.26	331.29	336.53
40.0	271.5	252.4	285.6	294.8	286.1	297.1	332.8	340.0	343.5	342.7	361.7	377.3	389.2	393.1	393.8	401.3	411.6	418.6
45.0	333.7	309.7	349.6	360.9	350.2	363.1	406.5	414.9	418.9	417.6	440.8	459.6	473.9	478.3	478.9	487.7	499.3	508.4
50.0	401.6	372.2	419.4	432.9	419.9	434.8	486.5	496.3	500.9	499.0	526.6	548.9	565.9	570.7	571.2	581.4	594.3	605.6
55.0	474.9	439.6	494.7	510.5	495.1	512.1	572.7	584.0	589.1	586.6	619.0	645.0	664.8	670.1	670.5	682.1	696.4	710.1
60.0	553.6	511.9	575.3	593.7	575.9	594.9	665.0	677.8	683.5	680.2	717.8	747.8	770.5	776.2	776.5	789.6	805.3	821.5
65.0	637.5	589.0	661.2	682.3	661.5	683.0	763.2	777.6	783.8	779.8	822.8	856.9	882.8	889.0	889.1	903.8	920.9	939.8
70.0	726.5	670.6	752.2	776.1	752.4	776.3	867.5	883.2	890.0	885.1	933.9	972.4	1001.6	1008.2	1008.2	1024.4	1043.0	1064.7
80.0	919.4	847.5	949.0	979.1	949.0	977.9	1091.7	1111.3	1119.4	1112.6	1173.7	1221.6	1258.0	1265.3	1264.9	1284.5	1306.3	1333.8
90.0	1131.4	1041.7	1165.0	1201.7	1164.6	1199.0	1337.7	1361.1	1370.5	1361.5	1436.1	1494.3	1539.7	1546.6	1545.7	1568.8	1593.8	1627.7
100.0	1361.8	1252.6	1399.3	1443.2	1398.6	1438.7	1604.4	1631.9	1642.5	1631.0	1720.2	1789.5	1842.2	1850.9	1849.4	1876.2	1904.8	1945.4
150.0	2769.	2538.	2824.	2911.	2821.	2894.	3222.	3273.	3290.	3262.	3439.	3575.	3678.	3689.	3684.	3731.	3781.	3858.
200.0	4555.	4161.	4618.	4761.	4617.	4726.	5258.	5339.	5359.	5308.	5595.	5766.	5945.	5996.	5984.	6055.	6094.	6249.
250.0	6661.	6060.	6714.	6925.	6732.	6866.	7636.	7774.	7771.	7691.	8109.	8318.	8583.	8688.	8665.	8780.	8778.	9032.
300.0	9031.	8197.	9069.	9355.	9106.	9268.	10305.	10537.	10476.	10361.	10924.	11178.	11539.	11702.	11665.	11830.	11789.	12145.
350.0	11631.	10540.	11648.	12016.	11705.	11895.	13225.	13568.	13433.	13281.	14002.	14305.	14770.	14994.	14942.	15161.	15076.	15542.
400.0	14433.	13064.	14423.	14880.	14502.	14722.	16364.	16824.	16611.	16419.	17308.	17666.	18243.	18529.	18461.	18737.	18601.	19187.
450.0	17413.	15748.	17370.	17923.	17472.	17723.	19697.	20277.	19984.	19746.	20815.	21232.	21927.	22279.	22193.	22527.	22342.	23051.
500.0	20551.	18573.	20470.	21124.	20595.	20879.	23201.	23904.	23528.	23244.	24499.	24981.	25798.	26217.	26111.	26508.	26270.	27108.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.44	11.87	12.82	13.06	13.55	14.25	14.67	15.21	15.53	15.85	16.18	16.53	16.88	17.20	17.61	17.76	19.04	19.45
3.0	13.64	14.17	15.10	15.33	15.83	16.66	17.15	17.83	18.20	18.58	18.96	19.35	19.80	20.16	20.60	20.73	22.14	22.58
3.5	15.91	16.54	17.46	17.67	18.19	19.14	19.70	20.50	20.93	21.37	21.80	22.23	22.78	23.17	23.63	23.76	25.29	25.77
4.0	18.27	19.00	19.91	20.10	20.62	21.70	22.33	23.26	23.73	24.24	24.72	25.19	25.83	26.25	26.75	26.87	28.53	29.04
4.5	20.72	21.56	22.45	22.62	23.14	24.35	25.05	26.11	26.63	27.20	27.72	28.23	28.96	29.42	29.95	30.07	31.86	32.41
5.0	23.26	24.21	25.09	25.24	25.76	27.10	27.87	29.06	29.62	30.25	30.82	31.37	32.19	32.69	33.26	33.36	35.29	35.88
5.5	25.90	26.96	27.83	27.95	28.48	29.95	30.80	32.11	32.71	33.41	34.02	34.61	35.53	36.06	36.66	36.76	38.83	39.46
6.0	28.64	29.82	30.67	30.77	31.30	32.90	33.82	35.26	35.90	36.67	37.33	37.96	38.97	39.54	40.18	40.26	42.49	43.15
6.5	31.48	32.78	33.62	33.70	34.22	35.96	36.96	38.52	39.20	40.03	40.75	41.42	42.51	43.13	43.80	43.88	46.26	46.96
7.0	34.43	35.85	36.67	36.73	37.25	39.12	40.20	41.88	42.61	43.51	44.27	44.98	46.17	46.82	47.54	47.61	50.14	50.89
8.0	40.62	42.30	43.09	43.10	43.61	45.76	47.00	48.94	49.75	50.78	51.65	52.44	53.82	54.55	55.36	55.40	58.28	59.11
9.0	47.23	49.18	49.93	49.89	50.37	52.82	54.23	56.43	57.33	58.49	59.47	60.35	61.91	62.73	63.63	63.65	66.88	67.81
10.0	54.24	56.48	57.20	57.09	57.56	60.31	61.89	64.36	65.34	66.65	67.74	68.69	70.46	71.36	72.37	72.36	75.97	76.99
11.0	61.66	64.19	64.88	64.72	65.15	68.21	69.98	72.72	73.78	75.24	76.45	77.49	79.45	80.44	81.56	81.53	85.53	86.65
12.0	69.48	72.33	72.98	72.75	73.14	76.54	78.49	81.52	82.66	84.26	85.59	86.72	88.89	89.97	91.20	91.15	95.57	96.79
15.0	95.32	99.20	99.73	99.30	99.54	103.99	106.55	110.45	111.85	113.93	115.64	117.05	119.87	121.22	122.85	122.72	128.50	130.06
20.0	146.12	152.00	152.30	151.45	151.34	157.78	161.49	166.97	168.81	171.77	174.21	176.14	180.13	181.96	184.40	184.11	192.53	194.74
25.0	206.22	214.44	214.46	213.13	212.53	221.25	226.27	233.49	235.80	239.73	243.00	245.49	250.79	253.12	256.55	256.07	267.59	270.53
30.0	275.24	286.12	285.82	283.94	282.72	294.00	300.48	309.59	312.39	317.40	321.59	324.70	331.44	334.28	338.86	338.17	353.20	356.96
35.0	352.84	366.69	366.04	363.53	361.57	375.67	383.75	394.90	398.22	404.40	409.60	413.39	421.68	425.03	430.95	430.02	448.95	453.63
40.0	438.7	455.8	454.8	451.6	448.8	466.0	475.8	489.1	493.0	500.4	506.7	511.2	521.2	525.0	532.5	531.3	554.5	560.2
45.0	532.6	553.3	551.8	547.8	544.0	564.6	576.3	591.9	596.3	605.1	612.6	617.9	629.6	634.0	643.1	641.6	669.5	676.2
50.0	634.2	658.8	656.8	652.0	647.1	671.2	684.9	703.0	708.0	718.2	727.0	733.1	746.7	751.6	762.5	760.7	793.6	801.4
55.0	743.4	772.1	769.6	763.9	757.8	785.7	801.5	822.2	827.8	839.5	849.6	856.6	872.2	877.6	890.4	888.3	926.5	935.6
60.0	859.9	892.9	889.9	883.3	875.8	907.8	926.9	949.2	955.4	968.6	980.2	988.1	1005.8	1011.8	1026.6	1024.1	1068.1	1078.4
65.0	983.5	1021.2	1017.6	1009.9	1001.1	1037.2	1057.7	1083.8	1090.7	1105.6	1118.6	1127.5	1147.4	1153.8	1170.9	1168.0	1218.0	1229.7
70.0	1114.0	1156.6	1152.5	1143.7	1133.3	1173.9	1196.9	1225.8	1233.4	1250.0	1264.6	1274.5	1296.6	1303.6	1323.1	1319.8	1376.1	1389.2
80.0	1395.2	1448.4	1442.9	1431.8	1418.0	1468.2	1496.4	1531.5	1540.4	1560.6	1578.7	1590.6	1617.6	1625.6	1650.2	1645.9	1715.9	1732.0
90.0	1702.3	1766.9	1760.0	1746.4	1728.7	1789.3	1823.2	1864.7	1875.1	1899.1	1920.9	1935.0	1967.2	1976.3	2006.4	2001.2	2085.9	2105.2
100.0	2034.1	2111.1	2102.7	2086.3	2066.4	2136.1	2176.1	2224.4	2236.3	2264.4	2290.1	2306.6	2344.2	2354.5	2390.6	2384.3	2484.8	2507.6
150.0	4032.	4184.	4166.	4133.	4084.	4222.	4297.	4384.	4405.	4456.	4505.	4535.	4605.	4621.	4693.	4680.	4876.	4918.
200.0	6530.	6773.	6746.	6692.	6607.	6826.	6944.	7076.	7106.	7184.	7262.	7309.	7415.	7440.	7555.	7534.	7781.	7914.
250.0	9437.	9783.	9773.	9694.	9565.	9877.	10035.	10220.	10251.	10365.	10484.	10543.	10687.	10731.	10897.	10865.	11142.	11386.
300.0	12687.	13148.	13175.	13081.	12902.	13297.	13488.	13735.	13763.	13916.	14088.	14153.	14337.	14407.	14633.	14588.	14892.	15257.
350.0	16234.	16820.	16887.	16780.	16546.	17025.	17255.	17566.	17591.	17787.	18015.	18087.	18313.	18412.	18702.	18643.	18976.	19472.
400.0	20041.	20760.	20868.	20748.	20455.	21024.	21294.	21674.	21696.	21936.	22225.	22304.	22574.	22703.	23060.	22988.	23354.	23986.
450.0	24073.	24936.	25086.	24953.	24595.	25260.	25573.	26024.	26042.	26330.	26681.	26769.	27085.	27245.	27673.	27586.	27988.	28763.
500.0	28308.	29319.	29515.	29364.	28941.	29705.	30067.	30589.	30601.	30940.	31360.	31453.	31816.	32007.	32515.	32412.	32849.	33771.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{31}_{15}$P IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	17.22	17.66	13.96	13.41	13.67	12.69	11.04	10.60	10.33	10.12	9.51	9.00	8.58	8.38	8.31	8.03	7.22	7.54
3.0	15.88	16.37	13.20	12.70	12.96	12.09	10.55	10.15	9.92	9.75	9.18	8.69	8.31	8.13	8.06	7.80	7.10	7.34
3.5	14.72	15.24	12.48	12.01	12.27	11.50	10.06	9.70	9.49	9.36	8.81	8.36	8.00	7.84	7.78	7.54	6.92	7.11
4.0	13.72	14.26	11.81	11.37	11.63	10.93	9.58	9.26	9.07	8.96	8.44	8.02	7.69	7.54	7.49	7.26	6.71	6.86
4.5	12.86	13.39	11.20	10.79	11.04	10.41	9.14	8.84	8.68	8.58	8.09	7.69	7.39	7.24	7.20	6.99	6.50	6.61
5.0	12.09	12.63	10.65	10.26	10.51	9.93	8.73	8.46	8.31	8.23	7.76	7.38	7.10	6.96	6.92	6.73	6.29	6.37
5.5	11.41	11.95	10.14	9.78	10.02	9.49	8.35	8.10	7.96	7.90	7.45	7.09	6.82	6.70	6.66	6.48	6.08	6.14
6.0	10.82	11.35	9.69	9.34	9.58	9.08	8.00	7.77	7.64	7.59	7.16	6.82	6.57	6.45	6.42	6.25	5.89	5.93
6.5	10.28	10.81	9.27	8.94	9.17	8.71	7.68	7.46	7.34	7.30	6.89	6.57	6.33	6.22	6.19	6.03	5.70	5.72
7.0	9.80	10.32	8.88	8.57	8.80	8.37	7.39	7.18	7.07	7.03	6.64	6.33	6.10	6.01	5.98	5.82	5.52	5.53
8.0	8.972	9.473	8.209	7.926	8.137	7.757	6.860	6.677	6.579	6.555	6.189	5.909	5.702	5.614	5.590	5.451	5.193	5.187
9.0	8.280	8.764	7.633	7.373	7.573	7.234	6.406	6.241	6.154	6.138	5.798	5.539	5.349	5.271	5.251	5.124	4.902	4.881
10.0	7.695	8.161	7.137	6.896	7.087	6.780	6.010	5.860	5.783	5.774	5.455	5.215	5.039	4.969	4.952	4.836	4.641	4.611
11.0	7.192	7.643	6.705	6.480	6.663	6.383	5.664	5.526	5.457	5.452	5.153	4.928	4.765	4.701	4.687	4.580	4.408	4.370
12.0	6.756	7.191	6.326	6.116	6.289	6.033	5.357	5.231	5.167	5.167	4.884	4.673	4.521	4.463	4.450	4.351	4.198	4.155
15.0	5.736	6.129	5.422	5.244	5.399	5.193	4.621	4.518	4.469	4.476	4.233	4.054	3.926	3.882	3.873	3.793	3.679	3.627
20.0	4.618	4.958	4.409	4.267	4.396	4.243	3.783	3.706	3.670	3.682	3.485	3.341	3.240	3.208	3.204	3.143	3.067	3.012
25.0	3.891	4.191	3.737	3.619	3.731	3.608	3.222	3.160	3.132	3.146	2.979	2.859	2.774	2.750	2.748	2.699	2.644	2.591
30.0	3.379	3.648	3.259	3.157	3.256	3.154	2.820	2.767	2.745	2.759	2.614	2.509	2.436	2.418	2.417	2.376	2.333	2.283
35.0	2.997	3.243	2.900	2.810	2.899	2.812	2.516	2.471	2.452	2.467	2.337	2.245	2.180	2.165	2.166	2.131	2.095	2.049
40.0	2.701	2.927	2.621	2.539	2.621	2.544	2.278	2.239	2.223	2.237	2.120	2.037	1.978	1.967	1.967	1.937	1.907	1.865
45.0	2.465	2.675	2.397	2.323	2.397	2.329	2.087	2.052	2.038	2.052	1.944	1.869	1.816	1.806	1.807	1.780	1.755	1.715
50.0	2.272	2.468	2.213	2.145	2.214	2.153	1.930	1.898	1.885	1.899	1.800	1.730	1.681	1.673	1.675	1.650	1.628	1.591
55.0	2.111	2.295	2.059	1.996	2.060	2.005	1.798	1.768	1.757	1.770	1.679	1.614	1.568	1.562	1.563	1.541	1.521	1.487
60.0	1.974	2.148	1.928	1.869	1.930	1.879	1.686	1.658	1.648	1.661	1.575	1.515	1.472	1.466	1.468	1.448	1.430	1.397
65.0	1.856	2.021	1.815	1.760	1.817	1.770	1.589	1.563	1.554	1.567	1.486	1.429	1.389	1.384	1.386	1.367	1.350	1.320
70.0	1.754	1.911	1.718	1.666	1.720	1.676	1.504	1.481	1.473	1.485	1.408	1.354	1.316	1.312	1.314	1.297	1.281	1.253
80.0	1.585	1.729	1.555	1.509	1.558	1.519	1.364	1.343	1.336	1.348	1.279	1.230	1.196	1.193	1.194	1.180	1.166	1.140
90.0	1.451	1.584	1.426	1.384	1.428	1.394	1.253	1.234	1.228	1.239	1.175	1.131	1.099	1.097	1.099	1.086	1.073	1.050
100.0	1.342	1.466	1.321	1.282	1.323	1.292	1.161	1.144	1.139	1.149	1.090	1.050	1.020	1.018	1.020	1.008	0.997	0.976
150.0	1.001	1.096	0.991	0.962	0.993	0.971	0.874	0.862	0.859	0.868	0.824	0.794	0.771	0.771	0.772	0.765	0.756	0.742
200.0	0.820	0.909	0.822	0.797	0.817	0.805	0.724	0.711	0.714	0.723	0.685	0.675	0.653	0.639	0.642	0.634	0.640	0.618
250.0	0.716	0.794	0.720	0.698	0.714	0.706	0.635	0.617	0.626	0.634	0.601	0.592	0.573	0.562	0.564	0.555	0.563	0.544
300.0	0.645	0.716	0.650	0.630	0.645	0.638	0.574	0.553	0.567	0.574	0.544	0.536	0.518	0.509	0.511	0.503	0.510	0.493
350.0	0.594	0.659	0.599	0.581	0.595	0.588	0.530	0.510	0.523	0.530	0.503	0.495	0.479	0.470	0.472	0.465	0.471	0.456
400.0	0.5552	0.6164	0.5610	0.5435	0.5567	0.5508	0.4960	0.4785	0.4900	0.4966	0.4712	0.4634	0.4486	0.4407	0.4428	0.4358	0.4417	0.4275
450.0	0.5249	0.5828	0.5310	0.5143	0.5270	0.5215	0.4697	0.4535	0.4642	0.4706	0.4465	0.4390	0.4250	0.4177	0.4198	0.4132	0.4187	0.4054
500.0	0.5006	0.5560	0.5069	0.4909	0.5032	0.4980	0.4486	0.4336	0.4435	0.4496	0.4268	0.4193	0.4061	0.3993	0.4013	0.3951	0.4003	0.3876

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	7.078	6.766	6.807	6.863	6.814	6.441	6.252	5.916	5.797	5.653	5.551	5.466	5.274	5.212	5.162	5.178	4.977	4.923
3.0	6.912	6.613	6.651	6.705	6.669	6.321	6.142	5.834	5.727	5.591	5.495	5.415	5.237	5.175	5.124	5.139	4.936	4.883
3.5	6.702	6.418	6.452	6.503	6.478	6.152	5.984	5.700	5.602	5.475	5.384	5.310	5.144	5.083	5.033	5.047	4.845	4.793
4.0	6.476	6.203	6.236	6.286	6.269	5.964	5.804	5.542	5.453	5.334	5.248	5.179	5.024	4.965	4.915	4.929	4.730	4.678
4.5	6.249	5.989	6.020	6.068	6.057	5.770	5.619	5.375	5.294	5.183	5.101	5.036	4.891	4.834	4.785	4.798	4.603	4.553
5.0	6.028	5.779	5.809	5.855	5.850	5.579	5.436	5.209	5.134	5.029	4.951	4.890	4.754	4.700	4.651	4.663	4.473	4.425
5.5	5.817	5.579	5.607	5.651	5.650	5.394	5.258	5.045	4.977	4.877	4.803	4.746	4.618	4.566	4.517	4.529	4.344	4.297
6.0	5.617	5.388	5.415	5.458	5.461	5.217	5.088	4.888	4.824	4.730	4.660	4.606	4.485	4.435	4.387	4.399	4.218	4.172
6.5	5.428	5.209	5.234	5.275	5.281	5.049	4.926	4.738	4.678	4.589	4.522	4.470	4.356	4.308	4.261	4.272	4.096	4.052
7.0	5.250	5.039	5.063	5.103	5.111	4.891	4.773	4.595	4.539	4.454	4.390	4.341	4.232	4.187	4.140	4.151	3.980	3.937
8.0	4.926	4.730	4.752	4.789	4.802	4.599	4.491	4.331	4.282	4.204	4.145	4.101	4.002	3.960	3.915	3.925	3.763	3.723
9.0	4.639	4.457	4.477	4.512	4.527	4.340	4.240	4.095	4.051	3.979	3.925	3.884	3.794	3.755	3.711	3.721	3.567	3.529
10.0	4.385	4.214	4.233	4.266	4.283	4.109	4.016	3.883	3.843	3.777	3.726	3.689	3.605	3.570	3.528	3.537	3.390	3.356
11.0	4.159	3.997	4.015	4.046	4.064	3.903	3.815	3.693	3.657	3.595	3.547	3.513	3.435	3.403	3.361	3.370	3.230	3.197
12.0	3.956	3.803	3.820	3.849	3.868	3.717	3.635	3.521	3.488	3.431	3.386	3.353	3.281	3.251	3.211	3.219	3.085	3.054
15.0	3.457	3.325	3.340	3.366	3.387	3.258	3.189	3.095	3.069	3.021	2.983	2.956	2.896	2.871	2.835	2.842	2.724	2.697
20.0	2.874	2.766	2.778	2.800	2.821	2.718	2.662	2.590	2.571	2.533	2.502	2.481	2.434	2.416	2.383	2.390	2.291	2.268
25.0	2.474	2.382	2.392	2.411	2.431	2.345	2.298	2.240	2.225	2.193	2.167	2.150	2.111	2.097	2.068	2.073	1.988	1.969
30.0	2.182	2.101	2.110	2.127	2.146	2.072	2.031	1.982	1.969	1.943	1.920	1.905	1.872	1.861	1.834	1.839	1.764	1.747
35.0	1.959	1.887	1.895	1.910	1.929	1.862	1.827	1.784	1.773	1.750	1.730	1.717	1.688	1.678	1.654	1.658	1.591	1.576
40.0	1.783	1.718	1.725	1.739	1.756	1.697	1.665	1.627	1.618	1.597	1.579	1.567	1.541	1.534	1.511	1.515	1.453	1.440
45.0	1.640	1.580	1.587	1.600	1.617	1.562	1.533	1.499	1.491	1.472	1.456	1.445	1.422	1.416	1.394	1.398	1.341	1.329
50.0	1.522	1.466	1.473	1.485	1.501	1.451	1.424	1.393	1.386	1.369	1.353	1.344	1.322	1.317	1.297	1.300	1.248	1.236
55.0	1.422	1.370	1.377	1.388	1.403	1.356	1.332	1.304	1.297	1.281	1.267	1.258	1.238	1.233	1.215	1.218	1.169	1.158
60.0	1.337	1.289	1.294	1.305	1.319	1.276	1.253	1.227	1.221	1.206	1.193	1.185	1.166	1.162	1.144	1.147	1.101	1.091
65.0	1.263	1.218	1.223	1.233	1.247	1.206	1.185	1.160	1.155	1.141	1.129	1.121	1.104	1.100	1.083	1.086	1.042	1.033
70.0	1.199	1.155	1.161	1.170	1.184	1.145	1.125	1.102	1.097	1.084	1.072	1.065	1.049	1.045	1.029	1.032	0.991	0.982
80.0	1.091	1.052	1.057	1.065	1.078	1.043	1.025	1.005	1.000	0.989	0.978	0.972	0.957	0.954	0.940	0.942	0.905	0.897
90.0	1.005	0.969	0.973	0.981	0.994	0.962	0.945	0.927	0.923	0.913	0.903	0.897	0.884	0.881	0.867	0.870	0.835	0.828
100.0	0.935	0.901	0.905	0.912	0.924	0.894	0.879	0.863	0.859	0.850	0.841	0.835	0.823	0.821	0.808	0.810	0.778	0.771
150.0	0.7106	0.6851	0.6881	0.6937	0.7034	0.6813	0.6701	0.6586	0.6562	0.6494	0.6426	0.6387	0.6300	0.6284	0.6186	0.6205	0.5958	0.5909
200.0	0.5915	0.5712	0.5712	0.5759	0.5844	0.5662	0.5572	0.5483	0.5465	0.5411	0.5365	0.5324	0.5255	0.5239	0.5160	0.5176	0.5108	0.4943
250.0	0.5206	0.5028	0.4973	0.5014	0.5090	0.4946	0.4897	0.4812	0.4815	0.4761	0.4690	0.4683	0.4631	0.4597	0.4524	0.4540	0.4508	0.4365
300.0	0.4719	0.4558	0.4509	0.4525	0.4592	0.4487	0.4443	0.4367	0.4370	0.4322	0.4259	0.4252	0.4206	0.4176	0.4110	0.4124	0.4095	0.3967
350.0	0.4366	0.4216	0.4172	0.4186	0.4249	0.4153	0.4112	0.4042	0.4046	0.4002	0.3944	0.3937	0.3896	0.3869	0.3808	0.3821	0.3793	0.3677
400.0	0.4095	0.3956	0.3915	0.3929	0.3988	0.3898	0.3860	0.3796	0.3799	0.3758	0.3705	0.3698	0.3660	0.3635	0.3578	0.3590	0.3562	0.3455
450.0	0.3884	0.3752	0.3715	0.3727	0.3784	0.3699	0.3662	0.3602	0.3606	0.3567	0.3517	0.3510	0.3475	0.3451	0.3398	0.3409	0.3382	0.3282
500.0	0.3714	0.3588	0.3553	0.3565	0.3619	0.3539	0.3503	0.3446	0.3450	0.3413	0.3366	0.3359	0.3326	0.3304	0.3253	0.3263	0.3236	0.3142

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

31
P IONS
15

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.510	4.310	6.075	6.050	5.930	7.027	7.620	8.051	8.370	8.680	8.860	9.410	9.720	10.195	10.390	10.580	10.907	11.190
3.0	6.448	6.222	7.216	7.238	7.095	8.278	9.056	9.544	9.900	10.239	10.518	11.161	11.554	12.071	12.282	12.537	13.069	13.272
3.5	6.463	6.204	8.424	8.493	8.324	9.592	10.561	11.106	11.497	11.861	12.242	12.979	13.455	14.013	14.239	14.558	15.280	15.417
4.0	7.554	7.256	9.701	9.820	9.622	10.975	12.140	12.742	13.167	13.554	14.040	14.873	15.431	16.030	16.270	16.654	17.554	17.637
4.5	8.722	8.379	11.049	11.219	10.990	12.428	13.797	14.455	14.914	15.321	15.916	16.846	17.487	18.128	18.382	18.830	19.900	19.939
5.0	9.967	9.571	12.468	12.692	12.429	13.953	15.532	16.248	16.740	17.166	17.873	18.904	19.629	20.311	20.578	21.091	22.325	22.327
5.5	11.287	10.833	13.960	14.240	13.940	15.550	17.348	18.121	18.647	19.089	19.912	21.046	21.857	22.580	22.860	23.439	24.832	24.805
6.0	12.683	12.165	15.524	15.862	15.523	17.220	19.244	20.075	20.635	21.092	22.036	23.275	24.173	24.938	25.231	25.876	27.423	27.374
6.5	14.153	13.565	17.161	17.558	17.177	18.963	21.220	22.111	22.704	23.175	24.244	25.591	26.578	27.384	27.690	28.403	30.100	30.036
7.0	15.697	15.033	18.869	19.329	18.904	20.779	23.278	24.228	24.855	25.338	26.536	27.995	29.073	29.921	30.239	31.019	32.864	32.790
8.0	19.01	18.17	22.50	23.09	22.57	24.63	27.64	28.71	29.40	29.91	31.38	33.07	34.33	35.26	35.60	36.53	38.66	38.58
9.0	22.61	21.58	26.42	27.15	26.52	28.77	32.32	33.51	34.28	34.80	36.55	38.49	39.95	40.96	41.33	42.39	44.80	44.74
10.0	26.49	25.24	30.62	31.50	30.76	33.20	37.31	38.64	39.48	40.01	42.07	44.26	45.92	47.02	47.41	48.62	51.31	51.28
11.0	30.66	29.17	35.11	36.14	35.27	37.92	42.63	44.09	45.00	45.53	47.92	50.37	52.25	53.44	53.85	55.21	58.16	58.19
12.0	35.11	33.36	39.87	41.07	40.06	42.91	48.26	49.86	50.84	51.38	54.10	56.84	58.93	60.21	60.64	62.16	65.37	65.47
15.0	50.11	47.42	55.80	57.54	56.07	59.58	67.01	69.05	70.25	70.77	74.61	78.26	81.07	82.62	83.10	85.11	89.09	89.48
20.0	80.43	75.71	87.70	90.51	88.08	92.79	104.29	107.14	108.74	109.16	115.19	120.60	124.76	126.77	127.69	130.24	135.45	136.61
25.0	117.15	109.86	126.03	130.11	126.50	132.56	148.85	152.60	154.62	154.87	163.47	170.93	176.65	179.13	179.74	183.64	190.07	192.29
30.0	160.02	149.61	170.57	176.10	171.10	178.63	200.41	205.15	207.62	207.61	219.16	228.95	236.43	239.38	240.02	244.99	252.62	256.17
35.0	208.84	194.77	221.08	228.25	221.65	230.78	258.71	264.54	267.48	267.14	282.00	294.38	303.82	307.24	307.89	314.00	322.84	327.95
40.0	263.4	245.2	277.4	286.4	278.0	288.8	323.5	330.5	334.0	333.2	351.7	367.0	378.6	382.5	383.1	390.4	400.5	407.4
45.0	323.5	300.6	339.3	350.3	339.9	352.8	394.7	403.0	406.9	405.7	428.2	446.5	460.5	464.8	465.4	474.0	485.3	494.1
50.0	389.1	361.0	406.7	419.8	407.2	421.8	472.0	481.6	486.0	484.3	511.1	532.8	549.3	554.0	554.6	564.5	577.1	588.1
55.0	459.9	426.2	479.4	494.8	479.9	496.5	555.3	566.3	571.3	568.9	600.4	625.6	644.8	650.0	650.4	661.7	675.7	688.9
60.0	535.9	496.1	557.2	575.1	557.7	576.4	644.4	656.8	662.4	659.3	695.7	724.8	746.9	752.5	752.8	765.6	780.8	796.5
65.0	617.0	570.5	640.1	660.6	640.8	661.5	739.2	753.2	759.3	755.4	797.1	830.2	855.3	861.3	861.5	875.8	892.4	910.7
70.0	702.9	649.4	728.0	751.1	728.2	751.5	839.5	855.1	861.8	857.1	904.3	941.6	970.0	976.4	976.4	992.2	1010.3	1031.3
80.0	889.1	820.2	917.9	947.0	917.9	946.1	1056.2	1075.9	1083.1	1076.6	1135.7	1182.2	1217.4	1224.6	1224.3	1243.2	1264.4	1291.1
90.0	1093.7	1007.7	1126.3	1161.8	1126.0	1159.4	1293.6	1316.3	1325.4	1316.8	1389.0	1445.3	1488.1	1496.0	1495.2	1517.5	1541.9	1574.7
100.0	1316.1	1211.4	1352.4	1394.8	1351.7	1390.7	1550.9	1577.5	1587.9	1576.8	1663.1	1730.1	1781.1	1789.6	1788.2	1814.1	1841.9	1881.1
150.0	2673.	2452.	2727.	2811.	2724.	2794.	3111.	3160.	3177.	3150.	3321.	3452.	3552.	3563.	3558.	3603.	3652.	3726.
200.0	4397.	4018.	4457.	4595.	4456.	4561.	5075.	5153.	5173.	5123.	5401.	5566.	5738.	5788.	5777.	5845.	5882.	6032.
250.0	6428.	5850.	6479.	6682.	6495.	6625.	7369.	7502.	7499.	7421.	7825.	8027.	8283.	8384.	8362.	8473.	8477.	8717.
300.0	8714.	7911.	8750.	9026.	8785.	8941.	9943.	10167.	10107.	9998.	10540.	10785.	11134.	11291.	11256.	11416.	11375.	11718.
350.0	11222.	10171.	11237.	11593.	11293.	11476.	12759.	13091.	12959.	12813.	13509.	13801.	14250.	14467.	14416.	14627.	14545.	14995.
400.0	13924.	12605.	13913.	14355.	13990.	14202.	15786.	16230.	16025.	15838.	16697.	17043.	17599.	17877.	17810.	18076.	17945.	18510.
450.0	16798.	15194.	16756.	17289.	16854.	17097.	19000.	19560.	19278.	19048.	20079.	20482.	21152.	21494.	21408.	21731.	21553.	22237.
500.0	19824.	17919.	19746.	20376.	19866.	20140.	22380.	23058.	22697.	22421.	23633.	24091.	24886.	25290.	25187.	25570.	25341.	26150.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.75	12.19	13.17	13.42	13.92	14.63	15.06	15.62	15.95	16.28	16.62	16.98	17.34	17.67	18.09	18.24	19.55	19.97
3.0	13.96	14.51	15.47	15.70	16.21	17.06	17.56	18.25	18.64	19.03	19.42	19.83	20.29	20.65	21.10	21.24	22.68	23.13
3.5	16.24	16.89	17.83	18.05	18.57	19.54	20.11	20.94	21.37	21.83	22.27	22.72	23.27	23.67	24.15	24.28	25.84	26.33
4.0	18.59	19.34	20.28	20.47	21.00	22.10	22.74	23.70	24.18	24.70	25.19	25.67	26.32	26.76	27.27	27.39	29.08	29.60
4.5	21.03	21.89	22.81	22.98	23.52	24.74	25.46	26.54	27.06	27.65	28.18	28.71	29.45	29.92	30.46	30.58	32.40	32.96
5.0	23.56	24.52	25.43	25.58	26.12	27.47	28.26	29.47	30.04	30.69	31.27	31.83	32.66	33.17	33.75	33.85	35.82	36.41
5.5	26.17	27.25	28.14	28.28	28.82	30.30	31.16	32.49	33.10	33.81	34.44	35.05	35.97	36.52	37.13	37.23	39.33	39.97
6.0	28.89	30.08	30.96	31.07	31.61	33.22	34.16	35.61	36.27	37.04	37.72	38.36	39.38	39.96	40.61	40.70	42.96	43.63
6.5	31.69	33.00	33.87	33.96	34.50	36.24	37.26	38.83	39.53	40.37	41.10	41.78	42.88	43.51	44.20	44.28	46.69	47.40
7.0	34.60	36.03	36.88	36.94	37.48	39.36	40.45	42.15	42.89	43.80	44.58	45.30	46.49	47.16	47.89	47.96	50.52	51.28
8.0	40.70	42.38	43.20	43.22	43.74	45.90	47.15	49.11	49.93	50.96	51.85	52.65	54.03	54.77	55.59	55.64	58.54	59.38
9.0	47.18	49.14	49.93	49.89	50.39	52.84	54.26	56.47	57.37	58.55	59.54	60.42	61.99	62.82	63.73	63.75	67.00	67.93
10.0	54.06	56.29	57.05	56.96	57.44	60.19	61.77	64.25	65.23	66.54	67.64	68.61	70.37	71.28	72.30	72.30	75.92	76.95
11.0	61.32	63.85	64.57	64.42	64.87	67.93	69.70	72.44	73.50	74.96	76.17	77.22	79.18	80.18	81.30	81.28	85.29	86.41
12.0	68.97	71.80	72.49	72.28	72.69	76.07	78.02	81.04	82.19	83.79	85.12	86.26	88.42	89.50	90.74	90.70	95.11	96.34
15.0	94.18	98.02	98.59	98.18	98.45	102.86	105.41	109.27	110.67	112.74	114.45	115.86	118.66	120.01	121.63	121.51	127.26	128.82
20.0	143.59	149.38	149.73	148.92	148.84	155.19	158.85	164.26	166.10	169.02	171.44	173.35	177.29	179.11	181.53	181.25	189.58	191.76
25.0	201.91	209.96	210.05	208.77	208.22	216.79	221.72	228.82	231.11	234.98	238.20	240.67	245.88	248.18	251.56	251.10	262.43	265.33
30.0	268.77	279.41	279.19	277.37	276.23	287.27	293.62	302.56	305.33	310.24	314.36	317.43	324.03	326.82	331.33	330.66	345.40	349.10
35.0	343.87	357.39	356.83	354.41	352.54	366.33	374.23	385.14	388.41	394.45	399.55	403.28	411.38	414.67	420.47	419.57	438.09	442.68
40.0	426.9	443.6	442.7	439.6	436.9	453.6	463.2	476.3	480.0	487.3	493.5	497.9	507.6	511.4	518.6	517.5	540.2	545.7
45.0	517.7	537.8	536.5	532.6	529.0	548.9	560.4	575.6	579.9	588.5	595.8	601.0	612.4	616.7	625.6	624.1	651.3	657.9
50.0	615.9	639.7	637.9	633.3	628.6	652.0	665.4	683.0	687.9	697.8	706.3	712.3	725.6	730.4	740.9	739.2	771.2	778.9
55.0	721.3	749.1	746.9	741.3	736.5	762.6	778.0	798.1	803.6	814.9	824.8	831.6	846.8	852.1	864.5	862.5	899.7	908.5
60.0	833.8	865.8	863.0	856.6	849.6	880.5	898.1	920.7	926.8	939.7	950.9	958.6	975.8	981.6	996.1	993.7	1036.4	1046.5
65.0	953.1	989.7	986.3	978.9	970.4	1006.5	1025.3	1050.7	1057.4	1071.9	1084.6	1093.2	1112.5	1118.8	1136.4	1132.6	1181.1	1192.5
70.0	1079.1	1120.4	1116.5	1108.0	1098.0	1137.4	1159.7	1187.8	1195.2	1211.3	1225.5	1235.1	1256.6	1263.4	1282.3	1279.1	1333.7	1346.5
80.0	1350.5	1402.0	1396.8	1386.1	1372.8	1421.4	1448.8	1482.8	1491.5	1511.0	1528.6	1540.1	1566.3	1574.2	1597.9	1593.9	1661.6	1677.3
90.0	1646.8	1709.4	1702.8	1689.7	1672.6	1731.3	1764.1	1804.3	1814.5	1837.7	1858.8	1872.5	1903.7	1912.6	1941.7	1936.7	2018.7	2037.4
100.0	1966.9	2041.4	2033.4	2017.6	1996.5	2065.9	2104.5	2151.4	2162.9	2190.1	2215.0	2231.0	2267.5	2277.4	2312.4	2306.3	2403.6	2425.7
150.0	3894.	4041.	4024.	3992.	3945.	4078.	4151.	4235.	4255.	4304.	4352.	4381.	4448.	4464.	4533.	4521.	4710.	4751.
200.0	6303.	6538.	6512.	6460.	6378.	6590.	6704.	6831.	6860.	6936.	7011.	7056.	7159.	7182.	7294.	7273.	7511.	7641.
250.0	9107.	9441.	9432.	9356.	9231.	9532.	9689.	9864.	9894.	10003.	10118.	10175.	10314.	10362.	10518.	10486.	10754.	10990.
300.0	12242.	12687.	12713.	12622.	12449.	12830.	13015.	13253.	13281.	13429.	13594.	13657.	13834.	13903.	14120.	14077.	14370.	14723.
350.0	15662.	16228.	16293.	16190.	15964.	16427.	16648.	16948.	16973.	17162.	17382.	17452.	17670.	17765.	18044.	17988.	18310.	18788.
400.0	19333.	20031.	20132.	20017.	19733.	20283.	20543.	20910.	20931.	21164.	21442.	21519.	21779.	21903.	22248.	22178.	22531.	23141.
450.0	23223.	24055.	24200.	24071.	23727.	24369.	24670.	25106.	25123.	25401.	25740.	25825.	26129.	26283.	26697.	26613.	27001.	27748.
500.0	27307.	28283.	28470.	28326.	27919.	28656.	29001.	29508.	29520.	29846.	30248.	30342.	30692.	30877.	31362.	31263.	31689.	32578.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{32}_{16}S$ IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	19.08	19.49	15.31	14.70	14.98	13.89	12.07	11.58	11.29	11.06	10.39	9.82	9.36	9.14	9.06	8.75	7.87	8.21
3.0	17.63	18.12	14.53	13.97	14.25	13.28	11.58	11.14	10.89	10.70	10.06	9.53	9.11	8.90	8.83	8.54	7.77	8.04
3.5	16.38	16.91	13.78	13.25	13.54	12.67	11.07	10.68	10.45	10.30	9.69	9.19	8.80	8.61	8.55	8.28	7.60	7.81
4.0	15.30	15.85	13.07	12.58	12.86	12.08	10.58	10.22	10.01	9.89	9.31	8.84	8.48	8.31	8.25	8.00	7.39	7.55
4.5	14.36	14.91	12.42	11.97	12.24	11.53	10.12	9.79	9.60	9.49	8.94	8.50	8.16	8.00	7.95	7.72	7.18	7.30
5.0	13.52	14.08	11.83	11.40	11.67	11.02	9.68	9.38	9.21	9.12	8.60	8.18	7.86	7.71	7.66	7.45	6.96	7.05
5.5	12.78	13.35	11.29	10.88	11.15	10.54	9.28	9.00	8.84	8.77	8.27	7.87	7.57	7.43	7.39	7.18	6.74	6.81
6.0	12.12	12.69	10.79	10.41	10.67	10.11	8.91	8.64	8.50	8.44	7.96	7.58	7.30	7.17	7.13	6.94	6.54	6.58
6.5	11.53	12.09	10.34	9.97	10.23	9.71	8.56	8.31	8.18	8.13	7.67	7.31	7.04	6.92	6.89	6.70	6.34	6.36
7.0	11.00	11.56	9.92	9.58	9.82	9.33	8.24	8.01	7.88	7.84	7.40	7.06	6.80	6.69	6.66	6.48	6.15	6.16
8.0	10.08	10.62	9.19	8.87	9.10	8.67	7.67	7.46	7.35	7.32	6.91	6.60	6.37	6.27	6.24	6.08	5.80	5.79
9.0	9.32	9.84	8.56	8.26	8.49	8.10	7.17	6.99	6.89	6.87	6.49	6.20	5.98	5.90	5.87	5.73	5.48	5.46
10.0	8.67	9.17	8.01	7.74	7.95	7.60	6.74	6.57	6.48	6.47	6.11	5.84	5.65	5.57	5.55	5.42	5.20	5.16
11.0	8.11	8.60	7.54	7.28	7.48	7.17	6.36	6.20	6.12	6.12	5.78	5.53	5.35	5.27	5.26	5.14	4.94	4.90
12.0	7.62	8.10	7.12	6.88	7.07	6.78	6.02	5.88	5.81	5.81	5.49	5.25	5.08	5.01	5.00	4.89	4.71	4.66
15.0	6.480	6.914	6.115	5.914	6.087	5.853	5.207	5.091	5.035	5.042	4.769	4.567	4.422	4.371	4.362	4.270	4.143	4.084
20.0	5.226	5.604	4.984	4.824	4.970	4.795	4.275	4.187	4.146	4.160	3.937	3.775	3.659	3.624	3.619	3.549	3.463	3.401
25.0	4.408	4.743	4.232	4.098	4.224	4.085	3.648	3.577	3.545	3.561	3.371	3.235	3.139	3.112	3.110	3.054	2.991	2.931
30.0	3.831	4.133	3.695	3.578	3.690	3.575	3.196	3.136	3.111	3.127	2.962	2.843	2.760	2.740	2.739	2.692	2.643	2.587
35.0	3.400	3.676	3.290	3.188	3.289	3.189	2.854	2.802	2.781	2.797	2.650	2.546	2.472	2.456	2.456	2.416	2.376	2.324
40.0	3.066	3.320	2.975	2.883	2.975	2.888	2.586	2.541	2.522	2.538	2.405	2.311	2.245	2.232	2.233	2.198	2.164	2.116
45.0	2.799	3.035	2.722	2.638	2.722	2.645	2.370	2.329	2.314	2.329	2.208	2.122	2.061	2.060	2.062	2.021	1.992	1.947
50.0	2.580	2.801	2.513	2.436	2.515	2.445	2.192	2.155	2.141	2.157	2.044	1.965	1.909	1.900	1.902	1.874	1.849	1.807
55.0	2.398	2.605	2.339	2.268	2.341	2.278	2.043	2.009	1.997	2.012	1.907	1.834	1.782	1.774	1.776	1.751	1.728	1.689
60.0	2.243	2.439	2.191	2.124	2.193	2.135	1.915	1.886	1.873	1.888	1.790	1.721	1.673	1.666	1.668	1.646	1.625	1.588
65.0	2.110	2.296	2.064	2.001	2.066	2.012	1.806	1.777	1.767	1.781	1.689	1.624	1.579	1.573	1.575	1.554	1.535	1.500
70.0	1.994	2.171	1.953	1.894	1.955	1.905	1.710	1.683	1.674	1.688	1.601	1.540	1.496	1.492	1.494	1.474	1.456	1.424
80.0	1.802	1.965	1.769	1.715	1.771	1.727	1.551	1.527	1.519	1.533	1.454	1.399	1.360	1.356	1.358	1.341	1.325	1.297
90.0	1.650	1.801	1.622	1.574	1.624	1.585	1.424	1.403	1.396	1.409	1.336	1.286	1.250	1.247	1.249	1.234	1.220	1.194
100.0	1.526	1.666	1.502	1.458	1.505	1.469	1.321	1.301	1.295	1.307	1.240	1.194	1.160	1.158	1.160	1.147	1.134	1.110
150.0	1.138	1.246	1.128	1.095	1.129	1.105	0.995	0.981	0.977	0.987	0.937	0.903	0.878	0.877	0.879	0.870	0.860	0.844
200.0	0.933	1.033	0.936	0.907	0.930	0.916	0.824	0.809	0.812	0.822	0.779	0.768	0.743	0.727	0.730	0.721	0.728	0.703
250.0	0.815	0.903	0.819	0.794	0.812	0.803	0.723	0.702	0.713	0.722	0.684	0.674	0.652	0.639	0.642	0.631	0.640	0.619
300.0	0.734	0.814	0.740	0.717	0.734	0.726	0.653	0.629	0.645	0.653	0.619	0.610	0.590	0.579	0.581	0.572	0.580	0.561
350.0	0.676	0.750	0.682	0.661	0.677	0.669	0.603	0.581	0.595	0.603	0.572	0.563	0.545	0.535	0.537	0.529	0.536	0.518
400.0	0.6317	0.7012	0.6383	0.6184	0.6334	0.6267	0.5644	0.5444	0.5576	0.5650	0.5361	0.5273	0.5104	0.5014	0.5038	0.4959	0.5026	0.4864
450.0	0.5972	0.6631	0.6041	0.5852	0.5996	0.5934	0.5344	0.5160	0.5281	0.5353	0.5081	0.4994	0.4836	0.4753	0.4776	0.4701	0.4764	0.4612
500.0	0.5696	0.6325	0.5767	0.5586	0.5725	0.5666	0.5104	0.4933	0.5046	0.5115	0.4856	0.4771	0.4620	0.4543	0.4566	0.4495	0.4555	0.4410

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	7.711	7.369	7.413	7.472	7.418	7.011	6.804	6.438	6.307	6.149	6.038	5.945	5.735	5.668	5.613	5.630	5.410	5.350
3.0	7.563	7.234	7.274	7.333	7.293	6.911	6.714	6.376	6.258	6.109	6.004	5.916	5.720	5.652	5.597	5.613	5.390	5.331
3.5	7.358	7.043	7.081	7.137	7.109	6.750	6.564	6.252	6.144	6.005	5.904	5.822	5.640	5.573	5.517	5.532	5.310	5.252
4.0	7.131	6.830	6.865	6.919	6.900	6.562	6.387	6.097	5.999	5.867	5.772	5.695	5.524	5.459	5.404	5.419	5.199	5.142
4.5	6.898	6.610	6.643	6.695	6.683	6.365	6.198	5.929	5.839	5.715	5.625	5.553	5.392	5.329	5.274	5.288	5.072	5.017
5.0	6.668	6.393	6.424	6.474	6.468	6.168	6.009	5.757	5.674	5.557	5.471	5.404	5.253	5.192	5.138	5.152	4.940	4.887
5.5	6.447	6.182	6.212	6.261	6.259	5.974	5.824	5.588	5.511	5.400	5.318	5.254	5.112	5.054	5.000	5.013	4.807	4.755
6.0	6.235	5.981	6.010	6.056	6.059	5.788	5.646	5.423	5.351	5.246	5.168	5.108	4.973	4.917	4.864	4.877	4.675	4.625
6.5	6.034	5.790	5.817	5.863	5.869	5.611	5.473	5.264	5.197	5.097	5.023	4.965	4.838	4.784	4.731	4.744	4.548	4.499
7.0	5.844	5.609	5.635	5.679	5.688	5.442	5.310	5.112	5.050	4.954	4.883	4.828	4.707	4.656	4.604	4.616	4.424	4.377
8.0	5.496	5.277	5.301	5.342	5.356	5.130	5.008	4.830	4.775	4.688	4.621	4.572	4.461	4.415	4.364	4.375	4.193	4.149
9.0	5.186	4.982	5.004	5.043	5.059	4.850	4.738	4.575	4.526	4.446	4.384	4.339	4.237	4.194	4.145	4.156	3.983	3.941
10.0	4.910	4.718	4.738	4.775	4.794	4.599	4.495	4.345	4.301	4.227	4.170	4.128	4.034	3.994	3.946	3.957	3.792	3.752
11.0	4.663	4.481	4.501	4.536	4.556	4.374	4.276	4.138	4.098	4.029	3.975	3.936	3.849	3.812	3.766	3.776	3.619	3.581
12.0	4.441	4.269	4.287	4.321	4.342	4.171	4.079	3.951	3.914	3.849	3.799	3.762	3.681	3.647	3.602	3.611	3.461	3.425
15.0	3.892	3.743	3.760	3.789	3.812	3.667	3.589	3.483	3.454	3.400	3.357	3.326	3.258	3.231	3.189	3.197	3.065	3.034
20.0	3.246	3.123	3.137	3.161	3.185	3.069	3.006	2.924	2.903	2.860	2.825	2.801	2.748	2.727	2.690	2.697	2.586	2.560
25.0	2.799	2.695	2.706	2.728	2.750	2.653	2.600	2.533	2.516	2.481	2.451	2.432	2.388	2.372	2.339	2.345	2.248	2.226
30.0	2.472	2.380	2.391	2.409	2.431	2.347	2.301	2.245	2.231	2.200	2.175	2.158	2.120	2.107	2.077	2.083	1.997	1.978
35.0	2.221	2.139	2.149	2.166	2.187	2.111	2.071	2.022	2.010	1.984	1.961	1.946	1.913	1.903	1.875	1.880	1.803	1.786
40.0	2.023	1.949	1.957	1.973	1.993	1.925	1.889	1.846	1.835	1.812	1.791	1.778	1.748	1.740	1.714	1.718	1.649	1.633
45.0	1.862	1.794	1.802	1.816	1.835	1.773	1.740	1.702	1.693	1.671	1.652	1.641	1.614	1.606	1.582	1.587	1.522	1.508
50.0	1.728	1.665	1.673	1.686	1.704	1.647	1.617	1.582	1.574	1.554	1.537	1.526	1.502	1.495	1.473	1.477	1.417	1.404
55.0	1.616	1.557	1.564	1.576	1.594	1.541	1.513	1.481	1.473	1.455	1.439	1.429	1.407	1.401	1.380	1.383	1.328	1.316
60.0	1.519	1.464	1.471	1.482	1.499	1.450	1.424	1.394	1.387	1.371	1.356	1.346	1.325	1.320	1.300	1.304	1.251	1.240
65.0	1.436	1.384	1.390	1.401	1.417	1.371	1.346	1.319	1.313	1.297	1.283	1.274	1.255	1.250	1.231	1.234	1.185	1.174
70.0	1.363	1.313	1.319	1.330	1.346	1.302	1.279	1.253	1.247	1.232	1.219	1.211	1.192	1.188	1.170	1.173	1.126	1.116
80.0	1.241	1.196	1.201	1.211	1.226	1.186	1.165	1.143	1.137	1.124	1.112	1.105	1.089	1.085	1.068	1.071	1.028	1.019
90.0	1.143	1.102	1.107	1.116	1.130	1.093	1.075	1.054	1.049	1.038	1.027	1.020	1.005	1.002	0.986	0.989	0.950	0.941
100.0	1.063	1.025	1.029	1.038	1.051	1.017	1.000	0.981	0.977	0.966	0.956	0.950	0.936	0.933	0.919	0.921	0.885	0.877
150.0	0.8084	0.7794	0.7828	0.7892	0.8002	0.7750	0.7623	0.7492	0.7465	0.7388	0.7311	0.7266	0.7167	0.7148	0.7038	0.7059	0.6778	0.6722
200.0	0.6729	0.6498	0.6499	0.6552	0.6648	0.6442	0.6340	0.6238	0.6217	0.6156	0.6093	0.6057	0.5978	0.5961	0.5871	0.5889	0.5812	0.5624
250.0	0.5923	0.5720	0.5658	0.5705	0.5792	0.5628	0.5572	0.5474	0.5478	0.5416	0.5337	0.5328	0.5269	0.5230	0.5147	0.5165	0.5129	0.4966
300.0	0.5370	0.5186	0.5130	0.5148	0.5225	0.5106	0.5055	0.4969	0.4972	0.4917	0.4846	0.4837	0.4785	0.4751	0.4677	0.4692	0.4659	0.4514
350.0	0.4966	0.4797	0.4746	0.4763	0.4834	0.4725	0.4678	0.4599	0.4603	0.4553	0.4487	0.4480	0.4433	0.4402	0.4333	0.4347	0.4315	0.4183
400.0	0.4659	0.4501	0.4455	0.4470	0.4538	0.4436	0.4391	0.4318	0.4323	0.4276	0.4215	0.4207	0.4164	0.4136	0.4071	0.4085	0.4053	0.3931
450.0	0.4419	0.4269	0.4226	0.4240	0.4305	0.4209	0.4166	0.4098	0.4102	0.4058	0.4001	0.3994	0.3954	0.3927	0.3866	0.3878	0.3847	0.3734
500.0	0.4226	0.4082	0.4043	0.4056	0.4118	0.4027	0.3986	0.3921	0.3926	0.3883	0.3830	0.3822	0.3785	0.3759	0.3701	0.3713	0.3682	0.3575

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{32}_{16}S$ IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.340	4.150	5.840	5.820	5.710	6.773	7.340	7.752	8.060	8.360	8.530	9.070	9.370	9.823	10.010	10.195	10.515	10.790
3.0	5.213	5.002	6.912	6.936	6.805	7.951	8.693	9.160	9.502	9.830	10.094	10.723	11.102	11.595	11.797	12.044	12.558	12.758
3.5	6.155	5.916	8.043	8.112	7.957	9.184	10.106	10.626	11.002	11.365	11.714	12.432	12.889	13.422	13.638	13.946	14.639	14.777
4.0	7.166	6.894	9.236	9.352	9.170	10.478	11.584	12.158	12.566	12.940	13.398	14.206	14.741	15.313	15.544	15.912	16.773	16.861
4.5	8.247	7.935	10.492	10.656	10.445	11.834	13.130	13.758	14.198	14.592	15.152	16.052	16.664	17.276	17.519	17.948	18.969	19.015
5.0	9.396	9.040	11.812	12.026	11.784	13.264	14.747	15.428	15.901	16.312	16.976	17.970	18.662	19.313	19.589	20.059	21.234	21.246
5.5	10.614	10.207	13.197	13.463	13.187	14.739	16.436	17.171	17.675	18.102	18.875	19.965	20.737	21.427	21.696	22.247	23.570	23.556
6.0	11.900	11.437	14.647	14.967	14.655	16.289	18.196	18.986	19.522	19.962	20.848	22.037	22.880	23.619	23.900	24.514	25.980	25.946
6.5	13.254	12.729	16.161	16.537	16.187	17.905	20.029	20.874	21.441	21.895	22.897	24.187	25.122	25.891	26.184	26.860	28.467	28.419
7.0	14.675	14.083	17.741	18.175	17.784	19.587	21.935	22.835	23.434	23.899	25.021	26.414	27.435	28.243	28.548	29.287	31.031	30.974
8.0	17.72	16.97	21.10	21.65	21.17	23.15	25.96	26.98	27.64	28.12	29.50	31.11	32.30	33.19	33.51	34.38	36.39	36.34
9.0	21.02	20.11	24.71	25.39	24.81	26.97	30.28	31.41	32.14	32.64	34.28	36.11	37.49	38.45	38.80	39.81	42.07	42.03
10.0	24.59	23.48	28.57	29.39	28.71	31.05	34.89	36.14	36.93	37.44	39.36	41.43	42.99	44.04	44.41	45.55	48.07	48.06
11.0	28.41	27.08	32.69	33.66	32.86	35.38	39.78	41.15	42.01	42.53	44.74	47.06	48.82	49.95	50.34	51.62	54.39	54.43
12.0	32.48	30.92	37.07	38.18	37.26	39.97	44.95	46.45	47.38	47.90	50.43	53.00	54.96	56.18	56.59	58.01	61.02	61.12
15.0	46.19	43.79	51.66	53.28	51.93	55.26	62.14	64.05	65.18	65.69	69.25	72.66	75.28	76.74	77.20	79.08	82.79	83.17
20.0	73.87	69.66	80.82	83.42	81.19	85.63	96.24	98.89	100.39	100.81	106.37	111.40	115.25	117.14	117.68	120.38	125.23	126.31
25.0	107.34	100.82	115.79	119.54	116.25	121.92	136.91	140.39	142.27	142.53	150.44	157.35	162.63	164.95	165.53	169.14	175.10	177.15
30.0	146.39	137.06	156.36	161.44	156.88	163.90	183.89	188.28	190.57	190.60	201.20	210.23	217.12	219.87	220.49	225.07	232.13	235.39
35.0	190.81	178.20	202.34	208.91	202.90	211.38	236.98	242.35	245.08	244.80	258.42	269.81	278.49	281.67	282.29	287.92	296.08	300.76
40.0	240.4	224.1	253.6	261.8	254.1	264.2	296.0	302.4	305.6	304.9	321.9	335.9	346.5	350.1	350.7	357.4	366.7	373.0
45.0	295.1	274.5	309.9	319.9	310.4	322.1	360.7	368.2	371.9	370.8	391.4	408.2	421.0	425.0	425.6	433.4	443.9	451.9
50.0	354.7	329.5	371.1	383.1	371.6	385.1	430.9	439.7	443.8	442.3	466.8	486.6	501.7	506.1	506.6	515.7	527.3	537.3
55.0	419.1	388.8	437.1	451.2	437.6	453.0	506.6	516.7	521.3	519.1	547.9	571.0	588.5	593.3	593.8	604.1	616.9	629.0
60.0	488.2	452.3	507.9	524.1	508.3	525.6	587.6	598.9	604.1	601.3	634.5	661.1	681.2	686.4	686.8	698.4	712.5	726.8
65.0	561.8	519.9	583.1	601.8	583.5	602.8	673.6	686.4	692.1	688.6	726.6	756.8	779.7	785.3	785.5	798.6	813.8	830.5
70.0	639.8	591.6	662.9	684.0	663.2	684.6	764.7	779.0	785.1	780.9	824.0	858.0	883.9	889.8	889.9	904.3	920.9	940.0
80.0	808.9	746.8	835.4	861.8	835.4	861.3	961.5	978.9	986.1	980.2	1034.1	1076.4	1108.6	1115.2	1114.9	1132.2	1151.6	1175.9
90.0	994.7	917.2	1024.5	1056.8	1024.3	1054.9	1177.0	1197.7	1206.9	1198.3	1263.9	1315.3	1354.3	1361.5	1360.8	1381.2	1403.5	1433.3
100.0	1196.6	1102.1	1229.7	1268.3	1229.2	1264.8	1410.5	1434.8	1444.3	1434.3	1512.8	1573.8	1620.2	1628.0	1626.8	1650.4	1675.8	1711.5
150.0	2429.	2228.	2477.	2553.	2474.	2538.	2826.	2871.	2886.	2862.	3017.	3136.	3228.	3237.	3233.	3274.	3318.	3386.
200.0	3992.	3649.	4047.	4172.	4046.	4142.	4608.	4679.	4697.	4653.	4904.	5054.	5211.	5256.	5246.	5308.	5342.	5478.
250.0	5835.	5312.	5881.	6066.	5896.	6014.	6690.	6810.	6808.	6737.	7104.	7287.	7516.	7611.	7591.	7692.	7696.	7914.
300.0	7910.	7182.	7942.	8192.	7974.	8116.	9025.	9228.	9174.	9075.	9567.	9790.	10106.	10249.	10217.	10362.	10325.	10637.
350.0	10185.	9233.	10198.	10521.	10249.	10416.	11580.	11880.	11762.	11629.	12260.	12526.	12934.	13129.	13084.	13276.	13202.	13610.
400.0	12637.	11442.	12626.	13027.	12696.	12889.	14326.	14729.	14543.	14374.	15153.	15467.	15972.	16223.	16163.	16406.	16287.	16799.
450.0	15244.	13791.	15205.	15689.	15295.	15515.	17243.	17750.	17494.	17286.	18222.	18587.	19196.	19504.	19428.	19723.	19560.	20180.
500.0	17990.	16263.	17918.	18490.	18027.	18276.	20308.	20925.	20596.	20346.	21446.	21867.	22583.	22949.	22857.	23204.	22996.	23730.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.33	11.76	12.70	12.94	13.42	14.11	14.53	15.07	15.39	15.70	16.03	16.38	16.72	17.04	17.45	17.60	18.87	19.27
3.0	13.42	13.96	14.87	15.10	15.60	16.41	16.89	17.56	17.93	18.31	18.68	19.07	19.51	19.86	20.30	20.44	21.83	22.26
3.5	15.57	16.19	17.10	17.31	17.82	18.75	19.30	20.09	20.51	20.95	21.37	21.80	22.33	22.71	23.18	23.31	24.82	25.28
4.0	17.78	18.49	19.40	19.59	20.10	21.16	21.77	22.69	23.15	23.65	24.11	24.57	25.19	25.61	26.11	26.23	27.86	28.36
4.5	20.06	20.87	21.77	21.94	22.46	23.63	24.32	25.35	25.85	26.41	26.92	27.42	28.12	28.58	29.10	29.22	30.97	31.51
5.0	22.42	23.33	24.22	24.37	24.89	26.19	26.94	28.08	28.63	29.25	29.80	30.34	31.13	31.62	32.18	32.28	34.17	34.74
5.5	24.86	25.88	26.75	26.88	27.41	28.82	29.64	30.91	31.49	32.17	32.77	33.34	34.22	34.74	35.33	35.43	37.45	38.06
6.0	27.38	28.51	29.37	29.48	30.01	31.54	32.43	33.81	34.44	35.17	35.82	36.43	37.39	37.95	38.58	38.67	40.83	41.47
6.5	29.99	31.23	32.07	32.17	32.69	34.35	35.31	36.81	37.47	38.27	38.96	39.61	40.65	41.25	41.91	41.99	44.30	44.98
7.0	32.68	34.04	34.87	34.94	35.46	37.25	38.28	39.89	40.59	41.45	42.19	42.88	44.01	44.64	45.34	45.41	47.87	48.59
8.0	38.33	39.92	40.73	40.75	41.26	43.30	44.49	46.33	47.11	48.09	48.93	49.69	50.99	51.70	52.48	52.54	55.30	56.10
9.0	44.33	46.17	46.94	46.92	47.41	49.72	51.06	53.14	54.00	55.11	56.04	56.88	58.35	59.14	60.01	60.04	63.13	64.01
10.0	50.67	52.77	53.52	53.44	53.91	56.50	58.00	60.32	61.25	62.49	63.53	64.44	66.10	66.96	67.92	67.94	71.37	72.34
11.0	57.36	59.73	60.45	60.32	60.76	63.64	65.30	67.87	68.88	70.25	71.39	72.38	74.22	75.16	76.23	76.22	80.01	81.07
12.0	64.40	67.05	67.74	67.55	67.96	71.13	72.96	75.79	76.87	78.38	79.63	80.70	82.72	83.75	84.92	84.89	89.05	90.21
15.0	87.54	91.12	91.70	91.34	91.61	95.73	98.11	101.72	103.04	104.97	106.57	107.89	110.50	111.77	113.30	113.20	118.59	120.05
20.0	132.77	138.14	138.51	137.78	137.74	143.65	147.05	152.08	153.79	156.51	158.75	160.54	164.20	165.90	168.15	167.91	175.67	177.70
25.0	186.03	193.46	193.60	192.44	191.97	199.90	204.47	211.04	213.17	216.76	219.74	222.03	226.85	228.99	232.13	231.72	242.22	244.92
30.0	246.99	256.78	256.65	255.00	253.99	264.18	270.03	278.28	280.85	285.39	289.19	292.03	298.12	300.71	304.88	304.28	317.89	321.32
35.0	315.39	327.80	327.37	325.16	323.50	336.18	343.45	353.50	356.53	362.09	366.79	370.23	377.69	380.74	386.08	385.27	402.33	406.57
40.0	391.0	406.3	405.5	402.7	400.3	415.6	424.5	436.4	439.9	446.6	452.3	456.3	465.3	468.8	475.4	474.4	495.2	500.3
45.0	473.5	491.9	490.8	487.3	484.0	502.3	512.8	526.8	530.8	538.6	545.4	550.1	560.6	564.6	572.7	571.4	596.3	602.4
50.0	562.8	584.6	583.0	578.8	574.6	596.0	608.3	624.4	628.9	638.0	645.8	651.3	663.5	667.9	677.6	676.0	705.4	712.4
55.0	658.6	684.0	682.0	677.0	671.7	696.5	710.6	729.0	734.1	744.5	753.5	759.7	773.6	778.5	789.9	788.0	822.1	830.2
60.0	760.8	790.1	787.6	781.8	775.3	803.6	819.7	840.4	846.0	857.8	868.1	875.2	890.9	896.2	909.5	907.3	946.3	955.6
65.0	869.2	902.5	899.6	892.8	885.1	917.2	935.3	958.5	964.7	977.9	989.5	997.4	1015.0	1020.8	1036.0	1033.5	1077.8	1088.2
70.0	983.6	1021.3	1017.8	1010.1	1001.0	1037.0	1057.3	1083.0	1089.8	1104.5	1117.5	1126.3	1145.9	1152.2	1169.4	1166.5	1216.4	1228.1
80.0	1230.0	1276.9	1272.3	1262.6	1250.5	1294.9	1319.8	1350.9	1358.9	1376.7	1392.7	1403.3	1427.2	1434.4	1456.0	1452.3	1514.2	1528.4
90.0	1499.0	1556.0	1550.1	1538.2	1522.7	1576.2	1606.1	1642.8	1652.1	1673.3	1692.5	1705.0	1733.4	1741.6	1768.1	1763.6	1838.3	1855.4
100.0	1789.6	1857.4	1850.2	1835.9	1816.7	1879.9	1915.1	1957.8	1968.4	1993.2	2015.8	2030.5	2063.7	2072.8	2104.6	2099.0	2187.7	2207.8
150.0	3539.	3672.	3657.	3628.	3585.	3706.	3772.	3849.	3866.	3912.	3955.	3981.	4042.	4057.	4126.	4109.	4281.	4318.
200.0	5725.	5938.	5914.	5867.	5793.	5985.	6088.	6204.	6230.	6299.	6367.	6409.	6502.	6523.	6625.	6606.	6823.	6940.
250.0	8268.	8572.	8563.	8494.	8381.	8655.	8793.	8956.	8983.	9083.	9187.	9239.	9365.	9403.	9550.	9521.	9769.	9978.
300.0	11112.	11516.	11540.	11458.	11301.	11647.	11815.	12031.	12056.	12190.	12340.	12398.	12559.	12621.	12818.	12779.	13045.	13365.
350.0	14216.	14729.	14788.	14696.	14491.	14910.	15111.	15383.	15406.	15577.	15777.	15840.	16038.	16125.	16378.	16335.	16622.	17053.
400.0	17546.	18177.	18272.	18167.	17910.	18409.	18645.	18978.	18997.	19208.	19460.	19530.	19767.	19879.	20192.	20129.	20450.	21003.
450.0	21075.	21831.	21962.	21846.	21533.	22115.	22389.	22784.	22800.	23052.	23360.	23437.	23714.	23853.	24229.	24152.	24505.	25183.
500.0	24781.	25666.	25836.	25705.	25336.	26005.	26318.	26778.	26789.	27086.	27450.	27535.	27853.	28021.	28461.	28371.	28759.	29565.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{35}_{17}$CL IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	20.98	21.35	16.68	16.01	16.30	15.09	13.11	12.58	12.26	12.00	11.27	10.65	10.15	9.91	9.82	9.48	8.52	8.89
3.0	19.45	19.91	15.88	15.26	15.57	14.49	12.63	12.15	11.86	11.65	10.96	10.37	9.91	9.69	9.61	9.29	8.45	8.74
3.5	18.10	18.63	15.10	14.52	14.83	13.86	12.11	11.67	11.42	11.25	10.69	10.04	9.61	9.40	9.33	9.03	8.29	8.51
4.0	16.93	17.49	14.36	13.82	14.12	13.25	11.60	11.20	10.97	10.83	10.20	9.68	9.28	9.09	9.03	8.75	8.09	8.26
4.5	15.91	16.48	13.68	13.17	13.47	12.67	11.11	10.75	10.54	10.42	9.82	9.33	8.96	8.78	8.72	8.46	7.87	8.00
5.0	15.00	15.59	13.05	12.57	12.86	12.13	10.66	10.32	10.13	10.03	9.45	8.99	8.64	8.47	8.42	8.18	7.64	7.74
5.5	14.20	14.79	12.47	12.02	12.31	11.63	10.23	9.92	9.74	9.66	9.11	8.67	8.33	8.18	8.13	7.91	7.42	7.49
6.0	13.48	14.08	11.94	11.51	11.79	11.16	9.83	9.54	9.38	9.31	8.78	8.36	8.05	7.90	7.86	7.65	7.20	7.25
6.5	12.83	13.43	11.45	11.04	11.32	10.73	9.46	9.19	9.04	8.98	8.47	8.07	7.78	7.64	7.60	7.40	6.99	7.02
7.0	12.25	12.85	11.00	10.61	10.88	10.33	9.12	8.86	8.72	8.67	8.18	7.80	7.52	7.39	7.36	7.17	6.79	6.81
8.0	11.25	11.83	10.20	9.85	10.11	9.62	8.50	8.27	8.15	8.12	7.66	7.31	7.05	6.94	6.91	6.74	6.42	6.41
9.0	10.40	10.97	9.52	9.19	9.44	9.00	7.97	7.76	7.65	7.63	7.20	6.88	6.64	6.54	6.52	6.36	6.08	6.05
10.0	9.68	10.23	8.92	8.62	8.85	8.46	7.50	7.31	7.21	7.20	6.80	6.50	6.28	6.19	6.16	6.02	5.77	5.74
11.0	9.07	9.60	8.40	8.12	8.34	7.98	7.08	6.91	6.82	6.81	6.44	6.16	5.95	5.87	5.85	5.71	5.50	5.45
12.0	8.53	9.05	7.94	7.68	7.89	7.56	6.71	6.55	6.47	6.47	6.12	5.85	5.66	5.58	5.57	5.44	5.25	5.19
15.0	7.263	7.738	6.840	6.614	6.808	6.543	5.820	5.690	5.626	5.634	5.328	5.102	4.940	4.883	4.871	4.769	4.626	4.560
20.0	5.868	6.283	5.590	5.409	5.573	5.374	4.792	4.693	4.647	4.661	4.411	4.229	4.100	4.060	4.054	3.976	3.879	3.810
25.0	4.955	5.326	4.754	4.602	4.745	4.587	4.096	4.016	3.980	3.997	3.785	3.631	3.523	3.493	3.490	3.427	3.357	3.289
30.0	4.309	4.644	4.155	4.024	4.150	4.018	3.592	3.525	3.496	3.514	3.329	3.196	3.102	3.079	3.078	3.025	2.970	2.907
35.0	3.827	4.133	3.703	3.587	3.701	3.588	3.211	3.153	3.129	3.147	2.981	2.864	2.781	2.762	2.762	2.717	2.673	2.614
40.0	3.453	3.735	3.350	3.246	3.349	3.251	2.911	2.860	2.840	2.858	2.708	2.602	2.527	2.512	2.513	2.474	2.436	2.381
45.0	3.153	3.416	3.066	2.971	3.066	2.979	2.669	2.624	2.606	2.623	2.486	2.390	2.321	2.309	2.310	2.276	2.243	2.192
50.0	2.907	3.154	2.832	2.745	2.834	2.755	2.470	2.428	2.413	2.430	2.303	2.214	2.151	2.141	2.143	2.112	2.083	2.035
55.0	2.702	2.934	2.637	2.556	2.639	2.567	2.302	2.264	2.250	2.267	2.149	2.067	2.008	1.999	2.001	1.973	1.947	1.903
60.0	2.528	2.747	2.470	2.395	2.473	2.407	2.159	2.125	2.112	2.128	2.018	1.941	1.886	1.878	1.881	1.855	1.831	1.790
65.0	2.378	2.587	2.327	2.257	2.330	2.269	2.036	2.004	1.992	2.008	1.904	1.832	1.780	1.774	1.776	1.752	1.731	1.692
70.0	2.248	2.447	2.202	2.136	2.205	2.148	1.929	1.898	1.888	1.903	1.805	1.736	1.688	1.682	1.684	1.662	1.642	1.606
80.0	2.033	2.215	1.995	1.935	1.998	1.948	1.760	1.723	1.714	1.729	1.640	1.578	1.534	1.529	1.532	1.513	1.495	1.462
90.0	1.861	2.030	1.830	1.775	1.833	1.788	1.607	1.583	1.575	1.589	1.508	1.461	1.410	1.407	1.410	1.393	1.377	1.347
100.0	1.721	1.879	1.695	1.645	1.698	1.658	1.490	1.468	1.461	1.475	1.399	1.347	1.309	1.307	1.309	1.294	1.279	1.253
150.0	1.284	1.406	1.273	1.236	1.275	1.247	1.123	1.107	1.103	1.115	1.058	1.019	0.991	0.990	0.992	0.982	0.970	0.953
200.0	1.053	1.166	1.056	1.024	1.060	1.034	0.930	0.914	0.917	0.928	0.880	0.867	0.838	0.821	0.824	0.814	0.822	0.793
250.0	0.920	1.019	0.925	0.896	0.917	0.907	0.816	0.792	0.805	0.815	0.773	0.761	0.736	0.722	0.725	0.713	0.723	0.698
300.0	0.829	0.919	0.835	0.809	0.828	0.819	0.737	0.710	0.728	0.737	0.699	0.688	0.666	0.653	0.656	0.646	0.655	0.633
350.0	0.763	0.847	0.770	0.746	0.764	0.756	0.680	0.656	0.672	0.681	0.646	0.635	0.615	0.604	0.607	0.597	0.605	0.585
400.0	0.7131	0.7916	0.7206	0.6981	0.7151	0.7075	0.6371	0.6146	0.6294	0.6378	0.6052	0.5952	0.5762	0.5660	0.5688	0.5598	0.5674	0.5491
450.0	0.6742	0.7485	0.6820	0.6606	0.6769	0.6698	0.6033	0.5826	0.5962	0.6043	0.5736	0.5638	0.5459	0.5366	0.5392	0.5307	0.5379	0.5207
500.0	0.6430	0.7140	0.6510	0.6306	0.6463	0.6397	0.5762	0.5569	0.5696	0.5774	0.5481	0.5386	0.5216	0.5129	0.5155	0.5075	0.5142	0.4979

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	8.347	7.976	8.021	8.085	8.025	7.583	7.359	6.961	6.820	6.648	6.527	6.426	6.199	6.125	6.065	6.083	5.843	5.779
3.0	8.220	7.862	7.903	7.966	7.921	7.505	7.291	6.923	6.794	6.632	6.516	6.421	6.208	6.134	6.073	6.090	5.846	5.782
3.5	8.023	7.679	7.718	7.779	7.747	7.355	7.152	6.810	6.693	6.540	6.430	6.340	6.141	6.067	6.006	6.023	5.779	5.715
4.0	7.796	7.466	7.503	7.562	7.540	7.170	6.977	6.660	6.552	6.408	6.303	6.219	6.032	5.961	5.899	5.915	5.674	5.612
4.5	7.559	7.243	7.277	7.334	7.320	6.971	6.788	6.491	6.393	6.257	6.157	6.078	5.902	5.833	5.772	5.787	5.550	5.489
5.0	7.322	7.019	7.052	7.106	7.099	6.768	6.594	6.317	6.225	6.097	6.002	5.927	5.761	5.695	5.634	5.649	5.416	5.357
5.5	7.091	6.800	6.831	6.884	6.882	6.568	6.402	6.141	6.057	5.935	5.844	5.774	5.617	5.553	5.493	5.507	5.279	5.222
6.0	6.869	6.589	6.619	6.670	6.673	6.374	6.215	5.970	5.891	5.775	5.688	5.621	5.473	5.411	5.352	5.366	5.143	5.088
6.5	6.657	6.387	6.416	6.466	6.472	6.187	6.035	5.803	5.729	5.619	5.536	5.473	5.332	5.273	5.214	5.228	5.010	4.956
7.0	6.456	6.196	6.223	6.271	6.281	6.008	5.862	5.643	5.574	5.468	5.389	5.328	5.194	5.138	5.080	5.093	4.881	4.829
8.0	6.084	5.842	5.867	5.913	5.927	5.676	5.542	5.343	5.282	5.185	5.112	5.057	4.934	4.882	4.826	4.839	4.637	4.587
9.0	5.752	5.524	5.548	5.591	5.609	5.377	5.252	5.071	5.016	4.927	4.859	4.808	4.696	4.648	4.593	4.605	4.412	4.366
10.0	5.454	5.240	5.262	5.303	5.323	5.107	4.990	4.824	4.775	4.692	4.628	4.581	4.477	4.433	4.380	4.391	4.208	4.164
11.0	5.186	4.984	5.005	5.044	5.066	4.863	4.754	4.601	4.556	4.478	4.419	4.375	4.278	4.237	4.185	4.196	4.021	3.979
12.0	4.945	4.753	4.773	4.810	4.833	4.643	4.540	4.397	4.356	4.284	4.227	4.187	4.096	4.058	4.008	4.018	3.850	3.811
15.0	4.346	4.180	4.197	4.230	4.256	4.094	4.006	3.888	3.855	3.795	3.746	3.712	3.636	3.606	3.559	3.568	3.419	3.385
20.0	3.636	3.498	3.513	3.540	3.566	3.436	3.365	3.274	3.250	3.202	3.163	3.136	3.076	3.053	3.012	3.019	2.894	2.866
25.0	3.141	3.024	3.037	3.061	3.086	2.976	2.917	2.842	2.823	2.783	2.750	2.728	2.678	2.661	2.623	2.630	2.522	2.497
30.0	2.778	2.675	2.686	2.707	2.732	2.636	2.585	2.522	2.506	2.472	2.443	2.424	2.382	2.367	2.333	2.339	2.244	2.222
35.0	2.498	2.406	2.417	2.436	2.459	2.375	2.329	2.274	2.261	2.231	2.205	2.189	2.151	2.140	2.109	2.114	2.028	2.009
40.0	2.277	2.193	2.203	2.220	2.243	2.166	2.126	2.077	2.065	2.039	2.016	2.001	1.968	1.958	1.929	1.934	1.855	1.838
45.0	2.097	2.020	2.029	2.045	2.066	1.997	1.960	1.916	1.906	1.882	1.861	1.847	1.817	1.809	1.782	1.786	1.714	1.698
50.0	1.947	1.876	1.884	1.899	1.920	1.856	1.822	1.782	1.773	1.761	1.731	1.719	1.692	1.684	1.659	1.663	1.596	1.582
55.0	1.821	1.754	1.762	1.776	1.796	1.736	1.705	1.669	1.660	1.640	1.622	1.611	1.585	1.579	1.555	1.559	1.496	1.483
60.0	1.713	1.650	1.658	1.671	1.690	1.634	1.605	1.571	1.564	1.545	1.528	1.517	1.494	1.488	1.465	1.469	1.410	1.398
65.0	1.619	1.560	1.567	1.580	1.598	1.546	1.518	1.487	1.480	1.462	1.446	1.436	1.414	1.409	1.388	1.391	1.335	1.324
70.0	1.537	1.481	1.488	1.500	1.517	1.468	1.442	1.413	1.406	1.390	1.375	1.365	1.345	1.340	1.319	1.323	1.270	1.259
80.0	1.400	1.349	1.355	1.366	1.383	1.338	1.315	1.289	1.283	1.268	1.255	1.246	1.228	1.224	1.205	1.208	1.160	1.150
90.0	1.290	1.243	1.249	1.259	1.275	1.234	1.212	1.189	1.184	1.171	1.158	1.151	1.134	1.130	1.113	1.116	1.071	1.062
100.0	1.199	1.156	1.161	1.171	1.186	1.148	1.128	1.107	1.102	1.090	1.079	1.072	1.056	1.053	1.037	1.040	0.998	0.990
150.0	0.9124	0.8797	0.8836	0.8908	0.9031	0.8748	0.8604	0.8456	0.8425	0.8339	0.8252	0.8201	0.8090	0.8068	0.7944	0.7967	0.7650	0.7587
200.0	0.7596	0.7336	0.7336	0.7397	0.7505	0.7272	0.7156	0.7041	0.7018	0.6950	0.6878	0.6837	0.6748	0.6729	0.6627	0.6647	0.6560	0.6348
250.0	0.6686	0.6458	0.6387	0.6440	0.6538	0.6353	0.6290	0.6180	0.6184	0.6114	0.6024	0.6014	0.5948	0.5904	0.5811	0.5831	0.5790	0.5606
300.0	0.6062	0.5855	0.5791	0.5811	0.5898	0.5764	0.5707	0.5609	0.5613	0.5551	0.5470	0.5461	0.5402	0.5364	0.5279	0.5297	0.5259	0.5096
350.0	0.5606	0.5415	0.5358	0.5377	0.5458	0.5334	0.5281	0.5192	0.5197	0.5140	0.5066	0.5057	0.5004	0.4969	0.4891	0.4908	0.4871	0.4722
400.0	0.5260	0.5081	0.5029	0.5046	0.5123	0.5007	0.4957	0.4875	0.4880	0.4827	0.4768	0.4750	0.4701	0.4669	0.4596	0.4611	0.4576	0.4438
450.0	0.4988	0.4819	0.4771	0.4787	0.4860	0.4751	0.4703	0.4626	0.4631	0.4581	0.4517	0.4508	0.4463	0.4433	0.4365	0.4378	0.4343	0.4215
500.0	0.4770	0.4609	0.4564	0.4579	0.4649	0.4546	0.4500	0.4427	0.4432	0.4384	0.4323	0.4315	0.4272	0.4244	0.4179	0.4192	0.4157	0.4036

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{35}_{17}$CL IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.440	4.250	5.988	5.970	5.860	6.952	7.530	7.948	8.260	8.570	8.750	9.310	9.620	10.081	10.270	10.456	10.780	11.060
3.0	5.307	5.099	7.063	7.089	6.958	8.135	8.890	9.363	9.711	10.049	10.323	10.973	11.363	11.866	12.071	12.320	12.840	13.044
3.5	6.240	6.008	8.193	8.265	8.110	9.370	10.305	10.832	11.214	11.577	11.948	12.688	13.156	13.700	13.919	14.229	14.930	15.072
4.0	7.240	6.978	9.382	9.500	9.320	10.662	11.781	12.362	12.777	13.162	13.632	14.463	15.009	15.593	15.826	16.197	17.067	17.158
4.5	8.307	8.009	10.631	10.798	10.589	12.013	13.322	13.957	14.404	14.809	15.381	16.304	16.928	17.552	17.799	18.231	19.260	19.311
5.0	9.441	9.101	11.941	12.158	11.918	13.425	14.930	15.619	16.098	16.521	17.197	18.214	18.918	19.581	19.841	20.334	21.517	21.535
5.5	10.640	10.254	13.314	13.583	13.310	14.899	16.607	17.350	17.861	18.300	19.084	20.197	20.981	21.684	21.956	22.511	23.841	23.833
6.0	11.906	11.467	14.749	15.071	14.763	16.435	18.352	19.150	19.692	20.146	21.041	22.253	23.118	23.860	24.145	24.762	26.235	26.208
6.5	13.237	12.741	16.246	16.624	16.278	18.035	20.167	21.019	21.594	22.060	23.071	24.383	25.330	26.112	26.409	27.089	28.702	28.660
7.0	14.633	14.073	17.806	18.241	17.855	19.697	22.051	22.959	23.565	24.043	25.173	26.588	27.619	28.441	28.750	29.493	31.242	31.192
8.0	17.62	16.92	21.11	21.67	21.19	23.21	26.03	27.05	27.72	28.22	29.59	31.22	32.43	33.33	33.66	34.53	36.55	36.49
9.0	20.86	19.99	24.67	25.35	24.78	26.97	30.28	31.42	32.15	32.67	34.31	36.16	37.54	38.52	38.88	39.88	42.15	42.12
10.0	24.35	23.30	28.47	29.28	28.61	30.99	34.81	36.07	36.87	37.39	39.31	41.40	42.97	44.03	44.40	45.54	48.06	48.06
11.0	28.08	26.83	32.51	33.47	32.69	35.25	39.62	41.00	41.86	42.39	44.60	46.94	48.70	49.84	50.24	51.51	54.27	54.32
12.0	32.07	30.59	36.80	37.91	37.00	39.75	44.70	46.20	47.13	47.67	50.18	52.77	54.73	55.96	56.37	57.79	60.79	60.90
15.0	46.46	43.18	51.09	52.69	51.37	54.72	61.54	63.44	64.58	65.11	68.63	72.04	74.64	76.12	76.59	78.45	82.14	82.52
20.0	72.44	68.44	79.55	82.11	79.94	84.40	94.86	97.49	98.98	99.43	104.91	109.90	113.72	115.62	116.16	118.83	123.64	124.70
25.0	105.03	98.81	113.63	117.32	114.10	119.77	134.50	137.94	139.82	140.11	147.88	154.71	159.92	162.24	162.83	166.39	172.28	174.30
30.0	143.01	134.10	153.11	158.09	153.65	160.64	180.24	184.57	186.85	186.92	197.31	206.20	212.98	215.73	216.35	220.86	227.83	231.02
35.0	186.19	174.12	197.82	204.25	198.39	206.81	231.87	237.16	239.86	239.63	252.96	264.16	272.68	275.85	276.48	282.00	290.04	294.62
40.0	234.4	218.7	247.6	255.6	248.2	258.1	289.2	295.5	298.7	298.1	314.6	328.4	338.8	342.4	343.0	349.6	358.7	364.9
45.0	287.5	267.8	302.3	312.0	302.8	314.4	352.0	359.5	363.1	362.1	382.2	398.6	411.1	415.1	415.7	423.4	433.7	441.5
50.0	345.4	321.1	361.7	373.4	362.3	375.6	420.3	428.9	432.9	431.4	455.4	474.8	489.5	493.9	494.4	503.3	514.7	524.5
55.0	407.9	378.7	425.8	439.5	426.3	441.4	493.7	503.5	508.1	506.1	534.1	556.6	573.8	578.5	579.0	589.1	601.6	613.4
60.0	474.9	440.4	494.4	510.2	494.9	511.8	572.2	583.4	588.4	585.8	618.1	644.1	663.7	668.9	669.2	680.6	694.4	708.3
65.0	546.3	506.1	567.4	585.6	567.8	586.8	655.7	668.3	673.8	670.5	707.5	737.0	759.3	764.8	765.0	777.8	792.7	808.9
70.0	622.0	575.7	645.1	665.3	645.1	666.1	744.1	758.0	764.1	760.0	801.9	835.1	860.3	866.2	866.3	880.4	896.6	915.2
80.0	786.0	726.3	812.0	837.7	812.1	837.4	934.9	951.8	958.9	953.3	1005.7	1046.9	1078.2	1084.7	1084.5	1101.4	1120.3	1143.9
90.0	966.1	891.5	995.4	1026.8	995.2	1025.1	1143.8	1164.0	1172.2	1164.7	1228.5	1278.5	1316.5	1323.6	1322.9	1342.8	1364.5	1393.5
100.0	1161.9	1070.9	1194.3	1231.8	1193.8	1228.6	1370.2	1393.9	1403.1	1393.5	1469.7	1529.1	1574.2	1581.9	1580.8	1603.7	1628.5	1663.1
150.0	2356.	2163.	2403.	2477.	2400.	2463.	2742.	2786.	2801.	2777.	2928.	3043.	3132.	3142.	3137.	3177.	3220.	3286.
200.0	3872.	3540.	3924.	4046.	3924.	4017.	4469.	4538.	4565.	4512.	4756.	4902.	5054.	5098.	5090.	5148.	5181.	5313.
250.0	5657.	5152.	5702.	5880.	5716.	5831.	6486.	6603.	6601.	6532.	6887.	7066.	7291.	7380.	7360.	7458.	7460.	7673.
300.0	7667.	6964.	7698.	7941.	7729.	7867.	8748.	8945.	8893.	8796.	9274.	9490.	9797.	9935.	9904.	10044.	10010.	10312.
350.0	9872.	8951.	9884.	10197.	9933.	10095.	11223.	11515.	11400.	11271.	11883.	12141.	12536.	12726.	12682.	12868.	12796.	13192.
400.0	12248.	11091.	12237.	12625.	12304.	12491.	13885.	14275.	14096.	13931.	14686.	14990.	15480.	15723.	15667.	15899.	15786.	16282.
450.0	14774.	13367.	14735.	15204.	14822.	15036.	16710.	17203.	16954.	16752.	17659.	18014.	18603.	18902.	18829.	19113.	18956.	19558.
500.0	17434.	15763.	17363.	17918.	17469.	17711.	19681.	20278.	19960.	19717.	20783.	21192.	21882.	22240.	22150.	22487.	22286.	22997.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.61	12.05	13.01	13.26	13.76	14.47	14.90	15.45	15.79	16.11	16.45	16.81	17.16	17.49	17.91	18.06	19.37	19.78
3.0	13.72	14.25	15.21	15.44	15.95	16.79	17.29	17.97	18.36	18.75	19.13	19.53	19.98	20.34	20.79	20.93	22.36	22.80
3.5	15.87	16.50	17.45	17.66	18.19	19.14	19.71	20.52	20.95	21.40	21.83	22.27	22.81	23.21	23.69	23.82	25.36	25.85
4.0	18.09	18.82	19.75	19.94	20.47	21.55	22.19	23.12	23.59	24.10	24.58	25.06	25.69	26.12	26.62	26.75	28.42	28.93
4.5	20.37	21.19	22.11	22.29	22.83	24.03	24.73	25.78	26.29	26.87	27.39	27.90	28.62	29.08	29.62	29.74	31.54	32.09
5.0	22.72	23.66	24.56	24.72	25.26	26.57	27.34	28.51	29.07	29.70	30.27	30.82	31.62	32.12	32.69	32.80	34.73	35.31
5.5	25.15	26.18	27.08	27.22	27.76	29.20	30.04	31.32	31.92	32.61	33.22	33.81	34.70	35.23	35.84	35.94	38.00	38.62
6.0	27.65	28.80	29.68	29.80	30.34	31.90	32.81	34.21	34.85	35.60	36.26	36.88	37.85	38.42	39.06	39.16	41.36	42.02
6.5	30.24	31.49	32.37	32.47	33.01	34.69	35.67	37.18	37.86	38.67	39.37	40.04	41.09	41.70	42.38	42.46	44.81	45.50
7.0	32.91	34.28	35.14	35.22	35.75	37.56	38.61	40.24	40.96	41.83	42.58	43.28	44.42	45.06	45.78	45.85	48.35	49.08
8.0	38.50	40.10	40.93	40.97	41.49	43.56	44.75	46.62	47.41	48.40	49.25	50.02	51.33	52.05	52.85	52.91	55.70	56.52
9.0	44.42	46.26	47.07	47.06	47.56	49.90	51.24	53.35	54.21	55.33	56.27	57.12	58.61	59.40	60.28	60.32	63.44	64.34
10.0	50.67	52.77	53.55	53.49	53.97	56.58	58.08	60.42	61.36	62.61	63.66	64.58	66.24	67.11	68.09	68.11	71.57	72.55
11.0	57.25	59.62	60.37	60.26	60.71	63.60	65.27	67.86	68.87	70.25	71.40	72.40	74.24	75.19	76.27	76.26	80.08	81.15
12.0	64.17	66.81	67.53	67.36	67.79	70.97	72.81	75.64	76.73	78.24	79.50	80.58	82.60	83.63	84.81	84.79	88.98	90.14
15.0	86.87	90.43	91.05	90.70	90.99	95.11	97.48	101.08	102.40	104.34	105.94	107.27	109.86	111.14	112.67	112.57	117.97	119.44
20.0	131.10	136.40	136.83	136.12	136.11	141.97	145.35	150.34	152.05	154.75	156.99	158.77	162.40	164.09	166.34	166.10	173.82	175.85
25.0	183.05	190.38	190.57	189.45	189.03	196.86	201.37	207.87	209.99	213.54	216.50	218.77	223.54	225.66	228.77	228.38	238.78	241.45
30.0	242.43	252.05	251.99	250.39	249.43	259.47	265.24	273.38	275.93	280.40	284.16	286.97	292.97	295.54	299.65	299.07	312.50	315.89
35.0	308.98	321.15	320.79	318.65	317.07	329.53	336.68	346.57	349.57	355.04	359.67	363.07	370.40	373.41	378.67	377.89	394.68	398.86
40.0	382.5	397.4	396.7	394.0	391.7	406.8	415.4	427.2	430.7	437.2	442.8	446.8	455.6	459.0	465.6	464.5	485.0	490.0
45.0	462.6	480.7	479.6	476.2	473.1	491.0	501.3	515.0	518.9	526.6	533.2	537.9	548.2	552.1	560.1	558.8	583.3	589.2
50.0	549.3	570.6	569.2	565.1	561.0	582.0	594.0	609.8	614.2	623.1	630.8	636.2	648.1	652.4	661.9	660.4	689.2	696.1
55.0	642.3	667.2	665.3	660.4	655.3	679.6	693.3	711.3	716.3	726.5	735.3	741.4	755.0	759.8	771.0	769.2	802.5	810.4
60.0	741.5	770.1	767.7	762.1	755.8	783.5	799.2	819.5	825.0	836.5	846.6	853.4	868.8	874.1	887.0	884.9	923.0	932.1
65.0	846.6	879.2	876.4	869.8	862.4	893.7	911.4	934.0	940.1	953.0	964.3	972.0	989.3	995.0	1009.8	1007.3	1050.6	1060.8
70.0	957.6	994.3	991.0	983.6	974.8	1009.9	1029.7	1054.8	1061.4	1075.8	1088.5	1097.1	1116.2	1122.4	1139.2	1136.4	1185.1	1196.4
80.0	1196.6	1242.3	1237.9	1228.5	1216.8	1260.0	1284.3	1314.6	1322.4	1339.8	1355.4	1365.7	1389.0	1396.0	1417.2	1413.6	1473.8	1487.8
90.0	1457.4	1512.9	1507.2	1496.7	1480.7	1532.7	1561.9	1597.6	1606.7	1627.3	1646.1	1658.3	1686.0	1693.9	1719.8	1715.3	1788.1	1804.8
100.0	1739.1	1805.1	1798.1	1784.2	1765.7	1827.2	1861.4	1903.0	1913.3	1937.4	1959.5	1973.8	2006.1	2015.0	2045.9	2040.6	2126.9	2146.4
150.0	3434.	3564.	3549.	3521.	3479.	3597.	3661.	3735.	3753.	3797.	3839.	3865.	3924.	3938.	3999.	3988.	4155.	4192.
200.0	5552.	5759.	5737.	5691.	5619.	5805.	5906.	6018.	6043.	6110.	6176.	6217.	6307.	6328.	6426.	6408.	6619.	6732.
250.0	8017.	8311.	8303.	8236.	8126.	8392.	8526.	8690.	8710.	8807.	8906.	8958.	9081.	9118.	9260.	9233.	9469.	9676.
300.0	10772.	11164.	11187.	11108.	10955.	11291.	11454.	11663.	11688.	11818.	11964.	12019.	12175.	12235.	12427.	12389.	12647.	12958.
350.0	13779.	14277.	14334.	14244.	14045.	14452.	14647.	14911.	14933.	15100.	15293.	15355.	15547.	15631.	15876.	15827.	16113.	16531.
400.0	17006.	17617.	17709.	17610.	17358.	17842.	18071.	18394.	18413.	18617.	18862.	18930.	19159.	19268.	19572.	19510.	19821.	20358.
450.0	20425.	21157.	21285.	21171.	20869.	21433.	21699.	22082.	22097.	22342.	22640.	22715.	22983.	23118.	23482.	23408.	23750.	24407.
500.0	24015.	24873.	25038.	24911.	24553.	25202.	25505.	25952.	25963.	26250.	26603.	26685.	26993.	27156.	27583.	27496.	27872.	28653.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{40}_{18}$AR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	22.93	23.24	18.06	17.33	17.64	16.31	14.16	13.58	13.23	12.95	12.16	11.49	10.95	10.68	10.58	10.21	9.18	9.58
3.0	21.31	21.74	17.26	16.56	16.90	15.71	13.69	13.16	12.85	12.62	11.87	11.23	10.73	10.48	10.39	10.04	9.13	9.44
3.5	19.88	20.38	16.45	15.82	16.14	15.07	13.16	12.69	12.41	12.22	11.50	10.90	10.43	10.20	10.12	9.80	8.99	9.23
4.0	18.62	19.18	15.68	15.09	15.41	14.44	12.64	12.20	11.95	11.79	11.10	10.54	10.10	9.89	9.81	9.51	8.79	8.98
4.5	17.52	18.10	14.96	14.40	14.73	13.83	12.13	11.73	11.50	11.37	10.71	10.17	9.76	9.57	9.50	9.22	8.57	8.71
5.0	16.54	17.14	14.29	13.77	14.09	13.27	11.65	11.28	11.07	10.96	10.33	9.82	9.43	9.25	9.19	8.93	8.34	8.45
5.5	15.67	16.28	13.68	13.18	13.49	12.74	11.20	10.86	10.66	10.57	9.97	9.48	9.12	8.95	8.89	8.64	8.11	8.19
6.0	14.89	15.51	13.11	12.64	12.95	12.24	10.78	10.46	10.28	10.20	9.62	9.16	8.82	8.66	8.61	8.37	7.88	7.94
6.5	14.19	14.81	12.59	12.14	12.44	11.79	10.39	10.09	9.92	9.85	9.30	8.86	8.53	8.38	8.33	8.11	7.66	7.70
7.0	13.56	14.18	12.11	11.68	11.98	11.36	10.02	9.74	9.58	9.53	8.99	8.57	8.26	8.12	8.08	7.86	7.45	7.47
8.0	12.46	13.07	11.25	10.86	11.14	10.60	9.37	9.11	8.97	8.93	8.43	8.05	7.76	7.64	7.60	7.41	7.06	7.05
9.0	11.53	12.14	10.51	10.15	10.42	9.93	8.79	8.56	8.44	8.41	7.94	7.58	7.32	7.21	7.18	7.00	6.70	6.67
10.0	10.75	11.34	9.87	9.53	9.79	9.36	8.28	8.07	7.96	7.94	7.51	7.17	6.93	6.83	6.80	6.64	6.37	6.33
11.0	10.07	10.64	9.30	8.99	9.23	8.83	7.83	7.64	7.54	7.53	7.12	6.80	6.58	6.48	6.46	6.31	6.07	6.02
12.0	9.48	10.04	8.80	8.50	8.74	8.37	7.43	7.25	7.16	7.16	6.77	6.47	6.26	6.18	6.16	6.02	5.80	5.74
15.0	8.084	8.600	7.597	7.345	7.559	7.262	6.459	6.314	6.243	6.250	5.911	5.659	5.479	5.415	5.402	5.288	5.129	5.056
20.0	6.542	6.997	6.224	6.022	6.204	5.981	5.332	5.222	5.170	5.186	4.907	4.704	4.560	4.515	4.508	4.421	4.314	4.236
25.0	5.531	5.937	5.302	5.132	5.291	5.113	4.565	4.476	4.436	4.455	4.218	4.047	3.926	3.892	3.889	3.819	3.740	3.664
30.0	4.814	5.182	4.638	4.492	4.632	4.485	4.009	3.934	3.902	3.922	3.714	3.566	3.461	3.435	3.434	3.375	3.314	3.243
35.0	4.278	4.615	4.137	4.008	4.135	4.009	3.587	3.522	3.495	3.515	3.330	3.198	3.105	3.085	3.085	3.035	2.984	2.918
40.0	3.861	4.173	3.745	3.629	3.744	3.634	3.254	3.197	3.174	3.194	3.026	2.908	2.824	2.807	2.808	2.764	2.722	2.661
45.0	3.527	3.818	3.429	3.323	3.430	3.332	2.985	2.934	2.914	2.934	2.780	2.672	2.596	2.582	2.583	2.545	2.508	2.451
50.0	3.253	3.526	3.169	3.072	3.171	3.083	2.763	2.717	2.699	2.718	2.577	2.477	2.407	2.395	2.397	2.362	2.330	2.277
55.0	3.024	3.281	2.951	2.861	2.953	2.873	2.577	2.534	2.518	2.537	2.405	2.313	2.247	2.237	2.240	2.208	2.179	2.129
60.0	2.830	3.074	2.766	2.681	2.768	2.695	2.417	2.378	2.364	2.382	2.259	2.172	2.111	2.102	2.105	2.076	2.050	2.003
65.0	2.663	2.894	2.606	2.527	2.608	2.540	2.280	2.243	2.230	2.248	2.132	2.051	1.993	1.986	1.988	1.962	1.937	1.894
70.0	2.517	2.738	2.466	2.392	2.469	2.406	2.160	2.126	2.114	2.131	2.021	1.944	1.890	1.884	1.886	1.862	1.839	1.798
80.0	2.276	2.479	2.235	2.168	2.238	2.182	1.960	1.930	1.920	1.936	1.837	1.767	1.718	1.713	1.716	1.694	1.674	1.638
90.0	2.085	2.273	2.050	1.989	2.053	2.004	1.801	1.773	1.765	1.780	1.689	1.626	1.580	1.576	1.579	1.560	1.542	1.509
100.0	1.928	2.104	1.900	1.843	1.903	1.858	1.670	1.645	1.637	1.653	1.568	1.509	1.467	1.464	1.467	1.450	1.433	1.404
150.0	1.439	1.575	1.427	1.385	1.429	1.398	1.258	1.241	1.236	1.249	1.186	1.142	1.110	1.109	1.112	1.100	1.088	1.068
200.0	1.180	1.307	1.184	1.147	1.177	1.160	1.043	1.024	1.028	1.040	0.986	0.972	0.940	0.920	0.924	0.912	0.922	0.889
250.0	1.031	1.143	1.037	1.005	1.028	1.016	0.914	0.888	0.902	0.913	0.866	0.853	0.825	0.809	0.812	0.799	0.810	0.783
300.0	0.929	1.030	0.936	0.907	0.929	0.918	0.827	0.796	0.816	0.826	0.784	0.771	0.746	0.732	0.736	0.724	0.734	0.710
350.0	0.855	0.949	0.863	0.836	0.856	0.847	0.763	0.736	0.753	0.763	0.724	0.712	0.689	0.677	0.680	0.669	0.678	0.656
400.0	0.7994	0.8873	0.8078	0.7826	0.8017	0.7932	0.7143	0.6890	0.7056	0.7150	0.6785	0.6673	0.6459	0.6346	0.6376	0.6276	0.6361	0.6156
450.0	0.7658	0.8391	0.7646	0.7406	0.7589	0.7510	0.6764	0.6531	0.6684	0.6775	0.6430	0.6321	0.6120	0.6015	0.6045	0.5950	0.6030	0.5838
500.0	0.7208	0.8004	0.7299	0.7069	0.7246	0.7171	0.6460	0.6243	0.6386	0.6474	0.6145	0.6038	0.5848	0.5750	0.5779	0.5689	0.5765	0.5582

E/A	SM 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	8.987	8.586	8.632	8.700	8.635	8.158	7.916	7.487	7.334	7.149	7.018	6.908	6.664	6.584	6.519	6.538	6.279	6.209
3.0	8.883	8.494	8.537	8.604	8.555	8.105	7.873	7.474	7.334	7.158	7.033	6.930	6.699	6.618	6.552	6.570	6.306	6.236
3.5	8.696	8.322	8.362	8.428	8.392	7.966	7.746	7.375	7.247	7.081	6.961	6.864	6.647	6.567	6.500	6.518	6.253	6.184
4.0	8.472	8.112	8.150	8.213	8.189	7.786	7.576	7.230	7.113	6.956	6.842	6.750	6.547	6.468	6.401	6.418	6.155	6.087
4.5	8.232	7.886	7.922	7.984	7.968	7.586	7.386	7.063	6.955	6.806	6.698	6.611	6.419	6.344	6.276	6.293	6.034	5.967
5.0	7.988	7.656	7.691	7.750	7.742	7.380	7.189	6.886	6.786	6.645	6.541	6.460	6.278	6.205	6.139	6.155	5.900	5.835
5.5	7.749	7.430	7.463	7.520	7.518	7.174	6.991	6.706	6.613	6.480	6.380	6.303	6.132	6.061	5.995	6.011	5.761	5.698
6.0	7.517	7.210	7.241	7.297	7.299	6.972	6.797	6.528	6.442	6.315	6.220	6.146	5.983	5.916	5.850	5.866	5.621	5.560
6.5	7.295	6.999	7.029	7.083	7.089	6.776	6.609	6.355	6.274	6.152	6.061	5.991	5.837	5.772	5.707	5.722	5.483	5.424
7.0	7.083	6.797	6.826	6.878	6.888	6.588	6.428	6.187	6.111	5.995	5.907	5.841	5.693	5.631	5.567	5.582	5.348	5.291
8.0	6.689	6.422	6.449	6.498	6.514	6.237	6.089	5.871	5.803	5.697	5.616	5.555	5.420	5.363	5.300	5.314	5.092	5.037
9.0	6.334	6.083	6.109	6.156	6.175	5.919	5.781	5.582	5.521	5.423	5.347	5.291	5.167	5.114	5.054	5.066	4.854	4.803
10.0	6.015	5.779	5.803	5.847	5.869	5.630	5.502	5.318	5.263	5.172	5.101	5.049	4.935	4.886	4.827	4.839	4.636	4.588
11.0	5.727	5.504	5.526	5.569	5.593	5.369	5.248	5.078	5.028	4.943	4.877	4.828	4.721	4.676	4.619	4.630	4.436	4.390
12.0	5.467	5.255	5.276	5.317	5.343	5.132	5.018	4.860	4.814	4.734	4.671	4.626	4.526	4.484	4.428	4.439	4.253	4.209
15.0	4.818	4.633	4.653	4.689	4.717	4.537	4.440	4.309	4.272	4.205	4.151	4.113	4.029	3.995	3.943	3.953	3.788	3.750
20.0	4.042	3.889	3.906	3.936	3.965	3.820	3.741	3.640	3.612	3.559	3.515	3.485	3.419	3.393	3.347	3.356	3.217	3.185
25.0	3.499	3.369	3.383	3.409	3.438	3.315	3.249	3.166	3.144	3.100	3.063	3.038	2.983	2.963	2.921	2.929	2.808	2.781
30.0	3.098	2.984	2.996	3.020	3.047	2.941	2.883	2.813	2.795	2.767	2.726	2.703	2.656	2.640	2.602	2.609	2.502	2.478
35.0	2.790	2.687	2.698	2.720	2.746	2.651	2.600	2.539	2.524	2.491	2.462	2.444	2.402	2.389	2.354	2.360	2.264	2.242
40.0	2.544	2.451	2.461	2.481	2.506	2.421	2.375	2.321	2.308	2.278	2.252	2.235	2.198	2.187	2.155	2.160	2.073	2.053
45.0	2.344	2.258	2.268	2.286	2.310	2.232	2.191	2.142	2.131	2.104	2.080	2.065	2.031	2.022	1.992	1.997	1.916	1.898
50.0	2.178	2.098	2.108	2.124	2.147	2.076	2.037	1.993	1.983	1.958	1.936	1.923	1.892	1.884	1.855	1.860	1.785	1.769
55.0	2.037	1.963	1.972	1.988	2.010	1.943	1.908	1.867	1.858	1.835	1.815	1.802	1.774	1.766	1.739	1.744	1.674	1.659
60.0	1.917	1.847	1.855	1.870	1.891	1.829	1.796	1.759	1.750	1.729	1.710	1.698	1.672	1.665	1.640	1.644	1.578	1.564
65.0	1.812	1.747	1.754	1.768	1.789	1.730	1.699	1.664	1.657	1.637	1.619	1.608	1.583	1.578	1.553	1.557	1.495	1.482
70.0	1.721	1.658	1.666	1.679	1.699	1.644	1.614	1.582	1.574	1.556	1.539	1.529	1.506	1.500	1.477	1.481	1.422	1.409
80.0	1.568	1.511	1.518	1.530	1.549	1.499	1.472	1.443	1.437	1.421	1.405	1.396	1.375	1.371	1.349	1.353	1.299	1.288
90.0	1.445	1.393	1.399	1.410	1.428	1.382	1.358	1.332	1.326	1.311	1.297	1.289	1.270	1.266	1.247	1.250	1.200	1.190
100.0	1.344	1.295	1.301	1.312	1.328	1.286	1.264	1.240	1.235	1.221	1.208	1.201	1.183	1.180	1.162	1.165	1.118	1.109
150.0	1.023	0.986	0.990	0.998	1.012	0.981	0.964	0.948	0.944	0.935	0.925	0.919	0.907	0.904	0.890	0.893	0.857	0.850
200.0	0.852	0.822	0.822	0.829	0.841	0.815	0.802	0.789	0.787	0.779	0.771	0.766	0.756	0.754	0.743	0.745	0.735	0.712
250.0	0.750	0.724	0.716	0.722	0.733	0.712	0.705	0.693	0.693	0.685	0.675	0.674	0.667	0.662	0.651	0.654	0.649	0.629
300.0	0.680	0.656	0.649	0.651	0.661	0.646	0.640	0.629	0.629	0.622	0.613	0.612	0.606	0.601	0.592	0.594	0.590	0.571
350.0	0.628	0.607	0.601	0.603	0.612	0.598	0.592	0.582	0.583	0.576	0.568	0.567	0.561	0.557	0.548	0.550	0.546	0.529
400.0	0.5897	0.5696	0.5638	0.5657	0.5743	0.5614	0.5558	0.5466	0.5471	0.5411	0.5334	0.5325	0.5270	0.5234	0.5153	0.5189	0.5130	0.4976
450.0	0.5592	0.5402	0.5349	0.5367	0.5448	0.5327	0.5273	0.5187	0.5192	0.5136	0.5064	0.5054	0.5004	0.4970	0.4893	0.4909	0.4869	0.4726
500.0	0.5348	0.5167	0.5117	0.5134	0.5212	0.5096	0.5046	0.4963	0.4968	0.4915	0.4847	0.4837	0.4790	0.4758	0.4686	0.4699	0.4660	0.4525

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

40
18 AR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.780	4.580	6.449	6.420	6.290	7.470	8.100	8.551	8.890	9.230	9.420	10.030	10.360	10.856	11.060	11.260	11.607	11.910
3.0	5.685	5.470	7.581	7.599	7.448	8.719	9.536	10.046	10.423	10.793	11.083	11.789	12.204	12.745	12.966	13.233	13.789	14.011
3.5	6.657	6.421	8.768	8.835	8.658	10.018	11.026	11.593	12.007	12.404	12.795	13.597	14.095	14.679	14.916	15.248	15.995	16.152
4.0	7.697	7.433	10.014	10.130	9.927	11.374	12.576	13.201	13.649	14.070	14.566	15.463	16.043	16.671	16.923	17.319	18.244	18.349
4.5	8.805	8.506	11.320	11.487	11.254	12.790	14.191	14.873	15.355	15.797	16.400	17.394	18.058	18.727	18.994	19.455	20.548	20.610
5.0	9.981	9.642	12.688	12.908	12.643	14.266	15.873	16.611	17.128	17.589	18.301	19.395	20.141	20.853	21.134	21.659	22.913	22.941
5.5	11.224	10.840	14.119	14.393	14.094	15.805	17.624	18.419	18.969	19.447	20.273	21.468	22.298	23.052	23.346	23.936	25.345	25.346
6.0	12.534	12.098	15.613	15.943	15.608	17.407	19.444	20.296	20.880	21.374	22.316	23.614	24.529	25.325	25.633	26.287	27.847	27.828
6.5	13.910	13.418	17.170	17.558	17.184	19.072	21.333	22.244	22.861	23.369	24.431	25.835	26.836	27.674	27.995	28.715	30.420	30.387
7.0	15.353	14.799	18.790	19.238	18.822	20.801	23.293	24.262	24.913	25.433	26.619	28.130	29.220	30.099	30.433	31.219	33.067	33.025
8.0	18.43	17.74	22.22	22.79	22.29	24.46	27.42	28.51	29.23	29.77	31.21	32.95	34.22	35.18	35.54	36.46	38.58	38.54
9.0	21.77	20.92	25.90	26.61	26.00	28.35	31.84	33.04	33.83	34.39	36.10	38.07	39.53	40.58	40.96	42.02	44.41	44.38
10.0	25.37	24.33	29.83	30.68	29.97	32.50	36.53	37.86	38.71	39.28	41.29	43.50	45.15	46.28	46.68	47.88	50.53	50.54
11.0	29.22	27.97	34.01	35.00	34.17	36.91	41.50	42.96	43.88	44.46	46.76	49.23	51.08	52.30	52.72	54.06	56.96	57.02
12.0	33.31	31.85	38.43	39.58	38.63	41.66	46.74	48.33	49.32	49.91	52.53	55.26	57.31	58.62	59.06	60.56	63.70	63.83
15.0	47.07	44.81	53.15	54.81	53.43	56.99	64.11	66.11	67.31	67.89	71.55	75.14	77.85	79.42	79.92	81.87	85.74	86.15
20.0	74.75	70.75	82.40	85.05	82.80	87.50	98.37	101.12	102.70	103.19	108.87	114.09	118.06	120.06	120.64	123.43	128.44	129.56
25.0	108.14	101.90	117.35	121.15	117.84	123.80	139.04	142.63	144.60	144.94	152.98	160.07	165.48	167.92	168.56	172.25	178.38	180.48
30.0	147.01	138.06	157.78	162.92	158.34	165.67	185.91	190.41	192.79	192.91	203.62	212.85	219.86	222.75	223.41	228.09	235.32	238.62
35.0	191.18	179.03	203.53	210.14	204.13	212.92	238.75	244.24	247.05	246.87	260.59	272.18	280.98	284.29	284.97	290.68	299.03	303.75
40.0	240.5	224.7	254.4	262.7	255.0	265.4	297.4	303.9	307.2	306.6	323.7	337.9	348.6	352.3	353.0	359.8	369.3	375.6
45.0	294.7	274.8	310.3	320.3	310.9	322.9	361.6	369.3	373.0	372.1	392.7	409.7	422.6	426.7	427.3	435.3	445.9	454.0
50.0	353.8	329.4	371.0	383.0	371.6	385.4	431.3	440.2	444.4	442.9	467.5	487.5	502.6	507.2	507.8	517.0	528.7	538.7
55.0	417.7	388.2	436.4	450.5	437.0	452.7	506.3	516.5	521.2	519.2	547.9	571.1	588.7	593.7	594.2	604.6	617.5	629.6
60.0	486.1	451.3	506.5	522.7	507.0	524.6	586.5	598.0	603.2	600.6	633.8	660.4	680.6	685.9	686.3	698.1	712.2	726.5
65.0	559.0	518.4	581.0	599.6	581.5	601.1	671.8	684.6	690.4	687.0	724.9	755.2	778.2	783.9	784.2	797.2	812.7	829.3
70.0	636.3	589.5	660.0	681.0	660.3	682.0	761.9	776.3	782.5	778.4	821.3	855.4	881.3	887.3	887.5	901.9	918.7	937.7
80.0	803.6	743.2	830.6	857.0	830.8	856.8	956.6	974.0	981.4	975.6	1029.3	1071.5	1103.6	1110.4	1110.2	1127.5	1146.9	1171.1
90.0	987.5	911.9	1017.7	1049.8	1017.6	1048.4	1169.8	1190.5	1198.9	1191.3	1256.6	1307.8	1346.7	1354.0	1353.4	1373.8	1396.1	1426.8
100.0	1187.1	1094.9	1220.5	1258.9	1220.1	1255.9	1400.7	1424.9	1434.5	1424.7	1502.6	1563.4	1609.6	1617.6	1616.5	1640.0	1665.4	1700.8
150.0	2405.	2209.	2453.	2529.	2450.	2515.	2800.	2844.	2860.	2836.	2990.	3108.	3198.	3208.	3204.	3245.	3289.	3356.
200.0	3950.	3614.	4004.	4128.	4003.	4099.	4560.	4631.	4648.	4604.	4854.	5003.	5158.	5202.	5192.	5254.	5288.	5423.
250.0	5771.	5257.	5816.	5998.	5831.	5948.	6617.	6736.	6734.	6664.	7026.	7208.	7438.	7529.	7509.	7609.	7611.	7829.
300.0	7820.	7105.	7851.	8099.	7883.	8024.	8922.	9123.	9071.	8972.	9460.	9680.	9993.	10134.	10102.	10246.	10210.	10518.
350.0	10068.	9131.	10080.	10399.	10130.	10295.	11446.	11743.	11626.	11496.	12119.	12383.	12787.	12979.	12935.	13124.	13051.	13464.
400.0	12490.	11313.	12478.	12874.	12547.	12738.	14159.	14557.	14375.	14206.	14977.	15287.	15786.	16035.	15976.	16214.	16098.	16605.
450.0	15065.	13633.	15025.	15504.	15114.	15332.	17040.	17541.	17288.	17082.	18007.	18369.	18970.	19275.	19200.	19490.	19331.	19944.
500.0	17777.	16075.	17704.	18269.	17812.	18059.	20087.	20675.	20352.	20105.	21191.	21609.	22316.	22678.	22586.	22930.	22725.	23450.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.51	12.98	14.02	14.29	14.82	15.58	16.04	16.63	16.98	17.33	17.69	18.08	18.46	18.81	19.26	19.42	20.82	21.27
3.0	14.75	15.32	16.35	16.60	17.15	18.04	18.57	19.30	19.71	20.12	20.53	20.96	21.45	21.84	22.32	22.47	24.00	24.48
3.5	17.02	17.70	18.72	18.95	19.51	20.53	21.13	21.99	22.45	22.93	23.39	23.86	24.44	24.87	25.38	25.52	27.18	27.70
4.0	19.35	20.13	21.14	21.35	21.92	23.07	23.74	24.73	25.23	25.78	26.29	26.80	27.47	27.93	28.48	28.61	30.40	30.96
4.5	21.74	22.63	23.63	23.82	24.40	25.67	26.41	27.53	28.08	28.68	29.24	29.79	30.56	31.06	31.63	31.76	33.68	34.27
5.0	24.21	25.21	26.19	26.36	26.94	28.34	29.16	30.40	30.99	31.66	32.26	32.85	33.71	34.24	34.85	34.97	37.04	37.66
5.5	26.75	27.86	28.83	28.98	29.56	31.09	31.98	33.34	33.97	34.70	35.36	35.98	36.93	37.50	38.15	38.26	40.47	41.13
6.0	29.37	30.59	31.55	31.68	32.26	33.92	34.88	36.36	37.04	37.83	38.53	39.20	40.23	40.84	41.53	41.63	43.98	44.68
6.5	32.07	33.41	34.35	34.47	35.04	36.83	37.86	39.47	40.18	41.04	41.79	42.49	43.62	44.27	44.99	45.08	47.58	48.33
7.0	34.86	36.31	37.24	37.33	37.91	39.82	40.93	42.66	43.41	44.33	45.13	45.87	47.09	47.77	48.54	48.62	51.28	52.06
8.0	40.67	42.36	43.27	43.32	43.88	46.06	47.33	49.29	50.13	51.18	52.08	52.90	54.29	55.05	55.90	55.97	58.94	59.81
9.0	46.82	48.77	49.65	49.64	50.19	52.65	54.07	56.28	57.20	58.38	59.38	60.28	61.85	62.69	63.63	63.68	66.99	67.94
10.0	53.30	55.51	56.37	56.31	56.84	59.58	61.17	63.63	64.62	65.93	67.04	68.02	69.77	70.70	71.73	71.76	75.42	76.47
11.0	60.12	62.61	63.43	63.32	63.82	66.86	68.61	71.33	72.40	73.85	75.06	76.12	78.06	79.07	80.21	80.21	84.25	85.38
12.0	67.27	70.05	70.84	70.68	71.14	74.48	76.41	79.38	80.53	82.12	83.44	84.59	86.72	87.81	89.05	89.03	93.46	94.69
15.0	90.70	94.42	95.12	94.76	95.10	99.40	101.89	105.66	107.04	109.07	110.75	112.15	114.87	116.21	117.83	117.73	123.41	124.95
20.0	136.22	141.74	142.24	141.52	141.54	147.65	151.17	156.37	158.16	160.97	163.31	165.18	168.96	170.74	173.09	172.86	180.92	183.05
25.0	189.57	197.17	197.43	196.29	195.88	204.02	208.70	215.46	217.67	221.36	224.43	226.81	231.76	233.99	237.22	236.82	247.65	250.44
30.0	250.44	260.39	260.39	258.76	257.81	268.21	274.19	282.62	285.27	289.91	293.81	296.74	302.96	305.63	309.90	309.32	323.26	326.78
35.0	318.58	331.15	330.85	328.66	327.07	339.96	347.35	357.58	360.69	366.36	371.15	374.68	382.27	385.39	390.84	390.04	407.43	411.75
40.0	393.8	409.2	408.6	405.8	403.4	419.0	427.9	440.1	443.7	450.4	456.2	460.4	469.4	473.0	479.7	478.7	499.9	505.1
45.0	475.7	494.3	493.3	489.8	486.6	505.1	515.7	529.9	533.9	541.9	548.7	553.5	564.1	568.2	576.4	575.1	600.3	606.5
50.0	564.3	586.2	584.8	580.7	576.5	598.1	610.4	626.7	631.3	640.5	648.4	654.0	666.2	670.7	680.5	679.0	708.6	715.7
55.0	659.3	684.9	683.0	678.1	672.8	697.8	712.0	730.5	735.6	746.1	755.2	761.5	775.5	780.5	791.9	790.1	824.4	832.5
60.0	760.6	789.9	787.6	781.9	775.5	803.9	820.1	840.9	846.6	858.4	868.8	875.9	891.7	897.1	910.4	908.2	947.5	956.8
65.0	868.0	901.3	898.6	891.9	884.3	916.4	934.6	957.9	964.1	977.4	989.1	997.0	1014.7	1020.6	1035.8	1033.3	1077.8	1088.2
70.0	981.3	1018.9	1015.6	1008.0	999.0	1035.1	1055.4	1081.2	1088.0	1102.8	1115.8	1124.6	1144.3	1150.6	1167.9	1165.0	1215.0	1226.7
80.0	1225.2	1271.9	1267.5	1257.9	1246.0	1290.3	1315.2	1346.3	1354.3	1372.2	1388.2	1398.8	1422.7	1429.9	1451.6	1447.9	1509.7	1524.0
90.0	1491.2	1548.0	1542.3	1530.5	1515.3	1568.6	1598.4	1635.1	1644.4	1665.6	1684.7	1697.3	1725.7	1733.9	1760.3	1755.8	1830.4	1847.5
100.0	1778.6	1846.1	1839.1	1824.9	1806.0	1868.9	1904.0	1946.6	1957.2	1981.9	2004.5	2019.1	2052.2	2061.4	2093.0	2087.6	2176.0	2196.0
150.0	3507.	3639.	3624.	3596.	3563.	3673.	3739.	3815.	3833.	3878.	3921.	3947.	4008.	4022.	4085.	4074.	4244.	4282.
200.0	5667.	5878.	5855.	5808.	5735.	5925.	6028.	6142.	6168.	6237.	6304.	6345.	6438.	6459.	6560.	6541.	6756.	6872.
250.0	8179.	8479.	8471.	8403.	8291.	8562.	8699.	8860.	8887.	8986.	9089.	9140.	9266.	9304.	9449.	9421.	9662.	9873.
300.0	10988.	11388.	11412.	11330.	11175.	11517.	11684.	11898.	11923.	12055.	12204.	12261.	12420.	12482.	12677.	12638.	12902.	13219.
350.0	14054.	14561.	14619.	14527.	14325.	14740.	14939.	15209.	15231.	15401.	15598.	15661.	15857.	15943.	16193.	16143.	16435.	16861.
400.0	17343.	17966.	18060.	17956.	17703.	18196.	18430.	18759.	18778.	18987.	19236.	19305.	19539.	19651.	19960.	19897.	20215.	20762.
450.0	20829.	21575.	21710.	21589.	21281.	21857.	22127.	22519.	22534.	22784.	23088.	23164.	23438.	23576.	23947.	23871.	24220.	24890.
500.0	24488.	25363.	25531.	25406.	25041.	25698.	26008.	26463.	26474.	26767.	27127.	27211.	27526.	27692.	28127.	28038.	28422.	29218.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{39}_{19}$K IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	24.93	25.16	19.47	18.67	19.00	17.54	15.22	14.59	14.21	13.91	13.06	12.33	11.75	11.46	11.35	10.95	9.84	10.26
3.0	23.22	23.60	18.65	17.91	18.26	16.95	14.76	14.19	13.85	13.60	12.78	12.09	11.55	11.28	11.18	10.81	9.82	10.16
3.5	21.70	22.18	17.82	17.13	17.48	16.30	14.23	13.71	13.41	13.20	12.42	11.77	11.26	11.00	10.92	10.57	9.69	9.95
4.0	20.36	20.90	17.02	16.37	16.72	15.65	13.70	13.22	12.94	12.77	12.02	11.40	10.93	10.69	10.61	10.29	9.50	9.70
4.5	19.18	19.76	16.27	15.66	16.01	15.02	13.17	12.73	12.48	12.33	11.62	11.03	10.58	10.37	10.30	9.99	9.28	9.44
5.0	18.13	18.74	15.67	14.99	15.34	14.43	12.67	12.26	12.03	11.91	11.22	10.67	10.25	10.04	9.98	9.69	9.05	9.17
5.5	17.19	17.82	14.92	14.37	14.71	13.87	12.20	11.82	11.60	11.50	10.84	10.31	9.92	9.73	9.67	9.40	8.81	8.90
6.0	16.35	16.99	14.32	13.80	14.13	13.35	11.76	11.40	11.20	11.12	10.48	9.98	9.60	9.42	9.37	9.11	8.58	8.64
6.5	15.59	16.24	13.76	13.27	13.60	12.87	11.34	11.01	10.82	10.75	10.14	9.66	9.30	9.13	9.08	8.84	8.35	8.39
7.0	14.91	15.56	13.25	12.78	13.10	12.42	10.95	10.64	10.47	10.40	9.82	9.36	9.01	8.86	8.81	8.58	8.13	8.15
8.0	13.71	14.36	12.33	11.90	12.21	11.60	10.25	9.97	9.82	9.77	9.23	8.80	8.49	8.35	8.31	8.10	7.71	7.70
9.0	12.71	13.35	11.54	11.14	11.43	10.89	9.63	9.38	9.24	9.22	8.70	8.31	8.02	7.89	7.86	7.67	7.33	7.30
10.0	11.85	12.48	10.84	10.47	10.75	10.26	9.09	8.86	8.74	8.72	8.23	7.87	7.60	7.49	7.46	7.28	6.98	6.94
11.0	11.11	11.73	10.23	9.88	10.16	9.71	8.61	8.39	8.28	8.27	7.82	7.47	7.22	7.12	7.09	6.93	6.67	6.61
12.0	10.47	11.07	9.69	9.36	9.63	9.21	8.18	7.98	7.88	7.87	7.44	7.12	6.88	6.79	6.77	6.61	6.38	6.31
15.0	8.941	9.498	8.384	8.105	8.341	8.009	7.122	6.962	6.882	6.890	6.516	6.238	6.039	5.966	5.952	5.827	5.651	5.570
20.0	7.248	7.742	6.885	6.662	6.862	6.613	5.896	5.773	5.715	5.732	5.424	5.199	5.040	4.989	4.981	4.885	4.766	4.680
25.0	6.134	6.578	5.875	5.687	5.862	5.664	5.057	4.957	4.913	4.933	4.671	4.481	4.347	4.309	4.305	4.227	4.140	4.056
30.0	5.343	5.747	5.145	4.983	5.138	4.974	4.446	4.363	4.326	4.348	4.118	3.953	3.837	3.808	3.806	3.741	3.673	3.594
35.0	4.751	5.122	4.594	4.450	4.590	4.449	3.981	3.909	3.878	3.901	3.695	3.549	3.446	3.423	3.423	3.367	3.311	3.238
40.0	4.290	4.633	4.161	4.031	4.159	4.037	3.614	3.551	3.525	3.547	3.361	3.229	3.136	3.117	3.118	3.069	3.022	2.954
45.0	3.920	4.241	3.812	3.694	3.812	3.703	3.317	3.260	3.238	3.260	3.089	2.969	2.884	2.869	2.870	2.827	2.786	2.723
50.0	3.617	3.918	3.524	3.416	3.525	3.427	3.072	3.020	3.000	3.022	2.864	2.753	2.675	2.662	2.664	2.625	2.589	2.530
55.0	3.363	3.647	3.282	3.182	3.285	3.196	2.865	2.818	2.800	2.821	2.674	2.572	2.499	2.488	2.490	2.455	2.423	2.368
60.0	3.148	3.417	3.077	2.983	3.079	2.997	2.689	2.645	2.629	2.650	2.512	2.416	2.348	2.338	2.341	2.309	2.280	2.228
65.0	2.963	3.218	2.899	2.811	2.902	2.826	2.537	2.496	2.482	2.501	2.372	2.281	2.217	2.209	2.212	2.182	2.155	2.107
70.0	2.801	3.045	2.745	2.662	2.748	2.677	2.403	2.366	2.352	2.372	2.249	2.164	2.103	2.096	2.099	2.071	2.046	2.001
80.0	2.534	2.758	2.488	2.413	2.491	2.429	2.182	2.148	2.137	2.155	2.044	1.967	1.912	1.907	1.910	1.886	1.864	1.823
90.0	2.321	2.529	2.283	2.215	2.286	2.231	2.006	1.974	1.965	1.982	1.880	1.810	1.759	1.755	1.758	1.737	1.717	1.680
100.0	2.147	2.342	2.115	2.052	2.119	2.068	1.859	1.832	1.823	1.840	1.746	1.681	1.634	1.630	1.633	1.614	1.596	1.563
150.0	1.603	1.754	1.589	1.543	1.592	1.557	1.402	1.382	1.377	1.392	1.321	1.272	1.237	1.236	1.238	1.226	1.212	1.190
200.0	1.315	1.456	1.319	1.278	1.311	1.292	1.162	1.141	1.145	1.159	1.099	1.082	1.047	1.025	1.030	1.016	1.027	0.991
250.0	1.148	1.273	1.155	1.119	1.145	1.132	1.019	0.990	1.005	1.017	0.965	0.950	0.919	0.901	0.905	0.890	0.903	0.872
300.0	1.035	1.148	1.043	1.011	1.035	1.023	0.921	0.887	0.909	0.921	0.873	0.860	0.832	0.816	0.820	0.806	0.818	0.791
350.0	0.953	1.067	0.962	0.932	0.954	0.944	0.850	0.819	0.839	0.850	0.807	0.794	0.768	0.754	0.758	0.746	0.756	0.731
400.0	0.8907	0.9885	0.9001	0.8720	0.8932	0.8838	0.7958	0.7677	0.7862	0.7967	0.7560	0.7435	0.7197	0.7070	0.7104	0.6992	0.7087	0.6859
450.0	0.8420	0.9348	0.8519	0.8252	0.8455	0.8367	0.7536	0.7277	0.7448	0.7548	0.7164	0.7043	0.6819	0.6702	0.6735	0.6630	0.6718	0.6504
500.0	0.8031	0.8918	0.8132	0.7877	0.8074	0.7990	0.7197	0.6956	0.7115	0.7213	0.6847	0.6728	0.6515	0.6407	0.6439	0.6339	0.6423	0.6219

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	9.631	9.200	9.246	9.319	9.248	8.736	8.476	8.015	7.851	7.652	7.511	7.393	7.131	7.045	6.975	6.994	6.716	6.641
3.0	9.551	9.133	9.176	9.248	9.194	8.709	8.459	8.029	7.878	7.689	7.554	7.442	7.194	7.107	7.035	7.054	6.769	6.693
3.5	9.377	8.972	9.014	9.084	9.045	8.584	8.346	7.945	7.806	7.627	7.498	7.392	7.158	7.072	6.999	7.018	6.731	6.656
4.0	9.156	8.766	8.805	8.874	8.846	8.410	8.182	7.808	7.681	7.510	7.387	7.287	7.067	6.982	6.909	6.927	6.642	6.568
4.5	8.914	8.539	8.577	8.643	8.625	8.211	7.994	7.643	7.525	7.364	7.246	7.152	6.944	6.862	6.788	6.806	6.524	6.452
5.0	8.666	8.305	8.341	8.405	8.395	8.002	7.794	7.465	7.356	7.203	7.090	7.000	6.804	6.724	6.651	6.669	6.391	6.321
5.5	8.420	8.072	8.108	8.168	8.165	7.790	7.592	7.281	7.180	7.034	6.926	6.842	6.655	6.578	6.506	6.523	6.251	6.183
6.0	8.179	7.844	7.877	7.937	7.939	7.581	7.391	7.098	7.004	6.865	6.761	6.681	6.504	6.430	6.358	6.375	6.108	6.041
6.5	7.947	7.623	7.655	7.714	7.720	7.378	7.196	6.918	6.830	6.697	6.597	6.521	6.352	6.281	6.210	6.226	5.966	5.901
7.0	7.724	7.412	7.442	7.499	7.509	7.182	7.007	6.743	6.660	6.533	6.437	6.364	6.204	6.135	6.065	6.081	5.826	5.763
8.0	7.309	7.016	7.045	7.099	7.115	6.813	6.651	6.411	6.337	6.221	6.132	6.065	5.918	5.855	5.786	5.801	5.557	5.498
9.0	6.933	6.658	6.685	6.736	6.757	6.476	6.325	6.106	6.039	5.931	5.849	5.787	5.651	5.593	5.526	5.540	5.308	5.251
10.0	6.593	6.333	6.359	6.408	6.431	6.169	6.028	5.826	5.766	5.666	5.588	5.531	5.405	5.361	5.286	5.299	5.077	5.023
11.0	6.285	6.040	6.064	6.110	6.136	5.890	5.757	5.571	5.516	5.422	5.349	5.296	5.178	5.128	5.065	5.078	4.864	4.813
12.0	6.006	5.773	5.796	5.840	5.868	5.636	5.511	5.337	5.286	5.198	5.129	5.079	4.969	4.923	4.861	4.873	4.669	4.620
15.0	5.307	5.103	5.124	5.164	5.194	4.996	4.889	4.744	4.704	4.630	4.570	4.528	4.436	4.398	4.341	4.352	4.170	4.127
20.0	4.465	4.297	4.314	4.348	4.379	4.219	4.132	4.020	3.990	3.930	3.882	3.849	3.775	3.747	3.696	3.705	3.551	3.518
25.0	3.873	3.728	3.744	3.773	3.804	3.669	3.595	3.503	3.480	3.430	3.389	3.362	3.301	3.279	3.232	3.241	3.107	3.077
30.0	3.434	3.307	3.321	3.347	3.377	3.259	3.195	3.117	3.097	3.055	3.019	2.996	2.943	2.925	2.883	2.891	2.772	2.746
35.0	3.095	2.981	2.993	3.017	3.046	2.941	2.885	2.817	2.800	2.763	2.731	2.710	2.664	2.650	2.611	2.618	2.511	2.487
40.0	2.825	2.721	2.733	2.754	2.782	2.687	2.637	2.576	2.562	2.529	2.500	2.482	2.440	2.428	2.392	2.398	2.301	2.279
45.0	2.604	2.509	2.520	2.540	2.566	2.480	2.434	2.379	2.367	2.337	2.310	2.294	2.256	2.246	2.212	2.218	2.128	2.108
50.0	2.421	2.332	2.342	2.361	2.386	2.307	2.264	2.215	2.204	2.176	2.152	2.137	2.102	2.093	2.062	2.067	1.984	1.966
55.0	2.265	2.183	2.192	2.210	2.234	2.160	2.121	2.076	2.065	2.040	2.017	2.003	1.972	1.964	1.934	1.939	1.861	1.844
60.0	2.132	2.054	2.063	2.080	2.103	2.034	1.997	1.956	1.946	1.923	1.902	1.889	1.859	1.852	1.824	1.829	1.755	1.739
65.0	2.016	1.943	1.952	1.967	1.990	1.925	1.890	1.851	1.843	1.821	1.801	1.789	1.761	1.755	1.728	1.732	1.663	1.648
70.0	1.915	1.845	1.853	1.868	1.890	1.829	1.796	1.760	1.752	1.731	1.712	1.701	1.675	1.669	1.643	1.648	1.582	1.568
80.0	1.745	1.682	1.689	1.703	1.724	1.668	1.639	1.606	1.599	1.581	1.564	1.554	1.531	1.526	1.502	1.506	1.446	1.433
90.0	1.608	1.550	1.557	1.570	1.590	1.538	1.512	1.483	1.476	1.460	1.444	1.435	1.414	1.410	1.388	1.392	1.336	1.325
100.0	1.496	1.442	1.449	1.460	1.479	1.432	1.407	1.381	1.375	1.360	1.346	1.337	1.318	1.314	1.293	1.297	1.245	1.235
150.0	1.139	1.098	1.103	1.112	1.128	1.092	1.074	1.056	1.052	1.041	1.030	1.024	1.010	1.007	0.992	0.995	0.955	0.947
200.0	0.949	0.916	0.916	0.924	0.937	0.908	0.894	0.879	0.876	0.868	0.859	0.854	0.843	0.840	0.828	0.830	0.819	0.793
250.0	0.835	0.807	0.796	0.804	0.817	0.793	0.786	0.772	0.772	0.764	0.752	0.751	0.743	0.737	0.726	0.728	0.723	0.700
300.0	0.757	0.731	0.723	0.726	0.737	0.720	0.713	0.701	0.701	0.693	0.683	0.682	0.675	0.670	0.659	0.662	0.657	0.636
350.0	0.700	0.676	0.669	0.672	0.682	0.666	0.660	0.649	0.649	0.642	0.633	0.632	0.625	0.621	0.611	0.613	0.608	0.590
400.0	0.6570	0.6347	0.6282	0.6303	0.6399	0.6255	0.6192	0.6090	0.6095	0.6029	0.5944	0.5933	0.5872	0.5832	0.5741	0.5760	0.5715	0.5544
450.0	0.6231	0.6019	0.5960	0.5980	0.6071	0.5935	0.5875	0.5779	0.5785	0.5722	0.5642	0.5632	0.5575	0.5537	0.5452	0.5469	0.5425	0.5265
500.0	0.5959	0.5757	0.5701	0.5720	0.5807	0.5678	0.5621	0.5530	0.5536	0.5476	0.5400	0.5390	0.5337	0.5301	0.5220	0.5236	0.5192	0.5042

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{39}_{19}$K IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.410	4.220	5.948	5.930	5.820	6.904	7.480	7.897	8.210	8.520	8.700	9.260	9.570	10.025	10.210	10.395	10.720	11.000
3.0	5.221	5.020	6.971	6.996	6.866	8.035	8.780	9.251	9.699	9.937	10.208	10.855	11.243	11.739	11.940	12.186	12.700	12.908
3.5	6.090	5.873	8.041	8.109	7.958	9.208	10.125	10.649	11.030	11.392	11.755	12.489	12.952	13.489	13.704	14.009	14.697	14.846
4.0	7.018	6.779	9.160	9.273	9.098	10.429	11.522	12.098	12.510	12.894	13.351	14.172	14.710	15.286	15.515	15.879	16.728	16.830
4.5	8.005	7.739	10.332	10.491	10.290	11.701	12.974	13.601	14.045	14.448	15.001	15.911	16.523	17.138	17.381	17.802	18.803	18.867
5.0	9.051	8.752	11.558	11.764	11.535	13.026	14.483	15.162	15.636	16.057	16.709	17.708	18.396	19.049	19.305	19.784	20.931	20.964
5.5	10.156	9.820	12.838	13.093	12.834	14.404	16.052	16.782	17.287	17.724	18.477	19.567	20.330	21.022	21.290	21.828	23.114	23.123
6.0	11.320	10.941	14.172	14.478	14.186	15.837	17.680	18.462	18.997	19.448	20.307	21.490	22.329	23.059	23.339	23.936	25.356	25.348
6.5	12.541	12.115	15.562	15.920	15.593	17.325	19.369	20.203	20.769	21.232	22.198	23.476	24.393	25.161	25.463	26.109	27.660	27.639
7.0	13.821	13.342	17.006	17.418	17.054	18.868	21.119	22.005	22.601	23.076	24.163	25.528	26.523	27.329	27.633	28.348	30.027	29.999
8.0	16.55	15.95	20.06	20.58	20.14	22.12	24.80	25.79	26.45	26.95	28.25	29.83	30.98	31.87	32.19	33.03	34.95	34.92
9.0	19.51	18.77	23.33	23.97	23.44	25.59	28.73	29.83	30.55	31.06	32.61	34.39	35.71	36.67	37.02	37.98	40.14	40.13
10.0	22.69	21.80	26.82	27.59	26.96	29.28	32.90	34.11	34.89	35.41	37.22	39.22	40.71	41.75	42.12	43.20	45.59	45.61
11.0	26.09	25.02	30.52	31.42	30.70	33.19	37.31	38.63	39.47	40.00	42.08	44.31	45.98	47.09	47.48	48.69	51.31	51.38
12.0	29.71	28.45	34.44	35.48	34.64	37.32	41.96	43.40	44.30	44.84	47.19	49.66	51.51	52.70	53.11	54.45	57.29	57.42
15.0	41.84	39.90	47.46	48.95	47.74	50.98	57.33	59.14	60.23	60.76	64.04	67.26	69.71	71.13	71.59	73.34	76.82	77.19
20.0	66.22	62.78	73.27	75.63	73.65	77.91	87.58	90.05	91.48	91.94	97.00	101.66	105.22	107.03	107.56	110.06	114.55	115.55
25.0	95.58	90.21	104.04	107.43	104.51	109.88	123.42	126.63	128.40	128.73	135.86	142.75	147.01	149.22	149.80	153.10	158.58	160.44
30.0	129.73	122.01	139.60	144.15	140.13	146.71	164.64	168.66	170.80	170.93	180.43	188.63	194.87	197.47	198.08	202.24	208.69	211.63
35.0	168.51	158.02	179.78	185.64	180.36	188.24	211.08	215.97	218.49	218.36	230.50	240.78	248.59	251.58	252.20	257.27	264.70	268.88
40.0	211.8	198.1	224.5	231.8	225.1	234.3	262.6	268.4	271.3	270.9	285.9	298.5	308.0	311.4	312.0	318.0	326.4	332.0
45.0	259.4	242.2	273.5	282.3	274.1	284.8	318.9	325.8	329.1	328.3	346.5	361.5	372.9	376.6	377.2	384.3	393.7	400.8
50.0	311.2	290.0	326.7	337.3	327.3	339.6	380.1	388.0	391.7	390.5	412.1	429.8	443.2	447.3	447.8	455.9	466.3	475.2
55.0	367.2	341.7	384.1	396.5	384.7	398.6	445.9	454.9	459.0	457.3	482.6	503.1	518.7	523.1	523.6	532.8	544.3	554.9
60.0	427.1	396.9	445.5	459.8	446.0	461.6	516.2	526.3	530.9	528.7	557.9	581.4	599.2	604.0	604.4	614.7	627.3	639.9
65.0	491.1	455.8	510.8	527.2	511.3	528.7	590.9	602.2	607.3	604.5	637.8	664.5	684.7	689.8	690.1	701.6	715.3	729.9
70.0	558.8	518.1	580.0	598.5	580.4	599.6	669.9	682.5	688.1	684.6	722.3	752.3	775.1	780.5	780.7	793.4	808.2	824.9
80.0	705.4	652.9	729.5	752.6	729.7	752.7	840.5	855.8	862.3	857.3	904.4	941.6	969.9	975.9	975.7	991.0	1008.2	1029.4
90.0	866.4	800.7	893.3	921.5	893.3	920.5	1027.2	1045.4	1052.8	1046.2	1103.6	1148.6	1182.8	1189.3	1188.8	1206.7	1226.5	1252.5
100.0	1041.3	961.1	1070.9	1104.6	1070.7	1102.2	1229.3	1250.7	1259.1	1250.6	1319.0	1372.4	1413.0	1420.1	1419.2	1439.9	1462.3	1493.4
150.0	2108.	1937.	2150.	2216.	2148.	2204.	2464.	2493.	2507.	2486.	2621.	2724.	2804.	2812.	2809.	2845.	2883.	2942.
200.0	3460.	3166.	3507.	3616.	3507.	3590.	3995.	4057.	4072.	4034.	4252.	4383.	4518.	4558.	4549.	4603.	4633.	4751.
250.0	5054.	4605.	5093.	5253.	5106.	5209.	5794.	5900.	5897.	5836.	6153.	6313.	6514.	6594.	6577.	6664.	6666.	6857.
300.0	6847.	6222.	6874.	7091.	6902.	7025.	7812.	7988.	7942.	7856.	8283.	8476.	8750.	8873.	8846.	8971.	8941.	9211.
350.0	8814.	7996.	8824.	9103.	8868.	9013.	10020.	10281.	10179.	10064.	10610.	10841.	11195.	11363.	11325.	11491.	11425.	11780.
400.0	10934.	9906.	10923.	11269.	10983.	11151.	12395.	12743.	12582.	12436.	13111.	13383.	13820.	14037.	13986.	14195.	14093.	14537.
450.0	13187.	11936.	13152.	13571.	13229.	13421.	14916.	15355.	15133.	14953.	15763.	16080.	16606.	16873.	16807.	17061.	16922.	17459.
500.0	15560.	14073.	15498.	15991.	15591.	15807.	17565.	18097.	17814.	17598.	18549.	18915.	19534.	19851.	19771.	20071.	19892.	20527.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.55	11.99	12.95	13.20	13.70	14.41	14.83	15.38	15.71	16.03	16.36	16.72	17.07	17.40	17.82	17.97	19.27	19.68
3.0	13.58	14.11	15.07	15.30	15.81	16.64	17.13	17.81	18.18	18.57	18.96	19.34	19.79	20.15	20.60	20.74	22.16	22.60
3.5	15.64	16.26	17.21	17.43	17.95	18.89	19.45	20.24	20.67	21.11	21.53	21.97	22.51	22.90	23.38	23.51	25.04	25.52
4.0	17.74	18.46	19.40	19.60	20.13	21.19	21.81	22.72	23.18	23.68	24.15	24.62	25.25	25.67	26.18	26.31	27.96	28.47
4.5	19.90	20.71	21.64	21.82	22.36	23.53	24.22	25.24	25.75	26.31	26.82	27.33	28.03	28.49	29.03	29.15	30.92	31.46
5.0	22.12	23.03	23.95	24.11	24.65	25.94	26.69	27.82	28.37	28.98	29.54	30.08	30.87	31.36	31.93	32.04	33.94	34.51
5.5	24.40	25.41	26.32	26.46	27.01	28.41	29.22	30.47	31.05	31.72	32.32	32.90	33.77	34.29	34.89	35.00	37.02	37.63
6.0	26.75	27.86	28.76	28.89	29.43	30.95	31.83	33.18	33.80	34.53	35.17	35.78	36.73	37.29	37.92	38.02	40.18	40.82
6.5	29.17	30.38	31.27	31.38	31.92	33.55	34.50	35.96	36.62	37.40	38.09	38.74	39.76	40.36	41.03	41.12	43.41	44.09
7.0	31.66	32.98	33.85	33.94	34.48	36.23	37.25	38.82	39.51	40.35	41.08	41.76	42.87	43.50	44.20	44.28	46.72	47.43
8.0	36.85	38.39	39.24	39.29	39.82	41.81	42.96	44.75	45.52	46.47	47.29	48.04	49.31	50.01	50.79	50.85	53.57	54.36
9.0	42.33	44.10	44.93	44.93	45.44	47.68	48.98	50.99	51.82	52.89	53.80	54.63	56.05	56.82	57.69	57.73	60.75	61.62
10.0	48.10	50.10	50.91	50.87	51.36	53.85	55.30	57.53	58.43	59.62	60.63	61.52	63.11	63.96	64.90	64.93	68.27	69.22
11.0	54.16	56.41	57.19	57.10	57.57	60.33	61.92	64.38	65.35	66.66	67.76	68.73	70.48	71.40	72.44	72.45	76.12	77.15
12.0	60.51	63.02	63.77	63.63	64.07	67.10	68.84	71.53	72.57	74.01	75.21	76.25	78.17	79.17	80.30	80.29	84.30	85.42
15.0	81.28	84.62	85.29	84.98	85.31	89.19	91.43	94.82	96.08	97.90	99.42	100.69	103.14	104.35	105.82	105.74	110.87	112.26
20.0	121.51	126.44	126.94	126.31	126.36	131.83	134.99	139.65	141.27	143.79	145.89	147.57	150.96	152.57	154.68	154.48	161.73	163.64
25.0	168.54	175.30	175.60	174.60	174.27	181.54	185.73	191.76	193.75	197.04	199.80	201.93	206.35	208.35	211.25	210.90	220.59	223.08
30.0	222.12	230.96	231.02	229.59	228.79	238.05	243.38	250.89	253.27	257.40	260.88	263.50	269.04	271.43	275.24	274.74	287.16	290.31
35.0	282.03	293.17	292.97	291.06	289.69	301.14	307.71	316.81	319.59	324.63	328.89	332.04	338.78	341.58	346.42	345.73	361.19	365.04
40.0	348.1	361.7	361.2	358.8	356.8	370.6	378.5	389.3	392.5	398.5	403.6	407.3	415.4	418.5	424.5	423.7	446.0	447.0
45.0	420.0	436.4	435.6	432.6	429.8	446.2	455.6	468.1	471.8	478.8	484.8	489.1	498.5	502.1	509.4	508.3	530.6	536.1
50.0	497.8	517.1	516.0	512.3	508.7	527.8	538.7	553.1	557.2	565.3	572.3	577.3	588.1	592.1	600.8	599.4	625.6	631.9
55.0	581.1	603.6	602.1	597.7	593.2	615.2	627.8	644.1	648.7	657.9	666.0	671.6	684.0	688.4	698.5	696.9	727.2	734.4
60.0	669.9	695.8	693.8	688.7	683.2	708.3	722.6	741.0	746.0	756.5	765.6	771.9	785.9	790.7	802.4	800.5	835.2	843.4
65.0	764.0	793.4	791.0	785.2	778.6	806.9	823.0	843.5	849.0	860.7	871.0	878.1	893.7	898.9	912.3	910.1	949.4	958.6
70.0	863.3	896.4	893.6	887.0	879.1	910.9	928.8	951.6	957.6	970.6	982.1	989.9	1007.3	1012.9	1028.1	1025.6	1069.7	1080.0
80.0	1077.0	1118.1	1114.3	1105.9	1095.5	1134.5	1156.5	1183.8	1190.9	1206.7	1220.8	1230.1	1251.2	1257.6	1276.7	1273.5	1327.9	1340.5
90.0	1310.0	1359.9	1355.0	1344.7	1331.4	1378.3	1404.5	1436.8	1445.0	1463.7	1480.5	1491.6	1516.6	1523.8	1547.1	1543.2	1608.8	1623.8
100.0	1561.7	1621.0	1614.9	1602.5	1585.9	1641.3	1672.1	1709.6	1719.0	1740.7	1760.6	1773.5	1802.6	1810.6	1838.5	1833.7	1911.4	1929.1
150.0	3075.	3191.	3178.	3153.	3116.	3221.	3279.	3346.	3361.	3401.	3438.	3462.	3515.	3527.	3582.	3572.	3722.	3755.
200.0	4965.	5150.	5130.	5089.	5025.	5192.	5282.	5382.	5405.	5465.	5524.	5560.	5641.	5660.	5748.	5732.	5921.	6022.
250.0	7164.	7427.	7420.	7360.	7262.	7500.	7620.	7761.	7785.	7871.	7961.	8006.	8116.	8150.	8276.	8252.	8463.	8648.
300.0	9622.	9972.	9993.	9922.	9786.	10086.	10232.	10419.	10441.	10557.	10687.	10737.	10877.	10930.	11102.	11068.	11299.	11576.
350.0	12304.	12749.	12800.	12719.	12542.	12906.	13080.	13316.	13336.	13485.	13658.	13713.	13884.	13959.	14179.	14135.	14388.	14764.
400.0	15183.	15729.	15811.	15720.	15498.	15930.	16135.	16423.	16440.	16623.	16841.	16902.	17107.	17204.	17475.	17420.	17699.	18178.
450.0	18233.	18887.	19001.	18899.	18630.	19134.	19371.	19713.	19727.	19945.	20211.	20278.	20518.	20639.	20964.	20897.	21203.	21790.
500.0	21436.	22202.	22348.	22236.	21916.	22495.	22766.	23165.	23175.	23431.	23746.	23820.	24095.	24241.	24622.	24544.	24880.	25577.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{40}_{20}$CA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	26.98	27.11	20.89	20.03	20.38	18.78	16.30	15.62	15.20	14.87	13.97	13.18	12.55	12.24	12.12	11.69	10.51	10.96
3.0	25.18	25.50	20.07	19.27	19.63	18.20	15.85	15.23	14.86	14.58	13.71	12.97	12.38	12.08	11.98	11.58	10.52	10.87
3.5	23.58	24.01	19.22	18.47	18.84	17.55	15.32	14.75	14.42	14.19	13.35	12.65	12.10	11.82	11.73	11.35	10.41	10.68
4.0	22.15	22.67	18.39	17.69	18.06	16.88	14.77	14.25	13.95	13.76	12.95	12.28	11.77	11.51	11.42	11.07	10.23	10.44
4.5	20.89	21.46	17.61	16.94	17.31	16.23	14.23	13.75	13.47	13.31	12.54	11.90	11.42	11.18	11.10	10.77	10.01	10.17
5.0	19.77	20.38	16.87	16.24	16.61	15.61	13.71	13.26	13.01	12.88	12.13	11.53	11.07	10.85	10.78	10.46	9.77	9.90
5.5	18.76	19.40	16.19	15.59	15.96	15.03	13.22	12.80	12.57	12.45	11.74	11.16	10.73	10.52	10.46	10.16	9.53	9.62
6.0	17.86	18.51	15.55	14.99	15.35	14.49	12.75	12.36	12.14	12.05	11.36	10.81	10.40	10.21	10.15	9.87	9.29	9.35
6.5	17.05	17.71	14.97	14.42	14.78	13.98	12.31	11.95	11.75	11.67	11.00	10.48	10.09	9.90	9.85	9.58	9.05	9.09
7.0	16.31	16.98	14.42	13.90	14.25	13.50	11.90	11.56	11.37	11.30	10.66	10.16	9.79	9.61	9.56	9.31	8.82	8.84
8.0	15.02	15.69	13.44	12.97	13.30	12.63	11.16	10.85	10.68	10.64	10.04	9.57	9.23	9.08	9.04	8.81	8.38	8.37
9.0	13.93	14.60	12.59	12.15	12.48	11.87	10.50	10.23	10.08	10.04	9.48	9.05	8.73	8.60	8.56	8.35	7.98	7.95
10.0	13.00	13.66	11.85	11.44	11.75	11.20	9.92	9.67	9.53	9.51	8.98	8.58	8.29	8.16	8.13	7.94	7.61	7.56
11.0	12.20	12.85	11.19	10.81	11.11	10.61	9.41	9.17	9.05	9.04	8.54	8.16	7.89	7.77	7.74	7.57	7.28	7.21
12.0	11.50	12.13	10.61	10.25	10.54	10.08	8.94	8.73	8.62	8.61	8.14	7.78	7.52	7.42	7.39	7.23	6.97	6.90
15.0	9.84	10.43	9.20	8.89	9.15	8.78	7.81	7.63	7.54	7.55	7.14	6.84	6.62	6.54	6.52	6.38	6.19	6.10
20.0	7.99	8.52	7.57	7.33	7.55	7.27	6.48	6.35	6.28	6.30	5.96	5.71	5.54	5.48	5.47	5.37	5.24	5.14
25.0	6.77	7.25	6.47	6.26	6.46	6.24	5.57	5.46	5.41	5.43	5.14	4.93	4.78	4.74	4.74	4.65	4.56	4.46
30.0	5.90	6.34	5.68	5.50	5.67	5.48	4.90	4.81	4.77	4.79	4.54	4.36	4.23	4.20	4.20	4.12	4.05	3.96
35.0	5.25	5.65	5.07	4.91	5.07	4.91	4.39	4.31	4.28	4.30	4.08	3.92	3.80	3.78	3.78	3.71	3.65	3.57
40.0	4.740	5.115	4.596	4.453	4.594	4.458	3.991	3.921	3.892	3.916	3.711	3.565	3.462	3.441	3.442	3.389	3.336	3.261
45.0	4.333	4.684	4.212	4.082	4.212	4.091	3.665	3.602	3.577	3.601	3.413	3.280	3.186	3.169	3.170	3.123	3.078	3.008
50.0	3.999	4.329	3.896	3.776	3.897	3.788	3.395	3.338	3.316	3.340	3.166	3.043	2.956	2.942	2.944	2.901	2.862	2.796
55.0	3.720	4.031	3.630	3.519	3.632	3.533	3.168	3.116	3.096	3.119	2.957	2.843	2.762	2.750	2.753	2.714	2.678	2.617
60.0	3.482	3.777	3.404	3.300	3.406	3.315	2.974	2.926	2.908	2.930	2.778	2.672	2.596	2.586	2.589	2.553	2.521	2.464
65.0	3.278	3.558	3.208	3.111	3.211	3.127	2.806	2.761	2.745	2.767	2.624	2.524	2.452	2.444	2.447	2.414	2.384	2.330
70.0	3.099	3.368	3.037	2.946	3.041	2.962	2.659	2.617	2.603	2.624	2.488	2.394	2.327	2.319	2.322	2.292	2.264	2.213
80.0	2.804	3.051	2.754	2.671	2.758	2.689	2.415	2.378	2.365	2.386	2.263	2.177	2.116	2.110	2.114	2.087	2.063	2.018
90.0	2.569	2.799	2.528	2.452	2.531	2.470	2.219	2.186	2.175	2.194	2.082	2.003	1.947	1.943	1.946	1.923	1.901	1.860
100.0	2.377	2.592	2.342	2.273	2.346	2.290	2.059	2.028	2.019	2.038	1.933	1.861	1.809	1.805	1.809	1.788	1.767	1.731
150.0	1.776	1.942	1.760	1.709	1.763	1.725	1.553	1.531	1.525	1.542	1.463	1.409	1.370	1.369	1.372	1.358	1.342	1.318
200.0	1.456	1.612	1.462	1.416	1.462	1.431	1.287	1.264	1.269	1.284	1.217	1.199	1.160	1.136	1.141	1.126	1.138	1.098
250.0	1.272	1.410	1.280	1.240	1.269	1.254	1.129	1.096	1.113	1.127	1.069	1.053	1.018	0.998	1.003	0.986	1.000	0.966
300.0	1.147	1.272	1.156	1.120	1.148	1.134	1.020	0.982	1.007	1.020	0.968	0.952	0.921	0.904	0.908	0.894	0.906	0.876
350.0	1.056	1.171	1.066	1.032	1.057	1.046	0.942	0.907	0.930	0.942	0.894	0.879	0.851	0.836	0.839	0.826	0.837	0.810
400.0	0.987	1.095	0.997	0.966	0.990	0.979	0.882	0.851	0.871	0.883	0.838	0.824	0.797	0.783	0.787	0.775	0.785	0.760
450.0	0.933	1.036	0.944	0.914	0.937	0.927	0.835	0.806	0.825	0.836	0.794	0.780	0.756	0.743	0.746	0.735	0.744	0.721
500.0	0.890	0.988	0.901	0.873	0.895	0.885	0.797	0.771	0.788	0.799	0.759	0.745	0.722	0.710	0.713	0.702	0.712	0.689

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	10.28	9.82	9.86	9.94	9.86	9.32	9.04	8.55	8.37	8.16	8.01	7.88	7.60	7.51	7.43	7.45	7.16	7.07
3.0	10.23	9.78	9.82	9.90	9.84	9.32	9.05	8.59	8.43	8.22	8.08	7.96	7.69	7.60	7.52	7.54	7.23	7.15
3.5	10.06	9.63	9.67	9.75	9.70	9.21	8.95	8.52	8.37	8.18	8.04	7.93	7.67	7.58	7.50	7.52	7.21	7.13
4.0	9.85	9.43	9.47	9.54	9.51	9.04	8.80	8.39	8.25	8.07	7.94	7.83	7.59	7.50	7.42	7.44	7.13	7.05
4.5	9.61	9.20	9.24	9.31	9.29	8.84	8.61	8.23	8.10	7.93	7.80	7.70	7.48	7.39	7.31	7.33	7.02	6.94
5.0	9.355	8.964	9.001	9.070	9.058	8.633	8.408	8.052	7.934	7.768	7.646	7.549	7.337	7.250	7.171	7.190	6.890	6.814
5.5	9.102	8.725	8.760	8.827	8.823	8.417	8.202	7.866	7.756	7.598	7.481	7.389	7.187	7.104	7.025	7.043	6.748	6.674
6.0	8.853	8.490	8.524	8.589	8.590	8.202	7.996	7.678	7.575	7.425	7.312	7.225	7.033	6.953	6.875	6.892	6.603	6.531
6.5	8.612	8.261	8.293	8.357	8.363	7.992	7.794	7.492	7.396	7.252	7.144	7.061	6.878	6.800	6.723	6.740	6.457	6.387
7.0	8.380	8.040	8.072	8.133	8.144	7.788	7.597	7.311	7.220	7.082	6.978	6.899	6.724	6.650	6.573	6.590	6.313	6.244
8.0	7.944	7.625	7.655	7.714	7.731	7.401	7.225	6.964	6.883	6.756	6.660	6.587	6.426	6.358	6.283	6.299	6.034	5.969
9.0	7.547	7.247	7.275	7.331	7.353	7.047	6.882	6.643	6.570	6.453	6.362	6.295	6.147	6.084	6.011	6.026	5.772	5.710
10.0	7.187	6.903	6.930	6.983	7.009	6.722	6.568	6.348	6.282	6.172	6.087	6.025	5.887	5.829	5.757	5.772	5.529	5.470
11.0	6.860	6.591	6.617	6.667	6.695	6.426	6.281	6.077	6.016	5.914	5.834	5.776	5.647	5.593	5.523	5.537	5.304	5.248
12.0	6.562	6.306	6.331	6.379	6.409	6.156	6.018	5.828	5.772	5.676	5.600	5.546	5.425	5.374	5.307	5.320	5.096	5.043
15.0	5.813	5.589	5.611	5.654	5.688	5.471	5.353	5.194	5.150	5.068	5.003	4.957	4.856	4.814	4.751	4.763	4.563	4.517
20.0	4.904	4.719	4.738	4.775	4.810	4.633	4.537	4.414	4.381	4.315	4.262	4.226	4.145	4.114	4.058	4.068	3.899	3.860
25.0	4.262	4.103	4.120	4.152	4.186	4.037	3.956	3.854	3.828	3.774	3.729	3.698	3.631	3.607	3.556	3.565	3.417	3.384
30.0	3.784	3.644	3.659	3.688	3.721	3.591	3.520	3.434	3.412	3.366	3.326	3.300	3.242	3.223	3.176	3.185	3.054	3.024
35.0	3.414	3.288	3.302	3.328	3.359	3.244	3.181	3.106	3.088	3.047	3.012	2.989	2.938	2.922	2.879	2.887	2.768	2.742
40.0	3.118	3.004	3.016	3.040	3.071	2.966	2.910	2.844	2.828	2.791	2.759	2.739	2.693	2.680	2.640	2.647	2.539	2.515
45.0	2.876	2.771	2.783	2.805	2.834	2.739	2.688	2.628	2.614	2.581	2.552	2.533	2.492	2.480	2.443	2.449	2.350	2.328
50.0	2.675	2.577	2.588	2.609	2.637	2.549	2.502	2.448	2.435	2.405	2.378	2.361	2.323	2.313	2.278	2.284	2.191	2.172
55.0	2.504	2.413	2.423	2.443	2.470	2.388	2.344	2.294	2.283	2.255	2.230	2.214	2.179	2.171	2.137	2.143	2.057	2.038
60.0	2.357	2.272	2.282	2.300	2.326	2.249	2.209	2.162	2.152	2.126	2.103	2.088	2.056	2.048	2.016	2.022	1.940	1.923
65.0	2.230	2.149	2.159	2.176	2.201	2.129	2.091	2.048	2.038	2.014	1.992	1.978	1.948	1.941	1.911	1.916	1.839	1.823
70.0	2.118	2.041	2.050	2.067	2.091	2.023	1.987	1.947	1.938	1.915	1.894	1.882	1.853	1.847	1.818	1.823	1.750	1.734
80.0	1.931	1.861	1.870	1.885	1.908	1.846	1.814	1.778	1.770	1.750	1.731	1.719	1.694	1.688	1.662	1.667	1.600	1.586
90.0	1.781	1.716	1.724	1.738	1.760	1.703	1.674	1.641	1.634	1.616	1.599	1.588	1.565	1.560	1.536	1.540	1.479	1.466
100.0	1.657	1.597	1.604	1.617	1.638	1.585	1.558	1.529	1.523	1.506	1.490	1.480	1.459	1.455	1.432	1.436	1.379	1.367
150.0	1.262	1.217	1.222	1.232	1.249	1.210	1.190	1.169	1.165	1.153	1.141	1.134	1.119	1.116	1.099	1.102	1.058	1.049
200.0	1.051	1.015	1.015	1.023	1.038	1.006	0.990	0.974	0.971	0.962	0.952	0.946	0.934	0.931	0.917	0.920	0.908	0.878
250.0	0.925	0.894	0.884	0.891	0.905	0.879	0.870	0.855	0.856	0.846	0.834	0.832	0.823	0.817	0.804	0.807	0.801	0.776
300.0	0.839	0.810	0.801	0.804	0.816	0.798	0.790	0.776	0.777	0.768	0.757	0.756	0.748	0.742	0.731	0.733	0.728	0.705
350.0	0.776	0.749	0.742	0.744	0.756	0.738	0.731	0.719	0.719	0.711	0.701	0.700	0.693	0.688	0.677	0.679	0.674	0.654
400.0	0.7280	0.7032	0.6960	0.6984	0.7090	0.6930	0.6861	0.6747	0.6754	0.6680	0.6586	0.6574	0.6506	0.6462	0.6361	0.6382	0.6333	0.6143
450.0	0.6904	0.6669	0.6603	0.6626	0.6726	0.6576	0.6510	0.6403	0.6410	0.6341	0.6252	0.6240	0.6177	0.6135	0.6041	0.6060	0.6012	0.5834
500.0	0.6603	0.6379	0.6317	0.6338	0.6435	0.6291	0.6228	0.6127	0.6134	0.6068	0.5984	0.5972	0.5913	0.5874	0.5783	0.5801	0.5753	0.5587

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{40}_{20}$CA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.290	4.110	5.800	5.780	5.670	6.729	7.290	7.693	8.000	8.310	8.480	9.030	9.330	9.777	9.960	10.138	10.449	10.720
3.0	5.058	4.871	6.776	6.798	6.669	7.811	8.534	8.989	9.330	9.667	9.924	10.558	10.933	11.420	11.618	11.855	12.348	12.550
3.5	5.879	5.679	7.795	7.858	7.709	8.930	9.817	10.323	10.695	11.056	11.402	12.119	12.566	13.093	13.305	13.599	14.258	14.405
4.0	6.754	6.537	8.858	8.964	8.793	10.092	11.147	11.702	12.106	12.488	12.923	13.724	14.242	14.807	15.033	15.383	16.196	16.297
4.5	7.684	7.444	9.970	10.120	9.926	11.300	12.527	13.131	13.565	13.965	14.492	15.378	15.967	16.570	16.809	17.214	18.172	18.238
5.0	8.669	8.401	11.131	11.326	11.104	12.556	13.959	14.612	15.076	15.493	16.114	17.085	17.746	18.386	18.637	19.098	20.195	20.231
5.5	9.708	9.407	12.341	12.583	12.333	13.862	15.445	16.147	16.640	17.073	17.790	18.848	19.581	20.258	20.521	21.038	22.267	22.281
6.0	10.801	10.462	13.602	13.892	13.611	15.218	16.986	17.737	18.259	18.706	19.522	20.669	21.475	22.188	22.463	23.035	24.393	24.390
6.5	11.947	11.567	14.913	15.252	14.939	16.623	18.582	19.383	19.934	20.393	21.311	22.548	23.427	24.177	24.464	25.092	26.574	26.560
7.0	13.147	12.721	16.275	16.665	16.317	18.080	20.234	21.085	21.665	22.135	23.158	24.486	25.441	26.227	26.525	27.210	28.812	28.791
8.0	15.71	15.17	19.15	19.65	19.22	21.14	23.71	24.66	25.30	25.78	27.03	28.54	29.65	30.51	30.83	31.63	33.46	33.44
9.0	18.47	17.82	22.23	22.83	22.33	24.41	27.40	28.46	29.15	29.66	31.13	32.84	34.11	35.04	35.38	36.29	38.36	38.35
10.0	21.45	20.65	25.50	26.23	25.64	27.88	31.32	32.48	33.23	33.75	35.46	37.38	38.81	39.81	40.17	41.21	43.49	43.51
11.0	24.63	23.67	28.98	29.83	29.14	31.55	35.46	36.73	37.54	38.07	40.03	42.16	43.76	44.84	45.22	46.37	48.86	48.93
12.0	28.00	26.88	32.85	33.63	32.84	35.42	39.83	41.20	42.07	42.60	44.83	47.19	48.95	50.11	50.50	51.78	54.48	54.60
15.0	39.33	37.58	44.83	46.23	45.09	48.21	54.22	55.94	56.99	57.52	60.61	63.68	66.00	67.38	67.82	69.49	72.79	73.14
20.0	62.04	58.92	68.92	71.14	69.29	73.36	82.47	84.82	86.19	86.65	91.41	95.83	99.19	100.93	101.45	103.81	108.06	109.01
25.0	89.35	84.47	97.58	100.76	98.04	103.16	115.88	118.92	120.61	120.95	127.64	133.62	138.16	140.28	140.84	143.95	149.13	150.88
30.0	121.12	114.06	130.67	134.93	131.18	137.44	154.25	158.04	160.08	160.24	169.13	176.86	182.72	185.21	185.80	189.71	195.80	198.55
35.0	157.12	147.55	168.02	173.50	168.57	176.06	197.43	202.03	204.43	204.35	215.70	225.36	232.69	235.53	236.13	240.90	247.89	251.81
40.0	197.3	184.8	209.5	216.3	210.1	218.9	245.3	250.7	253.5	253.1	267.2	279.0	287.9	291.1	291.7	297.3	305.3	310.5
45.0	241.5	225.7	255.0	263.3	255.6	265.7	297.6	304.0	307.2	306.4	323.4	337.5	348.2	351.7	352.3	358.9	367.7	374.4
50.0	289.6	270.2	304.4	314.3	305.0	316.6	354.4	361.7	365.3	364.2	384.3	400.9	413.4	417.3	417.8	425.4	435.2	443.4
55.0	341.4	318.1	357.7	369.2	358.2	371.3	415.4	423.8	427.7	426.2	449.8	468.9	483.4	487.6	488.1	496.7	507.5	517.4
60.0	397.1	369.4	414.6	427.9	415.1	429.8	480.6	490.1	494.4	492.4	519.6	541.5	558.2	562.7	563.1	572.7	584.5	596.2
65.0	456.3	424.0	475.2	490.4	475.6	491.9	549.9	560.5	565.3	562.6	593.7	618.6	637.4	642.3	642.6	653.3	666.1	679.7
70.0	519.1	481.8	539.3	556.5	539.7	557.7	623.1	634.9	640.1	636.9	672.0	700.0	721.2	726.3	726.5	738.4	752.2	767.8
80.0	655.0	606.7	677.8	699.3	678.0	699.6	781.2	795.5	801.6	797.0	840.8	875.5	901.8	907.4	907.3	921.6	937.6	957.4
90.0	804.2	743.8	829.6	855.8	829.6	855.0	954.2	971.2	978.1	972.0	1025.3	1067.2	1099.0	1105.2	1104.8	1121.5	1139.9	1164.1
100.0	966.2	892.5	994.1	1025.4	993.9	1023.4	1141.5	1161.3	1169.2	1161.4	1224.9	1274.6	1312.3	1319.0	1318.2	1337.4	1358.3	1387.2
150.0	1954.	1797.	1993.	2055.	1991.	2044.	2276.	2312.	2325.	2305.	2430.	2526.	2600.	2608.	2605.	2638.	2674.	2729.
200.0	3206.	2936.	3250.	3351.	3250.	3327.	3702.	3759.	3778.	3738.	3941.	4062.	4188.	4224.	4216.	4267.	4294.	4404.
250.0	4682.	4267.	4718.	4866.	4730.	4826.	5368.	5465.	5463.	5407.	5701.	5849.	6037.	6109.	6093.	6175.	6176.	6363.
300.0	6342.	5765.	6366.	6567.	6392.	6507.	7236.	7399.	7358.	7277.	7672.	7851.	8105.	8219.	8194.	8310.	8282.	8532.
350.0	8163.	7407.	8172.	8430.	8213.	8347.	9280.	9521.	9427.	9321.	9827.	10040.	10368.	10524.	10488.	10642.	10582.	10910.
400.0	10125.	9175.	10114.	10435.	10170.	10326.	11478.	11800.	11652.	11517.	12143.	12393.	12798.	12999.	12952.	13145.	13052.	13462.
450.0	12211.	11054.	12178.	12565.	12249.	12427.	13811.	14218.	14013.	13846.	14596.	14890.	15377.	15624.	15563.	15799.	15670.	16167.
500.0	14408.	13033.	14348.	14806.	14435.	14636.	16264.	16756.	16494.	16294.	17175.	17514.	18087.	18380.	18306.	18589.	18419.	19007.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.26	11.69	12.63	12.88	13.36	14.06	14.47	15.00	15.32	15.64	15.96	16.31	16.65	16.97	17.38	17.53	18.80	19.20
3.0	13.21	13.73	14.66	14.89	15.39	16.20	16.68	17.34	17.70	18.07	18.44	18.83	19.26	19.61	20.05	20.19	21.57	22.01
3.5	15.18	15.79	16.71	16.93	17.44	18.36	18.90	19.67	20.08	20.51	20.92	21.34	21.87	22.25	22.71	22.84	24.34	24.80
4.0	17.19	17.88	18.80	19.00	19.52	20.55	21.15	22.04	22.49	22.97	23.43	23.88	24.48	24.90	25.39	25.52	27.13	27.62
4.5	19.24	20.03	20.94	21.12	21.65	22.78	23.45	24.44	24.93	25.47	25.97	26.46	27.14	27.58	28.11	28.22	29.95	30.48
5.0	21.35	22.23	23.13	23.30	23.83	25.07	25.80	26.90	27.42	28.02	28.56	29.08	29.84	30.32	30.87	30.98	32.83	33.39
5.5	23.52	24.50	25.39	25.53	26.06	27.42	28.21	29.41	29.97	30.62	31.20	31.76	32.59	33.10	33.68	33.79	35.76	36.35
6.0	25.75	26.82	27.70	27.83	28.36	29.83	30.68	31.98	32.58	33.28	33.90	34.49	35.41	35.95	36.56	36.66	38.75	39.38
6.5	28.04	29.21	30.08	30.19	30.72	32.30	33.21	34.62	35.25	36.01	36.67	37.29	38.28	38.86	39.50	39.59	41.82	42.48
7.0	30.39	31.66	32.52	32.62	33.14	34.83	35.81	37.32	37.99	38.80	39.50	40.16	41.22	41.83	42.51	42.59	44.95	45.64
8.0	35.30	36.77	37.61	37.67	38.19	40.10	41.21	42.93	43.67	44.58	45.37	46.10	47.31	47.98	48.74	48.80	51.43	52.20
9.0	40.46	42.15	42.98	42.99	43.49	45.64	46.89	48.81	49.62	50.64	51.52	52.31	53.67	54.42	55.26	55.30	58.21	59.05
10.0	45.90	47.81	48.61	48.58	49.07	51.46	52.84	54.97	55.84	56.98	57.95	58.80	60.32	61.13	62.05	62.08	65.29	66.21
11.0	51.60	53.74	54.52	54.45	54.91	57.54	59.07	61.42	62.35	63.61	64.66	65.59	67.26	68.14	69.14	69.16	72.68	73.68
12.0	57.56	59.95	60.70	60.58	61.02	63.90	65.57	68.14	69.14	70.51	71.66	72.66	74.49	75.44	76.53	76.53	80.38	81.45
15.0	77.03	80.20	80.88	80.60	80.93	84.62	86.76	89.99	91.19	92.92	94.37	95.58	97.91	99.07	100.47	100.41	105.30	106.64
20.0	114.64	119.30	119.82	119.25	119.32	124.51	127.50	131.91	133.45	135.84	137.84	139.44	142.65	144.17	146.18	146.00	152.88	154.70
25.0	158.51	164.89	165.22	164.30	164.02	170.88	174.83	180.54	182.42	185.54	188.14	190.16	194.33	196.22	198.97	198.66	207.82	210.18
30.0	208.42	216.72	216.84	215.52	214.80	223.52	228.54	235.62	237.87	241.76	245.04	247.52	252.73	255.00	258.59	258.13	269.85	272.82
35.0	264.15	274.60	274.48	272.70	271.46	282.22	288.39	296.95	299.57	304.31	308.32	311.29	317.63	320.27	324.83	324.19	338.74	342.36
40.0	325.5	338.3	337.9	335.7	333.8	346.8	354.2	364.3	367.3	373.0	377.8	381.3	388.8	391.8	397.5	396.6	414.3	418.6
45.0	392.4	407.7	407.0	404.2	401.7	417.0	425.8	437.6	441.0	447.6	453.2	457.3	466.1	469.5	476.3	475.3	496.2	501.3
50.0	464.5	482.6	481.6	478.2	474.9	492.8	503.0	516.5	520.3	527.9	534.5	539.1	549.3	553.0	561.1	559.9	584.4	590.3
55.0	541.9	562.9	561.5	557.5	553.3	573.9	585.6	600.9	605.2	613.9	621.4	626.7	638.2	642.4	651.8	650.3	678.7	685.5
60.0	624.2	648.4	646.6	641.9	636.8	660.2	673.6	690.8	695.5	705.3	713.8	719.7	732.8	737.3	748.2	746.5	778.9	786.5
65.0	711.5	738.9	736.8	731.4	725.2	751.7	766.7	785.9	791.0	802.0	811.6	818.2	832.8	837.6	850.2	848.1	884.8	893.4
70.0	803.6	834.4	831.9	825.7	818.5	848.1	864.8	886.1	891.7	903.9	914.6	921.9	938.1	943.3	957.5	955.2	996.3	1005.9
80.0	1001.6	1039.9	1036.5	1028.7	1019.0	1055.4	1075.9	1101.4	1108.0	1122.7	1135.8	1144.6	1164.2	1170.2	1187.9	1185.0	1235.7	1247.4
90.0	1217.6	1264.0	1259.5	1249.9	1237.6	1281.3	1305.7	1335.8	1343.4	1360.8	1376.5	1386.9	1410.1	1416.9	1438.5	1434.9	1496.0	1510.0
100.0	1460.7	1505.8	1500.3	1488.8	1473.5	1524.9	1553.6	1588.5	1597.2	1617.5	1636.0	1648.0	1676.1	1682.6	1708.5	1704.1	1776.4	1792.8
150.0	2852.	2960.	2948.	2924.	2890.	2988.	3042.	3104.	3118.	3155.	3190.	3211.	3261.	3272.	3323.	3314.	3453.	3484.
200.0	4602.	4773.	4755.	4717.	4658.	4812.	4896.	4989.	5010.	5066.	5121.	5154.	5230.	5247.	5329.	5314.	5489.	5583.
250.0	6638.	6881.	6875.	6819.	6729.	6949.	7060.	7191.	7213.	7293.	7377.	7419.	7521.	7552.	7669.	7647.	7843.	8014.
300.0	8913.	9237.	9257.	9191.	9065.	9343.	9478.	9652.	9672.	9780.	9900.	9947.	10076.	10126.	10285.	10253.	10468.	10724.
350.0	11396.	11808.	11855.	11780.	11616.	11953.	12115.	12334.	12352.	12490.	12650.	12701.	12860.	12930.	13133.	13092.	13327.	13675.
400.0	14060.	14566.	14642.	14558.	14352.	14753.	14942.	15209.	15225.	15394.	15597.	15653.	15843.	15933.	16184.	16133.	16392.	16835.
450.0	16884.	17489.	17595.	17501.	17251.	17718.	17938.	18255.	18268.	18470.	18717.	18779.	19000.	19113.	19413.	19352.	19636.	20179.
500.0	19848.	20558.	20694.	20589.	20293.	20830.	21081.	21450.	21459.	21697.	21989.	22057.	22312.	22446.	22799.	22727.	23039.	23684.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

45
SC IONS
21

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	29.07	29.08	22.32	21.40	21.77	20.04	17.38	16.65	16.21	15.85	14.88	14.04	13.37	13.02	12.90	12.44	11.18	11.65
3.0	27.19	27.42	21.51	20.64	21.03	19.47	16.94	16.28	15.88	15.58	14.65	13.85	13.22	12.90	12.78	12.35	11.22	11.60
3.5	25.50	25.88	20.64	19.83	20.22	18.81	16.42	15.80	15.44	15.20	14.30	13.54	12.95	12.65	12.54	12.14	11.13	11.42
4.0	23.99	24.47	19.78	19.02	19.42	18.13	15.86	15.30	14.97	14.76	13.89	13.17	12.62	12.34	12.24	11.87	10.96	11.19
4.5	22.65	23.20	18.97	18.25	18.65	17.46	15.30	14.78	14.48	14.31	13.47	12.79	12.27	12.01	11.92	11.56	10.74	10.92
5.0	21.45	22.06	18.20	17.52	17.91	16.82	14.76	14.28	14.00	13.86	13.06	12.40	11.91	11.67	11.59	11.25	10.50	10.64
5.5	20.38	21.02	17.48	16.84	17.23	16.21	14.25	13.80	13.54	13.42	12.65	12.03	11.56	11.33	11.26	10.94	10.26	10.35
6.0	19.42	20.08	16.82	16.20	16.59	15.64	13.77	13.34	13.11	13.00	12.26	11.66	11.22	11.00	10.94	10.64	10.01	10.08
6.5	18.54	19.22	16.20	15.61	15.99	15.11	13.31	12.91	12.69	12.60	11.88	11.31	10.89	10.69	10.63	10.34	9.77	9.81
7.0	17.75	18.44	15.62	15.06	15.43	14.60	12.88	12.50	12.30	12.22	11.53	10.98	10.58	10.39	10.33	10.06	9.53	9.54
8.0	16.37	17.07	14.58	14.07	14.43	13.69	12.09	11.76	11.57	11.52	10.87	10.37	9.99	9.83	9.78	9.53	9.07	9.05
9.0	15.20	15.90	13.68	13.20	13.55	12.89	11.40	11.09	10.93	10.89	10.28	9.81	9.47	9.32	9.28	9.05	8.65	8.61
10.0	14.19	14.89	12.89	12.44	12.77	12.17	10.78	10.50	10.35	10.33	9.75	9.32	9.00	8.86	8.82	8.61	8.26	8.20
11.0	13.33	14.01	12.19	11.77	12.09	11.54	10.23	9.97	9.84	9.82	9.28	8.87	8.57	8.44	8.41	8.22	7.90	7.83
12.0	12.57	13.24	11.56	11.17	11.48	10.97	9.73	9.50	9.37	9.37	8.85	8.46	8.18	8.07	8.04	7.86	7.58	7.50
15.0	10.77	11.40	10.04	9.71	9.99	9.58	8.52	8.32	8.23	8.24	7.79	7.45	7.21	7.13	7.11	6.96	6.75	6.65
20.0	8.75	9.33	8.29	8.02	8.26	7.95	7.09	6.94	6.87	6.89	6.52	6.25	6.05	5.99	5.98	5.87	5.72	5.62
25.0	7.43	7.94	7.09	6.87	7.08	6.83	6.10	5.98	5.92	5.95	5.63	5.40	5.24	5.19	5.19	5.09	4.99	4.89
30.0	6.48	6.95	6.23	6.03	6.22	6.02	5.38	5.27	5.23	5.26	4.98	4.78	4.64	4.60	4.60	4.52	4.44	4.34
35.0	5.77	6.20	5.57	5.39	5.56	5.39	4.82	4.73	4.70	4.72	4.48	4.30	4.17	4.14	4.14	4.08	4.01	3.92
40.0	5.211	5.619	5.050	4.893	5.048	4.897	4.384	4.307	4.275	4.302	4.076	3.916	3.803	3.780	3.781	3.721	3.664	3.581
45.0	4.766	5.147	4.631	4.488	4.631	4.497	4.029	3.959	3.932	3.958	3.751	3.605	3.501	3.482	3.484	3.431	3.382	3.305
50.0	4.400	4.758	4.285	4.153	4.286	4.166	3.734	3.671	3.646	3.672	3.481	3.346	3.250	3.234	3.237	3.190	3.146	3.074
55.0	4.093	4.432	3.994	3.871	3.996	3.886	3.485	3.427	3.406	3.431	3.253	3.127	3.038	3.025	3.028	2.985	2.946	2.879
60.0	3.832	4.154	3.746	3.631	3.748	3.648	3.272	3.219	3.200	3.224	3.057	2.940	2.857	2.845	2.848	2.809	2.773	2.710
65.0	3.608	3.915	3.531	3.424	3.534	3.442	3.088	3.039	3.021	3.045	2.888	2.777	2.699	2.689	2.692	2.656	2.623	2.564
70.0	3.412	3.706	3.344	3.243	3.348	3.261	2.928	2.881	2.865	2.888	2.739	2.635	2.561	2.552	2.556	2.522	2.492	2.436
80.0	3.068	3.358	3.033	2.942	3.037	2.961	2.659	2.618	2.604	2.627	2.492	2.397	2.330	2.324	2.327	2.298	2.271	2.222
90.0	2.829	3.081	2.784	2.701	2.788	2.720	2.444	2.407	2.395	2.417	2.293	2.207	2.145	2.140	2.144	2.118	2.093	2.049
100.0	2.618	2.854	2.581	2.504	2.585	2.523	2.268	2.234	2.224	2.245	2.130	2.050	1.993	1.989	1.992	1.969	1.947	1.906
150.0	1.957	2.140	1.940	1.883	1.943	1.901	1.711	1.687	1.681	1.699	1.613	1.553	1.510	1.509	1.512	1.496	1.479	1.453
200.0	1.605	1.777	1.611	1.561	1.601	1.578	1.419	1.394	1.399	1.415	1.342	1.322	1.278	1.262	1.267	1.241	1.254	1.210
250.0	1.402	1.554	1.411	1.367	1.399	1.383	1.244	1.209	1.227	1.243	1.179	1.161	1.123	1.101	1.106	1.087	1.103	1.065
300.0	1.264	1.402	1.274	1.235	1.264	1.250	1.125	1.083	1.110	1.124	1.067	1.050	1.016	0.997	1.001	0.985	0.999	0.966
350.0	1.164	1.291	1.175	1.138	1.166	1.153	1.038	1.000	1.025	1.038	0.985	0.969	0.938	0.921	0.925	0.911	0.923	0.893
400.0	1.088	1.207	1.100	1.065	1.091	1.080	0.972	0.938	0.960	0.973	0.924	0.908	0.879	0.864	0.868	0.854	0.866	0.838
450.0	1.029	1.142	1.041	1.008	1.033	1.022	0.921	0.889	0.910	0.922	0.875	0.860	0.833	0.819	0.823	0.810	0.821	0.795
500.0	0.981	1.089	0.993	0.962	0.986	0.976	0.879	0.850	0.869	0.881	0.836	0.822	0.796	0.783	0.787	0.774	0.785	0.760

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	10.93	10.44	10.49	10.57	10.48	9.90	9.60	9.08	8.89	8.67	8.51	8.37	8.07	7.97	7.89	7.91	7.60	7.51
3.0	10.91	10.42	10.47	10.55	10.49	9.93	9.64	9.15	8.98	8.76	8.61	8.48	8.19	8.09	8.01	8.03	7.70	7.62
3.5	10.76	10.29	10.34	10.42	10.37	9.84	9.56	9.10	8.94	8.73	8.59	8.46	8.19	8.09	8.01	8.03	7.70	7.61
4.0	10.55	10.10	10.14	10.22	10.18	9.68	9.42	8.98	8.84	8.64	8.49	8.38	8.13	8.03	7.94	7.96	7.63	7.55
4.5	10.31	9.87	9.91	9.99	9.97	9.49	9.23	8.83	8.69	8.50	8.36	8.25	8.01	7.92	7.83	7.85	7.52	7.44
5.0	10.05	9.63	9.67	9.74	9.73	9.27	9.03	8.65	8.52	8.34	8.21	8.11	7.88	7.78	7.70	7.72	7.39	7.31
5.5	9.80	9.39	9.43	9.50	9.49	9.05	8.82	8.46	8.34	8.17	8.04	7.94	7.73	7.64	7.55	7.57	7.25	7.17
6.0	9.54	9.15	9.18	9.26	9.25	8.83	8.61	8.27	8.16	7.99	7.87	7.78	7.57	7.48	7.40	7.42	7.11	7.03
6.5	9.29	8.91	8.94	9.01	9.02	8.62	8.40	8.08	7.97	7.82	7.70	7.61	7.41	7.33	7.24	7.26	6.96	6.88
7.0	9.05	8.68	8.71	8.78	8.79	8.40	8.20	7.89	7.79	7.64	7.53	7.44	7.25	7.17	7.09	7.11	6.81	6.73
8.0	8.592	8.247	8.278	8.341	8.359	8.002	7.811	7.529	7.441	7.303	7.198	7.119	6.946	6.871	6.790	6.807	6.519	6.449
9.0	8.176	7.850	7.880	7.940	7.963	7.630	7.452	7.193	7.113	6.986	6.888	6.814	6.654	6.585	6.505	6.522	6.246	6.179
10.0	7.795	7.487	7.516	7.573	7.600	7.289	7.121	6.882	6.810	6.691	6.599	6.531	6.381	6.317	6.240	6.255	5.991	5.928
11.0	7.449	7.157	7.184	7.238	7.268	6.976	6.818	6.596	6.530	6.418	6.331	6.268	6.128	6.069	5.993	6.008	5.754	5.694
12.0	7.133	6.854	6.880	6.933	6.965	6.689	6.540	6.332	6.272	6.167	6.084	6.025	5.894	5.838	5.764	5.779	5.535	5.477
15.0	6.334	6.090	6.113	6.160	6.196	5.959	5.831	5.658	5.609	5.520	5.449	5.399	5.288	5.243	5.174	5.187	4.969	4.918
20.0	5.359	5.156	5.177	5.217	5.254	5.061	4.957	4.821	4.785	4.714	4.656	4.616	4.527	4.493	4.432	4.443	4.258	4.215
25.0	4.666	4.491	4.510	4.545	4.582	4.418	4.330	4.219	4.190	4.130	4.081	4.047	3.974	3.947	3.891	3.901	3.740	3.703
30.0	4.148	3.994	4.011	4.042	4.078	3.935	3.858	3.764	3.740	3.689	3.645	3.617	3.553	3.532	3.481	3.490	3.346	3.314
35.0	3.746	3.608	3.623	3.651	3.686	3.559	3.491	3.408	3.388	3.343	3.304	3.279	3.223	3.206	3.158	3.167	3.037	3.008
40.0	3.424	3.298	3.312	3.338	3.372	3.257	3.195	3.122	3.105	3.064	3.029	3.007	2.957	2.942	2.898	2.906	2.787	2.761
45.0	3.161	3.045	3.058	3.082	3.114	3.009	2.953	2.887	2.872	2.835	2.803	2.783	2.736	2.725	2.684	2.691	2.582	2.558
50.0	2.940	2.833	2.845	2.868	2.899	2.802	2.750	2.690	2.676	2.643	2.614	2.595	2.553	2.542	2.504	2.510	2.409	2.387
55.0	2.754	2.653	2.665	2.686	2.716	2.626	2.578	2.523	2.510	2.480	2.452	2.435	2.397	2.387	2.350	2.357	2.261	2.241
60.0	2.593	2.499	2.510	2.530	2.559	2.474	2.430	2.379	2.367	2.339	2.313	2.297	2.261	2.253	2.218	2.224	2.134	2.115
65.0	2.454	2.365	2.375	2.394	2.422	2.342	2.300	2.253	2.242	2.216	2.192	2.177	2.143	2.135	2.102	2.108	2.023	2.005
70.0	2.331	2.247	2.257	2.275	2.302	2.227	2.187	2.143	2.133	2.108	2.085	2.071	2.039	2.032	2.001	2.006	1.926	1.909
80.0	2.126	2.049	2.059	2.075	2.100	2.032	1.997	1.957	1.949	1.926	1.906	1.893	1.865	1.859	1.830	1.835	1.762	1.746
90.0	1.961	1.890	1.899	1.914	1.938	1.876	1.843	1.808	1.800	1.780	1.761	1.749	1.724	1.718	1.692	1.696	1.629	1.615
100.0	1.825	1.759	1.767	1.781	1.804	1.746	1.716	1.684	1.677	1.659	1.641	1.630	1.607	1.602	1.577	1.582	1.519	1.506
150.0	1.391	1.341	1.347	1.358	1.377	1.333	1.311	1.289	1.284	1.271	1.258	1.250	1.233	1.230	1.211	1.214	1.166	1.156
200.0	1.159	1.119	1.119	1.128	1.145	1.109	1.091	1.074	1.070	1.060	1.049	1.043	1.029	1.026	1.011	1.014	1.001	0.988
250.0	1.020	0.985	0.974	0.982	0.997	0.969	0.960	0.943	0.943	0.933	0.919	0.917	0.907	0.901	0.886	0.889	0.883	0.855
300.0	0.925	0.893	0.884	0.887	0.900	0.879	0.871	0.856	0.856	0.847	0.835	0.833	0.824	0.818	0.805	0.808	0.802	0.777
350.0	0.855	0.826	0.818	0.820	0.833	0.814	0.806	0.792	0.793	0.784	0.773	0.772	0.764	0.758	0.746	0.749	0.743	0.721
400.0	0.8026	0.7753	0.7674	0.7700	0.7816	0.7640	0.7564	0.7439	0.7446	0.7365	0.7260	0.7247	0.7173	0.7124	0.7013	0.7036	0.6982	0.6772
450.0	0.7612	0.7363	0.7280	0.7305	0.7416	0.7250	0.7177	0.7058	0.7067	0.6990	0.6892	0.6880	0.6810	0.6764	0.6660	0.6681	0.6628	0.6432
500.0	0.7279	0.7032	0.6965	0.6988	0.7094	0.6936	0.6866	0.6755	0.6762	0.6690	0.6597	0.6584	0.6519	0.6476	0.6378	0.6396	0.6343	0.6159

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

45 SC IONS 21

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.600	4.400	6.213	6.190	6.070	7.214	7.820	8.264	8.580	8.910	9.100	9.680	10.000	10.476	10.670	10.861	11.197	11.490
3.0	5.401	5.197	7.239	7.260	7.121	8.353	9.130	9.620	9.981	10.341	10.623	11.292	11.691	12.210	12.421	12.674	13.203	13.423
3.5	6.255	6.042	8.307	8.372	8.212	9.528	10.479	11.022	11.418	11.802	12.177	12.935	13.410	13.971	14.197	14.511	15.214	15.376
4.0	7.166	6.936	9.421	9.531	9.348	10.746	11.873	12.469	12.897	13.304	13.773	14.619	15.170	15.771	16.012	16.386	17.251	17.366
4.5	8.131	7.881	10.582	10.739	10.530	12.011	13.318	13.965	14.425	14.852	15.418	16.352	16.978	17.620	17.874	18.305	19.324	19.402
5.0	9.152	8.876	11.794	11.997	11.761	13.324	14.815	15.514	16.005	16.450	17.114	18.139	18.840	19.521	19.788	20.278	21.442	21.489
5.5	10.229	9.921	13.055	13.308	13.042	14.687	16.366	17.117	17.639	18.100	18.865	19.981	20.758	21.478	21.758	22.306	23.610	23.633
6.0	11.360	11.017	14.368	14.670	14.374	16.100	17.973	18.775	19.328	19.804	20.672	21.881	22.734	23.493	23.786	24.392	25.830	25.836
6.5	12.546	12.162	15.731	16.086	15.755	17.564	19.635	20.489	21.073	21.562	22.537	23.840	24.770	25.567	25.873	26.538	28.105	28.100
7.0	13.787	13.368	17.146	17.564	17.188	19.079	21.364	22.261	22.875	23.376	24.460	25.859	26.867	27.703	28.020	28.744	30.438	30.426
8.0	16.43	15.90	20.13	20.65	20.21	22.26	24.96	25.97	26.65	27.17	28.48	30.08	31.25	32.16	32.50	33.34	35.28	35.27
9.0	19.28	18.63	23.32	23.95	23.43	25.65	28.80	29.92	30.65	31.19	32.74	34.54	35.87	36.86	37.22	38.19	40.36	40.37
10.0	22.35	21.56	26.71	27.46	26.85	29.25	32.86	34.09	34.88	35.43	37.23	39.25	40.75	41.82	42.20	43.29	45.69	45.72
11.0	25.63	24.68	30.30	31.19	30.47	33.05	37.15	38.49	39.34	39.90	41.97	44.20	45.88	47.02	47.42	48.64	51.26	51.34
12.0	29.10	27.98	34.09	35.11	34.29	37.05	41.66	43.11	44.03	44.60	46.93	49.40	51.25	52.48	52.90	54.24	57.08	57.21
15.0	40.75	39.00	46.66	48.11	46.93	50.25	56.52	58.33	59.44	60.00	63.23	66.44	68.87	70.32	70.79	72.54	75.99	76.38
20.0	64.07	60.95	71.45	73.75	71.84	76.15	85.61	88.08	89.51	90.01	94.95	99.56	103.06	104.90	105.45	107.91	112.35	113.34
25.0	92.09	87.19	100.89	104.18	101.37	106.77	119.95	123.12	124.89	125.27	132.21	138.42	143.13	145.36	145.96	149.19	154.58	156.41
30.0	124.62	117.55	134.83	139.24	135.38	141.95	159.33	163.28	165.40	165.60	174.80	182.80	188.88	191.48	192.11	196.17	202.51	205.35
35.0	161.51	151.87	173.11	178.76	173.70	181.53	203.59	208.38	210.87	210.82	222.54	232.53	240.11	243.09	243.74	248.67	255.94	259.98
40.0	202.6	190.0	215.6	222.6	216.2	225.4	252.6	258.3	261.1	260.8	275.3	287.5	296.7	300.0	300.7	306.5	314.7	320.1
45.0	247.8	231.9	262.2	270.7	262.8	273.4	306.2	312.8	316.1	315.4	332.9	347.4	358.4	362.1	362.7	369.5	378.7	385.6
50.0	297.0	277.4	312.7	322.9	313.4	325.4	364.3	371.9	375.6	374.5	395.2	412.3	425.2	429.2	429.8	437.6	447.7	456.2
55.0	350.1	326.5	367.2	379.0	367.8	381.4	426.7	435.4	439.5	437.9	462.1	481.9	496.8	501.2	501.7	510.6	521.7	531.9
60.0	406.9	378.9	425.4	439.1	425.9	441.2	493.3	503.1	507.7	505.6	533.5	556.1	573.2	577.9	578.4	588.3	600.5	612.5
65.0	467.5	434.8	487.3	502.9	487.8	504.7	564.2	575.1	580.1	577.4	609.3	634.9	654.3	659.3	659.6	670.7	683.9	697.9
70.0	531.7	493.9	552.8	570.5	553.2	571.9	639.0	651.2	656.6	653.3	689.3	718.1	739.9	745.2	745.5	757.7	772.0	788.0
80.0	670.5	621.6	694.3	716.4	694.6	716.9	800.5	815.3	821.5	816.9	861.8	897.4	924.4	930.3	930.2	944.9	961.4	981.7
90.0	822.9	761.8	849.3	876.2	849.4	875.7	977.2	994.7	1001.9	995.7	1050.3	1093.3	1125.9	1132.3	1131.9	1149.1	1168.0	1192.8
100.0	988.4	913.6	1017.4	1049.4	1017.2	1047.6	1168.5	1188.9	1197.1	1189.1	1254.2	1305.1	1343.8	1350.7	1349.9	1369.6	1391.2	1420.7
150.0	1997.	1837.	2037.	2100.	2035.	2089.	2326.	2364.	2377.	2367.	2485.	2583.	2659.	2667.	2664.	2698.	2735.	2791.
200.0	3275.	3000.	3320.	3423.	3320.	3399.	3782.	3841.	3856.	3819.	4027.	4150.	4279.	4316.	4308.	4360.	4388.	4500.
250.0	4781.	4360.	4818.	4969.	4831.	4928.	5482.	5581.	5580.	5522.	5823.	5974.	6166.	6240.	6224.	6307.	6309.	6489.
300.0	6475.	5888.	6500.	6705.	6527.	6644.	7389.	7555.	7512.	7430.	7834.	8017.	8276.	8393.	8368.	8486.	8458.	8713.
350.0	8334.	7564.	8343.	8607.	8384.	8522.	9474.	9721.	9624.	9516.	10033.	10251.	10586.	10745.	10709.	10866.	10805.	11139.
400.0	10336.	9368.	10325.	10653.	10382.	10541.	11717.	12046.	11895.	11757.	12395.	12652.	13065.	13271.	13222.	13420.	13325.	13744.
450.0	12465.	11286.	12430.	12826.	12503.	12685.	14098.	14514.	14304.	14134.	14900.	15200.	15697.	15949.	15888.	16128.	15996.	16504.
500.0	14706.	13305.	14645.	15112.	14734.	14940.	16600.	17104.	16836.	16632.	17531.	17877.	18462.	18762.	18687.	18975.	18802.	19402.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.07	12.53	13.53	13.79	14.31	15.05	15.49	16.07	16.41	16.75	17.10	17.47	17.84	18.18	18.61	18.77	20.13	20.56
3.0	14.13	14.68	15.68	15.92	16.45	17.31	17.82	18.53	18.93	19.33	19.73	20.14	20.61	20.98	21.44	21.58	23.06	23.53
3.5	16.20	16.85	17.84	18.07	18.61	19.59	20.17	20.99	21.43	21.90	22.34	22.79	23.35	23.75	24.24	24.38	25.98	26.48
4.0	18.32	19.06	20.04	20.25	20.80	21.89	22.54	23.48	23.96	24.49	24.97	25.46	26.11	26.54	27.06	27.19	28.91	29.45
4.5	20.47	21.31	22.28	22.47	23.03	24.24	24.95	26.01	26.53	27.11	27.64	28.17	28.89	29.37	29.91	30.04	31.88	32.45
5.0	22.68	23.62	24.58	24.75	25.32	26.64	27.41	28.58	29.15	29.78	30.36	30.92	31.72	32.23	32.81	32.93	34.90	35.50
5.5	24.95	25.98	26.93	27.09	27.66	29.09	29.93	31.21	31.82	32.51	33.13	33.72	34.61	35.15	35.76	35.87	37.97	38.61
6.0	27.28	28.41	29.35	29.49	30.06	31.61	32.51	33.90	34.54	35.29	35.95	36.58	37.55	38.12	38.77	38.87	41.10	41.78
6.5	29.67	30.90	31.84	31.96	32.52	34.19	35.16	36.66	37.33	38.14	38.84	39.51	40.55	41.16	41.84	41.94	44.30	45.01
7.0	32.12	33.46	34.39	34.49	35.05	36.83	37.87	39.47	40.19	41.05	41.80	42.50	43.62	44.27	44.98	45.07	47.57	48.32
8.0	37.23	38.78	39.69	39.75	40.30	42.32	43.49	45.31	46.10	47.07	47.91	48.68	49.96	50.68	51.47	51.54	54.33	55.15
9.0	42.60	44.38	45.26	45.28	45.82	48.08	49.39	51.43	52.29	53.38	54.30	55.14	56.58	57.37	58.24	58.29	61.38	62.27
10.0	48.24	50.25	51.11	51.08	51.60	54.12	55.57	57.83	58.75	59.96	60.98	61.89	63.49	64.35	65.31	65.34	68.74	69.71
11.0	54.14	56.40	57.23	57.16	57.66	60.43	62.03	64.61	65.50	66.83	67.94	68.93	70.69	71.61	72.67	72.68	76.41	77.46
12.0	60.32	62.82	63.64	63.52	63.98	67.02	68.77	71.47	72.54	73.98	75.20	76.25	78.18	79.18	80.32	80.32	84.36	85.52
15.0	80.44	83.76	84.49	84.21	84.57	88.44	90.68	94.07	95.33	97.16	98.68	99.96	102.39	103.61	105.08	105.02	110.16	111.57
20.0	119.22	124.07	124.65	124.06	124.16	129.56	132.69	137.30	138.92	141.42	143.51	145.19	148.54	150.13	152.23	152.05	159.25	161.15
25.0	164.34	170.95	171.34	170.40	170.14	177.27	181.38	187.32	189.30	192.54	195.26	197.38	201.72	203.69	206.54	206.23	215.77	218.24
30.0	215.58	224.19	224.36	223.00	222.29	231.34	236.54	243.90	246.25	250.30	253.71	256.29	261.71	264.07	267.79	267.32	279.50	282.69
35.0	272.75	283.55	283.48	281.66	280.42	291.55	297.95	306.82	309.55	314.47	318.64	321.72	328.29	331.03	335.75	335.10	350.19	353.95
40.0	335.7	348.9	348.5	346.2	344.3	357.7	365.4	375.9	379.0	384.9	389.8	393.5	401.3	404.4	410.2	409.4	427.6	432.1
45.0	404.1	419.9	419.3	416.4	413.8	429.7	438.7	450.9	454.4	461.3	467.1	471.3	480.4	483.9	491.0	489.9	511.6	516.8
50.0	478.0	496.6	495.6	492.1	488.8	507.2	517.7	531.7	535.7	543.5	550.3	555.1	565.6	569.5	577.8	576.5	601.9	608.0
55.0	557.1	578.7	577.4	573.3	569.0	590.2	602.3	618.1	622.5	631.5	639.2	644.7	656.6	660.9	670.6	669.1	698.3	706.3
60.0	641.3	666.1	664.4	659.6	654.4	678.5	692.2	710.0	714.9	725.0	733.8	739.9	753.3	758.0	769.2	767.4	800.8	808.7
65.0	730.6	758.7	756.6	751.1	744.8	772.0	787.5	807.2	812.6	823.8	833.8	840.5	855.5	860.6	873.5	871.4	909.1	918.0
70.0	824.7	856.4	853.9	847.5	840.2	870.6	887.8	909.7	915.5	928.0	939.1	946.5	963.2	968.6	983.2	980.8	1023.1	1033.1
80.0	1027.1	1066.4	1062.9	1054.9	1045.1	1082.4	1103.5	1129.7	1136.5	1151.6	1165.1	1174.1	1194.3	1200.5	1218.7	1215.7	1267.8	1279.9
90.0	1247.7	1295.3	1290.8	1281.0	1268.4	1313.2	1338.3	1369.2	1377.1	1394.9	1411.1	1421.7	1445.6	1452.5	1474.8	1471.0	1533.8	1548.1
100.0	1485.8	1542.3	1536.7	1524.9	1509.3	1562.1	1591.5	1627.3	1636.3	1657.1	1676.0	1688.4	1716.2	1723.9	1750.5	1746.0	1820.1	1837.0
150.0	2917.	3027.	3014.	2991.	2956.	3056.	3111.	3174.	3189.	3227.	3262.	3285.	3335.	3347.	3399.	3390.	3532.	3564.
200.0	4703.	4878.	4859.	4821.	4760.	4918.	5003.	5099.	5120.	5177.	5234.	5268.	5345.	5363.	5446.	5431.	5610.	5706.
250.0	6780.	7029.	7022.	6966.	6874.	7098.	7212.	7346.	7369.	7451.	7536.	7579.	7683.	7715.	7835.	7812.	8012.	8187.
300.0	9102.	9433.	9463.	9386.	9257.	9541.	9680.	9857.	9878.	9988.	10111.	10158.	10291.	10341.	10504.	10471.	10691.	10953.
350.0	11636.	12066.	12105.	12028.	11861.	12205.	12370.	12594.	12621.	12763.	12917.	12969.	13131.	13203.	13410.	13368.	13609.	13964.
400.0	14355.	14871.	14949.	14863.	14653.	15062.	15256.	15528.	15544.	15717.	15924.	15981.	16175.	16268.	16524.	16472.	16736.	17188.
450.0	17236.	17854.	17962.	17866.	17611.	18088.	18312.	18636.	18649.	18856.	19107.	19171.	19397.	19512.	19819.	19756.	20046.	20601.
500.0	20261.	20985.	21124.	21017.	20715.	21263.	21519.	21896.	21906.	22148.	22446.	22516.	22776.	22914.	23274.	23201.	23519.	24178.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

48 TI IONS 22

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	31.20	31.07	23.78	22.79	23.17	21.30	18.47	17.69	17.21	16.83	15.80	14.90	14.19	13.82	13.68	13.20	11.86	12.35
3.0	29.24	29.37	22.96	22.03	22.44	20.75	18.05	17.34	16.91	16.59	15.59	14.74	14.06	13.72	13.59	13.14	11.93	12.33
3.5	27.47	27.77	22.08	21.20	21.62	20.09	17.53	16.87	16.48	16.22	15.25	14.44	13.81	13.48	13.37	12.94	11.86	12.17
4.0	25.88	26.31	21.20	20.38	20.80	19.40	16.96	16.36	16.00	15.78	14.85	14.08	13.48	13.18	13.08	12.67	11.70	11.94
4.5	24.46	24.98	20.35	19.58	20.00	18.71	16.39	15.83	15.51	15.32	14.42	13.69	13.12	12.84	12.75	12.37	11.49	11.67
5.0	23.19	23.77	19.55	18.82	19.24	18.05	15.84	15.32	15.02	14.86	13.99	13.29	12.76	12.50	12.41	12.05	11.26	11.39
5.5	22.06	22.67	18.81	18.10	18.52	17.42	15.31	14.82	14.54	14.40	13.57	12.90	12.40	12.15	12.07	11.73	11.00	11.10
6.0	21.02	21.68	18.11	17.44	17.85	16.82	14.80	14.34	14.08	13.97	13.17	12.53	12.05	11.82	11.74	11.42	10.74	10.81
6.5	20.09	20.77	17.46	16.82	17.22	16.26	14.32	13.89	13.65	13.55	12.78	12.16	11.71	11.49	11.42	11.11	10.49	10.53
7.0	19.24	19.94	16.85	16.24	16.64	15.73	13.87	13.46	13.24	13.15	12.41	11.82	11.38	11.17	11.11	10.82	10.24	10.26
8.0	17.76	18.48	15.75	15.19	15.58	14.77	13.04	12.68	12.48	12.42	11.72	11.17	10.77	10.59	10.54	10.27	9.77	9.75
9.0	16.50	17.23	14.79	14.27	14.65	13.92	12.31	11.98	11.80	11.76	11.10	10.59	10.22	10.05	10.01	9.76	9.33	9.29
10.0	15.42	16.15	13.95	13.47	13.83	13.17	11.66	11.35	11.19	11.16	10.54	10.07	9.72	9.57	9.53	9.30	8.92	8.86
11.0	14.49	15.21	13.20	12.75	13.10	12.49	11.07	10.79	10.66	10.63	10.04	9.59	9.27	9.13	9.10	8.89	8.55	8.47
12.0	13.67	14.38	12.54	12.11	12.45	11.89	10.55	10.29	10.15	10.15	9.59	9.16	8.86	8.73	8.70	8.51	8.20	8.11
15.0	11.73	12.40	10.91	10.55	10.85	10.40	9.25	9.04	8.93	8.94	8.45	8.09	7.83	7.73	7.71	7.55	7.32	7.21
20.0	9.55	10.16	9.03	8.73	8.99	8.66	7.71	7.55	7.47	7.50	7.09	6.80	6.59	6.52	6.51	6.38	6.22	6.11
25.0	8.11	8.67	7.74	7.49	7.72	7.45	6.65	6.52	6.46	6.49	6.14	5.89	5.71	5.66	5.65	5.55	5.44	5.33
30.0	7.08	7.59	6.80	6.58	6.79	6.57	5.87	5.76	5.71	5.74	5.43	5.21	5.06	5.02	5.02	4.93	4.84	4.74
35.0	6.31	6.78	6.09	5.90	6.08	5.89	5.27	5.17	5.13	5.16	4.89	4.69	4.56	4.53	4.53	4.45	4.38	4.28
40.0	5.703	6.143	5.524	5.361	5.521	5.355	4.794	4.709	4.674	4.703	4.456	4.281	4.157	4.132	4.133	4.068	4.005	3.914
45.0	5.217	5.630	5.068	4.911	5.067	4.920	4.407	4.331	4.301	4.329	4.103	3.943	3.830	3.809	3.811	3.753	3.699	3.614
50.0	4.818	5.206	4.691	4.546	4.692	4.559	4.086	4.017	3.991	4.019	3.809	3.661	3.557	3.539	3.542	3.490	3.442	3.364
55.0	4.483	4.851	4.374	4.240	4.376	4.255	3.816	3.753	3.729	3.756	3.561	3.423	3.326	3.311	3.314	3.267	3.224	3.151
60.0	4.198	4.548	4.103	3.978	4.106	3.995	3.584	3.526	3.504	3.531	3.348	3.219	3.128	3.116	3.119	3.076	3.037	2.968
65.0	3.953	4.287	3.869	3.751	3.872	3.770	3.383	3.329	3.310	3.336	3.163	3.042	2.956	2.945	2.949	2.910	2.873	2.809
70.0	3.739	4.058	3.666	3.554	3.668	3.573	3.208	3.157	3.139	3.165	3.001	2.887	2.806	2.796	2.800	2.763	2.730	2.669
80.0	3.385	3.679	3.325	3.225	3.329	3.245	2.915	2.870	2.855	2.879	2.731	2.628	2.554	2.547	2.551	2.519	2.489	2.435
90.0	3.102	3.376	3.053	2.961	3.057	2.982	2.680	2.639	2.626	2.650	2.514	2.419	2.351	2.346	2.350	2.322	2.295	2.246
100.0	2.871	3.128	2.830	2.746	2.834	2.767	2.487	2.450	2.439	2.461	2.335	2.248	2.185	2.180	2.185	2.159	2.134	2.090
150.0	2.146	2.347	2.129	2.066	2.132	2.086	1.877	1.851	1.844	1.864	1.769	1.704	1.656	1.655	1.659	1.642	1.623	1.594
200.0	1.761	1.949	1.768	1.713	1.757	1.731	1.557	1.529	1.535	1.553	1.472	1.450	1.403	1.374	1.380	1.362	1.376	1.328
250.0	1.539	1.705	1.548	1.500	1.535	1.518	1.365	1.326	1.347	1.364	1.293	1.274	1.232	1.208	1.213	1.193	1.210	1.169
300.0	1.387	1.538	1.398	1.355	1.387	1.372	1.234	1.188	1.219	1.234	1.171	1.152	1.115	1.094	1.099	1.081	1.096	1.060
350.0	1.277	1.417	1.289	1.249	1.279	1.265	1.139	1.098	1.125	1.140	1.081	1.064	1.030	1.011	1.016	0.999	1.013	0.980
400.0	1.194	1.325	1.207	1.169	1.197	1.185	1.067	1.029	1.054	1.068	1.014	0.997	0.965	0.948	0.952	0.937	0.950	0.920
450.0	1.129	1.253	1.142	1.106	1.134	1.122	1.010	0.976	0.998	1.012	0.960	0.944	0.914	0.899	0.903	0.889	0.901	0.872
500.0	1.077	1.195	1.090	1.056	1.082	1.071	0.965	0.933	0.954	0.967	0.918	0.902	0.874	0.859	0.863	0.850	0.861	0.834

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.59	11.06	11.11	11.20	11.11	10.49	10.17	9.62	9.42	9.18	9.01	8.86	8.55	8.44	8.36	8.38	8.04	7.95
3.0	11.59	11.08	11.12	11.21	11.14	10.55	10.24	9.72	9.53	9.30	9.14	9.00	8.70	8.59	8.50	8.53	8.18	8.08
3.5	11.46	10.96	11.01	11.09	11.04	10.47	10.18	9.69	9.52	9.30	9.14	9.01	8.72	8.61	8.52	8.54	8.19	8.10
4.0	11.26	10.78	10.82	10.90	10.86	10.32	10.04	9.58	9.42	9.21	9.06	8.93	8.66	8.56	8.46	8.49	8.13	8.04
4.5	11.02	10.55	10.59	10.67	10.65	10.13	9.86	9.43	9.28	9.08	8.93	8.82	8.56	8.45	8.36	8.38	8.03	7.94
5.0	10.76	10.31	10.35	10.43	10.41	9.92	9.66	9.25	9.11	8.92	8.78	8.67	8.42	8.32	8.23	8.25	7.91	7.82
5.5	10.50	10.06	10.10	10.18	10.17	9.70	9.45	9.06	8.93	8.75	8.61	8.51	8.27	8.18	8.09	8.11	7.76	7.68
6.0	10.24	9.81	9.85	9.92	9.92	9.47	9.24	8.87	8.75	8.57	8.44	8.34	8.12	8.02	7.93	7.95	7.62	7.53
6.5	9.98	9.57	9.60	9.68	9.68	9.25	9.02	8.67	8.56	8.39	8.26	8.17	7.96	7.87	7.77	7.79	7.46	7.38
7.0	9.73	9.33	9.37	9.44	9.45	9.03	8.81	8.48	8.37	8.21	8.09	8.00	7.79	7.71	7.62	7.64	7.31	7.23
8.0	9.254	8.881	8.914	8.981	9.000	8.615	8.409	8.104	8.009	7.861	7.747	7.662	7.476	7.394	7.306	7.324	7.014	6.938
9.0	8.818	8.466	8.497	8.561	8.586	8.227	8.033	7.754	7.668	7.530	7.424	7.344	7.171	7.097	7.011	7.028	6.730	6.658
10.0	8.418	8.085	8.114	8.176	8.205	7.868	7.687	7.428	7.350	7.221	7.121	7.048	6.886	6.817	6.733	6.750	6.464	6.395
11.0	8.053	7.736	7.764	7.824	7.855	7.539	7.368	7.127	7.056	6.935	6.840	6.772	6.621	6.556	6.474	6.490	6.215	6.150
12.0	7.718	7.417	7.444	7.501	7.536	7.236	7.074	6.849	6.783	6.669	6.580	6.516	6.374	6.313	6.233	6.249	5.984	5.922
15.0	6.870	6.605	6.630	6.681	6.719	6.462	6.322	6.135	6.082	5.985	5.907	5.853	5.733	5.683	5.608	5.622	5.386	5.330
20.0	5.828	5.608	5.629	5.673	5.714	5.503	5.389	5.242	5.203	5.125	5.061	5.018	4.922	4.884	4.817	4.830	4.628	4.582
25.0	5.084	4.894	4.913	4.951	4.992	4.813	4.717	4.595	4.564	4.499	4.445	4.408	4.328	4.299	4.238	4.249	4.073	4.033
30.0	4.526	4.358	4.375	4.409	4.449	4.293	4.209	4.105	4.079	4.023	3.976	3.945	3.876	3.852	3.796	3.806	3.649	3.614
35.0	4.091	3.940	3.956	3.987	4.025	3.886	3.812	3.721	3.699	3.650	3.608	3.580	3.519	3.500	3.448	3.457	3.316	3.284
40.0	3.742	3.605	3.620	3.648	3.685	3.559	3.492	3.412	3.393	3.349	3.310	3.286	3.231	3.215	3.167	3.175	3.046	3.017
45.0	3.456	3.330	3.344	3.370	3.405	3.291	3.229	3.157	3.140	3.100	3.065	3.043	2.993	2.979	2.934	2.942	2.823	2.797
50.0	3.217	3.100	3.113	3.138	3.172	3.065	3.009	2.943	2.928	2.892	2.859	2.839	2.793	2.781	2.739	2.746	2.635	2.611
55.0	3.014	2.904	2.917	2.940	2.973	2.874	2.822	2.761	2.747	2.714	2.684	2.665	2.623	2.612	2.572	2.579	2.475	2.453
60.0	2.840	2.736	2.748	2.770	2.802	2.709	2.660	2.604	2.592	2.560	2.532	2.515	2.476	2.466	2.428	2.435	2.337	2.316
65.0	2.688	2.590	2.601	2.622	2.653	2.565	2.519	2.468	2.456	2.427	2.400	2.384	2.347	2.339	2.302	2.309	2.216	2.196
70.0	2.554	2.462	2.472	2.492	2.522	2.439	2.396	2.347	2.336	2.309	2.284	2.268	2.234	2.226	2.192	2.198	2.109	2.091
80.0	2.330	2.246	2.256	2.274	2.302	2.227	2.188	2.145	2.136	2.111	2.088	2.074	2.044	2.037	2.005	2.011	1.930	1.914
90.0	2.150	2.072	2.081	2.098	2.124	2.056	2.020	1.982	1.973	1.951	1.930	1.917	1.889	1.884	1.854	1.859	1.785	1.770
100.0	2.001	1.929	1.937	1.953	1.978	1.915	1.882	1.846	1.839	1.819	1.799	1.788	1.762	1.757	1.729	1.734	1.665	1.651
150.0	1.526	1.471	1.477	1.490	1.510	1.463	1.439	1.414	1.409	1.394	1.380	1.371	1.353	1.349	1.328	1.332	1.279	1.269
200.0	1.271	1.228	1.228	1.238	1.256	1.217	1.198	1.178	1.174	1.163	1.151	1.144	1.129	1.126	1.109	1.112	1.098	1.062
250.0	1.119	1.081	1.069	1.078	1.095	1.064	1.053	1.036	1.036	1.024	1.009	1.007	0.996	0.988	0.973	0.976	0.969	0.939
300.0	1.015	0.980	0.970	0.973	0.988	0.965	0.956	0.939	0.940	0.929	0.916	0.914	0.905	0.898	0.884	0.887	0.881	0.853
350.0	0.939	0.907	0.897	0.900	0.914	0.893	0.884	0.869	0.870	0.861	0.848	0.847	0.836	0.832	0.819	0.822	0.816	0.791
400.0	0.8808	0.8508	0.8422	0.8450	0.8578	0.8385	0.8302	0.8164	0.8172	0.8083	0.7968	0.7954	0.7872	0.7818	0.7697	0.7722	0.7662	0.7432
450.0	0.8354	0.8070	0.7990	0.8017	0.8139	0.7957	0.7877	0.7748	0.7756	0.7672	0.7564	0.7550	0.7474	0.7424	0.7309	0.7332	0.7274	0.7059
500.0	0.7969	0.7718	0.7644	0.7669	0.7786	0.7613	0.7536	0.7413	0.7422	0.7342	0.7240	0.7228	0.7155	0.7107	0.6998	0.7020	0.6961	0.6760

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{48}_{22}$TI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.680	4.490	6.332	6.310	6.190	7.352	7.970	8.416	8.750	9.080	9.270	9.870	10.200	10.677	10.870	11.064	11.410	11.710
3.0	5.475	5.285	7.368	7.380	7.242	8.493	9.283	9.785	10.155	10.515	10.798	11.488	11.897	12.418	12.628	12.885	13.425	13.652
3.5	6.322	6.125	8.424	8.491	8.331	9.668	10.632	11.188	11.592	11.978	12.353	13.132	13.619	14.182	14.407	14.725	15.441	15.610
4.0	7.223	7.013	9.534	9.645	9.463	10.884	12.024	12.633	13.070	13.478	13.948	14.815	15.377	15.982	16.222	16.599	17.477	17.600
4.5	8.177	7.950	10.689	10.847	10.640	12.144	13.463	14.124	14.593	15.021	15.587	16.544	17.182	17.826	18.081	18.516	19.548	19.633
5.0	9.185	8.935	11.892	12.098	11.863	13.450	14.953	15.665	16.166	16.612	17.277	18.323	19.036	19.720	19.988	20.482	21.659	21.714
5.5	10.247	9.969	13.144	13.398	13.135	14.804	16.494	17.258	17.791	18.253	19.018	20.156	20.944	21.668	21.949	22.501	23.816	23.849
6.0	11.362	11.052	14.445	14.749	14.455	16.206	18.089	18.905	19.468	19.945	20.813	22.044	22.908	23.671	23.964	24.575	26.024	26.040
6.5	12.531	12.183	15.795	16.151	15.824	17.657	19.738	20.605	21.199	21.690	22.664	23.988	24.929	25.731	26.037	26.706	28.284	28.288
7.0	13.752	13.363	17.195	17.603	17.242	19.158	21.441	22.361	22.984	23.488	24.570	25.990	27.008	27.849	28.167	28.895	30.599	30.597
8.0	16.35	15.87	20.14	20.66	20.22	22.31	25.01	26.04	26.72	27.24	28.55	30.17	31.35	32.26	32.60	33.45	35.40	35.40
9.0	19.16	18.56	23.29	23.92	23.40	25.66	28.80	29.93	30.68	31.22	32.76	34.58	35.92	36.92	37.28	38.25	40.43	40.44
10.0	22.17	21.44	26.63	27.39	26.78	29.20	32.81	34.05	34.86	35.41	37.20	39.23	40.74	41.81	42.20	43.29	45.69	45.74
11.0	25.38	24.50	30.17	31.05	30.35	32.95	37.03	38.39	39.25	39.82	41.87	44.12	45.80	46.95	47.35	48.57	51.19	51.28
12.0	28.79	27.75	33.90	34.92	34.11	36.89	41.48	42.94	43.87	44.44	46.76	49.24	51.10	52.32	52.75	54.09	56.92	57.07
15.0	40.20	38.56	46.24	47.69	46.53	49.87	56.09	57.91	59.03	59.59	62.79	66.00	68.43	69.88	70.36	72.10	75.55	75.93
20.0	63.01	60.06	70.55	72.82	70.95	75.27	84.64	87.09	88.53	89.04	93.93	98.51	101.99	103.83	104.38	106.82	111.24	112.23
25.0	90.38	85.73	99.36	102.60	99.85	105.25	118.25	121.41	123.18	123.57	130.41	136.57	141.24	143.46	144.06	147.26	152.62	154.42
30.0	122.13	115.39	132.52	136.86	133.08	139.64	156.75	160.67	162.79	163.00	172.05	179.97	185.98	188.57	189.21	193.22	199.50	202.30
35.0	158.11	148.90	169.89	175.45	170.50	178.30	199.98	204.72	207.20	207.18	218.69	228.55	236.03	239.00	239.65	244.52	251.71	255.68
40.0	198.2	186.1	211.3	218.2	212.0	221.1	247.8	253.4	256.3	256.0	270.2	282.2	291.2	294.6	295.2	301.0	309.1	314.4
45.0	242.2	227.0	256.8	265.1	257.4	267.9	300.1	306.6	309.8	309.2	326.4	340.6	351.4	355.1	355.8	362.5	371.5	378.3
50.0	290.2	271.4	306.0	316.0	306.7	318.6	356.7	364.2	367.8	366.8	387.1	403.9	416.5	420.5	421.1	428.8	438.8	447.1
55.0	341.8	319.2	359.0	370.7	359.7	373.1	417.5	426.0	430.1	428.6	452.3	471.7	486.4	490.7	491.2	500.0	510.9	520.9
60.0	397.2	370.3	415.7	429.1	416.3	431.4	482.4	492.1	496.5	494.5	521.9	544.0	560.8	565.5	565.9	575.7	587.7	599.4
65.0	456.1	424.7	476.0	491.3	476.6	493.3	551.4	562.2	567.0	564.5	595.7	620.8	639.8	644.7	645.1	656.0	668.9	682.6
70.0	518.6	482.3	539.8	557.1	540.3	558.7	624.3	636.2	641.5	638.4	673.6	701.8	723.1	728.4	728.6	740.6	754.7	770.3
80.0	653.7	606.7	677.5	699.1	677.8	699.8	781.5	795.9	802.1	797.7	841.5	876.3	902.7	908.5	908.5	922.8	939.1	958.9
90.0	802.0	743.0	828.3	854.6	828.5	854.3	953.4	970.5	977.6	971.6	1024.9	1066.9	1098.8	1105.1	1104.8	1121.6	1140.1	1164.4
100.0	963.0	890.9	991.8	1023.1	991.7	1021.5	1139.5	1159.5	1167.5	1159.8	1223.2	1273.0	1310.8	1317.6	1316.8	1336.2	1357.2	1386.1
150.0	1944.	1789.	1983.	2045.	1982.	2035.	2265.	2302.	2315.	2295.	2420.	2516.	2589.	2598.	2594.	2628.	2664.	2718.
200.0	3187.	2920.	3230.	3331.	3230.	3308.	3681.	3738.	3753.	3717.	3919.	4039.	4165.	4201.	4193.	4243.	4271.	4380.
250.0	4651.	4242.	4687.	4834.	4699.	4795.	5333.	5430.	5428.	5373.	5665.	5812.	5997.	6071.	6055.	6136.	6138.	6314.
300.0	6298.	5728.	6322.	6521.	6348.	6462.	7186.	7348.	7306.	7227.	7620.	7798.	8050.	8164.	8139.	8254.	8227.	8475.
350.0	8104.	7357.	8112.	8369.	8153.	8287.	9213.	9453.	9359.	9254.	9757.	9969.	10296.	10450.	10414.	10567.	10508.	10834.
400.0	10050.	9111.	10039.	10358.	10094.	10249.	11393.	11713.	11566.	11432.	12052.	12303.	12705.	12905.	12858.	13050.	12957.	13365.
450.0	12119.	10976.	12085.	12470.	12156.	12333.	13707.	14111.	13908.	13743.	14487.	14779.	15263.	15508.	15448.	15681.	15554.	16047.
500.0	14298.	12938.	14238.	14692.	14325.	14525.	16139.	16629.	16369.	16171.	17045.	17381.	17950.	18242.	18168.	18445.	18281.	18864.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.30	12.77	13.79	14.06	14.58	15.34	15.79	16.38	16.73	17.07	17.43	17.81	18.19	18.53	18.97	19.13	20.52	20.96
3.0	14.37	14.93	15.95	16.20	16.74	17.62	18.14	18.86	19.26	19.67	20.07	20.49	20.97	21.34	21.81	21.96	23.47	23.95
3.5	16.45	17.11	18.12	18.35	18.90	19.90	20.49	21.33	21.77	22.25	22.70	23.16	23.72	24.13	24.63	24.77	26.40	26.91
4.0	18.56	19.31	20.31	20.53	21.09	22.20	22.86	23.82	24.31	24.84	25.33	25.83	26.48	26.92	27.45	27.59	29.34	29.88
4.5	20.72	21.56	22.56	22.75	23.32	24.55	25.27	26.34	26.87	27.46	28.00	28.53	29.27	29.75	30.31	30.43	32.31	32.89
5.0	22.92	23.86	24.85	25.03	25.60	26.94	27.73	28.91	29.48	30.13	30.71	31.28	32.09	32.61	33.20	33.32	35.32	35.93
5.5	25.18	26.22	27.19	27.36	27.93	29.39	30.24	31.53	32.14	32.84	33.47	34.07	34.97	35.51	36.14	36.25	38.38	39.03
6.0	27.49	28.64	29.60	29.75	30.32	31.89	32.81	34.21	34.86	35.61	36.28	36.92	37.89	38.48	39.13	39.24	41.50	42.18
6.5	29.87	31.11	32.07	32.20	32.77	34.46	35.44	36.95	37.63	38.44	39.16	39.83	40.88	41.50	42.19	42.29	44.69	45.40
7.0	32.30	33.65	34.60	34.71	35.28	37.08	38.13	39.75	40.47	41.33	42.09	42.80	43.93	44.58	45.31	45.40	47.94	48.69
8.0	37.36	38.92	39.85	39.92	40.49	42.52	43.71	45.54	46.33	47.31	48.15	48.93	50.22	50.94	51.74	51.82	54.64	55.46
9.0	42.68	44.46	45.37	45.40	45.95	48.23	49.55	51.59	52.46	53.55	54.49	55.33	56.78	57.57	58.45	58.51	61.63	62.53
10.0	48.25	50.27	51.15	51.14	51.67	54.19	55.66	57.92	58.85	60.06	61.09	62.00	63.61	64.47	65.44	65.48	68.90	69.88
11.0	54.08	56.34	57.20	57.14	57.65	60.43	62.04	64.52	65.52	66.85	67.97	68.95	70.72	71.65	72.71	72.73	76.48	77.54
12.0	60.17	62.67	63.52	63.41	63.89	66.93	68.69	71.39	72.46	73.90	75.12	76.18	78.11	79.11	80.27	80.27	84.35	85.50
15.0	79.98	83.29	84.05	83.79	84.16	88.02	90.26	93.64	94.91	96.73	98.25	99.54	101.96	103.19	104.66	104.60	109.75	111.16
20.0	118.06	122.87	123.49	122.92	123.04	128.42	131.52	136.11	137.73	140.21	142.29	143.97	147.30	148.89	150.98	150.81	157.98	159.89
25.0	162.27	168.81	169.25	168.33	168.10	175.17	179.25	185.13	187.10	190.32	193.02	195.12	199.42	201.39	204.23	203.92	213.40	215.85
30.0	212.40	220.89	221.11	219.80	219.13	228.07	233.22	240.49	242.83	246.84	250.21	252.78	258.13	260.47	264.17	263.71	275.77	278.83
35.0	268.26	278.90	278.89	277.12	276.93	286.91	293.23	301.98	304.70	309.56	313.67	316.73	323.21	325.93	330.59	329.96	344.86	348.59
40.0	329.7	342.7	342.4	340.1	338.3	351.5	359.1	369.4	372.5	378.3	383.2	386.8	394.5	397.6	403.3	402.5	420.5	424.9
45.0	396.5	412.0	411.4	408.6	406.1	421.7	430.6	442.6	446.1	452.8	458.6	462.7	471.7	475.2	482.1	481.1	502.4	507.6
50.0	468.5	486.8	485.9	482.5	479.2	497.3	507.7	521.4	525.3	533.1	539.7	544.5	554.8	558.6	566.8	565.6	590.5	596.5
55.0	545.5	566.8	565.6	561.6	557.4	578.3	590.1	605.6	610.0	618.8	626.4	631.8	643.5	647.7	657.3	655.8	684.5	691.4
60.0	627.7	652.0	650.4	645.7	640.6	664.3	677.8	695.2	700.0	709.9	718.5	724.5	737.7	742.3	753.4	751.6	784.4	792.2
65.0	714.6	742.2	740.2	734.8	728.7	755.4	770.5	789.9	795.2	806.2	815.9	822.6	837.3	842.3	854.9	852.9	889.9	898.6
70.0	806.3	837.3	834.9	828.7	821.6	851.4	868.2	889.6	895.4	907.6	918.5	925.8	942.2	947.5	961.8	959.5	1000.9	1010.7
80.0	1003.3	1041.7	1038.4	1030.6	1021.1	1057.6	1078.2	1103.8	1110.6	1125.4	1138.6	1147.4	1167.1	1173.2	1191.1	1188.1	1239.1	1250.9
90.0	1218.0	1264.4	1260.1	1250.6	1238.4	1282.2	1306.7	1336.9	1344.7	1362.1	1377.9	1388.3	1411.7	1418.5	1440.2	1436.6	1498.0	1512.0
100.0	1449.6	1504.7	1499.4	1487.9	1472.8	1524.3	1553.1	1588.1	1596.9	1617.2	1635.7	1647.8	1675.0	1682.6	1708.5	1704.1	1776.6	1793.1
150.0	2841.	2948.	2936.	2913.	2879.	2977.	3030.	3092.	3107.	3144.	3178.	3200.	3249.	3261.	3312.	3303.	3442.	3472.
200.0	4577.	4748.	4730.	4692.	4633.	4787.	4870.	4963.	4985.	5040.	5095.	5128.	5203.	5221.	5302.	5287.	5462.	5555.
250.0	6597.	6839.	6833.	6778.	6688.	6907.	7017.	7148.	7170.	7250.	7333.	7375.	7476.	7507.	7624.	7601.	7797.	7967.
300.0	8854.	9176.	9196.	9130.	9005.	9281.	9416.	9588.	9609.	9716.	9836.	9882.	10011.	10060.	10218.	10187.	10400.	10655.
350.0	11316.	11725.	11772.	11698.	11535.	11871.	12031.	12249.	12267.	12404.	12563.	12614.	12772.	12841.	13043.	13002.	13237.	13582.
400.0	13959.	14461.	14537.	14453.	14249.	14647.	14835.	15101.	15126.	15294.	15486.	15541.	15730.	15820.	16069.	16019.	16276.	16716.
450.0	16759.	17360.	17465.	17372.	17124.	17588.	17806.	18121.	18134.	18335.	18580.	18641.	18862.	18973.	19272.	19211.	19493.	20032.
500.0	19699.	20403.	20538.	20435.	20141.	20674.	20923.	21290.	21299.	21535.	21825.	21893.	22146.	22279.	22630.	22559.	22868.	23509.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{51}_{23}$V IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	33.37	33.08	25.25	24.19	24.60	22.58	19.57	18.74	18.23	17.82	16.73	15.77	15.01	14.62	14.47	13.95	12.53	13.06
3.0	31.33	31.35	24.44	23.44	23.87	22.05	19.18	18.41	17.95	17.61	16.55	15.64	14.92	14.55	14.41	13.92	12.65	13.07
3.5	29.48	29.70	23.54	22.60	23.04	21.38	18.65	17.95	17.53	17.24	16.22	15.35	14.67	14.33	14.20	13.74	12.60	12.93
4.0	27.81	28.18	22.64	21.75	22.20	20.68	18.08	17.43	17.05	16.81	15.82	14.99	14.35	14.03	13.91	13.48	12.44	12.70
4.5	26.31	26.79	21.76	20.93	21.37	19.98	17.50	16.90	16.55	16.34	15.38	14.60	13.99	13.69	13.59	13.18	12.24	12.44
5.0	24.97	25.52	20.93	20.14	20.59	19.30	16.93	16.37	16.04	15.87	14.95	14.19	13.62	13.34	13.25	12.86	12.00	12.15
5.5	23.76	24.37	20.15	19.40	19.84	18.64	16.38	15.85	15.55	15.40	14.52	13.80	13.25	12.99	12.90	12.53	11.75	11.86
6.0	22.66	23.32	19.42	18.70	19.14	18.02	15.85	15.36	15.08	14.95	14.10	13.41	12.89	12.64	12.56	12.21	11.49	11.56
6.5	21.67	22.36	18.74	18.05	18.49	17.44	15.35	14.89	14.63	14.52	13.69	13.03	12.54	12.30	12.23	11.90	11.23	11.27
7.0	20.77	21.48	18.10	17.44	17.87	16.88	14.88	14.44	14.20	14.11	13.31	12.67	12.20	11.98	11.91	11.59	10.98	10.99
8.0	19.19	19.92	16.95	16.34	16.76	15.88	14.02	13.62	13.41	13.34	12.59	12.00	11.56	11.37	11.31	11.02	10.48	10.46
9.0	17.85	18.60	15.94	15.37	15.77	14.98	13.25	12.89	12.69	12.65	11.94	11.39	10.99	10.81	10.76	10.49	10.02	9.98
10.0	16.70	17.45	15.04	14.52	14.90	14.18	12.56	12.23	12.05	12.02	11.36	10.84	10.46	10.30	10.26	10.01	9.60	9.53
11.0	15.69	16.44	14.25	13.76	14.13	13.47	11.94	11.64	11.48	11.46	10.82	10.34	9.99	9.84	9.80	9.57	9.20	9.12
12.0	14.82	15.56	13.54	13.08	13.44	12.83	11.38	11.10	10.95	10.94	10.34	9.88	9.55	9.42	9.38	9.17	8.84	8.74
15.0	12.73	13.44	11.81	11.41	11.74	11.25	10.00	9.77	9.66	9.66	9.14	8.74	8.46	8.35	8.33	8.15	7.90	7.79
20.0	10.38	11.03	9.79	9.47	9.75	9.38	8.36	8.19	8.10	8.12	7.69	7.36	7.14	7.06	7.05	6.91	6.74	6.62
25.0	8.82	9.42	8.41	8.14	8.38	8.09	7.22	7.08	7.01	7.04	6.66	6.39	6.20	6.14	6.14	6.02	5.90	5.78
30.0	7.71	8.26	7.40	7.16	7.38	7.14	6.38	6.26	6.21	6.24	5.91	5.67	5.50	5.46	5.45	5.36	5.26	5.15
35.0	6.87	7.38	6.62	6.42	6.62	6.41	5.73	5.63	5.58	5.61	5.32	5.11	4.96	4.92	4.92	4.84	4.76	4.65
40.0	6.215	6.669	6.016	5.827	6.012	5.830	5.219	5.127	5.088	5.120	4.851	4.660	4.525	4.497	4.498	4.427	4.359	4.260
45.0	5.687	6.132	5.522	5.350	5.521	5.360	4.801	4.718	4.685	4.716	4.469	4.294	4.171	4.148	4.150	4.087	4.028	3.936
50.0	5.253	5.673	5.113	4.955	5.114	4.969	4.453	4.378	4.349	4.379	4.151	3.990	3.876	3.856	3.859	3.803	3.750	3.665
55.0	4.890	5.287	4.769	4.623	4.771	4.639	4.160	4.091	4.065	4.095	3.882	3.732	3.626	3.609	3.613	3.561	3.514	3.434
60.0	4.580	4.958	4.475	4.339	4.478	4.357	3.909	3.845	3.821	3.850	3.651	3.510	3.411	3.397	3.401	3.364	3.311	3.236
65.0	4.313	4.674	4.221	4.093	4.225	4.113	3.691	3.631	3.610	3.639	3.450	3.318	3.225	3.213	3.216	3.173	3.134	3.063
70.0	4.081	4.426	3.999	3.878	4.003	3.899	3.500	3.444	3.425	3.463	3.274	3.150	3.061	3.051	3.055	3.015	2.978	2.912
80.0	3.695	4.014	3.629	3.520	3.633	3.542	3.181	3.132	3.116	3.142	2.980	2.868	2.787	2.779	2.784	2.749	2.716	2.657
90.0	3.387	3.684	3.333	3.233	3.338	3.256	2.926	2.881	2.867	2.893	2.744	2.641	2.567	2.561	2.565	2.534	2.505	2.452
100.0	3.136	3.414	3.090	2.998	3.095	3.021	2.716	2.675	2.663	2.687	2.550	2.454	2.386	2.381	2.385	2.357	2.330	2.282
150.0	2.345	2.563	2.326	2.258	2.329	2.278	2.051	2.022	2.015	2.036	1.933	1.862	1.810	1.808	1.812	1.794	1.773	1.741
200.0	1.924	2.129	1.932	1.872	1.920	1.892	1.701	1.671	1.677	1.697	1.609	1.585	1.533	1.501	1.508	1.488	1.504	1.451
250.0	1.681	1.862	1.692	1.640	1.678	1.659	1.492	1.449	1.472	1.490	1.413	1.392	1.346	1.320	1.326	1.304	1.322	1.278
300.0	1.516	1.680	1.528	1.481	1.516	1.499	1.349	1.299	1.332	1.349	1.279	1.259	1.218	1.196	1.201	1.181	1.198	1.158
350.0	1.396	1.548	1.409	1.365	1.398	1.383	1.245	1.200	1.230	1.246	1.182	1.163	1.125	1.105	1.110	1.092	1.107	1.071
400.0	1.305	1.448	1.319	1.278	1.309	1.295	1.166	1.125	1.152	1.167	1.108	1.089	1.055	1.036	1.041	1.025	1.038	1.005
450.0	1.234	1.369	1.248	1.209	1.239	1.226	1.104	1.066	1.091	1.106	1.050	1.032	0.999	0.982	0.987	0.971	0.984	0.953
500.0	1.177	1.306	1.192	1.154	1.183	1.171	1.055	1.019	1.043	1.057	1.003	0.986	0.955	0.939	0.943	0.929	0.941	0.911

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.25	11.69	11.74	11.83	11.74	11.08	10.75	10.16	9.95	9.69	9.51	9.36	9.02	8.91	8.82	8.85	8.49	8.39
3.0	12.28	11.74	11.78	11.87	11.80	11.17	10.85	10.29	10.10	9.85	9.67	9.53	9.21	9.09	9.00	9.02	8.65	8.55
3.5	12.17	11.64	11.68	11.77	11.72	11.12	10.80	10.28	10.10	9.86	9.69	9.55	9.25	9.14	9.04	9.06	8.69	8.59
4.0	11.98	11.46	11.50	11.59	11.55	10.98	10.68	10.18	10.01	9.79	9.63	9.49	9.20	9.09	8.99	9.02	8.64	8.54
4.5	11.74	11.24	11.28	11.37	11.34	10.79	10.50	10.04	9.88	9.67	9.51	9.38	9.11	9.00	8.90	8.92	8.55	8.45
5.0	11.48	11.00	11.04	11.12	11.10	10.58	10.30	9.86	9.72	9.51	9.36	9.24	8.98	8.87	8.77	8.79	8.42	8.33
5.5	11.21	10.75	10.78	10.86	10.86	10.35	10.09	9.67	9.53	9.34	9.19	9.08	8.83	8.73	8.63	8.65	8.28	8.19
6.0	10.94	10.49	10.53	10.61	10.61	10.13	9.87	9.47	9.35	9.16	9.02	8.91	8.67	8.57	8.47	8.49	8.13	8.04
6.5	10.68	10.24	10.28	10.35	10.36	9.90	9.65	9.27	9.15	8.97	8.84	8.73	8.51	8.41	8.31	8.33	7.98	7.89
7.0	10.42	10.00	10.03	10.11	10.12	9.67	9.43	9.08	8.96	8.79	8.66	8.56	8.34	8.25	8.15	8.17	7.82	7.74
8.0	9.928	9.528	9.561	9.633	9.652	9.239	9.017	8.690	8.587	8.428	8.306	8.214	8.013	7.926	7.832	7.851	7.517	7.436
9.0	9.473	9.094	9.126	9.195	9.221	8.834	8.627	8.325	8.233	8.084	7.970	7.885	7.698	7.618	7.525	7.544	7.223	7.145
10.0	9.054	8.695	8.726	8.792	8.822	8.460	8.264	7.986	7.901	7.762	7.655	7.575	7.402	7.327	7.236	7.254	6.946	6.872
11.0	8.670	8.329	8.358	8.422	8.456	8.114	7.930	7.670	7.593	7.463	7.361	7.286	7.124	7.054	6.965	6.982	6.686	6.615
12.0	8.318	7.992	8.021	8.082	8.118	7.795	7.621	7.378	7.307	7.184	7.087	7.018	6.864	6.799	6.713	6.729	6.444	6.376
15.0	7.420	7.134	7.160	7.215	7.256	6.978	6.827	6.624	6.566	6.461	6.378	6.319	6.189	6.135	6.054	6.069	5.813	5.753
20.0	6.312	6.072	6.096	6.142	6.187	5.959	5.835	5.675	5.632	5.548	5.479	5.432	5.328	5.287	5.215	5.228	5.009	4.959
25.0	5.516	5.309	5.330	5.371	5.415	5.221	5.116	4.984	4.950	4.879	4.821	4.781	4.694	4.662	4.596	4.608	4.416	4.373
30.0	4.917	4.734	4.753	4.790	4.832	4.663	4.571	4.459	4.431	4.370	4.318	4.284	4.209	4.183	4.123	4.133	3.963	3.925
35.0	4.449	4.284	4.302	4.335	4.377	4.225	4.144	4.046	4.022	3.968	3.922	3.892	3.826	3.805	3.749	3.758	3.604	3.570
40.0	4.073	3.923	3.939	3.970	4.010	3.873	3.800	3.713	3.692	3.644	3.602	3.575	3.516	3.498	3.446	3.455	3.313	3.283
45.0	3.764	3.626	3.641	3.670	3.708	3.583	3.516	3.437	3.419	3.375	3.337	3.313	3.259	3.244	3.195	3.203	3.073	3.044
50.0	3.505	3.377	3.391	3.418	3.455	3.339	3.278	3.206	3.190	3.150	3.115	3.092	3.043	3.030	2.984	2.991	2.870	2.844
55.0	3.285	3.166	3.179	3.204	3.240	3.132	3.075	3.009	2.994	2.957	2.925	2.904	2.858	2.847	2.803	2.811	2.697	2.673
60.0	3.096	2.983	2.996	3.020	3.054	2.953	2.900	2.839	2.825	2.791	2.761	2.742	2.699	2.688	2.647	2.654	2.547	2.524
65.0	2.931	2.825	2.837	2.860	2.893	2.798	2.748	2.691	2.678	2.646	2.617	2.600	2.560	2.550	2.511	2.518	2.416	2.395
70.0	2.786	2.685	2.697	2.719	2.751	2.661	2.613	2.560	2.548	2.519	2.491	2.474	2.437	2.428	2.391	2.397	2.301	2.281
80.0	2.543	2.451	2.462	2.482	2.512	2.430	2.388	2.341	2.330	2.304	2.279	2.264	2.230	2.223	2.188	2.194	2.106	2.088
90.0	2.347	2.262	2.272	2.290	2.319	2.244	2.206	2.163	2.154	2.129	2.107	2.093	2.062	2.056	2.024	2.030	1.949	1.932
100.0	2.185	2.106	2.115	2.132	2.160	2.090	2.055	2.016	2.008	1.985	1.964	1.952	1.924	1.918	1.888	1.893	1.818	1.802
150.0	1.667	1.607	1.614	1.627	1.650	1.598	1.572	1.545	1.539	1.523	1.507	1.498	1.478	1.474	1.451	1.455	1.397	1.386
200.0	1.389	1.341	1.342	1.353	1.372	1.330	1.309	1.288	1.283	1.271	1.258	1.250	1.234	1.230	1.212	1.216	1.200	1.161
250.0	1.223	1.181	1.169	1.178	1.196	1.162	1.151	1.131	1.131	1.119	1.102	1.100	1.088	1.080	1.063	1.067	1.059	1.026
300.0	1.109	1.071	1.060	1.063	1.079	1.055	1.044	1.026	1.027	1.016	1.001	0.999	0.989	0.981	0.966	0.969	0.962	0.932
350.0	1.026	0.991	0.981	0.984	0.999	0.976	0.966	0.950	0.951	0.941	0.927	0.925	0.916	0.909	0.895	0.898	0.891	0.864
400.0	0.9627	0.9299	0.9204	0.9236	0.9378	0.9165	0.9073	0.8923	0.8931	0.8834	0.8709	0.8693	0.8604	0.8545	0.8412	0.8439	0.8374	0.8123
450.0	0.9130	0.8820	0.8733	0.8762	0.8895	0.8696	0.8609	0.8468	0.8477	0.8385	0.8267	0.8252	0.8169	0.8114	0.7988	0.8014	0.7950	0.7715
500.0	0.8732	0.8435	0.8354	0.8382	0.8509	0.8320	0.8236	0.8103	0.8112	0.8024	0.7913	0.7898	0.7820	0.7768	0.7648	0.7672	0.7609	0.7388

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

51
V IONS
23

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.770	4.570	6.441	6.420	6.300	7.484	8.110	8.562	8.900	9.240	9.440	10.060	10.380	10.870	11.070	11.268	11.617	11.920
3.0	5.559	5.362	7.467	7.490	7.352	8.626	9.425	9.933	10.308	10.678	10.971	11.672	12.082	12.616	12.834	13.095	13.639	13.869
3.5	6.398	6.198	8.530	8.598	8.439	9.800	10.773	11.335	11.745	12.141	12.527	13.317	13.804	14.382	14.615	14.938	15.658	15.830
4.0	7.289	7.079	9.634	9.748	9.566	11.012	12.161	12.777	13.219	13.638	14.119	14.998	15.561	16.180	16.428	16.810	17.693	17.819
4.5	8.233	8.008	10.783	10.943	10.737	12.267	13.595	14.262	14.738	15.177	15.753	16.722	17.360	18.020	18.282	18.723	19.759	19.848
5.0	9.228	8.984	11.978	12.185	11.953	13.566	15.076	15.796	16.303	16.760	17.435	18.493	19.207	19.906	20.183	20.682	21.863	21.922
5.5	10.275	10.006	13.220	13.476	13.215	14.910	16.608	17.379	17.917	18.392	19.166	20.316	21.104	21.844	22.133	22.691	24.010	24.047
6.0	11.375	11.077	14.509	14.815	14.523	16.302	18.191	19.013	19.583	20.072	20.949	22.191	23.055	23.834	24.137	24.752	26.205	26.225
6.5	12.525	12.194	15.846	16.203	15.879	17.740	19.825	20.700	21.300	21.803	22.785	24.120	25.061	25.879	26.194	26.868	28.450	28.459
7.0	13.727	13.358	17.231	17.640	17.282	19.227	21.513	22.439	23.069	23.584	24.674	26.105	27.123	27.980	28.307	29.040	30.747	30.749
8.0	16.28	15.82	20.14	20.66	20.23	22.34	25.05	26.08	26.77	27.30	28.62	30.24	31.42	32.35	32.70	33.55	35.50	35.50
9.0	19.04	18.48	23.25	23.88	23.37	25.65	28.79	29.93	30.68	31.23	32.78	34.61	35.94	36.96	37.33	38.30	40.48	40.50
10.0	22.00	21.31	26.64	27.30	26.70	29.15	32.75	33.99	34.80	35.37	37.16	39.20	40.70	41.79	42.19	43.28	45.68	45.73
11.0	25.15	24.32	30.03	30.91	30.21	32.84	36.91	38.27	39.14	39.72	41.76	44.02	45.69	46.86	47.27	48.49	51.11	51.20
12.0	28.50	27.51	33.70	34.71	33.92	36.72	41.29	42.76	43.69	44.27	46.59	49.07	50.92	52.16	52.59	53.94	56.76	56.92
15.0	39.67	38.13	45.83	47.27	46.13	49.49	55.66	57.48	58.60	59.18	62.36	65.56	67.97	69.44	69.93	71.66	75.10	75.49
20.0	61.99	59.19	69.66	71.91	70.07	74.42	83.67	86.12	87.56	88.09	92.92	97.48	100.93	102.78	103.34	105.77	110.16	111.14
25.0	88.73	84.30	97.86	101.06	98.37	103.78	116.59	119.73	121.50	121.92	128.66	134.76	139.38	141.61	142.23	145.40	150.71	152.49
30.0	119.73	113.29	130.28	134.55	130.86	137.41	154.25	158.13	160.24	160.49	169.40	177.23	183.15	185.75	186.40	190.37	196.58	199.35
35.0	154.84	146.02	166.77	172.24	167.41	175.17	196.48	201.17	203.64	203.66	214.98	224.71	232.07	235.04	235.70	240.51	247.62	251.53
40.0	193.9	182.4	207.2	214.0	207.9	216.9	243.2	248.7	251.5	251.3	265.2	277.0	286.0	289.3	290.0	295.7	303.7	308.9
45.0	236.9	222.2	251.5	259.7	252.2	262.6	294.2	300.6	303.8	303.2	320.1	334.1	344.7	348.4	349.0	355.7	364.6	371.2
50.0	283.6	265.5	299.6	309.3	300.2	312.1	349.4	356.8	360.4	359.4	379.3	395.8	408.2	412.2	412.8	420.4	430.2	438.4
55.0	333.9	312.1	351.2	362.6	351.9	365.2	408.6	417.1	421.1	419.7	442.9	461.9	476.3	480.6	481.2	489.7	500.5	510.3
60.0	387.8	361.9	406.5	419.6	407.1	422.0	471.9	481.4	485.8	483.9	510.7	532.4	548.8	553.5	554.0	563.6	575.3	586.9
65.0	445.2	414.9	465.2	480.1	465.8	482.2	539.1	549.7	554.5	552.1	582.6	607.2	625.8	630.7	631.1	641.8	654.5	667.9
70.0	506.0	471.0	527.3	544.2	527.8	545.9	610.1	621.8	627.0	624.0	658.5	686.1	707.0	712.2	712.5	724.2	738.0	753.3
80.0	637.6	592.2	661.3	682.4	661.7	683.4	763.1	777.3	783.4	779.1	822.0	856.0	881.8	887.6	887.6	901.7	917.6	936.9
90.0	781.9	725.0	808.1	833.8	808.3	833.7	930.5	947.3	954.2	948.5	1000.5	1041.6	1072.7	1079.0	1078.7	1095.1	1113.3	1137.0
100.0	938.6	869.0	967.2	997.7	967.2	996.5	1111.6	1131.1	1139.0	1131.5	1193.5	1242.1	1279.0	1285.7	1285.0	1303.9	1324.6	1352.8
150.0	1893.	1743.	1932.	1992.	1930.	1982.	2207.	2242.	2255.	2236.	2368.	2451.	2523.	2531.	2528.	2560.	2596.	2649.
200.0	3102.	2843.	3144.	3242.	3144.	3220.	3583.	3639.	3663.	3619.	3815.	3933.	4055.	4090.	4083.	4132.	4159.	4265.
250.0	4525.	4129.	4560.	4703.	4572.	4666.	5190.	5284.	5282.	5228.	5513.	5656.	5836.	5908.	5893.	5972.	5974.	6145.
300.0	6126.	5574.	6150.	6344.	6175.	6287.	6991.	7149.	7108.	7031.	7414.	7587.	7832.	7943.	7919.	8031.	8005.	8246.
350.0	7882.	7158.	7891.	8140.	7930.	8061.	8962.	9195.	9104.	9002.	9491.	9698.	10015.	10165.	10131.	10280.	10222.	10539.
400.0	9774.	8863.	9763.	10074.	9818.	9969.	11081.	11393.	11249.	11119.	11722.	11966.	12357.	12552.	12506.	12693.	12603.	12999.
450.0	11786.	10676.	11753.	12127.	11822.	11994.	13330.	13723.	13526.	13366.	14089.	14373.	14844.	15082.	15024.	15251.	15128.	15607.
500.0	13904.	12584.	13845.	14287.	13931.	14125.	15695.	16171.	15918.	15726.	16576.	16903.	17457.	17740.	17669.	17938.	17778.	18345.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.52	12.99	14.04	14.31	14.85	15.62	16.08	16.67	17.03	17.38	17.74	18.13	18.51	18.86	19.31	19.47	20.88	21.33
3.0	14.60	15.17	16.21	16.46	17.02	17.91	18.44	19.16	19.57	19.98	20.39	20.82	21.30	21.69	22.17	22.32	23.85	24.33
3.5	16.68	17.35	18.38	18.62	19.18	20.19	20.79	21.64	22.09	22.57	23.03	23.49	24.06	24.48	24.99	25.14	26.79	27.31
4.0	18.79	19.55	20.58	20.80	21.37	22.50	23.17	24.13	24.63	25.16	25.66	26.17	26.83	27.28	27.82	27.96	29.73	30.28
4.5	20.94	21.80	22.82	23.02	23.60	24.84	25.57	26.65	27.19	27.78	28.33	28.87	29.61	30.10	30.67	30.80	32.70	33.28
5.0	23.14	24.09	25.10	25.29	25.87	27.23	28.02	29.22	29.79	30.44	31.03	31.61	32.43	32.95	33.55	33.68	35.70	36.32
5.5	25.39	26.44	27.44	27.61	28.20	29.67	30.53	31.83	32.44	33.15	33.78	34.39	35.29	35.85	36.48	36.60	38.76	39.41
6.0	27.69	28.84	29.83	29.98	30.57	32.16	33.08	34.49	35.14	35.91	36.58	37.23	38.21	38.80	39.47	39.58	41.86	42.55
6.5	30.05	31.30	32.28	32.42	33.00	34.71	35.69	37.21	37.90	38.72	39.44	40.12	41.18	41.80	42.50	42.61	45.03	45.75
7.0	32.46	33.82	34.79	34.91	35.50	37.31	38.37	39.99	40.72	41.59	42.35	43.07	44.20	44.86	45.60	45.70	48.26	49.01
8.0	37.48	39.05	40.00	40.08	40.66	42.71	43.90	45.73	46.53	47.52	48.37	49.15	50.44	51.17	51.99	52.07	54.91	55.74
9.0	42.74	44.53	45.46	45.50	46.06	48.35	49.68	51.73	52.60	53.70	54.63	55.49	56.94	57.73	58.63	58.69	61.83	62.73
10.0	48.25	50.27	51.18	51.17	51.72	54.25	55.72	57.99	58.92	60.13	61.16	62.09	63.69	64.56	65.54	65.59	69.03	70.01
11.0	54.01	56.26	57.15	57.10	57.63	60.41	62.02	64.51	65.51	66.84	67.96	68.95	70.72	71.66	72.73	72.76	76.51	77.58
12.0	60.01	62.51	63.38	63.28	63.78	66.82	68.59	71.29	72.36	73.80	75.02	76.09	78.01	79.02	80.19	80.20	84.29	85.43
15.0	79.52	82.81	83.61	83.36	83.75	87.60	89.83	93.21	94.48	96.29	97.81	99.10	101.52	102.74	104.22	104.17	109.32	110.73
20.0	116.92	121.70	122.35	121.80	121.95	127.29	130.38	134.94	136.55	139.02	141.09	142.76	146.07	147.66	149.75	149.59	156.72	158.62
25.0	160.25	166.73	167.21	166.32	166.12	173.12	177.17	183.00	184.96	188.15	190.82	192.92	197.18	199.14	201.96	201.66	211.07	213.51
30.0	209.32	217.69	217.97	216.69	216.07	224.90	230.00	237.19	239.51	243.47	246.81	249.36	254.65	256.98	260.64	260.20	272.13	275.17
35.0	263.92	274.40	274.45	272.73	271.60	282.44	288.67	297.31	300.00	304.80	308.86	311.89	318.28	320.98	325.59	324.99	339.70	343.39
40.0	323.9	336.7	336.5	334.3	332.5	345.5	353.0	363.2	366.3	371.9	376.8	380.3	387.9	391.0	396.6	395.8	413.6	416.0
45.0	389.1	404.4	403.9	401.1	398.7	414.1	422.8	434.6	438.1	444.7	450.4	454.5	463.3	466.7	473.5	472.6	493.6	498.7
50.0	459.4	477.3	476.5	473.2	470.0	487.8	498.0	511.5	515.4	523.0	529.5	534.2	544.3	548.1	556.2	555.0	579.5	585.4
55.0	534.6	555.3	554.2	550.3	546.3	566.7	578.4	593.6	597.9	606.6	614.1	619.3	630.9	635.0	644.4	643.0	671.2	678.0
60.0	614.6	638.4	636.9	632.3	627.4	650.6	663.8	680.9	685.7	695.4	703.9	709.8	722.7	727.2	738.1	736.4	768.5	776.2
65.0	699.2	726.2	724.4	719.1	713.2	739.4	754.2	773.2	778.4	789.2	798.8	805.3	819.8	824.7	837.1	835.1	871.4	879.9
70.0	788.5	818.9	816.6	810.6	803.7	832.9	849.4	870.4	876.1	888.1	898.7	905.9	921.9	927.2	941.2	938.9	979.6	989.1
80.0	980.4	1017.9	1014.8	1007.2	998.0	1033.7	1053.8	1079.0	1085.6	1100.1	1113.0	1121.7	1141.0	1147.0	1164.5	1161.6	1211.5	1223.1
90.0	1189.4	1234.8	1230.7	1221.4	1209.5	1252.3	1276.3	1305.9	1313.5	1330.6	1346.0	1356.2	1379.1	1385.8	1407.1	1403.5	1463.5	1477.3
100.0	1414.8	1468.7	1463.5	1452.4	1437.6	1488.0	1516.1	1550.3	1559.0	1578.8	1597.0	1608.8	1635.4	1642.8	1668.2	1663.9	1734.7	1750.9
150.0	2769.	2873.	2861.	2839.	2806.	2901.	2953.	3014.	3028.	3064.	3098.	3119.	3167.	3178.	3228.	3219.	3355.	3384.
200.0	4457.	4623.	4606.	4569.	4511.	4662.	4743.	4833.	4854.	4908.	4961.	4994.	5067.	5084.	5163.	5148.	5319.	5410.
250.0	6420.	6656.	6650.	6597.	6509.	6722.	6830.	6957.	6979.	7056.	7137.	7178.	7277.	7307.	7421.	7398.	7689.	7755.
300.0	8614.	8928.	8947.	8889.	8762.	9031.	9162.	9330.	9350.	9454.	9571.	9616.	9741.	9789.	9943.	9912.	10121.	10368.
350.0	11009.	11407.	11452.	11380.	11222.	11548.	11704.	11916.	11934.	12067.	12222.	12271.	12425.	12493.	12689.	12650.	12878.	13213.
400.0	13578.	14066.	14140.	14058.	13860.	14247.	14430.	14689.	14704.	14868.	15063.	15118.	15301.	15389.	15631.	15582.	15832.	16260.
450.0	16300.	16884.	16986.	16896.	16655.	17106.	17318.	17625.	17637.	17833.	18071.	18131.	18346.	18468.	18745.	18685.	18960.	19484.
500.0	19158.	19843.	19974.	19873.	19588.	20106.	20349.	20705.	20715.	20944.	21226.	21292.	21538.	21668.	22009.	21940.	22241.	22864.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{52}_{24}$CR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	35.57	35.10	26.74	25.61	26.03	23.87	20.69	19.80	19.26	18.82	17.66	16.65	15.84	15.42	15.26	14.72	13.22	13.77
3.0	33.47	33.35	25.93	24.87	25.31	23.36	20.31	19.50	19.00	18.64	17.51	16.54	15.78	15.38	15.24	14.72	13.37	13.81
3.5	31.53	31.65	25.02	24.02	24.48	22.70	19.79	19.04	18.59	18.28	17.19	16.27	15.55	15.18	15.05	14.56	13.34	13.69
4.0	29.78	30.07	24.09	23.15	23.62	21.98	19.21	18.52	18.11	17.85	16.79	15.91	15.23	14.88	14.76	14.30	13.20	13.47
4.5	28.20	28.63	23.19	22.30	22.77	21.26	18.62	17.97	17.60	17.38	16.36	15.52	14.88	14.55	14.44	14.00	13.00	13.21
5.0	26.79	27.30	22.33	21.48	21.96	20.56	18.03	17.43	17.08	16.90	15.91	15.11	14.50	14.19	14.09	13.68	12.76	12.92
5.5	25.51	26.09	21.52	20.71	21.18	19.89	17.47	16.90	16.58	16.42	15.47	14.70	14.12	13.83	13.74	13.35	12.51	12.62
6.0	24.35	24.99	20.76	19.99	20.45	19.24	16.92	16.39	16.09	15.95	15.04	14.30	13.75	13.48	13.39	13.02	12.25	12.32
6.5	23.30	23.98	20.05	19.31	19.77	18.63	16.40	15.90	15.62	15.51	14.62	13.91	13.38	13.13	13.05	12.69	11.98	12.03
7.0	22.36	23.05	19.38	18.67	19.13	18.06	15.91	15.44	15.18	15.08	14.22	13.54	13.03	12.79	12.72	12.38	11.72	11.74
8.0	20.66	21.41	18.17	17.52	17.96	17.00	15.01	14.58	14.35	14.28	13.47	12.84	12.37	12.16	12.09	11.78	11.21	11.19
9.0	19.24	20.00	17.10	16.50	16.92	16.06	14.20	13.81	13.60	13.55	12.79	12.20	11.77	11.57	11.52	11.23	10.73	10.68
10.0	18.01	18.78	16.16	15.59	16.01	15.22	13.48	13.12	12.93	12.89	12.18	11.62	11.22	11.04	10.99	10.73	10.29	10.21
11.0	16.94	17.71	15.32	14.79	15.19	14.47	12.82	12.50	12.32	12.30	11.62	11.10	10.72	10.56	10.52	10.27	9.87	9.78
12.0	16.00	16.77	14.57	14.07	14.46	13.80	12.24	11.93	11.77	11.76	11.11	10.62	10.26	10.11	10.08	9.86	9.49	9.39
15.0	13.76	14.50	12.73	12.30	12.66	12.12	10.77	10.52	10.40	10.41	9.84	9.41	9.11	8.99	8.97	8.78	8.51	8.38
20.0	11.24	11.93	10.58	10.23	10.53	10.13	9.03	8.84	8.74	8.77	8.30	7.95	7.70	7.62	7.61	7.46	7.27	7.14
25.0	9.56	10.20	9.10	8.80	9.07	8.76	7.81	7.65	7.58	7.61	7.20	6.91	6.70	6.64	6.63	6.51	6.37	6.24
30.0	8.36	8.95	8.01	7.76	8.00	7.73	6.91	6.78	6.72	6.75	6.39	6.13	5.95	5.90	5.90	5.80	5.69	5.57
35.0	7.46	8.00	7.18	6.96	7.17	6.95	6.21	6.10	6.05	6.08	5.76	5.53	5.37	5.33	5.33	5.24	5.16	5.04
40.0	6.747	7.255	6.526	6.321	6.521	6.323	5.660	5.559	5.518	5.551	5.260	5.052	4.906	4.875	4.876	4.799	4.725	4.618
45.0	6.176	6.654	5.993	5.807	5.992	5.816	5.209	5.119	5.083	5.116	4.849	4.659	4.525	4.499	4.502	4.433	4.369	4.269
50.0	5.707	6.158	5.552	5.381	5.553	5.394	4.834	4.763	4.721	4.764	4.506	4.330	4.207	4.186	4.188	4.127	4.070	3.977
55.0	5.313	5.741	5.180	5.021	5.182	5.038	4.518	4.442	4.414	4.446	4.215	4.052	3.937	3.919	3.922	3.867	3.816	3.728
60.0	4.978	5.386	4.862	4.714	4.865	4.733	4.246	4.176	4.161	4.182	3.965	3.813	3.705	3.690	3.694	3.643	3.596	3.514
65.0	4.688	5.077	4.587	4.448	4.591	4.469	4.010	3.946	3.922	3.953	3.749	3.605	3.503	3.490	3.494	3.447	3.404	3.328
70.0	4.436	4.809	4.347	4.215	4.351	4.238	3.804	3.743	3.722	3.752	3.558	3.423	3.326	3.315	3.319	3.276	3.236	3.164
80.0	4.018	4.362	3.946	3.827	3.951	3.851	3.459	3.405	3.387	3.416	3.240	3.117	3.030	3.021	3.026	2.988	2.953	2.888
90.0	3.683	4.005	3.625	3.516	3.630	3.541	3.182	3.133	3.118	3.146	2.984	2.872	2.791	2.785	2.789	2.756	2.724	2.666
100.0	3.410	3.712	3.362	3.262	3.367	3.286	2.954	2.910	2.896	2.923	2.773	2.669	2.595	2.590	2.594	2.564	2.535	2.482
150.0	2.552	2.788	2.531	2.457	2.535	2.480	2.232	2.201	2.193	2.216	2.104	2.026	1.970	1.968	1.972	1.952	1.929	1.895
200.0	2.095	2.317	2.103	2.038	2.090	2.059	1.852	1.819	1.825	1.847	1.751	1.725	1.669	1.634	1.641	1.620	1.637	1.579
250.0	1.830	2.027	1.842	1.785	1.827	1.806	1.625	1.578	1.603	1.623	1.539	1.515	1.466	1.437	1.443	1.419	1.440	1.391
300.0	1.650	1.829	1.664	1.612	1.650	1.632	1.469	1.414	1.450	1.468	1.393	1.371	1.327	1.302	1.308	1.286	1.304	1.261
350.0	1.520	1.685	1.534	1.486	1.522	1.506	1.356	1.306	1.339	1.356	1.287	1.266	1.225	1.203	1.209	1.189	1.206	1.166
400.0	1.421	1.576	1.436	1.391	1.425	1.410	1.270	1.225	1.254	1.271	1.206	1.186	1.148	1.128	1.133	1.116	1.131	1.094
450.0	1.343	1.491	1.359	1.317	1.349	1.336	1.202	1.161	1.188	1.204	1.143	1.124	1.088	1.069	1.075	1.058	1.072	1.038
500.0	1.281	1.422	1.297	1.257	1.288	1.275	1.148	1.110	1.135	1.151	1.092	1.073	1.040	1.022	1.027	1.011	1.025	0.992

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.91	12.33	12.38	12.47	12.37	11.68	11.32	10.70	10.48	10.21	10.02	9.86	9.51	9.39	9.29	9.31	8.94	8.83
3.0	12.98	12.40	12.45	12.54	12.47	11.80	11.46	10.87	10.66	10.40	10.21	10.06	9.72	9.60	9.50	9.52	9.13	9.03
3.5	12.88	12.32	12.37	12.46	12.40	11.76	11.43	10.88	10.68	10.43	10.25	10.11	9.78	9.66	9.56	9.58	9.18	9.08
4.0	12.70	12.16	12.20	12.29	12.24	11.63	11.32	10.79	10.61	10.37	10.20	10.08	9.75	9.63	9.53	9.55	9.15	9.05
4.5	12.47	11.94	11.98	12.07	12.04	11.45	11.15	10.65	10.48	10.26	10.09	9.96	9.66	9.55	9.44	9.46	9.07	8.96
5.0	12.21	11.69	11.73	11.82	11.80	11.24	10.95	10.48	10.32	10.11	9.94	9.82	9.54	9.42	9.32	9.34	8.95	8.85
5.5	11.94	11.44	11.48	11.56	11.55	11.02	10.73	10.29	10.14	9.93	9.78	9.66	9.39	9.28	9.18	9.20	8.81	8.71
6.0	11.66	11.18	11.22	11.30	11.30	10.78	10.51	10.09	9.95	9.75	9.60	9.49	9.23	9.12	9.02	9.04	8.66	8.56
6.5	11.39	10.92	10.96	11.04	11.05	10.55	10.29	9.89	9.76	9.56	9.42	9.31	9.07	8.96	8.86	8.88	8.50	8.41
7.0	11.12	10.67	10.70	10.79	10.80	10.32	10.07	9.68	9.56	9.38	9.24	9.13	8.90	8.80	8.69	8.71	8.34	8.25
8.0	10.61	10.18	10.22	10.30	10.32	9.87	9.64	9.29	9.18	9.00	8.87	8.78	8.56	8.47	8.37	8.39	8.03	7.94
9.0	10.14	9.73	9.77	9.84	9.87	9.45	9.23	8.91	8.81	8.65	8.53	8.43	8.24	8.15	8.05	8.07	7.72	7.64
10.0	9.70	9.32	9.35	9.42	9.45	9.06	8.85	8.55	8.46	8.31	8.20	8.11	7.93	7.85	7.75	7.77	7.44	7.36
11.0	9.30	8.93	8.96	9.03	9.07	8.70	8.50	8.22	8.14	8.00	7.89	7.81	7.64	7.56	7.47	7.48	7.17	7.09
12.0	8.93	8.58	8.61	8.68	8.71	8.37	8.18	7.92	7.84	7.71	7.61	7.53	7.37	7.30	7.20	7.22	6.91	6.84
15.0	7.984	7.676	7.703	7.762	7.806	7.506	7.343	7.124	7.062	6.950	6.859	6.795	6.655	6.597	6.510	6.526	6.250	6.186
20.0	6.809	6.551	6.575	6.625	6.673	6.427	6.293	6.121	6.074	5.983	5.909	5.857	5.745	5.701	5.622	5.636	5.400	5.346
25.0	5.961	5.737	5.759	5.804	5.851	5.641	5.528	5.385	5.348	5.272	5.208	5.165	5.071	5.038	4.965	4.977	4.770	4.724
30.0	5.320	5.122	5.142	5.182	5.228	5.045	4.946	4.824	4.793	4.727	4.671	4.635	4.553	4.525	4.460	4.471	4.286	4.245
35.0	4.819	4.640	4.659	4.696	4.740	4.576	4.488	4.382	4.355	4.297	4.247	4.215	4.143	4.120	4.059	4.070	3.902	3.866
40.0	4.415	4.252	4.270	4.303	4.346	4.198	4.118	4.024	4.001	3.949	3.904	3.875	3.810	3.791	3.734	3.744	3.591	3.557
45.0	4.082	3.933	3.949	3.980	4.022	3.886	3.813	3.728	3.708	3.660	3.619	3.593	3.534	3.518	3.464	3.473	3.332	3.301
50.0	3.804	3.665	3.680	3.709	3.749	3.624	3.557	3.479	3.461	3.418	3.379	3.355	3.302	3.287	3.237	3.246	3.114	3.086
55.0	3.567	3.437	3.451	3.479	3.517	3.400	3.338	3.267	3.250	3.210	3.175	3.153	3.103	3.090	3.043	3.051	2.927	2.901
60.0	3.362	3.240	3.254	3.280	3.317	3.207	3.149	3.083	3.068	3.031	2.998	2.977	2.931	2.919	2.874	2.882	2.766	2.741
65.0	3.184	3.069	3.082	3.106	3.142	3.039	2.985	2.923	2.909	2.875	2.843	2.824	2.780	2.770	2.727	2.735	2.624	2.601
70.0	3.027	2.918	2.930	2.954	2.989	2.891	2.839	2.782	2.769	2.736	2.707	2.688	2.647	2.638	2.597	2.604	2.500	2.478
80.0	2.784	2.684	2.678	2.698	2.730	2.642	2.595	2.544	2.533	2.504	2.477	2.460	2.424	2.416	2.378	2.385	2.289	2.269
90.0	2.552	2.460	2.470	2.490	2.521	2.440	2.398	2.352	2.342	2.315	2.291	2.278	2.242	2.236	2.201	2.207	2.119	2.100
100.0	2.376	2.290	2.300	2.319	2.349	2.273	2.235	2.193	2.183	2.159	2.136	2.123	2.092	2.086	2.053	2.059	1.977	1.960
150.0	1.814	1.749	1.757	1.771	1.796	1.739	1.711	1.681	1.675	1.658	1.640	1.630	1.608	1.604	1.579	1.584	1.521	1.508
200.0	1.512	1.460	1.460	1.472	1.494	1.448	1.425	1.402	1.397	1.383	1.369	1.361	1.343	1.339	1.319	1.323	1.306	1.264
250.0	1.332	1.286	1.272	1.283	1.302	1.266	1.253	1.231	1.232	1.218	1.200	1.198	1.186	1.178	1.157	1.161	1.153	1.117
300.0	1.208	1.166	1.154	1.158	1.175	1.148	1.137	1.117	1.118	1.106	1.090	1.088	1.076	1.069	1.052	1.055	1.048	1.015
350.0	1.117	1.079	1.068	1.071	1.087	1.063	1.052	1.035	1.035	1.024	1.009	1.008	0.997	0.990	0.976	0.978	0.971	0.941
400.0	1.048	1.013	1.002	1.006	1.021	0.998	0.988	0.972	0.972	0.962	0.948	0.946	0.937	0.930	0.916	0.919	0.912	0.884
450.0	0.994	0.960	0.951	0.954	0.969	0.947	0.937	0.922	0.923	0.913	0.900	0.898	0.889	0.883	0.870	0.873	0.866	0.840
500.0	0.951	0.918	0.910	0.913	0.927	0.906	0.897	0.882	0.883	0.874	0.862	0.860	0.851	0.846	0.833	0.836	0.828	0.804

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

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CR IONS
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E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.670	4.470	6.312	6.290	6.170	7.335	7.950	8.390	8.720	9.050	9.240	9.850	10.180	10.657	10.850	11.042	11.382	11.680
3.0	5.424	5.230	7.299	7.320	7.182	8.435	9.217	9.713	10.078	10.437	10.717	11.415	11.822	12.343	12.553	12.806	13.335	13.663
3.5	6.224	6.030	8.319	8.383	8.226	9.664	10.514	11.061	11.460	11.845	12.214	12.999	13.481	14.044	14.269	14.581	15.280	15.452
4.0	7.073	6.873	9.378	9.486	9.308	10.728	11.847	12.446	12.877	13.284	13.744	14.614	15.170	15.773	16.013	16.382	17.239	17.366
4.5	7.971	7.760	10.478	10.630	10.429	11.930	13.221	13.871	14.333	14.760	15.312	16.269	16.897	17.539	17.793	18.219	19.223	19.315
5.0	8.917	8.690	11.621	11.818	11.592	13.174	14.640	15.340	15.833	16.277	16.924	17.967	18.667	19.349	19.616	20.098	21.241	21.305
5.5	9.912	9.664	12.807	13.051	12.797	14.460	16.105	16.854	17.378	17.838	18.581	19.712	20.484	21.204	21.484	22.023	23.299	23.341
6.0	10.955	10.683	14.037	14.329	14.047	15.789	17.618	18.416	18.969	19.445	20.286	21.505	22.350	23.109	23.401	23.995	25.399	25.426
6.5	12.047	11.745	15.311	15.653	15.340	17.162	19.178	20.027	20.609	21.098	22.039	23.349	24.267	25.063	25.368	26.018	27.546	27.562
7.0	13.187	12.851	16.631	17.022	16.677	18.580	20.788	21.686	22.298	22.799	23.843	25.244	26.236	27.070	27.386	28.093	29.740	29.750
8.0	15.61	15.19	19.40	19.90	19.48	21.55	24.15	25.15	25.82	26.34	27.60	29.19	30.33	31.24	31.58	32.40	34.28	34.29
9.0	18.22	17.71	22.35	22.96	22.47	24.70	27.72	28.82	29.55	30.08	31.56	33.35	34.64	35.63	35.99	36.92	39.02	39.05
10.0	21.01	20.39	25.48	26.20	25.63	28.02	31.48	32.68	33.47	34.02	35.73	37.71	39.17	40.23	40.61	41.66	43.97	44.03
11.0	23.99	23.25	28.79	29.63	28.97	31.53	35.43	36.74	37.59	38.15	40.11	42.30	43.91	45.04	45.45	46.61	49.13	49.23
12.0	27.15	26.26	32.27	33.23	32.48	35.21	39.59	41.00	41.91	42.48	44.68	47.09	48.87	50.08	50.50	51.79	54.50	54.66
15.0	37.70	36.30	43.75	45.12	44.04	47.30	53.21	54.96	56.04	56.61	59.64	62.73	65.04	66.47	66.94	68.60	71.89	72.27
20.0	58.73	56.18	66.26	68.41	66.66	70.86	79.69	82.03	83.42	83.94	88.54	92.91	96.21	98.00	98.55	100.86	105.06	106.01
25.0	83.91	79.84	92.85	95.89	93.35	98.56	110.74	113.74	115.44	115.86	122.27	128.10	132.51	134.66	135.26	138.28	143.35	145.05
30.0	113.06	107.13	123.38	127.43	123.95	130.25	146.22	149.93	151.96	152.21	160.66	168.12	173.76	176.27	176.90	180.67	186.60	189.23
35.0	146.09	137.93	157.72	162.90	158.34	165.79	185.98	190.44	192.81	192.85	203.57	212.82	219.82	222.67	223.32	227.89	234.66	238.37
40.0	182.8	172.1	195.8	202.2	196.4	205.1	229.9	235.2	237.9	237.6	250.9	262.1	270.5	273.7	274.4	279.8	287.4	292.3
45.0	223.1	209.6	237.4	245.1	238.0	248.0	277.8	283.9	287.0	286.5	302.4	315.7	325.8	329.3	329.9	336.2	344.7	350.9
50.0	266.9	250.2	282.5	291.7	283.2	294.5	329.7	336.7	340.1	339.3	358.1	373.6	385.4	389.3	389.8	397.0	406.4	414.1
55.0	314.2	294.0	331.0	341.7	331.7	344.4	385.3	393.3	397.1	396.8	417.8	435.8	449.3	453.5	454.0	462.2	472.4	481.6
60.0	364.8	340.8	382.8	395.2	383.5	397.6	444.7	453.7	457.9	456.2	481.4	501.9	517.5	521.9	522.4	531.5	542.6	553.5
65.0	418.6	390.5	437.9	452.0	438.5	454.2	507.8	517.8	522.4	520.1	548.9	572.1	589.7	594.4	594.8	604.9	617.0	629.6
70.0	475.7	443.2	496.2	512.1	496.7	514.0	574.4	585.5	590.5	587.7	620.1	646.2	665.9	670.9	671.2	682.3	695.3	709.7
80.0	599.1	556.9	621.9	641.8	622.3	642.9	718.0	731.3	737.1	733.1	773.5	805.6	829.9	835.4	835.5	848.7	863.8	882.0
90.0	734.4	681.5	759.6	783.7	759.8	783.8	874.9	890.7	897.3	891.9	940.9	979.6	1008.9	1014.9	1014.6	1030.1	1047.4	1069.6
100.0	881.2	816.5	908.7	937.4	908.7	936.4	1044.7	1063.1	1070.5	1063.6	1121.8	1167.5	1202.3	1208.7	1208.1	1225.9	1245.4	1271.9
150.0	1775.	1636.	1812.	1869.	1811.	1860.	2071.	2104.	2116.	2099.	2213.	2301.	2368.	2376.	2373.	2403.	2437.	2486.
200.0	2908.	2667.	2948.	3040.	2948.	3020.	3360.	3412.	3428.	3394.	3578.	3688.	3803.	3836.	3829.	3875.	3901.	4000.
250.0	4241.	3871.	4274.	4408.	4286.	4373.	4865.	4953.	4952.	4901.	5168.	5302.	5472.	5539.	5525.	5599.	5601.	5761.
300.0	5741.	5225.	5764.	5945.	5787.	5892.	6552.	6700.	6662.	6590.	6948.	7111.	7341.	7445.	7422.	7527.	7503.	7729.
350.0	7386.	6709.	7394.	7627.	7430.	7553.	8398.	8616.	8531.	8435.	8893.	9087.	9385.	9526.	9494.	9633.	9579.	9876.
400.0	9157.	8306.	9147.	9438.	9198.	9340.	10383.	10674.	10540.	10418.	10983.	11211.	11578.	11760.	11718.	11893.	11809.	12180.
450.0	11041.	10004.	11010.	11361.	11075.	11237.	12488.	12856.	12672.	12522.	13200.	13466.	13907.	14130.	14076.	14289.	14173.	14622.
500.0	13025.	11791.	12969.	13384.	13050.	13232.	14703.	15148.	14912.	14732.	15528.	15835.	16353.	16619.	16552.	16804.	16655.	17186.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.27	12.73	13.76	14.02	14.55	15.30	15.75	16.34	16.69	17.03	17.39	17.77	18.14	18.48	18.92	19.08	20.47	20.91
3.0	14.28	14.83	15.85	16.10	16.64	17.51	18.03	18.74	19.15	19.55	19.96	20.37	20.84	21.21	21.68	21.83	23.34	23.82
3.5	16.28	16.94	17.94	18.18	18.73	19.71	20.30	21.13	21.58	22.05	22.49	22.95	23.50	23.91	24.41	24.55	26.18	26.69
4.0	18.32	19.06	20.06	20.28	20.84	21.94	22.58	23.53	24.02	24.55	25.04	25.53	26.16	26.60	27.13	27.27	29.01	29.55
4.5	20.38	21.22	22.21	22.41	22.98	24.19	24.90	25.96	26.49	27.06	27.60	28.12	28.84	29.31	29.87	30.00	31.86	32.44
5.0	22.49	23.42	24.40	24.59	25.16	26.48	27.25	28.42	28.98	29.62	30.19	30.75	31.55	32.06	32.64	32.77	34.75	35.36
5.5	24.64	25.67	26.64	26.81	27.39	28.81	29.65	30.92	31.52	32.21	32.83	33.42	34.29	34.83	35.45	35.57	37.68	38.32
6.0	26.85	27.97	28.94	29.09	29.66	31.20	32.10	33.47	34.11	34.85	35.51	36.14	37.09	37.66	38.31	38.42	40.66	41.33
6.5	29.10	30.32	31.28	31.41	31.99	33.64	34.60	36.08	36.75	37.55	38.25	38.91	39.93	40.53	41.22	41.32	43.69	44.39
7.0	31.41	32.73	33.68	33.80	34.37	36.13	37.15	38.73	39.44	40.29	41.03	41.73	42.82	43.46	44.18	44.28	46.77	47.52
8.0	36.20	37.72	38.65	38.73	39.30	41.28	42.43	44.22	44.99	45.95	46.78	47.54	48.78	49.49	50.28	50.36	53.13	53.94
9.0	41.21	42.94	43.86	43.90	44.45	46.66	47.95	49.94	50.78	51.84	52.76	53.58	54.98	55.75	56.62	56.68	59.73	60.61
10.0	46.46	48.40	49.30	49.30	49.84	52.28	53.70	55.89	56.80	57.98	58.98	59.87	61.41	62.25	63.20	63.25	66.59	67.55
11.0	51.93	54.10	54.98	54.94	55.46	58.14	59.70	62.09	63.07	64.35	65.44	66.40	68.10	69.00	70.04	70.07	73.72	74.75
12.0	57.64	60.04	60.90	60.82	61.31	64.24	65.93	68.54	69.58	70.98	72.15	73.18	75.03	76.01	77.13	77.15	81.11	82.22
15.0	76.15	79.30	80.09	79.86	80.25	83.95	86.09	89.34	90.57	92.32	93.78	95.02	97.34	98.52	99.95	99.90	104.87	106.23
20.0	111.54	116.10	116.75	116.24	116.40	121.51	124.47	128.84	130.39	132.77	134.75	136.36	139.52	141.04	143.05	142.90	149.76	151.58
25.0	152.45	158.62	159.12	158.28	158.12	164.80	168.66	174.24	176.12	179.17	181.73	183.73	187.80	189.67	192.37	192.10	201.10	203.44
30.0	198.71	206.67	206.98	205.78	205.21	213.63	218.48	225.34	227.57	231.35	234.54	236.97	242.00	244.23	247.72	247.31	258.70	261.60
35.0	250.14	260.08	260.18	258.56	257.52	267.82	273.75	281.97	284.55	289.11	292.98	295.87	301.95	304.52	308.91	308.35	322.35	325.87
40.0	306.6	318.7	318.5	316.5	314.9	327.2	334.3	344.0	346.9	352.3	356.9	360.3	367.5	370.4	375.8	375.0	391.9	396.1
45.0	367.9	382.3	381.9	379.4	377.1	391.6	400.0	411.2	414.5	420.7	426.1	430.0	438.4	441.6	448.1	447.2	467.1	472.0
50.0	433.9	450.9	450.2	447.1	444.1	461.0	470.6	483.4	487.1	494.3	500.5	505.0	514.6	518.2	525.8	524.7	547.9	553.5
55.0	504.5	524.2	523.2	519.5	515.8	535.1	546.1	560.6	564.7	572.9	580.0	585.0	595.8	599.8	608.7	607.4	634.1	640.5
60.0	579.7	602.1	600.8	596.5	591.9	613.9	626.4	642.5	647.1	656.2	664.3	669.9	682.1	686.4	696.7	695.1	725.5	732.7
65.0	659.2	684.6	682.9	678.0	672.5	697.2	711.2	729.2	734.1	744.4	753.4	759.6	773.2	777.9	789.6	787.7	822.0	830.1
70.0	742.9	771.6	769.5	763.9	757.4	785.0	800.6	820.4	825.8	837.1	847.2	854.0	869.1	874.1	887.3	885.2	923.6	932.6
80.0	922.9	958.3	955.4	948.3	939.7	973.4	992.4	1016.1	1022.4	1036.0	1048.3	1056.4	1074.7	1080.3	1096.8	1094.1	1141.2	1152.2
90.0	1118.9	1161.7	1157.9	1149.2	1138.1	1178.4	1201.0	1228.9	1236.1	1252.2	1266.8	1276.4	1297.9	1304.3	1324.3	1321.0	1377.6	1390.6
100.0	1330.3	1381.0	1376.2	1365.7	1351.9	1399.4	1425.8	1458.1	1466.3	1485.0	1502.1	1513.2	1538.2	1545.3	1569.2	1565.2	1631.9	1647.1
150.0	2599.	2697.	2686.	2665.	2634.	2724.	2773.	2829.	2843.	2876.	2908.	2928.	2973.	2984.	3031.	3023.	3150.	3178.
200.0	4180.	4336.	4320.	4286.	4232.	4373.	4449.	4534.	4553.	4604.	4654.	4685.	4753.	4769.	4844.	4830.	4990.	5075.
250.0	6019.	6240.	6235.	6185.	6103.	6303.	6404.	6523.	6543.	6616.	6692.	6730.	6823.	6851.	6958.	6938.	7116.	7272.
300.0	8074.	8368.	8386.	8326.	8213.	8465.	8588.	8745.	8764.	8862.	8971.	9013.	9131.	9176.	9320.	9292.	9487.	9719.
350.0	10316.	10689.	10732.	10666.	10516.	10822.	10968.	11167.	11184.	11309.	11454.	11500.	11645.	11708.	11892.	11855.	12069.	12384.
400.0	12722.	13180.	13249.	13173.	12987.	13350.	13522.	13764.	13778.	13931.	14115.	14166.	14338.	14420.	14647.	14601.	14836.	15237.
450.0	15271.	15819.	15915.	15830.	15604.	16027.	16226.	16513.	16525.	16708.	16931.	16988.	17202.	17290.	17563.	17507.	17765.	18256.
500.0	17948.	18589.	18712.	18618.	18351.	18836.	19064.	19398.	19407.	19621.	19886.	19948.	20178.	20300.	20620.	20555.	20837.	21421.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{55}_{25}$MN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	37.82	37.14	28.24	27.05	27.48	25.17	21.81	20.87	20.29	19.82	18.61	17.53	16.68	16.23	16.06	15.49	13.90	14.49
3.0	35.64	35.37	27.44	26.31	26.78	24.68	21.46	20.59	20.07	19.67	18.48	17.46	16.65	16.23	16.07	15.52	14.10	14.56
3.5	33.62	33.63	26.52	25.45	25.94	24.02	20.94	20.14	19.67	19.33	18.18	17.20	16.44	16.04	15.90	15.38	14.09	14.45
4.0	31.79	32.00	25.57	24.56	25.06	23.30	20.36	19.62	19.18	18.90	17.78	16.85	16.12	15.75	15.62	15.13	13.96	14.25
4.5	30.14	30.50	24.65	23.69	24.19	22.57	19.76	19.07	18.66	18.43	17.35	16.45	15.77	15.42	15.30	14.83	13.77	13.99
5.0	28.65	29.12	23.76	22.85	23.35	21.84	19.16	18.51	18.14	17.94	16.89	16.03	15.39	15.06	14.95	14.51	13.54	13.70
5.5	27.30	27.85	22.92	22.05	22.55	21.15	18.57	17.97	17.62	17.45	16.44	15.62	15.00	14.69	14.59	14.17	13.28	13.40
6.0	26.08	26.70	22.12	21.30	21.79	20.48	18.01	17.44	17.12	16.97	15.99	15.20	14.62	14.32	14.23	13.83	13.01	13.09
6.5	24.97	25.63	21.38	20.59	21.08	19.85	17.47	16.94	16.63	16.51	15.56	14.80	14.24	13.97	13.88	13.50	12.74	12.79
7.0	23.96	24.66	20.68	19.92	20.41	19.25	16.96	16.45	16.17	16.06	15.15	14.42	13.88	13.62	13.54	13.18	12.47	12.49
8.0	22.18	22.93	19.41	18.71	19.18	18.15	16.02	15.56	15.31	15.23	14.37	13.69	13.19	12.96	12.89	12.56	11.95	11.92
9.0	20.66	21.44	18.30	17.64	18.10	17.17	15.17	14.76	14.53	14.47	13.66	13.03	12.56	12.35	12.30	11.99	11.45	11.40
10.0	19.35	20.14	17.30	16.69	17.13	16.29	14.41	14.03	13.83	13.79	13.02	12.42	11.99	11.80	11.75	11.46	10.99	10.91
11.0	18.21	19.01	16.42	15.85	16.27	15.50	13.73	13.38	13.19	13.16	12.43	11.87	11.47	11.29	11.25	10.98	10.56	10.46
12.0	17.21	18.01	15.63	15.09	15.50	14.78	13.11	12.78	12.61	12.59	11.90	11.37	10.99	10.83	10.79	10.54	10.16	10.05
15.0	14.82	15.60	13.68	13.22	13.59	13.01	11.56	11.30	11.16	11.17	10.56	10.10	9.77	9.65	9.62	9.41	9.12	8.99
20.0	12.13	12.85	11.39	11.01	11.34	10.90	9.71	9.51	9.41	9.43	8.92	8.55	8.28	8.19	8.18	8.02	7.82	7.67
25.0	10.33	11.00	9.81	9.49	9.78	9.43	8.42	8.25	8.17	8.20	7.76	7.44	7.22	7.15	7.14	7.01	6.86	6.72
30.0	9.04	9.66	8.65	8.37	8.63	8.34	7.45	7.31	7.25	7.28	6.89	6.62	6.42	6.37	6.36	6.25	6.14	6.01
35.0	8.06	8.64	7.76	7.51	7.75	7.50	6.71	6.59	6.53	6.57	6.22	5.97	5.80	5.76	5.76	5.66	5.57	5.44
40.0	7.299	7.841	7.054	6.833	7.049	6.833	6.116	6.007	5.962	5.998	5.683	5.458	5.300	5.266	5.267	5.184	5.104	4.988
45.0	6.684	7.194	6.482	6.280	6.480	6.288	5.632	5.534	5.495	5.531	5.241	5.036	4.891	4.863	4.865	4.792	4.722	4.614
50.0	6.177	6.660	6.007	5.821	6.007	5.835	5.229	5.140	5.106	5.141	4.873	4.683	4.549	4.526	4.529	4.463	4.401	4.300
55.0	5.752	6.211	5.607	5.434	5.608	5.452	4.888	4.807	4.776	4.811	4.560	4.384	4.259	4.240	4.243	4.183	4.128	4.033
60.0	5.390	5.827	5.264	5.103	5.267	5.124	4.596	4.520	4.493	4.527	4.292	4.127	4.010	3.993	3.997	3.942	3.891	3.803
65.0	5.078	5.496	4.968	4.816	4.971	4.839	4.342	4.272	4.247	4.280	4.058	3.903	3.792	3.778	3.783	3.732	3.686	3.602
70.0	4.806	5.206	4.708	4.565	4.712	4.589	4.119	4.054	4.031	4.063	3.853	3.706	3.602	3.589	3.594	3.547	3.504	3.425
80.0	4.353	4.724	4.276	4.147	4.280	4.172	3.747	3.689	3.669	3.701	3.510	3.377	3.282	3.273	3.278	3.237	3.198	3.128
90.0	3.992	4.338	3.929	3.811	3.934	3.837	3.448	3.396	3.379	3.409	3.234	3.112	3.025	3.017	3.022	2.986	2.951	2.888
100.0	3.696	4.021	3.644	3.535	3.649	3.562	3.202	3.154	3.139	3.168	3.006	2.893	2.812	2.807	2.812	2.779	2.747	2.690
150.0	2.767	3.023	2.746	2.665	2.750	2.689	2.421	2.387	2.378	2.404	2.281	2.197	2.136	2.134	2.139	2.117	2.092	2.055
200.0	2.272	2.512	2.281	2.211	2.267	2.234	2.009	1.973	1.980	2.004	1.900	1.872	1.810	1.773	1.780	1.757	1.776	1.713
250.0	1.986	2.199	1.999	1.937	1.982	1.959	1.763	1.712	1.739	1.760	1.669	1.644	1.590	1.559	1.566	1.540	1.562	1.509
300.0	1.790	1.984	1.806	1.749	1.790	1.771	1.594	1.534	1.573	1.593	1.511	1.488	1.439	1.412	1.419	1.396	1.415	1.368
350.0	1.649	1.828	1.666	1.613	1.652	1.634	1.471	1.417	1.453	1.471	1.396	1.374	1.329	1.305	1.311	1.290	1.308	1.265
400.0	1.541	1.710	1.558	1.509	1.546	1.530	1.378	1.329	1.361	1.379	1.309	1.287	1.246	1.224	1.230	1.210	1.227	1.187
450.0	1.457	1.617	1.475	1.428	1.464	1.448	1.305	1.260	1.289	1.307	1.240	1.219	1.180	1.160	1.166	1.148	1.163	1.126
500.0	1.390	1.543	1.408	1.364	1.398	1.383	1.246	1.204	1.232	1.249	1.185	1.165	1.128	1.109	1.115	1.097	1.112	1.077

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.58	12.96	13.01	13.11	13.00	12.28	11.90	11.25	11.01	10.73	10.53	10.36	9.99	9.86	9.76	9.79	9.39	9.28
3.0	13.68	13.07	13.12	13.22	13.13	12.43	12.07	11.45	11.23	10.95	10.76	10.59	10.24	10.11	10.00	10.03	9.61	9.50
3.5	13.60	13.01	13.06	13.15	13.09	12.41	12.06	11.48	11.27	11.01	10.82	10.66	10.32	10.19	10.08	10.11	9.69	9.58
4.0	13.43	12.85	12.90	12.99	12.94	12.30	11.96	11.41	11.22	10.96	10.78	10.63	10.30	10.18	10.07	10.09	9.67	9.56
4.5	13.20	12.64	12.68	12.78	12.74	12.12	11.80	11.27	11.10	10.85	10.68	10.53	10.22	10.10	9.99	10.01	9.59	9.48
5.0	12.94	12.40	12.44	12.53	12.51	11.91	11.60	11.10	10.94	10.71	10.54	10.40	10.10	9.98	9.87	9.90	9.47	9.37
5.5	12.67	12.14	12.18	12.27	12.26	11.69	11.39	10.91	10.76	10.54	10.37	10.24	9.96	9.84	9.73	9.75	9.34	9.23
6.0	12.39	11.87	11.91	12.00	12.00	11.45	11.16	10.71	10.57	10.36	10.19	10.07	9.80	9.69	9.57	9.60	9.19	9.09
6.5	12.11	11.61	11.65	11.74	11.74	11.21	10.93	10.51	10.37	10.16	10.01	9.89	9.63	9.52	9.41	9.43	9.03	8.93
7.0	11.84	11.35	11.39	11.47	11.48	10.98	10.71	10.30	10.17	9.97	9.82	9.71	9.46	9.35	9.24	9.27	8.87	8.77
8.0	11.31	10.85	10.89	10.97	10.99	10.52	10.26	9.89	9.77	9.59	9.45	9.34	9.12	9.02	8.91	8.93	8.55	8.45
9.0	10.82	10.39	10.42	10.50	10.53	10.08	9.84	9.50	9.39	9.22	9.09	8.99	8.78	8.69	8.58	8.60	8.23	8.15
10.0	10.36	9.95	9.98	10.06	10.09	9.68	9.45	9.13	9.04	8.88	8.75	8.66	8.46	8.37	8.27	8.29	7.94	7.85
11.0	9.94	9.55	9.58	9.65	9.69	9.30	9.09	8.79	8.70	8.55	8.43	8.35	8.16	8.08	7.98	8.00	7.66	7.57
12.0	9.56	9.18	9.21	9.28	9.32	8.95	8.75	8.47	8.39	8.25	8.13	8.05	7.88	7.80	7.70	7.72	7.39	7.31
15.0	8.561	8.230	8.259	8.321	8.369	8.047	7.872	7.637	7.570	7.449	7.352	7.283	7.133	7.070	6.977	6.994	6.697	6.628
20.0	7.319	7.041	7.067	7.121	7.172	6.907	6.763	6.577	6.527	6.429	6.349	6.294	6.173	6.126	6.041	6.056	5.802	5.743
25.0	6.419	6.178	6.201	6.249	6.300	6.074	5.951	5.797	5.757	5.675	5.606	5.560	5.458	5.421	5.344	5.357	5.134	5.084
30.0	5.736	5.522	5.544	5.587	5.637	5.438	5.331	5.200	5.167	5.096	5.035	4.996	4.907	4.878	4.807	4.819	4.619	4.575
35.0	5.200	5.008	5.028	5.067	5.115	4.938	4.843	4.728	4.700	4.637	4.583	4.548	4.470	4.445	4.380	4.391	4.210	4.170
40.0	4.768	4.593	4.611	4.648	4.694	4.533	4.447	4.345	4.320	4.264	4.215	4.184	4.114	4.093	4.032	4.042	3.877	3.841
45.0	4.412	4.250	4.268	4.301	4.346	4.199	4.120	4.028	4.006	3.955	3.911	3.882	3.819	3.801	3.743	3.753	3.600	3.567
50.0	4.113	3.963	3.979	4.011	4.054	3.918	3.845	3.761	3.742	3.695	3.654	3.628	3.569	3.554	3.499	3.509	3.366	3.335
55.0	3.858	3.717	3.733	3.763	3.804	3.678	3.611	3.533	3.515	3.472	3.434	3.410	3.356	3.342	3.291	3.299	3.166	3.137
60.0	3.638	3.506	3.521	3.549	3.589	3.470	3.408	3.336	3.320	3.280	3.243	3.221	3.171	3.159	3.110	3.118	2.992	2.965
65.0	3.447	3.321	3.336	3.362	3.401	3.289	3.230	3.164	3.149	3.111	3.077	3.056	3.009	2.998	2.952	2.960	2.840	2.815
70.0	3.278	3.159	3.173	3.198	3.236	3.130	3.074	3.012	2.998	2.962	2.930	2.910	2.866	2.856	2.812	2.819	2.706	2.682
80.0	2.994	2.886	2.898	2.922	2.957	2.861	2.811	2.756	2.743	2.712	2.683	2.665	2.625	2.617	2.576	2.583	2.479	2.458
90.0	2.765	2.665	2.677	2.698	2.732	2.644	2.598	2.548	2.537	2.509	2.482	2.466	2.429	2.422	2.384	2.391	2.295	2.276
100.0	2.575	2.482	2.493	2.513	2.545	2.464	2.422	2.376	2.366	2.340	2.315	2.300	2.267	2.261	2.225	2.231	2.142	2.124
150.0	1.967	1.897	1.905	1.921	1.947	1.886	1.855	1.823	1.816	1.798	1.779	1.768	1.744	1.739	1.712	1.718	1.649	1.635
200.0	1.640	1.584	1.584	1.597	1.621	1.570	1.545	1.520	1.515	1.501	1.485	1.476	1.457	1.453	1.431	1.435	1.417	1.371
250.0	1.445	1.395	1.380	1.392	1.413	1.373	1.359	1.335	1.336	1.321	1.302	1.300	1.285	1.276	1.256	1.260	1.251	1.211
300.0	1.310	1.266	1.252	1.258	1.275	1.246	1.234	1.212	1.213	1.200	1.182	1.180	1.168	1.159	1.141	1.145	1.137	1.101
350.0	1.212	1.171	1.158	1.162	1.180	1.153	1.142	1.123	1.123	1.111	1.095	1.093	1.082	1.074	1.057	1.061	1.053	1.021
400.0	1.137	1.099	1.087	1.091	1.108	1.083	1.072	1.054	1.055	1.044	1.029	1.027	1.016	1.009	0.994	0.997	0.989	0.960
450.0	1.079	1.042	1.032	1.035	1.051	1.027	1.017	1.000	1.001	0.991	0.977	0.975	0.965	0.959	0.944	0.947	0.939	0.912
500.0	1.032	0.997	0.987	0.990	1.005	0.983	0.973	0.957	0.958	0.948	0.935	0.933	0.924	0.918	0.904	0.908	0.899	0.873

