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MC^2,
A Code to Calculate Multigroup Cross Sections

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I. INTRODUCTION

The growing availability of accurate basic nuclear data, coupled with a desire to achieve an objective standardization in deriving multigroup cross sections, has motivated several groups to develop computer programs to accomplish this task. Several examples are the GALAXY code,[1] the Atomics International Cross Section Program,[2] and the RBU code.[3] These efforts have been guided by recent developments in the theory of cross sections exemplified by the studies of resonance effects.[4-6] The cross-section programs now in existence are usually designed to generate cross sections for some specific use and hence are not completely general in one sense or another. For example, a detailed calculation in the resonance region may be excluded, or a calculation of the weighting spectrum appropriate to a particular composition may be lacking.

The MC^2 code attempts to provide a total system capability in the sense of generating a complete cross-section set, using an Evaluated Nuclear Data File (ENDF), suitable for direct use by neutronics codes without performing ancillary calculations.

Some of the features of MC^2 will now be described. MC^2 is written for a 64K CDC-3600 computer using 3600 FORTRAN language. The code utilizes nine magnetic tapes (Appendix C).

The degree to which the basic ENDF data are initially subdivided preparatory to averaging, is variable in MC^2 consistent with the dimension limitations of the code (Table II). In the practical case, we are required to conserve both memory space and computer time, so that MC^2 initially evaluates group cross sections on both a fine and an ultrafine scale. Data that are relatively slowly varying are calculated for fine groups. Data that are rapidly varying, such as elastic scattering and resolved resonant cross sections, are calculated for ultrafine groups.

Cross sections in the resolved resonance region are calculated using Doppler-broadened line shapes with an equivalence relation to account for heterogeneities. The interference between resonance and potential scattering and the interference with overlapping resonances in other isotopes are allowed.

Cross sections in the unresolved resonance region are computed by taking averages over suitable Porter-Thomas distributions of the neutron and fission widths. The program does the calculation for both s- and p-wave neutrons and includes a summation over spin states in each case. The program also permits energy variation of the fission and reduced neutron widths over the unresolved region.

The Doppler line-shape functions are obtained from interpolation in a previously generated table of the complex probability integral.[7] Outside the range of the table, various analytical approximations are utilized consistent with the value of the argument.

Quantities that are smoothly varying with respect to energy are represented in the library by the coordinates of end points of linear segments taken from graphs of ln E vs ln σ, ln E vs σ, or E vs σ, where σ may be a cross section or other quantity of interest which varies with energy E. Since the quantities tabulated are then linear functions of the energy, they may be easily integrated analytically, using an assumed flux shape, to obtain a suitable average over a fine group of arbitrary width.

Inelastic scattering and n,2n matrices are computed from excitation functions for individual levels and by using a nuclear evaporation model above the region of resolved levels.

Elastic scattering and transport cross sections are computed from Legendre coefficients for the expansions of the scattering angular-distribution data.

The fundamental-mode weighting spectrum may be calculated in either the ordinary P1 approximation or the consistent P1 or B1 approximations. Iteration on buckling to criticality may be done, if desired.

II. GENERAL COMMENTS CONCERNING OVERALL CODE OPERATION

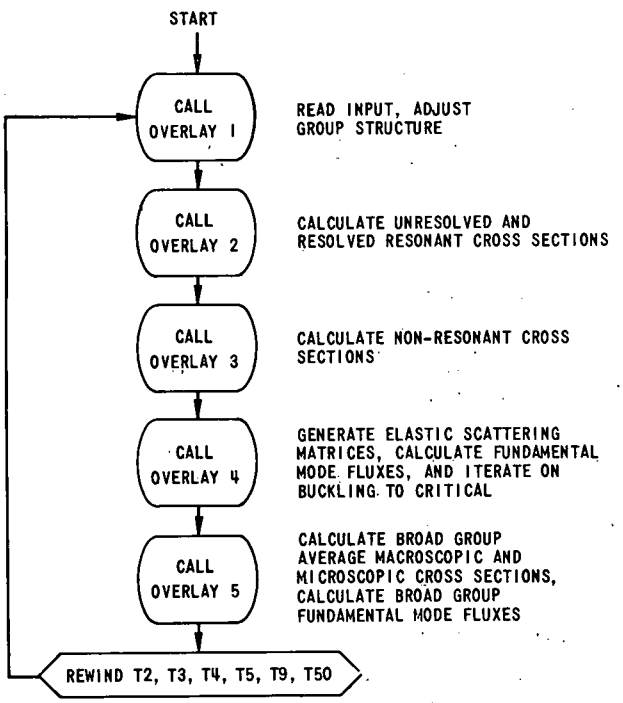
MC^2 has a group structure hierarchy consisting of three levels: ultrafine groups (ufg), fine groups (fg), and broad groups (bg). The code computes fine-group cross sections for reactions that are slowly varying with energy (see Section III-B-1). Ultrafine-group cross sections are generated for resolved resonant reactions and elastic moderation unless the user chooses to make all calculations at a fine-group level.

Fine- and ultrafine-group fluxes are calculated using either a P1, or consistent P1 or B1 fundamental-mode calculation for the specified problem composition with either an input buckling, or iterating on buckling, until criticality is achieved. The consistent options are not available for an all-fine-group problem. In this case, the user may choose to input arbitrary fine-group fluxes rather than have the code calculate them. The

code uses the ultrafine- and fine-group fluxes to collapse the ultrafine- and fine-group cross sections to equivalent broad-group cross sections.

As part of the input, the user specifies the number of broad groups, the broad-group energy boundaries, and the fine-group lethargy width. With the present library, the ultrafine lethargy width is 1/120. A typical problem might have 22 broad groups, 60 fine groups (each with a lethargy width of 0.25), and 1800 ultrafine groups with 30 ultrafine groups per fine group.

The code operates within the overlay capability of the CDC-3600 and consists of a main section and five overlays on a program overlay tape (T23). Figure 1 gives an overall view of the flow through the program and gives a brief statement of the task accomplished by each overlay. Figures 2-7 give a somewhat more detailed description of the logical flow within the last four overlays. Elaboration of the particular algorithms used and specific details are given later in Section III of this report.



112-6996 Rev. 1

Fig. 1. Main Flow Diagram

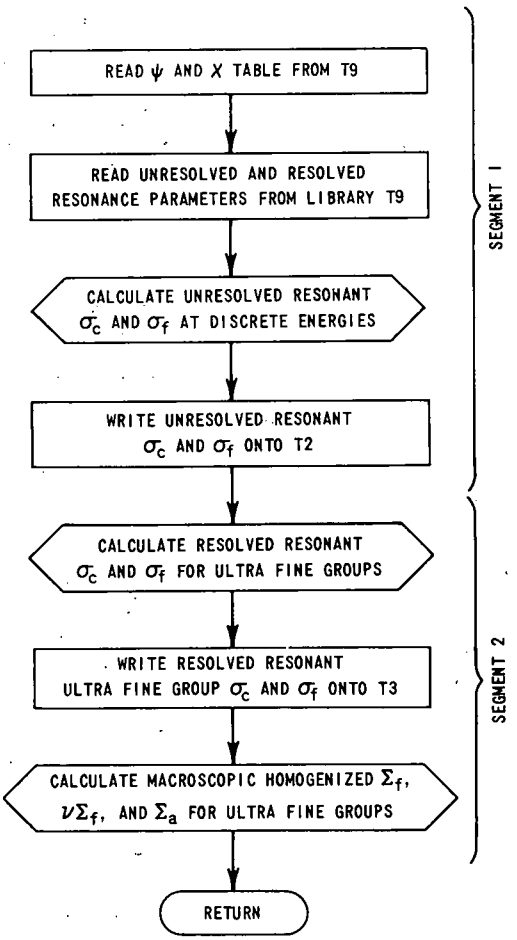


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Fig. 2. Overlay 2 Flow Diagram; Calculates Unresolved and Resolved Resonant Cross Sections.

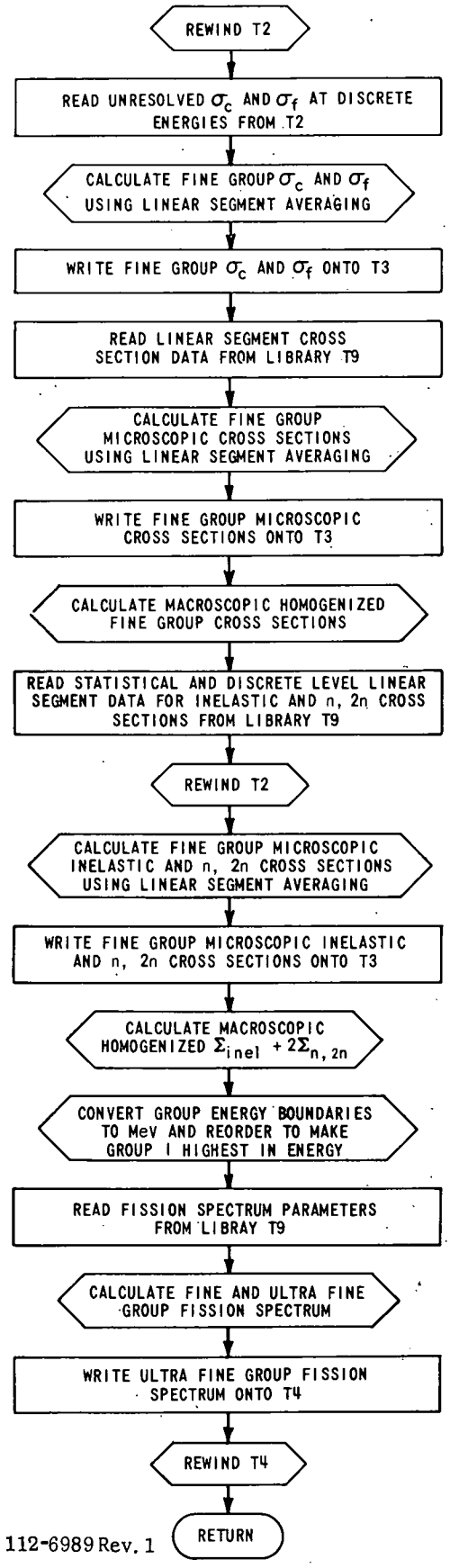

Fig. 3. Overlay 3 Flow Diagram; Calculates Nonresonant Cross Sections.

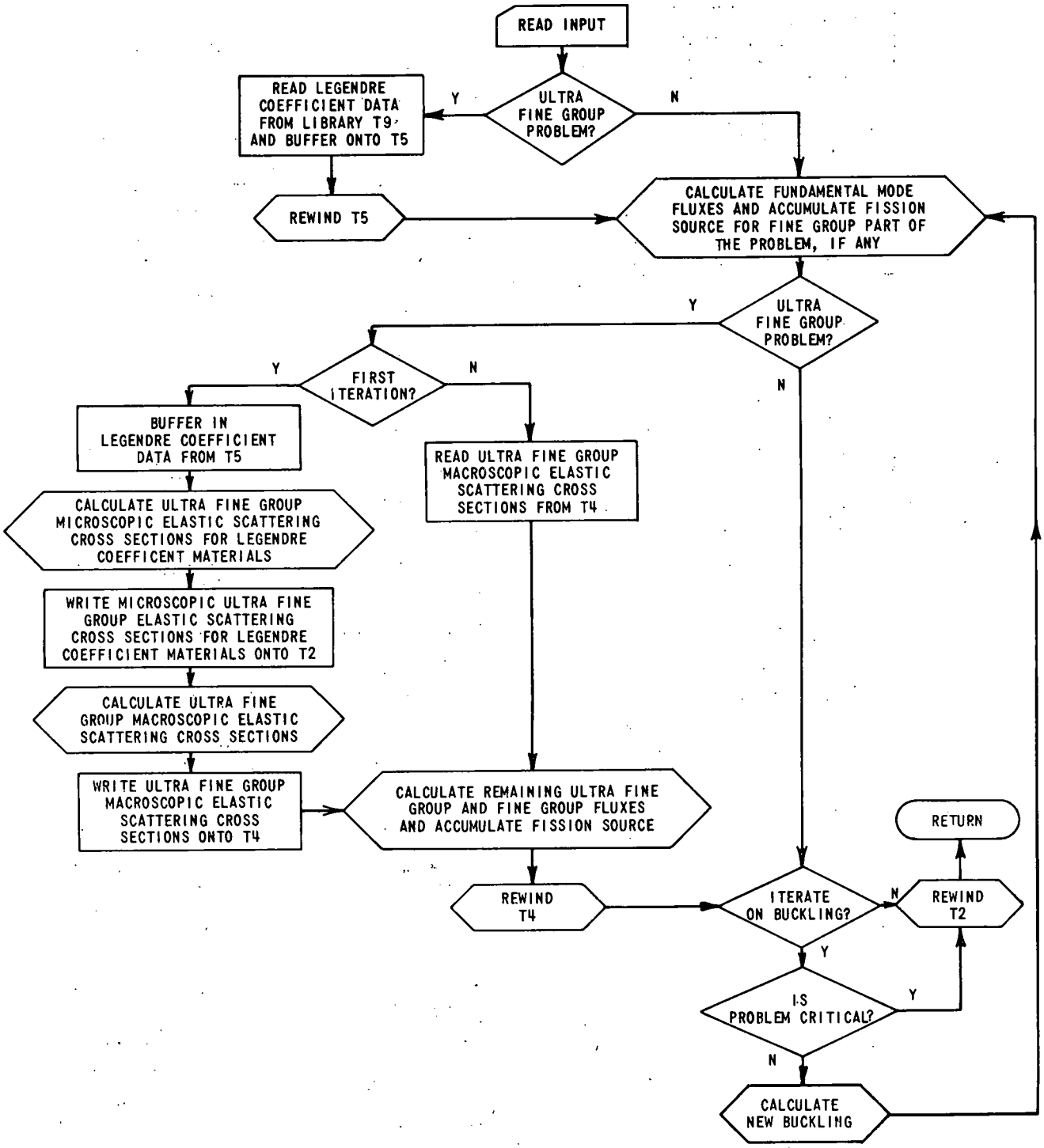

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Fig. 4. Overlay 4 Flow Diagram; Generates Elastic Scattering Matrices, and Calculates Fundamental-mode Fluxes.

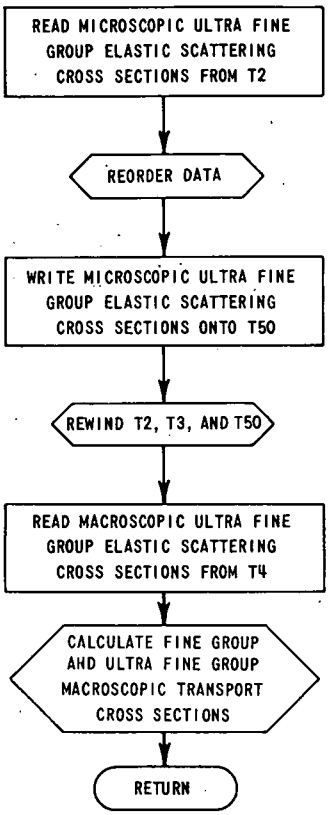

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Fig. 5. Overlay 5 Segment 1 Flow Diagram; Calculates Broad-group Average Macroscopic Cross Sections.

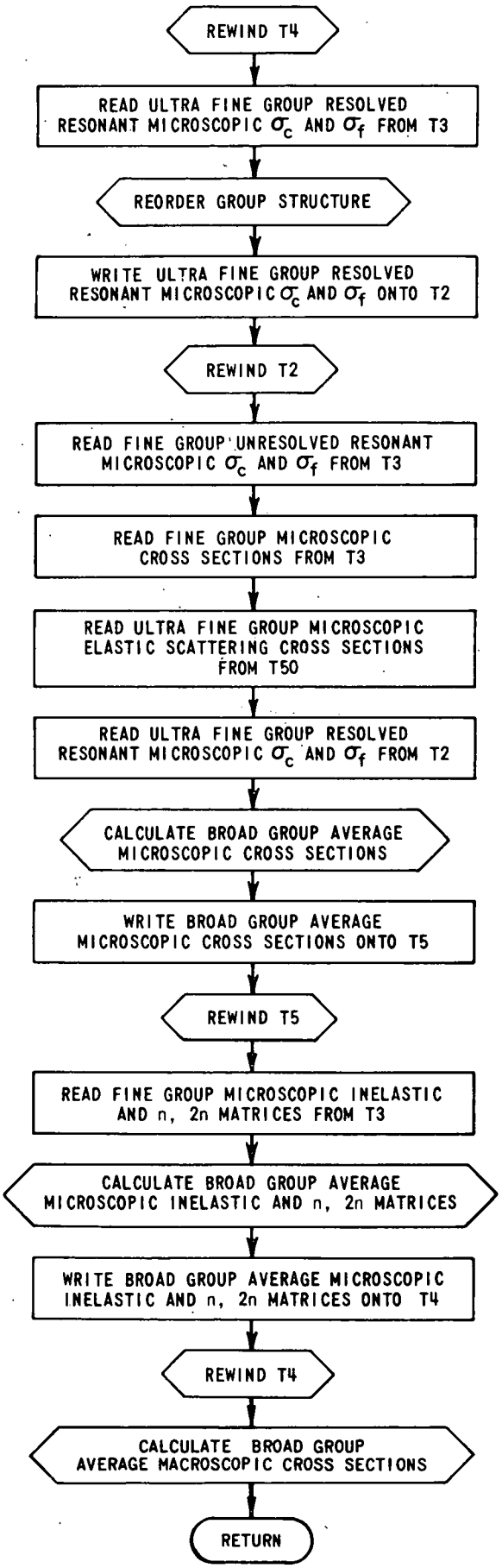

Fig. 6

Overlay 5 Segment 2 Flow Diagram; Calculates Broad-group Average Microscopic Cross Sections.

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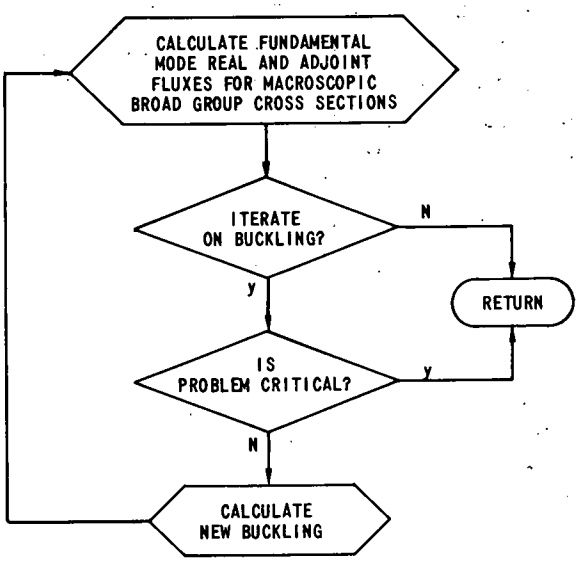

112-8261

Fig. 7. Overlay 5 Segment 3 Flow Diagram; Calculates Broad-group Fundamental-mode Fluxes.

The structure of the code is related to that of the library tape (T9), which consists of six main categories. The first of these contains the table of the real and imaginary parts of the W function. The second contains unresolved and resolved resonance parameters. The third consists of linear-segment data for various nonresonant quantities. (By linear segments is meant a series of energies and corresponding cross sections, for example, with a linear interpolation law to be used in obtaining values of the cross section at intermediate-energy values.) The fourth contains discrete and statistical level data for the calculation of inelastic and n,2n cross sections. The fifth contains data pertinent to the calculation of the fission spectra. The last file contains Legendre-coefficient data for elastic scattering.

Overlay 1 reads input and readjusts the broad-group energy structure, so that broad groups fall at multiples of the fine groups.

Overlay 2 is concerned with the calculation of unresolved (Segment 1) and resolved (Segment 2) resonance cross sections. For the unresolved region, cross sections are calculated at discrete energy points and then converted to fine-group cross sections in Overlay 3 by linear-segment interpolation. The resolved-resonance group cross sections are generated directly in Overlay 2, using Doppler-broadened cross sections as described in Section III-A below. In Overlay 2, as elsewhere in the code, both composition-homogenized macroscopic and individual material microscopic cross sections are generated. Computed macroscopic quantities are generally transmitted to other parts of the code through COMMON storage, whereas microscopic quantities are generally transmitted via binary tape.

Overlay 3 contains the programming that generates fine-group cross sections for quantities that are related to energy via linear-segment data. In this calculation, a flux-weighting spectrum is user-designated for the linear-interpolation calculation as described in Section III-B below. Overlay 3 also generates the fission spectrum as specified by the user.

Overlay 4 generates elastic scattering matrices using the methods of the ELMOE code[8] and generates a fundamental-mode spectrum for the macroscopic homogenized composition cross sections and for a given buckling. The code will iterate on buckling to criticality if desired. Because of the large volume of data generated for the scattering matrices, this macroscopic data is transmitted via binary tape rather than through COMMON storage.

Overlay 5 utilizes the flux spectrum to collapse the ultrafine- and fine-group cross sections to be consistent with the specified broad-group structure. The homogenized macroscopic broad-group cross sections are generated in Segment 3 of Overlay 5, and the individual material microscopic cross sections are computed in Segment 2 of Overlay 5.

The overlay tape structure is indicated in Table I, which gives the program and subroutine names associated with each area of the program tape.

TABLE I. Overlay Tape (T23) Structure

Overlay Tape Area	Program Name	Subroutine Names
Main	DRIVER	SYSTEM
Overlay 1	INPUT	-
Overlay 2	RESXEC	QUICKW
Segment 1	UNRES	QFJ
Segment 2	RESRES	-
Overlay 3	CONTROL1	FIGERO SIGAVC INSCAT SOURCE ROMBI EF
Overlay 4	CONTROL2	PONE ALRAGO
Overlay 5	CONTROL3	-
Segment 1	AVER	OGARLA
Segment 2	AVER1	-
Segment 3	BGPONE	-

Table II lists some of the more important dimension limitations of the present MC^2. The MC^2 code is listed in Appendix F.

TABLE II. Problem Dimension Limitations

Quantity	Limit	Quantity	Limit
No. of broad groups	49	No. of ultrafine groups	2100
No. of fine groups	70	No. of materials	20

An MC^2 problem for a typical large fast reactor composition requires of the order of 15 to 80 min, depending upon the parameters of the problem. The timing considerations are elaborated on in Appendix I.

III. DETAILS OF CALCULATIONAL ALGORITHMS

A. Overlay 2

1. Program UNRES and Program RESRES

Calculations in the resonance region may be either for homogeneous mixtures, or for heterogeneous systems making use of an equivalence relation. For the heterogeneous case, two regions in either slab or cylindrical geometry may be used. The user supplies the radius (or half-thickness) of the fuel region (pin) and the radius (or outer bound relative to the center of the fuel slab) of the outer region (homogenized clad-coolant). If the pin radius is input as zero, the problem reverts to a homogeneous calculation.

For the heterogeneous case, the user supplies atom densities for materials in the pin and for materials in the outer region. For a homogeneous calculation, only the pin concentrations are required.

Cross sections for materials present in the pin region are obtained using the equivalence relation discussed below in which the total potential-scattering cross section is augmented by an "escape" cross section. Outer-region materials have cross sections obtained using a homogeneous treatment in which the total cross section used in the calculation results from the volume-weighted mixture of pin and outer-region contributions. If a material appears in both the pin and the outer region, the code obtains its resonance cross sections as an outer-region material. Thus, for example, for a sodium-logged oxide fuel with an outer sodium-coolant region, the sodium resonant-capture cross section is obtained with a total cross-section weighting (see Eq. 24 below) corresponding to the volume-weighted pin and outer-region mixture.

For heterogeneous calculations, the potential-scattering cross section per absorber atom is given by

$$\sigma_p^* = \frac{\Sigma_p + \Sigma_e^*}{N_0}, \tag{1}$$

where Σ_p is the homogeneous potential scattering for the pin composition, N_0 is the atom density of the material being calculated, and

$$\Sigma_e^* = \Sigma_e \frac{a(1 - C)}{1 + (a - 1) C}, \tag{2}$$

where

$$\Sigma_e = \frac{S_0}{4V_0}, \tag{3}$$

$$C = 1 - \gamma_B - \gamma_B^4(1 - \gamma_B), \tag{4}$$

$$\gamma_B = \frac{\Sigma_1}{\Sigma_1 + \Sigma_{e_1}}, \tag{5}$$

and

$$\Sigma_{e_1} = \frac{S_0}{4V_1}, \tag{6}$$

where Σ_1 is the outer-region total cross section, and S_0, V_0, and V_1 are, respectively, the pin surface, pin volume, and outer region volume. In generating Σ_1, the code includes the total resolved resonant cross section plus background potential scattering for the clad-coolant mixture. Any unresolved contribution is neglected.

The user inputs the factor a. A typical value for a is 1.35. Equation 4 is a modified Bell approximation[9] for the Dancoff factor suggested by Hummel.[10]

The single-level Breit-Wigner formalism is used in MC^2 for calculation of resonance cross sections. Specifically, the code uses

$$\sigma_c(E) = \sigma_0 \frac{\Gamma_\gamma}{\Gamma} \left(\frac{E_0}{E}\right)^{1/2} \psi(\xi, x), \tag{7}$$

$$\sigma_f(E) = \sigma_0 \frac{\Gamma_f}{\Gamma} \left(\frac{E_0}{E}\right)^{1/2} \psi(\xi, x), \tag{8}$$

and

$$\sigma_n(E) = \sigma_0 \frac{\Gamma_n}{\Gamma} \psi(\xi, x) + \left(\sigma_0 \sigma_p g \frac{\Gamma_n}{\Gamma}\right)^{1/2} \chi(\xi, x) + \sigma_p, \tag{9}$$

where

$$\sigma_0 = 4\pi g \lambda_0^2 \frac{\Gamma_n}{\Gamma} \left(\frac{A + 1}{A}\right)^2, \tag{10}$$

$$\xi = \left(\frac{A\Gamma^2}{4E_0kT}\right)^{1/2} = \frac{\Gamma}{\Delta}, \tag{11}$$

$$x = \frac{2(E - E_0)}{\Gamma}, \tag{12}$$

and all widths are measured at the resonance energy E_0. Note that interference scattering is included in Eq. 9.

The usual Doppler-broadened line-shape functions, ψ and χ, are related to the complex probability integral W through the following expressions:

$$\psi(\xi, x) = \frac{\xi\sqrt{\pi}}{2} \mathrm{Re}W\left(\frac{\xi x}{2}, \frac{\xi}{2}\right), \tag{13}$$

and

$$\chi(\xi, x) = \xi\sqrt{\pi}\, \mathrm{Im}W\left(\frac{\xi x}{2}, \frac{\xi}{2}\right). \tag{14}$$

The code obtains the required values for W using the subroutine QUICKW described in Section III-A-2 below.

For the unresolved resonance calculations (program UNRES), cross sections are evaluated at discrete energy points E^* in the unresolved energy region. Calculations are done for both s- and p-wave neutrons and include a summation over spin states in each case. The program permits an energy variation of the fission and reduced-neutron widths so that the library contains average reduced-neutron and fission widths at the various E^* points.

Equations 7-9 are modified for the unresolved calculation in that the factors $(E_0/E)^{1/2}$ are replaced by unity and the interference-scattering term of Eq. 9 is ignored.

The evaluation of the effective unresolved resonant-capture cross section at energy E^* for material m, $\overline{\sigma_c^m(E^*)}$, is based on the expression

$$\overline{\sigma_c^m(E^*)} = \frac{\frac{1}{E_2 - E_1}\int_{E_1}^{E_2} \frac{\sigma_c^m(E)}{\sigma_t(E)}\, dE}{\frac{1}{E_2 - E_1}\int_{E_1}^{E_2} \frac{dE}{\sigma_t(E)}}. \tag{15}$$

In Eq. 15, $\sigma_t(E)$ is the total cross section per absorber m atom, and the energy limits E_1 and E_2 span some arbitrary energy interval containing the energy point E^*. Equation 15 may be written as

$$\overline{\sigma_c^m(E^*)} = \frac{\dfrac{1}{E_2 - E_1}\displaystyle\int_{E_1}^{E_2} \frac{\sum_s^m \sum_i \sigma_{c_i}^{ms}(E)\, dE}{\sum_s \sum_i \sigma_{r_i}^s(E) + \sigma_p}}{\dfrac{1}{E_2 - E_1}\displaystyle\int_{E_1}^{E_2} \frac{dE}{\sum_s \sum_i \sigma_{r_i}^s(E) + \sigma_p}}. \tag{16}$$

In Eq. 16, the total cross section, $\sigma_t(E)$, has been broken into a resonant part, $\sigma_r(E)$, and the remainder, which is denoted by σ_p. We will assume that the resonances contributing to σ_r are narrow so that σ_p includes the resolved resonant total cross sections for all nonnarrow resonances in the mixture, and the total background potential-scattering cross section for all materials present. The code includes resonant contributions to σ_p for all materials in the mixture of mass less than 100. The term σ_p is evaluated at E^*, and for heterogeneous calculation of pin materials, the escape cross section per absorber m atom, $\Sigma_e^* N_0^m$ is also included.

In Eq. 16, s represents a particular sequence of resonances (particular angular momentum and channel spin) and the i's are the resonances belonging to that sequence. The sum in the numerator of the upper integral ranges only over those sequences belonging to isotope m; the other sums range over all sequences for all included materials. Thus σ_r may contain several sequences for each of a number of isotopes. The shorthand notation in Eq. 16 could be rewritten as

$$\sum_s \sum_i \sigma_{r_i} = \sum_m \sum_s \sum_i \sigma_{r_i}^{ms},$$

where m ranges over all materials in the mixture of mass ≥ 100.

In the following, for simplicity, we will drop the functional dependence in the notation so that $\sigma_{r_i}^s$ should be understood to refer to $\sigma_{r_i}^s(E)$.

The numerator of Eq. 16 may be rewritten as[11]

$$\sum_s^m \sum_i \frac{1}{E_2 - E_1} \int_{E_1}^{E_2} \frac{\sigma_{c_i}^s}{\sigma_{r_i}^s + \sigma_p} \left[1 - \sum_{s' \neq s} \sum_{i'} \frac{\sigma_{r_{i'}}^{s'}}{\sigma_{r_{i'}}^{s'} + \sigma_p} \right]. \tag{17}$$

In deriving Eq. 17, we have explicitly ignored overlap effects between different resonances of the same sequence, and overlap between more than two sequences.

Similarly, the denominator of Eq. 16 becomes

$$\frac{1}{\sigma_p}\left\{1 - \sum_s \sum_i \frac{1}{E_2 - E_1} \int_{E_1}^{E_2} \frac{\sigma_{r_i}^s}{\sigma_{r_i}^s + \sigma_p} \left[1 - \sum_{s' \neq s} \sum_{i'} \frac{\sigma_{r_{i'}}^{s'}}{\sigma_{r_{i'}}^{s'} + \sigma_p}\right] dE\right\}. \quad (18)$$

The superscript m in Eq. 17 implies that s ranges over all sequences belonging to material m.

The interval $E_2 - E_1$ may be replaced by the average spacing of the resonances of sequence s, $\langle D^s \rangle$, times the number of resonances, N^s, contained in the interval. Also, since the sequences s' are uncorrelated with sequence s, it is necessary to integrate the second sequence sums in Eqs. 17 and 18 over the probability of finding resonance i' of s' at a separation δ from resonance i of s, where δ ranges from $-(E_i - E_1)$ to $(E_2 - E_i)$ and E_i is the location of the resonance i in the interval $E_2 - E_1$.

Consistent with the assumption of narrow resonances, the integration limits may be changed from E_1, E_2 to $-\infty$, ∞. Also, assuming the number of resonances in the interval is large, we may replace

$$\frac{1}{N^s} \sum_i$$

with an integration over the chi-squared distribution with n degrees of freedom,

$$P_n(r)\, dr = \frac{n}{2} \frac{1}{\Gamma\left(\frac{n}{2}\right)} \left(\frac{nr}{2}\right)^{\frac{n}{2}-1} \exp\left(-\frac{nr}{2}\right) dr.$$

Thus, Eq. 17 may be written

$$\sum_s^m \int_0^\infty P_n(r) \int_0^\infty \frac{\Gamma_\gamma^s}{\langle D^s \rangle} \frac{\psi^s}{\psi^s + \beta^s} dx dr \left[1 - \sum_{s' \neq s} \int_0^\infty P_n(r) \int_0^\infty \frac{\Gamma^{s'} \psi^{s'}}{\langle D^{s'} \rangle (\psi^{s'} + \beta^{s'})} dx dr\right], \quad (19)$$

where $\beta^s = \sigma_p / \sigma_0^s$, and σ_0 and x are given by Eqs. 10 and 12, respectively.

Equation 18 may be similarly rewritten as

$$\frac{1}{\sigma_p}\left\{1 - \sum_s \int_0^\infty P_n(r) \int_0^\infty \frac{\Gamma^s}{\langle D^s\rangle} \frac{\psi^s}{\psi^s + \beta^s}\, dxdr \left[1 - \sum_{s'=s} \int_0^\infty P_n(r) \int_0^\infty \frac{\Gamma^{s'}\psi^{s'}}{\langle D^{s'}\rangle(\psi^{s'} + \beta^{s'})}\, dxdr\right]\right\}. \quad (20)$$

By suitable factoring of Eq. 20 and recognizing that the product of terms involving the series s and s' are second-order corrections, we may show[11] finally that

$$\overline{\sigma_c^m(E^*)} = \sum_s^m \frac{\frac{\sigma_p \Gamma_\gamma^s}{\langle D^s\rangle} \int_0^\infty P_n(r) \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dxdr}{1 - \frac{1}{\langle D^s\rangle} \int_0^\infty P_n(r)\, \Gamma^s \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dxdr}. \quad (21)$$

Equation 21 is suitable for fertile isotopes m. For fissile isotopes, we must include an integration over the chi-squared distribution, $P_k(\delta)$, for the fission widths. Thus, for fissile isotopes

$$\overline{\sigma_c^m(E^*)} = \sum_s^m \frac{\frac{\sigma_p \Gamma_\gamma^s}{\langle D^s\rangle} \int_0^\infty P_n(r) \int_0^\infty P_k(\delta) \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dxdrd\delta}{1 - \frac{1}{\langle D^s\rangle} \int_0^\infty P_n(r) \int_0^\infty P_k(\delta)\, \Gamma^s \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dxdrd\delta}; \quad (22)$$

$$\overline{\sigma_f^m(E^*)} = \sum_s^m \frac{\frac{\sigma_p}{\langle D^s\rangle} \int_0^\infty P_n(r) \int_0^\infty P_k(\delta)\, \delta\overline{\Gamma_f(E^*)} \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dxdrd\delta}{1 - \frac{1}{\langle D^s\rangle} \int_0^\infty P_n(r) \int_0^\infty P_k(\delta)\, \Gamma^s \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dxdrd\delta}. \quad (23)$$

In Eqs. 21-23, r and δ are, respectively, the ratio of neutron width at E to mean neutron width at E^*, and fission width at E to mean fission width at E^*, $\overline{\Gamma_f(E^*)}$. The code allows values of k from 1 to 5 and n of 1 or 2. The library tabulation specifies the number of degrees of freedom to be used in the two width distributions.

The integrals involving the ψ functions above are just the familiar J functions, where

$$J(\xi^s, \beta^s) = \int_0^\infty \frac{\psi^s}{\psi^s + \beta^s}\, dx.$$

Equations 21-23 are usually written in a more compact form using angular brackets, $\langle\ \rangle$, to denote averages over the chi-squared distributions. Thus, for example, Eq. 21 is usually represented as

$$\overline{\sigma_c^m(E^*)} = \sum_s^m \frac{\sigma_p \dfrac{\langle \Gamma_\gamma^s J^s \rangle}{\langle D^s \rangle}}{1 - \dfrac{\langle \Gamma^s J^s \rangle}{\langle D^s \rangle}}.$$

The mean neutron width at E^* for neutrons of angular momentum ℓ and total channel spin J, $\Gamma_n(E^*)_{\ell,J}$ is evaluated using

$$\overline{\Gamma_n(E^*)}_{\ell,J} = \overline{\Gamma^0_{n_{\ell,J}}(E^*)}\ \sqrt{E^*} \cdot V_\ell \cdot \mu_{\ell,J},$$

where V_ℓ, the penetration factor for neutrons of angular momentum ℓ, is

$$V_0 = 1$$

and

$$V_1 = \frac{n^2}{1 + n^2}, \qquad n = \frac{R}{\lambda\!\!\!^{-*}},$$

where R is the nuclear radius, $\lambda\!\!\!^{-*}$ is the reduced wavelength at energy E^*, and $\mu_{\ell,J}$, the number of entrance channels for neutrons of the ℓ,J sequence, is

$$\mu_{0,J} = 1$$

and

$$\mu_{1,J} = 1 \text{ or } 2.$$

If $\mu = 1$, $P_1(r)$ is used; if $\mu = 2$, the $P_2(r)$ neutron-distribution function is used. The library supplies the $\overline{\Gamma^0_{n_{\ell,J}}(E^*)}$ and $\mu_{\ell,J}$.

The library is organized so that for the unresolved resonant data each element may consist of up to four isotopes, each with its own resonance parameters. In the evaluation of Eqs. 19 and 20, the code combines the contributions from the associated isotopes according to their abundances, which are also read from the library. This device provides a convenient way of grouping isotopes of similar characteristics on the library tape and also facilitates the calculation of cross sections for naturally occurring materials such as, for example, tungsten. The mass of the naturally occurring material is used for all isotopes for this material.

The code also allows the unresolved region to overlap the resolved resonance region. This is convenient, for example, at higher energies where a large number of weak p-wave resonances may be unresolved whereas members of the s-wave population are resolved.

The calculation of the effective ultrafine- (or fine)-group cross sections in the resolved resonant region (program RESRES) involves a flux weighting assuming $\phi(E) \sim 1/\Sigma_t(E)$ so that, for group i and material m,

$$\left\langle \sigma_c^m \right\rangle_i = \frac{\sum_j \int_{E_i}^{E_{i+1}} \frac{\sigma_c^m(E)_j}{\Sigma_t(E)} dE}{\int_{E_i}^{E_{i+1}} \frac{dE}{\Sigma_t(E)}} \tag{24}$$

The E_i and E_{i+1} are, respectively, the lower and upper energy boundaries of group i. The sum is over all resonances j belonging to material m which contribute to the group i cross section. The decision of whether to include a given resonance is based upon a comparison of the size of σ_a and σ_t resonant at the group boundaries due to the resonance, and the input test criterion EPSABS.

The $\Sigma_t(E)$ in Eq. 24 includes the total resonant plus smooth background scattering for all materials in the mixture. The full expressions of Eqs. 7-9 are used so that

$$\Sigma_t(E) = \sum_m N^m \sum_j \left\{ \sigma_{0_j}^m \psi_j(\xi, x) \left[\frac{\Gamma_{\gamma_j}^m + \Gamma_{f_j}^m}{\Gamma_j^m} \left(\frac{E_{0_j}^m}{E} \right)^{1/2} + \frac{\Gamma_{n_j}^m}{\Gamma_j^m} \right] + \left(\sigma_{0_j}^m \sigma_{p_j}^m g_j^m \frac{\Gamma_{n_j}^m}{\Gamma_j^m} \right)^{1/2} \chi_j(\xi, x) \right\} + \Sigma_m. \tag{25}$$

The sum is over all materials in the mixture each having atomic density N^m, and over all resonances j belonging to each material m. A test is made on the size of the total resonant cross section at each end of the group i due to the resonance j compared to the input test criterion EPSTOT. Denoting the quantity in the brackets { } in Eq. 25 as $\sigma_{t_j}^{\text{resonant}}(E)$, the test examines the size of the quantity

$$\left| \sigma_{t_j}^{\text{resonant}}(E_i) \right| + \left| \sigma_{t_j}^{\text{resonant}}(E_{i+1}) \right| - 2(\text{EPSTOT}).$$

Those resonances for which the result is negative or zero and which do not lie within the group i are assigned the constant average value

$$\frac{\sigma_{t_j}^{\text{resonant}}(E_i) + \sigma_{t_j}^{\text{resonant}}(E_{i+1})}{2}$$

for their contribution to the group i total cross section for use in the integration of Eq. 24. Other resonances are evaluated with their usual energy dependences as given in Eq. 25.

The smooth background potential-scattering cross section, Σ_m, includes the contribution of all materials. Thus,

$$\Sigma_m = \sum_m N^m \sigma_p^m. \tag{26}$$

For heterogeneous calculations, pin materials have the Σ_e^* of Eq. 2 added to Eq. 25.

The $\langle \sigma_f^m \rangle_{ij}$ is obtained by multiplying Eq. 24 by Γ_f/Γ_γ, the ratio of fission to radiative capture widths.

Program details of Overlay 2 are presented in Appendix A.

2. Subroutine QUICKW

QUICKW uses a six-point interpolation formula in two 62 x 62 tables of the real and imaginary parts of $W(x, y)$, which are stored as the first file on the library tape (T9). The tabulated values are given on a mesh of 0.1 for $-0.1 \le x \le 6.0$ and $-0.1 \le y \le 6.0$ and were generated using the W program.[7] Appendix H lists the code used for generating the W table. For a mesh of width h, the interpolation formula used is

$$\begin{aligned} f(x_0 + ph,\ y_0 + qh) = {} & \frac{q(q-1)}{2} f(x_0,\ y_0 - h) + \frac{p(p-1)}{2} f(x_0 - h,\ y_0) \\ & + (1 + pq - p^2 - q^2) f(x_0,\ y_0) + \frac{p(p - 2q + 1)}{2} f(x_0 + h,\ y_0) \\ & + \frac{q(q - 2p + 1)}{2} f(x_0,\ y_0 + h) + pqf(x_0 + h,\ y_0 + h), \end{aligned} \tag{27}$$

where p and q lie between 0 and 1 and the f are the real or imaginary parts of W.

Outside the tabulated range, QUICKW uses the rational approximation,[12]

$$W(z) = iz\left(\frac{0.5124242}{z^2 - 0.2752551} + \frac{0.05176536}{z^2 - 2.724745}\right) \tag{28}$$

when $6.0 \le |z| \le 12.0$, and

$$W(z) = \frac{2}{\sqrt{\pi}} iz\left(\frac{1}{2z^2 - 1}\right) \tag{29}$$

when $12.0 \leq |z| \leq 100.0$.[7] For larger values of the arguments, the natural line shape is assumed, so that

$$W(z) = \frac{i}{\sqrt{\pi}\, z} \tag{30}$$

for $|z| > 100.0$.

B. Overlay 3

1. Subroutine FIGERO and Subroutine SIGAVC

Fine-group effective cross sections for various nonresonant quantities are obtained in Overlay 3. These quantities, represented as continuous curves by means of linear segments, are contained on the third file of the library tape and include σ_s, $\bar{\mu}$, $\sigma_{inelastic}$, σ_f, σ_c, $\sigma_{n,2n}$, $\sigma_{n,p}$, and $\sigma_{n,\alpha}$. The σ_c and σ_f are intended to supply any deficiency between the observed capture and fission cross sections, and the quantities calculated using the resonance parameters.

