2018
3151
MASTER

Research Report

SC-RR-71 0507

ANALYTICAL APPROXIMATIONS FOR
X-RAY CROSS SECTIONS II

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Date Published - December 1971

SANDIA LABORATORIES

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-NOTICE

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ABSTRACT

Analytical approximations which are efficient for use in computer programs are given for the photoelectric, incoherent scattering, and energy transfer cross sections for photons of energy greater than 0.01 keV. All the atoms of atomic numbers $1 \leq Z \leq 100$ are included. The photoelectric cross section is approximated by four-term polynomials in reciprocal powers of the photon energy and is constrained to approach the theoretical high-energy limit. The incoherent scattering cross sections are approximated by the Klein-Nishina relation which is represented here by a simple rational function. Results are also shown graphically and provide readily available approximate cross sections. The graphs also show the source data on which the approximations are based in addition to some results from other compilations for comparison.

Key Words: Computer programs, Energy transfer, Incoherent scattering

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ANALYTICAL APPROXIMATIONS FOR X-RAY CROSS SECTIONS II

I. Introduction

When x-ray cross sections are needed for use in computer programs it is convenient to have a simple analytical representation for them as provided here. We shall use the term "cross section" to refer generically to a measure of any of the photon-matter interactions in whatever units they occur. The units are then specified whenever they are needed. Cross sections are usually found in the literature in the form of tables which have been derived from measurements or from theoretical calculations. This body of information, in whatever form it exists, is referred to here as "source data." Our representation is then obtained by the least-squares fitting of simple functions to the source data.

The analytical representation described is a revision of the one developed in the authors' earlier report.¹ We have retained the same basic fitting functions but have imposed additional constraints on the curve fitting procedure in order to obtain a smoother representation. Also, a large amount of additional source data has recently become available from measurements and from improved theoretical calculations.

We deem it desirable to have an analytical representation which will provide photon cross sections for use in computer programs and which satisfies the following requirements:

- (a) That it be as accurate as the source data justify.
- (b) That it be economical in computer time and memory storage.
- (c) That the approximating function and its derivative be continuous with respect to photon energy except at absorption edges.
- (d) That it be easily adaptable to any composite material and continue to satisfy requirements (a), (b), and (c) with respect to the composite material.
- (e) That approximations for specific cross sections (e.g., photoelectric, total, etc.) be available which also satisfy requirements (a), (b), (c), and (d).
- (f) That it be flexible in the sense that, when improved source data become available, it can readily be updated.

These requirements include all those given by the authors.¹ In addition, in (c) we now require continuity of the derivative, whereas previously only the approximating function was required to be continuous. This additional constraint leads to a smoother overall approximation and is convenient when the derivative of the cross section is needed in computer computations. The inclusion of improved source data has required an improvement in the fitting accuracy in keeping with requirement (a); this was achieved by using narrower fitting intervals. We have also extended the lower photon energy limit down by a factor of ten to 0.01 keV.

We emphasize that it is not the primary aim of this representation to improve on the source data, even though least-squares fitting does accomplish a certain amount of smoothing. Instead, the analytical scheme serves the primary purpose of "representing" the source data in a convenient parameterized form and hence makes a given cross section readily available to computer access. There are two aspects to this overall endeavor. One is the continuing problem of re-evaluating and updating the source data as additional cross-section information becomes available; the other is developing an analytical representation which satisfies the criteria enumerated above. This report describes such a representation for the photoelectric, total attenuation, and energy transfer cross sections. The authors have previously described² such a representation for pair-production cross sections.

The remainder of this report is organized as follows. The analytical forms of the approximations are given in Sections II, III, and IV, a discussion of the graphs in Section V, a discussion of the fitting parameters in Section VI, and a summary and estimate of errors in Section VII. Appendix A provides a graph for each element, and Appendix B enumerates the fitting parameters.

II. Photoelectric Cross Sections

The approach used on the photoelectric cross sections is to fit Eq. (1) by the least-squares method to the photoelectric source data in photon-energy intervals for each element in the range of atomic numbers $1 \leq Z \leq 100$. The approximation for use in energy interval j of element i is the linear combination of reciprocal powers of the photon energy E in keV,

$$\mu_{ij} = \sum_{k=1}^4 A_{ijk} E^{-k} \text{ (cm}^2/\text{gm)} , \quad (1)$$

$$i = 1, \dots, 100, j = 1, \dots, m_i ,$$

where m_i is the number of intervals used for element i . The interval size is adjusted until the least-squares fitting accuracy satisfies requirement (a). The interval boundaries are parameterized so that they can be readily changed and/or new intervals added, if necessary, in view of requirement (f). Requirement (c) is satisfied by building it into the fitting routine. A description of the least-squares fitting routine is given in a report by Biggs and Amos.³

The photoelectric cross section in interval l for a composite material composed of N elements is

$$\bar{\mu}_l = \sum_{i=1}^N f_i \mu_{ij} , \quad (2)$$

where f_i is the fraction by mass of element i in the material. The index i is used to designate the element and, in cases where the entire set of elements is under discussion, it is set equal to the atomic number Z . However, when some subset of the elements is involved, as is the case in Eq. (2), the index i will not, in general, be equal to Z . The element interval index j depends on both the composite interval index ℓ and the constituent element i and should be thought of as $j(\ell, i)$, but in order to simplify writing, this functional dependence will be left as understood. Substituting from Eq. (1), interchanging the order of summation, and using the definition

$$\bar{A}_{\ell k} = \sum_{i=1}^N f_i A_{ijk} \quad (3)$$

gives

$$\bar{\mu}_{\ell} = \sum_{k=1}^4 \bar{A}_{\ell k} E^{-k} (\text{cm}^2/\text{gm}), \quad \ell = 1, \dots, m. \quad (4)$$

The number of intervals m for the composite material may be larger than for any one of the constituent elements. The representation uses a common set of interval boundaries for all boundaries which are not determined by absorption edges. This prevents the number of intervals from growing unduly large in cases where a material consists of a large number of constituent elements.

III. Incoherent Scattering Cross Sections

The Klein-Nishina relations are used to supply the basic data for rational-function approximations to the incoherent scattering cross sections. The incoherent scattering cross section for element i is approximated by

$$\eta_i = \left(\frac{Z}{A} \right)_i R(\text{cm}^2/\text{gm}), \quad (5)$$

where Z is the atomic number and A is the atomic weight of element i . R is a rational function, described below, that gives the cross section for one Avogadro's number of electrons (mole of electrons). In this terminology, $(Z/A)_i$ is the number of moles of electrons in one gram of element i . The cross section for a composite material consisting of N elements is

$$\bar{\eta} = \sum_{i=1}^N f_i \eta_i = \overline{\left(\frac{Z}{A} \right)} R(\text{cm}^2/\text{gm}), \quad (6)$$

where

$$\overline{\left(\frac{Z}{A} \right)} = \sum_{i=1}^N f_i \left(\frac{Z}{A} \right)_i. \quad (7)$$

The cross section for transfer of energy to element 1 of the scattering medium is

$$\sigma_1 = \left(\frac{Z}{A} \right)_1 S(\text{cm}^2/\text{gm}) , \quad (8)$$

and for an N-element composite material,

$$\bar{\sigma} = \sum_{i=1}^N f_i \sigma_i = \left(\frac{Z}{A} \right) S(\text{cm}^2/\text{gm}) . \quad (9)$$

The cross section associated with element 1 for retention of energy by the scattered photon is

$$g_1 = \left(\frac{Z}{A} \right)_1 G(\text{cm}^2/\text{gm}) . \quad (10)$$

The corresponding cross section for an N-element composite scatterer is

$$\bar{g} = \sum_{i=1}^N f_i g_i = \left(\frac{Z}{A} \right) G(\text{cm}^2/\text{gm}) . \quad (11)$$

the above quantities R, S, and G are given by

$$R = L \left\{ \frac{1 + A_1 X + A_2 X^2}{1 + A_3 X + A_4 X^2 + A_5 X^3} \right\} , \quad (12)$$

$$S = L \left\{ \frac{X + B_1 X^2 + B_2 X^3}{1 + B_3 X + B_4 X^2 + B_5 X^3 + B_6 X^4} \right\} , \quad (13)$$

and

$$G = L \left\{ \frac{1 + C_1 X + C_2 X^2}{1 + C_3 X + C_4 X^2 + C_5 X^3} \right\} , \quad (14)$$

where $L = 8/3\pi r_o^2 N_o = 0.4006$ (r_o is the classical radius of the electron and N_o is Avogadro's number), $X = E(\text{keV})/511.006$ is the photon energy in mc^2 units. The ratio Z/A for each element 1 is listed in the parameter table of Appendix B. The parameters A_1 , B_1 , and C_1 are listed in the table below.

i	A_i	B_i	C_i
1	1.148	0.8250	1.099
2	0.06141	0.03234	0.02058
3	3.171	5.393	4.209
4	0.9328	5.212	2.251
5	0.02572	0.8783	0.04100
6		0.01599	

These approximations to the corresponding Klein-Nishina relations have a relative accuracy of about a percent or better for photons of energy less than 10 MeV. A detailed comparison of these approximations with the Klein-Nishina results is given in the authors' report previously referenced.¹

IV. Total and Energy Transfer Cross Sections

The total mass attenuation coefficient (less coherent scattering) for an element is obtained by adding the photoelectric contribution of Eq. (1) to the incoherent scattering contribution of Eq. (5). For a composite material, Eqs. (4) and (6) are added to give the total mass attenuation coefficient.

The cross section for transfer of energy to an element is obtained by adding Eqs. (1) and (8), and for a composite material Eqs. (4) and (9) are added.

Another type of energy transfer cross section which also discounts the energy reradiated by fluorescence is also available within this approximation scheme. Details of this are found in the authors' referenced report.¹

An analytical scheme for pair production cross sections has been developed by the authors.² Whenever the photon energy is above 1022 keV, the pair production cross section should be added to the above cross sections.

V. Discussion of Graphs

In Appendix A we provide a graph showing the cross sections versus energy for each element. These graphs are intended to serve several purposes. (1) They provide a ready means for obtaining rough values of cross sections for hand calculations. (2) They give a visual comparison of results from the analytical scheme, shown by curves, to the source data which are shown by numbers (the sources corresponding to these numbers are given in Appendix A). (3) They provide a visual comparison of results from this analytical representation with cross sections from other

compilations which are plotted by symbols (symbols are identified in Appendix A). (4) They provide a visual indication of the present state of knowledge of cross sections at low photon energies. (5) They show the absorption edge structure clearly. (6) They show the relative importance of cross sections representing different photon-matter interactions.

The photoelectric cross section, as given by Eq. (1) and referenced by the A's listed in Appendix B, is the smallest of the cross-section curves shown in the graphs. Observe that, for elements of atomic numbers $1 \leq Z \leq 67$, the photoelectric curve goes off the bottom of the graph referring to the left ordinate and continues at the top of the graph referring to the right ordinate.

The energy transfer cross section, consisting of the photoelectric cross section of Eq. (1) plus the Klein-Nishina contribution (Eq. (8)) to the energy transfer cross section, is shown by the middle curve. The total cross section (less coherent scattering), consisting of the photoelectric cross section of Eq. (1) plus the total Klein-Nishina cross section of Eq. (5), is shown by the top curve.

The cross sections from other compilations which are shown on the graphs by the symbols, asterisks, circles, and squares, include the use of atomic structure factors in obtaining the total cross sections, whereas our analytical representation does not. This gives an effect that is observable on the scale of these graphs only for the first few elements and only for photon energies just above where the total cross-section curve breaks away from the photoelectric curve

Our photoelectric formula (Eq. (1)) is not well suited for approximating functions that increase with energy. The source data do, however, occasionally indicate such a behavior. (See, for example, Gallium ($Z = 31$) in the interval $0.02 \text{ keV} < E < 0.07 \text{ keV}$.) We could change our representation to improve the fitting accuracy in these situations either by using narrower fitting intervals at low photon energies or by increasing the number of terms in the fitting function (Eq. (1)). We decided against both of these procedures as not being consistent with the requirements given in Section I, since it would complicate the analytical representation more than the accuracy of the currently available source data justifies.

For elements of atomic numbers $61 \leq Z \leq 100$ and for photon energies below the N5 absorption edge, we used only the E^{-1} term of Eq. (1) to provide an order-of-magnitude estimate in this interval. We have shown source data in this interval only for lead ($Z = 82$) and uranium ($Z = 92$), which are thought to be typical of the other elements.

The boundaries of many of the photoelectric intervals are fixed by the various absorption discontinuities (edges) but, in addition, we have introduced artificial interval boundaries at photon energies in keV of 0.1, 0.8, 4, 20, 100, and 500 to be used whenever needed. The fitting function is constrained to be continuous and to have a continuous derivative at each of these artificial boundaries in accordance with requirement (c) of Section I.

Whenever the lowest absorption edge for any neutral atom occurs at a photon energy greater than 0.01 keV, our representation gives a zero photoelectric cross section for photons in the interval between 0.01 keV and the lowest absorption edge. Such is the case for hydrogen at a photon energy for 0.014 keV and for neon at 0.018 keV.

The photon energies, in keV, of the various absorption edges used in our representation are given on the graphs for convenience. These are taken from Storm and Israel's article in Nuclear Data Tables.⁴ In our fitting procedure we have required that the photoelectric approximation in the L1-edge to the K-edge interval extrapolate smoothly back to the L3-edge. We have also required that the fitting curve in the M1-edge to the L3-edge extrapolate smoothly back to the M5-edge. This makes it possible for the user to eliminate some of the intervals in our analytical representation if he is not interested in the details of these edge structures.

A few of the curves in Appendix A are not shown after they go off scale at the tops of graphs at photon energies just above 0.01 keV. (See, for example, sulphur ($Z = 16$).) In these cases the approximation continues smoothly as the photon energy decreases to 0.01 keV.

VI. Discussion of Fitting Parameters

The parameters used in the incoherent scattering representations have already been discussed and tabulated in Section III. In Appendix B we have tabulated the parameters for the photoelectric representation. These parameters, the A's of Eq. (1), are shown in the last four columns. The first column gives the interval number and the interval identification is given next. The identification consists of the name of the edges or the numerical values of artificial boundaries used to define each fitting interval. The START and FINISH columns define the numerical boundaries of the fitting intervals, the upper boundary of the last interval of each element is infinity. The coefficient of the E^{-1} term of Eq. (1) (the $A(I, J, 1)$ in the table) in the last fitting interval of each element has been constrained to agree with theoretical results of Pratt.⁵

The RMS column gives a root-mean-square measure of the fractional residual error obtained in fitting the equations to the source data.

The ratio of atomic number to atomic weight Z/A is also listed for each element and is used in some of the equations of Section III.

VII. Summary and Estimate of Errors

We have presented an analytical representation that is useful in computer evaluation of photon cross sections. We have included the photoelectric, incoherent scattering, and energy transfer cross sections. Whenever photon energies lie above the threshold for pair production

at 1022 keV, the cross section for this interaction should also be included. An analytical representation for the total pair-production cross section is given in the authors' previously referenced work.²

We have presented a full set of graphs in Appendix A and rely on them to identify the source data which are indicated by numerals in the graphs. These numerals are then correlated with the appropriate references at the beginning of Appendix A. We also use symbols on the graphs, which are also identified at the beginning of Appendix A, to compare our results with cross sections from some other compilations.

This representation applies in the photon energy interval $0.01 \text{ keV} \leq E$, and the fitting functions are constrained to approach the proper relativistic high energy limit. In most applications the atoms are not free but are constituents of molecules, crystals, etc. This makes very little difference if the photon energies are of the order of 1 keV, but the cross section will undergo large changes in going from one state of matter to another at photon energies near 0.01 keV. The binding energies of the more loosely bound electrons depend strongly on the state of matter under consideration and thereby cause much of this effect.

The overall accuracy of this analytical representation of photon cross sections depends not only on how well we have approximated the source data, but also on the accuracy of the source data itself. A description of the accuracies of the individual sources is best gained by referring to the corresponding references, since (1) the meaning of the error of any particular measurement is closely linked with what is being measured and how it is being performed, and (2) much of the source data comes from existing compilations which already contain interpolated data. In the photon energy interval $1.0 \text{ keV} < E < 1000 \text{ keV}$, we have relied heavily on the recent compilation of Storm and Israel.⁴ As shown by the root-mean-square, fractional fitting errors RMS of the parameter table of Appendix B, we usually agree with the source data to about a percent or better in this interval.

As an estimate of how closely the cross sections provided by this analytical representation agree with physical reality, we estimate that in the photon energy interval $E \geq 10 \text{ keV}$ the errors are less than 10 percent but are likely to increase as the photon energy decreases. For photon energies below a kilovolt and for atomic numbers $Z \leq 60$, a rough idea for the accuracy can be gleaned by observing the scatter in the source data shown by the numerals plotted on the graphs of Appendix A. For photon energies below the M5-edges of atoms of atomic numbers $Z > 60$, the accuracy is thought to be about an order of magnitude or better.

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APPENDIX A
Photon Cross-Section Graphs

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Photon Cross-Section Graphs

In this appendix we show a graph of the photon cross sections for each element. These graphs are discussed in Section V. Numerals are used on the graphs to represent the source data used in the curve fitting. The source associated with each of these numerals is identified in the following table.

Identification of Source Data

2	Hubbell (Ref. 6)
3	McMaster <u>et al.</u> (Ref. 7)
4	Storm and Israel (Ref. 4)
5	Calculated from quantities given by Cromer and Liberman (Ref. 8)
6	Calculated with Brysk-Zerby code (Ref. 9)
7	McGuire (Ref. 10)
8	Henke (Ref. 11)
9	For hydrogen, this source is the Bethe-Salpeter formula (Ref. 12), and for all other elements this represents data from Eq. (2-1) of Ref. 6.

The symbols used on the graphs represent cross sections from other compilations that were not necessarily used in the curve fitting. The identification of these is shown in the table below.