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

56
MN IONS
25

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.750	4.550	6.421	6.400	6.280	7.466	8.090	8.536	8.870	9.210	9.410	10.030	10.370	10.849	11.040	11.234	11.584	11.890
3.0	5.499	5.309	7.408	7.430	7.293	8.569	9.360	9.861	10.231	10.601	10.891	11.600	12.018	12.542	12.749	13.006	13.546	13.781
3.5	6.294	6.106	8.427	8.493	8.336	9.698	10.657	11.211	11.616	12.010	12.391	13.186	13.679	14.246	14.469	14.784	15.495	15.675
4.0	7.135	6.945	9.483	9.592	9.415	10.860	11.989	12.594	13.031	13.448	13.919	14.801	15.368	15.975	16.213	16.587	17.455	17.690
4.5	8.024	7.825	10.579	10.733	10.532	12.059	13.360	14.016	14.484	14.922	15.485	16.453	17.092	17.739	17.992	18.422	19.438	19.538
5.0	8.960	8.748	11.715	11.915	11.689	13.298	14.773	15.479	15.978	16.434	17.091	18.147	18.858	19.544	19.810	20.297	21.452	21.524
5.5	9.944	9.714	12.894	13.140	12.888	14.578	16.231	16.987	17.517	17.989	18.742	19.885	20.668	21.393	21.673	22.215	23.503	23.554
6.0	10.974	10.723	14.115	14.409	14.129	15.899	17.735	18.541	19.100	19.587	20.438	21.669	22.526	23.289	23.581	24.179	25.595	25.630
6.5	12.052	11.774	15.380	15.723	15.412	17.263	19.286	20.141	20.730	21.231	22.181	23.502	24.432	25.233	25.538	26.191	27.730	27.756
7.0	13.177	12.868	16.688	17.081	16.738	18.670	20.883	21.789	22.407	22.920	23.973	25.385	26.388	27.227	27.544	28.253	29.912	29.931
8.0	15.56	15.18	19.43	19.93	19.52	21.61	24.22	25.23	25.90	26.44	27.70	29.30	30.45	31.37	31.71	32.53	34.42	34.44
9.0	18.14	17.67	22.35	22.96	22.47	24.73	27.75	28.86	29.59	30.14	31.63	33.42	34.73	35.72	36.08	37.01	39.12	39.16
10.0	20.69	20.31	25.45	26.16	25.60	28.02	31.47	32.68	33.47	34.04	35.75	37.75	39.21	40.27	40.65	41.71	44.02	44.09
11.0	23.62	23.13	28.71	29.55	28.89	31.48	35.38	36.70	37.55	38.12	40.08	42.28	43.90	45.04	45.44	46.61	49.13	49.24
12.0	26.93	26.10	32.14	33.11	32.36	35.12	39.48	40.90	41.81	42.40	44.60	47.01	48.80	50.01	50.43	51.72	54.44	54.61
15.0	37.29	35.97	43.46	44.82	43.75	47.04	52.91	54.67	55.75	56.34	59.35	62.44	64.76	66.19	66.66	68.32	71.61	72.00
20.0	57.92	55.50	65.59	67.72	66.00	70.23	78.97	81.32	82.70	83.25	87.80	92.16	95.45	97.24	97.79	100.09	104.28	105.23
25.0	82.58	78.71	91.70	94.70	92.20	97.43	109.48	112.47	114.17	114.61	120.94	126.74	131.12	133.27	133.87	136.87	141.91	143.61
30.0	111.13	105.47	121.63	125.63	122.21	128.51	144.28	147.96	149.99	150.27	158.61	166.01	171.60	174.10	174.74	178.48	184.36	186.97
35.0	143.41	135.63	155.26	160.37	155.90	163.33	183.24	187.66	190.02	190.10	200.67	209.82	218.09	219.59	220.24	224.76	231.48	235.14
40.0	179.3	169.1	192.5	198.8	193.2	201.8	226.2	231.4	234.1	234.0	247.0	258.0	266.4	269.6	270.2	275.6	283.1	288.0
45.0	218.7	205.7	233.2	240.8	233.9	243.8	273.1	279.2	282.2	281.8	297.4	310.6	320.5	324.0	324.6	330.8	339.2	345.4
50.0	261.6	245.5	277.3	286.4	278.0	289.2	323.8	330.8	334.2	333.4	351.9	367.2	378.8	382.6	383.3	390.3	399.6	407.2
55.0	307.7	288.3	324.7	335.3	325.4	338.0	378.3	386.2	389.9	388.7	410.3	428.0	441.3	445.5	446.0	454.0	464.1	473.2
60.0	357.2	334.0	375.4	387.5	376.1	390.1	436.3	445.2	449.3	447.7	472.4	492.7	507.9	512.3	512.8	521.8	532.8	543.5
65.0	409.7	382.7	429.2	443.0	429.8	445.3	497.9	507.8	512.3	510.2	538.4	561.2	578.5	583.2	583.6	593.5	605.5	617.8
70.0	465.4	434.1	486.1	501.7	486.7	503.7	563.0	573.9	578.8	576.2	607.9	633.6	652.9	657.9	658.2	669.1	682.0	696.1
80.0	585.9	545.2	608.8	628.3	609.3	629.6	703.2	716.3	722.0	718.2	757.7	789.2	813.1	818.6	818.7	831.7	846.5	864.4
90.0	718.0	666.8	743.2	766.8	743.5	767.2	856.4	871.9	878.4	873.2	921.2	959.1	987.9	993.8	993.6	1008.8	1025.8	1047.5
100.0	861.3	798.6	888.7	916.8	888.8	916.1	1022.1	1040.1	1047.5	1040.7	1097.7	1142.6	1176.6	1183.0	1182.4	1199.9	1219.1	1245.0
150.0	1733.	1598.	1770.	1825.	1769.	1817.	2023.	2056.	2067.	2051.	2162.	2248.	2314.	2321.	2319.	2349.	2381.	2430.
200.0	2838.	2604.	2878.	2967.	2878.	2948.	3282.	3331.	3345.	3313.	3493.	3600.	3713.	3746.	3739.	3784.	3809.	3906.
250.0	4138.	3779.	4171.	4302.	4182.	4268.	4747.	4834.	4832.	4783.	5043.	5175.	5340.	5406.	5392.	5464.	5466.	5623.
300.0	5600.	5099.	5623.	5799.	5645.	5748.	6392.	6536.	6499.	6429.	6779.	6938.	7162.	7263.	7241.	7344.	7321.	7541.
350.0	7204.	6545.	7212.	7439.	7247.	7367.	8191.	8406.	8322.	8228.	8675.	8866.	9153.	9292.	9261.	9397.	9345.	9634.
400.0	8931.	8103.	8921.	9204.	8971.	9110.	10127.	10410.	10280.	10161.	10712.	10935.	11293.	11471.	11429.	11600.	11519.	11881.
450.0	10768.	9758.	10737.	11079.	10800.	10958.	12179.	12538.	12358.	12212.	12873.	13133.	13563.	13781.	13728.	13935.	13823.	14261.
500.0	12701.	11500.	12647.	13061.	12725.	12903.	14337.	14772.	14542.	14366.	15143.	15442.	15948.	16207.	16142.	16388.	16243.	16761.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.49	12.96	14.01	14.28	14.82	15.58	16.04	16.63	16.98	17.33	17.69	18.08	18.46	18.81	19.26	19.42	20.83	21.28
3.0	14.50	15.07	16.11	16.37	16.92	17.80	18.33	19.05	19.45	19.86	20.27	20.70	21.17	21.56	22.04	22.19	23.72	24.20
3.5	16.52	17.18	18.21	18.45	19.01	20.02	20.61	21.45	21.89	22.36	22.82	23.28	23.85	24.27	24.77	24.92	26.57	27.08
4.0	18.55	19.31	20.33	20.55	21.13	22.24	22.90	23.85	24.34	24.87	25.36	25.86	26.51	26.96	27.50	27.64	29.41	29.96
4.5	20.62	21.46	22.48	22.69	23.27	24.49	25.21	26.27	26.80	27.39	27.92	28.46	29.19	29.67	30.24	30.38	32.26	32.84
5.0	22.72	23.66	24.67	24.86	25.44	26.78	27.56	28.73	29.30	29.94	30.52	31.09	31.89	32.41	33.01	33.14	35.15	35.76
5.5	24.87	25.90	26.90	27.08	27.66	29.11	29.95	31.23	31.83	32.52	33.15	33.75	34.64	35.19	35.82	35.94	38.07	38.72
6.0	27.06	28.19	29.19	29.34	29.93	31.49	32.39	33.77	34.41	35.16	35.82	36.46	37.42	38.00	38.67	38.78	41.04	41.72
6.5	29.31	30.53	31.52	31.66	32.25	33.91	34.88	36.36	37.04	37.84	38.54	39.21	40.25	40.87	41.56	41.67	44.06	44.77
7.0	31.61	32.93	33.91	34.03	34.62	36.39	37.42	39.01	39.72	40.57	41.32	42.02	43.13	43.78	44.51	44.61	47.13	47.88
8.0	36.36	37.88	38.85	38.93	39.51	41.51	42.67	44.46	45.24	46.19	47.03	47.79	49.05	49.77	50.57	50.66	53.45	54.26
9.0	41.33	43.07	44.01	44.06	44.63	46.85	48.14	50.13	50.98	52.04	52.96	53.79	55.20	55.98	56.86	56.93	60.00	60.89
10.0	46.53	48.48	49.41	49.41	49.96	52.42	53.85	56.04	56.95	58.12	59.13	60.03	61.58	62.43	63.39	63.45	66.81	67.77
11.0	51.95	54.12	55.03	55.00	55.53	58.22	59.78	62.18	63.15	64.44	65.53	66.50	68.20	69.12	70.17	70.20	73.86	74.90
12.0	57.59	59.99	60.89	60.81	61.31	64.25	65.95	68.55	69.59	70.99	72.17	73.21	75.06	76.05	77.18	77.20	81.18	82.29
15.0	75.86	79.01	79.83	79.61	80.02	83.72	85.86	89.10	90.33	92.07	93.54	94.78	97.10	98.29	99.72	99.69	104.66	106.02
20.0	110.72	115.26	115.95	115.46	115.64	120.73	123.67	128.02	129.57	131.93	133.91	135.52	138.67	140.20	142.20	142.06	148.90	150.72
25.0	150.95	157.06	157.60	156.79	156.66	163.29	167.13	172.66	174.53	177.56	180.11	182.11	186.15	188.02	190.71	190.45	199.40	201.72
30.0	196.35	204.23	204.59	203.42	202.89	211.23	216.04	222.83	225.04	228.79	231.95	234.38	239.37	241.59	245.06	244.66	255.96	258.84
35.0	246.78	256.60	256.75	255.18	254.18	264.37	270.23	278.37	280.93	285.44	289.28	292.15	298.17	300.73	305.08	304.53	318.40	321.88
40.0	302.1	314.0	313.9	311.9	310.4	322.6	329.6	339.1	342.0	347.4	351.9	355.3	362.4	365.3	370.6	369.9	386.5	390.7
45.0	362.1	376.3	376.0	373.5	371.3	385.6	393.9	404.9	408.2	414.4	419.7	423.6	431.8	435.0	441.4	440.5	460.2	465.0
50.0	426.7	443.4	442.8	439.7	436.9	453.5	463.0	475.6	479.3	486.4	492.5	496.9	506.3	509.9	517.5	516.4	539.3	544.8
55.0	495.8	515.1	514.2	510.6	507.0	526.0	536.8	551.1	555.1	563.2	570.2	575.1	585.9	589.8	598.6	597.2	623.6	629.9
60.0	569.2	591.3	590.1	585.9	581.4	603.0	615.3	631.2	636.7	644.7	652.6	658.2	670.2	674.5	684.6	683.0	713.0	720.1
65.0	646.9	671.9	670.3	665.5	660.2	684.4	698.2	715.9	720.8	730.9	739.7	745.8	759.3	763.9	775.4	773.6	807.3	815.3
70.0	728.7	756.8	754.9	749.4	743.1	770.2	785.5	805.0	810.3	821.5	831.4	838.1	853.0	857.9	870.9	868.8	906.6	915.4
80.0	904.5	939.3	936.5	929.6	921.1	954.2	972.9	996.2	1002.4	1015.8	1027.8	1035.8	1053.7	1059.3	1075.5	1072.9	1119.2	1129.9
90.0	1095.9	1137.8	1134.2	1125.7	1114.8	1154.4	1176.6	1204.0	1211.0	1226.9	1241.2	1250.6	1271.7	1278.0	1297.7	1294.5	1349.9	1362.7
100.0	1302.2	1351.8	1347.3	1337.0	1323.6	1370.1	1396.0	1427.7	1435.7	1454.1	1470.8	1481.8	1506.3	1513.3	1536.7	1532.8	1598.2	1613.1
150.0	2540.	2636.	2625.	2605.	2575.	2662.	2710.	2766.	2779.	2812.	2843.	2862.	2906.	2917.	2963.	2955.	3079.	3107.
200.0	4082.	4234.	4218.	4185.	4133.	4270.	4344.	4428.	4447.	4496.	4545.	4575.	4642.	4658.	4731.	4717.	4874.	4957.
250.0	5875.	6091.	6085.	6037.	5957.	6152.	6251.	6367.	6387.	6458.	6532.	6570.	6660.	6688.	6792.	6772.	6947.	7098.
300.0	7878.	8165.	8183.	8125.	8014.	8260.	8380.	8533.	8552.	8647.	8754.	8795.	8910.	8954.	9095.	9067.	9258.	9484.
350.0	10070.	10428.	10470.	10404.	10259.	10558.	10701.	10895.	10911.	11033.	11175.	11220.	11361.	11422.	11602.	11566.	11775.	12082.
400.0	12409.	12856.	12923.	12849.	12668.	13022.	13189.	13426.	13440.	13589.	13768.	13818.	13986.	14066.	14288.	14243.	14472.	14863.
450.0	14894.	15428.	15522.	15439.	15219.	15631.	15826.	16106.	16117.	16296.	16514.	16569.	16765.	16864.	17130.	17076.	17328.	17806.
500.0	17603.	18129.	18249.	18167.	17896.	18370.	18592.	18918.	18927.	19136.	19394.	19454.	19679.	19798.	20110.	20046.	20323.	20891.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{56}_{26}$FE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	40.10	39.20	29.76	28.50	28.95	26.49	22.94	21.94	21.33	20.84	19.56	18.43	17.53	17.05	16.87	16.26	14.60	15.21
3.0	37.85	37.41	28.97	27.77	28.25	26.02	22.61	21.69	21.14	20.72	19.47	18.38	17.53	17.08	16.91	16.33	14.83	15.32
3.5	35.75	35.63	28.04	26.90	27.41	25.36	22.10	21.26	20.75	20.40	19.18	18.13	17.33	16.90	16.75	16.20	14.84	15.23
4.0	33.84	33.95	27.07	26.00	26.52	24.63	21.52	20.73	20.27	19.97	18.78	17.79	17.02	16.63	16.49	15.97	14.73	15.03
4.5	32.12	32.39	26.12	25.10	25.62	23.88	20.91	20.17	19.74	19.49	18.34	17.39	16.67	16.29	16.16	15.67	14.55	14.78
5.0	30.55	30.96	25.20	24.23	24.76	23.14	20.29	19.61	19.21	18.99	17.88	16.97	16.28	15.93	15.81	15.34	14.32	14.49
5.5	29.14	29.64	24.33	23.41	23.93	22.43	19.69	19.05	18.68	18.49	17.42	16.54	15.89	15.56	15.45	15.00	14.06	14.18
6.0	27.86	28.43	23.51	22.63	23.15	21.74	19.11	18.51	18.16	18.00	16.96	16.12	15.50	15.18	15.08	14.66	13.79	13.87
6.5	26.69	27.32	22.74	21.89	22.41	21.08	18.56	17.98	17.66	17.52	16.52	15.71	15.11	14.82	14.72	14.32	13.51	13.56
7.0	25.62	26.30	22.01	21.20	21.71	20.46	18.03	17.49	17.18	17.06	16.09	15.31	14.74	14.46	14.37	13.99	13.24	13.26
8.0	23.73	24.48	20.68	19.93	20.43	19.32	17.05	16.56	16.29	16.20	15.28	14.56	14.03	13.78	13.70	13.35	12.70	12.67
9.0	22.12	22.91	19.51	18.81	19.30	18.29	16.16	15.72	15.47	15.41	14.55	13.87	13.37	13.15	13.08	12.76	12.19	12.12
10.0	20.74	21.54	18.47	17.82	18.29	17.37	15.37	14.96	14.74	14.69	13.87	13.24	12.78	12.57	12.51	12.21	11.70	11.62
11.0	19.53	20.34	17.54	16.93	17.38	16.54	14.65	14.27	14.07	14.04	13.26	12.66	12.23	12.04	11.99	11.71	11.25	11.15
12.0	18.46	19.29	16.71	16.13	16.57	15.79	14.00	13.65	13.47	13.45	12.70	12.13	11.73	11.55	11.51	11.25	10.84	10.72
15.0	15.92	16.73	14.65	14.15	14.55	13.93	12.37	12.09	11.94	11.94	11.29	10.80	10.45	10.31	10.28	10.06	9.75	9.61
20.0	13.04	13.80	12.22	11.82	12.17	11.69	10.42	10.19	10.09	10.11	9.57	9.16	8.88	8.78	8.76	8.59	8.38	8.22
25.0	11.12	11.82	10.54	10.20	10.51	10.13	9.04	8.86	8.77	8.81	8.33	7.99	7.75	7.68	7.67	7.53	7.37	7.22
30.0	9.73	10.39	9.30	9.00	9.28	8.97	8.01	7.86	7.79	7.83	7.41	7.11	6.90	6.84	6.84	6.72	6.60	6.45
35.0	8.69	9.30	8.36	8.09	8.34	8.07	7.22	7.09	7.03	7.07	6.69	6.43	6.24	6.19	6.19	6.09	5.99	5.85
40.0	7.870	8.447	7.600	7.361	7.593	7.359	6.587	6.469	6.420	6.459	6.119	5.877	5.706	5.670	5.671	5.581	5.494	5.369
45.0	7.210	7.754	6.987	6.769	6.984	6.776	6.069	5.963	5.921	5.959	5.647	5.425	5.269	5.239	5.241	5.162	5.086	4.970
50.0	6.665	7.181	6.478	6.277	6.478	6.291	5.637	5.542	5.504	5.542	5.253	5.048	4.904	4.878	4.881	4.810	4.743	4.634
55.0	6.208	6.698	6.048	5.862	6.050	5.880	5.272	5.184	5.150	5.188	4.918	4.727	4.593	4.571	4.575	4.510	4.450	4.348
60.0	5.819	6.286	5.680	5.506	5.683	5.528	4.958	4.877	4.847	4.883	4.630	4.451	4.325	4.307	4.311	4.252	4.197	4.102
65.0	5.483	5.930	5.362	5.198	5.366	5.222	4.685	4.610	4.582	4.618	4.379	4.211	4.092	4.078	4.081	4.026	3.976	3.886
70.0	5.189	5.618	5.083	4.928	5.087	4.954	4.446	4.375	4.350	4.386	4.159	4.000	3.887	3.874	3.879	3.828	3.781	3.696
80.0	4.702	5.099	4.617	4.478	4.622	4.505	4.046	3.983	3.962	3.996	3.790	3.646	3.544	3.533	3.539	3.494	3.453	3.377
90.0	4.312	4.684	4.244	4.117	4.249	4.145	3.724	3.667	3.649	3.682	3.492	3.361	3.267	3.259	3.264	3.225	3.187	3.119
100.0	3.994	4.343	3.937	3.820	3.943	3.848	3.459	3.407	3.391	3.423	3.247	3.125	3.038	3.032	3.037	3.002	2.967	2.906
150.0	2.991	3.266	2.968	2.861	2.973	2.907	2.617	2.580	2.571	2.598	2.466	2.375	2.309	2.307	2.312	2.288	2.262	2.221
200.0	2.456	2.716	2.467	2.390	2.451	2.415	2.172	2.134	2.141	2.167	2.054	2.024	1.967	1.917	1.925	1.900	1.920	1.852
250.0	2.147	2.377	2.161	2.094	2.143	2.118	1.906	1.851	1.880	1.904	1.805	1.778	1.720	1.686	1.693	1.665	1.689	1.632
300.0	1.936	2.145	1.952	1.892	1.936	1.915	1.724	1.659	1.701	1.723	1.634	1.609	1.557	1.527	1.534	1.509	1.530	1.480
350.0	1.783	1.977	1.800	1.744	1.786	1.767	1.591	1.533	1.571	1.591	1.510	1.486	1.438	1.412	1.418	1.396	1.415	1.369
400.0	1.667	1.849	1.685	1.633	1.672	1.655	1.490	1.437	1.472	1.492	1.415	1.392	1.347	1.324	1.330	1.309	1.327	1.284
450.0	1.576	1.749	1.596	1.546	1.583	1.567	1.411	1.362	1.394	1.413	1.341	1.319	1.277	1.255	1.261	1.241	1.258	1.218
500.0	1.503	1.669	1.523	1.475	1.512	1.496	1.348	1.303	1.332	1.351	1.282	1.260	1.220	1.200	1.206	1.187	1.203	1.165

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.25	13.61	13.66	13.76	13.65	12.88	12.49	11.80	11.55	11.25	11.04	10.87	10.48	10.34	10.24	10.26	9.84	9.73
3.0	14.39	13.75	13.79	13.90	13.81	13.07	12.69	12.03	11.80	11.51	11.30	11.13	10.76	10.62	10.51	10.54	10.10	9.98
3.5	14.33	13.70	13.75	13.85	13.78	13.07	12.70	12.08	11.87	11.59	11.39	11.22	10.86	10.73	10.61	10.64	10.19	10.08
4.0	14.17	13.56	13.60	13.70	13.65	12.97	12.61	12.03	11.82	11.56	11.36	11.20	10.86	10.73	10.61	10.64	10.19	10.07
4.5	13.94	13.35	13.39	13.49	13.46	12.80	12.46	11.90	11.71	11.46	11.27	11.12	10.79	10.66	10.54	10.57	10.12	10.00
5.0	13.68	13.11	13.16	13.25	13.22	12.59	12.26	11.74	11.56	11.31	11.13	10.99	10.68	10.55	10.43	10.45	10.01	9.90
5.5	13.41	12.85	12.89	12.98	12.97	12.37	12.05	11.55	11.38	11.15	10.97	10.83	10.53	10.41	10.29	10.31	9.87	9.76
6.0	13.12	12.58	12.62	12.71	12.71	12.13	11.82	11.34	11.19	10.96	10.79	10.66	10.37	10.25	10.13	10.16	9.72	9.62
6.5	12.84	12.31	12.35	12.44	12.45	11.89	11.59	11.13	10.99	10.77	10.61	10.48	10.21	10.09	9.97	9.99	9.57	9.46
7.0	12.56	12.05	12.08	12.17	12.18	11.64	11.36	10.92	10.78	10.57	10.42	10.29	10.03	9.92	9.80	9.82	9.40	9.30
8.0	12.02	11.53	11.57	11.65	11.67	11.17	10.90	10.50	10.38	10.18	10.04	9.92	9.68	9.57	9.46	9.48	9.07	8.97
9.0	11.51	11.05	11.08	11.16	11.19	10.72	10.47	10.10	9.99	9.81	9.67	9.56	9.33	9.24	9.12	9.14	8.75	8.66
10.0	11.04	10.60	10.63	10.71	10.75	10.30	10.06	9.72	9.62	9.45	9.31	9.22	9.00	8.91	8.80	8.82	8.44	8.35
11.0	10.60	10.18	10.21	10.29	10.33	9.91	9.68	9.36	9.27	9.11	8.98	8.89	8.69	8.61	8.50	8.52	8.15	8.07
12.0	10.19	9.79	9.83	9.90	9.94	9.54	9.33	9.03	8.94	8.79	8.67	8.59	8.40	8.32	8.21	8.23	7.88	7.80
15.0	9.151	8.797	8.826	8.893	8.943	8.599	8.411	8.160	8.088	7.958	7.855	7.781	7.620	7.553	7.453	7.471	7.154	7.080
20.0	7.842	7.544	7.571	7.629	7.683	7.399	7.245	7.046	6.991	6.886	6.800	6.741	6.611	6.560	6.469	6.485	6.213	6.160
25.0	6.889	6.630	6.655	6.706	6.760	6.517	6.386	6.221	6.177	6.089	6.015	5.965	5.856	5.816	5.733	5.748	5.508	5.454
30.0	6.164	5.934	5.957	6.003	6.056	5.843	5.728	5.587	5.551	5.474	5.410	5.367	5.272	5.240	5.163	5.176	4.962	4.914
35.0	5.594	5.387	5.408	5.450	5.501	5.311	5.208	5.085	5.054	4.986	4.928	4.891	4.807	4.780	4.709	4.721	4.527	4.484
40.0	5.133	4.944	4.964	5.003	5.052	4.880	4.787	4.677	4.650	4.589	4.537	4.503	4.428	4.405	4.339	4.350	4.172	4.133
45.0	4.762	4.578	4.597	4.633	4.681	4.522	4.438	4.338	4.315	4.260	4.211	4.181	4.112	4.093	4.031	4.042	3.877	3.841
50.0	4.432	4.270	4.288	4.322	4.368	4.222	4.144	4.053	4.032	3.981	3.937	3.909	3.846	3.829	3.770	3.780	3.627	3.594
55.0	4.160	4.008	4.025	4.057	4.101	3.965	3.892	3.809	3.790	3.743	3.702	3.675	3.617	3.602	3.547	3.557	3.412	3.382
60.0	3.924	3.781	3.797	3.827	3.871	3.743	3.675	3.598	3.580	3.537	3.498	3.473	3.419	3.406	3.353	3.362	3.227	3.198
65.0	3.718	3.583	3.599	3.627	3.669	3.548	3.485	3.413	3.397	3.356	3.319	3.297	3.246	3.234	3.184	3.192	3.064	3.036
70.0	3.537	3.409	3.424	3.451	3.492	3.377	3.317	3.250	3.235	3.197	3.162	3.140	3.092	3.082	3.034	3.042	2.920	2.894
80.0	3.232	3.115	3.129	3.154	3.192	3.089	3.035	2.975	2.961	2.927	2.896	2.877	2.834	2.825	2.780	2.788	2.676	2.653
90.0	2.986	2.878	2.890	2.914	2.950	2.855	2.806	2.752	2.740	2.709	2.680	2.662	2.623	2.615	2.574	2.582	2.478	2.457
100.0	2.781	2.681	2.693	2.715	2.749	2.661	2.616	2.567	2.556	2.528	2.501	2.485	2.449	2.442	2.403	2.410	2.314	2.294
150.0	2.126	2.050	2.059	2.076	2.105	2.039	2.005	1.971	1.963	1.943	1.923	1.911	1.885	1.880	1.851	1.856	1.783	1.768
200.0	1.774	1.713	1.713	1.727	1.752	1.698	1.671	1.644	1.639	1.623	1.606	1.596	1.576	1.571	1.547	1.552	1.532	1.482
250.0	1.562	1.509	1.493	1.505	1.528	1.484	1.470	1.444	1.445	1.429	1.408	1.405	1.390	1.380	1.358	1.362	1.353	1.310
300.0	1.417	1.369	1.354	1.359	1.379	1.347	1.334	1.311	1.312	1.298	1.279	1.277	1.263	1.254	1.234	1.238	1.229	1.191
350.0	1.311	1.266	1.253	1.257	1.276	1.247	1.235	1.214	1.215	1.202	1.185	1.182	1.170	1.162	1.144	1.147	1.139	1.104
400.0	1.230	1.188	1.176	1.180	1.198	1.171	1.159	1.140	1.141	1.129	1.113	1.111	1.099	1.092	1.075	1.078	1.070	1.038
450.0	1.167	1.127	1.116	1.120	1.137	1.111	1.100	1.082	1.083	1.071	1.056	1.054	1.044	1.037	1.021	1.024	1.016	0.986
500.0	1.116	1.078	1.067	1.071	1.087	1.063	1.052	1.035	1.037	1.025	1.011	1.009	0.999	0.993	0.977	0.980	0.972	0.944

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{56}_{26}$FE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.660	4.470	6.312	6.290	6.170	7.335	7.950	8.390	8.720	9.050	9.240	9.850	10.180	10.651	10.840	11.031	11.371	11.670
3.0	5.379	5.201	7.266	7.285	7.148	8.401	9.178	9.672	10.037	10.396	10.673	11.370	11.776	12.290	12.496	12.746	13.271	13.602
3.5	6.140	5.968	8.247	8.309	8.154	9.490	10.430	10.976	11.373	11.757	12.122	12.903	13.381	13.937	14.158	14.466	15.157	15.334
4.0	6.945	6.773	9.263	9.368	9.193	10.610	11.714	12.309	12.739	13.144	13.597	14.461	15.011	15.606	15.842	16.206	17.049	17.184
4.5	7.795	7.618	10.317	10.464	10.267	11.765	13.034	13.678	14.138	14.564	15.105	16.053	16.673	17.307	17.557	17.976	18.961	19.062
5.0	8.689	8.502	11.408	11.599	11.379	12.956	14.393	15.086	15.576	16.019	16.651	17.683	18.372	19.045	19.308	19.781	20.901	20.975
5.5	9.628	9.427	12.539	12.775	12.529	14.185	15.794	16.535	17.055	17.514	18.237	19.354	20.113	20.823	21.099	21.627	22.875	22.929
6.0	10.611	10.391	13.710	13.992	13.719	15.453	17.238	18.027	18.575	19.049	19.866	21.068	21.898	22.645	22.934	23.515	24.886	24.925
6.5	11.638	11.396	14.921	15.250	14.949	16.761	18.725	19.562	20.139	20.625	21.539	22.828	23.727	24.512	24.812	25.447	26.937	26.966
7.0	12.709	12.441	16.173	16.560	16.218	18.109	20.256	21.141	21.746	22.245	23.257	24.633	25.604	26.425	26.737	27.426	29.030	29.054
8.0	14.98	14.65	18.80	19.28	18.88	20.93	23.45	24.43	25.10	25.61	26.83	28.38	29.50	30.39	30.73	31.53	33.35	33.38
9.0	17.43	17.02	21.59	22.17	21.70	23.91	26.83	27.91	28.62	29.16	30.59	32.33	33.59	34.56	34.91	35.82	37.85	37.89
10.0	20.04	19.54	24.54	25.23	24.68	27.05	30.38	31.56	32.33	32.88	34.53	36.46	37.87	38.91	39.29	40.31	42.54	42.61
11.0	22.83	22.21	27.65	28.45	27.83	30.35	34.11	35.39	36.22	36.78	38.66	40.79	42.36	43.46	43.86	44.99	47.42	47.54
12.0	25.78	25.04	30.92	31.84	31.13	33.82	38.02	39.41	40.29	40.86	42.97	45.31	47.03	48.21	48.63	49.87	52.49	52.66
15.0	35.61	34.42	41.69	42.99	41.97	45.17	50.82	52.51	53.57	54.14	57.03	60.01	62.24	63.63	64.10	65.69	68.86	69.24
20.0	55.15	52.95	62.71	64.74	63.11	67.21	75.58	77.84	79.19	79.72	84.08	88.27	91.42	93.16	93.70	95.91	99.94	100.85
25.0	78.49	74.94	87.46	90.33	87.95	93.01	104.52	107.40	109.04	109.48	115.52	121.08	125.27	127.36	127.95	130.82	135.66	137.28
30.0	105.48	100.26	115.80	119.61	116.37	122.45	137.49	141.03	142.98	143.27	151.22	158.30	163.64	166.06	166.68	170.26	175.90	178.39
35.0	135.98	128.79	147.62	152.48	148.24	155.41	174.36	178.61	180.88	180.98	191.03	199.78	206.38	209.13	209.77	214.09	220.52	224.01
40.0	169.9	160.4	182.8	188.8	183.5	191.8	215.0	220.0	222.6	222.5	234.8	245.4	253.4	256.4	257.1	262.2	269.4	274.0
45.0	207.1	195.1	221.3	228.5	222.0	231.5	259.3	265.1	268.1	267.7	282.5	295.0	304.5	307.9	308.5	314.4	322.4	328.3
50.0	247.5	232.7	262.9	271.5	263.6	274.4	307.3	313.9	317.2	316.4	334.0	348.6	359.6	363.3	363.9	370.6	379.5	386.6
55.0	291.1	273.0	307.7	317.7	308.4	320.5	358.7	366.2	369.8	368.7	389.1	405.9	418.6	422.6	423.2	430.8	440.4	449.1
60.0	337.7	316.2	355.5	367.0	356.2	369.6	413.5	421.9	425.9	424.3	447.8	467.0	481.5	485.8	486.3	494.8	505.3	515.4
65.0	387.3	362.1	406.3	419.4	406.9	421.7	471.6	481.0	485.3	483.3	510.0	531.7	548.1	552.6	553.0	562.5	573.8	585.6
70.0	439.8	410.6	459.9	474.7	460.5	476.8	533.0	543.3	548.0	545.6	575.7	600.0	618.3	623.1	623.4	633.8	646.1	659.5
80.0	553.4	515.4	575.7	594.1	576.2	595.5	665.2	677.7	683.1	679.5	716.9	746.8	769.4	774.7	774.8	787.2	801.3	818.2
90.0	677.9	630.1	702.3	724.7	702.7	725.3	809.6	824.4	830.6	826.7	871.0	907.0	934.2	939.9	939.8	954.2	970.3	990.9
100.0	813.0	754.4	839.5	866.1	839.6	865.6	965.8	982.9	989.9	983.6	1037.5	1079.9	1112.1	1118.2	1117.8	1134.3	1152.5	1177.0
150.0	1635.	1508.	1670.	1722.	1669.	1714.	1909.	1940.	1961.	1935.	2040.	2121.	2183.	2191.	2188.	2216.	2247.	2293.
200.0	2675.	2456.	2713.	2797.	2713.	2779.	3093.	3141.	3154.	3124.	3294.	3396.	3501.	3532.	3526.	3568.	3592.	3684.
250.0	3899.	3562.	3930.	4054.	3941.	4022.	4474.	4556.	4555.	4508.	4753.	4880.	5033.	5095.	5082.	5150.	5153.	5300.
300.0	5276.	4805.	5297.	5464.	5319.	5415.	6023.	6159.	6124.	6058.	6387.	6537.	6749.	6849.	6824.	6921.	6898.	7106.
350.0	6785.	6167.	6793.	7008.	6827.	6940.	7717.	7917.	7840.	7752.	8173.	8353.	8624.	8754.	8725.	8853.	8804.	9077.
400.0	8412.	7633.	8402.	8669.	8450.	8581.	9538.	9806.	9683.	9571.	10091.	10301.	10638.	10805.	10766.	10927.	10851.	11192.
450.0	10141.	9192.	10112.	10434.	10172.	10321.	11471.	11809.	11639.	11502.	12125.	12369.	12775.	12980.	12930.	13126.	13020.	13433.
500.0	11961.	10832.	11911.	12291.	11983.	12151.	13503.	13912.	13695.	13530.	14261.	14543.	15020.	15264.	15203.	15434.	15298.	15786.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.26	12.73	13.75	14.02	14.55	15.30	15.75	16.33	16.68	17.03	17.38	17.76	18.14	18.48	18.92	19.08	20.47	20.91
3.0	14.21	14.77	15.79	16.04	16.58	17.45	17.97	18.68	19.08	19.48	19.88	20.30	20.77	21.15	21.61	21.77	23.27	23.75
3.5	16.16	16.81	17.82	18.06	18.61	19.59	20.17	21.00	21.44	21.90	22.35	22.80	23.36	23.77	24.26	24.41	26.03	26.53
4.0	18.12	18.86	19.87	20.09	20.65	21.74	22.39	23.32	23.80	24.32	24.81	25.30	25.93	26.37	26.90	27.04	28.77	29.31
4.5	20.12	20.94	21.94	22.15	22.72	23.92	24.62	25.66	26.18	26.75	27.28	27.81	28.52	28.99	29.55	29.68	31.53	32.10
5.0	22.14	23.06	24.05	24.24	24.82	26.12	26.88	28.03	28.59	29.21	29.78	30.34	31.13	31.63	32.22	32.34	34.31	34.91
5.5	24.21	25.22	26.20	26.38	26.95	28.36	29.19	30.43	31.03	31.70	32.31	32.90	33.77	34.30	34.92	35.04	37.13	37.76
6.0	26.32	27.42	28.40	28.56	29.13	30.66	31.53	32.88	33.51	34.24	34.89	35.51	36.44	37.01	37.66	37.77	39.98	40.65
6.5	28.48	29.67	30.64	30.78	31.36	32.98	33.93	35.37	36.03	36.81	37.50	38.16	39.16	39.77	40.45	40.55	42.89	43.59
7.0	30.68	31.97	32.93	33.06	33.63	35.36	36.37	37.91	38.61	39.44	40.17	40.85	41.93	42.57	43.28	43.38	45.84	46.57
8.0	35.24	36.72	37.67	37.76	38.33	40.27	41.40	43.14	43.90	44.83	45.64	46.39	47.62	48.31	49.10	49.18	51.90	52.70
9.0	40.00	41.68	42.62	42.67	43.23	45.39	46.64	48.58	49.40	50.44	51.33	52.14	53.51	54.27	55.13	55.19	58.19	59.05
10.0	44.97	46.86	47.78	47.79	48.34	50.72	52.10	54.23	55.12	56.26	57.23	58.11	59.62	60.44	61.38	61.43	64.70	65.64
11.0	50.15	52.25	53.16	53.13	53.65	56.26	57.78	60.10	61.05	62.29	63.36	64.30	65.95	66.84	67.85	67.89	71.45	72.46
12.0	55.54	57.86	58.75	58.68	59.18	62.02	63.67	66.19	67.20	68.55	69.70	70.71	72.50	73.46	74.56	74.58	78.44	79.53
15.0	72.96	75.99	76.82	76.61	77.02	80.59	82.66	85.79	86.98	88.66	90.08	91.29	93.53	94.68	96.06	96.03	100.84	102.17
20.0	106.13	110.48	111.18	110.72	110.91	115.81	118.64	122.83	124.32	126.60	128.50	130.06	133.09	134.56	136.50	136.37	142.96	144.72
25.0	144.31	150.17	150.73	149.96	149.86	156.23	159.90	165.22	167.03	169.93	172.38	174.31	178.18	179.99	182.57	182.33	190.93	193.17
30.0	187.36	194.89	195.28	194.17	193.70	201.68	206.28	212.80	214.92	218.52	221.55	223.88	228.66	230.79	234.12	233.75	244.57	247.34
35.0	235.11	244.48	244.68	243.19	242.27	252.01	257.62	265.40	267.86	272.18	275.85	278.60	284.35	286.81	290.97	290.46	303.73	307.07
40.0	287.4	298.8	298.8	296.9	295.4	307.1	313.8	322.9	325.7	330.8	335.1	338.3	345.1	347.9	353.0	352.3	368.2	372.2
45.0	344.2	357.7	357.5	355.1	353.1	366.7	374.6	385.1	388.2	394.2	399.2	402.9	410.8	413.9	420.0	419.1	437.9	442.5
50.0	405.2	421.1	420.6	417.7	415.0	430.9	439.9	451.9	455.4	462.2	468.1	472.2	481.2	484.7	491.9	490.8	512.6	517.9
55.0	470.5	488.8	488.0	484.6	481.2	499.3	509.7	523.2	527.1	534.8	541.4	546.2	556.4	560.1	568.5	567.2	592.3	598.3
60.0	539.8	560.8	559.7	555.7	551.6	572.1	583.7	598.9	603.2	611.8	619.3	624.6	636.0	640.1	649.7	648.2	676.7	683.5
65.0	613.2	636.9	635.5	630.9	625.9	648.9	662.0	678.8	683.5	693.1	701.5	707.3	720.1	724.5	735.4	733.7	765.8	773.4
70.0	690.4	717.0	715.3	710.1	704.1	729.9	744.4	762.9	768.0	778.6	788.0	794.4	808.5	813.2	825.5	823.6	859.4	867.9
80.0	856.2	889.1	886.6	880.0	872.1	903.5	921.1	943.3	949.2	961.9	973.3	981.0	997.9	1003.3	1018.6	1016.1	1060.0	1070.2
90.0	1036.7	1076.3	1073.0	1065.0	1054.8	1092.2	1113.3	1139.2	1146.0	1161.0	1174.5	1183.5	1203.5	1209.5	1228.1	1225.1	1277.7	1289.8
100.0	1231.2	1278.1	1273.9	1264.2	1251.6	1295.6	1320.2	1350.1	1357.8	1375.2	1391.0	1401.4	1424.7	1431.3	1453.4	1449.8	1511.7	1525.8
150.0	2397.	2488.	2478.	2459.	2430.	2513.	2558.	2611.	2623.	2654.	2684.	2702.	2744.	2754.	2797.	2790.	2907.	2933.
200.0	3850.	3993.	3978.	3947.	3898.	4027.	4098.	4176.	4194.	4241.	4287.	4315.	4379.	4393.	4462.	4450.	4597.	4676.
250.0	5538.	5741.	5736.	5690.	5615.	5799.	5893.	6002.	6021.	6088.	6158.	6193.	6279.	6305.	6403.	6384.	6549.	6692.
300.0	7424.	7694.	7711.	7656.	7552.	7784.	7897.	8042.	8059.	8149.	8250.	8289.	8397.	8439.	8571.	8545.	8725.	8939.
350.0	9482.	9825.	9864.	9802.	9666.	9947.	10082.	10265.	10280.	10395.	10529.	10571.	10704.	10762.	10932.	10898.	11095.	11384.
400.0	11690.	12110.	12174.	12104.	11933.	12267.	12425.	12648.	12661.	12802.	12971.	13018.	13176.	13251.	13460.	13418.	13635.	14003.
450.0	14029.	14532.	14620.	14542.	14335.	14724.	14907.	15182.	15182.	15350.	15555.	15607.	15792.	15885.	16136.	16085.	16322.	16773.
500.0	16485.	17074.	17187.	17101.	16856.	17302.	17511.	17818.	17826.	18024.	18266.	18323.	18536.	18648.	18941.	18881.	19142.	19677.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{59}_{27}$CO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	42.41	41.26	31.30	29.96	30.43	27.81	24.08	23.03	22.39	21.86	20.61	19.32	18.38	17.87	17.68	17.05	15.30	15.93
3.0	40.10	39.46	30.61	29.24	29.75	27.36	23.78	22.81	22.22	21.77	20.45	19.31	18.41	17.93	17.76	17.15	15.57	16.08
3.5	37.92	37.65	29.67	28.37	28.90	26.71	23.28	22.38	21.84	21.47	20.18	19.08	18.23	17.78	17.62	17.04	15.61	16.01
4.0	36.94	35.93	28.59	27.45	27.99	25.98	22.69	21.86	21.36	21.04	19.79	18.74	17.93	17.51	17.36	16.81	15.51	15.82
4.5	34.13	34.32	27.61	26.53	27.08	25.22	22.07	21.29	20.83	20.56	19.35	18.34	17.58	17.18	17.04	16.52	15.33	15.57
5.0	32.50	32.83	26.67	25.64	26.19	24.46	21.44	20.71	20.29	20.05	18.88	17.92	17.19	16.81	16.69	16.19	15.10	15.28
5.5	31.01	31.46	25.77	24.78	25.33	23.72	20.82	20.14	19.75	19.54	18.41	17.48	16.79	16.43	16.32	15.85	14.85	14.98
6.0	29.67	30.20	24.92	23.98	24.52	23.02	20.23	19.58	19.21	19.04	17.94	17.05	16.39	16.05	15.95	15.50	14.57	14.66
6.5	28.44	29.04	24.11	23.21	23.76	22.34	19.65	19.05	18.70	18.55	17.49	16.63	15.99	15.68	15.58	15.15	14.29	14.34
7.0	27.31	27.97	23.36	22.49	23.03	21.69	19.11	18.53	18.20	18.08	17.04	16.22	15.61	15.31	15.22	14.81	14.01	14.03
8.0	25.32	26.06	21.98	21.18	21.70	20.50	18.09	17.57	17.28	17.18	16.21	15.44	14.88	14.61	14.53	14.15	13.46	13.43
9.0	23.62	24.41	20.75	20.01	20.52	19.43	17.17	16.70	16.43	16.36	15.44	14.72	14.20	13.96	13.89	13.54	12.93	12.86
10.0	22.16	22.97	19.66	18.96	19.46	18.47	16.34	15.90	15.67	15.62	14.75	14.07	13.58	13.35	13.29	12.97	12.43	12.34
11.0	20.88	21.71	18.69	18.03	18.51	17.61	15.59	15.19	14.97	14.94	14.11	13.47	13.00	12.80	12.75	12.45	11.96	11.85
12.0	19.75	20.59	17.81	17.19	17.66	16.82	14.91	14.53	14.34	14.31	13.52	12.92	12.48	12.29	12.25	11.97	11.53	11.40
15.0	17.05	17.89	15.64	15.11	15.54	14.86	13.20	12.89	12.73	12.74	12.04	11.52	11.14	11.00	10.96	10.73	10.40	10.24
20.0	13.98	14.78	13.08	12.64	13.02	12.51	11.14	10.90	10.78	10.81	10.22	9.79	9.49	9.38	9.36	9.18	8.95	8.79
25.0	11.93	12.68	11.29	10.93	11.26	10.85	9.68	9.48	9.39	9.43	8.92	8.55	8.29	8.22	8.21	8.06	7.88	7.72
30.0	10.45	11.15	9.98	9.66	9.95	9.62	8.59	8.43	8.35	8.39	7.94	7.62	7.39	7.33	7.33	7.20	7.07	6.91
35.0	9.34	9.99	8.97	8.68	8.95	8.66	7.75	7.60	7.54	7.58	7.18	6.89	6.69	6.64	6.64	6.53	6.42	6.28
40.0	8.461	9.073	8.162	7.906	8.155	7.902	7.072	6.945	6.892	6.933	6.569	6.308	6.125	6.086	6.086	5.990	5.896	5.763
45.0	7.753	8.332	7.508	7.274	7.504	7.280	6.520	6.406	6.360	6.401	6.066	5.827	5.659	5.627	5.629	5.543	5.462	5.337
50.0	7.170	7.718	6.964	6.748	6.963	6.762	6.059	5.956	5.915	5.956	5.645	5.424	5.269	5.242	5.245	5.168	5.096	4.979
55.0	6.680	7.202	6.504	6.304	6.506	6.322	5.668	5.573	5.537	5.577	5.287	5.082	4.937	4.914	4.918	4.848	4.783	4.674
60.0	6.262	6.760	6.111	5.923	6.113	5.946	5.332	5.248	5.212	5.251	4.979	4.787	4.651	4.631	4.636	4.572	4.513	4.410
65.0	5.901	6.378	5.769	5.593	5.773	5.618	5.041	4.959	4.929	4.968	4.710	4.530	4.402	4.385	4.390	4.330	4.276	4.180
70.0	5.587	6.045	5.470	5.304	5.475	5.331	4.784	4.708	4.681	4.719	4.475	4.304	4.182	4.168	4.173	4.118	4.068	3.977
80.0	5.063	5.488	4.971	4.821	4.977	4.850	4.356	4.288	4.265	4.301	4.079	3.925	3.814	3.803	3.809	3.761	3.716	3.635
90.0	4.645	5.042	4.570	4.433	4.576	4.463	4.010	3.949	3.929	3.964	3.760	3.619	3.517	3.508	3.514	3.472	3.431	3.358
100.0	4.302	4.676	4.241	4.114	4.247	4.145	3.726	3.670	3.652	3.686	3.497	3.366	3.272	3.265	3.271	3.233	3.196	3.129
150.0	3.224	3.519	3.199	3.105	3.204	3.133	2.821	2.781	2.771	2.800	2.658	2.560	2.488	2.486	2.492	2.466	2.437	2.394
200.0	2.648	2.926	2.659	2.577	2.643	2.604	2.342	2.300	2.308	2.336	2.215	2.182	2.110	2.087	2.075	2.048	2.070	1.997
250.0	2.315	2.562	2.330	2.258	2.311	2.284	2.055	1.996	2.027	2.052	1.946	1.917	1.854	1.818	1.826	1.795	1.821	1.759
300.0	2.087	2.313	2.105	2.040	2.088	2.065	1.858	1.789	1.834	1.858	1.762	1.735	1.678	1.647	1.654	1.627	1.650	1.595
350.0	1.922	2.131	1.941	1.881	1.926	1.905	1.715	1.653	1.694	1.716	1.628	1.602	1.550	1.522	1.529	1.505	1.526	1.476
400.0	1.797	1.993	1.817	1.760	1.803	1.784	1.607	1.550	1.587	1.608	1.526	1.501	1.453	1.427	1.434	1.412	1.431	1.385
450.0	1.700	1.886	1.720	1.666	1.707	1.689	1.522	1.469	1.504	1.524	1.446	1.422	1.377	1.353	1.360	1.339	1.356	1.313
500.0	1.621	1.799	1.642	1.590	1.630	1.613	1.453	1.405	1.437	1.456	1.383	1.358	1.316	1.294	1.300	1.280	1.297	1.256

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.93	14.25	14.30	14.41	14.29	13.49	13.08	12.36	12.10	11.78	11.56	11.37	10.97	10.83	10.71	10.74	10.30	10.18
3.0	15.10	14.43	14.47	14.58	14.49	13.71	13.31	12.62	12.38	12.07	11.86	11.68	11.28	11.14	11.02	11.05	10.59	10.47
3.5	15.06	14.40	14.45	14.56	14.48	13.73	13.35	12.69	12.47	12.17	11.96	11.79	11.41	11.27	11.15	11.17	10.70	10.58
4.0	14.91	14.27	14.31	14.42	14.36	13.64	13.27	12.65	12.44	12.16	11.95	11.78	11.42	11.28	11.16	11.19	10.71	10.59
4.5	14.69	14.06	14.11	14.21	14.17	13.48	13.12	12.53	12.34	12.07	11.87	11.71	11.36	11.22	11.10	11.12	10.65	10.53
5.0	14.44	13.82	13.87	13.97	13.94	13.28	12.93	12.37	12.19	11.93	11.74	11.58	11.25	11.12	10.99	11.02	10.55	10.43
5.5	14.16	13.56	13.60	13.70	13.69	13.05	12.71	12.19	12.01	11.76	11.58	11.43	11.11	10.98	10.86	10.88	10.42	10.30
6.0	13.87	13.29	13.33	13.43	13.43	12.81	12.49	11.98	11.82	11.58	11.40	11.26	10.96	10.83	10.70	10.73	10.27	10.15
6.5	13.58	13.02	13.06	13.15	13.16	12.57	12.25	11.77	11.61	11.38	11.21	11.08	10.79	10.66	10.54	10.56	10.11	10.00
7.0	13.29	12.75	12.79	12.88	12.89	12.32	12.01	11.55	11.41	11.19	11.02	10.89	10.61	10.49	10.36	10.39	9.94	9.83
8.0	12.74	12.22	12.26	12.35	12.37	11.83	11.55	11.13	10.99	10.79	10.63	10.51	10.25	10.14	10.01	10.04	9.61	9.50
9.0	12.21	11.72	11.75	11.84	11.87	11.37	11.10	10.71	10.59	10.40	10.25	10.14	9.90	9.79	9.67	9.69	9.28	9.18
10.0	11.72	11.25	11.29	11.37	11.41	10.94	10.68	10.32	10.21	10.03	9.89	9.78	9.56	9.46	9.34	9.36	8.96	8.86
11.0	11.26	10.82	10.85	10.93	10.98	10.53	10.29	9.95	9.85	9.68	9.54	9.45	9.23	9.14	9.02	9.05	8.66	8.57
12.0	10.84	10.42	10.45	10.53	10.57	10.15	9.92	9.60	9.51	9.35	9.22	9.13	8.93	8.84	8.73	8.75	8.37	8.29
15.0	9.753	9.375	9.406	9.477	9.530	9.162	8.962	8.694	8.617	8.478	8.367	8.289	8.117	8.046	7.938	7.958	7.619	7.540
20.0	8.378	8.059	8.087	8.148	8.206	7.902	7.737	7.524	7.466	7.353	7.262	7.198	7.069	7.005	6.908	6.925	6.633	6.566
25.0	7.371	7.094	7.120	7.175	7.232	6.972	6.831	6.654	6.608	6.513	6.434	6.381	6.264	6.221	6.132	6.147	5.890	5.832
30.0	6.604	6.357	6.381	6.431	6.488	6.259	6.136	5.984	5.945	5.863	5.794	5.748	5.646	5.612	5.530	5.544	5.314	5.262
35.0	5.998	5.776	5.799	5.844	5.899	5.694	5.584	5.452	5.419	5.346	5.284	5.243	5.153	5.125	5.049	5.061	4.853	4.807
40.0	5.508	5.305	5.326	5.368	5.421	5.236	5.136	5.018	4.989	4.924	4.868	4.831	4.750	4.726	4.655	4.667	4.476	4.434
45.0	5.103	4.916	4.936	4.974	5.026	4.856	4.765	4.658	4.632	4.573	4.521	4.488	4.415	4.394	4.328	4.339	4.162	4.123
50.0	4.762	4.588	4.607	4.643	4.693	4.535	4.451	4.354	4.331	4.277	4.229	4.198	4.131	4.113	4.050	4.061	3.895	3.860
55.0	4.471	4.308	4.326	4.360	4.408	4.261	4.183	4.094	4.073	4.023	3.978	3.950	3.887	3.871	3.812	3.822	3.667	3.634
60.0	4.219	4.065	4.083	4.115	4.161	4.024	3.951	3.868	3.849	3.802	3.760	3.734	3.676	3.662	3.605	3.615	3.469	3.437
65.0	3.999	3.854	3.870	3.901	3.946	3.816	3.748	3.670	3.653	3.609	3.570	3.545	3.490	3.478	3.424	3.433	3.294	3.265
70.0	3.806	3.667	3.683	3.712	3.756	3.633	3.568	3.496	3.480	3.439	3.401	3.378	3.327	3.315	3.263	3.272	3.141	3.113
80.0	3.479	3.353	3.368	3.395	3.436	3.324	3.266	3.202	3.187	3.150	3.116	3.096	3.050	3.040	2.992	3.000	2.880	2.855
90.0	3.214	3.098	3.112	3.137	3.176	3.074	3.020	2.962	2.949	2.916	2.885	2.866	2.824	2.816	2.771	2.779	2.668	2.645
100.0	2.995	2.887	2.900	2.924	2.961	2.866	2.817	2.764	2.752	2.722	2.693	2.675	2.637	2.629	2.588	2.595	2.492	2.471
150.0	2.292	2.209	2.219	2.237	2.268	2.197	2.161	2.124	2.116	2.094	2.072	2.060	2.032	2.026	1.995	2.001	1.921	1.905
200.0	1.912	1.846	1.847	1.862	1.889	1.830	1.801	1.772	1.766	1.749	1.731	1.721	1.698	1.693	1.668	1.673	1.651	1.598
250.0	1.685	1.627	1.609	1.622	1.647	1.601	1.585	1.557	1.558	1.540	1.518	1.515	1.498	1.487	1.464	1.469	1.459	1.412
300.0	1.528	1.476	1.460	1.465	1.487	1.453	1.438	1.414	1.415	1.399	1.379	1.376	1.362	1.352	1.331	1.335	1.326	1.284
350.0	1.413	1.365	1.351	1.356	1.376	1.345	1.332	1.309	1.310	1.296	1.277	1.275	1.262	1.253	1.233	1.237	1.228	1.191
400.0	1.326	1.281	1.268	1.272	1.292	1.263	1.250	1.229	1.231	1.217	1.200	1.198	1.185	1.177	1.159	1.163	1.154	1.119
450.0	1.258	1.215	1.203	1.207	1.226	1.198	1.186	1.167	1.168	1.155	1.139	1.137	1.126	1.118	1.101	1.104	1.095	1.063
500.0	1.203	1.162	1.151	1.155	1.173	1.146	1.136	1.116	1.118	1.106	1.090	1.088	1.078	1.070	1.054	1.057	1.048	1.018

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{59}_{27}$CO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.740	4.540	6.420	6.400	6.280	7.466	8.090	8.536	8.870	9.210	9.410	10.030	10.360	10.836	11.030	11.226	11.575	11.880
3.0	5.455	5.271	7.374	7.396	7.260	8.535	9.322	9.822	10.191	10.561	10.848	11.555	11.962	12.482	12.693	12.949	13.484	13.721
3.5	6.212	6.036	8.356	8.420	8.266	9.625	10.575	11.127	11.530	11.924	12.300	13.091	13.571	14.133	14.359	14.674	15.375	15.658
4.0	7.011	6.838	9.371	9.477	9.303	10.745	11.858	12.460	12.895	13.312	13.775	14.651	15.202	15.804	16.046	16.416	17.270	17.411
4.5	7.854	7.679	10.421	10.570	10.374	11.897	13.176	13.828	14.293	14.730	15.282	16.242	16.863	17.505	17.760	18.186	19.182	19.289
5.0	8.740	8.558	11.508	11.702	11.482	13.085	14.533	15.232	15.728	16.183	16.825	17.869	18.560	19.240	19.509	19.989	21.121	21.201
5.5	9.669	9.476	12.634	12.872	12.628	14.310	15.929	16.677	17.202	17.673	18.407	19.536	20.297	21.015	21.297	21.831	23.090	23.151
6.0	10.642	10.433	13.798	14.082	13.811	15.572	17.366	18.162	18.717	19.202	20.030	21.244	22.075	22.831	23.125	23.713	25.096	25.141
6.5	11.658	11.429	15.002	15.333	15.034	16.873	18.846	19.690	20.273	20.772	21.696	22.996	23.897	24.691	24.997	25.639	27.139	27.176
7.0	12.717	12.464	16.245	16.624	16.295	18.214	20.368	21.260	21.872	22.383	23.405	24.793	25.765	26.595	26.913	27.609	29.224	29.255
8.0	14.96	14.65	18.85	19.33	18.94	21.01	23.54	24.53	25.20	25.73	26.96	28.52	29.64	30.54	30.88	31.69	33.52	33.55
9.0	17.38	16.99	21.61	22.20	21.73	23.97	26.89	27.98	28.70	29.25	30.68	32.44	33.70	34.67	35.04	35.95	37.99	38.04
10.0	19.96	19.48	24.54	25.23	24.69	27.08	30.41	31.60	32.38	32.94	34.60	36.54	37.95	39.00	39.38	40.40	42.65	42.73
11.0	22.70	22.13	27.62	28.42	27.80	30.36	34.11	35.40	36.23	36.81	38.69	40.83	42.39	43.51	43.91	45.05	47.49	47.61
12.0	25.61	24.92	30.85	31.77	31.06	33.79	37.98	39.37	40.26	40.84	42.96	45.30	47.02	48.21	48.64	49.88	52.51	52.68
15.0	35.29	34.17	41.48	42.78	41.77	45.00	50.62	52.32	53.39	53.97	56.86	59.84	62.06	63.46	63.94	65.53	68.70	69.09
20.0	54.50	52.41	62.20	64.22	62.61	66.74	75.05	77.31	78.66	79.21	83.54	87.72	90.86	92.61	93.16	95.36	99.38	100.29
25.0	77.42	74.03	86.55	89.40	87.06	92.14	103.55	106.41	108.06	108.52	114.51	120.04	124.20	126.30	126.89	129.76	134.58	136.19
30.0	103.90	98.91	114.41	118.18	114.99	121.08	135.97	139.48	141.44	141.76	149.62	156.65	161.94	164.37	165.01	168.56	174.17	176.64
35.0	133.81	126.91	145.65	150.45	146.29	153.46	172.19	176.40	178.67	178.80	188.74	197.41	203.94	206.70	207.35	211.64	218.03	221.48
40.0	167.1	157.9	180.2	186.1	180.9	189.2	212.1	217.0	219.6	219.5	231.7	242.2	250.1	253.1	253.8	258.9	266.0	270.6
45.0	203.5	191.9	217.9	225.1	218.6	228.1	255.6	261.3	264.2	263.9	278.5	290.9	300.2	303.6	304.3	310.1	318.1	323.8
50.0	243.1	228.7	258.7	267.2	259.5	270.2	302.6	309.1	312.4	311.7	329.0	343.4	354.3	358.0	358.6	365.3	374.0	381.1
55.0	285.8	268.3	302.6	312.5	303.3	315.3	352.9	360.4	364.0	362.9	383.0	399.6	412.2	416.1	416.7	424.2	433.8	442.3
60.0	331.4	310.6	349.4	360.8	350.1	363.5	406.6	415.0	418.9	417.4	440.5	459.5	473.8	478.0	478.5	486.9	497.3	507.3
65.0	380.0	355.6	399.1	412.0	399.8	414.5	463.5	472.8	477.1	475.2	501.5	522.9	539.0	543.5	544.0	553.3	564.5	576.0
70.0	431.4	403.1	451.7	466.2	452.3	468.5	523.6	533.9	538.6	536.2	565.8	589.7	607.8	612.5	612.9	623.1	635.3	648.4
80.0	542.5	505.7	565.0	583.1	565.5	584.7	653.1	665.4	670.8	667.3	704.1	733.5	755.7	760.9	761.1	773.3	787.2	803.8
90.0	664.4	618.0	688.9	710.8	689.3	711.6	794.4	808.9	815.1	810.4	854.9	890.2	917.0	922.6	922.5	936.7	952.6	972.8
100.0	796.4	739.6	823.0	849.8	823.2	848.9	947.2	964.1	971.0	964.8	1017.7	1059.4	1091.0	1097.1	1096.7	1113.0	1130.9	1155.0
150.0	1600.	1477.	1635.	1686.	1634.	1679.	1869.	1900.	1911.	1895.	1998.	2078.	2138.	2146.	2143.	2171.	2202.	2247.
200.0	2617.	2403.	2654.	2737.	2655.	2720.	3026.	3074.	3086.	3068.	3224.	3323.	3427.	3457.	3451.	3492.	3516.	3606.
250.0	3813.	3485.	3844.	3965.	3854.	3934.	4376.	4456.	4455.	4410.	4650.	4774.	4924.	4985.	4972.	5039.	5041.	5185.
300.0	5158.	4700.	5179.	5343.	5201.	5296.	5890.	6023.	5989.	5924.	6247.	6393.	6600.	6694.	6674.	6768.	6747.	6950.
350.0	6633.	6031.	6641.	6851.	6674.	6786.	7545.	7741.	7665.	7579.	7993.	8167.	8432.	8560.	8531.	8657.	8609.	8876.
400.0	8223.	7464.	8213.	8474.	8260.	8389.	9324.	9586.	9466.	9357.	9865.	10071.	10400.	10564.	10526.	10683.	10609.	10942.
450.0	9912.	8987.	9884.	10199.	9942.	10088.	11212.	11543.	11378.	11243.	11852.	12092.	12488.	12688.	12640.	12831.	12728.	13131.
500.0	11691.	10590.	11641.	12013.	11712.	11877.	13198.	13598.	13386.	13225.	13940.	14216.	14681.	14920.	14860.	15086.	14953.	15430.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.48	12.95	14.00	14.27	14.81	15.57	16.03	16.62	16.97	17.32	17.68	18.07	18.45	18.80	19.25	19.41	20.82	21.27
3.0	14.44	15.01	16.05	16.30	16.85	17.74	18.26	18.98	19.38	19.79	20.20	20.62	21.10	21.48	21.96	22.12	23.64	24.12
3.5	16.40	17.05	18.09	18.33	18.89	19.89	20.47	21.31	21.75	22.22	22.67	23.13	23.69	24.11	24.62	24.77	26.41	26.92
4.0	18.36	19.11	20.14	20.36	20.93	22.04	22.69	23.63	24.12	24.64	25.14	25.63	26.28	26.73	27.26	27.40	29.16	29.71
4.5	20.36	21.19	22.21	22.42	23.00	24.21	24.93	25.98	26.50	27.08	27.61	28.14	28.86	29.35	29.91	30.05	31.92	32.50
5.0	22.38	23.31	24.32	24.51	25.10	26.42	27.19	28.34	28.91	29.54	30.11	30.68	31.47	31.99	32.58	32.71	34.70	35.31
5.5	24.44	25.46	26.47	26.65	27.23	28.66	29.49	30.75	31.35	32.03	32.64	33.24	34.11	34.66	35.28	35.40	37.52	38.16
6.0	26.55	27.66	28.66	28.82	29.41	30.94	31.83	33.19	33.82	34.55	35.21	35.84	36.78	37.36	38.02	38.14	40.37	41.04
6.5	28.70	29.90	30.89	31.04	31.63	33.26	34.22	35.67	36.34	37.12	37.82	38.48	39.50	40.11	40.80	40.91	43.27	43.97
7.0	30.89	32.19	33.18	33.31	33.89	35.64	36.65	38.20	38.90	39.74	40.47	41.17	42.25	42.90	43.62	43.72	46.21	46.95
8.0	35.43	36.92	37.89	37.99	38.57	40.52	41.66	43.40	44.17	45.11	45.93	46.68	47.91	48.62	49.41	49.50	52.25	53.05
9.0	40.16	41.85	42.81	42.87	43.44	45.61	46.87	48.81	49.64	50.68	51.58	52.40	53.77	54.54	55.41	55.48	58.49	59.37
10.0	45.09	46.99	47.93	47.95	48.51	50.90	52.29	54.42	55.31	56.46	57.44	58.32	59.84	60.67	61.62	61.67	64.97	65.91
11.0	50.23	52.34	53.26	53.24	53.78	56.40	57.92	60.25	61.20	62.45	63.52	64.46	66.12	67.02	68.04	68.09	71.67	72.68
12.0	55.57	57.90	58.80	58.74	59.26	62.11	63.76	66.28	67.30	68.65	69.81	70.82	72.62	73.58	74.69	74.72	78.59	79.69
15.0	72.81	75.83	76.68	76.49	76.92	80.49	82.56	85.68	86.88	88.56	89.98	91.19	93.43	94.59	95.98	95.96	100.78	102.11
20.0	105.55	109.88	110.62	110.17	110.38	115.26	118.09	122.26	123.76	126.03	127.93	129.49	132.51	133.99	135.92	135.80	142.38	144.14
25.0	143.18	148.99	149.59	148.84	148.76	155.10	158.76	164.05	165.85	168.75	171.18	173.11	176.96	178.77	181.34	181.11	189.68	191.91
30.0	185.54	193.00	193.43	192.35	191.91	199.83	204.40	210.87	213.00	216.56	219.58	221.90	226.65	228.77	232.08	231.73	242.49	245.26
35.0	232.47	241.75	241.99	240.54	239.66	249.31	254.87	262.59	265.04	269.32	272.97	275.70	281.41	283.86	287.99	287.49	300.66	303.98
40.0	283.9	295.1	295.1	293.3	291.9	303.4	310.0	319.1	321.8	326.9	331.2	334.4	341.1	343.9	348.9	348.2	364.0	367.9
45.0	339.5	356.0	352.7	350.4	348.4	362.0	369.7	380.1	383.2	389.1	394.1	397.8	405.6	408.6	414.7	413.9	432.4	437.0
50.0	399.4	415.1	414.6	411.8	409.2	424.9	433.8	445.7	449.2	455.8	461.6	465.8	474.7	478.1	485.2	484.2	505.7	511.0
55.0	463.4	481.5	480.8	477.4	474.1	492.0	502.2	515.6	519.4	527.0	533.6	538.3	548.3	552.1	560.3	559.1	583.8	589.8
60.0	531.4	552.0	551.0	547.1	543.1	563.3	574.8	589.8	594.0	602.5	609.9	615.1	626.4	630.5	639.9	638.5	666.6	673.3
65.0	603.2	626.6	625.2	620.8	615.9	638.6	651.5	668.1	672.7	682.2	690.5	696.2	708.8	713.2	723.9	722.3	753.9	761.4
70.0	678.9	705.1	703.4	698.3	692.5	717.9	732.2	750.5	755.5	765.9	775.2	781.5	795.4	800.1	812.2	810.4	845.7	854.0
80.0	841.2	873.6	871.2	864.7	857.0	887.9	905.3	927.1	932.9	945.4	956.6	964.2	980.9	986.2	1001.3	998.9	1042.1	1052.1
90.0	1017.9	1056.8	1053.6	1045.7	1036.8	1072.6	1093.3	1118.8	1125.5	1140.3	1153.6	1162.5	1182.2	1188.1	1206.4	1203.4	1255.1	1267.0
100.0	1208.2	1254.2	1250.2	1240.7	1228.3	1271.6	1295.7	1325.2	1332.8	1349.8	1365.5	1375.7	1398.5	1405.1	1426.8	1423.3	1484.1	1498.0
150.0	2348.	2437.	2428.	2409.	2381.	2462.	2506.	2558.	2570.	2601.	2630.	2648.	2689.	2699.	2741.	2734.	2849.	2874.
200.0	3768.	3909.	3894.	3864.	3815.	3942.	4011.	4088.	4106.	4152.	4197.	4225.	4287.	4301.	4368.	4356.	4501.	4577.
250.0	5418.	5617.	5612.	5567.	5494.	5674.	5765.	5873.	5891.	5957.	6026.	6060.	6143.	6169.	6265.	6247.	6409.	6548.
300.0	7261.	7525.	7542.	7488.	7386.	7613.	7724.	7866.	7883.	7971.	8070.	8107.	8213.	8254.	8384.	8358.	8535.	8743.
350.0	9272.	9607.	9646.	9585.	9452.	9727.	9859.	10038.	10053.	10165.	10296.	10338.	10468.	10525.	10690.	10657.	10869.	11133.
400.0	11429.	11840.	11902.	11834.	11667.	11993.	12148.	12366.	12379.	12517.	12682.	12728.	12883.	12956.	13161.	13119.	13332.	13691.
450.0	13714.	14206.	14292.	14216.	14014.	14394.	14573.	14831.	14854.	15007.	15207.	15258.	15439.	15530.	15775.	15725.	15958.	16398.
500.0	16114.	16690.	16801.	16716.	16476.	16913.	17117.	17417.	17426.	17619.	17856.	17912.	18119.	18229.	18516.	18457.	18712.	19236.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{58}_{28}$NI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	44.76	43.34	32.85	31.43	31.92	29.15	25.23	24.12	23.44	22.89	21.48	20.23	19.23	18.70	18.50	17.83	16.00	16.67
3.0	42.38	41.53	32.07	30.73	31.25	28.72	24.95	23.93	23.31	22.84	21.45	20.24	19.30	18.79	18.61	17.97	16.31	16.84
3.5	40.13	39.70	31.12	29.85	30.40	28.08	24.46	23.51	22.94	22.55	21.19	20.03	19.14	18.66	18.49	17.88	16.37	16.80
4.0	38.07	37.93	30.12	28.92	29.48	27.34	23.87	22.99	22.47	22.13	20.81	19.70	18.85	18.40	18.24	17.66	16.29	16.62
4.5	36.19	36.27	29.12	27.98	28.55	26.57	23.24	22.42	21.93	21.64	20.37	19.30	18.49	18.07	17.93	17.37	16.12	16.38
5.0	34.48	34.73	28.15	27.06	27.64	25.79	22.60	21.83	21.38	21.13	19.90	18.87	18.10	17.70	17.57	17.05	15.90	16.09
5.5	32.93	33.31	27.22	26.18	26.76	25.04	21.97	21.25	20.83	20.61	19.42	18.43	17.70	17.32	17.20	16.70	15.64	15.78
6.0	31.61	32.00	26.34	25.35	25.92	24.31	21.36	20.68	20.28	20.10	18.94	17.99	17.29	16.93	16.82	16.34	15.37	15.46
6.5	30.22	30.79	25.51	24.55	25.12	23.61	20.77	20.12	19.75	19.59	18.47	17.56	16.88	16.55	16.44	15.99	15.08	15.14
7.0	29.04	29.67	24.73	23.81	24.37	22.94	20.20	19.59	19.24	19.10	18.01	17.14	16.49	16.17	16.07	15.64	14.80	14.82
8.0	26.95	27.67	23.29	22.44	22.99	21.71	19.15	18.59	18.29	18.18	17.15	16.33	15.73	15.45	15.36	14.96	14.23	14.20
9.0	25.16	25.94	22.01	21.22	21.76	20.60	18.20	17.69	17.41	17.33	16.36	15.59	15.03	14.77	14.70	14.33	13.68	13.61
10.0	23.61	24.43	20.87	20.13	20.65	19.60	17.33	16.87	16.61	16.56	15.63	14.91	14.39	14.15	14.09	13.74	13.17	13.07
11.0	22.26	23.10	19.85	19.15	19.66	18.69	16.55	16.12	15.89	15.85	14.97	14.28	13.79	13.58	13.52	13.20	12.68	12.56
12.0	21.07	21.93	18.93	18.27	18.77	17.87	15.84	15.44	15.22	15.20	14.36	13.71	13.25	13.05	13.00	12.70	12.23	12.10
15.0	18.21	19.07	16.66	16.09	16.54	15.81	14.05	13.72	13.55	13.55	12.81	12.25	11.85	11.69	11.66	11.40	11.05	10.89
20.0	14.96	15.79	13.95	13.49	13.88	13.34	11.88	11.62	11.49	11.52	10.90	10.44	10.11	10.00	9.98	9.78	9.54	9.36
25.0	12.77	13.55	12.07	11.67	12.02	11.58	10.33	10.13	10.03	10.06	9.53	9.13	8.85	8.77	8.76	8.60	8.41	8.24
30.0	11.20	11.93	10.67	10.33	10.65	10.28	9.18	9.01	8.93	8.97	8.49	8.15	7.90	7.84	7.83	7.69	7.55	7.39
35.0	10.01	10.69	9.60	9.29	9.58	9.27	8.29	8.13	8.07	8.11	7.68	7.37	7.16	7.10	7.10	6.98	6.87	6.71
40.0	9.071	9.718	8.742	8.467	8.733	8.461	7.572	7.435	7.378	7.422	7.032	6.753	6.556	6.513	6.514	6.411	6.310	6.167
45.0	8.315	8.928	8.045	7.794	8.041	7.799	6.984	6.862	6.812	6.866	6.497	6.241	6.061	6.026	6.028	5.936	5.849	5.715
50.0	7.692	8.273	7.466	7.234	7.464	7.247	6.494	6.382	6.339	6.382	6.049	5.812	5.646	5.616	5.620	5.537	5.460	5.334
55.0	7.168	7.722	6.975	6.760	6.976	6.779	6.077	5.975	5.936	5.979	5.667	5.448	5.292	5.267	5.271	5.196	5.127	5.009
60.0	6.721	7.260	6.555	6.354	6.568	6.377	5.719	5.625	5.590	5.632	5.339	5.133	4.987	4.966	4.971	4.902	4.839	4.728
65.0	6.335	6.842	6.190	6.001	6.194	6.027	5.407	5.320	5.288	5.329	5.053	4.859	4.721	4.703	4.708	4.645	4.586	4.483
70.0	5.998	6.486	5.871	5.692	5.875	5.720	5.134	5.052	5.023	5.063	4.801	4.618	4.487	4.471	4.477	4.418	4.364	4.266
80.0	5.437	5.890	5.337	5.176	5.343	5.206	4.675	4.603	4.578	4.617	4.379	4.212	4.094	4.082	4.088	4.037	3.989	3.901
90.0	4.989	5.413	4.908	4.761	4.914	4.793	4.306	4.240	4.219	4.256	4.038	3.885	3.776	3.767	3.773	3.727	3.684	3.606
100.0	4.621	5.021	4.556	4.420	4.562	4.452	4.001	3.941	3.923	3.959	3.756	3.615	3.514	3.506	3.513	3.472	3.432	3.361
150.0	3.465	3.781	3.435	3.337	3.443	3.368	3.031	2.989	2.978	3.009	2.856	2.751	2.674	2.672	2.678	2.650	2.619	2.573
200.0	2.846	3.145	2.859	2.770	2.841	2.799	2.517	2.473	2.482	2.511	2.381	2.345	2.268	2.222	2.231	2.202	2.225	2.147
250.0	2.489	2.754	2.506	2.428	2.484	2.456	2.210	2.146	2.180	2.207	2.093	2.061	1.993	1.955	1.963	1.930	1.958	1.892
300.0	2.245	2.486	2.264	2.193	2.245	2.220	1.998	1.924	1.973	1.998	1.895	1.865	1.805	1.771	1.779	1.750	1.774	1.716
350.0	2.067	2.291	2.088	2.023	2.071	2.049	1.845	1.778	1.822	1.845	1.751	1.723	1.667	1.637	1.645	1.618	1.640	1.587
400.0	1.933	2.143	1.954	1.893	1.939	1.919	1.728	1.667	1.707	1.730	1.641	1.614	1.562	1.535	1.542	1.518	1.539	1.489
450.0	1.828	2.028	1.850	1.792	1.836	1.817	1.636	1.580	1.617	1.639	1.556	1.529	1.481	1.455	1.462	1.439	1.459	1.412
500.0	1.743	1.935	1.766	1.710	1.753	1.735	1.563	1.511	1.545	1.566	1.487	1.461	1.415	1.391	1.398	1.376	1.395	1.350

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.62	14.90	14.95	15.07	14.94	14.10	13.67	12.91	12.64	12.31	12.08	11.89	11.46	11.31	11.19	11.22	10.76	10.64
3.0	15.82	15.11	15.16	15.27	15.17	14.35	13.93	13.21	12.96	12.64	12.41	12.22	11.81	11.66	11.53	11.56	11.08	10.95
3.5	15.80	15.11	15.15	15.27	15.19	14.40	13.99	13.31	13.07	12.76	12.54	12.36	11.96	11.81	11.68	11.71	11.22	11.09
4.0	15.66	14.98	15.03	15.14	15.08	14.32	13.93	13.28	13.06	12.76	12.54	12.37	11.99	11.84	11.71	11.74	11.24	11.11
4.5	15.45	14.79	14.83	14.94	14.90	14.17	13.79	13.17	12.96	12.68	12.47	12.30	11.94	11.79	11.66	11.69	11.19	11.06
5.0	15.19	14.55	14.59	14.70	14.67	13.97	13.60	13.02	12.82	12.55	12.34	12.18	11.84	11.69	11.56	11.59	11.09	10.97
5.5	14.91	14.29	14.33	14.43	14.42	13.75	13.39	12.83	12.65	12.38	12.19	12.03	11.70	11.56	11.43	11.45	10.96	10.84
6.0	14.62	14.01	14.05	14.16	14.15	13.50	13.16	12.63	12.45	12.20	12.01	11.86	11.54	11.41	11.27	11.30	10.82	10.69
6.5	14.33	13.74	13.77	13.88	13.88	13.25	12.92	12.41	12.25	12.00	11.82	11.68	11.37	11.24	11.11	11.13	10.66	10.54
7.0	14.03	13.46	13.50	13.60	13.61	13.00	12.68	12.19	12.04	11.80	11.63	11.49	11.19	11.07	10.93	10.96	10.49	10.37
8.0	13.46	12.92	12.95	13.05	13.07	12.51	12.20	11.76	11.61	11.40	11.23	11.10	10.83	10.71	10.58	10.60	10.15	10.04
9.0	12.92	12.40	12.44	12.53	12.56	12.03	11.74	11.33	11.20	11.00	10.84	10.72	10.47	10.36	10.23	10.25	9.81	9.70
10.0	12.41	11.92	11.95	12.04	12.08	11.58	11.31	10.93	10.81	10.62	10.47	10.36	10.12	10.01	9.89	9.91	9.48	9.38
11.0	11.94	11.47	11.50	11.59	11.63	11.16	10.90	10.54	10.43	10.25	10.11	10.01	9.78	9.69	9.56	9.58	9.17	9.07
12.0	11.50	11.05	11.08	11.17	11.22	10.77	10.52	10.18	10.08	9.91	9.78	9.68	9.47	9.37	9.25	9.28	8.88	8.78
15.0	10.37	9.96	10.00	10.07	10.13	9.74	9.52	9.24	9.16	9.01	8.89	8.81	8.62	8.55	8.43	8.45	8.09	8.01
20.0	8.92	8.58	8.61	8.68	8.74	8.42	8.24	8.01	7.95	7.83	7.73	7.67	7.52	7.46	7.36	7.37	7.06	6.99
25.0	7.87	7.57	7.60	7.65	7.72	7.44	7.29	7.10	7.05	6.95	6.86	6.81	6.68	6.64	6.54	6.56	6.28	6.22
30.0	7.05	6.79	6.82	6.87	6.93	6.69	6.55	6.39	6.35	6.26	6.19	6.14	6.03	5.99	5.91	5.92	5.67	5.62
35.0	6.41	6.18	6.20	6.25	6.31	6.09	5.97	5.83	5.79	5.72	5.65	5.61	5.51	5.48	5.40	5.41	5.19	5.14
40.0	5.895	5.677	5.699	5.744	5.801	5.602	5.496	5.369	5.338	5.268	5.208	5.169	5.082	5.056	4.980	4.993	4.788	4.743
45.0	5.464	5.263	5.285	5.326	5.381	5.199	5.101	4.987	4.959	4.896	4.840	4.805	4.726	4.704	4.633	4.645	4.455	4.414
50.0	5.102	4.915	4.935	4.974	5.027	4.858	4.768	4.664	4.639	4.581	4.530	4.497	4.425	4.405	4.338	4.349	4.172	4.134
55.0	4.792	4.617	4.636	4.673	4.724	4.566	4.483	4.387	4.364	4.311	4.263	4.233	4.165	4.148	4.084	4.095	3.929	3.894
60.0	4.523	4.359	4.377	4.412	4.461	4.314	4.235	4.147	4.126	4.076	4.031	4.003	3.940	3.925	3.864	3.875	3.718	3.685
65.0	4.289	4.133	4.151	4.184	4.232	4.092	4.019	3.936	3.917	3.870	3.828	3.802	3.743	3.729	3.671	3.681	3.533	3.501
70.0	4.082	3.934	3.951	3.982	4.029	3.897	3.828	3.750	3.732	3.688	3.648	3.623	3.568	3.556	3.500	3.510	3.368	3.339
80.0	3.734	3.598	3.614	3.643	3.687	3.567	3.505	3.436	3.420	3.381	3.344	3.322	3.272	3.262	3.211	3.220	3.091	3.064
90.0	3.451	3.326	3.341	3.368	3.410	3.300	3.242	3.180	3.166	3.131	3.097	3.077	3.032	3.022	2.975	2.983	2.864	2.839
100.0	3.217	3.101	3.114	3.139	3.179	3.077	3.026	2.968	2.955	2.923	2.892	2.873	2.831	2.823	2.779	2.787	2.676	2.653
150.0	2.463	2.374	2.385	2.404	2.438	2.361	2.322	2.282	2.274	2.250	2.227	2.213	2.183	2.177	2.144	2.150	2.064	2.047
200.0	2.055	1.985	1.985	2.001	2.031	1.968	1.936	1.905	1.899	1.880	1.861	1.850	1.826	1.820	1.793	1.798	1.775	1.717
250.0	1.811	1.749	1.730	1.744	1.771	1.721	1.704	1.674	1.675	1.656	1.632	1.629	1.611	1.599	1.574	1.579	1.568	1.519
300.0	1.643	1.587	1.570	1.575	1.599	1.562	1.547	1.520	1.521	1.505	1.483	1.480	1.464	1.454	1.431	1.436	1.425	1.381
350.0	1.520	1.468	1.453	1.458	1.480	1.446	1.432	1.408	1.409	1.394	1.373	1.371	1.357	1.347	1.326	1.331	1.321	1.280
400.0	1.426	1.378	1.364	1.368	1.389	1.358	1.344	1.322	1.323	1.309	1.290	1.288	1.275	1.266	1.246	1.250	1.241	1.204
450.0	1.353	1.307	1.294	1.298	1.318	1.289	1.276	1.255	1.256	1.242	1.225	1.223	1.210	1.202	1.184	1.187	1.178	1.143
500.0	1.294	1.250	1.238	1.242	1.261	1.233	1.220	1.201	1.202	1.189	1.173	1.170	1.159	1.151	1.133	1.137	1.127	1.095

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{58}_{28}$NI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.510	4.320	6.097	6.080	5.970	7.107	7.700	8.124	8.440	8.760	8.950	9.540	9.860	10.317	10.500	10.684	11.012	11.300
3.0	5.176	5.003	6.990	7.012	6.887	8.109	8.855	9.330	9.679	10.027	10.299	10.971	11.363	11.862	12.061	12.302	12.804	13.029
3.5	5.879	5.718	7.907	7.970	7.828	9.129	10.028	10.552	10.933	11.304	11.659	12.411	12.871	13.409	13.623	13.918	14.577	14.751
4.0	6.621	6.465	8.854	8.957	8.796	10.176	11.228	11.798	12.210	12.602	13.039	13.870	14.397	14.974	15.202	15.550	16.352	16.486
4.5	7.403	7.247	9.834	9.976	9.796	11.262	12.459	13.076	13.516	13.927	14.447	15.367	15.950	16.564	16.806	17.204	18.140	18.243
5.0	8.224	8.064	10.846	11.030	10.829	12.359	13.724	14.386	14.855	15.283	15.888	16.876	17.535	18.185	18.439	18.889	19.951	20.030
5.5	9.085	8.917	11.894	12.120	11.895	13.500	15.025	15.733	16.229	16.673	17.363	18.430	19.155	19.841	20.107	20.608	21.790	21.850
6.0	9.986	9.805	12.977	13.246	12.996	14.676	16.364	17.116	17.640	18.098	18.875	20.023	20.813	21.534	21.812	22.363	23.660	23.706
6.5	10.925	10.730	14.096	14.409	14.133	15.887	17.741	18.538	19.089	19.559	20.426	21.654	22.510	23.266	23.556	24.158	25.565	25.602
7.0	11.905	11.689	15.251	15.608	15.305	17.133	19.156	19.999	20.577	21.058	22.016	23.326	24.248	25.039	25.340	25.992	27.506	27.539
8.0	13.98	13.71	17.67	18.12	17.76	19.73	22.11	23.04	23.67	24.17	25.32	26.79	27.85	28.71	29.03	29.78	31.50	31.54
9.0	16.21	15.88	20.23	20.78	20.35	22.48	25.21	26.24	26.92	27.44	28.78	30.43	31.62	32.55	32.89	33.75	35.66	35.71
10.0	18.59	18.19	22.94	23.59	23.09	25.36	28.48	29.60	30.33	30.86	32.41	34.23	35.57	36.56	36.92	37.88	39.98	40.06
11.0	21.12	20.63	25.79	26.54	25.97	28.40	31.91	33.12	33.90	34.44	36.20	38.21	39.68	40.75	41.13	42.19	44.47	44.59
12.0	23.80	23.21	28.78	29.64	28.99	31.67	35.49	36.79	37.63	38.18	40.16	42.35	43.98	45.10	45.50	46.67	49.13	49.29
15.0	32.71	31.74	38.60	39.81	38.89	41.94	47.18	48.77	49.77	50.33	53.01	55.81	57.89	59.22	59.66	61.15	64.11	64.48
20.0	50.39	48.54	57.71	59.59	58.11	62.00	69.72	71.84	73.10	73.63	77.65	81.55	84.48	86.13	86.65	88.70	92.45	93.30
25.0	71.45	68.44	80.13	82.77	80.62	85.40	95.97	98.65	100.19	100.63	106.19	111.34	115.21	117.18	117.75	120.41	124.90	126.40
30.0	95.76	91.30	105.74	109.24	106.31	112.03	125.80	129.08	130.90	131.22	138.50	145.03	149.95	152.23	152.83	156.13	161.35	163.63
35.0	123.21	117.02	134.45	138.89	135.07	141.78	159.10	163.02	165.13	165.28	174.46	182.50	188.57	191.15	191.77	195.74	201.68	204.87
40.0	153.7	145.5	166.2	171.6	166.8	174.6	195.7	200.4	202.8	202.7	214.0	223.7	231.0	233.8	234.5	239.1	245.8	250.0
45.0	187.1	176.7	200.8	207.4	201.5	210.3	235.7	241.0	243.7	243.4	256.9	268.4	277.0	280.2	280.8	286.2	293.6	298.9
50.0	223.4	210.4	238.2	246.0	238.9	248.9	278.8	284.8	287.9	287.3	303.2	316.6	326.6	330.1	330.6	336.8	344.9	351.5
55.0	262.5	246.9	278.4	287.5	279.1	290.3	325.0	331.8	335.2	334.2	352.8	368.1	379.7	383.4	384.0	390.9	399.8	407.6
60.0	304.3	285.5	321.3	331.8	322.0	334.5	374.2	381.9	385.6	384.3	405.5	423.0	436.2	440.1	440.6	448.4	458.0	467.2
65.0	348.8	326.7	366.9	378.8	367.6	381.3	426.4	434.9	438.9	437.2	461.4	481.1	496.0	500.2	500.6	509.2	519.6	530.2
70.0	395.9	370.3	415.0	428.4	415.7	430.7	481.4	490.9	495.2	493.1	520.3	542.3	559.0	563.5	563.8	573.3	584.5	596.6
80.0	497.6	464.3	518.8	535.4	519.3	537.1	600.0	611.3	616.3	613.2	647.0	674.0	694.5	699.4	699.6	710.8	723.7	738.9
90.0	609.1	567.1	632.2	652.4	632.6	653.3	729.4	742.8	748.5	744.2	785.1	817.6	842.2	847.5	847.4	860.5	875.1	893.7
100.0	730.0	678.5	755.0	779.0	755.3	779.0	869.2	884.8	891.2	885.6	934.1	972.5	1001.5	1007.2	1006.9	1021.8	1038.4	1060.5
150.0	1465.	1353.	1498.	1544.	1497.	1538.	1713.	1741.	1751.	1737.	1831.	1904.	1960.	1967.	1965.	1990.	2018.	2059.
200.0	2395.	2201.	2430.	2506.	2430.	2490.	2771.	2815.	2826.	2800.	2952.	3043.	3138.	3166.	3160.	3198.	3220.	3302.
250.0	3489.	3190.	3518.	3629.	3527.	3600.	4005.	4078.	4078.	4036.	4256.	4367.	4507.	4563.	4551.	4612.	4615.	4746.
300.0	4719.	4301.	4738.	4888.	4758.	4845.	5389.	5511.	5480.	5421.	5716.	5850.	6040.	6125.	6112.	6194.	6174.	6360.
350.0	6068.	5518.	6075.	6267.	6105.	6207.	6902.	7081.	7012.	6934.	7311.	7472.	7714.	7831.	7805.	7920.	7877.	8120.
400.0	7520.	6828.	7512.	7751.	7555.	7672.	8528.	8768.	8659.	8559.	9023.	9212.	9513.	9663.	9628.	9772.	9706.	10009.
450.0	9065.	8221.	9039.	9327.	9093.	9227.	10255.	10557.	10406.	10283.	10840.	11059.	11422.	11605.	11561.	11736.	11642.	12011.
500.0	10691.	9686.	10646.	10985.	10710.	10861.	12069.	12436.	12242.	12095.	12748.	13001.	13427.	13645.	13591.	13798.	13676.	14112.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	11.87	12.32	13.32	13.58	14.09	14.82	15.26	15.83	16.17	16.50	16.84	17.20	17.57	17.90	18.33	18.49	19.83	20.26
3.0	13.71	14.25	15.24	15.49	16.01	16.86	17.36	18.04	18.43	18.82	19.20	19.61	20.06	20.42	20.88	21.03	22.48	22.94
3.5	15.55	16.17	17.15	17.38	17.92	18.87	19.43	20.23	20.65	21.10	21.53	21.96	22.49	22.89	23.37	23.52	25.08	25.57
4.0	17.39	18.09	19.07	19.29	19.84	20.89	21.51	22.41	22.87	23.37	23.84	24.31	24.91	25.34	25.85	25.99	27.66	28.18
4.5	19.25	20.04	21.02	21.22	21.77	22.92	23.60	24.60	25.10	25.65	26.15	26.66	27.34	27.79	28.33	28.46	30.25	30.80
5.0	21.14	22.02	22.99	23.17	23.73	24.98	25.72	26.81	27.35	27.95	28.49	29.03	29.78	30.26	30.83	30.95	32.85	33.43
5.5	23.07	24.03	24.99	25.17	25.73	27.08	27.87	29.06	29.63	30.27	30.86	31.42	32.24	32.76	33.35	33.47	35.48	36.09
6.0	25.03	26.08	27.04	27.19	27.76	29.21	30.05	31.34	31.94	32.63	33.25	33.85	34.73	35.28	35.91	36.02	38.14	38.78
6.5	27.04	28.17	29.12	29.26	29.82	31.37	32.28	33.65	34.29	35.03	35.69	36.31	37.27	37.84	38.50	38.60	40.84	41.51
7.0	29.08	30.30	31.25	31.37	31.93	33.58	34.54	36.01	36.67	37.47	38.16	38.81	39.84	40.44	41.13	41.23	43.59	44.29
8.0	33.30	34.70	35.63	35.73	36.28	38.13	39.20	40.85	41.58	42.47	43.24	43.95	45.10	45.77	46.52	46.61	49.21	49.97
9.0	37.70	39.29	40.21	40.27	40.81	42.86	44.05	45.88	46.66	47.65	48.49	49.27	50.55	51.28	52.10	52.17	55.02	55.85
10.0	42.28	44.06	44.96	44.99	45.62	47.77	49.08	51.09	51.94	53.02	53.94	54.77	56.19	56.97	57.87	57.93	61.03	61.93
11.0	47.05	49.02	49.91	49.90	50.41	52.88	54.31	56.50	57.40	58.58	59.58	60.47	62.02	62.86	63.83	63.88	67.25	68.21
12.0	51.99	54.17	55.05	55.00	55.49	58.17	59.72	62.10	63.05	64.33	65.41	66.36	68.05	68.95	70.00	70.03	73.68	74.71
15.0	67.95	70.78	71.60	71.43	71.84	75.19	77.13	80.06	81.18	82.76	84.10	85.23	87.33	88.41	89.72	89.70	94.23	95.48
20.0	98.20	102.23	102.95	102.54	102.76	107.32	109.96	113.86	115.27	117.39	119.17	120.62	123.44	124.82	126.64	126.53	132.69	134.33
25.0	132.89	138.29	138.89	138.21	138.16	144.06	147.47	152.40	154.09	156.78	159.06	160.86	164.44	166.12	168.53	168.32	176.31	178.40
30.0	171.89	178.81	179.26	178.27	177.88	185.25	189.50	195.52	197.51	200.82	203.63	205.79	210.20	212.18	215.27	214.94	224.96	227.53
35.0	215.06	223.65	223.93	222.59	221.81	230.77	235.93	243.10	245.38	249.36	252.75	255.29	260.58	262.86	266.70	266.25	278.48	281.57
40.0	262.3	272.7	272.8	271.1	269.8	280.5	286.6	295.0	297.6	302.3	306.3	309.2	315.4	318.0	322.7	322.1	336.7	340.4
45.0	313.4	325.8	325.7	323.5	321.8	334.3	341.4	351.1	354.0	359.4	364.1	367.5	374.7	377.5	383.1	382.4	399.6	403.8
50.0	368.4	382.8	382.5	379.9	377.6	392.0	400.3	411.3	414.5	420.7	426.1	429.9	438.1	441.3	447.9	446.9	466.9	471.7
55.0	427.1	443.8	443.2	440.1	437.1	453.6	463.0	476.4	479.0	486.0	492.1	496.4	505.7	509.2	516.8	515.7	538.6	544.1
60.0	489.4	508.4	507.6	504.0	500.3	519.0	529.6	543.4	547.4	555.2	562.1	566.9	577.3	581.1	589.8	588.5	614.5	620.7
65.0	555.3	576.8	575.6	571.5	567.1	588.0	599.9	615.3	619.5	628.3	635.9	641.3	652.9	656.9	666.9	665.3	694.5	701.5
70.0	624.6	648.7	647.3	642.6	637.3	660.7	673.9	690.8	695.4	705.0	713.6	719.4	732.3	736.6	747.8	746.1	778.6	786.3
80.0	773.4	803.1	801.0	795.1	788.0	816.4	832.5	852.6	857.9	869.5	879.8	886.8	902.2	907.1	921.0	918.8	958.6	967.9
90.0	935.1	970.9	968.1	960.9	951.8	985.7	1004.7	1028.2	1034.4	1048.0	1060.2	1068.4	1086.5	1092.0	1108.8	1106.1	1153.7	1164.7
100.0	1109.4	1151.7	1148.0	1139.4	1128.1	1167.8	1190.0	1217.2	1224.1	1239.9	1254.2	1263.7	1284.7	1290.7	1310.7	1307.4	1363.4	1376.2
150.0	2153.	2234.	2226.	2208.	2183.	2257.	2298.	2345.	2357.	2385.	2411.	2428.	2465.	2475.	2513.	2507.	2612.	2636.
200.0	3451.	3580.	3567.	3539.	3495.	3611.	3674.	3745.	3761.	3803.	3844.	3870.	3927.	3940.	4002.	3990.	4123.	4193.
250.0	4960.	5142.	5138.	5097.	5029.	5194.	5278.	5377.	5393.	5454.	5516.	5548.	5625.	5648.	5736.	5719.	5868.	5995.
300.0	6645.	6887.	6902.	6853.	6759.	6967.	7069.	7199.	7214.	7295.	7385.	7420.	7517.	7554.	7673.	7650.	7812.	8002.
350.0	8483.	8790.	8825.	8770.	8648.	8900.	9020.	9184.	9198.	9301.	9421.	9459.	9578.	9630.	9782.	9751.	9928.	10187.
400.0	10455.	10831.	10888.	10825.	10673.	10972.	11113.	11312.	11325.	11451.	11602.	11644.	11786.	11853.	12040.	12002.	12197.	12526.
450.0	12544.	12994.	13073.	13003.	12818.	13166.	13330.	13566.	13576.	13727.	13910.	13957.	14122.	14206.	14430.	14384.	14597.	15000.
500.0	14738.	15265.	15366.	15288.	15069.	15468.	15656.	15930.	15938.	16114.	16331.	16383.	16572.	16688.	16935.	16882.	17115.	17594.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

63 CU IONS 29

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	47.14	46.42	34.41	32.92	33.42	30.49	26.39	25.22	24.51	23.92	22.45	21.13	20.10	19.53	19.32	18.62	16.71	17.40
3.0	44.69	43.62	33.64	32.23	32.78	30.09	26.14	25.06	24.40	23.91	22.46	21.19	20.20	19.66	19.46	18.79	17.06	17.61
3.5	42.37	41.76	32.69	31.35	31.92	29.46	25.66	24.66	24.05	23.63	22.21	20.99	20.05	19.55	19.37	18.73	17.15	17.59
4.0	40.23	39.95	31.67	30.40	30.99	28.72	25.07	24.14	23.58	23.22	21.84	20.67	19.78	19.30	19.13	18.52	17.08	17.43
4.5	38.28	38.24	30.65	29.44	30.04	27.93	24.43	23.56	23.05	22.74	21.40	20.27	19.42	18.97	18.82	18.24	16.92	17.19
5.0	36.50	36.66	29.65	28.50	29.10	27.14	23.78	22.96	22.49	22.22	20.92	19.84	19.03	18.61	18.46	17.91	16.70	16.90
5.5	34.88	35.19	28.70	27.59	28.20	26.37	23.13	22.37	21.92	21.69	20.43	19.39	18.62	18.22	18.09	17.56	16.46	16.59
6.0	33.40	33.82	27.79	26.73	27.33	25.62	22.51	21.78	21.36	21.16	19.94	18.94	18.20	17.82	17.70	17.20	16.17	16.26
6.5	32.05	32.57	26.93	25.91	26.51	24.90	21.90	21.21	20.82	20.65	19.46	18.50	17.79	17.43	17.32	16.84	15.88	15.94
7.0	30.81	31.40	26.12	25.14	25.73	24.21	21.31	20.66	20.29	20.15	18.99	18.07	17.38	17.04	16.94	16.48	15.59	15.61
8.0	28.61	29.31	24.62	23.72	24.30	22.93	20.23	19.64	19.31	19.19	18.11	17.24	16.61	16.30	16.21	15.78	15.01	14.98
9.0	26.73	27.51	23.29	22.45	23.02	21.78	19.24	18.70	18.40	18.32	17.29	16.47	15.88	15.61	15.53	15.13	14.45	14.37
10.0	25.10	25.92	22.11	21.32	21.87	20.74	18.34	17.84	17.57	17.51	16.53	15.77	15.21	14.96	14.89	14.53	13.92	13.81
11.0	23.67	24.53	21.04	20.30	20.83	19.79	17.52	17.06	16.82	16.78	15.84	15.12	14.60	14.36	14.30	13.96	13.42	13.29
12.0	22.42	23.29	20.08	19.38	19.90	18.94	16.78	16.35	16.13	16.10	15.21	14.52	14.03	13.81	13.76	13.44	12.95	12.80
15.0	19.39	20.29	17.69	17.09	17.57	16.79	14.91	14.56	14.37	14.38	13.59	12.99	12.57	12.40	12.36	12.09	11.72	11.54
20.0	15.95	16.82	14.85	14.35	14.77	14.18	12.63	12.36	12.22	12.25	11.59	11.09	10.75	10.63	10.60	10.39	10.13	9.95
25.0	13.64	14.45	12.86	12.44	12.81	12.34	11.01	10.78	10.68	10.72	10.14	9.72	9.43	9.33	9.32	9.15	8.95	8.77
30.0	11.96	12.73	11.38	11.02	11.35	10.96	9.79	9.60	9.52	9.56	9.05	8.68	8.42	8.35	8.35	8.20	8.05	7.87
35.0	10.70	11.42	10.24	9.92	10.23	9.89	8.84	8.68	8.61	8.65	8.20	7.87	7.63	7.58	7.58	7.45	7.32	7.16
40.0	9.70	10.38	9.34	9.04	9.33	9.03	8.09	7.94	7.88	7.92	7.51	7.21	7.00	6.95	6.95	6.84	6.74	6.58
45.0	8.89	9.54	8.60	8.33	8.59	8.33	7.46	7.33	7.28	7.32	6.94	6.67	6.47	6.44	6.44	6.34	6.25	6.10
50.0	8.23	8.85	7.98	7.73	7.98	7.75	6.94	6.82	6.77	6.82	6.46	6.21	6.03	6.00	6.00	5.92	5.83	5.70
55.0	7.67	8.26	7.46	7.23	7.46	7.25	6.50	6.39	6.35	6.39	6.06	5.82	5.66	5.63	5.64	5.55	5.48	5.35
60.0	7.19	7.76	7.01	6.80	7.02	6.82	6.12	6.02	5.98	6.02	5.71	5.49	5.33	5.31	5.32	5.24	5.17	5.06
65.0	6.782	7.321	6.625	6.422	6.628	6.449	5.786	5.692	5.657	5.701	5.406	5.198	5.051	5.031	5.036	4.968	4.906	4.795
70.0	6.422	6.940	6.284	6.093	6.289	6.122	5.494	5.406	5.375	5.418	5.138	4.941	4.802	4.784	4.790	4.727	4.669	4.565
80.0	5.823	6.305	5.715	5.542	5.721	5.574	5.006	4.928	4.901	4.943	4.688	4.510	4.383	4.370	4.376	4.321	4.269	4.176
90.0	5.344	5.795	5.257	5.099	5.263	5.133	4.612	4.541	4.518	4.558	4.324	4.161	4.044	4.034	4.040	3.991	3.945	3.861
100.0	4.952	5.377	4.881	4.736	4.887	4.769	4.286	4.222	4.202	4.241	4.023	3.872	3.764	3.756	3.763	3.718	3.678	3.599
150.0	3.714	4.051	3.686	3.578	3.691	3.610	3.250	3.204	3.192	3.226	3.062	2.949	2.867	2.864	2.870	2.841	2.808	2.758
200.0	3.052	3.371	3.066	2.971	3.046	3.002	2.699	2.652	2.661	2.693	2.553	2.515	2.432	2.382	2.392	2.361	2.386	2.302
250.0	2.669	2.953	2.687	2.604	2.664	2.634	2.370	2.302	2.338	2.367	2.244	2.210	2.138	2.096	2.105	2.070	2.100	2.029
300.0	2.407	2.666	2.428	2.353	2.408	2.381	2.143	2.083	2.116	2.143	2.032	2.001	1.936	1.899	1.908	1.877	1.903	1.840
350.0	2.217	2.457	2.239	2.170	2.222	2.198	1.978	1.907	1.954	1.979	1.878	1.848	1.788	1.756	1.764	1.736	1.760	1.702
400.0	2.073	2.299	2.096	2.031	2.080	2.058	1.853	1.788	1.831	1.855	1.760	1.731	1.676	1.646	1.654	1.628	1.650	1.597
450.0	1.960	2.174	1.984	1.922	1.969	1.949	1.755	1.695	1.735	1.758	1.669	1.640	1.588	1.561	1.569	1.544	1.565	1.515
500.0	1.870	2.075	1.894	1.836	1.880	1.861	1.676	1.620	1.657	1.680	1.595	1.567	1.518	1.492	1.500	1.476	1.496	1.449

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.30	15.56	15.61	15.72	15.59	14.71	14.26	13.47	13.19	12.85	12.60	12.40	11.95	11.80	11.68	11.71	11.23	11.10
3.0	16.54	15.80	15.85	15.96	15.86	15.00	14.56	13.81	13.54	13.21	12.97	12.77	12.34	12.18	12.05	12.08	11.58	11.44
3.5	16.55	15.82	15.86	15.98	15.90	15.07	14.65	13.93	13.68	13.36	13.12	12.93	12.52	12.36	12.22	12.25	11.74	11.60
4.0	16.42	15.71	15.75	15.87	15.81	15.01	14.60	13.91	13.68	13.37	13.14	12.96	12.56	12.40	12.27	12.30	11.77	11.64
4.5	16.21	15.52	15.56	15.67	15.63	14.87	14.46	13.82	13.60	13.30	13.08	12.90	12.52	12.37	12.23	12.26	11.73	11.60
5.0	15.96	15.28	15.32	15.44	15.41	14.67	14.28	13.67	13.46	13.17	12.96	12.79	12.42	12.27	12.13	12.16	11.64	11.51
5.5	15.68	15.02	15.06	15.17	15.15	14.44	14.07	13.48	13.29	13.01	12.80	12.64	12.29	12.14	12.00	12.03	11.51	11.38
6.0	15.38	14.74	14.78	14.89	14.88	14.20	13.84	13.28	13.09	12.83	12.63	12.47	12.14	11.99	11.85	11.88	11.37	11.24
6.5	15.08	14.46	14.50	14.61	14.61	13.95	13.60	13.06	12.89	12.63	12.44	12.29	11.96	11.83	11.69	11.71	11.21	11.08
7.0	14.79	14.18	14.22	14.32	14.33	13.69	13.36	12.84	12.67	12.43	12.24	12.10	11.78	11.65	11.51	11.54	11.04	10.92
8.0	14.20	13.62	13.66	13.76	13.78	13.19	12.87	12.39	12.24	12.01	11.84	11.70	11.41	11.29	11.15	11.18	10.69	10.58
9.0	13.64	13.09	13.13	13.23	13.26	12.70	12.39	11.96	11.82	11.61	11.44	11.31	11.04	10.93	10.79	10.82	10.35	10.24
10.0	13.12	12.59	12.63	12.72	12.76	12.23	11.95	11.54	11.42	11.21	11.05	10.94	10.68	10.57	10.44	10.46	10.01	9.91
11.0	12.63	12.13	12.16	12.25	12.30	11.80	11.53	11.15	11.03	10.84	10.69	10.58	10.34	10.24	10.11	10.13	9.69	9.59
12.0	12.17	11.69	11.73	11.82	11.87	11.39	11.13	10.77	10.67	10.49	10.34	10.24	10.01	9.92	9.79	9.81	9.39	9.29
15.0	10.99	10.56	10.60	10.68	10.74	10.32	10.09	9.79	9.70	9.55	9.42	9.33	9.14	9.06	8.94	8.96	8.58	8.49
20.0	9.48	9.12	9.15	9.22	9.29	8.94	8.75	8.51	8.45	8.32	8.21	8.14	7.98	7.92	7.81	7.83	7.50	7.42
25.0	8.37	8.06	8.08	8.15	8.21	7.91	7.75	7.55	7.50	7.39	7.30	7.24	7.11	7.06	6.96	6.97	6.68	6.62
30.0	7.52	7.24	7.26	7.32	7.38	7.12	6.98	6.81	6.76	6.67	6.59	6.54	6.42	6.38	6.29	6.31	6.04	5.98
35.0	6.84	6.59	6.61	6.66	6.73	6.49	6.37	6.21	6.18	6.09	6.02	5.98	5.87	5.84	5.75	5.77	5.53	5.48
40.0	6.291	6.059	6.082	6.130	6.190	5.978	5.864	5.729	5.696	5.622	5.557	5.515	5.423	5.395	5.314	5.327	5.108	5.060
45.0	5.835	5.621	5.643	5.687	5.746	5.551	5.447	5.325	5.295	5.228	5.168	5.130	5.046	5.022	4.946	4.959	4.756	4.712
50.0	5.451	5.251	5.272	5.314	5.370	5.190	5.094	4.982	4.956	4.894	4.839	4.804	4.727	4.706	4.634	4.646	4.456	4.416
55.0	5.122	4.936	4.955	4.994	5.049	4.881	4.791	4.688	4.664	4.607	4.556	4.523	4.452	4.433	4.365	4.377	4.199	4.161
60.0	4.837	4.661	4.680	4.717	4.770	4.612	4.529	4.433	4.411	4.358	4.310	4.280	4.213	4.196	4.131	4.142	3.975	3.939
65.0	4.588	4.421	4.439	4.475	4.526	4.377	4.298	4.210	4.189	4.139	4.094	4.066	4.003	3.988	3.926	3.937	3.778	3.744
70.0	4.368	4.209	4.227	4.261	4.311	4.169	4.095	4.012	3.993	3.946	3.903	3.876	3.817	3.804	3.744	3.755	3.603	3.571
80.0	3.996	3.852	3.868	3.899	3.947	3.818	3.751	3.677	3.661	3.618	3.579	3.556	3.502	3.491	3.436	3.446	3.308	3.279
90.0	3.696	3.562	3.577	3.606	3.651	3.533	3.472	3.405	3.390	3.352	3.316	3.294	3.246	3.236	3.185	3.194	3.066	3.040
100.0	3.445	3.321	3.335	3.362	3.406	3.296	3.239	3.178	3.165	3.130	3.097	3.077	3.032	3.024	2.976	2.985	2.865	2.841
150.0	2.640	2.545	2.556	2.577	2.613	2.531	2.489	2.446	2.437	2.412	2.387	2.372	2.340	2.334	2.298	2.304	2.213	2.194
200.0	2.204	2.128	2.128	2.146	2.177	2.110	2.076	2.043	2.036	2.016	1.995	1.983	1.958	1.952	1.922	1.928	1.903	1.841
250.0	1.942	1.876	1.855	1.871	1.899	1.845	1.827	1.795	1.796	1.776	1.760	1.747	1.728	1.715	1.688	1.694	1.682	1.629
300.0	1.762	1.702	1.684	1.689	1.715	1.675	1.659	1.630	1.632	1.614	1.590	1.587	1.570	1.559	1.535	1.540	1.529	1.481
350.0	1.630	1.575	1.558	1.564	1.587	1.551	1.536	1.510	1.511	1.495	1.473	1.471	1.455	1.445	1.422	1.427	1.417	1.373
400.0	1.530	1.478	1.463	1.468	1.490	1.456	1.442	1.418	1.419	1.404	1.384	1.382	1.367	1.358	1.337	1.341	1.331	1.291
450.0	1.451	1.402	1.388	1.393	1.414	1.382	1.368	1.346	1.347	1.333	1.314	1.312	1.298	1.290	1.270	1.274	1.264	1.226
500.0	1.386	1.341	1.328	1.332	1.353	1.323	1.309	1.288	1.289	1.275	1.258	1.255	1.243	1.236	1.216	1.220	1.209	1.174

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

63 CU IONS 29

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.750	4.550	6.421	6.400	6.280	7.474	8.100	8.546	8.880	9.220	9.420	10.050	10.390	10.863	11.050	11.241	11.586	11.890
3.0	5.436	5.267	7.346	7.366	7.231	8.513	9.298	9.798	10.167	10.536	10.821	11.537	11.952	12.468	12.672	12.922	13.449	13.687
3.5	6.160	5.995	8.296	8.357	8.205	9.671	10.514	11.064	11.466	11.860	12.231	13.029	13.516	14.074	14.293	14.600	15.289	15.475
4.0	6.923	6.767	9.274	9.377	9.206	10.853	11.756	12.355	12.788	13.204	13.660	14.541	15.097	15.695	15.929	16.291	17.129	17.274
4.5	7.726	7.573	10.285	10.430	10.238	11.766	13.028	13.676	14.139	14.575	15.117	16.079	16.704	17.341	17.589	18.004	18.981	19.093
5.0	8.569	8.414	11.330	11.518	11.304	12.910	14.335	15.030	15.523	15.976	16.606	17.650	18.342	19.017	19.278	19.747	20.854	20.941
5.5	9.452	9.292	12.410	12.641	12.403	14.087	15.678	16.420	16.942	17.411	18.129	19.256	20.015	20.728	21.002	21.523	22.754	22.822
6.0	10.375	10.205	13.526	13.801	13.538	15.299	17.059	17.847	18.397	18.881	19.690	20.899	21.727	22.476	22.762	23.335	24.685	24.740
6.5	11.338	11.154	14.677	14.998	14.708	16.547	18.478	19.312	19.891	20.388	21.289	22.582	23.477	24.263	24.562	25.186	26.651	26.696
7.0	12.341	12.139	15.865	16.232	15.914	17.830	19.936	20.817	21.423	21.932	22.928	24.305	25.269	26.090	26.401	27.078	28.652	28.693
8.0	14.46	14.22	18.35	18.81	18.43	20.50	22.97	23.95	24.61	25.14	26.33	27.88	28.98	29.87	30.20	30.98	32.77	32.81
9.0	16.74	16.44	20.98	21.54	21.10	23.32	26.17	27.23	27.95	28.50	29.89	31.61	32.86	33.82	34.18	35.06	37.05	37.11
10.0	19.18	18.80	23.76	24.42	23.91	26.29	29.52	30.68	31.45	32.02	33.62	35.53	36.91	37.95	38.32	39.31	41.49	41.58
11.0	21.76	21.30	26.68	27.45	26.86	29.40	33.04	34.30	35.12	35.69	37.51	39.61	41.14	42.24	42.64	43.74	46.10	46.23
12.0	24.50	23.93	29.75	30.63	29.96	32.66	36.71	38.07	38.95	39.53	41.57	43.86	45.54	46.72	47.13	48.34	50.88	51.06
15.0	33.59	32.65	39.80	41.04	40.09	43.28	48.68	50.34	51.38	51.97	54.74	57.64	59.80	61.18	61.64	63.18	66.25	66.63
20.0	51.60	49.80	59.32	61.24	59.73	63.78	71.73	73.92	75.24	75.80	79.93	83.97	87.00	88.72	89.26	91.37	95.24	96.12
25.0	73.03	70.07	82.18	84.89	82.69	87.65	98.52	101.28	102.89	103.36	109.07	114.38	118.38	120.42	121.01	123.75	128.38	129.93
30.0	97.76	93.35	108.28	111.86	108.86	114.80	128.92	132.31	134.20	134.55	142.01	148.74	153.80	156.16	156.79	160.18	165.56	167.91
35.0	125.66	119.52	137.50	142.04	138.14	145.10	162.83	166.87	169.06	169.24	178.64	186.91	193.14	195.81	196.46	200.54	206.65	209.93
40.0	156.6	148.5	169.7	175.3	170.4	178.5	200.1	204.9	207.4	207.3	218.8	228.8	236.3	239.3	239.9	244.7	251.5	255.9
45.0	190.6	180.2	204.9	211.7	205.7	214.8	240.7	246.2	249.0	248.7	262.5	274.3	283.1	286.4	287.0	292.6	300.2	306.6
50.0	227.4	214.5	243.0	251.0	243.7	254.0	284.5	290.8	293.9	293.3	309.6	323.3	333.6	337.1	337.7	344.0	352.4	359.1
55.0	267.1	251.4	283.8	293.1	284.6	296.1	331.5	338.5	342.0	341.0	360.0	375.7	387.5	391.3	391.9	399.0	408.1	416.1
60.0	309.5	290.8	327.4	338.1	328.1	340.9	381.5	389.3	393.1	391.8	413.5	431.4	444.9	449.0	449.5	457.4	467.3	476.7
65.0	354.7	332.6	373.6	385.8	374.4	388.4	434.4	443.2	447.3	445.6	470.3	490.4	505.6	509.9	510.4	519.2	529.9	540.7
70.0	402.4	376.8	422.6	436.1	423.2	438.6	490.3	500.0	504.5	502.3	530.1	552.6	569.6	574.2	574.6	584.2	595.7	608.0
80.0	505.6	472.2	527.8	544.7	528.4	546.6	610.6	622.2	627.4	624.2	658.6	686.2	707.1	712.2	712.4	723.8	737.0	752.5
90.0	618.6	576.5	642.8	663.4	643.3	664.5	741.9	755.6	761.4	757.1	798.7	831.8	856.9	862.4	862.3	875.7	890.7	909.6
100.0	741.2	689.5	768.0	791.7	767.6	792.0	883.7	899.6	906.1	900.5	949.9	988.9	1018.6	1024.4	1024.1	1039.3	1056.2	1078.7
150.0	1486.	1374.	1520.	1567.	1519.	1561.	1739.	1767.	1778.	1763.	1859.	1933.	1990.	1997.	1995.	2021.	2049.	2091.
200.0	2428.	2233.	2465.	2541.	2465.	2526.	2811.	2855.	2867.	2840.	2995.	3087.	3184.	3212.	3206.	3245.	3267.	3350.
250.0	3536.	3235.	3567.	3678.	3576.	3650.	4061.	4135.	4135.	4093.	4315.	4429.	4570.	4627.	4615.	4677.	4680.	4813.
300.0	4782.	4360.	4802.	4954.	4823.	4911.	5462.	5586.	5555.	5495.	5794.	5930.	6122.	6209.	6191.	6279.	6259.	6448.
350.0	6148.	5593.	6156.	6351.	6187.	6291.	6994.	7176.	7107.	7027.	7409.	7573.	7818.	7937.	7915.	8027.	7983.	8230.
400.0	7619.	6920.	7611.	7854.	7654.	7774.	8642.	8885.	8774.	8673.	9144.	9335.	9640.	9792.	9757.	9903.	9834.	10143.
450.0	9183.	8330.	9158.	9450.	9212.	9348.	10390.	10696.	10543.	10419.	10983.	11206.	11573.	11759.	11714.	11891.	11796.	12170.
500.0	10830.	9815.	10785.	11129.	10850.	11003.	12228.	12598.	12403.	12253.	12916.	13172.	13603.	13824.	13769.	13979.	13856.	14298.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.49	12.97	14.02	14.29	14.83	15.60	16.06	16.65	17.01	17.35	17.71	18.09	18.47	18.82	19.27	19.43	20.85	21.30
3.0	14.41	14.97	16.02	16.27	16.83	17.72	18.24	18.96	19.36	19.77	20.17	20.59	21.06	21.44	21.92	22.08	23.61	24.09
3.5	16.31	16.96	18.00	18.25	18.81	19.81	20.40	21.23	21.67	22.14	22.58	23.04	23.59	24.01	24.51	24.66	26.31	26.82
4.0	18.22	18.96	19.99	20.22	20.80	21.90	22.55	23.49	23.97	24.49	24.98	25.47	26.10	26.55	27.08	27.23	28.98	29.53
4.5	20.15	20.98	22.01	22.22	22.80	24.01	24.72	25.76	26.28	26.85	27.38	27.91	28.61	29.09	29.66	29.79	31.66	32.24
5.0	22.11	23.02	24.05	24.24	24.83	26.14	26.91	28.05	28.61	29.23	29.80	30.36	31.14	31.65	32.24	32.37	34.36	34.97
5.5	24.10	25.10	26.12	26.30	26.89	28.31	29.13	30.37	30.97	31.64	32.24	32.83	33.69	34.23	34.85	34.97	37.08	37.72
6.0	26.13	27.22	28.23	28.40	28.99	30.50	31.39	32.73	33.35	34.08	34.72	35.34	36.27	36.84	37.49	37.61	39.83	40.50
6.5	28.19	29.38	30.38	30.53	31.13	32.74	33.68	35.12	35.78	36.55	37.23	37.89	38.88	39.48	40.17	40.28	42.62	43.32
7.0	30.30	31.58	32.58	32.71	33.30	35.02	36.02	37.55	38.24	39.06	39.79	40.47	41.53	42.17	42.88	42.99	45.45	46.19
8.0	34.65	36.11	37.10	37.20	37.79	39.71	40.83	42.54	43.30	44.22	45.02	45.77	46.97	47.66	48.44	48.54	51.25	52.05
9.0	39.18	40.83	41.80	41.87	42.45	44.58	45.82	47.72	48.54	49.56	50.44	51.24	52.58	53.33	54.19	54.27	57.24	58.10
10.0	43.89	45.74	46.69	46.73	47.29	49.63	51.00	53.08	53.96	55.08	56.04	56.90	58.38	59.19	60.12	60.19	63.43	64.36
11.0	48.78	50.83	51.78	51.77	52.32	54.88	56.37	58.64	59.57	60.79	61.84	62.76	64.37	65.25	66.26	66.31	69.82	70.83
12.0	53.87	56.12	57.05	57.01	57.53	60.32	61.93	64.39	65.38	66.71	67.83	68.82	70.56	71.50	72.59	72.63	76.43	77.50
15.0	70.23	73.15	74.03	73.86	74.30	77.77	79.78	82.81	83.98	85.62	86.99	88.17	90.34	91.46	92.82	92.81	97.51	98.81
20.0	101.18	105.34	106.11	105.71	105.95	110.66	113.39	117.41	118.87	121.06	122.90	124.40	127.31	128.74	130.62	130.52	136.89	138.60
25.0	136.61	142.17	142.82	142.13	142.10	148.19	151.70	156.78	158.53	161.31	163.65	165.51	169.21	170.95	173.43	173.22	181.47	183.63
30.0	176.39	183.50	184.00	183.00	182.63	190.21	194.59	200.78	202.83	206.24	209.13	211.36	215.90	217.94	221.12	220.79	231.12	233.76
35.0	220.38	229.19	229.52	228.17	227.39	236.60	241.90	249.27	251.62	255.71	259.19	261.82	267.25	269.60	273.55	273.09	285.67	288.85
40.0	268.5	279.1	279.2	277.5	276.3	287.2	293.5	302.1	304.8	309.6	313.7	316.7	323.1	325.8	330.6	330.0	345.0	348.7
45.0	320.5	333.1	333.1	330.9	329.1	341.9	349.3	359.2	362.2	367.7	372.5	376.0	383.4	386.3	392.1	391.3	409.0	413.3
50.0	376.4	391.2	390.9	388.2	385.9	400.7	409.1	420.4	423.7	430.1	435.6	439.5	447.9	451.2	457.9	457.0	477.4	482.4
55.0	436.0	453.1	452.5	449.4	446.4	463.3	472.9	485.6	489.3	496.4	502.7	507.1	516.6	520.2	528.0	526.9	550.3	555.9
60.0	499.4	518.8	518.0	514.4	510.6	529.7	540.6	554.7	558.7	566.8	573.8	578.7	589.4	593.2	602.2	600.9	627.4	633.8
65.0	566.3	588.2	587.1	583.0	578.4	599.9	612.0	627.7	632.1	641.0	648.8	654.3	666.2	670.3	680.5	678.9	708.8	715.8
70.0	636.7	661.3	659.8	655.1	649.8	673.6	687.1	704.4	709.1	719.0	727.7	733.7	746.8	751.2	762.6	760.9	794.2	802.0
80.0	787.6	818.0	815.8	809.9	802.7	831.7	848.1	868.6	874.1	885.9	896.5	903.6	919.3	924.3	938.5	936.3	976.9	986.3
90.0	951.8	988.2	985.4	978.1	968.9	1003.4	1022.8	1046.8	1053.1	1067.0	1079.5	1087.8	1106.3	1111.9	1129.1	1126.3	1174.9	1186.1
100.0	1126.5	1171.6	1167.9	1159.1	1147.7	1188.2	1210.8	1238.5	1245.6	1261.6	1276.3	1285.9	1307.3	1313.5	1333.9	1330.5	1387.6	1400.6
150.0	2186.	2269.	2260.	2243.	2217.	2292.	2334.	2382.	2394.	2422.	2449.	2466.	2504.	2514.	2553.	2546.	2654.	2677.
200.0	3502.	3632.	3619.	3591.	3546.	3664.	3728.	3800.	3816.	3859.	3901.	3927.	3985.	3998.	4061.	4050.	4185.	4256.
250.0	5030.	5215.	5210.	5169.	5101.	5268.	5353.	5453.	5470.	5531.	5595.	5627.	5705.	5729.	5818.	5801.	5951.	6081.
300.0	6736.	6982.	6997.	6947.	6853.	7064.	7166.	7298.	7314.	7396.	7488.	7523.	7621.	7659.	7780.	7756.	7920.	8114.
350.0	8598.	8909.	8945.	8889.	8765.	9021.	9143.	9309.	9324.	9428.	9549.	9588.	9709.	9761.	9915.	9884.	10064.	10326.
400.0	10595.	10976.	11034.	10970.	10816.	11129.	11262.	11464.	11477.	11605.	11758.	11800.	11944.	12013.	12202.	12164.	12361.	12694.
450.0	12711.	13167.	13246.	13176.	12989.	13341.	13507.	13747.	13757.	13910.	14095.	14143.	14310.	14395.	14622.	14576.	14792.	15200.
500.0	14932.	15466.	15568.	15490.	15268.	15672.	15862.	16141.	16148.	16327.	16547.	16599.	16792.	16893.	17159.	17105.	17342.	17827.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — 64 ZN IONS — 30

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	49.54	47.61	35.98	34.42	34.94	31.85	27.55	26.33	25.58	24.97	23.42	22.05	20.96	20.37	20.15	19.42	17.42	18.14
3.0	47.04	45.72	35.23	33.74	34.31	31.48	27.33	26.20	25.51	24.99	23.47	22.14	21.10	20.53	20.33	19.62	17.81	18.39
3.5	44.65	43.83	34.27	32.86	33.46	30.85	26.86	25.81	25.18	24.73	23.24	21.96	20.98	20.44	20.25	19.58	17.93	18.38
4.0	42.44	41.99	33.24	31.90	32.51	30.10	26.27	25.29	24.71	24.32	22.88	21.65	20.71	20.20	20.03	19.39	17.88	18.24
4.5	40.41	40.24	32.20	30.92	31.54	29.31	25.63	24.71	24.17	23.84	22.43	21.25	20.36	19.88	19.72	19.11	17.73	18.00
5.0	38.55	38.61	31.17	29.95	30.58	28.50	24.97	24.11	23.60	23.32	21.95	20.82	19.96	19.51	19.36	18.78	17.51	17.72
5.5	36.86	37.08	30.19	29.03	29.66	27.71	24.31	23.50	23.03	22.78	21.46	20.36	19.55	19.12	18.98	18.43	17.26	17.41
6.0	35.32	35.68	29.25	28.14	28.77	26.94	23.66	22.90	22.46	22.24	20.96	19.90	19.12	18.72	18.59	18.06	16.98	17.08
6.5	33.91	34.37	28.37	27.29	27.92	26.20	23.04	22.31	21.90	21.71	20.47	19.45	18.70	18.32	18.20	17.69	16.69	16.75
7.0	32.61	33.16	27.52	26.49	27.11	25.49	22.44	21.75	21.36	21.20	19.99	19.01	18.29	17.93	17.81	17.33	16.39	16.41
8.0	30.31	30.98	25.98	25.02	25.63	24.17	21.31	20.69	20.34	20.22	19.07	18.16	17.49	17.16	17.07	16.62	15.80	15.76
9.0	28.33	29.10	24.60	23.70	24.30	22.98	20.29	19.72	19.40	19.31	18.23	17.37	16.74	16.45	16.36	15.95	15.23	15.15
10.0	26.62	27.44	23.36	22.52	23.10	21.89	19.36	18.83	18.55	18.48	17.45	16.63	16.05	15.78	15.71	15.32	14.68	14.57
11.0	25.12	25.98	22.25	21.46	22.02	20.91	18.51	18.03	17.76	17.72	16.73	15.96	15.41	15.16	15.10	14.74	14.16	14.02
12.0	23.80	24.68	21.25	20.50	21.05	20.02	17.74	17.29	17.04	17.01	16.07	15.34	14.82	14.59	14.53	14.20	13.67	13.52
15.0	20.61	21.53	18.75	18.11	18.61	17.78	15.79	15.41	15.22	15.22	14.38	13.75	13.30	13.12	13.08	12.79	12.40	12.21
20.0	16.98	17.87	15.76	15.24	15.68	15.05	13.40	13.11	12.96	12.99	12.29	11.77	11.40	11.27	11.24	11.02	10.74	10.54
25.0	14.52	15.37	13.67	13.22	13.62	13.11	11.69	11.46	11.34	11.38	10.77	10.33	10.01	9.91	9.90	9.72	9.51	9.31
30.0	12.75	13.55	12.11	11.72	12.08	11.66	10.41	10.21	10.12	10.16	9.62	9.23	8.95	8.88	8.87	8.72	8.55	8.37
35.0	11.41	12.16	10.91	10.56	10.89	10.53	9.41	9.24	9.16	9.21	8.72	8.37	8.12	8.06	8.06	7.93	7.79	7.62
40.0	10.35	11.07	9.95	9.64	9.94	9.62	8.61	8.46	8.39	8.44	8.00	7.68	7.45	7.40	7.40	7.29	7.17	7.01
45.0	9.49	10.17	9.17	8.88	9.16	8.88	7.95	7.81	7.76	7.80	7.40	7.10	6.90	6.86	6.86	6.75	6.65	6.50
50.0	8.78	9.43	8.51	8.25	8.51	8.26	7.40	7.27	7.22	7.27	6.89	6.62	6.43	6.40	6.40	6.31	6.22	6.08
55.0	8.19	8.81	7.96	7.71	7.96	7.73	6.93	6.81	6.77	6.82	6.46	6.21	6.03	6.00	6.01	5.92	5.84	5.71
60.0	7.68	8.28	7.49	7.25	7.49	7.28	6.53	6.42	6.38	6.43	6.09	5.86	5.69	5.66	5.67	5.59	5.52	5.39
65.0	7.244	7.814	7.072	6.856	7.076	6.883	6.175	6.075	6.038	6.085	5.769	5.547	5.390	5.368	5.374	5.301	5.235	5.116
70.0	6.860	7.409	6.710	6.506	6.715	6.536	5.865	5.772	5.738	5.784	5.484	5.274	5.125	5.107	5.113	5.045	4.983	4.872
80.0	6.222	6.733	6.105	5.920	6.110	5.953	5.346	5.262	5.234	5.278	5.006	4.816	4.680	4.666	4.673	4.614	4.559	4.459
90.0	5.712	6.190	5.617	5.448	5.624	5.484	4.927	4.851	4.827	4.869	4.619	4.444	4.320	4.309	4.316	4.263	4.214	4.124
100.0	5.293	5.744	5.216	5.060	5.223	5.096	4.580	4.512	4.490	4.531	4.299	4.137	4.022	4.013	4.020	3.973	3.927	3.846
150.0	3.972	4.331	3.942	3.826	3.948	3.860	3.475	3.426	3.413	3.450	3.274	3.153	3.065	3.062	3.069	3.038	3.002	2.949
200.0	3.265	3.605	3.280	3.178	3.259	3.211	2.888	2.836	2.846	2.880	2.731	2.690	2.602	2.548	2.559	2.525	2.552	2.462
250.0	2.855	3.158	2.875	2.786	2.851	2.818	2.535	2.463	2.501	2.532	2.401	2.364	2.287	2.243	2.252	2.215	2.247	2.170
300.0	2.575	2.852	2.598	2.517	2.577	2.548	2.293	2.208	2.264	2.292	2.175	2.140	2.071	2.032	2.041	2.008	2.036	1.969
350.0	2.372	2.629	2.396	2.321	2.377	2.351	2.117	2.040	2.091	2.118	2.009	1.977	1.913	1.879	1.887	1.857	1.883	1.821
400.0	2.218	2.459	2.243	2.173	2.226	2.202	1.983	1.913	1.959	1.985	1.884	1.853	1.793	1.762	1.770	1.742	1.766	1.709
450.0	2.098	2.327	2.123	2.057	2.107	2.085	1.878	1.814	1.856	1.881	1.785	1.755	1.699	1.670	1.678	1.652	1.674	1.621
500.0	2.001	2.220	2.027	1.963	2.012	1.992	1.794	1.734	1.773	1.798	1.707	1.677	1.624	1.597	1.605	1.580	1.601	1.550

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.99	16.21	16.27	16.39	16.25	15.33	14.86	14.04	13.74	13.38	13.13	12.92	12.45	12.30	12.16	12.20	11.69	11.56
3.0	17.26	16.49	16.54	16.66	16.55	15.66	15.20	14.41	14.13	13.78	13.53	13.32	12.87	12.71	12.57	12.60	12.08	11.94
3.5	17.29	16.53	16.58	16.70	16.61	15.75	15.30	14.55	14.29	13.95	13.71	13.51	13.07	12.91	12.77	12.80	12.26	12.12
4.0	17.16	16.43	16.48	16.60	16.53	15.70	15.27	14.55	14.31	13.98	13.74	13.55	13.13	12.97	12.82	12.86	12.31	12.17
4.5	16.98	16.25	16.29	16.41	16.37	15.57	15.14	14.46	14.23	13.92	13.69	13.50	13.11	12.94	12.80	12.83	12.28	12.14
5.0	16.73	16.02	16.06	16.18	16.15	15.37	14.97	14.32	14.10	13.80	13.58	13.40	13.02	12.86	12.71	12.74	12.19	12.05
5.5	16.45	15.76	15.80	15.91	15.89	15.15	14.75	14.14	13.93	13.64	13.43	13.26	12.89	12.73	12.58	12.61	12.07	11.93
6.0	16.15	15.48	15.52	15.63	15.62	14.91	14.52	13.93	13.74	13.46	13.25	13.09	12.73	12.58	12.43	12.46	11.93	11.79
6.5	15.85	15.19	15.23	15.34	15.34	14.65	14.28	13.72	13.53	13.26	13.06	12.90	12.56	12.42	12.27	12.30	11.77	11.63
7.0	15.54	14.90	14.94	15.05	15.06	14.39	14.03	13.49	13.32	13.06	12.86	12.71	12.38	12.24	12.09	12.12	11.60	11.47
8.0	14.94	14.34	14.37	14.48	14.50	13.87	13.54	13.04	12.88	12.64	12.45	12.31	12.01	11.87	11.73	11.75	11.25	11.12
9.0	14.37	13.79	13.83	13.93	13.96	13.37	13.05	12.59	12.45	12.22	12.04	11.91	11.63	11.50	11.36	11.39	10.89	10.78
10.0	13.83	13.28	13.31	13.41	13.45	12.90	12.59	12.16	12.03	11.82	11.65	11.53	11.26	11.14	11.00	11.03	10.55	10.44
11.0	13.33	12.80	12.83	12.93	12.98	12.45	12.16	11.76	11.63	11.43	11.27	11.16	10.91	10.80	10.66	10.68	10.22	10.11
12.0	12.86	12.35	12.38	12.48	12.53	12.02	11.75	11.37	11.26	11.07	10.92	10.81	10.57	10.47	10.33	10.35	9.91	9.80
15.0	11.63	11.17	11.21	11.29	11.35	10.91	10.67	10.35	10.26	10.09	9.96	9.87	9.66	9.58	9.45	9.47	9.06	8.97
20.0	10.05	9.67	9.70	9.77	9.84	9.48	9.28	9.02	8.95	8.81	8.70	8.63	8.46	8.39	8.28	8.30	7.95	7.86
25.0	8.89	8.55	8.58	8.65	8.72	8.40	8.23	8.02	7.96	7.84	7.75	7.68	7.54	7.49	7.38	7.40	7.09	7.02
30.0	7.99	7.69	7.72	7.78	7.85	7.57	7.42	7.24	7.19	7.09	7.00	6.95	6.82	6.78	6.68	6.70	6.42	6.36
35.0	7.28	7.01	7.03	7.09	7.15	6.91	6.77	6.61	6.57	6.48	6.41	6.36	6.25	6.21	6.12	6.13	5.88	5.82
40.0	6.698	6.450	6.475	6.526	6.590	6.364	6.243	6.098	6.063	5.984	5.915	5.870	5.772	5.742	5.656	5.670	5.437	5.386
45.0	6.216	5.987	6.011	6.058	6.120	5.913	5.802	5.671	5.640	5.568	5.505	5.464	5.374	5.349	5.267	5.281	5.065	5.018
50.0	5.810	5.597	5.619	5.663	5.723	5.531	5.428	5.310	5.281	5.215	5.156	5.119	5.037	5.014	4.937	4.950	4.748	4.705
55.0	5.461	5.262	5.283	5.325	5.383	5.204	5.108	4.999	4.973	4.912	4.857	4.822	4.746	4.726	4.653	4.666	4.476	4.435
60.0	5.159	4.971	4.992	5.031	5.088	4.919	4.830	4.728	4.705	4.648	4.596	4.564	4.493	4.475	4.406	4.418	4.239	4.201
65.0	4.895	4.717	4.737	4.774	4.829	4.670	4.586	4.491	4.469	4.416	4.367	4.337	4.270	4.255	4.188	4.200	4.030	3.994
70.0	4.661	4.492	4.511	4.547	4.600	4.449	4.370	4.281	4.261	4.211	4.165	4.136	4.073	4.059	3.996	4.006	3.845	3.811
80.0	4.267	4.113	4.130	4.163	4.214	4.077	4.005	3.926	3.908	3.863	3.821	3.796	3.739	3.727	3.669	3.679	3.531	3.500
90.0	3.947	3.804	3.821	3.851	3.899	3.773	3.708	3.637	3.621	3.580	3.541	3.518	3.467	3.456	3.402	3.411	3.275	3.246
100.0	3.681	3.548	3.564	3.592	3.638	3.521	3.461	3.396	3.381	3.344	3.308	3.287	3.239	3.230	3.180	3.188	3.061	3.035
150.0	2.823	2.721	2.733	2.756	2.794	2.706	2.661	2.616	2.606	2.579	2.552	2.536	2.502	2.495	2.457	2.464	2.366	2.346
200.0	2.357	2.276	2.277	2.295	2.329	2.257	2.221	2.185	2.178	2.156	2.134	2.121	2.094	2.088	2.056	2.062	2.036	1.970
250.0	2.076	2.007	1.985	2.001	2.032	1.974	1.955	1.921	1.922	1.900	1.872	1.869	1.848	1.835	1.806	1.812	1.799	1.742
300.0	1.885	1.821	1.801	1.807	1.835	1.793	1.775	1.745	1.746	1.727	1.701	1.698	1.680	1.668	1.642	1.648	1.636	1.586
350.0	1.744	1.685	1.667	1.673	1.698	1.660	1.643	1.616	1.617	1.599	1.576	1.574	1.557	1.546	1.522	1.527	1.516	1.469
400.0	1.637	1.581	1.565	1.571	1.594	1.559	1.543	1.517	1.519	1.502	1.481	1.478	1.463	1.453	1.431	1.435	1.424	1.381
450.0	1.553	1.500	1.485	1.490	1.513	1.479	1.464	1.440	1.442	1.426	1.406	1.403	1.389	1.380	1.359	1.363	1.352	1.312
500.0	1.486	1.435	1.421	1.426	1.447	1.415	1.401	1.378	1.380	1.365	1.346	1.343	1.330	1.321	1.301	1.305	1.294	1.257

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{64}_{30}$ZN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.680	4.480	6.332	6.310	6.190	7.371	7.990	8.431	8.760	9.090	9.280	9.900	10.230	10.700	10.890	11.081	11.422	11.720
3.0	5.343	5.166	7.230	7.248	7.114	8.380	9.155	9.648	10.011	10.370	10.643	11.347	11.750	12.263	12.469	12.718	13.236	13.470
3.5	6.041	5.881	8.150	8.209	8.058	9.407	10.335	10.878	11.273	11.656	12.012	12.797	13.270	13.823	14.045	14.349	15.025	15.209
4.0	6.776	6.627	9.098	9.197	9.028	10.457	11.539	12.130	12.556	12.960	13.400	14.264	14.804	15.397	15.633	15.991	16.811	16.955
4.5	7.549	7.406	10.076	10.216	10.027	11.534	12.772	13.410	13.865	14.289	14.812	15.756	16.363	16.993	17.243	17.653	18.608	18.721
5.0	8.360	8.218	11.086	11.268	11.057	12.641	14.037	14.721	15.205	15.646	16.254	17.277	17.950	18.618	18.881	19.342	20.424	20.512
5.5	9.209	9.064	12.130	12.353	12.120	13.780	15.336	16.065	16.578	17.034	17.728	18.831	19.570	20.274	20.550	21.062	22.264	22.334
6.0	10.096	9.943	13.206	13.473	13.216	14.951	16.671	17.445	17.985	18.456	19.237	20.421	21.225	21.965	22.253	22.815	24.133	24.190
6.5	11.021	10.857	14.317	14.628	14.345	16.156	18.041	18.860	19.428	19.912	20.782	22.047	22.917	23.693	23.992	24.605	26.034	26.082
7.0	11.984	11.806	15.463	15.818	15.508	17.394	19.449	20.313	20.908	21.403	22.365	23.711	24.647	25.469	25.770	26.433	27.968	28.012
8.0	14.02	13.80	17.86	18.30	17.94	19.97	22.38	23.33	23.98	24.50	25.64	27.16	28.23	29.11	29.44	30.20	31.94	31.99
9.0	16.21	15.94	20.39	20.93	20.50	22.69	25.45	26.50	27.20	27.73	29.08	30.76	31.97	32.92	33.27	34.14	36.07	36.13
10.0	18.54	18.20	23.06	23.70	23.20	25.54	28.68	29.82	30.68	31.12	32.67	34.53	35.87	36.89	37.26	38.23	40.35	40.44
11.0	21.01	20.60	25.87	26.62	26.04	28.54	32.07	33.30	34.10	34.66	36.41	38.46	39.94	41.03	41.42	42.49	44.79	44.92
12.0	23.63	23.13	28.81	29.67	29.02	31.66	35.60	36.92	37.78	38.35	40.32	42.55	44.18	45.33	45.74	46.92	49.39	49.57
15.0	32.33	31.48	38.45	39.66	38.74	41.86	47.09	48.71	49.72	50.30	52.97	55.79	57.88	59.23	59.69	61.19	64.16	64.53
20.0	49.53	47.88	57.15	59.00	57.55	61.50	69.18	71.31	72.59	73.14	77.12	81.03	83.96	85.63	86.16	88.22	91.97	92.82
25.0	69.98	67.25	79.01	81.62	79.51	84.35	94.81	97.49	99.05	99.52	105.00	110.14	113.99	115.99	116.57	119.22	123.70	125.19
30.0	93.56	89.47	103.94	107.38	104.51	110.28	123.87	127.14	128.97	129.33	136.49	142.98	147.85	150.16	150.78	154.05	159.24	161.51
35.0	120.14	114.43	131.82	136.18	132.45	139.21	156.23	160.13	162.26	162.45	171.47	179.43	185.42	188.03	188.67	192.60	198.50	201.65
40.0	149.6	142.1	162.6	167.9	163.3	171.0	191.8	196.4	198.8	198.8	209.8	219.4	226.6	229.5	230.1	234.8	241.4	245.5
45.0	182.0	172.2	196.1	202.6	196.8	205.7	230.5	235.8	238.5	238.3	251.5	262.8	271.3	274.4	275.1	280.4	287.7	292.9
50.0	217.0	204.9	232.4	240.0	233.1	243.1	272.3	278.3	281.3	280.8	296.3	309.5	319.3	322.8	323.4	329.5	337.5	343.9
55.0	254.8	240.1	271.3	280.1	272.0	283.1	317.0	323.8	327.1	326.2	344.3	359.4	370.7	374.5	375.0	381.9	390.6	398.3
60.0	295.2	277.6	312.7	322.9	313.5	325.8	364.6	372.2	375.8	374.6	395.4	412.5	425.4	429.4	429.9	437.5	447.0	456.0
65.0	338.1	317.4	356.7	368.3	357.5	371.1	415.0	423.4	427.4	425.8	449.4	468.6	483.2	487.4	487.9	496.3	506.6	516.9
70.0	383.5	359.5	403.2	416.3	403.9	418.8	468.2	477.5	481.8	479.8	506.3	527.8	544.1	548.6	549.0	558.2	569.2	581.0
80.0	481.6	450.2	503.4	519.5	504.0	521.5	582.6	593.8	598.7	595.8	628.6	655.0	675.0	679.8	680.1	691.0	703.7	718.5
90.0	589.1	549.5	612.8	632.4	613.3	633.7	707.5	720.6	726.2	722.1	761.8	793.5	817.4	822.7	822.7	835.5	849.9	867.9
100.0	705.6	656.9	731.1	754.4	731.5	754.8	842.3	857.5	863.8	858.5	905.6	942.9	971.1	976.8	976.5	991.1	1007.3	1028.8
150.0	1413.	1307.	1446.	1491.	1446.	1486.	1655.	1682.	1692.	1678.	1770.	1840.	1894.	1901.	1899.	1924.	1951.	1991.
200.0	2308.	2123.	2343.	2417.	2344.	2404.	2673.	2715.	2727.	2701.	2848.	2937.	3028.	3055.	3050.	3087.	3108.	3187.
250.0	3360.	3075.	3390.	3496.	3399.	3470.	3860.	3931.	3930.	3891.	4102.	4210.	4345.	4399.	4388.	4447.	4449.	4576.
300.0	4543.	4144.	4563.	4707.	4583.	4667.	5191.	5310.	5279.	5222.	5506.	5636.	5819.	5901.	5884.	5967.	5949.	6128.
350.0	5840.	5315.	5848.	6034.	5878.	5977.	6645.	6818.	6752.	6677.	7040.	7195.	7429.	7542.	7517.	7627.	7586.	7821.
400.0	7237.	6575.	7230.	7460.	7271.	7385.	8209.	8441.	8335.	8239.	8686.	8868.	9159.	9305.	9269.	9408.	9343.	9637.
450.0	8722.	7914.	8698.	8975.	8750.	8879.	9869.	10160.	10015.	9897.	10433.	10644.	10993.	11170.	11127.	11298.	11206.	11561.
500.0	10285.	9323.	10242.	10569.	10305.	10451.	11613.	11966.	11780.	11638.	12267.	12511.	12921.	13131.	13079.	13278.	13162.	13581.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.31	12.78	13.81	14.08	14.62	15.37	15.83	16.42	16.77	17.11	17.46	17.84	18.21	18.55	18.99	19.15	20.55	21.00
3.0	14.18	14.73	15.76	16.02	16.56	17.44	17.96	18.66	19.06	19.46	19.86	20.27	20.73	21.11	21.57	21.73	23.24	23.72
3.5	16.03	16.67	17.69	17.93	18.49	19.47	20.05	20.87	21.31	21.76	22.20	22.65	23.20	23.60	24.10	24.24	25.87	26.38
4.0	17.88	18.61	19.63	19.85	20.42	21.51	22.14	23.07	23.55	24.05	24.53	25.02	25.64	26.07	26.60	26.74	28.47	29.01
4.5	19.75	20.57	21.58	21.79	22.37	23.55	24.25	25.27	25.79	26.35	26.87	27.38	28.07	28.54	29.09	29.23	31.07	31.64
5.0	21.65	22.55	23.56	23.76	24.33	25.62	26.37	27.50	28.04	28.66	29.21	29.76	30.52	31.02	31.60	31.73	33.69	34.29
5.5	23.58	24.56	25.57	25.75	26.33	27.72	28.53	29.74	30.33	30.99	31.58	32.16	32.99	33.52	34.13	34.25	36.32	36.96
6.0	25.54	26.61	27.61	27.78	28.36	29.85	30.71	32.02	32.64	33.35	33.98	34.59	35.49	36.05	36.69	36.80	38.99	39.65
6.5	27.54	28.70	29.69	29.84	30.43	32.01	32.93	34.34	34.99	35.74	36.41	37.05	38.02	38.61	39.28	39.39	41.69	42.38
7.0	29.58	30.83	31.81	31.95	32.53	34.22	35.20	36.69	37.37	38.17	38.88	39.55	40.59	41.20	41.91	42.01	44.43	45.15
8.0	33.78	35.20	36.18	36.29	36.86	38.74	39.84	41.51	42.26	43.16	43.94	44.67	45.84	46.51	47.28	47.37	50.03	50.82
9.0	38.15	39.76	40.72	40.79	41.36	43.44	44.65	46.51	47.31	48.31	49.17	49.95	51.25	51.99	52.82	52.90	55.82	56.67
10.0	42.69	44.49	45.44	45.48	46.03	48.32	49.65	51.68	52.54	53.63	54.57	55.41	56.85	57.64	58.55	58.61	61.79	62.70
11.0	47.40	49.40	50.33	50.34	50.88	53.37	54.82	57.03	57.95	59.14	60.15	61.06	62.62	63.48	64.46	64.51	67.95	68.93
12.0	52.30	54.49	55.41	55.38	55.90	58.60	60.17	62.57	63.54	64.83	65.92	66.89	68.58	69.50	70.56	70.60	74.31	75.36
15.0	68.02	70.86	71.73	71.57	72.02	75.38	77.34	80.28	81.42	83.01	84.35	85.50	87.60	88.70	90.02	90.01	94.59	95.86
20.0	97.71	101.74	102.51	102.13	102.38	106.94	109.58	113.49	114.90	117.02	118.81	120.27	123.08	124.47	126.29	126.20	132.38	134.04
25.0	131.64	137.01	137.66	137.01	137.00	142.88	146.28	151.19	152.89	155.58	157.85	159.65	163.22	164.90	167.30	167.11	175.10	177.19
30.0	169.68	176.53	177.05	176.10	175.76	183.08	187.30	193.28	195.26	198.56	201.35	203.51	207.88	209.86	212.93	212.62	222.59	225.16
35.0	211.70	220.18	220.54	219.25	218.53	227.40	232.50	239.61	241.89	245.83	249.18	251.72	256.95	259.22	263.03	262.69	274.73	277.80
40.0	257.6	267.8	268.0	266.4	265.2	275.7	281.8	290.1	292.6	297.3	301.2	304.2	310.3	312.9	317.5	316.9	331.4	335.0
45.0	307.2	319.4	319.3	317.3	315.6	327.9	335.0	344.6	347.4	352.7	357.3	360.7	367.8	370.6	376.1	375.4	392.4	396.6
50.0	360.5	374.7	374.4	372.0	369.7	383.9	392.0	402.9	406.1	412.2	417.5	421.3	429.3	432.5	438.9	438.1	457.7	462.5
55.0	417.4	433.7	433.2	430.3	427.4	443.6	452.9	465.0	468.6	475.4	481.4	485.7	494.8	498.2	505.7	504.7	527.2	532.6
60.0	477.7	496.3	495.6	492.1	488.6	506.9	517.3	530.9	534.7	542.5	549.2	553.9	564.2	567.9	576.4	575.2	600.7	606.8
65.0	541.4	562.4	561.4	557.4	553.2	573.7	585.3	600.3	604.6	613.1	620.7	625.9	637.3	641.2	651.0	649.5	678.1	684.9
70.0	608.4	632.0	630.6	626.1	621.1	643.9	656.8	673.4	677.9	687.4	695.7	701.5	714.0	718.3	729.2	727.6	759.4	767.0
80.0	752.1	781.0	779.1	773.4	766.6	794.4	810.0	829.7	834.9	846.2	856.3	863.2	878.2	883.0	896.6	894.5	933.3	942.4
90.0	908.2	943.0	940.4	933.4	924.7	957.7	976.2	999.2	1005.2	1018.5	1030.5	1038.5	1056.1	1061.5	1077.9	1075.3	1121.7	1132.4
100.0	1076.2	1117.4	1114.0	1105.6	1094.7	1133.4	1155.0	1181.5	1188.3	1203.6	1217.6	1226.8	1247.3	1253.2	1272.7	1269.5	1324.0	1336.5
150.0	2081.	2160.	2152.	2135.	2111.	2183.	2222.	2268.	2279.	2306.	2332.	2348.	2385.	2394.	2431.	2425.	2527.	2550.
200.0	3331.	3455.	3443.	3416.	3373.	3486.	3547.	3615.	3631.	3672.	3712.	3736.	3791.	3804.	3864.	3853.	3981.	4049.
250.0	4782.	4958.	4964.	4914.	4850.	5009.	5090.	5185.	5201.	5260.	5320.	5351.	5424.	5447.	5532.	5516.	5659.	5783.
300.0	6402.	6636.	6650.	6603.	6513.	6714.	6812.	6937.	6952.	7030.	7117.	7151.	7244.	7281.	7396.	7373.	7529.	7713.
350.0	8170.	8465.	8500.	8446.	8329.	8572.	8688.	8846.	8860.	8959.	9074.	9111.	9226.	9276.	9422.	9393.	9564.	9813.
400.0	10072.	10428.	10483.	10423.	10276.	10564.	10700.	10892.	10904.	11026.	11171.	11212.	11349.	11414.	11594.	11557.	11745.	12062.
450.0	12074.	12508.	12583.	12516.	12339.	12673.	12841.	13059.	13069.	13214.	13391.	13435.	13595.	13675.	13891.	13847.	14053.	14441.
500.0	14183.	14690.	14788.	14713.	14503.	14887.	15067.	15332.	15339.	15509.	15718.	15783.	15950.	16047.	16299.	16267.	16474.	16934.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{69}_{31}$GA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	51.98	49.61	37.57	35.93	36.46	33.21	28.72	27.45	26.66	26.01	24.41	22.97	21.83	21.21	20.98	20.21	18.13	18.88
3.0	49.42	47.83	36.83	35.27	35.86	32.87	28.53	27.35	26.62	26.07	24.48	23.09	22.01	21.41	21.19	20.46	18.56	19.17
3.5	46.96	45.93	35.87	34.39	35.00	32.25	28.08	26.97	26.30	25.83	24.28	22.94	21.90	21.34	21.14	20.44	18.71	19.19
4.0	44.67	44.05	34.82	33.41	34.05	31.50	27.49	26.46	25.84	25.44	23.92	22.63	21.65	21.12	20.93	20.26	18.68	19.05
4.5	42.57	42.26	33.76	32.41	33.06	30.70	26.84	25.87	25.30	24.96	23.48	22.24	21.30	20.80	20.63	19.99	18.54	18.83
5.0	40.64	40.58	32.71	31.43	32.08	29.88	26.17	25.26	24.73	24.43	22.99	21.80	20.90	20.43	20.27	19.66	18.33	18.54
5.5	38.89	39.01	31.70	30.47	31.13	29.07	25.49	24.64	24.14	23.88	22.49	21.34	20.48	20.04	19.89	19.30	18.08	18.23
6.0	37.28	37.55	30.74	29.56	30.22	28.28	24.83	24.03	23.56	23.33	21.98	20.88	20.05	19.63	19.49	18.93	17.80	17.90
6.5	35.80	36.20	29.82	28.69	29.34	27.52	24.19	23.43	22.99	22.79	21.48	20.41	19.62	19.22	19.09	18.56	17.51	17.56
7.0	34.45	34.94	28.95	27.86	28.51	26.79	23.58	22.85	22.44	22.27	20.99	19.96	19.20	18.82	18.70	18.19	17.20	17.22
8.0	32.04	32.68	27.35	26.34	26.98	25.43	22.42	21.76	21.39	21.26	20.05	19.08	18.38	18.04	17.93	17.46	16.60	16.56
9.0	29.97	30.71	25.92	24.97	25.60	24.19	21.36	20.76	20.42	20.32	19.18	18.27	17.61	17.30	17.21	16.77	16.01	15.92
10.0	28.18	28.99	24.63	23.75	24.36	23.07	20.40	19.84	19.53	19.46	18.37	17.51	16.90	16.61	16.53	16.12	15.45	15.33
11.0	26.60	27.46	23.48	22.64	23.23	22.05	19.52	19.00	18.72	18.67	17.63	16.82	16.24	15.97	15.90	15.52	14.91	14.77
12.0	25.21	26.10	22.43	21.64	22.22	21.12	18.71	18.23	17.98	17.94	16.95	16.18	15.62	15.38	15.32	14.96	14.41	14.25
15.0	21.86	22.79	19.83	19.14	19.68	18.79	16.68	16.28	16.08	16.07	15.19	14.52	14.05	13.85	13.81	13.51	13.09	12.89
20.0	18.02	18.95	16.70	16.14	16.61	15.93	14.19	13.87	13.72	13.75	13.01	12.45	12.06	11.92	11.89	11.66	11.36	11.15
25.0	15.43	16.32	14.50	14.02	14.44	13.90	12.40	12.14	12.02	12.06	11.42	10.94	10.61	10.50	10.49	10.29	10.07	9.86
30.0	13.56	14.40	12.86	12.44	12.82	12.37	11.05	10.83	10.74	10.78	10.21	9.79	9.50	9.42	9.41	9.25	9.07	8.87
35.0	12.13	12.93	11.59	11.22	11.57	11.18	10.00	9.81	9.73	9.78	9.26	8.89	8.63	8.56	8.56	8.41	8.27	8.09
40.0	11.01	11.77	10.58	10.24	10.57	10.23	9.15	8.99	8.92	8.97	8.50	8.16	7.92	7.87	7.86	7.74	7.62	7.44
45.0	10.11	10.82	9.75	9.45	9.74	9.44	8.46	8.31	8.25	8.30	7.86	7.55	7.33	7.29	7.29	7.18	7.07	6.91
50.0	9.36	10.04	9.06	8.78	9.06	8.79	7.87	7.74	7.68	7.73	7.33	7.04	6.84	6.80	6.81	6.71	6.61	6.46
55.0	8.72	9.38	8.47	8.21	8.47	8.23	7.38	7.25	7.20	7.25	6.88	6.61	6.42	6.39	6.39	6.30	6.22	6.07
60.0	8.19	8.81	7.97	7.72	7.97	7.75	6.95	6.83	6.79	6.84	6.48	6.23	6.06	6.03	6.03	5.95	5.87	5.74
65.0	7.719	8.321	7.533	7.302	7.536	7.330	6.575	6.468	6.429	6.479	6.142	5.906	5.738	5.715	5.721	5.644	5.573	5.447
70.0	7.312	7.891	7.149	6.931	7.153	6.962	6.247	6.147	6.111	6.160	5.841	5.617	5.458	5.438	5.445	5.373	5.307	5.188
80.0	6.634	7.173	6.506	6.309	6.512	6.344	5.696	5.607	5.577	5.624	5.334	5.131	4.986	4.971	4.978	4.915	4.857	4.760
90.0	6.090	6.597	5.988	5.808	5.995	5.845	5.251	5.171	5.144	5.190	4.923	4.737	4.604	4.592	4.600	4.544	4.490	4.395
100.0	5.645	6.123	5.562	5.395	5.569	5.433	4.883	4.810	4.787	4.831	4.583	4.411	4.287	4.278	4.286	4.235	4.186	4.099
150.0	4.238	4.619	4.206	4.082	4.212	4.119	3.708	3.655	3.642	3.680	3.493	3.364	3.270	3.267	3.274	3.241	3.203	3.146
200.0	3.484	3.847	3.501	3.392	3.478	3.427	3.082	3.027	3.038	3.074	2.914	2.871	2.777	2.720	2.731	2.695	2.723	2.628
250.0	3.048	3.370	3.069	2.974	3.043	3.008	2.706	2.629	2.670	2.703	2.563	2.524	2.442	2.394	2.404	2.364	2.398	2.317
300.0	2.749	3.044	2.773	2.687	2.751	2.720	2.448	2.367	2.417	2.447	2.322	2.285	2.211	2.169	2.179	2.144	2.174	2.102
350.0	2.533	2.806	2.558	2.479	2.538	2.511	2.260	2.178	2.232	2.261	2.145	2.111	2.043	2.006	2.015	1.983	2.010	1.945
400.0	2.368	2.626	2.395	2.320	2.376	2.351	2.117	2.042	2.092	2.120	2.011	1.978	1.915	1.881	1.890	1.860	1.885	1.825
450.0	2.239	2.484	2.267	2.196	2.250	2.226	2.005	1.936	1.982	2.009	1.906	1.874	1.814	1.783	1.792	1.764	1.788	1.731
500.0	2.136	2.370	2.164	2.096	2.149	2.126	1.915	1.851	1.894	1.920	1.822	1.790	1.734	1.705	1.713	1.687	1.709	1.655

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.69	16.88	16.93	17.05	16.90	15.95	15.46	14.61	14.30	13.92	13.66	13.44	12.95	12.79	12.65	12.68	12.16	12.02
3.0	17.99	17.19	17.23	17.36	17.24	16.31	15.83	15.01	14.72	14.36	14.10	13.88	13.41	13.24	13.09	13.13	12.58	12.43
3.5	18.05	17.25	17.30	17.42	17.33	16.43	15.96	15.18	14.90	14.55	14.30	14.09	13.63	13.46	13.31	13.35	12.78	12.63
4.0	17.95	17.17	17.21	17.34	17.27	16.40	15.94	15.20	14.94	14.60	14.35	14.15	13.71	13.54	13.39	13.42	12.85	12.70
4.5	17.76	16.99	17.03	17.16	17.11	16.27	15.83	15.12	14.88	14.55	14.31	14.11	13.69	13.52	13.37	13.40	12.83	12.68
5.0	17.51	16.76	16.80	16.93	16.89	16.08	15.66	14.98	14.75	14.43	14.20	14.01	13.61	13.45	13.29	13.32	12.75	12.60
5.5	17.23	16.50	16.54	16.66	16.64	15.86	15.45	14.80	14.59	14.28	14.05	13.87	13.49	13.33	13.17	13.20	12.63	12.49
6.0	16.93	16.22	16.26	16.38	16.37	15.62	15.21	14.60	14.39	14.10	13.88	13.71	13.34	13.18	13.02	13.05	12.49	12.35
6.5	16.62	15.93	15.97	16.09	16.09	15.36	14.97	14.38	14.19	13.90	13.69	13.52	13.17	13.01	12.86	12.89	12.33	12.19
7.0	16.31	15.64	15.68	15.79	15.80	15.10	14.72	14.15	13.97	13.70	13.49	13.33	12.98	12.84	12.68	12.71	12.16	12.02
8.0	15.70	15.06	15.10	15.21	15.23	14.57	14.21	13.69	13.52	13.27	13.07	12.92	12.60	12.46	12.31	12.34	11.80	11.67
9.0	15.11	14.50	14.54	14.64	14.68	14.06	13.72	13.23	13.08	12.84	12.66	12.52	12.22	12.09	11.94	11.96	11.45	11.32
10.0	14.55	13.97	14.01	14.11	14.15	13.57	13.25	12.79	12.66	12.43	12.25	12.12	11.84	11.72	11.57	11.60	11.09	10.97
11.0	14.03	13.47	13.51	13.61	13.66	13.10	12.80	12.38	12.25	12.03	11.87	11.74	11.48	11.36	11.22	11.24	10.76	10.64
12.0	13.55	13.01	13.05	13.14	13.20	12.67	12.38	11.98	11.86	11.66	11.50	11.38	11.13	11.02	10.88	10.90	10.43	10.32
15.0	12.27	11.79	11.83	11.92	11.98	11.52	11.26	10.92	10.83	10.65	10.51	10.41	10.19	10.10	9.97	9.99	9.56	9.46
20.0	10.63	10.23	10.26	10.34	10.41	10.02	9.81	9.54	9.46	9.32	9.20	9.12	8.94	8.87	8.75	8.77	8.40	8.31
25.0	9.41	9.06	9.09	9.16	9.23	8.90	8.72	8.49	8.43	8.31	8.21	8.14	7.99	7.93	7.82	7.84	7.51	7.43
30.0	8.47	8.16	8.18	8.25	8.32	8.03	7.87	7.67	7.62	7.51	7.43	7.37	7.24	7.19	7.08	7.10	6.81	6.74
35.0	7.72	7.44	7.46	7.52	7.59	7.33	7.19	7.01	6.97	6.88	6.80	6.74	6.63	6.59	6.49	6.51	6.24	6.18
40.0	7.114	6.851	6.877	6.931	6.999	6.759	6.630	6.477	6.439	6.354	6.281	6.234	6.129	6.098	6.006	6.021	5.773	5.719
45.0	6.607	6.364	6.388	6.438	6.504	6.284	6.165	6.027	5.993	5.917	5.849	5.806	5.711	5.683	5.597	5.611	5.381	5.331
50.0	6.178	5.951	5.975	6.022	6.086	5.881	5.772	5.645	5.615	5.544	5.482	5.442	5.355	5.331	5.249	5.263	5.048	5.002
55.0	5.810	5.597	5.620	5.664	5.726	5.535	5.433	5.317	5.289	5.224	5.166	5.129	5.048	5.027	4.949	4.962	4.760	4.717
60.0	5.490	5.290	5.312	5.354	5.414	5.234	5.139	5.031	5.006	4.945	4.890	4.856	4.780	4.762	4.688	4.700	4.510	4.469
65.0	5.211	5.021	5.042	5.082	5.140	4.971	4.881	4.780	4.757	4.700	4.648	4.616	4.545	4.528	4.458	4.470	4.289	4.251
70.0	4.964	4.783	4.803	4.842	4.898	4.737	4.653	4.558	4.537	4.483	4.434	4.404	4.337	4.321	4.254	4.265	4.093	4.057
80.0	4.546	4.381	4.400	4.435	4.489	4.343	4.266	4.182	4.163	4.115	4.070	4.043	3.983	3.970	3.908	3.919	3.761	3.728
90.0	4.206	4.054	4.071	4.104	4.155	4.021	3.951	3.875	3.858	3.815	3.774	3.749	3.694	3.683	3.625	3.635	3.489	3.459
100.0	3.924	3.782	3.799	3.829	3.876	3.753	3.689	3.620	3.604	3.564	3.526	3.504	3.453	3.443	3.389	3.398	3.263	3.235
150.0	3.011	2.903	2.916	2.940	2.980	2.887	2.839	2.790	2.780	2.751	2.723	2.706	2.669	2.662	2.621	2.628	2.524	2.503
200.0	2.516	2.430	2.430	2.450	2.485	2.408	2.370	2.332	2.324	2.301	2.278	2.264	2.235	2.228	2.194	2.201	2.172	2.102
250.0	2.218	2.142	2.119	2.136	2.169	2.108	2.087	2.050	2.051	2.028	1.998	1.996	1.973	1.958	1.927	1.934	1.921	1.860
300.0	2.013	1.944	1.923	1.930	1.958	1.914	1.895	1.862	1.864	1.843	1.816	1.813	1.794	1.781	1.753	1.759	1.746	1.692
350.0	1.862	1.799	1.780	1.786	1.813	1.772	1.754	1.725	1.726	1.707	1.683	1.680	1.662	1.651	1.626	1.630	1.618	1.569
400.0	1.748	1.688	1.671	1.677	1.702	1.664	1.647	1.620	1.622	1.604	1.581	1.578	1.562	1.551	1.527	1.532	1.520	1.475
450.0	1.658	1.602	1.586	1.591	1.615	1.579	1.563	1.538	1.539	1.523	1.501	1.499	1.483	1.473	1.451	1.455	1.444	1.401
500.0	1.586	1.532	1.517	1.522	1.545	1.511	1.496	1.472	1.473	1.457	1.437	1.434	1.420	1.411	1.389	1.393	1.382	1.342

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

69 GA IONS 31

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	4.890	4.690	6.628	6.610	6.490	7.720	8.360	8.816	9.160	9.510	9.710	10.360	10.710	11.203	11.400	11.599	11.956	12.270
3.0	5.571	5.398	7.555	7.578	7.443	8.763	9.564	10.074	10.454	10.833	11.120	11.856	12.282	12.820	13.034	13.293	13.834	14.081
3.5	6.287	6.134	8.504	8.569	8.417	9.822	10.782	11.344	11.757	12.162	12.534	13.354	13.852	14.432	14.662	14.979	15.683	15.879
4.0	7.040	6.901	9.480	9.586	9.416	10.904	12.024	12.635	13.079	13.507	13.965	14.868	15.436	16.057	16.302	16.673	17.527	17.682
4.5	7.832	7.701	10.486	10.635	10.444	12.014	13.294	13.953	14.428	14.876	15.420	16.405	17.042	17.702	17.962	18.387	19.380	19.503
5.0	8.661	8.534	11.524	11.716	11.504	13.153	14.595	15.302	15.808	16.273	16.905	17.972	18.677	19.376	19.649	20.128	21.251	21.349
5.5	9.529	9.401	12.596	12.831	12.595	14.324	15.931	16.685	17.220	17.702	18.422	19.572	20.344	21.081	21.367	21.898	23.146	23.225
6.0	10.436	10.303	13.701	13.980	13.720	15.527	17.302	18.103	18.666	19.163	19.973	21.206	22.046	22.820	23.119	23.703	25.069	25.135
6.5	11.380	11.239	14.840	15.165	14.879	16.764	18.710	19.557	20.149	20.659	21.561	22.877	23.785	24.597	24.908	25.543	27.024	27.081
7.0	12.363	12.209	16.015	16.385	16.072	18.036	20.154	21.048	21.668	22.191	23.186	24.587	25.563	26.411	26.734	27.421	29.012	29.064
8.0	14.44	14.25	18.47	18.93	18.56	20.68	23.16	24.14	24.82	25.36	26.55	28.12	29.24	30.16	30.50	31.29	33.09	33.15
9.0	16.67	16.43	21.06	21.62	21.19	23.46	26.31	27.39	28.12	28.68	30.07	31.82	33.07	34.06	34.43	35.33	37.33	37.40
10.0	19.04	18.74	23.79	24.46	23.95	26.38	29.62	30.79	31.58	32.16	33.76	35.68	37.07	38.13	38.52	39.52	41.72	41.82
11.0	21.57	21.19	26.66	27.44	26.85	29.44	33.08	34.35	35.19	35.77	37.58	39.70	41.24	42.37	42.78	43.89	46.26	46.40
12.0	24.23	23.77	29.67	30.55	29.89	32.64	36.69	38.05	38.95	39.54	41.57	43.88	45.57	46.77	47.20	48.41	50.97	51.16
15.0	33.07	32.28	39.51	40.74	39.81	43.05	48.43	50.09	51.15	51.75	54.50	57.41	59.57	60.97	61.45	62.99	66.06	66.46
20.0	50.55	48.96	58.55	60.45	58.97	63.07	70.94	73.13	74.46	75.04	79.12	83.15	86.16	87.91	88.46	90.57	94.43	95.31
25.0	71.31	68.65	80.79	83.45	81.31	86.32	97.02	99.78	101.39	101.90	107.51	112.79	116.74	118.81	119.42	122.14	126.75	128.28
30.0	95.22	91.20	106.11	109.63	106.72	112.68	126.56	129.91	131.81	132.20	139.52	146.18	151.17	153.56	154.21	157.57	162.90	165.22
35.0	122.16	116.53	134.41	138.87	135.09	142.05	159.43	163.43	165.62	165.84	175.05	183.21	189.34	192.04	192.71	196.73	202.78	206.01
40.0	152.0	144.5	165.6	171.1	166.3	174.3	195.5	200.2	202.7	202.7	214.0	223.8	231.1	234.1	234.8	239.5	246.3	250.5
45.0	184.8	175.1	199.6	206.2	200.4	209.5	234.8	240.2	243.0	242.8	256.2	267.8	276.4	279.7	280.4	285.9	293.3	298.7
50.0	220.3	208.3	236.3	244.1	237.1	247.4	277.1	283.2	286.4	285.9	301.7	315.1	325.2	328.8	329.4	335.6	343.8	350.3
55.0	258.5	243.9	275.7	284.8	276.5	288.0	322.4	329.3	332.8	331.9	350.3	365.7	377.3	381.1	381.7	388.7	397.7	405.4
60.0	299.4	281.8	317.7	328.1	318.5	331.2	370.6	378.4	382.1	380.9	402.0	419.5	432.6	436.7	437.3	445.1	454.8	463.9
65.0	342.8	322.1	362.3	374.1	363.1	377.0	421.7	430.3	434.4	432.8	456.7	476.4	491.2	495.5	496.1	504.6	515.1	525.6
70.0	388.7	364.7	409.3	422.6	410.1	425.3	475.5	485.0	489.4	487.4	514.3	536.3	552.9	557.5	557.9	567.3	578.6	590.6
80.0	488.0	456.6	510.6	527.1	511.3	529.3	591.4	602.7	607.8	604.8	638.1	665.0	685.3	690.3	690.6	701.8	714.7	729.7
90.0	596.6	557.0	621.3	641.2	621.9	642.7	717.7	731.0	736.7	732.7	772.9	805.1	829.5	834.9	834.9	847.9	862.6	880.9
100.0	714.4	665.7	741.0	764.6	741.4	765.3	854.0	869.5	875.9	870.6	918.3	956.2	984.9	990.7	990.6	1005.3	1021.8	1043.6
150.0	1430.	1323.	1464.	1510.	1463.	1504.	1675.	1703.	1713.	1699.	1792.	1863.	1918.	1925.	1923.	1948.	1976.	2016.
200.0	2334.	2148.	2370.	2444.	2371.	2430.	2704.	2747.	2758.	2733.	2881.	2971.	3064.	3091.	3086.	3123.	3145.	3225.
250.0	3397.	3110.	3427.	3535.	3436.	3508.	3903.	3975.	3974.	3934.	4148.	4257.	4394.	4448.	4437.	4497.	4500.	4628.
300.0	4591.	4189.	4612.	4758.	4632.	4717.	5247.	5365.	5336.	5282.	5566.	5697.	5882.	5966.	5948.	6033.	6014.	6195.
350.0	5901.	5372.	5910.	6097.	5940.	6040.	6716.	6891.	6824.	6748.	7115.	7272.	7508.	7627.	7597.	7709.	7667.	7905.
400.0	7312.	6645.	7305.	7537.	7346.	7462.	8295.	8530.	8422.	8326.	8777.	8961.	9255.	9401.	9367.	9507.	9442.	9738.
450.0	8811.	7997.	8787.	9067.	8840.	8971.	9971.	10265.	10118.	9999.	10541.	10755.	11107.	11286.	11243.	11413.	11322.	11681.
500.0	10390.	9420.	10347.	10677.	10410.	10558.	11732.	12088.	11901.	11758.	12393.	12639.	13054.	13266.	13213.	13415.	13297.	13721.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	12.89	13.38	14.46	14.73	15.29	16.08	16.55	17.16	17.53	17.89	18.26	18.65	19.04	19.40	19.86	20.03	21.48	21.95
3.0	14.82	15.40	16.47	16.74	17.30	18.21	18.75	19.49	19.91	20.33	20.74	21.17	21.66	22.05	22.54	22.70	24.27	24.77
3.5	16.73	17.40	18.47	18.72	19.30	20.32	20.92	21.77	22.23	22.71	23.17	23.64	24.21	24.63	25.15	25.30	26.99	27.52
4.0	18.66	19.41	20.47	20.70	21.29	22.42	23.08	24.04	24.54	25.08	25.58	26.08	26.73	27.18	27.73	27.88	29.68	30.24
4.5	20.58	21.43	22.48	22.70	23.30	24.53	25.25	26.32	26.86	27.44	27.98	28.52	29.24	29.73	30.31	30.45	32.36	32.96
5.0	22.54	23.47	24.52	24.73	25.33	26.66	27.44	28.61	29.18	29.82	30.40	30.97	31.77	32.29	32.89	33.03	35.06	35.68
5.5	24.52	25.54	26.59	26.78	27.38	28.82	29.66	30.93	31.54	32.22	32.85	33.45	34.32	34.86	35.50	35.63	37.78	38.43
6.0	26.54	27.65	28.69	28.87	29.47	31.01	31.91	33.27	33.92	34.66	35.32	35.95	36.89	37.47	38.13	38.26	40.53	41.21
6.5	28.60	29.80	30.83	30.99	31.60	33.24	34.20	35.65	36.33	37.12	37.82	38.48	39.49	40.10	40.80	40.92	43.31	44.02
7.0	30.70	31.99	33.02	33.16	33.76	35.51	36.52	38.07	38.78	39.62	40.36	41.05	42.13	42.77	43.50	43.61	46.12	46.87
8.0	35.01	36.48	37.50	37.61	38.21	40.16	41.29	43.03	43.80	44.74	45.55	46.31	47.52	48.22	49.02	49.12	51.88	52.70
9.0	39.49	41.15	42.16	42.24	42.83	44.98	46.23	48.16	48.99	50.02	50.92	51.74	53.08	53.85	54.72	54.80	57.82	58.70
10.0	44.14	46.00	46.99	47.04	47.62	49.98	51.35	53.46	54.35	55.48	56.46	57.34	58.82	59.64	60.59	60.66	63.94	64.89
11.0	48.97	51.03	52.01	52.02	52.58	55.15	56.65	58.94	59.89	61.13	62.18	63.12	64.74	65.62	66.65	66.70	70.26	71.27
12.0	53.98	56.24	57.21	57.18	57.72	60.51	62.13	64.61	65.62	66.95	68.09	69.09	70.84	71.79	72.89	72.93	76.77	77.86
15.0	70.05	72.98	73.89	73.74	74.20	77.67	79.68	82.73	83.91	85.55	86.94	88.12	90.29	91.42	92.79	92.79	97.51	98.82
20.0	100.34	104.48	105.30	104.91	105.18	109.87	112.59	116.61	118.08	120.26	122.10	123.61	126.51	127.94	129.82	129.73	136.10	137.81
25.0	134.90	140.41	141.11	140.45	140.45	146.49	149.98	155.03	156.78	159.55	161.88	163.73	167.40	169.14	171.61	171.41	179.62	181.78
30.0	173.60	180.61	181.17	180.21	179.88	187.38	191.71	197.85	199.89	203.28	206.14	208.36	212.85	214.89	218.03	217.72	227.96	230.59
35.0	216.30	224.97	225.37	224.06	223.35	232.42	237.65	244.93	247.28	251.32	254.76	257.37	262.73	265.06	268.96	268.52	280.96	284.11
40.0	262.9	273.3	273.6	271.9	270.7	281.5	287.7	296.2	298.8	303.6	307.6	310.6	316.9	319.5	324.3	323.7	338.5	342.2
45.0	313.3	325.6	325.7	323.6	321.9	334.5	341.7	351.4	354.4	359.9	364.6	368.0	375.3	378.2	383.8	383.1	400.4	404.7
50.0	367.3	381.7	381.5	379.0	376.8	391.3	399.6	410.6	413.9	420.1	425.5	429.4	437.7	440.9	447.5	446.6	466.7	471.6
55.0	424.9	441.6	441.1	438.1	436.3	451.8	461.2	473.6	477.3	484.3	490.4	494.8	504.1	507.6	515.2	514.2	537.1	542.6
60.0	486.0	505.0	504.3	500.8	497.2	515.9	526.5	540.4	544.3	552.2	559.1	563.9	574.4	578.1	586.9	585.6	611.6	617.8
65.0	550.6	572.0	571.0	567.0	562.7	583.6	595.4	610.7	615.1	623.8	631.5	636.8	648.4	652.5	662.4	660.9	690.1	697.0
70.0	618.4	642.4	641.1	636.6	631.5	654.7	667.9	684.7	689.3	699.0	707.5	713.4	726.1	730.5	741.6	740.0	772.4	780.1
80.0	763.9	793.3	791.4	786.7	778.8	807.0	822.9	842.9	848.3	859.8	870.1	877.1	892.4	897.3	911.1	909.0	948.5	957.7
90.0	921.8	957.2	954.6	947.5	938.7	972.3	991.1	1014.5	1020.6	1034.1	1046.3	1054.5	1072.4	1077.9	1094.6	1092.0	1139.2	1150.1
100.0	1091.8	1133.6	1130.2	1121.7	1110.8	1150.0	1172.0	1198.9	1205.8	1221.4	1235.6	1245.0	1265.8	1271.8	1291.6	1288.4	1343.8	1356.5
150.0	2108.	2188.	2180.	2163.	2138.	2211.	2251.	2298.	2309.	2336.	2362.	2379.	2416.	2425.	2463.	2456.	2560.	2583.
200.0	3370.	3496.	3484.	3456.	3413.	3528.	3589.	3658.	3674.	3716.	3756.	3781.	3837.	3850.	3910.	3899.	4030.	4098.
250.0	4836.	5014.	5010.	4970.	4905.	5066.	5148.	5244.	5261.	5320.	5381.	5412.	5487.	5510.	5596.	5579.	5725.	5849.
300.0	6473.	6708.	6723.	6676.	6585.	6788.	6887.	7014.	7029.	7108.	7196.	7230.	7325.	7361.	7477.	7454.	7613.	7799.
350.0	8257.	8556.	8591.	8537.	8419.	8664.	8782.	8942.	8956.	9056.	9172.	9210.	9325.	9377.	9524.	9495.	9688.	9920.
400.0	10172.	10538.	10594.	10533.	10385.	10676.	10814.	11008.	11020.	11143.	11290.	11331.	11469.	11535.	11717.	11680.	11871.	12190.
450.0	12200.	12638.	12715.	12647.	12467.	12806.	12965.	13196.	13206.	13363.	13531.	13576.	13738.	13819.	14037.	13993.	14201.	14592.
500.0	14329.	14842.	14940.	14865.	14652.	15041.	15223.	15491.	15498.	15670.	15881.	15931.	16116.	16213.	16469.	16417.	16645.	17110.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{74}_{32}$GE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	54.44	51.71	39.17	37.46	38.00	34.58	29.90	28.57	27.74	27.07	25.39	23.89	22.71	22.06	21.81	21.02	18.85	19.63
3.0	51.83	49.95	38.46	36.81	37.41	34.27	29.74	28.50	27.74	27.16	25.51	24.05	22.92	22.30	22.07	21.30	19.32	19.95
3.5	49.30	48.03	37.48	35.92	36.56	33.66	29.30	28.14	27.44	26.95	25.32	23.92	22.84	22.25	22.03	21.30	19.50	19.99
4.0	46.94	46.12	36.42	34.94	35.60	32.91	28.71	27.63	26.98	26.56	24.97	23.62	22.59	22.03	21.84	21.13	19.49	19.87
4.5	44.76	44.29	35.33	33.92	34.59	32.10	28.06	27.04	26.44	26.07	24.53	23.23	22.25	21.72	21.54	20.87	19.36	19.65
5.0	42.77	42.57	34.27	32.91	33.59	31.26	27.38	26.42	25.86	25.54	24.04	22.79	21.85	21.35	21.18	20.54	19.15	19.38
5.5	40.94	40.95	33.23	31.94	32.62	30.44	26.69	25.79	25.27	24.99	23.53	22.33	21.43	20.96	20.80	20.19	18.90	19.06
6.0	39.27	39.45	32.24	31.00	31.68	29.63	26.02	25.17	24.67	24.43	23.02	21.85	20.99	20.54	20.40	19.81	18.62	18.73
6.5	37.73	38.05	31.29	30.10	30.78	28.85	25.36	24.56	24.09	23.88	22.51	21.38	20.55	20.13	19.99	19.43	18.33	18.39
7.0	36.32	36.75	30.40	29.25	29.93	28.10	24.73	23.96	23.52	23.34	22.00	20.92	20.12	19.72	19.59	19.05	18.02	18.04
8.0	33.81	34.41	28.74	27.68	28.34	26.70	23.54	22.84	22.45	22.31	21.04	20.02	19.28	18.92	18.81	18.31	17.41	17.36
9.0	31.64	32.36	27.26	26.26	26.92	25.42	22.44	21.81	21.45	21.35	20.14	19.18	18.49	18.16	18.06	17.60	16.80	16.71
10.0	29.76	30.66	25.93	24.99	25.63	24.26	21.45	20.86	20.54	20.46	19.31	18.41	17.76	17.45	17.37	16.94	16.22	16.10
11.0	28.12	28.97	24.73	23.84	24.46	23.21	20.54	19.99	19.69	19.64	18.54	17.69	17.07	16.79	16.72	16.32	15.68	15.52
12.0	26.66	27.55	23.64	22.80	23.41	22.24	19.70	19.19	18.92	18.88	17.83	17.02	16.44	16.18	16.12	15.74	15.16	14.99
15.0	23.14	24.09	20.92	20.20	20.76	19.81	17.59	17.17	16.95	16.94	16.01	15.31	14.80	14.60	14.55	14.23	13.79	13.58
20.0	19.10	20.05	17.65	17.06	17.55	16.83	14.99	14.66	14.49	14.52	13.74	13.15	12.73	12.59	12.56	12.31	12.00	11.77
25.0	16.37	17.29	15.34	14.84	15.28	14.70	13.11	12.84	12.72	12.76	12.07	11.57	11.22	11.10	11.09	10.88	10.65	10.43
30.0	14.39	15.26	13.62	13.18	13.59	13.10	11.70	11.47	11.37	11.42	10.81	10.37	10.06	9.97	9.96	9.78	9.60	9.39
35.0	12.88	13.71	12.29	11.90	12.27	11.85	10.60	10.40	10.31	10.36	9.81	9.42	9.14	9.07	9.06	8.91	8.76	8.56
40.0	11.70	12.49	11.22	10.87	11.21	10.85	9.71	9.53	9.45	9.51	9.01	8.65	8.39	8.34	8.34	8.20	8.07	7.89
45.0	10.74	11.49	10.35	10.02	10.34	10.02	8.97	8.81	8.75	8.80	8.34	8.01	7.78	7.73	7.73	7.61	7.50	7.33
50.0	9.94	10.66	9.62	9.32	9.62	9.33	8.36	8.21	8.16	8.21	7.78	7.47	7.26	7.22	7.22	7.12	7.02	6.85
55.0	9.27	9.96	9.00	8.72	9.00	8.74	7.83	7.70	7.66	7.70	7.30	7.02	6.82	6.78	6.79	6.69	6.60	6.45
60.0	8.70	9.36	8.47	8.21	8.47	8.23	7.38	7.26	7.21	7.27	6.89	6.62	6.43	6.40	6.41	6.32	6.24	6.09
65.0	8.209	8.843	8.006	7.760	8.009	7.788	6.987	6.873	6.831	6.883	6.526	6.274	6.096	6.071	6.078	5.995	5.920	5.786
70.0	7.777	8.388	7.600	7.368	7.604	7.399	6.640	6.533	6.495	6.546	6.207	5.969	5.800	5.779	5.786	5.709	5.638	5.512
80.0	7.057	7.627	6.919	6.709	6.925	6.745	6.057	5.962	5.929	5.979	5.671	5.455	5.301	5.285	5.292	5.225	5.163	5.050
90.0	6.480	7.016	6.370	6.178	6.377	6.217	5.585	5.499	5.471	5.520	5.236	5.038	4.896	4.883	4.891	4.832	4.775	4.673
100.0	6.007	6.513	5.918	5.741	5.925	5.780	5.195	5.117	5.093	5.139	4.875	4.692	4.561	4.551	4.559	4.505	4.453	4.360
150.0	4.513	4.917	4.478	4.347	4.486	4.385	3.947	3.892	3.877	3.918	3.719	3.582	3.482	3.478	3.486	3.450	3.410	3.349
200.0	3.711	4.096	3.728	3.613	3.705	3.650	3.282	3.224	3.235	3.274	3.104	3.058	2.957	2.896	2.908	2.870	2.900	2.799
250.0	3.246	3.589	3.269	3.168	3.242	3.204	2.883	2.800	2.844	2.879	2.730	2.689	2.601	2.550	2.561	2.518	2.554	2.468
300.0	2.929	3.242	2.955	2.863	2.930	2.898	2.608	2.511	2.574	2.607	2.473	2.434	2.355	2.311	2.322	2.284	2.316	2.239
350.0	2.698	2.989	2.726	2.641	2.704	2.675	2.408	2.321	2.378	2.409	2.286	2.249	2.176	2.137	2.147	2.113	2.141	2.072
400.0	2.523	2.797	2.552	2.472	2.532	2.505	2.256	2.176	2.229	2.258	2.143	2.108	2.040	2.004	2.014	1.982	2.009	1.944
450.0	2.386	2.646	2.415	2.340	2.397	2.372	2.137	2.063	2.112	2.140	2.031	1.997	1.933	1.900	1.909	1.880	1.905	1.844
500.0	2.276	2.525	2.306	2.233	2.289	2.266	2.041	1.973	2.018	2.045	1.942	1.908	1.847	1.817	1.826	1.797	1.821	1.764

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	18.38	17.54	17.59	17.72	17.57	16.57	16.06	15.17	14.85	14.47	14.19	13.96	13.46	13.29	13.14	13.18	12.63	12.49
3.0	18.73	17.89	17.93	18.06	17.94	16.97	16.47	15.62	15.31	14.93	14.66	14.44	13.95	13.77	13.62	13.65	13.08	12.93
3.5	18.80	17.97	18.02	18.15	18.05	17.11	16.62	15.81	15.52	15.15	14.89	14.67	14.20	14.02	13.86	13.90	13.31	13.15
4.0	18.72	17.90	17.95	18.08	18.01	17.10	16.62	15.84	15.57	15.22	14.96	14.75	14.29	14.11	13.95	13.99	13.39	13.24
4.5	18.53	17.74	17.78	17.91	17.86	16.98	16.52	15.77	15.52	15.18	14.93	14.72	14.29	14.11	13.95	13.98	13.38	13.23
5.0	18.29	17.51	17.55	17.68	17.64	16.80	16.35	15.64	15.40	15.07	14.83	14.63	14.21	14.04	13.88	13.91	13.31	13.16
5.5	18.01	17.25	17.29	17.42	17.39	16.58	16.14	15.47	15.24	14.92	14.68	14.50	14.09	13.92	13.76	13.79	13.20	13.05
6.0	17.71	16.97	17.01	17.13	17.12	16.33	15.91	15.26	15.05	14.74	14.51	14.33	13.94	13.78	13.62	13.65	13.06	12.91
6.5	17.40	16.67	16.71	16.84	16.84	16.07	15.67	15.05	14.84	14.55	14.32	14.15	13.78	13.61	13.45	13.48	12.90	12.75
7.0	17.08	16.38	16.42	16.54	16.55	15.81	15.41	14.82	14.63	14.34	14.12	13.95	13.59	13.44	13.27	13.30	12.73	12.58
8.0	16.46	15.79	15.82	15.94	15.96	15.27	14.90	14.35	14.17	13.91	13.70	13.54	13.21	13.06	12.90	12.93	12.37	12.23
9.0	15.86	15.21	15.25	15.36	15.40	14.75	14.39	13.88	13.72	13.47	13.28	13.13	12.82	12.68	12.52	12.55	12.00	11.87
10.0	15.29	14.67	14.71	14.82	14.86	14.24	13.91	13.43	13.29	13.05	12.86	12.73	12.43	12.30	12.14	12.17	11.64	11.52
11.0	14.75	14.16	14.20	14.30	14.36	13.77	13.45	13.00	12.87	12.64	12.47	12.34	12.06	11.94	11.78	11.81	11.30	11.18
12.0	14.25	13.68	13.72	13.82	13.88	13.32	13.01	12.59	12.47	12.25	12.09	11.96	11.70	11.59	11.43	11.46	10.97	10.85
15.0	12.93	12.42	12.46	12.55	12.62	12.13	11.86	11.50	11.40	11.22	11.07	10.96	10.73	10.64	10.49	10.52	10.07	9.96
20.0	11.22	10.79	10.83	10.91	10.98	10.57	10.35	10.06	9.99	9.83	9.71	9.62	9.44	9.36	9.23	9.25	8.86	8.77
25.0	9.95	9.57	9.61	9.68	9.76	9.40	9.21	8.97	8.91	8.78	8.67	8.60	8.44	8.38	8.26	8.28	7.93	7.85
30.0	8.97	8.63	8.66	8.73	8.80	8.49	8.32	8.12	8.06	7.95	7.86	7.79	7.65	7.61	7.49	7.51	7.20	7.13
35.0	8.18	7.88	7.91	7.97	8.04	7.76	7.61	7.43	7.38	7.28	7.20	7.14	7.02	6.98	6.87	6.89	6.61	6.54
40.0	7.540	7.261	7.289	7.346	7.418	7.163	7.026	6.863	6.823	6.734	6.656	6.606	6.495	6.461	6.363	6.380	6.117	6.059
45.0	7.007	6.749	6.775	6.828	6.897	6.663	6.538	6.391	6.355	6.273	6.202	6.156	6.055	6.026	5.934	5.949	5.705	5.652
50.0	6.555	6.314	6.339	6.389	6.457	6.239	6.123	5.989	5.957	5.882	5.816	5.774	5.680	5.655	5.568	5.583	5.355	5.305
55.0	6.167	5.941	5.965	6.012	6.078	5.875	5.767	5.643	5.614	5.544	5.482	5.444	5.357	5.335	5.252	5.266	5.052	5.006
60.0	5.830	5.617	5.640	5.685	5.749	5.558	5.457	5.342	5.315	5.251	5.192	5.156	5.075	5.055	4.977	4.990	4.788	4.745
65.0	5.535	5.333	5.355	5.398	5.460	5.280	5.185	5.077	5.053	4.992	4.937	4.903	4.827	4.809	4.734	4.747	4.555	4.514
70.0	5.274	5.082	5.103	5.144	5.204	5.033	4.943	4.843	4.820	4.763	4.711	4.679	4.607	4.591	4.519	4.531	4.348	4.310
80.0	4.832	4.657	4.677	4.714	4.771	4.616	4.536	4.445	4.426	4.374	4.326	4.298	4.233	4.219	4.153	4.165	3.997	3.962
90.0	4.472	4.311	4.329	4.364	4.418	4.276	4.201	4.120	4.102	4.056	4.012	3.986	3.927	3.916	3.854	3.865	3.710	3.678
100.0	4.173	4.023	4.040	4.073	4.125	3.992	3.924	3.850	3.834	3.791	3.751	3.726	3.672	3.662	3.604	3.614	3.470	3.440
150.0	3.206	3.091	3.104	3.129	3.173	3.073	3.023	2.970	2.959	2.929	2.898	2.881	2.841	2.834	2.790	2.798	2.686	2.664
200.0	2.679	2.587	2.588	2.609	2.647	2.565	2.524	2.483	2.475	2.451	2.426	2.411	2.380	2.373	2.337	2.344	2.313	2.238
250.0	2.363	2.282	2.267	2.276	2.310	2.245	2.223	2.184	2.185	2.161	2.129	2.125	2.102	2.086	2.053	2.060	2.046	1.981
300.0	2.144	2.071	2.049	2.056	2.086	2.039	2.019	1.984	1.985	1.963	1.935	1.932	1.911	1.897	1.867	1.874	1.860	1.802
350.0	1.984	1.917	1.896	1.903	1.932	1.888	1.869	1.838	1.839	1.819	1.793	1.790	1.771	1.759	1.731	1.737	1.724	1.671
400.0	1.862	1.799	1.781	1.787	1.814	1.773	1.755	1.726	1.728	1.709	1.685	1.682	1.664	1.653	1.627	1.633	1.620	1.571
450.0	1.767	1.707	1.690	1.695	1.721	1.683	1.666	1.638	1.640	1.622	1.600	1.597	1.581	1.570	1.546	1.551	1.538	1.493
500.0	1.690	1.632	1.617	1.622	1.647	1.610	1.594	1.568	1.570	1.553	1.531	1.528	1.513	1.503	1.480	1.485	1.472	1.430

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

74 GE IONS 32

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.100	4.890	6.913	6.890	6.760	8.042	8.710	9.182	9.540	9.910	10.120	10.800	11.160	11.673	11.880	12.087	12.457	12.780
3.0	5.796	5.618	7.865	7.886	7.740	9.116	9.949	10.478	10.872	11.273	11.572	12.342	12.780	13.339	13.564	13.834	14.392	14.647
3.5	6.528	6.373	8.840	8.903	8.740	10.204	11.202	11.783	12.212	12.640	13.027	13.883	14.396	14.999	15.241	15.569	16.296	16.498
4.0	7.298	7.159	9.841	9.947	9.766	11.316	12.477	13.110	13.572	14.022	14.498	15.439	16.024	16.669	16.927	17.312	18.194	18.363
4.5	8.105	7.978	10.872	11.022	10.820	12.464	13.781	14.463	14.957	15.428	15.992	17.018	17.674	18.360	18.632	19.073	20.098	20.225
5.0	8.951	8.830	11.936	12.129	11.906	13.622	15.116	15.847	16.372	16.861	17.515	18.626	19.352	20.078	20.364	20.860	22.019	22.121
5.5	9.835	9.716	13.032	13.271	13.023	14.822	16.484	17.264	17.819	18.326	19.071	20.266	21.061	21.827	22.127	22.677	23.963	24.046
6.0	10.759	10.637	14.163	14.447	14.174	16.054	17.889	18.716	19.301	19.823	20.660	21.941	22.806	23.610	23.923	24.526	25.935	26.004
6.5	11.720	11.592	15.328	15.658	15.359	17.319	19.329	20.205	20.819	21.365	22.286	23.653	24.587	25.429	25.755	26.412	27.937	27.998
7.0	12.720	12.582	16.528	16.905	16.578	18.619	20.807	21.730	22.373	22.922	23.949	25.402	26.406	27.287	27.624	28.336	29.973	30.029
8.0	14.83	14.66	19.03	19.51	19.12	21.32	23.87	24.89	25.59	26.17	27.39	29.02	30.16	31.12	31.48	32.30	34.15	34.21
9.0	17.10	16.88	21.68	22.25	21.80	24.16	27.10	28.21	28.97	29.56	30.98	32.79	34.08	35.11	35.50	36.42	38.48	38.55
10.0	19.51	19.24	24.46	25.14	24.62	27.14	30.47	31.68	32.49	33.10	34.74	36.73	38.17	39.27	39.67	40.71	42.96	43.07
11.0	22.07	21.73	27.38	28.17	27.57	30.26	34.00	35.31	36.17	36.79	38.65	40.84	42.42	43.59	44.02	45.16	47.60	47.75
12.0	24.77	24.35	30.45	31.35	30.67	33.52	37.68	39.09	40.01	40.64	42.72	45.10	46.84	48.08	48.53	49.78	52.40	52.60
15.0	33.74	32.99	40.45	41.71	40.76	44.12	49.62	51.34	52.43	53.07	55.88	58.88	61.09	62.55	63.04	64.63	67.78	68.18
20.0	51.43	49.91	59.78	61.73	60.22	64.46	72.50	74.75	76.12	76.73	80.91	85.05	88.13	89.93	90.50	92.67	96.62	97.53
25.0	72.43	69.84	82.33	85.05	82.87	88.03	98.96	101.78	103.44	103.98	109.71	115.12	119.16	121.30	121.93	124.71	129.43	131.00
30.0	96.60	92.67	107.97	111.56	108.60	114.74	128.89	132.32	134.27	134.70	142.16	148.96	154.06	156.53	157.20	160.63	166.09	168.45
35.0	123.83	118.29	136.61	141.15	137.31	144.48	162.16	166.25	168.50	168.76	178.13	186.46	192.71	195.49	196.19	200.30	206.49	209.77
40.0	154.0	146.6	168.2	173.7	168.9	177.1	198.7	203.5	206.0	206.1	217.5	227.5	235.0	238.1	238.8	243.6	250.5	254.8
45.0	187.1	177.5	202.5	209.2	203.3	212.7	238.4	243.9	246.7	246.6	260.3	272.0	280.8	284.2	287.3	290.5	298.1	303.5
50.0	222.9	211.0	239.6	247.5	240.4	251.0	281.1	287.4	290.6	290.1	306.2	319.9	330.1	333.8	334.5	340.8	349.1	355.8
55.0	261.5	246.9	279.4	288.6	280.3	292.0	326.9	334.0	337.5	336.7	355.3	371.0	382.7	386.7	387.3	394.4	403.5	411.4
60.0	302.7	285.2	321.8	332.3	322.7	335.6	375.6	383.5	387.3	386.2	407.5	425.3	438.7	442.9	443.5	451.4	461.2	470.5
65.0	346.5	325.9	366.8	378.7	367.6	381.9	427.1	435.9	440.0	438.5	462.8	482.7	497.8	502.2	502.8	511.5	522.2	532.8
70.0	392.8	368.9	414.2	427.7	415.0	430.6	481.5	491.1	495.6	493.6	520.9	543.2	560.0	564.7	565.2	574.8	586.2	598.4
80.0	492.8	461.6	516.4	533.1	517.2	535.5	598.3	609.9	615.0	612.1	645.8	673.1	693.6	698.8	699.1	710.4	723.6	738.8
90.0	602.4	562.9	628.0	648.2	628.6	649.9	725.7	739.2	745.1	741.0	781.8	814.4	839.1	844.6	844.7	857.9	872.7	891.3
100.0	721.2	672.4	748.7	772.5	749.1	773.5	863.2	878.9	885.4	880.1	928.4	966.7	995.8	1001.7	1001.5	1016.6	1033.4	1055.4
150.0	1442.	1335.	1477.	1523.	1477.	1518.	1691.	1719.	1729.	1715.	1808.	1881.	1936.	1944.	1941.	1967.	1995.	2036.
200.0	2352.	2166.	2390.	2464.	2390.	2450.	2727.	2770.	2782.	2756.	2906.	2996.	3090.	3118.	3112.	3150.	3172.	3253.
250.0	3422.	3135.	3453.	3562.	3463.	3536.	3934.	4006.	4006.	3966.	4182.	4292.	4429.	4484.	4473.	4533.	4536.	4666.
300.0	4625.	4222.	4647.	4794.	4667.	4753.	5287.	5406.	5377.	5319.	5609.	5741.	5927.	6012.	5994.	6080.	6061.	6243.
350.0	5944.	5413.	5953.	6142.	5983.	6085.	6766.	6942.	6875.	6798.	7168.	7327.	7564.	7680.	7654.	7767.	7725.	7964.
400.0	7364.	6694.	7358.	7592.	7399.	7516.	8355.	8590.	8484.	8387.	8841.	9027.	9323.	9470.	9436.	9577.	9511.	9817.
450.0	8873.	8055.	8849.	9132.	8902.	9035.	10042.	10338.	10191.	10071.	10617.	10832.	11187.	11367.	11324.	11496.	11404.	11766.
500.0	10462.	9488.	10419.	10752.	10483.	10632.	11815.	12174.	11985.	11841.	12481.	12729.	13146.	13360.	13307.	13510.	13392.	13819.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.42	13.93	15.05	15.34	15.92	16.75	17.24	17.88	18.26	18.63	19.01	19.42	19.83	20.20	20.68	20.85	22.37	22.85
3.0	16.41	16.01	17.13	17.41	18.00	18.95	19.51	20.28	20.70	21.14	21.57	22.02	22.52	22.93	23.44	23.61	25.24	25.76
3.5	17.38	18.08	19.19	19.45	20.06	21.12	21.74	22.63	23.10	23.60	24.07	24.56	25.15	25.59	26.13	26.29	28.04	28.59
4.0	19.35	20.14	21.25	21.49	22.11	23.28	23.97	24.96	25.48	26.03	26.55	27.07	27.75	28.22	28.79	28.94	30.81	31.39
4.5	21.34	22.21	23.32	23.55	24.17	25.45	26.20	27.30	27.86	28.46	29.02	29.58	30.33	30.84	31.44	31.59	33.57	34.19
5.0	23.35	24.31	25.41	25.63	26.25	27.64	28.45	29.66	30.25	30.91	31.51	32.10	32.93	33.47	34.10	34.24	36.35	36.99
5.5	25.39	26.44	27.53	27.73	28.37	29.86	30.73	32.04	32.67	33.38	34.02	34.64	35.54	36.11	36.78	36.91	39.14	39.82
6.0	27.46	28.60	29.69	29.88	30.51	32.11	33.04	34.44	35.11	35.87	36.55	37.21	38.18	38.78	39.48	39.61	41.96	42.67
6.5	29.56	30.80	31.89	32.05	32.69	34.39	35.38	36.89	37.58	38.40	39.12	39.81	40.85	41.49	42.21	42.33	44.81	45.55
7.0	31.71	33.04	34.12	34.27	34.91	36.71	37.76	39.36	40.09	40.96	41.72	42.44	43.55	44.22	44.98	45.10	47.69	48.47
8.0	36.12	37.64	38.71	38.83	39.46	41.47	42.65	44.44	45.23	46.20	47.04	47.82	49.08	49.81	50.64	50.74	53.59	54.43
9.0	40.71	42.42	43.47	43.56	44.18	46.40	47.70	49.68	50.54	51.60	52.53	53.37	54.76	55.56	56.46	56.55	59.67	60.57
10.0	45.46	47.37	48.41	48.46	49.07	51.51	52.93	55.10	56.02	57.19	58.19	59.10	60.63	61.48	62.46	62.54	65.93	66.90
11.0	50.39	52.51	53.54	53.55	54.14	56.80	58.34	60.70	61.68	62.95	64.03	65.01	66.67	67.59	68.65	68.71	72.38	73.43
12.0	55.49	57.82	58.84	58.81	59.38	62.26	63.94	66.48	67.52	68.89	70.06	71.10	72.90	73.88	75.02	75.07	79.03	80.15
15.0	71.87	74.87	75.84	75.69	76.18	79.75	81.82	84.95	86.16	87.85	89.28	90.50	92.73	93.90	95.31	95.31	100.17	101.52
20.0	102.68	106.92	107.79	107.40	107.69	112.51	115.30	119.42	120.92	123.16	125.05	126.61	129.58	131.05	132.99	132.90	139.44	141.20
25.0	137.77	143.39	144.14	143.48	143.51	149.69	153.26	158.43	160.23	163.06	165.45	167.36	171.11	172.90	175.43	175.24	183.65	185.86
30.0	177.00	184.16	184.77	183.80	183.50	191.16	195.59	201.86	203.95	207.41	210.35	212.62	217.21	219.30	222.52	222.22	232.68	235.38
35.0	220.26	229.09	229.55	228.23	227.53	236.79	242.13	249.57	251.97	256.10	259.61	262.28	267.75	270.14	274.13	273.69	286.40	289.61
40.0	267.4	278.1	278.3	276.6	276.5	286.5	292.8	301.4	304.1	309.0	313.1	316.2	322.6	325.3	330.1	329.5	344.7	348.4
45.0	318.4	331.0	331.0	328.9	327.3	340.1	347.4	357.4	360.4	366.0	370.8	374.3	381.7	384.6	390.4	389.6	407.3	411.7
50.0	373.0	387.7	387.5	385.0	382.7	397.5	405.9	417.2	420.6	426.9	432.4	436.4	444.8	448.1	454.8	453.9	474.3	479.3
55.0	431.2	448.1	447.7	444.7	441.8	458.6	468.2	480.9	484.6	491.7	498.0	502.4	511.9	515.5	523.2	522.2	545.5	551.2
60.0	493.0	512.2	511.6	508.1	504.5	523.4	534.2	548.3	552.3	560.3	567.3	572.3	582.9	586.7	595.6	594.4	620.8	627.1
65.0	558.1	579.8	578.9	574.9	570.5	591.8	603.8	619.4	623.8	632.6	640.5	645.9	657.7	661.8	671.9	670.4	700.0	707.1
70.0	626.6	650.9	649.7	645.1	640.0	663.6	676.9	694.0	698.8	708.5	717.2	723.2	736.2	740.6	751.9	750.2	783.2	791.0
80.0	773.4	803.2	801.4	795.6	788.7	817.3	833.4	853.7	859.2	870.9	881.3	888.4	903.9	908.9	922.9	920.8	960.9	970.3
90.0	932.7	968.6	966.0	958.9	950.0	984.0	1003.1	1026.8	1033.1	1046.7	1059.1	1067.4	1085.6	1091.1	1108.1	1105.4	1153.3	1164.3
100.0	1104.2	1146.4	1143.1	1134.5	1123.5	1163.3	1185.5	1212.8	1219.8	1235.6	1250.0	1259.5	1280.6	1286.7	1306.8	1303.6	1359.7	1372.5
150.0	2128.	2209.	2201.	2184.	2159.	2232.	2273.	2320.	2331.	2359.	2386.	2402.	2440.	2449.	2487.	2481.	2586.	2609.
200.0	3400.	3527.	3514.	3487.	3443.	3559.	3621.	3691.	3707.	3749.	3790.	3815.	3871.	3884.	3945.	3934.	4066.	4135.
250.0	4676.	4855.	4851.	4811.	4745.	4908.	5190.	5287.	5304.	5364.	5425.	5457.	5532.	5555.	5642.	5626.	5772.	5898.
300.0	6523.	6761.	6776.	6728.	6637.	6841.	6941.	7069.	7085.	7164.	7253.	7287.	7383.	7420.	7536.	7513.	7673.	7861.
350.0	8320.	8621.	8656.	8602.	8483.	8730.	8849.	9010.	9024.	9125.	9242.	9280.	9397.	9448.	9597.	9568.	9743.	9996.
400.0	10247.	10616.	10672.	10611.	10462.	10755.	10894.	11090.	11102.	11226.	11374.	11415.	11555.	11621.	11804.	11767.	11960.	12281.
450.0	12289.	12730.	12807.	12739.	12558.	12899.	13060.	13292.	13302.	13450.	13630.	13676.	13838.	13920.	14139.	14095.	14305.	14723.
500.0	14432.	14948.	15047.	14972.	14757.	15149.	15332.	15602.	15610.	15783.	15995.	16046.	16232.	16330.	16587.	16535.	16765.	17259.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{75}_{33}$AS IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	56.93	53.81	40.77	38.98	39.54	35.96	31.09	29.70	28.83	28.13	26.38	24.82	23.59	22.91	22.65	21.82	19.57	20.37
3.0	54.27	52.08	40.07	38.36	38.98	35.68	30.96	29.66	28.86	28.26	26.53	25.01	23.83	23.18	22.94	22.14	20.09	20.73
3.5	51.67	50.15	39.10	37.47	38.13	35.08	30.53	29.32	28.58	28.06	26.37	24.90	23.78	23.16	22.93	22.17	20.29	20.80
4.0	49.24	48.22	38.03	36.47	37.16	34.33	29.95	28.81	28.13	27.68	26.03	24.62	23.54	22.96	22.75	22.02	20.30	20.70
4.5	46.99	46.35	36.93	35.44	36.14	33.51	29.29	28.22	27.59	27.20	25.59	24.23	23.20	22.65	22.46	21.76	20.18	20.49
5.0	44.92	44.58	35.83	34.41	35.12	32.66	28.60	27.60	27.00	26.67	25.10	23.79	22.81	22.28	22.10	21.44	19.98	20.21
5.5	43.03	42.92	34.77	33.41	34.12	31.82	27.90	26.96	26.40	26.11	24.59	23.32	22.38	21.88	21.72	21.08	19.73	19.90
6.0	41.29	41.37	33.75	32.45	33.16	30.99	27.21	26.32	25.80	25.54	24.06	22.84	21.94	21.47	21.31	20.70	19.46	19.56
6.5	39.69	39.93	32.78	31.53	32.24	30.19	26.54	25.69	25.20	24.98	23.54	22.36	21.49	21.05	20.90	20.32	19.16	19.22
7.0	38.22	38.58	31.86	30.65	31.36	29.43	25.89	25.08	24.62	24.43	23.03	21.89	21.05	20.63	20.49	19.93	18.85	18.87
8.0	35.60	36.15	30.15	29.03	29.73	27.98	24.66	23.93	23.52	23.37	22.04	20.97	20.19	19.81	19.69	19.17	18.22	18.18
9.0	33.35	34.03	28.62	27.57	28.25	26.67	23.54	22.87	22.49	22.38	21.12	20.11	19.38	19.03	18.93	18.44	17.61	17.51
10.0	31.38	32.16	27.24	26.25	26.92	25.47	22.51	21.89	21.55	21.46	20.26	19.31	18.62	18.30	18.21	17.76	17.01	16.88
11.0	29.66	30.50	25.99	25.06	25.71	24.38	21.57	20.99	20.68	20.62	19.47	18.57	17.92	17.63	17.54	17.12	16.45	16.29
12.0	28.13	29.02	24.86	23.98	24.61	23.38	20.71	20.17	19.88	19.84	18.73	17.88	17.27	16.99	16.92	16.53	15.91	15.73
15.0	24.44	25.40	22.04	21.27	21.86	20.85	18.51	18.06	17.83	17.83	16.85	16.10	15.57	15.35	15.30	14.97	14.50	14.28
20.0	20.20	21.18	18.62	18.00	18.52	17.75	15.80	15.45	15.28	15.31	14.48	13.86	13.42	13.26	13.23	12.97	12.64	12.40
25.0	17.33	18.28	16.21	15.67	16.14	15.53	13.85	13.56	13.42	13.47	12.74	12.21	11.84	11.72	11.70	11.48	11.23	11.00
30.0	15.24	16.15	14.41	13.94	14.36	13.86	12.37	12.12	12.01	12.06	11.42	10.95	10.62	10.53	10.52	10.34	10.14	9.92
35.0	13.65	14.52	13.00	12.59	12.98	12.54	11.21	11.00	10.90	10.96	10.38	9.96	9.66	9.59	9.58	9.42	9.26	9.06
40.0	12.40	13.23	11.88	11.51	11.86	11.48	10.27	10.08	10.00	10.06	9.53	9.15	8.88	8.82	8.82	8.68	8.54	8.35
45.0	11.39	12.17	10.96	10.62	10.95	10.61	9.50	9.33	9.26	9.32	8.83	8.48	8.23	8.18	8.19	8.06	7.94	7.76
50.0	10.55	11.30	10.19	9.88	10.19	9.88	8.85	8.70	8.64	8.70	8.24	7.92	7.69	7.65	7.65	7.54	7.43	7.26
55.0	9.84	10.56	9.54	9.25	9.54	9.26	8.30	8.16	8.11	8.16	7.74	7.43	7.22	7.19	7.19	7.09	6.99	6.83
60.0	9.24	9.93	8.98	8.70	8.98	8.73	7.82	7.69	7.65	7.70	7.30	7.02	6.82	6.79	6.79	6.70	6.61	6.46
65.0	8.712	9.379	8.492	8.231	8.494	8.259	7.409	7.288	7.243	7.298	6.919	6.652	6.463	6.437	6.444	6.356	6.275	6.133
70.0	8.255	8.897	8.062	7.816	8.067	7.848	7.043	6.929	6.888	6.943	6.583	6.330	6.151	6.128	6.135	6.054	5.979	5.845
80.0	7.493	8.093	7.343	7.120	7.349	7.158	6.427	6.326	6.291	6.344	6.016	5.787	5.624	5.606	5.614	5.543	5.477	5.357
90.0	6.882	7.446	6.763	6.559	6.770	6.599	5.928	5.837	5.807	5.858	5.557	5.347	5.196	5.183	5.191	5.128	5.068	4.959
100.0	6.381	6.914	6.284	6.096	6.292	6.137	5.516	5.433	5.407	5.456	5.176	4.981	4.842	4.831	4.839	4.782	4.727	4.629
150.0	4.795	5.223	4.759	4.619	4.765	4.660	4.194	4.135	4.120	4.163	3.951	3.805	3.699	3.696	3.704	3.666	3.623	3.558
200.0	3.946	4.352	3.963	3.840	3.938	3.880	3.489	3.427	3.439	3.480	3.299	3.250	3.143	3.079	3.091	3.051	3.083	2.975
250.0	3.451	3.815	3.476	3.368	3.446	3.406	3.065	2.977	3.023	3.061	2.903	2.858	2.765	2.711	2.723	2.677	2.716	2.623
300.0	3.114	3.446	3.142	3.044	3.116	3.081	2.773	2.670	2.737	2.772	2.630	2.588	2.504	2.457	2.468	2.428	2.462	2.381
350.0	2.869	3.177	2.898	2.808	2.875	2.844	2.560	2.468	2.529	2.562	2.430	2.391	2.314	2.272	2.283	2.246	2.277	2.203
400.0	2.683	2.973	2.713	2.628	2.692	2.664	2.399	2.314	2.370	2.401	2.279	2.241	2.169	2.131	2.141	2.108	2.136	2.067
450.0	2.537	2.813	2.568	2.488	2.549	2.523	2.272	2.194	2.245	2.276	2.160	2.123	2.056	2.021	2.030	1.999	2.025	1.961
500.0	2.420	2.685	2.452	2.375	2.435	2.409	2.170	2.098	2.145	2.175	2.065	2.029	1.965	1.932	1.941	1.911	1.937	1.875

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	19.08	18.21	18.26	18.39	18.23	17.20	16.67	15.75	15.41	15.01	14.72	14.48	13.96	13.78	13.63	13.67	13.10	12.95
3.0	19.46	18.59	18.64	18.77	18.64	17.64	17.11	16.23	15.91	15.52	15.23	15.00	14.49	14.30	14.15	14.18	13.59	13.43
3.5	19.56	18.70	18.74	18.88	18.78	17.80	17.29	16.44	16.14	15.76	15.48	15.25	14.76	14.58	14.41	14.45	13.83	13.67
4.0	19.49	18.64	18.69	18.82	18.75	17.80	17.30	16.49	16.21	15.84	15.57	15.35	14.88	14.69	14.52	14.56	13.93	13.77
4.5	19.32	18.49	18.53	18.66	18.61	17.69	17.21	16.44	16.17	15.81	15.55	15.34	14.88	14.70	14.53	14.56	13.94	13.78
5.0	19.08	18.26	18.31	18.44	18.40	17.52	17.05	16.31	16.06	15.72	15.46	15.26	14.82	14.64	14.47	14.50	13.87	13.71
5.5	18.80	18.00	18.05	18.18	18.15	17.30	16.84	16.14	15.90	15.57	15.32	15.12	14.70	14.53	14.36	14.39	13.77	13.61
6.0	18.50	17.72	17.76	17.89	17.88	17.05	16.61	15.94	15.71	15.39	15.15	14.96	14.56	14.38	14.21	14.25	13.63	13.47
6.5	18.18	17.43	17.47	17.59	17.59	16.79	16.37	15.72	15.51	15.20	14.96	14.78	14.39	14.22	14.05	14.08	13.47	13.32
7.0	17.86	17.12	17.16	17.29	17.30	16.52	16.11	15.49	15.29	14.99	14.76	14.58	14.21	14.04	13.87	13.90	13.30	13.15
8.0	17.23	16.52	16.56	16.68	16.71	15.98	15.59	15.01	14.83	14.55	14.33	14.17	13.82	13.66	13.49	13.52	12.94	12.79
9.0	16.61	15.94	15.98	16.09	16.13	15.44	15.07	14.54	14.37	14.11	13.90	13.75	13.42	13.27	13.11	13.14	12.57	12.43
10.0	16.03	15.38	15.42	15.53	15.58	14.93	14.58	14.08	13.92	13.67	13.48	13.33	13.02	12.89	12.72	12.75	12.20	12.07
11.0	15.47	14.86	14.89	15.00	15.06	14.44	14.11	13.64	13.49	13.26	13.07	12.94	12.64	12.51	12.35	12.38	11.84	11.72
12.0	14.96	14.36	14.40	14.51	14.57	13.98	13.66	13.22	13.08	12.86	12.68	12.55	12.28	12.16	12.00	12.02	11.50	11.38
15.0	13.59	13.06	13.10	13.19	13.27	12.75	12.47	12.09	11.98	11.79	11.63	11.52	11.28	11.18	11.03	11.05	10.58	10.47
20.0	11.82	11.37	11.40	11.49	11.57	11.14	10.90	10.60	10.52	10.36	10.23	10.13	9.94	9.86	9.72	9.74	9.33	9.23
25.0	10.50	10.10	10.13	10.21	10.29	9.92	9.72	9.46	9.39	9.26	9.15	9.07	8.90	8.84	8.71	8.73	8.36	8.28
30.0	9.47	9.11	9.15	9.22	9.30	8.97	8.79	8.57	8.51	8.39	8.29	8.23	8.08	8.03	7.91	7.93	7.60	7.53
35.0	8.65	8.33	8.36	8.42	8.50	8.20	8.04	7.85	7.80	7.70	7.61	7.55	7.42	7.37	7.26	7.28	6.98	6.91
40.0	7.976	7.681	7.709	7.769	7.845	7.576	7.431	7.259	7.216	7.121	7.039	6.986	6.868	6.832	6.729	6.746	6.468	6.407
45.0	7.416	7.142	7.170	7.226	7.299	7.051	6.918	6.763	6.725	6.638	6.563	6.514	6.407	6.376	6.279	6.295	6.036	5.980
50.0	6.941	6.686	6.712	6.765	6.836	6.606	6.483	6.341	6.307	6.227	6.157	6.112	6.014	5.987	5.895	5.910	5.668	5.616
55.0	6.533	6.294	6.319	6.369	6.438	6.223	6.108	5.977	5.946	5.873	5.807	5.766	5.674	5.650	5.563	5.577	5.350	5.302
60.0	6.178	5.953	5.977	6.024	6.092	5.889	5.782	5.660	5.632	5.563	5.502	5.463	5.377	5.356	5.273	5.287	5.072	5.027
65.0	5.867	5.654	5.677	5.722	5.787	5.596	5.495	5.382	5.355	5.291	5.233	5.197	5.116	5.097	5.018	5.031	4.827	4.784
70.0	5.592	5.389	5.411	5.454	5.518	5.337	5.241	5.134	5.110	5.050	4.994	4.960	4.884	4.867	4.791	4.804	4.610	4.569
80.0	5.126	4.940	4.961	5.001	5.061	4.896	4.810	4.715	4.694	4.639	4.589	4.558	4.490	4.476	4.405	4.417	4.240	4.203
90.0	4.746	4.575	4.594	4.631	4.689	4.537	4.458	4.372	4.353	4.304	4.258	4.230	4.167	4.155	4.089	4.101	3.936	3.902
100.0	4.430	4.270	4.289	4.323	4.378	4.238	4.165	4.086	4.069	4.024	3.981	3.955	3.898	3.887	3.826	3.836	3.683	3.651
150.0	3.406	3.284	3.298	3.325	3.371	3.265	3.211	3.156	3.144	3.112	3.079	3.060	3.019	3.010	2.964	2.973	2.854	2.830
200.0	2.848	2.750	2.750	2.773	2.813	2.726	2.683	2.639	2.631	2.605	2.578	2.563	2.529	2.522	2.484	2.491	2.459	2.379
250.0	2.512	2.426	2.399	2.419	2.456	2.386	2.363	2.321	2.323	2.297	2.263	2.259	2.234	2.218	2.183	2.190	2.175	2.106
300.0	2.280	2.202	2.178	2.186	2.218	2.168	2.146	2.109	2.111	2.088	2.057	2.054	2.032	2.017	1.985	1.992	1.978	1.916
350.0	2.110	2.038	2.016	2.023	2.054	2.007	1.987	1.954	1.956	1.934	1.906	1.903	1.883	1.870	1.841	1.847	1.833	1.777
400.0	1.980	1.913	1.893	1.900	1.929	1.885	1.866	1.835	1.837	1.817	1.791	1.788	1.770	1.758	1.730	1.736	1.723	1.671
450.0	1.879	1.815	1.797	1.803	1.830	1.789	1.771	1.742	1.744	1.725	1.701	1.698	1.681	1.669	1.644	1.649	1.636	1.587
500.0	1.797	1.736	1.719	1.725	1.751	1.712	1.695	1.667	1.669	1.651	1.628	1.625	1.609	1.598	1.574	1.579	1.566	1.520

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{75}_{33}$AS IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.030	4.820	6.806	6.790	6.670	7.942	8.600	9.068	9.420	9.780	9.990	10.650	11.000	11.505	11.710	11.917	12.286	12.610
3.0	5.705	5.528	7.733	7.759	7.624	8.988	9.807	10.330	10.718	11.108	11.405	12.153	12.579	13.130	13.353	13.620	14.174	14.432
3.5	6.413	6.262	8.680	8.748	8.597	10.048	11.027	11.601	12.023	12.439	12.822	13.654	14.153	14.747	14.986	15.311	16.030	16.236
4.0	7.156	7.024	9.653	9.762	9.593	11.128	12.266	12.891	13.345	13.784	14.253	15.168	15.738	16.372	16.627	17.008	17.877	18.042
4.5	7.936	7.818	10.653	10.805	10.616	12.234	13.533	14.206	14.691	15.150	15.705	16.703	17.342	18.016	18.286	18.721	19.729	19.862
5.0	8.753	8.643	11.684	11.879	11.668	13.367	14.828	15.549	16.065	16.542	17.184	18.265	18.972	19.685	19.969	20.457	21.596	21.705
5.5	9.606	9.500	12.747	12.984	12.752	14.530	16.156	16.924	17.469	17.963	18.694	19.857	20.631	21.383	21.680	22.221	23.484	23.574
6.0	10.496	10.390	13.841	14.123	13.866	15.725	17.517	18.332	18.906	19.415	20.235	21.481	22.323	23.113	23.423	24.016	25.398	25.475
6.5	11.422	11.313	14.969	15.296	15.013	16.950	18.913	19.774	20.377	20.900	21.811	23.141	24.050	24.878	25.199	25.844	27.340	27.409
7.0	12.385	12.268	16.129	16.502	16.193	18.209	20.343	21.262	21.882	22.418	23.422	24.836	25.813	26.677	27.011	27.708	29.313	29.378
8.0	14.42	14.28	18.55	19.02	18.65	20.82	23.31	24.31	25.00	25.56	26.75	28.34	29.45	30.39	30.75	31.55	33.36	33.43
9.0	16.60	16.42	21.10	21.67	21.24	23.57	26.43	27.52	28.26	28.84	30.23	31.99	33.24	34.25	34.63	35.53	37.55	37.63
10.0	18.92	18.69	23.79	24.46	23.96	26.45	29.68	30.87	31.67	32.26	33.86	35.80	37.19	38.27	38.67	39.68	41.88	42.00
11.0	21.38	21.08	26.61	27.38	26.81	29.46	33.09	34.37	35.22	35.83	37.63	39.76	41.30	42.45	42.87	43.98	46.37	46.52
12.0	23.97	23.60	29.56	30.44	29.79	32.60	36.64	38.02	38.92	39.53	41.56	43.88	45.56	46.78	47.22	48.44	51.00	51.21
15.0	32.58	31.91	39.19	40.42	39.51	42.81	48.15	49.83	50.89	51.52	54.24	57.16	59.30	60.73	61.22	62.76	65.83	66.24
20.0	49.55	48.16	57.78	59.67	58.22	62.38	70.16	72.35	73.69	74.29	78.33	82.34	85.33	87.09	87.65	89.76	93.61	94.49
25.0	69.66	67.28	79.42	82.06	79.97	85.02	95.58	98.32	99.94	100.48	106.01	111.24	115.15	117.24	117.86	120.56	125.14	126.67
30.0	92.80	89.16	104.02	107.48	104.65	110.65	124.29	127.63	129.53	129.95	137.15	143.73	148.65	151.06	151.72	155.04	160.34	162.63
35.0	118.84	113.69	131.46	135.83	132.16	139.15	156.19	160.16	162.34	162.61	171.64	179.69	185.72	188.43	189.12	193.09	199.08	202.26
40.0	147.7	140.8	161.7	167.0	162.4	170.4	191.2	195.8	198.3	198.4	209.4	219.0	226.2	229.2	229.9	234.6	241.3	245.4
45.0	179.4	170.4	194.5	201.0	195.4	204.4	229.2	234.5	237.3	237.1	250.3	261.6	270.1	273.4	274.1	279.5	286.9	292.1
50.0	213.6	202.4	230.0	237.6	230.9	241.1	270.1	276.2	279.2	278.8	294.3	307.4	317.3	320.9	321.5	327.6	335.7	342.1
55.0	250.4	236.7	268.1	276.9	268.9	280.3	313.9	320.7	324.1	323.4	341.3	356.3	367.6	371.5	372.1	379.0	387.8	395.4
60.0	289.8	273.4	308.6	318.7	309.5	322.1	360.4	368.0	371.7	370.7	391.2	408.3	421.1	425.2	425.8	433.4	443.0	451.9
65.0	331.6	312.3	351.6	363.1	352.4	366.2	409.7	418.1	422.2	420.7	444.0	463.2	477.6	482.0	482.5	490.9	501.2	511.5
70.0	375.8	353.3	396.9	409.8	397.8	412.8	461.6	470.9	475.3	473.4	499.6	521.0	537.1	541.7	542.2	551.4	562.5	574.1
80.0	471.3	441.8	494.5	510.5	496.3	513.0	573.3	584.4	589.4	586.6	618.9	645.1	664.8	669.8	670.1	681.0	693.7	708.3
90.0	575.9	538.6	601.1	620.4	601.8	622.3	694.9	707.9	713.6	709.7	748.8	780.0	803.7	809.1	809.2	821.9	836.2	854.0
100.0	689.2	643.2	716.3	739.1	716.8	740.2	826.2	841.2	847.5	842.5	888.7	925.5	953.4	959.1	959.0	973.4	989.6	1010.7
150.0	1377.	1276.	1411.	1455.	1411.	1451.	1616.	1643.	1652.	1639.	1728.	1798.	1851.	1858.	1856.	1880.	1907.	1946.
200.0	2245.	2068.	2281.	2353.	2282.	2340.	2604.	2645.	2656.	2632.	2775.	2862.	2951.	2978.	2973.	3009.	3030.	3107.
250.0	3265.	2992.	3296.	3399.	3306.	3375.	3755.	3824.	3824.	3785.	3991.	4097.	4228.	4280.	4270.	4327.	4331.	4454.
300.0	4412.	4029.	4433.	4573.	4452.	4535.	5044.	5159.	5130.	5076.	5352.	5479.	5656.	5737.	5720.	5802.	5784.	5958.
350.0	5669.	5164.	5678.	5858.	5707.	5804.	6454.	6622.	6558.	6485.	6838.	6988.	7217.	7326.	7302.	7410.	7370.	7598.
400.0	7022.	6386.	7017.	7240.	7057.	7168.	7969.	8193.	8092.	7999.	8433.	8610.	8892.	9033.	9000.	9135.	9073.	9358.
450.0	8461.	7683.	8439.	8708.	8489.	8616.	9577.	9859.	9719.	9605.	10125.	10331.	10670.	10842.	10800.	10964.	10877.	11222.
500.0	9975.	9049.	9936.	10252.	9996.	10138.	11267.	11609.	11429.	11292.	11902.	12139.	12537.	12741.	12691.	12884.	12772.	13179.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.25	13.75	14.86	15.15	15.72	16.52	17.01	17.64	18.01	18.38	18.76	19.16	19.57	19.93	20.40	20.57	22.06	22.54
3.0	16.19	16.79	16.89	17.16	17.75	18.67	19.23	19.98	20.40	20.83	21.26	21.70	22.20	22.60	23.10	23.26	24.87	25.38
3.5	17.11	17.80	18.90	19.15	19.75	20.79	21.40	22.27	22.74	23.23	23.70	24.18	24.76	25.19	25.72	25.88	27.60	28.14
4.0	19.03	19.81	20.90	21.14	21.75	22.89	23.57	24.55	25.06	25.60	26.11	26.63	27.29	27.75	28.31	28.46	30.30	30.87
4.5	20.96	21.83	22.91	23.14	23.75	25.01	25.74	26.83	27.37	27.97	28.52	29.07	29.81	30.30	30.89	31.03	32.99	33.59
5.0	22.92	23.87	24.95	25.16	25.78	27.14	27.93	29.12	29.70	30.35	30.94	31.52	32.33	32.86	33.47	33.61	35.69	36.32
5.5	24.90	25.93	27.01	27.21	27.83	29.29	30.14	31.43	32.05	32.74	33.38	33.99	34.87	35.43	36.08	36.21	38.40	39.07
6.0	26.91	28.03	29.11	29.29	29.91	31.47	32.39	33.76	34.42	35.17	35.84	36.48	37.43	38.02	38.70	38.83	41.14	41.83
6.5	28.95	30.17	31.24	31.40	32.03	33.69	34.66	36.13	36.82	37.62	38.33	39.00	40.02	40.64	41.35	41.47	43.90	44.63
7.0	31.03	32.34	33.40	33.55	34.18	35.94	36.97	38.54	39.26	40.10	40.85	41.56	42.65	43.30	44.04	44.15	46.70	47.47
8.0	35.31	36.80	37.85	37.97	38.59	40.56	41.70	43.45	44.24	45.18	46.01	46.78	48.00	48.71	49.52	49.62	52.42	53.25
9.0	39.74	41.42	42.46	42.55	43.16	45.33	46.59	48.53	49.37	50.42	51.32	52.15	53.51	54.28	55.16	55.25	58.30	59.20
10.0	44.34	46.21	47.24	47.29	47.89	50.27	51.65	53.77	54.68	55.82	56.80	57.69	59.18	60.01	60.97	61.04	64.36	65.32
11.0	49.10	51.17	52.19	52.21	52.79	55.38	56.89	59.19	60.15	61.39	62.45	63.40	65.02	65.92	66.95	67.01	70.60	71.63
12.0	54.03	56.31	57.31	57.29	57.85	60.66	62.29	64.78	65.79	67.13	68.28	69.29	71.05	72.00	73.11	73.16	77.03	78.13
15.0	69.83	72.75	73.71	73.57	74.06	77.53	79.55	82.59	83.78	85.42	86.82	88.01	90.18	91.32	92.69	92.69	97.44	98.76
20.0	99.50	103.61	104.48	104.11	104.41	109.08	111.79	115.80	117.26	119.44	121.28	122.79	125.68	127.11	128.99	128.91	135.27	136.98
25.0	133.23	138.68	139.44	138.80	138.85	144.83	148.30	153.31	155.06	157.81	160.13	161.98	165.62	167.35	169.81	169.63	177.79	179.94
30.0	170.90	177.82	178.45	177.52	177.25	184.66	188.94	195.02	197.05	200.41	203.25	205.46	209.90	211.93	215.05	214.75	224.89	227.51
35.0	212.40	220.92	221.40	220.15	219.49	228.44	233.60	240.79	243.12	247.12	250.52	253.11	258.40	260.71	264.57	264.15	276.44	279.55
40.0	257.6	267.9	268.2	266.6	265.5	276.1	282.2	290.5	293.1	297.8	301.8	304.8	311.0	313.6	318.3	317.7	332.3	336.0
45.0	306.4	318.5	318.7	316.6	315.1	327.4	334.5	344.1	347.0	352.4	357.0	360.4	367.6	370.4	376.0	375.3	392.4	396.6
50.0	358.7	372.8	372.7	370.3	368.2	382.4	390.5	401.4	404.6	410.8	416.1	419.9	428.0	431.2	437.7	436.8	456.5	461.3
55.0	414.4	430.7	430.4	427.5	424.7	440.9	450.2	462.3	465.9	472.8	478.8	483.1	492.2	495.7	503.2	502.2	524.6	530.1
60.0	473.5	492.0	491.4	488.1	484.6	502.9	513.3	526.8	530.7	538.4	545.2	550.0	560.2	563.9	572.5	571.2	596.7	602.8
65.0	535.8	556.6	555.8	552.0	547.8	568.2	579.8	594.8	599.1	607.6	615.1	620.4	631.7	635.7	645.4	644.0	672.5	679.3
70.0	601.3	624.6	623.5	619.1	614.2	636.9	649.7	666.2	670.8	680.2	688.5	694.3	706.7	711.0	721.9	720.3	752.0	759.5
80.0	741.5	770.2	768.4	762.9	756.3	783.8	799.3	818.8	824.1	835.3	845.3	852.2	867.1	871.9	885.3	883.3	921.8	930.9
90.0	893.7	928.1	925.7	918.9	910.4	943.1	961.4	984.1	990.2	1003.3	1015.2	1023.1	1040.6	1046.0	1062.2	1059.7	1105.6	1116.2
100.0	1057.4	1097.9	1094.8	1086.6	1076.1	1114.2	1135.6	1161.7	1168.5	1183.7	1197.5	1206.6	1226.8	1232.8	1252.0	1248.9	1302.7	1315.1
150.0	2035.	2112.	2104.	2088.	2064.	2135.	2173.	2218.	2229.	2256.	2281.	2297.	2333.	2342.	2379.	2372.	2473.	2495.
200.0	3247.	3369.	3357.	3331.	3289.	3399.	3459.	3526.	3541.	3581.	3620.	3644.	3698.	3711.	3769.	3759.	3884.	3950.
250.0	4654.	4826.	4822.	4784.	4732.	4876.	4955.	5048.	5064.	5121.	5180.	5210.	5282.	5304.	5387.	5372.	5512.	5656.
300.0	6225.	6452.	6466.	6421.	6334.	6529.	6624.	6747.	6762.	6837.	6922.	6955.	7046.	7081.	7193.	7171.	7324.	7503.
350.0	7938.	8225.	8259.	8207.	8093.	8330.	8443.	8597.	8610.	8707.	8819.	8855.	8966.	9015.	9158.	9129.	9297.	9538.
400.0	9775.	10127.	10180.	10122.	9980.	10260.	10392.	10579.	10591.	10709.	10850.	10890.	11023.	11086.	11261.	11226.	11410.	11717.
450.0	11721.	12141.	12215.	12150.	11978.	12303.	12457.	12678.	12688.	12829.	13000.	13044.	13199.	13277.	13487.	13444.	13645.	14021.
500.0	13763.	14256.	14350.	14278.	14074.	14447.	14623.	14894.	14887.	15052.	15255.	15303.	15481.	15575.	15820.	15770.	15990.	16437.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{80}_{34}$SE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	59.44	55.91	42.39	40.52	41.10	37.34	32.28	30.83	29.93	29.19	27.38	25.75	24.47	23.76	23.49	22.63	20.29	21.12
3.0	56.73	54.21	41.70	39.92	40.56	37.09	32.18	30.82	29.99	29.36	27.57	25.98	24.75	24.07	23.82	22.99	20.86	21.62
3.5	54.07	52.28	40.74	39.03	39.71	36.51	31.77	30.50	29.73	29.19	27.42	25.89	24.72	24.07	23.84	23.04	21.08	21.62
4.0	51.57	50.32	39.65	38.02	38.73	35.76	31.19	30.00	29.29	28.82	27.10	25.62	24.60	23.88	23.67	22.90	21.11	21.53
4.5	49.26	48.42	38.53	36.98	37.70	34.93	30.52	29.41	28.75	28.34	26.66	25.24	24.17	23.58	23.38	22.65	21.01	21.33
5.0	47.11	46.61	37.41	35.93	36.66	34.07	29.82	28.78	28.16	27.80	26.17	24.80	23.77	23.22	23.03	22.33	20.82	21.06
5.5	45.15	44.91	36.33	34.90	35.64	33.21	29.12	28.13	27.55	27.24	25.65	24.32	23.34	22.82	22.64	21.97	20.57	20.74
6.0	43.34	43.32	35.29	33.92	34.66	32.37	28.41	27.48	26.93	26.66	25.12	23.84	22.89	22.40	22.23	21.59	20.29	20.40
6.5	41.69	41.83	34.29	32.97	33.71	31.55	27.73	26.84	26.33	26.09	24.58	23.35	22.44	21.97	21.82	21.20	19.99	20.06
7.0	40.16	40.44	33.34	32.07	32.81	30.76	27.06	26.22	25.73	25.53	24.06	22.87	21.99	21.54	21.40	20.81	19.68	19.70
8.0	37.43	37.93	31.58	30.40	31.12	29.28	25.81	25.04	24.60	24.44	23.05	21.93	21.11	20.71	20.58	20.04	19.04	18.99
9.0	35.08	35.72	29.99	28.89	29.60	27.93	24.65	23.94	23.55	23.43	22.10	21.05	20.28	19.91	19.80	19.30	18.42	18.31
10.0	33.03	33.78	28.57	27.53	28.22	26.69	23.59	22.93	22.57	22.48	21.22	20.22	19.50	19.16	19.07	18.59	17.81	17.67
11.0	31.23	32.06	27.28	26.30	26.97	25.56	22.61	22.01	21.68	21.61	20.40	19.46	18.78	18.47	18.38	17.94	17.23	17.06
12.0	29.63	30.52	26.11	25.18	25.84	24.53	21.72	21.16	20.85	20.80	19.65	18.75	18.10	17.82	17.74	17.32	16.68	16.49
15.0	25.77	26.75	23.17	22.36	22.98	21.91	19.45	18.98	18.73	18.72	17.69	16.91	16.35	16.12	16.06	15.71	15.22	14.99
20.0	21.32	22.33	19.61	18.95	19.50	18.68	16.63	16.26	16.08	16.11	15.23	14.58	14.12	13.95	13.92	13.64	13.29	13.04
25.0	18.31	19.29	17.09	16.53	17.02	16.36	14.59	14.29	14.14	14.19	13.43	12.86	12.47	12.34	12.32	12.09	11.83	11.59
30.0	16.11	17.06	15.20	14.71	15.16	14.61	13.04	12.79	12.67	12.72	12.04	11.55	11.20	11.10	11.09	10.90	10.69	10.45
35.0	14.44	15.34	13.73	13.29	13.70	13.24	11.83	11.61	11.51	11.57	10.95	10.51	10.20	10.12	10.11	9.94	9.77	9.55
40.0	13.12	13.98	12.56	12.16	12.54	12.13	10.85	10.65	10.57	10.63	10.07	9.66	9.38	9.31	9.31	9.16	9.02	8.81
45.0	12.05	12.87	11.59	11.23	11.58	11.22	10.04	9.86	9.79	9.85	9.33	8.96	8.70	8.65	8.65	8.52	8.39	8.19
50.0	11.17	11.95	10.78	10.45	10.78	10.45	9.36	9.20	9.13	9.19	8.71	8.37	8.13	8.08	8.09	7.97	7.85	7.67
55.0	10.42	11.17	10.10	9.78	10.09	9.80	8.78	8.63	8.57	8.63	8.18	7.86	7.64	7.60	7.60	7.49	7.39	7.22
60.0	9.78	10.51	9.50	9.21	9.50	9.23	8.28	8.14	8.09	8.15	7.72	7.42	7.21	7.18	7.19	7.08	6.99	6.83
65.0	9.229	9.928	8.990	8.713	8.992	8.742	7.842	7.713	7.665	7.724	7.323	7.040	6.840	6.811	6.818	6.725	6.640	6.489
70.0	8.746	9.421	8.537	8.276	8.541	8.309	7.456	7.335	7.292	7.349	6.969	6.701	6.511	6.486	6.494	6.407	6.328	6.186
80.0	7.941	8.572	7.778	7.542	7.784	7.561	6.807	6.700	6.663	6.718	6.371	6.128	5.956	5.937	5.945	5.870	5.799	5.672
90.0	7.295	7.889	7.166	6.950	7.173	6.991	6.281	6.184	6.152	6.206	5.887	5.664	5.504	5.490	5.499	5.432	5.368	5.253
100.0	6.764	7.326	6.660	6.461	6.668	6.504	5.845	5.757	5.729	5.782	5.485	5.278	5.130	5.119	5.128	5.067	5.008	4.904
150.0	5.087	5.538	5.047	4.899	5.054	4.942	4.448	4.385	4.369	4.415	4.191	4.036	3.923	3.919	3.928	3.887	3.842	3.773
200.0	4.185	4.616	4.205	4.074	4.178	4.116	3.701	3.636	3.648	3.692	3.500	3.448	3.334	3.266	3.279	3.236	3.270	3.156
250.0	3.662	4.047	3.689	3.574	3.657	3.615	3.252	3.159	3.208	3.248	3.080	3.033	2.934	2.876	2.889	2.841	2.882	2.784
300.0	3.305	3.656	3.334	3.231	3.307	3.270	2.943	2.833	2.905	2.942	2.791	2.747	2.658	2.608	2.620	2.577	2.613	2.526
350.0	3.044	3.372	3.076	2.980	3.052	3.019	2.718	2.619	2.684	2.719	2.579	2.538	2.456	2.411	2.423	2.384	2.417	2.338
400.0	2.847	3.155	2.880	2.790	2.858	2.827	2.546	2.456	2.515	2.549	2.419	2.379	2.302	2.262	2.273	2.237	2.267	2.194
450.0	2.693	2.985	2.726	2.641	2.706	2.678	2.412	2.329	2.383	2.416	2.293	2.254	2.182	2.145	2.155	2.122	2.150	2.081
500.0	2.569	2.849	2.603	2.521	2.584	2.557	2.304	2.227	2.277	2.309	2.192	2.153	2.085	2.050	2.061	2.029	2.056	1.991

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	19.78	18.87	18.92	19.06	18.90	17.82	17.28	16.32	15.97	15.55	15.26	15.01	14.47	14.28	14.13	14.17	13.58	13.42
3.0	20.20	19.29	19.34	19.48	19.35	18.30	17.76	16.84	16.51	16.10	15.80	15.56	15.03	14.84	14.68	14.71	14.09	13.93
3.5	20.33	19.43	19.47	19.61	19.51	18.49	17.96	17.08	16.77	16.37	16.08	15.84	15.33	15.14	14.97	15.00	14.37	14.20
4.0	20.27	19.39	19.43	19.57	19.49	18.51	17.99	17.14	16.85	16.47	16.18	15.96	15.46	15.27	15.10	15.13	14.48	14.32
4.5	20.11	19.24	19.28	19.42	19.36	18.41	17.91	17.10	16.82	16.45	16.18	15.96	15.48	15.29	15.11	15.15	14.50	14.33
5.0	19.87	19.02	19.06	19.20	19.16	18.24	17.75	16.98	16.72	16.36	16.09	15.88	15.43	15.24	15.06	15.09	14.44	14.28
5.5	19.59	18.76	18.81	18.94	18.92	18.02	17.55	16.81	16.57	16.22	15.96	15.76	15.32	15.13	14.95	14.99	14.34	14.17
6.0	19.29	18.48	18.52	18.65	18.64	17.78	17.32	16.62	16.38	16.05	15.79	15.60	15.17	14.99	14.81	14.85	14.20	14.04
6.5	18.97	18.18	18.22	18.35	18.35	17.52	17.07	16.40	16.17	15.85	15.60	15.41	15.01	14.83	14.65	14.68	14.05	13.89
7.0	18.65	17.88	17.92	18.05	18.06	17.25	16.81	16.16	15.95	15.64	15.40	15.22	14.82	14.65	14.47	14.51	13.87	13.72
8.0	18.00	17.26	17.30	17.43	17.45	16.69	16.28	15.68	15.49	15.20	14.97	14.80	14.43	14.27	14.09	14.12	13.51	13.36
9.0	17.37	16.67	16.71	16.83	16.87	16.15	15.76	15.20	15.02	14.75	14.53	14.37	14.03	13.88	13.70	13.73	13.13	12.99
10.0	16.77	16.10	16.14	16.26	16.30	15.62	15.25	14.73	14.57	14.31	14.10	13.95	13.63	13.48	13.31	13.34	12.76	12.62
11.0	16.21	15.56	15.60	15.71	15.77	15.12	14.77	14.28	14.13	13.88	13.68	13.54	13.23	13.10	12.93	12.96	12.40	12.26
12.0	15.67	15.05	15.09	15.20	15.26	14.64	14.31	13.85	13.71	13.47	13.29	13.15	12.86	12.73	12.56	12.59	12.05	11.92
15.0	14.26	13.71	13.74	13.85	13.92	13.38	13.08	12.69	12.57	12.37	12.20	12.09	11.83	11.73	11.57	11.59	11.10	10.98
20.0	12.43	11.96	11.99	12.08	12.16	11.71	11.46	11.14	11.06	10.89	10.75	10.65	10.45	10.36	10.22	10.24	9.81	9.71
25.0	11.05	10.64	10.67	10.75	10.83	10.44	10.23	9.96	9.89	9.75	9.63	9.55	9.37	9.30	9.17	9.19	8.80	8.72
30.0	9.98	9.61	9.64	9.71	9.80	9.45	9.26	9.03	8.97	8.85	8.74	8.67	8.52	8.46	8.34	8.36	8.01	7.93
35.0	9.12	8.78	8.82	8.88	8.97	8.65	8.48	8.28	8.23	8.12	8.02	7.96	7.82	7.78	7.66	7.68	7.36	7.29
40.0	8.421	8.109	8.139	8.202	8.282	7.997	7.844	7.662	7.617	7.517	7.430	7.373	7.249	7.211	7.102	7.120	6.826	6.761
45.0	7.834	7.545	7.573	7.632	7.710	7.448	7.307	7.143	7.103	7.011	6.931	6.880	6.766	6.734	6.631	6.648	6.375	6.315
50.0	7.336	7.066	7.094	7.149	7.225	6.981	6.851	6.700	6.664	6.580	6.506	6.459	6.354	6.326	6.228	6.245	5.989	5.934
55.0	6.907	6.654	6.681	6.733	6.807	6.579	6.458	6.319	6.286	6.208	6.139	6.095	5.998	5.973	5.880	5.896	5.655	5.604
60.0	6.535	6.296	6.322	6.372	6.443	6.229	6.116	5.986	5.956	5.883	5.818	5.777	5.687	5.664	5.576	5.591	5.364	5.315
65.0	6.208	5.982	6.006	6.054	6.123	5.921	5.814	5.693	5.665	5.597	5.536	5.497	5.412	5.392	5.308	5.322	5.106	5.061
70.0	5.918	5.703	5.726	5.772	5.839	5.647	5.546	5.433	5.407	5.343	5.285	5.249	5.168	5.150	5.069	5.083	4.878	4.834
80.0	5.427	5.231	5.253	5.295	5.358	5.184	5.093	4.992	4.969	4.912	4.858	4.826	4.754	4.738	4.664	4.676	4.488	4.449
90.0	5.027	4.845	4.866	4.905	4.966	4.805	4.722	4.631	4.610	4.558	4.509	4.479	4.414	4.400	4.331	4.343	4.169	4.133
100.0	4.694	4.524	4.544	4.580	4.639	4.490	4.412	4.329	4.311	4.263	4.217	4.190	4.129	4.117	4.053	4.064	3.901	3.868
150.0	3.612	3.482	3.497	3.526	3.574	3.462	3.405	3.346	3.334	3.300	3.265	3.245	3.201	3.192	3.143	3.152	3.026	3.001
200.0	3.021	2.917	2.918	2.941	2.985	2.892	2.846	2.800	2.791	2.763	2.735	2.719	2.683	2.675	2.635	2.643	2.608	2.524
250.0	2.665	2.574	2.546	2.567	2.606	2.532	2.507	2.463	2.465	2.437	2.401	2.397	2.371	2.353	2.316	2.324	2.308	2.234
300.0	2.419	2.337	2.311	2.319	2.354	2.300	2.278	2.239	2.240	2.215	2.183	2.179	2.156	2.141	2.107	2.114	2.099	2.034
350.0	2.239	2.163	2.140	2.147	2.180	2.130	2.109	2.074	2.076	2.053	2.023	2.020	1.999	1.985	1.954	1.960	1.946	1.886
400.0	2.102	2.030	2.010	2.016	2.047	2.001	1.981	1.948	1.950	1.929	1.901	1.898	1.878	1.866	1.837	1.842	1.828	1.773
450.0	1.994	1.926	1.907	1.913	1.943	1.899	1.880	1.849	1.851	1.831	1.805	1.802	1.784	1.772	1.745	1.750	1.736	1.685
500.0	1.907	1.842	1.825	1.831	1.859	1.817	1.799	1.770	1.772	1.753	1.728	1.725	1.708	1.697	1.671	1.676	1.662	1.614

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

80
SE IONS
34

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.230	5.010	7.071	7.050	6.920	8.242	8.930	9.417	9.780	10.150	10.370	11.070	11.440	11.954	12.160	12.371	12.754	13.090
3.0	5.919	5.736	8.022	8.044	7.899	9.316	10.170	10.714	11.114	11.515	11.824	12.614	13.063	13.624	13.849	14.122	14.696	14.963
3.5	6.641	6.487	8.992	9.057	8.895	10.403	11.420	12.017	12.452	12.880	13.278	14.155	14.679	15.285	15.526	15.859	16.601	16.816
4.0	7.399	7.267	9.987	10.095	9.915	11.509	12.691	13.339	13.807	14.269	14.745	15.708	16.303	16.952	17.209	17.599	18.496	18.669
4.5	8.192	8.077	11.010	11.162	10.962	12.641	13.987	14.686	15.186	15.658	16.232	17.280	17.947	18.637	18.909	19.355	20.395	20.535
5.0	9.023	8.920	12.064	12.259	12.038	13.801	15.313	16.060	16.591	17.083	17.746	18.879	19.616	20.346	20.632	21.133	22.307	22.422
5.5	9.891	9.794	13.149	13.389	13.144	14.990	16.670	17.466	18.028	18.536	19.290	20.507	21.314	22.084	22.384	22.938	24.240	24.336
6.0	10.795	10.701	14.266	14.551	14.282	16.210	18.061	18.905	19.496	20.020	20.866	22.169	23.044	23.853	24.166	24.774	26.197	26.280
6.5	11.736	11.641	15.416	15.747	15.453	17.461	19.486	20.378	20.999	21.537	22.476	23.864	24.809	25.656	25.982	26.644	28.183	28.258
7.0	12.714	12.614	16.599	16.978	16.656	18.745	20.946	21.886	22.535	23.087	24.121	25.595	26.609	27.495	27.833	28.548	30.199	30.270
8.0	14.78	14.66	19.07	19.54	19.16	21.41	23.97	25.01	25.72	26.29	27.52	29.17	30.32	31.28	31.65	32.47	34.33	34.41
9.0	16.99	16.83	21.67	22.24	21.80	24.21	27.15	28.28	29.04	29.63	31.06	32.89	34.19	35.22	35.61	36.53	38.60	38.70
10.0	19.34	19.14	24.40	25.08	24.67	27.14	30.47	31.69	32.51	33.12	34.76	36.77	38.21	39.32	39.73	40.76	43.02	43.14
11.0	21.83	21.57	27.27	28.05	27.47	30.20	33.93	35.25	36.13	36.75	38.60	40.81	42.39	43.57	44.00	45.14	47.59	47.75
12.0	24.46	24.13	30.27	31.16	30.50	33.40	37.54	38.96	39.89	40.52	42.60	45.00	46.73	47.98	48.43	49.68	52.31	52.52
15.0	33.17	32.55	40.04	41.30	40.36	43.77	49.24	50.96	52.06	52.70	55.49	58.50	60.70	62.16	62.67	64.25	67.39	67.81
20.0	50.33	48.99	58.88	60.80	59.34	63.61	71.56	73.81	75.18	75.81	79.93	84.05	87.11	88.92	89.50	91.65	95.58	96.60
25.0	70.64	68.33	80.79	83.47	81.35	86.55	97.31	100.12	101.78	102.34	107.97	113.33	117.33	119.47	120.11	122.86	127.55	129.10
30.0	93.99	90.44	105.66	109.18	106.31	112.47	126.35	129.77	131.71	132.16	139.48	146.21	151.24	153.70	154.38	157.77	163.17	165.51
35.0	120.26	115.21	133.38	137.83	134.11	141.28	158.60	162.65	164.89	165.18	174.36	182.57	188.72	191.49	192.20	196.25	202.36	205.59
40.0	149.4	142.6	163.9	169.3	164.7	172.9	193.9	198.7	201.2	201.3	212.5	222.3	229.7	232.7	233.5	238.2	245.0	249.2
45.0	181.2	172.4	197.1	203.6	197.9	207.2	232.3	237.7	240.6	240.4	253.8	265.3	274.0	277.4	278.1	283.5	291.0	296.3
50.0	215.7	204.7	232.9	240.6	233.7	244.2	273.6	279.8	282.9	282.5	298.2	311.6	321.6	325.2	325.9	332.1	340.4	346.8
55.0	252.8	239.3	271.2	280.2	272.1	283.7	317.7	324.7	328.1	327.4	345.6	360.9	372.4	376.3	377.0	383.9	392.9	400.6
60.0	292.5	276.2	312.1	322.3	313.0	325.8	364.7	372.4	376.2	375.2	395.9	413.3	426.3	430.5	431.1	438.8	448.6	457.6
65.0	334.6	315.4	355.4	367.0	356.3	370.4	414.3	422.9	427.0	425.6	449.2	468.6	483.3	487.7	488.3	496.8	507.3	517.7
70.0	379.1	356.8	401.1	414.1	401.9	417.3	466.7	476.1	480.6	478.7	505.2	526.9	543.3	547.9	548.4	557.8	569.0	580.8
80.0	475.3	446.0	499.4	515.5	500.2	518.3	579.1	590.4	595.5	592.7	625.4	651.9	671.9	677.0	677.4	688.4	701.2	716.1
90.0	580.5	543.4	606.7	626.1	607.4	628.3	701.6	714.8	720.6	716.7	756.2	787.8	811.8	817.3	817.4	830.2	844.8	862.8
100.0	694.5	648.7	722.6	745.6	723.1	747.0	833.8	849.0	855.4	850.4	897.1	934.3	962.4	968.3	968.2	982.8	999.2	1020.5
150.0	1386.	1285.	1422.	1466.	1421.	1462.	1628.	1655.	1665.	1652.	1742.	1812.	1865.	1873.	1871.	1895.	1922.	1962.
200.0	2259.	2082.	2297.	2369.	2298.	2356.	2622.	2664.	2675.	2650.	2794.	2882.	2972.	2999.	2994.	3030.	3051.	3129.
250.0	3285.	3011.	3316.	3421.	3327.	3397.	3779.	3848.	3848.	3810.	4017.	4123.	4255.	4308.	4298.	4356.	4359.	4484.
300.0	4437.	4053.	4460.	4601.	4480.	4583.	5075.	5190.	5162.	5107.	5385.	5512.	5691.	5772.	5755.	5838.	5820.	5995.
350.0	5701.	5195.	5711.	5892.	5740.	5838.	6492.	6661.	6597.	6524.	6882.	7030.	7259.	7370.	7346.	7462.	7415.	7644.
400.0	7061.	6423.	7056.	7281.	7096.	7209.	8014.	8240.	8138.	8045.	8482.	8660.	8944.	9085.	9052.	9188.	9126.	9412.
450.0	8507.	7727.	8485.	8756.	8536.	8664.	9630.	9914.	9773.	9659.	10182.	10389.	10730.	10903.	10861.	11026.	10939.	11285.
500.0	10029.	9100.	9988.	10307.	10050.	10194.	11328.	11672.	11492.	11354.	11968.	12206.	12606.	12811.	12761.	12955.	12843.	13252.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.75	14.27	15.42	15.71	16.30	17.14	17.65	18.30	18.70	19.08	19.47	19.89	20.30	20.68	21.17	21.35	22.90	23.39
3.0	15.75	16.36	17.51	17.79	18.39	19.36	19.93	20.71	21.15	21.60	22.04	22.50	23.01	23.42	23.94	24.11	25.78	26.31
3.5	17.72	18.43	19.57	19.83	20.45	21.53	22.17	23.07	23.56	24.06	24.55	25.04	25.64	26.09	26.64	26.80	28.59	29.15
4.0	19.69	20.49	21.62	21.87	22.50	23.69	24.39	25.41	25.93	26.50	27.03	27.56	28.24	28.72	29.30	29.45	31.36	31.95
4.5	21.67	22.56	23.69	23.92	24.56	25.86	26.62	27.74	28.31	28.93	29.50	30.06	30.82	31.33	31.94	32.10	34.12	34.75
5.0	23.67	24.65	25.77	25.99	26.63	28.04	28.86	30.09	30.69	31.36	31.97	32.58	33.41	33.95	34.59	34.74	36.88	37.54
5.5	25.70	26.76	27.88	28.09	28.73	30.24	31.13	32.45	33.10	33.82	34.47	35.10	36.01	36.59	37.26	37.40	39.66	40.35
6.0	27.75	28.91	30.03	30.22	30.86	32.48	33.42	34.85	35.52	36.30	36.99	37.66	38.63	39.24	39.95	40.08	42.47	43.19
6.5	29.85	31.09	32.20	32.38	33.03	34.74	35.75	37.27	37.98	38.80	39.54	40.24	41.28	41.93	42.66	42.79	45.30	46.05
7.0	31.97	33.31	34.42	34.58	35.22	37.04	38.11	39.73	40.47	41.34	42.12	42.85	43.97	44.64	45.41	45.53	48.16	48.95
8.0	36.34	37.87	38.96	39.09	39.73	41.76	42.94	44.75	45.56	46.53	47.38	48.18	49.43	50.17	51.01	51.12	54.01	54.86
9.0	40.86	42.58	43.67	43.76	44.39	46.63	47.94	49.93	50.80	51.88	52.81	53.66	55.06	55.86	56.77	56.86	60.01	60.93
10.0	45.55	47.47	48.54	48.60	49.22	51.67	53.10	55.28	56.21	57.39	58.40	59.31	60.84	61.70	62.69	62.77	66.19	67.18
11.0	50.40	52.52	53.58	53.60	54.21	56.88	58.43	60.80	61.79	63.06	64.16	65.13	66.80	67.72	68.79	68.86	72.55	73.61
12.0	55.42	57.75	58.80	58.78	59.37	62.25	63.93	66.49	67.54	68.91	70.09	71.13	72.93	73.92	75.07	75.12	79.10	80.23
15.0	71.49	74.48	75.48	75.34	75.85	79.42	81.49	84.61	85.84	87.52	88.95	90.18	92.41	93.57	94.99	95.00	99.87	101.23
20.0	101.61	105.81	106.72	106.35	106.67	111.46	114.23	118.33	119.84	122.07	123.96	125.51	128.46	129.93	131.86	131.78	138.30	140.06
25.0	135.80	141.35	142.16	141.52	141.58	147.70	151.24	156.37	158.16	160.97	163.35	165.25	168.96	170.74	173.26	173.08	181.43	183.62
30.0	173.94	180.99	181.66	180.73	180.47	188.03	192.40	198.60	200.69	204.11	207.02	209.28	213.81	215.88	219.07	218.78	229.13	231.80
35.0	215.91	224.58	225.11	223.84	223.20	232.32	237.58	244.91	247.30	251.37	254.84	257.48	262.87	265.23	269.17	268.76	281.29	284.47
40.0	261.6	272.0	272.4	270.7	269.7	280.5	286.7	295.2	297.9	302.6	306.7	309.7	316.0	318.7	323.4	322.9	337.8	341.5
45.0	310.9	323.2	323.4	321.3	319.8	332.3	339.5	349.3	352.3	357.8	362.5	365.9	373.2	376.1	381.8	381.1	398.4	402.7
50.0	363.7	378.0	378.0	375.5	373.4	387.8	396.1	407.1	410.5	416.7	422.1	426.0	434.2	437.5	444.1	443.2	463.2	468.1
55.0	419.9	436.4	436.1	433.2	430.5	446.9	456.3	468.7	472.3	479.3	485.4	489.8	499.1	502.6	510.2	509.2	532.0	537.5
60.0	479.5	498.2	497.7	494.3	490.9	509.4	520.0	533.7	537.7	545.5	552.4	557.2	567.6	571.4	580.1	578.9	604.7	610.9
65.0	542.3	563.4	562.6	558.8	554.6	575.3	587.1	602.3	606.6	615.3	622.9	628.2	639.7	643.8	653.6	652.2	681.1	688.0
70.0	608.3	631.9	630.9	626.4	621.5	644.5	657.5	674.2	678.9	688.4	696.9	702.7	715.4	719.7	730.8	729.1	761.3	768.9
80.0	749.6	778.6	776.9	771.3	764.7	792.5	808.2	828.0	833.4	844.8	854.9	861.9	877.0	881.9	895.5	893.4	932.5	941.6
90.0	903.0	937.7	935.3	928.5	920.0	953.0	971.5	994.6	1000.7	1014.0	1026.0	1034.1	1051.8	1057.2	1073.7	1071.1	1117.6	1128.4
100.0	1067.8	1108.7	1105.6	1097.4	1086.8	1125.4	1146.9	1173.4	1180.3	1195.6	1209.6	1218.9	1239.3	1245.3	1264.8	1261.7	1316.1	1328.6
150.0	2051.	2129.	2121.	2105.	2081.	2152.	2191.	2237.	2248.	2275.	2300.	2316.	2352.	2361.	2399.	2392.	2494.	2516.
200.0	3271.	3393.	3381.	3355.	3313.	3424.	3484.	3551.	3567.	3607.	3647.	3671.	3725.	3738.	3797.	3786.	3913.	3980.
250.0	4685.	4858.	4854.	4816.	4753.	4909.	4988.	5082.	5098.	5155.	5215.	5245.	5318.	5340.	5424.	5408.	5549.	5670.
300.0	6264.	6492.	6507.	6461.	6374.	6570.	6666.	6789.	6804.	6881.	6966.	6999.	7091.	7127.	7239.	7217.	7371.	7551.
350.0	7985.	8275.	8308.	8256.	8142.	8380.	8494.	8649.	8662.	8759.	8872.	8909.	9021.	9070.	9213.	9185.	9354.	9596.
400.0	9831.	10186.	10239.	10181.	10038.	10319.	10453.	10641.	10653.	10772.	10914.	10954.	11088.	11152.	11328.	11292.	11477.	11786.
450.0	11787.	12210.	12284.	12219.	12046.	12373.	12528.	12750.	12760.	12902.	13075.	13119.	13275.	13364.	13564.	13522.	13724.	14102.
500.0	13840.	14335.	14430.	14358.	14152.	14528.	14704.	14963.	14988.	15137.	15341.	15389.	15568.	15662.	15909.	15859.	16080.	16529.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

79 BR IONS 35

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	61.98	58.02	44.01	42.06	42.66	38.73	33.47	31.96	31.02	30.25	28.37	26.68	25.35	24.61	24.33	23.44	21.01	21.88
3.0	59.22	56.35	43.35	41.48	42.14	38.51	33.41	31.99	31.13	30.47	28.60	26.96	25.68	24.97	24.70	23.84	21.62	22.32
3.5	56.50	54.42	42.38	40.60	41.30	37.94	33.01	31.69	30.88	30.32	28.48	26.89	25.67	24.99	24.74	23.91	21.88	22.44
4.0	53.93	52.44	41.29	39.59	40.32	37.19	32.43	31.20	30.45	29.96	28.17	26.63	25.46	24.81	24.59	23.79	21.93	22.36
4.5	51.53	50.51	40.15	38.52	39.27	36.36	31.77	30.61	29.91	29.48	27.74	26.25	25.13	24.52	24.31	23.55	21.84	22.17
5.0	49.33	48.66	39.01	37.45	38.21	35.49	31.06	29.97	29.32	28.95	27.24	25.81	24.74	24.16	23.96	23.23	21.65	21.90
5.5	47.30	46.92	37.90	36.41	37.17	34.62	30.34	29.31	28.70	28.37	26.72	25.33	24.31	23.76	23.57	22.88	21.41	21.59
6.0	45.43	45.28	36.83	35.40	36.17	33.76	29.63	28.65	28.07	27.79	26.18	24.84	23.85	23.33	23.16	22.49	21.14	21.25
6.5	43.71	43.75	35.81	34.43	35.19	32.92	28.93	28.00	27.46	27.21	25.64	24.34	23.39	22.90	22.74	22.10	20.83	20.90
7.0	42.12	42.32	34.83	33.50	34.27	32.11	28.25	27.36	26.85	26.63	25.10	23.85	22.94	22.47	22.32	21.70	20.52	20.54
8.0	39.29	39.72	33.02	31.78	32.54	30.59	26.96	26.15	25.69	25.52	24.07	22.89	22.04	21.61	21.48	20.91	19.87	19.82
9.0	36.84	37.44	31.39	30.23	30.97	29.20	25.77	25.03	24.61	24.48	23.10	21.98	21.19	20.80	20.68	20.15	19.23	19.13
10.0	34.71	35.43	29.91	28.82	29.55	27.93	24.67	23.99	23.61	23.51	22.19	21.14	20.39	20.03	19.93	19.44	18.61	18.46
11.0	32.83	33.64	28.58	27.55	28.26	26.76	23.67	23.03	22.69	22.61	21.35	20.36	19.64	19.32	19.23	18.76	18.02	17.84
12.0	31.16	32.04	27.36	26.39	27.08	25.69	22.75	22.16	21.83	21.78	20.57	19.62	18.95	18.65	18.57	18.13	17.45	17.25
15.0	27.13	28.11	24.32	23.47	24.12	22.98	20.40	19.90	19.64	19.63	18.55	17.72	17.14	16.90	16.84	16.47	15.95	15.71
20.0	22.47	23.50	20.62	19.92	20.50	19.63	17.47	17.08	16.89	16.92	16.00	15.31	14.82	14.65	14.61	14.32	13.95	13.69
25.0	19.31	20.32	17.99	17.39	17.91	17.21	15.35	15.03	14.87	14.92	14.12	13.53	13.11	12.98	12.96	12.71	12.44	12.18
30.0	17.00	17.98	16.02	15.49	15.96	15.38	13.74	13.46	13.34	13.39	12.68	12.16	11.79	11.69	11.67	11.47	11.25	11.00
35.0	15.25	16.18	14.48	14.01	14.44	13.95	12.47	12.23	12.12	12.18	11.54	11.07	10.74	10.66	10.65	10.47	10.29	10.06
40.0	13.86	14.75	13.25	12.82	13.22	12.79	11.44	11.23	11.14	11.20	10.61	10.19	9.89	9.82	9.82	9.66	9.50	9.29
45.0	12.73	13.59	12.23	11.85	12.22	11.83	10.59	10.40	10.33	10.39	9.84	9.45	9.18	9.12	9.12	8.98	8.85	8.64
50.0	11.80	12.62	11.38	11.03	11.38	11.03	9.88	9.71	9.64	9.70	9.19	8.83	8.58	8.53	8.53	8.40	8.29	8.09
55.0	11.01	11.80	10.66	10.33	10.66	10.34	9.27	9.11	9.05	9.11	8.64	8.30	8.06	8.02	8.03	7.91	7.80	7.62
60.0	10.34	11.10	10.04	9.73	10.04	9.75	8.74	8.60	8.54	8.60	8.16	7.84	7.62	7.58	7.59	7.48	7.38	7.21
65.0	9.76	10.49	9.50	9.21	9.50	9.24	8.28	8.15	8.10	8.16	7.74	7.44	7.22	7.19	7.20	7.10	7.01	6.85
70.0	9.25	9.96	9.02	8.75	9.03	8.78	7.88	7.75	7.71	7.77	7.36	7.08	6.88	6.85	6.86	6.77	6.69	6.53
80.0	8.40	9.06	8.22	7.97	8.23	8.01	7.20	7.08	7.04	7.10	6.74	6.48	6.30	6.28	6.28	6.20	6.13	5.99
90.0	7.72	8.34	7.58	7.35	7.59	7.39	6.64	6.54	6.51	6.56	6.22	5.99	5.82	5.80	5.81	5.74	5.68	5.55
100.0	7.16	7.75	7.05	6.84	7.05	6.88	6.18	6.09	6.06	6.12	5.80	5.58	5.43	5.41	5.42	5.36	5.30	5.19
150.0	5.386	5.862	5.344	5.187	5.351	5.232	4.709	4.643	4.625	4.674	4.436	4.272	4.153	4.149	4.158	4.115	4.067	3.994
200.0	4.432	4.888	4.453	4.315	4.425	4.359	3.920	3.851	3.864	3.910	3.707	3.561	3.531	3.459	3.473	3.427	3.463	3.342
250.0	3.879	4.286	3.907	3.786	3.874	3.829	3.445	3.346	3.398	3.440	3.263	3.213	3.108	3.047	3.060	3.009	3.052	2.949
300.0	3.501	3.873	3.532	3.423	3.503	3.464	3.118	3.002	3.078	3.117	2.956	2.910	2.816	2.763	2.775	2.730	2.768	2.676
350.0	3.225	3.571	3.259	3.157	3.233	3.198	2.879	2.775	2.843	2.880	2.733	2.689	2.602	2.555	2.567	2.526	2.560	2.477
400.0	3.017	3.342	3.051	2.956	3.028	2.996	2.698	2.602	2.665	2.700	2.563	2.520	2.440	2.397	2.408	2.370	2.402	2.325
450.0	2.853	3.163	2.889	2.798	2.867	2.837	2.555	2.467	2.525	2.559	2.429	2.388	2.312	2.272	2.284	2.248	2.278	2.205
500.0	2.722	3.019	2.758	2.671	2.738	2.710	2.441	2.359	2.413	2.446	2.322	2.282	2.210	2.173	2.184	2.150	2.178	2.109

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	20.49	19.54	19.59	19.74	19.56	18.45	17.89	16.89	16.53	16.10	15.79	15.54	14.97	14.78	14.62	14.66	14.05	13.89
3.0	20.94	20.00	20.05	20.19	20.05	18.97	18.40	17.45	17.11	16.68	16.38	16.12	15.58	15.38	15.21	15.24	14.60	14.43
3.5	21.09	20.16	20.20	20.35	20.24	19.18	18.63	17.71	17.39	16.98	16.68	16.43	15.90	15.70	15.52	15.56	14.90	14.73
4.0	21.06	20.13	20.18	20.32	20.24	19.21	18.68	17.80	17.50	17.10	16.80	16.56	16.05	15.85	15.67	15.71	15.03	14.86
4.5	20.90	20.00	20.04	20.18	20.12	19.13	18.61	17.77	17.48	17.09	16.81	16.58	16.08	15.88	15.70	15.74	15.06	14.88
5.0	20.67	19.78	19.83	19.97	19.93	18.97	18.46	17.66	17.39	17.01	16.73	16.51	16.04	15.84	15.65	15.69	15.01	14.84
5.5	20.39	19.53	19.57	19.71	19.68	18.75	18.26	17.49	17.24	16.88	16.60	16.39	15.93	15.74	15.55	15.59	14.91	14.74
6.0	20.09	19.24	19.28	19.42	19.41	18.51	18.03	17.30	17.05	16.70	16.44	16.23	15.79	15.60	15.42	15.45	14.78	14.61
6.5	19.77	18.94	18.98	19.12	19.12	18.25	17.78	17.08	16.85	16.51	16.25	16.05	15.63	15.44	15.26	15.29	14.63	14.46
7.0	19.44	18.63	18.67	18.81	18.82	17.97	17.52	16.84	16.62	16.30	16.05	15.86	15.45	15.27	15.08	15.11	14.45	14.29
8.0	18.78	18.01	18.05	18.18	18.21	17.41	16.99	16.36	16.16	15.85	15.61	15.43	15.05	14.88	14.70	14.73	14.09	13.93
9.0	18.14	17.40	17.44	17.57	17.61	16.86	16.45	15.87	15.68	15.39	15.17	15.00	14.64	14.48	14.30	14.33	13.71	13.55
10.0	17.53	16.82	16.86	16.98	17.03	16.32	15.93	15.39	15.22	14.94	14.73	14.57	14.23	14.08	13.90	13.93	13.33	13.18
11.0	16.95	16.27	16.31	16.43	16.48	15.81	15.44	14.92	14.77	14.51	14.30	14.15	13.83	13.69	13.51	13.54	12.96	12.81
12.0	16.40	15.75	15.79	15.90	15.96	15.32	14.97	14.48	14.34	14.09	13.89	13.75	13.45	13.32	13.14	13.17	12.60	12.46
15.0	14.95	14.36	14.40	14.51	14.58	14.01	13.70	13.29	13.17	12.95	12.78	12.66	12.39	12.28	12.12	12.14	11.62	11.50
20.0	13.05	12.55	12.59	12.68	12.77	12.29	12.03	11.69	11.60	11.42	11.28	11.18	10.96	10.87	10.72	10.75	10.29	10.18
25.0	11.62	11.18	11.21	11.30	11.39	10.97	10.75	10.47	10.39	10.24	10.12	10.03	9.85	9.78	9.63	9.66	9.25	9.16
30.0	10.50	10.11	10.14	10.22	10.31	9.94	9.74	9.50	9.44	9.31	9.19	9.12	8.96	8.90	8.77	8.79	8.42	8.34
35.0	9.61	9.25	9.28	9.35	9.44	9.11	8.93	8.72	8.66	8.55	8.45	8.38	8.24	8.19	8.07	8.09	7.75	7.68
40.0	8.874	8.545	8.576	8.643	8.727	8.427	8.265	8.073	8.026	7.920	7.828	7.769	7.638	7.598	7.483	7.501	7.191	7.123
45.0	8.260	7.956	7.985	8.048	8.129	7.853	7.704	7.531	7.488	7.392	7.307	7.253	7.133	7.099	6.990	7.008	6.720	6.657
50.0	7.739	7.454	7.483	7.542	7.621	7.364	7.227	7.068	7.030	6.941	6.862	6.812	6.702	6.672	6.569	6.586	6.316	6.258
55.0	7.290	7.023	7.051	7.106	7.183	6.943	6.815	6.668	6.633	6.551	6.478	6.431	6.329	6.302	6.205	6.221	5.967	5.913
60.0	6.900	6.647	6.674	6.727	6.802	6.575	6.456	6.319	6.287	6.211	6.142	6.099	6.003	5.979	5.886	5.902	5.662	5.610
65.0	6.556	6.317	6.343	6.393	6.466	6.252	6.139	6.012	5.983	5.911	5.845	5.805	5.715	5.694	5.605	5.620	5.392	5.344
70.0	6.252	6.025	6.049	6.097	6.168	5.965	5.859	5.739	5.712	5.644	5.582	5.544	5.459	5.440	5.354	5.369	5.152	5.106
80.0	5.736	5.528	5.551	5.596	5.663	5.479	5.382	5.275	5.251	5.191	5.134	5.100	5.023	5.007	4.928	4.942	4.743	4.701
90.0	5.315	5.123	5.145	5.186	5.250	5.080	4.992	4.895	4.874	4.819	4.767	4.736	4.666	4.652	4.578	4.591	4.407	4.369
100.0	4.964	4.785	4.805	4.844	4.906	4.748	4.666	4.578	4.559	4.508	4.460	4.431	4.367	4.354	4.286	4.298	4.126	4.090
150.0	3.823	3.686	3.702	3.732	3.784	3.665	3.604	3.542	3.529	3.493	3.456	3.435	3.388	3.379	3.327	3.336	3.203	3.177
200.0	3.199	3.090	3.090	3.115	3.161	3.062	3.014	2.965	2.955	2.926	2.896	2.879	2.841	2.833	2.790	2.799	2.762	2.673
250.0	2.823	2.727	2.697	2.719	2.760	2.682	2.656	2.609	2.611	2.581	2.543	2.539	2.511	2.492	2.463	2.461	2.444	2.367
300.0	2.563	2.475	2.449	2.457	2.494	2.437	2.413	2.371	2.373	2.347	2.313	2.309	2.284	2.268	2.232	2.240	2.223	2.154
350.0	2.372	2.291	2.267	2.275	2.309	2.257	2.235	2.197	2.199	2.175	2.144	2.140	2.117	2.103	2.070	2.077	2.061	1.998
400.0	2.227	2.151	2.129	2.136	2.169	2.120	2.099	2.064	2.066	2.044	2.015	2.011	1.990	1.977	1.946	1.952	1.937	1.879
450.0	2.113	2.041	2.021	2.027	2.058	2.012	1.992	1.959	1.961	1.940	1.913	1.909	1.890	1.877	1.848	1.854	1.839	1.785
500.0	2.021	1.952	1.933	1.940	1.969	1.926	1.906	1.875	1.877	1.857	1.831	1.828	1.810	1.798	1.770	1.776	1.761	1.710

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

79 BR IONS 35

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.040	4.830	6.824	6.800	6.670	7.945	8.610	9.079	9.430	9.790	10.000	10.670	11.030	11.532	11.730	11.932	12.297	12.620
3.0	5.692	5.520	7.727	7.745	7.601	8.967	9.790	10.313	10.700	11.089	11.385	12.141	12.576	13.123	13.339	13.600	14.147	14.405
3.5	6.375	6.233	8.649	8.707	8.547	9.999	10.979	11.553	11.973	12.388	12.768	13.607	14.113	14.703	14.935	15.253	15.961	16.169
4.0	7.090	6.973	9.593	9.692	9.515	11.050	12.186	12.809	13.260	13.698	14.161	15.082	15.658	16.288	16.536	16.908	17.763	17.931
4.5	7.840	7.740	10.563	10.703	10.508	12.124	13.416	14.087	14.569	15.027	15.574	16.576	17.219	17.889	18.151	18.576	19.567	19.705
5.0	8.623	8.537	11.561	11.743	11.527	13.224	14.673	15.391	15.903	16.379	17.011	18.093	18.803	19.511	19.787	20.264	21.383	21.497
5.5	9.441	9.364	12.588	12.813	12.575	14.351	15.960	16.724	17.265	17.757	18.475	19.638	20.414	21.160	21.449	21.978	23.217	23.313
6.0	10.294	10.221	13.646	13.913	13.653	15.506	17.277	18.087	18.656	19.164	19.969	21.213	22.054	22.837	23.139	23.719	25.074	25.157
6.5	11.180	11.109	14.733	15.045	14.760	16.691	18.627	19.482	20.079	20.600	21.494	22.819	23.726	24.546	24.860	25.490	26.956	27.032
7.0	12.101	12.027	15.852	16.208	15.897	17.906	20.009	20.909	21.534	22.068	23.051	24.458	25.431	26.288	26.613	27.294	28.866	28.938
8.0	14.04	13.95	18.18	18.63	18.26	20.43	22.87	23.86	24.54	25.10	26.27	27.84	28.94	29.87	30.22	31.00	32.78	32.85
9.0	16.12	16.00	20.64	21.18	20.75	23.07	25.87	26.95	27.68	28.26	29.62	31.36	32.60	33.60	33.97	34.85	36.82	36.91
10.0	18.33	18.17	23.22	23.86	23.37	25.84	29.00	30.18	30.96	31.55	33.11	35.02	36.40	37.47	37.86	38.84	40.99	41.12
11.0	20.67	20.46	25.92	26.66	26.10	28.73	32.27	33.54	34.38	34.98	36.74	38.83	40.35	41.49	41.90	42.98	45.31	45.47
12.0	23.14	22.87	28.74	29.59	28.96	31.74	35.68	37.04	37.93	38.54	40.51	42.79	44.45	45.65	46.08	47.27	49.76	49.97
15.0	31.32	30.79	37.95	39.13	38.25	41.51	46.70	48.34	49.39	50.02	52.66	55.51	57.61	59.02	59.50	61.00	63.98	64.39
20.0	47.40	46.23	55.66	57.47	56.09	60.15	67.70	69.84	71.15	71.76	75.66	79.56	82.47	84.20	84.76	86.80	90.53	91.39
25.0	66.43	64.36	76.23	78.75	76.76	81.72	91.88	94.55	96.13	96.68	102.00	107.08	110.87	112.91	113.53	116.13	120.57	122.05
30.0	88.28	85.07	99.54	102.86	100.16	106.04	119.13	122.37	124.22	124.67	131.57	137.93	142.69	145.04	145.70	148.90	154.02	156.22
35.0	112.86	108.27	125.52	129.71	126.22	133.04	149.36	153.20	155.33	155.63	164.27	172.02	177.84	180.49	181.17	184.99	190.78	193.82
40.0	140.1	133.9	154.1	159.2	154.8	162.6	182.5	186.9	189.4	189.5	200.0	209.3	216.2	219.1	219.8	224.3	230.8	234.7
45.0	169.8	161.8	185.1	191.3	185.9	194.8	218.4	223.5	226.2	226.1	238.7	249.6	257.7	260.9	261.6	266.8	273.9	278.9
50.0	202.1	192.0	218.6	226.9	219.5	229.4	257.0	262.8	265.8	265.5	280.2	292.8	302.3	305.7	306.4	312.3	320.0	326.1
55.0	236.8	224.4	254.5	262.9	255.4	266.4	296.3	304.9	308.2	307.5	324.6	339.0	349.8	353.5	354.2	360.7	369.2	376.4
60.0	273.8	258.9	292.7	302.3	293.6	305.7	342.2	349.5	353.1	352.2	371.7	388.0	400.2	404.2	404.8	412.1	421.3	429.7
65.0	313.1	295.5	333.2	344.1	334.0	347.4	388.6	396.7	400.6	399.3	421.4	439.7	453.5	457.7	458.3	466.3	476.2	485.9
70.0	354.7	334.2	375.8	388.1	376.7	391.2	437.6	446.5	450.6	449.0	473.8	494.2	509.6	514.0	514.5	523.3	533.9	545.0
80.0	444.5	417.4	467.7	482.8	468.5	485.5	542.6	553.2	558.0	555.5	586.1	611.0	629.8	634.6	635.0	645.4	657.5	671.3
90.0	542.7	508.4	567.8	586.1	568.6	588.3	657.0	669.4	674.8	671.3	708.2	738.0	760.4	765.7	765.8	777.8	791.5	808.4
100.0	649.1	606.7	676.0	697.7	676.6	699.1	780.4	794.7	800.8	796.1	839.8	874.7	901.1	906.7	906.6	920.4	935.7	955.7
150.0	1294.	1201.	1328.	1370.	1328.	1366.	1524.	1547.	1556.	1544.	1628.	1694.	1744.	1751.	1749.	1772.	1797.	1834.
200.0	2108.	1944.	2144.	2211.	2145.	2200.	2448.	2487.	2498.	2475.	2610.	2691.	2775.	2801.	2796.	2830.	2850.	2923.
250.0	3064.	2810.	3095.	3192.	3104.	3170.	3527.	3592.	3592.	3556.	3750.	3849.	3972.	4022.	4012.	4066.	4072.	4186.
300.0	4139.	3782.	4161.	4292.	4179.	4257.	4735.	4843.	4816.	4765.	5025.	5144.	5311.	5387.	5371.	5448.	5432.	5595.
350.0	5316.	4846.	5327.	5496.	5354.	5446.	6056.	6214.	6154.	6086.	6417.	6558.	6772.	6876.	6853.	6954.	6918.	7132.
400.0	6584.	5991.	6581.	6790.	6618.	6724.	7475.	7685.	7591.	7504.	7911.	8078.	8342.	8474.	8444.	8571.	8512.	8780.
450.0	7932.	7207.	7913.	8165.	7960.	8080.	8981.	9246.	9115.	9008.	9496.	9689.	10007.	10168.	10130.	10283.	10202.	10526.
500.0	9350.	8486.	9313.	9611.	9371.	9505.	10583.	10884.	10716.	10587.	11160.	11382.	11756.	11947.	11900.	12082.	11980.	12358.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.26	13.76	14.88	15.16	15.73	16.54	17.03	17.66	18.03	18.40	18.78	19.18	19.59	19.95	20.42	20.59	22.08	22.56
3.0	15.16	15.76	16.87	17.14	17.72	18.65	19.20	19.95	20.38	20.81	21.23	21.67	22.17	22.56	23.06	23.23	24.84	25.34
3.5	17.04	17.72	18.83	19.09	19.68	20.72	21.33	22.20	22.67	23.15	23.62	24.10	24.67	25.10	25.63	25.79	27.51	28.05
4.0	18.91	19.68	20.78	21.03	21.63	22.78	23.45	24.42	24.93	25.47	25.98	26.49	27.14	27.61	28.16	28.31	30.15	30.72
4.5	20.80	21.65	22.75	22.98	23.59	24.84	25.57	26.64	27.19	27.78	28.33	28.87	29.60	30.09	30.68	30.82	32.77	33.37
5.0	22.70	23.64	24.73	24.94	25.56	26.91	27.70	28.87	29.45	30.09	30.68	31.26	32.06	32.58	33.20	33.34	35.40	36.03
5.5	24.62	25.65	26.73	26.93	27.56	29.00	29.85	31.12	31.73	32.42	33.05	33.66	34.53	35.09	35.73	35.86	38.04	38.70
6.0	26.57	27.68	28.76	28.95	29.58	31.12	32.03	33.39	34.04	34.78	35.44	36.08	37.02	37.61	38.28	38.41	40.70	41.39
6.5	28.55	29.75	30.83	31.00	31.63	33.27	34.23	35.69	36.37	37.15	37.86	38.53	39.53	40.15	40.85	40.98	43.38	44.11
7.0	30.57	31.85	32.93	33.08	33.71	35.45	36.47	38.02	38.73	39.56	40.30	41.00	42.08	42.72	43.46	43.57	46.10	46.86
8.0	34.70	36.17	37.23	37.36	37.98	39.92	41.05	42.78	43.55	44.48	45.29	46.05	47.26	47.96	48.76	48.87	51.64	52.45
9.0	38.98	40.63	41.68	41.78	42.39	44.53	45.77	47.68	48.51	49.54	50.43	51.25	52.58	53.34	54.21	54.31	57.32	58.20
10.0	43.41	45.25	46.29	46.35	46.95	49.29	50.65	52.74	53.62	54.74	55.71	56.59	58.05	58.87	59.82	59.90	63.17	64.11
11.0	48.00	50.02	51.05	51.08	51.67	54.21	55.69	57.95	58.89	60.11	61.15	62.09	63.68	64.56	65.58	65.65	69.18	70.19
12.0	52.74	54.96	55.98	55.97	56.54	59.29	60.89	63.32	64.32	65.64	66.76	67.75	69.47	70.42	71.51	71.56	75.36	76.44
15.0	67.89	70.73	71.71	71.59	72.08	75.48	77.45	80.42	81.59	83.19	84.56	85.73	87.85	88.96	90.31	90.32	94.97	96.26
20.0	96.25	100.23	101.13	100.79	101.11	105.65	108.29	112.18	113.61	115.73	117.52	119.00	121.80	123.21	125.04	124.96	131.17	132.84
25.0	128.39	133.65	134.44	133.85	133.93	139.73	143.09	147.94	149.65	152.31	154.56	156.37	159.89	161.58	163.97	163.80	171.72	173.81
30.0	164.20	170.86	171.54	170.67	170.44	177.60	181.74	187.60	189.59	192.83	195.58	197.72	202.01	203.98	207.00	206.73	216.54	219.07
35.0	203.56	211.76	212.29	211.11	210.53	219.15	224.12	231.05	233.31	237.16	240.45	242.95	248.05	250.29	254.01	253.63	265.48	268.49
40.0	246.4	256.2	256.6	255.1	254.1	264.3	270.1	278.2	280.7	285.2	289.1	291.9	297.9	300.4	304.9	304.4	318.4	322.0
45.0	292.6	304.2	304.4	302.5	301.0	312.9	319.7	328.9	331.7	336.9	341.3	344.6	351.4	354.2	359.6	358.9	375.3	379.4
50.0	342.0	355.5	355.5	353.2	351.2	364.8	372.6	383.1	386.2	392.1	397.1	400.8	408.6	411.7	417.9	417.1	436.0	440.6
55.0	394.6	410.1	409.9	407.2	404.7	420.1	429.0	440.6	444.1	450.7	456.4	460.5	469.3	472.6	479.8	478.8	500.3	505.6
60.0	450.3	468.0	467.5	464.4	461.2	478.6	488.5	501.5	505.3	512.6	519.1	523.6	533.4	537.0	545.2	544.0	568.3	574.2
65.0	509.1	528.9	528.3	524.6	520.8	540.2	551.3	565.6	569.7	577.8	585.0	590.1	600.9	604.7	614.0	612.7	639.8	646.3
70.0	570.8	593.0	592.1	587.9	583.3	604.9	617.2	632.9	637.3	646.3	654.2	659.7	671.6	675.7	686.1	684.6	714.8	722.0
80.0	702.9	730.0	728.5	723.3	717.2	743.3	758.0	776.6	781.7	792.4	801.9	808.5	822.6	827.3	840.1	838.1	874.8	883.4
90.0	846.1	878.6	876.5	870.1	862.2	893.2	910.6	932.2	938.0	950.5	961.8	969.4	986.0	991.1	1006.5	1004.2	1047.8	1057.9
100.0	1000.0	1038.3	1036.5	1027.9	1018.0	1054.2	1074.4	1099.2	1105.7	1120.1	1133.2	1142.0	1161.1	1166.8	1185.0	1182.1	1233.2	1244.9
150.0	1918.	1990.	1983.	1968.	1946.	2012.	2049.	2092.	2102.	2127.	2151.	2166.	2200.	2208.	2243.	2237.	2332.	2353.
200.0	3055.	3169.	3158.	3134.	3096.	3199.	3255.	3318.	3333.	3370.	3407.	3430.	3481.	3493.	3547.	3538.	3686.	3718.
250.0	4374.	4535.	4532.	4496.	4437.	4583.	4667.	4745.	4760.	4814.	4869.	4897.	4965.	4986.	5064.	5050.	5182.	5294.
300.0	5846.	6059.	6073.	6030.	5948.	6132.	6221.	6336.	6351.	6422.	6502.	6533.	6618.	6652.	6756.	6736.	6880.	7048.
350.0	7450.	7720.	7752.	7703.	7597.	7819.	7925.	8070.	8082.	8173.	8278.	8312.	8417.	8463.	8597.	8570.	8728.	8954.
400.0	9171.	9501.	9563.	9497.	9364.	9626.	9751.	9927.	9938.	10049.	10181.	10219.	10344.	10403.	10567.	10534.	10707.	10995.
450.0	10994.	11388.	11457.	11396.	11235.	11541.	11685.	11893.	11902.	12034.	12195.	12237.	12382.	12456.	12652.	12612.	12801.	13154.
500.0	12906.	13368.	13457.	13390.	13198.	13549.	13713.	13955.	13962.	14117.	14307.	14352.	14519.	14607.	14837.	14791.	14997.	15416.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{84}_{36}$KR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	64.54	60.12	46.65	43.61	44.23	40.12	34.67	33.10	32.12	31.32	29.37	27.62	26.24	25.47	25.18	24.25	21.74	22.63
3.0	61.74	58.49	45.00	43.06	43.73	39.94	34.64	33.17	32.26	31.58	29.64	27.93	26.60	25.86	25.59	24.69	22.39	23.11
3.5	58.96	56.57	44.04	42.18	42.90	39.38	34.26	32.88	32.04	31.45	29.55	27.89	26.62	25.91	25.65	24.79	22.68	23.25
4.0	56.31	54.57	42.93	41.16	41.91	38.64	33.69	32.40	31.62	31.10	29.24	27.64	26.42	25.75	25.51	24.69	22.75	23.20
4.5	53.85	52.61	41.77	40.08	40.85	37.80	33.02	31.81	31.08	30.63	28.81	27.27	26.10	25.47	25.24	24.45	22.67	23.01
5.0	51.57	50.73	40.62	38.99	39.78	36.92	32.31	31.16	30.48	30.09	28.32	26.83	25.71	25.11	24.90	24.14	22.50	22.75
5.5	49.48	48.94	39.48	37.92	38.72	36.03	31.58	30.50	29.86	29.52	27.79	26.35	25.28	24.70	24.51	23.78	22.26	22.44
6.0	47.55	47.26	38.39	36.89	37.69	35.16	30.85	29.83	29.22	28.93	27.24	25.85	24.82	24.28	24.10	23.40	21.98	22.10
6.5	45.76	45.69	37.34	35.90	36.69	34.30	30.14	29.16	28.60	28.33	26.70	25.35	24.36	23.84	23.67	23.00	21.68	21.75
7.0	44.12	44.21	36.34	34.95	35.74	33.48	29.44	28.51	27.98	27.75	26.15	24.85	23.89	23.40	23.24	22.60	21.36	21.38
8.0	41.18	41.54	34.48	33.18	33.96	31.92	28.12	27.27	26.79	26.61	25.10	23.87	22.98	22.53	22.39	21.79	20.71	20.65
9.0	38.64	39.18	32.79	31.58	32.35	30.49	26.90	26.12	25.68	25.55	24.10	22.94	22.11	21.70	21.57	21.02	20.06	19.95
10.0	36.42	37.10	31.27	30.13	30.88	29.17	25.77	25.06	24.66	24.55	23.17	22.07	21.29	20.91	20.80	20.28	19.42	19.27
11.0	34.46	35.24	29.89	28.81	29.55	27.97	24.74	24.07	23.71	23.63	22.31	21.27	20.52	20.17	20.08	19.59	18.81	18.63
12.0	32.72	33.58	28.64	27.62	28.34	26.87	23.79	23.17	22.83	22.77	21.50	20.51	19.81	19.49	19.40	18.94	18.24	18.03
15.0	28.51	29.50	25.49	24.60	25.27	24.07	21.36	20.84	20.56	20.55	19.42	18.55	17.94	17.68	17.62	17.23	16.69	16.43
20.0	23.65	24.70	21.64	20.91	21.51	20.59	18.33	17.92	17.71	17.74	16.78	16.05	15.54	15.36	15.32	15.01	14.63	14.35
25.0	20.33	21.37	18.90	18.28	18.82	18.08	16.12	15.78	15.62	15.67	14.83	14.20	13.76	13.62	13.60	13.34	13.05	12.78
30.0	17.92	18.92	16.85	16.30	16.79	16.17	14.44	14.15	14.02	14.08	13.33	12.78	12.39	12.28	12.27	12.05	11.82	11.56
35.0	16.07	17.04	15.24	14.75	15.20	14.68	13.12	12.87	12.75	12.82	12.14	11.64	11.30	11.21	11.20	11.01	10.82	10.58
40.0	14.61	15.54	13.95	13.50	13.92	13.48	12.04	11.82	11.73	11.79	11.17	10.72	10.40	10.33	10.33	10.16	10.00	9.77
45.0	13.43	14.32	12.89	12.48	12.87	12.46	11.16	10.96	10.87	10.94	10.36	9.95	9.66	9.60	9.60	9.45	9.31	9.10
50.0	12.45	13.31	12.00	11.62	11.99	11.62	10.41	10.23	10.15	10.22	9.69	9.30	9.03	8.98	8.99	8.85	8.73	8.52
55.0	11.62	12.45	11.24	10.89	11.24	10.90	9.77	9.61	9.54	9.61	9.10	8.75	8.50	8.45	8.46	8.33	8.22	8.03
60.0	10.92	11.71	10.59	10.26	10.59	10.28	9.22	9.07	9.01	9.07	8.60	8.26	8.03	7.99	8.00	7.88	7.78	7.60
65.0	10.30	11.07	10.02	9.71	10.02	9.74	8.74	8.59	8.54	8.60	8.16	7.84	7.62	7.59	7.59	7.49	7.39	7.23
70.0	9.77	10.51	9.52	9.23	9.53	9.26	8.31	8.18	8.13	8.19	7.77	7.47	7.26	7.23	7.24	7.14	7.05	6.89
80.0	8.87	9.57	8.68	8.42	8.69	8.46	7.59	7.47	7.43	7.49	7.11	6.84	6.64	6.62	6.63	6.55	6.47	6.33
90.0	8.15	8.81	8.00	7.76	8.01	7.81	7.01	6.90	6.87	6.93	6.57	6.32	6.14	6.13	6.14	6.06	5.99	5.86
100.0	7.56	8.18	7.44	7.22	7.45	7.27	6.53	6.43	6.40	6.46	6.13	5.90	5.73	5.72	5.73	5.66	5.59	5.48
150.0	5.693	6.194	5.648	5.482	5.656	5.530	4.977	4.907	4.888	4.940	4.688	4.515	4.389	4.384	4.394	4.349	4.298	4.221
200.0	4.687	5.167	4.709	4.563	4.679	4.609	4.145	4.071	4.085	4.134	3.919	3.860	3.733	3.657	3.672	3.623	3.662	3.533
250.0	4.102	4.532	4.132	4.004	4.097	4.049	3.643	3.539	3.594	3.638	3.450	3.397	3.286	3.222	3.236	3.182	3.228	3.118
300.0	3.703	4.095	3.736	3.620	3.705	3.664	3.298	3.175	3.255	3.296	3.127	3.078	2.978	2.922	2.935	2.887	2.928	2.831
350.0	3.412	3.777	3.447	3.340	3.420	3.383	3.046	2.935	3.007	3.047	2.891	2.844	2.752	2.702	2.715	2.672	2.708	2.620
400.0	3.191	3.535	3.228	3.127	3.203	3.169	2.854	2.753	2.819	2.857	2.711	2.666	2.581	2.535	2.547	2.507	2.541	2.459
450.0	3.018	3.345	3.056	2.960	3.033	3.001	2.703	2.610	2.671	2.707	2.570	2.526	2.446	2.404	2.416	2.378	2.410	2.333
500.0	2.879	3.193	2.918	2.826	2.897	2.867	2.582	2.496	2.553	2.588	2.457	2.414	2.337	2.298	2.310	2.274	2.304	2.231

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	21.19	20.21	20.26	20.41	20.23	19.08	18.50	17.47	17.10	16.65	16.33	16.06	15.48	15.29	15.12	15.16	14.53	14.36
3.0	21.69	20.71	20.76	20.91	20.76	19.63	19.05	18.06	17.71	17.27	16.95	16.69	16.12	15.91	15.74	15.78	15.11	14.94
3.5	21.86	20.89	20.94	21.09	20.97	19.88	19.31	18.35	18.02	17.59	17.28	17.02	16.47	16.26	16.08	16.12	15.43	15.25
4.0	21.84	20.88	20.93	21.08	20.99	19.93	19.37	18.46	18.14	17.73	17.42	17.17	16.64	16.43	16.25	16.28	15.58	15.40
4.5	21.69	20.76	20.80	20.95	20.88	19.85	19.31	18.44	18.14	17.74	17.44	17.20	16.69	16.48	16.29	16.33	15.62	15.44
5.0	21.47	20.55	20.59	20.74	20.69	19.70	19.17	18.33	18.05	17.66	17.37	17.14	16.65	16.44	16.25	16.29	15.58	15.40
5.5	21.20	20.30	20.34	20.48	20.45	19.49	18.98	18.18	17.91	17.53	17.25	17.03	16.55	16.35	16.16	16.20	15.49	15.31
6.0	20.89	20.01	20.05	20.20	20.18	19.25	18.75	17.98	17.73	17.36	17.09	16.88	16.42	16.22	16.03	16.06	15.36	15.19
6.5	20.57	19.71	19.75	19.89	19.89	18.98	18.50	17.76	17.52	17.17	16.90	16.70	16.25	16.06	15.87	15.90	15.21	15.04
7.0	20.24	19.40	19.44	19.58	19.59	18.71	18.24	17.53	17.30	16.96	16.70	16.50	16.07	15.88	15.69	15.73	15.04	14.87
8.0	19.57	18.77	18.81	18.94	18.97	18.14	17.69	17.04	16.83	16.51	16.26	16.07	15.67	15.50	15.30	15.34	14.67	14.50
9.0	18.92	18.15	18.19	18.32	18.36	17.57	17.15	16.54	16.35	16.04	15.81	15.63	15.26	15.09	14.90	14.93	14.28	14.12
10.0	18.29	17.55	17.59	17.72	17.77	17.02	16.62	16.05	15.87	15.59	15.36	15.20	14.84	14.69	14.50	14.53	13.90	13.74
11.0	17.69	16.99	17.02	17.15	17.21	16.50	16.12	15.58	15.41	15.14	14.93	14.77	14.44	14.29	14.10	14.13	13.52	13.37
12.0	17.13	16.45	16.49	16.61	16.68	16.00	15.63	15.12	14.97	14.71	14.51	14.36	14.04	13.90	13.72	13.75	13.15	13.01
15.0	15.64	15.03	15.06	15.17	15.25	14.66	14.33	13.90	13.77	13.55	13.37	13.24	12.96	12.84	12.67	12.70	12.15	12.02
20.0	13.68	13.15	13.19	13.29	13.38	12.88	12.61	12.25	12.16	11.97	11.82	11.71	11.48	11.39	11.23	11.26	10.78	10.67
25.0	12.19	11.73	11.77	11.86	11.95	11.51	11.28	10.98	10.90	10.75	10.61	10.52	10.33	10.26	10.11	10.13	9.70	9.61
30.0	11.03	10.62	10.65	10.74	10.83	10.44	10.23	9.98	9.91	9.77	9.66	9.58	9.41	9.35	9.21	9.23	8.84	8.76
35.0	10.10	9.73	9.76	9.83	9.92	9.58	9.39	9.17	9.11	8.98	8.88	8.81	8.66	8.61	8.48	8.50	8.14	8.07
40.0	9.337	8.990	9.023	9.092	9.181	8.864	8.694	8.492	8.442	8.331	8.234	8.171	8.034	7.991	7.870	7.890	7.563	7.492
45.0	8.696	8.375	8.406	8.471	8.557	8.265	8.109	7.926	7.881	7.780	7.691	7.633	7.507	7.471	7.357	7.375	7.072	7.006
50.0	8.151	7.851	7.881	7.942	8.026	7.755	7.610	7.443	7.402	7.309	7.226	7.173	7.057	7.025	6.917	6.936	6.651	6.589
55.0	7.681	7.400	7.428	7.487	7.568	7.314	7.180	7.025	6.988	6.901	6.824	6.775	6.667	6.639	6.536	6.553	6.286	6.228
60.0	7.272	7.006	7.034	7.089	7.168	6.930	6.804	6.660	6.626	6.545	6.472	6.427	6.326	6.301	6.203	6.219	5.966	5.912
65.0	6.912	6.660	6.687	6.740	6.817	6.591	6.472	6.338	6.307	6.231	6.162	6.119	6.024	6.002	5.908	5.924	5.683	5.632
70.0	6.594	6.353	6.379	6.430	6.505	6.291	6.178	6.052	6.023	5.952	5.886	5.846	5.756	5.736	5.646	5.661	5.432	5.384
80.0	6.052	5.833	5.857	5.904	6.975	5.780	5.678	5.565	5.540	5.476	5.416	5.380	5.299	5.282	5.199	5.213	5.003	4.959
90.0	5.610	5.407	5.430	5.473	5.541	5.362	5.269	5.167	5.144	5.086	5.031	4.998	4.924	4.909	4.832	4.845	4.651	4.610
100.0	5.241	5.052	5.073	5.114	5.179	5.013	4.926	4.833	4.813	4.759	4.708	4.678	4.610	4.597	4.524	4.537	4.365	4.318
150.0	4.040	3.895	3.912	3.944	3.998	3.872	3.809	3.743	3.729	3.691	3.652	3.630	3.580	3.570	3.515	3.525	3.385	3.357
200.0	3.382	3.266	3.266	3.293	3.341	3.238	3.186	3.135	3.124	3.094	3.062	3.043	3.004	2.995	2.950	2.959	2.920	2.825
250.0	2.986	2.883	2.852	2.875	2.919	2.836	2.808	2.759	2.761	2.730	2.689	2.685	2.655	2.636	2.594	2.603	2.585	2.503
300.0	2.711	2.618	2.590	2.599	2.638	2.577	2.552	2.508	2.510	2.482	2.446	2.442	2.416	2.398	2.361	2.369	2.352	2.278
350.0	2.509	2.424	2.398	2.406	2.443	2.387	2.364	2.324	2.326	2.300	2.267	2.263	2.240	2.224	2.189	2.196	2.180	2.114
400.0	2.356	2.275	2.252	2.260	2.294	2.242	2.220	2.183	2.185	2.162	2.131	2.127	2.105	2.091	2.058	2.065	2.049	1.988
450.0	2.235	2.159	2.138	2.145	2.177	2.129	2.107	2.073	2.075	2.052	2.024	2.020	2.000	1.986	1.955	1.962	1.946	1.888
500.0	2.138	2.065	2.045	2.052	2.083	2.037	2.016	1.984	1.986	1.965	1.937	1.934	1.915	1.902	1.873	1.878	1.863	1.809

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{84}_{36}$KR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.220	5.010	7.071	7.050	6.920	8.242	8.930	9.418	9.780	10.150	10.370	11.060	11.430	11.952	12.160	12.370	12.747	13.080
3.0	5.885	5.718	7.997	8.018	7.874	9.290	10.141	10.684	11.083	11.484	11.791	12.570	13.017	13.586	13.812	14.083	14.647	14.914
3.5	6.581	6.448	8.940	9.003	8.843	10.349	11.359	11.966	12.388	12.816	13.210	14.074	14.594	15.207	15.450	15.779	16.509	16.724
4.0	7.310	7.204	9.906	10.011	9.834	11.425	12.595	13.241	13.708	14.158	14.638	15.586	16.177	16.832	17.091	17.476	18.357	18.531
4.5	8.073	7.987	10.898	11.045	10.849	12.624	13.854	14.549	15.047	15.518	16.084	17.115	17.776	18.472	18.745	19.185	20.205	20.348
5.0	8.870	8.801	11.917	12.108	11.890	13.648	15.140	15.883	16.411	16.901	17.554	18.668	19.397	20.133	20.420	20.914	22.064	22.183
5.5	9.702	9.644	12.966	13.200	12.961	14.800	16.455	17.245	17.804	18.310	19.051	20.248	21.044	21.819	22.120	22.666	23.941	24.042
6.0	10.568	10.517	14.045	14.323	14.060	15.980	17.801	18.638	19.225	19.748	20.578	21.857	22.721	23.534	23.848	24.446	25.839	25.927
6.5	11.469	11.421	15.154	15.477	15.190	17.189	19.178	20.062	20.678	21.215	22.135	23.498	24.429	25.280	25.607	26.257	27.763	27.843
7.0	12.404	12.355	16.295	16.663	16.350	18.429	20.588	21.519	22.163	22.713	23.726	25.171	26.170	27.058	27.398	28.099	29.714	29.791
8.0	14.38	14.32	18.67	19.13	18.76	21.00	23.51	24.53	25.23	25.80	27.00	28.62	29.76	30.72	31.08	31.88	33.71	33.79
9.0	16.48	16.40	21.17	21.73	21.30	23.69	26.56	27.68	28.43	29.03	30.42	32.21	33.48	34.52	34.90	35.81	37.83	37.93
10.0	18.72	18.60	23.79	24.45	23.95	26.51	29.75	30.96	31.77	32.38	33.98	35.94	37.36	38.46	38.87	39.88	42.08	42.21
11.0	21.10	20.93	26.54	27.30	26.74	29.45	33.08	34.38	35.25	35.87	37.67	39.82	41.38	42.55	42.98	44.09	46.48	46.65
12.0	23.60	23.37	29.41	30.28	29.64	32.52	36.54	37.94	38.86	39.49	41.51	43.84	45.54	46.79	47.24	48.45	51.01	51.23
15.0	31.87	31.40	38.76	39.97	39.08	42.44	47.74	49.43	50.51	51.16	53.86	56.78	58.93	60.38	60.88	62.42	65.47	65.89
20.0	48.13	47.03	56.71	58.56	57.16	61.37	69.04	71.24	72.59	73.22	77.20	81.19	84.16	85.94	86.52	88.61	92.42	93.31
25.0	67.35	65.37	77.53	80.10	78.09	83.19	93.54	96.28	97.90	98.47	103.89	109.07	112.94	115.05	115.68	118.35	122.88	124.38
30.0	89.41	86.30	101.11	104.49	101.77	107.80	121.12	124.43	126.33	126.80	133.82	140.30	145.15	147.57	148.25	151.52	156.75	158.99
35.0	114.21	109.73	127.37	131.62	128.10	135.10	151.68	155.60	157.78	158.11	166.89	174.79	180.70	183.42	184.13	188.03	193.93	197.03
40.0	141.6	135.6	156.2	161.4	157.0	165.0	185.1	189.7	192.2	192.3	203.0	212.4	219.5	222.5	223.2	227.8	234.3	238.4
45.0	171.7	163.7	187.6	193.8	188.4	197.5	221.4	226.6	229.4	229.3	242.1	253.1	261.4	264.7	265.4	270.7	277.9	283.0
50.0	204.2	194.2	221.4	228.7	222.2	232.4	260.4	266.3	269.4	269.1	284.0	296.8	306.4	310.0	310.7	316.6	324.5	330.7
55.0	239.1	226.8	257.5	266.0	258.4	269.7	302.1	308.7	312.1	311.5	328.8	343.4	354.4	358.2	358.9	365.5	374.1	381.5
60.0	276.4	261.7	296.1	305.8	297.0	309.4	346.3	353.8	357.4	356.5	376.3	392.8	405.2	409.3	410.0	417.4	426.7	436.2
65.0	316.0	298.6	336.8	347.9	337.8	351.4	393.2	401.4	405.3	404.1	426.4	445.0	459.0	463.3	463.9	472.0	482.1	491.9
70.0	357.9	337.5	379.9	392.3	380.8	395.6	442.5	451.5	455.8	454.1	479.2	499.9	515.5	520.0	520.6	529.5	540.3	551.5
80.0	448.3	421.4	472.4	487.7	473.2	490.6	548.3	559.1	564.0	561.5	592.4	617.6	636.6	641.6	642.0	652.5	664.8	678.8
90.0	547.1	513.0	573.2	591.7	574.0	594.1	663.5	676.1	681.7	678.1	715.5	745.5	768.2	773.6	773.8	786.0	799.9	816.9
100.0	654.2	612.1	682.2	704.0	682.8	705.7	787.8	802.3	808.5	803.8	848.0	883.2	909.9	915.7	915.6	929.5	945.1	965.3
150.0	1303.	1210.	1338.	1380.	1338.	1377.	1534.	1569.	1569.	1557.	1641.	1707.	1758.	1765.	1763.	1787.	1812.	1849.
200.0	2122.	1958.	2159.	2227.	2160.	2215.	2466.	2505.	2516.	2493.	2629.	2711.	2796.	2821.	2817.	2851.	2871.	2945.
250.0	3083.	2829.	3115.	3213.	3124.	3191.	3551.	3616.	3616.	3580.	3775.	3875.	3999.	4049.	4040.	4094.	4098.	4214.
300.0	4164.	3807.	4186.	4319.	4205.	4284.	4765.	4873.	4847.	4796.	5057.	5177.	5345.	5421.	5406.	5483.	5467.	5631.
350.0	5347.	4876.	5359.	5529.	5386.	5479.	6093.	6252.	6192.	6123.	6456.	6599.	6814.	6918.	6896.	6998.	6961.	7176.
400.0	6622.	6027.	6619.	6830.	6657.	6763.	7519.	7731.	7636.	7549.	7958.	8126.	8392.	8525.	8495.	8622.	8564.	8833.
450.0	7977.	7250.	7958.	8212.	8006.	8127.	9033.	9299.	9168.	9060.	9551.	9746.	10065.	10228.	10189.	10344.	10263.	10588.
500.0	9402.	8536.	9366.	9665.	9424.	9559.	10624.	10946.	10777.	10648.	11224.	11448.	11823.	12016.	11969.	12151.	12049.	12430.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.74	14.26	15.41	15.71	16.30	17.14	17.64	18.29	18.68	19.06	19.45	19.87	20.28	20.66	21.15	21.33	22.88	23.37
3.0	15.70	16.31	17.46	17.74	18.34	19.30	19.87	20.65	21.09	21.53	21.97	22.43	22.94	23.35	23.87	24.04	25.71	26.23
3.5	17.62	18.33	19.47	19.74	20.35	21.43	22.06	22.96	23.44	23.94	24.42	24.92	25.51	25.96	26.50	26.67	28.45	29.01
4.0	19.54	20.34	21.47	21.73	22.35	23.53	24.23	25.24	25.76	26.31	26.84	27.37	28.04	28.52	29.10	29.26	31.16	31.75
4.5	21.47	22.35	23.49	23.72	24.36	25.65	26.40	27.51	28.07	28.68	29.25	29.81	30.56	31.07	31.68	31.83	33.85	34.47
5.0	23.42	24.39	25.51	25.74	26.38	27.77	28.59	29.79	30.39	31.05	31.66	32.26	33.08	33.62	34.26	34.41	36.54	37.19
5.5	25.39	26.44	27.57	27.78	28.42	29.91	30.79	32.09	32.73	33.44	34.09	34.72	35.61	36.18	36.85	36.99	39.24	39.93
6.0	27.38	28.53	29.65	29.84	30.49	32.08	33.01	34.42	35.09	35.85	36.53	37.19	38.16	38.76	39.46	39.60	41.96	42.68
6.5	29.41	30.64	31.76	31.94	32.58	34.28	35.27	36.77	37.47	38.28	39.00	39.69	40.73	41.36	42.10	42.22	44.71	45.46
7.0	31.47	32.79	33.90	34.06	34.71	36.51	37.56	39.15	39.88	40.74	41.50	42.23	43.33	43.99	44.88	44.76	47.49	48.27
8.0	35.69	37.19	38.29	38.43	39.07	41.07	42.23	44.01	44.80	45.76	46.60	47.38	48.62	49.35	50.18	50.29	53.14	53.99
9.0	40.05	41.74	42.83	42.94	43.57	45.77	47.05	49.01	49.87	50.92	51.84	52.68	54.05	54.84	55.74	55.84	58.95	59.86
10.0	44.57	46.45	47.53	47.60	48.22	50.63	52.03	54.17	55.08	56.23	57.23	58.13	59.63	60.48	61.46	61.54	64.91	65.88
11.0	49.24	51.32	52.39	52.42	53.03	55.64	57.16	59.48	60.45	61.70	62.77	63.74	65.37	66.28	67.33	67.40	71.04	72.08
12.0	54.07	56.34	57.40	57.40	57.99	60.81	62.45	64.95	65.98	67.33	68.48	69.50	71.27	72.24	73.37	73.43	77.34	78.45
15.0	69.48	72.39	73.41	73.29	73.80	77.28	79.30	82.35	83.55	85.19	86.59	87.79	89.96	91.11	92.50	92.51	97.29	98.61
20.0	98.27	102.34	103.28	102.94	103.27	107.92	110.62	114.60	116.07	118.24	120.08	121.59	124.46	125.89	127.78	127.71	134.06	135.77
25.0	130.85	136.22	137.05	136.46	136.55	142.48	145.91	150.87	152.62	155.34	157.64	159.49	163.08	164.81	167.26	167.10	175.20	177.33
30.0	167.12	173.90	174.62	173.74	173.53	180.83	185.05	191.04	193.07	196.38	199.18	201.38	205.75	207.76	210.85	210.58	220.60	223.18
35.0	206.94	215.28	215.86	214.67	214.10	222.88	227.94	235.01	237.32	241.24	244.59	247.15	252.34	254.63	258.43	258.05	270.13	273.21
40.0	250.2	260.2	260.7	259.1	258.1	268.5	274.5	282.7	285.3	289.8	293.8	296.7	302.7	305.3	309.9	309.4	323.7	327.3
45.0	296.9	308.7	308.9	307.0	305.6	317.6	324.5	333.9	336.8	342.0	346.6	349.9	356.9	359.7	365.1	364.5	381.2	385.3
50.0	346.8	360.5	360.6	358.3	356.3	370.1	378.0	388.6	391.8	397.8	403.0	406.7	414.6	417.7	424.0	423.2	442.4	447.2
55.0	399.9	415.6	415.5	412.8	410.2	426.9	434.9	446.7	450.2	456.9	462.8	467.0	475.9	479.2	486.5	485.6	507.4	512.7
60.0	456.1	474.0	473.6	470.4	467.2	484.9	495.0	508.2	512.0	519.5	526.0	530.7	540.6	544.2	552.5	551.4	576.1	582.0
65.0	515.4	535.5	534.9	531.2	527.4	547.1	558.3	572.8	577.0	585.3	592.6	597.7	608.6	612.5	621.9	620.6	648.2	654.8
70.0	577.6	600.1	599.2	595.0	590.4	612.3	624.8	640.7	645.2	654.2	662.3	667.9	680.0	684.1	694.7	693.2	723.8	731.1
80.0	710.8	738.3	736.8	731.5	725.4	751.8	766.7	785.6	790.7	801.6	811.3	817.9	832.2	836.9	849.9	848.0	885.1	893.9
90.0	855.1	888.0	885.9	879.5	871.6	902.8	920.5	942.4	948.2	960.9	972.3	980.0	996.8	1002.0	1017.7	1015.3	1059.4	1069.7
100.0	1010.1	1048.8	1046.1	1038.3	1028.4	1065.0	1085.5	1110.6	1117.2	1131.7	1145.0	1153.9	1173.3	1179.0	1197.5	1194.6	1246.2	1258.1
150.0	1934.	2007.	2000.	1985.	1962.	2030.	2066.	2110.	2120.	2145.	2170.	2185.	2219.	2228.	2263.	2257.	2353.	2374.
200.0	3078.	3193.	3182.	3157.	3118.	3223.	3279.	3343.	3358.	3396.	3433.	3456.	3507.	3520.	3575.	3565.	3685.	3747.
250.0	4404.	4566.	4563.	4527.	4466.	4615.	4690.	4778.	4793.	4847.	4903.	4932.	5000.	5022.	5100.	5085.	5219.	5332.
300.0	5884.	6099.	6112.	6069.	5987.	6172.	6262.	6378.	6393.	6465.	6545.	6576.	6662.	6696.	6801.	6781.	6926.	7095.
350.0	7497.	7769.	7800.	7752.	7645.	7868.	7975.	8121.	8134.	8225.	8331.	8365.	8471.	8517.	8652.	8625.	8784.	9012.
400.0	9227.	9559.	9610.	9555.	9421.	9685.	9811.	9987.	9999.	10111.	10244.	10282.	10407.	10467.	10633.	10599.	10774.	11063.
450.0	11059.	11456.	11525.	11464.	11302.	11609.	11764.	11964.	11973.	12106.	12268.	12310.	12456.	12530.	12728.	12688.	12878.	13233.
500.0	12981.	13446.	13536.	13467.	13275.	13628.	13793.	14053.	14043.	14199.	14391.	14436.	14604.	14693.	14924.	14878.	15086.	15507.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{85}_{37}$RB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	67.12	62.22	47.28	45.17	45.80	41.52	35.87	34.24	33.22	32.39	30.38	28.55	27.13	26.32	26.02	25.06	22.46	23.39
3.0	64.28	60.64	46.66	44.64	45.33	41.37	35.87	34.35	33.40	32.69	30.68	28.91	27.53	26.76	26.48	25.55	23.16	23.90
3.5	61.43	58.73	45.70	43.77	44.51	40.83	35.51	34.08	33.20	32.58	30.61	28.89	27.57	26.83	26.57	25.67	23.49	24.08
4.0	58.72	56.71	44.58	42.74	43.51	40.09	34.95	33.60	32.79	32.25	30.32	28.65	27.39	26.69	26.44	25.58	23.57	24.04
4.5	56.19	54.72	43.41	41.64	42.44	39.24	34.28	33.01	32.25	31.79	29.90	28.29	27.08	26.41	26.18	25.36	23.51	23.86
5.0	53.85	52.81	42.24	40.54	41.35	38.36	33.56	32.37	31.65	31.25	29.40	27.85	26.69	26.06	25.84	25.05	23.34	23.61
5.5	51.69	50.98	41.08	39.45	40.27	37.46	32.82	31.69	31.02	30.67	28.87	27.37	26.25	25.65	25.45	24.69	23.11	23.30
6.0	49.69	49.26	39.96	38.40	39.22	36.56	32.08	31.01	30.38	30.07	28.32	26.87	25.79	25.22	25.03	24.31	22.84	22.96
6.5	47.85	47.65	38.89	37.38	38.20	35.69	31.35	30.34	29.74	29.47	27.76	26.36	25.32	24.78	24.60	23.91	22.53	22.60
7.0	46.14	46.13	37.86	36.41	37.23	34.85	30.64	29.67	29.11	28.87	27.21	25.85	24.85	24.33	24.17	23.50	22.21	22.23
8.0	43.10	43.38	35.95	34.59	35.40	33.25	29.29	28.41	27.90	27.71	26.13	24.85	23.92	23.45	23.30	22.68	21.55	21.49
9.0	40.46	40.95	34.22	32.95	33.74	31.78	28.04	27.23	26.77	26.62	25.11	23.90	23.03	22.60	22.47	21.89	20.89	20.77
10.0	38.15	38.79	32.65	31.45	32.23	30.44	26.89	26.13	25.71	25.60	24.16	23.01	22.19	21.80	21.68	21.14	20.24	20.08
11.0	36.12	36.87	31.23	30.09	30.86	29.20	25.82	25.12	24.74	24.65	23.27	22.18	21.41	21.04	20.94	20.43	19.62	19.42
12.0	34.31	35.15	29.93	28.86	29.61	28.07	24.84	24.19	23.83	23.77	22.45	21.41	20.67	20.33	20.24	19.76	19.03	18.81
15.0	29.92	30.91	26.67	25.73	26.43	25.17	22.33	21.79	21.50	21.48	20.30	19.39	18.75	18.48	18.41	18.00	17.43	17.17
20.0	24.84	25.91	22.68	21.91	22.54	21.57	19.19	18.76	18.55	18.57	17.57	16.81	16.27	16.07	16.03	15.71	15.31	15.02
25.0	21.38	22.44	19.83	19.17	19.74	18.96	16.90	16.55	16.38	16.43	15.54	14.89	14.43	14.28	14.25	13.98	13.68	13.39
30.0	18.85	19.89	17.69	17.11	17.63	16.98	15.15	14.85	14.71	14.77	13.98	13.40	13.00	12.88	12.87	12.64	12.40	12.12
35.0	16.92	17.92	16.01	15.50	15.97	15.42	13.78	13.51	13.39	13.46	12.75	12.23	11.86	11.77	11.76	11.56	11.36	11.10
40.0	15.39	16.35	14.67	14.20	14.64	14.15	12.66	12.42	12.32	12.39	11.74	11.26	10.93	10.85	10.85	10.68	10.51	10.26
45.0	14.15	15.07	13.56	13.13	13.54	13.11	11.73	11.52	11.43	11.50	10.90	10.46	10.16	10.09	10.09	9.94	9.79	9.56
50.0	13.12	14.01	12.63	12.23	12.62	12.23	10.95	10.76	10.68	10.75	10.19	9.79	9.50	9.45	9.45	9.31	9.18	8.96
55.0	12.25	13.11	11.84	11.47	11.83	11.48	10.28	10.11	10.04	10.11	9.58	9.20	8.94	8.89	8.90	8.77	8.65	8.45
60.0	11.51	12.33	11.15	10.81	11.15	10.83	9.71	9.54	9.48	9.55	9.05	8.70	8.45	8.41	8.42	8.30	8.19	8.00
65.0	10.86	11.66	10.56	10.23	10.56	10.26	9.20	9.05	8.99	9.06	8.59	8.26	8.02	7.99	7.99	7.88	7.78	7.61
70.0	10.30	11.07	10.03	9.72	10.03	9.76	8.75	8.61	8.56	8.63	8.18	7.86	7.64	7.61	7.62	7.52	7.42	7.26
80.0	9.36	10.08	9.15	8.87	9.16	8.91	8.00	7.88	7.83	7.90	7.49	7.20	7.00	6.98	6.99	6.90	6.81	6.66
90.0	8.60	9.28	8.44	8.18	8.44	8.23	7.39	7.28	7.24	7.30	6.93	6.66	6.48	6.46	6.47	6.39	6.31	6.18
100.0	7.98	8.63	7.85	7.61	7.86	7.66	6.88	6.78	6.75	6.81	6.46	6.21	6.04	6.03	6.04	5.97	5.90	5.77
150.0	6.009	6.535	5.961	5.785	5.969	5.835	5.252	5.178	5.158	5.213	4.947	4.764	4.631	4.626	4.636	4.588	4.535	4.454
200.0	4.948	5.463	4.971	4.817	4.939	4.866	4.375	4.298	4.312	4.364	4.137	4.075	3.941	3.860	3.876	3.825	3.865	3.729
250.0	4.332	4.784	4.363	4.228	4.326	4.276	3.847	3.736	3.795	3.841	3.643	3.587	3.470	3.402	3.417	3.360	3.408	3.292
300.0	3.910	4.324	3.945	3.823	3.913	3.869	3.482	3.352	3.437	3.481	3.302	3.250	3.145	3.085	3.099	3.049	3.092	2.989
350.0	3.603	3.988	3.641	3.527	3.612	3.573	3.216	3.100	3.176	3.218	3.053	3.004	2.907	2.854	2.867	2.821	2.860	2.767
400.0	3.370	3.733	3.409	3.303	3.383	3.347	3.014	2.907	2.977	3.017	2.863	2.816	2.725	2.677	2.690	2.648	2.684	2.597
450.0	3.188	3.533	3.228	3.126	3.203	3.170	2.855	2.757	2.821	2.860	2.714	2.668	2.583	2.539	2.551	2.512	2.545	2.464
500.0	3.041	3.372	3.082	2.985	3.060	3.028	2.727	2.636	2.696	2.733	2.595	2.549	2.469	2.428	2.440	2.402	2.434	2.357