The cross sections and corresponding discrete energy points are given as pairs of numbers (σ_n, E_n), and each type of quantity is associated with one of three types of interpolation laws. These are:

ln E vs ln σ interpolation

$$\sigma(E) = \left(\frac{E}{E_n}\right)^{A_n} \sigma_n; \qquad A_n = \frac{\ln \sigma_{n+1} - \ln \sigma_n}{\ln E_{n+1} - \ln E_n}; \tag{31}$$

ln E vs σ interpolation

$$\sigma(E) = A_n \ln \frac{E}{E_n} + \sigma_n; \qquad A_n = \frac{\sigma_{n+1} - \sigma_n}{\ln E_{n+1} - \ln E_n}; \tag{32}$$

E vs σ interpolation

$$\sigma(E) = A_n(E - E_n) + \sigma_n; \qquad A_n = \frac{\sigma_{n+1} - \sigma_n}{E_{n+1} - E_n}. \tag{33}$$

In obtaining effective quantities for the fine groups, the program assumes a flux weighting spectrum $\phi(E)$, which is user-designated as either $1/E$, constant, or E, so that for fine group i and material m,

$$\left\langle \sigma_x^m \right\rangle_i = \frac{\int_{E_i}^{E_{i+1}} \sigma_x^m(E)\, \phi(E)\, dE}{\int_{E_i}^{E_{i+1}} \phi(E)\, dE}. \tag{34}$$

The x corresponds to the various cross-section types such as inelastic, capture, etc. The integral in Eq. 34 is evaluated by piecewise integration over the linear segments. Using Eqs. 31-33 to obtain the $\sigma(E)$, we obtain for the $1/E$, constant, and E weighting spectra:

ln E vs ln σ interpolation

$$\left\langle \sigma^m \right\rangle_i = \frac{\sigma_n^m}{(E_n^m)^{A_n^m}} \cdot \frac{1}{\Delta U} \left\{ \frac{1}{A_n^m} \left[E_{i+1}^{A_n^m} - E_i^{A_n^m} \right] \right\}, \quad \frac{1}{E} \text{ weighting,}$$

$$= \frac{\sigma_n^m}{(E_n^m)^{A_n^m}} \cdot \frac{1}{E_{i+1} - E_i} \left\{ \frac{1}{A_n^m + 1} \left[E_{i+1}^{A_n^m+1} - E_i^{A_n^m+1} \right] \right\}, \quad \text{constant weighting,}$$

$$= \frac{\sigma_n^m}{(E_n^m)^{A_n^m}} \cdot \frac{2}{E_{i+1}^2 - E_i^2} \left\{ \frac{1}{A_n^m + 2} \left[E_{i+1}^{A_n^m+2} - E_i^{A_n^m+2} \right] \right\}, \quad \text{E weighting.} \tag{35}$$

$$\left\langle \frac{1}{\sigma^m} \right\rangle_i = \frac{(E_n^m)^{A_n^m}}{\sigma_n^m} \cdot \frac{1}{\Delta U} \left\{ \frac{1}{-A_n^m} \left[E_{i+1}^{-A_n^m} - E_i^{-A_n^m} \right] \right\}, \quad \frac{1}{E} \text{ weighting,}$$

$$= \frac{(E_n^m)^{A_n^m}}{\sigma_n^m} \cdot \frac{1}{E_{i+1} - E_i} \left\{ \frac{1}{-A_n^m + 1} \left[E_{i+1}^{-A_n^m+1} - E_i^{-A_n^m+1} \right] \right\}, \quad \text{constant weighting,}$$

$$= \frac{(E_n^m)^{A_n^m}}{\sigma_n^m} \cdot \frac{2}{E_{i+1}^2 - E_i^2} \left\{ \frac{1}{-A_n^m + 2} \left[E_{i+1}^{-A_n^m+2} - E_i^{-A_n^m+2} \right] \right\}, \quad \text{E weighting.} \tag{36}$$

Note that the special cases for which A_n^m takes on the values ± 1 and ± 2 require special treatment since the constant-weighting and E-weighting forms of Eqs. 35 and 36 become indeterminate. These singular cases are evaluated by replacing the quantities in the braces { } with the limiting value $\ln (E_{i+1}/E_i)$ and setting the A_n^m to the appropriate values.

ln E vs σ interpolation

$$\langle \sigma^m \rangle_i = \frac{1}{\Delta U}\left\{\frac{A_n^m}{2}\left[(\ln E_{i+1})^2 - (\ln E_i)^2\right] + \left(\sigma_n^m - A_n^m \ln E_n^m\right)\Delta U\right\}, \quad \frac{1}{E} \text{ weighting,}$$

$$= \frac{1}{E_{i+1} - E_i}\left\{A_n^m\left[E_{i+1} \ln E_{i+1} - E_i \ln E_i - E_{i+1} + E_i\right] + \left(\sigma_n^m - A_n^m \ln E_n^m\right)(E_{i+1} - E_i)\right\}, \quad \text{constant weighting,}$$

$$= \frac{2}{E_{i+1}^2 - E_i^2}\left\{\frac{A_n^m}{2}\left[E_{i+1}^2 \ln E_{i+1} - E_i^2 \ln E_i - \frac{E_{i+1}^2 - E_i^2}{2}\right] + \left(\sigma_n^m - A_n^m \ln E_n^m\right)\frac{E_{i+1}^2 - E_i^2}{2}\right\}, \quad E \text{ weighting.} \tag{37}$$

E vs σ interpolation

$$\langle \sigma^m \rangle_i = \frac{1}{\Delta U}\left\{A_n^m(E_{i+1} - E_i) + \left(\sigma_n^m - A_n^m E_n^m\right)\Delta U\right\}, \quad \frac{1}{E} \text{ weighting,}$$

$$= \frac{1}{E_{i+1} - E_i}\left\{A_n^m \frac{E_{i+1}^2 - E_i^2}{2} + \left(\sigma_n^m - A_n^m E_n^m\right)(E_{i+1} - E_i)\right\}, \quad \text{constant weighting,}$$

$$= \frac{2}{E_{i+1}^2 - E_i^2}\left\{A_n^m \frac{E_{i+1}^3 - E_i^3}{3} + \left(\sigma_n^m - A_n^m E_n^m\right)\frac{E_{i+1}^2 - E_i^2}{2}\right\}, \quad E \text{ weighting.} \tag{38}$$

In Eqs. 35-38, ΔU is the lethargy width of the fine group i and the A_n's are defined in Eqs. 31-33.

The second file on the library tape also contains the coefficients for $\nu^m(E)$ expressed as a cubic polynomial for the isotopes m, namely,

$$\nu^m(E) = A_0^m + A_1^m E + A_2^m E^2 + A_3^m E^3. \tag{39}$$

Using Eq. 39 in Eq. 34 yields for the fine-group average ν for material m

$$\left\langle \nu^m \right\rangle_i = \frac{1}{\Delta U}\left\{A_0^m \Delta U + A_1^m (E_{i+1} - E_i) + \frac{A_2^m}{2}\left(E_{i+1}^2 - E_i^2\right) + \frac{A_3^m}{3}\left(E_{i+1}^3 - E_i^3\right)\right\}, \quad \frac{1}{E} \text{ weighting,}$$

$$= \frac{1}{E_{i+1} - E_i}\left\{A_0^m (E_{i+1} - E_i) + \frac{A_1^m}{2}\left(E_{i+1}^2 - E_i^2\right) + \frac{A_2^m}{3}\left(E_{i+1}^3 - E_i^3\right) + \frac{A_3^m}{4}\left(E_{i+1}^4 - E_i^4\right)\right\}, \quad \text{constant weighting,}$$

$$= \frac{2}{E_{i+1}^2 - E_i^2}\left\{\frac{A_0^m}{2}\left(E_{i+1}^2 - E_i^2\right) + \frac{A_1^m}{3}\left(E_{i+1}^3 - E_i^3\right) + \frac{A_2^m}{4}\left(E_{i+1}^4 - E_i^4\right) + \frac{A_3^m}{5}\left(E_{i+1}^5 - E_i^5\right)\right\}, \quad E \text{ weighting.} \tag{40}$$

Equation 40 is also used in RESRES where there the energy limits will refer to the ultrafine groups for an ultrafine-group problem.

Program FIGERO evaluates $\left\langle \sigma_s^m \right\rangle_i$ and $\left\langle \bar{\mu}^m \right\rangle_i$ using Eq. 41 and then generates the fine group i to fine group i - 1 elastic transfer cross section as[13]

$$\left\langle \sigma_{el}^m \right\rangle_{i \to i-1} = \frac{\left\langle \sigma_s^m \right\rangle_i \left(1 - \left\langle \bar{\mu}^m \right\rangle_i\right)}{1 - \frac{2}{3A^m}} \cdot \frac{\xi^m}{\Delta U}, \quad \frac{1}{E} \text{ weighting,}$$

$$= \frac{\left\langle \sigma_s^m \right\rangle_i \left(1 - \left\langle \bar{\mu}^m \right\rangle_i\right)}{1 - \frac{2}{3A^m}} \cdot \frac{\xi^m E_i}{E_{i+1} - E_i}, \quad \text{constant weighting,}$$

$$= \frac{\left\langle \sigma_s^m \right\rangle_i \left(1 - \left\langle \bar{\mu}^m \right\rangle_i\right)}{1 - \frac{2}{3A^m}} \cdot \frac{\xi^m E_i}{E_{i+1} - E_i} \cdot \frac{2 + \xi^m}{2 + \frac{E_{i+1} - E_i}{E_i}}, \quad E \text{ weighting.} \tag{41}$$

The elastic transport cross section is also evaluated using Eq. 36 so that

$$\left\langle \sigma_{eltr}^m \right\rangle_i = \frac{1}{\left\langle \frac{1}{\sigma_s^m} \right\rangle_i}\left(1 - \left\langle \bar{\mu}^m \right\rangle_i\right). \tag{42}$$

The $\langle \sigma^m_{el} \rangle_{i \to i+1}$ and $\langle \sigma^m_{eltr} \rangle_i$ are used for materials m that do not make use of the Legendre-coefficient library. This would be the case, for example, for all materials if an all-fine-group calculation were involved.

For the special case of hydrogen, the code uses the analytical expressions,[14,15]

$$\sigma_t^H(E) = 3\pi\left[1.206E + (-1.86 + 0.09415E + 0.000136E^2)^2\right]^{-1} + \pi\left[1.206E + (0.4223 + 0.13E)^2\right]^{-1}; \quad (43)$$

$$\sigma_c^H(E) = 0.332\sqrt{\frac{0.02526 \times 10^{-6}}{E}}\,\frac{(1 + 0.2244E)(1 + 0.0205E)^2}{1 + 7.46E + 0.158E^2} + \frac{0.000143\sqrt{E}}{4.46 + E}. \quad (44)$$

The hydrogen-scattering cross section, $\sigma_s^H(E)$, is obtained by subtracting Eq. 44 from Eq. 43. We also assumed that for the energy ranges of interest, $\bar{\mu}^H = 2/3$.

The reciprocal of the difference between Eqs. 43 and 44 is used as $\sigma_x^m(E)$ in a direct numerical integration of Eq. 34 for the calculation of the hydrogen transport cross section as in Eq. 42. For the fine-group elastic removal cross section for hydrogen, $\langle \sigma^H_{elr} \rangle_i$, $\sigma_x^m(E)$ of Eq. 34 takes on the value $\sigma_s^H(E)/E$. Hydrogen capture is obtained by using Eq. 44 in Eq. 34 and again integrating numerically.

2. Subroutine INSCAT

Inelastic and n,2n cross sections are calculated in INSCAT. The inelastic calculation makes use of both discrete-level excitation cross sections, and a statistical nuclear-evaporation model where discrete data are lacking.

The discrete level data are stored as above, using linear segments to describe the excitation of the various levels for each material. With each level excitation is associated a discrete energy loss, E_γ, corresponding to the energy of the gamma ray emitted when the particular level is excited. The material inelastic cross sections are obtained from the summation over the levels involved and are based on the energetics of the event. For example, the average fine group i to fine group j inelastic cross section for material n is given by

$$\left\langle \sigma^{m}_{inel} \right\rangle_{i\to j} = \frac{\int_{E_j+E_\gamma}^{E_{j+1}+E_\gamma} \sigma^{m}_{inel}(E \to E - E_\gamma)\, \phi(E)\, dE}{\int_{E_i}^{E_{i+1}} \phi(E)\, dE}, \tag{45}$$

corresponding to Fig. 8a where, as before, $\phi(E)$ may be $1/E$, constant, or E. Special cases arise when $E_{j+1} + E_\gamma > E_{i+1}$ or when $E_j + E_\gamma < E_{j+1}$, corresponding to the energetics indicated schematically in Figs. 8b and 8c, respectively. For these cases,

$$\left\langle \sigma^{m}_{inel} \right\rangle_{i\to j} = \frac{\int_{E_j+E_\gamma}^{E_{i+1}} \sigma^{m}_{inel}(E \to E - E_\gamma)\, \phi(E)\, dE}{\int_{E_i}^{E_{i+1}} \phi(E)\, dE} \tag{46}$$

and

$$\left\langle \sigma^{m}_{inel} \right\rangle_{j\to j} = \frac{\int_{E_j+E_\gamma}^{E_{j+1}} \sigma^{m}_{inel}(E \to E - E_\gamma)\, \phi(E)\, dE}{\int_{E_j}^{E_{j+1}} \phi(E)\, dE}, \tag{47}$$

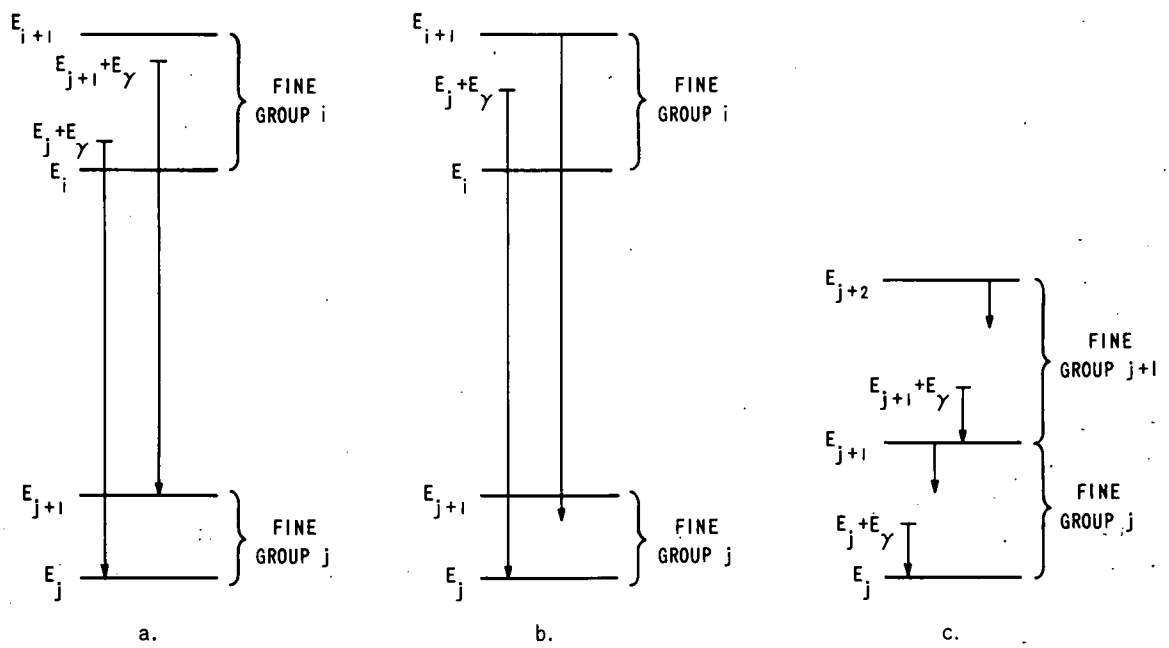

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Fig. 8. Schematic Diagram of Discrete-level Inelastic Scattering Energetics. a. Energetics for the case of $E_i \le E_j + E_\gamma \le E_{i+1}$ and $E_i \le E_{j+1} + E_\gamma \le E_{i+1}$. b. Energetics for the case of $E_i \le E_j + E_\gamma \le E_{i+1}$ and $E_{j+1} + E_\gamma > E_{i+1}$. c. Energetics for the case of $E_j + E_\gamma \le E_{j+1}$.

with

$$\left\langle \sigma^{m}_{inel} \right\rangle_{j+1\to j} = \frac{\int_{E_{j+1}}^{E_{j+1}+E_\gamma} \sigma^{m}_{inel}(E \to E - E_\gamma)\ \phi(E)\ dE}{\int_{E_{j+1}}^{E_{j+2}} \phi(E)\ dE}. \tag{48}$$

In the statistical region, a nuclear-evaporation model is used with an energy distribution for the emitted neutrons given by

$$N(E) = Ee^{-E/T}. \tag{49}$$

In Eq. 49, T is the appropriate nuclear temperature. The library tape stores nuclear temperature as a function of energy again as linear segments. The code calculates $\langle T^m \rangle_j$, the material m average temperature appropriate for fine group j, and then evaluates the normalized secondary neutron-scattering probability,

$$P^{m}_{j\to k} = \frac{\int_{E_k}^{E_{k+1}} Ee^{-E/\langle T^m \rangle_j}\ dE}{\sum_{k=j}^{n} \int_{E_k}^{E_{k+1}} Ee^{-E/\langle T^m \rangle_j}\ dE}. \tag{50}$$

In Eq. 50, the sum in the denominator is over all groups of energy less than or equal to that of group j.

The library tape contains linear segment data for σ^{m}_{inelst}, the difference between the total inelastic, and that due to the contribution of all the discrete levels. Averaging σ^{m}_{inelst} over group j as before, using Eq. 34, we finally have, for the statistical contribution to the inelastic cross section,

$$\left\langle \sigma^{m}_{inelst} \right\rangle_{j\to k} = \left\langle \sigma^{m}_{inelst} \right\rangle_{j} P_{j\to k}. \tag{51}$$

The use of σ^{m}_{inelst} for the unresolved region allows a smooth transition in the inelastic distributions when going from the discrete to the statistical region. The

$$\left\langle \sigma^{m}_{inel} \right\rangle_{j\to k} \text{ and } \left\langle \sigma^{m}_{inelst} \right\rangle_{j\to k}$$

are combined to get the complete inelastic scattering cross section.

The n,2n cross sections are evaluated following the methods used in the statistical inelastic treatment using appropriate nuclear temperatures and values for the total n,2n cross sections.

3. Subroutine SOURCE

The fine-group fission spectrum is evaluated by a direct numerical integration of the generalized fission spectrum,

$$\chi(E) = \alpha \frac{E}{\tau^2} e^{-E/\tau} + (1-\alpha) \sqrt{\frac{4E}{\pi\beta^3}} e^{-E/\beta}, \tag{52}$$

to yield the normalized fine-group values

$$\chi_i = \frac{\int_{E_i}^{E_{i+1}} \chi(E)\, dE}{\sum_{j=1}^{n} \int_{E_j}^{E_{j+1}} \chi(E)\, dE}. \tag{53}$$

The sum in the denominator is over all fine groups in the problem. For an ultrafine-group problem, χ is evaluated for each ultrafine group.

The library tape has various sets of α, β, and τ appropriate to the various isotopes, and the user specifies the desired spectrum as part of the problem input.

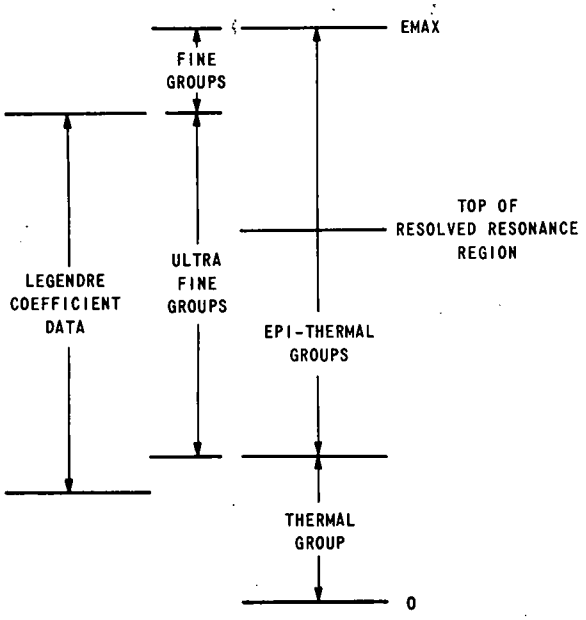

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Fig. 9. Schematic Diagram of MC^2 Energy Structure

C. Overlay 4: Subroutine PONE and Subroutine ALRAGO

Figure 9 gives a schematic representation of the MC^2 energy structure as related to the calculation of the fundamental-mode spectrum. If a problem involves ultrafine groups and contains Legendre materials, various restrictions are imposed. In particular, the interface between the thermal group and the epithermal groups, denoted by EMIN, must be at an energy that is greater than or equal to that corresponding to the bottom of the Legendre-coefficient data library. Also, the maximum problem energy, EMAX, may not lie below the energy

corresponding to the top of the Legendre-coefficient data library. For an all-fine-group problem, or for a problem containing no Legendre-coefficient treatment, the only restriction on the location of EMIN and EMAX is that imposed by the physics of the problem. Normally, EMAX will coincide with the energy at the top of the Legendre library data (10 MeV in the present library).

An ultrafine-group Legendre-material problem is further restricted in regard to fine- and ultrafine-group lethargy spacings and on the actual value of EMAX. These restrictions are due to the internal structure of the code described in Appendix B, and are related to the fixed energy limits and ultrafine-group lethargy spacing in the Legendre-coefficient library.

The present Legendre-coefficient library contains data at 2041 energy points ranging from $10e^{0}$ MeV to $10e^{-17}$ MeV with a constant lethargy spacing of 1/120. For reference, note that a neutron will lose a maximum energy corresponding to 53.554 of these ultrafine groups when scattering from a mass 9 nucleus. With the present code structure, this is the lightest material that can use the Legendre-coefficient treatment.

With the present code structure and Legendre library, the number of ultrafine groups per fine group is limited to the values 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, or 60 corresponding to fine-group lethargy widths (input variable DELUN) of 1/120, 1/60, 1/40, 1/30, 1/24, 1/20, 1/12, 1/10, 1/8, 1/6, 1/4, or 1/2. However, since the number of fine groups allowed in the problem is 70, the use of small values for DELUN will rapidly exhaust the fine groups and will lead to an unreasonably large value for EMIN. A reasonable value for DELUN is 0.25.

Once DELUN is fixed, the fine-group lethargy spacing is determined, and then EMAX may be chosen consistent with the restriction that EMAX lie an integral number of fine groups above the top of the Legendre library, if it does not coincide with the top of the library.

An all-fine-group problem is limited in fine-group lethargy width only by the requirement of a maximum of 70 fine groups in the problem.

Above the Legendre library, the code only has fine-group cross sections available; therefore only fine-group fluxes could be calculated above 10 MeV. Ultrafine-group fluxes are calculated for energies between EMIN and 10 MeV unless an all-fine-group problem is selected. If no Legendre materials are present but hydrogen is present, an ultrafine-group calculation can extend above 10 MeV.

Between EMIN and the top of the resolved resonance region, ultrafine group σ_c and σ_f are available, but only corresponding fine-group cross sections are available above the resolved region.

In general, when ultrafine-group fluxes are being calculated, the fine-group cross sections are assumed to be constant over all the ultrafine groups contained within the fine group in question.

In an ultrafine-group problem, over the energy range between EMIN and the top of the Legendre-coefficient library (10 MeV), the code generates ultrafine-group elastic transport cross sections and an ultrafine-group elastic scattering matrix in subroutine ALRAGO for the Legendre materials. The code uses the methods utilized in the ELMOE code.[8] For completeness, the algorithms described in Ref. 8 will be reviewed here.

The elastic scattering angular dependence for the material m at energy E_j is represented in the center of mass as

$$\sigma_s^m(\omega', E_j) = \sum_\ell B_{\ell_j}^m P_\ell(\mu'), \tag{54}$$

where

$\sigma_s^m(\omega', E_j)$ = the material m cross section for scattering into the solid angle $d\omega'$ in the center of mass,

μ' = the cosine of the scattering angle in the center of mass,

and

P_ℓ = the ℓth Legendre polynomial.

The present Legendre-coefficient library contains values of B_{ℓ_j} for $\ell = 0, 1, 2, \ldots, 19$. If we relate the initial and final energies in the laboratory system, E_0 and E, respectively, to the center-of-mass scattering angle, and integrate over the azimuth angle, we obtain

$$\sigma_s^m(E_0 \rightarrow E)\, dE = \frac{4\pi}{\alpha^m E_0}\, dE \sum_\ell B_{\ell_0}^m P_\ell(\mu'), \tag{55}$$

where α^m, for the mass A^m of nucleus m, is given by

$$\alpha^m = \frac{4A^m}{(A^m + 1)^2} \tag{56}$$

and relates the minimum energy, E_{min}^m to the initial energy by

$$E_{min}^m = (1 - \alpha^m)\, E_0. \tag{57}$$

The $B_{\ell_0}^m$ are the Legendre coefficients for energy E_0. If the variable X^m for material m is defined as

$$X^m = \frac{1}{\alpha^m}\left(1 - \frac{E}{E_0}\right), \tag{58}$$

as E varies from E_0 to E_{min}^m, X^m will vary from 0 to 1. Also, let

$$r = e^{-\Delta u}, \tag{59}$$

where Δu is the ultrafine-group lethargy width. The interval (0, 1) of X^m is divided into n^m intervals, where n^m is defined by

$$n^m = -\frac{\ln (1 - \alpha^m)}{\Delta u}. \tag{60}$$

In general, since n^m will not be an integer, the last scattering interval is some fraction of an ultrafine group. Thus, for example with the existing ultrafine-group lethargy width of 0.0083333, sodium of mass 23 scatters down a maximum of 20.8827 ultrafine groups. In this case, the last scattering interval is 0.8827 of an ultrafine group. The various X_i^m are then given by

$$X_0^m = 0,$$

$$X_1^m = \frac{1}{\alpha^m}(1 - r),$$

$$X_2^m = \frac{1}{\alpha^m}(1 - r^2),$$

$$\vdots$$

$$X_n^m = \frac{1}{\alpha^m}(1 - r^n) \to 1. \tag{61}$$

Because of the adjustment of n, X_n^m would in general not be one. However, the code forces X_n^m to always be exactly one so that the scattering into the last ultrafine group is calculated correctly.

If we define E_j to be the lower energy limit of the ultrafine group j, then the elastic transfer cross section from energy E_j to group k is given by integrating Eq. 55 over the energy range E_k to E_{k-1}, corresponding to X_{k-1} to X_k, with E_0 replaced by E_j. The result is given by

$$\sigma_s^m(E_j \to k) = 4\pi\left\{A_{0_j}^m\left(X_{k-j}^m - X_{k-j-1}^m\right) + A_{1_j}^m \frac{X_{k-j}^{m^2} - X_{k-j-1}^{m^2}}{2}\right.$$

$$\left. + A_{2_j}^m \frac{X_{k-j}^{m^3} - X_{k-j-1}^{m^3}}{3} + \ldots + A_{19_j}^m \frac{X_{k-j}^{m^{20}} - X_{k-j-1}^{m^{20}}}{20}\right\}. \quad (62)$$

In Eq. 62, the $A_{0_j}^m$ through $A_{19_j}^m$ involve simple expressions of the $B_{0_j}^m$ through $B_{19_j}^m$ at energy E_j.[8] It is clear how Eq. 62 would be extended if more terms in the Legendre expansion were included in the library.

The elastic transfer from group j to group k is obtained by averaging the corresponding $\sigma_{eltr}(E \to k)$ with E at each end of group j. Thus

$$\sigma_{el_{j\to k}}^m = \frac{\sigma_s^m(E_j \to k) + \sigma_s^m(E_{j-1} \to k)}{2}. \quad (63)$$

The elastic removal from energy E_j to below energy E_{j+1} is given by

$$\sigma_{elr}^m(E_j, E_{j+1}) = \sum_{k=j+2}^{j+n} \sigma_{eltr}^m(E_j \to k). \quad (64)$$

Using Eq. 62, we can show that

$$\sigma_{elr}^m(E_j, E_{j+1}) = 4\pi\left\{A_{0_j}^m(1 - X_1^m) + A_{1_j}^m \frac{1 - X_1^{m^2}}{2} + A_{2_j}^m \frac{1 - X_1^{m^3}}{3}\right.$$

$$\left. + \ldots + A_{19_j}^m \frac{1 - X_1^{m^{20}}}{20}\right\}. \quad (65)$$

The $A_{\ell_j}^m$ are the same as in Eq. 62, and again the extension to higher orders is obvious.

The removal cross section from group j is again obtained from an average of the results of Eq. 65 at the two group boundaries so that

$$\sigma_{elr_j}^m = \frac{\sigma_{elr}^m(E_{j-1}, E_j) + 4\pi B_{0_j}^m}{2}. \quad (66)$$

The second term in the numerator of Eq. 66 is just the total scattering cross section, $\sigma_{sc}^m(E_j)$, at energy E_j, which is clearly also the elastic removal cross section from energy E_j to below energy E_j.

The elastic transport cross section at energy E_j is defined by

$$\sigma^m_{eltr}(E_j) = \sigma^m_{sc}(E_j)[1 - \bar{\mu}^m(E_j)], \tag{67}$$

where as above, $\sigma^m_{sc}(E_j)$ is the total scattering cross section at energy E_j and is given by $4\pi B^m_{0j}$ where B^m_{0j} refers to B_0 for material m at energy E_j. The $\bar{\mu}^m(E_j)$ is the average of the scattering angle cosine in the laboratory system. Writing $\bar{\mu}^m(E_j)$ in terms of the $B^m_{\ell j}$, we can show that

$$3\sigma^m_{eltr}(E_j) = 4\pi\left\{3B^m_{0j} - \frac{2B^m_{0j}}{A^m} - U^{m-1}_{1,1}B^m_{1j} - U^{m-1}_{1,2}B^m_{2j} - \ldots - U^{m-1}_{1,19}B^m_{19j}\right\}. \tag{68}$$

In Eq. 68, the $U^{m-1}_{1,i}$ are the elements of the transformation matrix that transforms the B^m_ℓ from the center-of-mass system to the laboratory system and are given by $3(2i+1)^{-1}$ times the T_{1i} of Ref. 16.

Finally, averaging the $\sigma_{eltr}(E)$ at each end of the group, we obtain for the group j elastic transport cross section

$$\sigma^m_{eltr_j} = \frac{\sigma^m_{eltr}(E_j) + \sigma^m_{eltr}(E_{j-1})}{2}. \tag{69}$$

The P1 fundamental-mode spectrum is calculated using the buckling B^2 and the homogenized, macroscopic, effective group cross sections which are obtained using

$$\langle\Sigma_x\rangle_j = \sum_m N^m\langle\sigma^m_x\rangle_j. \tag{70}$$

The x refers to capture, fission, elastic removal, etc., and N^m is the specified atom density for material m. The sum is over all materials in the composition.

For an all-fine-group problem, or for an ultrafine-group problem above the top of the Legendre-coefficient data, the code calculates the fine-group fluxes for the ordinary P1 option using

$$\phi^{fg}_K = \frac{\chi_K + \sum_{J\neq K}\langle\Sigma_{inel}\rangle_{J\to K}\phi^{fg}_J + \langle\Sigma_{el}\rangle_{K-1\to K}\phi^{fg}_{K-1} + 2\sum_{J\neq K}\langle\Sigma_{n,2n}\rangle_{J\to K}\phi^{fg}_J}{\frac{B^2}{3\langle\Sigma_{tr}\rangle_K} + \langle\Sigma_c\rangle_K + \langle\Sigma_{np}\rangle_K + \langle\Sigma_{n\alpha}\rangle_K + \langle\Sigma_f\rangle_K + \langle\Sigma_{el}\rangle_{K\to K+1} + \langle\Sigma_{inel}\rangle_K + \langle\Sigma_{n,2n}\rangle_K - \langle\Sigma_{inel}\rangle_{K\to K} - 2\langle\Sigma_{n,2n}\rangle_{K\to K}} \tag{71}$$

and

$$\langle \Sigma_{tr} \rangle_K = \langle \Sigma_{eltr} \rangle_K + \langle \Sigma_{inel} \rangle_K + \langle \Sigma_c \rangle_K + \langle \Sigma_f \rangle_K + \langle \Sigma_{n,2n} \rangle_K + \langle \Sigma_{np} \rangle_K + \langle \Sigma_{n\alpha} \rangle_K = \langle \Sigma_{eltr} \rangle_K + \langle \Sigma_a \rangle_K . \quad (72)$$

In Eqs. 71 and 72, all cross sections are fine-group values obtained from Overlay 3 as described earlier, except that in the resolved resonance region, $\langle \Sigma_c \rangle_K$ and $\langle \Sigma_f \rangle_K$ include contributions from the resolved resonance treatment, although in this case, these too are fine-group values.

If the problem contains hydrogen, Eq. 71 is modified to include the source from all higher groups. In particular, the source into fine group K due to hydrogen scattering,

$$S_K^{fg} = \Delta E_K \sum_{J \neq K} \frac{\phi_J^{fg} \langle \Sigma_{elr}^H \rangle_J}{E_{J+1}}, \quad (73)$$

is included in the numerator of Eq. 71. In Eq. 73, ΔE_K is the width of fine group K, $\langle \Sigma_{elr}^H \rangle_J$ is the hydrogen elastic removal cross section for fine group J, and E_{J+1} is the lower energy of fine group J. The denominator of Eq. 71 also includes $\langle \Sigma_{elr}^H \rangle_K$ in addition to $\langle \Sigma_{el} \rangle_{K \to K+1}$ because of the other materials in the mixture.

For an ultrafine-group problem below the top of the Legendre-coefficient library, the code evaluates ultrafine-group fluxes. Let the non-fission source into fine group K be written as

$$S_K^{fg} = \sum_{J \neq K} \left[\sum_{j \text{ in } J} \Sigma_{inel_j}^{ufg} \phi_j^{ufg} \frac{\langle \Sigma_{inel} \rangle_{J \to K}}{\langle \Sigma_{inel} \rangle_J} + \sum_{j \text{ in } J} \Sigma_{n,2n_j}^{ufg} \phi_j^{ufg} \frac{2 \langle \Sigma_{n,2n} \rangle_{J \to K}}{\langle \Sigma_{n,2n} \rangle_J} \right] + \langle \Sigma_{el} \rangle_{K-1 \to K} \phi_{K-1}^{fg} . \quad (74)$$

In Eq. 74, $\Sigma_{inel_j}^{ufg}$ and $\Sigma_{n,2n_j}^{ufg}$ are evaluated using Eq. 34 with the integration extending over an ultrafine group. The quantities in the angular brackets are fine-group quantities. The code then defines the source into the ultrafine group k, contained within the fine group K, as

$$S_k^{ufg} = S_K^{fg} \frac{\Delta e_k^{ufg}}{\Delta e_K^{fg}} + \sum_{j \neq k} \Sigma_{el_{j\to k}}^{ufg} \phi_j^{ufg} + \chi_k^{ufg}. \tag{75}$$

In Eq. 75, the Δe_k^{ufg} and Δe_K^{fg} are, respectively, the energy widths of ultrafine group k and fine group K. The ultrafine-group contribution in Eq. 75 is due to the contribution of Legendre-coefficient materials. The $\Sigma_{el_{j\to k}}^{ufg}$ is written with the superscript to emphasize that it is an ultrafine-group value. For the first ultrafine group at the top of the Legendre-coefficient data, since no ultrafine scattering-in source is available, the Legendre materials are treated as they are above the Legendre region and contribute to the elastic term as in Eq. 74. This situation does not arise if the maximum problem energy corresponds to 10 MeV or less.

The ultrafine-group flux for ultrafine group k may be written as

$$\phi_k^{ufg} = \frac{S_k^{ufg}}{L_k}, \tag{76}$$

where

$$L_k = \frac{B^2}{3\Sigma_{tr_k}} + \langle \Sigma_c \rangle_K + \Sigma_{c_k}^{ufg} + \langle \Sigma_f \rangle_K + \Sigma_{f_k}^{ufg} + \langle \Sigma_{el} \rangle_{K\to K+1} + \Sigma_{elr_k}^{ufg}$$
$$+ \Sigma_{inel_k}^{ufg} \left(1 - \frac{\langle \Sigma_{inel} \rangle_{K\to K}}{\langle \Sigma_{inel} \rangle_K} \right) + \Sigma_{n,2n_k}^{ufg} \left(1 - \frac{2\langle \Sigma_{n,2n} \rangle_{K\to K}}{\langle \Sigma_{n,2n} \rangle_K} \right)$$
$$+ \langle \Sigma_{np} \rangle_K + \langle \Sigma_{n\alpha} \rangle_K, \tag{77}$$

and

$$\Sigma_{tr_k} = \langle \Sigma_{eltr} \rangle_K + \Sigma_{eltr_k}^{ufg} + \Sigma_{inel_k}^{ufg} + \Sigma_{n,2n_k}^{ufg} + \langle \Sigma_c \rangle_K + \Sigma_{c_k}^{ufg}$$
$$+ \langle \Sigma_f \rangle_K + \Sigma_{f_k}^{ufg} + \langle \Sigma_{np} \rangle_K + \langle \Sigma_{n\alpha} \rangle_K. \tag{78}$$

In Eqs. 75-78, the ultrafine-group quantities use a lower-case subscript and, in addition, are pointed out by using the ufg superscript. Fine-group quantities, denoted by the upper-case subscript, are treated as being constant for all ultrafine groups contained within the fine group. The $\Sigma_{c_k}^{ufg}$ and $\Sigma_{f_k}^{ufg}$ are obtained in the resolved resonant treatment. For the region above the resolved resonant region, $\Sigma_{c_k}^{ufg}$ and $\Sigma_{f_k}^{ufg}$ do not appear in the above equations.

For hydrogen in the composition, Eq. 75 is increased by the ultrafine-group source due to hydrogen given by

$$S_k^{H^{ufg}} = \Delta e_k^{ufg} \sum_{j \neq k} \frac{1}{2} \left[\Sigma_s^H(E_j) \frac{E_{j+1}}{E_j} + \Sigma_s^H(E_{j+1}) \right] \frac{\phi_j^{ufg}}{E_{j+1}}. \tag{79}$$

In Eq. 79, E_j and E_{j+1} are the upper and lower energies of ultrafine group j. Σ_s^H is evaluated using Eqs. 43 and 44. Also, Eq. 78 is increased by

$$\Sigma_{eltr_k}^{H^{ufg}} = \frac{1}{6} \left[\Sigma_s^H(E_k) + \Sigma_s^H(E_{k+1}) \right], \tag{80}$$

and Eq. 77 includes

$$\Sigma_{elr_k}^{H^{ufg}} = \frac{1}{2} \left[\Sigma_s^H(E_k) \frac{E_{k+1}}{E_k} + \Sigma_s^H(E_{k+1}) \right]. \tag{81}$$

Hydrogen capture is included in the fine-group quantity $\langle \Sigma_c \rangle_K$.

If the user inputs thermal-group cross sections, these are homogenized by the code to yield $\Sigma_{c_{th}}$, $\Sigma_{f_{th}}$, $\Sigma_{np_{th}}$, $\Sigma_{n\alpha_{th}}$, and $\Sigma_{tr_{th}}$. The code then calculates the thermal flux from

$$\phi_{th} = \frac{\langle \Sigma_{el} \rangle_{N \to N+1} \phi_N^{fg} + \sum_{j>th} \sum_{k<th} \Sigma_{el_{j \to k}}^{ufg} \phi_j^{ufg}}{\frac{B^2}{3\Sigma_{tr_{th}}} + \Sigma_{c_{th}} + \Sigma_{f_{th}} + \Sigma_{np_{th}} + \Sigma_{n\alpha_{th}}}. \tag{82}$$

In Eq. 82, we explicitly assume that there is no fission, inelastic, or n,2n source into the thermal group. The first term in the numerator of Eq. 82 is the fine-group elastic source from the last epithermal fine group, N. The ultrafine-group elastic-source term results from j ranging over all possible ultrafine groups above the thermal group, and k over all pseudo ultrafine groups in the thermal group. If the user does not input thermal cross sections, ϕ_{th} is set equal to zero. If the problem includes hydrogen, Eq. 82 is modified in a manner similar to that described above.

The code calculates the total fission source after determining all the fine- and ultrafine-group fluxes, as given by

$$S_f = \sum_K \langle \nu \rangle_K \langle \Sigma_f \rangle_K \phi_K^{fg} + \sum_k \langle \nu \rangle_k^{ufg} \langle \Sigma_f \rangle_k^{ufg} + \nu_{th} \Sigma_{f_{th}} \phi_{th}, \tag{83}$$

where

$$\langle \nu \rangle_K = \frac{\sum_m N^m \langle \nu^m \rangle_K \langle \sigma_f^m \rangle_K}{\langle \Sigma_f \rangle_K}$$

with corresponding definitions for $\langle \nu \rangle_k^{ufg}$ and ν_{th}.

If the user wishes to iterate on B^2, S_f is compared with 1, and if

$$|S_f - 1| > \epsilon, \tag{84}$$

the code computes a new value of B^2 and recalculates the spectrum as above. The procedure is continued until S_f deviates from one by less than or equal to the input convergence criterion, ϵ.

The user inputs the first and second guesses for B^2. Good initial guesses for the B^2 values will speed convergence in the iteration procedure. The third value is obtained by linear interpolation or extrapolation. All values after the third are selected using parabolic interpolation making use of the three most recent values of B^2 and the corresponding S_f. In particular, defining

$$S = S_f - 1, \tag{85}$$

if the three most recent values of B^2 are denoted by B(1), B(2), and B(3), and if the corresponding values of S are denoted by S(1), S(2), and S(3), then the parabolic interpolation predicts, for the next value of B^2,

$$B^2 = B(1) + S(1)\left\{[B(1) - B(2)]\frac{S(2) + S(3) + S(1)}{[S(1) - S(3)][S(1) - S(2)]} - \frac{S(2)[B(2) - B(3)]}{[S(1) - S(3)][S(2) - S(3)]}\right\}. \tag{86}$$

For the consistent P1 and consistent B1 options, the single equation for flux, such as Eq. 76, is replaced with a pair of coupled equations for the current and the flux.

We will define the P1 elastic scattering transfer cross section as

$$\Sigma_{1\,el_{j\to k}}^{ufg} = \sum_m N^m \frac{1}{2}\left(\frac{E_k}{E_j}\right)^{1/2}\left[(A^m + 1) - \frac{E_j}{E_k}(A^m - 1)\right]\sigma_{el_{j\to k}}^m, \tag{87}$$

where the sum ranges over all materials m in the mixture, N^m is the atom density of material m, E_k and E_j are the lower energy limits of ultrafine groups k and j, respectively, A^m is the mass of material m, and $\sigma^m_{el_{j\to k}}$ is given by Eq. 63.

The consistent equations, for the current and flux at a buckling of B^2 may then be written as[8]

$$J_k^{ufg} = \frac{B\phi_k^{ufg}}{3\gamma_k\Sigma_{tot_k}} + \frac{1}{\gamma_k\Sigma_{tot_k}} \sum_{j\neq k} \Sigma^{1\,ufg}_{el_{j\to k}} J_j^{ufg}; \tag{88}$$

$$\phi_k^{ufg} = \frac{S_k^{ufg} - \frac{B}{\gamma_k\Sigma_{tot_k}} \sum_{j\neq k} \Sigma^{1\,ufg}_{el_{j\to k}} J_j^{ufg}}{L_k^1}. \tag{89}$$

In Eq. 89, L_k^1 is obtained from Eq. 77 by replacing Σ_{tr_k} by $\gamma_k\Sigma_{tot_k}$, where γ_k and Σ_{tot_k} are defined below.

The code makes the usual transport approximation with regard to the within-group scattering so that there is no $\Sigma^{1\,ufg}_{el_{j\to j}}$ term involved, and in Eqs. 88 and 89

$$\Sigma_{tot_k} = \Sigma_{tr_k} - \Sigma^{ufg}_{eltr_k} + \Sigma^{ufg}_{elr_k}, \tag{90}$$

with Σ_{tr_k} given by Eq. 78, and $\Sigma^{ufg}_{elr_k}$ and $\Sigma^{ufg}_{eltr_k}$ obtained by homogenizing Eqs. 66 and 69, respectively, over materials in the mixture. Only Legendre-coefficient materials (or hydrogen) contribute to the $\Sigma^{ufg}_{elr_k}$ and $\Sigma^{ufg}_{eltr_k}$.

The consistent P1 equations are obtained by setting γ_k equal to one in Eqs. 88 and 89. For the consistent B1 equations, if B^2 is greater than zero

$$\gamma_k = \frac{\alpha_k \tan^{-1}\alpha_k}{3\left(1 - \frac{\tan^{-1}\alpha_k}{\alpha_k}\right)} \tag{91}$$

and

$$\alpha_k = \frac{B}{\Sigma_{tot_k}}. \tag{92}$$

For negative buckling, Eq. 91 is replaced by

$$\gamma_k = \frac{-\alpha_k \tanh^{-1}\alpha_k}{3\left(1 - \frac{\tanh^{-1}\alpha_k}{\alpha_k}\right)}. \tag{93}$$

In this case, only values of α_k less than one are permissible. In the abnormal case for which $B \geq \Sigma_{tot_k}$, the code sets α_k equal to one and $\tanh^{-1}\alpha_k$ equal to 10^{70}, and an error message is returned. In the limiting case of zero buckling, both Eqs. 91 and 93 yield one for γ_k, so that the consistent B1 and consistent P1 equations are identical.

If the consistent-option problem contains hydrogen, the P1 scattering source into ultrafine group k is augmented in Eqs. 88 and 89 by

$$S_k^{1H^{ufg}} = \Delta e_k^{ufg} E_k^{1/2} \sum_{j \neq k} \frac{1}{2}\left[\Sigma_s^H(E_j)\frac{E_{j+1}}{E_j} + \Sigma_s^H(E_{j+1})\right]\frac{J_j^{ufg}}{E_{j+1}^{3/2}}. \tag{94}$$

Appropriate contributions due to the hydrogen are also included in Eq. 90 and to the S_k^{ufg} of Eq. 89 as indicated above.