Identification of Comparison Symbols

Symbol	Source
Circle	Storm and Israel (Ref. 4)
Square	Hubbell (Ref. 6)
Asterisk	McMaster <u>et al.</u> (Ref. 7)

HYDROGEN 1

Barns/atom = $1.674 \times \text{cmsq/gm}$

HELIUM 2

Barns/atom = $6.645 \times \text{cmsq/gm}$

LITHIUM 3

Barns/atom = $11.52 \times \text{cmsq/gm}$

BERYLLIUM 4

Barns/atom = $14.96 \times \text{cmsq/gm}$

BORON 5

Barns/atom = 17.95 x cmsq/gm

CARBON 6

Barns/atom = $19.94 \times \text{cmsq/gm}$

NITROGEN 7

$$\text{Barns/atom} = 23.26 \times \text{cmsq/gm}$$

OXYGEN 8

Barns/atom = $26.57 \times \text{cmsq/gm}$

FLUORINE 9

$$\text{Barns/atom} = 31.55 \times \text{cmsq/gm}$$

NEON 10

$$\text{Barns/atom} = 33.51 \times \text{cmsq/gm}$$

SODIUM 11

$$\text{Barns/atom} = 38.17 \times \text{cmsq/gm}$$

MAGNESIUM 12

Barns/atom = $40.37 \times \text{cmsq/gm}$

ALUMINUM 13

$$\text{Barns/atom} = 44.80 \times \text{cmsq/gm}$$

SILICON 14

Barns/atom = $46.64 \times \text{cmsq/gm}$

PHOSPHORUS 15

Barns/atom = $51.44 \times \text{cmsq/gm}$

SULFUR 16

$$\text{Barns/atom} = 53.25 \times \text{cmsq/gm}$$

CHLORINE 17

$$\text{Barns/atom} = 58.86 \times \text{cmsq/gm}$$

ARGON 18

Barns/atom = $66.31 \times \text{cmsq/gm}$

POTASSIUM 19

Barns/atom = 64.94 x cmsq/gm

CALCIUM 20

Barns/atom = $66.53 \times \text{cmsq/gm}$

SCANDIUM 21

Barns/atom = $74.63 \times \text{cmsq/gm}$

TITANIUM 22

Barns/atom = $79.55 \times \text{cmsq/gm}$

VANADIUM 23

$$\text{Barns/atom} = 84.60 \times \text{cmsq/gm}$$

CHROMIUM 24

Barns/atom = $86.36 \times \text{cmsq/gm}$

MANGANESE 25

Barns/atom = $91.24 \times \text{cmsq/gm}$

IRON 26

$$\text{Barns/atom} = 92.76 \times \text{cmsq/gm}$$

COBALT 27

Barns/atom = 97.85 x cmsq/gm

NICKEL 28

Barns/atom = 97.47 x cmsq/gm

COPPER 29

$$\text{Barns/atom} = 105.5 \times \text{cmsq/gm}$$

ZINC 30

Barns/atom = $108.5 \times \text{cmsq/gm}$

GALLIUM 31

$$\text{Barns/atom} = 115.8 \times \text{cmsq/gm}$$

GERMANIUM 32

Barns/atom = 120.5 x cmsq/gm

ARSENIC 33

Barns/atom = $124.4 \times \text{cmsq/gm}$

SELENIUM 34

$$\text{Barns/atom} = 131.1 \times \text{cmsq/gm}$$

BROMINE 35

$$\text{Barns/atom} = 132.7 \times \text{cmsq/gm}$$

KRYPTON 36

Barns/atom = 139.1 x cmsq/gm

RUBIDIUM 37

Barns/atom = $141.9 \times \text{cmsq/gm}$

STRONTIUM 38

Barns/atom = 145.5 x cmsq/gm

YTTRIUM 39

$\text{Barns/atom} = 147.6 \times \text{cmsq/gm}$

ZIRCONIUM 40

Barns/atom = 151.5 x cmsq/gm

NIOBIUM 41

$$\text{Barns/atom} = 154.3 \times \text{cmsq/gm}$$

MOLYBDENUM 42

Barns/atom = 159.3 x cmsq/gm

TECHNETIUM 43

$$\text{Barns/atom} = 164.4 \times \text{cmsq/gm}$$

RUTHENIUM 44

Barns/atom = $167.8 \times \text{cmsq/gm}$

RHODIUM 45

$$\text{Barns/atom} = 170.9 \times \text{cmsq/gm}$$

PALLADIUM 46

Barns/atom = $176.7 \times \text{cmsq/gm}$

SILVER 47

$$\text{Barns/atom} = 179.1 \times \text{cmsq/gm}$$

CADMIUM 48

Barns/atom = $186.6 \times \text{cmsq/gm}$

INDIUM 49

Barns/atom = $190.7 \times \text{cmsq/gm}$

TIN 50

Barns/atom = $197.1 \times \text{cmsq/gm}$

ANTIMONY 51

Barns/atom = 202.1 x cmsq/gm

TELLURIUM 52

$$\text{Barns/atom} = 211.9 \times \text{cmsq/gm}$$

IODINE 53

$$\text{Barns/atom} = 210.7 \times \text{cmsq/gm}$$

XENON 54

Barns/atom = 218.0 x cmsq/gm

CESIUM 55

Barns/atom = $220.7 \times \text{cmsq/gm}$

BARIUM 56

$$\text{Barns/atom} = 228.1 \times \text{cmsq/gm}$$

LANTHANUM 57

Barns/atom = $230.6 \times \text{cmsq/gm}$

CERIUM 58

Barns/atom = $232.7 \times \text{cmsq/gm}$

PRASEODYMIUM 59

Barns/atom = 234.0 x cmsq/gm

NEODYMIUM 60

Barns/atom = $239.5 \times \text{cmsq/gm}$

PROMETHIUM 61

Barns/atom = $240.8 \times \text{cmsq/gm}$

SAMARIUM 62

$$\text{Barns/atom} = 249.6 \times \text{cmsq/gm}$$

EUROPIUM 63

$$\text{Barns/atom} = 252.3 \times \text{cmsq/gm}$$

GADOLINIUM 64

Barns/atom = $261.1 \times \text{cmsq/gm}$

TERBIUM 65

Barns/atom = $263.9 \times \text{cmsq/gm}$

DYSPROSIUM 66

Barns/atom = 269.8 x cmsq/gm

HOLMIUM 67

$$\text{Barns/atom} = 273.8 \times \text{cmsq/gm}$$

ERBIUM 68

Barns/atom = 277.7 x cmsq/gm

THULIUM 69

$$\text{Barns/atom} = 280.5 \times \text{cmsq/gm}$$

YTTERBIUM 70

Barns/atom = 287.4 x cmsq/gm

LUTETIUM 71

$$\text{Barns/atom} = 290.5 \times \text{cmsq/gm}$$

HAFNIUM 72

Barns/atom = 296.4 x cmsq/gm

TANTALUM 73

Barns/atom = 300.5 x cmsq/gm

TUNGSTEN 74

$$\text{Barns/atom} = 305.3 \times \text{cmsq/gm}$$

RHENIUM 75

$$\text{Barns/atom} = 309.2 \times \text{cmsq/gm}$$

OSMIUM 76

Barns/atom = 315.9 x cmsq/gm

IRIDIUM 77

Barns/atom = 319.2 x cmsq/gm

PLATINUM 78

GOLD 79

Barns/atom = $327.0 \times \text{cmsq/gm}$

MERCURY 80

Barns/atom = 333.1 x cmsq/gm

THALLIUM 81

Barns/atom = 339.3 x cmsq/gm

LEAD 82

$$\text{Barns/atom} = 344.0 \times \text{cmsq/gm}$$

BISMUTH 83

$$\text{Barns/atom} = 347.0 \times \text{cmsq/gm}$$

POLONIUM 84

$$\text{Barns/atom} = 348.7 \times \text{cmsq/gm}$$

ASTATINE 85

$$\text{Barns/atom} = 348.7 \times \text{cmsq/gm}$$

RADON 86

Barns/atom = 368.6 x cmsq/gm

FRANCIUM 87

Barns/atom = $370.2 \times \text{cmsq/gm}$

RADIUM 88

$$\text{Barns/atom} = 375.2 \times \text{cmsq/gm}$$

ACTINIUM 89

Barns/atom = 376.9 x cmsq/gm

THORIUM 90

Barns/atom = 385.4 x cmsq/gm

PROTACTINIUM 91

$$\text{Barns/atom} = 383.6 \times \text{cmsq/gm}$$

URANIUM 92

Barns/atom = 395.3 x cmsq/gm

NEPTUNIUM 93

Barns/atom = 393.5 x cmsq/gm

PLUTONIUM 94

Barns/atom = 401.8 x cmsq/gm

AMERICIUM 95

$$\text{Barns/atom} = 403.6 \times \text{cmsq/gm}$$

CURIUM 96

Barns/atom = 410.2 x cmsq/gm

BERKELIUM 97

$$\text{Barns/atom} = 413.4 \times \text{cmsq/gm}$$

CALIFORNIUM 98

Barns/atom = 416.8 x cmsq/gm

EINSTEINIUM 99

$$\text{Barns/atom} = 421.8 \times \text{cmsq/gm}$$

FERMIUM 100

Barns/atom = $420.2 \times \text{cmsq/gm}$

APPENDIX B
Fitting Parameters

APPENDIX B

Fitting Parameters

The approximation scheme represents 100 elements over a wide range of photon energies and involves several approximation intervals per element. The approximation uses four parameters in each of these intervals for the photoelectric cross section to be used in expressions such as Eqs. (1) and (3). Also, one value of $(Z/A)_1$ for each element is needed in the various scattering cross sections such as Eqs. (5), (7), (8), and (10). These parameters are compiled here together with additional information concerning the interval boundaries and accuracy of fitting the approximation to the source data, the parameters are also on tape for immediate computer access. The meaning of the entries is described in Section VI. Some of the fitting parameters for incoherent scattering are given in Section III. The fitting parameters for the total pair-production cross section are given in the authors' previously cited work.²

1 HYDROGEN Z/A = 9.921F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.014	0.	0.	0.	0.	0.
2	K---.1	.014	.1	2.30F-03	-6.383F+01	-6.446F+00	1.317F+01	-5.045E-02
3	.1---.8	.1	.8	6.31F-03	3.051F+00	-7.818F+00	1.144F+01	6.959E-02
4	.8---4.	.8	4.	4.61E-03	7.636E-02	-9.406E-01	6.144E+00	1.425E+00
5	4.---20.	4.	20.	5.29F-03	1.180F-03	-8.236F-02	2.886F+00	5.534F+00
6	20.---100	20.	100.	4.56E-03	1.620E-05	-5.610F-03	1.214E+00	1.761E+01
7	100---500	100.	500.	2.17E-03	1.034E-06	-4.114F-04	6.287F-01	3.927E+01
8	500---INF	500.	INF	8.34F-03	4.200E-07	4.288E-04	2.492F-01	9.574E+01

2 HELIUM Z/A = 4.997F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.025	0.	0.	0.	0.	0.
2	K---.1	.025	.1	7.01F-02	-7.150E+02	2.769F+02	4.455F+01	-9.080F-01
3	.1---.8	.1	.8	7.45E-02	1.857F+01	-4.079F+01	8.609F+01	-2.618E+00
4	.8---4.	.8	4.	2.16F-02	1.606F+00	-1.726F+01	8.101F+01	-4.928E+00
5	4.---20.	4.	20.	1.17F-02	3.663E-03	-3.782F-01	2.288F+01	6.006E+01
6	20.---100	20.	100.	2.04F-02	1.080F-04	-3.106F-02	1.325F+01	1.421F+02
7	100---500	100.	500.	1.11F-02	2.060F-05	-1.074E-02	1.181F+01	1.704F+02
8	500---INF	500.	INF	2.61F-02	6.632F-06	9.453F-03	2.092F+00	1.728E+03

3 LITHIUM Z/A = 4.323F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.055	1.54F-02	-2.418E+02	3.530F+01	-2.699F-01	5.580E-04
2	K---.8	.055	.8	7.54F-02	-1.888E+01	1.898F+01	2.381F+02	-9.697F+00
3	.8---4.	.8	4.	9.27F-03	4.375F+00	-5.094F+01	3.053E+02	-3.064E+01
4	4.---20.	4.	20.	6.34F-03	4.040E-02	-2.930F+00	1.293F+02	1.828F+02
5	20.---100	20.	100.	8.88F-03	1.414E-03	-3.913F-01	7.450E+01	5.746F+02
6	100---500	100.	500.	1.26F-02	3.769E-05	5.136F-03	3.650F+01	1.787E+03
7	500---INF	500.	INF	2.82F-02	2.854F-05	4.028F-02	8.213E+00	8.286E+03

4 BERYLLIUM Z/A = 4.438F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.111	2.41F-01	-1.139F+02	9.342F+01	-1.314F+00	5.228E-03
2	K---.8	.111	.8	7.35F-02	-6.254F+01	1.968F+02	5.011F+02	-3.138E+01
3	.8---4.	.8	4.	6.44F-02	1.037F+01	-1.280F+02	8.807E+02	-1.646E+02
4	4.---20.	4.	20.	5.02F-03	1.018E-01	-8.264F+00	4.158F+02	4.366E+02
5	20.---100	20.	100.	6.61F-03	5.693E-03	-1.595F+00	2.644F+02	1.566E+03
6	100---500	100.	500.	1.58F-02	4.261F-05	9.215E-02	9.639F+01	7.141F+03
7	500---INF	500.	INF	2.35F-02	9.101F-05	1.272E-01	2.504F+01	2.800E+04

5 BORON Z/A = 4.625F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.188	2.10F-01	-3.387F+02	1.923E+02	-2.742F+00	1.204F-02
2	K---.8	.188	.8	3.88F-02	-9.943F+02	1.816E+03	3.939F+02	-1.755F+01
3	.8---4.	.8	4.	6.36F-03	3.689F+00	-8.834F+01	1.525F+03	-2.145F+02
4	4.---20.	4.	20.	1.84F-02	6.447F-01	-3.953F+01	1.281F+03	1.768E+02
5	20.---100	20.	100.	2.32E-02	1.852F-03	-1.356F+00	5.252E+02	5.160E+03
6	100---500	100.	500.	1.55F-02	4.460F-04	-6.960F-02	3.101F+02	1.521F+04
7	500---INF	500.	INF	2.82F-02	2.273F-04	3.032F-01	1.013F+02	5.374F+04

6 CARBON Z/A = 4.995F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.284	1.75E-01	-6.531E+02	3.748F+02	-5.790F+00	2.678E-02
2	K---.8	.284	.8	3.99F-02	-9.022F+02	1.760F+03	1.549F+03	-2.280E+02
3	.8---4.	.8	4.	4.00F-03	-7.363F+00	-1.537F+01	2.672F+03	-4.482E+02
4	4.---20.	4.	20.	2.37E-02	1.640F+00	-9.428E+01	2.872F+03	-5.583E+02
5	20.---100	20.	100.	2.41F-02	5.621F-04	-2.533F+00	1.169F+03	9.909F+03
6	100---500	100.	500.	2.29F-02	1.183F-03	-2.891F-01	7.016F+02	3.359E+04
7	500---INF	500.	INF	2.17E-02	4.997E-04	6.323F-01	2.925E+02	9.317E+04

7 NITROGEN Z/A = 4.998E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.4	1.64E-01	-8.291E+02	5.716E+02	-1.010E+01	5.031E-02
2	K---.8	.4	.8	2.87E-02	-2.338E+03	5.732E+03	-2.082E+02	1.482E+02
3	.8---4.	.8	4.	1.55E-02	-4.940E+00	-8.442E+01	4.620E+03	-1.186E+03
4	4.---20.	4.	20.	1.67E-02	2.019E+00	-1.249E+02	4.609E+03	-9.421E+02
5	20.---100	20.	100.	1.40E-02	1.709E-02	-8.196E+00	2.345E+03	1.369E+04
6	100---500	100.	500.	1.55E-02	1.719E-03	-1.291E-01	1.192E+03	6.363E+04
7	500---INF	500.	INF	1.74E-02	9.085E-04	1.142E+00	5.293E+02	1.787E+05

8 OXYGEN Z/A = 5.000F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.533	1.74E-01	-8.968E+02	8.086E+02	-1.742E+01	1.025E-01
2	K---4.	.533	4.	2.28E-02	-7.181E+01	4.748E+02	5.542E+03	-1.363E+03
3	4.---20.	4.	20.	1.13E-02	2.745E+00	-1.747E+02	7.159E+03	-2.213E+03
4	20.---100	20.	100.	1.00E-02	3.774E-02	-1.559E+01	4.045E+03	1.810E+04
5	100---500	100.	500.	1.52E-02	4.359E-03	-1.372E+00	2.202E+03	9.357E+04
6	500---INF	500.	INF	1.95E-02	1.521E-03	1.827E+00	1.132E+03	1.837E+05

9 FLUORINE Z/A = 4.737F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---K	.01	.687	2.21E-01	-6.041E+02	8.206E+02	-1.627E+01	8.640E-02
2	K---4.	.687	4.	1.49E-02	-8.907E+01	6.850E+02	7.217E+03	-2.022E+03
3	4.---20.	4.	20.	6.26E-03	2.813E+00	-2.020E+02	9.903E+03	-4.454E+03
4	20.---100	20.	100.	5.41E-03	6.097E-02	-2.435E+01	6.099E+03	2.258E+04
5	100---500	100.	500.	1.93E-02	5.064E-03	-8.464E-01	3.076E+03	1.458E+05
6	500---INF	500.	INF	1.33E-02	2.262E-03	2.631E+00	1.701E+03	3.144E+05

10 NEON Z/A = 4.955F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---L3	.01	.018	0.	0.	0.	0.	0.
2	L3---K	.018	.867	1.38E-01	-1.183E+03	1.545E+03	-5.393E+01	5.024E-01
3	K---4.	.867	4.	1.10E-02	-8.680E+01	7.434E+02	1.077E+04	-3.822E+03
4	4.---20.	4.	20.	4.54E-03	3.167E+00	-2.491E+02	1.439E+04	-3.187E+03
5	20.---100	20.	100.	4.63E-03	1.288E-01	-4.471E+01	9.862E+03	2.497E+04
6	100---500	100.	500.	3.26E-02	5.202E-03	7.337E-02	4.614E+03	2.256E+05
7	500---INF	500.	INF	2.65E-02	3.536E-03	4.790E+00	1.147E+03	9.882E+05

11 SODIUM Z/A = 4.785F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---L3	.01	.032	2.37E-02	1.910E+01	1.575E+00	-2.367E-02	8.190E-05
2	L3---K	.032	1.073	2.12E-01	-9.125E+02	1.627E+03	-6.064E+01	4.588E-01
3	K---20.	1.073	20.	1.41E-02	1.732E+00	-1.853E+02	1.712E+04	-8.415E+03
4	20.---100	20.	100.	8.12E-03	2.726E-01	-8.218E+01	1.475E+04	9.467E+03
5	100---500	100.	500.	3.42E-02	2.083E-03	4.548E+00	5.521E+03	3.358E+05
6	500---INF	500.	INF	2.80E-02	4.900E-03	6.789E+00	1.167E+03	1.600E+06

12 MAGNESIUM Z/A = 4.936F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---L3	.01	.05	1.18E-01	3.150E+02	-6.639E+00	3.825E-02	-2.656E-05
2	L3---K	.05	1.305	2.49E-01	-8.778E+02	1.897E+03	-2.962E+01	-2.277E+00
3	K---20.	1.305	20.	9.66E-03	-6.648E-01	-1.084E+02	2.219E+04	-1.241E+04
4	20.---100	20.	100.	1.06E-02	4.080E-01	-1.205E+02	2.139E+04	-1.143E+02
5	100---500	100.	500.	3.46E-02	8.338E-03	2.236E+00	8.819E+03	4.784E+05
6	500---INF	500.	INF	2.82E-02	7.016E-03	9.228E+00	2.818E+03	1.846E+06