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	21.89	20.89	20.94	21.09	20.90	19.71	19.11	18.04	17.66	17.20	16.87	16.59	15.99	15.79	15.62	15.66	15.01	14.83
3.0	22.43	21.42	21.47	21.62	21.47	20.30	19.70	18.67	18.31	17.85	17.53	17.25	16.67	16.45	16.27	16.31	15.62	15.44
3.5	22.63	21.63	21.67	21.83	21.71	20.57	19.98	19.00	18.65	18.20	17.88	17.62	17.05	16.83	16.64	16.68	15.97	15.78
4.0	22.63	21.64	21.68	21.84	21.74	20.64	20.06	19.12	18.79	18.36	18.04	17.79	17.24	17.02	16.82	16.86	16.14	15.95
4.5	22.49	21.52	21.56	21.72	21.65	20.58	20.01	19.11	18.80	18.38	18.07	17.83	17.30	17.08	16.88	16.92	16.19	16.00
5.0	22.27	21.32	21.36	21.51	21.47	20.43	19.88	19.02	18.72	18.32	18.02	17.78	17.27	17.05	16.85	16.89	16.16	15.97
5.5	22.00	21.07	21.11	21.26	21.23	20.23	19.69	18.86	18.58	18.19	17.90	17.67	17.18	16.97	16.76	16.80	16.07	15.89
6.0	21.70	20.78	20.83	20.97	20.96	19.98	19.47	18.67	18.41	18.03	17.74	17.52	17.04	16.84	16.64	16.67	15.95	15.76
6.5	21.38	20.48	20.52	20.67	20.66	19.72	19.22	18.45	18.20	17.84	17.56	17.34	16.88	16.68	16.48	16.52	15.79	15.62
7.0	21.04	20.17	20.21	20.35	20.36	19.44	18.95	18.22	17.98	17.62	17.35	17.14	16.70	16.51	16.30	16.34	15.63	15.45
8.0	20.36	19.53	19.57	19.71	19.73	18.87	18.41	17.72	17.50	17.17	16.91	16.72	16.30	16.12	15.92	15.95	15.25	15.08
9.0	19.70	18.90	18.94	19.07	19.11	18.30	17.85	17.22	17.02	16.70	16.46	16.27	15.88	15.71	15.51	15.54	14.86	14.70
10.0	19.08	18.29	18.33	18.46	18.51	17.74	17.32	16.72	16.53	16.24	16.00	15.83	15.46	15.30	15.10	15.13	14.47	14.31
11.0	18.45	17.71	17.75	17.88	17.94	17.20	16.80	16.24	16.06	15.78	15.56	15.39	15.04	14.89	14.70	14.73	14.09	13.93
12.0	17.87	17.16	17.20	17.32	17.39	16.69	16.30	15.77	15.61	15.34	15.13	14.98	14.64	14.50	14.30	14.34	13.71	13.57
15.0	16.34	15.70	15.73	15.85	15.93	15.31	14.97	14.52	14.38	14.15	13.96	13.82	13.53	13.41	13.23	13.26	12.69	12.55
20.0	14.31	13.76	13.80	13.90	14.00	13.47	13.19	12.82	12.72	12.52	12.36	12.26	12.01	11.92	11.75	11.78	11.27	11.16
25.0	12.78	12.29	12.33	12.42	12.52	12.06	11.82	11.51	11.42	11.26	11.12	11.02	10.82	10.74	10.59	10.61	10.16	10.06
30.0	11.57	11.14	11.17	11.26	11.36	10.95	10.73	10.46	10.39	10.25	10.13	10.04	9.86	9.80	9.66	9.68	9.27	9.18
35.0	10.60	10.21	10.24	10.32	10.42	10.05	9.86	9.62	9.56	9.43	9.32	9.24	9.08	9.03	8.90	8.92	8.55	8.46
40.0	9.808	9.444	9.477	9.550	9.643	9.310	9.131	8.919	8.866	8.749	8.647	8.581	8.436	8.392	8.264	8.285	7.942	7.866
45.0	9.139	8.802	8.834	8.903	8.993	8.686	8.522	8.329	8.282	8.175	8.081	8.021	7.889	7.850	7.730	7.749	7.430	7.360
50.0	8.570	8.255	8.286	8.351	8.439	8.153	8.001	7.825	7.782	7.684	7.597	7.541	7.419	7.386	7.271	7.290	6.991	6.926
55.0	8.080	7.784	7.814	7.875	7.960	7.693	7.552	7.389	7.350	7.259	7.177	7.126	7.012	6.982	6.874	6.892	6.610	6.550
60.0	7.653	7.373	7.402	7.460	7.543	7.292	7.159	7.007	6.972	6.886	6.810	6.762	6.655	6.629	6.526	6.543	6.276	6.220
65.0	7.276	7.011	7.039	7.094	7.175	6.938	6.812	6.671	6.638	6.558	6.485	6.440	6.340	6.317	6.218	6.234	5.981	5.928
70.0	6.942	6.690	6.717	6.770	6.849	6.623	6.505	6.372	6.341	6.266	6.197	6.154	6.060	6.038	5.944	5.959	5.718	5.667
80.0	6.376	6.144	6.170	6.219	6.294	6.088	5.981	5.862	5.835	5.768	5.705	5.667	5.582	5.563	5.476	5.491	5.269	5.223
90.0	5.912	5.698	5.722	5.768	5.839	5.650	5.552	5.444	5.420	5.359	5.301	5.266	5.188	5.172	5.091	5.105	4.900	4.857
100.0	5.525	5.325	5.348	5.391	5.459	5.284	5.193	5.094	5.073	5.016	4.963	4.930	4.859	4.845	4.769	4.782	4.590	4.551
150.0	4.263	4.110	4.127	4.161	4.219	4.086	4.018	3.949	3.934	3.894	3.853	3.829	3.777	3.767	3.708	3.719	3.571	3.541
200.0	3.570	3.448	3.448	3.476	3.527	3.417	3.363	3.309	3.298	3.265	3.232	3.212	3.171	3.161	3.113	3.123	3.082	2.982
250.0	3.152	3.044	3.011	3.036	3.082	2.995	2.965	2.913	2.915	2.882	2.839	2.835	2.803	2.783	2.739	2.748	2.729	2.642
300.0	2.862	2.765	2.736	2.744	2.785	2.722	2.695	2.648	2.650	2.621	2.583	2.578	2.551	2.532	2.493	2.501	2.483	2.406
350.0	2.650	2.560	2.533	2.541	2.580	2.521	2.496	2.454	2.456	2.429	2.394	2.390	2.365	2.349	2.312	2.320	2.302	2.232
400.0	2.488	2.403	2.379	2.387	2.423	2.368	2.345	2.306	2.308	2.283	2.251	2.246	2.223	2.208	2.174	2.181	2.164	2.099
450.0	2.360	2.280	2.258	2.265	2.300	2.248	2.226	2.189	2.191	2.168	2.137	2.133	2.112	2.098	2.065	2.072	2.055	1.995
500.0	2.258	2.181	2.160	2.167	2.200	2.152	2.130	2.095	2.098	2.075	2.046	2.042	2.022	2.009	1.978	1.984	1.967	1.910

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{85}_{37}$RB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.160	4.950	6.992	6.970	6.840	8.142	8.820	9.301	9.660	10.030	10.250	10.930	11.290	11.803	12.010	12.218	12.592	12.920
3.0	5.807	5.641	7.896	7.916	7.772	9.166	10.003	10.539	10.934	11.334	11.640	12.407	12.843	13.402	13.627	13.895	14.452	14.715
3.5	6.483	6.353	8.816	8.877	8.718	10.199	11.194	11.780	12.209	12.636	13.026	13.877	14.384	14.987	15.228	15.553	16.272	16.485
4.0	7.191	7.090	9.757	9.859	9.683	11.250	12.400	13.036	13.497	13.946	14.420	15.353	15.930	16.574	16.831	17.211	18.077	18.250
4.5	7.931	7.853	10.723	10.867	10.672	12.321	13.627	14.311	14.804	15.273	15.831	16.846	17.490	18.174	18.445	18.879	19.881	20.024
5.0	8.704	8.643	11.716	11.901	11.687	13.416	14.880	15.611	16.133	16.621	17.265	18.359	19.071	19.794	20.079	20.565	21.695	21.814
5.5	9.509	9.462	12.736	12.964	12.728	14.537	16.161	16.938	17.490	17.994	18.723	19.899	20.676	21.438	21.736	22.273	23.524	23.626
6.0	10.348	10.311	13.786	14.056	13.797	15.686	17.471	18.294	18.874	19.394	20.209	21.466	22.309	23.108	23.420	24.008	25.374	25.464
6.5	11.220	11.188	14.863	15.178	14.896	16.862	18.811	19.680	20.288	20.821	21.725	23.063	23.972	24.808	25.132	25.771	27.247	27.330
7.0	12.125	12.095	15.971	16.330	16.023	18.067	20.182	21.096	21.732	22.279	23.271	24.691	25.666	26.539	26.875	27.564	29.147	29.226
8.0	14.03	14.00	18.28	18.73	18.36	20.56	23.02	24.02	24.71	25.28	26.46	28.05	29.15	30.10	30.46	31.25	33.03	33.11
9.0	16.07	16.01	20.70	21.24	20.82	23.18	25.99	27.08	27.83	28.41	29.78	31.53	32.77	33.79	34.17	35.06	37.04	37.14
10.0	18.23	18.15	23.24	23.89	23.40	25.91	29.08	30.27	31.07	31.67	33.23	35.16	36.53	37.62	38.02	39.01	41.17	41.30
11.0	20.52	20.40	25.91	26.65	26.10	28.77	32.31	33.59	34.44	35.05	36.81	38.92	40.44	41.59	42.01	43.10	45.44	45.60
12.0	22.94	22.76	28.69	29.53	28.91	31.74	35.67	37.04	37.94	38.57	40.53	42.82	44.48	45.70	46.14	47.33	49.84	50.05
15.0	30.92	30.51	37.73	38.91	38.04	41.35	46.51	48.16	49.22	49.86	52.50	55.35	57.45	58.87	59.37	60.87	63.85	64.26
20.0	46.59	45.60	55.08	56.88	55.52	59.65	67.10	69.25	70.57	71.20	75.07	78.97	81.85	83.60	84.17	86.21	89.93	90.80
25.0	65.09	63.28	75.17	77.67	75.72	80.72	90.76	93.43	95.02	95.59	100.85	105.89	109.65	111.72	112.34	114.94	119.35	120.82
30.0	86.32	83.44	97.90	101.18	98.55	104.45	117.36	120.59	122.44	122.92	129.73	136.03	140.74	143.11	143.78	146.96	152.04	154.22
35.0	110.16	105.99	123.19	127.31	123.92	130.75	146.81	150.63	152.76	153.10	161.60	169.27	175.00	177.67	178.37	182.16	187.90	190.90
40.0	136.5	130.9	151.0	156.0	151.7	159.6	179.0	183.5	185.9	186.0	196.4	205.5	212.4	215.3	216.0	220.4	226.8	230.7
45.0	165.4	158.0	181.1	187.2	182.0	190.8	213.9	219.0	221.7	221.7	234.0	244.7	252.7	256.0	256.7	261.7	268.8	273.7
50.0	196.6	187.2	213.6	220.7	214.5	224.4	251.5	257.2	260.2	259.9	274.4	286.7	296.0	299.5	300.2	306.0	313.7	319.6
55.0	230.2	218.6	248.4	256.6	249.3	260.3	291.5	298.0	301.3	300.7	317.4	331.6	342.2	345.9	346.6	353.0	361.4	368.5
60.0	266.0	252.1	285.4	294.8	286.3	298.4	334.1	341.3	344.9	344.0	363.1	379.1	391.1	395.1	395.7	402.9	411.9	420.2
65.0	304.0	287.5	324.6	335.3	325.5	338.8	379.1	387.0	390.9	389.7	411.3	429.2	442.7	447.0	447.6	455.4	465.2	474.7
70.0	344.2	324.9	365.9	377.9	366.8	381.3	426.5	435.2	439.4	437.8	462.0	482.0	497.0	501.5	502.0	510.7	521.1	531.9
80.0	430.9	406.5	454.8	469.5	455.6	472.5	528.1	538.5	543.3	540.9	570.8	595.1	613.4	618.3	618.7	628.9	640.8	654.3
90.0	525.8	493.5	551.6	569.4	552.4	571.9	638.8	650.9	656.3	653.0	688.9	717.9	739.8	745.1	745.3	757.0	770.5	786.9
100.0	628.5	588.5	656.2	677.2	656.9	679.0	758.0	772.0	778.0	773.6	816.1	850.1	875.8	881.4	881.4	894.8	909.9	929.4
150.0	1251.	1162.	1286.	1326.	1286.	1323.	1474.	1498.	1508.	1496.	1577.	1641.	1689.	1696.	1695.	1717.	1742.	1778.
200.0	2035.	1879.	2072.	2137.	2073.	2127.	2367.	2405.	2416.	2394.	2524.	2603.	2684.	2709.	2705.	2738.	2757.	2828.
250.0	2957.	2715.	2988.	3083.	2997.	3062.	3407.	3470.	3470.	3436.	3623.	3719.	3838.	3886.	3877.	3929.	3933.	4045.
300.0	3992.	3652.	4015.	4142.	4033.	4109.	4571.	4675.	4652.	4601.	4851.	4966.	5128.	5201.	5186.	5260.	5245.	5403.
350.0	5127.	4677.	5138.	5302.	5165.	5254.	5843.	5995.	5938.	5876.	6192.	6329.	6536.	6635.	6614.	6711.	6677.	6883.
400.0	6348.	5780.	6346.	6548.	6383.	6485.	7210.	7413.	7322.	7238.	7631.	7792.	8048.	8175.	8146.	8268.	8213.	8470.
450.0	7646.	6951.	7629.	7872.	7675.	7791.	8660.	8915.	8789.	8686.	9157.	9344.	9650.	9806.	9769.	9918.	9840.	10152.
500.0	9012.	8183.	8977.	9265.	9033.	9164.	10184.	10493.	10331.	10208.	10760.	10975.	11335.	11519.	11474.	11649.	11549.	11917.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.57	14.08	15.22	15.51	16.10	16.93	17.43	18.07	18.46	18.83	19.22	19.63	20.04	20.41	20.89	21.06	22.60	23.09
3.0	15.48	16.09	17.22	17.50	18.10	19.05	19.62	20.39	20.82	21.25	21.69	22.14	22.64	23.04	23.55	23.72	25.37	25.89
3.5	17.37	18.06	19.19	19.46	20.07	21.13	21.76	22.64	23.12	23.61	24.09	24.57	25.16	25.59	26.13	26.29	28.06	28.61
4.0	19.25	20.03	21.15	21.40	22.02	23.19	23.88	24.87	25.38	25.93	26.45	26.97	27.63	28.10	28.67	28.82	30.70	31.29
4.5	21.13	22.00	23.12	23.35	23.98	25.25	26.00	27.09	27.64	28.24	28.80	29.36	30.09	30.59	31.19	31.34	33.33	33.95
5.0	23.03	23.98	25.10	25.32	25.95	27.32	28.13	29.32	29.91	30.56	31.16	31.74	32.55	33.08	33.71	33.85	35.96	36.61
5.5	24.95	25.98	27.10	27.31	27.94	29.41	30.28	31.56	32.19	32.89	33.52	34.14	35.02	35.58	36.24	36.37	38.60	39.27
6.0	26.89	28.01	29.12	29.32	29.96	31.53	32.45	33.83	34.48	35.23	35.91	36.56	37.50	38.10	38.78	38.91	41.25	41.96
6.5	28.86	30.07	31.18	31.36	32.00	33.67	34.64	36.12	36.81	37.60	38.31	38.99	40.01	40.63	41.35	41.47	43.93	44.67
7.0	30.87	32.17	33.27	33.43	34.07	35.84	36.87	38.43	39.16	40.00	40.75	41.46	42.54	43.19	43.94	44.06	46.63	47.40
8.0	34.97	36.45	37.54	37.68	38.31	40.28	41.42	43.16	43.95	44.89	45.71	46.48	47.69	48.40	49.22	49.32	52.14	52.97
9.0	39.22	40.87	41.96	42.06	42.69	44.85	46.11	48.03	48.87	49.91	50.80	51.63	52.97	53.74	54.63	54.72	57.78	58.68
10.0	43.61	45.45	46.52	46.59	47.21	49.57	50.94	53.04	53.94	55.07	56.04	56.93	58.40	59.23	60.18	60.26	63.58	64.54
11.0	48.14	50.17	51.23	51.27	51.87	54.44	55.93	58.20	59.15	60.38	61.43	62.37	63.97	64.86	65.89	65.96	69.53	70.56
12.0	52.82	55.05	56.10	56.10	56.69	59.45	61.06	63.51	64.52	65.84	66.97	67.97	69.70	70.64	71.75	71.81	75.65	76.74
15.0	67.76	70.60	71.62	71.50	72.02	75.42	77.40	80.38	81.55	83.16	84.53	85.71	87.82	88.94	90.30	90.31	94.99	96.30
20.0	95.62	99.59	100.53	100.20	100.54	105.08	107.72	111.60	113.04	115.16	116.94	118.43	121.22	122.62	124.45	124.39	130.60	132.28
25.0	127.11	132.32	133.17	132.60	132.71	138.48	141.82	146.65	148.36	151.01	153.26	155.06	158.56	160.24	162.62	162.47	170.37	172.46
30.0	162.11	168.70	169.43	168.59	168.41	175.51	179.61	185.44	187.41	190.63	193.36	195.50	199.75	201.71	204.71	204.46	214.21	216.73
35.0	200.52	208.60	209.20	208.06	207.53	216.06	220.98	227.84	230.10	233.91	237.17	239.65	244.69	246.92	250.61	250.24	262.00	264.99
40.0	242.2	251.9	252.4	250.9	250.0	260.0	265.8	273.8	276.3	280.7	284.6	287.4	293.3	295.8	300.2	299.7	313.6	317.1
45.0	287.2	298.6	298.9	297.0	295.6	307.3	314.0	323.1	325.9	331.0	335.4	338.7	345.4	348.2	353.4	352.8	369.0	373.0
50.0	335.2	348.5	348.6	346.4	344.5	357.9	365.5	375.8	378.9	384.7	389.7	393.4	401.0	404.0	410.2	409.4	428.0	432.6
55.0	386.3	401.5	401.4	398.8	396.3	411.5	420.2	431.7	435.1	441.6	447.3	451.4	460.0	463.2	470.3	469.4	490.5	495.7
60.0	440.4	457.6	457.3	454.3	451.2	468.3	478.1	490.8	494.5	501.8	508.1	512.6	522.2	525.7	533.8	532.7	556.6	562.3
65.0	497.4	516.8	516.2	512.7	509.0	528.1	539.0	553.0	557.0	565.0	572.1	577.0	587.6	591.4	600.5	599.3	625.9	632.3
70.0	557.2	578.9	578.1	574.1	569.7	590.8	602.8	618.2	622.6	631.4	639.2	644.6	656.2	660.3	670.5	669.0	698.6	705.7
80.0	685.1	711.6	710.3	705.2	699.3	724.8	739.3	757.5	762.5	772.9	782.3	788.7	802.6	807.1	819.6	817.8	853.7	862.1
90.0	823.7	855.4	853.5	847.3	839.6	868.9	886.9	908.1	913.7	925.9	937.0	944.4	960.6	965.7	980.8	978.5	1021.1	1031.0
100.0	972.5	1009.8	1007.2	999.8	990.3	1025.6	1046.3	1069.6	1076.0	1090.0	1102.8	1111.4	1130.1	1135.6	1153.4	1150.6	1200.5	1211.9
150.0	1859.	1929.	1923.	1908.	1886.	1951.	1987.	2028.	2038.	2063.	2086.	2101.	2133.	2142.	2176.	2170.	2262.	2283.
200.0	2966.	3066.	3056.	3032.	2995.	3095.	3150.	3211.	3225.	3262.	3297.	3320.	3369.	3381.	3434.	3424.	3539.	3599.
250.0	4227.	4383.	4380.	4345.	4289.	4430.	4502.	4586.	4601.	4653.	4707.	4734.	4800.	4820.	4896.	4882.	5010.	5119.
300.0	5645.	5851.	5864.	5823.	5745.	5922.	6009.	6120.	6134.	6203.	6280.	6310.	6393.	6425.	6526.	6506.	6646.	6808.
350.0	7191.	7451.	7482.	7435.	7333.	7547.	7650.	7790.	7802.	7890.	7991.	8024.	8126.	8170.	8299.	8274.	8426.	8645.
400.0	8848.	9167.	9215.	9163.	9034.	9288.	9409.	9578.	9589.	9696.	9824.	9861.	9981.	10039.	10197.	10165.	10333.	10610.
450.0	10603.	10984.	11060.	10992.	10837.	11132.	11271.	11471.	11481.	11609.	11764.	11804.	11944.	12015.	12205.	12167.	12349.	12689.
500.0	12445.	12891.	12977.	12911.	12727.	13065.	13224.	13457.	13464.	13614.	13797.	13841.	14029.	14087.	14309.	14264.	14464.	14868.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{88}_{38}$SR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	69.71	64.31	48.92	46.73	47.37	42.91	37.07	35.38	34.33	33.46	31.38	29.49	28.01	27.18	26.87	25.87	23.19	24.14
3.0	66.84	62.79	48.33	46.22	46.94	42.81	37.11	35.53	34.55	33.80	31.73	29.89	28.46	27.66	27.36	26.40	23.94	24.70
3.5	63.94	60.89	47.37	45.36	46.12	42.28	36.77	35.28	34.37	33.72	31.68	29.89	28.53	27.76	27.48	26.55	24.29	24.90
4.0	61.16	58.87	46.25	44.32	45.12	41.55	36.21	34.81	33.96	33.41	31.40	29.67	28.36	27.63	27.37	26.48	24.40	24.88
4.5	58.56	56.85	45.06	43.22	44.04	40.70	35.64	34.23	33.43	32.95	30.99	29.31	28.06	27.36	27.12	26.27	24.35	24.71
5.0	56.15	54.90	43.86	42.10	42.93	39.80	34.82	33.57	32.83	32.41	30.49	28.88	27.67	27.01	26.78	25.97	24.19	24.46
5.5	53.92	53.04	42.69	40.99	41.83	38.89	34.07	32.89	32.20	31.82	29.96	28.39	27.23	26.61	26.40	25.61	23.97	24.16
6.0	51.86	51.28	41.54	39.91	40.76	37.98	33.32	32.20	31.55	31.22	29.40	27.89	26.77	26.18	25.98	25.22	23.69	23.82
6.5	49.96	49.63	40.45	38.87	39.72	37.09	32.58	31.52	30.90	30.61	28.83	27.37	26.30	25.73	25.54	24.82	23.39	23.46
7.0	48.20	48.07	39.39	37.88	38.73	36.23	31.85	30.84	30.26	30.00	28.27	26.85	25.82	25.27	25.10	24.40	23.07	23.09
8.0	45.04	45.24	37.43	36.02	36.86	34.60	30.47	29.55	29.02	28.82	27.18	25.84	24.87	24.38	24.22	23.58	22.40	22.34
9.0	42.31	42.73	35.65	34.32	35.15	33.09	29.19	28.34	27.86	27.71	26.13	24.87	23.96	23.51	23.38	22.77	21.73	21.60
10.0	39.91	40.51	34.04	32.79	33.60	31.71	28.01	27.22	26.78	26.66	25.16	23.96	23.10	22.69	22.57	22.00	21.07	20.90
11.0	37.80	38.52	32.57	31.39	32.19	30.44	26.92	26.18	25.78	25.69	24.25	23.11	22.30	21.92	21.81	21.28	20.43	20.23
12.0	35.92	36.74	31.24	30.11	30.89	29.27	25.91	25.22	24.86	24.78	23.40	22.32	21.54	21.19	21.09	20.59	19.82	19.69
15.0	31.36	32.34	27.87	26.89	27.62	26.28	23.32	22.75	22.44	22.43	21.19	20.24	19.56	19.28	19.21	18.78	18.19	17.91
20.0	26.06	27.15	23.74	22.93	23.58	22.56	20.07	19.62	19.39	19.42	18.37	17.57	17.01	16.80	16.76	16.42	16.00	15.70
25.0	22.44	23.53	20.78	20.09	20.68	19.85	17.70	17.32	17.14	17.19	16.27	15.58	15.10	14.94	14.91	14.63	14.31	14.01
30.0	19.80	20.87	18.55	17.94	18.48	17.79	15.88	15.56	15.42	15.48	14.65	14.04	13.62	13.49	13.48	13.24	12.98	12.70
35.0	17.78	18.81	16.80	16.26	16.76	16.17	14.45	14.17	14.05	14.11	13.36	12.82	12.44	12.34	12.33	12.12	11.91	11.64
40.0	16.18	17.18	15.40	14.91	15.37	14.85	13.28	13.04	12.93	13.00	12.31	11.82	11.47	11.39	11.38	11.20	11.02	10.77
45.0	14.88	15.84	14.24	13.79	14.22	13.76	12.32	12.10	12.00	12.07	11.44	10.98	10.66	10.59	10.59	10.43	10.27	10.03
50.0	13.80	14.72	13.27	12.85	13.26	12.84	11.50	11.30	11.22	11.29	10.70	10.28	9.98	9.92	9.92	9.77	9.64	9.41
55.0	12.89	13.78	12.44	12.05	12.43	12.06	10.81	10.62	10.55	10.62	10.06	9.67	9.39	9.34	9.35	9.21	9.08	8.88
60.0	12.11	12.97	11.73	11.36	11.72	11.38	10.20	10.03	9.96	10.04	9.51	9.14	8.88	8.84	8.84	8.72	8.60	8.41
65.0	11.43	12.26	11.10	10.76	11.10	10.79	9.67	9.51	9.45	9.52	9.03	8.68	8.43	8.39	8.40	8.29	8.18	8.00
70.0	10.84	11.65	10.55	10.23	10.56	10.26	9.21	9.06	9.00	9.07	8.60	8.27	8.03	8.00	8.01	7.90	7.81	7.63
80.0	9.85	10.61	9.63	9.34	9.63	9.38	8.42	8.29	8.24	8.31	7.88	7.58	7.36	7.34	7.35	7.25	7.17	7.01
90.0	9.06	9.77	8.88	8.61	8.89	8.66	7.78	7.66	7.62	7.68	7.29	7.01	6.81	6.80	6.81	6.72	6.64	6.50
100.0	8.40	9.08	8.26	8.02	8.27	8.07	7.25	7.14	7.10	7.17	6.80	6.54	6.36	6.34	6.35	6.28	6.21	6.08
150.0	6.333	6.884	6.281	6.096	6.289	6.148	5.534	5.455	5.435	5.492	5.212	5.019	4.879	4.874	4.884	4.834	4.777	4.692
200.0	5.216	5.747	5.240	5.077	5.206	5.129	4.612	4.530	4.546	4.600	4.361	4.295	4.154	4.069	4.085	4.031	4.074	3.931
250.0	4.567	5.042	4.600	4.458	4.561	4.508	4.056	3.939	4.001	4.050	3.841	3.782	3.658	3.587	3.602	3.542	3.593	3.471
300.0	4.123	4.558	4.160	4.031	4.126	4.080	3.672	3.535	3.624	3.671	3.482	3.427	3.316	3.253	3.268	3.215	3.260	3.152
350.0	3.799	4.205	3.839	3.720	3.809	3.768	3.392	3.269	3.349	3.393	3.219	3.167	3.066	3.009	3.024	2.975	3.016	2.918
400.0	3.554	3.936	3.595	3.483	3.568	3.530	3.178	3.066	3.140	3.182	3.019	2.969	2.874	2.824	2.837	2.792	2.830	2.739
450.0	3.362	3.725	3.404	3.297	3.379	3.343	3.011	2.907	2.976	3.016	2.862	2.814	2.724	2.678	2.691	2.649	2.684	2.599
500.0	3.207	3.556	3.250	3.148	3.227	3.193	2.877	2.780	2.844	2.883	2.736	2.689	2.604	2.560	2.573	2.533	2.567	2.486

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	22.60	21.56	21.61	21.76	21.57	20.34	19.72	18.62	18.22	17.75	17.41	17.12	16.50	16.29	16.11	16.15	15.48	15.30
3.0	23.18	22.13	22.18	22.34	22.18	20.97	20.35	19.29	18.91	18.44	18.10	17.82	17.21	16.99	16.81	16.85	16.13	15.95
3.5	23.41	22.36	22.41	22.57	22.45	21.27	20.66	19.64	19.28	18.82	18.48	18.21	17.62	17.40	17.20	17.24	16.50	16.31
4.0	23.42	22.39	22.43	22.59	22.50	21.36	20.76	19.78	19.44	18.99	18.67	18.40	17.83	17.60	17.40	17.44	16.69	16.50
4.5	23.29	22.28	22.33	22.49	22.41	21.30	20.72	19.78	19.46	19.03	18.71	18.45	17.90	17.68	17.47	17.51	16.75	16.56
5.0	23.08	22.09	22.13	22.29	22.24	21.16	20.60	19.70	19.39	18.98	18.66	18.41	17.88	17.66	17.45	17.49	16.73	16.54
5.5	22.81	21.84	21.88	22.04	22.01	20.97	20.41	19.55	19.26	18.86	18.55	18.31	17.80	17.58	17.37	17.41	16.65	16.46
6.0	22.51	21.56	21.60	21.75	21.74	20.73	20.19	19.36	19.09	18.70	18.40	18.17	17.67	17.46	17.25	17.29	16.53	16.34
6.5	22.19	21.26	21.30	21.45	21.44	20.46	19.94	19.15	18.89	18.50	18.22	17.99	17.51	17.31	17.09	17.13	16.38	16.20
7.0	21.85	20.94	20.98	21.13	21.14	20.18	19.68	18.91	18.66	18.29	18.01	17.79	17.33	17.13	16.92	16.96	16.22	16.03
8.0	21.16	20.29	20.33	20.48	20.50	19.60	19.12	18.41	18.18	17.84	17.57	17.37	16.93	16.74	16.53	16.57	15.84	15.67
9.0	20.49	19.65	19.69	19.83	19.87	19.02	18.56	17.90	17.69	17.36	17.11	16.92	16.51	16.33	16.12	16.16	15.45	15.28
10.0	19.83	19.03	19.07	19.21	19.26	18.45	18.01	17.39	17.20	16.89	16.65	16.47	16.08	15.91	15.70	15.74	15.05	14.89
11.0	19.21	18.44	18.48	18.61	18.67	17.90	17.49	16.90	16.72	16.43	16.19	16.02	15.66	15.50	15.29	15.33	14.66	14.50
12.0	18.62	17.88	17.92	18.05	18.12	17.36	16.98	16.43	16.26	15.98	15.76	15.59	15.25	15.10	14.90	14.93	14.28	14.12
15.0	17.04	16.37	16.41	16.53	16.62	15.97	15.61	15.14	15.00	14.75	14.56	14.42	14.11	13.99	13.79	13.82	13.23	13.09
20.0	14.96	14.38	14.42	14.53	14.62	14.08	13.78	13.39	13.29	13.08	12.91	12.80	12.55	12.45	12.27	12.30	11.77	11.65
25.0	13.37	12.86	12.90	13.00	13.10	12.62	12.36	12.04	11.95	11.77	11.63	11.53	11.32	11.24	11.07	11.10	10.63	10.52
30.0	12.12	11.67	11.70	11.79	11.89	11.47	11.24	10.96	10.88	10.73	10.60	10.52	10.33	10.26	10.11	10.13	9.71	9.61
35.0	11.12	10.70	10.74	10.82	10.92	10.54	10.33	10.08	10.02	9.88	9.76	9.69	9.52	9.46	9.32	9.35	8.95	8.87
40.0	10.29	9.90	9.94	10.02	10.11	9.76	9.58	9.35	9.30	9.17	9.07	9.00	8.85	8.80	8.67	8.69	8.33	8.25
45.0	9.59	9.24	9.27	9.34	9.44	9.11	8.94	8.74	8.69	8.58	8.48	8.42	8.28	8.24	8.11	8.13	7.79	7.72
50.0	9.00	8.67	8.70	8.77	8.86	8.56	8.40	8.21	8.17	8.07	7.97	7.92	7.79	7.75	7.63	7.65	7.34	7.27
55.0	8.49	8.18	8.21	8.27	8.36	8.08	7.93	7.76	7.72	7.62	7.54	7.48	7.36	7.33	7.22	7.24	6.94	6.88
60.0	8.04	7.75	7.78	7.84	7.92	7.66	7.52	7.36	7.32	7.23	7.15	7.10	6.99	6.96	6.86	6.87	6.59	6.53
65.0	7.648	7.368	7.398	7.456	7.541	7.291	7.159	7.010	6.976	6.892	6.815	6.768	6.663	6.638	6.534	6.551	6.286	6.228
70.0	7.299	7.033	7.061	7.117	7.200	6.962	6.838	6.698	6.666	6.586	6.514	6.469	6.370	6.347	6.247	6.264	6.010	5.957
80.0	6.706	6.462	6.489	6.541	6.619	6.403	6.290	6.165	6.137	6.066	6.000	5.959	5.870	5.851	5.758	5.774	5.541	5.493
90.0	6.220	5.995	6.020	6.068	6.143	5.944	5.841	5.728	5.703	5.638	5.577	5.540	5.458	5.442	5.358	5.371	5.155	5.110
100.0	5.815	5.605	5.628	5.674	5.746	5.561	5.465	5.362	5.339	5.279	5.223	5.189	5.114	5.099	5.018	5.032	4.831	4.789
150.0	4.491	4.330	4.348	4.384	4.444	4.304	4.233	4.160	4.145	4.102	4.059	4.034	3.979	3.968	3.907	3.918	3.762	3.730
200.0	3.763	3.634	3.634	3.664	3.717	3.602	3.544	3.487	3.476	3.442	3.406	3.386	3.342	3.332	3.281	3.291	3.248	3.143
250.0	3.323	3.209	3.174	3.200	3.249	3.157	3.126	3.071	3.073	3.038	2.993	2.988	2.956	2.933	2.887	2.897	2.877	2.786
300.0	3.018	2.915	2.884	2.893	2.937	2.870	2.841	2.792	2.795	2.764	2.723	2.719	2.689	2.670	2.628	2.637	2.618	2.537
350.0	2.794	2.699	2.671	2.680	2.720	2.659	2.632	2.588	2.590	2.562	2.525	2.521	2.494	2.477	2.438	2.446	2.428	2.354
400.0	2.624	2.534	2.509	2.517	2.555	2.498	2.473	2.432	2.434	2.408	2.373	2.369	2.345	2.329	2.292	2.300	2.282	2.214
450.0	2.489	2.406	2.381	2.389	2.425	2.371	2.347	2.309	2.311	2.286	2.254	2.250	2.227	2.212	2.178	2.186	2.167	2.104
500.0	2.381	2.301	2.278	2.286	2.321	2.269	2.246	2.210	2.212	2.188	2.158	2.154	2.133	2.118	2.086	2.092	2.075	2.015

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{88}_{38}$SR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.220	5.000	7.071	7.050	6.920	8.235	8.920	9.407	9.770	10.140	10.360	11.060	11.430	11.945	12.150	12.358	12.736	13.070
3.0	5.864	5.692	7.975	7.996	7.852	9.260	10.105	10.647	11.046	11.447	11.753	12.540	12.986	13.547	13.770	14.039	14.601	14.869
3.5	6.538	6.403	8.894	8.956	8.797	10.294	11.295	11.889	12.322	12.749	13.139	14.011	14.529	15.134	15.374	15.700	16.423	16.642
4.0	7.241	7.138	9.834	9.937	9.762	11.343	12.501	13.144	13.609	14.059	14.534	15.488	16.075	16.722	16.977	17.358	18.230	18.408
4.5	7.977	7.899	10.798	10.943	10.749	12.413	13.727	14.418	14.915	15.385	15.944	16.979	17.634	18.321	18.591	19.026	20.034	20.182
5.0	8.744	8.686	11.787	11.974	11.761	13.506	14.978	15.716	16.243	16.731	17.375	18.491	19.213	19.940	20.224	20.710	21.846	21.971
5.5	9.544	9.502	12.804	13.034	12.799	14.625	16.255	17.040	17.596	18.101	18.831	20.027	20.816	21.581	21.878	22.416	23.673	23.781
6.0	10.376	10.346	13.849	14.121	13.864	15.769	17.561	18.392	18.976	19.497	20.313	21.591	22.445	23.248	23.558	24.147	25.619	25.615
6.5	11.241	11.218	14.923	15.239	14.958	16.942	18.897	19.773	20.386	20.921	21.824	23.184	24.103	24.943	25.266	25.906	27.388	27.476
7.0	12.137	12.119	16.025	16.385	16.080	18.142	20.263	21.184	21.825	22.373	23.365	24.807	25.792	26.669	27.004	27.694	29.282	29.367
8.0	14.03	14.01	18.32	18.77	18.41	20.63	23.09	24.10	24.79	25.37	26.54	28.15	29.27	30.21	30.57	31.36	33.15	33.24
9.0	16.04	16.01	20.73	21.27	20.86	23.23	26.04	27.14	27.89	28.48	29.84	31.62	32.87	33.89	34.27	35.16	37.14	37.25
10.0	18.19	18.13	23.25	23.90	23.42	25.95	29.12	30.31	31.11	31.72	33.28	35.22	36.61	37.70	38.10	39.09	41.26	41.39
11.0	20.45	20.35	25.90	26.64	26.09	28.78	32.32	33.61	34.46	35.08	36.84	38.96	40.49	41.65	42.07	43.16	45.50	45.67
12.0	22.84	22.69	28.66	29.50	28.88	31.73	35.66	37.03	37.94	38.57	40.53	42.84	44.50	45.73	46.17	47.36	49.87	50.09
15.0	30.73	30.37	37.62	38.80	37.94	41.26	46.41	48.07	49.14	49.78	52.41	55.28	57.38	58.81	59.30	60.80	63.79	64.20
20.0	46.20	45.29	54.79	56.59	55.24	59.39	66.82	68.97	70.29	70.93	74.78	78.68	81.57	83.32	83.89	85.92	89.64	90.61
25.0	64.45	62.75	74.95	77.14	75.22	80.23	90.22	92.89	94.48	95.06	100.29	105.33	109.08	111.15	111.78	114.36	118.77	120.23
30.0	85.38	82.65	97.12	100.37	97.77	103.68	116.51	119.73	121.59	122.08	128.83	135.12	139.81	142.19	142.86	146.02	151.09	153.27
35.0	108.87	104.89	122.08	126.17	122.81	129.66	145.59	149.40	151.53	151.88	160.32	167.96	173.66	176.33	177.04	180.80	186.52	189.50
40.0	134.9	129.4	149.5	154.5	150.3	158.1	177.4	181.8	184.2	184.4	194.7	203.7	210.5	213.5	214.2	218.6	225.0	228.8
45.0	163.2	156.1	179.2	185.2	180.1	188.9	211.8	216.9	219.6	219.5	231.8	242.4	250.4	253.6	254.3	259.4	266.4	271.2
50.0	194.0	184.9	211.2	218.3	212.1	222.0	248.8	254.5	257.5	257.3	271.6	283.8	293.1	296.5	297.3	303.0	310.6	316.5
55.0	227.0	215.8	246.5	253.6	246.4	257.4	288.3	294.7	298.0	297.5	314.0	328.0	338.5	342.3	343.0	349.4	357.7	364.7
60.0	262.2	248.8	282.0	291.3	282.9	295.0	330.2	337.4	340.9	340.1	359.0	374.8	386.7	390.7	391.4	398.5	407.5	415.7
65.0	299.7	283.7	320.5	331.1	321.5	334.7	374.5	382.4	386.3	385.1	406.5	424.3	437.6	441.8	442.5	450.3	459.9	469.3
70.0	339.2	320.5	361.2	373.0	362.1	376.5	421.2	429.8	434.0	432.5	456.4	476.2	491.1	495.5	496.1	504.6	515.0	525.7
80.0	424.5	399.8	448.6	463.2	449.5	466.3	521.2	531.6	536.3	534.0	563.4	587.5	605.7	610.5	610.9	621.0	632.8	646.2
90.0	517.7	486.3	543.9	561.4	544.7	564.1	630.1	642.1	647.5	644.2	679.7	708.4	730.0	735.3	735.5	747.1	760.5	776.7
100.0	618.7	579.8	646.7	667.4	647.4	669.5	747.4	761.3	767.2	762.9	804.8	838.4	863.8	869.4	869.4	882.7	897.6	916.8
150.0	1230.	1144.	1265.	1305.	1265.	1302.	1451.	1475.	1484.	1473.	1553.	1616.	1664.	1670.	1669.	1691.	1715.	1751.
200.0	2001.	1848.	2038.	2102.	2039.	2092.	2329.	2366.	2376.	2355.	2483.	2561.	2641.	2665.	2661.	2694.	2713.	2782.
250.0	2906.	2669.	2938.	3030.	2946.	3010.	3350.	3412.	3412.	3378.	3562.	3657.	3774.	3821.	3812.	3864.	3867.	3978.
300.0	3922.	3589.	3946.	4071.	3963.	4039.	4493.	4595.	4570.	4522.	4768.	4882.	5040.	5112.	5098.	5171.	5156.	5311.
350.0	5036.	4596.	5049.	5209.	5075.	5163.	5741.	5891.	5835.	5771.	6085.	6219.	6423.	6521.	6500.	6596.	6562.	6764.
400.0	6235.	5679.	6234.	6434.	6270.	6371.	7083.	7283.	7193.	7112.	7498.	7656.	7907.	8032.	8004.	8124.	8070.	8323.
450.0	7509.	6829.	7493.	7733.	7540.	7653.	8507.	8758.	8634.	8533.	8996.	9179.	9481.	9634.	9598.	9743.	9667.	9973.
500.0	8850.	8039.	8817.	9099.	8872.	9001.	10003.	10306.	10148.	10027.	10589.	10780.	11134.	11315.	11271.	11443.	11345.	11706.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.73	14.25	15.40	15.69	16.28	17.12	17.62	18.27	18.66	19.04	19.43	19.84	20.25	20.62	21.11	21.29	22.84	23.33
3.0	15.65	16.26	17.40	17.68	18.29	19.24	19.81	20.59	21.03	21.47	21.90	22.35	22.85	23.26	23.78	23.95	25.62	26.14
3.5	17.54	18.24	19.37	19.64	20.26	21.32	21.96	22.85	23.33	23.83	24.31	24.79	25.38	25.82	26.36	26.53	28.31	28.87
4.0	19.42	20.20	21.34	21.59	22.21	23.39	24.08	25.08	25.60	26.15	26.67	27.20	27.86	28.33	28.90	29.06	30.96	31.55
4.5	21.30	22.17	23.30	23.54	24.17	25.45	26.20	27.30	27.86	28.47	29.03	29.58	30.32	30.82	31.43	31.58	33.59	34.21
5.0	23.20	24.15	25.28	25.50	26.14	27.52	28.33	29.53	30.13	30.78	31.38	31.97	32.78	33.31	33.95	34.09	36.21	36.86
5.5	25.11	26.16	27.28	27.49	28.13	29.61	30.48	31.77	32.40	33.11	33.75	34.36	35.24	35.81	36.47	36.61	38.85	39.53
6.0	27.05	28.18	29.30	29.50	30.14	31.72	32.64	34.03	34.70	35.45	36.13	36.78	37.72	38.32	39.01	39.15	41.50	42.21
6.5	29.02	30.24	31.35	31.54	32.18	33.85	34.84	36.32	37.01	37.82	38.53	39.21	40.22	40.85	41.57	41.70	44.17	44.92
7.0	31.02	32.32	33.43	33.60	34.25	36.02	37.06	38.63	39.36	40.21	40.96	41.67	42.75	43.40	44.16	44.29	46.87	47.65
8.0	35.11	36.59	37.70	37.83	38.47	40.44	41.59	43.35	44.13	45.08	45.90	46.67	47.88	48.60	49.42	49.53	52.36	53.20
9.0	39.34	41.00	42.09	42.20	42.83	45.00	46.26	48.19	49.04	50.08	50.98	51.81	53.15	53.92	54.81	54.91	57.99	58.89
10.0	43.71	45.55	46.64	46.71	47.33	49.70	51.08	53.18	54.09	55.22	56.19	57.08	58.55	59.38	60.34	60.43	63.76	64.72
11.0	48.22	50.25	51.32	51.36	51.97	54.54	56.03	58.31	59.27	60.50	61.55	62.50	64.09	64.98	66.02	66.10	69.68	70.71
12.0	52.87	55.10	56.16	56.17	56.76	59.53	61.14	63.60	64.61	65.93	67.06	68.07	69.79	70.74	71.85	71.91	75.77	76.86
15.0	67.71	70.54	71.57	71.47	71.99	75.39	77.37	80.35	81.53	83.14	84.51	85.68	87.80	88.92	90.28	90.30	94.99	96.29
20.0	95.33	99.29	100.24	99.92	100.27	104.80	107.43	111.32	112.76	114.87	116.66	118.14	120.92	122.32	124.16	124.10	130.31	131.99
25.0	126.51	131.70	132.56	132.00	132.12	137.87	141.21	146.03	147.74	150.38	152.62	154.42	157.90	159.58	161.97	161.82	169.71	171.79
30.0	161.12	167.67	168.43	167.60	167.43	174.60	178.59	184.40	186.37	189.58	192.30	194.43	198.65	200.61	203.61	203.36	213.08	215.59
35.0	199.07	207.10	207.73	206.60	206.09	214.57	219.47	226.31	228.55	232.35	235.59	238.07	243.07	245.30	248.98	248.62	260.32	263.30
40.0	240.3	249.9	250.4	248.9	248.0	258.0	263.8	271.7	274.2	278.6	282.4	285.2	291.1	293.6	298.0	297.5	311.3	314.8
45.0	284.6	295.9	296.2	294.4	293.1	304.7	311.3	320.4	323.2	328.2	332.8	335.8	342.5	345.3	350.5	349.9	366.0	370.0
50.0	332.0	345.1	345.3	343.1	341.2	354.5	362.1	372.3	375.4	381.2	386.2	389.8	397.4	400.4	406.5	405.7	424.2	428.7
55.0	382.4	397.4	397.4	394.8	392.4	407.5	416.1	427.5	430.9	437.3	442.9	447.0	455.5	458.8	465.8	464.9	485.9	491.0
60.0	436.6	452.7	452.5	449.5	446.5	463.4	473.1	485.7	489.4	496.6	502.9	507.4	516.8	520.4	528.3	527.3	550.9	556.6
65.0	491.8	511.0	510.5	507.0	503.4	522.3	533.1	547.0	551.0	558.9	565.9	570.8	581.3	585.1	594.1	592.9	619.3	625.6
70.0	550.7	572.1	571.4	567.5	563.1	584.1	596.0	611.2	615.5	624.3	632.0	637.4	648.9	652.9	663.0	661.6	690.9	697.9
80.0	676.6	702.8	701.6	696.6	690.8	716.0	730.3	748.3	753.3	763.6	772.9	779.2	793.0	797.5	809.9	808.1	843.6	851.9
90.0	813.0	844.4	842.5	836.4	828.9	858.8	875.6	896.5	902.2	914.3	925.2	932.5	948.6	953.6	968.5	966.2	1008.4	1018.2
100.0	959.4	996.3	993.8	986.5	977.1	1012.0	1031.5	1055.5	1061.8	1075.7	1088.4	1096.8	1115.3	1120.8	1138.3	1135.6	1184.9	1196.2
150.0	1831.	1900.	1894.	1879.	1858.	1922.	1957.	1998.	2008.	2032.	2055.	2069.	2102.	2110.	2143.	2138.	2229.	2249.
200.0	2908.	3017.	3007.	2984.	2947.	3046.	3100.	3160.	3174.	3210.	3245.	3267.	3315.	3327.	3379.	3370.	3484.	3543.
250.0	4157.	4310.	4307.	4273.	4218.	4357.	4427.	4511.	4525.	4577.	4630.	4656.	4721.	4741.	4816.	4802.	4928.	5035.
300.0	5550.	5752.	5765.	5725.	5647.	5822.	5907.	6017.	6030.	6098.	6174.	6204.	6285.	6317.	6416.	6397.	6535.	6694.
350.0	7067.	7323.	7353.	7307.	7207.	7417.	7519.	7656.	7668.	7755.	7855.	7887.	7987.	8031.	8157.	8132.	8283.	8497.
400.0	8694.	9007.	9055.	9003.	8877.	9127.	9245.	9412.	9423.	9528.	9654.	9690.	9808.	9865.	10021.	9989.	10159.	10427.
450.0	10417.	10791.	10857.	10799.	10659.	10937.	11073.	11271.	11280.	11405.	11558.	11597.	11735.	11805.	11991.	11954.	12134.	12468.
500.0	12226.	12663.	12759.	12683.	12502.	12835.	12991.	13220.	13227.	13374.	13554.	13597.	13756.	13839.	14057.	14013.	14210.	14607.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{89}_{39}$Y IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	72.33	66.40	50.57	48.30	48.95	44.31	38.27	36.52	36.43	34.53	32.38	30.43	28.90	28.04	27.71	26.69	23.92	24.89
3.0	69.42	64.94	50.00	47.81	48.55	44.24	38.35	36.71	36.69	34.92	32.77	30.87	29.39	28.56	28.25	27.26	24.71	25.50
3.5	66.46	63.05	49.05	46.96	47.74	43.74	38.03	36.48	36.54	34.87	32.75	30.90	29.48	28.69	28.40	27.44	25.10	25.72
4.0	63.62	61.02	47.92	45.92	46.74	43.01	37.48	36.03	36.14	34.56	32.49	30.69	29.33	28.57	28.30	27.38	25.23	25.72
4.5	60.96	58.99	46.72	44.80	45.65	42.16	36.81	35.44	34.62	34.11	32.08	30.34	29.04	28.32	28.06	27.18	25.19	25.57
5.0	58.48	57.01	45.50	43.66	44.52	41.25	36.08	34.79	34.02	33.57	31.59	29.91	28.66	27.97	27.73	26.88	25.05	25.32
5.5	56.18	55.11	44.30	42.54	43.41	40.33	35.32	34.10	33.37	32.98	31.05	29.42	28.22	27.57	27.35	26.53	24.82	25.02
6.0	54.06	53.31	43.14	41.44	42.31	39.41	34.56	33.40	32.72	32.37	30.48	28.91	27.75	27.13	26.92	26.14	24.55	24.68
6.5	52.10	51.62	42.02	40.38	41.26	38.50	33.81	32.71	32.06	31.75	29.91	28.39	27.27	26.68	26.49	25.73	24.25	24.32
7.0	50.28	50.03	40.94	39.36	40.24	37.62	33.07	32.02	31.41	31.14	29.34	27.87	26.79	26.22	26.04	25.31	23.93	23.94
8.0	47.02	47.11	38.93	37.45	38.32	35.96	31.66	30.70	30.15	29.94	28.23	26.83	25.83	25.31	25.15	24.48	23.25	23.19
9.0	44.18	44.53	37.10	35.72	36.57	34.41	30.35	29.46	28.96	28.80	27.16	25.85	24.90	24.43	24.29	23.66	22.57	22.44
10.0	41.70	42.24	35.44	34.14	34.98	32.99	29.14	28.32	27.85	27.73	26.16	24.92	24.02	23.59	23.46	22.87	21.90	21.72
11.0	39.51	40.19	33.94	32.70	33.52	31.69	28.02	27.25	26.83	26.73	25.23	24.05	23.20	22.80	22.68	22.13	21.25	21.03
12.0	37.56	38.35	32.56	31.38	32.19	30.49	26.98	26.26	25.87	25.80	24.36	23.23	22.42	22.05	21.95	21.43	20.63	20.39
15.0	32.82	33.80	29.08	28.05	28.81	27.41	24.32	23.72	23.40	23.38	22.09	21.09	20.39	20.09	20.02	19.57	18.95	18.66
20.0	27.30	28.40	24.81	23.96	24.64	23.57	20.96	20.49	20.25	20.28	19.18	18.34	17.76	17.54	17.49	17.14	16.70	16.38
25.0	23.53	24.65	21.74	21.01	21.63	20.76	18.50	18.11	17.92	17.97	17.01	16.29	15.78	15.61	15.59	15.29	14.96	14.64
30.0	20.77	21.87	19.42	18.78	19.35	18.62	16.62	16.29	16.13	16.20	15.33	14.69	14.25	14.12	14.10	13.85	13.58	13.28
35.0	18.66	19.73	17.61	17.04	17.56	16.93	15.13	14.84	14.71	14.78	13.99	13.42	13.02	12.91	12.90	12.69	12.46	12.18
40.0	16.98	18.02	16.14	15.63	16.11	15.57	13.92	13.66	13.55	13.62	12.90	12.38	12.02	11.93	11.92	11.73	11.54	11.28
45.0	15.62	16.62	14.94	14.46	14.91	14.43	12.91	12.68	12.58	12.66	11.99	11.51	11.18	11.10	11.10	10.93	10.77	10.52
50.0	14.50	15.46	13.92	13.48	13.91	13.47	12.07	11.85	11.77	11.84	11.22	10.78	10.46	10.40	10.41	10.25	10.10	9.87
55.0	13.54	14.47	13.08	12.65	13.05	12.65	11.34	11.14	11.07	11.14	10.56	10.14	9.85	9.80	9.80	9.66	9.53	9.31
60.0	12.72	13.62	12.31	11.93	12.31	11.95	10.71	10.53	10.46	10.53	9.98	9.59	9.32	9.27	9.28	9.15	9.03	8.82
65.0	12.02	12.88	11.66	11.30	11.66	11.33	10.16	9.99	9.92	10.00	9.48	9.11	8.85	8.81	8.82	8.70	8.59	8.39
70.0	11.40	12.23	11.09	10.74	11.09	10.78	9.67	9.51	9.45	9.53	9.03	8.68	8.44	8.40	8.41	8.30	8.19	8.01
80.0	10.36	11.15	10.12	9.81	10.12	9.85	8.85	8.71	8.66	8.73	8.28	7.96	7.73	7.71	7.72	7.62	7.53	7.36
90.0	9.53	10.27	9.34	9.05	9.34	9.10	8.18	8.05	8.01	8.08	7.66	7.37	7.16	7.14	7.15	7.06	6.98	6.83
100.0	8.84	9.55	8.69	8.43	8.70	8.48	7.62	7.50	7.47	7.53	7.15	6.88	6.68	6.67	6.68	6.60	6.52	6.39
150.0	6.665	7.242	6.609	6.415	6.618	6.469	5.822	5.740	5.718	5.778	5.484	5.281	5.133	5.127	5.138	5.085	5.026	4.936
200.0	5.491	6.048	5.516	5.345	5.480	5.398	4.854	4.768	4.784	4.841	4.590	4.521	4.372	4.282	4.299	4.243	4.288	4.137
250.0	4.808	5.308	4.844	4.693	4.802	4.746	4.270	4.147	4.212	4.264	4.044	3.981	3.851	3.776	3.792	3.729	3.782	3.654
300.0	4.341	4.798	4.381	4.245	4.345	4.296	3.867	3.722	3.816	3.865	3.666	3.608	3.491	3.426	3.441	3.385	3.432	3.319
350.0	4.001	4.427	4.043	3.917	4.011	3.967	3.572	3.442	3.527	3.573	3.390	3.336	3.228	3.169	3.184	3.133	3.176	3.072
400.0	3.743	4.144	3.786	3.668	3.757	3.717	3.347	3.229	3.307	3.351	3.180	3.127	3.027	2.974	2.988	2.941	2.980	2.885
450.0	3.540	3.922	3.585	3.473	3.558	3.521	3.171	3.062	3.134	3.176	3.015	2.963	2.869	2.820	2.834	2.790	2.827	2.737
500.0	3.378	3.744	3.423	3.316	3.399	3.363	3.030	2.928	2.995	3.036	2.882	2.832	2.742	2.697	2.710	2.668	2.704	2.618

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	23.30	22.23	22.28	22.44	22.24	20.97	20.33	19.20	18.78	18.29	17.94	17.65	17.01	16.79	16.61	16.65	15.96	15.77
3.0	23.92	22.84	22.89	23.05	22.89	21.64	21.00	19.90	19.51	19.03	18.68	18.39	17.76	17.53	17.34	17.38	16.65	16.45
3.5	24.18	23.10	23.15	23.31	23.18	21.97	21.33	20.28	19.91	19.43	19.09	18.81	18.20	17.96	17.76	17.80	17.04	16.84
4.0	24.21	23.15	23.19	23.35	23.25	22.07	21.45	20.44	20.09	19.63	19.29	19.01	18.43	18.19	17.98	18.02	17.25	17.05
4.5	24.10	23.05	23.09	23.26	23.18	22.03	21.43	20.46	20.13	19.68	19.35	19.08	18.51	18.28	18.07	18.11	17.32	17.12
5.0	23.89	22.87	22.91	23.07	23.02	21.90	21.31	20.38	20.07	19.63	19.31	19.05	18.50	18.27	18.06	18.10	17.31	17.11
5.5	23.63	22.62	22.66	22.82	22.79	21.71	21.13	20.24	19.94	19.52	19.21	18.96	18.43	18.20	17.98	18.03	17.24	17.04
6.0	23.33	22.34	22.38	22.54	22.52	21.47	20.91	20.06	19.77	19.36	19.06	18.82	18.30	18.08	17.86	17.91	17.12	16.93
6.5	23.00	22.03	22.07	22.23	22.23	21.21	20.67	19.84	19.57	19.18	18.88	18.64	18.15	17.93	17.71	17.75	16.97	16.78
7.0	22.66	21.72	21.75	21.91	21.92	20.93	20.40	19.61	19.35	18.96	18.67	18.45	17.97	17.76	17.54	17.58	16.81	16.62
8.0	21.97	21.06	21.10	21.25	21.28	20.34	19.84	19.10	18.87	18.51	18.23	18.02	17.57	17.37	17.15	17.19	16.43	16.25
9.0	21.28	20.41	20.45	20.60	20.64	19.75	19.28	18.59	18.37	18.03	17.76	17.56	17.14	16.95	16.74	16.77	16.04	15.86
10.0	20.61	19.78	19.82	19.96	20.01	19.17	18.72	18.07	17.87	17.55	17.29	17.11	16.71	16.53	16.31	16.35	15.63	15.46
11.0	19.97	19.17	19.21	19.35	19.42	18.61	18.18	17.57	17.38	17.08	16.83	16.66	16.28	16.11	15.90	15.93	15.24	15.07
12.0	19.37	18.60	18.64	18.77	18.85	18.08	17.66	17.09	16.91	16.62	16.39	16.22	15.86	15.70	15.49	15.53	14.85	14.69
15.0	17.75	17.06	17.10	17.22	17.31	16.63	16.26	15.77	15.62	15.37	15.16	15.01	14.70	14.56	14.36	14.40	13.77	13.63
20.0	15.61	15.01	15.05	15.16	15.26	14.69	14.37	13.97	13.86	13.65	13.47	13.35	13.09	12.99	12.80	12.83	12.28	12.15
25.0	13.97	13.44	13.48	13.58	13.68	13.18	12.91	12.57	12.48	12.30	12.15	12.04	11.82	11.74	11.56	11.59	11.10	10.99
30.0	12.68	12.20	12.24	12.33	12.44	11.99	11.75	11.46	11.38	11.22	11.09	10.99	10.80	10.73	10.57	10.60	10.15	10.06
35.0	11.63	11.20	11.24	11.32	11.43	11.03	10.81	10.55	10.48	10.34	10.22	10.14	9.96	9.90	9.75	9.78	9.37	9.28
40.0	10.77	10.37	10.41	10.49	10.59	10.22	10.03	9.79	9.74	9.61	9.49	9.42	9.26	9.21	9.07	9.10	8.72	8.64
45.0	10.05	9.68	9.71	9.79	9.89	9.55	9.37	9.16	9.10	8.99	8.88	8.82	8.67	8.63	8.50	8.52	8.17	8.09
50.0	9.43	9.09	9.12	9.19	9.29	8.97	8.81	8.61	8.56	8.45	8.36	8.30	8.16	8.13	8.00	8.02	7.69	7.62
55.0	8.90	8.57	8.61	8.67	8.77	8.47	8.32	8.14	8.09	7.99	7.90	7.85	7.72	7.69	7.57	7.59	7.28	7.21
60.0	8.44	8.13	8.16	8.22	8.31	8.04	7.89	7.72	7.68	7.69	7.60	7.45	7.33	7.30	7.19	7.21	6.92	6.85
65.0	8.026	7.733	7.764	7.825	7.914	7.651	7.513	7.357	7.320	7.232	7.152	7.102	6.991	6.965	6.856	6.874	6.595	6.535
70.0	7.662	7.383	7.412	7.471	7.558	7.309	7.178	7.031	6.997	6.913	6.837	6.790	6.686	6.662	6.557	6.575	6.308	6.252
80.0	7.043	6.787	6.815	6.869	6.952	6.725	6.606	6.475	6.445	6.370	6.301	6.258	6.164	6.144	6.047	6.063	5.819	5.768
90.0	6.536	6.299	6.325	6.376	6.454	6.245	6.136	6.017	5.991	5.923	5.859	5.820	5.734	5.717	5.626	5.642	5.415	5.368
100.0	6.112	5.891	5.915	5.963	6.038	5.844	5.743	5.635	5.611	5.548	5.489	5.453	5.374	5.358	5.274	5.288	5.076	5.032
150.0	4.724	4.555	4.574	4.611	4.675	4.528	4.453	4.376	4.360	4.315	4.270	4.243	4.185	4.174	4.109	4.121	3.957	3.924
200.0	3.961	3.825	3.825	3.856	3.912	3.791	3.730	3.670	3.658	3.622	3.585	3.563	3.517	3.507	3.453	3.464	3.418	3.308
250.0	3.499	3.379	3.342	3.369	3.421	3.324	3.291	3.233	3.235	3.199	3.151	3.146	3.111	3.088	3.039	3.050	3.028	2.932
300.0	3.178	3.069	3.036	3.047	3.092	3.022	2.992	2.940	2.942	2.910	2.867	2.863	2.832	2.811	2.767	2.777	2.757	2.671
350.0	2.943	2.842	2.813	2.822	2.865	2.800	2.772	2.725	2.727	2.698	2.659	2.654	2.626	2.608	2.567	2.576	2.557	2.478
400.0	2.763	2.669	2.642	2.651	2.691	2.630	2.604	2.561	2.563	2.535	2.499	2.495	2.469	2.452	2.414	2.422	2.403	2.331
450.0	2.622	2.533	2.508	2.516	2.554	2.497	2.472	2.431	2.434	2.408	2.374	2.369	2.346	2.330	2.294	2.301	2.283	2.216
500.0	2.508	2.423	2.400	2.408	2.444	2.390	2.366	2.327	2.330	2.305	2.273	2.269	2.246	2.231	2.197	2.204	2.185	2.122

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

89 Y IONS 39

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.160	4.950	6.992	6.970	6.840	8.144	8.820	9.295	9.650	10.020	10.240	10.930	11.300	11.809	12.010	12.216	12.590	12.920
3.0	5.788	5.627	7.876	7.895	7.752	9.148	9.980	10.509	10.900	11.300	11.604	12.380	12.825	13.360	13.598	13.863	14.418	14.783
3.5	6.443	6.322	8.774	8.834	8.676	10.159	11.145	11.724	12.148	12.574	12.961	13.820	14.335	14.933	15.168	15.489	16.203	16.419
4.0	7.127	7.040	9.692	9.792	9.618	11.185	12.323	12.951	13.407	13.855	14.325	15.264	15.847	16.486	16.737	17.112	17.970	18.148
4.5	7.842	7.781	10.633	10.773	10.581	12.230	13.521	14.196	14.683	15.151	15.703	16.722	17.372	18.050	18.315	18.742	19.736	19.883
5.0	8.588	8.549	11.598	11.779	11.568	13.297	14.742	15.463	15.979	16.486	17.101	18.199	18.914	19.631	19.910	20.388	21.506	21.631
5.5	9.364	9.343	12.589	12.812	12.580	14.388	15.988	16.755	17.300	17.803	18.522	19.699	20.478	21.234	21.526	22.055	23.290	23.399
6.0	10.172	10.164	13.607	13.872	13.619	15.504	17.262	18.074	18.647	19.165	19.968	21.224	22.068	22.861	23.165	23.744	25.092	25.190
6.5	11.010	11.012	14.652	14.960	14.684	16.646	18.564	19.420	20.021	20.553	21.441	22.777	23.686	24.515	24.832	25.460	26.916	27.006
7.0	11.880	11.888	15.725	16.076	15.776	17.816	19.894	20.795	21.423	21.968	22.944	24.360	25.332	26.197	26.526	27.203	28.763	28.850
8.0	13.71	13.72	17.96	18.39	18.04	20.24	22.64	23.63	24.32	24.88	26.04	27.61	28.72	29.65	30.00	30.78	32.54	32.63
9.0	15.67	15.67	20.30	20.83	20.42	22.77	25.52	26.59	27.33	27.91	29.25	30.99	32.23	33.23	33.61	34.48	36.42	36.53
10.0	17.74	17.72	22.75	23.38	22.91	25.41	28.51	29.68	30.46	31.06	32.59	34.50	35.87	36.94	37.33	38.30	40.42	40.56
11.0	19.93	19.88	25.32	26.04	25.51	28.16	31.63	32.88	33.72	34.33	36.05	38.14	39.64	40.78	41.19	42.26	44.55	44.73
12.0	22.24	22.15	28.00	28.82	28.22	31.03	34.86	36.21	37.10	37.72	39.64	41.90	43.54	44.75	45.18	46.35	48.80	49.02
15.0	29.87	29.58	36.69	37.84	37.00	40.28	45.30	46.92	47.96	48.61	51.17	53.98	56.04	57.45	57.93	59.40	62.32	62.73
20.0	44.81	44.01	53.32	55.06	53.76	57.84	65.07	67.17	68.47	69.11	72.85	76.67	79.49	81.21	81.77	83.76	87.39	88.24
25.0	62.43	60.88	72.54	74.95	73.09	78.01	87.72	90.32	91.88	92.46	97.55	102.47	106.13	108.16	108.78	111.30	115.60	117.03
30.0	82.60	80.09	94.24	97.39	94.88	100.68	113.14	116.28	118.10	118.59	125.15	131.28	135.85	138.18	138.84	141.93	146.87	148.98
35.0	105.25	101.55	118.34	122.30	119.06	125.77	141.24	144.94	147.02	147.39	155.57	163.01	168.56	171.18	171.87	175.54	181.11	184.01
40.0	130.3	125.2	144.8	149.6	145.6	153.2	171.9	176.2	178.6	178.8	188.7	197.6	204.2	207.1	207.8	212.1	218.2	222.0
45.0	157.6	150.9	173.4	179.2	174.3	182.9	205.1	210.1	212.7	212.7	224.5	234.9	242.6	245.8	246.5	251.4	258.2	262.9
50.0	187.2	178.7	204.3	211.1	205.2	214.9	240.8	246.4	249.3	249.1	262.9	274.8	283.8	287.2	287.9	293.5	300.9	306.6
55.0	219.0	208.5	237.4	245.2	238.3	249.0	278.9	285.1	288.3	287.8	303.8	317.4	327.6	331.3	332.0	338.2	346.3	353.1
60.0	252.9	240.2	272.5	281.5	273.4	285.2	319.3	326.2	329.7	328.9	347.2	362.6	374.1	378.0	378.7	385.5	394.3	402.2
65.0	288.9	273.8	309.6	319.8	310.6	323.5	362.0	369.6	373.4	372.3	393.0	410.2	423.1	427.3	427.9	435.5	444.8	454.0
70.0	327.0	309.3	348.8	360.2	349.7	363.8	406.9	415.3	419.4	417.9	441.1	460.2	474.7	479.0	479.6	487.8	497.9	508.3
80.0	409.0	385.6	432.9	447.0	433.8	450.2	503.3	513.3	517.9	515.7	544.1	567.4	585.0	589.7	590.2	599.9	611.4	624.3
90.0	498.7	468.9	524.6	541.6	525.5	544.3	608.0	619.7	624.9	621.8	656.0	683.8	704.7	709.8	710.1	721.3	734.3	749.9
100.0	595.8	558.8	623.5	643.5	624.3	645.7	720.9	734.3	740.1	736.0	776.4	808.9	833.5	838.9	839.0	851.8	866.3	884.8
150.0	1183.	1101.	1218.	1257.	1218.	1254.	1397.	1421.	1430.	1419.	1496.	1556.	1603.	1609.	1608.	1629.	1653.	1687.
200.0	1924.	1778.	1961.	2023.	1962.	2013.	2241.	2277.	2287.	2266.	2390.	2465.	2542.	2566.	2562.	2593.	2612.	2678.
250.0	2793.	2567.	2826.	2914.	2834.	2895.	3222.	3281.	3282.	3249.	3426.	3518.	3630.	3676.	3668.	3717.	3721.	3827.
300.0	3770.	3461.	3793.	3914.	3810.	3883.	4320.	4418.	4394.	4348.	4585.	4694.	4847.	4916.	4902.	4973.	4959.	5108.
350.0	4840.	4418.	4853.	5007.	4878.	4963.	5519.	5663.	5609.	5548.	5849.	5979.	6175.	6269.	6249.	6341.	6309.	6504.
400.0	5991.	5458.	5991.	6184.	6026.	6123.	6808.	7000.	6914.	6835.	7206.	7359.	7600.	7720.	7699.	7809.	7757.	8000.
450.0	7215.	6563.	7200.	7430.	7245.	7354.	8175.	8416.	8297.	8201.	8645.	8822.	9111.	9259.	9224.	9364.	9291.	9585.
500.0	8502.	7726.	8471.	8743.	8524.	8648.	9611.	9903.	9751.	9635.	10156.	10359.	10699.	10873.	10831.	10996.	10902.	11249.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.57	14.08	15.22	15.52	16.10	16.93	17.43	18.07	18.45	18.82	19.20	19.61	20.02	20.39	20.87	21.04	22.57	23.06
3.0	15.45	16.06	17.19	17.47	18.07	19.02	19.58	20.34	20.77	21.20	21.63	22.08	22.57	22.98	23.49	23.65	25.30	25.82
3.5	17.30	17.99	19.12	19.39	20.00	21.06	21.68	22.55	23.02	23.51	23.98	24.47	25.05	25.48	26.02	26.18	27.94	28.49
4.0	19.14	19.91	21.04	21.30	21.92	23.08	23.76	24.74	25.25	25.79	26.30	26.82	27.47	27.94	28.51	28.66	30.53	31.11
4.5	20.98	21.84	22.96	23.20	23.83	25.09	25.83	26.91	27.46	28.05	28.60	29.15	29.88	30.38	30.98	31.13	33.10	33.71
5.0	22.83	23.78	24.90	25.12	25.76	27.12	27.92	29.09	29.67	30.31	30.90	31.49	32.29	32.82	33.44	33.58	35.67	36.31
5.5	24.71	25.73	26.85	27.06	27.70	29.16	30.01	31.28	31.90	32.58	33.21	33.83	34.69	35.25	35.91	36.05	38.25	38.92
6.0	26.60	27.71	28.83	29.03	29.67	31.22	32.13	33.49	34.14	34.87	35.54	36.18	37.12	37.71	38.39	38.52	40.84	41.54
6.5	28.52	29.72	30.83	31.01	31.65	33.30	34.27	35.72	36.40	37.18	37.88	38.56	39.56	40.18	40.89	41.02	43.45	44.18
7.0	30.47	31.75	32.86	33.03	33.67	35.42	36.44	37.97	38.68	39.52	40.25	40.96	42.02	42.67	43.42	43.54	46.08	46.84
8.0	34.46	35.92	37.01	37.15	37.79	39.73	40.86	42.57	43.34	44.27	45.08	45.84	47.03	47.74	48.55	48.66	51.43	52.26
9.0	38.58	40.21	41.30	41.41	42.04	44.17	45.41	47.30	48.12	49.14	50.02	50.84	52.16	52.92	53.80	53.90	56.92	57.80
10.0	42.83	44.64	45.72	45.80	46.42	48.74	50.09	52.15	53.03	54.14	55.10	55.97	57.42	58.24	59.18	59.27	62.54	63.49
11.0	47.22	49.21	50.28	50.33	50.93	53.45	54.92	57.15	58.08	59.28	60.32	61.25	62.82	63.69	64.71	64.79	68.30	69.32
12.0	51.74	53.92	54.99	55.00	55.59	58.31	59.89	62.28	63.28	64.57	65.68	66.66	68.36	69.29	70.38	70.44	74.22	75.30
15.0	66.15	68.93	69.96	69.86	70.38	73.72	75.65	78.56	79.71	81.29	82.63	83.78	85.86	86.96	88.29	88.31	92.90	94.18
20.0	92.95	96.80	97.76	97.46	97.82	102.25	104.82	108.60	110.01	112.07	113.82	115.27	117.99	119.37	121.17	121.11	127.18	128.82
25.0	123.14	128.20	129.07	128.54	128.67	134.29	137.54	142.23	143.90	146.48	148.66	150.42	153.82	155.47	157.80	157.66	165.35	167.39
30.0	156.63	163.00	163.77	162.98	162.84	169.72	173.71	179.36	181.28	184.40	187.06	189.14	193.26	195.18	198.10	197.86	207.33	209.79
35.0	193.31	201.12	201.76	200.68	200.21	208.47	213.23	219.88	222.07	225.76	228.91	231.34	236.21	238.39	241.97	241.62	253.01	255.92
40.0	233.1	242.4	242.9	241.6	240.7	250.4	256.0	263.7	266.2	270.4	274.1	276.9	282.6	285.0	289.3	288.8	302.3	305.7
45.0	276.9	286.9	287.2	285.5	284.2	295.5	302.0	310.7	313.5	318.4	322.6	325.8	332.3	335.0	340.0	339.4	355.1	358.9
50.0	321.6	334.4	334.5	332.4	330.7	343.6	351.0	360.9	363.9	369.5	374.3	377.8	385.2	388.1	394.0	393.3	411.3	415.7
55.0	370.2	384.8	384.8	382.3	380.0	394.6	403.0	414.1	417.4	423.6	429.1	433.0	441.3	444.5	451.3	450.4	470.8	475.7
60.0	421.6	438.1	437.9	435.0	432.2	448.6	458.0	470.2	473.8	480.8	486.9	491.2	500.4	503.9	511.6	510.6	533.5	539.1
65.0	475.7	494.3	493.9	490.5	487.1	505.4	515.8	529.3	533.2	540.9	547.6	552.4	562.6	566.3	575.0	573.8	599.4	605.6
70.0	532.4	553.2	552.5	548.7	544.6	564.9	576.4	591.2	595.4	603.8	611.3	616.5	627.7	631.6	641.4	640.0	668.5	675.2
80.0	653.7	679.1	677.9	673.1	667.5	692.0	705.8	723.2	728.1	738.1	747.1	753.2	766.5	770.9	782.9	781.1	815.5	823.6
90.0	785.0	815.3	813.8	807.7	800.5	829.5	845.7	866.0	871.4	883.1	893.7	900.8	916.3	921.2	935.6	933.4	974.2	983.7
100.0	926.0	961.5	959.2	952.2	943.2	976.9	995.7	1018.9	1026.0	1038.5	1050.7	1058.9	1076.8	1082.1	1099.1	1096.5	1144.1	1155.0
150.0	1764.	1831.	1826.	1811.	1790.	1852.	1886.	1925.	1935.	1958.	1980.	1994.	2026.	2034.	2066.	2060.	2148.	2168.
200.0	2800.	2905.	2895.	2872.	2837.	2933.	2984.	3042.	3056.	3091.	3125.	3146.	3192.	3203.	3254.	3245.	3354.	3411.
250.0	3999.	4147.	4144.	4111.	4058.	4192.	4260.	4340.	4354.	4404.	4455.	4481.	4543.	4562.	4634.	4620.	4742.	4845.
300.0	5337.	5532.	5546.	5506.	5431.	5599.	5681.	5787.	5800.	5888.	5938.	5967.	6045.	6076.	6172.	6153.	6286.	6438.
350.0	6795.	7041.	7070.	7026.	6929.	7132.	7229.	7361.	7373.	7456.	7552.	7584.	7680.	7722.	7844.	7820.	7964.	8171.
400.0	8357.	8658.	8704.	8655.	8534.	8773.	8887.	9048.	9058.	9160.	9281.	9315.	9429.	9483.	9633.	9603.	9762.	10024.
450.0	10012.	10371.	10436.	10379.	10233.	10511.	10643.	10833.	10841.	10962.	11109.	11147.	11280.	11347.	11526.	11490.	11663.	11984.
500.0	11748.	12169.	12250.	12189.	12015.	12334.	12484.	12705.	12711.	12853.	13026.	13068.	13220.	13300.	13510.	13467.	13657.	14038.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{90}_{40}$ZR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	74.95	68.46	52.22	49.86	50.53	45.71	39.47	37.66	36.53	35.60	33.38	31.37	29.79	28.89	28.55	27.50	24.64	25.65
3.0	72.01	67.09	51.67	49.41	50.16	45.68	39.59	37.89	36.84	36.03	33.82	31.85	30.32	29.46	29.14	28.11	25.48	26.29
3.5	69.01	65.22	50.73	48.56	49.36	45.20	39.29	37.69	36.71	36.01	33.82	31.91	30.44	29.61	29.31	28.32	25.90	26.55
4.0	66.11	63.19	49.59	47.52	48.36	44.47	38.75	37.24	36.33	35.72	33.67	31.71	30.31	29.52	29.24	28.28	26.06	26.56
4.5	63.38	61.13	48.38	46.39	47.26	43.62	38.08	36.66	35.81	35.27	33.17	31.37	30.02	29.27	29.01	28.09	26.04	26.42
5.0	60.83	59.12	47.15	45.24	46.12	42.71	37.35	36.01	35.20	34.74	32.68	30.94	29.64	28.93	28.68	27.80	25.90	26.19
5.5	58.47	57.20	45.93	44.09	44.99	41.77	36.59	35.31	34.56	34.15	32.14	30.46	29.21	28.53	28.30	27.46	25.68	25.89
6.0	56.28	55.36	44.74	42.97	43.88	40.84	35.81	34.61	33.89	33.53	31.58	29.94	28.74	28.09	27.88	27.06	25.42	25.55
6.5	54.26	53.63	43.60	41.89	42.80	39.92	35.05	33.90	33.23	32.91	31.00	29.42	28.26	27.64	27.43	26.65	25.12	25.18
7.0	52.38	52.00	42.50	40.85	41.76	39.02	34.30	33.20	32.56	32.28	30.42	28.88	27.76	27.17	26.98	26.23	24.79	24.81
8.0	49.01	49.01	40.44	38.90	39.80	37.32	32.86	31.86	31.28	31.06	29.28	27.84	26.79	26.25	26.08	25.38	24.11	24.04
9.0	46.09	46.36	38.56	37.12	38.01	35.74	31.52	30.60	30.07	29.90	28.20	26.83	25.84	25.35	25.20	24.55	23.42	23.28
10.0	43.52	43.99	36.86	35.50	36.37	34.29	30.28	29.42	28.94	28.81	27.18	25.88	24.95	24.50	24.36	23.75	22.73	22.55
11.0	41.25	41.88	35.31	34.02	34.88	32.95	29.13	28.33	27.89	27.78	26.22	24.99	24.11	23.69	23.57	22.99	22.07	21.85
12.0	39.22	39.98	33.89	32.67	33.51	31.72	28.07	27.32	26.91	26.83	25.33	24.15	23.31	22.93	22.82	22.27	21.44	21.19
15.0	34.30	35.27	30.30	29.24	30.02	28.55	25.33	24.70	24.36	24.34	23.00	21.96	21.23	20.91	20.83	20.37	19.72	19.42
20.0	28.57	29.68	25.89	25.00	25.71	24.58	21.87	21.37	21.12	21.15	20.00	19.12	18.51	18.28	18.23	17.86	17.40	17.07
25.0	24.64	25.78	22.71	21.95	22.59	21.68	19.32	18.91	18.71	18.77	17.75	17.00	16.47	16.30	16.27	15.96	15.61	15.28
30.0	21.76	22.89	20.31	19.64	20.23	19.47	17.37	17.02	16.86	16.92	16.02	15.35	14.89	14.75	14.73	14.47	14.18	13.87
35.0	19.56	20.65	18.42	17.82	18.37	17.71	15.83	15.52	15.38	15.45	14.63	14.03	13.61	13.50	13.49	13.26	13.03	12.73
40.0	17.81	18.87	16.90	16.36	16.86	16.29	14.57	14.30	14.18	14.25	13.50	12.95	12.57	12.48	12.47	12.27	12.07	11.79
45.0	16.39	17.42	15.64	15.15	15.62	15.11	13.52	13.28	13.17	13.25	12.55	12.05	11.70	11.62	11.62	11.44	11.27	11.01
50.0	15.21	16.20	14.59	14.13	14.57	14.11	12.64	12.42	12.32	12.40	11.75	11.29	10.96	10.89	10.90	10.73	10.58	10.33
55.0	14.21	15.17	13.69	13.26	13.68	13.26	11.88	11.68	11.59	11.67	11.06	10.63	10.32	10.26	10.27	10.12	9.98	9.75
60.0	13.36	14.28	12.91	12.51	12.90	12.52	11.22	11.03	10.96	11.04	10.46	10.05	9.77	9.72	9.72	9.59	9.46	9.24
65.0	12.61	13.51	12.23	11.85	12.23	11.87	10.65	10.47	10.41	10.48	9.94	9.55	9.28	9.24	9.24	9.12	9.00	8.80
70.0	11.96	12.84	11.63	11.27	11.63	11.30	10.14	9.97	9.91	9.99	9.47	9.10	8.85	8.81	8.82	8.70	8.59	8.40
80.0	10.88	11.70	10.62	10.29	10.62	10.34	9.28	9.13	9.08	9.16	8.68	8.35	8.11	8.08	8.10	7.99	7.89	7.72
90.0	10.00	10.78	9.80	9.50	9.81	9.55	8.58	8.45	8.40	8.47	8.04	7.73	7.51	7.49	7.50	7.41	7.32	7.17
100.0	9.29	10.03	9.12	8.85	9.13	8.90	8.00	7.88	7.84	7.91	7.50	7.22	7.02	7.00	7.01	6.93	6.85	6.70
150.0	7.005	7.609	6.945	6.740	6.954	6.797	6.118	6.031	6.008	6.071	5.762	5.548	5.393	5.387	5.398	5.343	5.280	5.185
200.0	5.772	6.356	5.799	5.618	5.761	5.675	5.103	5.012	5.029	5.089	4.824	4.752	4.596	4.501	4.519	4.460	4.507	4.348
250.0	5.056	5.579	5.093	4.935	5.049	4.990	4.489	4.360	4.428	4.483	4.251	4.186	4.049	3.970	3.987	3.921	3.977	3.841
300.0	4.565	5.045	4.607	4.464	4.569	4.518	4.066	3.914	4.013	4.064	3.855	3.794	3.671	3.602	3.618	3.560	3.609	3.490
350.0	4.208	4.655	4.252	4.120	4.218	4.172	3.756	3.620	3.709	3.758	3.565	3.508	3.395	3.333	3.348	3.295	3.340	3.231
400.0	3.936	4.358	3.982	3.858	3.952	3.910	3.520	3.396	3.478	3.524	3.344	3.289	3.183	3.127	3.142	3.093	3.135	3.034
450.0	3.723	4.125	3.771	3.652	3.743	3.703	3.335	3.221	3.296	3.341	3.171	3.117	3.018	2.966	2.981	2.934	2.973	2.878
500.0	3.553	3.938	3.601	3.488	3.575	3.538	3.187	3.080	3.150	3.193	3.031	2.979	2.885	2.836	2.851	2.806	2.844	2.753

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	24.01	22.90	22.95	23.11	22.91	21.60	20.94	19.77	19.35	18.84	18.48	18.17	17.52	17.29	17.11	17.15	16.44	16.24
3.0	24.67	23.55	23.60	23.77	23.60	22.31	21.65	20.52	20.11	19.61	19.25	18.95	18.31	18.07	17.87	17.92	17.16	16.96
3.5	24.95	23.84	23.88	24.05	23.92	22.66	22.01	20.92	20.54	20.05	19.69	19.40	18.77	18.53	18.32	18.37	17.58	17.37
4.0	25.00	23.90	23.94	24.11	24.01	22.79	22.15	21.10	20.74	20.26	19.91	19.63	19.02	18.78	18.56	18.61	17.80	17.60
4.5	24.90	23.82	23.86	24.03	23.95	22.76	22.14	21.14	20.79	20.33	19.99	19.71	19.12	18.88	18.66	18.70	17.89	17.69
5.0	24.70	23.64	23.68	23.85	23.79	22.64	22.03	21.07	20.74	20.29	19.96	19.69	19.12	18.89	18.66	18.71	17.89	17.68
5.5	24.44	23.40	23.44	23.61	23.57	22.45	21.86	20.94	20.63	20.19	19.86	19.60	19.06	18.82	18.60	18.64	17.82	17.62
6.0	24.14	23.12	23.16	23.33	23.30	22.22	21.64	20.75	20.46	20.04	19.72	19.47	18.94	18.71	18.48	18.52	17.71	17.51
6.5	23.82	22.82	22.85	23.02	23.01	21.96	21.39	20.54	20.26	19.85	19.54	19.30	18.78	18.56	18.33	18.37	17.57	17.37
7.0	23.47	22.50	22.53	22.69	22.70	21.68	21.13	20.31	20.04	19.64	19.34	19.10	18.61	18.39	18.16	18.20	17.40	17.21
8.0	22.77	21.83	21.87	22.03	22.06	21.09	20.57	19.80	19.55	19.18	18.89	18.67	18.21	18.00	17.77	17.81	17.03	16.84
9.0	22.07	21.17	21.21	21.36	21.41	20.49	19.99	19.28	19.05	18.70	18.42	18.21	17.77	17.58	17.35	17.39	16.63	16.44
10.0	21.40	20.53	20.57	20.72	20.77	19.90	19.43	18.75	18.54	18.21	17.95	17.75	17.33	17.15	16.93	16.96	16.22	16.04
11.0	20.75	19.91	19.95	20.10	20.16	19.33	18.88	18.24	18.05	17.73	17.48	17.29	16.90	16.72	16.50	16.54	15.82	15.64
12.0	20.13	19.33	19.37	19.51	19.58	18.78	18.35	17.75	17.57	17.26	17.02	16.85	16.47	16.31	16.09	16.13	15.42	15.25
15.0	18.47	17.75	17.79	17.92	18.01	17.30	16.92	16.40	16.25	15.98	15.77	15.62	15.29	15.15	14.94	14.97	14.32	14.17
20.0	16.27	15.64	15.68	15.80	15.90	15.30	14.98	14.56	14.44	14.22	14.04	13.91	13.64	13.53	13.34	13.37	12.79	12.66
25.0	14.58	14.02	14.06	14.17	14.28	13.75	13.47	13.12	13.02	12.83	12.67	12.56	12.33	12.24	12.06	12.09	11.58	11.46
30.0	13.24	12.74	12.78	12.88	12.99	12.52	12.27	11.96	11.88	11.72	11.58	11.48	11.27	11.20	11.04	11.06	10.60	10.49
35.0	12.16	11.71	11.74	11.83	11.94	11.52	11.30	11.02	10.95	10.81	10.68	10.59	10.41	10.35	10.19	10.22	9.79	9.70
40.0	11.27	10.85	10.89	10.97	11.08	10.69	10.49	10.24	10.18	10.05	9.93	9.85	9.69	9.63	9.49	9.51	9.12	9.03
45.0	10.62	10.13	10.16	10.24	10.35	9.99	9.80	9.58	9.53	9.40	9.29	9.22	9.07	9.03	8.89	8.91	8.54	8.46
50.0	9.88	9.51	9.55	9.62	9.72	9.39	9.22	9.01	8.96	8.85	8.75	8.69	8.54	8.51	8.37	8.40	8.05	7.98
55.0	9.32	8.98	9.01	9.08	9.18	8.87	8.71	8.52	8.48	8.37	8.28	8.22	8.09	8.05	7.93	7.96	7.62	7.56
60.0	8.84	8.52	8.55	8.62	8.71	8.42	8.27	8.09	8.05	7.95	7.86	7.81	7.68	7.65	7.53	7.55	7.24	7.18
65.0	8.412	8.105	8.136	8.201	8.294	8.019	7.873	7.709	7.671	7.578	7.494	7.442	7.326	7.299	7.184	7.203	6.910	6.848
70.0	8.033	7.740	7.771	7.832	7.923	7.661	7.524	7.370	7.334	7.247	7.167	7.117	7.008	6.983	6.873	6.891	6.612	6.553
80.0	7.387	7.119	7.148	7.204	7.291	7.053	6.928	6.790	6.759	6.680	6.607	6.563	6.464	6.443	6.341	6.358	6.102	6.048
90.0	6.857	6.609	6.636	6.689	6.772	6.552	6.438	6.313	6.285	6.214	6.147	6.106	6.016	5.997	5.903	5.919	5.681	5.631
100.0	6.414	6.182	6.208	6.258	6.337	6.133	6.028	5.913	5.888	5.822	5.760	5.722	5.639	5.623	5.534	5.550	5.327	5.281
150.0	4.963	4.785	4.805	4.844	4.911	4.756	4.678	4.597	4.580	4.533	4.485	4.458	4.397	4.385	4.317	4.329	4.156	4.122
200.0	4.163	4.020	4.020	4.053	4.112	3.984	3.921	3.857	3.845	3.807	3.768	3.745	3.696	3.685	3.630	3.641	3.593	3.476
250.0	3.678	3.552	3.513	3.542	3.596	3.494	3.459	3.399	3.401	3.363	3.313	3.307	3.271	3.247	3.195	3.206	3.184	3.083
300.0	3.342	3.228	3.193	3.204	3.251	3.177	3.146	3.092	3.094	3.060	3.015	3.010	2.978	2.956	2.910	2.920	2.899	2.808
350.0	3.095	2.989	2.958	2.968	3.012	2.944	2.915	2.866	2.868	2.837	2.796	2.791	2.762	2.743	2.700	2.709	2.688	2.606
400.0	2.906	2.807	2.778	2.788	2.830	2.766	2.739	2.693	2.696	2.666	2.629	2.624	2.597	2.579	2.539	2.547	2.528	2.452
450.0	2.757	2.664	2.637	2.646	2.686	2.626	2.600	2.557	2.530	2.532	2.497	2.492	2.467	2.450	2.412	2.420	2.401	2.330
500.0	2.638	2.548	2.524	2.532	2.571	2.514	2.488	2.448	2.451	2.424	2.391	2.386	2.363	2.347	2.311	2.318	2.299	2.232

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{90}_{40}$ZR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.100	4.890	6.913	6.890	6.760	8.055	8.730	9.208	9.560	9.920	10.140	10.820	11.180	11.681	11.880	12.084	12.455	12.780
3.0	5.712	5.553	7.778	7.796	7.663	9.038	9.867	10.398	10.785	11.175	11.477	12.242	12.675	13.221	13.438	13.700	14.248	14.610
3.5	6.351	6.233	8.657	8.714	8.557	10.028	11.007	11.588	12.008	12.423	12.807	13.652	14.155	14.743	14.976	15.294	15.997	16.212
4.0	7.017	6.934	9.554	9.651	9.478	11.031	12.160	12.788	13.240	13.677	14.142	15.066	15.636	16.264	16.512	16.883	17.728	17.905
4.5	7.712	7.658	10.472	10.609	10.419	12.053	13.331	14.006	14.487	14.944	15.490	16.492	17.127	17.794	18.057	18.479	19.455	19.603
5.0	8.437	8.407	11.415	11.591	11.383	13.095	14.524	15.244	15.755	16.230	16.856	17.936	18.635	19.340	19.617	20.089	21.188	21.313
5.5	9.192	9.181	12.382	12.599	12.371	14.161	15.742	16.506	17.045	17.536	18.244	19.402	20.164	20.907	21.196	21.717	22.932	23.041
6.0	9.976	9.980	13.374	13.633	13.383	15.250	16.986	17.793	18.360	18.866	19.657	20.892	21.717	22.496	22.798	23.368	24.693	24.791
6.5	10.791	10.806	14.393	14.693	14.422	16.365	18.255	19.107	19.701	20.221	21.095	22.408	23.296	24.111	24.425	25.044	26.474	26.565
7.0	11.635	11.659	15.439	15.781	15.486	17.505	19.553	20.449	21.069	21.601	22.560	23.952	24.903	25.753	26.079	26.746	28.277	28.365
8.0	13.41	13.44	17.61	18.04	17.69	19.86	22.23	23.22	23.89	24.44	25.58	27.13	28.20	29.12	29.47	30.23	31.96	32.05
9.0	15.31	15.33	19.89	20.41	20.01	22.33	25.03	26.10	26.82	27.40	28.71	30.42	31.62	32.61	32.98	33.84	35.75	35.86
10.0	17.32	17.32	22.28	22.89	22.43	24.90	27.94	29.10	29.88	30.46	31.96	33.84	35.17	36.22	36.61	37.57	39.65	39.78
11.0	19.44	19.42	24.77	25.48	24.96	27.58	30.98	32.22	33.04	33.65	35.33	37.38	38.84	39.96	40.37	41.42	43.66	43.84
12.0	21.68	21.62	27.38	28.18	27.59	30.36	34.12	35.45	36.33	36.94	38.82	41.04	42.64	43.82	44.25	45.40	47.80	48.02
15.0	29.06	28.83	36.82	36.93	36.12	39.35	44.27	45.86	46.89	47.52	50.02	52.78	54.79	56.17	56.65	58.09	60.94	61.35
20.0	43.51	42.80	51.94	53.64	52.37	56.39	63.45	65.51	66.79	67.41	71.07	74.80	77.55	79.24	79.80	81.73	85.29	86.12
25.0	60.53	59.12	70.55	72.89	71.09	75.93	85.39	87.95	89.48	90.05	95.00	99.80	103.37	105.36	105.98	108.44	112.64	114.03
30.0	80.01	77.68	91.54	94.61	92.18	97.87	109.99	113.07	114.85	115.34	121.73	127.70	132.15	134.44	135.09	138.10	142.92	144.98
35.0	101.86	98.42	114.84	118.69	115.55	122.14	137.17	140.79	142.83	143.20	151.16	158.40	163.80	166.37	167.05	170.62	176.06	178.88
40.0	126.0	121.2	140.4	145.1	141.2	148.7	166.8	171.0	173.3	173.6	183.2	191.8	198.2	201.1	201.8	205.9	212.0	215.6
45.0	152.4	146.1	168.1	173.7	168.9	177.4	198.9	203.7	206.3	206.3	217.8	227.9	235.4	238.5	239.2	243.9	250.6	255.2
50.0	180.9	172.9	197.9	204.5	198.8	208.2	233.4	238.8	241.6	241.5	254.9	266.5	275.1	278.5	279.2	284.6	291.8	297.4
55.0	211.5	201.6	229.7	237.4	230.7	241.1	270.1	276.2	279.3	278.9	294.4	307.6	317.5	321.1	321.8	327.8	335.6	342.2
60.0	244.2	232.2	263.6	272.3	264.6	276.1	309.1	315.9	319.2	318.5	336.2	351.1	362.3	366.2	366.8	373.5	382.0	389.7
65.0	278.9	264.6	299.5	309.3	300.4	313.0	350.3	357.7	361.4	360.4	380.4	397.1	409.6	413.7	414.3	421.6	430.8	439.6
70.0	315.6	298.8	337.2	348.3	338.1	351.8	393.6	401.8	405.7	404.4	426.8	445.4	459.3	463.6	464.2	472.2	482.0	492.0
80.0	394.6	372.3	418.3	431.9	419.2	435.2	486.5	496.2	500.7	498.6	526.1	548.7	565.7	570.4	570.8	580.2	591.4	603.9
90.0	481.0	452.6	506.6	523.0	507.5	525.9	587.5	598.8	603.8	600.9	634.0	660.8	681.1	686.1	686.4	697.3	709.8	725.0
100.0	574.4	539.2	601.9	621.3	602.7	623.5	696.2	709.2	714.8	710.9	750.0	781.4	805.2	810.5	810.6	823.0	837.1	855.0
150.0	1140.	1061.	1175.	1211.	1175.	1209.	1348.	1370.	1379.	1368.	1443.	1501.	1546.	1552.	1561.	1572.	1594.	1627.
200.0	1852.	1713.	1889.	1948.	1890.	1940.	2159.	2194.	2204.	2184.	2303.	2375.	2450.	2472.	2469.	2499.	2517.	2581.
250.0	2689.	2472.	2720.	2806.	2728.	2788.	3103.	3160.	3161.	3129.	3300.	3388.	3497.	3541.	3533.	3580.	3584.	3686.
300.0	3628.	3322.	3651.	3767.	3668.	3738.	4158.	4253.	4231.	4186.	4414.	4520.	4667.	4734.	4720.	4788.	4775.	4918.
350.0	4656.	4252.	4670.	4818.	4694.	4777.	5313.	5451.	5399.	5340.	5630.	5755.	5943.	6034.	6015.	6104.	6073.	6260.
400.0	5763.	5252.	5765.	5950.	5798.	5892.	6551.	6736.	6653.	6578.	6935.	7082.	7314.	7430.	7404.	7515.	7465.	7699.
450.0	6940.	6315.	6927.	7148.	6970.	7076.	7865.	8097.	7984.	7890.	8318.	8488.	8767.	8909.	8876.	9010.	8940.	9224.
500.0	8178.	7432.	8149.	8410.	8200.	8320.	9246.	9527.	9381.	9269.	9770.	9966.	10293.	10461.	10420.	10580.	10489.	10823.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.42	13.93	15.05	15.34	15.92	16.74	17.23	17.86	18.24	18.61	18.99	19.40	19.80	20.17	20.65	20.82	22.33	22.81
3.0	15.27	15.86	16.98	17.26	17.85	18.78	19.34	20.09	20.52	20.95	21.37	21.82	22.31	22.71	23.22	23.39	25.00	25.52
3.5	17.08	17.76	18.87	19.14	19.74	20.78	21.40	22.26	22.73	23.21	23.68	24.16	24.73	25.17	25.70	25.86	27.59	28.13
4.0	18.88	19.64	20.75	21.00	21.62	22.76	23.44	24.40	24.91	25.44	25.95	26.46	27.11	27.58	28.14	28.30	30.13	30.71
4.5	20.68	21.53	22.64	22.87	23.49	24.74	25.47	26.53	27.07	27.66	28.20	28.75	29.47	29.97	30.56	30.71	32.65	33.26
5.0	22.50	23.42	24.53	24.75	25.38	26.72	27.50	28.66	29.24	29.87	30.46	31.03	31.82	32.35	32.97	33.11	35.17	35.80
5.5	24.33	25.34	26.44	26.65	27.28	28.71	29.55	30.81	31.42	32.10	32.72	33.32	34.18	34.73	35.38	35.52	37.69	38.35
6.0	26.18	27.27	28.37	28.57	29.20	30.73	31.62	32.97	33.61	34.33	34.99	35.63	36.55	37.13	37.81	37.94	40.22	40.91
6.5	28.06	29.23	30.32	30.51	31.14	32.78	33.71	35.14	35.82	36.59	37.28	37.95	38.93	39.55	40.25	40.38	42.77	43.49
7.0	29.96	31.22	32.31	32.48	33.11	34.83	35.83	37.35	38.05	38.87	39.60	40.29	41.34	41.98	42.72	42.84	45.34	46.09
8.0	33.85	35.28	36.36	36.50	37.13	39.04	40.15	41.84	42.59	43.51	44.31	45.06	46.23	46.93	47.73	47.84	50.57	51.38
9.0	37.86	39.46	40.54	40.65	41.27	43.37	44.59	46.44	47.26	48.26	49.13	49.94	51.23	51.99	52.85	52.95	55.92	56.79
10.0	42.01	43.78	44.85	44.93	45.64	47.82	49.15	51.18	52.05	53.14	54.08	54.94	56.36	57.17	58.10	58.19	61.40	62.33
11.0	46.28	48.23	49.29	49.34	49.94	52.41	53.85	56.04	56.97	58.15	59.16	60.08	61.62	62.48	63.49	63.56	67.02	68.01
12.0	50.68	52.82	53.87	53.89	54.47	57.14	58.69	61.04	62.02	63.29	64.38	65.35	67.01	67.93	69.01	69.07	72.78	73.84
15.0	64.70	67.41	68.43	68.34	68.86	72.13	74.02	76.88	78.01	79.55	80.87	82.01	84.04	85.12	86.44	86.46	90.96	92.21
20.0	90.71	94.48	95.44	95.15	95.51	99.84	102.35	106.06	107.44	109.46	111.17	112.59	115.25	116.61	118.37	118.32	124.26	125.86
25.0	119.99	124.92	125.79	125.28	125.43	130.91	134.08	138.67	140.31	142.83	144.96	146.69	150.01	151.62	153.90	153.77	161.29	163.28
30.0	152.43	158.64	159.41	158.65	158.52	165.24	169.12	174.64	176.53	179.57	182.17	184.20	188.22	190.10	192.95	192.73	201.97	204.36
35.0	187.93	195.52	196.18	195.14	194.70	202.74	207.38	213.86	216.01	219.61	222.68	225.05	229.80	231.93	235.42	235.10	246.19	249.02
40.0	226.4	235.5	236.0	234.7	233.9	243.3	248.8	256.2	258.7	262.8	266.4	269.1	274.7	277.0	281.2	280.8	293.9	297.2
45.0	267.8	278.4	278.8	277.2	275.9	286.9	293.2	301.7	304.4	309.2	313.3	316.4	322.7	325.3	330.3	329.7	344.9	348.7
50.0	311.9	324.3	324.5	322.5	320.8	333.4	340.5	350.2	353.1	358.5	363.2	366.7	373.8	376.7	382.4	381.8	399.2	403.5
55.0	358.9	373.0	373.1	370.7	368.5	382.7	390.8	401.5	404.8	410.8	416.1	420.0	428.0	431.1	437.7	436.9	456.7	461.5
60.0	408.5	424.5	424.4	421.6	418.8	434.7	443.8	455.8	459.3	466.0	472.0	476.2	485.1	488.5	496.0	495.0	517.3	522.7
65.0	460.7	478.7	478.3	475.1	471.8	489.5	499.6	512.8	516.5	524.0	530.6	535.2	545.1	548.7	557.2	556.0	580.9	586.9
70.0	515.4	535.5	534.9	531.3	527.3	547.0	558.1	572.5	576.6	584.8	592.0	597.1	607.9	611.7	621.2	619.9	647.5	654.1
80.0	632.4	656.9	655.8	651.2	645.9	669.5	682.9	699.8	704.5	714.2	723.0	728.9	741.8	746.1	757.7	756.0	789.3	797.2
90.0	759.0	788.3	786.6	781.0	774.1	802.1	817.8	837.4	842.7	854.1	864.3	871.2	886.3	891.0	904.9	902.9	942.3	951.5
100.0	894.8	929.2	927.0	920.2	911.6	944.1	962.4	984.8	990.8	1003.8	1015.7	1023.6	1040.9	1046.1	1062.5	1060.0	1106.1	1116.7
150.0	1702.	1766.	1760.	1747.	1727.	1787.	1820.	1858.	1867.	1890.	1911.	1925.	1955.	1962.	1993.	1988.	2073.	2092.
200.0	2698.	2800.	2790.	2769.	2735.	2827.	2876.	2933.	2946.	2979.	3012.	3032.	3077.	3088.	3137.	3128.	3234.	3289.
250.0	3663.	3995.	3992.	3961.	3909.	4038.	4104.	4181.	4196.	4242.	4291.	4317.	4377.	4396.	4464.	4451.	4569.	4668.
300.0	5139.	5327.	5339.	5301.	5230.	5392.	5471.	5573.	5585.	5648.	5718.	5746.	5822.	5851.	5943.	5925.	6054.	6201.
350.0	6541.	6778.	6806.	6763.	6670.	6865.	6959.	7087.	7098.	7178.	7271.	7301.	7393.	7434.	7551.	7528.	7668.	7866.
400.0	8043.	8333.	8377.	8329.	8213.	8444.	8554.	8708.	8718.	8816.	8932.	8966.	9076.	9128.	9272.	9243.	9396.	9649.
450.0	9634.	9980.	10041.	9988.	9847.	10115.	10242.	10424.	10433.	10549.	10691.	10727.	10855.	10919.	11092.	11057.	11224.	11533.
500.0	11304.	11708.	11787.	11727.	11571.	11868.	12012.	12224.	12231.	12367.	12534.	12574.	12720.	12797.	12999.	12959.	13141.	13608.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{93}_{41}$NB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	77.60	70.55	53.86	51.43	52.11	47.11	40.67	38.80	37.63	36.67	34.38	32.30	30.67	29.75	29.40	28.31	25.37	26.40
3.0	74.63	69.23	53.35	51.00	51.77	47.12	40.83	39.07	37.98	37.15	34.86	32.82	31.25	30.36	30.03	28.96	26.25	27.09
3.5	71.58	67.39	52.41	50.17	50.99	46.66	40.55	38.89	37.88	37.15	34.90	32.91	31.40	30.54	30.23	29.20	26.71	27.37
4.0	68.61	65.36	51.28	49.12	49.99	45.94	40.02	38.46	37.51	36.88	34.66	32.74	31.28	30.47	30.17	29.19	26.89	27.41
4.5	65.82	63.29	50.05	47.98	48.88	45.09	39.36	37.89	37.00	36.44	34.27	32.41	31.01	30.23	29.95	29.01	26.88	27.28
5.0	63.21	61.25	48.80	46.82	47.73	44.17	38.62	37.23	36.39	35.91	33.78	31.98	30.64	29.89	29.64	28.72	26.76	27.05
5.5	60.78	59.29	47.56	45.65	46.58	43.22	37.85	36.53	35.74	35.32	33.24	31.49	30.20	29.49	29.25	28.38	26.55	26.76
6.0	58.53	57.42	46.35	44.52	45.45	42.28	37.07	35.82	35.07	34.70	32.67	30.98	29.73	29.06	28.83	27.99	26.28	26.42
6.5	56.45	55.66	45.19	43.41	44.35	41.34	36.30	35.10	34.40	34.06	32.09	30.44	29.24	28.60	28.39	27.57	25.98	26.05
7.0	54.51	53.98	44.06	42.35	43.29	40.43	35.53	34.39	33.73	33.43	31.50	29.91	28.74	28.13	27.93	27.15	25.66	25.67
8.0	51.04	50.92	41.96	40.36	41.28	38.70	34.07	33.02	32.42	32.19	30.35	28.84	27.75	27.19	27.02	26.29	24.97	24.90
9.0	48.01	48.20	40.04	38.53	39.45	37.08	32.70	31.73	31.19	31.01	29.24	27.82	26.80	26.28	26.12	25.44	24.27	24.13
10.0	45.36	45.77	38.29	36.87	37.77	35.59	31.43	30.63	30.03	29.89	28.20	26.85	25.88	25.41	25.27	24.63	23.58	23.38
11.0	43.01	43.59	36.70	35.35	36.24	34.22	30.25	29.42	28.95	28.84	27.22	25.94	25.02	24.58	24.46	23.86	22.90	22.67
12.0	40.91	41.63	35.24	33.96	34.83	32.96	29.16	28.38	27.95	27.87	26.31	25.08	24.21	23.80	23.69	23.13	22.26	21.99
15.0	35.81	36.76	31.55	30.43	31.25	29.70	26.34	25.69	25.34	25.31	23.91	22.83	22.07	21.74	21.66	21.17	20.50	20.18
20.0	29.85	30.97	26.99	26.06	26.80	25.61	22.78	22.26	22.00	22.02	20.82	19.92	19.28	19.04	18.98	18.60	18.12	17.77
25.0	25.76	26.93	23.70	22.90	23.57	22.61	20.15	19.72	19.51	19.57	18.51	17.72	17.17	16.99	16.96	16.63	16.27	15.93
30.0	22.77	23.92	21.21	20.51	21.12	20.32	18.13	17.77	17.59	17.66	16.72	16.02	15.53	15.39	15.37	15.09	14.80	14.47
35.0	20.47	21.60	19.25	18.63	19.19	18.50	16.53	16.21	16.07	16.14	15.28	14.65	14.22	14.10	14.09	13.85	13.60	13.29
40.0	18.65	19.75	17.67	17.10	17.63	17.03	15.23	14.94	14.82	14.89	14.11	13.53	13.13	13.04	13.03	12.82	12.61	12.32
45.0	17.17	18.23	16.37	15.84	16.34	15.80	14.14	13.88	13.77	13.85	13.12	12.60	12.23	12.15	12.15	11.96	11.78	11.50
50.0	15.93	16.96	15.27	14.78	15.25	14.77	13.22	12.99	12.89	12.97	12.29	11.80	11.46	11.39	11.39	11.22	11.06	10.80
55.0	14.89	15.89	14.33	13.88	14.32	13.88	12.43	12.22	12.13	12.21	11.58	11.12	10.80	10.74	10.74	10.59	10.44	10.20
60.0	14.00	14.96	13.52	13.10	13.51	13.11	11.75	11.55	11.47	11.55	10.95	10.52	10.22	10.17	10.18	10.03	9.90	9.67
65.0	13.22	14.16	12.81	12.41	12.80	12.43	11.15	10.96	10.89	10.97	10.40	10.00	9.71	9.67	9.68	9.54	9.42	9.21
70.0	12.54	13.45	12.18	11.81	12.18	11.84	10.62	10.45	10.38	10.46	9.92	9.53	9.26	9.22	9.23	9.11	9.00	8.79
80.0	11.41	12.26	11.13	10.79	11.13	10.83	9.72	9.57	9.51	9.59	9.10	8.75	8.50	8.47	8.48	8.37	8.27	8.09
90.0	10.49	11.30	10.27	9.96	10.28	10.01	8.99	8.85	8.81	8.88	8.42	8.10	7.87	7.85	7.86	7.77	7.67	7.51
100.0	9.74	10.51	9.57	9.28	9.57	9.33	8.39	8.26	8.22	8.29	7.86	7.57	7.35	7.34	7.35	7.26	7.18	7.03
150.0	7.353	7.983	7.288	7.074	7.298	7.133	6.419	6.328	6.304	6.370	6.046	5.821	5.659	5.652	5.664	5.606	5.540	5.441
200.0	6.061	6.671	6.088	5.899	6.048	5.957	5.357	5.282	5.279	5.342	5.065	4.888	4.824	4.725	4.744	4.681	4.731	4.564
250.0	5.309	5.857	5.348	5.182	5.302	5.240	4.714	4.679	4.650	4.707	4.464	4.396	4.252	4.169	4.186	4.117	4.176	4.034
300.0	4.794	5.297	4.839	4.688	4.799	4.745	4.270	4.111	4.215	4.268	4.049	3.985	3.856	3.783	3.800	3.738	3.790	3.665
350.0	4.419	4.888	4.466	4.327	4.431	4.382	3.945	3.802	3.898	3.947	3.744	3.684	3.565	3.500	3.517	3.461	3.508	3.394
400.0	4.134	4.577	4.183	4.052	4.151	4.107	3.698	3.567	3.653	3.702	3.513	3.455	3.344	3.285	3.301	3.249	3.293	3.187
450.0	3.911	4.332	3.961	3.837	3.931	3.890	3.504	3.383	3.462	3.509	3.331	3.274	3.170	3.116	3.131	3.082	3.123	3.024
500.0	3.732	4.136	3.783	3.664	3.755	3.716	3.348	3.235	3.309	3.355	3.184	3.129	3.030	2.980	2.994	2.948	2.987	2.892

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	24.71	23.57	23.62	23.79	23.57	22.23	21.54	20.34	19.91	19.39	19.01	18.70	18.02	17.79	17.60	17.64	16.91	16.71
3.0	25.41	24.26	24.31	24.48	24.31	22.98	22.30	21.13	20.72	20.20	19.83	19.52	18.85	18.61	18.40	18.45	17.67	17.46
3.5	25.72	24.58	24.62	24.80	24.66	23.36	22.69	21.57	21.17	20.66	20.30	19.99	19.35	19.10	18.88	18.93	18.12	17.90
4.0	25.79	24.66	24.70	24.88	24.77	23.51	22.85	21.77	21.39	20.90	20.54	20.24	19.62	19.37	19.14	19.19	18.36	18.14
4.5	25.71	24.59	24.63	24.80	24.72	23.50	22.85	21.81	21.46	20.98	20.63	20.34	19.73	19.49	19.26	19.30	18.46	18.25
5.0	25.52	24.42	24.46	24.63	24.57	23.38	22.75	21.76	21.42	20.96	20.61	20.33	19.75	19.50	19.27	19.31	18.47	18.26
5.5	25.26	24.18	24.22	24.39	24.35	23.20	22.58	21.63	21.31	20.86	20.52	20.25	19.69	19.44	19.21	19.25	18.41	18.20
6.0	24.96	23.91	23.94	24.11	24.09	22.97	22.37	21.45	21.15	20.71	20.38	20.12	19.57	19.34	19.10	19.14	18.30	18.09
6.5	24.64	23.60	23.64	23.81	23.80	22.71	22.12	21.24	20.96	20.63	20.20	19.95	19.42	19.19	18.96	19.00	18.16	17.96
7.0	24.29	23.28	23.32	23.48	23.49	22.43	21.86	21.01	20.73	20.32	20.00	19.76	19.25	19.02	18.79	18.83	18.00	17.79
8.0	23.58	22.61	22.65	22.81	22.84	21.83	21.29	20.50	20.24	19.86	19.56	19.33	18.85	18.63	18.40	18.44	17.63	17.43
9.0	22.88	21.94	21.98	22.14	22.18	21.23	20.71	19.97	19.74	19.37	19.08	18.87	18.41	18.21	17.98	18.02	17.22	17.03
10.0	22.19	21.29	21.33	21.48	21.54	20.63	20.14	19.44	19.22	18.87	18.60	18.40	17.97	17.78	17.54	17.58	16.81	16.62
11.0	21.52	20.66	20.70	20.86	20.92	20.05	19.58	18.92	18.72	18.39	18.13	17.93	17.52	17.34	17.11	17.15	16.40	16.22
12.0	20.89	20.06	20.10	20.24	20.32	19.49	19.04	18.42	18.23	17.91	17.66	17.48	17.09	16.92	16.69	16.73	16.00	15.82
15.0	19.20	18.44	18.48	18.62	18.71	17.98	17.58	17.04	16.88	16.61	16.38	16.22	15.88	15.74	15.52	15.55	14.88	14.72
20.0	16.93	16.28	16.32	16.44	16.55	15.93	15.59	15.15	15.03	14.80	14.61	14.47	14.19	14.08	13.88	13.91	13.31	13.17
25.0	15.19	14.61	14.65	14.76	14.88	14.33	14.04	13.67	13.57	13.37	13.20	13.09	12.84	12.75	12.57	12.60	12.06	11.94
30.0	13.81	13.29	13.33	13.43	13.55	13.06	12.80	12.48	12.39	12.22	12.07	11.97	11.76	11.68	11.51	11.54	11.05	10.94
35.0	12.70	12.22	12.26	12.35	12.47	12.03	11.79	11.51	11.43	11.28	11.14	11.06	10.86	10.80	10.64	10.66	10.22	10.12
40.0	11.77	11.33	11.37	11.46	11.57	11.17	10.95	10.70	10.63	10.49	10.37	10.29	10.12	10.06	9.91	9.93	9.52	9.43
45.0	10.99	10.59	10.62	10.70	10.81	10.44	10.24	10.01	9.95	9.83	9.71	9.64	9.48	9.43	9.29	9.31	8.93	8.84
50.0	10.33	9.95	9.98	10.06	10.17	9.82	9.64	9.42	9.37	9.25	9.15	9.08	8.93	8.89	8.75	8.78	8.41	8.34
55.0	9.75	9.39	9.43	9.50	9.60	9.28	9.11	8.91	8.87	8.75	8.66	8.59	8.46	8.42	8.29	8.31	7.97	7.90
60.0	9.25	8.91	8.94	9.01	9.11	8.81	8.65	8.46	8.42	8.32	8.22	8.17	8.04	8.01	7.88	7.90	7.58	7.51
65.0	8.805	8.483	8.516	8.583	8.680	8.392	8.240	8.068	8.028	7.931	7.843	7.788	7.667	7.638	7.518	7.538	7.231	7.166
70.0	8.410	8.104	8.135	8.200	8.294	8.021	7.877	7.715	7.678	7.586	7.502	7.451	7.336	7.310	7.195	7.214	6.921	6.859
80.0	7.738	7.457	7.487	7.546	7.636	7.387	7.256	7.112	7.079	6.997	6.920	6.874	6.770	6.748	6.641	6.659	6.390	6.334
90.0	7.186	6.925	6.954	7.009	7.096	6.865	6.746	6.615	6.585	6.511	6.440	6.397	6.303	6.283	6.184	6.201	5.951	5.900
100.0	6.723	6.480	6.507	6.559	6.642	6.428	6.318	6.198	6.171	6.102	6.037	5.998	5.910	5.893	5.800	5.816	5.583	5.534
150.0	5.207	5.020	5.042	5.083	5.153	4.990	4.908	4.823	4.805	4.755	4.706	4.677	4.613	4.600	4.529	4.542	4.361	4.324
200.0	4.370	4.220	4.220	4.254	4.316	4.182	4.115	4.049	4.035	3.996	3.955	3.931	3.880	3.868	3.810	3.821	3.771	3.649
250.0	3.862	3.730	3.689	3.719	3.776	3.669	3.632	3.569	3.571	3.531	3.479	3.473	3.434	3.409	3.355	3.366	3.343	3.237
300.0	3.509	3.390	3.353	3.364	3.415	3.337	3.303	3.247	3.249	3.213	3.166	3.161	3.127	3.105	3.056	3.066	3.044	2.949
350.0	3.250	3.139	3.106	3.117	3.164	3.092	3.062	3.010	3.013	2.980	2.937	2.932	2.901	2.880	2.835	2.845	2.824	2.737
400.0	3.052	2.948	2.918	2.928	2.973	2.906	2.877	2.829	2.832	2.801	2.761	2.756	2.728	2.709	2.667	2.676	2.655	2.575
450.0	2.897	2.798	2.770	2.780	2.822	2.759	2.731	2.686	2.689	2.660	2.623	2.618	2.591	2.574	2.534	2.542	2.522	2.447
500.0	2.771	2.677	2.651	2.660	2.701	2.641	2.614	2.571	2.574	2.547	2.511	2.506	2.482	2.465	2.427	2.435	2.415	2.345

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

93 NB IONS
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E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.160	4.950	6.992	6.970	6.840	8.152	8.830	9.306	9.660	10.030	10.250	10.940	11.310	11.813	12.010	12.214	12.590	12.920
3.0	5.771	5.615	7.859	7.877	7.734	9.138	9.970	10.498	10.888	11.288	11.591	12.366	12.810	13.358	13.573	13.836	14.388	14.656
3.5	6.407	6.295	8.738	8.796	8.639	10.129	11.112	11.690	12.113	12.539	12.923	13.780	14.293	14.884	15.115	15.433	16.143	16.362
4.0	7.071	6.996	9.634	9.732	9.560	11.133	12.265	12.892	13.347	13.794	14.260	15.195	15.776	16.407	16.654	17.025	17.877	18.059
4.5	7.763	7.719	10.552	10.690	10.500	12.154	13.437	14.110	14.594	15.062	15.608	16.623	17.268	17.939	18.200	18.623	19.606	19.759
5.0	8.484	8.466	11.493	11.671	11.463	13.196	14.629	15.348	15.862	16.348	16.975	18.067	18.776	19.486	19.760	20.233	21.339	21.470
5.5	9.234	9.237	12.458	12.677	12.449	14.260	15.845	16.609	17.151	17.653	18.362	19.532	20.305	21.051	21.339	21.862	23.083	23.198
6.0	10.014	10.034	13.449	13.708	13.460	15.348	17.087	17.894	18.464	18.982	19.773	21.020	21.857	22.640	22.940	23.512	24.843	24.947
6.5	10.823	10.857	14.465	14.766	14.496	16.460	18.354	19.206	19.803	20.334	21.209	22.635	23.434	24.253	24.566	25.185	26.622	26.719
7.0	11.661	11.705	15.507	15.851	15.557	17.598	19.649	20.544	21.168	21.712	22.672	24.076	25.037	25.892	26.217	26.885	28.423	28.517
8.0	13.43	13.48	17.67	18.10	17.76	19.95	22.32	23.30	23.98	24.55	25.68	27.24	28.33	29.25	29.60	30.37	32.10	32.20
9.0	15.31	15.36	19.94	20.46	20.06	22.40	25.11	26.18	26.91	27.49	28.80	30.53	31.74	32.73	33.10	33.96	35.87	35.99
10.0	17.30	17.34	22.32	22.93	22.47	24.96	28.01	29.17	29.96	30.55	32.04	33.93	35.27	36.33	36.72	37.68	39.76	39.91
11.0	19.41	19.42	24.80	25.50	24.99	27.63	31.03	32.27	33.10	33.71	35.40	37.45	38.93	40.06	40.46	41.51	43.76	43.95
12.0	21.62	21.61	27.38	28.19	27.60	30.40	34.16	35.49	36.37	36.99	38.87	41.10	42.71	43.90	44.33	45.47	47.88	48.11
15.0	28.93	28.75	35.77	36.88	36.08	39.33	44.24	45.84	46.87	47.51	50.01	52.77	54.79	56.18	56.66	58.10	60.96	61.37
20.0	43.22	42.59	51.76	53.45	52.20	56.24	63.28	65.34	66.62	67.26	70.90	74.64	77.39	79.09	79.65	81.58	85.14	85.98
25.0	60.04	58.74	70.19	72.53	70.75	75.61	85.03	87.58	89.12	89.71	94.64	99.44	103.00	105.00	105.62	108.07	112.27	113.67
30.0	79.29	77.10	90.97	94.03	91.62	97.34	109.40	112.47	114.25	114.76	121.11	127.07	131.52	133.81	134.47	137.46	142.28	144.34
35.0	100.86	97.59	114.02	117.85	114.75	121.35	136.29	139.90	141.95	142.34	150.24	157.46	162.85	165.42	166.11	169.67	175.09	177.90
40.0	124.7	120.1	139.3	143.9	140.1	147.6	165.6	169.8	172.1	172.4	181.9	190.5	196.9	199.8	200.5	204.6	210.6	214.3
45.0	150.7	144.7	166.6	172.2	167.5	176.0	197.4	202.1	204.7	204.8	216.1	226.1	233.6	236.7	237.4	242.2	248.8	253.4
50.0	178.9	171.1	196.1	202.6	197.0	206.4	231.4	236.8	239.6	239.5	252.8	264.3	272.9	276.3	277.0	282.3	289.6	295.1
55.0	209.1	199.5	227.5	235.1	228.5	238.9	267.7	273.7	276.8	276.4	291.8	304.9	314.8	318.4	319.0	325.0	332.9	339.4
60.0	241.3	229.7	261.0	269.6	261.9	273.4	306.2	312.9	316.3	315.6	333.1	347.9	359.0	362.9	363.5	370.2	378.6	386.3
65.0	275.5	261.6	296.3	306.1	297.3	309.8	346.8	354.2	357.9	356.9	376.7	393.3	405.7	409.8	410.4	417.7	426.8	435.6
70.0	311.6	295.3	333.6	344.5	334.5	348.2	389.5	397.7	401.6	400.3	422.5	440.9	454.8	459.0	459.6	467.6	477.3	487.3
80.0	389.5	367.9	413.5	427.0	414.5	430.4	481.2	490.8	495.3	493.3	520.5	542.9	559.7	564.4	564.8	574.2	585.3	597.7
90.0	474.6	446.9	500.6	516.8	501.5	519.8	580.7	592.0	597.0	594.1	626.9	653.5	673.5	678.5	678.8	689.7	702.1	717.1
100.0	566.6	532.3	594.5	613.6	595.3	616.1	687.9	700.8	706.4	702.6	741.2	772.3	795.8	801.2	801.3	813.6	827.5	845.2
150.0	1123.	1047.	1158.	1195.	1159.	1193.	1330.	1352.	1360.	1350.	1424.	1481.	1525.	1532.	1531.	1551.	1574.	1606.
200.0	1825.	1688.	1862.	1920.	1863.	1912.	2129.	2163.	2173.	2153.	2270.	2342.	2415.	2438.	2434.	2464.	2482.	2546.
250.0	2648.	2435.	2680.	2765.	2688.	2747.	3057.	3114.	3114.	3084.	3252.	3339.	3446.	3489.	3481.	3529.	3532.	3633.
300.0	3572.	3272.	3596.	3710.	3612.	3682.	4096.	4189.	4167.	4124.	4348.	4452.	4597.	4663.	4650.	4717.	4704.	4845.
350.0	4584.	4187.	4598.	4744.	4622.	4704.	5231.	5367.	5317.	5258.	5544.	5668.	5853.	5943.	5924.	6012.	5981.	6166.
400.0	5673.	5172.	5675.	5857.	5708.	5801.	6450.	6632.	6551.	6476.	6828.	6973.	7202.	7316.	7290.	7400.	7351.	7582.
450.0	6830.	6217.	6819.	7037.	6861.	6965.	7743.	7971.	7859.	7768.	8189.	8357.	8631.	8771.	8738.	8878.	8802.	9081.
500.0	8048.	7316.	8021.	8278.	8071.	8189.	9101.	9378.	9234.	9124.	9618.	9810.	10132.	10298.	10258.	10415.	10326.	10654.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.57	14.08	15.22	15.51	16.09	16.92	17.42	18.06	18.44	18.82	19.20	19.61	20.02	20.39	20.87	21.04	22.57	23.06
3.0	15.42	16.02	17.16	17.44	18.03	18.98	19.54	20.30	20.73	21.16	21.59	22.04	22.54	22.94	23.45	23.62	25.26	25.78
3.5	17.24	17.93	19.05	19.32	19.93	20.98	21.60	22.47	22.95	23.43	23.91	24.39	24.97	25.40	25.94	26.10	27.85	28.40
4.0	19.04	19.81	20.94	21.19	21.81	22.96	23.64	24.62	25.13	25.67	26.18	26.70	27.35	27.82	28.38	28.54	30.40	30.98
4.5	20.85	21.70	22.82	23.06	23.69	24.94	25.68	26.75	27.30	27.89	28.44	28.99	29.71	30.21	30.80	30.95	32.93	33.54
5.0	22.66	23.60	24.72	24.94	25.58	26.93	27.72	28.89	29.47	30.11	30.69	31.28	32.07	32.60	33.22	33.36	35.44	36.08
5.5	24.49	25.51	26.63	26.84	27.48	28.92	29.77	31.03	31.64	32.33	32.95	33.57	34.43	34.98	35.63	35.77	37.96	38.63
6.0	26.35	27.45	28.56	28.76	29.40	30.94	31.84	33.19	33.83	34.57	35.23	35.87	36.80	37.38	38.06	38.19	40.50	41.19
6.5	28.22	29.40	30.51	30.70	31.34	32.97	33.93	35.37	36.04	36.82	37.52	38.19	39.18	39.80	40.50	40.63	43.05	43.77
7.0	30.12	31.39	32.49	32.66	33.30	35.03	36.04	37.57	38.27	39.10	39.83	40.53	41.59	42.23	42.97	43.09	45.62	46.37
8.0	34.01	35.44	36.54	36.68	37.32	39.23	40.35	42.05	42.81	43.73	44.53	45.29	46.47	47.17	47.97	48.08	50.84	51.65
9.0	38.01	39.62	40.71	40.82	41.45	43.55	44.78	46.64	47.46	48.47	49.35	50.16	51.46	52.22	53.08	53.18	56.17	57.05
10.0	42.14	43.92	45.00	45.09	45.71	48.00	49.33	51.36	52.24	53.33	54.28	55.15	56.57	57.38	58.32	58.41	61.64	62.58
11.0	46.40	48.36	49.43	49.48	50.09	52.57	54.02	56.21	57.14	58.33	59.35	60.27	61.81	62.68	63.69	63.76	67.24	68.24
12.0	50.78	52.92	53.99	54.01	54.60	57.28	58.83	61.20	62.18	63.45	64.55	65.52	67.19	68.11	69.19	69.25	72.98	74.05
15.0	64.72	67.44	68.48	68.39	68.92	72.19	74.09	76.95	78.09	79.64	80.96	82.10	84.13	85.22	86.53	86.56	91.08	92.34
20.0	90.57	94.33	95.31	95.03	95.40	99.73	102.24	105.95	107.33	109.35	111.07	112.50	115.16	116.51	118.27	118.22	124.17	125.78
25.0	119.61	124.54	125.43	124.93	125.08	130.55	133.73	138.31	139.95	142.47	144.60	146.33	149.65	151.26	153.54	153.41	160.93	162.92
30.0	151.76	157.95	158.75	157.99	157.89	164.58	168.46	173.97	175.85	178.89	181.48	183.52	187.53	189.40	192.25	192.03	201.26	203.65
35.0	186.91	194.47	195.16	194.13	193.71	201.72	206.35	212.81	214.95	218.54	221.61	223.98	228.71	230.83	234.32	233.99	245.07	247.89
40.0	225.0	234.0	234.6	233.3	232.5	241.9	247.3	254.8	257.2	261.3	264.9	267.6	273.1	275.5	279.6	279.2	292.3	295.5
45.0	265.9	276.5	276.9	275.3	274.1	285.0	291.2	299.7	302.4	307.2	311.3	314.3	320.6	323.2	328.2	327.6	342.7	346.5
50.0	309.6	321.8	322.1	320.1	318.5	330.9	338.1	347.6	350.6	356.0	360.6	364.1	371.2	374.0	379.8	379.1	396.4	400.7
55.0	355.9	370.0	370.1	367.7	365.5	379.6	387.7	398.4	401.6	407.6	412.9	416.7	424.7	427.8	434.4	433.5	453.2	458.0
60.0	404.9	420.8	420.7	417.9	415.3	431.1	440.1	451.9	455.4	462.2	468.1	472.3	481.1	484.5	491.9	491.0	513.1	518.5
65.0	456.4	474.3	474.0	470.8	467.6	485.2	495.2	508.2	512.0	519.4	526.0	530.6	540.4	544.0	552.4	551.2	575.9	581.9
70.0	510.5	530.4	529.9	526.3	522.4	541.9	553.0	567.2	571.3	579.4	586.6	591.7	602.4	606.2	615.6	614.3	641.7	648.2
80.0	625.9	650.2	649.2	644.6	639.4	662.8	676.1	692.9	697.5	707.2	715.8	721.8	734.5	738.8	750.3	748.6	781.7	789.5
90.0	750.8	779.8	778.2	772.6	766.8	793.5	809.2	828.6	833.9	845.1	855.3	862.1	877.0	881.7	895.5	893.5	932.6	941.7
100.0	884.7	918.7	916.6	909.9	901.4	933.8	951.7	974.0	979.9	992.8	1004.5	1012.4	1029.5	1034.7	1050.9	1048.5	1094.1	1104.6
150.0	1680.	1743.	1738.	1725.	1705.	1764.	1796.	1834.	1843.	1866.	1887.	1900.	1930.	1938.	1968.	1963.	2047.	2066.
200.0	2661.	2761.	2752.	2730.	2697.	2788.	2837.	2892.	2905.	2938.	2971.	2991.	3035.	3046.	3094.	3086.	3190.	3244.
250.0	3797.	3937.	3935.	3904.	3853.	3980.	4045.	4121.	4135.	4182.	4230.	4255.	4314.	4333.	4401.	4388.	4504.	4602.
300.0	5063.	5248.	5260.	5223.	5153.	5312.	5390.	5491.	5503.	5565.	5634.	5662.	5736.	5765.	5856.	5839.	5965.	6110.
350.0	6442.	6676.	6703.	6661.	6570.	6762.	6855.	6980.	6992.	7070.	7162.	7192.	7283.	7323.	7438.	7416.	7553.	7749.
400.0	7920.	8206.	8249.	8202.	8088.	8315.	8423.	8576.	8586.	8682.	8797.	8829.	8938.	8989.	9131.	9103.	9254.	9502.
450.0	9485.	9837.	9886.	9834.	9695.	9959.	10084.	10264.	10272.	10387.	10526.	10562.	10688.	10752.	10922.	10887.	11052.	11356.
500.0	11128.	11526.	11603.	11545.	11392.	11683.	11826.	12034.	12041.	12175.	12339.	12379.	12523.	12599.	12798.	12758.	12938.	13299.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

98 MO IONS 42

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	80.25	72.62	65.51	62.99	63.69	48.51	41.87	39.94	38.73	37.74	35.38	33.23	31.56	30.60	30.24	29.11	26.09	27.15
3.0	77.26	71.37	65.03	62.60	63.39	46.56	42.07	40.25	39.12	38.26	35.91	33.80	32.18	31.26	30.91	29.82	27.02	27.88
3.5	74.16	69.57	64.10	61.78	62.62	46.12	41.82	40.10	39.05	38.30	35.97	33.92	32.36	31.47	31.14	30.09	27.51	28.20
4.0	71.14	67.54	62.96	60.73	61.62	47.41	41.30	39.68	38.70	38.04	35.75	33.76	32.26	31.41	31.11	30.09	27.71	28.25
4.5	68.28	65.45	61.73	49.59	60.50	46.56	40.64	39.11	38.19	37.61	35.37	33.44	32.00	31.19	30.90	29.92	27.73	28.14
5.0	65.60	63.39	60.46	48.40	49.34	45.64	39.90	38.45	37.59	37.08	34.89	33.02	31.63	30.86	30.59	29.65	27.61	27.92
5.5	63.12	61.40	49.21	47.22	48.18	44.68	39.12	37.75	36.93	36.49	34.34	32.53	31.19	30.46	30.21	29.30	27.41	27.63
6.0	60.81	59.50	47.98	46.07	47.03	43.72	38.33	37.03	36.26	35.86	33.77	32.01	30.72	30.02	29.79	28.91	27.15	27.29
6.5	58.66	57.69	46.78	44.94	45.91	42.77	37.55	36.30	35.57	35.23	33.18	31.48	30.23	29.56	29.34	28.50	26.85	26.92
7.0	56.67	55.99	45.64	43.86	44.82	41.85	36.77	35.59	34.89	34.59	32.58	30.93	29.73	29.09	28.88	28.07	26.53	26.54
8.0	53.09	52.85	43.49	41.82	42.78	40.08	35.28	34.19	33.57	33.32	31.41	29.85	28.73	28.14	27.96	27.20	25.84	25.76
9.0	49.97	50.06	41.52	39.96	40.91	38.43	33.88	32.88	32.31	32.12	30.29	28.81	27.75	27.21	27.05	26.34	25.13	24.98
10.0	47.22	47.56	39.73	38.25	39.19	36.91	32.58	31.65	31.13	30.98	29.23	27.82	26.82	26.33	26.18	25.52	24.42	24.22
11.0	44.79	45.32	38.10	36.70	37.61	35.50	31.38	30.51	30.03	29.91	28.23	26.89	25.94	25.48	25.35	24.73	23.74	23.50
12.0	42.63	43.30	36.60	35.27	36.17	34.21	30.26	29.45	29.00	28.91	27.30	26.02	25.11	24.69	24.57	23.98	23.08	22.81
15.0	37.34	38.28	32.80	31.64	32.48	30.86	27.37	26.69	26.32	26.29	24.84	23.71	22.92	22.57	22.49	21.98	21.28	20.95
20.0	31.16	32.29	28.10	27.13	27.90	26.65	23.70	23.16	22.88	22.91	21.66	20.72	20.05	19.80	19.74	19.34	18.84	18.48
25.0	26.91	28.09	24.70	23.87	24.57	23.56	20.99	20.54	20.32	20.38	19.28	18.46	17.88	17.69	17.65	17.32	16.93	16.58
30.0	23.79	24.98	22.12	21.39	22.03	21.19	18.91	18.52	18.34	18.41	17.42	16.70	16.19	16.03	16.01	15.73	15.42	15.08
35.0	21.40	22.56	20.10	19.44	20.03	19.31	17.25	16.91	16.76	16.84	15.94	15.29	14.83	14.70	14.69	14.44	14.18	13.86
40.0	19.51	20.63	18.45	17.86	18.41	17.78	15.89	15.60	15.46	15.55	14.72	14.13	13.71	13.60	13.60	13.38	13.16	12.86
45.0	17.96	19.05	17.10	16.55	17.07	16.50	14.77	14.50	14.38	14.47	13.71	13.15	12.77	12.68	12.68	12.48	12.29	12.01
50.0	16.67	17.74	15.96	15.45	15.93	15.43	13.81	13.57	13.47	13.55	12.84	12.33	11.97	11.90	11.90	11.72	11.55	11.28
55.0	15.59	16.62	14.98	14.51	14.97	14.51	13.00	12.77	12.68	12.76	12.10	11.62	11.28	11.22	11.23	11.06	10.91	10.66
60.0	14.65	15.65	14.14	13.70	14.13	13.71	12.29	12.08	11.99	12.08	11.45	11.00	10.68	10.63	10.64	10.49	10.35	10.11
65.0	13.85	14.81	13.40	12.98	13.39	13.01	11.66	11.47	11.39	11.48	10.88	10.46	10.16	10.11	10.12	9.98	9.85	9.62
70.0	13.14	14.07	12.75	12.35	12.75	12.39	11.11	10.93	10.86	10.94	10.37	9.97	9.69	9.65	9.66	9.53	9.41	9.19
80.0	11.95	12.84	11.65	11.29	11.65	11.34	10.18	10.01	9.96	10.04	9.52	9.15	8.89	8.86	8.87	8.76	8.65	8.46
90.0	11.00	11.84	10.76	10.43	10.76	10.48	9.42	9.27	9.22	9.30	8.82	8.48	8.24	8.22	8.23	8.13	8.03	7.86
100.0	10.21	11.01	10.02	9.72	10.03	9.77	8.78	8.65	8.60	8.68	8.23	7.92	7.70	7.68	7.69	7.60	7.51	7.36
150.0	7.709	8.367	7.640	7.415	7.649	7.475	6.728	6.632	6.607	6.676	6.336	6.101	5.930	5.923	5.936	5.874	5.805	5.701
200.0	6.356	6.994	6.384	6.185	6.342	6.247	5.617	5.517	5.536	5.601	5.310	5.230	5.058	4.954	4.974	4.908	4.960	4.786
250.0	5.569	6.142	5.609	5.435	5.561	5.496	4.944	4.802	4.877	4.937	4.682	4.610	4.469	4.372	4.391	4.317	4.379	4.230
300.0	5.029	5.555	5.076	4.918	5.034	4.977	4.479	4.312	4.421	4.477	4.247	4.180	4.044	3.968	3.986	3.921	3.976	3.844
350.0	4.636	5.127	4.686	4.540	4.648	4.598	4.139	3.989	4.087	4.140	3.928	3.865	3.740	3.672	3.689	3.630	3.680	3.560
400.0	4.338	4.801	4.389	4.252	4.355	4.308	3.880	3.743	3.833	3.884	3.685	3.624	3.508	3.446	3.463	3.408	3.454	3.343
450.0	4.104	4.545	4.156	4.026	4.125	4.082	3.676	3.550	3.633	3.682	3.495	3.435	3.326	3.269	3.285	3.234	3.277	3.172
500.0	3.916	4.339	3.969	3.844	3.940	3.899	3.512	3.395	3.472	3.520	3.341	3.283	3.179	3.126	3.142	3.093	3.134	3.035

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	25.41	24.23	24.28	24.46	24.24	22.86	22.15	20.92	20.47	19.93	19.55	19.23	18.53	18.29	18.09	18.14	17.38	17.18
3.0	26.15	24.97	25.01	25.19	25.01	23.65	22.94	21.75	21.32	20.79	20.40	20.08	19.40	19.15	18.94	18.98	18.18	17.97
3.5	26.50	25.31	25.36	25.54	25.39	24.06	23.36	22.21	21.80	21.28	20.90	20.59	19.92	19.66	19.44	19.49	18.65	18.43
4.0	26.59	25.42	25.46	25.64	25.53	24.22	23.54	22.43	22.04	21.53	21.16	20.86	20.21	19.95	19.72	19.77	18.91	18.69
4.5	26.51	25.36	25.40	25.58	25.49	24.23	23.56	22.49	22.12	21.63	21.26	20.97	20.35	20.09	19.85	19.90	19.03	18.81
5.0	26.33	25.20	25.24	25.41	25.35	24.12	23.47	22.45	22.10	21.62	21.26	20.97	20.37	20.12	19.88	19.92	19.05	18.83
5.5	26.08	24.97	25.01	25.18	25.14	23.95	23.31	22.32	21.99	21.53	21.18	20.90	20.32	20.07	19.82	19.87	19.00	18.78
6.0	25.78	24.69	24.73	24.90	24.88	23.72	23.10	22.15	21.84	21.38	21.04	20.78	20.21	19.96	19.72	19.77	18.90	18.68
6.5	25.46	24.39	24.42	24.60	24.59	23.46	22.86	21.94	21.64	21.20	20.87	20.61	20.06	19.82	19.58	19.62	18.76	18.55
7.0	25.11	24.06	24.10	24.27	24.28	23.18	22.59	21.71	21.42	21.00	20.67	20.42	19.89	19.66	19.41	19.45	18.60	18.39
8.0	24.40	23.39	23.43	23.59	23.62	22.58	22.02	21.20	20.94	20.53	20.23	19.99	19.49	19.27	19.02	19.07	18.23	18.02
9.0	23.68	22.71	22.75	22.91	22.96	21.97	21.44	20.67	20.42	20.04	19.75	19.52	19.05	18.84	18.60	18.64	17.82	17.62
10.0	22.98	22.05	22.09	22.24	22.30	21.36	20.85	20.13	19.91	19.54	19.26	19.05	18.60	18.40	18.16	18.20	17.40	17.21
11.0	22.31	21.41	21.45	21.60	21.67	20.77	20.29	19.60	19.39	19.05	18.78	18.58	18.15	17.97	17.73	17.77	16.99	16.80
12.0	21.66	20.80	20.84	20.99	21.07	20.21	19.74	19.09	18.90	18.57	18.31	18.12	17.71	17.54	17.30	17.34	16.58	16.40
15.0	19.93	19.15	19.19	19.33	19.42	18.66	18.24	17.69	17.52	17.23	17.00	16.84	16.48	16.33	16.10	16.14	15.44	15.27
20.0	17.61	16.93	16.97	17.09	17.21	16.56	16.20	15.75	15.62	15.38	15.18	15.04	14.75	14.63	14.42	14.45	13.83	13.69
25.0	15.81	15.21	15.25	15.36	15.48	14.92	14.61	14.22	14.12	13.91	13.74	13.62	13.37	13.27	13.08	13.11	12.55	12.42
30.0	14.39	13.85	13.89	13.99	14.11	13.61	13.33	13.00	12.91	12.73	12.57	12.47	12.25	12.17	11.99	12.01	11.51	11.39
35.0	13.24	12.74	12.78	12.88	13.00	12.54	12.29	12.00	11.92	11.76	11.62	11.52	11.32	11.26	11.09	11.11	10.65	10.55
40.0	12.28	11.82	11.86	11.95	12.07	11.65	11.43	11.16	11.09	10.94	10.82	10.73	10.55	10.49	10.33	10.36	9.93	9.83
45.0	11.48	11.05	11.09	11.17	11.29	10.90	10.69	10.45	10.39	10.25	10.14	10.06	9.89	9.84	9.69	9.72	9.31	9.23
50.0	10.79	10.39	10.42	10.51	10.62	10.26	10.06	9.84	9.79	9.66	9.55	9.48	9.33	9.28	9.14	9.16	8.78	8.70
55.0	10.19	9.81	9.85	9.93	10.03	9.70	9.52	9.31	9.26	9.15	9.04	8.98	8.83	8.79	8.66	8.68	8.32	8.25
60.0	9.67	9.31	9.35	9.42	9.52	9.21	9.04	8.85	8.80	8.69	8.59	8.53	8.40	8.36	8.23	8.26	7.92	7.85
65.0	9.205	8.869	8.902	8.973	9.074	8.773	8.614	8.434	8.392	8.290	8.198	8.141	8.014	7.983	7.858	7.879	7.557	7.489
70.0	8.796	8.474	8.507	8.574	8.673	8.387	8.236	8.067	8.028	7.932	7.844	7.790	7.670	7.642	7.522	7.542	7.235	7.171
80.0	8.095	7.801	7.832	7.894	7.989	7.727	7.591	7.439	7.405	7.319	7.239	7.190	7.082	7.058	6.947	6.965	6.684	6.625
90.0	7.520	7.248	7.277	7.335	7.426	7.185	7.059	6.922	6.891	6.813	6.739	6.694	6.596	6.575	6.471	6.489	6.227	6.173
100.0	7.039	6.784	6.812	6.867	6.953	6.729	6.613	6.488	6.460	6.388	6.319	6.278	6.187	6.168	6.071	6.088	5.843	5.793
150.0	5.457	5.261	5.283	5.326	5.399	5.229	5.143	5.054	5.035	4.983	4.931	4.900	4.833	4.820	4.745	4.759	4.569	4.531
200.0	4.581	4.424	4.424	4.460	4.525	4.385	4.315	4.245	4.231	4.189	4.146	4.121	4.068	4.055	3.994	4.006	3.953	3.825
250.0	4.050	3.912	3.869	3.900	3.960	3.848	3.809	3.742	3.745	3.703	3.648	3.642	3.602	3.575	3.518	3.530	3.506	3.394
300.0	3.681	3.555	3.517	3.529	3.581	3.500	3.465	3.406	3.408	3.370	3.321	3.315	3.280	3.256	3.205	3.216	3.193	3.093
350.0	3.410	3.293	3.259	3.270	3.319	3.244	3.212	3.158	3.160	3.126	3.081	3.075	3.043	3.022	2.974	2.984	2.962	2.872
400.0	3.202	3.093	3.062	3.072	3.119	3.048	3.018	2.968	2.971	2.938	2.897	2.891	2.862	2.842	2.798	2.807	2.785	2.702
450.0	3.039	2.936	2.907	2.916	2.961	2.894	2.865	2.818	2.821	2.791	2.752	2.746	2.719	2.700	2.659	2.667	2.648	2.568
500.0	2.908	2.809	2.782	2.791	2.834	2.771	2.742	2.698	2.701	2.672	2.635	2.630	2.604	2.586	2.547	2.555	2.533	2.460

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

98
MO IONS
42

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.330	5.110	7.219	7.200	7.070	8.414	9.110	9.603	9.970	10.350	10.580	11.290	11.670	12.194	12.400	12.610	12.992	13.330
3.0	5.952	5.790	8.105	8.127	7.964	9.422	10.276	10.823	11.227	11.638	11.953	12.750	13.205	13.776	14.000	14.270	14.834	15.108
3.5	6.599	6.485	9.003	9.066	8.908	10.435	11.443	12.042	12.480	12.917	13.315	14.198	14.722	15.337	15.578	15.905	16.629	16.854
4.0	7.274	7.200	9.918	10.022	9.848	11.461	12.622	13.270	13.740	14.200	14.681	15.643	16.238	16.896	17.151	17.532	18.402	18.589
4.5	7.977	7.937	10.854	10.998	10.808	12.503	13.818	14.513	15.014	15.496	16.058	17.101	17.763	18.460	18.731	19.166	20.169	20.326
5.0	8.709	8.698	11.813	11.998	11.789	13.566	15.035	15.777	16.307	16.807	17.453	18.575	19.303	20.039	20.325	20.810	21.940	22.074
5.5	9.471	9.483	12.796	13.023	12.794	14.651	16.275	17.063	17.622	18.139	18.868	20.070	20.863	21.637	21.936	22.472	23.720	23.838
6.0	10.262	10.294	13.805	14.074	13.824	15.760	17.540	18.373	18.961	19.493	20.307	21.588	22.445	23.258	23.570	24.155	25.516	25.623
6.5	11.083	11.130	14.839	15.151	14.879	16.893	18.832	19.710	20.326	20.872	21.771	23.132	24.053	24.902	25.227	25.862	27.330	27.430
7.0	11.933	11.992	15.900	16.256	15.959	18.051	20.151	21.073	21.716	22.276	23.261	24.702	25.687	26.573	26.910	27.594	29.166	29.263
8.0	13.72	13.79	18.10	18.54	18.20	20.44	22.87	23.88	24.58	25.16	26.32	27.93	29.04	30.00	30.36	31.14	32.91	33.01
9.0	15.62	15.70	20.41	20.94	20.54	22.94	25.71	26.81	27.56	28.16	29.50	31.27	32.51	33.54	33.92	34.80	36.75	36.87
10.0	17.64	17.71	22.82	23.45	22.99	25.54	28.66	29.84	30.65	31.27	32.80	34.73	36.10	37.20	37.61	38.58	40.71	40.86
11.0	19.77	19.82	25.34	26.06	25.54	28.25	31.72	33.00	33.85	34.48	36.21	38.31	39.82	40.99	41.41	42.48	44.78	44.97
12.0	22.02	22.03	27.96	28.79	28.20	31.07	34.90	36.27	37.17	37.82	39.74	42.02	43.66	44.89	45.34	46.51	48.97	49.20
15.0	29.41	29.27	38.46	37.61	36.79	40.13	45.13	46.77	47.83	48.49	51.04	53.87	55.93	57.36	57.86	59.32	62.25	62.66
20.0	43.84	43.27	52.66	54.39	53.12	57.27	64.43	66.54	67.85	68.51	72.22	76.03	78.85	80.60	81.17	83.14	86.77	87.62
25.0	60.82	59.59	71.31	73.69	71.89	76.86	86.44	89.05	90.62	91.24	96.25	101.14	104.77	106.83	107.47	109.97	114.25	115.67
30.0	80.22	78.13	92.31	95.41	92.99	98.83	111.08	114.21	116.04	116.67	123.03	129.10	133.62	135.97	136.65	139.70	144.61	146.70
35.0	101.97	98.80	115.58	119.48	116.34	123.09	138.25	141.93	144.03	144.44	152.46	159.81	165.28	167.92	168.64	172.26	177.78	180.63
40.0	126.0	121.5	141.1	145.8	141.9	149.6	167.9	172.1	174.5	174.8	184.5	193.2	199.7	202.6	203.3	207.5	213.7	217.4
45.0	152.2	146.3	168.7	174.3	169.6	178.2	199.9	204.8	207.4	207.5	219.0	229.2	236.8	239.9	240.7	245.5	252.2	256.8
50.0	180.5	172.9	198.4	205.0	199.3	208.9	234.2	239.7	242.6	242.5	256.0	267.7	276.4	279.9	280.6	286.0	293.4	299.0
55.0	211.0	201.5	230.1	237.7	231.0	241.7	270.8	277.0	280.1	279.8	295.3	308.6	318.6	322.3	323.0	329.1	337.0	343.7
60.0	243.4	231.9	263.8	272.5	264.8	276.5	309.6	316.4	319.9	319.2	337.0	352.0	363.3	367.2	367.9	374.6	383.2	390.9
65.0	277.8	264.1	299.4	309.3	300.4	313.2	350.6	358.1	361.8	360.9	380.9	397.7	410.3	414.5	415.1	422.5	431.7	440.6
70.0	314.2	298.1	336.9	348.0	337.9	351.8	393.6	401.9	405.9	404.6	427.0	445.7	459.7	464.1	464.7	472.8	482.7	492.7
80.0	392.5	371.1	417.4	431.1	418.4	434.6	485.9	495.7	500.2	498.2	526.8	548.4	565.4	570.2	570.7	580.2	591.4	603.9
90.0	478.1	451.2	505.0	521.4	506.0	524.6	586.1	597.5	602.6	599.8	632.8	659.7	680.0	685.2	685.5	696.4	709.1	724.2
100.0	570.7	536.6	599.5	618.9	600.4	621.5	694.0	707.1	712.8	709.0	747.9	779.4	803.1	808.6	808.8	821.2	835.3	853.2
150.0	1130.	1054.	1167.	1203.	1167.	1204.	1339.	1362.	1371.	1360.	1434.	1493.	1537.	1544.	1542.	1563.	1586.	1619.
200.0	1835.	1699.	1874.	1933.	1875.	1926.	2142.	2177.	2187.	2168.	2286.	2358.	2432.	2455.	2451.	2481.	2499.	2563.
250.0	2662.	2449.	2696.	2781.	2704.	2764.	3076.	3133.	3133.	3103.	3272.	3359.	3467.	3511.	3503.	3551.	3555.	3656.
300.0	3590.	3290.	3616.	3731.	3632.	3703.	4119.	4213.	4191.	4147.	4373.	4478.	4624.	4690.	4677.	4744.	4732.	4874.
350.0	4607.	4210.	4623.	4770.	4647.	4729.	5269.	5397.	5346.	5287.	5575.	5699.	5886.	5976.	5957.	6045.	6016.	6201.
400.0	5701.	5199.	5704.	5886.	5737.	5831.	6483.	6668.	6585.	6511.	6864.	7010.	7240.	7355.	7329.	7440.	7391.	7623.
450.0	6863.	6249.	6853.	7072.	6895.	7001.	7782.	8012.	7900.	7808.	8231.	8400.	8676.	8816.	8784.	8917.	8848.	9128.
500.0	8087.	7363.	8060.	8318.	8111.	8230.	9147.	9425.	9280.	9170.	9668.	9860.	10184.	10350.	10310.	10468.	10378.	10709.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.00	14.53	15.70	16.00	16.60	17.46	17.97	18.63	19.02	19.40	19.80	20.22	20.64	21.03	21.53	21.71	23.28	23.78
3.0	15.90	16.52	17.69	17.97	18.59	19.56	20.14	20.92	21.36	21.81	22.25	22.71	23.22	23.64	24.17	24.35	26.03	26.56
3.5	17.76	18.47	19.63	19.90	20.53	21.61	22.25	23.15	23.63	24.13	24.62	25.12	25.71	26.16	26.72	26.89	28.69	29.25
4.0	19.60	20.40	21.56	21.82	22.46	23.64	24.34	25.34	25.87	26.42	26.95	27.48	28.15	28.64	29.22	29.39	31.30	31.89
4.5	21.45	22.33	23.48	23.73	24.38	25.66	26.42	27.52	28.08	28.69	29.26	29.82	30.57	31.08	31.70	31.85	33.88	34.50
5.0	23.30	24.26	25.42	25.65	26.30	27.69	28.50	29.70	30.30	30.96	31.56	32.16	32.97	33.52	34.16	34.31	36.45	37.10
5.5	25.17	26.22	27.37	27.59	28.24	29.73	30.60	31.89	32.52	33.23	33.87	34.50	35.38	35.96	36.63	36.78	39.02	39.71
6.0	27.08	28.19	29.34	29.54	30.20	31.78	32.71	34.10	34.76	35.51	36.19	36.85	37.80	38.41	39.11	39.25	41.61	42.33
6.5	28.97	30.19	31.33	31.52	32.18	33.86	34.84	36.32	37.01	37.81	38.53	39.22	40.23	40.87	41.60	41.74	44.21	44.96
7.0	30.91	32.21	33.35	33.53	34.19	35.96	37.00	38.56	39.29	40.13	40.89	41.60	42.69	43.35	44.12	44.24	46.84	47.61
8.0	34.87	36.34	37.48	37.62	38.26	40.25	41.39	43.13	43.91	44.85	45.68	46.45	47.66	48.38	49.21	49.33	52.16	52.99
9.0	38.95	40.59	41.72	41.84	42.49	44.64	45.90	47.81	48.65	49.68	50.58	51.41	52.75	53.53	54.42	54.53	57.59	58.49
10.0	43.15	44.97	46.09	46.18	46.82	49.17	50.54	52.62	53.51	54.63	55.61	56.50	57.95	58.79	59.76	59.85	63.16	64.12
11.0	47.48	49.48	50.59	50.65	51.28	53.82	55.30	57.55	58.50	59.71	60.76	61.70	63.29	64.18	65.22	65.30	68.86	69.88
12.0	51.93	54.13	55.23	55.25	55.86	58.60	60.20	62.61	63.62	64.92	66.04	67.05	68.75	69.70	70.81	70.88	74.70	75.79
15.0	66.09	68.87	69.95	69.86	70.41	73.76	75.70	78.62	79.79	81.37	82.72	83.89	85.97	87.08	88.43	88.46	93.08	94.37
20.0	92.31	96.15	97.16	96.88	97.27	101.69	104.25	108.04	109.45	111.52	113.27	114.73	117.44	118.83	120.64	120.60	126.67	128.31
25.0	121.73	126.74	127.67	127.17	127.34	132.92	136.15	140.83	142.50	145.07	147.25	149.01	152.39	154.04	156.37	156.24	163.91	165.94
30.0	154.25	160.55	161.39	160.63	160.54	167.36	171.30	176.91	178.84	181.93	184.57	186.65	190.73	192.65	195.55	195.34	204.74	207.18
35.0	189.79	197.48	198.20	197.17	196.76	204.91	209.62	216.19	218.38	222.03	225.16	227.56	232.38	234.55	238.10	237.78	249.04	251.92
40.0	228.3	237.4	238.0	236.7	235.9	245.5	251.0	258.6	261.0	265.3	268.9	271.7	277.2	279.7	283.9	283.5	296.7	300.1
45.0	269.6	280.3	280.8	279.1	277.9	289.0	295.4	304.0	306.7	311.5	315.7	318.8	325.2	327.9	332.9	332.4	347.7	351.6
50.0	313.6	326.1	326.4	324.4	322.7	336.4	342.6	352.3	355.3	360.8	366.6	369.1	376.3	379.2	385.0	384.3	401.9	406.3
55.0	360.4	374.7	374.8	372.4	370.2	384.5	392.7	403.6	406.8	413.0	418.3	422.2	430.3	433.4	440.1	439.3	459.3	464.1
60.0	409.8	425.9	425.9	423.1	420.4	436.4	445.6	457.6	461.1	467.9	473.9	478.2	487.2	490.6	498.2	497.2	519.6	525.1
65.0	461.8	479.9	479.6	476.4	473.1	491.0	501.1	514.3	518.2	525.7	532.3	537.0	547.0	550.6	559.1	558.0	583.0	589.0
70.0	516.2	536.4	535.9	532.3	528.4	548.1	559.3	573.8	577.9	586.1	593.5	598.6	609.5	613.3	622.9	621.8	649.3	656.9
80.0	632.5	657.1	656.1	651.5	646.2	670.0	683.4	700.4	705.1	714.9	723.6	729.7	742.6	746.9	758.6	756.9	790.4	798.2
90.0	758.2	787.5	786.1	780.4	773.6	801.6	817.4	837.1	842.4	853.8	864.1	871.0	886.1	890.9	904.9	902.8	942.4	951.6
100.0	893.0	927.4	925.3	918.6	910.1	942.7	961.0	983.4	989.4	1002.5	1014.4	1022.3	1039.6	1044.9	1061.3	1058.8	1105.0	1115.6
150.0	1693.	1757.	1751.	1738.	1719.	1778.	1811.	1849.	1858.	1881.	1902.	1916.	1946.	1953.	1984.	1979.	2064.	2082.
200.0	2680.	2780.	2771.	2749.	2716.	2807.	2857.	2913.	2926.	2959.	2992.	3012.	3057.	3068.	3116.	3108.	3213.	3267.
250.0	3821.	3962.	3960.	3928.	3878.	4006.	4071.	4148.	4162.	4209.	4256.	4282.	4342.	4361.	4429.	4417.	4538.	4632.
300.0	5093.	5279.	5291.	5254.	5184.	5344.	5423.	5523.	5536.	5599.	5668.	5696.	5771.	5800.	5892.	5874.	6002.	6147.
350.0	6478.	6713.	6741.	6699.	6607.	6801.	6894.	7020.	7032.	7111.	7203.	7233.	7324.	7365.	7481.	7458.	7597.	7794.
400.0	7963.	8250.	8294.	8247.	8132.	8361.	8469.	8623.	8633.	8730.	8845.	8878.	8987.	9039.	9182.	9153.	9305.	9555.
450.0	9535.	9878.	9938.	9885.	9746.	10012.	10137.	10318.	10327.	10442.	10582.	10618.	10745.	10809.	10980.	10946.	11112.	11417.
500.0	11184.	11585.	11662.	11615.	11439.	11743.	11886.	12096.	12103.	12238.	12403.	12443.	12588.	12664.	12864.	12824.	13005.	13401.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

98 TC IONS 43

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	82.92	74.67	57.16	54.56	55.26	49.90	43.07	41.08	39.83	38.80	36.38	34.16	32.44	31.45	31.07	29.92	26.81	27.90
3.0	79.91	73.51	56.71	54.20	55.00	50.00	43.31	41.43	40.27	39.38	36.95	34.78	33.11	32.15	31.79	30.67	27.79	28.67
3.5	76.76	71.74	55.79	53.39	54.25	49.59	43.08	41.31	40.22	39.44	37.04	34.93	33.31	32.39	32.06	30.97	28.32	29.02
4.0	73.69	69.71	54.65	52.34	53.25	48.89	42.57	40.90	39.88	39.20	36.84	34.79	33.24	32.36	32.04	30.99	28.54	29.09
4.5	70.76	67.62	53.41	51.19	52.13	48.04	41.92	40.34	39.38	38.78	36.47	34.48	32.98	32.14	31.86	30.84	28.57	29.00
5.0	68.02	65.54	52.13	50.00	50.96	47.11	41.18	39.68	38.78	38.26	35.99	34.06	32.62	31.82	31.54	30.57	28.47	28.78
5.5	65.47	63.52	50.85	48.80	49.78	46.14	40.39	38.97	38.13	37.66	35.45	33.57	32.19	31.43	31.17	30.23	28.28	28.50
6.0	63.10	61.59	49.60	47.63	48.61	45.17	39.60	38.25	37.45	37.04	34.87	33.05	31.72	30.99	30.75	29.84	28.02	28.16
6.5	60.90	59.75	48.39	46.48	47.47	44.21	38.80	37.51	36.75	36.39	34.27	32.51	31.22	30.53	30.30	29.43	27.73	27.80
7.0	58.85	58.00	47.22	45.38	46.37	43.27	38.02	36.79	36.07	35.74	33.67	31.96	30.72	30.05	29.84	29.00	27.40	27.41
8.0	55.16	54.80	45.03	43.30	44.29	41.47	36.50	35.37	34.72	34.46	32.49	30.87	29.70	29.09	28.90	28.12	26.71	26.62
9.0	51.94	51.93	43.02	41.39	42.37	39.79	35.08	34.03	33.44	33.24	31.34	29.81	28.71	28.15	27.98	27.25	25.99	25.83
10.0	49.11	49.37	41.18	39.65	40.61	38.23	33.75	32.78	32.23	32.08	30.26	28.81	27.76	27.25	27.10	26.41	25.27	25.06
11.0	46.60	47.06	39.51	38.05	39.00	36.80	32.52	31.61	31.11	30.99	29.24	27.86	26.87	26.39	26.25	25.61	24.58	24.33
12.0	44.36	44.98	37.97	36.59	37.52	35.47	31.37	30.53	30.06	29.97	28.29	26.96	26.02	25.58	25.45	24.84	23.91	23.62
15.0	38.89	39.81	34.07	32.85	33.73	32.04	28.41	27.69	27.31	27.28	25.77	24.60	23.78	23.42	23.32	22.80	22.07	21.73
20.0	32.49	33.62	29.22	28.22	29.01	27.70	24.64	24.07	23.78	23.81	22.51	21.52	20.83	20.57	20.51	20.09	19.57	19.19
25.0	28.08	29.28	25.72	24.85	25.57	24.52	21.84	21.37	21.14	21.20	20.05	19.20	18.60	18.40	18.36	18.01	17.61	17.24
30.0	24.84	26.05	23.05	22.29	22.95	22.07	19.69	19.29	19.10	19.17	18.14	17.38	16.85	16.69	16.67	16.37	16.05	15.69
35.0	22.35	23.54	20.95	20.27	20.88	20.12	17.97	17.62	17.46	17.54	16.61	15.92	15.45	15.31	15.30	15.04	14.77	14.44
40.0	20.38	21.54	19.25	18.63	19.20	18.54	16.57	16.26	16.12	16.21	15.35	14.72	14.29	14.18	14.17	13.94	13.71	13.40
45.0	18.77	19.90	17.84	17.27	17.81	17.22	15.41	15.12	15.00	15.09	14.29	13.72	13.32	13.23	13.22	13.02	12.82	12.52
50.0	17.43	18.52	16.66	16.13	16.63	16.10	14.42	14.16	14.05	14.14	13.40	12.86	12.49	12.41	12.42	12.23	12.05	11.77
55.0	16.30	17.36	15.64	15.15	15.63	15.15	13.57	13.33	13.24	13.32	12.63	12.13	11.78	11.71	11.72	11.54	11.38	11.12
60.0	15.32	16.35	14.77	14.31	14.76	14.31	12.83	12.61	12.52	12.61	11.95	11.48	11.15	11.10	11.10	10.95	10.80	10.55
65.0	14.48	15.48	14.00	13.57	13.99	13.59	12.18	11.98	11.90	11.99	11.36	10.92	10.61	10.56	10.57	10.42	10.29	10.05
70.0	13.74	14.71	13.32	12.91	13.32	12.94	11.61	11.42	11.35	11.43	10.84	10.42	10.12	10.08	10.09	9.95	9.83	9.60
80.0	12.50	13.42	12.18	11.81	12.18	11.85	10.64	10.47	10.41	10.49	9.95	9.57	9.29	9.26	9.27	9.15	9.04	8.84
90.0	11.51	12.38	11.25	10.91	11.26	10.96	9.84	9.69	9.64	9.72	9.22	8.87	8.62	8.59	8.60	8.50	8.40	8.22
100.0	10.69	11.52	10.48	10.17	10.49	10.22	9.19	9.04	9.00	9.08	8.61	8.29	8.05	8.03	8.04	7.95	7.86	7.69
150.0	8.073	8.758	7.998	7.763	8.008	7.826	7.043	6.943	6.916	6.988	6.632	6.386	6.207	6.200	6.213	6.149	6.076	5.968
200.0	6.658	7.324	6.686	6.478	6.643	6.542	5.882	5.778	5.797	5.866	5.561	5.477	5.297	5.188	5.209	5.140	5.194	5.011
250.0	5.834	6.433	5.877	5.694	5.826	5.757	5.179	5.031	5.109	5.172	4.904	4.829	4.671	4.579	4.599	4.523	4.587	4.431
300.0	5.270	5.820	5.318	5.153	5.274	5.215	4.693	4.518	4.632	4.691	4.449	4.380	4.237	4.157	4.176	4.108	4.166	4.027
350.0	4.858	5.371	4.910	4.757	4.871	4.818	4.337	4.179	4.283	4.338	4.116	4.050	3.919	3.848	3.866	3.804	3.856	3.730
400.0	4.545	5.030	4.599	4.456	4.564	4.515	4.066	3.922	4.016	4.070	3.862	3.798	3.676	3.611	3.629	3.572	3.620	3.503
450.0	4.300	4.762	4.355	4.219	4.323	4.277	3.852	3.720	3.807	3.859	3.662	3.600	3.485	3.426	3.442	3.389	3.434	3.324
500.0	4.104	4.547	4.160	4.029	4.130	4.087	3.681	3.558	3.639	3.689	3.502	3.441	3.332	3.276	3.293	3.242	3.285	3.180

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	26.11	24.90	24.95	25.13	24.90	23.48	22.75	21.49	21.02	20.47	20.08	19.75	19.03	18.79	18.58	18.63	17.86	17.65
3.0	26.90	25.67	25.72	25.90	25.72	24.31	23.59	22.36	21.91	21.37	20.97	20.65	19.94	19.69	19.47	19.51	18.69	18.47
3.5	27.27	26.05	26.09	26.28	26.13	24.75	24.04	22.85	22.43	21.89	21.50	21.18	20.49	20.23	20.00	20.05	19.19	18.96
4.0	27.38	26.17	26.21	26.40	26.28	24.94	24.24	23.09	22.69	22.17	21.78	21.47	20.81	20.54	20.30	20.35	19.47	19.24
4.5	27.32	26.13	26.17	26.35	26.26	24.96	24.27	23.17	22.79	22.28	21.90	21.60	20.96	20.69	20.45	20.49	19.60	19.37
5.0	27.15	25.98	26.01	26.20	26.13	24.86	24.19	23.13	22.77	22.28	21.91	21.62	20.99	20.73	20.48	20.53	19.63	19.40
5.5	26.90	25.75	25.79	25.97	25.93	24.69	24.04	23.02	22.68	22.20	21.84	21.55	20.95	20.69	20.44	20.49	19.59	19.36
6.0	26.61	25.48	25.52	25.70	25.67	24.47	23.83	22.85	22.53	22.06	21.71	21.43	20.85	20.59	20.34	20.39	19.49	19.27
6.5	26.28	25.17	25.21	25.39	25.38	24.21	23.59	22.65	22.34	21.88	21.54	21.27	20.70	20.46	20.20	20.25	19.36	19.14
7.0	25.94	24.85	24.89	25.06	25.07	23.93	23.33	22.41	22.12	21.68	21.34	21.08	20.53	20.29	20.04	20.08	19.20	18.98
8.0	25.22	24.17	24.21	24.38	24.41	23.33	22.76	21.90	21.63	21.22	20.90	20.65	20.13	19.91	19.65	19.70	18.83	18.61
9.0	24.49	23.49	23.52	23.69	23.74	22.72	22.16	21.37	21.11	20.72	20.41	20.18	19.70	19.48	19.23	19.27	18.42	18.21
10.0	23.78	22.81	22.85	23.01	23.07	22.10	21.57	20.82	20.59	20.22	19.92	19.70	19.24	19.04	18.79	18.83	18.00	17.80
11.0	23.09	22.16	22.20	22.36	22.43	21.50	21.00	20.29	20.07	19.71	19.43	19.23	18.79	18.59	18.35	18.39	17.58	17.38
12.0	22.44	21.54	21.58	21.74	21.82	20.93	20.44	19.77	19.57	19.23	18.96	18.76	18.34	18.16	17.91	17.95	17.16	16.98
15.0	20.67	19.85	19.89	20.04	20.14	19.35	18.92	18.34	18.17	17.87	17.62	17.45	17.08	16.93	16.69	16.73	16.00	15.83
20.0	18.29	17.58	17.62	17.75	17.87	17.19	16.83	16.35	16.22	15.97	15.76	15.62	15.31	15.19	14.97	15.01	14.36	14.21
25.0	16.44	15.81	15.86	15.97	16.10	15.51	15.19	14.79	14.68	14.46	14.28	14.16	13.89	13.79	13.59	13.62	13.04	12.91
30.0	14.98	14.41	14.45	14.56	14.68	14.16	13.87	13.52	13.43	13.24	13.08	12.97	12.74	12.66	12.47	12.50	11.97	11.85
35.0	13.79	13.27	13.31	13.41	13.53	13.06	12.80	12.49	12.41	12.24	12.10	12.00	11.79	11.72	11.54	11.57	11.09	10.98
40.0	12.80	12.32	12.36	12.46	12.58	12.14	11.91	11.63	11.56	11.40	11.27	11.18	10.99	10.93	10.77	10.79	10.34	10.24
45.0	11.96	11.52	11.56	11.65	11.77	11.36	11.15	10.89	10.83	10.69	10.57	10.49	10.31	10.26	10.10	10.13	9.71	9.62
50.0	11.25	10.84	10.87	10.96	11.07	10.70	10.50	10.26	10.21	10.08	9.96	9.89	9.73	9.68	9.53	9.56	9.16	9.08
55.0	10.63	10.24	10.28	10.36	10.47	10.12	9.93	9.71	9.66	9.54	9.43	9.37	9.22	9.18	9.03	9.06	8.68	8.60
60.0	10.09	9.72	9.76	9.83	9.94	9.61	9.43	9.23	9.18	9.07	8.97	8.91	8.77	8.73	8.59	8.62	8.26	8.19
65.0	9.612	9.260	9.295	9.368	9.474	9.159	8.993	8.805	8.761	8.655	8.559	8.499	8.366	8.334	8.203	8.225	7.889	7.818
70.0	9.186	8.850	8.885	8.955	9.058	8.759	8.601	8.424	8.383	8.283	8.192	8.135	8.010	7.981	7.855	7.876	7.555	7.488
80.0	8.459	8.161	8.184	8.249	8.347	8.074	7.931	7.773	7.737	7.647	7.563	7.512	7.399	7.374	7.267	7.277	6.983	6.921
90.0	7.861	7.576	7.607	7.667	7.762	7.510	7.379	7.235	7.203	7.121	7.044	6.997	6.893	6.872	6.763	6.782	6.508	6.452
100.0	7.360	7.094	7.123	7.180	7.271	7.036	6.915	6.783	6.754	6.679	6.607	6.564	6.468	6.449	6.347	6.365	6.109	6.056
150.0	5.712	5.506	5.529	5.574	5.651	5.473	5.383	5.290	5.270	5.216	5.160	5.129	5.059	5.045	4.966	4.981	4.782	4.742
200.0	4.798	4.633	4.633	4.671	4.739	4.591	4.518	4.445	4.430	4.387	4.341	4.315	4.259	4.247	4.182	4.195	4.140	4.006
250.0	4.243	4.097	4.052	4.086	4.148	4.030	3.990	3.920	3.922	3.878	3.821	3.815	3.772	3.744	3.685	3.698	3.672	3.555
300.0	3.857	3.725	3.684	3.697	3.752	3.667	3.630	3.568	3.570	3.531	3.480	3.474	3.436	3.412	3.358	3.369	3.345	3.241
350.0	3.573	3.451	3.415	3.426	3.478	3.399	3.365	3.309	3.311	3.275	3.228	3.222	3.188	3.166	3.117	3.127	3.104	3.009
400.0	3.356	3.241	3.208	3.219	3.268	3.194	3.162	3.110	3.113	3.079	3.035	3.030	2.999	2.978	2.932	2.941	2.919	2.831
450.0	3.185	3.077	3.046	3.056	3.103	3.033	3.003	2.954	2.957	2.925	2.884	2.878	2.849	2.830	2.786	2.795	2.773	2.691
500.0	3.047	2.944	2.915	2.925	2.970	2.904	2.874	2.828	2.831	2.800	2.761	2.756	2.729	2.711	2.669	2.677	2.655	2.578

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

98 TC IONS 43

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.220	5.010	7.071	7.050	6.920	8.245	8.930	9.412	9.770	10.140	10.360	11.070	11.440	11.948	12.150	12.356	12.731	13.060
3.0	5.822	5.671	7.931	7.950	7.808	9.226	10.063	10.598	10.992	11.392	11.695	12.489	12.933	13.487	13.706	13.971	14.523	14.790
3.5	6.447	6.345	8.802	8.861	8.704	10.208	11.197	11.782	12.209	12.634	13.018	13.894	14.407	15.004	15.240	15.560	16.268	16.487
4.0	7.099	7.038	9.689	9.787	9.616	11.203	12.340	12.973	13.432	13.880	14.344	15.299	15.879	16.516	16.768	17.141	17.990	18.172
4.5	7.778	7.752	10.596	10.734	10.546	12.214	13.500	14.179	14.668	15.136	15.680	16.714	17.358	18.035	18.301	18.725	19.705	19.858
5.0	8.484	8.488	11.524	11.702	11.496	13.244	14.679	15.404	15.921	16.408	17.032	18.143	18.852	19.567	19.847	20.321	21.422	21.554
5.5	9.218	9.247	12.476	12.694	12.469	14.295	15.881	16.649	17.196	17.699	18.404	19.592	20.364	21.116	21.409	21.932	23.149	23.265
6.0	9.981	10.031	13.452	13.711	13.465	15.368	17.106	17.919	18.492	19.010	19.798	21.063	21.897	22.686	22.992	23.564	24.889	24.994
6.5	10.771	10.839	14.452	14.752	14.485	16.465	18.356	19.212	19.813	20.345	21.215	22.558	23.454	24.279	24.597	25.217	26.647	26.745
7.0	11.590	11.671	15.477	15.819	15.530	17.585	19.632	20.531	21.159	21.704	22.657	24.078	25.036	25.897	26.227	26.894	28.425	28.520
8.0	13.31	13.41	17.60	18.03	17.69	19.90	22.26	23.25	23.93	24.50	25.62	27.20	28.28	29.21	29.56	30.33	32.05	32.15
9.0	15.14	15.25	19.83	20.35	19.96	22.31	25.00	26.07	26.81	27.39	28.69	30.43	31.64	32.64	33.01	33.87	35.77	35.88
10.0	17.08	17.18	22.16	22.77	22.32	24.83	27.85	29.01	29.79	30.39	31.87	33.77	35.11	36.17	36.57	37.52	39.59	39.74
11.0	19.13	19.22	24.59	25.29	24.78	27.44	30.81	32.05	32.89	33.50	35.17	37.23	38.70	39.83	40.24	41.29	43.52	43.71
12.0	21.29	21.35	27.12	27.92	27.34	30.15	33.88	35.21	36.09	36.72	38.58	40.81	42.40	43.60	44.04	45.18	47.57	47.79
15.0	28.39	28.31	35.31	36.41	35.62	38.89	43.74	45.33	46.36	47.01	49.48	52.24	54.24	55.63	56.11	57.54	60.37	60.78
20.0	42.24	41.76	50.89	52.56	51.34	55.39	62.32	64.37	65.65	66.29	69.86	73.59	76.31	78.01	78.57	80.49	84.00	84.83
25.0	58.51	57.42	68.81	71.11	69.37	74.23	83.49	86.02	87.54	88.15	92.98	97.74	101.25	103.25	103.87	106.29	110.44	111.81
30.0	77.11	75.21	88.97	91.97	89.63	95.33	107.15	110.19	111.97	112.49	118.71	124.60	128.97	131.26	131.92	134.87	139.63	141.65
35.0	97.94	95.03	111.30	115.06	112.05	118.62	133.24	136.80	138.83	139.25	146.98	154.09	159.37	161.94	162.64	166.14	171.48	174.23
40.0	120.9	116.8	135.7	140.3	136.5	144.0	161.7	165.8	168.1	168.3	177.7	186.1	192.4	195.2	195.9	200.0	205.9	209.5
45.0	146.0	140.5	162.2	167.6	163.1	171.5	192.4	197.1	199.6	199.7	210.8	220.6	227.9	231.0	231.8	236.4	242.9	247.4
50.0	173.1	166.1	190.6	197.0	191.6	200.9	225.3	230.6	233.4	233.3	246.2	257.5	266.0	269.3	270.0	275.3	282.4	287.7
55.0	202.2	193.4	221.0	228.4	222.0	232.3	260.3	266.2	269.3	269.0	283.9	296.8	306.4	310.0	310.7	316.5	324.2	330.6
60.0	233.2	222.5	253.3	261.7	254.2	265.6	297.5	304.1	307.4	306.8	323.8	338.3	349.2	353.0	353.7	360.1	368.4	375.9
65.0	266.2	253.3	287.4	296.9	288.4	300.8	336.7	343.9	347.5	346.7	365.9	382.1	394.2	398.3	398.9	406.0	414.9	423.5
70.0	300.9	285.8	323.2	333.9	324.3	337.7	377.9	385.9	389.7	388.5	410.1	428.0	441.5	445.8	446.4	454.2	463.7	473.4
80.0	375.8	355.6	400.3	413.4	401.3	417.0	466.2	475.6	480.0	478.1	504.6	526.3	542.7	547.3	547.8	557.0	567.8	579.8
90.0	457.6	431.7	484.1	499.8	485.1	503.0	562.1	573.0	578.0	575.3	607.0	632.8	652.3	657.3	657.7	668.2	680.4	694.9
100.0	546.0	513.9	574.4	593.0	575.3	595.7	665.2	677.8	683.3	679.7	717.1	747.3	770.1	775.4	775.5	787.5	801.1	818.3
150.0	1081.	1008.	1116.	1152.	1117.	1150.	1282.	1304.	1312.	1302.	1373.	1429.	1471.	1478.	1477.	1497.	1519.	1550.
200.0	1754.	1624.	1791.	1848.	1793.	1840.	2049.	2082.	2092.	2073.	2186.	2255.	2326.	2348.	2344.	2373.	2391.	2452.
250.0	2543.	2341.	2576.	2658.	2584.	2642.	2940.	2994.	2995.	2966.	3128.	3211.	3315.	3357.	3349.	3395.	3398.	3495.
300.0	3429.	3144.	3455.	3564.	3470.	3538.	3936.	4026.	4005.	3963.	4179.	4279.	4419.	4482.	4470.	4534.	4522.	4658.
350.0	4399.	4021.	4415.	4556.	4439.	4517.	5024.	5155.	5110.	5051.	5326.	5445.	5623.	5709.	5691.	5775.	5748.	5924.
400.0	5443.	4965.	5448.	5621.	5479.	5569.	6192.	6367.	6290.	6219.	6556.	6696.	6915.	7025.	7001.	7106.	7060.	7281.
450.0	6552.	5968.	6543.	6753.	6583.	6685.	7431.	7651.	7544.	7456.	7860.	8022.	8285.	8420.	8388.	8516.	8458.	8727.
500.0	7719.	7021.	7695.	7942.	7744.	7858.	8733.	8999.	8861.	8756.	9230.	9415.	9724.	9883.	9845.	9996.	9911.	10226.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.71	14.23	15.37	15.67	16.26	17.10	17.61	18.26	18.65	19.02	19.41	19.82	20.23	20.60	21.09	21.27	22.81	23.30
3.0	15.56	16.16	17.30	17.59	18.19	19.15	19.72	20.49	20.93	21.36	21.79	22.24	22.74	23.14	23.66	23.83	25.49	26.01
3.5	17.36	18.05	19.19	19.46	20.08	21.15	21.78	22.66	23.13	23.63	24.10	24.58	25.16	25.60	26.14	26.31	28.07	28.62
4.0	19.16	19.93	21.07	21.32	21.95	23.12	23.81	24.79	25.30	25.85	26.36	26.88	27.53	28.00	28.57	28.73	30.60	31.19
4.5	20.95	21.80	22.94	23.18	23.82	25.08	25.82	26.91	27.46	28.05	28.60	29.15	29.87	30.37	30.97	31.13	33.11	33.72
5.0	22.75	23.68	24.81	25.05	25.69	27.05	27.85	29.02	29.61	30.25	30.84	31.42	32.21	32.74	33.37	33.52	35.61	36.25
5.5	24.56	25.58	26.71	26.92	27.57	29.02	29.88	31.15	31.76	32.45	33.08	33.69	34.55	35.10	35.76	35.91	38.11	38.78
6.0	26.39	27.49	28.62	28.82	29.47	31.02	31.92	33.28	33.93	34.67	35.33	35.97	36.89	37.48	38.16	38.30	40.61	41.31
6.5	28.24	29.42	30.55	30.74	31.39	33.03	33.99	35.44	36.12	36.90	37.59	38.26	39.25	39.86	40.58	40.71	43.14	43.87
7.0	30.12	31.38	32.50	32.68	33.33	35.06	36.08	37.61	38.32	39.15	39.88	40.58	41.62	42.27	43.02	43.14	45.68	46.44
8.0	33.95	35.38	36.50	36.64	37.29	39.21	40.33	42.03	42.80	43.72	44.52	45.27	46.44	47.14	47.95	48.07	50.83	51.65
9.0	37.89	39.49	40.60	40.72	41.36	43.47	44.70	46.56	47.38	48.39	49.26	50.07	51.36	52.12	52.99	53.10	56.09	56.97
10.0	41.96	43.73	44.83	44.92	45.55	47.84	49.18	51.21	52.08	53.18	54.12	54.98	56.40	57.21	58.15	58.24	61.48	62.41
11.0	46.14	48.09	49.18	49.24	49.86	52.34	53.78	55.98	56.91	58.09	59.10	60.02	61.55	62.42	63.43	63.51	66.99	67.98
12.0	50.44	52.57	53.66	53.69	54.29	56.96	58.51	60.87	61.85	63.12	64.21	65.18	66.83	67.75	68.84	68.91	72.63	73.69
15.0	64.11	66.80	67.86	67.78	68.32	71.58	73.47	76.32	77.45	78.99	80.30	81.44	83.45	84.53	85.85	85.88	90.38	91.63
20.0	89.37	93.08	94.08	93.82	94.21	98.50	100.99	104.67	106.05	108.05	109.75	111.16	113.79	115.13	116.89	116.85	122.75	124.35
25.0	117.67	122.52	123.45	122.97	123.15	128.56	131.69	136.23	137.85	140.34	142.45	144.16	147.43	149.03	151.29	151.17	158.61	160.58
30.0	148.94	155.02	155.86	155.14	155.06	161.67	165.49	170.92	172.79	175.79	178.34	180.35	184.30	186.15	188.97	188.76	197.87	200.23
35.0	183.08	190.49	191.22	190.23	189.86	197.74	202.30	208.66	210.78	214.31	217.34	219.66	224.32	226.41	229.84	229.54	240.44	243.23
40.0	220.0	228.8	229.5	228.2	227.5	236.7	242.0	249.4	251.7	255.8	259.3	262.0	267.4	269.7	273.8	273.4	286.2	289.5
45.0	259.6	270.0	270.5	268.9	267.8	278.4	284.6	292.9	295.6	300.2	304.3	307.3	313.4	316.0	320.8	320.3	335.2	338.9
50.0	301.9	313.9	314.2	312.3	310.7	322.9	329.9	339.3	342.2	347.5	352.1	355.4	362.4	365.2	370.8	370.2	387.2	391.4
55.0	346.7	360.4	360.6	358.3	356.3	370.0	377.9	388.4	391.6	397.5	402.6	406.4	414.2	417.2	423.6	422.9	442.1	446.8
60.0	394.0	409.6	409.5	406.9	404.3	419.8	428.6	440.2	443.6	450.2	455.9	460.1	468.7	472.0	479.3	478.4	500.0	505.2
65.0	443.8	461.2	461.0	457.9	454.8	472.0	481.8	494.5	498.2	505.5	511.9	516.4	526.0	529.5	537.7	536.6	560.7	566.5
70.0	496.0	515.4	514.9	511.5	507.7	526.7	537.5	551.4	555.4	563.4	570.4	575.3	585.8	589.6	598.7	597.5	624.2	630.6
80.0	607.3	630.9	630.0	625.6	620.6	643.4	656.3	672.7	677.2	686.6	695.1	700.8	713.3	717.4	728.7	727.1	759.3	766.8
90.0	727.6	755.7	754.3	749.0	742.4	769.4	784.5	803.5	808.6	819.6	829.4	836.1	850.6	855.2	868.7	866.7	904.8	913.6
100.0	856.5	889.5	887.6	881.1	873.0	904.3	921.8	943.5	949.2	961.8	973.2	980.8	997.5	1002.5	1018.3	1016.0	1060.3	1070.5
150.0	1621.	1682.	1677.	1664.	1646.	1703.	1734.	1771.	1780.	1801.	1822.	1835.	1863.	1871.	1901.	1896.	1977.	1995.
200.0	2563.	2660.	2651.	2630.	2598.	2686.	2733.	2787.	2800.	2831.	2863.	2882.	2925.	2936.	2982.	2974.	3074.	3127.
250.0	3653.	3788.	3786.	3756.	3708.	3830.	3892.	3966.	3979.	4024.	4071.	4095.	4152.	4170.	4236.	4223.	4335.	4429.
300.0	4867.	5045.	5057.	5022.	4954.	5108.	5183.	5279.	5292.	5351.	5418.	5444.	5516.	5544.	5632.	5615.	5737.	5876.
350.0	6189.	6414.	6441.	6400.	6313.	6498.	6587.	6708.	6719.	6795.	6882.	6911.	6999.	7037.	7149.	7127.	7260.	7447.
400.0	7606.	7881.	7923.	7878.	7768.	7987.	8091.	8237.	8247.	8339.	8449.	8481.	8585.	8635.	8771.	8744.	8890.	9128.
450.0	9106.	9434.	9492.	9441.	9308.	9562.	9682.	9855.	9863.	9974.	10107.	10142.	10263.	10324.	10487.	10455.	10614.	10905.
500.0	10680.	11063.	11137.	11081.	10923.	11214.	11351.	11552.	11558.	11687.	11845.	11883.	12021.	12094.	12285.	12247.	12425.	12767.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{102}_{44}$RU IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	85.59	76.71	68.80	66.12	66.84	51.29	44.26	42.21	40.92	39.86	37.37	35.09	33.32	32.30	31.91	30.72	27.52	28.64
3.0	82.57	75.64	68.39	65.80	66.61	51.44	44.55	42.61	41.41	40.49	37.99	35.75	34.03	33.04	32.68	31.52	28.56	29.46
3.5	79.38	73.91	67.49	65.00	65.88	51.05	44.34	42.51	41.39	40.58	38.11	35.93	34.27	33.32	32.97	31.85	29.12	29.84
4.0	76.25	71.89	66.36	63.96	64.89	50.36	43.85	42.12	41.07	40.36	37.93	35.81	34.21	33.30	32.98	31.89	29.37	29.94
4.5	73.27	69.79	65.10	62.80	63.76	49.51	43.20	41.57	40.57	39.96	37.57	35.51	33.97	33.10	32.80	31.75	29.42	29.85
5.0	70.47	67.69	63.80	61.59	62.58	48.58	42.46	40.91	39.98	39.43	37.10	35.10	33.62	32.79	32.50	31.49	29.33	29.65
5.5	67.85	65.65	62.51	60.38	61.38	47.61	41.67	40.20	39.32	38.84	36.55	34.62	33.19	32.40	32.13	31.16	29.14	29.37
6.0	65.42	63.68	61.24	59.19	60.20	46.62	40.87	39.47	38.64	38.21	35.97	34.10	32.72	31.96	31.71	30.77	28.89	29.04
6.5	63.16	61.81	60.01	58.03	59.04	45.65	40.06	38.73	37.94	37.56	35.37	33.55	32.22	31.50	31.26	30.36	28.60	28.67
7.0	61.05	60.03	58.82	56.90	57.92	44.70	39.26	37.99	37.24	36.90	34.77	33.00	31.71	31.02	30.79	29.93	28.28	28.29
8.0	57.26	56.76	56.58	54.78	55.80	42.86	37.72	36.55	35.88	35.61	33.56	31.89	30.68	30.05	29.85	29.04	27.58	27.49
9.0	53.94	53.82	54.52	52.84	53.84	41.15	36.27	35.19	34.57	34.36	32.40	30.82	29.68	29.09	28.92	28.16	26.85	26.69
10.0	51.02	51.19	52.65	51.05	52.04	39.56	34.92	33.91	33.35	33.18	31.30	29.79	28.71	28.17	28.02	27.30	26.13	25.91
11.0	48.43	48.82	50.93	49.42	50.39	38.10	33.66	32.72	32.20	32.07	30.26	28.82	27.80	27.30	27.16	26.49	25.42	25.16
12.0	46.12	46.69	49.36	47.92	48.88	36.74	32.49	31.61	31.12	31.03	29.29	27.91	26.93	26.47	26.34	25.71	24.74	24.44
15.0	40.47	41.36	45.34	44.08	44.99	33.22	29.45	28.71	28.31	28.28	26.71	25.50	24.64	24.26	24.17	23.62	22.86	22.51
20.0	33.84	34.97	38.36	39.31	40.13	28.77	25.58	24.99	24.69	24.71	23.36	22.34	21.62	21.34	21.28	20.84	20.30	19.91
25.0	29.27	30.48	33.74	35.84	36.59	25.48	22.70	22.21	21.97	22.03	20.84	19.95	19.32	19.11	19.07	18.71	18.29	17.91
30.0	25.90	27.13	29.99	32.19	33.88	22.96	20.48	20.06	19.86	19.94	18.87	18.08	17.52	17.35	17.33	17.02	16.68	16.31
35.0	23.32	24.54	27.82	29.10	31.74	20.95	18.71	18.34	18.17	18.26	17.28	16.57	16.07	15.93	15.92	15.65	15.37	15.02
40.0	21.27	22.46	26.06	27.41	30.00	19.31	17.26	16.93	16.79	16.88	15.98	15.33	14.88	14.76	14.76	14.51	14.28	13.95
45.0	19.59	20.75	24.60	26.01	28.56	17.94	16.05	15.76	15.63	15.72	14.89	14.29	13.87	13.78	13.78	13.56	13.35	13.04
50.0	18.20	19.33	23.37	24.82	27.34	16.79	15.03	14.76	14.65	14.74	13.96	13.41	13.02	12.94	12.94	12.74	12.56	12.26
55.0	17.02	18.12	22.32	23.81	26.30	15.79	14.15	13.90	13.80	13.89	13.17	12.64	12.28	12.21	12.21	12.03	11.87	11.59
60.0	16.01	17.07	21.41	22.93	25.40	14.93	13.38	13.15	13.06	13.15	12.47	11.98	11.63	11.57	11.58	11.42	11.26	11.00
65.0	15.13	16.16	20.61	22.16	24.61	14.18	12.71	12.50	12.42	12.51	11.85	11.39	11.06	11.01	11.02	10.87	10.73	10.48
70.0	14.36	15.36	19.91	21.48	23.91	13.51	12.12	11.91	11.84	11.93	11.31	10.87	10.56	10.51	10.52	10.38	10.25	10.02
80.0	13.07	14.02	18.72	20.33	22.72	12.37	11.11	10.93	10.86	10.95	10.39	9.99	9.70	9.67	9.68	9.55	9.44	9.23
90.0	12.03	12.93	17.75	19.40	21.76	11.45	10.28	10.12	10.07	10.15	9.63	9.26	9.00	8.97	8.98	8.87	8.77	8.58
100.0	11.17	12.04	16.95	18.62	20.96	10.68	9.60	9.45	9.40	9.48	9.00	8.66	8.41	8.39	8.40	8.30	8.20	8.03
150.0	8.444	9.158	13.36	14.78	16.74	8.183	7.365	7.260	7.231	7.307	6.935	6.677	6.490	6.482	6.496	6.429	6.353	6.239
200.0	6.987	7.661	11.16	12.36	14.00	6.844	6.154	6.044	6.065	6.137	5.818	5.730	5.641	5.427	5.449	5.377	5.433	5.242
250.0	6.106	6.731	9.950	11.02	12.48	6.025	5.420	5.264	5.346	5.412	5.132	5.053	4.888	4.792	4.812	4.732	4.800	4.636
300.0	5.516	6.090	9.066	10.04	11.37	5.458	4.912	4.728	4.848	4.909	4.657	4.583	4.435	4.351	4.371	4.299	4.359	4.215
350.0	5.085	5.621	8.399	9.299	10.53	5.043	4.540	4.375	4.483	4.541	4.308	4.239	4.102	4.027	4.046	3.982	4.036	3.904
400.0	4.758	5.264	7.915	8.764	9.931	4.726	4.256	4.105	4.204	4.260	4.043	3.976	3.848	3.780	3.799	3.739	3.789	3.667
450.0	4.502	4.984	7.560	8.374	9.490	4.478	4.033	3.894	3.985	4.039	3.834	3.769	3.649	3.586	3.604	3.547	3.595	3.480
500.0	4.296	4.759	7.265	8.048	9.124	4.278	3.854	3.725	3.810	3.862	3.666	3.602	3.488	3.430	3.447	3.394	3.439	3.330

E/A	SM 60	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	26.80	25.56	25.61	25.79	25.56	24.10	23.36	22.05	21.58	21.01	20.61	20.27	19.53	19.29	19.07	19.12	18.33	18.11
3.0	27.63	26.38	26.42	26.61	26.42	24.98	24.23	22.97	22.51	21.95	21.54	21.21	20.48	20.22	19.99	20.04	19.19	18.97
3.5	28.04	26.78	26.83	27.02	26.86	25.45	24.71	23.49	23.05	22.50	22.10	21.77	21.07	20.79	20.56	20.61	19.72	19.49
4.0	28.17	26.93	26.97	27.16	27.04	25.66	24.93	23.75	23.34	22.80	22.41	22.09	21.40	21.13	20.88	20.93	20.02	19.79
4.5	28.12	26.90	26.94	27.13	27.03	25.69	24.98	23.85	23.46	22.93	22.54	22.23	21.57	21.29	21.04	21.09	20.17	19.94
5.0	27.96	26.76	26.79	26.98	26.91	25.61	24.91	23.82	23.45	22.94	22.56	22.26	21.61	21.34	21.09	21.14	20.21	19.98
5.5	27.72	26.54	26.57	26.76	26.71	25.44	24.77	23.72	23.36	22.87	22.50	22.20	21.58	21.31	21.06	21.10	20.18	19.94
6.0	27.43	26.27	26.30	26.49	26.46	25.22	24.57	23.55	23.22	22.74	22.37	22.09	21.48	21.22	20.96	21.01	20.09	19.85
6.5	27.11	25.96	26.00	26.18	26.17	24.97	24.33	23.35	23.03	22.56	22.21	21.93	21.35	21.09	20.83	20.88	19.96	19.73
7.0	26.76	25.64	25.68	25.86	25.86	24.69	24.06	23.12	22.81	22.36	22.01	21.74	21.18	20.93	20.67	20.71	19.80	19.57
8.0	26.04	24.96	24.99	25.17	25.20	24.09	23.49	22.61	22.33	21.90	21.57	21.31	20.78	20.54	20.28	20.33	19.43	19.21
9.0	25.30	24.26	24.30	24.47	24.52	23.46	22.89	22.07	21.81	21.40	21.08	20.85	20.34	20.12	19.86	19.90	19.02	18.81
10.0	24.58	23.58	23.62	23.79	23.85	22.84	22.30	21.52	21.28	20.89	20.59	20.36	19.88	19.67	19.41	19.45	18.60	18.39
11.0	23.88	22.92	22.96	23.12	23.20	22.23	21.71	20.98	20.75	20.38	20.09	19.88	19.42	19.22	18.97	19.01	18.17	17.97
12.0	23.22	22.29	22.33	22.49	22.57	21.65	21.15	20.45	20.24	19.89	19.61	19.40	18.97	18.78	18.53	18.57	17.75	17.56
15.0	21.41	20.57	20.61	20.76	20.86	20.04	19.59	18.99	18.81	18.50	18.25	18.07	17.69	17.53	17.29	17.32	16.57	16.39
20.0	18.97	18.24	18.28	18.41	18.53	17.83	17.45	16.96	16.82	16.56	16.35	16.20	15.88	15.75	15.53	15.56	14.89	14.74
25.0	17.08	16.42	16.47	16.59	16.72	16.10	15.77	15.35	15.24	15.02	14.83	14.70	14.43	14.32	14.11	14.14	13.54	13.40
30.0	15.57	14.98	15.02	15.14	15.26	14.72	14.42	14.06	13.96	13.76	13.60	13.48	13.24	13.16	12.96	12.99	12.44	12.32
35.0	14.34	13.80	13.85	13.95	14.08	13.58	13.31	12.99	12.91	12.73	12.58	12.48	12.26	12.19	12.01	12.03	11.53	11.42
40.0	13.32	12.83	12.87	12.97	13.09	12.64	12.39	12.10	12.03	11.87	11.73	11.64	11.44	11.38	11.20	11.23	10.76	10.66
45.0	12.46	12.00	12.04	12.13	12.25	11.83	11.61	11.34	11.28	11.13	11.00	10.92	10.74	10.68	10.52	10.55	10.11	10.01
50.0	11.72	11.29	11.33	11.42	11.54	11.14	10.93	10.69	10.63	10.50	10.38	10.30	10.13	10.09	9.93	9.95	9.54	9.45
55.0	11.08	10.67	10.71	10.80	10.91	10.54	10.35	10.12	10.07	9.94	9.83	9.76	9.60	9.56	9.41	9.44	9.05	8.97
60.0	10.52	10.14	10.17	10.25	10.36	10.02	9.83	9.62	9.58	9.46	9.35	9.28	9.14	9.10	8.98	8.98	8.61	8.53
65.0	10.03	9.66	9.69	9.77	9.88	9.65	9.38	9.18	9.14	9.03	8.93	8.86	8.72	8.69	8.55	8.58	8.23	8.15
70.0	9.58	9.23	9.27	9.34	9.45	9.14	8.97	8.79	8.75	8.64	8.54	8.49	8.35	8.32	8.19	8.21	7.88	7.81
80.0	8.83	8.51	8.54	8.61	8.71	8.43	8.28	8.11	8.07	7.98	7.89	7.84	7.72	7.70	7.57	7.59	7.29	7.22
90.0	8.21	7.91	7.94	8.01	8.10	7.84	7.70	7.55	7.52	7.43	7.35	7.30	7.20	7.17	7.06	7.08	6.79	6.74
100.0	7.69	7.41	7.44	7.50	7.59	7.35	7.22	7.08	7.05	6.98	6.90	6.85	6.76	6.74	6.63	6.65	6.38	6.32
150.0	6.972	6.757	6.781	6.828	6.908	6.722	6.627	6.530	6.509	6.452	6.396	6.362	6.288	6.274	6.192	6.207	4.999	4.957
200.0	5.018	4.846	4.846	4.885	4.957	4.803	4.726	4.650	4.634	4.589	4.541	4.514	4.455	4.442	4.375	4.388	4.330	4.190
250.0	4.439	4.287	4.240	4.275	4.340	4.217	4.175	4.102	4.104	4.058	3.998	3.991	3.947	3.918	3.856	3.869	3.842	3.720
300.0	4.036	3.898	3.856	3.869	3.927	3.837	3.799	3.734	3.737	3.695	3.641	3.635	3.596	3.570	3.514	3.526	3.500	3.391
350.0	3.739	3.612	3.574	3.586	3.640	3.558	3.522	3.463	3.466	3.428	3.379	3.373	3.337	3.314	3.262	3.273	3.248	3.149
400.0	3.513	3.393	3.358	3.370	3.421	3.344	3.310	3.255	3.258	3.223	3.177	3.171	3.139	3.117	3.069	3.079	3.055	2.963
450.0	3.334	3.221	3.189	3.199	3.248	3.175	3.143	3.092	3.095	3.062	3.019	3.013	2.983	2.962	2.917	2.926	2.902	2.817
500.0	3.190	3.082	3.052	3.062	3.109	3.040	3.009	2.960	2.963	2.931	2.891	2.885	2.857	2.838	2.794	2.803	2.779	2.699

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

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RU IONS
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E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.330	5.110	7.210	7.190	7.060	8.414	9.110	9.598	9.960	10.340	10.570	11.290	11.670	12.187	12.390	12.599	12.981	13.320
3.0	5.936	5.779	8.079	8.101	7.958	9.406	10.257	10.799	11.197	11.608	11.922	12.728	13.182	13.746	13.967	14.235	14.797	15.073
3.5	6.566	6.461	8.959	9.021	8.864	10.401	11.404	11.996	12.428	12.865	13.261	14.149	14.674	15.282	15.519	15.843	16.564	16.791
4.0	7.222	7.160	9.855	9.957	9.785	11.406	12.560	13.201	13.665	14.124	14.601	15.570	16.163	16.812	17.065	17.443	18.306	18.496
4.5	7.904	7.880	10.770	10.912	10.724	12.427	13.731	14.419	14.914	15.394	15.952	17.000	17.658	18.347	18.615	19.045	20.040	20.202
5.0	8.614	8.622	11.707	11.889	11.683	13.467	14.922	15.656	16.180	16.678	17.318	18.444	19.167	19.895	20.177	20.657	21.776	21.916
5.5	9.352	9.387	12.667	12.889	12.664	14.528	16.134	16.913	17.466	17.981	18.703	19.907	20.694	21.460	21.755	22.285	23.520	23.644
6.0	10.118	10.176	13.650	13.914	13.668	15.610	17.370	18.193	18.775	19.305	20.109	21.392	22.241	23.044	23.353	23.932	25.277	25.390
6.5	10.911	10.989	14.657	14.963	14.696	16.716	18.631	19.498	20.107	20.651	21.539	22.899	23.812	24.652	24.973	25.600	27.051	27.157
7.0	11.733	11.826	15.690	16.038	15.748	17.845	19.917	20.827	21.463	22.021	22.993	24.432	25.408	26.284	26.617	27.292	28.844	28.948
8.0	13.46	13.57	17.83	18.26	17.93	20.18	22.57	23.56	24.25	24.83	25.98	27.58	28.68	29.62	29.98	30.75	32.50	32.61
9.0	15.29	15.42	20.07	20.59	20.20	22.60	25.33	26.41	27.15	27.75	29.07	30.83	32.06	33.07	33.46	34.32	36.24	36.37
10.0	17.24	17.36	22.41	23.03	22.58	25.13	28.19	29.36	30.16	30.77	32.28	34.20	35.55	36.64	37.04	38.00	40.10	40.25
11.0	19.29	19.41	24.85	25.56	25.05	27.76	31.17	32.42	33.27	33.90	35.59	37.68	39.16	40.32	40.74	41.79	44.05	44.24
12.0	21.45	21.54	27.39	28.20	27.63	30.49	34.25	35.60	36.49	37.13	39.02	41.27	42.89	44.11	44.55	45.70	48.12	48.36
15.0	28.55	28.52	35.61	36.73	35.94	39.26	44.16	45.77	46.81	47.48	49.97	52.76	54.78	56.20	56.69	58.13	61.00	61.41
20.0	42.40	41.99	51.24	52.92	51.70	55.81	62.79	64.86	66.16	66.82	70.44	74.18	76.93	78.66	79.23	81.16	84.71	85.55
25.0	58.66	57.65	69.18	71.49	69.76	74.69	84.00	86.55	88.10	88.72	93.59	98.39	101.93	103.96	104.59	107.03	111.22	112.61
30.0	77.22	75.42	89.35	92.36	90.03	95.81	107.69	110.75	112.55	113.09	119.35	125.28	129.69	132.01	132.68	135.65	140.45	142.49
35.0	98.01	95.22	111.67	115.45	112.44	119.10	133.78	137.37	139.42	139.86	147.63	154.79	160.11	162.71	163.42	166.94	172.33	175.10
40.0	120.9	117.0	136.1	140.7	136.9	144.5	162.2	166.3	168.6	168.9	178.3	186.8	193.1	196.0	196.7	200.8	206.8	210.4
45.0	146.0	140.6	162.5	168.0	163.4	171.9	192.9	197.6	200.2	200.3	211.4	221.3	228.7	231.8	232.5	237.2	243.8	248.2
50.0	173.0	166.1	190.9	197.3	191.9	201.3	225.7	231.0	233.9	233.8	246.8	258.2	266.6	270.0	270.7	276.0	283.2	288.6
55.0	202.0	193.4	221.2	228.6	222.2	232.7	260.7	266.7	269.8	269.5	284.4	297.3	307.0	310.6	311.3	317.2	325.0	331.4
60.0	232.9	222.4	253.4	261.8	254.4	265.9	297.8	304.4	307.8	307.2	324.3	338.8	349.7	353.5	354.2	360.8	369.1	376.5
65.0	265.7	253.1	287.4	296.9	288.4	300.9	336.9	344.2	347.8	347.0	366.2	382.5	394.7	398.7	399.4	406.6	415.5	424.0
70.0	300.3	285.5	323.2	333.9	324.2	337.8	378.0	386.0	389.9	388.8	410.3	428.3	441.9	446.1	446.8	454.6	464.2	473.8
80.0	374.9	355.1	400.0	413.1	401.0	416.8	466.1	475.5	479.9	478.1	504.5	526.3	542.8	547.4	548.0	557.1	568.0	580.0
90.0	456.3	430.9	483.5	499.2	484.5	502.6	561.6	572.6	577.6	574.9	606.6	632.5	652.0	657.1	657.4	668.0	680.2	694.8
100.0	544.4	512.7	573.4	592.0	574.4	594.9	664.4	677.0	682.5	679.0	716.3	746.5	769.4	774.7	774.9	786.9	800.6	817.7
150.0	1077.	1005.	1113.	1148.	1113.	1147.	1278.	1300.	1309.	1299.	1370.	1425.	1468.	1474.	1473.	1493.	1515.	1546.
200.0	1746.	1618.	1785.	1841.	1786.	1834.	2042.	2075.	2084.	2066.	2179.	2248.	2320.	2340.	2337.	2366.	2383.	2444.
250.0	2531.	2331.	2565.	2646.	2573.	2631.	2928.	2982.	2983.	2954.	3115.	3199.	3302.	3344.	3336.	3382.	3386.	3482.
300.0	3412.	3129.	3439.	3548.	3455.	3522.	3919.	4008.	3987.	3946.	4161.	4261.	4400.	4463.	4451.	4515.	4503.	4638.
350.0	4377.	4003.	4394.	4534.	4418.	4496.	5000.	5131.	5083.	5028.	5301.	5420.	5597.	5683.	5665.	5749.	5721.	5898.
400.0	5415.	4941.	5421.	5594.	5452.	5542.	6162.	6336.	6259.	6189.	6525.	6664.	6883.	6992.	6968.	7073.	7026.	7247.
450.0	6518.	5938.	6510.	6718.	6550.	6652.	7394.	7613.	7506.	7419.	7821.	7982.	8245.	8378.	8347.	8474.	8409.	8676.
500.0	7678.	6986.	7655.	7901.	7704.	7818.	8689.	8953.	8816.	8711.	9183.	9368.	9675.	9834.	9795.	9945.	9861.	10175.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.99	14.52	15.69	15.99	16.59	17.44	17.95	18.61	19.00	19.39	19.78	20.20	20.62	21.00	21.50	21.68	23.25	23.75
3.0	15.86	16.48	17.64	17.93	18.55	19.51	20.09	20.87	21.31	21.76	22.20	22.65	23.16	23.58	24.11	24.28	25.96	26.50
3.5	17.69	18.40	19.56	19.83	20.46	21.53	22.17	23.06	23.55	24.05	24.53	25.02	25.61	26.06	26.62	26.79	28.58	29.15
4.0	19.50	20.29	21.45	21.71	22.35	23.53	24.22	25.22	25.75	26.30	26.82	27.35	28.01	28.49	29.08	29.24	31.15	31.74
4.5	21.32	22.19	23.34	23.59	24.23	25.51	26.27	27.36	27.92	28.53	29.09	29.65	30.39	30.90	31.51	31.67	33.68	34.31
5.0	23.13	24.09	25.24	25.48	26.12	27.50	28.31	29.50	30.10	30.75	31.35	31.94	32.75	33.29	33.93	34.08	36.21	36.86
5.5	24.97	26.00	27.15	27.37	28.03	29.50	30.36	31.65	32.28	32.98	33.61	34.23	35.11	35.68	36.35	36.50	38.73	39.41
6.0	26.81	27.93	29.08	29.29	29.94	31.51	32.43	33.81	34.47	35.21	35.89	36.54	37.48	38.08	38.78	38.92	41.27	41.98
6.5	28.68	29.89	31.03	31.23	31.88	33.54	34.52	35.98	36.67	37.46	38.17	38.85	39.86	40.49	41.22	41.35	43.81	44.55
7.0	30.58	31.86	33.00	33.19	33.84	35.60	36.62	38.17	38.90	39.73	40.48	41.19	42.26	42.91	43.67	43.80	46.38	47.15
8.0	34.44	35.89	37.03	37.18	37.84	39.78	40.91	42.63	43.41	44.34	45.16	45.93	47.12	47.83	48.66	48.77	51.58	52.41
9.0	38.42	40.04	41.17	41.29	41.94	44.07	45.31	47.20	48.04	49.05	49.94	50.76	52.08	52.85	53.74	53.85	56.88	57.77
10.0	42.51	44.30	45.43	45.62	46.16	48.48	49.83	51.88	52.77	53.88	54.84	55.72	57.15	57.97	58.93	59.03	62.31	63.26
11.0	46.72	48.69	49.81	49.87	50.50	53.00	54.46	56.68	57.62	58.82	59.85	60.79	62.34	63.22	64.25	64.33	67.86	68.87
12.0	51.05	53.20	54.31	54.34	54.95	57.65	59.22	61.61	62.60	63.89	64.99	65.98	67.65	68.59	69.69	69.76	73.53	74.61
15.0	64.78	67.51	68.59	68.52	69.07	72.36	74.27	77.14	78.29	79.85	81.17	82.33	84.36	85.46	86.80	86.83	91.39	92.66
20.0	90.14	93.90	94.92	94.66	95.05	99.38	101.90	105.61	107.00	109.03	110.74	112.18	114.84	116.20	117.97	117.94	123.90	125.52
25.0	118.52	123.41	124.36	123.88	124.08	129.53	132.69	137.26	138.90	141.41	143.55	145.27	148.57	150.19	152.47	152.36	159.87	161.86
30.0	149.84	155.97	156.83	156.11	156.05	162.69	166.55	172.02	173.91	176.93	179.51	181.54	185.52	187.39	190.23	190.03	199.21	201.59
35.0	184.01	191.47	192.23	191.24	190.87	198.80	203.39	209.79	211.93	215.49	218.54	220.89	225.58	227.69	231.15	230.85	241.83	244.64
40.0	220.9	229.8	230.5	229.2	228.5	237.8	243.1	250.5	252.9	257.0	260.6	263.2	268.7	271.0	275.2	274.8	287.7	290.9
45.0	260.5	271.0	271.5	269.9	268.8	279.5	285.7	294.1	296.7	301.4	305.5	308.5	314.7	317.3	322.2	321.6	336.6	340.3
50.0	302.8	314.8	315.2	313.2	311.7	323.9	331.0	340.4	343.3	348.6	353.2	356.8	363.6	366.5	372.1	371.5	388.5	392.8
55.0	347.5	361.3	361.5	359.2	357.2	371.0	378.9	389.4	392.6	398.6	403.8	407.5	415.4	418.4	424.9	424.1	443.5	448.2
60.0	394.8	410.3	410.4	407.7	405.2	420.7	429.5	441.1	444.6	451.2	457.0	461.1	469.8	473.1	480.5	479.5	501.2	506.5
65.0	444.5	461.9	461.7	458.7	455.6	472.8	482.6	495.4	499.1	506.4	512.8	517.4	527.0	530.5	538.7	537.7	561.9	567.7
70.0	496.5	515.9	515.6	512.1	508.4	527.4	538.3	552.2	556.2	564.2	571.2	576.2	586.7	590.5	599.7	598.4	625.2	631.6
80.0	607.5	631.2	630.3	625.9	620.9	643.8	656.7	673.1	677.7	687.1	695.6	701.4	713.9	718.0	729.3	727.7	760.0	767.6
90.0	727.4	755.6	754.3	748.9	742.4	769.4	784.6	803.5	808.7	819.7	829.6	836.3	850.8	855.4	868.9	866.9	905.0	913.9
100.0	855.9	888.9	887.1	880.7	872.5	903.9	921.4	943.1	948.9	961.4	972.9	980.5	997.2	1002.3	1018.1	1015.7	1060.1	1070.3
150.0	1617.	1679.	1674.	1661.	1642.	1699.	1730.	1767.	1776.	1797.	1818.	1831.	1860.	1867.	1897.	1892.	1973.	1991.
200.0	2555.	2651.	2643.	2622.	2590.	2678.	2725.	2778.	2791.	2823.	2854.	2874.	2916.	2927.	2973.	2965.	3066.	3117.
250.0	3839.	3774.	3772.	3742.	3694.	3816.	3878.	3952.	3965.	4010.	4058.	4080.	4137.	4155.	4220.	4208.	4320.	4414.
300.0	4847.	5024.	5036.	5001.	4934.	5087.	5162.	5258.	5270.	5330.	5396.	5422.	5494.	5522.	5609.	5592.	5714.	5852.
350.0	6162.	6385.	6412.	6372.	6285.	6469.	6558.	6678.	6689.	6765.	6852.	6881.	6968.	7007.	7118.	7096.	7229.	7415.
400.0	7571.	7844.	7886.	7841.	7732.	7950.	8053.	8199.	8209.	8301.	8411.	8442.	8546.	8595.	8731.	8704.	8849.	9087.
450.0	9062.	9388.	9446.	9395.	9263.	9516.	9636.	9808.	9816.	9926.	10059.	10093.	10214.	10275.	10437.	10405.	10563.	10853.
500.0	10627.	11008.	11082.	11026.	10869.	11159.	11295.	11495.	11501.	11629.	11786.	11824.	11962.	12035.	12225.	12187.	12380.	12704.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

103 RH IONS 45

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	88.28	78.74	60.45	57.68	58.41	52.68	45.45	43.34	42.01	40.92	38.36	36.01	34.19	33.14	32.74	31.52	28.23	29.38
3.0	85.24	77.76	60.06	57.39	58.23	52.87	45.79	43.79	42.54	41.59	39.03	36.72	34.95	33.93	33.55	32.36	29.32	30.25
3.5	82.01	76.07	59.18	56.61	57.51	52.51	45.60	43.72	42.55	41.72	39.18	36.93	35.22	34.24	33.88	32.73	29.92	30.66
4.0	78.83	74.07	58.04	55.57	56.53	51.83	45.13	43.34	42.25	41.52	39.02	36.83	35.19	34.25	33.91	32.79	30.20	30.78
4.5	75.79	71.96	56.78	54.41	55.40	50.99	44.48	42.79	41.77	41.13	38.67	36.55	34.96	34.06	33.74	32.67	30.26	30.71
5.0	72.93	69.85	55.48	53.19	54.20	50.05	43.74	42.14	41.18	40.61	38.20	36.14	34.61	33.75	33.45	32.42	30.19	30.52
5.5	70.25	67.78	54.17	51.97	53.00	49.07	42.95	41.43	40.52	40.02	37.66	35.66	34.19	33.37	33.09	32.09	30.01	30.24
6.0	67.76	65.79	52.88	50.76	51.80	48.08	42.14	40.69	39.83	39.39	37.08	35.14	33.71	32.93	32.67	31.70	29.77	29.91
6.5	65.44	63.88	51.63	49.58	50.62	47.10	41.32	39.94	39.13	38.73	36.48	34.59	33.21	32.47	32.22	31.29	29.48	29.55
7.0	63.28	62.07	50.42	48.43	49.48	46.13	40.52	39.20	38.42	38.07	35.86	34.03	32.70	31.98	31.75	30.85	29.15	29.16
8.0	59.38	58.73	48.13	46.28	47.32	44.27	38.95	37.74	37.04	36.76	34.65	32.91	31.66	31.00	30.80	29.96	28.45	28.36
9.0	55.97	55.73	46.04	44.29	45.32	42.52	37.48	36.35	35.71	35.49	33.47	31.82	30.64	30.04	29.85	29.07	27.72	27.55
10.0	52.96	53.03	44.12	42.46	43.49	40.90	36.10	35.05	34.46	34.29	32.35	30.78	29.66	29.11	28.94	28.20	26.99	26.76
11.0	50.29	50.60	42.36	40.79	41.80	39.40	34.81	33.84	33.29	33.16	31.29	29.80	28.73	28.22	28.07	27.37	26.27	26.00
12.0	47.91	48.41	40.75	39.25	40.25	38.01	33.62	32.70	32.20	32.09	30.29	28.87	27.85	27.37	27.24	26.58	25.58	25.27
15.0	42.06	42.93	36.63	35.32	36.26	34.41	30.51	29.74	29.32	29.28	27.66	26.40	25.51	25.12	25.02	24.45	23.67	23.30
20.0	35.21	36.34	31.51	30.42	31.27	29.84	26.53	25.92	25.60	25.63	24.23	23.16	22.42	22.12	22.06	21.61	21.04	20.64
25.0	30.47	31.70	27.78	26.84	27.62	26.46	23.57	23.06	22.81	22.87	21.63	20.71	20.06	19.83	19.79	19.41	18.98	18.58
30.0	26.98	28.24	24.94	24.11	24.83	23.86	21.28	20.85	20.64	20.71	19.60	18.78	18.20	18.03	18.00	17.68	17.33	16.94
35.0	24.30	25.55	22.70	21.95	22.62	21.78	19.45	19.07	18.90	18.98	17.97	17.23	16.71	16.56	16.55	16.26	15.98	15.61
40.0	22.17	23.39	20.88	20.20	20.82	20.09	17.96	17.62	17.47	17.56	16.63	15.95	15.47	15.35	15.35	15.09	14.85	14.50
45.0	20.43	21.62	19.37	18.75	19.33	18.68	16.71	16.40	16.27	16.36	15.50	14.87	14.44	14.34	14.33	14.11	13.89	13.57
50.0	18.98	20.14	18.10	17.52	18.07	17.48	15.65	15.37	15.25	15.35	14.54	13.96	13.55	13.47	13.47	13.26	13.07	12.77
55.0	17.76	18.89	17.01	16.47	16.99	16.45	14.74	14.48	14.38	14.47	13.71	13.17	12.79	12.71	12.72	12.53	12.36	12.07
60.0	16.70	17.80	16.06	15.56	16.05	15.56	13.95	13.71	13.61	13.71	12.99	12.48	12.12	12.06	12.06	11.89	11.73	11.46
65.0	15.79	16.86	15.23	14.76	15.23	14.78	13.25	13.03	12.94	13.03	12.35	11.87	11.53	11.48	11.48	11.33	11.18	10.92
70.0	14.99	16.03	14.50	14.05	14.50	14.08	12.63	12.42	12.34	12.44	11.79	11.33	11.01	10.96	10.97	10.82	10.68	10.44
80.0	13.64	14.63	13.27	12.86	13.27	12.91	11.58	11.40	11.33	11.42	10.83	10.41	10.12	10.08	10.09	9.96	9.84	9.62
90.0	12.56	13.50	12.27	11.89	12.27	11.95	10.73	10.56	10.50	10.59	10.04	9.66	9.39	9.36	9.37	9.26	9.14	8.95
100.0	11.67	12.56	11.43	11.09	11.44	11.15	10.01	9.86	9.81	9.90	9.39	9.03	8.78	8.75	8.77	8.66	8.56	8.38
150.0	8.824	9.566	8.738	8.480	8.748	8.548	7.693	7.583	7.553	7.632	7.243	6.974	6.779	6.771	6.784	6.714	6.636	6.516
200.0	7.282	8.005	7.311	7.083	7.263	7.152	6.431	6.316	6.338	6.413	6.079	5.988	5.790	5.671	5.693	5.618	5.677	5.478
250.0	6.383	7.035	6.429	6.229	6.373	6.298	5.665	5.603	5.588	5.657	5.364	5.282	5.109	5.009	5.030	4.946	5.017	4.846
300.0	5.767	6.366	5.820	5.638	5.771	5.706	5.135	4.943	5.068	5.133	4.868	4.792	4.636	4.549	4.569	4.495	4.558	4.406
350.0	5.317	5.876	5.374	5.207	5.331	5.273	4.747	4.574	4.687	4.748	4.505	4.432	4.289	4.211	4.231	4.163	4.220	4.082
400.0	4.976	5.504	5.035	4.877	4.996	4.942	4.450	4.293	4.396	4.455	4.227	4.157	4.024	3.953	3.972	3.909	3.962	3.835
450.0	4.708	5.211	4.768	4.619	4.733	4.683	4.217	4.072	4.168	4.224	4.009	3.941	3.816	3.750	3.769	3.710	3.759	3.639
500.0	4.493	4.976	4.554	4.411	4.521	4.474	4.030	3.895	3.984	4.039	3.834	3.767	3.648	3.587	3.605	3.549	3.596	3.482

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	27.49	26.22	26.27	26.45	26.22	24.72	23.95	22.62	22.13	21.55	21.13	20.79	20.03	19.78	19.56	19.61	18.79	18.58
3.0	28.37	27.08	27.12	27.32	27.12	25.64	24.87	23.57	23.11	22.53	22.11	21.77	21.02	20.75	20.52	20.57	19.70	19.47
3.5	28.80	27.52	27.56	27.75	27.59	26.14	25.38	24.12	23.68	23.11	22.70	22.36	21.64	21.36	21.11	21.16	20.26	20.02
4.0	28.96	27.68	27.72	27.91	27.79	26.37	25.63	24.41	23.99	23.44	23.03	22.70	21.99	21.71	21.46	21.51	20.58	20.34
4.5	28.93	27.67	27.70	27.90	27.80	26.42	25.69	24.52	24.12	23.58	23.18	22.86	22.18	21.89	21.64	21.69	20.74	20.50
5.0	28.78	27.53	27.57	27.76	27.69	26.35	25.63	24.51	24.13	23.60	23.21	22.90	22.24	21.96	21.70	21.74	20.79	20.55
5.5	28.54	27.32	27.36	27.55	27.50	26.19	25.50	24.41	24.05	23.54	23.15	22.85	22.21	21.94	21.67	21.72	20.76	20.52
6.0	28.26	27.06	27.09	27.28	27.25	25.98	25.30	24.26	23.91	23.41	23.04	22.74	22.12	21.85	21.59	21.63	20.68	20.44
6.5	27.93	26.75	26.79	26.98	26.97	25.73	25.06	24.06	23.73	23.24	22.88	22.59	21.99	21.73	21.46	21.50	20.55	20.32
7.0	27.59	26.43	26.47	26.65	26.65	25.45	24.80	23.83	23.51	23.04	22.68	22.41	21.82	21.57	21.30	21.34	20.40	20.17
8.0	26.86	25.74	25.78	25.96	25.99	24.84	24.23	23.32	23.03	22.58	22.24	21.98	21.43	21.18	20.91	20.96	20.03	19.81
9.0	26.12	25.04	25.08	25.26	25.31	24.21	23.62	22.77	22.50	22.08	21.76	21.51	20.99	20.76	20.49	20.53	19.62	19.40
10.0	25.39	24.35	24.39	24.56	24.63	23.58	23.02	22.22	21.97	21.57	21.25	21.02	20.53	20.31	20.04	20.08	19.20	18.98
11.0	24.68	23.68	23.72	23.89	23.97	22.97	22.43	21.67	21.44	21.06	20.75	20.53	20.06	19.85	19.59	19.63	18.77	18.56
12.0	24.00	23.04	23.08	23.24	23.33	22.37	21.85	21.14	20.92	20.55	20.26	20.05	19.60	19.41	19.14	19.19	18.34	18.14
15.0	22.16	21.28	21.32	21.48	21.59	20.73	20.27	19.65	19.46	19.14	18.88	18.70	18.30	18.13	17.88	17.92	17.14	16.95
20.0	19.66	18.90	18.94	19.08	19.21	18.48	18.09	17.57	17.43	17.16	16.94	16.78	16.45	16.32	16.09	16.12	15.43	15.27
25.0	17.72	17.04	17.08	17.21	17.34	16.71	16.36	15.93	15.81	15.58	15.38	15.25	14.96	14.86	14.64	14.67	14.04	13.90
30.0	16.17	15.56	15.60	15.72	15.85	15.28	14.97	14.59	14.50	14.29	14.12	14.00	13.75	13.66	13.45	13.49	12.91	12.79
35.0	14.90	14.35	14.39	14.50	14.63	14.11	13.83	13.50	13.41	13.23	13.07	12.97	12.74	12.67	12.47	12.50	11.98	11.86
40.0	13.85	13.34	13.38	13.48	13.61	13.14	12.88	12.58	12.50	12.34	12.19	12.10	11.89	11.83	11.65	11.67	11.19	11.08
45.0	12.96	12.48	12.52	12.62	12.75	12.31	12.07	11.80	11.73	11.58	11.44	11.36	11.17	11.11	10.94	10.97	10.51	10.41
50.0	12.20	11.75	11.79	11.88	12.00	11.60	11.38	11.13	11.06	10.92	10.80	10.72	10.54	10.49	10.33	10.36	9.93	9.84
55.0	11.54	11.11	11.15	11.24	11.36	10.98	10.77	10.54	10.48	10.35	10.23	10.16	10.00	9.95	9.80	9.82	9.42	9.33
60.0	10.96	10.56	10.59	10.68	10.79	10.43	10.24	10.02	9.97	9.85	9.74	9.67	9.52	9.48	9.33	9.35	8.97	8.89
65.0	10.45	10.06	10.10	10.18	10.29	9.95	9.77	9.57	9.52	9.40	9.30	9.23	9.09	9.05	8.91	8.93	8.57	8.49
70.0	9.99	9.62	9.66	9.74	9.85	9.52	9.35	9.16	9.11	9.00	8.90	8.84	8.71	8.67	8.54	8.56	8.21	8.14
80.0	9.21	8.87	8.90	8.98	9.08	8.79	8.63	8.46	8.42	8.32	8.23	8.17	8.05	8.02	7.90	7.92	7.60	7.53
90.0	8.56	8.25	8.28	8.35	8.45	8.18	8.03	7.88	7.84	7.75	7.67	7.62	7.51	7.48	7.36	7.38	7.09	7.02
100.0	8.02	7.73	7.76	7.82	7.92	7.67	7.53	7.39	7.36	7.28	7.20	7.15	7.05	7.03	6.91	6.93	6.65	6.60
150.0	6.237	6.012	6.037	6.086	6.170	5.975	5.877	5.775	5.753	5.694	5.634	5.599	5.522	5.507	5.422	5.438	5.220	5.176
200.0	5.244	5.064	5.063	5.105	5.179	5.018	4.938	4.858	4.842	4.794	4.745	4.716	4.655	4.641	4.571	4.585	4.524	4.377
250.0	4.640	4.481	4.432	4.468	4.536	4.408	4.364	4.287	4.290	4.242	4.179	4.172	4.126	4.095	4.030	4.044	4.015	3.888
300.0	4.219	4.075	4.031	4.045	4.105	4.011	3.972	3.903	3.906	3.863	3.807	3.800	3.759	3.732	3.674	3.686	3.659	3.545
350.0	3.910	3.777	3.737	3.750	3.806	3.720	3.683	3.621	3.624	3.584	3.532	3.526	3.489	3.465	3.410	3.422	3.396	3.292
400.0	3.673	3.548	3.512	3.524	3.577	3.496	3.461	3.404	3.407	3.370	3.322	3.316	3.282	3.260	3.209	3.219	3.194	3.099
450.0	3.486	3.368	3.334	3.346	3.396	3.320	3.287	3.233	3.236	3.202	3.157	3.151	3.119	3.098	3.050	3.060	3.036	2.946
500.0	3.336	3.223	3.192	3.202	3.251	3.179	3.147	3.096	3.099	3.066	3.023	3.017	2.988	2.968	2.922	2.931	2.907	2.822

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

103 RH IONS 45

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.280	5.060	7.141	7.120	6.990	8.332	9.020	9.499	9.860	10.240	10.460	11.180	11.560	12.071	12.270	12.476	12.855	13.190
3.0	5.873	5.717	7.995	8.014	7.872	9.307	10.148	10.680	11.077	11.487	11.789	12.594	13.047	13.604	13.821	14.086	14.642	14.916
3.5	6.489	6.387	8.858	8.917	8.762	10.284	11.274	11.856	12.286	12.722	13.105	13.991	14.514	15.113	15.347	15.667	16.379	16.604
4.0	7.130	7.073	9.736	9.835	9.665	11.271	12.409	13.039	13.500	13.959	14.422	15.387	15.976	16.616	16.866	17.239	18.091	18.280
4.5	7.796	7.778	10.633	10.772	10.585	12.272	13.558	14.234	14.726	15.204	15.747	16.790	17.444	18.124	18.388	18.812	19.794	19.954
5.0	8.489	8.504	11.551	11.729	11.525	13.292	14.725	15.447	15.967	16.464	17.087	18.207	18.924	19.642	19.920	20.394	21.497	21.636
5.5	9.209	9.253	12.490	12.708	12.485	14.331	15.913	16.679	17.228	17.742	18.444	19.641	20.421	21.177	21.468	21.990	23.208	23.331
6.0	9.965	10.024	13.463	13.711	13.468	15.391	17.124	17.934	18.510	19.039	19.822	21.096	21.938	22.730	23.034	23.605	24.930	25.043
6.5	10.729	10.818	14.438	14.738	14.474	16.473	18.358	19.211	19.814	20.367	21.223	22.573	23.477	24.305	24.622	25.240	26.669	26.775
7.0	11.529	11.636	15.448	15.789	15.503	17.578	19.617	20.513	21.143	21.698	22.646	24.074	25.039	25.903	26.232	26.897	28.426	28.530
8.0	13.21	13.34	17.54	17.96	17.63	19.86	22.21	23.19	23.87	24.45	25.57	27.15	28.24	29.17	29.53	30.28	32.00	32.11
9.0	15.00	15.14	19.73	20.24	19.86	22.23	24.91	25.97	26.71	27.30	28.59	30.33	31.55	32.55	32.92	33.77	35.67	35.80
10.0	16.89	17.04	22.01	22.62	22.18	24.70	27.71	28.86	29.64	30.26	31.72	33.63	34.96	36.03	36.43	37.37	39.43	39.59
11.0	18.89	19.03	24.40	25.09	24.59	27.27	30.61	31.85	32.68	33.31	34.96	37.03	38.49	39.63	40.04	41.08	43.30	43.49
12.0	20.99	21.11	26.88	27.67	27.11	29.93	33.62	34.95	35.83	36.47	38.31	40.54	42.13	43.33	43.77	44.90	47.28	47.51
15.0	27.89	27.90	34.89	35.98	35.21	38.49	43.29	44.87	45.90	46.56	49.00	51.74	53.74	55.13	55.62	57.03	59.85	60.26
20.0	41.33	40.99	50.10	51.74	50.55	54.61	61.44	63.47	64.75	65.41	68.94	72.62	75.33	77.03	77.59	79.48	82.97	83.79
25.0	57.11	56.21	67.54	69.81	68.12	72.97	82.08	84.58	86.10	86.72	91.48	96.18	99.66	101.66	102.28	104.67	108.77	110.13
30.0	75.11	73.46	87.14	90.08	87.82	93.50	105.11	108.10	109.87	110.42	116.53	122.34	126.65	128.93	129.60	132.51	137.21	139.20
35.0	95.25	92.67	108.82	112.50	109.58	116.12	130.45	133.96	135.98	136.43	144.00	151.01	156.21	158.77	159.47	162.92	168.19	170.90
40.0	117.5	113.8	132.5	137.0	133.3	140.8	158.0	162.1	164.4	164.7	173.8	182.1	188.3	191.1	191.8	195.8	201.7	205.2
45.0	141.7	136.7	158.1	163.5	159.0	167.4	187.8	192.4	194.9	195.1	205.9	215.6	222.8	225.8	226.6	231.1	237.6	241.9
50.0	167.9	161.4	185.7	191.9	186.6	196.9	219.7	224.9	227.6	227.6	240.3	251.3	259.6	262.9	263.7	268.8	275.8	281.1
55.0	195.9	187.8	215.0	222.2	216.0	226.3	253.6	259.4	262.4	262.2	276.8	289.3	298.7	302.3	303.0	308.8	316.3	322.6
60.0	225.9	215.9	246.2	254.4	247.2	258.5	289.5	296.0	299.3	298.8	315.4	329.5	340.1	343.9	344.6	351.0	359.1	366.4
65.0	257.6	245.6	279.2	288.4	280.2	292.5	327.4	334.5	338.1	337.3	356.0	371.9	383.7	387.7	388.4	395.4	404.1	412.4
70.0	291.1	277.0	313.8	324.2	314.9	328.2	367.3	375.0	378.9	377.8	398.7	416.3	429.5	433.7	434.3	441.9	451.3	460.7
80.0	363.2	344.4	388.2	400.9	389.2	404.7	452.5	461.7	466.1	464.3	490.0	511.2	527.2	531.8	532.3	541.2	551.8	563.5
90.0	442.0	417.7	469.0	484.3	470.0	487.7	545.0	555.7	560.6	558.1	588.8	614.0	633.0	637.9	638.3	648.6	660.5	674.6
100.0	527.1	496.9	556.0	574.0	557.0	577.0	644.5	656.7	662.1	658.7	695.0	724.4	746.5	751.8	752.0	763.7	777.0	793.7
150.0	1041.5	972.7	1077.7	1111.8	1078.2	1111.1	1238.3	1259.5	1267.6	1258.3	1326.9	1380.9	1422.1	1428.5	1427.5	1446.7	1468.1	1498.4
200.0	1688.2	1565.5	1726.9	1782.6	1728.4	1774.8	1976.0	2008.2	2017.4	1999.8	2108.7	2175.7	2244.1	2265.3	2262.1	2290.1	2307.4	2366.2
250.0	2446.5	2254.3	2480.8	2559.5	2488.9	2544.9	2832.2	2885.0	2885.9	2857.9	3013.7	3094.7	3194.3	3235.0	3227.8	3271.7	3275.8	3369.2
300.0	3297.4	3025.8	3324.8	3430.6	3340.1	3406.0	3789.2	3875.7	3855.9	3815.9	4023.7	4120.8	4255.0	4316.4	4304.4	4366.4	4355.3	4486.1
350.0	4229.1	3869.8	4247.2	4382.6	4270.0	4346.5	4834.0	4960.5	4914.2	4860.8	5125.2	5240.1	5411.7	5496.0	5477.6	5558.9	5531.4	5702.3
400.0	5232.	4776.	5238.	5406.	5269.	5357.	5956.	6124.	6050.	5982.	6307.	6441.	6653.	6759.	6735.	6837.	6792.	7005.
450.0	6297.	5738.	6291.	6492.	6329.	6428.	7146.	7357.	7254.	7170.	7559.	7715.	7968.	8097.	8068.	8190.	8128.	8385.
500.0	7417.	6750.	7396.	7634.	7443.	7554.	8396.	8651.	8519.	8418.	8873.	9052.	9349.	9503.	9466.	9611.	9530.	9833.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.85	14.37	15.53	15.83	16.43	17.27	17.78	18.43	18.82	19.20	19.59	20.01	20.42	20.80	21.29	21.47	23.02	23.51
3.0	15.69	16.30	17.46	17.74	18.35	19.31	19.89	20.66	21.09	21.53	21.97	22.42	22.93	23.34	23.86	24.03	25.69	26.21
3.5	17.49	18.19	19.34	19.61	20.23	21.30	21.93	22.82	23.29	23.79	24.26	24.75	25.34	25.78	26.33	26.49	28.26	28.82
4.0	19.27	20.05	21.20	21.46	22.09	23.26	23.95	24.94	25.45	26.00	26.51	27.04	27.70	28.17	28.74	28.90	30.78	31.37
4.5	21.05	21.91	23.06	23.31	23.94	25.21	25.96	27.04	27.59	28.19	28.74	29.30	30.03	30.53	31.13	31.29	33.28	33.89
5.0	22.84	23.78	24.92	25.16	25.80	27.16	27.96	29.14	29.73	30.37	30.96	31.55	32.35	32.88	33.51	33.66	35.75	36.40
5.5	24.63	25.65	26.80	27.02	27.67	29.12	29.98	31.24	31.86	32.55	33.18	33.80	34.66	35.22	35.88	36.03	38.23	38.91
6.0	26.45	27.55	28.69	28.90	29.55	31.10	32.01	33.36	34.01	34.75	35.41	36.06	36.99	37.58	38.26	38.40	40.72	41.42
6.5	28.28	29.46	30.60	30.79	31.45	33.09	34.05	35.49	36.17	36.95	37.66	38.33	39.32	39.94	40.66	40.79	43.21	43.95
7.0	30.13	31.40	32.53	32.71	33.37	35.10	36.12	37.64	38.35	39.18	39.92	40.62	41.67	42.32	43.07	43.19	45.73	46.49
8.0	33.92	35.35	36.48	36.63	37.28	39.20	40.32	42.01	42.78	43.69	44.50	45.26	46.43	47.14	47.95	48.06	50.82	51.64
9.0	37.81	39.40	40.53	40.65	41.30	43.40	44.62	46.48	47.30	48.31	49.18	49.99	51.29	52.05	52.92	53.03	56.02	56.89
10.0	41.81	43.57	44.69	44.79	45.42	47.71	49.04	51.06	51.94	53.03	53.97	54.84	56.25	57.06	58.00	58.10	61.32	62.26
11.0	45.92	47.86	48.97	49.04	49.66	52.13	53.57	55.75	56.68	57.86	58.88	59.80	61.33	62.19	63.20	63.29	66.75	67.75
12.0	50.15	52.27	53.38	53.41	54.02	56.68	58.22	60.57	61.55	62.81	63.90	64.87	66.52	67.44	68.52	68.59	72.30	73.36
15.0	63.56	66.24	67.31	67.25	67.80	71.03	72.91	75.74	76.87	78.40	79.70	80.84	82.84	83.92	85.23	85.26	89.74	90.99
20.0	88.29	91.96	92.99	92.74	93.14	97.39	99.86	103.50	104.87	106.85	108.54	109.95	112.56	113.90	115.64	115.60	121.46	123.04
25.0	115.92	120.71	121.66	121.20	121.40	126.74	129.84	134.33	135.94	138.40	140.49	142.19	145.42	147.01	149.24	149.13	156.49	158.44
30.0	146.39	152.38	153.25	152.55	152.51	159.02	162.79	168.14	170.00	172.96	175.48	177.48	181.37	183.20	185.98	185.79	194.78	197.11
35.0	179.60	186.89	187.66	186.70	186.36	194.12	198.60	204.87	206.97	210.45	213.43	215.74	220.32	222.39	225.78	225.49	236.22	238.97
40.0	215.5	224.1	224.8	223.6	222.9	232.0	237.2	244.4	246.8	250.8	254.3	256.9	262.2	264.5	268.5	268.1	280.8	283.9
45.0	253.9	264.1	264.6	263.1	262.0	272.5	278.5	286.7	289.3	293.9	297.9	300.9	306.9	309.5	314.2	313.7	328.3	331.9
50.0	294.9	306.6	307.0	305.2	303.7	315.6	322.5	331.7	334.5	339.7	344.2	347.6	354.4	357.2	362.7	362.0	378.7	382.8
55.0	338.3	351.7	352.0	349.7	347.8	361.3	369.0	379.3	382.4	388.2	393.3	396.9	404.6	407.6	413.9	413.1	432.0	436.6
60.0	384.1	399.3	399.3	396.8	394.3	409.4	418.1	429.4	432.8	439.2	444.9	448.9	457.4	460.6	467.8	466.9	488.0	493.2
65.0	432.3	449.3	449.2	446.2	443.2	460.0	469.6	482.0	485.7	492.7	499.0	503.4	512.8	516.2	524.3	523.2	546.8	552.5
70.0	482.7	501.6	501.3	497.9	494.4	512.9	523.5	537.1	541.0	548.7	555.6	560.5	570.7	574.4	583.3	582.1	608.2	614.5
80.0	590.3	613.2	612.5	608.3	603.4	625.7	638.3	654.2	658.7	667.9	676.1	681.8	693.9	698.0	708.9	707.4	738.8	746.2
90.0	706.4	733.8	732.6	727.3	721.1	747.3	762.1	780.5	785.6	796.2	805.9	812.4	826.5	831.0	844.1	842.2	879.3	887.9
100.0	830.8	862.8	861.1	854.9	847.0	877.5	894.6	916.6	921.3	933.5	944.6	952.1	968.3	973.2	988.6	986.3	1029.4	1039.4
150.0	1567.	1627.	1622.	1610.	1592.	1647.	1677.	1713.	1721.	1742.	1762.	1775.	1803.	1810.	1839.	1834.	1912.	1930.
200.0	2474.	2567.	2559.	2539.	2508.	2593.	2639.	2690.	2703.	2733.	2764.	2783.	2824.	2834.	2879.	2871.	2969.	3019.
250.0	3521.	3652.	3650.	3621.	3574.	3693.	3753.	3824.	3837.	3880.	3925.	3949.	4004.	4021.	4084.	4073.	4181.	4271.
300.0	4688.	4859.	4871.	4837.	4772.	4920.	4993.	5086.	5098.	5155.	5220.	5245.	5314.	5341.	5426.	5410.	5528.	5661.
350.0	5968.	6174.	6200.	6161.	6077.	6255.	6341.	6458.	6469.	6542.	6626.	6654.	6739.	6776.	6883.	6862.	6990.	7171.
400.0	7318.	7583.	7623.	7580.	7474.	7685.	7785.	7926.	7936.	8025.	8131.	8162.	8262.	8310.	8441.	8415.	8556.	8785.
450.0	8759.	9074.	9130.	9081.	8953.	9198.	9313.	9480.	9488.	9594.	9723.	9756.	9873.	9932.	10089.	10058.	10211.	10491.
500.0	10270.	10638.	10709.	10656.	10504.	10784.	10916.	11109.	11115.	11239.	11391.	11428.	11561.	11632.	11815.	11778.	11946.	12279.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{106}_{46}$PD IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	90.97	80.76	62.08	59.23	59.97	54.06	46.63	44.46	43.09	41.97	39.34	36.93	35.06	33.98	33.56	32.31	28.94	30.12
3.0	87.92	79.86	61.74	58.99	59.83	54.30	47.02	44.96	43.68	42.70	40.06	37.69	35.87	34.82	34.43	33.20	30.08	31.03
3.5	84.66	78.24	60.87	58.22	59.14	53.96	46.86	44.92	43.72	42.86	40.25	37.93	36.17	35.16	34.79	33.60	30.72	31.47
4.0	81.42	76.26	59.74	57.19	58.16	53.30	46.40	44.56	43.44	42.68	40.11	37.85	36.16	35.19	34.84	33.69	31.02	31.62
4.5	78.33	74.14	58.47	56.02	57.03	52.46	45.76	44.02	42.96	42.30	39.77	37.58	35.95	35.02	34.69	33.58	31.11	31.56
5.0	75.40	72.01	57.16	54.80	55.83	51.53	45.02	43.37	42.37	41.79	39.31	37.18	35.61	34.72	34.41	33.34	31.04	31.38
5.5	72.67	69.92	55.83	53.56	54.61	50.54	44.23	42.66	41.72	41.20	38.77	36.71	35.18	34.34	34.05	33.02	30.88	31.11
6.0	70.12	67.90	54.53	52.33	53.40	49.54	43.41	41.92	41.02	40.56	38.19	36.18	34.71	33.90	33.63	32.64	30.64	30.79
6.5	67.74	65.97	53.25	51.13	52.21	48.54	42.59	41.16	40.31	39.90	37.58	35.63	34.21	33.44	33.18	32.22	30.35	30.42
7.0	65.52	64.13	52.02	49.97	51.05	47.56	41.77	40.41	39.60	39.24	36.96	35.07	33.70	32.96	32.71	31.79	30.03	30.04
8.0	61.52	60.72	49.70	47.77	48.85	45.67	40.19	38.93	38.20	37.91	35.73	33.94	32.65	31.97	31.75	30.89	29.33	29.23
9.0	58.01	57.65	47.56	45.75	46.81	43.90	38.69	37.52	36.86	36.63	34.53	32.84	31.61	30.99	30.79	29.98	28.59	28.42
10.0	54.92	54.89	45.60	43.88	44.94	42.25	37.28	36.20	35.59	35.40	33.40	31.78	30.62	30.04	29.87	29.11	27.85	27.61
11.0	52.17	52.40	43.80	42.18	43.21	40.72	35.97	34.96	34.39	34.25	32.32	30.77	29.67	29.14	28.98	28.26	27.12	26.84
12.0	49.71	50.15	42.15	40.60	41.62	39.30	34.75	33.80	33.27	33.16	31.30	29.83	28.78	28.28	28.14	27.46	26.42	26.10
15.0	43.68	44.51	37.93	36.57	37.54	35.61	31.57	30.77	30.34	30.30	28.62	27.31	26.38	25.98	25.87	25.29	24.47	24.09
20.0	36.60	37.73	32.67	31.54	32.42	30.93	27.49	26.85	26.53	26.55	25.10	23.99	23.22	22.91	22.85	22.38	21.79	21.37
25.0	31.69	32.93	28.83	27.86	28.66	27.45	24.45	23.92	23.66	23.71	22.43	21.47	20.80	20.56	20.52	20.13	19.68	19.26
30.0	28.08	29.35	25.90	25.04	25.78	24.77	22.09	21.64	21.42	21.50	20.34	19.49	18.89	18.70	18.68	18.34	17.98	17.58
35.0	25.30	26.57	23.59	22.82	23.50	22.63	20.21	19.81	19.63	19.71	18.66	17.89	17.35	17.20	17.18	16.89	16.59	16.21
40.0	23.09	24.34	21.71	21.01	21.65	20.88	18.67	18.31	18.15	18.24	17.28	16.57	16.08	15.95	15.94	15.68	15.42	15.07
45.0	21.28	22.51	20.15	19.50	20.10	19.42	17.38	17.05	16.92	17.01	16.11	15.46	15.01	14.90	14.90	14.66	14.44	14.10
50.0	19.78	20.97	18.83	18.23	18.80	18.19	16.28	15.99	15.86	15.96	15.12	14.52	14.09	14.00	14.00	13.79	13.59	13.27
55.0	18.51	19.67	17.70	17.14	17.68	17.12	15.34	15.07	14.96	15.06	14.27	13.70	13.30	13.23	13.23	13.04	12.85	12.56
60.0	17.41	18.54	16.72	16.20	16.71	16.20	14.52	14.27	14.17	14.26	13.52	12.99	12.61	12.55	12.55	12.37	12.21	11.93
65.0	16.46	17.56	15.87	15.37	15.86	15.39	13.79	13.56	13.47	13.57	12.86	12.36	12.00	11.95	11.95	11.79	11.63	11.37
70.0	15.63	16.70	15.11	14.64	15.10	14.67	13.15	12.94	12.85	12.95	12.28	11.80	11.46	11.41	11.42	11.27	11.12	10.87
80.0	14.23	15.25	13.83	13.40	13.83	13.45	12.07	11.87	11.80	11.90	11.28	10.85	10.54	10.50	10.51	10.38	10.25	10.02
90.0	13.10	14.07	12.79	12.40	12.79	12.45	11.18	11.01	10.94	11.04	10.47	10.07	9.78	9.75	9.77	9.64	9.53	9.32
100.0	12.17	13.10	11.92	11.56	11.93	11.62	10.44	10.28	10.23	10.32	9.79	9.41	9.15	9.12	9.14	9.03	8.92	8.74
150.0	9.212	9.982	9.119	8.850	9.129	8.920	8.027	7.912	7.882	7.964	7.558	7.277	7.073	7.064	7.079	7.005	6.922	6.798
200.0	7.604	8.356	7.633	7.395	7.583	7.467	6.714	6.594	6.616	6.694	6.346	6.251	6.045	5.920	5.943	5.865	5.926	5.718
250.0	6.667	7.345	6.714	6.505	6.655	6.576	5.916	5.746	5.835	5.907	5.602	5.515	5.335	5.230	5.253	5.165	5.239	5.060
300.0	6.024	6.647	6.078	5.889	6.028	5.960	5.364	5.163	5.293	5.361	5.085	5.005	4.842	4.751	4.772	4.694	4.760	4.602
350.0	5.554	6.137	5.614	5.439	5.569	5.508	4.958	4.778	4.896	4.960	4.705	4.630	4.480	4.399	4.419	4.348	4.408	4.264
400.0	5.198	5.749	5.260	5.095	5.219	5.163	4.649	4.485	4.593	4.654	4.416	4.343	4.204	4.129	4.149	4.084	4.139	4.006
450.0	4.918	5.444	4.982	4.825	4.944	4.892	4.406	4.254	4.354	4.413	4.188	4.117	3.986	3.918	3.937	3.875	3.927	3.802
500.0	4.694	5.198	4.758	4.608	4.724	4.674	4.211	4.070	4.162	4.219	4.005	3.936	3.811	3.747	3.766	3.708	3.757	3.638

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	28.18	26.87	26.92	27.11	26.87	25.33	24.55	23.18	22.68	22.08	21.66	21.30	20.53	20.27	20.04	20.09	19.26	19.03
3.0	29.10	27.78	27.82	28.02	27.82	26.30	25.51	24.18	23.70	23.10	22.68	22.32	21.56	21.28	21.04	21.10	20.20	19.96
3.5	29.57	28.25	28.29	28.49	28.32	26.83	26.05	24.76	24.30	23.72	23.30	22.95	22.20	21.92	21.67	21.72	20.78	20.54
4.0	29.75	28.43	28.47	28.67	28.54	27.08	26.32	25.07	24.64	24.07	23.65	23.31	22.58	22.29	22.03	22.09	21.13	20.88
4.5	29.73	28.43	28.47	28.67	28.57	27.15	26.40	26.20	24.78	24.23	23.82	23.49	22.78	22.49	22.23	22.28	21.31	21.06
5.0	29.59	28.31	28.35	28.55	28.47	27.09	26.35	25.20	24.80	24.26	23.86	23.54	22.86	22.57	22.30	22.35	21.37	21.12
5.5	29.37	28.11	28.14	28.34	28.29	26.94	26.22	25.11	24.73	24.21	23.81	23.50	22.84	22.56	22.29	22.33	21.35	21.11
6.0	29.08	27.85	27.88	28.08	28.04	26.73	26.03	24.96	24.60	24.09	23.70	23.40	22.76	22.48	22.21	22.26	21.27	21.03
6.5	28.76	27.55	27.58	27.77	27.76	26.48	25.80	24.76	24.42	23.92	23.55	23.25	22.63	22.36	22.08	22.13	21.15	20.91
7.0	28.41	27.22	27.26	27.45	27.45	26.20	25.64	24.64	24.21	23.73	23.36	23.07	22.47	22.20	21.93	21.97	21.00	20.76
8.0	27.68	26.53	26.57	26.76	26.78	25.60	24.96	24.03	23.73	23.27	22.92	22.65	22.08	21.83	21.55	21.59	20.64	20.40
9.0	26.93	25.83	25.86	26.05	26.09	24.97	24.36	23.48	23.20	22.77	22.43	22.17	21.64	21.40	21.12	21.16	20.23	20.00
10.0	26.19	25.13	25.16	25.34	25.41	24.33	23.75	22.92	22.66	22.25	21.92	21.68	21.17	20.95	20.67	20.71	19.80	19.68
11.0	25.48	24.45	24.49	24.66	24.74	23.71	23.15	22.37	22.12	21.73	21.42	21.19	20.70	20.49	20.21	20.26	19.36	19.15
12.0	24.79	23.79	23.83	24.00	24.09	23.10	22.57	21.82	21.60	21.22	20.92	20.70	20.24	20.03	19.76	19.81	18.93	18.73
15.0	22.91	22.01	22.05	22.21	22.32	21.43	20.95	20.31	20.12	19.79	19.52	19.33	18.92	18.74	18.48	18.52	17.71	17.52
20.0	20.36	19.57	19.61	19.76	19.88	19.13	18.72	18.19	18.04	17.76	17.53	17.37	17.03	16.89	16.65	16.69	15.97	15.80
25.0	18.37	17.66	17.71	17.84	17.97	17.31	16.96	16.51	16.38	16.14	15.94	15.80	15.51	15.39	15.17	15.20	14.55	14.40
30.0	16.77	16.14	16.18	16.30	16.44	15.85	15.53	15.14	15.03	14.82	14.64	14.52	14.26	14.17	13.95	13.99	13.39	13.26
35.0	15.47	14.89	14.94	15.05	15.18	14.65	14.36	14.01	13.92	13.73	13.57	13.46	13.22	13.14	12.94	12.98	12.43	12.31
40.0	14.39	13.85	13.90	14.00	14.14	13.64	13.38	13.07	12.99	12.81	12.66	12.56	12.35	12.28	12.09	12.12	11.62	11.51
45.0	13.47	12.97	13.02	13.12	13.26	12.79	12.55	12.26	12.19	12.03	11.89	11.80	11.60	11.55	11.37	11.40	10.92	10.82
50.0	12.69	12.22	12.26	12.35	12.48	12.06	11.83	11.57	11.50	11.36	11.22	11.14	10.96	10.91	10.74	10.77	10.32	10.22
55.0	12.00	11.56	11.60	11.69	11.82	11.42	11.21	10.96	10.90	10.77	10.64	10.57	10.40	10.35	10.19	10.21	9.79	9.70
60.0	11.40	10.98	11.02	11.11	11.23	10.86	10.66	10.43	10.37	10.25	10.13	10.06	9.90	9.86	9.70	9.73	9.33	9.24
65.0	10.87	10.47	10.51	10.59	10.71	10.36	10.17	9.96	9.91	9.78	9.68	9.61	9.46	9.42	9.27	9.30	8.92	8.84
70.0	10.40	10.02	10.06	10.13	10.25	9.91	9.73	9.53	9.49	9.37	9.27	9.20	9.06	9.03	8.89	8.91	8.55	8.47
80.0	9.59	9.24	9.27	9.35	9.46	9.15	8.99	8.81	8.77	8.66	8.57	8.51	8.38	8.35	8.22	8.24	7.91	7.84
90.0	8.92	8.60	8.63	8.70	8.81	8.52	8.37	8.21	8.17	8.08	7.99	7.94	7.82	7.79	7.67	7.69	7.38	7.32
100.0	8.36	8.06	8.09	8.15	8.26	7.99	7.85	7.70	7.67	7.58	7.50	7.45	7.34	7.32	7.21	7.23	6.93	6.87
150.0	6.507	6.272	6.299	6.350	6.437	6.234	6.131	6.025	6.002	5.940	5.877	5.841	5.761	5.745	5.656	5.672	5.445	5.400
200.0	5.474	5.286	5.285	5.329	5.406	5.238	5.154	5.071	5.054	5.004	4.953	4.923	4.859	4.844	4.771	4.785	4.722	4.569
250.0	4.845	4.679	4.628	4.665	4.737	4.602	4.556	4.476	4.479	4.429	4.383	4.356	4.308	4.276	4.208	4.222	4.193	4.059
300.0	4.407	4.256	4.210	4.224	4.287	4.189	4.148	4.077	4.079	4.034	3.976	3.969	3.926	3.898	3.836	3.849	3.822	3.703
350.0	4.084	3.945	3.903	3.916	3.975	3.885	3.847	3.782	3.785	3.743	3.690	3.683	3.644	3.619	3.562	3.574	3.547	3.439
400.0	3.837	3.706	3.668	3.681	3.736	3.652	3.616	3.556	3.559	3.520	3.470	3.464	3.429	3.405	3.352	3.363	3.337	3.237
450.0	3.642	3.518	3.483	3.495	3.548	3.469	3.434	3.378	3.381	3.345	3.298	3.291	3.258	3.236	3.186	3.196	3.171	3.077
500.0	3.485	3.367	3.335	3.346	3.397	3.321	3.287	3.234	3.238	3.203	3.158	3.152	3.121	3.100	3.053	3.062	3.037	2.949

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

106 PD IONS 46

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.330	5.110	7.210	7.190	7.060	8.417	9.110	9.592	9.950	10.330	10.560	11.290	11.670	12.180	12.380	12.587	12.971	13.310
3.0	5.922	5.769	8.065	8.086	7.944	9.394	10.240	10.776	11.170	11.580	11.893	12.708	13.162	13.719	13.937	14.203	14.763	15.041
3.5	6.537	6.439	8.929	8.990	8.834	10.373	11.369	11.954	12.382	12.818	13.212	14.109	14.632	15.232	15.467	15.788	16.505	16.736
4.0	7.175	7.125	9.808	9.908	9.738	11.360	12.505	13.138	13.598	14.057	14.531	15.507	16.097	16.738	16.988	17.363	18.221	18.414
4.5	7.839	7.830	10.706	10.844	10.658	12.362	13.655	14.335	14.824	15.304	15.857	16.912	17.566	18.247	18.512	18.938	19.926	20.091
5.0	8.528	8.555	11.621	11.801	11.597	13.382	14.822	15.547	16.066	16.564	17.197	18.329	19.048	19.767	20.046	20.521	21.631	21.775
5.5	9.245	9.302	12.560	12.779	12.557	14.420	16.010	16.779	17.327	17.841	18.555	19.764	20.545	21.302	21.594	22.119	23.342	23.471
6.0	9.987	10.071	13.520	13.780	13.538	15.479	17.219	18.033	18.608	19.138	19.932	21.218	22.061	22.855	23.160	23.733	25.065	25.183
6.5	10.756	10.863	14.504	14.805	14.542	16.560	18.452	19.309	19.911	20.455	21.331	22.694	23.599	24.429	24.747	25.367	26.803	26.915
7.0	11.552	11.678	15.511	15.853	15.569	17.663	19.709	20.608	21.237	21.794	22.753	24.193	25.160	26.026	26.356	27.023	28.558	28.668
8.0	13.22	13.38	17.60	18.02	17.69	19.94	22.30	23.28	23.96	24.54	25.67	27.27	28.36	29.29	29.64	30.41	32.13	32.24
9.0	15.00	15.17	19.78	20.29	19.91	22.31	24.98	26.05	26.79	27.39	28.69	30.44	31.66	32.66	33.03	33.89	35.79	35.92
10.0	16.88	17.06	22.05	22.66	22.22	24.77	27.78	28.93	29.72	30.33	31.81	33.72	35.06	36.13	36.53	37.48	39.55	39.71
11.0	18.86	19.03	24.43	25.12	24.63	27.32	30.67	31.91	32.75	33.38	35.04	37.11	38.58	39.72	40.13	41.17	43.40	43.60
12.0	20.94	21.10	26.89	27.68	27.13	29.97	33.67	35.00	35.88	36.52	38.37	40.61	42.21	43.41	43.85	44.98	47.36	47.61
15.0	27.78	27.85	34.86	35.95	35.18	38.49	43.28	44.87	45.90	46.56	49.01	51.77	53.76	55.15	55.64	57.06	59.88	60.30
20.0	41.10	40.83	49.96	51.61	50.42	54.50	61.32	63.36	64.63	65.30	68.83	72.52	75.22	76.93	77.49	79.38	82.87	83.70
25.0	56.71	55.91	67.27	69.53	67.85	72.73	81.81	84.31	85.83	86.46	91.21	95.92	99.39	101.39	102.01	104.40	108.51	109.87
30.0	74.51	72.99	86.70	89.63	87.38	93.09	104.65	107.64	109.41	109.97	116.06	121.86	126.16	128.45	129.12	132.03	136.72	138.71
35.0	94.43	92.00	108.17	111.83	108.94	116.51	129.76	133.27	135.29	135.75	143.29	150.28	155.47	158.03	158.74	162.17	167.44	170.14
40.0	116.4	112.9	131.6	136.1	132.5	139.9	157.1	161.1	163.4	163.7	172.8	181.1	187.2	190.1	190.8	194.8	200.6	204.1
45.0	140.3	135.5	157.0	162.3	157.9	166.3	186.5	191.1	193.7	193.8	204.6	214.2	221.4	224.5	225.2	229.7	236.1	240.5
50.0	166.2	159.9	184.2	190.4	185.2	194.5	218.1	223.3	226.0	226.0	238.6	249.6	257.8	261.2	261.9	267.0	274.0	279.2
55.0	193.9	186.1	213.3	220.4	214.3	224.5	251.6	257.4	260.5	260.2	274.7	287.2	296.6	300.1	300.9	306.6	314.1	320.3
60.0	223.4	213.8	244.1	252.2	245.1	256.4	287.2	293.6	296.9	296.4	312.9	327.0	337.5	341.3	342.0	348.3	356.4	363.6
65.0	254.8	243.2	276.6	285.8	277.7	290.0	324.6	331.7	335.3	334.5	353.1	368.8	380.6	384.6	385.3	392.2	400.9	409.2
70.0	287.8	274.2	310.9	321.2	311.9	326.2	364.0	371.7	375.6	374.5	395.3	412.7	425.8	430.0	430.7	438.2	447.5	456.9
80.0	359.0	340.7	384.3	396.9	385.4	400.8	448.2	457.4	461.7	460.0	485.4	506.5	522.4	527.0	527.5	536.4	546.9	558.5
90.0	436.7	413.1	464.1	479.2	465.2	482.8	539.6	550.2	555.1	552.6	583.1	608.1	626.9	631.8	632.2	642.4	654.3	668.3
100.0	520.7	491.2	550.0	567.8	551.0	571.0	637.7	649.9	655.3	652.0	687.9	717.0	739.0	744.3	744.5	756.1	769.3	785.8
150.0	1027.9	960.6	1064.6	1098.3	1065.2	1097.9	1223.6	1244.6	1252.7	1243.6	1311.4	1364.8	1405.5	1412.0	1411.0	1430.1	1451.3	1481.3
200.0	1665.4	1545.2	1704.6	1758.4	1706.2	1752.3	1951.0	1982.9	1992.1	1974.7	2082.3	2148.6	2216.1	2237.2	2234.0	2261.8	2279.0	2337.0
250.0	2412.6	2224.2	2447.7	2525.4	2455.7	2511.3	2794.9	2847.1	2848.1	2820.5	2974.3	3054.4	3152.7	3193.0	3185.9	3229.4	3233.5	3325.7
300.0	3251.0	2984.5	3279.3	3383.7	3294.5	3359.9	3738.0	3823.4	3803.9	3764.5	3969.6	4065.6	4198.0	4268.7	4246.9	4308.1	4297.4	4426.4
350.0	4168.9	3815.6	4188.1	4321.7	4210.7	4286.5	4767.4	4892.2	4846.7	4794.1	5054.9	5168.4	5337.7	5419.9	5402.9	5483.1	5456.2	5624.8
400.0	5156.	4709.	5165.	5330.	5195.	5282.	5873.	6038.	5966.	5899.	6219.	6352.	6562.	6665.	6642.	6742.	6698.	6909.
450.0	6206.	5657.	6201.	6400.	6239.	6337.	7045.	7253.	7152.	7069.	7452.	7606.	7856.	7984.	7954.	8076.	8014.	8268.
500.0	7310.	6654.	7290.	7524.	7337.	7446.	8276.	8528.	8398.	8298.	8747.	8924.	9217.	9368.	9332.	9475.	9395.	9694.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.98	14.51	15.67	15.97	16.57	17.42	17.93	18.59	18.98	19.37	19.76	20.18	20.60	20.98	21.48	21.66	23.22	23.72
3.0	15.83	16.44	17.61	17.89	18.50	19.47	20.04	20.82	21.26	21.71	22.15	22.60	23.11	23.53	24.06	24.23	25.91	26.43
3.5	17.63	18.33	19.49	19.77	20.39	21.46	22.10	22.99	23.47	23.97	24.45	24.94	25.53	25.98	26.53	26.70	28.49	29.05
4.0	19.42	20.20	21.36	21.62	22.25	23.43	24.12	25.11	25.63	26.18	26.71	27.23	27.90	28.37	28.96	29.12	31.02	31.60
4.5	21.20	22.07	23.22	23.47	24.11	25.38	26.13	27.22	27.78	28.38	28.94	29.50	30.23	30.74	31.35	31.51	33.51	34.13
5.0	22.99	23.93	25.09	25.32	25.97	27.33	28.14	29.32	29.92	30.56	31.16	31.75	32.55	33.09	33.73	33.88	36.00	36.64
5.5	24.78	25.81	26.96	27.18	27.83	29.30	30.15	31.43	32.05	32.75	33.38	34.00	34.87	35.44	36.11	36.25	38.48	39.15
6.0	26.60	27.71	28.85	29.06	29.72	31.27	32.18	33.55	34.20	34.94	35.61	36.26	37.20	37.79	38.49	38.63	40.96	41.67
6.5	28.43	29.62	30.76	30.96	31.61	33.26	34.23	35.68	36.36	37.15	37.86	38.54	39.53	40.15	40.88	41.02	43.46	44.19
7.0	30.28	31.56	32.70	32.88	33.53	35.27	36.29	37.83	38.54	39.38	40.12	40.82	41.88	42.53	43.29	43.42	45.97	46.74
8.0	34.06	35.50	36.64	36.79	37.44	39.37	40.49	42.19	42.97	43.89	44.70	45.46	46.64	47.35	48.17	48.29	51.06	51.89
9.0	37.94	39.55	40.68	40.81	41.45	43.56	44.79	46.66	47.48	48.49	49.37	50.19	51.49	52.25	53.14	53.24	56.25	57.13
10.0	41.94	43.71	44.83	44.93	45.57	47.86	49.20	51.22	52.11	53.20	54.15	55.02	56.44	57.26	58.21	58.31	61.55	62.49
11.0	46.04	47.99	49.10	49.17	49.80	52.27	53.72	55.91	56.84	58.02	59.04	59.97	61.50	62.37	63.39	63.48	66.96	67.96
12.0	50.26	52.38	53.49	53.53	54.14	56.80	58.35	60.70	61.69	62.96	64.05	65.03	66.68	67.61	68.70	68.77	72.50	73.56
15.0	63.61	66.29	67.38	67.31	67.87	71.10	72.99	75.82	76.95	78.49	79.80	80.93	82.94	84.02	85.34	85.38	89.87	91.12
20.0	88.20	91.88	92.91	92.67	93.07	97.32	99.79	103.43	104.81	106.80	108.49	109.90	112.51	113.85	115.60	115.57	121.43	123.02
25.0	115.65	120.43	121.40	120.94	121.15	126.49	129.58	134.06	135.68	138.14	140.23	141.93	145.16	146.75	148.99	148.89	156.25	158.20
30.0	145.89	151.86	152.74	152.06	152.02	158.52	162.28	167.63	169.49	172.44	174.96	176.96	180.85	182.68	185.47	185.28	194.25	196.59
35.0	178.82	186.08	186.87	185.92	185.60	193.33	197.80	204.05	206.15	209.63	212.61	214.91	219.48	221.56	224.94	224.65	235.37	238.11
40.0	214.4	223.0	223.7	222.5	221.8	230.8	236.1	243.3	245.6	249.6	253.1	255.7	261.0	263.3	267.3	266.9	279.5	282.7
45.0	252.4	262.6	263.1	261.6	260.6	271.0	277.0	285.2	287.8	292.3	296.3	299.3	305.3	307.8	312.6	312.1	326.6	330.2
50.0	293.0	304.7	305.1	303.3	301.8	313.7	320.5	329.7	332.5	337.7	342.2	345.5	352.3	355.1	360.6	359.9	376.5	380.6
55.0	336.0	349.3	349.6	347.4	345.5	358.9	366.6	376.8	379.9	385.7	390.7	394.4	402.0	405.0	411.2	410.5	429.3	433.9
60.0	381.3	396.4	396.5	393.9	391.5	406.5	415.1	426.4	429.7	436.1	441.8	445.8	454.2	457.5	464.6	463.7	484.7	489.9
65.0	428.9	445.8	445.7	442.8	439.8	456.5	466.0	478.4	482.0	489.1	495.3	499.7	509.0	512.5	520.5	519.4	542.9	548.5
70.0	478.8	497.6	497.3	493.9	490.4	508.8	519.3	532.8	536.7	544.5	551.3	556.1	566.3	570.0	578.9	577.7	603.6	609.8
80.0	585.1	607.9	607.2	603.0	598.2	620.3	632.8	648.6	653.1	662.2	670.4	676.0	688.1	692.1	703.0	701.5	732.7	740.0
90.0	699.8	726.9	725.7	720.6	714.4	740.4	755.1	773.4	778.5	789.0	798.6	805.1	819.1	823.6	836.6	834.7	871.5	880.1
100.0	822.6	854.4	852.7	846.6	838.8	869.0	885.9	906.8	912.5	924.6	935.6	943.0	959.1	964.0	979.3	977.0	1019.8	1029.7
150.0	1549.	1608.	1603.	1591.	1574.	1628.	1658.	1693.	1702.	1723.	1742.	1755.	1783.	1790.	1818.	1814.	1891.	1909.
200.0	2443.	2535.	2527.	2508.	2477.	2561.	2606.	2658.	2670.	2700.	2730.	2749.	2790.	2800.	2844.	2837.	2933.	2983.
250.0	3476.	3605.	3603.	3574.	3528.	3645.	3705.	3775.	3788.	3831.	3875.	3898.	3953.	3970.	4032.	4021.	4128.	4217.
300.0	4626.	4795.	4806.	4773.	4709.	4855.	4927.	5019.	5030.	5087.	5151.	5176.	5244.	5271.	5354.	5338.	5455.	5587.
350.0	5877.	6090.	6116.	6078.	5995.	6171.	6255.	6370.	6381.	6453.	6537.	6564.	6648.	6684.	6790.	6769.	6897.	7075.
400.0	7217.	7478.	7518.	7475.	7371.	7579.	7678.	7817.	7827.	7915.	8020.	8050.	8149.	8196.	8326.	8300.	8439.	8665.
450.0	8636.	8947.	9002.	8954.	8828.	907C	9184.	9348.	9356.	9461.	9588.	9621.	9736.	9794.	9949.	9918.	10070.	10346.
500.0	10125.	10488.	10558.	10505.	10356.	1063..	10762.	10953.	10959.	11081.	11231.	11267.	11399.	11468.	11649.	11613.	11779.	12107.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{107}_{47}$AG IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	93.66	82.75	63.71	60.78	61.53	55.43	47.81	45.57	44.17	43.01	40.31	37.84	35.92	34.81	34.38	33.10	29.64	30.85
3.0	90.61	81.98	63.41	60.58	61.44	55.72	48.24	46.13	44.80	43.79	41.09	38.65	36.78	35.70	35.30	34.04	30.84	31.81
3.5	87.32	80.40	62.56	59.83	60.77	55.42	48.12	46.12	44.88	43.99	41.31	38.93	37.12	36.08	35.69	34.47	31.51	32.29
4.0	84.03	78.43	61.43	58.80	59.80	54.77	47.67	45.78	44.62	43.84	41.19	38.87	37.13	36.13	35.77	34.58	31.84	32.45
4.5	80.88	76.32	60.16	57.63	58.67	53.94	47.04	45.25	44.15	43.47	40.87	38.61	36.93	35.97	35.63	34.49	31.95	32.42
5.0	77.90	74.18	58.84	56.40	57.46	53.00	46.30	44.60	43.57	42.96	40.41	38.22	36.60	35.68	35.36	34.26	31.90	32.24
5.5	75.10	72.07	57.50	55.15	56.23	52.01	45.51	43.89	42.91	42.38	39.88	37.75	36.18	35.31	35.01	33.94	31.74	31.98
6.0	72.49	70.03	56.18	53.91	55.00	51.00	44.69	43.14	42.22	41.74	39.29	37.23	35.71	34.87	34.59	33.57	31.51	31.66
6.5	70.06	68.06	54.88	52.69	53.79	50.00	43.86	42.38	41.51	41.08	38.68	36.68	35.21	34.41	34.14	33.15	31.23	31.30
7.0	67.79	66.19	53.63	51.51	52.62	49.00	43.03	41.62	40.79	40.41	38.06	36.11	34.69	33.92	33.67	32.72	30.91	30.92
8.0	63.68	62.71	51.27	49.28	50.38	47.08	41.42	40.12	39.37	39.07	36.82	34.97	33.63	32.93	32.70	31.81	30.20	30.11
9.0	60.07	59.58	49.09	47.21	48.31	45.28	39.90	38.70	38.00	37.76	35.61	33.86	32.59	31.94	31.74	30.90	29.46	29.28
10.0	56.89	56.76	47.09	45.31	46.40	43.60	38.47	37.35	36.71	36.52	34.45	32.78	31.58	30.98	30.80	30.01	28.71	28.47
11.0	54.06	54.21	45.25	43.57	44.64	42.04	37.13	36.09	35.50	35.36	33.35	31.76	30.62	30.06	29.90	29.16	27.98	27.69
12.0	51.53	51.90	43.57	41.96	43.01	40.59	35.89	34.91	34.36	34.24	32.32	30.79	29.71	29.19	29.04	28.34	27.26	26.93
15.0	45.32	46.12	39.24	37.84	38.83	36.82	32.64	31.81	31.36	31.31	29.58	28.22	27.27	26.84	26.73	26.13	25.28	24.89
20.0	38.01	39.13	33.84	32.67	33.58	32.02	28.46	27.80	27.46	27.48	25.98	24.83	24.03	23.71	23.64	23.15	22.54	22.11
25.0	32.94	34.19	29.90	28.88	29.71	28.45	25.34	24.79	24.51	24.57	23.24	22.24	21.54	21.30	21.25	20.85	20.38	19.95
30.0	29.20	30.49	26.88	25.98	26.75	25.69	22.91	22.44	22.21	22.29	21.10	20.21	19.59	19.39	19.36	19.01	18.64	18.22
35.0	26.32	27.61	24.49	23.69	24.40	23.49	20.97	20.56	20.37	20.46	19.36	18.56	18.00	17.84	17.82	17.52	17.20	16.81
40.0	24.03	25.30	22.55	21.82	22.48	21.68	19.38	19.01	18.85	18.94	17.94	17.20	16.69	16.56	16.55	16.28	16.01	15.64
45.0	22.15	23.41	20.94	20.27	20.89	20.18	18.05	17.72	17.57	17.67	16.74	16.06	15.59	15.47	15.47	15.23	14.99	14.64
50.0	20.59	21.82	19.58	18.95	19.54	18.90	16.92	16.61	16.49	16.59	15.71	15.08	14.64	14.55	14.55	14.33	14.12	13.79
55.0	19.27	20.46	18.41	17.83	18.38	17.80	15.94	15.66	15.55	15.65	14.83	14.24	13.83	13.75	13.75	13.55	13.36	13.05
60.0	18.13	19.30	17.40	16.85	17.38	16.85	15.10	14.84	14.73	14.83	14.06	13.50	13.11	13.04	13.05	12.86	12.69	12.40
65.0	17.15	18.28	16.51	15.99	16.50	16.01	14.35	14.11	14.01	14.11	13.38	12.85	12.48	12.42	12.43	12.26	12.10	11.82
70.0	16.28	17.39	15.73	15.24	15.72	15.26	13.69	13.46	13.37	13.47	12.77	12.27	11.92	11.87	11.88	11.72	11.57	11.31
80.0	14.83	15.88	14.40	13.96	14.40	14.00	12.56	12.36	12.29	12.38	11.74	11.29	10.97	10.93	10.94	10.80	10.67	10.43
90.0	13.66	14.66	13.32	12.91	13.32	12.96	11.64	11.46	11.40	11.49	10.90	10.48	10.18	10.15	10.17	10.04	9.92	9.70
100.0	12.69	13.65	12.42	12.04	12.43	12.10	10.87	10.71	10.65	10.75	10.19	9.80	9.53	9.50	9.52	9.40	9.29	9.10
150.0	9.61	10.41	9.51	9.23	9.52	9.30	8.37	8.25	8.22	8.30	7.88	7.59	7.37	7.36	7.38	7.30	7.22	7.09
200.0	7.93	8.71	7.96	7.71	7.91	7.79	7.00	6.88	6.90	6.98	6.62	6.52	6.30	6.17	6.20	6.12	6.18	5.96
250.0	6.96	7.66	7.00	6.79	6.94	6.86	6.17	5.99	6.09	6.16	5.84	5.75	5.57	5.46	5.48	5.39	5.46	5.28
300.0	6.29	6.94	6.34	6.15	6.29	6.22	5.60	5.39	5.52	5.59	5.31	5.22	5.05	4.96	4.98	4.90	4.97	4.80
350.0	5.80	6.40	5.86	5.68	5.81	5.75	5.17	4.99	5.11	5.18	4.91	4.83	4.68	4.59	4.61	4.54	4.60	4.45
400.0	5.425	5.999	5.489	5.318	5.447	5.388	4.852	4.680	4.793	4.857	4.609	4.532	4.387	4.310	4.330	4.262	4.319	4.180
450.0	5.133	5.681	5.199	5.036	5.160	5.106	4.599	4.440	4.544	4.606	4.371	4.297	4.160	4.089	4.109	4.045	4.099	3.968
500.0	4.899	5.425	4.966	4.810	4.930	4.879	4.395	4.248	4.344	4.404	4.181	4.108	3.978	3.911	3.931	3.870	3.921	3.797

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	28.86	27.52	27.57	27.77	27.51	25.94	25.14	23.73	23.22	22.61	22.18	21.81	21.02	20.75	20.52	20.58	19.72	19.49
3.0	29.83	28.47	28.52	28.72	28.51	26.95	26.15	24.78	24.28	23.68	23.24	22.88	22.10	21.81	21.57	21.62	20.70	20.46
3.5	30.33	28.97	29.01	29.22	29.05	27.52	26.72	25.39	24.92	24.32	23.89	23.53	22.77	22.47	22.22	22.27	21.31	21.06
4.0	30.53	29.18	29.22	29.42	29.29	27.79	27.01	25.73	25.28	24.69	24.26	23.92	23.17	22.87	22.61	22.66	21.68	21.42
4.5	30.53	29.20	29.23	29.44	29.34	27.87	27.10	25.87	25.45	24.87	24.45	24.11	23.39	23.09	22.82	22.87	21.87	21.62
5.0	30.40	29.09	29.12	29.33	29.25	27.83	27.07	25.88	25.48	24.92	24.51	24.18	23.48	23.18	22.90	22.96	21.95	21.69
5.5	30.19	28.89	28.92	29.13	29.07	27.69	26.95	25.80	25.42	24.88	24.47	24.15	23.47	23.18	22.90	22.95	21.94	21.69
6.0	29.91	28.63	28.67	28.87	28.84	27.48	26.76	25.66	25.29	24.76	24.37	24.06	23.40	23.11	22.83	22.88	21.87	21.62
6.5	29.59	28.34	28.37	28.57	28.55	27.24	26.53	25.47	25.12	24.60	24.22	23.91	23.27	23.00	22.71	22.76	21.75	21.50
7.0	29.24	28.01	28.05	28.24	28.24	26.96	26.28	25.25	24.91	24.41	24.03	23.74	23.12	22.84	22.56	22.60	21.60	21.36
8.0	28.51	27.32	27.36	27.55	27.58	26.36	25.70	24.74	24.43	23.95	23.59	23.31	22.73	22.47	22.18	22.23	21.24	21.00
9.0	27.75	26.61	26.65	26.83	26.88	25.72	25.09	24.19	23.90	23.45	23.10	22.84	22.29	22.04	21.75	21.80	20.83	20.60
10.0	27.00	25.90	25.94	26.12	26.19	25.08	24.48	23.62	23.36	22.93	22.60	22.35	21.82	21.59	21.30	21.35	20.40	20.17
11.0	26.28	25.21	25.25	25.43	25.51	24.45	23.87	23.06	22.81	22.41	22.08	21.85	21.35	21.12	20.84	20.89	19.96	19.74
12.0	25.58	24.55	24.59	24.76	24.85	23.83	23.28	22.51	22.28	21.89	21.58	21.35	20.88	20.66	20.38	20.43	19.53	19.31
15.0	23.67	22.73	22.77	22.94	23.05	22.14	21.64	20.98	20.78	20.43	20.16	19.96	19.54	19.35	19.08	19.13	18.29	18.09
20.0	21.06	20.24	20.29	20.44	20.57	19.79	19.36	18.82	18.66	18.37	18.13	17.97	17.61	17.47	17.22	17.26	16.51	16.34
25.0	19.02	18.29	18.34	18.47	18.61	17.93	17.56	17.09	16.96	16.71	16.50	16.36	16.05	15.94	15.70	15.74	15.06	14.91
30.0	17.39	16.73	16.77	16.90	17.04	16.43	16.10	15.69	15.58	15.36	15.17	15.04	14.77	14.68	14.46	14.49	13.87	13.74
35.0	16.05	15.45	15.49	15.61	15.75	15.19	14.89	14.53	14.44	14.24	14.07	13.95	13.71	13.63	13.42	13.45	12.89	12.76
40.0	14.93	14.38	14.42	14.53	14.67	14.16	13.88	13.56	13.47	13.29	13.14	13.04	12.81	12.74	12.55	12.58	12.05	11.94
45.0	13.99	13.47	13.51	13.62	13.75	13.28	13.03	12.73	12.65	12.49	12.34	12.25	12.05	11.99	11.80	11.83	11.34	11.23
50.0	13.18	12.69	12.73	12.83	12.96	12.52	12.29	12.01	11.95	11.79	11.66	11.57	11.38	11.33	11.15	11.18	10.72	10.62
55.0	12.47	12.01	12.05	12.15	12.28	11.86	11.64	11.39	11.33	11.18	11.06	10.98	10.80	10.75	10.59	10.61	10.17	10.08
60.0	11.85	11.42	11.46	11.55	11.67	11.28	11.08	10.84	10.78	10.65	10.53	10.45	10.29	10.25	10.08	10.11	9.70	9.61
65.0	11.30	10.89	10.93	11.02	11.14	10.77	10.57	10.35	10.30	10.17	10.06	9.99	9.83	9.79	9.64	9.66	9.27	9.18
70.0	10.81	10.42	10.46	10.54	10.66	10.31	10.12	9.91	9.86	9.75	9.64	9.57	9.42	9.39	9.24	9.26	8.89	8.81
80.0	9.98	9.61	9.65	9.73	9.84	9.52	9.35	9.16	9.12	9.01	8.91	8.85	8.72	8.69	8.55	8.58	8.23	8.16
90.0	9.29	8.95	8.98	9.05	9.17	8.87	8.71	8.54	8.50	8.41	8.32	8.26	8.14	8.11	7.98	8.01	7.68	7.61
100.0	8.70	8.39	8.42	8.49	8.60	8.32	8.17	8.02	7.98	7.90	7.81	7.76	7.65	7.62	7.50	7.52	7.22	7.16
150.0	6.782	6.537	6.565	6.618	6.709	6.497	6.390	6.279	6.255	6.190	6.125	6.087	6.004	5.988	5.894	5.912	5.675	5.628
200.0	5.708	5.512	5.512	5.557	5.638	5.462	5.375	5.288	5.270	5.218	5.164	5.133	5.067	5.051	4.975	4.990	4.924	4.764
250.0	5.054	4.881	4.827	4.867	4.941	4.801	4.753	4.669	4.672	4.620	4.561	4.543	4.493	4.460	4.389	4.404	4.373	4.234
300.0	4.598	4.441	4.392	4.407	4.473	4.371	4.328	4.253	4.256	4.209	4.148	4.141	4.096	4.067	4.003	4.016	3.987	3.863
350.0	4.262	4.116	4.073	4.087	4.148	4.054	4.014	3.946	3.949	3.906	3.850	3.843	3.803	3.776	3.717	3.729	3.702	3.588
400.0	4.004	3.868	3.828	3.841	3.899	3.812	3.773	3.711	3.714	3.674	3.622	3.615	3.578	3.553	3.498	3.509	3.482	3.378
450.0	3.801	3.672	3.636	3.648	3.703	3.620	3.584	3.525	3.529	3.491	3.442	3.435	3.401	3.378	3.325	3.336	3.309	3.212
500.0	3.638	3.514	3.480	3.492	3.545	3.466	3.431	3.375	3.379	3.343	3.296	3.290	3.258	3.236	3.186	3.196	3.169	3.078

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{107}_{47}$AG IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.280	5.060	7.150	7.130	7.000	8.341	9.030	9.512	9.870	10.240	10.460	11.180	11.560	12.071	12.270	12.476	12.855	13.190
3.0	5.860	5.709	7.991	8.011	7.869	9.302	10.143	10.678	11.071	11.471	11.773	12.577	13.030	13.586	13.803	14.066	14.622	14.895
3.5	6.462	6.367	8.840	8.899	8.744	10.264	11.252	11.837	12.263	12.689	13.070	13.955	14.476	15.075	15.309	15.628	16.336	16.563
4.0	7.086	7.041	9.703	9.801	9.631	11.235	12.369	13.001	13.458	13.906	14.366	15.329	15.916	16.556	16.806	17.177	18.024	18.215
4.5	7.735	7.732	10.583	10.720	10.535	12.219	13.498	14.176	14.663	15.132	15.670	16.710	17.361	18.040	18.304	18.725	19.700	19.863
5.0	8.410	8.443	11.482	11.658	11.456	13.219	14.644	15.367	15.883	16.369	16.986	18.102	18.815	19.533	19.810	20.281	21.375	21.518
5.5	9.109	9.175	12.402	12.617	12.397	14.238	15.810	16.576	17.120	17.623	18.319	19.510	20.285	21.040	21.331	21.849	23.056	23.183
6.0	9.834	9.928	13.343	13.598	13.359	15.277	16.996	17.805	18.377	18.895	19.670	20.937	21.774	22.564	22.868	23.434	24.747	24.864
6.5	10.585	10.703	14.306	14.602	14.343	16.336	18.204	19.056	19.655	20.187	21.042	22.385	23.282	24.109	24.425	25.038	26.453	26.564
7.0	11.362	11.500	15.293	15.629	15.348	17.417	19.436	20.330	20.955	21.500	22.437	23.855	24.813	25.675	26.003	26.662	28.175	28.283
8.0	12.99	13.16	17.33	17.75	17.43	19.65	21.97	22.95	23.63	24.19	25.30	26.87	27.95	28.88	29.23	29.98	31.68	31.79
9.0	14.72	14.91	19.47	19.97	19.60	21.96	24.60	25.66	26.39	26.98	28.25	29.98	31.18	32.18	32.55	33.39	35.26	35.39
10.0	16.55	16.75	21.69	22.29	21.86	24.37	27.33	28.48	29.26	29.86	31.31	33.19	34.51	35.58	35.97	36.90	38.94	39.10
11.0	18.48	18.68	24.01	24.69	24.21	26.87	30.17	31.39	32.22	32.84	34.46	36.51	37.95	39.08	39.50	40.52	42.72	42.91
12.0	20.51	20.70	26.42	27.20	26.65	29.46	33.10	34.41	35.29	35.91	37.72	39.93	41.60	42.70	43.13	44.24	46.59	46.83
15.0	27.17	27.28	34.20	35.27	34.52	37.78	42.49	44.05	45.08	45.73	48.12	50.83	52.79	54.18	54.66	56.05	58.83	59.24
20.0	40.12	39.92	48.93	50.53	49.38	53.40	60.09	62.10	63.36	64.01	67.46	71.09	73.74	75.43	75.99	77.85	81.27	82.09
25.0	55.29	54.59	65.78	67.99	66.36	71.17	80.05	82.52	84.02	84.64	89.28	93.89	97.30	99.28	99.90	102.24	106.27	107.61
30.0	72.58	71.19	84.69	87.55	85.37	90.99	102.29	105.24	106.98	107.53	113.47	119.17	123.38	125.64	126.31	129.15	133.76	135.70
35.0	91.91	89.66	105.57	109.15	106.33	112.80	126.73	130.18	132.16	132.62	139.98	146.82	151.90	154.43	155.14	158.50	163.67	166.31
40.0	113.2	109.9	128.4	132.7	129.2	136.5	153.3	157.3	159.5	159.8	168.7	176.8	182.8	185.6	186.3	190.2	195.9	199.3
45.0	136.4	131.9	153.0	158.2	153.9	162.1	181.9	186.4	188.9	189.1	199.6	209.0	216.0	219.0	219.8	224.2	230.5	234.7
50.0	161.5	155.6	179.4	185.5	180.4	189.5	212.5	217.6	220.4	220.4	232.6	243.4	251.4	254.7	255.5	260.5	267.3	272.4
55.0	188.4	181.0	207.6	214.6	208.6	218.7	245.1	250.8	253.8	253.6	267.7	279.9	289.1	292.6	293.3	298.9	306.3	312.3
60.0	217.0	207.9	237.5	245.5	238.6	249.6	279.6	285.9	289.2	288.7	304.8	318.5	328.8	332.5	333.3	339.4	347.4	354.4
65.0	247.4	236.4	269.1	278.1	270.2	282.2	316.0	322.9	326.4	325.7	343.8	359.1	370.6	374.6	375.3	382.0	390.6	398.6
70.0	279.4	266.4	302.3	312.4	303.4	316.5	354.2	361.8	365.5	364.5	384.7	401.8	414.5	418.7	419.3	426.7	435.8	444.9
80.0	348.4	330.9	373.5	385.8	374.6	389.8	435.9	444.8	449.1	447.5	472.2	492.8	508.2	512.7	513.3	521.9	532.2	543.5
90.0	423.6	401.1	450.9	465.6	452.0	469.3	524.5	534.8	539.6	537.2	566.9	591.2	609.5	614.4	614.8	624.8	636.4	650.0
100.0	505.0	476.8	534.2	551.5	535.2	554.8	619.6	631.5	636.8	633.6	668.5	696.8	718.2	723.4	723.7	735.0	747.9	763.9
150.0	996.0	931.4	1032.6	1065.3	1033.2	1065.1	1187.2	1207.6	1215.5	1206.7	1272.5	1324.4	1364.0	1370.4	1369.4	1388.0	1408.7	1437.7
200.0	1612.9	1497.3	1652.1	1704.3	1653.7	1698.6	1891.3	1922.3	1931.3	1914.5	2018.8	2083.2	2148.8	2169.3	2166.3	2193.2	2210.0	2266.3
250.0	2335.9	2164.5	2371.1	2446.4	2379.0	2433.1	2708.0	2758.6	2759.7	2733.0	2882.1	2959.9	3055.2	3094.3	3087.4	3129.6	3133.7	3223.1
300.0	3147.0	2890.2	3175.7	3276.8	3190.4	3254.1	3620.4	3703.2	3684.4	3646.4	3845.1	3938.2	4066.5	4125.4	4114.0	4173.4	4163.1	4288.2
350.0	4034.8	3694.3	4054.8	4184.2	4076.8	4150.4	4616.2	4737.1	4693.2	4642.3	4894.9	5006.0	5169.0	5248.7	5232.3	5310.0	5284.2	5447.4
400.0	4990.	4559.	4999.	5159.	5029.	5113.	5685.	5846.	5776.	5711.	6021.	6150.	6353.	6453.	6431.	6528.	6486.	6689.
450.0	6005.	5476.	6002.	6194.	6039.	6134.	6819.	7020.	6923.	6843.	7214.	7363.	7605.	7729.	7700.	7818.	7758.	8004.
500.0	7072.	6440.	7055.	7282.	7100.	7206.	8010.	8253.	8128.	8032.	8466.	8637.	8921.	9067.	9032.	9177.	9094.	9383.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	13.86	14.37	15.53	15.83	16.42	17.26	17.77	18.42	18.81	19.19	19.58	19.99	20.40	20.78	21.27	21.45	23.00	23.50
3.0	15.67	16.28	17.43	17.72	18.32	19.28	19.86	20.63	21.06	21.50	21.93	22.38	22.88	23.29	23.81	23.98	25.65	26.17
3.5	17.45	18.14	19.29	19.56	20.18	21.25	21.88	22.76	23.23	23.72	24.20	24.69	25.26	25.70	26.25	26.41	28.19	28.75
4.0	19.20	19.98	21.13	21.39	22.01	23.16	23.87	24.85	25.36	25.91	26.42	26.94	27.59	28.06	28.63	28.79	30.68	31.26
4.5	20.96	21.81	22.96	23.20	23.84	25.10	25.84	26.92	27.47	28.06	28.62	29.17	29.89	30.39	30.99	31.14	33.13	33.75
5.0	22.71	23.65	24.79	25.02	25.66	27.02	27.82	28.99	29.57	30.21	30.80	31.38	32.17	32.70	33.33	33.48	35.57	36.22
5.5	24.48	25.49	26.63	26.85	27.50	28.95	29.80	31.06	31.67	32.36	32.98	33.60	34.45	35.01	35.66	35.81	38.01	38.68
6.0	26.26	27.35	28.49	28.70	29.35	30.89	31.79	33.14	33.78	34.51	35.17	35.81	36.73	37.32	38.00	38.14	40.45	41.16
6.5	28.06	29.23	30.36	30.56	31.21	32.84	33.80	35.23	35.91	36.68	37.38	38.04	39.02	39.64	40.35	40.49	42.91	43.64
7.0	29.87	31.13	32.26	32.44	33.09	34.82	35.82	37.34	38.04	38.86	39.59	40.29	41.33	41.97	42.72	42.84	45.37	46.13
8.0	33.58	35.00	36.12	36.28	36.93	38.83	39.94	41.62	42.38	43.29	44.09	44.84	46.00	46.69	47.50	47.62	50.37	51.18
9.0	37.38	38.96	40.09	40.21	40.86	42.94	44.15	45.99	46.81	47.80	48.67	49.47	50.75	51.50	52.37	52.48	55.45	56.33
10.0	41.29	43.04	44.16	44.26	44.89	47.15	48.47	50.47	51.34	52.42	53.35	54.21	55.60	56.41	57.34	57.44	60.64	61.58
11.0	45.31	47.23	48.34	48.41	49.03	51.47	52.90	55.05	55.97	57.14	58.14	59.05	60.56	61.42	62.42	62.50	65.94	66.94
12.0	49.44	51.53	52.63	52.67	53.28	55.90	57.43	59.75	60.72	61.97	63.04	64.01	65.63	66.54	67.61	67.68	71.36	72.42
15.0	62.49	65.12	66.21	66.15	66.70	69.89	71.74	74.53	75.65	77.15	78.44	79.56	81.53	82.59	83.89	83.93	88.35	89.59
20.0	86.50	90.11	91.14	90.91	91.32	96.49	97.92	101.50	102.85	104.81	106.46	107.85	110.41	111.73	113.44	113.42	119.18	120.75
25.0	113.27	117.95	118.92	118.48	118.70	123.94	126.98	131.38	132.96	135.38	137.43	139.10	142.27	143.83	146.02	145.92	153.15	155.07
30.0	142.73	148.58	149.47	148.80	148.78	155.15	158.84	164.09	165.91	168.81	171.28	173.24	177.04	178.84	181.57	181.39	190.20	192.60
35.0	174.79	181.89	182.69	181.78	181.48	189.05	193.43	199.56	201.62	205.02	207.94	210.19	214.67	216.70	220.01	219.74	230.24	232.94
40.0	209.4	217.8	218.5	217.3	216.7	225.6	230.7	237.7	240.0	243.9	247.3	249.9	255.1	257.3	261.3	260.9	273.2	276.3
45.0	246.4	256.3	256.9	255.4	254.4	264.6	270.5	278.5	281.0	285.5	289.4	292.3	298.2	300.6	305.3	304.8	319.0	322.6
50.0	285.8	297.2	297.7	295.9	294.5	306.1	312.8	321.7	324.5	329.6	334.0	337.2	343.9	346.6	351.9	351.3	367.6	371.6
55.0	327.6	340.6	340.9	338.8	336.9	350.0	357.5	367.5	370.6	376.2	381.1	384.7	392.1	395.1	401.2	400.5	418.8	423.3
60.0	371.6	386.3	386.4	384.0	381.6	396.3	404.7	415.7	419.0	425.2	430.7	434.7	442.9	446.1	453.0	452.1	472.7	477.7
65.0	417.8	434.3	434.2	431.4	428.6	444.8	454.1	466.2	469.8	476.7	482.7	487.0	496.1	499.5	507.3	506.3	529.2	534.7
70.0	466.2	484.5	484.3	481.1	477.7	495.6	505.9	519.0	522.9	530.4	537.1	541.8	551.7	555.3	564.0	562.8	588.1	594.2
80.0	569.4	591.6	590.9	586.9	582.2	603.8	616.0	631.4	635.8	644.7	652.6	658.1	669.9	673.9	684.5	683.0	713.4	720.6
90.0	680.6	707.0	706.0	701.0	695.0	720.3	734.6	752.5	757.4	767.7	777.0	783.4	797.0	801.4	814.1	812.2	848.1	856.5
100.0	799.8	830.6	829.1	823.1	815.6	845.0	861.5	881.8	887.3	899.1	909.9	917.1	932.8	937.6	952.4	950.2	991.9	1001.5
150.0	1504.	1561.	1556.	1545.	1528.	1581.	1610.	1644.	1652.	1673.	1692.	1704.	1731.	1738.	1765.	1761.	1836.	1853.
200.0	2369.	2459.	2451.	2432.	2403.	2484.	2528.	2578.	2589.	2619.	2648.	2666.	2706.	2716.	2759.	2751.	2845.	2893.
250.0	3369.	3493.	3492.	3464.	3420.	3533.	3591.	3659.	3672.	3713.	3757.	3779.	3832.	3848.	3909.	3898.	4002.	4068.
300.0	4481.	4645.	4656.	4624.	4562.	4704.	4773.	4886.	4874.	4929.	4991.	5015.	5081.	5107.	5188.	5173.	5286.	5414.
350.0	5692.	5898.	5923.	5886.	5806.	5977.	6059.	6170.	6181.	6251.	6331.	6358.	6439.	6475.	6577.	6557.	6680.	6853.
400.0	6988.	7241.	7280.	7238.	7138.	7339.	7435.	7570.	7579.	7664.	7766.	7795.	7891.	7937.	8062.	8037.	8172.	8391.
450.0	8361.	8662.	8715.	8669.	8547.	8781.	8891.	9050.	9058.	9160.	9282.	9314.	9426.	9482.	9632.	9602.	9750.	10017.
500.0	9800.	10152.	10220.	10169.	10024.	10292.	10418.	10602.	10609.	10727.	10872.	10907.	11034.	11102.	11277.	11242.	11403.	11720.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{114}_{48}$CD IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	96.36	84.73	65.34	62.32	63.09	56.80	48.98	46.68	45.24	44.05	41.28	38.75	38.78	35.63	35.20	33.88	30.34	31.57
3.0	93.31	84.07	65.08	62.16	63.04	57.14	49.46	47.29	45.93	44.89	42.11	39.61	37.69	36.58	36.16	34.87	31.59	32.59
3.5	89.98	82.55	64.25	61.44	62.40	56.87	49.37	47.31	46.03	45.12	42.37	39.92	38.06	36.99	36.59	35.34	32.30	33.10
4.0	86.66	80.61	63.13	60.42	61.43	56.24	48.94	46.99	45.79	44.99	42.27	39.89	38.10	37.06	36.69	35.48	32.66	33.29
4.5	83.45	78.50	61.86	59.25	60.30	55.41	48.32	46.47	45.34	44.64	41.96	39.64	37.91	36.92	36.57	35.40	32.79	33.27
5.0	80.41	76.35	60.52	58.01	59.09	54.48	47.59	45.83	44.77	44.14	41.51	39.26	37.59	36.64	36.31	35.18	32.75	33.11
5.5	77.56	74.22	59.17	56.74	57.85	53.48	46.79	45.12	44.11	43.56	40.98	38.79	37.18	36.27	35.96	34.87	32.61	32.85
6.0	74.89	72.16	57.83	55.49	56.61	52.47	45.96	44.37	43.42	42.92	40.40	38.27	36.71	35.85	35.55	34.50	32.38	32.54
6.5	72.40	70.16	56.52	54.26	55.38	51.45	45.12	43.60	42.70	42.26	39.79	37.72	36.21	35.38	35.10	34.09	32.10	32.18
7.0	70.07	68.26	55.25	53.06	54.19	50.44	44.29	42.83	41.97	41.58	39.16	37.15	35.69	34.89	34.63	33.65	31.79	31.79
8.0	65.86	64.72	52.85	50.79	51.92	48.50	42.66	41.32	40.54	40.22	37.91	36.00	34.62	33.89	33.66	32.74	31.08	30.98
9.0	62.16	61.53	50.63	48.69	49.81	46.67	41.12	39.87	39.16	38.90	36.68	34.87	33.57	32.89	32.68	31.82	30.34	30.15
10.0	58.89	58.64	48.59	46.75	47.86	44.96	39.66	38.50	37.84	37.64	35.51	33.78	32.54	31.92	31.73	30.92	29.58	29.33
11.0	55.98	56.03	46.71	44.97	46.07	43.37	38.30	37.22	36.61	36.45	34.39	32.74	31.57	30.99	30.82	30.05	28.84	28.53
12.0	53.38	53.67	44.99	43.32	44.41	41.89	37.03	36.02	35.45	35.33	33.34	31.76	30.64	30.10	29.95	29.22	28.11	27.77
15.0	46.98	47.73	40.57	39.11	40.13	38.04	33.72	32.85	32.39	32.34	30.54	29.14	28.15	27.71	27.60	26.97	26.10	25.69
20.0	39.43	40.55	35.03	33.81	34.74	33.12	29.44	28.75	28.39	28.42	26.86	25.67	24.84	24.51	24.44	23.93	23.30	22.85
25.0	34.20	35.45	30.97	29.92	30.78	29.46	26.23	25.66	25.38	25.43	24.06	23.02	22.30	22.04	21.99	21.57	21.09	20.64
30.0	30.33	31.64	27.87	26.94	27.73	26.62	23.74	23.25	23.02	23.09	21.85	20.93	20.29	20.08	20.05	19.69	19.30	18.87
35.0	27.35	28.67	25.41	24.57	25.31	24.36	21.75	21.31	21.11	21.20	20.07	19.24	18.66	18.49	18.47	18.15	17.83	17.42
40.0	24.98	26.28	23.40	22.64	23.33	22.50	20.11	19.72	19.55	19.65	18.60	17.84	17.31	17.17	17.16	16.88	16.60	16.21
45.0	23.04	24.32	21.74	21.04	21.69	20.94	18.73	18.39	18.23	18.34	17.37	16.66	16.17	16.06	16.05	15.80	15.55	15.19
50.0	21.42	22.67	20.33	19.69	20.30	19.63	17.57	17.25	17.12	17.22	16.31	15.66	15.20	15.10	15.10	14.87	14.65	14.31
55.0	20.05	21.27	19.13	18.52	19.10	18.49	16.56	16.27	16.15	16.25	15.40	14.79	14.36	14.27	14.28	14.07	13.87	13.55
60.0	18.87	20.06	18.08	17.51	18.06	17.50	15.68	15.41	15.30	15.41	14.60	14.03	13.62	13.55	13.55	13.36	13.18	12.87
65.0	17.84	19.01	17.16	16.63	17.15	16.63	14.91	14.66	14.56	14.66	13.90	13.35	12.97	12.91	12.92	12.74	12.57	12.28
70.0	16.94	18.08	16.35	15.84	16.34	15.86	14.23	13.99	13.90	14.00	13.27	12.76	12.39	12.33	12.35	12.18	12.02	11.75
80.0	15.44	16.52	14.98	14.52	14.98	14.56	13.06	12.85	12.78	12.88	12.21	11.74	11.40	11.36	11.37	11.23	11.09	10.84
90.0	14.22	15.26	13.86	13.43	13.86	13.49	12.11	11.92	11.85	11.95	11.34	10.90	10.59	10.56	10.57	10.44	10.31	10.09
100.0	13.22	14.21	12.93	12.53	12.93	12.59	11.31	11.14	11.08	11.18	10.60	10.20	9.91	9.88	9.90	9.78	9.67	9.46
150.0	10.01	10.84	9.90	9.61	9.91	9.68	8.72	8.59	8.56	8.65	8.20	7.90	7.68	7.67	7.68	7.60	7.51	7.38
200.0	8.27	9.08	8.30	8.04	8.24	8.11	7.30	7.17	7.19	7.27	6.90	6.79	6.57	6.43	6.46	6.37	6.44	6.21
250.0	7.25	7.98	7.30	7.07	7.24	7.15	6.43	6.25	6.34	6.42	6.09	6.00	5.80	5.69	5.71	5.62	5.70	5.50
300.0	6.55	7.23	6.61	6.41	6.56	6.48	5.83	5.62	5.76	5.83	5.53	5.44	5.27	5.17	5.19	5.11	5.18	5.00
350.0	6.04	6.68	6.11	5.92	6.06	5.99	5.39	5.20	5.33	5.40	5.12	5.04	4.87	4.79	4.81	4.73	4.80	4.64
400.0	5.657	6.254	5.724	5.545	5.679	5.618	5.059	4.880	4.998	5.064	4.805	4.726	4.574	4.493	4.515	4.444	4.504	4.369
450.0	5.353	5.923	5.422	5.252	5.381	5.324	4.795	4.630	4.739	4.803	4.558	4.481	4.338	4.264	4.285	4.218	4.274	4.138
500.0	5.109	5.656	5.179	5.016	5.142	5.088	4.583	4.429	4.530	4.593	4.360	4.284	4.148	4.079	4.099	4.036	4.089	3.959