D. Overlay 5

1. Program AVER1

The individual material m microscopic broad-group cross sections are obtained by contracting the ultrafine- and fine-group cross sections using the following algorithms. The superscripts bg, fg, and ufg denote broad-group, fine-group, and ultrafine-group quantities, respectively.

a. Inelastic Scattering Matrix

$$\overline{\sigma_{inel}^m}^{bg}_{J\to K} = \frac{\sum_{k \text{ in } K}\sum_{j \text{ in } J}\left\langle\sigma_{inel}^m\right\rangle_{j\to k}^{fg}\phi_j^{fg}}{\sum_{j \text{ in } J}\phi_j^{fg}} \tag{95}$$

b. n,2n Matrix

$$\overline{\sigma_{n,2n}^m}^{bg}_{J\to K} = \frac{\sum_{k \text{ in } K}\sum_{j \text{ in } J}\left\langle\sigma_{n,2n}^m\right\rangle_{j\to k}^{fg}\phi_j^{fg}}{\sum_{j \text{ in } J}\phi_j^{fg}} \tag{96}$$

c. Capture Cross Section

The unresolved-resonant, the resolved-resonant, and the total broad-group cross sections are calculated separately in AVER1. Resonant-scattering effects are not properly accounted for in the calculation of the fundamental-mode spectrum because of the computational strategy employed for the Legendre-coefficient data. Resolved-resonant cross sections are therefore contracted using a special procedure as compared with other cross sections:

$$\left(\overline{\sigma_{c_J}^{m}}^{bg}\right)_{\text{unresolved}} = \frac{\sum_{j \text{ in } J} \left(\langle \sigma_c^m \rangle_j^{fg}\right)_{\text{unresolved}} \phi_j^{fg}}{\phi_J^{bg}}, \tag{97}$$

$$\left(\overline{\sigma_{c_J}^{m}}^{bg}\right)_{\text{resolved}} = \frac{\sum_{j \text{ in } J} \left(\langle \sigma_c^m \rangle_j^{ufg}\right)_{\text{resolved}} \int_{E_j}^{E_{j+1}} \frac{dE}{\Sigma_{t(E)}} S_j^{ufg}}{\sum_{j \text{ in } J} \int_{E_j}^{E_{j+1}} \frac{dE}{\Sigma_{t(E)}} S_j^{ufg}}, \tag{98}$$

where the integral and $\langle \sigma_c^m \rangle_j^{ufg}$ are defined in Eq. 24 and the S_j^{ufg} is given by Eq. 75. In an all-fine-group problem, Eq. 98 involves only fine-group quantities.

The total capture is given by the sum of Eqs. 97 and 98 plus any smooth contribution.

d. Fission Cross Section

As above, the resolved-resonant cross section is displayed separately from the unresolved-resonant cross section:

$$\left(\overline{\sigma_{f_J}^{m}}^{bg}\right)_{\text{unresolved}} = \frac{\sum_{j \text{ in } J} \left(\langle \sigma_f^m \rangle_j^{fg}\right)_{\text{unresolved}} \phi_j^{fg}}{\phi_J^{bg}}, \tag{99}$$

$$\left(\overline{\sigma_{f_J}^{m}}^{bg}\right)_{\text{resolved}} = \frac{\sum_{j \text{ in } J} \left(\langle \sigma_f^m \rangle_j^{ufg}\right)_{\text{resolved}} \int_{E_j}^{E_{j+1}} \frac{dE}{\Sigma_{t(E)}} S_j^{ufg}}{\sum_{j \text{ in } J} \int_{E_j}^{E_{j+1}} \frac{dE}{\Sigma_{t(E)}} S_j^{ufg}}, \tag{100}$$

and the total fission is the sum of Eqs. 99 and 100 plus any smooth contribution.

If the broad-group structure is such that the resolved-resonance region does not start on a broad-group boundary, Eqs. 98 and 100 must be modified. This is necessary since the integral involved there is only evaluated for groups containing resolved-resonant cross sections. For the highest broad group containing the start of the resolved-resonance region, Eqs. 98 and 100 are multiplied by the ratio of the partial broad-group flux, up to the top of the resonance region, to the total broad-group flux.

e. Average Number of Neutrons per Fission

$$\overline{\nu^m}^{bg}_J = \frac{\sum_{j \text{ in } J} \langle \nu^m \rangle_j^{fg} \langle \sigma_f^m \rangle_j^{fg} \phi_j^{fg} + \sum_{j \text{ in } J} \langle \nu^m \rangle_j^{ufg} \langle \sigma_f^m \rangle_j^{ufg} \phi_j^{ufg}}{\phi_J^{bg} \overline{\sigma_f^m}^{bg}_J}. \quad (101)$$

The $\overline{\sigma_f^m}^{bg}_J$ is the total broad-group J fission cross section given by Eq. 99 plus Eq. 100.

f. Inelastic Cross Section

$$\overline{\sigma_{inel}^m}^{bg}_J = \frac{\sum_{j \text{ in } J} \langle \sigma_{inel}^m \rangle_j^{fg} \phi_j^{fg}}{\phi_J^{bg}} \quad (102)$$

g. n,2n Cross Section

$$\overline{\sigma_{n,2n}^m}^{bg}_J = \frac{\sum_{j \text{ in } J} \langle \sigma_{n,2n}^m \rangle_j^{fg} \phi_j^{fg}}{\phi_J^{bg}} \quad (103)$$

h. n,p Cross Section

$$\overline{\sigma_{n,p}^m}^{bg}_J = \frac{\sum_{j \text{ in } J} \langle \sigma_{np}^m \rangle_j^{fg} \phi_j^{fg}}{\phi_J^{bg}} \quad (104)$$

i. n,α Cross Section

$$\overline{\sigma^{m}_{n,\alpha_J}}^{bg} = \frac{\sum_{j \text{ in } J} \langle \sigma^{m}_{n\alpha} \rangle^{fg}_{j} \phi^{fg}_{j}}{\phi^{bg}_{J}} \tag{105}$$

j. Transport Cross Section

The definition of the transport cross section depends upon the option chosen. For the ordinary P1 option (IOPT = 1),

$$\overline{\sigma^{m}_{tr_J}}^{bg} = \frac{\sum_{j \text{ in } J} \frac{\langle \sigma^{m}_{tr} \rangle^{fg}_{j} \phi^{fg}_{j}}{\langle \Sigma_{tr} \rangle^{fg}_{j}} + \sum_{j \text{ in } J} \frac{\sigma^{m^{ufg}}_{tr_j} \phi^{ufg}_{j}}{\Sigma^{ufg}_{tr_j}}}{\sum_{j \text{ in } J} \frac{\phi^{fg}_{j}}{\langle \Sigma_{tr} \rangle^{fg}_{j}} + \sum_{j \text{ in } J} \frac{\phi^{ufg}_{j}}{\Sigma^{ufg}_{tr_j}}}, \tag{106}$$

where $\langle \Sigma_{tr} \rangle^{fg}_{j}$ and $\Sigma^{ufg}_{tr_j}$ are given in Eqs. 72 and 78. The $\langle \sigma^{m}_{tr} \rangle^{fg}_{j}$ and $\sigma^{m^{ufg}}_{tr_j}$ are evaluated using Eqs. 72 and 78 but for the individual materials m.

For an all-fine-group problem, only the fine-group quantities appear in Eq. 106. For an ultrafine-group problem and for Legendre materials, below 10 MeV only the ultrafine-group contributions appear in Eq. 106. In this range, the non-Legendre-material transport cross section is given by

$$\overline{\sigma^{m}_{tr_J}}^{bg} = \frac{\sum_{j \text{ in } J} \frac{\langle \sigma^{m}_{tr} \rangle^{fg}_{j} \phi^{ufg}_{j}}{\Sigma^{ufg}_{tr_j}}}{\sum_{j \text{ in } J} \frac{\phi^{ufg}_{j}}{\Sigma^{ufg}_{tr_j}}}, \tag{107}$$

where the $\langle \sigma^{m}_{tr} \rangle^{fg}_{j}$ is assumed to be constant for all ultrafine groups contained in the fine group over which the average was obtained.

If a consistent option is chosen (IOPT $\geq$ 1), Legendre materials and hydrogen have

$$\overline{\sigma_{tr_J}^{m}}^{bg} = \frac{\sum_{j \text{ in } J} \gamma_j \sigma_{tot_j}^{m} J_j^{ufg} - \sum_{j \text{ in } J} \sum_{k \neq j} \sigma_{el_{k\to j}}^{l\,m^{ufg}} J_k^{ufg}}{J_J^{bg}},$$

where $\sigma_{el_{k\to j}}^{l\,m^{ufg}}$ is given by Eq. 87 and $\sigma_{tot_j}^{m}$ is given by Eq. 90. The γ_j are defined in Eq. 91 and are equal to one for the consistent P1 option.

For the non-Legendre materials,

$$\overline{\sigma_{tr_J}^{m}}^{bg} = \frac{\sum_{j \text{ in } J} \langle \sigma_{tr}^{m} \rangle_j^{fg} J_j^{ufg}}{J_j^{bg}}, \tag{109}$$

and $\langle \sigma_{tr}^{m} \rangle_j^{fg}$ is assumed to be constant for all ultrafine groups in the corresponding fine groups.

k. Elastic Scattering Matrix

For non-Legendre materials,

$$\overline{\sigma_{el_{K\to K+1}}^{m}}^{bg} = \frac{\phi_j^{fg}}{\phi_K^{bg}} \langle \sigma_{el}^{m} \rangle_{j\to j+1}^{fg}, \tag{110}$$

where j is the last fine group in broad group K.

If m is hydrogen,

$$\overline{\sigma_{el_{J\to K}}^{H}}^{bg} = \frac{\Delta E_K}{\phi_J^{bg}} \sum_{j \text{ in } J} \frac{\phi_j^{fg} \langle \sigma_{elr}^{H} \rangle_j^{fg}}{E_{j+1}}, \tag{111}$$

where ΔE_K is the energy width of broad group K, $\langle \sigma_{elr}^{H} \rangle_j^{fg}$ is average elastic removal cross section of the fine group j due to hydrogen, and E_{j+1} is the lower energy of fine group j.

For Legendre materials in an ultrafine-group problem

$$\overline{\sigma^{m}_{el_{J\to K}}}^{bg} = \frac{\sum_{k \text{ in } K} \sum_{j \text{ in } J} \sigma^{m^{ufg}}_{el_{j\to k}} \phi^{ufg}_{j}}{\phi^{bg}_{J}}, \tag{112}$$

where $\sigma^{m^{ufg}}_{el_{j\to k}}$ is given in Eq. 63.

If IOPT is greater than 3, the code also generates the P1 scattering matrix

$$\overline{\sigma^{1}{}^{m}_{el_{J\to K}}}^{bg} = \frac{\sum_{k \text{ in } K} \sum_{j \text{ in } J} \sigma^{1}{}^{m^{ufg}}_{el_{j\to k}} J^{ufg}_{j}}{J^{bg}_{J}}, \tag{113}$$

where $\sigma^{1}{}^{m^{ufg}}_{el_{j\to k}}$ was also used in Eq. 87.

For hydrogen in an ultrafine-group problem,

$$\overline{\sigma^{H}_{el_{J\to K}}}^{bg} = \frac{\Delta E_K}{\phi^{bg}_{J}} \sum_{j \text{ in } J} \frac{1}{2} \left[\sigma^{H}_{s}(E_j) \frac{E_{j+1}}{E_j} + \sigma^{H}_{s}(E_{j+1}) \right] \frac{\phi^{ufg}_{j}}{E_{j+1}}, \tag{114}$$

where E_j and E_{j+1} are the upper and lower energies of ultrafine group j in broad group J, and σ^{H}_{s} is evaluated using Eqs. 43 and 44.

If IOPT > 3, for hydrogen,

$$\overline{\sigma^{1}{}^{H}_{el_{J\to K}}}^{bg} = \frac{\sum_{k \text{ in } K} \Delta e^{ufg}_{k} E_K^{1/2} \sum_{j \text{ in } J} \frac{1}{2} \left[\sigma^{H}_{s}(E_j) \frac{E_{j+1}}{E_j} + \sigma^{H}_{s}(E_{j+1}) \right] \frac{J^{ufg}_{j}}{E^{3/2}_{j+1}}}{J^{bg}_{j}}, \tag{115}$$

where Δe^{ufg}_{k} is the energy width of ultrafine group k. For P1 scattering by hydrogen into the thermal group, 800 pseudo ultrafine groups k in the thermal group are included.

The material m microscopic broad-group self-scattering is obtained by subtracting from the transport cross section the sum of all events that remove a neutron from the broad group. Therefore,

$$\overline{\sigma^{m}_{el_{J\to J}}}^{bg} = \overline{\sigma^{m}_{tr_J}}^{bg} - \sum_{K\neq J} \overline{\sigma^{m}_{el_{J\to K}}}^{bg} - \overline{\sigma^{m}_{n,p_J}}^{bg} - \overline{\sigma^{m}_{n,\alpha_J}}^{bg} - \overline{\sigma^{m}_{inel_J}}^{bg}$$
$$- \overline{\sigma^{m}_{n,2n_J}}^{bg} - \overline{\sigma^{m}_{c_J}}^{bg} - \overline{\sigma^{m}_{f_J}}^{bg} . \qquad (116)$$

If the input option IOPT $\geq$ 3, the code also generates an "anisotropic" self-scattering in the broad group, $\overline{\sigma^{anis\,m}_{el_{J\to J}}}^{bg}$. This number, when added to the sum of all events that remove a neutron from the group yields the broad-group total cross section

$$\overline{\sigma^{m}_{tot_J}}^{bg} = \frac{\sum_{j \text{ in } J} \sigma^{m}_{tot_j} J^{ufg}_{j}}{J^{bg}_{J}}, \qquad (117)$$

where $\sigma^{m}_{tot_j}$ was defined in Eq. 90. Thus,

$$\overline{\sigma^{anis\,m}_{el_{J\to J}}}^{bg} = \overline{\sigma^{m}_{tot_J}}^{bg} - \sum_{K\neq J} \overline{\sigma^{m}_{el_{J\to K}}}^{bg} - \overline{\sigma^{m}_{n,p_J}}^{bg} - \overline{\sigma^{m}_{n,\alpha_J}}^{bg} - \overline{\sigma^{m}_{inel_J}}^{bg}$$
$$- \overline{\sigma^{m}_{n,2n_J}}^{bg} - \overline{\sigma^{m}_{c_J}}^{bg} - \overline{\sigma^{m}_{f_J}}^{bg} . \qquad (118)$$

2. Program BGPONE

Program BGPONE calculates an ordinary P1, broad-group real and adjoint fundamental-mode spectrum utilizing homogenized macroscopic broad-group cross sections generated in AVER1. BGPONE uses the same input buckling data as used by program PONE and iterates on buckling to criticality as described in Section III-C above. The resulting fluxes and buckling differ somewhat from the results obtained in the PONE program because of the treatment used to obtain the broad-group resonant capture and fission cross sections.

For BGPONE, if the user has not input thermal-group cross sections, the code sets the thermal-group cross sections equal to the last epithermal broad-group values.

IV. MC² INPUT PREPARATION

Table III identifies the problem input items together with the FORTRAN names and formats. Table IV gives the description and limitations of the various input quantities.

TABLE III. MC² Input Format

Item	Variable	Format
1	IDENT	12A6
2	IOPT, NOI, NOBG, NGEOM, NTHRM, NSORS, IYOS, NMIC, NPUN, NDELU, DELUN	10I6, E12.5
3	(CGB(I), I=1, NOBG+1)	6E12.5
4	EPSABS, EPSINT, EPSTOT, RADP, RADC, AFAC	6E12.5
5	KT1, KT2, KT3, KT4, KT5, KT6, IA, KTFLUX	8I6
6	(NUCID(I), NELMO(I), ADEN(I), TEMP(I), FCONC(I), CCONC(I), I=1, NOI)	A6, I6, 4E12.5
7*	(THC(I), THF(I), THNU(I), THTR(I), THNA(I), THNP(I), I=1, NOI), if NTHRM≠0	6E12.5
8*	(PHIC(J), J=1, NINTC), if IYOS≠0	6E12.5
9*	IBSQ, BSQ, BSQ2, EPS, if IYOS=0	I12, 3E12.5

*Conditional on Item 2 quantities.

TABLE IV. Definitions of Variables for MC² Input

Variable Name		Identification
IDENT		Problem identification.
IOPT	= 1	P1 fundamental-mode calculation.
	= 2	Consistent B1 fundamental-mode calculation for isotropic neutronics.
	= 3	Consistent P1 fundamental-mode calculation for isotropic neutronics.
	= 4	Consistent B1 fundamental-mode calculation for anisotropic neutronics.
	= 5	Consistent P1 fundamental-mode calculation for anistropic neutronics.
NOI		Number of materials in the problem.

TABLE IV. (Contd.)

Variable Name		Identification
NOBG		Number of epithermal broad groups desired in final cross-section set.
NGEOM		Fuel-pin geometry.
	= 1	Slab.
	= 2	Cylinder.
NTHRM	> 0	Read in thermal-group cross sections with problem data.
	= 0	Code sets thermal fluxes and cross sections to zero.
NSORS		Library identification number for fission source.
IYOS	> 0	Input weighting spectrum with problem data. If IYOS > 0, fundamental-mode spectrum is not generated.
NMIC	= 0	Calculate microscopic and macroscopic broad-group cross sections.
	> 0	Broad-group cross sections not calculated.
NPUN	= 1	Punch broad-group microscopic cross-section information.
	= 0	Avoids punching.
NDELU	= 1	All-fine-group problem.
	= 2	Ultrafine-group problem.
DELUN		Fine-group lethargy width. DELUN is restricted as indicated in the text. DELUN is typically 0.25.
CGB(I)		Broad-group energy boundaries in eV. CGB(1) is the upper energy limit of the highest energy group (EMAX). The last CGB is the energy interface between the thermal group and the epithermal groups (EMIN). For an ultrafine-group problem, EMIN must be greater than or equal to 0.41399 eV for the present Legendre library. EMAX is also restricted as indicated in the text. A suitable value for EMAX is 10^7 eV.
EPSABS		Resolved resonances which produce a $\sigma_a <$ EPSABS at the energy limits of an ultrafine group and do not lie within the group are not included in the effective ultrafine-group cross sections for that group. EPSABS is typically 0.001 barn.

TABLE IV. (Contd.)

Variable Name		Identification
EPSINT		Relative convergence criterion for integration to generate ultrafine-group cross sections in the resolved resonant region. EPSINT is typically 0.0005.
EPSTOT		Resolved resonances which produce an average $\sigma_t <$ EPSTOT at the energy limits of an ultrafine-group and do not lie within the group are treated as having a constant average value over the group. EPSTOT is typically 0.5 barn.
RADP		Radius of fuel pin if NGEOM = 2, half thickness of fuel slab if NGEOM = 1, in cm.
RADC		Radius of outer clad-coolant region if NGEOM = 2, outer bound of clad-coolant region relative to center of fuel slab if NGEOM = 1, in cm.
AFAC		The constant a, used to improve the rational approximation to the escape probability. AFAC is typically 1.35.
KT1	> 0	Edit ultrafine-group average microscopic cross sections summed over all contributing resonances in the resolved resonance region. Also edit point values of microscopic cross sections averaged over Porter-Thomas distributions in the unresolved resonance region.
KT2	> 0	Edit ultrafine-group average microscopic cross sections for each resonance in the resolved resonance region.
KT3	> 0	Edit microscopic fine-group average cross sections computed from nonresonant linear segment data.
KT4	> 0	Edit homogenized macroscopic fine-group and ultrafine-group average cross sections. Also edit fission spectrum for fine groups.
KT5	> 0	Edit for code-debugging purposes.
KT6	> 0	Edit fine- and ultrafine-group fluxes for each buckling iteration.

TABLE IV. (Contd.)

Variable Name		Identification
IA	> 0	Edit ultrafine-group material macroscopic elastic removal cross sections, elastic transport cross sections, and elastic transfer cross sections.
	= 0	No edit of ultrafine-group elastic cross sections.
KTFLUX	= 1	1/E weighting spectrum used for fine-group cross sections.
	= 2	Constant weighting spectrum used for fine-group cross sections.
	= 3	E weighting spectrum used for fine-group cross sections.
NUCID(I)		Nuclide identification on library tape. The order is arbitrary. Hydrogen is built into the code and is designated by HYDRO.
NELMO(I)	> 0	Legendre treatment used for elastic scattering for material NUCID(I). NELMO should be zero for hydrogen.
ADEN(I)		Atomic concentrations used to compute homogenized macroscopic cross sections for use in fundamental mode calculations (atoms/cc x 10^{-24}).
TEMP(I)		Nuclide temperature (°K).
FCONC(I)		Nuclide concentrations in fuel pin (atoms/cc x 10^{-24}).
CCONC(I)		Nuclide concentrations in outer region (atoms/cc x 10^{-24}).
THC(I)		Microscopic thermal-group capture cross section for each material. If NTHRM = 0, omit.
THF(I)		Microscopic thermal-group fission cross section for each material. If NTHRM = 0, omit.
THNU(I)		Number of neutrons emitted per fission in the thermal group for each material. If NTHRM = 0, omit.
THTR(I)		Microscopic thermal-group transport cross section for each isotope. If NTHRM = 0, omit.
THNA(I)		Microscopic thermal-group n,α cross section for each isotope. If NTHRM = 0, omit.
THNP(I)		Microscopic thermal-group n,p cross section for each isotope. If NTHRM = 0, omit.

TABLE IV. (Contd.)

Variable Name		Identification
PHIC(I)		Fine-group weighting spectrum. If IYOS = 0, omit. NINTC values of PHIC(J) are supplied, NINTC being the number of fine groups in the problem. NINTC will be the closest integral multiple of the fine-group lethargy width that will fit between the lower and upper epithermal energy bounds of the problem.
IBSQ	> 0	Iterate on buckling to critical.
BSQ		First guess on buckling.
BSQ2		Second guess on buckling if IBSQ > 0.
EPS		Convergence on $\lvert k_{eff} - 1 \rvert$, typically 0.0001.

The variable NPUN (Tables III and IV) controls the punching of cross sections. Tables V and VI give the format and definitions of the items punched.

TABLE V. Format of Cards Punched by MC²

Item	Variable	Format
1	IDENT	12A6
2	NOBG	I6
3	(CGB(K+1), K=1, NOBG), 0.	6E12.5
4	(STR3(K), K=1, NOBG), 0.	6E12.5
5	NUCID(M), N2N(M), ADEN(M)	A6, I6, E12.5
6	(XC(M,K), XF(M,K), XTR(M,K), XNU(M,K), XIN(M,K), X2N(M,K), XNP(M,K), XNA(M,K), K=1, NOBG), THC(M), THF(M), THTR(M), THNU(M), 0., 0., THNP(M), THNA(M)	6E12.5/2E12.5
7[a]	((XELT(M,K,KF), KF=K, NOBG+1), K=1, NOBG)	6E12.5
8[a]	((XINEL(M,K,KF), KF=K, NOBG), 0., K=1, NOBG)	6E12.5
9[a,b]	((XN2N(M,K,KF), KF=K, NOBG), 0., K=1, NOBG)	6E12.5
10[c]	(XANIS(M,K), (X1ELT(M,K,KF), KF=K, NOBG+1), K=1, NOBG)	6E12.5
	Items 5-10 are repeated for each material M.	

[a]Each new value of K is started on a new card.
[b]Punched only if material M contains n,2n cross-section data on the library tape, i.e., if N2N(M) ≠ 0.
[c]Items punched if IOPT > 3 (see Table IV).

TABLE VI. Definitions of Variables for Cards Punched by MC^2

Variable Name	Identification
IDENT	Problem identification card.
NOBG	Number of epithermal broad groups.
CGB(K+1)	Lower energy of broad group K.
STR3(K)	Fission spectrum for broad group K.
NUCID(M)	Material M identification.
N2N(M)	If nonzero, material has n,2n cross sections.
ADEN(M)	Atom density for material M.
XC(M,K)	Microscopic capture cross section, σ_c, for material M and broad group K.
XF(M,K)	Microscopic fission cross section, σ_f, for material M and broad group K.
XTR(M,K)	Microscopic transport cross section, σ_{tr}, for material M and broad group K.
XNU(M,K)	Average number of neutrons per fission, ν, for material M and broad group K.
XIN(M,K)	Microscopic inelastic cross section, σ_{inel}, for material M and broad group K.
X2N(M,K)	Microscopic n,2n cross section $\sigma_{n,2n}$, for material M and broad group K.
XNP(M,K)	Microscopic n,p cross section, $\sigma_{n,p}$, for material M and broad group K.
XNA(M,K)	Microscopic n,α cross section $\sigma_{n,\alpha}$, for material M and broad group K.
THC(M)	Microscopic thermal-capture cross section for material M.
THF(M)	Microscopic thermal-fission cross section for material M.
THTR(M)	Microscopic thermal-transport cross section for material M.
THNU(M)	Average number of neutrons per fission in the thermal group for material M.
THNP(M)	Microscopic thermal n,p cross section for material M.

TABLE VI. (Contd.)

Variable Name	Identification
THNA(M)	Microscopic thermal n,α cross section for material M.
XELT(M,K,KF)	Microscopic elastic transfer cross section, Σ_{el} (K → KF), from broad group K to broad group KF for material M.
XINEL(M,K,KF)	Microscopic inelastic transfer cross section, Σ_{inel} (K → KF), from broad group K to broad group KF for material M.
XN2N(M,K,KF)	Microscopic n,2n transfer cross section, $\Sigma_{n,2n}$ (K → KF), from broad group K to broad group KF for material M.
XANIS(M,K)	Microscopic elastic transfer cross section, Σ_{el} (K → K), from broad group K to broad group K for anisotropic neutronics for material M.
X1ELT(M,K,KF)	Microscopic P1 elastic transfer cross section Σ^1_{el} (K → KF) from broad group K to broad group KF for material M.

The input for a sample problem is given in Appendix D; the output is given in Appendix E.

V. INPUT PREPARATION FOR MC² DATA LIBRARY

Table VII identifies the input items together with the FORTRAN names and formats. Table VIII gives the description and limitations of the various quantities.

TABLE VII. Formats for MC² Data Library Input

Section	Variables	Format
1. Table of Contents	NOMAT	I6
	(ILIST(I), I=1, NOMAT)	12A6
2. Resonance Data	NID, IWR, IWF, NOI for first material.	6X, A6, 3I12
	SIGP, AMASS, A0, A1, A2, A3 for first material.	6E12.5
	NUN, IFI, IS, ISK for first material.	4I12
	ABUN(1), ..., ABUN(IS) for first isotope through last isotope in first material that will be used in the unresolved calculation.	6E12.5
	LST, NPT, AAA for first isotope in first material with unresolved parameters.	2I12, E12.5
	JST(1), JST(LST) for first through last ℓ state for first isotope in first material that has unresolved parameters.	2I12
	ES(1), ..., ES(NP) for first isotope in first material that has unresolved parameters.	6E12.5
	For first J state in first ℓ state in first isotope in first material that has unresolved parameters.	
	GAMA, G, D, AMU, NUT	4E12.5, I12
	GNO(1), ..., GNO(NP)	6E12.5
	GF(1), ..., GF(NP)[a]	6E12.5

[a] Supplied if IFI = 1.

TABLE VII. (Contd.)

Section	Variables	Format
2. Resonance Data (Contd.)	For last J state in first ℓ state in first isotope in first material that has unresolved parameters.	
	GAMA, G, D, AMU, NUT	4E12.5, I12
	GNO(1), ..., GNO(NP)	6E12.5
	GF(1), ..., GF(NP)[a]	6E12.5
	⋮	
	For first J state in last ℓ state in first isotope in first material that has unresolved parameters.	
	GAMA, G, D, AMU, NUT	4E12.5, I12
	GNO(1), ..., GNO(NP)	6E12.5
	GF(1), ..., GF(NP)[a]	6E12.5
	⋮	
	For last J state in last ℓ state in first isotope in first material that has unresolved parameters.	
	GAMA, G, D, AMU, NUT	4E12.5, I12
	GNO(1), ..., GNO(NP)	6E12.5
	GF(1), ..., GF(NP)[a]	6E12.5
	⋮	
	LST, NPT, AAA for last isotope in first material that has unresolved parameters.	2I12, E12.5
	JST(1), JST(LST) for first through last ℓ state for last isotope in first material that has unresolved parameters.	2I12
	⋮	
	(Follow format given above for first isotope in first material that has unresolved material for data in this range.)	
	⋮	
	GF(1), ..., GF(NP)[a] for last J state in last ℓ state in last isotope in first material that has unresolved parameters.	6E12.5

TABLE VII. (Contd.)

Section	Variables	Format
2. Resonance Data (Contd.)	NRGYS, MASSI, ABUND for first isotope with resolved resonance parameters in first material.	2I6, E12.4
	L, G, EN, GAMGAM, GAMN, GAF for first resolved resonance in first isotope in first material.	I6, 5E12.4
	⋮	
	L, G, EN, GAMGAM, GAMN, GAF for last resolved resonance in first isotope in first material.	I6, 5E12.4
	⋮	
	NRGYS, MASSI, ABUND for last isotope with resolved resonance parameters in first material.	2I6, E12.4
	L, G, EN, GAMGAM, GAMN, GAF for last resolved resonance in last isotope in first material.	I6, 5E12.4
	NID, IWR, IWF, NOI for second material.	6X, A6, 3I12
	⋮	
	Format specification is same as for first material and is repeated for all following materials until resonance information has been specified for all materials.	
3. Non-resonance Data	MATNO, for first material.	A6
	EMUO, A0, A1, A2, A3, XI for first material.	6E12.5
	(INS(K), K=1,8)	8I6
	NC(K), (IFMT(I), I=1,9) for first reaction type in first material.	6XI6, 9A6
	(NS(I,K), KMOD(I,K), I=1, INS(K)) for first reaction type in first material.	12I6

TABLE VII. (Contd.)

Section	Variable	Format
3. Non-resonance Data (Contd.)	EN(K,1), SIG(K,1), ..., EN(K,NT(K)), SIG(K,NT(K))[b] for first reaction type in first material.	Variable format IFMT
	⋮	
	NC(K), (IFMT(I), I=9) for last reaction type in first material.	6XI6, 9A6
	(NS(I,K), KMOD(I,K), I=1, INS(K)) for last reaction type in first material.	12I6
	EN(K,1), SIG(K,1), ..., EN(K,NT(K)), SIG(K,NT(K))[b] for last reaction type in first material.	IFMT
	MATNO for second material.	A6
	Format specification is same as for first material and is repeated for all following materials until smooth data have been specified for all materials.	
4. Inelastic Scattering and n,2n Data	ID, NLEVLS, NSTAT, NTWON for first material.	A6, 3I6
	AMASS, ESTAT, THRESH for first material.	3E12.5
	IR, EGAM for first resolved level in first material.	I12, E12.5
	(NIR(I), KT(I), I=1, IR) for first resolved level in first material.	12I6
	EIN(1), SIGIN(1), ..., EIN(NS1), SIGIN(NS1)[c] for first resolved level in first material.	6E12.5
	⋮	
	IR, EGAM for last resolved level in first material.	I12, E12.5

[b] $NT(K) = \sum_{I=1}^{INS(K)} NS(I,K)$. If NT(K) is 0, this data is omitted.

[c] $NSI = \sum_{I=1}^{IR} NIR(I)$.

TABLE VII. (Contd.)

Section	Variable	Format
4. Inelastic Scattering and n,2n Data (Contd.)	(NIR(I), KT(I), I=1, IR) for last resolved level in first material.	12I6
	EIN(1), SIGIN(1), ..., EIN(NS1), SIGIN(NS1)[c] for last resolved level in first material.	6E12.5
	IR1, IR2, IR3 for statistical calculation in first material.	3I6
	(NST(I), KT(I), I=1, IR1) for statistical calculation in first material if NSTAT > 0.	12I6
	ENT(1), SNT(1), ..., ENT(NST1), SNT(NST1)[d] for statistical calculation in first material if NSTAT > 0.	6E12.5
	(NSD(I), KTD(I), I=1, IR2) for statistical calculation in first material if NSTAT > 0.	12I6
	END(1), SND(1), ..., END(NSD1), SND(NSD1)[e] for statistical calculation in first material if NSTAT > 0.	6E12.5
	(NS2N(I), KT2N(I), I=1, IR3) for n,2n calculation in first material if NTWON > 0.	12I6
	E2NT(1), S2N(1), ..., E2NT(NS2N1), S2N(NS2N1)[f] for n,2n calculation in first material if NTWON > 0.	6E12.5

[d] $NST1 = \sum_{I=1}^{IR1} NST(I)$.

[e] $NSD1 = \sum_{I=1}^{IR2} NSD(I)$.

[f] $NS2N1 = \sum_{I=1}^{IR3} NS2N(I)$.

TABLE VII. (Contd.)

Section	Variable	Format
4. Inelastic Scattering and n,2n Data (Contd.)	ID, NLEVLS, NSTAT, NTWON for second material.	A6, 3I6
	⋮	
	Format specification is same as for first material and is repeated for all following materials until inelastic and n,2n data have been specified for all materials.	
5. Fission-spectra Data	NSPEC	I6
	I, BETA, ALPHA, TAU for first spectrum.	I6, 6X, 3E12.5
	⋮	
	I, BETA, ALPHA, TAU for last spectrum.	I6, 6X, 3E12.5

TABLE VIII. Definitions of Variables for MC^2 Data Library Input

Name of Variable		Definition
NOMAT		Number of materials on the library.
ILIST(I)		Identification of library materials.
NID		Material identification.
IWR	= 1	Material has resolved-resonance parameters.
	= 0	Material has no resolved-resonance parameters.
IWF	= 1	Material is fissile, 0 otherwise.
	= 0	Material is nonfissile.
NOI		Number of isotopes that have resolved resonance parameters.
SIGP		Constant background scattering cross section, barns.
AMASS		Atomic mass number for material.
A0, A1, A2, A3		Coefficients in polynomial fit to data on $\overline{\nu}$ (E).
NUN	= 1	Material has unresolved-resonance parameters.
	= 0	Material has no unresolved-resonance parameters.

TABLE VIII. (Contd.)

Name of Variable		Definition
IFI	= 1	Fissile isotopes.
	= 0	Nonfissile isotopes.
IS		Number of isotopes in unresolved calculation, ≤4.
ISK		Number of logical records in resonance data
		$ISK = IWR + 2 + NUN \sum_{IS} \left\{ 1 + \sum_{LST} \left[1 + \sum_{JST} (2) \right] \right\}$,
		where LST and JST are defined below.
ABUN(I)		Abundance of each isotope in unresolved calculation.
LST		Number of angular momentum states, ℓ, considered in unresolved calculation, ≤2.
NPT		Number of energy points at which unresolved calculation is done, ≤25.
AAA		$ka/\sqrt{E}$, where k is the wave number, a is the nuclear radius, and E is the energy.
JST(I)		Number of channel spin states, J, associated with each angular momentum state, ≤4.
ES(I)		Energies at which unresolved calculation is to be done, in eV, and in order of increasing energy.
GAMA		Average radiation width, eV.
G		Statistical factor.
D		Average spacing, eV.
AMU		Number of degrees of freedom in neutron-width distribution, 1 or 2.
NUT		Number of degrees of freedom in fission-width distribution, 1, 2, 3, or 4.
GNO		Average reduced neutron width.
GF		Average fission width, eV.
NRGYS		Number of resolved resonances for an isotope.

TABLE VIII. (Contd.)

Name of Variable		Definition
MASSI		Mass of isotope.
ABUND		Abundance associated with each isotope with resolved resonance parameters.
L		Identification number (optional).
G		Statistical factor, g.
EN		Energy at resolved resonance peak, eV.
GAMGAM		Resolved-resonance radiation width, eV.
GAMN		Resolved-resonance neutron width, eV.
GAF		Resolved-resonance fission width, eV.
MATNO		Material identification.
EMUO		Average cosine of the scattering angle in laboratory system for isotropic scattering in the cm system (2/3A).
XI		Average logarithmic energy loss per collision for isotropic scattering in the center-of-mass system.
INS(I)		Number of interpolation regions associated with reaction Type I.
NC(I)	$\neq 0$	Energies on cards are in MeV.
	$= 0$	Energies are in eV.
IFMT(I)		Variable format field used for reading data for an individual reaction.
NS(J,I)		Number of coordinate pairs associated with reaction Type I and interpolation range J.
KMOD(J,I)		Flag indicating type of interpolation to be used for reaction Type I in interpolation range J:
	$= 1$	ln E vs log σ;
	$= 2$	ln E vs σ;
	$= 3$	E vs σ.
EN(K,J)		Energy coordinate associated with a particular energy point J, for a given reaction, K. The reaction types included are: K = 1, σ_s; K = 2, $\bar{\mu}$; K = 3, σ_{inel}; K = 4, σ_f; K = 5, σ_c; K = 6, $\sigma_{n,2n}$; K = 7, $\sigma_{n,p}$; K = 8, $\sigma_{n,\alpha}$. Energies must be in order of increasing energy, in eV or MeV.

TABLE VIII. (Contd.)

Name of Variable		Definition
SIG(K,J)		Cross-section coordinate associated with a particular energy point J, for a given reaction, K. Cross sections must be in barns.
ID		Material identification.
NLEVLS		Number of resolved levels for inelastic scattering in a particular material.
NSTAT	> 0	Indicates that data for a statistical calculation of inelastic scattering are included.
NTWON	> 0	Indicates that data for n,2n scattering are included.
AMASS		Atomic mass for material.
ESTAT		Energy, in eV, at which a statistical calculation for inelastic scattering begins.
THRESH		Energy, in eV, at which a statistical calculation for n,2n scattering begins.
IR		Number of interpolation regions for resolved inelastic scattering.
EGAM		Energy of gamma ray, in eV, which is emitted when a particular resolved level is excited.
NIR(I)		Number of coordinate pairs associated with the data for a particular resolved level for inelastic scattering in a given material and for interpolation region I.
KT(I)		Type of interpolation rule to be used for interpolation region I:
	= 1	ln E vs ln σ;
	= 2	ln E vs σ;
	= 3	E vs σ.
EIN(K)		Energy coordinate associated with a particular resolved inelastic level. Energies must be in order of increasing energy and in eV.
SIGIN(K)		Cross-section coordinate associated with a particular resolved inelastic level. Cross section must be in barns.
IR1		Number of interpolation regions for unresolved inelastic scattering nuclear temperatures.

TABLE VIII. (Contd.)

Name of Variable	Definition
IR2	Number of interpolation regions for inelastic scattering data for unresolved calculation.
IR3	Number of interpolation regions for n,2n nuclear temperatures.
NST(I)	Number of energy points associated with the data for nuclear temperature for unresolved inelastic scattering, for interpolation region I.
KT(I)	Same as KT(I) above.
ENT(K)	Energy coordinate associated with data for nuclear temperature in inelastic scattering. Energies must be in order of increasing energy and in eV.
SNT(K)	Temperature coordinate associated with data for a statistical calculation of inelastic scattering. Temperatures must be in MeV.
NSD(I)	Number of points associated with the data describing the graph of the difference between total inelastic cross section, and the sum of contribution due to the resolved levels for interpolation region I.
KTD(I)	Type of interpolation to be used for the data describing the difference between the total inelastic cross section and the sum of resolved levels for interpolation region I:
	= 1 ln E vs ln σ;
	= 2 ln E vs σ;
	= 3 E vs σ.
END(K)	Energy coordinate associated with data describing the difference between total inelastic cross section, and the sum of resolved levels. Energies must be in order of increasing energy and in eV.
SND(K)	Cross-section coordinate associated with data describing the difference between total inelastic cross section, and the sum of resolved levels.
NS2N(I)	Number of points associated with the nuclear temperature data for the n,2n reaction for interpolation region I.

TABLE VIII. (Contd.)

Name of Variable	Definition
KT2N(I)	Type of interpolation to be used for the n,2n nuclear temperature data for interpolation region I: = 1 ln E vs ln T; = 2 ln E vs T; = 3 E vs T.
E2NT(K)	Energy coordinate associated with data for a statistical calculation of the n,2n reaction. Energies must be in order of increasing energy and in eV.
S2N(K)	Temperature coordinate associated with data for a statistical calculation of the n,2n reaction. Temperatures must be in MeV.
NSPEC	Number of fission spectra in library.
I	Identification number for a particular fission spectrum.
BETA ALPHA TAU	Parameters in generalized fission spectrum: $f(E) = \text{ALPHA}\left(\frac{E}{\text{TAU}^2}\right) e^{-E/\text{TAU}}$ $+ (1 - \text{ALPHA}\sqrt{\frac{4E}{\pi\,\text{BETA}^3}}\, e^{-E/\text{BETA}}$

The code listing for the library program is given in Appendix G.

APPENDIX A

Program Details of Overlay 2

Overlay 2 is concerned with the calculation of the unresolved and resolved resonant capture and fission cross sections as described in Section III-A.

The J integrals in the unresolved resonance calculation are evaluated by breaking the infinite interval into two finite intervals plus a remainder term. In particular, the code assumes

$$\int_0^\infty \frac{\psi}{\psi + \beta}\, dx = \int_0^{20/\xi} \frac{\psi}{\psi + \beta}\, dx + \int_{20/\xi}^{200/\xi} \frac{\psi}{\psi + \beta}\, dx + \text{remainder}, \tag{A1}$$

where ξ is given in Eq. 11 and

$$\text{remainder} = \frac{1}{\sqrt{\beta(1+\beta)}} \left\{ \frac{\pi}{2} - \tan^{-1}\left(\frac{200}{\xi} \sqrt{\frac{\beta}{1+\beta}} \right) \right\}. \tag{A2}$$

The two integrals in Eq. A1 are evaluated using 16-point Gaussian quadrature.

The integrations over the chi-squared distributions use a method similar to that in the ERIC-2 code,[17] 10-point integration being used for one or two degrees of freedom in the neutron-width distribution, and five-point integration for one to four degrees of freedom in the fission-width distributions.

Values of z_i are determined such that

$$\int_{z_i}^{z_{i+1}} P_n(x)\, dx = \frac{1}{N}, \tag{A3}$$

where P_n is the chi-squared distribution of order n, and N is 10 for the neutron-width distributions (n = 1,2) and five for the fission-width distributions (n = 1,2,3,4). N - 1 points z_i are involved, besides the points $z_0 = 0$ and $z_N = \infty$.

Within each interval z_i, z_{i+1}, average values for x are determined using

$$x_{i+1} = N \int_{z_i}^{z_{i+1}} x P_n(x)\, dx. \tag{A4}$$

The code then assumes that

$$\int_0^\infty f(x)Pn(x)\ dx = \frac{1}{N}\sum_{i=1}^{N} f(x_i). \qquad (A5)$$

Tables IX and X list the values of x_i used in the code.

TABLE IX. Values of x_i Used for Integration of Neutron-width Distributions with One or Two Degrees of Freedom

	Degrees of Freedom, n			Degrees of Freedom, n	
Index, i	1	2	Index, i	1	2
1	0.00525430	0.0517550	6	0.574320	0.800477
2	0.0371740	0.163089	7	0.879486	1.05263
3	0.103133	0.288398	8	1.33502	1.39297
4	0.207850	0.431720	9	2.10558	1.91582
5	0.359875	0.599144	10	4.39230	3.30400

TABLE X. Values of x_i Used for Integration of Fission-width Distributions with One, Two, Three, or Four Degrees of Freedom

	Degrees of Freedom, n			
Index, i	1	2	3	4
1	0.0212093	0.107400	0.189269	0.254966
2	0.155477	0.360070	0.476304	0.549072
3	0.467072	0.699863	0.793185	0.842565
4	1.10710	1.22312	1.23576	1.23075
5	3.24914	2.60955	2.30575	2.12265

In the resolved resonant region, the integrals in Eq. 24 are evaluated using the Romberg integration algorithm.[18] Since this part of the code is quite time-consuming, the code is selective in regard to which of the resonances to include in each group-integration interval. Only those resonances are included which produce a σ_a or σ_t (resonant) at the upper group boundary greater than the input test criterion EPSABS, or which lie within the group in question.

Subroutine RESRES has a limit of 16 built in for the Romberg integration order. Any group that does not converge at this order will be flagged with an error message, and the code will continue using the unconverged results for that group. Dense metal compositions being evaluated using an all-fine-group option have been observed to exhibit this difficulty. In this case, use of ultrafine groups, rather than fine groups, has not only assured convergence, but has reduced the time to execute RESRES by as much as a factor of two.

APPENDIX B

Program Details of Overlay 4

The present Legendre-coefficient library has been arbitrarily set up with a high energy limit (ESTART) of 10 MeV corresponding to a lethargy of 0. The coefficients are on the library tape in the center-of-mass system. The lower energy limit of the Legendre library is at an energy corresponding to a lethargy of 17. The data are tabulated in order of decreasing energy at values corresponding to a lethargy increment of 1/120 resulting in 2041 energy points.