13 ALUMINUM Z/A = 4.818F-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---L3	.01	.073	3.30E-01	4.303E+02	-8.931E+00	4.919E-02	6.325E-05
2	L3---K	.073	1.560	1.98E-01	-4.530E+02	1.420E+03	2.528E+02	-2.366E+01
3	K---20.	1.560	20.	1.04E-02	-3.674E+00	-1.622E+01	2.732E+04	-1.752E+04
4	20.---100	20.	100.	1.33E-02	4.158E-01	-1.351E+02	2.716E+04	3.723E+02
5	100---500	100.	500.	3.35E-02	1.125E-02	2.747E+00	1.174E+04	5.695E+05
6	500---INF	500.	INF	3.06E-02	9.245E-03	1.188E+01	4.104E+03	2.352E+06

14 SILICON	Z/A = 4.985E-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---L3	.01	.1	3.03E-01	8.816E+02	-2.314E+01	1.090E-01
2	L3---K	.1	1.839	1.21E-01	-3.946E+02	1.498E+03	4.883E+02
3	K---20.	1.839	20.	5.56E-03	-4.056E+00	-1.089E+01	3.544E+04
4	20.---100	20.	100.	1.12E-02	4.945E-01	-1.682E+02	3.627E+04
5	100---500	100.	500.	3.10E-02	2.716E-02	-5.428E+00	1.775E+04
6	500---INF	500.	INF	3.08E-02	1.261E-02	1.557E+01	7.662E+03

15 PHOSPHORUS	Z/A = 4.843F-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---L3	.01	.13	2.78E-01	9.405E+02	-9.183E+00	-7.379E-01
2	L3---K	.13	2.144	7.91E-02	-2.678E+02	1.287E+03	9.558E+02
3	K---20.	2.144	20.	7.56E-03	-6.098E+00	7.712E+01	4.196E+04
4	20.---100	20.	100.	1.13E-02	5.710E-01	-2.001E+02	4.505E+04
5	100---500	100.	500.	3.03E-02	3.613E-02	-8.426E+00	2.277E+04
6	500---INF	500.	INF	3.44E-02	1.582E-02	1.847E+01	1.110E+04

16 SULFUR	Z/A = 4.990E-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---L3	.01	.165	2.77E-01	1.850E+03	-7.648E+01	4.856E-01
2	L3---K	.165	2.472	7.71E-02	-3.580E+02	1.751E+03	1.186E+03
3	K---20.	2.472	20.	8.13E-03	-1.021E+01	2.346E+02	5.164E+04
4	20.---100	20.	100.	1.01E-02	7.467E-01	-2.534E+02	5.800E+04
5	100---500	100.	500.	3.10E-02	5.442E-02	-1.719E+01	3.154E+04
6	500---INF	500.	INF	3.46E-02	2.069E-02	2.375E+01	1.589E+04

17 CHLORINE	Z/A = 4.795E-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---L3	.01	.202	2.88E-01	1.558E+03	-1.641E+01	-1.325E+00
2	L3---K	.202	2.824	8.22E-02	-2.174E+02	1.397E+03	1.833E+03
3	K---20.	2.824	20.	7.49E-03	-1.192E+01	3.253E+02	5.927E+04
4	20.---100	20.	100.	1.14E-02	8.789E-01	-2.920E+02	6.860E+04
5	100---500	100.	500.	3.06E-02	6.556E-02	-2.175E+01	3.895E+04
6	500---INF	500.	INF	3.86E-02	2.483E-02	2.697E+01	2.078E+04

18 ARGON	Z/A = 4.506F-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---L3	.01	.245	3.79E-01	2.556E+03	-1.624E+02	3.134E+00
2	L3---K	.245	3.203	7.60E-02	-1.949E+02	1.368E+03	2.385E+03
3	K---20.	3.203	20.	5.31E-03	-1.446E+01	4.359E+02	6.578E+04
4	20.---100	20.	100.	8.53E-03	8.786E-01	-3.001E+02	7.682E+04
5	100---500	100.	500.	3.24E-03	8.835E-02	-3.637E+01	4.777E+04
6	500---INF	500.	INF	3.65E-02	2.874E-02	3.165E+01	2.446E+04

19 POTASSIUM	Z/A = 4.859F-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---M3	.01	.018	1.06E-02	5.292E+00	3.717E-01	-4.740E-03
2	M3---L3	.018	.294	2.58E-01	-1.733E+02	5.359E+02	-3.738E+01
3	L3---K	.294	3.607	8.23E-02	-1.595E+02	1.345E+03	3.549E+03
4	K---20.	3.607	20.	4.18E-03	-2.113E+01	7.161E+02	8.183E+04
5	20.---100	20.	100.	8.71E-03	1.048E+00	-3.644E+02	9.844E+04
6	100---500	100.	500.	2.87E-02	1.040E-01	-3.553E+01	6.096E+04
7	500---INF	500.	INF	3.76E-02	3.773E-02	4.007E+01	3.507E+04

20 CALCIUM	Z/A = 4.990E-01						
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)
1	.01---M3	.01	.025	2.49E-03	1.442E+02	-3.204E+00	2.579E-02
2	M3---L3	.025	.346	1.38E-01	1.440E+01	6.073E+02	-4.745E+01
3	L3---K	.346	4.037	6.28E-02	7.171E+01	6.790E+01	6.646E+03
4	K---20.	4.037	20.	4.12E-03	-3.015E+01	1.141E+03	9.459E+04
5	20.---100	20.	100.	8.41E-03	1.408E+00	-4.553E+02	1.206E+05
6	100---500	100.	500.	2.84E-02	1.154E-01	-3.465E+01	7.523E+04
7	500---INF	500.	INF	3.29E-02	4.664E-02	5.252E+01	3.960E+04

21 SCANDIUM Z/A = 4.671E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	M3	.01	.032	3.24E-02	1.088E+03	5.062E+00	-2.564E-01	1.298E-03
2	M3---	L3	.032	.401	1.12E-01	1.897E+02	4.984E+02	-3.352E+01	6.726E-01
3	L3---	K	.401	4.491	5.39E-02	-1.507E+02	1.501E+03	5.139E+03	-1.442E+03
4	K---	100	4.491	100.	8.27E-03	4.615E-01	-2.614E+02	1.217E+05	-2.057E+05
5	100---	500	100.	500.	6.22E-03	1.509E-01	-6.913E+01	9.253E+04	1.096E+06
6	500---	INF	500.	INF	2.91E-02	5.204E-02	6.443E+01	3.314E+04	9.765E+06

22 TITANIUM Z/A = 4.593E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	L3	.01	.456	2.89E-01	1.581E+03	2.413E+01	-7.791E-01	4.080E-03
2	L3---	K	.456	4.966	2.39E-02	-4.626E+01	8.678E+02	7.308E+03	-2.383E+03
3	K---	100	4.966	100.	8.27E-03	2.074E-01	-2.292E+02	1.371E+05	-2.489E+05
4	100---	500	100.	500.	1.20E-02	1.972E-01	-9.550E+01	1.106E+05	1.067E+06
5	500---	INF	500.	INF	2.73E-02	6.044E-02	7.449E+01	4.320E+04	9.379E+06

23 VANADIUM Z/A = 4.515E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	L3	.01	.513	3.19E-01	1.887E+03	1.983E+01	-7.427E-01	3.731E-03
2	L3---	K	.513	5.465	1.87E-02	-7.196E+01	1.132E+03	8.004E+03	-2.803E+03
3	K---	100	5.465	100.	8.23E-03	3.940E-01	-2.733E+02	1.564E+05	-3.184E+05
4	100---	500	100.	500.	7.17E-03	2.007E-01	-8.911E+01	1.254E+05	1.137E+06
5	500---	INF	500.	INF	1.32E-02	6.962E-02	7.762E+01	5.692E+04	1.006E+07

24 CHROMIUM Z/A = 4.616E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	L3	.01	.575	3.21E-01	1.755E+03	9.204E+01	-1.973E+00	9.457E-03
2	L3---	K	.575	5.989	4.85E-02	3.932E+01	1.537E+02	1.228E+04	-4.984E+03
3	K---	100	5.989	100.	8.38E-03	2.740E-01	-2.665E+02	1.818E+05	-3.997E+05
4	100---	500	100.	500.	9.86E-03	2.727E-01	-1.288E+02	1.543E+05	9.755E+05
5	500---	INF	500.	INF	1.65E-02	8.278E-02	9.017E+01	7.781E+04	8.227E+06

25 MANGANESE Z/A = 4.551E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	.1	.01	.1	1.53E-01	5.885E+03	-1.396E+02	1.353E+00	-4.829E-03
2	.1---	L3	.1	.640	1.53E-01	-5.021E+02	1.265E+03	-8.805E+01	1.272E+00
3	L3---	K	.640	6.539	4.50E-02	5.200E+01	1.957E+01	1.447E+04	-6.930E+03
4	K---	100	6.539	100.	7.14E-03	2.930E-01	-2.703E+02	2.034E+05	-4.886E+05
5	100---	500	100.	500.	9.25E-03	2.940E-01	-1.342E+02	1.761E+05	8.747E+05
6	500---	INF	500.	INF	1.05E-02	9.427E-02	1.057E+02	8.606E+04	1.091E+07

26 IRON Z/A = 4.656E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	.1	.01	.1	1.97E-01	5.852E+03	-1.336E+02	1.336E+00	-4.843E-03
2	.1---	L3	.1	.708	1.97E-01	-1.412E+02	1.086E+03	-6.278E+01	2.043E-01
3	L3---	K	.708	7.112	2.02E-02	-8.128E+00	6.550E+02	1.511E+04	-7.079E+03
4	K---	100	7.112	100.	5.43E-03	2.151E-01	-2.680E+02	2.341E+05	-6.063E+05
5	100---	500	100.	500.	7.01E-03	3.511E-01	-1.633E+02	2.090E+05	7.131E+05
6	500---	INF	500.	INF	9.85E-03	1.107E-01	1.252E+02	1.008E+05	1.273E+07

27 COBALT Z/A = 4.581E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	.1	.01	.1	2.93E-01	5.153E+03	-3.891E+01	-4.490E-01	4.045E-03
2	.1---	L3	.1	.779	2.32E-01	-1.957E+02	1.422E+03	-1.321E+02	3.914E+00
3	L3---	K	.779	7.709	3.01E-02	2.092E+01	3.311E+02	1.820E+04	-9.303E+03
4	K---	100	7.709	100.	6.88E-03	4.947E-02	-2.478E+02	2.586E+05	-7.185E+05
5	100---	500	100.	500.	6.32E-03	3.588E-01	-1.492E+02	2.296E+05	8.856E+05
6	500---	INF	500.	INF	8.39E-03	1.244E-01	1.427E+02	1.134E+05	1.528E+07

28 NICKEL Z/A = 4.769E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	.1	.01	.1	2.15E-01	6.887E+03	-1.547E+02	1.332E+00	-4.244E-03
2	.1---	L3	.1	.854	2.15E-01	9.185E+01	1.073E+03	-4.045E+01	-1.313E+00
3	L3---	L2	.854	.871	0.	0.	6.600E+03	0.	0.
4	L2---	L1	.871	1.008	0.	0.	9.810E+03	0.	0.
5	L1---	K	1.008	8.332	9.61E-03	-1.175E+02	2.171E+03	1.514E+04	-6.042E+03
6	K---	100	8.332	100.	5.42E-03	1.685E-02	-2.522E+02	3.005E+05	-9.000E+05
7	100---	500	100.	500.	5.48E-03	4.681E-01	-2.085E+02	2.782E+05	4.399E+05
8	500---	INF	500.	INF	1.37E-02	1.470E-01	1.687E+02	1.419E+05	1.446E+07

29 COPPER Z/A = 4.564E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	.1	.01	.1	2.53E-01	3.293E+03	-2.208E+01	-3.511E-01	2.914E-03
2	.1---	L3	.1	.933	2.53E-01	-3.217E+02	1.834E+03	-2.631E+02	1.133E+01
3	L3---	L1	.933	1.096	7.38E-07	-5.089E+02	4.139E+03	7.468E+03	-6.981E+02
4	L1---	K	1.096	8.981	1.05E-02	-9.173E+01	1.862E+03	1.777E+04	-8.202E+03
5	K---	100	8.981	100.	5.64E-03	7.440E-03	-2.371E+02	3.202E+05	-1.028E+06
6	100---	500	100.	500.	7.01E-03	4.729E-01	-2.055E+02	3.000E+05	2.182E+05
7	500---	INF	500.	INF	2.29E-02	1.589E-01	1.848E+02	1.452E+05	1.929E+07

30 ZINC Z/A = 4.589E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	.1	.01	.1	1.37E-01	7.941E+03	-2.347E+02	2.501E+00	-8.979E-03
2	.1---	L3	.1	1.020	1.37E-01	-1.534E+02	1.829E+03	-1.674E+02	4.439E+00
3	L3---	L2	1.020	1.043	5.42E-07	-2.807E+04	1.091E+05	-1.511E+05	7.897E+04
4	L2---	L1	1.043	1.193	4.54E-03	-3.057E+03	1.385E+04	3.780E+02	-2.163E+02
5	L1---	K	1.193	9.659	1.19E-02	-8.018E+01	1.794E+03	2.095E+04	-1.070E+04
6	K---	100	9.659	100.	3.68E-03	-1.158E+00	-3.871E+01	3.499E+05	-1.154E+06
7	100---	500	100.	500.	9.77E-03	4.820E-01	-1.832E+02	3.296E+05	6.802E+05
8	500---	INF	500.	INF	2.06E-02	1.796E-01	2.204E+02	1.529E+05	2.596E+07

31 GALLIUM Z/A = 4.446E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	M5	.01	.017	0.	0.	0.	0.	3.400E-04
2	M5---	.1	.017	.1	1.51E-01	1.091E+04	-5.719E+02	1.060E+01	-6.716E-02
3	.1---	L3	.1	1.115	1.51E-01	-6.776E+02	2.582E+03	-2.726E+02	8.301E+00
4	L3---	L2	1.115	1.142	3.64E-07	-1.457E+04	6.363E+04	-1.011E+05	6.416E+04
5	L2---	L1	1.142	1.3	6.28E-03	3.470E+03	-8.674E+03	2.548E+04	-8.411E+03
6	L1---	K	1.3	10.367	1.29E-02	-9.431E+01	2.078E+03	2.172E+04	-1.101E+04
7	K---	100	10.367	100.	6.84E-03	-1.253E+00	-2.897E+01	3.783E+05	-1.357E+06
8	100---	500	100.	500.	9.28E-03	5.591E-01	-2.217E+02	3.625E+05	3.392E+05
9	500---	INF	500.	INF	1.79E-02	1.949E-01	2.371E+02	1.767E+05	2.400E+07

32 GERMANIUM Z/A = 4.408E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	M5	.01	.028	0.	0.	0.	0.	1.800E-03
2	M5---	.1	.028	.1	2.09E-01	1.942E+04	-1.740E+03	5.357E+01	-5.554E-01
3	.1---	L3	.1	1.217	1.41E-01	-9.082E+02	3.097E+03	-3.039E+02	7.152E+00
4	L3---	L2	1.217	1.248	2.16E-07	-7.402E+03	3.636E+04	-6.670E+04	5.346E+04
5	L2---	L1	1.248	1.413	2.07E-06	-3.400E+02	3.232E+03	1.163E+04	-1.089E+03
6	L1---	K	1.413	11.104	1.14E-02	-5.940E+01	1.646E+03	2.621E+04	-1.507E+04
7	K---	100	11.104	100.	5.68E-03	-2.025E+00	1.283E+02	4.069E+05	-1.510E+06
8	100---	500	100.	500.	9.10E-03	6.478E-01	-2.603E+02	4.045E+05	-5.153E+04
9	500---	INF	500.	INF	1.92E-02	2.155E-01	2.609E+02	2.074E+05	2.220E+07

33 ARSENIC Z/A = 4.405E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.041	6.36E-02	1.642E+02	-2.624E+01	1.048E+00	-5.116E-03
2	M5---.1	.041	.1	2.50E-01	1.858E+04	-2.363E+03	1.082E+02	-1.737E+00
3	.1---L3	.1	1.323	2.50E-01	-8.391E+02	3.143E+03	-4.102E+02	1.448E+01
4	L3---L2	1.323	1.359	1.68E-07	-4.525E+03	2.468E+04	-5.133E+04	5.102E+04
5	L2---L1	1.359	1.530	1.36E-06	-3.858E+02	1.013E+04	3.603E+03	-7.657E+02
6	L1---K	1.530	11.867	1.21E-02	-5.339E+01	1.649E+03	2.950E+04	-1.800E+04
7	K---100	11.867	100.	6.41E-03	-1.655E+00	8.588E+01	4.504E+05	-1.795E+06
8	100---500	100.	500.	6.71E-03	7.880E-01	-3.490E+02	4.641E+05	-1.258E+06
9	500---INF	500.	INF	1.79E-02	2.393E-01	2.906E+02	2.360E+05	2.145E+07

34 SELENIUM Z/A = 4.306E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.055	1.05E-01	3.589E+02	-4.858E+01	1.838E+00	-8.229E-03
2	M5---.1	.055	.1	9.57E-02	4.647E+04	-7.676E+03	4.318E+02	-8.207E+00
3	.1---L3	.1	1.434	1.27E-01	-9.469E+02	3.639E+03	-4.086E+02	1.010E+01
4	L3---L2	1.434	1.475	2.69E-08	-6.637E+02	4.194E+03	-1.104E+04	2.806E+04
5	L2---L1	1.475	1.652	1.41E-06	-4.265E+02	9.660E+03	5.343E+03	-1.174E+03
6	L1---K	1.652	12.658	1.05E-02	-3.968E+01	1.459E+03	3.327E+04	-2.228E+04
7	K---100	12.658	100.	7.92E-03	-3.461E+00	4.401E+02	4.690E+05	-1.943E+06
8	100---500	100.	500.	1.01E-02	8.564E-01	-3.723E+02	5.020E+05	-1.430E+06
9	500---INF	500.	INF	1.85E-02	2.590E-01	3.237E+02	2.541E+05	2.321E+07

35 BROMINE Z/A = 4.380E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.071	9.56E-02	7.741E+02	-7.717E+01	2.608E+00	-1.018E-02
2	M5---.8	.071	.8	2.18E-01	3.275E+02	2.964E+03	-4.214E+02	1.494E+01
3	.8---L3	.8	1.551	2.18E-01	4.049E+03	-1.310E+04	1.813E+04	-6.454E+03
4	L3---L2	1.551	1.597	6.28E-09	1.461E+02	-1.050E+03	3.457E+03	2.000E+04
5	L2---L1	1.597	1.782	1.29E-06	-4.318E+02	1.007E+04	6.548E+03	-1.535E+03
6	L1---K	1.782	13.474	1.23E-02	-4.033E+01	1.607E+03	3.681E+04	-2.478E+04
7	K---100	13.474	100.	5.90E-03	-3.955E+00	5.482E+02	5.202E+05	-2.262E+06
8	100---500	100.	500.	9.23E-03	9.718E-01	-4.209E+02	5.662E+05	-2.099E+06
9	500---INF	500.	INF	1.54E-02	2.907E-01	3.653E+02	2.908E+05	2.417E+07