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	29.54	28.17	28.21	28.41	28.16	26.55	25.72	24.29	23.76	23.14	22.69	22.32	21.51	21.23	21.00	21.05	20.18	19.94
3.0	30.56	29.16	29.21	29.41	29.20	27.60	26.78	25.37	24.87	24.25	23.80	23.43	22.63	22.33	22.08	22.14	21.20	20.95
3.5	31.09	29.69	29.73	29.94	29.77	28.20	27.38	26.02	25.54	24.93	24.48	24.11	23.33	23.03	22.77	22.82	21.84	21.58
4.0	31.31	29.93	29.96	30.17	30.04	28.50	27.69	26.38	25.92	25.32	24.88	24.52	23.76	23.45	23.18	23.23	22.22	21.97
4.5	31.33	29.96	30.00	30.21	30.10	28.60	27.81	26.54	26.10	25.62	25.08	24.74	23.99	23.69	23.41	23.46	22.44	22.18
5.0	31.22	29.86	29.90	30.11	30.03	28.56	27.79	26.57	26.15	25.68	25.15	24.81	24.10	23.79	23.51	23.56	22.52	22.26
5.5	31.00	29.67	29.71	29.91	29.86	28.43	27.67	26.50	26.10	25.64	25.13	24.80	24.10	23.80	23.51	23.56	22.53	22.26
6.0	30.73	29.42	29.45	29.66	29.63	28.24	27.50	26.36	25.98	25.44	25.03	24.71	24.03	23.74	23.45	23.50	22.46	22.20
6.5	30.41	29.13	29.16	29.36	29.35	27.99	27.27	26.17	25.81	25.28	24.88	24.57	23.92	23.63	23.33	23.39	22.35	22.09
7.0	30.07	28.81	28.84	29.04	29.04	27.72	27.01	25.95	25.61	25.09	24.70	24.40	23.76	23.48	23.19	23.24	22.21	21.95
8.0	29.33	28.11	28.15	28.34	28.37	27.12	26.44	25.45	25.13	24.64	24.27	23.98	23.38	23.11	22.81	22.86	21.85	21.60
9.0	28.57	27.40	27.43	27.62	27.67	26.48	25.83	24.90	24.60	24.14	23.78	23.51	22.94	22.68	22.39	22.43	21.44	21.20
10.0	27.82	26.68	26.72	26.91	26.97	25.83	25.21	24.33	24.05	23.61	23.27	23.01	22.47	22.23	21.93	21.98	21.01	20.77
11.0	27.08	25.98	26.02	26.21	26.29	25.19	24.60	23.76	23.50	23.08	22.75	22.51	21.99	21.76	21.47	21.52	20.56	20.34
12.0	26.37	25.31	25.35	25.53	25.62	24.57	24.00	23.21	22.96	22.58	22.24	22.01	21.52	21.30	21.01	21.05	20.12	19.90
15.0	24.43	23.46	23.50	23.67	23.79	22.84	22.33	21.64	21.44	21.08	20.80	20.59	20.16	19.97	19.69	19.73	18.87	18.66
20.0	21.77	20.92	20.97	21.12	21.25	20.45	20.01	19.44	19.28	18.98	18.74	18.56	18.20	18.05	17.79	17.83	17.06	16.88
25.0	19.68	18.93	18.97	19.11	19.25	18.55	18.16	17.68	17.55	17.29	17.07	16.92	16.60	16.48	16.24	16.28	15.58	15.42
30.0	18.00	17.32	17.37	17.50	17.64	17.01	16.66	16.24	16.13	15.90	15.71	15.57	15.29	15.19	14.97	15.00	14.36	14.22
35.0	16.63	16.01	16.05	16.17	16.32	15.74	15.43	15.05	14.96	14.75	14.57	14.46	14.20	14.12	13.90	13.94	13.35	13.22
40.0	15.48	14.91	14.95	15.06	15.21	14.68	14.39	14.05	13.97	13.78	13.62	13.51	13.28	13.21	13.01	13.04	12.49	12.37
45.0	14.51	13.97	14.02	14.12	14.26	13.77	13.51	13.20	13.12	12.95	12.80	12.70	12.49	12.43	12.24	12.27	11.76	11.64
50.0	13.68	13.17	13.21	13.32	13.45	12.99	12.75	12.46	12.39	12.24	12.10	12.01	11.81	11.75	11.57	11.60	11.12	11.01
55.0	12.95	12.47	12.51	12.61	12.74	12.31	12.09	11.82	11.76	11.61	11.48	11.39	11.21	11.16	10.99	11.01	10.56	10.46
60.0	12.31	11.86	11.90	11.99	12.12	11.72	11.50	11.25	11.20	11.06	10.93	10.85	10.68	10.64	10.47	10.50	10.07	9.97
65.0	11.74	11.31	11.35	11.44	11.57	11.18	10.98	10.75	10.70	10.57	10.45	10.37	10.21	10.17	10.01	10.04	9.63	9.54
70.0	11.24	10.83	10.87	10.95	11.08	10.71	10.52	10.30	10.25	10.13	10.01	9.94	9.79	9.75	9.60	9.62	9.23	9.15
80.0	10.37	9.99	10.03	10.11	10.23	9.89	9.72	9.52	9.48	9.37	9.27	9.20	9.06	9.03	8.89	8.91	8.55	8.48
90.0	9.66	9.30	9.34	9.42	9.53	9.22	9.06	8.88	8.84	8.74	8.65	8.59	8.46	8.43	8.30	8.32	7.99	7.92
100.0	9.05	8.73	8.76	8.83	8.94	8.65	8.50	8.34	8.30	8.21	8.12	8.07	7.95	7.93	7.80	7.82	7.51	7.44
150.0	7.062	6.807	6.836	6.891	6.986	6.765	6.653	6.538	6.513	6.446	6.378	6.338	6.261	6.234	6.137	6.155	5.908	5.859
200.0	5.947	5.743	5.742	5.789	5.873	5.691	5.600	5.509	5.490	5.437	5.380	5.348	5.278	5.263	5.183	5.198	5.130	4.963
250.0	5.267	5.087	5.031	5.072	5.149	5.003	4.953	4.866	4.869	4.814	4.743	4.735	4.683	4.648	4.574	4.590	4.557	4.413
300.0	4.793	4.629	4.579	4.594	4.663	4.556	4.511	4.434	4.437	4.388	4.324	4.316	4.270	4.239	4.172	4.186	4.156	4.027
350.0	4.443	4.291	4.246	4.261	4.325	4.227	4.185	4.114	4.117	4.072	4.014	4.007	3.965	3.937	3.875	3.888	3.859	3.741
400.0	4.175	4.033	3.992	4.005	4.066	3.974	3.934	3.869	3.873	3.831	3.776	3.769	3.731	3.705	3.647	3.659	3.631	3.522
450.0	3.964	3.829	3.791	3.804	3.861	3.775	3.737	3.676	3.679	3.640	3.589	3.582	3.546	3.522	3.467	3.478	3.460	3.349
500.0	3.793	3.665	3.629	3.641	3.697	3.614	3.578	3.520	3.524	3.486	3.437	3.431	3.397	3.374	3.322	3.333	3.305	3.209

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

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48 CD IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.620	5.290	7.467	7.450	7.320	8.724	9.440	9.940	10.310	10.700	10.940	11.690	12.080	12.610	12.820	13.038	13.438	13.790
3.0	6.121	5.965	8.340	8.365	8.223	9.724	10.597	11.151	11.559	11.980	12.305	13.143	13.609	14.186	14.415	14.694	15.276	15.564
3.5	6.743	6.648	9.221	9.287	9.131	10.723	11.749	12.356	12.798	13.245	13.653	14.575	15.112	15.735	15.981	16.316	17.058	17.298
4.0	7.388	7.347	10.116	10.222	10.062	11.731	12.908	13.564	14.038	14.510	15.000	16.002	16.608	17.273	17.536	17.925	18.812	19.014
4.5	8.059	8.063	11.028	11.175	10.988	12.751	14.080	14.783	15.289	15.781	16.352	17.435	18.107	18.813	19.091	19.533	20.553	20.727
5.0	8.755	8.800	11.960	12.147	11.943	13.789	15.268	16.018	16.554	17.065	17.718	18.880	19.617	20.363	20.654	21.147	22.292	22.444
5.5	9.476	9.557	12.912	13.140	12.918	14.845	16.476	17.272	17.836	18.365	19.100	20.340	21.141	21.926	22.231	22.774	24.035	24.172
6.0	10.224	10.336	13.887	14.156	13.914	15.921	17.705	18.546	19.139	19.683	20.500	21.819	22.684	23.506	23.825	24.418	25.789	25.915
6.5	10.999	11.137	14.884	15.195	14.932	17.018	18.957	19.841	20.463	21.022	21.922	23.319	24.247	25.107	25.439	26.080	27.557	27.676
7.0	11.799	11.960	15.904	16.257	15.972	18.137	20.232	21.160	21.809	22.382	23.366	24.842	25.833	26.729	27.073	27.763	29.341	29.458
8.0	13.48	13.68	18.01	18.45	18.12	20.44	22.85	23.87	24.57	25.17	26.32	27.96	29.08	30.04	30.41	31.20	32.97	33.09
9.0	15.26	15.48	20.22	20.75	20.36	22.84	25.58	26.68	27.43	28.05	29.38	31.18	32.42	33.46	33.85	34.73	36.68	36.82
10.0	17.15	17.38	22.52	23.14	22.70	25.33	28.40	29.59	30.40	31.03	32.54	34.60	35.87	36.98	37.39	38.36	40.48	40.65
11.0	19.13	19.37	24.91	25.62	25.13	27.91	31.33	32.60	33.46	34.11	35.80	37.93	39.43	40.60	41.03	42.10	44.39	44.60
12.0	21.22	21.46	27.40	28.21	27.65	30.58	34.35	35.72	36.62	37.29	39.17	41.46	43.09	44.33	44.79	45.95	48.39	48.65
15.0	28.06	28.22	35.42	36.53	35.76	39.16	44.04	45.67	46.73	47.42	49.90	52.72	54.75	56.19	56.69	58.14	61.03	61.46
20.0	41.37	41.23	50.59	52.26	51.07	55.27	62.19	64.26	65.57	66.26	69.85	73.60	76.35	78.10	78.69	80.62	84.18	85.03
25.0	56.94	56.30	67.93	70.22	68.54	73.55	82.74	85.29	86.85	87.51	92.31	97.09	100.61	102.67	103.32	105.75	109.93	111.32
30.0	74.67	73.36	87.37	90.33	88.09	93.94	105.61	108.66	110.47	111.06	117.20	123.09	127.45	129.80	130.49	133.45	138.22	140.24
35.0	94.50	92.31	108.82	112.52	109.63	116.35	130.73	134.30	136.36	136.85	144.45	151.53	156.78	159.41	160.14	163.63	168.98	171.71
40.0	116.3	113.1	132.2	136.7	133.1	140.7	158.0	162.1	164.4	164.8	174.0	182.3	188.5	191.4	192.2	196.2	202.1	205.7
45.0	140.1	136.7	157.5	162.8	158.5	167.0	187.4	192.1	194.7	194.9	205.7	215.4	222.6	225.8	226.8	231.1	237.6	242.0
50.0	165.8	160.0	184.6	190.9	185.7	195.1	218.8	224.1	226.9	227.0	239.6	250.7	259.0	262.4	263.2	268.4	275.4	280.7
55.0	193.3	185.9	213.6	220.7	214.6	225.1	252.3	258.2	261.2	261.1	275.6	288.2	297.6	301.3	302.0	307.8	316.4	321.6
60.0	222.7	213.5	244.2	252.4	245.3	256.8	287.7	294.2	297.5	297.1	313.6	327.8	338.4	342.3	343.0	349.4	357.6	364.8
65.0	253.7	242.7	276.6	285.8	277.7	290.2	325.0	332.1	335.7	335.0	353.6	369.5	381.3	385.4	386.1	393.1	401.9	410.2
70.0	286.5	273.5	310.6	321.0	311.8	325.3	364.1	371.9	375.8	374.8	395.6	413.1	426.3	430.6	431.3	438.9	448.3	457.7
80.0	357.1	339.5	383.6	396.2	384.8	400.4	447.8	457.0	461.4	459.8	485.3	506.4	522.3	527.0	527.6	536.5	547.1	558.8
90.0	434.2	411.4	462.8	477.9	464.0	481.9	538.6	549.2	554.2	551.8	582.2	607.3	626.1	631.2	631.6	641.9	653.8	667.8
100.0	517.4	488.9	548.0	565.9	549.2	569.4	636.0	648.3	653.7	650.5	686.3	715.5	737.5	742.8	743.2	754.8	768.1	784.6
150.0	1019.5	964.1	1058.1	1091.6	1058.8	1091.7	1216.8	1237.8	1245.9	1237.0	1304.5	1357.8	1398.4	1405.0	1404.1	1423.1	1444.4	1474.3
200.0	1650.2	1532.8	1691.6	1745.0	1693.3	1739.5	1936.9	1968.7	1978.0	1960.9	2072.6	2133.9	2201.0	2222.1	2219.1	2246.8	2264.1	2321.8
250.0	2389.2	2204.7	2426.6	2503.7	2434.7	2490.4	2771.9	2823.7	2824.9	2797.7	2950.3	3030.1	3127.7	3167.9	3160.9	3204.2	3208.5	3300.0
300.0	3218.1	2956.8	3248.9	3352.4	3264.1	3329.6	3704.4	3789.2	3770.2	3731.3	3934.7	4030.1	4161.5	4221.8	4210.3	4271.1	4260.7	4388.7
350.0	4125.4	3778.7	4147.2	4279.6	4169.9	4245.6	4722.1	4845.8	4801.1	4749.1	5007.6	5120.4	5288.2	5369.9	5353.1	5432.7	5406.4	5573.5
400.0	5101.	4662.	5112.	5276.	5143.	5229.	5814.	5979.	5907.	5841.	6158.	6290.	6497.	6601.	6578.	6677.	6634.	6843.
450.0	6138.	5599.	6136.	6333.	6175.	6272.	6973.	7179.	7079.	6998.	7377.	7530.	7777.	7904.	7875.	7995.	7935.	8186.
500.0	7229.	6585.	7213.	7444.	7259.	7368.	8190.	8439.	8310.	8212.	8657.	8832.	9122.	9272.	9236.	9378.	9299.	9595.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.48	15.02	16.23	16.54	17.15	18.03	18.56	19.24	19.65	20.04	20.45	20.88	21.32	21.71	22.22	22.40	24.02	24.54
3.0	16.37	17.01	18.21	18.51	19.14	20.13	20.73	21.53	21.99	22.44	22.90	23.37	23.90	24.32	24.86	25.04	26.77	27.32
3.5	18.22	18.94	20.14	20.42	21.07	22.18	22.83	23.75	24.25	24.76	25.26	25.77	26.37	26.83	27.40	27.57	29.42	30.00
4.0	20.05	20.86	22.05	22.32	22.97	24.18	24.90	25.92	26.46	27.03	27.56	28.11	28.79	29.28	29.88	30.05	32.01	32.62
4.5	21.87	22.76	23.95	24.21	24.87	26.18	26.95	28.07	28.65	29.27	29.85	30.42	31.18	31.70	32.33	32.49	34.56	35.20
5.0	23.69	24.66	25.85	26.10	26.76	28.17	29.00	30.22	30.83	31.50	32.11	32.72	33.55	34.10	34.75	34.91	37.09	37.76
5.5	25.52	26.58	27.76	28.00	28.67	30.17	31.06	32.37	33.01	33.73	34.38	35.02	35.91	36.49	37.18	37.33	39.62	40.32
6.0	27.37	28.51	29.69	29.91	30.58	32.19	33.12	34.52	35.20	35.96	36.65	37.32	38.28	38.89	39.61	39.75	42.15	42.88
6.5	29.23	30.45	31.64	31.84	32.52	34.21	35.20	36.69	37.40	38.21	38.94	39.63	40.66	41.30	42.04	42.18	44.70	45.46
7.0	31.12	32.42	33.60	33.79	34.47	36.26	37.30	38.88	39.62	40.47	41.23	41.96	43.05	43.72	44.49	44.63	47.26	48.05
8.0	34.95	36.43	37.60	37.76	38.44	40.42	41.57	43.32	44.11	45.06	45.89	46.67	47.88	48.61	49.45	49.57	52.43	53.28
9.0	38.89	40.53	41.70	41.84	42.51	44.67	45.93	47.84	48.70	49.73	50.63	51.47	52.81	53.59	54.49	54.60	57.70	58.61
10.0	42.93	44.75	45.92	46.02	46.68	49.03	50.40	52.48	53.38	54.50	55.48	56.38	57.83	58.66	59.64	59.74	63.07	64.04
11.0	47.09	49.08	50.24	50.31	50.96	53.50	54.98	57.22	58.18	59.39	60.44	61.39	62.96	63.85	64.89	64.98	68.55	69.58
12.0	51.35	53.52	54.68	54.72	55.36	58.08	59.67	62.07	63.08	64.38	65.50	66.51	68.20	69.14	70.26	70.34	74.16	75.25
15.0	64.84	67.57	68.70	68.64	69.22	72.53	74.45	77.34	78.50	80.07	81.41	82.58	84.62	85.73	87.08	87.12	91.71	93.00
20.0	89.60	93.34	94.42	94.18	94.61	98.94	101.46	105.17	106.58	108.60	110.32	111.77	114.42	115.79	117.57	117.55	123.53	125.15
25.0	117.19	122.03	123.05	122.60	122.83	128.25	131.40	135.95	137.60	140.11	142.24	143.97	147.25	148.88	151.15	151.05	158.54	160.53
30.0	147.50	153.55	154.49	153.81	153.80	160.38	164.20	169.63	171.52	174.52	177.09	179.12	183.06	184.93	187.75	187.56	196.69	199.06
35.0	180.48	187.82	188.66	187.73	187.42	195.25	199.78	206.12	208.25	211.78	214.80	217.14	221.77	223.88	227.30	227.02	237.89	240.67
40.0	216.0	224.7	225.5	224.3	223.6	232.8	238.1	245.3	247.7	251.8	255.3	258.0	263.3	265.6	269.7	269.3	282.1	285.3
45.0	254.1	264.3	264.9	263.4	262.4	272.9	279.0	287.2	289.8	294.5	298.5	301.5	307.6	310.1	314.9	314.4	329.1	332.8
50.0	294.6	306.3	306.8	305.0	303.5	315.5	322.4	331.7	334.6	339.8	344.3	347.7	354.5	357.3	362.9	362.2	379.0	383.2
55.0	337.4	350.8	351.1	349.0	347.1	360.6	368.4	378.6	381.8	387.6	392.7	396.4	404.1	407.1	413.4	412.7	431.6	436.3
60.0	382.6	397.7	397.9	395.3	393.0	408.1	416.7	428.1	431.5	437.9	443.6	447.7	456.2	459.4	466.6	465.7	486.9	492.1
65.0	430.0	446.9	446.9	444.0	441.1	457.9	467.5	479.9	483.6	490.7	497.0	501.4	510.8	514.3	522.3	521.3	544.9	550.6
70.0	479.6	498.5	498.3	495.0	491.5	510.0	520.5	534.1	538.1	545.8	552.7	557.6	567.8	571.5	580.5	579.3	605.4	611.6
80.0	585.4	608.2	607.6	603.4	598.7	620.9	633.4	649.3	653.8	663.0	671.2	676.9	689.0	693.1	704.0	702.5	733.8	741.2
90.0	699.4	726.5	725.5	720.4	714.2	740.3	755.0	773.4	778.5	789.1	798.7	806.2	819.3	823.8	836.8	835.0	871.8	880.5
100.0	821.4	853.1	851.6	845.5	837.8	868.0	885.0	905.9	911.6	923.7	934.8	942.2	958.3	963.3	978.6	976.3	1019.2	1029.1
150.0	1542.	1601.	1596.	1584.	1567.	1621.	1651.	1686.	1695.	1715.	1735.	1748.	1775.	1782.	1811.	1806.	1884.	1901.
200.0	2428.	2519.	2511.	2492.	2462.	2545.	2590.	2641.	2653.	2684.	2714.	2732.	2773.	2783.	2827.	2819.	2916.	2965.
250.0	3449.	3577.	3575.	3547.	3502.	3618.	3677.	3747.	3760.	3803.	3847.	3870.	3924.	3941.	4003.	3992.	4098.	4187.
300.0	4586.	4754.	4766.	4732.	4669.	4814.	4885.	4977.	4989.	5045.	5108.	5133.	5201.	5228.	5311.	5295.	5411.	5542.
350.0	5824.	6035.	6061.	6023.	5941.	6115.	6199.	6314.	6324.	6396.	6479.	6506.	6589.	6625.	6730.	6710.	6836.	7013.
400.0	7148.	7407.	7447.	7404.	7301.	7508.	7606.	7744.	7753.	7841.	7944.	7974.	8073.	8119.	8248.	8223.	8361.	8585.
450.0	8551.	8859.	8913.	8866.	8741.	8980.	9094.	9257.	9265.	9369.	9494.	9527.	9641.	9699.	9852.	9822.	9986.	10246.
500.0	10022.	10381.	10451.	10399.	10251.	10525.	10654.	10842.	10849.	10970.	11118.	11164.	11285.	11353.	11533.	11497.	11661.	11986.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{116}_{49}$IN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	99.07	86.70	66.95	63.85	64.63	58.15	50.14	47.79	46.30	45.08	42.25	39.65	37.63	36.45	36.00	34.65	31.04	32.29
3.0	96.02	86.16	66.74	63.74	64.63	58.55	50.68	48.44	47.04	45.97	43.13	40.56	38.60	37.45	37.02	35.70	32.34	33.35
3.5	92.66	84.69	65.94	63.04	64.02	58.31	50.62	48.50	47.19	46.25	43.42	40.91	39.00	37.90	37.49	36.20	33.09	33.90
4.0	89.29	82.78	64.82	62.03	63.06	57.70	50.21	48.20	46.97	46.14	43.35	40.90	39.06	37.99	37.61	36.36	33.48	34.12
4.5	86.03	80.69	63.55	60.86	61.94	56.88	49.60	47.69	46.53	45.80	43.05	40.67	38.89	37.87	37.51	36.31	33.63	34.11
5.0	82.94	78.53	62.20	59.61	60.72	55.95	48.87	47.06	45.96	45.31	42.62	40.30	38.58	37.60	37.26	36.10	33.61	33.97
5.5	80.03	76.38	60.84	58.34	59.47	54.95	48.07	46.36	45.31	44.73	42.09	39.84	38.18	37.24	36.92	35.80	33.47	33.72
6.0	77.30	74.29	59.48	57.07	58.21	53.93	47.24	45.59	44.61	44.10	41.51	39.32	37.71	36.82	36.51	35.43	33.25	33.41
6.5	74.75	72.27	58.16	55.82	56.98	52.90	46.39	44.82	43.89	43.43	40.89	38.76	37.21	36.35	36.07	35.02	32.98	33.05
7.0	72.37	70.34	56.87	54.61	55.77	51.89	45.55	44.05	43.16	42.76	40.26	38.19	36.69	35.86	35.59	34.58	32.66	32.67
8.0	68.06	66.74	54.43	52.30	53.46	49.92	43.91	42.52	41.71	41.38	39.00	37.03	35.61	34.86	34.62	33.67	31.96	31.85
9.0	64.27	63.49	52.17	50.16	51.32	48.06	42.34	41.05	40.31	40.05	37.76	35.89	34.55	33.85	33.63	32.74	31.21	31.02
10.0	60.91	60.54	50.09	48.19	49.33	46.32	40.86	39.66	38.98	38.77	36.57	34.78	33.51	32.86	32.67	31.83	30.45	30.19
11.0	57.92	57.87	48.18	46.37	47.50	44.70	39.48	38.36	37.72	37.56	35.43	33.73	32.52	31.92	31.74	30.96	29.70	29.38
12.0	55.25	55.45	46.42	44.70	45.81	43.20	38.19	37.13	36.54	36.41	34.37	32.73	31.58	31.02	30.86	30.11	28.96	28.61
15.0	48.66	49.37	41.90	40.38	41.44	39.27	34.80	33.91	33.42	33.37	31.52	30.06	29.04	28.59	28.46	27.82	26.92	26.49
20.0	40.88	41.98	36.22	34.95	35.92	34.23	30.42	29.71	29.34	29.36	27.75	26.52	25.66	25.32	25.24	24.72	24.07	23.60
25.0	35.47	36.74	32.06	30.96	31.85	30.48	27.14	26.54	26.25	26.31	24.88	23.81	23.06	22.79	22.74	22.30	21.80	21.34
30.0	31.48	32.80	28.86	27.90	28.72	27.56	24.58	24.07	23.82	23.90	22.62	21.66	21.00	20.78	20.75	20.37	19.97	19.52
35.0	28.40	29.74	26.33	25.46	26.23	25.23	22.53	22.08	21.87	21.96	20.79	19.93	19.32	19.15	19.13	18.80	18.46	18.04
40.0	25.94	27.27	24.27	23.48	24.19	23.32	20.84	20.44	20.26	20.36	19.28	18.49	17.93	17.79	17.78	17.49	17.20	16.80
45.0	23.93	25.24	22.56	21.83	22.50	21.72	19.43	19.06	18.91	19.01	18.01	17.28	16.76	16.64	16.64	16.37	16.12	15.74
50.0	22.26	23.54	21.10	20.43	21.06	20.36	18.22	17.89	17.75	17.86	16.92	16.24	15.76	15.66	15.66	15.42	15.19	14.84
55.0	20.84	22.09	19.86	19.23	19.83	19.19	17.18	16.88	16.76	16.86	15.98	15.34	14.89	14.81	14.81	14.59	14.39	14.05
60.0	19.61	20.84	18.77	18.18	18.75	18.17	16.28	16.00	15.88	15.99	15.16	14.56	14.13	14.06	14.06	13.86	13.68	13.36
65.0	18.55	19.75	17.83	17.27	17.81	17.27	15.48	15.22	15.12	15.22	14.43	13.86	13.46	13.40	13.41	13.22	13.04	12.75
70.0	17.62	18.79	16.99	16.46	16.98	16.48	14.77	14.53	14.43	14.54	13.78	13.25	12.86	12.81	12.82	12.64	12.48	12.20
80.0	16.05	17.17	15.56	15.08	15.56	15.12	13.57	13.35	13.27	13.38	12.68	12.19	11.85	11.80	11.81	11.66	11.52	11.26
90.0	14.79	15.86	14.40	13.96	14.41	14.02	12.59	12.39	12.32	12.42	11.78	11.33	11.01	10.97	10.99	10.85	10.72	10.49
100.0	13.75	14.78	13.44	13.03	13.45	13.09	11.76	11.58	11.52	11.62	11.02	10.60	10.30	10.27	10.29	10.17	10.05	9.83
150.0	10.42	11.28	10.31	10.00	10.32	10.08	9.07	8.94	8.90	9.00	8.54	8.22	7.99	7.98	7.99	7.91	7.82	7.68
200.0	8.61	9.45	8.64	8.37	8.58	8.45	7.60	7.46	7.48	7.57	7.18	7.07	6.84	6.70	6.72	6.63	6.70	6.47
250.0	7.55	8.31	7.60	7.37	7.54	7.45	6.70	6.51	6.61	6.69	6.34	6.24	6.04	5.92	5.95	5.85	5.93	5.73
300.0	6.83	7.53	6.89	6.67	6.83	6.75	6.08	5.85	6.00	6.07	5.76	5.67	5.49	5.38	5.41	5.32	5.39	5.21
350.0	6.30	6.95	6.36	6.16	6.31	6.24	5.62	5.42	5.55	5.62	5.33	5.25	5.08	4.98	5.01	4.93	5.00	4.83
400.0	5.893	6.514	5.963	5.777	5.917	5.853	5.270	5.084	5.206	5.275	5.006	4.923	4.765	4.681	4.703	4.629	4.692	4.540
450.0	5.577	6.169	5.649	5.472	5.606	5.547	4.996	4.824	4.937	5.004	4.749	4.668	4.520	4.442	4.464	4.394	4.453	4.310
500.0	5.323	5.892	5.396	5.226	5.367	5.301	4.775	4.615	4.720	4.785	4.542	4.463	4.322	4.250	4.271	4.204	4.260	4.125

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	30.21	28.80	28.85	29.06	28.79	27.15	26.30	24.83	24.30	23.66	23.20	22.82	21.99	21.71	21.47	21.53	20.63	20.39
3.0	31.27	29.85	29.89	30.10	29.88	28.25	27.40	25.96	26.45	24.81	24.35	23.97	23.15	22.85	22.60	22.65	21.69	21.44
3.5	31.84	30.41	30.45	30.67	30.49	28.88	28.04	26.65	26.15	25.52	25.07	24.69	23.89	23.58	23.31	23.37	22.36	22.10
4.0	32.09	30.67	30.71	30.92	30.78	29.20	28.38	27.03	26.56	25.94	25.49	25.12	24.34	24.03	23.75	23.80	22.77	22.50
4.5	32.13	30.72	30.76	30.97	30.86	29.32	28.51	27.21	26.76	26.16	25.71	25.36	24.60	24.28	24.00	24.05	23.00	22.73
5.0	32.02	30.64	30.67	30.88	30.80	29.30	28.50	27.25	26.82	26.24	25.80	25.45	24.71	24.40	24.11	24.16	23.10	22.83
5.5	31.82	30.46	30.49	30.70	30.64	29.18	28.40	27.19	26.78	26.21	25.78	25.44	24.73	24.42	24.12	24.18	23.11	22.84
6.0	31.55	30.21	30.24	30.45	30.41	28.99	28.23	27.06	26.67	26.11	25.69	25.36	24.67	24.37	24.07	24.12	23.05	22.79
6.5	31.24	29.92	29.95	30.16	30.14	28.75	28.01	26.88	26.51	25.96	25.55	25.23	24.56	24.26	23.96	24.01	22.95	22.68
7.0	30.90	29.60	29.63	29.84	29.84	28.48	27.75	26.66	26.30	25.78	25.37	25.06	24.41	24.12	23.81	23.87	22.81	22.55
8.0	30.16	28.91	28.94	29.14	29.17	27.88	27.18	26.16	25.83	25.33	24.94	24.65	24.03	23.75	23.45	23.50	22.46	22.20
9.0	29.39	28.18	28.22	28.42	28.46	27.23	26.57	25.61	25.30	24.82	24.45	24.18	23.59	23.33	23.02	23.07	22.05	21.80
10.0	28.63	27.46	27.50	27.69	27.76	26.58	25.94	25.03	24.75	24.30	23.94	23.68	23.12	22.87	22.56	22.61	21.61	21.37
11.0	27.89	26.76	26.79	26.98	27.06	25.93	25.32	24.46	24.20	23.76	23.42	23.17	22.64	22.40	22.10	22.15	21.17	20.93
12.0	27.17	26.07	26.11	26.30	26.39	25.31	24.72	23.90	23.65	23.24	22.91	22.67	22.16	21.93	21.63	21.68	20.72	20.49
15.0	25.19	24.19	24.23	24.41	24.53	23.56	23.03	22.32	22.11	21.74	21.44	21.23	20.78	20.59	20.30	20.34	19.45	19.24
20.0	22.48	21.61	21.65	21.81	21.95	21.11	20.66	20.07	19.91	19.60	19.34	19.17	18.79	18.63	18.36	18.41	17.61	17.42
25.0	20.34	19.56	19.61	19.75	19.90	19.17	18.77	18.27	18.13	17.87	17.64	17.49	17.16	17.03	16.78	16.82	16.10	15.93
30.0	18.63	17.92	17.97	18.10	18.25	17.59	17.24	16.80	16.68	16.45	16.25	16.11	15.82	15.72	15.48	15.51	14.85	14.71
35.0	17.22	16.57	16.62	16.74	16.89	16.29	15.97	15.58	15.48	15.27	15.08	14.96	14.70	14.61	14.39	14.42	13.82	13.68
40.0	16.04	15.44	15.49	15.60	15.75	15.20	14.91	14.56	14.47	14.27	14.10	13.99	13.76	13.68	13.47	13.50	12.94	12.81
45.0	15.04	14.48	14.53	14.64	14.78	14.27	14.00	13.68	13.60	13.42	13.27	13.16	12.94	12.88	12.68	12.71	12.18	12.06
50.0	14.18	13.65	13.70	13.80	13.95	13.47	13.22	12.92	12.85	12.68	12.54	12.45	12.24	12.18	11.99	12.02	11.52	11.42
55.0	13.43	12.93	12.98	13.08	13.22	12.77	12.53	12.26	12.19	12.04	11.90	11.82	11.63	11.57	11.39	11.42	10.95	10.86
60.0	12.77	12.30	12.34	12.44	12.58	12.15	11.93	11.68	11.61	11.47	11.34	11.26	11.08	11.04	10.86	10.89	10.44	10.35
65.0	12.19	11.74	11.78	11.87	12.01	11.61	11.40	11.16	11.10	10.96	10.84	10.76	10.60	10.55	10.39	10.41	9.99	9.90
70.0	11.67	11.24	11.28	11.37	11.50	11.12	10.92	10.69	10.64	10.51	10.39	10.32	10.16	10.12	9.96	9.99	9.58	9.49
80.0	10.77	10.38	10.42	10.50	10.62	10.28	10.05	9.89	9.84	9.73	9.62	9.56	9.41	9.38	9.23	9.26	8.88	8.80
90.0	10.03	9.67	9.71	9.78	9.90	9.58	9.41	9.23	9.19	9.08	8.98	8.92	8.79	8.76	8.62	8.65	8.30	8.22
100.0	9.41	9.07	9.10	9.18	9.29	8.99	8.84	8.67	8.63	8.63	8.44	8.39	8.26	8.24	8.11	8.13	7.80	7.73
150.0	7.347	7.082	7.111	7.169	7.267	7.038	6.921	6.801	6.776	6.705	6.635	6.593	6.503	6.485	6.384	6.403	6.146	6.095
200.0	6.190	5.977	5.977	6.026	6.114	5.923	5.829	5.734	5.715	5.659	5.600	5.566	5.494	5.477	5.394	5.411	5.339	5.166
250.0	5.485	5.297	5.238	5.281	5.361	5.209	5.157	5.067	5.070	5.013	4.939	4.930	4.876	4.839	4.763	4.779	4.745	4.595
300.0	4.991	4.821	4.768	4.785	4.856	4.745	4.698	4.617	4.621	4.569	4.503	4.495	4.447	4.415	4.345	4.360	4.328	4.193
350.0	4.628	4.470	4.423	4.438	4.505	4.403	4.359	4.285	4.289	4.242	4.181	4.173	4.129	4.101	4.036	4.050	4.019	3.897
400.0	4.349	4.201	4.158	4.172	4.235	4.140	4.098	4.030	4.034	3.990	3.934	3.926	3.886	3.859	3.799	3.812	3.782	3.669
450.0	4.129	3.989	3.949	3.963	4.023	3.933	3.893	3.829	3.833	3.792	3.739	3.732	3.694	3.669	3.612	3.624	3.595	3.489
500.0	3.952	3.818	3.781	3.794	3.851	3.766	3.728	3.667	3.671	3.632	3.581	3.574	3.539	3.516	3.461	3.472	3.443	3.343

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{115}_{49}$ IN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.470	5.240	7.407	7.390	7.260	8.642	9.350	9.847	10.220	10.610	10.840	11.590	11.980	12.504	12.710	12.923	13.315	13.660
3.0	6.059	5.904	8.266	8.290	8.149	9.626	10.489	11.041	11.450	11.871	12.185	13.022	13.486	14.058	14.282	14.556	15.127	15.409
3.5	6.669	6.577	9.133	9.197	9.042	10.610	11.624	12.226	12.670	13.117	13.513	14.432	14.967	15.583	15.824	16.153	16.883	17.117
4.0	7.301	7.264	10.012	10.116	9.947	11.601	12.764	13.415	13.891	14.361	14.837	15.837	16.439	17.097	17.355	17.737	18.609	18.807
4.5	7.957	7.967	10.908	11.052	10.867	12.604	13.916	14.613	15.120	15.612	16.168	17.246	17.914	18.612	18.885	19.319	20.322	20.492
5.0	8.638	8.690	11.822	12.006	11.804	13.623	15.083	15.827	16.363	16.874	17.510	18.666	19.398	20.136	20.423	20.907	22.032	22.181
5.5	9.344	9.432	12.757	12.981	12.781	14.660	16.270	17.058	17.623	18.151	18.867	20.101	20.896	21.672	21.973	22.506	23.746	23.879
6.0	10.075	10.195	13.713	13.978	13.738	15.716	17.476	18.309	18.902	19.446	20.243	21.554	22.411	23.225	23.538	24.120	25.469	25.592
6.5	10.831	10.980	14.690	14.997	14.737	16.793	18.704	19.581	20.201	20.759	21.638	23.027	23.946	24.796	25.123	25.753	27.205	27.322
7.0	11.613	11.787	15.690	16.036	15.757	17.890	19.955	20.875	21.523	22.093	23.055	24.521	25.503	26.389	26.728	27.406	28.957	29.072
8.0	13.25	13.47	17.76	18.19	17.86	20.15	22.53	23.53	24.23	24.83	25.96	27.58	28.68	29.64	30.00	30.77	32.51	32.64
9.0	14.99	15.23	19.92	20.44	20.06	22.50	25.19	26.28	27.04	27.65	28.95	30.73	31.96	32.99	33.37	34.24	36.16	36.29
10.0	16.83	17.09	22.17	22.78	22.35	24.94	27.96	29.14	29.94	30.57	32.05	33.99	35.34	36.44	36.84	37.80	39.89	40.05
11.0	18.77	19.03	24.51	25.21	24.72	27.46	30.82	32.08	32.94	33.59	35.25	37.35	38.83	39.99	40.41	41.46	43.71	43.91
12.0	20.80	21.06	26.94	27.73	27.19	30.08	33.79	35.13	36.04	36.70	38.54	40.81	42.42	43.64	44.09	45.23	47.63	47.88
15.0	27.47	27.67	34.78	35.87	35.12	38.47	43.26	44.87	45.92	46.60	49.03	51.82	53.82	55.24	55.74	57.16	60.00	60.42
20.0	40.42	40.35	49.58	51.22	50.06	54.20	60.98	63.03	64.33	65.02	68.52	72.22	74.93	76.66	77.24	79.13	82.62	83.46
25.0	55.57	55.03	66.50	68.74	67.10	72.03	81.03	83.55	85.09	85.75	90.44	95.15	98.61	100.63	101.27	103.66	107.76	109.12
30.0	72.81	71.63	85.43	88.33	86.15	91.91	103.33	106.33	108.12	108.71	114.72	120.50	124.77	127.09	127.78	130.67	135.35	137.33
35.0	92.07	90.06	106.32	109.94	107.12	113.74	127.79	131.30	133.33	133.83	141.26	148.21	153.35	155.94	156.67	160.08	166.33	168.00
40.0	113.3	110.3	129.1	133.5	130.0	137.5	154.4	158.4	160.7	161.1	170.0	178.2	184.3	187.1	187.9	191.8	197.6	201.1
45.0	136.4	132.2	153.7	158.9	154.6	163.0	183.0	187.5	190.1	190.3	200.9	210.4	217.5	220.6	221.3	225.8	232.2	236.5
50.0	161.3	155.8	180.1	186.2	181.1	190.4	213.5	218.7	221.5	221.5	233.9	244.7	252.8	256.2	257.0	262.0	269.0	274.1
55.0	188.0	181.0	208.2	215.2	209.2	219.5	246.1	251.8	254.8	254.7	268.8	281.2	290.4	294.0	294.8	300.4	307.9	313.9
60.0	216.5	207.9	238.0	245.9	239.1	250.3	280.4	286.8	290.1	289.7	305.8	319.7	330.0	333.9	334.6	340.8	348.9	355.9
65.0	246.7	236.2	269.4	278.4	270.6	282.8	316.7	323.7	327.2	326.6	344.7	360.2	371.7	375.8	376.5	383.3	391.9	400.0
70.0	278.5	266.1	302.5	312.5	303.6	316.9	354.7	362.4	366.2	365.2	385.5	402.6	415.4	419.7	420.4	427.8	437.0	446.1
80.0	346.9	330.2	373.3	385.6	374.5	389.8	436.0	445.0	449.3	447.8	472.6	493.2	508.7	513.3	513.9	522.6	533.0	544.4
90.0	421.7	399.9	450.2	464.9	451.3	468.9	524.1	534.5	539.4	537.1	566.7	591.2	609.5	614.5	615.0	625.0	636.7	650.3
100.0	502.4	475.1	532.9	550.2	534.0	553.8	618.7	630.6	636.0	632.9	667.7	696.2	717.6	722.9	723.2	734.6	747.6	763.6
150.0	989.0	926.2	1027.4	1060.0	1028.2	1060.4	1182.0	1202.4	1210.4	1201.8	1267.3	1319.2	1358.7	1365.2	1364.3	1382.9	1403.6	1432.7
200.0	1600.1	1487.1	1641.4	1693.3	1643.1	1688.2	1879.9	1910.8	1919.9	1903.4	2007.2	2071.4	2136.7	2157.2	2154.3	2181.2	2198.1	2254.2
250.0	2315.9	2138.1	2353.4	2428.3	2361.4	2415.8	2688.8	2739.2	2740.5	2714.2	2862.3	2939.8	3034.6	3073.6	3066.9	3108.9	3113.3	3202.1
300.0	3118.7	2866.7	3149.9	3250.3	3164.7	3228.5	3595.1	3674.4	3656.1	3618.5	3815.7	3908.4	4035.9	4094.5	4083.4	4142.4	4132.5	4256.6
350.0	3997.3	3662.8	4019.9	4148.3	4041.9	4115.7	4577.7	4697.7	4654.5	4604.2	4854.8	4964.4	5127.1	5206.4	5190.2	5267.5	5242.2	5404.1
400.0	4942.	4518.	4954.	5113.	4984.	5068.	5636.	5795.	5726.	5661.	5969.	6097.	6298.	6398.	6376.	6473.	6431.	6633.
450.0	5946.	5426.	5946.	6137.	5983.	6078.	6757.	6957.	6861.	6782.	7149.	7297.	7538.	7660.	7632.	7749.	7690.	7934.
500.0	7002.	6380.	6988.	7213.	7033.	7139.	7935.	8177.	8053.	7958.	8388.	8558.	8839.	8985.	8950.	9088.	9012.	9298.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.34	14.88	16.08	16.39	17.00	17.88	18.40	19.07	19.47	19.86	20.26	20.69	21.12	21.51	22.02	22.20	23.80	24.31
3.0	16.21	16.84	18.03	18.33	18.96	19.95	20.54	21.33	21.78	22.23	22.67	23.14	23.66	24.09	24.63	24.80	26.51	27.05
3.5	18.03	18.74	19.93	20.22	20.86	21.96	22.61	23.51	24.00	24.51	25.00	25.50	26.10	26.56	27.13	27.30	29.12	29.69
4.0	19.83	20.62	21.81	22.08	22.74	23.94	24.65	25.66	26.18	26.74	27.27	27.81	28.49	28.97	29.57	29.74	31.67	32.27
4.5	21.61	22.50	23.68	23.94	24.60	25.90	26.67	27.77	28.34	28.95	29.52	30.09	30.83	31.35	31.98	32.14	34.18	34.81
5.0	23.41	24.37	25.56	25.80	26.47	27.86	28.68	29.89	30.49	31.14	31.75	32.35	33.16	33.71	34.37	34.52	36.67	37.33
5.5	25.21	26.25	27.44	27.67	28.34	29.83	30.70	32.00	32.63	33.33	33.98	34.61	35.49	36.07	36.75	36.90	39.16	39.85
6.0	27.02	28.15	29.33	29.55	30.22	31.81	32.74	34.12	34.78	35.53	36.21	36.87	37.82	38.42	39.14	39.28	41.65	42.37
6.5	28.85	30.06	31.24	31.44	32.12	33.80	34.78	36.25	36.94	37.74	38.45	39.14	40.15	40.79	41.53	41.67	44.15	44.90
7.0	30.70	31.99	33.17	33.36	34.04	35.81	36.84	38.40	39.12	39.96	40.71	41.43	42.50	43.17	43.94	44.07	46.66	47.44
8.0	34.47	35.92	37.10	37.26	37.93	39.89	41.03	42.75	43.63	44.46	45.28	46.06	47.25	47.97	48.80	48.93	51.74	52.58
9.0	38.33	39.95	41.12	41.26	41.93	44.06	45.31	47.19	48.03	49.05	49.94	50.77	52.08	52.85	53.75	53.86	56.91	57.81
10.0	42.30	44.09	45.25	45.36	46.02	48.34	49.69	51.73	52.62	53.73	54.69	55.57	57.00	57.83	58.80	58.90	62.18	63.13
11.0	46.37	48.33	49.49	49.56	50.21	52.72	54.18	56.38	57.32	58.51	59.55	60.48	62.03	62.91	63.95	64.04	67.56	68.57
12.0	50.55	52.68	53.83	53.88	54.52	57.21	58.77	61.14	62.13	63.41	64.51	65.50	67.16	68.10	69.21	69.29	73.05	74.12
15.0	63.74	66.43	67.56	67.51	68.08	71.34	73.24	76.08	77.23	78.76	80.08	81.23	83.25	84.34	85.67	85.72	90.24	91.50
20.0	87.95	91.62	92.70	92.47	92.91	97.17	99.65	103.29	104.67	106.66	108.35	109.78	112.39	113.73	115.49	115.47	121.35	122.95
25.0	114.88	119.63	120.65	120.22	120.46	125.79	128.88	133.35	134.97	137.43	139.52	141.22	144.45	146.04	148.28	148.19	155.54	157.50
30.0	144.45	150.38	151.32	150.66	150.67	157.14	160.88	166.21	168.07	171.01	173.52	175.62	179.38	181.22	184.00	183.82	192.77	195.10
35.0	176.59	183.78	184.63	183.73	183.45	191.13	195.57	201.78	203.87	207.33	210.28	212.58	217.12	219.19	222.56	222.29	232.94	235.67
40.0	211.2	219.8	220.5	219.3	218.7	227.7	232.9	240.0	242.3	246.3	249.7	252.3	257.6	259.9	263.9	263.5	276.0	279.1
45.0	248.3	258.2	258.9	257.4	256.4	266.7	272.7	280.8	283.3	287.9	291.8	294.7	300.7	303.2	307.9	307.4	321.8	325.4
50.0	287.7	299.1	299.6	297.9	296.5	308.2	315.0	324.0	326.9	332.0	336.4	339.7	346.4	349.2	354.6	354.0	370.4	374.4
55.0	329.3	342.4	342.8	340.7	338.9	352.1	359.7	369.7	372.8	378.5	383.5	387.1	394.6	397.6	403.8	403.1	421.6	426.1
60.0	373.3	388.0	388.2	385.8	383.5	398.3	406.7	417.8	421.2	427.5	433.0	437.0	445.3	448.5	455.5	454.6	475.4	480.4
65.0	419.4	435.9	435.9	433.1	430.3	446.7	456.0	468.2	471.8	478.8	484.9	489.2	498.4	501.8	509.6	508.7	531.7	537.3
70.0	467.6	486.0	485.8	482.6	479.2	497.3	507.6	520.9	524.8	532.3	539.1	543.8	553.8	557.4	566.2	565.0	590.5	596.6
80.0	570.3	592.6	592.0	588.0	583.4	605.0	617.3	632.8	637.2	646.2	654.2	659.7	671.5	675.6	686.2	684.8	715.3	722.5
90.0	681.0	707.5	706.5	701.5	695.6	721.0	735.4	753.3	758.3	768.6	778.0	784.4	798.1	802.5	815.2	813.4	849.4	857.8
100.0	799.5	830.4	828.9	823.0	815.6	845.0	861.6	882.0	887.5	899.3	910.1	917.4	933.1	938.0	952.8	950.7	992.4	1002.1
150.0	1499.	1556.	1551.	1540.	1523.	1576.	1605.	1639.	1647.	1667.	1687.	1699.	1726.	1733.	1760.	1756.	1831.	1848.
200.0	2357.	2446.	2438.	2419.	2390.	2471.	2515.	2565.	2577.	2606.	2635.	2653.	2693.	2703.	2746.	2738.	2832.	2880.
250.0	3347.	3471.	3469.	3442.	3398.	3511.	3568.	3636.	3649.	3690.	3733.	3755.	3808.	3825.	3885.	3874.	3978.	4064.
300.0	4448.	4611.	4623.	4590.	4529.	4670.	4739.	4828.	4839.	4894.	4955.	4980.	5046.	5071.	5152.	5136.	5249.	5376.
350.0	5647.	5852.	5877.	5840.	5760.	5930.	6012.	6122.	6133.	6202.	6282.	6309.	6390.	6425.	6527.	6507.	6630.	6801.
400.0	6930.	7180.	7219.	7178.	7078.	7278.	7374.	7507.	7517.	7601.	7702.	7731.	7827.	7872.	7997.	7972.	8106.	8323.
450.0	8288.	8586.	8639.	8593.	8473.	8704.	8814.	8972.	8980.	9081.	9203.	9235.	9345.	9401.	9550.	9520.	9667.	9932.
500.0	9712.	10060.	10128.	10077.	9934.	10200.	10325.	10508.	10514.	10631.	10775.	10810.	10937.	11003.	11177.	11143.	11302.	11617.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{120}_{50}$SN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	101.8	88.6	88.6	85.4	86.2	59.5	51.3	48.9	47.4	46.1	43.2	40.5	38.5	37.3	36.8	35.4	31.7	33.0
3.0	98.7	88.2	88.4	85.3	86.2	60.0	51.9	49.6	48.2	47.1	44.1	41.5	39.5	38.3	37.9	36.5	33.1	34.1
3.5	95.3	86.8	87.6	84.6	85.6	59.8	51.9	49.7	48.3	47.4	44.5	41.9	39.9	38.8	38.4	37.1	33.9	34.7
4.0	91.9	85.0	86.5	83.6	84.7	59.2	51.5	49.4	48.1	47.3	44.4	41.9	40.0	38.9	38.5	37.2	34.3	34.9
4.5	88.6	82.9	85.2	82.5	83.6	58.4	50.9	48.9	47.7	47.0	44.1	41.7	39.9	38.8	38.4	37.2	34.5	35.0
5.0	85.48	80.70	83.88	81.22	82.35	57.42	50.15	48.28	47.15	46.48	43.72	41.33	39.57	38.56	38.21	37.02	34.46	34.82
5.5	82.51	78.54	82.51	79.93	81.09	56.42	49.35	47.57	46.50	45.91	43.19	40.88	39.17	38.21	37.87	36.72	34.33	34.59
6.0	79.73	76.43	81.14	78.65	79.82	55.39	48.51	46.82	45.81	45.27	42.61	40.36	38.71	37.78	37.47	36.36	34.12	34.28
6.5	77.13	74.39	79.80	77.39	78.57	54.36	47.66	46.05	45.08	44.61	42.00	39.81	38.21	37.32	37.03	35.95	33.85	33.93
7.0	74.69	72.43	78.49	76.16	77.35	53.33	46.82	45.26	44.35	43.92	41.37	39.23	37.68	36.83	36.56	35.51	33.54	33.55
8.0	70.28	68.77	76.01	73.82	75.01	51.34	45.15	43.72	42.88	42.54	40.09	38.06	36.60	35.82	35.57	34.60	32.84	32.73
9.0	66.39	65.46	73.72	71.65	72.83	49.45	43.56	42.23	41.47	41.19	38.84	36.91	35.53	34.80	34.58	33.66	32.09	31.89
10.0	62.95	62.45	71.60	69.64	70.81	47.69	42.06	40.82	40.12	39.90	37.63	35.79	34.48	33.81	33.61	32.74	31.32	31.05
11.0	59.88	59.73	69.65	67.79	68.95	46.04	40.65	39.50	38.84	38.67	36.48	34.72	33.47	32.85	32.67	31.85	30.56	30.24
12.0	57.13	57.25	67.86	66.08	67.22	44.51	39.34	38.25	37.64	37.50	35.39	33.71	32.52	31.94	31.77	31.00	29.81	29.45
15.0	50.36	51.01	63.24	61.67	62.76	40.50	35.89	34.96	34.46	34.40	32.49	30.99	29.94	29.46	29.34	28.67	27.74	27.30
20.0	42.35	43.43	57.42	56.11	57.11	35.35	31.42	30.68	30.29	30.31	28.65	27.38	26.49	26.13	26.05	25.51	24.84	24.36
25.0	36.77	38.04	53.15	52.02	52.93	31.50	28.05	27.43	27.13	27.18	25.71	24.60	23.82	23.55	23.49	23.04	22.52	22.04
30.0	32.65	33.99	49.87	48.87	49.72	28.51	25.43	24.90	24.64	24.72	23.39	22.40	21.71	21.49	21.45	21.06	20.64	20.18
35.0	29.46	30.82	47.27	46.37	47.15	26.12	23.32	22.85	22.63	22.73	21.51	20.62	19.99	19.81	19.79	19.45	19.10	18.66
40.0	26.92	28.28	45.14	44.32	45.06	24.15	21.58	21.17	20.98	21.08	19.96	19.14	18.57	18.42	18.40	18.10	17.80	17.38
45.0	24.84	26.18	43.38	42.62	43.31	22.50	20.13	19.75	19.59	19.69	18.65	17.89	17.36	17.24	17.23	16.96	16.69	16.30
50.0	23.11	24.43	41.88	41.18	41.83	21.10	18.89	18.54	18.40	18.51	17.53	16.83	16.33	16.22	16.22	15.98	15.74	15.37
55.0	21.64	22.93	40.59	19.94	20.56	19.90	17.82	17.50	17.37	17.48	16.56	15.90	15.44	15.35	15.35	15.12	14.91	14.56
60.0	20.37	21.64	19.48	18.86	19.45	18.84	16.88	16.59	16.47	16.58	15.72	15.09	14.66	14.58	14.58	14.37	14.18	13.85
65.0	19.27	20.51	18.50	17.92	18.48	17.92	16.06	15.79	15.68	15.79	14.97	14.38	13.96	13.89	13.90	13.71	13.53	13.22
70.0	18.31	19.51	17.63	17.08	17.62	17.10	15.33	15.07	14.98	15.09	14.30	13.74	13.35	13.29	13.30	13.12	12.95	12.65
80.0	16.68	17.84	16.16	15.66	16.16	15.70	14.09	13.86	13.78	13.88	13.16	12.66	12.29	12.25	12.26	12.10	11.95	11.68
90.0	15.38	16.48	14.96	14.50	14.96	14.56	13.07	12.86	12.79	12.90	12.23	11.76	11.43	11.39	11.40	11.26	11.13	10.89
100.0	14.30	15.35	13.96	13.54	13.97	13.60	12.22	12.03	11.97	12.07	11.45	11.01	10.70	10.67	10.69	10.56	10.43	10.21
150.0	10.84	11.73	10.72	10.40	10.73	10.48	9.43	9.29	9.26	9.35	8.87	8.54	8.30	8.29	8.31	8.22	8.13	7.98
200.0	8.96	9.83	8.99	8.71	8.93	8.79	7.90	7.76	7.78	7.88	7.47	7.35	7.11	6.96	6.99	6.90	6.97	6.73
250.0	7.86	8.65	7.91	7.67	7.84	7.75	6.97	6.77	6.87	6.96	6.60	6.50	6.28	6.16	6.19	6.08	6.17	5.96
300.0	7.10	7.83	7.17	6.94	7.11	7.03	6.32	6.09	6.24	6.32	5.99	5.90	5.71	5.60	5.63	5.53	5.61	5.42
350.0	6.55	7.24	6.62	6.42	6.57	6.50	5.85	5.64	5.78	5.85	5.55	5.46	5.28	5.19	5.21	5.13	5.20	5.03
400.0	6.134	6.779	6.207	6.013	6.159	6.092	5.486	5.292	5.419	5.491	5.211	5.124	4.960	4.872	4.896	4.818	4.883	4.726
450.0	5.805	6.421	5.880	5.696	5.836	5.774	5.200	5.021	5.139	5.208	4.943	4.859	4.705	4.624	4.646	4.574	4.635	4.487
500.0	5.541	6.133	5.618	5.441	5.577	5.518	4.971	4.804	4.914	4.981	4.728	4.646	4.499	4.424	4.446	4.377	4.436	4.294

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	30.87	29.44	29.49	29.69	29.42	27.74	26.88	25.38	24.83	24.18	23.71	23.32	22.47	22.18	21.94	22.00	21.08	20.84
3.0	31.99	30.53	30.57	30.79	30.56	28.89	28.02	26.55	26.02	25.37	24.90	24.51	23.68	23.37	23.11	23.16	22.18	21.92
3.5	32.59	31.13	31.17	31.38	31.20	29.55	28.69	27.27	26.76	26.12	25.65	25.27	24.45	24.13	23.85	23.91	22.88	22.61
4.0	32.87	31.41	31.44	31.66	31.52	29.90	29.06	27.68	27.19	26.56	26.10	25.72	24.92	24.60	24.32	24.37	23.31	23.04
4.5	32.92	31.48	31.51	31.73	31.62	30.04	29.21	27.88	27.42	26.80	26.34	25.98	25.20	24.88	24.58	24.64	23.56	23.28
5.0	32.83	31.41	31.44	31.66	31.57	30.03	29.21	27.93	27.49	26.89	26.44	26.08	25.33	25.01	24.71	24.76	23.67	23.40
5.5	32.64	31.23	31.27	31.48	31.42	29.92	29.12	27.88	27.46	26.88	26.44	26.09	25.35	25.04	24.73	24.79	23.69	23.42
6.0	32.38	30.99	31.03	31.24	31.20	29.74	28.96	27.76	27.36	26.79	26.36	26.02	25.30	24.99	24.69	24.74	23.64	23.37
6.5	32.07	30.71	30.74	30.95	30.93	29.50	28.74	27.58	27.20	26.64	26.22	25.89	25.20	24.90	24.58	24.64	23.55	23.27
7.0	31.72	30.39	30.42	30.63	30.63	29.24	28.49	27.37	27.00	26.46	26.05	25.73	25.05	24.76	24.44	24.50	23.41	23.14
8.0	30.99	29.70	29.73	29.94	29.96	28.63	27.92	26.87	26.53	26.02	25.62	25.32	24.68	24.40	24.08	24.13	23.06	22.80
9.0	30.22	28.97	29.00	29.21	29.26	27.99	27.30	26.32	26.00	25.51	25.13	24.84	24.24	23.97	23.66	23.71	22.65	22.40
10.0	29.45	28.24	28.28	28.48	28.55	27.33	26.68	25.74	25.45	24.98	24.62	24.34	23.77	23.51	23.20	23.25	22.22	21.97
11.0	28.69	27.53	27.57	27.76	27.84	26.68	26.05	25.16	24.89	24.44	24.09	23.83	23.28	23.04	22.73	22.78	21.77	21.53
12.0	27.97	26.84	26.88	27.07	27.16	26.04	25.44	24.60	24.34	23.91	23.57	23.32	22.80	22.57	22.26	22.31	21.32	21.09
15.0	25.96	24.93	24.97	25.15	25.27	24.27	23.72	22.99	22.77	22.39	22.09	21.87	21.41	21.21	20.91	20.95	20.03	19.82
20.0	23.20	22.29	22.34	22.50	22.64	21.78	21.31	20.71	20.54	20.22	19.95	19.77	19.38	19.22	18.94	18.98	18.16	17.97
25.0	21.01	20.21	20.25	20.40	20.55	19.80	19.39	18.87	18.73	18.45	18.22	18.06	17.72	17.59	17.33	17.37	16.62	16.45
30.0	19.26	18.52	18.57	18.71	18.86	18.18	17.82	17.36	17.24	17.00	16.79	16.65	16.35	16.24	16.00	16.03	15.35	15.20
35.0	17.81	17.14	17.19	17.32	17.47	16.85	16.52	16.12	16.01	15.79	15.60	15.47	15.20	15.11	14.88	14.92	14.29	14.15
40.0	16.60	15.98	16.03	16.15	16.30	15.73	15.43	15.06	14.97	14.77	14.59	14.48	14.23	14.16	13.94	13.97	13.38	13.26
45.0	15.67	15.00	15.04	15.16	15.31	14.78	14.50	14.16	14.08	13.90	13.73	13.63	13.40	13.33	13.13	13.16	12.61	12.49
50.0	14.69	14.15	14.19	14.30	14.45	13.95	13.69	13.38	13.31	13.14	12.99	12.89	12.68	12.62	12.42	12.45	11.94	11.82
55.0	13.92	13.40	13.45	13.55	13.70	13.23	12.99	12.70	12.63	12.47	12.33	12.24	12.05	11.99	11.80	11.83	11.34	11.24
60.0	13.24	12.75	12.80	12.90	13.04	12.60	12.37	12.10	12.04	11.89	11.75	11.67	11.48	11.44	11.26	11.29	10.82	10.72
65.0	12.64	12.17	12.22	12.31	12.45	12.03	11.82	11.57	11.51	11.37	11.24	11.16	10.99	10.94	10.77	10.80	10.35	10.26
70.0	12.10	11.66	11.70	11.79	11.93	11.53	11.32	11.09	11.03	10.90	10.78	10.70	10.54	10.50	10.33	10.36	9.94	9.85
80.0	11.18	10.77	10.81	10.90	11.02	10.66	10.47	10.26	10.21	10.09	9.98	9.92	9.76	9.73	9.58	9.60	9.21	9.13
90.0	10.41	10.04	10.07	10.15	10.28	9.94	9.77	9.58	9.53	9.43	9.32	9.26	9.12	9.09	8.95	8.97	8.61	8.53
100.0	9.77	9.42	9.45	9.53	9.65	9.34	9.18	9.00	8.96	8.86	8.76	8.71	8.58	8.55	8.42	8.44	8.10	8.03
150.0	7.636	7.361	7.392	7.451	7.554	7.315	7.194	7.069	7.042	6.968	6.896	6.853	6.769	6.740	6.635	6.655	6.388	6.334
200.0	6.438	6.217	6.216	6.267	6.358	6.160	6.062	5.963	5.943	5.885	5.824	5.789	5.713	5.696	5.610	5.627	5.552	5.372
250.0	5.706	5.510	5.450	5.494	5.578	5.419	5.365	5.271	5.274	5.215	5.138	5.129	5.072	5.034	4.955	4.971	4.936	4.780
300.0	5.194	5.017	4.962	4.979	5.053	4.938	4.888	4.805	4.808	4.755	4.685	4.677	4.627	4.594	4.521	4.536	4.504	4.363
350.0	4.816	4.652	4.603	4.619	4.688	4.582	4.536	4.460	4.463	4.414	4.351	4.343	4.298	4.267	4.201	4.215	4.183	4.055
400.0	4.527	4.373	4.328	4.342	4.408	4.309	4.266	4.195	4.195	4.153	4.094	4.087	4.045	4.017	3.954	3.967	3.937	3.818
450.0	4.298	4.152	4.111	4.125	4.187	4.094	4.052	3.986	3.990	3.947	3.892	3.884	3.845	3.819	3.760	3.772	3.742	3.631
500.0	4.114	3.974	3.936	3.949	4.009	3.920	3.880	3.817	3.822	3.780	3.728	3.721	3.684	3.659	3.603	3.614	3.584	3.480

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

120 50 SN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.610	5.380	7.603	7.580	7.440	8.862	9.590	10.094	10.470	10.870	11.110	11.880	12.280	12.819	13.030	13.247	13.646	14.000
3.0	6.208	6.058	8.478	8.497	8.345	9.885	10.751	11.311	11.725	12.156	12.482	13.340	13.817	14.404	14.634	14.913	15.495	15.785
3.5	6.827	6.743	9.360	9.420	9.255	10.867	11.907	12.519	12.967	13.426	13.835	14.778	15.326	15.959	16.207	16.542	17.286	17.627
4.0	7.467	7.441	10.254	10.355	10.176	11.876	13.068	13.730	14.211	14.693	15.184	16.209	16.826	17.502	17.766	18.156	19.045	19.249
4.5	8.132	8.156	11.165	11.307	11.111	12.897	14.240	14.950	15.462	15.966	16.539	17.644	18.328	19.045	19.324	19.767	20.789	20.965
5.0	8.822	8.890	12.094	12.277	12.064	13.933	15.428	16.184	16.727	17.260	17.904	19.089	19.838	20.696	20.889	21.383	22.530	22.684
5.5	9.536	9.643	13.044	13.267	13.036	14.987	16.634	17.436	18.008	18.549	19.285	20.549	21.362	22.158	22.466	23.010	24.274	24.413
6.0	10.276	10.418	14.014	14.279	14.029	16.060	17.860	18.707	19.308	19.865	20.683	22.026	22.903	23.737	24.059	24.652	26.027	26.155
6.5	11.041	11.214	15.007	15.314	15.042	17.154	19.108	19.999	20.628	21.200	22.101	23.522	24.463	25.335	25.669	26.312	27.792	27.914
7.0	11.832	12.031	16.021	16.370	16.078	18.268	20.378	21.314	21.970	22.555	23.541	25.041	26.044	26.953	27.300	27.991	29.572	29.692
8.0	13.49	13.73	18.12	18.55	18.21	20.56	22.99	24.01	24.72	25.33	26.49	28.15	29.27	30.26	30.63	31.41	33.19	33.31
9.0	15.25	15.52	20.31	20.83	20.44	22.94	25.69	26.80	27.57	28.20	29.53	31.35	32.60	33.66	34.05	34.93	36.88	37.03
10.0	17.10	17.40	22.59	23.20	22.76	25.41	28.50	29.69	30.51	31.16	32.67	34.65	36.03	37.15	37.57	38.54	40.67	40.84
11.0	19.06	19.36	24.96	25.66	25.16	27.98	31.40	32.68	33.55	34.21	35.91	38.05	39.56	40.75	41.19	42.26	44.55	44.76
12.0	21.11	21.42	27.42	28.22	27.66	30.63	34.40	35.77	36.69	37.37	39.25	41.56	43.20	44.46	44.92	46.08	48.52	48.78
15.0	27.84	28.09	35.35	36.45	35.68	39.12	43.99	45.63	46.70	47.40	49.87	52.71	54.75	56.20	56.72	58.16	61.05	61.48
20.0	40.89	40.89	50.31	51.96	50.79	55.02	61.91	63.99	65.31	66.02	69.58	73.35	76.10	77.87	78.46	80.39	83.94	84.79
25.0	56.14	55.69	67.38	69.65	67.99	73.03	82.16	84.72	86.28	86.96	91.73	96.51	100.03	102.10	102.76	105.18	109.35	110.73
30.0	73.50	72.41	86.48	89.42	87.20	93.08	104.66	107.71	109.52	110.14	116.23	122.11	126.44	128.81	129.52	132.45	137.21	139.21
35.0	92.88	90.98	107.53	111.19	108.35	115.10	129.33	132.89	134.96	135.48	143.00	150.05	155.27	157.92	158.66	162.13	167.46	170.16
40.0	114.2	111.3	130.5	134.9	131.4	139.0	156.1	160.2	162.5	162.9	172.0	180.3	186.4	189.4	190.1	194.1	200.0	203.5
45.0	137.4	133.4	155.2	160.5	156.2	164.8	184.9	189.6	192.1	192.4	203.1	212.7	219.9	223.1	223.8	228.4	234.9	239.2
50.0	162.5	157.1	181.8	187.9	182.8	192.3	215.7	220.9	223.8	223.8	236.3	247.3	255.5	259.0	259.8	264.9	271.9	277.1
55.0	189.3	182.5	210.1	217.2	211.2	221.6	248.4	254.3	257.3	257.2	271.5	284.0	293.3	297.0	297.8	303.5	311.1	317.2
60.0	217.9	209.5	240.0	248.1	241.2	252.6	283.0	289.5	292.8	292.5	308.7	322.8	333.2	337.1	337.9	344.2	352.4	359.5
65.0	248.2	238.0	271.7	280.8	272.8	285.3	319.5	326.6	330.2	329.6	347.9	363.5	375.2	379.3	380.1	387.0	395.7	403.9
70.0	280.2	268.0	304.9	315.1	306.1	319.6	357.8	365.5	369.4	368.5	388.9	406.2	419.2	423.5	424.2	431.7	441.1	450.3
80.0	348.9	332.4	376.1	388.5	377.3	392.9	439.5	448.6	453.0	451.5	476.5	497.3	513.0	517.7	518.3	527.1	537.6	549.1
90.0	423.9	402.4	453.3	468.2	454.6	472.4	528.0	538.6	543.5	541.2	571.1	595.8	614.3	619.4	619.9	630.0	641.8	655.6
100.0	505.0	478.0	536.4	553.9	537.6	557.7	623.1	635.1	640.6	637.5	672.6	701.3	722.9	728.3	728.7	740.1	753.3	769.4
150.0	993.3	930.8	1032.9	1065.7	1033.7	1066.3	1188.7	1209.3	1217.3	1208.7	1274.7	1326.9	1366.7	1373.3	1372.5	1391.2	1412.1	1441.4
200.0	1606.2	1493.6	1648.9	1701.1	1650.7	1696.3	1889.0	1920.1	1929.3	1912.8	2017.1	2081.8	2147.4	2168.1	2165.3	2192.4	2209.5	2265.8
250.0	2324.0	2146.7	2363.0	2438.2	2371.2	2426.0	2700.4	2751.0	2752.4	2726.1	2874.8	2952.8	3048.1	3087.3	3080.7	3123.0	3127.5	3216.7
300.0	3128.9	2877.3	3161.7	3262.5	3176.7	3241.1	3606.2	3688.8	3670.6	3632.9	3831.0	3924.2	4052.3	4111.2	4100.1	4159.4	4149.7	4274.3
350.0	4009.7	3675.7	4033.9	4162.8	4056.2	4130.5	4594.4	4714.9	4671.6	4621.3	4872.9	4983.0	5146.4	5226.1	5209.9	5287.5	5262.3	5424.9
400.0	4957.	4533.	4971.	5130.	5001.	5085.	5655.	5815.	5745.	5681.	5995.	6119.	6320.	6421.	6399.	6496.	6454.	6657.
450.0	5964.	5444.	5965.	6156.	6002.	6098.	6779.	6980.	6883.	6804.	7173.	7322.	7563.	7686.	7658.	7775.	7717.	7961.
500.0	7022.	6400.	7010.	7235.	7055.	7161.	7960.	8202.	8078.	7983.	8415.	8586.	8868.	9014.	8979.	9117.	9041.	9329.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.70	15.25	16.47	16.79	17.41	18.30	18.84	19.53	19.95	20.35	20.76	21.20	21.63	22.03	22.55	22.74	24.38	24.90
3.0	16.61	17.25	18.47	18.77	19.41	20.42	21.02	21.84	22.30	22.77	23.22	23.70	24.23	24.66	25.21	25.39	27.15	27.70
3.5	18.46	19.19	20.41	20.70	21.35	22.47	23.14	24.07	24.57	25.09	25.60	26.11	26.72	27.18	27.76	27.94	29.81	30.39
4.0	20.29	21.11	22.32	22.60	23.26	24.49	25.21	26.25	26.79	27.37	27.91	28.46	29.15	29.64	30.25	30.42	32.40	33.02
4.5	22.12	23.02	24.23	24.49	25.16	26.49	27.27	28.41	28.99	29.62	30.20	30.78	31.54	32.07	32.70	32.87	34.96	35.61
5.0	23.94	24.93	26.13	26.38	27.06	28.49	29.32	30.56	31.18	31.85	32.47	33.09	33.91	34.47	35.14	35.30	37.50	38.18
5.5	25.77	26.84	28.05	28.28	28.97	30.49	31.38	32.71	33.36	34.08	34.74	35.39	36.28	36.87	37.56	37.72	40.03	40.74
6.0	27.62	28.77	29.97	30.20	30.88	32.50	33.45	34.86	35.56	36.32	37.01	37.69	38.65	39.27	39.99	40.14	42.57	43.31
6.5	29.48	30.71	31.92	32.13	32.81	34.52	35.53	37.03	37.75	38.56	39.30	40.00	41.03	41.67	42.43	42.57	45.11	45.88
7.0	31.36	32.68	33.88	34.07	34.76	36.57	37.62	39.22	39.96	40.82	41.59	42.32	43.41	44.09	44.87	45.01	47.67	48.46
8.0	35.19	36.67	37.87	38.04	38.72	40.71	41.88	43.64	44.44	45.40	46.24	47.02	48.24	48.97	49.82	49.95	52.83	53.69
9.0	39.11	40.76	41.95	42.09	42.77	44.95	46.22	48.15	49.01	50.05	50.96	51.81	53.14	53.93	54.85	54.98	58.08	59.00
10.0	43.13	44.96	46.14	46.26	46.93	49.29	50.67	52.76	53.68	54.81	55.79	56.69	58.14	58.99	59.97	60.07	63.43	64.40
11.0	47.26	49.26	50.44	50.52	51.18	53.73	55.22	57.48	58.44	59.66	60.72	61.67	63.24	64.14	65.19	65.29	68.88	69.92
12.0	51.50	53.68	54.85	54.90	55.55	58.29	59.88	62.30	63.32	64.63	65.75	66.76	68.45	69.40	70.53	70.61	74.45	75.55
15.0	64.87	67.60	68.76	68.71	69.30	72.61	74.55	77.45	78.62	80.19	81.53	82.70	84.75	85.86	87.22	87.27	91.88	93.17
20.0	89.36	93.10	94.21	93.97	94.42	98.75	101.27	104.98	106.40	108.42	110.15	111.59	114.24	115.62	117.40	117.38	123.37	125.00
25.0	116.58	121.41	122.45	122.02	122.27	127.68	130.83	135.37	137.03	139.53	141.66	143.39	146.66	148.28	150.56	150.46	157.95	159.94
30.0	146.44	152.46	153.43	152.76	152.78	159.34	163.15	168.56	170.45	173.44	176.00	178.03	181.95	183.82	186.63	186.46	195.55	197.92
35.0	178.87	186.16	187.04	186.13	185.86	193.65	198.15	204.46	206.59	210.10	213.11	215.44	220.04	222.14	225.56	225.29	236.10	238.88
40.0	213.8	222.4	223.2	222.0	221.4	230.5	235.8	243.0	245.4	249.4	252.9	255.5	260.9	263.2	267.2	266.9	279.5	282.7
45.0	251.1	261.2	261.9	260.4	259.4	269.9	275.9	284.1	286.7	291.3	295.3	298.3	304.3	306.9	311.6	311.2	325.7	329.4
50.0	290.8	302.4	303.0	301.2	299.8	311.7	318.5	327.7	330.6	335.8	340.3	343.6	350.4	353.2	358.6	358.1	374.7	378.8
55.0	332.8	346.0	346.4	344.3	342.5	355.9	363.5	373.7	376.9	382.6	387.7	391.4	399.0	402.0	408.2	407.5	426.3	430.9
60.0	377.0	391.9	392.2	389.7	387.4	402.4	410.9	422.1	425.5	431.9	437.5	441.6	450.0	453.2	460.3	459.4	480.4	485.5
65.0	423.4	440.1	440.2	437.3	434.5	451.1	460.6	472.9	476.5	483.6	489.8	494.2	503.4	506.9	514.8	513.8	537.1	542.8
70.0	472.0	490.5	490.4	487.2	483.8	502.1	512.5	525.9	529.8	537.5	544.3	549.1	559.2	562.9	571.7	570.6	596.3	602.5
80.0	575.3	597.7	597.2	593.1	588.5	610.4	622.8	638.5	643.0	652.0	660.1	665.7	677.6	681.7	692.5	691.0	721.9	729.2
90.0	686.6	713.2	712.3	707.3	701.4	727.0	741.5	759.6	764.7	775.1	784.6	791.0	804.9	809.4	822.2	820.4	856.7	865.2
100.0	805.6	836.8	835.3	829.4	822.0	851.7	868.3	889.0	894.6	906.5	917.4	924.8	940.6	945.5	960.5	958.3	1000.5	1010.2
150.0	1508.	1565.	1561.	1549.	1532.	1585.	1615.	1649.	1658.	1678.	1697.	1710.	1737.	1744.	1772.	1767.	1843.	1860.
200.0	2369.	2458.	2451.	2432.	2403.	2484.	2528.	2578.	2590.	2620.	2649.	2667.	2707.	2717.	2760.	2753.	2847.	2895.
250.0	3362.	3487.	3485.	3458.	3414.	3527.	3585.	3653.	3666.	3708.	3751.	3773.	3826.	3843.	3904.	3892.	3997.	4083.
300.0	4467.	4631.	4642.	4609.	4548.	4690.	4759.	4848.	4860.	4915.	4976.	5001.	5067.	5093.	5174.	5159.	5272.	5400.
350.0	5668.	5874.	5899.	5863.	5783.	5953.	6035.	6146.	6157.	6227.	6307.	6334.	6415.	6450.	6553.	6533.	6657.	6828.
400.0	6955.	7206.	7245.	7204.	7104.	7305.	7401.	7535.	7545.	7630.	7731.	7760.	7856.	7901.	8027.	8002.	8137.	8355.
450.0	8316.	8616.	8669.	8623.	8502.	8735.	8845.	9004.	9012.	9113.	9235.	9267.	9378.	9434.	9584.	9554.	9702.	9967.
500.0	9759.	10094.	10161.	10110.	9967.	10234.	10359.	10543.	10549.	10667.	10811.	10846.	10974.	11040.	11215.	11180.	11341.	11656.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{121}_{51}$SB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	104.5	90.6	70.2	66.9	67.7	60.8	52.4	50.0	48.4	47.1	44.2	41.4	39.3	38.1	37.6	36.2	32.4	33.7
3.0	101.4	90.3	70.0	66.9	67.8	61.4	53.1	50.7	49.3	48.1	45.1	42.4	40.4	39.2	38.7	37.3	33.8	34.9
3.5	98.0	89.0	69.3	66.2	67.2	61.2	53.1	50.9	49.5	48.5	45.5	42.9	40.9	39.7	39.3	37.9	34.6	35.5
4.0	94.6	87.1	68.2	65.2	66.3	60.6	52.7	50.6	49.3	48.4	45.5	42.9	41.0	39.8	39.4	38.1	35.1	35.8
4.5	91.2	85.0	66.9	64.1	65.2	59.8	52.1	50.1	48.9	48.1	45.2	42.7	40.8	39.8	39.4	38.1	35.3	35.8
5.0	88.03	82.88	65.67	62.82	63.97	58.89	51.42	49.51	48.34	47.65	44.81	42.36	40.55	39.52	39.15	37.93	35.30	35.68
5.5	85.01	80.70	64.18	61.53	62.71	57.89	50.63	48.80	47.70	47.08	44.30	41.91	40.16	39.17	38.83	37.64	35.19	35.45
6.0	82.18	78.57	62.80	60.24	61.43	56.86	49.79	48.05	47.00	46.45	43.72	41.40	39.71	38.75	38.43	37.29	34.99	35.15
6.5	79.52	76.51	61.44	58.96	60.17	55.81	48.93	47.27	46.27	45.78	43.10	40.85	39.21	38.29	37.99	36.88	34.73	34.80
7.0	77.03	74.53	60.12	57.72	58.93	54.78	48.08	46.48	45.53	45.09	42.47	40.27	38.68	37.80	37.52	36.45	34.42	34.42
8.0	72.51	70.81	57.60	55.35	56.56	52.76	46.40	44.92	44.06	43.70	41.18	39.10	37.59	36.79	36.53	35.53	33.72	33.61
9.0	68.53	67.43	55.27	53.14	54.35	50.85	44.79	43.42	42.63	42.34	39.92	37.93	36.51	35.76	35.53	34.59	32.97	32.76
10.0	65.00	64.37	53.12	51.09	52.30	49.06	43.26	41.99	41.26	41.03	38.69	36.80	35.45	34.76	34.55	33.66	32.19	31.92
11.0	61.86	61.59	51.13	49.21	50.40	47.38	41.84	40.64	39.96	39.78	37.53	35.72	34.43	33.79	33.60	32.76	31.42	31.09
12.0	59.03	59.06	49.30	47.46	48.64	45.82	40.50	39.37	38.74	38.60	36.43	34.69	33.46	32.86	32.69	31.89	30.67	30.30
15.0	52.07	52.68	44.58	42.97	44.09	41.74	36.98	36.03	35.51	35.44	33.47	31.93	30.84	30.35	30.22	29.53	28.56	28.11
20.0	43.83	44.90	38.64	37.28	38.31	36.48	32.41	31.66	31.25	31.27	29.55	28.24	27.32	26.95	26.86	26.31	25.61	25.11
25.0	38.08	39.35	34.26	33.08	34.03	32.54	28.97	28.33	28.01	28.07	26.55	25.40	24.60	24.31	24.25	23.78	23.24	22.75
30.0	33.83	35.18	30.89	29.85	30.73	29.47	26.28	25.73	25.46	25.55	24.17	23.15	22.43	22.20	22.16	21.76	21.33	20.85
35.0	30.54	31.92	28.21	27.28	28.09	27.01	24.11	23.63	23.41	23.50	22.25	21.32	20.67	20.48	20.46	20.10	19.74	19.29
40.0	27.92	29.30	26.03	25.18	25.94	24.99	22.33	21.90	21.70	21.81	20.65	19.80	19.21	19.05	19.04	18.72	18.41	17.98
45.0	25.77	27.14	24.21	23.42	24.14	23.30	20.83	20.44	20.27	20.38	19.30	18.52	17.97	17.84	17.83	17.55	17.27	16.87
50.0	23.98	25.32	22.67	21.94	22.62	21.86	19.56	19.20	19.05	19.16	18.15	17.42	16.91	16.80	16.80	16.54	16.29	15.91
55.0	22.45	23.77	21.34	20.66	21.30	20.61	18.46	18.13	17.99	18.11	17.16	16.47	15.99	15.89	15.90	15.66	15.44	15.08
60.0	21.14	22.44	20.19	19.55	20.16	19.53	17.50	17.19	17.07	17.18	16.28	15.64	15.18	15.10	15.11	14.89	14.69	14.34
65.0	20.01	21.27	19.18	18.58	19.16	18.57	16.65	16.36	16.25	16.37	15.51	14.90	14.47	14.40	14.41	14.20	14.02	13.69
70.0	19.00	20.24	18.28	17.71	18.27	17.73	15.89	15.63	15.53	15.64	14.82	14.24	13.83	13.77	13.78	13.59	13.42	13.11
80.0	17.33	18.51	16.77	16.25	16.76	16.28	14.61	14.37	14.29	14.40	13.65	13.12	12.75	12.70	12.71	12.55	12.39	12.12
90.0	15.97	17.10	15.53	15.05	15.53	15.10	13.56	13.34	13.27	13.38	12.69	12.20	11.85	11.81	11.83	11.68	11.54	11.29
100.0	14.85	15.94	14.49	14.05	14.50	14.12	12.68	12.48	12.42	12.53	11.88	11.43	11.10	11.07	11.09	10.95	10.82	10.60
150.0	11.27	12.18	11.13	10.80	11.14	10.88	9.79	9.65	9.61	9.71	9.22	8.87	8.62	8.61	8.63	8.54	8.44	8.29
200.0	9.31	10.22	9.34	9.05	9.28	9.13	8.21	8.08	8.09	8.19	7.76	7.64	7.39	7.24	7.27	7.17	7.24	6.99
250.0	8.17	8.99	8.23	7.97	8.15	8.06	7.25	7.04	7.15	7.23	6.86	6.75	6.53	6.40	6.43	6.32	6.41	6.19
300.0	7.39	8.14	7.45	7.22	7.39	7.31	6.58	6.33	6.49	6.57	6.23	6.13	5.93	5.82	5.85	5.75	5.83	5.64
350.0	6.82	7.52	6.89	6.67	6.83	6.76	6.08	5.86	6.01	6.08	5.77	5.68	5.50	5.39	5.42	5.33	5.41	5.23
400.0	6.380	7.050	6.456	6.254	6.406	6.336	5.706	5.504	5.636	5.711	5.419	5.329	5.158	5.067	5.091	5.011	5.078	4.915
450.0	6.038	6.678	6.116	5.924	6.070	6.006	5.409	5.223	5.345	5.417	5.142	5.054	4.893	4.809	4.833	4.757	4.821	4.667
500.0	5.764	6.379	5.843	5.659	5.801	5.740	5.170	4.997	5.111	5.181	4.918	4.832	4.680	4.601	4.624	4.552	4.613	4.466

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	31.53	30.06	30.11	30.33	30.05	28.33	27.45	25.91	25.35	24.69	24.21	23.81	22.95	22.65	22.40	22.46	21.53	21.28
3.0	32.70	31.20	31.25	31.46	31.23	29.52	28.64	27.14	26.60	25.93	25.45	25.05	24.19	23.88	23.61	23.67	22.66	22.40
3.5	33.34	31.84	31.88	32.10	31.91	30.22	29.34	27.88	27.37	26.71	26.23	25.84	25.00	24.67	24.39	24.45	23.39	23.12
4.0	33.64	32.15	32.18	32.40	32.25	30.60	29.73	28.32	27.83	27.18	26.70	26.32	25.50	25.17	24.88	24.93	23.85	23.57
4.5	33.71	32.23	32.27	32.49	32.37	30.76	29.90	28.64	28.07	27.44	26.97	26.59	25.79	25.47	25.16	25.22	24.11	23.83
5.0	33.63	32.17	32.20	32.43	32.34	30.76	29.92	28.61	28.16	27.54	27.08	26.71	25.94	25.61	25.30	25.36	24.24	23.96
5.5	33.45	32.01	32.04	32.26	32.20	30.66	29.84	28.57	28.14	27.54	27.09	26.73	25.98	25.65	25.34	25.40	24.27	23.99
6.0	33.20	31.78	31.81	32.03	31.99	30.48	29.68	28.45	28.04	27.46	27.01	26.67	25.94	25.62	25.30	25.36	24.23	23.95
6.5	32.89	31.50	31.53	31.74	31.72	30.26	29.47	28.28	27.89	27.32	26.89	26.55	25.84	25.53	25.21	25.26	24.14	23.86
7.0	32.55	31.18	31.21	31.43	31.42	29.99	29.22	28.08	27.70	27.14	26.72	26.39	25.70	25.39	25.07	25.12	24.01	23.73
8.0	31.81	30.49	30.52	30.73	30.76	29.39	28.66	27.58	27.23	26.70	26.29	25.98	25.33	25.04	24.71	24.77	23.67	23.40
9.0	31.04	29.76	29.79	30.00	30.05	28.75	28.04	27.03	26.70	26.20	25.81	25.51	24.89	24.61	24.29	24.34	23.26	23.00
10.0	30.26	29.03	29.06	29.26	29.33	28.09	27.41	26.45	26.15	25.67	25.29	25.01	24.42	24.16	23.83	23.88	22.82	22.57
11.0	29.50	28.31	28.34	28.54	28.62	27.43	26.78	25.87	25.59	25.13	24.77	24.50	23.93	23.68	23.36	23.41	22.37	22.13
12.0	28.77	27.61	27.64	27.84	27.94	26.78	26.16	25.29	25.03	24.59	24.24	23.98	23.44	23.21	22.89	22.94	21.92	21.68
15.0	26.73	25.67	25.71	25.89	26.02	24.98	24.42	23.67	23.44	23.05	22.74	22.51	22.03	21.83	21.52	21.57	20.62	20.40
20.0	23.92	22.99	23.03	23.20	23.34	22.46	21.97	21.35	21.17	20.84	20.57	20.38	19.98	19.81	19.52	19.57	18.72	18.52
25.0	21.69	20.85	20.90	21.05	21.21	20.43	20.00	19.47	19.32	19.04	18.80	18.63	18.28	18.15	17.88	17.92	17.15	16.97
30.0	19.89	19.13	19.18	19.32	19.48	18.78	18.40	17.93	17.81	17.55	17.34	17.19	16.88	16.77	16.52	16.56	15.85	15.69
35.0	18.41	17.72	17.76	17.90	18.06	17.42	17.07	16.65	16.55	16.32	16.12	15.99	15.71	15.62	15.38	15.41	14.76	14.62
40.0	17.17	16.53	16.57	16.70	16.86	16.27	15.95	15.58	15.48	15.27	15.09	14.97	14.72	14.64	14.41	14.44	13.84	13.70
45.0	16.11	15.51	15.56	15.68	15.84	15.29	15.00	14.65	14.57	14.37	14.21	14.10	13.86	13.79	13.58	13.61	13.04	12.92
50.0	15.21	14.64	14.69	14.80	14.95	14.44	14.17	13.85	13.77	13.60	13.44	13.34	13.12	13.06	12.85	12.89	12.35	12.23
55.0	14.41	13.88	13.93	14.03	14.18	13.70	13.45	13.15	13.08	12.92	12.77	12.67	12.47	12.41	12.22	12.25	11.74	11.63
60.0	13.71	13.21	13.25	13.36	13.50	13.05	12.81	12.53	12.47	12.31	12.17	12.09	11.89	11.84	11.66	11.69	11.21	11.10
65.0	13.09	12.61	12.66	12.76	12.90	12.47	12.24	11.98	11.92	11.78	11.64	11.56	11.38	11.34	11.16	11.18	10.73	10.63
70.0	12.54	12.08	12.12	12.22	12.36	11.95	11.73	11.49	11.43	11.29	11.17	11.09	10.92	10.88	10.70	10.73	10.29	10.20
80.0	11.69	11.17	11.21	11.30	11.43	11.05	10.86	10.64	10.59	10.46	10.35	10.28	10.12	10.09	9.93	9.95	9.55	9.46
90.0	10.80	10.41	10.45	10.53	10.66	10.31	10.13	9.93	9.89	9.77	9.67	9.60	9.46	9.43	9.28	9.31	8.93	8.85
100.0	10.14	9.77	9.81	9.89	10.01	9.69	9.52	9.34	9.30	9.19	9.09	9.03	8.90	8.87	8.73	8.76	8.40	8.33
150.0	7.931	7.645	7.676	7.739	7.845	7.597	7.471	7.341	7.313	7.237	7.161	7.116	7.019	7.000	6.890	6.910	6.633	6.578
200.0	6.690	6.460	6.459	6.512	6.607	6.401	6.299	6.197	6.176	6.115	6.051	6.015	5.937	5.919	5.829	5.846	5.769	5.682
250.0	5.931	5.728	5.665	5.711	5.798	5.633	5.577	5.479	5.482	5.421	5.340	5.331	5.272	5.233	5.150	5.168	5.131	4.968
300.0	5.400	5.216	5.159	5.177	5.254	5.134	5.083	4.995	4.999	4.943	4.871	4.863	4.810	4.776	4.701	4.716	4.682	4.536
350.0	5.008	4.838	4.787	4.803	4.875	4.764	4.717	4.637	4.641	4.590	4.524	4.516	4.469	4.437	4.368	4.382	4.350	4.217
400.0	4.708	4.547	4.501	4.516	4.584	4.481	4.436	4.363	4.367	4.319	4.258	4.250	4.206	4.177	4.112	4.126	4.094	3.971
450.0	4.471	4.319	4.276	4.290	4.355	4.258	4.215	4.146	4.150	4.105	4.047	4.040	3.999	3.972	3.911	3.923	3.892	3.777
500.0	4.279	4.134	4.094	4.108	4.170	4.077	4.036	3.971	3.975	3.932	3.878	3.870	3.832	3.806	3.748	3.759	3.728	3.620

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

121 SB IONS 51

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.560	5.330	7.534	7.510	7.370	8.782	9.510	10.017	10.390	10.780	11.020	11.770	12.160	12.697	12,910	13.130	13.529	13.880
3.0	6.147	5.998	8.396	8.414	8.262	9.771	10.655	11.217	11.627	12.049	12.373	13.211	13.676	14.261	14.493	14.773	15.354	15.642
3.5	6.754	6.673	9.264	9.322	9.168	10.758	11.794	12.407	12.852	13.300	13.707	14.628	15.164	15.793	16.043	16.379	17.119	17.369
4.0	7.382	7.360	10.143	10.242	10.063	11.751	12.937	13.599	14.076	14.548	15.036	16.037	16.642	17.314	17.580	17.970	18.853	19.056
4.5	8.033	8.063	11.039	11.178	10.983	12.756	14.090	14.800	15.308	15.801	16.369	17.450	18.120	18.833	19.114	19.556	20.571	20.746
5.0	8.709	8.783	11.952	12.131	11.920	13.775	15.258	16.014	16.552	17.064	17.712	18.872	19.606	20.359	20.656	21.147	22.284	22.439
5.5	9.408	9.523	12.885	13.104	12.875	14.811	16.444	17.245	17.812	18.341	19.070	20.307	21.105	21.896	22.206	22.748	24.000	24.140
6.0	10.132	10.283	13.838	14.098	13.850	15.865	17.649	18.494	19.090	19.635	20.445	21.760	22.620	23.449	23.772	24.363	25.724	25.853
6.5	10.880	11.063	14.812	15.113	14.845	16.939	18.875	19.764	20.387	20.947	21.838	23.231	24.153	25.020	25.355	25.994	27.459	27.583
7.0	11.654	11.864	15.807	16.150	15.861	18.033	20.122	21.055	21.705	22.278	23.252	24.722	25.707	26.610	26.958	27.644	29.209	29.330
8.0	13.27	13.53	17.86	18.29	17.96	20.28	22.68	23.70	24.41	25.00	26.15	27.77	28.88	29.85	30.23	31.01	32.76	32.89
9.0	14.99	15.28	20.01	20.52	20.14	22.62	25.34	26.44	27.20	27.82	29.13	30.91	32.15	33.19	33.58	34.46	36.39	36.53
10.0	16.80	17.12	22.24	22.85	22.41	25.04	28.09	29.28	30.08	30.72	32.21	34.15	35.51	36.62	37.04	38.00	40.10	40.28
11.0	18.71	19.04	24.56	25.26	24.77	27.55	30.93	32.21	33.06	33.72	35.38	37.49	38.97	40.15	40.59	41.65	43.91	44.12
12.0	20.72	21.05	26.97	27.76	27.21	30.15	33.87	35.23	36.14	36.80	38.66	40.93	42.54	43.79	44.24	45.39	47.80	48.06
15.0	27.28	27.57	34.73	35.81	35.06	38.46	43.26	44.88	45.94	46.63	49.06	51.85	53.85	55.29	55.80	57.23	60.07	60.51
20.0	40.00	40.06	49.35	50.98	49.83	54.01	60.78	62.84	64.14	64.84	68.34	72.04	74.74	76.49	77.08	78.98	82.48	83.32
25.0	54.85	54.49	66.02	68.24	66.62	71.60	80.56	83.08	84.63	85.30	89.98	94.67	98.11	100.16	100.82	103.21	107.31	108.67
30.0	71.74	70.78	84.65	87.52	85.36	91.17	102.52	105.52	107.32	107.92	113.89	119.65	123.90	126.24	126.95	129.83	134.51	136.48
35.0	90.60	88.86	105.17	108.75	105.98	112.64	126.58	130.09	132.12	132.64	140.01	146.92	152.03	154.64	155.39	158.79	164.03	166.68
40.0	111.3	108.7	127.5	131.9	128.4	135.9	152.7	156.7	159.0	159.4	168.3	176.4	182.4	185.3	186.1	190.0	195.8	199.2
45.0	133.9	130.1	151.6	156.8	152.6	161.0	180.7	185.3	187.9	188.1	198.6	208.0	215.0	218.1	218.9	223.4	229.7	234.0
50.0	158.3	153.2	177.5	183.5	178.5	187.9	210.7	215.9	218.7	218.7	230.9	241.7	249.7	253.1	253.9	258.9	265.8	270.9
55.0	184.4	177.9	205.0	211.9	206.1	216.4	242.6	248.3	251.4	251.2	265.2	277.4	286.5	290.2	291.0	296.5	304.0	310.0
60.0	212.2	204.1	234.2	242.0	235.3	246.6	276.3	282.6	285.9	285.6	301.4	315.2	325.4	329.2	330.0	336.2	344.2	351.1
65.0	241.6	231.8	264.9	273.8	266.1	278.3	311.7	318.7	322.2	321.6	339.5	354.8	366.2	370.3	371.0	377.8	386.4	394.3
70.0	272.6	261.0	297.2	307.2	298.4	311.7	348.9	356.5	360.3	359.5	379.4	396.3	409.0	413.3	414.0	421.4	430.5	439.5
80.0	339.4	323.6	366.4	378.6	367.7	383.0	428.4	437.4	441.7	440.2	464.6	484.9	500.2	504.9	505.5	514.1	524.4	535.6
90.0	412.2	391.7	441.5	456.0	442.7	460.2	514.5	524.8	529.6	527.5	556.6	580.7	598.7	603.7	604.3	614.1	625.7	639.1
100.0	490.9	465.0	522.2	539.3	523.5	543.2	606.8	618.6	624.0	621.0	655.2	683.2	704.3	709.6	710.0	721.2	734.0	749.8
150.0	964.8	904.6	1004.3	1036.2	1005.1	1037.0	1156.1	1176.2	1184.1	1175.7	1239.9	1290.8	1329.5	1336.1	1335.3	1353.5	1374.0	1402.4
200.0	1559.3	1450.8	1601.9	1652.7	1603.8	1648.4	1835.7	1866.0	1875.1	1859.1	1960.4	2023.4	2087.2	2107.5	2104.8	2131.1	2147.9	2202.6
250.0	2255.4	2084.3	2294.7	2367.7	2302.7	2356.2	2622.8	2672.1	2673.5	2648.0	2792.5	2868.4	2961.0	2999.2	2992.8	3033.9	3038.5	3125.1
300.0	3035.9	2793.0	3069.2	3167.1	3083.8	3146.7	3501.3	3581.6	3564.0	3527.5	3719.9	3810.5	3934.9	3992.2	3981.5	4039.2	4029.8	4150.9
350.0	3889.9	3567.3	3914.9	4040.1	3936.6	4009.2	4459.5	4576.5	4534.7	4485.9	4730.2	4837.2	4995.9	5073.4	5057.7	5133.1	5108.8	5266.7
400.0	4809.	4399.	4823.	4978.	4852.	4935.	5488.	5643.	5576.	5514.	5813.	5938.	6134.	6232.	6211.	6305.	6265.	6461.
450.0	5784.	5282.	5787.	5973.	5823.	5916.	6578.	6772.	6679.	6602.	6960.	7105.	7339.	7466.	7432.	7545.	7489.	7726.
500.0	6810.	6209.	6800.	7018.	6844.	6948.	7723.	7957.	7837.	7745.	8164.	8330.	8604.	8745.	8712.	8846.	8772.	9052.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.57	15.12	16.32	16.63	17.26	18.14	18.67	19.35	19.76	20.16	20.57	21.00	21.44	21.83	22.34	22.53	24.15	24.67
3.0	16.45	17.09	18.29	18.59	19.23	20.23	20.82	21.63	22.09	22.55	23.00	23.48	24.00	24.43	24.97	25.14	26.88	27.44
3.5	18.28	19.00	20.21	20.49	21.14	22.25	22.91	23.83	24.33	24.84	25.34	25.85	26.46	26.92	27.48	27.66	29.51	30.09
4.0	20.09	20.89	22.09	22.37	23.03	24.24	24.96	25.98	26.52	27.09	27.63	28.17	28.85	29.34	29.94	30.10	32.07	32.68
4.5	21.88	22.77	23.97	24.23	24.90	26.21	26.98	28.11	28.68	29.30	29.88	30.46	31.21	31.73	32.35	32.52	34.59	35.23
5.0	23.68	24.65	25.85	26.09	26.77	28.18	29.01	30.22	30.83	31.50	32.12	32.72	33.55	34.10	34.75	34.91	37.09	37.76
5.5	25.48	26.54	27.73	27.96	28.64	30.15	31.03	32.34	32.98	33.70	34.35	34.99	35.88	36.46	37.14	37.29	39.58	40.28
6.0	27.30	28.43	29.63	29.85	30.52	32.12	33.06	34.46	35.14	35.90	36.59	37.25	38.21	38.82	39.53	39.67	42.08	42.81
6.5	29.13	30.34	31.54	31.74	32.42	34.12	35.11	36.59	37.30	38.11	38.83	39.53	40.54	41.18	41.92	42.06	44.58	45.34
7.0	30.98	32.27	33.46	33.66	34.34	36.12	37.17	38.74	39.48	40.33	41.09	41.81	42.89	43.56	44.33	44.46	47.09	47.88
8.0	34.74	36.20	37.38	37.55	38.23	40.20	41.35	43.09	43.88	44.82	45.65	46.43	47.63	48.35	49.19	49.31	52.17	53.01
9.0	38.59	40.22	41.40	41.54	42.21	44.36	45.62	47.52	48.37	49.39	50.30	51.13	52.45	53.23	54.13	54.24	57.32	58.23
10.0	42.53	44.33	45.51	45.62	46.29	48.62	49.98	52.04	52.95	54.06	55.03	55.92	57.36	58.19	59.15	59.26	62.57	63.54
11.0	46.58	48.55	49.73	49.81	50.46	52.98	54.45	56.67	57.62	58.83	59.87	60.81	62.36	63.25	64.28	64.38	67.93	68.95
12.0	50.74	52.88	54.05	54.10	54.74	57.44	59.02	61.40	62.40	63.69	64.80	65.80	67.47	68.41	69.52	69.60	73.39	74.48
15.0	63.84	66.53	67.67	67.63	68.21	71.48	73.39	76.24	77.40	78.94	80.27	81.43	83.45	84.54	85.87	85.92	90.47	91.74
20.0	87.81	91.47	92.58	92.36	92.80	97.06	99.54	103.19	104.59	106.58	108.28	109.71	112.32	113.67	115.42	115.40	121.30	122.91
25.0	114.41	119.15	120.19	119.77	120.03	125.35	128.44	132.91	134.54	136.99	139.09	140.79	144.01	145.61	147.84	147.75	155.11	157.07
30.0	143.57	149.47	150.44	149.80	149.82	156.27	160.01	165.32	167.18	170.12	172.63	174.63	178.48	180.32	183.08	182.91	191.85	194.18
35.0	175.22	182.36	183.25	182.36	182.11	189.75	194.17	200.36	202.46	205.90	208.85	211.15	215.66	217.73	221.08	220.81	231.43	234.16
40.0	209.3	217.7	218.5	217.4	216.8	225.7	230.9	238.0	240.3	244.3	247.7	250.3	255.5	257.8	261.7	261.4	273.8	276.9
45.0	245.7	255.5	256.2	254.8	253.9	264.1	270.0	278.0	280.6	285.1	289.0	291.9	297.9	300.4	305.0	304.6	318.9	322.4
50.0	284.3	295.7	296.3	294.5	293.2	304.8	311.5	320.5	323.3	328.4	332.8	336.1	342.7	345.5	350.8	350.3	366.5	370.6
55.0	325.2	338.2	338.6	336.5	334.8	347.9	355.4	365.4	368.4	374.1	379.0	382.6	390.1	393.0	399.1	398.4	416.8	421.3
60.0	368.3	382.9	383.1	380.7	378.5	393.1	401.5	412.5	415.8	422.1	427.6	431.5	439.8	442.9	449.9	449.0	469.6	474.6
65.0	413.4	429.8	429.9	427.1	424.4	440.6	449.8	461.9	465.5	472.3	478.4	482.7	491.8	495.2	502.9	502.0	524.8	530.3
70.0	460.7	478.8	478.7	475.6	472.3	490.2	500.3	513.5	517.3	524.8	531.5	536.2	546.1	549.7	558.3	557.2	582.4	588.4
80.0	561.2	583.1	582.6	578.7	574.2	595.6	607.7	623.0	627.4	636.2	644.1	649.6	661.3	666.3	675.8	674.4	704.5	711.7
90.0	669.4	695.4	694.5	689.7	683.9	709.0	723.1	740.8	745.7	756.0	765.2	771.5	785.0	789.4	801.9	800.2	835.7	844.0
100.0	785.1	815.5	814.2	808.4	801.1	830.1	846.4	866.5	872.0	883.7	894.3	901.5	917.0	921.8	936.4	934.3	975.5	985.0
150.0	1467.	1523.	1519.	1507.	1491.	1543.	1571.	1605.	1613.	1633.	1652.	1664.	1690.	1697.	1724.	1720.	1794.	1811.
200.0	2303.	2390.	2383.	2364.	2336.	2415.	2458.	2507.	2519.	2548.	2576.	2594.	2633.	2642.	2684.	2677.	2769.	2815.
250.0	3267.	3388.	3386.	3360.	3317.	3427.	3483.	3550.	3562.	3603.	3645.	3667.	3718.	3734.	3793.	3783.	3884.	3968.
300.0	4338.	4497.	4508.	4477.	4417.	4555.	4622.	4709.	4720.	4774.	4834.	4857.	4922.	4947.	5025.	5011.	5121.	5245.
350.0	5503.	5703.	5727.	5692.	5614.	5780.	5860.	5968.	5978.	6046.	6124.	6150.	6229.	6263.	6363.	6343.	6466.	6630.
400.0	6751.	6995.	7032.	6992.	6896.	7091.	7184.	7314.	7324.	7406.	7504.	7533.	7626.	7670.	7792.	7768.	7899.	8110.
450.0	8070.	8361.	8413.	8368.	8251.	8477.	8584.	8738.	8746.	8844.	8963.	8994.	9102.	9156.	9302.	9273.	9416.	9674.
500.0	9455.	9794.	9860.	9810.	9671.	9930.	10052.	10230.	10237.	10351.	10491.	10525.	10649.	10713.	10883.	10849.	11005.	11311.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

130
52 TE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	107.2	92.5	71.8	68.4	69.2	62.2	53.6	51.0	49.4	48.1	45.1	42.3	40.1	38.9	38.4	36.9	33.1	34.4
3.0	104.2	92.3	71.7	68.4	69.4	62.7	54.3	51.9	50.3	49.2	46.1	43.4	41.3	40.0	39.6	38.1	34.5	35.6
3.5	100.7	91.1	71.0	67.8	68.8	62.6	54.3	52.0	50.6	49.6	46.5	43.8	41.8	40.6	40.1	38.8	35.4	36.3
4.0	97.3	89.3	69.9	66.8	67.9	62.1	54.0	51.8	50.5	49.6	46.6	43.9	41.9	40.8	40.3	39.0	35.9	36.6
4.5	93.9	87.2	68.6	65.7	66.8	61.3	53.4	51.3	50.1	49.3	46.3	43.7	41.8	40.7	40.3	39.0	36.1	36.6
5.0	90.60	85.05	67.25	64.42	65.60	60.35	52.69	50.73	49.53	48.82	45.90	43.39	41.53	40.47	40.09	38.84	36.15	36.53
5.5	87.53	82.87	65.85	63.13	64.33	59.35	51.90	50.02	48.89	48.25	45.40	42.95	41.15	40.13	39.78	38.56	36.05	36.31
6.0	84.64	80.72	64.46	61.82	63.04	58.32	51.06	49.27	48.19	47.62	44.82	42.44	40.70	39.72	39.39	38.21	35.86	36.02
6.5	81.92	78.64	63.09	60.54	61.77	57.27	50.20	48.49	47.46	46.96	44.21	41.89	40.20	39.26	38.95	37.81	35.60	35.68
7.0	79.38	76.63	61.75	59.28	60.52	56.22	49.34	47.70	46.72	46.26	43.57	41.31	39.68	38.77	38.47	37.38	35.30	35.30
8.0	74.77	72.86	59.20	56.87	58.12	54.19	47.64	46.12	45.23	44.87	42.28	40.13	38.59	37.75	37.49	36.45	34.60	34.48
9.0	70.69	69.42	56.83	54.63	55.87	52.25	46.01	44.60	43.79	43.49	41.00	38.95	37.49	36.72	36.48	35.51	33.84	33.63
10.0	67.08	66.30	54.64	52.55	53.78	50.43	44.47	43.16	42.40	42.16	39.76	37.81	36.42	35.71	35.49	34.57	33.07	32.78
11.0	63.85	63.47	52.62	50.63	51.85	48.73	43.02	41.79	41.09	40.90	38.58	36.71	35.39	34.72	34.53	33.66	32.29	31.95
12.0	60.96	60.88	50.75	48.86	50.06	47.15	41.66	40.50	39.85	39.70	37.46	35.67	34.41	33.78	33.61	32.79	31.53	31.14
15.0	53.81	54.35	45.94	44.27	45.42	42.99	38.08	37.09	36.56	36.49	34.46	32.86	31.74	31.23	31.10	30.39	29.39	28.93
20.0	45.33	46.38	39.86	38.46	39.51	37.62	33.42	32.63	32.21	32.23	30.46	29.11	28.16	27.77	27.68	27.11	26.39	25.87
25.0	39.41	40.68	35.37	34.16	35.13	33.58	29.90	29.24	28.90	28.96	27.39	26.20	25.37	25.07	25.01	24.53	23.97	23.46
30.0	35.03	36.39	31.92	30.84	31.74	30.44	27.14	26.57	26.29	26.38	24.96	23.90	23.16	22.92	22.88	22.46	22.01	21.52
35.0	31.63	33.03	29.17	28.20	29.04	27.92	24.92	24.42	24.18	24.28	22.98	22.02	21.35	21.16	21.13	20.77	20.39	19.92
40.0	28.92	30.33	26.92	26.04	26.83	25.84	23.09	22.64	22.44	22.54	21.35	20.47	19.85	19.69	19.67	19.35	19.02	18.58
45.0	26.71	28.10	25.05	24.24	24.98	24.10	21.55	21.15	20.97	21.08	19.96	19.15	18.58	18.44	18.44	18.14	17.86	17.44
50.0	24.85	26.23	23.46	22.71	23.41	22.62	20.24	19.87	19.71	19.83	18.78	18.02	17.49	17.38	17.37	17.11	16.85	16.46
55.0	23.28	24.63	22.10	21.40	22.06	21.34	19.11	18.76	18.62	18.74	17.76	17.05	16.55	16.45	16.45	16.20	15.97	15.60
60.0	21.93	23.25	20.91	20.25	20.88	20.22	18.12	17.80	17.67	17.79	16.86	16.19	15.72	15.63	15.64	15.41	15.20	14.85
65.0	20.75	22.05	19.87	19.25	19.85	19.24	17.24	16.95	16.83	16.95	16.06	15.43	14.98	14.91	14.92	14.71	14.51	14.18
70.0	19.71	20.99	18.95	18.35	18.93	18.36	16.47	16.19	16.08	16.20	15.36	14.75	14.33	14.26	14.27	14.08	13.90	13.68
80.0	17.98	19.19	17.38	16.84	17.37	16.88	15.14	14.90	14.81	14.92	14.15	13.60	13.21	13.16	13.17	13.00	12.84	12.65
90.0	16.57	17.74	16.10	15.61	16.10	15.66	14.06	13.83	13.76	13.87	13.15	12.65	12.29	12.25	12.26	12.11	11.96	11.70
100.0	15.41	16.54	15.03	14.58	15.04	14.64	13.15	12.94	12.88	12.99	12.32	11.85	11.51	11.48	11.50	11.36	11.22	10.98
150.0	11.70	12.65	11.56	11.21	11.57	11.30	10.17	10.02	9.98	10.08	9.57	9.21	8.95	8.94	8.96	8.86	8.76	8.60
200.0	9.67	10.61	9.70	9.40	9.63	9.48	8.53	8.37	8.40	8.50	8.06	7.94	7.67	7.61	7.54	7.44	7.52	7.26
250.0	8.49	9.34	8.54	8.28	8.47	8.37	7.53	7.31	7.42	7.51	7.13	7.02	6.79	6.65	6.68	6.57	6.66	6.43
300.0	7.68	8.46	7.74	7.50	7.68	7.59	6.83	6.58	6.74	6.83	6.48	6.37	6.17	6.05	6.08	5.98	6.06	5.86
350.0	7.08	7.82	7.16	6.93	7.10	7.02	6.32	6.09	6.24	6.32	6.00	5.90	5.71	5.61	5.63	5.54	5.62	5.43
400.0	6.631	7.325	6.709	6.499	6.667	6.585	5.929	5.720	5.857	5.935	5.632	5.538	5.361	5.266	5.291	5.207	5.277	5.108
450.0	6.276	6.939	6.367	6.157	6.309	6.242	5.622	5.428	5.555	5.630	5.344	5.253	5.085	4.998	5.022	4.944	5.010	4.850
500.0	5.991	6.629	6.073	5.882	6.029	5.966	5.374	5.194	5.312	5.385	5.112	5.023	4.864	4.782	4.806	4.732	4.794	4.642

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	32.18	30.68	30.73	30.95	30.67	28.91	28.01	26.44	25.87	25.19	24.71	24.30	23.42	23.12	22.86	22.92	21.97	21.71
3.0	33.40	31.87	31.91	32.14	31.90	30.15	29.25	27.71	27.16	26.48	25.99	25.58	24.71	24.39	24.11	24.17	23.15	22.88
3.5	34.08	32.54	32.58	32.81	32.61	30.89	29.99	28.50	27.97	27.30	26.81	26.40	25.55	25.21	24.92	24.98	23.91	23.63
4.0	34.40	32.88	32.91	33.14	32.98	31.29	30.40	28.96	28.45	27.79	27.31	26.91	26.07	25.74	25.44	25.50	24.39	24.10
4.5	34.50	32.98	33.02	33.24	33.12	31.47	30.59	29.20	28.71	28.07	27.59	27.20	26.39	26.05	25.74	25.80	24.67	24.38
5.0	34.44	32.94	32.97	33.20	33.10	31.49	30.63	29.28	28.82	28.19	27.72	27.34	26.55	26.21	25.90	25.95	24.81	24.52
5.5	34.26	32.79	32.81	33.04	32.98	31.40	30.56	29.25	28.81	28.20	27.74	27.37	26.60	26.27	25.95	26.00	24.85	24.56
6.0	34.01	32.56	32.59	32.81	32.77	31.23	30.41	29.15	28.73	28.13	27.67	27.32	26.57	26.24	25.92	25.97	24.82	24.53
6.5	33.71	32.28	32.31	32.53	32.51	31.01	30.20	28.99	28.58	28.00	27.55	27.20	26.48	26.16	25.83	25.88	24.73	24.45
7.0	33.38	31.97	32.00	32.22	32.22	30.75	29.96	28.78	28.39	27.82	27.39	27.05	26.34	26.03	25.70	25.75	24.61	24.32
8.0	32.64	31.28	31.31	31.53	31.55	30.15	29.40	28.29	27.93	27.39	26.97	26.65	25.98	25.68	25.35	25.40	24.27	23.99
9.0	31.86	30.55	30.58	30.79	30.84	29.50	28.78	27.74	27.40	26.89	26.49	26.18	25.54	25.26	24.93	24.98	23.87	23.60
10.0	31.08	29.81	29.84	30.05	30.12	28.84	28.14	27.16	26.85	26.35	25.97	25.68	25.07	24.80	24.47	24.52	23.43	23.17
11.0	30.31	29.08	29.12	29.32	29.41	28.18	27.51	26.57	26.28	25.81	25.44	25.16	24.58	24.32	23.99	24.05	22.98	22.72
12.0	29.57	28.38	28.41	28.61	28.71	27.53	26.88	25.99	25.72	25.27	24.91	24.65	24.09	23.85	23.52	23.57	22.52	22.28
15.0	27.50	26.41	26.46	26.64	26.77	25.70	25.12	24.35	24.12	23.71	23.39	23.16	22.66	22.45	22.14	22.18	21.21	20.98
20.0	24.64	23.68	23.72	23.90	24.05	23.13	22.63	21.99	21.81	21.47	21.19	20.99	20.57	20.41	20.11	20.15	19.27	19.07
25.0	22.37	21.51	21.55	21.71	21.87	21.06	20.63	20.07	19.92	19.63	19.38	19.21	18.85	18.71	18.43	18.47	17.68	17.50
30.0	20.53	19.75	19.80	19.94	20.11	19.38	18.99	18.50	18.38	18.11	17.89	17.74	17.42	17.30	17.04	17.08	16.35	16.19
35.0	19.01	18.30	18.35	18.48	18.65	17.99	17.63	17.20	17.09	16.85	16.65	16.51	16.22	16.12	15.88	15.91	15.24	15.09
40.0	17.74	17.08	17.13	17.26	17.42	16.81	16.48	16.09	15.99	15.78	15.59	15.47	15.20	15.12	14.89	14.92	14.29	14.16
45.0	16.66	16.04	16.09	16.21	16.37	15.80	15.50	15.15	15.06	14.86	14.68	14.57	14.33	14.26	14.03	14.07	13.48	13.35
50.0	15.73	15.14	15.19	15.31	15.46	14.94	14.65	14.32	14.24	14.06	13.90	13.79	13.57	13.50	13.29	13.32	12.77	12.65
55.0	14.91	14.36	14.41	14.52	14.67	14.17	13.91	13.61	13.53	13.36	13.21	13.11	12.90	12.84	12.64	12.67	12.15	12.03
60.0	14.19	13.67	13.72	13.82	13.97	13.50	13.25	12.97	12.90	12.74	12.60	12.51	12.31	12.26	12.06	12.09	11.59	11.49
65.0	13.56	13.06	13.10	13.21	13.35	12.91	12.67	12.40	12.34	12.19	12.05	11.97	11.78	11.73	11.55	11.58	11.10	11.00
70.0	12.99	12.51	12.55	12.65	12.80	12.37	12.15	11.90	11.84	11.69	11.56	11.48	11.30	11.26	11.08	11.11	10.66	10.56
80.0	12.01	11.57	11.61	11.70	11.84	11.45	11.25	11.02	10.97	10.84	10.72	10.65	10.49	10.45	10.28	10.31	9.89	9.80
90.0	11.19	10.79	10.83	10.91	11.05	10.69	10.50	10.29	10.25	10.13	10.02	9.95	9.80	9.77	9.62	9.64	9.25	9.17
100.0	10.51	10.13	10.17	10.25	10.38	10.04	9.87	9.68	9.64	9.53	9.42	9.36	9.23	9.20	9.05	9.08	8.71	8.63
150.0	8.230	7.933	7.966	8.030	8.140	7.883	7.753	7.618	7.589	7.510	7.431	7.384	7.283	7.263	7.150	7.170	6.883	6.825
200.0	6.946	6.707	6.707	6.761	6.860	6.646	6.540	6.434	6.412	6.349	6.283	6.245	6.164	6.145	6.052	6.070	5.989	5.795
250.0	6.161	5.949	5.884	5.932	6.022	5.851	5.793	5.691	5.694	5.630	5.547	5.537	5.476	5.435	5.349	5.367	5.329	5.160
300.0	5.610	5.419	5.360	5.378	5.458	5.333	5.280	5.189	5.193	5.136	5.061	5.052	4.997	4.961	4.883	4.900	4.864	4.713
350.0	5.204	5.027	4.973	4.990	5.065	4.950	4.901	4.818	4.822	4.770	4.701	4.693	4.643	4.611	4.538	4.553	4.519	4.381
400.0	4.892	4.726	4.677	4.693	4.764	4.657	4.610	4.533	4.538	4.488	4.425	4.416	4.371	4.341	4.273	4.287	4.254	4.126
450.0	4.646	4.488	4.444	4.458	4.526	4.425	4.380	4.308	4.313	4.266	4.206	4.198	4.156	4.128	4.064	4.077	4.044	3.925
500.0	4.448	4.297	4.255	4.269	4.334	4.238	4.195	4.127	4.131	4.087	4.030	4.022	3.983	3.956	3.895	3.907	3.875	3.762

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

130
TE IONS
52

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.870	5.630	7.949	7.930	7.790	9.278	10.040	10.575	10.970	11.380	11.630	12.430	12.850	13.412	13.630	13.855	14.271	14.640
3.0	6.485	6.333	8.854	8.879	8.727	10.317	11.244	11.837	12.271	12.714	13.053	13.945	14.445	15.057	15.295	15.584	16.190	16.493
3.5	7.119	7.041	9.765	9.833	9.667	11.354	12.440	13.087	13.558	14.029	14.454	15.434	16.008	16.668	16.925	17.273	18.047	18.299
4.0	7.776	7.762	10.688	10.798	10.617	12.396	13.640	14.338	14.843	15.340	15.850	16.915	17.560	18.265	18.539	18.944	19.868	20.082
4.5	8.456	8.498	11.627	11.778	11.582	13.450	14.850	15.598	16.136	16.654	17.249	18.398	19.112	19.861	20.150	20.610	21.672	21.857
5.0	9.161	9.253	12.584	12.778	12.563	14.518	16.075	16.872	17.441	17.980	18.659	19.890	20.672	21.462	21.767	22.279	23.471	23.634
5.5	9.891	10.027	13.560	13.797	13.564	15.604	17.318	18.162	18.762	19.319	20.082	21.395	22.244	23.075	23.394	23.958	25.271	25.418
6.0	10.647	10.822	14.558	14.837	14.585	16.709	18.580	19.471	20.101	20.674	21.523	22.917	23.832	24.703	25.036	25.652	27.078	27.215
6.5	11.427	11.638	15.577	15.900	15.626	17.834	19.864	20.801	21.460	22.049	22.983	24.459	25.439	26.349	26.695	27.362	28.897	29.028
7.0	12.233	12.475	16.619	16.985	16.690	18.979	21.170	22.152	22.840	23.443	24.464	26.021	27.066	28.014	28.375	29.091	30.731	30.859
8.0	13.92	14.22	18.77	19.22	18.88	21.33	23.85	24.92	25.67	26.30	27.49	29.21	30.39	31.41	31.80	32.61	34.45	34.59
9.0	15.71	16.04	21.01	21.56	21.16	23.78	26.63	27.79	28.59	29.24	30.62	32.50	33.81	34.90	35.31	36.22	38.25	38.40
10.0	17.60	17.96	23.34	23.98	23.54	26.31	29.50	30.75	31.61	32.28	33.84	35.89	37.32	38.49	38.93	39.94	42.13	42.32
11.0	19.59	19.97	25.77	26.50	26.00	28.93	32.47	33.82	34.72	35.41	37.16	39.38	40.95	42.19	42.64	43.75	46.11	46.34
12.0	21.67	22.06	28.29	29.12	28.55	31.65	35.55	36.98	37.93	38.63	40.58	42.97	44.67	45.98	46.46	47.66	50.19	50.46
15.0	28.50	28.85	36.37	37.52	36.74	40.32	45.35	47.05	48.16	48.89	51.44	54.37	56.48	58.00	58.53	60.02	63.00	63.46
20.0	41.72	41.85	51.61	53.32	52.13	56.53	63.61	65.78	67.15	67.89	71.55	75.43	78.27	80.11	80.73	82.71	86.38	87.26
25.0	57.14	56.85	68.96	71.29	69.61	74.85	84.22	86.86	88.49	89.20	94.09	99.01	102.63	104.78	105.47	107.96	112.26	113.68
30.0	74.67	73.78	88.34	91.35	89.11	95.21	107.07	110.22	112.10	112.75	118.98	125.02	129.48	131.93	132.67	135.69	140.58	142.64
35.0	94.23	92.55	109.67	113.42	110.54	117.54	132.09	135.76	137.90	138.46	146.15	153.38	158.74	161.48	162.26	165.81	171.29	174.07
40.0	115.7	113.1	132.9	137.4	133.9	141.8	159.2	163.4	165.8	166.3	175.5	184.0	190.3	193.4	194.2	198.3	204.3	207.9
45.0	139.2	135.4	157.9	163.3	159.0	167.8	188.4	193.2	195.8	196.1	207.0	216.9	224.2	227.5	228.3	233.0	239.6	244.0
50.0	164.4	159.4	184.8	191.0	185.9	195.7	219.5	224.9	227.8	227.9	240.6	251.9	260.3	263.8	264.7	269.9	277.1	282.4
55.0	191.4	184.9	213.3	220.5	214.5	225.3	252.6	258.6	261.8	261.7	276.2	289.0	298.5	302.3	303.1	309.0	316.7	323.0
60.0	220.2	212.1	243.6	251.8	244.8	256.6	287.5	294.2	297.6	297.3	313.8	328.1	338.8	342.8	343.7	350.1	358.5	365.7
65.0	250.7	240.8	275.5	284.7	276.7	289.6	324.3	331.6	335.3	334.7	353.3	369.3	381.2	385.4	386.2	393.3	402.2	410.5
70.0	282.9	271.1	309.0	319.3	310.3	324.2	362.9	370.9	374.8	374.0	394.7	412.4	425.6	430.0	430.8	438.5	448.0	457.4
80.0	352.0	335.9	380.7	393.4	382.1	398.1	445.4	454.7	459.2	457.7	483.0	504.3	520.2	525.1	525.7	534.7	545.5	557.1
90.0	427.4	406.4	458.5	473.6	459.9	478.1	534.5	545.3	550.4	548.1	578.4	603.5	622.3	627.6	628.1	638.4	650.5	664.4
100.0	508.8	482.4	542.1	559.9	543.5	564.1	630.2	642.5	648.1	645.1	680.6	709.8	731.7	737.3	737.7	749.3	762.8	779.2
150.0	999.2	937.5	1041.2	1074.4	1042.2	1075.5	1199.0	1219.9	1228.1	1219.6	1286.1	1339.0	1379.2	1386.1	1385.4	1404.3	1425.6	1455.1
200.0	1614.2	1502.7	1659.6	1712.3	1661.7	1708.1	1902.2	1933.8	1943.2	1926.7	2031.8	2097.1	2163.4	2184.4	2181.7	2209.1	2226.6	2283.3
250.0	2334.1	2158.1	2376.1	2451.8	2384.5	2440.3	2716.4	2767.6	2769.1	2742.8	2892.5	2971.3	3067.2	3107.0	3100.4	3143.0	3147.9	3237.6
300.0	3141.1	2891.0	3177.0	3278.5	3192.3	3257.8	3624.9	3708.2	3694.9	3652.4	3851.6	3945.6	4074.5	4133.9	4122.9	4182.7	4173.1	4298.6
350.0	4024.0	3691.7	4051.5	4181.1	4074.1	4149.6	4615.7	4736.9	4693.8	4643.4	4896.3	5007.2	5171.6	5251.9	5235.8	5313.9	5288.9	5452.3
400.0	4974.	4552.	4991.	5151.	5021.	5107.	5679.	5840.	5770.	5706.	6016.	6146.	6348.	6450.	6428.	6525.	6484.	6688.
450.0	5982.	5464.	5987.	6179.	6025.	6121.	6806.	7007.	6911.	6831.	7202.	7352.	7594.	7718.	7690.	7807.	7749.	7995.
500.0	7043.	6423.	7034.	7260.	7079.	7187.	7989.	8232.	8108.	8013.	8446.	8618.	8902.	9048.	9014.	9152.	9076.	9365.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.37	15.95	17.22	17.55	18.20	19.13	19.69	20.41	20.84	21.26	21.69	22.14	22.60	23.01	23.55	23.75	25.45	26.00
3.0	17.35	18.02	19.29	19.60	20.27	21.33	21.96	22.81	23.29	23.77	24.25	24.75	25.29	25.74	26.31	26.50	28.33	28.91
3.5	19.27	20.04	21.30	21.60	22.29	23.46	24.15	25.12	25.64	26.19	26.71	27.24	27.88	28.36	28.96	29.14	31.09	31.70
4.0	21.17	22.02	23.29	23.57	24.27	25.55	26.30	27.38	27.95	28.54	29.11	29.68	30.39	30.91	31.54	31.72	33.78	34.43
4.5	23.06	24.00	25.26	25.53	26.23	27.62	28.43	29.61	30.22	30.87	31.48	32.08	32.87	33.42	34.08	34.25	36.43	37.11
5.0	24.94	25.97	27.23	27.49	28.20	29.68	30.55	31.84	32.48	33.18	33.83	34.46	35.33	35.90	36.60	36.76	39.06	39.76
5.5	26.83	27.94	29.20	29.45	30.16	31.75	32.68	34.06	34.73	35.49	36.17	36.84	37.77	38.38	39.10	39.26	41.67	42.41
6.0	28.74	29.93	31.19	31.42	32.14	33.82	34.81	36.28	36.99	37.79	38.52	39.22	40.22	40.86	41.61	41.76	44.29	45.06
6.5	30.66	31.94	33.19	33.41	34.13	35.91	36.95	38.52	39.26	40.11	40.87	41.60	42.67	43.34	44.12	44.27	46.91	47.71
7.0	32.59	33.96	35.22	35.42	36.14	38.02	39.11	40.77	41.54	42.44	43.24	44.00	45.13	45.83	46.64	46.79	49.55	50.38
8.0	36.53	38.07	39.32	39.50	40.22	42.28	43.49	45.32	46.16	47.15	48.02	48.84	50.09	50.85	51.74	51.87	54.87	55.76
9.0	40.56	42.28	43.52	43.67	44.38	46.64	47.96	49.96	50.86	51.94	52.88	53.76	55.14	55.96	56.91	57.03	60.27	61.22
10.0	44.69	46.58	47.83	47.94	48.65	51.10	52.53	54.70	55.65	56.82	57.84	58.77	60.28	61.15	62.17	62.28	65.76	66.78
11.0	48.93	51.00	52.24	52.32	53.02	55.66	57.20	59.54	60.54	61.80	62.90	63.88	65.51	66.44	67.53	67.63	71.37	72.44
12.0	53.27	55.53	56.76	56.81	57.49	60.33	61.98	64.49	65.54	66.89	68.06	69.11	70.86	71.84	73.01	73.09	77.08	78.22
15.0	66.96	69.78	70.99	70.95	71.57	75.00	77.00	79.99	81.21	82.83	84.22	85.44	87.55	88.70	90.10	90.15	94.93	96.27
20.0	91.97	95.81	96.98	96.75	97.23	101.69	104.29	108.12	109.59	111.68	113.46	114.95	117.68	119.10	120.95	120.93	127.11	128.80
25.0	119.69	124.65	125.77	125.33	125.61	131.18	134.41	139.10	140.81	143.38	145.57	147.36	150.73	152.40	154.75	154.65	162.36	164.42
30.0	150.06	156.23	157.27	156.60	156.64	163.38	167.29	172.86	174.81	177.89	180.52	182.61	186.64	188.56	191.46	191.28	200.63	203.08
35.0	182.99	190.46	191.41	190.49	190.24	198.23	202.85	209.33	211.53	215.13	218.22	220.62	225.34	227.50	231.00	230.74	241.84	244.70
40.0	218.4	227.3	228.1	226.9	226.3	235.6	241.0	248.4	250.9	255.0	258.6	261.3	266.8	269.2	273.3	272.9	285.9	289.2
45.0	256.2	266.6	267.3	265.8	264.9	276.5	281.7	290.1	292.8	297.5	301.6	304.6	310.8	313.5	318.3	317.8	332.8	336.5
50.0	296.4	308.3	308.9	307.1	305.7	317.9	324.9	334.2	337.2	342.5	347.1	350.5	357.5	360.3	365.9	365.3	382.3	386.5
55.0	338.9	352.4	352.8	350.7	348.9	362.6	370.4	380.8	384.0	389.9	395.1	398.9	406.6	409.7	416.1	415.4	434.5	439.3
60.0	383.6	398.8	399.1	396.6	394.3	409.6	418.3	429.8	433.3	439.8	445.5	449.6	458.2	461.5	468.8	467.9	489.3	494.6
65.0	430.5	447.5	447.6	444.7	441.9	458.8	468.5	481.0	484.8	492.0	498.3	502.8	512.2	515.8	523.9	522.9	546.7	552.4
70.0	479.5	498.3	498.3	495.0	491.7	510.3	520.9	534.6	538.6	546.4	553.4	558.3	568.6	572.3	581.3	580.2	606.4	612.7
80.0	583.7	606.5	606.1	602.0	597.4	619.6	632.2	648.2	652.8	662.0	670.2	676.0	688.1	692.3	703.2	701.8	733.2	740.6
90.0	695.9	723.0	722.1	717.1	711.1	737.2	751.9	770.4	775.5	786.2	795.8	802.4	816.4	821.0	834.1	832.2	869.2	877.8
100.0	815.9	847.5	846.1	840.1	832.7	862.8	879.8	900.7	906.4	918.6	929.7	937.1	953.2	958.2	973.5	971.3	1014.1	1024.0
150.0	1522.	1580.	1576.	1564.	1547.	1601.	1631.	1666.	1674.	1695.	1714.	1727.	1754.	1762.	1790.	1785.	1862.	1879.
200.0	2388.	2477.	2470.	2451.	2422.	2504.	2549.	2599.	2611.	2641.	2671.	2689.	2730.	2740.	2783.	2776.	2871.	2919.
250.0	3364.	3510.	3509.	3481.	3437.	3551.	3609.	3678.	3691.	3733.	3777.	3799.	3853.	3870.	3931.	3920.	4025.	4112.
300.0	4492.	4657.	4669.	4636.	4575.	4717.	4787.	4877.	4889.	4944.	5006.	5031.	5098.	5124.	5205.	5190.	5305.	5433.
350.0	5697.	5904.	5930.	5893.	5813.	5984.	6067.	6179.	6190.	6260.	6341.	6368.	6449.	6485.	6588.	6568.	6693.	6865.
400.0	6987.	7240.	7279.	7237.	7137.	7339.	7436.	7571.	7581.	7666.	7768.	7797.	7894.	7939.	8065.	8041.	8177.	8396.
450.0	8351.	8652.	8706.	8660.	8538.	8772.	8883.	9043.	9051.	9153.	9276.	9308.	9420.	9476.	9627.	9597.	9745.	10012.
500.0	9782.	10133.	10202.	10150.	10007.	10275.	10401.	10585.	10592.	10711.	10855.	10891.	11019.	11086.	11261.	11226.	11388.	11705.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{127}_{53}$I IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	109.9	94.3	73.3	69.9	70.7	63.5	54.7	52.1	50.5	49.1	46.0	43.2	41.0	39.7	39.2	37.7	33.7	35.1
3.0	106.9	94.3	73.3	70.0	70.9	64.1	55.5	53.0	51.4	50.2	47.1	44.3	42.1	40.9	40.4	38.9	35.3	36.4
3.5	103.4	93.2	72.6	69.4	70.4	64.0	55.5	53.2	51.7	50.7	47.6	44.8	42.7	41.5	41.0	39.6	36.2	37.1
4.0	99.9	91.4	71.6	68.4	69.5	63.5	55.2	53.0	51.6	50.7	47.6	44.9	42.9	41.7	41.2	39.9	36.7	37.4
4.5	96.5	89.4	70.3	67.3	68.4	62.7	54.7	52.5	51.2	50.4	47.4	44.7	42.8	41.6	41.2	39.9	36.9	37.5
5.0	93.18	87.22	68.92	66.02	67.22	61.82	53.96	51.94	50.71	49.98	46.99	44.42	42.51	41.41	41.03	39.74	36.99	37.38
5.5	90.05	85.03	67.52	64.72	65.94	60.82	53.17	51.24	50.08	49.42	46.49	43.98	42.14	41.09	40.72	39.48	36.90	37.17
6.0	87.11	82.87	66.12	63.41	64.65	59.78	52.33	50.49	49.38	48.79	45.92	43.48	41.69	40.68	40.34	39.13	36.72	36.89
6.5	84.34	80.77	64.73	62.11	63.36	58.72	51.47	49.71	48.65	48.13	45.31	42.93	41.20	40.23	39.90	38.74	36.47	36.55
7.0	81.75	78.73	63.38	60.84	62.10	57.67	50.60	48.91	47.91	47.44	44.67	42.35	40.67	39.74	39.43	38.30	36.17	36.17
8.0	77.04	74.91	60.80	58.40	59.67	55.61	48.89	47.33	46.41	46.03	43.37	41.16	39.58	38.72	38.44	37.38	35.48	35.35
9.0	72.87	71.42	58.39	56.12	57.39	53.65	47.24	45.79	44.95	44.64	42.08	39.98	38.47	37.68	37.43	36.43	34.72	34.50
10.0	69.17	68.25	56.17	54.02	55.28	51.81	45.68	44.32	43.55	43.30	40.83	38.82	37.39	36.65	36.43	35.49	33.94	33.64
11.0	65.87	65.35	54.11	52.06	53.31	50.08	44.21	42.94	42.22	42.02	39.63	37.71	36.35	35.66	35.46	34.57	33.16	32.80
12.0	62.90	62.71	52.21	50.26	51.49	48.47	42.83	41.63	40.96	40.80	38.50	36.66	35.35	34.71	34.53	33.68	32.39	31.99
15.0	55.56	56.04	47.30	45.58	46.76	44.24	39.19	38.17	37.61	37.54	35.45	33.80	32.65	32.12	31.98	31.25	30.23	29.75
20.0	46.85	47.87	41.09	39.64	40.73	38.76	34.43	33.61	33.18	33.20	31.38	29.98	29.00	28.60	28.51	27.91	27.17	26.64
25.0	40.76	42.02	36.50	35.24	36.24	34.63	30.83	30.15	29.80	29.86	28.24	27.01	26.16	25.84	25.78	25.28	24.71	24.18
30.0	36.24	37.61	32.95	31.84	32.77	31.42	28.01	27.42	27.13	27.22	25.75	24.66	23.89	23.64	23.60	23.17	22.70	22.19
35.0	32.74	34.16	30.13	29.13	30.00	28.83	25.73	25.21	24.97	25.07	23.73	22.74	22.04	21.84	21.81	21.43	21.04	20.56
40.0	29.95	31.38	27.83	26.91	27.73	26.70	23.85	23.39	23.18	23.29	22.05	21.14	20.50	20.33	20.32	19.98	19.65	19.19
45.0	27.66	29.08	25.90	25.06	25.83	24.91	22.27	21.86	21.67	21.78	20.63	19.79	19.20	19.06	19.05	18.75	18.45	18.02
50.0	25.75	27.15	24.27	23.49	24.21	23.39	20.93	20.54	20.38	20.50	19.42	18.63	18.08	17.96	17.96	17.68	17.42	17.01
55.0	24.12	25.50	22.87	22.14	22.82	22.07	19.76	19.41	19.26	19.38	18.36	17.63	17.11	17.01	17.01	16.75	16.52	16.13
60.0	22.72	24.08	21.64	20.96	21.61	20.92	18.74	18.41	18.28	18.40	17.44	16.75	16.26	16.17	16.17	15.94	15.72	15.35
65.0	21.51	22.84	20.57	19.92	20.55	19.91	17.84	17.54	17.42	17.54	16.62	15.96	15.50	15.42	15.43	15.21	15.01	14.67
70.0	20.44	21.74	19.62	19.00	19.60	19.01	17.04	16.76	16.65	16.77	15.89	15.27	14.83	14.76	14.77	14.57	14.38	14.05
80.0	18.64	19.89	18.00	17.45	18.00	17.48	15.68	15.42	15.33	15.45	14.65	14.08	13.68	13.62	13.64	13.46	13.29	12.99
90.0	17.19	18.39	16.68	16.17	16.68	16.22	14.56	14.33	14.25	14.37	13.62	13.10	12.73	12.68	12.70	12.54	12.39	12.12
100.0	15.99	17.14	15.58	15.11	15.58	15.17	13.62	13.41	13.34	13.46	12.76	12.27	11.93	11.89	11.91	11.77	11.62	11.38
150.0	12.14	13.12	11.99	11.63	12.00	11.72	10.54	10.39	10.35	10.45	9.92	9.55	9.28	9.27	9.29	9.19	9.08	8.92
200.0	10.04	11.01	10.07	9.75	10.00	9.84	8.85	8.69	8.72	8.82	8.36	8.23	7.96	7.80	7.83	7.72	7.80	7.53
250.0	8.82	9.69	8.87	8.59	8.79	8.69	7.81	7.69	7.70	7.80	7.40	7.28	7.04	6.90	6.93	6.82	6.91	6.68
300.0	7.97	8.78	8.04	7.79	7.97	7.88	7.09	6.83	7.00	7.09	6.72	6.62	6.40	6.28	6.31	6.21	6.29	6.08
350.0	7.36	8.12	7.43	7.20	7.37	7.29	6.56	6.32	6.48	6.56	6.23	6.13	5.93	5.82	5.85	5.76	5.83	5.64
400.0	6.886	7.606	6.967	6.749	6.913	6.838	6.157	5.939	6.082	6.163	5.848	5.751	5.567	5.468	5.494	5.407	5.480	5.304
450.0	6.518	7.205	6.602	6.395	6.552	6.482	5.838	5.637	5.769	5.847	5.549	5.456	5.281	5.190	5.216	5.134	5.203	5.037
500.0	6.222	6.883	6.308	6.109	6.262	6.196	5.581	5.394	5.517	5.593	5.309	5.216	5.051	4.967	4.991	4.914	4.979	4.821

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	32.83	31.30	31.34	31.57	31.28	29.48	28.57	26.97	26.39	25.69	25.20	24.78	23.88	23.57	23.32	23.37	22.40	22.14
3.0	34.10	32.54	32.58	32.80	32.56	30.78	29.85	28.29	27.72	27.03	26.53	26.11	25.22	24.89	24.61	24.67	23.62	23.35
3.5	34.81	33.24	33.28	33.51	33.31	31.55	30.63	29.10	28.56	27.88	27.38	26.96	26.09	25.75	25.45	25.51	24.41	24.13
4.0	35.17	33.60	33.63	33.87	33.71	31.98	31.07	29.59	29.08	28.40	27.90	27.50	26.64	26.30	25.99	26.05	24.92	24.63
4.5	35.28	33.73	33.76	33.99	33.87	32.17	31.28	29.85	29.36	28.70	28.21	27.81	26.98	26.63	26.32	26.38	25.22	24.92
5.0	35.23	33.70	33.73	33.96	33.87	32.21	31.33	29.95	29.48	28.83	28.35	27.97	27.15	26.81	26.49	26.55	25.38	25.08
5.5	35.07	33.56	33.59	33.82	33.75	32.13	31.27	29.94	29.49	28.85	28.38	28.01	27.22	26.88	26.55	26.61	25.43	25.13
6.0	34.83	33.34	33.37	33.60	33.55	31.97	31.13	29.84	29.41	28.79	28.33	27.96	27.20	26.86	26.53	26.59	25.41	25.11
6.5	34.53	33.07	33.09	33.32	33.30	31.76	30.93	29.68	29.27	28.67	28.21	27.86	27.11	26.78	26.45	26.50	25.33	25.03
7.0	34.20	32.76	32.78	33.01	33.01	31.50	30.89	29.48	29.09	28.50	28.05	27.71	26.98	26.66	26.32	26.38	25.20	24.92
8.0	33.46	32.07	32.10	32.32	32.35	30.91	30.13	29.00	28.63	28.07	27.64	27.32	26.63	26.32	25.98	26.03	24.87	24.59
9.0	32.69	31.34	31.37	31.58	31.64	30.26	29.52	28.45	28.11	27.57	27.16	26.85	26.19	25.90	25.56	25.61	24.47	24.20
10.0	31.90	30.59	30.63	30.84	30.91	29.59	28.88	27.87	27.55	27.04	26.64	26.35	25.72	25.44	25.10	25.16	24.04	23.77
11.0	31.13	29.86	29.89	30.10	30.19	28.93	28.24	27.28	26.98	26.49	26.11	25.83	25.23	24.97	24.63	24.68	23.58	23.32
12.0	30.37	29.15	29.18	29.38	29.49	28.27	27.61	26.69	26.41	25.95	25.58	25.31	24.74	24.48	24.15	24.20	23.13	22.87
15.0	28.28	27.16	27.19	27.39	27.52	26.42	25.83	25.03	24.79	24.38	24.04	23.80	23.30	23.08	22.75	22.80	21.80	21.56
20.0	25.37	24.38	24.42	24.60	24.75	23.81	23.30	22.63	22.45	22.09	21.81	21.60	21.17	21.00	20.69	20.74	19.84	19.63
25.0	23.05	22.16	22.21	22.37	22.54	21.70	21.25	20.68	20.53	20.22	19.97	19.79	19.42	19.28	18.99	19.03	18.21	18.02
30.0	21.17	20.37	20.42	20.57	20.73	19.99	19.58	19.08	18.95	18.68	18.45	18.29	17.96	17.84	17.57	17.61	16.86	16.69
35.0	19.62	18.88	18.93	19.07	19.24	18.56	18.19	17.74	17.63	17.38	17.17	17.04	16.74	16.64	16.38	16.42	15.72	15.57
40.0	18.32	17.63	17.68	17.82	17.98	17.36	17.02	16.61	16.51	16.29	16.09	15.97	15.69	15.61	15.37	15.40	14.75	14.61
45.0	17.21	16.57	16.62	16.75	16.91	16.33	16.01	15.64	15.55	15.35	15.17	15.05	14.80	14.72	14.49	14.53	13.92	13.79
50.0	16.25	15.65	15.70	15.82	15.98	15.43	15.14	14.80	14.72	14.53	14.36	14.25	14.02	13.95	13.73	13.77	13.19	13.07
55.0	15.42	14.85	14.89	15.01	15.17	14.65	14.38	14.06	13.99	13.81	13.65	13.55	13.33	13.27	13.06	13.10	12.55	12.44
60.0	14.68	14.14	14.18	14.29	14.46	13.96	13.71	13.41	13.34	13.17	13.02	12.93	12.72	12.67	12.47	12.50	11.99	11.88
65.0	14.02	13.51	13.55	13.66	13.81	13.35	13.11	12.83	12.76	12.61	12.47	12.38	12.18	12.13	11.94	11.97	11.48	11.38
70.0	13.44	12.94	12.99	13.09	13.24	12.80	12.57	12.31	12.25	12.10	11.96	11.88	11.69	11.65	11.47	11.50	11.02	10.92
80.0	12.43	11.97	12.02	12.11	12.26	11.85	11.64	11.41	11.35	11.22	11.10	11.02	10.85	10.82	10.64	10.67	10.24	10.15
90.0	11.59	11.17	11.21	11.30	11.44	11.07	10.87	10.66	10.61	10.49	10.37	10.30	10.15	10.12	9.96	9.98	9.58	9.49
100.0	10.89	10.49	10.53	10.62	10.76	10.40	10.22	10.02	9.98	9.87	9.76	9.70	9.55	9.53	9.37	9.40	9.02	8.94
150.0	8.534	8.226	8.260	8.327	8.441	8.174	8.039	7.898	7.869	7.787	7.704	7.656	7.551	7.530	7.413	7.434	7.136	7.076
200.0	7.207	6.959	6.958	7.016	7.117	6.895	6.785	6.675	6.652	6.587	6.518	6.479	6.394	6.375	6.278	6.297	6.214	6.012
250.0	6.394	6.175	6.106	6.156	6.250	6.072	6.012	5.906	5.909	5.843	5.756	5.746	5.683	5.640	5.551	5.570	5.530	5.355
300.0	5.824	5.625	5.564	5.583	5.666	5.536	5.481	5.387	5.391	5.331	5.253	5.244	5.188	5.150	5.069	5.086	5.049	4.892
350.0	5.403	5.219	5.164	5.181	5.259	5.140	5.089	5.003	5.007	4.952	4.881	4.872	4.821	4.787	4.712	4.728	4.692	4.549
400.0	5.080	4.907	4.857	4.873	4.947	4.835	4.787	4.707	4.712	4.661	4.594	4.586	4.539	4.508	4.437	4.452	4.417	4.285
450.0	4.825	4.661	4.614	4.630	4.700	4.595	4.549	4.474	4.479	4.430	4.368	4.360	4.316	4.287	4.220	4.234	4.200	4.076
500.0	4.619	4.462	4.419	4.434	4.501	4.401	4.356	4.286	4.290	4.244	4.185	4.177	4.136	4.108	4.045	4.058	4.024	3.907

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{127}_{53}$I IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.650	5.410	7.642	7.620	7.480	8.907	9.640	10.150	10.530	10.930	11.170	11.940	12.340	12.885	13.100	13.321	13.725	14.080
3.0	6.236	6.082	8.508	8.527	8.376	9.901	10.791	11.367	11.775	12.206	12.531	13.390	13.866	14.460	14.694	14.976	15.562	15.854
3.5	6.839	6.759	9.377	9.438	9.273	10.891	11.934	12.562	13.005	13.464	13.871	14.814	15.361	16.000	16.252	16.592	17.338	17.682
4.0	7.464	7.447	10.258	10.359	10.180	11.887	13.080	13.748	14.233	14.716	15.205	16.229	16.845	17.527	17.795	18.189	19.079	19.286
4.5	8.111	8.149	11.153	11.294	11.101	12.893	14.236	14.951	15.467	15.971	16.541	17.645	18.327	19.051	19.335	19.780	20.803	20.982
5.0	8.780	8.868	12.065	12.247	12.037	13.912	15.405	16.166	16.713	17.236	17.886	19.069	19.816	20.580	20.878	21.374	22.520	22.679
5.5	9.474	9.606	12.996	13.218	12.990	14.948	16.590	17.397	17.972	18.514	19.245	20.505	21.316	22.119	22.431	22.977	24.238	24.382
6.0	10.191	10.362	13.947	14.210	13.963	16.001	17.794	18.645	19.249	19.807	20.619	21.957	22.831	23.672	23.998	24.593	25.963	26.097
6.5	10.932	11.138	14.917	15.221	14.955	17.073	19.017	19.912	20.545	21.117	22.011	23.427	24.363	25.241	25.580	26.223	27.698	27.826
7.0	11.697	11.935	15.909	16.255	15.967	18.164	20.261	21.200	21.860	22.446	23.422	24.916	25.914	26.829	27.181	27.872	29.446	29.572
8.0	13.30	13.59	17.95	18.39	18.05	20.41	22.81	23.84	24.55	25.16	26.31	27.96	29.08	30.07	30.44	31.23	32.99	33.12
9.0	14.99	15.33	20.09	20.60	20.22	22.73	25.46	26.57	27.33	27.97	29.28	31.09	32.33	33.39	33.79	34.67	36.61	36.76
10.0	16.78	17.14	22.30	22.91	22.48	25.14	28.19	29.39	30.21	30.85	32.34	34.31	35.68	36.81	37.23	38.20	40.31	40.49
11.0	18.67	19.05	24.61	25.31	24.82	27.63	31.02	32.30	33.17	33.83	35.50	37.63	39.13	40.32	40.76	41.83	44.09	44.31
12.0	20.64	21.03	27.00	27.79	27.24	30.21	33.94	35.30	36.22	36.90	38.75	41.05	42.67	43.93	44.39	45.55	47.97	48.23
15.0	27.10	27.47	34.68	35.76	35.02	38.45	43.25	44.87	45.94	46.64	49.08	51.88	53.89	55.35	55.87	57.30	60.15	60.59
20.0	39.60	39.78	49.12	50.74	49.61	53.83	60.58	62.64	63.95	64.67	68.16	71.87	74.57	76.34	76.94	78.84	82.34	83.18
25.0	54.17	53.97	65.56	67.77	66.18	71.19	80.10	82.63	84.18	84.87	89.52	94.22	97.67	99.74	100.40	102.78	106.88	108.24
30.0	70.73	69.97	83.90	86.76	84.63	90.47	101.74	104.74	106.54	107.18	113.10	118.86	123.10	125.46	126.17	129.05	133.72	135.68
35.0	89.20	87.72	104.07	107.63	104.91	111.60	125.42	128.92	130.97	131.51	138.82	145.71	150.80	153.43	154.19	157.57	162.80	165.44
40.0	109.5	107.1	126.0	130.3	126.9	134.5	151.1	155.1	157.4	157.8	166.6	174.7	180.7	183.6	184.4	188.3	194.1	197.4
45.0	131.6	128.2	149.7	154.8	150.7	159.1	178.6	183.2	185.7	186.0	196.4	205.8	212.7	215.9	216.7	221.1	227.4	231.6
50.0	155.4	150.8	175.0	181.0	176.1	185.5	208.1	213.2	216.0	216.1	228.1	238.9	246.8	250.2	251.0	256.0	262.9	267.9
55.0	180.9	174.9	202.0	208.9	203.1	213.4	239.3	245.0	248.0	248.0	261.8	273.9	282.9	286.6	287.4	292.9	300.3	306.3
60.0	208.0	200.6	230.6	238.3	231.7	243.0	272.3	278.6	281.9	281.6	297.3	310.9	321.0	324.9	325.7	331.8	339.7	346.6
65.0	236.8	227.7	260.7	269.4	261.9	274.1	307.1	314.0	317.5	317.0	334.6	349.7	361.0	365.1	365.9	372.6	381.1	389.0
70.0	267.1	256.2	292.3	302.1	293.5	306.8	343.5	351.0	354.8	354.0	373.7	390.4	402.9	407.2	408.0	415.3	424.3	433.2
80.0	332.2	317.3	360.0	371.9	361.2	376.5	421.3	430.1	434.4	433.0	457.0	477.1	492.2	496.9	497.6	506.1	516.3	527.3
90.0	403.3	383.8	433.3	447.6	434.6	452.0	505.4	515.6	520.4	518.3	547.0	570.7	588.6	593.6	594.2	603.9	615.4	628.6
100.0	480.0	455.4	512.2	528.9	513.4	533.1	595.6	607.3	612.6	609.8	643.4	671.0	691.7	697.1	697.5	708.5	721.3	736.8
150.0	941.9	884.2	982.4	1013.7	983.3	1014.9	1131.5	1151.3	1159.2	1151.1	1214.0	1264.0	1302.0	1308.6	1307.9	1325.8	1346.0	1373.9
200.0	1520.5	1416.3	1564.6	1614.3	1566.7	1610.7	1793.8	1823.6	1832.6	1817.1	1916.2	1978.0	2040.4	2060.4	2057.9	2083.8	2100.4	2153.9
250.0	2198.0	2033.2	2239.0	2310.4	2247.0	2299.9	2560.2	2608.5	2610.0	2585.3	2726.5	2800.9	2893.3	2928.9	2922.8	2963.0	2967.7	3052.3
300.0	2957.6	2723.1	2992.7	3088.3	3007.2	3069.2	3415.2	3493.6	3476.7	3441.3	3629.0	3717.8	3839.3	3895.4	3885.1	3941.5	3932.6	4050.8
350.0	3788.0	3476.5	3815.4	3937.5	3836.8	3908.3	4347.4	4461.6	4421.1	4373.8	4612.0	4716.7	4871.6	4947.3	4932.3	5005.9	4982.5	5136.5
400.0	4681.	4286.	4699.	4850.	4727.	4809.	5348.	5499.	5434.	5378.	5665.	5788.	5978.	6074.	6054.	6146.	6107.	6299.
450.0	5630.	5144.	5636.	5817.	5672.	5763.	6408.	6597.	6507.	6432.	6781.	6922.	7150.	7267.	7241.	7352.	7299.	7528.
500.0	6628.	6047.	6621.	6834.	6664.	6766.	7521.	7750.	7633.	7543.	7952.	8114.	8383.	8519.	8486.	8627.	8546.	8832.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.78	15.33	16.56	16.87	17.50	18.39	18.93	19.62	20.03	20.44	20.85	21.29	21.73	22.13	22.65	22.84	24.48	25.00
3.0	16.67	17.32	18.54	18.84	19.49	20.50	21.10	21.92	22.38	22.84	23.30	23.78	24.31	24.75	25.30	25.48	27.23	27.79
3.5	18.52	19.25	20.47	20.75	21.41	22.53	23.20	24.13	24.63	25.15	25.65	26.17	26.78	27.25	27.83	28.00	29.87	30.46
4.0	20.33	21.15	22.36	22.64	23.31	24.53	25.25	26.29	26.83	27.41	27.95	28.50	29.19	29.69	30.30	30.47	32.45	33.06
4.5	22.13	23.03	24.25	24.51	25.18	26.51	27.29	28.42	29.00	29.63	30.21	30.80	31.56	32.09	32.72	32.89	34.98	35.62
5.0	23.93	24.91	26.13	26.38	27.06	28.48	29.32	30.55	31.16	31.84	32.46	33.07	33.90	34.46	35.13	35.29	37.49	38.16
5.5	25.74	26.80	28.01	28.25	28.94	30.45	31.35	32.67	33.32	34.04	34.70	35.34	36.24	36.83	37.52	37.67	39.99	40.69
6.0	27.55	28.70	29.91	30.13	30.82	32.44	33.38	34.79	35.47	36.24	36.93	37.61	38.57	39.19	39.91	40.06	42.48	43.22
6.5	29.39	30.61	31.82	32.03	32.72	34.43	35.43	36.92	37.64	38.45	39.18	39.88	40.91	41.56	42.31	42.45	44.99	45.75
7.0	31.23	32.54	33.75	33.95	34.64	36.44	37.49	39.07	39.81	40.67	41.44	42.17	43.26	43.93	44.72	44.85	47.50	48.29
8.0	34.99	36.46	37.66	37.83	38.52	40.50	41.66	43.41	44.21	45.16	46.00	46.78	47.99	48.73	49.57	49.70	52.57	53.42
9.0	38.83	40.47	41.67	41.81	42.49	44.66	45.92	47.83	48.69	49.72	50.63	51.47	52.80	53.59	54.50	54.62	57.72	58.63
10.0	42.76	44.57	45.76	45.88	46.55	48.90	50.27	52.34	53.25	54.37	55.35	56.25	57.69	58.54	59.51	59.62	62.95	63.92
11.0	46.79	48.77	49.96	50.05	50.71	53.24	54.72	56.95	57.91	59.12	60.17	61.12	62.68	63.57	64.62	64.72	68.29	69.32
12.0	50.92	53.07	54.26	54.32	54.97	57.68	59.27	61.66	62.67	63.96	65.08	66.08	67.76	68.71	69.83	69.91	73.72	74.82
15.0	63.93	66.62	67.79	67.75	68.35	71.63	73.54	76.40	77.56	79.12	80.45	81.61	83.64	84.74	86.08	86.13	90.70	91.98
20.0	87.67	91.34	92.47	92.26	92.72	96.98	99.46	103.12	104.51	106.51	108.21	109.65	112.26	113.61	115.38	115.37	121.27	122.88
25.0	113.97	118.70	119.77	119.36	119.64	124.95	128.03	132.50	134.13	136.59	138.68	140.39	143.61	145.21	147.45	147.36	154.72	156.67
30.0	142.75	148.62	149.63	149.00	149.04	155.47	159.20	164.50	166.36	169.29	171.80	173.80	177.64	179.48	182.24	182.08	190.99	193.32
35.0	173.93	181.03	181.96	181.09	180.86	188.47	192.87	199.04	201.13	204.56	207.51	209.80	214.30	216.37	219.70	219.45	230.03	232.74
40.0	207.4	215.9	216.7	215.6	215.0	223.9	229.0	236.0	238.4	242.3	245.7	248.3	253.5	255.8	259.8	259.4	271.7	274.9
45.0	243.2	253.0	253.8	252.3	251.5	261.6	267.5	275.5	278.0	282.5	286.4	289.3	295.2	297.7	302.3	301.9	316.1	319.6
50.0	281.2	292.5	293.1	291.4	290.1	301.7	308.3	317.2	320.0	325.1	329.4	332.7	339.3	342.0	347.4	346.8	363.0	367.0
55.0	321.4	334.2	334.6	332.6	330.9	343.9	351.3	361.2	364.3	369.9	374.8	378.4	385.8	388.7	394.8	394.1	412.3	416.8
60.0	363.6	378.0	378.3	376.0	373.8	388.3	396.6	407.5	410.8	417.0	422.5	426.4	434.5	437.7	444.6	443.8	464.1	469.1
65.0	407.9	424.0	424.2	421.4	418.8	434.8	444.0	455.9	459.5	466.3	472.3	476.6	485.6	488.9	496.6	495.7	518.2	523.7
70.0	454.1	472.0	472.0	468.9	465.8	483.4	493.5	506.5	510.3	517.7	524.3	529.0	538.8	542.3	550.9	549.8	574.7	580.7
80.0	552.5	574.1	573.8	569.9	565.6	586.6	598.6	613.8	618.1	626.8	634.7	640.1	651.6	655.6	666.0	664.6	694.4	701.4
90.0	658.4	684.0	683.3	678.5	672.9	697.6	711.6	729.0	733.9	744.0	753.1	759.4	772.7	777.1	789.4	787.7	822.7	830.9
100.0	771.5	801.4	800.2	794.6	787.5	816.1	832.1	852.0	857.4	868.9	879.4	886.5	901.8	906.5	921.0	918.9	959.4	968.9
150.0	1437.	1492.	1488.	1477.	1461.	1512.	1540.	1573.	1581.	1601.	1619.	1631.	1657.	1664.	1690.	1686.	1759.	1775.
200.0	2252.	2337.	2330.	2313.	2285.	2362.	2405.	2452.	2464.	2492.	2520.	2537.	2576.	2585.	2626.	2619.	2709.	2755.
250.0	3191.	3309.	3308.	3282.	3240.	3348.	3403.	3468.	3480.	3520.	3561.	3582.	3633.	3649.	3706.	3696.	3796.	3877.
300.0	4234.	4389.	4400.	4369.	4311.	4446.	4512.	4596.	4608.	4660.	4718.	4742.	4805.	4829.	4906.	4892.	5000.	5121.
350.0	5367.	5563.	5586.	5552.	5476.	5636.	5716.	5821.	5832.	5898.	5974.	6000.	6077.	6110.	6207.	6188.	6306.	6469.
400.0	6581.	6819.	6856.	6817.	6723.	6913.	7004.	7131.	7140.	7221.	7317.	7345.	7436.	7479.	7598.	7574.	7703.	7909.
450.0	7864.	8148.	8198.	8155.	8041.	8261.	8366.	8516.	8524.	8620.	8735.	8766.	8871.	8925.	9066.	9038.	9178.	9430.
500.0	9210.	9541.	9605.	9557.	9422.	9674.	9793.	9967.	9974.	10085.	10221.	10255.	10375.	10439.	10604.	10571.	10724.	11022.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

132 XE IONS 54

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	112.6	96.2	74.9	71.4	72.2	64.8	55.8	53.2	51.5	50.1	46.9	44.0	41.8	40.4	39.9	38.4	34.4	35.8
3.0	109.6	96.3	74.9	71.5	72.5	65.5	56.8	54.1	52.5	51.3	48.1	45.2	43.0	41.7	41.2	39.7	36.0	37.1
3.5	106.2	96.3	74.3	71.0	72.0	65.4	56.8	54.4	52.9	51.8	48.6	45.8	43.6	42.3	41.9	40.4	36.9	37.8
4.0	102.6	93.6	73.2	70.0	71.2	64.9	56.5	54.2	52.8	51.8	48.7	45.9	43.8	42.6	42.1	40.7	37.5	38.2
4.5	99.1	91.5	72.0	68.9	70.1	64.2	55.9	53.7	52.4	51.6	48.5	45.7	43.7	42.6	42.1	40.8	37.8	38.3
5.0	95.77	89.39	70.60	67.62	68.84	63.27	55.23	53.15	51.89	51.13	48.08	45.44	43.49	42.36	41.96	40.64	37.82	38.22
5.5	92.59	87.20	69.19	66.31	67.56	62.27	54.44	52.46	51.26	50.58	47.68	45.01	43.12	42.04	41.67	40.39	37.75	38.03
6.0	89.59	85.02	67.77	64.99	66.26	61.23	53.60	51.71	50.57	49.96	47.02	44.51	42.68	41.64	41.29	40.05	37.58	37.75
6.5	86.78	82.90	66.38	63.68	64.96	60.17	52.74	50.92	49.84	49.30	46.41	43.96	42.19	41.19	40.86	39.66	37.34	37.41
7.0	84.13	80.84	65.01	62.39	63.69	59.11	51.87	50.13	49.09	48.60	45.77	43.39	41.66	40.70	40.39	39.23	37.04	37.04
8.0	79.32	76.97	62.39	59.93	61.23	57.04	50.14	48.53	47.58	47.19	44.46	42.20	40.57	39.68	39.40	38.31	36.36	36.23
9.0	75.06	73.43	59.96	57.62	58.92	55.06	48.47	46.98	46.11	45.79	43.16	41.00	39.46	38.64	38.38	37.36	35.60	35.37
10.0	71.28	70.20	57.70	55.48	56.77	53.19	46.89	45.50	44.69	44.43	41.90	39.84	38.37	37.60	37.37	36.41	34.81	34.51
11.0	67.89	67.25	55.61	53.50	54.78	51.44	45.40	44.09	43.34	43.14	40.69	38.71	37.31	36.60	36.39	35.48	34.03	33.66
12.0	64.85	64.56	53.67	51.66	52.92	49.80	44.00	42.77	42.07	41.90	39.54	37.64	36.30	35.64	35.45	34.58	33.25	32.84
15.0	57.33	57.74	48.67	46.90	48.10	45.49	40.30	39.24	38.67	38.59	36.44	34.75	33.56	33.01	32.86	32.11	31.06	30.57
20.0	48.38	49.38	42.33	40.83	41.95	39.91	35.45	34.60	34.16	34.17	32.30	30.85	29.84	29.43	29.33	28.72	27.95	27.41
25.0	42.12	43.38	37.63	36.33	37.36	35.69	31.77	31.06	30.71	30.76	29.09	27.83	26.94	26.62	26.56	26.04	25.45	24.90
30.0	37.47	38.85	34.00	32.85	33.81	32.40	28.88	28.27	27.98	28.06	26.55	25.42	24.63	24.37	24.33	23.88	23.40	22.87
35.0	33.87	35.30	31.11	30.07	30.96	29.75	26.55	26.02	25.76	25.86	24.48	23.45	22.74	22.53	22.50	22.11	21.70	21.20
40.0	30.99	32.43	28.74	27.80	28.63	27.56	24.63	24.15	23.93	24.04	22.76	21.82	21.16	20.98	20.97	20.62	20.27	19.80
45.0	28.62	30.07	26.76	25.89	26.68	25.73	23.01	22.57	22.38	22.50	21.31	20.43	19.83	19.68	19.67	19.35	19.05	18.60
50.0	26.65	28.08	25.09	24.28	25.02	24.17	21.62	21.22	21.05	21.17	20.06	19.25	18.68	18.55	18.55	18.26	17.99	17.57
55.0	24.97	26.38	23.64	22.89	23.59	22.81	20.42	20.06	19.91	20.03	18.98	18.21	17.68	17.57	17.57	17.31	17.06	16.66
60.0	23.53	24.92	22.38	21.67	22.35	21.63	19.38	19.04	18.90	19.02	18.03	17.31	16.80	16.71	16.71	16.47	16.25	15.87
65.0	22.27	23.63	21.28	20.61	21.25	20.59	18.45	18.13	18.01	18.13	17.19	16.51	16.03	15.94	15.95	15.73	15.52	15.16
70.0	21.17	22.50	20.30	19.66	20.28	19.66	17.63	17.33	17.22	17.34	16.44	15.79	15.33	15.26	15.27	15.06	14.87	14.53
80.0	19.31	20.59	18.63	18.06	18.62	18.09	16.23	15.96	15.86	15.99	15.16	14.57	14.15	14.09	14.11	13.92	13.75	13.44
90.0	17.81	19.04	17.27	16.74	17.27	16.79	15.07	14.83	14.75	14.87	14.10	13.56	13.17	13.12	13.14	12.98	12.82	12.54
100.0	16.57	17.76	16.14	15.64	16.14	15.71	14.11	13.89	13.81	13.93	13.21	12.71	12.35	12.31	12.33	12.18	12.03	11.78
150.0	12.59	13.60	12.43	12.06	12.44	12.14	10.93	10.77	10.72	10.83	10.28	9.90	9.62	9.61	9.62	9.52	9.41	9.24
200.0	10.42	11.42	10.44	10.11	10.37	10.20	9.17	9.01	9.04	9.14	8.67	8.54	8.25	8.08	8.11	8.01	8.09	7.81
250.0	9.15	10.05	9.20	8.91	9.12	9.01	8.10	7.87	7.99	8.09	7.67	7.55	7.30	7.16	7.19	7.07	7.17	6.93
300.0	8.27	9.11	8.34	8.08	8.27	8.18	7.36	7.08	7.26	7.35	6.97	6.86	6.64	6.51	6.54	6.44	6.53	6.31
350.0	7.63	8.42	7.71	7.47	7.66	7.56	6.81	6.56	6.72	6.81	6.46	6.36	6.15	6.04	6.07	5.97	6.05	5.86
400.0	7.146	7.891	7.230	7.004	7.174	7.096	6.389	6.163	6.311	6.395	6.068	5.968	5.776	5.674	5.701	5.611	5.686	5.503
450.0	6.764	7.477	6.851	6.636	6.800	6.727	6.059	5.850	5.987	6.068	5.759	5.661	5.481	5.386	5.413	5.328	5.399	5.227
500.0	6.458	7.143	6.547	6.340	6.499	6.431	5.792	5.598	5.726	5.804	5.510	5.413	5.242	5.154	5.180	5.100	5.167	5.003

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	33.46	31.90	31.95	32.18	31.88	30.05	29.12	27.49	26.89	26.19	25.68	25.25	24.34	24.03	23.76	23.82	22.83	22.57
3.0	34.78	33.19	33.23	33.46	33.22	31.39	30.45	28.85	28.28	27.57	27.06	26.63	25.72	25.39	25.10	25.16	24.09	23.81
3.5	35.64	33.94	33.97	34.21	34.00	32.20	31.26	29.71	29.16	28.45	27.94	27.52	26.63	26.28	25.98	26.04	24.92	24.63
4.0	35.92	34.32	34.36	34.59	34.43	32.66	31.73	30.22	29.69	29.00	28.50	28.08	27.21	26.86	26.54	26.60	25.44	25.15
4.5	36.06	34.47	34.50	34.74	34.61	32.88	31.96	30.60	30.00	29.32	28.82	28.42	27.56	27.21	26.89	26.95	25.76	25.46
5.0	36.02	34.46	34.48	34.72	34.62	32.93	32.03	30.62	30.14	29.47	28.98	28.59	27.76	27.41	27.07	27.13	25.94	25.64
5.5	35.87	34.33	34.35	34.59	34.52	32.86	31.98	30.62	30.15	29.51	29.02	28.64	27.83	27.49	27.15	27.21	26.00	25.70
6.0	35.64	34.12	34.14	34.38	34.33	32.71	31.85	30.53	30.09	29.46	28.98	28.61	27.82	27.48	27.14	27.20	25.99	25.69
6.5	35.35	33.85	33.87	34.11	34.08	32.50	31.66	30.38	29.96	29.34	28.87	28.51	27.75	27.41	27.06	27.12	25.92	25.62
7.0	35.02	33.54	33.57	33.80	33.79	32.25	31.42	30.18	29.78	29.18	28.72	28.37	27.62	27.29	26.94	27.00	25.80	25.50
8.0	34.29	32.86	32.88	33.11	33.14	31.66	30.87	29.71	29.33	28.76	28.32	27.98	27.27	26.96	26.61	26.67	25.48	25.19
9.0	33.61	32.12	32.15	32.38	32.43	31.02	30.26	29.16	28.81	28.26	27.84	27.52	26.85	26.55	26.19	26.25	25.08	24.80
10.0	32.72	31.38	31.41	31.63	31.70	30.35	29.61	28.57	28.25	27.73	27.32	27.01	26.37	26.09	25.74	25.79	24.64	24.37
11.0	31.94	30.64	30.67	30.88	30.97	29.67	28.97	27.98	27.68	27.18	26.78	26.49	25.88	25.61	25.26	25.32	24.19	23.92
12.0	31.18	29.92	29.95	30.16	30.26	29.01	28.33	27.39	27.11	26.63	26.25	25.97	25.38	25.12	24.78	24.83	23.73	23.47
15.0	29.06	27.90	27.94	28.14	28.27	27.15	26.53	25.71	25.47	25.04	24.70	24.45	23.93	23.70	23.37	23.42	22.39	22.14
20.0	26.10	25.08	25.12	25.31	25.46	24.49	23.96	23.28	23.09	22.73	22.43	22.22	21.78	21.60	21.28	21.33	20.40	20.18
25.0	23.74	22.82	22.87	23.04	23.21	22.35	21.88	21.30	21.13	20.82	20.56	20.38	19.99	19.84	19.55	19.59	18.75	18.55
30.0	21.82	20.99	21.04	21.19	21.37	20.59	20.18	19.66	19.52	19.24	19.01	18.85	18.50	18.38	18.10	18.14	17.37	17.19
35.0	20.24	19.47	19.52	19.67	19.84	19.14	18.76	18.30	18.18	17.92	17.71	17.56	17.25	17.15	16.89	16.93	16.21	16.05
40.0	18.90	18.19	18.25	18.38	18.55	17.91	17.56	17.14	17.03	16.80	16.60	16.47	16.19	16.10	15.85	15.89	15.22	15.07
45.0	17.77	17.10	17.15	17.28	17.45	16.85	16.53	16.15	16.05	15.84	15.65	15.53	15.27	15.20	14.96	14.99	14.37	14.23
50.0	16.78	16.16	16.21	16.33	16.50	15.94	15.63	15.28	15.20	15.00	14.83	14.72	14.47	14.41	14.18	14.21	13.62	13.49
55.0	15.93	15.34	15.39	15.50	15.67	15.14	14.85	14.53	14.45	14.26	14.10	14.00	13.77	13.71	13.49	13.53	12.97	12.85
60.0	15.17	14.61	14.66	14.77	14.93	14.43	14.16	13.86	13.78	13.61	13.46	13.36	13.15	13.09	12.88	12.92	12.38	12.27
65.0	14.50	13.96	14.01	14.12	14.28	13.80	13.55	13.26	13.19	13.03	12.88	12.79	12.59	12.54	12.34	12.37	11.86	11.76
70.0	13.89	13.38	13.43	13.53	13.69	13.23	12.99	12.72	12.66	12.51	12.37	12.28	12.09	12.04	11.85	11.88	11.40	11.29
80.0	12.86	12.39	12.43	12.53	12.68	12.26	12.04	11.80	11.74	11.60	11.48	11.40	11.22	11.19	11.01	11.04	10.59	10.49
90.0	12.00	11.56	11.60	11.69	11.84	11.45	11.25	11.03	10.98	10.85	10.73	10.66	10.50	10.47	10.30	10.33	9.91	9.82
100.0	11.27	10.86	10.90	10.99	11.13	10.76	10.58	10.38	10.33	10.21	10.10	10.04	9.89	9.86	9.70	9.73	9.33	9.25
150.0	8.843	8.524	8.558	8.627	8.746	8.469	8.329	8.184	8.152	8.067	7.982	7.932	7.824	7.802	7.680	7.702	7.393	7.331
200.0	7.472	7.215	7.214	7.272	7.378	7.148	7.034	6.920	6.896	6.828	6.757	6.716	6.629	6.609	6.508	6.528	6.441	6.232
250.0	6.631	6.404	6.333	6.385	6.482	6.298	6.235	6.125	6.128	6.059	5.970	5.959	5.893	5.849	5.757	5.776	5.735	5.553
300.0	6.042	5.835	5.771	5.791	5.877	5.743	5.686	5.588	5.592	5.530	5.449	5.440	5.381	5.342	5.258	5.276	5.237	5.074
350.0	5.606	5.415	5.367	5.376	5.456	5.333	5.279	5.190	5.195	5.138	5.064	5.055	5.001	4.966	4.889	4.905	4.868	4.719
400.0	5.271	5.092	5.040	5.056	5.133	5.017	4.967	4.885	4.889	4.836	4.767	4.758	4.709	4.677	4.604	4.619	4.583	4.446
450.0	5.007	4.837	4.789	4.804	4.877	4.768	4.720	4.643	4.648	4.597	4.533	4.524	4.479	4.448	4.379	4.393	4.358	4.229
500.0	4.794	4.631	4.586	4.601	4.671	4.567	4.521	4.448	4.463	4.405	4.343	4.335	4.292	4.263	4.198	4.211	4.176	4.055

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{132}_{54}$XE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.770	5.530	7.811	7.790	7.650	9.112	9.860	10.382	10.770	11.180	11.430	12.210	12.620	13.174	13.390	13.614	14.025	14.390
3.0	6.364	6.215	8.691	8.713	8.561	10.124	11.032	11.611	12.038	12.480	12.817	13.687	14.175	14.778	15.014	15.300	15.898	16.198
3.5	6.976	6.903	9.575	9.639	9.474	11.131	12.195	12.827	13.289	13.760	14.180	15.137	15.697	16.347	16.601	16.945	17.706	17.958
4.0	7.608	7.602	10.469	10.574	10.396	12.143	13.361	14.043	14.539	15.033	15.537	16.576	17.206	17.900	18.171	18.570	19.478	19.692
4.5	8.262	8.315	11.378	11.525	11.330	13.165	14.535	15.266	15.793	16.310	16.895	18.016	18.714	19.450	19.737	20.189	21.231	21.417
5.0	8.940	9.044	12.304	12.492	12.281	14.201	15.722	16.500	17.059	17.595	18.262	19.463	20.227	21.004	21.306	21.809	22.977	23.142
5.5	9.641	9.792	13.249	13.477	13.248	15.252	16.926	17.750	18.338	18.892	19.642	20.922	21.750	22.568	22.884	23.438	24.723	24.873
6.0	10.366	10.558	14.212	14.482	14.235	16.321	18.147	19.017	19.634	20.205	21.037	22.397	23.289	24.145	24.475	25.079	26.475	26.615
6.5	11.114	11.345	15.196	15.508	15.241	17.408	19.389	20.303	20.949	21.535	22.450	23.889	24.844	25.739	26.082	26.735	28.237	28.371
7.0	11.887	12.161	16.201	16.556	16.267	18.515	20.651	21.609	22.283	22.883	23.882	25.400	26.418	27.350	27.706	28.408	30.011	30.143
8.0	13.50	13.82	18.27	18.71	18.38	20.79	23.24	24.29	25.01	25.64	26.81	28.48	29.63	30.63	31.01	31.81	33.61	33.75
9.0	15.21	15.68	20.43	20.96	20.58	23.14	25.92	27.05	27.83	28.48	29.82	31.66	32.93	34.01	34.41	35.30	37.28	37.43
10.0	17.02	17.42	22.68	23.30	22.86	25.68	28.69	29.91	30.74	31.41	32.93	34.92	36.32	37.47	37.89	38.88	41.03	41.21
11.0	18.92	19.34	25.01	25.72	25.23	28.11	31.55	32.85	33.74	34.42	36.12	38.29	39.81	41.03	41.47	42.55	44.86	45.08
12.0	20.91	21.36	27.42	28.23	27.68	30.72	34.50	35.89	36.83	37.53	39.41	41.74	43.40	44.68	45.15	46.32	48.79	49.05
15.0	27.42	27.84	35.18	36.29	35.54	39.04	43.91	45.57	46.66	47.38	49.85	52.70	54.75	56.23	56.76	58.21	61.11	61.56
20.0	40.00	40.25	49.77	51.41	50.27	54.57	61.42	63.52	64.86	65.60	69.13	72.90	75.65	77.45	78.06	79.99	83.54	84.40
25.0	54.67	54.55	66.34	68.58	66.98	72.10	81.12	83.69	85.27	85.98	90.70	95.46	98.96	101.07	101.74	104.16	108.32	109.70
30.0	71.32	70.65	84.82	87.72	85.58	91.53	102.94	105.99	107.82	108.48	114.48	120.31	124.61	127.01	127.74	130.65	135.40	137.38
35.0	89.87	88.50	105.14	108.74	106.00	112.81	126.80	130.35	132.43	133.00	140.39	147.37	152.53	155.21	155.97	159.41	164.71	167.38
40.0	110.3	108.0	127.2	131.6	128.2	135.9	152.6	156.7	159.0	159.5	168.4	176.6	182.6	185.6	186.4	190.3	196.2	199.6
45.0	132.5	129.2	151.1	156.2	152.1	160.7	180.4	185.0	187.6	187.9	198.4	207.8	214.9	218.1	218.9	223.4	229.8	234.0
50.0	156.4	151.9	176.5	182.6	177.6	187.2	210.0	215.2	218.0	218.2	230.3	241.1	249.2	252.7	253.5	258.5	266.5	270.6
55.0	182.0	176.2	203.7	210.6	204.8	215.3	241.4	247.2	250.3	250.2	264.2	276.4	285.5	289.2	290.1	295.7	303.2	309.2
60.0	209.2	201.9	232.4	240.2	233.6	245.0	274.6	281.0	284.3	284.0	299.9	313.6	323.8	327.8	328.6	334.8	342.8	349.8
65.0	238.1	229.1	262.6	271.5	263.9	276.3	309.5	316.5	320.1	319.6	337.4	352.7	364.1	368.2	369.0	375.8	384.4	392.3
70.0	268.5	257.8	294.4	304.3	295.7	309.1	346.1	353.7	357.6	356.8	376.7	393.6	406.2	410.5	411.3	418.7	427.9	436.8
80.0	333.8	319.2	362.3	374.4	363.7	379.2	424.3	433.2	437.6	436.2	460.4	480.7	495.9	500.6	501.3	509.9	520.3	531.4
90.0	405.1	385.9	436.0	450.4	437.4	455.0	508.7	519.1	523.9	521.9	550.8	574.7	592.7	597.8	598.4	608.2	619.8	633.1
100.0	482.0	457.7	515.1	532.0	516.5	536.3	599.3	611.1	616.5	613.7	647.5	675.3	696.3	701.7	702.2	713.3	726.2	741.8
150.0	944.9	887.8	986.8	1018.3	987.9	1019.8	1137.0	1157.0	1164.9	1156.9	1220.1	1270.4	1308.6	1315.3	1314.7	1332.7	1353.1	1381.1
200.0	1525.0	1421.3	1570.5	1620.4	1572.6	1617.1	1801.0	1831.0	1840.1	1824.6	1924.1	1986.3	2049.1	2069.2	2066.7	2092.8	2109.5	2163.3
250.0	2203.8	2039.6	2246.3	2318.0	2254.5	2307.8	2569.1	2617.6	2619.3	2594.6	2736.2	2811.0	2901.9	2939.7	2933.6	2974.0	2978.9	3063.8
300.0	2964.7	2730.8	3001.4	3097.4	3016.1	3078.6	3425.8	3504.5	3487.7	3452.3	3640.6	3729.8	3851.8	3908.1	3897.9	3954.5	3945.8	4064.4
350.0	3796.5	3485.7	3825.6	3948.1	3847.1	3919.2	4359.7	4474.3	4433.8	4386.5	4625.4	4730.6	4886.0	4962.0	4947.0	5033.2	4997.6	5152.0
400.0	4691.	4296.	4711.	4862.	4739.	4821.	5361.	5513.	5448.	5388.	5681.	5804.	5995.	6091.	6070.	6163.	6124.	6316.
450.0	5641.	5156.	5649.	5831.	5685.	5777.	6423.	6613.	6523.	6448.	6798.	6940.	7168.	7286.	7260.	7371.	7317.	7548.
500.0	6641.	6060.	6635.	6849.	6678.	6781.	7538.	7768.	7651.	7561.	7971.	8133.	8403.	8539.	8507.	8638.	8567.	8839.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.11	15.68	16.93	17.25	17.89	18.80	19.35	20.06	20.48	20.89	21.31	21.75	22.20	22.60	23.13	23.32	25.00	25.64
3.0	17.04	17.70	18.95	19.26	19.91	20.95	21.56	22.40	22.87	23.34	23.81	24.29	24.83	25.27	25.83	26.01	27.81	28.38
3.5	18.92	19.67	20.91	21.21	21.88	23.02	23.70	24.65	25.16	25.69	26.21	26.73	27.35	27.82	28.41	28.59	30.50	31.10
4.0	20.76	21.60	22.84	23.12	23.80	25.05	25.79	26.85	27.41	27.99	28.54	29.10	29.80	30.30	30.92	31.09	33.12	33.76
4.5	22.60	23.52	24.76	25.03	25.71	27.07	27.86	29.02	29.62	30.25	30.85	31.44	32.21	32.74	33.39	33.56	35.70	36.36
5.0	24.43	25.43	26.67	26.93	27.62	29.07	29.93	31.18	31.81	32.50	33.13	33.75	34.59	35.16	35.83	36.00	38.25	38.94
5.5	26.26	27.35	28.59	28.83	29.53	31.08	31.99	33.34	34.00	34.73	35.40	36.06	36.96	37.55	38.27	38.43	40.79	41.51
6.0	28.11	29.28	30.61	30.74	31.45	33.09	34.05	35.49	36.19	36.97	37.68	38.36	39.34	39.96	40.70	40.85	43.33	44.08
6.5	29.97	31.22	32.46	32.67	33.37	35.11	36.13	37.66	38.39	39.22	39.96	40.67	41.71	42.37	43.13	43.28	45.87	46.65
7.0	31.84	33.18	34.41	34.61	35.32	37.15	38.23	39.84	40.60	41.47	42.25	42.99	44.09	44.78	45.58	45.72	48.42	49.24
8.0	35.65	37.15	38.38	38.56	39.26	41.28	42.46	44.25	45.06	46.03	46.88	47.68	48.90	49.64	50.51	50.64	53.57	54.44
9.0	39.54	41.22	42.44	42.59	43.29	45.49	46.78	48.73	49.60	50.66	51.58	52.43	53.78	54.58	55.50	55.62	58.79	59.72
10.0	43.53	45.37	46.60	46.72	47.41	49.80	51.19	53.31	54.23	55.37	56.37	57.27	58.74	59.59	60.59	60.70	64.10	65.09
11.0	47.61	49.63	50.85	50.94	51.62	54.19	55.70	57.97	58.95	60.18	61.24	62.21	63.79	64.70	65.76	65.86	69.51	70.56
12.0	51.80	53.99	55.21	55.26	55.93	58.69	60.30	62.74	63.77	65.09	66.22	67.24	68.94	69.90	71.04	71.13	75.02	76.13
15.0	64.96	67.70	68.90	68.87	69.48	72.81	74.75	77.67	78.85	80.43	81.78	82.96	85.01	86.13	87.50	87.55	92.20	93.51
20.0	88.97	92.69	93.85	93.64	94.11	98.44	100.96	104.68	106.10	108.13	109.86	111.31	113.96	115.33	117.12	117.11	123.12	124.75
25.0	115.52	120.31	121.42	121.01	121.30	126.69	129.82	134.35	136.01	138.50	140.63	142.36	145.62	147.24	149.51	149.43	156.90	158.89
30.0	144.55	150.50	151.54	150.91	150.97	157.48	161.26	166.64	168.53	171.51	174.05	176.07	179.96	181.82	184.63	184.47	193.51	195.88
35.0	175.99	183.18	184.14	183.26	183.05	190.75	195.22	201.47	203.60	207.07	210.05	212.38	216.93	219.02	222.41	222.15	232.88	235.64
40.0	209.8	218.3	219.1	218.0	217.5	226.4	231.6	238.8	241.1	245.1	248.6	251.2	256.4	258.8	262.8	262.4	274.9	278.1
45.0	245.8	255.7	256.5	255.0	254.2	264.5	270.4	278.5	281.1	285.6	289.5	292.5	298.4	301.0	305.7	305.2	319.6	323.2
50.0	284.0	295.4	296.1	294.3	293.1	304.8	311.5	320.5	323.4	328.4	332.9	336.2	342.8	345.6	351.0	350.4	366.8	370.9
55.0	324.4	337.4	337.9	335.8	334.1	347.3	354.8	364.8	367.9	373.6	378.5	382.2	389.6	392.6	398.7	398.1	416.5	421.0
60.0	366.9	381.5	381.8	379.5	377.3	391.9	400.3	411.3	414.7	421.0	426.5	430.5	438.7	441.9	448.8	448.0	468.6	473.6
65.0	411.4	427.7	427.9	425.2	422.5	438.7	448.0	460.1	463.7	470.5	476.6	481.0	490.0	493.4	501.2	500.2	523.0	528.6
70.0	457.9	476.0	476.0	472.9	469.8	487.6	497.7	510.9	514.8	522.3	528.9	533.6	543.5	547.1	555.8	554.7	579.8	585.9
80.0	556.8	578.6	578.3	574.4	570.1	591.3	603.4	618.7	623.1	631.9	639.8	645.3	656.9	661.0	671.4	670.0	700.1	707.2
90.0	663.2	689.0	688.3	683.6	677.9	702.8	716.9	734.5	739.5	749.7	758.9	765.2	778.6	783.0	795.5	793.8	829.1	837.4
100.0	776.8	806.9	805.8	800.1	793.0	821.8	838.0	858.0	863.5	875.1	885.7	892.9	908.2	913.1	927.6	925.5	966.4	975.9
150.0	1445.	1500.	1496.	1485.	1469.	1520.	1548.	1582.	1590.	1610.	1628.	1640.	1666.	1673.	1700.	1696.	1769.	1785.
200.0	2262.	2347.	2341.	2323.	2295.	2373.	2415.	2463.	2475.	2504.	2532.	2549.	2587.	2597.	2638.	2631.	2722.	2768.
250.0	3203.	3322.	3321.	3295.	3253.	3361.	3416.	3482.	3494.	3534.	3575.	3597.	3647.	3663.	3721.	3711.	3811.	3893.
300.0	4248.	4404.	4415.	4384.	4326.	4461.	4527.	4612.	4624.	4676.	4735.	4758.	4822.	4846.	4923.	4909.	5018.	5139.
350.0	5384.	5580.	5603.	5569.	5493.	5655.	5734.	5840.	5850.	5916.	5993.	6019.	6096.	6130.	6227.	6208.	6327.	6490.
400.0	6599.	6838.	6875.	6836.	6742.	6933.	7024.	7152.	7161.	7242.	7338.	7366.	7457.	7501.	7620.	7596.	7726.	7932.
450.0	7885.	8169.	8220.	8176.	8062.	8283.	8388.	8539.	8547.	8643.	8759.	8790.	8896.	8949.	9091.	9063.	9204.	9456.
500.0	9233.	9565.	9629.	9581.	9445.	9698.	9818.	9992.	9999.	10111.	10247.	10281.	10402.	10465.	10631.	10598.	10752.	11050.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

133 55 CS IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	115.3	98.0	76.4	72.8	73.7	66.1	56.9	54.2	52.5	51.1	47.8	44.9	42.6	41.2	40.7	39.1	35.0	36.5
3.0	112.3	98.3	76.6	73.1	74.0	66.8	57.8	55.2	53.6	52.3	49.1	46.1	43.9	42.5	42.0	40.5	36.7	37.8
3.5	108.9	97.3	75.9	72.5	73.6	66.8	58.0	55.5	54.0	52.9	49.6	46.7	44.5	43.2	42.7	41.3	37.7	38.6
4.0	105.3	95.7	74.9	71.6	72.8	66.4	57.7	55.4	53.9	52.9	49.7	46.9	44.7	43.5	43.0	41.6	38.3	39.0
4.5	101.8	93.7	73.6	70.5	71.7	65.6	57.2	54.9	53.6	52.7	49.5	46.7	44.7	43.5	43.1	41.7	38.6	39.1
5.0	98.36	91.55	72.27	69.21	70.45	64.72	56.49	54.36	53.06	52.28	49.16	46.45	44.45	43.30	42.89	41.54	38.65	39.06
5.5	95.14	89.36	70.85	67.90	69.17	63.73	55.71	53.67	52.44	51.74	48.67	46.04	44.10	42.99	42.60	41.30	38.60	38.88
6.0	92.09	87.17	69.43	66.57	67.86	62.69	54.87	52.92	51.75	51.13	48.11	45.54	43.67	42.60	42.23	40.97	38.44	38.61
6.5	89.22	85.03	68.02	65.25	66.56	61.62	54.00	52.14	51.02	50.46	47.50	45.00	43.18	42.15	41.81	40.58	38.20	38.28
7.0	86.53	82.96	66.64	63.95	65.27	60.56	53.13	51.34	50.27	49.77	46.87	44.42	42.65	41.67	41.34	40.15	37.91	37.91
8.0	81.62	79.04	63.99	61.46	62.79	58.47	51.39	49.73	48.76	48.35	45.55	43.23	41.56	40.64	40.35	39.24	37.23	37.10
9.0	77.27	75.44	61.52	59.12	60.45	56.46	49.71	48.17	47.27	46.94	44.24	42.03	40.44	39.59	39.33	38.28	36.48	36.24
10.0	73.40	72.16	59.23	56.95	58.27	54.67	48.11	46.67	45.84	45.57	42.97	40.85	39.34	38.55	38.31	37.32	35.69	35.37
11.0	69.94	69.16	57.11	54.94	56.24	52.80	46.59	45.25	44.48	44.26	41.75	39.72	38.27	37.54	37.32	36.38	34.89	34.52
12.0	66.83	66.41	55.14	53.07	54.36	51.13	45.17	43.90	43.18	43.01	40.58	38.63	37.25	36.57	36.37	35.48	34.11	33.69
15.0	59.12	59.46	50.05	48.22	49.46	46.76	41.41	40.32	39.73	39.65	37.44	35.70	34.47	33.91	33.75	32.98	31.90	31.39
20.0	49.93	50.90	43.57	42.03	43.18	41.06	36.47	35.60	35.14	35.15	33.22	31.73	30.69	30.26	30.16	29.53	28.74	28.18
25.0	43.50	44.75	38.77	37.43	38.49	36.76	32.72	31.99	31.62	31.67	29.95	28.65	27.74	27.40	27.33	26.80	26.19	25.63
30.0	38.71	40.10	35.06	33.87	34.85	33.39	29.77	29.14	28.83	28.91	27.36	26.19	25.37	25.10	25.06	24.60	24.10	23.56
35.0	35.00	36.45	32.09	31.02	31.94	30.68	27.38	26.82	26.56	26.66	25.24	24.18	23.44	23.22	23.19	22.78	22.37	21.85
40.0	32.04	33.50	29.66	28.69	29.55	28.44	25.41	24.91	24.68	24.80	23.48	22.50	21.83	21.64	21.62	21.26	20.90	20.41
45.0	29.60	31.07	27.63	26.73	27.55	26.56	23.74	23.30	23.10	23.21	21.99	21.09	20.46	20.30	20.29	19.97	19.65	19.19
50.0	27.57	29.03	25.91	25.07	25.84	24.95	22.32	21.91	21.74	21.86	20.71	19.87	19.28	19.15	19.14	18.85	18.57	18.13
55.0	25.84	27.28	24.43	23.64	24.37	23.56	21.10	20.72	20.56	20.68	19.60	18.81	18.26	18.14	18.14	17.87	17.62	17.20
60.0	24.35	25.77	23.13	22.40	23.09	22.35	20.02	19.67	19.52	19.65	18.62	17.88	17.36	17.26	17.28	17.01	16.78	16.39
65.0	23.05	24.44	22.00	21.30	21.97	21.28	19.07	18.74	18.61	18.74	17.76	17.05	16.56	16.47	16.48	16.25	16.03	15.66
70.0	21.91	23.28	20.99	20.33	20.97	20.33	18.22	17.91	17.79	17.92	16.99	16.32	15.85	15.77	15.78	15.56	15.36	15.01
80.0	19.99	21.31	19.27	18.68	19.26	18.70	16.78	16.50	16.40	16.53	15.67	15.06	14.63	14.57	14.58	14.39	14.21	13.89
90.0	18.44	19.71	17.87	17.32	17.87	17.37	15.59	15.34	15.25	15.38	14.58	14.02	13.62	13.57	13.59	13.42	13.25	12.97
100.0	17.16	18.38	16.70	16.19	16.70	16.25	14.60	14.37	14.29	14.41	13.67	13.15	12.77	12.73	12.75	12.60	12.45	12.18
150.0	13.05	14.08	12.87	12.49	12.88	12.58	11.32	11.15	11.11	11.22	10.65	10.25	9.96	9.95	9.97	9.86	9.74	9.57
200.0	10.80	11.83	10.82	10.48	10.74	10.57	9.51	9.34	9.37	9.48	8.98	8.84	8.55	8.37	8.41	8.30	8.38	8.09
250.0	9.48	10.42	9.54	9.24	9.45	9.34	8.40	8.16	8.28	8.38	7.95	7.83	7.57	7.42	7.45	7.33	7.43	7.18
300.0	8.58	9.44	8.65	8.38	8.58	8.48	7.63	7.34	7.53	7.62	7.23	7.12	6.88	6.75	6.78	6.67	6.77	6.54
350.0	7.91	8.73	8.00	7.75	7.93	7.84	7.06	6.80	6.97	7.06	6.70	6.59	6.38	6.26	6.29	6.19	6.27	6.07
400.0	7.411	8.182	7.498	7.263	7.439	7.358	6.825	6.391	6.545	6.631	6.292	6.188	5.989	5.883	5.911	5.818	5.896	5.706
450.0	7.015	7.753	7.105	6.882	7.052	6.977	6.283	6.067	6.209	6.292	5.972	5.870	5.683	5.586	5.613	5.525	5.599	5.420
500.0	6.697	7.407	6.790	6.576	6.740	6.669	6.007	5.806	5.938	6.019	5.714	5.614	5.437	5.346	5.372	5.289	5.359	5.189

E/A	SM 62	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	34.09	32.50	32.55	32.78	32.47	30.61	29.66	28.00	27.39	26.87	26.16	25.72	24.79	24.47	24.20	24.27	23.26	22.99
3.0	35.47	33.84	33.88	34.12	33.86	32.00	31.04	29.41	28.83	28.10	27.58	27.15	26.22	25.88	25.59	25.65	24.56	24.27
3.5	36.26	34.62	34.66	34.90	34.69	32.85	31.89	30.30	29.74	29.02	28.50	28.07	27.16	26.81	26.50	26.56	25.42	25.12
4.0	36.67	35.04	35.07	35.31	35.14	33.34	32.39	30.85	30.31	29.60	29.08	28.66	27.77	27.41	27.09	27.15	25.97	25.66
4.5	36.83	35.21	35.24	35.48	35.35	33.58	32.64	31.15	30.63	29.94	29.43	29.02	28.15	27.79	27.45	27.52	26.31	26.00
5.0	36.81	35.21	35.23	35.48	35.38	33.64	32.73	31.28	30.79	30.11	29.61	29.21	28.36	28.00	27.66	27.72	26.50	26.19
5.5	36.67	35.09	35.12	35.36	35.28	33.59	32.69	31.29	30.82	30.16	29.66	29.27	28.45	28.09	27.74	27.81	26.57	26.26
6.0	36.45	34.89	34.91	35.15	35.10	33.45	32.57	31.22	30.76	30.12	29.63	29.25	28.44	28.09	27.74	27.80	26.57	26.26
6.5	36.17	34.63	34.65	34.89	34.86	33.25	32.38	31.07	30.64	30.01	29.53	29.16	28.38	28.03	27.68	27.74	26.50	26.20
7.0	35.84	34.33	34.35	34.59	34.58	33.00	32.15	30.88	30.47	29.85	29.38	29.02	28.26	27.92	27.57	27.62	26.39	26.09
8.0	35.11	33.65	33.67	33.90	33.93	32.42	31.60	30.41	30.02	29.44	28.99	28.64	27.92	27.60	27.24	27.30	26.08	25.78
9.0	34.33	32.91	32.94	33.17	33.22	31.77	30.99	29.86	29.50	28.95	28.51	28.18	27.50	27.19	26.83	26.88	25.68	25.39
10.0	33.54	32.16	32.19	32.41	32.49	31.10	30.35	29.28	28.95	28.41	27.99	27.68	27.02	26.73	26.37	26.43	25.25	24.97
11.0	32.75	31.42	31.45	31.67	31.76	30.42	29.70	28.69	28.37	27.86	27.46	27.16	26.53	26.25	25.89	25.95	24.79	24.52
12.0	31.98	30.69	30.72	30.94	31.04	29.76	29.06	28.10	27.80	27.31	26.92	26.63	26.03	25.77	25.41	25.46	24.33	24.06
15.0	29.84	28.65	28.69	28.89	29.03	27.87	27.24	26.39	26.14	25.71	25.35	25.10	24.56	24.33	23.99	24.04	22.98	22.73
20.0	26.83	25.79	25.83	26.02	26.18	25.18	24.63	23.93	23.73	23.36	23.05	22.84	22.38	22.20	21.87	21.92	20.96	20.74
25.0	24.43	23.49	23.53	23.71	23.88	23.00	22.52	21.91	21.75	21.42	21.15	20.96	20.57	20.42	20.11	20.16	19.28	19.09
30.0	22.47	21.62	21.67	21.83	22.00	21.21	20.78	20.25	20.10	19.81	19.57	19.41	19.05	18.93	18.64	18.68	17.88	17.70
35.0	20.85	20.07	20.12	20.27	20.45	19.72	19.33	18.85	18.73	18.47	18.24	18.10	17.78	17.67	17.40	17.44	16.70	16.53
40.0	19.49	18.76	18.81	18.95	19.13	18.46	18.10	17.67	17.56	17.32	17.12	16.98	16.69	16.60	16.34	16.38	15.69	15.54
45.0	18.33	17.64	17.69	17.83	18.00	17.38	17.05	16.65	16.55	16.34	16.14	16.02	15.75	15.67	15.43	15.46	14.81	14.67
50.0	17.32	16.68	16.73	16.86	17.03	16.44	16.13	15.77	15.68	15.48	15.30	15.18	14.93	14.86	14.63	14.66	14.05	13.92
55.0	16.44	15.83	15.88	16.00	16.17	15.62	15.33	14.99	14.91	14.72	14.55	14.45	14.21	14.15	13.93	13.96	13.38	13.26
60.0	15.66	15.09	15.14	15.25	15.42	14.90	14.62	14.31	14.23	14.05	13.89	13.79	13.57	13.52	13.30	13.34	12.79	12.67
65.0	14.97	14.42	14.47	14.58	14.75	14.25	13.99	13.69	13.62	13.46	13.31	13.21	13.00	12.95	12.75	12.78	12.25	12.14
70.0	14.35	13.83	13.87	13.98	14.14	13.67	13.42	13.14	13.08	12.92	12.78	12.69	12.49	12.44	12.24	12.27	11.77	11.66
80.0	13.29	12.80	12.85	12.95	13.10	12.67	12.44	12.19	12.14	11.99	11.86	11.78	11.60	11.56	11.38	11.41	10.94	10.84
90.0	12.40	11.95	12.00	12.09	12.24	11.84	11.63	11.40	11.35	11.22	11.10	11.02	10.86	10.82	10.65	10.68	10.24	10.15
100.0	11.66	11.23	11.28	11.37	11.51	11.13	10.94	10.73	10.68	10.56	10.45	10.38	10.23	10.20	10.03	10.06	9.65	9.57
150.0	9.156	8.826	8.861	8.933	9.055	8.768	8.623	8.473	8.441	8.352	8.264	8.213	8.100	8.077	7.951	7.974	7.654	7.590
200.0	7.741	7.474	7.473	7.534	7.643	7.405	7.287	7.168	7.144	7.074	7.000	6.958	6.867	6.846	6.742	6.762	6.672	6.456
250.0	6.872	6.637	6.563	6.617	6.717	6.526	6.461	6.348	6.351	6.280	6.186	6.176	6.107	6.062	5.966	5.986	5.943	5.755
300.0	6.263	6.049	5.983	6.003	6.093	5.953	5.894	5.792	5.796	5.732	5.649	5.639	5.578	5.538	5.450	5.469	5.429	5.260
350.0	5.812	5.614	5.554	5.573	5.657	5.529	5.473	5.381	5.385	5.326	5.250	5.240	5.185	5.149	5.068	5.085	5.047	4.892
400.0	5.466	5.280	5.225	5.243	5.322	5.202	5.150	5.065	5.069	5.014	4.943	4.934	4.883	4.849	4.774	4.789	4.752	4.610
450.0	5.192	5.016	4.966	4.982	5.058	4.945	4.895	4.815	4.819	4.767	4.700	4.691	4.644	4.613	4.541	4.556	4.519	4.386
500.0	4.971	4.802	4.756	4.772	4.844	4.736	4.688	4.612	4.618	4.568	4.504	4.496	4.461	4.421	4.353	4.367	4.331	4.205

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

133 CS IONS 55

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.730	5.490	7.751	7.730	7.590	9.035	9.780	10.303	10.690	11.090	11.330	12.110	12.520	13.067	13.280	13.501	13.910	14.270
3.0	6.314	6.166	8.620	8.641	8.489	10.035	10.938	11.517	11.942	12.374	12.700	13.569	14.056	14.653	14.885	15.166	15.761	16.057
3.5	6.915	6.846	9.491	9.554	9.390	11.029	12.086	12.717	13.178	13.638	14.047	15.001	15.560	16.202	16.453	16.793	17.546	17.795
4.0	7.536	7.534	10.373	10.476	10.298	12.027	13.235	13.916	14.410	14.894	15.385	16.421	17.049	17.735	18.002	18.397	19.296	19.508
4.5	8.179	8.236	11.268	11.412	11.219	13.034	14.392	15.122	15.647	16.153	16.725	17.841	18.536	19.264	19.547	19.994	21.026	21.210
5.0	8.844	8.954	12.180	12.364	12.155	14.055	15.562	16.338	16.894	17.420	18.072	19.268	20.027	20.796	21.094	21.592	22.747	22.911
5.5	9.531	9.689	13.109	13.334	13.107	15.090	16.748	17.569	18.155	18.698	19.431	20.706	21.529	22.337	22.649	23.197	24.468	24.617
6.0	10.242	10.443	14.057	14.323	14.078	16.142	17.951	18.817	19.431	19.991	20.805	22.158	23.044	23.891	24.217	24.814	26.195	26.333
6.5	10.975	11.215	15.025	15.332	15.067	17.212	19.172	20.083	20.725	21.300	22.196	23.627	24.576	25.460	25.799	26.445	27.930	28.063
7.0	11.732	12.007	16.013	16.362	16.076	18.301	20.414	21.368	22.038	22.627	23.606	25.114	26.125	27.047	27.399	28.092	29.677	29.808
8.0	13.32	13.65	18.05	18.48	18.15	20.54	22.96	24.00	24.72	25.34	26.48	28.15	29.28	30.28	30.65	31.44	33.22	33.35
9.0	14.99	15.37	20.17	20.69	20.31	22.85	25.59	26.72	27.50	28.13	29.45	31.27	32.53	33.59	33.99	34.87	36.82	36.98
10.0	16.76	17.18	22.37	22.98	22.55	25.25	28.31	29.52	30.35	31.01	32.50	34.48	35.86	37.00	37.42	38.39	40.51	40.70
11.0	18.61	19.06	24.66	25.36	24.88	27.73	31.12	32.42	33.30	33.97	35.64	37.78	39.29	40.49	40.94	42.00	44.28	44.50
12.0	20.56	21.02	27.03	27.82	27.28	30.29	34.02	35.40	36.33	37.02	38.87	41.18	42.81	44.08	44.55	45.70	48.13	48.40
15.0	26.92	27.38	34.64	35.72	34.99	38.45	43.25	44.89	45.98	46.69	49.11	51.93	53.96	55.42	55.94	57.38	60.24	60.68
20.0	39.21	39.51	48.92	50.54	49.42	53.67	60.41	62.49	63.81	64.54	68.01	71.73	74.44	76.22	76.82	78.72	82.23	83.07
25.0	53.53	53.48	65.13	67.34	65.77	70.82	79.69	82.23	83.80	84.50	89.12	93.82	97.27	99.35	100.01	102.39	106.50	107.85
30.0	69.77	69.21	83.20	86.04	83.95	89.83	101.03	104.04	106.85	106.50	112.38	118.13	122.36	124.73	125.45	128.32	132.99	134.94
35.0	87.86	86.63	103.05	106.58	103.90	110.63	124.35	127.85	129.91	130.48	137.72	144.58	149.66	152.30	153.07	156.44	161.66	164.28
40.0	107.7	105.7	124.6	128.9	125.6	133.2	149.6	153.6	155.9	156.4	165.1	173.1	179.1	182.0	182.8	186.7	192.4	195.8
45.0	129.4	126.3	147.9	152.9	148.9	157.4	176.7	181.2	183.8	184.1	194.4	203.7	210.6	213.7	214.6	219.0	225.3	229.4
50.0	152.7	148.5	172.7	178.6	173.8	183.2	205.6	210.7	213.5	213.6	225.5	236.2	244.1	247.5	248.3	253.3	260.1	265.1
55.0	177.6	172.1	199.2	206.0	200.3	210.7	236.2	241.9	245.0	244.9	258.6	270.6	279.5	283.2	284.0	289.5	296.9	302.8
60.0	204.1	197.2	227.2	234.9	228.4	239.7	268.6	274.9	278.2	277.9	293.4	306.9	316.9	320.8	321.6	327.7	335.6	342.4
65.0	232.2	223.7	256.7	265.3	257.9	270.2	302.7	309.5	313.1	312.6	330.0	345.0	356.2	360.2	361.0	367.7	376.1	383.9
70.0	261.8	251.6	287.6	297.3	288.9	302.1	338.4	345.8	349.6	348.9	368.3	384.8	397.2	401.5	402.3	409.5	418.5	427.3
80.0	325.4	311.4	353.8	365.6	355.2	370.4	414.5	423.3	427.6	426.3	449.9	469.8	484.7	489.4	490.1	498.5	508.6	519.5
90.0	394.8	376.4	425.6	439.6	426.9	444.3	496.8	506.9	511.7	509.8	537.9	561.4	579.0	584.0	584.6	594.3	605.6	618.6
100.0	469.6	446.3	502.6	519.1	504.0	523.5	585.0	596.6	601.9	599.2	632.2	659.4	679.9	685.3	685.7	696.6	709.2	724.5
150.0	919.8	864.7	961.6	992.3	962.7	994.0	1108.4	1127.9	1135.7	1127.9	1189.5	1238.6	1275.9	1282.6	1282.0	1299.6	1319.5	1346.9
200.0	1483.7	1383.6	1529.3	1577.9	1531.4	1575.0	1754.2	1783.5	1792.4	1777.4	1874.3	1935.0	1996.2	2015.9	2013.5	2039.0	2055.4	2107.8
250.0	2143.4	1984.7	2186.3	2256.1	2194.3	2246.5	2501.0	2548.3	2550.0	2526.0	2663.9	2736.9	2825.4	2862.3	2856.4	2895.8	2900.7	2983.4
300.0	2882.9	2656.7	2920.2	3013.6	2934.6	2995.7	3333.6	3410.4	3394.1	3359.7	3543.0	3630.0	3748.8	3803.7	3793.8	3848.9	3840.6	3956.1
350.0	3691.2	3390.3	3721.1	3840.3	3742.2	3812.6	4241.2	4352.8	4313.6	4267.6	4500.1	4602.6	4753.9	4828.0	4813.4	4885.3	4862.9	5013.2
400.0	4561.	4178.	4581.	4728.	4609.	4689.	5215.	5362.	5299.	5241.	5526.	5645.	5831.	5925.	5905.	5995.	5958.	6144.
450.0	5484.	5014.	5493.	5669.	5528.	5618.	6246.	6431.	6343.	6271.	6611.	6749.	6972.	7086.	7061.	7169.	7117.	7341.
500.0	6455.	5892.	6451.	6659.	6493.	6594.	7329.	7553.	7439.	7352.	7760.	7909.	8169.	8304.	8272.	8400.	8331.	8596.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.98	15.54	16.78	17.10	17.74	18.65	19.19	19.89	20.31	20.71	21.13	21.57	22.01	22.41	22.94	23.13	24.80	25.33
3.0	16.89	17.54	18.78	19.09	19.74	20.77	21.38	22.20	22.67	23.14	23.60	24.08	24.61	25.05	25.61	25.79	27.58	28.14
3.5	18.74	19.48	20.72	21.01	21.68	22.81	23.49	24.43	24.94	25.46	25.97	26.49	27.10	27.57	28.16	28.34	30.23	30.83
4.0	20.56	21.39	22.62	22.91	23.58	24.82	25.56	26.60	27.15	27.73	28.28	28.83	29.52	30.02	30.64	30.81	32.82	33.45
4.5	22.37	23.28	24.52	24.78	25.47	26.81	27.60	28.75	29.33	29.96	30.55	31.13	31.90	32.43	33.07	33.24	35.36	36.02
5.0	24.18	25.17	26.40	26.66	27.35	28.79	29.63	30.88	31.50	32.18	32.80	33.42	34.25	34.81	35.49	35.65	37.88	38.57
5.5	25.99	27.06	28.29	28.53	29.23	30.76	31.67	33.00	33.66	34.38	35.04	35.69	36.59	37.18	37.89	38.04	40.39	41.10
6.0	27.81	28.96	30.19	30.42	31.12	32.75	33.70	35.13	35.82	36.59	37.29	37.96	38.93	39.55	40.28	40.44	42.89	43.63
6.5	29.64	30.88	32.10	32.32	33.02	34.74	35.75	37.26	37.98	38.80	39.53	40.24	41.27	41.92	42.68	42.83	45.39	46.17
7.0	31.48	32.80	34.03	34.23	34.93	36.75	37.81	39.41	40.16	41.02	41.79	42.53	43.62	44.29	45.09	45.23	47.91	48.71
8.0	35.23	36.72	37.94	38.12	38.82	40.81	41.98	43.75	44.55	45.51	46.35	47.14	48.35	49.08	49.94	50.07	52.98	53.84
9.0	39.06	40.71	41.93	42.08	42.78	44.96	46.23	48.16	49.02	50.06	50.97	51.82	53.15	53.94	54.86	54.98	58.11	59.04
10.0	42.98	44.80	46.02	46.14	46.83	49.19	50.57	52.66	53.57	54.70	55.68	56.58	58.03	58.87	59.86	59.97	63.34	64.32
11.0	47.00	48.99	50.20	50.29	50.97	53.51	55.00	57.25	58.21	59.43	60.48	61.43	62.99	63.89	64.95	65.05	68.65	69.69
12.0	51.11	53.27	54.48	54.54	55.20	57.93	59.53	61.93	62.95	64.25	65.37	66.37	68.05	69.01	70.13	70.22	74.07	75.17
15.0	64.03	66.73	67.92	67.89	68.50	71.79	73.71	76.59	77.75	79.31	80.65	81.81	83.84	84.94	86.30	86.35	90.94	92.23
20.0	87.57	91.23	92.39	92.18	92.66	96.93	99.42	103.08	104.48	106.48	108.18	109.62	112.22	113.58	115.36	115.35	121.27	122.89
25.0	113.58	118.29	119.40	119.00	119.29	124.60	127.69	132.15	133.79	136.24	138.33	140.04	143.25	144.85	147.09	147.01	154.38	156.34
30.0	141.99	147.84	148.88	148.26	148.33	154.74	158.46	163.76	165.62	168.55	171.05	173.04	176.87	178.71	181.47	181.32	190.22	192.55
35.0	172.73	179.79	180.76	179.91	179.71	187.29	191.68	197.82	199.92	203.34	206.27	208.56	213.03	215.10	218.43	218.19	228.74	231.45
40.0	205.7	214.1	215.0	213.9	213.4	222.2	227.3	234.3	236.6	240.5	243.9	246.5	251.7	254.0	257.9	257.6	269.8	273.0
45.0	240.9	250.7	251.4	250.1	249.2	259.3	265.1	273.1	275.6	280.1	284.0	286.9	292.7	295.2	299.8	299.4	313.5	317.0
50.0	278.3	289.5	290.1	288.4	287.2	298.7	305.3	314.1	316.9	321.9	326.3	329.5	336.1	338.8	344.1	343.6	359.6	363.6
55.0	317.7	330.4	330.9	328.9	327.3	340.2	347.6	357.4	360.4	366.0	370.9	374.4	381.7	384.7	390.7	390.0	408.1	412.6
60.0	359.2	373.4	373.8	371.5	369.4	383.8	392.0	402.8	406.1	412.3	417.7	421.6	429.6	432.8	439.6	438.8	459.0	463.9
65.0	402.6	418.5	418.8	416.1	413.6	429.4	438.5	450.3	453.9	460.6	466.6	470.8	479.7	483.0	490.7	489.8	512.1	517.5
70.0	448.0	465.6	465.7	462.7	459.6	477.1	487.0	499.9	503.7	511.1	517.6	522.2	531.9	535.5	543.9	542.9	567.5	573.4
80.0	544.4	565.7	565.4	561.6	557.4	578.2	590.0	605.1	609.4	618.0	625.8	631.1	642.5	646.5	656.7	655.4	684.8	691.8
90.0	648.0	673.3	672.6	668.0	662.5	686.9	700.7	718.0	722.8	732.8	741.8	748.0	761.1	765.5	777.7	776.0	810.6	818.7
100.0	758.7	788.2	787.1	781.5	774.7	802.8	818.7	838.3	843.7	855.0	865.4	872.4	887.4	892.1	906.4	904.4	944.4	953.7
150.0	1409.	1463.	1459.	1448.	1433.	1483.	1510.	1543.	1551.	1570.	1588.	1600.	1625.	1632.	1658.	1654.	1726.	1742.
200.0	2204.	2287.	2281.	2263.	2237.	2313.	2354.	2401.	2412.	2440.	2467.	2484.	2522.	2531.	2571.	2564.	2653.	2698.
250.0	3119.	3235.	3234.	3208.	3168.	3273.	3327.	3391.	3403.	3442.	3482.	3503.	3552.	3568.	3624.	3614.	3712.	3792.
300.0	4135.	4286.	4297.	4267.	4211.	4342.	4407.	4490.	4501.	4552.	4609.	4632.	4694.	4718.	4793.	4779.	4885.	5003.
350.0	5239.	5429.	5453.	5419.	5345.	5503.	5579.	5683.	5693.	5758.	5832.	5857.	5932.	5965.	6060.	6042.	6158.	6316.
400.0	6420.	6652.	6688.	6650.	6559.	6745.	6833.	6958.	6967.	7046.	7139.	7167.	7255.	7298.	7414.	7391.	7517.	7718.
450.0	7669.	7946.	7995.	7953.	7841.	8057.	8159.	8306.	8314.	8407.	8520.	8550.	8653.	8705.	8843.	8816.	8953.	9198.
500.0	8979.	9301.	9364.	9317.	9186.	9432.	9548.	9718.	9724.	9833.	9966.	9999.	10116.	10178.	10340.	10308.	10457.	10748.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{138}_{56}$BA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	117.9	99.8	78.0	74.3	75.1	67.3	58.0	55.2	53.5	52.0	48.7	45.7	43.4	42.0	41.4	39.9	35.7	37.1
3.0	115.0	100.3	78.2	74.6	75.6	68.2	59.0	56.3	54.6	53.4	50.0	47.0	44.7	43.4	42.8	41.3	37.4	38.6
3.5	111.6	99.4	77.6	74.1	75.2	68.2	59.2	56.6	55.1	53.9	50.6	47.7	45.4	44.1	43.6	42.1	38.4	39.4
4.0	108.0	97.8	76.5	73.2	74.3	67.8	58.9	56.5	55.0	54.0	50.7	47.8	45.7	44.4	43.9	42.4	39.1	39.8
4.5	104.4	96.8	75.3	72.1	73.3	67.1	58.4	56.1	54.7	53.8	50.6	47.7	45.6	44.4	44.0	42.5	39.4	39.9
5.0	101.0	93.7	73.9	70.8	72.1	66.2	57.7	55.6	54.2	53.4	50.2	47.5	45.4	44.2	43.8	42.4	39.5	39.9
5.5	97.7	91.5	72.5	69.5	70.8	65.2	57.0	54.9	53.6	52.9	49.8	47.1	45.1	43.9	43.5	42.2	39.4	39.7
6.0	94.6	89.3	71.1	68.1	69.5	64.1	56.1	54.1	52.9	52.3	49.2	46.6	44.6	43.5	43.2	41.9	39.3	39.5
6.5	91.7	87.2	69.7	66.8	68.2	63.1	55.3	53.4	52.2	51.6	48.6	46.0	44.2	43.1	42.8	41.5	39.1	39.1
7.0	88.9	85.1	68.3	65.5	66.9	62.0	54.4	52.5	51.5	50.9	48.0	45.5	43.6	42.6	42.3	41.1	38.8	38.8
8.0	83.93	81.11	65.60	62.99	64.34	59.89	52.63	50.93	49.93	49.51	46.64	44.26	42.54	41.61	41.30	40.16	38.11	37.97
9.0	79.50	77.46	63.09	60.63	61.98	57.87	50.94	49.36	48.43	48.09	45.33	43.05	41.42	40.55	40.28	39.20	37.36	37.11
10.0	75.54	74.13	60.77	58.42	59.77	55.96	49.32	47.84	46.99	46.71	44.04	41.86	40.31	39.50	39.26	38.24	36.56	36.24
11.0	72.00	71.08	58.61	56.38	57.72	54.16	47.79	46.40	45.61	45.38	42.81	40.72	39.24	38.48	38.26	37.29	35.76	35.38
12.0	68.82	68.28	56.61	54.48	55.80	52.47	46.35	45.04	44.30	44.12	41.63	39.62	38.21	37.50	37.29	36.38	34.97	34.54
15.0	60.92	61.18	51.43	49.55	50.81	48.02	42.53	41.41	40.79	40.71	38.44	36.65	35.39	34.80	34.64	33.85	32.74	32.21
20.0	51.50	52.43	44.83	43.24	44.41	42.22	37.50	36.60	36.13	36.13	34.15	32.62	31.54	31.10	31.00	30.35	29.53	28.96
25.0	44.89	46.13	39.92	38.54	39.63	37.83	33.67	32.92	32.53	32.59	30.82	29.47	28.54	28.19	28.12	27.57	26.94	26.36
30.0	39.97	41.36	36.12	34.90	35.91	34.39	30.66	30.00	29.68	29.77	28.17	26.96	26.12	25.84	25.80	25.32	24.81	24.25
35.0	36.16	37.61	33.08	31.98	32.92	31.62	28.21	27.64	27.37	27.47	26.00	24.91	24.16	23.92	23.88	23.47	23.04	22.50
40.0	33.10	34.59	30.59	29.59	30.47	29.32	26.19	25.68	25.44	25.56	24.20	23.20	22.50	22.30	22.28	21.91	21.54	21.04
45.0	30.59	32.09	28.51	27.58	28.42	27.39	24.49	24.03	23.82	23.94	22.67	21.74	21.09	20.93	20.92	20.58	20.26	19.78
50.0	28.50	29.98	26.74	25.88	26.67	25.75	23.03	22.61	22.42	22.55	21.36	20.49	19.89	19.75	19.74	19.44	19.15	18.70
55.0	26.72	28.18	25.22	24.41	25.16	24.32	21.77	21.38	21.21	21.34	20.22	19.41	18.84	18.72	18.72	18.44	18.18	17.75
60.0	25.18	26.63	23.89	23.13	23.85	23.08	20.67	20.30	20.15	20.28	19.22	18.45	17.92	17.81	17.82	17.56	17.32	16.91
65.0	23.84	25.27	22.72	22.00	22.69	21.98	19.69	19.35	19.22	19.35	18.33	17.61	17.10	17.01	17.01	16.77	16.55	16.17
70.0	22.66	24.06	21.68	21.00	21.66	21.00	18.82	18.50	18.38	18.51	17.54	16.85	16.37	16.29	16.30	16.07	15.86	15.50
80.0	20.69	22.03	19.92	19.30	19.91	19.33	17.34	17.05	16.95	17.08	16.19	15.56	15.11	15.05	15.06	14.87	14.68	14.35
90.0	19.09	20.38	18.48	17.91	18.47	17.95	16.12	15.86	15.77	15.90	15.07	14.49	14.08	14.03	14.04	13.87	13.70	13.40
100.0	17.76	19.01	17.27	16.74	17.27	16.80	15.09	14.85	14.77	14.90	14.13	13.59	13.20	13.16	13.18	13.02	12.87	12.59
150.0	13.51	14.58	13.32	12.93	13.33	13.02	11.71	11.54	11.49	11.61	11.02	10.61	10.31	10.29	10.31	10.20	10.08	9.90
200.0	11.18	12.25	11.20	10.85	11.12	10.95	9.84	9.67	9.70	9.81	9.30	9.16	8.86	8.67	8.70	8.59	8.68	8.37
250.0	9.82	10.79	9.88	9.57	9.79	9.67	8.70	8.45	8.58	8.68	8.23	8.11	7.84	7.69	7.72	7.59	7.70	7.43
300.0	8.89	9.78	8.96	8.68	8.89	8.78	7.90	7.61	7.80	7.90	7.49	7.37	7.13	7.00	7.03	6.91	7.01	6.78
350.0	8.20	9.04	8.29	8.03	8.22	8.13	7.32	7.05	7.22	7.32	6.94	6.83	6.61	6.49	6.52	6.41	6.50	6.29
400.0	7.680	8.478	7.770	7.527	7.709	7.625	6.866	6.623	6.782	6.871	6.520	6.412	6.206	6.096	6.126	6.029	6.110	5.913
450.0	7.271	8.033	7.364	7.133	7.308	7.230	6.511	6.287	6.434	6.521	6.189	6.084	5.890	5.788	5.817	5.726	5.802	5.617
500.0	6.942	7.676	7.037	6.815	6.986	6.912	6.226	6.017	6.154	6.238	5.922	5.819	5.634	5.540	5.568	5.481	5.554	5.377

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	34.71	33.09	33.14	33.37	33.06	31.16	30.19	28.50	27.89	27.15	26.63	26.19	25.24	24.91	24.64	24.70	23.67	23.40
3.0	36.14	34.49	34.52	34.76	34.50	32.61	31.63	29.97	29.37	28.63	28.10	27.66	26.71	26.37	26.07	26.13	25.02	24.73
3.5	36.97	35.31	35.34	35.58	35.37	33.49	32.52	30.89	30.32	29.59	29.06	28.62	27.69	27.33	27.01	27.08	25.91	25.61
4.0	37.42	35.75	35.78	36.02	35.85	34.01	33.04	31.47	30.92	30.20	29.67	29.24	28.33	27.96	27.63	27.69	26.49	26.18
4.5	37.60	35.94	35.97	36.21	36.08	34.27	33.32	31.79	31.26	30.56	30.03	29.61	28.72	28.36	28.02	28.08	26.85	26.53
5.0	37.60	35.96	35.98	36.23	36.13	34.35	33.42	31.94	31.44	30.75	30.23	29.82	28.95	28.59	28.24	28.30	27.05	26.74
5.5	37.47	35.85	35.87	36.12	36.05	34.31	33.39	31.97	31.48	30.81	30.30	29.90	29.05	28.69	28.34	28.40	27.14	26.82
6.0	37.26	35.66	35.68	35.93	35.88	34.18	33.28	31.90	31.43	30.78	30.28	29.89	29.06	28.71	28.35	28.41	27.15	26.83
6.5	36.98	35.41	35.43	35.67	35.64	33.99	33.10	31.76	31.32	30.68	30.19	29.80	29.00	28.65	28.29	28.35	27.09	26.78
7.0	36.66	35.11	35.13	35.37	35.36	33.75	32.88	31.58	31.15	30.52	30.04	29.67	28.89	28.55	28.18	28.24	26.98	26.67
8.0	35.93	34.43	34.45	34.69	34.72	33.17	32.34	31.12	30.72	30.12	29.66	29.30	28.56	28.23	27.87	27.92	26.68	26.37
9.0	35.15	33.70	33.72	33.96	34.01	32.53	31.73	30.57	30.20	29.63	29.19	28.85	28.14	27.83	27.46	27.52	26.29	25.99
10.0	34.35	32.94	32.97	33.20	33.27	31.85	31.08	29.99	29.64	29.10	28.67	28.35	27.67	27.37	27.01	27.06	25.85	25.56
11.0	33.56	32.20	32.22	32.45	32.54	31.17	30.43	29.39	29.07	28.54	28.13	27.82	27.18	26.89	26.53	26.58	25.40	25.12
12.0	32.79	31.46	31.49	31.71	31.82	30.50	29.79	28.80	28.49	27.99	27.59	27.30	26.68	26.41	26.04	26.10	24.94	24.66
15.0	30.62	29.40	29.44	29.64	29.78	28.60	27.95	27.08	26.82	26.37	26.01	25.75	25.20	24.96	24.61	24.66	23.57	23.31
20.0	27.57	26.49	26.54	26.73	26.89	25.87	25.31	24.58	24.38	23.99	23.68	23.46	22.99	22.80	22.47	22.52	21.53	21.31
25.0	25.12	24.16	24.20	24.38	24.56	23.65	23.15	22.53	22.36	22.02	21.75	21.55	21.15	20.99	20.68	20.72	19.82	19.62
30.0	23.13	22.25	22.30	22.46	22.64	21.82	21.38	20.83	20.69	20.39	20.14	19.97	19.60	19.47	19.18	19.22	18.40	18.21
35.0	21.48	20.67	20.72	20.87	21.05	20.31	19.90	19.41	19.28	19.02	18.78	18.63	18.30	18.19	17.91	17.95	17.19	17.02
40.0	20.09	19.33	19.38	19.53	19.71	19.02	18.65	18.20	18.09	17.85	17.63	17.49	17.19	17.10	16.83	16.87	16.16	16.00
45.0	18.89	18.19	18.24	18.38	18.56	17.92	17.57	17.16	17.06	16.84	16.64	16.51	16.23	16.15	15.90	15.94	15.27	15.12
50.0	17.86	17.20	17.25	17.38	17.56	16.96	16.64	16.26	16.17	15.96	15.77	15.65	15.40	15.32	15.08	15.12	14.49	14.35
55.0	16.96	16.33	16.38	16.51	16.68	16.12	15.81	15.47	15.38	15.19	15.01	14.90	14.66	14.59	14.36	14.40	13.80	13.67
60.0	16.17	15.57	15.62	15.74	15.91	15.37	15.09	14.76	14.68	14.50	14.34	14.23	14.01	13.95	13.72	13.76	13.19	13.07
65.0	15.46	14.89	14.94	15.05	15.22	14.71	14.44	14.13	14.06	13.89	13.73	13.63	13.42	13.37	13.15	13.19	12.64	12.53
70.0	14.82	14.28	14.33	14.44	14.60	14.11	13.86	13.57	13.50	13.34	13.19	13.10	12.89	12.84	12.64	12.67	12.15	12.04
80.0	13.73	13.22	13.27	13.38	13.53	13.09	12.85	12.59	12.53	12.39	12.25	12.16	11.98	11.94	11.75	11.78	11.30	11.20
90.0	12.82	12.35	12.40	12.49	12.65	12.23	12.02	11.78	11.73	11.59	11.46	11.39	11.22	11.18	11.00	11.03	10.58	10.49
100.0	12.05	11.61	11.65	11.75	11.89	11.51	11.31	11.09	11.04	10.92	10.80	10.73	10.57	10.54	10.37	10.40	9.98	9.89
150.0	9.474	9.132	9.168	9.242	9.369	9.072	8.922	8.766	8.733	8.642	8.550	8.497	8.380	8.357	8.226	8.250	7.918	7.852
200.0	8.014	7.738	7.737	7.800	7.913	7.666	7.543	7.421	7.396	7.323	7.246	7.203	7.109	7.087	6.979	7.000	6.907	6.683
250.0	7.117	6.873	6.797	6.853	6.957	6.759	6.691	6.574	6.577	6.503	6.407	6.396	6.325	6.277	6.178	6.199	6.155	5.959
300.0	6.488	6.266	6.197	6.219	6.311	6.167	6.105	6.000	6.004	5.938	5.851	5.841	5.778	5.736	5.646	5.665	5.623	5.448
350.0	6.022	5.816	5.755	5.774	5.861	5.728	5.671	5.575	5.580	5.518	5.439	5.429	5.372	5.334	5.251	5.268	5.229	5.069
400.0	5.664	5.471	5.415	5.433	5.515	5.391	5.337	5.248	5.253	5.196	5.122	5.112	5.060	5.025	4.947	4.963	4.924	4.776
450.0	5.381	5.198	5.146	5.163	5.241	5.124	5.072	4.989	4.994	4.940	4.871	4.862	4.813	4.780	4.706	4.721	4.683	4.545
500.0	5.152	4.977	4.929	4.945	5.020	4.909	4.859	4.780	4.785	4.734	4.688	4.659	4.613	4.582	4.512	4.526	4.488	4.358

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{138}_{56}$BA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.850	5.600	7.909	7.890	7.750	9.232	9.990	10.519	10.910	11.320	11.570	12.370	12.790	13.346	13.560	13.784	14.200	14.570
3.0	6.442	6.288	8.792	8.816	8.665	10.249	11.168	11.754	12.185	12.628	12.965	13.856	14.355	14.961	15.195	15.482	16.085	16.391
3.5	7.051	6.979	9.678	9.744	9.580	11.260	12.336	12.975	13.442	13.913	14.335	15.312	15.884	16.537	16.790	17.135	17.903	18.160
4.0	7.679	7.678	10.573	10.680	10.502	12.275	13.504	14.194	14.694	15.190	15.695	16.757	17.399	18.096	18.366	18.767	19.682	19.902
4.5	8.329	8.391	11.482	11.630	11.437	13.298	14.679	15.419	15.951	16.469	17.057	18.200	18.909	19.650	19.936	20.390	21.441	21.632
5.0	9.001	9.119	12.407	12.596	12.386	14.333	15.867	16.654	17.218	17.756	18.425	19.649	20.425	21.207	21.508	22.014	23.190	23.360
5.5	9.696	9.864	13.349	13.580	13.353	15.384	17.070	17.903	18.497	19.053	19.805	21.109	21.949	22.772	23.087	23.644	24.938	25.093
6.0	10.414	10.627	14.310	14.583	14.337	16.451	18.290	19.169	19.792	20.365	21.199	22.583	23.487	24.349	24.678	25.285	26.691	26.836
6.5	11.155	11.409	15.291	15.605	15.339	17.536	19.529	20.453	21.105	21.693	22.610	24.073	25.041	25.941	26.284	26.940	28.452	28.591
7.0	11.919	12.210	16.291	16.648	16.362	18.639	20.788	21.756	22.436	23.038	24.039	25.681	26.613	27.551	27.907	28.611	30.225	30.362
8.0	13.52	13.87	18.35	18.80	18.47	20.90	23.37	24.42	25.16	25.79	26.96	28.66	29.81	30.83	31.21	32.01	33.81	33.96
9.0	15.21	15.61	20.50	21.03	20.65	23.25	26.03	27.18	27.96	28.61	29.96	31.82	33.10	34.19	34.59	35.49	37.47	37.63
10.0	16.99	17.43	22.73	23.36	22.92	25.67	28.79	30.02	30.86	31.53	33.05	35.07	36.48	37.63	38.06	39.05	41.21	41.40
11.0	18.86	19.34	25.04	25.75	25.27	28.18	31.63	32.95	33.84	34.52	36.23	38.41	39.95	41.17	41.62	42.71	45.02	45.25
12.0	20.82	21.32	27.44	28.24	27.70	30.77	34.56	35.96	36.91	37.61	39.50	41.85	43.51	44.81	45.28	46.45	48.92	49.20
15.0	27.23	27.73	35.12	36.22	35.49	39.03	43.90	45.56	46.66	47.39	49.85	52.72	54.78	56.27	56.80	58.26	61.16	61.62
20.0	39.60	39.96	49.53	51.17	50.05	54.39	61.21	63.32	64.67	65.41	68.94	72.72	75.47	77.28	77.89	79.82	83.38	84.24
25.0	53.99	54.03	65.88	68.11	66.53	71.68	80.67	83.24	84.83	85.55	90.24	95.01	98.51	100.62	101.30	103.71	107.88	109.25
30.0	70.32	69.85	84.07	86.95	84.85	90.84	102.17	105.22	107.06	107.73	113.69	119.52	123.81	126.22	126.95	129.86	134.60	136.58
35.0	88.49	87.37	104.06	107.63	104.94	111.79	125.66	129.21	131.30	131.88	139.21	146.17	151.31	154.00	154.77	158.19	163.48	166.14
40.0	108.5	106.5	125.8	130.1	126.7	134.5	151.1	155.1	157.5	157.9	166.7	174.9	180.9	183.9	184.7	188.6	194.5	197.9
45.0	130.2	127.3	149.1	154.3	150.2	158.8	178.3	182.9	185.5	185.9	196.2	205.6	212.6	215.9	216.7	221.2	227.5	231.7
50.0	153.6	149.5	174.2	180.1	175.3	184.8	207.4	212.6	215.4	215.6	227.6	238.3	246.3	249.8	250.7	255.7	262.6	267.6
55.0	178.6	173.3	200.7	207.6	201.9	212.4	238.2	244.0	247.0	247.0	260.8	273.0	282.0	285.7	286.6	292.1	299.6	305.5
60.0	205.2	198.5	228.9	236.6	230.1	241.6	270.8	277.1	280.4	280.2	295.8	309.4	319.6	323.5	324.4	330.5	338.5	345.4
65.0	233.4	225.1	258.5	267.2	259.8	272.2	305.0	311.9	315.5	315.1	332.6	347.7	359.0	363.2	364.0	370.7	379.3	387.1
70.0	263.1	253.1	289.6	299.3	290.9	304.3	340.8	348.4	352.2	351.5	371.1	387.8	400.3	404.7	405.5	412.7	421.9	430.7
80.0	326.9	313.1	356.1	367.9	357.5	372.9	417.3	426.2	430.5	429.2	453.0	473.1	488.1	492.9	493.6	502.1	512.4	523.3
90.0	396.4	378.3	428.1	442.2	429.5	447.1	499.9	510.2	515.0	513.1	541.5	565.1	582.8	588.0	588.6	598.3	609.8	622.9
100.0	471.4	448.4	505.4	522.0	506.8	526.6	588.5	600.1	605.5	602.8	636.1	663.5	684.1	689.6	690.1	701.1	713.8	729.2
150.0	922.6	868.0	965.6	996.5	966.8	998.5	1113.4	1133.0	1140.9	1133.2	1195.1	1244.5	1282.0	1288.8	1288.2	1306.0	1326.1	1353.6
200.0	1487.6	1387.9	1534.5	1583.4	1536.8	1580.7	1760.7	1790.2	1799.2	1784.2	1881.5	1942.5	2004.0	2023.9	2021.5	2047.1	2063.7	2116.4
250.0	2148.3	1991.7	2192.7	2262.8	2200.9	2253.6	2508.9	2556.4	2558.2	2534.3	2672.7	2746.0	2834.9	2872.0	2866.1	2905.7	2910.8	2993.8
300.0	2888.8	2663.3	2927.8	3021.5	2942.3	3004.0	3342.9	3419.9	3403.7	3369.4	3553.2	3640.6	3759.8	3815.0	3805.1	3860.5	3852.3	3968.1
350.0	3698.1	3398.1	3729.8	3849.4	3751.1	3822.1	4251.9	4363.7	4324.6	4278.6	4511.7	4614.7	4766.4	4840.8	4826.3	4898.4	4876.2	5026.8
400.0	4569.	4187.	4591.	4738.	4619.	4700.	5227.	5375.	5312.	5253.	5539.	5659.	5845.	5939.	5920.	6009.	5972.	6160.
450.0	5493.	5024.	5504.	5681.	5539.	5630.	6260.	6445.	6357.	6285.	6626.	6764.	6987.	7102.	7076.	7185.	7133.	7358.
500.0	6465.	5905.	6463.	6671.	6505.	6607.	7344.	7568.	7454.	7367.	7766.	7925.	8186.	8321.	8290.	8417.	8349.	8614.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.30	15.87	17.14	17.46	18.11	19.03	19.58	20.29	20.72	21.13	21.56	22.01	22.46	22.87	23.41	23.61	25.30	25.84
3.0	17.24	17.91	19.17	19.48	20.15	21.19	21.81	22.65	23.13	23.60	24.08	24.57	25.11	25.56	26.13	26.32	28.13	28.70
3.5	19.13	19.89	21.15	21.44	22.12	23.27	23.96	24.92	25.44	25.97	26.49	27.02	27.64	28.12	28.72	28.91	30.84	31.44
4.0	20.98	21.83	23.09	23.37	24.06	25.32	26.06	27.13	27.69	28.28	28.84	29.40	30.11	30.62	31.25	31.42	33.47	34.10
4.5	22.82	23.75	25.01	25.28	25.97	27.34	28.14	29.31	29.91	30.55	31.15	31.75	32.52	33.07	33.73	33.90	36.05	36.72
5.0	24.66	25.67	26.93	27.18	27.88	29.35	30.21	31.47	32.11	32.80	33.44	34.07	34.92	35.49	36.18	36.34	38.61	39.31
5.5	26.50	27.59	28.85	29.09	29.80	31.36	32.27	33.63	34.30	35.04	35.72	36.38	37.29	37.90	38.62	38.78	41.16	41.89
6.0	28.34	29.52	30.77	31.01	31.71	33.37	34.34	35.79	36.49	37.28	37.99	38.68	39.67	40.30	41.05	41.21	43.70	44.46
6.5	30.20	31.46	32.71	32.93	33.64	35.39	36.42	37.96	38.69	39.53	40.28	41.00	42.04	42.71	43.49	43.64	46.25	47.03
7.0	32.07	33.42	34.67	34.88	35.59	37.43	38.51	40.14	40.90	41.78	42.57	43.32	44.43	45.12	45.93	46.07	48.80	49.61
8.0	35.88	37.39	38.64	38.81	39.52	41.55	42.74	44.54	45.36	46.33	47.19	47.99	49.23	49.98	50.85	50.99	53.94	54.81
9.0	39.76	41.44	42.68	42.83	43.54	45.76	47.06	49.01	49.89	50.95	51.88	52.74	54.10	54.90	55.84	55.96	59.15	60.08
10.0	43.73	45.58	46.82	46.94	47.64	50.04	51.44	53.57	54.50	55.65	56.65	57.56	59.04	59.90	60.91	61.02	64.44	65.44
11.0	47.79	49.82	51.06	51.15	51.84	54.42	55.93	58.22	59.20	60.44	61.51	62.48	64.07	64.99	66.06	66.16	69.83	70.88
12.0	51.95	54.16	55.39	55.45	56.12	58.90	60.51	62.96	64.00	65.32	66.46	67.49	69.20	70.16	71.31	71.40	75.31	76.43
15.0	65.03	67.77	68.99	68.96	69.58	72.92	74.87	77.79	78.98	80.56	81.92	83.11	85.16	86.29	87.67	87.73	92.39	93.70
20.0	88.81	92.53	93.71	93.51	93.99	98.32	100.85	104.56	105.99	108.02	109.75	111.21	113.86	115.24	117.04	117.03	123.05	124.68
25.0	115.06	119.84	120.98	120.57	120.88	126.26	129.38	133.91	135.58	138.07	140.19	141.93	145.18	146.81	149.09	149.01	156.47	158.46
30.0	143.72	149.64	150.71	150.09	150.17	156.66	160.43	165.79	167.69	170.66	173.19	175.22	179.10	180.96	183.77	183.61	192.64	195.00
35.0	174.70	181.85	182.84	181.99	181.80	189.47	193.91	200.13	202.26	205.73	208.70	211.02	215.55	217.65	221.02	220.78	231.46	234.21
40.0	207.9	216.4	217.3	216.2	215.7	224.6	229.7	236.9	239.2	243.2	246.6	249.3	254.5	256.8	260.8	260.5	272.9	276.0
45.0	243.4	253.2	254.0	252.6	251.8	262.0	267.9	275.9	278.5	283.0	286.9	289.9	295.8	298.3	303.0	302.6	316.8	320.4
50.0	281.0	292.2	292.9	291.3	290.0	301.6	308.3	317.2	320.1	325.1	329.6	332.8	339.5	342.2	347.6	347.0	363.3	367.3
55.0	320.6	333.4	334.0	332.0	330.4	343.4	350.8	360.8	363.9	369.5	374.4	378.0	385.4	388.4	394.5	393.8	412.1	416.6
60.0	362.3	376.7	377.1	374.8	372.7	387.2	395.5	406.4	409.8	416.0	421.5	425.4	433.6	436.8	443.6	442.8	463.2	468.2
65.0	406.0	422.1	422.3	419.7	417.1	433.1	442.3	454.2	457.8	464.6	470.7	475.0	483.9	487.3	495.0	494.1	516.7	522.1
70.0	451.6	469.4	469.5	466.5	463.4	481.0	491.1	504.1	507.9	515.3	521.9	526.6	536.4	540.0	548.5	547.5	572.4	578.3
80.0	548.4	569.9	569.7	565.9	561.7	582.7	594.6	609.7	614.1	622.8	630.6	636.1	647.5	651.5	661.9	660.5	690.3	697.3
90.0	652.6	678.0	677.4	672.7	667.2	691.8	705.7	723.1	728.0	738.1	747.2	753.4	766.7	771.1	783.4	781.7	816.5	824.7
100.0	763.7	793.3	792.3	786.7	779.8	808.2	824.2	843.9	849.4	860.8	871.3	878.3	893.5	898.3	912.6	910.6	950.9	960.3
150.0	1416.	1470.	1467.	1456.	1440.	1490.	1518.	1551.	1559.	1578.	1596.	1608.	1634.	1641.	1667.	1663.	1735.	1751.
200.0	2213.	2297.	2290.	2273.	2246.	2322.	2364.	2411.	2422.	2450.	2478.	2495.	2533.	2542.	2582.	2576.	2664.	2709.
250.0	3130.	3246.	3245.	3220.	3179.	3285.	3339.	3403.	3415.	3454.	3495.	3516.	3565.	3581.	3638.	3628.	3726.	3806.
300.0	4147.	4300.	4311.	4281.	4224.	4356.	4421.	4504.	4515.	4567.	4624.	4647.	4709.	4733.	4809.	4794.	4901.	5020.
350.0	5253.	5444.	5468.	5434.	5360.	5519.	5595.	5699.	5709.	5774.	5849.	5874.	5949.	5983.	6078.	6059.	6176.	6334.
400.0	6436.	6669.	6705.	6667.	6575.	6762.	6851.	6976.	6985.	7064.	7158.	7185.	7274.	7317.	7433.	7410.	7537.	7738.
450.0	7687.	7964.	8013.	7971.	7860.	8076.	8178.	8325.	8333.	8427.	8540.	8570.	8674.	8726.	8864.	8837.	8975.	9220.
500.0	8998.	9321.	9384.	9337.	9206.	9452.	9569.	9739.	9746.	9855.	9988.	10021.	10139.	10201.	10363.	10331.	10481.	10772.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{139}_{57}$LA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	120.6	101.6	79.5	75.7	76.6	68.6	59.1	56.3	54.5	53.0	49.6	46.5	44.1	42.7	42.2	40.6	36.3	37.8
3.0	117.7	102.2	79.7	76.1	77.1	69.5	60.1	57.4	55.7	54.4	51.0	47.9	45.6	44.2	43.6	42.1	38.1	39.3
3.5	114.3	101.5	79.2	75.6	76.7	69.6	60.4	57.8	56.2	55.0	51.6	48.6	46.3	44.9	44.4	42.9	39.2	40.1
4.0	110.7	99.9	78.2	74.8	75.9	69.2	60.1	57.7	56.2	55.1	51.8	48.8	46.6	45.3	44.8	43.3	39.8	40.6
4.5	107.1	98.0	77.0	73.6	74.9	68.5	59.7	57.3	55.9	54.9	51.6	48.7	46.6	45.3	44.9	43.4	40.2	40.7
5.0	103.6	96.9	75.6	72.4	73.7	67.6	59.0	56.8	55.4	54.6	51.3	48.5	46.4	45.2	44.7	43.3	40.3	40.7
5.5	100.3	93.7	74.2	71.1	72.4	66.6	58.2	56.1	54.8	54.0	50.8	48.1	46.0	44.9	44.5	43.1	40.3	40.6
6.0	97.1	91.5	72.7	69.7	71.1	65.6	57.4	55.3	54.1	53.4	50.3	47.6	45.6	44.5	44.1	42.8	40.1	40.3
6.5	94.2	89.3	71.3	68.4	69.7	64.5	56.5	54.6	53.4	52.8	49.7	47.1	45.1	44.1	43.7	42.4	39.9	40.0
7.0	91.4	87.2	69.9	67.1	68.4	63.4	55.6	53.8	52.6	52.1	49.1	46.5	44.6	43.6	43.2	42.0	39.6	39.6
8.0	86.26	83.19	67.20	64.52	65.90	61.31	53.88	52.13	51.10	50.67	47.73	45.29	43.53	42.56	42.25	41.08	38.98	38.83
9.0	81.73	79.49	64.66	62.13	63.51	59.27	52.17	50.54	49.59	49.24	46.41	44.07	42.40	41.51	41.23	40.12	38.23	37.98
10.0	77.70	76.10	62.31	59.90	61.28	57.34	50.53	49.01	48.13	47.84	45.11	42.88	41.29	40.46	40.20	39.15	37.43	37.10
11.0	74.08	73.00	60.12	57.82	59.19	55.52	48.99	47.56	46.74	46.51	43.86	41.72	40.20	39.43	39.19	38.20	36.63	36.24
12.0	70.82	70.16	58.09	55.90	57.25	53.81	47.53	46.18	45.42	45.23	42.67	40.61	39.16	38.43	38.22	37.28	35.84	35.39
15.0	62.74	62.92	52.82	50.88	52.18	49.29	43.65	42.50	41.86	41.77	39.44	37.60	36.30	35.70	35.54	34.72	33.58	33.04
20.0	53.08	53.98	46.09	44.45	45.66	43.39	38.54	37.61	37.12	37.12	35.08	33.50	32.40	31.94	31.83	31.16	30.33	29.74
25.0	46.30	47.52	41.08	39.66	40.77	38.91	34.63	33.85	33.45	33.51	31.69	30.30	29.34	28.98	28.90	28.34	27.69	27.09
30.0	41.24	42.64	37.19	35.93	36.97	35.40	31.55	30.88	30.55	30.63	28.98	27.74	26.88	26.59	26.54	26.05	25.52	24.94
35.0	37.32	38.79	34.09	32.95	33.92	32.56	29.05	28.46	28.18	28.29	26.77	25.64	24.86	24.62	24.59	24.16	23.71	23.16
40.0	34.18	35.68	31.54	30.49	31.41	30.21	26.99	26.46	26.21	26.33	24.93	23.89	23.17	22.97	22.95	22.57	22.18	21.66
45.0	31.60	33.11	29.40	28.44	29.30	28.24	25.24	24.76	24.55	24.67	23.36	22.41	21.74	21.57	21.56	21.21	20.87	20.38
50.0	29.44	30.95	27.59	26.69	27.51	26.55	23.75	23.31	23.12	23.25	22.02	21.13	20.50	20.36	20.35	20.04	19.74	19.27
55.0	27.60	29.10	26.02	25.19	25.96	25.09	22.46	22.05	21.88	22.01	20.85	20.01	19.43	19.30	19.30	19.01	18.74	18.30
60.0	26.02	27.50	24.66	23.87	24.61	23.81	21.32	20.95	20.79	20.93	19.83	19.04	18.48	18.37	18.38	18.11	17.86	17.44
65.0	24.64	26.10	23.46	22.71	23.42	22.68	20.32	19.97	19.83	19.96	18.92	18.17	17.64	17.54	17.55	17.30	17.07	16.68
70.0	23.43	24.86	22.39	21.69	22.36	21.67	19.43	19.10	18.97	19.10	18.11	17.39	16.89	16.81	16.82	16.58	16.37	15.99
80.0	21.39	22.77	20.58	19.94	20.56	19.96	17.90	17.61	17.50	17.63	16.72	16.06	15.60	15.54	15.55	15.35	15.15	14.82
90.0	19.74	21.07	19.09	18.50	19.09	18.55	16.65	16.38	16.28	16.42	15.57	14.97	14.54	14.49	14.50	14.32	14.14	13.84
100.0	18.37	19.66	17.85	17.30	17.85	17.36	15.59	15.35	15.26	15.40	14.60	14.04	13.64	13.60	13.62	13.45	13.29	13.01
150.0	13.98	15.08	13.78	13.37	13.79	13.46	12.11	11.94	11.89	12.01	11.39	10.97	10.66	10.64	10.66	10.55	10.42	10.24
200.0	11.58	12.68	11.59	11.23	11.51	11.33	10.18	10.00	10.03	10.15	9.62	9.48	9.16	8.97	9.01	8.89	8.98	8.66
250.0	10.17	11.17	10.23	9.91	10.14	10.01	9.00	8.74	8.88	8.99	8.52	8.39	8.12	7.96	7.99	7.85	7.97	7.69
300.0	9.20	10.13	9.28	8.99	9.20	9.09	8.18	7.87	8.07	8.17	7.75	7.63	7.38	7.24	7.27	7.16	7.26	7.01
350.0	8.49	9.36	8.58	8.31	8.51	8.41	7.57	7.30	7.48	7.58	7.19	7.07	6.84	6.72	6.75	6.64	6.73	6.51
400.0	7.954	8.779	8.047	7.795	7.984	7.896	7.110	6.858	7.023	7.116	6.752	6.640	6.427	6.313	6.343	6.243	6.327	6.123
450.0	7.530	8.319	7.627	7.387	7.569	7.488	6.744	6.511	6.664	6.753	6.410	6.300	6.100	5.995	6.024	5.930	6.009	5.817
500.0	7.190	7.949	7.289	7.069	7.235	7.159	6.448	6.232	6.374	6.461	6.133	6.026	5.836	5.738	5.766	5.677	5.752	5.569

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	35.32	33.67	33.72	33.95	33.64	31.71	30.72	29.00	28.37	27.63	27.09	26.64	25.68	25.35	25.07	25.13	24.09	23.81
3.0	36.81	35.12	35.16	35.40	35.14	33.20	32.21	30.51	29.90	29.15	28.61	28.16	27.20	26.85	26.54	26.61	25.48	25.18
3.5	37.88	35.98	36.01	36.26	36.04	34.13	33.13	31.48	30.89	30.15	29.61	29.16	28.21	27.85	27.52	27.59	26.40	26.09
4.0	38.15	36.45	36.48	36.73	36.56	34.67	33.69	32.08	31.52	30.79	30.24	29.81	28.88	28.50	28.17	28.23	27.00	26.69
4.5	38.36	36.67	36.69	36.94	36.80	34.96	33.98	32.43	31.89	31.17	30.64	30.21	29.30	28.92	28.58	28.64	27.38	27.06
5.0	38.37	36.70	36.72	36.97	36.87	35.06	34.10	32.60	32.08	31.37	30.85	30.43	29.54	29.17	28.81	28.88	27.60	27.28
5.5	38.26	36.61	36.63	36.88	36.80	35.03	34.09	32.63	32.14	31.45	30.93	30.52	29.66	29.29	28.93	28.99	27.70	27.38
6.0	38.06	36.43	36.45	36.69	36.64	34.91	33.99	32.58	32.10	31.43	30.92	30.52	29.68	29.32	28.95	29.01	27.72	27.40
6.5	37.79	36.18	36.20	36.45	36.42	34.73	33.82	32.45	32.00	31.34	30.84	30.45	29.63	29.27	28.90	28.96	27.67	27.35
7.0	37.47	35.89	35.91	36.15	36.14	34.49	33.60	32.27	31.84	31.19	30.70	30.32	29.53	29.17	28.80	28.86	27.57	27.26
8.0	36.75	35.21	35.24	35.48	35.50	33.92	33.07	31.82	31.41	30.80	30.32	29.96	29.21	28.87	28.49	28.55	27.27	26.96
9.0	35.97	34.48	34.51	34.74	34.80	33.28	32.46	31.28	30.90	30.31	29.86	29.51	28.79	28.47	28.09	28.15	26.89	26.59
10.0	35.17	33.73	33.75	33.99	34.06	32.61	31.82	30.70	30.34	29.78	29.34	29.01	28.32	28.02	27.64	27.70	26.46	26.16
11.0	34.37	32.97	33.00	33.23	33.32	31.92	31.16	30.10	29.77	29.23	28.80	28.49	27.83	27.54	27.16	27.22	26.00	25.71
12.0	33.59	32.23	32.26	32.49	32.60	31.25	30.51	29.50	29.19	28.67	28.26	27.96	27.33	27.05	26.67	26.73	25.54	25.26
15.0	31.40	30.15	30.19	30.40	30.54	29.32	28.66	27.77	27.50	27.04	26.67	26.40	25.84	25.59	25.23	25.28	24.16	23.90
20.0	28.31	27.20	27.25	27.44	27.61	26.56	25.98	25.24	25.03	24.63	24.31	24.08	23.60	23.41	23.06	23.11	22.10	21.87
25.0	25.82	24.83	24.87	25.05	25.24	24.30	23.79	23.15	22.98	22.63	22.34	22.15	21.73	21.57	21.24	21.29	20.37	20.16
30.0	23.79	22.88	22.93	23.10	23.29	22.44	21.99	21.42	21.27	20.97	20.71	20.53	20.16	20.03	19.72	19.76	18.92	18.73
35.0	22.10	21.27	21.32	21.48	21.67	20.90	20.48	19.97	19.84	19.57	19.33	19.17	18.83	18.72	18.43	18.47	17.69	17.51
40.0	20.68	19.91	19.96	20.11	20.29	19.58	19.20	18.74	18.62	18.37	18.15	18.01	17.70	17.60	17.33	17.37	16.63	16.47
45.0	19.47	18.74	18.79	18.93	19.12	18.45	18.10	17.68	17.57	17.34	17.14	17.01	16.72	16.63	16.37	16.41	15.72	15.57
50.0	18.41	17.73	17.78	17.91	18.09	17.47	17.14	16.76	16.66	16.44	16.25	16.13	15.86	15.79	15.54	15.58	14.93	14.79
55.0	17.49	16.84	16.89	17.02	17.20	16.61	16.30	15.94	15.86	15.65	15.47	15.36	15.11	15.04	14.80	14.84	14.22	14.09
60.0	16.67	16.05	16.11	16.23	16.41	15.85	15.56	15.22	15.14	14.95	14.78	14.67	14.44	14.38	14.15	14.19	13.60	13.47
65.0	15.94	15.36	15.41	15.53	15.70	15.17	14.89	14.58	14.50	14.32	14.16	14.06	13.84	13.79	13.57	13.60	13.04	12.92
70.0	15.29	14.73	14.78	14.90	15.06	14.56	14.30	14.00	13.93	13.76	13.61	13.51	13.30	13.25	13.04	13.07	12.53	12.42
80.0	14.17	13.65	13.70	13.81	13.97	13.51	13.27	13.00	12.94	12.78	12.64	12.55	12.36	12.32	12.12	12.16	11.66	11.56
90.0	13.24	12.75	12.80	12.90	13.06	12.63	12.41	12.16	12.11	11.97	11.84	11.76	11.58	11.54	11.36	11.39	10.93	10.83
100.0	12.45	11.99	12.04	12.13	12.28	11.89	11.68	11.45	11.40	11.28	11.15	11.08	10.92	10.88	10.71	10.74	10.30	10.21
150.0	9.796	9.442	9.480	9.556	9.687	9.360	9.225	9.063	9.029	8.935	8.840	8.785	8.664	8.640	8.505	8.529	8.186	8.118
200.0	8.291	8.006	8.004	8.069	8.186	7.931	7.804	7.677	7.651	7.576	7.497	7.451	7.354	7.332	7.220	7.242	7.146	6.913
250.0	7.366	7.114	7.035	7.092	7.200	6.995	6.925	6.803	6.807	6.730	6.630	6.619	6.545	6.497	6.393	6.415	6.370	6.167
300.0	6.716	6.487	6.416	6.437	6.533	6.384	6.320	6.211	6.216	6.147	6.057	6.046	5.981	5.938	5.844	5.864	5.821	5.640
350.0	6.236	6.022	5.958	5.979	6.068	5.931	5.871	5.772	5.777	5.714	5.631	5.621	5.562	5.523	5.436	5.454	5.413	5.248
400.0	5.865	5.665	5.607	5.626	5.711	5.582	5.526	5.434	5.439	5.380	5.304	5.294	5.239	5.203	5.122	5.139	5.099	4.946
450.0	5.572	5.383	5.329	5.347	5.428	5.306	5.253	5.167	5.172	5.116	5.044	5.035	4.984	4.950	4.874	4.889	4.850	4.707
500.0	5.336	5.155	5.106	5.122	5.200	5.084	5.032	4.951	4.956	4.903	4.835	4.825	4.778	4.746	4.673	4.687	4.648	4.513

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

139 LA IONS 57

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.810	5.560	7.850	7.830	7.690	9.159	9.910	10.433	10.820	11.230	11.480	12.270	12.680	13.233	13.450	13.674	14.086	14.450
3.0	6.393	6.241	8.722	8.745	8.594	10.164	11.075	11.654	12.080	12.523	12.859	13.740	14.227	14.831	15.067	15.353	15.961	16.251
3.5	6.992	6.923	9.596	9.660	9.497	11.163	12.228	12.860	13.322	13.793	14.213	15.179	15.739	16.389	16.644	16.988	17.748	18.000
4.0	7.610	7.613	10.479	10.584	10.407	12.164	13.381	14.063	14.559	15.054	15.556	16.605	17.235	17.929	18.201	18.600	19.506	19.721
4.5	8.248	8.315	11.375	11.521	11.328	13.173	14.541	15.272	15.799	16.316	16.900	18.030	18.726	19.463	19.751	20.202	21.242	21.430
5.0	8.908	9.032	12.286	12.473	12.264	14.194	15.712	16.490	17.048	17.585	18.250	19.459	20.221	20.999	21.302	21.805	22.969	23.135
5.5	9.590	9.765	13.214	13.442	13.216	15.230	16.898	17.722	18.310	18.865	19.611	20.899	21.725	22.543	22.860	23.413	24.693	24.845
6.0	10.295	10.516	14.160	14.429	14.185	16.281	18.100	18.969	19.586	20.158	20.985	22.352	23.241	24.098	24.429	25.031	26.421	26.564
6.5	11.021	11.286	15.125	15.435	15.172	17.350	19.320	20.234	20.879	21.466	22.375	23.820	24.772	25.667	26.012	26.663	28.157	28.294
7.0	11.771	12.072	16.110	16.462	16.178	18.436	20.560	21.517	22.191	22.792	23.783	25.306	26.321	27.253	27.610	28.309	29.904	30.039
8.0	13.34	13.70	18.14	18.58	18.25	20.66	23.10	24.14	24.87	25.50	26.66	28.34	29.47	30.48	30.86	31.66	33.44	33.58
9.0	14.99	15.41	20.25	20.77	20.40	22.97	25.72	26.85	27.63	28.28	29.61	31.45	32.71	33.79	34.19	35.08	37.04	37.20
10.0	16.74	17.20	22.44	23.05	22.63	25.36	28.43	29.64	30.48	31.14	32.65	34.64	36.03	37.18	37.61	38.59	40.71	40.90
11.0	18.57	19.07	24.71	25.41	24.93	27.82	31.22	32.52	33.41	34.09	35.77	37.93	39.44	40.66	41.11	42.18	44.47	44.69
12.0	20.49	21.01	27.06	27.86	27.32	30.36	34.10	35.49	36.42	37.12	38.98	41.31	42.95	44.23	44.70	45.86	48.30	48.58
15.0	26.76	27.30	34.60	35.69	34.96	38.47	43.27	44.91	46.00	46.72	49.16	51.99	54.01	55.50	56.02	57.46	60.33	60.78
20.0	38.85	39.27	48.73	50.34	49.24	53.53	60.25	62.33	63.67	64.41	67.88	71.61	74.32	76.11	76.72	78.62	82.14	82.98
25.0	52.91	53.02	64.73	66.93	65.38	70.48	79.31	81.85	83.42	84.14	88.76	93.45	96.89	98.99	99.66	102.04	106.15	107.50
30.0	68.85	68.49	82.54	85.37	83.31	89.23	100.37	103.37	105.19	105.86	111.72	117.45	121.67	124.06	124.79	127.65	132.32	134.27
35.0	86.59	85.60	102.08	105.59	102.96	109.72	123.35	126.84	128.90	129.50	136.69	143.54	148.59	151.25	152.02	155.39	160.60	163.21
40.0	106.1	104.3	123.3	127.5	124.3	131.9	148.2	152.2	154.5	155.0	163.6	171.6	177.6	180.5	181.3	185.2	190.9	194.3
45.0	127.2	124.5	146.1	151.2	147.2	155.7	174.8	179.4	181.9	182.3	192.4	201.7	208.6	211.7	212.6	217.0	223.2	227.4
50.0	150.0	146.3	170.6	176.4	171.7	181.1	203.2	208.3	211.1	211.3	223.1	233.7	241.5	244.9	245.8	250.7	257.5	262.4
55.0	174.4	169.4	196.5	203.2	197.7	208.1	233.3	239.0	242.0	242.0	255.5	267.5	276.3	280.0	280.9	286.3	293.7	299.5
60.0	200.4	194.0	224.0	231.6	225.2	236.5	265.1	271.3	274.6	274.4	289.7	303.1	313.0	316.9	317.8	323.8	331.7	338.4
65.0	227.8	220.0	252.9	261.4	254.2	266.4	298.5	305.3	308.9	308.5	325.6	340.5	351.5	355.7	356.5	363.1	371.5	379.2
70.0	256.8	247.3	283.2	292.8	284.6	297.8	333.5	340.9	344.7	344.1	363.2	379.6	391.8	396.1	396.9	404.1	413.1	421.7
80.0	319.0	305.8	348.1	359.7	349.5	364.7	408.1	416.8	421.1	419.9	443.2	462.8	477.5	482.3	483.0	491.3	501.4	512.1
90.0	386.7	369.3	418.3	432.1	419.7	437.0	488.7	498.7	503.5	501.6	529.4	552.6	569.9	575.0	575.6	585.2	596.4	609.3
100.0	459.7	437.7	493.6	509.9	495.1	514.5	575.0	586.5	591.7	589.1	621.7	648.5	668.7	674.1	674.6	685.4	697.9	712.9
150.0	899.0	846.3	942.0	972.1	943.2	974.3	1086.4	1105.7	1113.4	1105.9	1166.4	1214.5	1251.3	1258.0	1257.5	1274.9	1294.5	1321.4
200.0	1448.7	1352.5	1495.8	1543.5	1498.1	1541.2	1716.7	1745.5	1754.3	1739.8	1834.8	1894.3	1954.4	1973.8	1971.6	1996.6	2012.9	2064.2
250.0	2091.6	1938.6	2136.3	2204.6	2144.3	2196.0	2444.8	2491.2	2493.1	2469.8	2604.8	2676.4	2763.0	2799.3	2793.6	2832.3	2837.3	2918.3
300.0	2811.7	2593.6	2851.4	2942.8	2865.7	2926.1	3256.4	3331.5	3315.8	3282.4	3461.6	3546.8	3663.0	3716.9	3707.3	3761.3	3753.5	3866.3
350.0	3599.1	3308.4	3631.6	3748.2	3652.4	3722.0	4140.6	4249.6	4211.6	4166.9	4394.0	4494.5	4642.3	4714.9	4700.8	4771.1	4749.6	4896.4
400.0	4446.	4076.	4469.	4613.	4497.	4576.	5089.	5233.	5172.	5115.	5393.	5510.	5692.	5783.	5764.	5852.	5816.	5998.
450.0	5345.	4890.	5367.	5529.	5391.	5480.	6093.	6274.	6189.	6118.	6450.	6585.	6802.	6914.	6890.	6995.	6944.	7164.
500.0	6290.	5747.	6290.	6492.	6331.	6430.	7148.	7366.	7256.	7171.	7559.	7714.	7968.	8100.	8081.	8194.	8127.	8386.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.17	15.74	16.99	17.32	17.96	18.88	19.43	20.14	20.56	20.97	21.39	21.84	22.28	22.69	23.22	23.41	25.09	25.63
3.0	17.09	17.76	19.01	19.32	19.98	21.02	21.64	22.47	22.94	23.41	23.88	24.37	24.91	25.35	25.91	26.09	27.89	28.46
3.5	18.96	19.71	20.96	21.26	21.93	23.08	23.76	24.71	25.22	25.75	26.27	26.79	27.41	27.89	28.48	28.66	30.57	31.17
4.0	20.79	21.63	22.88	23.16	23.85	25.10	25.84	26.89	27.45	28.03	28.59	29.15	29.85	30.35	30.97	31.14	33.17	33.80
4.5	22.61	23.53	24.78	25.05	25.74	27.09	27.89	29.05	29.64	30.28	30.87	31.46	32.23	32.77	33.42	33.59	35.73	36.39
5.0	24.42	25.42	26.67	26.93	27.63	29.08	29.93	31.18	31.81	32.50	33.13	33.75	34.60	35.16	35.84	36.00	38.25	38.94
5.5	26.23	27.32	28.56	28.81	29.51	31.06	31.97	33.32	33.98	34.71	35.38	36.03	36.94	37.54	38.25	38.40	40.77	41.49
6.0	28.05	29.22	30.47	30.70	31.40	33.05	34.01	35.45	36.14	36.92	37.62	38.31	39.28	39.91	40.65	40.80	43.27	44.02
6.5	29.88	31.13	32.38	32.60	33.31	35.04	36.06	37.58	38.31	39.13	39.87	40.59	41.63	42.28	43.05	43.20	45.78	46.56
7.0	31.73	33.06	34.31	34.51	35.22	37.05	38.12	39.73	40.48	41.36	42.13	42.88	43.98	44.66	45.46	45.60	48.30	49.11
8.0	35.48	36.97	38.21	38.39	39.10	41.11	42.29	44.07	44.88	45.84	46.69	47.49	48.71	49.45	50.31	50.44	53.36	54.23
9.0	39.30	40.96	42.20	42.35	43.06	45.25	46.53	48.47	49.34	50.39	51.31	52.16	53.50	54.30	55.22	55.34	58.50	59.42
10.0	43.21	45.04	46.27	46.40	47.09	49.47	50.86	52.96	53.88	55.01	56.00	56.91	58.37	59.22	60.21	60.32	63.71	64.69
11.0	47.20	49.20	50.44	50.53	51.22	53.78	55.27	57.53	58.50	59.72	60.78	61.74	63.32	64.22	65.28	65.38	69.01	70.05
12.0	51.29	53.47	54.70	54.76	55.44	58.18	59.78	62.20	63.22	64.53	65.65	66.67	68.36	69.32	70.45	70.54	74.40	75.51
15.0	64.14	66.85	68.06	68.04	68.66	71.96	73.89	76.77	77.94	79.51	80.85	82.02	84.05	85.17	86.52	86.58	91.19	92.48
20.0	87.48	91.15	92.33	92.13	92.62	96.90	99.39	103.05	104.46	106.46	108.17	109.61	112.22	113.59	115.36	115.36	121.29	122.91
25.0	113.22	117.93	119.06	118.67	118.98	124.29	127.37	131.84	133.48	135.93	138.02	139.74	142.94	144.55	146.79	146.71	154.08	156.04
30.0	141.29	147.12	148.19	147.59	147.68	154.08	157.79	163.07	164.94	167.86	170.36	172.36	176.18	178.02	180.78	180.62	189.51	191.84
35.0	171.62	178.65	179.65	178.82	178.65	186.20	190.67	196.69	198.79	202.20	205.13	207.42	211.88	213.94	217.26	217.02	227.54	230.25
40.0	204.2	212.5	213.4	212.3	211.8	220.6	225.6	232.6	235.0	238.9	242.3	244.8	250.0	252.3	256.2	255.8	268.1	271.2
45.0	238.8	248.5	249.3	247.9	247.1	257.2	262.9	270.8	273.4	277.8	281.7	284.6	290.4	292.9	297.5	297.0	311.1	314.6
50.0	275.5	286.6	287.3	285.7	284.5	295.9	302.4	311.2	314.0	319.0	323.3	326.6	333.1	335.8	341.0	340.5	356.5	360.4
55.0	314.3	326.9	327.4	325.5	323.9	336.7	344.0	353.8	356.8	362.3	367.2	370.7	378.0	380.9	386.9	386.2	404.2	408.6
60.0	355.0	369.1	369.6	367.3	365.3	379.5	387.7	398.4	401.7	407.8	413.2	417.0	425.1	428.2	434.9	434.2	454.2	459.1
65.0	397.7	413.4	413.7	411.1	408.6	424.4	433.3	445.1	448.6	455.3	461.2	465.4	474.2	477.6	485.1	484.2	506.4	511.7
70.0	442.2	459.6	459.8	456.8	453.8	471.1	481.0	493.7	497.5	504.8	511.3	515.9	525.5	529.0	537.4	536.3	560.8	566.6
80.0	536.7	557.8	557.6	553.9	549.8	570.3	582.0	596.9	601.2	609.7	617.4	622.7	634.0	637.9	648.0	646.7	675.8	682.8
90.0	638.3	663.2	662.6	658.1	652.8	676.8	690.4	707.5	712.3	722.2	731.1	737.2	750.2	754.5	766.6	764.9	799.1	807.1
100.0	746.7	775.7	774.7	769.3	762.6	790.4	806.0	825.3	830.7	841.9	852.1	859.1	873.9	878.6	892.7	890.7	930.2	939.3
150.0	1383.	1436.	1432.	1421.	1406.	1455.	1482.	1514.	1522.	1541.	1559.	1570.	1596.	1602.	1628.	1624.	1694.	1710.
200.0	2159.	2240.	2234.	2217.	2191.	2265.	2306.	2352.	2363.	2390.	2417.	2434.	2471.	2480.	2520.	2513.	2600.	2643.
250.0	3061.	3164.	3163.	3139.	3099.	3202.	3255.	3318.	3329.	3368.	3407.	3428.	3476.	3492.	3547.	3537.	3633.	3711.
300.0	4041.	4189.	4200.	4171.	4116.	4245.	4308.	4389.	4400.	4450.	4506.	4529.	4589.	4613.	4686.	4672.	4777.	4892.
350.0	5117.	5303.	5326.	5293.	5221.	5376.	5450.	5551.	5562.	5625.	5698.	5723.	5796.	5828.	5921.	5903.	6017.	6171.
400.0	6267.	6494.	6530.	6493.	6403.	6585.	6672.	6794.	6803.	6880.	6971.	6998.	7085.	7126.	7239.	7217.	7341.	7537.
450.0	7484.	7754.	7802.	7761.	7653.	7863.	7963.	8106.	8114.	8206.	8316.	8345.	8446.	8497.	8632.	8605.	8740.	8979.
500.0	8759.	9074.	9136.	9090.	8962.	9202.	9316.	9482.	9488.	9594.	9724.	9756.	9871.	9931.	10089.	10058.	10204.	10488.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{140}_{58}$CE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	123.3	103.4	81.0	77.2	78.0	69.8	60.1	57.3	55.4	53.9	50.5	47.3	44.9	43.5	42.9	41.3	36.9	38.4
3.0	120.5	104.2	81.3	77.6	78.6	70.8	61.2	58.5	56.7	55.4	51.9	48.8	46.4	45.0	44.4	42.8	38.8	40.0
3.5	117.0	103.5	80.8	77.2	78.3	71.0	61.5	58.9	57.2	56.1	52.6	49.5	47.2	45.8	45.3	43.7	39.9	40.9
4.0	113.4	102.0	79.8	76.3	77.5	70.6	61.4	58.8	57.3	56.2	52.8	49.8	47.5	46.1	45.7	44.1	40.6	41.4
4.5	109.7	100.1	78.6	75.2	76.5	69.9	60.9	58.5	57.0	56.1	52.7	49.7	47.5	46.2	45.7	44.3	41.0	41.5
5.0	106.2	98.0	77.3	74.0	75.3	69.0	60.2	57.9	56.5	55.7	52.4	49.5	47.3	46.1	45.6	44.2	41.1	41.5
5.5	102.8	96.8	75.8	72.6	74.0	68.1	59.5	57.3	56.0	55.2	51.9	49.1	47.0	45.8	45.4	44.0	41.1	41.4
6.0	99.6	93.6	74.4	71.3	72.7	67.0	58.6	56.5	55.3	54.6	51.4	48.6	46.6	45.4	45.0	43.7	41.0	41.2
6.5	96.6	91.4	72.9	69.9	71.3	66.0	57.8	55.8	54.6	53.9	50.8	48.1	46.1	45.0	44.6	43.3	40.8	40.9
7.0	93.8	89.3	71.5	68.6	70.0	64.9	56.9	55.0	53.8	53.3	50.1	47.5	45.6	44.5	44.2	42.9	40.5	40.5
8.0	88.60	85.27	68.80	66.05	67.46	62.74	55.12	53.33	52.27	51.82	48.82	46.31	44.51	43.52	43.20	42.00	39.85	39.70
9.0	83.98	81.53	66.24	63.63	65.04	60.68	53.40	51.73	50.75	50.39	47.49	45.09	43.38	42.46	42.17	41.04	39.10	38.84
10.0	79.87	78.09	63.85	61.38	62.78	58.72	51.75	50.19	49.28	48.98	46.18	43.89	42.26	41.40	41.14	40.07	38.31	37.97
11.0	76.17	74.93	61.63	59.27	60.67	56.88	50.18	48.72	47.87	47.63	44.92	42.72	41.17	40.37	40.13	39.11	37.50	37.09
12.0	72.84	72.04	59.57	57.32	58.70	55.15	48.71	47.32	46.54	46.34	43.72	41.60	40.11	39.36	39.14	38.18	36.70	36.24
15.0	64.58	64.67	54.21	52.22	53.55	50.57	44.77	43.59	42.93	42.84	40.45	38.55	37.22	36.60	36.43	35.59	34.42	33.86
20.0	54.68	55.54	47.36	45.67	46.91	44.56	39.57	38.62	38.11	38.11	36.02	34.39	33.26	32.79	32.68	31.99	31.13	30.52
25.0	47.72	48.93	42.24	40.78	41.92	40.00	35.59	34.79	34.38	34.44	32.57	31.14	30.14	29.77	29.69	29.11	28.44	27.83
30.0	42.53	43.92	38.28	36.97	38.04	36.41	32.45	31.76	31.42	31.50	29.80	28.53	27.64	27.33	27.28	26.78	26.23	25.64
35.0	38.50	39.98	35.10	33.92	34.92	33.51	29.90	29.29	29.00	29.11	27.55	26.38	25.57	25.33	25.29	24.85	24.39	23.82
40.0	35.27	36.79	32.48	31.41	32.35	31.11	27.79	27.24	26.99	27.11	25.66	24.59	23.85	23.64	23.62	23.22	22.83	22.29
45.0	32.62	34.15	30.30	29.31	30.19	29.09	26.00	25.51	25.28	25.41	24.06	23.07	22.38	22.21	22.20	21.84	21.49	20.98
50.0	30.40	31.93	28.44	27.52	28.36	27.36	24.47	24.02	23.82	23.95	22.69	21.77	21.12	20.97	20.96	20.64	20.33	19.85
55.0	28.51	30.03	26.83	25.97	26.77	25.86	23.15	22.73	22.55	22.69	21.49	20.63	20.02	19.89	19.89	19.59	19.31	18.85
60.0	26.88	28.38	25.43	24.62	25.38	24.55	21.99	21.60	21.44	21.57	20.44	19.62	19.05	18.94	18.94	18.66	18.41	17.98
65.0	25.46	26.94	24.20	23.43	24.16	23.39	20.96	20.59	20.45	20.59	19.51	18.73	18.19	18.09	18.10	17.84	17.60	17.19
70.0	24.20	25.66	23.10	22.38	23.07	22.36	20.04	19.70	19.57	19.70	18.68	17.94	17.42	17.33	17.34	17.10	16.88	16.49
80.0	22.10	23.51	21.24	20.58	21.22	20.60	18.48	18.17	18.06	18.19	17.25	16.58	16.10	16.03	16.04	15.83	15.63	15.28
90.0	20.40	21.76	19.71	19.10	19.71	19.15	17.19	16.91	16.81	16.95	16.07	15.45	15.00	14.95	14.97	14.78	14.60	14.28
100.0	18.99	20.31	18.43	17.87	18.43	17.93	16.10	15.85	15.76	15.90	15.08	14.50	14.08	14.04	14.06	13.89	13.72	13.43
150.0	14.46	15.59	14.25	13.82	14.25	13.91	12.52	12.34	12.28	12.41	11.78	11.33	11.02	11.00	11.02	10.90	10.77	10.58
200.0	11.98	13.11	11.99	11.61	11.91	11.72	10.53	10.34	10.38	10.50	9.95	9.80	9.47	9.28	9.31	9.19	9.28	8.96
250.0	10.52	11.56	10.58	10.25	10.49	10.36	9.31	9.05	9.18	9.30	8.82	8.68	8.39	8.23	8.26	8.12	8.24	7.96
300.0	9.52	10.48	9.60	9.30	9.52	9.41	8.47	8.15	8.35	8.46	8.02	7.90	7.64	7.49	7.53	7.40	7.51	7.26
350.0	8.79	9.69	8.88	8.60	8.81	8.71	7.84	7.55	7.74	7.84	7.44	7.32	7.08	6.95	6.98	6.87	6.96	6.74
400.0	8.233	9.084	8.328	8.067	8.263	8.172	7.358	7.098	7.268	7.364	6.988	6.872	6.651	6.533	6.565	6.461	6.548	6.337
450.0	7.795	8.609	7.894	7.646	7.834	7.750	6.980	6.739	6.897	6.990	6.634	6.521	6.313	6.204	6.235	6.137	6.219	6.020
500.0	7.443	8.227	7.545	7.307	7.489	7.410	6.675	6.451	6.598	6.688	6.349	6.238	6.040	5.939	5.969	5.876	5.954	5.765

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	35.93	34.25	34.29	34.53	34.21	32.24	31.24	29.49	28.85	28.09	27.55	27.09	26.11	25.77	25.49	25.56	24.49	24.21
3.0	37.46	35.75	35.78	36.03	35.76	33.79	32.78	31.05	30.43	29.67	29.12	28.66	27.68	27.32	27.01	27.08	25.92	25.62
3.5	38.38	36.65	36.67	36.93	36.71	34.76	33.74	32.06	31.46	30.70	30.15	29.69	28.73	28.36	28.03	28.09	26.88	26.57
4.0	38.88	37.15	37.18	37.43	37.25	35.33	34.33	32.69	32.12	31.37	30.82	30.37	29.42	29.04	28.70	28.77	27.51	27.19
4.5	39.11	37.39	37.41	37.67	37.52	35.64	34.65	33.06	32.51	31.78	31.23	30.79	29.87	29.48	29.13	29.20	27.91	27.59
5.0	39.15	37.44	37.46	37.72	37.61	35.76	34.78	33.25	32.72	32.00	31.46	31.03	30.13	29.75	29.39	29.45	28.15	27.82
5.5	39.05	37.36	37.38	37.63	37.55	35.75	34.79	33.30	32.79	32.09	31.56	31.14	30.26	29.88	29.51	29.58	28.26	27.94
6.0	38.85	37.19	37.21	37.46	37.41	35.64	34.70	33.25	32.77	32.08	31.56	31.15	30.29	29.92	29.55	29.61	28.29	27.96
6.5	38.59	36.95	36.97	37.22	37.19	35.46	34.54	33.14	32.67	32.00	31.49	31.09	30.25	29.89	29.51	29.57	28.25	27.92
7.0	38.28	36.66	36.68	36.93	36.92	35.23	34.32	32.97	32.52	31.86	31.36	30.97	30.16	29.79	29.41	29.48	28.16	27.83
8.0	37.57	36.00	36.02	36.26	36.29	34.67	33.80	32.52	32.10	31.47	30.99	30.62	29.85	29.50	29.11	29.18	27.87	27.55
9.0	36.79	35.26	35.29	35.53	35.58	34.03	33.19	31.98	31.59	30.99	30.53	30.17	29.44	29.11	28.72	28.78	27.49	27.18
10.0	35.99	34.51	34.53	34.77	34.85	33.36	32.55	31.40	31.04	30.46	30.01	29.68	28.97	28.66	28.27	28.33	27.06	26.76
11.0	35.19	33.75	33.78	34.01	34.11	32.67	31.89	30.80	30.46	29.91	29.48	29.15	28.48	28.18	27.79	27.85	26.61	26.31
12.0	34.40	33.01	33.03	33.26	33.37	31.99	31.24	30.20	29.88	29.35	28.93	28.62	27.97	27.69	27.30	27.36	26.14	25.85
15.0	32.19	30.90	30.94	31.16	31.30	30.05	29.37	28.45	28.18	27.71	27.33	27.05	26.47	26.22	25.85	25.90	24.76	24.49
20.0	29.05	27.92	27.96	28.16	28.33	27.25	26.66	25.89	25.68	25.27	24.94	24.71	24.21	24.01	23.66	23.71	22.67	22.43
25.0	26.52	25.50	25.55	25.73	25.92	24.96	24.43	23.78	23.59	23.24	22.95	22.74	22.31	22.15	21.81	21.86	20.91	20.70
30.0	24.46	23.52	23.57	23.75	23.94	23.07	22.60	22.02	21.86	21.65	21.28	21.10	20.72	20.58	20.26	20.31	19.44	19.24
35.0	22.74	21.88	21.93	22.09	22.28	21.49	21.06	20.54	20.41	20.12	19.88	19.71	19.37	19.25	18.95	18.99	18.19	18.01
40.0	21.28	20.48	20.54	20.69	20.88	20.15	19.75	19.28	19.16	18.90	18.68	18.53	18.21	18.11	17.83	17.87	17.11	16.95
45.0	20.04	19.29	19.34	19.49	19.68	19.00	18.63	18.20	18.09	17.85	17.64	17.50	17.21	17.12	16.85	16.89	16.18	16.03
50.0	18.96	18.26	18.31	18.45	18.63	18.00	17.65	17.26	17.16	16.93	16.74	16.61	16.34	16.26	16.00	16.04	15.37	15.22
55.0	18.02	17.35	17.40	17.53	17.72	17.12	16.79	16.42	16.33	16.13	15.94	15.82	15.56	15.50	15.25	15.29	14.65	14.51
60.0	17.18	16.55	16.60	16.73	16.91	16.34	16.03	15.69	15.60	15.41	15.23	15.12	14.88	14.82	14.58	14.62	14.01	13.88
65.0	16.44	15.83	15.88	16.01	16.18	15.64	15.35	15.03	14.95	14.77	14.60	14.49	14.26	14.21	13.98	14.02	13.44	13.32
70.0	15.77	15.19	15.24	15.36	15.53	15.01	14.74	14.43	14.36	14.19	14.03	13.93	13.71	13.66	13.44	13.48	12.92	12.80
80.0	14.62	14.08	14.13	14.24	14.41	13.93	13.68	13.41	13.34	13.19	13.04	12.95	12.75	12.71	12.50	12.54	12.02	11.92
90.0	13.66	13.16	13.21	13.31	13.47	13.03	12.80	12.55	12.49	12.35	12.21	12.13	11.95	11.91	11.72	11.75	11.27	11.17
100.0	12.85	12.38	12.43	12.52	12.68	12.27	12.05	11.82	11.77	11.64	11.51	11.43	11.27	11.23	11.05	11.08	10.63	10.54
150.0	10.12	9.76	9.80	9.87	10.01	9.69	9.53	9.36	9.33	9.23	9.13	9.08	8.95	8.93	8.79	8.81	8.46	8.39
200.0	8.57	8.28	8.28	8.34	8.46	8.20	8.07	7.94	7.91	7.83	7.75	7.70	7.60	7.58	7.46	7.49	7.39	7.15
250.0	7.62	7.36	7.28	7.34	7.45	7.23	7.16	7.04	7.04	6.96	6.86	6.85	6.77	6.72	6.61	6.63	6.59	6.38
300.0	6.95	6.71	6.64	6.66	6.76	6.60	6.54	6.43	6.43	6.36	6.27	6.25	6.19	6.14	6.05	6.07	6.02	5.83
350.0	6.45	6.23	6.17	6.19	6.28	6.14	6.08	5.97	5.98	5.91	5.83	5.82	5.76	5.71	5.63	5.64	5.60	5.43
400.0	6.069	5.863	5.802	5.822	5.910	5.777	5.719	5.624	5.629	5.567	5.488	5.478	5.422	5.385	5.301	5.318	5.276	5.118
450.0	5.767	5.571	5.515	5.534	5.618	5.492	5.437	5.347	5.353	5.295	5.220	5.211	5.158	5.123	5.044	5.060	5.019	4.871
500.0	5.523	5.335	5.284	5.301	5.382	5.262	5.209	5.124	5.130	5.074	5.004	4.994	4.945	4.912	4.836	4.851	4.811	4.671

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

140 58 CE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.760	5.510	7.791	7.770	7.630	9.092	9.840	10.360	10.740	11.140	11.390	12.180	12.590	13.130	13.340	13.561	13.974	14.340
3.0	6.334	6.183	8.652	8.674	8.523	10.086	10.992	11.568	11.987	12.419	12.755	13.634	14.121	14.711	14.941	15.223	15.820	16.123
3.5	6.924	6.857	9.515	9.578	9.415	11.073	12.131	12.760	13.214	13.674	14.093	15.057	15.616	16.252	16.500	16.840	17.597	17.953
4.0	7.531	7.538	10.386	10.490	10.313	12.061	13.270	13.948	14.436	14.921	15.420	16.466	17.094	17.774	18.039	18.433	19.335	19.554
4.5	8.159	8.231	11.270	11.414	11.222	13.058	14.415	15.141	15.661	16.167	16.747	17.873	18.567	19.290	19.670	20.016	21.050	21.242
5.0	8.807	8.937	12.168	12.352	12.145	14.065	15.571	16.343	16.893	17.419	18.079	19.285	20.043	20.806	21.101	21.598	22.755	22.926
5.5	9.477	9.659	13.083	13.307	13.083	15.086	16.740	17.558	18.138	18.682	19.422	20.705	21.527	22.329	22.639	23.186	24.457	24.614
6.0	10.169	10.398	14.015	14.280	14.038	16.122	17.925	18.788	19.396	19.957	20.777	22.138	23.022	23.863	24.186	24.782	26.162	26.309
6.5	10.882	11.155	14.965	15.271	15.010	17.175	19.128	20.035	20.671	21.246	22.147	23.586	24.532	25.411	25.747	26.391	27.875	28.016
7.0	11.618	11.929	15.934	16.281	16.001	18.245	20.349	21.299	21.963	22.552	23.535	25.050	26.058	26.974	27.323	28.014	29.597	29.737
8.0	13.15	13.53	17.93	18.36	18.04	20.44	22.85	23.88	24.60	25.22	26.36	28.03	29.16	30.15	30.53	31.31	33.08	33.23
9.0	14.78	15.21	20.00	20.52	20.15	22.71	25.43	26.55	27.32	27.96	29.27	31.10	32.35	33.41	33.81	34.68	36.63	36.79
10.0	16.49	16.97	22.16	22.76	22.34	25.05	28.09	29.30	30.12	30.78	32.26	34.25	35.62	36.75	37.17	38.14	40.24	40.44
11.0	18.28	18.80	24.39	25.08	24.61	27.48	30.84	32.13	33.00	33.67	35.34	37.48	38.98	40.17	40.61	41.67	43.94	44.17
12.0	20.16	20.71	26.70	27.49	26.96	29.98	33.67	35.05	35.97	36.65	38.49	40.80	42.42	43.69	44.15	45.30	47.71	47.99
15.0	26.30	26.87	34.10	35.17	34.46	37.94	42.68	44.30	45.37	46.09	48.49	51.29	53.30	54.76	55.28	56.70	59.53	59.98
20.0	38.13	38.59	47.95	49.55	48.46	52.72	59.34	61.40	62.71	63.45	66.87	70.55	73.23	75.00	75.60	77.48	80.95	81.79
25.0	51.87	52.05	63.64	65.80	64.28	69.33	78.03	80.53	82.08	82.80	87.34	91.98	95.37	97.44	98.10	100.45	104.50	105.84
30.0	67.44	67.18	81.07	83.85	81.83	87.70	98.65	101.62	103.41	104.08	109.83	115.49	119.65	122.00	122.72	125.55	130.15	132.07
35.0	84.77	83.91	100.19	104.32	101.06	107.76	121.15	124.59	126.63	127.22	134.29	141.03	146.01	148.63	149.40	152.71	157.85	160.42
40.0	103.8	102.2	120.9	125.1	121.9	129.5	145.5	149.4	151.7	152.2	160.6	168.5	174.4	177.3	178.1	181.9	187.5	190.8
45.0	124.4	121.9	143.3	148.2	144.3	152.7	171.5	176.0	178.5	178.8	188.8	197.9	204.7	207.8	208.6	213.0	219.2	223.2
50.0	146.7	143.2	167.1	172.9	168.3	177.6	199.3	204.3	207.0	207.2	218.8	229.2	236.9	240.3	241.1	246.0	252.7	257.5
55.0	170.5	165.8	192.5	199.1	193.7	203.9	228.7	234.2	237.2	237.3	250.5	262.2	271.0	274.6	275.4	280.8	288.0	293.7
60.0	195.8	189.8	219.3	226.8	220.6	231.7	259.7	265.9	269.1	268.9	283.9	297.1	306.8	310.7	311.5	317.4	325.2	331.8
65.0	222.6	215.1	247.5	255.9	248.8	260.9	292.4	299.1	302.5	302.2	319.0	333.6	344.4	348.5	349.3	355.8	364.1	371.6
70.0	250.8	241.7	277.1	286.5	278.5	291.5	326.5	333.8	337.6	336.9	355.7	371.8	383.8	388.0	388.8	395.9	404.7	413.2
80.0	311.4	298.8	340.4	351.8	341.8	356.8	399.4	407.9	412.1	411.0	433.8	453.0	467.5	472.1	472.9	481.0	491.0	501.4
90.0	377.4	360.7	408.9	422.5	410.3	427.4	478.0	487.8	492.5	490.8	517.9	540.6	557.6	562.6	563.3	572.6	583.7	596.3
100.0	448.6	427.4	482.4	498.3	483.9	503.0	562.2	573.4	578.6	576.1	607.9	634.2	654.0	659.3	659.8	670.4	682.7	697.4
150.0	876.4	825.6	919.4	948.9	920.7	951.2	1060.8	1079.6	1087.2	1079.9	1139.0	1186.2	1222.1	1228.6	1228.2	1245.2	1264.5	1290.8
200.0	1411.7	1318.7	1458.9	1505.4	1461.2	1503.5	1674.8	1702.9	1711.6	1697.5	1790.2	1848.4	1907.1	1926.1	1924.0	1948.4	1964.4	2014.5
250.0	2037.5	1889.4	2082.6	2149.2	2090.5	2141.1	2383.9	2429.2	2431.1	2408.5	2540.1	2610.1	2694.6	2730.0	2724.6	2762.3	2767.4	2846.3
300.0	2738.4	2527.1	2778.7	2867.8	2792.7	2851.9	3173.9	3247.2	3232.0	3199.6	3374.2	3457.5	3570.8	3623.4	3614.1	3666.9	3659.4	3769.4
350.0	3504.7	3223.0	3538.1	3651.7	3558.5	3629.2	4034.6	4140.9	4104.0	4060.6	4281.9	4380.0	4524.1	4594.9	4581.2	4649.9	4629.1	4772.1
400.0	4329.	3970.	4353.	4493.	4380.	4457.	4957.	5098.	5038.	4983.	5254.	5368.	5545.	5635.	5616.	5702.	5667.	5845.
450.0	5203.	4762.	5217.	5385.	5251.	5338.	5935.	6111.	6028.	5959.	6283.	6415.	6626.	6735.	6711.	6814.	6765.	6979.
500.0	6123.	5595.	6125.	6322.	6165.	6262.	6961.	7173.	7066.	6984.	7362.	7513.	7761.	7889.	7860.	7981.	7916.	8168.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.06	15.62	16.87	17.19	17.82	18.73	19.27	19.97	20.39	20.80	21.22	21.66	22.11	22.51	23.04	23.23	24.89	25.42
3.0	16.96	17.62	18.86	19.17	19.82	20.84	21.45	22.28	22.75	23.22	23.69	24.17	24.70	25.14	25.70	25.89	27.66	28.22
3.5	18.81	19.55	20.79	21.08	21.75	22.88	23.56	24.50	25.01	25.54	26.05	26.57	27.18	27.65	28.24	28.42	30.31	30.90
4.0	20.62	21.45	22.69	22.97	23.64	24.88	25.61	26.66	27.21	27.79	28.34	28.90	29.59	30.09	30.71	30.88	32.88	33.51
4.5	22.41	23.33	24.56	24.83	25.51	26.85	27.64	28.79	29.38	30.01	30.60	31.18	31.95	32.48	33.13	33.30	35.41	36.06
5.0	24.20	25.20	26.43	26.69	27.37	28.81	29.66	30.90	31.52	32.20	32.83	33.45	34.28	34.84	35.52	35.68	37.91	38.59
5.5	25.99	27.07	28.30	28.54	29.24	30.77	31.67	33.00	33.66	34.38	35.05	35.70	36.60	37.19	37.90	38.05	40.39	41.10
6.0	27.79	28.95	30.18	30.41	31.10	32.73	33.68	35.10	35.79	36.57	37.27	37.95	38.91	39.53	40.27	40.42	42.86	43.60
6.5	29.60	30.83	32.07	32.28	32.98	34.70	35.70	37.21	37.93	38.75	39.49	40.19	41.22	41.87	42.64	42.78	45.34	46.11
7.0	31.42	32.74	33.97	34.17	34.87	36.68	37.74	39.33	40.08	40.94	41.71	42.45	43.54	44.22	45.01	45.15	47.82	48.62
8.0	35.11	36.59	37.82	37.99	38.69	40.68	41.85	43.60	44.41	45.36	46.20	46.99	48.20	48.94	49.79	49.93	52.81	53.67
9.0	38.87	40.52	41.74	41.89	42.59	44.76	46.03	47.94	48.81	49.84	50.75	51.60	52.93	53.72	54.64	54.76	57.87	58.79
10.0	42.72	44.53	45.75	45.88	46.57	48.91	50.28	52.36	53.28	54.40	55.38	56.28	57.72	58.56	59.55	59.66	63.00	63.98
11.0	46.65	48.63	49.85	49.95	50.63	53.15	54.63	56.86	57.83	59.04	60.09	61.04	62.59	63.49	64.54	64.64	68.22	69.25
12.0	50.68	52.83	54.05	54.11	54.78	57.48	59.06	61.45	62.47	63.78	64.88	65.88	67.55	68.50	69.62	69.72	73.53	74.62
15.0	63.31	65.98	67.19	67.16	67.78	71.03	72.93	75.78	76.95	78.49	79.82	80.98	82.99	84.09	85.44	85.49	90.04	91.31
20.0	86.23	89.85	91.02	90.83	91.31	95.53	97.98	101.60	102.99	104.97	106.66	108.08	110.66	112.01	113.76	113.76	119.61	121.21
25.0	111.48	116.12	117.25	116.87	117.18	122.40	125.44	129.84	131.46	133.88	135.95	137.64	140.80	142.39	144.61	144.53	151.79	153.72
30.0	138.99	144.73	145.80	145.21	145.31	151.60	155.26	160.46	162.31	165.19	167.66	169.63	173.39	175.21	177.93	177.78	186.53	188.83
35.0	168.70	175.61	176.62	175.80	175.64	183.07	187.37	193.40	195.48	198.84	201.72	203.97	208.36	210.40	213.67	213.45	223.79	226.46
40.0	200.5	208.7	209.6	208.6	208.1	216.7	221.7	228.6	230.9	234.8	238.1	240.6	245.7	247.9	251.8	251.5	263.5	266.6
45.0	234.5	243.9	244.8	243.4	242.7	252.5	258.2	266.0	268.5	272.9	276.7	279.5	285.2	287.7	292.2	291.8	305.6	309.1
50.0	270.4	281.3	282.0	280.4	279.2	290.4	296.8	305.5	308.3	313.2	317.4	320.6	327.0	329.7	334.8	334.3	350.0	353.9
55.0	308.3	320.6	321.2	319.3	317.8	330.3	337.5	347.1	350.1	355.5	360.3	363.8	370.9	373.8	379.7	379.0	396.7	401.0
60.0	348.1	361.9	362.4	360.2	358.2	372.2	380.2	390.7	394.0	400.0	405.2	409.1	416.9	420.0	426.6	425.9	445.5	450.3
65.0	389.7	405.2	405.5	403.0	400.6	416.0	424.8	436.3	439.8	446.4	452.2	456.4	465.0	468.3	475.7	474.8	496.6	501.8
70.0	433.2	450.4	450.6	447.7	444.7	461.7	471.4	483.9	487.6	494.8	501.1	505.6	515.0	518.5	526.7	525.7	549.7	555.4
80.0	525.5	546.2	546.0	542.4	538.4	558.6	570.0	584.6	588.8	597.2	604.7	610.0	621.0	624.9	634.8	633.6	662.1	668.9
90.0	624.7	649.1	648.6	644.7	639.0	662.6	675.9	692.6	697.3	707.0	715.7	721.8	734.5	738.7	750.6	749.0	782.4	790.3
100.0	730.5	758.9	758.0	752.7	746.1	773.3	788.6	807.6	812.9	823.9	833.9	840.7	855.2	859.9	873.6	871.7	910.4	919.4
150.0	1351.	1402.	1399.	1389.	1374.	1422.	1448.	1479.	1487.	1506.	1523.	1535.	1559.	1566.	1591.	1587.	1656.	1671.
200.0	2107.	2186.	2181.	2164.	2138.	2211.	2251.	2296.	2307.	2333.	2360.	2376.	2412.	2421.	2460.	2453.	2538.	2581.
250.0	2976.	3086.	3086.	3062.	3023.	3124.	3175.	3236.	3248.	3285.	3324.	3344.	3391.	3406.	3460.	3451.	3544.	3621.
300.0	3940.	4085.	4095.	4067.	4013.	4139.	4200.	4280.	4290.	4340.	4394.	4416.	4475.	4498.	4570.	4556.	4658.	4770.
350.0	4987.	5169.	5191.	5159.	5089.	5240.	5313.	5411.	5421.	5483.	5554.	5578.	5650.	5681.	5772.	5754.	5865.	6016.
400.0	6107.	6328.	6363.	6327.	6240.	6417.	6501.	6620.	6629.	6704.	6793.	6820.	6904.	6944.	7055.	7033.	7154.	7345.
450.0	7291.	7554.	7601.	7561.	7455.	7661.	7758.	7898.	7906.	7995.	8102.	8131.	8229.	8278.	8410.	8384.	8515.	8748.
500.0	8532.	8839.	8899.	8854.	8729.	8964.	9074.	9236.	9242.	9346.	9472.	9504.	9616.	9675.	9828.	9798.	9941.	10217.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

141 PR IONS 59

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	125.9	105.1	82.5	78.6	79.4	71.1	61.2	58.2	56.4	54.8	51.4	48.1	45.7	44.2	43.6	42.0	37.6	39.1
3.0	123.2	106.1	82.9	79.0	80.1	72.1	62.3	59.5	57.7	56.4	52.9	49.7	47.2	45.8	45.2	43.6	39.4	40.7
3.5	119.7	105.5	82.4	78.7	79.8	72.3	62.7	60.0	58.3	57.1	53.6	50.4	48.0	46.6	46.1	44.5	40.6	41.6
4.0	116.1	104.1	81.5	77.9	79.1	72.0	62.6	60.0	58.4	57.3	53.8	50.7	48.4	47.0	46.5	45.0	41.4	42.1
4.5	112.4	102.2	80.3	76.8	78.0	71.3	62.1	59.7	58.1	57.2	53.7	50.7	48.4	47.1	46.6	45.1	41.8	42.3
5.0	108.8	100.2	78.9	75.5	76.8	70.5	61.5	59.1	57.7	56.8	53.4	50.5	48.3	47.0	46.5	45.1	41.9	42.4
5.5	105.4	98.0	77.5	74.2	75.6	69.5	60.7	58.5	57.1	56.3	53.0	50.1	48.0	46.7	46.3	44.9	41.9	42.2
6.0	102.2	95.8	76.0	72.9	74.2	68.5	59.9	57.7	56.4	55.7	52.4	49.6	47.6	46.4	46.0	44.6	41.8	42.0
6.5	99.1	93.6	74.6	71.5	72.9	67.4	59.0	57.0	55.7	55.1	51.9	49.1	47.1	46.0	45.6	44.2	41.6	41.7
7.0	96.2	91.4	73.2	70.2	71.6	66.3	58.1	56.2	55.0	54.4	51.2	48.5	46.6	45.5	45.1	43.8	41.4	41.4
8.0	90.95	87.35	70.40	67.58	69.02	64.16	56.36	54.53	53.44	52.98	49.90	47.33	45.49	44.47	44.14	42.92	40.72	40.56
9.0	86.25	83.56	67.81	65.14	66.58	62.08	54.63	52.92	51.91	51.53	48.57	46.11	44.36	43.41	43.11	41.96	39.97	39.70
10.0	82.05	80.08	65.39	62.85	64.29	60.11	52.96	51.36	50.43	50.12	47.25	44.90	43.23	42.35	42.08	40.98	39.18	38.83
11.0	78.28	76.88	63.14	60.72	62.15	58.24	51.38	49.87	49.01	48.75	45.98	43.73	42.13	41.31	41.06	40.02	38.37	37.95
12.0	74.88	73.94	61.05	58.74	60.15	56.49	49.89	48.46	47.65	47.45	44.76	42.60	41.07	40.30	40.07	39.08	37.56	37.09
15.0	66.43	66.43	55.61	53.56	54.92	51.84	45.90	44.68	44.01	43.91	41.45	39.51	38.14	37.50	37.33	36.46	35.26	34.69
20.0	56.30	57.11	48.63	46.90	48.16	45.74	40.62	39.63	39.11	39.11	36.96	35.29	34.12	33.64	33.52	32.81	31.93	31.30
25.0	49.16	50.35	43.42	41.91	43.08	41.09	36.56	35.74	35.31	35.37	33.44	31.97	30.95	30.57	30.49	29.89	29.20	28.57
30.0	43.83	45.22	39.36	38.02	39.12	37.43	33.36	32.64	32.29	32.38	30.63	29.31	28.40	28.09	28.03	27.51	26.95	26.34
35.0	39.69	41.18	36.11	34.90	35.93	34.47	30.75	30.12	29.82	29.93	28.33	27.13	26.30	26.04	26.00	25.55	25.07	24.49
40.0	36.37	37.91	33.44	32.33	33.30	32.02	28.59	28.03	27.77	27.89	26.40	25.30	24.54	24.32	24.30	23.89	23.48	22.93
45.0	33.65	35.20	31.20	30.18	31.09	29.95	26.77	26.26	26.03	26.15	24.77	23.75	23.04	22.85	22.84	22.47	22.11	21.59
50.0	31.36	32.92	29.30	28.35	29.21	28.18	25.20	24.73	24.53	24.66	23.36	22.41	21.74	21.59	21.58	21.26	20.93	20.43
55.0	29.42	30.97	27.65	26.76	27.58	26.64	23.85	23.41	23.23	23.37	22.14	21.24	20.62	20.48	20.48	20.17	19.88	19.41
60.0	27.74	29.27	26.21	25.38	26.16	25.30	22.66	22.25	22.09	22.23	21.06	20.22	19.62	19.51	19.51	19.23	18.96	18.52
65.0	26.28	27.79	24.95	24.16	24.91	24.11	21.60	21.23	21.07	21.21	20.10	19.30	18.74	18.64	18.65	18.38	18.13	17.71
70.0	24.99	26.48	23.82	23.07	23.79	23.05	20.66	20.31	20.17	20.31	19.25	18.49	17.95	17.86	17.87	17.63	17.39	17.00
80.0	22.82	24.27	21.91	21.23	21.89	21.24	19.06	18.74	18.62	18.76	17.79	17.09	16.60	16.53	16.54	16.32	16.12	15.76
90.0	21.07	22.47	20.34	19.71	20.33	19.75	17.73	17.44	17.34	17.48	16.58	15.93	15.48	15.42	15.44	15.24	15.05	14.73
100.0	19.62	20.97	19.03	18.45	19.03	18.50	16.62	16.35	16.26	16.40	15.56	14.96	14.53	14.48	14.50	14.33	14.15	13.85
150.0	14.95	16.11	14.72	14.28	14.73	14.37	12.93	12.74	12.69	12.82	12.16	11.71	11.38	11.36	11.38	11.26	11.12	10.92
200.0	12.38	13.55	12.39	12.00	12.31	12.11	10.88	10.69	10.72	10.85	10.28	10.12	9.79	9.59	9.62	9.49	9.59	9.25
250.0	10.88	11.95	10.94	10.60	10.84	10.71	9.63	9.35	9.50	9.61	9.11	8.97	8.68	8.51	8.54	8.40	8.52	8.23
300.0	9.85	10.83	9.93	9.62	9.84	9.73	8.75	8.42	8.64	8.75	8.30	8.16	7.90	7.75	7.78	7.65	7.78	7.50
350.0	9.09	10.02	9.18	8.90	9.11	9.01	8.11	7.81	8.00	8.11	7.69	7.57	7.32	7.19	7.22	7.10	7.20	6.97
400.0	8.516	9.395	8.614	8.344	8.547	8.453	7.611	7.341	7.517	7.617	7.228	7.107	6.879	6.757	6.789	6.682	6.772	6.554
450.0	8.063	8.904	8.166	7.909	8.104	8.017	7.220	6.971	7.134	7.230	6.862	6.745	6.530	6.418	6.449	6.348	6.432	6.227
500.0	7.699	8.509	7.805	7.559	7.748	7.666	6.905	6.673	6.825	6.918	6.567	6.452	6.248	6.143	6.174	6.078	6.159	5.963