The current Legendre library is made up of a Table of Contents followed by 33 blocks of data as shown in Fig. 10. The Table of Contents

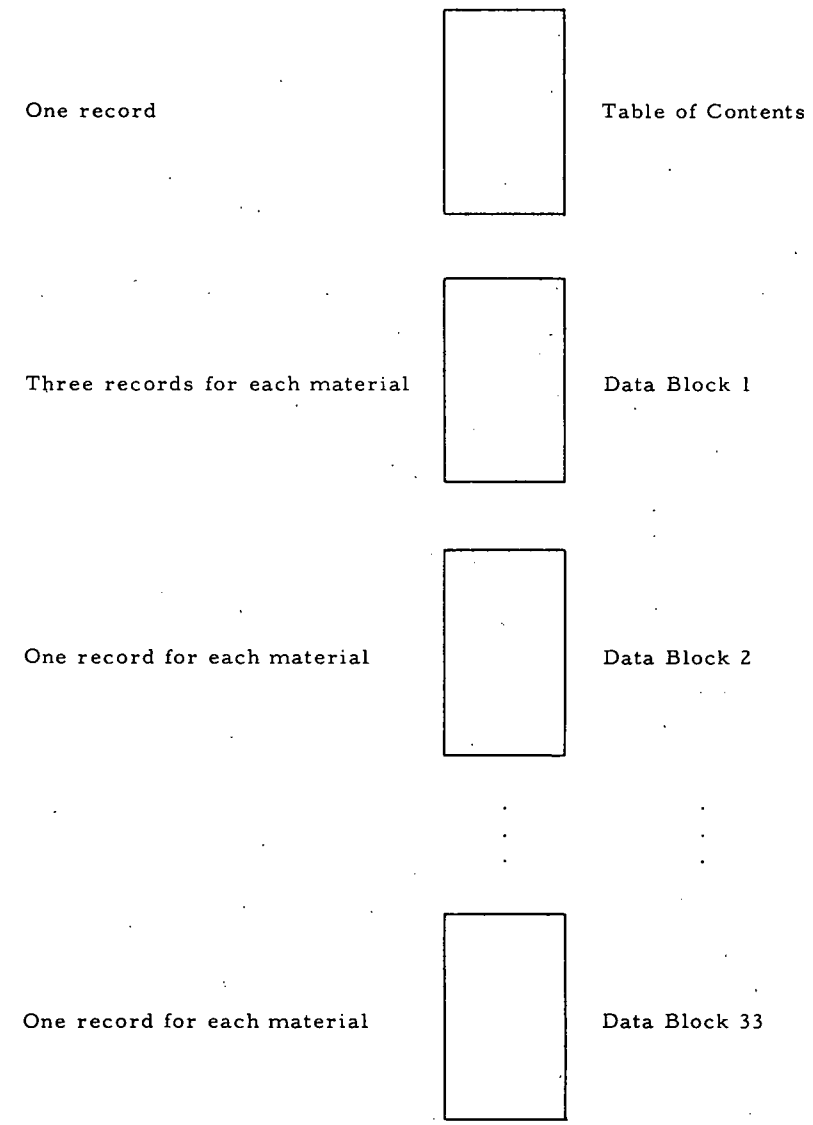

Fig. 10. Legendre-coefficient Tape Structure

(Fig. 11) contains (1) MATLS, the number of materials in the library; (2) LEVLS, the number of energy levels of data; (3) ESTART, energy at the top of the Legendre-library data; (4) NPASS, the number of blocks of data to follow; and (5) MANY1(I), the number of energy points of information in each of these blocks, I.

MATLS	Number of materials
LEVLS	Number of energy levels
ESTART	Energy at top of Legendre-library data
NPASS	Number of blocks of data
MANY1(1)	Number of energy points in Block 1
MANY1(2)	Number of energy points in Block 2
⋮	⋮
MANY1(NPASS)	Number of energy points in Block NPASS

Fig. 11
Table-of-contents Structure on Legendre-coefficient Tape

The first data block (Fig. 12) is made up of three records for each material. The first of the records contains the material identification number. The second lists the elements of the transformation matrix for conversion from center-of-mass to the laboratory system[16] followed by the atomic weight of the material. The third record consists of the first 20 Legendre expansion coefficients for MANY1(1) energy points starting at energy ESTART. Three similar records appear for each material. MANY1(1) for the current Legendre library tape has a value of 121.

The remaining NPASS-1 blocks of data are made up of two records, each consisting of the material identification and the first 20 Legendre expansion coefficients B0(I), B1(I), B2(I),..., and B19(I) for the next MANY1(I) energy points, for each material. Figure 13 illustrates Block 2 on the current Legendre-library tape where MANY1(2) through MANY1(33) have a value of 61. Figure 14 shows the structure of Block 33 on the current library tape.

The Legendre-coefficient library has been structured in the format described above in order to effect an economy of storage demanded by the vast amount of data handled. This is achieved in Overlay 4 by calculating the elastic scattering cross sections, elastic transport cross sections, and fluxes in a series of passes through the group structure involved until the calculation has been completed for all groups. The program thus works its way through the groups calculating first the elastic scattering, removal, and transport cross sections for a small number of groups, then the fluxes for these groups, and repeating this procedure until all groups are exhausted.

This procedure will be described here in detail.

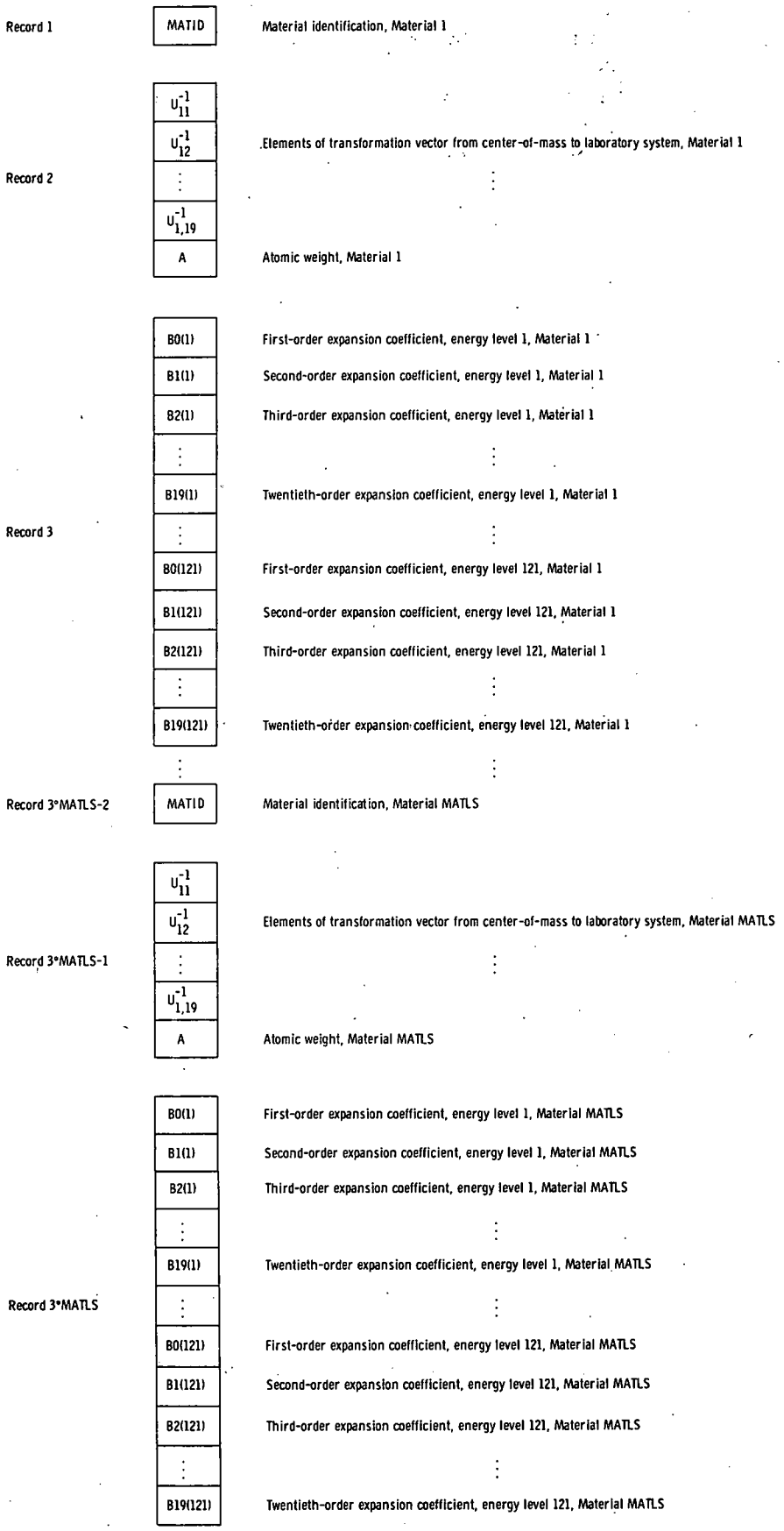

Fig. 12. Data Block 1 on Legendre-coefficient Tape

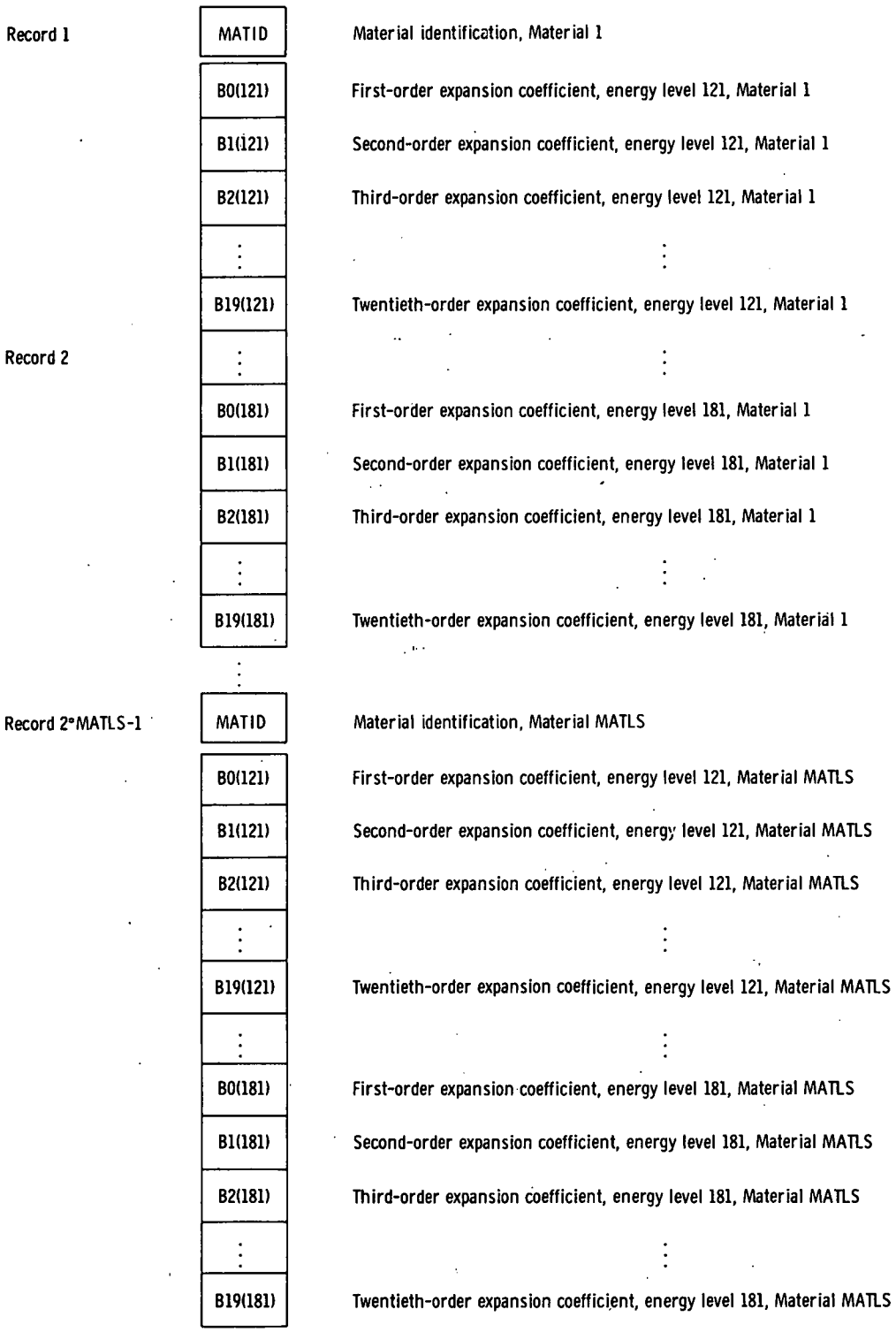

Fig. 13. Data Block 2 on Legendre-coefficient Tape

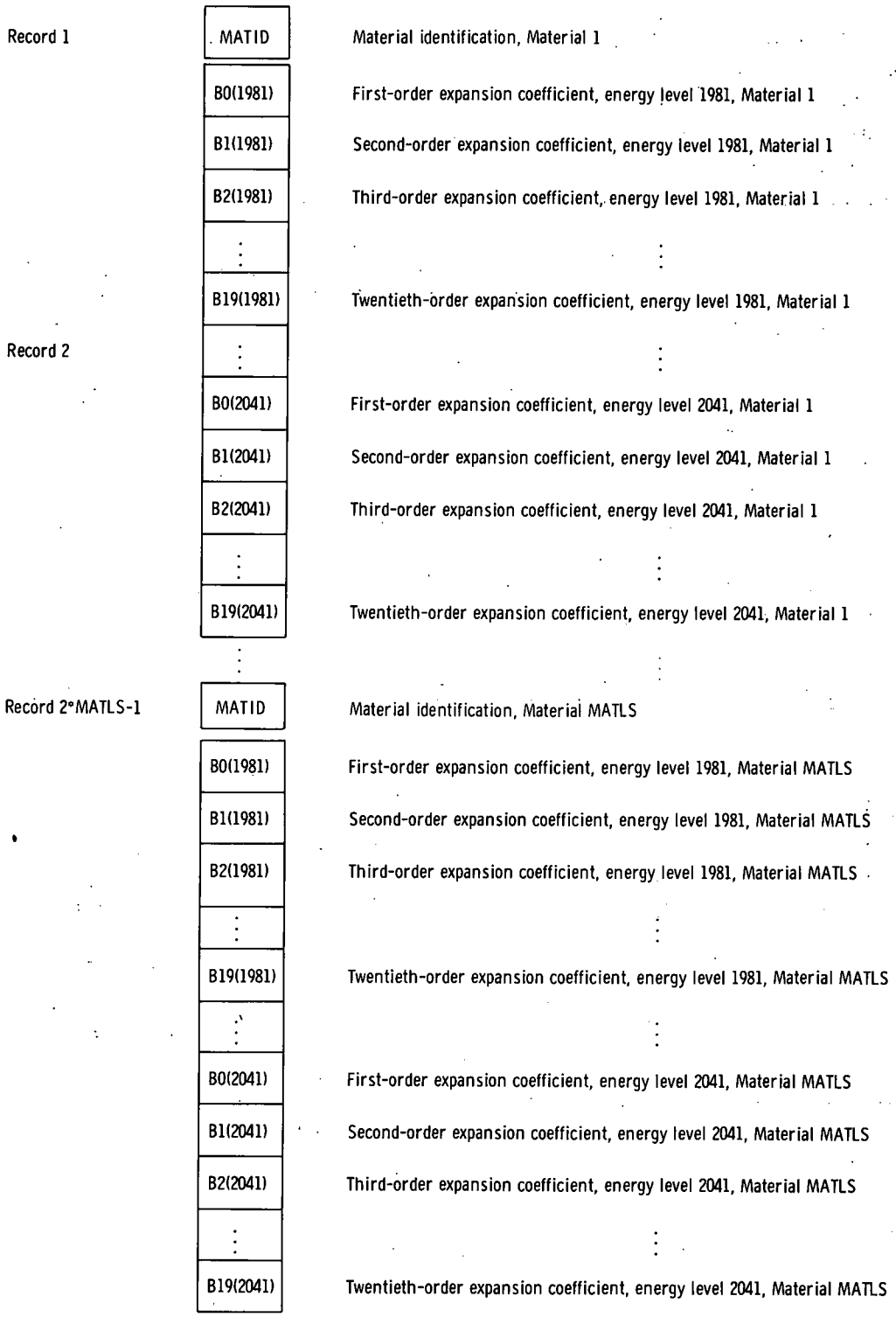

Fig. 14. Data Block 33 on Legendre-coefficient Tape

Overlay 4 is made up of three routines: CONTROL2, ALRAGO, and PONE. CONTROL2 controls the logical flow between ALRAGO and PONE. ALRAGO calculates the elastic scattering, elastic removal, and elastic transport cross sections for specified groups for each of the materials in the problem for which Legendre coefficients are available. PONE calculates the fundamental-mode flux for a specified number of groups.

Initially in CONTROL2, the Legendre coefficients for those materials used in the problem are transferred from the library tape (logical unit 9) to a scratch tape (logical unit 5) in the same format as Data Block 1 through Data Block n, modified to the extent that the coefficients, B0, B1, B2, ..., B19, for each energy level constitute an individual record. The number of blocks, n, transferred to tape 5 is determined by comparing the number of ultrafine groups in the problem between EMIN and ESTART with 2040, the total available number of groups of data on the Legendre coefficient library. If they are equal, this implies that EMIN (an input quantity) lies at a lethargy of 17, and all 33 data blocks are transferred to tape 5 for each material in the problem. If they are not equal, the number of blocks of data required to be transferred is calculated from

$$\text{NPASS} = \left[\frac{(\text{ultrafine groups between ESTART and EMIN}) - 1}{60}\right],$$

where the brackets denote integer arithmetic. In this manner, the number of blocks put onto tape 5 will be that which most nearly corresponds to the number of ultrafine groups contained in the number of fine groups in the problem from ESTART to EMIN. Thus, the last block may not all be used if only one fine group is needed to fill out the bottom of the problem.

To illustrate, consider the following example. Let EMAX be at a lethargy of zero, or an energy of 10 MeV. Let EMIN be the minimum energy desired and have a value such that a choice of a quarter lethargy width for fine groups results in 51 fine groups between EMAX and EMIN. Let NDELU, the number of ultrafine groups per fine group, be 30. The group structure will then appear as in Fig. 15. Note that the ultrafine group indexing is relative to ESTART. For this example, the number of blocks of data to be transferred onto tape 5 is 25. The entire 60 ultrafine groups of Data Block 25 are transferred, even though only the first 30 are necessary for the calculation. Blocks 26 through 33 are not required and therefore are not transferred from tape 10 onto tape 5.

Having obtained a working tape containing the Legendre coefficients necessary in the problem, CONTROL2 proceeds to step its way through the required cross sections and the fundamental-mode flux. First, for an ultrafine-group problem, the value of KMINS, the index of the first fine group below ESTART, is calculated. PONE is then entered with KMIN and KEND set to 1 and KMINS - 1, respectively. This obtains the

fundamental-mode flux for the fine groups above the Legendre coefficient region, if any. Normally EMAX = ESTART so that KMINS = 1. If an all-fine-group problem is involved, KEND is set equal to the number of fine groups in the problem and no further flux calculation is needed. For an ultrafine calculation, however, CONTROL2 sets up NPASS successive entries to ALRAGO and PONE to complete one iteration of a search for critical buckling. This procedure is repeated until convergence on the buckling is obtained as described earlier in Section III-C.

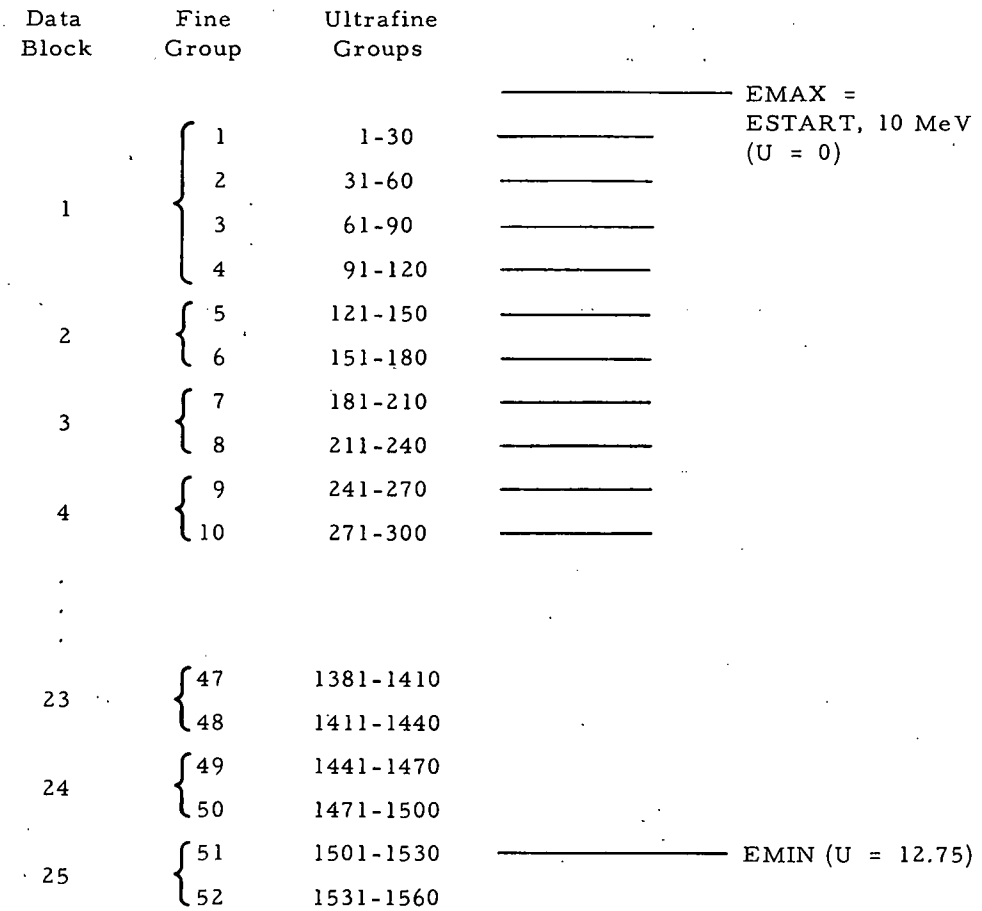

Fig. 15. Group Structure for Legendre-coefficient Ultrafine-group Treatment

For the example, KMINS has a value of 1. NPASS, for the example, is 25. For the first of the 25 passes through ALRAGO and PONE, cross sections and fluxes for ultrafine groups 1-120 (fine groups 1-4) are calculated. For the second through 24th passes, ultrafine groups 121-180 through 1441-1500 are calculated. The 25th pass completes the calculation for the remaining fine group, 51 (corresponding to ultrafine groups 1501-1530).

Subroutine ALRAGO calculates the elastic scattering, elastic removal, and elastic transport cross sections for the ultrafine groups contained in fine groups KMIN to KEND. The array for storage of the

elastic scattering matrix, BSIGET, has arbitrarily been assigned dimension limits of 120 ultrafine groups by 54 ultrafine groups of down-scattering (120, 54). Table XI shows, for various light elements, the maximum energy loss per elastic collision in ultrafine groups based on the lethargy width of the current Legendre-coefficient library. The value 54 limits the Legendre treatment to materials of at least mass 9.

TABLE XI. Number of Ultrafine Groups Scattered by Various Masses

Element	Atomic Weight	Number of Ultrafine Groups Scattered[a]
Sodium	23	20.8827
Oxygen	16	30.0391
Carbon	12	40.0930
Beryllium	9	53.5544
Lithium	7	69.0437
Helium	4	122.5985

[a]Ultrafine-group lethargy width is 1/120.

In general, if the calculation involves N ultrafine groups in one pass, the dimension limit of the first subscript of BSIGET must be 2N. 2N groups are required because of the necessity of obtaining the scattering source from higher groups in any pass. The elastic scattering matrix for the current pass is stored in N of the 2N storage block, and the scattering matrix that will be used in the next pass is stored in the remaining N locations. N must be at least 54, the maximum permissible number of down-scatter groups. N has been chosen to be 60, and the dimension limit on BSIGET is therefore 120. The restriction that KEND - KMIN + 1 divide 60 integrally allows the choices listed earlier for DELUN, the fine-group lethargy width. The storage arrangement for elastic removal, BSIGER, and elastic transport, BTSIGT, is basically the same as for BSIGET without the second subscript, so the explanation for BSIGET also applies to these.

ALRAGO is entered with fine-group limits KMIN and KEND. These are set up in the program to be the fine-group limits corresponding to the number of ultrafine groups to be calculated in each pass through ALRAGO. There are 120 ultrafine groups for the first pass and 60 for each subsequent pass; for the last pass, any multiple of NDELU as is required to end up at EMIN. The number of the current pass through ALRAGO is denoted by the variable MORE, and the number of ultrafine groups to be calculated in pass MORE is MANY. The region (i.e., which of the two 60 locations) in the 120-location block of storage to be utilized in pass MORE is picked out by starting at the value IS and doing the calculation until IS + MANY - 1. IS starts out with a value of 1 for the first two passes and alternates on subsequent passes as 61, 1, 61, etc.

MANY1(I) ultrafine groups of data appear for each material for block I on tape 5, even though for the last pass, MANY may be less than MANY1(NPASS). To allow this possibility, the variable NUSANS, the difference between MANY1(I) and MANY, is introduced. For each material, on each pass, if a nonzero value of NUSANS is encountered, NUSANS records on tape 5 are skipped to advance to the Legendre coefficients for the next material.

PONE calculates the fundamental-mode flux for fine groups KMIN to KEND. If KMIN is less than KMINS, the pass through PONE is one in which there are only fine groups. If KMIN is greater than or equal to KMINS, all ultrafine-group fluxes corresponding to groups KMIN to KEND are obtained. The number of the pass through the groups is MORE, as in ALRAGO, and the first ultrafine group in fine group KMIN is JFKS (relative to ESTART). As the routine works through from fine group KMIN to KEND, the variables JFKS and JFKL refer to the first and last ultrafine group of the current fine group. The last ultrafine group in any current pass is JEND1. As PONE calculates the flux in ultrafine group JFK (which has a range of JFKS to JFKL for each fine group), the index J of the elastic transport and elastic removal cross sections BTSIGT and BSIGER, which picks the correct value out of the 120-length array, is calculated as JFK-NSH2. NSH2 is initially zero and is incremented by 120 on each even-numbered pass. In the calculation of the scattering source for group JFK (ranging from JFKS to JFKL for each fine group), if JL is the actual ultrafine group from which elastic scattering occurs, the index to pick the correct BSIGET out of the 120-length array is JL - NW1*60, where NW1 is either N1 or N2 depending on whether JL is less than or greater than or equal to the initial JFKS of the current pass. N1 is calculated as 2*[(MORE - 1)/2] and N2 as 2*[MORE/2], where MORE is the number of the current pass and the brackets denote integer arithmetic. If JL is less than JFKS, NW1 is set equal to N1. If JL is greater than or equal to JFKS, NW1 is set equal to N2.

APPENDIX C

Logical Tape Usage

Table XII lists the logical tapes used by MC^2 and describes the tape contents. The names of the subprograms involved with each logical tape are also listed for reference.

TABLE XII. Description of Logical Tapes

Logical Tape	Written by	Read by	Description of Contents
2[a]	UNRES;FIGERO; ALRAGO;AVER1	FIGERO;FIGERO; OGARLA;AVER1	Binary, unresolved resonance cross sections; ufg-resolved resonant σ_a; Legendre coefficient derived microscopic cross sections; resolved resonances cross sections.
3[a]	RESRES;FIGERO; INSCAT	AVER1	Binary, resolved resonance cross sections; unresolved resonance cross sections, smooth nonresonant quantities; inelastic and n,2n matrices.
4[a]	SOURCE;ALRAGO; AVER1	CONTROL2; ALRAGO;AVER; AVER1	Binary, ultrafine-group fission spectrum; Legendre-coefficient-derived macroscopic cross sections; broad-group microscopic cross sections.
5[a]	CONTROL2;AVER1	ALRAGO;AVER1	Binary, Legendre-coefficient library; broad-group microscopic cross sections.
6[a]	DRIVER;UNRES; RESRES;CONTROL1; FIGERO;SIGAVC; INSCAT;SOURCE; CONTROL2;ALRAGO; OGARLA;AVER; AVER1	-	BCD, output information.
7[a]	User[b]	DRIVER;CONTROL2	BCD, input information.
9[c]	Library[d]	DRIVER;UNRES; INSCAT;SOURCE; CONTROL2	Binary, table of real and imaginary parts of the W function, library data, Legendre-coefficient data.
23[c]	-	-	Binary MC^2 overlay program tape
50[a]	OGARLA	AVER1	Legendre-coefficient-derived microscopic cross section

[a]Working tapes during a run, to be released after run is completed.
[b]Loaded from cards supplied by user.
[c]Permanent tapes to be mounted before each run and saved for future use.
[d]The library tape is prepared in advance and may be updated from time to time.

The library tape 9 is prepared off line by merging three main categories onto the single library tape. The first category consists of the W table prepared by the program listed in Appendix H. The second category contains the cross-section data prepared by the library program listed in Appendix G. Section V of this report describes the input format for the library program. The last category of tape 9 contains the Legendre-coefficient data as described in Appendix B.

APPENDIX D

Listing of Sample Problem Input

The following is a listing of the BCD input deck for a sample problem involving five materials, 21 epithermal groups, and an ordinary P1 fundamental-mode spectrum calculation involving a buckling iteration to criticality. The material designations correspond to the library generated from tape 102 of the Evaluated Nuclear Data File (ENDF/B) supplied by the Brookhaven National Laboratory. Code-test options 1, 2, 3, 4, and 6 have been selected to display various internal print selections. For brevity, the card-punch option is not selected.

```
 TEST PROB,, ALL FINE GROUP, LIBRARY FROM ENDF/B TAPE 102 OF 2/23/67
     1      5     21      2      0  1047      0      0      0     1 ,25
 10,        +6 36,7      +5 22,3      +5 13,5      +5 82,5      +4 50,       +4
 30,        +4 18,       +4 11,       +4 67,       +3 41,       +3 25,       +3
 15,        +3 91,       +2 43,       +2 26,       +2 20,4      +2 12,3      +2
 960,          583,         275,         85,755
 ,001          ,0005        ,5
     1      1      1      1             1             2
NA 23          ,0123        900,         ,0123
PU239          ,0012        900,         ,0012
U 238          ,0108        900,         ,0108
PU240          ,0004        900,         ,0004
FE             ,011         900,         ,011
            1 0,            ,00005       ,0001
```

APPENDIX E

Listing of Sample Problem Output

The listing given is the output for the problem specified in Appendix D. Since the library data used were an early test release of ENDF/B data, the numbers resulting in the problem should be considered useful only from the standpoint of code testing. Thus, for example, the divide check indicated for subroutine INSCAT is due to inadequacies in the library data and not due to a coding error.

TEST PROB., ALL FINE GROUP, LIBRARY FROM ENDF/B TAPE 102 OF 2/23/67

REVISED BROAD GROUP BOUNDARIES BY ENERGY AND LETHARGY

	DESIRED ENERGY	ACTUAL ENERGY USED	DESIRED LETHARGY	ACTUAL LETHARGY USED
0	10.00000000+006	10.00000000+006	00.00000000+000	00.00000000+000
1	36.70000000+005	36.78794412+005	10.02393431-001	10.00000000-001
2	22.30000000+005	22.31301602+005	15.00583508-001	15.00000000-001
3	13.50000000+005	13.53352832+005	20.02480501-001	20.00000000-001
4	82.50000000+004	82.08499862+004	24.94956986-001	25.00000000-001
5	50.00000000+004	49.78706837+004	29.95732274-001	30.00000000-001
6	30.00000000+004	30.19738342+004	35.06557897-001	35.00000000-001
7	18.00000000+004	18.31563889+004	40.17383521-001	40.00000000-001
8	11.00000000+004	11.10899654+004	45.09860006-001	45.00000000-001
9	67.00000000+003	67.37946999+003	50.05647753-001	50.00000000-001
10	41.00000000+003	40.86771438+003	54.96768305-001	55.00000000-001
11	25.00000000+003	24.78752177+003	59.91464547-001	60.00000000-001
12	15.00000000+003	15.03439193+003	65.02290171-001	65.00000000-001
13	91.00000000+002	91.18819656+002	70.02065959-001	70.00000000-001
14	43.00000000+002	43.07425406+002	77.51725349-001	77.50000000-001
15	26.00000000+002	26.12585573+002	82.54828927-001	82.50000000-001
16	20.40000000+002	20.34683690+002	84.97390564-001	85.00000000-001
17	12.30000000+002	12.34098041+002	90.03326203-001	90.00000000-001
18	96.00000000+001	96.11165206+001	92.51162366-001	92.50000000-001
19	58.30000000+001	58.29466373+001	97.49908464-001	97.50000000-001
20	27.50000000+001	27.53644935+001	10.50132455+000	10.50000000+000
21	85.75500000+000	78.89324827+000	11.66660126+000	11.75000000+000
22	00.00000000+000	00.00000000+000		

GROUP	DELTA U	DELTA E
1	10.00000000-001	63.21205588+005
2	50.00000000-002	14.47492810+005
3	50.00000000-002	87.79487692+004
4	50.00000000-002	53.25028461+004
5	50.00000000-002	32.29793026+004
6	50.00000000-002	19.58968494+004
7	50.00000000-002	11.88174453+004
8	50.00000000-002	72.06642350+003
9	50.00000000-002	43.71049539+003
10	50.00000000-002	26.51175561+003
11	50.00000000-002	16.08019262+003
12	50.00000000-002	97.53129837+002
13	50.00000000-002	59.15572274+002
14	75.00000000-002	48.11394250+002
15	50.00000000-002	16.94839833+002
16	25.00000000-002	57.79018828+001
17	50.00000000-002	80.05856493+001
18	25.00000000-002	27.29815203+001
19	50.00000000-002	37.81698833+001
20	75.00000000-002	30.75821438+001
21	12.50000000-001	19.64712452+001
22		78.89324827+000

EPSILON SIGMA= 1.0000-003 EPSILON SIGMA BAR= 5.0000-004 EPSILON SIGMA T= 5.0000-001
GEOMETRY= 2 SOURCE TYPE=1047 PIN RADIUS=-0.0000+000 COOLANT RADIUS=-0.0000+000 A=-0.0000+000
THERMAL OPTION= 0 SPECTRUM INPUT 0 MICROSCOPIC CROSS SECTIONS 0 PUNCH OPTION 0
NUMBER OF ULTRA FINE GROUPS PER FINE GROUP= 1 ULTRA FINE GROUP LETHARGY WIDTH= 2.50000-001 FINE GROUP WEIGHTING OPTION 2
FUNDAMENTAL MODE OPTION= 1

MATERIAL ID.	ELMO MAT. ID.	ATOMIC CONC.	TEMPERATURE	ATOMIC CONC. PIN	ATOMIC CONC. COOLANT
FE	-0	1.10000000-002	9.00000000+002	1.10000000-002	-0.00000000+000
U 238	-0	1.08000000-002	9.00000000+002	1.08000000-002	-0.00000000+000
PU239	-0	1.20000000-003	9.00000000+002	1.20000000-003	-0.00000000+000
PU240	-0	4.00000000-004	9.00000000+002	4.00000000-004	-0.00000000+000
NA 23	-0	1.23000000-002	9.00000000+002	1.23000000-002	-0.00000000+000

ELAPSED TIME IN OVERLAY 1.05590+004MS

TIME SPENT IN PROGRAM AREA NO. 1 WAS 7.090+000SECONDS

MAT. NOU 238 2 L STATES 6 E POINTS

3.92000+003	9.99443-001	0.00000+000	8.02221-002
8.00000+003	7.76529-001	0.00000+000	1.12173-001
1.20000+004	6.84162-001	0.00000+000	1.12721-001
2.00000+004	5.62811-001	0.00000+000	1.10282-001
3.50000+004	4.27633-001	0.00000+000	1.06775-001
5.00000+004	3.46640-001	0.00000+000	1.01335-001

TIME SPENT IN PROGRAM AREA NO. 2 WAS 4.286+000SECONDS

MAT. NOPU239 1 L STATES 16 E POINTS

3.00000+002	7.49517+000	1.11636+001	8.81088-002
6.00000+002	5.44220+000	8.16463+000	6.78178-002
1.00000+003	4.13217+000	6.36625+000	5.37343-002
1.50000+003	3.25693+000	5.17965+000	4.14006-002
2.50000+003	2.37343+000	3.97188+000	8.55622-003
3.50000+003	1.87511+000	3.30907+000	1.02903-002
5.00000+003	1.45428+000	2.71895+000	1.93061-002
8.00000+003	1.02570+000	2.11608+000	1.84033-002
1.30000+004	6.99137-001	1.64943+000	1.52666-002
2.00000+004	4.85035-001	1.34360+000	1.25768-002
3.00000+004	3.34355-001	1.12937+000	1.03798-002
4.00000+004	2.52140-001	1.00998+000	9.01845-003
5.00000+004	2.01075-001	9.28254-001	7.80070-003
6.00000+004	1.66611-001	8.66593-001	7.33246-003
8.00000+004	1.25072-001	7.67226-001	6.43541-003
1.00000+005	9.89384-002	7.02583-001	5.76659-003

TIME SPENT IN PROGRAM AREA NO. 2 WAS 2.407+001SECONDS

MAT, NOPU240 2 L STATES 14 E POINTS

6,85000+002	4,04128+000	6.00002-002	1.83785-002
8,00000+002	3,68822+000	6.04357-002	1.74865-002
1,00000+003	3,21958+000	6.16721-002	1.61149-002
2,00000+003	2,12957+000	7.09437-002	8.94523-003
4,00000+003	1,43305+000	8.53044-002	5.46263-003
6,00000+003	1,16824+000	9.43746-002	7.05848-003
8,00000+003	1,02553+000	1.00582-001	6.87686-003
1,00000+004	9,31173-001	1.03096-001	6.57747-003
1,50000+004	7,79163-001	1.06347-001	5.99307-003
2,00000+004	6,81164-001	1.05529-001	5.62676-003
2,50000+004	6,07891-001	1.05962-001	5.38504-003
3,00000+004	5,51646-001	1.02587-001	5.21564-003
3,50000+004	5,02313-001	1.09629-001	5.09030-003
4,00000+004	4,64736-001	1.05111-001	4.99120-003

TIME SPENT IN PROGRAM AREA NO, 2 WAS 3.361+001SECONDS

340	5	1	65	2	2	1	1	1	1
1 7,88932+001		1,01301+002							
PU239 9,6000+001	9,4209+000	8,0187+001	8,0187+001	2,8858-001	7				
PU239 9,9000+001	6,7353+000	8,0187+001	8,0187+001	2,8858-001	7				
U 238 1,0270+002	3,3428+001	8,0187+001	8,0187+001	2,8858-001	7				
PU239 1,0300+002	8,0320+001	8,0187+001	8,0187+001	2,8858-001	7				
PU240 1,0490+002	8,3153+000	8,0187+001	8,0187+001	2,8858-001	7				
PU239 1,0540+002	9,5076+001	8,0187+001	8,0187+001	2,8858-001	7				
PU239 1,0680+002	8,0860+001	8,0187+001	8,0187+001	2,8858-001	7				
PU240 1,0560+000	4,9546+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,0930+001	1,1529+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,5500+001	5,8243+003	8,0173+001	8,0173+001	2,8858-001	8				
U 238 2,1000+001	5,3324+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 2,2200+001	1,3456+002	8,0173+001	8,0173+001	2,8858-001	8				
U 238 3,6700+001	2,4966+001	8,0173+001	8,0173+001	2,8858-001	8				
PU240 3,8310+001	1,5159+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 4,1400+001	1,0061+001	8,0173+001	8,0173+001	2,8858-001	8				
PU240 4,1650+001	2,0644+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 4,4500+001	5,4630+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 4,7600+001	2,4224+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 4,9850+001	3,3464+003	8,0173+001	8,0173+001	2,8858-001	8				
PU239 5,0220+001	4,8685+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 5,2600+001	1,7087+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 5,5790+001	1,8968+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 5,7600+001	1,2418+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 5,8000+001	8,9803+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 5,9390+001	1,7216+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 6,1100+001	2,0552+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 6,3400+001	6,3773+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 6,5960+001	2,9839+001	8,0173+001	8,0173+001	2,8858-001	8				
U 238 6,6200+001	8,9452+001	8,0173+001	8,0173+001	2,8858-001	8				
PU240 6,6590+001	2,2379+000	8,0173+001	8,0173+001	2,8858-001	8				
PU240 7,2750+001	1,8773+000	8,0173+001	8,0173+001	2,8858-001	8				
PU239 7,4310+001	4,3923+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 8,2000+001	4,9367+000	8,0173+001	8,0173+001	2,8858-001	8				
PU239 8,5300+001	5,8774+000	8,0173+001	8,0173+001	2,8858-001	8				
PU239 8,5600+001	4,4227+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 9,7600+001	7,3003+000	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,0120+002	1,7082+000	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,1040+002	5,3670+002	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,1610+002	6,6647+002	8,0173+001	8,0173+001	2,8858-001	8				
U 238 1,1690+002	5,8220+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,1890+002	4,3627+001	8,0173+001	8,0173+001	2,8858-001	8				
PU239 1,2100+002	5,1538+002	8,0173+001	8,0173+001	2,8858-001	8				

PU240	1,2150+002	3,1080-001	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,2630+002	3,0236-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,2760+002	6,0962-003	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,3190+002	1,0295-001	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,3380+002	3,0534-002	8,0173+001	8,0173+001	2,8858-001	8
PU240	1,3530+002	1,6757-001	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,4320+002	3,7400-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,4630+002	4,9162-002	8,0173+001	8,0173+001	2,8858-001	8
PU240	1,5180+002	6,0853-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,5700+002	3,4818-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,6090+002	5,2725-003	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,6440+002	6,2280-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,7050+002	5,7785-003	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,8510+002	6,2681-003	8,0173+001	8,0173+001	2,8858-001	8
U 238	1,8960+002	1,4842-001	8,0173+001	8,0173+001	2,8858-001	8
PU239	1,9510+002	1,7640-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	2,0360+002	1,6472-002	8,0173+001	8,0173+001	2,8858-001	8
PU239	2,6180+002	9,6168-003	8,0173+001	8,0173+001	2,8858-001	8
PU239	2,7920+002	7,9885-003	8,0173+001	8,0173+001	2,8858-001	8
PU240	2,8790+002	6,8663-002	8,0173+001	8,0173+001	2,8858-001	8
NA 23	2,8500+003	7,5514-001	8,0173+001	8,0173+001	2,8858-001	8
PU239	7,5210+001	4,6752-000	8,0173+001	8,0173+001	2,8858-001	9
U 238	8,1100+001	7,6871-001	8,0173+001	8,0173+001	2,8858-001	9
U 238	8,9500+001	1,3328-001	8,0173+001	8,0173+001	2,8858-001	9
PU240	9,0700+001	7,5506-002	8,0173+001	8,0173+001	2,8858-001	9
PU239	9,0900+001	4,5245-001	8,0173+001	8,0173+001	2,8858-001	9
PU240	9,2500+001	3,8183-002	8,0173+001	8,0173+001	2,8858-001	9
PU239	9,5900+001	1,5301-001	8,0173+001	8,0173+001	2,8858-001	9
FE	0,00000+000	0,00000+000	U 238	1,56232+000	0,00000+000	PU239	1,88174+000	2,22515+001
PU240	1,43482+001	7,10807-006	NA 23	9,41884-003	0,00000+000			
340	17	1	74	2	2	1	1	1	1
2	1,01301+002	1,30073+002							
PU239	1,3190+002	2,0997-000	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,3380+002	4,0171-001	7,1417+001	7,1417+001	2,8858-001	7
PU240	1,3530+002	1,5858-000	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,3540+002	2,7403-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,3680+002	1,6378-001	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,4320+002	1,5374-001	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,4630+002	1,6988-001	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,4940+002	2,3249-002	7,1417+001	7,1417+001	2,8858-001	7
PU240	1,5180+002	1,6583-001	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,5700+002	8,2521-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,6090+002	1,1415-002	7,1417+001	7,1417+001	2,8858-001	7
PU240	1,6280+002	7,4358-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,6440+002	1,2588-001	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,6690+002	2,4140-002	7,1417+001	7,1417+001	2,8858-001	7
PU240	1,7020+002	6,9717-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,7050+002	1,0579-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,8510+002	9,7083-003	7,1417+001	7,1417+001	2,8858-001	7
PU240	1,8610+002	5,2959-002	7,1417+001	7,1417+001	2,8858-001	7
U 238	1,8960+002	2,2119-001	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,9510+002	2,5221-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,9920+002	6,7868-003	7,1417+001	7,1417+001	2,8858-001	7
PU239	2,0360+002	2,2977-002	7,1417+001	7,1417+001	2,8858-001	7
U 238	2,0860+002	5,0463-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	2,6180+002	1,0581-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	2,7920+002	8,5560-003	7,1417+001	7,1417+001	2,8858-001	7
PU240	2,8790+002	7,1945-002	7,1417+001	7,1417+001	2,8858-001	7
PU239	1,5500+001	2,4919-003	7,1423+001	7,1423+001	2,8858-001	8
U 238	3,6700+001	8,6971-002	7,1423+001	7,1423+001	2,8858-001	8
PU240	3,8310+001	5,1670-002	7,1423+001	7,1423+001	2,8858-001	8
PU239	4,1400+001	3,2768-002	7,1423+001	7,1423+001	2,8858-001	8