36 KRYPTON Z/A = 4.296E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.090	1.61E-01	5.868E+01	5.694E+01	-3.164E+00	5.185E-02
2	M5---.8	.090	.8	1.69E-01	-1.048E+03	4.558E+03	-7.909E+02	3.526E+01
3	.8---L3	.8	1.675	3.39E-02	-1.462E+03	6.037E+03	-2.364E+03	5.585E+02
4	L3---L2	1.675	1.727	1.76E-08	3.611E+02	-2.974E+03	1.308E+04	1.268E+04
5	L2---L1	1.727	1.921	1.17E-06	-4.163E+02	1.017E+04	7.535E+03	-1.891E+03
6	L1---K	1.921	14.323	7.45E-03	-9.924E-01	8.455E+02	4.446E+04	-3.490E+04
7	K---100	14.323	100.	5.19E-03	-3.076E+00	4.257E+02	5.613E+05	-2.587E+06
8	100---500	100.	500.	6.81E-03	1.050E+00	-4.435E+02	6.114E+05	-3.028E+06
9	500---INF	500.	INF	1.86E-02	3.136E-01	3.952E+02	3.252E+05	2.248E+07

37 RUBIDIUM Z/A = 4.329E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N1	.01	.031	2.60E-02	8.623E-01	7.942E-02	-1.525E-03	6.932E-06
2	N1---M5	.031	.110	4.35E-02	1.558E+02	9.161E+00	-1.414E+00	7.049E-02
3	M5---L3	.110	1.805	1.71E-01	-1.446E+03	5.719E+03	-1.213E+03	6.655E+01
4	L3---L2	1.805	1.863	1.97E-08	3.524E+02	-3.194E+03	1.657E+04	1.224E+04
5	L2---L1	1.863	2.065	1.02E-06	-4.025E+02	1.067E+04	8.396E+03	-2.275E+03
6	L1---K	2.065	15.200	6.84E-03	5.234E+00	7.494E+02	5.033E+04	-4.276E+04
7	K---100	15.200	100.	6.26E-03	-2.207E+00	2.653E+02	6.269E+05	-3.163E+06
8	100---500	100.	500.	5.56E-03	1.101E+00	-4.280E+02	6.664E+05	-3.481E+06
9	500---INF	500.	INF	1.57E-02	3.467E-01	4.515E+02	3.525E+05	2.783E+07

38 STRONTIUM Z/A = 4.337E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N3	.01	.020	1.62E-01	4.666E+01	-1.282E+00	1.181E-02	-3.649E-05
2	N3---M5	.020	.133	2.05E-01	7.687E+02	-6.434E+01	1.634E+00	3.457E-02
3	M5---.8	.133	.8	1.22E-01	-2.899E+03	8.153E+03	-1.741E+03	9.548E+01
4	.8---L3	.8	1.94	4.23E-02	1.053E+03	-2.725E+03	8.076E+03	-2.820E+03
5	L3---L2	1.94	2.007	1.94E-08	2.746E+02	-2.830E+03	2.149E+04	7.655E+03
6	L2---L1	2.007	2.216	9.82E-07	-4.181E+02	1.025E+04	1.159E+04	-3.199E+03
7	L1---K	2.216	16.105	6.87E-03	-4.367E+01	1.966E+03	4.835E+04	-3.788E+04
8	K---100	16.105	100.	4.58E-03	-5.177E-01	-2.546E+01	6.941E+05	-3.733E+06
9	100---500	100.	500.	2.62E-03	1.296E+00	-5.192E+02	7.384E+05	-5.043E+06
10	500---INF	500.	INF	1.82E-02	3.800E-01	4.950E+02	4.111E+05	1.955E+07

39 YTTRIUM Z/A = 4.387E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N3	.01	.025	1.14E-02	1.646E+03	-1.524E+01	-3.033E-02	4.574E-04
2	N3---M5	.025	.156	3.49E-01	4.222E+01	7.685E+01	-4.225E+00	8.261E-02
3	M5---.8	.156	.8	2.61E-01	-2.128E+03	8.026E+03	-2.124E+03	1.548E+02
4	.8---L3	.8	2.079	1.23E-02	3.585E+02	-4.223E+02	6.620E+03	-2.706E+03
5	L3---L2	2.079	2.155	6.45E-09	-8.813E+01	1.184E+03	2.198E+04	-1.440E+03
6	L2---L1	2.155	2.373	9.05E-07	-4.141E+02	1.043E+04	1.385E+04	-4.020E+03
7	L1---K	2.373	17.038	6.94E-03	-1.282E+01	1.204E+03	6.028E+04	-5.752E+04
8	K---100	17.038	100.	6.20E-03	4.265E-01	-1.646E+02	7.684E+05	-4.421E+06
9	100---500	100.	500.	5.76E-03	1.334E+00	-4.917E+02	8.066E+05	-5.879E+06
10	500---INF	500.	INF	2.15E-02	4.194E-01	5.651E+02	4.353E+05	2.981E+07

40 ZIRCONIUM Z/A = 4.385E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.180	3.11E-01	1.910E+02	3.638E+01	-4.958E-01	1.598E-03
2	M5---.8	.180	.8	2.33E-01	-8.578E+03	1.742E+04	-5.382E+03	4.570E+02
3	.8---L3	.8	2.223	2.33E-01	-3.681E+02	3.235E+03	1.544E+03	-2.121E+02
4	L3---L2	2.223	2.307	1.69E-08	-2.164E+02	3.512E+03	2.053E+04	-3.382E+03
5	L2---L1	2.307	2.533	8.06E-07	-3.996E+02	1.064E+04	1.548E+04	-4.776E+03
6	L1---K	2.533	17.998	3.46E-03	-3.011E+01	1.794E+03	6.153E+04	-5.699E+04
7	K---100	17.998	100.	4.60E-03	-5.900E-01	1.945E+02	8.031E+05	-4.579E+06
8	100---500	100.	500.	4.42E-03	1.474E+00	-5.530E+02	8.907E+05	-7.927E+06
9	500---INF	500.	INF	2.03E-02	4.562E-01	6.248E+02	4.760E+05	3.216E+07

41 NIOBIUM Z/A = 4.413E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.204	4.04E-01	5.478E+02	-1.855E+01	1.190E+00	-1.007E-02
2	M5---.8	.204	.8	1.31E-01	-7.034E+03	1.685E+04	-5.527E+03	5.032E+02
3	.8---L3	.8	2.370	4.77E-02	7.252E+02	-1.862E+03	9.507E+03	-3.524E+03
4	L3---L2	2.370	2.464	2.58E-08	-2.981E+02	6.188E+03	1.735E+04	-4.420E+03
5	L2---L1	2.464	2.698	7.21E-07	-3.923E+02	1.102E+04	1.751E+04	-5.733E+03
6	L1---K	2.698	18.986	1.04E-02	-1.658E+01	1.435E+03	7.050E+04	-7.037E+04
7	K---100	18.986	100.	3.75E-03	-2.292E+00	5.516E+02	8.555E+05	-5.018E+06
8	100---500	100.	500.	4.59E-03	1.599E+00	-5.764E+02	9.643E+05	-8.517E+06
9	500---INF	500.	INF	2.19E-01	4.986E-01	7.224E+02	4.910E+05	4.104E+07

42 MOLYBDENUM Z/A = 4.378E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.228	4.03E-01	5.429E+02	2.506E+00	5.446E-01	-5.466E-03
2	M5---.8	.228	.8	1.59E-01	-6.303E+03	1.614E+04	-5.496E+03	5.143E+02
3	.8---L3	.8	2.521	2.97E-02	-1.114E+02	1.895E+03	5.405E+03	-2.261E+03
4	L3---L2	2.521	2.625	2.99E-08	-3.027E+02	7.576E+03	1.570E+04	-4.795E+03
5	L2---L1	2.625	2.867	6.53E-07	-3.784E+02	1.099E+04	1.983E+04	-6.801E+03
6	L1---K	2.867	20.00	6.19E-03	-1.840E+01	1.552E+03	7.635E+04	-8.181E+04
7	K---100	20.00	100.	3.57E-03	-2.560E+00	7.317E+02	9.005E+05	-5.349E+06
8	100---500	100.	500.	3.12E-03	1.540E+00	-4.834E+02	1.021E+06	-9.300E+06
9	500---INF	500.	INF	2.31E-02	5.359E-01	7.662E+02	5.243E+05	5.200E+07

43 TECHNETIUM Z/A = 4.343E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.253	3.21E-01	2.495E+02	6.721E+01	-5.844E-01	-2.482E-04
2	M5---.8	.253	.8	9.18E-02	-6.741E+03	1.690E+04	-5.576E+03	5.102E+02
3	.8---L3	.8	2.677	3.49E-02	-3.012E+02	3.094E+03	4.154E+03	-1.733E+03
4	L3---L2	2.677	2.793	3.67E-08	-2.871E+02	7.198E+03	1.867E+04	-5.767E+03
5	L2---L1	2.793	3.043	1.32E-07	-1.101E+02	1.635E+04	3.183E+03	-1.491E+03
6	L1---K	3.043	21.044	4.07E-03	-2.936E+01	1.924E+03	7.955E+04	-8.669E+04
7	K---100	21.044	100.	5.80E-03	5.721E-01	7.164E+01	1.004E+06	-6.678E+06
8	100---500	100.	500.	4.47E-03	1.769E+00	-5.691E+02	1.097E+06	-1.069E+07
9	500---INF	500.	INF	2.44E-02	5.748E-01	8.119E+02	6.113E+05	3.605E+07

44 RUTHENIUM Z/A = 4.353E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.280	4.13E-01	7.391E+02	3.482E+01	4.295E-01	-6.811E-03
2	M5---.8	.280	.8	1.33E-01	-8.171E+03	2.199E+04	-8.951E+03	1.037E+03
3	.8---L3	.8	2.838	2.96E-02	3.087E+02	-1.095E+02	1.012E+04	-4.421E+03
4	L3---L2	2.838	2.967	4.39E-08	-2.831E+02	7.880E+03	1.913E+04	-6.518E+03
5	L2---L1	2.967	3.224	5.29E-07	-3.547E+02	1.093E+04	2.575E+04	-9.586E+03
6	L1---K	3.224	22.117	5.05E-03	-1.311E+01	1.428E+03	9.237E+04	-1.148E+05
7	K---100	22.117	100.	6.17E-03	1.007E-02	1.277E+02	1.086E+06	-7.755E+06
8	100---500	100.	500.	1.20E-02	1.633E+00	-4.030E+02	1.144E+06	-9.817E+06
9	500---INF	500.	INF	2.48E-02	6.218E-01	9.117E+02	5.873E+05	6.614E+07

45 RHODIUM Z/A = 4.373E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.307	4.61E-01	8.935E+02	2.878E+00	1.008E+00	-9.542E-03
2	M5---.8	.307	.8	1.84E-01	-8.948E+03	2.146E+04	-7.129E+03	4.790E+02
3	.8---L3	.8	3.004	6.03E-02	-5.992E+02	4.521E+03	3.942E+03	-1.812E+03
4	L3---L2	3.004	3.146	5.16E-08	-2.665E+02	7.197E+03	2.390E+04	-7.946E+03
5	L2---L1	3.146	3.412	4.90E-07	-3.285E+02	9.342E+03	3.454E+04	-1.203E+04
6	L1---K	3.412	23.220	4.25E-03	-2.532E+01	2.009E+03	9.447E+04	-1.115E+05
7	K---100	23.220	100.	2.93E-03	-3.043E+00	9.079E+02	1.126E+06	-8.086E+06
8	100---500	100.	500.	3.78E-03	1.870E+00	-4.570E+02	1.251E+06	-1.191E+07
9	500---INF	500.	INF	2.36E-02	6.726E-01	9.644E+02	7.281E+05	4.409E+07

46 PALLADIUM Z/A = 4.323E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.335	4.20E-01	2.673E+02	8.162E+01	-1.115E+00	3.804E-03
2	M5---.8	.335	.8	1.70E-01	-1.793E+04	4.014E+04	-1.899E+04	2.659E+03
3	.8---L3	.8	3.174	8.73E-02	-8.864E+02	6.126E+03	2.706E+03	-1.656E+03
4	L3---L2	3.174	3.330	6.45E-08	-2.530E+02	7.129E+03	2.620E+04	-9.068E+03
5	L2---L1	3.330	3.605	4.30E-07	-3.225E+02	1.001E+04	3.550E+04	-1.354E+04
6	L1---K	3.605	24.350	8.40E-03	1.642E+01	4.603E+02	1.181E+05	-1.737E+05
7	K---100	24.350	100.	3.91E-03	-2.888E+00	8.714E+02	1.203E+06	-9.306E+06
8	100---500	100.	500.	2.58E-03	1.857E+00	-3.662E+02	1.308E+06	-1.219E+07
9	500---INF	500.	INF	2.24E-02	7.151E-01	1.066E+03	7.318E+05	6.061E+07

47 SILVER Z/A = 4.357E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.367	4.53E-01	1.221E+03	7.507E+01	-1.363E+00	5.328E-03
2	M5---.8	.367	.8	1.05E-01	-4.940E+03	1.907E+04	-7.444E+03	5.703E+02
3	.8---L3	.8	3.351	4.34E-02	1.918E+02	5.874E+02	1.228E+04	-6.006E+03
4	L3---L2	3.351	3.524	7.29E-08	-2.547E+02	7.851E+03	2.733E+04	-1.038E+04
5	L2---L1	3.524	3.806	3.98E-07	-3.170E+02	1.045E+04	3.850E+04	-1.560E+04
6	L1---K	3.806	25.514	4.08E-03	-1.817E+00	1.265E+03	1.192E+05	-1.684E+05
7	K---100	25.514	100.	3.33E-03	-4.061E+00	1.339E+03	1.260E+06	-9.752E+06
8	100---500	100.	500.	2.72E-03	2.065E+00	-4.444E+02	1.433E+06	-1.533E+07
9	500---INF	500.	INF	2.28E-02	7.734E-01	1.157E+03	8.006E+05	6.214E+07

48 CADMIUM Z/A = 4.270E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---M5	.01	.404	4.45E-01	5.246E+02	1.111E+02	-1.429E+00	3.266E-03
2	M5---L3	.404	3.537	1.06E-01	-2.053E+03	1.198E+04	-2.209E+03	-5.686E+02
3	L3---L2	3.537	3.727	8.50E-08	-2.454E+02	8.162E+03	2.822E+04	-1.156E+04
4	L2---L1	3.727	4.018	3.44E-07	-2.677E+02	8.244E+03	4.935E+04	-1.791E+04
5	L1---K	4.018	26.711	3.36E-03	-2.306E+01	2.129E+03	1.161E+05	-1.547E+05
6	K---100	26.711	100.	2.62E-03	-8.206E+00	2.269E+03	1.268E+06	-9.746E+06
7	100---500	100.	500.	9.70E-03	2.254E+00	-4.904E+02	1.506E+06	-1.642E+07
8	500---INF	500.	INF	2.44E-02	8.123E-01	1.229E+03	8.686E+05	5.293E+07

49 INDIUM Z/A = 4.268E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.016	0.	0.	0.	1.850E-02	0.
2	N5---M5	.016	.443	4.94E-01	1.917E+03	1.793E+00	-4.297E-02	-5.864E-03
3	M5---L3	.443	3.730	9.49E-02	-5.531E+02	5.425E+03	5.739E+03	-2.683E+03
4	L3---L2	3.730	3.938	9.80E-08	-2.324E+02	7.725E+03	3.333E+04	-1.361E+04
5	L2---L1	3.938	4.238	3.17E-07	-2.675E+02	8.828E+03	5.249E+04	-2.065E+04
6	L1---K	4.238	27.940	2.91E-03	-2.149E+01	2.143E+03	1.256E+05	-1.775E+05
7	K---100	27.940	100.	4.13E-03	-2.097E+00	1.045E+03	1.428E+06	-1.216E+07
8	100---500	100.	500.	5.53E-03	2.233E+00	-3.526E+02	1.578E+06	-1.747E+07
9	500---INF	500.	INF	2.37E-02	8.685E-01	1.331E+03	9.171E+05	6.234E+07

50 TIN Z/A = 4.213E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.024	0.	0.	0.	7.300E-02	0.
2	N5---M5	.024	.485	3.57E-01	1.755E+03	-3.700E+01	6.164E+00	-1.436E-01
3	M5---M3	.485	.714	1.41E-02	3.184E+04	-5.161E+04	3.430E+04	-6.716E+03
4	M3---L3	.714	3.929	8.67E-02	-8.411E+02	7.174E+03	3.429E+03	-1.945E+03
5	L3---L2	3.929	4.156	1.09E-07	-2.078E+02	6.795E+03	3.953E+04	-1.546E+04
6	L2---L1	4.156	4.465	2.98E-07	-2.735E+02	1.006E+04	5.154E+04	-2.316E+04
7	L1---K	4.465	29.200	1.07E-02	1.409E+01	5.245E+02	1.554E+05	-2.738E+05
8	K---100	29.200	100.	2.98E-03	-6.053E+00	2.152E+03	1.430E+06	-1.218E+07
9	100---500	100.	500.	2.18E-03	2.434E+00	-4.441E+02	1.694E+06	-2.116E+07
10	500---INF	500.	INF	2.04E-02	9.156E-01	1.438E+03	9.506E+05	6.990E+07

51 ANTIMONY Z/A = 4.189E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.031	2.25E-02	6.617E+02	-3.674E+01	7.073E-01	-2.415E-03
2	N5---M5	.031	.528	4.40E-01	2.657E+03	-4.585E+02	4.392E+01	-9.883E-01
3	M5---M3	.528	.766	5.37E-03	1.852E+04	-3.091E+04	2.529E+04	-5.381E+03
4	M3---L3	.766	4.132	6.17E-02	-7.504E+02	7.011E+03	4.377E+03	-1.656E+03
5	L3---L2	4.132	4.381	1.32E-07	-2.154E+02	7.884E+03	3.884E+04	-1.742E+04
6	L2---L1	4.381	4.698	2.54E-07	-2.413E+02	8.640E+03	6.267E+04	-2.629E+04
7	L1---K	4.698	30.491	2.75E-03	-2.300E+01	2.351E+03	1.410E+05	-2.130E+05
8	K---100	30.491	100.	6.70E-04	-9.816E+00	3.157E+03	1.443E+06	-1.193E+07
9	100---500	100.	500.	8.70E-03	2.470E+00	-3.671E+02	1.779E+06	-2.260E+07
10	500---INF	500.	INF	2.26E-02	9.713E-01	1.520E+03	1.016E+06	7.466E+07