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	36.52	34.81	34.85	35.10	34.77	32.77	31.75	29.97	29.32	28.55	28.00	27.53	26.54	26.20	25.91	25.97	24.89	24.60
3.0	38.11	36.37	36.40	36.65	36.38	34.37	33.34	31.59	30.95	30.18	29.62	29.15	28.15	27.79	27.47	27.54	26.37	26.06
3.5	39.07	37.31	37.33	37.59	37.36	35.38	34.35	32.63	32.02	31.25	30.69	30.22	29.24	28.86	28.53	28.59	27.36	27.04
4.0	39.61	37.84	37.86	38.12	37.94	35.99	34.96	33.29	32.71	31.95	31.38	30.93	29.96	29.58	29.23	29.29	28.01	27.69
4.5	39.86	38.10	38.12	38.38	38.24	36.32	35.30	33.69	33.13	32.38	31.82	31.37	30.43	30.04	29.68	29.75	28.44	28.10
5.0	39.92	38.17	38.19	38.45	38.34	36.46	35.46	33.89	33.35	32.62	32.07	31.63	30.71	30.32	29.95	30.02	28.69	28.36
5.5	39.83	38.11	38.12	38.38	38.30	36.46	35.48	33.96	33.44	32.72	32.18	31.76	30.86	30.47	30.10	30.16	28.82	28.49
6.0	39.65	37.95	37.96	38.22	38.16	36.36	35.40	33.92	33.43	32.73	32.20	31.78	30.90	30.52	30.14	30.20	28.86	28.52
6.5	39.39	37.71	37.73	37.99	37.96	36.19	35.25	33.82	33.34	32.65	32.13	31.72	30.87	30.50	30.11	30.17	28.83	28.49
7.0	39.09	37.43	37.45	37.70	37.69	35.97	35.04	33.65	33.20	32.52	32.01	31.61	30.78	30.41	30.02	30.09	28.74	28.41
8.0	38.38	36.77	36.79	37.04	37.07	35.41	34.52	33.21	32.79	32.15	31.65	31.27	30.48	30.13	29.73	29.80	28.46	28.14
9.0	37.61	36.05	36.07	36.31	36.37	34.78	33.92	32.68	32.29	31.67	31.20	30.83	30.08	29.74	29.35	29.41	28.09	27.77
10.0	36.80	35.29	35.31	35.55	35.63	34.11	33.28	32.10	31.73	31.15	30.69	30.34	29.62	29.30	28.90	28.96	27.66	27.35
11.0	36.00	34.53	34.55	34.79	34.89	33.42	32.62	31.50	31.16	30.59	30.15	29.82	29.13	28.82	28.42	28.48	27.21	26.91
12.0	35.21	33.78	33.81	34.04	34.15	32.74	31.97	30.90	30.57	30.03	29.60	29.28	28.62	28.33	27.93	27.99	26.74	26.45
15.0	32.97	31.66	31.69	31.91	32.06	30.78	30.08	29.14	28.86	28.38	27.98	27.70	27.11	26.85	26.47	26.53	25.35	25.07
20.0	29.80	28.63	28.67	28.88	29.05	27.94	27.34	26.55	26.33	25.91	25.57	25.33	24.83	24.62	24.26	24.31	23.24	23.00
25.0	27.23	26.18	26.22	26.41	26.60	25.62	25.08	24.40	24.22	23.85	23.55	23.34	22.90	22.73	22.39	22.44	21.46	21.24
30.0	25.12	24.16	24.21	24.39	24.59	23.70	23.21	22.62	22.46	22.13	21.86	21.67	21.28	21.13	20.81	20.86	19.96	19.76
35.0	23.37	22.49	22.54	22.71	22.90	22.09	21.65	21.11	20.97	20.68	20.43	20.26	19.90	19.78	19.47	19.52	18.69	18.50
40.0	21.89	21.07	21.12	21.28	21.47	20.72	20.31	19.83	19.70	19.44	19.20	19.05	18.72	18.62	18.33	18.37	17.59	17.42
45.0	20.62	19.85	19.90	20.05	20.25	19.54	19.17	18.72	18.61	18.36	18.15	18.01	17.70	17.61	17.34	17.38	16.65	16.49
50.0	19.52	18.79	18.84	18.99	19.18	18.52	18.17	17.76	17.66	17.43	17.22	17.09	16.81	16.73	16.47	16.51	15.82	15.67
55.0	18.55	17.86	17.92	18.05	18.24	17.62	17.29	16.91	16.81	16.60	16.41	16.29	16.02	15.95	15.70	15.74	15.08	14.94
60.0	17.70	17.04	17.10	17.23	17.41	16.82	16.51	16.15	16.07	15.87	15.69	15.57	15.32	15.26	15.01	15.05	14.43	14.29
65.0	16.93	16.31	16.36	16.49	16.67	16.11	15.82	15.48	15.40	15.21	15.04	14.93	14.69	14.63	14.40	14.44	13.84	13.71
70.0	16.25	15.65	15.70	15.83	16.00	15.47	15.19	14.87	14.80	14.62	14.45	14.35	14.13	14.07	13.85	13.88	13.31	13.19
80.0	15.07	14.52	14.57	14.68	14.85	14.36	14.11	13.82	13.75	13.59	13.44	13.35	13.14	13.10	12.89	12.92	12.39	12.28
90.0	14.09	13.57	13.62	13.73	13.89	13.44	13.20	12.94	12.88	12.73	12.59	12.51	12.32	12.28	12.09	12.12	11.62	11.52
100.0	13.25	12.77	12.82	12.92	13.08	12.66	12.44	12.20	12.14	12.00	11.87	11.79	11.62	11.59	11.40	11.43	10.97	10.87
150.0	10.45	10.08	10.12	10.20	10.34	10.01	9.84	9.67	9.63	9.53	9.43	9.37	9.24	9.22	9.07	9.10	8.73	8.66
200.0	8.86	8.55	8.55	8.62	8.75	8.47	8.34	8.20	8.17	8.09	8.01	7.96	7.86	7.83	7.71	7.74	7.63	7.38
250.0	7.88	7.61	7.52	7.58	7.70	7.48	7.40	7.27	7.28	7.19	7.09	7.08	7.00	6.94	6.83	6.86	6.81	6.59
300.0	7.18	6.94	6.86	6.89	6.99	6.83	6.76	6.64	6.65	6.57	6.48	6.47	6.40	6.35	6.25	6.27	6.23	6.03
350.0	6.67	6.44	6.38	6.40	6.49	6.35	6.28	6.18	6.18	6.11	6.03	6.01	5.95	5.91	5.82	5.84	5.79	5.61
400.0	6.277	6.063	6.001	6.021	6.112	5.974	5.914	5.816	5.821	5.758	5.676	5.666	5.607	5.569	5.482	5.500	5.457	5.293
450.0	5.965	5.762	5.705	5.724	5.811	5.680	5.623	5.531	5.536	5.477	5.400	5.389	5.335	5.299	5.217	5.233	5.191	5.038
500.0	5.713	5.519	5.466	5.484	5.567	5.443	5.388	5.300	5.306	5.249	5.176	5.166	5.115	5.081	5.003	5.018	4.976	4.832

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

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E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.720	5.470	7.731	7.710	7.570	9.017	9.760	10.279	10.660	11.060	11.310	12.090	12.500	13.035	13.240	13.458	13.868	14.230
3.0	6.286	6.137	8.583	8.604	8.453	10.000	10.900	11.475	11.894	12.326	12.661	13.530	14.016	14.600	14.825	15.104	15.696	15.996
3.5	6.866	6.802	9.436	9.497	9.334	10.975	12.026	12.653	13.108	13.567	13.984	14.937	15.495	16.125	16.368	16.704	17.455	17.708
4.0	7.464	7.475	10.296	10.397	10.221	11.952	13.152	13.828	14.315	14.799	15.296	16.330	16.956	17.630	17.889	18.279	19.173	19.390
4.5	8.081	8.158	11.167	11.309	11.119	12.936	14.282	15.006	15.525	16.031	16.607	17.720	18.411	19.127	19.402	19.844	20.869	21.058
5.0	8.719	8.855	12.053	12.235	12.029	13.930	15.423	16.193	16.742	17.267	17.923	19.114	19.869	20.625	20.915	21.407	22.553	22.722
5.5	9.377	9.566	12.955	13.176	12.954	14.937	16.577	17.392	17.970	18.513	19.248	20.516	21.334	22.129	22.433	22.974	24.234	24.389
6.0	10.057	10.294	13.874	14.135	13.895	15.959	17.746	18.605	19.212	19.771	20.585	21.930	22.809	23.643	23.961	24.550	25.917	26.063
6.5	10.757	11.039	14.810	15.112	14.853	16.997	18.932	19.834	20.469	21.043	21.937	23.358	24.299	25.170	25.501	26.137	27.606	27.747
7.0	11.479	11.801	15.764	16.107	15.829	18.052	20.135	21.080	21.742	22.331	23.304	24.802	25.804	26.712	27.055	27.739	29.305	29.444
8.0	12.99	13.38	17.73	18.15	17.84	20.21	22.60	23.63	24.34	24.96	26.09	27.74	28.87	29.85	30.21	30.99	32.74	32.89
9.0	14.58	15.03	19.77	20.28	19.92	22.45	25.14	26.25	27.02	27.66	28.96	30.76	32.00	33.05	33.45	34.31	36.23	36.40
10.0	16.26	16.75	21.89	22.48	22.07	24.76	27.76	28.96	29.78	30.43	31.90	33.86	35.22	36.34	36.76	37.71	39.80	39.99
11.0	18.02	18.55	24.08	24.77	24.30	27.14	30.46	31.74	32.61	33.28	34.93	37.04	38.53	39.71	40.15	41.19	43.43	43.66
12.0	19.86	20.42	26.35	27.13	26.61	29.60	33.25	34.61	35.53	36.21	38.03	40.31	41.92	43.17	43.62	44.76	47.15	47.42
15.0	25.87	26.47	33.62	34.68	33.98	37.42	42.10	43.71	44.78	45.49	47.86	50.63	52.61	54.06	54.57	55.97	58.77	59.22
20.0	37.45	37.95	47.22	48.78	47.72	51.93	58.46	60.50	61.80	62.54	65.91	69.55	72.19	73.94	74.53	76.38	79.81	80.64
25.0	50.88	51.13	62.59	64.72	63.23	68.22	76.79	79.27	80.81	81.52	85.99	90.56	93.91	95.96	96.62	98.93	102.93	104.25
30.0	66.10	65.93	79.67	82.41	80.43	86.22	97.00	99.93	101.71	102.38	108.04	113.62	117.72	120.05	120.76	123.64	128.08	129.97
35.0	83.03	82.29	98.39	101.78	99.26	105.87	119.04	122.44	124.45	125.05	132.00	138.64	143.54	146.14	146.90	150.16	155.22	157.75
40.0	101.6	100.2	118.7	122.8	119.7	127.1	142.8	146.7	149.0	149.5	157.8	165.6	171.3	174.2	175.0	178.7	184.3	187.5
45.0	121.8	119.5	140.5	145.4	141.6	149.9	168.3	172.7	175.2	175.6	185.4	194.4	201.0	204.1	204.9	209.2	215.3	219.2
50.0	143.5	140.2	163.9	169.5	165.0	174.2	195.5	200.4	203.1	203.4	214.7	224.9	232.5	235.9	236.7	241.4	248.0	252.8
55.0	166.7	162.3	188.7	195.1	189.8	199.9	224.3	229.7	232.7	232.7	245.7	257.3	266.8	269.4	270.2	275.5	282.6	288.2
60.0	191.4	185.7	214.9	222.2	216.1	227.1	254.6	260.6	263.8	263.7	278.4	291.3	300.9	304.7	305.5	311.3	318.9	325.4
65.0	217.5	210.4	242.4	250.7	243.7	255.6	286.5	293.1	296.5	296.2	312.7	327.0	337.7	341.7	342.5	348.8	357.0	364.4
70.0	245.1	236.4	271.4	280.5	272.7	285.6	319.9	327.0	330.7	330.1	348.5	364.3	376.1	380.3	381.1	388.0	396.7	405.0
80.0	304.2	292.1	333.1	344.3	334.5	349.3	391.0	399.4	403.6	402.5	424.8	443.7	457.9	462.5	463.2	471.2	481.0	491.3
90.0	368.5	352.6	400.0	413.3	401.4	418.2	467.8	477.5	482.1	480.4	507.0	529.2	545.9	550.9	551.5	560.7	571.6	583.9
100.0	437.9	417.6	471.7	487.3	473.2	492.0	550.0	561.0	566.1	563.7	594.9	620.6	640.0	645.3	645.8	656.2	668.2	682.7
150.0	854.9	805.9	897.9	926.7	899.2	929.2	1036.3	1054.8	1062.2	1055.2	1112.9	1159.1	1194.2	1200.7	1200.3	1216.9	1235.8	1261.6
200.0	1376.4	1286.4	1423.7	1469.1	1426.0	1467.5	1634.8	1662.4	1670.9	1657.2	1747.7	1804.7	1862.0	1880.7	1878.6	1902.5	1918.2	1967.2
250.0	1986.0	1842.5	2031.3	2096.4	2039.1	2088.8	2325.7	2370.0	2372.0	2350.0	2478.4	2546.8	2629.4	2664.0	2658.8	2695.7	2700.7	2777.7
300.0	2668.5	2463.7	2709.4	2796.3	2723.2	2781.2	3095.3	3166.8	3152.2	3120.6	3291.0	3372.4	3483.0	3534.4	3525.4	3576.8	3569.7	3677.0
350.0	3414.7	3141.5	3448.9	3559.7	3468.9	3535.7	3933.6	4037.3	4001.5	3959.2	4175.0	4270.8	4411.4	4480.5	4467.3	4534.3	4514.2	4653.6
400.0	4217.	3869.	4243.	4379.	4269.	4345.	4832.	4969.	4911.	4857.	5122.	5233.	5406.	5493.	5475.	5559.	5525.	5698.
450.0	5068.	4641.	5084.	5248.	5117.	5202.	5784.	5956.	5875.	5808.	6124.	6252.	6469.	6565.	6542.	6642.	6594.	6803.
500.0	5964.	5451.	5968.	6160.	6007.	6102.	6783.	6990.	6886.	6806.	7175.	7322.	7563.	7688.	7660.	7778.	7715.	7960.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.94	15.50	16.74	17.06	17.69	18.59	19.13	19.82	20.24	20.64	21.05	21.49	21.93	22.33	22.85	23.04	24.70	25.23
3.0	16.83	17.48	18.71	19.02	19.67	20.69	21.29	22.11	22.57	23.03	23.49	23.97	24.50	24.94	25.49	25.67	27.45	28.01
3.5	18.65	19.39	20.62	20.92	21.58	22.71	23.37	24.30	24.81	25.33	25.83	26.35	26.96	27.42	28.00	28.18	30.07	30.66
4.0	20.44	21.26	22.50	22.78	23.45	24.68	25.41	26.44	26.98	27.56	28.10	28.66	29.34	29.84	30.44	30.61	32.61	33.24
4.5	22.22	23.12	24.35	24.62	25.30	26.63	27.41	28.54	29.12	29.76	30.33	30.91	31.67	32.20	32.83	33.00	35.11	35.76
5.0	23.98	24.97	26.20	26.45	27.14	28.57	29.40	30.63	31.24	31.91	32.53	33.15	33.98	34.53	35.20	35.36	37.57	38.26
5.5	25.75	26.82	28.05	28.29	28.98	30.50	31.39	32.71	33.35	34.07	34.73	35.37	36.27	36.85	37.54	37.70	40.03	40.74
6.0	27.52	28.67	29.90	30.13	30.82	32.44	33.38	34.78	35.46	36.23	36.92	37.59	38.55	39.16	39.88	40.04	42.47	43.21
6.5	29.31	30.53	31.76	31.98	32.67	34.38	35.38	36.87	37.57	38.38	39.11	39.81	40.83	41.47	42.22	42.37	44.91	45.68
7.0	31.10	32.41	33.64	33.84	34.54	36.33	37.38	38.95	39.69	40.55	41.31	42.04	43.12	43.79	44.57	44.71	47.36	48.16
8.0	34.74	36.21	37.43	37.61	38.31	40.28	41.43	43.17	43.97	44.90	45.74	46.52	47.72	48.44	49.29	49.42	52.29	53.15
9.0	38.45	40.08	41.30	41.46	42.15	44.30	45.55	47.45	48.30	49.32	50.22	51.06	52.37	53.15	54.06	54.18	57.28	58.19
10.0	42.24	44.03	45.25	45.38	46.07	48.39	49.75	51.80	52.70	53.81	54.78	55.67	57.10	57.93	58.90	59.01	62.33	63.30
11.0	46.12	48.07	49.29	49.39	50.07	52.57	54.03	56.24	57.19	58.38	59.41	60.36	61.90	62.78	63.82	63.92	67.47	68.50
12.0	50.08	52.20	53.42	53.49	54.15	56.83	58.40	60.75	61.75	63.03	64.13	65.13	66.78	67.72	68.82	68.91	72.70	73.79
15.0	62.50	65.14	66.35	66.33	66.94	70.16	72.04	74.85	76.00	77.52	78.83	79.98	81.97	83.06	84.38	84.44	88.95	90.21
20.0	85.02	88.59	89.76	89.58	90.07	94.23	96.66	100.22	101.60	103.55	105.21	106.62	109.16	110.49	112.22	112.22	118.01	119.59
25.0	109.80	114.38	115.51	115.14	115.45	120.61	123.61	127.95	129.55	131.93	133.97	135.64	138.76	140.32	142.50	142.44	149.60	151.52
30.0	136.79	142.44	143.51	142.94	143.05	149.26	152.86	157.99	159.81	162.64	165.07	167.01	170.73	172.52	175.19	175.05	183.69	185.96
35.0	165.91	172.71	173.72	172.92	172.78	180.10	184.33	190.27	192.32	195.62	198.46	200.68	205.01	207.02	210.24	210.02	220.22	222.86
40.0	197.1	205.1	206.1	205.0	204.6	213.1	218.0	224.8	227.0	230.8	234.1	236.6	241.6	243.8	247.6	247.3	259.1	262.1
45.0	230.3	239.6	240.5	239.2	238.4	248.1	253.7	261.4	263.9	268.1	271.9	274.7	280.3	282.7	287.1	286.7	300.3	303.8
50.0	265.5	276.1	276.9	275.3	274.2	285.2	291.5	300.0	302.8	307.6	311.8	314.9	321.2	323.8	328.9	328.4	343.8	347.7
55.0	302.5	314.6	315.3	313.4	311.9	324.2	331.3	340.7	343.7	349.0	353.7	357.1	364.1	367.0	372.8	372.1	389.5	393.8
60.0	341.4	355.1	355.6	353.4	351.5	365.2	373.1	383.4	386.6	392.5	397.7	401.4	409.2	412.2	418.7	418.0	437.3	442.0
65.0	382.2	397.4	397.7	395.2	392.9	408.0	416.7	428.0	431.4	437.9	443.6	447.7	456.2	459.4	466.7	465.8	487.2	492.4
70.0	424.7	441.5	441.7	438.9	436.1	452.7	462.2	474.5	478.2	485.2	491.4	495.9	505.1	508.5	516.6	515.6	539.1	544.8
80.0	514.9	535.1	535.0	531.5	527.6	547.4	558.6	572.9	577.1	585.3	592.7	597.8	608.7	612.5	622.2	621.0	649.0	655.7
90.0	611.7	635.7	635.2	630.9	625.8	648.9	662.0	678.4	683.1	692.8	701.1	707.0	719.5	723.7	735.3	733.7	766.6	774.3
100.0	715.0	742.8	742.0	736.8	730.5	757.1	772.1	790.7	795.9	806.7	816.5	823.2	837.4	842.0	855.5	853.6	891.5	900.3
150.0	1320.	1371.	1367.	1357.	1343.	1390.	1416.	1446.	1454.	1472.	1489.	1500.	1524.	1531.	1555.	1551.	1619.	1634.
200.0	2057.	2135.	2129.	2113.	2088.	2159.	2198.	2242.	2253.	2279.	2305.	2321.	2356.	2365.	2402.	2396.	2479.	2521.
250.0	2904.	3012.	3011.	2988.	2950.	3049.	3099.	3159.	3170.	3207.	3244.	3264.	3310.	3325.	3378.	3368.	3460.	3534.
300.0	3843.	3985.	3996.	3967.	3915.	4037.	4098.	4175.	4186.	4234.	4287.	4308.	4366.	4389.	4458.	4445.	4545.	4655.
350.0	4863.	5041.	5062.	5031.	4963.	5110.	5181.	5277.	5287.	5347.	5417.	5440.	5510.	5541.	5629.	5612.	5721.	5868.
400.0	5954.	6170.	6203.	6168.	6083.	6256.	6339.	6455.	6464.	6537.	6624.	6649.	6732.	6771.	6879.	6858.	6976.	7162.
450.0	7107.	7363.	7409.	7370.	7267.	7468.	7563.	7699.	7707.	7793.	7898.	7926.	8022.	8070.	8199.	8173.	8302.	8529.
500.0	8315.	8614.	8673.	8629.	8508.	8736.	8844.	9002.	9008.	9109.	9233.	9263.	9372.	9430.	9579.	9550.	9690.	9958.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

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60 ND IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	128.6	106.8	84.0	80.0	80.8	72.3	62.2	59.2	57.3	55.7	52.2	48.9	46.4	44.9	44.3	42.6	38.2	39.7
3.0	125.9	108.0	84.4	80.5	81.5	73.4	63.5	60.6	58.8	57.4	53.8	50.5	48.0	46.5	46.0	44.3	40.1	41.4
3.5	122.4	107.5	84.0	80.2	81.3	73.7	63.8	61.1	59.4	58.1	54.6	51.3	48.9	47.4	46.9	45.3	41.4	42.3
4.0	118.8	106.2	83.1	79.4	80.6	73.4	63.7	61.1	59.5	58.4	54.8	51.7	49.3	47.9	47.4	45.8	42.1	42.9
4.5	115.1	104.4	81.9	78.3	79.6	72.7	63.3	60.8	59.3	58.3	54.8	51.7	49.4	48.0	47.5	46.0	42.5	43.1
5.0	111.5	102.3	80.5	77.1	78.4	71.9	62.7	60.3	58.8	57.9	54.5	51.4	49.2	47.9	47.4	45.9	42.7	43.2
5.5	108.0	100.1	79.1	75.8	77.2	70.9	62.0	59.7	58.3	57.5	54.0	51.1	48.9	47.7	47.2	45.8	42.8	43.1
6.0	104.7	97.9	77.7	74.4	75.8	69.9	61.1	58.9	57.6	56.9	53.5	50.6	48.5	47.3	46.9	45.5	42.7	42.8
6.5	101.6	95.7	76.2	73.1	74.5	68.8	60.3	58.2	56.9	56.2	52.9	50.1	48.1	46.9	46.5	45.1	42.5	42.5
7.0	98.7	93.6	74.8	71.7	73.2	67.7	59.4	57.4	56.1	55.6	52.3	49.6	47.6	46.4	46.1	44.7	42.2	42.2
8.0	93.31	89.44	72.00	69.11	70.57	65.57	57.60	55.72	54.60	54.12	50.98	48.36	46.47	45.43	45.09	43.83	41.58	41.42
9.0	88.53	85.61	69.38	66.64	68.11	63.48	55.85	54.10	53.07	52.68	49.64	47.13	45.34	44.36	44.06	42.87	40.84	40.57
10.0	84.24	82.07	66.94	64.33	65.79	61.49	54.18	52.53	51.58	51.25	48.32	45.91	44.20	43.30	43.02	41.89	40.05	39.69
11.0	80.40	78.82	64.66	62.17	63.63	59.61	52.58	51.03	50.14	49.88	47.04	44.73	43.09	42.25	41.99	40.92	39.24	38.81
12.0	76.93	75.84	62.54	60.16	61.60	57.83	51.07	49.61	48.77	48.56	45.81	43.59	42.02	41.23	40.99	39.98	38.43	37.95
15.0	68.29	68.20	57.01	54.91	56.29	53.12	47.03	45.77	45.08	44.97	42.46	40.46	39.06	38.40	38.22	37.34	36.10	35.52
20.0	57.93	58.69	49.91	48.13	49.42	46.92	41.66	40.65	40.11	40.11	37.90	36.18	34.99	34.49	34.36	33.64	32.73	32.09
25.0	50.61	51.78	44.60	43.04	44.25	42.19	37.54	36.69	36.25	36.30	34.33	32.82	31.77	31.37	31.28	30.67	29.96	29.31
30.0	45.15	46.54	40.46	39.08	40.20	38.46	34.27	33.53	33.17	33.26	31.46	30.11	29.16	28.84	28.79	28.25	27.68	27.05
35.0	40.90	42.40	37.14	35.89	36.94	35.43	31.61	30.96	30.65	30.76	29.11	27.88	27.02	26.76	26.72	26.25	25.76	25.16
40.0	37.49	39.04	34.41	33.26	34.26	32.93	29.41	28.82	28.55	28.68	27.15	26.01	25.23	25.00	24.98	24.56	24.14	23.57
45.0	34.69	36.26	32.12	31.06	32.00	30.81	27.54	27.01	26.77	26.91	25.48	24.43	23.69	23.51	23.49	23.11	22.74	22.20
50.0	32.34	33.92	30.16	29.18	30.07	29.00	25.94	25.46	25.24	25.38	24.04	23.06	22.37	22.21	22.20	21.86	21.53	21.02
55.0	30.34	31.92	28.48	27.56	28.41	27.43	24.55	24.10	23.91	24.05	22.79	21.87	21.22	21.08	21.08	20.76	20.46	19.98
60.0	28.62	30.18	27.01	26.14	26.95	26.05	23.33	22.92	22.74	22.89	21.68	20.81	20.20	20.08	20.09	19.79	19.52	19.06
65.0	27.11	28.65	25.71	24.89	25.66	24.84	22.25	21.86	21.71	21.85	20.71	19.88	19.30	19.19	19.20	18.93	18.67	18.24
70.0	25.79	27.31	24.55	23.78	24.62	23.75	21.29	20.92	20.78	20.92	19.83	19.05	18.49	18.40	18.41	18.15	17.92	17.50
80.0	23.56	25.03	22.59	21.89	22.57	21.90	19.64	19.31	19.19	19.34	18.33	17.61	17.11	17.03	17.05	16.82	16.61	16.24
90.0	21.75	23.18	20.98	20.33	20.97	20.37	18.28	17.98	17.88	18.02	17.09	16.43	15.95	15.90	15.91	15.71	15.52	15.18
100.0	20.26	21.64	19.63	19.03	19.63	19.08	17.14	16.87	16.77	16.91	16.04	15.42	14.98	14.94	14.96	14.77	14.59	14.28
150.0	15.44	16.63	15.19	14.74	15.20	14.84	13.35	13.15	13.10	13.23	12.55	12.08	11.74	11.72	11.75	11.62	11.48	11.27
200.0	12.80	14.00	12.80	12.40	12.71	12.51	11.24	11.04	11.07	11.20	10.62	10.46	10.11	9.90	9.94	9.80	9.91	9.56
250.0	11.25	12.34	11.30	10.95	11.20	11.06	9.95	9.66	9.81	9.93	9.42	9.27	8.96	8.79	8.82	8.68	8.80	8.50
300.0	10.18	11.20	10.26	9.94	10.17	10.05	9.05	8.71	8.93	9.04	8.57	8.44	8.16	8.01	8.04	7.91	8.02	7.75
350.0	9.40	10.36	9.49	9.20	9.41	9.31	8.38	8.07	8.27	8.38	7.95	7.82	7.57	7.43	7.46	7.34	7.44	7.20
400.0	8.804	9.711	8.905	8.626	8.835	8.738	7.867	7.588	7.771	7.873	7.471	7.347	7.111	6.985	7.018	6.907	6.999	6.774
450.0	8.336	9.204	8.442	8.177	8.378	8.288	7.464	7.206	7.375	7.474	7.094	6.973	6.750	6.634	6.666	6.562	6.649	6.437
500.0	7.960	8.796	8.069	7.815	8.010	7.925	7.138	6.899	7.056	7.152	6.789	6.671	6.460	6.351	6.383	6.284	6.367	6.165

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	37.10	35.37	35.41	35.65	35.32	33.29	32.25	30.45	29.79	29.00	28.44	27.97	26.95	26.61	26.32	26.38	25.29	24.99
3.0	38.76	36.98	37.01	37.26	36.98	34.95	33.90	32.11	31.47	30.68	30.11	29.63	28.62	28.25	27.93	28.00	26.81	26.49
3.5	39.76	37.96	37.98	38.24	38.01	35.99	34.94	33.20	32.58	31.79	31.22	30.75	29.74	29.36	29.02	29.09	27.83	27.50
4.0	40.33	38.53	38.55	38.81	38.62	36.63	35.59	33.89	33.29	32.52	31.94	31.48	30.50	30.10	29.75	29.82	28.51	28.18
4.5	40.60	38.81	38.83	39.09	38.95	36.99	35.96	34.31	33.74	32.97	32.41	31.95	30.99	30.59	30.22	30.29	28.96	28.62
5.0	40.68	38.90	38.92	39.18	39.07	37.15	36.13	34.53	33.98	33.23	32.67	32.23	31.29	30.89	30.52	30.58	29.23	28.89
5.5	40.61	38.85	38.86	39.13	39.04	37.16	36.16	34.61	34.09	33.35	32.80	32.37	31.45	31.06	30.67	30.74	29.37	29.03
6.0	40.44	38.70	38.71	38.98	38.92	37.08	36.10	34.59	34.09	33.37	32.83	32.40	31.51	31.12	30.73	30.79	29.42	29.08
6.5	40.19	38.48	38.49	38.75	38.72	36.92	35.95	34.49	34.01	33.31	32.77	32.36	31.49	31.10	30.71	30.77	29.40	29.06
7.0	39.89	38.20	38.22	38.48	38.46	36.70	35.75	34.34	33.87	33.18	32.66	32.25	31.41	31.03	30.63	30.70	29.32	28.98
8.0	39.19	37.55	37.57	37.82	37.85	36.16	35.25	33.91	33.47	32.82	32.31	31.93	31.12	30.76	30.35	30.42	29.05	28.72
9.0	38.42	36.82	36.84	37.10	37.15	35.53	34.65	33.38	32.98	32.35	31.86	31.49	30.72	30.38	29.97	30.03	28.69	28.36
10.0	37.62	36.07	36.09	36.34	36.41	34.85	34.01	32.81	32.43	31.83	31.35	31.00	30.26	29.93	29.53	29.59	28.26	27.95
11.0	36.81	35.30	35.33	35.57	35.67	34.17	33.35	32.21	31.85	31.27	30.82	30.48	29.77	29.46	29.05	29.11	27.81	27.50
12.0	36.01	34.55	34.58	34.82	34.93	33.48	32.69	31.60	31.26	30.71	30.27	29.94	29.27	28.96	28.56	28.62	27.34	27.04
15.0	33.76	32.41	32.44	32.67	32.82	31.51	30.79	29.83	29.54	29.04	28.64	28.35	27.75	27.49	27.09	27.15	25.94	25.66
20.0	30.54	29.35	29.39	29.60	29.78	28.64	28.02	27.21	26.98	26.56	26.21	25.96	25.44	25.23	24.86	24.91	23.82	23.57
25.0	27.93	26.86	26.90	27.10	27.29	26.28	25.73	25.03	24.84	24.47	24.15	23.94	23.49	23.31	22.96	23.01	22.01	21.78
30.0	25.79	24.81	24.86	25.04	25.24	24.33	23.83	23.22	23.05	22.72	22.44	22.24	21.84	21.69	21.36	21.41	20.49	20.28
35.0	24.01	23.10	23.15	23.32	23.53	22.69	22.23	21.69	21.54	21.24	20.98	20.81	20.44	20.32	20.00	20.05	19.19	19.00
40.0	22.50	21.65	21.71	21.87	22.07	21.29	20.88	20.38	20.25	19.97	19.74	19.58	19.24	19.13	18.83	18.88	18.08	17.90
45.0	21.20	20.41	20.46	20.62	20.82	20.10	19.71	19.25	19.13	18.88	18.66	18.51	18.20	18.11	17.82	17.86	17.11	16.95
50.0	20.08	19.33	19.38	19.53	19.73	19.05	18.69	18.27	18.16	17.92	17.71	17.58	17.29	17.21	16.93	16.98	16.26	16.11
55.0	19.09	18.38	18.44	18.58	18.77	18.13	17.79	17.40	17.30	17.08	16.88	16.76	16.49	16.41	16.16	16.19	15.52	15.37
60.0	18.22	17.54	17.60	17.73	17.92	17.32	16.99	16.63	16.54	16.33	16.14	16.02	15.77	15.70	15.45	15.49	14.85	14.71
65.0	17.44	16.79	16.85	16.98	17.16	16.59	16.28	15.94	15.85	15.66	15.48	15.37	15.13	15.07	14.82	14.86	14.25	14.12
70.0	16.74	16.12	16.17	16.30	16.48	15.93	15.64	15.31	15.24	15.05	14.88	14.78	14.55	14.49	14.26	14.30	13.71	13.58
80.0	15.53	14.96	15.01	15.13	15.30	14.80	14.53	14.24	14.17	14.00	13.85	13.75	13.54	13.49	13.28	13.31	12.77	12.65
90.0	14.52	13.99	14.04	14.15	14.32	13.85	13.61	13.34	13.28	13.12	12.98	12.89	12.70	12.66	12.45	12.49	11.98	11.87
100.0	13.66	13.17	13.22	13.32	13.49	13.05	12.82	12.57	12.52	12.38	12.24	12.16	11.98	11.94	11.75	11.78	11.31	11.21
150.0	10.79	10.40	10.44	10.52	10.67	10.33	10.16	9.98	9.94	9.84	9.73	9.67	9.54	9.51	9.36	9.39	9.01	8.94
200.0	9.15	8.83	8.83	8.90	9.03	8.75	8.61	8.47	8.44	8.36	8.27	8.22	8.11	8.09	7.96	7.99	7.88	7.62
250.0	8.14	7.86	7.77	7.83	7.95	7.73	7.65	7.51	7.52	7.43	7.32	7.31	7.23	7.17	7.06	7.08	7.03	6.81
300.0	7.42	7.17	7.09	7.11	7.22	7.06	6.98	6.86	6.87	6.79	6.69	6.68	6.61	6.56	6.46	6.48	6.43	6.23
350.0	6.89	6.66	6.59	6.61	6.71	6.56	6.49	6.38	6.39	6.32	6.23	6.22	6.15	6.11	6.01	6.03	5.99	5.80
400.0	6.488	6.267	6.203	6.224	6.318	6.175	6.113	6.011	6.017	5.951	5.867	5.856	5.796	5.756	5.666	5.684	5.640	5.471
450.0	6.166	5.957	5.897	5.917	6.007	5.872	5.813	5.717	5.723	5.661	5.582	5.571	5.515	5.477	5.393	5.410	5.366	5.208
500.0	5.906	5.706	5.650	5.669	5.755	5.627	5.570	5.479	5.485	5.426	5.351	5.341	5.288	5.252	5.172	5.188	5.144	4.995

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

142
ND IONS
60

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.680	5.440	7.682	7.660	7.520	8.955	9.690	10.201	10.580	10.980	11.220	12.000	12.400	12.938	13.150	13.370	13.774	14.130
3.0	6.238	6.100	8.524	8.544	8.393	9.928	10.818	11.384	11.802	12.234	12.558	13.426	13.901	14.488	14.720	15.001	15.586	15.880
3.5	6.810	6.759	9.367	9.427	9.265	10.893	11.933	12.550	13.003	13.462	13.867	14.819	15.365	15.998	16.247	16.584	17.327	17.674
4.0	7.398	7.423	10.217	10.316	10.141	11.858	13.045	13.712	14.197	14.680	15.165	16.197	16.810	17.486	17.753	18.143	19.027	19.239
4.5	8.006	8.097	11.077	11.216	11.027	12.830	14.162	14.876	15.392	15.897	16.460	17.571	18.249	18.967	19.248	19.690	20.703	20.889
5.0	8.633	8.784	11.951	12.130	11.925	13.812	15.289	16.048	16.594	17.119	17.760	18.948	19.689	20.447	20.743	21.235	22.368	22.534
5.5	9.280	9.486	12.841	13.059	12.838	14.806	16.428	17.232	17.807	18.349	19.068	20.332	21.136	21.933	22.243	22.783	24.029	24.180
6.0	9.948	10.203	13.746	14.004	13.766	15.814	17.582	18.429	19.032	19.591	20.388	21.728	22.593	23.428	23.752	24.339	25.691	25.833
6.5	10.636	10.936	14.669	14.967	14.711	16.838	18.751	19.642	20.273	20.846	21.722	23.138	24.063	24.935	25.272	25.906	27.358	27.496
7.0	11.345	11.687	15.610	15.948	15.673	17.878	19.938	20.871	21.529	22.116	23.072	24.562	25.548	26.456	26.806	27.486	29.035	29.171
8.0	12.83	13.24	17.55	17.96	17.65	20.01	22.37	23.38	24.09	24.71	25.82	27.46	28.57	29.55	29.92	30.69	32.42	32.57
9.0	14.39	14.86	19.55	20.06	19.70	22.21	24.87	25.97	26.73	27.36	28.64	30.44	31.66	32.71	33.11	33.97	35.87	36.03
10.0	16.03	16.56	21.64	22.23	21.82	24.48	27.45	28.63	29.45	30.10	31.54	33.49	34.83	35.95	36.37	37.32	39.38	39.57
11.0	17.76	18.32	23.80	24.47	24.01	26.83	30.11	31.38	32.24	32.91	34.52	36.62	38.09	39.27	39.71	40.75	42.96	43.19
12.0	19.57	20.16	26.03	26.79	26.28	29.25	32.85	34.20	35.11	35.79	37.58	39.84	41.42	42.67	43.13	44.26	46.62	46.89
15.0	25.45	26.09	33.17	34.22	33.52	36.94	41.55	43.15	44.20	44.91	47.25	49.99	51.95	53.39	53.90	55.29	58.06	58.50
20.0	36.79	37.35	46.52	48.06	47.02	51.19	57.63	59.64	60.93	61.66	64.98	68.58	71.18	72.93	73.52	75.35	78.74	79.56
25.0	49.94	50.26	61.60	63.69	62.23	67.18	75.61	78.06	79.58	80.30	84.69	89.21	92.51	94.54	95.20	97.49	101.44	102.74
30.0	64.82	64.75	78.34	81.03	79.09	84.83	95.43	98.32	100.08	100.76	106.32	111.83	115.86	118.17	118.89	121.64	126.12	127.98
35.0	81.37	80.76	96.67	100.01	97.54	104.08	117.03	120.38	122.37	122.98	129.81	136.36	141.18	143.75	144.52	147.73	152.73	155.21
40.0	99.52	98.23	116.55	120.58	117.51	124.88	140.33	144.17	146.39	146.90	155.08	162.74	168.39	171.23	172.02	175.72	181.22	184.39
45.0	119.23	117.12	137.93	142.68	138.97	147.19	165.30	169.63	172.09	172.48	182.10	190.92	197.45	200.53	201.35	205.54	211.54	215.45
50.0	140.44	137.37	160.76	166.28	161.88	170.96	191.88	196.72	199.42	199.66	210.80	220.86	228.31	231.62	232.45	237.15	243.65	248.33
55.0	163.12	158.96	185.00	191.33	186.18	196.14	220.03	225.40	228.33	228.41	241.15	252.49	260.91	264.45	265.29	270.49	277.49	283.00
60.0	187.23	181.85	210.61	217.79	211.86	222.71	249.70	255.62	258.79	258.69	273.10	285.79	295.21	298.97	299.81	305.53	313.03	319.39
65.0	212.7	206.0	237.6	245.6	238.9	250.6	280.9	287.4	290.8	290.4	306.6	320.7	331.2	335.1	336.0	342.2	350.2	357.5
70.0	239.6	231.4	265.8	274.8	267.2	279.9	313.5	320.6	324.2	323.7	341.7	357.2	368.8	372.9	373.7	380.5	389.1	397.2
80.0	297.3	285.8	326.2	337.1	327.6	342.2	383.0	391.3	395.4	394.3	416.2	434.8	448.7	453.2	454.0	461.9	471.5	481.5
90.0	360.1	344.8	391.5	404.5	392.9	409.5	458.0	467.5	472.1	470.5	496.5	518.4	534.7	539.6	540.3	549.3	560.0	572.1
100.0	427.8	408.3	461.5	476.8	463.0	481.6	538.3	549.1	554.2	551.9	582.3	607.6	626.6	631.8	632.4	642.6	654.4	668.6
150.0	834.4	787.1	877.4	905.6	878.7	908.2	1012.9	1031.0	1038.4	1031.6	1088.0	1133.2	1167.6	1174.0	1173.7	1190.0	1208.5	1233.7
200.0	1342.7	1265.7	1390.1	1434.5	1392.5	1433.2	1596.7	1623.7	1632.1	1618.7	1707.2	1762.9	1818.9	1837.3	1835.3	1868.7	1874.2	1922.0
250.0	1936.7	1797.8	1982.4	2046.0	1990.2	2038.9	2270.2	2313.5	2315.6	2294.2	2419.6	2486.5	2567.1	2601.0	2596.0	2632.1	2637.1	2712.3
300.0	2601.8	2403.2	2643.3	2728.1	2656.8	2713.8	3020.3	3090.2	3076.0	3045.3	3211.6	3291.2	3399.1	3449.4	3440.7	3491.0	3484.2	3588.9
350.0	3328.8	3063.7	3363.9	3472.0	3383.5	3448.9	3837.2	3938.4	3903.6	3862.5	4073.0	4166.7	4304.9	4371.4	4358.6	4424.0	4404.6	4540.6
400.0	4110.	3773.	4137.	4270.	4163.	4237.	4716.	4847.	4795.	4738.	4995.	5105.	5273.	5358.	5341.	5422.	5389.	5558.
450.0	4940.	4524.	4957.	5116.	4989.	5072.	5640.	5807.	5729.	5664.	5972.	6097.	6298.	6402.	6380.	6478.	6431.	6635.
500.0	5812.	5314.	5817.	6005.	5856.	5949.	6613.	6815.	6714.	6636.	7004.	7139.	7374.	7497.	7469.	7584.	7523.	7762.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.83	15.38	16.60	16.92	17.55	18.44	18.98	19.87	20.09	20.49	20.90	21.33	21.76	22.15	22.66	22.85	24.49	25.02
3.0	16.70	17.34	18.56	18.86	19.51	20.52	21.12	21.94	22.40	22.87	23.32	23.79	24.31	24.73	25.27	25.45	27.21	27.77
3.5	18.51	19.24	20.45	20.74	21.40	22.52	23.18	24.11	24.62	25.14	25.63	26.14	26.74	27.20	27.76	27.94	29.81	30.40
4.0	20.28	21.09	22.31	22.58	23.25	24.47	25.20	26.23	26.77	27.34	27.88	28.42	29.10	29.58	30.18	30.35	32.33	32.95
4.5	22.03	22.93	24.14	24.41	25.08	26.40	27.18	28.31	28.89	29.51	30.09	30.66	31.40	31.92	32.54	32.71	34.80	35.45
5.0	23.78	24.75	25.97	26.22	26.90	28.32	29.15	30.37	30.99	31.65	32.27	32.87	33.68	34.23	34.88	35.04	37.24	37.92
5.5	25.52	26.58	27.79	28.03	28.72	30.23	31.11	32.42	33.07	33.79	34.44	35.07	35.95	36.52	37.20	37.36	39.66	40.37
6.0	27.28	28.41	29.62	29.85	30.54	32.14	33.08	34.48	35.15	35.91	36.60	37.26	38.20	38.80	39.51	39.66	42.07	42.81
6.5	29.04	30.25	31.46	31.68	32.37	34.06	35.05	36.53	37.24	38.04	38.76	39.45	40.45	41.09	41.82	41.97	44.49	45.25
7.0	30.81	32.10	33.31	33.52	34.21	35.99	37.03	38.59	39.33	40.18	40.93	41.65	42.71	43.37	44.14	44.28	46.91	47.70
8.0	34.40	35.85	37.06	37.24	37.93	39.88	41.03	42.75	43.55	44.48	45.30	46.07	47.25	47.97	48.79	48.92	51.77	52.62
9.0	38.06	39.67	40.88	41.03	41.71	43.84	45.09	46.97	47.82	48.84	49.73	50.55	51.84	52.61	53.50	53.62	56.69	57.59
10.0	41.79	43.56	44.77	44.89	45.58	47.88	49.23	51.26	52.16	53.26	54.22	55.10	56.50	57.32	58.27	58.38	61.67	62.64
11.0	45.61	47.54	48.75	48.84	49.52	51.99	53.44	55.63	56.58	57.76	58.79	59.71	61.23	62.10	63.12	63.22	66.74	67.76
12.0	49.51	51.61	52.81	52.88	53.54	56.19	57.74	60.08	61.08	62.34	63.44	64.42	66.04	66.96	68.05	68.14	71.89	72.96
15.0	61.73	64.34	66.53	65.52	66.12	69.31	71.17	73.96	75.10	76.61	77.90	79.04	80.99	82.06	83.37	83.42	87.88	89.14
20.0	83.88	87.40	88.56	88.38	88.86	92.98	95.37	98.91	100.27	102.20	103.84	105.23	107.73	109.04	110.75	110.74	116.46	118.03
25.0	108.21	112.72	113.84	113.48	113.80	118.89	121.85	126.14	127.72	130.08	132.09	133.74	136.81	138.34	140.49	140.42	147.50	149.39
30.0	134.69	140.25	141.32	140.76	140.87	147.00	150.55	155.62	157.42	160.22	162.61	164.53	168.18	169.94	172.58	172.44	180.96	183.20
35.0	163.24	169.93	170.94	170.16	170.03	177.24	181.42	187.28	189.30	192.56	195.36	197.55	201.81	203.78	206.95	206.73	216.79	219.39
40.0	193.8	201.7	202.6	201.6	201.2	209.6	214.4	221.1	223.3	227.1	230.3	232.8	237.6	239.8	243.6	243.3	254.9	257.9
45.0	226.3	235.5	236.3	235.1	234.4	243.9	249.4	256.9	259.4	263.6	267.3	270.1	275.6	278.0	282.3	281.9	295.3	298.7
50.0	260.8	271.3	272.0	270.5	269.4	280.2	286.4	294.8	297.5	302.2	306.4	309.4	315.6	318.2	323.2	322.7	337.9	341.7
55.0	297.0	308.9	309.6	307.8	306.3	318.4	325.4	334.7	337.6	342.8	347.4	350.8	357.7	360.5	366.2	365.6	382.6	386.8
60.0	335.1	348.5	349.0	346.9	345.0	358.5	366.2	376.4	379.6	385.4	390.5	394.2	401.8	404.7	411.1	410.4	429.4	434.0
65.0	375.0	389.9	390.3	387.8	385.5	400.4	408.9	420.1	423.4	429.8	435.4	439.4	447.7	450.9	458.0	457.2	478.2	483.3
70.0	416.6	433.0	433.3	430.5	427.8	444.1	453.4	465.5	469.1	476.0	482.2	486.5	495.6	499.0	506.9	505.9	529.1	534.6
80.0	504.7	524.6	524.5	521.1	517.3	536.7	547.7	561.8	565.9	573.9	581.2	586.3	596.9	600.6	610.2	609.0	636.5	643.0
90.0	599.4	622.8	622.4	618.2	613.3	635.9	648.8	664.9	669.5	678.8	687.2	693.0	705.2	709.3	720.7	719.2	751.4	759.0
100.0	700.3	727.5	726.7	721.7	715.5	741.6	756.3	774.6	779.7	790.3	799.9	806.5	820.5	824.9	838.1	836.3	873.5	882.2
150.0	1291.	1340.	1337.	1327.	1313.	1359.	1385.	1415.	1422.	1440.	1457.	1467.	1491.	1497.	1521.	1518.	1584.	1598.
200.0	2010.	2086.	2081.	2065.	2041.	2110.	2148.	2191.	2201.	2227.	2252.	2268.	2302.	2311.	2348.	2342.	2423.	2464.
250.0	2836.	2941.	2941.	2918.	2881.	2977.	3027.	3085.	3096.	3132.	3168.	3188.	3233.	3247.	3299.	3290.	3379.	3452.
300.0	3751.	3889.	3899.	3872.	3821.	3941.	4000.	4076.	4086.	4133.	4185.	4206.	4262.	4284.	4352.	4340.	4437.	4544.
350.0	4745.	4918.	4940.	4909.	4843.	4986.	5056.	5150.	5159.	5218.	5286.	5309.	5377.	5407.	5494.	5477.	5583.	5726.
400.0	5808.	6018.	6051.	6017.	5935.	6103.	6184.	6297.	6306.	6377.	6462.	6487.	6568.	6606.	6711.	6691.	6806.	6988.
450.0	6931.	7181.	7226.	7188.	7088.	7283.	7376.	7509.	7517.	7602.	7704.	7731.	7825.	7872.	7997.	7972.	8098.	8319.
500.0	8109.	8400.	8457.	8415.	8296.	8519.	8625.	8779.	8785.	8883.	9004.	9034.	9140.	9196.	9342.	9313.	9450.	9712.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

145 PM IONS 61

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	131.2	108.5	85.4	81.4	82.2	73.5	63.3	60.2	58.2	56.6	53.1	49.7	47.1	45.6	45.0	43.3	38.7	40.3
3.0	128.5	109.8	86.0	82.0	83.0	74.7	64.5	61.6	59.8	58.3	54.7	51.4	48.8	47.3	46.7	45.0	40.8	42.0
3.5	125.1	109.5	85.6	81.7	82.8	75.0	65.0	62.2	60.4	59.2	55.5	52.2	49.7	48.3	47.7	46.1	42.1	43.1
4.0	121.4	108.2	84.7	80.9	82.2	74.7	64.9	62.2	60.6	59.4	55.8	52.6	50.2	48.7	48.2	46.6	42.9	43.7
4.5	117.7	106.5	83.5	79.9	81.2	74.1	64.5	62.0	60.4	59.4	55.8	52.6	50.3	48.9	48.4	46.8	43.3	43.9
5.0	114.1	104.4	82.2	78.6	80.0	73.3	63.9	61.5	60.0	59.1	55.5	52.4	50.1	48.8	48.3	46.8	43.5	44.0
5.5	110.6	102.3	80.8	77.3	78.7	72.3	63.2	60.8	59.4	58.6	55.1	52.1	49.9	48.6	48.1	46.6	43.6	43.9
6.0	107.3	100.0	79.3	76.0	77.4	71.3	62.4	60.1	58.8	58.0	54.6	51.6	49.5	48.2	47.8	46.4	43.5	43.7
6.5	104.1	97.8	77.8	74.6	76.1	70.2	61.5	59.4	58.0	57.4	54.0	51.1	49.0	47.8	47.4	46.0	43.3	43.4
7.0	101.2	95.7	76.4	73.3	74.7	69.2	60.6	58.6	57.3	56.7	53.4	50.6	48.6	47.4	47.0	45.6	43.1	43.1
8.0	95.69	91.52	73.60	70.64	72.13	66.99	58.84	56.91	55.77	55.27	52.06	49.37	47.44	46.37	46.02	44.74	42.44	42.28
9.0	90.81	87.65	70.96	68.15	69.64	64.88	57.08	55.28	54.22	53.82	50.72	48.14	46.31	45.31	45.00	43.78	41.70	41.42
10.0	86.45	84.07	68.48	65.81	67.30	62.87	55.39	53.70	52.72	52.39	49.39	46.92	45.17	44.24	43.95	42.80	40.91	40.54
11.0	82.53	80.78	66.18	63.63	65.11	60.97	53.78	52.19	51.27	51.00	48.10	45.73	44.05	43.18	42.92	41.83	40.10	39.66
12.0	78.99	77.75	64.03	61.59	63.06	59.18	52.25	50.75	49.89	49.67	46.86	44.58	42.97	42.16	41.92	40.88	39.29	38.80
15.0	70.17	69.97	58.42	56.26	57.67	54.41	48.16	46.87	46.16	46.05	43.47	41.42	39.99	39.31	39.12	38.21	36.95	36.35
20.0	59.67	60.28	51.20	49.37	50.69	48.11	42.71	41.67	41.11	41.11	38.85	37.08	35.86	35.34	35.21	34.47	33.53	32.87
25.0	52.08	53.23	45.79	44.19	45.42	43.30	38.52	37.64	37.19	37.24	35.21	33.66	32.58	32.17	32.09	31.45	30.72	30.06
30.0	46.48	47.86	41.56	40.14	41.29	39.49	35.19	34.43	34.05	34.14	32.30	30.90	29.94	29.60	29.54	28.99	28.40	27.76
35.0	42.12	43.62	38.17	36.89	37.97	36.41	32.48	31.81	31.49	31.60	29.90	28.63	27.75	27.48	27.44	26.95	26.45	25.84
40.0	38.62	40.19	35.38	34.20	35.22	33.85	30.23	29.62	29.34	29.47	27.90	26.73	25.92	25.69	25.66	25.23	24.80	24.21
45.0	35.74	37.34	33.04	31.95	32.91	31.69	28.32	27.77	27.53	27.66	26.19	25.11	24.36	24.16	24.14	23.75	23.37	22.82
50.0	33.33	34.93	31.04	30.03	30.94	29.83	26.68	26.18	25.96	26.10	24.72	23.71	23.01	22.84	22.83	22.47	22.13	21.61
55.0	31.28	32.88	29.31	28.37	29.24	28.23	25.26	24.80	24.60	24.75	23.44	22.49	21.83	21.68	21.68	21.35	21.04	20.55
60.0	29.50	31.09	27.80	26.92	27.74	26.82	24.01	23.58	23.40	23.55	22.31	21.42	20.79	20.66	20.67	20.36	20.08	19.61
65.0	27.96	29.53	26.47	25.63	26.43	25.57	22.91	22.51	22.34	22.49	21.31	20.46	19.87	19.75	19.76	19.48	19.22	18.77
70.0	26.59	28.14	25.29	24.49	25.25	24.46	21.92	21.54	21.39	21.54	20.42	19.61	19.04	18.94	18.95	18.69	18.44	18.02
80.0	24.30	25.81	23.28	22.55	23.26	22.56	20.23	19.89	19.77	19.92	18.88	18.14	17.62	17.54	17.55	17.32	17.10	16.72
90.0	22.44	23.90	21.62	20.95	21.61	20.99	18.84	18.53	18.42	18.57	17.61	16.92	16.44	16.38	16.39	16.19	15.98	15.64
100.0	20.90	22.32	20.24	19.62	20.23	19.67	17.66	17.38	17.29	17.43	16.53	15.90	15.44	15.39	15.41	15.22	15.04	14.72
150.0	15.94	17.17	15.68	15.21	15.69	15.31	13.77	13.57	13.51	13.65	12.96	12.47	12.11	12.09	12.12	11.99	11.84	11.63
200.0	13.22	14.45	13.21	12.80	13.12	12.91	11.60	11.39	11.43	11.56	10.96	10.79	10.44	10.22	10.26	10.12	10.22	9.86
250.0	11.62	12.74	11.67	11.31	11.57	11.42	10.27	9.98	10.13	10.25	9.72	9.57	9.26	9.07	9.11	8.96	9.08	8.77
300.0	10.52	11.56	10.60	10.27	10.51	10.38	9.34	8.99	9.22	9.33	8.85	8.71	8.43	8.27	8.30	8.17	8.28	8.01
350.0	9.71	10.69	9.81	9.50	9.73	9.61	8.65	8.34	8.54	8.65	8.21	8.08	7.82	7.67	7.71	7.58	7.69	7.44
400.0	9.10	10.03	9.20	8.91	9.13	9.03	8.13	7.84	8.03	8.13	7.72	7.59	7.35	7.22	7.25	7.13	7.23	7.00
450.0	8.61	9.51	8.72	8.45	8.66	8.56	7.71	7.45	7.62	7.72	7.33	7.20	6.97	6.85	6.89	6.78	6.87	6.65
500.0	8.23	9.09	8.34	8.08	8.28	8.19	7.38	7.13	7.29	7.39	7.02	6.89	6.67	6.56	6.59	6.49	6.58	6.37

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	37.68	35.91	35.95	36.20	35.86	33.80	32.75	30.91	30.24	29.44	28.88	28.40	27.37	27.01	26.72	26.79	25.67	25.37
3.0	39.39	37.58	37.61	37.87	37.58	35.51	34.44	32.63	31.98	31.17	30.59	30.11	29.08	28.70	28.38	28.45	27.24	26.92
3.5	40.43	38.60	38.63	38.89	38.66	36.60	35.53	33.75	33.12	32.32	31.74	31.26	30.24	29.85	29.50	29.57	28.30	27.96
4.0	41.04	39.20	39.22	39.49	39.30	37.27	36.21	34.48	33.87	33.08	32.50	32.03	31.03	30.63	30.26	30.33	29.01	28.67
4.5	41.34	39.51	39.53	39.80	39.65	37.65	36.60	34.92	34.34	33.56	32.99	32.52	31.54	31.14	30.76	30.83	29.47	29.13
5.0	41.43	39.62	39.64	39.90	39.79	37.83	36.79	35.17	34.61	33.84	33.27	32.82	31.86	31.46	31.07	31.14	29.76	29.41
5.5	41.38	39.59	39.60	39.87	39.78	37.86	36.84	35.26	34.73	33.98	33.42	32.97	32.04	31.64	31.25	31.31	29.92	29.57
6.0	41.22	39.45	39.46	39.73	39.67	37.79	36.79	35.25	34.74	34.01	33.45	33.02	32.11	31.71	31.31	31.38	29.98	29.63
6.5	40.98	39.23	39.25	39.51	39.48	37.64	36.65	35.17	34.67	33.95	33.41	32.99	32.10	31.71	31.30	31.37	29.97	29.62
7.0	40.69	38.96	38.98	39.24	39.23	37.43	36.46	35.02	34.54	33.84	33.31	32.89	32.03	31.64	31.23	31.30	29.90	29.55
8.0	40.00	38.32	38.34	38.60	38.62	36.90	35.96	34.60	34.16	33.49	32.97	32.57	31.75	31.38	30.97	31.03	29.64	29.30
9.0	39.23	37.60	37.62	37.87	37.93	36.27	35.37	34.08	33.67	33.03	32.53	32.15	31.36	31.01	30.59	30.66	29.28	28.95
10.0	38.43	36.84	36.86	37.12	37.19	35.60	34.73	33.51	33.12	32.50	32.02	31.66	30.91	30.57	30.15	30.22	28.86	28.54
11.0	37.62	36.08	36.10	36.36	36.46	34.91	34.08	32.91	32.54	31.95	31.49	31.14	30.42	30.09	29.68	29.74	28.41	28.09
12.0	36.82	35.32	35.36	35.59	35.70	34.22	33.42	32.30	31.96	31.39	30.94	30.60	29.91	29.60	29.19	29.25	27.94	27.63
15.0	34.54	33.16	33.19	33.43	33.58	32.23	31.50	30.52	30.22	29.71	29.30	29.01	28.39	28.12	27.71	27.77	26.54	26.25
20.0	31.29	30.06	30.11	30.32	30.50	29.33	28.70	27.87	27.64	27.20	26.84	26.59	26.06	25.84	25.46	25.51	24.39	24.13
25.0	28.64	27.54	27.58	27.78	27.98	26.94	26.38	25.66	25.47	25.08	24.76	24.54	24.08	23.90	23.54	23.59	22.56	22.33
30.0	26.47	25.46	25.51	25.69	25.90	24.96	24.45	23.82	23.65	23.31	23.02	22.82	22.40	22.25	21.91	21.96	21.02	20.80
35.0	24.65	23.72	23.77	23.95	24.15	23.29	22.83	22.26	22.11	21.80	21.54	21.36	20.98	20.86	20.53	20.58	19.70	19.50
40.0	23.11	22.24	22.30	22.46	22.67	21.87	21.44	20.93	20.80	20.52	20.27	20.11	19.76	19.65	19.34	19.39	18.57	18.38
45.0	21.79	20.98	21.03	21.19	21.39	20.65	20.25	19.78	19.66	19.40	19.17	19.02	18.70	18.60	18.31	18.35	17.58	17.41
50.0	20.64	19.87	19.93	20.08	20.28	19.58	19.21	18.78	18.67	18.42	18.21	18.07	17.77	17.69	17.41	17.45	16.72	16.56
55.0	19.63	18.90	18.96	19.10	19.30	18.65	18.29	17.89	17.79	17.56	17.36	17.23	16.95	16.87	16.61	16.65	15.95	15.80
60.0	18.74	18.05	18.10	18.24	18.44	17.81	17.48	17.10	17.01	16.80	16.60	16.48	16.22	16.15	15.89	15.93	15.27	15.13
65.0	17.94	17.28	17.33	17.47	17.66	17.07	16.75	16.40	16.31	16.11	15.93	15.81	15.56	15.50	15.25	15.29	14.66	14.52
70.0	17.23	16.59	16.65	16.77	16.96	16.40	16.10	15.76	15.68	15.49	15.32	15.21	14.97	14.91	14.67	14.71	14.10	13.98
80.0	15.99	15.40	15.45	15.58	15.76	15.24	14.96	14.68	14.59	14.42	14.26	14.16	13.94	13.89	13.67	13.71	13.14	13.03
90.0	14.96	14.41	14.46	14.57	14.75	14.27	14.01	13.74	13.67	13.52	13.37	13.28	13.08	13.04	12.83	12.86	12.34	12.23
100.0	14.08	13.57	13.62	13.72	13.89	13.44	13.21	12.95	12.90	12.75	12.61	12.53	12.34	12.30	12.11	12.14	11.65	11.54
150.0	11.13	10.73	10.77	10.85	11.00	10.65	10.48	10.29	10.25	10.15	10.04	9.98	9.84	9.81	9.66	9.68	9.29	9.22
200.0	9.44	9.12	9.11	9.19	9.32	9.03	8.88	8.74	8.71	8.62	8.53	8.48	8.37	8.35	8.22	8.24	8.13	7.87
250.0	8.40	8.11	8.02	8.09	8.21	7.98	7.90	7.76	7.76	7.67	7.56	7.55	7.46	7.41	7.29	7.31	7.26	7.03
300.0	7.67	7.40	7.32	7.35	7.46	7.29	7.21	7.09	7.09	7.01	6.91	6.90	6.83	6.78	6.67	6.69	6.64	6.44
350.0	7.12	6.88	6.81	6.83	6.93	6.77	6.71	6.59	6.60	6.53	6.43	6.42	6.35	6.31	6.21	6.23	6.18	5.99
400.0	6.703	6.474	6.408	6.429	6.526	6.379	6.315	6.210	6.216	6.148	6.060	6.049	5.987	5.946	5.853	5.872	5.826	5.651
450.0	6.371	6.154	6.093	6.113	6.205	6.066	6.006	5.907	5.913	5.849	5.766	5.755	5.697	5.659	5.571	5.589	5.544	5.380
500.0	6.102	5.895	5.838	5.857	5.946	5.814	5.755	5.661	5.668	5.606	5.529	5.518	5.463	5.427	5.343	5.360	5.315	5.161

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

145 61 PM IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.720	5.470	7.731	7.710	7.570	9.019	9.760	10.273	10.650	11.050	11.300	12.080	12.490	13.025	13.230	13.448	13.858	14.220
3.0	6.278	6.133	8.576	8.597	8.447	9.997	10.893	11.462	11.877	12.309	12.644	13.512	13.999	14.583	14.808	15.087	15.678	15.976
3.5	6.849	6.794	9.421	9.482	9.320	10.964	12.011	12.632	13.083	13.542	13.958	14.911	15.468	16.098	16.342	16.677	17.427	17.681
4.0	7.437	7.460	10.272	10.373	10.199	11.932	13.127	13.797	14.280	14.764	15.260	16.294	16.918	17.592	17.852	18.241	19.133	19.351
4.5	8.044	8.135	11.134	11.275	11.086	12.906	14.247	14.964	15.479	15.985	16.559	17.671	18.361	19.077	19.352	19.793	20.815	21.006
5.0	8.669	8.822	12.009	12.190	11.986	13.890	15.375	16.139	16.683	17.209	17.862	19.052	19.805	20.561	20.851	21.342	22.484	22.656
5.5	9.315	9.524	12.899	13.119	12.899	14.885	16.516	17.324	17.898	18.441	19.172	20.439	21.254	22.050	22.354	22.894	24.148	24.306
6.0	9.980	10.241	13.805	14.065	13.828	15.895	17.671	18.523	19.125	19.684	20.494	21.837	22.714	23.547	23.865	24.462	25.814	25.962
6.5	10.666	10.973	14.728	15.028	14.772	16.919	18.841	19.736	20.366	20.941	21.829	23.248	24.185	25.056	25.387	26.021	27.484	27.627
7.0	11.373	11.723	15.668	16.008	15.734	17.959	20.028	20.966	21.623	22.212	23.180	24.674	25.671	26.579	26.923	27.603	29.162	29.304
8.0	12.85	13.27	17.60	18.02	17.71	20.09	22.46	23.48	24.19	24.80	25.93	27.58	28.69	29.67	30.04	30.81	32.55	32.70
9.0	14.40	14.89	19.61	20.11	19.76	22.29	24.96	26.06	26.82	27.46	28.75	30.55	31.79	32.83	33.23	34.09	36.00	36.17
10.0	16.04	16.58	21.69	22.28	21.87	24.56	27.54	28.72	29.54	30.19	31.65	33.60	34.96	36.07	36.49	37.44	39.61	39.70
11.0	17.76	18.34	23.84	24.52	24.06	26.90	30.19	31.46	32.33	33.00	34.62	36.73	38.21	39.39	39.83	40.86	43.09	43.32
12.0	19.55	20.17	26.07	26.84	26.33	29.32	32.93	34.28	35.19	35.88	37.68	39.94	41.54	42.79	43.24	44.37	46.74	47.02
15.0	25.41	26.08	33.19	34.24	33.55	36.99	41.61	43.21	44.26	44.98	47.32	50.07	52.04	53.48	53.99	55.38	58.16	58.61
20.0	36.67	37.28	46.48	48.03	46.99	51.19	57.63	59.65	60.94	61.67	65.00	68.60	71.22	72.96	73.56	75.39	78.78	79.61
25.0	49.72	50.11	61.49	63.58	62.13	67.11	75.53	77.98	79.51	80.23	84.63	89.15	92.46	94.49	95.15	97.44	101.39	102.70
30.0	64.49	64.50	78.13	80.82	78.90	84.66	95.25	98.15	99.91	100.59	106.15	111.66	115.70	118.01	118.73	121.47	125.96	127.82
35.0	80.90	80.39	96.35	99.69	97.23	103.80	116.72	120.08	122.07	122.68	129.50	136.05	140.87	143.46	144.21	147.43	152.43	154.92
40.0	98.89	97.72	116.10	120.12	117.07	124.47	139.88	143.72	145.94	146.46	154.63	162.27	167.93	170.76	171.56	175.25	180.76	183.92
45.0	118.42	116.45	137.32	142.06	138.38	146.63	164.68	169.01	171.47	171.87	181.46	190.27	196.80	199.88	200.70	204.88	210.89	214.79
50.0	139.44	136.54	159.98	165.48	161.11	170.22	191.07	195.91	198.60	198.87	209.97	220.00	227.44	230.76	231.60	236.28	242.78	247.45
55.0	161.91	157.95	184.03	190.34	185.23	195.22	219.00	224.38	227.30	227.40	240.10	251.41	259.81	263.36	264.20	269.39	276.38	281.87
60.0	185.79	180.64	209.44	216.59	210.70	221.58	248.45	254.37	257.53	257.45	271.81	284.45	293.85	297.62	298.46	304.17	311.67	318.01
65.0	211.0	204.6	236.2	244.2	237.5	249.3	279.4	286.8	289.2	289.0	305.1	319.1	329.5	333.5	334.3	340.6	348.6	355.8
70.0	237.6	229.7	264.2	273.1	265.6	278.3	311.7	318.8	322.4	321.9	339.8	355.3	366.8	371.0	371.8	378.6	387.1	395.2
80.0	294.8	283.6	324.0	334.9	325.5	340.1	380.7	388.9	393.0	392.0	413.8	432.3	446.1	450.6	451.4	459.3	468.8	478.9
90.0	356.9	342.1	388.7	401.7	390.2	406.8	455.0	464.5	469.0	467.4	493.4	515.1	531.4	536.3	536.9	545.9	556.6	568.6
100.0	423.9	404.9	458.1	473.2	459.6	478.2	534.5	545.3	550.4	548.1	578.4	603.6	622.4	627.7	628.2	638.4	650.2	664.3
150.0	826.2	779.8	869.8	897.7	871.2	900.6	1004.5	1022.5	1029.9	1023.1	1079.1	1124.0	1158.1	1164.6	1164.3	1180.5	1199.0	1224.0
200.0	1328.9	1243.4	1377.0	1421.1	1379.5	1420.1	1582.1	1608.9	1617.3	1604.2	1691.8	1747.1	1802.7	1821.0	1819.0	1842.3	1857.7	1905.1
250.0	1916.1	1779.5	1962.8	2025.8	1970.6	2019.1	2248.3	2291.2	2293.3	2272.2	2396.4	2462.8	2542.8	2576.4	2571.5	2607.3	2612.4	2686.9
300.0	2573.6	2378.1	2616.2	2700.2	2629.7	2686.4	2990.0	3059.2	3045.2	3014.9	3179.6	3258.5	3365.5	3415.3	3406.8	3456.6	3450.0	3553.8
350.0	3292.1	3031.1	3328.5	3435.6	3348.0	3413.2	3797.5	3897.7	3863.4	3822.8	4031.3	4124.1	4261.0	4326.9	4314.3	4379.1	4360.0	4494.7
400.0	4064.	3732.	4093.	4224.	4118.	4192.	4663.	4795.	4740.	4688.	4943.	5051.	5218.	5302.	5285.	5366.	5333.	5501.
450.0	4884.	4475.	4903.	5061.	4935.	5018.	5579.	5746.	5668.	5603.	5908.	6032.	6232.	6334.	6312.	6409.	6363.	6564.
500.0	5746.	5255.	5753.	5939.	5792.	5884.	6541.	6741.	6641.	6564.	6920.	7062.	7295.	7428.	7388.	7503.	7442.	7679.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	14.93	15.49	16.72	17.04	17.67	18.57	19.11	19.81	20.22	20.62	21.03	21.46	21.89	22.29	22.81	23.00	24.65	25.18
3.0	16.81	17.46	18.69	18.99	19.64	20.66	21.26	22.08	22.55	23.01	23.46	23.94	24.46	24.89	25.44	25.62	27.39	27.95
3.5	18.62	19.36	20.59	20.88	21.54	22.67	23.33	24.27	24.77	25.29	25.79	26.30	26.90	27.36	27.94	28.12	30.00	30.59
4.0	20.40	21.22	22.45	22.73	23.40	24.63	25.35	26.39	26.93	27.50	28.04	28.59	29.27	29.76	30.36	30.54	32.53	33.15
4.5	22.16	23.06	24.29	24.56	25.24	26.56	27.34	28.48	29.06	29.68	30.26	30.83	31.58	32.10	32.74	32.90	35.00	35.65
5.0	23.91	24.90	26.12	26.38	27.06	28.48	29.32	30.55	31.16	31.83	32.44	33.05	33.87	34.42	35.08	35.24	37.45	38.13
5.5	25.66	26.73	27.95	28.19	28.88	30.40	31.29	32.60	33.25	33.97	34.62	35.25	36.14	36.72	37.41	37.56	39.88	40.59
6.0	27.42	28.56	29.79	30.01	30.71	32.31	33.26	34.66	35.34	36.10	36.79	37.45	38.40	39.01	39.73	39.88	42.30	43.03
6.5	29.18	30.40	31.63	31.84	32.54	34.24	35.23	36.72	37.43	38.23	38.95	39.65	40.65	41.29	42.04	42.19	44.72	45.48
7.0	30.96	32.26	33.48	33.69	34.38	36.17	37.21	38.78	39.52	40.37	41.13	41.85	42.91	43.58	44.36	44.50	47.14	47.93
8.0	34.55	36.01	37.23	37.41	38.11	40.07	41.22	42.95	43.74	44.68	45.50	46.28	47.46	48.18	49.02	49.15	52.01	52.86
9.0	38.21	39.83	41.05	41.20	41.89	44.03	45.28	47.17	48.02	49.04	49.93	50.76	52.05	52.83	53.73	53.85	56.93	57.83
10.0	41.94	43.72	44.94	45.07	45.75	48.07	49.42	51.46	52.36	53.46	54.42	55.30	56.71	57.54	58.50	58.61	61.92	62.88
11.0	45.76	47.70	48.92	49.02	49.69	52.18	53.63	55.83	56.77	57.96	58.99	59.92	61.44	62.32	63.35	63.45	66.98	68.00
12.0	49.65	51.76	52.98	53.05	53.71	56.38	57.93	60.27	61.27	62.54	63.63	64.61	66.25	67.17	68.27	68.37	72.12	73.20
15.0	61.86	64.48	65.68	65.66	66.28	69.48	71.34	74.13	75.27	76.78	78.08	79.22	81.18	82.25	83.57	83.63	88.10	89.36
20.0	83.94	87.47	88.64	88.47	88.96	93.08	95.48	99.01	100.38	102.31	103.95	105.34	107.85	109.17	110.88	110.88	116.61	118.18
25.0	108.18	112.69	113.83	113.47	113.80	118.90	121.86	126.15	127.73	130.09	132.10	133.75	136.82	138.37	140.53	140.46	147.55	149.44
30.0	134.54	140.10	141.19	140.63	140.76	146.88	150.43	155.50	157.30	160.10	162.49	164.41	168.06	169.83	172.47	172.34	180.87	183.10
35.0	162.94	169.63	170.65	169.89	169.77	176.97	181.15	187.01	189.03	192.28	195.08	197.27	201.52	203.50	206.68	206.47	216.52	219.12
40.0	193.3	201.2	202.2	201.2	200.8	209.1	213.9	220.6	222.9	226.6	229.8	232.3	237.1	239.3	243.1	242.8	254.5	257.4
45.0	225.7	234.6	235.7	234.4	233.7	243.2	248.7	256.3	258.7	262.9	266.6	269.4	274.9	277.3	281.6	281.2	294.6	298.0
50.0	258.9	270.3	271.1	269.6	268.5	279.3	285.5	293.9	296.6	301.3	306.4	308.5	314.7	317.3	322.3	321.8	336.9	340.7
55.0	295.9	307.7	308.4	306.6	305.2	317.3	324.2	333.5	336.4	341.6	346.2	349.6	356.5	359.2	364.9	364.3	381.3	385.5
60.0	333.7	347.0	347.6	345.5	343.6	357.1	364.8	374.9	378.1	383.8	388.9	392.6	400.2	403.2	409.6	408.9	427.8	432.4
65.0	373.2	388.1	388.5	386.1	383.8	398.7	407.1	418.2	421.6	427.9	433.5	437.5	445.8	449.0	456.1	455.3	476.3	481.3
70.0	414.5	430.9	431.2	428.5	425.7	442.0	451.3	463.4	467.0	473.8	480.0	484.3	493.4	496.7	504.6	503.7	526.7	532.2
80.0	502.0	521.7	521.7	518.2	514.5	533.8	544.8	558.8	562.9	571.0	578.2	583.2	593.8	597.5	607.1	605.9	633.3	639.8
90.0	595.8	619.1	618.8	614.6	609.7	632.3	645.0	661.1	665.6	674.9	683.3	689.1	701.3	705.4	716.7	715.2	747.2	754.8
100.0	696.8	722.9	722.2	717.2	711.0	737.0	751.7	769.8	774.9	785.4	795.0	801.6	815.5	819.9	833.1	831.3	868.3	876.9
150.0	1281.	1330.	1327.	1317.	1303.	1349.	1374.	1404.	1411.	1429.	1446.	1456.	1480.	1486.	1510.	1506.	1572.	1586.
200.0	1993.	2068.	2063.	2047.	2023.	2092.	2129.	2172.	2183.	2208.	2233.	2249.	2283.	2291.	2328.	2322.	2402.	2443.
250.0	2809.	2914.	2913.	2891.	2854.	2950.	2999.	3057.	3067.	3103.	3139.	3158.	3203.	3218.	3269.	3260.	3349.	3421.
300.0	3715.	3851.	3861.	3835.	3784.	3903.	3961.	4036.	4047.	4093.	4144.	4165.	4221.	4243.	4311.	4298.	4395.	4501.
350.0	4697.	4869.	4890.	4860.	4794.	4936.	5005.	5098.	5108.	5166.	5233.	5256.	5324.	5354.	5439.	5423.	5528.	5670.
400.0	5748.	5956.	5989.	5955.	5873.	6041.	6120.	6233.	6241.	6312.	6396.	6421.	6501.	6539.	6643.	6623.	6737.	6917.
450.0	6858.	7106.	7150.	7113.	7014.	7207.	7299.	7431.	7438.	7522.	7623.	7650.	7743.	7790.	7913.	7889.	8014.	8233.
500.0	8022.	8310.	8367.	8325.	8208.	8429.	8533.	8685.	8691.	8789.	8908.	8938.	9043.	9099.	9243.	9215.	9350.	9609.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

152 SM IONS 62

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	133.8	110.1	86.9	82.7	83.6	74.7	64.3	61.1	59.2	57.5	53.9	50.5	47.9	46.3	45.7	44.0	39.3	40.9
3.0	131.2	111.6	87.5	83.4	84.4	76.0	65.6	62.6	60.7	59.3	55.6	52.2	49.6	48.1	47.5	45.8	41.4	42.7
3.5	127.8	111.4	87.1	83.2	84.3	76.3	66.1	63.3	61.5	60.2	56.5	53.1	50.6	49.1	48.5	46.8	42.8	43.8
4.0	124.1	110.3	86.3	82.4	83.7	76.1	66.1	63.4	61.6	60.5	56.8	53.5	51.1	49.6	49.0	47.4	43.6	44.4
4.5	120.4	108.5	85.1	81.4	82.7	75.5	65.7	63.1	61.5	60.4	56.8	53.6	51.2	49.8	49.2	47.6	44.1	44.7
5.0	116.7	106.5	83.8	80.2	81.6	74.7	65.1	62.6	61.1	60.2	56.5	53.4	51.1	49.7	49.2	47.7	44.3	44.8
5.5	113.2	104.4	82.4	78.9	80.3	73.7	64.4	62.0	60.5	59.7	56.1	53.1	50.8	49.5	49.0	47.5	44.4	44.7
6.0	109.8	102.2	80.9	77.5	79.0	72.7	63.6	61.3	59.9	59.1	55.6	52.6	50.4	49.2	48.7	47.3	44.3	44.5
6.5	106.6	100.0	79.5	76.2	77.6	71.7	62.7	60.5	59.2	58.5	55.1	52.1	50.0	48.8	48.4	46.9	44.1	44.2
7.0	103.6	97.8	78.0	74.8	76.3	70.6	61.9	59.7	58.5	57.8	54.5	51.6	49.5	48.3	47.9	46.5	43.9	43.9
8.0	98.07	93.61	75.19	72.16	73.68	68.40	60.07	58.10	56.92	56.41	53.14	50.39	48.42	47.32	46.96	45.65	43.30	43.13
9.0	93.11	89.70	72.53	69.65	71.17	66.28	58.30	56.46	55.38	54.96	51.79	49.16	47.28	46.26	45.93	44.69	42.57	42.28
10.0	88.67	86.08	70.03	67.29	68.81	64.26	56.60	54.87	53.86	53.52	50.45	47.93	46.14	45.18	44.89	43.71	41.78	41.40
11.0	84.68	82.74	67.70	65.08	66.59	62.33	54.97	53.35	52.41	52.12	49.15	46.73	45.02	44.12	43.85	42.73	40.97	40.52
12.0	81.07	79.66	65.52	63.02	64.52	60.52	53.43	51.89	51.01	50.78	47.90	45.57	43.93	43.09	42.84	41.78	40.15	39.64
15.0	72.07	71.76	59.83	57.61	59.06	55.69	49.29	47.97	47.23	47.12	44.48	42.38	40.91	40.21	40.02	39.09	37.79	37.18
20.0	61.23	61.88	52.49	50.61	51.96	49.30	43.77	42.69	42.12	42.12	39.79	37.99	36.73	36.19	36.06	35.30	34.34	33.66
25.0	53.56	54.68	46.98	45.33	46.60	44.41	39.50	38.60	38.13	38.19	36.11	34.51	33.40	32.98	32.89	32.24	31.49	30.81
30.0	47.82	49.19	42.67	41.21	42.39	40.53	36.11	35.33	34.94	35.03	33.14	31.71	30.71	30.37	30.30	29.74	29.13	28.47
35.0	43.35	44.86	39.21	37.89	39.00	37.38	33.35	32.66	32.33	32.44	30.70	29.39	28.49	28.20	28.16	27.66	27.15	26.51
40.0	39.76	41.34	36.36	35.15	36.19	34.77	31.05	30.43	30.14	30.27	28.65	27.45	26.62	26.38	26.35	25.91	25.46	24.86
45.0	36.81	38.42	33.96	32.85	33.83	32.57	29.10	28.54	28.29	28.42	26.91	25.80	25.02	24.82	24.80	24.40	24.01	23.44
50.0	34.33	35.96	31.92	30.88	31.82	30.67	27.43	26.92	26.69	26.83	25.41	24.37	23.65	23.47	23.46	23.10	22.75	22.21
55.0	32.22	33.85	30.15	29.18	30.07	29.03	25.98	25.50	25.30	25.44	24.10	23.13	22.44	22.29	22.29	21.95	21.63	21.12
60.0	30.40	32.01	28.61	27.69	28.55	27.59	24.70	24.26	24.07	24.22	22.95	22.03	21.38	21.25	21.25	20.94	20.65	20.16
65.0	28.81	30.41	27.25	26.38	27.20	26.31	23.57	23.16	22.99	23.14	21.93	21.05	20.44	20.32	20.33	20.04	19.76	19.31
70.0	27.41	28.99	26.04	25.21	26.00	25.17	22.56	22.17	22.02	22.17	21.01	20.18	19.59	19.49	19.50	19.23	18.97	18.54
80.0	25.05	26.59	23.97	23.22	23.95	23.23	20.83	20.48	20.35	20.50	19.44	18.67	18.13	18.05	18.07	17.83	17.60	17.21
90.0	23.14	24.63	22.27	21.59	22.26	21.62	19.40	19.08	18.97	19.12	18.13	17.43	16.93	16.86	16.88	16.66	16.46	16.10
100.0	21.56	23.00	20.85	20.21	20.85	20.27	18.20	17.91	17.81	17.96	17.03	16.37	15.90	15.85	15.87	15.68	15.49	15.16
150.0	16.45	17.70	16.17	15.69	16.18	15.78	14.20	13.99	13.93	14.07	13.35	12.85	12.49	12.47	12.49	12.36	12.21	11.99
200.0	13.64	14.91	13.63	13.21	13.54	13.32	11.97	11.76	11.79	11.93	11.31	11.13	10.76	10.54	10.58	10.44	10.55	10.17
250.0	11.99	13.15	12.05	11.67	11.94	11.79	10.60	10.30	10.45	10.58	10.03	9.88	9.55	9.36	9.40	9.24	9.37	9.05
300.0	10.86	11.94	10.94	10.60	10.85	10.72	9.64	9.28	9.51	9.63	9.14	8.99	8.70	8.53	8.57	8.43	8.55	8.26
350.0	10.03	11.04	10.12	9.81	10.04	9.93	8.94	8.61	8.82	8.94	8.48	8.34	8.07	7.92	7.96	7.83	7.94	7.68
400.0	9.39	10.36	9.50	9.20	9.42	9.32	8.39	8.09	8.29	8.40	7.97	7.84	7.58	7.45	7.49	7.37	7.47	7.22
450.0	8.90	9.82	9.01	8.72	8.94	8.84	7.96	7.69	7.87	7.97	7.57	7.44	7.20	7.08	7.11	7.00	7.09	6.87
500.0	8.50	9.38	8.61	8.34	8.55	8.46	7.62	7.36	7.53	7.63	7.24	7.12	6.89	6.78	6.81	6.70	6.79	6.58

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	38.24	36.45	36.49	36.74	36.40	34.30	33.23	31.37	30.69	29.88	29.30	28.81	27.77	27.41	27.11	27.18	26.05	25.75
3.0	40.01	38.17	38.20	38.46	38.17	36.07	34.98	33.14	32.48	31.66	31.07	30.58	29.53	29.15	28.82	28.89	27.66	27.34
3.5	41.10	39.24	39.26	39.53	39.29	37.20	36.11	34.30	33.66	32.85	32.26	31.77	30.74	30.33	29.98	30.05	28.75	28.42
4.0	41.74	39.87	39.89	40.16	39.97	37.90	36.82	35.06	34.44	33.64	33.05	32.57	31.55	31.14	30.77	30.84	29.49	29.15
4.5	42.07	40.21	40.22	40.50	40.34	38.31	37.24	35.53	34.94	34.15	33.56	33.09	32.09	31.68	31.30	31.37	29.98	29.63
5.0	42.18	40.34	40.35	40.62	40.50	38.51	37.45	35.79	35.22	34.45	33.87	33.40	32.43	32.02	31.63	31.70	30.29	29.94
5.5	42.14	40.32	40.33	40.60	40.51	38.56	37.52	35.91	35.36	34.60	34.03	33.57	32.62	32.21	31.81	31.88	30.46	30.11
6.0	42.00	40.19	40.20	40.47	40.41	38.50	37.48	35.91	35.39	34.64	34.08	33.63	32.71	32.30	31.90	31.96	30.54	30.18
6.5	41.77	39.99	40.00	40.27	40.23	38.36	37.35	35.83	35.33	34.60	34.04	33.61	32.71	32.31	31.90	31.96	30.53	30.18
7.0	41.49	39.72	39.74	40.01	39.99	38.15	37.17	35.69	35.21	34.49	33.95	33.53	32.64	32.25	31.83	31.90	30.47	30.12
8.0	40.80	39.09	39.10	39.37	39.39	37.63	36.68	35.29	34.84	34.15	33.62	33.22	32.38	32.00	31.58	31.65	30.23	29.88
9.0	40.04	38.37	38.39	38.65	38.70	37.01	36.10	34.78	34.35	33.70	33.19	32.80	32.00	31.64	31.21	31.28	29.87	29.53
10.0	39.24	37.62	37.64	37.89	37.97	36.34	35.46	34.20	33.81	33.18	32.69	32.32	31.55	31.20	30.78	30.84	29.46	29.13
11.0	38.42	36.85	36.87	37.13	37.23	35.65	34.80	33.61	33.23	32.63	32.15	31.80	31.06	30.73	30.31	30.37	29.01	28.68
12.0	37.62	36.09	36.11	36.36	36.48	34.96	34.14	33.00	32.64	32.06	31.60	31.26	30.55	30.24	29.82	29.88	28.54	28.23
15.0	35.33	33.92	33.95	34.18	34.34	32.96	32.21	31.21	30.90	30.38	29.96	29.66	29.02	28.75	28.34	28.40	27.13	26.84
20.0	32.04	30.78	30.82	31.04	31.23	30.03	29.38	28.53	28.29	27.84	27.48	27.22	26.67	26.45	26.06	26.12	24.97	24.70
25.0	29.36	28.22	28.27	28.47	28.68	27.61	27.03	26.30	26.09	25.70	25.37	25.15	24.67	24.49	24.11	24.17	23.12	22.88
30.0	27.15	26.11	26.16	26.35	26.56	25.59	25.07	24.42	24.25	23.90	23.60	23.40	22.97	22.82	22.47	22.52	21.55	21.33
35.0	25.30	24.34	24.39	24.57	24.78	23.90	23.42	22.84	22.69	22.37	22.10	21.91	21.53	21.40	21.06	21.11	20.21	20.01
40.0	23.73	22.84	22.89	23.06	23.27	22.45	22.01	21.49	21.35	21.06	20.81	20.64	20.28	20.17	19.85	19.90	19.06	18.87
45.0	22.38	21.54	21.60	21.76	21.97	21.21	20.80	20.31	20.19	19.92	19.69	19.53	19.20	19.11	18.80	18.85	18.05	17.88
50.0	21.21	20.42	20.48	20.63	20.84	20.12	19.74	19.29	19.18	18.93	18.71	18.56	18.26	18.17	17.88	17.92	17.17	17.01
55.0	20.18	19.43	19.49	19.64	19.84	19.16	18.80	18.39	18.28	18.05	17.84	17.71	17.42	17.34	17.06	17.11	16.39	16.24
60.0	19.27	18.55	18.61	18.75	18.95	18.31	17.97	17.58	17.49	17.27	17.07	16.94	16.67	16.60	16.34	16.38	15.70	15.55
65.0	18.45	17.77	17.83	17.96	18.16	17.55	17.23	16.86	16.77	16.57	16.38	16.26	16.00	15.94	15.68	15.72	15.07	14.93
70.0	17.72	17.07	17.12	17.26	17.45	16.87	16.56	16.21	16.13	15.93	15.75	15.64	15.40	15.34	15.09	15.13	14.51	14.37
80.0	16.45	15.85	15.90	16.03	16.22	15.68	15.40	15.09	15.01	14.83	14.67	14.57	14.36	14.29	14.06	14.10	13.52	13.40
90.0	15.40	14.83	14.89	15.00	15.18	14.69	14.43	14.14	14.08	13.91	13.78	13.67	13.46	13.42	13.20	13.24	12.70	12.58
100.0	14.50	13.97	14.02	14.13	14.31	13.84	13.60	13.34	13.28	13.13	12.98	12.90	12.71	12.67	12.47	12.50	11.99	11.89
150.0	11.47	11.06	11.10	11.19	11.34	10.98	10.80	10.61	10.57	10.46	10.35	10.28	10.14	10.11	9.95	9.98	9.58	9.50
200.0	9.74	9.40	9.40	9.48	9.61	9.31	9.16	9.01	8.98	8.89	8.80	8.75	8.63	8.61	8.48	8.50	8.39	8.12
250.0	8.67	8.37	8.28	8.34	8.47	8.23	8.15	8.00	8.01	7.92	7.80	7.79	7.70	7.64	7.52	7.55	7.49	7.25
300.0	7.91	7.64	7.56	7.58	7.70	7.52	7.44	7.32	7.32	7.24	7.13	7.12	7.04	6.99	6.88	6.91	6.86	6.64
350.0	7.35	7.10	7.03	7.05	7.16	6.99	6.92	6.81	6.81	6.74	6.64	6.63	6.56	6.51	6.41	6.43	6.38	6.19
400.0	6.920	6.684	6.615	6.638	6.738	6.586	6.520	6.411	6.417	6.347	6.257	6.245	6.181	6.138	6.043	6.062	6.015	5.834
450.0	6.578	6.354	6.291	6.312	6.408	6.264	6.201	6.099	6.105	6.039	5.954	5.943	5.883	5.843	5.752	5.771	5.724	5.555
500.0	6.302	6.087	6.029	6.048	6.140	6.004	5.943	5.846	5.853	5.789	5.709	5.698	5.642	5.604	5.517	5.535	5.488	5.329

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

152 SM IONS 62

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.910	5.660	7.989	7.970	7.830	9.320	10.080	10.609	11.000	11.410	11.660	12.480	12.900	13.454	13.670	13.895	14.311	14.680
3.0	6.483	6.344	8.859	8.884	8.733	10.328	11.249	11.835	12.266	12.709	13.047	13.958	14.457	15.063	15.299	15.586	16.190	16.495
3.5	7.070	7.025	9.729	9.796	9.633	11.325	12.401	13.042	13.509	13.981	14.402	15.400	15.972	16.626	16.881	17.226	17.994	18.251
4.0	7.673	7.710	10.605	10.713	10.538	12.322	13.550	14.241	14.743	15.240	15.743	16.825	17.467	18.166	18.437	18.839	19.753	19.974
4.5	8.295	8.405	11.492	11.641	11.451	13.325	14.703	15.443	15.977	16.496	17.081	18.244	18.953	19.695	19.983	20.438	21.485	21.679
5.0	8.936	9.112	12.392	12.581	12.376	14.337	15.864	16.652	17.216	17.756	18.422	19.665	20.439	21.223	21.526	22.032	23.204	23.377
5.5	9.597	9.832	13.306	13.536	13.314	15.361	17.038	17.871	18.466	19.024	19.770	21.092	21.931	22.755	23.073	23.629	24.917	25.076
6.0	10.278	10.568	14.237	14.508	14.269	16.398	18.225	19.104	19.728	20.303	21.130	22.530	23.432	24.296	24.628	25.233	26.631	26.780
6.5	10.981	11.320	15.185	15.497	15.239	17.451	19.428	20.361	21.004	21.594	22.502	23.981	24.945	25.847	26.193	26.847	28.349	28.493
7.0	11.704	12.089	16.150	16.504	16.227	18.620	20.648	21.615	22.295	22.901	23.890	25.447	26.473	27.413	27.772	28.473	30.074	30.217
8.0	13.21	13.68	18.13	18.57	18.25	20.71	23.14	24.19	24.93	25.56	26.72	28.43	29.58	30.59	30.98	31.77	33.56	33.71
9.0	14.80	15.34	20.19	20.72	20.35	22.97	25.71	26.85	27.64	28.29	29.61	31.48	32.75	33.84	34.25	35.14	37.10	37.27
10.0	16.48	17.07	22.33	22.94	22.53	25.29	28.36	29.58	30.42	31.09	32.59	34.61	36.01	37.16	37.60	38.57	40.70	40.90
11.0	18.23	18.87	24.53	25.23	24.77	27.70	31.08	32.39	33.28	33.97	35.64	37.83	39.34	40.57	41.02	42.09	44.38	44.61
12.0	20.07	20.74	26.82	27.61	27.09	30.17	33.89	35.28	36.22	36.93	38.77	41.12	42.76	44.06	44.53	45.69	48.13	48.41
15.0	26.04	26.78	34.11	35.19	34.49	38.03	42.78	44.43	45.52	46.26	48.66	51.50	53.53	55.02	55.55	56.98	59.83	60.29
20.0	37.53	38.22	47.71	49.30	48.24	52.57	59.18	61.25	62.59	63.35	66.75	70.48	73.16	74.97	75.58	77.47	80.95	81.80
25.0	50.84	51.32	63.04	65.19	63.71	68.84	77.49	80.00	81.58	82.33	86.83	91.50	94.89	97.00	97.68	100.03	104.09	105.43
30.0	65.89	66.00	80.04	82.80	80.84	86.78	97.63	100.61	102.43	103.13	108.83	114.50	118.65	121.04	121.78	124.60	129.21	131.11
35.0	82.60	82.20	98.64	102.06	99.55	106.32	119.56	123.01	125.06	125.70	132.68	139.42	144.36	147.03	147.82	151.12	156.25	158.80
40.0	100.93	99.87	118.78	122.90	119.80	127.42	143.19	147.14	149.43	149.97	158.33	166.19	171.98	174.91	175.74	179.53	185.18	188.42
45.0	120.81	118.95	140.43	146.29	141.54	150.02	168.49	172.94	175.48	175.90	185.71	194.76	201.45	204.63	205.48	209.77	215.93	219.92
50.0	142.20	139.41	163.52	169.16	164.71	174.08	195.41	200.38	203.15	203.43	214.79	225.09	232.71	236.13	237.00	241.80	248.47	253.25
55.0	165.07	161.21	188.03	194.49	189.29	199.56	223.89	229.40	232.42	232.53	245.51	257.11	265.71	269.37	270.25	275.57	282.75	288.36
60.0	189.36	184.31	213.92	221.24	215.25	226.43	253.91	259.97	263.22	263.16	277.84	290.80	300.42	304.31	305.18	311.03	318.72	325.20
65.0	215.1	208.7	241.1	249.4	242.5	254.7	285.4	292.0	295.5	295.3	311.7	326.1	336.8	340.9	341.8	348.1	356.4	363.7
70.0	242.1	234.3	269.7	278.8	271.1	284.2	318.4	325.6	329.3	328.8	347.1	363.0	374.8	379.1	379.9	386.9	395.6	403.9
80.0	300.2	289.1	330.6	341.7	332.1	347.1	388.6	397.0	401.2	400.2	422.4	441.4	455.5	460.2	461.0	469.1	478.9	489.1
90.0	363.4	348.6	396.4	409.7	398.0	415.0	464.3	474.0	478.7	477.0	503.5	525.7	542.4	547.4	548.1	557.3	568.2	580.5
100.0	431.5	412.5	467.0	482.5	468.8	487.7	545.2	556.2	561.4	559.1	590.0	615.8	635.1	640.4	641.0	651.4	663.5	677.9
150.0	840.2	793.6	885.6	914.2	887.1	917.3	1023.2	1041.6	1049.1	1042.3	1099.4	1145.2	1180.0	1186.6	1186.3	1202.9	1221.8	1247.3
200.0	1350.9	1264.7	1401.1	1446.0	1403.7	1445.3	1610.2	1637.6	1646.2	1632.9	1722.1	1778.5	1835.1	1853.8	1851.9	1875.6	1891.4	1939.7
250.0	1947.2	1809.3	1996.2	2060.3	2004.2	2053.9	2287.0	2330.8	2333.0	2311.6	2438.0	2505.7	2587.1	2621.4	2616.4	2652.9	2658.2	2734.1
300.0	2614.7	2417.3	2659.7	2745.2	2673.5	2731.5	3040.3	3110.7	3096.7	3066.0	3233.4	3313.9	3422.7	3473.5	3464.8	3515.6	3509.1	3614.5
350.0	3344.3	3080.4	3383.0	3491.9	3403.0	3469.5	3860.3	3962.2	3927.5	3886.3	4098.3	4192.8	4331.0	4399.2	4386.4	4452.4	4433.2	4570.1
400.0	4128.	3792.	4159.	4293.	4185.	4261.	4739.	4874.	4817.	4765.	5024.	5134.	5304.	5390.	5372.	5454.	5422.	5592.
450.0	4960.	4546.	4981.	5142.	5014.	5098.	5669.	5844.	5759.	5694.	6012.	6130.	6339.	6437.	6415.	6513.	6467.	6672.
500.0	5836.	5339.	5845.	6033.	5884.	5978.	6646.	6849.	6747.	6669.	7031.	7175.	7412.	7535.	7508.	7623.	7562.	7803.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.41	15.99	17.26	17.59	18.24	19.17	19.72	20.43	20.86	21.27	21.69	22.14	22.59	23.00	23.54	23.73	25.38	25.90
3.0	17.35	18.02	19.29	19.60	20.27	21.32	21.94	22.79	23.26	23.73	24.20	24.69	25.24	25.68	26.25	26.44	28.21	28.76
3.5	19.22	19.98	21.25	21.55	22.23	23.39	24.08	25.04	25.55	26.09	26.60	27.13	27.76	28.24	28.84	29.02	30.90	31.48
4.0	21.06	21.90	23.17	23.46	24.15	25.42	26.16	27.23	27.78	28.37	28.93	29.49	30.19	30.71	31.33	31.51	33.50	34.12
4.5	22.87	23.80	25.07	25.34	26.04	27.41	28.21	29.38	29.97	30.61	31.21	31.80	32.58	33.12	33.78	33.95	36.06	36.70
5.0	24.67	25.69	26.95	27.21	27.92	29.39	30.25	31.51	32.14	32.83	33.46	34.09	34.94	35.51	36.20	36.36	38.58	39.25
5.5	26.47	27.57	28.84	29.09	29.80	31.36	32.28	33.63	34.29	35.03	35.70	36.36	37.27	37.88	38.59	38.75	41.08	41.79
6.0	28.28	29.46	30.72	30.96	31.66	33.33	34.30	35.74	36.44	37.22	37.93	38.62	39.60	40.23	40.98	41.13	43.57	44.31
6.5	30.09	31.35	32.62	32.84	33.56	35.31	36.33	37.86	38.59	39.42	40.16	40.88	41.92	42.58	43.36	43.51	46.06	46.82
7.0	31.92	33.26	34.52	34.74	35.45	37.30	38.37	39.99	40.74	41.62	42.40	43.14	44.25	44.94	45.74	45.89	48.55	49.34
8.0	35.61	37.12	38.38	38.56	39.28	41.31	42.49	44.27	45.08	46.04	46.89	47.70	48.92	49.67	50.54	50.67	53.56	54.41
9.0	39.37	41.04	42.30	42.46	43.18	45.38	46.66	48.61	49.48	50.52	51.44	52.30	53.64	54.44	55.38	55.50	58.61	59.52
10.0	43.21	45.04	46.30	46.43	47.14	49.52	50.91	53.01	53.94	55.07	56.06	56.97	58.42	59.28	60.28	60.39	63.74	64.71
11.0	47.12	49.12	50.38	50.48	51.18	53.74	55.24	57.50	58.47	59.69	60.75	61.71	63.28	64.19	65.26	65.36	68.94	69.96
12.0	51.12	53.29	54.55	54.62	55.31	58.05	59.65	62.06	63.08	64.39	65.51	66.53	68.21	69.17	70.31	70.40	74.22	75.31
15.0	63.63	66.33	67.57	67.56	68.19	71.49	73.40	76.27	77.44	79.00	80.33	81.50	83.53	84.64	86.00	86.06	90.60	91.87
20.0	86.25	89.88	91.10	90.92	91.43	95.67	98.13	101.76	103.17	105.15	106.84	108.27	110.86	112.22	113.99	113.99	119.82	121.41
25.0	111.06	115.69	116.87	116.51	116.85	122.09	125.13	129.54	131.16	133.58	135.65	137.35	140.51	142.11	144.33	144.26	151.49	153.41
30.0	138.00	143.71	144.85	144.28	144.42	150.70	154.35	159.55	161.40	164.27	166.74	168.71	172.46	174.28	177.00	176.87	185.57	187.84
35.0	167.03	173.89	174.96	174.17	174.06	181.46	185.74	191.75	193.82	197.17	200.04	202.29	206.66	208.70	211.96	211.75	222.01	224.66
40.0	198.1	206.1	207.1	206.1	205.7	214.3	219.2	226.1	228.4	232.2	235.5	238.0	243.1	245.3	249.2	248.8	260.8	263.8
45.0	231.1	240.4	241.3	240.1	239.4	249.1	254.8	262.5	265.0	269.3	273.1	275.9	281.6	284.0	288.5	288.1	301.8	305.2
50.0	266.0	276.7	277.5	275.9	274.9	286.9	292.3	300.9	303.6	308.5	312.7	315.8	322.2	324.8	330.0	329.5	344.9	348.8
55.0	302.7	314.8	315.6	313.7	312.3	324.7	331.8	341.3	344.2	349.6	354.3	357.8	364.8	367.7	373.5	372.9	390.3	394.5
60.0	341.3	354.9	355.5	353.3	351.5	365.2	373.1	383.5	386.8	392.7	397.9	401.7	409.4	412.5	419.0	418.3	437.7	442.4
65.0	381.6	396.8	397.2	394.8	392.5	407.6	416.3	427.7	431.1	437.6	443.3	447.5	456.0	459.2	466.5	465.7	487.1	492.3
70.0	423.6	440.4	440.7	437.9	435.2	451.8	461.3	473.7	477.4	484.4	490.7	495.1	504.4	507.8	515.9	515.0	538.5	544.1
80.0	512.7	532.9	532.9	529.4	526.6	545.4	556.6	571.0	575.1	583.4	590.7	595.9	606.8	610.6	620.4	619.1	647.1	653.8
90.0	608.3	632.1	631.8	627.5	622.6	645.6	658.7	675.1	679.8	689.2	697.8	703.7	716.2	720.4	732.0	730.5	763.2	770.9
100.0	710.1	737.8	737.0	732.0	725.7	752.3	767.3	785.6	791.0	801.8	811.6	816.3	832.5	837.1	850.5	848.7	886.4	895.2
150.0	1305.	1355.	1352.	1342.	1328.	1375.	1400.	1431.	1439.	1457.	1473.	1484.	1508.	1515.	1539.	1535.	1602.	1617.
200.0	2029.	2106.	2100.	2084.	2060.	2130.	2168.	2212.	2223.	2249.	2274.	2290.	2325.	2334.	2371.	2365.	2447.	2488.
250.0	2859.	2965.	2965.	2942.	2905.	3002.	3062.	3111.	3122.	3158.	3195.	3214.	3260.	3275.	3327.	3318.	3408.	3481.
300.0	3778.	3917.	3928.	3900.	3849.	3970.	4029.	4106.	4116.	4164.	4216.	4237.	4294.	4316.	4385.	4372.	4471.	4579.
350.0	4776.	4950.	4972.	4941.	4875.	5020.	5090.	5184.	5194.	5254.	5322.	5345.	5414.	5444.	5531.	5514.	5622.	5766.
400.0	5843.	6055.	6088.	6054.	5971.	6141.	6222.	6336.	6345.	6417.	6502.	6528.	6609.	6648.	6754.	6733.	6850.	7032.
450.0	6970.	7222.	7267.	7229.	7128.	7325.	7416.	7553.	7560.	7646.	7748.	7776.	7870.	7918.	8044.	8019.	8148.	8368.
500.0	8151.	8445.	8502.	8460.	8341.	8565.	8671.	8826.	8832.	8932.	9053.	9083.	9190.	9247.	9394.	9365.	9503.	9766.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

153 EU IONS 63

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	136.4	111.7	88.3	84.1	84.9	75.8	65.3	62.1	60.0	58.4	54.7	51.2	48.6	47.0	46.4	44.6	39.9	41.5
3.0	133.9	113.4	89.0	84.8	85.9	77.2	66.7	63.6	61.7	60.2	56.5	53.0	50.4	48.8	48.2	46.5	42.1	43.4
3.5	130.5	113.4	88.7	84.7	85.8	77.6	67.2	64.3	62.5	61.2	57.4	54.0	51.4	49.9	49.3	47.6	43.4	44.5
4.0	126.8	112.3	87.9	84.0	85.2	77.4	67.2	64.5	62.7	61.5	57.8	54.4	51.9	50.4	49.9	48.2	44.3	45.1
4.5	123.1	110.6	86.7	82.9	84.3	76.9	66.9	64.2	62.6	61.5	57.8	54.5	52.1	50.6	50.1	48.5	44.8	45.5
5.0	119.4	108.6	85.4	81.7	83.1	76.1	66.3	63.8	62.2	61.3	57.6	54.4	52.0	50.6	50.1	48.5	45.1	45.6
5.5	115.8	106.5	84.0	80.4	81.9	75.2	65.6	63.2	61.7	60.8	57.2	54.0	51.7	50.4	49.9	48.4	45.2	45.5
6.0	112.4	104.3	82.5	79.1	80.6	74.1	64.8	62.5	61.0	60.3	56.7	53.6	51.4	50.1	49.6	48.1	45.1	45.3
6.5	109.2	102.1	81.1	77.7	79.2	73.1	64.0	61.7	60.4	59.6	56.1	53.1	50.9	49.7	49.3	47.8	45.0	45.1
7.0	106.1	99.9	79.6	76.3	77.9	72.0	63.1	60.9	59.6	59.0	55.5	52.6	50.5	49.2	48.8	47.4	44.8	44.7
8.0	100.5	95.7	76.8	73.7	75.2	69.8	61.3	59.3	58.1	57.6	54.2	51.4	49.4	48.3	47.9	46.5	44.2	44.0
9.0	95.4	91.8	74.1	71.2	72.7	67.7	59.5	57.6	56.5	56.1	52.9	50.2	48.2	47.2	46.9	45.6	43.4	43.1
10.0	90.9	88.1	71.6	68.8	70.3	65.6	57.8	56.0	55.0	54.6	51.5	48.9	47.1	46.1	45.8	44.6	42.6	42.3
11.0	86.8	84.7	69.2	66.5	68.1	63.7	56.2	54.5	53.5	53.2	50.2	47.7	46.0	45.1	44.8	43.6	41.8	41.4
12.0	83.2	81.6	67.0	64.4	66.0	61.9	54.6	53.0	52.1	51.9	48.9	46.6	44.9	44.0	43.8	42.7	41.0	40.5
15.0	73.97	73.56	61.25	58.97	60.44	56.98	50.42	49.07	48.31	48.19	45.49	43.34	41.84	41.12	40.92	39.96	38.64	38.01
20.0	62.90	63.49	53.79	51.86	53.24	50.50	44.82	43.72	43.13	43.12	40.75	38.89	37.60	37.05	36.91	36.13	35.15	34.45
25.0	55.05	56.15	48.18	46.49	47.78	45.52	40.49	39.56	39.08	39.13	37.00	35.36	34.23	33.79	33.69	33.03	32.26	31.56
30.0	49.18	50.54	43.79	42.29	43.49	41.58	37.04	36.23	35.83	35.92	33.98	32.51	31.49	31.13	31.07	30.49	29.86	29.18
35.0	44.60	46.11	40.26	38.90	40.03	38.37	34.22	33.51	33.17	33.28	31.50	30.16	29.23	28.93	28.89	28.38	27.85	27.20
40.0	40.92	42.50	37.35	36.10	37.17	35.70	31.88	31.24	30.94	31.07	29.41	28.18	27.32	27.08	27.05	26.59	26.13	25.51
45.0	37.89	39.52	34.90	33.75	34.76	33.45	29.89	29.31	29.05	29.19	27.64	26.49	25.70	25.49	25.47	25.05	24.65	24.06
50.0	35.35	36.99	32.81	31.74	32.70	31.52	28.19	27.65	27.42	27.57	26.11	25.04	24.29	24.11	24.10	23.72	23.36	22.81
55.0	33.18	34.83	31.00	30.00	30.92	29.84	26.70	26.21	26.00	26.15	24.77	23.76	23.06	22.90	22.90	22.55	22.23	21.70
60.0	31.31	32.95	29.42	28.48	29.36	28.36	25.40	24.94	24.75	24.90	23.59	22.64	21.98	21.84	21.84	21.52	21.22	20.72
65.0	29.68	31.30	28.03	27.14	27.98	27.06	24.24	23.81	23.64	23.79	22.54	21.64	21.01	20.89	20.90	20.60	20.32	19.84
70.0	28.24	29.85	26.79	25.94	26.75	25.89	23.20	22.80	22.64	22.80	21.61	20.75	20.14	20.04	20.05	19.77	19.51	19.06
80.0	25.81	27.38	24.67	23.90	24.65	23.90	21.43	21.07	20.94	21.09	20.00	19.21	18.66	18.57	18.59	18.34	18.11	17.70
90.0	23.85	25.37	22.93	22.22	22.92	22.25	19.97	19.64	19.52	19.68	18.66	17.93	17.42	17.35	17.37	17.15	16.93	16.57
100.0	22.22	23.70	21.47	20.81	21.47	20.87	18.74	18.44	18.33	18.49	17.53	16.85	16.37	16.32	16.34	16.14	15.94	15.60
150.0	16.96	18.25	16.67	16.17	16.67	16.27	14.63	14.42	14.36	14.50	13.76	13.24	12.87	12.85	12.87	12.73	12.58	12.35
200.0	14.07	15.37	14.06	13.62	13.96	13.73	12.34	12.12	12.16	12.30	11.66	11.48	11.10	10.87	10.91	10.76	10.87	10.49
250.0	12.38	13.57	12.43	12.04	12.31	12.16	10.94	10.62	10.78	10.91	10.35	10.19	9.85	9.66	9.70	9.53	9.67	9.34
300.0	11.21	12.31	11.29	10.93	11.19	11.06	9.95	9.58	9.82	9.94	9.43	9.28	8.97	8.80	8.84	8.70	8.82	8.52
350.0	10.35	11.39	10.45	10.12	10.36	10.24	9.22	8.88	9.10	9.22	8.75	8.60	8.33	8.17	8.21	8.08	8.19	7.92
400.0	9.70	10.69	9.80	9.50	9.73	9.62	8.66	8.35	8.55	8.67	8.22	8.09	7.83	7.69	7.72	7.60	7.70	7.46
450.0	9.18	10.13	9.30	9.00	9.23	9.13	8.22	7.93	8.12	8.23	7.81	7.68	7.43	7.30	7.34	7.22	7.32	7.09
500.0	8.77	9.69	8.89	8.61	8.82	8.73	7.86	7.60	7.77	7.88	7.48	7.35	7.11	6.99	7.03	6.92	7.01	6.79

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	38.79	36.97	37.01	37.27	36.92	34.79	33.71	31.82	31.13	30.31	29.72	29.23	28.17	27.80	27.50	27.57	26.42	26.12
3.0	40.62	38.75	38.78	39.05	38.75	36.62	35.51	33.64	32.97	32.14	31.54	31.04	29.98	29.59	29.25	29.33	28.08	27.75
3.5	41.76	39.87	39.89	40.16	39.91	37.79	36.68	34.85	34.20	33.37	32.77	32.27	31.22	30.81	30.46	30.53	29.21	28.87
4.0	42.43	40.53	40.55	40.82	40.63	38.53	37.43	35.64	35.01	34.19	33.59	33.10	32.07	31.65	31.28	31.35	29.98	29.63
4.5	42.79	40.90	40.91	41.19	41.03	38.96	37.87	36.13	35.53	34.72	34.13	33.64	32.63	32.21	31.82	31.89	30.49	30.13
5.0	42.93	41.05	41.06	41.33	41.21	39.18	38.11	36.42	35.84	35.05	34.46	33.98	32.99	32.57	32.17	32.24	30.81	30.45
5.5	42.90	41.04	41.05	41.33	41.24	39.25	38.19	36.55	35.99	35.22	34.63	34.17	33.20	32.79	32.38	32.45	31.00	30.64
6.0	42.77	40.93	40.94	41.21	41.15	39.20	38.16	36.57	36.03	35.27	34.70	34.24	33.30	32.89	32.47	32.54	31.09	30.73
6.5	42.55	40.73	40.74	41.02	40.98	39.07	38.04	36.50	35.98	35.24	34.67	34.23	33.31	32.90	32.48	32.55	31.09	30.73
7.0	42.28	40.48	40.49	40.76	40.75	38.87	37.87	36.37	35.87	35.14	34.59	34.15	33.25	32.85	32.43	32.50	31.04	30.68
8.0	41.61	39.86	39.87	40.14	40.16	38.36	37.39	35.97	35.51	34.81	34.28	33.86	33.00	32.62	32.19	32.26	30.81	30.46
9.0	40.84	39.14	39.16	39.42	39.48	37.75	36.82	35.47	35.04	34.37	33.85	33.45	32.63	32.26	31.83	31.90	30.46	30.12
10.0	40.04	38.39	38.41	38.67	38.75	37.08	36.18	34.90	34.50	33.85	33.35	32.97	32.19	31.83	31.40	31.47	30.05	29.71
11.0	39.23	37.62	37.64	37.90	38.00	36.40	35.52	34.30	33.92	33.30	32.82	32.46	31.70	31.37	30.93	31.00	29.61	29.27
12.0	38.42	36.86	36.88	37.13	37.25	35.70	34.86	33.69	33.33	32.74	32.27	31.92	31.20	30.87	30.44	30.51	29.14	28.82
15.0	36.12	34.67	34.70	34.94	35.10	33.69	32.92	31.89	31.59	31.05	30.62	30.31	29.86	29.38	28.96	29.02	27.73	27.42
20.0	32.79	31.51	31.54	31.77	31.96	30.73	30.06	29.20	28.95	28.49	28.11	27.85	27.29	27.06	26.66	26.72	25.54	25.27
25.0	30.07	28.91	28.95	29.16	29.37	28.28	27.68	26.93	26.72	26.32	25.98	25.75	25.26	25.07	24.69	24.75	23.67	23.42
30.0	27.83	26.76	26.81	27.01	27.22	26.23	25.69	25.03	24.85	24.49	24.19	23.98	23.54	23.38	23.02	23.07	22.08	21.86
35.0	25.95	24.96	25.02	25.20	25.42	24.51	24.02	23.42	23.27	22.94	22.66	22.47	22.07	21.94	21.60	21.65	20.72	20.51
40.0	24.35	23.43	23.49	23.66	23.88	23.04	22.59	22.05	21.91	21.61	21.35	21.18	20.81	20.69	20.37	20.42	19.55	19.36
45.0	22.98	22.12	22.17	22.34	22.56	21.77	21.35	20.85	20.73	20.45	20.21	20.05	19.71	19.61	19.30	19.34	18.53	18.35
50.0	21.78	20.97	21.03	21.19	21.40	20.66	20.27	19.81	19.69	19.44	19.21	19.06	18.75	18.66	18.36	18.40	17.63	17.46
55.0	20.73	19.96	20.02	20.17	20.38	19.68	19.31	18.89	18.78	18.54	18.33	18.19	17.89	17.81	17.53	17.57	16.84	16.68
60.0	19.80	19.07	19.12	19.27	19.48	18.82	18.47	18.07	17.97	17.74	17.54	17.41	17.13	17.06	16.78	16.83	16.13	15.98
65.0	18.97	18.27	18.32	18.47	18.67	18.04	17.71	17.33	17.24	17.03	16.83	16.71	16.45	16.38	16.12	16.16	15.49	15.35
70.0	18.22	17.55	17.60	17.74	17.94	17.34	17.02	16.67	16.58	16.38	16.19	16.08	15.83	15.77	15.51	15.55	14.91	14.77
80.0	16.92	16.30	16.36	16.49	16.68	16.13	15.84	15.51	15.44	15.26	15.09	14.98	14.75	14.70	14.46	14.50	13.91	13.78
90.0	15.84	15.26	15.32	15.44	15.62	15.11	14.84	14.55	14.48	14.31	14.16	14.06	13.85	13.80	13.58	13.62	13.06	12.95
100.0	14.92	14.38	14.43	14.55	14.73	14.25	14.00	13.73	13.67	13.51	13.36	13.27	13.08	13.04	12.83	12.86	12.34	12.23
150.0	11.82	11.39	11.44	11.53	11.68	11.31	11.13	10.93	10.89	10.77	10.66	10.59	10.45	10.42	10.25	10.28	9.87	9.79
200.0	10.04	9.69	9.69	9.77	9.91	9.60	9.45	9.29	9.26	9.17	9.07	9.02	8.90	8.87	8.74	8.76	8.65	8.36
250.0	8.94	8.63	8.64	8.61	8.74	8.49	8.40	8.25	8.26	8.16	8.04	8.03	7.94	7.88	7.75	7.78	7.73	7.48
300.0	8.16	7.88	7.80	7.82	7.94	7.76	7.68	7.55	7.55	7.47	7.36	7.35	7.27	7.21	7.10	7.12	7.07	6.85
350.0	7.59	7.33	7.25	7.27	7.38	7.21	7.14	7.02	7.03	6.95	6.85	6.84	6.77	6.72	6.61	6.63	6.58	6.38
400.0	7.141	6.897	6.826	6.849	6.953	6.796	6.728	6.616	6.622	6.550	6.456	6.444	6.378	6.334	6.235	6.256	6.207	6.020
450.0	6.789	6.558	6.492	6.514	6.613	6.464	6.399	6.294	6.300	6.232	6.145	6.133	6.071	6.030	5.936	5.955	5.907	5.733
500.0	6.504	6.283	6.222	6.242	6.337	6.196	6.133	6.034	6.040	5.975	5.892	5.881	5.822	5.783	5.694	5.712	5.664	5.500

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

153 EU IONS 63

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.870	5.620	7.930	7.910	7.770	9.255	10.010	10.533	10.920	11.330	11.580	12.390	12.810	13.358	13.570	13.793	14.209	14.580
3.0	6.436	6.298	8.792	8.815	8.665	10.253	11.168	11.748	12.175	12.618	12.954	13.855	14.354	14.953	15.185	15.470	16.073	16.380
3.5	7.014	6.972	9.652	9.717	9.555	11.241	12.309	12.943	13.405	13.877	14.297	15.284	15.855	16.502	16.752	17.096	17.861	18.120
4.0	7.609	7.650	10.518	10.624	10.449	12.227	13.446	14.130	14.627	15.123	15.625	16.694	17.334	18.026	18.294	18.692	19.603	19.826
4.5	8.221	8.336	11.394	11.541	11.352	13.219	14.586	15.319	15.847	16.366	16.948	18.098	18.805	19.540	19.824	20.275	21.318	21.514
5.0	8.852	9.034	12.283	12.470	12.266	14.219	15.734	16.514	17.073	17.612	18.274	19.504	20.275	21.051	21.350	21.852	23.018	23.194
5.5	9.503	9.745	13.186	13.413	13.193	15.230	16.894	17.719	18.308	18.865	19.607	20.915	21.750	22.566	22.880	23.431	24.712	24.874
6.0	10.173	10.471	14.105	14.372	14.135	16.255	18.066	18.936	19.555	20.129	20.950	22.336	23.233	24.089	24.416	25.016	26.406	26.558
6.5	10.864	11.212	15.040	15.348	15.092	17.294	19.254	20.168	20.815	21.404	22.306	23.769	24.728	25.622	25.963	26.611	28.103	28.251
7.0	11.575	11.969	15.992	16.341	16.066	18.349	20.458	21.415	22.090	22.694	23.676	25.216	26.236	27.168	27.522	28.218	29.808	29.955
8.0	13.06	13.53	17.95	18.38	18.07	20.51	22.92	23.96	24.69	25.32	26.46	28.18	29.30	30.31	30.69	31.47	33.25	33.40
9.0	14.62	15.17	19.98	20.49	20.13	22.73	25.45	26.58	27.36	28.01	29.32	31.17	32.44	33.51	33.91	34.79	36.74	36.92
10.0	16.26	16.87	22.08	22.68	22.28	25.03	28.06	29.27	30.10	30.78	32.26	34.26	35.64	36.79	37.22	38.19	40.30	40.50
11.0	17.99	18.64	24.25	24.94	24.49	27.40	30.74	32.04	32.92	33.61	35.26	37.43	38.93	40.15	40.59	41.65	43.92	44.16
12.0	19.79	20.48	26.50	27.28	26.77	29.83	33.51	34.89	35.82	36.52	38.35	40.67	42.30	43.58	44.05	45.20	47.61	47.90
15.0	25.65	26.42	33.67	34.74	34.05	37.57	42.26	43.89	44.97	45.71	48.08	50.90	52.90	54.38	54.90	56.32	59.15	59.60
20.0	36.91	37.65	47.04	48.60	47.57	51.87	58.39	60.44	61.76	62.52	65.88	69.56	72.22	74.01	74.62	76.48	79.93	80.77
25.0	49.95	50.49	62.09	64.21	62.76	67.85	76.37	78.86	80.42	81.17	85.61	90.22	93.57	95.66	96.33	98.65	102.67	103.99
30.0	64.68	64.88	78.77	81.49	79.57	85.46	96.15	99.09	100.89	101.60	107.21	112.80	116.90	119.27	120.00	122.78	127.34	129.23
35.0	81.04	80.74	97.01	100.38	97.92	104.63	117.66	121.07	123.10	123.74	130.62	137.26	142.14	144.78	145.56	148.81	153.89	156.40
40.0	98.96	98.04	116.76	120.81	117.77	125.32	140.84	144.73	147.00	147.55	155.77	163.52	169.23	172.13	172.95	176.69	182.27	185.46
45.0	118.41	116.73	137.96	142.74	139.07	147.47	165.64	170.02	172.53	172.96	182.62	191.53	198.12	201.27	202.12	206.34	212.43	216.36
50.0	139.33	136.75	160.58	166.13	161.77	171.04	192.01	196.91	199.65	199.95	211.11	221.25	228.76	232.15	233.01	237.74	244.32	249.03
55.0	161.68	158.07	184.58	190.93	185.84	196.00	219.91	225.34	228.32	228.46	241.21	252.63	261.09	264.72	265.59	270.83	277.91	283.43
60.0	185.43	180.67	209.92	217.11	211.24	222.31	249.30	255.27	258.49	258.45	272.87	285.62	295.09	298.93	299.80	305.56	313.15	319.52
65.0	210.5	204.5	236.6	244.6	237.9	249.9	280.1	286.7	290.1	289.9	306.0	320.2	330.7	334.8	335.6	341.9	350.0	357.3
70.0	237.0	229.5	264.5	273.5	265.9	278.8	312.4	319.5	323.2	322.7	340.7	356.3	367.9	372.2	373.0	379.8	388.4	396.6
80.0	293.7	283.1	324.1	335.0	325.6	340.4	381.1	389.4	393.5	392.6	414.4	433.0	446.9	451.6	452.3	460.3	469.9	480.0
90.0	355.4	341.2	388.4	401.4	390.0	406.8	455.1	464.6	469.3	467.7	493.7	515.5	531.8	536.9	537.6	546.6	557.4	569.4
100.0	422.0	403.7	457.4	472.6	459.0	477.9	534.3	545.1	550.2	548.0	578.3	603.6	622.5	627.8	628.5	638.6	650.6	664.6
150.0	821.0	775.9	866.4	894.3	867.9	897.7	1001.3	1019.4	1026.8	1020.2	1076.0	1121.0	1155.0	1161.6	1161.4	1177.7	1196.2	1221.2
200.0	1319.3	1235.8	1369.7	1413.6	1372.3	1413.2	1574.5	1601.3	1609.8	1596.9	1684.2	1739.4	1794.8	1813.2	1811.4	1834.6	1850.2	1897.4
250.0	1901.1	1767.4	1950.4	2013.1	1958.3	2007.2	2235.1	2277.9	2280.2	2259.3	2382.9	2449.2	2528.8	2562.5	2557.6	2593.3	2598.7	2672.8
300.0	2552.2	2360.6	2597.8	2681.4	2611.4	2668.4	2970.1	3039.0	3025.4	2995.5	3159.1	3238.0	3344.2	3394.0	3385.6	3435.2	3429.0	3532.1
350.0	3263.8	3007.5	3303.4	3409.7	3323.0	3388.4	3770.1	3869.7	3836.0	3795.8	4002.9	4095.4	4230.5	4297.2	4284.7	4349.2	4330.6	4464.4
400.0	4028.	3702.	4060.	4191.	4086.	4160.	4627.	4759.	4704.	4653.	4906.	5014.	5179.	5263.	5246.	5326.	5295.	5461.
450.0	4840.	4437.	4862.	5019.	4894.	4977.	5535.	5699.	5623.	5559.	5861.	5985.	6183.	6285.	6263.	6360.	6314.	6514.
500.0	5693.	5210.	5704.	5888.	5743.	5835.	6487.	6685.	6586.	6510.	6863.	7005.	7236.	7356.	7329.	7442.	7383.	7618.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.31	15.88	17.15	17.47	18.12	19.03	19.58	20.28	20.70	21.11	21.53	21.98	22.42	22.83	23.36	23.55	25.25	25.79
3.0	17.23	17.90	19.16	19.47	20.13	21.17	21.79	22.62	23.09	23.56	24.02	24.51	25.05	25.49	26.05	26.24	28.05	28.63
3.5	19.09	19.86	21.10	21.40	22.08	23.23	23.90	24.85	25.36	25.89	26.40	26.93	27.55	28.02	28.61	28.79	30.72	31.33
4.0	20.90	21.75	23.01	23.29	23.98	25.23	25.97	27.02	27.57	28.15	28.70	29.26	29.96	30.47	31.09	31.26	33.30	33.94
4.5	22.70	23.62	24.88	25.16	25.85	27.20	28.00	29.15	29.74	30.37	30.96	31.55	32.33	32.86	33.51	33.68	35.83	36.50
5.0	24.48	25.49	26.75	27.01	27.71	29.16	30.01	31.26	31.88	32.56	33.19	33.82	34.66	35.22	35.90	36.06	38.33	39.02
5.5	26.27	27.35	28.61	28.86	29.56	31.11	32.02	33.36	34.01	34.74	35.41	36.06	36.97	37.56	38.27	38.43	40.80	41.53
6.0	28.05	29.22	30.48	30.71	31.42	33.06	34.02	35.45	36.13	36.91	37.61	38.30	39.27	39.89	40.63	40.78	43.26	44.02
6.5	29.84	31.09	32.35	32.57	33.28	35.01	36.03	37.54	38.26	39.08	39.82	40.53	41.56	42.22	42.98	43.13	45.72	46.51
7.0	31.65	32.98	34.23	34.44	35.16	36.98	38.04	39.64	40.39	41.25	42.03	42.77	43.86	44.54	45.34	45.48	48.18	49.00
8.0	35.29	36.79	38.04	38.22	38.94	40.94	42.11	43.87	44.67	45.63	46.47	47.26	48.48	49.22	50.07	50.21	53.13	54.00
9.0	39.01	40.66	41.91	42.07	42.78	44.96	46.23	48.15	49.01	50.05	50.96	51.81	53.14	53.93	54.85	54.98	58.12	59.05
10.0	42.79	44.61	45.86	45.99	46.69	49.05	50.42	52.50	53.41	54.53	55.51	56.42	57.86	58.71	59.69	59.81	63.18	64.17
11.0	46.65	48.63	49.88	49.99	50.68	53.21	54.69	56.92	57.88	59.09	60.14	61.09	62.65	63.55	64.60	64.70	68.31	69.35
12.0	50.59	52.74	53.99	54.06	54.74	57.45	59.04	61.42	62.43	63.72	64.84	65.85	67.51	68.46	69.58	69.68	73.52	74.62
15.0	62.92	65.58	66.82	66.81	67.44	70.69	72.59	75.42	76.58	78.12	79.44	80.60	82.60	83.70	85.04	85.11	89.66	90.95
20.0	85.17	88.76	89.97	89.80	90.31	94.49	96.93	100.51	101.90	103.86	105.53	106.95	109.51	110.85	112.59	112.60	118.43	120.03
25.0	109.56	114.13	115.31	114.96	115.30	120.47	123.47	127.82	129.43	131.82	133.86	135.54	138.67	140.24	142.43	142.37	149.57	151.49
30.0	136.03	141.66	142.79	142.24	142.38	148.58	152.18	157.31	159.14	161.97	164.40	166.35	170.06	171.86	174.54	174.41	183.06	185.33
35.0	164.52	171.28	172.35	171.59	171.49	178.77	183.00	188.92	190.97	194.27	197.10	199.33	203.64	205.65	208.87	208.66	218.85	221.48
40.0	195.0	202.9	203.9	202.9	202.6	211.0	215.9	222.6	224.9	228.7	231.9	234.4	239.4	241.6	245.4	245.1	256.9	259.9
45.0	227.3	236.6	237.5	236.2	235.5	246.2	250.7	258.3	260.8	265.1	268.8	271.6	277.1	279.6	284.0	283.6	297.1	300.5
50.0	261.5	272.1	272.9	271.4	270.4	281.3	287.5	296.0	298.7	303.4	307.6	310.7	317.0	319.6	324.6	324.1	339.4	343.3
55.0	297.5	309.5	310.2	308.4	307.0	319.2	326.2	335.5	338.5	343.8	348.4	351.8	358.7	361.6	367.3	366.7	383.9	388.1
60.0	336.3	348.7	349.3	347.2	345.4	359.0	366.7	377.0	380.1	386.0	391.1	394.8	402.5	405.5	411.9	411.2	430.3	435.0
65.0	374.8	389.7	390.2	387.8	385.6	400.5	409.0	420.2	423.6	430.0	435.6	439.7	448.0	451.3	458.4	457.6	478.7	483.8
70.0	416.0	432.5	432.8	430.1	427.4	443.8	453.1	465.2	468.9	475.8	482.0	486.4	495.5	498.9	506.8	505.9	529.1	534.7
80.0	503.2	523.0	523.1	519.6	515.9	535.3	546.4	560.5	564.6	572.7	579.9	585.0	595.7	599.5	609.1	607.9	635.4	642.0
90.0	596.7	620.1	619.8	615.6	610.8	633.4	646.2	662.4	667.0	676.3	684.7	690.5	702.8	706.9	718.3	716.8	749.0	756.6
100.0	696.2	736.3	722.8	717.8	711.7	737.8	752.5	770.7	775.8	786.4	796.0	802.6	816.6	821.1	834.3	832.5	869.6	878.3
150.0	1278.	1327.	1324.	1314.	1301.	1346.	1371.	1401.	1409.	1426.	1443.	1454.	1477.	1484.	1507.	1504.	1569.	1584.
200.0	1985.	2060.	2055.	2039.	2015.	2084.	2121.	2164.	2175.	2200.	2225.	2240.	2274.	2283.	2320.	2314.	2394.	2435.
250.0	2795.	2899.	2898.	2876.	2840.	2935.	2984.	3041.	3052.	3088.	3124.	3143.	3188.	3202.	3253.	3244.	3333.	3405.
300.0	3692.	3828.	3838.	3812.	3762.	3880.	3938.	4013.	4023.	4069.	4120.	4141.	4197.	4219.	4286.	4274.	4370.	4475.
350.0	4666.	4836.	4857.	4827.	4763.	4904.	4972.	5065.	5075.	5133.	5199.	5222.	5290.	5319.	5404.	5388.	5493.	5634.
400.0	5706.	5913.	5946.	5912.	5831.	5998.	6077.	6189.	6197.	6268.	6351.	6376.	6455.	6493.	6597.	6577.	6691.	6869.
450.0	6806.	7052.	7096.	7059.	6961.	7153.	7244.	7375.	7383.	7466.	7567.	7594.	7686.	7732.	7855.	7831.	7957.	8172.
500.0	7958.	8244.	8301.	8259.	8143.	8362.	8466.	8617.	8624.	8721.	8839.	8868.	8973.	9028.	9172.	9144.	9279.	9536.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{158}_{64}$GD IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	139.0	113.3	89.7	85.4	86.3	77.0	66.2	63.0	60.9	59.2	55.5	52.0	49.3	47.6	47.0	45.2	40.5	42.1
3.0	136.6	115.2	90.5	86.2	87.3	78.4	67.8	64.6	62.7	61.2	57.3	53.8	51.2	49.6	48.9	47.2	42.7	44.0
3.5	133.2	115.3	90.2	86.1	87.3	78.9	68.4	65.4	63.5	62.2	58.3	54.8	52.2	50.7	50.1	48.3	44.1	45.2
4.0	129.5	114.3	89.5	85.5	86.7	78.8	68.4	65.5	63.8	62.6	58.7	55.3	52.8	51.2	50.7	49.0	45.0	45.9
4.5	125.7	112.7	88.3	84.5	85.8	78.2	68.1	65.4	63.7	62.6	58.8	55.4	53.0	51.5	50.9	49.3	45.6	46.2
5.0	122.0	110.7	87.0	83.3	84.7	77.5	67.5	64.9	63.3	62.3	58.6	55.3	52.9	51.5	51.0	49.3	45.9	46.3
5.5	118.4	108.6	85.6	82.0	83.4	76.5	66.8	64.3	62.8	61.9	58.2	55.0	52.7	51.3	50.8	49.2	46.0	46.3
6.0	115.0	106.4	84.2	80.6	82.1	75.5	66.0	63.6	62.2	61.4	57.7	54.6	52.3	51.0	50.5	49.0	45.9	46.1
6.5	111.7	104.2	82.7	79.2	80.8	74.5	65.2	62.9	61.5	60.8	57.2	54.1	51.9	50.6	50.2	48.7	45.8	45.9
7.0	108.6	102.0	81.2	77.9	79.4	73.4	64.3	62.1	60.8	60.1	56.6	53.6	51.4	50.2	49.8	48.3	45.6	45.6
8.0	102.9	97.8	78.4	75.2	76.8	71.2	62.5	60.5	59.2	58.7	55.3	52.4	50.3	49.2	48.8	47.4	45.0	44.8
9.0	97.7	93.8	75.7	72.7	74.2	69.1	60.7	58.8	57.7	57.2	53.9	51.2	49.2	48.1	47.8	46.5	44.3	44.0
10.0	93.1	90.1	73.1	70.2	71.8	67.0	59.0	57.2	56.1	55.8	52.6	49.9	48.1	47.1	46.7	45.5	43.5	43.1
11.0	89.0	86.7	70.7	68.0	69.6	65.1	57.4	55.7	54.7	54.4	51.3	48.7	46.9	46.0	45.7	44.5	42.7	42.2
12.0	85.3	83.5	68.5	65.9	67.4	63.2	55.8	54.2	53.3	53.0	50.0	47.5	45.8	44.9	44.7	43.6	41.9	41.3
15.0	75.89	75.36	62.66	60.33	61.83	58.26	51.56	50.17	49.39	49.26	46.50	44.30	42.76	42.02	41.82	40.84	39.48	38.84
20.0	64.58	65.12	55.09	53.11	54.52	51.69	45.88	44.75	44.15	44.13	41.70	39.80	38.48	37.91	37.77	36.96	35.96	35.25
25.0	56.56	57.62	49.38	47.65	48.97	46.64	41.48	40.53	40.03	40.08	37.90	36.22	35.05	34.60	34.50	33.82	33.03	32.32
30.0	50.55	51.90	44.92	43.37	44.61	42.63	37.97	37.14	36.73	36.82	34.83	33.32	32.27	31.90	31.84	31.24	30.60	29.90
35.0	45.86	47.36	41.31	39.92	41.08	39.36	35.11	34.37	34.02	34.13	32.30	30.93	29.97	29.66	29.62	29.09	28.55	27.88
40.0	42.09	43.68	38.34	37.06	38.16	36.64	32.72	32.06	31.75	31.88	30.18	28.91	28.03	27.77	27.74	27.27	26.80	26.17
45.0	38.98	40.62	35.84	34.66	35.70	34.34	30.69	30.09	29.82	29.96	28.37	27.19	26.37	26.16	26.14	25.71	25.30	24.69
50.0	36.37	38.03	33.71	32.61	33.59	32.37	28.95	28.40	28.16	28.30	26.81	25.71	24.94	24.75	24.74	24.35	23.98	23.41
55.0	34.15	35.82	31.86	30.83	31.77	30.65	27.43	26.92	26.71	26.86	25.44	24.41	23.68	23.52	23.52	23.16	22.82	22.28
60.0	32.23	33.89	30.25	29.27	30.17	29.15	26.10	25.62	25.43	25.58	24.24	23.26	22.58	22.43	22.44	22.11	21.79	21.28
65.0	30.55	32.20	28.82	27.90	28.76	27.81	24.91	24.47	24.29	24.45	23.17	22.24	21.59	21.46	21.47	21.16	20.87	20.39
70.0	29.08	30.71	27.55	26.68	27.50	26.62	23.86	23.44	23.28	23.43	22.21	21.33	20.70	20.59	20.60	20.32	20.05	19.59
80.0	26.59	28.18	25.38	24.59	25.35	24.58	22.04	21.67	21.53	21.69	20.56	19.75	19.18	19.09	19.11	18.86	18.61	18.20
90.0	24.57	26.12	23.60	22.87	23.58	22.89	20.54	20.21	20.08	20.24	19.19	18.45	17.92	17.85	17.86	17.64	17.42	17.04
100.0	22.89	24.40	22.10	21.42	22.09	21.47	19.28	18.97	18.86	19.02	18.04	17.34	16.84	16.79	16.81	16.60	16.40	16.05
150.0	17.49	18.80	17.17	16.66	17.18	16.75	15.07	14.85	14.79	14.94	14.17	13.64	13.25	13.23	13.25	13.11	12.95	12.72
200.0	14.51	15.85	14.49	14.04	14.39	14.15	12.72	12.49	12.53	12.67	12.01	11.83	11.44	11.20	11.24	11.09	11.20	10.81
250.0	12.76	13.99	12.81	12.41	12.70	12.53	11.27	10.95	11.11	11.25	10.67	10.50	10.15	9.95	9.99	9.83	9.96	9.62
300.0	11.56	12.70	11.64	11.28	11.54	11.40	10.26	9.87	10.12	10.25	9.72	9.57	9.25	9.08	9.12	8.97	9.09	8.79
350.0	10.68	11.75	10.78	10.44	10.69	10.56	9.51	9.16	9.39	9.51	9.02	8.87	8.59	8.43	8.47	8.33	8.44	8.17
400.0	10.00	11.02	10.11	9.80	10.03	9.92	8.93	8.62	8.82	8.94	8.48	8.34	8.07	7.93	7.97	7.84	7.95	7.69
450.0	9.47	10.45	9.59	9.29	9.52	9.41	8.48	8.19	8.38	8.49	8.06	7.92	7.67	7.53	7.57	7.45	7.55	7.31
500.0	9.05	9.99	9.17	8.88	9.10	9.00	8.11	7.84	8.02	8.13	7.71	7.58	7.34	7.22	7.25	7.14	7.23	7.00

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	39.33	37.49	37.53	37.79	37.43	35.28	34.18	32.26	31.56	30.72	30.13	29.63	28.55	28.19	27.88	27.95	26.79	26.48
3.0	41.23	39.33	39.35	39.62	39.32	37.15	36.03	34.13	33.45	32.61	32.00	31.50	30.42	30.02	29.68	29.75	28.49	28.16
3.5	42.41	40.49	40.50	40.78	40.53	38.37	37.25	35.38	34.72	33.88	33.27	32.77	31.70	31.29	30.92	31.00	29.65	29.31
4.0	43.12	41.19	41.20	41.48	41.28	39.14	38.02	36.21	35.57	34.74	34.12	33.63	32.58	32.15	31.77	31.85	30.45	30.10
4.5	43.50	41.58	41.59	41.87	41.71	39.61	38.50	36.73	36.11	35.30	34.69	34.20	33.17	32.74	32.35	32.42	30.99	30.63
5.0	43.66	41.75	41.76	42.04	41.91	39.85	38.75	37.03	36.44	35.64	35.04	34.56	33.55	33.12	32.72	32.79	31.33	30.97
5.5	43.66	41.76	41.77	42.05	41.95	39.93	38.85	37.18	36.61	35.83	35.23	34.76	33.78	33.35	32.94	33.01	31.54	31.17
6.0	43.54	41.66	41.67	41.95	41.88	39.90	38.84	37.21	36.67	35.89	35.31	34.85	33.89	33.47	33.04	33.11	31.63	31.27
6.5	43.33	41.48	41.48	41.76	41.72	39.78	38.73	37.16	36.63	35.87	35.30	34.85	33.91	33.49	33.07	33.14	31.65	31.28
7.0	43.06	41.23	41.24	41.52	41.50	39.59	38.57	37.04	36.53	35.79	35.22	34.78	33.86	33.46	33.02	33.09	31.61	31.24
8.0	42.40	40.62	40.63	40.90	40.93	39.09	38.10	36.65	36.18	35.47	34.92	34.50	33.63	33.23	32.80	32.86	31.39	31.03
9.0	41.65	39.91	39.92	40.20	40.25	38.49	37.53	36.16	35.72	35.03	34.50	34.10	33.26	32.89	32.45	32.51	31.05	30.70
10.0	40.85	39.16	39.17	39.44	39.52	37.82	36.90	35.59	35.18	34.53	34.01	33.63	32.82	32.46	32.02	32.09	30.65	30.30
11.0	40.03	38.39	38.41	38.67	38.77	37.14	36.25	35.00	34.61	33.98	33.48	33.11	32.34	32.00	31.56	31.62	30.20	29.86
12.0	39.22	37.63	37.65	37.91	38.03	36.44	35.58	34.39	34.02	33.41	32.93	32.58	31.84	31.51	31.07	31.13	29.74	29.41
15.0	36.90	35.42	35.45	35.70	35.86	34.42	33.64	32.58	32.27	31.72	31.28	30.96	30.30	30.01	29.58	29.64	28.32	28.01
20.0	33.54	32.23	32.27	32.49	32.69	31.43	30.75	29.86	29.61	29.14	28.75	28.48	27.91	27.68	27.27	27.32	26.12	25.84
25.0	30.79	29.60	29.64	29.86	30.07	28.95	28.34	27.57	27.35	26.94	26.60	26.36	25.86	25.66	25.27	25.33	24.22	23.97
30.0	28.51	27.42	27.47	27.67	27.89	26.87	26.32	25.64	25.46	25.09	24.77	24.56	24.11	23.96	23.58	23.63	22.61	22.38
35.0	26.60	25.59	25.64	25.83	26.05	25.12	24.62	24.01	23.85	23.51	23.22	23.03	22.62	22.48	22.13	22.18	21.23	21.02
40.0	24.98	24.03	24.09	24.27	24.49	23.63	23.16	22.61	22.46	22.16	21.89	21.71	21.34	21.22	20.88	20.93	20.04	19.85
45.0	23.68	22.69	22.75	22.92	23.14	22.34	21.90	21.39	21.26	20.98	20.73	20.57	20.22	20.12	19.80	19.84	19.01	18.82
50.0	22.36	21.53	21.58	21.75	21.96	21.21	20.80	20.33	20.21	19.95	19.71	19.56	19.24	19.15	18.84	18.89	18.09	17.92
55.0	21.29	20.50	20.55	20.71	20.93	20.21	19.83	19.39	19.28	19.03	18.81	18.67	18.37	18.28	17.99	18.04	17.28	17.12
60.0	20.34	19.58	19.64	19.79	20.00	19.32	18.96	18.55	18.46	18.22	18.01	17.88	17.59	17.52	17.23	17.28	16.56	16.40
65.0	19.49	18.77	18.82	18.97	19.18	18.53	18.19	17.80	17.71	17.49	17.29	17.16	16.89	16.82	16.55	16.60	15.91	15.76
70.0	18.72	18.03	18.09	18.23	18.43	17.82	17.49	17.12	17.04	16.83	16.64	16.52	16.26	16.20	15.94	15.98	15.32	15.18
80.0	17.40	16.76	16.82	16.95	17.14	16.58	16.28	15.95	15.87	15.68	15.51	15.40	15.16	15.11	14.87	14.91	14.29	14.17
90.0	16.29	15.70	15.75	15.87	16.07	15.54	15.26	14.96	14.89	14.72	14.56	14.46	14.24	14.19	13.96	14.00	13.43	13.31
100.0	15.35	14.79	14.85	14.96	15.15	14.65	14.40	14.12	14.06	13.90	13.74	13.65	13.45	13.41	13.19	13.23	12.69	12.58
150.0	12.17	11.73	11.78	11.87	12.03	11.65	11.46	11.25	11.21	11.09	10.98	10.91	10.76	10.73	10.56	10.59	10.16	10.07
200.0	10.34	9.99	9.98	10.07	10.21	9.89	9.73	9.57	9.54	9.45	9.35	9.29	9.17	9.14	9.00	9.03	8.91	8.62
250.0	9.21	8.90	8.80	8.87	9.00	8.75	8.66	8.51	8.51	8.42	8.29	8.28	8.18	8.12	7.99	8.02	7.96	7.71
300.0	8.42	8.13	8.04	8.07	8.19	8.00	7.92	7.78	7.79	7.70	7.59	7.57	7.49	7.44	7.32	7.34	7.29	7.06
350.0	7.82	7.56	7.47	7.50	7.61	7.44	7.37	7.24	7.25	7.17	7.06	7.05	6.98	6.93	6.82	6.84	6.79	6.58
400.0	7.365	7.114	7.041	7.064	7.171	7.009	6.939	6.823	6.829	6.755	6.659	6.646	6.578	6.533	6.431	6.451	6.401	6.209
450.0	7.002	6.764	6.697	6.719	6.821	6.668	6.600	6.492	6.499	6.428	6.338	6.326	6.262	6.219	6.123	6.142	6.093	5.913
500.0	6.709	6.481	6.418	6.439	6.537	6.392	6.327	6.224	6.231	6.164	6.078	6.066	6.006	5.966	5.874	5.892	5.843	5.673

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

158 GD IONS 64

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.980	5.720	8.078	8.060	7.920	9.434	10.200	10.729	11.120	11.540	11.800	12.620	13.040	13.600	13.820	14.049	14.474	14.850
3.0	6.553	6.410	8.954	8.980	8.829	10.450	11.378	11.965	12.396	12.850	13.198	14.111	14.611	15.223	15.464	15.757	16.371	16.683
3.5	7.138	7.095	9.827	9.896	9.734	11.453	12.538	13.179	13.647	14.130	14.563	15.564	16.137	16.798	17.058	17.410	18.189	18.452
4.0	7.740	7.783	10.706	10.816	10.641	12.455	13.692	14.385	14.888	15.396	15.912	16.997	17.641	18.348	18.625	19.033	19.960	20.187
4.5	8.359	8.479	11.595	11.746	11.567	13.461	14.850	15.592	16.127	16.669	17.256	18.423	19.134	19.885	20.179	20.640	21.702	21.901
5.0	8.997	9.186	12.496	12.688	12.483	14.475	16.014	16.804	17.371	17.923	18.602	19.849	20.627	21.419	21.728	22.242	23.429	23.607
5.5	9.654	9.906	13.411	13.644	13.423	15.501	17.190	18.026	18.624	19.194	19.954	21.281	22.123	22.957	23.281	23.844	25.148	25.312
6.0	10.331	10.641	14.341	14.616	14.377	16.540	18.379	19.261	19.888	20.476	21.316	22.722	23.627	24.501	24.839	25.453	26.866	27.021
6.5	11.028	11.391	15.288	15.604	15.348	17.593	19.583	20.509	21.165	21.769	22.691	24.175	25.143	26.056	26.408	27.070	28.588	28.738
7.0	11.746	12.157	16.252	16.610	16.334	18.662	20.803	21.773	22.458	23.076	24.079	25.642	26.672	27.624	27.989	28.699	30.317	30.466
8.0	13.24	13.74	18.23	18.67	18.36	20.85	23.29	24.35	25.09	25.74	26.90	28.62	29.78	30.80	31.19	32.00	33.80	33.96
9.0	14.82	15.39	20.28	20.81	20.45	23.10	25.86	27.00	27.79	28.46	29.80	31.67	32.95	34.05	34.46	35.36	37.34	37.52
10.0	16.47	17.11	22.41	23.02	22.62	25.42	28.50	29.73	30.57	31.26	32.77	34.80	36.20	37.37	37.81	38.80	40.94	41.16
11.0	18.21	18.90	24.61	25.31	24.85	27.82	31.21	32.63	33.42	34.13	35.81	38.00	39.63	40.77	41.23	42.30	44.61	44.85
12.0	20.02	20.75	26.88	27.67	27.16	30.28	34.01	35.40	36.35	37.07	38.93	41.29	42.93	44.24	44.72	45.89	48.35	48.63
15.0	25.93	26.74	34.12	35.20	34.51	38.10	42.85	44.50	45.60	46.35	48.77	51.62	53.65	55.15	55.69	57.13	60.01	60.47
20.0	37.26	38.05	47.60	49.19	48.15	52.52	59.13	61.21	62.55	63.33	66.74	70.46	73.15	74.98	75.60	77.49	81.00	81.85
25.0	50.36	50.98	62.77	64.93	63.46	68.64	77.26	79.79	81.37	82.14	86.64	91.30	94.69	96.82	97.51	99.86	103.94	105.28
30.0	65.17	65.45	79.57	82.33	80.39	86.38	97.19	100.17	102.00	102.72	108.41	114.07	118.21	120.62	121.37	124.19	128.81	130.72
35.0	81.60	81.40	97.93	101.34	98.87	105.69	118.85	122.30	124.37	125.03	131.98	138.70	143.63	146.32	147.12	150.42	155.56	158.10
40.0	99.60	98.79	117.80	121.89	118.84	126.51	142.18	146.12	148.42	148.99	157.30	165.14	170.91	173.86	174.70	178.48	184.14	187.37
45.0	119.12	117.56	139.12	143.95	140.26	148.79	167.13	171.57	174.11	174.57	184.32	193.33	199.98	203.19	204.06	208.34	214.50	218.46
50.0	140.12	137.67	161.87	167.47	163.09	172.50	193.65	198.61	201.39	201.71	212.98	223.23	230.80	234.25	235.14	239.92	246.59	251.34
55.0	162.55	159.09	185.98	192.39	187.28	197.59	221.70	227.20	230.21	230.38	243.25	254.78	263.32	267.01	267.90	273.20	280.37	285.94
60.0	186.37	181.78	211.44	218.70	212.81	224.03	251.24	257.29	260.54	260.53	275.07	287.95	297.50	301.41	302.31	308.13	316.80	322.23
65.0	211.6	205.7	238.2	246.4	239.6	251.8	282.2	288.8	292.3	292.1	308.4	322.7	333.3	337.4	338.3	344.7	352.9	360.2
70.0	238.1	230.8	266.3	275.3	267.7	280.8	314.7	321.8	325.6	325.1	343.3	359.0	370.7	375.0	375.9	382.8	391.5	399.7
80.0	295.3	284.6	326.1	337.1	327.6	342.7	383.6	392.0	396.2	395.3	417.3	436.0	450.0	454.8	455.6	463.6	473.4	483.5
90.0	356.9	342.9	390.7	403.8	392.3	409.3	457.9	467.6	472.3	470.8	496.9	518.9	535.3	540.4	541.2	550.3	561.2	573.3
100.0	423.6	405.5	459.9	475.2	461.6	480.6	537.4	548.3	553.5	551.3	581.8	607.3	626.3	631.8	632.4	642.7	654.7	668.9
150.0	823.4	778.7	870.0	898.1	871.6	901.7	1005.8	1024.0	1031.5	1024.9	1081.1	1126.3	1160.5	1167.3	1167.1	1183.4	1202.1	1227.2
200.0	1322.5	1239.5	1374.4	1418.5	1377.1	1418.4	1580.3	1607.3	1615.9	1603.0	1690.7	1746.2	1801.9	1820.4	1818.6	1842.0	1857.7	1905.2
250.0	1905.2	1772.0	1956.1	2019.0	1964.2	2013.5	2242.2	2285.2	2287.6	2266.7	2390.8	2467.4	2537.3	2571.2	2566.4	2602.2	2607.8	2682.2
300.0	2557.2	2366.2	2604.5	2688.4	2618.3	2675.8	2978.4	3047.5	3034.0	3004.1	3168.2	3247.5	3354.1	3404.1	3395.7	3445.6	3439.5	3542.9
350.0	3269.5	3014.0	3311.0	3417.7	3330.8	3396.7	3779.5	3879.4	3845.7	3805.6	4013.2	4106.1	4241.6	4308.6	4296.2	4360.9	4342.4	4476.6
400.0	4035.	3709.	4069.	4200.	4095.	4169.	4638.	4770.	4715.	4663.	4917.	5026.	5192.	5276.	5259.	5339.	5308.	5474.
450.0	4847.	4446.	4872.	5029.	4904.	4987.	5546.	5711.	5635.	5571.	5874.	5998.	6197.	6299.	6277.	6374.	6329.	6529.
500.0	5702.	5219.	5715.	5899.	5763.	5846.	6500.	6698.	6599.	6523.	6877.	7019.	7250.	7371.	7344.	7458.	7398.	7634.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.59	16.17	17.45	17.78	18.43	19.36	19.92	20.64	21.07	21.49	21.92	22.37	22.83	23.24	23.78	23.98	25.69	26.24
3.0	17.55	18.22	19.60	19.82	20.49	21.54	22.17	23.02	23.60	23.98	24.46	24.96	25.50	25.95	26.52	26.71	28.55	29.13
3.5	19.44	20.20	21.48	21.78	22.46	23.63	24.32	25.29	25.81	26.35	26.88	27.41	28.04	28.52	29.12	29.31	31.26	31.87
4.0	21.28	22.14	23.41	23.70	24.39	25.67	26.42	27.49	28.06	28.66	29.22	29.79	30.50	31.01	31.64	31.82	33.89	34.53
4.5	23.10	24.04	25.32	25.59	26.30	27.67	28.48	29.66	30.26	30.91	31.51	32.12	32.90	33.45	34.11	34.28	36.46	37.13
5.0	24.92	25.94	27.21	27.47	28.18	29.66	30.53	31.80	32.44	33.14	33.78	34.41	35.27	35.84	36.53	36.70	38.99	39.70
5.5	26.73	27.83	29.10	29.35	30.07	31.64	32.56	33.93	34.60	35.35	36.03	36.69	37.61	38.22	38.94	39.10	41.50	42.24
6.0	28.54	29.72	31.00	31.23	31.95	33.62	34.59	36.06	36.76	37.55	38.27	38.96	39.95	40.58	41.33	41.49	44.00	44.77
6.5	30.36	31.62	32.90	33.12	33.84	35.60	36.63	38.17	38.91	39.75	40.50	41.23	42.28	42.94	43.72	43.87	46.50	47.29
7.0	32.18	33.53	34.81	35.02	35.74	37.59	38.68	40.30	41.07	41.95	42.74	43.50	44.61	45.30	46.11	46.26	49.00	49.82
8.0	35.88	37.39	38.66	38.85	39.57	41.61	42.80	44.59	45.42	46.39	47.25	48.06	49.29	50.04	50.91	51.05	54.01	54.89
9.0	39.64	41.32	42.59	42.75	43.47	45.68	46.97	48.93	49.81	50.87	51.80	52.66	54.01	54.82	55.75	55.88	59.07	60.01
10.0	43.47	45.31	46.58	46.72	47.43	49.82	51.22	53.33	54.27	55.41	56.41	57.33	58.79	59.65	60.65	60.77	64.19	65.19
11.0	47.38	49.39	50.66	50.76	51.46	54.04	55.54	57.81	58.79	60.02	61.09	62.06	63.64	64.55	65.62	65.73	69.39	70.44
12.0	51.37	53.55	54.81	54.89	55.58	58.33	59.94	62.36	63.40	64.71	65.85	66.87	68.57	69.53	70.67	70.77	74.66	75.78
15.0	63.83	66.53	67.79	67.78	68.42	71.72	73.64	76.53	77.71	79.27	80.62	81.80	83.83	84.94	86.31	86.37	90.99	92.29
20.0	86.31	89.94	91.17	91.00	91.52	95.76	98.23	101.87	103.29	105.28	106.98	108.42	111.01	112.37	114.14	114.15	120.06	121.67
25.0	110.92	115.55	116.74	116.39	116.74	121.97	125.02	129.43	131.07	133.50	135.57	137.28	140.44	142.04	144.26	144.20	151.49	153.44
30.0	137.61	143.30	144.46	143.90	144.05	150.32	153.97	159.17	161.03	163.91	166.37	168.36	172.10	173.92	176.64	176.51	185.26	187.56
35.0	166.31	173.15	174.24	173.47	173.38	180.75	185.03	191.03	193.12	196.46	199.33	201.59	205.95	207.99	211.24	211.03	221.34	224.00
40.0	197.0	205.0	206.0	205.0	204.7	213.2	218.1	225.0	227.3	231.1	234.4	236.9	241.9	244.2	248.0	247.7	259.7	262.7
45.0	229.6	238.9	239.8	238.6	237.9	247.6	253.2	260.9	263.4	267.7	271.5	274.3	280.0	282.4	286.9	286.5	300.1	303.6
50.0	264.0	274.6	275.5	274.0	272.9	283.9	290.3	298.8	301.6	306.4	310.6	313.7	320.0	322.7	327.8	327.3	342.8	346.6
55.0	300.2	312.3	313.0	311.2	309.8	322.1	329.2	338.6	341.6	346.9	351.6	355.1	362.1	364.9	370.7	370.1	387.5	391.7
60.0	338.2	351.7	352.3	350.2	348.4	362.1	369.9	380.3	383.5	389.4	394.6	398.3	406.0	409.1	415.6	414.9	434.2	438.9
65.0	377.9	392.9	393.4	391.0	388.8	403.8	412.5	423.8	427.2	433.6	439.3	443.4	451.9	455.1	462.4	461.6	482.9	488.0
70.0	419.2	435.9	436.3	433.5	430.8	447.3	456.8	469.0	472.7	479.7	485.9	490.4	499.6	503.0	511.0	510.1	533.5	539.1
80.0	506.9	526.8	526.9	523.5	519.8	539.4	550.5	564.7	568.9	577.1	584.4	589.5	600.3	604.1	613.8	612.6	640.4	647.0
90.0	600.8	624.3	624.1	619.9	615.0	637.9	650.8	667.1	671.7	681.1	689.6	695.5	707.9	712.0	723.5	722.0	754.5	762.1
100.0	700.7	728.1	727.5	722.5	716.4	742.6	757.4	775.8	781.0	791.7	801.4	808.0	822.1	826.6	840.0	838.2	875.6	884.3
150.0	1284.	1334.	1331.	1321.	1307.	1353.	1378.	1408.	1416.	1434.	1451.	1461.	1485.	1491.	1515.	1512.	1578.	1592.
200.0	1993.	2068.	2063.	2048.	2024.	2093.	2130.	2173.	2184.	2209.	2234.	2260.	2284.	2293.	2330.	2324.	2405.	2445.
250.0	2805.	2909.	2909.	2886.	2850.	2946.	2994.	3052.	3064.	3099.	3136.	3155.	3200.	3214.	3265.	3256.	3346.	3417.
300.0	3704.	3840.	3850.	3824.	3774.	3892.	3950.	4025.	4036.	4082.	4134.	4155.	4211.	4232.	4300.	4287.	4385.	4490.
350.0	4679.	4849.	4871.	4841.	4776.	4918.	4986.	5079.	5089.	5147.	5214.	5237.	5305.	5335.	5420.	5404.	5509.	5650.
400.0	5721.	5928.	5961.	5927.	5846.	6013.	6093.	6205.	6213.	6284.	6367.	6393.	6472.	6510.	6614.	6594.	6709.	6887.
450.0	6822.	7068.	7112.	7075.	6977.	7169.	7261.	7393.	7400.	7484.	7585.	7612.	7704.	7751.	7874.	7850.	7977.	8192.
500.0	7975.	8262.	8318.	8277.	8161.	8380.	8484.	8636.	8642.	8740.	8858.	8888.	8993.	9048.	9192.	9164.	9299.	9557.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

159 TB IONS 65

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	141.6	114.8	91.1	86.7	87.6	78.1	67.2	63.9	61.8	60.1	56.3	52.7	50.0	48.3	47.7	45.8	41.0	42.6
3.0	139.2	117.0	91.9	87.6	88.7	79.7	68.8	65.6	63.6	62.1	58.2	54.6	51.9	50.3	49.7	47.8	43.3	44.6
3.5	135.9	117.2	91.8	87.6	88.8	80.2	69.5	66.4	64.5	63.1	59.2	55.7	53.0	51.4	50.8	49.1	44.8	45.9
4.0	132.2	116.3	91.0	86.9	88.2	80.1	69.5	66.6	64.8	63.6	59.7	56.2	53.6	52.1	51.6	49.7	45.8	46.6
4.5	128.4	114.7	89.9	86.0	87.3	79.6	69.2	66.5	64.7	63.6	59.8	56.4	53.8	52.3	51.8	50.1	46.3	47.0
5.0	124.7	112.8	88.6	84.8	86.2	78.8	68.7	66.1	64.4	63.4	59.6	56.3	53.8	52.3	51.8	50.2	46.7	47.1
5.5	121.0	110.7	87.2	83.5	85.0	77.9	68.0	65.5	63.9	63.0	59.3	56.0	53.6	52.2	51.7	50.1	46.8	47.1
6.0	117.5	108.5	85.8	82.2	83.7	76.9	67.3	64.8	63.3	62.5	58.8	55.6	53.3	51.9	51.4	49.9	46.8	46.9
6.5	114.2	106.3	84.3	80.8	82.3	75.9	66.4	64.1	62.6	61.9	58.2	55.1	52.8	51.5	51.1	49.6	46.6	46.7
7.0	111.1	104.1	82.8	79.4	81.0	74.8	65.5	63.3	61.9	61.2	57.6	54.6	52.4	51.1	50.7	49.2	46.4	46.4
8.0	105.3	99.9	80.0	76.7	78.3	72.6	63.7	61.6	60.4	59.8	56.3	53.4	51.3	50.1	49.7	48.3	45.8	45.7
9.0	100.1	96.9	77.2	74.1	75.7	70.5	62.0	60.0	58.8	58.4	55.0	52.2	50.2	49.1	48.7	47.4	45.1	44.8
10.0	96.4	92.1	74.7	71.7	73.3	68.4	60.2	58.4	57.3	56.9	53.6	50.9	49.0	48.0	47.7	46.4	44.4	44.0
11.0	91.2	88.7	72.3	69.4	71.0	66.4	58.6	56.8	55.8	55.5	52.3	49.7	47.9	46.9	46.6	45.4	43.5	43.1
12.0	87.4	85.4	70.0	67.3	68.9	64.6	57.0	55.3	54.4	54.1	51.0	48.5	46.8	45.9	45.6	44.5	42.7	42.2
15.0	77.83	77.17	64.08	61.69	63.22	59.55	52.70	51.27	50.47	50.34	47.52	45.26	43.68	42.93	42.71	41.72	40.32	39.67
20.0	66.28	66.75	56.40	54.36	55.80	52.90	46.94	45.78	45.16	45.14	42.65	40.71	39.35	38.77	38.62	37.80	36.77	36.04
25.0	58.08	59.11	50.59	48.81	50.16	47.76	42.48	41.49	40.99	41.04	38.80	37.08	35.88	35.42	35.31	34.61	33.81	33.07
30.0	51.93	53.26	46.05	44.46	45.72	43.68	38.91	38.06	37.63	37.72	35.68	34.13	33.06	32.68	32.61	32.00	31.34	30.62
35.0	47.13	48.63	42.38	40.94	42.13	40.35	35.99	35.24	34.87	34.99	33.11	31.70	30.72	30.40	30.35	29.81	29.25	28.57
40.0	43.27	44.87	39.34	38.03	39.15	37.59	33.56	32.88	32.56	32.69	30.95	29.65	28.74	28.48	28.44	27.96	27.48	26.83
45.0	40.08	41.74	36.79	35.58	36.64	35.24	31.49	30.86	30.60	30.74	29.10	27.90	27.05	26.83	26.81	26.37	25.94	25.33
50.0	37.41	39.09	34.61	33.48	34.49	33.23	29.71	29.15	28.90	29.05	27.51	26.38	25.59	25.40	25.39	24.99	24.60	24.02
55.0	35.13	36.82	32.73	31.67	32.63	31.48	28.16	27.64	27.42	27.57	26.12	25.06	24.31	24.14	24.14	23.77	23.42	22.87
60.0	33.16	34.85	31.07	30.08	31.00	29.94	26.80	26.32	26.11	26.27	24.89	23.89	23.18	23.03	23.04	22.70	22.37	21.85
65.0	31.44	33.12	29.62	28.67	29.55	28.57	25.59	25.14	24.95	25.11	23.80	22.84	22.17	22.04	22.05	21.73	21.44	20.94
70.0	29.92	31.59	28.32	27.42	28.27	27.35	24.51	24.09	23.91	24.08	22.82	21.91	21.27	21.16	21.16	20.87	20.59	20.12
80.0	27.37	28.99	26.10	25.28	26.07	25.27	22.66	22.28	22.13	22.29	21.13	20.30	19.71	19.62	19.64	19.38	19.13	18.70
90.0	25.29	26.88	24.27	23.52	24.25	23.54	21.12	20.78	20.65	20.81	19.73	18.96	18.42	18.35	18.36	18.13	17.90	17.51
100.0	23.57	25.11	22.74	22.04	22.73	22.09	19.83	19.51	19.40	19.56	18.55	17.83	17.32	17.26	17.28	17.07	16.86	16.50
150.0	18.01	19.37	17.68	17.15	17.68	17.25	15.52	15.29	15.22	15.37	14.59	14.04	13.64	13.62	13.64	13.50	13.33	13.09
200.0	14.95	16.32	14.93	14.46	14.82	14.58	13.10	12.87	12.90	13.05	12.37	12.18	11.78	11.53	11.57	11.42	11.54	11.13
250.0	13.16	14.41	13.20	12.79	13.08	12.92	11.62	11.28	11.45	11.59	10.99	10.82	10.46	10.26	10.30	10.12	10.27	9.92
300.0	11.92	13.09	12.00	11.62	11.89	11.75	10.57	10.18	10.43	10.56	10.02	9.86	9.54	9.35	9.40	9.24	9.37	9.06
350.0	11.01	12.11	11.11	10.76	11.02	10.89	9.80	9.44	9.68	9.80	9.30	9.15	8.85	8.69	8.73	8.59	8.70	8.42
400.0	10.31	11.36	10.43	10.10	10.34	10.23	9.21	8.88	9.10	9.22	8.74	8.60	8.32	8.17	8.21	8.08	8.19	7.93
450.0	9.77	10.77	9.89	9.58	9.81	9.71	8.74	8.44	8.64	8.75	8.31	8.16	7.90	7.77	7.81	7.68	7.79	7.54
500.0	9.33	10.30	9.45	9.16	9.39	9.28	8.36	8.08	8.27	8.38	7.95	7.81	7.57	7.44	7.48	7.36	7.46	7.22

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	39.87	37.99	38.03	38.29	37.93	35.75	34.63	32.69	31.98	31.13	30.53	30.02	28.94	28.56	28.25	28.32	27.14	26.83
3.0	41.82	39.89	39.92	40.19	39.89	37.68	36.55	34.62	33.93	33.07	32.45	31.94	30.86	30.45	30.10	30.18	28.89	28.56
3.5	43.05	41.10	41.11	41.39	41.14	38.95	37.80	35.91	35.24	34.39	33.77	33.25	32.17	31.75	31.38	31.46	30.10	29.74
4.0	43.79	41.83	41.85	42.13	41.92	39.75	38.62	36.77	36.12	35.28	34.65	34.15	33.08	32.65	32.26	32.34	30.92	30.56
4.5	44.21	42.25	42.26	42.54	42.38	40.24	39.12	37.32	36.69	35.86	35.24	34.74	33.70	33.26	32.86	32.93	31.48	31.11
5.0	44.39	42.44	42.45	42.74	42.61	40.51	39.39	37.64	37.04	36.23	35.61	35.13	34.10	33.67	33.25	33.33	31.85	31.47
5.5	44.40	42.47	42.48	42.76	42.67	40.61	39.51	37.81	37.23	36.43	35.83	35.35	34.35	33.91	33.49	33.56	32.07	31.69
6.0	44.30	42.39	42.39	42.66	42.61	40.59	39.51	37.86	37.30	36.51	35.92	35.45	34.47	34.04	33.61	33.68	32.18	31.80
6.5	44.10	42.21	42.22	42.50	42.46	40.48	39.42	37.81	37.28	36.50	35.92	35.46	34.50	34.08	33.65	33.72	32.21	31.83
7.0	43.84	41.98	41.98	42.27	42.25	40.30	39.26	37.70	37.18	36.43	35.85	35.40	34.47	34.05	33.61	33.68	32.17	31.80
8.0	43.19	41.38	41.38	41.66	41.69	39.82	38.81	37.33	36.85	36.13	35.57	35.14	34.25	33.85	33.40	33.47	31.96	31.60
9.0	42.45	40.68	40.69	40.96	41.02	39.22	38.24	36.84	36.39	35.70	35.16	34.75	33.89	33.51	33.06	33.13	31.64	31.27
10.0	41.65	39.93	39.94	40.21	40.29	38.56	37.62	36.29	35.86	35.19	34.67	34.28	33.46	33.09	32.64	32.71	31.24	30.88
11.0	40.83	39.16	39.18	39.44	39.55	37.87	36.96	35.69	35.29	34.65	34.14	33.77	32.98	32.63	32.18	32.24	30.80	30.45
12.0	40.02	38.39	38.41	38.67	38.80	37.18	36.30	35.08	34.71	34.09	33.60	33.23	32.48	32.14	31.69	31.76	30.33	29.99
15.0	37.69	36.18	36.20	36.46	36.62	35.15	34.35	33.27	32.95	32.39	31.94	31.61	30.93	30.64	30.20	30.26	28.91	28.59
20.0	34.30	32.95	32.99	33.22	33.42	32.13	31.43	30.53	30.27	29.78	29.39	29.11	28.53	28.29	27.87	27.93	26.70	26.41
25.0	31.51	30.29	30.33	30.55	30.77	29.62	28.99	28.21	27.99	27.56	27.21	26.97	26.45	26.26	25.86	25.91	24.78	24.52
30.0	29.20	28.08	28.13	28.33	28.56	27.51	26.95	26.25	26.06	25.69	25.36	25.15	24.69	24.52	24.14	24.20	23.15	22.91
35.0	27.26	26.22	26.27	26.47	26.69	25.74	25.22	24.60	24.43	24.09	23.79	23.59	23.18	23.03	22.67	22.72	21.75	21.53
40.0	25.61	24.64	24.69	24.88	25.10	24.22	23.74	23.17	23.02	22.71	22.44	22.25	21.87	21.75	21.40	21.45	20.54	20.34
45.0	24.18	23.27	23.33	23.51	23.73	22.90	22.46	21.94	21.80	21.51	21.26	21.09	20.73	20.63	20.30	20.35	19.49	19.30
50.0	22.94	22.08	22.14	22.31	22.53	21.75	21.34	20.85	20.73	20.46	20.22	20.07	19.73	19.64	19.32	19.37	18.56	18.38
55.0	21.85	21.04	21.09	21.25	21.47	20.74	20.35	19.90	19.78	19.53	19.30	19.16	18.85	18.76	18.46	18.51	17.73	17.56
60.0	20.88	20.10	20.16	20.32	20.53	19.84	19.47	19.04	18.94	18.70	18.49	18.35	18.05	17.98	17.69	17.73	16.99	16.84
65.0	20.01	19.27	19.33	19.48	19.69	19.03	18.68	18.28	18.18	17.96	17.75	17.62	17.34	17.27	16.99	17.04	16.33	16.18
70.0	19.23	18.52	18.58	18.72	18.93	18.30	17.96	17.59	17.50	17.28	17.09	16.96	16.70	16.63	16.37	16.41	15.73	15.59
80.0	17.88	17.22	17.28	17.41	17.62	17.03	16.73	16.38	16.30	16.11	15.93	15.82	15.58	15.52	15.27	15.31	14.68	14.55
90.0	16.75	16.13	16.19	16.32	16.51	15.97	15.69	15.38	15.30	15.13	14.96	14.86	14.63	14.59	14.35	14.39	13.80	13.68
100.0	15.79	15.21	15.26	15.38	15.57	15.07	14.80	14.52	14.45	14.29	14.13	14.04	13.83	13.78	13.56	13.60	13.05	12.93
150.0	12.53	12.07	12.12	12.22	12.38	11.99	11.79	11.58	11.54	11.42	11.30	11.22	11.07	11.04	10.86	10.90	10.46	10.37
200.0	10.65	10.28	10.28	10.37	10.52	10.19	10.02	9.86	9.82	9.73	9.63	9.57	9.44	9.41	9.27	9.30	9.17	8.87
250.0	9.49	9.17	9.06	9.14	9.28	9.01	8.92	8.76	8.77	8.67	8.54	8.52	8.43	8.37	8.23	8.26	8.20	7.94
300.0	8.67	8.38	8.28	8.31	8.43	8.24	8.16	8.02	8.02	7.93	7.82	7.80	7.72	7.66	7.54	7.57	7.51	7.28
350.0	8.06	7.79	7.70	7.73	7.85	7.67	7.59	7.46	7.47	7.39	7.28	7.27	7.19	7.14	7.03	7.05	7.00	6.78
400.0	7.592	7.333	7.258	7.282	7.392	7.225	7.153	7.033	7.040	6.963	6.864	6.851	6.781	6.734	6.629	6.650	6.598	6.400
450.0	7.219	6.974	6.904	6.927	7.032	6.874	6.805	6.693	6.700	6.627	6.534	6.521	6.456	6.412	6.312	6.332	6.281	6.096
500.0	6.917	6.682	6.618	6.639	6.740	6.590	6.523	6.417	6.424	6.355	6.267	6.254	6.192	6.151	6.056	6.075	6.024	5.849

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{159}_{65}$TB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.940	5.680	8.028	8.010	7.870	9.371	10.130	10.653	11.040	11.460	11.720	12.540	12.960	13.515	13.730	13.954	14.370	14.740
3.0	6.506	6.365	8.896	8.921	8.771	10.378	11.298	11.878	12.306	12.760	13.107	14.019	14.518	15.125	15.361	15.649	16.253	16.559
3.5	7.084	7.043	9.761	9.828	9.666	11.372	12.447	13.081	13.546	14.028	14.460	15.459	16.032	16.687	16.941	17.288	18.056	18.314
4.0	7.677	7.724	10.630	10.739	10.564	12.364	13.590	14.276	14.774	15.282	15.796	16.879	17.521	18.222	18.494	18.896	19.811	20.032
4.5	8.287	8.412	11.509	11.658	11.470	13.359	14.736	15.470	16.001	16.532	17.126	18.291	19.000	19.744	20.033	20.488	21.536	21.731
5.0	8.915	9.111	12.399	12.589	12.386	14.363	15.888	16.669	17.232	17.783	18.458	19.702	20.477	21.263	21.567	22.073	23.245	23.420
5.5	9.562	9.822	13.303	13.534	13.315	15.377	17.060	17.878	18.471	19.040	19.795	21.118	21.957	22.784	23.103	23.659	24.947	25.107
6.0	10.229	10.547	14.222	14.494	14.257	16.403	18.225	19.098	19.720	20.307	21.142	22.543	23.445	24.311	24.644	25.249	26.646	26.797
6.5	10.915	11.287	15.157	15.470	15.215	17.444	19.415	20.332	20.983	21.585	22.501	23.980	24.943	25.849	26.195	26.848	28.349	28.495
7.0	11.621	12.042	16.109	16.462	16.189	18.499	20.620	21.581	22.259	22.876	23.873	25.429	26.454	27.398	27.758	28.458	30.057	30.203
8.0	13.09	13.60	18.06	18.50	18.19	20.66	23.08	24.13	24.86	25.50	26.66	28.37	29.52	30.54	30.92	31.72	33.50	33.66
9.0	14.64	15.23	20.09	20.61	20.25	22.88	25.61	26.74	27.63	28.19	29.52	31.39	32.65	33.74	34.15	35.04	37.00	37.17
10.0	16.27	16.92	22.18	22.79	22.38	25.17	28.21	29.43	30.27	30.95	32.45	34.47	35.86	37.02	37.45	38.43	40.55	40.75
11.0	17.97	18.68	24.35	25.04	24.59	27.53	30.89	32.19	33.08	33.78	35.45	37.63	39.14	40.37	40.83	41.89	44.17	44.41
12.0	19.76	20.51	26.58	27.37	26.86	29.96	33.64	35.03	35.97	36.69	38.53	40.87	42.50	43.80	44.27	45.43	47.85	48.14
15.0	25.55	26.39	33.71	34.78	34.10	37.66	42.36	43.99	45.08	45.83	48.22	51.05	53.06	54.55	55.09	56.51	59.35	59.80
20.0	36.67	37.50	46.97	48.54	47.51	51.85	58.37	60.43	61.76	62.54	65.91	69.60	72.26	74.07	74.69	76.56	80.01	80.85
25.0	49.51	50.19	61.88	64.00	62.57	67.70	76.20	78.70	80.27	81.03	85.48	90.09	93.45	95.55	96.24	98.56	102.59	103.91
30.0	64.02	64.38	78.37	81.09	79.19	85.12	95.78	98.73	100.53	101.26	106.87	112.46	116.56	118.94	119.69	122.47	127.03	128.91
35.0	80.11	80.02	96.39	99.75	97.32	104.08	117.05	120.46	122.50	123.16	130.02	136.66	141.53	144.19	144.98	148.24	153.31	155.81
40.0	97.73	97.06	115.88	119.91	116.92	124.51	139.94	143.83	146.11	146.69	154.87	162.61	168.30	171.23	172.06	175.79	181.37	184.56
45.0	116.84	115.44	136.79	141.54	137.92	146.37	164.42	168.80	171.31	171.78	181.38	190.27	196.83	200.00	200.86	205.08	211.16	215.06
50.0	137.39	135.14	159.08	164.59	160.30	169.61	190.42	195.31	198.06	198.40	209.49	219.59	227.06	230.48	231.35	236.07	242.64	247.31
55.0	159.33	156.11	182.71	189.02	184.01	194.21	217.92	223.33	226.32	226.50	239.16	250.53	258.95	262.59	263.48	268.70	275.77	281.25
60.0	182.64	178.31	207.65	214.79	209.02	220.12	246.87	252.82	256.04	256.05	270.35	283.04	292.45	296.32	297.21	302.94	310.51	316.83
65.0	207.3	201.7	233.9	241.9	235.3	247.3	277.2	283.7	287.2	287.0	303.0	317.1	327.5	331.6	332.5	338.7	346.8	354.0
70.0	233.2	226.3	261.3	270.2	262.8	276.8	309.0	316.1	319.8	319.4	337.2	352.6	364.1	368.4	369.3	376.1	384.7	392.8
80.0	288.8	278.9	319.9	330.7	321.5	336.3	376.5	384.8	388.9	388.1	409.6	428.1	441.9	446.5	447.4	455.2	464.9	474.8
90.0	349.3	335.9	383.1	396.0	384.7	401.5	449.3	458.7	463.4	461.9	487.6	509.2	525.4	530.4	531.2	540.1	550.9	562.8
100.0	414.5	397.2	450.8	465.9	452.5	471.3	527.0	537.8	542.9	540.8	570.7	595.7	614.5	619.8	620.5	630.6	642.4	656.3
150.0	805.1	762.0	861.8	879.3	853.5	883.1	985.1	1003.0	1010.4	1004.0	1059.0	1103.3	1136.9	1143.6	1143.4	1159.5	1177.9	1202.5
200.0	1292.6	1212.2	1344.6	1387.8	1347.3	1387.9	1546.5	1573.0	1581.5	1568.9	1654.7	1709.2	1763.7	1781.9	1780.2	1803.2	1818.6	1865.1
250.0	1861.8	1732.3	1912.8	1974.4	1920.7	1969.2	2193.0	2235.2	2237.6	2217.3	2338.6	2403.9	2482.2	2515.4	2510.7	2545.9	2551.4	2624.2
300.0	2498.0	2312.4	2545.9	2627.9	2559.5	2616.0	2911.9	2979.6	2966.5	2937.3	3097.9	3175.5	3279.8	3328.8	3320.7	3369.5	3363.7	3464.8
350.0	3193.3	2945.0	3235.7	3340.0	3255.1	3319.9	3694.1	3791.8	3759.0	3719.9	3922.9	4013.9	4146.4	4212.0	4199.9	4263.2	4245.3	4376.5
400.0	3940.	3623.	3975.	4103.	4001.	4074.	4532.	4661.	4607.	4557.	4806.	4912.	5074.	5156.	5140.	5219.	5188.	5351.
450.0	4733.	4343.	4769.	4913.	4791.	4873.	5419.	5580.	5505.	5443.	5739.	5861.	6055.	6155.	6134.	6228.	6184.	6380.
500.0	5567.	5098.	5582.	5762.	5619.	5711.	6349.	6543.	6447.	6372.	6718.	6857.	7083.	7201.	7175.	7286.	7228.	7459.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.47	16.05	17.32	17.64	18.29	19.22	19.78	20.50	20.93	21.34	21.77	22.22	22.67	23.08	23.62	23.82	25.52	26.06
3.0	17.41	18.08	19.35	19.67	20.33	21.38	22.01	22.86	23.34	23.82	24.29	24.78	25.32	25.77	26.34	26.53	28.35	28.93
3.5	19.28	20.04	21.31	21.61	22.29	23.46	24.15	25.11	25.63	26.17	26.69	27.22	27.84	28.32	28.92	29.11	31.04	31.65
4.0	21.11	21.96	23.23	23.62	24.21	25.48	26.23	27.30	27.86	28.45	29.01	29.58	30.28	30.79	31.42	31.60	33.65	34.28
4.5	22.92	23.85	25.12	25.39	26.09	27.46	28.27	29.44	30.04	30.68	31.28	31.88	32.66	33.20	33.86	34.03	36.19	36.86
5.0	24.71	25.73	26.99	27.26	27.96	29.43	30.29	31.56	32.20	32.89	33.53	34.16	35.00	35.58	36.26	36.43	38.70	39.40
5.5	26.50	27.60	28.87	29.12	29.83	31.39	32.31	33.67	34.34	35.08	35.75	36.41	37.33	37.93	38.64	38.81	41.19	41.92
6.0	28.30	29.47	30.74	30.98	31.69	33.35	34.32	35.77	36.47	37.26	37.97	38.66	39.64	40.27	41.01	41.17	43.66	44.42
6.5	30.09	31.35	32.62	32.84	33.56	35.31	36.33	37.87	38.60	39.43	40.18	40.90	41.94	42.60	43.38	43.53	46.13	46.92
7.0	31.90	33.24	34.51	34.72	35.44	37.28	38.36	39.97	40.74	41.61	42.40	43.14	44.24	44.93	45.74	45.89	48.60	49.42
8.0	35.56	37.05	38.32	38.51	39.22	41.25	42.43	44.21	45.03	45.99	46.85	47.65	48.87	49.62	50.48	50.62	53.56	54.43
9.0	39.27	40.93	42.19	42.35	43.07	45.27	46.55	48.50	49.37	50.42	51.34	52.20	53.54	54.34	55.27	55.40	58.56	59.49
10.0	43.05	44.87	46.14	46.27	46.98	49.36	50.75	52.85	53.77	54.91	55.90	56.81	58.26	59.11	60.11	60.23	63.62	64.60
11.0	46.91	48.89	50.16	50.26	50.96	53.52	55.01	57.26	58.24	59.46	60.52	61.48	63.04	63.95	65.01	65.12	68.74	69.79
12.0	50.84	53.00	54.26	54.33	55.02	57.75	59.35	61.76	62.78	64.09	65.21	66.23	67.90	68.86	69.99	70.09	73.94	75.05
15.0	63.12	65.80	67.05	67.04	67.68	70.95	72.86	75.72	76.89	78.44	79.77	80.94	82.95	84.06	85.41	85.48	90.05	91.34
20.0	85.26	88.85	90.08	89.91	90.43	94.63	97.08	100.69	102.09	104.06	105.74	107.17	109.73	111.08	112.83	112.84	118.68	120.28
25.0	109.47	114.04	115.24	114.89	115.25	120.43	123.44	127.80	129.42	131.83	133.88	135.56	138.69	140.27	142.47	142.41	149.61	151.54
30.0	135.71	141.33	142.48	141.94	142.09	148.30	151.90	157.04	158.88	161.73	164.16	166.11	169.82	171.62	174.31	174.18	182.83	185.10
35.0	163.91	170.65	171.75	170.99	170.91	178.19	182.42	188.35	190.41	193.71	196.54	198.77	203.08	205.09	208.31	208.11	218.28	220.91
40.0	194.0	201.9	203.0	202.0	201.6	210.1	214.9	221.7	223.9	227.7	231.0	233.5	238.4	240.6	244.4	244.1	255.9	258.9
45.0	226.0	235.2	236.1	234.9	234.2	243.8	249.4	256.9	259.4	263.7	267.4	270.2	275.8	278.2	282.6	282.2	295.7	299.1
50.0	259.8	270.2	271.1	269.6	268.6	279.5	285.7	294.1	296.9	301.6	305.8	308.9	315.1	317.7	322.7	322.3	337.5	341.3
55.0	295.3	307.2	307.9	306.1	304.8	316.9	323.9	333.2	336.1	341.4	346.0	349.4	356.3	359.1	364.8	364.3	381.3	385.6
60.0	332.5	345.8	346.5	344.4	342.7	356.1	363.8	374.0	377.2	383.0	388.1	391.8	399.4	402.4	408.9	408.2	427.2	431.8
65.0	371.4	386.2	386.8	384.4	382.2	397.0	405.5	416.7	420.1	426.4	432.0	436.1	444.4	447.6	454.7	453.9	474.9	480.0
70.0	412.0	428.3	428.7	426.0	423.4	439.7	449.0	461.0	464.7	471.6	477.7	482.1	491.1	494.5	502.4	501.5	524.5	530.1
80.0	497.8	517.4	517.5	514.2	510.5	529.8	540.8	554.8	558.9	566.9	574.1	579.2	589.8	593.5	603.0	601.9	629.2	635.7
90.0	589.8	612.9	612.7	608.6	603.8	626.3	639.0	655.0	659.6	668.8	677.2	683.0	695.1	699.3	710.5	709.1	741.0	748.5
100.0	687.6	714.5	713.9	709.0	703.1	728.9	743.4	761.5	766.6	777.1	786.6	793.2	807.0	811.5	824.5	822.8	859.5	868.1
150.0	1258.	1307.	1304.	1295.	1281.	1326.	1351.	1380.	1388.	1405.	1422.	1432.	1455.	1462.	1485.	1482.	1546.	1561.
200.0	1951.	2025.	2020.	2005.	1981.	2049.	2086.	2128.	2138.	2163.	2188.	2203.	2237.	2246.	2282.	2276.	2355.	2395.
250.0	2744.	2846.	2846.	2824.	2789.	2882.	2930.	2987.	2998.	3033.	3068.	3087.	3131.	3145.	3195.	3186.	3274.	3344.
300.0	3622.	3755.	3766.	3740.	3691.	3807.	3864.	3937.	3948.	3993.	4043.	4064.	4119.	4140.	4206.	4194.	4289.	4392.
350.0	4574.	4741.	4762.	4733.	4669.	4808.	4875.	4966.	4976.	5033.	5098.	5121.	5187.	5216.	5300.	5284.	5387.	5525.
400.0	5591.	5794.	5826.	5794.	5714.	5877.	5955.	6065.	6074.	6143.	6224.	6249.	6327.	6364.	6466.	6446.	6558.	6733.
450.0	6666.	6907.	6950.	6914.	6818.	7006.	7096.	7225.	7232.	7314.	7412.	7439.	7529.	7575.	7696.	7672.	7794.	8007.
500.0	7792.	8072.	8127.	8087.	7973.	8188.	8290.	8438.	8445.	8540.	8656.	8685.	8788.	8842.	8982.	8955.	9087.	9339.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

164 DY IONS 66

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	144.1	116.3	92.5	88.0	88.9	79.2	68.1	64.8	62.7	60.9	57.0	53.4	50.6	48.9	48.3	46.4	41.6	43.2
3.0	141.8	118.7	93.4	89.0	90.1	80.8	69.8	66.6	64.6	63.0	59.0	55.4	52.7	51.0	50.4	48.5	43.9	45.3
3.5	138.6	119.0	93.3	89.0	90.2	81.4	70.5	67.4	65.5	64.1	60.1	56.5	53.8	52.2	51.6	49.8	45.5	46.5
4.0	134.9	118.2	92.6	88.4	89.7	81.4	70.7	67.7	65.9	64.6	60.6	57.1	54.5	52.9	52.3	50.5	46.5	47.3
4.5	131.1	116.8	91.5	87.5	88.8	80.9	70.4	67.6	65.8	64.7	60.8	57.3	54.7	53.2	52.6	50.9	47.1	47.7
5.0	127.3	114.9	90.2	86.3	87.7	80.2	69.9	67.2	65.5	64.5	60.6	57.2	54.7	53.2	52.7	51.0	47.4	47.9
5.5	123.6	112.8	88.8	85.0	86.5	79.3	69.2	66.6	65.0	64.1	60.3	56.9	54.5	53.1	52.6	50.9	47.6	47.9
6.0	120.1	110.6	87.4	83.7	85.2	78.3	68.5	66.0	64.4	63.6	59.8	56.6	54.2	52.8	52.3	50.7	47.6	47.7
6.5	116.8	108.4	85.9	82.3	83.9	77.3	67.6	65.2	63.8	63.0	59.3	56.1	53.8	52.4	52.0	50.4	47.4	47.5
7.0	113.6	106.2	84.4	80.9	82.5	76.2	66.8	64.4	63.0	62.3	58.7	55.6	53.3	52.0	51.6	50.1	47.2	47.2
8.0	107.7	102.0	81.5	78.2	79.8	74.0	65.0	62.8	61.5	60.9	57.4	54.4	52.3	51.1	50.7	49.2	46.7	46.5
9.0	102.4	97.9	78.8	75.6	77.3	71.8	63.2	61.1	60.0	59.5	56.0	53.2	51.1	50.0	49.6	48.3	46.0	45.7
10.0	97.7	94.1	76.2	73.2	74.8	69.8	61.4	59.5	58.4	58.0	54.7	51.9	50.0	48.9	48.6	47.3	45.2	44.8
11.0	93.4	90.6	73.8	70.9	72.5	67.8	59.7	58.0	56.9	56.6	53.4	50.7	48.8	47.9	47.5	46.3	44.4	43.9
12.0	89.5	87.4	71.5	68.7	70.4	65.9	58.2	56.5	55.5	55.2	52.1	49.5	47.7	46.8	46.5	45.4	43.6	43.0
15.0	79.77	78.99	65.60	63.05	64.62	60.84	53.83	52.37	51.55	51.41	48.53	46.22	44.61	43.83	43.61	42.59	41.17	40.49
20.0	67.99	68.39	57.71	55.62	57.09	54.10	48.01	46.82	46.18	46.16	43.61	41.61	40.23	39.63	39.48	38.63	37.58	36.83
25.0	59.62	60.61	51.81	49.98	51.36	48.89	43.47	42.47	41.95	41.99	39.70	37.94	36.71	36.23	36.13	35.41	34.58	33.83
30.0	53.33	54.64	47.18	45.55	46.84	44.74	39.85	38.97	38.54	38.63	36.54	34.95	33.84	33.45	33.38	32.75	32.08	31.34
35.0	48.41	49.91	43.44	41.97	43.18	41.36	36.88	36.11	35.73	35.85	33.92	32.47	31.47	31.14	31.09	30.54	29.96	29.26
40.0	44.46	46.06	40.35	39.00	40.15	38.54	34.40	33.71	33.38	33.51	31.72	30.39	29.46	29.18	29.15	28.65	28.16	27.49
45.0	41.20	42.86	37.75	36.50	37.59	36.15	32.30	31.66	31.38	31.52	29.84	28.60	27.74	27.51	27.48	27.03	26.60	25.96
50.0	38.46	40.15	35.53	34.36	35.40	34.09	30.48	29.90	29.65	29.80	28.22	27.06	26.25	26.05	26.04	25.63	25.23	24.63
55.0	36.12	37.83	33.60	32.51	33.49	32.30	28.90	28.37	28.13	28.29	26.80	25.71	24.94	24.77	24.76	24.39	24.03	23.46
60.0	34.10	35.81	31.91	30.88	31.83	30.73	27.51	27.01	26.80	26.96	25.55	24.51	23.79	23.64	23.64	23.29	22.96	22.42
65.0	32.34	34.04	30.42	29.45	30.35	29.34	26.28	25.81	25.62	25.78	24.43	23.45	22.76	22.63	22.63	22.31	22.00	21.49
70.0	30.78	32.47	29.09	28.17	29.04	28.09	25.17	24.73	24.56	24.72	23.43	22.50	21.84	21.72	21.73	21.43	21.14	20.65
80.0	28.16	29.81	26.82	25.98	26.79	25.96	23.28	22.89	22.73	22.90	21.71	20.85	20.25	20.16	20.17	19.90	19.64	19.20
90.0	26.03	27.64	24.95	24.18	24.93	24.19	21.71	21.35	21.22	21.39	20.28	19.49	18.93	18.85	18.87	18.63	18.39	17.99
100.0	24.26	25.83	23.38	22.66	23.37	22.71	20.38	20.06	19.94	20.11	19.07	18.33	17.80	17.74	17.76	17.55	17.33	16.96
150.0	18.55	19.93	18.19	17.65	18.20	17.75	15.96	15.73	15.66	15.82	15.01	14.44	14.04	14.01	14.03	13.89	13.72	13.47
200.0	15.40	16.81	15.37	14.89	15.26	15.01	13.49	13.24	13.29	13.44	12.74	12.54	12.13	11.87	11.91	11.76	11.88	11.46
250.0	13.55	14.85	13.60	13.17	13.47	13.30	11.96	11.62	11.79	11.94	11.32	11.14	10.77	10.56	10.60	10.42	10.57	10.21
300.0	12.28	13.48	12.36	11.97	12.25	12.10	10.89	10.48	10.75	10.88	10.32	10.15	9.82	9.64	9.68	9.52	9.65	9.33
350.0	11.34	12.48	11.44	11.09	11.35	11.22	10.10	9.73	9.97	10.10	9.58	9.42	9.12	8.95	8.99	8.85	8.97	8.67
400.0	10.63	11.71	10.74	10.41	10.66	10.54	9.49	9.15	9.37	9.50	9.01	8.86	8.57	8.42	8.46	8.33	8.44	8.17
450.0	10.07	11.10	10.19	9.87	10.11	10.00	9.01	8.70	8.90	9.02	8.56	8.41	8.15	8.00	8.04	7.92	8.02	7.77
500.0	9.62	10.61	9.74	9.44	9.67	9.57	8.62	8.33	8.52	8.63	8.20	8.05	7.80	7.67	7.70	7.58	7.69	7.44

E/A	SM 60	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	40.39	38.49	38.52	38.79	38.42	36.21	35.08	33.11	32.39	31.54	30.93	30.41	29.31	28.93	28.61	28.69	27.49	27.18
3.0	42.40	40.45	40.47	40.75	40.44	38.21	37.05	35.10	34.39	33.53	32.90	32.38	31.27	30.87	30.52	30.59	29.29	28.95
3.5	43.68	41.70	41.71	41.99	41.74	39.51	38.35	36.43	35.75	34.89	34.25	33.73	32.64	32.21	31.84	31.91	30.53	30.17
4.0	44.46	42.47	42.48	42.77	42.56	40.35	39.20	37.32	36.66	35.81	35.17	34.66	33.58	33.14	32.75	32.82	31.39	31.02
4.5	44.91	42.92	42.92	43.21	43.04	40.87	39.73	37.90	37.26	36.42	35.79	35.28	34.22	33.78	33.37	33.45	31.97	31.60
5.0	45.11	43.13	43.14	43.43	43.29	41.16	40.03	38.26	37.64	36.81	36.18	35.69	34.65	34.20	33.78	33.86	32.35	31.98
5.5	45.14	43.18	43.18	43.47	43.37	41.28	40.16	38.43	37.85	37.03	36.41	35.93	34.91	34.47	34.04	34.11	32.59	32.21
6.0	45.06	43.11	43.11	43.40	43.33	41.27	40.17	38.49	37.93	37.13	36.52	36.04	35.05	34.61	34.17	34.25	32.71	32.33
6.5	44.87	42.95	42.95	43.24	43.19	41.17	40.09	38.48	37.92	37.13	36.53	36.07	35.09	34.66	34.22	34.29	32.75	32.37
7.0	44.62	42.72	42.72	43.01	42.99	41.01	39.95	38.36	37.83	37.06	36.47	36.02	35.07	34.64	34.20	34.27	32.73	32.35
8.0	43.98	42.13	42.14	42.42	42.44	40.54	39.51	38.01	37.51	36.78	36.21	35.77	34.86	34.45	34.00	34.07	32.53	32.16
9.0	43.24	41.44	41.45	41.73	41.78	39.95	38.96	37.53	37.07	36.36	35.81	35.39	34.52	34.13	33.67	33.74	32.22	31.85
10.0	42.45	40.69	40.70	40.98	41.06	39.29	38.33	36.97	36.54	35.86	35.33	34.92	34.09	33.72	33.26	33.32	31.82	31.46
11.0	41.63	39.93	39.94	40.21	40.31	38.61	37.68	36.38	35.98	35.32	34.80	34.42	33.62	33.26	32.80	32.86	31.39	31.03
12.0	40.82	39.16	39.17	39.44	39.56	37.91	37.02	35.77	35.39	34.76	34.26	33.88	33.11	32.77	32.31	32.38	30.93	30.58
15.0	38.47	36.93	36.96	37.21	37.38	35.87	35.05	33.95	33.62	33.05	32.59	32.26	31.57	31.27	30.82	30.88	29.50	29.18
20.0	35.05	33.67	33.71	33.95	34.15	32.84	32.12	31.19	30.92	30.43	30.03	29.74	29.15	28.90	28.47	28.53	27.27	26.98
25.0	32.23	30.98	31.02	31.25	31.47	30.29	29.65	28.85	28.62	28.19	27.83	27.58	27.05	26.85	26.44	26.50	25.34	25.08
30.0	29.88	28.74	28.79	29.00	29.23	28.16	27.58	26.87	26.67	26.29	25.96	25.73	25.26	25.09	24.70	24.76	23.69	23.45
35.0	27.92	26.85	26.91	27.10	27.34	26.36	25.83	25.18	25.01	24.66	24.36	24.16	23.73	23.58	23.21	23.27	22.27	22.05
40.0	26.24	25.25	25.30	25.49	25.72	24.81	24.32	23.74	23.59	23.26	22.98	22.80	22.40	22.28	21.93	21.98	21.04	20.83
45.0	24.79	23.86	23.91	24.09	24.32	23.48	23.02	22.48	22.35	22.05	21.78	21.61	21.25	21.14	20.80	20.85	19.97	19.77
50.0	23.62	22.64	22.70	22.87	23.10	22.30	21.88	21.38	21.26	20.98	20.73	20.57	20.23	20.13	19.81	19.86	19.02	18.84
55.0	22.41	21.58	21.64	21.80	22.02	21.27	20.87	20.41	20.29	20.03	19.80	19.65	19.33	19.24	18.93	18.98	18.18	18.01
60.0	21.42	20.63	20.69	20.84	21.07	20.35	19.97	19.54	19.43	19.19	18.96	18.82	18.52	18.44	18.15	18.19	17.43	17.27
65.0	20.54	19.78	19.84	19.99	20.21	19.53	19.17	18.76	18.66	18.43	18.21	18.08	17.80	17.72	17.44	17.48	16.76	16.60
70.0	19.74	19.01	19.07	19.22	19.43	18.78	18.44	18.05	17.96	17.74	17.54	17.41	17.14	17.07	16.80	16.84	16.14	16.00
80.0	18.36	17.69	17.74	17.88	18.09	17.49	17.18	16.83	16.74	16.54	16.36	16.24	16.00	15.94	15.68	15.72	15.08	14.94
90.0	17.21	16.58	16.63	16.76	16.96	16.41	16.11	15.80	15.72	15.54	15.37	15.26	15.03	14.98	14.74	14.78	14.18	14.05
100.0	16.22	15.63	15.68	15.81	16.00	15.48	15.21	14.92	14.85	14.68	14.52	14.42	14.21	14.16	13.94	13.97	13.40	13.29
150.0	12.89	12.42	12.47	12.57	12.74	12.33	12.13	11.91	11.87	11.74	11.62	11.55	11.39	11.35	11.17	11.21	10.75	10.66
200.0	10.96	10.59	10.58	10.67	10.82	10.48	10.32	10.15	10.11	10.01	9.91	9.85	9.72	9.69	9.54	9.57	9.44	9.13
250.0	9.77	9.44	9.33	9.41	9.55	9.28	9.19	9.02	9.03	8.93	8.79	8.78	8.68	8.62	8.48	8.51	8.45	8.16
300.0	8.93	8.63	8.53	8.56	8.69	8.49	8.40	8.26	8.26	8.17	8.05	8.04	7.95	7.89	7.77	7.79	7.74	7.50
350.0	8.31	8.02	7.94	7.96	8.08	7.90	7.82	7.69	7.69	7.61	7.50	7.49	7.41	7.36	7.24	7.26	7.21	6.99
400.0	7.822	7.556	7.478	7.503	7.616	7.444	7.369	7.247	7.253	7.174	7.072	7.059	6.986	6.938	6.830	6.852	6.798	6.594
450.0	7.439	7.186	7.114	7.138	7.246	7.083	7.012	6.897	6.903	6.829	6.733	6.720	6.652	6.607	6.504	6.525	6.472	6.281
500.0	7.129	6.887	6.820	6.842	6.946	6.791	6.722	6.613	6.620	6.549	6.458	6.445	6.381	6.339	6.241	6.260	6.208	6.028

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

164 DY IONS 66

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.050	5.790	8.174	8.150	8.000	9.527	10.310	10.852	11.260	11.670	11.930	12.760	13.190	13.753	13.970	14.198	14.624	15.000
3.0	6.623	6.486	9.056	9.076	8.915	10.551	11.497	12.099	12.537	12.992	13.341	14.265	14.776	15.391	15.630	15.923	16.540	16.851
3.5	7.208	7.176	9.934	9.996	9.824	11.560	12.665	13.321	13.797	14.281	14.716	15.728	16.314	16.979	17.236	17.589	18.373	18.635
4.0	7.807	7.866	10.816	10.920	10.736	12.567	13.826	14.534	15.045	15.555	16.073	17.170	17.827	18.538	18.814	19.223	20.156	20.382
4.5	8.424	8.564	11.707	11.853	11.654	13.577	14.988	15.746	16.290	16.823	17.423	18.604	19.328	20.084	20.376	20.839	21.908	22.107
5.0	9.059	9.272	12.609	12.796	12.582	14.595	16.157	16.963	17.539	18.092	18.774	20.036	20.827	21.626	21.934	22.449	23.643	23.821
5.5	9.713	9.992	13.525	13.754	13.524	15.623	17.335	18.188	18.795	19.368	20.131	21.472	22.328	23.169	23.492	24.058	25.369	25.533
6.0	10.385	10.726	14.456	14.726	14.479	16.663	18.526	19.425	20.062	20.652	21.496	22.917	23.837	24.718	25.055	25.671	27.093	27.248
6.5	11.078	11.474	15.402	15.714	15.449	17.717	19.731	20.675	21.341	21.947	22.873	24.373	25.356	26.276	26.627	27.292	28.819	28.969
7.0	11.790	12.238	16.365	16.719	16.434	18.786	20.952	21.940	22.634	23.255	24.263	25.842	26.887	27.846	28.211	28.924	30.551	30.700
8.0	13.27	13.81	18.34	18.78	18.45	20.97	23.44	24.52	25.27	25.92	27.09	28.82	29.99	31.03	31.42	32.23	34.04	34.20
9.0	14.84	15.46	20.39	20.91	20.54	23.22	26.00	27.16	27.97	28.64	29.98	31.87	33.17	34.27	34.69	35.59	37.58	37.76
10.0	16.48	17.16	22.50	23.12	22.70	25.54	28.64	29.88	30.74	31.43	32.94	34.99	36.41	37.59	38.03	39.02	41.18	41.38
11.0	18.19	18.94	24.69	25.39	24.93	27.92	31.34	32.67	33.58	34.29	35.98	38.19	39.73	40.98	41.44	42.52	44.84	45.08
12.0	19.99	20.78	26.95	27.74	27.22	30.38	34.12	35.54	36.50	37.23	39.09	41.46	43.13	44.44	44.93	46.10	48.56	48.85
15.0	25.82	26.71	34.15	35.22	34.53	38.15	42.93	44.60	45.71	46.47	48.88	51.75	53.79	55.31	55.85	57.30	60.18	60.64
20.0	37.00	37.91	47.52	49.10	48.06	52.47	59.09	61.19	62.54	63.33	66.74	70.48	73.18	75.02	75.64	77.54	81.05	81.90
25.0	49.91	50.67	62.54	64.68	63.23	68.45	77.06	79.60	81.20	81.98	86.47	91.14	94.54	96.68	97.38	99.74	103.82	105.16
30.0	64.49	64.94	79.15	81.89	79.97	86.00	96.79	99.78	101.62	102.36	108.02	113.69	117.83	120.26	121.02	123.84	128.46	130.36
35.0	80.65	80.67	97.28	100.67	98.22	105.08	118.20	121.66	123.74	124.42	131.34	138.05	142.98	145.68	146.49	149.79	154.93	157.46
40.0	98.34	97.79	116.88	120.95	117.93	125.64	141.24	145.19	147.50	148.09	156.35	164.17	169.93	172.90	173.75	177.53	183.18	186.39
45.0	117.52	116.26	137.91	142.70	139.05	147.63	165.86	170.30	172.86	173.34	183.02	192.01	198.64	201.86	202.74	207.00	213.16	217.10
50.0	138.14	136.04	160.31	165.87	161.55	171.00	192.00	196.96	199.76	200.11	211.29	221.49	229.04	232.51	233.41	238.17	244.83	249.55
55.0	160.15	157.09	184.06	190.42	185.37	195.72	219.64	225.13	228.16	228.36	241.12	252.60	261.10	264.81	265.71	270.99	278.14	283.67
60.0	183.53	179.38	209.12	216.31	210.50	221.75	248.73	254.77	258.04	258.06	272.47	285.27	294.78	298.71	299.62	305.41	313.07	319.44
65.0	208.2	202.9	235.4	243.5	236.9	249.1	279.2	285.8	289.3	289.2	305.3	319.5	330.0	334.2	335.1	341.4	349.6	356.8
70.0	234.2	227.5	263.0	272.0	264.5	277.6	311.1	318.3	322.0	321.7	339.6	355.2	366.8	371.2	372.1	378.9	387.6	395.7
80.0	290.0	280.3	321.8	332.7	323.4	338.4	379.0	387.3	391.5	390.6	412.4	431.0	444.9	449.6	450.5	458.4	468.1	478.2
90.0	350.7	337.5	385.2	398.2	386.9	403.9	452.0	461.5	466.2	464.8	490.6	512.4	528.7	533.8	534.6	543.7	554.5	566.5
100.0	416.0	398.9	453.2	468.3	454.9	473.9	530.0	540.8	546.0	543.9	574.1	599.2	618.1	623.6	624.2	634.4	646.4	660.4
150.0	807.3	764.6	855.2	882.9	856.9	886.8	989.4	1007.4	1014.9	1008.5	1063.8	1108.3	1142.1	1148.9	1148.8	1165.0	1183.5	1208.2
200.0	1295.5	1215.6	1348.9	1392.3	1351.8	1392.8	1552.0	1578.6	1587.2	1574.6	1660.8	1715.6	1770.3	1788.7	1787.0	1810.1	1825.7	1872.4
250.0	1865.4	1736.5	1918.0	1979.8	1926.1	1975.0	2199.6	2242.0	2244.4	2224.1	2345.9	2411.5	2490.1	2523.4	2518.9	2554.2	2559.8	2632.9
300.0	2502.2	2317.4	2552.0	2634.3	2565.7	2622.7	2919.5	2987.4	2974.4	2945.2	3106.2	3184.2	3288.9	3338.1	3330.0	3379.0	3373.3	3474.7
350.0	3198.2	2950.7	3242.5	3347.1	3262.1	3327.4	3702.6	3800.6	3767.9	3728.8	3932.2	4023.7	4156.5	4222.4	4210.4	4273.9	4256.1	4387.6
400.0	3946.	3630.	3983.	4111.	4008.	4082.	4541.	4671.	4617.	4567.	4816.	4922.	5085.	5168.	5151.	5230.	5200.	5363.
450.0	4739.	4350.	4767.	4921.	4799.	4882.	5429.	5590.	5516.	5454.	5750.	5873.	6067.	6167.	6146.	6241.	6197.	6393.
500.0	5574.	5106.	5591.	5771.	5629.	5720.	6360.	6555.	6458.	6384.	6730.	6869.	7096.	7215.	7189.	7300.	7242.	7473.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.74	16.33	17.62	17.95	18.62	19.56	20.13	20.86	21.29	21.71	22.14	22.60	23.06	23.48	24.03	24.23	25.96	26.51
3.0	17.72	18.40	19.69	20.01	20.70	21.76	22.40	23.26	23.74	24.22	24.71	25.21	25.76	26.22	26.80	26.99	28.84	29.43
3.5	19.62	20.39	21.69	21.99	22.69	23.87	24.57	25.55	26.08	26.62	27.14	27.69	28.33	28.82	29.43	29.61	31.58	32.20
4.0	21.48	22.34	23.63	23.93	24.63	25.92	26.69	27.77	28.34	28.94	29.50	30.08	30.80	31.32	31.96	32.14	34.23	34.88
4.5	23.31	24.26	25.55	25.83	26.55	27.94	28.76	29.95	30.56	31.21	31.81	32.42	33.22	33.77	34.44	34.62	36.81	37.49
5.0	25.14	26.17	27.46	27.73	28.45	29.94	30.82	32.10	32.74	33.44	34.09	34.73	35.60	36.18	36.88	37.05	39.36	40.07
5.5	26.95	28.06	29.36	29.61	30.34	31.93	32.86	34.24	34.92	35.67	36.35	37.02	37.96	38.57	39.30	39.47	41.89	42.63
6.0	28.77	29.97	31.26	31.50	32.23	33.92	34.90	36.37	37.08	37.88	38.60	39.30	40.30	40.94	41.70	41.86	44.40	45.17
6.5	30.59	31.87	33.16	33.39	34.12	35.90	36.95	38.50	39.24	40.08	40.84	41.58	42.64	43.31	44.10	44.26	46.90	47.70
7.0	32.43	33.78	35.08	35.29	36.03	37.90	38.99	40.64	41.41	42.29	43.09	43.85	44.97	45.68	46.50	46.65	49.41	50.24
8.0	36.13	37.65	38.94	39.13	39.87	41.92	43.12	44.93	45.76	46.73	47.60	48.42	49.66	50.42	51.31	51.45	54.43	55.32
9.0	39.89	41.57	42.86	43.03	43.76	46.00	47.30	49.27	50.15	51.22	52.15	53.03	54.39	55.20	56.15	56.28	59.50	60.44
10.0	43.71	45.57	46.86	47.00	47.72	50.13	51.54	53.67	54.61	55.76	56.76	57.69	59.17	60.04	61.05	61.17	64.62	65.62
11.0	47.62	49.64	50.92	51.04	51.75	54.35	55.86	58.14	59.13	60.37	61.44	62.42	64.01	64.93	66.02	66.13	69.81	70.87
12.0	51.59	53.78	55.07	55.15	55.86	58.63	60.25	62.69	63.73	65.05	66.19	67.22	68.93	69.90	71.06	71.15	75.07	76.19
15.0	64.01	66.72	68.00	68.00	68.65	71.97	73.91	76.81	77.99	79.56	80.91	82.10	84.14	85.27	86.65	86.71	91.36	92.66
20.0	86.37	90.00	91.26	91.09	91.63	95.89	98.37	102.02	103.44	105.43	107.14	108.59	111.19	112.56	114.34	114.35	120.28	121.90
25.0	110.79	115.42	116.64	116.30	116.67	121.91	124.97	129.38	131.03	133.45	135.53	137.24	140.41	142.02	144.25	144.20	151.49	153.45
30.0	137.23	142.92	144.11	143.56	143.73	150.01	153.66	158.86	160.72	163.60	166.07	168.05	171.80	173.63	176.36	176.23	184.99	187.29
35.0	165.65	172.46	173.59	172.83	172.76	180.14	184.41	190.41	192.49	195.83	198.70	200.96	205.32	207.36	210.62	210.42	220.71	223.38
40.0	196.0	204.0	205.0	204.1	203.7	212.2	217.1	224.0	226.3	230.1	233.4	235.9	240.9	243.2	247.0	246.7	258.6	261.7
45.0	228.1	237.4	238.4	237.2	236.5	246.2	251.8	259.5	262.0	266.3	270.0	272.9	278.5	281.0	285.4	285.0	298.6	302.1
50.0	262.1	272.7	273.6	272.1	271.1	282.1	288.4	296.9	299.6	304.4	308.6	311.8	318.1	320.7	325.8	325.3	340.7	344.6
55.0	297.8	309.8	310.6	308.8	307.5	319.7	326.8	336.2	339.1	344.5	349.1	352.6	359.5	362.4	368.2	367.6	384.8	389.1
60.0	335.3	348.7	349.4	347.3	345.6	359.1	366.9	377.2	380.5	386.3	391.5	395.2	402.9	406.0	412.4	411.7	430.9	435.6
65.0	374.4	389.3	389.9	387.5	385.3	400.3	408.9	420.1	423.5	429.9	435.6	439.7	448.1	451.3	458.5	457.7	478.9	484.0
70.0	415.1	431.6	432.0	429.3	426.7	443.1	452.5	464.7	468.3	475.3	481.5	485.9	495.0	498.5	506.5	505.5	528.8	534.4
80.0	501.3	521.1	521.3	517.9	514.3	533.7	544.7	558.9	563.0	571.1	578.4	583.5	594.2	598.0	607.6	606.4	634.0	640.6
90.0	593.7	617.0	616.8	612.7	607.9	630.6	643.4	659.5	664.2	673.5	681.9	687.7	700.0	704.2	715.5	714.1	746.2	753.8
100.0	691.9	718.9	718.4	713.5	707.5	733.5	748.2	766.4	771.6	782.1	791.8	798.4	812.3	816.8	830.0	828.2	865.3	873.9
150.0	1265.	1313.	1310.	1301.	1287.	1333.	1358.	1387.	1395.	1412.	1429.	1440.	1463.	1469.	1493.	1489.	1554.	1569.
200.0	1959.	2033.	2028.	2013.	1989.	2057.	2094.	2137.	2147.	2172.	2197.	2212.	2246.	2255.	2291.	2285.	2365.	2405.
250.0	2753.	2856.	2856.	2834.	2798.	2892.	2940.	2997.	3008.	3043.	3079.	3098.	3142.	3156.	3207.	3198.	3286.	3356.
300.0	3632.	3766.	3777.	3750.	3702.	3818.	3875.	3949.	3959.	4005.	4055.	4076.	4131.	4153.	4219.	4207.	4302.	4406.
350.0	4586.	4753.	4774.	4745.	4681.	4821.	4888.	4980.	4989.	5046.	5112.	5135.	5201.	5230.	5314.	5298.	5402.	5540.
400.0	5604.	5808.	5840.	5807.	5728.	5891.	5970.	6079.	6088.	6157.	6239.	6264.	6342.	6379.	6481.	6462.	6575.	6750.
450.0	6680.	6921.	6965.	6928.	6832.	7021.	7111.	7240.	7248.	7330.	7429.	7456.	7546.	7592.	7713.	7689.	7875.	8025.
500.0	7807.	8088.	8143.	8103.	7989.	8204.	8306.	8456.	8462.	8557.	8673.	8702.	8805.	8860.	9000.	8973.	9106.	9358.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{165}_{67}$HO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	146.6	117.8	93.8	89.3	90.1	80.3	69.1	65.7	63.5	61.7	57.8	54.1	51.3	49.6	48.9	47.0	42.1	43.8
3.0	144.5	120.4	94.8	90.4	91.4	82.0	70.8	67.5	65.5	63.9	59.9	56.2	53.4	51.7	51.1	49.2	44.5	45.9
3.5	141.2	120.9	94.8	90.4	91.6	82.7	71.6	68.5	66.5	65.0	61.0	57.4	54.6	53.0	52.3	50.5	46.1	47.2
4.0	137.6	120.2	94.1	89.9	91.2	82.7	71.8	68.8	66.9	65.6	61.8	58.0	55.3	53.7	53.1	51.3	47.2	48.0
4.5	133.7	118.8	93.1	88.9	90.3	82.2	71.5	68.7	66.9	65.7	61.7	58.2	55.6	54.0	53.4	51.7	47.8	48.5
5.0	129.9	116.9	91.8	87.8	89.3	81.5	71.1	68.3	66.6	65.5	61.6	58.1	55.6	54.1	53.5	51.8	48.2	48.7
5.5	126.2	114.9	90.4	86.5	88.0	80.7	70.4	67.8	66.1	65.2	61.3	57.9	55.4	53.9	53.4	51.8	48.3	48.7
6.0	122.7	112.7	89.0	85.2	86.7	79.7	69.7	67.1	65.5	64.7	60.8	57.5	55.1	53.7	53.2	51.6	48.3	48.5
6.5	119.3	110.5	87.5	83.8	85.4	78.7	68.8	66.4	64.9	64.1	60.3	57.1	54.7	53.3	52.9	51.3	48.2	48.3
7.0	116.1	108.3	86.0	82.4	84.1	77.6	68.0	65.6	64.2	63.5	59.7	56.5	54.3	52.9	52.5	50.9	48.1	48.0
8.0	110.1	104.0	83.1	79.7	81.4	75.4	66.2	64.0	62.6	62.1	58.4	55.4	53.2	52.0	51.6	50.1	47.5	47.3
9.0	104.8	100.0	80.4	77.1	78.8	73.2	64.4	62.3	61.1	60.6	57.1	54.2	52.1	50.9	50.6	49.2	46.8	46.5
10.0	99.9	96.2	77.7	74.7	76.3	71.1	62.6	60.7	59.5	59.1	55.7	52.9	50.9	49.9	49.5	48.2	46.1	45.6
11.0	95.6	92.6	75.3	72.3	74.0	69.1	60.9	59.1	58.0	57.7	54.4	51.7	49.8	48.8	48.5	47.2	45.3	44.8
12.0	91.6	89.3	73.0	70.2	71.8	67.2	59.3	57.6	56.6	56.3	53.1	50.5	48.7	47.7	47.4	46.2	44.4	43.9
15.0	81.73	80.81	66.93	64.42	66.01	62.14	54.97	53.47	52.63	52.49	49.54	47.18	45.53	44.73	44.51	43.47	42.01	41.32
20.0	69.72	70.04	59.02	56.88	58.39	55.31	49.07	47.85	47.20	47.17	44.57	42.53	41.11	40.49	40.33	39.47	38.39	37.63
25.0	61.16	62.11	53.03	51.16	52.56	50.02	44.48	43.44	42.91	42.96	40.61	38.80	37.54	37.05	36.94	36.21	35.36	34.59
30.0	54.73	56.03	48.32	46.65	47.97	45.80	40.79	39.90	39.45	39.54	37.39	35.77	34.64	34.23	34.16	33.52	32.82	32.07
35.0	49.71	51.20	44.52	43.00	44.25	42.36	37.78	36.98	36.59	36.71	34.74	33.25	32.22	31.88	31.83	31.26	30.68	29.96
40.0	45.66	47.27	41.37	39.98	41.16	39.49	35.25	34.54	34.20	34.34	32.50	31.13	30.18	29.90	29.86	29.35	28.84	28.15
45.0	42.32	44.00	38.71	37.43	38.55	37.06	33.11	32.46	32.16	32.31	30.59	29.31	28.43	28.19	28.16	27.70	27.25	26.60
50.0	39.52	41.23	36.44	35.25	36.31	34.96	31.26	30.66	30.40	30.55	28.93	27.74	26.91	26.70	26.69	26.27	25.86	25.25
55.0	37.12	38.85	34.48	33.36	34.37	33.14	29.65	29.10	28.86	29.02	27.49	26.36	25.58	25.40	25.39	25.01	24.64	24.05
60.0	35.05	36.78	32.75	31.70	32.66	31.54	28.23	27.72	27.50	27.66	26.21	25.15	24.40	24.25	24.25	23.89	23.55	22.99
65.0	33.24	34.97	31.23	30.23	31.16	30.11	26.97	26.49	26.29	26.46	25.07	24.06	23.36	23.22	23.22	22.89	22.57	22.05
70.0	31.65	33.36	29.87	28.92	29.81	28.84	25.84	25.39	25.21	25.38	24.05	23.09	22.41	22.29	22.30	21.99	21.69	21.19
80.0	28.96	30.64	27.55	26.68	27.51	26.66	23.91	23.50	23.34	23.52	22.29	21.41	20.79	20.69	20.71	20.43	20.17	19.71
90.0	26.77	28.42	25.64	24.84	25.61	24.85	22.30	21.93	21.80	21.97	20.83	20.01	19.44	19.36	19.38	19.13	18.89	18.47
100.0	24.96	26.56	24.03	23.29	24.02	23.33	20.95	20.61	20.49	20.66	19.59	18.83	18.29	18.23	18.25	18.02	17.80	17.42
150.0	19.09	20.51	18.71	18.15	18.72	18.25	16.42	16.18	16.11	16.27	15.44	14.85	14.43	14.41	14.43	14.28	14.10	13.85
200.0	15.86	17.30	15.82	15.32	15.71	15.44	13.88	13.63	13.67	13.83	13.11	12.90	12.48	12.21	12.26	12.10	12.22	11.79
250.0	13.96	15.28	14.00	13.56	13.87	13.69	12.31	11.96	12.14	12.29	11.65	11.47	11.09	10.87	10.91	10.73	10.88	10.51
300.0	12.65	13.88	12.73	12.33	12.62	12.46	11.21	10.79	11.06	11.20	10.62	10.45	10.11	9.92	9.96	9.80	9.94	9.60
350.0	11.68	12.85	11.79	11.42	11.69	11.55	10.40	10.02	10.27	10.40	9.86	9.70	9.39	9.22	9.26	9.11	9.23	8.93
400.0	10.95	12.06	11.07	10.72	10.98	10.85	9.77	9.43	9.65	9.78	9.28	9.12	8.83	8.67	8.71	8.58	8.69	8.41
450.0	10.37	11.44	10.50	10.17	10.42	10.30	9.28	8.96	9.17	9.29	8.82	8.67	8.39	8.24	8.28	8.15	8.26	8.00
500.0	9.91	10.93	10.04	9.72	9.96	9.86	8.88	8.58	8.77	8.89	8.44	8.30	8.03	7.90	7.94	7.81	7.92	7.66

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	40.90	38.97	39.01	39.28	38.91	36.66	35.52	33.52	32.79	31.93	31.31	30.79	29.67	29.29	28.97	29.04	27.84	27.52
3.0	42.98	40.99	41.01	41.29	40.98	38.72	37.55	35.57	34.85	33.97	33.34	32.81	31.69	31.28	30.92	31.00	29.68	29.33
3.5	44.30	42.29	42.30	42.59	42.33	40.07	38.89	36.94	36.25	35.37	34.73	34.21	33.09	32.66	32.28	32.36	30.96	30.59
4.0	45.12	43.10	43.11	43.40	43.18	40.95	39.77	37.87	37.20	36.33	35.69	35.17	34.07	33.63	33.23	33.30	31.84	31.47
4.5	45.60	43.58	43.58	43.87	43.70	41.49	40.33	38.47	37.83	36.97	36.33	35.82	34.74	34.29	33.88	33.95	32.45	32.07
5.0	45.83	43.81	43.82	44.11	43.97	41.80	40.65	38.85	38.23	37.38	36.75	36.24	35.19	34.74	34.31	34.38	32.86	32.47
5.5	45.88	43.88	43.88	44.18	44.07	41.94	40.81	39.05	38.45	37.62	37.00	36.50	35.47	35.02	34.58	34.66	33.11	32.72
6.0	45.80	43.82	43.82	44.12	44.04	41.95	40.83	39.13	38.55	37.73	37.12	36.63	35.62	35.18	34.73	34.81	33.25	32.86
6.5	45.63	43.67	43.67	43.97	43.92	41.87	40.77	39.11	38.55	37.75	37.14	36.67	35.68	35.24	34.79	34.86	33.30	32.91
7.0	45.39	43.46	43.46	43.75	43.73	41.71	40.63	39.01	38.48	37.69	37.10	36.63	35.66	35.23	34.78	34.85	33.28	32.90
8.0	44.77	42.88	42.88	43.17	43.19	41.25	40.21	38.67	38.18	37.42	36.84	36.40	35.47	35.06	34.59	34.66	33.10	32.72
9.0	44.03	42.20	42.20	42.49	42.54	40.67	39.66	38.20	37.74	37.01	36.45	36.03	35.14	34.74	34.27	34.34	32.80	32.42
10.0	43.24	41.45	41.46	41.74	41.82	40.02	39.05	37.66	37.22	36.52	35.98	35.57	34.72	34.34	33.87	33.94	32.41	32.04
11.0	42.43	40.69	40.70	40.98	41.08	39.34	38.40	37.07	36.66	35.99	35.46	35.07	34.25	33.88	33.41	33.48	31.98	31.62
12.0	41.62	39.92	39.93	40.21	40.33	38.65	37.73	36.46	36.07	35.43	34.91	34.54	33.75	33.40	32.93	33.00	31.52	31.16
15.0	39.26	37.68	37.71	37.97	38.13	36.60	35.76	34.64	34.30	33.72	33.25	32.91	32.20	31.90	31.44	31.50	30.09	29.76
20.0	35.81	34.40	34.43	34.68	34.88	33.54	32.80	31.86	31.58	31.08	30.67	30.38	29.77	29.52	29.08	29.14	27.85	27.55
25.0	32.95	31.67	31.72	31.94	32.17	30.96	30.31	29.49	29.26	28.81	28.44	28.19	27.65	27.44	27.02	27.08	25.90	25.63
30.0	30.58	29.40	29.46	29.66	29.90	28.81	28.21	27.48	27.28	26.89	26.55	26.32	25.84	25.66	25.27	25.32	24.23	23.98
35.0	28.58	27.49	27.54	27.74	27.98	26.98	26.43	25.78	25.60	25.24	24.93	24.72	24.28	24.14	23.76	23.81	22.79	22.56
40.0	26.87	25.85	25.91	26.10	26.34	25.41	24.91	24.31	24.15	23.82	23.53	23.34	22.94	22.81	22.45	22.50	21.54	21.33
45.0	25.40	24.44	24.50	24.68	24.92	24.05	23.58	23.03	22.89	22.58	22.32	22.14	21.77	21.65	21.31	21.36	20.45	20.25
50.0	24.11	23.21	23.27	23.44	23.68	22.86	22.42	21.91	21.78	21.50	21.24	21.08	20.73	20.63	20.30	20.35	19.49	19.31
55.0	22.98	22.12	22.18	22.35	22.58	21.81	21.39	20.92	20.80	20.53	20.29	20.14	19.81	19.72	19.41	19.45	18.64	18.46
60.0	21.97	21.16	21.22	21.38	21.60	20.87	20.48	20.03	19.92	19.67	19.45	19.30	18.99	18.91	18.61	18.65	17.87	17.71
65.0	21.07	20.29	20.35	20.50	20.73	20.03	19.66	19.24	19.14	18.90	18.68	18.55	18.25	18.18	17.89	17.93	17.18	17.03
70.0	20.26	19.51	19.57	19.72	19.94	19.27	18.92	18.52	18.42	18.20	17.99	17.86	17.58	17.51	17.23	17.28	16.56	16.41
80.0	18.85	18.15	18.21	18.35	18.57	17.95	17.63	17.27	17.18	16.98	16.79	16.67	16.42	16.36	16.09	16.14	15.47	15.33
90.0	17.67	17.02	17.08	17.21	17.42	16.84	16.55	16.22	16.14	15.95	15.78	15.67	15.43	15.38	15.13	15.17	14.55	14.42
100.0	16.66	16.05	16.11	16.24	16.44	15.90	15.62	15.32	15.25	15.06	14.91	14.81	14.59	14.55	14.31	14.35	13.77	13.64
150.0	13.25	12.77	12.82	12.92	13.10	12.68	12.47	12.25	12.20	12.07	11.95	11.87	11.71	11.67	11.49	11.52	11.06	10.96
200.0	11.28	10.89	10.89	10.98	11.13	10.79	10.61	10.44	10.40	10.30	10.19	10.13	10.00	9.97	9.81	9.84	9.71	9.40
250.0	10.06	9.71	9.61	9.68	9.83	9.55	9.45	9.29	9.29	9.19	9.05	9.03	8.93	8.87	8.73	8.75	8.69	8.41
300.0	9.20	8.88	8.78	8.81	8.94	8.74	8.65	8.50	8.51	8.41	8.29	8.27	8.19	8.13	8.00	8.02	7.96	7.72
350.0	8.55	8.26	8.17	8.20	8.32	8.13	8.05	7.92	7.92	7.83	7.72	7.71	7.63	7.57	7.45	7.48	7.42	7.19
400.0	8.056	7.781	7.701	7.727	7.843	7.666	7.589	7.463	7.469	7.388	7.283	7.269	7.194	7.145	7.033	7.056	7.001	6.790
450.0	7.662	7.401	7.327	7.352	7.463	7.295	7.222	7.103	7.110	7.033	6.934	6.921	6.851	6.805	6.699	6.720	6.666	6.469
500.0	7.343	7.093	7.025	7.048	7.155	6.995	6.924	6.812	6.819	6.745	6.652	6.639	6.573	6.529	6.428	6.448	6.394	6.209

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

165 67 HO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.010	5.750	8.125	8.100	7.950	9.475	10.250	10.781	11.170	11.590	11.850	12.680	13.110	13.667	13.880	14.104	14.525	14.900
3.0	6.576	6.441	8.998	9.018	8.858	10.490	11.428	12.017	12.448	12.902	13.250	14.174	14.664	15.294	15.528	15.816	16.427	16.738
3.5	7.154	7.124	9.868	9.930	9.758	11.491	12.585	13.229	13.697	14.181	14.614	15.625	16.210	16.869	17.122	17.470	18.246	18.609
4.0	7.745	7.808	10.741	10.845	10.660	12.488	13.736	14.431	14.933	15.443	15.959	17.055	17.710	18.415	18.686	19.090	20.014	20.240
4.5	8.354	8.499	11.623	11.767	11.569	13.488	14.887	15.631	16.167	16.699	17.296	18.475	19.197	19.947	20.234	20.692	21.751	21.950
5.0	8.979	9.199	12.515	12.701	12.488	14.495	16.043	16.836	17.403	17.956	18.634	19.893	20.681	21.474	21.777	22.286	23.470	23.648
5.5	9.624	9.910	13.421	13.647	13.418	15.512	17.209	18.048	18.646	19.218	19.977	21.315	22.168	23.001	23.319	23.879	25.179	25.343
6.0	10.287	10.635	14.340	14.608	14.362	16.541	18.387	19.272	19.899	20.488	21.327	22.744	23.660	24.534	24.867	25.475	26.885	27.041
6.5	10.969	11.374	15.276	15.584	15.321	17.583	19.579	20.508	21.164	21.769	22.689	24.184	25.163	26.075	26.422	27.079	28.593	28.744
7.0	11.670	12.128	16.226	16.576	16.294	18.639	20.785	21.758	22.442	23.063	24.064	25.637	26.677	27.628	27.988	28.693	30.306	30.456
8.0	13.13	13.68	18.18	18.61	18.29	20.80	23.25	24.31	25.04	25.69	26.86	28.58	29.75	30.77	31.16	31.96	33.76	33.92
9.0	14.67	15.30	20.20	20.72	20.35	23.02	25.77	26.92	27.71	28.38	29.71	31.60	32.88	33.98	34.39	35.28	37.25	37.43
10.0	16.28	16.98	22.28	22.89	22.48	25.30	28.37	29.60	30.45	31.14	32.64	34.68	36.08	37.25	37.69	38.67	40.81	41.01
11.0	17.97	18.73	24.44	25.13	24.67	27.66	31.04	32.36	33.25	33.96	35.63	37.83	39.36	40.60	41.06	42.13	44.42	44.66
12.0	19.73	20.55	26.67	27.45	26.94	30.08	33.79	35.19	36.13	36.86	38.70	41.06	42.71	44.02	44.50	45.66	48.10	48.39
15.0	25.46	26.38	33.76	34.82	34.14	37.74	42.46	44.11	45.21	45.97	48.36	51.21	53.23	54.74	55.27	56.70	59.56	60.02
20.0	36.43	37.38	46.92	48.48	47.46	51.84	58.38	60.45	61.79	62.57	65.94	69.65	72.33	74.15	74.77	76.64	80.12	80.96
25.0	49.10	49.92	61.69	63.80	62.37	67.56	76.06	78.57	80.15	80.93	85.36	89.99	93.36	95.48	96.17	98.49	102.53	103.86
30.0	63.39	63.92	78.01	80.71	78.82	84.81	95.45	98.41	100.22	100.97	106.56	112.16	116.26	118.66	119.41	122.20	126.77	128.65
35.0	79.23	79.35	95.82	99.15	96.75	103.56	116.49	119.91	121.96	122.64	129.47	136.10	140.98	143.65	144.46	147.71	152.79	155.29
40.0	96.56	96.13	115.06	119.07	116.10	123.75	139.12	143.01	145.30	145.90	154.04	161.76	167.45	170.39	171.23	174.96	180.54	183.71
45.0	115.35	114.24	135.69	140.41	136.83	145.33	163.28	167.67	170.19	170.68	180.22	189.09	195.64	198.83	199.70	203.91	209.99	213.88
50.0	135.54	133.62	157.66	163.14	158.89	168.26	188.94	193.83	196.59	196.95	207.96	218.03	225.48	228.92	229.81	234.51	241.08	245.73
55.0	157.09	154.25	180.95	187.21	182.26	192.51	216.05	221.46	224.46	224.67	237.23	248.55	256.94	260.61	261.61	266.71	273.77	279.22
60.0	179.97	176.08	206.51	212.59	206.89	218.04	244.58	250.53	253.76	253.80	267.98	280.61	289.97	293.86	294.77	300.48	308.03	314.31
65.0	204.2	199.1	231.3	239.3	232.8	244.8	274.5	281.0	284.4	284.3	300.2	314.2	324.5	328.6	329.5	335.8	343.8	351.0
70.0	229.6	223.3	258.3	267.2	259.8	272.8	305.8	312.8	316.5	316.2	333.8	349.2	360.6	364.9	365.8	372.6	381.1	389.1
80.0	284.2	274.9	315.9	326.6	317.5	332.4	372.2	380.4	384.6	383.8	405.1	423.4	437.1	441.8	442.7	450.5	460.1	469.9
90.0	343.5	330.9	378.1	390.8	379.7	396.5	443.7	453.2	457.8	456.4	481.8	503.2	519.3	524.3	525.1	534.0	544.7	556.5
100.0	407.4	391.0	444.6	459.4	446.3	465.1	520.1	530.8	535.9	533.9	563.5	588.3	606.8	612.2	612.9	622.9	634.7	648.5
150.0	790.0	748.7	837.9	865.1	839.7	869.1	969.7	987.4	994.8	988.6	1042.8	1086.6	1119.7	1126.4	1126.3	1142.2	1160.5	1184.7
200.0	1267.1	1189.6	1320.7	1363.2	1323.6	1363.9	1519.9	1546.1	1554.5	1542.3	1626.7	1680.5	1734.2	1752.2	1750.6	1773.3	1788.7	1834.4
250.0	1823.9	1698.7	1876.9	1937.5	1884.9	1933.1	2153.0	2194.5	2204.6	2177.2	2296.4	2360.8	2437.8	2470.5	2466.1	2500.7	2506.4	2577.9
300.0	2446.1	2266.4	2498.1	2577.0	2509.9	2566.0	2856.5	2923.0	2910.4	2862.0	3039.5	3116.0	3218.5	3266.7	3258.9	3306.9	3301.5	3400.7
350.0	3125.9	2885.2	3171.1	3273.4	3190.3	3254.6	3621.6	3717.6	3685.7	3647.5	3846.6	3936.2	4066.3	4130.8	4119.1	4181.3	4164.1	4292.8
400.0	3857.	3549.	3894.	4020.	3919.	3992.	4441.	4567.	4515.	4467.	4710.	4814.	4973.	5055.	5039.	5116.	5086.	5246.
450.0	4631.	4252.	4660.	4811.	4692.	4773.	5308.	5466.	5393.	5333.	5623.	5742.	5932.	6031.	6010.	6103.	6060.	6252.
500.0	5446.	4990.	5465.	5641.	5502.	5592.	6218.	6408.	6314.	6241.	6580.	6716.	6938.	7054.	7028.	7137.	7081.	7307.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.64	16.22	17.51	17.84	18.49	19.43	19.99	20.71	21.14	21.56	21.99	22.44	22.90	23.31	23.85	24.05	25.77	26.32
3.0	17.60	18.28	19.56	19.88	20.56	21.61	22.24	23.10	23.58	24.06	24.54	25.03	25.58	26.03	26.60	26.79	28.63	29.22
3.5	19.49	20.26	21.54	21.85	22.53	23.71	24.40	25.37	25.90	26.44	26.96	27.49	28.13	28.61	29.21	29.39	31.35	31.97
4.0	21.34	22.19	23.47	23.76	24.46	25.74	26.50	27.67	28.14	28.74	29.30	29.87	30.58	31.09	31.72	31.90	33.98	34.62
4.5	23.15	24.10	25.38	25.65	26.36	27.74	28.56	29.73	30.34	30.99	31.59	32.19	32.98	33.52	34.18	34.36	36.54	37.22
5.0	24.96	25.98	27.26	27.53	28.24	29.72	30.59	31.87	32.51	33.20	33.85	34.48	35.34	35.91	36.60	36.77	39.07	39.78
5.5	26.76	27.86	29.14	29.40	30.12	31.69	32.62	33.98	34.66	35.40	36.08	36.75	37.67	38.28	39.00	39.16	41.57	42.31
6.0	28.56	29.74	31.02	31.27	31.99	33.66	34.64	36.09	36.80	37.59	38.31	39.00	39.99	40.63	41.38	41.53	44.05	44.82
6.5	30.36	31.63	32.91	33.14	33.86	35.63	36.66	38.20	38.94	39.78	40.53	41.26	42.30	42.97	43.75	43.90	46.53	47.33
7.0	32.17	33.52	34.80	35.02	35.75	37.60	38.69	40.32	41.08	41.96	42.75	43.51	44.62	45.31	46.12	46.27	49.01	49.84
8.0	35.83	37.34	38.63	38.81	39.54	41.58	42.77	44.56	45.39	46.36	47.21	48.02	49.25	50.00	50.87	51.01	53.98	54.86
9.0	39.55	41.22	42.50	42.67	43.39	45.60	46.90	48.85	49.73	50.79	51.72	52.58	53.93	54.73	55.67	55.79	58.99	59.93
10.0	43.33	45.17	46.45	46.58	47.30	49.69	51.09	53.20	54.13	55.28	56.27	57.19	58.65	59.51	60.51	60.63	64.05	65.05
11.0	47.18	49.19	50.46	50.57	51.28	53.85	55.35	57.62	58.60	59.83	60.89	61.86	63.43	64.34	65.41	65.52	69.17	70.23
12.0	51.11	53.28	54.56	54.64	55.34	58.08	59.69	62.11	63.14	64.45	65.58	66.60	68.29	69.25	70.39	70.48	74.37	75.49
15.0	63.36	66.05	67.32	67.31	67.96	71.25	73.16	76.03	77.21	78.77	80.11	81.28	83.30	84.41	85.77	85.84	90.44	91.74
20.0	85.38	88.98	90.24	90.07	90.60	94.81	97.27	100.89	102.29	104.27	105.96	107.39	109.96	111.31	113.07	113.08	118.95	120.56
25.0	109.43	114.00	115.22	114.88	115.25	120.44	123.46	127.83	129.45	131.86	133.91	135.61	138.74	140.32	142.52	142.47	149.69	151.63
30.0	135.44	141.06	142.24	141.71	141.88	148.09	151.69	156.83	158.68	161.52	163.96	165.92	169.62	171.43	174.12	173.99	182.65	184.93
35.0	163.37	170.10	171.23	170.49	170.42	177.70	181.92	187.85	189.91	193.21	196.04	198.28	202.58	204.60	207.81	207.61	217.79	220.42
40.0	193.2	201.1	202.1	201.2	200.8	209.2	214.1	220.8	223.1	226.9	230.1	232.6	237.5	239.8	243.6	243.3	255.0	258.0
45.0	224.8	233.9	234.9	233.7	233.0	242.6	248.1	255.7	258.2	262.5	266.1	268.9	274.5	276.9	281.3	280.9	294.4	297.8
50.0	258.1	268.6	269.5	268.0	267.0	277.8	284.0	292.4	295.2	299.9	304.0	307.1	313.3	316.0	321.0	320.5	336.7	339.5
55.0	293.2	305.0	305.8	304.0	302.7	314.8	321.7	331.0	333.9	339.2	343.8	347.2	354.1	356.9	362.6	362.0	379.0	383.2
60.0	329.9	343.1	343.8	341.8	340.1	353.5	361.1	371.3	374.5	380.3	385.3	389.0	396.6	399.6	406.0	405.3	424.2	428.8
65.0	368.3	383.0	383.5	381.2	379.1	393.8	402.3	413.3	416.7	423.1	428.6	432.7	440.9	444.1	451.2	450.4	471.3	476.4
70.0	408.2	424.4	424.9	422.3	419.7	435.8	445.1	457.1	460.7	467.5	473.6	478.0	487.0	490.4	498.2	497.3	520.2	525.7
80.0	492.7	512.2	512.4	509.1	506.6	524.6	535.5	549.4	553.5	561.5	568.6	573.7	584.2	587.9	597.4	596.2	623.4	629.9
90.0	583.2	606.1	606.0	602.0	597.3	619.6	632.2	648.1	652.6	661.8	670.1	675.9	687.9	692.0	703.2	701.7	733.4	740.9
100.0	679.4	706.0	705.5	700.7	694.9	720.5	734.9	752.8	757.9	768.3	777.7	784.2	797.9	802.4	815.3	813.6	850.0	858.6
150.0	1240.	1286.	1285.	1276.	1262.	1307.	1331.	1361.	1368.	1385.	1402.	1412.	1435.	1441.	1464.	1461.	1525.	1539.
200.0	1919.	1992.	1987.	1972.	1949.	2016.	2052.	2094.	2104.	2129.	2153.	2168.	2201.	2210.	2246.	2239.	2318.	2357.
250.0	2696.	2796.	2790.	2775.	2740.	2832.	2879.	2935.	2946.	2980.	3015.	3034.	3077.	3091.	3140.	3132.	3218.	3287.
300.0	3555.	3686.	3696.	3671.	3623.	3737.	3793.	3865.	3876.	3920.	3970.	3990.	4044.	4065.	4130.	4118.	4212.	4313.
350.0	4487.	4651.	4671.	4643.	4581.	4717.	4783.	4873.	4882.	4938.	5002.	5025.	5089.	5118.	5200.	5185.	5286.	5422.
400.0	5482.	5681.	5712.	5680.	5603.	5763.	5840.	5947.	5956.	6024.	6104.	6128.	6204.	6241.	6341.	6321.	6432.	6603.
450.0	6533.	6769.	6812.	6776.	6682.	6867.	6955.	7081.	7089.	7169.	7265.	7292.	7380.	7425.	7543.	7520.	7641.	7849.
500.0	7633.	7908.	7962.	7923.	7812.	8022.	8122.	8268.	8274.	8367.	8481.	8510.	8611.	8664.	8801.	8774.	8905.	9152.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{166}_{68}$ER IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	149.2	119.3	95.1	90.5	91.4	81.4	70.0	66.5	64.3	62.5	58.5	54.8	51.9	50.2	49.5	47.6	42.6	44.3
3.0	147.1	122.1	96.2	91.7	92.8	83.2	71.8	68.5	66.4	64.7	60.7	56.9	54.1	52.4	51.7	49.8	45.1	46.5
3.5	143.9	122.7	96.3	91.8	93.0	83.9	72.7	69.5	67.4	66.0	61.9	58.2	55.4	53.7	53.1	51.2	46.7	47.9
4.0	140.2	122.1	95.6	91.3	92.6	83.9	72.9	69.8	67.9	66.6	62.5	58.8	56.1	54.5	53.9	52.0	47.8	48.7
4.5	136.4	120.8	94.6	90.4	91.8	83.6	72.7	69.7	67.9	66.7	62.7	59.1	56.4	54.8	54.2	52.5	48.5	49.2
5.0	132.6	119.0	93.4	89.3	90.8	82.9	72.2	69.4	67.7	66.6	62.6	59.0	56.5	54.9	54.4	52.6	48.9	49.4
5.5	128.9	117.0	92.0	88.0	89.6	82.0	71.6	68.9	67.2	66.2	62.3	58.8	56.3	54.8	54.3	52.6	49.1	49.4
6.0	125.3	114.8	90.6	86.7	88.3	81.1	70.8	68.2	66.6	65.8	61.9	58.5	56.0	54.6	54.1	52.4	49.1	49.3
6.5	121.8	112.6	89.1	85.3	86.9	80.0	70.0	67.5	66.0	65.2	61.3	58.0	55.6	54.2	53.8	52.1	49.1	49.1
7.0	118.6	110.4	87.6	84.0	85.6	79.0	69.2	66.7	65.3	64.6	60.8	57.5	55.2	53.8	53.4	51.8	48.9	48.9
8.0	112.5	106.1	84.7	81.2	82.9	76.8	67.4	65.1	63.8	63.2	59.5	56.4	54.2	52.9	52.5	51.0	48.4	48.2
9.0	107.1	102.0	81.9	78.6	80.3	74.6	65.6	63.5	62.2	61.7	58.1	55.2	53.0	51.9	51.5	50.1	47.7	47.3
10.0	102.2	98.2	79.3	76.1	77.8	72.5	63.8	61.8	60.7	60.3	56.8	53.9	51.9	50.8	50.4	49.1	46.9	46.5
11.0	97.8	94.6	76.8	73.8	75.5	70.5	62.1	60.3	59.2	58.8	55.5	52.7	50.7	49.7	49.4	48.1	46.1	45.6
12.0	93.8	91.3	74.5	71.6	73.3	68.6	60.5	58.7	57.7	57.4	54.2	51.5	49.6	48.6	48.3	47.1	45.3	44.7
15.0	83.70	82.64	68.35	65.78	67.41	63.43	56.11	54.58	53.72	53.56	50.55	48.14	46.46	45.64	45.40	44.34	42.85	42.15
20.0	71.45	71.70	60.34	58.15	59.68	56.52	50.14	48.89	48.22	48.19	45.53	43.44	41.99	41.35	41.19	40.31	39.20	38.42
25.0	62.72	63.63	54.26	52.34	53.77	51.15	45.48	44.42	43.87	43.92	41.52	39.66	38.38	37.87	37.76	37.01	36.14	35.35
30.0	56.15	57.43	49.47	47.76	49.10	46.87	41.74	40.82	40.36	40.45	38.26	36.59	35.43	35.02	34.94	34.28	33.57	32.80
35.0	51.02	52.50	45.60	44.04	45.31	43.37	38.67	37.86	37.46	37.58	35.56	34.03	32.98	32.63	32.57	31.99	31.39	30.65
40.0	46.87	48.49	42.39	40.96	42.17	40.45	36.11	35.37	35.03	35.16	33.28	31.88	30.90	30.61	30.57	30.05	29.53	28.82
45.0	43.46	45.14	39.68	38.37	39.51	37.97	33.92	33.26	32.95	33.10	31.34	30.03	29.12	28.87	28.85	28.37	27.91	27.24
50.0	40.59	42.31	37.37	36.14	37.23	35.84	32.04	31.43	31.15	31.31	29.65	28.43	27.58	27.36	27.35	26.91	26.50	25.87
55.0	38.13	39.88	35.36	34.21	35.25	33.98	30.40	29.83	29.58	29.75	28.18	27.03	26.22	26.03	26.03	25.63	25.25	24.65
60.0	36.01	37.77	33.60	32.52	33.51	32.34	28.95	28.42	28.20	28.37	26.87	25.79	25.02	24.86	24.86	24.49	24.14	23.57
65.0	34.16	35.91	32.05	31.02	31.97	30.89	27.66	27.17	26.97	27.14	25.71	24.68	23.95	23.81	23.81	23.47	23.15	22.61
70.0	32.52	34.27	30.66	29.68	30.60	29.59	26.51	26.05	25.86	26.03	24.67	23.69	22.99	22.86	22.87	22.55	22.25	21.73
80.0	29.77	31.48	28.29	27.40	28.25	27.37	24.54	24.12	23.96	24.13	22.88	21.97	21.33	21.23	21.25	20.96	20.69	20.23
90.0	27.52	29.20	26.33	25.51	26.30	25.52	22.90	22.52	22.38	22.55	21.38	20.55	19.95	19.87	19.89	19.64	19.39	18.96
100.0	25.66	27.30	24.69	23.92	24.67	23.96	21.51	21.16	21.04	21.22	20.12	19.34	18.78	18.71	18.74	18.51	18.28	17.89
150.0	19.64	21.09	19.24	18.66	19.25	18.77	16.88	16.63	16.56	16.72	15.87	15.27	14.83	14.81	14.83	14.68	14.50	14.23
200.0	16.32	17.80	16.27	15.76	16.16	15.89	14.28	14.02	14.06	14.22	13.48	13.27	12.83	12.56	12.61	12.44	12.56	12.12
250.0	14.37	15.73	14.41	13.95	14.27	14.09	12.67	12.30	12.49	12.64	11.99	11.80	11.41	11.18	11.23	11.04	11.19	10.81
300.0	13.02	14.29	13.10	12.69	12.98	12.83	11.54	11.11	11.39	11.53	10.93	10.76	10.41	10.21	10.25	10.09	10.22	9.88
350.0	12.03	13.22	12.13	11.75	12.03	11.89	10.70	10.31	10.57	10.70	10.15	9.99	9.66	9.49	9.53	9.38	9.50	9.19
400.0	11.27	12.41	11.39	11.04	11.30	11.17	10.06	9.70	9.94	10.07	9.55	9.39	9.09	8.93	8.97	8.83	8.95	8.66
450.0	10.68	11.77	10.81	10.47	10.73	10.61	9.55	9.22	9.44	9.56	9.08	8.92	8.64	8.49	8.53	8.40	8.51	8.23
500.0	10.20	11.26	10.34	10.01	10.26	10.15	9.14	8.83	9.03	9.16	8.69	8.54	8.27	8.13	8.17	8.04	8.15	7.89

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	41.40	39.45	39.48	39.75	39.38	37.11	35.95	33.93	33.19	32.31	31.69	31.16	30.03	29.64	29.32	29.39	28.17	27.85
3.0	43.54	41.53	41.55	41.83	41.51	39.22	38.03	36.02	35.30	34.41	33.77	33.24	32.10	31.68	31.32	31.40	30.06	29.71
3.5	44.91	42.87	42.88	43.17	42.91	40.62	39.42	37.45	36.75	35.86	35.21	34.67	33.54	33.10	32.72	32.80	31.38	31.01
4.0	45.77	43.72	43.73	44.02	43.80	41.53	40.34	38.41	37.73	36.85	36.20	35.67	34.55	34.10	33.70	33.77	32.29	31.92
4.5	46.28	44.23	44.23	44.52	44.35	42.11	40.93	39.04	38.39	37.52	36.87	36.35	35.25	34.79	34.37	34.45	32.93	32.54
5.0	46.53	44.49	44.49	44.78	44.65	42.44	41.27	39.44	38.81	37.95	37.31	36.79	35.72	35.26	34.83	34.90	33.35	32.96
5.5	46.60	44.57	44.57	44.87	44.76	42.60	41.45	39.66	39.05	38.21	37.57	37.07	36.02	35.56	35.12	35.19	33.62	33.23
6.0	46.54	44.53	44.53	44.83	44.75	42.62	41.49	39.75	39.17	38.34	37.71	37.22	36.19	35.74	35.28	35.36	33.78	33.38
6.5	46.38	44.39	44.39	44.69	44.64	42.55	41.43	39.74	39.18	38.37	37.75	37.27	36.26	35.81	35.35	35.43	33.84	33.44
7.0	46.15	44.19	44.18	44.48	44.46	42.41	41.31	39.66	39.12	38.32	37.71	37.24	36.25	35.82	35.35	35.42	33.83	33.44
8.0	45.55	43.63	43.63	43.92	43.94	41.96	40.90	39.34	38.83	38.07	37.47	37.02	36.08	35.66	35.18	35.26	33.67	33.28
9.0	44.82	42.95	42.95	43.24	43.30	41.39	40.36	38.88	38.40	37.67	37.09	36.66	35.76	35.35	34.87	34.95	33.37	32.99
10.0	44.04	42.21	42.22	42.50	42.59	40.75	39.75	38.34	37.89	37.18	36.63	36.21	35.35	34.96	34.48	34.55	32.99	32.62
11.0	43.22	41.45	41.46	41.74	41.84	40.07	39.11	37.76	37.33	36.65	36.11	35.71	34.88	34.51	34.03	34.10	32.56	32.20
12.0	42.41	40.68	40.69	40.97	41.09	39.38	38.44	37.15	36.75	36.09	35.57	35.18	34.38	34.03	33.55	33.62	32.11	31.75
15.0	40.04	38.43	38.46	38.72	38.89	37.32	36.47	35.32	34.98	34.38	33.91	33.56	32.84	32.52	32.05	32.12	30.68	30.35
20.0	36.56	35.12	35.16	35.40	35.61	34.24	33.49	32.52	32.24	31.73	31.31	31.01	30.39	30.13	29.68	29.74	28.43	28.12
25.0	33.67	32.37	32.41	32.64	32.87	31.64	30.97	30.13	29.89	29.44	29.06	28.80	28.25	28.04	27.61	27.67	26.46	26.18
30.0	31.27	30.07	30.12	30.33	30.57	29.45	28.85	28.10	27.90	27.49	27.15	26.91	26.42	26.24	25.83	25.89	24.77	24.51
35.0	29.24	28.13	28.18	28.39	28.63	27.60	27.04	26.37	26.19	25.82	25.50	25.29	24.84	24.69	24.30	24.36	23.31	23.08
40.0	27.51	26.47	26.52	26.72	26.96	26.01	25.49	24.88	24.72	24.38	24.09	23.89	23.48	23.34	22.98	23.03	22.05	21.83
45.0	26.01	25.03	25.09	25.28	25.52	24.63	24.15	23.58	23.44	23.13	22.85	22.67	22.29	22.17	21.82	21.87	20.94	20.74
50.0	24.70	23.78	23.84	24.02	24.26	23.42	22.97	22.44	22.31	22.02	21.76	21.59	21.23	21.13	20.79	20.84	19.96	19.77
55.0	23.55	22.67	22.73	22.90	23.14	22.35	21.92	21.43	21.31	21.04	20.79	20.64	20.30	20.21	19.88	19.93	19.10	18.91
60.0	22.52	21.69	21.75	21.91	22.14	21.39	20.99	20.53	20.42	20.16	19.93	19.78	19.46	19.38	19.07	19.12	18.32	18.15
65.0	21.60	20.80	20.86	21.02	21.25	20.54	20.16	19.72	19.62	19.38	19.15	19.01	18.71	18.64	18.33	18.38	17.62	17.45
70.0	20.77	20.01	20.07	20.22	20.45	19.76	19.40	18.99	18.89	18.66	18.45	18.32	18.03	17.96	17.67	17.71	16.98	16.83
80.0	19.34	18.63	18.69	18.83	19.05	18.42	18.09	17.72	17.63	17.42	17.22	17.10	16.84	16.78	16.51	16.55	15.87	15.73
90.0	18.13	17.47	17.53	17.66	17.88	17.29	16.98	16.64	16.57	16.37	16.19	16.08	15.84	15.79	15.53	15.57	14.93	14.80
100.0	17.11	16.48	16.54	16.67	16.88	16.32	16.04	15.73	15.66	15.48	15.31	15.20	14.98	14.93	14.69	14.73	14.13	14.01
150.0	13.62	13.12	13.17	13.28	13.46	13.03	12.81	12.59	12.54	12.41	12.28	12.20	12.03	11.99	11.81	11.84	11.36	11.26
200.0	11.60	11.20	11.20	11.29	11.45	11.09	10.91	10.73	10.70	10.59	10.48	10.42	10.28	10.25	10.09	10.12	9.98	9.66
250.0	10.35	9.99	9.88	9.96	10.11	9.82	9.73	9.55	9.56	9.45	9.31	9.29	9.19	9.12	8.98	9.01	8.94	8.66
300.0	9.46	9.14	9.04	9.07	9.20	8.99	8.90	8.75	8.75	8.66	8.53	8.51	8.42	8.36	8.23	8.26	8.20	7.94
350.0	8.80	8.50	8.41	8.44	8.57	8.37	8.29	8.15	8.15	8.06	7.95	7.93	7.85	7.79	7.67	7.70	7.64	7.40
400.0	8.293	8.010	7.927	7.954	8.074	7.891	7.812	7.682	7.689	7.605	7.497	7.483	7.405	7.354	7.240	7.263	7.206	6.989
450.0	7.888	7.620	7.543	7.568	7.683	7.511	7.435	7.313	7.320	7.240	7.139	7.125	7.053	7.005	6.896	6.918	6.862	6.660
500.0	7.560	7.303	7.232	7.256	7.366	7.202	7.129	7.013	7.021	6.945	6.848	6.835	6.767	6.722	6.618	6.639	6.583	6.392

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

166 ER IONS 68

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	5.970	5.710	8.068	8.050	7.910	9.419	10.180	10.703	11.090	11.510	11.770	12.600	13.020	13.567	13.780	14.006	14.428	14.800
3.0	6.530	6.397	8.934	8.960	8.810	10.426	11.349	11.931	12.358	12.813	13.160	14.083	14.583	15.183	15.417	15.706	16.317	16.626
3.5	7.100	7.074	9.796	9.864	9.703	11.419	12.497	13.133	13.598	14.081	14.513	15.524	16.097	16.746	16.999	17.347	18.123	18.384
4.0	7.684	7.752	10.660	10.770	10.597	12.407	13.637	14.324	14.824	15.333	15.847	16.941	17.585	18.279	18.550	18.954	19.877	20.101
4.5	8.285	8.436	11.533	11.683	11.496	13.398	14.777	15.513	16.045	16.577	17.172	18.348	19.059	19.798	20.085	20.542	21.598	21.796
5.0	8.902	9.127	12.416	12.607	12.405	14.395	15.923	16.706	17.270	17.822	18.497	19.753	20.529	21.310	21.613	22.122	23.301	23.479
5.5	9.537	9.830	13.311	13.543	13.326	15.402	17.077	17.906	18.500	19.072	19.826	21.161	22.001	22.823	23.141	23.699	24.994	25.158
6.0	10.190	10.546	14.221	14.493	14.259	16.420	18.242	19.117	19.740	20.329	21.163	22.576	23.479	24.340	24.673	25.280	26.684	26.839
6.5	10.862	11.276	15.145	15.458	15.206	17.450	19.420	20.339	20.991	21.596	22.510	24.001	24.965	25.866	26.212	26.868	28.374	28.525
7.0	11.552	12.020	16.084	16.438	16.169	18.494	20.613	21.575	22.256	22.875	23.870	25.437	26.463	27.402	27.762	28.464	30.069	30.219
8.0	12.99	13.55	18.01	18.45	18.14	20.63	23.04	24.09	24.83	25.47	26.63	28.35	29.50	30.51	30.90	31.69	33.48	33.64
9.0	14.50	15.15	20.00	20.53	20.17	22.82	25.54	26.67	27.46	28.13	29.45	31.33	32.60	33.68	34.09	34.98	36.94	37.12
10.0	16.09	16.81	22.06	22.67	22.27	25.08	28.11	29.32	30.16	30.85	32.34	34.37	35.76	36.92	37.35	38.33	40.45	40.65
11.0	17.75	18.53	24.19	24.89	24.44	27.40	30.74	32.04	32.94	33.64	35.30	37.49	39.00	40.22	40.67	41.74	44.02	44.26
12.0	19.48	20.32	26.39	27.17	26.67	29.79	33.45	34.83	35.78	36.50	38.33	40.67	42.30	43.60	44.07	45.23	47.65	47.94
15.0	25.12	26.06	33.37	34.43	33.77	37.34	42.01	43.64	44.73	45.48	47.85	50.68	52.68	54.17	54.70	56.12	58.96	59.41
20.0	35.89	36.88	46.33	47.89	46.88	51.24	57.68	59.73	61.06	61.85	65.18	68.86	71.50	73.30	73.92	75.78	79.22	80.06
25.0	48.32	49.19	60.86	62.96	61.56	66.70	75.09	77.57	79.14	79.91	84.30	88.88	92.20	94.30	94.99	97.29	101.30	102.61
30.0	62.33	62.94	76.90	79.58	77.73	83.67	94.16	97.08	98.88	99.63	105.14	110.69	114.73	117.11	117.86	120.62	125.15	127.00
35.0	77.86	78.08	94.40	97.70	95.35	102.09	114.84	118.22	120.25	120.94	127.67	134.23	139.04	141.69	142.49	145.70	150.74	153.20
40.0	94.85	94.55	113.29	117.26	114.35	121.93	137.07	140.91	143.18	143.79	151.81	159.45	165.06	167.97	168.81	172.49	178.02	181.14
45.0	113.26	112.30	133.55	138.21	134.70	143.12	160.80	165.13	167.63	168.13	177.53	186.29	192.74	195.91	196.77	200.93	206.94	210.78
50.0	133.04	131.31	155.11	160.51	156.36	165.63	185.99	190.82	193.55	193.93	204.77	214.71	222.05	225.45	226.34	230.98	237.48	242.06
55.0	154.15	151.52	177.96	184.13	179.28	189.42	212.60	217.93	220.90	221.13	233.50	244.67	252.93	256.56	257.46	262.60	269.58	274.94
60.0	176.56	172.92	202.04	209.02	203.44	214.47	240.58	246.45	249.65	249.71	263.67	276.12	285.34	289.20	290.11	295.74	303.20	309.39
65.0	200.2	195.5	227.3	235.2	228.8	240.7	269.9	276.3	279.8	279.6	295.3	309.0	319.3	323.3	324.2	330.4	338.3	345.4
70.0	225.1	219.1	253.8	262.5	255.4	268.2	300.6	307.5	311.2	310.9	328.2	343.4	354.6	358.9	359.8	366.5	374.9	382.8
80.0	278.6	269.7	310.3	320.8	311.9	326.6	365.7	373.8	377.9	377.2	398.2	416.2	429.7	434.3	435.2	442.9	452.3	462.1
90.0	336.6	324.6	371.1	383.6	372.8	389.5	435.8	445.1	449.7	448.4	473.3	494.4	510.2	515.2	516.0	524.8	535.3	546.9
100.0	399.1	383.4	436.3	450.9	438.0	456.6	510.7	521.2	526.2	524.3	553.4	577.7	596.0	601.3	602.0	611.9	623.5	637.1
150.0	773.4	733.4	821.3	848.0	823.1	852.2	950.8	968.2	975.5	969.5	1022.7	1065.7	1098.2	1104.9	1104.8	1120.4	1138.4	1162.2
200.0	1239.8	1164.7	1293.6	1335.3	1296.5	1336.3	1489.1	1514.8	1523.2	1511.2	1594.0	1646.8	1699.4	1717.2	1715.7	1738.0	1763.1	1797.9
250.0	1783.8	1662.5	1837.5	1896.8	1845.4	1892.9	2108.2	2149.0	2161.5	2132.2	2249.0	2312.2	2387.6	2419.8	2415.5	2449.4	2456.1	2525.2
300.0	2392.1	2217.5	2443.1	2522.0	2456.4	2511.7	2796.1	2861.3	2849.0	2821.3	2975.6	3060.6	3150.8	3198.2	3190.6	3237.7	3232.5	3329.7
350.0	3057.0	2822.3	3102.5	3202.7	3121.5	3184.7	3544.0	3637.9	3606.9	3569.6	3764.5	3852.3	3979.7	4042.9	4031.6	4092.5	4075.8	4201.8
400.0	3771.	3471.	3809.	3932.	3834.	3905.	4345.	4469.	4418.	4370.	4608.	4710.	4866.	4946.	4930.	5006.	4977.	5133.
450.0	4527.	4158.	4558.	4705.	4589.	4668.	5192.	5347.	5276.	5217.	5500.	5618.	5804.	5900.	5880.	5971.	5929.	6117.
500.0	5323.	4880.	5344.	5517.	5380.	5469.	6081.	6267.	6175.	6104.	6435.	6569.	6786.	6900.	6875.	6981.	6927.	7147.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.53	16.11	17.38	17.71	18.36	19.29	19.85	20.57	21.00	21.42	21.85	22.30	22.75	23.16	23.70	23.90	25.61	26.15
3.0	17.48	18.15	19.42	19.74	20.41	21.46	22.09	22.94	23.42	23.91	24.38	24.87	25.42	25.86	26.43	26.62	28.45	29.03
3.5	19.36	20.12	21.39	21.69	22.37	23.54	24.23	25.20	25.73	26.27	26.79	27.32	27.94	28.42	29.02	29.21	31.15	31.76
4.0	21.19	22.03	23.30	23.59	24.28	25.56	26.31	27.39	27.95	28.55	29.11	29.67	30.38	30.89	31.52	31.70	33.76	34.40
4.5	22.99	23.92	25.19	25.46	26.17	27.54	28.35	29.53	30.13	30.78	31.38	31.98	32.76	33.30	33.96	34.13	36.30	36.97
5.0	24.78	25.79	27.06	27.32	28.03	29.50	30.37	31.64	32.28	32.98	33.62	34.25	35.09	35.67	36.35	36.52	38.80	39.50
5.5	26.56	27.65	28.92	29.17	29.89	31.46	32.38	33.74	34.41	35.16	35.83	36.49	37.41	38.01	38.73	38.89	41.28	42.01
6.0	28.34	29.52	30.78	31.02	31.74	33.40	34.38	35.83	36.53	37.32	38.04	38.73	39.71	40.34	41.08	41.24	43.74	44.50
6.5	30.13	31.38	32.65	32.88	33.60	35.35	36.38	37.92	38.65	39.49	40.24	40.96	42.00	42.66	43.43	43.59	46.20	46.99
7.0	31.92	33.26	34.53	34.74	35.46	37.30	38.39	40.01	40.77	41.65	42.44	43.18	44.29	44.97	45.78	45.93	48.65	49.47
8.0	35.54	37.04	38.30	38.49	39.22	41.24	42.42	44.21	45.03	46.00	46.85	47.65	48.87	49.62	50.49	50.62	53.57	54.44
9.0	39.21	40.87	42.14	42.30	43.02	45.22	46.51	48.45	49.33	50.38	51.30	52.16	53.49	54.29	55.22	55.35	58.52	59.45
10.0	42.96	44.77	46.04	46.17	46.89	49.26	50.65	52.75	53.68	54.81	55.80	56.71	58.16	59.01	60.01	60.13	63.52	64.51
11.0	46.75	48.74	50.00	50.11	50.82	53.37	54.86	57.11	58.09	59.31	60.37	61.33	62.89	63.79	64.86	64.96	68.58	69.63
12.0	50.63	52.78	54.05	54.13	54.82	57.55	59.14	61.55	62.57	63.87	65.00	66.01	67.68	68.64	69.77	69.87	73.72	74.82
15.0	62.72	65.38	66.64	66.63	67.28	70.54	72.44	75.29	76.46	78.01	79.34	80.50	82.50	83.60	84.95	85.02	89.58	90.87
20.0	84.43	87.99	89.23	89.07	89.60	93.78	96.21	99.80	101.19	103.15	104.83	106.25	108.79	110.13	111.88	111.89	117.70	119.29
25.0	108.11	112.63	113.85	113.51	113.89	119.02	122.00	126.33	127.95	130.33	132.37	134.04	137.14	138.71	140.89	140.84	147.98	149.90
30.0	133.71	139.26	140.44	139.91	140.09	146.23	149.79	154.88	156.71	159.53	161.94	163.88	167.54	169.33	171.99	171.87	180.43	182.68
35.0	161.18	167.82	168.95	168.22	168.17	175.36	179.53	185.39	187.44	190.70	193.50	195.71	199.96	201.96	205.14	204.94	215.00	217.60
40.0	190.5	198.3	199.3	198.4	198.1	206.4	211.2	217.8	220.1	223.8	227.0	229.5	234.3	236.5	240.3	240.0	251.6	254.6
45.0	221.5	230.5	231.5	230.3	229.7	239.2	244.6	252.1	254.6	258.8	262.4	265.2	270.6	273.0	277.4	277.0	290.3	293.6
50.0	254.3	264.6	265.5	264.0	263.1	273.7	279.9	288.2	290.9	295.6	299.6	302.7	308.8	311.4	316.4	315.9	330.9	334.6
55.0	288.7	300.3	301.1	299.4	298.1	310.0	316.9	326.0	329.0	334.1	338.7	342.0	348.8	351.6	357.2	356.6	373.4	377.6
60.0	324.7	337.8	338.5	336.5	334.8	348.0	355.6	365.6	368.8	374.4	379.5	383.1	390.6	393.5	399.8	399.2	417.8	422.4
65.0	362.4	376.9	377.5	375.2	373.1	387.6	396.0	406.9	410.2	416.5	421.9	425.9	434.1	437.2	444.2	443.5	464.0	469.0
70.0	401.6	417.6	418.0	415.4	412.9	428.8	437.9	449.8	453.4	460.1	466.1	470.4	479.3	482.6	490.4	489.5	512.0	517.5
80.0	484.5	503.6	503.8	500.6	497.1	515.9	526.6	540.3	544.4	552.3	559.3	564.3	574.6	578.3	587.6	586.5	613.2	619.6
90.0	573.2	595.7	595.6	591.7	587.1	609.0	621.4	637.1	641.6	650.6	658.8	664.5	676.3	680.4	691.4	690.0	721.1	728.5
100.0	667.5	693.6	693.2	688.5	682.8	707.9	722.1	739.7	744.7	755.0	764.3	770.7	784.2	788.6	801.3	799.6	835.5	843.8
150.0	1216.	1263.	1261.	1252.	1239.	1282.	1306.	1336.	1342.	1359.	1375.	1386.	1408.	1414.	1437.	1434.	1496.	1510.
200.0	1881.	1952.	1948.	1933.	1911.	1976.	2012.	2053.	2063.	2087.	2111.	2126.	2158.	2166.	2201.	2196.	2273.	2311.
250.0	2641.	2739.	2739.	2718.	2684.	2774.	2821.	2876.	2886.	2920.	2954.	2973.	3015.	3029.	3077.	3069.	3153.	3221.
300.0	3481.	3609.	3619.	3594.	3548.	3659.	3714.	3785.	3795.	3839.	3888.	3907.	3960.	3981.	4045.	4033.	4125.	4224.
350.0	4392.	4552.	4573.	4544.	4484.	4617.	4682.	4770.	4779.	4834.	4897.	4919.	4982.	5011.	5091.	5076.	5176.	5308.
400.0	5364.	5559.	5590.	5559.	5483.	5640.	5715.	5820.	5829.	5895.	5973.	5997.	6072.	6108.	6206.	6187.	6295.	6463.
450.0	6391.	6622.	6664.	6629.	6538.	6719.	6805.	6928.	6936.	7014.	7109.	7135.	7222.	7265.	7381.	7359.	7477.	7681.
500.0	7467.	7736.	7789.	7750.	7642.	7848.	7946.	8088.	8094.	8186.	8297.	8325.	8424.	8476.	8610.	8584.	8712.	8953.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{169}_{69}$TM IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	151.6	120.7	98.4	91.7	92.6	82.4	70.9	67.4	65.1	63.3	59.2	55.5	52.6	50.8	50.1	48.2	43.1	44.8
3.0	149.7	123.7	97.6	93.0	94.1	84.3	72.8	69.4	67.3	65.6	61.5	57.7	54.8	53.1	52.4	50.5	45.7	47.1
3.5	146.5	124.5	97.7	93.2	94.4	85.1	73.7	70.4	68.4	66.9	62.8	59.0	56.2	54.4	53.6	51.9	47.4	48.5
4.0	142.9	124.0	97.1	92.7	94.1	85.2	74.0	70.8	68.9	67.5	63.4	59.7	56.9	55.2	54.6	52.8	48.5	49.4
4.5	139.1	122.7	96.1	91.9	93.3	84.9	73.8	70.8	68.9	67.7	63.6	60.0	57.3	55.6	55.0	53.2	49.2	49.9
5.0	135.2	121.0	94.9	90.8	92.3	84.2	73.4	70.5	68.7	67.6	63.6	60.0	57.3	55.7	55.2	53.4	49.7	50.1
5.5	131.5	119.0	93.6	89.5	91.1	83.4	72.8	70.0	68.3	67.3	63.3	59.8	57.2	55.7	55.1	53.4	49.9	50.2
6.0	127.9	116.9	92.1	88.2	89.8	82.4	72.0	69.4	67.7	66.8	62.9	59.4	56.9	55.4	54.9	53.3	49.9	50.1
6.5	124.4	114.7	90.7	86.8	88.5	81.4	71.2	68.7	67.1	66.3	62.4	59.0	56.6	55.1	54.6	53.0	49.8	49.9
7.0	121.1	112.5	89.2	85.5	87.1	80.3	70.4	67.9	66.4	65.7	61.8	58.5	56.1	54.7	54.3	52.7	49.7	49.7
8.0	115.0	108.2	86.3	82.7	84.4	78.1	68.6	66.3	64.9	64.3	60.5	57.4	55.1	53.8	53.4	51.9	49.2	49.0
9.0	109.5	104.1	83.5	80.1	81.8	76.0	66.8	64.6	63.3	62.8	59.2	56.1	54.0	52.8	52.4	51.0	48.5	48.2
10.0	104.5	100.2	80.8	77.6	79.3	73.9	65.0	63.0	61.8	61.4	57.8	54.9	52.8	51.7	51.3	50.0	47.8	47.3
11.0	100.0	96.6	78.3	75.2	77.0	71.8	63.3	61.4	60.3	59.9	56.5	53.7	51.7	50.6	50.3	49.0	47.0	46.4
12.0	95.9	93.2	76.0	73.0	74.7	69.9	61.7	59.9	58.8	58.5	55.2	52.5	50.6	49.6	49.3	48.0	46.1	45.5
15.0	85.68	84.48	69.78	67.15	68.80	64.72	57.24	55.68	54.79	54.63	51.56	49.10	47.38	46.54	46.30	45.21	43.69	42.97
20.0	73.20	73.36	61.66	59.42	60.98	57.73	51.21	49.93	49.24	49.21	46.49	44.35	42.87	42.21	42.05	41.15	40.02	39.22
25.0	64.29	65.15	55.49	53.52	54.99	52.29	46.49	45.40	44.84	44.88	42.43	40.53	39.22	38.70	38.58	37.81	36.92	36.11
30.0	57.59	58.83	50.62	48.86	50.24	47.95	42.69	41.75	41.27	41.36	39.12	37.41	36.23	35.80	35.72	35.04	34.31	33.53
35.0	52.34	53.81	46.68	45.09	46.39	44.39	39.58	38.74	38.33	38.45	36.38	34.82	33.73	33.38	33.32	32.72	32.11	31.35
40.0	48.10	49.71	43.42	41.95	43.18	41.42	36.97	36.21	35.86	35.99	34.07	32.63	31.63	31.33	31.29	30.75	30.21	29.49
45.0	44.61	46.30	40.66	39.31	40.48	38.89	34.74	34.06	33.74	33.89	32.09	30.75	29.82	29.56	29.53	29.05	28.57	27.89
50.0	41.67	43.41	38.30	37.04	38.15	36.72	32.83	32.20	31.91	32.08	30.37	29.12	28.24	28.02	28.01	27.56	27.14	26.49
55.0	39.16	40.92	36.26	35.07	36.13	34.83	31.15	30.57	30.32	30.48	28.87	27.69	26.87	26.67	26.66	26.26	25.87	25.25
60.0	36.98	38.76	34.46	33.34	34.36	33.16	29.68	29.14	28.90	29.08	27.54	26.43	25.64	25.48	25.47	25.10	24.74	24.15
65.0	35.09	36.86	32.87	31.81	32.79	31.68	28.37	27.86	27.65	27.82	26.36	25.30	24.55	24.41	24.41	24.06	23.72	23.17
70.0	33.41	35.18	31.45	30.45	31.39	30.35	27.19	26.71	26.52	26.70	25.30	24.29	23.57	23.44	23.45	23.12	22.81	22.28
80.0	30.58	32.32	29.03	28.12	28.99	28.08	25.17	24.75	24.58	24.76	23.47	22.54	21.88	21.78	21.79	21.50	21.22	20.74
90.0	28.29	29.89	27.03	26.19	27.00	26.19	23.50	23.11	22.97	23.14	21.94	21.08	20.47	20.39	20.41	20.15	19.89	19.46
100.0	26.38	28.04	25.35	24.57	25.33	24.60	22.08	21.73	21.60	21.78	20.65	19.85	19.28	19.21	19.23	18.99	18.76	18.36
150.0	20.20	21.68	19.77	19.18	19.78	19.28	17.34	17.09	17.01	17.18	16.30	15.69	15.24	15.21	15.24	15.08	14.89	14.62
200.0	16.79	18.30	16.73	16.21	16.61	16.33	14.68	14.41	14.45	14.62	13.86	13.64	13.19	12.91	12.96	12.79	12.92	12.46
250.0	14.78	16.18	14.82	14.35	14.68	14.49	13.03	12.65	12.84	13.00	12.33	12.13	11.73	11.50	11.55	11.35	11.51	11.12
300.0	13.40	14.70	13.48	13.05	13.36	13.19	11.87	11.43	11.71	11.86	11.25	11.07	10.71	10.50	10.55	10.37	10.52	10.17
350.0	12.38	13.61	12.48	12.09	12.38	12.24	11.01	10.61	10.87	11.01	10.45	10.28	9.94	9.76	9.80	9.65	9.78	9.46
400.0	11.60	12.77	11.72	11.36	11.63	11.50	10.35	9.99	10.22	10.36	9.83	9.66	9.35	9.19	9.23	9.08	9.21	8.91
450.0	10.99	12.11	11.12	10.77	11.04	10.92	9.83	9.49	9.71	9.84	9.34	9.18	8.89	8.73	8.78	8.64	8.75	8.47
500.0	10.50	11.58	10.64	10.30	10.56	10.45	9.41	9.09	9.30	9.43	8.95	8.79	8.51	8.37	8.41	8.28	8.39	8.12

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	41.88	39.91	39.94	40.22	39.84	37.54	36.36	34.32	33.57	32.69	32.05	31.52	30.38	29.99	29.66	29.73	28.50	28.17
3.0	44.09	42.06	42.07	42.36	42.03	39.71	38.51	36.48	35.74	34.84	34.19	33.65	32.50	32.07	31.71	31.79	30.43	30.08
3.5	45.52	43.45	43.46	43.75	43.48	41.16	39.95	37.94	37.23	36.33	35.67	35.13	33.98	33.54	33.15	33.23	31.79	31.42
4.0	46.42	44.33	44.34	44.63	44.41	42.11	40.90	38.94	38.25	37.36	36.70	36.16	35.03	34.57	34.16	34.24	32.74	32.36
4.5	46.95	44.87	44.87	45.17	44.99	42.71	41.52	39.60	38.94	38.05	37.40	36.87	35.75	35.29	34.86	34.94	33.40	33.01
5.0	47.23	45.15	45.15	45.45	45.31	43.07	41.89	40.02	39.38	38.51	37.86	37.34	36.25	35.78	35.34	35.42	33.84	33.45
5.5	47.32	45.26	45.26	45.56	45.45	43.25	42.08	40.26	39.65	38.79	38.14	37.63	36.56	36.10	35.65	35.73	34.13	33.73
6.0	47.28	45.23	45.23	45.53	45.45	43.29	42.14	40.37	39.78	38.93	38.30	37.79	36.75	36.29	35.83	35.91	34.30	33.90
6.5	47.13	45.11	45.10	45.41	45.36	43.23	42.10	40.38	39.80	38.98	38.35	37.86	36.83	36.38	35.91	35.99	34.37	33.97
7.0	46.91	44.91	44.91	45.21	45.18	43.10	41.98	40.31	39.75	38.94	38.32	37.84	36.84	36.39	35.92	36.00	34.38	33.98
8.0	46.32	44.37	44.36	44.66	44.68	42.67	41.59	40.00	39.48	38.70	38.10	37.64	36.68	36.25	35.77	35.84	34.23	33.83
9.0	45.60	43.70	43.70	43.99	44.05	42.11	41.06	39.55	39.07	38.32	37.73	37.29	36.37	35.98	35.47	35.55	33.94	33.55
10.0	44.82	42.97	42.97	43.26	43.34	41.47	40.46	39.02	38.56	37.84	37.28	36.85	35.97	35.57	35.08	35.16	33.57	33.19
11.0	44.02	42.21	42.21	42.50	42.61	40.80	39.82	38.44	38.01	37.31	36.77	36.36	35.51	35.13	34.64	34.71	33.15	32.77
12.0	43.20	41.43	41.45	41.73	41.86	40.11	39.15	37.84	37.43	36.76	36.23	35.83	35.02	34.65	34.16	34.23	32.69	32.33
15.0	40.82	39.18	39.20	39.47	39.65	38.05	37.18	36.01	35.66	35.05	34.56	34.20	33.47	33.15	32.67	32.74	31.27	30.93
20.0	37.32	35.85	35.88	36.13	36.35	34.94	34.18	33.19	32.90	32.38	31.95	31.64	31.01	30.74	30.28	30.35	29.00	28.69
25.0	34.40	33.06	33.10	33.34	33.57	32.32	31.63	30.77	30.53	30.07	29.68	29.41	28.85	28.63	28.19	28.26	27.02	26.74
30.0	31.96	30.73	30.78	31.01	31.25	30.10	29.48	28.72	28.51	28.10	27.74	27.50	27.00	26.81	26.40	26.46	25.31	25.05
35.0	29.91	28.77	28.82	29.03	29.28	28.22	27.66	26.97	26.78	26.41	26.08	25.86	25.40	25.24	24.85	24.90	23.83	23.59
40.0	28.15	27.08	27.14	27.34	27.59	26.61	26.08	25.46	25.29	24.94	24.64	24.44	24.02	23.88	23.50	23.56	22.55	22.33
45.0	26.63	25.62	25.68	25.87	26.12	25.21	24.72	24.14	23.99	23.67	23.39	23.20	22.81	22.69	22.33	22.38	21.43	21.22
50.0	25.30	24.35	24.41	24.59	24.84	23.98	23.52	22.98	22.84	22.55	22.28	22.11	21.74	21.63	21.29	21.34	20.44	20.24
55.0	24.12	23.22	23.28	23.46	23.70	22.89	22.45	21.95	21.83	21.55	21.30	21.14	20.79	20.70	20.36	20.41	19.55	19.37
60.0	23.08	22.22	22.28	22.45	22.69	21.92	21.51	21.04	20.92	20.66	20.42	20.27	19.94	19.85	19.53	19.58	18.76	18.59
65.0	22.14	21.32	21.38	21.55	21.78	21.04	20.65	20.21	20.10	19.85	19.63	19.48	19.17	19.10	18.79	18.83	18.05	17.88
70.0	21.30	20.51	20.57	20.73	20.96	20.26	19.89	19.47	19.37	19.13	18.91	18.77	18.48	18.41	18.11	18.16	17.40	17.24
80.0	19.83	19.10	19.16	19.31	19.54	18.89	18.55	18.17	18.08	17.86	17.66	17.54	17.27	17.21	16.93	16.97	16.27	16.13
90.0	18.60	17.92	17.98	18.12	18.34	17.73	17.42	17.07	16.99	16.79	16.61	16.49	16.25	16.19	15.93	15.97	15.32	15.18
100.0	17.56	16.91	16.97	17.11	17.32	16.75	16.46	16.14	16.06	15.88	15.71	15.60	15.37	15.32	15.07	15.11	14.50	14.37
150.0	13.99	13.48	13.53	13.64	13.83	13.39	13.16	12.93	12.88	12.74	12.61	12.53	12.36	12.32	12.13	12.16	11.67	11.57
200.0	11.92	11.51	11.51	11.60	11.77	11.40	11.22	11.03	10.99	10.89	10.77	10.71	10.57	10.53	10.37	10.40	10.26	9.93
250.0	10.64	10.28	10.16	10.24	10.40	10.10	10.00	9.82	9.83	9.72	9.67	9.56	9.45	9.38	9.23	9.26	9.19	8.90
300.0	9.73	9.40	9.30	9.33	9.47	9.25	9.16	9.00	9.00	8.90	8.77	8.76	8.66	8.60	8.46	8.49	8.43	8.17
350.0	9.06	8.75	8.65	8.68	8.81	8.61	8.53	8.38	8.39	8.30	8.18	8.16	8.07	8.02	7.89	7.92	7.86	7.62
400.0	8.533	8.242	8.156	8.184	8.307	8.119	8.038	7.904	7.911	7.824	7.713	7.699	7.619	7.567	7.449	7.473	7.414	7.191
450.0	8.117	7.841	7.762	7.788	7.906	7.728	7.650	7.525	7.532	7.450	7.346	7.332	7.258	7.208	7.096	7.119	7.061	6.853
500.0	7.781	7.516	7.443	7.467	7.581	7.412	7.336	7.217	7.225	7.147	7.048	7.034	6.964	6.917	6.811	6.832	6.775	6.578

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

169
69 TM IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.010	5.750	8.115	8.090	7.940	9.467	10.240	10.765	11.150	11.570	11.830	12.670	13.100	13.650	13.860	14.083	14.504	14.880
3.0	6.570	6.440	8.985	9.004	8.844	10.479	11.415	11.999	12.425	12.879	13.228	14.161	14.671	15.275	15.506	15.793	16.406	16.716
3.5	7.141	7.120	9.849	9.910	9.740	11.476	12.567	13.206	13.669	14.163	14.586	15.608	16.192	16.845	17.096	17.442	18.219	18.483
4.0	7.725	7.800	10.716	10.819	10.636	12.467	13.711	14.401	14.900	15.409	15.925	17.031	17.686	18.385	18.653	19.056	19.980	20.208
4.5	8.324	8.484	11.590	11.734	11.537	13.461	14.855	15.594	16.125	16.658	17.255	18.443	19.165	19.909	20.193	20.649	21.708	21.909
5.0	8.940	9.178	12.475	12.659	12.448	14.460	16.003	16.790	17.353	17.906	18.583	19.852	20.640	21.426	21.726	22.234	23.417	23.597
5.5	9.574	9.881	13.371	13.597	13.370	15.469	17.159	17.992	18.586	19.158	19.915	21.263	22.115	22.942	23.258	23.816	25.114	25.281
6.0	10.226	10.598	14.281	14.547	14.304	16.488	18.326	19.205	19.828	20.418	21.255	22.681	23.596	24.463	24.793	25.400	26.808	26.965
6.5	10.896	11.327	15.206	15.513	15.252	17.519	19.506	20.429	21.081	21.687	22.604	24.108	25.085	25.991	26.335	26.990	28.501	28.654
7.0	11.584	12.071	16.146	16.494	16.215	18.564	20.700	21.667	22.347	22.968	23.965	25.546	26.585	27.530	27.887	28.589	30.199	30.351
8.0	13.02	13.60	18.07	18.50	18.19	20.70	23.13	24.19	24.92	25.57	26.73	28.46	29.62	30.64	31.03	31.82	33.62	33.78
9.0	14.52	15.20	20.06	20.58	20.22	22.89	25.63	26.77	27.56	28.23	29.55	31.44	32.72	33.81	34.22	35.11	37.08	37.26
10.0	16.10	16.85	22.12	22.72	22.32	25.15	28.19	29.42	30.26	30.95	32.44	34.48	35.89	37.05	37.48	38.46	40.59	40.80
11.0	17.76	18.57	24.25	24.93	24.48	27.47	30.83	32.13	33.03	33.74	35.40	37.60	39.12	40.35	40.81	41.87	44.15	44.40
12.0	19.48	20.35	26.44	27.21	26.71	29.85	33.53	34.92	35.86	36.59	38.42	40.78	42.43	43.73	44.20	45.36	47.79	48.08
15.0	25.09	26.07	33.41	34.46	33.79	37.40	42.07	43.71	44.80	45.56	47.93	50.78	52.79	54.29	54.82	56.24	59.08	59.54
20.0	35.80	36.84	46.32	47.87	46.86	51.25	57.71	59.76	61.10	61.88	65.22	68.91	71.57	73.38	74.00	75.85	79.30	80.14
25.0	48.15	49.09	60.79	62.88	61.48	66.65	75.05	77.54	79.10	79.89	84.27	88.87	92.20	94.31	95.00	97.30	101.31	102.62
30.0	62.06	62.76	76.76	79.43	77.58	83.55	94.04	96.97	98.77	99.52	105.03	110.59	114.64	117.03	117.78	120.54	125.07	126.93
35.0	77.48	77.79	94.16	97.45	95.10	101.88	114.62	118.00	120.03	120.73	127.45	134.02	138.83	141.50	142.30	145.51	150.55	153.01
40.0	94.34	94.15	112.94	116.89	114.00	121.61	136.72	140.57	142.84	143.46	151.47	159.11	164.72	167.65	168.49	172.16	177.69	180.82
45.0	112.60	111.77	133.07	137.71	134.22	142.67	160.32	164.65	167.15	167.67	177.04	185.80	192.25	195.43	196.30	200.45	206.47	210.29
50.0	132.21	130.64	154.49	159.87	155.74	165.04	185.35	190.18	192.91	193.31	204.12	214.05	221.39	224.80	225.70	230.33	236.82	241.40
55.0	153.14	150.70	177.18	183.33	178.61	188.69	211.79	217.13	220.09	220.34	232.66	243.82	252.07	255.72	256.63	261.75	268.73	274.08
60.0	175.36	171.93	201.10	208.05	202.50	213.56	239.59	245.45	248.65	248.73	262.64	276.07	284.28	288.15	289.06	294.68	302.14	308.31
65.0	198.8	194.3	226.2	234.0	227.7	239.6	268.7	275.1	278.5	278.5	294.0	307.8	318.0	322.0	323.0	329.1	337.0	344.0
70.0	223.5	217.8	252.5	261.2	254.0	266.9	299.2	306.1	309.8	309.5	326.7	341.9	353.1	357.4	358.3	364.9	373.4	381.2
80.0	276.5	267.9	308.5	319.0	310.1	324.9	363.8	371.9	376.0	375.3	396.2	414.2	427.6	432.2	433.1	440.8	450.2	459.9
90.0	334.0	322.3	368.9	381.3	370.6	387.2	433.4	442.6	447.2	445.9	470.7	491.7	507.5	512.5	513.3	522.0	532.6	544.1
100.0	395.9	380.6	433.5	448.0	435.2	453.9	507.6	518.1	523.1	521.3	550.1	574.4	592.6	598.0	598.7	608.5	620.1	633.6
150.0	766.5	727.3	815.0	841.5	816.9	845.9	943.9	961.2	968.5	962.5	1015.4	1058.1	1090.5	1097.2	1097.1	1112.7	1130.6	1154.3
200.0	1228.6	1154.4	1282.8	1324.1	1285.7	1325.4	1477.1	1502.6	1511.0	1499.2	1581.3	1633.8	1686.1	1703.8	1702.3	1724.5	1739.6	1784.1
250.0	1766.5	1647.2	1821.2	1880.1	1829.2	1878.5	2090.0	2130.5	2133.1	2114.1	2229.9	2292.7	2367.5	2399.5	2395.3	2429.0	2434.7	2504.2
300.0	2368.4	2196.5	2420.6	2498.8	2433.9	2488.9	2770.9	2835.5	2823.5	2796.1	2949.0	3023.5	3123.0	3170.0	3162.6	3209.3	3204.3	3300.7
350.0	3026.2	2795.0	3073.0	3172.4	3092.0	3155.0	3511.0	3604.1	3573.5	3536.7	3729.8	3817.0	3943.2	4006.0	3994.8	4055.2	4038.9	4163.7
400.0	3732.	3437.	3772.	3894.	3797.	3868.	4303.	4426.	4376.	4329.	4565.	4666.	4820.	4899.	4884.	4959.	4931.	5085.
450.0	4481.	4117.	4513.	4659.	4543.	4623.	5142.	5295.	5225.	5166.	5447.	5564.	5748.	5843.	5824.	5914.	5873.	6059.
500.0	5268.	4830.	5290.	5461.	5327.	5415.	6021.	6205.	6114.	6044.	6372.	6505.	6720.	6832.	6808.	6913.	6859.	7078.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.62	16.20	17.49	17.82	18.48	19.41	19.97	20.69	21.12	21.53	21.96	22.41	22.87	23.28	23.82	24.02	25.73	26.28
3.0	17.58	18.26	19.54	19.86	20.54	21.59	22.22	23.07	23.55	24.03	24.51	25.00	25.55	26.00	26.57	26.76	28.60	29.18
3.5	19.47	20.24	21.52	21.82	22.51	23.68	24.38	25.34	25.86	26.40	26.92	27.46	28.09	28.57	29.17	29.36	31.31	31.92
4.0	21.30	22.16	23.44	23.73	24.43	25.71	26.46	27.54	28.10	28.69	29.26	29.83	30.54	31.05	31.68	31.86	33.93	34.57
4.5	23.11	24.05	25.34	25.61	26.32	27.70	28.51	29.69	30.29	30.93	31.54	32.14	32.92	33.47	34.13	34.30	36.48	37.15
5.0	24.91	25.93	27.21	27.48	28.19	29.67	30.54	31.81	32.45	33.14	33.78	34.42	35.27	35.84	36.53	36.70	38.99	39.70
5.5	26.69	27.80	29.08	29.33	30.05	31.63	32.55	33.91	34.58	35.33	36.00	36.67	37.59	38.20	38.91	39.08	41.48	42.21
6.0	28.48	29.67	30.95	31.19	31.91	33.58	34.56	36.01	36.71	37.50	38.21	38.91	39.89	40.53	41.28	41.43	43.95	44.71
6.5	30.27	31.54	32.82	33.05	33.77	35.53	36.56	38.10	38.83	39.67	40.42	41.14	42.19	42.85	43.63	43.78	46.41	47.20
7.0	32.07	33.41	34.70	34.91	35.64	37.49	38.57	40.20	40.96	41.84	42.62	43.37	44.48	45.18	45.98	46.13	48.86	49.69
8.0	35.69	37.20	38.48	38.67	39.40	41.43	42.62	44.40	45.22	46.19	47.04	47.85	49.08	49.83	50.70	50.83	53.79	54.67
9.0	39.37	41.04	42.32	42.48	43.21	45.42	46.70	48.65	49.52	50.58	51.50	52.36	53.70	54.51	55.44	55.57	58.75	59.68
10.0	43.10	44.93	46.22	46.36	47.08	49.46	50.85	52.95	53.88	55.01	56.01	56.92	58.37	59.23	60.23	60.35	63.75	64.75
11.0	46.91	48.90	50.19	50.30	51.01	53.57	55.06	57.32	58.29	59.51	60.57	61.54	63.10	64.01	65.08	65.18	68.82	69.87
12.0	50.78	52.94	54.23	54.31	55.01	57.75	59.34	61.75	62.77	64.07	65.20	66.22	67.90	68.85	69.99	70.09	73.95	75.06
15.0	62.86	65.53	66.81	66.81	67.46	70.73	72.63	75.48	76.65	78.20	79.53	80.70	82.70	83.81	85.16	85.23	89.81	91.09
20.0	84.53	88.10	89.36	89.20	89.74	93.92	96.35	99.94	101.34	103.30	104.97	106.40	108.95	110.29	112.04	112.05	117.88	119.47
25.0	108.14	112.67	113.90	113.57	113.95	119.09	122.08	126.40	128.02	130.40	132.44	134.12	137.22	138.79	140.98	140.93	148.08	150.00
30.0	133.84	139.20	140.39	139.87	140.06	146.20	149.77	154.85	156.68	159.49	161.91	163.85	167.52	169.31	171.97	171.85	180.42	182.67
35.0	160.99	167.64	168.78	168.06	168.02	175.21	179.38	185.23	187.28	190.54	193.34	195.55	199.80	201.80	204.98	204.79	214.84	217.45
40.0	190.1	197.9	199.0	198.1	197.8	206.1	210.9	217.5	219.8	223.5	226.7	229.2	234.0	236.2	240.0	239.7	251.3	254.3
45.0	221.0	230.0	231.0	229.9	229.3	238.7	244.2	251.6	254.1	258.3	261.9	264.7	270.1	272.6	276.9	276.5	289.8	293.1
50.0	253.6	263.9	264.8	263.4	262.5	273.1	279.2	287.5	290.2	294.9	298.9	302.0	308.1	310.7	315.6	315.2	330.2	333.9
55.0	287.8	299.4	300.3	298.6	297.3	309.2	316.0	325.1	328.0	333.2	337.7	341.1	347.9	350.7	356.2	355.7	372.4	376.6
60.0	323.6	336.6	337.4	335.4	333.7	346.9	354.5	364.5	367.6	373.3	378.3	381.9	389.4	392.4	398.6	398.0	416.6	421.1
65.0	361.0	375.5	376.1	373.8	371.8	386.3	394.6	405.5	408.8	415.0	420.5	424.5	432.6	435.8	442.7	442.0	462.5	467.5
70.0	399.9	415.9	416.4	413.8	411.3	427.2	436.3	448.1	451.6	458.4	464.4	468.7	477.5	480.8	488.6	487.7	510.2	515.6
80.0	482.3	501.3	501.6	498.4	494.9	513.7	524.4	538.0	542.0	549.9	556.9	561.9	572.2	575.9	585.2	584.0	610.7	617.0
90.0	570.3	592.7	592.7	588.8	584.3	606.1	618.4	634.0	638.5	647.5	655.7	661.3	673.2	677.2	688.1	686.8	717.8	725.1
100.0	663.9	689.9	689.5	684.8	679.2	704.2	718.3	735.9	740.9	751.1	760.4	766.7	780.2	784.6	797.3	795.6	831.3	839.6
150.0	1208.	1255.	1252.	1243.	1230.	1274.	1298.	1326.	1334.	1350.	1366.	1377.	1399.	1405.	1428.	1424.	1487.	1501.
200.0	1866.	1937.	1933.	1918.	1896.	1961.	1997.	2037.	2047.	2071.	2095.	2110.	2142.	2150.	2185.	2179.	2256.	2294.
250.0	2619.	2716.	2717.	2696.	2662.	2752.	2798.	2852.	2863.	2896.	2930.	2948.	2991.	3004.	3052.	3044.	3128.	3195.
300.0	3451.	3578.	3588.	3563.	3517.	3628.	3682.	3753.	3763.	3806.	3854.	3874.	3926.	3947.	4010.	3999.	4090.	4188.
350.0	4352.	4511.	4531.	4504.	4443.	4576.	4640.	4727.	4736.	4791.	4853.	4875.	4938.	4966.	5045.	5031.	5130.	5261.
400.0	5314.	5507.	5538.	5507.	5432.	5587.	5662.	5766.	5775.	5841.	5919.	5942.	6017.	6052.	6149.	6130.	6238.	6404.
450.0	6330.	6560.	6601.	6566.	6476.	6655.	6740.	6863.	6870.	6948.	7042.	7068.	7154.	7197.	7312.	7290.	7407.	7609.
500.0	7394.	7661.	7714.	7676.	7568.	7772.	7869.	8010.	8017.	8107.	8217.	8245.	8343.	8394.	8528.	8502.	8629.	8868.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{174}_{70}$YB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	154.1	122.0	97.7	92.9	93.8	83.4	71.7	68.2	65.9	64.0	60.0	56.1	53.2	51.4	50.7	48.7	43.6	45.3
3.0	152.3	125.3	99.0	94.3	95.4	85.5	73.8	70.3	68.1	66.5	62.3	58.4	55.5	53.7	53.1	51.1	46.2	47.7
3.5	149.2	126.3	99.2	94.6	95.8	86.3	74.7	71.4	69.3	67.8	63.6	59.8	56.9	55.2	54.5	52.6	48.0	49.1
4.0	145.5	125.9	98.6	94.2	95.5	86.5	75.0	71.9	69.9	68.5	64.3	60.5	57.7	56.0	55.4	53.5	49.2	50.1
4.5	141.7	124.7	97.7	93.3	94.8	86.1	74.9	71.9	70.0	68.7	64.6	60.8	58.1	56.4	55.8	54.0	49.9	50.6
5.0	137.9	123.0	96.5	92.2	93.8	85.5	74.5	71.6	69.8	68.7	64.5	60.9	58.2	56.6	56.0	54.2	50.4	50.9
5.5	134.1	121.1	95.1	91.0	92.6	84.7	73.9	71.1	69.4	68.4	64.3	60.7	58.1	56.5	56.0	54.2	50.6	51.0
6.0	130.4	119.0	93.7	89.7	91.3	83.8	73.2	70.5	68.8	67.9	63.9	60.4	57.8	56.3	55.8	54.1	50.7	50.9
6.5	126.9	116.8	92.2	88.3	90.0	82.8	72.4	69.8	68.2	67.4	63.4	59.9	57.5	56.0	55.5	53.8	50.6	50.7
7.0	123.6	114.6	90.8	87.0	88.6	81.7	71.5	69.0	67.5	66.8	62.8	59.5	57.0	55.6	55.1	53.5	50.5	50.5
8.0	117.4	110.3	87.8	84.2	85.9	79.5	69.8	67.4	66.0	65.4	61.6	58.3	56.0	54.7	54.3	52.7	50.0	49.8
9.0	111.8	106.1	85.0	81.6	83.3	77.3	68.0	65.8	64.5	63.9	60.2	57.1	54.9	53.7	53.3	51.8	49.3	49.0
10.0	106.8	102.2	82.4	79.1	80.8	75.2	66.2	64.1	62.9	62.5	58.9	55.9	53.8	52.6	52.3	50.9	48.6	48.1
11.0	102.2	98.6	79.8	76.7	78.4	73.2	64.5	62.5	61.4	61.0	57.5	54.7	52.6	51.5	51.2	49.9	47.8	47.3
12.0	98.1	95.2	77.5	74.5	76.2	71.2	62.9	61.0	59.9	59.6	56.2	53.4	51.5	50.5	50.2	48.9	47.0	46.4
15.0	87.67	86.32	71.21	68.52	70.20	66.01	58.38	56.78	55.87	55.70	52.57	50.06	48.30	47.44	47.19	46.08	44.53	43.80
20.0	74.96	75.04	62.99	60.69	62.28	58.94	52.28	50.97	50.26	50.23	47.45	45.26	43.75	43.08	42.91	41.98	40.83	40.02
25.0	65.87	66.69	56.72	54.71	56.20	53.43	47.50	46.39	45.80	45.85	43.34	41.40	40.05	39.52	39.40	38.61	37.70	36.87
30.0	59.03	60.25	51.78	49.98	51.38	49.02	43.65	42.68	42.19	42.28	39.99	38.24	37.02	36.59	36.50	35.81	35.06	34.26
35.0	53.67	55.13	47.77	46.14	47.47	45.41	40.48	39.63	39.20	39.32	37.21	35.61	34.50	34.13	34.07	33.46	32.83	32.05
40.0	49.34	50.95	44.45	42.95	44.21	42.39	37.83	37.06	36.69	36.83	34.86	33.38	32.36	32.05	32.00	31.46	30.91	30.17
45.0	45.76	47.46	41.64	40.26	41.45	39.82	35.57	34.87	34.54	34.69	32.85	31.47	30.52	30.25	30.22	29.73	29.24	28.54
50.0	42.76	44.51	39.24	37.95	39.08	37.61	33.62	32.97	32.68	32.84	31.10	29.82	28.92	28.69	28.67	28.22	27.78	27.11
55.0	40.19	41.97	37.15	35.94	37.02	35.68	31.91	31.31	31.05	31.22	29.57	28.36	27.51	27.32	27.31	26.89	26.49	25.86
60.0	37.97	39.76	35.32	34.18	35.22	33.98	30.41	29.85	29.61	29.79	28.22	27.07	26.27	26.10	26.09	25.71	25.34	24.74
65.0	36.02	37.82	33.70	32.62	33.61	32.47	29.07	28.55	28.33	28.51	27.01	25.92	25.16	25.01	25.01	24.65	24.31	23.74
70.0	34.31	36.10	32.25	31.22	32.18	31.12	27.88	27.38	27.18	27.36	25.93	24.89	24.16	24.03	24.03	23.69	23.37	22.83
80.0	31.41	33.18	29.78	28.84	29.73	28.80	25.82	25.38	25.20	25.39	24.06	23.11	22.44	22.33	22.34	22.04	21.76	21.27
90.0	29.06	30.79	27.74	26.87	27.70	26.87	24.11	23.71	23.56	23.74	22.51	21.62	21.00	20.91	20.93	20.66	20.40	19.95
100.0	27.10	28.80	26.02	25.21	26.00	25.24	22.66	22.29	22.16	22.34	21.19	20.36	19.78	19.70	19.73	19.48	19.24	18.83
150.0	20.77	22.28	20.31	19.70	20.32	19.61	17.81	17.55	17.47	17.64	16.11	15.65	15.62	15.65	15.48	15.29	15.01
200.0	17.26	18.81	17.20	16.65	17.07	16.78	15.08	14.81	14.85	15.02	14.24	14.02	13.55	13.27	13.32	13.14	13.27	12.80
250.0	15.20	16.63	15.23	14.75	15.09	14.89	13.40	13.01	13.20	13.36	12.67	12.47	12.06	11.82	11.87	11.67	11.83	11.43
300.0	13.78	15.11	13.86	13.42	13.74	13.57	12.21	11.75	12.04	12.19	11.56	11.38	11.01	10.80	10.84	10.67	10.81	10.45
350.0	12.73	13.99	12.84	12.44	12.73	12.58	11.33	10.91	11.18	11.32	10.74	10.57	10.22	10.04	10.08	9.92	10.05	9.72
400.0	11.94	13.14	12.06	11.68	11.96	11.83	10.65	10.27	10.52	10.65	10.11	9.94	9.62	9.45	9.49	9.34	9.47	9.16
450.0	11.31	12.46	11.44	11.08	11.35	11.23	10.11	9.76	9.99	10.12	9.61	9.44	9.14	8.98	9.03	8.89	9.00	8.72
500.0	10.80	11.92	10.94	10.60	10.86	10.75	9.68	9.35	9.57	9.70	9.20	9.04	8.76	8.61	8.65	8.52	8.63	8.35

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	42.36	40.37	40.39	40.67	40.28	37.96	36.77	34.71	33.95	33.05	32.41	31.87	30.72	30.32	29.99	30.06	28.82	28.48
3.0	44.63	42.57	42.59	42.88	42.55	40.19	38.98	36.92	36.18	35.26	34.60	34.06	32.89	32.46	32.09	32.17	30.80	30.44
3.5	46.11	44.01	44.02	44.31	44.04	41.69	40.46	38.43	37.71	36.80	36.13	35.58	34.42	33.97	33.57	33.65	32.20	31.82
4.0	47.05	44.94	44.94	45.24	45.01	42.68	41.45	39.46	38.77	37.86	37.19	36.64	35.60	35.04	34.62	34.70	33.18	32.79
4.5	47.62	45.50	45.50	45.80	45.62	43.31	42.10	40.16	39.48	38.58	37.92	37.38	36.25	35.78	35.35	35.43	33.86	33.46
5.0	47.92	45.81	45.81	46.11	45.97	43.70	42.49	40.60	39.95	39.06	38.40	37.87	36.77	36.30	35.85	35.93	34.33	33.93
5.5	48.03	45.94	45.93	46.24	46.13	43.89	42.70	40.86	40.23	39.36	38.71	38.19	37.10	36.64	36.18	36.25	34.63	34.23
6.0	48.01	45.93	45.92	46.23	46.15	43.95	42.78	40.99	40.38	39.53	38.88	38.37	37.31	36.84	36.37	36.45	34.82	34.41
6.5	47.88	45.82	45.81	46.12	46.06	43.91	42.75	41.01	40.42	39.58	38.94	38.44	37.40	36.94	36.47	36.55	34.90	34.50
7.0	47.67	45.63	45.62	45.93	45.90	43.78	42.65	40.95	40.38	39.56	38.93	38.44	37.42	36.97	36.49	36.56	34.92	34.51
8.0	47.09	45.10	45.10	45.40	45.42	43.37	42.27	40.66	40.13	39.34	38.73	38.26	37.28	36.84	36.35	36.43	34.78	34.38
9.0	46.38	44.44	44.44	44.74	44.79	42.82	41.76	40.22	39.73	38.96	38.37	37.92	36.98	36.56	36.07	36.14	34.51	34.11
10.0	45.61	43.72	43.72	44.01	44.10	42.19	41.16	39.70	39.23	38.50	37.92	37.49	36.59	36.18	35.69	35.76	34.15	33.76
11.0	44.80	42.96	42.96	43.26	43.36	41.52	40.52	39.12	38.68	37.97	37.41	37.00	36.13	35.75	35.25	35.32	33.73	33.35
12.0	43.99	42.19	42.20	42.49	42.61	40.83	39.86	38.52	38.10	37.42	36.88	36.48	35.64	35.27	34.78	34.85	33.28	32.90
15.0	41.60	39.93	39.95	40.23	40.40	38.77	37.88	36.69	36.33	35.71	35.21	34.85	34.10	33.77	33.28	33.35	31.86	31.51
20.0	38.07	36.57	36.60	36.86	37.08	35.64	34.86	33.85	33.56	33.03	32.58	32.27	31.62	31.36	30.89	30.95	29.58	29.27
25.0	35.12	33.76	33.80	34.04	34.28	32.99	32.29	31.41	31.17	30.69	30.30	30.02	29.45	29.23	28.78	28.84	27.58	27.29
30.0	32.66	31.40	31.45	31.68	31.92	30.76	30.12	29.34	29.13	28.70	28.34	28.09	27.58	27.39	26.96	27.02	25.85	25.59
35.0	30.57	29.41	29.46	29.68	29.93	28.85	28.27	27.56	27.38	26.99	26.66	26.43	25.96	25.80	25.40	25.45	24.36	24.11
40.0	28.79	27.70	27.76	27.96	28.21	27.21	26.68	26.03	25.86	25.51	25.20	24.99	24.56	24.42	24.03	24.09	23.06	22.83
45.0	27.25	26.22	26.28	26.47	26.72	25.79	25.29	24.70	24.54	24.21	23.92	23.74	23.33	23.21	22.84	22.89	21.92	21.71
50.0	25.89	24.92	24.98	25.17	25.42	24.54	24.07	23.52	23.38	23.07	22.80	22.62	22.25	22.14	21.78	21.84	20.91	20.71
55.0	24.70	23.78	23.84	24.02	24.27	23.43	22.99	22.48	22.35	22.06	21.80	21.64	21.28	21.19	20.84	20.90	20.02	19.83
60.0	23.64	22.76	22.82	22.99	23.24	22.44	22.02	21.54	21.42	21.15	20.91	20.75	20.42	20.33	20.00	20.05	19.21	19.03
65.0	22.68	21.84	21.90	22.07	22.31	21.56	21.16	20.70	20.59	20.34	20.10	19.96	19.64	19.56	19.24	19.29	18.49	18.32
70.0	21.82	21.02	21.08	21.24	21.48	20.75	20.37	19.94	19.84	19.60	19.37	19.23	18.93	18.86	18.55	18.60	17.83	17.67
80.0	20.33	19.58	19.64	19.80	20.02	19.36	19.01	18.62	18.53	18.31	18.10	17.98	17.70	17.64	17.35	17.40	16.68	16.53
90.0	19.08	18.38	18.44	18.58	18.80	18.18	17.86	17.51	17.42	17.22	17.03	16.91	16.66	16.60	16.33	16.38	15.70	15.56
100.0	18.01	17.35	17.41	17.55	17.76	17.18	16.88	16.55	16.48	16.29	16.11	16.00	15.76	15.71	15.46	15.50	14.87	14.74
150.0	14.36	13.84	13.89	14.01	14.20	13.74	13.51	13.28	13.22	13.09	12.95	12.86	12.69	12.65	12.45	12.48	11.98	11.88
200.0	12.25	11.83	11.82	11.92	12.09	11.71	11.52	11.34	11.30	11.18	11.07	11.00	10.85	10.82	10.65	10.69	10.54	10.20
250.0	10.94	10.56	10.44	10.53	10.69	10.38	10.28	10.10	10.10	9.99	9.84	9.82	9.71	9.64	9.48	9.52	9.45	9.15
300.0	10.01	9.66	9.56	9.59	9.73	9.51	9.41	9.25	9.26	9.15	9.02	9.00	8.91	8.84	8.70	8.73	8.67	8.39
350.0	9.31	8.99	8.90	8.93	9.06	8.86	8.77	8.62	8.62	8.53	8.41	8.39	8.30	8.24	8.11	8.14	8.08	7.83
400.0	8.775	8.476	8.388	8.416	8.543	8.350	8.266	8.129	8.136	8.047	7.932	7.917	7.836	7.782	7.660	7.685	7.625	7.395
450.0	8.349	8.085	7.984	8.011	8.132	7.949	7.869	7.740	7.747	7.663	7.555	7.541	7.465	7.414	7.299	7.322	7.263	7.048
500.0	8.004	7.732	7.656	7.682	7.798	7.624	7.547	7.424	7.432	7.352	7.250	7.235	7.164	7.116	7.006	7.028	6.969	6.766