PU240	4,1650+001	6,6974+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	4,7600+001	7,0726+003	7,1423+001	7,1423+001	2,8858-001	8
PU239	5,2600+001	4,4580+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	5,7600+001	2,8027+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	5,8000+001	1,9998+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	5,9390+001	3,6477+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	6,1100+001	4,0758+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	6,5960+001	4,6182+002	7,1423+001	7,1423+001	2,8858-001	8
U 238	6,6200+001	1,3638+001	7,1423+001	7,1423+001	2,8858-001	8
PU240	6,6590+001	3,3274+001	7,1423+001	7,1423+001	2,8858-001	8
PU240	7,2750+001	1,5386+001	7,1423+001	7,1423+001	2,8858-001	8
PU239	7,4310+001	2,7478+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	7,5210+001	2,3748+001	7,1423+001	7,1423+001	2,8858-001	8
U 238	8,1100+001	2,1394+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	8,2000+001	2,7515+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	8,5300+001	4,7856+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	8,5600+001	5,2042+002	7,1423+001	7,1423+001	2,8858-001	8
PU240	9,0700+001	3,3147+001	7,1423+001	7,1423+001	2,8858-001	8
PU239	9,0900+001	6,6078+002	7,1423+001	7,1423+001	2,8858-001	8
PU240	9,2500+001	8,9995+002	7,1423+001	7,1423+001	2,8858-001	8
PU239	1,2630+002	7,8846+001	7,1423+001	7,1423+001	2,8858-001	8
PU239	1,2760+002	6,1587+000	7,1423+001	7,1423+001	2,8858-001	8
NA 23	2,8500+003	6,0356+001	7,1423+001	7,1423+001	2,8858-001	8
PU239	9,5800+001	4,5836+002	7,1423+001	7,1423+001	2,8858-001	9
PU239	9,6000+001	1,6168+001	7,1423+001	7,1423+001	2,8858-001	9
PU239	9,7600+001	4,5152+002	7,1423+001	7,1423+001	2,8858-001	9
PU239	9,9000+001	3,5367+001	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,0120+002	6,3717+001	7,1423+001	7,1423+001	2,8858-001	9
U 238	1,0270+002	7,5120+001	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,0300+002	2,5927+000	7,1423+001	7,1423+001	2,8858-001	9
PU240	1,0490+002	5,6964+002	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,0540+002	5,3576+001	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,0680+002	1,7233+002	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,1040+002	7,1415+001	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,1610+002	1,9237+001	7,1423+001	7,1423+001	2,8858-001	9
U 238	1,1690+002	9,2346+001	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,1890+002	2,1297+002	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,2100+002	7,7436+001	7,1423+001	7,1423+001	2,8858-001	9
PU240	1,2150+002	6,4704+002	7,1423+001	7,1423+001	2,8858-001	9
PU239	1,2340+002	1,2727+001	7,1423+001	7,1423+001	2,8858-001	9
FE	0,00000+000	0,00000+000	U 238	2,35194+000	0,00000+000	PU239	9,97698+000	1,60179+001
PU240	1,70776+001	2,67616-006	NA 23	8,45050-003	0,00000+000			
340	45	1	98	2	2	1	1	1	1
3	1,30073+002	1,67017+002							
PU239	5,8000+001	1,3314+002	1,2444+002	1,2444+002	2,8858-001	1
PU240	9,0700+001	8,9254+002	1,2400+002	1,2400+002	2,8858-001	2
PU239	9,0900+001	1,7552+002	1,2400+002	1,2400+002	2,8858-001	2
PU239	1,3190+002	5,9932+000	1,1533+002	1,1533+002	2,8858-001	7
U 238	3,6700+001	6,4986+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	5,7600+001	1,7194+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	5,9390+001	2,1869+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	6,1100+001	2,3881+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	6,5960+001	2,5128+002	1,1530+002	1,1530+002	2,8858-001	8
U 238	6,6200+001	7,3912+002	1,1530+002	1,1530+002	2,8858-001	8
PU240	6,6590+001	1,7915+001	1,1530+002	1,1530+002	2,8858-001	8
PU240	7,2750+001	7,3616+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	7,5210+001	1,0738+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	8,2000+001	1,0223+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	8,5300+001	1,5661+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	8,5600+001	1,6787+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	9,5500+001	7,0918+003	1,1530+002	1,1530+002	2,8858-001	8
PU239	9,6000+001	2,3727+002	1,1530+002	1,1530+002	2,8858-001	8

PU239	9,7600+001	4,9449+003	1,1530+002	1,1530+002	2,8858-001	8
PU239	9,9000+001	2,7193+002	1,1530+002	1,1530+002	2,8858-001	8
U 238	1,0270+002	5,9849+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,0300+002	1,8176+002	1,1530+002	1,1530+002	2,8858-001	8
PU240	1,0490+002	5,0248+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,0540+002	6,9136+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,0680+002	9,1898+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,1610+002	5,6023+002	1,1530+002	1,1530+002	2,8858-001	8
U 238	1,1690+002	5,6916+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,1890+002	6,2822+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,2100+002	1,1261+001	1,1530+002	1,1530+002	2,8858-001	8
PU240	1,2150+002	7,5482+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,2340+002	1,8119+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,2630+002	2,6175+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,2760+002	9,1404+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,3540+002	6,0172+000	1,1530+002	1,1530+002	2,8858-001	8
PU240	1,5180+002	7,0728+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,5700+002	3,2567+001	1,1530+002	1,1530+002	2,8858-001	8
PU240	1,7020+002	1,6674+000	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,7050+002	2,3142+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,7580+002	5,3785+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,7710+002	1,6130+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,7880+002	2,7848+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,8510+002	5,8813+002	1,1530+002	1,1530+002	2,8858-001	8
PU240	1,8610+002	3,0640+001	1,1530+002	1,1530+002	2,8858-001	8
U 238	1,8960+002	1,1379+000	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,9030+002	1,4197+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,9510+002	1,1219+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,9640+002	4,8658+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,9920+002	2,7683+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	2,0360+002	8,5153+002	1,1530+002	1,1530+002	2,8858-001	8
U 238	2,0860+002	1,7659+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	2,6180+002	2,4938+002	1,1530+002	1,1530+002	2,8858-001	8
PU239	2,7920+002	1,9208+002	1,1530+002	1,1530+002	2,8858-001	8
PU240	2,8790+002	1,5847+001	1,1530+002	1,1530+002	2,8858-001	8
NA 23	2,8500+003	8,8658+001	1,1530+002	1,1530+002	2,8858-001	8
PU239	1,3380+002	1,8084+002	1,1530+002	1,1530+002	2,8858-001	9
PU240	1,3530+002	7,7887+002	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,3680+002	1,1573+002	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,4320+002	1,5319+002	1,1530+002	1,1530+002	2,8858-001	9
U 238	1,4570+002	3,8578+001	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,4630+002	2,4217+002	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,4800+002	7,3780+001	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,4940+002	5,9478+001	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,6090+002	9,4856+000	1,1530+002	1,1530+002	2,8858-001	9
PU240	1,6280+002	5,7974+002	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,6440+002	3,5256+002	1,1530+002	1,1530+002	2,8858-001	9
U 238	1,6540+002	7,2908+001	1,1530+002	1,1530+002	2,8858-001	9
PU239	1,6690+002	7,2285+001	1,1530+002	1,1530+002	2,8858-001	9
FE	0,00000+000	0,00000+000	U 238	9,89550-001	0,00000+000	PU239 1,13318+001 1,74487+001
PU240	1,79500+001	0,00000+000	NA 23	7,68939-003	0,00000+000	
340	93	1	110	2	2	1 1 1 1
4	1,67017+002	2,14454+002				
U 238	1,0270+002	1,6236+001	1,2858+002	1,2858+002	2,8858-001	3
PU239	1,6090+002	1,1493+001	1,2858+002	1,2858+002	2,8858-001	3
PU240	2,6090+002	5,8444+002	1,4165+002	1,4165+002	2,8858-001	7
PU239	2,6180+002	6,9442+002	1,4165+002	1,4165+002	2,8858-001	7
PU239	2,6920+002	1,1274+002	1,4165+002	1,4165+002	2,8858-001	7
PU239	5,7600+001	9,0478+003	1,4160+002	1,4160+002	2,8858-001	8
PU239	5,8000+001	6,4053+003	1,4160+002	1,4160+002	2,8858-001	8
PU239	6,1100+001	1,2247+002	1,4160+002	1,4160+002	2,8858-001	8
PU240	6,6590+001	8,7856+002	1,4160+002	1,4160+002	2,8858-001	8

PU239	7,5210+001	4,8485-002	1,4160+002	1,4160+002	2,8858-001	8
PU239	8,2000+001	4,2645-003	1,4160+002	1,4160+002	2,8858-001	8
PU239	8,5300+001	6,2507-003	1,4160+002	1,4160+002	2,8858-001	8
PU239	9,6000+001	7,9028-003	1,4160+002	1,4160+002	2,8858-001	8
PU239	9,9000+001	8,4920-003	1,4160+002	1,4160+002	2,8858-001	8
PU240	1,0490+002	1,3444-001	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,0540+002	1,8220-002	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,1610+002	9,3543-003	1,4160+002	1,4160+002	2,8858-001	8
U 238	1,1690+002	9,0392-002	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,1890+002	8,6139-002	1,4160+002	1,4160+002	2,8858-001	8
PU240	1,2150+002	8,2192-002	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,3190+002	7,7198-002	1,4160+002	1,4160+002	2,8858-001	8
PU240	1,3530+002	1,7308-001	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,4320+002	8,2280-002	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,4630+002	1,4795-001	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,4940+002	3,2351-002	1,4160+002	1,4160+002	2,8858-001	8
PU240	1,5180+002	3,3206-001	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,5700+002	3,8606-001	1,4160+002	1,4160+002	2,8858-001	8
PU240	1,6280+002	1,2824+000	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,6440+002	3,9410+000	1,4160+002	1,4160+002	2,8858-001	8
PU239	1,8510+002	6,6548+000	1,4160+002	1,4160+002	2,8858-001	8
U 238	1,8960+002	8,6659+001	1,4160+002	1,4160+002	2,8858-001	8
NA 23	2,8500+003	9,9658-001	1,4160+002	1,4160+002	2,8858-001	8
U 238	1,6540+002	6,4000+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,6690+002	5,0911+001	1,4161+002	1,4161+002	2,8858-001	9
PU240	1,7020+002	6,9194+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,7050+002	4,9444+000	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,7580+002	5,7790+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,7710+002	2,0028+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,7880+002	6,5124+001	1,4161+002	1,4161+002	2,8858-001	9
PU240	1,8610+002	9,0631+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,9510+002	4,3884+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,9640+002	7,7368+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,9920+002	4,5121+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,0360+002	7,0197+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,2280+002	7,0730+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,3110+002	1,0340+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,3400+002	7,6019+002	1,4161+002	1,4161+002	2,8858-001	9
U 238	2,3740+002	1,6771+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,3870+002	3,3009+002	1,4161+002	1,4161+002	2,8858-001	9
PU240	2,4000+002	7,3471+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,4260+002	2,9641+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,4850+002	5,8717+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,5090+002	8,6990+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,7230+002	4,3216+002	1,4161+002	1,4161+002	2,8858-001	9
PU239	2,7520+002	4,6615+002	1,4161+002	1,4161+002	2,8858-001	9
PU240	2,8790+002	3,4269+001	1,4161+002	1,4161+002	2,8858-001	9
PU239	1,9030+002	1,8988+000	1,4161+002	1,4161+002	2,8858-001	10
PU239	2,0710+002	1,7295+002	1,4161+002	1,4161+002	2,8858-001	10
U 238	2,0860+002	7,7530+001	1,4161+002	1,4161+002	2,8858-001	10
PU239	2,1630+002	8,1588+001	1,4161+002	1,4161+002	2,8858-001	10
FE	0,00000+000	0,00000+000	U 238	1,16696+000	0,00000+000	PU239	5,67468+000	1,42120+001
PU240	1,13046+001	0,00000+000	NA 23	7,03765-003	0,00000+000			
340	71	1	124	2	2	1	1	1	1
5	2,14454+002	2,75364+002							
PU239	6,1100+001	6,5875-003	1,8239+002	1,8239+002	2,8858-001	8
PU239	8,5300+001	2,8956-003	1,8239+002	1,8239+002	2,8858-001	8
PU239	9,6000+001	3,3509-003	1,8239+002	1,8239+002	2,8858-001	8
PU239	9,9000+001	3,5006-003	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,3190+002	1,9517-002	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,5700+002	3,1404-002	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,6090+002	5,9431-003	1,8239+002	1,8239+002	2,8858-001	8

PU239	1,6440+002	8,5742+002	1,8239+002	1,8239+002	2,8858-001	8
PU240	1,7020+002	7,2942+002	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,7050+002	1,1314+002	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,8510+002	3,0352+002	1,8239+002	1,8239+002	2,8858-001	8
PU240	1,8610+002	1,7888+001	1,8239+002	1,8239+002	2,8858-001	8
U 238	1,8960+002	9,8640+001	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,9030+002	1,3308+002	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,9510+002	1,8062+001	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,9640+002	9,1087+002	1,8239+002	1,8239+002	2,8858-001	8
PU239	1,9920+002	7,2617+002	1,8239+002	1,8239+002	2,8858-001	8
PU239	2,0360+002	4,0374+001	1,8239+002	1,8239+002	2,8858-001	8
PU239	2,0710+002	2,2389+001	1,8239+002	1,8239+002	2,8858-001	8
PU239	2,6180+002	5,6051+000	1,8239+002	1,8239+002	2,8858-001	8
PU239	2,8250+002	5,1624+001	1,8239+002	1,8239+002	2,8858-001	8
PU240	2,8790+002	3,4438+000	1,8239+002	1,8239+002	2,8858-001	8
NA 23	2,8500+003	1,1747+000	1,8239+002	1,8239+002	2,8858-001	8
U 238	2,0860+002	2,0357+000	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,1630+002	1,3752+002	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,2280+002	5,4652+001	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,3110+002	2,3011+002	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,3400+002	1,9657+002	1,8239+002	1,8239+002	2,8858-001	9
U 238	2,3740+002	9,1622+001	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,4260+002	8,1238+001	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,4850+002	1,9399+002	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,5090+002	2,9817+002	1,8239+002	1,8239+002	2,8858-001	9
PU240	2,6090+002	5,0829+002	1,8239+002	1,8239+002	2,8858-001	9
U 238	2,6390+002	1,0848+001	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,6920+002	2,1163+001	1,8239+002	1,8239+002	2,8858-001	9
U 238	2,7370+002	8,3309+001	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,7910+002	2,9974+001	1,8239+002	1,8239+002	2,8858-001	9
U 238	2,9110+002	1,2935+001	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,9180+002	4,2369+002	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,9600+002	2,1355+002	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,9810+002	6,1820+002	1,8239+002	1,8239+002	2,8858-001	9
PU239	2,3870+002	4,1308+001	1,8239+002	1,8239+002	2,8858-001	10
PU240	2,4000+002	3,7487+002	1,8239+002	1,8239+002	2,8858-001	10
PU239	2,7230+002	2,5613+002	1,8239+002	1,8239+002	2,8858-001	10
PU239	2,7520+002	2,7082+001	1,8239+002	1,8239+002	2,8858-001	10
FE	0:00000+000	0.00000+000	U 238	1,3586+000	0.00000+000	PU239 8,47450+000 1,21429+001
PU240	4:86241+000	0.00000+000	NA 23	6,44061-003	0.00000+000	
340	112	1	132	2	2	1 1 1 1
6 2,75364+002	3,53575+002					
PU240	3,6430+002	4,2305+001	2,5324+002	2,5324+002	2,8858-001	7
PU240	3,7250+002	9,1710+002	2,5324+002	2,5324+002	2,8858-001	7
PU240	4,0530+002	2,0867+001	2,5324+002	2,5324+002	2,8858-001	7
PU239	2,6920+002	1,7490+001	2,5348+002	2,5348+002	2,8858-001	8
PU239	6,1100+001	4,1411+003	2,5346+002	2,5346+002	2,8858-001	9
PU239	1,3190+002	8,6108+003	2,5346+002	2,5346+002	2,8858-001	9
PU239	1,5700+002	1,0775+002	2,5346+002	2,5346+002	2,8858-001	9
PU239	1,7050+002	3,1658+003	2,5346+002	2,5346+002	2,8858-001	9
PU239	1,8510+002	6,0939+003	2,5346+002	2,5346+002	2,8858-001	9
U 238	1,8960+002	1,7139+001	2,5346+002	2,5346+002	2,8858-001	9
PU239	1,9510+002	2,5113+002	2,5346+002	2,5346+002	2,8858-001	9
PU239	2,0360+002	3,2821+002	2,5346+002	2,5346+002	2,8858-001	9
U 238	2,0860+002	9,1438+002	2,5346+002	2,5346+002	2,8858-001	9
U 238	2,3740+002	9,6652+002	2,5346+002	2,5346+002	2,8858-001	9
PU239	2,4850+002	8,7802+002	2,5346+002	2,5346+002	2,8858-001	9
PU239	2,5090+002	1,6009+001	2,5346+002	2,5346+002	2,8858-001	9
PU240	2,6090+002	2,8033+001	2,5346+002	2,5346+002	2,8858-001	9
PU239	2,6180+002	3,6153+001	2,5346+002	2,5346+002	2,8858-001	9
PU239	2,7230+002	1,5059+000	2,5346+002	2,5346+002	2,8858-001	9
U 238	2,7370+002	2,5325+000	2,5346+002	2,5346+002	2,8858-001	9

PU239	2,8250+002	3,3019+002	2,5346+002	2,5346+002	2,8858-001	9
PU240	2,8790+002	1,0368+003	2,5346+002	2,5346+002	2,8858-001	9
PU240	3,2090+002	4,2953+002	2,5346+002	2,5346+002	2,8858-001	9
U 238	3,4790+002	7,2674+001	2,5346+002	2,5346+002	2,8858-001	9
NA 23	2,8500+003	1,5171+000	2,5346+002	2,5346+002	2,8858-001	9
PU239	2,7520+002	2,8718+001	2,5346+002	2,5346+002	2,8858-001	10
PU239	2,7910+002	1,4549+002	2,5346+002	2,5346+002	2,8858-001	10
U 238	2,9110+002	9,6856+001	2,5346+002	2,5346+002	2,8858-001	10
PU239	2,9180+002	7,6760+000	2,5346+002	2,5346+002	2,8858-001	10
PU239	2,9600+002	3,0856+001	2,5346+002	2,5346+002	2,8858-001	10
PU239	2,9810+002	1,1887+002	2,5346+002	2,5346+002	2,8858-001	10
PU240	3,0530+002	2,5257+002	2,5346+002	2,5346+002	2,8858-001	10
U 238	3,1110+002	3,5152+001	2,5346+002	2,5346+002	2,8858-001	10
PU240	3,3840+002	2,1298+002	2,5346+002	2,5346+002	2,8858-001	10
PU240	3,4630+002	3,5048+002	2,5346+002	2,5346+002	2,8858-001	10
FE	0,00000+000	0,00000+000	U 238	8,18952-001	0,00000+000	PU239 2,62045+000 2,66479+000
PU240	8,99304+000	0,00000+000	NA 23	5,98545-003	0,00000+000	
340	112	1	141	2	2	1 1 1 1
7	3,53575+002	4,53999+002				
NA 23	2,8500+003	2,0490+000	3,6096+002	3,6096+002	2,8858-001	3
PU239	1,3190+002	4,6225+003	3,4083+002	3,4083+002	2,8858-001	8
PU239	2,6180+002	3,2643+002	3,4083+002	3,4083+002	2,8858-001	8
PU239	2,7520+002	3,9811+002	3,4083+002	3,4083+002	2,8858-001	8
PU240	2,8790+002	5,0367+001	3,4083+002	3,4083+002	2,8858-001	8
PU240	3,3840+002	6,1788+002	3,4082+002	3,4082+002	2,8858-001	9
PU240	3,4630+002	3,7383+001	3,4082+002	3,4082+002	2,8858-001	9
U 238	3,4790+002	1,9388+000	3,4082+002	3,4082+002	2,8858-001	9
PU240	4,0530+002	5,2916+002	3,4082+002	3,4082+002	2,8858-001	9
PU240	4,4970+002	2,8983+002	3,4082+002	3,4082+002	2,8858-001	9
U 238	4,6330+002	6,3863+002	3,4082+002	3,4082+002	2,8858-001	9
PU240	3,6430+002	4,8577+002	3,4082+002	3,4082+002	2,8858-001	10
PU240	3,7250+002	3,1795+002	3,4082+002	3,4082+002	2,8858-001	10
U 238	3,7690+002	3,4720+001	3,4082+002	3,4082+002	2,8858-001	10
U 238	3,9760+002	9,0007+001	3,4082+002	3,4082+002	2,8858-001	10
U 238	4,1030+002	9,8329+001	3,4082+002	3,4082+002	2,8858-001	10
PU240	4,1850+002	7,8558+001	3,4082+002	3,4082+002	2,8858-001	10
U 238	4,3420+002	9,2583+001	3,4082+002	3,4082+002	2,8858-001	10
U 238	4,5420+002	5,4344+000	3,4082+002	3,4082+002	2,8858-001	10
FE	0,00000+000	0,00000+000	U 238	9,47941-001	0,00000+000	PU239 2,26151-004 1,78547-002
PU240	4,99452+000	0,00000+000	NA 23	6,01186-003	0,00000+000	
340	139	1	157	2	2	1 1 1 1
8	4,53999+002	5,82947+002				
PU240	6,6620+002	1,5562+001	4,4897+002	4,4897+002	2,8858-001	8
PU239	1,3190+002	2,6522+003	4,4884+002	4,4884+002	2,8858-001	9
PU239	2,6180+002	1,0865+002	4,4884+002	4,4884+002	2,8858-001	9
PU240	4,0530+002	2,3882+001	4,4884+002	4,4884+002	2,8858-001	9
U 238	5,9520+002	5,3363+001	4,4884+002	4,4884+002	2,8858-001	9
PU240	5,9770+002	3,3245+001	4,4884+002	4,4884+002	2,8858-001	9
NA 23	2,8500+003	2,4739+000	4,4884+002	4,4884+002	2,8858-001	9
U 238	4,5420+002	9,8394+000	4,4885+002	4,4885+002	2,8858-001	10
U 238	4,6330+002	7,8522+001	4,4885+002	4,4885+002	2,8858-001	10
PU240	4,6570+002	7,6228+001	4,4885+002	4,4885+002	2,8858-001	10
PU240	4,7310+002	7,8200+001	4,4885+002	4,4885+002	2,8858-001	10
U 238	4,7870+002	6,0028+001	4,4885+002	4,4885+002	2,8858-001	10
U 238	4,8890+002	1,2952+001	4,4885+002	4,4885+002	2,8858-001	10
PU240	4,9360+002	1,3517+002	4,4885+002	4,4885+002	2,8858-001	10
PU240	5,0020+002	3,5217+002	4,4885+002	4,4885+002	2,8858-001	10
PU240	5,1350+002	3,8531+002	4,4885+002	4,4885+002	2,8858-001	10
U 238	5,3550+002	8,7427+001	4,4885+002	4,4885+002	2,8858-001	10
PU240	5,4730+002	3,7102+002	4,4885+002	4,4885+002	2,8858-001	10
PU240	5,5350+002	3,0651+002	4,4885+002	4,4885+002	2,8858-001	10
U 238	5,5610+002	1,6993+001	4,4885+002	4,4885+002	2,8858-001	10

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U 238    1,0230+003  7,2028+001  8,5808+002  8,5808+002  2,8858-001  11
U 238    1,0539+003  7,1670+001  8,5808+002  8,5808+002  2,8858-001  11
U 238    1,0984+003  7,1409+001  8,5808+002  8,5808+002  2,8858-001  11
U 238    1,1089+003  8,1765+001  8,5808+002  8,5808+002  2,8858-001  11
U 238    1,1315+003  2,7748+001  8,5808+002  8,5808+002  2,8858-001  11
U 238    1,1776+003  7,1427+001  8,5808+002  8,5808+002  2,8858-001  11
U 238    1,1950+003  6,4617+001  8,5808+002  8,5808+002  2,8858-001  11
   FE        0.00000+000    0.00000+000    U 238     8,37246-001    0.00000+000    PU239    0.00000+000    0.00000+000
   PU240     0.00000+000    0.00000+000    NA 23     6,68129-003    0.00000+000
     340       202          1        213         2          2          1          1          1          1
  12 1,23410+003      1,58461+003
NA 23    2,8500+003  9,2654+000  1,0641+003  1,0641+003  2,8858-001   9
U 238    1,2451+003  4,5190+001  1,0641+003  1,0641+003  2,8858-001  10
U 238    1,4441+003  6,8499+001  1,0641+003  1,0641+003  2,8858-001  10
U 238    1,2670+003  7,5803+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,2732+003  7,4406+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,2985+003  2,9822+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,3172+003  3,6152+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,3357+003  1,4155+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,3930+003  4,9873+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,4051+003  6,1654+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,4197+003  5,4406+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,4278+003  7,1030+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,4738+003  6,2283+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,5231+003  4,3859+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,5460+003  1,4133+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,5500+003  1,4107+001  1,0641+003  1,0641+003  2,8858-001  11
U 238    1,5650+003  1,6560+001  1,0641+003  1,0641+003  2,8858-001  11
   FE        0.00000+000    0.00000+000    U 238     6,87832-001    0.00000+000    PU239    0.00000+000    0.00000+000
   PU240     0.00000+000    0.00000+000    NA 23     8,70711-003    0.00000+000
     340       212          1        230         2          2          1          1          1          1
  13 1,58461+003      2,03468+003
U 238    1,8456+003  4,3155+001  1,1642+003  1,1642+003  2,8858-001  10
U 238    2,0236+003  3,6081+001  1,1642+003  1,1642+003  2,8858-001  10
NA 23    2,8500+003  1,6907+001  1,1642+003  1,1642+003  2,8858-001  10
U 238    1,6229+003  5,9643+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,6382+003  6,7214+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,6883+003  6,0803+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,7094+003  6,3416+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,7230+003  5,0360+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,7558+003  6,0696+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,7823+003  3,1167+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,7977+003  1,0908+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,8083+003  4,7593+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,9023+003  5,0628+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,9171+003  5,0828+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,9687+003  2,7374+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,9746+003  2,2924+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    2,0311+003  4,4949+001  1,1642+003  1,1642+003  2,8858-001  11
U 238    1,6621+003  4,7867+001  1,1642+003  1,1642+003  2,8858-001  12
   FE        0.00000+000    0.00000+000    U 238     6,66199-001    0.00000+000    PU239    0.00000+000    0.00000+000
   PU240     0.00000+000    0.00000+000    NA 23     1,45219-002    0.00000+000
     340       246          1        264         2          2          1          1          1          1
  14 2,03468+003      2,61259+003
NA 23    2,8500+003  3,3317+001  7,6300+002  7,6300+002  2,8858-001   7
U 238    2,0236+003  3,0247+001  7,6488+002  7,6488+002  2,8858-001   9
U 238    1,9687+003  1,1963+001  7,6486+002  7,6486+002  2,8858-001  10
U 238    1,9746+003  1,0805+001  7,6486+002  7,6486+002  2,8858-001  10
U 238    2,2887+003  5,6211+000  7,6486+002  7,6486+002  2,8858-001  10
U 238    2,5593+003  1,5642+001  7,6486+002  7,6486+002  2,8858-001  10
U 238    2,5987+003  1,1205+001  7,6486+002  7,6486+002  2,8858-001  10
U 238    2,0311+003  3,3675+001  7,6486+002  7,6486+002  2,8858-001  11
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PU240   5,6720+002  3,4869+002  4,4885+002  4,4885+002  2,8858-001  10
U 238   5,8020+002  9,1602+001  4,4885+002  4,4885+002  2,8858-001  10
PU240   4,4970+002  4,9306+001  4,4885+002  4,4885+002  2,8858-001  11
U 238   5,1860+002  8,7038+001  4,4885+002  4,4885+002  2,8858-001  11
    FE      0:00000+000   0.00000+000   U 238     9,91270-001   0.00000+000   PU239   3,01150-005   4,52409-003
   PU240    4:57726+000   0.00000+000   NA 23     5,51154-003   0.00000+000
   340   152   1   170   2   2   1   1   1   1
 9 5,82947+002  7,48518+002
PU240   5,6720+002  1,8476+001  5,5359+002  5,5359+002  2,8858-001  6
U 238   5,8020+002  1,1957+000  5,5036+002  5,5036+002  2,8858-001  9
U 238   6,2000+002  9,2055+001  5,5036+002  5,5036+002  2,8858-001  9
PU239   2,6180+002  4,5955+003  5,5034+002  5,5034+002  2,8858-001  10
PU240   5,9770+002  2,8984+002  5,5034+002  5,5034+002  2,8858-001  10
PU240   6,0880+002  2,5819+002  5,5034+002  5,5034+002  2,8858-001  10
PU240   6,3180+002  1,9820+002  5,5034+002  5,5034+002  2,8858-001  10
PU240   6,3790+002  6,6120+001  5,5034+002  5,5034+002  2,8858-001  10
U 238   6,6120+002  6,2624+001  5,5034+002  5,5034+002  2,8858-001  10
PU240   6,6620+002  3,2740+002  5,5034+002  5,5034+002  2,8858-001  10
U 238   6,7700+002  1,7043+001  5,5034+002  5,5034+002  2,8858-001  10
PU240   6,7940+002  2,6804+002  5,5034+002  5,5034+002  2,8858-001  10
U 238   6,9330+002  8,6820+001  5,5034+002  5,5034+002  2,8858-001  10
U 238   7,0850+002  9,0821+001  5,5034+002  5,5034+002  2,8858-001  10
U 238   7,2180+002  2,0960+001  5,5034+002  5,5034+002  2,8858-001  10
U 238   7,3010+002  2,6604+001  5,5034+002  5,5034+002  2,8858-001  10
NA 23   2,8500+003  3,0472+000  5,5034+002  5,5034+002  2,8858-001  10
U 238   5,9520+002  7,1335+001  5,5034+002  5,5034+002  2,8858-001  11
U 238   6,2870+002  5,8228+001  5,5034+002  5,5034+002  2,8858-001  11
    FE      0:00000+000   0.00000+000   U 238     9,58830-001   0.00000+000   PU239   8,35018-006   1,36365-003
   PU240    2:59108+000   0.00000+000   NA 23     5,53685-003   0.00000+000
   340   168   1   183   2   2   1   1   1   1
 10 7,48518+002  9,61117+002
PU239   2,6180+002  2,4772+003  7,2388+002  7,2388+002  2,8858-001  10
U 238   8,2160+002  7,8484+001  7,2388+002  7,2388+002  2,8858-001  10
U 238   8,6650+002  4,1288+001  7,2388+002  7,2388+002  2,8858-001  10
U 238   8,9130+002  1,8481+001  7,2388+002  7,2388+002  2,8858-001  10
U 238   9,0510+002  8,0493+001  7,2388+002  7,2388+002  2,8858-001  10
U 238   9,3690+002  5,6219+001  7,2388+002  7,2388+002  2,8858-001  10
U 238   9,5840+002  5,1393+001  7,2388+002  7,2388+002  2,8858-001  10
U 238   9,9180+002  5,1995+001  7,2388+002  7,2388+002  2,8858-001  10
NA 23   2,8500+003  4,2289+000  7,2388+002  7,2388+002  2,8858-001  10
U 238   7,6510+002  6,9594+001  7,2388+002  7,2388+002  2,8858-001  11
U 238   7,7920+002  2,8037+001  7,2388+002  7,2388+002  2,8858-001  11
U 238   7,9090+002  6,0179+001  7,2388+002  7,2388+002  2,8858-001  11
U 238   8,5100+002  7,9993+001  7,2388+002  7,2388+002  2,8858-001  11
U 238   8,5620+002  6,6743+001  7,2388+002  7,2388+002  2,8858-001  11
U 238   9,2520+002  7,7811+001  7,2388+002  7,2388+002  2,8858-001  11
    FE      0:00000+000   0.00000+000   U 238     9,79765-001   0.00000+000   PU239   3,42215-006   5,98863-004
   PU240    0:00000+000   0.00000+000   NA 23     5,84193-003   0.00000+000
   340   188   1   198   2   2   1   1   1   1
 11 9,61117+002  1,23410+003
U 238   9,3690+002  3,0663+001  8,5808+002  8,5808+002  2,8858-001  10
U 238   9,5840+002  3,2475+000  8,5808+002  8,5808+002  2,8858-001  10
U 238   9,9180+002  4,3647+001  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,0332+003  8,9173+000  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,0705+003  4,2016+000  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,0811+003  8,8089+000  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,1404+003  4,6853+001  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,1675+003  6,9322+001  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,2109+003  5,6495+001  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,2451+003  8,9208+001  8,5808+002  8,5808+002  2,8858-001  10
NA 23   2,8500+003  5,7331+000  8,5808+002  8,5808+002  2,8858-001  10
U 238   1,0113+003  1,5066+001  8,5808+002  8,5808+002  2,8858-001  11
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U 238	2,0886+003	3,3002±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,0965+003	2,7276±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,1243+003	1,5212±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,1460+003	4,4559±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,1528+003	3,5660±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,1720+003	7,8655±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,1860+003	2,6870±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,1940+003	6,6991±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2014+003	3,6712±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2300+003	1,2033±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2357+003	1,1934±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2415+003	4,1127±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2591+003	3,7742±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2664+003	3,2840±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,2813+003	3,3436±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,3020+003	2,3862±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,3159+003	2,1110±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,3374+003	9,4337±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,3520+003	3,0416±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,3560+003	2,8817±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,3925+003	1,4738±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,4102+003	7,0013±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,4265+003	2,5748±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,4462+003	2,4036±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,4540+003	3,5445±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,4898+003	2,0400±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,5207+003	8,6401+000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,5487+003	1,5111±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,5807+003	1,4441±001	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,6040+003	1,6996±000	7,6486+002	7,6486+002	2,8858-001 11
U 238	2,6206+003	1,6909±002	7,6486+002	7,6486+002	2,8858-001 11
FE	0;00000+000	0.00000+000	U 238	8,19090-001	0.00000+000 PU239 0.00000+000 0.00000+000
PU240	0;00000+000	0.00000+000	NA 23	4,35592-002	0.00000+000
340	290	1	308	2	2 1 1 1 1
15 2,61259+003		3,35463+003			
U 238	2,5807+003	1,8218±002	2,9822+002	2,9822+002	2,8858-001 10
U 238	2,5987+003	1,0674±001	2,9822+002	2,9822+002	2,8858-001 10
NA 23	2,8500+003	3,9746±001	2,9822+002	2,9822+002	2,8858-001 10
U 238	3,2950+003	5,9698±000	2,9822+002	2,9822+002	2,8858-001 10
U 238	2,6206+003	1,0816±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,6728+003	1,0363±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,6956+003	6,0054±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,7168+003	7,8871±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,7980+003	7,8486±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,8062+003	1,7217±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,8452+003	7,1728±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,8661+003	5,2854±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,8829+003	5,4871±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,9085+003	7,3052±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,9236+003	1,1379±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,9323+003	3,8472±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,9563+003	3,1316±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,9740+003	8,6996±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	2,9874+003	1,6540±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,0031+003	7,0903±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,0290+003	7,9950±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,0410+003	1,1012±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,0602+003	6,0585±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,0811+003	1,9298±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,1094+003	1,0082±001	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,1332+003	2,7838±000	2,9822+002	2,9822+002	2,8858-001 11
U 238	3,1490+003	1,0922±001	2,9822+002	2,9822+002	2,8858-001 11

U 238	3.1690+003	4.8730+000	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.1794+003	1.1483+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.1890+003	1.0724+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.2060+003	1.2029+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.2260+003	9.1602+000	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.2492+003	6.5348+000	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.2800+003	1.5482+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.3109+003	1.6851+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.3213+003	1.6308+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	3.3340+003	1.5793+001	2.9822+002	2.9822+002	2.8858-001	11			
U 238	2.6316+003	7.0271+001	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.7300+003	1.0207+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.7501+003	5.7844+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.7619+003	3.5594+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.7879+003	2.4939+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.8286+003	2.0085+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.8978+003	3.7384+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	2.9674+003	2.1211+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	3.0150+003	2.2420+000	2.9822+002	2.9822+002	2.8858-001	12			
U 238	3.3557+003	4.4197+000	2.9822+002	2.9822+002	2.8858-001	12			
FE	0.00000+000	0.00000+000	U 238	8.74940-001	0.00000+000	PU239	0.00000+000	0.00000+000	
PU240	0.00000+000	0.00000+000	NA 23	1.33278-001	0.00000+000				
340	337	2	339	2	2	1	1	1	1
16	3.35463+003	4.30743+003							
NA 23	2.8500+003	1.7963+001	1.4686+003	1.4686+003	2.8858-001	10			
U 238	3.5740+003	2.0613+001	1.4686+003	1.4686+003	2.8858-001	10			
U 238	3.5930+003	1.3823+001	1.4686+003	1.4686+003	2.8858-001	10			
U 238	3.6000+003	3.9687+000	1.4686+003	1.4686+003	2.8858-001	10			
U 238	3.4090+003	1.9434+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.4369+003	1.9355+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.4843+003	2.0768+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.5615+003	2.2644+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.7333+003	2.4644+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.7647+003	2.2101+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.8320+003	8.7162+000	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.8581+003	2.2054+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.8713+003	2.3189+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.9044+003	2.4212+001	1.4686+003	1.4686+003	2.8858-001	11			
U 238	3.3557+003	1.2951+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.3710+003	2.8882+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.3878+003	6.9719+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.4190+003	3.1638+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.4591+003	1.6899+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.4700+003	1.4098+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.4920+003	9.7492+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.5120+003	3.5816+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.5260+003	1.0113+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.6110+003	4.0604+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.6250+003	4.1514+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.6300+003	2.1974+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.6470+003	4.1372+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.6930+003	2.2369+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.7177+003	2.4579+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.7640+003	4.2438+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.7837+003	2.2452+001	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.7997+003	4.6225+000	1.4686+003	1.4686+003	2.8858-001	12			
U 238	3.8950+003	7.4278+000	1.4686+003	1.4686+003	2.8858-001	12			
FE	0.00000+000	0.00000+000	U 238	2.94817-001	0.00000+000	PU239	0.00000+000	0.00000+000	
PU240	0.00000+000	0.00000+000	NA 23	1.22316-002	0.00000+000				
340	337	2	339	2	2	2	1	1	1
17	4.30743+003	5.53084+003							
NA 23	2.8500+003	7.4998+000	3.0642+003	3.0642+003	2.8858-001	3			

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   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    2,44758-003   0.00000+000
     340       337          2      339       2          2           2          1          1          1
  18 5,53084+003    7,10174+003
NA 23    2,8500+003  3,4722+000  4,5839+003  4,5839+003  2,8858-001   3
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    7,57475-004   0.00000+000
     340       337          2      339       2          2           2          1          1          1
  19 7,10174+003    9,11882+003
NA 23    2,8500+003  1,8088+000  6,2937+003  6,2937+003  2,8858-001   3
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    2,87393-004   0.00000+000
     340       337          2      339       2          2           2          1          1          1
  20 9,11882+003    1,17088+004
NA 23    2,8500+003  1,0209+000  8,3738+003  8,3738+003  2,8858-001   3
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+080   0.00000+000   NA 23    1,21921-004   0.00000+000
     340       337         20      339       2          2           2          1          1          1
  21 1,17088+084    1,90344+004
NA 23    2,8500+003  6,0826+001  1,0982+004  1,0982+004  2,8858-001   3
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    5,53871-005   0.00000+000
     340       337         20      339       2          2          20          1          1          1
  22 1,50344+004    1,93045+004
NA 23    2,8500+003  3,7621+001  1,4294+004  1,4294+004  2,8858-001   2
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    2,63200-005   0.00000+000
     340       338         20      339       2          2          20          1          1          1
  23 1,93045+004    2,47875+004
NA 23    2,8500+003  2,3893+001  1,8520+004  1,8520+004  2,8858-001   2
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    1,29012-005   0.00000+000
     340       338         37      339       2          2          20          1          1          1
  24 2,47875+004    3,18278+004
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    0,00000+000   0.00000+000
     340       339         92    32000       2          1          37          1          1          1
  25 3,18278+004    4,08677+004
NA 23    3,5400+004  6,9800+001  3,0813+004  3,0813+004  2,8858-001  12
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    2,26529-003   0.00000+000
     340       339         92    32000       2          1          92          1          1          1
  26 4,08677+004    5,24752+004
NA 23    5,3500+004  1,0036+001  3,8565+004  3,8565+004  2,8858-001   5
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    2,60237-004   0.00000+000
     340       339        276    32000       2          1          92          1          1          1
  27 5,24752+084    6,73795+004
NA 23    5,3500+004  3,4093+001  4,6868+004  4,6868+004  2,8858-001   7
   FE        0,00000+080   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    7,27431-004   0.00000+000

  TIME SPENT IN PROGRAM AREA NO. 3  WAS  9,043+002SECONDS

     340       339        276    32000       2          1         276          1          1          1
  28 6,73795+004    8,65170+004
   FE        0,00000+000   0.00000+000   U 238    0,00000+000   0.00000+000   PU239   0.00000+000   0.00000+000
   PU240     0,00000+000   0.00000+000   NA 23    0,00000+000   0.00000+000

  TIME SPENT IN PROGRAM AREA NO. 3  WAS  9,045+002SECONDS

MACROSCOPIC CROSS SECTIONS - HOMOGENIZED
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I	E(I)	SIGABS	SIGFIS	NU SIGFIS
1	7,88932+001	5,16881+002	2,67019-002	7,66347+002
2	1,01301+002	6,35299+002	1,92215-002	5,51660+002
3	1,30073+002	5,24984+002	2,09385-002	6,00938+002
4	1,67017+002	4,10755+002	1,70543-002	4,89464+002
5	2,14454+002	3,79523+002	1,45714-002	4,18205+002
6	2,75364+002	1,88578+002	3,19775-003	9,17768+003
7	3,53575+002	1,23312+002	2,14256-005	6,14928+005
8	4,53999+002	1,26099+002	5,42891-006	1,55813+005
9	5,82947+002	1,14456+002	1,63638+006	4,69655+006
10	7,48518+002	1,06540+002	6,70636-007	1,92480+006
11	9,61117+002	9,12443+003	0,00000+000	0,00000+000
12	1,23410+003	7,93569+003	0,00000+000	0,00000+000
13	1,58461+003	7,37357+003	0,00000+000	0,00000+000
14	2,03468+003	9,38195+003	0,00000+000	0,00000+000
15	2,61259+003	1,10887+002	0,00000+000	0,00000+000
16	3,35463+003	3,33447+003	0,00000+000	0,00000+000
17	4,30743+003	3,01052+005	0,00000+000	0,00000+000
18	5,53084+003	9,31695+006	0,00000+000	0,00000+000
19	7,10174+003	3,53493+006	0,00000+000	0,00000+000
20	9,11882+003	1,49963+006	0,00000+000	0,00000+000
21	1,17088+004	6,81261+007	0,00000+000	0,00000+000
22	1,50344+004	3,23736+007	0,00000+000	0,00000+000
23	1,93045+004	1,58685+007	0,00000+000	0,00000+000
24	2,47875+004	0,00000+000	0,00000+000	0,00000+000
25	3,18278+004	2,78631+005	0,00000+000	0,00000+000
26	4,08677+004	3,20092+006	0,00000+000	0,00000+000
27	5,24752+004	8,94740+006	0,00000+000	0,00000+000
28	6,73795+004	0,00000+000	0,00000+000	0,00000+000

ELAPSED TIME IN OVERLAY 9,77743+005MS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,000-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 6,000-003SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,600-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,800-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 5,130-001SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,950-001SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,400-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.470-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.240-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 6.000-003SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 4.100-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 7.000-003SECONDS

FOLLOWING ARE THE FINE GROUP CROSS SECTIONS FOR MATERIAL IDENT, FE

J	EL	SIGTRF	SIGERH	SIGINEL	SIGFIS	SIGCAPT	NUBAR	SIGTRL	SIGERL	SIGN2N	SIGNP	SIGNALPHA
1	7.7880+006	3.1801-001	4.0247-002	1.3425+000	0.0000+000	3.4162-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.4589-002	0.0000+000
2	6.0653+006	4.7339-001	5.9828-002	1.3555+000	0.0000+000	4.1465-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.5618-002	0.0000+000
3	4.7237+006	7.1831-001	9.0619-002	1.3508+000	0.0000+000	5.0605-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.4393-003	0.0000+000
4	3.6788+006	8.5162-001	1.0744-001	1.4327+000	0.0000+000	6.1593-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
5	2.8650+006	1.1379+000	1.4363-001	1.0503+000	0.0000+000	7.4968-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
6	2.2313+006	1.4327+000	1.8141-001	9.6328-001	0.0000+000	9.1246-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
7	1.7377+006	1.5825+000	2.0037-001	7.3524-001	0.0000+000	1.1428-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
8	1.3534+006	1.7004+000	2.1553-001	6.2757-001	0.0000+000	1.6287-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
9	1.0540+006	1.7279+000	2.1986-001	3.9776-001	0.0000+000	2.3612-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
10	8.2085+005	1.6104+000	2.0934-001	1.7872-001	0.0000+000	3.3263-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
11	6.3928+005	2.5192+000	3.3226-001	0.0000+000	0.0000+000	4.0734-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
12	4.9787+005	2.0806+000	2.6487-001	0.0000+000	0.0000+000	4.7174-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
13	3.8774+005	3.3964+000	4.3341-001	0.0000+000	0.0000+000	5.1644-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
14	3.0197+005	2.5352+000	3.3829-001	0.0000+000	0.0000+000	5.3863-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
15	2.3518+005	2.3977+000	3.1360-001	0.0000+000	0.0000+000	5.4223-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
16	1.8316+005	2.7002+000	4.2291-001	0.0000+000	0.0000+000	5.3980-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
17	1.4264+005	4.6674+000	6.8186-001	0.0000+000	0.0000+000	5.2821-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
18	1.1109+005	2.2014+000	4.7381-001	0.0000+000	0.0000+000	5.3300-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
19	8.6517+004	4.7284+000	6.1166-001	0.0000+000	0.0000+000	5.5327-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
20	6.7379+004	2.8006+000	7.0379-001	0.0000+000	0.0000+000	5.8837-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
21	5.2475+004	3.8839+000	5.0677-001	0.0000+000	0.0000+000	6.3724-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
22	4.0868+004	4.6801+000	5.9405-001	0.0000+000	0.0000+000	7.1410-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
23	3.1828+004	7.0833+000	9.5114-001	0.0000+000	0.0000+000	1.0639-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
24	2.4788+004	2.9138+000	3.9173-000	0.0000+000	0.0000+000	4.6521-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
25	1.9305+004	4.1376-001	1.2572-001	0.0000+000	0.0000+000	2.3951-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
26	1.5034+004	2.7319+000	3.5083-001	0.0000+000	0.0000+000	1.4146-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
27	1.1709+004	4.1581+000	5.2919-001	0.0000+000	0.0000+000	1.6536-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
28	9.1188+003	6.1719+000	7.9911-001	0.0000+000	0.0000+000	3.0547-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
29	7.1017+003	1.4401+001	1.9521-000	0.0000+000	0.0000+000	6.4710-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
30	5.5308+003	7.7849+000	1.0508-000	0.0000+000	0.0000+000	5.8434-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
31	4.3074+003	5.0472+000	6.3762-001	0.0000+000	0.0000+000	1.8629-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
32	3.3546+003	5.9548+000	7.5396-001	0.0000+000	0.0000+000	1.8315-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
33	2.6126+003	5.2049+000	6.5729-001	0.0000+000	0.0000+000	8.6500-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
34	2.0347+003	6.0686+000	7.6667-001	0.0000+000	0.0000+000	7.4837-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
35	1.5846+003	6.9265+000	8.7443-001	0.0000+000	0.0000+000	1.8723-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
36	1.2341+003	7.7947+000	9.8433-001	0.0000+000	0.0000+000	7.7593-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
37	9.6112+002	8.6496+000	1.0914-000	0.0000+000	0.0000+000	2.9431-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
38	7.4852+002	9.3318+000	1.1772-000	0.0000+000	0.0000+000	1.7891-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
39	5.8295+002	9.8902+000	1.2474-000	0.0000+000	0.0000+000	1.6203-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000

40	4,5400+002	1:0293+001	1,2981+000	0,0000+000	0,0000+000	1,7317+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
41	3,5358+002	1:0590+001	1,3356+000	0,0000+000	0,0000+000	2,5276+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
42	2,7536+002	1:0876+001	1,3716+000	0,0000+000	0,0000+000	2,8896+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
43	2,1445+002	1:1092+001	1,3989+000	0,0000+000	0,0000+000	2,5034+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
44	1,6702+002	1:1234+001	1,4167+000	0,0000+000	0,0000+000	2,7123+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
45	1,3007+002	1:1253+001	1,4193+000	0,0000+000	0,0000+000	3,5775+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
46	1,0130+002	1:1267+001	1,4208+000	0,0000+000	0,0000+000	3,8437+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
47	7,8893+001	1:1274+001	1,4217+000	0,0000+000	0,0000+000	4,1332+002	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3.354+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3.175+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.300+002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4.600+002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 6.700+002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 8.000+002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.800+002SECONDS

FOLLOWING ARE THE FINE GROUP CROSS SECTIONS FOR MATERIAL IDENT, U 238 .