52 TELLURIUM Z/A = 4.075E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.04	0.	0.	0.	2.300E-01	0.
2	N5---M5	.04	.572	5.24E-01	1.891E+03	-3.992E+02	5.548E+01	-1.669E+00
3	M5---M1	.572	1.006	1.19E-01	4.769E+04	-9.744E+04	7.551E+04	-1.741E+04
4	M1---L3	1.006	4.341	4.71E-02	-4.397E+01	2.059E+03	1.571E+04	-9.021E+03
5	L3---L2	4.341	4.612	1.48E-07	-1.946E+02	7.129E+03	4.399E+04	-1.939E+04
6	L2---L1	4.612	4.939	2.41E-07	-2.372E+02	9.166E+03	6.308E+04	-2.911E+04
7	L1---K	4.939	31.814	9.79E-03	1.086E+00	1.149E+03	1.640E+05	-2.950E+05
8	K---100	31.814	100.	2.15E-03	-3.401E+00	1.832E+03	1.571E+06	-1.426E+07
9	100---500	100.	500.	5.06E-03	2.389E+00	-1.733E+02	1.798E+06	-2.273E+07
10	500---INF	500.	INF	2.21E-02	1.007E+00	1.586E+03	1.076E+06	7.154E+07

53 IODINE Z/A = 4.176E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.050	5.06E-02	4.617E+02	-1.755E+01	2.146E-01	5.709E-03
2	N5---	M5	.050	.619	3.60E-01	2.438E+03	-6.588E+02	1.076E+02	-3.949E+00
3	M5---	M1	.619	1.072	1.15E-01	-1.216E+03	2.425E+04	-2.237E+04	8.492E+03
4	M1---	L3	1.072	4.557	5.37E-02	-6.432E+02	7.074E+03	5.262E+03	-2.211E+03
5	L3---	L2	4.557	4.852	1.64E-07	-1.833E+02	6.763E+03	5.201E+04	-2.240E+04
6	L2---	L1	4.852	5.188	2.07E-07	-2.150E+02	8.275E+03	7.525E+04	-3.297E+04
7	L1---	K	5.188	33.170	3.46E-03	-2.566E+01	2.615E+03	1.595E+05	-2.557E+05
8	K---	100	33.170	100.	2.90E-03	-3.670E+00	1.872E+03	1.719E+06	-1.646E+07
9	100---	500	100.	500.	4.71E-03	2.225E+00	1.829E+02	1.881E+06	-2.157E+07
10	500---	INF	500.	INF	2.33E-02	1.098E+00	1.755E+03	1.154E+06	8.971E+07

54 XENON Z/A = 4.113E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.063	3.81E-01	2.648E+02	-1.704E+01	9.316E-01	-7.699E-03
2	N5---	M5	.063	.672	3.97E-01	3.266E+03	-1.120E+03	1.619E+02	-6.243E+00
3	M5---	M3	.672	.936	3.31E-02	7.789E+04	-1.758E+05	1.423E+05	-3.620E+04
4	M3---	M1	.936	1.143	5.02E-02	-2.422E+04	6.454E+04	-3.914E+04	8.599E+03
5	M1---	L3	1.143	4.782	1.92E-02	-6.606E+02	7.269E+03	6.119E+03	-3.383E+03
6	L3---	L2	4.782	5.102	1.72E-07	-1.565E+02	5.749E+03	5.985E+04	-2.396E+04
7	L2---	L1	5.102	5.445	1.94E-07	-2.236E+02	9.444E+03	7.463E+04	-3.742E+04
8	L1---	K	5.445	34.561	5.10E-03	-2.010E+01	2.400E+03	1.720E+05	-2.977E+05
9	K---	100	34.561	100.	2.22E-03	-1.622E+00	1.830E+03	1.780E+06	-1.721E+07
10	100---	500	100.	500.	5.08E-03	2.082E+00	3.625E+02	1.962E+06	-2.448E+07
11	500---	INF	500.	INF	2.13E-02	1.148E+00	1.892E+03	1.133E+06	1.244E+08

55 CESIUM Z/A = 4.138E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.079	6.03E-02	5.253E+02	-4.708E+01	1.701E+00	-3.056E-03
2	N5---	M5	.079	.726	1.79E-01	-1.999E+03	3.398E+03	-8.813E+02	6.592E+01
3	M5---	M2	.726	1.065	2.95E-02	-9.499E+03	4.412E+04	-3.666E+04	1.130E+04
4	M2---	M1	1.065	1.217	1.79E-06	-3.460E+02	8.781E+03	1.848E+03	-3.182E+02
5	M1---	L3	1.217	5.012	1.34E-02	-2.807E+02	4.779E+03	1.240E+04	-6.939E+03
6	L3---	L2	5.012	5.360	1.19E-07	-8.402E+01	2.872E+03	7.699E+04	-1.853E+04
7	L2---	L1	5.360	5.713	1.82E-07	-2.254E+02	1.015E+04	7.940E+04	-4.284E+04
8	L1---	K	5.713	35.985	8.26E-03	-1.987E+00	1.400E+03	2.040E+05	-4.166E+05
9	K---	100	35.985	100.	2.53E-03	-4.238E+00	2.444E+03	1.873E+06	-1.899E+07
10	100---	500	100.	500.	5.56E-03	2.278E+00	4.044E+02	2.085E+06	-2.635E+07
11	500---	INF	500.	INF	2.24E-02	1.226E+00	2.030E+03	1.249E+06	1.169E+08

56 BARIUM Z/A = 4.077E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.092	9.86E-02	6.159E+02	-6.640E+01	2.701E+00	-1.599E-02
2	N5---	M5	.092	.780	6.26E-02	1.191E+03	6.631E+02	-9.405E+01	6.376E+00
3	M5---	M3	.780	1.061	6.48E-02	-1.422E+04	4.480E+04	-3.020E+04	8.387E+03
4	M3---	M2	1.061	1.135	9.42E-08	-2.930E+02	8.866E+03	1.354E+03	-2.310E+02
5	M2---	M1	1.135	1.291	1.23E-06	-2.751E+02	9.345E+03	1.542E+03	-2.889E+02
6	M1---	L3	1.291	5.247	3.81E-02	-6.491E+02	7.592E+03	8.802E+03	-6.067E+03
7	L3---	L2	5.247	5.623	1.73E-07	-1.084E+02	4.043E+03	7.718E+04	-2.532E+04
8	L2---	L1	5.623	5.987	1.52E-07	-1.836E+02	7.952E+03	9.545E+04	-4.532E+04
9	L1---	K	5.987	37.441	1.33E-02	8.708E+00	7.581E+02	2.258E+05	-5.011E+05
10	K---	100	37.441	100.	2.57E-03	-5.846E+00	3.162E+03	1.902E+06	-1.948E+07
11	100---	500	100.	500.	4.41E-03	2.590E+00	2.297E+02	2.236E+06	-3.193E+07
12	500---	INF	500.	INF	2.17E-02	1.281E+00	2.144E+03	1.303E+06	1.193E+08

57 LANTHANUM Z/A = 4.103E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.099	4.04E-02	5.406E+02	-5.009E+01	2.070E+00	-1.381E-02
2	N5---M5	.099	.832	3.85E-02	6.683E+02	9.673E+02	-2.153E+02	1.381E+01
3	M5---M3	.832	1.124	6.93E-02	-2.289E+04	6.758E+04	-4.780E+04	1.250E+04
4	M3---M2	1.124	1.204	1.49E-07	-4.024E+02	8.837E+03	2.398E+03	-4.154E+02
5	M2---M1	1.204	1.363	1.38E-06	-3.424E+02	9.463E+03	2.343E+03	-4.528E+02
6	M1---L3	1.363	5.484	3.84E-02	-8.911E+02	1.007E+04	3.513E+03	-2.142E+03
7	L3---L2	5.484	5.891	1.72E-07	-9.085E+01	3.459E+03	8.639E+04	-2.558E+04
8	L2---L1	5.891	6.266	1.22E-07	-1.485E+02	6.357E+03	1.121E+05	-4.626E+04
9	L1---K	6.266	38.925	6.58E-03	-6.527E+00	1.901E+03	2.209E+05	-4.602E+05
10	K---100	38.925	100.	3.55E-03	-7.588E+00	3.685E+03	1.991E+06	-2.054E+07
11	100---500	100.	500.	4.46E-03	2.727E+00	3.137E+02	2.356E+06	-3.362E+07
12	500---INF	500.	INF	2.22E-02	1.365E+00	2.298E+03	1.393E+06	1.220E+08

58 CERIUM Z/A = 4.110E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.105	9.45E-02	1.525E+03	-1.451E+02	5.492E+00	-4.193E-02
2	N5---M5	.105	.883	1.77E-01	1.513E+03	5.125E+02	-2.459E+02	2.320E+01
3	M5---M3	.883	1.185	8.51E-02	5.551E+04	-1.769E+05	2.024E+05	7.125E+04
4	M3---M2	1.185	1.273	5.25E-06	4.656E+03	6.580E+03	-3.256E+03	-8.079E+02
5	M2---M1	1.273	1.435	9.73E-07	-2.828E+02	1.019E+04	2.005E+03	-4.180E+02
6	M1---L3	1.435	5.723	3.26E-02	-3.900E+02	5.970E+03	1.533E+04	-9.604E+03
7	L3---L2	5.723	6.164	1.65E-07	-7.263E+01	2.822E+03	9.606E+04	-2.458E+04
8	L2---L1	6.164	6.549	1.28E-07	-1.695E+02	7.899E+03	1.139E+05	-5.644E+04
9	L1---K	6.549	40.443	1.31E-02	1.939E+01	3.799E+02	2.661E+05	-6.583E+05
10	K---100	40.443	100.	7.60E-04	-1.029E+01	4.409E+03	2.101E+06	-2.280E+07
11	100---500	100.	500.	6.33E-03	2.723E+00	4.916E+02	2.494E+06	-3.595E+07
12	500---INF	500.	INF	2.63E-02	1.464E+00	2.444E+03	1.486E+06	1.376E+08

59 PRASEODYMIUM Z/A = 4.187E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.112	2.19E-01	1.779E+03	-1.728E+02	7.854E+00	-6.296E-02
2	N5---M5	.112	.931	1.60E-01	1.020E+03	1.017E+03	-3.883E+02	3.566E+01
3	M5---M3	.931	1.242	8.11E-02	-6.489E+03	2.485E+04	-1.060E+04	2.589E+03
4	M3---M2	1.242	1.337	3.00E-07	-5.349E+02	8.049E+03	5.499E+03	-9.313E+02
5	M2---M1	1.337	1.505	1.34E-06	-3.829E+02	1.003E+04	3.437E+03	-7.202E+02
6	M1---L3	1.505	5.964	4.24E-03	-1.340E+02	4.371E+03	1.917E+04	-1.118E+04
7	L3---L2	5.964	6.440	1.23E-07	-4.523E+01	1.773E+03	1.075E+05	-1.884E+04
8	L2---L1	6.440	6.835	1.03E-07	-1.401E+02	6.504E+03	1.315E+05	-5.758E+04
9	L1---K	6.835	41.991	1.12E-02	8.492E+00	8.664E+02	2.819E+05	-7.256E+05
10	K---100	41.991	100.	3.15E-04	-9.126E+00	4.223E+03	2.290E+06	-2.709E+07
11	100---500	100.	500.	6.04E-03	3.207E+00	3.424E+02	2.697E+06	-4.123E+07
12	500---INF	500.	INF	2.37E-02	1.557E+00	2.710E+03	1.566E+06	1.383E+08

60 NEODYMIUM Z/A = 4.160E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.117	1.73E-02	-6.505E+02	2.083E+02	-8.262E+00	1.263E-01
2	N5---M5	.117	.978	1.32E-01	5.619E+02	1.452E+03	-5.060E+02	4.545E+01
3	M5---M3	.978	1.298	4.28E-05	-5.304E+02	8.032E+03	3.889E+03	-5.907E+02
4	M3---M1	1.298	1.575	4.32E-06	2.239E+02	1.199E+04	-1.181E+03	2.855E+02
5	M1---L3	1.575	6.208	1.65E-03	-2.457E+02	5.622E+03	1.700E+04	-9.398E+03
6	L3---L2	6.208	6.722	2.08E-07	-6.644E+01	2.796E+03	1.098E+05	-2.924E+04
7	L2---L1	6.722	7.128	8.19E-08	-1.114E+02	5.206E+03	1.457E+05	-5.559E+04
8	L1---K	7.128	43.569	7.56E-03	8.287E+00	9.600E+02	2.935E+05	-7.637E+05
9	K---100	43.569	100.	2.11E-04	-9.944E+00	4.886E+03	2.320E+06	-2.702E+07
10	100---500	100.	500.	6.45E-04	3.820E+00	8.492E+01	2.868E+06	-4.750E+07
11	500---INF	500.	INF	2.31E-02	1.633E+00	2.833E+03	1.759E+06	9.295E+07

61	PROMETHIUM		Z/A = 4.207E-01					
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.122	0.	1.690E+03	0.	0.	0.
2	N5---M5	.122	1.027	1.13E-02	1.440E+03	6.486E+02	-1.094E+02	5.512E+00
3	M5---M4	1.027	1.052	3.63E-11	-6.403E+00	7.436E+03	2.087E+01	-3.609E+00
4	M4---M3	1.052	1.357	4.22E-05	-5.546E+02	7.912E+03	4.958E+03	-7.606E+02
5	M3---M2	1.357	1.471	4.15E-07	-5.157E+02	8.937E+03	6.066E+03	-1.148E+03
6	M2---M1	1.471	1.648	1.50E-06	-4.607E+02	9.760E+03	6.028E+03	-1.298E+03
7	M1---L3	1.648	6.459	2.22E-03	-1.912E+02	5.138E+03	2.120E+04	-1.345E+04
8	L3---L2	6.459	7.013	2.58E-07	-7.165E+01	3.169E+03	1.166E+05	-3.499E+04
9	L2---L1	7.013	7.428	3.02E-07	-2.589E+02	8.215E+03	-1.102E+05	1.824E+06
10	L1---K	7.428	45.184	8.15E-03	-4.251E+01	4.740E+03	2.377E+05	-4.279E+05
11	K---100	45.184	100.	9.69E-04	9.003E-02	2.739E+03	2.641E+06	-3.336E+07
12	100---500	100.	500.	5.31E-03	2.857E+00	1.090E+03	2.888E+06	-4.432E+07
13	500---INF	500.	INF	2.38E-02	1.742E+00	3.069E+03	1.744E+06	1.719E+08

62	SAMARIUM		Z/A = 4.124E-01					
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.127	0.	1.680E+03	0.	0.	0.
2	N5---M5	.127	1.078	5.11E-03	-3.980E+02	2.937E+03	-5.059E+02	2.698E+01
3	M5---M4	1.078	1.106	8.44E-09	2.417E+03	6.924E+03	-2.629E+03	5.790E+02
4	M4---M3	1.106	1.419	3.98E-05	-5.499E+02	7.881E+03	5.664E+03	-8.952E+02
5	M3---M2	1.419	1.541	4.07E-07	-4.675E+02	9.685E+03	5.381E+03	-1.113E+03
6	M2---M1	1.541	1.723	1.55E-06	-4.771E+02	9.283E+03	7.693E+03	-1.657E+03
7	M1---L3	1.723	6.716	4.41E-03	-1.944E+02	5.237E+03	2.215E+04	-1.434E+04
8	L3---L2	6.716	7.312	1.59E-07	-3.580E+01	1.576E+03	1.290E+05	-2.201E+04
9	L2---L1	7.312	7.736	4.43E-08	-6.400E+01	3.084E+03	1.751E+05	-4.595E+04
10	L1---K	7.736	46.834	7.73E-03	7.096E+00	1.071E+03	3.267E+05	-9.193E+05
11	K---100	46.834	100.	1.34E-03	-1.082E+01	5.919E+03	2.475E+06	-2.997E+07
12	100---500	100.	500.	7.21E-03	3.844E+00	4.077E+02	3.137E+06	-5.576E+07
13	500---INF	500.	INF	2.41E-02	1.799E+00	3.181E+03	1.898E+06	1.263E+08

63	EUROPIUM		Z/A = 4.146E-01					
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.134	0.	1.660E+03	0.	0.	0.
2	N5---M5	.134	1.131	7.44E-03	-2.970E+02	2.959E+03	-5.177E+02	2.881E+01
3	M5---M4	1.131	1.161	5.20E-09	8.618E+02	8.414E+03	-1.992E+03	4.240E+02
4	M4---M3	1.161	1.481	3.72E-05	-5.507E+02	7.936E+03	6.518E+03	-1.058E+03
5	M3---M2	1.481	1.614	4.71E-07	-4.589E+02	1.019E+04	5.669E+03	-1.234E+03
6	M2---M1	1.614	1.800	1.54E-06	-4.913E+02	8.740E+03	1.016E+04	-2.142E+03
7	M1---L3	1.800	6.977	3.51E-03	-2.288E+02	5.934E+03	2.154E+04	-1.326E+04
8	L3---L2	6.977	7.618	1.28E-07	-2.466E+01	1.115E+03	1.400E+05	-1.768E+04
9	L2---L1	7.618	8.052	4.10E-08	-6.266E+01	3.143E+03	1.878E+05	-5.089E+04
10	L1---K	8.052	48.519	3.85E-03	-4.306E+00	2.026E+03	3.280E+05	-9.012E+05
11	K---100	48.519	100.	2.60E-03	-7.610E+00	5.488E+03	2.642E+06	-3.287E+07
12	100---500	100.	500.	4.87E-03	3.783E+00	7.655E+02	3.245E+06	-5.731E+07
13	500---INF	500.	INF	2.42E-02	1.904E+00	3.400E+03	2.020E+06	1.315E+08

64	GADOLINIUM		Z/A = 4.07CF-01					
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.140	0.	1.630E+03	0.	0.	0.
2	N5---M5	.140	1.185	6.66E-02	4.170E+01	2.626E+03	-3.982E+02	2.107E+01
3	M5---M4	1.185	1.217	9.16E-09	1.902E+03	7.831E+03	-2.992E+03	7.117E+02
4	M4---M3	1.217	1.544	3.46E-05	-5.394E+02	7.849E+03	7.295E+03	-1.216E+03
5	M3---M2	1.544	1.688	5.50E-07	-4.486E+02	1.029E+04	6.091E+03	-1.380E+03
6	M2---M1	1.688	1.881	1.43E-06	-4.679E+02	9.424E+03	9.571E+03	-2.201E+03
7	M1---L3	1.881	7.243	2.87E-03	-3.017E+02	6.938E+03	1.944E+04	-1.104E+04
8	L3---L2	7.243	7.930	3.39E-07	-5.768E+01	2.841E+03	1.366E+05	-4.131E+04
9	L2---L1	7.930	8.375	2.21E-08	-3.358E+01	1.701E+03	2.029E+05	-3.312E+04
10	L1---K	8.375	50.239	3.28E-03	-8.668E+00	2.379E+03	3.331E+05	-9.285E+05
11	K---500	50.239	500.	4.92E-03	3.209E+00	1.579E+03	3.144E+06	-4.804E+07
12	500---INF	500.	INF	2.41E-02	1.966E+00	3.553E+03	2.103E+06	1.345E+08