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

174 YB IONS 70

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.110	5.840	8.263	8.230	8.080	9.627	10.410	10.944	11.340	11.770	12.030	12.880	13.310	13.871	14.090	14.320	14.749	15.130
3.0	6.677	6.542	9.137	9.158	8.998	10.656	11.604	12.199	12.636	13.101	13.451	14.397	14.908	15.524	15.764	16.060	16.683	16.998
3.5	7.254	7.233	10.014	10.078	9.907	11.668	12.775	13.425	13.901	14.396	14.832	15.867	16.454	17.120	17.380	17.736	18.527	18.794
4.0	7.845	7.922	10.893	11.000	10.817	12.674	13.936	14.639	15.150	15.671	16.191	17.312	17.971	18.684	18.963	19.375	20.316	20.547
4.5	8.451	8.616	11.779	11.928	11.731	13.682	15.096	15.849	16.394	16.939	17.541	18.745	19.473	20.231	20.526	20.993	22.071	22.274
5.0	9.073	9.318	12.675	12.865	12.654	14.696	16.260	17.061	17.638	18.205	18.888	20.175	20.969	21.771	22.082	22.601	23.805	23.988
5.5	9.713	10.031	13.583	13.815	13.587	15.718	17.433	18.281	18.889	19.474	20.239	21.606	22.465	23.309	23.635	24.206	25.527	25.696
6.0	10.371	10.756	14.505	14.778	14.534	16.750	18.615	19.509	20.148	20.751	21.597	23.043	23.966	24.851	25.192	25.812	27.244	27.404
6.5	11.047	11.494	15.441	15.755	15.493	17.795	19.810	20.750	21.417	22.037	22.964	24.489	25.475	26.400	26.755	27.424	28.961	29.116
7.0	11.742	12.246	16.392	16.748	16.468	18.853	21.019	22.003	22.699	23.334	24.343	25.946	26.995	27.958	28.328	29.045	30.681	30.836
8.0	13.19	13.79	18.34	18.78	18.46	21.01	23.48	24.55	25.31	25.97	27.14	28.90	30.07	31.11	31.51	32.32	34.14	34.31
9.0	14.70	15.40	20.35	20.88	20.52	23.23	26.01	27.17	27.97	28.66	30.00	31.91	33.21	34.32	34.74	35.65	37.65	37.83
10.0	16.30	17.07	22.43	23.05	22.64	25.51	28.60	29.84	30.70	31.41	32.92	34.99	36.41	37.60	38.04	39.03	41.20	41.41
11.0	17.96	18.81	24.58	25.28	24.82	27.86	31.27	32.59	33.50	34.23	35.91	38.14	39.68	40.94	41.40	42.49	44.81	45.06
12.0	19.70	20.60	26.79	27.58	27.08	30.27	34.00	35.41	36.37	37.11	38.97	41.36	43.02	44.35	44.84	46.01	48.48	48.77
15.0	25.34	26.37	33.83	34.90	34.22	37.89	42.62	44.29	45.40	46.18	48.57	51.46	53.49	55.02	55.57	57.01	59.89	60.36
20.0	36.11	37.21	46.85	48.42	47.41	51.86	58.40	60.48	61.84	62.65	66.02	69.76	72.45	74.29	74.92	76.81	80.31	81.16
25.0	48.53	49.54	61.43	63.55	62.14	67.39	75.88	78.40	80.00	80.80	85.23	89.88	93.25	95.40	96.11	98.44	102.51	103.83
30.0	62.50	63.28	77.50	80.21	78.35	84.41	95.01	97.98	99.81	100.58	106.15	111.77	115.87	118.30	119.07	121.86	126.45	128.33
35.0	77.98	78.40	95.02	98.34	95.98	102.86	115.72	119.15	121.22	121.94	128.72	135.37	140.23	142.94	143.76	147.01	152.12	154.61
40.0	94.91	94.83	113.91	117.90	114.99	122.71	137.97	141.87	144.18	144.82	152.90	160.62	166.29	169.26	170.12	173.85	179.45	182.60
45.0	113.24	112.54	134.15	138.84	135.33	143.90	161.70	166.09	168.63	169.17	178.62	187.48	193.99	197.22	198.11	202.32	208.40	212.27
50.0	132.92	131.48	155.68	161.11	156.96	166.39	186.88	191.76	194.54	194.95	205.86	216.89	223.29	226.76	227.68	232.37	238.94	243.56
55.0	153.92	151.62	178.48	184.68	179.84	190.16	213.45	218.85	221.86	222.13	234.56	246.82	254.15	257.85	258.79	263.97	271.03	276.42
60.0	176.20	172.93	202.51	209.52	203.94	215.15	241.39	247.32	250.56	250.67	264.68	277.23	286.52	290.45	291.39	297.07	304.62	310.83
65.0	199.7	195.4	227.7	235.6	229.2	241.4	270.7	277.1	280.6	280.5	296.2	310.1	320.4	324.5	325.5	331.6	339.7	346.7
70.0	224.5	218.9	254.1	262.9	255.7	268.7	301.2	308.2	312.0	311.7	329.1	344.3	355.7	360.0	361.0	367.7	376.2	384.1
80.0	277.6	269.3	310.3	320.9	312.0	326.9	366.2	374.3	378.5	377.8	398.8	417.0	430.5	435.2	436.1	443.9	453.4	463.2
90.0	335.2	323.8	370.9	383.5	372.7	389.5	436.0	445.3	450.0	448.7	473.6	494.9	510.7	515.8	516.6	525.5	536.1	547.7
100.0	397.3	382.2	435.7	450.4	437.6	456.4	510.5	521.1	526.2	524.3	553.4	577.8	596.1	601.6	602.3	612.2	624.0	637.5
150.0	768.6	729.8	818.3	844.9	820.2	849.6	948.0	965.4	972.8	966.9	1020.0	1063.0	1095.5	1102.3	1102.3	1118.0	1136.0	1159.8
200.0	1230.9	1157.6	1287.0	1328.5	1290.0	1333.8	1482.3	1508.1	1516.5	1504.7	1587.2	1639.9	1692.5	1710.3	1708.9	1731.2	1746.5	1791.1
250.0	1769.9	1651.2	1826.3	1885.3	1834.3	1882.1	2096.4	2137.0	2139.7	2120.7	2236.9	2302.2	2375.1	2407.3	2403.1	2437.0	2442.9	2512.6
300.0	2372.4	2201.2	2426.4	2504.9	2439.9	2495.4	2778.2	2843.1	2831.1	2803.7	2957.1	3032.0	3131.7	3179.0	3171.6	3218.5	3213.7	3310.3
350.0	3030.8	2802.9	3079.6	3179.3	3098.7	3162.2	3519.2	3612.6	3582.0	3545.2	3738.8	3826.4	3953.0	4016.0	4004.9	4065.5	4049.3	4174.5
400.0	3737.	3443.	3780.	3902.	3804.	3876.	4312.	4435.	4385.	4338.	4575.	4676.	4831.	4910.	4895.	4970.	4942.	5097.
450.0	4486.	4123.	4521.	4667.	4552.	4632.	5151.	5305.	5235.	5177.	5458.	5575.	5761.	5855.	5836.	5926.	5885.	6071.
500.0	5274.	4838.	5299.	5470.	5335.	5424.	6031.	6216.	6125.	6055.	6384.	6517.	6733.	6845.	6821.	6927.	6873.	7092.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.88	16.47	17.77	18.11	18.77	19.72	20.29	21.02	21.46	21.88	22.32	22.78	23.24	23.66	24.21	24.41	26.15	26.70
3.0	17.88	18.56	19.86	20.19	20.87	21.94	22.58	23.45	23.94	24.43	24.91	25.42	25.97	26.43	27.01	27.20	29.06	29.65
3.5	19.79	20.57	21.87	22.18	22.88	24.07	24.77	25.76	26.29	26.84	27.37	27.91	28.55	29.04	29.65	29.84	31.82	32.44
4.0	21.66	22.53	23.83	24.12	24.83	26.13	26.89	27.99	28.56	29.17	29.74	30.32	31.04	31.56	32.20	32.39	34.48	35.13
4.5	23.50	24.45	25.75	26.03	26.75	28.15	28.98	30.17	30.79	31.44	32.06	32.67	33.46	34.02	34.69	34.86	37.07	37.76
5.0	25.32	26.35	27.65	27.92	28.66	30.15	31.03	32.33	32.98	33.68	34.33	34.98	35.85	36.43	37.13	37.30	39.62	40.34
5.5	27.13	28.25	29.55	29.81	30.54	32.13	33.07	34.46	35.14	35.90	36.59	37.27	38.20	38.82	39.55	39.71	42.15	42.89
6.0	28.94	30.14	31.44	31.69	32.42	34.11	35.11	36.59	37.30	38.11	38.83	39.54	40.54	41.18	41.95	42.10	44.65	45.42
6.5	30.75	32.04	33.34	33.57	34.31	36.10	37.14	38.71	39.46	40.30	41.07	41.80	42.87	43.54	44.33	44.49	47.15	47.95
7.0	32.58	33.94	35.24	35.46	36.20	38.08	39.18	40.83	41.61	42.50	43.30	44.07	45.19	45.89	46.72	46.87	49.64	50.47
8.0	36.25	37.78	39.08	39.27	40.01	42.07	43.28	45.09	45.93	46.91	47.78	48.60	49.85	50.61	51.49	51.63	54.63	55.52
9.0	39.97	41.66	42.96	43.13	43.87	46.11	47.42	49.40	50.29	51.36	52.29	53.17	54.53	55.35	56.30	56.43	59.65	60.60
10.0	43.75	45.61	46.91	47.05	47.78	50.20	51.61	53.75	54.69	55.85	56.86	57.78	59.26	60.13	61.15	61.27	64.72	65.72
11.0	47.60	49.62	50.93	51.04	51.76	54.36	55.87	58.16	59.16	60.40	61.48	62.46	64.05	64.97	66.05	66.16	69.84	70.91
12.0	51.52	53.71	55.01	55.10	55.81	58.58	60.20	62.65	63.69	65.01	66.16	67.19	68.89	69.87	71.02	71.12	75.04	76.16
15.0	63.72	66.43	67.73	67.73	68.39	71.70	73.64	76.53	77.72	79.29	80.64	81.83	83.86	84.99	86.36	86.43	91.07	92.37
20.0	85.60	89.22	90.50	90.34	90.89	95.12	97.59	101.23	102.65	104.64	106.34	107.78	110.37	111.73	113.51	113.52	119.42	121.03
25.0	109.42	114.00	115.26	114.92	115.31	120.52	123.54	127.93	129.57	131.98	134.05	135.75	138.89	140.49	142.70	142.65	149.90	151.84
30.0	135.13	140.74	141.96	141.44	141.63	147.86	151.46	156.61	158.47	161.32	163.76	165.73	169.44	171.26	173.95	173.84	182.50	184.78
35.0	162.68	169.39	170.56	169.83	169.80	177.07	181.29	187.22	189.29	192.59	195.43	197.67	201.97	204.00	207.22	207.03	217.19	219.83
40.0	192.0	199.9	201.0	200.1	199.8	208.1	213.0	219.7	222.0	225.8	229.0	231.5	236.4	238.7	242.4	242.2	253.9	256.9
45.0	223.1	232.2	233.2	232.0	231.6	241.0	246.5	254.0	256.6	260.8	264.5	267.3	272.8	275.2	279.6	279.2	292.6	296.0
50.0	255.9	266.2	267.2	265.8	264.9	275.6	281.8	290.2	292.9	297.6	301.7	304.8	311.0	313.6	318.6	318.2	333.3	337.1
55.0	290.3	302.0	302.9	301.2	299.9	311.9	318.8	328.0	331.0	336.2	340.8	344.2	351.0	353.8	359.5	358.9	375.8	380.0
60.0	326.3	339.4	340.2	338.2	336.5	349.8	357.5	367.6	370.7	376.5	381.5	385.2	392.7	395.7	402.1	401.4	420.2	424.8
65.0	363.9	378.4	379.1	376.8	374.8	389.4	397.8	408.8	412.2	418.4	424.0	428.0	436.2	439.4	446.4	445.7	466.4	471.4
70.0	403.0	419.1	419.6	417.0	414.5	430.5	439.7	451.6	455.2	462.0	468.1	472.4	481.3	484.7	492.5	491.6	514.3	519.8
80.0	485.7	504.9	505.2	501.9	498.5	517.4	528.2	542.0	546.0	554.0	561.0	566.1	576.5	580.2	589.5	588.4	615.3	621.7
90.0	574.1	596.7	596.7	592.7	588.2	610.2	622.7	638.4	642.9	652.0	660.2	665.9	677.9	681.9	693.0	691.6	722.9	730.3
100.0	668.0	694.2	693.8	689.1	683.5	708.7	722.9	740.7	745.7	756.0	765.3	771.8	785.3	789.7	802.5	800.9	836.8	845.2
150.0	1214.	1261.	1258.	1249.	1236.	1280.	1304.	1333.	1340.	1357.	1373.	1384.	1406.	1412.	1435.	1432.	1494.	1508.
200.0	1874.	1945.	1941.	1926.	1904.	1969.	2005.	2045.	2056.	2080.	2104.	2119.	2151.	2159.	2194.	2188.	2265.	2303.
250.0	2628.	2726.	2726.	2705.	2671.	2761.	2807.	2862.	2873.	2906.	2941.	2959.	3001.	3015.	3063.	3055.	3140.	3207.
300.0	3461.	3588.	3599.	3574.	3527.	3639.	3694.	3764.	3774.	3818.	3866.	3886.	3939.	3959.	4023.	4011.	4103.	4201.
350.0	4363.	4523.	4543.	4515.	4455.	4588.	4653.	4740.	4749.	4804.	4867.	4888.	4952.	4980.	5059.	5044.	5144.	5276.
400.0	5327.	5520.	5551.	5520.	5445.	5601.	5676.	5780.	5789.	5855.	5933.	5957.	6031.	6067.	6164.	6145.	6254.	6420.
450.0	6344.	6574.	6615.	6581.	6490.	6670.	6755.	6878.	6886.	6964.	7058.	7084.	7170.	7213.	7329.	7306.	7424.	7626.
500.0	7409.	7676.	7729.	7690.	7583.	7788.	7885.	8027.	8033.	8124.	8234.	8262.	8360.	8412.	8546.	8520.	8648.	8887.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — 175 LU IONS (71)

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	156.6	123.4	99.0	94.1	95.0	84.4	72.6	69.0	66.7	64.8	60.6	56.8	53.8	52.0	51.3	49.3	44.1	45.8
3.0	154.8	126.9	100.4	96.6	96.7	86.6	74.7	71.2	69.0	67.3	63.1	59.2	56.2	54.4	53.7	51.7	46.8	48.2
3.5	151.8	128.0	100.6	96.9	97.2	87.5	75.7	72.4	70.3	68.7	64.5	60.6	57.7	55.9	55.2	53.3	48.6	49.8
4.0	148.2	127.8	100.1	96.6	96.9	87.7	76.1	72.9	70.8	69.5	65.2	61.4	58.5	56.8	56.1	54.2	49.8	50.7
4.5	144.4	126.7	99.2	94.8	96.2	87.4	76.0	72.9	71.0	69.7	65.5	61.7	58.9	57.2	56.6	54.7	50.6	51.3
5.0	140.5	125.0	98.0	93.7	95.2	86.8	75.6	72.7	70.8	69.7	65.5	61.8	59.0	57.4	56.8	55.0	51.1	51.6
5.5	136.7	123.1	96.7	92.5	94.1	86.0	75.1	72.2	70.4	69.4	65.2	61.6	58.9	57.4	56.8	55.0	51.4	51.7
6.0	133.0	121.0	95.3	91.2	92.8	85.1	74.4	71.6	69.9	69.0	64.9	61.3	58.7	57.2	56.6	54.9	51.5	51.7
6.5	129.5	118.9	93.8	89.8	91.5	84.1	73.6	70.9	69.3	68.4	64.4	60.9	58.4	56.9	56.4	54.7	51.4	51.5
7.0	126.1	116.7	92.3	88.5	90.1	83.1	72.7	70.2	68.6	67.8	63.8	60.4	57.9	56.5	56.0	54.4	51.3	51.3
8.0	119.9	112.3	89.4	85.7	87.4	80.9	71.0	68.6	67.1	66.5	62.6	59.3	57.0	55.6	55.2	53.6	50.8	50.6
9.0	114.2	108.2	86.6	83.1	84.8	78.7	69.2	66.9	65.6	65.0	61.3	58.1	55.9	54.6	54.2	52.7	50.2	49.8
10.0	109.1	104.2	83.9	80.5	82.3	76.6	67.4	65.3	64.0	63.6	59.9	56.9	54.7	53.5	53.2	51.7	49.4	49.0
11.0	104.5	100.6	81.3	78.1	79.9	74.5	65.7	63.7	62.5	62.1	58.6	55.6	53.6	52.5	52.1	50.8	48.6	48.1
12.0	100.3	97.1	79.0	75.9	77.6	72.6	64.0	62.1	61.0	60.7	57.3	54.4	52.4	51.4	51.1	49.8	47.8	47.2
15.0	89.67	88.17	72.63	69.89	71.59	67.30	59.51	57.88	56.95	56.77	53.58	51.01	49.22	48.34	48.09	46.95	45.37	44.62
20.0	76.73	76.72	64.31	61.97	63.58	60.15	53.36	52.02	51.29	51.25	48.41	46.18	44.63	43.94	43.77	42.82	41.64	40.81
25.0	67.47	68.23	57.96	55.90	57.42	54.57	48.51	47.37	46.77	46.82	44.25	42.27	40.89	40.34	40.22	39.41	38.48	37.64
30.0	60.48	61.68	52.94	51.10	52.53	50.10	44.61	43.62	43.11	43.20	40.86	39.07	37.83	37.37	37.29	36.58	35.82	34.99
35.0	55.01	56.46	48.87	47.19	48.55	46.43	41.39	40.51	40.08	40.20	38.04	36.40	35.26	34.89	34.82	34.20	33.55	32.76
40.0	50.59	52.19	45.49	43.95	45.24	43.36	38.70	37.91	37.53	37.67	35.65	34.14	33.09	32.77	32.73	32.16	31.60	30.85
45.0	46.93	48.64	42.63	41.21	42.43	40.75	36.40	35.68	35.34	35.50	33.61	32.20	31.22	30.95	30.92	30.41	29.91	29.19
50.0	43.86	45.62	40.18	38.86	40.02	38.50	34.41	33.75	33.45	33.62	31.83	30.51	29.59	29.36	29.34	28.87	28.42	27.74
55.0	41.23	43.03	38.06	36.81	37.92	36.53	32.68	32.06	31.79	31.97	30.28	29.03	28.17	27.96	27.95	27.52	27.11	26.47
60.0	38.96	40.77	36.19	35.02	36.08	34.80	31.15	30.57	30.33	30.51	28.90	27.72	26.90	26.72	26.72	26.32	25.94	25.33
65.0	36.97	38.79	34.54	33.42	34.44	33.26	29.78	29.25	29.02	29.21	27.67	26.55	25.77	25.61	25.61	25.24	24.89	24.31
70.0	35.21	37.03	33.06	32.00	32.99	31.89	28.56	28.06	27.85	28.04	26.57	25.50	24.75	24.61	24.62	24.27	23.94	23.39
80.0	32.25	34.04	30.54	29.57	30.48	29.52	26.46	26.01	25.83	26.02	24.66	23.69	23.00	22.88	22.90	22.59	22.29	21.79
90.0	29.83	31.60	28.45	27.56	28.41	27.55	24.72	24.31	24.15	24.34	23.07	22.17	21.53	21.44	21.46	21.18	20.91	20.45
100.0	27.83	29.56	26.69	25.87	26.67	25.89	23.24	22.86	22.73	22.91	21.73	20.88	20.28	20.21	20.23	19.98	19.73	19.31
150.0	21.34	22.88	20.86	20.23	20.86	20.33	18.29	18.01	17.93	18.11	17.19	16.54	16.07	16.03	16.06	15.89	15.69	15.41
200.0	17.74	19.33	17.67	17.11	17.54	17.24	15.49	15.21	15.26	15.43	14.63	14.40	13.92	13.62	13.68	13.49	13.63	13.15
250.0	15.63	17.09	15.65	15.16	15.51	15.31	13.76	13.36	13.57	13.73	13.02	12.81	12.39	12.14	12.19	11.99	12.16	11.74
300.0	14.17	15.53	14.24	13.80	14.12	13.94	12.55	12.07	12.38	12.53	11.88	11.69	11.31	11.10	11.14	10.96	11.11	10.74
350.0	13.09	14.36	13.20	12.79	13.09	12.94	11.64	11.22	11.49	11.64	11.04	10.86	10.51	10.32	10.36	10.20	10.33	10.00
400.0	12.27	13.51	12.40	12.01	12.30	12.16	10.95	10.56	10.81	10.95	10.39	10.22	9.89	9.71	9.76	9.61	9.73	9.42
450.0	11.63	12.81	11.77	11.40	11.68	11.55	10.40	10.04	10.27	10.41	9.88	9.71	9.40	9.24	9.28	9.14	9.26	8.96
500.0	11.11	12.25	11.26	10.90	11.17	11.05	9.95	9.62	9.84	9.97	9.46	9.30	9.00	8.85	8.90	8.76	8.87	8.59

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	42.82	40.81	40.83	41.11	40.72	38.37	37.17	35.08	34.32	33.41	32.76	32.22	31.05	30.65	30.31	30.39	29.13	28.79
3.0	45.16	43.08	43.09	43.38	43.05	40.67	39.44	37.35	36.60	35.68	35.01	34.45	33.27	32.84	32.47	32.55	31.16	30.80
3.5	46.69	44.57	44.57	44.87	44.59	42.21	40.97	38.91	38.18	37.25	36.58	36.02	34.85	34.39	33.99	34.07	32.59	32.21
4.0	47.67	45.53	45.53	45.83	45.60	43.24	42.00	39.98	39.27	38.35	37.67	37.12	35.96	35.49	35.07	35.15	33.61	33.21
4.5	48.27	46.13	46.12	46.43	46.24	43.90	42.67	40.70	40.02	39.11	38.43	37.89	36.74	36.27	35.83	35.91	34.32	33.92
5.0	48.60	46.47	46.46	46.77	46.62	44.31	43.09	41.17	40.51	39.61	38.94	38.40	37.28	36.80	36.35	36.43	34.81	34.40
5.5	48.74	46.61	46.60	46.91	46.80	44.53	43.32	41.45	40.82	39.93	39.27	38.74	37.64	37.16	36.70	36.77	35.13	34.72
6.0	48.73	46.62	46.61	46.92	46.84	44.61	43.41	41.59	40.98	40.11	39.45	38.93	37.86	37.39	36.91	36.99	35.33	34.91
6.5	48.61	46.52	46.51	46.82	46.77	44.58	43.40	41.63	41.03	40.18	39.53	39.02	37.97	37.50	37.02	37.10	35.43	35.01
7.0	48.41	46.35	46.34	46.64	46.62	44.46	43.31	41.58	41.01	40.17	39.53	39.03	38.00	37.54	37.05	37.13	35.45	35.04
8.0	47.85	45.83	45.83	46.13	46.15	44.07	42.95	41.31	40.77	39.97	39.34	38.87	37.88	37.43	36.93	37.01	35.34	34.93
9.0	47.16	45.19	45.18	45.48	45.54	43.53	42.45	40.88	40.38	39.60	39.00	38.54	37.59	37.16	36.66	36.73	35.07	34.67
10.0	46.39	44.47	44.47	44.76	44.85	42.91	41.86	40.37	39.89	39.15	38.56	38.12	37.21	36.79	36.29	36.36	34.72	34.32
11.0	45.59	43.71	43.71	44.01	44.12	42.24	41.22	39.80	39.35	38.63	38.06	37.64	36.76	36.36	35.86	35.93	34.31	33.92
12.0	44.77	42.94	42.95	43.24	43.37	41.55	40.57	39.20	38.77	38.08	37.53	37.12	36.27	35.89	35.39	35.46	33.86	33.48
15.0	42.38	40.68	40.70	40.98	41.15	39.49	38.58	37.37	37.00	36.37	35.86	35.49	34.73	34.40	33.90	33.97	32.44	32.09
20.0	38.83	37.30	37.33	37.59	37.81	36.35	35.55	34.52	34.22	33.67	33.22	32.90	32.24	31.97	31.49	31.56	30.16	29.84
25.0	35.85	34.46	34.50	34.74	34.98	33.67	32.96	32.06	31.81	31.32	30.92	30.64	30.05	29.82	29.37	29.43	28.14	27.85
30.0	33.36	32.07	32.12	32.35	32.60	31.41	30.76	29.96	29.74	29.31	28.94	28.69	28.16	27.97	27.53	27.59	26.39	26.12
35.0	31.24	30.05	30.11	30.32	30.58	29.48	28.89	28.16	27.97	27.58	27.24	27.01	26.53	26.36	25.95	26.00	24.88	24.63
40.0	29.44	28.32	28.38	28.59	28.84	27.82	27.27	26.61	26.44	26.07	25.76	25.55	25.11	24.98	24.57	24.62	23.57	23.34
45.0	27.67	26.82	26.88	27.08	27.33	26.37	25.86	25.25	25.10	24.76	24.47	24.27	23.86	23.73	23.35	23.41	22.41	22.20
50.0	26.49	25.50	25.56	25.75	26.01	25.11	24.62	24.06	23.92	23.60	23.32	23.14	22.76	22.65	22.28	22.34	21.39	21.19
55.0	25.28	24.34	24.40	24.58	24.83	23.98	23.53	23.00	22.87	22.57	22.31	22.14	21.78	21.68	21.33	21.38	20.48	20.29
60.0	24.20	23.30	23.36	23.54	23.79	22.98	22.55	22.05	21.93	21.65	21.40	21.24	20.90	20.81	20.47	20.52	19.66	19.48
65.0	23.23	22.37	22.43	22.60	22.85	22.07	21.66	21.20	21.09	20.82	20.58	20.43	20.11	20.02	19.70	19.75	18.93	18.75
70.0	22.35	21.53	21.59	21.75	22.00	21.26	20.87	20.43	20.32	20.07	19.84	19.70	19.39	19.31	19.00	19.05	18.26	18.09
80.0	20.83	20.07	20.13	20.28	20.52	19.84	19.48	19.08	18.98	18.76	18.55	18.42	18.13	18.07	17.78	17.82	17.09	16.93
90.0	19.55	18.84	18.90	19.05	19.27	18.64	18.31	17.94	17.86	17.65	17.45	17.33	17.07	17.01	16.74	16.78	16.09	15.95
100.0	18.46	17.79	17.85	17.99	18.21	17.61	17.31	16.97	16.89	16.70	16.51	16.40	16.16	16.11	15.85	15.89	15.24	15.11
150.0	14.74	14.21	14.26	14.37	14.57	14.11	13.87	13.63	13.57	13.43	13.29	13.20	13.02	12.98	12.78	12.81	12.29	12.19
200.0	12.58	12.15	12.14	12.24	12.42	12.03	11.83	11.64	11.60	11.48	11.36	11.29	11.15	11.11	10.94	10.97	10.83	10.47
250.0	11.24	10.85	10.73	10.82	10.98	10.67	10.56	10.37	10.38	10.26	10.11	10.09	9.98	9.90	9.74	9.78	9.70	9.40
300.0	10.28	9.93	9.82	9.85	10.00	9.77	9.67	9.51	9.51	9.41	9.27	9.25	9.15	9.08	8.94	8.97	8.90	8.63
350.0	9.57	9.24	9.15	9.18	9.31	9.10	9.01	8.86	8.86	8.77	8.64	8.62	8.53	8.47	8.34	8.37	8.30	8.05
400.0	9.021	8.714	8.624	8.652	8.783	8.584	8.498	8.356	8.364	8.272	8.154	8.139	8.055	7.999	7.875	7.900	7.838	7.602
450.0	8.584	8.292	8.209	8.236	8.361	8.173	8.090	7.957	7.965	7.879	7.768	7.753	7.675	7.622	7.504	7.528	7.467	7.246
500.0	8.230	7.950	7.873	7.898	8.018	7.840	7.760	7.634	7.642	7.559	7.454	7.440	7.366	7.316	7.204	7.226	7.165	6.957

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

175 LU IONS 71

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.070	5.810	8.204	8.180	8.030	9.568	10.350	10.887	11.280	11.700	11.960	12.800	13.230	13.785	14.000	14.230	14.661	15.040
3.0	6.631	6.508	9.081	9.101	8.942	10.589	11.536	12.133	12.568	13.023	13.372	14.307	14.819	15.428	15.665	15.960	16.584	16.898
3.5	7.202	7.193	9.951	10.014	9.844	11.594	12.698	13.351	13.823	14.308	14.743	15.768	16.354	17.013	17.270	17.625	18.416	18.682
4.0	7.785	7.877	10.822	10.928	10.745	12.592	13.850	14.555	15.063	15.574	16.092	17.202	17.859	18.566	18.840	19.252	20.192	20.422
4.5	8.384	8.565	11.700	11.847	11.651	13.591	15.000	15.755	16.296	16.831	17.431	18.623	19.349	20.101	20.392	20.857	21.933	22.136
5.0	8.998	9.260	12.587	12.775	12.565	14.595	16.154	16.967	17.530	18.086	18.767	20.040	20.832	21.627	21.934	22.462	23.652	23.835
5.5	9.629	9.965	13.486	13.715	13.489	15.608	17.315	18.164	18.769	19.344	20.105	21.459	22.315	23.152	23.474	24.042	25.360	25.529
6.0	10.278	10.682	14.398	14.668	14.425	16.630	18.486	19.381	20.016	20.609	21.450	22.883	23.802	24.679	25.017	25.634	27.061	27.221
6.5	10.945	11.411	15.324	15.635	15.375	17.664	19.669	20.609	21.273	21.882	22.804	24.315	25.297	26.214	26.565	27.231	28.762	28.918
7.0	11.630	12.154	16.264	16.616	16.339	18.711	20.866	21.849	22.542	23.166	24.168	25.757	26.801	27.757	28.122	28.836	30.466	30.621
8.0	13.05	13.68	18.19	18.63	18.31	20.85	23.30	24.37	25.12	25.77	26.94	28.68	29.85	30.88	31.27	32.08	33.89	34.06
9.0	14.55	15.27	20.18	20.70	20.34	23.04	25.80	26.96	27.76	28.43	29.76	31.66	32.95	34.05	34.47	35.37	37.36	37.54
10.0	16.12	16.92	22.23	22.84	22.44	25.29	28.36	29.60	30.46	31.15	32.65	34.71	36.11	37.29	37.73	38.72	40.87	41.08
11.0	17.76	18.63	24.35	25.05	24.60	27.61	30.99	32.32	33.22	33.94	35.60	37.82	39.35	40.59	41.05	42.13	44.44	44.69
12.0	19.47	20.40	26.54	27.32	26.82	29.99	33.69	35.10	36.06	36.79	38.63	41.00	42.65	43.96	44.45	45.61	48.07	48.36
15.0	25.01	26.08	33.48	34.54	33.87	37.51	42.20	43.88	44.97	45.73	48.11	50.96	52.99	54.50	55.04	56.48	59.34	59.80
20.0	36.60	38.75	46.31	47.86	46.86	51.29	57.76	59.83	61.18	61.98	65.31	69.02	71.68	73.51	74.14	76.01	79.48	80.33
25.0	47.80	48.87	60.66	62.75	61.37	66.58	74.98	77.49	79.07	79.87	84.24	88.85	92.19	94.31	95.02	97.33	101.36	102.68
30.0	61.52	62.38	76.48	79.15	77.32	83.33	93.81	96.76	98.58	99.34	104.84	110.40	114.46	116.87	117.63	120.40	124.95	126.81
35.0	76.71	77.23	93.70	96.98	94.66	101.49	114.19	117.59	119.64	120.36	127.05	133.62	138.43	141.12	141.93	145.15	150.21	152.67
40.0	93.32	93.36	112.27	116.21	113.35	121.01	136.07	139.94	142.22	142.86	150.83	158.46	164.07	167.01	167.87	171.55	177.10	180.21
45.0	111.29	110.74	132.16	136.79	133.34	141.84	159.40	163.74	166.26	166.80	176.13	184.87	191.31	194.51	195.39	199.55	205.57	209.39
50.0	130.59	129.33	153.31	158.66	154.58	163.94	184.14	188.97	191.72	192.14	202.89	212.80	220.11	223.55	224.46	229.09	235.60	240.15
55.0	151.18	149.09	175.70	181.81	177.06	187.28	210.24	215.58	218.67	218.85	231.09	242.21	250.43	254.10	255.03	260.15	267.13	272.45
60.0	173.02	169.99	199.29	206.19	200.72	211.83	237.68	243.54	246.75	246.88	260.68	273.06	282.22	286.12	287.06	292.67	300.13	306.26
65.0	196.1	192.0	224.0	231.8	225.6	237.6	266.4	272.8	276.3	276.2	291.6	305.3	315.5	319.6	320.5	326.6	334.6	341.5
70.0	220.4	215.1	249.9	258.5	251.5	264.4	296.4	303.4	307.0	306.8	323.9	339.0	350.1	354.4	355.4	362.0	370.4	378.2
80.0	272.4	264.5	305.1	315.5	306.8	321.5	360.1	368.2	372.3	371.6	392.3	410.2	423.5	428.3	429.1	436.8	446.2	455.8
90.0	328.8	317.9	364.5	376.8	366.3	382.9	428.6	437.9	442.5	441.2	465.8	486.7	502.3	507.3	508.2	516.9	527.3	538.8
100.0	389.6	375.2	428.1	442.4	429.9	448.5	501.7	512.1	517.2	515.4	544.0	568.0	586.1	591.5	592.2	602.0	613.6	626.9
150.0	753.1	715.6	802.9	829.0	804.8	833.8	930.5	947.7	954.9	949.2	1001.3	1043.6	1075.6	1082.3	1082.3	1097.8	1115.5	1138.9
200.0	1205.6	1134.5	1261.8	1302.6	1264.9	1304.4	1453.8	1479.1	1487.5	1476.0	1556.8	1608.7	1660.3	1677.9	1676.5	1698.4	1713.5	1757.3
250.0	1733.0	1617.5	1789.7	1847.6	1797.7	1844.8	2054.9	2094.8	2097.6	2079.0	2192.9	2254.9	2328.6	2360.2	2356.2	2389.4	2395.3	2463.7
300.0	2322.4	2155.8	2377.0	2453.9	2390.3	2445.0	2722.1	2785.8	2774.2	2747.5	2897.8	2971.3	3069.1	3115.6	3108.4	3154.3	3149.8	3244.5
350.0	2965.9	2742.0	3016.1	3113.7	3034.9	3097.5	3447.2	3538.8	3509.0	3473.0	3662.7	3748.7	3872.8	3934.6	3923.8	3983.2	3967.5	4090.2
400.0	3657.	3371.	3701.	3821.	3725.	3796.	4223.	4344.	4295.	4249.	4480.	4580.	4732.	4810.	4795.	4868.	4841.	4993.
450.0	4390.	4036.	4426.	4569.	4456.	4535.	5044.	5194.	5126.	5069.	5345.	5459.	5641.	5734.	5715.	5803.	5763.	5946.
500.0	5160.	4735.	5187.	5355.	5223.	5310.	5905.	6085.	5997.	5928.	6250.	6383.	6592.	6702.	6678.	6782.	6730.	6944.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	15.78	16.36	17.65	17.99	18.65	19.59	20.16	20.89	21.32	21.75	22.18	22.64	23.09	23.51	24.05	24.25	25.98	26.53
3.0	17.77	18.45	19.74	20.06	20.74	21.80	22.44	23.30	23.79	24.28	24.76	25.26	25.81	26.26	26.83	27.02	28.87	29.46
3.5	19.67	20.44	21.73	22.04	22.73	23.91	24.61	25.59	26.13	26.67	27.20	27.74	28.38	28.86	29.46	29.65	31.62	32.24
4.0	21.52	22.38	23.67	23.96	24.67	25.96	26.72	27.81	28.38	28.99	29.55	30.13	30.85	31.36	32.00	32.17	34.26	34.91
4.5	23.34	24.29	25.58	25.86	26.67	27.97	28.79	29.98	30.59	31.24	31.85	32.46	33.25	33.80	34.46	34.63	36.83	37.51
5.0	25.15	26.18	27.47	27.74	28.46	29.95	30.83	32.11	32.76	33.47	34.11	34.75	35.62	36.20	36.89	37.05	39.36	40.07
5.5	26.95	28.06	29.35	29.60	30.33	31.92	32.85	34.23	34.91	35.66	36.35	37.02	37.95	38.56	39.28	39.44	41.86	42.61
6.0	28.74	29.94	31.23	31.47	32.20	33.88	34.87	36.34	37.05	37.85	38.57	39.27	40.27	40.91	41.66	41.81	44.35	45.12
6.5	30.54	31.81	33.10	33.34	34.07	35.84	36.89	38.44	39.18	40.03	40.79	41.52	42.57	43.24	44.02	44.18	46.82	47.62
7.0	32.34	33.70	34.99	35.21	35.94	37.81	38.90	40.54	41.32	42.21	43.00	43.76	44.88	45.58	46.39	46.53	49.29	50.12
8.0	35.98	37.49	38.79	38.98	39.71	41.76	42.96	44.77	45.60	46.57	47.44	48.25	49.49	50.24	51.12	51.25	54.23	55.12
9.0	39.66	41.34	42.63	42.80	43.53	45.76	47.06	49.02	49.91	50.97	51.90	52.77	54.13	54.93	55.87	56.00	59.20	60.15
10.0	43.40	45.24	46.53	46.68	47.40	49.80	51.21	53.33	54.27	55.41	56.42	57.34	58.80	59.66	60.67	60.79	64.21	65.22
11.0	47.21	49.21	50.50	50.62	51.34	53.91	55.42	57.69	58.68	59.91	60.98	61.96	63.54	64.45	65.52	65.63	69.28	70.35
12.0	51.08	53.25	54.54	54.63	55.34	58.09	59.70	62.13	63.16	64.48	65.61	66.64	68.33	69.29	70.43	70.53	74.42	75.54
15.0	63.13	65.81	67.10	67.10	67.76	71.05	72.97	75.84	77.02	78.58	79.92	81.10	83.12	84.23	85.59	85.65	90.26	91.55
20.0	84.72	88.30	89.57	89.42	89.97	94.16	96.61	100.22	101.63	103.60	105.28	106.72	109.27	110.63	112.38	112.39	118.24	119.84
25.0	108.20	112.73	113.98	113.65	114.05	119.20	122.19	126.54	128.17	130.56	132.60	134.29	137.40	138.98	141.17	141.12	148.29	150.22
30.0	133.52	139.07	140.28	139.77	139.98	146.12	149.70	154.79	156.64	159.46	161.88	163.83	167.50	169.29	171.96	171.84	180.42	182.68
35.0	160.64	167.28	168.44	167.73	167.70	174.90	179.07	184.94	186.99	190.25	193.06	195.28	199.53	201.54	204.71	204.53	214.58	217.19
40.0	189.5	197.3	198.4	197.5	197.2	205.5	210.3	216.9	219.2	222.9	226.1	228.6	233.5	235.7	239.4	239.1	250.7	253.7
45.0	220.1	229.1	230.1	228.9	228.4	237.8	243.2	250.7	253.2	257.4	261.0	263.8	269.2	271.6	275.9	275.6	288.8	292.2
50.0	252.3	262.5	263.5	262.1	261.2	271.8	277.9	286.2	288.9	293.6	297.6	300.7	306.8	309.4	314.3	313.9	328.8	332.5
55.0	286.1	297.7	298.5	296.9	295.6	307.5	314.3	323.4	326.3	331.5	336.0	339.4	346.1	348.9	354.5	353.9	370.6	374.8
60.0	321.5	334.4	335.2	333.3	331.7	344.8	352.3	362.3	365.4	371.1	376.1	379.7	387.1	390.1	396.3	395.7	414.2	418.8
65.0	358.4	372.8	373.4	371.2	369.2	383.6	391.9	402.7	406.1	412.3	417.8	421.7	429.8	433.0	439.9	439.2	459.6	464.6
70.0	396.8	412.7	413.2	410.7	408.2	424.0	433.1	444.8	448.4	455.1	461.1	465.4	474.1	477.5	485.2	484.3	506.7	512.1
80.0	478.0	496.9	497.2	494.1	490.7	509.3	519.9	533.5	537.6	545.4	552.4	557.3	567.6	571.2	580.5	579.4	605.8	612.2
90.0	564.8	587.0	587.0	583.2	578.8	600.4	612.7	628.2	632.7	641.6	649.7	655.3	667.1	671.1	682.0	680.6	711.4	718.7
100.0	666.9	682.7	682.4	677.8	672.2	697.0	711.1	728.5	733.5	743.6	752.8	759.2	772.5	776.9	789.5	787.8	823.2	831.5
150.0	1192.	1238.	1236.	1227.	1214.	1257.	1281.	1309.	1317.	1333.	1349.	1359.	1381.	1387.	1410.	1406.	1468.	1482.
200.0	1838.	1908.	1904.	1890.	1868.	1932.	1967.	2007.	2017.	2041.	2064.	2079.	2111.	2119.	2153.	2148.	2223.	2261.
250.0	2577.	2673.	2673.	2653.	2620.	2708.	2753.	2807.	2817.	2850.	2884.	2902.	2943.	2957.	3004.	2996.	3079.	3145.
300.0	3392.	3517.	3527.	3503.	3458.	3567.	3621.	3690.	3700.	3743.	3790.	3809.	3861.	3881.	3944.	3932.	4023.	4119.
350.0	4275.	4432.	4452.	4424.	4365.	4496.	4559.	4645.	4654.	4708.	4769.	4790.	4853.	4880.	4958.	4943.	5042.	5170.
400.0	5218.	5408.	5438.	5407.	5334.	5487.	5560.	5663.	5671.	5736.	5813.	5836.	5909.	5944.	6039.	6021.	6127.	6290.
450.0	6213.	6436.	6479.	6445.	6356.	6532.	6616.	6737.	6744.	6821.	6913.	6938.	7023.	7065.	7178.	7156.	7272.	7470.
500.0	7255.	7516.	7568.	7530.	7425.	7626.	7721.	7860.	7866.	7955.	8063.	8091.	8187.	8238.	8369.	8343.	8469.	8703.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

180
72 HF IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	159.0	124.7	100.2	95.3	96.2	85.4	73.4	69.8	67.4	65.5	61.3	57.4	54.4	52.5	51.8	49.8	44.5	46.3
3.0	157.4	128.5	101.7	96.9	98.0	87.7	75.6	72.1	69.8	68.1	63.8	59.9	56.9	55.0	54.3	52.3	47.3	48.8
3.5	154.4	129.8	102.0	97.3	98.5	88.7	76.7	73.3	71.2	69.6	65.3	61.3	58.4	56.6	55.9	53.9	49.2	50.4
4.0	150.8	129.6	101.6	96.9	98.3	88.9	77.1	73.9	71.8	70.4	66.1	62.2	59.3	57.5	56.9	54.9	50.5	51.4
4.5	147.0	128.6	100.7	96.2	97.6	88.7	77.1	73.9	72.0	70.7	66.4	62.6	59.7	58.0	57.4	55.5	51.3	52.0
5.0	143.1	127.0	99.5	95.1	96.7	88.1	76.7	73.7	71.8	70.7	66.4	62.6	59.9	58.2	57.6	55.8	51.8	52.3
5.5	139.3	125.1	98.2	93.9	95.5	87.3	76.2	73.3	71.5	70.4	66.2	62.5	59.8	58.2	57.6	55.8	52.1	52.4
6.0	135.6	123.1	96.8	92.7	94.3	86.4	75.5	72.7	71.0	70.0	65.9	62.2	59.6	58.0	57.5	55.7	52.2	52.4
6.5	132.1	120.9	95.4	91.3	93.0	85.4	74.7	72.0	70.4	69.5	65.4	61.8	59.3	57.7	57.2	55.5	52.2	52.3
7.0	128.7	118.8	93.9	89.9	91.6	84.4	73.9	71.3	69.7	68.9	64.8	61.4	58.9	57.4	56.9	55.2	52.1	52.0
8.0	122.3	114.4	90.9	87.2	88.9	82.2	72.1	69.7	68.2	67.6	63.6	60.3	57.9	56.5	56.1	54.5	51.6	51.4
9.0	116.6	110.2	88.1	84.5	86.3	80.1	70.3	68.1	66.7	66.1	62.3	59.1	56.8	55.5	55.1	53.6	51.0	50.6
10.0	111.4	106.3	85.4	82.0	83.8	77.9	68.6	66.4	65.1	64.7	61.0	57.8	55.7	54.4	54.1	52.6	50.3	49.8
11.0	106.7	102.6	82.9	79.6	81.4	75.9	66.8	64.8	63.6	63.2	59.6	56.6	54.5	53.4	53.0	51.6	49.5	48.9
12.0	102.5	99.1	80.5	77.3	79.1	73.9	65.2	63.3	62.1	61.8	58.3	55.4	53.4	52.3	52.0	50.7	48.7	48.0
15.0	91.68	90.02	74.06	71.25	72.99	68.59	60.65	58.98	58.03	57.84	54.59	51.97	50.14	49.23	48.98	47.82	46.21	45.44
20.0	78.51	78.41	65.64	63.24	64.89	61.37	54.43	53.06	52.31	52.27	49.37	47.09	45.51	44.81	44.63	43.66	42.46	41.61
25.0	69.07	69.78	59.20	57.09	58.64	55.72	49.53	48.36	47.75	47.79	45.17	43.14	41.74	41.17	41.04	40.22	39.27	38.40
30.0	61.95	63.11	54.11	52.22	53.68	51.19	45.57	44.56	44.04	44.12	41.73	39.90	38.63	38.17	38.07	37.35	36.57	35.73
35.0	56.36	57.80	49.97	48.26	49.64	47.46	42.31	41.41	40.96	41.08	38.87	37.19	36.03	35.64	35.58	34.94	34.27	33.46
40.0	51.84	53.45	46.53	44.96	46.27	44.34	39.57	38.76	38.37	38.51	36.45	34.90	33.82	33.50	33.45	32.87	32.30	31.52
45.0	48.11	49.82	43.63	42.17	43.41	41.69	37.23	36.49	36.15	36.31	34.37	32.93	31.93	31.65	31.61	31.09	30.58	29.85
50.0	44.97	46.74	41.13	39.77	40.96	39.40	35.21	34.53	34.22	34.39	32.57	31.22	30.27	30.03	30.01	29.53	29.07	28.38
55.0	42.28	44.10	38.97	37.69	38.82	37.40	33.45	32.82	32.54	32.71	30.98	29.71	28.82	28.61	28.60	28.16	27.74	27.08
60.0	39.96	41.79	37.06	35.86	36.95	35.63	31.89	31.30	31.05	31.23	29.58	28.38	27.53	27.35	27.34	26.94	26.55	25.92
65.0	37.92	39.76	35.38	34.24	35.28	34.07	30.50	29.96	29.72	29.90	28.33	27.19	26.38	26.22	26.22	25.84	25.48	24.88
70.0	36.13	37.96	33.87	32.79	33.79	32.66	29.26	28.74	28.53	28.71	27.21	26.12	25.35	25.20	25.21	24.85	24.52	23.95
80.0	33.09	34.91	31.30	30.31	31.24	30.25	27.12	26.65	26.47	26.66	25.27	24.27	23.56	23.44	23.45	23.14	22.84	22.32
90.0	30.62	32.41	29.17	28.25	29.13	28.24	25.34	24.91	24.75	24.94	23.65	22.72	22.06	21.97	21.99	21.70	21.43	20.95
100.0	28.57	30.33	27.37	26.52	27.35	26.55	23.83	23.44	23.30	23.49	22.27	21.41	20.79	20.71	20.73	20.48	20.22	19.79
150.0	21.92	23.49	21.41	20.76	21.41	20.87	18.77	18.49	18.40	18.59	17.63	16.97	16.48	16.45	16.48	16.30	16.10	15.81
200.0	18.23	19.85	18.14	17.57	18.01	17.70	15.91	15.62	15.66	15.84	15.02	14.78	14.29	13.99	14.04	13.85	13.99	13.50
250.0	16.06	17.56	16.08	15.58	15.93	15.72	14.14	13.73	13.93	14.10	13.37	13.16	12.73	12.47	12.52	12.31	12.48	12.06
300.0	14.56	15.96	14.63	14.18	14.51	14.33	12.89	12.40	12.72	12.87	12.21	12.01	11.62	11.40	11.45	11.26	11.41	11.03
350.0	13.46	14.78	13.67	13.14	13.46	13.29	11.96	11.53	11.81	11.96	11.35	11.16	10.80	10.60	10.65	10.48	10.62	10.27
400.0	12.62	13.88	12.74	12.34	12.64	12.50	11.25	10.86	11.11	11.26	10.68	10.50	10.16	9.98	10.03	9.87	10.00	9.68
450.0	11.95	13.17	12.09	11.71	12.00	11.87	10.69	10.32	10.56	10.70	10.15	9.98	9.66	9.49	9.54	9.39	9.51	9.21
500.0	11.42	12.59	11.57	11.20	11.48	11.36	10.23	9.89	10.11	10.25	9.73	9.56	9.25	9.10	9.14	9.00	9.12	8.83

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	43.28	41.24	41.26	41.55	41.15	38.77	37.56	36.46	34.68	33.76	33.10	32.55	31.37	30.97	30.63	30.70	29.43	29.09
3.0	45.68	43.57	43.58	43.88	43.54	41.13	39.88	37.77	37.02	36.08	35.41	34.84	33.65	33.21	32.84	32.91	31.51	31.15
3.5	47.27	45.11	45.11	45.42	45.13	42.72	41.46	39.38	38.64	37.70	37.02	36.46	35.27	34.80	34.40	34.48	32.99	32.60
4.0	48.29	46.12	46.11	46.42	46.18	43.79	42.53	40.49	39.77	38.84	38.15	37.59	36.41	35.94	35.51	35.59	34.03	33.63
4.5	48.92	46.75	46.74	47.05	46.86	44.49	43.24	41.24	40.55	39.62	38.94	38.38	37.23	36.74	36.30	36.38	34.77	34.36
5.0	49.28	47.11	47.10	47.41	47.26	44.92	43.68	41.74	41.07	40.15	39.47	38.93	37.79	37.31	36.84	36.92	35.28	34.87
5.5	49.44	47.28	47.26	47.58	47.46	45.16	43.93	42.04	41.39	40.49	39.82	39.28	38.17	37.68	37.21	37.29	35.62	35.20
6.0	49.44	47.30	47.29	47.60	47.52	45.25	44.04	42.20	41.57	40.69	40.02	39.50	38.40	37.92	37.44	37.52	35.83	35.42
6.5	49.34	47.22	47.20	47.52	47.46	45.24	44.04	42.24	41.64	40.77	40.12	39.60	38.53	38.05	37.56	37.64	35.95	35.53
7.0	49.16	47.05	47.04	47.35	47.33	45.14	43.96	42.21	41.63	40.77	40.12	39.62	38.57	38.10	37.61	37.68	35.98	35.57
8.0	48.61	46.56	46.55	46.86	46.88	44.76	43.62	41.96	41.41	40.59	39.96	39.47	38.47	38.01	37.51	37.58	35.89	35.47
9.0	47.93	45.92	45.92	46.22	46.28	44.24	43.13	41.54	41.03	40.24	39.63	39.16	38.20	37.76	37.25	37.32	35.64	35.23
10.0	47.17	45.21	45.21	45.51	45.59	43.62	42.55	41.04	40.55	39.79	39.20	38.75	37.82	37.40	36.89	36.96	35.29	34.89
11.0	46.37	44.46	44.46	44.76	44.87	42.96	41.92	40.47	40.02	39.28	38.70	38.27	37.38	36.97	36.46	36.53	34.88	34.49
12.0	45.56	43.69	43.70	43.99	44.12	42.27	41.27	39.88	39.44	38.74	38.17	37.76	36.90	36.51	35.99	36.07	34.44	34.05
15.0	43.16	41.42	41.44	41.72	41.90	40.21	39.29	38.05	37.67	37.03	36.51	36.14	35.36	35.02	34.51	34.58	33.03	32.66
20.0	39.58	38.02	38.05	38.32	38.54	37.05	36.24	35.18	34.88	34.32	33.86	33.54	32.86	32.58	32.09	32.16	30.73	30.40
25.0	36.58	35.15	35.19	35.44	35.69	34.35	33.62	32.70	32.45	31.95	31.54	31.25	30.65	30.42	29.95	30.02	28.70	28.40
30.0	34.06	32.74	32.79	33.03	33.28	32.06	31.40	30.58	30.36	29.92	29.54	29.28	28.74	28.55	28.10	28.16	26.94	26.66
35.0	31.92	30.70	30.75	30.97	31.24	30.11	29.50	28.77	28.57	28.16	27.82	27.58	27.09	26.92	26.50	26.56	25.41	25.16
40.0	30.08	28.94	29.00	29.21	29.47	28.43	27.86	27.19	27.01	26.64	26.32	26.10	25.65	25.50	25.10	25.16	24.08	23.84
45.0	28.49	27.42	27.48	27.68	27.94	26.96	26.44	25.82	25.66	25.31	25.01	24.81	24.39	24.26	23.87	23.93	22.91	22.69
50.0	27.10	26.08	26.14	26.34	26.60	25.67	25.18	24.60	24.46	24.14	23.85	23.67	23.27	23.16	22.78	22.84	21.87	21.66
55.0	25.86	24.90	24.96	25.15	25.40	24.53	24.07	23.53	23.39	23.09	22.82	22.65	22.28	22.17	21.82	21.87	20.95	20.75
60.0	24.76	23.84	23.91	24.09	24.34	23.51	23.07	22.56	22.44	22.15	21.90	21.73	21.38	21.29	20.95	21.00	20.12	19.93
65.0	23.78	22.90	22.96	23.13	23.38	22.59	22.17	21.70	21.58	21.31	21.07	20.91	20.58	20.49	20.16	20.21	19.37	19.19
70.0	22.89	22.04	22.10	22.27	22.52	21.76	21.36	20.91	20.80	20.55	20.31	20.16	19.85	19.77	19.45	19.50	18.69	18.52
80.0	21.34	20.55	20.61	20.77	21.01	20.31	19.95	19.54	19.44	19.21	18.99	18.86	18.57	18.50	18.20	18.25	17.50	17.34
90.0	20.04	19.30	19.36	19.51	19.75	19.10	18.76	18.38	18.29	18.08	17.88	17.76	17.49	17.43	17.15	17.19	16.49	16.34
100.0	18.92	18.23	18.29	18.44	18.66	18.05	17.73	17.39	17.31	17.11	16.92	16.81	16.56	16.51	16.24	16.28	15.62	15.48
150.0	15.12	14.58	14.63	14.75	14.95	14.47	14.23	13.98	13.92	13.78	13.63	13.54	13.35	13.32	13.11	13.14	12.61	12.50
200.0	12.92	12.47	12.46	12.56	12.75	12.35	12.15	11.95	11.91	11.79	11.66	11.59	11.44	11.41	11.23	11.26	11.11	10.75
250.0	11.54	11.14	11.02	11.11	11.28	10.95	10.84	10.65	10.66	10.54	10.38	10.36	10.24	10.17	10.00	10.04	9.97	9.65
300.0	10.56	10.20	10.09	10.12	10.27	10.04	9.94	9.76	9.77	9.66	9.52	9.50	9.40	9.33	9.18	9.21	9.15	8.86
350.0	9.83	9.50	9.40	9.43	9.57	9.35	9.26	9.10	9.11	9.01	8.88	8.86	8.77	8.71	8.57	8.60	8.53	8.27
400.0	9.271	8.954	8.861	8.891	9.025	8.821	8.732	8.587	8.594	8.500	8.379	8.363	8.277	8.220	8.092	8.118	8.054	7.812
450.0	8.822	8.622	8.436	8.464	8.592	8.399	8.315	8.178	8.186	8.097	7.983	7.968	7.887	7.833	7.712	7.736	7.673	7.447
500.0	8.459	8.171	8.092	8.118	8.241	8.058	7.976	7.846	7.854	7.769	7.662	7.646	7.571	7.520	7.404	7.427	7.364	7.151

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

180 HF IONS 72

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.180	5.910	8.343	8.320	8.170	9.729	10.520	11.062	11.460	11.890	12.160	13.010	13.450	14.015	14.230	14.459	14.893	15.280
3.0	6.748	6.620	9.233	9.255	9.096	10.768	11.726	12.329	12.769	13.235	13.596	14.543	15.066	15.686	15.923	16.219	16.849	17.170
3.5	7.326	7.316	10.115	10.182	10.011	11.787	12.906	13.566	14.044	14.541	14.989	16.026	16.626	17.297	17.554	17.911	18.711	18.983
4.0	7.915	8.009	10.999	11.108	10.925	12.800	14.075	14.788	15.303	15.826	16.358	17.483	18.154	18.874	19.149	19.564	20.516	20.751
4.5	8.520	8.706	11.889	12.040	11.844	13.814	15.242	16.005	16.554	17.101	17.716	18.925	19.666	20.431	20.724	21.193	22.283	22.490
5.0	9.140	9.410	12.788	12.981	12.770	14.831	16.411	17.224	17.805	18.374	19.071	20.362	21.170	21.980	22.289	22.811	24.027	24.215
5.5	9.778	10.124	13.698	13.932	13.706	15.857	17.588	18.448	19.061	19.649	20.428	21.800	22.674	23.526	23.851	24.424	25.759	25.932
6.0	10.432	10.849	14.621	14.897	14.654	16.893	18.774	19.681	20.324	20.930	21.791	23.243	24.181	25.074	25.414	26.038	27.484	27.649
6.5	11.105	11.587	15.557	15.876	15.615	17.940	19.972	20.924	21.597	22.220	23.162	24.694	25.695	26.629	26.983	27.656	29.208	29.368
7.0	11.796	12.338	16.509	16.869	16.590	19.000	21.183	22.180	22.882	23.521	24.544	26.155	27.219	28.192	28.561	29.282	30.934	31.093
8.0	13.23	13.88	18.46	18.90	18.58	21.16	23.65	24.73	25.49	26.16	27.35	29.11	30.30	31.35	31.75	32.56	34.40	34.57
9.0	14.74	15.48	20.47	21.00	20.64	23.38	26.17	27.35	28.16	28.85	30.20	32.13	33.44	34.57	34.99	35.90	37.91	38.10
10.0	16.32	17.15	22.64	23.16	22.76	25.66	28.77	30.02	30.89	31.60	33.13	35.21	36.64	37.84	38.28	39.28	41.47	41.68
11.0	17.97	18.87	24.68	25.39	24.94	28.00	31.43	32.77	33.69	34.42	36.11	38.36	39.91	41.18	41.65	42.74	45.07	45.33
12.0	19.69	20.66	26.89	27.68	27.18	30.40	34.15	35.58	36.55	37.30	39.17	41.57	43.25	44.59	45.08	46.26	48.74	49.04
15.0	25.27	26.38	33.89	34.97	34.29	37.99	42.75	44.42	45.55	46.33	48.74	51.64	53.69	55.23	55.78	57.23	60.13	60.60
20.0	36.92	37.13	46.83	48.40	47.40	51.89	58.44	60.54	61.91	62.72	66.10	69.86	72.56	74.42	75.05	76.95	80.47	81.32
25.0	48.17	49.32	61.29	63.41	62.01	67.30	75.80	78.33	79.94	80.75	85.18	89.85	93.23	95.39	96.11	98.45	102.53	103.86
30.0	61.96	62.90	77.21	79.91	78.07	84.18	94.76	97.74	99.59	100.37	105.94	111.56	115.67	118.12	118.89	121.69	126.30	128.18
35.0	77.21	77.82	94.54	97.86	95.52	102.45	115.28	118.71	120.80	121.53	128.30	134.94	139.81	142.54	143.37	146.62	151.73	154.22
40.0	93.88	94.03	113.22	117.19	114.32	122.09	137.29	141.20	143.52	144.17	152.23	159.94	165.61	168.60	169.47	173.19	178.80	181.95
45.0	111.92	111.49	133.20	137.88	134.41	143.03	160.75	165.14	167.70	168.26	177.67	186.51	193.01	196.26	197.16	201.36	207.45	211.31
50.0	131.28	130.15	154.46	159.87	155.77	165.25	185.62	190.51	193.30	193.74	204.59	214.59	221.97	225.47	226.40	231.07	237.65	242.25
55.0	151.93	149.98	176.95	183.12	178.35	188.71	211.85	217.25	220.28	220.58	232.93	244.15	252.45	256.18	257.13	262.29	269.35	274.73
60.0	173.84	170.96	200.65	207.61	202.12	213.37	239.42	245.35	248.60	248.75	262.67	275.16	284.41	288.37	289.32	294.98	302.53	308.71
65.0	197.0	193.0	225.5	233.3	227.1	239.2	268.3	274.7	278.2	278.2	293.8	307.6	317.8	322.0	322.9	329.1	337.1	344.2
70.0	221.3	216.2	251.5	260.2	253.1	266.2	298.4	305.4	309.2	308.9	326.2	341.4	352.6	357.0	358.0	364.6	373.2	381.0
80.0	273.4	265.7	308.9	317.3	308.6	323.5	362.4	370.5	374.7	374.1	394.9	412.9	426.4	431.1	432.1	439.8	449.3	459.0
90.0	330.0	319.3	366.5	378.9	368.3	385.2	431.1	440.4	445.1	443.9	468.6	489.6	505.4	510.5	511.4	520.1	530.7	542.2
100.0	390.9	376.7	430.2	444.7	432.1	450.9	504.4	515.0	520.1	518.3	547.1	571.3	589.5	595.0	595.7	605.6	617.3	630.7
150.0	755.0	717.9	806.0	832.3	808.0	837.3	934.4	951.7	959.1	953.3	1005.7	1048.2	1080.4	1087.2	1087.3	1102.8	1120.7	1144.2
200.0	1208.1	1137.5	1265.8	1306.7	1268.9	1308.8	1458.8	1484.2	1492.7	1481.2	1562.4	1614.5	1666.4	1684.1	1682.8	1704.8	1720.0	1764.0
250.0	1736.0	1621.2	1794.4	1852.6	1802.6	1850.0	2060.8	2101.0	2103.8	2085.2	2199.5	2261.8	2335.8	2367.6	2363.6	2397.0	2403.0	2471.7
300.0	2325.9	2160.1	2382.4	2459.6	2395.9	2451.0	2728.9	2792.8	2781.3	2754.6	2905.3	2979.2	3077.3	3124.0	3116.8	3163.0	3158.5	3253.5
350.0	2970.0	2746.9	3022.1	3120.0	3041.1	3104.2	3454.7	3546.6	3516.9	3480.9	3671.1	3757.4	3881.9	3944.0	3933.2	3992.8	3977.2	4100.2
400.0	3661.	3376.	3707.	3828.	3734.	3807.	4231.	4352.	4303.	4257.	4490.	4590.	4742.	4820.	4805.	4879.	4851.	5004.
450.0	4395.	4042.	4433.	4577.	4463.	4543.	5053.	5203.	5135.	5078.	5354.	5469.	5652.	5745.	5726.	5814.	5775.	5958.
500.0	5166.	4742.	5194.	5363.	5231.	5319.	5914.	6095.	6007.	5938.	6261.	6392.	6603.	6714.	6690.	6794.	6742.	6956.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.04	16.64	17.95	18.28	18.95	19.91	20.48	21.22	21.66	22.09	22.53	23.00	23.46	23.88	24.43	24.63	26.39	26.95
3.0	18.06	18.76	20.06	20.39	21.08	22.16	22.80	23.67	24.17	24.66	25.15	25.66	26.22	26.68	27.26	27.46	29.34	29.93
3.5	19.99	20.78	22.09	22.40	23.10	24.30	25.01	26.00	26.54	27.10	27.64	28.18	28.83	29.32	29.94	30.12	32.12	32.75
4.0	21.88	22.75	24.06	24.36	25.07	26.38	27.15	28.26	28.84	29.45	30.03	30.61	31.34	31.87	32.51	32.69	34.81	35.47
4.5	23.73	24.69	26.00	26.28	27.01	28.42	29.25	30.46	31.08	31.74	32.36	32.98	33.78	34.34	35.01	35.19	37.42	38.12
5.0	25.56	26.61	27.92	28.19	28.92	30.43	31.32	32.63	33.28	34.00	34.66	35.31	36.18	36.77	37.47	37.64	39.99	40.71
5.5	27.38	28.51	29.83	30.08	30.82	32.43	33.37	34.77	35.46	36.23	36.93	37.61	38.55	39.17	39.90	40.07	42.53	43.28
6.0	29.20	30.42	31.73	31.97	32.71	34.42	35.42	36.91	37.63	38.45	39.18	39.89	40.90	41.55	42.31	42.47	45.05	45.83
6.5	31.02	32.32	33.63	33.87	34.61	36.41	37.46	39.04	39.80	40.65	41.43	42.17	43.24	43.92	44.71	44.87	47.55	48.37
7.0	32.85	34.23	35.54	35.76	36.51	38.40	39.51	41.17	41.96	42.86	43.67	44.44	45.57	46.28	47.11	47.26	50.06	50.90
8.0	36.53	38.08	39.39	39.58	40.33	42.40	43.62	45.45	46.29	47.28	48.16	48.99	50.24	51.01	51.90	52.04	55.06	55.96
9.0	40.26	41.97	43.28	43.45	44.19	46.45	47.76	49.76	50.66	51.74	52.68	53.57	54.94	55.76	56.71	56.84	60.10	61.05
10.0	44.05	45.92	47.23	47.37	48.11	50.54	51.97	54.12	55.07	56.23	57.25	58.19	59.67	60.55	61.57	61.69	65.17	66.19
11.0	47.89	49.93	51.25	51.36	52.09	54.70	56.23	58.53	59.54	60.79	61.87	62.86	64.46	65.39	66.48	66.59	70.30	71.38
12.0	51.81	54.02	55.33	55.42	56.13	58.92	60.55	63.01	64.07	65.40	66.55	67.59	69.31	70.29	71.44	71.55	75.49	76.63
15.0	63.99	66.71	68.02	68.02	68.69	72.02	73.96	76.88	78.07	79.66	81.02	82.21	84.26	85.39	86.76	86.83	91.50	92.82
20.0	85.78	89.41	90.70	90.55	91.11	95.36	97.83	101.49	102.92	104.91	106.62	108.08	110.67	112.04	113.82	113.83	119.76	121.39
25.0	109.46	114.05	115.32	115.00	115.39	120.60	123.64	128.04	129.69	132.11	134.18	135.89	139.04	140.64	142.86	142.81	150.08	152.03
30.0	134.98	140.60	141.83	141.32	141.53	147.74	151.36	156.52	158.38	161.24	163.69	165.66	169.38	171.20	173.90	173.78	182.47	184.76
35.0	162.29	169.00	170.20	169.48	169.46	176.73	180.95	186.88	188.96	192.26	195.11	197.35	201.65	203.68	206.90	206.71	216.89	219.53
40.0	191.4	199.2	200.4	199.4	199.1	207.5	212.4	219.1	221.4	225.1	228.4	230.9	235.8	238.0	241.8	241.5	253.3	256.3
45.0	222.1	231.2	232.3	231.1	230.5	240.0	245.5	253.1	255.6	259.8	263.5	266.3	271.8	274.2	278.6	278.2	291.6	295.0
50.0	254.5	264.9	265.8	264.4	263.5	274.3	280.4	288.8	291.5	296.2	300.3	303.4	309.6	312.2	317.2	316.8	331.8	335.6
55.0	288.5	300.2	301.1	299.4	298.2	310.1	317.0	326.2	329.2	334.4	338.9	342.3	349.1	352.0	357.6	357.0	373.9	378.1
60.0	324.1	337.1	338.0	336.0	334.4	347.6	355.2	365.3	368.5	374.2	379.2	382.9	390.4	393.4	399.7	399.1	417.8	422.4
65.0	361.2	375.7	376.4	374.1	372.1	386.7	395.0	406.0	409.4	415.6	421.1	425.1	433.3	436.5	443.5	442.8	463.4	468.4
70.0	399.8	415.7	416.3	413.8	411.3	427.3	436.4	448.2	451.8	458.6	464.6	469.0	477.8	481.2	489.0	488.1	510.7	516.2
80.0	481.3	500.4	500.7	497.5	494.2	513.0	523.6	537.4	541.4	549.3	556.4	561.4	571.7	575.4	584.7	583.6	610.3	616.7
90.0	568.4	590.8	590.9	587.0	582.6	604.4	616.8	632.4	636.9	646.0	654.1	659.8	671.6	675.7	686.7	685.3	716.4	723.7
100.0	660.9	686.8	686.6	682.0	676.4	701.4	715.5	733.1	738.1	748.3	757.6	764.0	777.5	781.9	794.6	792.9	828.6	837.0
150.0	1198.	1244.	1242.	1233.	1220.	1263.	1287.	1316.	1323.	1340.	1355.	1366.	1388.	1394.	1417.	1413.	1475.	1489.
200.0	1846.	1916.	1912.	1897.	1876.	1940.	1975.	2015.	2025.	2049.	2073.	2087.	2119.	2128.	2162.	2157.	2233.	2270.
250.0	2585.	2681.	2682.	2661.	2628.	2717.	2762.	2816.	2827.	2860.	2894.	2912.	2954.	2967.	3015.	3006.	3090.	3156.
300.0	3402.	3527.	3537.	3513.	3468.	3577.	3631.	3701.	3711.	3754.	3801.	3821.	3873.	3893.	3955.	3944.	4035.	4132.
350.0	4286.	4443.	4463.	4436.	4376.	4507.	4571.	4657.	4666.	4720.	4781.	4803.	4865.	4893.	4971.	4957.	5055.	5184.
400.0	5229.	5420.	5450.	5420.	5346.	5499.	5573.	5676.	5684.	5749.	5826.	5849.	5923.	5958.	6053.	6035.	6142.	6305.
450.0	6225.	6451.	6492.	6458.	6369.	6546.	6630.	6751.	6758.	6835.	6927.	6953.	7038.	7080.	7193.	7172.	7288.	7486.
500.0	7268.	7530.	7582.	7644.	7439.	7640.	7736.	7875.	7881.	7970.	8079.	8107.	8203.	8254.	8385.	8360.	8486.	8720.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{181}_{73}$TA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	161.4	125.9	101.5	96.5	97.3	86.4	74.3	70.5	68.2	66.2	62.0	58.0	54.9	53.1	52.4	50.3	45.0	46.8
3.0	159.9	130.0	103.1	98.1	99.2	88.7	76.6	73.0	70.7	68.9	64.6	60.6	57.5	55.7	54.9	52.9	47.9	49.3
3.5	157.0	131.5	103.4	98.6	99.8	89.8	77.7	74.3	72.1	70.5	66.1	62.1	59.1	57.3	56.6	54.6	49.8	51.0
4.0	153.4	131.4	103.0	98.3	99.7	90.1	78.2	74.8	72.8	71.3	66.9	63.0	60.0	58.2	57.6	55.6	51.1	52.0
4.5	149.6	130.5	102.2	97.6	99.1	89.9	78.2	75.0	73.0	71.7	67.3	63.4	60.5	58.8	58.1	56.2	52.0	52.7
5.0	145.7	129.0	101.0	96.6	98.1	89.4	77.9	74.8	72.9	71.7	67.3	63.5	60.7	59.0	58.4	56.5	52.5	53.0
5.5	141.9	127.2	99.7	96.4	97.0	88.6	77.3	74.4	72.5	71.5	67.2	63.4	60.7	59.0	58.4	56.6	52.8	53.2
6.0	138.2	125.1	98.3	94.1	95.8	87.8	76.7	73.8	72.0	71.1	66.8	63.1	60.5	58.9	58.3	56.5	53.0	53.2
6.5	134.6	123.0	96.9	92.8	94.5	86.8	75.9	73.1	71.5	70.6	66.4	62.8	60.2	58.6	58.1	56.3	53.0	53.0
7.0	131.2	120.8	95.4	91.4	93.1	85.7	75.1	72.4	70.8	70.0	65.9	62.3	59.8	58.3	57.8	56.0	52.9	52.8
8.0	124.8	116.5	92.5	88.7	90.4	83.6	73.3	70.8	69.3	68.7	64.6	61.2	58.8	57.4	56.9	55.3	52.4	52.2
9.0	119.0	112.3	89.6	86.0	87.8	81.4	71.5	69.2	67.8	67.2	63.3	60.0	57.7	56.4	56.0	54.4	51.8	51.5
10.0	113.7	108.3	86.9	83.4	85.3	79.3	69.7	67.6	66.3	65.8	62.0	58.8	56.6	55.3	55.0	53.5	51.1	50.6
11.0	109.0	104.5	84.4	81.0	82.8	77.2	68.0	65.9	64.7	64.3	60.6	57.6	55.4	54.3	53.9	52.5	50.3	49.7
12.0	104.6	101.0	81.9	78.7	80.5	75.2	66.4	64.4	63.2	62.9	59.3	56.4	54.3	53.2	52.9	51.5	49.5	48.9
15.0	93.70	91.88	75.49	72.62	74.39	69.88	61.78	60.07	59.10	58.91	55.60	52.92	51.06	50.13	49.87	48.69	47.04	46.26
20.0	80.30	80.10	66.98	64.52	66.20	62.59	55.51	54.10	53.34	53.29	50.34	48.01	46.39	45.67	45.48	44.50	43.27	42.40
25.0	70.69	71.34	60.45	58.29	59.87	56.87	50.54	49.35	48.72	48.76	46.09	44.01	42.58	42.00	41.87	41.02	40.05	39.17
30.0	63.43	64.55	55.28	53.35	54.84	52.27	46.54	45.49	44.96	45.05	42.60	40.73	39.43	38.96	38.86	38.12	37.32	36.46
35.0	57.72	59.14	51.08	49.32	50.73	48.50	43.23	42.30	41.84	41.97	39.70	37.99	36.80	36.40	36.33	35.68	35.00	34.17
40.0	53.11	54.71	47.58	45.97	47.31	45.33	40.45	39.61	39.21	39.36	37.25	35.66	34.56	34.23	34.18	33.59	33.00	32.21
45.0	49.30	51.01	44.63	43.13	44.40	42.63	38.07	37.31	36.96	37.12	35.14	33.66	32.64	32.35	32.31	31.78	31.25	30.50
50.0	46.09	47.87	42.09	40.70	41.91	40.30	36.02	35.32	35.00	35.17	33.31	31.92	30.96	30.71	30.69	30.20	29.72	29.01
55.0	43.36	45.17	39.88	38.57	39.73	38.26	34.22	33.58	33.29	33.47	31.70	30.39	29.48	29.26	29.25	28.80	28.37	27.69
60.0	40.97	42.82	37.94	36.71	37.82	36.47	32.64	32.03	31.77	31.96	30.27	29.04	28.17	27.98	27.98	27.56	27.16	26.52
65.0	38.89	40.75	36.23	35.06	36.13	34.87	31.22	30.66	30.42	30.61	29.00	27.82	27.00	26.83	26.83	26.44	26.07	25.46
70.0	37.05	38.91	34.69	33.58	34.61	33.44	29.96	29.42	29.21	29.39	27.85	26.73	25.95	25.80	25.80	25.44	25.09	24.51
80.0	33.94	35.79	32.07	31.05	32.01	30.98	27.77	27.30	27.11	27.30	25.88	24.85	24.12	24.00	24.02	23.69	23.38	22.85
90.0	31.42	33.24	29.89	28.96	29.85	28.94	25.96	25.52	25.36	25.55	24.23	23.27	22.60	22.50	22.52	22.23	21.94	21.46
100.0	29.32	31.10	28.06	27.19	28.03	27.21	24.42	24.02	23.88	24.07	22.82	21.93	21.30	21.22	21.24	20.98	20.72	20.27
150.0	22.50	24.11	21.96	21.30	21.96	21.40	19.25	18.96	18.88	19.06	18.09	17.40	16.91	16.87	16.90	16.72	16.51	16.21
200.0	18.72	20.38	18.62	18.03	18.48	18.17	16.33	16.03	16.07	16.26	15.41	15.17	14.67	14.35	14.41	14.21	14.36	13.85
250.0	16.50	18.03	16.51	15.99	16.36	16.14	14.51	14.09	14.31	14.48	13.73	13.51	13.07	12.80	12.86	12.64	12.81	12.38
300.0	14.96	16.39	15.03	14.56	14.90	14.71	13.24	12.74	13.06	13.22	12.54	12.34	11.93	11.70	11.76	11.56	11.72	11.33
350.0	13.83	15.18	13.93	13.50	13.82	13.65	12.29	11.84	12.13	12.28	11.65	11.46	11.09	10.89	10.94	10.76	10.90	10.55
400.0	12.96	14.26	13.09	12.68	12.99	12.84	11.56	11.15	11.41	11.56	10.97	10.79	10.44	10.25	10.30	10.14	10.27	9.94
450.0	12.28	13.53	12.43	12.03	12.33	12.19	10.98	10.60	10.85	10.99	10.43	10.25	9.93	9.75	9.80	9.65	9.77	9.46
500.0	11.74	12.94	11.89	11.51	11.80	11.67	10.51	10.16	10.39	10.53	10.00	9.82	9.51	9.35	9.39	9.25	9.37	9.07

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	43.72	41.66	41.68	41.97	41.57	39.16	37.94	35.80	35.02	34.10	33.44	32.88	31.69	31.28	30.93	31.01	29.73	29.38
3.0	46.19	44.06	44.07	44.36	44.02	41.58	40.32	38.19	37.42	36.48	35.79	35.23	34.02	33.58	33.19	33.27	31.86	31.49
3.5	47.83	45.65	45.65	45.95	45.66	43.22	41.95	39.84	39.09	38.14	37.45	36.88	35.68	35.21	34.80	34.88	33.37	32.98
4.0	48.89	46.69	46.69	47.00	46.76	44.33	43.06	40.99	40.26	39.32	38.62	38.05	36.86	36.38	35.95	36.03	34.45	34.04
4.5	49.56	47.36	47.35	47.66	47.46	45.06	43.79	41.77	41.07	40.13	39.44	38.88	37.70	37.22	36.76	36.84	35.21	34.80
5.0	49.95	47.75	47.73	48.05	47.89	45.52	44.27	42.29	41.61	40.69	40.00	39.44	38.29	37.80	37.33	37.41	35.75	35.33
5.5	50.12	47.93	47.92	48.24	48.12	45.78	44.54	42.62	41.96	41.05	40.36	39.82	38.69	38.20	37.72	37.80	36.11	35.68
6.0	50.15	47.98	47.96	48.28	48.19	45.89	44.67	42.79	42.16	41.26	40.56	40.05	38.94	38.46	37.97	38.04	36.34	35.91
6.5	50.06	47.91	47.89	48.21	48.15	45.89	44.68	42.85	42.24	41.36	40.69	40.17	39.08	38.60	38.10	38.18	36.46	36.04
7.0	49.89	47.76	47.74	48.06	48.03	45.81	44.61	42.83	42.24	41.38	40.71	40.20	39.14	38.66	38.16	38.23	36.51	36.09
8.0	49.37	47.28	47.27	47.58	47.60	45.45	44.29	42.60	42.04	41.21	40.57	40.07	39.05	38.59	38.08	38.16	36.43	36.01
9.0	48.70	46.66	46.65	46.96	47.01	44.94	43.82	42.20	41.68	40.88	40.25	39.78	38.80	38.35	37.83	37.91	36.19	35.78
10.0	47.94	45.95	45.94	46.25	46.34	44.33	43.24	41.70	41.21	40.44	39.83	39.37	38.43	38.00	37.48	37.56	35.86	35.45
11.0	47.15	45.20	45.20	45.51	45.62	43.67	42.62	41.14	40.68	39.93	39.34	38.90	37.99	37.58	37.06	37.13	35.46	35.05
12.0	46.34	44.44	44.44	44.74	44.87	42.99	41.97	40.55	40.11	39.39	38.82	38.39	37.52	37.12	36.60	36.67	35.02	34.62
15.0	43.94	42.17	42.18	42.47	42.65	40.93	39.99	38.72	38.34	37.69	37.16	36.78	35.98	35.64	35.12	35.19	33.61	33.24
20.0	40.34	38.75	38.77	39.04	39.27	37.75	36.92	35.85	35.54	34.87	34.50	34.17	33.48	33.20	32.70	32.76	31.31	30.97
25.0	37.31	35.85	35.89	36.15	36.40	35.03	34.29	33.35	33.08	32.58	32.16	31.87	31.26	31.02	30.54	30.61	29.26	28.96
30.0	34.76	33.42	33.46	33.70	33.96	32.72	32.04	31.21	30.98	30.53	30.14	29.88	29.33	29.13	28.67	28.73	27.48	27.20
35.0	32.59	31.35	31.40	31.63	31.89	30.74	30.12	29.37	29.17	28.75	28.40	28.16	27.66	27.48	27.05	27.11	25.94	25.68
40.0	30.73	29.57	29.62	29.84	30.11	29.04	28.46	27.77	27.59	27.21	26.88	26.66	26.20	26.05	25.63	25.69	24.59	24.35
45.0	29.12	28.02	28.08	28.29	28.55	27.55	27.01	26.38	26.22	25.86	25.55	25.35	24.92	24.79	24.39	24.45	23.41	23.18
50.0	27.70	26.66	26.72	26.92	27.19	26.24	25.74	25.15	25.00	24.67	24.38	24.19	23.79	23.67	23.29	23.34	22.35	22.14
55.0	26.45	25.46	25.52	25.72	25.98	25.08	24.61	24.06	23.92	23.61	23.33	23.16	22.78	22.67	22.31	22.36	21.42	21.21
60.0	25.33	24.39	24.45	24.64	24.90	24.05	23.60	23.08	22.95	22.66	22.40	22.23	21.87	21.77	21.42	21.47	20.57	20.38
65.0	24.33	23.43	23.49	23.67	23.92	23.11	22.68	22.20	22.08	21.80	21.55	21.39	21.05	20.96	20.62	20.68	19.81	19.63
70.0	23.42	22.56	22.62	22.79	23.04	22.27	21.86	21.40	21.29	21.02	20.78	20.63	20.31	20.23	19.90	19.95	19.12	18.94
80.0	21.85	21.04	21.11	21.27	21.51	20.80	20.42	20.00	19.90	19.66	19.44	19.31	19.01	18.94	18.63	18.68	17.91	17.75
90.0	20.52	19.77	19.83	19.98	20.22	19.56	19.21	18.82	18.73	18.52	18.31	18.18	17.91	17.85	17.56	17.60	16.88	16.73
100.0	19.39	18.68	18.74	18.89	19.12	18.49	18.17	17.81	17.73	17.53	17.34	17.22	16.96	16.91	16.64	16.68	16.00	15.86
150.0	15.51	14.95	15.00	15.12	15.33	14.84	14.59	14.33	14.28	14.13	13.97	13.89	13.69	13.65	13.44	13.48	12.93	12.82
200.0	13.26	12.80	12.79	12.89	13.08	12.67	12.46	12.26	12.22	12.10	11.97	11.90	11.74	11.70	11.52	11.56	11.40	11.03
250.0	11.85	11.44	11.31	11.40	11.57	11.24	11.13	10.93	10.94	10.81	10.65	10.63	10.52	10.44	10.27	10.30	10.23	9.90
300.0	10.85	10.48	10.36	10.39	10.55	10.31	10.20	10.03	10.03	9.92	9.77	9.76	9.65	9.58	9.43	9.46	9.39	9.10
350.0	10.10	9.76	9.65	9.68	9.83	9.60	9.51	9.35	9.35	9.25	9.12	9.10	9.00	8.94	8.80	8.83	8.76	8.49
400.0	9.523	9.198	9.102	9.133	9.270	9.061	8.970	8.820	8.828	8.731	8.607	8.591	8.502	8.443	8.311	8.338	8.272	8.024
450.0	9.063	8.755	8.667	8.695	8.827	8.629	8.541	8.401	8.409	8.318	8.201	8.185	8.102	8.047	7.922	7.947	7.883	7.650
500.0	8.691	8.395	8.314	8.341	8.467	8.278	8.194	8.061	8.070	7.982	7.871	7.856	7.778	7.726	7.607	7.630	7.566	7.346

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

181 73 TA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.140	5.870	8.293	8.270	8.120	9.674	10.460	10.996	11.390	11.820	12.090	12.940	13.380	13.939	14.150	14.377	14.808	15.190
3.0	6.703	6.576	9.177	9.199	9.040	10.706	11.658	12.256	12.692	13.157	13.518	14.464	14.987	15.601	15.834	16.127	16.753	17.070
3.5	7.274	7.267	10.053	10.118	9.948	11.719	12.831	13.484	13.958	14.455	14.902	15.938	16.537	17.202	17.455	17.809	18.604	18.873
4.0	7.857	7.955	10.929	11.037	10.855	12.724	13.991	14.697	15.207	15.730	16.261	17.385	18.055	18.768	19.040	19.451	20.396	20.628
4.5	8.454	8.646	11.811	11.961	11.765	13.729	15.148	15.905	16.449	16.996	17.609	18.816	19.555	20.314	20.603	21.069	22.151	22.356
5.0	9.067	9.343	12.701	12.893	12.683	14.738	16.308	17.113	17.690	18.258	18.953	20.242	21.048	21.850	22.156	22.674	23.882	24.067
5.5	9.696	10.050	13.603	13.836	13.610	15.754	17.474	18.326	18.936	19.522	20.298	21.668	22.539	23.383	23.704	24.273	25.599	25.770
6.0	10.342	10.767	14.516	14.791	14.549	16.780	18.649	19.548	20.186	20.792	21.649	23.098	24.033	24.918	25.254	25.873	27.310	27.472
6.5	11.006	11.497	15.443	15.759	15.500	17.817	19.836	20.780	21.448	22.070	23.007	24.535	25.533	26.459	26.809	27.477	29.018	29.176
7.0	11.687	12.239	16.385	16.742	16.465	18.866	21.035	22.023	22.720	23.358	24.376	25.982	27.042	28.008	28.372	29.087	30.728	30.886
8.0	13.10	13.77	18.31	18.75	18.44	21.00	23.47	24.55	25.30	25.97	27.15	28.91	30.10	31.14	31.53	32.34	34.16	34.33
9.0	14.59	15.35	20.30	20.82	20.47	23.20	25.97	27.14	27.94	28.63	29.98	31.90	33.20	34.32	34.73	35.64	37.64	37.82
10.0	16.14	16.99	22.35	22.96	22.56	25.45	28.54	29.78	30.64	31.35	32.87	34.94	36.37	37.56	38.00	38.99	41.15	41.37
11.0	17.77	18.69	24.46	25.16	24.71	27.77	31.16	32.49	33.41	34.14	35.82	38.05	39.60	40.86	41.32	42.40	44.72	44.98
12.0	19.47	20.45	26.64	27.43	26.93	30.14	33.86	35.27	36.24	36.98	38.84	41.23	42.90	44.23	44.71	45.88	48.35	48.65
15.0	24.96	26.09	33.55	34.62	33.95	37.63	42.35	44.01	45.12	45.91	48.30	51.18	53.22	54.74	55.29	56.73	59.60	60.07
20.0	35.43	36.67	46.31	47.87	46.88	51.34	57.83	59.91	61.27	62.08	65.43	69.15	71.83	73.68	74.31	76.19	79.68	80.52
25.0	47.47	48.67	60.55	62.65	61.27	66.54	74.94	77.45	79.04	79.86	84.24	88.86	92.22	94.37	95.07	97.39	101.43	102.75
30.0	61.01	62.03	76.23	78.90	77.09	83.15	93.62	96.57	98.40	99.19	104.68	110.26	114.33	116.76	117.53	120.29	124.86	126.72
35.0	75.99	76.69	93.28	96.56	94.26	101.15	113.81	117.22	119.28	120.02	126.71	133.29	138.10	140.81	141.63	144.85	149.91	152.37
40.0	92.35	92.62	111.65	115.58	112.75	120.46	135.47	139.34	141.64	142.30	150.26	157.89	163.49	166.46	167.33	171.01	176.56	179.67
45.0	110.06	109.76	131.30	135.92	132.51	141.06	158.55	162.89	165.42	165.99	175.29	184.02	190.46	193.68	194.58	198.73	204.76	208.56
50.0	129.05	128.09	152.20	157.53	153.50	162.91	183.00	187.84	190.60	191.05	201.75	211.64	218.94	222.41	223.33	227.95	234.46	238.99
55.0	149.31	147.56	174.30	180.38	175.69	185.97	208.79	214.13	217.12	217.44	229.62	240.71	248.91	252.61	253.55	258.65	265.64	270.93
60.0	170.80	168.15	197.57	204.44	199.04	210.20	236.88	241.73	244.96	245.12	258.85	271.19	280.32	284.25	285.20	290.79	298.25	304.34
65.0	193.5	189.8	222.0	229.7	223.5	235.6	264.2	270.6	274.1	274.1	289.4	303.0	313.1	317.3	318.2	324.3	332.3	339.2
70.0	217.3	212.6	247.5	256.1	249.1	262.1	293.8	300.8	304.4	304.3	321.3	336.2	347.3	351.7	352.6	359.2	367.7	375.4
80.0	268.4	261.1	301.8	312.2	303.6	318.4	356.7	364.7	368.8	368.2	388.7	406.5	419.8	424.5	425.4	433.0	442.5	452.0
90.0	323.9	313.6	360.4	372.6	362.2	378.9	424.1	433.3	437.9	436.8	461.1	481.8	497.3	502.4	503.3	511.9	522.4	533.7
100.0	383.6	370.0	422.9	437.1	424.8	443.4	496.1	506.5	511.5	509.8	538.1	562.0	579.9	585.3	586.1	595.8	607.4	620.6
150.0	740.3	704.3	791.3	817.2	793.4	822.3	917.7	934.8	942.0	936.5	987.9	1029.7	1061.4	1068.2	1068.3	1083.6	1101.2	1124.3
200.0	1184.0	1116.4	1241.8	1282.1	1245.0	1284.4	1431.6	1456.6	1466.0	1453.8	1533.5	1584.8	1635.7	1653.2	1651.9	1673.6	1688.6	1731.8
250.0	1700.8	1589.1	1759.6	1816.7	1767.7	1814.5	2021.3	2060.8	2063.6	2045.5	2157.6	2218.9	2291.5	2322.8	2318.9	2351.8	2367.8	2425.1
300.0	2278.3	2116.8	2335.3	2411.0	2348.6	2403.0	2675.6	2738.3	2727.2	2701.0	2848.9	2921.4	3017.7	3063.6	3056.6	3101.9	3097.7	3190.9
350.0	2908.6	2691.3	2961.6	3057.6	2980.3	3042.5	3386.2	3476.3	3447.3	3412.2	3598.6	3683.4	3805.5	3866.5	3855.9	3914.5	3899.4	4019.9
400.0	3585.	3307.	3632.	3750.	3657.	3727.	4146.	4265.	4217.	4172.	4400.	4498.	4647.	4724.	4709.	4782.	4755.	4905.
450.0	4303.	3959.	4343.	4483.	4372.	4451.	4950.	5098.	5031.	4976.	5246.	5359.	5538.	5630.	5611.	5698.	5659.	5838.
500.0	5057.	4644.	5088.	5253.	5123.	5210.	5793.	5971.	5884.	5817.	6133.	6262.	6469.	6578.	6555.	6656.	6605.	6816.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.94	16.53	17.83	18.17	18.84	19.79	20.36	21.09	21.53	21.95	22.39	22.85	23.31	23.73	24.28	24.48	26.22	26.78
3.0	17.95	18.64	19.94	20.26	20.95	22.03	22.67	23.54	24.03	24.52	25.00	25.50	26.06	26.52	27.10	27.29	29.16	29.75
3.5	19.87	20.65	21.96	22.27	22.97	24.16	24.87	25.85	26.39	26.94	27.47	28.01	28.65	29.14	29.76	29.94	31.93	32.55
4.0	21.74	22.61	23.92	24.21	24.92	26.23	26.99	28.09	28.67	29.27	29.85	30.42	31.15	31.67	32.31	32.49	34.60	35.25
4.5	23.58	24.54	25.84	26.12	26.84	28.25	29.08	30.28	30.89	31.55	32.16	32.78	33.57	34.13	34.80	34.98	37.19	37.88
5.0	25.40	26.44	27.74	28.01	28.74	30.25	31.13	32.43	33.08	33.79	34.44	35.09	35.95	36.54	37.24	37.41	39.74	40.46
5.5	27.21	28.33	29.63	29.89	30.62	32.23	33.17	34.56	35.24	36.00	36.69	37.37	38.30	38.92	39.65	39.82	42.26	43.01
6.0	29.01	30.22	31.52	31.77	32.50	34.20	35.20	36.68	37.40	38.20	38.93	39.63	40.64	41.28	42.04	42.20	44.76	45.53
6.5	30.82	32.10	33.41	33.64	34.38	36.17	37.22	38.79	39.54	40.39	41.15	41.89	42.95	43.63	44.42	44.58	47.24	48.05
7.0	32.63	34.00	35.30	35.52	36.26	38.15	39.25	40.90	41.68	42.58	43.38	44.14	45.27	45.97	46.80	46.95	49.72	50.56
8.0	36.27	37.80	39.11	39.31	40.05	42.11	43.32	45.14	45.98	46.96	47.83	48.65	49.90	50.66	51.54	51.68	54.69	55.58
9.0	39.96	41.66	42.97	43.14	43.87	46.12	47.43	49.41	50.30	51.37	52.31	53.18	54.54	55.36	56.31	56.44	59.67	60.62
10.0	43.71	45.57	46.87	47.02	47.75	50.17	51.59	53.72	54.67	55.82	56.83	57.75	59.23	60.10	61.12	61.24	64.69	65.70
11.0	47.52	49.54	50.85	50.96	51.69	54.28	55.80	58.09	59.09	60.32	61.40	62.38	63.97	64.89	65.97	66.08	69.77	70.83
12.0	51.39	53.58	54.88	54.97	55.69	58.46	60.08	62.52	63.57	64.89	66.03	67.06	68.76	69.73	70.89	70.99	74.90	76.03
15.0	63.42	66.12	67.43	67.43	68.10	71.41	73.34	76.22	77.41	78.98	80.33	81.51	83.54	84.66	86.03	86.10	90.73	92.03
20.0	84.94	88.53	89.82	89.67	90.23	94.45	96.90	100.53	101.94	103.92	105.61	107.05	109.62	110.98	112.74	112.76	118.64	120.25
25.0	108.29	112.83	114.10	113.79	114.19	119.35	122.36	126.72	128.35	130.75	132.80	134.49	137.61	139.20	141.40	141.36	148.55	150.48
30.0	133.44	139.00	140.24	139.73	139.95	146.11	149.68	154.79	156.64	159.46	161.89	163.84	167.52	169.32	172.00	171.89	180.49	182.75
35.0	160.35	166.98	168.17	167.47	167.46	174.66	178.83	184.70	186.76	190.03	192.84	195.06	199.32	201.33	204.51	204.33	214.40	217.01
40.0	189.0	196.7	197.9	196.9	196.7	205.0	209.8	216.4	218.7	222.4	225.6	228.1	233.0	235.2	238.9	238.6	250.2	253.2
45.0	219.2	228.2	229.3	228.1	227.6	237.0	242.4	249.9	252.3	256.5	260.2	262.9	268.4	270.8	275.1	274.8	288.0	291.3
50.0	251.1	261.3	262.3	260.9	260.1	270.6	276.7	285.0	287.7	292.4	296.4	299.5	305.6	308.2	313.1	312.7	327.6	331.3
55.0	284.6	296.1	297.0	295.3	294.1	305.9	312.7	321.8	324.7	329.9	334.4	337.7	344.5	347.3	352.8	352.3	368.9	373.1
60.0	319.5	332.4	333.2	331.3	329.7	342.8	350.3	360.2	363.4	369.0	374.0	377.6	385.0	388.0	394.2	393.6	412.1	416.6
65.0	356.0	370.3	371.0	368.8	366.8	381.2	389.4	400.2	403.6	409.7	415.2	419.2	427.2	430.4	437.3	436.6	456.9	461.9
70.0	393.9	409.6	410.3	407.8	405.4	421.1	430.1	441.8	445.3	452.0	458.0	462.2	471.0	474.3	482.0	481.1	503.4	508.8
80.0	474.0	492.8	493.2	490.0	486.7	505.3	515.8	529.3	533.3	541.1	548.1	553.0	563.2	566.9	576.0	575.0	601.3	607.6
90.0	559.5	581.6	581.7	577.9	573.6	595.1	607.3	622.7	627.1	636.0	644.1	649.7	661.4	665.4	676.2	674.8	705.5	712.7
100.0	650.3	675.9	675.6	671.1	665.7	690.3	704.2	721.6	726.5	736.6	745.7	752.0	765.3	769.6	782.1	780.5	815.7	823.9
150.0	1177.	1222.	1220.	1211.	1199.	1242.	1265.	1293.	1300.	1317.	1332.	1342.	1364.	1370.	1393.	1389.	1450.	1464.
200.0	1812.	1881.	1877.	1863.	1841.	1905.	1939.	1979.	1989.	2012.	2035.	2050.	2081.	2090.	2123.	2118.	2193.	2229.
250.0	2536.	2631.	2632.	2611.	2579.	2666.	2711.	2764.	2774.	2807.	2840.	2858.	2899.	2912.	2959.	2951.	3033.	3098.
300.0	3336.	3459.	3469.	3446.	3401.	3508.	3562.	3630.	3640.	3682.	3729.	3748.	3799.	3819.	3880.	3869.	3958.	4053.
350.0	4202.	4356.	4376.	4349.	4291.	4419.	4482.	4566.	4575.	4628.	4689.	4710.	4771.	4798.	4875.	4860.	4957.	5084.
400.0	5126.	5312.	5342.	5312.	5240.	5391.	5463.	5564.	5572.	5636.	5711.	5734.	5806.	5841.	5934.	5916.	6021.	6181.
450.0	6101.	6322.	6362.	6329.	6241.	6415.	6497.	6616.	6623.	6699.	6789.	6814.	6897.	6939.	7050.	7029.	7143.	7337.
500.0	7121.	7378.	7429.	7392.	7289.	7486.	7580.	7716.	7723.	7810.	7916.	7944.	8038.	8088.	8217.	8192.	8316.	8545.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

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74 W IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	163.8	127.2	102.7	97.6	98.5	87.4	75.1	71.3	68.9	66.9	62.6	58.6	55.5	53.6	52.9	50.8	45.5	47.3
3.0	162.4	131.5	104.4	99.4	100.5	89.8	77.5	73.8	71.5	69.7	65.3	61.2	58.2	56.3	55.5	53.5	48.4	49.9
3.5	159.6	133.1	104.8	99.9	101.2	91.0	78.7	75.2	73.0	71.3	66.9	62.8	59.8	57.9	57.2	55.2	50.4	51.6
4.0	156.1	133.2	104.5	99.7	101.1	91.3	79.2	75.8	73.7	72.2	67.8	63.8	60.8	59.0	58.3	56.3	51.7	52.7
4.5	152.2	132.4	103.6	99.0	100.5	91.2	79.2	76.0	73.9	72.6	68.2	64.2	61.3	59.5	58.9	56.9	52.6	53.4
5.0	148.4	130.9	102.5	98.0	99.6	90.7	78.9	75.8	73.9	72.7	68.3	64.4	61.5	59.8	59.2	57.3	53.2	53.7
5.5	144.5	129.1	101.3	96.8	98.5	89.9	78.4	75.4	73.6	72.5	68.1	64.3	61.5	59.8	59.2	57.4	53.6	53.9
6.0	140.8	127.2	99.9	95.6	97.2	89.1	77.8	74.9	73.1	72.1	67.8	64.0	61.3	59.7	59.1	57.3	53.7	53.9
6.5	137.2	125.0	98.4	94.2	96.0	88.1	77.0	74.2	72.5	71.6	67.4	63.7	61.0	59.5	58.9	57.1	53.7	53.8
7.0	133.7	122.9	97.0	92.9	94.6	87.1	76.2	73.5	71.9	71.0	66.8	63.2	60.6	59.1	58.6	56.9	53.6	53.6
8.0	127.2	118.5	94.0	90.1	91.9	84.9	74.5	72.0	70.4	69.7	65.7	62.2	59.7	58.3	57.8	56.2	53.2	53.0
9.0	121.4	114.3	91.2	87.5	89.3	82.7	72.7	70.3	68.9	68.3	64.3	61.0	58.6	57.3	56.9	55.3	52.6	52.3
10.0	116.1	110.3	88.6	84.9	86.7	80.6	70.9	68.7	67.4	66.9	63.0	59.8	57.5	56.3	55.9	54.4	51.9	51.4
11.0	111.2	106.5	85.9	82.5	84.3	78.5	69.2	67.1	65.8	65.4	61.7	58.5	56.4	55.2	54.8	53.4	51.1	50.6
12.0	106.8	103.0	83.4	80.2	82.0	76.6	67.5	65.5	64.3	64.0	60.3	57.3	55.2	54.1	53.8	52.4	50.3	49.7
15.0	95.73	93.74	76.92	73.99	75.79	71.16	62.92	61.17	60.18	59.98	56.60	53.87	51.97	51.02	50.75	49.55	47.87	47.08
20.0	82.10	81.81	68.31	65.80	67.51	63.80	56.58	55.15	54.36	54.31	51.30	48.92	47.27	46.53	46.34	45.34	44.08	43.20
25.0	72.32	72.90	61.70	59.49	61.10	58.02	51.56	50.34	49.70	49.73	47.00	44.89	43.42	42.83	42.69	41.83	40.84	39.94
30.0	64.91	66.01	56.46	54.48	56.00	53.36	47.50	46.44	45.89	45.98	43.48	41.57	40.24	39.75	39.65	38.90	38.08	37.20
35.0	59.10	60.50	52.19	50.39	51.83	49.53	44.15	43.20	42.73	42.85	40.54	38.79	37.57	37.16	37.09	36.42	35.73	34.88
40.0	54.39	55.98	48.64	46.99	48.35	46.32	41.33	40.47	40.06	40.21	38.05	36.43	35.30	34.96	34.91	34.30	33.70	32.89
45.0	50.50	52.21	45.63	44.10	45.40	43.58	38.91	38.14	37.77	37.93	35.91	34.40	33.35	33.05	33.02	32.47	31.93	31.16
50.0	47.22	49.01	43.05	41.62	42.86	41.21	36.83	36.11	35.79	35.96	34.05	32.63	31.64	31.39	31.36	30.86	30.38	29.65
55.0	44.42	46.26	40.80	39.46	40.65	39.14	35.00	34.34	34.04	34.22	32.41	31.08	30.15	29.92	29.91	29.44	29.00	28.31
60.0	41.99	43.85	38.83	37.57	38.70	37.31	33.39	32.77	32.50	32.69	30.96	29.70	28.81	28.62	28.61	28.18	27.77	27.12
65.0	39.86	41.74	37.08	35.88	36.97	35.69	31.95	31.37	31.12	31.31	29.67	28.47	27.62	27.45	27.45	27.05	26.67	26.04
70.0	37.98	39.87	35.52	34.38	35.43	34.23	30.66	30.11	29.89	30.08	28.50	27.36	26.55	26.39	26.40	26.03	25.67	25.07
80.0	34.81	36.68	32.84	31.80	32.78	31.72	28.44	27.95	27.75	27.95	26.49	25.44	24.69	24.57	24.58	24.25	23.93	23.39
90.0	32.22	34.07	30.62	29.66	30.58	29.64	26.58	26.14	25.97	26.17	24.81	23.83	23.14	23.04	23.06	22.76	22.47	21.97
100.0	30.07	31.89	28.75	27.86	28.72	27.87	25.02	24.61	24.46	24.66	23.38	22.47	21.82	21.73	21.76	21.49	21.22	20.76
150.0	23.09	24.73	22.53	21.85	22.52	21.95	19.74	19.44	19.35	19.55	18.54	17.84	17.33	17.30	17.33	17.14	16.93	16.62
200.0	19.22	20.91	19.11	18.50	18.97	18.64	16.75	16.44	16.49	16.68	15.81	15.56	15.04	14.72	14.78	14.58	14.73	14.21
250.0	16.94	18.51	16.95	16.42	16.79	16.57	14.90	14.46	14.68	14.86	14.09	13.86	13.41	13.14	13.19	12.97	13.15	12.70
300.0	15.36	16.83	15.43	14.95	15.30	15.10	13.59	13.08	13.40	13.57	12.87	12.66	12.25	12.01	12.07	11.87	12.03	11.63
350.0	14.20	15.59	14.31	13.86	14.19	14.02	12.62	12.16	12.45	12.61	11.97	11.77	11.39	11.18	11.23	11.05	11.20	10.83
400.0	13.32	14.64	13.45	13.02	13.34	13.18	11.87	11.45	11.72	11.87	11.27	11.08	10.72	10.53	10.58	10.41	10.55	10.21
450.0	12.62	13.89	12.76	12.36	12.66	12.52	11.28	10.89	11.14	11.29	10.71	10.53	10.19	10.02	10.06	9.91	10.04	9.72
500.0	12.06	13.29	12.21	11.83	12.12	11.99	10.80	10.43	10.67	10.81	10.27	10.09	9.77	9.60	9.65	9.50	9.62	9.32

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	44.15	42.07	42.09	42.38	41.97	39.55	38.31	36.15	35.36	34.43	33.76	33.20	31.99	31.58	31.23	31.31	30.01	29.67
3.0	46.69	44.53	44.54	44.84	44.49	42.03	40.75	38.60	37.82	36.86	36.17	35.60	34.38	33.93	33.55	33.63	32.20	31.82
3.5	48.38	46.17	46.17	46.48	46.19	43.72	42.43	40.30	39.54	38.58	37.88	37.30	36.08	35.61	35.19	35.28	33.75	33.35
4.0	49.49	47.28	47.25	47.57	47.32	44.86	43.57	41.48	40.74	39.79	39.08	38.51	37.30	36.82	36.38	36.46	34.86	34.45
4.5	50.19	47.96	47.94	48.26	48.06	45.63	44.34	42.30	41.58	40.63	39.93	39.36	38.17	37.68	37.22	37.30	35.65	35.23
5.0	50.60	48.37	48.36	48.68	48.52	46.12	44.84	42.84	42.15	41.22	40.51	39.96	38.79	38.29	37.81	37.90	36.21	35.78
5.5	50.81	48.58	48.57	48.89	48.77	46.40	45.14	43.19	42.52	41.60	40.90	40.35	39.21	38.71	38.22	38.30	36.59	36.16
6.0	50.85	48.64	48.63	48.95	48.86	46.53	45.28	43.38	42.74	41.83	41.14	40.60	39.48	38.98	38.48	38.56	36.83	36.40
6.5	50.78	48.59	48.57	48.89	48.84	46.54	45.31	43.46	42.84	41.94	41.26	40.73	39.63	39.14	38.64	38.72	36.97	36.54
7.0	50.62	48.45	48.43	48.76	48.72	46.47	45.26	43.45	42.85	41.97	41.30	40.78	39.70	39.22	38.70	38.78	37.03	36.60
8.0	50.12	47.99	47.98	48.30	48.31	46.13	44.96	43.23	42.67	41.83	41.17	40.67	39.63	39.17	38.64	38.72	36.97	36.54
9.0	49.46	47.38	47.37	47.69	47.74	45.63	44.49	42.85	42.32	41.51	40.87	40.39	39.39	38.94	38.41	38.49	36.75	36.32
10.0	48.71	46.69	46.68	46.99	47.07	45.04	43.93	42.36	41.86	41.08	40.46	39.99	39.04	38.60	38.07	38.14	36.42	36.00
11.0	47.92	45.94	45.94	46.25	46.36	44.38	43.31	41.81	41.34	40.58	39.98	39.53	38.61	38.19	37.66	37.73	36.03	35.62
12.0	47.11	45.18	45.18	45.49	45.62	43.71	42.66	41.22	40.77	40.04	39.48	39.03	38.13	37.73	37.20	37.28	35.59	35.19
15.0	44.71	42.91	42.92	43.21	43.40	41.64	40.68	39.40	39.01	38.34	37.80	37.41	36.61	36.25	35.73	35.80	34.19	33.81
20.0	41.09	39.47	39.50	39.77	40.00	38.45	37.61	36.51	36.19	35.61	35.14	34.80	34.10	33.81	33.30	33.37	31.88	31.54
25.0	38.03	36.55	36.59	36.85	37.10	35.71	34.95	33.99	33.72	33.21	32.78	32.48	31.86	31.62	31.13	31.20	29.82	29.51
30.0	35.46	34.09	34.14	34.38	34.65	33.37	32.68	31.83	31.60	31.13	30.74	30.47	29.91	29.71	29.24	29.31	28.03	27.74
35.0	33.27	31.99	32.05	32.28	32.55	31.38	30.74	29.97	29.77	29.34	28.98	28.74	28.22	28.05	27.60	27.66	26.47	26.20
40.0	31.38	30.19	30.25	30.47	30.74	29.65	29.06	28.36	28.17	27.78	27.45	27.22	26.75	26.59	26.17	26.23	25.10	24.86
45.0	29.75	28.62	28.68	28.90	29.17	28.14	27.59	26.95	26.78	26.42	26.10	25.89	25.45	25.32	24.91	24.97	23.90	23.67
50.0	28.31	27.25	27.31	27.51	27.78	26.82	26.30	25.70	25.55	25.21	24.91	24.72	24.30	24.18	23.79	23.85	22.84	22.62
55.0	27.04	26.03	26.09	26.29	26.55	25.64	25.15	24.59	24.45	24.13	23.85	23.67	23.28	23.17	22.80	22.85	21.89	21.68
60.0	25.90	24.94	25.00	25.19	25.46	24.59	24.13	23.60	23.46	23.17	22.90	22.73	22.36	22.26	21.90	21.95	21.03	20.84
65.0	24.88	23.96	24.02	24.21	24.47	23.64	23.20	22.70	22.58	22.30	22.04	21.88	21.53	21.44	21.09	21.14	20.26	20.07
70.0	23.96	23.07	23.14	23.32	23.57	22.78	22.36	21.89	21.77	21.50	21.26	21.10	20.77	20.69	20.35	20.41	19.56	19.38
80.0	22.36	21.53	21.60	21.77	22.02	21.28	20.90	20.47	20.37	20.12	19.90	19.75	19.45	19.38	19.07	19.11	18.32	18.16
90.0	21.01	20.24	20.30	20.46	20.70	20.02	19.66	19.27	19.18	18.95	18.74	18.61	18.33	18.27	17.97	18.02	17.28	17.12
100.0	19.85	19.13	19.19	19.34	19.58	18.94	18.60	18.24	18.16	17.95	17.75	17.63	17.37	17.31	17.03	17.08	16.38	16.23
150.0	15.90	15.32	15.38	15.50	15.71	15.21	14.96	14.69	14.63	14.48	14.32	14.23	14.04	13.99	13.77	13.81	13.25	13.14
200.0	13.59	13.12	13.12	13.22	13.41	12.99	12.78	12.57	12.53	12.41	12.28	12.20	12.04	12.00	11.82	11.86	11.69	11.31
250.0	12.16	11.74	11.61	11.70	11.88	11.54	11.42	11.22	11.22	11.10	10.93	10.91	10.79	10.71	10.54	10.57	10.49	10.16
300.0	11.13	10.75	10.63	10.67	10.83	10.58	10.47	10.29	10.30	10.18	10.03	10.01	9.91	9.83	9.68	9.71	9.64	9.34
350.0	10.37	10.02	9.91	9.94	10.09	9.86	9.76	9.60	9.60	9.50	9.36	9.34	9.24	9.18	9.03	9.06	8.99	8.72
400.0	9.778	9.444	9.348	9.377	9.519	9.303	9.210	9.056	9.064	8.965	8.837	8.820	8.729	8.669	8.533	8.561	8.493	8.238
450.0	9.307	8.990	8.900	8.929	9.064	8.861	8.771	8.627	8.635	8.542	8.421	8.405	8.320	8.263	8.135	8.161	8.094	7.855
500.0	8.926	8.622	8.538	8.566	8.696	8.502	8.415	8.279	8.287	8.198	8.084	8.068	7.988	7.934	7.812	7.836	7.770	7.544

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

184 W IONS 74

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.170	5.900	8.333	8.310	8.160	9.719	10.510	11.052	11.450	11.880	12.150	13.000	13.440	13.998	14.210	14.438	14.873	15.260
3.0	6.734	6.610	9.220	9.243	9.084	10.756	11.715	12.318	12.759	13.225	13.586	14.533	15.056	15.670	15.904	16.199	16.830	17.152
3.5	7.305	7.305	10.099	10.166	9.996	11.773	12.892	13.552	14.031	14.528	14.976	16.014	16.614	17.280	17.534	17.889	18.691	18.964
4.0	7.888	7.995	10.978	11.087	10.905	12.782	14.057	14.770	15.285	15.809	16.341	17.467	18.138	18.852	19.125	19.538	20.491	20.727
4.5	8.484	8.687	11.862	12.013	11.818	13.790	15.217	15.982	16.531	17.079	17.694	18.903	19.644	20.404	20.694	21.163	22.253	22.462
5.0	9.097	9.386	12.754	12.947	12.737	14.802	16.380	17.193	17.776	18.345	19.042	20.333	21.142	21.946	22.252	22.773	23.990	24.179
5.5	9.725	10.093	13.657	13.891	13.666	15.821	17.549	18.410	19.023	19.613	20.391	21.763	22.637	23.483	23.806	24.378	25.712	25.888
6.0	10.370	10.811	14.572	14.848	14.607	16.849	18.727	19.634	20.278	20.885	21.744	23.197	24.134	25.022	25.360	25.982	27.427	27.594
6.5	11.032	11.541	15.499	15.817	15.559	17.887	19.915	20.867	21.541	22.165	23.105	24.637	25.638	26.566	26.918	27.589	29.139	29.302
7.0	11.711	12.283	16.441	16.800	16.524	18.937	21.116	22.113	22.816	23.455	24.476	26.087	27.150	28.118	28.483	29.203	30.853	31.015
8.0	13.12	13.81	18.37	18.81	18.50	21.08	23.56	24.64	25.40	26.07	27.25	29.02	30.21	31.25	31.64	32.46	34.30	34.47
9.0	14.60	15.39	20.36	20.88	20.53	23.27	26.06	27.23	28.04	28.73	30.08	32.01	33.32	34.44	34.85	35.76	37.77	37.96
10.0	16.15	17.03	22.40	23.02	22.62	25.52	28.62	29.88	30.74	31.46	32.97	35.05	36.48	37.68	38.12	39.11	41.29	41.51
11.0	17.77	18.72	24.52	25.22	24.77	27.84	31.25	32.59	33.51	34.24	35.93	38.16	39.72	40.98	41.44	42.53	44.86	45.12
12.0	19.46	20.48	26.69	27.48	26.99	30.21	33.94	35.36	36.33	37.08	38.94	41.34	43.01	44.35	44.83	46.01	48.49	48.79
15.0	24.93	26.11	33.59	34.66	33.99	37.69	42.41	44.09	45.21	46.00	48.39	51.28	53.32	54.85	55.40	56.84	59.73	60.21
20.0	35.35	36.64	46.31	47.87	46.88	51.37	57.86	59.95	61.32	62.14	65.49	69.22	71.90	73.76	74.39	76.27	79.77	80.62
25.0	47.32	48.58	60.50	62.60	61.23	66.51	74.92	77.44	79.04	79.86	84.25	88.87	92.23	94.39	95.10	97.42	101.47	102.79
30.0	60.77	61.86	76.11	78.78	76.98	83.07	93.53	96.49	98.33	99.12	104.62	110.19	114.26	116.70	117.48	120.25	124.82	126.68
35.0	75.64	76.44	93.08	96.35	94.07	100.98	113.63	117.05	119.12	119.86	126.55	133.12	137.94	140.66	141.48	144.70	149.78	152.24
40.0	91.89	92.26	111.35	115.28	112.46	120.20	135.19	139.06	141.37	142.04	149.99	157.61	163.22	166.20	167.07	170.75	176.31	179.42
45.0	109.45	109.29	130.89	135.50	132.11	140.69	158.14	162.49	165.03	165.61	174.89	183.62	190.04	193.28	194.18	198.33	204.37	208.17
50.0	128.31	127.49	151.66	156.98	152.98	162.41	182.46	187.30	190.07	190.54	201.21	211.09	218.38	221.85	222.78	227.41	233.92	238.45
55.0	148.41	146.82	173.62	179.69	176.03	186.33	208.09	213.44	216.44	216.77	228.92	239.99	248.18	251.89	252.84	257.94	264.92	270.21
60.0	169.72	167.26	196.75	203.60	198.24	209.42	236.02	240.87	244.11	244.29	257.97	270.29	279.40	283.34	284.30	289.88	297.36	303.43
65.0	192.2	188.8	221.0	228.7	222.6	234.6	263.2	269.6	273.0	273.1	288.3	301.9	312.0	316.2	317.1	323.2	331.2	338.1
70.0	215.9	211.3	246.4	254.9	248.0	261.0	292.6	299.5	303.2	303.0	320.0	334.9	346.0	350.4	351.3	357.9	366.3	374.1
80.0	266.6	259.5	300.3	310.6	302.0	316.9	355.0	363.0	367.2	366.6	387.0	404.7	417.9	422.7	423.6	431.2	440.6	450.1
90.0	321.5	311.6	358.4	370.5	360.2	376.9	422.0	431.1	435.8	434.6	458.8	479.5	495.0	500.1	501.0	509.6	520.0	531.3
100.0	380.7	367.5	420.4	434.6	422.3	441.0	493.4	503.7	508.8	507.1	536.3	559.1	576.9	582.4	583.2	592.8	604.4	617.5
150.0	734.1	698.9	785.8	811.4	787.8	816.7	911.6	928.6	935.8	930.3	981.4	1023.1	1054.6	1061.4	1061.5	1076.7	1094.3	1117.3
200.0	1173.5	1106.1	1232.2	1272.1	1235.4	1274.7	1420.9	1445.8	1454.2	1443.1	1522.3	1573.2	1623.8	1641.2	1640.0	1661.6	1676.6	1719.5
250.0	1685.2	1575.4	1746.1	1801.7	1753.2	1799.9	2005.1	2044.3	2047.3	2029.3	2140.6	2201.5	2273.6	2304.7	2300.9	2333.6	2339.7	2406.5
300.0	2256.9	2097.9	2315.2	2390.3	2328.5	2382.8	2653.1	2715.4	2704.4	2678.6	2825.2	2897.3	2992.9	3038.4	3031.6	3076.6	3072.6	3165.0
350.0	2880.8	2666.7	2935.3	3030.5	2953.9	3015.9	3356.7	3446.1	3417.5	3382.8	3567.7	3651.9	3773.0	3833.5	3823.2	3881.3	3866.4	3986.0
400.0	3551.	3276.	3599.	3716.	3624.	3693.	4109.	4227.	4180.	4135.	4361.	4458.	4606.	4682.	4668.	4740.	4714.	4862.
450.0	4261.	3922.	4302.	4442.	4332.	4410.	4905.	5052.	4986.	4943.	5199.	5311.	5487.	5579.	5561.	5647.	5609.	5786.
500.0	5007.	4599.	5040.	5203.	5075.	5161.	5740.	5916.	5830.	5764.	6077.	6204.	6410.	6518.	6495.	6596.	6545.	6754.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.02	16.62	17.92	18.26	18.93	19.88	20.45	21.19	21.62	22.05	22.49	22.96	23.42	23.84	24.39	24.59	26.34	26.90
3.0	18.04	18.74	20.04	20.37	21.05	22.13	22.77	23.64	24.13	24.63	25.12	25.63	26.19	26.64	27.23	27.42	29.29	29.89
3.5	19.98	20.76	22.07	22.38	23.08	24.28	24.98	25.97	26.51	27.06	27.60	28.15	28.79	29.29	29.90	30.09	32.08	32.71
4.0	21.85	22.73	24.04	24.33	25.05	26.35	27.12	28.22	28.80	29.41	29.99	30.57	31.30	31.83	32.47	32.65	34.76	35.42
4.5	23.70	24.66	25.97	26.25	26.97	28.38	29.21	30.42	31.03	31.70	32.32	32.93	33.74	34.29	34.97	35.14	37.37	38.06
5.0	25.52	26.57	27.88	28.15	28.88	30.39	31.27	32.58	33.23	33.94	34.60	35.25	36.13	36.71	37.42	37.59	39.93	40.65
5.5	27.34	28.47	29.78	30.04	30.77	32.38	33.32	34.71	35.40	36.16	36.86	37.54	38.48	39.10	39.84	40.00	42.45	43.20
6.0	29.15	30.36	31.67	31.92	32.65	34.36	35.35	36.84	37.56	38.37	39.10	39.81	40.82	41.47	42.24	42.40	44.96	45.74
6.5	30.96	32.25	33.56	33.80	34.54	36.33	37.38	38.96	39.71	40.57	41.34	42.08	43.15	43.83	44.62	44.78	47.45	48.26
7.0	32.77	34.15	35.46	35.68	36.42	38.31	39.42	41.07	41.86	42.76	43.56	44.33	45.47	46.17	47.00	47.15	49.94	50.78
8.0	36.42	37.96	39.28	39.47	40.21	42.28	43.49	45.32	46.16	47.15	48.02	48.85	50.10	50.87	51.75	51.90	54.91	55.81
9.0	40.12	41.82	43.13	43.30	44.04	46.29	47.61	49.59	50.49	51.56	52.51	53.39	54.76	55.58	56.53	56.66	59.90	60.86
10.0	43.87	45.73	47.05	47.19	47.93	50.35	51.77	53.91	54.86	56.02	57.03	57.97	59.45	60.32	61.34	61.46	64.93	65.94
11.0	47.68	49.70	51.02	51.14	51.86	54.47	55.99	58.28	59.28	60.52	61.61	62.59	64.19	65.11	66.20	66.31	70.01	71.08
12.0	51.55	53.74	55.06	55.15	55.86	58.64	60.27	62.71	63.76	65.09	66.24	67.28	68.98	69.96	71.11	71.22	75.15	76.28
15.0	63.58	66.28	67.59	67.60	68.27	71.58	73.51	76.41	77.60	79.17	80.53	81.72	83.75	84.88	86.25	86.32	90.97	92.28
20.0	85.06	88.65	89.96	89.81	90.37	94.59	97.05	100.68	102.10	104.08	105.78	107.23	109.80	111.17	112.93	112.95	118.84	120.45
25.0	108.35	112.90	114.18	113.86	114.27	119.44	122.44	126.81	128.45	130.85	132.91	134.61	137.73	139.32	141.52	141.48	148.69	150.63
30.0	133.42	138.98	140.23	139.73	139.95	146.10	149.68	154.80	156.65	159.48	161.91	163.87	167.55	169.36	172.03	171.93	180.53	182.80
35.0	160.22	166.85	168.06	167.36	167.36	174.55	178.73	184.60	186.66	189.93	192.75	194.98	199.23	201.25	204.43	204.25	214.33	216.94
40.0	188.7	196.5	197.6	196.7	196.5	204.7	209.5	216.2	218.4	222.2	225.4	227.9	232.7	235.0	238.7	238.4	250.0	253.0
45.0	218.8	227.8	228.9	227.7	227.2	236.6	242.0	249.5	252.0	256.1	259.8	262.6	268.0	270.4	274.7	274.4	287.6	290.9
50.0	250.6	260.7	261.8	260.4	259.5	270.1	276.2	284.4	287.1	291.8	295.9	298.9	305.0	307.6	312.5	312.1	327.0	330.7
55.0	283.8	295.3	296.2	294.6	293.4	305.2	312.0	321.1	324.0	329.1	333.6	337.0	343.7	346.5	352.0	351.5	368.2	372.3
60.0	318.6	331.4	332.3	330.4	328.8	341.8	349.3	359.3	362.4	368.0	373.0	376.7	384.0	387.0	393.2	392.6	411.0	415.6
65.0	354.8	369.1	369.8	367.6	365.7	380.0	388.2	399.0	402.4	408.5	414.0	417.9	426.0	429.1	436.0	435.3	455.6	460.6
70.0	392.5	408.2	408.8	406.4	404.0	419.7	428.6	440.3	443.9	450.6	456.5	460.8	469.5	472.8	480.5	479.6	501.9	507.2
80.0	472.1	490.8	491.2	488.1	484.8	503.3	513.8	527.3	531.3	539.1	546.0	551.0	561.1	564.8	573.9	572.9	599.1	605.4
90.0	557.0	579.0	579.1	575.4	571.1	592.5	604.7	620.0	624.5	633.4	641.4	647.0	658.6	662.6	673.4	672.1	702.6	709.8
100.0	647.2	672.6	672.4	667.9	662.5	687.1	700.9	718.2	723.2	733.2	742.3	748.6	761.8	766.2	778.6	777.0	812.0	820.2
150.0	1170.	1215.	1213.	1204.	1192.	1234.	1257.	1285.	1292.	1309.	1324.	1334.	1356.	1362.	1384.	1381.	1442.	1455.
200.0	1799.	1868.	1864.	1850.	1829.	1892.	1926.	1965.	1975.	1998.	2021.	2036.	2067.	2075.	2109.	2103.	2178.	2214.
250.0	2517.	2611.	2612.	2592.	2560.	2646.	2690.	2743.	2753.	2786.	2819.	2836.	2877.	2890.	2937.	2929.	3011.	3075.
300.0	3309.	3431.	3441.	3418.	3374.	3480.	3533.	3601.	3611.	3653.	3699.	3718.	3769.	3789.	3849.	3838.	3927.	4021.
350.0	4167.	4319.	4339.	4312.	4255.	4382.	4444.	4528.	4537.	4590.	4650.	4671.	4731.	4758.	4835.	4820.	4917.	5042.
400.0	5081.	5266.	5296.	5266.	5195.	5344.	5416.	5516.	5524.	5588.	5662.	5685.	5757.	5791.	5883.	5866.	5970.	6129.
450.0	6046.	6265.	6306.	6272.	6186.	6358.	6440.	6558.	6565.	6640.	6730.	6754.	6837.	6878.	6989.	6967.	7081.	7273.
500.0	7056.	7311.	7362.	7325.	7223.	7419.	7512.	7647.	7653.	7740.	7845.	7872.	7966.	8015.	8143.	8119.	8241.	8469.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{187}_{75}$RE IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	166.1	128.3	103.8	98.7	99.6	88.3	75.8	72.0	69.6	67.6	63.3	59.2	56.1	54.1	53.4	51.3	45.9	47.7
3.0	164.9	132.9	105.7	100.6	101.7	90.8	78.3	74.8	72.3	70.5	66.0	61.9	58.8	56.9	56.1	54.1	48.9	50.4
3.5	162.1	134.8	106.2	101.2	102.4	92.1	79.6	76.1	73.8	72.2	67.7	63.6	60.5	58.6	57.9	55.8	51.0	52.2
4.0	158.7	136.0	106.9	101.0	102.4	92.5	80.2	76.8	74.6	73.1	68.6	64.6	61.5	59.7	59.0	57.0	52.4	53.3
4.5	154.9	134.2	106.1	100.4	101.9	92.4	80.3	77.0	74.9	73.6	69.1	65.1	62.1	60.3	59.6	57.6	53.3	54.0
5.0	151.0	132.9	104.0	99.4	101.0	91.9	80.0	76.8	74.9	73.6	69.2	65.2	62.3	60.6	60.0	58.0	53.9	54.4
5.5	147.1	131.1	102.8	98.3	99.9	91.2	79.5	76.5	74.6	73.5	69.1	65.2	62.3	60.6	60.0	58.1	54.3	54.6
6.0	143.3	129.2	101.4	97.0	98.7	90.4	78.9	76.0	74.1	73.1	68.8	64.9	62.2	60.5	60.0	58.1	54.4	54.6
6.5	139.7	127.1	100.0	95.7	97.4	89.4	78.2	75.3	73.6	72.7	68.3	64.6	61.9	60.3	59.7	57.9	54.5	54.6
7.0	136.2	124.9	98.5	94.3	96.1	88.4	77.4	74.6	72.9	72.1	67.8	64.2	61.5	60.0	59.5	57.7	54.4	54.4
8.0	129.7	120.6	95.6	91.6	93.4	86.3	75.6	73.1	71.5	70.8	66.7	63.1	60.6	59.2	58.7	57.0	54.0	53.8
9.0	123.8	116.4	92.7	88.9	90.8	84.1	73.9	71.4	70.0	69.4	65.4	62.0	59.6	58.2	57.7	56.2	53.4	53.1
10.0	118.4	112.3	90.0	86.3	88.2	81.9	72.1	69.8	68.5	67.9	64.0	60.7	58.4	57.1	56.7	55.2	52.7	52.2
11.0	113.5	108.5	87.4	83.9	85.8	79.9	70.4	68.2	66.9	66.5	62.7	59.5	57.3	56.1	55.7	54.3	52.0	51.4
12.0	109.0	105.0	84.9	81.6	83.4	77.9	68.7	66.6	65.4	65.1	61.4	58.3	56.1	55.0	54.7	53.3	51.2	50.5
15.0	97.77	95.60	78.35	75.36	77.18	72.45	64.05	62.26	61.25	61.04	57.60	54.82	52.88	51.92	51.64	50.41	48.70	47.89
20.0	83.92	83.51	69.65	67.08	68.82	65.02	57.66	56.19	55.39	55.33	52.26	49.84	48.15	47.40	47.20	46.18	44.90	43.99
25.0	73.95	74.47	62.95	60.69	62.33	59.17	52.58	51.33	50.67	50.71	47.92	45.76	44.27	43.66	43.52	42.64	41.62	40.70
30.0	66.41	67.46	57.64	55.61	57.16	54.46	48.47	47.38	46.82	46.91	44.36	42.40	41.05	40.55	40.44	39.67	38.84	37.94
35.0	60.48	61.86	53.30	51.47	52.93	50.57	45.07	44.10	43.62	43.74	41.38	39.59	38.35	37.93	37.85	37.17	36.46	35.59
40.0	55.68	57.27	49.70	48.01	49.40	47.31	42.21	41.33	40.91	41.06	38.86	37.20	36.05	35.69	35.64	35.02	34.40	33.58
45.0	51.71	53.42	46.64	45.08	46.40	44.53	39.76	38.96	38.59	38.75	36.68	35.14	34.06	33.76	33.72	33.16	32.61	31.83
50.0	48.37	50.16	44.02	42.56	43.82	42.12	37.64	36.91	36.57	36.75	34.79	33.34	32.33	32.07	32.04	31.53	31.04	30.29
55.0	45.50	47.35	41.73	40.36	41.57	40.01	35.78	35.10	34.80	34.98	33.13	31.77	30.81	30.58	30.56	30.09	29.64	28.93
60.0	43.02	44.90	39.72	38.43	39.59	38.16	34.14	33.51	33.23	33.42	31.66	30.36	29.46	29.25	29.25	28.81	28.39	27.72
65.0	40.85	42.74	37.94	36.71	37.83	36.50	32.68	32.08	31.83	32.03	30.34	29.11	28.25	28.07	28.07	27.66	27.27	26.63
70.0	38.92	40.83	36.35	35.18	36.26	35.02	31.37	30.81	30.57	30.77	29.16	27.98	27.16	27.00	27.00	26.62	26.25	25.64
80.0	35.68	37.57	33.62	32.55	33.55	32.47	29.10	28.60	28.40	28.60	27.11	26.03	25.27	25.14	25.15	24.81	24.48	23.93
90.0	33.03	34.91	31.36	30.37	31.31	30.34	27.22	26.76	26.59	26.79	25.39	24.39	23.68	23.58	23.60	23.29	22.99	22.49
100.0	30.83	32.68	29.45	28.54	29.42	28.54	25.62	25.20	25.05	25.25	23.94	23.00	22.34	22.25	22.27	22.00	21.72	21.25
150.0	23.69	25.36	23.09	22.40	23.09	22.50	20.23	19.93	19.84	20.03	19.01	18.28	17.76	17.73	17.76	17.57	17.35	17.03
200.0	19.72	21.45	19.60	18.98	19.45	19.12	17.18	16.86	16.91	17.10	16.21	15.96	15.43	15.10	15.15	14.95	15.10	14.57
250.0	17.39	18.99	17.39	16.84	17.23	16.99	15.28	14.84	15.06	15.24	14.45	14.22	13.75	13.48	13.53	13.30	13.49	13.03
300.0	15.77	17.27	15.84	15.34	15.70	15.60	13.94	13.42	13.75	13.93	13.21	12.99	12.57	12.33	12.38	12.18	12.34	11.93
350.0	14.58	16.00	14.69	14.23	14.56	14.39	12.95	12.48	12.78	12.94	12.28	12.08	11.69	11.47	11.52	11.34	11.49	11.11
400.0	13.67	15.03	13.80	13.37	13.69	13.53	12.18	11.75	12.03	12.19	11.57	11.37	11.01	10.81	10.86	10.69	10.83	10.48
450.0	12.96	14.26	13.10	12.69	13.00	12.86	11.58	11.18	11.44	11.59	11.00	10.81	10.46	10.28	10.33	10.17	10.30	9.97
500.0	12.38	13.64	12.54	12.14	12.44	12.31	11.08	10.71	10.95	11.10	10.54	10.35	10.03	9.86	9.91	9.75	9.88	9.56

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	44.57	42.47	42.49	42.78	42.37	39.92	38.66	36.49	35.69	34.75	34.07	33.51	32.29	31.87	31.52	31.60	30.29	29.94
3.0	47.18	45.00	45.00	45.30	44.95	42.46	41.17	38.99	38.21	37.24	36.54	35.96	34.73	34.28	33.89	33.97	32.52	32.15
3.5	48.92	46.69	46.69	47.00	46.70	44.20	42.90	40.74	39.97	39.00	38.29	37.71	36.48	36.00	35.58	35.66	34.12	33.72
4.0	50.07	47.82	47.81	48.12	47.88	45.39	44.08	41.96	41.22	40.25	39.54	38.96	37.74	37.24	36.80	36.88	35.26	34.85
4.5	50.81	48.55	48.53	48.85	48.65	46.19	44.89	42.81	42.09	41.13	40.41	39.84	38.64	38.14	37.67	37.75	36.08	35.66
5.0	51.25	48.99	48.97	49.30	49.14	46.70	45.41	43.38	42.68	41.74	41.03	40.46	39.27	38.77	38.29	38.37	36.66	36.23
5.5	51.48	49.23	49.21	49.53	49.41	47.01	45.73	43.75	43.08	42.14	41.44	40.88	39.71	39.21	38.72	38.80	37.06	36.63
6.0	51.64	49.31	49.28	49.61	49.52	47.15	45.89	43.96	43.31	42.39	41.69	41.14	40.00	39.50	39.00	39.08	37.32	36.89
6.5	51.49	49.27	49.25	49.57	49.51	47.18	45.94	44.06	43.43	42.52	41.83	41.29	40.17	39.68	39.17	39.25	37.48	37.04
7.0	51.34	49.14	49.12	49.45	49.41	47.12	45.90	44.06	43.45	42.56	41.88	41.35	40.25	39.76	39.24	39.32	37.55	37.11
8.0	50.86	48.70	48.69	49.01	49.02	46.81	45.61	43.87	43.29	42.44	41.77	41.26	40.21	39.74	39.20	39.28	37.51	37.07
9.0	50.21	48.11	48.09	48.41	48.46	46.32	45.16	43.50	42.96	42.13	41.48	40.99	39.98	39.52	38.99	39.06	37.29	36.87
10.0	49.48	47.42	47.41	47.72	47.81	45.74	44.61	43.02	42.51	41.71	41.08	40.61	39.64	39.20	38.65	38.73	36.98	36.56
11.0	48.69	46.68	46.67	46.99	47.10	45.09	44.00	42.47	41.99	41.22	40.61	40.16	39.22	38.79	38.25	38.33	36.59	36.18
12.0	47.89	45.92	45.92	46.23	46.36	44.42	43.36	41.89	41.44	40.69	40.10	39.66	38.75	38.34	37.80	37.88	36.16	35.76
15.0	45.48	43.65	43.66	43.96	44.14	42.35	41.38	40.07	39.68	39.00	38.45	38.05	37.23	36.87	36.33	36.41	34.77	34.38
20.0	41.85	40.19	40.22	40.50	40.73	39.15	38.29	37.17	36.85	36.26	35.77	35.43	34.71	34.42	33.90	33.97	32.46	32.11
25.0	38.76	37.25	37.29	37.55	37.81	36.39	35.61	34.64	34.36	33.84	33.40	33.09	32.46	32.21	31.72	31.78	30.38	30.07
30.0	36.16	34.76	34.81	35.06	35.33	34.03	33.33	32.46	32.22	31.75	31.34	31.07	30.50	30.29	29.81	29.88	28.57	28.28
35.0	33.94	32.65	32.70	32.93	33.21	32.01	31.36	30.58	30.37	29.93	29.56	29.31	28.79	28.61	28.16	28.22	27.00	26.73
40.0	32.04	30.82	30.88	31.10	31.38	30.26	29.66	28.94	28.75	28.36	28.01	27.78	27.30	27.14	26.71	26.77	25.62	25.37
45.0	30.38	29.23	29.29	29.51	29.78	28.74	28.18	27.51	27.34	26.97	26.65	26.44	25.99	25.85	25.43	25.49	24.40	24.17
50.0	28.92	27.83	27.90	28.10	28.38	27.39	26.87	26.25	26.09	25.75	25.44	25.24	24.82	24.70	24.30	24.36	23.33	23.10
55.0	27.63	26.60	26.66	26.86	27.13	26.20	25.70	25.12	24.98	24.66	24.37	24.18	23.78	23.67	23.29	23.35	22.36	22.15
60.0	26.48	25.49	25.56	25.75	26.02	25.13	24.66	24.12	23.98	23.68	23.40	23.23	22.85	22.75	22.38	22.44	21.49	21.29
65.0	25.44	24.50	24.56	24.75	25.01	24.17	23.72	23.21	23.08	22.79	22.53	22.36	22.01	21.91	21.56	21.61	20.71	20.52
70.0	24.51	23.60	23.66	23.84	24.11	23.29	22.86	22.38	22.26	21.99	21.74	21.58	21.24	21.15	20.81	20.86	19.99	19.81
80.0	22.87	22.03	22.10	22.27	22.52	21.77	21.38	20.94	20.83	20.58	20.35	20.21	19.90	19.82	19.50	19.55	18.74	18.57
90.0	21.50	20.71	20.77	20.94	21.18	20.49	20.12	19.72	19.62	19.39	19.18	19.04	18.76	18.69	18.39	18.44	17.68	17.52
100.0	20.32	19.58	19.64	19.80	20.04	19.38	19.04	18.67	18.58	18.37	18.17	18.04	17.78	17.72	17.43	17.48	16.76	16.61
150.0	16.29	15.70	15.76	15.88	16.10	15.59	15.32	15.05	14.99	14.84	14.68	14.58	14.38	14.34	14.11	14.15	13.58	13.46
200.0	13.94	13.46	13.45	13.56	13.75	13.32	13.11	12.89	12.85	12.72	12.58	12.51	12.34	12.30	12.12	12.15	11.99	11.80
250.0	12.47	12.04	11.90	12.00	12.18	11.83	11.71	11.51	11.51	11.38	11.21	11.19	11.07	10.98	10.81	10.84	10.76	10.42
300.0	11.42	11.03	10.91	10.95	11.11	10.85	10.74	10.56	10.56	10.45	10.29	10.27	10.16	10.09	9.93	9.96	9.89	9.58
350.0	10.64	10.28	10.17	10.20	10.35	10.12	10.02	9.85	9.85	9.75	9.60	9.59	9.49	9.42	9.27	9.30	9.23	8.95
400.0	10.04	9.69	9.59	9.62	9.77	9.55	9.45	9.29	9.30	9.20	9.07	9.05	8.96	8.90	8.76	8.79	8.72	8.46
450.0	9.55	9.23	9.14	9.17	9.30	9.10	9.00	8.86	8.86	8.77	8.64	8.63	8.54	8.48	8.35	8.38	8.31	8.06
500.0	9.16	8.85	8.77	8.79	8.93	8.73	8.64	8.50	8.51	8.42	8.30	8.28	8.20	8.15	8.02	8.04	7.98	7.74

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

187 RE IONS 75

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.210	5.930	8.382	8.360	8.210	9.780	10.570	11.107	11.500	11.930	12.200	13.070	13.510	14.066	14.280	14.511	14.951	15.340
3.0	6.774	6.644	9.273	9.297	9.138	10.822	11.781	12.380	12.816	13.282	13.644	14.612	15.136	15.748	15.984	16.283	16.920	17.243
3.5	7.346	7.342	10.155	10.223	10.053	11.843	12.964	13.619	14.095	14.592	15.041	16.101	16.701	17.366	17.622	17.982	18.791	19.065
4.0	7.929	8.035	11.037	11.148	10.966	12.856	14.133	14.842	15.354	15.878	16.412	17.559	18.232	18.946	19.221	19.639	20.600	20.837
4.5	8.525	8.729	11.923	12.076	11.881	13.867	15.297	16.057	16.604	17.152	17.769	19.001	19.744	20.504	20.797	21.269	22.368	22.578
5.0	9.137	9.429	12.817	13.012	12.802	14.882	16.464	17.273	17.852	18.422	19.121	20.436	21.246	22.050	22.360	22.886	24.112	24.302
5.5	9.764	10.137	13.721	13.958	13.733	16.903	17.635	18.492	19.103	19.693	20.474	21.870	22.746	23.593	23.918	24.495	25.839	26.016
6.0	10.408	10.855	14.637	14.915	14.675	16.932	18.815	19.719	20.360	20.969	21.831	23.307	24.247	25.135	25.476	26.103	27.559	27.727
6.5	11.069	11.585	15.566	15.886	15.628	17.973	20.006	20.955	21.626	22.252	23.194	24.750	25.754	26.683	27.038	27.714	29.275	29.439
7.0	11.746	12.327	16.508	16.870	16.594	19.024	21.208	22.202	22.902	23.543	24.568	26.202	27.268	28.237	28.606	29.331	30.993	31.156
8.0	13.15	13.85	18.44	18.88	18.57	21.17	23.65	24.73	25.49	26.16	27.35	29.14	30.33	31.38	31.77	32.59	34.44	34.61
9.0	14.63	15.43	20.42	20.95	20.60	23.36	26.15	27.32	28.13	28.83	30.18	32.13	33.44	34.56	34.98	35.90	37.92	38.11
10.0	16.18	17.07	22.47	23.09	22.69	25.61	28.72	29.97	30.84	31.55	33.07	35.18	36.61	37.81	38.25	39.25	41.44	41.66
11.0	17.79	18.76	24.58	25.28	24.84	27.93	31.34	32.68	33.60	34.33	36.02	38.29	39.84	41.11	41.58	42.67	45.01	45.27
12.0	19.47	20.51	26.75	27.65	27.05	30.30	34.03	35.45	36.42	37.18	39.04	41.46	43.14	44.48	44.97	46.15	48.64	48.95
15.0	24.91	26.12	33.64	34.71	34.05	37.77	42.50	44.17	45.29	46.08	48.48	51.39	53.44	54.98	55.53	56.98	59.88	60.35
20.0	35.27	36.61	46.32	47.88	46.90	51.42	57.91	60.00	61.37	62.19	65.54	69.30	71.99	73.84	74.49	76.37	79.88	80.74
25.0	47.17	48.49	60.46	62.56	61.20	66.51	74.91	77.43	79.04	79.86	84.25	88.90	92.26	94.42	95.14	97.47	101.53	102.86
30.0	60.54	61.70	76.01	78.67	76.88	83.00	93.45	96.41	98.25	99.05	104.54	110.14	114.22	116.66	117.44	120.22	124.80	126.67
35.0	75.31	76.19	92.89	96.17	93.90	100.83	113.47	116.88	118.96	119.71	126.38	132.98	137.80	140.52	141.36	144.58	149.67	152.13
40.0	91.44	91.92	111.07	114.99	112.20	119.96	134.93	138.80	141.11	141.79	149.72	157.36	162.96	165.95	166.83	170.51	176.08	179.19
45.0	108.88	108.84	130.51	135.11	131.74	140.35	157.76	162.11	164.65	165.24	174.50	183.24	189.66	192.90	193.81	197.97	204.01	207.81
50.0	127.59	126.91	151.15	156.47	152.49	161.95	181.94	186.78	189.55	190.03	200.68	210.57	217.85	221.33	222.27	226.89	233.41	237.93
55.0	147.53	146.10	172.98	179.04	174.40	184.74	207.43	212.77	215.77	216.12	228.23	239.31	247.48	251.20	252.16	257.26	264.25	269.53
60.0	168.68	166.39	195.95	202.79	197.46	208.67	234.19	240.04	243.28	243.47	257.11	269.43	278.53	282.47	283.44	289.02	296.49	302.56
65.0	191.0	187.7	220.0	227.7	221.6	233.7	262.2	268.6	272.0	272.1	287.3	300.9	310.9	315.1	316.1	322.2	330.1	337.0
70.0	214.4	210.1	245.2	253.7	246.9	259.9	291.4	298.3	302.0	301.9	318.7	333.7	344.7	349.1	350.1	356.6	365.1	372.8
80.0	264.7	257.9	298.8	309.0	300.6	315.4	353.4	361.4	365.5	364.9	385.3	403.0	416.2	420.9	421.9	429.5	438.9	448.3
90.0	319.2	309.6	356.4	368.5	358.3	375.0	419.9	429.0	433.6	432.6	456.6	477.3	492.7	497.8	498.7	507.3	517.7	529.0
100.0	377.9	365.0	418.0	432.1	420.0	438.6	490.7	501.1	506.1	504.5	532.5	556.3	574.0	579.5	580.3	590.0	601.5	614.6
150.0	728.0	693.6	780.3	805.8	782.4	811.3	905.6	922.5	929.7	924.3	975.1	1018.6	1047.9	1054.7	1054.9	1070.0	1087.6	1110.5
200.0	1163.3	1097.1	1222.7	1262.4	1226.0	1265.3	1410.4	1435.2	1443.6	1432.7	1511.2	1562.0	1612.2	1629.6	1628.5	1649.9	1664.9	1707.5
250.0	1670.0	1561.9	1730.9	1787.1	1739.0	1785.6	1989.3	2028.2	2031.2	2013.5	2124.0	2184.5	2256.1	2287.0	2283.4	2315.8	2322.0	2388.3
300.0	2236.0	2079.4	2295.5	2370.0	2308.8	2362.9	2631.1	2692.9	2682.2	2656.6	2802.1	2873.8	2968.6	3013.9	3007.2	3051.9	3048.0	3139.7
350.0	2853.6	2642.7	2911.9	3004.0	2928.1	2990.0	3327.9	3416.6	3388.4	3354.0	3537.4	3621.1	3741.2	3801.3	3791.1	3848.8	3834.3	3952.8
400.0	3517.	3246.	3567.	3683.	3591.	3661.	4073.	4190.	4143.	4099.	4323.	4420.	4566.	4642.	4628.	4699.	4673.	4820.
450.0	4220.	3885.	4263.	4401.	4292.	4370.	4861.	5006.	4941.	4887.	5152.	5264.	5438.	5530.	5511.	5597.	5559.	5735.
500.0	4969.	4556.	4993.	5155.	5028.	5114.	5687.	5869.	5777.	5711.	6021.	6148.	6362.	6459.	6436.	6536.	6487.	6693.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.10	16.70	18.01	18.35	19.02	19.98	20.55	21.29	21.73	22.15	22.59	23.05	23.52	23.94	24.49	24.69	26.46	27.02
3.0	18.13	18.83	20.14	20.47	21.16	22.24	22.89	23.76	24.25	24.75	25.23	25.74	26.30	26.76	27.34	27.54	29.43	30.03
3.5	20.08	20.87	22.18	22.49	23.20	24.40	25.11	26.10	26.64	27.19	27.73	28.28	28.93	29.42	30.03	30.22	32.23	32.86
4.0	21.97	22.85	24.16	24.46	25.17	26.48	27.26	28.36	28.94	29.55	30.13	30.71	31.44	31.97	32.61	32.80	34.92	35.59
4.5	23.82	24.79	26.10	26.38	27.11	28.53	29.36	30.57	31.19	31.85	32.47	33.09	33.89	34.45	35.12	35.30	37.54	38.24
5.0	25.65	26.70	28.02	28.29	29.02	30.54	31.43	32.74	33.39	34.10	34.76	35.41	36.29	36.88	37.58	37.76	40.11	40.84
5.5	27.47	28.60	29.92	30.18	30.92	32.53	33.48	34.88	35.57	36.33	37.03	37.71	38.66	39.28	40.01	40.18	42.65	43.40
6.0	29.28	30.50	31.82	32.07	32.81	34.52	35.52	37.01	37.73	38.54	39.28	39.99	41.00	41.65	42.42	42.58	45.16	45.96
6.5	31.10	32.40	33.72	33.95	34.70	36.50	37.56	39.14	39.89	40.75	41.52	42.26	43.33	44.01	44.81	44.97	47.66	48.48
7.0	32.92	34.30	35.62	35.84	36.59	38.48	39.59	41.26	42.04	42.94	43.76	44.52	45.66	46.37	47.19	47.34	50.15	51.00
8.0	36.58	38.12	39.44	39.64	40.38	42.46	43.68	45.51	46.35	47.34	48.22	49.05	50.30	51.07	51.96	52.10	55.13	56.04
9.0	40.28	41.98	43.30	43.48	44.22	46.48	47.80	49.79	50.69	51.76	52.71	53.59	54.97	55.79	56.74	56.87	60.13	61.09
10.0	44.03	45.90	47.22	47.37	48.10	50.54	51.96	54.11	55.06	56.22	57.24	58.17	59.66	60.54	61.56	61.68	65.17	66.19
11.0	47.84	49.87	51.19	51.31	52.04	54.66	56.18	58.49	59.49	60.73	61.82	62.81	64.41	65.33	66.42	66.53	70.25	71.33
12.0	51.71	53.91	55.23	55.33	56.05	58.84	60.46	62.92	63.97	65.30	66.45	67.49	69.20	70.18	71.34	71.44	75.39	76.53
15.0	63.73	66.44	67.76	67.77	68.45	71.77	73.71	76.61	77.80	79.38	80.74	81.93	83.97	85.10	86.47	86.54	91.21	92.52
20.0	85.18	88.78	90.09	89.95	90.51	94.74	97.21	100.85	102.27	104.25	105.96	107.40	109.98	111.35	113.12	113.14	119.05	120.67
25.0	108.41	112.96	114.26	113.94	114.36	119.53	122.55	126.92	128.56	130.96	133.02	134.73	137.85	139.44	141.65	141.61	148.84	150.78
30.0	133.40	138.97	140.23	139.73	139.96	146.12	149.71	154.82	156.68	159.51	161.94	163.90	167.59	169.40	172.07	171.97	180.59	182.86
35.0	160.11	166.74	167.96	167.26	167.27	174.47	178.64	184.52	186.59	189.86	192.67	194.90	199.16	201.18	204.36	204.18	214.27	216.89
40.0	188.5	196.2	197.4	196.5	196.3	204.5	209.3	216.0	218.2	222.0	225.2	227.7	232.5	234.7	238.5	238.2	249.8	252.8
45.0	218.5	227.4	228.5	227.4	226.8	236.2	241.7	249.1	251.6	256.8	259.4	262.2	267.6	270.1	274.4	274.0	287.2	290.6
50.0	250.0	260.2	261.2	259.9	259.0	269.6	275.7	283.9	286.6	291.3	295.3	298.4	304.5	307.1	312.0	311.6	326.4	330.2
55.0	283.1	294.6	295.5	293.9	292.7	304.5	311.3	320.3	323.3	328.4	332.9	336.3	343.0	345.8	351.3	350.8	367.4	371.5
60.0	317.7	330.5	331.4	329.5	327.9	340.9	348.4	358.3	361.5	367.1	372.1	375.7	383.1	386.1	392.3	391.6	410.1	414.6
65.0	353.7	367.9	368.7	366.5	364.6	378.9	387.1	397.9	401.2	407.4	412.8	416.8	424.8	427.9	434.8	434.1	454.4	459.3
70.0	391.2	406.8	407.5	405.0	402.7	418.3	427.3	438.9	442.5	449.1	455.1	459.3	468.1	471.4	479.0	478.2	500.4	505.7
80.0	470.2	488.9	489.3	486.2	483.0	501.4	511.9	525.4	529.4	537.1	544.0	549.0	559.1	562.8	571.9	570.8	597.0	603.3
90.0	554.6	576.5	576.7	572.9	568.7	590.0	602.1	617.5	621.9	630.8	638.8	644.3	656.0	660.0	670.7	669.4	699.8	707.0
100.0	644.1	669.4	669.3	664.8	659.5	683.9	697.7	715.0	719.9	729.9	739.0	745.3	758.4	762.8	775.2	773.6	808.5	816.7
150.0	1163.	1207.	1205.	1197.	1185.	1227.	1250.	1278.	1285.	1301.	1316.	1327.	1348.	1354.	1376.	1373.	1433.	1447.
200.0	1787.	1855.	1851.	1837.	1816.	1879.	1913.	1952.	1962.	1985.	2008.	2022.	2053.	2061.	2095.	2089.	2163.	2200.
250.0	2498.	2591.	2592.	2572.	2541.	2626.	2670.	2723.	2733.	2765.	2798.	2815.	2856.	2869.	2915.	2907.	2989.	3052.
300.0	3283.	3404.	3414.	3391.	3347.	3453.	3505.	3573.	3582.	3624.	3670.	3689.	3739.	3759.	3819.	3808.	3897.	3990.
350.0	4132.	4283.	4303.	4277.	4220.	4346.	4408.	4491.	4500.	4552.	4612.	4632.	4693.	4719.	4795.	4781.	4877.	5001.
400.0	5038.	5221.	5251.	5221.	5151.	5299.	5370.	5469.	5478.	5540.	5614.	5637.	5708.	5742.	5834.	5816.	5920.	6077.
450.0	5993.	6211.	6250.	6218.	6132.	6303.	6384.	6501.	6508.	6582.	6671.	6696.	6778.	6819.	6928.	6907.	7020.	7211.
500.0	6993.	7246.	7296.	7260.	7159.	7353.	7445.	7579.	7585.	7671.	7776.	7803.	7896.	7945.	8071.	8047.	8169.	8395.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

192 76 OS IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	168.5	129.5	105.0	99.8	100.7	89.2	76.6	72.8	70.3	68.2	63.9	59.7	56.6	54.6	53.9	51.8	46.3	48.1
3.0	167.4	134.3	106.9	101.8	102.9	91.8	79.2	75.5	73.1	71.2	66.7	62.6	59.4	57.5	56.7	54.6	49.4	50.9
3.5	164.7	136.4	107.5	102.5	103.7	93.2	80.6	77.0	74.7	73.0	68.5	64.3	61.2	59.3	58.5	56.5	51.5	52.7
4.0	161.2	136.7	107.3	102.3	103.7	93.6	81.2	77.7	75.5	74.0	69.5	65.3	62.3	60.4	59.7	57.6	53.0	53.9
4.5	157.5	136.1	106.6	101.7	103.2	93.6	81.3	78.0	75.9	74.5	69.9	65.9	62.9	61.0	60.4	58.4	54.0	54.7
5.0	153.6	134.8	106.5	100.8	102.4	93.2	81.1	77.9	75.8	74.6	70.1	66.1	63.1	61.4	60.7	58.7	54.6	55.1
5.5	149.7	133.1	104.3	99.7	101.3	92.5	80.6	77.5	75.6	74.5	70.0	66.0	63.2	61.4	60.8	58.9	55.0	55.3
6.0	145.9	131.2	102.9	98.5	100.2	91.7	80.0	77.0	75.2	74.1	69.7	65.8	63.0	61.4	60.8	58.9	55.2	55.4
6.5	142.3	129.1	101.5	97.1	98.9	90.7	79.3	76.4	74.6	73.7	69.3	65.5	62.8	61.1	60.6	58.7	55.2	55.3
7.0	138.7	126.9	100.0	95.8	97.6	89.7	78.5	75.7	74.0	73.1	68.8	65.1	62.4	60.8	60.3	58.5	55.2	55.1
8.0	132.2	122.6	97.1	93.1	94.9	87.6	76.8	74.2	72.6	71.9	67.7	64.1	61.5	60.0	59.5	57.8	54.8	54.6
9.0	126.2	118.4	94.2	90.4	92.2	85.4	75.0	72.6	71.1	70.5	66.4	62.9	60.5	59.1	58.6	57.0	54.2	53.9
10.0	120.7	114.3	91.6	87.8	89.7	83.3	73.3	70.9	69.5	69.0	65.0	61.7	59.3	58.0	57.6	56.1	53.6	53.0
11.0	115.8	110.5	88.9	85.3	87.2	81.2	71.5	69.3	68.0	67.6	63.7	60.5	58.2	57.0	56.6	55.1	52.8	52.2
12.0	111.3	106.9	86.4	83.0	84.9	79.2	69.8	67.7	66.5	66.1	62.4	59.3	57.1	55.9	55.5	54.1	52.0	51.3
15.0	99.81	97.47	79.78	76.73	78.58	73.73	65.18	63.36	62.32	62.11	58.61	55.77	53.80	52.81	52.52	51.27	49.53	48.71
20.0	85.74	85.23	70.98	68.37	70.13	66.24	58.73	57.23	56.41	56.35	53.23	50.75	49.03	48.26	48.06	47.01	45.71	44.79
25.0	75.60	76.06	64.21	61.90	63.57	60.33	53.61	52.33	51.65	51.68	48.85	46.64	45.11	44.49	44.34	43.44	42.41	41.47
30.0	67.92	68.93	58.82	56.75	58.33	55.55	49.44	48.33	47.76	47.84	45.24	43.24	41.86	41.34	41.24	40.45	39.60	38.68
35.0	61.88	63.23	54.42	52.54	54.04	51.62	46.00	45.01	44.51	44.63	42.22	40.39	39.12	38.69	38.62	37.92	37.19	36.31
40.0	56.98	58.55	50.76	49.03	50.45	48.31	43.09	42.20	41.77	41.91	39.66	37.97	36.79	36.43	36.37	35.74	35.11	34.27
45.0	52.93	54.64	47.66	46.06	47.41	45.48	40.61	39.79	39.41	39.57	37.46	35.88	34.78	34.47	34.43	33.86	33.29	32.49
50.0	49.52	51.32	44.99	43.49	44.78	43.04	38.46	37.71	37.36	37.54	35.54	34.06	33.03	32.75	32.73	32.20	31.70	30.93
55.0	46.59	48.45	42.67	41.26	42.49	40.90	36.57	35.87	35.56	35.75	33.85	32.46	31.48	31.24	31.23	30.74	30.28	29.55
60.0	44.06	45.95	40.62	39.30	40.48	39.01	34.90	34.25	33.97	34.16	32.36	31.03	30.11	29.90	29.89	29.44	29.01	28.32
65.0	41.84	43.75	38.81	37.55	38.69	37.33	33.41	32.80	32.55	32.74	31.02	29.76	28.88	28.69	28.69	28.27	27.87	27.22
70.0	39.88	41.80	37.19	35.99	37.09	35.82	32.08	31.50	31.27	31.46	29.81	28.61	27.77	27.60	27.60	27.21	26.84	26.21
80.0	36.56	38.48	34.41	33.31	34.33	33.22	29.77	29.26	29.05	29.26	27.73	26.62	25.84	25.71	25.72	25.38	25.04	24.47
90.0	33.85	35.75	32.10	31.09	32.05	31.05	27.85	27.38	27.21	27.41	25.98	24.96	24.23	24.13	24.14	23.83	23.52	23.01
100.0	31.60	33.48	30.16	29.22	30.12	29.22	26.22	25.79	25.64	25.84	24.50	23.54	22.86	22.77	22.80	22.51	22.23	21.75
150.0	24.29	25.89	23.67	22.95	23.66	23.05	20.73	20.42	20.32	20.52	19.47	18.73	18.20	18.16	18.19	17.99	17.77	17.45
200.0	20.23	22.00	20.09	19.46	19.94	19.60	17.61	17.29	17.34	17.53	16.62	16.36	15.81	15.48	15.53	15.32	16.48	14.93
250.0	17.84	19.48	17.83	17.27	17.67	17.43	15.67	15.22	15.45	15.63	14.82	14.58	14.10	13.82	13.88	13.64	13.83	13.36
300.0	16.18	17.72	16.25	15.74	16.10	15.90	14.30	13.76	14.11	14.28	13.55	13.33	12.89	12.64	12.70	12.49	12.66	12.24
350.0	14.96	16.42	15.07	14.60	14.94	14.76	13.29	12.80	13.11	13.28	12.60	12.39	11.99	11.77	11.82	11.63	11.79	11.40
400.0	14.03	15.42	14.16	13.72	14.05	13.89	12.50	12.06	12.35	12.51	11.87	11.67	11.29	11.09	11.14	10.96	11.11	10.75
450.0	13.30	14.64	13.45	13.02	13.34	13.19	11.88	11.47	11.74	11.89	11.29	11.09	10.74	10.55	10.60	10.44	10.57	10.24
500.0	12.71	14.00	12.87	12.46	12.77	12.63	11.38	10.99	11.24	11.40	10.82	10.63	10.29	10.12	10.17	10.01	10.14	9.82

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	44.98	42.85	42.87	43.16	42.75	40.28	39.01	36.82	36.01	35.06	34.38	33.81	32.58	32.16	31.81	31.89	30.57	30.21
3.0	47.66	45.45	45.45	45.76	45.40	42.88	41.58	39.38	38.59	37.61	36.91	36.32	35.08	34.62	34.22	34.31	32.85	32.46
3.5	49.46	47.20	47.19	47.50	47.20	44.67	43.36	41.18	40.40	39.42	38.70	38.11	36.87	36.38	35.96	36.04	34.48	34.08
4.0	50.65	48.37	48.36	48.67	48.42	45.90	44.58	42.44	41.69	40.71	39.98	39.39	38.16	37.66	37.21	37.29	35.66	35.24
4.5	51.43	49.13	49.11	49.44	49.23	46.74	45.42	43.32	42.59	41.62	40.89	40.31	39.09	38.59	38.12	38.20	36.51	36.08
5.0	51.90	49.60	49.58	49.91	49.75	47.28	45.97	43.92	43.21	42.25	41.53	40.96	39.76	39.25	38.76	38.84	37.11	36.67
5.5	52.15	49.86	49.84	50.17	50.04	47.61	46.31	44.31	43.62	42.68	41.96	41.40	40.22	39.71	39.21	39.29	37.53	37.09
6.0	52.23	49.96	49.94	50.27	50.17	47.77	46.49	44.54	43.88	42.94	42.24	41.68	40.52	40.02	39.51	39.59	37.81	37.36
6.5	52.19	49.94	49.91	50.24	50.18	47.82	46.56	44.66	44.01	43.09	42.39	41.84	40.71	40.21	39.69	39.77	37.98	37.53
7.0	52.06	49.83	49.80	50.13	50.10	47.77	46.53	44.67	44.05	43.14	42.45	41.92	40.80	40.31	39.78	39.86	38.06	37.62
8.0	51.69	49.41	49.39	49.71	49.73	47.48	46.27	44.49	43.91	43.04	42.37	41.85	40.78	40.30	39.76	39.84	38.04	37.60
9.0	50.96	48.82	48.81	49.13	49.18	47.01	45.83	44.14	43.59	42.75	42.10	41.60	40.57	40.10	39.56	39.64	37.84	37.40
10.0	50.24	48.15	48.13	48.45	48.54	46.43	45.29	43.67	43.15	42.34	41.70	41.23	40.24	39.79	39.24	39.32	37.53	37.10
11.0	49.46	47.41	47.41	47.72	47.83	45.79	44.69	43.13	42.64	41.86	41.24	40.78	39.82	39.39	38.84	38.92	37.16	36.73
12.0	48.66	46.66	46.65	46.97	47.10	45.12	44.05	42.56	42.09	41.33	40.73	40.28	39.36	38.95	38.40	38.47	36.73	36.32
15.0	46.25	44.39	44.39	44.70	44.88	43.07	42.07	40.74	40.34	39.65	39.09	38.68	37.85	37.48	36.94	37.01	35.34	34.95
20.0	42.60	40.91	40.94	41.22	41.46	39.85	38.97	37.84	37.51	36.90	36.41	36.06	35.33	35.03	34.50	34.57	33.03	32.68
25.0	39.49	37.95	37.99	38.26	38.52	37.07	36.28	35.28	35.00	34.47	34.02	33.71	33.06	32.81	32.30	32.37	30.95	30.62
30.0	36.86	35.44	35.49	35.74	36.01	34.69	33.97	33.08	32.84	32.36	31.95	31.67	31.08	30.87	30.39	30.45	29.12	28.82
35.0	34.62	33.30	33.35	33.59	33.87	32.65	31.99	31.18	30.97	30.53	30.15	29.89	29.36	29.17	28.71	28.78	27.53	27.25
40.0	32.69	31.45	31.51	31.74	32.02	30.88	30.27	29.53	29.34	28.93	28.58	28.34	27.85	27.69	27.25	27.31	26.14	25.88
45.0	31.01	29.84	29.90	30.12	30.40	29.33	28.76	28.08	27.91	27.53	27.20	26.98	26.52	26.38	25.96	26.02	24.91	24.66
50.0	29.63	28.42	28.49	28.70	28.98	27.97	27.43	26.80	26.64	26.29	25.98	25.77	25.34	25.22	24.81	24.87	23.81	23.58
55.0	28.23	27.17	27.23	27.44	27.71	26.76	26.25	25.66	25.51	25.18	24.89	24.70	24.29	24.18	23.79	23.84	22.84	22.62
60.0	27.06	26.05	26.11	26.31	26.58	25.67	25.19	24.64	24.50	24.19	23.91	23.73	23.34	23.24	22.86	22.92	21.96	21.75
65.0	26.00	25.04	25.10	25.29	25.56	24.70	24.24	23.71	23.59	23.29	23.02	22.85	22.49	22.39	22.03	22.08	21.16	20.96
70.0	25.05	24.12	24.19	24.37	24.64	23.81	23.37	22.88	22.75	22.47	22.22	22.05	21.71	21.62	21.27	21.32	20.43	20.25
80.0	23.39	22.53	22.60	22.77	23.03	22.26	21.86	21.41	21.30	21.05	20.81	20.66	20.34	20.27	19.94	19.99	19.16	18.99
90.0	21.98	21.19	21.25	21.42	21.67	20.95	20.58	20.17	20.07	19.84	19.62	19.48	19.18	19.12	18.81	18.86	18.08	17.92
100.0	20.80	20.04	20.10	20.26	20.51	19.83	19.48	19.10	19.02	18.80	18.59	18.46	18.19	18.13	17.84	17.88	17.15	17.00
150.0	16.69	16.08	16.14	16.27	16.49	15.96	15.70	15.42	15.36	15.19	15.03	14.94	14.73	14.69	14.45	14.49	13.91	13.79
200.0	14.29	13.79	13.79	13.90	14.10	13.65	13.43	13.21	13.17	13.03	12.90	12.82	12.65	12.61	12.42	12.45	12.28	11.88
250.0	12.79	12.35	12.21	12.30	12.49	12.13	12.01	11.80	11.80	11.67	11.49	11.47	11.35	11.26	11.08	11.12	11.04	10.68
300.0	11.72	11.31	11.19	11.23	11.39	11.13	11.02	10.83	10.83	10.71	10.56	10.54	10.42	10.35	10.18	10.22	10.14	9.82
350.0	10.92	10.54	10.43	10.47	10.62	10.38	10.28	10.10	10.11	10.00	9.85	9.83	9.73	9.66	9.51	9.54	9.47	9.18
400.0	10.30	9.95	9.84	9.88	10.02	9.80	9.70	9.54	9.54	9.44	9.31	9.29	9.19	9.13	8.99	9.01	8.94	8.67
450.0	9.80	9.47	9.37	9.41	9.55	9.33	9.24	9.09	9.10	9.00	8.87	8.85	8.76	8.70	8.57	8.60	8.53	8.27
500.0	9.40	9.08	9.00	9.02	9.16	8.96	8.87	8.72	8.73	8.64	8.52	8.50	8.42	8.36	8.23	8.26	8.19	7.95

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

192 76 OS IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.300	6.030	8.511	8.490	8.340	9.930	10.730	11.276	11.680	12.120	12.390	13.270	13.720	14.285	14.500	14.733	15.176	15.570
3.0	6.871	6.756	9.415	9.441	9.262	10.989	11.960	12.569	13.017	13.494	13.858	14.837	15.372	15.995	16.233	16.534	17.179	17.606
3.5	7.449	7.465	10.310	10.381	10.211	12.025	13.161	13.828	14.316	14.824	15.276	16.349	16.963	17.638	17.897	18.260	19.080	19.356
4.0	8.038	8.167	11.204	11.318	11.136	13.052	14.347	15.068	15.593	16.129	16.667	17.829	18.517	19.242	19.520	19.942	20.916	21.155
4.5	8.640	8.870	12.101	12.258	12.063	14.078	15.528	16.301	16.861	17.422	18.044	19.292	20.050	20.823	21.118	21.597	22.710	22.922
5.0	9.258	9.579	13.006	13.206	12.996	15.105	16.709	17.533	18.126	18.709	19.415	20.747	21.573	22.391	22.703	23.236	24.478	24.670
5.5	9.891	10.296	13.922	14.164	13.939	16.140	17.896	18.768	19.393	19.997	20.785	22.200	23.093	23.954	24.283	24.867	26.230	26.408
6.0	10.540	11.022	14.848	15.132	14.891	17.182	19.091	20.010	20.667	21.289	22.160	23.655	24.614	25.517	25.861	26.497	27.973	28.142
6.5	11.207	11.760	15.788	16.114	15.856	18.235	20.296	21.261	21.948	22.588	23.541	25.117	26.140	27.085	27.444	28.129	29.711	29.877
7.0	11.890	12.510	16.741	17.109	16.833	19.299	21.513	22.523	23.240	23.895	24.931	26.587	27.673	28.659	29.032	29.766	31.450	31.615
8.0	13.31	14.05	18.69	19.14	18.83	21.46	23.98	25.08	25.86	26.54	27.74	29.56	30.77	31.84	32.24	33.07	34.94	35.11
9.0	14.80	15.64	20.70	21.24	20.88	23.68	26.51	27.70	28.53	29.24	30.61	32.58	33.92	35.06	35.49	36.41	38.46	38.66
10.0	16.35	17.29	22.76	23.39	22.99	25.96	29.10	30.38	31.26	31.99	33.53	35.67	37.12	38.34	38.79	39.81	42.02	42.25
11.0	17.98	19.00	24.89	25.61	25.15	28.30	31.76	33.12	34.05	34.80	36.51	38.81	40.39	41.68	42.15	43.26	45.63	45.90
12.0	19.67	20.77	27.09	27.89	27.40	30.69	34.47	35.92	36.91	37.68	39.56	42.02	43.72	45.08	45.58	46.77	49.30	49.61
15.0	25.14	26.42	34.03	35.12	34.46	38.23	43.02	44.72	45.86	46.67	49.09	52.04	54.12	55.68	56.24	57.71	60.65	61.13
20.0	35.56	36.98	46.81	48.40	47.41	51.99	58.56	60.68	62.07	62.92	66.30	70.11	72.83	74.72	75.37	77.28	80.84	81.70
25.0	47.51	48.92	61.06	63.18	61.81	67.20	75.69	78.25	79.88	80.72	85.15	89.86	93.27	95.46	96.18	98.54	102.66	104.00
30.0	60.93	62.20	76.70	79.40	77.60	83.80	94.36	97.36	99.23	100.05	105.59	111.26	115.38	117.86	118.65	121.46	126.10	127.98
35.0	75.76	76.76	93.68	96.99	94.71	101.75	114.50	117.96	120.07	120.84	127.57	134.24	139.12	141.88	142.73	145.99	151.13	153.62
40.0	91.95	92.55	111.96	115.92	113.11	120.99	136.08	140.00	142.35	143.05	151.05	158.77	164.43	167.47	168.36	172.08	177.72	180.85
45.0	109.44	109.54	131.49	136.14	132.76	141.48	159.04	163.44	166.02	166.64	175.97	184.80	191.28	194.57	195.50	199.69	205.81	209.64
50.0	128.20	127.68	152.24	157.60	153.60	163.19	183.35	188.24	191.05	191.55	202.29	212.27	219.62	223.16	224.11	228.78	235.37	239.93
55.0	148.20	146.94	174.16	180.27	175.62	186.08	208.96	214.35	217.40	217.77	229.97	241.15	249.40	253.18	254.15	259.30	266.37	271.69
60.0	169.40	167.30	197.23	204.12	198.77	210.13	235.84	241.75	245.03	245.25	258.99	271.41	280.60	284.60	285.59	291.22	298.77	304.88
65.0	191.8	188.7	221.4	229.1	223.0	235.3	264.0	270.4	273.9	274.0	289.3	303.0	313.2	317.4	318.4	324.5	332.5	339.5
70.0	215.3	211.2	246.7	255.2	248.4	261.6	293.3	300.3	304.0	303.9	320.9	336.9	347.1	351.5	352.5	359.1	367.7	375.4
80.0	265.6	259.1	300.4	310.8	302.3	317.3	355.5	363.6	367.8	367.2	387.7	405.6	418.8	423.7	424.6	432.3	441.8	451.3
90.0	320.3	310.9	358.2	370.5	360.2	377.1	422.2	431.5	436.1	435.1	459.3	480.1	495.6	500.8	501.7	510.4	520.9	532.3
100.0	379.0	366.5	420.0	434.2	422.0	440.9	493.3	503.7	508.9	507.3	535.4	559.3	577.2	582.8	583.6	593.3	605.0	618.1
150.0	729.7	695.6	783.1	808.8	785.4	814.5	909.2	926.2	933.5	928.2	979.2	1020.8	1052.3	1059.5	1059.5	1074.7	1092.4	1115.4
200.0	1165.3	1099.7	1226.3	1266.1	1229.7	1269.2	1414.9	1439.9	1448.3	1437.4	1516.3	1567.3	1617.8	1635.3	1634.2	1655.7	1670.8	1713.7
250.0	1672.5	1565.0	1735.0	1791.4	1743.3	1790.3	1994.6	2033.7	2036.8	2019.1	2129.9	2190.7	2262.5	2293.7	2290.0	2322.6	2328.9	2395.5
300.0	2238.8	2082.9	2300.2	2375.0	2313.6	2368.2	2637.1	2707.8	2688.4	2662.9	2808.8	2880.8	2975.9	3021.4	3014.7	3059.5	3055.8	3147.8
350.0	2856.7	2646.7	2914.7	3009.3	2933.5	2995.7	3334.5	3423.4	3396.3	3360.9	3644.7	3628.7	3749.1	3809.5	3799.3	3857.2	3842.8	3961.6
400.0	3520.	3251.	3573.	3689.	3597.	3667.	4080.	4197.	4151.	4107.	4331.	4428.	4575.	4651.	4637.	4708.	4683.	4830.
450.0	4223.	3890.	4269.	4407.	4299.	4377.	4869.	5014.	4949.	4894.	5161.	5272.	5448.	5539.	5521.	5606.	5569.	5745.
500.0	4962.	4561.	4999.	5161.	5034.	5121.	5695.	5870.	5785.	5720.	6030.	6157.	6361.	6469.	6446.	6546.	6497.	6704.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.34	16.95	18.28	18.62	19.31	20.28	20.86	21.61	22.06	22.49	22.93	23.40	23.86	24.29	24.85	25.05	26.84	27.41
3.0	18.41	19.12	20.45	20.78	21.48	22.58	23.24	24.13	24.63	25.13	25.62	26.13	26.70	27.16	27.75	27.95	29.86	30.47
3.5	20.38	21.19	22.52	22.84	23.55	24.77	25.50	26.51	27.05	27.61	28.16	28.71	29.36	29.86	30.49	30.68	32.71	33.35
4.0	22.30	23.19	24.53	24.83	25.56	26.89	27.68	28.80	29.39	30.01	30.59	31.18	31.92	32.45	33.11	33.29	35.45	36.12
4.5	24.18	25.16	26.50	26.79	27.52	28.96	29.81	31.04	31.67	32.34	32.97	33.59	34.40	34.97	35.65	35.83	38.11	38.81
5.0	26.04	27.11	28.44	28.72	29.46	31.00	31.91	33.24	33.90	34.63	35.29	35.95	36.84	37.43	38.15	38.32	40.71	41.45
5.5	27.88	29.04	30.37	30.64	31.39	33.03	33.99	35.41	36.11	36.89	37.59	38.28	39.24	39.87	40.61	40.78	43.28	44.05
6.0	29.72	30.96	32.30	32.56	33.30	35.04	36.06	37.57	38.31	39.13	39.87	40.59	41.61	42.27	43.05	43.21	45.83	46.63
6.5	31.56	32.88	34.22	34.46	35.21	37.05	38.12	39.73	40.49	41.36	42.14	42.89	43.98	44.67	45.48	45.63	48.36	49.19
7.0	33.40	34.80	36.14	36.37	37.13	39.06	40.18	41.88	42.67	43.59	44.40	45.18	46.33	47.05	47.89	48.04	50.89	51.74
8.0	37.11	38.67	40.01	40.21	40.97	43.09	44.32	46.18	47.04	48.04	48.93	49.77	51.04	51.81	52.72	52.86	55.93	56.85
9.0	40.85	42.58	43.92	44.10	44.86	47.15	48.49	50.51	51.42	52.52	53.47	54.37	55.76	56.59	57.56	57.69	60.99	61.97
10.0	44.64	46.54	47.88	48.03	48.78	51.26	52.70	54.88	55.85	57.03	58.06	59.00	60.51	61.39	62.43	62.55	66.09	67.12
11.0	48.49	50.56	51.90	52.03	52.77	55.42	56.97	59.31	60.32	61.59	62.69	63.68	65.30	66.24	67.35	67.46	71.23	72.32
12.0	52.41	54.64	55.99	56.08	56.81	59.64	61.30	63.79	64.86	66.20	67.37	68.42	70.15	71.14	72.32	72.42	76.42	77.58
15.0	64.55	67.30	68.64	68.65	69.34	72.71	74.68	77.62	78.83	80.43	81.80	83.01	85.07	86.21	87.61	87.68	92.41	93.74
20.0	86.19	89.84	91.18	91.03	91.61	95.90	98.40	102.08	103.52	105.53	107.26	108.72	111.33	112.71	114.51	114.53	120.51	122.15
25.0	109.62	114.22	115.54	115.23	115.65	120.89	123.94	128.37	130.03	132.47	134.55	136.27	139.43	141.04	143.28	143.24	150.55	152.51
30.0	134.79	140.42	141.71	141.21	141.44	147.68	151.31	156.49	158.37	161.23	163.69	165.67	169.40	171.23	173.94	173.83	182.55	184.84
35.0	161.68	168.38	169.63	168.93	168.95	176.23	180.45	186.39	188.49	191.79	194.64	196.89	201.19	203.23	206.45	206.28	216.47	219.11
40.0	190.2	198.1	199.3	198.3	198.1	206.5	211.3	218.0	220.4	224.1	227.4	229.9	234.8	237.0	240.8	240.5	252.3	255.3
45.0	220.4	229.4	230.6	229.4	228.9	238.4	243.9	251.4	253.9	258.1	261.8	264.6	270.1	272.6	276.9	276.6	289.9	293.3
50.0	252.1	262.4	263.5	262.1	261.3	271.9	278.1	286.4	289.1	293.8	297.9	301.0	307.2	309.8	314.7	314.3	329.3	333.1
55.0	285.4	296.9	297.9	296.3	295.1	307.0	313.9	323.0	326.0	331.2	335.7	339.1	345.9	348.7	354.3	353.8	370.5	374.7
60.0	320.1	333.0	334.0	332.0	330.5	343.7	351.2	361.2	364.4	370.1	375.1	378.8	386.2	389.2	395.5	394.8	413.4	418.0
65.0	356.3	370.7	371.5	369.3	367.4	381.8	390.1	400.9	404.3	410.5	416.0	420.0	428.1	431.3	438.2	437.5	458.0	463.0
70.0	394.0	409.7	410.4	407.9	405.6	421.4	430.4	442.2	445.8	452.5	458.5	462.8	471.6	474.9	482.6	481.8	504.1	509.6
80.0	473.3	492.2	492.6	489.5	486.3	504.8	515.4	529.0	533.1	540.8	547.8	552.8	563.0	566.7	575.9	574.8	601.2	607.6
90.0	558.0	580.1	580.3	576.5	572.3	593.8	606.0	621.4	626.0	634.9	642.9	648.6	660.2	664.3	675.1	673.8	704.5	711.7
100.0	647.9	673.3	673.2	668.7	663.4	688.0	701.9	719.3	724.3	734.4	743.5	749.9	763.1	767.5	780.0	778.4	813.6	821.8
150.0	1168.	1213.	1211.	1202.	1190.	1232.	1256.	1283.	1291.	1307.	1323.	1333.	1355.	1361.	1383.	1380.	1440.	1454.
200.0	1793.	1861.	1858.	1844.	1823.	1886.	1920.	1959.	1969.	1993.	2015.	2030.	2061.	2069.	2103.	2097.	2172.	2208.
250.0	2505.	2599.	2600.	2580.	2548.	2634.	2679.	2731.	2742.	2774.	2807.	2824.	2865.	2878.	2925.	2917.	2999.	3063.
300.0	3291.	3413.	3423.	3400.	3356.	3462.	3515.	3582.	3592.	3634.	3680.	3699.	3750.	3769.	3830.	3819.	3908.	4001.
350.0	4141.	4293.	4313.	4287.	4230.	4356.	4418.	4502.	4511.	4563.	4623.	4644.	4704.	4731.	4807.	4793.	4889.	5014.
400.0	5048.	5232.	5261.	5232.	5161.	5309.	5381.	5481.	5489.	5552.	5626.	5649.	5720.	5754.	5846.	5829.	5933.	6091.
450.0	6004.	6222.	6262.	6229.	6143.	6314.	6396.	6513.	6520.	6595.	6684.	6709.	6791.	6832.	6941.	6920.	7033.	7225.
500.0	7004.	7257.	7308.	7271.	7170.	7365.	7457.	7592.	7598.	7684.	7789.	7816.	7909.	7958.	8085.	8061.	8183.	8409.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{193}_{77}$IR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	170.8	130.6	106.1	100.8	101.7	90.1	77.4	73.5	71.0	68.9	64.5	60.3	57.1	55.1	54.4	52.3	46.7	48.6
3.0	169.8	135.7	108.2	102.9	104.0	92.8	80.1	76.3	73.8	72.0	67.4	63.2	60.0	58.0	57.3	55.2	49.9	51.4
3.5	167.2	138.0	108.8	103.7	105.0	94.2	81.5	77.8	75.5	73.8	69.2	65.0	61.9	59.9	59.2	57.1	52.1	53.3
4.0	163.8	138.5	108.7	103.7	105.1	94.8	82.2	78.7	76.4	74.9	70.3	66.1	63.0	61.1	60.4	58.3	53.6	54.5
4.5	160.1	137.9	108.0	103.1	104.6	94.8	82.3	78.9	76.8	75.4	70.8	66.7	63.6	61.8	61.1	59.0	54.6	55.3
5.0	156.2	136.7	107.0	102.2	103.8	94.4	82.2	78.9	76.8	75.6	71.0	66.9	63.9	62.1	61.5	59.5	55.3	55.8
5.5	152.3	135.0	105.7	101.1	102.8	93.7	81.7	78.6	76.6	75.4	70.9	66.9	64.0	62.2	61.6	59.7	55.7	56.0
6.0	148.5	133.1	104.4	99.9	101.6	92.9	81.1	78.1	76.2	75.1	70.6	66.7	63.9	62.2	61.6	59.7	55.9	56.1
6.5	144.6	131.1	103.0	98.6	100.3	92.0	80.4	77.5	75.7	74.7	70.3	66.4	63.6	62.0	61.4	59.5	56.0	56.0
7.0	141.3	129.0	101.5	97.2	99.0	91.0	79.6	76.8	75.1	74.2	69.8	66.0	63.3	61.7	61.1	59.3	55.9	55.9
8.0	134.6	124.7	98.6	94.5	96.4	88.9	78.0	75.3	73.7	72.9	68.6	65.0	62.4	60.9	60.4	58.7	55.6	55.3
9.0	128.6	120.4	95.7	91.8	93.7	86.7	76.2	73.7	72.2	71.5	67.4	63.9	61.4	59.9	59.5	57.8	55.0	54.6
10.0	123.1	116.4	93.0	89.2	91.1	84.6	74.4	72.0	70.6	70.1	66.0	62.7	60.3	58.9	58.5	56.9	54.4	53.8
11.0	118.1	112.5	90.4	86.8	88.7	82.5	72.7	70.4	69.1	68.6	64.7	61.4	59.1	57.9	57.5	56.0	53.6	53.0
12.0	113.5	108.9	87.9	84.4	86.3	80.5	71.0	68.8	67.6	67.2	63.4	60.2	58.0	56.8	56.4	55.0	52.8	52.1
15.0	101.9	99.3	81.2	78.1	80.0	75.0	66.3	64.4	63.4	63.2	59.6	56.7	54.7	53.7	53.4	52.1	50.4	49.6
20.0	87.6	86.9	72.3	69.7	71.4	67.5	59.8	58.3	57.4	57.4	54.2	51.7	49.9	49.1	48.9	47.8	46.5	45.8
25.0	77.3	77.6	65.5	63.1	64.8	61.5	54.6	53.3	52.6	52.7	49.8	47.5	46.0	45.3	45.2	44.3	43.2	42.2
30.0	69.4	70.4	60.0	57.9	59.5	56.7	50.4	49.3	48.7	48.8	46.1	44.1	42.7	42.1	42.0	41.2	40.4	39.4
35.0	63.3	64.6	55.5	53.6	55.1	52.7	46.9	45.9	45.4	45.5	43.1	41.2	39.9	39.5	39.4	38.7	37.9	37.0
40.0	58.30	59.85	51.83	50.06	51.51	49.31	43.98	43.07	42.62	42.77	40.48	38.74	37.54	37.17	37.11	36.46	35.82	34.96
45.0	54.16	55.87	48.68	47.04	48.42	46.44	41.46	40.63	40.23	40.40	38.24	36.63	35.50	35.18	35.14	34.55	33.98	33.16
50.0	50.68	52.48	45.97	44.44	45.75	43.96	39.28	38.51	38.15	38.33	36.29	34.78	33.72	33.44	33.41	32.88	32.36	31.58
55.0	47.69	49.56	43.60	42.17	43.43	41.78	37.36	36.65	36.33	36.52	34.58	33.16	32.15	31.91	31.89	31.40	30.92	30.18
60.0	45.11	47.01	41.52	40.17	41.38	39.86	35.66	35.00	34.71	34.90	33.06	31.71	30.76	30.54	30.53	30.07	29.64	28.93
65.0	42.84	44.77	39.68	38.39	39.55	38.15	34.15	33.53	33.26	33.46	31.70	30.41	29.51	29.31	29.31	28.88	28.48	27.81
70.0	40.84	42.78	38.03	36.80	37.92	36.62	32.79	32.21	31.96	32.16	30.47	29.24	28.38	28.21	28.21	27.81	27.43	26.79
80.0	37.45	39.39	35.20	34.08	35.12	33.97	30.45	29.92	29.71	29.92	28.35	27.22	26.43	26.29	26.30	25.94	25.60	25.02
90.0	34.68	36.61	32.85	31.81	32.79	31.77	28.49	28.01	27.83	28.04	26.58	25.53	24.79	24.67	24.69	24.37	24.06	23.53
100.0	32.38	34.28	30.87	29.90	30.83	29.90	26.83	26.39	26.23	26.44	25.07	24.09	23.39	23.30	23.32	23.03	22.74	22.25
150.0	24.91	26.64	24.24	23.51	24.24	23.61	21.23	20.91	20.81	21.02	19.94	19.18	18.64	18.60	18.63	18.43	18.20	17.86
200.0	20.75	22.55	20.60	19.94	20.44	20.08	18.05	17.71	17.77	17.97	17.03	16.76	16.20	15.86	15.91	15.70	15.86	15.30
250.0	18.30	19.97	18.29	17.71	18.11	17.87	16.07	15.60	15.83	16.02	15.19	14.95	14.46	14.17	14.22	13.98	14.18	13.69
300.0	16.60	18.17	16.66	16.14	16.51	16.30	14.67	14.11	14.47	14.65	13.89	13.67	13.22	12.96	13.02	12.81	12.98	12.55
350.0	15.35	16.84	15.46	14.97	15.33	15.14	13.63	13.13	13.45	13.62	12.92	12.71	12.30	12.07	12.12	11.93	12.09	11.69
400.0	14.40	15.82	14.53	14.07	14.41	14.24	12.82	12.37	12.66	12.83	12.17	11.97	11.58	11.37	11.43	11.25	11.40	11.03
450.0	13.65	15.02	13.80	13.36	13.69	13.53	12.19	11.77	12.04	12.20	11.58	11.38	11.02	10.82	10.88	10.70	10.85	10.50
500.0	13.04	14.37	13.20	12.79	13.10	12.96	11.67	11.28	11.53	11.69	11.10	10.90	10.56	10.38	10.43	10.27	10.40	10.07

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	45.38	43.23	43.25	43.54	43.12	40.63	39.35	37.13	36.32	35.36	34.68	34.10	32.86	32.44	32.08	32.16	30.83	30.47
3.0	48.13	45.89	45.89	46.20	45.84	43.30	41.98	39.76	38.96	37.97	37.26	36.67	35.41	34.95	34.55	34.63	33.16	32.77
3.5	49.98	47.69	47.68	48.00	47.70	45.14	43.81	41.60	40.82	39.83	39.10	38.51	37.25	36.76	36.33	36.41	34.84	34.43
4.0	51.22	48.91	48.89	49.21	48.96	46.41	45.07	42.91	42.14	41.15	40.42	39.83	38.58	38.07	37.62	37.70	36.05	35.62
4.5	52.03	49.71	49.69	50.01	49.80	47.28	45.94	43.82	43.08	42.09	41.36	40.77	39.54	39.03	38.55	38.64	36.92	36.49
5.0	52.53	50.21	50.18	50.51	50.35	47.85	46.52	44.44	43.73	42.76	42.03	41.44	40.23	39.71	39.22	39.30	37.55	37.11
5.5	52.80	50.49	50.46	50.79	50.67	48.20	46.89	44.86	44.16	43.20	42.48	41.91	40.71	40.20	39.69	39.77	37.99	37.54
6.0	52.91	50.61	50.58	50.91	50.82	48.39	47.09	45.11	44.44	43.49	42.77	42.21	41.04	40.53	40.01	40.09	38.29	37.84
6.5	52.88	50.60	50.57	50.91	50.84	48.45	47.17	45.23	44.59	43.65	42.95	42.39	41.24	40.73	40.20	40.29	38.47	38.02
7.0	52.77	50.50	50.48	50.81	50.77	48.42	47.15	45.26	44.64	43.72	43.02	42.48	41.35	40.84	40.31	40.39	38.56	38.12
8.0	52.32	50.11	50.08	50.41	50.42	48.14	46.92	45.11	44.52	43.64	42.96	42.43	41.35	40.86	40.31	40.39	38.56	38.12
9.0	51.71	49.54	49.52	49.84	49.90	47.69	46.50	44.78	44.22	43.37	42.70	42.20	41.15	40.68	40.13	40.21	38.38	37.94
10.0	50.99	48.87	48.85	49.18	49.26	47.12	45.96	44.32	43.79	42.97	42.32	41.83	40.83	40.37	39.82	39.89	38.09	37.65
11.0	50.22	48.14	48.13	48.45	48.57	46.49	45.37	43.79	43.29	42.50	41.87	41.40	40.43	39.99	39.43	39.51	37.72	37.29
12.0	49.42	47.39	47.39	47.70	47.84	45.83	44.73	43.22	42.75	41.98	41.36	40.91	39.97	39.55	38.99	39.07	37.30	36.88
15.0	47.02	45.12	45.13	45.43	45.62	43.77	42.76	41.41	41.00	40.30	39.73	39.32	38.47	38.09	37.54	37.61	35.92	35.52
20.0	43.35	41.64	41.66	41.95	42.19	40.55	39.65	38.50	38.16	37.55	37.04	36.68	35.94	35.64	35.10	35.17	33.60	33.24
25.0	40.22	38.65	38.69	38.96	39.22	37.75	36.94	35.93	35.64	35.10	34.64	34.32	33.66	33.41	32.89	32.96	31.51	31.18
30.0	37.57	36.12	36.16	36.42	36.70	35.35	34.61	33.71	33.46	32.97	32.55	32.26	31.67	31.45	30.96	31.02	29.67	29.36
35.0	35.30	33.95	34.00	34.25	34.53	33.29	32.61	31.79	31.57	31.12	30.73	30.47	29.93	29.74	29.27	29.33	28.06	27.78
40.0	33.35	32.08	32.14	32.37	32.66	31.50	30.87	30.12	29.92	29.51	29.15	28.91	28.40	28.24	27.79	27.85	26.65	26.39
45.0	31.65	30.45	30.51	30.74	31.02	29.93	29.35	28.65	28.47	28.09	27.75	27.53	27.06	26.91	26.48	26.54	25.41	25.16
50.0	30.15	29.02	29.08	29.29	29.58	28.55	28.00	27.36	27.19	26.83	26.51	26.31	25.87	25.74	25.32	25.38	24.30	24.07
55.0	28.82	27.74	27.81	28.01	28.30	27.32	26.80	26.20	26.05	25.71	25.41	25.21	24.80	24.68	24.28	24.34	23.31	23.09
60.0	27.64	26.60	26.67	26.87	27.15	26.22	25.73	25.16	25.02	24.70	24.41	24.23	23.84	23.73	23.35	23.40	22.42	22.21
65.0	26.57	25.58	25.64	25.84	26.12	25.23	24.76	24.22	24.09	23.79	23.52	23.34	22.97	22.87	22.50	22.56	21.61	21.41
70.0	25.60	24.65	24.72	24.90	25.18	24.33	23.88	23.37	23.25	22.96	22.70	22.53	22.18	22.09	21.73	21.78	20.88	20.68
80.0	23.91	23.03	23.10	23.28	23.54	22.76	22.34	21.88	21.77	21.51	21.27	21.12	20.79	20.72	20.38	20.43	19.58	19.41
90.0	22.49	21.67	21.73	21.90	22.16	21.43	21.04	20.62	20.52	20.28	20.06	19.92	19.62	19.55	19.23	19.28	18.49	18.32
100.0	21.28	20.50	20.56	20.72	20.97	20.29	19.93	19.54	19.45	19.23	19.01	18.88	18.60	18.54	18.24	18.29	17.54	17.38
150.0	17.09	16.47	16.53	16.66	16.88	16.34	16.07	15.79	15.72	15.56	15.39	15.29	15.08	15.04	14.80	14.84	14.24	14.12
200.0	14.64	14.13	14.12	14.24	14.44	13.99	13.76	13.54	13.49	13.35	13.21	13.13	12.96	12.92	12.72	12.76	12.58	12.17
250.0	13.11	12.65	12.61	12.61	12.80	12.44	12.31	12.09	12.10	11.96	11.78	11.76	11.63	11.54	11.36	11.39	11.31	10.95
300.0	12.01	11.60	11.47	11.51	11.68	11.41	11.30	11.10	11.11	10.98	10.82	10.80	10.69	10.61	10.44	10.47	10.40	10.07
350.0	11.20	10.81	10.70	10.73	10.89	10.64	10.54	10.36	10.37	10.25	10.10	10.08	9.98	9.91	9.75	9.78	9.71	9.41
400.0	10.56	10.20	10.09	10.13	10.28	10.05	9.95	9.78	9.79	9.68	9.54	9.53	9.43	9.36	9.22	9.25	9.17	8.90
450.0	10.06	9.71	9.62	9.65	9.79	9.57	9.48	9.32	9.33	9.23	9.10	9.08	8.99	8.93	8.79	8.82	8.74	8.49
500.0	9.65	9.32	9.23	9.26	9.40	9.19	9.10	8.95	8.96	8.86	8.74	8.72	8.63	8.57	8.44	8.47	8.40	8.15

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

193 IR IONS 77

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.270	6.000	8.471	8.450	8.300	9.883	10.680	11.223	11.620	12.050	12.320	13.200	13.650	14.215	14.430	14.662	15.101	15.490
3.0	6.836	6.723	9.370	9.396	9.237	10.936	11.904	12.510	12.951	13.418	13.781	14.760	15.295	15.918	16.156	16.455	17.095	17.418
3.5	7.408	7.427	10.259	10.329	10.159	11.967	13.098	13.761	14.242	14.741	15.192	16.264	16.877	17.553	17.811	18.173	18.987	19.259
4.0	7.991	8.125	11.146	11.259	11.078	12.987	14.276	14.994	15.511	16.038	16.574	17.735	18.422	19.147	19.424	19.845	20.812	21.048
4.5	8.587	8.823	12.036	12.192	11.998	14.005	15.448	16.218	16.770	17.321	17.942	19.188	19.945	20.717	21.013	21.489	22.596	22.804
5.0	9.197	9.526	12.934	13.132	12.924	15.025	16.621	17.441	18.026	18.599	19.303	20.633	21.458	22.275	22.587	23.117	24.352	24.540
5.5	9.823	10.236	13.841	14.082	13.858	16.051	17.799	18.666	19.284	19.877	20.663	22.075	22.966	23.827	24.155	24.736	26.091	26.266
6.0	10.465	10.955	14.760	15.042	14.802	17.084	18.984	19.898	20.547	21.159	22.026	23.519	24.475	25.378	25.721	26.354	27.820	27.986
6.5	11.123	11.686	15.690	16.014	15.758	18.128	20.178	21.139	21.818	22.447	23.395	24.969	25.988	26.933	27.291	27.973	29.545	29.707
7.0	11.798	12.428	16.634	17.000	16.726	19.182	21.384	22.390	23.098	23.743	24.773	26.426	27.509	28.493	28.866	29.596	31.270	31.432
8.0	13.20	13.95	18.56	19.01	18.70	21.33	23.83	24.93	25.69	26.37	27.56	29.37	30.58	31.64	32.04	32.87	34.73	34.90
9.0	14.66	15.53	20.55	21.09	20.73	23.53	26.34	27.52	28.34	29.04	30.40	32.37	33.70	34.84	35.26	36.18	38.22	38.41
10.0	16.20	17.16	22.59	23.22	22.82	25.78	28.90	30.17	31.04	31.76	33.29	35.42	36.87	38.08	38.53	39.54	41.75	41.97
11.0	17.80	18.84	24.70	25.41	24.97	28.09	31.53	32.88	33.81	34.55	36.24	38.53	40.10	41.39	41.86	42.96	45.32	45.58
12.0	19.47	20.59	26.87	27.67	27.18	30.46	34.21	35.65	36.63	37.39	39.26	41.70	43.40	44.75	45.25	46.44	48.96	49.25
15.0	24.86	26.16	33.73	34.80	34.15	37.91	42.66	44.35	45.48	46.28	48.68	51.61	53.68	55.24	55.80	57.26	60.17	60.65
20.0	35.12	36.57	46.35	47.92	46.94	51.50	58.01	60.12	61.49	62.33	65.68	69.46	72.17	74.05	74.70	76.59	80.12	80.98
25.0	46.88	48.34	60.39	62.49	61.15	66.50	74.91	77.45	79.07	79.90	84.29	88.96	92.34	94.52	95.25	97.58	101.67	102.99
30.0	60.08	61.41	75.81	78.48	76.71	82.87	93.32	96.29	98.15	98.96	104.45	110.06	114.15	116.62	117.41	120.19	124.80	126.66
35.0	74.65	75.74	92.54	95.81	93.57	100.56	113.17	116.60	118.69	119.46	126.11	132.73	137.55	140.30	141.15	144.38	149.48	151.93
40.0	90.56	91.27	110.54	114.45	111.69	119.51	134.43	138.31	140.64	141.34	149.24	156.90	162.50	165.52	166.41	170.10	175.68	178.77
45.0	107.75	107.97	129.76	134.35	131.02	139.69	157.04	161.40	163.95	164.57	173.78	182.53	188.95	192.22	193.15	197.30	203.35	207.13
50.0	126.18	125.80	150.17	155.47	151.54	161.06	180.96	185.81	188.59	189.10	199.70	209.58	216.85	220.37	221.32	225.94	232.47	236.97
55.0	145.82	144.73	171.74	177.77	173.20	183.58	206.16	211.50	214.52	214.90	226.95	238.01	246.16	249.92	250.89	255.99	262.98	268.24
60.0	166.63	164.73	194.42	201.23	196.97	207.24	232.61	238.46	241.71	241.94	255.50	267.78	276.86	280.84	281.83	287.40	294.87	300.90
65.0	188.6	185.8	218.2	225.8	219.8	232.0	260.3	266.6	270.1	270.2	285.3	298.9	308.9	313.1	314.1	320.2	328.1	334.9
70.0	211.7	207.8	243.1	251.5	244.8	257.8	289.1	296.0	299.7	299.6	316.4	331.2	342.3	346.7	347.7	354.2	362.6	370.3
80.0	261.1	254.9	295.9	306.0	297.7	312.6	350.2	358.2	362.4	361.9	382.1	399.7	412.8	417.6	418.8	426.1	435.5	444.9
90.0	314.7	305.8	352.7	364.7	354.6	371.4	415.8	426.0	429.6	428.8	452.4	473.0	488.3	493.4	494.4	502.9	513.4	524.5
100.0	372.3	360.3	413.3	427.3	415.3	434.0	485.7	496.0	501.1	499.5	527.3	550.8	568.5	574.0	574.8	584.4	595.9	608.9
150.0	716.2	683.3	769.8	795.0	772.0	800.9	894.0	910.8	918.0	912.8	963.0	1004.0	1035.0	1041.9	1042.1	1057.2	1074.6	1097.3
200.0	1143.4	1079.6	1204.5	1243.7	1207.9	1247.0	1390.2	1414.8	1423.1	1412.5	1490.0	1540.2	1589.9	1607.2	1606.1	1627.3	1642.3	1684.4
250.0	1640.4	1535.8	1703.4	1758.8	1711.5	1758.0	1958.7	1997.2	2000.3	1983.0	2091.8	2151.7	2222.3	2252.9	2249.4	2281.4	2287.8	2353.1
300.0	2195.4	2043.5	2257.4	2330.8	2270.7	2324.6	2588.6	2649.5	2639.2	2614.2	2757.4	2828.2	2921.7	2966.5	2960.0	3004.0	3000.5	3090.8
350.0	2800.9	2596.0	2859.7	2952.6	2878.2	2939.7	3272.2	3359.5	3332.0	3298.4	3478.8	3561.4	3679.7	3739.0	3729.1	3786.0	3772.0	3888.6
400.0	3451.	3188.	3504.	3618.	3531.	3597.	4003.	4118.	4072.	4029.	4249.	4345.	4489.	4564.	4550.	4620.	4595.	4739.
450.0	4140.	3815.	4186.	4323.	4216.	4293.	4776.	4918.	4854.	4801.	5063.	5179.	5344.	5434.	5416.	5500.	5464.	5637.
500.0	4864.	4472.	4902.	5061.	4937.	5022.	5585.	5757.	5674.	5610.	5914.	6039.	6240.	6345.	6323.	6421.	6373.	6576.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.26	16.85	18.17	18.51	19.19	20.16	20.74	21.49	21.93	22.37	22.81	23.28	23.74	24.17	24.73	24.93	26.71	27.27
3.0	18.31	19.01	20.33	20.66	21.36	22.46	23.11	23.99	24.49	24.99	25.49	26.00	26.57	27.03	27.62	27.82	29.72	30.32
3.5	20.28	21.07	22.39	22.71	23.42	24.64	25.36	26.36	26.91	27.47	28.01	28.57	29.22	29.72	30.34	30.53	32.55	33.19
4.0	22.18	23.07	24.39	24.69	25.41	26.74	27.53	28.65	29.24	29.85	30.44	31.03	31.76	32.29	32.95	33.13	35.27	35.94
4.5	24.05	25.02	26.35	26.63	27.37	28.80	29.65	30.87	31.50	32.17	32.80	33.42	34.23	34.80	35.48	35.66	37.92	38.61
5.0	25.89	26.95	28.28	28.55	29.29	30.83	31.73	33.06	33.72	34.44	35.11	35.77	36.65	37.25	37.96	38.14	40.51	41.23
5.5	27.73	28.87	30.20	30.46	31.20	32.84	33.80	35.22	35.92	36.69	37.39	38.08	39.03	39.66	40.41	40.57	43.06	43.82
6.0	29.55	30.78	32.11	32.36	33.11	34.83	35.85	37.36	38.09	38.91	39.66	40.37	41.39	42.05	42.83	42.99	45.59	46.38
6.5	31.38	32.69	34.01	34.25	35.00	36.83	37.90	39.50	40.26	41.13	41.91	42.66	43.74	44.43	45.23	45.39	48.10	48.92
7.0	33.20	34.59	35.92	36.15	36.90	38.82	39.94	41.63	42.42	43.34	44.15	44.93	46.07	46.79	47.63	47.78	50.61	51.46
8.0	36.87	38.43	39.76	39.96	40.72	42.82	44.04	45.90	46.75	47.75	48.64	49.47	50.74	51.51	52.42	52.56	55.61	56.52
9.0	40.58	42.30	43.63	43.81	44.56	46.84	48.18	50.19	51.10	52.19	53.14	54.03	55.42	56.25	57.21	57.35	60.63	61.59
10.0	44.34	46.22	47.56	47.71	48.45	50.91	52.35	54.52	55.48	56.66	57.68	58.63	60.12	61.01	62.04	62.17	65.67	66.70
11.0	48.16	50.20	51.54	51.66	52.40	55.04	56.58	58.90	59.92	61.17	62.27	63.26	64.87	65.81	66.91	67.03	70.76	71.85
12.0	52.03	54.24	55.58	55.67	56.40	59.22	60.86	63.34	64.40	65.74	66.91	67.95	69.68	70.66	71.83	71.94	75.91	77.05
15.0	64.04	66.76	68.10	68.11	68.80	72.14	74.10	77.02	78.23	79.82	81.18	82.39	84.44	85.57	86.96	87.04	91.72	93.04
20.0	85.43	89.04	90.37	90.23	90.81	95.06	97.54	101.20	102.63	104.63	106.35	107.80	110.39	111.77	113.55	113.57	119.61	121.13
25.0	108.56	113.12	114.43	114.12	114.55	119.74	122.77	127.16	128.82	131.23	133.30	135.01	138.15	139.75	141.97	141.93	149.18	151.12
30.0	133.40	138.96	140.25	139.76	140.00	146.18	149.77	154.91	156.78	159.62	162.06	164.03	167.72	169.54	172.23	172.12	180.76	183.03
35.0	159.91	166.54	167.78	167.10	167.12	174.33	178.51	184.40	186.48	189.76	192.58	194.82	199.08	201.10	204.30	204.13	214.22	216.84
40.0	188.1	195.8	197.0	196.1	195.9	204.1	208.9	215.6	217.9	221.6	224.8	227.3	232.2	234.4	238.2	237.9	249.5	252.5
45.0	217.8	226.7	227.8	226.7	226.2	235.6	241.0	248.5	251.0	255.2	258.8	261.6	267.0	269.4	273.7	273.4	286.6	290.0
50.0	249.0	259.2	260.2	258.9	258.1	268.6	274.7	282.9	285.7	290.3	294.4	297.4	303.5	306.1	311.0	310.6	325.5	329.2
55.0	281.8	293.2	294.2	292.6	291.4	303.2	309.9	319.0	321.9	327.1	331.6	334.9	341.6	344.4	349.9	349.4	366.0	370.1
60.0	316.0	328.7	329.6	327.8	326.3	339.2	346.7	356.6	359.7	365.4	370.3	374.0	381.3	384.3	390.5	389.9	408.2	412.8
65.0	351.6	365.7	366.5	364.4	362.5	376.8	384.9	395.7	399.1	405.2	410.6	414.6	422.6	425.7	432.6	431.9	452.1	457.0
70.0	388.6	404.2	404.9	402.4	400.1	415.7	424.6	436.3	439.8	446.5	452.4	456.6	465.3	468.7	476.2	475.4	497.5	502.9
80.0	466.7	485.2	485.7	482.7	479.5	497.8	508.3	521.7	525.7	533.4	540.3	545.2	555.3	558.9	568.0	567.0	593.1	599.3
90.0	549.9	571.7	571.9	568.2	564.0	585.3	597.3	612.6	617.0	625.8	633.8	639.4	650.9	654.9	665.6	664.3	694.5	701.7
100.0	638.2	663.3	663.3	658.8	653.6	677.9	691.6	708.8	713.7	723.6	732.7	738.9	752.0	756.3	768.7	767.1	801.8	809.9
150.0	1149.	1193.	1191.	1183.	1171.	1212.	1235.	1263.	1270.	1286.	1302.	1312.	1333.	1339.	1361.	1358.	1418.	1431.
200.0	1762.	1830.	1826.	1812.	1792.	1854.	1887.	1926.	1936.	1959.	1981.	1996.	2026.	2035.	2067.	2062.	2135.	2171.
250.0	2461.	2553.	2554.	2535.	2504.	2588.	2632.	2683.	2694.	2725.	2758.	2775.	2815.	2828.	2874.	2866.	2946.	3009.
300.0	3232.	3351.	3361.	3338.	3295.	3400.	3461.	3518.	3528.	3569.	3614.	3633.	3682.	3702.	3762.	3751.	3838.	3930.
350.0	4065.	4214.	4234.	4208.	4152.	4277.	4337.	4419.	4428.	4480.	4538.	4559.	4618.	4645.	4719.	4705.	4800.	4922.
400.0	4953.	5134.	5163.	5134.	5065.	5211.	5281.	5379.	5387.	5449.	5522.	5544.	5614.	5648.	5738.	5721.	5824.	5978.
450.0	5891.	6104.	6143.	6111.	6027.	6195.	6275.	6390.	6398.	6471.	6558.	6583.	6663.	6704.	6811.	6791.	6902.	7090.
500.0	6871.	7119.	7169.	7133.	7034.	7225.	7315.	7448.	7454.	7539.	7641.	7668.	7759.	7807.	7932.	7908.	8029.	8250.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{195}_{78}$PT IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	173.1	131.7	107.3	101.9	102.8	91.0	78.1	74.2	71.6	69.5	65.1	60.8	57.6	55.6	54.9	52.7	47.1	49.0
3.0	172.2	137.1	109.4	104.1	105.2	93.8	80.9	77.0	74.6	72.7	68.1	63.8	60.6	58.6	57.8	55.7	50.4	51.9
3.5	169.7	139.5	110.2	104.9	106.2	95.3	82.4	78.7	76.3	74.6	70.0	65.7	62.5	60.5	59.8	57.7	52.6	53.8
4.0	166.4	140.2	110.0	104.9	106.4	96.9	83.2	79.6	77.3	75.7	71.1	66.8	63.7	61.7	61.0	58.9	54.2	55.1
4.5	162.7	139.7	109.4	104.4	106.0	96.9	83.4	79.9	77.7	76.3	71.6	67.5	64.4	62.5	61.8	59.7	55.2	56.0
5.0	158.8	138.6	108.4	103.6	105.2	96.6	83.2	79.9	77.8	76.5	71.9	67.7	64.7	62.9	62.2	60.2	55.9	56.5
5.5	154.9	137.0	107.2	102.5	104.2	96.0	82.8	79.6	77.6	76.4	71.8	67.7	64.8	63.0	62.4	60.4	56.4	56.7
6.0	151.1	135.1	106.9	101.3	103.0	94.2	82.2	79.1	77.2	76.1	71.6	67.6	64.7	63.0	62.4	60.4	56.6	56.8
6.5	147.4	133.1	104.5	100.0	101.8	93.3	81.5	78.5	76.7	75.7	71.2	67.3	64.5	62.8	62.2	60.3	56.7	56.8
7.0	143.8	131.0	103.0	98.7	100.5	92.3	80.8	77.9	76.1	75.2	70.7	66.9	64.1	62.5	61.9	60.1	56.7	56.6
8.0	137.1	126.7	100.1	96.9	97.8	90.2	79.1	76.4	74.7	74.0	69.6	65.9	63.3	61.7	61.2	59.5	56.4	56.1
9.0	131.0	122.4	97.3	93.3	95.2	88.1	77.3	74.8	73.2	72.6	68.4	64.8	62.3	60.8	60.3	58.7	55.8	55.4
10.0	125.4	118.4	94.5	90.7	92.6	85.9	75.6	73.1	71.7	71.2	67.1	63.6	61.2	59.8	59.4	57.8	55.2	54.6
11.0	120.3	114.5	91.8	88.2	90.1	83.8	73.8	71.5	70.2	69.7	65.7	62.4	60.0	58.8	58.3	56.8	54.4	53.8
12.0	115.7	110.9	89.3	85.8	87.7	81.8	72.1	70.0	68.7	68.3	64.4	61.2	58.9	57.7	57.3	55.9	53.6	52.9
15.0	103.9	101.2	82.6	79.5	81.4	76.3	67.4	66.5	64.5	64.2	60.6	57.7	55.6	54.6	54.3	53.0	51.2	50.3
20.0	89.4	88.7	73.7	70.9	72.8	68.7	60.9	59.3	58.5	58.4	55.2	52.6	50.8	50.0	49.8	48.7	47.3	46.4
25.0	78.9	79.2	66.7	64.3	66.0	62.6	55.7	54.3	53.6	53.6	50.7	48.4	46.8	46.1	46.0	45.1	44.0	43.0
30.0	71.0	71.9	61.2	59.0	60.7	57.8	51.4	50.2	49.6	49.7	47.0	44.9	43.5	42.9	42.8	42.0	41.1	40.2
35.0	64.7	66.0	56.7	54.7	56.3	53.7	47.9	46.8	46.3	46.4	43.9	42.0	40.7	40.2	40.1	39.4	38.7	37.7
40.0	59.62	61.16	52.91	51.10	52.57	50.31	44.88	43.94	43.48	43.63	41.29	39.52	38.29	37.91	37.85	37.19	36.53	35.65
45.0	55.40	57.10	49.71	48.03	49.43	47.40	42.32	41.46	41.06	41.23	39.02	37.37	36.23	35.89	35.85	35.25	34.66	33.83
50.0	51.85	53.66	46.95	45.38	46.73	44.88	40.10	39.31	38.95	39.13	37.05	35.50	34.42	34.13	34.10	33.55	33.02	32.23
55.0	48.80	50.68	44.55	43.08	44.36	42.68	38.16	37.42	37.10	37.29	35.31	33.85	32.83	32.58	32.56	32.05	31.57	30.81
60.0	46.16	48.08	42.43	41.04	42.28	40.72	36.43	35.75	35.45	35.65	33.77	32.38	31.41	31.19	31.18	30.71	30.26	29.54
65.0	43.85	45.80	40.56	39.24	40.43	38.99	34.90	34.26	33.98	34.19	32.39	31.07	30.14	29.94	29.94	29.50	29.09	28.40
70.0	41.80	43.77	38.88	37.62	38.77	37.43	33.51	32.91	32.66	32.87	31.14	29.88	29.00	28.82	28.82	28.41	28.02	27.37
80.0	38.34	40.31	35.99	34.85	35.91	34.73	31.13	30.59	30.37	30.58	28.98	27.83	27.01	26.87	26.88	26.51	26.16	25.67
90.0	35.52	37.47	33.60	32.54	33.54	32.49	29.14	28.65	28.46	28.67	27.18	26.10	25.34	25.23	25.25	24.92	24.59	24.05
100.0	33.17	35.10	31.58	30.60	31.54	30.59	27.45	27.00	26.83	27.04	25.64	24.64	23.92	23.83	23.85	23.55	23.25	22.75
150.0	25.52	27.29	24.83	24.08	24.82	24.17	21.74	21.41	21.31	21.52	20.42	19.64	19.08	19.04	19.07	18.86	18.63	18.29
200.0	21.27	23.11	21.10	20.43	20.94	20.57	18.49	18.15	18.20	18.40	17.44	17.17	16.60	16.24	16.30	16.08	16.24	15.67
250.0	18.78	20.47	18.74	18.15	18.56	18.31	16.46	15.98	16.23	16.42	15.57	15.32	14.81	14.52	14.57	14.33	14.53	14.03
300.0	17.02	18.63	17.08	16.54	16.93	16.71	15.03	14.47	14.83	15.01	14.24	14.01	13.55	13.29	13.36	13.13	13.30	12.86
350.0	15.74	17.27	15.85	15.35	15.71	15.52	13.97	13.46	13.79	13.96	13.25	13.03	12.61	12.37	12.43	12.23	12.39	11.99
400.0	14.77	16.22	14.90	14.43	14.78	14.61	13.15	12.68	12.98	13.15	12.48	12.27	11.88	11.66	11.72	11.53	11.68	11.31
450.0	14.00	15.40	14.15	13.70	14.04	13.88	12.50	12.07	12.35	12.51	11.87	11.67	11.30	11.10	11.15	10.98	11.12	10.77
500.0	13.38	14.73	13.54	13.11	13.44	13.29	11.97	11.57	11.83	11.99	11.38	11.18	10.83	10.64	10.70	10.53	10.67	10.33

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	45.76	43.60	43.61	43.91	43.48	40.96	39.68	37.44	36.63	35.66	34.96	34.38	33.13	32.71	32.35	32.43	31.08	30.73
3.0	48.58	46.33	46.32	46.63	46.27	43.70	42.37	40.13	39.32	38.32	37.61	37.01	35.74	35.27	34.87	34.95	33.47	33.08
3.5	50.49	48.18	48.17	48.49	48.18	45.59	44.25	42.02	41.23	40.23	39.49	38.89	37.62	37.13	36.69	36.78	35.18	34.77
4.0	51.77	49.44	49.42	49.74	49.49	46.91	45.56	43.36	42.59	41.59	40.85	40.25	38.99	38.48	38.02	38.10	36.43	36.00
4.5	52.62	50.27	50.25	50.58	50.37	47.81	46.46	44.31	43.56	42.57	41.83	41.23	39.98	39.46	38.98	39.07	37.34	36.90
5.0	53.15	50.80	50.77	51.11	50.94	48.41	47.07	44.96	44.24	43.25	42.52	41.93	40.70	40.18	39.68	39.76	37.99	37.54
5.5	53.45	51.11	51.08	51.41	51.28	48.79	47.46	45.40	44.70	43.73	42.99	42.41	41.21	40.68	40.17	40.25	38.45	37.99
6.0	53.58	51.25	51.22	51.55	51.46	48.99	47.68	45.67	44.99	44.03	43.31	42.74	41.55	41.03	40.50	40.59	38.76	38.30
6.5	53.57	51.26	51.23	51.56	51.50	49.07	47.77	45.81	45.16	44.21	43.49	42.93	41.77	41.25	40.72	40.80	38.96	38.50
7.0	53.47	51.17	51.14	51.48	51.44	49.05	47.77	45.86	45.22	44.29	43.58	43.03	41.89	41.38	40.83	40.92	39.07	38.61
8.0	53.05	50.80	50.77	51.11	51.12	48.80	47.56	45.73	45.13	44.23	43.54	43.01	41.91	41.41	40.86	40.94	39.08	38.63
9.0	52.45	50.24	50.22	50.55	50.60	48.36	47.15	45.41	44.84	43.98	43.30	42.79	41.73	41.25	40.69	40.77	38.92	38.47
10.0	51.74	49.59	49.57	49.90	49.98	47.81	46.63	44.96	44.43	43.59	42.94	42.44	41.42	40.96	40.39	40.47	38.63	38.19
11.0	50.98	48.87	48.86	49.18	49.29	47.19	46.05	44.44	43.94	43.13	42.49	42.01	41.03	40.58	40.01	40.09	38.27	37.84
12.0	50.19	48.12	48.11	48.44	48.57	46.53	45.42	43.88	43.40	42.61	41.99	41.53	40.58	40.15	39.58	39.66	37.86	37.43
15.0	47.79	45.86	45.86	46.17	46.36	44.48	43.45	42.08	41.66	40.94	40.37	39.96	39.08	38.70	38.14	38.21	36.49	36.09
20.0	44.11	42.36	42.38	42.67	42.91	41.25	40.34	39.16	38.81	38.19	37.68	37.31	36.56	36.24	35.70	35.77	34.17	33.81
25.0	40.95	39.35	39.39	39.66	39.93	38.43	37.61	36.57	36.28	35.73	35.26	34.94	34.27	34.00	33.48	33.55	32.07	31.73
30.0	38.27	36.79	36.84	37.10	37.38	36.01	35.26	34.34	34.08	33.58	33.15	32.86	32.26	32.03	31.63	31.60	30.22	29.90
35.0	36.99	34.61	34.66	34.91	35.20	33.92	33.23	32.40	32.17	31.72	31.32	31.06	30.50	30.31	29.83	29.89	28.59	28.31
40.0	34.01	32.71	32.77	33.01	33.30	32.12	31.48	30.71	30.51	30.09	29.72	29.47	28.96	28.79	28.33	28.39	27.17	26.90
45.0	32.29	31.06	31.12	31.35	31.65	30.63	29.93	29.23	29.04	28.65	28.30	28.08	27.60	27.45	27.01	27.07	25.91	25.66
50.0	30.77	29.61	29.67	29.89	30.18	29.13	28.57	27.91	27.74	27.38	27.05	26.84	26.39	26.26	25.83	25.89	24.79	24.55
55.0	29.42	28.32	28.38	28.60	28.88	27.89	27.36	26.74	26.59	26.24	25.93	25.73	25.31	25.19	24.78	24.84	23.79	23.56
60.0	28.22	27.16	27.23	27.43	27.72	26.77	26.27	25.69	25.54	25.22	24.92	24.74	24.34	24.23	23.83	23.89	22.89	22.67
65.0	27.13	26.12	26.19	26.39	26.67	25.76	25.28	24.74	24.60	24.29	24.01	23.84	23.45	23.36	22.98	23.03	22.07	21.86
70.0	26.15	25.18	25.25	25.44	25.72	24.85	24.39	23.87	23.75	23.45	23.18	23.02	22.65	22.58	22.19	22.25	21.32	21.12
80.0	24.44	23.54	23.60	23.79	24.06	23.25	22.83	22.36	22.25	21.98	21.73	21.58	21.25	21.17	20.82	20.87	20.01	19.83
90.0	22.99	22.15	22.22	22.39	22.65	21.90	21.51	21.08	20.98	20.73	20.50	20.36	20.05	19.98	19.66	19.71	18.89	18.72
100.0	21.76	20.96	21.02	21.19	21.45	20.74	20.38	19.98	19.89	19.66	19.44	19.31	19.02	18.96	18.65	18.70	17.93	17.77
150.0	17.49	16.86	16.92	17.05	17.28	16.73	16.45	16.16	16.09	15.92	15.75	15.65	15.43	15.39	15.14	15.19	14.57	14.45
200.0	14.99	14.47	14.47	14.58	14.79	14.33	14.09	13.86	13.81	13.68	13.53	13.45	13.27	13.23	13.03	13.06	12.89	12.47
250.0	13.43	12.97	12.82	12.92	13.12	12.74	12.61	12.39	12.39	12.25	12.07	12.06	11.91	11.82	11.63	11.67	11.59	11.22
300.0	12.31	11.89	11.76	11.80	11.97	11.70	11.58	11.38	11.38	11.26	11.09	11.07	10.95	10.87	10.70	10.73	10.65	10.32
350.0	11.48	11.08	10.96	11.00	11.17	10.91	10.80	10.62	10.63	10.51	10.36	10.34	10.23	10.16	10.00	10.03	9.95	9.65
400.0	10.83	10.46	10.35	10.38	10.54	10.30	10.20	10.03	10.04	9.93	9.78	9.77	9.67	9.60	9.45	9.48	9.40	9.12
450.0	10.31	9.96	9.86	9.89	10.04	9.82	9.72	9.56	9.57	9.46	9.33	9.31	9.22	9.15	9.01	9.04	8.97	8.70
500.0	9.89	9.56	9.46	9.49	9.64	9.42	9.33	9.18	9.19	9.09	8.96	8.94	8.85	8.79	8.66	8.68	8.61	8.36

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

196 PT IONS 78

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.270	5.990	8.461	8.440	8.290	9.870	10.670	11.219	11.620	12.050	12.320	13.190	13.630	14.199	14.420	14.654	15.092	15.480
3.0	6.834	6.714	9.360	9.385	9.226	10.924	11.895	12.507	12.952	13.419	13.782	14.752	15.277	15.904	16.148	16.460	17.089	17.410
3.5	7.404	7.418	10.247	10.317	10.148	11.954	13.087	13.757	14.242	14.741	15.193	16.255	16.859	17.539	17.803	18.168	18.981	19.253
4.0	7.984	8.115	11.132	11.246	11.065	12.973	14.264	14.988	15.511	16.037	16.574	17.726	18.403	19.132	19.416	19.840	20.806	21.041
4.5	8.577	8.811	12.021	12.177	11.983	13.989	15.435	16.211	16.768	17.319	17.940	19.177	19.924	20.701	21.003	21.482	22.688	22.796
5.0	9.183	9.512	12.916	13.114	12.906	15.007	16.605	17.431	18.021	18.595	19.298	20.619	21.434	22.256	22.575	23.108	24.342	24.529
5.5	9.805	10.219	13.820	14.060	13.837	16.030	17.780	18.654	19.276	19.870	20.655	22.058	22.939	23.805	24.140	24.724	26.078	26.252
6.0	10.442	10.936	14.735	15.017	14.778	17.060	18.961	19.882	20.536	21.148	22.015	23.499	24.445	25.353	25.703	26.338	27.803	27.969
6.5	11.096	11.663	15.662	15.986	15.731	18.100	20.152	21.119	21.803	22.432	23.381	24.944	25.954	26.903	27.268	27.953	29.524	29.685
7.0	11.766	12.401	16.601	16.968	16.695	19.151	21.353	22.365	23.079	23.724	24.764	26.397	27.470	28.469	28.839	29.572	31.244	31.405
8.0	13.15	13.91	18.52	18.97	18.66	21.29	23.79	24.89	25.66	26.34	27.53	29.33	30.53	31.60	32.00	32.83	34.69	34.86
9.0	14.61	15.48	20.50	21.03	20.68	23.48	26.29	27.47	28.30	29.00	30.36	32.32	33.64	34.78	35.21	36.13	38.17	38.36
10.0	16.13	17.10	22.53	23.15	22.76	25.72	28.84	30.11	30.99	31.71	33.24	35.35	36.79	38.01	38.47	39.48	41.68	41.90
11.0	17.72	18.78	24.63	25.34	24.90	28.01	31.45	32.81	33.74	34.48	36.17	38.45	40.01	41.30	41.78	42.88	45.24	45.50
12.0	19.37	20.51	26.78	27.58	27.09	30.37	34.12	35.56	36.55	37.31	39.17	41.61	43.29	44.65	45.15	46.35	48.85	49.15
15.0	24.72	26.04	33.59	34.67	34.02	37.78	42.51	44.21	45.34	46.14	48.54	51.46	53.52	55.08	55.64	57.10	60.01	60.49
20.0	34.87	36.35	46.12	47.68	46.71	51.27	57.75	59.87	61.25	62.08	65.43	69.19	71.88	73.76	74.42	76.31	79.83	80.69
25.0	46.50	48.01	60.04	62.14	60.80	66.15	74.53	77.06	78.68	79.52	83.89	88.54	91.90	94.08	94.82	97.15	101.22	102.54
30.0	59.56	60.95	75.32	77.98	76.22	82.38	92.77	95.76	97.60	98.42	103.88	109.47	113.53	116.00	116.80	119.58	124.16	126.01
35.0	73.96	75.12	91.89	95.15	92.93	99.90	112.45	115.87	117.96	118.74	125.36	131.93	136.73	139.48	140.33	143.55	148.63	151.07
40.0	89.68	90.48	109.71	113.60	110.87	118.67	133.50	137.38	139.70	140.41	148.27	155.87	161.44	164.46	165.36	169.03	174.59	177.67
45.0	106.66	106.99	128.74	133.30	130.00	138.65	155.89	160.24	162.79	163.41	172.57	181.26	187.63	190.91	191.84	195.97	202.01	205.76
50.0	124.86	124.62	148.93	154.19	150.30	159.80	179.67	184.40	187.18	187.70	198.22	208.04	215.26	218.77	219.74	224.33	230.83	235.30
55.0	144.25	143.32	170.26	176.25	171.73	182.09	204.50	209.82	212.84	213.23	225.19	236.17	244.27	248.02	249.01	254.08	261.04	266.26
60.0	164.80	163.08	192.69	199.45	194.25	205.48	230.66	236.49	239.74	239.98	253.43	265.63	274.64	278.62	279.62	285.16	292.60	298.59
65.0	186.5	183.9	216.2	223.8	217.8	230.0	258.0	264.4	267.8	267.9	282.9	296.4	306.3	310.5	311.5	317.6	326.5	332.3
70.0	209.3	205.7	240.8	249.1	242.5	255.5	286.5	293.4	297.1	297.0	313.6	328.4	339.3	343.7	344.7	351.2	359.6	367.2
80.0	258.0	252.1	292.9	303.0	294.8	309.6	347.0	354.9	359.1	358.6	378.6	396.1	409.1	413.9	414.9	422.4	431.7	441.0
90.0	310.9	302.4	349.1	361.0	351.0	367.7	411.8	420.8	425.5	424.5	448.1	468.5	483.7	488.8	489.8	498.3	508.6	519.7
100.0	367.8	356.2	409.0	422.8	411.0	429.6	480.8	491.0	496.1	494.6	522.0	545.4	562.9	568.4	569.3	578.8	590.2	603.1
150.0	706.9	674.8	760.8	785.8	763.1	791.7	883.8	900.5	907.7	902.6	952.2	992.9	1023.8	1030.5	1030.7	1045.6	1062.9	1086.3
200.0	1127.9	1065.6	1189.6	1228.3	1193.0	1231.9	1373.4	1397.7	1406.1	1395.6	1472.2	1521.9	1571.0	1588.2	1587.2	1608.2	1623.1	1664.7
250.0	1617.8	1515.4	1681.4	1736.2	1689.6	1735.7	1934.0	1972.0	1975.2	1958.2	2065.7	2124.9	2194.7	2225.1	2221.6	2253.3	2259.7	2324.2
300.0	2164.6	2015.8	2227.5	2300.0	2240.7	2294.2	2554.9	2615.1	2605.0	2580.5	2721.9	2791.9	2884.2	2928.5	2922.1	2965.7	2962.4	3051.5
350.0	2761.2	2560.3	2821.0	2912.8	2839.5	2900.5	3228.6	3314.9	3287.9	3254.8	3432.9	3515.9	3631.3	3690.0	3680.3	3736.5	3722.8	3837.9
400.0	3401.	3143.	3456.	3569.	3480.	3549.	3949.	4062.	4017.	3975.	4192.	4286.	4429.	4503.	4489.	4558.	4534.	4676.
450.0	4080.	3761.	4128.	4263.	4157.	4234.	4710.	4851.	4788.	4736.	4994.	5102.	5271.	5360.	5343.	5426.	5390.	5561.
500.0	4793.	4409.	4833.	4990.	4868.	4952.	5516.	5677.	5595.	5532.	5833.	5956.	6154.	6258.	6236.	6333.	6286.	6486.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.24	16.84	18.16	18.50	19.18	20.14	20.72	21.47	21.91	22.35	22.79	23.26	23.72	24.15	24.71	24.91	26.68	27.24
3.0	18.30	19.00	20.32	20.65	21.34	22.44	23.09	23.98	24.48	24.98	25.47	25.99	26.55	27.01	27.61	27.80	29.69	30.29
3.5	20.27	21.06	22.38	22.70	23.41	24.62	25.34	26.35	26.90	27.46	28.00	28.55	29.21	29.70	30.33	30.52	32.53	33.16
4.0	22.17	23.06	24.38	24.68	25.40	26.73	27.51	28.63	29.22	29.84	30.42	31.01	31.75	32.28	32.94	33.12	35.25	35.92
4.5	24.04	25.01	26.34	26.62	27.35	28.78	29.63	30.85	31.48	32.16	32.78	33.40	34.22	34.78	35.47	35.65	37.89	38.59
5.0	25.88	26.94	28.27	28.54	29.28	30.81	31.71	33.04	33.70	34.43	35.09	35.75	36.63	37.23	37.94	38.12	40.48	41.21
5.5	27.71	28.86	30.18	30.44	31.19	32.82	33.77	35.19	35.89	36.67	37.37	38.08	39.01	39.64	40.39	40.55	43.03	43.79
6.0	29.53	30.76	32.09	32.33	33.08	34.81	35.82	37.33	38.07	38.89	39.63	40.35	41.37	42.03	42.80	42.97	45.56	46.34
6.5	31.35	32.66	33.99	34.23	34.98	36.80	37.87	39.47	40.23	41.10	41.88	42.63	43.71	44.40	45.20	45.36	48.07	48.88
7.0	33.18	34.57	35.89	36.12	36.87	38.79	39.91	41.59	42.39	43.30	44.12	44.89	46.04	46.75	47.59	47.75	50.56	51.41
8.0	36.84	38.39	39.72	39.92	40.67	42.77	44.00	45.85	46.70	47.70	48.59	49.42	50.69	51.46	52.37	52.51	55.55	56.46
9.0	40.53	42.25	43.58	43.75	44.50	46.78	48.11	50.13	51.04	52.12	53.08	53.97	55.35	56.18	57.15	57.28	60.55	61.51
10.0	44.27	46.15	47.49	47.64	48.38	50.84	52.27	54.44	55.40	56.58	57.60	58.54	60.04	60.92	61.96	62.08	65.58	66.60
11.0	48.07	50.12	51.45	51.57	52.31	54.94	56.48	58.80	59.82	61.07	62.17	63.16	64.77	65.70	66.81	66.92	70.65	71.73
12.0	51.93	54.14	55.47	55.57	56.29	59.10	60.74	63.22	64.28	65.62	66.78	67.83	69.55	70.54	71.71	71.81	75.77	76.91
15.0	63.87	66.59	67.93	67.94	68.62	71.96	73.91	76.83	78.04	79.62	80.99	82.19	84.23	85.37	86.76	86.83	91.50	92.82
20.0	85.12	88.73	90.06	89.92	90.49	94.73	97.21	100.86	102.29	104.29	106.00	107.45	110.03	111.41	113.19	113.21	119.12	120.74
25.0	108.08	112.63	113.94	113.64	114.06	119.24	122.26	126.64	128.29	130.70	132.76	134.47	137.59	139.19	141.40	141.37	148.59	150.52
30.0	132.73	138.27	139.55	139.07	139.32	145.47	149.05	154.17	156.03	158.86	161.29	163.26	166.94	168.75	171.43	171.33	179.92	182.19
35.0	159.02	165.61	166.86	166.18	166.21	173.38	177.55	183.42	185.49	188.75	191.57	193.79	198.04	200.06	203.24	203.07	213.11	215.72
40.0	186.9	194.6	195.8	194.9	194.7	202.9	207.7	214.3	216.6	220.3	223.5	226.0	230.9	233.1	236.8	236.6	248.1	251.1
45.0	216.3	225.2	226.3	225.2	224.8	234.1	239.5	246.9	249.4	253.6	257.2	259.9	265.4	267.8	272.1	271.7	284.9	288.2
50.0	247.3	257.4	258.4	257.1	256.3	266.8	272.8	281.0	283.8	288.4	292.4	295.5	301.5	304.1	309.0	308.6	323.3	327.0
55.0	279.7	291.0	292.1	290.5	289.3	301.0	307.7	316.7	319.7	324.8	329.2	332.6	339.2	342.0	347.5	347.0	363.5	367.6
60.0	313.6	326.2	327.1	325.3	323.8	336.7	344.1	354.0	357.1	362.7	367.6	371.2	378.5	381.5	387.7	387.1	405.3	409.8
65.0	348.8	362.8	363.7	361.5	359.7	373.8	382.0	392.6	396.0	402.1	407.5	411.4	419.4	422.5	429.3	428.6	448.7	453.6
70.0	385.4	400.8	401.6	399.2	396.9	412.4	421.2	432.8	436.3	442.9	448.8	453.0	461.7	465.0	472.5	471.7	493.7	499.0
80.0	462.6	481.0	481.5	478.5	475.4	493.6	503.9	517.2	521.2	528.9	536.7	540.6	550.6	554.3	563.3	562.3	588.1	594.3
90.0	544.9	566.5	566.7	563.1	559.0	580.0	592.0	607.1	611.6	620.3	628.2	633.7	645.2	649.2	659.7	658.5	688.5	695.6
100.0	632.2	657.0	657.0	652.6	647.5	671.6	685.2	702.2	707.1	716.9	725.9	732.1	745.1	749.4	761.6	760.1	794.5	802.5
150.0	1136.	1180.	1179.	1170.	1158.	1199.	1222.	1249.	1257.	1273.	1288.	1298.	1319.	1325.	1347.	1343.	1403.	1416.
200.0	1742.	1808.	1805.	1791.	1771.	1832.	1866.	1904.	1914.	1936.	1959.	1973.	2003.	2011.	2044.	2039.	2111.	2147.
250.0	2431.	2522.	2523.	2504.	2473.	2557.	2600.	2651.	2661.	2692.	2726.	2742.	2781.	2794.	2839.	2831.	2911.	2973.
300.0	3191.	3309.	3319.	3296.	3254.	3357.	3408.	3474.	3483.	3524.	3569.	3587.	3636.	3656.	3715.	3704.	3790.	3881.
350.0	4012.	4159.	4179.	4153.	4098.	4221.	4281.	4362.	4371.	4422.	4480.	4500.	4559.	4585.	4659.	4645.	4739.	4859.
400.0	4888.	5066.	5095.	5066.	4998.	5142.	5211.	5308.	5316.	5377.	5449.	5471.	5540.	5573.	5663.	5648.	5747.	5900.
450.0	5811.	6022.	6061.	6029.	5946.	6112.	6191.	6305.	6312.	6384.	6470.	6495.	6574.	6614.	6720.	6700.	6810.	6995.
500.0	6777.	7022.	7071.	7036.	6938.	7126.	7216.	7346.	7353.	7436.	7538.	7564.	7654.	7702.	7825.	7801.	7920.	8139.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{197}_{79}$AU IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	175.3	132.7	108.3	102.9	103.8	91.8	78.8	74.8	72.3	70.1	65.6	61.4	58.1	56.1	55.3	53.2	47.5	49.4
3.0	174.7	138.4	110.6	105.2	106.3	94.8	81.7	77.8	75.3	73.4	68.8	64.4	61.2	59.2	58.4	56.2	50.8	52.4
3.5	172.2	141.0	111.4	106.2	107.4	96.4	83.3	79.5	77.2	75.4	70.7	66.4	63.2	61.1	60.4	58.2	53.1	54.4
4.0	168.9	141.8	111.4	106.2	107.7	97.0	84.1	80.5	78.2	76.6	71.9	67.6	64.4	62.4	61.7	59.6	54.7	55.7
4.5	165.2	141.5	110.8	105.8	107.3	97.1	84.4	80.8	78.6	77.2	72.5	68.2	65.1	63.2	62.5	60.4	55.8	56.6
5.0	161.4	140.4	109.9	104.9	106.6	96.8	84.2	80.9	78.7	77.4	72.7	68.5	65.5	63.6	62.9	60.9	56.6	57.1
5.5	157.5	138.9	108.7	103.9	105.6	96.2	83.9	80.6	78.6	77.4	72.7	68.6	65.6	63.8	63.1	61.1	57.0	57.4
6.0	153.6	137.1	107.4	102.7	104.4	95.4	83.3	80.2	78.2	77.1	72.5	68.5	65.5	63.8	63.1	61.2	57.3	57.5
6.5	149.9	135.1	106.0	101.4	103.2	94.6	82.6	79.6	77.7	76.7	72.2	68.2	65.3	63.6	63.0	61.1	57.4	57.5
7.0	146.3	133.0	104.5	100.1	101.9	93.6	81.9	78.9	77.1	76.2	71.7	67.8	65.0	63.3	62.8	60.9	57.4	57.4
8.0	139.6	128.7	101.6	97.4	99.3	91.5	80.2	77.5	75.8	75.0	70.6	66.8	64.2	62.6	62.1	60.3	57.1	56.9
9.0	133.4	124.5	98.8	94.7	96.6	89.4	78.5	75.9	74.3	73.7	69.4	65.7	63.2	61.7	61.2	59.5	56.6	56.2
10.0	127.8	120.4	96.0	92.1	94.0	87.2	76.7	74.3	72.8	72.2	68.1	64.5	62.1	60.7	60.2	58.6	56.0	55.4
11.0	122.6	116.5	93.3	89.6	91.5	85.1	75.0	72.6	71.3	70.8	66.7	63.3	60.9	59.6	59.2	57.7	55.2	54.6
12.0	117.9	112.8	90.8	87.2	89.2	83.1	73.3	71.1	69.8	69.4	65.4	62.1	59.8	58.6	58.2	56.7	54.4	53.7
15.0	106.0	103.1	84.1	80.8	82.8	77.6	68.6	66.6	65.5	65.3	61.6	58.6	56.5	55.5	55.2	53.8	52.0	51.1
20.0	91.3	90.4	75.0	72.2	74.1	69.9	62.0	60.4	59.5	59.4	56.1	53.5	51.7	50.8	50.6	49.5	48.1	47.2
25.0	80.6	80.8	68.0	65.5	67.3	63.8	56.7	55.3	54.6	54.6	51.6	49.3	47.6	47.0	46.8	45.9	44.8	43.8
30.0	72.5	73.4	62.4	60.2	61.8	58.9	52.4	51.2	50.6	50.6	47.9	45.8	44.3	43.7	43.6	42.8	41.9	40.9
35.0	66.1	67.4	57.8	55.8	57.4	54.8	48.8	47.7	47.2	47.3	44.8	42.8	41.5	41.0	40.9	40.2	39.4	38.5
40.0	60.95	62.47	53.98	52.14	53.64	51.32	45.77	44.81	44.35	44.50	42.11	40.30	39.05	38.65	38.59	37.91	37.24	36.34
45.0	56.65	58.35	50.74	49.02	50.45	48.37	43.18	42.30	41.89	42.06	39.81	38.12	36.95	36.61	36.57	35.96	35.35	34.50
50.0	53.03	54.84	47.94	46.34	47.70	45.81	40.93	40.12	39.75	39.93	37.81	36.23	35.12	34.83	34.80	34.23	33.69	32.88
55.0	49.92	51.81	45.50	43.99	45.30	43.57	38.95	38.21	37.87	38.06	36.04	34.55	33.51	33.25	33.23	32.71	32.21	31.44
60.0	47.23	49.16	43.35	41.93	43.18	41.59	37.20	36.51	36.20	36.40	34.48	33.08	32.07	31.84	31.83	31.35	30.89	30.15
65.0	44.87	46.83	41.44	40.09	41.30	39.82	35.64	34.99	34.71	34.91	33.07	31.73	30.78	30.58	30.57	30.12	29.70	29.00
70.0	42.78	44.76	39.73	38.45	39.61	38.24	34.24	33.62	33.36	33.57	31.81	30.52	29.62	29.44	29.44	29.02	28.62	27.95
80.0	39.25	41.24	36.80	35.62	36.71	35.50	31.81	31.26	31.04	31.25	29.62	28.43	27.60	27.45	27.46	27.09	26.73	26.12
90.0	36.36	38.34	34.36	33.28	34.30	33.22	29.79	29.28	29.09	29.31	27.78	26.68	25.90	25.78	25.80	25.46	25.14	24.58
100.0	33.96	35.92	32.30	31.29	32.26	31.28	28.07	27.60	27.43	27.65	26.22	25.19	24.46	24.36	24.38	24.07	23.77	23.26
150.0	26.15	27.94	25.41	24.65	25.41	24.74	22.25	21.91	21.81	22.02	20.89	20.10	19.52	19.48	19.51	19.30	19.06	18.71
200.0	21.80	23.68	21.61	20.93	21.45	21.07	18.93	18.58	18.64	18.85	17.86	17.58	16.99	16.63	16.69	16.47	16.63	16.04
250.0	19.23	20.98	19.20	18.60	19.02	18.76	16.87	16.37	16.62	16.82	15.95	15.69	15.17	14.87	14.93	14.67	14.88	14.37
300.0	17.45	19.09	17.50	16.95	17.35	17.13	15.41	14.82	15.19	15.38	14.59	14.35	13.88	13.61	13.67	13.45	13.63	13.18
350.0	16.14	17.70	16.24	15.73	16.11	15.91	14.32	13.79	14.13	14.31	13.58	13.35	12.92	12.68	12.74	12.53	12.70	12.28
400.0	15.14	16.63	15.27	14.79	15.15	14.97	13.48	13.00	13.31	13.48	12.79	12.58	12.17	11.95	12.01	11.82	11.98	11.59
450.0	14.35	15.79	14.51	14.05	14.39	14.23	12.81	12.37	12.66	12.83	12.17	11.96	11.58	11.38	11.43	11.25	11.40	11.04
500.0	13.72	15.11	13.88	13.45	13.78	13.63	12.27	11.86	12.13	12.29	11.67	11.46	11.10	10.91	10.96	10.79	10.94	10.59

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	46.13	43.95	43.96	44.26	43.83	41.29	40.00	37.74	36.92	35.94	35.24	34.65	33.40	32.97	32.60	32.69	31.33	30.97
3.0	49.03	46.75	46.74	47.06	46.69	44.09	42.75	40.49	39.67	38.67	37.94	37.34	36.06	35.59	35.18	35.27	33.77	33.37
3.5	50.99	48.66	48.64	48.97	48.65	46.04	44.68	42.43	41.63	40.62	39.88	39.27	37.99	37.49	37.05	37.13	35.52	35.11
4.0	52.32	49.96	49.94	50.27	50.00	47.40	46.03	43.82	43.03	42.02	41.27	40.67	39.39	38.88	38.41	38.50	36.81	36.37
4.5	53.21	50.83	50.80	51.14	50.92	48.33	46.97	44.79	44.04	43.03	42.28	41.68	40.42	39.89	39.41	39.49	37.74	37.30
5.0	53.77	51.39	51.36	51.70	51.52	48.96	47.61	45.48	44.74	43.75	43.00	42.40	41.16	40.63	40.13	40.21	38.42	37.96
5.5	54.09	51.72	51.69	52.03	51.89	49.36	48.02	45.94	45.23	44.24	43.50	42.91	41.69	41.16	40.64	40.72	38.90	38.44
6.0	54.24	51.88	51.85	52.19	52.09	49.59	48.26	46.23	45.54	44.57	43.83	43.25	42.05	41.52	40.99	41.08	39.23	38.77
6.5	54.25	51.91	51.87	52.21	52.15	49.69	48.37	46.39	45.72	44.76	44.04	43.47	42.29	41.76	41.22	41.31	39.44	38.98
7.0	54.16	51.84	51.80	52.14	52.10	49.69	48.39	46.45	45.80	44.86	44.14	43.58	42.42	41.90	41.35	41.44	39.56	39.10
8.0	53.77	51.48	51.45	51.79	51.80	49.46	48.19	46.34	45.73	44.82	44.12	43.58	42.47	41.96	41.40	41.48	39.60	39.14
9.0	53.18	50.95	50.92	51.26	51.31	49.04	47.81	46.04	45.46	44.58	43.90	43.38	42.30	41.82	41.25	41.33	39.45	39.00
10.0	52.49	50.30	50.28	50.61	50.70	48.49	47.30	45.60	45.06	44.21	43.54	43.04	42.01	41.54	40.96	41.04	39.18	38.73
11.0	51.73	49.59	49.57	49.90	50.02	47.88	46.72	45.09	44.58	43.76	43.11	42.62	41.62	41.17	40.59	40.67	38.83	38.38
12.0	50.94	48.85	48.84	49.16	49.30	47.23	46.10	44.53	44.04	43.25	42.62	42.15	41.18	40.75	40.17	40.25	38.42	37.99
15.0	48.55	46.59	46.59	46.90	47.10	45.18	44.14	42.74	42.31	41.59	41.00	40.57	39.70	39.31	38.73	38.81	37.06	36.65
20.0	44.86	43.08	43.10	43.39	43.64	41.94	41.02	39.82	39.47	38.83	38.31	37.94	37.17	36.85	36.29	36.37	34.74	34.37
25.0	41.68	40.05	40.08	40.37	40.64	39.11	38.27	37.22	36.92	36.35	35.88	35.55	34.87	34.60	34.07	34.14	32.63	32.28
30.0	38.98	37.47	37.52	37.78	38.07	36.67	35.90	34.96	34.70	34.19	33.75	33.46	32.84	32.62	32.10	32.17	30.76	30.45
35.0	36.67	35.26	35.31	35.57	35.86	34.56	33.86	33.01	32.78	32.31	31.91	31.64	31.07	30.87	30.38	30.45	29.13	28.83
40.0	34.67	33.35	33.41	33.65	33.95	32.74	32.08	31.30	31.10	30.66	30.29	30.04	29.51	29.34	28.87	28.94	27.69	27.42
45.0	32.93	31.68	31.74	31.97	32.27	31.13	30.52	29.80	29.61	29.21	28.86	28.63	28.14	27.99	27.54	27.60	26.42	26.16
50.0	31.39	30.21	30.27	30.49	30.79	29.72	29.14	28.47	28.30	27.92	27.59	27.37	26.92	26.78	26.35	26.41	25.29	25.04
55.0	30.02	28.90	28.96	29.18	29.47	28.46	27.91	27.28	27.13	26.77	26.46	26.25	25.82	25.70	25.28	25.34	24.27	24.04
60.0	28.80	27.73	27.79	28.00	28.29	27.32	26.81	26.22	26.07	25.74	25.44	25.24	24.84	24.72	24.32	24.38	23.35	23.13
65.0	27.70	26.67	26.74	26.94	27.23	26.30	25.81	25.25	25.12	24.80	24.51	24.33	23.94	23.84	23.45	23.51	22.52	22.31
70.0	26.71	25.71	25.78	25.98	26.26	25.38	24.91	24.38	24.25	23.95	23.67	23.50	23.13	23.04	22.66	22.72	21.77	21.57
80.0	24.97	24.04	24.11	24.30	24.57	23.75	23.32	22.84	22.73	22.45	22.20	22.04	21.70	21.62	21.27	21.32	20.44	20.25
90.0	23.50	22.63	22.70	22.88	23.15	22.38	21.98	21.54	21.44	21.18	20.95	20.80	20.49	20.41	20.08	20.13	19.30	19.13
100.0	22.24	21.42	21.49	21.66	21.92	21.20	20.83	20.42	20.32	20.09	19.87	19.73	19.44	19.37	19.06	19.11	18.32	18.16
150.0	17.90	17.25	17.31	17.45	17.68	17.12	16.83	16.53	16.47	16.29	16.12	16.01	15.79	15.74	15.49	15.54	14.91	14.78
200.0	15.36	14.82	14.81	14.93	15.14	14.67	14.43	14.19	14.14	14.00	13.85	13.77	13.59	13.54	13.34	13.37	13.19	12.76
250.0	13.75	13.28	13.13	13.23	13.43	13.05	12.92	12.69	12.69	12.55	12.36	12.34	12.20	12.11	11.92	11.96	11.87	11.49
300.0	12.61	12.18	12.05	12.09	12.26	11.98	11.86	11.66	11.66	11.53	11.36	11.34	11.22	11.14	10.96	11.00	10.91	10.67
350.0	11.76	11.36	11.24	11.27	11.44	11.18	11.07	10.88	10.89	10.77	10.61	10.59	10.48	10.41	10.24	10.28	10.20	9.88
400.0	11.10	10.72	10.61	10.64	10.80	10.56	10.45	10.28	10.29	10.17	10.03	10.01	9.91	9.84	9.68	9.71	9.64	9.35
450.0	10.57	10.21	10.11	10.14	10.29	10.06	9.96	9.80	9.81	9.70	9.56	9.54	9.45	9.38	9.24	9.27	9.19	8.92
500.0	10.14	9.80	9.70	9.73	9.88	9.66	9.56	9.41	9.42	9.31	9.18	9.17	9.08	9.01	8.88	8.90	8.83	8.67

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{197}_{79}$AU IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.270	5.990	8.461	8.440	8.290	9.873	10.670	11.213	11.610	12.040	12.310	13.180	13.620	14.189	14.410	14.644	15.082	15.470
3.0	6.832	6.715	9.360	9.385	9.226	10.927	11.895	12.502	12.943	13.410	13.773	14.743	15.269	15.896	16.140	16.442	17.082	17.403
3.5	7.400	7.419	10.246	10.316	10.147	11.956	13.088	13.752	14.233	14.733	15.184	16.248	16.851	17.532	17.797	18.162	18.975	19.247
4.0	7.977	8.115	11.130	11.243	11.062	12.974	14.264	14.983	15.501	16.028	16.565	17.717	18.395	19.125	19.409	19.833	20.800	21.035
4.5	8.567	8.810	12.016	12.172	11.979	13.989	15.433	16.203	16.757	17.308	17.929	19.167	19.915	20.693	20.995	21.474	22.581	22.788
5.0	9.170	9.508	12.909	13.107	12.900	15.004	16.601	17.421	18.008	18.582	19.286	20.607	21.423	22.246	22.565	23.098	24.333	24.520
5.5	9.788	10.214	13.810	14.050	13.828	16.025	17.773	18.641	19.260	19.854	20.640	22.043	22.925	23.792	24.127	24.712	26.066	26.240
6.0	10.421	10.927	14.722	15.004	14.766	17.053	18.951	19.866	20.516	21.129	21.996	23.480	24.427	25.336	25.687	26.322	27.788	27.954
6.5	11.070	11.651	15.645	15.969	15.715	18.089	20.138	21.099	21.780	22.410	23.358	24.922	25.932	26.883	27.248	27.933	29.504	29.666
7.0	11.735	12.386	16.581	16.947	16.675	19.136	21.335	22.342	23.052	23.698	24.727	26.371	27.444	28.434	28.814	29.548	31.220	31.381
8.0	13.11	13.89	18.49	18.94	18.63	21.26	23.77	24.86	25.63	26.30	27.50	29.30	30.49	31.56	31.97	32.80	34.66	34.83
9.0	14.56	15.45	20.46	20.99	20.65	23.44	26.25	27.43	28.25	28.95	30.31	32.27	33.59	34.73	35.16	36.09	38.12	38.31
10.0	16.07	17.06	22.48	23.10	22.71	25.67	28.79	30.06	30.93	31.65	33.18	35.29	36.73	37.95	38.41	39.42	41.62	41.84
11.0	17.64	18.72	24.56	25.27	24.84	27.96	31.39	32.74	33.67	34.41	36.10	38.37	39.94	41.23	41.71	42.81	45.16	45.42
12.0	19.28	20.44	26.70	27.50	27.02	30.30	34.04	35.48	36.46	37.22	39.08	41.51	43.20	44.56	45.06	46.25	48.76	49.06
15.0	24.58	25.93	33.47	34.55	33.90	37.67	42.39	44.07	45.21	46.01	48.40	51.31	53.37	54.93	55.50	56.95	59.86	60.33
20.0	34.62	36.16	45.90	47.46	46.51	51.06	57.52	59.63	61.00	61.84	65.17	68.93	71.61	73.50	74.15	76.04	79.56	80.41
25.0	46.14	47.70	59.72	61.80	60.48	65.83	74.17	76.69	78.31	79.15	83.50	88.13	91.48	93.67	94.40	96.73	100.79	102.10
30.0	59.04	60.51	74.86	77.51	75.77	81.93	92.26	95.22	97.07	97.90	103.33	108.90	112.94	115.42	116.21	118.98	123.55	125.40
35.0	73.29	74.53	91.28	94.52	92.32	99.29	111.76	115.17	117.25	118.03	124.62	131.16	135.94	138.69	139.55	142.76	147.82	150.25
40.0	88.82	89.73	108.92	112.79	110.08	117.88	132.62	136.48	138.79	139.51	147.32	154.89	160.43	163.45	164.35	168.01	173.55	176.61
45.0	105.60	106.05	127.76	132.29	129.03	137.67	154.79	159.11	161.66	162.29	171.39	180.03	186.38	189.65	190.59	194.70	200.71	204.44
50.0	123.58	123.48	147.74	152.97	149.12	158.60	178.23	183.03	185.81	186.34	196.79	206.55	213.73	217.25	218.21	222.79	229.26	233.70
55.0	142.74	141.97	168.84	174.79	170.32	180.66	202.91	208.20	211.21	211.61	223.48	234.40	242.45	246.20	247.19	252.23	259.17	264.35
60.0	163.03	161.50	191.03	197.74	192.60	203.81	228.79	234.59	237.82	238.08	251.43	263.56	272.51	276.49	277.49	283.00	290.41	296.35
65.0	184.4	182.0	214.3	221.8	215.9	228.0	255.8	262.2	265.6	265.7	280.6	294.0	303.9	308.1	309.1	315.1	322.9	329.7
70.0	206.9	203.8	238.6	246.9	240.3	253.3	284.1	290.9	294.6	294.5	311.0	325.6	336.5	340.9	341.9	348.4	356.7	364.3
80.0	255.1	249.5	290.1	300.2	292.0	306.8	343.8	351.7	355.8	355.4	375.2	392.6	405.5	410.3	411.3	418.7	428.0	437.2
90.0	307.3	299.0	345.6	357.4	347.6	364.2	407.8	416.9	421.5	420.5	444.0	464.2	479.2	484.4	485.3	493.8	504.1	515.0
100.0	363.4	352.2	404.8	418.5	406.8	425.4	476.0	486.2	491.2	489.8	517.0	540.2	557.5	563.0	563.9	573.4	584.7	597.5
150.0	697.9	666.6	752.1	776.8	754.4	782.9	874.0	890.6	897.8	892.7	941.8	982.1	1012.5	1019.4	1019.6	1034.4	1051.6	1073.8
200.0	1113.0	1052.1	1175.1	1213.4	1178.6	1217.2	1357.1	1381.2	1389.5	1379.2	1455.0	1504.2	1552.7	1569.8	1568.8	1589.7	1604.4	1645.6
250.0	1595.8	1495.6	1660.2	1714.3	1668.3	1714.2	1910.0	1947.7	1960.9	1934.2	2040.3	2099.0	2167.9	2198.0	2194.7	2226.0	2232.5	2296.2
300.0	2134.8	1988.9	2198.6	2270.2	2211.7	2264.9	2522.3	2581.8	2571.9	2547.8	2687.4	2756.7	2847.9	2891.7	2885.5	2928.6	2925.4	3013.5
350.0	2722.6	2525.6	2783.6	2874.2	2801.9	2862.5	3186.4	3271.6	3245.1	3212.6	3388.3	3469.1	3584.5	3642.5	3633.0	3688.5	3675.2	3788.8
400.0	3353.	3100.	3410.	3521.	3433.	3501.	3896.	4008.	3964.	3922.	4137.	4230.	4371.	4443.	4430.	4499.	4475.	4615.
450.0	4022.	3709.	4072.	4204.	4101.	4177.	4646.	4785.	4724.	4672.	4927.	5034.	5201.	5289.	5272.	5354.	5318.	5487.
500.0	4725.	4347.	4767.	4922.	4801.	4885.	5432.	5599.	5519.	5457.	5754.	5875.	6070.	6173.	6152.	6248.	6201.	6399.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.23	16.83	18.15	18.49	19.17	20.13	20.71	21.45	21.90	22.33	22.77	23.24	23.70	24.13	24.69	24.89	26.66	27.22
3.0	18.30	19.00	20.32	20.64	21.34	22.44	23.09	23.97	24.47	24.96	25.46	25.97	26.54	27.00	27.59	27.79	29.68	30.28
3.5	20.26	21.06	22.38	22.69	23.40	24.62	25.34	26.34	26.89	27.46	27.99	28.54	29.19	29.69	30.32	30.51	32.52	33.15
4.0	22.17	23.06	24.38	24.68	25.40	26.72	27.51	28.62	29.21	29.83	30.41	31.00	31.74	32.27	32.92	33.11	35.24	35.90
4.5	24.04	25.01	26.33	26.62	27.35	28.78	29.62	30.85	31.47	32.14	32.77	33.39	34.20	34.77	35.45	35.63	37.88	38.58
5.0	25.88	26.94	28.26	28.53	29.27	30.81	31.71	33.03	33.69	34.41	35.08	35.73	36.62	37.21	37.93	38.10	40.47	41.19
5.5	27.70	28.85	30.17	30.43	31.18	32.81	33.77	35.18	35.88	36.65	37.35	38.04	38.99	39.62	40.37	40.54	43.01	43.77
6.0	29.52	30.75	32.07	32.32	33.07	34.80	35.81	37.32	38.05	38.87	39.61	40.33	41.35	42.00	42.78	42.94	45.54	46.32
6.5	31.34	32.64	33.97	34.21	34.96	36.78	37.85	39.45	40.21	41.07	41.85	42.60	43.68	44.37	45.18	45.33	48.04	48.85
7.0	33.15	34.54	35.87	36.10	36.85	38.76	39.89	41.57	42.36	43.27	44.08	44.86	46.01	46.72	47.56	47.72	50.53	51.38
8.0	36.80	38.35	39.69	39.89	40.64	42.74	43.96	45.81	46.66	47.66	48.55	49.38	50.65	51.42	52.32	52.46	55.51	56.41
9.0	40.48	42.20	43.53	43.71	44.46	46.74	48.07	50.08	50.98	52.07	53.02	53.91	55.29	56.12	57.09	57.22	60.49	61.45
10.0	44.21	46.09	47.43	47.58	48.32	50.78	52.21	54.37	55.33	56.50	57.53	58.47	59.96	60.85	61.88	62.00	65.50	66.52
11.0	47.99	50.04	51.37	51.50	52.23	54.86	56.40	58.72	59.73	60.98	62.07	63.07	64.67	65.61	66.71	66.82	70.55	71.63
12.0	51.83	54.04	55.38	55.47	56.20	59.01	60.64	63.11	64.17	65.51	66.67	67.71	69.43	70.42	71.59	71.69	75.65	76.79
15.0	63.71	66.43	67.77	67.78	68.47	71.80	73.74	76.66	77.86	79.44	80.80	82.00	84.04	85.18	86.57	86.64	91.31	92.62
20.0	84.83	88.43	89.76	89.63	90.20	94.44	96.90	100.54	101.97	103.96	105.66	107.11	109.69	111.06	112.84	112.86	118.76	120.38
25.0	107.63	112.16	113.48	113.18	113.61	118.77	121.78	126.14	127.79	130.19	132.24	133.95	137.06	138.66	140.87	140.83	148.03	149.96
30.0	132.08	137.60	138.90	138.42	138.67	144.80	148.37	153.47	155.32	158.14	160.56	162.52	166.19	167.99	170.67	170.57	179.13	181.39
35.0	158.15	164.72	165.98	165.30	165.34	172.49	176.63	182.48	184.54	187.79	190.59	192.81	197.04	199.05	202.22	202.05	212.05	214.65
40.0	185.8	193.5	194.7	193.8	193.6	201.8	206.5	213.1	215.4	219.1	222.3	224.8	229.6	231.8	235.5	235.3	246.8	249.7
45.0	215.0	223.6	224.9	223.8	223.4	232.7	238.0	246.4	247.9	252.0	255.6	258.4	263.8	266.2	270.4	270.1	283.2	286.5
50.0	245.6	255.6	256.7	255.4	254.6	265.0	271.1	279.2	281.9	286.5	290.5	293.6	299.6	302.2	307.0	306.6	321.3	325.0
55.0	277.7	289.0	290.0	288.4	287.3	298.9	305.6	314.6	317.5	322.6	327.0	330.3	336.9	339.7	345.2	344.7	361.1	365.1
60.0	311.2	323.8	324.7	322.9	321.5	334.3	341.6	351.4	354.5	360.1	365.0	368.6	375.9	378.8	384.9	384.3	402.5	406.9
65.0	346.1	360.0	360.9	358.8	357.0	371.0	379.1	389.7	393.0	399.1	404.4	408.4	416.3	419.4	426.2	425.5	445.4	450.3
70.0	382.3	397.6	398.4	396.0	393.8	409.2	417.9	429.4	433.0	439.5	445.3	449.6	458.1	461.4	468.9	468.1	489.9	495.2
80.0	458.7	476.9	477.5	474.5	471.4	489.5	499.7	513.0	516.9	524.5	531.3	536.2	546.1	549.8	558.7	557.7	583.4	589.5
90.0	540.1	561.4	561.7	558.1	554.1	575.0	586.8	601.8	606.3	614.9	622.8	628.3	639.6	643.6	654.1	652.8	682.6	689.7
100.0	626.3	651.0	651.0	646.7	641.6	665.4	678.9	695.8	700.7	710.5	719.4	725.5	738.4	742.7	754.8	753.3	787.4	795.4
150.0	1124.	1168.	1166.	1158.	1146.	1187.	1210.	1236.	1244.	1259.	1274.	1284.	1305.	1311.	1333.	1330.	1388.	1401.
200.0	1722.	1788.	1784.	1771.	1751.	1811.	1845.	1882.	1892.	1915.	1937.	1951.	1981.	1989.	2021.	2016.	2088.	2123.
250.0	2402.	2492.	2493.	2474.	2444.	2526.	2569.	2619.	2630.	2660.	2692.	2709.	2748.	2761.	2806.	2798.	2877.	2938.
300.0	3151.	3268.	3278.	3255.	3213.	3315.	3366.	3431.	3441.	3481.	3525.	3543.	3592.	3611.	3669.	3659.	3744.	3834.
350.0	3961.	4106.	4125.	4100.	4046.	4168.	4227.	4307.	4316.	4366.	4423.	4443.	4501.	4527.	4600.	4586.	4679.	4798.
400.0	4824.	5000.	5029.	5000.	4933.	5075.	5143.	5239.	5248.	5308.	5379.	5401.	5469.	5502.	5590.	5573.	5674.	5824.
450.0	5734.	5942.	5981.	5949.	5868.	6031.	6110.	6222.	6229.	6300.	6385.	6409.	6488.	6528.	6632.	6612.	6721.	6904.
500.0	6686.	6928.	6976.	6941.	6845.	7031.	7119.	7248.	7255.	7337.	7437.	7463.	7552.	7599.	7721.	7697.	7815.	8031.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{202}_{80}$HG IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	177.5	133.7	109.4	103.9	104.8	92.6	79.5	75.5	72.9	70.7	66.2	61.9	58.6	56.5	55.8	53.6	47.9	49.8
3.0	177.0	139.7	111.8	106.4	107.5	96.7	82.5	78.6	76.0	74.1	69.4	65.0	61.7	59.7	58.9	56.7	51.3	52.8
3.5	174.7	142.5	112.7	107.4	108.6	97.4	84.2	80.4	77.9	76.2	71.4	67.0	63.8	61.7	61.0	58.8	53.6	54.9
4.0	171.5	143.5	112.7	107.5	108.9	98.1	85.0	81.4	79.0	77.4	72.6	68.3	65.1	63.1	62.3	60.2	55.3	56.3
4.5	167.8	143.2	112.2	107.1	108.6	98.3	85.3	81.8	79.5	78.1	73.3	69.0	65.8	63.9	63.2	61.1	56.4	57.2
5.0	163.9	142.3	111.3	106.3	107.9	98.0	85.3	81.8	79.7	78.3	73.6	69.3	66.3	64.3	63.7	61.6	57.2	57.8
5.5	160.0	140.8	110.1	105.3	107.0	97.4	84.9	81.6	79.5	78.3	73.8	69.4	66.4	64.5	63.9	61.9	57.7	58.1
6.0	156.2	139.0	108.8	104.1	105.8	96.7	84.4	81.2	79.2	78.1	73.4	69.3	66.3	64.5	63.9	61.9	58.0	58.2
6.5	152.4	137.0	107.5	102.8	104.6	95.8	83.7	80.6	78.7	77.7	73.1	69.0	66.2	64.4	63.8	61.9	58.1	58.2
7.0	148.8	135.0	106.0	101.5	103.4	94.9	83.0	80.0	78.2	77.2	72.7	68.7	65.9	64.2	63.6	61.7	58.2	58.1
8.0	142.0	130.7	103.1	98.8	100.7	92.8	81.4	78.5	76.8	76.0	71.6	67.8	65.0	63.4	62.9	61.1	57.9	57.6
9.0	135.8	126.5	100.3	96.1	98.1	90.7	79.6	77.0	75.4	74.7	70.4	66.7	64.0	62.5	62.1	60.3	57.4	57.0
10.0	130.1	122.4	97.5	93.5	95.5	88.5	77.8	75.3	73.9	73.3	69.0	65.5	63.0	61.6	61.1	59.5	56.8	56.2
11.0	124.9	118.5	94.8	91.0	93.0	86.4	76.1	73.7	72.3	71.8	67.7	64.3	61.8	60.5	60.1	58.5	56.0	55.4
12.0	120.2	114.8	92.3	88.6	90.6	84.4	74.4	72.2	70.8	70.4	66.4	63.1	60.7	59.5	59.1	57.6	55.3	54.5
15.0	108.1	105.0	85.5	82.2	84.1	78.8	69.7	67.7	66.6	66.3	62.6	59.5	57.4	56.3	56.0	54.7	52.8	51.9
20.0	93.1	92.1	76.3	73.5	75.4	71.1	63.0	61.4	60.5	60.4	57.1	54.4	52.6	51.7	51.5	50.4	48.9	48.0
25.0	82.3	82.4	69.3	66.7	68.5	65.0	57.7	56.3	55.6	55.6	52.5	50.1	48.5	47.8	47.6	46.7	45.6	44.5
30.0	74.1	74.9	63.6	61.3	63.0	60.0	53.4	52.1	51.5	51.6	48.8	46.6	45.1	44.5	44.4	43.6	42.6	41.6
35.0	67.6	68.8	58.9	56.9	58.5	55.8	49.7	48.6	48.1	48.2	45.6	43.6	42.2	41.8	41.7	40.9	40.1	39.2
40.0	62.29	63.79	55.07	53.18	54.71	52.33	46.67	45.69	45.21	45.36	42.92	41.08	39.80	39.39	39.33	38.64	37.95	37.04
45.0	57.91	59.60	51.77	50.02	51.48	49.34	44.04	43.15	42.72	42.89	40.60	38.88	37.68	37.33	37.28	36.66	36.04	35.17
50.0	54.22	56.03	48.93	47.29	48.69	46.74	41.76	40.94	40.65	40.74	38.57	36.95	35.83	35.52	35.49	34.92	34.36	33.53
55.0	51.05	52.94	46.46	44.91	46.25	44.47	39.76	38.99	38.65	38.84	36.78	35.25	34.19	33.92	33.90	33.37	32.86	32.07
60.0	48.31	50.25	44.27	42.81	44.10	42.48	37.98	37.27	36.95	37.15	35.19	33.74	32.73	32.49	32.48	31.99	31.52	30.77
65.0	45.90	47.87	42.33	40.95	42.18	40.66	36.39	35.72	35.44	35.64	33.77	32.39	31.42	31.21	31.21	30.75	30.31	29.60
70.0	43.77	45.76	40.59	39.28	40.47	39.05	34.97	34.34	34.07	34.28	32.48	31.16	30.24	30.05	30.06	29.62	29.21	28.53
80.0	40.16	42.17	37.60	36.40	37.52	36.27	32.50	31.93	31.71	31.92	30.25	29.04	28.19	28.04	28.05	27.67	27.30	26.68
90.0	37.22	39.22	35.13	34.02	35.06	33.95	30.44	29.93	29.73	29.95	28.39	27.26	26.47	26.34	26.36	26.02	25.68	25.11
100.0	34.76	36.75	33.03	32.00	32.98	31.98	28.69	28.22	28.04	28.26	26.80	25.74	25.00	24.89	24.92	24.60	24.29	23.77
150.0	26.78	28.60	26.01	25.22	26.00	25.32	22.76	22.42	22.31	22.53	21.37	20.56	19.97	19.93	19.96	19.74	19.50	19.14
200.0	22.33	24.25	22.13	21.43	21.96	21.57	19.38	19.02	19.08	19.29	18.28	18.00	17.39	17.02	17.08	16.85	17.02	16.42
250.0	19.70	21.49	19.67	19.05	19.48	19.21	17.27	16.77	17.02	17.22	16.33	16.07	15.54	15.22	15.29	15.03	15.23	14.71
300.0	17.88	19.56	17.93	17.37	17.77	17.54	15.78	15.19	15.56	15.76	14.94	14.70	14.22	13.95	14.00	13.77	13.96	13.50
350.0	16.54	18.13	16.64	16.12	16.50	16.30	14.67	14.13	14.48	14.66	13.91	13.68	13.23	12.99	13.05	12.84	13.01	12.58
400.0	15.52	17.04	15.65	15.16	15.52	15.34	13.81	13.32	13.64	13.82	13.11	12.89	12.47	12.25	12.31	12.11	12.27	11.87
450.0	14.71	16.18	14.87	14.40	14.75	14.58	13.13	12.68	12.97	13.14	12.47	12.26	11.87	11.66	11.72	11.53	11.68	11.31
500.0	14.06	15.48	14.23	13.78	14.12	13.97	12.58	12.15	12.43	12.60	11.96	11.75	11.38	11.18	11.24	11.06	11.21	10.85

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	46.50	44.29	44.30	44.60	44.17	41.61	40.31	38.03	37.20	36.22	35.51	34.92	33.65	33.22	32.85	32.94	31.67	31.21
3.0	49.46	47.16	47.15	47.47	47.09	44.48	43.13	40.84	40.01	39.00	38.27	37.66	36.37	35.89	35.49	35.57	34.06	33.66
3.5	51.48	49.12	49.11	49.43	49.11	46.48	45.10	42.83	42.02	41.00	40.25	39.64	38.34	37.84	37.40	37.48	35.86	35.44
4.0	52.86	50.47	50.44	50.78	50.51	47.88	46.50	44.26	43.47	42.44	41.69	41.08	39.79	39.27	38.80	38.88	37.17	36.74
4.5	53.78	51.38	51.35	51.68	51.47	48.85	47.47	45.27	44.50	43.49	42.73	42.12	40.85	40.31	39.82	39.91	38.14	37.69
5.0	54.38	51.97	51.93	52.27	52.10	49.51	48.14	45.98	45.24	44.23	43.47	42.87	41.61	41.08	40.57	40.65	38.84	38.38
5.5	54.73	52.32	52.29	52.63	52.49	49.93	48.57	46.47	45.75	44.75	44.00	43.40	42.17	41.63	41.10	41.19	39.34	38.88
6.0	54.89	52.50	52.47	52.81	52.71	50.18	48.84	46.78	46.08	45.10	44.35	43.76	42.55	42.01	41.48	41.56	39.69	39.22
6.5	54.93	52.55	52.51	52.86	52.79	50.30	48.97	46.95	46.28	45.31	44.57	43.99	42.80	42.27	41.72	41.81	39.92	39.45
7.0	54.85	52.49	52.46	52.80	52.76	50.31	48.99	47.03	46.37	45.42	44.69	44.12	42.95	42.43	41.87	41.95	40.05	39.58
8.0	54.48	52.17	52.13	52.47	52.48	50.11	48.82	46.95	46.33	45.41	44.70	44.15	43.02	42.51	41.94	42.02	40.11	39.65
9.0	53.91	51.64	51.62	51.96	52.01	49.70	48.45	46.66	46.08	45.18	44.49	43.96	42.87	42.38	41.80	41.88	39.98	39.52
10.0	53.23	51.01	50.99	51.32	51.41	49.17	47.96	46.24	45.69	44.83	44.15	43.64	42.59	42.11	41.53	41.61	39.72	39.26
11.0	52.48	50.31	50.29	50.62	50.74	48.57	47.39	45.74	45.22	44.38	43.72	43.23	42.21	41.76	41.17	41.25	39.37	38.93
12.0	51.70	49.57	49.56	49.89	50.03	47.92	46.77	45.18	44.69	43.88	43.24	42.76	41.78	41.34	40.75	40.83	38.98	38.54
15.0	49.31	47.31	47.31	47.63	47.83	45.88	44.82	43.40	42.97	42.23	41.63	41.20	40.31	39.91	39.33	39.41	37.63	37.21
20.0	46.61	43.79	43.81	44.11	44.36	42.64	41.69	40.47	40.12	39.47	38.94	38.56	37.78	37.46	36.89	36.96	35.31	34.93
25.0	42.41	40.75	40.78	41.07	41.35	39.78	38.93	37.86	37.56	36.98	36.50	36.16	35.47	35.20	34.65	34.72	33.19	32.84
30.0	39.69	38.15	38.19	38.46	38.76	37.33	36.55	35.59	35.33	34.81	34.36	34.06	33.43	33.20	32.68	32.75	31.31	30.99
35.0	37.35	35.92	35.97	36.23	36.53	35.20	34.49	33.62	33.38	32.91	32.50	32.22	31.64	31.44	30.94	31.01	29.66	29.36
40.0	35.33	33.99	34.04	34.29	34.59	33.36	32.69	31.89	31.68	31.24	30.86	30.61	30.07	29.90	29.42	29.48	28.21	27.93
45.0	33.67	32.30	32.35	32.59	32.90	31.74	31.11	30.38	30.19	29.78	29.42	29.18	28.68	28.53	28.07	28.13	26.93	26.66
50.0	32.01	30.80	30.87	31.10	31.40	30.30	29.72	29.03	28.86	28.47	28.13	27.91	27.44	27.31	26.86	26.93	25.78	25.53
55.0	30.63	29.48	29.54	29.76	30.06	29.02	28.47	27.83	27.67	27.31	26.98	26.78	26.34	26.21	25.79	25.85	24.75	24.52
60.0	29.39	28.29	28.36	28.57	28.87	27.88	27.35	26.75	26.60	26.26	25.95	25.75	25.34	25.22	24.81	24.87	23.82	23.60
65.0	28.27	27.22	27.29	27.49	27.79	26.84	26.34	25.77	25.63	25.31	25.01	24.83	24.43	24.33	23.93	23.99	22.98	22.77
70.0	27.26	26.25	26.32	26.52	26.81	25.90	25.42	24.88	24.75	24.44	24.16	23.98	23.61	23.51	23.13	23.18	22.22	22.01
80.0	25.50	24.55	24.62	24.81	25.10	24.26	23.82	23.32	23.21	22.93	22.67	22.50	22.16	22.07	21.71	21.77	20.87	20.68
90.0	24.01	23.12	23.19	23.37	23.65	22.86	22.45	22.00	21.90	21.64	21.39	21.25	20.92	20.86	20.51	20.56	19.72	19.54
100.0	22.73	21.89	21.96	22.13	22.40	21.66	21.26	20.86	20.77	20.53	20.30	20.16	19.86	19.80	19.47	19.52	18.72	18.56
150.0	18.31	17.64	17.70	17.85	18.09	17.51	17.21	16.91	16.84	16.66	16.48	16.38	16.15	16.10	15.85	15.89	15.24	15.11
200.0	15.71	15.17	15.16	15.28	15.50	15.01	14.77	14.53	14.47	14.33	14.18	14.09	13.90	13.86	13.65	13.69	13.50	13.06
250.0	14.08	13.60	13.44	13.55	13.75	13.36	13.23	12.99	13.00	12.85	12.66	12.63	12.49	12.40	12.20	12.24	12.15	11.76
300.0	12.92	12.48	12.34	12.38	12.56	12.27	12.15	11.94	11.94	11.81	11.64	11.62	11.49	11.41	11.22	11.26	11.18	10.83
350.0	12.05	11.64	11.51	11.55	11.72	11.45	11.34	11.15	11.15	11.03	10.87	10.85	10.74	10.66	10.49	10.53	10.44	10.12
400.0	11.37	10.98	10.87	10.90	11.07	10.82	10.71	10.53	10.54	10.42	10.27	10.26	10.15	10.08	9.92	9.95	9.87	9.58
450.0	10.83	10.46	10.36	10.39	10.55	10.31	10.21	10.04	10.05	9.94	9.80	9.78	9.68	9.61	9.47	9.50	9.42	9.14
500.0	10.39	10.04	9.94	9.98	10.13	9.90	9.80	9.64	9.65	9.55	9.41	9.39	9.30	9.24	9.10	9.12	9.05	8.78

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{202}_{80}$HG IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.360	6.080	8.590	8.570	8.420	10.025	10.830	11.377	11.780	12.220	12.490	13.370	13.820	14.398	14.620	14.856	15.298	15.690
3.0	6.929	6.817	9.501	9.529	9.370	11.096	12.076	12.686	13.134	13.612	13.977	14.969	15.496	16.133	16.379	16.684	17.331	17.665
3.5	7.503	7.532	10.400	10.474	10.304	12.141	13.285	13.956	14.445	14.955	15.410	16.487	17.103	17.795	18.062	18.430	19.254	19.629
4.0	8.086	8.238	11.296	11.413	11.232	13.173	14.478	15.204	15.731	16.270	16.811	17.978	18.669	19.412	19.698	20.127	21.107	21.344
4.5	8.682	8.942	12.194	12.354	12.161	14.202	15.663	16.441	17.004	17.568	18.194	19.449	20.211	21.002	21.307	21.792	22.914	23.123
5.0	9.290	9.649	13.097	13.301	13.093	15.231	16.847	17.676	18.272	18.859	19.569	20.908	21.740	22.577	22.899	23.438	24.690	24.880
5.5	9.914	10.363	14.010	14.256	14.033	16.264	18.034	18.911	19.540	20.148	20.941	22.363	23.262	24.143	24.482	25.074	26.447	26.623
6.0	10.553	11.084	14.932	15.221	14.982	17.305	19.227	20.152	20.813	21.439	22.315	23.819	24.784	25.708	26.062	26.706	28.192	28.359
6.5	11.207	11.816	15.866	16.197	15.942	18.354	20.428	21.400	22.092	22.736	23.694	25.279	26.308	27.274	27.644	28.337	29.931	30.094
7.0	11.878	12.559	16.812	17.186	16.913	19.413	21.640	22.657	23.379	24.039	25.080	26.746	27.838	28.846	29.229	29.972	31.667	31.831
8.0	13.27	14.08	18.74	19.20	18.89	21.57	24.10	25.21	25.98	26.67	27.88	29.71	30.92	32.01	32.42	33.26	35.15	35.32
9.0	14.72	15.65	20.73	21.28	20.93	23.77	26.61	27.80	28.64	29.35	30.73	32.71	34.05	35.22	35.65	36.59	38.65	38.84
10.0	16.24	17.27	22.77	23.41	23.01	26.02	29.17	30.46	31.35	32.08	33.62	35.77	37.23	38.47	38.94	39.96	42.19	42.41
11.0	17.83	18.95	24.88	25.60	25.16	28.33	31.80	33.17	34.11	34.87	36.58	38.88	40.47	41.78	42.27	43.38	45.77	46.03
12.0	19.48	20.68	27.04	27.85	27.36	30.70	34.48	35.93	36.93	37.71	39.59	42.06	43.77	45.15	45.66	46.87	49.40	49.71
15.0	24.80	26.21	33.86	34.95	34.30	38.13	42.90	44.61	45.76	46.58	49.00	51.95	54.03	55.62	56.19	57.67	60.61	61.10
20.0	34.90	36.51	46.39	47.97	47.01	51.64	58.17	60.29	61.69	62.55	65.91	69.71	72.44	74.35	75.02	76.93	80.49	81.35
25.0	46.47	48.12	60.30	62.41	61.08	66.52	74.93	77.49	79.13	79.99	84.38	89.07	92.46	94.68	95.43	97.78	101.89	103.22
30.0	59.43	60.99	75.54	78.21	76.47	82.72	93.15	96.15	98.03	98.87	104.35	109.98	114.07	116.59	117.40	120.19	124.82	126.69
35.0	73.73	75.08	92.05	95.33	93.12	100.19	112.78	116.22	118.33	119.13	125.78	132.40	137.23	140.02	140.89	144.13	149.25	151.71
40.0	89.31	90.34	109.80	113.70	110.98	118.89	133.76	137.66	140.00	140.74	148.61	156.27	161.87	164.93	165.85	169.54	175.15	178.24
45.0	106.15	106.73	128.72	133.30	130.03	138.78	156.05	160.42	163.00	163.65	172.82	181.55	187.96	191.28	192.24	196.39	202.47	206.23
50.0	124.18	124.22	148.80	154.08	150.21	159.82	179.61	184.46	187.27	187.82	198.36	208.21	215.46	219.03	220.01	224.63	231.18	235.65
55.0	143.39	142.78	170.00	176.00	171.51	181.98	204.40	209.75	212.79	213.22	225.18	236.21	244.33	248.14	249.14	254.23	261.24	266.46
60.0	163.74	162.37	192.28	199.04	193.88	205.23	230.41	236.26	239.63	239.82	253.27	265.50	274.53	278.57	279.59	285.15	292.63	298.62
65.0	185.2	183.0	215.6	223.2	217.3	229.5	257.6	263.9	267.4	267.6	282.6	296.1	306.0	310.3	311.3	317.4	325.3	332.1
70.0	207.7	204.6	240.0	248.4	241.8	254.9	285.9	292.8	296.5	296.5	313.1	327.9	338.8	343.3	344.3	350.8	359.3	366.9
80.0	256.0	250.6	291.8	301.8	293.7	308.6	345.9	353.8	358.0	357.6	377.6	395.1	408.1	412.9	413.9	421.5	430.9	440.1
90.0	308.3	300.3	347.4	359.3	349.4	366.2	410.1	419.2	423.9	423.0	446.6	466.9	482.1	487.3	488.3	496.8	507.2	518.2
100.0	364.5	353.6	406.7	420.6	408.8	427.6	478.5	488.8	493.9	492.5	519.8	543.2	560.6	566.2	567.1	576.7	588.1	601.0
150.0	699.5	668.6	754.9	779.7	757.2	786.1	877.6	894.2	901.5	896.5	945.8	986.3	1016.9	1023.8	1024.1	1039.0	1056.3	1078.7
200.0	1115.0	1054.6	1178.6	1217.1	1182.2	1221.1	1361.6	1385.8	1394.2	1384.0	1460.0	1509.4	1558.2	1575.4	1574.5	1595.4	1610.3	1651.6
250.0	1598.3	1498.6	1664.3	1718.6	1672.6	1718.8	1915.2	1953.1	1956.4	1939.7	2046.2	2105.1	2174.3	2204.6	2201.3	2232.8	2239.3	2303.3
300.0	2137.5	1992.4	2206.6	2275.1	2216.6	2270.1	2528.2	2687.9	2578.2	2554.0	2694.0	2763.6	2865.1	2899.1	2893.0	2936.2	2933.2	3021.5
350.0	2725.7	2529.5	2788.8	2879.6	2807.2	2868.3	3193.0	3278.4	3252.0	3219.5	3395.6	3476.7	3592.4	3650.6	3641.2	3696.9	3683.7	3797.6
400.0	3357.	3105.	3415.	3526.	3439.	3508.	3903.	4015.	3972.	3930.	4144.	4238.	4379.	4452.	4439.	4508.	4484.	4625.
450.0	4026.	3714.	4078.	4211.	4107.	4183.	4654.	4793.	4732.	4680.	4935.	5042.	5210.	5298.	5281.	5363.	5328.	5497.
500.0	4728.	4352.	4773.	4928.	4807.	4892.	5440.	5618.	5528.	5465.	5762.	5885.	6080.	6183.	6162.	6258.	6211.	6409.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.46	17.07	18.41	18.76	19.44	20.42	21.01	21.76	22.21	22.64	23.09	23.56	24.03	24.46	25.02	25.22	27.02	27.60
3.0	18.56	19.27	20.61	20.95	21.65	22.77	23.43	24.32	24.82	25.33	25.82	26.34	26.91	27.38	27.97	28.17	30.10	30.71
3.5	20.56	21.37	22.71	23.03	23.75	24.98	25.71	26.73	27.28	27.85	28.39	28.95	29.61	30.11	30.74	30.93	32.98	33.63
4.0	22.50	23.39	24.74	25.04	25.78	27.12	27.92	29.05	29.64	30.27	30.86	31.45	32.20	32.73	33.39	33.57	36.75	36.43
4.5	24.39	25.38	26.72	27.01	27.76	29.21	30.07	31.30	31.94	32.62	33.25	33.88	34.70	35.27	35.96	36.14	38.43	39.14
5.0	26.25	27.33	28.68	28.96	29.71	31.26	32.18	33.52	34.19	34.92	35.59	36.25	37.15	37.75	38.47	38.64	41.05	41.79
5.5	28.11	29.27	30.61	30.88	31.64	33.29	34.27	35.70	36.41	37.19	37.90	38.59	39.56	40.19	40.94	41.11	43.63	44.41
6.0	29.95	31.19	32.54	32.80	33.56	35.31	36.34	37.87	38.61	39.43	40.18	40.91	41.94	42.61	43.39	43.55	46.19	46.99
6.5	31.79	33.12	34.47	34.71	35.47	37.32	38.40	40.02	40.79	41.67	42.45	43.21	44.31	45.00	45.81	45.97	48.73	49.56
7.0	33.63	35.04	36.39	36.62	37.39	39.33	40.47	42.17	42.97	43.89	44.72	45.50	46.66	47.39	48.23	48.38	51.25	52.11
8.0	37.32	38.90	40.25	40.46	41.22	43.35	44.59	46.47	47.33	48.34	49.24	50.08	51.36	52.14	53.05	53.19	56.29	57.21
9.0	41.05	42.79	44.14	44.32	45.09	47.40	48.75	50.78	51.70	52.80	53.76	54.66	56.06	56.90	57.87	58.01	61.33	62.31
10.0	44.82	46.72	48.08	48.23	48.99	51.48	52.94	55.13	56.10	57.29	58.32	59.27	60.79	61.68	62.72	62.84	66.40	67.44
11.0	48.64	50.71	52.07	52.20	52.95	55.62	57.17	59.52	60.55	61.81	62.92	63.92	65.55	66.49	67.60	67.72	71.51	72.61
12.0	52.52	54.76	56.12	56.22	56.96	59.80	61.46	63.97	65.04	66.39	67.56	68.62	70.36	71.36	72.53	72.64	76.66	77.82
15.0	64.52	67.27	68.63	68.65	69.35	72.72	74.70	77.65	78.86	80.46	81.84	83.05	85.12	86.27	87.67	87.74	92.48	93.82
20.0	85.83	89.47	90.83	90.69	91.28	95.57	98.07	101.75	103.20	105.21	106.93	108.40	111.01	112.39	114.18	114.21	120.19	121.83
25.0	108.81	113.39	114.74	114.44	114.88	120.11	123.15	127.57	129.23	131.66	133.74	135.46	138.61	140.22	142.45	142.41	149.71	151.67
30.0	133.45	139.03	140.35	139.87	140.13	146.33	149.94	155.10	156.97	159.82	162.27	164.25	167.96	169.78	172.48	172.38	181.05	183.34
35.0	159.70	166.33	167.61	166.94	166.99	174.21	178.40	184.31	186.40	189.68	192.51	194.75	199.02	201.06	204.26	204.09	214.21	216.84
40.0	187.5	195.2	196.5	195.6	195.4	203.7	208.5	215.2	217.5	221.2	224.4	226.9	231.8	234.0	237.7	237.5	249.1	252.1
45.0	216.9	225.7	226.9	225.8	225.4	234.8	240.2	247.6	250.1	254.3	258.0	260.7	266.2	268.6	272.9	272.6	285.8	289.2
50.0	247.7	257.8	258.9	257.6	256.8	267.3	273.4	281.7	284.4	289.0	293.1	296.1	302.2	304.8	309.7	309.3	324.1	327.9
55.0	279.9	291.3	292.4	290.8	289.7	301.4	308.1	317.2	320.1	325.3	329.7	333.1	339.8	342.6	348.1	347.6	364.1	368.3
60.0	313.6	326.3	327.3	325.4	324.0	336.9	344.3	354.2	357.4	363.0	367.9	371.6	378.9	381.9	388.0	387.4	405.7	410.3
65.0	348.7	362.7	363.6	361.5	359.7	373.9	382.0	392.7	396.1	402.2	407.6	411.5	419.5	422.7	429.5	428.8	448.9	453.8
70.0	385.1	400.5	401.3	398.9	396.7	412.2	421.0	432.6	436.2	442.8	448.7	452.9	461.6	464.9	472.4	471.6	493.6	499.0
80.0	461.7	480.1	480.7	477.7	474.6	492.8	503.2	516.5	520.5	528.2	535.0	539.9	549.9	553.6	562.6	561.6	587.5	593.7
90.0	543.4	565.0	565.3	561.6	557.6	578.7	590.6	605.7	610.2	618.9	626.8	632.4	643.8	647.8	658.4	657.1	687.2	694.3
100.0	630.0	654.8	654.8	650.5	645.4	669.5	683.1	700.1	705.0	714.8	723.8	730.0	743.0	747.3	759.5	758.0	792.4	800.4
150.0	1129.	1173.	1172.	1163.	1152.	1192.	1215.	1242.	1250.	1265.	1281.	1290.	1312.	1318.	1339.	1336.	1395.	1408.
200.0	1728.	1794.	1791.	1778.	1758.	1818.	1852.	1890.	1899.	1922.	1944.	1958.	1989.	1997.	2029.	2024.	2096.	2131.
250.0	2409.	2500.	2501.	2482.	2451.	2534.	2577.	2626.	2638.	2669.	2701.	2716.	2757.	2770.	2815.	2807.	2887.	2948.
300.0	3160.	3277.	3286.	3264.	3222.	3325.	3375.	3441.	3450.	3491.	3535.	3553.	3602.	3621.	3680.	3669.	3755.	3845.
350.0	3970.	4116.	4135.	4110.	4056.	4178.	4237.	4317.	4326.	4377.	4434.	4454.	4513.	4538.	4611.	4598.	4691.	4811.
400.0	4834.	5010.	5039.	5011.	4943.	5086.	5155.	5251.	5269.	5319.	5391.	5413.	5481.	5514.	5602.	5586.	5687.	5837.
450.0	5745.	5953.	5992.	5960.	5879.	6043.	6121.	6234.	6241.	6313.	6398.	6422.	6501.	6541.	6645.	6625.	6735.	6918.
500.0	6697.	6939.	6988.	6953.	6857.	7043.	7132.	7261.	7267.	7350.	7450.	7476.	7566.	7613.	7735.	7711.	7830.	8046.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{205}_{81}$TL IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	179.7	134.7	110.5	104.9	105.8	93.4	80.2	76.1	73.5	71.3	66.7	62.4	59.1	57.0	56.2	54.0	48.3	50.2
3.0	179.4	140.9	113.0	107.5	108.6	96.7	83.3	79.3	76.8	74.8	70.0	65.6	62.3	60.2	59.4	57.2	51.7	53.3
3.5	177.2	144.0	114.0	108.6	109.8	98.4	85.1	81.2	78.7	76.9	72.1	67.7	64.4	62.3	61.6	59.4	54.1	55.4
4.0	174.0	145.1	114.1	108.7	110.2	99.2	86.0	82.2	79.9	78.2	73.4	69.0	65.7	63.7	63.0	60.8	55.9	56.8
4.5	170.4	145.0	113.6	108.4	109.9	99.4	86.3	82.7	80.4	78.9	74.1	69.8	66.6	64.6	63.9	61.7	57.0	57.8
5.0	166.5	144.1	112.7	107.6	109.2	99.2	86.3	82.8	80.6	79.2	74.4	70.1	67.0	65.1	64.4	62.3	57.9	58.4
5.5	162.6	142.7	111.6	106.6	108.3	98.6	86.0	82.6	80.5	79.3	74.5	70.2	67.2	65.3	64.6	62.6	58.4	58.7
6.0	158.7	140.9	110.3	105.5	107.2	97.9	85.4	82.2	80.2	79.1	74.3	70.1	67.1	65.3	64.7	62.7	58.7	58.9
6.5	155.0	139.0	108.9	104.2	106.0	97.1	84.8	81.7	79.7	78.7	74.0	69.9	67.0	65.2	64.6	62.6	58.9	58.9
7.0	151.4	137.0	107.5	102.9	104.8	96.1	84.1	81.1	79.2	78.2	73.6	69.6	66.7	65.0	64.4	62.5	58.9	58.8
8.0	144.5	132.7	104.6	100.2	102.1	94.1	82.5	79.6	77.9	77.1	72.5	68.7	65.9	64.3	63.7	61.9	58.7	58.4
9.0	138.2	128.5	101.7	97.5	99.5	92.0	80.7	78.1	76.4	75.7	71.3	67.6	64.9	63.4	62.9	61.1	58.2	57.8
10.0	132.5	124.4	99.0	94.9	96.9	89.8	79.0	76.4	74.9	74.3	70.0	66.4	63.9	62.4	62.0	60.3	57.6	57.0
11.0	127.2	120.4	96.3	92.4	94.4	87.7	77.2	74.8	73.4	72.9	68.7	65.2	62.7	61.4	61.0	59.4	56.8	56.2
12.0	122.4	116.7	93.7	90.0	92.0	85.7	75.5	73.2	71.9	71.5	67.4	64.0	61.6	60.3	59.9	58.4	56.1	55.3
15.0	110.2	106.8	86.9	83.5	85.5	80.1	70.8	68.8	67.6	67.4	63.6	60.5	58.3	57.2	56.9	55.5	53.6	52.7
20.0	96.0	93.9	77.7	74.8	76.7	72.3	64.1	62.5	61.5	61.5	58.0	55.3	53.4	52.6	52.3	51.2	49.8	48.7
25.0	84.0	84.1	70.5	68.0	69.8	66.1	58.7	57.3	56.6	56.6	53.5	51.0	49.3	48.6	48.5	47.5	46.3	45.3
30.0	75.6	76.4	64.8	62.5	64.2	61.1	54.3	53.1	52.4	52.5	49.7	47.5	45.9	45.3	45.2	44.3	43.4	42.4
35.0	69.0	70.2	60.1	58.0	59.6	56.9	50.7	49.6	49.0	49.1	46.5	44.4	43.0	42.5	42.5	41.7	40.9	39.9
40.0	63.64	65.12	56.15	54.23	55.78	53.34	47.57	46.57	46.08	46.23	43.74	41.86	40.56	40.14	40.07	39.37	38.67	37.73
45.0	59.18	60.86	52.81	51.02	52.50	50.31	44.91	43.99	43.56	43.73	41.39	39.63	38.41	38.05	38.00	37.37	36.74	35.85
50.0	55.42	57.22	49.93	48.25	49.67	47.68	42.60	41.75	41.36	41.55	39.33	37.68	36.53	36.22	36.19	35.60	35.03	34.19
55.0	52.19	54.08	47.41	45.84	47.20	45.37	40.56	39.78	39.43	39.62	37.52	35.96	34.87	34.60	34.58	34.03	33.52	32.71
60.0	49.39	51.34	45.19	43.71	45.01	43.33	38.76	38.03	37.71	37.91	35.91	34.43	33.39	33.15	33.14	32.64	32.16	31.39
65.0	46.93	48.92	43.22	41.81	43.07	41.51	37.15	36.46	36.17	36.38	34.46	33.05	32.07	31.85	31.84	31.38	30.93	30.20
70.0	44.76	46.77	41.45	40.11	41.33	39.87	35.70	35.05	34.78	35.00	33.16	31.81	30.87	30.67	30.68	30.24	29.82	29.12
80.0	41.08	43.11	38.42	37.19	38.32	37.04	33.20	32.61	32.38	32.60	30.89	29.66	28.78	28.63	28.64	28.25	27.87	27.24
90.0	38.08	40.10	35.89	34.76	35.83	34.68	31.10	30.57	30.37	30.59	29.00	27.85	27.03	26.91	26.92	26.57	26.23	25.65
100.0	35.57	37.58	33.76	32.70	33.71	32.68	29.32	28.83	28.65	28.88	27.38	26.30	25.54	25.43	25.45	25.13	24.81	24.28
150.0	27.42	29.27	26.61	25.80	26.60	25.90	23.28	22.93	22.82	23.04	21.86	21.03	20.43	20.38	20.41	20.19	19.94	19.57
200.0	22.87	24.62	22.65	21.93	22.48	22.07	19.83	19.47	19.52	19.74	18.71	18.41	17.80	17.42	17.48	17.24	17.42	16.80
250.0	20.18	22.00	20.14	19.50	19.94	19.67	17.68	17.17	17.42	17.63	16.72	16.45	15.91	15.58	15.65	15.38	15.59	15.06
300.0	18.32	20.03	18.36	17.79	18.20	17.96	16.16	15.55	15.94	16.13	15.30	15.05	14.56	14.28	14.34	14.10	14.30	13.82
350.0	16.95	18.57	17.05	16.51	16.90	16.70	15.03	14.47	14.83	15.02	14.24	14.01	13.55	13.30	13.36	13.15	13.32	12.89
400.0	15.90	17.46	16.03	15.53	15.90	15.72	14.15	13.64	13.97	14.15	13.43	13.20	12.78	12.55	12.60	12.40	12.57	12.16
450.0	15.08	16.57	15.23	14.75	15.11	14.94	13.45	12.99	13.29	13.46	12.78	12.56	12.16	11.94	12.00	11.81	11.97	11.59
500.0	14.41	15.86	14.58	14.12	14.47	14.31	12.89	12.45	12.74	12.91	12.25	12.04	11.65	11.46	11.51	11.33	11.48	11.12

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	46.85	44.63	44.63	44.94	44.50	41.92	40.60	38.31	37.48	36.48	35.77	35.18	33.90	33.46	33.09	33.18	31.80	31.44
3.0	49.88	47.56	47.55	47.87	47.49	44.85	43.49	41.18	40.35	39.33	38.59	37.98	36.67	36.19	35.78	35.87	34.34	33.94
3.5	51.96	49.58	49.56	49.89	49.57	46.91	45.52	43.23	42.41	41.38	40.62	40.00	38.69	38.18	37.74	37.82	36.18	35.76
4.0	53.39	50.97	50.94	51.28	51.01	48.35	46.95	44.69	43.89	42.86	42.10	41.48	40.18	39.65	39.17	39.26	37.54	37.09
4.5	54.35	51.92	51.88	52.22	52.00	49.36	47.96	45.74	44.96	43.93	43.17	42.55	41.27	40.73	40.23	40.32	38.53	38.07
5.0	54.97	52.54	52.50	52.84	52.67	50.05	48.66	46.48	45.73	44.71	43.94	43.33	42.06	41.52	41.00	41.09	39.25	38.79
5.5	55.35	52.92	52.88	53.23	53.09	50.50	49.12	46.99	46.26	45.25	44.49	43.89	42.64	42.09	41.56	41.65	39.78	39.31
6.0	55.54	53.12	53.08	53.43	53.32	50.77	49.40	47.32	46.61	45.62	44.86	44.27	43.04	42.50	41.95	42.04	40.14	39.67
6.5	55.59	53.19	53.15	53.49	53.42	50.90	49.55	47.51	46.83	45.85	45.10	44.52	43.31	42.77	42.22	42.30	40.39	39.92
7.0	55.53	53.15	53.11	53.45	53.41	50.93	49.59	47.60	46.94	45.97	45.23	44.66	43.47	42.94	42.38	42.46	40.54	40.06
8.0	55.19	52.84	52.80	53.15	53.16	50.75	49.45	47.55	46.92	45.99	45.26	44.71	43.56	43.05	42.47	42.55	40.62	40.15
9.0	54.64	52.34	52.30	52.65	52.70	50.36	49.10	47.28	46.69	45.78	45.08	44.54	43.44	42.94	42.35	42.43	40.50	40.03
10.0	53.97	51.71	51.69	52.03	52.11	49.84	48.61	46.87	46.31	45.44	44.75	44.23	43.17	42.68	42.09	42.17	40.25	39.79
11.0	53.23	51.02	51.00	51.34	51.45	49.25	48.05	46.38	45.85	45.00	44.33	43.83	42.80	42.34	41.74	41.82	39.92	39.47
12.0	52.45	50.29	50.27	50.61	50.75	48.61	47.44	45.83	45.33	44.51	43.85	43.37	42.38	41.93	41.33	41.41	39.53	39.08
15.0	50.07	48.04	48.04	48.36	48.56	46.58	45.51	44.06	43.62	42.87	42.26	41.82	40.92	40.52	39.92	40.00	38.19	37.77
20.0	46.35	44.51	44.53	44.83	45.09	43.33	42.37	41.13	40.77	40.11	39.57	39.18	38.39	38.06	37.48	37.56	35.88	35.49
25.0	43.14	41.45	41.48	41.77	42.05	40.46	39.60	38.51	38.20	37.61	37.12	36.78	36.07	35.79	35.24	35.31	33.75	33.39
30.0	40.39	38.83	38.87	39.15	39.44	37.99	37.20	36.22	35.95	35.42	34.97	34.66	34.02	33.78	33.25	33.32	31.86	31.53
35.0	38.04	36.58	36.63	36.89	37.19	35.84	35.11	34.23	33.99	33.50	33.09	32.80	32.22	32.01	31.50	31.57	30.20	29.89
40.0	36.00	34.62	34.68	34.93	35.24	33.98	33.30	32.49	32.27	31.82	31.43	31.17	30.63	30.45	29.96	30.03	28.73	28.45
45.0	34.21	32.91	32.97	33.21	33.52	32.34	31.70	30.95	30.76	30.34	29.97	29.73	29.22	29.07	28.60	28.66	27.43	27.16
50.0	32.63	31.40	31.47	31.70	32.01	30.89	30.29	29.59	29.41	29.02	28.68	28.45	27.97	27.83	27.38	27.44	26.27	26.02
55.0	31.23	30.06	30.13	30.35	30.66	29.60	29.03	28.38	28.21	27.84	27.51	27.30	26.85	26.72	26.29	26.35	25.23	24.99
60.0	29.98	28.86	28.92	29.14	29.44	28.43	27.90	27.28	27.13	26.78	26.47	26.27	25.84	25.72	25.30	25.37	24.30	24.07
65.0	28.85	27.77	27.84	28.05	28.35	27.38	26.87	26.29	26.15	25.82	25.52	25.33	24.92	24.82	24.41	24.47	23.44	23.22
70.0	27.82	26.79	26.86	27.06	27.36	26.43	25.94	25.39	25.25	24.94	24.65	24.47	24.09	23.99	23.60	23.66	22.67	22.46
80.0	26.03	25.07	25.14	25.33	25.62	24.76	24.31	23.81	23.69	23.40	23.14	22.97	22.62	22.53	22.16	22.22	21.30	21.10
90.0	24.52	23.61	23.68	23.86	24.15	23.35	22.93	22.47	22.36	22.09	21.85	21.69	21.36	21.29	20.94	21.00	20.13	19.95
100.0	23.21	22.36	22.43	22.61	22.88	22.13	21.74	21.31	21.21	20.97	20.73	20.59	20.28	20.22	19.89	19.94	19.12	18.95
150.0	18.72	18.04	18.10	18.25	18.49	17.90	17.60	17.29	17.22	17.04	16.85	16.74	16.51	16.46	16.20	16.25	15.58	15.45
200.0	16.07	15.52	15.51	15.63	15.86	15.36	15.11	14.86	14.81	14.66	14.50	14.42	14.22	14.18	13.96	14.00	13.81	13.36
250.0	14.41	13.92	13.76	13.87	14.08	13.68	13.54	13.30	13.30	13.15	12.95	12.93	12.79	12.69	12.49	12.53	12.43	12.04
300.0	13.23	12.77	12.63	12.67	12.86	12.56	12.44	12.22	12.23	12.09	11.91	11.89	11.76	11.68	11.49	11.53	11.44	11.09
350.0	12.34	11.92	11.79	11.83	12.00	11.73	11.61	11.41	11.42	11.30	11.13	11.11	10.99	10.92	10.74	10.78	10.70	10.37
400.0	11.65	11.25	11.13	11.17	11.34	11.08	10.97	10.78	10.79	10.68	10.52	10.50	10.39	10.32	10.16	10.19	10.11	9.81
450.0	11.10	10.72	10.61	10.65	10.81	10.56	10.46	10.28	10.29	10.18	10.04	10.02	9.92	9.85	9.70	9.73	9.65	9.36
500.0	10.65	10.29	10.19	10.22	10.37	10.14	10.04	9.88	9.89	9.78	9.64	9.62	9.53	9.46	9.32	9.35	9.27	9.00