J	EL	SIGTRH	SIGERH	SIGINEL	SIGFIS	SIGCAPT	NUBAR	SIGTRL	SIGERL	SIGN2N	SIGNP	SIGNALPHA
1	7,7880+006	5:9456-001	1,7761-002	6,3732-001	1,0242+000	5,4243-003	3,7455+000	0,0000+000	0,0000+000	1,2686+000	0,0000+000	0,0000+000
2	6,0653+006	8:0481-001	2,4083-002	1,6606+000	9,0128-001	7,3011-003	3,4386+000	0,0000+000	0,0000+000	4,6023-001	0,0000+000	0,0000+000
3	4,7237+006	9:9248-001	2,9673-002	2,5068+000	5,8076-001	9,9307-003	3,1995+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
4	3,6788+006	1:1138+000	3,3233-002	2,5976+000	5,6477-001	1,4768-002	3,0134+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
5	2,8650+006	1:3580+000	4,0519-002	2,6196+000	5,4823-001	2,3144-002	2,8684+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
6	2,2313+006	1:5430+000	4,6046-002	2,6043+000	5,6194-001	3,5536-002	2,7555+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
7	1,7377+006	1:7425+000	5,2195-002	2,7799+000	5,3708-001	5,4327-002	2,6676+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
8	1,3534+006	1:5686+000	4,6841-002	3,1683+000	3,1334-001	9,1505-002	2,5991+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
9	1,0540+006	1:9642+000	5,8762-002	2,6628+000	4,2378-002	1,3924-001	2,5458+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
10	8,2085+005	2:7802+000	8,3095-002	2,2374+000	1,3095-002	1,5034-001	2,5042+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
11	6,3928+005	3:2848+000	9,8315-002	1,9215+000	2,0702-003	1,4443-001	2,4719+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
12	4,9787+005	4:2818+000	1,2795-001	1,8174+000	7,7973-004	1,3643-001	2,4467+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
13	3,8774+005	5:1074+000	1,5279-001	1,6115+000	0,0000+000	1,3258-001	2,4271+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
14	3,0197+005	6:1342+000	1,8336-001	1,3144+000	0,0000+000	1,3661-001	2,4118+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
15	2,3518+005	6:9074+000	2,0641-001	1,1994+000	0,0000+000	1,4510-001	2,3999+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
16	1,8316+005	7:5906+000	2,2686-001	1,1000+000	0,0000+000	1,5709-001	2,3906+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
17	1,4264+005	8:4891+000	2,5391-001	9,4994-001	0,0000+000	1,7208-001	2,3834+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
18	1,1109+005	9:4501+000	2,8373-001	7,6491-001	0,0000+000	1,9037-001	2,3778+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
19	8,6517+004	1:0401+001	3,1088-001	5,1861-001	0,0000+000	2,1902-001	2,3734+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
20	6,7379+004	1:1266+001	3,3630-001	3,0793-001	0,0000+000	2,5624-001	2,3700+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
21	5,2475+004	1:2014+001	3,5864-001	1,4401-001	0,0000+000	3,0598-001	2,3673+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
22	4,0868+004	2:0420+001	6,5983-001	2,3964-002	0,0000+000	3,6136-001	2,3653+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
23	3,1828+004	2:5043+001	7,4721-001	0,0000+000	0,0000+000	4,1853-001	2,3637+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
24	2,4788+004	2:5406+001	7,5805-001	0,0000+000	0,0000+000	4,7548-001	2,3624+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
25	1,9305+004	2:5979+001	7,7517-001	0,0000+000	0,0000+000	5,3742-001	2,3614+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
26	1,5034+004	2:6401+001	7,8774-001	0,0000+000	0,0000+000	5,9743-001	2,3607+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000

27	1.1709+004	2.6562+001	7.9281-001	0.0000+000	0.0000+000	6.5729-001	2.3601+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
28	9.1188+003	2.6555+001	7.9231-001	0.0000+000	0.0000+000	7.1590-001	2.3596+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
29	7.1017+003	2.6529+001	7.9154-001	0.0000+000	0.0000+000	7.7490-001	2.3593+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
30	5.5308+003	2.6496+001	7.9055-001	0.0000+000	0.0000+000	8.4529-001	2.3590+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
31	4.3074+003	2.6451+001	7.8921-001	0.0000+000	0.0000+000	9.2345-001	2.3588+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
32	3.3546+003	1.4548+001	6.2232-001	0.0000+000	0.0000+000	3.9959-001	2.3586+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
33	2.6126+003	1.0609+001	3.8222-001	0.0000+000	0.0000+000	0.0000+000	2.3585+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
34	2.0347+003	9.9564+000	4.9585-001	0.0000+000	0.0000+000	0.0000+000	2.3584+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
35	1.5846+003	1.0578-001	5.7852-001	0.0000+000	0.0000+000	0.0000+000	2.3583+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
36	1.2341+003	1.0219+001	4.7614-001	0.0000+000	0.0000+000	0.0000+000	2.3582+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
37	9.6112+002	1.0174+001	6.1338-001	0.0000+000	0.0000+000	0.0000+000	2.3582+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
38	7.4852+002	9.2445+000	5.3944-001	0.0000+000	0.0000+000	0.0000+000	2.3581+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
39	5.8295+002	1.0390+001	5.3697-001	0.0000+000	0.0000+000	0.0000+000	2.3581+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
40	4.5400+002	9.5942+000	3.9592-001	0.0000+000	0.0000+000	0.0000+000	2.3581+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
41	3.5358+002	1.0346+001	3.3302-001	0.0000+000	0.0000+000	0.0000+000	2.3581+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
42	2.7536+002	9.3452+000	5.6463-001	0.0000+000	0.0000+000	0.0000+000	2.3580+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
43	2.1445+002	1.0838+001	5.3582-001	0.0000+000	0.0000+000	0.0000+000	2.3580+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
44	1.6702+002	2.7869+000	2.4036+000	0.0000+000	0.0000+000	0.0000+000	2.3580+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
45	1.3007+002	8.8282+000	2.7207-001	0.0000+000	0.0000+000	0.0000+000	2.3580+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
46	1.0130+002	6.2075+000	2.8909+000	0.0000+000	0.0000+000	0.0000+000	2.3580+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
47	7.8893+001	7.4729-002	1.9756-001	0.0000+000	0.0000+000	0.0000+000	2.3580+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.178+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.109+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.750-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 5.800-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.580-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.430-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.900-002SECONDS

FOLLOWING ARE THE FINE GROUP CROSS SECTIONS FOR MATERIAL IDENT. PU239 .