65 TERBIUM Z/A = 4.090E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.147	0.	1.600E+03	0.	0.	0.
2	N5---M5	.147	1.240	6.63E-03	-1.794E+02	2.952E+03	-4.363E+02	2.180E+01
3	M5---M4	1.240	1.274	3.78E-09	4.709E+02	8.920E+03	-1.596E+03	3.598E+02
4	M4---M3	1.274	1.610	3.33E-05	-5.345E+02	7.632E+03	8.660E+03	-1.449E+03
5	M3---M2	1.610	1.765	7.47E-07	-4.988E+02	9.401E+03	9.226E+03	-2.000E+03
6	M2---M1	1.765	1.963	1.37E-06	-4.700E+02	9.391E+03	1.117E+04	-2.613E+03
7	M1---L3	1.963	7.514	1.39E-03	-1.902E+02	5.724E+03	2.615E+04	-1.782E+04
8	L3---L2	7.514	8.252	8.74E-07	-1.568E+02	1.116E+04	8.757E+04	-7.647E+04
9	L2---L1	8.252	8.708	2.82E-08	-4.533E+01	2.421E+03	2.126E+05	-4.859E+04
10	L1---K	8.708	51.996	5.30E-03	-4.721E+00	2.127E+03	3.644E+05	-1.109E+06
11	K---500	51.996	500.	4.14E-03	3.903E+00	1.250E+03	3.405E+06	-5.637E+07
12	500---INF	500.	INF	2.35E-02	2.077E+00	3.763E+03	2.261E+06	1.155E+08

66 DYSPROSIUM Z/A = 4.062E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.154	0.	1.570E+03	0.	0.	0.
2	N5---M5	.154	1.295	7.04E-03	-2.930E+02	3.204E+03	-4.744E+02	2.422E+01
3	M5---M4	1.295	1.332	4.88E-09	5.198E+02	9.201E+03	-1.861E+03	4.412E+02
4	M4---M3	1.332	1.676	3.09E-05	-5.242E+02	7.751E+03	9.341E+03	-1.624E+03
5	M3---M2	1.676	1.842	7.51E-07	-4.635E+02	1.050E+04	8.066E+03	-1.930E+03
6	M2---M1	1.842	2.046	1.32E-06	-4.608E+02	9.448E+03	1.216E+04	-2.942E+03
7	M1---L3	2.046	7.790	2.01E-03	-1.077E+02	4.675E+03	3.253E+04	-2.519E+04
8	L3---L2	7.790	8.580	4.95E-07	-6.326E+01	3.407E+03	1.499E+05	-5.526E+04
9	L2---L1	8.580	9.046	4.22E-08	-7.262E+01	4.176E+03	2.130E+05	-8.026E+04
10	L1---K	9.046	53.788	4.31E-03	-1.800E+01	3.374E+03	3.526E+05	-9.982E+05
11	K---500	53.788	500.	4.80E-03	4.112E+00	1.344E+03	3.520E+06	-5.867E+07
12	500---INF	500.	INF	2.40E-02	2.166E+00	3.928E+03	2.396E+06	1.007E+08

67 HOLMIUM Z/A = 4.062E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.161	0.	1.530E+03	0.	0.	0.
2	N5---M5	.161	1.351	3.40E-02	-2.278E+02	3.277E+03	-5.051E+02	2.412E+01
3	M5---M4	1.351	1.392	1.46E-08	1.858E+03	8.664E+03	-3.790E+03	1.030E+03
4	M4---M3	1.392	1.743	2.83E-05	-5.221E+02	8.169E+03	9.852E+03	-1.807E+03
5	M3---M2	1.743	1.923	1.00E-06	-4.878E+02	9.589E+03	1.119E+04	-2.580E+03
6	M2---M1	1.923	2.130	1.20E-06	-4.549E+02	9.349E+03	1.378E+04	-3.393E+03
7	M1---L3	2.130	8.072	3.95E-03	-1.379E+02	5.032E+03	3.428E+04	-2.787E+04
8	L3---L2	8.072	8.918	4.54E-07	-4.939E+01	2.705E+03	1.628E+05	-5.056E+04
9	L2---L1	8.918	9.394	2.53E-08	-4.426E+01	2.555E+03	2.349E+05	-5.948E+04
10	L1---K	9.394	55.618	5.44E-03	-2.988E+00	2.094E+03	4.072E+05	-1.335E+06
11	K---500	55.618	500.	2.15E-02	5.131E+00	5.023E+02	4.000E+06	-7.974E+07
12	500---INF	500.	INF	2.40E-02	2.274E+00	4.258E+03	2.387E+06	1.450E+08

68 ERBIUM Z/A = 4.066E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.169	0.	1.520E+03	0.	0.	0.
2	N5---M5	.169	1.409	9.08E-03	-4.193E+02	3.700E+03	-5.990E+02	3.331E+01
3	M5---M4	1.409	1.453	1.73E-08	3.499E+03	6.300E+03	-3.724E+03	1.119E+03
4	M4---M3	1.453	1.812	2.62E-05	-5.148E+02	8.464E+03	1.038E+04	-1.998E+03
5	M3---M2	1.812	2.006	1.21E-06	-4.781E+02	8.546E+03	1.463E+04	-3.195E+03
6	M2---M1	2.006	2.217	1.11E-06	-4.470E+02	9.490E+03	1.489E+04	-3.799E+03
7	M1---L3	2.217	8.358	3.61E-03	-2.279E+02	6.501E+03	3.083E+04	-2.363E+04
8	L3---L2	8.358	9.264	5.47E-07	-5.162E+01	2.947E+03	1.710E+05	-5.828E+04
9	L2---L1	9.264	9.752	2.93E-08	-5.360E+01	3.254E+03	2.449E+05	-7.821E+04
10	L1---K	9.752	57.486	1.08E-02	6.456E+00	1.211E+03	4.583E+05	-1.684E+06
11	K---500	57.486	500.	5.99E-03	4.025E+00	2.031E+03	3.795E+06	-6.651E+07
12	500---INF	500.	INF	2.34E-02	2.386E+00	4.497E+03	2.558E+06	1.403E+08

69 THULIUM Z/A = 4.084E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.177	0.	1.500E+03	0.	0.	0.
2	N5---M5	.177	1.468	1.12E-02	-4.117E+02	3.892E+03	-6.641E+02	4.384E+01
3	M5---M4	1.468	1.515	1.94E-08	3.309E+03	6.805E+03	-4.124E+03	1.286E+03
4	M4---M3	1.515	1.881	2.44E-05	-5.074E+02	8.420E+03	1.161E+04	-2.277E+03
5	M3---M2	1.881	2.090	1.40E-06	-4.701E+02	8.553E+03	1.620E+04	-3.609E+03
6	M2---M1	2.090	2.306	1.05E-06	-4.405E+02	9.321E+03	1.702E+04	-4.382E+03
7	M1---L3	2.306	8.648	2.92E-03	-2.641E+02	7.170E+03	3.109E+04	-2.392E+04
8	L3---L2	8.648	9.617	6.32E-07	-5.189E+01	3.077E+03	1.808E+05	-6.499E+04
9	L2---L1	9.617	10.116	2.87E-08	-5.311E+01	3.348E+03	2.598E+05	-8.657E+04
10	L1---K	10.116	59.390	9.37E-03	-3.887E+00	2.132E+03	4.637E+05	-1.723E+06
11	K---500	59.390	500.	6.41E-03	4.124E+00	2.299E+03	3.956E+06	-7.043E+07
12	500---INF	500.	INF	2.42E-02	2.512E+00	4.774E+03	2.690E+06	1.454E+08

70 YTTERBIUM Z/A = 4.045E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.188	0.	1.490E+03	0.	0.	0.
2	N5---M5	.188	1.528	1.00E-02	-5.724E+02	4.268E+03	-7.115E+02	4.693E+01
3	M5---M4	1.528	1.577	1.02E-09	-2.392E+02	2.574E+03	1.221E+04	-1.237E+03
4	M4---M3	1.577	1.950	2.42E-05	-4.649E+02	1.046E+04	8.110E+03	-1.884E+03
5	M3---M2	1.950	2.175	1.61E-06	-4.593E+02	8.718E+03	1.696E+04	-3.936E+03
6	M2---M1	2.175	2.398	1.00E-06	-4.300E+02	9.905E+03	1.674E+04	-4.633E+03
7	M1---L3	2.398	8.943	3.22E-03	-2.294E+02	6.908E+03	3.414E+04	-2.810E+04
8	L3---L2	8.943	9.978	7.52E-07	-5.328E+01	3.291E+03	1.869E+05	-7.332E+04
9	L2---L1	9.978	10.489	3.68E-08	-7.311E+01	4.929E+03	2.602E+05	-1.239E+05
10	L1---K	10.489	61.332	3.82E-03	-2.434E+01	4.269E+03	4.243E+05	-1.379E+06
11	K---500	61.332	500.	5.09E-03	4.575E+00	2.312E+03	4.086E+06	-7.562E+07
12	500---INF	500.	INF	2.25E-02	2.606E+00	4.980E+03	2.895E+06	9.923E+07

71 LUTETIUM Z/A = 4.058E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.199	0.	1.490E+03	0.	0.	0.
2	N5---M5	.199	1.591	5.31E-03	-5.832E+02	4.426E+03	-6.739E+02	3.958E+01
3	M5---M4	1.591	1.641	9.70E-09	7.177E+02	1.052E+04	-3.382E+03	1.011E+03
4	M4---M3	1.641	2.024	2.14E-05	-4.936E+02	9.095E+03	1.255E+04	-2.717E+03
5	M3---M2	2.024	2.264	1.78E-06	-4.436E+02	8.391E+03	1.928E+04	-4.456E+03
6	M2---M1	2.264	2.494	9.53E-07	-4.229E+02	1.051E+04	1.693E+04	-4.987E+03
7	M1---L3	2.494	9.245	6.02E-03	-1.794E+02	6.176E+03	4.132E+04	-3.872E+04
8	L3---L2	9.245	10.349	8.46E-07	-5.213E+01	3.333E+03	1.974E+05	-7.977E+04
9	L2---L1	10.349	10.874	2.57E-08	-5.333E+01	3.627E+03	2.858E+05	-1.071E+05
10	L1---K	10.874	63.316	1.01E-02	3.726E+00	1.486E+03	5.352E+05	-2.222E+06
11	K---500	63.316	500.	4.22E-03	5.266E+00	2.137E+03	4.329E+06	-8.327E+07
12	500---INF	500.	INF	2.41E-02	2.736E+00	5.209E+03	3.153E+06	5.239E+07

72 HAFNIUM Z/A = 4.034E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.213	0.	1.480E+03	0.	0.	0.
2	N5---M5	.213	1.662	1.04E-02	-5.793E+02	4.429E+03	-4.123E+02	-2.341E+01
3	M5---M4	1.662	1.716	1.00E-08	6.148E+02	1.077E+04	-3.332E+03	1.032E+03
4	M4---M3	1.716	2.108	1.95E-05	-4.835E+02	9.549E+03	1.284E+04	-2.957E+03
5	M3---M2	2.108	2.364	1.94E-06	-4.488E+02	9.643E+03	1.803E+04	-4.705E+03
6	M2---M1	2.364	2.600	9.04E-07	-4.146E+02	1.043E+04	1.883E+04	-5.684E+03
7	M1---L3	2.600	9.560	6.90E-03	-4.615E+02	1.113E+04	1.850E+04	-2.974E+03
8	L3---L2	9.560	10.739	1.12E-06	-6.090E+01	4.112E+03	2.015E+05	-9.934E+04
9	L2---L1	10.739	11.272	3.31E-08	-7.386E+01	5.387E+03	2.859E+05	-1.536E+05
10	L1---K	11.272	65.345	3.11E-03	-1.873E+01	4.102E+03	4.698E+05	-1.572E+06
11	K---500	65.345	500.	3.48E-03	4.753E+00	2.673E+03	4.462E+06	-8.960E+07
12	500---INF	500.	INF	2.50E-02	2.845E+00	5.554E+03	3.013E+06	1.535E+08

73 TANTALUM				Z/A = 4.034E-01							
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)			
1	.01---N5	.01	.228	0.	1.470E+03	0.	0.	0.			
2	N5---M5	.228	1.735	2.44E-03	-5.773E+02	4.832E+03	-8.075E+02	4.906E+01			
3	M5---M4	1.735	1.793	6.13E-09	2.954E+02	1.102E+04	-2.147E+03	6.678E+02			
4	M4---M3	1.793	2.194	1.79E-05	-4.771E+02	1.003E+04	1.338E+04	-3.254E+03			
5	M3---M2	2.194	2.469	2.20E-06	-4.305E+02	8.881E+03	2.202E+04	-5.544E+03			
6	M2---M1	2.469	2.709	8.38E-07	-4.034E+02	9.726E+03	2.291E+04	-6.762E+03			
7	M1---L3	2.709	9.880	4.11E-03	-8.593E+01	4.826E+03	5.410E+04	-5.683E+04			
8	L3---L2	9.880	11.136	1.19E-06	-5.521E+01	3.828E+03	2.145E+05	-1.019E+05			
9	L2---L1	11.136	11.680	2.19E-08	-4.987E+01	3.641E+03	3.160E+05	-1.250E+05			
10	L1---K	11.680	67.416	9.72E-03	-2.176E+00	2.172E+03	5.708E+05	-2.482E+06			
11	K---500	67.416	500.	3.17E-03	5.194E+00	2.794E+03	4.645E+06	-9.648E+07			
12	500---INF	500.	INF	2.18E-02	2.973E+00	5.785E+03	3.320E+06	9.608E+07			

74 TUNGSTEN				Z/A = 4.025E-01							
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)			
1	.01---N5	.01	.242	0.	1.480E+03	0.	0.	0.			
2	N5---M5	.242	1.809	3.70E-03	-6.028E+02	5.107E+03	-8.969E+02	5.534E+01			
3	M5---M4	1.809	1.871	3.91E-09	1.573E+02	1.107E+04	-1.381E+03	4.379E+02			
4	M4---M3	1.871	2.281	1.63E-05	-4.666E+02	1.057E+04	1.355E+04	-3.503E+03			
5	M3---M2	2.281	2.575	2.44E-06	-4.159E+02	8.743E+03	2.421E+04	-6.191E+03			
6	M2---M1	2.575	2.820	7.68E-07	-3.984E+02	1.026E+04	2.349E+04	-7.382E+03			
7	M1---L3	2.820	10.204	4.25E-03	-1.624E+02	6.121E+03	5.094E+04	-5.128E+04			
8	L3---L2	10.204	11.541	1.50E-06	-6.206E+01	4.525E+03	2.194E+05	-1.223E+05			
9	L2---L1	11.541	12.098	4.88E-08	-1.211E+02	1.058E+04	2.701E+05	-2.556E+05			
10	L1---K	12.098	69.525	2.60E-03	-2.105E+01	4.623E+03	5.109E+05	-1.835E+06			
11	K---500	69.525	500.	2.63E-03	5.276E+00	2.999E+03	4.828E+06	-1.030E+08			
12	500---INF	500.	INF	2.49E-02	3.099E+00	6.112E+03	3.348E+06	1.310E+08			

75 RHENIUM				Z/A = 4.028E-01							
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)			
1	.01---N5	.01	.258	0.	1.570E+03	0.	0.	0.			
2	N5---M5	.258	1.883	5.84E-03	-6.033E+02	5.404E+03	-1.108E+03	9.354E+01			
3	M5---M4	1.883	1.950	7.08E-09	-1.992E+02	1.014E+04	2.835E+03	-8.434E+02			
4	M4---M3	1.950	2.368	1.42E-05	-4.438E+02	1.148E+04	1.253E+04	-3.520E+03			
5	M3---M2	2.368	2.682	2.72E-06	-4.181E+02	9.456E+03	2.446E+04	-6.751E+03			
6	M2---M1	2.682	2.934	7.16E-07	-3.940E+02	1.126E+04	2.277E+04	-7.800E+03			
7	M1---L3	2.934	10.534	5.46E-03	-1.220E+02	5.627E+03	5.672E+04	-5.943E+04			
8	L3---L2	10.534	11.957	1.61E-06	-5.721E+01	4.284E+03	2.331E+05	-1.270E+05			
9	L2---L1	11.957	12.528	4.57E-08	-1.192E+02	1.081E+04	2.828E+05	-2.788E+05			
10	L1---K	12.528	71.676	5.17E-03	-8.548E+00	3.122E+03	5.972E+05	-2.571E+06			
11	K---500	71.676	500.	3.46E-03	4.901E+00	3.621E+03	4.969E+06	-1.085E+08			
12	500---INF	500.	INF	2.38E-02	3.238E+00	6.600E+03	3.237E+06	2.204E+08			

76 OSMIUM				Z/A = 3.996E-01							
J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)			
1	.01---N5	.01	.274	0.	1.720E+03	0.	0.	0.			
2	N5---M5	.274	1.960	8.30E-03	-5.720E+02	5.552E+03	-1.165E+03	9.523E+01			
3	M5---M4	1.960	2.031	1.22E-08	-2.871E+02	9.431E+03	5.398E+03	-1.569E+03			
4	M4---M3	2.031	2.457	1.30E-05	-4.312E+02	1.174E+04	1.298E+04	-3.813E+03			
5	M3---M2	2.457	2.792	3.01E-06	-4.172E+02	1.036E+04	2.374E+04	-7.166E+03			
6	M2---M1	2.792	3.052	6.90E-07	-3.837E+02	1.147E+04	2.383E+04	-8.523E+03			
7	M1---L3	3.052	10.871	5.31E-03	-1.463E+02	6.213E+03	5.661E+04	-5.933E+04			
8	L3---L2	10.871	12.385	1.90E-06	-5.946E+01	4.643E+03	2.401E+05	-1.434E+05			
9	L2---L1	12.385	12.969	4.13E-08	-1.116E+02	1.035E+04	3.012E+05	-2.961E+05			
10	L1---K	12.969	73.871	3.66E-03	-1.803E+01	4.548E+03	5.700E+05	-2.246E+06			
11	K---500	73.871	500.	1.40E-03	5.735E+00	3.318E+03	5.232E+06	-1.209E+08			
12	500---INF	500.	INF	2.44E-02	3.351E+00	6.829E+03	3.509E+06	1.607E+08			