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{205}_{81}$Tl IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.390	6.110	8.620	8.600	8.450	10.060	10.870	11.423	11.830	12.270	12.540	13.430	13.880	14.457	14.680	14.917	15.363	15.760
3.0	6.960	6.852	9.536	9.564	9.405	11.137	12.122	12.740	13.192	13.671	14.036	15.029	15.566	16.203	16.450	16.757	17.410	17.739
3.5	7.535	7.571	10.438	10.512	10.343	12.187	13.338	14.016	14.509	15.021	15.477	16.565	17.182	17.874	18.143	18.514	19.344	19.623
4.0	8.118	8.279	11.337	11.455	11.274	13.224	14.536	15.269	15.801	16.341	16.884	18.063	18.756	19.499	19.787	20.218	21.206	21.447
4.5	8.713	8.985	12.237	12.399	12.205	14.256	15.726	16.511	17.079	17.645	18.273	19.540	20.305	21.096	21.403	21.891	23.021	23.234
5.0	9.322	9.694	13.143	13.348	13.141	15.288	16.913	17.750	18.352	18.940	19.653	21.005	21.839	22.677	23.001	23.544	24.804	24.998
5.5	9.945	10.409	14.057	14.305	14.083	16.324	18.103	18.989	19.624	20.233	21.029	22.465	23.366	24.249	24.590	25.185	26.567	26.747
6.0	10.583	11.132	14.981	15.271	15.034	17.367	19.299	20.233	20.900	21.528	22.406	23.925	24.892	25.818	26.175	26.822	28.318	28.489
6.5	11.236	11.864	15.916	16.249	15.995	18.418	20.503	21.484	22.181	22.827	23.788	25.388	26.420	27.389	27.760	28.458	30.061	30.229
7.0	11.906	12.607	16.863	17.239	16.967	19.479	21.717	22.743	23.471	24.133	25.177	26.858	27.954	28.964	29.350	30.097	31.802	31.970
8.0	13.29	14.13	18.80	19.26	18.95	21.63	24.18	25.29	26.08	26.77	27.98	29.82	31.05	32.13	32.55	33.39	35.29	35.47
9.0	14.74	15.70	20.78	21.33	20.98	23.84	26.69	27.89	28.74	29.46	30.83	32.83	34.18	35.35	35.79	36.72	38.80	39.00
10.0	16.26	17.32	22.83	23.46	23.07	26.09	29.26	30.55	31.45	32.19	33.73	35.89	37.36	38.60	39.07	40.10	42.34	42.57
11.0	17.84	18.99	24.93	25.65	25.21	28.40	31.88	33.26	34.21	34.97	36.69	39.01	40.60	41.92	42.41	43.53	45.92	46.19
12.0	19.48	20.72	27.08	27.90	27.41	30.77	34.57	36.03	37.03	37.81	39.70	42.18	43.90	45.28	45.80	47.01	49.55	49.87
15.0	24.79	26.24	33.90	34.99	34.35	38.19	42.98	44.70	45.85	46.68	49.10	52.07	54.16	55.75	56.33	57.81	60.77	61.25
20.0	34.84	36.50	46.40	47.99	47.03	51.68	58.22	60.36	61.76	62.62	65.99	69.81	72.54	74.46	75.13	77.05	80.62	81.48
25.0	46.34	48.06	60.27	62.38	61.06	66.52	74.94	77.51	79.16	80.03	84.41	89.12	92.52	94.75	95.50	97.86	101.98	103.31
30.0	59.23	60.87	75.45	78.13	76.39	82.66	93.10	96.11	98.00	98.85	104.32	109.97	114.07	116.59	117.41	120.21	124.85	126.72
35.0	73.44	74.88	91.90	95.17	92.97	100.07	112.65	116.11	118.23	119.04	125.68	132.31	137.14	139.94	140.82	144.07	149.20	151.66
40.0	88.92	90.05	109.56	113.46	110.76	118.69	133.54	137.46	139.81	140.56	148.42	156.09	161.69	164.76	165.68	169.38	175.00	178.09
45.0	105.64	106.35	128.39	132.96	129.71	138.49	155.73	160.11	162.70	163.37	172.52	181.27	187.67	191.00	191.96	196.12	202.21	205.97
50.0	123.55	123.73	148.36	153.63	149.79	159.43	179.18	184.04	186.86	187.43	197.94	207.80	215.05	218.62	219.61	224.23	230.79	235.26
55.0	142.62	142.16	169.44	175.44	170.97	181.47	203.85	209.20	212.26	212.70	224.63	235.65	243.77	247.59	248.60	253.69	260.71	265.93
60.0	162.82	161.62	191.60	198.35	193.22	204.60	229.71	235.56	238.85	239.15	252.57	264.80	273.82	277.86	278.89	284.46	291.94	297.92
65.0	184.1	182.1	214.8	222.3	216.5	228.8	256.7	263.1	266.6	266.8	281.7	295.2	305.1	309.4	310.5	316.5	324.5	331.2
70.0	206.5	203.5	239.0	247.4	240.8	254.0	284.9	291.8	295.5	295.5	312.0	326.8	337.7	342.2	343.3	349.8	358.2	365.8
80.0	254.4	249.2	290.4	300.5	292.4	307.4	344.5	352.5	356.7	356.2	376.2	393.6	406.6	411.5	412.5	420.0	429.4	438.7
90.0	306.2	298.6	345.7	357.6	347.7	364.6	408.3	417.4	422.1	421.2	444.7	465.0	480.1	485.4	486.4	494.9	505.3	516.3
100.0	362.0	351.4	404.6	418.4	406.8	425.5	476.3	486.5	491.6	490.2	517.5	540.8	558.2	563.8	564.7	574.2	585.7	598.5
150.0	694.1	663.9	750.1	774.8	752.5	781.3	872.4	889.0	896.2	891.3	940.4	980.7	1011.1	1018.1	1018.4	1033.3	1050.5	1072.7
200.0	1105.9	1046.7	1170.4	1208.6	1174.0	1212.9	1352.4	1376.6	1385.0	1374.9	1450.4	1499.6	1548.1	1565.3	1564.4	1585.3	1600.2	1641.2
250.0	1584.8	1486.7	1651.8	1705.8	1660.1	1706.3	1901.4	1939.0	1942.4	1925.9	2031.7	2090.3	2159.1	2189.2	2186.0	2217.3	2223.9	2287.5
300.0	2119.0	1976.1	2186.0	2267.3	2199.3	2252.7	2508.9	2568.3	2558.7	2534.8	2673.8	2742.9	2833.9	2877.7	2871.6	2914.6	2911.8	2999.4
350.0	2701.6	2508.3	2766.1	2856.3	2784.5	2845.4	3167.7	3252.5	3226.4	3194.3	3369.1	3449.7	3564.5	3622.4	3613.1	3668.4	3655.5	3768.6
400.0	3327.	3078.	3387.	3497.	3410.	3479.	3871.	3983.	3939.	3898.	4111.	4204.	4344.	4417.	4404.	4472.	4448.	4588.
450.0	3989.	3681.	4043.	4175.	4072.	4155.	4615.	4753.	4692.	4641.	4894.	5001.	5167.	5255.	5238.	5319.	5285.	5452.
500.0	4685.	4314.	4731.	4886.	4766.	4850.	5394.	5560.	5481.	5419.	5714.	5835.	6029.	6131.	6110.	6206.	6160.	6356.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.54	17.15	18.50	18.84	19.53	20.50	21.09	21.85	22.30	22.73	23.18	23.65	24.13	24.56	25.13	25.34	27.13	27.70
3.0	18.66	19.37	20.72	21.05	21.75	22.86	23.52	24.42	24.93	25.43	25.93	26.45	27.03	27.50	28.10	28.30	30.22	30.83
3.5	20.67	21.48	22.82	23.14	23.86	25.09	25.82	26.85	27.40	27.97	28.52	29.08	29.74	30.25	30.89	31.08	33.13	33.77
4.0	22.61	23.52	24.86	25.17	25.90	27.24	28.04	29.18	29.77	30.40	30.99	31.59	32.34	32.88	33.55	33.74	35.91	36.58
4.5	24.51	25.51	26.85	27.15	27.89	29.34	30.20	31.44	32.08	32.76	33.40	34.03	34.86	35.43	36.13	36.31	38.60	39.31
5.0	26.39	27.47	28.82	29.10	29.85	31.40	32.32	33.66	34.34	35.07	35.75	36.42	37.32	37.92	38.65	38.83	41.23	41.97
5.5	28.24	29.41	30.76	31.03	31.78	33.44	34.41	35.86	36.57	37.35	38.07	38.77	39.73	40.37	41.13	41.31	43.83	44.59
6.0	30.09	31.35	32.70	32.95	33.71	35.47	36.49	38.03	38.77	39.61	40.36	41.09	42.13	42.80	43.69	43.75	46.39	47.19
6.5	31.94	33.27	34.63	34.87	35.63	37.48	38.57	40.19	40.97	41.85	42.64	43.40	44.50	45.20	46.02	46.18	48.94	49.76
7.0	33.78	35.20	36.56	36.78	37.55	39.49	40.63	42.35	43.15	44.08	44.91	45.70	46.86	47.59	48.45	48.60	51.47	52.33
8.0	37.48	39.07	40.42	40.63	41.39	43.52	44.77	46.65	47.52	48.54	49.43	50.28	51.57	52.36	53.28	53.42	56.52	57.44
9.0	41.22	42.97	44.32	44.50	45.27	47.58	48.93	50.97	51.90	53.00	53.97	54.87	56.28	57.12	58.11	58.25	61.57	62.55
10.0	44.99	46.91	48.27	48.42	49.18	51.67	53.13	55.33	56.30	57.50	58.54	59.49	61.01	61.91	62.96	63.09	66.85	67.68
11.0	48.81	50.90	52.26	52.38	53.14	55.81	57.37	59.73	60.75	62.03	63.14	64.15	65.78	66.73	67.85	67.97	71.76	72.86
12.0	52.69	54.94	56.31	56.41	57.15	60.00	61.66	64.17	65.25	66.61	67.79	68.85	70.60	71.60	72.79	72.90	76.92	78.07
15.0	64.69	67.45	68.82	68.84	69.54	72.92	74.89	77.85	79.08	80.68	82.07	83.28	85.36	86.51	87.92	88.00	92.74	94.08
20.0	85.98	89.63	91.00	90.86	91.45	95.74	98.24	101.94	103.39	105.41	107.14	108.61	111.22	112.62	114.42	114.45	120.43	122.07
25.0	108.92	113.51	114.86	114.56	115.01	120.24	123.28	127.71	129.38	131.81	133.89	135.62	138.78	140.40	142.64	142.60	149.90	151.86
30.0	133.49	139.08	140.41	139.93	140.19	146.40	150.01	155.17	157.05	159.91	162.36	164.35	168.06	169.89	172.60	172.50	181.17	183.46
35.0	159.66	166.29	167.59	166.92	166.97	174.19	178.38	184.29	186.39	189.68	192.51	194.76	199.03	201.07	204.28	204.12	214.24	216.86
40.0	187.4	195.1	196.4	195.5	195.3	203.6	208.4	215.0	217.3	221.1	224.3	226.8	231.7	233.9	237.7	237.4	249.0	252.0
45.0	216.6	225.5	226.7	225.6	225.1	234.5	239.9	247.4	249.9	254.1	257.7	260.5	266.0	268.4	272.7	272.4	286.6	288.9
50.0	247.3	257.4	258.5	257.2	256.4	267.0	273.0	281.3	284.0	288.6	292.7	295.8	301.8	304.4	309.3	308.9	323.8	327.5
55.0	279.4	290.8	291.8	290.2	289.2	300.9	307.6	316.8	319.6	324.7	329.2	332.5	339.2	342.0	347.6	347.1	363.6	367.7
60.0	312.9	325.6	326.6	324.7	323.3	336.2	343.6	353.5	356.6	362.3	367.2	370.8	378.1	381.1	387.3	386.7	405.0	409.5
65.0	347.8	361.8	362.7	360.6	358.8	372.9	381.1	391.8	395.1	401.2	406.6	410.6	418.5	421.7	428.6	427.9	447.9	452.9
70.0	384.0	399.4	400.2	397.8	395.6	411.1	419.9	431.5	435.0	441.6	447.5	451.8	460.4	463.7	471.3	470.5	492.4	497.8
80.0	460.2	478.5	479.1	476.2	473.1	491.2	501.6	514.9	518.9	526.6	533.4	538.3	548.3	552.0	561.0	560.0	585.8	592.0
90.0	541.4	562.9	563.2	559.6	555.6	576.6	588.5	603.6	608.0	616.8	624.6	630.2	641.6	645.6	656.2	654.9	684.9	692.0
100.0	627.4	652.1	652.2	647.9	642.8	666.8	680.4	697.3	702.2	712.1	721.0	727.2	740.1	744.5	756.7	755.2	789.4	797.5
150.0	1123.	1167.	1165.	1157.	1145.	1186.	1209.	1236.	1243.	1259.	1274.	1284.	1305.	1311.	1332.	1329.	1388.	1401.
200.0	1718.	1783.	1780.	1767.	1747.	1807.	1840.	1878.	1888.	1910.	1932.	1946.	1977.	1985.	2017.	2012.	2083.	2118.
250.0	2393.	2483.	2484.	2465.	2435.	2517.	2560.	2610.	2620.	2651.	2683.	2700.	2739.	2752.	2796.	2789.	2868.	2929.
300.0	3137.	3253.	3263.	3240.	3199.	3301.	3351.	3416.	3426.	3466.	3510.	3528.	3576.	3595.	3653.	3643.	3729.	3818.
350.0	3940.	4085.	4104.	4079.	4025.	4146.	4205.	4285.	4294.	4344.	4401.	4421.	4479.	4505.	4577.	4564.	4656.	4775.
400.0	4796.	4971.	4999.	4971.	4905.	5046.	5114.	5210.	5218.	5278.	5349.	5371.	5439.	5471.	5559.	5543.	5643.	5792.
450.0	5698.	5906.	5943.	5912.	5831.	5994.	6072.	6184.	6191.	6262.	6347.	6371.	6449.	6488.	6593.	6573.	6681.	6863.
500.0	6642.	6882.	6930.	6896.	6800.	6985.	7073.	7201.	7208.	7290.	7389.	7415.	7604.	7551.	7672.	7648.	7766.	7980.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

208 PB IONS 82

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	181.9	136.6	111.5	105.9	106.7	94.2	80.9	76.7	74.1	71.9	67.3	62.9	59.5	57.4	56.6	54.4	48.6	50.5
3.0	181.8	142.2	114.1	108.5	109.6	97.6	84.1	80.0	77.4	75.4	70.7	66.2	62.8	60.7	59.9	57.7	52.2	53.7
3.5	179.6	145.4	115.2	109.7	111.0	99.4	85.9	82.0	79.5	77.7	72.8	68.3	65.0	62.9	62.1	59.9	54.6	55.9
4.0	176.5	146.7	116.4	110.0	111.4	100.3	86.9	83.1	80.7	79.0	74.2	69.7	66.4	64.3	63.6	61.4	56.4	57.4
4.5	172.9	146.7	114.9	109.6	111.2	100.5	87.3	83.6	81.3	79.8	74.9	70.5	67.3	65.3	64.5	62.4	57.6	58.4
5.0	169.1	145.9	114.1	108.9	110.6	100.3	87.3	83.7	81.5	80.1	75.3	70.9	67.7	65.8	65.1	62.9	58.5	59.0
5.5	165.2	144.5	113.0	108.0	109.7	99.8	87.0	83.6	81.4	80.2	75.3	71.1	67.9	66.0	65.4	63.3	59.0	59.4
6.0	161.3	142.8	111.7	106.8	108.6	99.1	86.5	83.2	81.2	80.0	75.2	71.0	67.9	66.1	65.4	63.4	59.4	59.6
6.5	157.5	140.9	110.4	105.6	107.4	98.3	85.9	82.7	80.7	79.7	74.9	70.8	67.8	66.0	65.4	63.4	59.6	59.6
7.0	153.9	138.9	109.0	104.3	106.2	97.4	85.2	82.1	80.2	79.2	74.5	70.4	67.5	65.8	65.2	63.2	59.6	59.5
8.0	147.0	134.7	106.1	101.6	103.6	95.4	83.6	80.7	78.9	78.1	73.5	69.6	66.8	65.1	64.6	62.7	59.4	59.1
9.0	140.6	130.5	103.2	98.9	100.9	93.3	81.9	79.1	77.5	76.8	72.3	68.5	65.8	64.2	63.7	62.0	59.0	58.5
10.0	134.8	126.4	100.4	96.3	98.3	91.1	80.1	77.5	76.0	75.4	71.0	67.3	64.7	63.3	62.8	61.1	58.3	57.8
11.0	129.5	122.4	97.8	93.8	95.8	89.0	78.4	75.9	74.5	74.0	69.7	66.1	63.6	62.3	61.8	60.2	57.6	57.0
12.0	124.7	118.7	95.2	91.4	93.4	87.0	76.7	74.3	73.0	72.5	68.4	64.9	62.5	61.2	60.8	59.2	56.9	56.1
15.0	112.3	108.7	88.3	84.9	86.9	81.4	71.9	69.9	68.7	68.4	64.6	61.4	59.2	58.1	57.8	56.4	54.4	53.5
20.0	96.9	95.6	79.0	76.1	78.0	73.6	65.2	63.5	62.6	62.5	59.0	56.2	54.3	53.4	53.2	52.0	50.6	49.5
25.0	85.7	85.7	71.8	69.2	71.0	67.3	59.8	58.3	57.5	57.5	54.4	51.9	50.2	49.5	49.3	48.3	47.1	46.1
30.0	77.2	77.9	66.0	63.6	65.4	62.2	55.3	54.0	53.4	53.5	50.6	48.3	46.7	46.1	46.0	45.1	44.2	43.1
35.0	70.5	71.6	61.2	59.1	60.8	57.9	51.6	50.5	49.9	50.0	47.3	45.3	43.8	43.3	43.2	42.4	41.6	40.6
40.0	64.99	66.46	57.24	55.28	56.86	54.36	48.48	47.45	46.95	47.10	44.57	42.65	41.32	40.89	40.82	40.10	39.38	38.43
45.0	60.46	62.12	53.85	52.03	53.54	51.29	45.78	44.84	44.40	44.67	42.18	40.39	39.15	38.78	38.72	38.07	37.43	36.52
50.0	56.63	58.43	50.93	49.22	50.66	48.62	43.43	42.57	42.17	42.36	40.10	38.42	37.24	36.92	36.88	36.29	35.71	34.84
55.0	53.34	55.23	48.37	46.77	48.15	46.28	41.37	40.57	40.21	40.41	38.26	36.67	35.56	35.28	35.25	34.70	34.17	33.35
60.0	50.48	52.44	46.12	44.60	45.93	44.21	39.54	38.80	38.46	38.67	36.63	35.12	34.06	33.81	33.80	33.28	32.79	32.01
65.0	47.98	49.98	44.12	42.68	43.96	42.36	37.91	37.21	36.90	37.12	35.16	33.72	32.71	32.49	32.49	32.01	31.55	30.80
70.0	45.76	47.79	42.32	40.95	42.19	40.70	36.44	35.78	35.50	35.71	33.84	32.46	31.50	31.30	31.30	30.86	30.42	29.71
80.0	42.01	44.06	39.24	37.98	39.14	37.82	33.89	33.30	33.06	33.28	31.54	30.27	29.38	29.22	29.23	28.83	28.45	27.80
90.0	38.95	41.00	36.67	35.51	36.60	35.42	31.76	31.22	31.01	31.24	29.61	28.44	27.60	27.47	27.49	27.13	26.78	26.18
100.0	36.39	38.42	34.50	33.42	34.44	33.38	29.95	29.45	29.27	29.50	27.97	26.87	26.08	25.97	26.00	25.67	25.34	24.80
150.0	28.06	29.95	27.21	26.39	27.20	26.48	23.81	23.44	23.33	23.56	22.35	21.50	20.88	20.83	20.87	20.64	20.38	20.01
200.0	23.41	25.40	23.18	22.44	23.00	22.58	20.29	19.92	19.97	20.20	19.14	18.84	18.21	17.82	17.88	17.64	17.81	17.18
250.0	20.67	22.52	20.61	19.96	20.41	20.13	18.10	17.57	17.83	18.04	17.11	16.83	16.28	15.95	16.01	15.74	15.96	15.41
300.0	18.76	20.51	18.80	18.21	18.63	18.39	16.54	15.92	16.31	16.52	15.66	15.41	14.90	14.62	14.68	14.44	14.63	14.14
350.0	17.36	19.02	17.46	16.91	17.31	17.10	15.38	14.82	15.18	15.37	14.58	14.34	13.88	13.62	13.68	13.46	13.64	13.19
400.0	16.29	17.88	16.42	15.90	16.29	16.09	14.49	13.97	14.30	14.49	13.75	13.52	13.08	12.85	12.91	12.70	12.87	12.45
450.0	15.44	16.98	15.60	15.11	15.48	15.30	13.78	13.30	13.61	13.79	13.09	12.86	12.45	12.23	12.29	12.10	12.26	11.86
500.0	14.76	16.25	14.94	14.46	14.82	14.66	13.20	12.76	13.04	13.22	12.55	12.33	11.94	11.73	11.79	11.61	11.76	11.39

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	47.19	44.95	44.95	45.26	44.82	42.22	40.89	38.58	37.74	36.74	36.03	35.42	34.14	33.70	33.33	33.41	32.03	31.66
3.0	50.29	47.85	47.94	48.26	47.88	45.22	43.84	41.51	40.68	39.65	38.90	38.28	36.97	36.48	36.07	36.16	34.62	34.21
3.5	52.43	50.03	50.01	50.34	50.01	47.32	45.92	43.61	42.78	41.74	40.98	40.35	39.03	38.52	38.07	38.16	36.50	36.07
4.0	53.90	51.47	51.43	51.77	51.50	48.81	47.40	45.12	44.31	43.27	42.50	41.87	40.56	40.02	39.54	39.63	37.89	37.44
4.5	54.91	52.45	52.41	52.75	52.53	49.86	48.45	46.20	45.42	44.38	43.60	42.98	41.68	41.14	40.63	40.72	38.91	38.45
5.0	55.56	53.10	53.06	53.41	53.22	50.57	49.17	46.97	46.21	45.18	44.40	43.79	42.50	41.95	41.43	41.52	39.66	39.20
5.5	55.97	53.51	53.46	53.81	53.67	51.05	49.66	47.50	46.76	45.74	44.98	44.37	43.10	42.55	42.01	42.10	40.21	39.74
6.0	56.18	53.73	53.69	54.04	53.93	51.34	49.96	47.85	47.14	46.13	45.37	44.77	43.52	42.98	42.42	42.51	40.59	40.12
6.5	56.25	53.81	53.77	54.12	54.05	51.50	50.13	48.07	47.37	46.38	45.63	45.03	43.81	43.27	42.70	42.79	40.86	40.38
7.0	56.21	53.79	53.75	54.10	54.05	51.54	50.19	48.17	47.50	46.52	45.77	45.19	43.99	43.45	42.88	42.96	41.02	40.54
8.0	55.89	53.51	53.47	53.82	53.83	51.38	50.07	48.14	47.51	46.56	45.83	45.26	44.11	43.58	42.99	43.08	41.12	40.64
9.0	55.36	53.02	52.99	53.34	53.39	51.02	49.73	47.89	47.29	46.37	45.66	45.11	44.00	43.49	42.89	42.98	41.02	40.55
10.0	54.70	52.41	52.38	52.73	52.81	50.51	49.27	47.50	46.93	46.04	45.35	44.82	43.74	43.25	42.65	42.73	40.79	40.32
11.0	53.97	51.73	51.70	52.05	52.16	49.93	48.71	47.01	46.48	45.62	44.94	44.43	43.39	42.91	42.31	42.39	40.46	40.00
12.0	53.20	51.01	50.99	51.32	51.47	49.29	48.11	46.48	45.96	45.13	44.47	43.98	42.97	42.51	41.91	41.99	40.08	39.63
15.0	50.82	48.76	48.76	49.08	49.28	47.28	46.18	44.71	44.27	43.51	42.89	42.44	41.52	41.12	40.51	40.59	38.76	38.33
20.0	47.10	45.23	45.24	45.55	45.81	44.02	43.05	41.79	41.42	40.75	40.20	39.80	39.00	38.66	38.08	38.15	36.45	36.05
25.0	43.87	42.15	42.18	42.47	42.76	41.14	40.26	39.15	38.84	38.24	37.74	37.39	36.67	36.39	35.82	35.90	34.31	33.94
30.0	41.10	39.51	39.55	39.83	40.13	38.65	37.84	36.85	36.57	36.03	35.57	35.26	34.60	34.36	33.82	33.89	32.41	32.07
35.0	38.72	37.23	37.28	37.55	37.86	36.49	35.74	34.84	34.60	34.10	33.67	33.39	32.79	32.58	32.06	32.13	30.73	30.42
40.0	36.66	35.26	35.32	35.57	35.88	34.60	33.91	33.08	32.86	32.41	32.01	31.74	31.19	31.00	30.51	30.57	29.25	28.96
45.0	34.85	33.53	33.59	33.84	34.15	32.95	32.30	31.53	31.33	30.91	30.53	30.29	29.77	29.61	29.13	29.19	27.94	27.67
50.0	33.26	32.01	32.07	32.31	32.62	31.48	30.87	30.16	29.97	29.57	29.22	28.99	28.50	28.36	27.90	27.96	26.77	26.51
55.0	31.84	30.65	30.71	30.94	31.25	30.17	29.59	28.92	28.75	28.38	28.04	27.83	27.37	27.24	26.80	26.86	25.72	25.47
60.0	30.57	29.43	29.49	29.72	30.02	28.99	28.44	27.82	27.66	27.30	26.98	26.78	26.34	26.23	25.80	25.86	24.77	24.53
65.0	29.42	28.33	28.40	28.61	28.91	27.93	27.41	26.81	26.66	26.33	26.02	25.83	25.42	25.31	24.89	24.95	23.91	23.68
70.0	28.38	27.33	27.40	27.61	27.91	26.96	26.46	25.90	25.76	25.44	25.15	24.96	24.57	24.47	24.07	24.13	23.12	22.90
80.0	26.57	25.58	25.65	25.85	26.14	25.27	24.81	24.30	24.17	23.88	23.61	23.44	23.08	22.99	22.62	22.67	21.73	21.53
90.0	25.03	24.11	24.18	24.36	24.65	23.83	23.40	22.93	22.82	22.55	22.30	22.14	21.81	21.73	21.38	21.43	20.55	20.36
100.0	23.71	22.84	22.91	23.08	23.36	22.59	22.20	21.76	21.66	21.41	21.17	21.02	20.71	20.64	20.31	20.36	19.52	19.35
150.0	19.14	18.44	18.50	18.65	18.90	18.30	17.99	17.67	17.60	17.41	17.22	17.11	16.88	16.83	16.56	16.60	15.93	15.79
200.0	16.44	15.87	15.86	15.99	16.22	15.71	15.45	15.20	15.14	14.99	14.83	14.74	14.55	14.50	14.28	14.32	14.12	13.66
250.0	14.75	14.24	14.08	14.19	14.41	13.99	13.85	13.60	13.61	13.46	13.25	13.23	13.08	12.98	12.77	12.82	12.72	12.32
300.0	13.54	13.07	12.93	12.97	13.16	12.86	12.73	12.51	12.52	12.38	12.19	12.17	12.04	11.95	11.76	11.80	11.71	11.35
350.0	12.63	12.20	12.07	12.11	12.29	12.01	11.89	11.68	11.69	11.56	11.40	11.37	11.25	11.17	11.00	11.03	10.95	10.61
400.0	11.93	11.52	11.40	11.44	11.61	11.35	11.23	11.04	11.05	10.93	10.77	10.75	10.64	10.57	10.40	10.44	10.35	10.04
450.0	11.36	10.98	10.87	10.90	11.07	10.82	10.71	10.53	10.54	10.43	10.28	10.25	10.16	10.09	9.93	9.96	9.88	9.59
500.0	10.91	10.54	10.43	10.47	10.62	10.39	10.28	10.11	10.12	10.01	9.88	9.86	9.76	9.69	9.54	9.57	9.49	9.22

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{208}_{82}$PB IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.420	6.140	8.667	8.640	8.480	10.100	10.920	11.476	11.880	12.320	12.600	13.490	13.950	14.531	14.750	14.985	15.432	15.830
3.0	6.991	6.887	9.587	9.609	9.440	11.182	12.179	12.801	13.251	13.730	14.106	15.099	15.647	16.289	16.532	16.838	17.493	17.822
3.5	7.566	7.609	10.494	10.561	10.382	12.237	13.402	14.083	14.576	15.087	15.554	16.643	17.272	17.969	18.234	18.604	19.438	19.717
4.0	8.150	8.321	11.395	11.507	11.317	13.279	14.605	15.342	15.872	16.413	16.968	18.149	18.854	19.602	19.887	20.318	21.310	21.551
4.5	8.745	9.029	12.298	12.454	12.261	14.314	15.798	16.590	17.155	17.722	18.362	19.632	20.409	21.206	21.510	21.998	23.133	23.346
5.0	9.354	9.740	13.206	13.405	13.188	15.350	16.990	17.832	18.432	19.022	19.747	21.102	21.949	22.793	23.114	23.657	24.923	25.117
5.5	9.976	10.456	14.122	14.364	14.132	16.389	18.183	19.075	19.708	20.319	21.127	22.567	23.481	24.370	24.708	25.304	26.693	26.873
6.0	10.613	11.180	15.048	15.333	15.085	17.434	19.382	20.322	20.987	21.617	22.509	24.031	25.011	25.944	26.298	26.946	28.449	28.620
6.5	11.266	11.913	15.984	16.312	16.048	18.487	20.589	21.575	22.272	22.920	23.894	25.498	26.544	27.519	27.888	28.587	30.197	30.365
7.0	11.934	12.656	16.932	17.303	17.021	19.550	21.804	22.838	23.564	24.229	25.286	26.971	28.081	29.097	29.481	30.230	31.943	32.110
8.0	13.32	14.18	18.87	19.32	19.00	21.71	24.27	25.39	26.18	26.87	28.10	29.94	31.18	32.27	32.69	33.53	35.44	35.61
9.0	14.76	15.75	20.85	21.40	21.04	23.91	26.78	28.00	28.84	29.56	30.95	32.95	34.32	35.49	35.93	36.87	38.95	39.15
10.0	16.28	17.37	22.90	23.53	23.13	26.17	29.35	30.65	31.55	32.29	33.85	36.02	37.50	38.75	39.22	40.25	42.50	42.73
11.0	17.85	19.04	25.00	25.72	25.27	28.48	31.98	33.36	34.31	35.08	36.81	39.13	40.74	42.07	42.55	43.68	46.08	46.35
12.0	19.49	20.76	27.15	27.96	27.47	30.84	34.66	36.13	37.14	37.92	39.82	42.31	44.04	45.44	45.95	47.16	49.72	50.03
15.0	24.77	26.26	33.96	35.05	34.40	38.26	43.07	44.79	45.95	46.78	49.21	52.19	54.30	55.90	56.48	57.96	60.93	61.42
20.0	34.78	36.49	46.43	48.01	47.05	51.72	58.28	60.43	61.84	62.70	66.08	69.91	72.65	74.59	75.25	77.18	80.76	81.63
25.0	46.22	48.00	60.26	62.37	61.04	66.53	74.96	77.54	79.19	80.07	84.47	89.18	92.59	94.83	95.58	97.94	102.08	103.41
30.0	59.03	60.75	75.39	78.06	76.32	82.62	93.07	96.08	97.97	98.83	104.32	109.97	114.08	116.62	117.43	120.24	124.89	126.76
35.0	73.15	74.69	91.77	95.03	92.83	99.96	112.55	116.01	118.14	118.95	125.60	132.23	137.08	139.89	140.77	144.02	149.16	151.62
40.0	88.53	89.78	109.35	113.24	110.54	118.51	133.35	137.27	139.63	140.39	148.26	155.92	161.53	164.62	165.54	169.24	174.87	177.96
45.0	105.14	105.97	128.09	132.65	129.40	138.21	155.44	159.83	162.42	163.10	172.25	180.99	187.41	190.75	191.71	195.87	201.97	205.73
50.0	122.93	123.25	147.96	153.21	149.38	159.05	178.78	183.64	186.47	187.05	197.55	207.41	214.66	218.25	219.24	223.86	230.42	234.89
55.0	141.86	141.56	168.92	174.90	170.45	180.98	203.32	208.68	211.74	212.19	224.11	235.12	243.24	247.08	248.09	253.18	260.21	265.41
60.0	161.91	160.90	190.95	197.68	192.57	203.98	229.04	234.90	238.19	238.51	251.90	264.12	273.14	277.20	278.23	283.79	291.29	297.25
65.0	183.1	181.2	214.0	221.5	215.7	228.0	255.9	262.3	265.8	266.0	280.9	294.3	304.3	308.6	309.6	315.7	323.6	330.4
70.0	205.3	202.5	238.1	246.4	239.9	253.1	283.9	290.8	294.5	294.5	311.0	325.8	336.7	341.2	342.3	348.8	357.2	364.8
80.0	252.8	247.9	289.2	299.2	291.1	306.1	348.4	351.1	355.3	354.9	374.8	392.2	405.1	410.0	411.1	418.6	428.0	437.2
90.0	304.2	296.9	344.1	355.9	346.1	363.0	406.6	415.7	420.3	419.5	442.9	463.1	478.2	483.5	484.5	493.0	503.4	514.4
100.0	359.5	349.3	402.6	416.3	404.7	423.5	474.1	484.3	489.4	488.0	515.2	538.4	555.8	561.4	562.4	571.9	583.3	596.0
150.0	688.8	659.3	745.5	770.1	747.9	776.7	867.3	883.8	891.1	886.2	935.0	975.2	1005.5	1012.5	1012.9	1027.7	1044.9	1067.0
200.0	1097.1	1038.8	1162.3	1200.3	1166.0	1204.8	1343.5	1367.6	1376.0	1366.0	1441.0	1490.0	1538.3	1555.4	1554.6	1575.3	1590.2	1631.1
250.0	1571.5	1475.1	1639.6	1693.3	1648.0	1694.1	1887.8	1925.3	1928.7	1912.4	2017.5	2075.8	2144.1	2174.2	2171.0	2202.2	2208.8	2272.0
300.0	2100.9	1960.0	2169.1	2239.9	2182.3	2235.7	2490.1	2549.1	2539.7	2516.0	2654.0	2722.8	2813.1	2856.7	2850.7	2893.5	2890.8	2977.8
350.0	2678.0	2487.4	2744.0	2833.5	2762.3	2823.1	3142.9	3227.2	3201.4	3169.6	3343.1	3423.3	3537.3	3594.9	3585.7	3640.6	3628.0	3740.2
400.0	3297.	3052.	3359.	3468.	3382.	3451.	3840.	3951.	3908.	3867.	4078.	4171.	4310.	4382.	4369.	4437.	4414.	4552.
450.0	3953.	3650.	4009.	4140.	4038.	4114.	4577.	4714.	4654.	4603.	4854.	4960.	5125.	5212.	5196.	5277.	5242.	5409.
500.0	4643.	4276.	4691.	4844.	4725.	4809.	5349.	5513.	5435.	5374.	5666.	5787.	5979.	6081.	6060.	6155.	6109.	6304.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.61	17.22	18.57	18.92	19.61	20.59	21.18	21.94	22.39	22.83	23.28	23.75	24.23	24.66	25.23	25.44	27.24	27.81
3.0	18.74	19.46	20.81	21.14	21.85	22.97	23.63	24.53	25.04	25.55	26.05	26.57	27.15	27.62	28.22	28.42	30.35	30.96
3.5	20.76	21.58	22.93	23.25	23.97	25.21	25.95	26.97	27.53	28.10	28.65	29.21	29.88	30.39	31.02	31.22	33.27	33.92
4.0	22.72	23.63	24.98	25.28	26.02	27.37	28.17	29.32	29.92	30.55	31.14	31.74	32.49	33.03	33.70	33.89	36.07	36.75
4.5	24.63	25.63	26.98	27.27	28.02	29.48	30.34	31.59	32.23	32.92	33.56	34.19	35.02	35.60	36.30	36.48	38.77	39.48
5.0	26.51	27.60	28.95	29.23	29.98	31.55	32.47	33.82	34.50	35.24	35.92	36.59	37.49	38.10	38.83	39.00	41.42	42.16
5.5	28.37	29.55	30.90	31.17	31.93	33.60	34.57	36.02	36.74	37.53	38.25	38.95	39.92	40.56	41.32	41.49	44.02	44.80
6.0	30.23	31.49	32.84	33.10	33.86	35.63	36.66	38.21	38.95	39.79	40.55	41.28	42.32	42.99	43.78	43.95	46.60	47.40
6.5	32.08	33.42	34.78	35.02	35.79	37.65	38.74	40.37	41.15	42.04	42.83	43.60	44.70	45.40	46.23	46.39	49.15	49.98
7.0	33.93	35.35	36.71	36.94	37.71	39.67	40.81	42.53	43.35	44.28	45.11	45.90	47.07	47.80	48.66	48.81	51.69	52.55
8.0	37.64	39.23	40.59	40.79	41.57	43.71	44.96	46.85	47.72	48.74	49.65	50.50	51.79	52.58	53.50	53.64	56.75	57.68
9.0	41.38	43.13	44.50	44.68	45.44	47.77	49.13	51.18	52.11	53.22	54.19	55.10	56.51	57.35	58.34	58.48	61.82	62.80
10.0	45.16	47.08	48.44	48.60	49.36	51.87	53.33	55.54	56.52	57.72	58.76	59.72	61.25	62.15	63.20	63.33	66.90	67.94
11.0	48.98	51.07	52.44	52.57	53.32	56.01	57.57	59.94	60.98	62.26	63.37	64.38	66.02	66.97	68.10	68.22	72.02	73.12
12.0	52.86	55.12	56.49	56.59	57.34	60.20	61.87	64.39	65.48	66.84	68.02	69.09	70.84	71.84	73.04	73.15	77.18	78.34
15.0	64.86	67.63	69.01	69.02	69.73	73.12	75.11	78.08	79.31	80.92	82.31	83.53	85.61	86.76	88.18	88.25	93.01	94.35
20.0	86.13	89.79	91.16	91.03	91.62	95.93	98.44	102.14	103.60	105.62	107.36	108.83	111.45	112.85	114.66	114.68	120.68	122.33
25.0	109.03	113.62	114.98	114.69	115.14	120.38	123.43	127.87	129.54	131.98	134.07	135.80	138.96	140.58	142.83	142.79	150.10	152.07
30.0	133.54	139.13	140.47	139.99	140.26	146.48	150.09	155.27	157.15	160.01	162.47	164.46	168.17	170.01	172.72	172.62	181.31	183.60
35.0	159.62	166.26	167.56	166.90	166.96	174.19	178.39	184.31	186.41	189.70	192.53	194.79	199.06	201.11	204.32	204.15	214.28	216.91
40.0	187.2	195.0	196.2	195.4	195.2	203.5	208.3	215.0	217.3	221.0	224.2	226.7	231.6	233.8	237.6	237.3	249.0	252.0
45.0	216.3	225.2	226.4	225.4	224.9	234.3	239.7	247.2	249.7	253.9	257.5	260.3	265.7	268.2	272.5	272.2	285.4	288.7
50.0	246.9	257.0	258.1	256.8	256.1	266.6	272.7	280.9	283.6	288.3	292.3	295.4	301.5	304.1	309.0	308.6	323.4	327.1
55.0	278.9	290.2	291.3	289.7	288.7	300.4	307.1	316.1	319.1	324.2	328.7	332.0	338.7	341.5	347.0	346.5	363.1	367.2
60.0	312.2	324.8	325.9	324.0	322.6	335.5	342.9	352.8	356.0	361.6	366.5	370.1	377.4	380.4	386.6	386.0	404.3	408.8
65.0	346.9	360.9	361.8	359.7	357.9	372.1	380.2	390.9	394.3	400.4	405.7	409.7	417.6	420.8	427.6	427.0	447.0	451.9
70.0	382.9	398.3	399.1	396.7	394.6	410.0	418.8	430.4	434.0	440.6	446.4	450.7	459.3	462.6	470.1	469.4	491.3	496.6
80.0	458.7	477.0	477.6	474.7	471.6	489.7	500.1	513.4	517.4	525.0	531.8	536.7	546.7	550.4	559.4	558.3	584.1	590.3
90.0	539.4	560.8	561.2	557.6	553.6	574.6	586.4	601.5	606.0	614.7	622.5	628.1	639.5	643.5	654.0	652.8	682.6	689.7
100.0	624.8	649.5	649.6	645.3	640.3	664.2	677.7	694.7	699.6	709.4	718.3	724.5	737.4	741.7	753.9	752.4	786.5	794.6
150.0	1117.	1161.	1159.	1151.	1139.	1180.	1203.	1229.	1237.	1252.	1267.	1277.	1298.	1304.	1326.	1322.	1381.	1394.
200.0	1707.	1772.	1769.	1756.	1736.	1796.	1829.	1867.	1877.	1899.	1921.	1935.	1965.	1973.	2005.	2000.	2071.	2106.
250.0	2377.	2466.	2467.	2448.	2418.	2500.	2543.	2593.	2603.	2634.	2665.	2682.	2721.	2734.	2778.	2770.	2849.	2910.
300.0	3114.	3229.	3239.	3217.	3176.	3277.	3327.	3392.	3401.	3441.	3485.	3503.	3561.	3570.	3628.	3618.	3703.	3791.
350.0	3910.	4054.	4073.	4048.	3995.	4115.	4174.	4253.	4262.	4312.	4368.	4388.	4446.	4471.	4544.	4530.	4622.	4740.
400.0	4759.	4932.	4961.	4933.	4867.	5007.	5075.	5170.	5178.	5238.	5308.	5330.	5397.	5429.	5517.	5500.	5600.	5748.
450.0	5653.	5858.	5896.	5865.	5785.	5947.	6024.	6135.	6142.	6213.	6297.	6321.	6398.	6437.	6541.	6521.	6629.	6809.
500.0	6587.	6826.	6873.	6839.	6745.	6928.	7016.	7143.	7150.	7231.	7330.	7355.	7444.	7490.	7610.	7587.	7704.	7916.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{209}_{83}$BI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	184.1	136.5	112.5	106.8	107.6	95.0	81.5	77.3	74.6	72.4	67.8	63.3	60.0	57.8	57.0	54.8	49.0	50.9
3.0	184.1	143.3	115.3	109.6	110.7	98.5	84.8	80.7	78.1	76.1	71.3	66.8	63.4	61.2	60.4	58.2	52.6	54.2
3.5	182.1	146.8	116.4	110.9	112.2	100.4	86.7	82.8	80.3	78.4	73.5	69.0	65.6	63.5	62.7	60.4	55.1	56.4
4.0	179.0	148.3	116.7	111.2	112.6	101.3	87.8	83.9	81.5	79.8	74.9	70.4	67.1	65.0	64.2	62.0	56.9	57.9
4.5	175.4	148.4	116.3	110.9	112.5	101.6	88.2	84.5	82.2	80.6	75.7	71.2	68.0	65.9	65.2	63.0	58.2	59.0
5.0	171.6	147.6	115.5	110.2	111.9	101.5	88.3	84.7	82.4	81.0	76.1	71.7	68.5	66.5	65.8	63.6	59.1	59.7
5.5	167.7	146.4	114.4	109.3	111.0	101.0	88.0	84.5	82.4	81.1	76.2	71.9	68.7	66.8	66.1	64.0	59.7	60.1
6.0	163.8	144.7	113.2	108.2	110.0	100.3	87.5	84.2	82.1	80.9	76.1	71.8	68.7	66.8	66.2	64.1	60.1	60.3
6.5	160.1	142.9	111.8	107.0	108.8	99.5	87.0	83.7	81.7	80.6	75.8	71.6	68.6	66.8	66.1	64.1	60.2	60.3
7.0	156.4	140.9	110.4	105.7	107.6	98.6	86.3	83.1	81.2	80.2	75.4	71.3	68.3	66.6	66.0	64.0	60.3	60.2
8.0	149.4	136.7	107.6	103.0	105.0	96.6	84.7	81.7	79.9	79.1	74.4	70.4	67.6	65.9	65.4	63.5	60.1	59.9
9.0	143.0	132.5	104.7	100.4	102.4	94.5	83.0	80.2	78.5	77.8	73.3	69.4	66.7	65.1	64.6	62.8	59.7	59.3
10.0	137.2	128.3	101.9	97.7	99.8	92.4	81.2	78.6	77.0	76.4	72.0	68.3	65.8	64.1	63.7	61.9	59.1	58.5
11.0	131.8	124.4	99.2	95.2	97.3	90.3	79.5	77.0	75.5	75.0	70.7	67.1	64.5	63.1	62.7	61.0	58.4	57.7
12.0	126.9	120.6	96.7	92.8	94.9	88.3	77.8	75.4	74.0	73.6	69.4	65.9	63.4	62.1	61.7	60.1	57.7	56.9
15.0	114.4	110.6	89.7	86.3	88.3	82.7	73.0	70.9	69.7	69.5	65.5	62.3	60.1	59.0	58.6	57.2	55.3	54.3
20.0	98.8	97.4	80.4	77.4	79.3	74.8	66.3	64.5	63.6	63.5	59.9	57.1	55.2	54.3	54.0	52.8	51.4	50.3
25.0	87.4	87.3	73.1	70.4	72.3	68.4	60.8	59.3	58.5	58.5	55.3	52.8	51.0	50.3	50.1	49.1	47.9	46.8
30.0	78.8	79.4	67.2	64.8	66.8	63.3	56.3	55.0	54.3	54.4	51.4	49.1	47.6	46.9	46.8	45.9	44.9	43.9
35.0	71.9	73.0	62.4	60.2	61.9	59.0	52.6	51.4	50.8	50.9	48.2	46.1	44.6	44.1	44.0	43.2	42.3	41.3
40.0	66.36	67.80	58.34	56.33	57.94	55.38	49.38	48.34	47.82	47.97	45.39	43.43	42.08	41.64	41.56	40.84	40.10	39.13
45.0	61.75	63.40	54.90	53.04	54.57	52.27	46.65	45.70	45.24	45.41	42.98	41.15	39.88	39.50	39.45	38.78	38.13	37.20
50.0	57.84	59.64	51.93	50.19	51.66	49.57	44.27	43.39	42.98	43.17	40.87	39.15	37.95	37.62	37.59	36.98	36.38	35.50
55.0	54.49	56.39	49.34	47.70	49.11	47.19	42.18	41.37	40.99	41.20	39.01	37.38	36.25	35.96	35.93	35.37	34.83	33.99
60.0	51.59	53.55	47.05	45.50	46.86	45.09	40.33	39.56	39.23	39.44	37.35	35.81	34.73	34.47	34.46	33.93	33.43	32.63
65.0	49.03	51.05	45.02	43.55	44.86	43.22	38.67	37.95	37.64	37.86	35.86	34.39	33.36	33.13	33.13	32.64	32.17	31.41
70.0	46.77	48.82	43.20	41.79	43.06	41.53	37.18	36.50	36.21	36.44	34.52	33.11	32.13	31.93	31.92	31.47	31.03	30.30
80.0	42.95	45.02	40.06	38.78	39.95	38.61	34.59	33.98	33.74	33.97	32.19	30.89	29.98	29.82	29.83	29.42	29.02	28.36
90.0	39.82	41.89	37.45	36.26	37.37	36.17	32.43	31.88	31.66	31.89	30.23	29.03	28.18	28.04	28.06	27.69	27.33	26.72
100.0	37.21	39.27	35.24	34.14	35.18	34.10	30.59	30.08	29.89	30.12	28.56	27.43	26.63	26.52	26.54	26.21	25.87	25.31
150.0	28.71	30.63	27.82	26.98	27.81	27.07	24.33	23.96	23.86	24.08	22.84	21.97	21.34	21.29	21.32	21.09	20.83	20.45
200.0	23.96	25.99	23.71	22.95	23.52	23.10	20.75	20.37	20.42	20.65	19.57	19.28	18.62	18.22	18.28	18.04	18.21	17.57
250.0	21.16	23.05	21.09	20.42	20.89	20.59	18.52	17.97	18.24	18.46	17.50	17.22	16.65	16.31	16.38	16.10	16.32	15.76
300.0	19.21	20.99	19.24	18.64	19.07	18.82	16.93	16.29	16.70	16.90	16.03	15.77	15.25	14.96	15.02	14.77	14.97	14.47
350.0	17.78	19.47	17.87	17.31	17.72	17.50	15.75	15.17	15.54	15.74	14.93	14.68	14.20	13.94	14.00	13.77	13.96	13.50
400.0	16.68	18.30	16.81	16.28	16.67	16.48	14.83	14.30	14.64	14.83	14.08	13.84	13.39	13.15	13.21	13.00	13.17	12.75
450.0	15.82	17.38	15.97	15.47	15.85	15.67	14.11	13.62	13.93	14.12	13.40	13.17	12.75	12.52	12.58	12.38	12.55	12.15
500.0	15.12	16.64	15.29	14.81	15.18	15.01	13.52	13.06	13.36	13.54	12.85	12.62	12.22	12.01	12.07	11.88	12.04	11.66

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	47.51	45.26	45.26	45.57	45.12	42.51	41.17	38.85	38.00	36.99	36.27	35.66	34.37	33.93	33.55	33.64	32.25	31.88
3.0	50.69	48.33	48.32	48.64	48.25	45.57	44.18	41.84	40.99	39.95	39.20	38.58	37.25	36.77	36.35	36.44	34.88	34.48
3.5	52.89	50.47	50.44	50.77	50.44	47.73	46.32	43.98	43.15	42.10	41.33	40.70	39.37	38.85	38.39	38.48	36.81	36.38
4.0	54.41	51.95	51.91	52.26	51.98	49.26	47.84	45.53	44.72	43.66	42.89	42.25	40.93	40.39	39.91	39.99	38.24	37.79
4.5	55.45	52.97	52.93	53.28	53.05	50.35	48.92	46.65	45.86	44.81	44.03	43.40	42.08	41.54	41.03	41.11	39.29	38.83
5.0	56.14	53.65	53.61	53.96	53.77	51.10	49.68	47.45	46.68	45.64	44.86	44.23	42.94	42.38	41.85	41.94	40.07	39.59
5.5	56.57	54.09	54.04	54.39	54.25	51.60	50.19	48.01	47.26	46.23	45.45	44.84	43.56	43.00	42.46	42.55	40.63	40.16
6.0	56.81	54.33	54.29	54.64	54.53	51.91	50.52	48.38	47.66	46.64	45.87	45.26	44.00	43.45	42.89	42.98	41.04	40.56
6.5	56.90	54.43	54.39	54.74	54.67	52.08	50.70	48.61	47.91	46.91	46.14	45.54	44.31	43.76	43.19	43.27	41.31	40.83
7.0	56.88	54.43	54.38	54.74	54.69	52.14	50.78	48.73	48.05	47.06	46.31	45.72	44.50	43.96	43.38	43.46	41.49	41.01
8.0	56.58	54.17	54.13	54.48	54.49	52.01	50.68	48.73	48.09	47.13	46.39	45.82	44.64	44.11	43.52	43.60	41.62	41.13
9.0	56.07	53.70	53.67	54.02	54.07	51.67	50.37	48.50	47.89	46.96	46.24	45.68	44.55	44.04	43.43	43.52	41.54	41.06
10.0	55.43	53.11	53.07	53.42	53.51	51.18	49.91	48.12	47.54	46.64	45.94	45.40	44.31	43.81	43.20	43.29	41.32	40.84
11.0	54.71	52.43	52.41	52.75	52.87	50.60	49.37	47.65	47.10	46.23	45.54	45.02	43.97	43.49	42.87	42.96	41.00	40.53
12.0	53.94	51.72	51.69	52.04	52.18	49.97	48.78	47.12	46.60	45.75	45.08	44.58	43.56	43.10	42.48	42.56	40.63	40.17
15.0	51.57	49.48	49.47	49.81	50.01	47.97	46.86	45.37	44.91	44.14	43.51	43.06	42.12	41.71	41.10	41.18	39.32	38.88
20.0	47.84	45.94	45.95	46.27	46.53	44.71	43.72	42.44	42.06	41.38	40.82	40.42	39.61	39.26	38.67	38.75	37.01	36.61
25.0	44.60	42.85	42.87	43.17	43.46	41.82	40.92	39.79	39.47	38.86	38.35	38.00	37.27	36.98	36.41	36.48	34.86	34.50
30.0	41.81	40.19	40.23	40.51	40.82	39.31	38.49	37.48	37.20	36.64	36.16	35.86	35.19	34.95	34.39	34.47	32.95	32.61
35.0	39.41	37.89	37.94	38.21	38.53	37.13	36.37	35.45	35.20	34.70	34.26	33.97	33.36	33.15	32.62	32.69	31.27	30.95
40.0	37.33	35.90	35.95	36.22	36.53	35.23	34.52	33.68	33.45	32.99	32.58	32.31	31.75	31.56	31.05	31.12	29.78	29.48
45.0	35.50	34.15	34.21	34.46	34.78	33.55	32.89	32.11	31.91	31.47	31.09	30.84	30.31	30.15	29.66	29.73	28.45	28.17
50.0	33.89	32.61	32.67	32.91	33.23	32.07	31.45	30.72	30.53	30.13	29.77	29.53	29.04	28.89	28.42	28.48	27.27	27.00
55.0	32.45	31.23	31.30	31.53	31.85	30.74	30.16	29.47	29.30	28.92	28.58	28.36	27.89	27.75	27.30	27.37	26.20	25.95
60.0	31.17	30.00	30.07	30.29	30.60	29.55	28.99	28.35	28.19	27.83	27.50	27.29	26.85	26.73	26.29	26.36	25.24	25.00
65.0	30.00	28.88	28.95	29.17	29.48	28.48	27.94	27.34	27.19	26.84	26.53	26.33	25.91	25.80	25.38	25.44	24.37	24.14
70.0	28.95	27.87	27.94	28.15	28.46	27.50	26.99	26.41	26.27	25.94	25.64	25.45	25.05	24.95	24.54	24.60	23.57	23.35
80.0	27.11	26.10	26.17	26.37	26.67	25.78	25.31	24.79	24.66	24.36	24.08	23.91	23.54	23.45	23.07	23.13	22.17	21.96
90.0	25.54	24.60	24.67	24.86	25.16	24.32	23.88	23.40	23.29	23.01	22.76	22.60	22.25	22.18	21.81	21.87	20.96	20.78
100.0	24.20	23.31	23.38	23.56	23.85	23.06	22.66	22.21	22.11	21.85	21.61	21.46	21.14	21.07	20.73	20.78	19.93	19.75
150.0	19.56	18.84	18.91	19.06	19.32	18.70	18.38	18.06	17.98	17.79	17.60	17.49	17.24	17.19	16.92	16.97	16.27	16.14
200.0	16.81	16.23	16.22	16.35	16.58	16.06	15.80	15.54	15.48	15.33	15.17	15.07	14.87	14.83	14.60	14.64	14.44	13.97
250.0	15.09	14.57	14.40	14.52	14.74	14.31	14.17	13.92	13.92	13.76	13.56	13.53	13.38	13.28	13.07	13.11	13.01	12.60
300.0	13.85	13.38	13.23	13.27	13.47	13.16	13.02	12.80	12.81	12.66	12.48	12.45	12.32	12.23	12.03	12.07	11.98	11.61
350.0	12.93	12.48	12.35	12.39	12.58	12.29	12.16	11.96	11.97	11.83	11.66	11.64	11.52	11.44	11.26	11.29	11.20	10.86
400.0	12.21	11.79	11.67	11.71	11.88	11.61	11.50	11.30	11.31	11.19	11.03	11.01	10.89	10.82	10.65	10.68	10.60	10.28
450.0	11.63	11.24	11.12	11.16	11.33	11.07	10.96	10.78	10.79	10.67	10.52	10.50	10.40	10.32	10.16	10.20	10.11	9.81
500.0	11.17	10.79	10.68	10.72	10.88	10.64	10.53	10.35	10.37	10.25	10.11	10.09	9.99	9.92	9.77	9.80	9.72	9.43

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{209}_{83}$BI IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.390	6.110	8.627	8.600	8.440	10.045	10.860	11.414	11.820	12.260	12.530	13.420	13.870	14.448	14.670	14.906	15.348	15.740
3.0	6.957	6.855	9.643	9.564	9.396	11.124	12.115	12.734	13.186	13.665	14.031	15.024	15.562	16.200	16.447	16.763	17.403	17.727
3.5	7.527	7.574	10.445	10.612	10.333	12.174	13.332	14.011	14.504	15.016	15.473	16.562	17.181	17.874	18.142	18.513	19.342	19.615
4.0	8.106	8.282	11.341	11.452	11.262	13.210	14.528	15.263	15.795	16.336	16.880	18.061	18.755	19.500	19.788	20.219	21.205	21.441
4.5	8.696	8.986	12.238	12.393	12.190	14.239	15.715	16.503	17.072	17.638	18.267	19.536	20.302	21.096	21.403	21.891	23.019	23.228
5.0	9.298	9.692	13.140	13.338	13.122	15.268	16.899	17.738	18.341	18.930	19.643	20.997	21.833	22.673	22.998	23.541	24.800	24.989
5.5	9.914	10.403	14.049	14.290	14.059	16.300	18.085	18.973	19.609	20.219	21.015	22.453	23.356	24.241	24.583	25.179	26.559	26.734
6.0	10.544	11.120	14.967	15.251	15.004	17.338	19.275	20.211	20.879	21.509	22.388	23.908	24.876	25.805	26.163	26.810	28.304	28.471
6.5	11.190	11.847	15.896	16.222	15.969	18.383	20.473	21.456	22.154	22.802	23.763	25.364	26.398	27.369	27.742	28.439	30.041	30.204
7.0	11.850	12.584	16.836	17.205	16.925	19.438	21.679	22.709	23.437	24.101	25.145	26.827	27.924	28.937	29.324	30.071	31.774	31.937
8.0	13.22	14.09	18.75	19.21	18.89	21.58	24.12	25.24	26.03	26.72	27.93	29.77	31.00	32.09	32.51	33.35	35.24	35.42
9.0	14.65	15.64	20.72	21.26	20.91	23.77	26.62	27.82	28.67	29.39	30.76	32.78	34.11	35.28	35.72	36.66	38.73	38.92
10.0	16.14	17.25	22.75	23.37	22.98	26.00	29.16	30.46	31.36	32.10	33.64	35.80	37.27	38.51	38.98	40.01	42.25	42.47
11.0	17.69	18.90	24.83	25.54	25.10	28.29	31.76	33.14	34.10	34.86	36.57	38.89	40.48	41.80	42.29	43.41	45.80	46.07
12.0	19.31	20.61	26.96	27.76	27.27	30.63	34.42	35.89	36.89	37.67	39.55	42.03	43.75	45.14	45.65	46.86	49.40	49.71
15.0	24.52	26.04	33.70	34.78	34.13	37.97	42.74	44.46	45.62	46.44	48.86	51.82	53.91	55.50	56.08	57.56	60.51	60.99
20.0	34.39	36.13	46.02	47.59	46.64	51.28	57.79	59.92	61.33	62.20	65.54	69.35	72.07	73.99	74.66	76.57	80.13	80.99
25.0	45.66	47.49	59.68	61.77	60.46	65.91	74.27	76.83	78.48	79.36	83.71	88.40	91.78	94.01	94.76	97.10	101.21	102.53
30.0	58.28	60.06	74.61	77.26	75.54	81.80	92.15	95.15	97.03	97.89	103.32	108.93	113.00	115.53	116.35	119.13	123.75	125.59
35.0	72.18	73.79	90.77	94.00	91.83	98.92	111.38	114.82	116.93	117.76	124.33	130.91	135.71	138.51	139.39	142.61	147.72	150.15
40.0	87.32	88.66	108.11	111.96	109.30	117.21	131.91	135.79	138.15	138.91	146.68	154.29	159.84	162.91	163.84	167.51	173.09	176.14
45.0	103.66	104.61	126.58	131.09	127.89	136.65	153.69	158.04	160.62	161.31	170.35	179.02	185.36	188.69	189.66	193.78	199.82	203.54
50.0	121.16	121.61	146.16	151.36	147.59	157.19	176.69	181.52	184.33	184.92	195.30	205.06	212.24	215.81	216.81	221.39	227.89	232.31
55.0	139.79	139.64	166.82	172.73	168.34	178.80	200.88	206.20	209.24	209.71	221.48	232.39	240.42	244.23	245.25	250.29	257.26	262.40
60.0	159.50	158.67	188.51	195.17	190.13	201.46	226.23	232.04	235.31	235.64	248.87	260.96	269.88	273.92	274.96	280.47	287.89	293.79
65.0	180.3	178.7	211.2	218.6	212.9	225.1	252.7	259.0	262.5	262.7	277.4	290.7	300.6	304.9	305.9	311.9	319.8	326.4
70.0	202.1	199.6	234.9	243.2	236.7	249.8	280.3	287.1	290.8	290.8	307.1	321.7	332.5	337.0	338.0	344.5	352.8	360.3
80.0	248.8	244.2	285.2	295.1	287.2	302.1	338.6	346.5	350.7	350.3	369.9	387.1	399.9	404.8	405.8	413.2	422.5	431.7
90.0	299.4	292.4	339.2	350.9	341.3	358.0	401.0	410.0	414.7	413.9	436.9	457.0	471.9	477.1	478.1	486.5	496.8	507.6
100.0	353.7	344.0	396.8	410.3	399.0	417.6	467.4	477.6	482.6	481.3	508.1	531.1	548.2	553.8	554.7	564.1	575.4	588.0
150.0	677.2	648.6	733.9	758.2	736.4	764.9	854.1	870.5	877.7	872.9	921.0	960.6	990.5	997.5	997.9	1012.5	1029.5	1051.3
200.0	1078.0	1021.4	1143.5	1180.9	1147.2	1185.6	1322.1	1345.9	1354.2	1344.4	1418.3	1466.6	1514.2	1531.1	1530.3	1550.8	1585.5	1605.7
250.0	1543.8	1449.8	1612.3	1665.0	1620.6	1666.2	1856.8	1893.7	1897.2	1881.2	1984.6	2042.1	2109.3	2139.0	2135.9	2166.6	2173.3	2235.4
300.0	2063.3	1925.9	2132.1	2201.8	2145.3	2198.1	2448.2	2506.3	2497.1	2474.0	2609.7	2677.5	2766.4	2809.3	2803.5	2845.5	2843.0	2928.6
350.0	2629.7	2443.6	2696.5	2784.5	2714.6	2774.7	3089.2	3172.0	3146.9	3115.7	3286.2	3365.2	3477.4	3534.0	3525.1	3579.2	3566.9	3677.2
400.0	3237.	2998.	3300.	3408.	3323.	3391.	3774.	3882.	3840.	3800.	4008.	4099.	4236.	4307.	4294.	4361.	4338.	4475.
450.0	3881.	3584.	3938.	4067.	3967.	4042.	4497.	4632.	4573.	4523.	4769.	4874.	5036.	5122.	5105.	5185.	5152.	5315.
500.0	4557.	4199.	4607.	4757.	4641.	4724.	5254.	5416.	5339.	5279.	5566.	5685.	5874.	5974.	5954.	6047.	6002.	6194.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.51	17.12	18.46	18.81	19.50	20.48	21.07	21.82	22.27	22.70	23.15	23.62	24.09	24.52	25.08	25.28	27.08	27.66
3.0	18.63	19.35	20.69	21.03	21.74	22.85	23.51	24.41	24.91	25.42	25.91	26.43	27.00	27.47	28.07	28.26	30.19	30.80
3.5	20.65	21.46	22.81	23.13	23.85	25.09	25.82	26.84	27.39	27.96	28.51	29.07	29.73	30.23	30.86	31.05	33.10	33.75
4.0	22.60	23.50	24.85	25.16	25.89	27.24	28.04	29.18	29.77	30.40	30.99	31.58	32.33	32.87	33.53	33.71	35.89	36.57
4.5	24.50	25.49	26.84	27.13	27.88	29.34	30.20	31.44	32.08	32.76	33.39	34.02	34.85	35.42	36.11	36.29	38.58	39.29
5.0	26.37	27.45	28.80	29.08	29.83	31.40	32.32	33.66	34.33	35.07	35.74	36.41	37.30	37.91	38.63	38.80	41.21	41.96
5.5	28.22	29.39	30.74	31.01	31.77	33.43	34.41	35.85	36.56	37.34	38.05	38.75	39.72	40.35	41.10	41.27	43.80	44.58
6.0	30.07	31.32	32.67	32.92	33.69	35.45	36.48	38.02	38.76	39.59	40.34	41.07	42.10	42.77	43.55	43.72	46.36	47.16
6.5	31.90	33.24	34.59	34.84	35.60	37.46	38.56	40.17	40.95	41.82	42.61	43.37	44.47	45.17	45.98	46.14	48.90	49.73
7.0	33.74	35.16	36.51	36.74	37.51	39.47	40.61	42.32	43.12	44.05	44.87	45.66	46.82	47.55	48.39	48.55	51.42	52.29
8.0	37.42	39.00	40.36	40.57	41.34	43.48	44.73	46.61	47.47	48.48	49.38	50.23	51.51	52.29	53.20	53.35	56.45	57.37
9.0	41.13	42.88	44.24	44.42	45.19	47.51	48.86	50.90	51.82	52.92	53.89	54.79	56.20	57.03	58.01	58.14	61.47	62.46
10.0	44.88	46.79	48.16	48.31	49.08	51.57	53.03	55.23	56.20	57.39	58.43	59.38	60.90	61.79	62.83	62.96	66.52	67.56
11.0	48.68	50.75	52.12	52.25	53.00	55.68	57.24	59.59	60.62	61.89	62.99	64.00	65.63	66.58	67.69	67.80	71.59	72.69
12.0	52.52	54.76	56.13	56.24	56.98	59.83	61.50	64.00	65.08	66.43	67.61	68.67	70.41	71.40	72.58	72.69	76.71	77.87
15.0	64.41	67.16	68.53	68.55	69.26	72.64	74.61	77.56	78.78	80.38	81.76	82.97	85.04	86.19	87.58	87.66	92.40	93.73
20.0	85.46	89.08	90.46	90.33	90.93	95.21	97.70	101.38	102.83	104.83	106.55	108.02	110.62	112.01	113.80	113.82	119.79	121.43
25.0	108.10	112.65	114.02	113.73	114.18	119.39	122.42	126.82	128.48	130.90	132.98	134.69	137.83	139.44	141.66	141.63	148.89	150.85
30.0	132.31	137.85	139.20	138.73	139.01	145.18	148.77	153.90	155.77	158.61	161.04	163.02	166.70	168.52	171.20	171.11	179.74	182.02
35.0	158.07	164.65	165.96	165.30	165.38	172.55	176.71	182.58	184.66	187.93	190.74	192.97	197.21	199.24	202.42	202.26	212.31	214.92
40.0	185.3	193.0	194.3	193.4	193.2	201.5	206.2	212.8	215.1	218.8	222.0	224.5	229.3	231.6	235.3	235.0	246.6	249.5
45.0	214.1	222.8	224.1	223.0	222.6	231.9	237.2	244.6	247.1	251.3	254.9	257.6	263.0	265.4	269.7	269.4	282.5	285.8
50.0	244.2	254.2	255.3	254.0	253.3	263.7	269.7	277.9	280.6	285.2	289.2	292.3	298.3	300.9	305.7	305.3	320.0	323.7
55.0	275.7	286.9	288.0	286.5	285.5	297.0	303.7	312.6	315.6	320.6	325.1	328.4	335.0	337.8	343.2	342.8	359.1	363.2
60.0	308.6	321.1	322.1	320.3	318.9	331.7	339.0	348.8	351.9	357.5	362.4	366.0	373.2	376.2	382.3	381.7	399.8	404.2
65.0	342.8	356.6	357.5	355.5	353.7	367.7	375.8	386.4	389.7	395.7	401.1	405.0	412.8	416.0	422.7	422.0	441.9	446.8
70.0	378.2	393.4	394.3	391.9	389.8	405.1	413.8	425.3	428.8	435.3	441.1	445.3	453.9	457.2	464.6	463.8	485.5	490.8
80.0	452.9	471.0	471.6	468.7	465.7	483.6	493.9	507.0	511.0	518.5	525.3	530.1	540.0	543.6	552.5	551.5	577.0	583.1
90.0	532.4	553.5	553.9	550.4	546.5	567.2	578.9	593.8	598.2	606.8	614.6	620.1	631.3	635.3	645.7	644.5	674.0	681.0
100.0	616.5	640.8	641.0	636.8	631.8	655.5	668.8	685.5	690.4	700.1	708.9	715.0	727.8	732.0	744.0	742.6	776.3	784.3
150.0	1101.	1144.	1142.	1134.	1123.	1163.	1185.	1212.	1219.	1234.	1249.	1259.	1279.	1285.	1306.	1303.	1361.	1374.
200.0	1680.	1745.	1742.	1729.	1709.	1769.	1801.	1838.	1848.	1870.	1892.	1905.	1935.	1943.	1974.	1969.	2040.	2074.
250.0	2338.	2426.	2427.	2409.	2380.	2461.	2502.	2552.	2562.	2592.	2623.	2640.	2678.	2691.	2734.	2727.	2804.	2864.
300.0	3063.	3176.	3186.	3164.	3124.	3223.	3273.	3336.	3346.	3385.	3428.	3446.	3493.	3512.	3569.	3559.	3643.	3730.
350.0	3845.	3986.	4005.	3980.	3928.	4046.	4104.	4182.	4191.	4240.	4295.	4315.	4372.	4397.	4468.	4455.	4546.	4661.
400.0	4677.	4848.	4876.	4849.	4784.	4922.	4989.	5082.	5090.	5149.	5218.	5239.	5306.	5337.	5423.	5407.	5506.	5651.
450.0	5555.	5757.	5794.	5764.	5685.	5844.	5920.	6029.	6037.	6106.	6189.	6212.	6288.	6327.	6429.	6409.	6516.	6693.
500.0	6472.	6706.	6753.	6720.	6627.	6808.	6894.	7019.	7025.	7105.	7202.	7228.	7314.	7360.	7478.	7465.	7571.	7779.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{210}_{84}$PO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	186.2	137.3	113.5	107.7	108.6	96.7	82.1	77.9	75.2	73.0	68.3	63.8	60.4	58.2	57.4	55.2	49.3	51.2
3.0	186.4	144.5	116.4	110.6	111.7	99.3	85.5	81.4	78.8	76.7	71.9	67.3	63.9	61.7	60.9	58.6	53.0	54.6
3.5	184.5	148.2	117.6	112.0	113.3	101.3	87.6	83.6	81.0	79.1	74.2	69.6	66.2	64.0	63.2	61.0	55.6	56.9
4.0	181.5	149.8	117.9	112.4	113.8	102.3	88.7	84.8	82.3	80.6	75.6	71.1	67.7	65.6	64.8	62.6	57.5	58.5
4.5	177.9	150.0	117.6	112.2	113.7	102.7	89.2	85.4	83.0	81.5	76.5	72.0	68.7	66.6	65.8	63.6	58.8	59.6
5.0	174.1	149.4	116.8	111.5	113.2	102.6	89.2	85.6	83.3	81.9	76.9	72.4	69.2	67.2	66.5	64.3	59.7	60.3
5.5	170.3	148.2	115.8	110.6	112.4	102.2	89.0	85.5	83.3	82.0	77.0	72.6	69.5	67.5	66.8	64.7	60.3	60.7
6.0	166.4	146.6	114.6	109.5	111.3	101.5	88.6	85.2	83.1	81.9	77.0	72.6	69.5	67.6	66.9	64.8	60.7	60.9
6.5	162.6	144.8	113.3	108.3	110.2	100.8	88.0	84.7	82.7	81.6	76.7	72.5	69.4	67.5	66.9	64.8	60.9	61.0
7.0	158.9	142.8	111.9	107.1	109.0	99.9	87.3	84.1	82.2	81.2	76.4	72.2	69.2	67.4	66.7	64.7	61.0	60.9
8.0	151.9	138.7	109.0	104.4	106.4	97.9	85.8	82.8	81.0	80.1	75.4	71.3	68.5	66.7	66.2	64.3	60.9	60.6
9.0	145.5	134.4	106.2	101.8	103.8	95.8	84.1	81.3	79.6	78.8	74.2	70.3	67.5	65.9	65.4	63.6	60.5	60.0
10.0	139.6	130.3	103.4	99.1	101.2	93.7	82.4	79.7	78.1	77.5	73.0	69.2	66.5	65.0	64.5	62.7	59.9	59.3
11.0	134.1	126.4	100.7	96.6	98.7	91.6	80.6	78.1	76.6	76.0	71.7	68.0	65.4	64.0	63.5	61.8	59.2	58.5
12.0	129.2	122.6	98.1	94.2	96.3	89.6	78.9	76.5	75.1	74.6	70.3	66.8	64.3	62.9	62.5	60.9	58.5	57.7
15.0	116.5	112.5	91.2	87.6	89.7	83.9	74.1	72.0	70.8	70.5	66.5	63.3	61.0	59.8	59.5	58.1	56.1	55.1
20.0	100.6	99.1	81.7	78.7	80.6	76.0	67.3	65.6	64.6	64.5	60.9	58.0	56.1	55.1	54.9	53.7	52.2	51.1
25.0	89.1	88.9	74.3	71.6	73.5	69.6	61.8	60.3	59.5	59.5	56.2	53.7	51.9	51.1	50.9	49.9	48.7	47.6
30.0	80.3	80.9	68.4	66.0	67.8	64.4	57.3	56.0	55.3	55.4	52.3	50.0	48.4	47.8	47.6	46.7	45.7	44.6
35.0	73.4	74.5	63.5	61.3	63.0	60.1	53.5	52.3	51.7	51.8	49.0	46.9	45.4	44.9	44.8	43.9	43.1	42.1
40.0	67.74	69.15	59.44	57.39	59.02	56.40	50.29	49.22	48.70	48.85	46.22	44.22	42.84	42.39	42.31	41.57	40.82	39.83
45.0	63.04	64.68	55.95	54.05	55.61	53.25	47.53	46.55	46.08	46.26	43.78	41.91	40.62	40.23	40.17	39.49	38.83	37.88
50.0	59.07	60.86	52.94	51.16	52.66	50.51	45.12	44.22	43.80	43.99	41.64	39.89	38.67	38.33	38.29	37.67	37.06	36.16
55.0	55.66	57.56	50.31	48.64	50.07	48.11	43.00	42.16	41.78	41.99	39.76	38.10	36.94	36.64	36.62	36.04	35.49	34.63
60.0	52.70	54.67	47.99	46.41	47.79	46.98	41.12	40.34	39.99	40.20	38.07	36.50	35.40	35.14	35.12	34.58	34.07	33.26
65.0	50.10	52.12	45.93	44.42	45.76	44.07	39.44	38.70	38.38	38.60	36.57	35.07	34.02	33.78	33.77	33.27	32.80	32.02
70.0	47.79	49.85	44.07	42.64	43.93	42.36	37.92	37.23	36.94	37.16	35.20	33.77	32.77	32.55	32.55	32.08	31.64	30.89
80.0	43.89	45.98	40.89	39.58	40.78	39.40	35.30	34.67	34.42	34.65	32.84	31.52	30.59	30.42	30.43	30.01	29.61	28.93
90.0	40.70	42.80	38.23	37.02	38.15	36.92	33.10	32.53	32.31	32.55	30.85	29.62	28.75	28.61	28.63	28.25	27.88	27.27
100.0	38.05	40.13	35.99	34.86	35.93	34.81	31.23	30.71	30.51	30.75	29.15	28.00	27.19	27.07	27.09	26.75	26.41	25.84
150.0	29.37	31.32	28.43	27.57	28.42	27.66	24.87	24.49	24.37	24.60	23.34	22.45	21.81	21.75	21.79	21.55	21.28	20.89
200.0	24.52	26.58	24.24	23.47	24.05	23.62	21.22	20.82	20.88	21.11	20.01	19.69	19.03	18.62	18.69	18.44	18.62	17.96
250.0	21.65	23.58	21.57	20.89	21.37	21.06	18.94	18.38	18.66	18.88	17.90	17.61	17.03	16.68	16.75	16.47	16.69	16.12
300.0	19.66	21.48	19.69	19.07	19.51	19.25	17.32	16.67	17.08	17.29	16.40	16.13	15.60	15.30	15.36	15.11	15.32	14.80
350.0	18.20	19.93	18.29	17.71	18.13	17.91	16.11	15.52	15.90	16.10	15.27	15.02	14.53	14.26	14.33	14.09	14.28	13.81
400.0	17.08	18.73	17.21	16.67	17.07	16.86	15.18	14.64	14.99	15.18	14.40	14.16	13.70	13.46	13.52	13.30	13.48	13.04
450.0	16.19	17.79	16.35	15.83	16.22	16.03	14.44	13.94	14.26	14.45	13.71	13.48	13.05	12.82	12.88	12.68	12.84	12.43
500.0	15.48	17.03	15.66	15.16	15.54	15.36	13.84	13.37	13.67	13.86	13.15	12.92	12.51	12.30	12.36	12.16	12.32	11.93

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	47.83	45.56	45.56	45.87	45.42	42.78	41.44	39.10	38.24	37.23	36.50	35.89	34.59	34.14	33.77	33.85	32.45	32.08
3.0	51.08	48.70	48.69	49.01	48.62	45.91	44.52	42.15	41.30	40.25	39.50	38.87	37.53	37.04	36.62	36.71	35.15	34.74
3.5	53.34	50.89	50.87	51.20	50.87	48.13	46.71	44.35	43.51	42.45	41.67	41.04	39.69	39.17	38.71	38.80	37.12	36.68
4.0	54.91	52.42	52.39	52.73	52.45	49.71	48.27	45.94	45.12	44.06	43.27	42.63	41.29	40.75	40.26	40.35	38.58	38.12
4.5	55.99	53.48	53.44	53.79	53.55	50.83	49.39	47.10	46.30	45.23	44.44	43.81	42.48	41.93	41.41	41.50	39.66	39.19
5.0	56.71	54.20	54.15	54.50	54.31	51.61	50.17	47.92	47.15	46.09	45.30	44.67	43.36	42.80	42.27	42.36	40.46	39.99
5.5	57.17	54.66	54.61	54.96	54.82	52.14	50.71	48.51	47.75	46.71	45.93	45.30	44.01	43.45	42.90	42.98	41.05	40.57
6.0	57.43	54.93	54.88	55.23	55.12	52.48	51.06	48.90	48.17	47.14	46.36	45.75	44.47	43.91	43.35	43.44	41.47	40.99
6.5	57.54	55.05	55.00	55.36	55.28	52.67	51.27	49.15	48.44	47.43	46.65	46.05	44.80	44.24	43.66	43.75	41.77	41.28
7.0	57.54	55.06	55.01	55.37	55.32	52.74	51.36	49.29	48.60	47.60	46.83	46.24	45.01	44.45	43.87	43.95	41.96	41.47
8.0	57.27	54.83	54.78	55.14	55.14	52.64	51.29	49.31	48.66	47.69	46.94	46.36	45.17	44.63	44.03	44.12	42.11	41.62
9.0	56.78	54.38	54.34	54.69	54.74	52.31	50.99	49.10	48.48	47.54	46.81	46.25	45.10	44.58	43.97	44.05	42.05	41.56
10.0	56.15	53.80	53.76	54.11	54.20	51.84	50.55	48.74	48.15	47.24	46.52	45.98	44.88	44.37	43.75	43.84	41.84	41.36
11.0	55.44	53.13	53.10	53.45	53.57	51.27	50.02	48.28	47.72	46.84	46.14	45.62	44.54	44.06	43.43	43.52	41.54	41.06
12.0	54.68	52.42	52.40	52.74	52.89	50.65	49.44	47.75	47.23	46.37	45.69	45.18	44.14	43.67	43.05	43.13	41.17	40.70
15.0	52.32	50.20	50.19	50.53	50.73	48.66	47.53	46.02	45.56	44.77	44.14	43.67	42.72	42.31	41.68	41.77	39.87	39.43
20.0	48.59	46.65	46.66	46.98	47.24	45.40	44.39	43.09	42.71	42.02	41.45	41.04	40.21	39.86	39.26	39.34	37.57	37.17
25.0	45.32	43.55	43.57	43.87	44.17	42.49	41.58	40.43	40.11	39.49	38.97	38.61	37.87	37.57	36.99	37.07	35.42	35.05
30.0	42.52	40.87	40.90	41.19	41.50	39.97	39.13	38.10	37.82	37.26	36.78	36.45	35.78	35.53	34.97	35.04	33.50	33.15
35.0	40.10	38.55	38.60	38.88	39.19	37.77	37.00	36.06	35.81	35.30	34.85	34.56	33.94	33.72	33.18	33.25	31.80	31.48
40.0	37.99	36.54	36.60	36.86	37.18	35.85	35.13	34.27	34.05	33.57	33.16	32.88	32.31	32.12	31.60	31.67	30.30	30.00
45.0	36.15	34.78	34.83	35.09	35.41	34.16	33.49	32.69	32.48	32.04	31.65	31.40	30.86	30.69	30.19	30.26	28.98	28.68
50.0	34.62	33.21	33.28	33.52	33.84	32.66	32.03	31.29	31.09	30.68	30.31	30.07	29.57	29.42	28.94	29.01	27.77	27.50
55.0	33.07	31.82	31.89	32.12	32.45	31.32	30.72	30.03	29.85	29.46	29.11	28.88	28.41	28.27	27.81	27.88	26.69	26.44
60.0	31.76	30.57	30.64	30.87	31.19	30.12	29.55	28.89	28.73	28.36	28.02	27.81	27.36	27.24	26.79	26.85	25.72	25.48
65.0	30.59	29.44	29.51	29.73	30.05	29.02	28.48	27.86	27.71	27.36	27.04	26.84	26.41	26.29	25.86	25.93	24.83	24.60
70.0	29.52	28.42	28.49	28.70	29.02	28.03	27.51	26.92	26.78	26.45	26.14	25.95	25.54	25.43	25.02	25.08	24.03	23.80
80.0	27.65	26.62	26.69	26.90	27.20	26.29	25.81	25.28	25.15	24.84	24.56	24.38	24.01	23.92	23.53	23.58	22.60	22.40
90.0	26.06	25.10	25.17	25.37	25.66	24.81	24.37	23.88	23.78	23.48	23.21	23.05	22.70	22.62	22.25	22.31	21.39	21.19
100.0	24.70	23.79	23.86	24.05	24.34	23.54	23.12	22.67	22.56	22.30	22.05	21.90	21.57	21.50	21.15	21.21	20.33	20.15
150.0	19.98	19.25	19.32	19.47	19.73	19.10	18.78	18.44	18.37	18.17	17.98	17.86	17.61	17.56	17.28	17.33	16.62	16.48
200.0	17.18	16.59	16.58	16.71	16.95	16.42	16.15	15.88	15.83	15.67	15.50	15.41	15.20	15.15	14.92	14.96	14.76	14.28
250.0	15.43	14.90	14.73	14.84	15.07	14.64	14.49	14.23	14.23	14.07	13.86	13.84	13.68	13.58	13.36	13.40	13.30	12.88
300.0	14.17	13.68	13.53	13.58	13.78	13.46	13.32	13.09	13.10	12.95	12.76	12.74	12.60	12.51	12.31	12.35	12.26	11.87
350.0	13.23	12.77	12.64	12.68	12.87	12.57	12.45	12.23	12.24	12.11	11.93	11.91	11.78	11.70	11.51	11.55	11.46	11.11
400.0	12.49	12.07	11.94	11.98	12.16	11.88	11.76	11.57	11.58	11.45	11.29	11.26	11.15	11.07	10.90	10.93	10.84	10.52
450.0	11.91	11.50	11.38	11.42	11.59	11.33	11.22	11.03	11.04	10.92	10.77	10.75	10.64	10.57	10.40	10.43	10.35	10.04
500.0	11.43	11.04	10.93	10.97	11.13	10.89	10.77	10.60	10.61	10.49	10.35	10.33	10.23	10.16	10.00	10.03	9.94	9.66

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{210}_{84}$PO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.360	6.080	8.570	8.550	8.400	10.005	10.810	11.357	11.760	12.200	12.470	13.350	13.800	14.372	14.590	14.824	15.267	15.660
3.0	6.923	6.823	9.483	9.510	9.352	11.080	12.060	12.673	13.122	13.601	13.966	14.949	15.487	16.119	16.362	16.667	17.317	17.642
3.5	7.489	7.540	10.379	10.453	10.284	12.126	13.272	13.944	14.436	14.947	15.403	16.482	17.100	17.787	18.052	18.421	19.249	19.524
4.0	8.062	8.244	11.270	11.388	11.208	13.156	14.463	15.191	15.720	16.261	16.604	17.974	18.667	19.406	19.691	20.120	21.105	21.342
4.5	8.647	8.944	12.162	12.323	12.131	14.180	15.644	16.424	16.989	17.556	18.184	19.441	20.207	20.994	21.297	21.783	22.910	23.121
5.0	9.243	9.645	13.058	13.262	13.056	15.202	16.820	17.652	18.251	18.841	19.552	20.895	21.729	22.564	22.884	23.425	24.682	24.873
5.5	9.853	10.350	13.960	14.207	13.987	16.228	17.998	18.879	19.511	20.122	20.916	22.342	23.243	24.123	24.460	25.053	26.431	26.608
6.0	10.477	11.063	14.872	15.161	14.926	17.259	19.181	20.109	20.773	21.403	22.279	23.787	24.754	25.677	26.030	26.674	28.165	28.334
6.5	11.115	11.783	15.793	16.124	15.873	18.297	20.370	21.345	22.040	22.687	23.645	25.234	26.266	27.231	27.599	28.293	29.891	30.057
7.0	11.768	12.513	16.726	17.099	16.831	19.343	21.568	22.588	23.313	23.977	25.017	26.686	27.781	28.787	29.171	29.914	31.613	31.779
8.0	13.12	14.01	18.63	19.09	18.78	21.47	23.99	25.10	25.89	26.58	27.78	29.61	30.83	31.92	32.33	33.17	35.06	35.23
9.0	14.53	15.54	20.58	21.12	20.78	23.64	26.47	27.66	28.50	29.22	30.59	32.58	33.92	35.08	35.52	36.45	38.52	38.71
10.0	16.01	17.13	22.58	23.21	22.83	25.85	28.99	30.27	31.17	31.91	33.44	35.59	37.05	38.29	38.75	39.78	42.01	42.23
11.0	17.54	18.77	24.64	25.36	24.93	28.12	31.57	32.94	33.88	34.65	36.35	38.65	40.24	41.55	42.04	43.15	45.53	45.80
12.0	19.14	20.45	26.76	27.56	27.09	30.44	34.20	35.65	36.65	37.43	39.31	41.77	43.48	44.86	45.37	46.57	49.10	49.41
15.0	24.28	25.82	33.42	34.50	33.87	37.71	42.44	44.14	45.30	46.12	48.52	51.46	53.54	55.13	55.70	57.17	60.10	60.58
20.0	34.01	35.79	45.61	47.17	46.24	50.87	57.32	59.44	60.84	61.71	65.03	68.81	71.51	73.42	74.09	75.99	79.52	80.38
25.0	45.13	47.00	59.10	61.18	59.89	65.33	73.62	76.16	77.80	78.67	82.99	87.64	91.00	93.21	93.96	96.29	100.37	101.68
30.0	57.55	59.39	73.84	76.47	74.79	81.03	91.28	94.25	96.12	96.98	102.36	107.93	111.97	114.48	115.29	118.06	122.64	124.48
35.0	71.25	72.93	89.79	93.00	90.87	97.92	110.26	113.67	115.77	116.60	123.11	129.63	134.39	137.18	138.05	141.25	146.32	148.73
40.0	86.15	87.57	106.89	110.72	108.10	115.97	130.51	134.37	136.71	137.48	145.17	152.71	158.22	161.27	162.19	165.83	171.37	174.40
45.0	102.23	103.29	125.11	129.58	126.44	135.14	152.00	156.32	158.88	159.58	168.53	177.11	183.40	186.71	187.67	191.75	197.76	201.44
50.0	119.45	120.03	144.41	149.56	146.85	155.40	174.69	179.47	182.27	182.86	193.13	202.80	209.91	213.46	214.45	218.99	225.45	229.82
55.0	137.78	137.78	164.76	170.62	168.30	176.71	198.54	203.80	206.82	207.31	218.95	229.75	237.70	241.49	242.50	247.50	254.41	259.50
60.0	157.17	156.51	186.14	192.73	187.78	199.04	223.52	229.27	232.52	232.87	245.94	257.91	266.74	270.76	271.79	277.25	284.61	290.45
65.0	177.6	176.2	208.5	215.9	210.2	222.4	249.6	255.9	259.3	259.5	274.1	287.3	297.0	301.2	302.3	308.2	316.0	322.6
70.0	199.1	196.8	231.9	240.0	233.7	246.7	276.8	283.5	287.2	287.3	303.4	317.8	328.5	332.9	334.0	340.4	348.6	356.0
80.0	245.0	240.7	281.4	291.2	283.3	298.1	334.2	342.0	346.2	345.8	365.2	382.2	394.9	399.7	400.7	408.1	417.3	426.3
90.0	294.7	288.1	334.5	346.1	336.6	353.2	395.7	404.6	409.2	408.4	431.2	451.0	465.7	470.9	471.9	480.2	490.4	501.1
100.0	348.1	338.8	391.2	404.6	393.4	411.9	461.0	471.1	476.1	474.8	501.3	523.9	540.9	546.4	547.4	556.7	567.9	580.3
150.0	666.0	636.3	722.7	746.6	725.2	753.5	841.4	857.6	864.7	860.1	907.5	946.5	976.0	983.0	983.4	997.8	1014.7	1036.1
200.0	1059.6	1004.5	1125.2	1162.1	1129.0	1167.0	1301.5	1324.9	1333.1	1323.6	1396.4	1444.0	1490.9	1507.6	1506.9	1527.1	1541.7	1581.3
250.0	1517.0	1426.3	1585.8	1637.8	1594.1	1639.2	1826.8	1863.2	1866.7	1851.0	1952.8	2009.5	2075.7	2104.9	2102.0	2132.3	2138.9	2200.1
300.0	2027.0	1892.9	2096.3	2164.9	2109.4	2161.6	2407.8	2464.9	2456.0	2433.3	2566.9	2633.6	2721.1	2763.4	2757.8	2799.2	2796.9	2881.1
350.0	2583.0	2401.2	2650.5	2737.1	2668.5	2727.9	3037.2	3118.7	3094.1	3063.5	3231.3	3309.1	3419.4	3475.2	3466.5	3519.7	3507.8	3616.3
400.0	3179.	2945.	3243.	3349.	3266.	3333.	3709.	3816.	3775.	3736.	3940.	4030.	4164.	4234.	4222.	4287.	4265.	4399.
450.0	3811.	3521.	3870.	3996.	3898.	3972.	4419.	4552.	4494.	4445.	4688.	4790.	4950.	5034.	5018.	5097.	5064.	5226.
500.0	4475.	4125.	4526.	4674.	4559.	4641.	5163.	5321.	5248.	5188.	5470.	5587.	5773.	5871.	5851.	5943.	5899.	6087.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.43	17.04	18.37	18.72	19.40	20.38	20.96	21.71	22.16	22.59	23.03	23.50	23.96	24.39	24.95	25.15	26.94	27.51
3.0	18.55	19.26	20.60	20.93	21.63	22.74	23.40	24.29	24.79	25.29	25.79	26.30	26.87	27.34	27.93	28.13	30.04	30.65
3.5	20.56	21.37	22.70	23.02	23.74	24.97	25.70	26.72	27.27	27.83	28.37	28.93	29.59	30.09	30.71	30.90	32.94	33.58
4.0	22.50	23.40	24.74	25.04	25.77	27.12	27.91	29.04	29.63	30.26	30.84	31.44	32.18	32.71	33.37	33.55	35.72	36.39
4.5	24.39	25.38	26.72	27.01	27.75	29.20	30.06	31.30	31.93	32.61	33.24	33.86	34.68	35.25	35.94	36.12	38.40	39.10
5.0	26.25	27.33	28.67	28.95	29.70	31.25	32.17	33.50	34.17	34.90	35.57	36.24	37.13	37.73	38.45	38.62	41.02	41.76
5.5	28.09	29.26	30.60	30.87	31.62	33.28	34.25	35.68	36.39	37.17	37.88	38.57	39.53	40.16	40.91	41.08	43.59	44.36
6.0	29.93	31.17	32.52	32.77	33.53	35.26	36.31	37.84	38.58	39.40	40.15	40.87	41.90	42.57	43.35	43.51	46.14	46.94
6.5	31.75	33.08	34.43	34.67	35.43	37.28	38.36	39.98	40.75	41.62	42.41	43.16	44.25	44.95	45.78	45.92	48.66	49.49
7.0	33.58	34.99	36.34	36.57	37.33	39.27	40.41	42.11	42.91	43.83	44.65	45.44	46.59	47.31	48.16	48.31	51.17	52.02
8.0	37.23	38.81	40.16	40.37	41.13	43.25	44.50	46.37	47.23	48.24	49.13	49.97	51.25	52.03	52.93	53.08	56.16	57.08
9.0	40.92	42.65	44.01	44.19	44.95	47.26	48.60	50.63	51.55	52.65	53.61	54.50	55.90	56.73	57.71	57.84	61.15	62.12
10.0	44.63	46.54	47.90	48.05	48.81	51.29	52.74	54.93	55.90	57.08	58.11	59.06	60.57	61.45	62.49	62.62	66.16	67.19
11.0	48.40	50.46	51.82	51.95	52.70	55.36	56.91	59.26	60.28	61.54	62.64	63.64	65.26	66.20	67.31	67.43	71.19	72.28
12.0	52.21	54.44	55.81	55.91	56.65	59.48	61.14	63.63	64.70	66.05	67.21	68.27	70.00	70.99	72.16	72.27	76.27	77.42
15.0	63.99	66.72	68.09	68.11	68.81	72.17	74.13	77.06	78.28	79.87	81.24	82.44	84.50	85.64	87.03	87.11	91.81	93.14
20.0	84.82	88.43	89.80	89.67	90.27	94.51	96.99	100.65	102.08	104.08	105.79	107.24	109.83	111.20	112.99	113.01	118.94	120.56
25.0	107.21	111.74	113.10	112.81	113.27	118.43	121.44	125.81	127.46	129.87	131.93	133.63	136.75	138.34	140.55	140.52	147.73	149.67
30.0	131.15	136.64	137.98	137.52	137.81	143.93	147.49	152.58	154.44	157.25	159.67	161.63	165.29	167.09	169.76	169.67	178.22	180.48
35.0	156.59	163.11	164.42	163.78	163.85	170.96	175.09	180.92	182.98	186.22	189.01	191.23	195.43	197.44	200.60	200.44	210.41	213.00
40.0	183.5	191.1	192.4	191.5	191.4	199.5	204.2	210.8	213.1	216.7	219.9	222.4	227.2	229.4	233.0	232.8	244.2	247.2
45.0	211.9	220.6	221.8	220.7	220.3	229.5	234.9	242.2	244.7	248.8	252.3	255.1	260.4	262.8	267.0	266.7	279.7	283.0
50.0	241.6	251.5	252.6	251.4	250.7	261.0	266.9	276.0	277.7	282.3	286.2	289.3	295.2	297.8	302.6	302.2	316.7	320.4
55.0	272.7	283.8	284.9	283.4	282.4	293.8	300.4	309.3	312.2	317.2	321.6	324.9	331.4	334.2	339.6	339.1	355.3	359.3
60.0	305.1	317.5	318.5	316.7	315.4	328.0	335.3	344.9	348.0	353.5	358.4	362.0	369.1	372.0	378.1	377.5	395.4	399.8
65.0	338.8	352.5	353.4	351.4	349.7	363.5	371.5	382.0	385.3	391.2	396.5	400.4	408.2	411.3	418.0	417.3	437.0	441.8
70.0	373.7	388.8	389.6	387.3	385.2	400.4	409.0	420.3	423.8	430.3	436.0	440.2	448.6	451.9	459.3	458.5	480.0	485.2
80.0	447.3	465.2	465.8	463.0	460.1	477.8	487.9	500.9	504.8	512.3	519.0	523.7	533.5	537.1	545.9	544.9	570.1	576.2
90.0	525.6	546.5	546.9	543.4	539.6	560.0	571.6	586.4	590.8	599.3	607.0	612.4	623.5	627.4	637.7	636.6	665.7	672.6
100.0	608.4	632.4	632.6	628.5	623.6	647.0	660.2	676.7	681.5	691.1	699.8	705.9	718.4	722.7	734.6	733.1	766.6	774.3
150.0	1085.	1127.	1126.	1118.	1107.	1146.	1168.	1194.	1201.	1217.	1231.	1241.	1261.	1267.	1288.	1285.	1342.	1355.
200.0	1655.	1718.	1715.	1703.	1684.	1742.	1774.	1811.	1820.	1842.	1863.	1877.	1906.	1914.	1945.	1940.	2009.	2043.
250.0	2302.	2388.	2389.	2371.	2342.	2422.	2463.	2512.	2522.	2551.	2582.	2599.	2636.	2649.	2691.	2684.	2761.	2819.
300.0	3013.	3125.	3134.	3113.	3074.	3171.	3220.	3283.	3292.	3331.	3373.	3391.	3437.	3456.	3512.	3502.	3584.	3670.
350.0	3781.	3920.	3939.	3915.	3863.	3980.	4037.	4113.	4122.	4170.	4225.	4246.	4300.	4325.	4396.	4382.	4472.	4586.
400.0	4599.	4767.	4794.	4768.	4704.	4840.	4905.	4997.	5006.	5063.	5131.	5152.	5217.	5249.	5333.	5317.	5414.	5558.
450.0	5460.	5659.	5696.	5666.	5589.	5745.	5820.	5927.	5935.	6003.	6084.	6107.	6182.	6220.	6320.	6301.	6408.	6580.
500.0	6361.	6591.	6637.	6605.	6513.	6691.	6776.	6899.	6905.	6984.	7079.	7104.	7190.	7234.	7350.	7328.	7442.	7647.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{211}_{85}$AT IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	188.3	138.1	114.4	108.6	109.4	96.5	82.7	78.5	75.7	73.5	68.7	64.2	60.8	58.6	57.8	56.5	49.6	51.5
3.0	188.6	145.6	117.5	111.7	112.7	100.2	86.3	82.1	79.4	77.3	72.4	67.8	64.4	62.2	61.4	59.1	53.4	55.0
3.5	186.9	149.6	118.8	113.1	114.4	102.3	88.4	84.3	81.7	79.8	74.8	70.2	66.8	64.6	63.8	61.5	56.1	57.4
4.0	184.0	151.3	119.2	113.6	115.0	103.4	89.5	85.6	83.1	81.4	76.3	71.7	68.3	66.2	65.4	63.1	58.0	59.0
4.5	180.5	151.7	118.9	113.4	115.0	103.8	90.1	86.3	83.9	82.3	77.2	72.7	69.3	67.2	66.5	64.2	59.3	60.1
5.0	176.7	151.1	118.2	112.8	114.5	103.7	90.2	86.5	84.2	82.8	77.7	73.2	69.9	67.9	67.1	64.9	60.3	60.9
5.5	172.8	150.0	117.2	111.9	113.7	103.3	90.0	86.4	84.2	82.9	77.9	73.4	70.2	68.2	67.5	65.3	61.0	61.3
6.0	168.9	148.5	116.0	110.9	112.7	102.7	89.6	86.2	84.0	82.8	77.8	73.4	70.3	68.3	67.6	65.5	61.4	61.6
6.5	165.1	146.7	114.7	109.7	111.6	102.0	89.0	85.7	83.7	82.5	77.6	73.3	70.2	68.3	67.6	65.6	61.6	61.7
7.0	161.4	144.7	113.3	108.4	110.4	101.1	88.4	85.2	83.2	82.1	77.3	73.0	70.0	68.1	67.5	66.5	61.7	61.6
8.0	154.4	140.6	110.5	105.8	107.8	99.1	86.9	83.8	82.0	81.1	76.3	72.2	69.3	67.6	67.0	65.0	61.6	61.3
9.0	147.9	136.4	107.6	103.1	105.2	97.1	85.2	82.3	80.6	79.8	75.2	71.2	68.4	66.8	66.2	64.4	61.2	60.8
10.0	141.9	132.3	104.8	100.5	102.6	96.0	83.5	80.7	79.1	78.5	73.9	70.1	67.4	65.8	65.3	63.6	60.7	60.1
11.0	136.5	128.3	102.1	98.0	100.1	92.9	81.7	79.2	77.6	77.1	72.6	68.9	66.3	64.8	64.4	62.7	60.0	59.3
12.0	131.4	124.5	99.6	96.6	97.7	90.9	80.0	77.6	76.1	75.7	71.3	67.7	65.2	63.8	63.4	61.7	59.3	58.5
15.0	118.6	114.4	92.6	89.0	91.1	85.2	76.2	73.1	71.8	71.6	67.5	64.2	61.9	60.7	60.3	58.9	56.9	55.9
20.0	102.5	100.9	83.1	79.9	82.0	77.2	68.4	66.6	65.6	65.5	61.9	58.9	56.9	56.0	55.7	54.5	53.0	51.9
25.0	90.9	90.6	75.6	72.8	74.8	70.8	62.8	61.3	60.5	60.5	57.2	54.5	52.7	52.0	51.8	50.7	49.5	48.4
30.0	81.9	82.5	69.6	67.1	69.0	65.5	58.3	56.9	56.2	56.3	53.2	50.8	49.2	48.6	48.4	47.5	46.5	45.4
35.0	74.9	75.9	64.7	62.4	64.2	61.1	54.4	53.2	52.6	52.8	49.9	47.7	46.2	45.6	45.5	44.7	43.8	42.8
40.0	69.13	70.51	60.54	58.45	60.11	57.43	51.20	50.11	49.57	49.73	47.05	45.01	43.60	43.14	43.06	42.31	41.54	40.53
45.0	64.35	65.97	57.01	55.07	56.66	54.24	48.40	47.41	46.93	47.10	44.58	42.68	41.36	40.96	40.90	40.21	39.53	38.56
50.0	60.30	62.08	53.96	52.14	53.66	51.47	45.97	45.05	44.62	44.81	42.42	40.63	39.38	39.03	38.99	38.36	37.74	36.82
55.0	56.83	58.73	51.29	49.58	51.04	49.03	43.82	42.96	42.57	42.78	40.51	38.81	37.64	37.33	37.30	36.71	36.15	35.28
60.0	53.81	55.79	48.94	47.32	48.73	46.87	41.91	41.11	40.76	40.97	38.80	37.20	36.08	35.80	35.79	35.24	34.72	33.89
65.0	51.17	53.20	46.84	45.30	46.66	44.94	40.21	39.46	39.13	39.35	37.27	35.74	34.67	34.43	34.42	33.91	33.42	32.63
70.0	48.82	50.89	44.96	43.50	44.80	43.20	38.67	37.96	37.66	37.89	35.89	34.43	33.40	33.19	33.19	32.71	32.25	31.49
80.0	44.85	46.95	41.72	40.38	41.61	40.19	36.01	35.37	35.11	35.34	33.49	32.14	31.19	31.02	31.03	30.60	30.19	29.50
90.0	41.60	43.71	39.02	37.79	38.94	37.67	33.77	33.19	32.97	33.21	31.47	30.22	29.33	29.19	29.21	28.82	28.44	27.81
100.0	38.89	40.99	36.74	35.59	36.68	35.53	31.87	31.34	31.14	31.38	29.75	28.57	27.74	27.62	27.64	27.29	26.94	26.36
150.0	30.03	32.01	29.05	28.17	29.04	28.26	25.40	25.01	24.89	25.13	23.84	22.93	22.27	22.22	22.25	22.01	21.73	21.33
200.0	25.08	27.18	24.78	23.99	24.59	24.14	21.69	21.28	21.34	21.58	20.45	20.13	19.45	19.03	19.10	18.84	19.03	18.35
250.0	22.15	24.12	22.06	21.36	21.85	21.54	19.36	18.80	19.08	19.30	18.30	18.01	17.41	17.06	17.12	16.83	17.07	16.48
300.0	20.12	21.97	20.14	19.50	19.96	19.69	17.71	17.04	17.47	17.68	16.77	16.50	15.96	15.65	15.71	15.45	15.66	15.14
350.0	18.62	20.39	18.71	18.12	18.55	18.32	16.48	15.88	16.26	16.47	15.62	15.37	14.87	14.59	14.65	14.42	14.61	14.13
400.0	17.48	19.17	17.61	17.05	17.46	17.25	15.53	14.98	15.33	15.53	14.74	14.49	14.02	13.77	13.83	13.61	13.79	13.34
450.0	16.57	18.21	16.73	16.20	16.60	16.41	14.77	14.26	14.59	14.79	14.03	13.79	13.35	13.11	13.18	12.97	13.14	12.72
500.0	15.85	17.43	16.02	15.52	15.90	15.72	14.16	13.68	13.99	14.18	13.46	13.22	12.80	12.58	12.65	12.45	12.61	12.21

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	48.14	45.85	45.85	46.16	45.70	43.05	41.70	39.34	38.48	37.46	36.73	36.12	34.80	34.36	33.98	34.06	32.66	32.28
3.0	51.46	49.07	49.05	49.37	48.98	46.25	44.84	42.46	41.60	40.54	39.78	39.15	37.80	37.31	36.88	36.97	35.40	34.99
3.5	53.78	51.31	51.28	51.62	51.28	48.52	47.08	44.71	43.86	42.79	42.01	41.36	40.01	39.48	39.02	39.11	37.41	36.98
4.0	55.40	52.89	52.85	53.19	52.91	50.14	48.69	46.34	45.51	44.44	43.65	43.00	41.65	41.10	40.61	40.70	38.91	38.45
4.5	56.52	53.99	53.94	54.29	54.05	51.30	49.85	47.53	46.72	45.65	44.85	44.21	42.87	42.31	41.79	41.88	40.02	39.55
5.0	57.28	54.73	54.68	55.04	54.85	52.11	50.66	48.39	47.61	46.54	45.74	45.11	43.78	43.22	42.68	42.77	40.85	40.37
5.5	57.77	55.22	55.17	55.53	55.38	52.67	51.23	49.00	48.24	47.18	46.39	45.76	44.45	43.89	43.33	43.42	41.46	40.98
6.0	58.05	55.51	55.46	55.82	55.71	53.03	51.60	49.42	48.68	47.64	46.85	46.23	44.94	44.37	43.80	43.89	41.91	41.41
6.5	58.18	55.65	55.60	55.96	55.88	53.24	51.82	49.69	48.97	47.94	47.16	46.54	45.28	44.72	44.13	44.22	42.22	41.72
7.0	58.19	55.68	55.63	55.99	55.94	53.33	51.93	49.84	49.14	48.13	47.35	46.75	45.51	44.95	44.35	44.44	42.42	41.93
8.0	57.95	55.48	55.43	55.79	55.79	53.26	51.89	49.89	49.23	48.25	47.48	46.90	45.70	45.15	44.54	44.63	42.60	42.10
9.0	57.48	55.05	55.00	55.36	55.41	52.95	51.61	49.69	49.07	48.12	47.37	46.81	45.65	45.12	44.50	44.59	42.55	42.06
10.0	56.86	54.48	54.44	54.80	54.88	52.49	51.19	49.35	48.76	47.83	47.11	46.56	45.44	44.93	44.30	44.38	42.36	41.87
11.0	56.16	53.83	53.79	54.15	54.27	51.94	50.67	48.90	48.34	47.44	46.73	46.20	45.12	44.62	43.99	44.08	42.07	41.59
12.0	55.42	53.13	53.10	53.45	53.59	51.33	50.09	48.39	47.85	46.98	46.29	45.78	44.72	44.25	43.61	43.70	41.71	41.24
15.0	53.07	50.91	50.90	51.24	51.44	49.35	48.20	46.67	46.20	45.40	44.75	44.28	43.32	42.90	42.27	42.35	40.43	39.98
20.0	49.33	47.37	47.37	47.70	47.96	46.09	45.06	43.74	43.35	42.65	42.07	41.66	40.81	40.46	39.85	39.92	38.13	37.72
25.0	46.05	44.24	44.27	44.57	44.87	43.17	42.24	41.08	40.74	40.12	39.59	39.22	38.46	38.17	37.57	37.65	35.98	35.60
30.0	43.22	41.55	41.58	41.88	42.19	40.63	39.78	38.73	38.44	37.87	37.38	37.05	36.37	36.11	35.54	35.61	34.05	33.70
35.0	40.78	39.21	39.26	39.54	39.86	38.41	37.63	36.68	36.42	35.90	35.44	35.14	34.51	34.29	33.74	33.81	32.34	32.01
40.0	38.66	37.18	37.24	37.51	37.83	36.48	35.75	34.87	34.64	34.15	33.73	33.45	32.87	32.67	32.15	32.22	30.82	30.52
45.0	36.80	35.40	35.46	35.72	36.05	34.77	34.09	33.27	33.06	32.61	32.22	31.95	31.41	31.24	30.73	30.80	29.47	29.18
50.0	35.15	33.82	33.88	34.13	34.46	33.25	32.61	31.85	31.66	31.24	30.86	30.62	30.10	29.95	29.46	29.53	28.27	27.99
55.0	33.68	32.41	32.48	32.72	33.04	31.90	31.29	30.58	30.40	30.00	29.65	29.42	28.93	28.79	28.32	28.39	27.18	26.92
60.0	32.36	31.15	31.21	31.45	31.77	30.68	30.10	29.43	29.26	28.89	28.55	28.33	27.87	27.74	27.29	27.36	26.20	25.95
65.0	31.17	30.00	30.07	30.30	30.62	29.57	29.02	28.39	28.23	27.88	27.55	27.34	26.91	26.79	26.35	26.41	25.30	25.06
70.0	30.09	28.97	29.04	29.25	29.57	28.57	28.04	27.44	27.29	26.95	26.64	26.44	26.03	25.92	25.49	25.56	24.48	24.26
80.0	28.19	27.15	27.22	27.43	27.74	26.81	26.32	25.77	25.64	25.33	25.04	24.86	24.47	24.38	23.98	24.04	23.04	22.83
90.0	26.58	25.60	25.67	25.87	26.18	25.31	24.85	24.35	24.23	23.94	23.67	23.51	23.15	23.07	22.69	22.75	21.81	21.61
100.0	25.20	24.27	24.35	24.53	24.83	24.01	23.59	23.12	23.01	22.75	22.49	22.34	22.01	21.93	21.57	21.63	20.74	20.55
150.0	20.40	19.66	19.73	19.88	20.15	19.50	19.18	18.83	18.76	18.56	18.36	18.24	17.98	17.93	17.65	17.69	16.97	16.83
200.0	17.56	16.95	16.94	17.08	17.32	16.77	16.50	16.23	16.17	16.01	15.84	15.74	15.53	15.48	15.25	15.29	15.08	14.59
250.0	15.77	15.23	15.05	15.18	15.40	14.96	14.81	14.55	14.55	14.39	14.17	14.14	13.99	13.88	13.66	13.70	13.60	13.17
300.0	14.49	13.99	13.84	13.88	14.09	13.76	13.62	13.39	13.39	13.24	13.05	13.02	12.88	12.79	12.58	12.63	12.53	12.14
350.0	13.53	13.07	12.92	12.97	13.16	12.86	12.73	12.51	12.52	12.38	12.20	12.18	12.05	11.97	11.78	11.81	11.72	11.36
400.0	12.78	12.34	12.21	12.25	12.44	12.16	12.03	11.83	11.84	11.71	11.54	11.52	11.40	11.32	11.15	11.18	11.09	10.76
450.0	12.18	11.77	11.65	11.69	11.86	11.59	11.48	11.29	11.30	11.18	11.02	11.00	10.88	10.81	10.64	10.68	10.59	10.27
500.0	11.70	11.30	11.19	11.22	11.39	11.14	11.02	10.84	10.86	10.74	10.59	10.57	10.46	10.39	10.23	10.26	10.18	9.88

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{211}_{85}$AT IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.330	6.050	8.531	8.510	8.360	9.956	10.760	11.310	11.710	12.140	12.410	13.290	13.740	14.305	14.520	14.753	15.196	15.590
3.0	6.889	6.792	9.439	9.467	9.308	11.027	12.006	12.621	13.068	13.537	13.902	14.885	15.423	16.049	16.288	16.591	17.241	17.567
3.5	7.451	7.506	10.332	10.404	10.236	12.068	13.213	13.888	14.376	14.878	15.333	16.412	17.030	17.711	17.972	18.339	19.167	19.443
4.0	8.019	8.206	11.218	11.335	11.155	13.094	14.399	15.129	15.655	16.186	16.728	17.898	18.591	19.324	19.604	20.031	21.016	21.255
4.5	8.598	8.902	12.104	12.264	12.073	14.112	15.573	16.356	16.918	17.474	18.101	19.358	20.123	20.904	21.204	21.688	22.813	23.026
5.0	9.189	9.599	12.993	13.197	12.992	15.129	16.743	17.577	18.173	18.753	19.463	20.804	21.638	22.466	22.783	23.321	24.576	24.769
5.5	9.793	10.299	13.890	14.135	13.916	16.147	17.914	18.796	19.426	20.026	20.818	22.243	23.143	24.016	24.350	24.940	26.315	26.495
6.0	10.411	11.006	14.795	15.082	14.848	17.171	19.089	20.019	20.679	21.299	22.173	23.679	24.645	25.561	25.911	26.552	28.040	28.211
6.5	11.042	11.721	15.709	16.039	15.789	18.202	20.270	21.246	21.938	22.575	23.530	25.117	26.147	27.105	27.470	28.161	29.755	29.923
7.0	11.689	12.445	16.635	17.006	16.740	19.241	21.459	22.481	23.202	23.856	24.893	26.559	27.652	28.651	29.031	29.771	31.466	31.634
8.0	13.03	13.92	18.52	18.98	18.67	21.35	23.87	24.98	25.76	26.44	27.64	29.46	30.68	31.76	32.17	33.00	34.89	35.06
9.0	14.42	15.45	20.46	21.00	20.66	23.50	26.32	27.52	28.35	29.06	30.42	32.41	33.75	34.90	35.34	36.26	38.32	38.52
10.0	15.88	17.02	22.44	23.07	22.69	25.70	28.82	30.10	31.00	31.73	33.25	35.39	36.85	38.08	38.54	39.56	41.78	42.01
11.0	17.40	18.64	24.48	25.19	24.77	27.94	31.38	32.74	33.69	34.44	36.13	38.43	40.01	41.31	41.80	42.91	45.28	45.55
12.0	18.97	20.31	26.57	27.37	26.90	30.24	33.98	35.44	36.43	37.20	39.07	41.52	43.22	44.60	45.10	46.30	48.82	49.13
15.0	24.05	25.62	33.17	34.24	33.62	37.44	42.15	43.85	44.99	45.81	48.19	51.12	53.19	54.77	55.34	56.80	59.72	60.20
20.0	33.65	35.46	45.22	46.77	45.85	50.47	56.87	58.99	60.38	61.23	64.53	68.29	70.98	72.88	73.54	75.43	78.95	79.80
25.0	44.60	46.52	58.56	60.62	59.35	64.76	72.98	75.51	77.14	78.01	82.29	86.92	90.25	92.46	93.20	95.51	99.57	100.88
30.0	56.85	58.74	73.12	75.72	74.06	80.27	90.43	93.39	95.25	96.11	101.44	106.97	110.98	113.48	114.29	117.03	121.59	123.41
35.0	70.34	72.09	88.85	92.04	89.93	96.95	109.17	112.56	114.66	115.48	121.93	128.41	133.13	135.90	136.77	139.94	144.98	147.37
40.0	85.02	86.53	105.73	109.52	106.93	114.77	129.17	133.00	135.32	136.09	143.71	151.19	156.65	159.69	160.60	164.21	169.72	172.72
45.0	100.85	102.01	123.70	128.12	125.02	133.68	150.37	154.66	157.21	157.90	166.76	175.27	181.51	184.80	185.75	189.81	195.77	199.42
50.0	117.80	118.50	142.73	147.82	144.17	153.66	172.75	177.50	180.28	180.87	191.03	200.62	207.66	211.19	212.18	216.68	223.09	227.42
55.0	135.83	135.98	162.79	168.58	164.33	174.67	196.27	201.49	204.49	204.98	216.49	227.20	235.07	238.84	239.86	244.80	251.66	256.70
60.0	154.92	154.42	183.86	190.37	185.50	196.69	220.89	226.60	229.83	230.19	243.11	254.97	263.71	267.71	268.74	274.14	281.45	287.23
65.0	175.0	173.8	205.9	213.2	207.6	219.7	246.6	252.8	256.3	256.5	270.9	283.9	293.6	297.8	298.8	304.7	312.4	319.0
70.0	196.1	194.1	228.9	236.9	230.7	243.6	273.4	280.1	283.7	283.8	299.7	314.0	324.6	329.0	330.0	336.4	344.6	351.9
80.0	241.3	237.3	277.7	287.3	279.6	294.3	330.0	337.7	341.8	341.5	360.6	377.5	390.0	394.8	395.8	403.1	412.2	421.2
90.0	290.2	283.9	330.0	341.4	332.1	348.6	390.5	399.3	403.9	403.1	425.7	445.2	459.8	465.0	466.0	474.2	484.3	494.9
100.0	342.7	333.8	385.8	399.0	388.0	406.3	454.9	464.8	469.8	468.5	494.6	517.1	533.8	539.3	540.3	549.5	560.6	572.8
150.0	655.1	628.2	711.9	735.5	714.4	742.4	829.1	845.1	852.2	847.6	894.4	932.9	962.0	968.9	969.4	983.6	1000.3	1021.5
200.0	1041.8	988.2	1107.6	1144.0	1111.4	1149.0	1281.5	1304.6	1312.8	1303.4	1375.1	1422.1	1468.3	1484.9	1484.2	1504.2	1518.6	1557.6
250.0	1491.0	1401.6	1560.2	1611.4	1568.4	1613.1	1797.8	1833.7	1837.2	1821.8	1922.0	1977.9	2043.2	2072.0	2069.2	2099.0	2105.7	2165.9
300.0	1991.9	1860.9	2061.8	2129.3	2074.7	2126.4	2368.6	2424.9	2416.2	2394.0	2525.4	2591.2	2677.4	2719.1	2713.6	2754.4	2752.3	2835.1
350.0	2537.8	2360.2	2606.1	2691.3	2623.9	2682.7	2986.9	3067.1	3043.0	3013.1	3178.1	3254.8	3363.4	3418.4	3409.9	3462.3	3450.7	3567.5
400.0	3123.	2894.	3188.	3292.	3211.	3277.	3647.	3752.	3712.	3673.	3874.	3963.	4095.	4164.	4152.	4216.	4195.	4327.
450.0	3744.	3460.	3803.	3927.	3831.	3904.	4344.	4474.	4418.	4370.	4608.	4710.	4867.	4949.	4934.	5011.	4979.	5137.
500.0	4395.	4052.	4448.	4593.	4481.	4562.	5074.	5230.	5157.	5099.	5377.	5491.	5674.	5771.	5752.	5842.	5799.	5984.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.36	16.96	18.29	18.63	19.31	20.27	20.85	21.59	22.04	22.47	22.91	23.38	23.84	24.27	24.83	25.03	26.81	27.37
3.0	18.47	19.18	20.51	20.84	21.53	22.63	23.28	24.17	24.67	25.17	25.66	26.18	26.74	27.21	27.80	28.00	29.90	30.50
3.5	20.48	21.28	22.61	22.92	23.64	24.85	25.58	26.59	27.13	27.70	28.24	28.79	29.45	29.95	30.58	30.77	32.80	33.43
4.0	22.41	23.31	24.63	24.93	25.66	26.99	27.78	28.90	29.49	30.11	30.70	31.29	32.03	32.57	33.23	33.41	35.56	36.23
4.5	24.29	25.28	26.61	26.90	27.63	29.07	29.92	31.15	31.78	32.46	33.08	33.71	34.53	35.10	35.79	35.96	38.23	38.93
5.0	26.15	27.22	28.55	28.83	29.57	31.11	32.02	33.35	34.02	34.74	35.41	36.07	36.96	37.56	38.28	38.46	40.84	41.57
5.5	27.98	29.14	30.47	30.73	31.48	33.12	34.09	35.51	36.22	36.99	37.70	38.39	39.35	39.99	40.74	40.90	43.40	44.16
6.0	29.80	31.04	32.38	32.63	33.38	35.12	36.14	37.66	38.39	39.22	39.96	40.69	41.71	42.38	43.16	43.32	45.93	46.72
6.5	31.62	32.94	34.28	34.52	35.27	37.10	38.18	39.79	40.55	41.43	42.21	42.96	44.05	44.74	45.56	45.71	48.44	49.26
7.0	33.43	34.83	36.17	36.40	37.16	39.08	40.21	41.91	42.70	43.62	44.44	45.22	46.38	47.10	47.94	48.09	50.93	51.78
8.0	37.06	38.63	39.97	40.17	40.93	43.04	44.27	46.13	46.99	48.00	48.89	49.73	51.00	51.78	52.68	52.83	55.89	56.80
9.0	40.72	42.45	43.79	43.97	44.73	47.01	48.35	50.37	51.28	52.38	53.33	54.23	55.62	56.45	57.42	57.56	60.84	61.81
10.0	44.41	46.30	47.65	47.80	48.55	51.01	52.45	54.63	55.60	56.77	57.80	58.75	60.25	61.14	62.17	62.30	65.81	66.84
11.0	48.14	50.19	51.55	51.67	52.42	55.06	56.60	58.93	59.94	61.20	62.30	63.29	64.91	65.85	66.95	67.07	70.81	71.89
12.0	51.92	54.14	55.49	55.59	56.33	59.14	60.78	63.26	64.33	65.67	66.83	67.88	69.61	70.60	71.77	71.88	75.85	76.99
15.0	63.59	66.31	67.67	67.69	68.38	71.72	73.66	76.58	77.79	79.37	80.73	81.94	83.98	85.12	86.50	86.58	91.25	92.57
20.0	84.22	87.80	89.16	89.04	89.63	93.84	96.30	99.93	101.36	103.35	105.05	106.50	109.07	110.44	112.21	112.24	118.12	119.74
25.0	106.37	110.86	112.21	111.93	112.38	117.51	120.50	124.83	126.48	128.86	130.91	132.61	135.70	137.29	139.49	139.46	146.61	148.54
30.0	130.03	135.48	136.82	136.36	136.65	142.72	146.25	151.30	153.15	155.94	158.35	160.29	163.92	165.72	168.37	168.28	176.77	179.01
35.0	155.17	161.64	162.94	162.31	162.39	169.43	173.53	179.30	181.36	184.57	187.34	189.54	193.72	195.72	198.85	198.70	208.58	211.15
40.0	181.8	189.3	190.6	189.7	189.6	197.6	202.3	208.8	211.1	214.7	217.9	220.3	225.1	227.2	230.9	230.7	242.0	244.9
45.0	209.7	218.4	219.6	218.6	218.1	227.3	232.5	239.8	242.3	246.3	249.9	252.6	257.9	260.3	264.5	264.2	277.0	280.3
50.0	239.1	248.9	250.0	248.8	248.1	258.3	264.2	272.2	274.9	279.4	283.3	286.3	292.2	294.8	299.5	299.2	313.6	317.2
55.0	269.8	280.7	281.9	280.4	279.4	290.7	297.2	306.0	308.9	313.9	318.2	321.5	328.0	330.7	336.1	335.6	351.7	355.6
60.0	301.7	314.0	315.0	313.3	311.9	324.4	331.6	341.2	344.3	349.7	354.5	358.1	365.2	368.1	374.0	373.5	391.2	395.6
65.0	334.9	348.5	349.4	347.4	345.8	359.6	367.3	377.7	381.0	386.9	392.1	396.0	403.7	406.8	413.4	412.7	432.2	437.0
70.0	369.4	384.3	385.2	382.9	380.8	395.8	404.3	415.5	419.0	425.4	431.1	435.2	443.6	446.8	454.1	453.4	474.6	479.7
80.0	441.9	459.6	460.3	457.4	454.6	472.1	482.1	494.9	498.8	506.2	512.8	517.6	527.2	530.8	539.5	538.5	563.5	569.5
90.0	519.0	539.7	540.1	536.7	532.9	553.1	564.6	578.2	583.5	591.9	599.5	604.9	615.9	619.8	630.0	628.8	657.7	664.5
100.0	600.6	624.3	624.6	620.5	615.7	638.8	651.8	668.2	672.9	682.4	691.0	697.0	709.4	713.7	725.4	724.0	756.9	764.7
150.0	1070.	1111.	1110.	1102.	1091.	1130.	1152.	1178.	1185.	1200.	1214.	1224.	1244.	1250.	1270.	1267.	1324.	1336.
200.0	1630.	1693.	1690.	1677.	1659.	1716.	1748.	1784.	1793.	1815.	1836.	1849.	1878.	1886.	1916.	1912.	1980.	2013.
250.0	2266.	2351.	2352.	2335.	2306.	2385.	2425.	2473.	2483.	2512.	2543.	2559.	2596.	2608.	2650.	2643.	2719.	2776.
300.0	2965.	3075.	3086.	3064.	3025.	3121.	3169.	3231.	3240.	3278.	3320.	3337.	3383.	3401.	3456.	3447.	3528.	3612.
350.0	3720.	3856.	3875.	3851.	3801.	3915.	3971.	4047.	4056.	4103.	4157.	4176.	4231.	4255.	4324.	4312.	4400.	4512.
400.0	4523.	4688.	4715.	4689.	4626.	4760.	4825.	4915.	4923.	4980.	5047.	5068.	5132.	5163.	5246.	5230.	5326.	5467.
450.0	5369.	5564.	5600.	5571.	5495.	5649.	5723.	5828.	5836.	5903.	5983.	6006.	6080.	6117.	6215.	6197.	6300.	6471.
500.0	6253.	6480.	6525.	6493.	6403.	6578.	6661.	6783.	6789.	6866.	6960.	6985.	7069.	7113.	7227.	7205.	7317.	7519.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

211
86 RN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	190.3	138.9	115.4	109.5	110.3	97.2	83.3	79.0	76.3	74.0	69.2	64.6	61.2	59.0	58.2	55.9	49.9	51.9
3.0	190.9	146.7	118.5	112.7	113.7	101.0	87.0	82.8	80.0	77.9	73.0	68.3	64.9	62.7	61.8	59.5	53.8	55.4
3.5	189.2	150.9	120.0	114.2	115.5	103.2	89.2	85.0	82.4	80.5	75.5	70.8	67.3	65.1	64.3	62.0	56.5	57.8
4.0	186.4	152.8	120.4	114.7	116.2	104.4	90.4	86.4	83.9	82.1	77.0	72.4	68.9	66.8	66.0	63.7	58.5	59.5
4.5	182.9	153.3	120.2	114.6	116.2	104.8	91.0	87.1	84.7	83.1	78.0	73.4	70.0	67.9	67.1	64.8	59.9	60.7
5.0	179.2	152.8	119.5	114.1	115.7	104.8	91.1	87.4	85.1	83.6	78.5	73.9	70.6	68.5	67.8	65.6	60.9	61.5
5.5	175.3	151.8	118.5	113.2	115.0	104.5	91.0	87.4	85.1	83.8	78.7	74.2	70.9	68.9	68.2	66.0	61.6	61.9
6.0	171.4	150.3	117.4	112.2	114.0	103.9	90.6	87.1	85.0	83.7	78.7	74.2	71.0	69.1	68.4	66.2	62.0	62.2
6.5	167.6	148.6	116.1	111.0	112.9	103.1	90.1	86.7	84.6	83.5	78.5	74.1	71.0	69.0	68.4	66.3	62.3	62.3
7.0	163.9	146.7	114.8	109.8	111.7	102.3	89.4	86.2	84.1	83.1	78.2	73.8	70.8	68.9	68.3	66.2	62.4	62.3
8.0	156.8	142.6	111.9	107.2	109.2	100.4	87.9	84.9	83.0	82.1	77.2	73.1	70.1	68.4	67.8	65.8	62.3	62.0
9.0	150.3	138.4	109.1	104.5	106.6	98.3	86.3	83.4	81.6	80.8	76.1	72.1	69.2	67.6	67.0	65.1	62.0	61.5
10.0	144.3	134.3	106.3	101.9	104.0	96.2	84.6	81.8	80.2	79.5	74.9	71.0	68.2	66.7	66.2	64.4	61.4	60.8
11.0	138.8	130.3	103.6	99.4	101.5	94.2	82.8	80.2	78.7	78.1	73.6	69.8	67.2	65.7	65.2	63.5	60.8	60.1
12.0	133.7	126.5	101.0	97.0	99.1	92.1	81.1	78.6	77.2	76.7	72.3	68.6	66.1	64.6	64.2	62.6	60.0	59.2
15.0	120.7	116.3	94.0	90.3	92.4	86.4	76.3	74.1	72.9	72.6	68.5	65.1	62.8	61.6	61.2	59.7	57.7	56.7
20.0	104.5	102.6	84.4	81.2	83.3	78.4	69.5	67.6	66.6	66.5	62.8	59.8	57.8	56.8	56.6	55.3	53.8	52.7
25.0	92.6	92.2	76.9	74.1	76.0	71.9	63.9	62.3	61.5	61.5	58.1	55.4	53.6	52.8	52.6	51.5	50.3	49.1
30.0	83.5	84.0	70.8	68.3	70.1	66.6	59.3	57.9	57.2	57.2	54.1	51.7	50.0	49.4	49.2	48.3	47.2	46.1
35.0	76.4	77.4	65.8	63.5	65.3	62.2	55.4	54.2	53.5	53.7	50.8	48.5	47.0	46.4	46.3	45.5	44.6	43.5
40.0	70.52	71.87	61.64	59.51	61.20	58.45	52.11	51.00	50.45	50.60	47.88	45.80	44.37	43.89	43.81	43.04	42.26	41.24
45.0	65.66	67.26	58.07	56.09	57.70	55.23	49.28	48.26	47.78	47.95	45.38	43.44	42.10	41.69	41.63	40.92	40.23	39.26
50.0	61.54	63.32	54.98	53.12	54.67	52.42	46.81	45.88	45.44	45.63	43.19	41.37	40.10	39.74	39.70	39.06	38.42	37.49
55.0	58.01	59.91	52.27	50.53	52.01	49.95	44.64	43.77	43.37	43.58	41.26	39.53	38.33	38.02	37.99	37.39	36.81	35.92
60.0	54.94	56.92	49.88	48.23	49.66	47.76	42.71	41.89	41.53	41.75	39.53	37.90	36.75	36.47	36.45	35.90	35.36	34.51
65.0	52.25	54.29	47.76	46.19	47.57	45.80	40.98	40.21	39.88	40.10	37.99	36.42	35.33	35.08	35.07	34.55	34.05	33.24
70.0	49.86	51.94	45.85	44.35	45.69	44.04	39.42	38.70	38.39	38.62	36.59	35.09	34.04	33.82	33.82	33.33	32.86	32.09
80.0	45.81	47.93	42.56	41.19	42.44	40.99	36.72	36.07	35.80	36.04	34.15	32.77	31.81	31.62	31.63	31.20	30.78	30.07
90.0	42.49	44.63	39.82	38.55	39.73	38.43	34.45	33.86	33.63	33.87	32.10	30.82	29.92	29.77	29.78	29.39	29.01	28.36
100.0	39.73	41.86	37.50	36.32	37.43	36.25	32.52	31.98	31.77	32.01	30.36	29.15	28.30	28.18	28.20	27.84	27.48	26.89
150.0	30.70	32.71	29.68	28.77	29.66	28.86	25.94	25.54	25.42	25.66	24.35	23.41	22.74	22.69	22.72	22.47	22.19	21.78
200.0	25.64	27.79	25.33	24.52	25.13	24.67	22.16	21.75	21.81	22.05	20.90	20.56	19.87	19.45	19.51	19.25	19.44	18.75
250.0	22.66	24.66	22.55	21.84	22.34	22.02	19.79	19.21	19.50	19.73	18.71	18.41	17.80	17.43	17.50	17.20	17.44	16.84
300.0	20.58	22.47	20.59	19.94	20.41	20.14	18.11	17.43	17.86	18.08	17.15	16.87	16.31	16.00	16.06	15.80	16.01	15.48
350.0	19.05	20.85	19.14	18.53	18.97	18.73	16.86	16.24	16.63	16.84	15.98	15.71	15.20	14.92	14.98	14.74	14.94	14.45
400.0	17.88	19.61	18.01	17.44	17.86	17.65	15.88	15.32	15.68	15.89	15.07	14.82	14.34	14.08	14.15	13.92	14.10	13.65
450.0	16.96	18.62	17.12	16.58	16.98	16.78	15.11	14.59	14.93	15.12	14.35	14.10	13.65	13.41	13.48	13.27	13.44	13.01
500.0	16.21	17.83	16.39	15.87	16.27	16.08	14.48	14.00	14.31	14.51	13.77	13.53	13.10	12.87	12.94	12.73	12.90	12.49

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	48.43	46.13	46.13	46.44	45.98	43.31	41.95	39.58	38.71	37.68	36.95	36.33	35.01	34.56	34.18	34.27	32.85	32.47
3.0	51.83	49.42	49.39	49.72	49.32	46.57	45.16	42.76	41.89	40.83	40.06	39.42	38.07	37.57	37.14	37.23	35.64	35.23
3.5	54.21	51.72	51.68	52.02	51.68	48.90	47.45	45.06	44.20	43.12	42.33	41.69	40.32	39.79	39.32	39.41	37.70	37.26
4.0	55.88	53.34	53.30	53.65	53.36	50.57	49.11	46.73	45.90	44.81	44.01	43.36	42.00	41.45	40.95	41.04	39.24	38.77
4.5	57.04	54.48	54.43	54.78	54.54	51.76	50.30	47.96	47.14	46.06	45.26	44.61	43.26	42.69	42.17	42.26	40.38	39.91
5.0	57.83	55.26	55.21	55.57	55.37	52.61	51.15	48.85	48.06	46.98	46.18	45.53	44.20	43.62	43.08	43.17	41.24	40.75
5.5	58.35	55.78	55.72	56.08	55.93	53.19	51.74	49.49	48.71	47.65	46.85	46.21	44.89	44.32	43.75	43.84	41.87	41.38
6.0	58.66	56.09	56.04	56.40	56.28	53.58	52.13	49.93	49.18	48.13	47.33	46.70	45.40	44.83	44.25	44.34	42.33	41.84
6.5	58.81	56.25	56.20	56.56	56.48	53.81	52.37	50.22	49.49	48.45	47.66	47.04	45.76	45.19	44.60	44.69	42.66	42.16
7.0	58.83	56.30	56.24	56.61	56.55	53.92	52.50	50.39	49.68	48.65	47.87	47.26	46.00	45.43	44.83	44.92	42.88	42.38
8.0	58.62	56.12	56.07	56.43	56.43	53.87	52.48	50.46	49.79	48.80	48.03	47.43	46.22	45.67	45.05	45.14	43.08	42.58
9.0	58.17	55.71	55.67	56.03	56.08	53.58	52.23	50.29	49.65	48.69	47.94	47.36	46.19	45.65	45.02	45.11	43.05	42.56
10.0	57.57	55.16	55.12	55.48	55.56	53.14	51.82	49.95	49.36	48.42	47.68	47.13	45.99	45.47	44.84	44.93	42.88	42.38
11.0	56.89	54.52	54.48	54.84	54.96	52.60	51.31	49.52	48.95	48.04	47.32	46.79	45.68	45.19	44.54	44.63	42.59	42.11
12.0	56.15	53.83	53.79	54.15	54.29	51.99	50.74	49.01	48.47	47.59	46.89	46.37	45.30	44.82	44.18	44.26	42.25	41.77
15.0	53.81	51.62	51.61	51.95	52.16	50.03	48.87	47.31	46.83	46.02	45.37	44.89	43.92	43.49	42.84	42.93	40.98	40.52
20.0	50.07	48.07	48.08	48.41	48.68	46.77	45.73	44.39	43.99	43.28	42.69	42.27	41.42	41.06	40.43	40.51	38.69	38.27
25.0	46.78	44.94	44.96	45.27	45.57	43.84	42.90	41.72	41.38	40.74	40.20	39.83	39.06	38.76	38.15	38.23	36.53	36.15
30.0	43.93	42.22	42.26	42.56	42.88	41.29	40.42	39.36	39.06	38.48	37.99	37.65	36.95	36.69	36.11	36.19	34.59	34.24
35.0	41.47	39.87	39.92	40.20	40.53	39.06	38.26	37.29	37.03	36.49	36.04	35.73	35.08	34.86	34.30	34.37	32.87	32.54
40.0	39.33	37.83	37.88	38.15	38.48	37.10	36.36	35.47	35.23	34.74	34.31	34.02	33.43	33.23	32.69	32.77	31.35	31.03
45.0	37.45	36.02	36.08	36.35	36.68	35.38	34.68	33.86	33.64	33.18	32.78	32.51	31.96	31.78	31.26	31.34	29.99	29.69
50.0	35.78	34.43	34.49	34.74	35.08	33.85	33.19	32.42	32.22	31.79	31.41	31.16	30.64	30.48	29.98	30.05	28.77	28.49
55.0	34.30	33.00	33.07	33.31	33.65	32.48	31.86	31.13	30.95	30.55	30.18	29.95	29.45	29.31	28.83	28.90	27.67	27.40
60.0	32.96	31.72	31.79	32.03	32.36	31.25	30.65	29.97	29.80	29.42	29.07	28.85	28.38	28.25	27.79	27.85	26.68	26.42
65.0	31.75	30.57	30.64	30.87	31.19	30.13	29.56	28.92	28.76	28.39	28.06	27.85	27.41	27.29	26.84	26.90	25.77	25.53
70.0	30.66	29.51	29.59	29.81	30.13	29.11	28.57	27.96	27.81	27.46	27.14	26.94	26.51	26.41	25.97	26.04	24.94	24.71
80.0	28.74	27.67	27.74	27.96	28.27	27.32	26.82	26.27	26.13	25.82	25.52	25.34	24.94	24.85	24.44	24.50	23.48	23.27
90.0	27.11	26.11	26.18	26.38	26.69	25.80	25.34	24.83	24.71	24.41	24.14	23.97	23.60	23.52	23.14	23.19	22.23	22.03
100.0	25.70	24.76	24.83	25.02	25.33	24.49	24.06	23.58	23.47	23.20	22.94	22.78	22.44	22.37	22.00	22.06	21.15	20.96
150.0	20.83	20.07	20.14	20.30	20.57	19.91	19.58	19.23	19.15	18.94	18.74	18.62	18.36	18.30	18.01	18.06	17.33	17.18
200.0	17.94	17.32	17.31	17.44	17.69	17.14	16.86	16.58	16.52	16.35	16.18	16.08	15.87	15.82	15.57	15.62	15.40	14.90
250.0	16.12	15.56	15.38	15.51	15.74	15.29	15.13	14.86	14.87	14.70	14.48	14.45	14.29	14.18	13.96	14.00	13.90	13.45
300.0	14.81	14.31	14.14	14.19	14.40	14.07	13.93	13.68	13.69	13.54	13.34	13.31	13.17	13.07	12.86	12.91	12.81	12.41
350.0	13.83	13.36	13.21	13.26	13.46	13.15	13.02	12.79	12.80	12.66	12.48	12.45	12.32	12.23	12.04	12.08	11.99	11.62
400.0	13.07	12.62	12.49	12.53	12.72	12.43	12.31	12.10	12.11	11.98	11.81	11.78	11.66	11.58	11.40	11.43	11.34	11.00
450.0	12.46	12.04	11.91	11.95	12.13	11.86	11.74	11.54	11.56	11.43	11.27	11.25	11.13	11.06	10.88	10.92	10.83	10.51
500.0	11.96	11.56	11.44	11.48	11.65	11.39	11.28	11.09	11.10	10.98	10.83	10.81	10.70	10.63	10.47	10.50	10.41	10.11

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

211 86 RN IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.270	5.990	8.452	8.430	8.280	9.865	10.660	11.198	11.590	12.020	12.290	13.170	13.620	14.180	14.390	14.617	15.052	15.440
3.0	6.623	6.727	9.352	9.378	9.220	10.928	11.897	12.499	12.938	13.407	13.771	14.754	15.291	15.911	16.146	16.443	17.084	17.404
3.5	7.377	7.435	10.236	10.308	10.140	11.960	13.094	13.756	14.235	14.737	15.191	16.269	16.886	17.561	17.817	18.178	18.995	19.266
4.0	7.939	8.129	11.113	11.229	11.050	12.976	14.268	14.985	15.503	16.033	16.573	17.741	18.433	19.159	19.436	19.856	20.828	21.063
4.5	8.510	8.818	11.990	12.148	11.958	13.985	15.431	16.201	16.754	17.310	17.934	19.188	19.951	20.726	21.020	21.497	22.610	22.817
5.0	9.093	9.507	12.870	13.071	12.867	14.991	16.589	17.409	17.996	18.575	19.282	20.620	21.451	22.272	22.584	23.115	24.356	24.544
5.5	9.688	10.200	13.756	13.999	13.781	15.999	17.748	18.616	19.236	19.835	20.623	22.044	22.941	23.807	24.136	24.718	26.078	26.254
6.0	10.297	10.898	14.651	14.935	14.703	17.011	18.909	19.825	20.476	21.095	21.964	23.465	24.427	25.336	25.680	26.314	27.785	27.952
6.5	10.919	11.604	15.554	15.880	15.632	18.030	20.077	21.038	21.720	22.357	23.306	24.888	25.913	26.864	27.223	27.906	29.482	29.646
7.0	11.555	12.319	16.468	16.836	16.571	19.057	21.252	22.259	22.971	23.623	24.653	26.314	27.401	28.393	28.767	29.498	31.174	31.338
8.0	12.87	13.78	18.33	18.78	18.48	21.14	23.63	24.73	25.50	26.18	27.37	29.19	30.40	31.47	31.87	32.69	34.56	34.73
9.0	14.25	15.28	20.24	20.77	20.44	23.26	26.05	27.23	28.06	28.77	30.12	32.09	33.42	34.57	35.00	35.91	37.95	38.15
10.0	15.68	16.83	22.20	22.82	22.44	25.43	28.52	29.79	30.67	31.40	32.91	35.04	36.49	37.71	38.17	39.17	41.37	41.59
11.0	17.17	18.42	24.21	24.91	24.49	27.65	31.04	32.39	33.32	34.08	35.76	38.04	39.61	40.90	41.38	42.47	44.82	45.09
12.0	18.72	20.07	26.27	27.06	26.60	29.91	33.62	35.05	36.03	36.80	38.65	41.09	42.78	44.14	44.64	45.82	48.31	48.62
15.0	23.71	25.29	32.77	33.83	33.22	37.01	41.66	43.34	44.47	45.29	47.65	50.56	52.61	54.17	54.74	56.18	59.07	59.55
20.0	33.14	34.97	44.64	46.17	45.26	49.84	56.17	58.25	59.63	60.49	63.75	67.47	70.14	72.02	72.68	74.54	78.02	78.86
25.0	43.89	45.84	57.76	59.79	58.54	63.91	72.02	74.52	76.13	77.00	81.23	85.81	89.11	91.30	92.03	94.32	98.33	99.62
30.0	55.90	57.84	72.07	74.64	73.00	79.16	89.19	92.11	93.95	94.80	100.07	105.54	109.51	111.98	112.78	115.49	120.00	121.79
35.0	69.13	70.94	87.53	90.67	88.61	95.56	107.62	110.96	113.03	113.85	120.21	126.62	131.29	134.04	134.89	138.03	143.01	145.36
40.0	83.52	85.11	104.11	107.84	105.31	113.07	127.26	131.04	133.34	134.11	141.63	149.02	154.41	157.42	158.33	161.89	167.33	170.28
45.0	99.04	100.29	121.75	126.12	123.07	131.65	148.09	152.32	154.84	155.54	164.27	172.68	178.84	182.09	183.04	187.04	192.92	196.52
50.0	115.65	116.47	140.43	145.46	141.86	151.26	170.07	174.75	177.49	178.10	188.11	197.58	204.52	208.02	209.00	213.44	219.77	224.03
55.0	133.31	133.61	160.12	165.83	161.66	171.89	193.15	198.30	201.27	201.77	213.11	223.67	231.44	235.17	236.18	241.06	247.83	252.79
60.0	152.01	151.68	180.79	187.21	182.42	193.50	217.32	222.95	226.14	226.51	239.24	250.94	259.56	263.52	264.54	269.86	277.08	282.76
65.0	171.7	170.7	202.4	209.6	204.1	216.1	242.5	248.7	252.1	252.3	266.5	279.3	288.8	293.0	294.1	299.8	307.5	313.9
70.0	192.4	190.5	225.0	232.9	226.8	239.6	268.8	275.4	279.0	279.1	294.8	308.9	319.3	323.7	324.7	330.9	339.0	346.2
80.0	236.6	232.9	272.8	282.3	274.7	289.3	324.3	331.9	336.0	335.7	354.5	371.1	383.4	388.2	389.3	396.4	405.4	414.2
90.0	284.5	278.5	324.1	335.3	326.2	342.5	383.7	392.4	396.9	396.2	418.3	437.6	451.9	457.0	458.0	466.1	476.1	486.5
100.0	335.9	327.4	378.7	391.7	380.9	399.0	446.8	456.5	461.4	460.3	485.9	508.0	524.5	529.9	530.9	539.9	550.9	562.9
150.0	641.5	615.6	698.1	721.3	700.7	728.3	813.4	829.1	836.1	831.7	877.5	915.4	944.0	950.9	951.3	965.3	981.7	1002.6
200.0	1019.7	967.8	1089.0	1121.1	1089.2	1126.3	1256.2	1278.9	1287.0	1277.9	1348.2	1394.4	1439.7	1456.0	1455.4	1475.0	1489.2	1527.5
250.0	1458.9	1372.2	1528.2	1578.4	1536.3	1580.4	1761.4	1796.6	1800.1	1785.1	1883.3	1938.2	2002.2	2030.6	2027.8	2057.1	2063.8	2122.8
300.0	1948.6	1821.4	2018.7	2084.9	2031.5	2082.4	2319.7	2374.9	2366.5	2344.8	2473.6	2538.2	2622.6	2663.6	2658.3	2698.3	2696.3	2777.5
350.0	2482.2	2309.5	2551.0	2634.4	2568.5	2626.4	2924.3	3003.0	2979.5	2950.3	3111.9	3187.1	3293.5	3347.5	3339.2	3390.6	3379.4	3484.0
400.0	3054.	2832.	3120.	3222.	3142.	3207.	3570.	3673.	3633.	3596.	3792.	3879.	4009.	4076.	4065.	4128.	4107.	4236.
450.0	3661.	3384.	3721.	3843.	3749.	3821.	4251.	4379.	4324.	4277.	4510.	4610.	4763.	4844.	4829.	4905.	4874.	5028.
500.0	4298.	3964.	4351.	4494.	4384.	4463.	4965.	5118.	5046.	4990.	5261.	5374.	5553.	5648.	5629.	5717.	5676.	5857.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.20	16.80	18.11	18.45	19.12	20.08	20.65	21.39	21.83	22.25	22.69	23.15	23.62	24.04	24.59	24.79	26.53	27.09
3.0	18.30	19.00	20.32	20.64	21.33	22.42	23.07	23.95	24.44	24.94	25.43	25.94	26.50	26.96	27.54	27.74	29.61	30.20
3.5	20.29	21.09	22.40	22.71	23.42	24.63	25.34	26.35	26.89	27.45	27.98	28.53	29.19	29.69	30.30	30.49	32.48	33.11
4.0	22.20	23.09	24.41	24.71	25.43	26.75	27.53	28.64	29.23	29.84	30.43	31.01	31.75	32.28	32.93	33.11	35.22	35.88
4.5	24.07	25.05	26.37	26.65	27.38	28.81	29.65	30.87	31.49	32.16	32.79	33.41	34.22	34.79	35.46	35.64	37.87	38.56
5.0	25.91	26.97	28.29	28.56	29.30	30.83	31.73	33.05	33.71	34.43	35.09	35.75	36.63	37.23	37.94	38.11	40.46	41.18
5.5	27.72	28.87	30.19	30.45	31.19	32.82	33.78	35.19	35.89	36.66	37.36	38.05	39.00	39.63	40.37	40.53	42.99	43.74
6.0	29.53	30.76	32.08	32.33	33.07	34.80	35.81	37.31	38.04	38.86	39.60	40.32	41.34	41.99	42.76	42.92	45.50	46.28
6.5	31.32	32.63	33.96	34.20	34.94	36.76	37.83	39.42	40.18	41.05	41.82	42.57	43.65	44.34	45.14	45.29	47.98	48.79
7.0	33.11	34.51	35.84	36.06	36.81	38.72	39.84	41.52	42.31	43.22	44.03	44.81	45.95	46.67	47.50	47.65	50.45	51.29
8.0	36.71	38.26	39.59	39.79	40.54	42.63	43.86	45.70	46.55	47.55	48.43	49.26	50.53	51.30	52.19	52.33	55.35	56.25
9.0	40.32	42.03	43.37	43.54	44.29	46.56	47.89	49.89	50.79	51.87	52.82	53.71	55.09	55.92	56.87	57.00	60.25	61.21
10.0	43.96	45.84	47.18	47.33	48.07	50.51	51.94	54.10	55.05	56.22	57.24	58.18	59.67	60.54	61.57	61.69	65.16	66.17
11.0	47.65	49.68	51.03	51.15	51.89	54.51	56.03	58.34	59.34	60.59	61.68	62.67	64.27	65.20	66.29	66.40	70.10	71.17
12.0	51.38	53.58	54.92	55.02	55.75	58.54	60.17	62.62	63.68	65.01	66.16	67.20	68.91	69.89	71.04	71.15	75.07	76.20
15.0	62.90	65.59	66.93	66.96	67.65	70.95	72.87	75.76	76.96	78.52	79.88	81.07	83.09	84.22	85.59	85.66	90.28	91.58
20.0	83.23	86.77	88.12	88.00	88.59	92.76	95.19	98.79	100.20	102.16	103.85	105.28	107.83	109.18	110.93	110.96	116.77	118.36
25.0	105.04	109.48	110.83	110.55	111.00	116.07	119.02	123.31	124.94	127.30	129.32	131.00	134.06	135.64	137.80	137.77	144.84	146.73
30.0	128.33	133.72	135.04	134.60	134.88	140.88	144.37	149.36	151.19	153.95	156.33	158.26	161.85	163.62	166.24	166.15	174.52	176.74
35.0	153.06	159.44	160.74	160.12	160.20	167.17	171.21	176.91	178.94	182.12	184.86	187.03	191.16	193.13	196.22	196.07	205.82	208.36
40.0	179.2	186.6	187.9	187.1	186.9	194.9	199.5	205.9	208.2	211.8	214.9	217.3	222.0	224.1	227.7	227.5	238.7	241.6
45.0	206.7	215.2	216.4	215.4	215.0	224.0	229.2	236.4	238.8	242.8	246.3	249.0	254.3	256.6	260.7	260.5	273.1	276.3
50.0	235.5	245.2	246.4	245.1	244.4	254.5	260.3	268.2	270.9	275.3	279.2	282.2	288.0	290.5	295.2	294.8	309.1	312.6
55.0	265.7	276.5	277.6	276.1	275.2	286.3	292.8	301.5	304.3	309.2	313.5	316.7	323.1	325.8	331.1	330.7	346.5	350.4
60.0	297.0	309.1	310.1	308.4	307.1	319.5	326.6	336.0	339.0	344.4	349.1	352.6	359.6	362.5	368.4	367.8	385.3	389.6
65.0	329.7	343.0	344.0	342.0	340.4	353.9	361.6	371.8	375.1	380.9	386.1	389.9	397.5	400.5	407.0	406.4	425.5	430.2
70.0	363.5	378.1	379.0	376.8	374.8	389.5	397.9	409.0	412.4	418.7	424.3	428.4	436.6	439.8	447.0	446.3	467.2	472.2
80.0	434.6	452.0	452.7	449.9	447.1	464.4	474.2	486.9	490.7	498.0	504.5	509.2	518.7	522.2	530.8	529.9	554.4	560.3
90.0	510.3	530.6	531.1	527.7	524.0	543.9	555.2	569.5	573.8	582.1	589.6	594.9	605.7	609.6	619.6	618.4	646.8	653.5
100.0	590.2	613.6	613.8	609.8	605.2	627.9	640.7	656.8	661.5	670.8	679.3	685.2	697.4	701.6	713.1	711.7	744.2	751.8
150.0	1050.	1091.	1089.	1082.	1071.	1109.	1131.	1156.	1163.	1178.	1192.	1201.	1221.	1227.	1247.	1244.	1299.	1312.
200.0	1599.	1660.	1657.	1645.	1627.	1683.	1714.	1750.	1759.	1780.	1801.	1814.	1842.	1850.	1880.	1875.	1942.	1975.
250.0	2221.	2304.	2306.	2288.	2261.	2337.	2377.	2424.	2434.	2463.	2492.	2508.	2546.	2557.	2598.	2591.	2685.	2722.
300.0	2905.	3013.	3022.	3002.	2964.	3068.	3105.	3165.	3175.	3212.	3253.	3270.	3315.	3333.	3387.	3377.	3457.	3540.
350.0	3643.	3777.	3795.	3772.	3722.	3835.	3890.	3964.	3973.	4019.	4072.	4091.	4144.	4168.	4236.	4223.	4310.	4420.
400.0	4428.	4590.	4617.	4591.	4530.	4661.	4724.	4813.	4821.	4876.	4942.	4962.	5025.	5055.	5137.	5122.	5216.	5354.
450.0	5255.	5447.	5482.	5454.	5379.	5530.	5602.	5706.	5713.	5779.	5857.	5879.	5952.	5989.	6085.	6067.	6168.	6336.
500.0	6120.	6342.	6386.	6365.	6267.	6438.	6520.	6639.	6645.	6721.	6813.	6837.	6919.	6962.	7074.	7053.	7163.	7360.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{221}_{87}$FR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	192.3	139.6	116.3	110.3	111.2	97.9	83.9	79.6	76.8	74.5	69.7	65.1	61.6	59.4	58.5	56.2	50.2	52.2
3.0	193.1	147.7	119.6	113.6	114.7	101.8	87.7	83.4	80.7	78.5	73.5	68.9	65.3	63.1	62.3	59.9	54.1	55.8
3.5	191.6	152.1	121.1	115.3	116.6	104.1	89.9	85.8	83.1	81.2	76.1	71.4	67.9	65.6	64.8	62.5	57.0	58.3
4.0	188.8	154.2	121.6	115.9	117.3	105.3	91.2	87.2	84.6	82.9	77.7	73.0	69.5	67.3	66.5	64.2	59.0	60.0
4.5	185.4	154.9	121.5	115.8	117.4	105.9	91.9	88.0	85.5	83.9	78.7	74.1	70.6	68.5	67.7	65.4	60.4	61.2
5.0	181.7	154.5	120.8	115.3	117.0	105.9	92.1	88.3	85.9	84.4	79.3	74.7	71.3	69.2	68.4	66.2	61.5	62.0
5.5	177.8	153.5	119.9	114.5	116.3	105.6	92.0	88.3	86.0	84.6	79.5	75.0	71.7	69.6	68.9	66.7	62.2	62.6
6.0	173.9	152.1	118.8	113.5	115.3	105.0	91.6	88.1	85.9	84.6	79.5	75.0	71.8	69.8	69.1	66.9	62.7	62.9
6.5	170.1	150.4	117.5	112.4	114.3	104.3	91.1	87.7	85.6	84.4	79.3	74.9	71.7	69.8	69.1	67.0	62.9	63.0
7.0	166.4	148.6	116.2	111.1	113.1	103.5	90.5	87.2	85.1	84.0	79.0	74.7	71.6	69.7	69.0	66.9	63.1	63.0
8.0	159.3	144.5	113.4	108.5	110.6	101.6	89.0	85.9	84.0	83.1	78.2	73.9	70.9	69.2	68.5	66.6	63.0	62.7
9.0	152.7	140.3	110.5	105.9	108.0	99.6	87.4	84.4	82.6	81.8	77.1	73.0	70.1	68.4	67.8	65.9	62.7	62.2
10.0	146.7	136.2	107.7	103.3	105.4	97.5	85.7	82.9	81.2	80.5	75.8	71.9	69.1	67.5	67.0	65.2	62.2	61.6
11.0	141.1	132.2	105.0	100.8	102.9	95.4	83.9	81.3	79.7	79.1	74.6	70.7	68.0	66.5	66.0	64.3	61.5	60.8
12.0	136.0	128.4	102.4	98.3	100.5	93.4	82.3	79.7	78.2	77.7	73.3	69.5	66.9	65.5	65.0	63.4	60.8	60.0
15.0	122.8	118.1	95.4	91.7	93.8	87.7	77.4	75.2	73.9	73.6	69.4	66.0	63.7	62.4	62.1	60.6	58.5	57.5
20.0	106.4	104.4	85.7	82.5	84.6	79.6	70.5	68.7	67.6	67.5	63.8	60.7	58.7	57.7	57.4	56.1	54.6	53.4
25.0	94.4	93.8	78.2	75.3	77.3	73.1	64.9	63.3	62.4	62.4	59.0	56.3	54.4	53.6	53.4	52.3	51.0	49.9
30.0	85.2	85.5	72.0	69.5	71.3	67.7	60.2	58.8	58.1	58.2	55.0	52.5	50.8	50.2	50.0	49.0	48.0	46.9
35.0	77.9	78.8	67.0	64.6	66.4	63.3	56.3	55.1	54.5	54.6	51.6	49.3	47.8	47.2	47.1	46.2	45.3	44.2
40.0	71.92	73.24	62.75	60.58	62.29	59.48	53.03	51.89	51.33	51.48	48.71	46.59	45.13	44.65	44.57	43.78	42.98	41.94
45.0	66.98	68.56	59.13	57.11	58.75	56.22	50.17	49.13	48.63	48.80	46.19	44.21	42.84	42.42	42.36	41.64	40.93	39.93
50.0	62.80	64.56	56.00	54.11	55.68	53.38	47.67	46.71	46.26	46.45	43.97	42.11	40.82	40.45	40.41	39.75	39.11	38.15
55.0	59.20	61.09	53.26	51.47	52.99	50.88	45.47	44.57	44.17	44.37	42.02	40.25	39.03	38.71	38.68	38.06	37.48	36.57
60.0	56.08	58.06	50.83	49.15	50.61	48.66	43.51	42.68	42.30	42.52	40.27	38.60	37.43	37.14	37.12	36.56	36.01	35.15
65.0	53.33	55.38	48.68	47.08	48.48	46.67	41.76	40.97	40.63	40.86	38.70	37.11	35.99	35.74	35.72	35.19	34.68	33.86
70.0	50.90	52.99	46.74	45.21	46.57	44.88	40.17	39.44	39.12	39.35	37.28	35.76	34.69	34.46	34.46	33.96	33.48	32.69
80.0	46.77	48.92	43.40	42.00	43.28	41.79	37.43	36.77	36.50	36.74	34.81	33.41	32.42	32.23	32.24	31.80	31.36	30.65
90.0	43.40	45.56	40.62	39.33	40.52	39.19	35.13	34.53	34.29	34.54	32.73	31.43	30.50	30.35	30.37	29.96	29.57	28.91
100.0	40.58	42.74	38.26	37.05	38.19	36.98	33.17	32.62	32.41	32.65	30.96	29.73	28.86	28.73	28.76	28.39	28.02	27.42
150.0	31.38	33.41	30.30	29.38	30.28	29.46	26.49	26.08	25.95	26.20	24.85	23.90	23.22	23.16	23.19	22.94	22.65	22.23
200.0	26.22	28.39	25.88	25.05	25.67	25.20	22.64	22.22	22.27	22.52	21.34	21.00	20.30	19.86	19.93	19.66	19.85	19.15
250.0	23.17	25.21	23.05	22.32	22.83	22.50	20.23	19.63	19.93	20.16	19.11	18.81	18.18	17.81	17.88	17.58	17.82	17.21
300.0	21.05	22.97	21.05	20.39	20.86	20.58	18.51	17.81	18.25	18.48	17.52	17.24	16.67	16.35	16.42	16.15	16.36	15.82
350.0	19.49	21.32	19.57	18.95	19.40	19.15	17.23	16.60	17.00	17.22	16.33	16.06	15.54	15.25	15.32	15.07	15.27	14.77
400.0	18.29	20.05	18.42	17.84	18.26	18.04	16.24	15.66	16.03	16.24	15.41	15.15	14.66	14.40	14.46	14.23	14.42	13.95
450.0	17.35	19.05	17.51	16.95	17.37	17.16	15.45	14.92	15.26	15.47	14.68	14.42	13.96	13.72	13.78	13.56	13.74	13.30
500.0	16.59	18.24	16.77	16.24	16.64	16.45	14.81	14.31	14.64	14.84	14.08	13.83	13.39	13.16	13.23	13.02	13.19	12.77

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	48.72	46.40	46.39	46.70	46.24	43.56	42.18	39.80	38.93	37.90	37.16	36.54	35.21	34.76	34.37	34.46	33.04	32.66
3.0	52.19	49.76	49.73	50.06	49.66	46.89	45.46	43.04	42.17	41.10	40.33	39.68	38.32	37.82	37.39	37.48	35.88	35.47
3.5	54.63	52.12	52.08	52.42	52.08	49.27	47.81	45.40	44.53	43.45	42.65	42.00	40.62	40.09	39.62	39.71	37.99	37.54
4.0	56.35	53.79	53.74	54.09	53.80	50.99	49.51	47.12	46.27	45.18	44.37	43.72	42.34	41.79	41.28	41.37	39.55	39.09
4.5	57.55	54.97	54.91	55.27	55.03	52.22	50.74	48.38	47.56	46.46	45.65	45.00	43.63	43.06	42.53	42.63	40.73	40.25
5.0	58.38	55.78	55.72	56.08	55.89	53.10	51.62	49.30	48.50	47.41	46.60	45.95	44.60	44.02	43.47	43.56	41.61	41.12
5.5	58.92	56.33	56.27	56.63	56.47	53.71	52.24	49.96	49.18	48.11	47.30	46.65	45.32	44.74	44.17	44.26	42.27	41.77
6.0	59.26	56.66	56.60	56.97	56.85	54.12	52.66	50.43	49.67	48.61	47.80	47.16	45.85	45.27	44.69	44.78	42.75	42.25
6.5	59.43	56.85	56.79	57.15	57.07	54.37	52.92	50.74	50.00	48.96	48.15	47.52	46.23	45.65	45.05	45.14	43.10	42.59
7.0	59.47	56.91	56.85	57.21	57.16	54.49	53.06	50.92	50.21	49.17	48.38	47.76	46.49	45.92	45.31	45.40	43.33	42.83
8.0	59.29	56.76	56.70	57.07	57.07	54.47	53.07	51.02	50.35	49.34	48.56	47.96	46.73	46.17	45.55	45.64	43.56	43.05
9.0	58.86	56.37	56.32	56.69	56.73	54.21	52.84	50.87	50.23	49.26	48.49	47.91	46.72	46.18	45.54	45.63	43.55	43.05
10.0	58.28	55.84	55.79	56.15	56.24	53.78	52.45	50.56	49.95	49.00	48.26	47.69	46.54	46.02	45.37	45.46	43.39	42.89
11.0	57.60	55.21	55.16	55.53	55.64	53.25	51.95	50.13	49.56	48.64	47.91	47.36	46.25	45.74	45.09	45.18	43.12	42.63
12.0	56.87	54.52	54.48	54.84	54.99	52.66	51.39	49.64	49.09	48.20	47.48	46.96	45.88	45.39	44.74	44.82	42.78	42.29
15.0	54.55	52.33	52.31	52.66	52.87	50.71	49.53	47.95	47.47	46.65	45.98	45.50	44.51	44.07	43.42	43.51	41.53	41.07
20.0	50.81	48.78	48.79	49.12	49.39	47.46	46.40	45.04	44.63	43.91	43.31	42.89	42.02	41.65	41.02	41.10	39.25	38.83
25.0	47.50	45.63	45.65	45.97	46.27	44.52	43.56	42.36	42.01	41.36	40.82	40.44	39.66	39.35	38.73	38.81	37.09	36.70
30.0	44.64	42.90	42.94	43.24	43.56	41.95	41.07	39.99	39.68	39.09	38.59	38.25	37.54	37.27	36.68	36.76	35.14	34.78
35.0	42.16	40.54	40.58	40.87	41.20	39.70	38.89	37.90	37.63	37.09	36.63	36.31	35.66	35.43	34.86	34.94	33.41	33.07
40.0	40.00	38.47	38.52	38.80	39.13	37.73	36.97	36.07	35.83	35.32	34.89	34.60	33.99	33.79	33.24	33.32	31.87	31.55
45.0	38.40	36.65	36.71	36.98	37.31	35.99	35.28	34.44	34.22	33.75	33.34	33.07	32.50	32.33	31.80	31.87	30.50	30.20
50.0	36.42	35.04	35.10	35.36	35.70	34.45	33.78	32.99	32.79	32.35	31.96	31.71	31.17	31.01	30.51	30.58	29.27	28.98
55.0	34.91	33.60	33.66	33.91	34.25	33.06	32.43	31.69	31.50	31.09	30.72	30.48	29.98	29.83	29.34	29.41	28.16	27.89
60.0	33.56	32.30	32.37	32.61	32.95	31.81	31.21	30.52	30.34	29.95	29.60	29.37	28.89	28.76	28.29	28.36	27.16	26.90
65.0	32.34	31.13	31.20	31.44	31.77	30.68	30.11	29.45	29.29	28.91	28.58	28.36	27.91	27.79	27.33	27.40	26.24	25.99
70.0	31.23	30.07	30.14	30.37	30.69	29.65	29.10	28.48	28.32	27.97	27.65	27.44	27.01	26.90	26.45	26.52	25.40	25.17
80.0	29.29	28.20	28.27	28.49	28.81	27.84	27.33	26.77	26.63	26.30	26.00	25.82	25.42	25.32	24.90	24.97	23.93	23.71
90.0	27.63	26.61	26.69	26.89	27.21	26.30	25.83	25.31	25.18	24.88	24.60	24.43	24.06	23.97	23.58	23.64	22.66	22.45
100.0	26.21	25.25	25.32	25.52	25.82	24.97	24.53	24.04	23.93	23.65	23.39	23.23	22.88	22.80	22.43	22.49	21.56	21.37
150.0	21.25	20.49	20.56	20.72	21.00	20.32	19.98	19.62	19.54	19.33	19.13	19.00	18.74	18.68	18.38	18.43	17.68	17.53
200.0	18.32	17.68	17.67	17.81	18.07	17.50	17.22	16.93	16.87	16.70	16.52	16.42	16.20	16.15	15.90	15.95	15.73	15.22
250.0	16.47	15.90	15.72	15.85	16.08	15.62	15.46	15.19	15.19	15.02	14.79	14.77	14.60	14.49	14.26	14.30	14.20	13.74
300.0	15.14	14.62	14.46	14.60	14.72	14.38	14.23	13.98	13.99	13.84	13.63	13.61	13.46	13.36	13.15	13.19	13.09	12.66
350.0	14.14	13.66	13.61	13.65	13.75	13.44	13.30	13.08	13.09	12.94	12.75	12.73	12.59	12.51	12.31	12.35	12.25	11.88
400.0	13.36	12.91	12.77	12.81	13.00	12.71	12.58	12.37	12.38	12.24	12.07	12.05	11.92	11.84	11.65	11.69	11.60	11.25
450.0	12.74	12.31	12.18	12.22	12.41	12.13	12.00	11.80	11.82	11.69	11.52	11.50	11.38	11.31	11.13	11.16	11.07	10.74
500.0	12.24	11.82	11.70	11.74	11.92	11.65	11.53	11.34	11.36	11.23	11.08	11.06	10.94	10.87	10.70	10.74	10.64	10.33

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{221}_{87}$FR IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.510	6.220	8.776	8.750	8.590	10.224	11.050	11.609	12.020	12.470	12.750	13.660	14.120	14.699	14.920	15.159	15.611	16.010
3.0	7.083	6.987	9.711	9.735	9.567	11.330	12.336	12.963	13.422	13.912	14.291	15.308	15.859	16.501	16.747	17.058	17.725	18.054
3.5	7.657	7.723	10.628	10.700	10.522	12.402	13.579	14.268	14.769	15.294	15.766	16.882	17.516	18.215	18.484	18.862	19.711	19.990
4.0	8.237	8.444	11.538	11.655	11.466	13.456	14.798	15.545	16.086	16.641	17.202	18.411	19.123	19.876	20.166	20.605	21.616	21.857
4.5	8.828	9.158	12.447	12.608	12.407	14.502	16.005	16.806	17.384	17.965	18.613	19.913	20.698	21.502	21.811	22.309	23.466	23.678
5.0	9.430	9.872	13.359	13.564	13.349	15.545	17.206	18.059	18.673	19.278	20.011	21.399	22.255	23.107	23.434	23.988	25.278	25.471
5.5	10.044	10.589	14.277	14.526	14.298	16.590	18.406	19.310	19.958	20.585	21.403	22.875	23.800	24.698	25.043	25.651	27.064	27.244
6.0	10.673	11.312	15.203	15.495	15.250	17.639	19.610	20.563	21.243	21.890	22.792	24.349	25.341	26.283	26.644	27.305	28.834	29.005
6.5	11.315	12.043	16.138	16.473	16.213	18.694	20.820	21.820	22.532	23.197	24.183	25.822	26.880	27.866	28.243	28.955	30.593	30.761
7.0	11.972	12.762	17.084	17.462	17.185	19.768	22.037	23.084	23.827	24.509	25.578	27.300	28.422	29.451	29.843	30.605	32.346	32.514
8.0	13.33	14.29	19.01	19.47	19.16	21.91	24.50	25.64	26.44	27.15	28.39	30.27	31.52	32.63	33.05	33.91	35.85	36.03
9.0	14.75	15.84	20.98	21.54	21.18	24.11	27.00	28.23	29.09	29.83	31.24	33.28	34.66	35.85	36.29	37.25	39.36	39.56
10.0	16.22	17.44	23.01	23.65	23.25	26.35	29.56	30.88	31.79	32.56	34.13	36.33	37.83	39.10	39.57	40.62	42.90	43.13
11.0	17.76	19.09	25.09	25.81	25.38	28.64	32.16	33.57	34.54	35.32	37.07	39.43	41.06	42.40	42.90	44.04	46.47	46.74
12.0	19.36	20.78	27.22	28.03	27.55	30.98	34.82	36.31	37.34.	38.14	40.06	42.58	44.33	45.75	46.27	47.50	50.09	50.40
15.0	24.50	26.17	33.93	35.02	34.38	38.31	43.13	44.88	46.06	46.91	49.35	52.37	54.49	56.11	56.70	58.20	61.20	61.69
20.0	34.19	36.14	46.17	47.75	46.81	51.56	58.10	60.27	61.70	62.60	66.97	69.83	72.59	74.54	75.23	77.16	80.77	81.64
25.0	45.25	47.33	59.69	61.79	60.50	66.06	74.45	77.05	78.72	79.63	84.01	88.75	92.16	94.43	95.19	97.56	101.72	103.05
30.0	57.60	59.68	74.43	77.08	75.39	81.77	92.14	95.17	97.08	97.98	103.42	109.08	113.19	115.75	116.59	119.39	124.06	125.92
35.0	71.19	73.15	90.35	93.59	91.46	98.66	111.12	114.59	116.74	117.60	124.17	130.80	135.63	138.47	139.37	142.62	147.77	150.20
40.0	85.97	87.71	107.40	111.26	108.65	116.69	131.35	135.27	137.65	138.46	146.22	153.86	159.44	162.55	163.50	167.19	172.82	175.87
45.0	101.90	103.31	125.56	130.06	126.92	135.81	152.78	157.16	159.78	160.51	169.53	178.22	184.58	187.96	188.95	193.08	199.18	202.89
50.0	118.95	119.93	144.77	149.95	146.25	155.99	175.39	180.24	183.09	183.73	194.06	203.84	211.01	214.64	215.67	220.26	226.81	231.21
55.0	137.08	137.53	165.01	170.90	166.61	177.20	199.14	204.47	207.54	208.08	219.78	230.69	238.71	242.58	243.63	248.67	255.68	260.80
60.0	156.27	156.10	186.26	192.87	187.95	199.42	223.99	229.81	233.12	233.52	246.65	258.73	267.63	271.73	272.80	278.30	286.77	291.63
65.0	176.5	175.6	208.5	215.9	210.3	222.6	249.9	256.2	259.8	260.0	274.7	287.9	297.7	302.1	303.1	309.1	317.0	323.7
70.0	197.7	196.0	231.7	239.8	233.5	246.8	276.9	283.7	287.5	287.6	303.8	318.3	329.0	333.6	334.7	341.1	349.5	356.9
80.0	243.0	239.5	280.8	290.6	282.8	297.8	333.9	341.8	346.0	345.8	365.1	382.3	395.0	399.9	401.0	408.4	417.7	426.8
90.0	292.1	286.3	333.4	345.0	335.6	352.5	394.9	403.9	408.6	407.9	430.7	450.5	465.3	470.6	471.7	480.0	490.3	501.0
100.0	344.8	336.4	389.5	402.9	391.8	410.6	459.7	469.8	474.9	473.7	500.1	522.9	539.8	545.5	546.5	555.9	567.2	579.6
150.0	658.1	632.0	717.3	741.1	719.9	748.5	836.0	852.2	859.4	854.9	902.1	941.1	970.5	977.6	978.1	992.6	1009.5	1030.9
200.0	1045.7	993.1	1114.4	1151.0	1118.3	1156.6	1290.1	1313.5	1321.9	1312.6	1384.8	1432.3	1478.9	1496.7	1495.1	1515.3	1530.0	1569.4
250.0	1496.6	1407.4	1568.2	1619.8	1576.7	1622.1	1808.0	1844.2	1847.9	1832.6	1933.4	1989.9	2055.7	2084.9	2082.1	2112.2	2119.2	2179.8
300.0	1997.2	1867.6	2070.9	2138.8	2084.1	2136.6	2380.2	2436.9	2428.4	2408.2	2538.4	2604.8	2691.5	2733.6	2728.2	2769.3	2767.4	2850.8
350.0	2543.7	2367.7	2616.1	2701.8	2634.2	2694.0	2999.7	3080.4	3056.5	3026.5	3192.4	3269.7	3378.9	3434.4	3426.0	3478.7	3467.4	3574.7
400.0	3130.	2903.	3199.	3304.	3222.	3289.	3661.	3766.	3726.	3688.	3890.	3979.	4112.	4181.	4169.	4234.	4213.	4345.
450.0	3751.	3469.	3815.	3940.	3843.	3917.	4359.	4490.	4433.	4386.	4625.	4727.	4885.	4968.	4952.	5030.	4998.	5167.
500.0	4403.	4062.	4460.	4606.	4493.	4575.	5090.	5246.	5173.	5116.	5394.	5510.	5693.	5791.	5771.	5862.	5820.	6006.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.79	17.40	18.76	19.11	19.81	20.80	21.40	22.17	22.63	23.07	23.52	23.99	24.46	24.89	25.46	25.67	27.48	28.06
3.0	18.98	19.70	21.06	21.39	22.11	23.24	23.92	24.83	25.35	25.86	26.37	26.89	27.46	27.93	28.53	28.74	30.68	31.30
3.5	21.04	21.87	23.23	23.55	24.28	25.54	26.28	27.33	27.90	28.47	29.03	29.59	30.26	30.76	31.40	31.60	33.67	34.32
4.0	23.03	23.95	25.31	25.62	26.37	27.74	28.55	29.72	30.33	30.97	31.57	32.17	32.92	33.46	34.13	34.32	36.52	37.20
4.5	24.97	25.98	27.34	27.64	28.39	29.88	30.76	32.03	32.68	33.38	34.02	34.65	35.49	36.06	36.77	36.95	39.27	39.99
5.0	26.88	27.98	29.34	29.62	30.39	31.98	32.91	34.29	34.98	35.73	36.41	37.08	37.99	38.60	39.33	39.51	41.95	42.70
5.5	28.76	29.95	31.31	31.58	32.35	34.05	35.04	36.52	37.24	38.04	38.77	39.47	40.45	41.09	41.85	42.03	44.59	45.37
6.0	30.63	31.90	33.27	33.53	34.30	36.10	37.15	38.72	39.48	40.33	41.09	41.82	42.87	43.54	44.34	44.51	47.18	48.00
6.5	32.49	33.85	35.22	35.46	36.24	38.13	39.24	40.90	41.69	42.59	43.39	44.16	45.27	45.97	46.80	46.96	49.76	50.60
7.0	34.35	35.79	37.16	37.40	38.18	40.16	41.33	43.07	43.90	44.84	45.68	46.48	47.65	48.39	49.25	49.40	52.32	53.19
8.0	38.07	39.68	41.06	41.26	42.04	44.22	45.49	47.41	48.29	49.33	50.24	51.09	52.39	53.18	54.11	54.26	57.40	58.33
9.0	41.81	43.58	44.97	45.15	45.93	48.28	49.66	51.74	52.68	53.81	54.79	55.70	57.12	57.97	58.96	59.10	62.47	63.46
10.0	45.58	47.52	48.91	49.06	49.84	52.37	53.86	56.10	57.10	58.31	59.36	60.32	61.86	62.76	63.82	63.95	67.55	68.61
11.0	49.40	51.50	52.89	53.02	53.79	56.50	58.09	60.49	61.54	62.83	63.95	64.97	66.62	67.58	68.71	68.82	72.66	73.77
12.0	53.26	55.53	56.92	57.02	57.78	60.68	62.37	64.92	66.02	67.40	68.59	69.66	71.42	72.43	73.63	73.74	77.81	78.98
15.0	65.16	67.94	69.34	69.36	70.08	73.50	75.50	78.50	79.75	81.37	82.77	83.99	86.08	87.24	88.66	88.74	93.53	94.88
20.0	86.16	89.82	91.22	91.09	91.71	96.03	98.56	102.28	103.75	105.79	107.53	109.01	111.63	113.03	114.84	114.87	120.89	122.55
25.0	108.66	113.25	114.65	114.36	114.83	120.09	123.15	127.60	129.28	131.73	133.82	135.55	138.71	140.33	142.57	142.55	149.86	151.83
30.0	132.67	138.24	139.62	139.16	139.46	145.67	149.28	154.46	156.36	159.22	161.67	163.66	167.36	169.19	171.90	171.81	180.48	182.78
35.0	158.16	164.75	166.10	165.46	165.56	172.76	176.95	182.86	184.96	188.25	191.08	193.32	197.58	199.61	202.81	202.66	212.75	215.37
40.0	185.1	192.7	194.1	193.2	193.1	201.3	206.1	212.8	215.1	218.8	222.0	224.5	229.3	231.6	235.3	235.1	246.6	249.6
45.0	213.4	222.2	223.5	222.4	222.0	231.3	236.7	244.1	246.6	250.8	254.4	257.2	262.6	265.0	269.3	269.0	282.1	285.4
50.0	243.1	253.0	254.3	253.0	252.3	262.7	268.7	276.9	279.6	284.2	288.3	291.3	297.3	299.9	304.8	304.4	319.1	322.8
55.0	274.1	285.2	286.4	284.9	283.9	295.5	302.1	311.1	314.0	319.1	323.5	326.9	333.5	336.3	341.7	341.2	357.6	361.6
60.0	306.4	318.8	319.9	318.1	316.8	329.5	336.9	346.6	349.8	355.3	360.2	363.8	371.0	374.0	380.1	379.5	397.5	402.0
65.0	339.9	353.7	354.7	352.7	351.0	364.9	372.9	383.5	386.9	392.9	398.2	402.1	409.9	413.1	419.8	419.2	438.9	443.8
70.0	374.7	389.8	390.7	388.4	386.4	401.6	410.3	421.7	425.2	431.7	437.5	441.7	450.2	453.5	460.9	460.2	481.7	487.0
80.0	447.8	465.7	466.5	463.6	460.7	478.5	488.7	501.8	505.8	513.3	520.0	524.8	534.6	538.3	547.1	546.1	571.5	577.5
90.0	525.6	546.5	547.0	543.5	539.7	560.3	571.9	586.7	591.2	599.7	607.4	612.9	624.0	628.0	638.3	637.1	666.4	673.4
100.0	607.7	631.8	632.1	627.9	623.2	646.5	659.8	676.4	681.2	690.8	699.6	705.7	718.3	722.6	734.5	733.0	766.5	774.3
150.0	1080.	1122.	1120.	1112.	1102.	1141.	1163.	1189.	1196.	1212.	1226.	1236.	1256.	1262.	1283.	1280.	1337.	1350.
200.0	1643.	1706.	1703.	1690.	1671.	1730.	1761.	1798.	1807.	1829.	1850.	1864.	1893.	1901.	1932.	1927.	1996.	2030.
250.0	2280.	2366.	2368.	2350.	2321.	2400.	2441.	2490.	2500.	2529.	2560.	2576.	2614.	2626.	2668.	2661.	2738.	2796.
300.0	2982.	3092.	3102.	3081.	3042.	3139.	3187.	3249.	3259.	3297.	3339.	3357.	3403.	3422.	3477.	3467.	3550.	3634.
350.0	3738.	3875.	3894.	3870.	3820.	3935.	3991.	4068.	4077.	4124.	4178.	4198.	4253.	4278.	4347.	4334.	4423.	4536.
400.0	4542.	4708.	4736.	4710.	4647.	4781.	4846.	4937.	4946.	5003.	5070.	5091.	5156.	5187.	5270.	5255.	5351.	5493.
450.0	5390.	5586.	5623.	5593.	5517.	5672.	5746.	5852.	5860.	5927.	6008.	6031.	6105.	6143.	6241.	6223.	6327.	6499.
500.0	6275.	6503.	6549.	6516.	6427.	6602.	6686.	6808.	6814.	6892.	6986.	7011.	7096.	7140.	7254.	7233.	7346.	7548.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) — $^{226}_{88}$RA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	194.3	140.3	117.2	111.2	112.0	98.5	84.5	80.1	77.3	74.9	70.1	65.5	61.9	59.7	58.8	56.5	50.5	52.5
3.0	195.3	148.7	120.6	114.6	115.7	102.6	88.3	84.0	81.3	79.1	74.1	69.3	65.8	63.5	62.7	60.3	54.5	56.1
3.5	193.9	153.4	122.3	116.3	117.6	105.0	90.7	86.5	83.8	81.8	76.7	71.9	68.4	66.1	65.3	62.9	57.4	58.7
4.0	191.2	155.7	122.8	117.0	118.5	106.3	92.0	88.0	85.4	83.6	78.4	73.6	70.1	67.9	67.1	64.8	59.5	60.5
4.5	187.9	156.4	122.7	117.0	118.6	106.9	92.8	88.8	86.3	84.7	79.5	74.7	71.3	69.1	68.3	66.0	61.0	61.8
5.0	184.2	156.2	122.1	116.6	118.2	107.0	93.0	89.2	86.8	85.3	80.1	75.4	72.0	69.8	69.1	66.8	62.0	62.6
5.5	180.3	155.3	121.2	115.8	117.6	106.7	92.9	89.2	86.9	85.5	80.3	75.7	72.4	70.3	69.5	67.3	62.8	63.2
6.0	176.5	153.9	120.1	114.8	116.7	106.2	92.6	89.0	86.8	85.5	80.4	75.8	72.5	70.5	69.8	67.6	63.3	63.5
6.5	172.6	152.3	118.9	113.7	115.6	105.5	92.1	88.6	86.5	85.3	80.2	75.7	72.5	70.5	69.8	67.7	63.6	63.7
7.0	168.9	150.4	117.6	112.5	114.4	104.7	91.5	88.1	86.1	85.0	79.9	75.5	72.3	70.4	69.8	67.7	63.8	63.7
8.0	161.8	146.4	114.8	109.9	112.0	102.8	90.1	86.9	85.0	84.0	79.1	74.8	71.8	69.9	69.3	67.3	63.8	63.4
9.0	155.1	142.3	112.0	107.3	109.4	100.8	88.5	85.5	83.6	82.8	78.0	73.8	70.9	69.2	68.6	66.7	63.4	63.0
10.0	149.0	138.2	109.2	104.7	106.8	98.7	86.8	83.9	82.2	81.5	76.8	72.8	69.9	68.3	67.8	65.9	62.9	62.3
11.0	143.4	134.2	106.5	102.1	104.3	96.7	85.0	82.3	80.7	80.1	75.5	71.6	68.9	67.4	66.9	65.1	62.3	61.6
12.0	138.2	130.4	103.9	99.7	101.9	94.7	83.4	80.8	79.2	78.7	74.2	70.4	67.8	66.3	65.9	64.2	61.6	60.8
15.0	124.9	120.0	96.8	93.0	95.2	88.9	78.5	76.3	75.0	74.6	70.4	66.9	64.5	63.3	62.9	61.4	59.3	58.2
20.0	108.3	106.2	87.1	83.8	85.9	80.8	71.6	69.7	68.7	68.5	64.7	61.6	59.5	58.5	58.3	57.0	55.4	54.2
25.0	96.1	95.5	79.4	76.5	78.5	74.3	65.9	64.3	63.4	63.4	59.9	57.2	55.3	54.4	54.2	53.1	51.8	50.7
30.0	86.8	87.1	73.3	70.6	72.5	68.9	61.2	59.8	59.1	59.1	55.9	53.4	51.6	51.0	50.8	49.8	48.7	47.6
35.0	79.4	80.3	68.2	65.8	67.6	64.3	57.3	56.0	55.4	55.5	52.5	50.2	48.6	48.0	47.9	47.0	46.1	45.0
40.0	73.33	74.62	63.86	61.65	63.39	60.51	53.94	52.79	52.21	52.37	49.54	47.39	45.90	45.40	45.32	44.52	43.71	42.64
45.0	68.31	69.87	60.20	58.14	59.81	57.21	51.05	49.99	49.48	49.66	46.99	44.98	43.58	43.15	43.09	42.36	41.63	40.62
50.0	64.08	65.81	57.02	55.09	56.70	54.34	48.52	47.54	47.08	47.28	44.75	42.86	41.54	41.17	41.12	40.45	39.79	38.82
55.0	60.40	62.29	54.24	52.43	53.97	51.81	46.29	45.38	44.97	45.18	42.77	40.98	39.73	39.40	39.37	38.74	38.14	37.22
60.0	57.22	59.20	51.79	50.07	51.55	49.56	44.31	43.46	43.08	43.30	41.00	39.30	38.11	37.82	37.80	37.22	36.66	35.78
65.0	54.43	56.48	49.60	47.97	49.40	47.55	42.53	41.74	41.38	41.61	39.42	37.79	36.65	36.39	36.38	35.84	35.32	34.48
70.0	51.95	54.05	47.64	46.08	47.46	45.73	40.93	40.18	39.85	40.09	37.98	36.42	35.33	35.10	35.10	34.59	34.10	33.30
80.0	47.75	49.91	44.25	42.82	44.12	42.59	38.15	37.47	37.19	37.44	35.48	34.04	33.03	32.84	32.85	32.40	31.98	31.22
90.0	44.31	46.49	41.42	40.10	41.32	39.96	35.82	35.20	34.98	35.21	33.37	32.03	31.09	30.93	30.95	30.54	30.14	29.47
100.0	41.45	43.63	39.03	37.80	38.95	37.72	33.83	33.26	33.04	33.30	31.56	30.31	29.43	29.30	29.32	28.94	28.57	27.95
150.0	32.06	34.13	30.94	30.00	30.91	30.07	27.03	26.62	26.49	26.74	25.37	24.39	23.69	23.63	23.66	23.41	23.11	22.68
200.0	26.79	29.01	26.43	25.59	26.22	25.73	23.12	22.69	22.75	23.00	21.80	21.45	20.73	20.28	20.35	20.07	20.27	19.55
250.0	23.68	25.76	23.55	22.81	23.32	22.99	20.66	20.06	20.36	20.60	19.53	19.21	18.57	18.20	18.27	17.96	18.20	17.58
300.0	21.52	23.48	21.52	20.84	21.32	21.03	18.92	18.20	18.65	18.88	17.91	17.61	17.04	16.70	16.77	16.50	16.72	16.16
350.0	19.92	21.79	20.00	19.37	19.83	19.57	17.61	16.97	17.38	17.60	16.69	16.42	15.88	15.58	15.65	15.40	15.61	15.09
400.0	18.70	20.50	18.83	18.23	18.67	18.45	16.60	16.01	16.39	16.60	15.75	15.49	14.99	14.72	14.78	14.55	14.74	14.26
450.0	17.74	19.47	17.90	17.33	17.76	17.55	15.80	15.25	15.60	15.81	15.01	14.75	14.27	14.02	14.09	13.87	14.05	13.60
500.0	16.96	18.65	17.15	16.60	17.01	16.82	15.15	14.64	14.97	15.17	14.40	14.14	13.69	13.46	13.53	13.31	13.49	13.06

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	48.99	46.66	46.65	46.96	46.50	43.80	42.41	40.02	39.14	38.10	37.36	36.73	35.40	34.94	34.56	34.65	33.21	32.83
3.0	52.54	50.09	50.06	50.39	49.98	47.20	45.76	43.32	42.44	41.37	40.59	39.94	38.57	38.06	37.63	37.72	36.11	35.70
3.5	55.04	52.51	52.47	52.81	52.46	49.63	48.16	45.73	44.86	43.76	42.96	42.30	40.92	40.38	39.91	40.00	38.26	37.81
4.0	56.81	54.23	54.18	54.53	54.23	51.39	49.90	47.49	46.64	45.54	44.72	44.06	42.68	42.12	41.61	41.70	39.87	39.40
4.5	58.05	55.44	55.39	55.75	55.50	52.67	51.17	48.79	47.96	46.86	46.04	45.38	44.00	43.43	42.89	42.99	41.08	40.59
5.0	58.91	56.29	56.23	56.59	56.39	53.58	52.09	49.75	48.94	47.84	47.02	46.36	45.00	44.42	43.86	43.95	41.98	41.49
5.5	59.49	56.86	56.80	57.17	57.01	54.22	52.73	50.43	49.65	48.56	47.74	47.09	45.75	45.16	44.59	44.68	42.66	42.16
6.0	59.85	57.23	57.16	57.53	57.41	54.65	53.17	50.92	50.16	49.08	48.27	47.62	46.30	45.71	45.12	45.21	43.17	42.66
6.5	60.04	57.43	57.37	57.74	57.65	54.92	53.46	51.25	50.51	49.44	48.63	48.00	46.69	46.11	45.51	45.60	43.53	43.02
7.0	60.10	57.51	57.45	57.82	57.76	55.06	53.61	51.45	50.73	49.68	48.88	48.25	46.97	46.39	45.78	45.87	43.78	43.27
8.0	59.95	57.39	57.33	57.70	57.70	55.07	53.66	51.58	50.90	49.88	49.09	48.49	47.24	46.68	46.04	46.13	44.03	43.52
9.0	59.54	57.03	56.97	57.34	57.39	54.83	53.45	51.46	50.81	49.82	49.06	48.46	47.25	46.71	46.06	46.16	44.04	43.53
10.0	58.98	56.51	56.45	56.82	56.91	54.42	53.07	51.16	50.54	49.58	48.83	48.26	47.09	46.56	45.91	46.00	43.89	43.39
11.0	58.32	55.89	55.84	56.21	56.33	53.90	52.59	50.74	50.16	49.23	48.49	47.94	46.81	46.30	45.64	45.73	43.64	43.14
12.0	57.59	55.21	55.17	55.53	55.68	53.32	52.04	50.26	49.70	48.80	48.08	47.54	46.45	45.95	45.29	45.38	43.31	42.82
15.0	55.29	53.04	53.01	53.37	53.58	51.39	50.19	48.59	48.10	47.27	46.59	46.10	45.10	44.66	43.99	44.08	42.08	41.61
20.0	51.54	49.49	49.49	49.83	50.10	48.14	47.07	45.68	45.27	44.54	43.93	43.50	42.61	42.24	41.60	41.68	39.81	39.38
25.0	48.22	46.33	46.35	46.67	46.97	45.19	44.22	42.99	42.64	41.98	41.43	41.05	40.25	39.94	39.31	39.39	37.64	37.24
30.0	46.35	43.58	43.62	43.92	44.25	42.61	41.71	40.61	40.31	39.71	39.20	38.85	38.12	37.86	37.25	37.33	35.69	35.32
35.0	42.85	41.20	41.24	41.53	41.87	40.34	39.52	38.52	38.24	37.69	37.22	36.90	36.23	36.00	35.42	35.50	33.95	33.60
40.0	40.67	39.11	39.16	39.45	39.79	38.36	37.59	36.67	36.42	35.91	35.47	35.17	34.55	34.35	33.79	33.87	32.40	32.07
45.0	38.75	37.28	37.33	37.61	37.95	36.60	35.88	35.03	34.80	34.33	33.91	33.63	33.05	32.87	32.34	32.41	31.01	30.71
50.0	37.05	35.65	35.71	35.97	36.32	35.04	34.36	33.56	33.36	32.91	32.51	32.25	31.71	31.55	31.03	31.10	29.77	29.48
55.0	35.53	34.19	34.26	34.51	34.85	33.64	33.00	32.25	32.06	31.64	31.26	31.02	30.50	30.36	29.86	29.93	28.65	28.38
60.0	34.17	32.88	32.95	33.20	33.54	32.36	31.77	31.06	30.88	30.48	30.12	29.89	29.41	29.27	28.79	28.86	27.64	27.37
65.0	32.93	31.70	31.77	32.01	32.34	31.24	30.65	29.98	29.82	29.44	29.09	28.87	28.41	28.29	27.82	27.89	26.71	26.46
70.0	31.81	30.62	30.69	30.92	31.26	30.20	29.63	29.00	28.84	28.48	28.15	27.94	27.50	27.39	26.94	27.00	25.87	25.62
80.0	29.84	28.73	28.80	29.02	29.35	28.36	27.84	27.27	27.13	26.80	26.49	26.30	25.89	25.79	25.37	25.43	24.37	24.15
90.0	28.16	27.12	27.20	27.40	27.72	26.80	26.32	25.79	25.66	25.36	25.07	24.89	24.51	24.43	24.03	24.09	23.09	22.88
100.0	26.72	25.74	25.81	26.01	26.32	25.45	25.00	24.51	24.39	24.11	23.84	23.67	23.32	23.24	22.86	22.92	21.97	21.78
150.0	21.70	20.90	20.97	21.14	21.42	20.73	20.39	20.02	19.94	19.73	19.51	19.39	19.12	19.06	18.75	18.81	18.04	17.88
200.0	18.71	18.06	18.04	18.19	18.45	17.87	17.58	17.28	17.22	17.05	16.87	16.76	16.54	16.49	16.23	16.28	16.06	15.53
250.0	16.82	16.24	16.05	16.18	16.43	15.96	15.79	15.51	15.52	15.34	15.11	15.08	14.91	14.80	14.56	14.61	14.50	14.04
300.0	15.47	14.94	14.77	14.82	15.04	14.69	14.54	14.29	14.30	14.13	13.93	13.90	13.75	13.65	13.43	13.48	13.37	12.95
350.0	14.45	13.96	13.80	13.85	14.06	13.73	13.60	13.36	13.37	13.23	13.03	13.01	12.87	12.78	12.58	12.62	12.52	12.14
400.0	13.66	13.19	13.05	13.10	13.29	12.99	12.86	12.64	12.65	12.51	12.34	12.31	12.18	12.10	11.91	11.95	11.85	11.50
450.0	13.02	12.58	12.45	12.49	12.68	12.40	12.27	12.07	12.08	11.95	11.78	11.76	11.64	11.56	11.38	11.41	11.32	10.98
500.0	12.51	12.08	11.96	12.00	12.18	11.91	11.79	11.60	11.61	11.48	11.32	11.30	11.19	11.11	10.94	10.97	10.88	10.57

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

226 88 RA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.600	6.300	8.894	8.870	8.710	10.364	11.200	11.768	12.180	12.630	12.920	13.840	14.310	14.892	15.110	15.349	15.810	16.220
3.0	7.179	7.080	9.643	9.669	9.701	11.486	12.506	13.143	13.603	14.095	14.485	15.514	16.076	16.722	16.966	17.280	17.959	18.297
3.5	7.759	7.827	10.773	10.847	10.669	12.574	13.767	14.467	14.971	15.497	15.982	17.112	17.758	18.463	18.730	19.111	19.976	20.263
4.0	8.346	8.557	11.694	11.815	11.625	13.642	15.003	15.761	16.306	16.863	17.438	18.663	19.389	20.147	20.436	20.880	21.908	22.157
4.5	8.942	9.281	12.614	12.780	12.578	14.702	16.225	17.039	17.621	18.205	18.869	20.185	20.986	21.796	22.104	22.607	23.784	24.004
5.0	9.549	10.004	13.537	13.747	13.532	15.758	17.441	18.308	18.927	19.535	20.285	21.690	22.563	23.422	23.749	24.309	25.620	25.821
5.5	10.169	10.729	14.465	14.720	14.490	16.816	18.657	19.575	20.228	20.858	21.694	23.186	24.128	25.034	25.378	25.993	27.430	27.617
6.0	10.803	11.460	15.402	15.700	15.455	17.877	19.875	20.842	21.529	22.179	23.100	24.677	25.687	26.639	27.000	27.668	29.222	29.401
6.5	11.450	12.198	16.347	16.689	16.428	18.944	21.098	22.114	22.833	23.502	24.507	26.168	27.245	28.241	28.618	29.338	31.003	31.178
7.0	12.112	12.944	17.303	17.689	17.411	20.020	22.329	23.393	24.142	24.829	25.919	27.663	28.805	29.844	30.237	31.008	32.777	32.953
8.0	13.48	14.47	19.25	19.72	19.41	22.20	24.82	25.97	26.78	27.50	28.76	30.67	31.94	33.06	33.49	34.35	36.32	36.51
9.0	14.91	16.03	21.24	21.80	21.45	24.42	27.35	28.60	29.47	30.21	31.64	33.71	35.11	36.31	36.76	37.73	39.87	40.08
10.0	16.39	17.64	23.29	23.94	23.54	26.68	29.93	31.27	32.19	32.96	34.56	36.79	38.32	39.60	40.07	41.13	43.45	43.69
11.0	17.94	19.30	25.38	26.12	25.68	28.99	32.56	33.98	34.97	35.76	37.53	39.92	41.57	42.93	43.43	44.58	47.06	47.34
12.0	19.55	21.01	27.53	28.36	27.87	31.36	35.24	36.76	37.79	38.60	40.55	43.11	44.88	46.31	46.84	48.08	50.70	51.03
15.0	24.71	26.44	34.30	35.41	34.76	38.75	43.63	45.40	46.59	47.45	49.93	52.98	55.13	56.77	57.37	58.88	61.92	62.43
20.0	34.46	36.47	46.63	48.23	47.28	52.09	58.71	60.91	62.36	63.26	66.68	70.59	73.38	75.36	76.04	78.00	81.66	82.54
25.0	45.56	47.71	60.23	62.36	61.06	66.70	75.18	77.80	79.50	80.41	84.84	89.64	93.09	95.39	96.16	98.56	102.77	104.12
30.0	57.95	60.12	75.06	77.74	76.05	82.51	92.98	96.04	97.98	98.88	104.38	110.11	114.26	116.86	117.70	120.54	125.26	127.14
35.0	71.59	73.65	91.07	94.34	92.20	99.50	112.07	115.58	117.75	118.63	125.26	131.96	136.84	139.72	140.63	143.90	149.12	151.58
40.0	86.41	88.27	108.21	112.10	109.48	117.62	132.41	136.37	138.78	139.60	147.44	155.15	160.79	163.94	164.90	168.62	174.32	177.40
45.0	102.39	103.93	126.45	130.99	127.84	136.84	153.95	158.38	161.02	161.77	170.87	179.64	186.06	189.48	190.48	194.66	200.82	204.57
50.0	119.49	120.60	145.74	150.97	147.26	157.11	176.67	181.57	184.44	185.10	195.52	205.39	212.63	216.30	217.34	221.97	228.59	233.03
55.0	137.66	138.26	166.07	172.00	167.70	178.42	200.52	205.90	209.01	209.56	221.36	232.36	240.46	244.37	245.44	250.53	257.61	262.77
60.0	156.89	156.88	187.40	194.06	189.13	200.73	225.48	231.36	234.70	235.12	248.35	260.53	269.50	273.65	274.74	280.29	287.83	293.75
65.0	177.2	176.4	209.7	217.1	211.5	224.0	251.5	257.9	261.5	261.7	276.5	289.9	299.7	304.1	305.2	311.2	319.2	325.9
70.0	198.4	196.9	233.0	241.2	234.9	248.3	278.6	285.5	289.3	289.4	305.7	320.3	331.2	335.7	336.9	343.3	351.8	359.3
80.0	243.8	240.4	282.2	292.1	284.3	299.5	335.8	343.8	348.0	347.8	367.3	384.6	397.4	402.4	403.5	410.9	420.3	429.4
90.0	293.0	287.4	335.1	346.7	337.3	354.3	397.0	406.1	410.8	410.1	433.0	453.0	467.9	473.3	474.4	482.8	493.2	504.0
100.0	345.8	337.6	391.3	404.8	393.6	412.6	462.0	472.2	477.3	476.1	502.7	525.6	542.7	548.4	549.5	558.9	570.3	582.8
150.0	659.4	633.7	719.7	743.6	722.5	751.3	839.1	855.4	862.7	858.2	905.6	944.8	974.4	981.6	982.1	996.7	1013.7	1035.2
200.0	1047.3	995.1	1117.4	1154.2	1121.4	1160.1	1294.0	1317.5	1325.9	1316.7	1389.1	1436.9	1483.7	1500.6	1500.1	1520.4	1535.2	1574.7
250.0	1497.4	1409.8	1571.7	1623.4	1580.2	1626.1	1812.5	1848.9	1852.6	1837.4	1938.5	1995.2	2061.2	2090.5	2087.8	2118.0	2125.1	2185.9
300.0	1999.1	1870.3	2074.7	2142.8	2088.1	2141.0	2385.1	2442.0	2433.6	2411.5	2543.9	2610.7	2697.6	2739.9	2734.6	2775.8	2774.1	2867.6
350.0	2545.7	2370.6	2620.2	2706.1	2638.5	2698.7	3005.0	3085.9	3062.1	3032.2	3198.4	3276.1	3385.5	3441.2	3432.8	3485.7	3474.6	3582.1
400.0	3132.	2906.	3203.	3308.	3226.	3294.	3666.	3772.	3732.	3694.	3896.	3985.	4119.	4188.	4176.	4241.	4220.	4353.
450.0	3754.	3472.	3819.	3944.	3848.	3923.	4365.	4496.	4439.	4392.	4631.	4735.	4892.	4975.	4960.	5038.	5006.	5165.
500.0	4405.	4065.	4465.	4611.	4498.	4581.	5096.	5253.	5198.	5122.	5401.	5517.	5701.	5798.	5779.	5870.	5828.	6014.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.02	17.65	19.02	19.37	20.07	21.07	21.67	22.44	22.90	23.34	23.80	24.28	24.76	25.20	25.78	25.99	27.83	28.41
3.0	19.24	19.98	21.35	21.69	22.41	23.55	24.23	25.15	25.67	26.18	26.69	27.22	27.81	28.29	28.91	29.11	31.08	31.70
3.5	21.34	22.18	23.55	23.88	24.62	25.88	26.63	27.68	28.25	28.84	29.40	29.97	30.65	31.17	31.82	32.01	34.12	34.77
4.0	23.36	24.29	25.67	25.98	26.73	28.12	28.94	30.11	30.72	31.36	31.97	32.58	33.35	33.91	34.59	34.78	37.01	37.70
4.5	25.33	26.35	27.73	28.03	28.79	30.29	31.17	32.45	33.11	33.81	34.46	35.11	35.96	36.55	37.26	37.44	39.80	40.52
5.0	27.26	28.38	29.76	30.04	30.81	32.41	33.36	34.74	35.44	36.19	36.89	37.57	38.50	39.12	39.86	40.04	42.52	43.27
5.5	29.17	30.37	31.76	32.03	32.80	34.51	35.51	37.00	37.73	38.54	39.27	39.99	40.98	41.64	42.42	42.59	45.18	45.97
6.0	31.06	32.35	33.74	34.00	34.78	36.59	37.65	39.23	39.99	40.85	41.62	42.37	43.44	44.13	44.94	45.11	47.82	48.64
6.5	32.94	34.32	35.71	35.96	36.74	38.65	39.77	41.44	42.24	43.14	43.96	44.74	45.87	46.59	47.43	47.59	50.42	51.28
7.0	34.82	36.29	37.68	37.91	38.70	40.70	41.88	43.64	44.47	45.42	46.27	47.08	48.28	49.03	49.91	50.06	53.01	53.89
8.0	38.59	40.22	41.62	41.82	42.61	44.80	46.09	48.02	48.92	49.96	50.89	51.75	53.08	53.88	54.83	54.97	58.16	59.10
9.0	42.37	44.17	45.57	45.75	46.54	48.92	50.31	52.41	53.36	54.49	55.49	56.41	57.86	58.72	59.73	59.87	63.29	64.29
10.0	46.18	48.15	49.55	49.71	50.49	53.05	54.55	56.81	57.82	59.04	60.11	61.09	62.65	63.57	64.64	64.77	68.42	69.49
11.0	50.04	52.17	53.58	53.71	54.48	57.22	58.83	61.25	62.30	63.61	64.75	65.78	67.46	68.43	69.58	69.70	73.59	74.71
12.0	53.93	56.24	57.65	57.75	58.52	61.44	63.15	65.72	66.83	68.22	69.43	70.52	72.31	73.33	74.55	74.66	78.79	79.97
15.0	65.95	68.77	70.18	70.20	70.93	74.39	76.41	79.44	80.69	82.34	83.75	84.99	87.11	88.29	89.73	89.81	94.66	96.03
20.0	87.12	90.83	92.25	92.12	92.75	97.11	99.66	103.42	104.91	106.96	108.72	110.22	112.89	114.30	116.14	116.17	122.27	123.94
25.0	109.80	114.44	115.86	115.67	116.05	121.35	124.44	128.93	130.63	133.10	135.22	136.98	140.18	141.82	144.09	144.07	151.47	153.45
30.0	133.98	139.61	141.01	140.54	140.85	147.12	150.77	155.99	157.90	160.79	163.27	165.29	169.03	170.89	173.63	173.54	182.31	184.62
35.0	159.63	166.29	167.66	167.02	167.12	174.39	178.61	184.57	186.70	190.02	192.87	195.15	199.45	201.52	204.75	204.60	214.79	217.44
40.0	186.7	194.5	195.8	194.9	194.8	203.1	207.9	214.7	217.0	220.7	224.0	226.5	231.4	233.7	237.4	237.2	248.9	251.9
45.0	215.2	224.1	225.4	224.3	223.9	233.3	238.7	246.2	248.7	252.9	256.6	259.4	264.8	267.3	271.6	271.3	284.5	287.9
50.0	245.0	255.1	256.3	255.0	254.4	264.9	270.9	279.2	281.9	286.6	290.6	293.7	299.8	302.4	307.3	306.9	321.7	325.5
55.0	276.2	287.4	288.6	287.1	286.1	297.8	304.5	313.5	316.5	321.6	326.1	329.5	336.1	338.9	344.4	344.0	360.4	364.5
60.0	308.6	321.1	322.3	320.5	319.2	332.0	339.4	349.2	352.4	358.0	362.9	366.6	373.8	376.8	383.0	382.4	400.6	405.1
65.0	342.3	356.2	357.2	355.2	353.5	367.6	375.6	386.3	389.7	395.7	401.1	405.0	412.9	416.1	422.9	422.3	442.2	447.1
70.0	377.2	392.4	393.4	391.1	389.0	404.4	413.1	424.6	428.2	434.8	440.6	444.8	453.4	456.7	464.2	463.4	485.2	490.5
80.0	450.6	468.7	469.5	466.6	463.7	481.6	491.9	505.0	509.1	516.6	523.4	528.3	538.1	541.8	550.7	549.7	575.3	581.4
90.0	528.7	549.7	550.3	546.8	543.0	563.7	575.4	590.3	594.8	603.4	611.2	616.6	627.9	631.9	642.3	641.1	670.6	677.6
100.0	611.1	635.3	635.6	631.5	626.7	650.2	663.5	680.3	685.1	694.8	703.6	709.8	722.5	726.8	738.8	737.3	771.0	778.9
150.0	1084.	1126.	1125.	1117.	1106.	1146.	1168.	1194.	1202.	1217.	1232.	1241.	1262.	1268.	1289.	1286.	1343.	1356.
200.0	1648.	1711.	1709.	1696.	1677.	1736.	1768.	1804.	1814.	1836.	1857.	1871.	1900.	1908.	1939.	1934.	2004.	2037.
250.0	2287.	2373.	2374.	2357.	2328.	2407.	2448.	2497.	2507.	2537.	2568.	2584.	2622.	2634.	2677.	2670.	2746.	2804.
300.0	2989.	3100.	3110.	3089.	3050.	3147.	3195.	3258.	3267.	3306.	3348.	3366.	3412.	3431.	3486.	3476.	3559.	3644.
350.0	3746.	3883.	3902.	3878.	3828.	3944.	4000.	4076.	4086.	4133.	4188.	4207.	4263.	4287.	4357.	4344.	4434.	4546.
400.0	4551.	4717.	4745.	4718.	4655.	4790.	4855.	4947.	4955.	5012.	5080.	5101.	5166.	5197.	5281.	5265.	5362.	5504.
450.0	5398.	5595.	5632.	5602.	5526.	5681.	5756.	5862.	5870.	5937.	6018.	6041.	6116.	6153.	6252.	6234.	6339.	6510.
500.0	6284.	6512.	6558.	6526.	6436.	6612.	6696.	6818.	6825.	6903.	6997.	7022.	7107.	7151.	7266.	7244.	7357.	7560.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

225 AC IONS 89

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	196.3	141.0	118.1	112.0	112.8	99.2	85.0	80.6	77.7	75.4	70.5	65.8	62.3	60.0	59.2	56.8	50.8	52.8
3.0	197.5	149.7	121.6	115.6	116.6	103.4	89.0	84.6	81.8	79.7	74.6	69.8	66.2	64.0	63.1	60.7	54.9	56.5
3.5	196.2	154.6	123.4	117.4	118.7	105.9	91.4	87.2	84.5	82.5	77.3	72.5	68.9	66.6	65.8	63.4	57.8	59.1
4.0	193.6	157.1	124.0	118.1	119.6	107.3	92.9	88.7	86.1	84.3	79.1	74.3	70.7	68.5	67.6	65.3	59.9	61.0
4.5	190.3	158.0	124.0	118.2	119.8	107.9	93.6	89.6	87.1	85.4	80.2	75.4	71.9	69.7	68.9	66.6	61.5	62.3
5.0	186.7	157.8	123.4	117.8	119.5	108.0	93.9	90.0	87.6	86.1	80.8	76.1	72.7	70.5	69.7	67.4	62.6	63.2
5.5	182.8	157.0	122.6	117.0	118.8	107.8	93.9	90.1	87.8	86.4	81.1	76.4	73.1	71.0	70.2	68.0	63.4	63.8
6.0	179.0	155.7	121.5	116.1	118.0	107.3	93.6	89.9	87.7	86.4	81.2	76.6	73.3	71.2	70.5	68.3	63.9	64.1
6.5	175.1	154.1	120.3	115.0	116.9	106.7	93.1	89.6	87.4	86.2	81.1	76.5	73.3	71.3	70.6	68.4	64.2	64.3
7.0	171.4	152.3	119.0	113.8	115.8	105.9	92.5	89.1	87.0	85.9	80.8	76.3	73.1	71.2	70.5	68.4	64.4	64.3
8.0	164.2	148.4	116.2	111.3	113.3	104.0	91.1	87.9	85.9	85.0	80.0	75.6	72.6	70.7	70.1	68.1	64.5	64.1
9.0	157.5	144.2	113.4	108.6	110.8	102.1	89.5	86.5	84.6	83.8	78.9	74.7	71.7	70.0	69.4	67.5	64.2	63.7
10.0	151.4	140.1	110.6	106.0	108.2	100.0	87.8	85.0	83.2	82.5	77.7	73.6	70.8	69.1	68.6	66.7	63.7	63.0
11.0	145.7	136.1	107.9	103.5	105.7	97.9	86.1	83.4	81.8	81.2	76.5	72.5	69.7	68.2	67.7	65.9	63.1	62.3
12.0	140.5	132.3	105.3	101.1	103.2	95.9	84.4	81.8	80.3	79.8	75.2	71.3	68.7	67.2	66.7	65.0	62.4	61.5
15.0	127.1	121.9	98.2	94.3	96.5	90.2	79.6	77.3	76.0	75.7	71.4	67.8	65.4	64.1	63.7	62.2	60.0	59.0
20.0	110.2	107.9	88.4	85.1	87.2	82.0	72.7	70.7	69.7	69.5	65.7	62.5	60.4	59.4	59.1	57.8	56.1	55.0
25.0	97.9	97.1	80.7	77.7	79.8	75.4	67.0	65.3	64.4	64.4	60.8	58.0	56.1	55.3	55.1	53.9	52.6	51.4
30.0	88.4	88.6	74.5	71.8	73.7	70.0	62.2	60.8	60.0	60.1	56.8	54.2	52.5	51.8	51.6	50.6	49.5	48.3
35.0	80.9	81.7	69.3	66.9	68.7	65.4	58.3	56.9	56.3	56.4	53.3	51.0	49.4	48.8	48.6	47.7	46.8	45.7
40.0	74.75	76.01	64.97	62.72	64.49	61.55	54.86	53.68	53.10	53.25	50.38	48.18	46.67	46.16	46.07	45.26	44.43	43.35
45.0	69.65	71.19	61.27	59.16	60.86	58.21	51.94	50.85	50.33	50.51	47.80	45.75	44.33	43.89	43.82	43.07	42.34	41.30
50.0	65.32	67.06	58.05	56.09	57.71	55.30	49.38	48.38	47.91	48.11	45.54	43.61	42.26	41.88	41.83	41.14	40.48	39.49
55.0	61.61	63.49	55.24	53.39	54.96	52.74	47.12	46.20	45.77	45.98	43.53	41.70	40.43	40.09	40.06	39.42	38.81	37.87
60.0	58.37	60.36	52.75	51.00	52.50	50.46	45.12	44.25	43.86	44.08	41.74	40.01	38.80	38.49	38.47	37.88	37.31	36.42
65.0	55.53	57.59	50.53	48.87	50.32	48.42	43.32	42.50	42.14	42.37	40.13	38.48	37.32	37.05	37.04	36.48	35.95	35.10
70.0	53.01	55.12	48.54	46.95	48.36	46.59	41.69	40.92	40.59	40.83	38.68	37.09	35.98	35.74	35.74	35.22	34.72	33.90
80.0	48.73	50.91	45.10	43.64	44.96	43.40	38.88	38.18	37.90	38.14	36.14	34.68	33.65	33.46	33.46	33.00	32.55	31.80
90.0	45.24	47.43	42.23	40.89	42.13	40.73	36.51	35.88	35.63	35.88	34.00	32.64	31.68	31.52	31.54	31.12	30.71	30.02
100.0	42.31	44.52	39.80	38.54	39.72	38.45	34.49	33.91	33.69	33.94	32.17	30.90	30.00	29.86	29.88	29.50	29.12	28.49
150.0	32.75	34.84	31.58	30.61	31.55	30.69	27.58	27.16	27.03	27.28	25.88	24.89	24.17	24.11	24.14	23.86	23.58	23.14
200.0	27.38	29.63	26.99	26.13	26.77	26.27	23.60	23.16	23.22	23.48	22.25	21.89	21.16	20.70	20.77	20.49	20.69	19.96
250.0	24.20	26.32	24.06	23.30	23.82	23.48	21.10	20.48	20.79	21.03	19.94	19.62	18.97	18.58	18.65	18.34	18.59	17.95
300.0	21.99	23.99	21.98	21.29	21.78	21.49	19.33	18.60	19.06	19.29	18.29	17.99	17.40	17.06	17.13	16.85	17.08	16.51
350.0	20.37	22.27	20.44	19.79	20.26	20.00	18.00	17.34	17.76	17.98	17.06	16.77	16.23	15.92	15.99	15.73	15.94	15.42
400.0	19.12	20.95	19.24	18.64	19.08	18.85	16.97	16.36	16.75	16.97	16.10	15.83	15.32	15.04	15.11	14.87	15.06	14.57
450.0	18.14	19.91	18.30	17.72	18.15	17.94	16.15	15.59	15.95	16.16	15.34	15.07	14.59	14.33	14.40	14.17	14.36	13.90
500.0	17.34	19.06	17.53	16.97	17.39	17.19	15.48	14.96	15.30	15.50	14.72	14.46	14.00	13.76	13.82	13.61	13.79	13.36

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	49.25	46.91	46.89	47.21	46.74	44.02	42.64	40.22	39.34	38.30	37.55	36.92	35.58	35.12	34.74	34.82	33.39	33.00
3.0	52.88	50.41	50.38	50.71	50.30	47.49	46.04	43.59	42.71	41.62	40.84	40.19	38.81	38.30	37.86	37.95	36.34	35.92
3.5	55.44	52.88	52.84	53.19	52.83	49.99	48.50	46.05	45.18	44.07	43.26	42.60	41.21	40.66	40.18	40.28	38.53	38.08
4.0	57.26	54.65	54.60	54.95	54.66	51.79	50.29	47.86	47.00	45.89	45.07	44.40	43.01	42.44	41.93	42.02	40.17	39.70
4.5	58.54	55.91	55.85	56.21	55.96	53.11	51.60	49.20	48.36	47.25	46.42	45.75	44.37	43.79	43.25	43.34	41.41	40.92
5.0	59.44	56.79	56.73	57.10	56.89	54.05	52.54	50.18	49.36	48.26	47.43	46.77	45.39	44.80	44.24	44.33	42.35	41.85
5.5	60.05	57.40	57.33	57.70	57.54	54.72	53.22	50.90	50.10	49.01	48.18	47.52	46.16	45.57	44.99	45.08	43.05	42.54
6.0	60.43	57.78	57.72	58.09	57.97	55.17	53.68	51.41	50.63	49.55	48.73	48.08	46.74	46.15	45.55	45.64	43.57	43.06
6.5	60.65	58.01	57.94	58.31	58.22	55.47	53.99	51.76	51.00	49.93	49.11	48.47	47.15	46.56	45.95	46.05	43.95	43.44
7.0	60.73	58.10	58.04	58.41	58.35	55.63	54.16	51.98	51.25	50.19	49.38	48.74	47.44	46.86	46.24	46.33	44.22	43.70
8.0	60.61	58.02	57.95	58.33	58.32	55.67	54.23	52.14	51.44	50.41	49.62	49.00	47.75	47.17	46.53	46.63	44.50	43.98
9.0	60.22	57.67	57.61	57.99	58.03	55.44	54.04	52.03	51.37	50.37	49.59	49.00	47.78	47.22	46.57	46.66	44.53	44.01
10.0	59.67	57.17	57.12	57.49	57.57	55.06	53.69	51.75	51.12	50.15	49.39	48.81	47.63	47.10	46.43	46.52	44.40	43.89
11.0	59.02	56.56	56.52	56.89	57.00	54.55	53.22	51.35	50.76	49.81	49.07	48.51	47.36	46.85	46.18	46.27	44.15	43.65
12.0	58.31	55.90	55.85	56.22	56.37	53.98	52.68	50.88	50.31	49.39	48.66	48.12	47.01	46.51	45.84	45.93	43.83	43.33
15.0	56.02	53.74	53.71	54.07	54.28	52.06	50.85	49.22	48.73	47.88	47.20	46.70	45.68	45.23	44.56	44.65	42.62	42.15
20.0	52.28	50.19	50.19	50.53	50.81	48.82	47.73	46.32	45.91	45.16	44.55	44.11	43.21	42.84	42.18	42.26	40.36	39.92
25.0	48.95	47.02	47.04	47.36	47.67	45.86	44.88	43.63	43.28	42.61	42.04	41.65	40.85	40.53	39.89	39.97	38.19	37.79
30.0	46.05	44.26	44.29	44.60	44.93	43.26	42.36	41.24	40.93	40.32	39.80	39.44	38.71	38.44	37.83	37.90	36.23	35.86
35.0	43.54	41.86	41.90	42.20	42.54	40.99	40.15	39.13	38.85	38.29	37.81	37.48	36.81	36.57	35.98	36.06	34.48	34.13
40.0	41.34	39.76	39.81	40.09	40.44	38.99	38.20	37.27	37.01	36.50	36.04	35.74	35.11	34.91	34.34	34.42	32.92	32.59
45.0	39.41	37.91	37.96	38.24	38.59	37.22	36.48	35.61	35.38	34.90	34.47	34.19	33.60	33.42	32.87	32.95	31.53	31.22
50.0	37.69	36.26	36.32	36.59	36.94	35.64	34.95	34.13	33.92	33.47	33.07	32.80	32.25	32.08	31.56	31.63	30.27	29.98
55.0	36.15	34.79	34.86	35.11	35.46	34.23	33.57	32.81	32.61	32.18	31.80	31.55	31.03	30.88	30.37	30.44	29.14	28.86
60.0	34.77	33.47	33.53	33.78	34.13	32.95	32.33	31.61	31.42	31.02	30.65	30.42	29.92	29.79	29.30	29.37	28.12	27.85
65.0	33.52	32.27	32.34	32.58	32.92	31.80	31.20	30.52	30.35	29.96	29.61	29.39	28.91	28.79	28.32	28.38	27.18	26.93
70.0	32.38	31.18	31.25	31.48	31.82	30.74	30.17	29.52	29.36	28.99	28.66	28.44	27.99	27.88	27.42	27.49	26.33	26.08
80.0	30.39	29.26	29.34	29.56	29.89	28.89	28.36	27.77	27.62	27.29	26.98	26.78	26.37	26.27	25.83	25.90	24.82	24.59
90.0	28.69	27.63	27.71	27.92	28.25	27.30	26.81	26.27	26.14	25.83	25.54	25.36	24.97	24.88	24.47	24.54	23.52	23.30
100.0	27.23	26.23	26.30	26.51	26.82	25.94	25.48	24.98	24.86	24.57	24.29	24.12	23.76	23.68	23.30	23.36	22.39	22.19
150.0	22.13	21.32	21.40	21.56	21.85	21.15	20.79	20.42	20.34	20.12	19.90	19.77	19.50	19.44	19.13	19.18	18.40	18.24
200.0	19.09	18.43	18.42	18.56	18.83	18.24	17.94	17.64	17.58	17.40	17.22	17.11	16.88	16.83	16.57	16.62	16.39	16.85
250.0	17.18	16.59	16.39	16.53	16.77	16.29	16.13	15.84	15.84	15.66	15.43	15.40	15.23	15.11	14.87	14.92	14.80	14.33
300.0	15.80	15.26	15.09	15.14	15.36	15.00	14.85	14.59	14.60	14.44	14.22	14.20	14.04	13.94	13.72	13.76	13.66	13.23
350.0	14.76	14.26	14.10	14.15	14.36	14.03	13.89	13.65	13.66	13.51	13.31	13.29	13.15	13.05	12.85	12.89	12.79	12.40
400.0	13.96	13.48	13.34	13.38	13.58	13.27	13.14	12.92	12.93	12.79	12.60	12.58	12.45	12.36	12.17	12.21	12.11	11.75
450.0	13.31	12.86	12.73	12.77	12.96	12.67	12.54	12.33	12.34	12.21	12.04	12.01	11.89	11.81	11.63	11.66	11.57	11.22
500.0	12.79	12.35	12.23	12.27	12.46	12.17	12.05	11.85	11.87	11.74	11.57	11.55	11.44	11.36	11.18	11.22	11.12	10.80

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

225 AC IONS 89

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.510	6.210	8.775	8.750	8.590	10.227	11.050	11.604	12.010	12.460	12.740	13.650	14.110	14.690	14.910	15.147	15.598	16.000
3.0	7.081	6.982	9.713	9.737	9.569	11.336	12.341	12.963	13.418	13.909	14.288	15.306	15.857	16.501	16.747	17.057	17.724	18.056
3.5	7.652	7.720	10.630	10.702	10.525	12.410	13.587	14.271	14.769	15.295	15.767	16.885	17.520	18.222	18.491	18.868	19.719	19.999
4.0	8.228	8.441	11.539	11.657	11.468	13.465	14.807	15.549	16.087	16.643	17.205	18.417	19.130	19.886	20.176	20.615	21.628	21.871
4.5	8.814	9.155	12.446	12.609	12.408	14.510	16.013	16.810	17.385	17.968	18.617	19.920	20.707	21.513	21.823	22.321	23.480	23.695
5.0	9.411	9.867	13.355	13.562	13.348	15.552	17.212	18.062	18.673	19.279	20.015	21.405	22.263	23.118	23.445	24.000	25.292	25.488
5.5	10.020	10.582	14.270	14.520	14.292	16.594	18.410	19.310	19.955	20.584	21.404	22.879	23.806	24.708	25.053	25.661	27.077	27.260
6.0	10.642	11.301	15.191	15.485	15.242	17.640	19.611	20.560	21.238	21.886	22.790	24.349	25.343	26.290	26.652	27.313	28.844	29.019
6.5	11.277	12.027	16.122	16.459	16.200	18.691	20.816	21.813	22.522	23.190	24.176	25.819	26.879	27.869	28.247	28.959	30.600	30.771
7.0	11.927	12.761	17.062	17.442	17.167	19.750	22.027	23.071	23.812	24.497	25.566	27.291	28.416	29.449	29.842	30.604	32.348	32.519
8.0	13.27	14.26	18.98	19.44	19.13	21.89	24.48	25.61	26.41	27.13	28.36	30.25	31.50	32.62	33.04	33.90	35.84	36.02
9.0	14.67	15.80	20.94	21.49	21.14	24.08	26.97	28.19	29.05	29.79	31.20	33.24	34.62	35.82	36.27	37.22	39.34	39.54
10.0	16.12	17.38	22.94	23.58	23.19	26.30	29.51	30.82	31.73	32.50	34.07	36.28	37.78	39.06	39.53	40.57	42.85	43.09
11.0	17.64	19.01	25.00	25.73	25.30	28.58	32.09	33.49	34.46	35.25	36.99	39.36	40.98	42.33	42.83	43.97	46.40	46.68
12.0	19.21	20.68	27.11	27.93	27.45	30.90	34.73	36.21	37.24	38.05	39.96	42.48	44.23	45.65	46.18	47.40	49.99	50.31
15.0	24.27	26.00	33.76	34.85	34.22	38.16	42.96	44.70	45.88	46.74	49.17	52.19	54.30	55.93	56.53	58.02	61.02	61.51
20.0	33.81	36.83	45.85	47.43	46.50	51.26	57.77	59.93	61.36	62.26	65.62	69.47	72.22	74.18	74.86	76.79	80.40	81.27
25.0	44.66	48.84	59.18	61.28	60.00	65.57	73.92	76.50	78.17	79.08	83.43	88.16	91.56	93.83	94.60	96.96	101.11	102.44
30.0	56.78	58.98	73.71	76.35	74.69	81.07	91.36	94.37	96.28	97.19	102.59	108.23	112.31	114.88	115.72	118.51	123.16	125.01
35.0	70.10	72.21	89.38	92.60	90.51	97.71	110.06	113.51	115.65	116.53	123.04	129.64	134.43	137.28	138.18	141.41	146.55	148.96
40.0	84.58	86.50	106.16	109.99	107.42	115.45	129.97	133.87	136.24	137.07	144.76	152.35	157.89	161.01	161.96	165.62	171.23	174.26
45.0	100.18	101.81	124.00	128.46	125.38	134.26	151.06	155.41	158.02	158.77	167.69	176.32	182.63	186.01	187.01	191.12	197.18	200.86
50.0	116.87	118.10	142.87	148.00	144.37	154.09	173.28	178.10	180.94	181.60	191.82	201.52	208.63	212.26	213.29	217.85	224.36	228.72
55.0	134.62	135.35	162.75	168.57	164.36	174.93	196.61	201.90	204.97	205.53	217.09	227.91	235.86	239.73	240.79	245.79	252.76	257.82
60.0	153.39	153.53	183.60	190.14	185.31	196.75	221.02	226.80	230.09	230.53	243.49	255.46	264.27	268.37	269.45	274.91	282.33	288.12
65.0	173.2	172.6	205.4	212.7	207.2	219.5	246.5	252.7	256.3	256.6	271.0	284.1	293.8	298.2	299.3	305.2	313.0	319.6
70.0	193.9	192.6	228.1	236.2	230.0	243.2	273.0	279.7	283.5	283.6	299.5	313.9	324.6	329.1	330.2	336.6	344.9	352.2
80.0	238.2	235.1	276.3	285.9	278.3	293.3	328.9	336.7	340.9	340.7	359.8	376.7	389.3	394.2	395.3	402.6	411.9	420.6
90.0	286.2	280.9	327.8	339.2	330.1	346.8	388.7	397.5	402.2	401.5	424.0	443.6	458.2	463.5	464.6	472.9	483.1	493.7
100.0	337.7	329.9	382.8	395.9	385.1	403.7	452.1	462.1	467.1	466.1	492.1	514.5	531.2	536.9	538.0	547.2	558.4	570.6
150.0	643.4	618.7	703.2	726.6	706.0	734.3	820.2	836.2	843.4	839.0	885.4	923.7	952.7	959.8	960.4	974.6	991.3	1012.4
200.0	1021.4	971.1	1091.0	1127.0	1095.1	1133.0	1263.8	1286.9	1295.2	1286.2	1367.0	1403.8	1449.5	1466.1	1465.7	1485.5	1500.1	1538.7
250.0	1459.9	1375.2	1533.9	1584.4	1542.3	1587.3	1769.4	1805.0	1808.7	1793.9	1892.6	1948.1	2012.6	2041.3	2038.7	2068.3	2075.3	2134.7
300.0	1948.6	1823.9	2024.1	2090.6	2037.2	2089.2	2327.5	2383.1	2375.0	2353.5	2482.8	2548.0	2633.0	2674.3	2669.2	2709.5	2707.9	2789.5
350.0	2481.0	2311.3	2555.6	2639.4	2573.6	2632.6	2931.5	3010.5	2987.4	2958.4	3120.5	3196.5	3303.3	3357.8	3349.7	3401.3	3390.6	3496.5
400.0	3052.	2833.	3124.	3226.	3146.	3213.	3576.	3679.	3640.	3603.	3800.	3888.	4018.	4085.	4074.	4138.	4117.	4247.
450.0	3657.	3384.	3724.	3845.	3751.	3825.	4256.	4384.	4329.	4283.	4517.	4618.	4771.	4852.	4837.	4913.	4883.	5038.
500.0	4291.	3962.	4352.	4495.	4385.	4466.	4968.	5121.	5050.	4994.	5268.	5379.	5559.	5654.	5635.	5724.	5683.	5864.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.79	17.41	18.77	19.12	19.81	20.80	21.39	22.15	22.60	23.03	23.48	23.95	24.43	24.86	25.43	25.64	27.45	28.03
3.0	18.99	19.72	21.08	21.41	22.13	23.25	23.92	24.83	25.33	25.84	26.35	26.87	27.45	27.92	28.52	28.72	30.67	31.29
3.5	21.06	21.89	23.26	23.58	24.31	25.56	26.30	27.33	27.89	28.47	29.02	29.58	30.26	30.77	31.40	31.60	33.68	34.33
4.0	23.06	23.98	25.35	25.66	26.40	27.77	28.58	29.73	30.33	30.96	31.56	32.17	32.92	33.47	34.14	34.33	36.53	37.22
4.5	25.00	26.02	27.39	27.68	28.43	29.91	30.78	32.05	32.69	33.38	34.02	34.66	35.50	36.08	36.78	36.98	39.29	40.01
5.0	26.91	28.01	29.38	29.66	30.43	32.01	32.94	34.31	34.99	35.73	36.42	37.09	38.00	38.62	39.35	39.53	41.97	42.72
5.5	28.79	29.98	31.35	31.62	32.39	34.08	35.07	36.53	37.25	38.05	38.77	39.48	40.46	41.11	41.87	42.04	44.61	45.39
6.0	30.66	31.94	33.31	33.57	34.34	36.13	37.17	38.73	39.48	40.33	41.09	41.83	42.88	43.56	44.36	44.52	47.20	48.02
6.5	32.51	33.88	35.25	35.50	36.27	38.16	39.26	40.91	41.70	42.59	43.39	44.16	45.28	45.98	46.82	46.98	49.77	50.62
7.0	34.37	35.82	37.19	37.43	38.20	40.18	41.34	43.08	43.90	44.84	45.67	46.47	47.66	48.39	49.26	49.41	52.32	53.20
8.0	38.08	39.69	41.07	41.28	42.06	44.23	45.49	47.40	48.28	49.31	50.22	51.07	52.38	53.18	54.10	54.25	57.39	58.33
9.0	41.80	43.58	44.97	45.15	45.93	48.27	49.65	51.72	52.65	53.77	54.75	55.66	57.09	57.94	58.93	59.07	62.45	63.44
10.0	45.55	47.50	48.89	49.04	49.82	52.35	53.82	56.05	57.04	58.25	59.30	60.26	61.80	62.71	63.77	63.90	67.51	68.56
11.0	49.34	51.45	52.85	52.98	53.74	56.45	58.03	60.42	61.46	62.75	63.87	64.89	66.54	67.50	68.63	68.75	72.59	73.70
12.0	53.18	55.45	56.85	56.96	57.71	60.60	62.28	64.82	65.91	67.28	68.47	69.54	71.31	72.32	73.52	73.63	77.70	78.87
15.0	64.98	67.77	69.17	69.20	69.91	73.33	75.32	78.30	79.54	81.16	82.55	83.77	85.87	87.03	88.46	88.53	93.31	94.66
20.0	85.78	89.43	90.84	90.72	91.34	95.65	98.16	101.86	103.32	105.35	107.08	108.56	111.18	112.58	114.39	114.42	120.43	122.08
25.0	108.03	112.60	114.01	113.73	114.21	119.43	122.48	126.90	128.57	131.00	133.08	134.81	137.97	139.59	141.82	141.80	149.09	151.05
30.0	131.74	137.28	138.67	138.22	138.53	144.70	148.29	153.43	155.32	158.16	160.60	162.58	166.27	168.10	170.79	170.71	179.34	181.62
35.0	156.88	163.43	164.80	164.17	164.27	171.43	175.58	181.45	183.54	186.80	189.61	191.85	196.09	198.12	201.30	201.15	211.18	213.79
40.0	183.4	191.0	192.4	191.5	191.4	199.6	204.3	210.9	213.2	216.9	220.1	222.6	227.4	229.6	233.3	233.1	244.6	247.5
45.0	211.3	220.0	221.3	220.3	219.9	229.1	234.5	241.8	244.3	248.4	252.0	254.8	260.2	262.6	266.8	266.5	279.5	282.8
50.0	240.5	250.4	251.6	250.4	249.7	260.0	266.0	274.1	276.8	281.4	285.4	288.4	294.3	296.9	301.7	301.4	315.9	319.6
55.0	271.0	282.0	283.2	281.8	280.8	292.2	298.8	307.7	310.6	315.7	320.1	323.4	329.9	332.7	338.1	337.6	353.8	357.9
60.0	302.7	315.0	316.2	314.4	313.2	325.8	333.0	342.7	345.8	351.3	356.1	359.7	366.8	369.8	375.8	375.3	393.1	397.5
65.0	335.7	349.3	350.3	348.3	346.7	360.5	368.4	378.9	382.2	388.2	393.5	397.3	405.1	408.2	414.9	414.2	433.8	438.6
70.0	369.8	384.7	385.7	383.5	381.5	396.5	405.1	416.4	419.9	426.4	432.1	436.2	444.6	447.9	455.3	454.5	475.9	481.1
80.0	441.6	459.3	460.1	457.3	454.5	472.1	482.1	495.0	499.0	506.4	513.1	517.8	527.5	531.1	539.9	538.9	564.0	570.0
90.0	517.8	538.5	539.1	535.7	532.0	552.2	563.7	578.4	582.8	591.2	598.8	604.2	615.3	619.2	629.4	628.2	657.2	664.0
100.0	598.4	622.1	622.5	618.4	613.7	636.8	649.9	666.3	671.1	680.6	689.2	695.2	707.7	711.9	723.7	722.3	755.3	763.0
150.0	1060.	1102.	1101.	1093.	1082.	1121.	1142.	1168.	1175.	1190.	1205.	1214.	1234.	1240.	1261.	1258.	1314.	1326.
200.0	1611.	1672.	1670.	1658.	1639.	1696.	1727.	1763.	1773.	1794.	1815.	1828.	1857.	1865.	1895.	1890.	1959.	1991.
250.0	2233.	2318.	2319.	2302.	2274.	2351.	2391.	2439.	2449.	2478.	2508.	2524.	2561.	2573.	2615.	2608.	2683.	2740.
300.0	2918.	3026.	3036.	3015.	2977.	3072.	3120.	3180.	3190.	3227.	3269.	3286.	3331.	3350.	3404.	3394.	3475.	3558.
350.0	3655.	3790.	3808.	3785.	3736.	3849.	3904.	3978.	3987.	4034.	4087.	4106.	4160.	4184.	4252.	4240.	4328.	4437.
400.0	4440.	4602.	4629.	4603.	4542.	4674.	4737.	4826.	4835.	4891.	4966.	4977.	5041.	5071.	5153.	5138.	5232.	5371.
450.0	5266.	5457.	5493.	5465.	5390.	5542.	5614.	5718.	5726.	5792.	5870.	5893.	5966.	6003.	6099.	6081.	6184.	6351.
500.0	6128.	6351.	6396.	6364.	6276.	6448.	6530.	6649.	6656.	6732.	6824.	6849.	6931.	6974.	7087.	7065.	7176.	7374.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{232}_{90}$TH IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	198.2	141.6	118.9	112.8	113.6	99.8	85.5	81.1	78.2	75.8	70.9	66.2	62.6	60.4	59.5	57.1	51.0	53.0
3.0	199.6	150.7	122.6	116.5	117.5	104.1	89.6	85.2	82.4	80.2	75.1	70.3	66.7	64.4	63.5	61.1	55.2	56.9
3.5	198.5	155.8	124.5	118.4	119.7	106.7	92.1	87.9	85.1	83.1	77.9	73.0	69.4	67.1	66.3	63.9	58.2	59.6
4.0	196.0	158.4	125.2	119.2	120.7	108.2	93.7	89.5	86.8	85.0	79.7	74.9	71.3	69.0	68.2	65.8	60.4	61.5
4.5	192.8	159.5	125.2	119.4	121.0	108.9	94.5	90.4	87.9	86.2	80.9	76.0	72.5	70.3	69.5	67.1	62.0	62.8
5.0	189.1	159.5	124.7	119.0	120.7	109.1	94.8	90.9	88.4	86.9	81.6	76.8	73.3	71.1	70.3	68.0	63.2	63.7
5.5	185.3	158.7	123.9	118.3	120.1	108.9	94.8	91.0	88.6	87.2	81.9	77.2	73.8	71.6	70.9	68.6	64.0	64.3
6.0	181.5	157.5	122.8	117.4	119.2	108.4	94.5	90.9	88.6	87.3	82.0	77.3	74.0	71.9	71.2	68.9	64.5	64.7
6.5	177.6	155.9	121.6	116.3	118.2	107.8	94.1	90.5	88.3	87.1	81.9	77.3	74.0	72.0	71.3	69.1	64.9	64.9
7.0	173.9	154.2	120.4	115.1	117.1	107.0	93.5	90.1	87.9	86.8	81.6	77.1	73.9	71.9	71.2	69.1	65.1	65.0
8.0	166.7	150.3	117.6	112.6	114.7	105.3	92.2	88.9	86.9	85.9	80.9	76.5	73.4	71.5	70.9	68.8	65.1	64.8
9.0	160.0	146.2	114.8	110.0	112.1	103.3	90.6	87.5	85.6	84.8	79.8	75.6	72.6	70.8	70.2	68.2	64.9	64.4
10.0	153.8	142.1	112.0	107.4	109.6	101.2	88.9	86.0	84.2	83.5	78.7	74.5	71.6	69.9	69.4	67.5	64.4	63.8
11.0	148.0	138.1	109.3	104.9	107.1	99.2	87.2	84.4	82.8	82.2	77.4	73.4	70.6	69.0	68.5	66.7	63.8	63.1
12.0	142.8	134.2	106.7	102.4	104.6	97.2	85.5	82.9	81.3	80.8	76.1	72.2	69.5	68.0	67.5	65.8	63.1	62.3
15.0	129.2	123.8	99.6	95.7	97.9	91.4	80.7	78.4	77.0	76.7	72.3	68.8	66.3	65.0	64.6	63.0	60.8	59.8
20.0	112.2	109.7	89.8	86.4	88.6	83.2	73.7	71.8	70.7	70.5	66.6	63.4	61.3	60.2	59.9	58.6	56.9	55.8
25.0	99.6	98.8	82.0	79.0	81.0	76.6	68.0	66.3	65.4	65.4	61.8	58.9	56.9	56.1	55.9	54.7	53.4	52.2
30.0	90.0	90.2	75.7	73.0	74.9	71.1	63.2	61.7	61.0	61.0	57.7	55.1	53.3	52.6	52.4	51.4	50.3	49.1
35.0	82.4	83.2	70.5	68.0	69.9	66.5	59.2	57.9	57.2	57.3	54.2	51.8	50.1	49.5	49.4	48.5	47.5	46.4
40.0	76.18	77.39	66.09	63.79	65.59	62.58	55.78	54.58	53.98	54.13	51.21	48.98	47.44	46.92	46.83	46.00	45.16	44.06
45.0	71.00	72.51	62.34	60.20	61.92	59.21	52.82	51.72	51.19	51.37	48.61	46.52	45.07	44.62	44.55	43.79	43.04	41.99
50.0	66.60	68.32	59.09	57.08	58.73	56.27	50.24	49.22	48.74	48.94	46.32	44.35	42.99	42.59	42.54	41.84	41.16	40.16
55.0	62.82	64.69	56.23	54.35	55.94	53.67	47.96	47.01	46.57	46.79	44.30	42.43	41.14	40.79	40.75	40.11	39.48	38.52
60.0	59.53	61.51	53.71	51.93	53.46	51.37	45.92	45.04	44.64	44.86	42.48	40.71	39.48	39.17	39.15	38.54	37.97	37.05
65.0	56.64	58.70	51.46	49.77	51.25	49.30	44.10	43.27	42.90	43.14	40.86	39.17	37.99	37.71	37.70	37.13	36.59	35.72
70.0	54.08	56.20	49.44	47.82	49.25	47.44	42.46	41.67	41.33	41.57	39.38	37.77	36.63	36.39	36.38	35.85	35.34	34.51
80.0	49.73	51.91	45.96	44.47	45.81	44.21	39.60	38.89	38.60	38.85	36.81	35.32	34.27	34.07	34.08	33.60	33.15	32.39
90.0	46.16	48.38	43.05	41.67	42.94	41.50	37.20	36.56	36.30	36.55	34.65	33.26	32.28	32.11	32.13	31.70	31.28	30.58
100.0	43.19	45.41	40.58	39.29	40.49	39.19	35.15	34.56	34.33	34.59	32.79	31.49	30.57	30.43	30.45	30.06	29.67	29.03
150.0	33.44	35.57	32.22	31.23	32.19	31.31	28.14	27.71	27.57	27.83	26.40	25.39	24.65	24.59	24.62	24.35	24.04	23.60
200.0	27.97	30.26	27.55	26.67	27.33	26.82	24.09	23.64	23.70	23.96	22.71	22.34	21.60	21.13	21.20	20.91	21.12	20.36
250.0	24.73	26.88	24.57	23.79	24.33	23.97	21.55	20.92	21.23	21.48	20.36	20.03	19.37	18.97	19.04	18.72	18.98	18.32
300.0	22.48	24.51	22.45	21.75	22.25	21.95	19.74	18.99	19.46	19.70	18.68	18.38	17.77	17.43	17.50	17.21	17.44	16.86
350.0	20.81	22.76	20.88	20.22	20.70	20.43	18.39	17.71	18.14	18.37	17.42	17.13	16.58	16.26	16.34	16.07	16.29	15.75
400.0	19.54	21.41	19.66	19.04	19.50	19.26	17.34	16.72	17.11	17.34	16.45	16.17	15.65	15.36	15.43	15.19	15.39	14.89
450.0	18.54	20.34	18.70	18.10	18.55	18.33	16.50	15.93	16.30	16.51	15.67	15.40	14.91	14.64	14.71	14.48	14.67	14.20
500.0	17.73	19.48	17.91	17.34	17.77	17.57	15.82	15.29	15.63	15.84	15.04	14.77	14.30	14.06	14.13	13.91	14.09	13.64

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	49.50	47.15	47.13	47.44	46.97	44.24	42.85	40.42	39.54	38.49	37.74	37.10	35.76	35.29	34.91	34.99	33.55	33.17
3.0	53.20	50.72	50.68	51.02	50.60	47.78	46.32	43.85	42.96	41.87	41.08	40.43	39.04	38.53	38.09	38.18	36.55	36.13
3.5	55.83	53.25	53.21	53.55	53.20	50.33	48.83	46.36	45.48	44.37	43.56	42.89	41.49	40.94	40.46	40.55	38.79	38.34
4.0	57.70	55.07	55.02	55.37	55.07	52.18	50.67	48.22	47.35	46.23	45.41	44.73	43.33	42.76	42.24	42.33	40.47	39.99
4.5	59.03	56.37	56.31	56.67	56.42	53.54	52.01	49.59	48.75	47.63	46.79	46.12	44.72	44.14	43.59	43.69	41.74	41.25
5.0	59.96	57.29	57.22	57.59	57.38	54.51	52.99	50.61	49.79	48.67	47.83	47.16	45.78	45.18	44.62	44.71	42.71	42.20
5.5	60.60	57.92	57.85	58.22	58.06	55.21	53.70	51.35	50.55	49.44	48.61	47.95	46.58	45.98	45.39	45.48	43.43	42.92
6.0	61.01	58.33	58.26	58.64	58.51	55.69	54.19	51.89	51.11	50.01	49.18	48.52	47.17	46.57	45.97	46.06	43.98	43.46
6.5	61.24	58.58	58.51	58.88	58.79	56.00	54.51	52.26	51.50	50.41	49.59	48.94	47.61	47.01	46.39	46.49	44.38	43.85
7.0	61.35	58.69	58.62	59.00	58.94	56.18	54.70	52.50	51.76	50.69	49.87	49.23	47.91	47.32	46.70	46.79	44.66	44.13
8.0	61.25	58.63	58.57	58.95	58.94	56.25	54.81	52.68	51.98	50.94	50.14	49.52	48.24	47.67	47.02	47.11	44.96	44.43
9.0	60.89	58.31	58.25	58.63	58.67	56.05	54.64	52.60	51.94	50.92	50.13	49.53	48.30	47.74	47.08	47.17	45.01	44.49
10.0	60.36	57.83	57.77	58.15	58.23	55.68	54.30	52.34	51.70	50.72	49.95	49.36	48.17	47.63	46.96	47.05	44.90	44.38
11.0	59.73	57.24	57.18	57.58	57.67	55.19	53.84	51.95	51.35	50.40	49.64	49.07	47.92	47.39	46.72	46.80	44.66	44.15
12.0	59.02	56.58	56.53	56.90	57.05	54.63	53.31	51.49	50.91	49.99	49.25	48.70	47.58	47.07	46.39	46.48	44.35	43.85
15.0	56.75	54.44	54.41	54.77	54.98	52.73	51.50	49.85	49.35	48.49	47.80	47.30	46.27	45.81	45.13	45.22	43.16	42.68
20.0	53.01	50.89	50.89	51.23	51.51	49.49	48.39	46.96	46.54	45.78	45.16	44.72	43.81	43.42	42.76	42.84	40.91	40.47
25.0	49.67	47.71	47.73	48.06	48.37	46.53	45.53	44.27	43.91	43.22	42.65	42.26	41.44	41.11	40.47	40.55	38.74	38.33
30.0	46.76	44.94	44.97	45.28	45.62	43.92	43.00	41.86	41.55	40.93	40.40	40.04	39.29	39.02	38.40	38.48	36.78	36.39
35.0	44.23	42.52	42.56	42.86	43.21	41.63	40.78	39.74	39.46	38.89	38.40	38.07	37.38	37.14	36.54	36.62	35.02	34.66
40.0	42.01	40.40	40.45	40.74	41.09	39.62	38.82	37.87	37.61	37.08	36.62	36.32	35.68	35.46	34.89	34.97	33.45	33.11
45.0	40.06	38.53	38.59	38.87	39.22	37.83	37.08	36.20	35.96	35.47	35.04	34.75	34.15	33.97	33.41	33.49	32.04	31.72
50.0	38.33	36.87	36.93	37.20	37.56	36.24	35.53	34.71	34.49	34.03	33.62	33.35	32.79	32.62	32.09	32.16	30.78	30.48
55.0	36.78	35.39	35.45	35.71	36.07	34.81	34.14	33.37	33.17	32.73	32.34	32.09	31.56	31.40	30.89	30.96	29.64	29.35
60.0	35.38	34.05	34.12	34.37	34.72	33.52	32.89	32.15	31.97	31.56	31.18	30.94	30.44	30.30	29.80	29.87	28.60	28.33
65.0	34.12	32.84	32.91	33.15	33.60	32.36	31.75	31.05	30.88	30.49	30.13	29.90	29.42	29.29	28.81	28.88	27.66	27.40
70.0	32.96	31.73	31.81	32.04	32.39	31.29	30.71	30.05	29.88	29.51	29.17	28.95	28.49	28.37	27.90	27.97	26.79	26.54
80.0	30.94	29.80	29.87	30.10	30.44	29.41	28.87	28.27	28.13	27.78	27.46	27.27	26.84	26.74	26.30	26.37	25.26	25.03
90.0	29.23	28.15	28.22	28.44	28.77	27.81	27.31	26.76	26.62	26.31	26.01	25.82	25.43	25.34	24.92	24.99	23.95	23.73
100.0	27.74	26.72	26.80	27.00	27.33	26.43	25.96	25.44	25.32	25.03	24.75	24.57	24.21	24.13	23.73	23.79	22.81	22.60
150.0	22.57	21.75	21.82	21.99	22.28	21.57	21.20	20.83	20.74	20.52	20.30	20.16	19.88	19.82	19.51	19.56	18.76	18.60
200.0	19.48	18.81	18.79	18.94	19.21	18.61	18.30	18.00	17.94	17.76	17.57	17.46	17.23	17.17	16.91	16.95	16.72	16.17
250.0	17.54	16.93	16.74	16.87	17.12	16.63	16.46	16.17	16.17	15.99	15.75	15.72	15.54	15.42	15.18	15.23	15.11	14.63
300.0	16.14	15.58	15.40	15.46	15.68	15.32	15.17	14.90	14.91	14.74	14.52	14.50	14.34	14.23	14.01	14.05	13.95	13.51
350.0	15.08	14.56	14.40	14.45	14.67	14.33	14.19	13.94	13.95	13.80	13.60	13.57	13.43	13.33	13.12	13.17	13.06	12.66
400.0	14.26	13.77	13.63	13.67	13.88	13.56	13.42	13.20	13.21	13.06	12.88	12.85	12.72	12.63	12.43	12.47	12.37	12.00
450.0	13.60	13.14	13.00	13.05	13.24	12.94	12.81	12.60	12.61	12.47	12.30	12.27	12.15	12.07	11.88	11.91	11.82	11.47
500.0	13.06	12.62	12.50	12.54	12.73	12.44	12.31	12.11	12.12	11.99	11.83	11.80	11.68	11.61	11.43	11.46	11.36	11.03

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM — $^{232}_{90}$TH IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.660	6.350	8.963	8.940	8.780	10.452	11.290	11.856	12.270	12.730	13.020	13.950	14.420	15.007	15.230	15.471	15.931	16.340
3.0	7.242	7.142	9.923	9.950	9.782	11.587	12.612	13.248	13.712	14.214	14.606	15.647	16.211	16.864	17.113	17.430	18.111	18.448
3.5	7.824	7.898	10.861	10.937	10.759	12.686	13.887	14.587	15.096	15.633	16.121	17.264	17.913	18.626	18.899	19.284	20.154	20.438
4.0	8.412	8.635	11.789	11.913	11.724	13.765	15.135	15.894	16.444	17.012	17.592	18.831	19.561	20.329	20.623	21.072	22.108	22.354
4.5	9.009	9.365	12.715	12.885	12.683	14.833	16.368	17.183	17.771	18.367	19.036	20.368	21.173	21.994	22.308	22.817	24.002	24.220
5.0	9.616	10.092	13.643	13.858	13.643	15.897	17.593	18.462	19.086	19.707	20.463	21.885	22.763	23.634	23.967	24.533	25.855	26.053
5.5	10.236	10.821	14.576	14.835	14.607	16.961	18.816	19.737	20.396	21.040	21.882	23.392	24.340	25.258	25.609	26.231	27.679	27.864
6.0	10.868	11.554	15.517	15.820	15.576	18.028	20.041	21.012	21.705	22.369	23.297	24.893	25.910	26.874	27.242	27.918	29.485	29.660
6.5	11.515	12.294	16.466	16.813	16.553	19.101	21.271	22.291	23.016	23.700	24.713	26.393	27.477	28.487	28.871	29.599	31.277	31.449
7.0	12.175	13.042	17.424	17.815	17.539	20.181	22.507	23.575	24.332	25.033	26.131	27.895	29.046	30.099	30.499	31.278	33.062	33.235
8.0	13.54	14.57	19.37	19.85	19.54	22.37	25.01	26.17	26.99	27.72	28.99	30.92	32.20	33.33	33.76	34.64	36.62	36.81
9.0	14.96	16.13	21.37	21.94	21.59	24.59	27.54	28.80	29.67	30.44	31.87	33.97	35.37	36.59	37.05	38.03	40.19	40.40
10.0	16.44	17.74	23.42	24.07	23.68	26.86	30.13	31.47	32.41	33.19	34.80	37.06	38.59	39.89	40.37	41.44	43.78	44.02
11.0	17.98	19.40	25.51	26.26	25.82	29.18	32.76	34.19	35.18	35.99	37.77	40.19	41.85	43.23	43.74	44.90	47.39	47.67
12.0	19.57	21.10	27.66	28.50	28.01	31.54	35.45	36.97	38.01	38.84	40.80	43.38	45.17	46.62	47.15	48.41	51.05	51.38
15.0	24.70	26.51	34.41	35.53	34.89	38.93	43.83	45.60	46.81	47.69	50.18	53.26	55.42	57.08	57.69	59.21	62.28	62.78
20.0	34.37	36.48	46.70	48.31	47.38	52.24	58.68	61.09	62.55	63.47	66.90	70.83	73.64	75.64	76.34	78.31	81.99	82.88
25.0	45.37	47.64	60.24	62.38	61.09	66.78	75.28	77.92	79.63	80.57	85.00	89.83	93.29	95.61	96.40	98.81	103.04	104.39
30.0	57.63	59.95	74.98	77.67	75.99	82.52	92.99	96.07	98.02	98.95	104.45	110.21	114.37	116.99	117.85	120.70	125.44	127.32
35.0	71.12	73.36	90.88	94.16	92.04	99.40	111.97	115.49	117.68	118.58	125.21	131.94	136.82	139.73	140.65	143.94	149.18	151.64
40.0	85.77	87.83	107.89	111.78	109.18	117.39	132.17	136.14	138.56	139.41	147.24	154.98	160.62	163.80	164.78	168.51	174.23	177.31
45.0	101.56	103.32	125.97	130.51	127.40	136.46	153.55	157.98	160.64	161.42	170.50	179.29	185.72	189.17	190.18	194.37	200.55	204.29
50.0	118.44	119.81	145.09	150.31	146.64	156.57	176.07	180.98	183.88	184.57	194.96	204.84	212.08	215.78	216.84	221.48	228.12	232.55
55.0	136.38	137.27	165.23	171.15	166.89	177.68	199.71	205.11	208.23	208.82	220.58	231.59	239.67	243.62	244.71	249.80	256.90	262.05
60.0	155.36	155.67	186.34	192.99	188.11	199.78	224.44	230.32	233.68	234.15	247.32	259.50	268.46	272.65	273.76	279.31	286.87	292.76
65.0	175.3	175.0	208.4	215.8	210.3	222.8	250.2	256.6	260.2	260.5	276.2	288.6	298.4	302.8	304.0	310.0	318.0	324.7
70.0	196.3	195.2	231.4	239.6	233.4	246.8	277.0	283.9	287.7	287.9	304.1	318.7	329.5	334.2	335.3	341.8	350.3	357.7
80.0	241.1	238.2	280.1	290.0	282.3	297.5	333.7	341.6	345.9	345.7	365.1	382.3	395.1	400.1	401.2	408.7	418.1	427.1
90.0	289.6	284.5	332.3	343.9	334.6	351.7	394.2	403.2	407.9	407.3	430.1	450.0	464.8	470.3	471.4	479.8	490.2	500.9
100.0	341.6	334.0	387.9	401.3	390.3	409.3	458.3	468.5	473.7	472.6	499.0	521.8	538.8	544.5	545.6	555.0	566.4	578.8
150.0	650.4	625.8	711.8	735.6	714.7	743.5	830.5	846.8	854.1	849.8	896.7	935.6	965.0	972.2	972.8	987.3	1004.3	1025.6
200.0	1031.9	981.7	1103.6	1140.1	1107.8	1146.4	1278.8	1302.2	1310.7	1301.6	1373.3	1420.8	1467.1	1484.0	1483.5	1503.7	1518.5	1557.6
250.0	1474.6	1389.7	1550.9	1602.0	1559.5	1605.3	1789.4	1825.5	1829.3	1814.4	1914.3	1970.6	2035.8	2065.0	2062.4	2092.4	2099.6	2159.7
300.0	1967.7	1842.6	2045.8	2113.0	2059.1	2112.0	2353.0	2409.2	2401.2	2379.5	2510.2	2578.4	2662.3	2704.2	2699.0	2739.9	2738.4	2820.9
350.0	2504.9	2334.6	2582.2	2667.0	2600.5	2660.5	2962.7	3042.6	3019.4	2990.1	3154.1	3231.0	3339.0	3394.2	3386.0	3438.3	3427.6	3533.7
400.0	3081.	2861.	3155.	3259.	3179.	3246.	3613.	3717.	3678.	3641.	3840.	3929.	4060.	4129.	4117.	4182.	4161.	4292.
450.0	3691.	3417.	3761.	3884.	3789.	3864.	4299.	4429.	4374.	4327.	4563.	4666.	4820.	4903.	4888.	4964.	4934.	5090.
500.0	4331.	4000.	4395.	4545.	4428.	4511.	5018.	5173.	5101.	5045.	5319.	5434.	5615.	5712.	5693.	5782.	5741.	5924.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.14	17.77	19.15	19.51	20.22	21.23	21.83	22.60	23.06	23.51	23.97	24.46	24.95	25.39	25.97	26.18	28.03	28.62
3.0	19.40	20.14	21.52	21.86	22.59	23.74	24.43	25.35	25.87	26.39	26.91	27.45	28.04	28.53	29.14	29.35	31.33	31.96
3.5	21.52	22.36	23.75	24.08	24.83	26.11	26.86	27.92	28.49	29.08	29.65	30.23	30.92	31.44	32.09	32.29	34.41	35.07
4.0	23.56	24.50	25.90	26.21	26.97	28.37	29.19	30.37	30.99	31.64	32.25	32.87	33.65	34.21	34.90	35.09	37.33	38.03
4.5	25.55	26.58	27.98	28.28	29.05	30.56	31.45	32.74	33.40	34.11	34.77	35.42	36.29	36.88	37.60	37.78	40.15	40.89
5.0	27.50	28.63	30.02	30.31	31.08	32.71	33.66	35.06	35.75	36.52	37.22	37.91	38.86	39.48	40.23	40.41	42.90	43.67
5.5	29.42	30.64	32.04	32.31	33.09	34.82	35.83	37.33	38.07	38.88	39.62	40.35	41.36	42.02	42.80	42.98	45.59	46.39
6.0	31.33	32.63	34.03	34.29	35.08	36.91	37.98	39.58	40.35	41.21	41.99	42.75	43.83	44.53	45.34	45.51	48.25	49.08
6.5	33.23	34.62	36.02	36.27	37.06	38.99	40.12	41.80	42.61	43.52	44.34	45.13	46.28	47.01	47.85	48.02	50.87	51.73
7.0	35.12	36.60	38.00	38.24	39.03	41.06	42.24	44.02	44.85	45.82	46.67	47.50	48.71	49.47	50.34	50.50	53.48	54.37
8.0	38.90	40.55	41.96	42.17	42.97	45.18	46.48	48.43	49.32	50.38	51.31	52.19	53.53	54.35	55.29	55.44	58.65	59.60
9.0	42.70	44.51	45.93	46.11	46.91	49.31	50.71	52.83	53.79	54.93	55.94	56.88	58.34	59.21	60.22	60.36	63.81	64.82
10.0	46.53	48.51	49.93	50.09	50.88	53.46	54.97	57.25	58.26	59.50	60.57	61.57	63.14	64.07	65.16	65.29	68.97	70.04
11.0	50.39	52.54	53.96	54.10	54.88	57.65	59.26	61.70	62.77	64.08	65.23	66.28	67.97	68.96	70.11	70.23	74.15	75.28
12.0	54.30	56.62	58.04	58.15	58.92	61.87	63.59	66.19	67.30	68.71	69.92	71.02	72.83	73.87	75.09	75.20	79.36	80.55
15.0	66.32	69.16	70.59	70.61	71.35	74.84	76.87	79.92	81.18	82.84	84.26	85.52	87.66	88.85	90.29	90.38	95.26	96.63
20.0	87.47	91.20	92.64	92.52	93.15	97.54	100.11	103.89	105.38	107.45	109.22	110.74	113.42	114.85	116.69	116.72	122.85	124.54
25.0	110.09	114.75	116.19	115.91	116.40	121.73	124.83	129.34	131.05	133.53	135.66	137.43	140.65	142.31	144.59	144.56	151.99	154.00
30.0	134.18	139.82	141.24	140.79	141.11	147.40	151.06	156.30	158.22	161.12	163.62	165.64	169.41	171.28	174.02	173.94	182.74	185.06
35.0	159.70	166.37	167.77	167.13	167.25	174.64	178.77	184.75	186.89	190.21	193.08	195.37	199.69	201.77	205.00	204.85	215.07	217.74
40.0	186.6	194.4	195.7	194.9	194.8	203.1	207.9	214.7	217.0	220.8	224.0	226.6	231.5	233.7	237.5	237.3	249.0	252.0
45.0	214.9	223.8	225.1	224.1	223.7	233.1	238.5	246.0	248.6	252.8	256.4	259.2	264.7	267.2	271.5	271.2	284.4	287.8
50.0	244.5	254.6	255.8	254.6	253.9	264.4	270.5	278.7	281.5	286.2	290.2	293.3	299.4	302.0	306.9	306.5	321.4	325.1
55.0	275.4	286.7	287.9	286.4	285.4	297.1	303.8	312.8	315.8	320.9	325.4	328.8	335.5	338.3	343.8	343.3	359.8	363.9
60.0	307.6	320.1	321.3	319.5	318.2	331.1	338.4	348.3	351.4	357.0	362.0	365.6	372.9	375.9	382.0	381.5	399.6	404.1
65.0	341.0	354.8	355.9	353.9	352.3	366.3	374.3	385.0	388.4	394.4	399.8	403.8	411.7	414.8	421.6	421.0	440.9	445.8
70.0	375.6	390.7	391.8	389.5	387.5	402.7	411.5	423.0	426.6	433.1	438.9	443.2	451.7	455.1	462.5	461.8	483.5	488.8
80.0	448.3	466.3	467.1	464.2	461.4	479.3	489.5	502.6	506.6	514.2	521.0	525.8	535.7	539.4	548.2	547.3	572.7	578.9
90.0	525.5	546.4	547.0	543.6	539.9	560.4	572.1	587.0	591.5	600.1	607.8	613.3	624.5	628.5	638.9	637.7	667.1	674.1
100.0	607.0	631.0	631.4	627.4	622.6	646.1	659.3	676.0	680.9	690.5	699.3	705.4	718.1	722.4	734.3	732.9	766.4	774.3
150.0	1074.	1116.	1115.	1107.	1096.	1136.	1158.	1184.	1191.	1206.	1221.	1230.	1251.	1257.	1278.	1275.	1331.	1344.
200.0	1630.	1693.	1690.	1678.	1659.	1717.	1749.	1785.	1795.	1817.	1838.	1851.	1880.	1888.	1919.	1914.	1983.	2016.
250.0	2260.	2345.	2346.	2329.	2301.	2379.	2420.	2468.	2478.	2507.	2538.	2554.	2591.	2604.	2646.	2639.	2715.	2772.
300.0	2950.	3060.	3070.	3049.	3011.	3107.	3155.	3217.	3226.	3264.	3306.	3324.	3370.	3388.	3443.	3433.	3515.	3599.
350.0	3696.	3831.	3850.	3826.	3777.	3891.	3947.	4022.	4032.	4079.	4132.	4152.	4207.	4231.	4300.	4287.	4376.	4487.
400.0	4487.	4651.	4679.	4653.	4591.	4724.	4788.	4878.	4887.	4944.	5010.	5031.	5095.	5126.	5209.	5193.	5289.	5429.
450.0	5321.	5514.	5551.	5522.	5447.	5600.	5674.	5779.	5786.	5853.	5932.	5955.	6029.	6066.	6164.	6146.	6249.	6419.
500.0	6191.	6416.	6461.	6430.	6341.	6515.	6598.	6718.	6725.	6802.	6895.	6920.	7003.	7047.	7160.	7139.	7251.	7451.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{231}_{91}$PA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	200.1	142.2	119.8	113.6	114.3	100.4	86.0	81.6	78.6	76.2	71.3	66.6	63.0	60.7	59.8	57.4	51.3	53.3
3.0	201.8	161.6	123.6	117.4	118.4	104.9	90.2	85.8	83.0	80.7	75.6	70.7	67.1	64.8	63.9	61.5	55.5	57.2
3.5	200.8	156.9	125.5	119.4	120.7	107.6	92.9	88.5	85.8	83.7	78.5	73.6	69.9	67.6	66.7	64.3	58.6	60.0
4.0	198.4	159.8	126.4	120.3	121.8	109.1	94.4	90.2	87.5	85.7	80.4	75.4	71.8	69.5	68.7	66.3	60.9	61.9
4.5	195.2	161.0	126.4	120.5	122.1	109.9	95.3	91.2	88.6	86.9	81.6	76.7	73.1	70.9	70.0	67.7	62.5	63.3
5.0	191.6	161.1	126.0	120.2	121.9	110.1	95.7	91.7	89.2	87.7	82.3	77.5	74.0	71.7	70.9	68.6	63.7	64.3
5.5	187.8	160.4	125.2	119.5	121.3	110.0	95.7	91.9	89.5	88.0	82.7	77.9	74.5	72.3	71.5	69.2	64.5	64.9
6.0	183.9	159.2	124.2	118.6	120.5	109.6	95.5	91.8	89.4	88.1	82.8	78.1	74.7	72.6	71.8	69.6	65.1	65.3
6.5	180.1	157.7	123.0	117.6	119.5	108.9	96.1	91.5	89.2	88.0	82.7	78.1	74.7	72.7	72.0	69.7	65.5	65.6
7.0	176.3	156.0	121.7	116.4	118.4	108.2	94.5	91.0	88.9	87.7	82.5	77.9	74.6	72.6	72.0	69.8	65.7	65.6
8.0	169.1	152.2	119.0	113.9	116.0	106.4	93.2	89.9	87.9	86.9	81.7	77.3	74.2	72.3	71.6	69.5	65.8	65.5
9.0	162.4	148.1	116.2	111.3	113.5	104.5	91.6	88.5	86.6	85.8	80.7	76.4	73.4	71.6	71.0	69.0	65.6	65.1
10.0	156.1	144.0	113.5	108.8	110.9	102.5	90.0	87.0	85.2	84.5	79.6	75.4	72.5	70.8	70.2	68.3	65.2	64.5
11.0	150.4	140.0	110.8	106.2	108.4	100.4	88.3	85.5	83.8	83.2	78.3	74.3	71.4	69.8	69.3	67.5	64.6	63.8
12.0	145.1	136.2	108.2	103.8	106.0	98.4	86.6	83.9	82.3	81.8	77.1	73.1	70.4	68.8	68.4	66.6	63.9	63.0
15.0	131.4	125.7	101.0	97.0	99.2	92.7	81.8	79.4	78.0	77.7	73.3	69.7	67.1	65.8	65.4	63.8	61.6	60.6
20.0	114.1	111.5	91.1	87.7	89.8	84.5	74.8	72.8	71.7	71.5	67.5	64.3	62.1	61.1	60.8	59.4	57.7	56.5
25.0	101.4	100.5	83.3	80.2	82.3	77.7	69.0	67.3	66.4	66.3	62.7	59.8	57.8	56.9	56.7	55.5	54.2	52.9
30.0	91.7	91.7	76.9	74.1	76.1	72.2	64.2	62.7	61.9	62.0	58.6	55.9	54.1	53.4	53.2	52.2	51.0	49.8
35.0	83.9	84.7	71.6	69.1	71.0	67.6	60.2	58.8	58.1	58.2	55.1	52.6	50.9	50.3	50.2	49.3	48.3	47.1
40.0	77.62	78.79	67.21	64.87	66.69	63.62	56.70	55.48	54.87	55.02	52.05	49.78	48.21	47.68	47.58	46.74	45.88	44.76
45.0	72.35	73.83	63.41	61.23	62.98	60.21	53.72	52.59	52.04	52.22	49.42	47.29	45.82	45.36	45.29	44.51	43.75	42.68
50.0	67.88	69.59	60.12	58.08	59.76	57.24	51.10	50.06	49.57	49.77	47.11	45.11	43.71	43.31	43.26	42.55	41.85	40.83
55.0	64.04	65.91	57.24	55.31	56.93	54.61	48.79	47.83	47.38	47.59	45.06	43.16	41.84	41.49	41.45	40.79	40.15	39.18
60.0	60.70	62.68	54.68	52.86	54.42	52.28	46.74	45.83	45.42	45.65	43.23	41.42	40.17	39.85	39.83	39.21	38.62	37.69
65.0	57.76	59.82	52.40	50.67	52.17	50.19	44.89	44.04	43.67	43.90	41.58	39.86	38.66	38.37	38.36	37.78	37.23	36.35
70.0	55.15	57.28	50.36	48.70	50.16	48.30	43.22	42.42	42.08	42.32	40.09	38.44	37.29	37.03	37.03	36.49	35.97	35.12
80.0	50.72	52.92	46.82	45.30	46.67	45.03	40.33	39.61	39.31	39.56	37.49	35.97	34.90	34.69	34.69	34.21	33.75	32.97
90.0	47.10	49.33	43.86	42.46	43.75	42.28	37.90	37.24	36.98	37.23	35.29	33.87	32.88	32.70	32.72	32.28	31.85	31.14
100.0	44.07	46.31	41.36	40.05	41.27	39.94	35.82	35.21	34.98	35.24	33.41	32.08	31.14	31.00	31.02	30.62	30.22	29.57
150.0	34.14	36.30	32.86	31.86	32.83	31.93	28.70	28.25	28.11	28.38	26.92	25.89	25.14	25.07	25.11	24.83	24.52	24.06
200.0	28.56	30.89	28.12	27.22	27.89	27.37	24.58	24.12	24.18	24.45	23.17	22.80	22.03	21.55	21.63	21.33	21.54	20.78
250.0	25.26	27.45	25.08	24.29	24.83	24.47	22.00	21.36	21.67	21.92	20.78	20.45	19.77	19.36	19.44	19.11	19.37	18.70
300.0	22.96	25.03	22.93	22.21	22.72	22.41	20.16	19.39	19.87	20.11	19.07	18.76	18.15	17.79	17.86	17.57	17.81	17.21
350.0	21.27	23.24	21.33	20.65	21.14	20.87	18.78	18.09	18.53	18.76	17.79	17.50	16.93	16.61	16.68	16.41	16.63	16.08
400.0	19.97	21.87	20.09	19.45	19.92	19.67	17.71	17.08	17.48	17.71	16.80	16.51	15.98	15.69	15.76	15.51	15.71	15.21
450.0	18.94	20.78	19.10	18.50	18.95	18.72	16.86	16.27	16.65	16.87	16.01	15.73	15.23	14.96	15.03	14.79	14.99	14.50
500.0	18.12	19.90	18.30	17.72	18.16	17.95	16.17	15.62	15.97	16.19	15.36	15.09	14.61	14.36	14.43	14.21	14.39	13.93

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	49.74	47.37	47.36	47.67	47.20	44.45	43.05	40.61	39.72	38.67	37.91	37.28	35.92	35.46	35.07	35.16	33.71	33.32
3.0	53.52	51.02	50.98	51.31	50.90	48.06	46.59	44.11	43.21	42.11	41.32	40.66	39.26	38.75	38.31	38.40	36.76	36.34
3.5	56.20	53.61	53.56	53.91	53.55	50.66	49.16	46.67	45.78	44.66	43.84	43.17	41.76	41.21	40.72	40.81	39.04	38.59
4.0	58.13	55.48	55.42	55.78	55.47	52.57	51.04	48.57	47.70	46.57	45.73	45.06	43.64	43.07	42.55	42.64	40.76	40.28
4.5	59.50	56.82	56.75	57.12	56.86	53.96	52.42	49.98	49.13	48.00	47.16	46.48	45.07	44.48	43.93	44.02	42.07	41.57
5.0	60.47	57.77	57.70	58.07	57.86	54.97	53.44	51.03	50.20	49.07	48.23	47.55	46.16	45.56	44.99	45.08	43.06	42.55
5.5	61.14	58.43	58.36	58.74	58.57	55.70	54.17	51.80	50.99	49.87	49.03	48.36	46.98	46.38	45.78	45.88	43.81	43.29
6.0	61.57	58.87	58.80	59.18	59.05	56.20	54.68	52.36	51.57	50.46	49.62	48.98	47.60	46.99	46.38	46.48	44.37	43.85
6.5	61.83	59.14	59.07	59.45	59.35	56.54	55.03	52.75	51.98	50.89	50.05	49.40	48.05	47.45	46.83	46.92	44.79	44.26
7.0	61.96	59.27	59.20	59.58	59.52	56.73	55.24	53.01	52.26	51.18	50.35	49.70	48.38	47.78	47.15	47.24	45.09	44.56
8.0	61.90	59.25	59.18	59.56	59.55	56.84	55.37	53.23	52.52	51.47	50.65	50.02	48.74	48.15	47.50	47.59	45.42	44.89
9.0	61.56	58.95	58.88	59.28	59.31	56.66	55.23	53.17	52.49	51.47	50.67	50.06	48.82	48.25	47.58	47.67	45.49	44.96
10.0	61.05	58.48	58.42	58.80	58.88	56.30	54.90	52.92	52.28	51.28	50.50	49.91	48.70	48.15	47.48	47.57	45.39	44.87
11.0	60.42	57.90	57.85	58.22	58.34	55.83	54.46	52.55	51.94	50.97	50.21	49.63	48.46	47.93	47.25	47.34	45.17	44.65
12.0	59.73	57.25	57.21	57.58	57.73	55.28	53.94	52.10	51.52	50.57	49.83	49.27	48.13	47.62	46.93	47.02	44.87	44.36
15.0	57.47	55.13	55.10	55.46	55.68	53.40	52.15	50.48	49.97	49.10	48.40	47.89	46.85	46.39	45.70	45.78	43.70	43.21
20.0	53.74	51.59	51.59	51.94	52.22	50.17	49.05	47.60	47.17	46.41	45.77	45.32	44.40	44.01	43.34	43.42	41.46	41.01
25.0	50.39	48.41	48.42	48.75	49.07	47.20	46.18	44.90	44.53	43.84	43.26	42.86	42.03	41.70	41.05	41.13	39.29	38.88
30.0	47.47	45.62	45.64	45.96	46.30	44.58	43.64	42.49	42.17	41.54	41.00	40.63	39.88	39.60	38.96	39.05	37.32	36.93
35.0	44.92	43.18	43.22	43.53	43.88	42.28	41.41	40.36	40.07	39.49	38.99	38.65	37.95	37.71	37.10	37.18	35.55	35.19
40.0	42.68	41.05	41.10	41.39	41.75	40.25	39.44	38.47	38.20	37.67	37.20	36.89	36.24	36.02	35.44	35.52	33.97	33.63
45.0	40.72	39.16	39.22	39.50	39.86	38.45	37.69	36.78	36.55	36.05	35.60	35.31	34.71	34.51	33.95	34.03	32.56	32.23
50.0	38.97	37.49	37.55	37.82	38.18	36.84	36.12	35.28	35.06	34.59	34.17	33.90	33.33	33.16	32.61	32.69	31.28	30.98
55.0	37.40	35.99	36.05	36.32	36.68	35.40	34.72	33.93	33.72	33.28	32.88	32.63	32.08	31.93	31.40	31.48	30.13	29.84
60.0	35.99	34.64	34.70	34.96	35.32	34.10	33.46	32.70	32.51	32.09	31.71	31.47	30.96	30.81	30.31	30.38	29.09	28.81
65.0	34.71	33.41	33.48	33.73	34.08	32.92	32.30	31.59	31.41	31.01	30.65	30.42	29.93	29.80	29.31	29.38	28.13	27.87
70.0	33.55	32.29	32.37	32.61	32.96	31.84	31.24	30.57	30.41	30.02	29.68	29.45	28.99	28.87	28.39	28.46	27.26	27.00
80.0	31.50	30.33	30.41	30.64	30.98	29.94	29.39	28.78	28.63	28.28	27.96	27.75	27.32	27.22	26.77	26.83	25.71	25.48
90.0	29.76	28.66	28.74	28.96	29.29	28.32	27.81	27.24	27.11	26.79	26.48	26.29	25.89	25.80	25.38	25.44	24.38	24.16
100.0	28.26	27.22	27.30	27.51	27.84	26.91	26.44	25.91	25.79	25.49	25.20	25.03	24.65	24.57	24.17	24.23	23.23	23.02
150.0	23.01	22.17	22.25	22.42	22.72	21.99	21.62	21.23	21.14	20.92	20.69	20.56	20.27	20.21	19.88	19.94	19.12	18.96
200.0	19.88	19.19	19.17	19.33	19.60	18.98	18.67	18.36	18.30	18.11	17.92	17.81	17.57	17.52	17.24	17.29	17.05	16.50
250.0	17.90	17.28	17.08	17.22	17.47	16.97	16.80	16.50	16.51	16.32	16.07	16.04	15.86	15.74	15.49	15.54	15.42	14.93
300.0	16.47	15.91	15.73	15.78	16.01	15.64	15.48	15.21	15.22	15.05	14.83	14.80	14.64	14.53	14.30	14.36	14.24	13.79
350.0	15.40	14.87	14.71	14.76	14.98	14.63	14.49	14.24	14.25	14.09	13.89	13.86	13.71	13.61	13.40	13.44	13.34	12.93
400.0	14.56	14.06	13.92	13.96	14.17	13.85	13.71	13.48	13.49	13.34	13.15	13.12	12.99	12.90	12.70	12.74	12.63	12.25
450.0	13.89	13.42	13.28	13.32	13.53	13.22	13.09	12.87	12.88	12.74	12.56	12.54	12.41	12.32	12.13	12.17	12.07	11.71
500.0	13.35	12.89	12.76	12.81	13.00	12.71	12.58	12.37	12.39	12.25	12.08	12.06	11.94	11.86	11.67	11.71	11.61	11.27

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{231}_{91}$PA IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.570	6.270	8.854	8.830	8.670	10.320	11.150	11.710	12.120	12.570	12.850	13.770	14.230	14.816	15.040	15.279	15.729	16.130
3.0	7.144	7.055	9.802	9.829	9.661	11.443	12.458	13.088	13.547	14.039	14.420	15.450	16.003	16.654	16.904	17.218	17.887	18.217
3.5	7.717	7.802	10.729	10.803	10.626	12.530	13.718	14.411	14.915	15.442	15.917	17.049	17.687	18.397	18.671	19.052	19.908	20.187
4.0	8.296	8.531	11.645	11.766	11.578	13.595	14.951	15.703	16.247	16.805	17.371	18.598	19.315	20.080	20.375	20.820	21.840	22.080
4.5	8.883	9.250	12.569	12.725	12.525	14.649	16.168	16.975	17.557	18.142	18.797	20.115	20.907	21.724	22.039	22.543	23.711	23.924
5.0	9.480	9.967	13.474	13.684	13.471	15.699	17.377	18.237	18.855	19.465	20.206	21.613	22.477	23.343	23.677	24.238	25.541	25.734
5.5	10.089	10.686	14.393	14.648	14.421	16.748	18.583	19.495	20.147	20.780	21.606	23.099	24.033	24.946	25.298	25.913	27.342	27.521
6.0	10.710	11.408	15.319	15.618	15.376	17.800	19.791	20.752	21.438	22.091	23.001	24.580	25.581	26.541	26.909	27.578	29.123	29.294
6.5	11.345	12.137	16.254	16.596	16.338	18.857	21.003	22.012	22.731	23.402	24.397	26.059	27.127	28.131	28.515	29.235	30.890	31.058
7.0	11.993	12.873	17.198	17.583	17.309	19.921	22.221	23.278	24.028	24.717	25.794	27.540	28.673	29.720	30.120	30.891	32.650	32.819
8.0	13.33	14.37	19.12	19.59	19.28	22.07	24.68	25.83	26.64	27.36	28.61	30.52	31.78	32.91	33.34	34.21	36.16	36.34
9.0	14.73	15.91	21.08	21.64	21.29	24.26	27.18	28.42	29.29	30.04	31.45	33.52	34.91	36.12	36.58	37.54	39.67	39.88
10.0	16.18	17.49	23.09	23.74	23.35	26.50	29.72	31.05	31.98	32.75	34.33	36.56	38.07	39.36	39.85	40.91	43.21	43.44
11.0	17.68	19.12	25.15	25.89	25.46	28.77	32.31	33.73	34.71	35.51	37.26	39.65	41.29	42.65	43.16	44.31	46.77	47.04
12.0	19.25	20.79	27.26	28.09	27.61	31.10	34.96	36.46	37.49	38.31	40.23	42.78	44.54	45.98	46.51	47.76	50.36	50.68
15.0	24.28	26.09	33.90	35.00	34.37	38.36	43.19	44.95	46.14	47.00	49.45	52.49	54.62	56.28	56.88	58.38	61.40	61.90
20.0	33.74	36.87	45.96	47.54	46.62	51.43	57.97	60.15	61.59	62.50	65.88	69.76	72.52	74.51	75.20	77.15	80.77	81.64
25.0	44.50	46.81	59.24	61.34	60.07	65.70	74.07	76.67	78.36	79.28	83.64	88.40	91.81	94.11	94.89	97.27	101.44	102.77
30.0	56.50	58.86	73.69	76.33	74.68	81.13	91.43	94.46	96.39	97.31	102.72	108.39	112.48	115.08	115.93	118.74	123.42	125.27
35.0	69.68	71.97	89.26	92.48	90.40	97.67	110.03	113.50	115.66	116.55	123.07	129.69	134.50	137.38	138.29	141.54	146.70	149.11
40.0	84.00	86.13	105.92	109.74	107.20	115.30	129.82	133.73	136.13	136.97	144.66	152.27	157.82	160.97	161.94	165.62	171.24	174.27
45.0	99.43	101.28	123.62	128.08	125.03	133.97	150.76	155.13	157.75	158.53	167.44	176.09	182.40	185.82	186.83	190.95	197.03	200.71
50.0	115.92	117.40	142.33	147.46	143.86	153.65	172.81	177.65	180.50	181.19	191.39	201.11	208.22	211.89	212.94	217.50	224.03	228.38
55.0	133.45	134.47	162.03	167.84	163.67	174.32	195.95	201.26	204.34	204.93	216.47	227.29	235.24	239.14	240.22	245.23	252.22	257.27
60.0	151.98	152.45	182.68	189.21	184.43	195.94	220.15	225.94	229.25	229.72	242.64	254.61	263.42	267.56	268.66	274.12	281.56	287.34
65.0	171.5	171.3	204.3	211.5	206.1	218.5	245.4	251.7	255.2	255.5	269.9	283.0	292.7	297.1	298.2	304.1	312.0	318.5
70.0	192.0	191.1	226.8	234.8	228.7	242.0	271.6	278.4	282.1	282.3	298.2	312.6	323.2	327.7	328.9	335.2	343.6	350.9
80.0	235.7	233.1	274.4	284.0	276.5	291.5	327.0	334.8	339.0	338.8	357.8	374.7	387.3	392.2	393.4	400.7	409.9	418.8
90.0	283.0	278.3	325.4	336.7	327.7	344.5	386.1	395.0	399.8	399.1	421.4	441.0	455.5	460.9	462.0	470.2	480.4	491.0
100.0	333.7	326.7	379.7	392.8	382.1	400.8	448.8	458.8	463.9	462.9	488.7	511.1	527.7	533.5	534.5	543.7	554.9	567.1
150.0	634.9	611.4	696.0	719.2	698.8	727.2	812.3	828.3	835.5	831.3	877.2	915.3	944.1	951.3	951.9	966.1	982.7	1003.6
200.0	1007.0	968.5	1078.3	1114.0	1082.4	1120.4	1249.9	1272.8	1281.1	1272.3	1342.4	1388.9	1434.2	1450.8	1450.4	1470.1	1484.8	1522.9
250.0	1438.5	1356.5	1514.6	1564.5	1523.1	1568.0	1748.0	1783.3	1787.1	1772.6	1870.3	1925.3	1989.1	2017.7	2015.2	2044.6	2051.7	2110.4
300.0	1919.2	1798.1	1997.1	2062.9	2010.3	2062.2	2297.6	2352.8	2344.8	2323.7	2451.5	2516.2	2600.1	2641.2	2636.2	2676.1	2674.8	2755.4
350.0	2442.7	2277.6	2520.2	2603.0	2538.1	2597.1	2892.1	2970.2	2947.6	2919.2	3079.2	3154.5	3260.1	3314.0	3306.1	3357.3	3346.9	3450.5
400.0	3004.	2790.	3079.	3180.	3102.	3168.	3526.	3628.	3590.	3554.	3748.	3835.	3963.	4030.	4019.	4082.	4062.	4190.
450.0	3598.	3333.	3669.	3789.	3697.	3770.	4195.	4322.	4268.	4222.	4453.	4552.	4704.	4785.	4770.	4845.	4815.	4968.
500.0	4222.	3901.	4287.	4428.	4320.	4400.	4896.	5047.	4976.	4922.	5190.	5302.	5479.	5573.	5555.	5642.	5602.	5781.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.92	17.54	18.90	19.26	19.95	20.94	21.54	22.31	22.76	23.21	23.66	24.14	24.62	25.05	25.62	25.83	27.66	28.24
3.0	19.15	19.88	21.25	21.59	22.30	23.44	24.11	25.03	25.54	26.06	26.57	27.10	27.68	28.16	28.76	28.96	30.93	31.55
3.5	21.26	22.09	23.46	23.78	24.51	25.78	26.52	27.57	28.14	28.72	29.28	29.85	30.53	31.04	31.68	31.88	33.97	34.63
4.0	23.27	24.21	25.57	25.88	26.63	28.01	28.83	29.99	30.61	31.25	31.86	32.47	33.23	33.78	34.45	34.64	36.86	37.56
4.5	25.24	26.26	27.63	27.93	28.68	30.18	31.06	32.34	32.99	33.69	34.34	34.99	35.84	36.42	37.12	37.31	39.65	40.38
5.0	27.16	28.28	29.65	29.93	30.70	32.30	33.24	34.62	35.32	36.07	36.76	37.44	38.37	38.98	39.72	39.90	42.36	43.12
5.5	29.06	30.26	31.64	31.91	32.68	34.38	35.38	36.87	37.60	38.40	39.14	39.85	40.85	41.50	42.26	42.44	45.02	45.81
6.0	30.94	32.23	33.61	33.87	34.64	36.45	37.51	39.09	39.85	40.71	41.48	42.22	43.29	43.97	44.77	44.94	47.64	48.46
6.5	32.81	34.19	35.57	35.81	36.59	38.50	39.61	41.28	42.08	42.98	43.79	44.57	45.70	46.41	47.25	47.41	50.23	51.08
7.0	34.68	36.14	37.52	37.75	38.54	40.54	41.71	43.47	44.29	45.25	46.09	46.90	48.10	48.84	49.71	49.86	52.80	53.68
8.0	38.41	40.04	41.42	41.63	42.42	44.60	45.88	47.81	48.70	49.74	50.67	51.53	52.85	53.65	54.58	54.73	57.90	58.85
9.0	42.15	43.94	45.34	45.52	46.30	48.67	50.06	52.15	53.10	54.23	55.22	56.15	57.59	58.44	59.44	59.58	62.98	63.99
10.0	45.92	47.88	49.27	49.43	50.21	52.76	54.25	56.51	57.51	58.73	59.79	60.77	62.32	63.23	64.30	64.43	68.07	69.13
11.0	49.72	51.85	53.25	53.38	54.15	56.88	58.47	60.89	61.94	63.24	64.38	65.41	67.08	68.04	69.18	69.30	73.17	74.29
12.0	53.57	55.86	57.26	57.37	58.13	61.04	62.74	65.30	66.41	67.79	68.99	70.08	71.86	72.88	74.08	74.19	78.30	79.48
15.0	65.39	68.19	69.60	69.63	70.35	73.79	75.80	78.81	80.06	81.69	83.10	84.34	86.44	87.61	89.04	89.12	93.94	95.30
20.0	86.18	89.85	91.27	91.15	91.77	96.11	98.63	102.37	103.84	105.88	107.63	109.12	111.76	113.17	114.99	115.02	121.06	122.72
25.0	108.38	112.97	114.39	114.12	114.60	119.85	122.91	127.36	129.05	131.50	133.60	135.34	138.51	140.13	142.38	142.35	149.68	151.66
30.0	132.01	137.87	138.97	138.53	138.85	146.04	148.65	153.81	156.71	158.57	161.03	163.02	166.73	168.67	171.27	171.18	179.85	182.15
35.0	157.04	163.60	164.99	164.36	164.48	171.66	175.83	181.72	183.83	187.10	189.93	192.18	196.43	198.47	201.66	201.51	211.57	214.20
40.0	183.4	191.0	192.4	191.6	191.5	199.7	204.4	211.0	213.4	217.1	220.3	222.8	227.6	229.8	233.5	233.3	244.8	247.8
45.0	211.1	219.9	221.2	220.2	219.8	229.0	234.4	241.8	244.3	248.4	252.0	254.8	260.2	262.6	266.8	266.5	279.6	282.9
50.0	240.2	250.0	251.3	250.0	249.4	259.7	265.7	273.8	276.6	281.1	285.1	288.2	294.1	296.7	301.5	301.2	315.8	319.4
55.0	270.4	281.5	282.7	281.2	280.3	291.7	298.3	307.2	310.2	315.2	319.6	322.9	329.5	332.2	337.6	337.2	353.4	357.4
60.0	301.9	314.2	316.4	313.6	312.4	325.0	332.2	341.9	345.0	350.5	355.4	359.0	366.1	369.1	375.1	374.6	392.4	396.8
65.0	334.6	348.2	349.3	347.3	345.7	359.5	367.4	377.9	381.2	387.2	392.4	396.3	404.1	407.2	413.9	413.2	432.8	437.6
70.0	368.5	383.3	384.3	382.1	380.2	395.2	403.8	415.0	418.6	425.0	430.7	434.9	443.3	446.6	453.9	453.2	474.5	479.7
80.0	439.6	457.2	458.0	455.3	452.5	470.0	480.0	493.0	496.9	504.3	511.0	515.8	525.4	529.1	537.8	536.8	561.8	567.8
90.0	515.0	535.6	536.2	532.9	529.2	549.4	560.9	575.5	579.9	588.3	595.9	601.3	612.3	616.3	626.4	625.3	654.1	661.0
100.0	594.7	618.3	618.7	614.8	610.2	633.1	646.1	662.5	667.3	676.8	685.4	691.4	703.8	708.1	719.8	718.4	751.2	759.0
150.0	1051.	1092.	1091.	1084.	1073.	1112.	1133.	1159.	1166.	1181.	1195.	1204.	1224.	1230.	1251.	1248.	1303.	1316.
200.0	1594.	1655.	1653.	1641.	1623.	1679.	1710.	1746.	1755.	1777.	1797.	1811.	1839.	1847.	1877.	1872.	1940.	1972.
250.0	2208.	2291.	2293.	2276.	2249.	2325.	2365.	2412.	2422.	2451.	2480.	2496.	2533.	2545.	2586.	2579.	2654.	2710.
300.0	2882.	2989.	2999.	2979.	2941.	3035.	3082.	3143.	3152.	3189.	3230.	3247.	3292.	3310.	3364.	3354.	3435.	3516.
350.0	3608.	3741.	3759.	3737.	3688.	3800.	3854.	3928.	3937.	3983.	4036.	4055.	4108.	4132.	4199.	4187.	4274.	4383.
400.0	4380.	4541.	4567.	4542.	4482.	4612.	4675.	4763.	4771.	4827.	4891.	4912.	4975.	5005.	5086.	5071.	5165.	5301.
450.0	5193.	5382.	5418.	5390.	5317.	5466.	5538.	5640.	5648.	5713.	5791.	5813.	5885.	5921.	6017.	5999.	6101.	6266.
500.0	6042.	6261.	6305.	6274.	6188.	6358.	6439.	6556.	6563.	6638.	6729.	6753.	6835.	6878.	6988.	6967.	7077.	7272.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{238}_{92}$U IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	202.0	142.7	120.6	114.3	115.1	101.0	86.5	82.0	79.1	76.6	71.7	66.9	63.3	61.0	60.1	57.7	51.5	53.5
3.0	203.9	152.4	124.5	118.3	119.3	105.6	90.8	86.4	83.5	81.3	76.1	71.2	67.5	65.2	64.3	61.8	55.9	57.5
3.5	203.0	158.1	126.6	120.4	121.7	108.4	93.6	89.2	86.4	84.3	79.0	74.1	70.4	68.1	67.2	64.7	59.0	60.4
4.0	200.7	161.1	127.5	121.4	122.9	110.0	95.2	91.0	88.2	86.3	81.0	76.0	72.4	70.1	69.2	66.8	61.3	62.4
4.5	197.6	162.4	127.6	121.6	123.2	110.9	96.1	92.0	89.4	87.6	82.2	77.3	73.7	71.4	70.6	68.2	63.0	63.8
5.0	194.0	162.6	127.2	121.4	123.1	111.1	96.6	92.6	90.0	88.4	83.0	78.1	74.6	72.4	71.5	69.2	64.2	64.8
5.5	190.3	162.1	126.5	120.7	122.5	111.0	96.6	92.8	90.3	88.8	83.4	78.6	75.1	72.9	72.2	69.8	65.1	65.5
6.0	186.4	161.0	125.5	119.9	121.8	110.6	96.4	92.7	90.3	89.0	83.6	78.8	75.4	73.3	72.5	70.2	65.7	65.9
6.5	182.6	159.5	124.4	118.8	120.8	110.1	96.1	92.4	90.1	88.9	83.5	78.8	75.5	73.4	72.7	70.4	66.1	66.2
7.0	178.8	157.8	123.1	117.7	119.7	109.3	95.5	92.0	89.8	88.6	83.3	78.7	75.4	73.4	72.7	70.5	66.4	66.3
8.0	171.6	154.0	120.4	115.2	117.4	107.6	94.2	90.9	88.8	87.8	82.6	78.1	74.9	73.0	72.4	70.2	66.5	66.2
9.0	164.8	150.0	117.6	112.7	114.8	105.7	92.7	89.5	87.6	86.7	81.6	77.3	74.2	72.4	71.8	69.7	66.3	65.8
10.0	158.5	145.9	114.9	110.1	112.3	103.7	91.1	88.0	86.2	85.5	80.5	76.3	73.3	71.6	71.0	69.0	65.9	65.2
11.0	152.7	141.9	112.2	107.6	109.8	101.6	89.4	86.5	84.8	84.1	79.3	75.2	72.3	70.6	70.1	68.2	65.3	64.5
12.0	147.3	138.1	109.6	105.1	107.4	99.6	87.7	85.0	83.3	82.8	78.0	74.0	71.2	69.7	69.2	67.4	64.7	63.8
15.0	133.5	127.5	102.4	98.3	100.6	93.9	82.9	80.5	79.1	78.7	74.2	70.6	68.0	66.7	66.3	64.6	62.4	61.3
20.0	116.0	113.2	92.4	88.9	91.1	85.7	75.8	73.8	72.7	72.5	68.5	65.2	63.0	61.9	61.6	60.2	58.5	57.3
25.0	103.2	102.1	84.5	81.4	83.5	78.9	70.0	68.3	67.3	67.3	63.6	60.7	58.6	57.7	57.5	56.3	54.9	53.7
30.0	93.3	93.3	78.1	75.3	77.3	73.3	65.2	63.7	62.8	62.9	59.5	56.8	54.9	54.2	54.0	53.0	51.8	50.6
35.0	85.5	86.1	72.8	70.2	72.2	68.7	61.1	59.7	59.0	59.1	55.9	53.4	51.7	51.1	51.0	50.0	49.0	47.9
40.0	79.06	80.19	68.33	65.95	67.80	64.66	57.63	56.38	55.75	55.90	52.89	50.57	48.98	48.44	48.34	47.48	46.61	45.47
45.0	73.71	75.17	64.49	62.27	64.05	61.22	54.61	53.46	52.90	53.08	50.23	48.07	46.57	46.10	46.02	45.24	44.46	43.37
50.0	69.18	70.86	61.16	59.08	60.79	58.21	51.96	50.91	50.40	50.60	47.90	45.86	44.44	44.03	43.97	43.25	42.54	41.50
55.0	65.27	67.13	58.24	56.28	57.92	55.55	49.63	48.64	48.19	48.41	45.83	43.89	42.55	42.19	42.15	41.48	40.83	39.83
60.0	61.87	63.85	55.65	53.80	55.38	53.19	47.55	46.63	46.21	46.44	43.97	42.14	40.86	40.53	40.51	39.88	39.28	38.33
65.0	58.89	60.95	53.34	51.58	53.11	51.07	45.68	44.81	44.43	44.67	42.31	40.55	39.33	39.04	39.02	38.44	37.88	36.97
70.0	56.23	58.36	51.27	49.58	51.06	49.16	44.00	43.18	42.82	43.07	40.80	39.12	37.94	37.68	37.67	37.12	36.60	35.73
80.0	51.73	53.94	47.68	46.14	47.52	45.85	41.06	40.32	40.02	40.27	38.16	36.61	35.52	35.31	35.31	34.82	34.35	33.56
90.0	48.04	50.29	44.69	43.26	44.56	43.06	38.60	37.92	37.65	37.92	35.94	34.49	33.48	33.30	33.31	32.87	32.43	31.71
100.0	44.96	47.22	42.14	40.81	42.05	40.69	36.49	35.87	35.63	35.90	34.03	32.67	31.72	31.57	31.59	31.18	30.78	30.11
150.0	34.85	37.03	33.52	32.49	33.48	32.56	29.26	28.81	28.66	28.93	27.45	26.39	25.63	25.56	25.59	25.31	24.99	24.53
200.0	29.16	31.53	28.69	27.77	28.46	27.92	25.08	24.61	24.67	24.94	23.64	23.26	22.48	21.99	22.06	21.76	21.97	21.19
250.0	25.79	28.02	25.60	24.79	25.35	24.97	22.45	21.79	22.11	22.37	21.21	20.86	20.17	19.76	19.83	19.49	19.76	19.08
300.0	23.45	25.56	23.41	22.67	23.19	22.88	20.58	19.79	20.28	20.53	19.47	19.15	18.52	18.16	18.23	17.93	18.17	17.56
350.0	21.72	23.74	21.78	21.09	21.58	21.31	19.17	18.47	18.91	19.15	18.17	17.86	17.28	16.96	17.03	16.75	16.98	16.42
400.0	20.40	22.34	20.51	19.86	20.34	20.09	18.08	17.44	17.85	18.08	17.15	16.86	16.32	16.02	16.10	15.84	16.05	15.53
450.0	19.35	21.23	19.51	18.89	19.35	19.12	17.22	16.62	17.00	17.23	16.35	16.06	15.55	15.28	15.35	15.11	15.30	14.81
500.0	18.51	20.33	18.69	18.10	18.55	18.34	16.51	15.95	16.31	16.53	15.69	15.41	14.92	14.67	14.74	14.51	14.70	14.23

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	49.98	47.59	47.57	47.89	47.41	44.65	43.24	40.79	39.90	38.84	38.08	37.44	36.08	35.62	35.22	35.31	33.86	33.47
3.0	53.83	51.31	51.27	51.60	51.18	48.32	46.85	44.35	43.45	42.35	41.55	40.88	39.48	38.96	38.52	38.61	36.97	36.54
3.5	56.57	53.96	53.91	54.26	53.90	50.99	49.47	46.97	46.08	44.95	44.12	43.45	42.02	41.47	40.98	41.07	39.29	38.83
4.0	58.55	55.88	55.82	56.18	55.87	52.94	51.40	48.91	48.03	46.90	46.06	45.37	43.95	43.37	42.84	42.94	41.05	40.56
4.5	59.96	57.26	57.19	57.56	57.30	54.37	52.82	50.36	49.50	48.36	47.52	46.83	45.41	44.82	44.26	44.36	42.38	41.88
5.0	60.97	58.25	58.18	58.55	58.34	55.42	53.87	51.44	50.60	49.47	48.62	47.94	46.53	45.92	45.35	45.44	43.40	42.89
5.5	61.67	58.94	58.86	59.24	59.07	56.17	54.63	52.25	51.43	50.30	49.45	48.77	47.38	46.77	46.17	46.27	44.18	43.66
6.0	62.13	59.41	59.33	59.71	59.58	56.70	55.17	52.83	52.03	50.91	50.06	49.40	48.02	47.41	46.79	46.89	44.76	44.24
6.5	62.42	59.70	59.62	60.00	59.90	57.06	55.54	53.24	52.46	51.36	50.51	49.85	48.49	47.89	47.26	47.35	45.20	44.67
7.0	62.56	59.85	59.77	60.15	60.09	57.28	55.77	53.51	52.76	51.67	50.83	50.18	48.84	48.23	47.59	47.69	45.51	44.98
8.0	62.53	59.85	59.78	60.16	60.16	57.41	55.93	53.76	53.05	51.98	51.16	50.52	49.22	48.63	47.97	48.07	45.87	45.33
9.0	62.22	59.58	59.51	59.89	59.94	57.26	55.81	53.72	53.04	52.01	51.20	50.58	49.33	48.75	48.08	48.17	45.96	45.43
10.0	61.72	59.13	59.06	59.45	59.53	56.92	55.50	53.50	52.85	51.84	51.05	50.45	49.23	48.68	47.99	48.08	45.88	45.35
11.0	61.12	58.56	58.51	58.89	59.00	56.46	55.08	53.14	52.52	51.55	50.77	50.19	49.01	48.47	47.78	47.87	45.68	45.15
12.0	60.43	57.93	57.87	58.25	58.40	55.92	54.57	52.70	52.11	51.16	50.40	49.84	48.69	48.17	47.47	47.56	45.39	44.87
15.0	58.20	55.82	55.79	56.16	56.37	54.06	52.80	51.11	50.59	49.71	49.00	48.48	47.42	46.96	46.26	46.35	44.24	43.74
20.0	54.47	52.29	52.28	52.63	52.92	50.84	49.71	48.24	47.80	47.02	46.38	45.92	44.99	44.60	43.91	44.00	42.01	41.56
25.0	51.11	49.09	49.11	49.44	49.77	47.87	46.84	45.53	45.16	44.46	43.87	43.46	42.62	42.29	41.62	41.71	39.84	39.42
30.0	48.17	46.29	46.32	46.64	46.99	45.24	44.29	43.11	42.79	42.15	41.60	41.23	40.46	40.17	39.53	39.62	37.86	37.47
35.0	45.61	43.84	43.88	44.19	44.55	42.92	42.04	40.97	40.67	40.09	39.58	39.24	38.53	38.28	37.66	37.74	36.09	35.72
40.0	43.36	41.69	41.74	42.04	42.40	40.88	40.05	39.07	38.80	38.26	37.78	37.46	36.80	36.58	35.99	36.07	34.50	34.15
45.0	41.37	39.79	39.85	40.14	40.50	39.06	38.29	37.37	37.13	36.62	36.17	35.88	35.26	35.06	34.49	34.57	33.07	32.74
50.0	39.61	38.10	38.16	38.44	38.81	37.44	36.71	35.85	35.63	35.15	34.73	34.45	33.87	33.69	33.14	33.22	31.79	31.48
55.0	38.02	36.59	36.65	36.92	37.29	35.99	35.29	34.49	34.28	33.83	33.43	33.16	32.61	32.46	31.92	32.00	30.63	30.33
60.0	36.60	35.22	35.29	35.55	35.91	34.67	34.01	33.25	33.06	32.63	32.25	32.00	31.47	31.33	30.81	30.89	29.57	29.29
65.0	35.31	33.98	34.05	34.31	34.67	33.48	32.85	32.13	31.95	31.54	31.17	30.93	30.44	30.30	29.80	29.87	28.61	28.34
70.0	34.13	32.85	32.93	33.17	33.53	32.39	31.78	31.10	30.93	30.54	30.19	29.96	29.48	29.36	28.88	28.95	27.73	27.47
80.0	32.06	30.87	30.94	31.18	31.53	30.47	29.91	29.29	29.13	28.78	28.45	28.24	27.80	27.69	27.24	27.31	26.16	25.92
90.0	30.30	29.18	29.26	29.48	29.82	28.83	28.31	27.73	27.59	27.27	26.96	26.76	26.36	26.26	25.83	25.90	24.82	24.59
100.0	28.78	27.72	27.79	28.01	28.34	27.41	26.92	26.39	26.26	25.95	25.66	25.48	25.10	25.02	24.61	24.67	23.65	23.44
150.0	23.46	22.60	22.67	22.85	23.16	22.41	22.03	21.64	21.55	21.32	21.09	20.95	20.66	20.60	20.27	20.32	19.49	19.32
200.0	20.27	19.57	19.55	19.71	19.99	19.36	19.04	18.73	18.66	18.47	18.28	18.16	17.92	17.86	17.59	17.64	17.39	16.82
250.0	18.26	17.63	17.43	17.57	17.83	17.32	17.14	16.83	16.84	16.65	16.40	16.37	16.18	16.06	15.80	15.85	15.73	15.23
300.0	16.81	16.23	16.05	16.10	16.34	15.96	15.80	15.52	15.53	15.36	15.13	15.10	14.94	14.83	14.59	14.64	14.53	14.07
350.0	15.72	15.18	15.02	15.07	15.29	14.94	14.79	14.53	14.54	14.38	14.17	14.15	14.00	13.90	13.68	13.72	13.61	13.20
400.0	14.87	14.36	14.21	14.25	14.47	14.14	14.00	13.76	13.77	13.62	13.43	13.40	13.26	13.17	12.96	13.00	12.90	12.51
450.0	14.19	13.70	13.56	13.61	13.81	13.50	13.36	13.14	13.15	13.01	12.83	12.80	12.67	12.58	12.39	12.43	12.32	11.96
500.0	13.63	13.17	13.04	13.08	13.28	12.98	12.85	12.64	12.65	12.51	12.34	12.31	12.19	12.11	11.92	11.96	11.85	11.51