J	EL	SIGTRH	SIGERH	SIGINEL	SIGFIS	SIGCAPT	NUBAR	SIGTRL	SIGERL	SIGN2N	SIGNP	SIGNALPHA
1	7.7880+006	5.7423-001	1.7102-002	8.1201-001	2.4106+000	0.0000+000	4.0707+000	0.0000+000	0.0000+000	1.4116-001	0.0000+000	0.0000+000
2	6.0653+006	8.3410-001	2.4881-002	1.2559+000	2.0962+000	0.0000+000	3.8051+000	0.0000+000	0.0000+000	7.1679-002	0.0000+000	0.0000+000
3	4.7237+006	9.9801-001	2.9655-002	1.5224+000	1.8719+000	0.0000+000	3.5983+000	0.0000+000	0.0000+000	1.4804-003	0.0000+000	0.0000+000
4	3.6788+006	1.0749+000	3.1938-002	1.3811+000	1.9170+000	0.0000+000	3.4372+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
5	2.8650+006	1.3269+000	3.9426-002	1.2352+000	1.9794+000	0.0000+000	3.3117+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
6	2.2313+006	1.5642+000	4.6481-002	1.1681+000	2.0336+000	0.0000+000	3.2140+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
7	1.7377+006	1.9388+000	5.7611-002	1.0877+000	1.9863+000	0.0000+000	3.1379+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
8	1.3534+006	2.2766+000	6.7642-002	9.9447-001	1.8688+000	8.9414-003	3.0786+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
9	1.0540+006	2.4719+000	7.3456-002	8.9780-001	1.7945+000	3.2812-002	3.0325+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
10	8.2085+005	2.6364+000	7.8404-002	7.8779-001	1.7213+000	5.6452-002	2.9966+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
11	6.3928+005	3.0831+000	9.1665-002	7.6160-001	1.6551+000	7.7291-002	2.9686+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
12	4.9787+005	3.6686+000	1.0813-001	7.3683-001	1.5944+000	1.0019-001	2.9468+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
13	3.8774+005	4.4235+000	1.3163-001	6.7156-001	1.5134+000	1.2200-001	2.9298+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000

```
14 3.0197+005 5.1247+000 1.5238-001 5.6833-001 1.4895+000 1.4772-001 2.9166+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
15 2.3518+005 5.7116+000 1.6978-001 4.8096-001 1.4800+000 1.7183-001 2.9063+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
16 1.8316+005 6.9272+000 2.0593-001 4.3151-001 1.4819+000 1.8838-001 2.8982+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
17 1.4264+005 7.8189+000 2.3235-001 3.7908-001 1.5083+000 2.0408-001 2.8920+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
18 1.1109+005 8.4834+000 2.5208-001 3.3883-001 1.5242+000 2.1415-001 2.8871+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
19 8.6517+004 9.4268+000 2.8069-001 3.0263-001 1.5379+000 2.1909-001 2.8833+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
20 6.7379+004 1.0153+001 3.0168-001 2.7152-001 1.4903+000 2.1880-001 2.8804+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
21 5.2475+004 1.0471+001 3.1112-001 2.5044-001 1.4607+000 2.5130-001 2.8781+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
22 4.0868+004 1.0759+001 3.1966-001 2.4028-001 1.4920+000 3.3199-001 2.8763+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
23 3.1828+004 1.1021+001 3.2746-001 2.3202-001 1.5763+000 2.9248-001 2.8749+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
24 2.4788+004 1.1252+001 3.3432-001 2.2193-001 1.6765+000 5.0956-001 2.8738+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
25 1.9305+004 1.1442+001 3.3996-001 2.1173-001 1.7834+000 6.7114-001 2.8730+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
26 1.5034+004 1.1620+001 3.4525-001 1.9451-001 1.9000+000 7.8436-001 2.8723+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
27 1.1709+004 1.1790+001 3.5031-001 1.5894-001 2.0269+000 9.0226-001 2.8718+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
28 9.1188+003 1.1952+001 3.5512-001 1.0401-001 2.1789+000 1.0263+000 2.8714+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
29 7.1017+003 1.2092+001 3.5929-001 1.6624-002 2.3396+000 1.1479+000 2.8711+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
30 5.5308+003 1.2226+001 3.6326-001 0.0000+000 2.5219+000 1.2810+000 2.8709+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
31 4.3074+003 1.2359+001 3.6722-001 0.0000+000 2.6967+000 1.4377+000 2.8707+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
32 3.3546+003 1.2488+001 3.7105-001 0.0000+000 2.9471+000 1.6494+000 2.8705+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
33 2.6126+003 1.2615+001 3.7481-001 0.0000+000 3.3101+000 1.9284+000 2.8704+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
34 2.0347+003 1.2733+001 3.7831-001 0.0000+000 3.7473+000 2.2477+000 2.8703+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
35 1.5846+003 1.2835+001 3.8137-001 0.0000+000 4.2007+000 2.5965+000 2.8702+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
36 1.2341+003 1.2931+001 3.8422-001 0.0000+000 4.7498+000 3.0133+000 2.8702+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
37 9.6112+002 1.3010+001 3.8654-001 0.0000+000 5.7069+000 3.6796+000 2.8701+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
38 7.4852+002 1.3065+001 3.8817-001 0.0000+000 7.2295+000 3.6259+000 2.8701+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
39 5.8295+002 1.3105+001 3.8938-001 0.0000+000 8.0021+000 4.8459+000 2.8701+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
40 4.5400+002 1.3110+001 3.8952-001 0.0000+000 1.2820+001 8.6792+000 2.8701+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
41 3.5358+002 1.3089+001 3.8890-001 0.0000+000 9.7870+000 4.5918+000 2.8701+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
42 2.7536+002 1.3480+001 4.3344-001 0.0000+000 8.9065+000 4.5154+000 2.8700+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
43 2.1445+002 1.1111+001 4.2462-001 0.0000+000 3.8495+000 4.4164-001 2.8700+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
44 1.6702+002 1.1455+001 3.6712-001 0.0000+000 9.4451-001 1.2187-001 2.8700+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
45 1.3007+002 1.1300+001 4.7398-001 0.0000+000 0.0000+000 0.0000+000 2.8700+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
46 1.0130+002 1.0821+001 3.8216-001 0.0000+000 0.0000+000 0.0000+000 2.8700+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000
47 7.8893+001 1.0921+001 3.2836-001 0.0000+000 0.0000+000 0.0000+000 2.8700+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.947+000SECONDS

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.880+000SECONDS

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.750-001SECONDS

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.000-002SECONDS

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 9.100-002SECONDS

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 6.100-002SECONDS

 TIME SPENT IN PROGRAM AREA NO. 8 WAS 9.000-003SECONDS

FOLLOWING ARE THE FINE GROUP CROSS SECTIONS FOR MATERIAL IDENT, PU240 .

 J    EL      SIGTRL      SIGERH      SIGINEL      SIGFIS      SIGCAPT      NUBAR      SIGTRL      SIGERL      SIGN2N      SIGNP      SIGNALPHA
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1	7,7880+006	5:2334-001	1,3929-002	7,0735-001	2,1461+000	5,4039-003	3,9085+00[illegible]	[illegible]+000	0,0000+000	5,1765-001	0,0000+000	0,0000+000
2	6,0653+006	7:3453-001	1,2604-002	1,4817+000	1,8741+000	9,2251-003	3,7067+00[illegible]	[illegible]+000	0,0000+000	1,2522-001	0,0000+000	0,0000+000
3	4,7237+006	9:6214-001	2,849[illegible]-002	1,8480+000	1,5339+000	1,0778-002	3,5386+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
4	3,6788+006	1:0954+000	3,2416-002	1,7605+000	1,5386+000	1,6703-002	3,4010+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
5	2,8650+006	1:3396+000	4,0228-002	1,6483+000	1,6577+000	2,6644-002	3,2898+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
6	2,2313+006	1:5828+000	4,6842-002	1,5348+000	1,7146+000	3,9348-002	3,2007+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
7	1,7377+006	1:9397+000	5,7398-002	1,5578+000	1,6241+000	5,3003-002	3,1298+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
8	1,3534+006	2:2959+000	6,7933-002	1,4171+000	1,5046+000	1,0187-001	3,0738+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
9	1,0540+006	2:5169+000	7,4531-002	1,1038+000	1,4925+000	1,5726-001	3,0295+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
10	8,2085+005	2:8437+000	8,4224-002	8,5458+001	1,3731+000	1,7379-001	2,9947+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
11	6,3928+005	3:4419+000	1,0201-001	9,4012-001	9,4168-001	1,6914-001	2,9675+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
12	4,9787+005	4:1436+000	1,2274-001	1,1840+000	5,8637-001	1,6151-001	2,9461+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
13	3,8774+005	4:9952+000	1,4802-001	1,2588+000	2,9708-001	1,6113-001	2,9294+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
14	3,0197+005	5:7943+000	1,7157-001	1,1218+000	1,7142-001	1,6636-001	2,9163+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
15	2,3518+005	6:5007+000	1,9247-001	1,0365+000	1,2502-001	1,7992-001	2,9061+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
16	1,8316+005	7:9038+000	2,3399-001	9,5409-001	9,9450-002	1,9578-001	2,8981+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
17	1,4264+005	9:0522+000	2,6793-001	8,0800-001	8,7477-002	2,1519-001	2,8919+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
18	1,1109+005	9:8344+000	2,9099-001	5,9227-001	8,2229-002	2,3962-001	2,8871+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
19	8,6517+004	1:0400+001	3,0774-001	3,7592-001	8,0677-002	2,6984-001	2,8833+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
20	6,7379+004	1:0984+001	3,2504-001	1,6796-001	8,3375-002	3,1739-001	2,8804+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
21	5,2475+004	1:1705+001	3,4638-001	3,0636-002	8,6535-002	3,7288-001	2,8781+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
22	4,0868+004	1:2395+001	3,6682-001	1,2577-003	9,4344-002	4,3501-001	2,8763+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
23	3,1828+004	1:2907+001	3,8191-001	0,0000+000	1,0615-001	4,8895-001	2,8749+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
24	2,4788+004	1:3132+001	3,8857-001	0,0000+000	1,0419-001	5,6986-001	2,8738+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
25	1,9305+004	1:3500+001	3,9945-001	0,0000+000	1,0572-001	6,4938-001	2,8730+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
26	1,5034+004	1:3783+001	4,0781-001	0,0000+000	1,0597-001	7,3281-001	2,8723+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
27	1,1709+004	1:4062+001	4,1609-001	0,0000+000	1,0540-001	8,2088-001	2,8718+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
28	9,1188+003	1:4413+001	4,2647-001	0,0000+000	1,0334-001	9,1612-001	2,8714+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
29	7,1017+003	1:4827+001	4,3872-001	0,0000+000	1,0042-001	1,0217+000	2,8711+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
30	5,5308+003	1:5203+001	4,4986-001	0,0000+000	9,5381-002	1,1440+000	2,8709+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
31	4,3074+003	1:5791+001	4,6730-001	0,0000+000	8,9773-002	1,2938+000	2,8707+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
32	3,3546+003	1:6484+001	4,8781-001	0,0000+000	8,4271-002	1,4734+000	2,8705+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
33	2,6126+003	1:7216+001	5,0946-001	0,0000+000	7,8866-002	1,6984+000	2,8704+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
34	2,0347+003	1:7981+001	5,3209-001	0,0000+000	7,3793-002	1,9592+000	2,8703+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
35	1,5846+003	1:8770+001	5,5545-001	0,0000+000	6,9498-002	2,2661+000	2,8702+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
36	1,2341+003	1:9580+001	5,7943-001	0,0000+000	6,6072-002	2,6303+000	2,8702+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
37	9,6112+002	2:0410+001	6,0395-001	0,0000+000	6,2837-002	3,0533+000	2,8701+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
38	7,4852+002	2:0406+001	6,0298-001	0,0000+000	6,0809-002	3,5489+000	2,8701+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
39	5,8295+002	1:2777+001	6,7317-001	0,0000+000	5,8070-002	1,5096+000	2,8701+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
40	4,5400+002	1:1190+001	4,1229-001	0,0000+000	5,8202-002	0,0000+000	2,8701+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
41	3,5358+002	1:0876+001	6,2804-001	0,0000+000	5,6816-002	0,0000+000	2,8701+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
42	2,7536+002	9:4392+000	8,4492-001	0,0000+000	5,4121-002	0,0000+000	2,8700+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
43	2,1445+002	9:7807+000	3,8027-001	0,0000+000	5,2233-002	0,0000+000	2,8700+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
44	1,6702+002	1:1665+001	4,4859-001	0,0000+000	5,1658-002	0,0000+000	2,8700+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
45	1,3007+002	1:1364+001	5,4303-001	0,0000+000	5,4406-002	0,0000+000	2,8700+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
46	1,0130+002	9:7030+000	1,5403+000	0,0000+000	5,9752-002	0,0000+000	2,8700+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000
47	7,8893-001	1:0684+001	5,2168-001	0,0000+000	6,8660-002	0,0000+000	2,8700+00[illegible]	[illegible]+000	0,0000+000	0,0000+000	0,0000+000	0,0000+000

TIME SPENT IN PROGRAM AREA NO, 8 WAS 8.770-001SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3.850-001SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.720-001SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4.300-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.090-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 5.000-003SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.200-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.100-002SECONDS

FOLLOWING ARE THE FINE GROUP CROSS SECTIONS FOR MATERIAL IDENT, NA 23 .

J	EL	SIGTRP	SIGERP	SIGINEL	SIGFIS	SIGCAPT	NUBAR	SIGTRL	SIGERL	SIGN2N	SIGNP	SIGNALPHA
1	7.7880+006	2.5614-001	7.9589-002	8.7033-001	0.0000+000	1.7281-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.6230-002	6.3472-002
2	6.0653+006	3.2166-001	1.0117-001	9.2212-001	0.0000+000	1.6740-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	3.8756-002	9.4172-003
3	4.7237+006	4.9670-001	1.5662-001	8.8781-001	0.0000+000	1.6309-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.0690-002	6.9522-004
4	3.6788+006	6.9175-001	2.1733-001	8.0367-001	0.0000+000	1.6062-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.9751-004	1.1411-004
5	2.8650+006	8.3180-001	2.6011-001	6.7016-001	0.0000+000	1.6879-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
6	2.2313+006	1.1111+000	3.4916-001	6.4548-001	0.0000+000	1.8020-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
7	1.7377+006	1.2620+000	4.0983-001	6.7773-001	0.0000+000	1.9239-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
8	1.3534+006	1.5083+000	4.8268-001	3.8159-001	0.0000+000	2.0540-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
9	1.0540+006	1.9223+000	6.1373-001	5.8976-001	0.0000+000	2.1929-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
10	8.2085+005	2.2201+000	7.0910-001	3.6694-001	0.0000+000	2.3733-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
11	6.3928+005	4.0125+000	1.3141+000	3.3192-001	0.0000+000	3.1720-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
12	4.9787+005	3.1094+000	1.0398+000	1.0697-001	0.0000+000	3.2917-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
13	3.8774+005	3.0164+000	1.0014+000	8.8307-003	0.0000+000	2.5812-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
14	3.0197+005	3.1457+000	9.8933-001	0.0000+000	0.0000+000	4.6516-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
15	2.3518+005	3.0237+000	1.0666+000	0.0000+000	0.0000+000	6.8898-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
16	1.8316+005	3.9153+000	1.2670+000	0.0000+000	0.0000+000	7.7878-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
17	1.4264+005	3.2404+000	1.0033+000	0.0000+000	0.0000+000	6.8947-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
18	1.1109+005	3.3828+000	1.0472+000	0.0000+000	0.0000+000	8.0970-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
19	8.6517+004	3.5380+000	1.0944+000	0.0000+000	0.0000+000	2.9752-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
20	6.7379+004	3.6968+000	1.1309+000	0.0000+000	0.0000+000	2.6870-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
21	5.2475+004	4.7819+000	2.1930+000	0.0000+000	0.0000+000	3.1008-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
22	4.0868+004	4.4787+000	1.4553+000	0.0000+000	0.0000+000	3.5237-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
23	3.1828+004	4.0678+000	1.2588+000	0.0000+000	0.0000+000	4.0335-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
24	2.4788+004	4.2323+000	1.3089+000	0.0000+000	0.0000+000	4.7361-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
25	1.9305+004	4.3710+000	1.3518+000	0.0000+000	0.0000+000	5.9831-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
26	1.5034+004	4.5931+000	1.4082+000	0.0000+000	0.0000+000	7.9092-004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
27	1.1709+004	4.8219+000	1.4918+000	0.0000+000	0.0000+000	1.0520-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
28	9.1188+003	5.2702+000	1.6312+000	0.0000+000	0.0000+000	1.3780-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
29	7.1017+003	6.0493+000	1.8756+000	0.0000+000	0.0000+000	1.7770-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
30	5.5308+003	7.6232+000	2.3758+000	0.0000+000	0.0000+000	2.0738-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
31	4.3074+003	1.1562+001	3.6794+000	0.0000+000	0.0000+000	1.4048-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
32	3.3546+003	2.7011+001	9.7730+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
33	2.6126+003	1.6462+002	6.5904+001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
34	2.0347+003	3.4111+001	1.5574+001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
35	1.5846+003	9.3622+000	3.0861+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
36	1.2341+003	5.1744+000	1.6220+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
37	9.6112+002	3.8738+000	1.2020+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
38	7.4852+002	3.3378+000	1.0331+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
39	5.8295+002	3.0763+000	9.5158-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
40	4.5400+002	2.9345+000	9.0755-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
41	3.5358+002	2.8579+000	8.8377-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
42	2.7536+002	2.8544+000	8.8266-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
43	2.1445+002	2.8628+000	8.8527-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
44	1.6702+002	2.8713+000	8.8788-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
45	1.3007+002	2.8797+000	8.9050-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
46	1.0130+002	2.8882+000	8.9313-001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000

47 7.8893+001 2.8968+000 8.9577-001 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000 0.0000+000

MACROSCOPIC HOMOGENIZED FINE GROUP CROSS SECTIONS

J	EL	SIGTRH	SIGERH	SIGINEL	SIGFIS	SIGCAPT	NUSIGFIS	SIGTRL	SIGERL	SIGN2N	SIGNP	SIGNALPHA
1	7.7880+006	1.3968-002	1.6396-003	3.3614-002	1.4812-002	6.6627-005	5.6559-002	0.0000+000	0.0000+000	1.4077-002	1.2921-003	7.8071-004
2	6.0653+006	1.9150-002	2.1975-003	4.6286-002	1.2999-002	8.9162-005	4.5820-002	0.0000+000	0.0000+000	5.1066-003	7.5850-004	1.1583-004
3	4.7237+006	2.6312-002	3.2906-003	5.5418-002	9.1321-003	1.1914-004	3.0322-002	0.0000+000	0.0000+000	1.7764-006	1.9132-004	8.5512-006
4	3.6788+006	3.1633-002	4.2681-003	5.6061-002	9.0154-003	1.7492-004	2.8380-002	0.0000+000	0.0000+000	0.0000+000	3.6594-006	1.4036-006
5	2.8650+006	3.9550-002	5.2803-003	5.0229-002	8.9592-003	2.7094-004	2.7031-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
6	2.2313+006	4.8601-002	6.8629-003	4.8677-002	9.1951-003	4.1178-004	2.6762-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
7	1.7377+006	5.4852-002	7.9008-003	4.8375-002	8.8336-003	6.2287-004	2.4986-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
8	1.3534+006	5.7849-002	8.9217-003	4.7575-002	6.2285-003	1.0602-003	1.7550-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
9	1.0540+006	6.7837-002	1.0726-002	4.1907-002	3.2080-003	1.6348-003	9.5038-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
10	8.2085+005	7.9349-002	1.2058-002	3.1931-002	2.7562-003	1.8005-003	8.1885-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
11	6.3928+005	1.1762-001	2.1031-002	2.6125-002	2.3851-003	1.7686-003	7.0689-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
12	4.9787+005	1.1344-001	1.7265-002	2.2301-002	2.1563-003	1.7142-003	6.3496-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
13	3.8774+005	1.3693-001	1.8952-002	1.8822-002	1.9349-003	1.7027-003	5.6688-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
14	3.0197+005	1.4130-001	1.8122-002	1.5326-002	1.8559-003	1.7842-003	5.4130-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
15	2.3518+005	1.4762-001	1.9072-002	1.3946-002	1.8260-003	1.9134-003	5.3369-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
16	1.8316+005	1.7131-001	2.3027-002	1.2780-002	1.8181-003	2.0699-003	5.2693-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
17	1.4264+005	1.9588-001	2.2969-002	1.1037-002	1.8449-003	2.2561-003	5.3355-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
18	1.1109+005	1.8200-001	2.1575-002	8.9046-003	1.8619-003	2.4774-003	5.3756-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
19	8.6517+004	2.2333-001	2.4006-002	6.1145-003	1.8777-003	2.7575-003	5.4141-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
20	6.7379+004	2.1404-001	2.5775-002	3.7187-003	1.8217-003	3.2249-003	5.2472-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
21	5.2475+004	2.4854-001	3.6933-002	1.8480-003	1.7874-003	3.8292-003	5.1443-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
22	4.0868+004	3.4497-001	3.2092-002	5.4766-004	1.8281-003	4.5578-003	5.2582-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
23	3.1828+004	4.1680-001	3.4561-002	2.7842-004	1.9340-003	5.1887-003	5.5601-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
24	2.4788+004	3.7724-001	5.8031-002	2.6631-004	2.0535-003	6.4922-003	5.9013-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
25	1.9305+004	3.5802-001	2.6950-002	2.5407-004	2.1823-003	7.1401-003	6.2698-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
26	1.5034+004	3.9064-001	3.0265-002	2.3342-004	2.3224-003	7.8523-003	6.6706-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
27	1.1709+004	4.1169-001	3.3316-002	1.9073-004	2.4745-003	8.7046-003	7.1362-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
28	9.1188+003	4.3961-001	3.8008-002	1.2481-004	2.6560-003	9.6827-003	7.6266-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
29	7.1017+003	5.3978-001	5.3699-002	1.9949-005	2.8476-003	1.0889-002	8.1759-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
30	5.5308+003	4.8631-001	4.9934-002	0.0000+000	3.0644-003	1.1792-002	8.7975-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
31	4.3074+003	5.0455-001	6.1422-002	0.0000+000	3.2720-003	1.2438-002	9.3927-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
32	3.3546+003	5.7643-001	1.3586-001	0.0000+000	3.5702-003	7.0856-003	1.0248-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
33	2.6126+003	2.2187-000	8.2264-001	0.0000+000	4.0036-003	3.0886-003	1.1492-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
34	2.0347+003	6.1632-001	2.0602-001	0.0000+000	4.5263-003	3.5633-003	1.2992-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
35	1.5846+003	2.1540-001	5.4506-002	0.0000+000	5.0686-003	4.2282-003	1.4548-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
36	1.2341+003	2.8310-001	3.6613-002	0.0000+000	5.7262-003	4.7534-003	1.6435-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
37	9.6112+002	2.7644-001	3.4118-002	0.0000+000	6.8735-003	8.8742-003	1.9728-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
38	7.4852+002	2.6739-001	3.2190-002	0.0000+000	8.6998-003	5.9679-003	2.4969-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
39	5.8295+002	2.7968-001	3.1962-002	0.0000+000	9.6258-003	6.8971-003	2.7627-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
40	4.5400+002	2.7314-001	3.0350-002	0.0000+000	1.5408-002	1.0606-002	4.4221-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
41	3.5358+002	2.8345-001	2.9876-002	0.0000+000	1.1767-002	5.7882-003	3.3772-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
42	2.7536+002	2.7562-001	3.2900-002	0.0000+000	1.0709-002	5.7363-003	3.0736-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
43	2.1445+002	2.9153-001	3.2724-002	0.0000+000	4.6403-003	8.0934-004	1.3318-002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
44	1.6702+002	2.0740-001	5.3077-002	0.0000+000	1.1541-003	4.4463-004	3.3122-003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
45	1.3007+002	2.7265-001	3.0287-002	0.0000+000	2.1763-005	3.9352-004	6.2459-005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
46	1.0130+002	2.4337-001	5.8911-002	0.0000+000	2.3901-005	4.2281-004	6.8596-005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000
47	7.8893+001	1.7783-001	2.9393-002	0.0000+000	2.7464-005	4.5465-004	7.8822-005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000

TIME SPENT IN PROGRAM AREA NO. 8 WAS 9.400-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 5.900-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.400-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.000-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.500-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.000-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 8.000-003SECONDS

MATERIAL FE

DISCRETE LEVEL SCATTERING

SCATTERING FROM GROUP 1

0.0000000+000	1 1	0.0000000+000	1 2	0.0000000+000	1 3	0.0000000+000	1 4	0.0000000+000	1 5
0.0000000+000	1 6	0.0000000+000	1 7	0.0000000+000	1 8	0.0000000+000	1 9	0.0000000+000	1 10
0.0000000+000	1 11	0.0000000+000	1 12	0.0000000+000	1 13	0.0000000+000	1 14	0.0000000+000	1 15
0.0000000+000	1 16	0.0000000+000	1 17	0.0000000+000	1 18	0.0000000+000	1 19	0.0000000+000	1 20
0.0000000+000	1 21	0.0000000+000	1 22	0.0000000+000	1 23	0.0000000+000	1 24	0.0000000+000	1 25
0.0000000+000	1 26	0.0000000+000	1 27	0.0000000+000	1 28	0.0000000+000	1 29	0.0000000+000	1 30
0.0000000+000	1 31	0.0000000+000	1 32	0.0000000+000	1 33	0.0000000+000	1 34	0.0000000+000	1 35
0.0000000+000	1 36	0.0000000+000	1 37	0.0000000+000	1 38	0.0000000+000	1 39	0.0000000+000	1 40
0.0000000+000	1 41	0.0000000+000	1 42	0.0000000+000	1 43	0.0000000+000	1 44	0.0000000+000	1 45
0.0000000+000	1 46	0.0000000+000	1 47						

SCATTERING FROM GROUP 2

0.0000000+000	2 2	0.0000000+000	2 3	0.0000000+000	2 4	0.0000000+000	2 5	0.0000000+000	2 6
0.0000000+000	2 7	0.0000000+000	2 8	0.0000000+000	2 9	0.0000000+000	2 10	0.0000000+000	2 11
0.0000000+000	2 12	0.0000000+000	2 13	0.0000000+000	2 14	0.0000000+000	2 15	0.0000000+000	2 16
0.0000000+000	2 17	0.0000000+000	2 18	0.0000000+000	2 19	0.0000000+000	2 20	0.0000000+000	2 21
0.0000000+000	2 22	0.0000000+000	2 23	0.0000000+000	2 24	0.0000000+000	2 25	0.0000000+000	2 26
0.0000000+000	2 27	0.0000000+000	2 28	0.0000000+000	2 29	0.0000000+000	2 30	0.0000000+000	2 31
0.0000000+000	2 32	0.0000000+000	2 33	0.0000000+000	2 34	0.0000000+000	2 35	0.0000000+000	2 36
0.0000000+000	2 37	0.0000000+000	2 38	0.0000000+000	2 39	0.0000000+000	2 40	0.0000000+000	2 41
0.0000000+000	2 42	0.0000000+000	2 43	0.0000000+000	2 44	0.0000000+000	2 45	0.0000000+000	2 46
0.0000000+000	2 47								

SCATTERING FROM GROUP 3

0.0000000+000	3 3	0.0000000+000	3 4	0.0000000+000	3 5	0.0000000+000	3 6	0.0000000+000	3 7
0.0000000+000	3 8	0.0000000+000	3 9	0.0000000+000	3 10	0.0000000+000	3 11	0.0000000+000	3 12
0.0000000+000	3 13	0.0000000+000	3 14	0.0000000+000	3 15	0.0000000+000	3 16	0.0000000+000	3 17
0.0000000+000	3 18	0.0000000+000	3 19	0.0000000+000	3 20	0.0000000+000	3 21	0.0000000+000	3 22
0.0000000+000	3 23	0.0000000+000	3 24	0.0000000+000	3 25	0.0000000+000	3 26	0.0000000+000	3 27
0.0000000+000	3 28	0.0000000+000	3 29	0.0000000+000	3 30	0.0000000+000	3 31	0.0000000+000	3 32
0.0000000+000	3 33	0.0000000+000	3 34	0.0000000+000	3 35	0.0000000+000	3 36	0.0000000+000	3 37
0.0000000+000	3 38	0.0000000+000	3 39	0.0000000+000	3 40	0.0000000+000	3 41	0.0000000+000	3 42
0.0000000+000	3 43	0.0000000+000	3 44	0.0000000+000	3 45	0.0000000+000	3 46	0.0000000+000	3 47

SCATTERING FROM GROUP 4

0,0000000+000	4	4	1,7559934-001	4	5	1,5787122-002	4	6	2,3149201-002	4	7	2,9547711-002	4 8
2,3462484-002	4	9	5,6386878-002	4	10	4,7819753-002	4	11	1,6147828-002	4	12	1,6992110-002	4 13
2,0445021-002	4	14	1,0853055-002	4	15	2,8390755-003	4	16	1,5862064-003	4	17	8,9361704-004	4 18
5,9717303-004	4	19	3,9982983-004	4	20	2,6796988-004	4	21	1,7920930-004	4	22	1,2085167-004	4 23
0,0000000+000	4	24	0,0000000+000	4	25	0,0000000+000	4	26	0, 000000+000	4	27	0,0000000+000	4 28
0,0000000+000	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0, 000000+000	4	32	0,0000000+000	4 33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0, 000000+000	4	37	0,0000000+000	4 38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0, 000000+000	4	42	0,0000000+000	4 43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0, 000000+000	4	47		

SCATTERING FROM GROUP 5

0,0000000+000	5	5	3,0733877-001	5	6	1,8280888-001	5	7	4,3659289-002	5	8	6,4678465-002	5 9
7,0935690-002	5	10	5,7997435-002	5	11	9,097?268-002	5	12	6,2494173-002	5	13	4,4378807-002	5 14
4,3889339-002	5	15	3,2110907-002	5	16	1,9228784-002	5	17	1, 206616-002	5	18	6,7692366-003	5 19
4,3651005-003	5	20	2,7380941-003	5	21	1,7307078-003	5	22	1, 890610-003	5	23	6,9293572-004	5 24
3,9453430-004	5	25	2,7833301-004	5	26	1,9542563-004	5	27	1,3874749-004	5	28	0,0000000+000	5 29
0,0000000+000	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0, 000000+000	5	33	0,0000000+000	5 34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0, 000000+000	5	38	0,0000000+000	5 39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0, 000000+000	5	43	0,0000000+000	5 44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47					

SCATTERING FROM GROUP 6

0,0000000+000	6	6	3,3846787-001	6	7	5,2196632-001	6	8	0, 000000+000	6	9	0,0000000+000	6 10
1,8515227-002	6	11	2,5169345-002	6	12	1,5459408-002	6	13	1,2077593-002	6	14	7,3569160-003	6 15
4,4932570-003	6	16	4,8869780-003	6	17	4,4913600-003	6	18	2,2555223-003	6	19	2,4383172-003	6 20
1,9114859-003	6	21	1,3188274-003	6	22	8,6648591-004	6	23	5,5613381-004	6	24	3,4596880-004	6 25
2,1658214-004	6	26	1,3661424-004	6	27	0,0000000+000	6	28	0, 000000+000	6	29	0,0000000+000	6 30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0, 000000+000	6	34	0,0000000+000	6 35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0, 000000+000	6	39	0,0000000+000	6 40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0, 000000+000	6	44	0,0000000+000	6 45
0,0000000+000	6	46	0,0000000+000	6	47								

SCATTERING FROM GROUP 7

0,0000000+000	7	7	3,2814145-002	7	8	4,7606000-001	7	9	2,2316232-001	7	10	0,0000000+000	7 11
0,0000000+000	7	12	0,0000000+000	7	13	0,0000000+000	7	14	0, 000000+000	7	15	0,0000000+000	7 16
0,0000000+000	7	17	0,0000000+000	7	18	1,1951337-003	7	19	7,8978212-004	7	20	4,7690953-004	7 21
2,8444732-004	7	22	1,7258867-004	7	23	1,0877675-004	7	24	0, 000000+000	7	25	0,0000000+000	7 26
0,0000000+000	7	27	0,0000000+000	7	28	0,0000000+000	7	29	0, 000000+000	7	30	0,0000000+000	7 31
0,0000000+000	7	32	0,0000000+000	7	33	0,0000000+000	7	34	0, 000000+000	7	35	0,0000000+000	7 36
0,0000000+000	7	37	0,0000000+000	7	38	0,0000000+000	7	39	0, 000000+000	7	40	0,0000000+000	7 41
0,0000000+000	7	42	0,0000000+000	7	43	0,0000000+000	7	44	0, 000000+000	7	45	0,0000000+000	7 46
0,0000000+000	7	47											

SCATTERING FROM GROUP 8

0,0000000+000	8	8	0,0000000+000	8	9	9,3418144-002	8	10	3,2158046-001	8	11	2,0669333-001	8 12
5,8949072-003	8	13	0,0000000+000	8	14	0,0000000+000	8	15	0, 000000+000	8	16	0,0000000+000	8 17
0,0000000+000	8	18	0,0000000+000	8	19	0,0000000+000	8	20	0, 000000+000	8	21	0,0000000+000	8 22
0,0000000+000	8	23	0,0000000+000	8	24	0,0000000+000	8	25	0, 000000+000	8	26	0,0000000+000	8 27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0, 000000+000	8	31	0,0000000+000	8 32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0, 000000+000	8	36	0,0000000+000	8 37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0, 000000+000	8	41	0,0000000+000	8 42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0, 000000+000	8	46	0,0000000+000	8 47

SCATTERING FROM GROUP 9

0,0000000+000	9	9	0,0000000+000	9	10	0,0000000+000	9	11	0, 000000+000	9	12	1,5426902-001	9 13
1,0325068-001	9	14	8,5692260-002	9	15	5,4566433-002	9	16	0, 000000+000	9	17	0,0000000+000	9 18

0,0000000+000 9 19	0,0000000+000 9 20	0,0000000+000 9 21	0,0000000+000 9 22	0,0000000+000 9 23
0,0000000+000 9 24	0,0000000+000 9 25	0,0000000+000 9 26	0,0000000+000 9 27	0,0000000+000 9 28
0,0000000+000 9 29	0,0000000+000 9 30	0,0000000+000 9 31	0,0000000+000 9 32	0,0000000+000 9 33
0,0000000+000 9 34	0,0000000+000 9 35	0,0000000+000 9 36	0,0000000+000 9 37	0,0000000+000 9 38
0,0000000+000 9 39	0,0000000+000 9 40	0,0000000+000 9 41	0,0000000+000 9 42	0,0000000+000 9 43
0,0000000+000 9 44	0,0000000+000 9 45	0,0000000+000 9 46	0,0000000+000 9 47	

SCATTERING FROM GROUP 10

0,0000000+000 10 10	0,0000000+000 10 11	0,0000000+000 10 12	0,0000000+000 10 13	0,0000000+000 10 14
0,0000000+000 10 15	1,7419239-002 10 16	5,9813733-002 10 17	3,8407641-002 10 18	2,4221471-002 10 19
1,5182336-002 10 20	9,3607977-003 10 21	5,7707256-003 10 22	3,5448860-003 10 23	2,1450356-003 10 24
1,3052969-003 10 25	7,9778136-004 10 26	4,8086487-004 10 27	2,9212004-004 10 28	1,7906616-004 10 29
1,1039590-004 10 30	0,0000000+000 10 31	0,0000000+000 10 32	0,0000000+000 10 33	0,0000000+000 10 34
0,0000000+000 10 35	0,0000000+000 10 36	0,0000000+000 10 37	0,0000000+000 10 38	0,0000000+000 10 39
0,0000000+000 10 40	0,0000000+000 10 41	0,0000000+000 10 42	0,0000000+000 10 43	0,0000000+000 10 44
0,0000000+000 10 45	0,0000000+000 10 46	0,0000000+000 10 47		

SCATTERING FROM GROUP 11

0,0000000+000 11 11	0,0000000+000 11 12	0,0000000+000 11 13	0,0000000+000 11 14	0,0000000+000 11 15
0,0000000+000 11 16	0,0000000+000 11 17	0,0000000+000 11 18	0,0000000+000 11 19	0,0000000+000 11 20
0,0000000+000 11 21	0,0000000+000 11 22	0,0000000+000 11 23	0,0000000+000 11 24	0,0000000+000 11 25
0,0000000+000 11 26	0,0000000+000 11 27	0,0000000+000 11 28	0,0000000+000 11 29	0,0000000+000 11 30
0,0000000+000 11 31	0,0000000+000 11 32	0,0000000+000 11 33	0,0000000+000 11 34	0,0000000+000 11 35
0,0000000+000 11 36	0,0000000+000 11 37	0,0000000+000 11 38	0,0000000+000 11 39	0,0000000+000 11 40
0,0000000+000 11 41	0,0000000+000 11 42	0,0000000+000 11 43	0,0000000+000 11 44	0,0000000+000 11 45
0,0000000+000 11 46	0,0000000+000 11 47			

SCATTERING FROM GROUP 12

0,0000000+000 12 12	0,0000000+000 12 13	0,0000000+000 12 14	0,0000000+000 12 15	0,0000000+000 12 16
0,0000000+000 12 17	0,0000000+000 12 18	0,0000000+000 12 19	0,0000000+000 12 20	0,0000000+000 12 21
0,0000000+000 12 22	0,0000000+000 12 23	0,0000000+000 12 24	0,0000000+000 12 25	0,0000000+000 12 26
0,0000000+000 12 27	0,0000000+000 12 28	0,0000000+000 12 29	0,0000000+000 12 30	0,0000000+000 12 31
0,0000000+000 12 32	0,0000000+000 12 33	0,0000000+000 12 34	0,0000000+000 12 35	0,0000000+000 12 36
0,0000000+000 12 37	0,0000000+000 12 38	0,0000000+000 12 39	0,0000000+000 12 40	0,0000000+000 12 41
0,0000000+000 12 42	0,0000000+000 12 43	0,0000000+000 12 44	0,0000000+000 12 45	0,0000000+000 12 46
0,0000000+000 12 47				

SCATTERING FROM GROUP 13

0,0000000+000 13 13	0,0000000+000 13 14	0,0000000+000 13 15	0,0000000+000 13 16	0,0000000+000 13 17
0,0000000+000 13 18	0,0000000+000 13 19	0,0000000+000 13 20	0,0000000+000 13 21	0,0000000+000 13 22
0,0000000+000 13 23	0,0000000+000 13 24	0,0000000+000 13 25	0,0000000+000 13 26	0,0000000+000 13 27
0,0000000+000 13 28	0,0000000+000 13 29	0,0000000+000 13 30	0,0000000+000 13 31	0,0000000+000 13 32
0,0000000+000 13 33	0,0000000+000 13 34	0,0000000+000 13 35	0,0000000+000 13 36	0,0000000+000 13 37
0,0000000+000 13 38	0,0000000+000 13 39	0,0000000+000 13 40	0,0000000+000 13 41	0,0000000+000 13 42
0,0000000+000 13 43	0,0000000+000 13 44	0,0000000+000 13 45	0,0000000+000 13 46	0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14	0,0000000+000 14 15	0,0000000+000 14 16	0,0000000+000 14 17	0,0000000+000 14 18
0,0000000+000 14 19	0,0000000+000 14 20	0,0000000+000 14 21	0,0000000+000 14 22	0,0000000+000 14 23
0,0000000+000 14 24	0,0000000+000 14 25	0,0000000+000 14 26	0,0000000+000 14 27	0,0000000+000 14 28
0,0000000+000 14 29	0,0000000+000 14 30	0,0000000+000 14 31	0,0000000+000 14 32	0,0000000+000 14 33
0,0000000+000 14 34	0,0000000+000 14 35	0,0000000+000 14 36	0,0000000+000 14 37	0,0000000+000 14 38
0,0000000+000 14 39	0,0000000+000 14 40	0,0000000+000 14 41	0,0000000+000 14 42	0,0000000+000 14 43
0,0000000+000 14 44	0,0000000+000 14 45	0,0000000+000 14 46	0,0000000+000 14 47	

SCATTERING FROM GROUP 15

0,0000000+000 15 15	0,0000000+000 15 16	0,0000000+000 15 17	0,0000000+000 15 18	0,0000000+000 15 19
0,0000000+000 15 20	0,0000000+000 15 21	0,0000000+000 15 22	0,0000000+000 15 23	0,0000000+000 15 24
0,0000000+000 15 25	0,0000000+000 15 26	0,0000000+000 15 27	0,0000000+000 15 28	0,0000000+000 15 29
0,0000000+000 15 30	0,0000000+000 15 31	0,0000000+000 15 32	0,0000000+000 15 33	0,0000000+000 15 34
0,0000000+000 15 35	0,0000000+000 15 36	0,0000000+000 15 37	0,0000000+000 15 38	0,0000000+000 15 39
0,0000000+000 15 40	0,0000000+000 15 41	0,0000000+000 15 42	0,0000000+000 15 43	0,0000000+000 15 44
0,0000000+000 15 45	0,0000000+000 15 46	0,0000000+000 15 47		

SCATTERING FROM GROUP 16

0,0000000+000 16 16	0,0000000+000 16 17	0,0000000+000 16 18	0,0000000+000 16 19	0,0000000+000 16 20
0,0000000+000 16 21	0,0000000+000 16 22	0,0000000+000 16 23	0,0000000+000 16 24	0,0000000+000 16 25
0,0000000+000 16 26	0,0000000+000 16 27	0,0000000+000 16 28	0,0000000+000 16 29	0,0000000+000 16 30
0,0000000+000 16 31	0,0000000+000 16 32	0,0000000+000 16 33	0,0000000+000 16 34	0,0000000+000 16 35
0,0000000+000 16 36	0,0000000+000 16 37	0,0000000+000 16 38	0,0000000+000 16 39	0,0000000+000 16 40
0,0000000+000 16 41	0,0000000+000 16 42	0,0000000+000 16 43	0,0000000+000 16 44	0,0000000+000 16 45
0,0000000+000 16 46	0,0000000+000 16 47			

SCATTERING FROM GROUP 17

0,0000000+000 17 17	0,0000000+000 17 18	0,0000000+000 17 19	0,0000000+000 17 20	0,0000000+000 17 21
0,0000000+000 17 22	0,0000000+000 17 23	0,0000000+000 17 24	0,0000000+000 17 25	0,0000000+000 17 26
0,0000000+000 17 27	0,0000000+000 17 28	0,0000000+000 17 29	0,0000000+000 17 30	0,0000000+000 17 31
0,0000000+000 17 32	0,0000000+000 17 33	0,0000000+000 17 34	0,0000000+000 17 35	0,0000000+000 17 36
0,0000000+000 17 37	0,0000000+000 17 38	0,0000000+000 17 39	0,0000000+000 17 40	0,0000000+000 17 41
0,0000000+000 17 42	0,0000000+000 17 43	0,0000000+000 17 44	0,0000000+000 17 45	0,0000000+000 17 46
0,0000000+000 17 47				

SCATTERING FROM GROUP 18

0,0000000+000 18 18	0,0000000+000 18 19	0,0000000+000 18 20	0,0000000+000 18 21	0,0000000+000 18 22
0,0000000+000 18 23	0,0000000+000 18 24	0,0000000+000 18 25	0,0000000+000 18 26	0,0000000+000 18 27
0,0000000+000 18 28	0,0000000+000 18 29	0,0000000+000 18 30	0,0000000+000 18 31	0,0000000+000 18 32
0,0000000+000 18 33	0,0000000+000 18 34	0,0000000+000 18 35	0,0000000+000 18 36	0,0000000+000 18 37
0,0000000+000 18 38	0,0000000+000 18 39	0,0000000+000 18 40	0,0000000+000 18 41	0,0000000+000 18 42
0,0000000+000 18 43	0,0000000+000 18 44	0,0000000+000 18 45	0,0000000+000 18 46	0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19	0,0000000+000 19 20	0,0000000+000 19 21	0,0000000+000 19 22	0,0000000+000 19 23
0,0000000+000 19 24	0,0000000+000 19 25	0,0000000+000 19 26	0,0000000+000 19 27	0,0000000+000 19 28
0,0000000+000 19 29	0,0000000+000 19 30	0,0000000+000 19 31	0,0000000+000 19 32	0,0000000+000 19 33
0,0000000+000 19 34	0,0000000+000 19 35	0,0000000+000 19 36	0,0000000+000 19 37	0,0000000+000 19 38
0,0000000+000 19 39	0,0000000+000 19 40	0,0000000+000 19 41	0,0000000+000 19 42	0,0000000+000 19 43
0,0000000+000 19 44	0,0000000+000 19 45	0,0000000+000 19 46	0,0000000+000 19 47	

SCATTERING FROM GROUP 20

0,0000000+000 20 20	0,0000000+000 20 21	0,0000000+000 20 22	0,0000000+000 20 23	0,0000000+000 20 24
0,0000000+000 20 25	0,0000000+000 20 26	0,0000000+000 20 27	0,0000000+000 20 28	0,0000000+000 20 29
0,0000000+000 20 30	0,0000000+000 20 31	0,0000000+000 20 32	0,0000000+000 20 33	0,0000000+000 20 34
0,0000000+000 20 35	0,0000000+000 20 36	0,0000000+000 20 37	0,0000000+000 20 38	0,0000000+000 20 39
0,0000000+000 20 40	0,0000000+000 20 41	0,0000000+000 20 42	0,0000000+000 20 43	0,0000000+000 20 44
0,0000000+000 20 45	0,0000000+000 20 46	0,0000000+000 20 47		

SCATTERING FROM GROUP 21

0,0000000+000 21 21	0,0000000+000 21 22	0,0000000+000 21 23	0,0000000+000 21 24	0,0000000+000 21 25
0,0000000+000 21 26	0,0000000+000 21 27	0,0000000+000 21 28	0,0000000+000 21 29	0,0000000+000 21 30
0,0000000+000 21 31	0,0000000+000 21 32	0,0000000+000 21 33	0,0000000+000 21 34	0,0000000+000 21 35
0,0000000+000 21 36	0,0000000+000 21 37	0,0000000+000 21 38	0,0000000+000 21 39	0,0000000+000 21 40
0,0000000+000 21 41	0,0000000+000 21 42	0,0000000+000 21 43	0,0000000+000 21 44	0,0000000+000 21 45

0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38

0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,000000+000 39 42 0,0000000+000 39 43

0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO, 9 WAS 4.036+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 5.000-003SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.700-002SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

1,4912968+003 1 1 8,0429010-003 1 2 2,7177927-002 1 3 6,3454904-002 1 4 1,1067028-001 1 5
1,5341612+001 1 6 1,7757139-001 1 7 1,7842221-001 1 8 1,6048354-001 1 9 1,3237320-001 1 10
1,0204281+001 1 11 7,4613996-002 1 12 5,2354500-002 1 13 3,5573182-002 1 14 2,3572334-002 1 15
1,5317731+002 1 16 9,8032722-003 1 17 6,2000170-003 1 18 3,8850661-003 1 19 2,4169906-003 1 20
1,4952509+003 1 21 9,2098903-004 1 22 5,6534809-004 1 23 3,4611898-004 1 24 2,1146466-004 1 25
1,2898860+004 1 26 0,0000000+000 1 27 0,0000000+000 1 28 0,0000000+000 1 29 0,0000000+000 1 30
0,0000000+000 1 31 0,0000000+000 1 32 0,0000000+000 1 33 0,0000000+000 1 34 0,0000000+000 1 35
0,0000000+000 1 36 0,0000000+000 1 37 0,0000000+000 1 38 0,0000000+000 1 39 0,0000000+000 1 40
0,0000000+000 1 41 0,0000000+000 1 42 0,0000000+000 1 43 0,0000000+000 1 44 0,0000000+000 1 45

0,0000000+000	1	46	0,0000000+000	1	47						

SCATTERING FROM GROUP 2

8,1292004+003	2	2	2,7469543-002	2	3	6,4135768-002	2	4	1,1185776+001	2	5	1,5506226-001	2	6
1,7947671+001	2	7	1,8033666-001	2	8	1,6224551-001	2	9	1,3379355+001	2	10	1,0313772-001	2	11
7,5414597+002	2	12	5,2916258-002	2	13	3,5954879-002	2	14	2,3825263+002	2	15	1,5482088-002	2	16
9,9084602+003	2	17	6,2665425+003	2	18	3,9267524+003	2	19	2,4429247+003	2	20	1,5112947-003	2	21
9,3087115+004	2	22	5,7141421+004	2	23	3,4983283+004	2	24	2,1373365+004	2	25	1,3037263+004	2	26
0,0000000+000	2	27	0,0000000+000	2	28	0,0000000+000	2	29	0,0000000+000	2	30	0,0000000+000	2	31
0,0000000+000	2	32	0,0000000+000	2	33	0,0000000+000	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

2,7539644+002	3	3	6,4299440-002	3	4	1,1214321-001	3	5	1,5545797+001	3	6	1,7993473+001	3	7
1,8079687+001	3	8	1,6261945-001	3	9	1,3413498+001	3	10	1,3400925+001	3	11	7,5607052-002	3	12
5,3051298+002	3	13	3,6046634-002	3	14	2,3886064-002	3	15	1,5521598+002	3	16	9,9337463-003	3	17
6,2825345+003	3	18	3,9367732+003	3	19	2,4491590+003	3	20	1,5151515+003	3	21	9,3324669+004	3	22
5,7287249+004	3	23	3,5072551-004	3	24	2,1427909+004	3	25	1,3070534+004	3	26	0,0000000+000	3	27
0,0000000+000	3	28	0,0000000+000	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0,0000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

1,1872344+002	4	4	3,2682243-002	4	5	6,4904961-002	4	6	9,9652615+002	4	7	1,2497593+001	4	8
1,3372270+001	4	9	1,2634442-001	4	10	1,0830104-001	4	11	8,6033123+002	4	12	6,4400804-002	4	13
4,6022866+002	4	14	3,1720611-002	4	15	2,1254685-002	4	16	1,3932013+002	4	17	8,9769018-003	4	18
5,7073700+003	4	19	3,5910706-003	4	20	2,2412437+003	4	21	1,3899842+003	4	22	8,5781340+004	4	23
5,2736415+004	4	24	3,2324456-004	4	25	1,9767045-004	4	26	1,2566057+004	4	27	7,3548889-005	4	28
0,0000000+000	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0,0000000+000	4	32	0,0000000+000	4	33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0,0000000+000	4	37	0,0000000+000	4	38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0,0000000+000	4	42	0,0000000+000	4	43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0,0000000+000	4	47			

SCATTERING FROM GROUP 5

0,0000000+000	5	5	0,0000000+000	5	6	0,0000000+000	5	7	0,0000000+000	5	8	0,0000000+000	5	9
0,0000000+000	5	10	0,0000000+000	5	11	0,0000000+000	5	12	0,0000000+000	5	13	0,0000000+000	5	14
0,0000000+000	5	15	0,0000000+000	5	16	0,0000000+000	5	17	0,0000000+000	5	18	0,0000000+000	5	19
0,0000000+000	5	20	0,0000000+000	5	21	0,0000000+000	5	22	0,0000000+000	5	23	0,0000000+000	5	24
0,0000000+000	5	25	0,0000000+000	5	26	0,0000000+000	5	27	0,0000000+000	5	28	0,0000000+000	5	29
0,0000000+000	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0,0000000+000	5	33	0,0000000+000	5	34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0,0000000+000	5	38	0,0000000+000	5	39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0,0000000+000	5	43	0,0000000+000	5	44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47						

SCATTERING FROM GROUP 6

0,0000000+000	6	6	0,0000000+000	6	7	0,0000000+000	6	8	0,0000000+000	6	9	0,0000000+000	6	10
0,0000000+000	6	11	0,0000000+000	6	12	0,0000000+000	6	13	0,0000000+000	6	14	0,0000000+000	6	15
0,0000000+000	6	16	0,0000000+000	6	17	0,0000000+000	6	18	0,0000000+000	6	19	0,0000000+000	6	20
0,0000000+000	6	21	0,0000000+000	6	22	0,0000000+000	6	23	0,0000000+000	6	24	0,0000000+000	6	25
0,0000000+000	6	26	0,0000000+000	6	27	0,0000000+000	6	28	0,0000000+000	6	29	0,0000000+000	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0,0000000+000	6	39	0,0000000+000	6	40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0,0000000+000	6	44	0,0000000+000	6	45
0,0000000+000	6	46	0,0000000+000	6	47									

SCATTERING FROM GROUP 7

0,0000000+000	7 7	0,0000000+000	7 8	0,0000000+000	7 9	0,0000000+000	7 10	0,0000000+000	7 11		
0,0000000+000	7 12	0,0000000+000	7 13	0,0000000+000	7 14	0,0000000+000	7 15	0,0000000+000	7 16		
0,0000000+000	7 17	0,0000000+000	7 18	0,0000000+000	7 19	0,0000000+000	7 20	0,0000000+000	7 21		
0,0000000+000	7 22	0,0000000+000	7 23	0,0000000+000	7 24	0,0000000+000	7 25	0,0000000+000	7 26		
0,0000000+000	7 27	0,0000000+000	7 28	0,0000000+000	7 29	0,0000000+000	7 30	0,0000000+000	7 31		
0,0000000+000	7 32	0,0000000+000	7 33	0,0000000+000	7 34	0,0000000+000	7 35	0,0000000+000	7 36		
0,0000000+000	7 37	0,0000000+000	7 38	0,0000000+000	7 39	0,0000000+000	7 40	0,0000000+000	7 41		
0,0000000+000	7 42	0,0000000+000	7 43	0,0000000+000	7 44	0,0000000+000	7 45	0,0000000+000	7 46		
0,0000000+000	7 47										

SCATTERING FROM GROUP 8

0,0000000+000	8 8	0,0000000+000	8 9	0,0000000+000	8 10	0,0000000+000	8 11	0,0000000+000	8 12		
0,0000000+000	8 13	0,0000000+000	8 14	0,0000000+000	8 15	0,0000000+000	8 16	0,0000000+000	8 17		
0,0000000+000	8 18	0,0000000+000	8 19	0,0000000+000	8 20	0,0000000+000	8 21	0,0000000+000	8 22		
0,0000000+000	8 23	0,0000000+000	8 24	0,0000000+000	8 25	0,0000000+000	8 26	0,0000000+000	8 27		
0,0000000+000	8 28	0,0000000+000	8 29	0,0000000+000	8 30	0,0000000+000	8 31	0,0000000+000	8 32		
0,0000000+000	8 33	0,0000000+000	8 34	0,0000000+000	8 35	0,0000000+000	8 36	0,0000000+000	8 37		
0,0000000+000	8 38	0,0000000+000	8 39	0,0000000+000	8 40	0,0000000+000	8 41	0,0000000+000	8 42		
0,0000000+000	8 43	0,0000000+000	8 44	0,0000000+000	8 45	0,0000000+000	8 46	0,0000000+000	8 47		

SCATTERING FROM GROUP 9

0,0000000+000	9 9	0,0000000+000	9 10	0,0000000+000	9 11	0,0000000+000	9 12	0,0000000+000	9 13		
0,0000000+000	9 14	0,0000000+000	9 15	0,0000000+000	9 16	0,0000000+000	9 17	0,0000000+000	9 18		
0,0000000+000	9 19	0,0000000+000	9 20	0,0000000+000	9 21	0,0000000+000	9 22	0,0000000+000	9 23		
0,0000000+000	9 24	0,0000000+000	9 25	0,0000000+000	9 26	0,0000000+000	9 27	0,0000000+000	9 28		
0,0000000+000	9 29	0,0000000+000	9 30	0,0000000+000	9 31	0,0000000+000	9 32	0,0000000+000	9 33		
0,0000000+000	9 34	0,0000000+000	9 35	0,0000000+000	9 36	0,0000000+000	9 37	0,0000000+000	9 38		
0,0000000+000	9 39	0,0000000+000	9 40	0,0000000+000	9 41	0,0000000+000	9 42	0,0000000+000	9 43		
0,0000000+000	9 44	0,0000000+000	9 45	0,0000000+000	9 46	0,0000000+000	9 47				

SCATTERING FROM GROUP 10

0,0000000+000	10 10	0,0000000+000	10 11	0,0000000+000	10 12	0,0000000+000	10 13	0,0000000+000	10 14		
0,0000000+000	10 15	0,0000000+000	10 16	0,0000000+000	10 17	0,0000000+000	10 18	0,0000000+000	10 19		
0,0000000+000	10 20	0,0000000+000	10 21	0,0000000+000	10 22	0,0000000+000	10 23	0,0000000+000	10 24		