77 IRIDIUM Z/A = 4.006E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.293	0.	1.890E+03	0.	0.	0.
2	N5---M5	.293	2.040	5.88E-03	-6.457E+02	5.954E+03	-1.292E+03	1.094E+02
3	M5---M4	2.040	2.116	1.36E-08	-2.830E+02	9.680E+03	5.768E+03	-1.746E+03
4	M4---M3	2.116	2.551	1.27E-05	-4.371E+02	1.150E+04	1.539E+04	-4.560E+03
5	M3---M2	2.551	2.908	3.30E-06	-4.125E+02	1.085E+04	2.464E+04	-7.841E+03
6	M2---M1	2.908	3.173	6.26E-07	-3.774E+02	1.211E+04	2.431E+04	-9.223E+03
7	M1---L3	3.173	11.215	4.78E-03	-2.858E+01	3.946E+03	7.479E+04	-9.186E+04
8	L3---L2	11.215	12.824	1.82E-06	-5.153E+01	4.097E+03	2.582E+05	-1.419E+05
9	L2---L1	12.824	13.419	4.80E-08	-1.366E+02	1.456E+04	2.707E+05	-3.461E+05
10	L1---K	13.419	76.111	1.39E-02	-1.995E+01	4.906E+03	6.064E+05	-2.648E+06
11	K---500	76.111	500.	2.41E-03	6.213E+00	3.458E+03	5.442E+06	-1.286E+08
12	500---INF	500.	INF	2.50E-02	3.505E+00	7.126E+03	3.805E+06	1.114E+08

78 PLATINUM Z/A = 3.998E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.313	0.	2.060E+03	0.	0.	0.
2	N5---M5	.313	2.122	1.75E-03	-6.891E+02	6.259E+03	-1.339E+03	1.009E+02
3	M5---M4	2.122	2.202	1.74E-08	-3.204E+02	9.105E+03	8.268E+03	-2.460E+03
4	M4---M3	2.202	2.645	1.20E-05	-4.333E+02	1.147E+04	1.710E+04	-5.181E+03
5	M3---M2	2.645	3.027	3.66E-06	-4.064E+02	1.162E+04	2.438E+04	-8.327E+03
6	M2---M1	3.027	3.297	5.76E-07	-3.694E+02	1.237E+04	2.562E+04	-1.013E+04
7	M1---L3	3.297	11.564	2.34E-03	-1.003E+02	5.662E+03	6.740E+04	-7.624E+04
8	L3---L2	11.564	13.273	2.69E-06	-6.719E+01	5.737E+03	2.565E+05	-1.880E+05
9	L2---L1	13.273	13.880	4.58E-08	-1.399E+02	1.605E+04	2.671E+05	-3.742E+05
10	L1---K	13.880	78.395	1.29E-02	1.076E+01	9.617E+02	7.776E+05	-4.207E+06
11	K---500	78.395	500.	3.39E-03	6.088E+00	4.001E+03	5.552E+06	-1.300E+08
12	500---INF	500.	INF	2.31E-02	3.646E+00	7.453E+03	3.931E+06	1.226E+08

79 GOLD Z/A = 4.011E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.334	0.	2.200E+03	0.	0.	0.
2	N5---M5	.334	2.206	6.71E-03	-7.040E+02	6.562E+03	-1.438E+03	1.267E+02
3	M5---M4	2.206	2.291	1.85E-08	-3.105E+02	9.446E+03	8.461E+03	-2.642E+03
4	M4---M3	2.291	2.743	1.08E-05	-4.203E+02	1.212E+04	1.690E+04	-5.448E+03
5	M3---M2	2.743	3.150	3.91E-06	-3.968E+02	1.263E+04	2.339E+04	-8.644E+03
6	M2---M1	3.150	3.425	5.38E-07	-3.646E+02	1.234E+04	2.840E+04	-1.148E+04
7	M1---L3	3.425	11.919	4.64E-03	-5.314E+00	3.877E+03	8.307E+04	-1.051E+05
8	L3---L2	11.919	13.734	3.56E-06	-8.194E+01	7.574E+03	2.506E+05	-2.318E+05
9	L2---L1	13.734	14.353	3.79E-08	-1.134E+02	1.194E+04	3.355E+05	-3.921E+05
10	L1---K	14.353	80.725	4.40E-03	-3.392E+00	3.070E+03	7.247E+05	-3.499E+06
11	K---500	80.725	500.	9.60E-04	7.917E+00	2.918E+03	6.095E+06	-1.596E+08
12	500---INF	500.	INF	2.27E-02	3.811E+00	7.846E+03	4.248E+06	4.571E+07

80 MERCURY Z/A = 3.988E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.360	0.	2.210E+03	0.	0.	0.
2	N5---M5	.360	2.295	3.61E-03	-8.035E+02	7.031E+03	-1.602E+03	1.385E+02
3	M5---M4	2.295	2.385	2.46E-08	-3.336E+02	7.497E+03	1.461E+04	-4.020E+03
4	M4---M3	2.385	2.847	9.54E-06	-3.961E+02	1.286E+04	1.582E+04	-5.482E+03
5	M3---M2	2.847	3.280	4.14E-06	-3.830E+02	1.343E+04	2.276E+04	-8.999E+03
6	M2---M1	3.280	3.562	5.08E-07	-3.553E+02	1.248E+04	3.007E+04	-1.263E+04
7	M1---L3	3.562	12.283	2.91E-03	1.179E+01	3.460E+03	9.044E+04	-1.201E+05
8	L3---L2	12.283	14.209	3.85E-06	-7.533E+01	7.084E+03	2.675E+05	-2.412E+05
9	L2---L1	14.209	14.842	3.44E-08	-1.288E+02	1.524E+04	3.090E+05	-4.397E+05
10	L1---K	14.842	83.102	9.00E-03	4.681E-01	2.405E+03	7.958E+05	-4.232E+06
11	K---500	83.102	500.	3.31E-03	6.983E+00	4.309E+03	5.980E+06	-1.518E+08
12	500---INF	500.	INF	2.40E-02	3.946E+00	8.311E+03	4.256E+06	8.942E+07

81	THALLIUM			Z/A = 3.963E-01					
J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.386	0.	2.210E+03	0.	0.	0.
2	N5---	M5	.386	2.389	2.85E-03	-9.684E+02	7.861E+03	-2.292E+03	3.194E+02
3	M5---	M4	2.389	2.485	2.70E-08	-3.275E+02	7.729E+03	1.535E+04	-4.426E+03
4	M4---	M3	2.485	2.956	9.88E-06	-4.087E+02	1.156E+04	2.169E+04	-7.188E+03
5	M3---	M2	2.956	3.416	4.69E-06	-3.790E+02	1.294E+04	2.638E+04	-1.049E+04
6	M2---	M1	3.416	3.704	4.74E-07	-3.455E+02	1.245E+04	3.232E+04	-1.400E+04
7	M1---	L3	3.704	12.656	4.76E-03	5.060E+01	2.722E+03	1.006E+05	-1.441E+05
8	L3---	L2	12.656	14.697	3.88E-06	-6.647E+01	6.324E+03	2.871E+05	-2.439E+05
9	L2---	L1	14.697	15.346	3.87E-08	-1.405E+02	2.137E+04	2.340E+05	-4.290E+05
10	L1---	K	15.346	85.530	5.36E-03	-1.053E+01	4.195E+03	7.543E+05	-3.747E+06
11	K---	500	85.530	500.	2.80E-03	7.684E+00	4.048E+03	6.314E+06	-1.714E+08
12	500---	INF	500.	INF	2.41E-02	4.082E+00	8.543E+03	4.521E+06	5.178E+07

82	LEAD			Z/A = 3.958E-01					
J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.413	0.	2.200E+03	0.	0.	0.
2	N5---	M5	.413	2.484	2.57E-03	-7.847E+02	7.343E+03	-1.425E+03	-3.703E-01
3	M5---	M4	2.484	2.586	2.91E-08	-3.238E+02	8.188E+03	1.567E+04	-4.802E+03
4	M4---	M3	2.586	3.066	9.17E-06	-4.016E+02	1.173E+04	2.316E+04	-7.955E+03
5	M3---	M2	3.066	3.554	5.30E-06	-3.717E+02	1.215E+04	3.143E+04	-1.232E+04
6	M2---	M1	3.554	3.851	4.53E-07	-3.372E+02	1.292E+04	3.306E+04	-1.511E+04
7	M1---	L3	3.851	13.035	1.40E-03	-1.004E+02	6.410E+03	7.864E+04	-9.524E+04
8	L3---	L2	13.035	15.200	4.62E-06	-7.125E+01	7.126E+03	2.931E+05	-2.779E+05
9	L2---	L1	15.200	15.861	3.69E-08	-1.363E+02	1.992E+04	2.721E+05	-4.887E+05
10	L1---	K	15.861	88.004	5.37E-03	-8.206E+00	4.058E+03	7.950E+05	-4.115E+06
11	K---	500	88.004	500.	4.59E-04	7.595E+00	4.692E+03	6.429E+06	-1.747E+08
12	500---	INF	500.	INF	2.24E-02	4.240E+00	8.883E+03	4.754E+06	3.448E+07

83	RISMUTH			Z/A = 3.972E-01					
J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.440	0.	2.030E+03	0.	0.	0.
2	N5---	M5	.440	2.581	5.36E-03	-1.030E+03	8.535E+03	-2.431E+03	2.738E+02
3	M5---	M4	2.581	2.689	3.20E-08	-3.149E+02	7.642E+03	1.884E+04	-5.632E+03
4	M4---	M3	2.689	3.177	8.63E-06	-3.943E+02	1.129E+04	2.671E+04	-9.164E+03
5	M3---	M2	3.177	3.696	5.88E-06	-3.641E+02	1.204E+04	3.463E+04	-1.381E+04
6	M2---	M1	3.696	4.000	4.35E-07	-3.300E+02	1.254E+04	3.747E+04	-1.725E+04
7	M1---	L3	4.000	13.420	3.24E-03	2.320E+01	3.479E+03	1.066E+05	-1.595E+05
8	L3---	L2	13.420	15.714	5.05E-06	-6.824E+01	7.005E+03	3.089E+05	-2.951E+05
9	L2---	L1	15.714	16.391	3.65E-08	-1.337E+02	1.999E+04	2.903E+05	-5.342E+05
10	L1---	K	16.391	90.526	7.85E-03	-1.411E+00	3.094E+03	8.901E+05	-5.203E+06
11	K---	500	90.526	500.	4.48E-03	9.935E+00	3.289E+03	6.983E+06	-2.020E+08
12	500---	INF	500.	INF	2.29E-02	4.425E+00	9.396E+03	5.008E+06	-5.280E+07

84	POLONIUM			Z/A = 4.000E-01					
J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.473	0.	1.830E+03	0.	0.	0.
2	N5---	M5	.473	2.683	5.63E-03	-9.975E+02	8.677E+03	-2.206E+03	1.699E+02
3	M5---	M4	2.683	2.798	3.48E-08	-3.167E+02	8.401E+03	1.878E+04	-6.087E+03
4	M4---	M3	2.798	3.295	8.03E-06	-3.899E+02	1.134E+04	2.963E+04	-1.038E+04
5	M3---	M2	3.295	3.849	6.54E-06	-3.604E+02	1.242E+04	3.688E+04	-1.531E+04
6	M2---	M1	3.849	4.156	3.93E-07	-3.216E+02	1.192E+04	4.405E+04	-2.004E+04
7	M1---	L3	4.156	13.814	1.16E-03	-4.664E+01	5.421E+03	9.815E+04	-1.380E+05
8	L3---	L2	13.814	16.244	6.14E-06	-7.471E+01	8.106E+03	3.143E+05	-3.397E+05
9	L2---	L1	16.244	16.936	3.53E-08	-1.335E+02	2.199E+04	2.786E+05	-5.569E+05
10	L1---	K	16.936	93.105	1.03E-02	7.789E+00	1.767E+03	1.003E+06	-6.443E+06
11	K---	500	93.105	500.	2.23E-03	8.525E+00	5.102E+03	6.990E+06	-2.009E+08
12	500---	INF	500.	INF	2.17E-02	4.633E+00	9.868E+03	5.142E+06	1.775E+07

85 ASTATINE Z/A = 4.048E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.506	0.	1.610E+03	0.	0.	0.
2	N5---M5	.506	2.787	7.31E-03	-1.158E+03	9.785E+03	-3.286E+03	4.977E+02
3	M5---M4	2.787	2.909	3.78E-08	-2.939E+02	7.047E+03	2.494E+04	-7.295E+03
4	M4---M3	2.909	3.416	7.49E-06	-3.889E+02	1.171E+04	3.195E+04	-1.160E+04
5	M3---M2	3.416	4.006	7.24E-06	-3.573E+02	1.264E+04	4.031E+04	-1.720E+04
6	M2---M1	4.006	4.317	3.53E-07	-3.206E+02	1.263E+04	4.560E+04	-2.199E+04
7	M1---L3	4.317	14.214	2.91E-03	1.227E+02	1.460E+03	1.347E+05	-2.192E+05
8	L3---L2	14.214	16.785	6.49E-06	-6.880E+01	7.565E+03	3.411E+05	-3.547E+05
9	L2---L1	16.785	17.491	3.16E-08	-1.280E+02	1.941E+04	3.508E+05	-6.556E+05
10	L1---K	17.491	95.730	4.51E-03	-1.695E+00	3.621E+03	9.663E+05	-5.746E+06
11	K---500	95.730	500.	2.85E-03	9.913E+00	4.822E+03	7.370E+06	-2.163E+08
12	500---INF	500.	INF	2.50E-02	4.871E+00	1.062E+04	5.352E+06	-2.702E+07

86 RADON Z/A = 3.874E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.541	0.	1.380E+03	0.	0.	0.
2	N5---M5	.541	2.892	6.63E-03	-9.559E+02	9.029E+03	-2.571E+03	3.310E+02
3	M5---M4	2.892	3.022	4.24E-08	-2.893E+02	7.615E+03	2.331E+04	-7.562E+03
4	M4---M3	3.022	3.538	6.98E-06	-3.616E+02	1.088E+04	3.423E+04	-1.248E+04
5	M3---M2	3.538	4.164	5.11E-06	-2.652E+02	7.797E+03	5.879E+04	-1.903E+04
6	M2---M1	4.164	4.482	3.33E-07	-2.980E+02	1.182E+04	4.838E+04	-2.359E+04
7	M1---L3	4.482	14.619	1.47E-03	-6.112E+01	5.945E+03	1.001E+05	-1.407E+05
8	L3---L2	14.619	17.337	7.34E-06	-6.756E+01	7.739E+03	3.363E+05	-3.748E+05
9	L2---L1	17.337	18.055	3.11E-08	-1.220E+02	1.976E+04	3.335E+05	-6.657E+05
10	L1---K	18.055	98.404	6.51E-03	-5.899E-01	3.312E+03	9.833E+05	-6.258E+06
11	K---500	98.404	500.	3.44E-03	8.633E+00	5.888E+03	7.122E+06	-2.120E+08
12	500---INF	500.	INF	2.18E-02	4.841E+00	1.057E+04	5.286E+06	1.022E+07

87 FRANCIUM Z/A = 3.901E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.576	0.	1.250E+03	0.	0.	0.
2	N5---M5	.576	3.000	8.56E-03	-7.818E+02	8.542E+03	-1.652E+03	4.668E+01
3	M5---M4	3.000	3.136	4.39E-08	-2.906E+02	8.104E+03	2.416E+04	-8.306E+03
4	M4---M3	3.136	3.664	6.61E-06	-3.615E+02	1.150E+04	3.541E+04	-1.363E+04
5	M3---M2	3.664	4.325	8.53E-06	-3.299E+02	1.230E+04	4.485E+04	-2.020E+04
6	M2---M1	4.325	4.652	3.17E-07	-2.983E+02	1.294E+04	4.768E+04	-2.521E+04
7	M1---L3	4.652	15.030	1.65E-03	-2.362E+01	5.338E+03	1.099E+05	-1.583E+05
8	L3---L2	15.030	17.904	7.64E-06	-6.236E+01	7.249E+03	3.612E+05	-3.893E+05
9	L2---L1	17.904	18.639	3.05E-08	-1.213E+02	2.052E+04	3.455E+05	-7.195E+05
10	L1---K	18.639	101.137	4.22E-03	-8.453E+00	4.660E+03	9.757E+05	-6.010E+06
11	K---500	101.137	500.	4.14E-03	1.104E+01	4.630E+03	7.706E+06	-2.445E+08
12	500---INF	500.	INF	2.38E-02	5.063E+00	1.115E+04	5.666E+06	-1.082E+08

88 RADIUM Z/A = 3.877E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.610	0.	1.170E+03	0.	0.	0.
2	N5---M5	.610	3.109	6.04E-03	-9.110E+02	9.350E+03	-2.300E+03	2.228E+02
3	M5---M4	3.109	3.253	4.60E-08	-2.592E+02	6.680E+03	3.041E+04	-9.387E+03
4	M4---M3	3.253	3.791	6.19E-06	-3.547E+02	1.164E+04	3.753E+04	-1.492E+04
5	M3---M2	3.791	4.490	9.27E-06	-3.193E+02	1.201E+04	4.919E+04	-2.237E+04
6	M2---M1	4.490	4.824	2.97E-07	-2.920E+02	1.314E+04	5.024E+04	-2.757E+04
7	M1---L3	4.824	15.446	3.35E-03	-5.651E+01	6.065E+03	1.108E+05	-1.601E+05
8	L3---L2	15.446	18.484	8.39E-06	-6.085E+01	7.287E+03	3.762E+05	-4.161E+05
9	L2---L1	18.484	19.237	2.98E-08	-1.192E+02	2.119E+04	3.500E+05	-7.644E+05
10	L1---K	19.237	103.922	3.81E-03	-1.024E+01	5.310E+03	9.756E+05	-5.773E+06
11	K---500	103.922	500.	6.27E-03	1.241E+01	3.727E+03	8.307E+06	-2.833E+08
12	500---INF	500.	INF	2.24E-02	5.221E+00	1.168E+04	5.739E+06	-9.046E+07

89 ACTINIUM Z/A = 3.921E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.644	0.	1.110E+03	0.	0.	0.
2	N5---	M5	.644	3.219	9.63E-03	-1.115E+03	1.053E+04	-3.094E+03	2.300E+02
3	M5---	M4	3.219	3.371	5.14E-08	-2.814E+02	8.281E+03	2.798E+04	-1.015E+04
4	M4---	M3	3.371	3.918	5.78E-06	-3.474E+02	1.153E+04	4.113E+04	-1.657E+04
5	M3---	M2	3.918	4.658	1.01E-05	-3.138E+02	1.208E+04	5.316E+04	-2.471E+04
6	M2---	M1	4.658	5.002	2.86E-07	-2.887E+02	1.389E+04	5.091E+04	-2.962E+04
7	M1---	L3	5.002	15.870	2.75E-03	7.657E+01	2.243E+03	1.528E+05	-2.731E+05
8	L3---	L2	15.870	19.083	9.81E-06	-6.339E+01	7.915E+03	3.884E+05	-4.637E+05
9	L2---	L1	19.083	19.845	2.76E-08	-1.182E+02	2.194E+04	3.621E+05	-8.244E+05
10	L1---	K	19.845	106.759	6.12E-03	8.142E+00	2.287E+03	1.185E+06	-8.493E+06
11	K---	500	106.759	500.	3.17E-03	1.003E+01	6.690E+03	7.961E+06	-2.545E+08
12	500---	INF	500.	INF	2.44E-02	5.479E+00	1.217E+04	5.897E+06	-2.287E+07