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{238}_{92}$U IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.710	6.400	9.042	9.020	8.860	10.537	11.380	11.961	12.370	12.830	13.120	14.060	14.530	15.123	15.350	15.593	16.052	16.460
3.0	7.296	7.204	10.012	10.042	9.874	11.687	12.719	13.362	13.832	14.336	14.728	15.781	16.346	17.007	17.261	17.580	18.265	18.699
3.5	7.880	7.970	10.959	11.038	10.860	12.798	14.009	14.717	15.231	15.771	16.261	17.417	18.070	18.791	19.069	19.458	20.334	20.816
4.0	8.469	8.715	11.895	12.022	11.833	13.887	15.269	16.037	16.593	17.164	17.747	19.002	19.735	20.513	20.813	21.266	22.310	22.553
4.5	9.067	9.450	12.827	13.000	12.800	14.964	16.512	17.337	17.932	18.531	19.204	20.553	21.363	22.194	22.514	23.029	24.224	24.438
5.0	9.674	10.182	13.761	13.980	13.766	16.036	17.746	18.626	19.258	19.882	20.644	22.083	22.967	23.848	24.188	24.760	26.094	26.288
5.5	10.294	10.914	14.699	14.962	14.734	17.107	18.978	19.910	20.577	21.224	22.073	23.601	24.556	25.486	25.843	26.472	27.933	28.114
6.0	10.925	11.651	15.643	15.952	15.708	18.180	20.210	21.193	21.895	22.563	23.498	25.113	26.137	27.114	27.488	28.171	29.752	29.925
6.5	11.570	12.394	16.596	16.948	16.689	19.258	21.446	22.479	23.213	23.901	24.921	26.622	27.714	28.736	29.128	29.863	31.556	31.726
7.0	12.229	13.144	17.557	17.955	17.679	20.343	22.689	23.769	24.536	25.242	26.347	28.132	29.291	30.358	30.765	31.553	33.362	33.522
8.0	13.59	14.67	19.51	20.00	19.69	22.54	25.20	26.37	27.20	27.94	29.21	31.17	32.46	33.61	34.05	34.93	36.93	37.11
9.0	15.00	16.24	21.51	22.09	21.74	24.77	27.74	29.01	29.90	30.67	32.11	34.23	35.65	36.88	37.35	38.33	40.51	40.72
10.0	16.48	17.84	23.56	24.22	23.83	27.04	30.33	31.69	32.64	33.43	35.05	37.33	38.87	40.19	40.68	41.78	44.11	44.35
11.0	18.01	19.50	25.66	26.41	25.98	29.36	32.97	34.42	35.42	36.24	38.03	40.47	42.14	43.54	44.06	45.23	47.74	48.02
12.0	19.59	21.20	27.80	28.65	28.17	31.72	35.66	37.19	38.25	39.09	41.05	43.66	45.46	46.93	47.47	48.74	51.40	51.73
15.0	24.69	26.58	34.55	35.67	35.04	39.11	44.04	45.83	47.05	47.93	50.43	53.54	55.72	57.40	58.02	59.56	62.64	63.14
20.0	34.28	36.50	46.80	48.42	47.49	52.39	59.06	61.28	62.76	63.69	67.14	71.10	73.92	75.94	76.65	78.64	82.34	83.22
25.0	45.18	47.59	60.28	62.42	61.14	66.88	75.40	78.06	79.78	80.73	85.18	90.03	93.51	95.86	96.66	99.08	103.34	104.69
30.0	57.32	59.80	74.93	77.63	75.96	82.54	93.03	96.12	98.09	99.03	104.55	110.33	114.50	117.15	118.02	120.88	125.66	127.53
35.0	70.66	73.08	90.73	94.01	91.91	99.32	111.90	115.43	117.64	118.56	125.19	131.94	136.84	139.78	140.71	144.02	149.28	151.74
40.0	85.15	87.41	107.61	111.51	108.93	117.20	131.96	135.95	138.40	139.26	147.09	154.84	160.49	163.71	164.70	168.44	174.18	177.26
45.0	100.75	102.75	125.64	130.09	127.00	136.12	153.18	157.64	160.32	161.12	170.19	178.99	185.42	188.90	189.94	194.13	200.34	204.07
50.0	117.43	119.07	144.60	149.71	146.08	156.06	176.53	180.46	183.37	184.09	194.46	204.35	211.59	215.33	216.40	221.05	227.71	232.13
55.0	135.15	136.33	164.45	170.36	166.14	177.00	198.97	204.38	207.53	208.14	219.86	230.88	238.96	242.95	244.05	249.15	256.27	261.40
60.0	153.88	154.51	185.36	192.00	187.16	198.90	223.48	229.37	232.75	233.25	246.38	258.56	267.51	271.73	272.86	278.42	285.99	291.86
65.0	173.6	173.6	207.2	214.6	209.1	221.7	249.0	255.4	259.0	259.4	274.0	287.4	297.2	301.7	302.8	308.8	316.9	323.5
70.0	194.3	193.6	230.0	238.1	232.0	245.5	275.6	282.5	286.3	286.5	302.6	317.2	328.0	332.7	333.8	340.3	348.8	356.2
80.0	238.5	236.0	278.1	287.9	280.3	295.7	331.6	339.6	343.9	343.7	363.0	380.2	392.9	398.0	399.1	406.6	416.0	426.0
90.0	286.3	281.7	329.7	341.3	332.1	349.3	391.4	400.5	405.2	404.7	427.3	447.2	462.0	467.4	468.6	477.0	487.4	498.0
100.0	337.5	330.6	384.6	397.9	387.1	406.2	454.9	465.0	470.2	469.2	495.4	518.1	535.0	540.9	542.0	551.3	562.7	575.1
150.0	641.6	618.2	704.3	727.9	707.3	736.1	822.4	838.5	845.9	841.7	888.2	926.8	956.0	963.3	964.0	978.4	995.3	1016.5
200.0	1017.1	968.7	1090.5	1126.6	1094.7	1133.3	1264.4	1287.6	1296.1	1287.3	1358.2	1405.3	1451.1	1468.0	1467.7	1487.7	1502.6	1541.2
250.0	1452.5	1370.4	1530.9	1581.4	1539.6	1585.3	1767.3	1803.1	1807.1	1792.5	1891.2	1947.0	2011.6	2040.6	2038.1	2067.8	2075.2	2134.5
300.0	1937.4	1816.0	2018.0	2084.4	2031.4	2084.1	2322.1	2377.8	2370.0	2348.8	2477.9	2543.5	2628.4	2670.0	2665.0	2705.4	2704.2	2785.7
350.0	2465.5	2299.9	2545.8	2629.5	2564.0	2623.9	2922.1	3001.0	2978.4	2949.7	3111.5	3187.7	3294.4	3349.0	3341.2	3392.9	3382.6	3487.3
400.0	3031.	2817.	3109.	3211.	3133.	3200.	3562.	3665.	3627.	3590.	3786.	3874.	4004.	4072.	4061.	4124.	4104.	4233.
450.0	3631.	3364.	3705.	3826.	3733.	3807.	4237.	4365.	4310.	4265.	4497.	4598.	4751.	4833.	4818.	4894.	4864.	5019.
500.0	4260.	3938.	4328.	4470.	4361.	4443.	4943.	5096.	5025.	4970.	5241.	5354.	5533.	5628.	5610.	5698.	5658.	5839.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.26	17.89	19.29	19.65	20.36	21.38	21.99	22.77	23.24	23.69	24.15	24.64	25.12	25.56	26.14	26.35	28.21	28.81
3.0	19.55	20.29	21.69	22.03	22.77	23.94	24.63	25.57	26.09	26.62	27.13	27.67	28.26	28.75	29.36	29.57	31.57	32.20
3.5	21.70	22.55	23.95	24.28	25.03	26.33	27.10	28.17	28.75	29.34	29.91	30.49	31.18	31.70	32.35	32.55	34.69	35.36
4.0	23.77	24.72	26.12	26.43	27.20	28.62	29.45	30.65	31.27	31.93	32.55	33.17	33.95	34.51	35.19	35.38	37.65	38.35
4.5	25.78	26.82	28.22	28.52	29.30	30.83	31.74	33.04	33.71	34.43	35.09	35.75	36.61	37.20	37.92	38.11	40.50	41.24
5.0	27.74	28.88	30.28	30.57	31.36	33.00	33.96	35.38	36.09	36.86	37.56	38.26	39.20	39.82	40.58	40.75	43.27	44.04
5.5	29.68	30.91	32.32	32.69	33.39	35.13	36.16	37.68	38.42	39.24	39.99	40.72	41.73	42.39	43.17	43.35	45.99	46.79
6.0	31.60	32.92	34.33	34.69	35.39	37.24	38.32	39.94	40.72	41.59	42.38	43.14	44.22	44.92	45.73	45.90	48.66	49.50
6.5	33.51	34.92	36.33	36.68	37.38	39.33	40.47	42.18	43.00	43.92	44.75	45.54	46.69	47.41	48.26	48.43	51.31	52.18
7.0	35.42	36.91	38.32	38.66	39.37	41.41	42.61	44.41	45.26	46.23	47.09	47.92	49.13	49.89	50.77	50.93	53.93	54.83
8.0	39.22	40.88	42.30	42.62	43.32	45.56	46.87	48.85	49.75	50.82	51.76	52.64	53.98	54.80	55.75	55.90	59.14	60.10
9.0	43.04	44.87	46.29	46.48	47.28	49.71	51.13	53.27	54.24	55.39	56.41	57.35	58.81	59.69	60.70	60.84	64.32	65.34
10.0	46.88	48.88	50.31	50.47	51.27	53.88	55.41	57.71	58.73	59.98	61.06	62.06	63.64	64.57	65.66	65.79	69.50	70.58
11.0	50.75	52.92	54.35	54.49	55.28	58.08	59.71	62.18	63.25	64.58	65.73	66.78	68.49	69.47	70.63	70.75	74.70	75.84
12.0	54.67	57.01	58.44	58.55	59.34	62.31	64.05	66.67	67.80	69.21	70.44	71.54	73.36	74.39	75.62	75.74	79.92	81.13
15.0	66.70	69.56	71.01	71.03	71.78	75.29	77.35	80.42	81.70	83.37	84.80	86.06	88.21	89.40	90.85	90.93	95.85	97.24
20.0	87.84	91.59	93.04	92.92	93.57	97.99	100.57	104.39	105.89	107.97	109.76	111.27	113.96	115.40	117.25	117.28	123.45	125.14
25.0	110.41	115.09	116.54	116.26	116.77	122.12	125.25	129.79	131.51	134.01	136.14	137.92	141.15	142.80	145.09	145.07	152.54	154.55
30.0	134.41	140.06	141.51	141.05	141.39	147.71	151.39	156.66	158.59	161.51	164.01	166.04	169.81	171.69	174.44	174.35	183.18	185.52
35.0	159.81	166.49	167.91	167.28	167.41	174.73	178.98	184.98	187.13	190.47	193.34	195.64	199.96	202.04	205.29	205.14	215.39	218.06
40.0	186.6	194.3	195.7	194.9	194.8	203.1	208.0	214.7	217.1	220.9	224.1	226.7	231.6	233.9	237.6	237.4	249.1	252.1
45.0	214.7	223.6	224.9	223.9	223.5	232.9	238.4	245.9	248.5	252.7	256.3	259.2	264.6	267.1	271.4	271.1	284.4	287.7
50.0	244.1	254.1	255.4	254.2	253.6	264.1	270.1	278.4	281.2	285.8	289.9	293.0	299.1	301.7	306.8	306.2	321.1	324.8
55.0	274.8	286.0	287.3	285.8	284.8	296.5	303.2	312.3	315.2	320.4	324.9	328.2	334.9	337.7	343.2	342.8	359.2	363.3
60.0	306.7	319.2	320.4	318.6	317.4	330.2	337.6	347.4	350.6	356.2	361.1	364.8	372.0	375.0	381.2	380.6	398.8	403.3
65.0	339.8	353.6	354.7	352.7	351.1	365.1	373.2	383.8	387.2	393.3	398.6	402.6	410.5	413.7	420.4	419.8	439.7	444.6
70.0	374.1	389.2	390.2	388.0	386.0	401.3	410.0	421.5	425.1	431.6	437.4	441.7	450.2	453.6	461.0	460.3	482.0	487.2
80.0	446.1	464.0	464.9	462.1	459.3	477.1	487.3	500.4	504.4	512.0	518.7	523.6	533.4	537.1	545.9	545.0	570.4	576.5
90.0	522.5	543.3	544.0	540.6	536.9	557.4	569.1	584.0	588.4	597.0	604.7	610.2	621.4	625.4	635.7	634.5	663.8	670.8
100.0	603.1	627.0	627.5	623.5	618.8	642.2	655.4	672.0	676.9	686.5	695.2	701.4	713.9	718.3	730.1	728.7	762.1	770.0
150.0	1065.	1106.	1105.	1098.	1087.	1126.	1148.	1174.	1181.	1196.	1211.	1220.	1240.	1246.	1267.	1264.	1320.	1333.
200.0	1613.	1675.	1673.	1661.	1642.	1700.	1731.	1767.	1777.	1798.	1819.	1833.	1861.	1869.	1900.	1895.	1964.	1997.
250.0	2233.	2318.	2319.	2302.	2274.	2352.	2392.	2440.	2450.	2479.	2509.	2525.	2562.	2575.	2616.	2610.	2685.	2742.
300.0	2914.	3022.	3032.	3012.	2974.	3069.	3116.	3178.	3187.	3225.	3266.	3284.	3329.	3347.	3401.	3392.	3473.	3556.
350.0	3647.	3781.	3800.	3777.	3728.	3841.	3896.	3971.	3980.	4026.	4080.	4099.	4153.	4177.	4246.	4233.	4321.	4430.
400.0	4426.	4588.	4615.	4589.	4528.	4660.	4724.	4813.	4821.	4877.	4943.	4964.	5027.	5058.	5139.	5124.	5219.	5357.
450.0	5246.	5437.	5473.	5445.	5371.	5522.	5595.	5698.	5706.	5772.	5850.	5873.	5946.	5983.	6079.	6061.	6164.	6331.
500.0	6102.	6323.	6369.	6337.	6250.	6422.	6503.	6622.	6629.	6705.	6797.	6822.	6904.	6947.	7059.	7038.	7149.	7346.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{239}_{93}$NP IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	203.9	143.2	121.4	115.0	115.8	101.6	87.0	82.4	79.5	77.0	72.0	67.2	63.6	61.3	60.4	58.0	51.8	53.8
3.0	205.9	153.3	125.5	119.1	120.2	106.3	91.4	86.9	84.0	81.8	76.5	71.6	67.9	65.5	64.6	62.2	56.2	57.8
3.5	205.3	159.1	127.6	121.4	122.7	109.2	94.2	89.8	87.0	84.9	79.6	74.6	70.9	68.5	67.6	65.2	59.4	60.7
4.0	203.0	162.4	128.6	122.5	123.9	110.9	96.0	91.7	88.9	87.0	81.6	76.6	72.9	70.6	69.7	67.3	61.7	62.8
4.5	200.0	163.9	128.8	122.8	124.4	111.8	97.0	92.8	90.1	88.4	82.9	77.9	74.3	72.0	71.2	68.7	63.5	64.3
5.0	196.5	164.2	128.5	122.5	124.2	112.1	97.4	93.4	90.8	89.2	83.7	78.8	75.2	73.0	72.1	69.7	64.7	65.3
5.5	192.7	163.7	127.8	121.9	123.8	112.1	97.5	93.6	91.1	89.6	84.2	79.3	75.8	73.6	72.8	70.4	65.7	66.1
6.0	188.9	162.7	126.8	121.1	123.0	111.7	97.4	93.6	91.2	89.8	84.4	79.5	76.1	73.9	73.2	70.8	66.3	66.5
6.5	185.0	161.3	125.7	120.1	122.1	111.2	97.0	93.3	91.0	89.7	84.4	79.6	76.2	74.1	73.3	71.1	66.8	66.8
7.0	181.3	159.6	124.5	119.0	121.0	110.5	96.5	92.9	90.7	89.5	84.2	79.5	76.1	74.1	73.4	71.1	67.0	66.9
8.0	174.0	155.9	121.8	116.6	118.7	108.8	95.2	91.8	89.8	88.7	83.5	78.9	75.7	73.8	73.1	71.0	67.2	66.9
9.0	167.2	151.9	119.0	114.0	116.2	106.9	93.7	90.5	88.6	87.7	82.5	78.1	75.0	73.1	72.5	70.5	67.0	66.5
10.0	160.9	147.9	116.3	111.4	113.7	104.9	92.1	89.1	87.2	86.4	81.4	77.1	74.1	72.4	71.8	69.8	66.6	65.9
11.0	155.0	143.9	113.6	108.9	111.2	102.9	90.4	87.5	85.8	85.1	80.2	76.0	73.1	71.5	70.9	69.0	66.1	65.3
12.0	149.6	140.0	111.0	106.5	108.7	100.9	88.8	86.0	84.3	83.8	78.9	74.9	72.1	70.5	70.0	68.2	65.4	64.5
15.0	135.6	129.4	103.8	99.7	102.0	95.1	84.0	81.5	80.1	79.7	75.2	71.4	68.9	67.5	67.1	65.4	63.2	62.1
20.0	118.0	115.0	93.8	90.2	92.4	86.9	76.9	74.9	73.7	73.5	69.4	66.1	63.8	62.7	62.4	61.0	59.3	58.1
25.0	105.0	103.8	85.8	82.6	84.8	80.1	71.1	69.3	68.3	68.3	64.5	61.5	59.5	58.6	58.3	57.1	55.7	54.5
30.0	96.0	94.9	79.4	76.5	78.5	74.5	66.2	64.6	63.8	63.8	60.4	57.6	55.7	55.0	54.8	53.7	52.6	51.3
35.0	87.0	87.6	74.0	71.4	73.3	69.7	62.1	60.7	59.9	60.1	56.8	54.3	52.5	51.9	51.8	50.8	49.8	48.6
40.0	80.52	81.60	69.46	67.03	68.91	65.70	58.55	57.28	56.64	56.79	53.72	51.37	49.75	49.20	49.09	48.22	47.33	46.18
45.0	75.09	76.51	65.57	63.31	65.12	62.22	55.50	54.33	53.76	53.95	51.05	48.84	47.32	46.84	46.76	45.96	45.17	44.06
50.0	70.48	72.14	62.20	60.08	61.82	59.18	52.83	51.75	51.24	51.44	48.69	46.61	45.17	44.75	44.69	43.95	43.23	42.18
55.0	66.51	68.35	59.25	57.25	58.92	56.50	50.47	49.47	49.00	49.22	46.60	44.63	43.26	42.89	42.85	42.16	41.50	40.49
60.0	63.06	65.03	56.63	54.74	56.34	54.11	48.37	47.43	47.00	47.23	44.72	42.85	41.55	41.22	41.19	40.55	39.94	38.97
65.0	60.02	62.08	54.29	52.49	54.04	51.96	46.48	45.59	45.20	45.44	43.04	41.25	40.00	39.71	39.69	39.09	38.52	37.60
70.0	57.32	59.46	52.18	50.47	51.97	50.03	44.77	43.93	43.57	43.82	41.51	39.80	38.60	38.34	38.32	37.76	37.23	36.35
80.0	52.74	54.97	48.55	46.98	48.39	46.67	41.60	41.05	40.73	40.99	38.84	37.26	36.15	35.93	35.94	35.44	34.96	34.15
90.0	48.99	51.26	45.51	44.05	45.39	43.85	39.30	38.61	38.34	38.60	36.58	35.11	34.08	33.90	33.91	33.46	33.01	32.27
100.0	45.85	48.14	42.93	41.57	42.83	41.44	37.16	36.53	36.29	36.56	34.65	33.27	32.30	32.14	32.16	31.75	31.33	30.65
150.0	35.56	37.77	34.17	33.13	34.14	33.19	29.83	29.36	29.22	29.49	27.97	26.90	26.12	26.05	26.08	25.80	25.47	25.00
200.0	29.77	32.17	29.27	28.33	29.03	28.47	25.58	25.10	25.16	25.44	24.11	23.72	22.92	22.42	22.50	22.19	22.40	21.61
250.0	26.34	28.60	26.12	25.29	25.86	25.48	22.90	22.23	22.56	22.82	21.64	21.29	20.58	20.16	20.23	19.89	20.16	19.47
300.0	23.95	26.09	23.89	23.14	23.67	23.35	21.00	20.20	20.70	20.95	19.87	19.54	18.90	18.53	18.61	18.30	18.54	17.92
350.0	22.18	24.23	22.23	21.53	22.03	21.75	19.57	18.85	19.31	19.55	18.54	18.23	17.64	17.31	17.38	17.10	17.33	16.76
400.0	20.83	22.81	20.94	20.28	20.77	20.51	18.46	17.80	18.22	18.46	17.51	17.21	16.66	16.36	16.43	16.17	16.38	15.85
450.0	19.77	21.67	19.92	19.29	19.76	19.53	17.58	16.97	17.36	17.59	16.69	16.40	15.88	15.60	15.67	15.42	15.62	15.12
500.0	18.91	20.76	19.09	18.49	18.94	18.72	16.86	16.29	16.66	16.88	16.02	15.74	15.24	14.98	15.05	14.81	15.01	14.53

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	50.20	47.80	47.78	48.09	47.61	44.84	43.42	40.97	40.07	39.00	38.24	37.60	36.23	35.77	35.37	35.46	34.00	33.61
3.0	54.12	51.59	51.55	51.88	51.46	48.58	47.10	44.59	43.68	42.57	41.77	41.10	39.69	39.17	38.72	38.81	37.16	36.73
3.5	56.93	54.30	54.25	54.60	54.23	51.30	49.78	47.26	46.36	45.22	44.39	43.71	42.28	41.72	41.23	41.32	39.53	39.07
4.0	58.96	56.27	56.21	56.57	56.25	53.30	51.75	49.25	48.36	47.22	46.37	45.68	44.24	43.66	43.13	43.23	41.32	40.84
4.5	60.42	57.70	57.62	57.99	57.73	54.78	53.22	50.74	49.87	48.72	47.87	47.18	45.74	45.15	44.59	44.68	42.69	42.19
5.0	61.46	58.72	58.64	59.02	58.80	55.86	54.30	51.85	51.00	49.86	49.00	48.31	46.89	46.28	45.70	45.80	43.74	43.23
5.5	62.19	59.44	59.36	59.74	59.57	56.64	55.08	52.68	51.85	50.72	49.86	49.18	47.77	47.16	46.55	46.65	44.54	44.02
6.0	62.68	59.93	59.85	60.23	60.10	57.20	55.65	53.29	52.48	51.35	50.50	49.82	48.43	47.82	47.20	47.29	45.15	44.62
6.5	62.99	60.24	60.16	60.55	60.45	57.58	56.04	53.72	52.94	51.82	50.97	50.30	48.93	48.32	47.68	47.77	45.60	45.06
7.0	63.15	60.42	60.33	60.72	60.66	57.82	56.29	54.01	53.25	52.15	51.30	50.64	49.29	48.68	48.03	48.13	45.93	45.39
8.0	63.16	60.45	60.37	60.76	60.75	57.98	56.48	54.29	53.57	52.49	51.66	51.02	49.71	49.11	48.44	48.53	46.31	45.77
9.0	62.87	60.20	60.13	60.52	60.56	57.85	56.39	54.28	53.59	52.54	51.73	51.10	49.83	49.25	48.57	48.66	46.43	45.89
10.0	62.40	59.77	59.70	60.09	60.17	57.53	56.10	54.07	53.41	52.40	51.60	50.99	49.76	49.19	48.50	48.59	46.37	45.83
11.0	61.80	59.22	59.16	59.54	59.66	57.09	55.69	53.73	53.10	52.11	51.33	50.74	49.55	49.00	48.30	48.39	46.17	45.64
12.0	61.13	58.59	58.54	58.92	59.07	56.56	55.19	53.30	52.70	51.74	50.97	50.40	49.24	48.71	48.01	48.10	45.90	45.37
15.0	58.91	56.51	56.47	56.85	57.06	54.72	53.44	51.73	51.20	50.31	49.59	49.07	48.00	47.52	46.82	46.91	44.77	44.27
20.0	55.19	52.99	52.97	53.33	53.62	51.51	50.36	48.87	48.43	47.64	46.99	46.52	45.58	45.18	44.48	44.57	42.56	42.10
25.0	51.83	49.78	49.79	50.13	50.46	48.54	47.49	46.17	45.79	45.08	44.48	44.06	43.21	42.87	42.20	42.28	40.39	39.96
30.0	48.88	46.97	46.99	47.32	47.67	45.89	44.93	43.74	43.40	42.76	42.20	41.82	41.04	40.75	40.10	40.18	38.41	38.01
35.0	46.30	44.51	44.54	44.86	45.22	43.56	42.67	41.58	41.28	40.69	40.17	39.82	39.10	38.85	38.22	38.30	36.62	36.25
40.0	44.03	42.34	42.39	42.69	43.06	41.51	40.67	39.67	39.40	38.84	38.36	38.04	37.37	37.14	36.54	36.62	35.02	34.67
45.0	42.03	40.43	40.48	40.77	41.14	39.68	38.89	37.96	37.71	37.19	36.74	36.44	35.81	35.61	35.03	35.11	33.59	33.25
50.0	40.25	38.72	38.78	39.06	39.43	38.04	37.30	36.43	36.20	35.72	35.28	35.00	34.41	34.23	33.67	33.75	32.29	31.98
55.0	38.65	37.19	37.25	37.53	37.90	36.58	35.87	35.05	34.84	34.38	33.97	33.70	33.14	32.98	32.44	32.51	31.12	30.82
60.0	37.21	35.81	35.88	36.14	36.51	35.25	34.58	33.80	33.61	33.17	32.78	32.53	31.99	31.85	31.32	31.40	30.06	29.77
65.0	35.91	34.56	34.63	34.89	35.25	34.04	33.40	32.67	32.48	32.07	31.69	31.45	30.95	30.81	30.30	30.37	29.09	28.81
70.0	34.72	33.42	33.49	33.74	34.10	32.94	32.33	31.63	31.46	31.06	30.70	30.47	29.98	29.86	29.37	29.44	28.20	27.93
80.0	32.62	31.41	31.49	31.72	32.08	31.00	30.43	29.79	29.64	29.28	28.94	28.73	28.28	28.17	27.71	27.78	26.61	26.37
90.0	30.84	29.70	29.78	30.00	30.35	29.34	28.81	28.22	28.08	27.75	27.43	27.24	26.82	26.73	26.29	26.35	25.25	25.02
100.0	29.30	28.22	28.30	28.51	28.86	27.90	27.40	26.86	26.73	26.42	26.12	25.94	25.55	25.46	25.05	25.11	24.07	23.85
150.0	23.90	23.03	23.11	23.29	23.60	22.84	22.45	22.05	21.96	21.72	21.49	21.35	21.05	20.99	20.65	20.71	19.86	19.69
200.0	20.67	19.95	19.94	20.10	20.38	19.74	19.42	19.09	19.02	18.83	18.63	18.52	18.27	18.21	17.93	17.98	17.73	17.15
250.0	18.63	17.98	17.78	17.92	18.19	17.66	17.48	17.17	17.18	16.98	16.73	16.69	16.51	16.38	16.12	16.17	16.05	15.53
300.0	17.16	16.57	16.38	16.43	16.67	16.29	16.12	15.84	15.85	15.67	15.44	15.41	15.24	15.13	14.89	14.94	14.82	14.36
350.0	16.04	15.49	15.32	15.38	15.60	15.25	15.09	14.83	14.84	14.68	14.47	14.44	14.28	14.18	13.96	14.00	13.89	13.47
400.0	15.18	14.66	14.50	14.55	14.77	14.43	14.29	14.05	14.06	13.90	13.70	13.68	13.54	13.44	13.23	13.27	13.17	12.77
450.0	14.48	13.99	13.85	13.89	14.10	13.78	13.64	13.42	13.43	13.28	13.09	13.07	12.94	12.85	12.65	12.69	12.58	12.21
500.0	13.92	13.44	13.31	13.35	13.56	13.25	13.12	12.90	12.92	12.77	12.60	12.57	12.46	12.36	12.17	12.21	12.10	11.75

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

239 93 NP IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.680	6.380	9.003	8.980	8.820	10.499	11.340	11.906	12.320	12.780	13.070	14.000	14.470	15.057	15.280	15.521	15.981	16.390
3.0	7.262	7.184	9.970	9.999	9.831	11.647	12.677	13.315	13.779	14.283	14.676	15.719	16.284	16.939	17.189	17.507	18.192	18.528
3.5	7.843	7.948	10.913	10.992	10.814	12.755	13.963	14.665	15.175	15.715	16.205	17.352	18.004	18.720	18.994	19.381	20.257	20.640
4.0	8.428	8.691	11.845	11.971	11.783	13.840	15.218	15.981	16.533	17.104	17.687	18.931	19.665	20.437	20.733	21.185	22.229	22.473
4.5	9.021	9.423	12.773	12.945	12.745	14.913	16.457	17.276	17.867	18.466	19.139	20.477	21.287	22.112	22.429	22.941	24.136	24.352
5.0	9.624	10.151	13.702	13.920	13.706	15.980	17.686	18.559	19.187	19.812	20.572	22.001	22.884	23.760	24.096	24.666	25.999	26.195
5.5	10.238	10.880	14.635	14.897	14.670	17.045	18.911	19.837	20.500	21.148	21.995	23.512	24.466	25.391	25.744	26.371	27.831	28.014
6.0	10.864	11.612	15.573	15.880	15.638	18.113	20.137	21.114	21.811	22.479	23.413	25.016	26.040	27.011	27.382	28.062	29.641	29.816
6.5	11.504	12.349	16.520	16.871	16.613	19.185	21.367	22.392	23.123	23.810	24.829	26.518	27.609	28.626	29.013	29.746	31.437	31.608
7.0	12.156	13.094	17.475	17.871	17.596	20.263	22.601	23.676	24.438	25.144	26.247	28.020	29.178	30.238	30.642	31.426	33.223	33.395
8.0	13.50	14.61	19.42	19.90	19.59	22.44	25.09	26.26	27.09	27.82	29.10	31.04	32.32	33.47	33.90	34.79	36.78	36.97
9.0	14.90	16.16	21.40	21.97	21.63	24.66	27.62	28.88	29.77	30.63	31.98	34.08	35.50	36.72	37.19	38.17	40.34	40.55
10.0	16.36	17.76	23.43	24.09	23.71	26.92	30.19	31.54	32.49	33.28	34.89	37.16	38.70	40.01	40.50	41.57	43.92	44.16
11.0	17.87	19.39	25.51	26.26	25.83	29.22	32.81	34.25	35.25	36.06	37.85	40.28	41.95	43.33	43.85	45.02	47.52	47.80
12.0	19.44	21.08	27.64	28.48	28.01	31.56	35.48	37.01	38.06	38.89	40.85	43.45	45.24	46.70	47.24	48.50	51.16	51.49
15.0	24.48	26.41	34.33	35.45	34.82	38.89	43.79	45.57	46.78	47.67	50.16	53.25	55.42	57.09	57.70	59.23	62.31	62.81
20.0	33.96	36.22	46.46	48.07	47.15	52.05	58.67	60.88	62.35	63.29	66.71	70.65	73.45	75.47	76.18	78.15	81.84	82.72
25.0	44.72	47.18	59.80	61.92	60.66	66.39	74.85	77.49	79.21	80.16	84.58	89.40	92.86	95.20	95.99	98.40	102.64	103.98
30.0	56.70	59.24	74.29	76.97	75.32	81.88	92.29	95.37	97.32	98.27	103.74	109.48	113.63	116.27	117.14	119.98	124.73	126.60
35.0	69.86	72.36	89.90	93.16	91.08	98.48	110.95	114.46	116.66	117.58	124.17	130.87	135.73	138.66	139.59	142.87	148.10	150.55
40.0	84.15	86.50	106.58	110.45	107.90	116.14	130.78	134.75	137.18	138.05	145.81	153.51	159.12	162.32	163.31	167.03	172.73	175.79
45.0	99.53	101.64	124.30	128.80	125.75	134.84	151.76	156.18	158.84	159.65	168.64	177.38	183.76	187.23	188.26	192.42	198.59	202.29
50.0	115.97	117.73	143.02	148.19	144.60	154.54	173.83	178.72	181.62	182.35	192.62	202.43	209.62	213.34	214.41	219.02	225.64	230.02
55.0	133.43	134.76	162.71	168.57	164.41	175.22	196.99	202.35	205.48	206.10	217.72	228.64	236.66	240.62	241.72	246.79	253.86	258.95
60.0	151.90	152.69	183.35	189.93	185.15	196.84	221.18	227.03	230.39	230.90	243.90	255.97	264.85	269.05	270.18	275.69	283.22	289.04
65.0	171.3	171.5	204.9	212.2	206.8	219.4	246.4	252.7	256.3	256.7	271.2	284.4	294.2	298.6	299.7	305.7	313.7	320.3
70.0	191.7	191.2	227.4	235.5	229.4	242.8	272.6	279.4	283.3	283.5	299.4	313.9	324.6	329.2	330.4	336.8	345.3	352.6
80.0	236.2	233.0	274.9	284.6	277.1	292.3	327.9	335.8	340.0	339.9	359.0	376.0	388.6	393.7	394.8	402.2	411.6	420.5
90.0	282.3	278.1	325.8	337.2	328.1	345.2	386.9	395.8	400.6	400.0	422.5	442.1	456.7	462.2	463.3	471.7	482.0	492.5
100.0	332.7	326.2	379.9	393.0	382.4	401.3	449.5	459.5	464.7	463.7	489.6	512.1	528.8	534.6	535.8	545.0	556.3	568.5
150.0	632.1	609.5	694.9	718.1	697.8	726.5	811.6	827.6	834.9	830.8	876.7	915.0	943.7	951.1	951.7	966.0	982.7	1003.7
200.0	1001.6	954.5	1075.1	1110.7	1079.4	1117.6	1246.9	1269.9	1278.3	1269.7	1339.7	1386.2	1431.5	1448.2	1447.9	1467.7	1482.5	1520.6
250.0	1429.9	1349.7	1508.6	1558.4	1517.3	1562.6	1742.1	1777.4	1781.4	1767.0	1864.4	1919.5	1983.2	2011.9	2009.5	2038.8	2046.2	2104.8
300.0	1906.8	1788.1	1987.8	2053.4	2001.2	2053.5	2288.0	2342.9	2335.4	2314.5	2441.8	2506.5	2590.3	2631.4	2626.5	2666.4	2665.4	2745.7
350.0	2426.1	2264.1	2507.1	2589.6	2526.1	2584.5	2878.3	2956.2	2934.0	2905.8	3065.2	3140.4	3245.6	3299.5	3291.8	3342.9	3332.9	3436.1
400.0	2983.	2773.	3061.	3162.	3084.	3151.	3508.	3609.	3572.	3536.	3729.	3816.	3943.	4011.	4000.	4062.	4043.	4170.
450.0	3572.	3311.	3647.	3767.	3675.	3748.	4172.	4297.	4244.	4199.	4428.	4527.	4679.	4759.	4745.	4820.	4790.	4942.
500.0	4191.	3875.	4260.	4400.	4293.	4374.	4868.	5017.	4947.	4893.	5160.	5271.	5448.	5542.	5524.	5611.	5571.	5749.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.19	17.82	19.21	19.57	20.28	21.29	21.89	22.67	23.13	23.57	24.03	24.51	25.00	25.45	26.06	26.28	28.11	28.68
3.0	19.48	20.22	21.61	21.95	22.68	23.84	24.53	25.46	25.98	26.50	27.01	27.54	28.14	28.63	29.28	29.49	31.46	32.07
3.5	21.63	22.47	23.87	24.19	24.94	26.23	26.99	28.06	28.63	29.22	29.78	30.36	31.05	31.59	32.27	32.47	34.57	35.22
4.0	23.69	24.63	26.03	26.34	27.10	28.51	29.34	30.53	31.15	31.80	32.41	33.03	33.81	34.38	35.10	35.29	37.53	38.21
4.5	25.69	26.73	28.13	28.43	29.20	30.72	31.62	32.92	33.58	34.29	34.95	35.60	36.47	37.07	37.82	38.01	40.37	41.09
5.0	27.65	28.78	30.18	30.47	31.25	32.88	33.84	35.25	35.95	36.71	37.41	38.10	39.05	39.68	40.47	40.65	43.13	43.88
5.5	29.58	30.80	32.21	32.48	33.27	35.00	36.02	37.53	38.27	39.09	39.83	40.56	41.57	42.24	43.06	43.24	45.84	46.62
6.0	31.49	32.81	34.21	34.47	35.26	37.10	38.18	39.79	40.56	41.43	42.21	42.97	44.05	44.76	45.60	45.78	48.50	49.32
6.5	33.40	34.79	36.20	36.45	37.25	39.19	40.32	42.02	42.83	43.75	44.57	45.36	46.51	47.24	48.12	48.29	51.14	51.98
7.0	35.29	36.77	38.18	38.42	39.22	41.26	42.45	44.24	45.08	46.04	46.90	47.72	48.94	49.71	50.62	50.78	53.75	54.62
8.0	39.07	40.73	42.14	42.35	43.15	45.38	46.68	48.65	49.55	50.61	51.54	52.42	53.77	54.59	55.57	55.73	58.93	59.86
9.0	42.86	44.69	46.11	46.29	47.09	49.51	50.92	53.05	54.01	55.16	56.17	57.10	58.57	59.45	60.50	60.64	64.08	65.08
10.0	46.68	48.67	50.10	50.26	51.05	53.65	55.17	57.46	58.48	59.71	60.79	61.78	63.36	64.30	65.42	65.56	69.23	70.29
11.0	50.53	52.69	54.12	54.25	55.04	57.82	59.44	61.89	62.96	64.29	65.43	66.48	68.18	69.17	70.36	70.48	74.39	75.51
12.0	54.41	56.74	58.18	58.29	59.07	62.02	63.75	66.36	67.48	68.89	70.11	71.20	73.02	74.06	75.32	75.44	79.58	80.76
15.0	66.36	69.20	70.64	70.67	71.41	74.91	76.95	80.01	81.27	82.93	84.36	85.61	87.76	88.96	90.43	90.52	95.39	96.75
20.0	87.32	91.04	92.50	92.38	93.02	97.42	99.98	103.77	105.27	107.34	109.11	110.62	113.30	114.74	116.61	116.65	122.76	124.43
25.0	109.67	114.32	115.77	115.50	116.00	121.32	124.43	128.94	130.65	133.13	135.25	137.02	140.23	141.89	144.20	144.18	151.59	153.57
30.0	133.43	139.05	140.49	140.04	140.38	146.66	150.31	155.54	157.47	160.36	162.84	164.86	168.62	170.49	173.26	173.18	181.94	184.24
35.0	158.56	165.20	166.62	165.99	166.13	173.39	177.61	183.57	185.71	189.02	191.88	194.16	198.46	200.54	203.79	203.65	213.81	216.45
40.0	185.0	192.7	194.1	193.3	193.2	201.5	206.3	213.0	215.4	219.1	222.3	224.9	229.7	232.0	235.8	235.6	247.2	250.2
45.0	212.8	221.6	223.0	222.0	221.6	231.0	236.4	243.8	246.4	250.5	254.2	257.0	262.4	264.9	269.2	268.9	282.0	286.4
50.0	241.9	251.8	253.2	251.9	251.3	261.7	267.8	276.0	278.7	283.3	287.4	290.5	296.5	299.1	304.0	303.6	318.3	322.0
55.0	272.2	283.3	284.6	283.1	282.2	293.8	300.4	309.4	312.4	317.4	321.9	325.3	331.9	334.7	340.2	339.7	356.0	360.1
60.0	303.7	316.1	317.3	315.6	314.4	327.1	334.4	344.1	347.3	352.8	357.7	361.4	368.6	371.6	377.7	377.1	395.1	399.6
65.0	336.4	350.1	351.2	349.3	347.7	361.6	369.5	380.1	383.5	389.5	394.8	398.7	406.5	409.7	416.5	415.8	435.5	440.4
70.0	370.3	385.2	386.3	384.1	382.2	397.3	405.9	417.3	420.9	427.4	433.1	437.3	445.8	449.1	456.5	455.8	477.3	482.5
80.0	441.3	459.1	460.0	457.2	454.5	472.1	482.2	495.2	499.2	506.7	513.4	518.2	527.9	531.6	540.4	539.4	564.6	570.6
90.0	516.7	537.4	538.1	534.7	531.1	551.4	562.9	577.7	582.1	590.6	598.2	603.6	614.7	618.7	629.0	627.8	656.8	663.7
100.0	596.3	620.0	620.5	616.5	611.9	635.0	648.0	664.5	669.3	678.9	687.5	693.6	706.1	710.4	722.2	720.8	753.8	761.6
150.0	1051.	1092.	1091.	1084.	1073.	1112.	1133.	1159.	1166.	1181.	1196.	1205.	1225.	1231.	1251.	1249.	1304.	1317.
200.0	1592.	1653.	1651.	1639.	1621.	1677.	1708.	1744.	1753.	1775.	1795.	1809.	1837.	1845.	1875.	1870.	1938.	1971.
250.0	2202.	2285.	2287.	2270.	2243.	2320.	2359.	2407.	2416.	2445.	2475.	2491.	2527.	2539.	2581.	2574.	2648.	2704.
300.0	2872.	2979.	2989.	2969.	2931.	3025.	3072.	3132.	3142.	3179.	3220.	3237.	3282.	3300.	3353.	3344.	3425.	3506.
350.0	3593.	3726.	3744.	3721.	3673.	3785.	3839.	3913.	3922.	3968.	4020.	4039.	4093.	4117.	4183.	4171.	4258.	4366.
400.0	4360.	4520.	4546.	4521.	4461.	4591.	4654.	4742.	4750.	4805.	4870.	4890.	4953.	4983.	5064.	5049.	5143.	5278.
450.0	5166.	5355.	5390.	5362.	5290.	5439.	5510.	5613.	5620.	5685.	5762.	5785.	5857.	5893.	5988.	5970.	6072.	6236.
500.0	6008.	6227.	6271.	6240.	6155.	6324.	6404.	6521.	6528.	6603.	6693.	6718.	6799.	6842.	6952.	6931.	7041.	7234.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{239}_{94}$PU IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	205.7	143.6	122.1	115.8	116.5	102.1	87.5	82.9	79.9	77.4	72.4	67.5	63.9	61.5	60.6	58.2	52.0	54.0
3.0	208.0	154.0	126.4	120.0	121.0	107.0	92.0	87.5	84.5	82.2	77.0	72.0	68.3	65.9	65.0	62.5	56.5	58.2
3.5	207.5	160.2	128.7	122.3	123.6	110.0	94.9	90.5	87.6	85.5	80.1	75.1	71.3	68.9	68.0	65.6	59.8	61.1
4.0	205.3	163.6	129.7	123.5	124.9	111.8	96.7	92.4	89.6	87.7	82.2	77.1	73.5	71.1	70.2	67.7	62.2	63.2
4.5	202.3	166.3	130.0	123.9	126.5	112.7	97.8	93.5	90.9	89.1	83.6	78.5	74.9	72.5	71.7	69.2	64.0	64.8
5.0	198.9	165.7	129.7	123.7	126.4	113.1	98.3	94.2	91.6	89.9	84.4	79.5	75.8	73.5	72.7	70.3	65.3	65.9
5.5	195.2	165.3	129.0	123.1	125.0	113.1	98.4	94.5	91.9	90.4	84.9	80.0	76.4	74.2	73.4	71.0	66.2	66.6
6.0	191.3	164.4	128.1	122.3	124.2	112.8	98.3	94.4	92.0	90.6	85.1	80.3	76.8	74.6	73.8	71.5	66.9	67.1
6.5	187.5	163.0	127.0	121.4	123.3	112.3	98.0	94.2	91.9	90.6	85.2	80.3	76.9	74.8	74.0	71.7	67.4	67.4
7.0	183.7	161.4	126.8	120.3	122.3	111.8	97.5	93.9	91.6	90.4	85.0	80.2	76.9	74.8	74.1	71.8	67.6	67.5
8.0	176.4	157.8	123.2	117.9	120.0	110.0	96.3	92.8	90.7	89.7	84.4	79.7	76.5	74.5	73.8	71.7	67.9	67.5
9.0	169.6	153.8	120.4	116.3	117.5	108.1	94.8	91.5	89.5	88.6	83.4	78.9	75.8	73.9	73.3	71.2	67.7	67.2
10.0	163.2	149.8	117.7	112.8	115.0	106.1	93.2	90.1	88.2	87.4	82.3	78.0	74.9	73.1	72.6	70.6	67.3	66.6
11.0	157.3	145.8	115.0	110.2	112.5	104.1	91.5	88.6	86.8	86.1	81.1	76.9	73.9	72.3	71.7	69.8	66.8	66.0
12.0	151.9	141.9	112.4	107.8	110.1	102.1	89.8	87.0	85.3	84.8	79.9	75.8	72.9	71.3	70.8	68.9	66.2	65.2
15.0	137.8	131.3	105.2	101.0	103.3	96.3	85.0	82.5	81.1	80.7	76.1	72.3	69.7	68.3	67.9	66.2	63.9	62.8
20.0	120.0	116.8	96.1	91.5	93.7	88.1	78.0	75.9	74.7	74.5	70.4	67.0	64.7	63.6	63.3	61.8	60.1	58.8
25.0	106.8	105.5	87.1	83.9	86.0	81.2	72.1	70.3	69.3	69.3	65.4	62.4	60.3	59.4	59.2	57.9	56.5	55.2
30.0	96.7	96.5	80.6	77.7	79.7	75.6	67.2	65.6	64.7	64.8	61.2	58.5	56.6	55.8	55.6	54.5	53.3	52.1
35.0	88.6	89.1	75.2	72.5	74.5	70.8	63.0	61.6	60.9	61.0	57.7	55.1	53.3	52.7	52.5	51.6	50.5	49.3
40.0	81.98	83.01	70.58	68.11	70.02	66.75	59.48	58.18	57.53	57.68	54.56	52.17	50.52	49.96	49.85	48.96	48.06	46.88
45.0	76.46	77.85	66.66	64.36	66.19	63.23	56.40	55.21	54.63	54.81	51.86	49.62	48.07	47.58	47.50	46.68	45.87	44.75
50.0	71.78	73.43	63.25	61.09	62.85	60.16	53.70	52.60	52.07	52.28	49.48	47.37	45.90	45.47	45.41	44.66	43.93	42.85
55.0	67.76	69.58	60.26	58.22	59.92	57.44	51.31	50.29	49.81	50.03	47.37	45.36	43.97	43.59	43.55	42.85	42.18	41.15
60.0	64.25	66.21	57.61	55.68	57.31	55.03	49.18	48.23	47.79	48.02	45.47	43.57	42.24	41.90	41.87	41.22	40.60	39.62
65.0	61.16	63.22	55.24	53.41	54.98	52.86	47.27	46.37	45.97	46.21	43.77	41.95	40.68	40.38	40.36	39.75	39.16	38.23
70.0	58.42	60.56	53.11	51.36	52.89	50.90	45.54	44.69	44.32	44.57	42.22	40.48	39.26	38.99	38.98	38.41	37.86	36.96
80.0	53.76	56.00	49.42	47.82	49.25	47.50	42.54	41.77	41.45	41.71	39.52	37.91	36.78	36.56	36.56	36.05	35.56	34.74
90.0	49.95	52.23	46.34	44.86	46.21	44.64	40.01	39.30	39.02	39.29	37.24	35.74	34.68	34.50	34.51	34.05	33.59	32.84
100.0	46.76	49.06	43.72	42.34	43.62	42.20	37.84	37.19	36.94	37.22	35.28	33.87	32.88	32.72	32.74	32.32	31.90	31.20
150.0	36.28	38.52	34.83	33.76	34.79	33.82	30.40	29.92	29.77	30.05	28.51	27.41	26.62	26.54	26.58	26.28	25.95	25.47
200.0	30.38	32.82	29.85	28.89	29.60	29.04	26.08	25.59	25.65	25.94	24.58	24.18	23.37	22.86	22.94	22.62	22.84	22.03
250.0	26.88	29.18	26.65	25.80	26.39	25.99	23.36	22.67	23.01	23.28	22.07	21.71	20.99	20.56	20.64	20.28	20.56	19.85
300.0	24.45	26.63	24.38	23.61	24.15	23.82	21.42	20.61	21.12	21.38	20.27	19.94	19.28	18.90	18.98	18.67	18.92	18.28
350.0	22.65	24.74	22.69	21.97	22.49	22.20	19.97	19.24	19.70	19.95	18.92	18.61	18.00	17.66	17.74	17.45	17.68	17.10
400.0	21.27	23.28	21.38	20.70	21.20	20.94	18.84	18.17	18.60	18.84	17.87	17.57	17.00	16.69	16.77	16.50	16.72	16.18
450.0	20.18	22.13	20.34	19.69	20.17	19.93	17.94	17.32	17.72	17.95	17.04	16.74	16.21	15.92	15.99	15.74	15.95	15.44
500.0	19.31	21.20	19.49	18.87	19.34	19.12	17.21	16.63	17.01	17.23	16.36	16.07	15.56	15.29	15.36	15.12	15.32	14.83

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	50.41	48.00	47.97	48.29	47.81	45.02	43.60	41.13	40.23	39.16	38.39	37.75	36.38	35.91	35.51	35.60	34.13	33.74
3.0	54.41	51.86	51.81	52.15	51.72	48.83	47.34	44.82	43.91	42.79	41.98	41.31	39.89	39.37	38.92	39.01	37.35	36.92
3.5	57.28	54.64	54.58	54.93	54.56	51.61	50.08	47.54	46.63	45.49	44.66	43.97	42.53	41.97	41.47	41.57	39.76	39.30
4.0	59.36	56.65	56.58	56.95	56.63	53.66	52.10	49.57	48.68	47.53	46.68	45.98	44.54	43.95	43.42	43.51	41.60	41.11
4.5	60.86	58.12	58.04	58.42	58.15	55.17	53.60	51.10	50.23	49.07	48.21	47.51	46.07	45.47	44.91	45.00	43.00	42.49
5.0	61.95	59.18	59.10	59.48	59.26	56.29	54.71	52.25	51.40	50.24	49.37	48.68	47.25	46.64	46.05	46.14	44.07	43.55
5.5	62.71	59.93	59.85	60.23	60.05	57.10	55.53	53.11	52.27	51.13	50.26	49.57	48.15	47.53	46.93	47.02	44.90	44.37
6.0	63.23	60.45	60.36	60.75	60.61	57.69	56.12	53.74	52.93	51.79	50.92	50.24	48.84	48.22	47.59	47.69	45.53	44.99
6.5	63.56	60.78	60.70	61.09	60.99	58.09	56.53	54.19	53.40	52.27	51.41	50.74	49.36	48.74	48.10	48.19	46.00	45.46
7.0	63.74	60.98	60.89	61.28	61.21	58.34	56.80	54.51	53.74	52.62	51.77	51.10	49.74	49.12	48.47	48.56	46.35	45.80
8.0	63.78	61.04	60.96	61.35	61.34	58.54	57.03	54.82	54.08	53.00	52.16	51.51	50.18	49.58	48.90	49.00	46.76	46.21
9.0	63.52	60.82	60.74	61.13	61.17	58.44	56.96	54.83	54.13	53.07	52.25	51.62	50.33	49.74	49.05	49.15	46.89	46.35
10.0	63.06	60.41	60.34	60.73	60.81	58.14	56.69	54.64	53.98	52.96	52.14	51.52	50.28	49.71	49.00	49.10	46.85	46.30
11.0	62.48	59.87	59.81	60.19	60.31	57.71	56.29	54.31	53.68	52.68	51.89	51.29	50.08	49.53	48.82	48.91	46.67	46.13
12.0	61.83	59.26	59.20	59.58	59.73	57.19	55.81	53.90	53.29	52.32	51.54	50.96	49.79	49.25	48.54	48.63	46.40	45.87
15.0	59.63	57.19	57.15	57.53	57.75	55.38	54.08	52.35	51.81	50.91	50.18	49.65	48.57	48.09	47.37	47.46	45.30	44.79
20.0	55.92	53.68	53.66	54.03	54.31	52.18	51.01	49.50	49.06	48.26	47.59	47.12	46.16	45.76	45.05	45.14	43.10	42.63
25.0	52.54	50.47	50.48	50.82	51.15	49.20	48.14	46.80	46.41	45.69	45.08	44.66	43.79	43.45	42.77	42.86	40.94	40.50
30.0	49.58	47.64	47.67	48.00	48.35	46.55	45.57	44.36	44.02	43.36	42.80	42.42	41.62	41.33	40.67	40.75	38.95	38.54
35.0	46.98	45.17	45.20	45.52	45.89	44.21	43.30	42.19	41.89	41.28	40.76	40.41	39.67	39.42	38.78	38.86	37.16	36.78
40.0	44.70	42.99	43.03	43.34	43.71	42.14	41.28	40.27	39.99	39.43	38.94	38.61	37.93	37.70	37.09	37.17	35.55	35.19
45.0	42.69	41.06	41.11	41.41	41.78	40.29	39.49	38.55	38.30	37.77	37.31	37.00	36.36	36.16	35.57	35.65	34.10	33.77
50.0	40.89	39.34	39.40	39.68	40.06	38.65	37.89	37.01	36.77	36.28	35.84	35.55	34.95	34.77	34.20	34.28	32.80	32.48
55.0	39.28	37.79	37.86	38.13	38.51	37.17	36.45	35.62	35.40	34.93	34.52	34.24	33.68	33.51	32.96	33.03	31.62	31.32
60.0	37.82	36.40	36.47	36.74	37.11	35.83	35.14	34.36	34.16	33.71	33.31	33.06	32.52	32.37	31.83	31.91	30.55	30.26
65.0	36.51	35.14	35.21	35.47	35.84	34.61	33.95	33.21	33.02	32.60	32.22	31.97	31.46	31.32	30.80	30.87	29.57	29.29
70.0	35.30	33.98	34.05	34.31	34.68	33.49	32.87	32.16	31.98	31.58	31.21	30.98	30.49	30.36	29.86	29.93	28.66	28.40
80.0	33.19	31.95	32.03	32.27	32.63	31.53	30.95	30.31	30.15	29.78	29.44	29.22	28.77	28.66	28.18	28.25	27.07	26.82
90.0	31.38	30.22	30.30	30.53	30.88	29.85	29.31	28.72	28.57	28.23	27.91	27.71	27.29	27.19	26.74	26.81	25.69	25.46
100.0	29.82	28.72	28.80	29.02	29.37	28.40	27.89	27.34	27.21	26.89	26.59	26.40	26.00	25.91	25.49	25.55	24.49	24.27
150.0	24.35	23.47	23.54	23.73	24.04	23.27	22.87	22.46	22.37	22.13	21.89	21.75	21.44	21.38	21.03	21.09	20.23	20.05
200.0	21.07	20.34	20.32	20.49	20.78	20.12	19.79	19.46	19.39	19.20	18.99	18.87	18.62	18.56	18.27	18.33	18.07	17.48
250.0	19.00	18.34	18.13	18.27	18.55	18.01	17.83	17.51	17.52	17.32	17.06	17.02	16.83	16.70	16.43	16.49	16.36	15.84
300.0	17.50	16.90	16.71	16.76	17.01	16.61	16.45	16.16	16.17	15.99	15.75	15.72	15.55	15.43	15.19	15.24	15.12	14.65
350.0	16.37	15.81	15.64	15.69	15.92	15.56	15.40	15.14	15.15	14.98	14.76	14.73	14.57	14.47	14.24	14.29	14.17	13.74
400.0	15.49	14.96	14.80	14.85	15.07	14.73	14.58	14.34	14.35	14.19	13.99	13.96	13.81	13.72	13.50	13.54	13.43	13.03
450.0	14.78	14.28	14.13	14.18	14.39	14.07	13.92	13.69	13.71	13.56	13.36	13.34	13.20	13.11	12.91	12.95	12.84	12.46
500.0	14.21	13.72	13.59	13.63	13.84	13.53	13.39	13.17	13.18	13.04	12.86	12.83	12.70	12.62	12.42	12.46	12.35	12.00

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{239}_{94}$PU IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.630	6.330	8.934	8.910	8.750	10.404	11.240	11.808	12.220	12.670	12.960	13.880	14.350	14.939	15.160	15.397	15.848	16.250
3.0	7.207	7.131	9.694	9.922	9.755	11.545	12.569	13.209	13.671	14.164	14.557	15.590	16.155	16.811	17.069	17.373	18.048	18.377
3.5	7.782	7.890	10.830	10.908	10.731	12.646	13.847	14.550	15.058	15.588	16.077	17.213	17.864	18.582	18.854	19.236	20.101	20.379
4.0	8.360	8.627	11.755	11.879	11.692	13.723	15.093	15.857	16.406	16.967	17.548	18.782	19.514	20.287	20.581	21.028	22.060	22.299
4.5	8.947	9.353	12.674	12.845	12.646	14.787	16.321	17.142	17.730	18.319	18.989	20.316	21.124	21.950	22.265	22.772	23.954	24.165
5.0	9.542	10.075	13.595	13.810	13.598	15.844	17.540	18.414	19.039	19.653	20.411	21.828	22.709	23.586	23.919	24.484	25.802	25.994
5.5	10.149	10.797	14.518	14.778	14.552	16.900	18.755	19.681	20.341	20.978	21.822	23.326	24.277	25.203	25.554	26.174	27.619	27.797
6.0	10.767	11.522	15.448	15.752	15.511	17.958	19.969	20.946	21.640	22.298	23.227	24.817	25.837	26.809	27.177	27.851	29.414	29.584
6.5	11.398	12.262	16.384	16.733	16.477	19.020	21.187	22.213	22.940	23.616	24.630	26.305	27.392	28.409	28.794	29.520	31.194	31.361
7.0	12.042	12.988	17.330	17.722	17.449	20.087	22.410	23.483	24.242	24.937	26.034	27.793	28.946	30.007	30.408	31.185	32.964	33.132
8.0	13.37	14.49	19.25	19.73	19.42	22.24	24.88	26.04	26.86	27.59	28.86	30.78	32.06	33.21	33.64	34.51	36.49	36.67
9.0	14.75	16.02	21.21	21.78	21.43	24.44	27.38	28.64	29.52	30.27	31.70	33.79	35.20	36.43	36.89	37.86	40.01	40.22
10.0	16.19	17.59	23.22	23.87	23.49	26.67	29.92	31.27	32.21	32.99	34.59	36.84	38.37	39.68	40.16	41.23	43.55	43.79
11.0	17.68	19.21	25.27	26.02	25.59	28.94	32.51	33.94	34.94	35.74	37.51	39.92	41.58	42.96	43.48	44.64	47.12	47.39
12.0	19.23	20.87	27.38	28.21	27.74	31.26	35.15	36.67	37.71	38.54	40.48	43.05	44.84	46.29	46.83	48.08	50.71	51.03
15.0	24.19	26.13	33.98	35.09	34.47	38.49	43.35	45.13	46.33	47.21	49.68	52.74	54.89	56.57	57.17	58.69	61.73	62.23
20.0	33.51	35.80	45.94	47.54	46.63	51.48	58.04	60.24	61.70	62.62	66.01	69.91	72.70	74.71	75.41	77.36	81.01	81.89
25.0	44.09	46.59	59.09	61.19	59.95	65.62	74.00	76.62	78.32	79.27	83.64	88.41	91.84	94.17	94.96	97.34	101.54	102.87
30.0	55.87	58.45	73.37	76.02	74.39	80.89	91.18	94.24	96.18	97.12	102.53	108.21	112.32	114.95	115.81	118.62	123.32	125.17
35.0	68.80	71.35	88.74	91.96	89.91	97.24	109.56	113.05	115.23	116.14	122.65	129.28	134.09	137.00	137.93	141.18	146.36	148.77
40.0	82.84	85.26	105.15	108.97	106.47	114.63	129.09	133.02	135.43	136.30	143.97	151.58	157.13	160.31	161.29	164.97	170.62	173.63
45.0	97.94	100.13	122.59	127.03	124.03	133.03	149.73	154.12	156.76	157.57	166.44	175.08	181.39	184.83	185.86	189.98	196.08	199.73
50.0	114.09	116.95	141.00	146.10	142.57	152.42	171.46	176.30	179.18	179.90	190.04	199.73	206.84	210.54	211.60	216.16	222.71	227.03
55.0	131.23	132.67	160.36	166.16	162.05	172.75	194.23	199.55	202.65	203.27	214.73	225.52	233.45	237.39	238.48	243.48	250.48	255.50
60.0	149.35	150.29	180.65	187.14	182.45	194.02	218.03	223.82	227.15	227.66	240.49	252.41	261.18	265.36	266.48	271.92	279.36	285.10
65.0	168.4	168.8	201.8	209.1	203.7	216.2	242.8	249.1	252.6	253.0	267.3	280.4	290.0	294.4	295.6	301.5	309.3	315.8
70.0	188.4	188.1	223.9	231.9	225.9	239.2	268.6	275.4	279.1	279.4	295.1	309.4	319.9	324.5	325.7	332.0	340.4	347.6
80.0	231.1	229.2	270.6	280.2	272.8	287.9	322.9	330.7	334.9	334.8	353.6	370.4	382.9	387.9	389.1	396.3	405.6	414.4
90.0	277.3	273.4	320.6	331.8	322.9	339.8	380.9	389.7	394.4	393.9	416.0	435.4	449.8	455.2	456.4	464.6	474.8	485.2
100.0	326.8	320.6	373.7	386.7	376.2	394.9	442.4	452.3	457.4	456.4	482.0	504.1	520.6	526.4	527.5	536.7	547.8	559.9
150.0	620.3	598.5	682.8	705.7	685.8	714.1	797.9	813.6	820.8	816.8	862.0	899.6	928.0	935.3	935.9	950.0	966.5	987.1
200.0	982.3	936.7	1055.8	1090.8	1060.0	1097.8	1224.9	1247.5	1255.9	1247.4	1316.2	1362.0	1406.5	1423.0	1422.7	1442.2	1466.8	1494.3
250.0	1402.0	1324.1	1480.7	1529.7	1489.3	1534.1	1710.4	1745.1	1749.1	1735.1	1830.7	1885.0	1947.6	1975.8	1973.5	2002.4	2009.7	2067.2
300.0	1869.2	1753.7	1950.5	2014.8	1963.6	2015.2	2245.5	2299.5	2292.2	2271.8	2396.8	2460.4	2542.7	2583.1	2578.4	2617.6	2616.7	2695.6
350.0	2377.9	2220.0	2469.2	2540.2	2477.1	2535.6	2824.0	2900.5	2878.8	2851.3	3007.7	3081.7	3185.0	3238.0	3230.5	3280.6	3271.0	3372.2
400.0	2923.	2719.	3008.	3101.	3025.	3091.	3441.	3540.	3504.	3468.	3658.	3743.	3869.	3935.	3924.	3986.	3967.	4091.
450.0	3500.	3246.	3576.	3693.	3603.	3676.	4091.	4214.	4162.	4119.	4343.	4441.	4589.	4668.	4654.	4728.	4699.	4848.
500.0	4106.	3798.	4177.	4314.	4209.	4289.	4771.	4919.	4851.	4798.	5060.	5170.	5342.	5435.	5417.	5503.	5464.	5639.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.04	17.66	19.03	19.39	20.09	21.09	21.69	22.47	22.93	23.37	23.83	24.31	24.79	25.23	25.81	26.02	27.85	28.43
3.0	19.32	20.05	21.42	21.76	22.49	23.63	24.31	25.24	25.76	26.29	26.80	27.33	27.92	28.40	29.02	29.22	31.19	31.81
3.5	21.45	22.29	23.67	23.99	24.73	26.01	26.76	27.83	28.40	28.99	29.55	30.13	30.82	31.34	31.99	32.18	34.28	34.94
4.0	23.50	24.44	25.82	26.13	26.88	28.28	29.10	30.29	30.91	31.56	32.17	32.78	33.56	34.11	34.80	34.99	37.22	37.91
4.5	25.49	26.52	27.90	28.20	28.96	30.47	31.36	32.66	33.32	34.03	34.69	35.34	36.19	36.79	37.50	37.69	40.04	40.77
5.0	27.43	28.56	29.94	30.22	31.00	32.61	33.57	34.97	35.67	36.43	37.13	37.82	38.75	39.38	40.13	40.31	42.78	43.54
5.5	29.35	30.56	31.95	32.22	33.00	34.72	35.73	37.24	37.98	38.79	39.53	40.25	41.26	41.92	42.70	42.87	45.47	46.26
6.0	31.25	32.55	33.93	34.19	34.98	36.80	37.87	39.47	40.25	41.11	41.89	42.65	43.72	44.41	45.23	45.39	48.11	48.93
6.5	33.13	34.52	35.91	36.15	36.94	38.87	39.99	41.69	42.49	43.41	44.23	45.01	46.16	46.88	47.72	47.89	50.72	51.58
7.0	35.01	36.48	37.87	38.11	38.90	40.92	42.10	43.89	44.72	45.69	46.54	47.36	48.57	49.32	50.20	50.36	53.31	54.19
8.0	38.76	40.40	41.79	42.00	42.80	45.01	46.30	48.26	49.15	50.21	51.14	52.02	53.35	54.16	55.10	55.25	58.44	59.39
9.0	42.51	44.32	45.72	45.90	46.70	49.09	50.49	52.61	53.57	54.71	55.72	56.65	58.10	58.97	59.98	60.12	63.54	64.55
10.0	46.28	48.26	49.67	49.83	50.61	53.19	54.70	56.98	57.99	59.22	60.30	61.28	62.85	63.77	64.86	64.99	68.64	69.71
11.0	50.09	52.23	53.65	53.78	54.56	57.32	58.93	61.37	62.43	63.75	64.89	65.93	67.61	68.59	69.74	69.86	73.75	74.88
12.0	53.94	56.24	57.66	57.77	58.54	61.48	63.19	65.78	66.90	68.30	69.51	70.60	72.40	73.43	74.65	74.76	78.89	80.07
15.0	65.74	68.56	69.98	70.01	70.75	74.21	76.24	79.27	80.54	82.18	83.60	84.85	86.97	88.15	89.59	89.68	94.52	95.88
20.0	86.44	90.13	91.56	91.45	92.08	96.44	98.98	102.74	104.23	106.29	108.05	109.55	112.20	113.62	115.45	115.48	121.55	123.22
25.0	108.50	113.10	114.54	114.26	114.76	120.03	123.11	127.58	129.28	131.74	133.85	135.60	138.78	140.42	142.68	142.66	150.00	151.98
30.0	131.92	137.48	138.91	138.47	138.80	146.02	148.63	153.82	155.73	158.60	161.06	163.07	166.78	168.63	171.34	171.26	179.94	182.23
35.0	156.69	163.25	164.66	164.05	164.19	171.37	175.55	181.45	183.57	186.85	189.68	191.94	196.20	198.25	201.44	201.30	211.36	213.99
40.0	182.8	190.4	191.8	191.0	190.9	199.1	203.8	210.5	212.8	216.5	219.7	222.2	227.0	229.3	233.0	232.8	244.3	247.2
45.0	210.1	218.8	220.2	219.2	218.9	228.1	233.4	240.8	243.3	247.5	251.1	253.8	259.2	261.6	265.9	265.6	278.6	281.9
50.0	238.8	248.6	249.9	248.7	248.1	258.4	264.3	272.4	275.2	279.7	283.7	286.8	292.7	295.3	300.1	299.8	314.3	318.0
55.0	268.6	279.6	280.8	279.4	278.5	289.9	296.5	305.4	308.3	313.3	317.7	321.0	327.6	330.4	335.7	335.3	351.4	355.5
60.0	299.6	311.8	313.0	311.3	310.1	322.7	329.9	339.5	342.7	348.2	353.0	356.6	363.7	366.7	372.6	372.1	389.9	394.3
65.0	331.8	345.2	346.4	344.4	342.9	356.6	364.5	374.9	378.3	384.2	389.5	393.3	401.1	404.2	410.8	410.2	429.7	434.4
70.0	365.1	379.8	380.9	378.7	376.8	391.7	400.3	411.5	415.0	421.5	427.1	431.3	439.7	443.0	450.2	449.5	470.7	475.9
80.0	434.9	452.4	453.3	450.6	447.9	465.3	475.2	488.1	492.1	499.4	506.0	510.8	520.4	524.0	532.7	531.8	556.6	562.6
90.0	509.0	529.4	530.1	526.8	523.2	543.3	554.6	569.2	573.5	581.9	589.5	594.8	605.8	609.7	619.8	618.7	647.3	654.1
100.0	587.2	610.5	611.0	607.1	602.6	625.4	638.3	654.5	659.3	668.7	677.2	683.2	695.5	699.8	711.4	710.0	742.6	750.3
150.0	1034.	1074.	1074.	1066.	1056.	1094.	1115.	1140.	1147.	1162.	1176.	1186.	1205.	1211.	1231.	1228.	1283.	1296.
200.0	1564.	1624.	1622.	1610.	1593.	1648.	1679.	1714.	1723.	1744.	1765.	1778.	1806.	1813.	1843.	1839.	1905.	1937.
250.0	2163.	2245.	2246.	2230.	2203.	2278.	2317.	2364.	2374.	2402.	2431.	2447.	2483.	2495.	2535.	2529.	2602.	2657.
300.0	2820.	2925.	2934.	2915.	2878.	2970.	3016.	3076.	3085.	3122.	3161.	3179.	3223.	3240.	3293.	3284.	3363.	3443.
350.0	3527.	3657.	3675.	3652.	3605.	3715.	3768.	3841.	3850.	3895.	3946.	3965.	4017.	4041.	4106.	4095.	4180.	4286.
400.0	4278.	4435.	4461.	4436.	4377.	4505.	4567.	4653.	4661.	4715.	4779.	4799.	4860.	4890.	4969.	4955.	5047.	5180.
450.0	5068.	5253.	5288.	5260.	5189.	5336.	5406.	5506.	5514.	5578.	5653.	5675.	5746.	5782.	5875.	5858.	5957.	6119.
500.0	5893.	6107.	6151.	6120.	6037.	6202.	6282.	6397.	6403.	6477.	6566.	6589.	6669.	6711.	6819.	6799.	6907.	7097.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{243}_{95}$Am IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	207.5	144.1	122.9	116.4	117.2	102.6	87.9	83.3	80.3	77.8	72.7	67.8	64.2	61.8	60.9	58.5	52.2	54.2
3.0	210.0	154.8	127.3	120.8	121.8	107.6	92.6	88.0	85.0	82.7	77.4	72.4	68.7	66.3	65.3	62.9	56.8	58.5
3.5	209.6	161.2	129.7	123.3	124.5	110.8	95.6	91.1	88.2	86.0	80.6	75.5	71.8	69.4	68.5	66.0	60.1	61.5
4.0	207.6	164.8	130.8	124.5	126.0	112.6	97.4	93.1	90.2	88.3	82.8	77.7	74.0	71.6	70.7	68.2	62.6	63.7
4.5	204.7	166.6	131.1	124.9	126.5	113.7	98.5	94.3	91.6	89.8	84.2	79.1	75.5	73.1	72.2	69.8	64.4	65.2
5.0	201.3	167.2	130.9	124.8	126.5	114.1	99.1	95.0	92.4	90.7	85.1	80.1	76.5	74.1	73.3	70.9	65.8	66.4
5.5	197.6	166.9	130.3	124.3	126.1	114.1	99.3	95.3	92.7	91.2	85.7	80.7	77.1	74.8	74.0	71.6	66.8	67.1
6.0	193.8	166.0	129.4	123.5	125.5	113.9	99.2	95.3	92.9	91.4	85.9	81.0	77.5	75.2	74.4	72.1	67.5	67.7
6.5	190.0	164.8	128.3	122.6	124.6	113.4	98.9	95.1	92.8	91.4	85.9	81.1	77.6	75.4	74.7	72.4	68.0	68.0
7.0	186.2	163.2	127.1	121.5	123.6	112.7	98.5	94.8	92.5	91.3	85.8	81.0	77.6	75.5	74.8	72.5	68.3	68.2
8.0	178.9	159.6	124.5	119.2	121.3	111.1	97.3	93.8	91.6	90.6	85.2	80.5	77.2	75.2	74.6	72.4	68.5	68.2
9.0	172.0	155.7	121.8	116.6	118.9	109.3	95.8	92.5	90.5	89.6	84.3	79.8	76.6	74.7	74.0	71.9	68.4	67.9
10.0	165.6	151.7	119.1	114.1	116.4	107.3	94.2	91.1	89.2	88.4	83.2	78.8	75.7	73.9	73.3	71.3	68.0	67.3
11.0	159.7	147.7	116.4	111.6	113.9	105.3	92.6	89.6	87.8	87.1	82.0	77.8	74.8	73.1	72.5	70.6	67.5	66.7
12.0	154.2	143.8	113.8	109.1	111.4	103.3	90.9	88.0	86.3	85.8	80.8	76.6	73.7	72.1	71.6	69.7	66.9	66.0
15.0	140.0	133.2	106.5	102.3	104.6	97.6	86.1	83.6	82.1	81.7	77.1	73.2	70.6	69.2	68.7	67.0	64.7	63.6
20.0	121.9	118.5	96.4	92.8	95.0	89.3	79.0	76.9	75.7	75.5	71.3	67.9	65.5	64.4	64.1	62.6	60.8	59.6
25.0	108.6	107.1	88.4	85.1	87.3	82.4	73.1	71.3	70.3	70.2	66.3	63.3	61.1	60.2	60.0	58.7	57.3	56.0
30.0	98.3	98.0	81.8	78.8	80.9	76.7	68.2	66.5	65.7	65.7	62.1	59.3	57.4	56.6	56.4	55.3	54.1	52.8
35.0	90.1	90.6	76.3	73.6	75.6	71.9	64.0	62.5	61.8	61.9	58.5	55.9	54.1	53.4	53.3	52.3	51.3	50.0
40.0	83.44	84.43	71.71	69.20	71.13	67.79	60.40	59.08	58.42	58.57	55.40	52.97	51.30	50.72	50.61	49.71	48.79	47.59
45.0	77.85	79.20	67.75	65.40	67.26	64.24	57.29	56.08	55.49	55.67	52.68	50.40	48.82	48.32	48.24	47.41	46.58	45.44
50.0	73.10	74.72	64.30	62.10	63.89	61.14	54.57	53.45	52.91	53.12	50.27	48.12	46.63	46.19	46.13	45.37	44.62	43.53
55.0	69.01	70.82	61.27	59.20	60.92	58.39	52.16	51.11	50.63	50.85	48.14	46.10	44.69	44.29	44.25	43.54	42.85	41.81
60.0	65.45	67.40	58.59	56.63	58.28	55.95	50.01	49.03	48.58	48.82	46.22	44.29	42.94	42.59	42.56	41.90	41.26	40.26
65.0	62.31	64.37	56.19	54.32	55.93	53.75	48.07	47.15	46.74	46.99	44.50	42.65	41.36	41.05	41.02	40.41	39.81	38.86
70.0	59.53	61.67	54.03	52.25	53.80	51.77	46.32	45.45	45.08	45.33	42.94	41.16	39.92	39.64	39.63	39.05	38.49	37.58
80.0	54.79	57.04	50.30	48.67	50.12	48.33	43.26	42.50	42.17	42.43	40.20	38.57	37.42	37.19	37.19	36.67	36.16	35.33
90.0	50.91	53.21	47.18	45.66	47.04	45.43	40.71	40.00	39.71	39.98	37.89	36.37	35.29	35.10	35.11	34.64	34.18	33.41
100.0	47.66	49.99	44.52	43.11	44.41	42.96	38.52	37.86	37.61	37.88	35.91	34.48	33.46	33.30	33.32	32.89	32.46	31.75
150.0	37.00	39.27	35.50	34.41	35.46	34.46	30.97	30.49	30.33	30.62	29.04	27.92	27.11	27.04	27.07	26.77	26.43	25.94
200.0	30.99	33.47	30.43	29.46	30.18	29.60	26.59	26.09	26.15	26.44	25.05	24.65	23.82	23.30	23.38	23.06	23.28	22.45
250.0	27.43	29.77	27.18	26.32	26.91	26.51	23.83	23.12	23.46	23.74	22.50	22.14	21.40	20.96	21.04	20.68	20.96	20.24
300.0	24.95	27.17	24.87	24.09	24.64	24.30	21.85	21.02	21.54	21.80	20.68	20.34	19.67	19.28	19.36	19.04	19.29	18.65
350.0	23.12	25.24	23.15	22.42	22.95	22.65	20.38	19.63	20.10	20.35	19.31	18.98	18.36	18.02	18.10	17.80	18.04	17.44
400.0	21.71	23.76	21.82	21.13	21.63	21.36	19.23	18.54	18.98	19.22	18.24	17.93	17.35	17.03	17.11	16.84	17.06	16.50
450.0	20.61	22.58	20.76	20.10	20.59	20.34	18.31	17.68	18.08	18.32	17.39	17.09	16.54	16.25	16.32	16.06	16.27	15.75
500.0	19.71	21.64	19.90	19.26	19.74	19.51	17.57	16.98	17.36	17.59	16.70	16.40	15.88	15.61	15.68	15.43	15.64	15.14

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	50.61	48.19	48.16	48.48	47.99	45.19	43.77	41.29	40.38	39.30	38.54	37.89	36.51	36.04	35.65	35.74	34.26	33.87
3.0	54.68	52.12	52.07	52.41	51.98	49.07	47.57	45.04	44.12	43.00	42.18	41.51	40.08	39.56	39.10	39.20	37.53	37.10
3.5	57.62	54.96	54.90	55.25	54.88	51.91	50.36	47.81	46.90	45.75	44.91	44.22	42.77	42.21	41.71	41.80	39.99	39.52
4.0	59.75	57.03	56.95	57.32	57.00	54.01	52.43	49.89	48.99	47.83	46.97	46.28	44.82	44.23	43.69	43.79	41.86	41.37
4.5	61.30	58.54	58.46	58.83	58.56	55.56	53.98	51.46	50.58	49.41	48.54	47.84	46.39	45.78	45.22	45.31	43.30	42.78
5.0	62.42	59.63	59.55	59.93	59.71	56.71	55.13	52.64	51.78	50.62	49.74	49.05	47.60	46.98	46.39	46.49	44.40	43.88
5.5	63.22	60.42	60.33	60.71	60.53	57.56	55.97	53.53	52.69	51.53	50.65	49.96	48.53	47.91	47.29	47.39	45.25	44.71
6.0	63.76	60.96	60.87	61.26	61.12	58.17	56.59	54.18	53.36	52.22	51.34	50.68	49.24	48.62	47.98	48.08	45.90	45.36
6.5	64.12	61.32	61.23	61.62	61.52	58.59	57.02	54.66	53.86	52.72	51.86	51.18	49.78	49.16	48.51	48.60	46.39	45.84
7.0	64.32	61.53	61.44	61.83	61.76	58.87	57.31	54.99	54.21	53.09	52.23	51.55	50.18	49.56	48.89	48.99	46.75	46.20
8.0	64.39	61.63	61.54	61.94	61.93	59.10	57.57	55.33	54.60	53.50	52.65	51.99	50.65	50.05	49.36	49.46	47.19	46.64
9.0	64.16	61.43	61.35	61.75	61.78	59.02	57.52	55.37	54.67	53.60	52.76	52.13	50.83	50.23	49.53	49.63	47.35	46.80
10.0	63.72	61.04	60.96	61.36	61.44	58.74	57.28	55.20	54.53	53.49	52.67	52.05	50.79	50.21	49.50	49.60	47.32	46.78
11.0	63.16	60.52	60.45	60.84	60.96	58.33	56.89	54.89	54.25	53.24	52.44	51.83	50.61	50.05	49.33	49.43	47.16	46.62
12.0	62.51	59.92	59.85	60.24	60.39	57.82	56.42	54.49	53.87	52.89	52.10	51.52	50.33	49.79	49.07	49.16	46.91	46.37
15.0	60.34	57.87	57.83	58.21	58.43	56.03	54.72	52.96	52.42	51.51	50.77	50.23	49.13	48.65	47.92	48.01	45.82	45.31
20.0	56.64	54.37	54.35	54.72	55.01	52.84	51.66	50.13	49.68	48.87	48.20	47.72	46.75	46.34	45.62	45.71	43.65	43.17
25.0	53.26	51.16	51.16	51.51	51.84	49.87	48.79	47.43	47.04	46.30	45.69	45.26	44.38	44.03	43.34	43.42	41.48	41.04
30.0	50.28	48.32	48.34	48.68	49.03	47.20	46.21	44.98	44.64	43.97	43.40	43.01	42.21	41.91	41.24	41.32	39.49	39.08
35.0	47.67	45.83	45.86	46.19	46.55	44.85	43.93	42.80	42.50	41.88	41.35	40.99	40.25	39.99	39.34	39.42	37.69	37.30
40.0	45.38	43.63	43.68	43.99	44.37	42.77	41.90	40.87	40.59	40.02	39.52	39.18	38.49	38.26	37.64	37.72	36.07	35.71
45.0	43.34	41.69	41.74	42.04	42.42	40.91	40.10	39.14	38.88	38.36	37.87	37.56	36.92	36.71	36.11	36.19	34.62	34.28
50.0	41.53	39.95	40.01	40.30	40.68	39.25	38.48	37.58	37.35	36.84	36.40	36.11	35.49	35.31	34.73	34.81	33.31	32.98
55.0	39.91	38.40	38.46	38.74	39.12	37.76	37.03	36.18	35.96	35.49	35.06	34.79	34.21	34.04	33.48	33.56	32.12	31.81
60.0	38.44	36.99	37.06	37.33	37.71	36.40	35.71	34.91	34.71	34.26	33.85	33.59	33.04	32.88	32.34	32.42	31.04	30.74
65.0	37.11	35.71	35.78	36.05	36.43	35.17	34.51	33.75	33.56	33.13	32.74	32.49	31.97	31.83	31.30	31.38	30.05	29.76
70.0	35.89	34.55	34.62	34.88	35.25	34.05	33.41	32.69	32.51	32.10	31.73	31.49	30.99	30.86	30.35	30.42	29.14	28.86
80.0	33.75	32.50	32.57	32.82	33.18	32.06	31.48	30.82	30.66	30.28	29.93	29.71	29.25	29.14	28.66	28.73	27.52	27.27
90.0	31.93	30.74	30.82	31.06	31.42	30.37	29.82	29.21	29.06	28.72	28.39	28.19	27.76	27.66	27.20	27.27	26.13	25.89
100.0	30.35	29.23	29.31	29.53	29.88	28.89	28.38	27.82	27.68	27.36	27.05	26.86	26.46	26.37	25.93	26.00	24.92	24.70
150.0	24.81	23.90	23.98	24.16	24.49	23.70	23.30	22.88	22.78	22.54	22.29	22.15	21.84	21.77	21.42	21.48	20.60	20.42
200.0	21.48	20.73	20.71	20.88	21.17	20.51	20.17	19.84	19.76	19.56	19.36	19.23	18.98	18.92	18.62	18.68	18.42	17.82
250.0	19.37	18.70	18.48	18.63	18.91	18.37	18.18	17.85	17.86	17.65	17.39	17.35	17.16	17.03	16.75	16.81	16.68	16.15
300.0	17.85	17.24	17.04	17.10	17.35	16.94	16.77	16.48	16.49	16.30	16.06	16.03	15.86	15.74	15.49	15.64	15.42	14.94
350.0	16.70	16.13	15.95	16.00	16.24	15.87	15.71	15.44	15.45	15.28	15.06	15.03	14.87	14.76	14.53	14.57	14.46	14.02
400.0	15.80	15.26	15.10	15.15	15.38	15.03	14.88	14.63	14.64	14.48	14.27	14.24	14.09	13.99	13.77	13.82	13.71	13.29
450.0	15.09	14.57	14.42	14.47	14.69	14.35	14.21	13.97	13.99	13.83	13.64	13.61	13.47	13.38	13.17	13.21	13.10	12.71
500.0	14.50	14.01	13.87	13.91	14.12	13.81	13.66	13.44	13.46	13.31	13.12	13.10	12.97	12.88	12.68	12.72	12.61	12.24

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

243 AM IONS 95

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.690	6.380	9.003	8.980	8.820	10.491	11.330	11.896	12.310	12.770	13.060	13.990	14.460	15.047	15.270	15.511	15.971	16.380
3.0	7.271	7.191	9.973	10.003	9.835	11.645	12.674	13.312	13.778	14.282	14.676	15.720	16.286	16.942	17.192	17.511	18.197	18.533
3.5	7.850	7.959	10.918	10.997	10.820	12.757	13.964	14.668	15.179	15.720	16.211	17.360	18.014	18.731	19.006	19.395	20.274	20.657
4.0	8.432	8.703	11.850	11.977	11.790	13.844	15.222	15.986	16.540	17.113	17.697	18.944	19.680	20.454	20.751	21.205	22.252	22.497
4.5	9.021	9.436	12.777	12.951	12.752	14.917	16.462	17.283	17.876	18.477	19.151	20.493	21.305	22.133	22.451	22.965	24.164	24.381
5.0	9.620	10.163	13.705	13.923	13.711	15.983	17.691	18.566	19.197	19.823	20.586	22.018	22.904	23.783	24.120	24.693	26.030	26.226
5.5	10.229	10.890	14.636	14.899	14.673	17.048	18.915	19.843	20.509	21.158	22.008	23.529	24.486	25.414	25.769	26.398	27.863	28.046
6.0	10.850	11.620	15.571	15.879	15.638	18.113	20.139	21.118	21.818	22.489	23.424	25.032	26.058	27.033	27.406	28.089	29.673	29.848
6.5	11.483	12.354	16.513	16.866	16.610	19.183	21.365	22.394	23.127	23.817	24.838	26.531	27.625	28.646	29.035	29.771	31.467	31.639
7.0	12.129	13.095	17.465	17.862	17.589	20.257	22.596	23.673	24.439	25.147	26.252	28.030	29.190	30.256	30.661	31.448	33.250	33.423
8.0	13.46	14.60	19.40	19.88	19.57	22.43	25.08	26.25	27.08	27.82	29.09	31.04	32.33	33.48	33.91	34.80	36.80	36.99
9.0	14.85	16.14	21.37	21.94	21.60	24.63	27.60	28.86	29.75	30.52	31.96	34.07	35.49	36.72	37.18	38.17	40.35	40.56
10.0	16.29	17.72	23.39	24.05	23.66	26.88	30.16	31.51	32.45	33.25	34.86	37.13	38.68	39.99	40.48	41.56	43.91	44.15
11.0	17.78	19.35	25.45	26.20	25.77	29.16	32.76	34.20	35.20	36.02	37.80	40.24	41.91	43.30	43.81	44.99	47.50	47.78
12.0	19.33	21.01	27.56	28.40	27.93	31.49	35.41	36.93	37.99	38.83	40.79	43.38	45.18	46.64	47.19	48.45	51.11	51.44
15.0	24.30	26.29	34.19	35.31	34.69	38.76	43.65	45.43	46.65	47.54	50.02	53.11	55.28	56.97	57.58	59.11	62.19	62.69
20.0	33.63	35.97	46.19	47.80	46.89	51.79	58.39	60.60	62.07	63.01	66.42	70.36	73.16	75.18	75.89	77.86	81.55	82.43
25.0	44.21	46.77	59.37	61.49	60.24	65.97	74.39	77.03	78.75	79.71	84.10	88.91	92.37	94.71	95.50	97.91	102.14	103.48
30.0	55.99	58.64	73.67	76.34	74.71	81.27	91.62	94.68	96.64	97.60	103.04	108.76	112.89	115.54	116.41	119.24	123.98	125.64
35.0	68.91	71.55	89.06	92.30	90.25	97.65	110.03	113.53	115.73	116.66	123.20	129.87	134.71	137.64	138.58	141.85	147.07	149.50
40.0	82.93	85.45	105.49	109.33	106.83	115.05	129.58	133.53	135.96	136.85	144.55	152.21	157.78	160.99	161.98	165.69	171.37	174.41
45.0	98.02	100.32	122.93	127.40	124.40	133.48	150.24	154.65	157.31	158.14	167.05	175.73	182.07	185.54	186.58	190.72	196.87	200.54
50.0	114.13	116.12	141.35	146.48	142.95	152.88	171.98	176.85	179.74	180.49	190.67	200.41	207.55	211.27	212.35	216.93	223.53	227.87
55.0	131.25	132.83	160.72	166.52	162.43	173.22	194.76	200.10	203.23	203.88	215.37	226.22	234.17	238.14	239.25	244.28	251.32	256.36
60.0	149.34	150.43	181.00	187.52	182.83	194.48	218.56	224.38	227.73	228.27	241.14	253.11	261.92	266.12	267.26	272.73	280.22	285.98
65.0	168.4	168.9	202.2	209.4	204.1	216.6	243.4	249.7	253.2	253.6	267.9	281.1	290.8	295.2	296.3	302.3	310.2	316.7
70.0	188.3	188.2	224.2	232.2	226.3	239.7	269.1	275.9	279.7	280.0	295.7	310.1	320.7	325.3	326.5	332.9	341.3	348.5
80.0	230.9	229.2	270.9	280.5	273.1	288.3	323.4	331.2	335.5	335.4	354.3	371.1	383.6	388.7	389.8	397.1	406.4	415.2
90.0	277.0	273.3	320.8	332.1	323.2	340.2	381.3	390.2	394.9	394.5	416.6	436.0	450.5	456.0	457.1	465.4	475.6	486.0
100.0	326.3	320.5	373.9	386.9	376.4	395.2	442.7	452.7	457.8	456.9	482.5	504.7	521.2	527.1	528.2	537.4	548.6	560.7
150.0	619.0	597.6	682.4	705.3	686.4	713.9	797.6	813.4	820.7	816.7	861.9	899.6	928.0	935.3	936.0	950.1	966.7	987.3
200.0	979.9	934.9	1054.4	1089.4	1058.7	1096.7	1223.6	1246.3	1254.7	1246.3	1315.0	1360.9	1405.4	1422.0	1421.7	1441.3	1455.9	1493.4
250.0	1398.0	1321.0	1478.1	1527.0	1486.7	1531.7	1707.8	1742.5	1746.6	1732.7	1828.2	1882.5	1945.0	1973.3	1971.1	1999.9	2007.4	2064.8
300.0	1863.5	1749.1	1946.3	2010.5	1959.5	2011.3	2241.2	2295.2	2288.0	2267.7	2392.5	2456.2	2538.3	2578.8	2574.1	2613.3	2612.6	2691.3
350.0	2370.1	2213.8	2463.3	2534.1	2471.2	2530.0	2817.8	2894.1	2872.6	2845.2	3001.4	3075.3	3178.5	3231.5	3224.1	3274.2	3264.7	3365.8
400.0	2913.	2710.	2994.	3093.	3017.	3083.	3432.	3532.	3495.	3460.	3650.	3735.	3860.	3926.	3915.	3977.	3958.	4083.
450.0	3488.	3236.	3566.	3683.	3593.	3666.	4080.	4203.	4152.	4108.	4332.	4429.	4578.	4657.	4643.	4716.	4688.	4837.
500.0	4091.	3785.	4164.	4301.	4196.	4276.	4758.	4905.	4838.	4785.	5046.	5156.	5328.	5420.	5403.	5488.	5450.	5624.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.18	17.81	19.19	19.55	20.26	21.27	21.87	22.65	23.11	23.55	24.01	24.49	24.98	25.42	26.00	26.21	28.06	28.65
3.0	19.48	20.23	21.61	21.96	22.69	23.84	24.53	25.46	25.98	26.50	27.02	27.55	28.15	28.63	29.25	29.45	31.44	32.07
3.5	21.65	22.49	23.88	24.21	24.96	26.24	27.00	28.07	28.64	29.23	29.80	30.38	31.08	31.60	32.25	32.45	34.57	35.24
4.0	23.71	24.66	26.05	26.37	27.13	28.54	29.37	30.55	31.18	31.83	32.44	33.06	33.85	34.41	35.09	35.28	37.54	38.24
4.5	25.72	26.76	28.16	28.46	29.23	30.75	31.65	32.95	33.61	34.33	34.99	35.64	36.51	37.10	37.82	38.01	40.39	41.12
5.0	27.68	28.82	30.22	30.50	31.28	32.92	33.87	35.28	35.99	36.75	37.46	38.15	39.09	39.72	40.47	40.65	43.16	43.93
5.5	29.62	30.84	32.24	32.52	33.30	35.04	36.06	37.57	38.31	39.13	39.88	40.60	41.62	42.28	43.07	43.24	45.87	46.67
6.0	31.53	32.84	34.25	34.51	35.30	37.14	38.22	39.83	40.60	41.47	42.26	43.02	44.10	44.80	45.62	45.79	48.53	49.37
6.5	33.43	34.83	36.24	36.49	37.28	39.22	40.36	42.06	42.87	43.79	44.61	45.40	46.56	47.28	48.14	48.30	51.17	52.03
7.0	35.32	36.81	38.22	38.45	39.25	41.29	42.48	44.28	45.12	46.09	46.95	47.77	48.99	49.75	50.63	50.79	53.77	54.67
8.0	39.10	40.75	42.17	42.38	43.18	45.41	46.71	48.68	49.58	50.64	51.58	52.46	53.81	54.62	55.57	55.72	58.94	59.90
9.0	42.87	44.70	46.12	46.31	47.11	49.52	50.93	53.07	54.03	55.18	56.19	57.13	58.59	59.47	60.48	60.62	64.08	65.10
10.0	46.67	48.67	50.09	50.25	51.05	53.65	55.16	57.46	58.48	59.72	60.80	61.79	63.37	64.30	65.39	65.52	69.21	70.29
11.0	50.50	52.67	54.10	54.23	55.02	57.80	59.42	61.87	62.94	64.27	65.42	66.47	68.17	69.15	70.31	70.43	74.36	75.49
12.0	54.37	56.70	58.14	58.24	59.02	61.98	63.71	66.32	67.44	68.85	70.07	71.17	72.98	74.02	75.25	75.36	79.52	80.72
15.0	66.24	69.08	70.52	70.55	71.29	74.78	76.82	79.88	81.15	82.81	84.23	85.49	87.63	88.82	90.27	90.35	95.24	96.61
20.0	87.02	90.74	92.19	92.08	92.72	97.11	99.67	103.45	104.95	107.02	108.79	110.30	112.97	114.40	116.24	116.28	122.39	124.08
25.0	109.15	113.79	115.25	114.97	115.48	120.79	123.88	128.38	130.09	132.56	134.68	136.45	139.65	141.30	143.57	143.55	150.95	152.95
30.0	132.64	138.24	139.69	139.25	139.59	145.84	149.48	154.69	156.62	159.50	161.98	164.00	167.73	169.60	172.32	172.24	180.98	183.30
35.0	157.47	164.07	165.50	164.89	165.03	172.26	176.46	182.39	184.52	187.82	190.67	192.94	197.22	199.29	202.50	202.36	212.49	215.13
40.0	183.6	191.2	192.7	191.9	191.8	200.0	204.8	211.5	213.8	217.5	220.7	223.3	228.1	230.4	234.1	233.9	245.4	248.4
45.0	211.0	219.7	221.1	220.1	219.8	229.1	234.4	241.8	244.4	248.5	252.2	254.9	260.3	262.8	267.1	266.8	279.8	283.2
50.0	239.7	249.5	250.9	249.6	249.1	259.4	265.4	273.5	276.3	280.9	284.9	288.0	293.9	296.5	301.4	301.0	315.6	319.3
55.0	269.5	280.6	281.8	280.4	279.5	291.0	297.6	306.5	309.4	314.5	318.9	322.2	328.8	331.6	337.0	336.6	352.8	356.8
60.0	300.5	312.8	314.0	312.4	311.2	323.7	331.0	340.7	343.8	349.3	354.2	357.8	364.9	367.9	373.9	373.4	391.3	395.7
65.0	332.7	346.2	347.4	345.5	343.9	357.7	365.6	376.1	379.4	385.4	390.7	394.6	402.3	405.5	412.1	411.5	431.1	435.9
70.0	366.0	380.8	381.9	379.8	377.9	392.8	401.4	412.7	416.2	422.7	428.4	432.6	440.9	444.3	451.6	450.9	472.1	477.3
80.0	435.9	453.4	454.4	451.6	449.0	466.4	476.4	489.3	493.3	500.7	507.3	512.1	521.7	525.3	534.0	533.1	558.0	564.0
90.0	510.0	530.3	531.1	527.8	524.3	544.3	555.7	570.3	574.7	583.1	590.7	596.1	607.0	611.0	621.1	620.0	648.7	655.5
100.0	588.1	611.4	612.0	606.1	603.6	626.4	639.3	655.6	660.4	669.8	678.4	684.4	696.7	701.0	712.6	711.3	743.9	751.6
150.0	1034.	1075.	1074.	1066.	1056.	1094.	1115.	1141.	1148.	1163.	1177.	1186.	1206.	1212.	1232.	1229.	1284.	1296.
200.0	1563.	1624.	1621.	1610.	1592.	1648.	1678.	1714.	1723.	1744.	1764.	1777.	1805.	1813.	1843.	1838.	1905.	1937.
250.0	2161.	2242.	2244.	2227.	2201.	2276.	2315.	2362.	2371.	2400.	2429.	2445.	2480.	2492.	2533.	2526.	2600.	2655.
300.0	2816.	2920.	2930.	2910.	2874.	2966.	3012.	3071.	3081.	3117.	3157.	3174.	3218.	3236.	3288.	3279.	3359.	3438.
350.0	3520.	3650.	3668.	3646.	3599.	3708.	3761.	3834.	3843.	3888.	3939.	3958.	4011.	4034.	4099.	4088.	4173.	4279.
400.0	4268.	4425.	4451.	4427.	4368.	4495.	4557.	4643.	4652.	4706.	4769.	4789.	4851.	4880.	4959.	4945.	5037.	5170.
450.0	5056.	5240.	5275.	5248.	5177.	5323.	5393.	5494.	5501.	5565.	5641.	5663.	5733.	5769.	5862.	5845.	5944.	6105.
500.0	5878.	6091.	6135.	6105.	6021.	6187.	6266.	6381.	6388.	6461.	6549.	6573.	6653.	6695.	6803.	6782.	6890.	7080.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

245 CM IONS 96

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	209.2	144.4	123.6	117.1	117.8	103.2	88.3	83.7	80.6	78.1	73.0	68.1	64.4	62.0	61.1	58.7	52.4	54.4
3.0	212.0	155.5	128.1	121.6	122.7	108.3	93.1	88.5	85.5	83.2	77.9	72.8	69.0	66.6	65.7	63.2	57.1	58.7
3.5	211.8	162.2	130.7	124.2	125.5	111.5	96.2	91.7	88.7	86.6	81.1	76.0	72.2	69.8	68.9	66.4	60.5	61.8
4.0	209.9	166.0	131.9	125.5	127.0	113.5	98.1	93.7	90.9	88.9	83.4	78.2	74.5	72.0	71.1	68.6	63.0	64.1
4.5	207.0	168.0	132.3	126.0	127.6	114.6	99.3	95.0	92.3	90.4	84.9	79.7	76.0	73.6	72.7	70.2	64.9	65.7
5.0	203.7	168.7	132.1	125.9	127.7	115.1	99.9	96.8	93.1	91.4	85.8	80.7	77.1	74.7	73.9	71.4	66.3	66.9
5.5	200.0	168.5	131.5	125.5	127.3	115.1	100.2	96.1	93.5	92.0	86.4	81.3	77.7	75.4	74.6	72.2	67.3	67.7
6.0	196.2	167.7	130.7	124.7	126.7	114.9	100.1	96.2	93.7	92.2	86.7	81.7	78.1	75.9	75.1	72.7	68.0	68.2
6.5	192.4	166.5	129.6	123.8	125.8	114.5	99.8	96.0	93.6	92.3	86.7	81.8	78.3	76.1	75.3	73.0	68.5	68.6
7.0	188.6	165.0	128.5	122.8	124.8	113.8	99.4	96.7	93.4	92.1	86.6	81.8	78.3	76.2	75.4	73.1	68.9	68.8
8.0	181.3	161.4	125.9	120.4	122.6	112.3	98.2	94.7	92.5	91.5	86.1	81.3	78.0	76.0	75.3	73.1	69.2	68.8
9.0	174.4	157.5	123.2	117.9	120.2	110.4	96.8	93.5	91.4	90.5	85.2	80.6	77.4	75.4	74.8	72.7	69.1	68.5
10.0	168.0	153.5	120.5	115.4	117.7	108.5	95.2	92.1	90.1	89.3	84.1	79.7	76.5	74.7	74.1	72.1	68.7	68.0
11.0	162.0	149.6	117.8	112.9	115.2	106.5	93.6	90.6	88.7	88.1	82.9	78.6	75.6	73.8	73.3	71.3	68.2	67.4
12.0	156.5	145.7	115.2	110.5	112.8	104.5	92.0	89.1	87.3	86.7	81.7	77.5	74.6	72.9	72.4	70.5	67.6	66.7
15.0	142.1	135.0	107.9	103.6	106.0	98.8	87.2	84.6	83.1	82.7	78.0	74.1	71.4	70.0	69.5	67.8	65.5	64.3
20.0	123.9	120.3	97.8	94.0	96.3	90.4	80.1	77.9	76.7	76.5	72.2	68.8	66.4	65.2	64.9	63.4	61.6	60.3
25.0	110.4	108.8	89.7	86.3	88.5	83.5	74.1	72.3	71.2	71.2	67.3	64.1	62.0	61.0	60.8	59.5	58.0	56.7
30.0	100.0	99.6	83.0	80.0	82.1	77.8	69.2	67.5	66.6	66.7	63.0	60.2	58.2	57.4	57.2	56.1	54.8	53.5
35.0	91.7	92.1	77.5	74.7	76.8	73.0	64.9	63.5	62.7	62.8	59.4	56.7	54.9	54.2	54.1	53.1	52.0	50.8
40.0	84.92	85.85	72.84	70.29	72.24	68.84	61.33	59.99	59.31	59.46	56.24	53.77	52.07	51.48	51.37	50.45	49.51	48.30
45.0	79.24	80.58	68.83	66.46	68.33	65.25	58.19	56.96	56.35	56.54	53.49	51.18	49.57	49.06	48.97	48.13	47.30	46.13
50.0	74.42	76.02	65.35	63.11	64.93	62.12	55.44	54.30	53.75	53.96	51.07	48.88	47.37	46.91	46.85	46.07	45.31	44.20
55.0	70.27	72.07	62.29	60.18	61.92	59.34	53.00	51.94	51.44	51.67	48.91	46.84	45.40	45.00	44.95	44.23	43.53	42.47
60.0	66.65	68.60	59.57	57.57	59.26	56.87	50.83	49.83	49.38	49.62	46.98	45.01	43.63	43.28	43.24	42.57	41.92	40.91
65.0	63.47	65.52	57.15	55.26	56.87	54.65	48.87	47.94	47.52	47.77	45.23	43.35	42.04	41.72	41.70	41.07	40.46	39.49
70.0	60.64	62.78	54.96	53.15	54.72	52.65	47.10	46.22	45.83	46.09	43.65	41.85	40.59	40.30	40.29	39.70	39.12	38.20
80.0	55.83	58.08	51.18	49.52	51.00	49.16	44.02	43.22	42.89	43.16	40.89	39.22	38.05	37.82	37.82	37.29	36.77	35.92
90.0	51.88	54.20	48.02	46.47	47.87	46.23	41.43	40.70	40.40	40.68	38.55	37.00	35.90	35.70	35.72	35.24	34.76	33.98
100.0	48.58	50.92	45.32	43.88	45.21	43.72	39.20	38.53	38.27	38.55	36.54	35.08	34.05	33.88	33.90	33.47	33.02	32.31
150.0	37.73	40.03	36.16	35.06	36.12	35.10	31.55	31.05	30.90	31.18	29.58	28.44	27.62	27.54	27.57	27.27	26.92	26.42
200.0	31.61	34.13	31.02	30.03	30.76	30.17	27.09	26.58	26.65	26.94	25.53	25.12	24.27	23.74	23.82	23.49	23.72	22.88
250.0	27.99	30.36	27.72	26.84	27.44	27.03	24.29	23.57	23.92	24.20	22.94	22.57	21.82	21.37	21.45	21.08	21.37	20.63
300.0	25.46	27.71	25.37	24.57	25.13	24.78	22.29	21.44	21.97	22.24	21.09	20.74	20.06	19.66	19.74	19.41	19.67	19.01
350.0	23.59	25.75	23.62	22.87	23.41	23.10	20.78	20.02	20.50	20.76	19.69	19.36	18.73	18.38	18.46	18.16	18.40	17.79
400.0	22.16	24.24	22.26	21.56	22.07	21.80	19.62	18.91	19.36	19.61	18.61	18.29	17.70	17.37	17.45	17.17	17.40	16.84
450.0	21.03	23.05	21.18	20.51	21.01	20.76	18.69	18.04	18.45	18.69	17.74	17.43	16.87	16.57	16.65	16.39	16.60	16.07
500.0	20.12	22.08	20.30	19.66	20.15	19.91	17.93	17.32	17.71	17.95	17.04	16.73	16.20	15.92	16.00	15.75	15.95	15.45

E/A	SM 62	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	50.80	48.37	48.33	48.65	48.17	45.36	43.92	41.43	40.52	39.44	38.67	38.03	36.64	36.17	35.77	35.86	34.38	33.99
3.0	54.95	52.37	52.32	52.66	52.23	49.31	47.80	45.25	44.33	43.20	42.38	41.70	40.27	39.74	39.29	39.38	37.71	37.27
3.5	57.95	55.27	55.21	55.56	55.18	52.20	50.64	48.08	47.16	46.01	45.16	44.46	43.01	42.44	41.94	42.03	40.21	39.74
4.0	60.13	57.39	57.31	57.68	57.36	54.34	52.76	50.20	49.30	48.13	47.27	46.56	45.10	44.50	43.96	44.06	42.12	41.62
4.5	61.73	58.94	58.86	59.23	58.96	55.94	54.35	51.81	50.92	49.75	48.87	48.17	46.70	46.09	45.52	45.62	43.59	43.07
5.0	62.89	60.08	59.99	60.37	60.14	57.13	55.53	53.02	52.16	50.98	50.10	49.40	47.95	47.32	46.73	46.82	44.72	44.19
5.5	63.72	60.89	60.80	61.19	61.01	58.00	56.41	53.94	53.09	51.92	51.04	50.34	48.90	48.27	47.65	47.75	45.59	45.06
6.0	64.29	61.46	61.37	61.76	61.62	58.64	57.05	54.62	53.79	52.64	51.76	51.06	49.64	49.01	48.37	48.46	46.27	45.72
6.5	64.67	61.84	61.75	62.14	62.04	59.09	57.50	55.12	54.31	53.17	52.29	51.60	50.20	49.57	48.91	49.01	46.78	46.22
7.0	64.89	62.08	61.98	62.38	62.31	59.38	57.81	55.47	54.69	53.55	52.68	52.00	50.61	49.99	49.32	49.41	47.16	46.60
8.0	65.00	62.21	62.12	62.52	62.51	59.65	58.10	55.85	55.10	53.99	53.13	52.47	51.12	50.51	49.81	49.91	47.62	47.07
9.0	64.79	62.04	61.95	62.35	62.39	59.59	58.08	55.91	55.20	54.12	53.27	52.63	51.32	50.72	50.01	50.11	47.81	47.25
10.0	64.38	61.67	61.59	61.98	62.06	59.34	57.86	55.76	55.08	54.03	53.20	52.57	51.30	50.72	50.00	50.09	47.80	47.24
11.0	63.83	61.16	61.09	61.48	61.60	58.94	57.49	55.46	54.82	53.79	52.98	52.37	51.14	50.57	49.85	49.94	47.65	47.10
12.0	63.20	60.57	60.50	60.90	61.05	58.45	57.03	55.07	54.45	53.46	52.66	52.07	50.87	50.32	49.59	49.68	47.40	46.86
15.0	61.05	58.55	58.50	58.89	59.11	56.68	55.35	53.57	53.03	52.10	51.36	50.81	49.70	49.21	48.47	48.56	46.35	45.83
20.0	57.36	55.06	55.04	55.41	55.70	53.51	52.31	50.76	50.30	49.48	48.80	48.31	47.33	46.91	46.19	46.28	44.19	43.70
25.0	53.97	51.84	51.84	52.20	52.53	50.53	49.43	48.05	47.66	46.91	46.29	45.86	44.96	44.61	43.91	44.00	42.03	41.58
30.0	50.99	48.99	49.01	49.35	49.71	47.86	46.85	45.60	45.25	44.58	44.00	43.60	42.79	42.48	41.80	41.89	40.03	39.61
35.0	48.36	46.49	46.52	46.85	47.22	45.49	44.56	43.42	43.10	42.48	41.94	41.57	40.82	40.55	39.90	39.98	38.22	37.83
40.0	46.05	44.28	44.32	44.64	45.02	43.40	42.52	41.47	41.18	40.60	40.10	39.76	39.05	38.82	38.19	38.27	36.60	36.23
45.0	44.00	42.32	42.37	42.66	43.06	41.53	40.70	39.72	39.47	38.92	38.44	38.13	37.47	37.26	36.65	36.73	35.14	34.79
50.0	42.18	40.57	40.63	40.93	41.31	39.85	39.07	38.16	37.92	37.41	36.96	36.66	36.04	35.85	35.26	35.34	33.82	33.48
55.0	40.54	39.00	39.06	39.35	39.74	38.35	37.61	36.75	36.52	36.04	35.61	35.33	34.74	34.57	34.00	34.08	32.62	32.30
60.0	39.05	37.58	37.65	37.93	38.31	36.98	36.28	35.46	35.26	34.80	34.39	34.12	33.56	33.40	32.85	32.93	31.52	31.22
65.0	37.71	36.29	36.36	36.63	37.01	35.74	35.07	34.30	34.10	33.67	33.27	33.02	32.48	32.34	31.80	31.88	30.53	30.24
70.0	36.48	35.12	35.19	35.45	35.83	34.61	33.96	33.23	33.04	32.63	32.25	32.00	31.49	31.36	30.84	30.91	29.61	29.33
80.0	34.32	33.04	33.12	33.37	33.74	32.60	32.00	31.33	31.17	30.79	30.43	30.21	29.74	29.62	29.13	29.20	27.98	27.72
90.0	32.47	31.27	31.35	31.59	31.95	30.88	30.32	29.71	29.56	29.20	28.87	28.67	28.23	28.13	27.66	27.73	26.57	26.33
100.0	30.88	29.74	29.81	30.04	30.40	29.39	28.87	28.30	28.16	27.83	27.52	27.32	26.91	26.82	26.38	26.45	25.35	25.12
150.0	25.26	24.34	24.42	24.61	24.93	24.13	23.72	23.30	23.20	22.95	22.70	22.55	22.24	22.17	21.81	21.87	20.97	20.79
200.0	21.88	21.12	21.10	21.27	21.57	20.89	20.55	20.21	20.14	19.93	19.72	19.60	19.34	19.27	18.97	19.03	18.76	18.15
250.0	19.75	19.06	18.84	18.99	19.27	18.72	18.53	18.20	18.20	17.99	17.72	17.69	17.49	17.36	17.08	17.13	17.00	16.46
300.0	18.20	17.57	17.37	17.43	17.69	17.28	17.10	16.80	16.81	16.62	16.38	16.34	16.17	16.05	15.79	15.84	15.72	15.23
350.0	17.03	16.45	16.27	16.32	16.56	16.18	16.02	15.75	15.78	15.58	15.35	15.32	15.16	15.05	14.81	14.86	14.74	14.29
400.0	16.12	15.57	15.40	15.45	15.69	15.33	15.17	14.92	14.93	14.77	14.55	14.53	14.37	14.27	14.05	14.09	13.98	13.56
450.0	15.39	14.86	14.71	14.76	14.98	14.64	14.50	14.26	14.27	14.11	13.91	13.88	13.74	13.65	13.44	13.48	13.37	12.97
500.0	14.79	14.29	14.15	14.19	14.41	14.09	13.94	13.71	13.73	13.68	13.39	13.36	13.23	13.14	12.93	12.97	12.86	12.49

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

245 CM IONS 96

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.690	6.380	9.003	8.980	8.820	10.498	11.340	11.909	12.320	12.770	13.060	13.990	14.460	15.047	15.270	15.511	15.971	16.380
3.0	7.271	7.195	9.975	10.005	9.837	11.654	12.668	13.330	13.792	14.286	14.681	15.725	16.292	16.949	17.199	17.518	18.206	18.641
3.5	7.848	7.964	10.921	11.000	10.824	12.768	13.981	14.688	15.197	15.728	16.220	17.370	18.025	18.743	19.018	19.407	20.288	20.671
4.0	8.429	8.710	11.853	11.981	11.793	13.856	15.240	16.009	16.560	17.123	17.708	18.957	19.693	20.469	20.766	21.221	22.271	22.515
4.5	9.017	9.443	12.780	12.954	12.765	14.930	16.480	17.306	17.897	18.488	19.164	20.507	21.321	22.150	22.468	22.984	24.186	24.401
5.0	9.613	10.170	13.707	13.926	13.715	15.996	17.709	18.590	19.218	19.835	20.599	22.033	22.920	23.801	24.139	24.713	26.053	26.249
5.5	10.220	10.897	14.636	14.901	14.675	17.060	18.933	19.866	20.530	21.171	22.021	23.544	24.503	25.433	25.789	26.419	27.887	28.069
6.0	10.838	11.625	15.570	15.880	15.640	18.125	20.157	21.140	21.838	22.500	23.437	25.047	26.075	27.052	27.425	28.109	29.696	29.871
6.5	11.469	12.358	16.512	16.865	16.610	19.193	21.382	22.415	23.146	23.828	24.849	26.545	27.641	28.664	29.054	29.791	31.490	31.662
7.0	12.112	13.097	17.461	17.859	17.587	20.266	22.611	23.693	24.457	25.156	26.263	28.043	29.205	30.272	30.678	31.467	33.272	33.445
8.0	13.44	14.60	19.39	19.87	19.57	22.43	25.09	26.27	27.09	27.82	29.10	31.05	32.34	33.49	33.93	34.82	36.82	37.00
9.0	14.81	16.13	21.35	21.93	21.59	24.63	27.60	28.87	29.75	30.52	31.96	34.07	35.49	36.73	37.19	38.18	40.36	40.57
10.0	16.25	17.71	23.37	24.03	23.65	26.87	30.15	31.51	32.45	33.24	34.85	37.13	38.68	39.99	40.48	41.56	43.92	44.16
11.0	17.73	19.33	25.42	26.18	25.75	29.15	32.75	34.19	35.19	36.00	37.79	40.23	41.90	43.29	43.81	44.98	47.49	47.78
12.0	19.27	20.99	27.53	28.37	27.90	31.47	35.39	36.92	37.98	38.81	40.76	43.36	45.16	46.63	47.17	48.44	51.10	51.43
15.0	24.21	26.23	34.12	35.24	34.63	38.71	43.60	45.39	46.60	47.48	49.97	53.06	55.23	56.92	57.53	59.06	62.14	62.64
20.0	33.47	35.86	46.07	47.67	46.76	51.68	58.27	60.49	61.96	62.89	66.30	70.23	73.03	75.06	75.77	77.74	81.43	82.31
25.0	43.96	46.58	59.17	61.28	60.04	65.79	74.19	76.83	78.55	79.50	83.89	88.69	92.14	94.48	95.28	97.69	101.92	103.26
30.0	55.64	58.36	73.38	76.04	74.42	80.99	91.31	94.38	96.34	97.29	102.71	108.43	112.55	115.20	116.07	118.90	123.64	125.50
35.0	68.44	71.16	88.66	91.89	89.86	97.26	109.60	113.11	115.30	116.23	122.75	129.41	134.24	137.17	138.11	141.37	146.59	149.01
40.0	82.34	84.95	104.97	108.80	106.32	114.56	129.02	132.97	135.40	136.29	143.95	151.59	157.16	160.37	161.36	165.06	170.74	173.76
45.0	97.28	99.69	122.28	126.73	123.76	132.84	149.54	153.94	156.60	157.42	166.30	174.96	181.28	184.75	185.79	189.93	196.06	199.72
50.0	113.24	115.35	140.56	145.66	142.16	152.09	171.12	175.98	178.87	179.61	189.74	199.46	206.57	210.29	211.38	215.95	222.53	226.86
55.0	130.19	131.91	159.77	165.54	161.49	172.28	193.72	199.05	202.17	202.82	214.26	225.07	232.99	236.96	238.08	243.09	250.12	255.14
60.0	148.10	149.34	179.88	186.36	181.72	193.37	217.33	223.13	226.48	227.02	239.82	251.75	260.52	264.73	266.87	271.33	278.80	284.53
65.0	166.9	167.6	200.9	208.1	202.8	215.3	241.9	248.2	251.8	252.2	266.4	279.5	289.1	293.6	294.7	300.6	308.6	315.0
70.0	186.7	186.7	222.7	230.7	224.8	238.2	267.5	274.2	278.0	278.3	294.0	308.3	318.8	323.4	324.6	331.0	339.3	346.6
80.0	228.9	227.3	269.0	278.5	271.2	286.4	321.3	329.1	333.3	333.3	352.0	368.8	381.2	386.3	387.4	394.7	404.0	412.7
90.0	274.4	271.0	318.4	329.6	320.8	337.8	378.7	387.5	392.2	391.8	413.8	433.1	447.5	453.0	454.1	462.3	472.5	482.9
100.0	323.3	317.7	371.0	383.9	373.5	392.3	439.5	449.5	454.6	453.7	479.1	501.2	517.6	523.4	524.6	533.7	544.9	556.9
150.0	614.0	591.9	676.4	699.1	679.5	707.8	790.9	806.7	813.9	810.0	854.8	892.3	920.4	927.8	928.5	942.5	959.0	979.5
200.0	969.4	925.4	1044.4	1079.1	1048.8	1086.6	1212.5	1235.0	1243.4	1235.1	1303.2	1348.8	1392.9	1409.4	1409.2	1428.6	1443.2	1480.4
250.0	1382.7	1307.2	1463.4	1511.9	1472.1	1516.8	1691.3	1725.8	1729.9	1716.2	1810.8	1864.7	1926.7	1954.8	1952.6	1981.2	1988.7	2045.7
300.0	1842.6	1730.4	1926.3	1990.0	1939.5	1991.1	2218.8	2272.2	2265.2	2245.2	2368.8	2432.0	2513.4	2553.5	2549.0	2587.8	2587.2	2665.2
350.0	2343.2	2189.6	2427.4	2507.5	2445.3	2503.8	2788.7	2864.3	2843.2	2816.2	2970.8	3044.1	3146.3	3198.8	3191.5	3241.2	3232.0	3332.0
400.0	2880.	2680.	2962.	3060.	2985.	3050.	3396.	3494.	3459.	3424.	3611.	3696.	3820.	3885.	3875.	3936.	3917.	4041.
450.0	3447.	3199.	3527.	3643.	3554.	3627.	4036.	4158.	4107.	4064.	4286.	4382.	4529.	4607.	4594.	4666.	4639.	4786.
500.0	4043.	3742.	4118.	4253.	4150.	4230.	4706.	4852.	4785.	4733.	4991.	5100.	5271.	5362.	5345.	5429.	5392.	5564.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.18	17.81	19.19	19.55	20.26	21.27	21.87	22.65	23.11	23.55	24.01	24.49	24.98	25.42	26.00	26.21	28.05	28.64
3.0	19.49	20.24	21.62	21.97	22.70	23.85	24.54	25.47	25.99	26.51	27.03	27.56	28.16	28.64	29.26	29.46	31.45	32.07
3.5	21.66	22.51	23.90	24.23	24.97	26.26	27.02	28.09	28.66	29.26	29.82	30.40	31.10	31.62	32.27	32.47	34.59	35.25
4.0	23.73	24.68	26.08	26.39	27.15	28.56	29.39	30.58	31.20	31.86	32.47	33.09	33.88	34.44	35.12	35.31	37.56	38.26
4.5	25.74	26.79	28.18	28.48	29.25	30.78	31.68	32.98	33.64	34.36	35.02	35.68	36.54	37.14	37.86	38.04	40.42	41.15
5.0	27.71	28.85	30.24	30.53	31.31	32.94	33.90	35.32	36.02	36.79	37.49	38.19	39.13	39.76	40.51	40.69	43.19	43.96
5.5	29.64	30.87	32.27	32.54	33.33	35.07	36.09	37.61	38.35	39.17	39.91	40.64	41.66	42.32	43.11	43.28	45.90	46.70
6.0	31.56	32.87	34.28	34.54	35.33	37.17	38.25	39.86	40.64	41.51	42.30	43.06	44.14	44.84	45.66	45.83	48.57	49.40
6.5	33.46	34.86	36.27	36.51	37.31	39.25	40.39	42.09	42.90	43.83	44.65	45.44	46.60	47.32	48.18	48.34	51.20	52.06
7.0	35.35	36.83	38.25	38.48	39.28	41.32	42.51	44.31	45.15	46.12	46.98	47.81	49.03	49.79	50.67	50.83	53.81	54.70
8.0	39.12	40.78	42.19	42.40	43.20	45.43	46.74	48.71	49.61	50.67	51.61	52.49	53.84	54.66	55.61	55.76	58.98	59.93
9.0	42.89	44.72	46.14	46.33	47.13	49.54	50.95	53.09	54.05	55.21	56.22	57.15	58.62	59.50	60.52	60.66	64.11	65.12
10.0	46.68	48.68	50.10	50.27	51.06	53.66	55.18	57.48	58.50	59.74	60.82	61.81	63.40	64.33	65.41	65.54	69.23	70.31
11.0	50.50	52.67	54.10	54.23	55.02	57.80	59.43	61.88	62.95	64.28	65.43	66.48	68.18	69.16	70.32	70.44	74.36	75.50
12.0	54.36	56.69	58.13	58.24	59.02	61.98	63.71	66.32	67.44	68.85	70.07	71.17	72.98	74.02	75.25	75.36	79.52	80.71
15.0	66.19	69.03	70.48	70.51	71.25	74.74	76.78	79.84	81.11	82.77	84.19	85.45	87.59	88.78	90.23	90.31	95.19	96.56
20.0	86.89	90.61	92.07	91.95	92.60	96.98	99.54	103.32	104.82	106.88	108.66	110.17	112.84	114.27	116.11	116.14	122.25	123.93
25.0	108.92	113.55	115.01	114.74	115.25	120.55	123.64	128.13	129.85	132.32	134.43	136.20	139.40	141.05	143.31	143.29	150.68	152.67
30.0	132.28	137.86	139.32	138.89	139.23	145.47	149.11	154.31	156.23	159.11	161.59	163.60	167.33	169.19	171.92	171.84	180.56	182.86
35.0	156.96	163.54	164.99	164.37	164.53	171.74	175.93	181.85	183.98	187.27	190.12	192.38	196.66	198.72	201.92	201.78	211.88	214.52
40.0	182.9	190.6	192.0	191.2	191.1	199.3	204.1	210.7	213.1	216.8	220.0	222.5	227.3	229.6	233.3	233.1	244.6	247.6
45.0	210.2	218.9	220.2	219.2	218.9	228.2	233.5	240.9	243.5	247.6	251.2	254.0	259.4	261.8	266.1	265.8	278.8	282.1
50.0	238.6	248.4	249.8	248.6	248.0	258.3	264.3	272.4	275.1	279.7	283.7	286.8	292.7	295.3	300.2	299.8	314.4	318.0
55.0	268.2	279.2	280.5	279.1	278.2	289.6	296.2	305.1	308.1	313.1	317.5	320.8	327.4	330.2	335.5	335.1	351.3	355.3
60.0	299.0	311.2	312.5	310.8	309.6	322.2	329.4	339.1	342.2	347.7	352.5	356.1	363.2	366.2	372.2	371.7	389.5	393.9
65.0	331.0	344.4	345.6	343.7	342.2	355.9	363.8	374.2	377.5	383.5	388.7	392.6	400.3	403.5	410.1	409.5	429.0	433.8
70.0	364.0	378.7	379.9	377.7	375.8	390.7	399.3	410.5	414.0	420.5	426.1	430.3	438.7	442.0	449.2	448.5	469.7	474.9
80.0	433.3	450.7	451.7	449.0	446.3	463.7	473.6	486.5	490.4	497.8	504.4	509.2	518.8	522.4	531.0	530.1	554.9	560.9
90.0	506.7	527.0	527.8	524.5	521.0	541.0	552.3	566.8	571.2	579.6	587.1	592.5	603.4	607.3	617.4	616.3	644.8	651.6
100.0	584.1	607.4	607.9	604.1	599.6	622.3	635.2	651.4	656.2	665.5	674.1	680.0	692.3	696.6	708.1	706.8	739.2	746.9
150.0	1026.	1066.	1065.	1058.	1048.	1086.	1107.	1132.	1139.	1154.	1168.	1177.	1197.	1203.	1222.	1220.	1274.	1287.
200.0	1550.	1609.	1607.	1596.	1578.	1634.	1664.	1699.	1708.	1729.	1749.	1762.	1790.	1798.	1827.	1823.	1889.	1920.
250.0	2141.	2222.	2223.	2207.	2181.	2255.	2294.	2340.	2350.	2378.	2407.	2422.	2458.	2470.	2510.	2504.	2576.	2631.
300.0	2788.	2892.	2902.	2882.	2846.	2938.	2983.	3042.	3051.	3087.	3127.	3144.	3188.	3205.	3257.	3248.	3327.	3406.
350.0	3485.	3613.	3631.	3609.	3563.	3671.	3724.	3796.	3805.	3850.	3900.	3919.	3971.	3994.	4059.	4048.	4133.	4237.
400.0	4226.	4380.	4406.	4381.	4323.	4450.	4511.	4596.	4604.	4658.	4721.	4741.	4802.	4831.	4909.	4895.	4986.	5118.
450.0	5003.	5186.	5220.	5193.	5123.	5268.	5337.	5437.	5444.	5507.	5582.	5604.	5674.	5709.	5801.	5784.	5883.	6042.
500.0	5816.	6026.	6070.	6040.	5957.	6121.	6199.	6313.	6320.	6393.	6480.	6504.	6583.	6624.	6731.	6711.	6818.	7006.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

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97 BK IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	210.9	144.8	124.3	117.8	118.5	103.7	88.7	84.0	81.0	78.4	73.4	68.4	64.7	62.3	61.4	58.9	52.6	54.6
3.0	214.0	156.2	129.0	122.4	123.4	108.9	93.6	89.0	86.0	83.6	78.3	73.2	69.4	66.9	66.0	63.5	57.3	59.0
3.5	213.9	163.2	131.6	125.1	126.4	112.2	96.8	92.2	89.3	87.1	81.6	76.5	72.7	70.2	69.3	66.7	60.8	62.2
4.0	212.1	167.2	132.9	126.5	128.0	114.3	98.8	94.4	91.5	89.5	83.9	78.7	75.0	72.5	71.6	69.1	63.4	64.5
4.5	209.4	169.3	133.4	127.1	128.7	115.5	100.1	95.7	93.0	91.1	85.5	80.3	76.6	74.1	73.2	70.7	65.3	66.1
5.0	206.0	170.1	133.3	127.0	128.8	116.0	100.8	96.5	93.8	92.1	86.5	81.3	77.6	75.3	74.4	71.9	66.8	67.3
5.5	202.4	170.0	132.7	126.6	128.5	116.1	101.0	96.9	94.3	92.7	87.1	82.0	78.4	76.0	75.2	72.7	67.8	68.2
6.0	198.6	169.3	131.9	125.9	127.9	115.9	101.0	97.0	94.5	93.0	87.4	82.4	78.8	76.5	75.7	73.3	68.6	68.8
6.5	194.8	168.2	130.9	125.0	127.1	115.5	100.8	96.9	94.4	93.1	87.5	82.5	79.0	76.8	76.0	73.6	69.1	69.2
7.0	191.1	166.7	129.8	124.0	126.1	114.9	100.4	96.6	94.2	93.0	87.4	82.5	79.0	76.9	76.1	73.8	69.5	69.4
8.0	183.7	163.3	127.2	121.7	123.9	113.4	99.2	95.7	93.4	92.4	86.9	82.1	78.7	78.7	76.0	73.7	69.8	69.5
9.0	176.8	159.4	124.6	119.2	121.5	111.6	97.8	94.4	92.3	91.4	86.0	81.4	78.1	76.2	75.5	73.4	69.8	69.2
10.0	170.3	155.4	121.8	116.7	119.0	109.7	96.3	93.0	91.1	90.3	85.0	80.5	77.3	75.5	74.9	72.8	69.4	68.7
11.0	164.3	151.5	119.2	114.2	116.5	107.7	94.7	91.6	89.7	89.0	83.8	79.5	76.4	74.6	74.1	72.1	69.0	68.1
12.0	158.7	147.6	116.6	111.8	114.1	105.7	93.0	90.1	88.3	87.7	82.6	78.4	75.4	73.7	73.2	71.3	68.4	67.4
15.0	144.3	136.9	109.3	104.9	107.3	100.0	88.2	85.6	84.1	83.7	78.9	75.0	72.3	70.8	70.4	68.6	66.2	65.1
20.0	125.9	122.1	99.1	96.3	97.6	91.6	81.1	78.9	77.7	77.5	73.2	69.6	67.2	66.0	65.7	64.2	62.4	61.1
25.0	112.2	110.5	90.9	87.5	89.8	84.7	75.1	73.3	72.2	72.2	68.2	65.0	62.8	61.8	61.6	60.3	58.8	57.5
30.0	101.7	101.2	84.3	81.2	83.3	78.9	70.1	68.5	67.6	67.6	63.9	61.0	59.0	58.2	58.0	56.8	55.6	54.3
35.0	93.3	93.6	78.7	75.9	77.9	74.1	65.9	64.4	63.6	63.7	60.3	57.6	55.7	55.0	54.9	53.8	52.8	51.5
40.0	86.40	87.28	73.98	71.37	73.36	69.88	62.26	60.89	60.20	60.35	57.09	54.57	52.84	52.24	52.13	51.19	50.24	49.01
45.0	80.64	81.92	69.93	67.50	69.41	66.27	59.09	57.84	57.22	57.40	54.31	51.96	50.33	49.80	49.71	48.86	48.01	46.83
50.0	75.75	77.32	66.40	64.13	65.97	63.10	56.31	55.15	54.59	54.80	51.86	49.64	48.10	47.64	47.57	46.78	46.01	44.88
55.0	71.54	73.32	63.31	61.16	62.93	60.30	53.85	52.77	52.26	52.49	49.69	47.58	46.12	45.71	45.66	44.92	44.21	43.13
60.0	67.86	69.80	60.56	58.53	60.24	57.80	51.65	50.64	50.18	50.41	47.73	45.73	44.33	43.97	43.93	43.25	42.59	41.56
65.0	64.63	66.68	58.11	56.17	57.82	55.56	49.68	48.72	48.29	48.54	45.97	44.06	42.72	42.39	42.37	41.73	41.11	40.13
70.0	61.76	63.90	55.89	54.05	55.65	53.53	47.89	46.99	46.59	46.85	44.37	42.54	41.26	40.96	40.95	40.34	39.76	38.82
80.0	56.87	59.13	52.07	50.37	51.87	50.00	44.77	43.96	43.61	43.89	41.58	39.88	38.69	38.45	38.45	37.91	37.38	36.52
90.0	52.86	55.19	48.86	47.29	48.71	47.03	42.14	41.40	41.10	41.38	39.21	37.63	36.51	36.31	36.32	35.83	35.35	34.56
100.0	49.50	51.86	46.13	44.66	46.01	44.49	39.89	39.20	38.94	39.22	37.18	35.69	34.64	34.47	34.49	34.04	33.59	32.86
150.0	38.47	40.79	36.84	35.71	36.79	35.75	32.13	31.62	31.46	31.75	30.12	28.96	28.12	28.04	28.07	27.76	27.40	26.90
200.0	32.24	34.79	31.61	30.60	31.35	30.74	27.61	27.09	27.15	27.45	26.01	25.59	24.73	24.19	24.27	23.93	24.17	23.30
250.0	28.55	30.96	28.26	27.36	27.97	27.55	24.76	24.03	24.38	24.67	23.38	23.00	22.24	21.78	21.86	21.49	21.78	21.03
300.0	25.97	28.27	25.87	25.05	25.63	25.27	22.72	21.86	22.40	22.67	21.50	21.14	20.45	20.04	20.13	19.79	20.06	19.38
350.0	24.07	26.27	24.09	23.33	23.87	23.56	21.20	20.41	20.91	21.17	20.08	19.74	19.10	18.74	18.82	18.51	18.76	18.14
400.0	22.61	24.73	22.71	21.99	22.51	22.23	20.01	19.29	19.75	20.00	18.98	18.65	18.05	17.72	17.80	17.51	17.74	17.17
450.0	21.46	23.51	21.61	20.92	21.43	21.17	19.06	18.40	18.82	19.07	18.10	17.78	17.21	16.91	16.99	16.72	16.93	16.39
500.0	20.53	22.53	20.72	20.06	20.65	20.31	18.29	17.67	18.07	18.31	17.38	17.07	16.53	16.24	16.32	16.07	16.27	15.76

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	50.97	48.54	48.50	48.82	48.33	45.51	44.07	41.57	40.66	39.58	38.80	38.15	36.76	36.29	35.89	35.98	34.50	34.11
3.0	56.21	52.61	52.56	52.90	52.47	49.53	48.01	45.45	44.52	43.39	42.57	41.89	40.45	39.92	39.46	39.55	37.87	37.43
3.5	58.27	55.58	55.51	55.86	55.48	52.48	50.92	48.34	47.41	46.25	45.40	44.70	43.24	42.66	42.16	42.26	40.42	39.95
4.0	60.51	57.75	57.67	58.03	57.71	54.67	53.08	50.51	49.60	48.42	47.55	46.84	45.37	44.77	44.23	44.32	42.37	41.87
4.5	62.15	59.34	59.25	59.63	59.36	56.31	54.71	52.15	51.26	50.08	49.19	48.48	47.01	46.39	45.82	45.92	43.87	43.35
5.0	63.35	60.51	60.42	60.80	60.58	57.54	55.92	53.40	52.53	51.34	50.46	49.75	48.28	47.66	47.05	47.15	45.03	44.50
5.5	64.21	61.36	61.26	61.65	61.47	58.44	56.83	54.35	53.49	52.31	51.43	50.72	49.27	48.63	48.01	48.11	45.93	45.39
6.0	64.81	61.96	61.86	62.25	62.11	59.11	57.50	55.05	54.22	53.05	52.16	51.46	50.03	49.39	48.75	48.84	46.63	46.08
6.5	65.21	62.36	62.27	62.66	62.55	59.58	57.98	55.57	54.76	53.60	52.72	52.03	50.61	49.97	49.31	49.41	47.16	46.60
7.0	65.46	62.62	62.52	62.92	62.84	59.89	58.31	55.95	55.15	54.01	53.13	52.44	51.04	50.41	49.73	49.83	47.55	47.00
8.0	65.60	62.78	62.69	63.09	63.08	60.19	58.63	56.35	55.60	54.48	53.61	52.94	51.58	50.96	50.26	50.36	48.05	47.49
9.0	65.42	62.64	62.55	62.95	62.99	60.16	58.64	56.44	55.72	54.63	53.78	53.13	51.80	51.20	50.48	50.58	48.26	47.69
10.0	65.03	62.29	62.20	62.60	62.68	59.93	58.43	56.31	55.63	54.56	53.73	53.09	51.81	51.22	50.49	50.59	48.26	47.70
11.0	64.50	61.80	61.72	62.12	62.24	59.54	58.08	56.03	55.38	54.34	53.52	52.91	51.66	51.08	50.35	50.45	48.13	47.58
12.0	63.88	61.22	61.15	61.55	61.70	59.07	57.63	55.65	55.03	54.02	53.22	52.62	51.40	50.85	50.11	50.20	47.90	47.35
15.0	61.75	59.22	59.17	59.56	59.78	57.33	55.98	54.18	53.63	52.69	51.94	51.38	50.26	49.76	49.02	49.11	46.87	46.34
20.0	58.07	55.74	55.72	56.09	56.39	54.17	52.96	51.38	50.92	50.09	49.40	48.91	47.91	47.49	46.75	46.84	44.72	44.23
25.0	54.69	52.52	52.52	52.88	53.22	51.19	50.08	48.68	48.28	47.52	46.89	46.45	45.55	45.19	44.48	44.56	42.57	42.11
30.0	51.69	49.67	49.68	50.03	50.39	48.51	47.49	46.22	45.87	45.18	44.59	44.19	43.36	43.05	42.37	42.45	40.57	40.14
35.0	49.05	47.15	47.18	47.51	47.89	46.13	45.18	44.03	43.71	43.07	42.53	42.16	41.39	41.12	40.46	40.54	38.76	38.36
40.0	46.73	44.93	44.97	45.29	45.67	44.03	43.13	42.07	41.78	41.19	40.67	40.33	39.62	39.38	38.74	38.82	37.12	36.75
45.0	44.66	42.95	43.01	43.31	43.70	42.15	41.31	40.31	40.05	39.50	39.01	38.69	38.02	37.81	37.19	37.27	35.65	35.30
50.0	42.82	41.19	41.25	41.55	41.94	40.46	39.67	38.74	38.49	37.97	37.51	37.21	36.58	36.39	35.79	35.87	34.32	33.99
55.0	41.17	39.61	39.67	39.96	40.35	38.94	38.19	37.31	37.09	36.60	36.16	35.87	35.27	35.10	34.52	34.60	33.12	32.79
60.0	39.67	38.18	38.24	38.52	38.91	37.56	36.85	36.02	35.81	35.34	34.92	34.65	34.08	33.93	33.36	33.44	32.01	31.71
65.0	38.31	36.87	36.94	37.22	37.60	36.31	35.62	34.84	34.64	34.20	33.80	33.54	33.00	32.85	32.31	32.38	31.01	30.71
70.0	37.07	35.68	35.76	36.02	36.41	35.16	34.51	33.76	33.57	33.15	32.76	32.52	32.00	31.86	31.33	31.41	30.08	29.80
80.0	34.89	33.59	33.66	33.92	34.30	33.14	32.53	31.85	31.68	31.29	30.93	30.70	30.22	30.11	29.61	29.68	28.43	28.17
90.0	33.02	31.80	31.88	32.12	32.49	31.40	30.83	30.21	30.05	29.69	29.36	29.14	28.70	28.60	28.12	28.19	27.02	26.77
100.0	31.41	30.25	30.32	30.56	30.92	29.89	29.36	28.78	28.64	28.30	27.98	27.79	27.37	27.28	26.83	26.90	25.78	25.54
150.0	25.72	24.78	24.86	25.05	25.38	24.57	24.15	23.72	23.62	23.36	23.11	22.96	22.63	22.57	22.20	22.26	21.35	21.17
200.0	22.29	21.52	21.50	21.67	21.98	21.28	20.93	20.59	20.51	20.30	20.09	19.96	19.69	19.63	19.33	19.38	19.11	18.49
250.0	20.12	19.43	19.20	19.35	19.64	19.08	18.88	18.54	18.55	18.34	18.06	18.03	17.82	17.69	17.40	17.46	17.32	16.77
300.0	18.55	17.91	17.71	17.77	18.03	17.61	17.43	17.13	17.14	16.94	16.69	16.66	16.48	16.36	16.10	16.15	16.02	15.52
350.0	17.37	16.77	16.59	16.64	16.89	16.50	16.33	16.05	16.06	15.89	15.65	15.62	15.46	15.35	15.10	15.15	15.03	14.57
400.0	16.44	15.88	15.71	15.76	16.00	15.63	15.47	15.21	15.23	15.06	14.84	14.81	14.66	14.56	14.33	14.37	14.26	13.83
450.0	15.70	15.16	15.01	15.06	15.28	14.94	14.78	14.54	14.55	14.39	14.19	14.16	14.02	13.92	13.70	13.75	13.63	13.23
500.0	15.09	14.58	14.43	14.48	14.70	14.37	14.22	13.99	14.00	13.85	13.66	13.63	13.49	13.40	13.19	13.23	13.12	12.74

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

248 97 BK IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.720	6.410	9.043	9.020	8.860	10.539	11.380	11.946	12.360	12.820	13.110	14.050	14.520	15.107	15.330	15.571	16.031	16.440
3.0	7.303	7.232	10.020	10.051	9.883	11.704	12.737	13.377	13.843	14.348	14.743	15.799	16.367	17.023	17.274	17.594	18.284	18.619
3.5	7.882	8.007	10.971	11.052	10.875	12.824	14.038	14.744	15.257	15.799	16.292	17.454	18.110	18.829	19.106	19.497	20.381	20.662
4.0	8.464	8.757	11.908	12.037	11.850	13.918	15.304	16.071	16.627	17.202	17.789	19.050	19.789	20.566	20.865	21.321	22.376	22.619
4.5	9.052	9.493	12.838	13.014	12.816	14.997	16.551	17.375	17.971	18.574	19.252	20.609	21.425	22.256	22.576	23.094	24.301	24.516
5.0	9.649	10.223	13.768	13.990	13.779	16.068	17.785	18.665	19.298	19.927	20.694	22.142	23.032	23.916	24.255	24.832	26.178	26.373
5.5	10.256	10.952	14.700	14.967	14.743	17.136	19.014	19.946	20.615	21.268	22.122	23.660	24.622	25.554	25.912	26.545	28.020	28.202
6.0	10.874	11.683	15.637	15.949	15.710	18.204	20.241	21.225	21.929	22.602	23.543	25.168	26.200	27.180	27.555	28.243	29.838	30.012
6.5	11.505	12.417	16.581	16.937	16.683	19.275	21.470	22.504	23.241	23.935	24.960	26.672	27.771	28.798	29.190	29.931	31.638	31.809
7.0	12.147	13.158	17.532	17.933	17.662	20.352	22.703	23.786	24.555	25.267	26.378	28.174	29.341	30.412	30.821	31.613	33.427	33.599
8.0	13.47	14.66	19.46	19.95	19.65	22.52	25.19	26.36	27.20	27.94	29.22	31.19	32.48	33.64	34.08	34.97	36.99	37.17
9.0	14.85	16.20	21.43	22.01	21.67	24.73	27.70	28.97	29.87	30.84	32.09	34.22	35.64	36.89	37.35	38.34	40.54	40.75
10.0	16.28	17.77	23.45	24.11	23.73	26.97	30.26	31.62	32.57	33.37	34.99	37.28	38.83	40.16	40.65	41.74	44.10	44.34
11.0	17.76	19.39	25.50	26.26	25.84	29.25	32.86	34.31	35.31	36.14	37.93	40.36	42.06	43.46	43.98	45.16	47.68	47.97
12.0	19.30	21.05	27.61	28.45	27.99	31.58	35.50	37.04	38.10	38.94	40.91	43.53	45.33	46.80	47.35	48.62	51.30	51.62
15.0	24.22	26.29	34.20	35.33	34.71	38.81	43.71	45.51	46.73	47.63	50.12	53.23	55.41	57.10	57.72	59.26	62.35	62.85
20.0	33.45	35.89	46.13	47.74	46.84	51.78	58.39	60.60	62.08	63.03	66.44	70.40	73.21	75.24	75.96	77.93	81.64	82.52
25.0	43.90	46.59	59.21	61.33	60.10	65.87	74.28	76.93	78.65	79.62	84.02	88.84	92.30	94.65	95.46	97.87	102.11	103.45
30.0	55.52	58.33	73.39	76.06	74.45	81.05	91.37	94.45	96.42	97.39	102.81	108.55	112.68	115.34	116.22	119.06	123.81	125.66
35.0	68.27	71.08	88.63	91.87	89.84	97.28	109.62	113.13	115.34	116.29	122.81	129.48	134.32	137.27	138.21	141.48	146.72	149.13
40.0	82.10	84.81	104.90	108.73	106.25	114.52	128.99	132.95	135.39	136.29	143.96	151.62	157.19	160.41	161.41	165.12	170.81	173.83
45.0	96.96	99.49	122.15	126.60	123.64	132.75	149.45	153.85	156.52	157.37	166.24	174.92	181.24	184.73	185.78	189.92	196.07	199.73
50.0	112.84	115.07	140.35	145.46	141.97	151.94	170.95	175.81	178.72	179.48	189.61	199.34	206.46	210.20	211.29	215.86	222.46	226.79
55.0	129.69	131.55	159.49	165.26	161.22	172.05	193.47	198.81	201.94	202.61	214.04	224.86	232.79	236.78	237.90	242.92	249.96	254.98
60.0	147.50	148.89	179.52	186.00	181.37	193.06	216.99	222.80	226.16	226.72	239.51	251.46	260.22	264.45	266.60	271.06	278.55	284.27
65.0	166.2	167.1	200.4	207.6	202.4	214.9	241.5	247.8	251.4	251.8	266.0	279.1	288.7	293.2	294.3	300.3	308.2	314.6
70.0	185.9	186.1	222.2	230.1	224.3	237.7	266.9	273.7	277.5	277.8	293.5	307.7	318.3	322.9	324.1	330.5	338.9	346.1
80.0	227.8	226.5	268.2	277.7	270.5	285.7	320.5	328.3	332.6	332.5	351.2	368.0	380.4	385.5	386.7	393.9	403.2	412.0
90.0	273.0	269.9	317.4	328.6	319.8	336.8	377.6	386.5	391.2	390.8	412.7	432.1	446.4	451.9	453.1	461.3	471.5	481.8
100.0	321.6	316.3	369.7	382.6	372.2	391.1	438.2	448.1	453.2	452.4	477.7	499.8	516.2	522.0	523.2	532.3	543.5	555.5
150.0	608.9	588.7	673.3	696.0	676.4	704.8	787.6	803.3	810.5	806.7	851.4	888.7	916.8	924.1	924.9	938.9	955.4	975.8
200.0	963.1	920.0	1038.9	1073.5	1043.3	1081.1	1206.4	1228.9	1237.3	1229.1	1297.0	1342.4	1386.3	1402.8	1402.7	1422.0	1436.6	1473.6
250.0	1373.2	1299.0	1455.0	1503.3	1463.7	1508.5	1682.0	1716.4	1720.5	1707.0	1801.1	1854.8	1916.6	1944.6	1942.5	1971.0	1978.5	2035.2
300.0	1829.6	1719.0	1914.5	1977.9	1927.8	1979.3	2205.8	2259.0	2252.1	2232.3	2355.2	2418.1	2499.2	2539.2	2534.7	2573.4	2572.9	2650.4
350.0	2326.3	2174.8	2411.9	2491.6	2429.8	2488.3	2771.5	2846.7	2825.9	2799.1	2952.8	3025.8	3127.5	3179.8	3172.6	3222.0	3213.0	3312.5
400.0	2858.	2662.	2943.	3040.	2965.	3031.	3374.	3472.	3437.	3402.	3589.	3673.	3796.	3861.	3851.	3911.	3893.	4016.
450.0	3422.	3176.	3503.	3618.	3530.	3603.	4010.	4131.	4080.	4038.	4258.	4354.	4500.	4578.	4564.	4637.	4609.	4755.
500.0	4013.	3716.	4089.	4224.	4121.	4201.	4674.	4819.	4753.	4702.	4958.	5066.	5236.	5327.	5310.	5394.	5357.	5528.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.24	17.87	19.26	19.62	20.33	21.34	21.95	22.73	23.19	23.64	24.10	24.59	25.07	25.51	26.09	26.30	28.15	28.74
3.0	19.57	20.32	21.71	22.05	22.79	23.95	24.64	25.58	26.10	26.63	27.14	27.68	28.28	28.76	29.38	29.58	31.57	32.20
3.5	21.75	22.61	24.00	24.33	25.08	26.38	27.14	28.22	28.79	29.39	29.96	30.54	31.24	31.76	32.41	32.61	34.74	35.40
4.0	23.84	24.79	26.19	26.51	27.27	28.69	29.53	30.72	31.35	32.01	32.62	33.25	34.03	34.59	35.28	35.47	37.73	38.43
4.5	25.86	26.91	28.31	28.61	29.39	30.92	31.82	33.14	33.81	34.52	35.19	35.85	36.71	37.31	38.03	38.22	40.60	41.34
5.0	27.84	28.98	30.38	30.67	31.45	33.10	34.07	35.49	36.19	36.97	37.67	38.37	39.32	39.95	40.70	40.88	43.39	44.16
5.5	29.78	31.01	32.42	32.69	33.49	35.24	36.26	37.79	38.53	39.36	40.11	40.84	41.86	42.52	43.31	43.48	46.12	46.92
6.0	31.70	33.02	34.43	34.70	35.49	37.35	38.43	40.05	40.83	41.71	42.50	43.26	44.35	45.05	45.87	46.04	48.79	49.63
6.5	33.61	35.02	36.43	36.68	37.48	39.44	40.58	42.29	43.11	44.04	44.86	45.66	46.82	47.55	48.40	48.56	51.44	52.30
7.0	35.51	37.00	38.42	38.66	39.46	41.51	42.71	44.52	45.37	46.34	47.21	48.03	49.26	50.02	50.90	51.06	54.06	54.95
8.0	39.29	40.96	42.38	42.59	43.40	45.64	46.95	48.93	49.84	50.91	51.85	52.74	54.09	54.91	55.86	56.01	59.24	60.20
9.0	43.07	44.91	46.34	46.52	47.33	49.76	51.18	53.33	54.30	55.45	56.47	57.41	58.88	59.76	60.78	60.92	64.39	65.41
10.0	46.87	48.88	50.31	50.47	51.27	53.89	55.41	57.73	58.75	59.99	61.08	62.08	63.67	64.60	65.69	65.82	69.53	70.61
11.0	50.70	52.87	54.31	54.45	55.24	58.04	59.67	62.14	63.22	64.55	65.70	66.76	68.46	69.45	70.61	70.73	74.67	75.81
12.0	54.57	56.91	58.35	58.46	59.25	62.22	63.96	66.58	67.71	69.12	70.35	71.46	73.27	74.31	75.55	75.66	79.84	81.04
15.0	66.41	69.26	70.71	70.74	71.49	75.00	77.05	80.12	81.40	83.06	84.49	85.76	87.90	89.10	90.55	90.63	95.53	96.91
20.0	87.12	90.84	92.31	92.20	92.85	97.25	99.82	103.62	105.12	107.19	108.97	110.48	113.16	114.59	116.44	116.47	122.60	124.28
25.0	109.13	113.77	115.24	114.97	115.49	120.81	123.90	128.41	130.13	132.61	134.74	136.50	139.71	141.36	143.64	143.62	151.02	153.02
30.0	132.47	138.05	139.52	139.09	139.44	145.70	149.34	154.56	156.49	159.38	161.86	163.88	167.62	169.48	172.21	172.13	180.87	183.18
35.0	157.10	163.69	165.14	164.53	164.70	171.92	176.12	182.06	184.20	187.50	190.34	192.62	196.90	198.96	202.17	202.03	212.15	214.79
40.0	183.0	190.6	192.1	191.3	191.2	199.4	204.2	210.9	213.2	216.9	220.2	222.7	227.5	229.8	233.5	233.3	244.9	247.8
45.0	210.2	218.9	220.3	219.3	219.0	228.2	233.6	241.0	243.5	247.7	251.3	254.1	259.5	261.9	266.2	265.9	278.9	282.3
50.0	238.5	248.4	249.7	248.5	248.0	258.3	264.2	272.4	275.1	279.7	283.7	286.8	292.7	295.4	300.2	299.8	314.4	318.1
55.0	268.1	279.1	280.4	279.0	278.1	289.5	296.1	305.0	308.0	313.0	317.4	320.7	327.3	330.1	335.5	335.0	351.2	355.2
60.0	298.8	311.0	312.2	310.6	309.4	322.0	329.2	338.8	342.0	347.5	352.3	355.9	363.0	366.0	372.0	371.5	389.3	393.7
65.0	330.6	344.0	345.2	343.3	341.8	355.5	363.4	373.9	377.2	383.2	388.4	392.3	400.0	403.2	409.8	409.2	428.6	433.4
70.0	363.5	378.2	379.4	377.2	375.3	390.2	398.8	410.0	413.6	420.0	425.7	429.9	438.2	441.5	448.8	448.1	469.3	474.4
80.0	432.5	449.9	450.9	448.2	445.6	462.9	472.9	485.7	489.7	497.0	503.6	508.4	518.0	521.6	530.2	529.3	554.1	560.1
90.0	505.6	525.8	526.6	523.4	519.9	539.9	551.2	565.7	570.1	578.4	586.0	591.3	602.2	606.2	616.2	615.1	643.6	650.4
100.0	582.6	605.8	606.4	602.6	598.2	620.8	633.7	649.9	654.7	664.0	672.5	678.5	690.8	695.0	706.6	705.2	737.6	745.3
150.0	1022.	1062.	1062.	1054.	1044.	1082.	1103.	1128.	1135.	1150.	1164.	1173.	1192.	1198.	1218.	1216.	1270.	1282.
200.0	1543.	1602.	1600.	1589.	1571.	1626.	1657.	1691.	1701.	1721.	1742.	1755.	1782.	1790.	1819.	1815.	1881.	1912.
250.0	2130.	2210.	2212.	2196.	2170.	2244.	2282.	2329.	2338.	2366.	2395.	2411.	2446.	2458.	2498.	2491.	2564.	2618.
300.0	2773.	2876.	2886.	2866.	2831.	2922.	2967.	3026.	3035.	3071.	3110.	3127.	3171.	3188.	3240.	3231.	3309.	3388.
350.0	3464.	3592.	3610.	3588.	3542.	3650.	3703.	3774.	3783.	3828.	3878.	3897.	3949.	3972.	4036.	4025.	4109.	4213.
400.0	4199.	4353.	4379.	4356.	4297.	4423.	4483.	4568.	4577.	4630.	4692.	4713.	4773.	4802.	4880.	4866.	4957.	5088.
450.0	4971.	5153.	5187.	5160.	5091.	5235.	5304.	5403.	5410.	5473.	5548.	5569.	5639.	5674.	5766.	5749.	5847.	6005.
500.0	5777.	5987.	6030.	6001.	5919.	6082.	6160.	6273.	6279.	6352.	6439.	6462.	6541.	6582.	6688.	6668.	6775.	6961.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

$^{249}_{98}$CF IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	212.6	145.1	126.0	118.4	119.1	104.1	89.1	84.4	81.3	78.8	73.6	68.7	64.9	62.5	61.6	59.1	52.8	54.8
3.0	215.9	166.9	129.8	123.2	124.2	109.5	94.2	89.5	86.4	84.0	78.7	73.6	69.7	67.2	66.3	63.8	57.6	59.3
3.5	216.0	164.1	132.6	126.0	127.2	113.0	97.4	92.8	89.8	87.6	82.1	76.9	73.1	70.6	69.6	67.1	61.1	62.5
4.0	214.4	168.3	134.0	127.5	128.9	115.1	99.5	95.0	92.1	90.1	84.5	79.3	75.4	73.0	72.0	69.5	63.8	64.9
4.5	211.7	170.6	134.5	128.1	129.7	116.3	100.8	96.4	93.6	91.8	86.1	80.9	77.1	74.6	73.7	71.2	65.8	66.6
5.0	208.4	171.6	134.4	128.1	129.9	117.0	101.6	97.3	94.6	92.8	87.1	82.0	78.2	75.8	74.9	72.4	67.2	67.8
5.5	204.8	171.6	133.9	127.8	129.6	117.1	101.9	97.7	95.1	93.5	87.8	82.7	79.0	76.6	75.8	73.3	68.3	68.7
6.0	201.0	170.9	133.2	127.1	129.0	117.0	101.9	97.8	95.3	93.8	88.1	83.1	79.4	77.1	76.3	73.9	69.1	69.3
6.5	197.3	169.8	132.2	126.2	128.3	116.6	101.7	97.7	95.3	93.9	88.3	83.2	79.7	77.4	76.6	74.2	69.7	69.7
7.0	193.5	168.4	131.1	125.2	127.3	116.0	101.3	97.5	95.1	93.8	88.2	83.2	79.7	77.5	76.8	74.4	70.1	70.0
8.0	186.1	165.1	128.6	123.0	125.2	114.5	100.2	96.6	94.3	93.2	87.7	82.9	79.5	77.4	76.7	74.4	70.4	70.1
9.0	179.2	161.2	125.9	120.5	122.8	112.7	98.8	95.4	93.3	92.3	86.9	82.2	78.9	76.9	76.3	74.1	70.4	69.9
10.0	172.7	157.3	123.2	118.0	120.3	110.8	97.3	94.0	92.0	91.2	85.9	81.3	78.1	76.2	75.6	73.5	70.1	69.4
11.0	166.6	153.4	120.5	115.5	117.9	108.9	95.7	92.6	90.7	90.0	84.7	80.3	77.2	75.4	74.8	72.8	69.7	68.8
12.0	161.0	149.5	117.9	113.1	115.5	106.9	94.1	91.1	89.3	88.7	83.5	79.2	76.2	74.5	74.0	72.0	69.1	68.1
15.0	146.4	138.7	110.7	106.2	108.6	101.2	89.3	86.6	85.1	84.7	79.9	75.9	73.1	71.6	71.2	69.4	67.0	65.8
20.0	127.9	123.9	100.4	96.6	98.9	92.8	82.2	79.9	78.7	78.5	74.1	70.5	68.1	66.9	66.5	65.0	63.2	61.9
25.0	114.1	112.2	92.2	88.8	91.0	85.9	76.2	74.2	73.2	73.1	69.1	65.9	63.6	62.7	62.4	61.1	59.6	58.2
30.0	103.4	102.8	85.5	82.4	84.5	80.0	71.1	69.4	68.5	68.6	64.8	61.8	59.8	59.0	58.8	57.6	56.4	55.0
35.0	94.9	95.1	79.9	77.0	79.1	75.1	66.9	65.3	64.5	64.6	61.1	58.4	56.5	55.8	55.6	54.6	53.5	52.2
40.0	87.89	88.71	75.11	72.47	74.48	70.93	63.19	61.80	61.09	61.24	57.93	55.38	53.62	53.00	52.88	51.93	50.97	49.72
45.0	82.05	83.29	71.02	68.55	70.49	67.28	60.00	58.72	58.09	58.27	55.13	52.74	51.08	50.54	50.45	49.58	48.72	47.52
50.0	77.09	78.63	67.46	65.15	67.01	64.08	57.19	56.01	55.44	55.65	52.66	50.40	48.84	48.36	48.29	47.49	46.70	45.56
55.0	72.81	74.57	64.33	62.15	63.94	61.25	54.70	53.60	53.08	53.31	50.46	48.32	46.83	46.41	46.36	45.62	44.89	43.80
60.0	69.08	71.01	61.55	59.48	61.22	58.73	52.48	51.45	50.98	51.22	48.49	46.45	45.03	44.66	44.62	43.92	43.25	42.21
65.0	65.80	67.85	59.07	57.10	58.78	56.46	50.48	49.51	49.07	49.33	46.71	44.76	43.40	43.07	43.04	42.39	41.76	40.76
70.0	62.88	65.02	56.83	54.95	56.58	54.41	48.67	47.76	47.35	47.61	45.10	43.23	41.92	41.62	41.61	40.99	40.40	39.44
80.0	57.92	60.19	52.95	51.23	52.76	50.84	45.52	44.69	44.34	44.62	42.27	40.54	39.33	39.08	39.08	38.53	38.00	37.12
90.0	53.84	56.18	49.71	48.10	49.55	47.83	42.86	42.10	41.79	42.08	39.87	38.26	37.13	36.92	36.93	36.43	35.94	35.14
100.0	50.43	52.81	46.94	45.44	46.81	45.26	40.58	39.88	39.61	39.89	37.81	36.30	35.23	35.06	35.07	34.62	34.16	33.42
150.0	39.21	41.56	37.51	36.36	37.47	36.40	32.71	32.20	32.03	32.33	30.66	29.48	28.63	28.54	28.58	28.26	27.90	27.38
200.0	32.87	35.46	32.21	31.18	31.94	31.32	28.12	27.59	27.66	27.96	26.50	26.07	25.19	24.63	24.72	24.38	24.61	23.74
250.0	29.11	31.56	28.80	27.88	28.51	28.07	25.23	24.49	24.85	25.14	23.83	23.44	22.66	22.19	22.27	21.89	22.19	21.43
300.0	26.49	28.82	26.38	25.54	26.13	25.76	23.16	22.28	22.83	23.11	21.91	21.55	20.84	20.43	20.51	20.17	20.44	19.76
350.0	24.55	26.79	24.56	23.78	24.34	24.02	21.61	20.81	21.32	21.58	20.47	20.13	19.47	19.10	19.19	18.87	19.12	18.49
400.0	23.07	25.22	23.16	22.42	22.96	22.67	20.40	19.67	20.14	20.40	19.35	19.02	18.40	18.07	18.15	17.86	18.09	17.51
450.0	21.90	23.98	22.04	21.34	21.86	21.59	19.44	18.76	19.20	19.45	18.46	18.13	17.55	17.24	17.32	17.05	17.27	16.71
500.0	20.95	22.98	21.13	20.46	20.97	20.72	18.66	18.02	18.43	18.68	17.73	17.41	16.86	16.57	16.65	16.39	16.60	16.07

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	51.14	48.70	48.66	48.98	48.49	45.66	44.21	41.70	40.79	39.70	38.92	38.27	36.88	36.40	36.00	36.09	34.61	34.21
3.0	55.45	52.85	52.79	53.13	52.69	49.74	48.22	45.65	44.71	43.58	42.75	42.07	40.62	40.09	39.63	39.72	38.03	37.59
3.5	58.58	55.87	55.80	56.16	55.77	52.75	51.18	48.58	47.66	46.49	45.63	44.93	43.46	42.88	42.38	42.47	40.63	40.15
4.0	60.87	58.09	58.01	58.38	58.05	55.00	53.39	50.80	49.89	48.70	47.83	47.11	45.63	45.03	44.48	44.58	42.61	42.11
4.5	62.56	59.73	59.64	60.02	59.74	56.68	55.06	52.49	51.59	50.40	49.51	48.79	47.31	46.69	46.11	46.21	44.15	43.63
5.0	63.79	60.94	60.84	61.23	61.00	57.94	56.31	53.77	52.89	51.70	50.80	50.09	48.61	47.98	47.38	47.47	45.34	44.80
5.5	64.69	61.82	61.72	62.11	61.92	58.87	57.25	54.74	53.88	52.70	51.80	51.09	49.63	48.99	48.36	48.46	46.27	45.72
6.0	65.32	62.44	62.34	62.74	62.59	59.56	57.94	55.48	54.64	53.46	52.56	51.86	50.41	49.77	49.12	49.22	46.98	46.43
6.5	65.75	62.87	62.77	63.17	63.06	60.06	58.45	56.02	55.20	54.03	53.14	52.44	51.01	50.37	49.70	49.80	47.53	46.97
7.0	66.02	63.15	63.05	63.45	63.37	60.40	58.80	56.41	55.61	54.46	53.57	52.88	51.46	50.83	50.15	50.24	47.95	47.38
8.0	66.20	63.35	63.25	63.66	63.64	60.73	59.15	56.85	56.09	54.96	54.09	53.41	52.04	51.41	50.70	50.80	48.47	47.90
9.0	66.04	63.23	63.14	63.54	63.58	60.73	59.19	56.97	56.24	55.14	54.28	53.62	52.28	51.67	50.95	51.05	48.70	48.13
10.0	65.67	62.90	62.81	63.22	63.30	60.51	59.00	56.86	56.17	55.09	54.25	53.61	52.31	51.71	50.98	51.07	48.73	48.16
11.0	65.16	62.43	62.35	62.75	62.87	60.15	58.67	56.60	55.94	54.89	54.06	53.44	52.17	51.60	50.85	50.95	48.61	48.05
12.0	64.55	61.87	61.79	62.19	62.34	59.68	58.23	56.23	55.60	54.58	53.77	53.16	51.93	51.37	50.62	50.72	48.39	47.84
15.0	62.45	59.89	59.84	60.23	60.46	57.97	56.61	54.79	54.23	53.28	52.51	51.95	50.82	50.31	49.56	49.65	47.38	46.85
20.0	58.78	56.43	56.40	56.78	57.08	54.83	53.60	52.01	51.53	50.69	49.99	49.50	48.48	48.06	47.31	47.41	45.28	44.76
25.0	55.40	53.20	53.20	53.57	53.91	51.85	50.72	49.30	48.90	48.13	47.49	47.04	46.13	45.76	45.04	45.13	43.11	42.65
30.0	52.39	50.34	50.36	50.70	51.07	49.16	48.13	46.84	46.48	45.78	45.19	44.78	43.94	43.63	42.93	43.02	41.11	40.68
35.0	49.74	47.81	47.84	48.18	48.56	46.78	45.81	44.64	44.31	43.67	43.12	42.74	41.96	41.69	41.01	41.10	39.29	38.88
40.0	47.40	45.57	45.62	45.94	46.33	44.66	43.75	42.67	42.37	41.78	41.25	40.90	40.18	39.94	39.29	39.37	37.65	37.27
45.0	45.32	43.59	43.64	43.95	44.34	42.76	41.91	40.90	40.63	40.07	39.58	39.25	38.57	38.36	37.73	37.81	36.17	35.81
50.0	43.47	41.81	41.87	42.17	42.57	41.07	40.26	39.32	39.07	38.54	38.07	37.76	37.12	36.93	36.32	36.40	34.83	34.49
55.0	41.80	40.21	40.28	40.57	40.97	39.53	38.77	37.88	37.65	37.15	36.70	36.41	35.81	35.63	35.04	35.12	33.61	33.29
60.0	40.29	38.77	38.84	39.12	39.52	38.15	37.42	36.58	36.36	35.89	35.46	35.19	34.61	34.45	33.88	33.96	32.50	32.19
65.0	38.92	37.46	37.53	37.80	38.20	36.88	36.18	35.39	35.18	34.73	34.32	34.06	33.51	33.36	32.81	32.89	31.49	31.19
70.0	37.67	36.26	36.33	36.60	36.99	35.72	35.05	34.30	34.11	33.68	33.28	33.03	32.50	32.37	31.83	31.91	30.55	30.27
80.0	35.46	34.14	34.21	34.47	34.86	33.68	33.06	32.36	32.19	31.80	31.43	31.20	30.71	30.59	30.09	30.16	28.89	28.63
90.0	33.57	32.33	32.40	32.65	33.03	31.92	31.34	30.70	30.55	30.18	29.84	29.63	29.17	29.07	28.59	28.66	27.46	27.21
100.0	31.94	30.76	30.84	31.07	31.44	30.40	29.85	29.26	29.12	28.78	28.46	28.25	27.83	27.73	27.28	27.35	26.21	25.97
150.0	26.18	25.22	25.30	25.50	25.84	25.00	24.58	24.14	24.04	23.78	23.52	23.36	23.04	22.97	22.60	22.66	21.73	21.54
200.0	22.70	21.91	21.90	22.07	22.38	21.67	21.32	20.96	20.89	20.68	20.46	20.33	20.06	19.99	19.68	19.74	19.46	18.82
250.0	20.50	19.79	19.56	19.72	20.01	19.44	19.24	18.89	18.90	18.68	18.40	18.36	18.16	18.02	17.73	17.79	17.65	17.09
300.0	18.91	18.26	18.05	18.11	18.37	17.95	17.77	17.46	17.46	17.27	17.01	16.98	16.79	16.67	16.40	16.46	16.33	15.82
350.0	17.71	17.10	16.91	16.96	17.22	16.82	16.65	16.37	16.38	16.19	15.96	15.93	15.76	15.64	15.40	15.45	15.32	14.85
400.0	16.76	16.19	16.02	16.07	16.31	15.94	15.78	15.51	15.52	15.35	15.13	15.10	14.95	14.84	14.61	14.65	14.53	14.10
450.0	16.01	15.46	15.30	15.35	15.58	15.23	15.08	14.83	14.84	14.68	14.47	14.44	14.29	14.19	13.97	14.02	13.90	13.49
500.0	15.39	14.87	14.72	14.77	14.99	14.65	14.50	14.27	14.28	14.12	13.93	13.90	13.76	13.67	13.46	13.50	13.38	12.99

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

249 CF IONS 98

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.690	6.380	9.013	8.990	8.830	10.502	11.340	11.903	12.310	12.760	13.050	13.990	14.460	15.048	15.270	15.509	15.964	16.370
3.0	7.270	7.202	9.988	10.019	9.852	11.666	12.696	13.333	13.792	14.287	14.682	15.738	16.306	16.964	17.214	17.531	18.216	18.549
3.5	7.846	7.977	10.936	11.017	10.841	12.783	13.994	14.697	15.203	15.736	16.229	17.391	18.048	18.768	19.043	19.432	20.311	20.591
4.0	8.424	8.725	11.870	11.999	11.812	13.874	15.258	16.022	16.571	17.135	17.723	18.984	19.723	20.501	20.799	21.253	22.303	22.543
4.5	9.009	9.459	12.797	12.973	12.775	14.950	16.500	17.321	17.910	18.504	19.182	20.538	21.354	22.187	22.506	23.022	24.223	24.436
5.0	9.601	10.186	13.722	13.944	13.734	16.017	17.730	18.606	19.233	19.852	20.618	22.067	22.957	23.842	24.180	24.754	26.095	26.288
5.5	10.204	10.912	14.650	14.917	14.693	17.080	18.953	19.883	20.545	21.188	22.041	23.579	24.540	25.475	25.832	26.462	27.931	28.111
6.0	10.817	11.639	15.582	15.894	15.655	18.144	20.175	21.156	21.853	22.517	23.456	25.081	26.112	27.094	27.469	28.153	29.742	29.914
6.5	11.443	12.369	16.521	16.876	16.623	19.210	21.398	22.429	23.159	23.843	24.867	26.578	27.677	28.705	29.097	29.834	31.535	31.704
7.0	12.080	13.105	17.466	17.866	17.597	20.280	22.625	23.704	24.467	25.169	26.278	28.073	29.239	30.312	30.720	31.509	33.316	33.486
8.0	13.39	14.60	19.38	19.87	19.57	22.44	25.10	26.27	27.09	27.83	29.11	31.07	32.37	33.52	33.96	34.85	36.86	37.04
9.0	14.76	16.12	21.34	21.92	21.58	24.63	27.60	28.86	29.75	30.51	31.96	34.09	35.51	36.75	37.22	38.21	40.39	40.60
10.0	16.17	17.69	23.34	24.01	23.63	26.86	30.14	31.49	32.44	33.23	34.84	37.13	38.68	40.00	40.50	41.58	43.93	44.17
11.0	17.64	19.29	25.38	26.14	25.72	29.12	32.72	34.16	35.16	35.98	37.76	40.21	41.89	43.29	43.81	44.98	47.50	47.77
12.0	19.16	20.94	27.47	28.32	27.85	31.43	35.34	36.87	37.93	38.76	40.72	43.33	45.13	46.61	47.15	48.42	51.08	51.41
15.0	24.03	26.12	34.01	35.13	34.52	38.62	43.49	45.28	46.50	47.38	49.86	52.97	55.14	56.83	57.45	58.98	62.06	62.56
20.0	33.16	35.64	45.84	47.44	46.55	51.47	58.04	60.25	61.72	62.66	66.06	70.00	72.80	74.83	75.55	77.51	81.20	82.07
25.0	43.49	46.22	58.79	60.90	59.68	65.43	73.80	76.43	78.14	79.11	83.47	88.28	91.72	94.07	94.88	97.27	101.50	102.83
30.0	54.97	57.83	72.83	75.48	73.88	80.46	90.72	93.78	95.74	96.70	102.09	107.80	111.91	114.57	115.45	118.27	123.00	124.84
35.0	67.55	70.43	87.91	91.12	89.12	96.53	108.79	112.28	114.47	115.41	121.89	128.53	133.34	136.28	137.23	140.48	145.68	148.08
40.0	81.20	83.99	104.00	107.80	105.35	113.59	127.95	131.88	134.31	135.21	142.82	150.44	155.97	159.19	160.19	163.87	169.53	172.53
45.0	95.87	98.49	121.05	125.47	122.54	131.62	148.18	152.56	155.22	156.06	164.86	173.48	179.77	183.25	184.30	188.41	194.52	198.15
50.0	111.54	113.88	139.05	144.11	140.66	150.59	169.44	174.28	177.16	177.93	187.97	197.64	204.71	208.44	209.53	214.08	220.63	224.92
55.0	128.16	130.15	157.95	163.68	159.69	170.47	191.71	197.01	200.12	200.80	212.13	222.88	230.75	234.73	235.85	240.83	247.83	252.80
60.0	145.73	147.26	177.74	184.17	179.60	191.23	214.95	220.72	224.06	224.63	237.31	249.16	257.87	262.08	263.23	268.65	276.09	281.77
65.0	164.2	165.2	198.4	205.5	200.4	212.9	239.1	245.4	249.0	249.4	263.5	276.5	286.0	290.5	291.6	297.5	305.4	311.8
70.0	183.6	184.0	219.9	227.8	222.0	235.3	264.3	271.0	274.8	275.1	290.6	304.8	315.2	319.9	321.1	327.4	335.7	342.8
80.0	224.9	223.8	265.3	274.7	267.6	282.7	317.2	324.9	329.2	329.2	347.7	364.3	376.6	381.7	382.9	390.1	399.3	408.0
90.0	269.5	266.7	313.9	324.9	316.3	333.2	373.6	382.4	387.1	386.7	408.4	427.6	441.8	447.3	448.4	456.6	466.7	477.0
100.0	317.3	312.4	365.5	378.2	368.0	386.8	433.4	443.2	448.3	447.5	472.5	494.4	510.7	516.5	517.7	526.7	537.8	549.7
150.0	600.5	580.9	664.9	687.3	668.0	696.2	778.0	793.6	800.8	797.1	841.2	878.1	905.9	913.3	914.1	927.9	944.2	964.4
200.0	949.3	907.3	1025.3	1059.4	1029.7	1067.2	1191.0	1213.2	1221.5	1213.5	1280.5	1325.4	1368.9	1385.3	1385.1	1404.3	1418.8	1455.3
250.0	1353.1	1280.6	1435.2	1482.9	1443.9	1488.3	1659.6	1693.6	1697.8	1684.4	1777.4	1830.5	1891.4	1919.2	1917.1	1945.3	1952.9	2008.8
300.0	1802.4	1694.3	1887.8	1950.4	1901.0	1952.2	2175.6	2228.1	2221.4	2202.0	2323.2	2385.4	2465.4	2504.9	2500.6	2538.8	2538.5	2615.0
350.0	2291.3	2143.0	2377.7	2456.2	2395.4	2463.4	2732.7	2807.0	2786.5	2760.2	2911.8	2984.0	3084.3	3136.0	3129.0	3177.7	3169.0	3267.1
400.0	2815.	2622.	2900.	2996.	2923.	2987.	3326.	3423.	3388.	3354.	3538.	3621.	3743.	3807.	3797.	3857.	3839.	3960.
450.0	3369.	3129.	3452.	3565.	3479.	3551.	3952.	4071.	4022.	3980.	4197.	4292.	4436.	4513.	4499.	4571.	4544.	4688.
500.0	3951.	3660.	4029.	4162.	4061.	4140.	4606.	4749.	4684.	4633.	4886.	4993.	5160.	5250.	5233.	5316.	5280.	5448.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.17	17.80	19.19	19.54	20.25	21.26	21.86	22.63	23.09	23.53	23.99	24.47	24.96	25.40	25.98	26.19	28.03	28.62
3.0	19.50	20.25	21.64	21.98	22.71	23.86	24.55	25.48	26.00	26.52	27.03	27.57	28.17	28.65	29.27	29.47	31.45	32.08
3.5	21.68	22.54	23.93	24.25	25.00	26.29	27.05	28.12	28.69	29.28	29.85	30.43	31.12	31.65	32.30	32.50	34.62	35.28
4.0	23.77	24.72	26.11	26.43	27.19	28.60	29.43	30.62	31.24	31.89	32.51	33.13	33.92	34.48	35.16	35.35	37.61	38.31
4.5	25.78	26.83	28.23	28.53	29.30	30.83	31.73	33.03	33.69	34.41	35.07	35.73	36.59	37.19	37.91	38.10	40.47	41.21
5.0	27.75	28.89	30.29	30.58	31.36	33.00	33.96	35.37	36.07	36.84	37.55	38.24	39.19	39.82	40.57	40.75	43.25	44.02
5.5	29.69	30.92	32.32	32.60	33.39	35.13	36.15	37.67	38.41	39.23	39.97	40.70	41.72	42.39	43.17	43.35	45.97	46.77
6.0	31.60	32.92	34.33	34.59	35.39	37.23	38.31	39.92	40.70	41.57	42.36	43.12	44.21	44.91	45.73	45.89	48.64	49.47
6.5	33.50	34.91	36.32	36.57	37.37	39.31	40.45	42.16	42.97	43.89	44.71	45.51	46.66	47.39	48.25	48.41	51.28	52.14
7.0	35.39	36.89	38.30	38.54	39.34	41.38	42.57	44.37	45.21	46.18	47.05	47.87	49.09	49.85	50.74	50.90	53.88	54.78
8.0	39.16	40.82	42.24	42.45	43.25	45.49	46.79	48.76	49.67	50.73	51.67	52.55	53.90	54.72	55.67	55.82	59.04	60.00
9.0	42.92	44.75	46.18	46.37	47.17	49.59	51.00	53.14	54.10	55.25	56.26	57.20	58.67	59.55	60.57	60.71	64.17	65.18
10.0	46.70	48.70	50.13	50.29	51.09	53.69	55.21	57.51	58.53	59.77	60.85	61.85	63.43	64.37	65.46	65.69	69.28	70.35
11.0	50.51	52.67	54.11	54.25	55.04	57.82	59.45	61.90	62.97	64.30	65.45	66.50	68.20	69.19	70.35	70.47	74.39	75.53
12.0	54.35	56.68	58.12	58.23	59.01	61.98	63.71	66.31	67.44	68.85	70.07	71.17	72.98	74.02	75.25	75.36	79.53	80.72
15.0	66.11	68.95	70.40	70.43	71.18	74.67	76.71	79.76	81.03	82.69	84.12	85.37	87.51	88.71	90.15	90.24	95.12	96.49
20.0	86.66	90.36	91.83	91.72	92.37	96.75	99.31	103.08	104.58	106.64	108.40	109.92	112.58	114.01	115.85	115.89	121.99	123.66
25.0	108.48	113.09	114.57	114.30	114.82	120.11	123.19	127.67	129.38	131.85	133.96	135.72	138.91	140.56	142.83	142.81	150.18	152.16
30.0	131.60	137.16	138.63	138.20	138.56	144.78	148.40	153.59	155.51	158.38	160.84	162.85	166.57	168.43	171.15	171.07	179.76	182.06
35.0	156.00	162.55	164.01	163.40	163.57	170.75	174.92	180.82	182.95	186.23	189.06	191.32	195.58	197.63	200.83	200.69	210.75	213.38
40.0	181.7	189.2	190.7	189.9	189.8	198.0	202.7	209.4	211.7	215.4	218.6	221.1	225.9	228.2	231.9	231.6	243.1	246.1
45.0	208.5	217.2	218.6	217.6	217.3	226.5	231.8	239.2	241.7	245.8	249.4	252.2	257.5	260.0	264.2	263.9	276.9	280.2
50.0	236.6	246.3	247.7	246.5	246.0	256.2	262.1	270.2	273.0	277.5	281.5	284.5	290.4	293.1	297.8	297.5	312.0	315.6
55.0	265.8	276.7	278.0	276.6	275.8	287.1	293.7	302.5	305.4	310.4	314.8	318.1	324.6	327.4	332.7	332.3	348.4	352.4
60.0	296.1	308.3	309.5	307.9	306.7	319.2	326.4	336.0	339.1	344.5	349.3	352.9	360.0	362.9	368.9	368.4	386.0	390.4
65.0	327.6	340.9	342.2	340.3	338.8	352.4	360.2	370.6	373.9	379.8	385.0	388.9	396.5	399.7	406.2	405.6	425.0	429.7
70.0	360.1	374.7	375.9	373.7	371.9	386.7	395.2	406.3	409.8	416.2	421.9	426.0	434.3	437.6	444.8	444.1	465.1	470.2
80.0	428.3	445.6	446.6	443.9	441.3	458.5	468.4	481.1	485.0	492.3	498.9	503.6	513.1	516.7	525.3	524.4	549.0	554.9
90.0	500.5	520.5	521.4	518.2	514.7	534.5	545.8	560.1	564.5	572.8	580.2	585.5	596.4	600.3	610.2	609.1	637.4	644.1
100.0	576.6	599.6	600.2	596.4	592.0	614.5	627.2	643.2	648.0	657.3	665.7	671.6	683.8	688.0	699.4	698.1	730.3	737.8
150.0	1010.	1050.	1049.	1042.	1032.	1069.	1090.	1115.	1122.	1137.	1150.	1160.	1179.	1185.	1204.	1202.	1256.	1268.
200.0	1524.	1582.	1580.	1569.	1552.	1606.	1636.	1671.	1680.	1700.	1720.	1733.	1760.	1768.	1797.	1793.	1858.	1889.
250.0	2102.	2182.	2184.	2167.	2142.	2215.	2253.	2299.	2308.	2336.	2364.	2380.	2415.	2427.	2466.	2460.	2531.	2585.
300.0	2736.	2838.	2847.	2828.	2793.	2883.	2928.	2985.	2995.	3030.	3069.	3086.	3129.	3146.	3197.	3189.	3266.	3344.
350.0	3417.	3543.	3561.	3539.	3494.	3600.	3652.	3723.	3732.	3776.	3826.	3844.	3895.	3918.	3982.	3970.	4054.	4157.
400.0	4140.	4292.	4318.	4294.	4238.	4361.	4421.	4505.	4513.	4566.	4628.	4648.	4707.	4736.	4813.	4799.	4889.	5018.
450.0	4901.	5080.	5114.	5087.	5019.	5161.	5229.	5327.	5334.	5396.	5470.	5491.	5560.	5594.	5685.	5668.	5766.	5921.
500.0	5694.	5901.	5944.	5915.	5834.	5995.	6072.	6183.	6190.	6261.	6347.	6370.	6448.	6489.	6593.	6574.	6679.	6862.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

264 99 ES IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	214.3	145.4	125.7	119.0	119.7	104.6	89.5	84.8	81.6	79.1	73.9	68.9	66.2	62.7	61.8	59.3	52.9	55.0
3.0	217.8	157.5	130.6	124.0	125.0	110.1	94.7	89.9	86.8	84.5	79.0	73.9	70.1	67.5	66.6	64.1	57.8	59.5
3.5	218.1	165.0	133.5	126.9	128.1	113.7	98.0	93.4	90.4	88.1	82.6	77.3	73.5	71.0	70.0	67.5	61.5	62.8
4.0	216.6	169.4	135.0	128.4	129.9	115.9	100.2	95.7	92.7	90.7	85.0	79.8	75.9	73.4	72.5	69.9	64.2	65.3
4.5	214.0	171.9	135.6	129.1	130.7	117.2	101.6	97.1	94.3	92.4	86.7	81.4	77.6	75.1	74.2	71.7	66.2	67.0
5.0	210.7	173.0	135.6	129.2	131.0	117.9	102.3	98.0	95.3	93.5	87.8	82.6	78.8	76.4	75.5	73.0	67.7	68.3
5.5	207.2	173.1	135.1	128.9	130.7	118.1	102.7	98.5	95.8	94.2	88.5	83.3	79.6	77.2	76.3	73.8	68.8	69.2
6.0	203.5	172.5	134.4	128.3	130.2	118.0	102.7	98.7	96.1	94.6	88.9	83.7	80.1	77.7	76.9	74.5	69.7	69.9
6.5	199.7	171.5	133.4	127.4	129.5	117.6	102.6	98.6	96.1	94.7	89.0	83.9	80.3	78.0	77.3	74.8	70.3	70.3
7.0	195.9	170.2	132.3	126.6	128.6	117.1	102.2	98.4	95.9	94.7	89.0	84.0	80.4	78.2	77.4	75.1	70.7	70.6
8.0	188.5	166.8	129.9	124.2	126.4	115.6	101.2	97.5	95.2	94.1	88.5	83.7	80.2	78.1	77.4	75.1	71.1	70.7
9.0	181.6	163.1	127.3	121.8	124.1	113.9	99.8	96.3	94.2	93.2	87.7	83.0	79.7	77.6	77.0	74.8	71.1	70.5
10.0	175.1	159.2	124.6	119.3	121.6	112.0	98.3	95.0	93.0	92.1	86.7	82.1	78.9	77.0	76.4	74.2	70.8	70.1
11.0	169.0	155.2	121.9	116.8	119.2	110.1	96.7	93.6	91.6	90.9	85.6	81.1	78.0	76.2	75.6	73.6	70.4	69.5
12.0	163.3	151.4	119.3	114.4	116.8	108.1	95.1	92.1	90.3	89.6	84.4	80.1	77.0	75.3	74.7	72.8	69.8	68.8
15.0	148.6	140.6	112.0	107.6	110.0	102.4	90.3	87.7	86.1	85.7	80.8	76.7	73.9	72.4	72.0	70.2	67.7	66.6
20.0	129.8	125.6	101.8	97.9	100.2	94.0	83.2	80.9	79.7	79.5	75.0	71.4	68.9	67.7	67.4	65.8	63.9	62.6
25.0	115.9	113.8	93.5	90.0	92.3	87.0	77.2	75.2	74.2	74.1	70.0	66.7	64.5	63.5	63.2	61.9	60.3	59.0
30.0	105.1	104.4	86.7	83.5	85.7	81.2	72.1	70.4	69.5	69.5	65.7	62.7	60.6	59.8	59.6	58.4	57.1	55.8
35.0	96.5	96.6	81.0	78.1	80.3	76.2	67.8	66.3	65.5	65.6	62.0	59.2	57.3	56.6	56.4	55.4	54.2	52.9
40.0	89.39	90.15	76.25	73.56	75.60	71.98	64.12	62.70	61.99	62.14	58.77	56.18	54.39	53.76	53.64	52.68	51.70	50.43
45.0	83.47	84.66	72.12	69.61	71.57	68.30	60.90	59.60	58.96	59.14	55.95	53.52	51.84	51.29	51.20	50.31	49.43	48.21
50.0	78.44	79.94	68.52	66.17	68.06	65.07	58.07	56.86	56.28	56.49	53.46	51.16	49.57	49.09	49.02	48.20	47.40	46.24
55.0	74.10	75.83	65.36	63.14	64.96	62.21	55.56	54.43	53.91	54.13	51.24	49.06	47.55	47.12	47.07	46.31	45.57	44.46
60.0	70.31	72.22	62.55	60.44	62.20	59.66	53.31	52.26	51.78	52.02	49.25	47.18	45.73	45.35	45.31	44.60	43.92	42.86
65.0	66.98	69.02	60.03	58.03	59.73	57.37	51.29	50.30	49.86	50.11	47.45	45.47	44.09	43.75	43.72	43.06	42.42	41.40
70.0	64.01	66.15	57.77	55.86	57.51	55.29	49.46	48.53	48.11	48.38	45.82	43.92	42.59	42.28	42.27	41.64	41.04	40.07
80.0	58.97	61.25	53.85	52.09	53.64	51.68	46.27	45.43	45.07	45.35	42.96	41.20	39.97	39.72	39.72	39.16	38.61	37.72
90.0	54.83	57.19	50.56	48.93	50.39	48.64	43.58	42.81	42.49	42.78	40.54	38.90	37.74	37.52	37.54	37.04	36.53	35.71
100.0	51.37	53.76	47.75	46.23	47.62	46.03	41.27	40.56	40.28	40.57	38.45	36.91	35.82	35.85	35.88	35.20	34.73	33.98
150.0	39.96	42.33	38.20	37.02	38.14	37.06	33.30	32.78	32.60	32.91	31.21	30.00	29.13	29.05	29.08	28.76	28.39	27.86
200.0	33.51	36.13	32.81	31.76	32.53	31.90	28.64	28.10	28.17	28.48	26.98	26.54	25.65	25.09	25.17	24.82	25.06	24.17
250.0	29.68	32.17	29.35	28.41	29.05	28.61	25.71	24.95	25.32	25.61	24.28	23.88	23.08	22.61	22.69	22.30	22.60	21.83
300.0	27.01	29.38	26.88	26.03	26.63	26.25	23.61	22.71	23.27	23.55	22.33	21.96	21.24	20.82	20.90	20.56	20.83	20.13
350.0	25.04	27.31	25.04	24.25	24.81	24.49	22.03	21.22	21.73	22.00	20.87	20.52	19.85	19.47	19.55	19.24	19.49	18.85
400.0	23.53	25.72	23.61	22.86	23.41	23.11	20.80	20.06	20.53	20.79	19.73	19.39	18.76	18.42	18.50	18.21	18.44	17.85
450.0	22.33	24.46	22.47	21.76	22.29	22.02	19.82	19.13	19.57	19.83	18.82	18.49	17.90	17.58	17.66	17.38	17.61	17.04
500.0	21.37	23.43	21.55	20.87	21.38	21.13	19.02	18.38	18.79	19.05	18.08	17.75	17.19	16.89	16.97	16.71	16.92	16.38

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	51.31	48.85	48.81	49.13	48.63	45.79	44.34	41.83	40.91	39.82	39.04	38.38	36.99	36.51	36.11	36.20	34.71	34.31
3.0	55.69	53.07	53.01	53.36	52.91	49.95	48.42	45.83	44.90	43.75	42.93	42.24	40.79	40.25	39.79	39.88	38.19	37.75
3.5	58.88	56.16	56.08	56.44	56.05	53.02	51.44	48.83	47.89	46.72	45.86	45.15	43.67	43.09	42.58	42.68	40.83	40.35
4.0	61.23	58.43	58.34	58.71	58.38	55.31	53.70	51.09	50.17	48.98	48.10	47.38	45.89	45.28	44.73	44.83	42.85	42.35
4.5	62.96	60.11	60.02	60.40	60.12	57.03	55.40	52.81	51.91	50.71	49.82	49.10	47.60	46.98	46.40	46.49	44.42	43.90
5.0	64.24	61.36	61.26	61.65	61.41	58.33	56.69	54.13	53.24	52.04	51.14	50.43	48.94	48.30	47.69	47.79	45.64	45.10
5.5	65.16	62.27	62.17	62.56	62.37	59.30	57.66	55.14	54.27	53.07	52.17	51.45	49.98	49.34	48.70	48.80	46.59	46.04
6.0	65.82	62.92	62.82	63.22	63.07	60.01	58.38	55.90	55.05	53.86	52.96	52.25	50.79	50.14	49.49	49.58	47.33	46.77
6.5	66.28	63.38	63.27	63.67	63.56	60.53	58.91	56.46	55.63	54.46	53.56	52.85	51.41	50.76	50.09	50.19	47.90	47.34
7.0	66.57	63.67	63.57	63.97	63.90	60.89	59.28	56.87	56.07	54.90	54.00	53.31	51.88	51.24	50.55	50.65	48.33	47.76
8.0	66.78	63.91	63.81	64.22	64.20	61.26	59.67	57.36	56.58	55.44	54.55	53.87	52.48	51.85	51.14	51.24	48.89	48.32
9.0	66.66	63.82	63.72	64.13	64.17	61.29	59.73	57.49	56.75	55.64	54.77	54.11	52.76	52.14	51.41	51.51	49.14	48.57
10.0	66.31	63.51	63.42	63.83	63.91	61.09	59.56	57.40	56.70	55.61	54.76	54.11	52.80	52.20	51.46	51.56	49.19	48.62
11.0	65.81	63.06	62.97	63.38	63.49	60.74	59.25	57.16	56.49	55.43	54.59	53.96	52.69	52.10	51.35	51.45	49.08	48.52
12.0	65.22	62.51	62.43	62.83	62.98	60.29	58.83	56.81	56.16	55.13	54.31	53.70	52.46	51.89	51.14	51.23	48.88	48.32
15.0	63.14	60.56	60.50	60.90	61.12	58.61	57.23	55.39	54.82	53.86	53.09	52.52	51.37	50.86	50.10	50.19	47.90	47.36
20.0	59.49	57.11	57.08	57.46	57.76	55.48	54.24	52.63	52.15	51.29	50.59	50.08	49.06	48.63	47.87	47.97	45.79	45.29
25.0	56.10	53.88	53.88	54.25	54.59	52.50	51.36	49.93	49.51	48.74	48.09	47.64	46.71	46.34	45.61	45.70	43.65	43.18
30.0	53.09	51.01	51.02	51.38	51.75	49.81	48.76	47.46	47.10	46.39	45.78	45.37	44.52	44.20	43.49	43.58	41.64	41.21
35.0	50.43	48.47	48.50	48.84	49.22	47.42	46.44	45.25	44.92	44.27	43.70	43.32	42.53	42.25	41.57	41.66	39.82	39.41
40.0	48.07	46.22	46.26	46.59	46.98	45.29	44.37	43.27	42.97	42.36	41.83	41.48	40.74	40.50	39.83	39.92	38.17	37.79
45.0	45.98	44.22	44.27	44.59	44.99	43.38	42.52	41.49	41.22	40.65	40.15	39.82	39.13	38.91	38.27	38.35	36.69	36.32
50.0	44.11	42.43	42.49	42.80	43.20	41.67	40.85	39.89	39.64	39.11	38.63	38.32	37.67	37.47	36.85	36.93	35.34	34.99
55.0	42.43	40.82	40.88	41.18	41.58	40.13	39.35	38.45	38.21	37.71	37.25	36.96	36.34	36.16	35.56	35.65	34.11	33.78
60.0	40.91	39.36	39.43	39.72	40.12	38.73	37.99	37.13	36.91	36.43	36.00	35.72	35.13	34.97	34.39	34.47	33.00	32.68
65.0	39.53	38.04	38.11	38.39	38.78	37.45	36.74	35.93	35.73	35.27	34.85	34.58	34.03	33.88	33.31	33.39	31.97	31.67
70.0	38.26	36.83	36.90	37.17	37.57	36.28	35.60	34.83	34.64	34.20	33.80	33.55	33.01	32.87	32.33	32.40	31.03	30.74
80.0	36.03	34.69	34.76	35.03	35.42	34.22	33.59	32.88	32.71	32.31	31.93	31.70	31.20	31.08	30.57	30.64	29.35	29.08
90.0	34.12	32.86	32.94	33.19	33.57	32.44	31.86	31.21	31.05	30.68	30.33	30.11	29.65	29.54	29.05	29.12	27.90	27.65
100.0	32.47	31.27	31.35	31.59	31.97	30.90	30.36	29.75	29.60	29.26	28.92	28.72	28.29	28.19	27.73	27.80	26.64	26.40
150.0	28.64	25.67	25.75	25.95	26.29	25.44	25.01	24.56	24.46	24.19	23.93	23.77	23.44	23.37	22.99	23.05	22.11	21.92
200.0	23.12	22.31	22.29	22.47	22.79	22.07	21.71	21.35	21.27	21.05	20.83	20.70	20.42	20.35	20.04	20.09	19.81	19.17
250.0	20.89	20.16	19.93	20.09	20.39	19.80	19.60	19.24	19.25	19.03	18.74	18.71	18.49	18.35	18.06	18.12	17.98	17.40
300.0	19.27	18.60	18.39	18.45	18.72	18.29	18.10	17.79	17.79	17.59	17.33	17.30	17.11	16.98	16.71	16.77	16.64	16.12
350.0	18.05	17.43	17.23	17.29	17.55	17.14	16.97	16.68	16.69	16.50	16.26	16.23	16.06	15.94	15.69	15.74	15.62	15.14
400.0	17.09	16.50	16.33	16.38	16.63	16.25	16.08	15.81	15.82	15.65	15.42	15.39	15.23	15.13	14.89	14.94	14.81	14.37
450.0	16.32	15.76	15.60	15.65	15.89	15.53	15.37	15.11	15.13	14.96	14.75	14.72	14.57	14.47	14.25	14.29	14.17	13.75
500.0	15.69	15.16	15.01	15.06	15.28	14.94	14.79	14.55	14.56	14.40	14.20	14.17	14.03	13.93	13.72	13.76	13.64	13.25

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

254 99 ES IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.780	6.460	9.121	9.100	8.940	10.635	11.480	12.047	12.460	12.920	13.210	14.160	14.640	15.229	15.450	15.691	16.156	16.570
3.0	7.367	7.296	10.111	10.144	9.976	11.816	12.657	13.498	13.965	14.471	14.868	15.935	16.515	17.176	17.425	17.747	18.445	18.784
3.5	7.949	8.083	11.072	11.155	10.979	12.949	14.173	14.882	15.397	15.941	16.437	17.613	18.283	19.007	19.282	19.676	20.572	20.957
4.0	8.533	8.841	12.017	12.150	11.963	14.055	15.454	16.225	16.783	17.360	17.952	19.229	19.982	20.765	21.063	21.523	22.592	22.838
4.5	9.123	9.586	12.955	13.136	12.937	15.144	16.712	17.542	18.140	18.746	19.430	20.804	21.635	22.474	22.793	23.316	24.539	24.757
5.0	9.721	10.321	13.892	14.118	13.908	16.224	17.957	18.843	19.479	20.112	20.885	22.352	23.259	24.150	24.489	25.071	26.435	26.633
5.5	10.329	11.055	14.830	15.102	14.878	17.300	19.196	20.135	20.808	21.464	22.326	23.883	24.862	25.804	26.162	26.801	28.295	28.480
6.0	10.947	11.790	15.772	16.089	15.851	18.376	20.432	21.423	22.131	22.809	23.768	25.403	26.453	27.443	27.819	28.513	30.128	30.306
6.5	11.577	12.528	16.720	17.083	16.829	19.454	21.669	22.710	23.452	24.151	25.185	26.918	28.036	29.073	29.466	30.214	31.943	32.117
7.0	12.219	13.271	17.676	18.083	17.813	20.536	22.909	24.000	24.775	25.492	26.612	28.430	29.616	30.698	31.108	31.908	33.744	33.920
8.0	13.54	14.78	19.61	20.11	19.81	22.72	25.41	26.59	27.43	28.18	29.47	31.46	32.78	33.95	34.39	35.29	37.33	37.51
9.0	14.91	16.32	21.59	22.17	21.83	24.93	27.93	29.21	30.11	30.89	32.35	34.51	35.95	37.21	37.68	38.68	40.90	41.11
10.0	16.34	17.89	23.61	24.28	23.90	27.18	30.50	31.87	32.83	33.63	35.26	37.58	39.16	40.49	40.99	42.09	44.48	44.72
11.0	17.82	19.51	25.67	26.43	26.01	29.47	33.10	34.56	35.58	36.41	38.21	40.69	42.39	43.81	44.33	45.52	48.07	48.36
12.0	19.36	21.17	27.77	28.63	28.16	31.80	35.75	37.30	38.37	39.22	41.20	43.85	45.67	47.16	47.71	48.99	51.70	52.03
15.0	24.24	26.39	34.37	35.50	34.89	39.04	43.97	45.78	47.01	47.92	50.42	53.57	55.77	57.48	58.10	59.65	62.77	63.28
20.0	33.41	35.96	46.28	47.90	47.00	52.00	58.63	60.87	62.36	63.32	66.75	70.73	73.57	75.62	76.34	78.34	82.07	82.96
25.0	43.79	46.60	59.31	61.45	60.22	66.05	74.49	77.16	78.90	79.88	84.28	89.14	92.63	95.01	95.82	98.24	102.52	103.87
30.0	55.31	58.26	73.43	76.11	74.51	81.18	91.53	94.62	96.60	97.59	103.03	108.79	112.96	115.64	116.53	119.38	124.17	126.03
35.0	67.94	70.92	88.60	91.84	89.83	97.33	109.70	113.23	115.45	116.41	122.94	129.65	134.52	137.49	138.44	141.73	146.99	149.42
40.0	81.63	84.54	104.76	108.60	106.14	114.49	128.97	132.94	135.40	136.32	143.99	151.68	157.28	160.53	161.54	165.26	170.99	174.02
45.0	96.34	99.09	121.90	126.36	123.42	132.61	149.30	153.72	156.41	157.28	166.15	174.85	181.20	184.72	185.78	189.94	196.12	199.78
50.0	112.06	114.53	139.97	145.08	141.62	151.67	170.67	175.55	178.47	179.26	189.38	199.13	206.27	210.04	211.14	215.73	222.36	226.69
55.0	128.72	130.85	158.96	164.74	160.73	171.64	193.03	198.38	201.53	202.23	213.65	224.49	232.43	236.45	237.59	242.62	249.70	254.71
60.0	146.32	148.02	178.83	185.30	180.72	192.49	216.38	222.20	225.58	226.17	238.94	250.89	259.67	263.93	265.10	270.67	278.09	283.81
65.0	164.8	166.0	199.6	206.8	201.6	214.2	240.7	247.0	250.6	251.1	265.2	278.3	288.0	292.5	293.6	299.6	307.5	314.0
70.0	184.2	184.8	221.1	229.1	223.2	236.8	265.9	272.7	276.5	276.9	292.5	306.7	317.3	322.0	323.2	329.6	338.0	345.2
80.0	225.6	224.8	266.7	276.2	269.0	284.3	319.0	326.8	331.1	331.1	349.7	366.5	378.9	384.0	385.2	392.5	401.8	410.5
90.0	270.3	267.7	315.4	326.5	317.9	335.0	375.6	384.5	389.2	388.8	410.6	430.0	444.3	449.8	451.0	459.2	469.5	479.8
100.0	318.2	313.6	367.2	380.0	369.8	388.7	435.5	445.5	450.6	449.8	475.0	497.0	513.4	519.3	520.5	529.6	540.8	552.7
150.0	601.7	582.5	667.3	689.8	670.5	698.9	781.1	796.8	804.0	800.3	844.6	881.8	909.7	917.1	918.0	931.9	948.4	968.6
200.0	950.8	909.3	1028.2	1062.5	1032.7	1070.6	1194.8	1217.1	1225.5	1217.6	1284.8	1330.0	1373.6	1390.1	1390.0	1409.2	1423.9	1460.6
250.0	1354.9	1283.0	1438.7	1486.5	1447.5	1492.2	1664.1	1698.2	1702.4	1689.1	1782.3	1835.7	1896.9	1924.8	1922.8	1951.1	1958.8	2014.9
300.0	1804.4	1696.9	1891.7	1954.4	1905.0	1956.5	2180.5	2233.2	2226.7	2207.2	2328.8	2391.3	2471.5	2511.3	2507.0	2545.3	2545.1	2621.8
350.0	2293.4	2145.9	2381.8	2460.6	2399.7	2458.1	2738.2	2812.6	2792.2	2766.0	2917.9	2990.4	3090.9	3142.9	3135.9	3184.8	3176.2	3274.6
400.0	2817.	2626.	2905.	3001.	2927.	2993.	3332.	3429.	3394.	3360.	3544.	3628.	3750.	3814.	3804.	3864.	3847.	3968.
450.0	3372.	3132.	3456.	3570.	3484.	3556.	3958.	4078.	4028.	3986.	4204.	4299.	4443.	4520.	4507.	4579.	4552.	4696.
500.0	3953.	3663.	4034.	4167.	4066.	4145.	4612.	4755.	4691.	4640.	4893.	5000.	5168.	5258.	5241.	5324.	5288.	5457.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.38	18.02	19.41	19.77	20.49	21.50	22.11	22.89	23.36	23.81	24.27	24.76	25.25	25.69	26.27	26.48	28.34	28.94
3.0	19.75	20.50	21.90	22.25	22.98	24.15	24.84	25.79	26.31	26.84	27.36	27.90	28.51	28.99	29.61	29.82	31.82	32.46
3.5	21.96	22.83	24.23	24.56	25.31	26.61	27.38	28.47	29.05	29.65	30.22	30.81	31.51	32.04	32.69	32.89	35.03	35.71
4.0	24.08	25.04	26.46	26.76	27.53	28.96	29.80	31.01	31.63	32.30	32.92	33.55	34.34	34.91	35.60	35.79	38.07	38.78
4.5	26.12	27.18	28.69	28.89	29.67	31.22	32.13	33.45	34.12	34.84	35.52	36.18	37.06	37.66	38.38	38.57	40.98	41.72
5.0	28.12	29.27	30.68	30.97	31.76	33.42	34.39	35.82	36.54	37.32	38.03	38.73	39.69	40.33	41.08	41.26	43.79	44.57
5.5	30.08	31.33	32.74	33.02	33.81	35.58	36.61	38.15	38.90	39.73	40.49	41.23	42.26	42.93	43.72	43.89	46.55	47.36
6.0	32.02	33.35	34.77	35.04	35.84	37.70	38.80	40.43	41.22	42.11	42.90	43.67	44.78	45.48	46.30	46.47	49.25	50.09
6.5	33.94	35.36	36.79	37.04	37.84	39.81	40.96	42.69	43.51	44.45	45.29	46.09	47.26	48.00	48.85	49.02	51.92	52.79
7.0	35.85	37.36	38.79	39.03	39.83	41.90	43.11	44.93	45.79	46.77	47.65	48.48	49.72	50.49	51.38	51.53	54.56	55.46
8.0	39.66	41.34	42.78	42.99	43.80	46.06	47.38	49.38	50.30	51.37	52.32	53.22	54.58	55.41	56.37	56.52	59.78	60.75
9.0	43.46	45.32	46.76	46.94	47.75	50.20	51.63	53.80	54.78	55.94	56.97	57.92	59.41	60.29	61.32	61.46	64.96	65.99
10.0	47.28	49.31	50.75	50.91	51.72	54.35	55.89	58.22	59.25	60.51	61.61	62.61	64.22	65.16	66.26	66.39	70.12	71.21
11.0	51.13	53.32	54.77	54.91	55.71	58.52	60.17	62.65	63.74	65.08	66.25	67.31	69.03	70.03	71.20	71.32	75.29	76.44
12.0	55.01	57.37	58.82	58.93	59.72	62.72	64.47	67.11	68.25	69.68	70.91	72.03	73.87	74.91	76.15	76.26	80.48	81.69
15.0	66.87	69.75	71.22	71.24	72.00	75.53	77.59	80.69	81.97	83.65	85.10	86.37	88.53	89.74	91.20	91.28	96.21	97.61
20.0	87.59	91.34	92.83	92.71	93.37	97.80	100.38	104.20	105.72	107.80	109.59	111.12	113.82	115.26	117.12	117.15	123.32	125.02
25.0	109.58	114.24	115.73	115.47	115.99	121.34	124.45	128.98	130.71	133.21	135.35	137.13	140.35	142.02	144.30	144.28	151.73	153.74
30.0	132.87	138.48	139.97	139.53	139.90	146.18	149.84	155.08	157.02	159.93	162.42	164.45	168.21	170.09	172.82	172.75	181.53	183.85
35.0	157.42	164.03	165.51	164.90	165.07	172.32	176.53	182.50	184.64	187.96	190.82	193.11	197.40	199.48	202.70	202.56	212.72	215.38
40.0	183.2	190.9	192.3	191.5	191.5	199.7	204.5	211.2	213.6	217.3	220.5	223.1	227.9	230.2	233.9	233.7	245.3	248.3
45.0	210.2	219.0	220.4	219.4	219.1	228.4	233.8	241.2	243.7	247.9	251.6	254.3	259.7	262.2	266.5	266.2	279.3	282.6
50.0	238.5	248.3	249.7	248.5	247.9	258.3	264.3	272.4	275.2	279.8	283.8	286.9	292.8	295.5	300.3	299.9	314.5	318.2
55.0	267.8	278.8	280.2	278.7	277.9	289.3	295.9	304.9	307.8	312.9	317.3	320.6	327.2	330.0	335.4	334.9	351.1	355.2
60.0	298.3	310.5	311.8	310.2	309.0	321.6	328.8	338.5	341.6	347.1	352.0	356.6	362.7	365.7	371.7	371.2	389.0	393.4
65.0	329.9	343.3	344.6	342.7	341.2	354.9	362.8	373.2	376.6	382.6	387.8	391.7	399.4	402.6	409.2	408.6	428.1	432.9
70.0	362.6	377.3	378.5	376.3	374.5	389.4	397.9	409.1	412.7	419.1	424.8	429.0	437.3	440.7	447.9	447.2	468.4	473.6
80.0	431.0	448.4	449.4	446.8	444.2	461.5	471.4	484.2	488.2	495.6	502.2	506.9	516.5	520.2	528.8	527.9	552.6	558.6
90.0	503.5	523.7	524.5	521.3	517.9	537.8	549.1	563.6	568.0	576.3	583.8	589.2	600.1	604.0	614.1	613.0	641.4	648.2
100.0	579.8	602.9	603.6	599.8	595.4	618.0	630.8	647.0	651.8	661.1	669.6	675.6	687.8	692.1	703.6	702.3	734.6	742.3
150.0	1015.	1055.	1054.	1047.	1037.	1074.	1095.	1120.	1127.	1142.	1156.	1165.	1184.	1190.	1210.	1207.	1262.	1274.
200.0	1529.	1588.	1586.	1575.	1558.	1612.	1642.	1677.	1686.	1707.	1727.	1740.	1767.	1775.	1804.	1800.	1865.	1897.
250.0	2109.	2188.	2190.	2174.	2148.	2222.	2260.	2306.	2316.	2344.	2372.	2388.	2423.	2435.	2474.	2468.	2540.	2594.
300.0	2743.	2845.	2855.	2836.	2801.	2891.	2936.	2994.	3003.	3039.	3078.	3095.	3138.	3155.	3207.	3198.	3276.	3363.
350.0	3425.	3551.	3569.	3548.	3502.	3609.	3661.	3732.	3741.	3785.	3835.	3854.	3905.	3928.	3992.	3980.	4064.	4167.
400.0	4149.	4301.	4327.	4303.	4246.	4371.	4431.	4515.	4523.	4576.	4638.	4658.	4718.	4746.	4823.	4809.	4900.	5029.
450.0	4910.	5089.	5123.	5097.	5028.	5171.	5239.	5337.	5345.	5407.	5480.	5502.	5571.	5605.	5696.	5679.	5777.	5933.
500.0	5704.	5911.	5954.	5925.	5844.	6005.	6082.	6194.	6201.	6272.	6358.	6382.	6459.	6500.	6605.	6585.	6691.	6875.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{252}_{100}$FM IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	215.9	145.6	126.3	119.6	120.3	105.0	89.9	85.1	81.9	79.4	74.2	69.2	65.4	62.9	62.0	59.5	53.1	55.1
3.0	219.7	158.1	131.4	124.7	125.7	110.7	96.1	90.4	87.3	84.9	79.4	74.2	70.4	67.8	66.9	64.3	58.1	59.8
3.5	220.2	165.8	134.4	127.7	128.9	114.4	98.6	93.9	90.9	88.6	83.0	77.8	73.9	71.3	70.4	67.8	61.8	63.2
4.0	218.7	170.5	136.0	129.4	130.8	116.7	100.9	96.3	93.3	91.2	85.5	80.2	76.4	73.8	72.9	70.3	64.5	65.6
4.5	216.2	173.1	136.7	130.1	131.7	118.1	102.3	97.8	94.9	93.0	87.3	82.0	78.1	75.6	74.7	72.1	66.6	67.4
5.0	213.1	174.3	136.7	130.3	132.0	118.8	103.1	98.8	96.0	94.2	88.4	83.1	79.3	76.9	76.0	73.5	68.2	68.8
5.5	209.5	174.6	136.3	130.0	131.9	119.0	103.5	99.3	96.6	95.0	89.2	83.9	80.2	77.8	76.9	74.4	69.3	69.7
6.0	205.8	174.1	135.6	129.4	131.4	119.0	103.6	99.5	96.9	95.4	89.6	84.4	80.7	78.3	77.5	75.0	70.2	70.4
6.5	202.1	173.1	134.7	128.6	130.7	118.6	103.5	99.4	96.9	95.5	89.8	84.6	81.0	78.7	77.9	75.4	70.8	70.9
7.0	198.3	171.8	133.6	127.7	129.8	118.1	103.1	99.2	96.8	95.5	89.8	84.7	81.1	78.8	78.1	75.7	71.3	71.1
8.0	191.0	168.6	131.2	125.5	127.7	116.7	102.1	98.4	96.1	95.0	89.3	84.4	80.9	78.8	78.1	75.8	71.7	71.3
9.0	184.0	164.9	128.6	123.1	125.4	115.0	100.8	97.3	95.1	94.1	88.6	83.8	80.4	78.4	77.7	75.5	71.7	71.2
10.0	177.4	161.0	125.9	120.6	122.9	113.2	99.3	96.0	93.9	93.1	87.6	82.9	79.7	77.7	77.1	75.0	71.5	70.8
11.0	171.3	157.1	123.3	118.1	120.5	111.2	97.7	94.5	92.6	91.9	86.5	82.0	78.8	77.0	76.4	74.3	71.1	70.2
12.0	165.6	153.3	120.7	115.7	118.1	109.3	96.1	93.1	91.2	90.6	85.3	80.9	77.8	76.1	75.5	73.5	70.5	69.6
15.0	150.8	142.5	113.4	108.9	111.3	103.6	91.4	88.7	87.1	86.6	81.7	77.6	74.8	73.2	72.8	71.0	68.5	67.3
20.0	131.8	127.4	103.1	99.1	101.5	96.2	84.2	82.0	80.6	80.4	75.9	72.3	69.7	68.5	68.2	66.6	64.7	63.4
25.0	117.7	115.5	94.8	91.2	93.5	88.2	78.2	76.2	75.1	75.1	70.9	67.6	65.3	64.3	64.0	62.7	61.1	59.7
30.0	106.8	106.0	87.9	84.7	87.0	82.3	73.1	71.4	70.4	70.4	66.6	63.5	61.4	60.6	60.4	59.2	57.9	56.5
35.0	98.1	98.1	82.2	79.3	81.4	77.3	68.8	67.2	66.4	66.5	62.9	60.0	58.1	57.4	57.2	56.1	55.0	53.6
40.0	90.89	91.59	77.38	74.65	76.72	73.03	65.05	63.61	62.88	63.03	59.61	56.98	55.17	54.53	54.40	53.42	52.42	51.13
45.0	84.89	86.04	73.22	70.67	72.65	69.32	61.80	60.48	59.82	60.01	56.77	54.30	52.59	52.03	51.94	51.04	50.14	48.91
50.0	79.79	81.26	69.58	67.19	69.11	66.06	58.95	57.72	57.13	57.34	54.26	51.93	50.31	49.82	49.74	48.91	48.10	46.91
55.0	75.39	77.10	66.39	64.13	65.97	63.17	56.41	55.27	54.73	54.96	52.02	49.81	48.27	47.83	47.78	47.01	46.26	45.12
60.0	71.55	73.44	63.55	61.40	63.19	60.59	54.14	53.07	52.58	52.82	50.01	47.90	46.44	46.04	46.00	45.28	44.69	43.51
65.0	68.16	70.19	61.00	58.97	60.69	58.28	52.10	51.10	50.64	50.90	48.20	46.18	44.78	44.42	44.40	43.72	43.07	42.03
70.0	65.15	67.29	58.71	56.77	58.44	56.18	50.25	49.30	48.88	49.15	46.55	44.61	43.26	42.95	42.93	42.29	41.68	40.69
80.0	60.04	62.32	54.74	52.95	54.53	52.53	47.03	46.17	45.80	46.08	43.66	41.87	40.62	40.35	40.35	39.78	39.23	38.32
90.0	55.83	58.19	51.41	49.75	51.24	49.45	44.30	43.52	43.20	43.49	41.21	39.54	38.36	38.15	38.15	37.64	37.13	36.29
100.0	52.31	54.72	48.57	47.02	48.44	46.81	41.97	41.24	40.96	41.25	39.10	37.53	36.42	36.24	36.25	35.78	35.31	34.54
150.0	40.71	43.11	38.88	37.68	38.83	37.71	33.89	33.35	33.18	33.49	31.76	30.53	29.65	29.56	29.59	29.26	28.89	28.35
200.0	34.15	36.81	33.42	32.34	33.13	32.48	29.17	28.62	28.68	28.99	27.48	27.03	26.12	25.54	25.63	25.27	25.51	24.60
250.0	30.26	32.78	29.90	28.95	29.60	29.14	26.19	25.41	25.79	26.08	24.73	24.32	23.51	23.02	23.11	22.71	23.02	22.23
300.0	27.54	29.95	27.40	26.53	27.13	26.75	24.05	23.14	23.71	23.99	22.75	22.38	21.64	21.21	21.30	20.94	21.22	20.51
350.0	25.53	27.84	25.52	24.71	25.29	24.95	22.45	21.62	22.14	22.42	21.27	20.91	20.22	19.84	19.93	19.60	19.86	19.21
400.0	23.99	26.22	24.07	23.31	23.86	23.56	21.20	20.44	20.92	21.19	20.11	19.76	19.12	18.77	18.86	18.55	18.80	18.19
450.0	22.78	24.93	22.91	22.19	22.72	22.45	20.21	19.50	19.95	20.21	19.18	18.85	18.24	17.92	18.00	17.72	17.95	17.37
500.0	21.79	23.89	21.97	21.27	21.80	21.54	19.40	18.74	19.16	19.42	18.43	18.10	17.52	17.22	17.30	17.03	17.25	16.70

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	51.46	48.99	48.95	49.27	48.77	45.92	44.47	41.94	41.02	39.93	39.15	38.49	37.09	36.61	36.21	36.30	34.80	34.41
3.0	55.92	53.29	53.22	53.57	53.12	50.15	48.61	46.01	45.07	43.92	43.09	42.40	40.94	40.41	39.94	40.04	38.34	37.89
3.5	59.18	56.43	56.35	56.71	56.33	53.27	51.68	49.06	48.12	46.94	46.08	45.37	43.88	43.30	42.78	42.88	41.02	40.54
4.0	61.58	58.76	58.67	59.04	58.71	55.62	53.99	51.37	50.44	49.24	48.36	47.64	46.14	45.53	44.97	45.07	43.08	42.58
4.5	63.35	60.49	60.39	60.77	60.49	57.38	55.74	53.14	52.22	51.02	50.12	49.39	47.89	47.26	46.67	46.77	44.69	44.16
5.0	64.67	61.77	61.67	62.06	61.82	58.71	57.07	54.49	53.59	52.38	51.48	50.75	49.26	48.62	48.00	48.10	45.94	45.39
5.5	65.63	62.71	62.61	63.00	62.81	59.71	58.07	55.52	54.66	53.44	52.53	51.81	50.33	49.68	49.04	49.14	46.91	46.36
6.0	66.32	63.40	63.29	63.69	63.54	60.46	58.81	56.31	55.45	54.25	53.35	52.63	51.16	50.51	49.85	49.94	47.67	47.11
6.5	66.80	63.87	63.77	64.17	64.06	61.00	59.36	56.90	56.06	54.87	53.97	53.26	51.80	51.15	50.47	50.57	48.26	47.69
7.0	67.11	64.19	64.08	64.49	64.41	61.38	59.75	57.33	56.51	55.34	54.43	53.73	52.29	51.64	50.95	51.05	48.71	48.14
8.0	67.36	64.47	64.36	64.77	64.75	61.78	60.18	57.84	57.06	55.91	55.02	54.33	52.93	52.29	51.57	51.67	49.30	48.72
9.0	67.27	64.40	64.30	64.71	64.75	61.84	60.27	58.00	57.26	56.14	55.26	54.59	53.23	52.60	51.87	51.97	49.58	49.00
10.0	66.94	64.11	64.02	64.43	64.51	61.67	60.12	57.94	57.23	56.13	55.27	54.62	53.29	52.68	51.94	52.03	49.64	49.06
11.0	66.47	63.68	63.59	64.00	64.11	61.34	59.83	57.71	57.04	55.97	55.12	54.48	53.19	52.60	51.85	51.94	49.55	48.98
12.0	65.89	63.14	63.06	63.47	63.62	60.90	59.42	57.37	56.73	55.68	54.85	54.23	52.98	52.41	51.64	51.74	49.36	48.80
15.0	63.84	61.22	61.16	61.56	61.79	59.24	57.85	55.98	55.41	54.44	53.66	53.08	51.92	51.40	50.63	50.73	48.41	47.86
20.0	60.20	57.78	57.75	58.14	58.44	56.14	54.88	53.24	52.76	51.89	51.18	50.67	49.63	49.19	48.43	48.52	46.32	45.82
25.0	56.81	54.56	54.56	54.93	55.27	53.16	52.00	50.55	50.13	49.34	48.69	48.23	47.29	46.91	46.17	46.26	44.18	43.71
30.0	53.79	51.68	51.69	52.05	52.42	50.46	49.40	48.08	47.71	46.99	46.38	45.96	45.10	44.77	44.05	44.14	42.18	41.74
35.0	51.11	49.13	49.16	49.50	49.89	48.06	47.06	45.86	45.52	44.86	44.29	43.90	43.10	42.82	42.13	42.21	40.35	39.94
40.0	48.75	46.87	46.91	47.24	47.64	45.91	44.98	43.87	43.57	42.95	42.41	42.05	41.31	41.06	40.38	40.47	38.70	38.31
45.0	46.64	44.86	44.90	45.22	45.63	44.00	43.12	42.08	41.80	41.23	40.72	40.38	39.68	39.46	38.81	38.89	37.20	36.83
50.0	44.76	43.05	43.11	43.42	43.83	42.28	41.45	40.47	40.22	39.67	39.19	38.87	38.21	38.01	37.38	37.47	35.85	35.49
55.0	43.06	41.43	41.49	41.79	42.20	40.72	39.93	39.02	38.78	38.26	37.80	37.50	36.88	36.69	36.09	36.17	34.61	34.28
60.0	41.53	39.96	40.03	40.32	40.73	39.31	38.56	37.69	37.47	36.98	36.54	36.25	35.66	35.49	34.90	34.98	33.49	33.17
65.0	40.13	38.62	38.69	38.98	39.38	38.02	37.30	36.48	36.27	35.81	35.38	35.11	34.54	34.39	33.82	33.90	32.46	32.15
70.0	38.86	37.40	37.47	37.75	38.15	36.85	36.15	35.37	35.17	34.73	34.32	34.06	33.52	33.38	32.82	32.90	31.50	31.21
80.0	36.61	35.24	35.32	35.58	35.98	34.76	34.12	33.40	33.23	32.82	32.44	32.20	31.70	31.57	31.05	31.12	29.81	29.54
90.0	34.68	33.39	33.47	33.72	34.11	32.97	32.37	31.71	31.55	31.17	30.81	30.59	30.12	30.01	29.52	29.59	28.35	28.09
100.0	33.01	31.79	31.87	32.11	32.49	31.41	30.85	30.23	30.09	29.73	29.40	29.19	28.75	28.66	28.16	28.25	27.07	26.83
150.0	27.11	26.11	26.19	26.40	26.75	25.88	25.44	24.99	24.88	24.61	24.34	24.18	23.84	23.77	23.39	23.45	22.49	22.29
200.0	23.54	22.72	22.70	22.88	23.20	22.46	22.10	21.73	21.65	21.43	21.20	21.07	20.79	20.72	20.39	20.45	20.17	19.51
250.0	21.27	20.53	20.29	20.46	20.76	20.16	19.96	19.60	19.60	19.38	19.09	19.05	18.83	18.69	18.39	18.45	18.30	17.72
300.0	19.63	18.95	18.74	18.80	19.07	18.63	18.44	18.12	18.13	17.92	17.66	17.62	17.43	17.30	17.02	17.08	16.95	16.42
350.0	18.39	17.76	17.56	17.62	17.88	17.47	17.29	16.99	17.00	16.82	16.57	16.54	16.36	16.24	15.99	16.04	15.91	15.42
400.0	17.42	16.82	16.64	16.69	16.94	16.56	16.39	16.11	16.13	15.95	15.72	15.69	15.52	15.42	15.17	15.22	15.10	14.64
450.0	16.64	16.07	15.90	15.95	16.19	15.83	15.67	15.41	15.42	15.25	15.04	15.00	14.85	14.75	14.52	14.56	14.44	14.02
500.0	16.00	15.45	15.30	15.35	15.58	15.23	15.07	14.83	14.84	14.68	14.48	14.45	14.30	14.20	13.98	14.03	13.91	13.60

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{252}_{100}$FM IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.670	6.360	8.983	8.960	8.800	10.464	11.300	11.863	12.270	12.720	13.010	13.940	14.410	14.992	15.210	15.447	15.902	16.310
3.0	7.248	7.188	9.959	9.990	9.823	11.631	12.660	13.296	13.757	14.252	14.648	15.694	16.263	16.916	17.162	17.479	18.165	18.499
3.5	7.820	7.964	10.906	10.987	10.811	12.749	13.959	14.662	15.170	15.703	16.197	17.350	18.008	18.724	18.996	19.383	20.265	20.646
4.0	8.394	8.713	11.837	11.967	11.781	13.839	15.221	15.986	16.537	17.102	17.691	18.944	19.684	20.458	20.753	21.207	22.259	22.601
4.5	8.973	9.445	12.761	12.937	12.740	14.912	16.461	17.284	17.874	18.469	19.148	20.497	21.314	22.144	22.459	22.974	24.179	24.394
5.0	9.560	10.170	13.683	13.905	13.695	15.975	17.687	18.566	19.194	19.814	20.582	22.022	22.914	23.795	24.131	24.704	26.048	26.243
5.5	10.156	10.892	14.605	14.872	14.650	17.035	18.907	19.838	20.502	21.146	22.000	23.530	24.493	25.424	25.778	26.408	27.880	28.062
6.0	10.763	11.615	15.532	15.844	15.607	18.093	20.123	21.105	21.804	22.470	23.410	25.027	26.059	27.038	27.410	28.094	29.686	29.860
6.5	11.381	12.340	16.464	16.820	16.569	19.154	21.340	22.372	23.104	23.790	24.815	26.517	27.618	28.643	29.032	29.769	31.472	31.643
7.0	12.010	13.071	17.403	17.803	17.536	20.218	22.560	23.640	24.405	25.109	26.218	28.005	29.172	30.242	30.647	31.436	33.245	33.418
8.0	13.31	14.55	19.31	19.79	19.49	22.36	25.01	26.19	27.02	27.75	29.03	30.98	32.28	33.44	33.87	34.76	36.77	36.95
9.0	14.65	16.06	21.25	21.82	21.49	24.54	27.50	28.76	29.65	30.42	31.86	33.98	35.40	36.64	37.11	38.09	40.28	40.49
10.0	16.04	17.61	23.23	23.89	23.51	26.75	30.02	31.37	32.32	33.11	34.72	37.00	38.55	39.87	40.36	41.44	43.80	44.04
11.0	17.49	19.19	25.25	26.00	25.59	28.99	32.57	34.02	35.02	35.84	37.62	40.06	41.73	43.13	43.65	44.82	47.33	47.61
12.0	18.99	20.82	27.32	28.16	27.70	31.28	35.17	36.70	37.76	38.60	40.55	43.16	44.95	46.42	46.97	48.23	50.89	51.22
15.0	23.78	25.94	33.78	34.90	34.29	38.38	43.24	45.03	46.24	47.13	49.60	52.69	54.86	56.55	57.16	58.69	61.76	62.27
20.0	32.74	35.30	45.45	47.04	46.16	51.08	57.61	59.82	61.29	62.23	65.61	69.53	72.31	74.34	75.06	77.02	80.69	81.57
25.0	42.87	45.70	58.21	60.31	59.11	64.85	73.15	75.77	77.49	78.46	82.79	87.57	90.99	93.34	94.14	96.52	100.74	102.06
30.0	54.13	57.10	72.03	74.65	73.09	79.65	89.82	92.87	94.82	95.79	101.14	106.81	110.90	113.54	114.42	117.23	121.93	123.76
35.0	66.46	69.47	86.86	90.04	88.08	95.46	107.60	111.08	113.27	114.22	120.63	127.22	132.00	134.93	135.87	139.10	144.28	146.66
40.0	80.54	82.77	102.67	106.43	104.03	112.24	126.45	130.36	132.76	133.69	141.22	148.77	154.27	157.47	158.47	162.13	167.76	170.73
45.0	94.17	96.97	119.41	123.79	120.91	129.96	146.33	150.68	153.33	154.19	162.89	171.44	177.67	181.14	182.19	186.26	192.34	195.93
50.0	109.49	112.05	137.07	142.08	138.70	148.59	167.22	172.02	174.89	175.68	185.60	195.17	202.17	205.89	206.98	211.49	218.01	222.25
55.0	125.74	127.98	155.62	161.28	157.37	168.10	189.07	194.33	197.43	198.13	209.32	219.96	227.75	231.71	232.84	237.78	244.73	249.64
60.0	142.91	144.73	176.03	181.37	176.89	188.47	211.88	217.60	220.93	221.52	234.03	245.76	254.37	258.57	259.72	265.09	272.48	278.08
65.0	161.0	162.3	196.3	202.3	197.2	209.7	235.6	241.8	245.4	245.8	259.7	272.6	282.0	286.4	287.6	293.4	301.2	307.6
70.0	179.9	180.6	216.3	224.1	218.4	231.7	260.2	266.9	270.7	271.0	286.3	300.3	310.6	315.3	316.5	322.7	331.0	338.0
80.0	220.2	219.6	260.8	270.1	263.1	278.1	312.1	319.8	324.0	324.0	342.3	358.7	370.8	375.9	377.1	384.2	393.3	401.9
90.0	263.8	261.5	308.4	319.2	310.8	327.6	367.4	376.0	380.7	380.4	401.7	420.6	434.7	440.1	441.3	449.4	459.4	469.5
100.0	310.4	306.1	358.8	371.4	361.4	380.0	425.8	435.6	440.6	439.9	464.5	486.1	502.1	507.9	509.1	518.1	529.0	540.7
150.0	586.6	568.3	661.4	673.4	654.6	682.5	762.8	778.2	786.3	781.7	825.0	861.3	888.7	896.0	896.8	910.4	926.6	946.4
200.0	926.4	886.5	1003.1	1036.6	1007.6	1044.7	1166.0	1187.9	1196.1	1188.4	1254.0	1298.2	1340.8	1357.0	1356.9	1375.7	1390.1	1426.9
250.0	1319.8	1250.4	1402.9	1449.6	1411.5	1455.4	1623.1	1656.4	1660.7	1647.8	1738.7	1790.9	1850.7	1877.9	1876.0	1903.7	1911.3	1966.1
300.0	1757.2	1653.3	1844.0	1905.2	1857.0	1907.6	2126.1	2177.5	2171.2	2152.4	2270.9	2332.0	2410.3	2449.1	2446.0	2482.4	2482.4	2557.2
350.0	2233.1	2090.4	2321.1	2397.9	2338.7	2395.9	2669.0	2741.6	2721.9	2696.3	2844.5	2915.3	3013.4	3064.1	3057.4	3105.1	3096.9	3192.8
400.0	2743.	2557.	2830.	2924.	2852.	2916.	3247.	3342.	3308.	3275.	3454.	3536.	3655.	3718.	3708.	3766.	3750.	3868.
450.0	3282.	3050.	3367.	3478.	3394.	3464.	3856.	3973.	3926.	3884.	4096.	4189.	4330.	4405.	4392.	4462.	4436.	4577.
500.0	3848.	3567.	3929.	4058.	3960.	4038.	4493.	4633.	4570.	4521.	4767.	4872.	5035.	5123.	5107.	5188.	5153.	5317.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.11	17.74	19.11	19.46	20.16	21.16	21.76	22.53	22.99	23.43	23.89	24.37	24.85	25.29	25.87	26.08	27.92	28.50
3.0	19.45	20.20	21.57	21.91	22.63	23.78	24.46	25.39	25.91	26.44	26.95	27.48	28.07	28.56	29.17	29.38	31.36	31.98
3.5	21.64	22.49	23.87	24.19	24.93	26.21	26.97	28.04	28.61	29.21	29.77	30.35	31.04	31.56	32.22	32.41	34.53	35.19
4.0	23.73	24.68	26.06	26.37	27.12	28.53	29.36	30.55	31.17	31.82	32.44	33.06	33.84	34.40	35.09	35.28	37.52	38.22
4.5	25.74	26.79	28.17	28.47	29.24	30.76	31.65	32.96	33.62	34.34	35.00	35.65	36.52	37.11	37.83	38.02	40.39	41.12
5.0	27.71	28.85	30.24	30.52	31.29	32.93	33.88	35.30	36.00	36.77	37.48	38.17	39.11	39.74	40.49	40.67	43.17	43.94
5.5	29.64	30.87	32.26	32.53	33.32	35.05	36.07	37.59	38.33	39.15	39.90	40.62	41.64	42.30	43.09	43.26	45.88	46.68
6.0	31.55	32.87	34.27	34.52	35.31	37.15	38.23	39.84	40.62	41.49	42.28	43.04	44.12	44.82	45.64	45.81	48.55	49.38
6.5	33.44	34.85	36.25	36.49	37.28	39.22	40.36	42.06	42.88	43.80	44.62	45.41	46.57	47.30	48.16	48.31	51.17	52.03
7.0	35.33	36.82	38.22	38.45	39.25	41.28	42.47	44.27	45.11	46.09	46.95	47.77	48.99	49.75	50.63	50.79	53.77	54.66
8.0	39.07	40.73	42.14	42.35	43.15	45.37	46.67	48.64	49.55	50.61	51.55	52.43	53.78	54.59	55.55	55.69	58.91	59.86
9.0	42.81	44.64	46.06	46.24	47.04	49.45	50.86	52.99	53.96	55.11	56.12	57.06	58.52	59.40	60.42	60.56	64.00	65.02
10.0	46.57	48.56	49.98	50.14	50.93	53.53	55.04	57.34	58.36	59.60	60.68	61.67	63.25	64.18	65.27	65.40	69.08	70.16
11.0	50.34	52.51	53.93	54.07	54.85	57.62	59.24	61.70	62.77	64.09	65.24	66.29	67.98	68.97	70.13	70.25	74.16	75.30
12.0	54.15	56.48	57.91	58.02	58.80	61.75	63.47	66.07	67.20	68.61	69.82	70.92	72.73	73.77	75.00	75.11	79.26	80.45
15.0	65.80	68.63	70.08	70.11	70.85	74.33	76.36	79.41	80.67	82.33	83.75	85.00	87.13	88.32	89.77	89.85	94.71	96.08
20.0	86.13	89.82	91.28	91.17	91.82	96.17	98.71	102.48	103.97	106.02	107.78	109.29	111.94	113.36	115.20	115.24	121.31	122.97
25.0	107.68	112.26	113.73	113.47	113.99	119.24	122.31	126.77	128.47	130.93	133.03	134.78	137.95	139.59	141.85	141.83	149.16	151.13
30.0	130.48	136.00	137.47	137.05	137.41	143.58	147.17	152.33	154.25	157.10	159.55	161.55	165.25	167.09	169.79	169.72	178.35	180.64
35.0	154.53	161.02	162.48	161.88	162.05	169.17	173.32	179.18	181.29	184.55	187.36	189.61	193.83	195.88	199.05	198.92	208.91	211.51
40.0	179.8	187.3	188.7	187.9	187.9	196.0	200.7	207.3	209.6	213.3	216.4	218.9	223.7	225.9	229.6	229.4	240.8	243.7
45.0	206.2	214.8	216.2	215.2	214.9	224.0	229.3	236.6	239.1	243.2	246.8	249.5	254.8	257.3	261.4	261.2	274.0	277.3
50.0	233.8	243.5	244.8	243.7	243.1	253.3	259.1	267.2	269.9	274.4	278.3	281.3	287.2	289.8	294.5	294.2	308.5	312.1
55.0	262.5	273.3	274.6	273.2	272.4	283.6	290.1	298.9	301.8	306.7	311.1	314.4	320.8	323.5	328.8	328.4	344.3	348.3
60.0	292.3	304.3	305.6	303.9	302.8	315.1	322.2	331.7	334.8	340.2	345.0	348.5	355.5	358.5	364.4	363.9	381.3	385.7
65.0	323.2	336.3	337.6	335.7	334.3	347.7	355.5	365.7	369.0	374.9	380.0	383.8	391.4	394.5	401.0	400.5	419.5	424.2
70.0	355.1	369.5	370.7	368.6	366.8	381.4	389.8	400.8	404.3	410.6	416.2	420.3	428.5	431.7	438.9	438.2	459.0	464.0
80.0	422.0	439.0	440.0	437.4	434.9	451.9	461.6	474.2	478.1	485.3	491.8	496.4	505.8	509.4	517.8	517.0	541.2	547.1
90.0	492.7	512.5	513.3	510.2	506.9	526.4	537.4	551.6	556.9	564.1	571.5	576.8	587.4	591.3	601.1	600.1	628.0	634.6
100.0	567.2	589.9	590.5	586.8	582.6	604.7	617.2	633.1	637.8	646.9	655.3	661.1	673.1	677.3	688.5	687.3	719.0	726.4
150.0	991.7	1030.5	1029.9	1022.8	1013.1	1049.8	1070.2	1094.7	1101.5	1116.0	1129.6	1138.7	1157.7	1163.4	1182.7	1180.1	1233.1	1245.1
200.0	1493.1	1550.8	1548.8	1537.6	1521.0	1574.4	1603.7	1637.7	1646.6	1666.8	1686.4	1699.1	1725.8	1733.4	1761.9	1757.6	1821.8	1852.2
250.0	2057.6	2135.5	2137.5	2121.6	2096.6	2168.6	2205.8	2250.5	2259.9	2287.2	2315.0	2330.2	2364.5	2376.1	2414.9	2408.6	2479.2	2531.5
300.0	2675.3	2775.2	2784.8	2766.2	2731.8	2819.5	2863.7	2920.4	2929.5	2964.4	3002.5	3019.1	3061.1	3078.0	3128.2	3119.6	3195.7	3271.5
350.0	3339.3	3462.9	3480.3	3459.4	3414.9	3519.1	3570.2	3639.3	3648.0	3691.1	3740.0	3758.0	3808.1	3830.4	3892.9	3881.8	3964.0	4064.3
400.0	4044.	4193.	4218.	4195.	4140.	4261.	4319.	4401.	4410.	4461.	4521.	4541.	4599.	4627.	4703.	4689.	4778.	4903.
450.0	4785.	4960.	4993.	4967.	4901.	5040.	5106.	5202.	5209.	5270.	5342.	5363.	5430.	5464.	5552.	5536.	5632.	5784.
500.0	5558.	5760.	5801.	5773.	5694.	5852.	5927.	6036.	6043.	6112.	6196.	6219.	6295.	6334.	6437.	6418.	6521.	6700.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

255 MD IONS 101

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	217.5	145.8	126.9	120.2	120.9	105.5	90.2	85.4	82.2	79.6	74.4	69.4	65.6	63.1	62.2	59.7	53.3	55.3
3.0	221.6	158.6	132.2	125.4	126.4	111.3	95.6	90.8	87.7	85.2	79.8	74.6	70.7	68.1	67.2	64.6	58.3	60.0
3.5	222.2	166.7	135.3	128.5	129.8	115.0	99.2	94.4	91.4	89.1	83.5	78.2	74.3	71.7	70.7	68.1	62.1	63.5
4.0	220.9	171.6	137.0	130.3	131.7	117.4	101.5	96.9	93.9	91.8	86.1	80.7	76.8	74.3	73.3	70.7	64.9	66.0
4.5	218.5	174.3	137.7	131.1	132.7	118.9	103.0	98.5	95.6	93.6	87.8	82.5	78.6	76.1	75.2	72.6	67.0	67.9
5.0	215.4	175.7	137.8	131.3	133.1	119.7	103.9	99.5	96.7	94.9	89.1	83.7	79.9	77.4	76.5	73.9	68.6	69.2
5.5	211.9	176.0	137.5	131.1	133.0	120.0	104.3	100.0	97.3	95.7	89.8	84.5	80.8	78.3	77.4	74.9	69.8	70.2
6.0	208.2	175.6	136.8	130.6	132.5	120.0	104.4	100.3	97.6	96.1	90.3	85.1	81.3	78.9	78.1	75.6	70.7	70.9
6.5	204.5	174.8	135.9	129.8	131.8	119.7	104.3	100.3	97.7	96.3	90.5	85.3	81.6	79.3	78.5	76.0	71.4	71.4
7.0	200.7	173.5	134.9	128.9	131.0	119.2	104.0	100.1	97.6	96.3	90.5	85.4	81.8	79.5	78.7	76.3	71.8	71.7
8.0	193.4	170.4	132.5	126.7	128.9	117.8	103.1	99.3	97.0	95.8	90.1	85.2	81.6	79.5	78.7	76.4	72.3	71.9
9.0	186.3	166.7	129.9	124.3	126.6	116.2	101.8	98.2	96.0	96.0	89.4	84.6	81.2	79.1	78.4	76.2	72.4	71.8
10.0	179.8	162.9	127.3	121.9	124.2	114.3	100.3	96.9	94.8	94.0	88.5	83.7	80.4	78.5	77.8	76.7	72.2	71.4
11.0	173.6	159.0	124.6	119.4	121.8	112.4	98.8	95.5	93.6	92.8	87.4	82.8	79.6	77.7	77.1	75.0	71.8	70.9
12.0	167.9	155.1	122.0	117.0	119.4	110.5	97.2	94.1	92.2	91.5	86.2	81.8	78.6	76.9	76.3	74.3	71.2	70.3
15.0	153.0	144.3	114.7	110.1	112.6	104.8	92.4	89.7	88.1	87.6	82.6	78.5	75.6	74.0	73.6	71.7	69.2	68.0
20.0	133.8	129.2	104.4	100.4	102.8	96.4	85.3	83.0	81.6	81.4	76.9	73.1	70.6	69.3	69.0	67.4	65.5	64.1
25.0	119.6	117.2	96.0	92.4	94.8	89.3	79.2	77.2	76.1	76.0	71.8	68.4	66.1	65.1	64.8	63.4	61.9	60.5
30.0	108.5	107.6	89.2	86.9	88.2	83.4	74.1	72.3	71.4	71.4	67.5	64.4	62.3	61.4	61.2	59.9	58.6	57.2
35.0	99.7	99.7	83.4	80.4	82.6	78.4	69.7	68.1	67.3	67.4	63.7	60.9	58.9	58.1	58.0	56.9	55.7	54.4
40.0	92.40	93.04	78.52	75.75	77.84	74.08	65.98	64.52	63.77	63.92	60.46	57.78	55.94	55.29	55.16	54.17	53.15	51.84
45.0	86.32	87.42	74.32	71.72	73.74	70.33	62.71	61.36	60.69	60.88	57.59	55.08	53.35	52.78	52.68	51.77	50.86	49.60
50.0	81.15	82.58	70.65	68.21	70.16	67.05	59.83	58.58	57.97	58.18	55.06	52.69	51.05	50.54	50.47	49.62	48.80	47.59
55.0	76.68	78.37	67.42	65.12	66.99	64.13	57.27	56.10	55.55	55.78	52.80	50.55	48.99	48.54	48.49	47.70	46.94	45.79
60.0	72.79	74.66	64.55	62.37	64.18	61.53	54.98	53.89	53.38	53.63	50.77	48.63	47.14	46.74	46.70	45.97	45.26	44.16
65.0	69.35	71.38	61.98	59.90	61.66	59.19	52.92	51.89	51.43	51.68	48.94	46.89	45.46	45.10	45.07	44.39	43.73	42.67
70.0	66.30	68.43	59.66	57.68	59.38	57.07	51.05	50.08	49.65	49.92	47.27	45.31	43.94	43.61	43.59	42.95	42.32	41.32
80.0	61.10	63.39	55.64	53.82	55.42	53.38	47.79	46.91	46.54	46.82	44.35	42.54	41.26	40.99	40.99	40.41	39.85	38.92
90.0	56.84	59.21	52.27	50.58	52.09	50.26	45.03	44.23	43.90	44.19	41.88	40.18	38.98	38.76	38.77	38.25	37.73	36.88
100.0	53.26	55.68	49.39	47.81	49.25	47.59	42.66	41.92	41.63	41.93	39.74	38.15	37.02	36.83	36.85	36.37	35.89	35.10
150.0	41.47	43.90	39.57	38.35	39.51	38.38	34.48	33.94	33.76	34.07	32.31	31.06	30.16	30.07	30.10	29.77	29.38	28.84
200.0	34.80	37.49	34.03	32.93	33.73	33.07	29.69	29.13	29.20	29.52	27.97	27.51	26.58	26.00	26.08	25.72	25.97	25.04
250.0	30.84	33.40	30.46	29.48	30.14	29.68	26.67	26.88	26.26	26.56	25.18	24.77	23.94	23.44	23.53	23.13	23.44	22.63
300.0	28.07	30.51	27.91	27.03	27.64	27.25	24.50	23.57	24.15	24.44	23.18	22.79	22.04	21.60	21.69	21.33	21.62	20.89
350.0	26.03	28.37	26.01	25.18	25.77	25.43	22.87	22.03	22.56	22.84	21.67	21.30	20.61	20.21	20.30	19.97	20.23	19.57
400.0	24.46	26.72	24.53	23.75	24.32	24.01	21.61	20.83	21.32	21.60	20.49	20.14	19.49	19.13	19.22	18.91	19.15	18.53
450.0	23.22	25.42	23.35	22.61	23.16	22.88	20.59	19.88	20.33	20.60	19.55	19.21	18.59	18.26	18.35	18.06	18.29	17.70
500.0	22.22	24.36	22.40	21.69	22.22	21.96	19.77	19.10	19.53	19.79	18.78	18.45	17.86	17.55	17.64	17.36	17.59	17.02

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	51.60	49.12	49.08	49.40	48.90	46.04	44.58	42.05	41.12	40.03	39.24	38.59	37.18	36.70	36.30	36.39	34.89	34.50
3.0	56.14	53.49	53.43	53.77	53.32	50.33	48.79	46.18	45.24	44.09	43.25	42.56	41.09	40.55	40.09	40.18	38.48	38.03
3.5	59.46	56.70	56.62	56.98	56.59	53.52	51.92	49.29	48.34	47.15	46.29	45.57	44.08	43.49	42.98	43.08	41.21	40.72
4.0	61.91	59.08	58.99	59.36	59.02	55.91	54.28	51.64	50.71	49.50	48.61	47.89	46.38	45.77	45.21	45.31	43.31	42.80
4.5	63.74	60.85	60.75	61.13	60.85	57.72	56.07	53.45	52.53	51.31	50.41	49.68	48.17	47.54	46.95	47.04	44.95	44.42
5.0	65.09	62.17	62.07	62.46	62.22	59.09	57.43	54.83	53.93	52.72	51.80	51.08	49.57	48.92	48.30	48.40	46.23	45.68
5.5	66.09	63.15	63.04	63.44	63.24	60.12	58.46	55.90	55.02	53.80	52.89	52.16	50.67	50.01	49.37	49.47	47.23	46.67
6.0	66.81	63.86	63.75	64.15	64.00	60.89	59.24	56.71	55.85	54.64	53.73	53.00	51.52	50.86	50.20	50.30	48.01	47.44
6.5	67.31	64.36	64.25	64.66	64.54	61.46	59.81	57.32	56.48	55.28	54.37	53.65	52.19	51.53	50.85	50.95	48.62	48.05
7.0	67.65	64.70	64.59	65.00	64.92	61.86	60.22	57.78	56.95	55.77	54.86	54.15	52.70	52.04	51.35	51.44	49.09	48.51
8.0	67.94	65.01	64.90	65.32	65.30	62.30	60.68	58.32	57.54	56.37	55.47	54.78	53.37	52.72	52.00	52.10	49.70	49.12
9.0	67.87	64.98	64.87	65.29	65.32	62.39	60.80	58.51	57.77	56.63	55.74	55.07	53.69	53.06	52.32	52.42	50.01	49.42
10.0	67.57	64.71	64.61	65.03	65.10	62.23	60.68	58.47	57.76	56.65	55.78	55.12	53.78	53.16	52.41	52.51	50.09	49.51
11.0	67.11	64.29	64.20	64.61	64.73	61.92	60.40	58.26	57.58	56.50	55.64	55.00	53.70	53.10	52.34	52.43	50.02	49.44
12.0	66.55	63.77	63.69	64.10	64.25	61.50	60.01	57.94	57.28	56.23	55.39	54.76	53.50	52.92	52.15	52.24	49.84	49.27
15.0	64.52	61.88	61.81	62.22	62.45	59.87	58.47	56.58	56.00	55.02	54.22	53.64	52.47	51.94	51.16	51.26	48.91	48.36
20.0	60.91	58.46	58.43	58.82	59.12	56.79	55.51	53.86	53.37	52.49	51.77	51.25	50.20	49.76	48.98	49.08	46.85	46.34
25.0	57.52	55.24	55.23	55.60	55.96	53.81	52.64	51.17	50.74	49.95	49.28	48.81	47.86	47.48	46.73	46.82	44.72	44.24
30.0	54.48	52.35	52.36	52.72	53.10	51.11	50.03	48.69	48.32	47.59	46.97	46.54	45.67	45.34	44.61	44.70	42.71	42.26
35.0	51.80	49.79	49.81	50.16	50.56	48.70	47.69	46.47	46.13	45.46	44.88	44.48	43.67	43.39	42.68	42.77	40.88	40.46
40.0	49.42	47.52	47.55	47.89	48.29	46.54	45.60	44.47	44.16	43.53	42.99	42.62	41.87	41.61	40.93	41.02	39.22	38.82
45.0	47.30	45.49	45.54	45.86	46.27	44.62	43.73	42.67	42.39	41.80	41.29	40.94	40.24	40.01	39.35	39.44	37.72	37.34
50.0	45.41	43.68	43.73	44.04	44.46	42.88	42.04	41.05	40.79	40.24	39.75	39.43	38.76	38.55	37.92	38.00	36.36	36.00
55.0	43.70	42.04	42.10	42.41	42.82	41.32	40.52	39.59	39.34	38.82	38.35	38.05	37.41	37.23	36.61	36.69	35.11	34.77
60.0	42.15	40.56	40.62	40.92	41.33	39.90	39.13	38.25	38.02	37.53	37.08	36.79	36.19	36.02	35.42	35.50	33.98	33.65
65.0	40.74	39.21	39.28	39.67	39.98	38.60	37.87	37.03	36.82	36.35	35.91	35.64	35.06	34.91	34.33	34.41	32.94	32.63
70.0	39.45	37.97	38.05	38.33	38.74	37.41	36.71	35.91	35.71	35.26	34.84	34.58	34.03	33.88	33.32	33.40	31.98	31.68
80.0	37.18	35.79	35.87	36.14	36.54	35.30	34.65	33.92	33.74	33.33	32.94	32.70	32.19	32.06	31.53	31.61	30.27	29.99
90.0	35.23	33.92	34.00	34.26	34.66	33.49	32.88	32.21	32.05	31.66	31.30	31.08	30.60	30.49	29.98	30.06	28.80	28.54
100.0	33.54	32.30	32.36	32.63	33.02	31.92	31.36	30.72	30.57	30.21	29.87	29.66	29.21	29.11	28.63	28.70	27.51	27.26
150.0	27.57	26.56	26.64	26.85	27.21	26.33	25.88	25.41	25.31	25.03	24.76	24.60	24.25	24.18	23.79	23.85	22.87	22.67
200.0	23.96	23.12	23.10	23.28	23.61	22.86	22.49	22.11	22.03	21.81	21.58	21.44	21.15	21.08	20.76	20.82	20.52	19.85
250.0	21.66	20.91	20.86	20.83	21.14	20.53	20.32	19.95	19.96	19.73	19.43	19.39	19.17	19.03	18.72	18.78	18.64	18.04
300.0	19.99	19.30	19.08	19.15	19.43	18.97	18.78	18.45	18.46	18.25	17.98	17.95	17.75	17.62	17.34	17.39	17.26	16.72
350.0	18.73	18.09	17.89	17.95	18.21	17.79	17.61	17.31	17.32	17.13	16.88	16.85	16.67	16.55	16.29	16.34	16.21	15.71
400.0	17.75	17.14	16.95	17.01	17.26	16.87	16.70	16.42	16.43	16.25	16.02	15.98	15.82	15.71	15.46	15.51	15.38	14.92
450.0	16.95	16.37	16.21	16.26	16.50	16.13	15.96	15.70	15.71	15.54	15.32	15.29	15.13	15.03	14.80	14.84	14.72	14.28
500.0	16.31	15.75	15.59	15.64	15.88	15.52	15.36	15.11	15.13	14.96	14.75	14.72	14.58	14.48	14.25	14.30	14.17	13.76

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

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MD IONS
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E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.700	6.390	9.013	8.990	8.830	10.510	11.350	11.913	12.320	12.770	13.060	14.000	14.470	15.050	15.270	15.510	15.970	16.380
3.0	7.280	7.226	9.995	10.027	9.860	11.685	12.720	13.358	13.818	14.314	14.711	15.768	16.338	16.990	17.239	17.558	18.252	18.587
3.5	7.854	8.008	10.948	11.030	10.854	12.810	14.027	14.733	15.241	15.775	16.271	17.436	18.096	18.812	19.086	19.477	20.368	20.650
4.0	8.429	8.761	11.884	12.014	11.828	13.906	15.297	16.065	16.616	17.183	17.773	19.040	19.782	20.557	20.854	21.312	22.375	22.618
4.5	9.009	9.498	12.811	12.989	12.792	14.985	16.543	17.369	17.961	18.557	19.239	20.601	21.422	22.252	22.571	23.081	24.307	24.522
5.0	9.597	10.226	13.736	13.960	13.751	16.053	17.776	18.657	19.287	19.909	20.680	22.135	23.030	23.913	24.251	24.830	26.186	26.381
5.5	10.194	10.950	14.662	14.931	14.709	17.117	19.000	19.935	20.601	21.247	22.105	23.649	24.616	25.549	25.907	26.543	28.027	28.210
6.0	10.801	11.675	15.592	15.906	15.670	18.179	20.221	21.207	21.908	22.576	23.520	25.153	26.189	27.171	27.546	28.236	29.841	30.016
6.5	11.418	12.403	16.527	16.885	16.634	19.244	21.442	22.479	23.213	23.901	24.931	26.649	27.754	28.782	29.174	29.918	31.635	31.807
7.0	12.048	13.135	17.468	17.871	17.604	20.311	22.666	23.751	24.518	25.225	26.339	28.143	29.314	30.367	30.796	31.592	33.415	33.588
8.0	13.34	14.62	19.38	19.87	19.57	22.46	25.13	26.31	27.14	27.88	29.16	31.13	32.43	33.59	34.03	34.93	36.95	37.14
9.0	14.69	16.13	21.32	21.90	21.56	24.64	27.62	28.89	29.78	30.55	32.00	34.14	35.57	36.81	37.28	38.27	40.47	40.68
10.0	16.08	17.68	23.30	23.97	23.59	26.85	30.14	31.50	32.45	33.25	34.87	37.17	38.72	40.05	40.54	41.63	44.00	44.24
11.0	17.52	19.26	25.33	26.08	25.67	29.10	32.70	34.15	35.16	35.98	37.77	40.23	41.91	43.31	43.83	45.01	47.54	47.83
12.0	19.02	20.89	27.39	28.24	27.78	31.39	35.31	36.84	37.90	38.75	40.70	43.33	45.13	46.61	47.16	48.43	51.11	51.44
15.0	23.80	26.00	33.86	34.98	34.38	38.50	43.38	45.17	46.39	47.29	49.77	52.88	55.05	56.75	57.37	58.90	62.00	62.50
20.0	32.73	35.35	45.53	47.12	46.25	51.20	57.75	59.97	61.44	62.39	65.77	69.71	72.51	74.55	75.27	77.24	80.93	81.81
25.0	42.83	45.73	58.27	60.37	59.17	64.96	73.28	75.91	77.63	78.61	82.95	87.75	91.18	93.54	94.35	96.74	100.97	102.30
30.0	54.04	57.10	72.06	74.69	73.13	79.74	89.93	92.99	94.95	95.92	101.28	106.97	111.07	113.72	114.61	117.43	122.15	123.99
35.0	66.32	69.42	86.86	90.05	88.09	95.52	107.68	111.18	113.36	114.32	120.74	127.35	132.14	135.08	136.03	139.27	144.47	146.86
40.0	79.62	82.67	102.62	106.39	104.00	112.26	126.48	130.40	132.83	133.75	141.29	148.86	154.36	157.58	158.59	162.25	167.91	170.88
45.0	93.90	96.82	119.32	123.70	120.84	129.93	146.31	150.67	153.33	154.20	162.90	171.47	177.71	181.19	182.25	186.34	192.44	196.03
50.0	109.15	111.83	136.93	141.94	138.57	148.51	167.14	171.95	174.83	175.63	185.55	195.14	202.15	205.89	206.99	211.50	218.04	222.28
55.0	125.32	127.69	155.41	161.07	157.18	167.96	188.93	194.20	197.31	198.02	209.21	219.86	227.65	231.63	232.77	237.72	244.69	249.60
60.0	142.39	144.36	174.74	181.09	176.63	188.26	211.66	217.39	220.73	221.33	233.84	245.58	254.19	258.41	259.57	264.95	272.36	277.96
65.0	160.3	161.8	194.9	202.0	196.9	209.4	235.3	241.5	245.1	245.6	259.4	272.3	281.7	286.2	287.4	293.2	301.0	307.3
70.0	179.2	180.1	215.9	223.6	218.0	231.3	259.8	266.5	270.3	270.7	285.9	300.0	310.3	314.9	316.1	322.4	330.7	337.7
80.0	219.3	218.8	260.2	269.5	262.5	277.6	311.5	319.2	323.4	323.5	341.7	358.1	370.2	375.3	376.5	383.6	392.8	401.3
90.0	262.6	260.5	307.5	318.4	310.0	326.8	366.5	376.2	379.8	379.5	400.9	419.8	433.8	439.3	440.5	448.5	458.6	468.7
100.0	309.0	304.9	357.7	370.2	360.3	379.0	424.7	434.4	439.5	438.8	463.4	485.0	501.0	506.8	508.0	516.9	527.9	539.6
150.0	583.3	565.5	648.7	670.7	652.0	679.9	760.0	775.3	782.4	778.9	822.1	858.3	885.6	893.0	893.8	907.4	923.6	943.3
200.0	920.9	881.7	998.3	1031.7	1002.9	1040.0	1160.8	1182.6	1190.9	1183.3	1248.6	1292.7	1335.2	1351.3	1351.3	1370.1	1384.5	1420.2
250.0	1311.4	1243.1	1395.5	1442.0	1404.2	1448.2	1615.1	1648.3	1652.6	1639.8	1730.4	1782.4	1841.9	1869.1	1867.3	1894.9	1902.5	1957.1
300.0	1745.7	1643.3	1833.7	1894.6	1846.8	1897.4	2114.7	2166.0	2159.8	2141.1	2259.1	2320.0	2397.9	2436.6	2432.6	2469.9	2469.9	2544.4
350.0	2218.1	2077.3	2307.6	2384.0	2325.1	2382.4	2654.0	2726.3	2708.8	2681.4	2828.8	2899.4	2997.0	3047.5	3040.9	3088.5	3080.4	3175.8
400.0	2724.	2541.	2813.	2906.	2835.	2899.	3228.	3322.	3289.	3256.	3435.	3516.	3634.	3697.	3687.	3745.	3729.	3846.
450.0	3259.	3030.	3346.	3456.	3373.	3443.	3833.	3949.	3901.	3861.	4072.	4164.	4304.	4379.	4367.	4436.	4410.	4550.
500.0	3821.	3543.	3904.	4032.	3935.	4013.	4465.	4604.	4542.	4493.	4738.	4842.	5004.	5092.	5076.	5156.	5122.	5285.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.18	17.81	19.18	19.54	20.24	21.24	21.84	22.61	23.07	23.52	23.98	24.46	24.95	25.39	25.97	26.18	28.02	28.60
3.0	19.54	20.29	21.67	22.00	22.73	23.88	24.57	25.50	26.02	26.55	27.07	27.60	28.20	28.69	29.30	29.51	31.49	32.11
3.5	21.75	22.60	23.98	24.30	25.05	26.33	27.10	28.17	28.74	29.34	29.91	30.49	31.19	31.72	32.37	32.56	34.68	35.34
4.0	23.85	24.80	26.18	26.49	27.25	28.66	29.49	30.69	31.32	31.98	32.60	33.22	34.01	34.57	35.26	35.45	37.70	38.40
4.5	25.87	26.92	28.31	28.61	29.38	30.91	31.80	33.12	33.78	34.50	35.17	35.83	36.70	37.30	38.02	38.21	40.58	41.32
5.0	27.85	29.00	30.39	30.67	31.45	33.09	34.05	35.47	36.18	36.95	37.66	38.36	39.31	39.94	40.70	40.88	43.38	44.15
5.5	29.80	31.03	32.43	32.70	33.48	35.23	36.25	37.77	38.52	39.35	40.10	40.83	41.86	42.52	43.31	43.48	46.11	46.91
6.0	31.71	33.04	34.44	34.69	35.48	37.33	38.42	40.04	40.82	41.70	42.49	43.25	44.35	45.05	45.87	46.04	48.78	49.61
6.5	33.61	35.03	36.43	36.67	37.47	39.42	40.56	42.27	43.09	44.02	44.85	45.64	46.81	47.54	48.39	48.55	51.42	52.28
7.0	35.50	37.00	38.41	38.64	39.44	41.48	42.68	44.49	45.33	46.31	47.18	48.01	49.24	50.00	50.89	51.04	54.03	54.92
8.0	39.26	40.93	42.34	42.55	43.35	45.59	46.90	48.88	49.79	50.86	51.80	52.69	54.04	54.86	55.82	55.97	59.19	60.15
9.0	43.02	44.85	46.27	46.46	47.25	49.68	51.09	53.24	54.21	55.37	56.38	57.33	58.80	59.68	60.71	60.84	64.30	65.32
10.0	46.78	48.78	50.21	50.37	51.16	53.77	55.29	57.60	58.62	59.87	60.96	61.96	63.55	64.48	65.57	65.70	69.40	70.47
11.0	50.57	52.74	54.17	54.30	55.09	57.87	59.50	61.97	63.04	64.38	65.53	66.59	68.29	69.28	70.44	70.56	74.49	75.62
12.0	54.38	56.72	58.16	58.26	59.04	62.01	63.74	66.35	67.48	68.90	70.13	71.23	73.05	74.09	75.32	75.43	79.60	80.79
15.0	66.05	68.89	70.34	70.37	71.12	74.61	76.65	79.71	80.98	82.64	84.07	85.34	87.48	88.67	90.12	90.21	95.08	96.45
20.0	86.39	90.09	91.56	91.45	92.10	96.47	99.02	102.80	104.29	106.36	108.13	109.64	112.31	113.74	115.58	115.61	121.70	123.37
25.0	107.94	112.53	114.01	113.75	114.27	119.54	122.61	127.09	128.80	131.26	133.37	135.13	138.32	139.97	142.23	142.21	149.55	151.53
30.0	130.72	136.25	137.73	137.31	137.67	143.86	147.46	152.64	154.56	157.42	159.88	161.89	165.60	167.45	170.16	170.08	178.73	181.02
35.0	154.73	161.24	162.70	162.11	162.29	169.42	173.57	179.45	181.57	184.84	187.66	189.92	194.15	196.21	199.38	199.25	209.25	211.86
40.0	179.9	187.5	188.9	188.1	188.1	196.2	200.9	207.5	209.8	213.5	216.7	219.2	224.0	226.2	229.9	229.7	241.1	244.0
45.0	206.3	214.9	216.3	215.3	215.1	224.2	229.5	236.8	239.3	243.4	247.0	249.7	255.1	257.5	261.7	261.4	274.3	277.5
50.0	233.8	243.5	244.9	243.7	243.2	253.4	259.2	267.3	270.0	274.5	278.5	281.5	287.3	290.0	294.7	294.4	308.7	312.3
55.0	262.5	273.3	274.6	273.2	272.4	283.7	290.1	298.9	301.8	306.8	311.1	314.4	320.8	323.6	328.9	328.5	344.4	348.4
60.0	292.2	304.2	305.5	303.8	302.7	315.1	322.2	331.7	334.8	340.2	344.9	348.5	355.5	358.4	364.3	363.8	381.3	385.6
65.0	323.0	336.1	337.4	335.5	334.1	347.6	355.3	365.6	368.9	374.7	379.9	383.7	391.3	394.4	400.9	400.3	419.4	424.1
70.0	354.8	369.2	370.4	368.3	366.5	381.1	389.5	400.5	404.0	410.3	415.9	420.0	428.2	431.5	438.6	437.9	458.7	463.8
80.0	421.4	438.4	439.4	436.8	434.3	451.3	461.0	473.6	477.5	484.8	491.2	495.9	505.3	508.9	517.3	516.5	540.7	546.6
90.0	491.9	511.6	512.5	509.4	506.0	525.5	536.6	550.8	555.1	563.3	570.7	575.9	586.6	590.5	600.3	599.3	627.1	633.8
100.0	566.1	588.7	589.4	585.7	581.5	603.6	616.1	631.9	636.6	645.8	654.1	660.0	671.9	676.1	687.4	686.1	717.6	725.2
150.0	988.5	1027.2	1026.6	1019.6	1010.0	1046.6	1066.9	1091.4	1098.2	1112.6	1126.2	1135.3	1154.2	1160.0	1179.3	1176.7	1229.5	1241.5
200.0	1487.1	1544.4	1542.7	1531.6	1515.0	1568.3	1597.5	1631.4	1640.3	1660.4	1680.0	1692.6	1719.3	1726.9	1755.3	1751.1	1815.0	1845.4
250.0	2048.3	2125.8	2127.8	2112.1	2087.2	2158.9	2196.0	2240.6	2250.0	2277.1	2304.8	2320.1	2354.2	2365.8	2404.4	2398.2	2488.6	2520.7
300.0	2662.0	2761.5	2771.1	2752.5	2718.4	2806.0	2849.8	2906.2	2915.3	2950.1	3099.8	3004.6	3046.5	3063.3	3113.3	3104.8	3180.7	3256.0
350.0	3321.6	3444.6	3462.0	3441.2	3397.0	3500.7	3551.6	3620.4	3629.2	3672.0	3720.7	3738.7	3788.6	3810.8	3873.0	3862.0	3943.9	4043.7
400.0	4022.	4169.	4195.	4172.	4117.	4237.	4296.	4377.	4386.	4437.	4497.	4516.	4575.	4602.	4677.	4664.	4752.	4877.
450.0	4757.	4931.	4964.	4939.	4873.	5011.	5077.	5172.	5180.	5240.	5311.	5332.	5399.	5433.	5521.	5505.	5600.	5751.
500.0	5524.	5726.	5767.	5739.	5661.	5817.	5892.	6000.	6007.	6076.	6160.	6183.	6258.	6298.	6399.	6380.	6483.	6661.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM) $^{254}_{102}$NO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	219.1	145.9	127.5	120.7	121.4	105.9	90.6	85.7	82.5	79.9	74.7	69.6	65.8	63.3	62.3	59.8	53.4	55.4
3.0	223.4	159.1	133.0	126.1	127.1	111.8	96.1	91.2	88.1	85.6	80.1	74.9	71.0	68.4	67.4	64.8	58.5	60.3
3.5	224.2	167.5	136.2	129.4	130.6	115.7	99.7	95.0	91.9	89.6	83.9	78.6	74.6	72.0	71.1	68.5	62.4	63.8
4.0	223.1	172.6	138.0	131.2	132.6	118.2	102.1	97.5	94.5	92.3	86.6	81.2	77.2	74.7	73.7	71.1	65.2	66.3
4.5	220.7	175.5	138.8	132.1	133.7	119.7	103.7	99.1	96.2	94.3	88.4	83.0	79.1	76.6	75.6	73.0	67.4	68.3
5.0	217.7	177.0	138.9	132.4	134.1	120.6	104.6	100.2	97.4	96.5	89.7	84.3	80.4	77.9	77.0	74.4	69.1	69.7
5.5	214.2	177.5	138.6	132.2	134.1	120.9	105.1	100.8	98.0	96.4	90.5	85.2	81.3	78.9	78.0	75.4	70.3	70.7
6.0	210.6	177.2	138.0	131.7	133.7	120.9	105.3	101.1	98.4	96.9	91.0	85.7	81.9	79.5	78.7	76.1	71.2	71.4
6.5	206.9	176.4	137.2	131.0	133.0	120.7	105.2	101.1	98.5	97.1	91.2	86.0	82.3	79.9	79.1	76.6	71.9	71.9
7.0	203.1	175.2	136.1	130.0	132.2	120.2	104.9	100.9	98.4	97.1	91.3	86.1	82.4	80.1	79.3	76.9	72.4	72.3
8.0	195.7	172.1	133.8	127.9	130.2	118.9	104.0	100.2	97.9	96.7	90.9	85.9	82.4	80.2	79.4	77.1	72.9	72.5
9.0	188.7	168.5	131.2	125.6	127.9	117.3	102.7	99.1	96.9	96.9	90.2	85.3	81.9	79.8	79.1	76.8	73.0	72.4
10.0	182.1	164.7	128.6	123.1	125.5	115.5	101.3	97.9	95.8	94.9	89.3	84.5	81.2	79.2	78.6	76.4	72.8	72.1
11.0	176.9	160.8	126.0	120.7	123.1	113.6	99.8	96.5	94.5	93.7	88.3	83.6	80.4	78.5	77.9	75.8	72.5	71.6
12.0	170.2	157.0	123.4	118.3	120.7	111.6	98.2	95.0	93.2	92.5	87.1	82.6	79.4	77.6	77.1	75.0	71.9	70.9
15.0	155.1	146.2	116.1	111.4	113.9	106.0	93.5	90.7	89.0	88.6	83.5	79.3	76.4	74.8	74.4	72.5	70.0	68.7
20.0	135.8	131.0	105.7	101.6	104.1	97.5	86.3	84.0	82.6	82.4	77.8	74.0	71.4	70.1	69.8	68.2	66.2	64.8
25.0	121.4	118.9	97.3	93.7	96.0	90.5	80.2	78.2	77.1	77.0	72.7	69.3	67.0	65.9	65.6	64.2	62.6	61.2
30.0	110.2	109.2	90.4	87.1	89.4	84.5	75.1	73.3	72.3	72.3	68.4	65.2	63.1	62.2	62.0	60.7	59.4	58.0
35.0	101.3	101.2	84.6	81.5	83.8	79.5	70.7	69.1	68.2	68.3	64.6	61.7	59.7	58.9	58.7	57.6	56.5	55.1
40.0	93.92	94.49	79.67	76.84	78.96	75.13	66.91	65.43	64.67	64.81	61.30	58.59	56.72	56.05	55.92	54.91	53.88	52.55
45.0	87.76	88.81	75.42	72.79	74.83	71.36	63.61	62.24	61.56	61.75	58.42	55.87	54.10	53.52	53.42	52.49	51.57	50.29
50.0	82.51	83.91	71.72	69.24	71.21	68.04	60.71	59.44	58.82	59.03	55.86	53.45	51.79	51.27	51.19	50.34	49.50	48.27
55.0	77.99	79.65	68.45	66.12	68.02	65.10	58.12	56.94	56.38	56.61	53.59	51.30	49.71	49.26	49.19	48.40	47.62	46.46
60.0	74.04	75.90	65.55	63.34	65.17	62.47	55.81	54.71	54.19	54.44	51.54	49.36	47.84	47.44	47.39	46.65	45.93	44.81
65.0	70.55	72.56	62.95	60.84	62.62	60.11	53.73	52.69	52.21	52.47	49.69	47.60	46.15	45.79	45.75	45.06	44.38	43.31
70.0	67.46	69.58	60.61	58.59	60.32	57.96	51.84	50.86	50.42	50.69	48.00	46.01	44.61	44.28	44.26	43.60	42.97	41.95
80.0	62.18	64.47	56.54	54.69	56.31	54.23	48.55	47.65	47.27	47.56	45.05	43.21	41.91	41.64	41.63	41.04	40.47	39.53
90.0	57.85	60.23	53.13	51.41	52.95	51.08	45.76	44.94	44.61	44.90	42.55	40.82	39.61	39.38	39.39	38.85	38.32	37.46
100.0	54.21	56.65	50.22	48.61	50.07	48.38	43.37	42.61	42.31	42.62	40.39	38.77	37.62	37.43	37.44	36.96	36.46	35.67
150.0	42.23	44.69	40.26	39.02	40.20	39.04	35.08	34.52	34.34	34.66	32.87	31.59	30.68	30.58	30.62	30.28	29.88	29.33
200.0	35.45	38.18	34.64	33.52	34.34	33.66	30.22	29.65	29.72	30.04	28.47	28.00	27.05	26.46	26.54	26.18	26.43	25.48
250.0	31.42	34.02	31.01	30.03	30.70	30.22	27.16	26.35	26.74	27.05	25.64	25.22	24.38	23.87	23.96	23.55	23.87	23.04
300.0	28.61	31.09	28.43	27.53	28.16	27.75	24.96	24.01	24.60	24.89	23.60	23.21	22.45	22.00	22.09	21.72	22.01	21.27
350.0	26.53	28.91	26.50	25.66	26.26	25.90	23.30	22.44	22.98	23.27	22.07	21.70	20.99	20.59	20.68	20.34	20.61	19.93
400.0	24.93	27.23	25.00	24.20	24.78	24.46	22.01	21.22	21.73	22.00	20.88	20.52	19.85	19.49	19.58	19.26	19.51	18.88
450.0	23.67	25.90	23.80	23.04	23.60	23.31	20.99	20.25	20.72	20.99	19.92	19.57	18.94	18.61	18.69	18.40	18.64	18.04
500.0	22.65	24.83	22.83	22.10	22.65	22.38	20.15	19.47	19.90	20.17	19.14	18.80	18.20	17.89	17.97	17.69	17.92	17.35

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	51.73	49.25	49.20	49.52	49.02	46.15	44.69	42.15	41.22	40.12	39.34	38.68	37.27	36.79	36.38	36.48	34.98	34.58
3.0	56.35	53.69	53.62	53.97	53.52	50.51	48.96	46.35	45.40	44.24	43.40	42.71	41.24	40.70	40.23	40.33	38.61	38.17
3.5	59.73	56.96	56.87	57.24	56.84	53.76	52.15	49.50	48.56	47.36	46.49	45.77	44.27	43.68	43.17	43.26	41.39	40.90
4.0	62.24	59.39	59.29	59.67	59.33	56.20	54.56	51.91	50.97	49.76	48.86	48.13	46.61	46.00	45.44	45.54	43.53	43.02
4.5	64.11	61.21	61.10	61.49	61.20	58.05	56.39	53.75	52.83	51.61	50.70	49.96	48.44	47.80	47.21	47.31	45.20	44.67
5.0	65.51	62.57	62.46	62.85	62.61	59.46	57.79	55.17	54.27	53.04	52.12	51.39	49.87	49.22	48.60	48.70	46.51	45.96
5.5	66.54	63.58	63.46	63.86	63.67	60.52	58.85	56.27	55.38	54.16	53.24	52.50	51.00	50.34	49.69	49.79	47.54	46.97
6.0	67.29	64.32	64.20	64.61	64.45	61.32	59.65	57.11	56.24	55.02	54.10	53.37	51.88	51.22	50.55	50.65	48.34	47.77
6.5	67.82	64.85	64.73	65.14	65.02	61.92	60.25	57.75	56.90	55.69	54.77	54.05	52.57	51.91	51.22	51.32	48.97	48.40
7.0	68.18	65.21	65.09	65.50	65.42	62.34	60.68	58.22	57.39	56.19	55.28	54.56	53.10	52.44	51.73	51.83	49.46	48.88
8.0	68.51	65.56	65.44	65.86	65.83	62.81	61.18	58.80	58.00	56.83	55.93	55.23	53.80	53.16	52.42	52.52	50.11	49.52
9.0	68.47	65.55	65.44	65.86	65.89	62.93	61.32	59.02	58.26	57.12	56.22	55.54	54.15	53.52	52.77	52.86	50.43	49.84
10.0	68.19	65.31	65.20	65.62	65.70	62.80	61.23	59.00	58.27	57.16	56.28	55.61	54.26	53.64	52.88	52.98	50.54	49.95
11.0	67.75	64.90	64.81	65.22	65.34	62.50	60.96	58.81	58.12	57.02	56.16	55.51	54.20	53.59	52.82	52.92	50.48	49.90
12.0	67.20	64.40	64.31	64.72	64.87	62.10	60.59	58.50	57.84	56.77	55.92	55.29	54.01	53.43	52.65	52.74	50.32	49.74
15.0	65.21	62.53	62.46	62.87	63.10	60.50	59.08	57.17	56.58	55.59	54.79	54.20	53.01	52.48	51.69	51.79	49.42	48.86
20.0	61.61	59.13	59.10	59.49	59.80	57.43	56.14	54.47	53.97	53.09	52.35	51.83	50.77	50.32	49.54	49.63	47.38	46.86
25.0	58.22	55.91	55.90	56.28	56.63	54.46	53.28	51.79	51.35	50.55	49.87	49.40	48.44	48.05	47.29	47.38	45.25	44.77
30.0	55.18	53.02	53.03	53.39	53.77	51.76	50.66	49.31	48.93	48.19	47.56	47.13	46.24	45.91	45.17	45.26	43.25	42.79
35.0	52.49	50.45	50.47	50.82	51.22	49.34	48.32	47.07	46.73	46.05	45.46	45.06	44.24	43.95	43.24	43.33	41.41	40.98
40.0	50.09	48.16	48.20	48.54	48.95	47.17	46.22	45.07	44.75	44.12	43.57	43.19	42.43	42.17	41.48	41.57	39.75	39.34
45.0	47.96	46.12	46.17	46.50	46.91	45.24	44.33	43.26	42.98	42.38	41.86	41.51	40.79	40.56	39.89	39.98	38.24	37.85
50.0	46.05	44.30	44.35	44.67	45.09	43.49	42.63	41.63	41.37	40.81	40.31	39.98	39.30	39.09	38.45	38.53	36.86	36.50
55.0	44.33	42.65	42.71	43.02	43.44	41.91	41.10	40.15	39.91	39.38	38.90	38.59	37.95	37.76	37.13	37.22	35.62	35.27
60.0	42.77	41.16	41.22	41.52	41.94	40.48	39.70	38.81	38.58	38.08	37.62	37.33	36.71	36.54	35.93	36.02	34.47	34.14
65.0	41.35	39.80	39.86	40.16	40.57	39.17	38.43	37.58	37.36	36.88	36.45	36.17	35.58	35.42	34.83	34.91	33.42	33.11
70.0	40.05	38.55	38.62	38.91	39.32	37.97	37.26	36.45	36.25	35.79	35.37	35.10	34.54	34.39	33.82	33.90	32.46	32.15
80.0	37.76	36.35	36.42	36.70	37.10	35.85	35.19	34.45	34.26	33.84	33.45	33.20	32.68	32.55	32.01	32.09	30.74	30.45
90.0	35.79	34.46	34.54	34.80	35.20	34.02	33.40	32.72	32.55	32.16	31.79	31.56	31.08	30.96	30.45	30.53	29.25	28.98
100.0	34.08	32.82	32.90	33.16	33.56	32.43	31.85	31.21	31.06	30.70	30.35	30.13	29.68	29.56	29.09	29.16	27.94	27.69
150.0	28.04	27.01	27.10	27.31	27.67	26.77	26.32	25.84	25.74	25.46	25.18	25.01	24.66	24.58	24.19	24.26	23.26	23.06
200.0	24.38	23.53	23.60	23.69	24.03	23.26	22.88	22.50	22.42	22.19	21.96	21.81	21.52	21.45	21.12	21.18	20.88	20.20
250.0	22.05	21.28	21.03	21.20	21.52	20.90	20.68	20.31	20.32	20.08	19.78	19.74	19.52	19.37	19.05	19.12	18.97	18.36
300.0	20.36	19.66	19.43	19.60	19.78	19.32	19.12	18.79	18.80	18.69	18.31	18.27	18.07	17.94	17.65	17.71	17.57	17.02
350.0	19.08	18.42	18.22	18.28	18.55	18.12	17.94	17.63	17.64	17.45	17.19	17.16	16.98	16.85	16.59	16.64	16.51	16.00
400.0	18.08	17.46	17.27	17.33	17.59	17.19	17.01	16.72	16.74	16.55	16.31	16.28	16.11	16.00	15.75	15.80	15.67	15.20
450.0	17.27	16.68	16.51	16.56	16.81	16.43	16.27	16.00	16.01	15.83	15.61	15.58	15.42	15.31	15.07	15.12	14.99	14.56
500.0	16.62	16.05	15.89	15.94	16.18	15.82	15.66	15.40	15.41	15.25	15.03	15.00	14.85	14.75	14.52	14.57	14.44	14.02

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

$^{254}_{102}$NO IONS

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.630	6.320	8.914	8.890	8.730	10.392	11.220	11.771	12.170	12.620	12.910	13.840	14.310	14.886	15.100	15.334	15.786	16.190
3.0	7.203	7.150	9.888	9.917	9.751	11.557	12.579	13.204	13.656	14.152	14.548	15.595	16.164	16.811	17.054	17.368	18.052	18.382
3.5	7.770	7.927	10.830	10.910	10.735	12.672	13.875	14.567	15.066	15.600	16.094	17.249	17.907	18.617	18.886	19.271	20.150	20.427
4.0	8.338	8.673	11.756	11.884	11.699	13.757	15.132	15.886	16.429	16.995	17.583	18.837	19.578	20.347	20.639	21.090	22.139	22.378
4.5	8.910	9.402	12.674	12.849	12.653	14.824	16.365	17.177	17.760	18.355	19.034	20.383	21.201	22.026	22.338	22.851	24.053	24.264
5.0	9.489	10.122	13.588	13.808	13.601	15.881	17.584	18.451	19.072	19.693	20.460	21.901	22.793	23.669	24.002	24.573	25.913	26.105
5.5	10.077	10.838	14.503	14.768	14.547	16.933	18.795	19.714	20.371	21.016	21.869	23.399	24.362	25.288	25.640	26.267	27.735	27.914
6.0	10.675	11.554	15.421	15.731	15.496	17.983	20.001	20.972	21.664	22.330	23.268	24.885	25.918	26.892	27.261	27.942	29.529	29.700
6.5	11.283	12.273	16.344	16.698	16.449	19.034	21.208	22.228	22.953	23.640	24.662	26.364	27.464	28.484	28.870	29.605	31.302	31.471
7.0	11.903	12.995	17.273	17.671	17.406	20.088	22.417	23.485	24.243	24.948	26.054	27.840	29.006	30.071	30.473	31.259	33.062	33.232
8.0	13.18	14.46	19.15	19.64	19.34	22.21	24.85	26.01	26.83	27.57	28.84	30.79	32.09	33.24	33.67	34.56	36.56	36.74
9.0	14.50	16.95	21.07	21.64	21.31	24.36	27.30	28.56	29.44	30.21	31.64	33.76	35.18	36.41	36.88	37.86	40.03	40.24
10.0	15.87	17.47	23.03	23.69	23.32	26.55	29.79	31.14	32.07	32.87	34.47	36.75	38.29	39.61	40.10	41.17	43.52	43.75
11.0	17.29	19.03	25.02	25.77	25.36	28.76	32.32	33.75	34.74	35.56	37.33	39.77	41.44	42.83	43.34	44.51	47.01	47.29
12.0	18.76	20.63	27.06	27.89	27.44	31.02	34.89	36.40	37.45	38.29	40.23	42.83	44.62	46.08	46.62	47.88	50.53	50.85
15.0	23.45	25.67	33.43	34.53	33.94	38.03	42.84	44.61	45.82	46.71	49.16	52.24	54.39	56.08	56.69	58.21	61.26	61.76
20.0	32.23	34.86	44.91	46.48	45.62	50.53	56.99	59.18	60.63	61.58	64.92	68.82	71.59	73.61	74.32	76.27	79.92	80.78
25.0	42.13	45.05	57.44	59.51	58.33	64.06	72.26	74.86	76.56	77.54	81.82	86.57	89.97	92.30	93.10	95.46	99.64	100.95
30.0	53.13	56.21	70.99	73.59	72.06	78.59	88.64	91.65	93.59	94.57	99.85	105.47	109.52	112.15	113.03	115.81	120.48	122.29
35.0	65.16	68.30	85.53	88.67	86.75	94.10	106.08	109.52	111.68	112.64	118.98	125.50	130.24	133.15	134.09	137.29	142.42	144.77
40.0	78.20	81.30	101.01	104.72	102.37	110.54	124.55	128.42	130.82	131.74	139.17	146.64	152.07	155.26	156.26	159.87	165.45	168.38
45.0	92.20	95.18	117.40	121.71	118.90	127.90	144.03	148.33	150.95	151.82	160.40	168.85	175.01	178.46	179.50	183.54	189.56	193.10
50.0	107.13	109.89	134.68	139.61	136.31	146.13	164.47	169.22	172.06	172.87	182.64	192.10	199.01	202.71	203.80	208.25	214.70	218.88
55.0	122.97	125.44	152.81	158.39	154.56	165.22	185.86	191.05	194.12	194.84	205.86	216.36	224.05	227.99	229.11	233.99	240.87	245.70
60.0	139.69	141.78	171.78	178.02	173.65	185.14	208.16	213.81	217.11	217.73	230.03	241.60	250.10	254.27	255.42	260.72	268.03	273.64
65.0	157.3	158.9	191.6	198.5	193.5	205.9	231.4	237.5	241.0	241.5	255.1	267.8	277.1	281.5	282.7	288.4	296.2	302.4
70.0	175.7	176.8	212.1	219.8	214.2	227.4	255.4	262.0	265.7	266.1	281.1	295.0	305.1	309.7	310.9	317.1	325.2	332.2
80.0	215.0	214.7	255.5	264.7	257.8	272.7	306.1	313.7	317.8	317.9	335.8	352.0	363.9	368.9	370.1	377.2	386.2	394.6
90.0	257.3	255.5	301.9	312.6	304.4	321.0	360.0	368.6	373.2	372.9	393.8	412.5	426.3	431.7	432.9	440.8	450.7	460.6
100.0	302.7	299.0	351.1	363.4	353.7	372.2	417.1	426.6	431.7	431.0	455.1	476.4	492.1	497.9	499.1	507.9	518.7	530.2
150.0	571.1	554.0	636.1	657.7	639.3	666.9	745.4	760.5	767.6	764.1	806.5	842.1	868.9	876.2	877.1	890.4	906.3	925.8
200.0	901.2	863.4	978.2	1011.0	982.8	1019.4	1137.8	1159.3	1167.4	1160.0	1224.1	1267.4	1309.1	1325.0	1326.0	1343.4	1367.6	1392.6
250.0	1283.0	1216.9	1366.8	1412.4	1375.4	1418.7	1582.3	1614.9	1619.2	1606.7	1696.5	1746.5	1804.9	1831.7	1829.9	1857.0	1864.6	1918.0
300.0	1707.6	1608.2	1795.3	1855.0	1808.2	1858.0	2071.0	2121.3	2115.3	2097.1	2212.7	2272.4	2348.8	2386.8	2382.9	2419.5	2419.7	2492.6
350.0	2169.3	2032.4	2258.7	2333.5	2275.9	2332.3	2598.3	2669.1	2650.2	2625.5	2769.8	2839.0	2934.7	2984.3	2977.9	3024.4	3016.7	3110.2
400.0	2664.	2485.	2753.	2844.	2774.	2837.	3160.	3252.	3219.	3187.	3362.	3442.	3557.	3619.	3610.	3667.	3651.	3765.
450.0	3187.	2964.	3274.	3382.	3300.	3370.	3751.	3865.	3818.	3779.	3985.	4076.	4213.	4286.	4274.	4342.	4317.	4454.
500.0	3736.	3465.	3819.	3945.	3849.	3926.	4369.	4505.	4444.	4396.	4636.	4738.	4897.	4983.	4967.	5046.	5012.	5173.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	16.98	17.60	18.96	19.31	20.01	21.00	21.59	22.36	22.81	23.26	23.71	24.19	24.67	25.10	25.67	25.88	27.69	28.27
3.0	19.33	20.06	21.43	21.76	22.48	23.62	24.30	25.22	25.74	26.26	26.78	27.31	27.90	28.37	28.98	29.18	31.14	31.76
3.5	21.51	22.36	23.72	24.04	24.78	26.05	26.81	27.87	28.44	29.03	29.60	30.17	30.86	31.38	32.02	32.21	34.31	34.97
4.0	23.59	24.54	25.91	26.21	26.96	28.36	29.19	30.37	30.99	31.65	32.26	32.88	33.66	34.21	34.89	35.07	37.30	37.99
4.5	25.60	26.64	28.02	28.31	29.07	30.58	31.47	32.77	33.44	34.15	34.81	35.46	36.33	36.92	37.63	37.81	40.16	40.88
5.0	27.56	28.69	30.07	30.35	31.12	32.74	33.70	35.10	35.81	36.58	37.28	37.97	38.91	39.53	40.28	40.45	42.93	43.69
5.5	29.48	30.71	32.09	32.35	33.13	34.86	35.87	37.38	38.12	38.94	39.69	40.41	41.42	42.08	42.86	43.03	45.63	46.42
6.0	31.38	32.69	34.08	34.33	35.11	36.94	38.02	39.62	40.40	41.27	42.05	42.81	43.89	44.58	45.39	45.56	48.27	49.10
6.5	33.26	34.66	36.04	36.29	37.07	39.00	40.13	41.83	42.64	43.56	44.39	45.17	46.32	47.05	47.89	48.05	50.88	51.74
7.0	35.13	36.61	38.00	38.23	39.02	41.06	42.23	44.02	44.86	45.83	46.69	47.51	48.73	49.48	50.35	50.51	53.46	54.35
8.0	38.84	40.49	41.89	42.10	42.89	45.10	46.40	48.36	49.26	50.32	51.26	52.14	53.48	54.29	55.23	55.37	58.56	59.51
9.0	42.55	44.37	45.77	45.95	46.74	49.14	50.54	52.67	53.63	54.78	55.79	56.72	58.18	59.05	60.06	60.19	63.61	64.62
10.0	46.27	48.25	49.66	49.82	50.60	53.18	54.69	56.98	57.99	59.22	60.30	61.29	62.86	63.79	64.86	64.99	68.64	69.71
11.0	50.00	52.15	53.56	53.70	54.48	57.23	58.85	61.29	62.35	63.67	64.82	65.86	67.55	68.52	69.67	69.79	73.67	74.79
12.0	53.77	56.08	57.50	57.61	58.38	61.31	63.02	65.62	66.73	68.14	69.35	70.44	72.24	73.27	74.48	74.59	78.71	79.89
15.0	65.27	68.08	69.52	69.56	70.28	73.74	75.75	78.78	80.05	81.69	83.11	84.35	86.47	87.65	89.08	89.16	93.98	95.34
20.0	85.31	88.96	90.42	90.31	90.95	96.28	97.80	101.53	103.02	105.06	106.81	108.30	110.94	112.35	114.16	114.20	120.21	121.86
25.0	106.52	111.05	112.52	112.26	112.78	117.99	121.02	126.45	127.14	129.58	131.66	133.40	136.55	138.18	140.40	140.39	147.64	149.59
30.0	128.93	134.39	135.85	135.44	135.81	141.92	145.48	150.59	152.49	155.32	157.75	159.73	163.39	165.22	167.89	167.82	176.35	178.62
35.0	152.54	158.96	160.41	159.83	160.01	167.06	171.15	176.96	179.05	182.28	185.07	187.30	191.48	193.50	196.63	196.50	206.37	208.95
40.0	177.3	184.7	186.2	185.4	185.4	193.4	198.0	204.5	206.8	210.5	213.6	216.1	220.8	223.0	226.6	226.4	237.7	240.6
45.0	203.2	211.7	213.1	212.2	211.9	220.9	226.1	233.3	235.8	239.8	243.4	246.1	251.3	253.7	257.9	257.6	270.3	273.5
50.0	230.3	239.8	241.2	240.0	239.5	249.5	255.3	263.2	265.9	270.4	274.3	277.3	283.1	285.6	290.3	290.0	304.1	307.7
55.0	258.4	269.0	270.4	269.0	268.2	279.3	285.7	294.3	297.2	302.1	306.4	309.6	316.0	318.7	323.9	323.5	339.2	343.1
60.0	287.6	299.3	300.6	299.1	298.0	310.1	317.1	326.5	329.6	334.9	339.6	343.1	350.0	352.9	358.7	358.2	376.4	379.7
65.0	317.8	330.7	332.0	330.2	328.8	342.0	349.6	359.8	363.0	368.8	373.9	377.7	385.1	388.2	394.6	394.0	412.8	417.5
70.0	349.0	363.2	364.3	362.3	360.6	375.0	383.2	394.1	397.5	403.7	409.3	413.3	421.4	424.6	431.6	430.9	451.4	456.4
80.0	414.3	431.1	432.1	429.6	427.1	443.8	453.4	466.8	469.7	476.8	483.1	487.8	497.0	500.5	508.8	508.0	531.9	537.6
90.0	483.5	502.9	503.8	500.7	497.4	516.6	527.5	541.5	545.8	553.8	561.1	566.3	576.7	580.6	590.2	589.2	616.6	623.2
100.0	556.2	578.4	579.1	575.5	571.4	593.1	605.4	621.0	625.7	634.7	642.9	648.6	660.4	664.5	675.6	674.4	705.5	712.9
150.0	970.1	1008.1	1007.6	1000.7	991.3	1027.2	1047.2	1071.3	1078.0	1092.1	1105.5	1114.4	1133.0	1138.7	1157.6	1155.1	1207.0	1218.8
200.0	1458.3	1514.5	1512.9	1502.0	1486.8	1538.1	1566.8	1600.0	1608.8	1628.6	1647.8	1660.2	1686.4	1693.8	1721.7	1717.6	1780.4	1810.2
250.0	2007.4	2083.4	2085.5	2070.1	2045.8	2116.1	2152.5	2196.3	2205.5	2232.2	2259.3	2274.3	2307.8	2319.2	2357.1	2351.0	2420.1	2471.2
300.0	2607.9	2705.4	2714.8	2696.7	2663.3	2749.2	2792.1	2847.5	2856.5	2890.6	2927.8	2944.0	2985.1	3001.6	3050.6	3042.3	3116.8	3190.6
350.0	3253.0	3373.5	3390.6	3370.2	3327.0	3428.7	3478.6	3546.1	3554.7	3596.7	3644.4	3662.0	3711.0	3732.8	3793.7	3782.9	3863.3	3961.1
400.0	3937.	4082.	4107.	4084.	4031.	4149.	4206.	4286.	4294.	4345.	4403.	4423.	4480.	4507.	4580.	4567.	4654.	4776.
450.0	4657.	4827.	4860.	4835.	4770.	4905.	4970.	5063.	5071.	5130.	5200.	5220.	5286.	5319.	5405.	5389.	5483.	5631.
500.0	5407.	5604.	5644.	5617.	5540.	5693.	5767.	5873.	5880.	5948.	6029.	6052.	6125.	6164.	6264.	6245.	6346.	6521.

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

ELECTRONIC STOPPING POWER IN UNITS OF MEV/(MG/SQ CM)

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LW IONS
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E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	220.6	146.1	128.1	121.3	121.9	106.2	90.9	86.0	82.8	80.1	74.9	69.8	66.0	63.5	62.5	60.0	53.5	55.6
3.0	225.2	159.6	133.7	126.8	127.8	112.3	96.5	91.6	88.4	86.0	80.5	75.2	71.2	68.7	67.7	65.1	58.7	60.5
3.5	226.2	168.2	137.0	130.2	131.4	116.3	100.3	95.5	92.3	90.0	84.3	78.9	75.0	72.4	71.4	68.8	62.6	64.0
4.0	225.2	173.6	138.9	132.1	133.5	118.9	102.8	98.0	95.0	92.9	87.1	81.6	77.7	75.1	74.1	71.5	65.6	66.7
4.5	222.9	176.7	139.8	133.1	134.7	120.5	104.4	99.8	96.8	94.8	89.0	83.5	79.6	77.0	76.1	73.5	67.8	68.6
5.0	220.0	178.3	140.0	133.4	135.2	121.4	105.4	100.9	98.0	96.2	90.3	84.9	81.0	78.4	77.5	74.9	69.5	70.1
5.5	216.6	178.9	139.8	133.3	135.1	121.8	105.9	101.5	98.8	97.1	91.1	85.8	81.9	79.4	78.5	76.0	70.8	71.2
6.0	212.9	178.7	139.2	132.8	134.8	121.9	106.1	101.9	99.2	97.6	91.7	86.3	82.5	80.1	79.2	76.7	71.7	71.9
6.5	209.2	177.9	138.4	132.1	134.2	121.7	106.1	101.9	99.3	97.8	91.9	86.7	82.9	80.5	79.7	77.2	72.5	72.5
7.0	205.5	176.8	137.4	131.2	133.4	121.2	105.8	101.8	99.2	97.9	92.0	86.8	83.1	80.8	80.0	77.5	73.0	72.8
8.0	198.1	173.8	135.1	129.1	131.4	120.0	104.9	101.1	98.7	97.5	91.7	86.6	83.1	80.8	80.1	77.7	73.5	73.1
9.0	191.1	170.3	132.6	126.8	129.2	118.4	103.7	100.1	97.8	96.8	91.1	86.1	82.6	80.5	79.8	77.5	73.7	73.1
10.0	184.5	166.5	129.9	124.4	126.8	116.6	102.3	98.8	96.7	95.8	90.2	85.3	82.0	79.9	79.3	77.1	73.5	72.7
11.0	178.3	162.7	127.3	122.0	124.4	114.7	100.8	97.4	95.4	94.6	89.1	84.4	81.1	79.2	78.6	76.5	73.1	72.2
12.0	172.5	158.8	124.7	119.6	122.0	112.8	99.2	96.0	94.1	93.4	88.0	83.4	80.2	78.4	77.8	75.8	72.6	71.6
15.0	157.3	148.0	117.4	112.7	115.2	107.2	94.5	91.7	90.0	89.5	84.4	80.2	77.2	75.6	75.1	73.3	70.7	69.5
20.0	137.8	132.8	107.0	102.9	105.4	98.7	87.3	85.0	83.6	83.4	78.7	74.9	72.2	70.9	70.6	69.0	67.0	65.6
25.0	123.3	120.6	98.6	94.9	97.3	91.6	81.2	79.2	78.0	77.9	73.6	70.2	67.8	66.7	66.4	65.0	63.4	61.9
30.0	112.0	110.8	91.6	88.3	90.6	85.6	76.1	74.2	73.2	73.3	69.2	66.1	63.9	63.0	62.7	61.5	60.1	58.7
35.0	102.9	102.7	85.8	82.7	84.9	80.6	71.7	70.0	69.1	69.2	65.4	62.5	60.5	59.7	59.5	58.4	57.2	55.8
40.0	95.44	95.95	80.81	77.94	80.09	76.18	67.85	66.33	65.56	65.71	62.14	59.39	57.49	56.81	56.68	55.65	54.61	53.26
45.0	89.20	90.20	76.52	73.85	75.91	72.38	64.52	63.13	62.44	62.62	59.24	56.65	54.86	54.27	54.16	53.22	52.28	50.99
50.0	83.89	85.25	72.79	70.27	72.26	69.03	61.59	60.30	59.67	59.88	56.67	54.22	52.53	52.00	51.92	51.05	50.19	48.96
55.0	79.30	80.93	69.49	67.11	69.04	66.06	58.98	57.78	57.21	57.44	54.37	52.05	50.43	49.97	49.91	49.10	48.31	47.12
60.0	75.29	77.13	66.56	64.30	66.17	63.41	56.65	55.52	55.00	55.25	52.30	50.09	48.55	48.13	48.09	47.33	46.60	45.47
65.0	71.76	73.76	63.93	61.79	63.59	61.02	54.55	53.49	53.00	53.26	50.44	48.32	46.84	46.47	46.44	45.73	46.04	43.96
70.0	68.62	70.74	61.56	59.51	61.26	58.86	52.64	51.64	51.19	51.46	48.74	46.71	45.29	44.95	44.93	44.26	43.61	42.58
80.0	63.26	65.55	57.45	55.56	57.21	55.09	49.31	48.40	48.01	48.30	45.76	43.88	42.56	42.28	42.27	41.67	41.09	40.14
90.0	58.86	61.25	54.00	52.25	53.81	51.90	46.49	45.66	45.32	45.62	43.22	41.47	40.23	40.00	40.01	39.46	38.92	38.05
100.0	55.17	57.63	51.05	49.41	50.89	49.16	44.07	43.30	43.00	43.30	41.04	39.39	38.22	38.03	38.04	37.55	37.04	36.23
150.0	43.00	45.49	40.96	39.70	40.90	39.71	35.68	35.11	34.93	35.25	33.43	32.13	31.20	31.10	31.14	30.79	30.39	29.82
200.0	36.11	38.88	35.26	34.12	34.95	34.25	30.76	30.17	30.24	30.57	28.97	28.49	27.53	26.92	27.01	26.63	26.89	25.93
250.0	32.01	34.65	31.58	30.57	31.25	30.76	27.65	26.83	27.22	27.53	26.10	25.67	24.81	24.30	24.39	23.97	24.29	23.45
300.0	29.15	31.67	28.96	28.03	28.68	28.26	25.41	24.44	25.04	25.35	24.03	23.63	22.85	22.40	22.49	22.12	22.41	21.66
350.0	27.03	29.45	26.99	26.13	26.74	26.38	23.73	22.86	23.41	23.70	22.48	22.10	21.38	20.97	21.06	20.71	20.99	20.30
400.0	25.41	27.75	25.47	24.66	25.24	24.92	22.43	21.62	22.13	22.41	21.26	20.90	20.22	19.85	19.94	19.62	19.87	19.23
450.0	24.13	26.39	24.25	23.48	24.05	23.75	21.38	20.63	21.11	21.39	20.29	19.94	19.30	18.96	19.04	18.74	18.98	18.37
500.0	23.09	25.30	23.26	22.52	23.08	22.80	20.53	19.83	20.28	20.55	19.50	19.16	18.54	18.22	18.31	18.02	18.26	17.67

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	51.85	49.36	49.31	49.63	49.13	46.25	44.79	42.24	41.31	40.21	39.42	38.76	37.35	36.87	36.46	36.56	35.05	34.65
3.0	56.55	53.88	53.81	54.15	53.70	50.69	49.13	46.50	45.55	44.39	43.55	42.85	41.38	40.83	40.36	40.46	38.74	38.29
3.5	60.00	57.21	57.12	57.49	57.09	53.99	52.38	49.71	48.76	47.56	46.69	45.97	44.46	43.87	43.35	43.45	41.56	41.07
4.0	62.56	59.69	59.59	59.97	59.63	56.48	54.83	52.17	51.22	50.00	49.10	48.37	46.84	46.22	45.66	45.76	43.74	43.23
4.5	64.48	61.56	61.45	61.84	61.54	58.38	56.71	54.05	53.12	51.89	50.98	50.24	48.71	48.07	47.47	47.57	45.45	44.91
5.0	65.91	62.95	62.84	63.24	62.99	59.82	58.14	55.51	54.59	53.36	52.44	51.70	50.17	49.52	48.89	48.99	46.79	46.23
5.5	66.98	64.00	63.88	64.28	64.08	60.92	59.23	56.63	55.74	54.51	53.58	52.84	51.33	50.66	50.01	50.11	47.84	47.27
6.0	67.76	64.77	64.65	65.05	64.90	61.75	60.06	57.50	56.62	55.40	54.47	53.74	52.23	51.57	50.89	50.99	48.67	48.09
6.5	68.32	65.32	65.20	65.61	65.49	62.36	60.69	58.16	57.30	56.09	55.16	54.43	52.94	52.28	51.58	51.68	49.32	48.74
7.0	68.70	65.71	65.59	66.00	65.91	62.81	61.14	58.65	57.82	56.61	55.69	54.97	53.49	52.83	52.12	52.22	49.83	49.24
8.0	69.07	66.09	65.97	66.39	66.37	63.32	61.67	59.27	58.47	57.29	56.37	55.67	54.23	53.57	52.84	52.94	50.50	49.91
9.0	69.06	66.11	66.00	66.42	66.45	63.46	61.84	59.52	58.75	57.60	56.70	56.01	54.61	53.96	53.21	53.31	50.85	50.26
10.0	68.81	65.89	65.79	66.21	66.28	63.36	61.77	59.52	58.79	57.66	56.77	56.10	54.74	54.11	53.34	53.44	50.98	50.38
11.0	68.38	65.51	65.41	65.83	65.95	63.08	61.52	59.35	58.65	57.55	56.67	56.02	54.69	54.08	53.30	53.40	50.94	50.35
12.0	67.85	65.02	64.93	65.34	65.49	62.69	61.16	59.05	58.38	57.31	56.45	55.81	54.52	53.93	53.14	53.24	50.79	50.20
15.0	65.89	63.18	63.11	63.52	63.75	61.12	59.68	57.75	57.16	56.16	55.35	54.75	53.55	53.02	52.22	52.32	49.92	49.35
20.0	62.31	59.80	59.76	60.16	60.47	58.08	56.77	55.08	54.58	53.68	52.94	52.41	51.33	50.88	50.09	50.18	47.90	47.38
25.0	58.92	56.58	56.57	56.95	57.31	55.11	53.91	52.40	51.96	51.15	50.46	49.98	49.01	48.62	47.85	47.94	45.78	45.29
30.0	56.88	53.68	53.69	54.06	54.45	52.40	51.29	49.92	49.53	48.79	48.15	47.71	46.82	46.48	45.73	45.82	43.78	43.32
35.0	53.17	51.10	51.13	51.48	51.89	49.98	48.94	47.68	47.33	46.64	46.05	45.64	44.81	44.61	43.79	43.88	41.94	41.61
40.0	50.77	48.81	48.84	49.19	49.60	47.80	46.83	45.67	45.35	44.71	44.14	43.77	42.99	42.73	42.03	42.12	40.27	39.86
45.0	48.62	46.76	46.80	47.14	47.56	45.85	44.94	43.85	43.56	42.96	42.42	42.07	41.34	41.11	40.43	40.52	38.75	38.36
50.0	46.70	44.92	44.97	45.30	45.72	44.10	43.23	42.21	41.94	41.37	40.87	40.54	39.85	39.64	38.98	39.07	37.37	37.00
55.0	44.97	43.26	43.32	43.63	44.06	42.51	41.68	40.72	40.47	39.94	39.45	39.14	38.48	38.29	37.66	37.74	36.12	35.76
60.0	43.40	41.75	41.82	42.12	42.55	41.07	40.28	39.37	39.14	38.62	38.16	37.86	37.24	37.06	36.45	36.53	34.97	34.63
65.0	41.96	40.38	40.45	40.75	41.17	39.75	38.99	38.13	37.91	37.42	36.98	36.69	36.10	35.94	35.34	35.42	33.91	33.59
70.0	40.65	39.13	39.20	39.49	39.91	38.54	37.81	36.99	36.78	36.32	35.89	35.62	35.05	34.90	34.32	34.40	32.94	32.63
80.0	38.34	36.90	36.98	37.26	37.67	36.39	35.72	34.97	34.78	34.35	33.96	33.70	33.18	33.05	32.50	32.58	31.20	30.91
90.0	36.35	35.00	35.08	35.34	35.75	34.55	33.92	33.23	33.06	32.66	32.28	32.05	31.56	31.44	30.92	31.00	29.70	29.43
100.0	34.62	33.34	33.42	33.68	34.08	32.94	32.35	31.71	31.55	31.18	30.82	30.61	30.14	30.04	29.54	29.62	28.38	28.12
150.0	28.51	27.47	27.55	27.77	28.13	27.22	26.76	26.28	26.17	25.88	25.60	25.43	25.07	24.99	24.59	24.66	23.64	23.44
200.0	24.80	23.94	23.91	24.10	24.44	23.67	23.28	22.89	22.81	22.57	22.33	22.19	21.90	21.82	21.48	21.54	21.24	20.55
250.0	22.44	21.66	21.41	21.58	21.90	21.27	21.05	20.67	20.68	20.44	20.13	20.09	19.86	19.71	19.39	19.46	19.30	18.69
300.0	20.73	20.01	19.78	19.85	20.14	19.67	19.47	19.13	19.14	18.92	18.64	18.60	18.40	18.26	17.97	18.03	17.89	17.33
350.0	19.43	18.76	18.55	18.62	18.89	18.46	18.27	17.95	17.97	17.77	17.51	17.47	17.29	17.16	16.89	16.94	16.81	16.29
400.0	18.41	17.78	17.59	17.65	17.91	17.50	17.33	17.03	17.05	16.86	16.62	16.58	16.41	16.30	16.04	16.09	15.96	15.48
450.0	17.60	16.99	16.82	16.87	17.13	16.74	16.57	16.29	16.31	16.13	15.90	15.87	15.71	15.60	15.35	15.40	15.27	14.82
500.0	16.93	16.35	16.19	16.24	16.49	16.11	15.95	15.69	15.70	15.53	15.31	15.28	15.13	15.03	14.79	14.84	14.71	14.28

TABLE I. Stopping Power and Range for Heavy Ions

See page 8 for Explanation of Table

RANGE IN UNITS OF MG/SQ CM

257 LW IONS 103

E/A	BE 4	C 6	MG 12	AL 13	SI 14	CA 20	TI 22	CR 24	FE 26	NI 28	CU 29	GE 32	SE 34	SR 38	ZR 40	MO 42	RH 45	AG 47
2.5	6.660	6.350	8.954	8.930	8.770	10.437	11.270	11.827	12.230	12.680	12.970	13.900	14.370	14.945	15.160	15.397	15.854	16.260
3.0	7.236	7.189	9.934	9.964	9.798	11.611	12.639	13.271	13.728	14.224	14.621	15.670	16.240	16.887	17.131	17.448	18.140	18.471
3.5	7.804	7.971	10.882	10.963	10.788	12.733	13.944	14.644	15.148	15.683	16.179	17.335	17.995	18.707	18.977	19.366	20.264	20.632
4.0	8.373	8.722	11.813	11.942	11.758	13.825	15.209	15.971	16.519	17.087	17.677	18.934	19.677	20.448	20.741	21.197	22.257	22.496
4.5	8.947	9.455	12.734	12.911	12.715	14.898	16.449	17.269	17.858	18.455	19.136	20.489	21.310	22.137	22.451	22.969	24.182	24.394
5.0	9.527	10.179	13.652	13.875	13.668	15.960	17.674	18.549	19.176	19.800	20.569	22.015	22.910	23.789	24.124	24.701	26.053	26.246
5.5	10.116	10.898	14.570	14.839	14.618	17.016	18.890	19.819	20.482	21.129	21.986	23.521	24.488	25.417	25.770	26.404	27.884	28.064
6.0	10.714	11.617	15.492	15.804	15.570	18.070	20.101	21.082	21.780	22.449	23.391	25.014	26.050	27.027	27.399	28.087	29.687	29.859
6.5	11.323	12.337	16.417	16.774	16.526	19.125	21.313	22.343	23.074	23.764	24.791	26.499	27.603	28.627	29.016	29.757	31.469	31.639
7.0	11.942	13.061	17.349	17.750	17.486	20.183	22.526	23.604	24.369	25.077	26.188	27.981	29.151	30.220	30.625	31.418	33.236	33.407
8.0	13.22	14.53	19.24	19.72	19.43	22.31	24.96	26.14	26.98	27.71	28.98	30.94	32.24	33.40	33.84	34.73	36.74	36.93
9.0	14.54	16.02	21.16	21.73	21.40	24.47	27.43	28.69	29.58	30.36	31.80	33.92	35.34	36.58	37.05	38.04	40.23	40.44
10.0	15.91	17.65	23.11	23.78	23.41	26.66	29.92	31.28	32.22	33.02	34.63	36.92	38.47	39.79	40.28	41.36	43.72	43.96
11.0	17.32	19.11	25.11	25.86	25.45	28.88	32.45	33.90	34.90	35.72	37.50	39.94	41.62	43.02	43.54	44.71	47.23	47.51
12.0	18.79	20.71	27.15	27.99	27.54	31.14	35.02	36.55	37.61	38.46	40.40	43.01	44.80	46.28	46.82	48.09	50.75	51.08
15.0	23.48	25.74	33.52	34.64	34.04	38.15	42.99	44.77	45.99	46.88	49.34	52.43	54.60	56.29	56.90	58.43	61.51	62.01
20.0	32.23	34.92	45.00	46.58	45.72	50.66	57.14	59.34	60.81	61.76	65.11	69.02	71.80	73.83	74.55	76.50	80.17	81.05
25.0	42.10	45.09	57.52	59.60	58.42	64.18	72.41	75.02	76.73	77.71	82.01	86.76	90.18	92.52	93.32	95.70	99.90	101.21
30.0	53.06	56.22	71.05	73.65	72.13	78.70	88.76	91.79	93.74	94.73	100.02	105.65	109.72	112.36	113.24	116.03	120.72	122.54
35.0	65.05	68.28	85.56	88.71	86.79	94.18	106.18	109.63	111.81	112.78	119.12	125.66	130.40	133.33	134.28	137.49	142.64	145.00
40.0	78.03	81.23	101.00	104.72	102.38	110.59	124.62	128.50	130.91	131.84	139.28	146.76	152.21	155.41	156.41	160.04	165.64	168.58
45.0	91.96	95.05	117.35	121.67	118.87	127.90	144.05	148.36	151.00	151.88	160.46	168.93	175.10	178.56	179.61	183.66	189.70	193.24
50.0	106.83	109.71	134.58	139.52	136.23	146.09	164.44	169.20	172.06	172.87	182.65	192.12	199.04	202.76	203.85	208.32	214.79	218.97
55.0	122.59	125.19	152.66	158.23	154.43	165.12	185.77	190.98	194.06	194.79	205.81	216.32	224.02	227.97	229.10	233.99	240.89	245.73
60.0	139.23	141.46	171.56	177.80	173.44	184.98	208.00	213.67	216.98	217.61	229.91	241.49	249.99	254.18	255.34	260.65	267.98	273.50
65.0	156.7	158.5	191.3	198.2	193.3	206.6	231.1	237.3	240.8	241.3	254.9	267.6	276.9	281.4	282.5	288.3	296.0	302.2
70.0	175.0	176.3	211.7	219.4	213.9	227.1	255.1	261.7	265.5	265.9	280.9	294.7	304.8	309.5	310.7	316.9	325.0	332.0
80.0	214.1	214.1	255.0	264.1	257.3	272.3	305.6	313.2	317.3	317.4	336.3	351.5	363.4	368.5	369.7	376.7	386.8	394.2
90.0	256.2	254.7	301.2	311.9	303.7	320.4	359.3	367.9	372.5	372.2	393.1	411.8	425.6	431.0	432.2	440.1	450.1	460.0
100.0	301.4	298.0	350.2	362.5	352.8	371.3	416.1	425.7	430.7	430.1	454.2	475.4	491.1	496.9	498.1	506.9	517.8	529.2
150.0	568.1	551.5	633.7	655.2	637.0	664.6	742.9	758.0	765.0	761.7	803.9	839.5	866.2	873.5	874.4	887.7	903.6	923.0
200.0	896.1	859.0	973.9	1006.5	978.5	1015.1	1133.1	1154.5	1162.7	1155.4	1219.2	1262.4	1304.0	1319.9	1319.9	1338.4	1352.6	1387.4
250.0	1275.3	1210.2	1360.1	1405.5	1368.8	1412.1	1575.0	1607.5	1611.8	1599.5	1687.8	1738.8	1796.9	1823.6	1821.9	1848.9	1856.6	1909.8
300.0	1696.9	1598.9	1785.9	1845.3	1798.8	1848.7	2060.6	2110.7	2104.9	2086.8	2201.8	2261.4	2337.5	2375.4	2371.6	2408.0	2408.3	2481.0
350.0	2155.4	2020.3	2246.2	2320.7	2263.4	2319.9	2584.5	2655.0	2636.3	2611.8	2755.4	2824.4	2919.6	2969.1	2962.7	3009.2	3001.6	3094.6
400.0	2646.	2470.	2737.	2827.	2758.	2822.	3142.	3234.	3201.	3170.	3344.	3423.	3538.	3599.	3590.	3647.	3631.	3746.
450.0	3166.	2946.	3254.	3362.	3280.	3350.	3729.	3842.	3796.	3757.	3963.	4053.	4189.	4262.	4250.	4318.	4293.	4430.
500.0	3711.	3443.	3796.	3921.	3826.	3903.	4343.	4478.	4418.	4371.	4609.	4711.	4869.	4954.	4939.	5017.	4984.	5143.

E/A	SN 50	TE 52	BA 56	LA 57	PR 59	SM 62	GD 64	HO 67	TM 69	LU 71	TA 73	RE 75	IR 77	AU 79	PB 82	BI 83	TH 90	U 92
2.5	17.05	17.67	19.04	19.39	20.09	21.08	21.68	22.45	22.90	23.35	23.80	24.28	24.76	25.19	25.76	25.97	27.80	28.38
3.0	19.42	20.16	21.52	21.86	22.58	23.73	24.41	25.34	25.86	26.38	26.89	27.42	28.01	28.49	29.10	29.30	31.27	31.90
3.5	21.82	22.47	23.84	24.16	24.90	26.18	26.94	28.01	28.58	29.17	29.74	30.31	31.01	31.52	32.17	32.36	34.47	35.13
4.0	23.71	24.66	26.04	26.35	27.10	28.51	29.34	30.53	31.15	31.80	32.42	33.04	33.82	34.37	35.05	35.24	37.48	38.18
4.5	25.74	26.78	28.16	28.46	29.22	30.74	31.64	32.95	33.61	34.32	34.98	35.64	36.51	37.10	37.81	37.99	40.36	41.09
5.0	27.71	28.84	30.23	30.51	31.28	32.92	33.88	35.29	36.00	36.76	37.47	38.16	39.10	39.73	40.48	40.65	43.14	43.91
5.5	29.64	30.87	32.25	32.52	33.30	35.04	36.06	37.58	38.32	39.16	39.89	40.62	41.63	42.29	43.07	43.24	45.86	46.66
6.0	31.55	32.86	34.25	34.51	35.30	37.14	38.22	39.83	40.61	41.48	42.27	43.03	44.12	44.81	45.62	45.78	48.52	49.35
6.5	33.43	34.84	36.23	36.48	37.27	39.21	40.35	42.05	42.87	43.79	44.61	45.40	46.56	47.28	48.13	48.29	51.14	52.01
7.0	35.31	36.80	38.20	38.43	39.22	41.26	42.46	44.25	45.10	46.07	46.93	47.75	48.97	49.73	50.60	50.76	53.74	54.63
8.0	39.04	40.70	42.10	42.31	43.11	45.33	46.64	48.61	49.51	50.58	51.52	52.40	53.74	54.55	55.50	55.64	58.86	59.81
9.0	42.76	44.58	46.00	46.18	46.97	49.39	50.80	52.93	53.90	55.05	56.06	57.00	58.46	59.33	60.34	60.48	63.92	64.94
10.0	46.49	48.48	49.89	50.05	50.85	53.44	54.95	57.25	58.27	59.51	60.59	61.58	63.16	64.09	65.17	65.29	68.97	70.04
11.0	50.23	52.39	53.81	53.95	54.73	57.50	59.12	61.57	62.64	63.97	65.12	66.16	67.86	68.84	69.98	70.10	74.01	75.15
12.0	54.00	56.32	57.76	57.86	58.64	61.59	63.31	65.92	67.04	68.44	69.66	70.76	72.56	73.59	74.81	74.92	79.06	80.26
15.0	65.53	68.35	69.79	69.82	70.57	74.04	76.06	79.11	80.37	82.02	83.44	84.70	86.82	88.00	89.44	89.52	94.37	95.73
20.0	85.58	89.25	90.71	90.61	91.26	95.60	98.13	101.88	103.37	105.42	107.17	108.67	111.31	112.73	114.55	114.58	120.63	122.29
25.0	106.80	111.35	112.82	112.57	113.09	118.32	121.36	125.80	127.50	129.94	132.04	133.78	136.93	138.56	140.80	140.78	148.07	150.03
30.0	129.20	134.67	136.14	136.73	136.10	142.23	145.81	150.93	152.84	155.67	158.11	160.10	163.77	165.60	168.27	168.20	176.78	179.05
35.0	152.78	159.21	160.68	160.10	160.29	167.35	171.46	177.28	179.38	182.62	185.41	187.64	191.83	193.86	197.00	196.87	206.77	209.36
40.0	177.5	184.9	186.4	185.6	185.6	193.7	198.3	204.8	207.1	210.8	213.9	216.4	221.1	223.3	227.0	226.8	238.0	241.0
45.0	203.4	211.9	213.3	212.3	212.1	221.1	226.3	233.5	236.0	240.1	243.6	246.4	251.6	254.0	258.1	257.9	270.6	273.8
50.0	230.4	239.9	241.3	240.2	239.7	249.7	255.5	263.4	266.1	270.6	274.5	277.5	283.3	285.8	290.5	290.2	304.4	307.9
55.0	258.4	269.1	270.4	269.1	268.3	279.4	285.8	294.4	297.3	302.2	306.5	309.7	316.1	318.8	324.1	323.7	339.3	343.3
60.0	287.5	299.3	300.6	299.0	298.0	310.1	317.1	326.5	329.6	334.9	339.6	343.1	350.0	352.9	358.8	358.3	375.5	379.8
65.0	317.6	330.6	331.9	330.1	328.7	342.0	349.6	359.7	363.0	368.7	373.8	377.6	385.1	388.2	394.6	394.0	412.8	417.5
70.0	348.8	362.9	364.2	362.1	360.4	374.8	383.0	393.9	397.4	403.6	409.1	413.2	421.2	424.5	431.5	430.8	451.3	456.3
80.0	413.9	430.6	431.7	429.2	426.7	443.5	453.0	465.4	469.3	476.4	482.8	487.4	496.6	500.2	508.5	507.6	531.5	537.3
90.0	482.8	502.2	503.1	500.0	496.8	516.0	526.9	540.8	545.1	553.2	560.4	565.6	576.1	579.9	589.6	588.6	616.0	622.5
100.0	555.2	577.4	578.2	574.5	570.5	592.2	604.5	620.1	624.7	633.7	641.9	647.7	659.5	663.6	674.7	673.4	704.5	711.9
150.0	967.2	1005.1	1004.7	997.8	988.5	1024.4	1044.3	1068.4	1075.1	1089.2	1102.5	1111.4	1130.0	1135.7	1154.6	1152.1	1203.9	1215.7
200.0	1452.9	1509.0	1507.4	1496.6	1480.5	1532.6	1561.2	1594.4	1603.1	1622.9	1642.0	1654.4	1680.6	1688.0	1715.8	1711.7	1774.4	1804.1
250.0	1998.9	2074.6	2076.8	2061.4	2037.3	2107.3	2143.6	2187.3	2196.5	2223.1	2250.2	2265.1	2298.5	2309.8	2347.6	2341.6	2410.5	2461.3
300.0	2595.7	2692.8	2702.3	2684.3	2651.0	2736.6	2779.4	2834.6	2843.6	2877.6	2914.6	2930.8	2971.7	2988.2	3037.0	3028.8	3103.1	3176.6
350.0	3236.8	3356.8	3373.8	3353.6	3310.6	3411.9	3461.6	3528.8	3537.4	3579.3	3626.8	3644.4	3693.1	3714.8	3775.5	3764.8	3845.0	3942.2
400.0	3917.	4061.	4086.	4063.	4010.	4127.	4185.	4264.	4272.	4322.	4381.	4400.	4457.	4484.	4557.	4544.	4630.	4752.
450.0	4631.	4801.	4833.	4808.	4744.	4879.	4944.	5036.	5044.	5102.	5172.	5193.	5258.	5290.	5376.	5361.	5454.	5601.
500.0	5376.	5572.	5612.	5585.	5509.	5661.	5734.	5840.	5847.	5915.	5996.	6018.	6092.	6130.	6229.	6211.	6312.	6485.