90 THORIUM Z/A = 3.879E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.676	0.	1.050E+03	0.	0.	0.
2	N5---	M5	.676	3.332	7.08E-03	-9.331E+02	9.938E+03	-2.564E+03	2.942E+02
3	M5---	M4	3.332	3.490	4.81E-08	-2.325E+02	6.130E+03	3.633E+04	-1.104E+04
4	M4---	M3	3.490	4.046	5.39E-06	-3.308E+02	1.094E+04	4.517E+04	-1.812E+04
5	M3---	M2	4.046	4.830	1.11E-05	-3.073E+02	1.244E+04	5.401E+04	-2.638E+04
6	M2---	M1	4.830	5.182	2.65E-07	-2.797E+02	1.474E+04	4.897E+04	-3.059E+04
7	M1---	L3	5.182	16.300	2.14E-03	8.999E+00	4.311E+03	1.390E+05	-2.331E+05
8	L3---	L2	16.300	19.693	1.06E-05	-5.998E+01	7.669E+03	4.039E+05	-4.843E+05
9	L2---	L1	19.693	20.466	2.56E-08	-1.152E+02	2.229E+04	3.694E+05	-8.743E+05
10	L1---	K	20.466	109.651	4.08E-03	-1.965E+01	7.238E+03	9.916E+05	-5.869E+06
11	K---	500	109.651	500.	3.81E-03	1.150E+01	6.085E+03	8.292E+06	-2.758E+08
12	500---	INF	500.	INF	2.44E-02	5.620E+00	1.245E+04	6.338E+06	-1.549E+08

91 PROTACTINIUM Z/A = 3.939E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.708	0.	1.000E+03	0.	0.	0.
2	N5---	M5	.708	3.442	1.69E-02	-1.195E+03	1.151E+04	-3.714E+03	5.109E+01
3	M5---	M4	3.442	3.609	5.30E-08	-2.349E+02	6.438E+03	3.849E+04	-1.223E+04
4	M4---	M3	3.609	4.174	5.02E-06	-3.240E+02	1.078E+04	5.022E+04	-2.015E+04
5	M3---	M2	4.174	5.003	1.21E-05	-3.119E+02	1.369E+04	5.366E+04	-2.824E+04
6	M2---	M1	5.003	5.364	2.55E-07	-2.785E+02	1.523E+04	5.214E+04	-3.377E+04
7	M1---	L3	5.364	16.733	4.23E-03	1.482E+02	3.411E+02	1.839E+05	-3.542E+05
8	L3---	L2	16.733	20.314	1.25E-05	-6.436E+01	8.617E+03	4.180E+05	-5.495E+05
9	L2---	L1	20.314	21.105	2.53E-08	-1.129E+02	2.138E+04	4.231E+05	-9.875E+05
10	L1---	K	21.105	112.601	7.73E-03	1.526E+01	1.356E+03	1.351E+06	-1.082E+07
11	K---	500	112.601	500.	3.00E-03	1.254E+01	5.894E+03	8.877E+06	-3.120E+08
12	500---	INF	500.	INF	2.62E-02	5.918E+00	1.306E+04	6.683E+06	-1.778E+08

92 URANIUM Z/A = 3.865E-01

J	INT	IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---	N5	.01	.740	0.	9.700E+02	0.	0.	0.
2	N5---	M5	.740	3.552	1.57E-02	-1.023E+03	1.062E+04	-1.978E+03	-9.188E+02
3	M5---	M4	3.552	3.728	6.16E-08	-2.568E+02	7.987E+03	3.435E+04	-1.308E+04
4	M4---	M3	3.728	4.304	4.80E-06	-3.148E+02	1.094E+04	5.041E+04	-2.121E+04
5	M3---	M2	4.304	5.181	1.34E-05	-2.917E+02	1.249E+04	5.991E+04	-3.088E+04
6	M2---	M1	5.181	5.548	2.48E-07	-2.653E+02	1.346E+04	6.280E+04	-3.903E+04
7	M1---	L3	5.548	17.170	2.06E-03	5.629E+00	4.645E+03	1.486E+05	-2.622E+05
8	L3---	L2	17.170	20.948	1.47E-05	-6.720E+01	7.489E+03	4.107E+05	-6.000E+05
9	L2---	L1	20.948	21.759	2.32E-08	-1.033E+02	1.864E+04	4.878E+05	-1.076E+06
10	L1---	K	21.759	115.606	5.75E-03	6.281E-01	3.792E+03	1.281E+06	-1.003E+07
11	K---	500	115.606	500.	1.51E-03	1.146E+01	7.568E+03	8.699E+06	-3.106E+08
12	500---	INF	500.	INF	2.28E-02	6.017E+00	1.327E+04	7.079E+06	-2.456E+08

93	NEPTUNIUM	J	INT IDENT	START	FINISH	RMS	Z/A = 3.924E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
12	500----	INF	500.	500.	INF	2.55E-02	6.330E+00	1.392E+04	7.484E+06	-3.064E+08	
11	K----	500	118.670	22.427	5.02E-03	2.67E-03	1.272E+01	7.422E+03	9.191E+06	-3.336E+08	
10	L1----	K	22.427	21.600	2.2E-08	5.02E-03	5.579E+00	3.489E+03	1.354E+06	-1.078E+07	
9	L2----	L1	21.600	17.613	1.57E-05	1.57E-05	-1.103E+02	2.501E+04	3.841E+05	-1.044E+06	
8	L3----	L2	17.613	5.735	1.69E-03	1.69E-03	6.355E+01	9.093E+03	4.439E+05	-6.341E+05	
7	M1----	L3	5.735	5.366	2.22E-07	2.22E-07	6.006E+01	3.205E+03	1.724E+05	-3.290E+05	
6	M2----	M1	5.366	4.435	1.49E-05	1.49E-05	1.325E+04	7.069E+04	-4.046E+04	-3.410E+04	
5	M3----	M2	4.435	3.850	4.53E-06	4.53E-06	1.303E+04	6.385E+04	-3.410E+04	-2.302E+04	
4	M4----	M3	3.850	3.664	6.79E-08	6.79E-08	1.200E+04	5.096E+04	-3.410E+04	-1.713E+03	
3	M5----	M4	3.664	.772	3.76E-02	3.76E-02	8.351E+03	5.599E+04	-1.117E+04	0.	
2	NS----	M5	.772	.01	0.	0.	1.746E+04	0.	0.	0.	
1	.01----	NS	.01	START	FINISH	RMS	9.500E+02	0.	0.	0.	A(I,J,4)
J	INT IDENT	START	FINISH	RMS	Z/A = 3.924E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)		
94	PLUTONIUM	J	INT IDENT	START	FINISH	RMS	Z/A = 3.884E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
12	500----	INF	500.	500.	INF	2.44E-02	6.490E+00	1.422E+04	8.179E+06	-5.340E+08	
11	K----	500	121.797	23.109	4.53E-03	2.49E-03	1.781E+01	3.158E+03	1.075E+07	-4.693E+08	
10	L1----	K	23.109	22.270	2.12E-08	2.12E-08	-1.248E+01	6.703E+03	1.250E+06	-9.411E+06	
9	L2----	L1	22.270	18.063	1.77E-05	1.77E-05	1.065E+02	2.299E+04	4.461E+05	-1.181E+06	
8	L3----	L2	18.063	5.927	2.03E-03	2.03E-03	6.367E+01	9.444E+03	4.539E+05	-6.84E+05	
7	M1----	L3	5.927	5.555	1.98E-07	1.98E-07	6.135E+01	3.329E+03	1.742E+05	-3.276E+05	
6	M2----	M1	5.555	4.568	1.65E-05	1.65E-05	1.62E+04	1.162E+04	8.310E+04	-3.276E+05	
5	M3----	M2	4.568	3.973	4.29E-06	4.29E-06	1.369E+04	6.306E+04	-3.581E+04	-3.581E+04	
4	M4----	M3	3.973	3.778	6.35E-08	6.35E-08	1.245E+04	5.096E+04	-2.427E+04	-2.427E+04	
3	M5----	M4	3.778	.801	1.51E-02	1.51E-02	1.245E+04	5.096E+04	-2.427E+04	-2.427E+04	
2	NS----	M5	.801	.01	0.	0.	1.139E+03	6.929E+02	-1.482E+04	-1.482E+04	
1	.01----	NS	.01	START	FINISH	RMS	9.500E+02	0.	0.	0.	A(I,J,4)
J	INT IDENT	START	FINISH	RMS	Z/A = 3.884E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)		
95	AMERICIUM	J	INT IDENT	START	FINISH	RMS	Z/A = 3.909E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
12	500----	INF	500.	500.	INF	2.52E-02	6.763E+00	1.479E+04	8.647E+06	-6.116E+08	
11	K----	500	124.990	23.812	3.62E-03	3.62E-03	1.966E+01	2.217E+03	1.154E+07	-5.298E+08	
10	L1----	K	23.812	22.958	2.81E-03	2.81E-03	-3.730E+00	5.425E+03	1.376E+06	-1.109E+07	
9	L2----	L1	22.958	18.519	1.89E-08	1.89E-08	-9.199E+01	1.716E+04	6.101E+05	-1.350E+06	
8	L3----	L2	18.519	6.122	1.94E-05	1.94E-05	-6.201E+01	9.427E+03	4.778E+05	-7.281E+05	
7	M1----	L3	6.122	5.748	2.77E-03	2.77E-03	1.398E+02	8.374E+02	2.097E+05	-4.54E+05	
6	M2----	M1	5.748	4.703	1.76E-07	1.76E-07	1.168E+04	8.876E+04	-5.342E+04	-5.342E+04	
5	M3----	M2	4.703	4.100	1.80E-05	1.80E-05	1.505E+04	6.139E+04	-3.761E+04	-3.761E+04	
4	M4----	M3	4.100	3.894	3.99E-06	3.99E-06	1.325E+04	5.127E+04	-2.586E+04	-2.586E+04	
3	M5----	M4	3.894	.828	7.08E-08	7.08E-08	6.152E+03	4.844E+04	-1.624E+04	-1.624E+04	
2	NS----	M5	.828	.01	1.53E-02	1.53E-02	1.063E+04	5.553E+02	-1.750E+03	-1.750E+03	
1	.01----	NS	.01	START	FINISH	RMS	9.600E+02	0.	0.	0.	A(I,J,4)
J	INT IDENT	START	FINISH	RMS	Z/A = 3.909E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)		
96	CURIUM	J	INT IDENT	START	FINISH	RMS	Z/A = 3.918E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
12	500----	INF	500.	500.	INF	2.52E-02	6.763E+00	1.479E+04	8.647E+06	-6.116E+08	
11	K----	500	128.253	24.535	4.31E-03	4.31E-03	2.200E+01	1.083E+03	1.208E+07	-5.884E+08	
10	L1----	K	24.535	23.663	3.99E-03	3.99E-03	-1.147E+01	7.190E+03	1.327E+06	-1.016E+07	
9	L2----	L1	23.663	18.982	2.02E-08	2.02E-08	-1.010E+02	2.212E+04	5.193E+05	-1.402E+06	
8	L3----	L2	18.982	6.322	2.10E-05	2.10E-05	-5.879E+01	9.126E+03	4.981E+05	-7.597E+05	
7	M1----	L3	6.322	5.945	3.35E-03	3.35E-03	6.769E+01	3.243E+03	1.909E+05	-3.844E+05	
6	M2----	M1	5.945	4.839	1.51E-07	1.51E-07	-2.092E+02	1.004E+04	1.017E+05	-5.684E+04	
5	M3----	M2	4.839	4.230	2.02E-05	2.02E-05	-2.793E+02	1.411E+04	6.926E+04	-4.181E+04	
4	M4----	M3	4.230	4.012	3.67E-06	3.67E-06	-3.144E+02	1.378E+04	5.160E+04	-2.733E+04	
3	M5----	M4	4.012	.853	6.76E-08	6.76E-08	-1.652E+02	4.824E+03	5.512E+04	-1.585E+04	
2	NS----	M5	.853	.01	1.30E-02	1.30E-02	-8.139E+02	1.040E+04	4.547E+02	-2.530E+03	
1	.01----	NS	.01	START	FINISH	RMS	1.000E+03	0.	0.	0.	A(I,J,4)
J	INT IDENT	START	FINISH	RMS	Z/A = 3.918E-01	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)		

97 RFRKELIUM Z/A = 3.896E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.877	0.	1.100E+03	0.	0.	0.
2	N5---M5	.877	4.132	1.66E-02	-1.092E+03	1.257F+04	-3.090E+03	-6.861E+02
3	M5---M4	4.132	4.364	9.18E-08	-2.062E+02	6.715E+03	5.159F+04	-1.915E+04
4	M4---M3	4.364	4.977	3.35E-06	-3.108E+02	1.396E+04	5.452E+04	-2.964E+04
5	M3---M2	4.977	6.147	2.24E-05	-2.726F+02	1.392E+04	7.484F+04	-4.567E+04
6	M2---M1	6.147	6.526	1.39E-07	-2.161E+02	1.101E+04	1.029E+05	-6.243E+04
7	M1---L3	6.526	19.452	4.23E-03	1.590E+02	-5.494E+01	2.383E+05	-5.506E+05
8	L3---L2	19.452	24.385	2.41E-05	-6.035E+01	9.752E+03	5.095E+05	-8.299E+05
9	L2---L1	24.385	25.275	1.83E-08	-1.018E+02	2.538E+04	4.681E+05	-1.412E+06
10	L1---K	25.275	131.590	3.62E-03	-1.308E+01	7.916F+03	1.354E+06	-1.049E+07
11	K---500	131.590	500.	4.57E-03	2.374E+01	1.750E+02	1.285E+07	-6.352E+08
12	500---INF	500.	INF	2.77E-02	7.219E+00	1.592E+04	9.491E+06	-8.283E+08

98 CALIFORNIUM Z/A = 3.936E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.902	0.	1.220E+03	0.	0.	0.
2	N5---M5	.902	4.254	1.63E-02	-9.355E+02	1.168E+04	-4.663F+02	-2.379E+03
3	M5---M4	4.254	4.502	1.14E-07	-2.264E+02	8.092E+03	4.926F+04	-2.117E+04
4	M4---M3	4.502	5.117	3.04E-06	-3.044E+02	1.361E+04	6.013E+04	-3.273E+04
5	M3---M2	5.117	6.353	2.46E-05	-2.641E+02	1.349E+04	8.233E+04	-5.011E+04
6	M2---M1	6.353	6.735	1.23E-07	-2.018E+02	1.029E+04	1.132E+05	-6.698F+04
7	M1---L3	6.735	19.929	3.50E-03	7.527E+01	3.285E+03	2.079E+05	-4.385E+05
8	L3---L2	19.929	25.125	2.60E-05	-5.797E+01	9.571E+03	5.352E+05	-8.755E+05
9	L2---L1	25.125	26.030	1.71E-08	-9.148E+01	1.942E+04	6.490E+05	-1.673E+06
10	L1---K	26.030	135.005	1.21E-02	-5.416E+01	1.706E+04	8.630F+05	-1.792E+06
11	K---500	135.005	500.	6.46E-03	2.771E+01	-2.903E+03	1.419F+07	-7.456E+08
12	500---INF	500.	INF	3.19E-02	7.544E+00	1.589E+04	1.052E+07	-1.089E+09

99 FINSTEINIUM Z/A = 3.89E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.927	0.	1.330E+03	0.	0.	0.
2	N5---M5	.927	4.378	1.42E-02	-8.936E+02	1.145E+04	1.094E+03	-3.692E+03
3	M5---M4	4.378	4.644	1.30E-07	-2.152E+02	7.720E+03	5.372E+04	-2.276E+04
4	M4---M3	4.644	5.259	2.70E-06	-2.914E+02	1.268E+04	6.828E+04	-3.620E+04
5	M3---M2	5.259	6.564	2.71E-05	-2.568E+02	1.341E+04	8.685E+04	-5.387E+04
6	M2---M1	6.564	6.949	1.16E-07	-2.104E+02	1.155E+04	1.107F+05	-7.279E+04
7	M1---L3	6.949	20.414	4.41E-03	1.088E+02	1.536E+03	2.458F+05	-6.005E+05
8	L3---L2	20.414	25.883	2.86E-05	-5.691E+01	9.660E+03	5.556F+05	-9.320E+05
9	L2---L1	25.883	26.803	1.75E-08	-9.167E+01	2.050F+04	6.520F+05	-1.784E+06
10	L1---K	26.803	138.502	4.54E-03	9.687E-01	5.331E+03	1.646E+06	-1.518E+07
11	K---500	138.502	500.	9.16E-03	3.315E+01	-7.298F+03	1.587E+07	-8.866E+08
12	500---INF	500.	INF	2.63E-02	7.728E+00	1.675E+04	1.090E+07	-1.231E+09

100 FERMIUM Z/A = 3.968E-01

J	INT IDENT	START	FINISH	RMS	A(I,J,1)	A(I,J,2)	A(I,J,3)	A(I,J,4)
1	.01---N5	.01	.952	0.	1.460E+03	0.	0.	0.
2	N5---M5	.952	4.504	1.55E-02	-1.082F+03	1.308E+04	-9.100E+02	-2.846E+03
3	M5---M4	4.504	4.790	1.43E-07	-1.923E+02	6.709E+03	6.231F+04	-2.410E+04
4	M4---M3	4.790	5.403	2.22E-06	-2.559E+02	1.024E+04	8.602E+04	-3.977E+04
5	M3---M2	5.403	6.780	2.94E-05	-2.466E+02	1.276F+04	9.751E+04	-5.925E+04
6	M2---M1	6.780	7.168	1.08E-07	-2.304E+02	1.518E+04	9.220E+04	-7.454E+04
7	M1---L3	7.168	20.907	2.11E-03	8.675E+01	2.132E+03	2.568F+05	-6.538E+05
8	L3---L2	20.907	26.659	3.19E-05	-5.793E+01	1.018E+04	5.793E+05	-1.018E+06
9	L2---L1	26.659	27.594	1.51E-08	-8.637E+01	1.890E+04	7.445E+05	-1.949E+06
10	L1---K	27.594	142.085	5.17E-03	5.556E-01	5.648E+03	1.738E+06	-1.662E+07
11	K---500	142.085	500.	1.06E-02	2.968E+01	-2.026E+03	1.484E+07	-7.825E+08
12	500---INF	500.	INF	2.93E-02	8.135F+00	1.726E+04	1.171F+07	-1.346E+09

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