0,0000000+000	10 25	0,0000000+000	10 26	0,0000000+000	10 27	0,0000000+000	10 28	0,0000000+000	10 29		
0,0000000+000	10 30	0,0000000+000	10 31	0,0000000+000	10 32	0,0000000+000	10 33	0,0000000+000	10 34		
0,0000000+000	10 35	0,0000000+000	10 36	0,0000000+000	10 37	0,0000000+000	10 38	0,0000000+000	10 39		
0,0000000+000	10 40	0,0000000+000	10 41	0,0000000+000	10 42	0,0000000+000	10 43	0,0000000+000	10 44		
0,0000000+000	10 45	0,0000000+000	10 46	0,0000000+000	10 47						

SCATTERING FROM GROUP 11

0,0000000+000	11 11	0,0000000+000	11 12	0,0000000+000	11 13	0,0000000+000	11 14	0,0000000+000	11 15		
0,0000000+000	11 16	0,0000000+000	11 17	0,0000000+000	11 18	0,0000000+000	11 19	0,0000000+000	11 20		
0,0000000+000	11 21	0,0000000+000	11 22	0,0000000+000	11 23	0,0000000+000	11 24	0,0000000+000	11 25		
0,0000000+000	11 26	0,0000000+000	11 27	0,0000000+000	11 28	0,0000000+000	11 29	0,0000000+000	11 30		
0,0000000+000	11 31	0,0000000+000	11 32	0,0000000+000	11 33	0,0000000+000	11 34	0,0000000+000	11 35		
0,0000000+000	11 36	0,0000000+000	11 37	0,0000000+000	11 38	0,0000000+000	11 39	0,0000000+000	11 40		
0,0000000+000	11 41	0,0000000+000	11 42	0,0000000+000	11 43	0,0000000+000	11 44	0,0000000+000	11 45		
0,0000000+000	11 46	0,0000000+000	11 47								

SCATTERING FROM GROUP 12

0,0000000+000	12 12	0,0000000+000	12 13	0,0000000+000	12 14	0,0000000+000	12 15	0,0000000+000	12 16		
0,0000000+000	12 17	0,0000000+000	12 18	0,0000000+000	12 19	0,0000000+000	12 20	0,0000000+000	12 21		
0,0000000+000	12 22	0,0000000+000	12 23	0,0000000+000	12 24	0,0000000+000	12 25	0,0000000+000	12 26		

0,0000000+000 12 27 0,0000000+000 12 28 0,0000000+000 12 29 0,000000+000 12 30 0,0000000+000 12 31
0,0000000+000 12 32 0,0000000+000 12 33 0,0000000+000 12 34 0,000000+000 12 35 0,0000000+000 12 36
0,0000000+000 12 37 0,0000000+000 12 38 0,0000000+000 12 39 0,000000+000 12 40 0,0000000+000 12 41
0,0000000+000 12 42 0,0000000+000 12 43 0,0000000+000 12 44 0,000000+000 12 45 0,0000000+000 12 46
0,0000000+000 12 47

SCATTERING FROM GROUP 13

0,0000000+000 13 13 0,0000000+000 13 14 0,0000000+000 13 15 0,000000+000 13 16 0,0000000+000 13 17
0,0000000+000 13 18 0,0000000+000 13 19 0,0000000+000 13 20 0,000000+000 13 21 0,0000000+000 13 22
0,0000000+000 13 23 0,0000000+000 13 24 0,0000000+000 13 25 0,000000+000 13 26 0,0000000+000 13 27
0,0000000+000 13 28 0,0000000+000 13 29 0,0000000+000 13 30 0,000000+000 13 31 0,0000000+000 13 32
0,0000000+000 13 33 0,0000000+000 13 34 0,0000000+000 13 35 0,000000+000 13 36 0,0000000+000 13 37
0,0000000+000 13 38 0,0000000+000 13 39 0,0000000+000 13 40 0,000000+000 13 41 0,0000000+000 13 42
0,0000000+000 13 43 0,0000000+000 13 44 0,0000000+000 13 45 0,000000+000 13 46 0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,000000+000 15 28 0,0000000+000 15 29
0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,000000+000 18 36 0,0000000+000 18 37

0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26	0,0000000+000 26 27	0,0000000+000 26 28	0,0000000+000 26 29	0,0000000+000 26 30
0,0000000+000 26 31	0,0000000+000 26 32	0,0000000+000 26 33	0,0000000+000 26 34	0,0000000+000 26 35
0,0000000+000 26 36	0,0000000+000 26 37	0,0000000+000 26 38	0,0000000+000 26 39	0,0000000+000 26 40
0,0000000+000 26 41	0,0000000+000 26 42	0,0000000+000 26 43	0,0000000+000 26 44	0,0000000+000 26 45
0,0000000+000 26 46	0,0000000+000 26 47			

SCATTERING FROM GROUP 27

0,0000000+000 27 27	0,0000000+000 27 28	0,0000000+000 27 29	0,0000000+000 27 30	0,0000000+000 27 31
0,0000000+000 27 32	0,0000000+000 27 33	0,0000000+000 27 34	0,0000000+000 27 35	0,0000000+000 27 36
0,0000000+000 27 37	0,0000000+000 27 38	0,0000000+000 27 39	0,0000000+000 27 40	0,0000000+000 27 41
0,0000000+000 27 42	0,0000000+000 27 43	0,0000000+000 27 44	0,0000000+000 27 45	0,0000000+000 27 46
0,0000000+000 27 47				

SCATTERING FROM GROUP 28

0,0000000+000 28 28	0,0000000+000 28 29	0,0000000+000 28 30	0,0000000+000 28 31	0,0000000+000 28 32
0,0000000+000 28 33	0,0000000+000 28 34	0,0000000+000 28 35	0,0000000+000 28 36	0,0000000+000 28 37
0,0000000+000 28 38	0,0000000+000 28 39	0,0000000+000 28 40	0,0000000+000 28 41	0,0000000+000 28 42
0,0000000+000 28 43	0,0000000+000 28 44	0,0000000+000 28 45	0,0000000+000 28 46	0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29	0,0000000+000 29 30	0,0000000+000 29 31	0,0000000+000 29 32	0,0000000+000 29 33
0,0000000+000 29 34	0,0000000+000 29 35	0,0000000+000 29 36	0,0000000+000 29 37	0,0000000+000 29 38
0,0000000+000 29 39	0,0000000+000 29 40	0,0000000+000 29 41	0,0000000+000 29 42	0,0000000+000 29 43
0,0000000+000 29 44	0,0000000+000 29 45	0,0000000+000 29 46	0,0000000+000 29 47	

SCATTERING FROM GROUP 30

0,0000000+000 30 30	0,0000000+000 30 31	0,0000000+000 30 32	0,0000000+000 30 33	0,0000000+000 30 34
0,0000000+000 30 35	0,0000000+000 30 36	0,0000000+000 30 37	0,0000000+000 30 38	0,0000000+000 30 39
0,0000000+000 30 40	0,0000000+000 30 41	0,0000000+000 30 42	0,0000000+000 30 43	0,0000000+000 30 44
0,0000000+000 30 45	0,0000000+000 30 46	0,0000000+000 30 47		

SCATTERING FROM GROUP 31

0,0000000+000 31 31	0,0000000+000 31 32	0,0000000+000 31 33	0,0000000+000 31 34	0,0000000+000 31 35
0,0000000+000 31 36	0,0000000+000 31 37	0,0000000+000 31 38	0,0000000+000 31 39	0,0000000+000 31 40
0,0000000+000 31 41	0,0000000+000 31 42	0,0000000+000 31 43	0,0000000+000 31 44	0,0000000+000 31 45
0,0000000+000 31 46	0,0000000+000 31 47			

SCATTERING FROM GROUP 32

0,0000000+000 32 32	0,0000000+000 32 33	0,0000000+000 32 34	0,0000000+000 32 35	0,0000000+000 32 36
0,0000000+000 32 37	0,0000000+000 32 38	0,0000000+000 32 39	0,0000000+000 32 40	0,0000000+000 32 41
0,0000000+000 32 42	0,0000000+000 32 43	0,0000000+000 32 44	0,0000000+000 32 45	0,0000000+000 32 46
0,0000000+000 32 47				

SCATTERING FROM GROUP 33

0,0000000+000 33 33	0,0000000+000 33 34	0,0000000+000 33 35	0,0000000+000 33 36	0,0000000+000 33 37
0,0000000+000 33 38	0,0000000+000 33 39	0,0000000+000 33 40	0,0000000+000 33 41	0,0000000+000 33 42
0,0000000+000 33 43	0,0000000+000 33 44	0,0000000+000 33 45	0,0000000+000 33 46	0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34	0,0000000+000 34 35	0,0000000+000 34 36	0,0000000+000 34 37	0,0000000+000 34 38
0,0000000+000 34 39	0,0000000+000 34 40	0,0000000+000 34 41	0,0000000+000 34 42	0,0000000+000 34 43

0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO, 10 WAS 4,069+000SECONDS

N-2N SCATTERING

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,300-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,000-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,900-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,000-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,100-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,900-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,600-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,600-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,600-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,400-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,400-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,400-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,400-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,200-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,300-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.200-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.100-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.100-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.000-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.100-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2.000-002SECONDS

MATERIAL U 238

DISCRETE LEVEL SCATTERING

SCATTERING FROM GROUP 1

0,0000000+000	1	1	0,0000000+000	1	2	0,0000000+000	1	3	0,0000000+000	1	4	0,0000000+000	1	5
0,0000000+000	1	6	0,0000000+000	1	7	0,0000000+000	1	8	0,0000000+000	1	9	0,0000000+000	1	10
0,0000000+000	1	11	0,0000000+000	1	12	0,0000000+000	1	13	0,0000000+000	1	14	0,0000000+000	1	15
0,0000000+000	1	16	0,0000000+000	1	17	0,0000000+000	1	18	0,0000000+000	1	19	0,0000000+000	1	20
0,0000000+000	1	21	0,0000000+000	1	22	0,0000000+000	1	23	0,0000000+000	1	24	0,0000000+000	1	25
0,0000000+000	1	26	0,0000000+000	1	27	0,0000000+000	1	28	0,0000000+000	1	29	0,0000000+000	1	30
0,0000000+000	1	31	0,0000000+000	1	32	0,0000000+000	1	33	0,0000000+000	1	34	0,0000000+000	1	35
0,0000000+000	1	36	0,0000000+000	1	37	0,0000000+000	1	38	0,0000000+000	1	39	0,0000000+000	1	40
0,0000000+000	1	41	0,0000000+000	1	42	0,0000000+000	1	43	0,0000000+000	1	44	0,0000000+000	1	45
0,0000000+000	1	46	0,0000000+000	1	47									

SCATTERING FROM GROUP 2

0,0000000+000	2	2	0,0000000+000	2	3	0,0000000+000	2	4	0,0000000+000	2	5	0,0000000+000	2	6
0,0000000+000	2	7	0,0000000+000	2	8	0,0000000+000	2	9	0,0000000+000	2	10	0,0000000+000	2	11
0,0000000+000	2	12	0,0000000+000	2	13	0,0000000+000	2	14	0,0000000+000	2	15	0,0000000+000	2	16
0,0000000+000	2	17	0,0000000+000	2	18	0,0000000+000	2	19	0,0000000+000	2	20	0,0000000+000	2	21
0,0000000+000	2	22	0,0000000+000	2	23	0,0000000+000	2	24	0,0000000+000	2	25	0,0000000+000	2	26
0,0000000+000	2	27	0,0000000+000	2	28	0,0000000+000	2	29	0,0000000+000	2	30	0,0000000+000	2	31
0,0000000+000	2	32	0,0000000+000	2	33	0,0000000+000	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

0,0000000+000	3	3	0,0000000+000	3	4	0,0000000+000	3	5	0,0000000+000	3	6	0,0000000+000	3	7
0,0000000+000	3	8	0,0000000+000	3	9	0,0000000+000	3	10	0,0000000+000	3	11	0,0000000+000	3	12
0,0000000+000	3	13	0,0000000+000	3	14	0,0000000+000	3	15	0,0000000+000	3	16	0,0000000+000	3	17
0,0000000+000	3	18	0,0000000+000	3	19	0,0000000+000	3	20	0,0000000+000	3	21	0,0000000+000	3	22
0,0000000+000	3	23	0,0000000+000	3	24	0,0000000+000	3	25	0,0000000+000	3	26	0,0000000+000	3	27
0,0000000+000	3	28	0,0000000+000	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42

0,0000000+000	3 43	0,0000000+000	3 44	0,0000000+000	3 45	0,0000000+000	3 46	0,0000000+000	3 47		

SCATTERING FROM GROUP 4

0,0000000+000	4 4	0,0000000+000	4 5	0,0000000+000	4 6	0,0000000+000	4 7	0,0000000+000	4 8		
0,0000000+000	4 9	0,0000000+000	4 10	0,0000000+000	4 11	0,0000000+000	4 12	0,0000000+000	4 13		
0,0000000+000	4 14	0,0000000+000	4 15	0,0000000+000	4 16	0,0000000+000	4 17	0,0000000+000	4 18		
0,0000000+000	4 19	0,0000000+000	4 20	0,0000000+000	4 21	0,0000000+000	4 22	0,0000000+000	4 23		
0,0000000+000	4 24	0,0000000+000	4 25	0,0000000+000	4 26	0,0000000+000	4 27	0,0000000+000	4 28		
0,0000000+000	4 29	0,0000000+000	4 30	0,0000000+000	4 31	0,0000000+000	4 32	0,0000000+000	4 33		
0,0000000+000	4 34	0,0000000+000	4 35	0,0000000+000	4 36	0,0000000+000	4 37	0,0000000+000	4 38		
0,0000000+000	4 39	0,0000000+000	4 40	0,0000000+000	4 41	0,0000000+000	4 42	0,0000000+000	4 43		
0,0000000+000	4 44	0,0000000+000	4 45	0,0000000+000	4 46	0,0000000+000	4 47				

SCATTERING FROM GROUP 5

0,0000000+000	5 5	0,0000000+000	5 6	0,0000000+000	5 7	0,0000000+000	5 8	0,0000000+000	5 9		
0,0000000+000	5 10	0,0000000+000	5 11	0,0000000+000	5 12	0,0000000+000	5 13	0,0000000+000	5 14		
0,0000000+000	5 15	0,0000000+000	5 16	0,0000000+000	5 17	0,0000000+000	5 18	0,0000000+000	5 19		
0,0000000+000	5 20	0,0000000+000	5 21	0,0000000+000	5 22	0,0000000+000	5 23	0,0000000+000	5 24		
0,0000000+000	5 25	0,0000000+000	5 26	0,0000000+000	5 27	0,0000000+000	5 28	0,0000000+000	5 29		
0,0000000+000	5 30	0,0000000+000	5 31	0,0000000+000	5 32	0,0000000+000	5 33	0,0000000+000	5 34		
0,0000000+000	5 35	0,0000000+000	5 36	0,0000000+000	5 37	0,0000000+000	5 38	0,0000000+000	5 39		
0,0000000+000	5 40	0,0000000+000	5 41	0,0000000+000	5 42	0,0000000+000	5 43	0,0000000+000	5 44		
0,0000000+000	5 45	0,0000000+000	5 46	0,0000000+000	5 47						

SCATTERING FROM GROUP 6

0,0000000+000	6 6	0,0000000+000	6 7	0,0000000+000	6 8	9,5343601+004	6 9	1,0291791+004	6 10		
1,2065085+003	6 11	0,0000000+000	6 12	4,2115866+004	6 13	0,0000000+000	6 14	0,0000000+000	6 15		
0,0000000+000	6 16	0,0000000+000	6 17	0,0000000+000	6 18	0,0000000+000	6 19	0,0000000+000	6 20		
0,0000000+000	6 21	0,0000000+000	6 22	0,0000000+000	6 23	0,0000000+000	6 24	0,0000000+000	6 25		
0,0000000+000	6 26	0,0000000+000	6 27	0,0000000+000	6 28	0,0000000+000	6 29	0,0000000+000	6 30		
0,0000000+000	6 31	0,0000000+000	6 32	0,0000000+000	6 33	0,0000000+000	6 34	0,0000000+000	6 35		
0,0000000+000	6 36	0,0000000+000	6 37	0,0000000+000	6 38	0,0000000+000	6 39	0,0000000+000	6 40		
0,0000000+000	6 41	0,0000000+000	6 42	0,0000000+000	6 43	0,0000000+000	6 44	0,0000000+000	6 45		
0,0000000+000	6 46	0,0000000+000	6 47								

SCATTERING FROM GROUP 7

2,1916740+003	7 7	2,9843508-002	7 8	1,7815189+001	7 9	4,8817334+001	7 10	4,4227381+001	7 11		
3,6052255+001	7 12	3,0324119+001	7 13	2,1399041+001	7 14	1,3119268+001	7 15	2,9128382-002	7 16		
1,4669369+002	7 17	7,8125562-003	7 18	4,2426709+003	7 19	2,4375569+003	7 20	1,3958058-003	7 21		
8,0314042+004	7 22	4,8619772-004	7 23	2,9489385-004	7 24	1,7886214+004	7 25	1,0848538-004	7 26		
0,0000000+000	7 27	0,0000000+000	7 28	0,0000000+000	7 29	0,0000000+000	7 30	0,0000000+000	7 31		
0,0000000+000	7 32	0,0000000+000	7 33	0,0000000+000	7 34	0,0000000+000	7 35	0,0000000+000	7 36		
0,0000000+000	7 37	0,0000000+000	7 38	0,0000000+000	7 39	0,0000000+000	7 40	0,0000000+000	7 41		
0,0000000+000	7 42	0,0000000+000	7 43	0,0000000+000	7 44	0,0000000+000	7 45	0,0000000+000	7 46		
0,0000000+000	7 47										

SCATTERING FROM GROUP 8

1,4075867+001	8 8	1,9014766-001	8 9	1,9440377+001	8 10	4,7615301+001	8 11	6,2667317-001	8 12		
6,0558123+001	8 13	3,8669095-001	8 14	2,2429424+001	8 15	1,6417819+001	8 16	7,9848257-002	8 17		
3,8960313+002	8 18	1,9305158-002	8 19	9,3434933-003	8 20	4,8915968-003	8 21	2,7284382-003	8 22		
1,4657663+003	8 23	8,7912337-004	8 24	3,1704966-004	8 25	1,9176995+004	8 26	0,0000000+000	8 27		
0,0000000+000	8 28	0,0000000+000	8 29	0,0000000+000	8 30	0,0000000+000	8 31	0,0000000+000	8 32		
0,0000000+000	8 33	0,0000000+000	8 34	0,0000000+000	8 35	0,0000000+000	8 36	0,0000000+000	8 37		
0,0000000+000	8 38	0,0000000+000	8 39	0,0000000+000	8 40	0,0000000+000	8 41	0,0000000+000	8 42		
0,0000000+000	8 43	0,0000000+000	8 44	0,0000000+000	8 45	0,0000000+000	8 46	0,0000000+000	8 47		

SCATTERING FROM GROUP 9

6,1203657*001	9	9	3,8869936-001	9	10	5,8729919-002	9	11	2,2407676*001	9	12	2,7027204*001	9	13
2,6808526*001	9	14	2,4777513*001	9	15	2,1581710*001	9	16	1,5462425*001	9	17	1,0014230*001	9	18
5,2992585*002	9	19	2,7282082-002	9	20	1,6627346*002	9	21	9,3464046*003	9	22	5,5882819*003	9	23
3,4249588*003	9	24	1,8760550-003	9	25	8,8648751-004	9	26	4,5181424*004	9	27	2,7333723*004	9	28
0,0000000+000	9	29	0,0000000+000	9	30	0,0000000+000	9	31	0, 000000+000	9	32	0,0000000+000	9	33
0,0000000+000	9	34	0,0000000+000	9	35	0,0000000+000	9	36	0, 000000+000	9	37	0,0000000+000	9	38
0,0000000+000	9	39	0,0000000+000	9	40	0,0000000+000	9	41	0, 000000+000	9	42	0,0000000+000	9	43
0,0000000+000	9	44	0,0000000+000	9	45	0,0000000+000	9	46	0, 000000+000	9	47			

SCATTERING FROM GROUP 10

9,5583877*001	10	10	6,0057334*001	10	11	8,0443202*002	10	12	0,0000000+000	10	13	1,2505037-001	10	14
1,6083670*001	10	15	1,1991854*001	10	16	8,1450389*002	10	17	2,9600988*002	10	18	3,0950500*002	10	19
1,9080747*002	10	20	1,1939713*002	10	21	8,0645144*003	10	22	5,2573172*003	10	23	3,1775048*003	10	24
1,8144804*003	10	25	1,0758857-003	10	26	5,3636769*004	10	27	3,2009936*004	10	28	1,0469017*004	10	29
0,0000000+000	10	30	0,0000000+000	10	31	0,0000000+000	10	32	0, 000000+000	10	33	0,0000000+000	10	34
0,0000000+000	10	35	0,0000000+000	10	36	0,0000000+000	10	37	0, 000000+000	10	38	0,0000000+000	10	39
0,0000000+000	10	40	0,0000000+000	10	41	0,0000000+000	10	42	0, 000000+000	10	43	0,0000000+000	10	44
0,0000000+000	10	45	0,0000000+000	10	46	0,0000000+000	10	47						

SCATTERING FROM GROUP 11

1,0093424+000	11	11	6,4156690-001	11	12	1,0035262-001	11	13	3,9691367-002	11	14	0,0000000+000	11	15
0,0000000+000	11	16	0,0000000+000	11	17	3,3150901*002	11	18	2,3519641*002	11	19	2,6739889-002	11	20
1,6967698*002	11	21	1,0895765-002	11	22	6,9568486*003	11	23	4,4264222*003	11	24	2,7326859*003	11	25
1,6817655*003	11	26	1,0400466*003	11	27	6,4644568*004	11	28	4, 321631*004	11	29	1,5639876*004	11	30
0,0000000+000	11	31	0,0000000+000	11	32	0,0000000+000	11	33	0, 000000+000	11	34	0,0000000+000	11	35
0,0000000+000	11	36	0,0000000+000	11	37	0,0000000+000	11	38	0, 000000+000	11	39	0,0000000+000	11	40
0,0000000+000	11	41	0,0000000+000	11	42	0,0000000+000	11	43	0, 000000+000	11	44	0,0000000+000	11	45
0,0000000+000	11	46	0,0000000+000	11	47									

SCATTERING FROM GROUP 12

9,7060215*001	12	12	6,8383303-001	12	13	9,4453811*002	12	14	4,3849792*002	12	15	2,4615936*002	12	16
0,0000000+000	12	17	0,0000000+000	12	18	0,0000000+000	12	19	0, 000000+000	12	20	0,0000000+000	12	21
0,0000000+000	12	22	0,0000000+000	12	23	0,0000000+000	12	24	0, 000000+000	12	25	0,0000000+000	12	26
0,0000000+000	12	27	0,0000000+000	12	28	0,0000000+000	12	29	0, 000000+000	12	30	0,0000000+000	12	31
0,0000000+000	12	32	0,0000000+000	12	33	0,0000000+000	12	34	0, 000000+000	12	35	0,0000000+000	12	36
0,0000000+000	12	37	0,0000000+000	12	38	0,0000000+000	12	39	0, 000000+000	12	40	0,0000000+000	12	41
0,0000000+000	12	42	0,0000000+000	12	43	0,0000000+000	12	44	0, 000000+000	12	45	0,0000000+000	12	46
0,0000000+000	12	47												

SCATTERING FROM GROUP 13

8,2687461*001	13	13	6,1453626-001	13	14	1,2402444*001	13	15	2,7444614*003	13	16	2,0847226*002	13	17
1,2635224*002	13	18	7,5775885-003	13	19	2,2126921*003	13	20	0, 000000+000	13	21	0,0000000+000	13	22
0,0000000+000	13	23	0,0000000+000	13	24	0,0000000+000	13	25	0, 000000+000	13	26	0,0000000+000	13	27
0,0000000+000	13	28	0,0000000+000	13	29	0,0000000+000	13	30	0, 000000+000	13	31	0,0000000+000	13	32
0,0000000+000	13	33	0,0000000+000	13	34	0,0000000+000	13	35	0, 000000+000	13	36	0,0000000+000	13	37
0,0000000+000	13	38	0,0000000+000	13	39	0,0000000+000	13	40	0, 000000+000	13	41	0,0000000+000	13	42
0,0000000+000	13	43	0,0000000+000	13	44	0,0000000+000	13	45	0, 000000+000	13	46	0,0000000+000	13	47

SCATTERING FROM GROUP 14

5,5114531*001	14	14	5,8817805-001	14	15	1,1046800*001	14	16	5,2536413*002	14	17	0,0000000+000	14	18
0,0000000+000	14	19	2,9512893-003	14	20	3,5593510*003	14	21	2,2055094*003	14	22	1,3312952-003	14	23
7,9592690*004	14	24	4,6353067-004	14	25	2,6584871*004	14	26	1,4933218*004	14	27	0,0000000+000	14	28
0,0000000+000	14	29	0,0000000+000	14	30	0,0000000+000	14	31	0, 000000+000	14	32	0,0000000+000	14	33
0,0000000+000	14	34	0,0000000+000	14	35	0,0000000+000	14	36	0, 000000+000	14	37	0,0000000+000	14	38
0,0000000+000	14	39	0,0000000+000	14	40	0,0000000+000	14	41	0, 000000+000	14	42	0,0000000+000	14	43
0,0000000+000	14	44	0,0000000+000	14	45	0,0000000+000	14	46	0, 000000+000	14	47			

SCATTERING FROM GROUP 15

3,6152240*001 15 15	7,1919673-001 15 16	2,3719374*002 15 17	5,8312528-002 15 18	3,6682046-002 15 19
0,0000000+000 15 20	0,0000000*000 15 21	0,0000000*000 15 22	0,0000000*000 15 23	0,0000000*000 15 24
0,0000000+000 15 25	0,0000000*000 15 26	0,0000000*000 15 27	0,0000000*000 15 28	0,0000000*000 15 29
0,0000000+000 15 30	0,0000000*000 15 31	0,0000000*000 15 32	0,0000000*000 15 33	0,0000000*000 15 34
0,0000000+000 15 35	0,0000000*000 15 36	0,0000000*000 15 37	0,0000000*000 15 38	0,0000000*000 15 39
0,0000000+000 15 40	0,0000000*000 15 41	0,0000000*000 15 42	0,0000000*000 15 43	0,0000000*000 15 44
0,0000000+000 15 45	0,0000000*000 15 46	0,0000000*000 15 47		

SCATTERING FROM GROUP 16

1,4870483*001 16 16	8,0440790-001 16 17	8,0283696-002 16 18	1,1731586-003 16 19	3,0365527-002 16 20
1,8760303*002 16 21	1,1603977-002 16 22	4,7384607-003 16 23	0,0000000*000 16 24	0,0000000*000 16 25
0,0000000+000 16 26	0,0000000*000 16 27	0,0000000*000 16 28	0,0000000*000 16 29	0,0000000*000 16 30
0,0000000+000 16 31	0,0000000*000 16 32	0,0000000*000 16 33	0,0000000*000 16 34	0,0000000*000 16 35
0,0000000+000 16 36	0,0000000*000 16 37	0,0000000*000 16 38	0,0000000*000 16 39	0,0000000*000 16 40
0,0000000+000 16 41	0,0000000*000 16 42	0,0000000*000 16 43	0,0000000*000 16 44	0,0000000*000 16 45
0,0000000+000 16 46	0,0000000*000 16 47			

SCATTERING FROM GROUP 17

0,0000000+000 17 17	6,4437944-001 17 18	2,8703801-001 17 19	0,0000000*000 17 20	0,0000000*000 17 21
0,0000000+000 17 22	3,1551588-003 17 23	5,6446426-003 17 24	3,3905036*003 17 25	2,0306308-003 17 26
1,2116329*003 17 27	7,2853323-004 17 28	4,4187775-004 17 29	2,6801240*004 17 30	1,6255773-004 17 31
0,0000000+000 17 32	0,0000000*000 17 33	0,0000000*000 17 34	0,0000000*000 17 35	0,0000000*000 17 36
0,0000000+000 17 37	0,0000000*000 17 38	0,0000000*000 17 39	0,0000000*000 17 40	0,0000000*000 17 41
0,0000000+000 17 42	0,0000000*000 17 43	0,0000000*000 17 44	0,0000000*000 17 45	0,0000000*000 17 46
0,0000000+000 17 47				

SCATTERING FROM GROUP 18

0,0000000+000 18 18	3,0074961-001 18 19	4,4387471-001 18 20	2,2178914002 18 21	0,0000000*000 18 22
0,0000000+000 18 23	0,0000000*000 18 24	0,0000000*000 18 25	0,0000000*000 18 26	0,0000000*000 18 27
0,0000000+000 18 28	0,0000000*000 18 29	0,0000000*000 18 30	0,0000000*000 18 31	0,0000000*000 18 32
0,0000000+000 18 33	0,0000000*000 18 34	0,0000000*000 18 35	0,0000000*000 18 36	0,0000000*000 18 37
0,0000000+000 18 38	0,0000000*000 18 39	0,0000000*000 18 40	0,0000000*000 18 41	0,0000000*000 18 42
0,0000000+000 18 43	0,0000000*000 18 44	0,0000000*000 18 45	0,0000000*000 18 46	0,0000000*000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19	0,0000000*000 19 20	3,2327022-001 19 21	1,9534330-001 19 22	0,0000000*000 19 23
0,0000000+000 19 24	0,0000000*000 19 25	0,0000000*000 19 26	0,0000000*000 19 27	0,0000000*000 19 28
0,0000000+000 19 29	0,0000000*000 19 30	0,0000000*000 19 31	0,0000000*000 19 32	0,0000000*000 19 33
0,0000000+000 19 34	0,0000000*000 19 35	0,0000000*000 19 36	0,0000000*000 19 37	0,0000000*000 19 38
0,0000000+000 19 39	0,0000000*000 19 40	0,0000000*000 19 41	0,0000000*000 19 42	0,0000000*000 19 43
0,0000000+000 19 44	0,0000000*000 19 45	0,0000000*000 19 46	0,0000000*000 19 47	

SCATTERING FROM GROUP 20

0,0000000+000 20 20	0,0000000*000 20 21	1,9592700*002 20 22	1,6393883-001 20 23	9,9436983-002 20 24
2,4965994*002 20 25	0,0000000*000 20 26	0,0000000*000 20 27	0,0000000*000 20 28	0,0000000*000 20 29
0,0000000+000 20 30	0,0000000*000 20 31	0,0000000*000 20 32	0,0000000*000 20 33	0,0000000*000 20 34
0,0000000+000 20 35	0,0000000*000 20 36	0,0000000*000 20 37	0,0000000*000 20 38	0,0000000*000 20 39
0,0000000+000 20 40	0,0000000*000 20 41	0,0000000*000 20 42	0,0000000*000 20 43	0,0000000*000 20 44
0,0000000+000 20 45	0,0000000*000 20 46	0,0000000*000 20 47		

SCATTERING FROM GROUP 21

0,0000000+000 21 21	0,0000000*000 21 22	0,0000000*000 21 23	0,0000000*000 21 24	4,5231937-002 21 25
4,6328664*002 21 26	2,8035043-002 21 27	1,7179755-002 21 28	7,2311182-003 21 29	0,0000000*000 21 30

0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0, 000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0, 000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0, 000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0, 000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 4,0919536-003 22 29 8, 871521-003 22 30 4,8676138-003 22 31
2,8984425-003 22 32 1,7155719-003 22 33 1,0079083-003 22 34 5,8535425-004 22 35 3,3499636-004 22 36
1,8757926-004 22 37 1,0161836-004 22 38 0,0000000+000 22 39 0, 000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0, 000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0, 000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0, 000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0, 000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0, 000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0, 000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0, 000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0, 000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0, 000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0, 000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0, 000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0, 000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0, 000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0, 000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0, 000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0, 000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0, 000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0, 000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0, 000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0, 000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0, 000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0, 000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0, 000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0, 000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0, 000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0, 000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0, 000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,0000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,0000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,0000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,0000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,0000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO, 9 WAS 4.044+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.100+002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.500+002SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

5,9484128+006 1 1 1,0765759+004 1 2 9,4864169+004 1 3 4,7283957+003 1 4 1,5011540+002 1 5
3,3363954+002 1 6 5,5973726+002 1 7 7,5261012+002 1 8 8,5049594+002 1 9 8,3868925+002 1 10
7,4337597+002 1 11 6,0617239+002 1 12 4,6311384+002 1 13 3,3627067+002 1 14 2,3466794+002 1 15
1,5877244+002 1 16 1,0486120+002 1 17 6,7964823+003 1 18 4,3409630+003 1 19 2,7411092+003 1 20
1,7155400+003 1 21 1,0662616+003 1 22 6,5914444+004 1 23 4,576072+004 1 24 2,4896369+004 1 25
1,5236779+004 1 26 9,3065114+005 1 27 5,6759513+005 1 28 0,000000+000 1 29 0,0000000+000 1 30

0,0000000+000	1	31	0,0000000+000	1	32	0,0000000+000	1	33	0,0000000+000	1	34	0,0000000+000	1	35
0,0000000+000	1	36	0,0000000+000	1	37	0,0000000+000	1	38	0,0000000+000	1	39	0,0000000+000	1	40
0,0000000+000	1	41	0,0000000+000	1	42	0,0000000+000	1	43	0,0000000+000	1	44	0,0000000+000	1	45
0,0000000+000	1	46	0,0000000+000	1	47									

SCATTERING FROM GROUP 2

1,9137987+004	2	2	1,8581848+003	2	3	1,0001565+002	2	4	3,3742978+002	2	5	7,8684410+002	2	6
1,3709642+001	2	7	1,8990189+001	2	8	2,1966808+001	2	9	2,2061538+001	2	10	1,9836055+001	2	11
1,6356796+001	2	12	1,2606126+001	2	13	9,2159972+002	2	14	6,4657039+002	2	15	4,3927607+002	2	16
2,9105884+002	2	17	1,8912289+002	2	18	1,2103152+002	2	19	7,6542559+003	2	20	4,7961746+003	2	21
2,9837404+003	2	22	1,8458310+003	2	23	1,1369097+003	2	24	6,9788267+004	2	25	4,2725593+004	2	26
2,6103409+004	2	27	1,5922407+004	2	28	0,0000000+000	2	29	0,0000000+000	2	30	0,0000000+000	2	31
0,0000000+000	2	32	0,0000000+000	2	33	0,0000000+000	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

1,6870896+003	3	3	1,0394140+002	3	4	3,9025101+002	3	5	9,9024443+002	3	6	1,8441873+001	3	7
2,6918947+001	3	8	3,2445369+001	3	9	3,3652287+001	3	10	3,1030198+001	3	11	2,6096831+001	3	12
2,0424785+001	3	13	1,5112534+001	3	14	1,0702435+001	3	15	7,3245312+002	3	16	4,8808877+002	3	17
3,1856042+002	3	18	2,0457381+002	3	19	1,2972578+002	3	20	8,1457528+003	3	21	5,0758466+003	3	22
3,1440785+003	3	23	1,9384695+003	3	24	1,1908351+003	3	25	7,2948953+004	3	26	4,4589473+004	3	27
2,7208344+004	3	28	1,6580339+004	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0,0000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

5,5797845+003	4	4	2,5167209+002	4	5	7,3827500+002	4	6	1,5415933+001	4	7	2,4622482+001	4	8
3,1852480+001	4	9	3,4921071+001	4	10	3,3628789+001	4	11	2,9258880+001	4	12	2,3515052+001	4	13
1,7763091+001	4	14	1,2784416+001	4	15	8,8603560+002	4	16	5,9626250+002	4	17	3,9215423+002	4	18
2,5334220+002	4	19	1,6140013+002	4	20	1,0171447+002	4	21	6,3560332+003	4	22	3,9457200+003	4	23
2,4368898+003	4	24	1,4990222+003	4	25	9,1923579+004	4	26	5,6233066+004	4	27	3,4334881+004	4	28
2,0933402+004	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0,0000000+000	4	32	0,0000000+000	4	33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0,0000000+000	4	37	0,0000000+000	4	38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0,0000000+000	4	42	0,0000000+000	4	43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0,0000000+000	4	47			

SCATTERING FROM GROUP 5

9,5531395+003	5	5	3,7197445+002	5	6	9,7142394+002	5	7	1,8506612+001	5	8	2,7500092+001	5	9
3,3613765+001	5	10	3,5249355+001	5	11	3,2783581+001	5	12	2,7757481+001	5	13	2,1838918+001	5	14
1,6225267+001	5	15	1,1527277+001	5	16	7,9087474+002	5	17	5,2804586+002	5	18	3,4516222+002	5	19
2,2191913+002	5	20	1,4085457+002	5	21	8,8509015+003	5	22	5,5183282+003	5	23	3,4196493+003	5	24
2,1090865+003	5	25	1,2959905+003	5	26	7,9406972+004	5	27	4,8544642+004	5	28	2,9625496+004	5	29
1,8055075+004	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0,0000000+000	5	33	0,0000000+000	5	34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0,0000000+000	5	38	0,0000000+000	5	39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0,0000000+000	5	43	0,0000000+000	5	44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47						

SCATTERING FROM GROUP 6

1,4755445+002	6	6	5,0668851+002	6	7	1,1981406+001	6	8	2,1156793+001	6	9	2,9490473+001	6	10
3,4345298+001	6	11	3,4677338+001	6	12	3,1309238+001	6	13	2,5901686+001	6	14	2,0013118+001	6	15
1,4660088+001	6	16	1,0301058+001	6	17	7,0069253+002	6	18	4,6470697+002	6	19	3,0217661+002	6	20
1,9349213+002	6	21	1,2242246+002	6	22	7,6736810+003	6	23	4,7751509+003	6	24	2,9546728+003	6	25
1,8201811+003	6	26	1,1174461+003	6	27	6,8418785+004	6	28	4,1804043+004	6	29	2,5500906+004	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35

0,0000000+000 6 36	0,0000000+000 6 37	0,0000000+000 6 38	0,0000000+000 6 39	0,0000000+000 6 40
0,0000000+000 6 41	0,0000000+000 6 42	0,0000000+000 6 43	0,0000000+000 6 44	0,0000000+000 6 45
0,0000000+000 6 46	0,0000000+000 6 47			

SCATTERING FROM GROUP 7

1,3505684+005 7 7	1,9402323-004 7 8	1,4241074-003 7 9	6,1418976-003 7 10	1,7389895-002 7 11
3,5310520+002 7 12	5,5170164-002 7 13	7,0146093-002 7 14	7,5867655-002 7 15	7,2288196-002 7 16
6,2374355+002 7 17	4,9805271-002 7 18	3,7432327-002 7 19	2,6834380-002 7 20	1,8540527-002 7 21
1,2446973+002 7 22	8,1708796-003 7 23	5,2708999-003 7 24	3,3541815-003 7 25	2,1119327-003 7 26
1,3188132+003 7 27	8,1825667-004 7 28	5,0514606-004 7 29	3,1063281-004 7 30	1,9043887-004 7 31
1,1647546+004 7 32	7,1106795-005 7 33	4,3347419-005 7 34	0,0000000+000 7 35	0,0000000+000 7 36
0,0000000+000 7 37	0,0000000+000 7 38	0,0000000+000 7 39	0,0000000+000 7 40	0,0000000+000 7 41
0,0000000+000 7 42	0,0000000+000 7 43	0,0000000+000 7 44	0,0000000+000 7 45	0,0000000+000 7 46
0,0000000+000 7 47				

SCATTERING FROM GROUP 8

0,0000000+000 8 8	0,0000000+000 8 9	0,0000000+000 8 10	0,0000000+000 8 11	0,0000000+000 8 12
0,0000000+000 8 13	0,0000000+000 8 14	0,0000000+000 8 15	0,0000000+000 8 16	0,0000000+000 8 17
0,0000000+000 8 18	0,0000000+000 8 19	0,0000000+000 8 20	0,0000000+000 8 21	0,0000000+000 8 22
0,0000000+000 8 23	0,0000000+000 8 24	0,0000000+000 8 25	0,0000000+000 8 26	0,0000000+000 8 27
0,0000000+000 8 28	0,0000000+000 8 29	0,0000000+000 8 30	0,0000000+000 8 31	0,0000000+000 8 32
0,0000000+000 8 33	0,0000000+000 8 34	0,0000000+000 8 35	0,0000000+000 8 36	0,0000000+000 8 37
0,0000000+000 8 38	0,0000000+000 8 39	0,0000000+000 8 40	0,0000000+000 8 41	0,0000000+000 8 42
0,0000000+000 8 43	0,0000000+000 8 44	0,0000000+000 8 45	0,0000000+000 8 46	0,0000000+000 8 47

SCATTERING FROM GROUP 9

0,0000000+000 9 9	0,0000000+000 9 10	0,0000000+000 9 11	0,0000000+000 9 12	0,0000000+000 9 13
0,0000000+000 9 14	0,0000000+000 9 15	0,0000000+000 9 16	0,0000000+000 9 17	0,0000000+000 9 18
0,0000000+000 9 19	0,0000000+000 9 20	0,0000000+000 9 21	0,0000000+000 9 22	0,0000000+000 9 23
0,0000000+000 9 24	0,0000000+000 9 25	0,0000000+000 9 26	0,0000000+000 9 27	0,0000000+000 9 28
0,0000000+000 9 29	0,0000000+000 9 30	0,0000000+000 9 31	0,0000000+000 9 32	0,0000000+000 9 33
0,0000000+000 9 34	0,0000000+000 9 35	0,0000000+000 9 36	0,0000000+000 9 37	0,0000000+000 9 38
0,0000000+000 9 39	0,0000000+000 9 40	0,0000000+000 9 41	0,0000000+000 9 42	0,0000000+000 9 43
0,0000000+000 9 44	0,0000000+000 9 45	0,0000000+000 9 46	0,0000000+000 9 47	

SCATTERING FROM GROUP 10

0,0000000+000 10 10	0,0000000+000 10 11	0,0000000+000 10 12	0,0000000+000 10 13	0,0000000+000 10 14
0,0000000+000 10 15	0,0000000+000 10 16	0,0000000+000 10 17	0,0000000+000 10 18	0,0000000+000 10 19
0,0000000+000 10 20	0,0000000+000 10 21	0,0000000+000 10 22	0,0000000+000 10 23	0,0000000+000 10 24
0,0000000+000 10 25	0,0000000+000 10 26	0,0000000+000 10 27	0,0000000+000 10 28	0,0000000+000 10 29
0,0000000+000 10 30	0,0000000+000 10 31	0,0000000+000 10 32	0,0000000+000 10 33	0,0000000+000 10 34
0,0000000+000 10 35	0,0000000+000 10 36	0,0000000+000 10 37	0,0000000+000 10 38	0,0000000+000 10 39
0,0000000+000 10 40	0,0000000+000 10 41	0,0000000+000 10 42	0,0000000+000 10 43	0,0000000+000 10 44
0,0000000+000 10 45	0,0000000+000 10 46	0,0000000+000 10 47		

SCATTERING FROM GROUP 11

0,0000000+000 11 11	0,0000000+000 11 12	0,0000000+000 11 13	0,0000000+000 11 14	0,0000000+000 11 15
0,0000000+000 11 16	0,0000000+000 11 17	0,0000000+000 11 18	0,0000000+000 11 19	0,0000000+000 11 20
0,0000000+000 11 21	0,0000000+000 11 22	0,0000000+000 11 23	0,0000000+000 11 24	0,0000000+000 11 25
0,0000000+000 11 26	0,0000000+000 11 27	0,0000000+000 11 28	0,0000000+000 11 29	0,0000000+000 11 30
0,0000000+000 11 31	0,0000000+000 11 32	0,0000000+000 11 33	0,0000000+000 11 34	0,0000000+000 11 35
0,0000000+000 11 36	0,0000000+000 11 37	0,0000000+000 11 38	0,0000000+000 11 39	0,0000000+000 11 40
0,0000000+000 11 41	0,0000000+000 11 42	0,0000000+000 11 43	0,0000000+000 11 44	0,0000000+000 11 45
0,0000000+000 11 46	0,0000000+000 11 47			

SCATTERING FROM GROUP 12

0,0000000+000 12 12	0,0000000+000 12 13	0,0000000+000 12 14	0,0000000+000 12 15	0,0000000+000 12 16
0,0000000+000 12 17	0,0000000+000 12 18	0,0000000+000 12 19	0,0000000+000 12 20	0,0000000+000 12 21
0,0000000+000 12 22	0,0000000+000 12 23	0,0000000+000 12 24	0,0000000+000 12 25	0,0000000+000 12 26
0,0000000+000 12 27	0,0000000+000 12 28	0,0000000+000 12 29	0,0000000+000 12 30	0,0000000+000 12 31
0,0000000+000 12 32	0,0000000+000 12 33	0,0000000+000 12 34	0,0000000+000 12 35	0,0000000+000 12 36
0,0000000+000 12 37	0,0000000+000 12 38	0,0000000+000 12 39	0,0000000+000 12 40	0,0000000+000 12 41
0,0000000+000 12 42	0,0000000+000 12 43	0,0000000+000 12 44	0,0000000+000 12 45	0,0000000+000 12 46
0,0000000+000 12 47				

SCATTERING FROM GROUP 13

0,0000000+000 13 13	0,0000000+000 13 14	0,0000000+000 13 15	0,0000000+000 13 16	0,0000000+000 13 17
0,0000000+000 13 18	0,0000000+000 13 19	0,0000000+000 13 20	0,0000000+000 13 21	0,0000000+000 13 22
0,0000000+000 13 23	0,0000000+000 13 24	0,0000000+000 13 25	0,0000000+000 13 26	0,0000000+000 13 27
0,0000000+000 13 28	0,0000000+000 13 29	0,0000000+000 13 30	0,0000000+000 13 31	0,0000000+000 13 32
0,0000000+000 13 33	0,0000000+000 13 34	0,0000000+000 13 35	0,0000000+000 13 36	0,0000000+000 13 37
0,0000000+000 13 38	0,0000000+000 13 39	0,0000000+000 13 40	0,0000000+000 13 41	0,0000000+000 13 42
0,0000000+000 13 43	0,0000000+000 13 44	0,0000000+000 13 45	0,0000000+000 13 46	0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14	0,0000000+000 14 15	0,0000000+000 14 16	0,0000000+000 14 17	0,0000000+000 14 18
0,0000000+000 14 19	0,0000000+000 14 20	0,0000000+000 14 21	0,0000000+000 14 22	0,0000000+000 14 23
0,0000000+000 14 24	0,0000000+000 14 25	0,0000000+000 14 26	0,0000000+000 14 27	0,0000000+000 14 28
0,0000000+000 14 29	0,0000000+000 14 30	0,0000000+000 14 31	0,0000000+000 14 32	0,0000000+000 14 33
0,0000000+000 14 34	0,0000000+000 14 35	0,0000000+000 14 36	0,0000000+000 14 37	0,0000000+000 14 38
0,0000000+000 14 39	0,0000000+000 14 40	0,0000000+000 14 41	0,0000000+000 14 42	0,0000000+000 14 43
0,0000000+000 14 44	0,0000000+000 14 45	0,0000000+000 14 46	0,0000000+000 14 47	

SCATTERING FROM GROUP 15

0,0000000+000 15 15	0,0000000+000 15 16	0,0000000+000 15 17	0,0000000+000 15 18	0,0000000+000 15 19
0,0000000+000 15 20	0,0000000+000 15 21	0,0000000+000 15 22	0,0000000+000 15 23	0,0000000+000 15 24
0,0000000+000 15 25	0,0000000+000 15 26	0,0000000+000 15 27	0,0000000+000 15 28	0,0000000+000 15 29
0,0000000+000 15 30	0,0000000+000 15 31	0,0000000+000 15 32	0,0000000+000 15 33	0,0000000+000 15 34
0,0000000+000 15 35	0,0000000+000 15 36	0,0000000+000 15 37	0,0000000+000 15 38	0,0000000+000 15 39
0,0000000+000 15 40	0,0000000+000 15 41	0,0000000+000 15 42	0,0000000+000 15 43	0,0000000+000 15 44
0,0000000+000 15 45	0,0000000+000 15 46	0,0000000+000 15 47		

SCATTERING FROM GROUP 16

0,0000000+000 16 16	0,0000000+000 16 17	0,0000000+000 16 18	0,0000000+000 16 19	0,0000000+000 16 20
0,0000000+000 16 21	0,0000000+000 16 22	0,0000000+000 16 23	0,0000000+000 16 24	0,0000000+000 16 25
0,0000000+000 16 26	0,0000000+000 16 27	0,0000000+000 16 28	0,0000000+000 16 29	0,0000000+000 16 30
0,0000000+000 16 31	0,0000000+000 16 32	0,0000000+000 16 33	0,0000000+000 16 34	0,0000000+000 16 35
0,0000000+000 16 36	0,0000000+000 16 37	0,0000000+000 16 38	0,0000000+000 16 39	0,0000000+000 16 40
0,0000000+000 16 41	0,0000000+000 16 42	0,0000000+000 16 43	0,0000000+000 16 44	0,0000000+000 16 45
0,0000000+000 16 46	0,0000000+000 16 47			

SCATTERING FROM GROUP 17

0,0000000+000 17 17	0,0000000+000 17 18	0,0000000+000 17 19	0,0000000+000 17 20	0,0000000+000 17 21
0,0000000+000 17 22	0,0000000+000 17 23	0,0000000+000 17 24	0,0000000+000 17 25	0,0000000+000 17 26
0,0000000+000 17 27	0,0000000+000 17 28	0,0000000+000 17 29	0,0000000+000 17 30	0,0000000+000 17 31
0,0000000+000 17 32	0,0000000+000 17 33	0,0000000+000 17 34	0,0000000+000 17 35	0,0000000+000 17 36
0,0000000+000 17 37	0,0000000+000 17 38	0,0000000+000 17 39	0,0000000+000 17 40	0,0000000+000 17 41
0,0000000+000 17 42	0,0000000+000 17 43	0,0000000+000 17 44	0,0000000+000 17 45	0,0000000+000 17 46
0,0000000+000 17 47				

SCATTERING FROM GROUP 18

0,0000000+000 18 18	0,0000000+000 18 19	0,0000000+000 18 20	0,0000000+000 18 21	0,0000000+000 18 22

0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,000000+000 25 33 0,0000000+000 25 34

0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,0000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,0000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,0000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,0000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,0000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO. 10 WAS 4.077+000SECONDS

N=2N SCATTERING

TIME SPENT IN PROGRAM AREA NO. 8 WAS 5.000+003SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

1,9035344+011	1	1	7,8153383+009	1	2	8,0133272+007	1	3	2,7710653+005	1	4	4,0726638+004	1	5
3,0436789+003	1	6	1,3315575+002	1	7	3,8129265+002	1	8	7,8115200+002	1	9	1,2290866+001	1	10
1,5713582+001	1	11	1,7068890+001	1	12	1,6318702+001	1	13	1,4118015+001	1	14	1,1296423+001	1	15
8,5038115+002	1	16	6,1038734+002	1	17	4,2214613+002	1	18	2,8362026+002	1	19	1,8629523+002	1	20
1,2023194+002	1	21	7,6538365+003	1	22	4,8205373+003	1	23	3,108858+003	1	24	1,8684223+003	1	25
1,1536139+003	1	26	7,0947322+004	1	27	4,3499027+004	1	28	2,6636374+004	1	29	1,6243654+004	1	30
9,9026808+005	1	31	0,0000000+000	1	32	0,0000000+000	1	33	0, 000000+000	1	34	0,0000000+000	1	35
0,0000000+000	1	36	0,0000000+000	1	37	0,0000000+000	1	38	0, 000000+000	1	39	0,0000000+000	1	40
0,0000000+000	1	41	0,0000000+000	1	42	0,0000000+000	1	43	0, 000000+000	1	44	0,0000000+000	1	45
0,0000000+000	1	46	0,0000000+000	1	47									

SCATTERING FROM GROUP 2

1,5145423+027	2	2	2,1590507+021	2	3	1,2702621+016	2	4	6,2456169+013	2	5	4,4431041+010	2	6
6,9994389+008	2	7	3,3964393+006	2	8	6,4997691+005	2	9	5,9941533+004	2	10	3,0974022+003	2	11
1,0118095+002	2	12	2,3000385+002	2	13	3,9278084+002	2	14	5,3554479+002	2	15	6,1186037+002	2	16
6,0856283+002	2	17	5,4303337+002	2	18	4,4513460+002	2	19	3,4147690+002	2	20	2,4874279+002	2	21
1,7401954+002	2	22	1,1796787+002	2	23	7,8030009+003	2	24	5, 634209+003	2	25	3,2370225+003	2	26
2,0454905+003	2	27	1,2808984+003	2	28	7,9646490+004	2	29	4,9252779+004	2	30	3,0327380+004	2	31
1,8611880+004	2	32	1,1392446+004	2	33	6,9592919+005	2	34	4,2445141+005	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0, 000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0, 000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

0,0000000+000	3	3	0,0000000+000	3	4	0,0000000+000	3	5	0, 000000+000	3	6	0,0000000+000	3	7
0,0000000+000	3	8	0,0000000+000	3	9	0,0000000+000	3	10	0, 000000+000	3	11	0,0000000+000	3	12
0,0000000+000	3	13	0,0000000+000	3	14	0,0000000+000	3	15	0, 000000+000	3	16	0,0000000+000	3	17
0,0000000+000	3	18	0,0000000+000	3	19	0,0000000+000	3	20	0, 000000+000	3	21	0,0000000+000	3	22
0,0000000+000	3	23	0,0000000+000	3	24	0,0000000+000	3	25	0, 000000+000	3	26	0,0000000+000	3	27
0,0000000+000	3	28	0,0000000+000	3	29	0,0000000+000	3	30	0, 000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0, 000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0, 000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0, 000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

0,0000000+000	4	4	0,0000000+000	4	5	0,0000000+000	4	6	0, 000000+000	4	7	0,0000000+000	4	8
0,0000000+000	4	9	0,0000000+000	4	10	0,0000000+000	4	11	0, 000000+000	4	12	0,0000000+000	4	13

0,0000000+000 4 14 0,0000000+000 4 15 0,0000000+000 4 16 0,0000000+000 4 17 0,0000000+000 4 18
0,0000000+000 4 19 0,0000000+000 4 20 0,0000000+000 4 21 0,0000000+000 4 22 0,0000000+000 4 23
0,0000000+000 4 24 0,0000000+000 4 25 0,0000000+000 4 26 0,0000000+000 4 27 0,0000000+000 4 28
0,0000000+000 4 29 0,0000000+000 4 30 0,0000000+000 4 31 0,0000000+000 4 32 0,0000000+000 4 33
0,0000000+000 4 34 0,0000000+000 4 35 0,0000000+000 4 36 0,0000000+000 4 37 0,0000000+000 4 38
0,0000000+000 4 39 0,0000000+000 4 40 0,0000000+000 4 41 0,0000000+000 4 42 0,0000000+000 4 43
0,0000000+000 4 44 0,0000000+000 4 45 0,0000000+000 4 46 0,0000000+000 4 47

SCATTERING FROM GROUP 5

0,0000000+000 5 5 0,0000000+000 5 6 0,0000000+000 5 7 0,0000000+000 5 8 0,0000000+000 5 9
0,0000000+000 5 10 0,0000000+000 5 11 0,0000000+000 5 12 0,0000000+000 5 13 0,0000000+000 5 14
0,0000000+000 5 15 0,0000000+000 5 16 0,0000000+000 5 17 0,0000000+000 5 18 0,0000000+000 5 19
0,0000000+000 5 20 0,0000000+000 5 21 0,0000000+000 5 22 0,0000000+000 5 23 0,0000000+000 5 24
0,0000000+000 5 25 0,0000000+000 5 26 0,0000000+000 5 27 0,0000000+000 5 28 0,0000000+000 5 29
0,0000000+000 5 30 0,0000000+000 5 31 0,0000000+000 5 32 0,0000000+000 5 33 0,0000000+000 5 34
0,0000000+000 5 35 0,0000000+000 5 36 0,0000000+000 5 37 0,0000000+000 5 38 0,0000000+000 5 39
0,0000000+000 5 40 0,0000000+000 5 41 0,0000000+000 5 42 0,0000000+000 5 43 0,0000000+000 5 44
0,0000000+000 5 45 0,0000000+000 5 46 0,0000000+000 5 47

SCATTERING FROM GROUP 6

0,0000000+000 6 6 0,0000000+000 6 7 0,0000000+000 6 8 0,0000000+000 6 9 0,0000000+000 6 10
0,0000000+000 6 11 0,0000000+000 6 12 0,0000000+000 6 13 0,0000000+000 6 14 0,0000000+000 6 15
0,0000000+000 6 16 0,0000000+000 6 17 0,0000000+000 6 18 0,0000000+000 6 19 0,0000000+000 6 20
0,0000000+000 6 21 0,0000000+000 6 22 0,0000000+000 6 23 0,0000000+000 6 24 0,0000000+000 6 25
0,0000000+000 6 26 0,0000000+000 6 27 0,0000000+000 6 28 0,0000000+000 6 29 0,0000000+000 6 30
0,0000000+000 6 31 0,0000000+000 6 32 0,0000000+000 6 33 0,0000000+000 6 34 0,0000000+000 6 35
0,0000000+000 6 36 0,0000000+000 6 37 0,0000000+000 6 38 0,0000000+000 6 39 0,0000000+000 6 40
0,0000000+000 6 41 0,0000000+000 6 42 0,0000000+000 6 43 0,0000000+000 6 44 0,0000000+000 6 45
0,0000000+000 6 46 0,0000000+000 6 47

SCATTERING FROM GROUP 7

0,0000000+000 7 7 0,0000000+000 7 8 0,0000000+000 7 9 0,0000000+000 7 10 0,0000000+000 7 11
0,0000000+000 7 12 0,0000000+000 7 13 0,0000000+000 7 14 0,0000000+000 7 15 0,0000000+000 7 16
0,0000000+000 7 17 0,0000000+000 7 18 0,0000000+000 7 19 0,0000000+000 7 20 0,0000000+000 7 21
0,0000000+000 7 22 0,0000000+000 7 23 0,0000000+000 7 24 0,0000000+000 7 25 0,0000000+000 7 26
0,0000000+000 7 27 0,0000000+000 7 28 0,0000000+000 7 29 0,0000000+000 7 30 0,0000000+000 7 31
0,0000000+000 7 32 0,0000000+000 7 33 0,0000000+000 7 34 0,0000000+000 7 35 0,0000000+000 7 36
0,0000000+000 7 37 0,0000000+000 7 38 0,0000000+000 7 39 0,0000000+000 7 40 0,0000000+000 7 41
0,0000000+000 7 42 0,0000000+000 7 43 0,0000000+000 7 44 0,0000000+000 7 45 0,0000000+000 7 46
0,0000000+000 7 47

SCATTERING FROM GROUP 8

0,0000000+000 8 8 0,0000000+000 8 9 0,0000000+000 8 10 0,0000000+000 8 11 0,0000000+000 8 12
0,0000000+000 8 13 0,0000000+000 8 14 0,0000000+000 8 15 0,0000000+000 8 16 0,0000000+000 8 17
0,0000000+000 8 18 0,0000000+000 8 19 0,0000000+000 8 20 0,0000000+000 8 21 0,0000000+000 8 22
0,0000000+000 8 23 0,0000000+000 8 24 0,0000000+000 8 25 0,0000000+000 8 26 0,0000000+000 8 27
0,0000000+000 8 28 0,0000000+000 8 29 0,0000000+000 8 30 0,0000000+000 8 31 0,0000000+000 8 32
0,0000000+000 8 33 0,0000000+000 8 34 0,0000000+000 8 35 0,0000000+000 8 36 0,0000000+000 8 37
0,0000000+000 8 38 0,0000000+000 8 39 0,0000000+000 8 40 0,0000000+000 8 41 0,0000000+000 8 42
0,0000000+000 8 43 0,0000000+000 8 44 0,0000000+000 8 45 0,0000000+000 8 46 0,0000000+000 8 47

SCATTERING FROM GROUP 9

0,0000000+000 9 9 0,0000000+000 9 10 0,0000000+000 9 11 0,0000000+000 9 12 0,0000000+000 9 13
0,0000000+000 9 14 0,0000000+000 9 15 0,0000000+000 9 16 0,0000000+000 9 17 0,0000000+000 9 18
0,0000000+000 9 19 0,0000000+000 9 20 0,0000000+000 9 21 0,0000000+000 9 22 0,0000000+000 9 23
0,0000000+000 9 24 0,0000000+000 9 25 0,0000000+000 9 26 0,0000000+000 9 27 0,0000000+000 9 28
0,0000000+000 9 29 0,0000000+000 9 30 0,0000000+000 9 31 0,0000000+000 9 32 0,0000000+000 9 33

0,0000000+000 9 34 0,0000000+000 9 35 0,0000000+000 9 36 0,0000000+000 9 37 0,0000000+000 9 38
0,0000000+000 9 39 0,0000000+000 9 40 0,0000000+000 9 41 0,0000000+000 9 42 0,0000000+000 9 43
0,0000000+000 9 44 0,0000000+000 9 45 0,0000000+000 9 46 0,0000000+000 9 47

SCATTERING FROM GROUP 10

0,0000000+000 10 10 0,0000000+000 10 11 0,0000000+000 10 12 0,0000000+000 10 13 0,0000000+000 10 14
0,0000000+000 10 15 0,0000000+000 10 16 0,0000000+000 10 17 0,0000000+000 10 18 0,0000000+000 10 19
0,0000000+000 10 20 0,0000000+000 10 21 0,0000000+000 10 22 0,0000000+000 10 23 0,0000000+000 10 24
0,0000000+000 10 25 0,0000000+000 10 26 0,0000000+000 10 27 0,0000000+000 10 28 0,0000000+000 10 29
0,0000000+000 10 30 0,0000000+000 10 31 0,0000000+000 10 32 0,0000000+000 10 33 0,0000000+000 10 34
0,0000000+000 10 35 0,0000000+000 10 36 0,0000000+000 10 37 0,0000000+000 10 38 0,0000000+000 10 39
0,0000000+000 10 40 0,0000000+000 10 41 0,0000000+000 10 42 0,0000000+000 10 43 0,0000000+000 10 44
0,0000000+000 10 45 0,0000000+000 10 46 0,0000000+000 10 47

SCATTERING FROM GROUP 11

0,0000000+000 11 11 0,0000000+000 11 12 0,0000000+000 11 13 0,0000000+000 11 14 0,0000000+000 11 15
0,0000000+000 11 16 0,0000000+000 11 17 0,0000000+000 11 18 0,0000000+000 11 19 0,0000000+000 11 20
0,0000000+000 11 21 0,0000000+000 11 22 0,0000000+000 11 23 0,0000000+000 11 24 0,0000000+000 11 25
0,0000000+000 11 26 0,0000000+000 11 27 0,0000000+000 11 28 0,0000000+000 11 29 0,0000000+000 11 30
0,0000000+000 11 31 0,0000000+000 11 32 0,0000000+000 11 33 0,0000000+000 11 34 0,0000000+000 11 35
0,0000000+000 11 36 0,0000000+000 11 37 0,0000000+000 11 38 0,0000000+000 11 39 0,0000000+000 11 40
0,0000000+000 11 41 0,0000000+000 11 42 0,0000000+000 11 43 0,0000000+000 11 44 0,0000000+000 11 45
0,0000000+000 11 46 0,0000000+000 11 47

SCATTERING FROM GROUP 12

0,0000000+000 12 12 0,0000000+000 12 13 0,0000000+000 12 14 0,0000000+000 12 15 0,0000000+000 12 16
0,0000000+000 12 17 0,0000000+000 12 18 0,0000000+000 12 19 0,0000000+000 12 20 0,0000000+000 12 21
0,0000000+000 12 22 0,0000000+000 12 23 0,0000000+000 12 24 0,0000000+000 12 25 0,0000000+000 12 26
0,0000000+000 12 27 0,0000000+000 12 28 0,0000000+000 12 29 0,0000000+000 12 30 0,0000000+000 12 31
0,0000000+000 12 32 0,0000000+000 12 33 0,0000000+000 12 34 0,0000000+000 12 35 0,0000000+000 12 36
0,0000000+000 12 37 0,0000000+000 12 38 0,0000000+000 12 39 0,0000000+000 12 40 0,0000000+000 12 41
0,0000000+000 12 42 0,0000000+000 12 43 0,0000000+000 12 44 0,0000000+000 12 45 0,0000000+000 12 46
0,0000000+000 12 47

SCATTERING FROM GROUP 13

0,0000000+000 13 13 0,0000000+000 13 14 0,0000000+000 13 15 0,0000000+000 13 16 0,0000000+000 13 17
0,0000000+000 13 18 0,0000000+000 13 19 0,0000000+000 13 20 0,0000000+000 13 21 0,0000000+000 13 22
0,0000000+000 13 23 0,0000000+000 13 24 0,0000000+000 13 25 0,0000000+000 13 26 0,0000000+000 13 27
0,0000000+000 13 28 0,0000000+000 13 29 0,0000000+000 13 30 0,0000000+000 13 31 0,0000000+000 13 32
0,0000000+000 13 33 0,0000000+000 13 34 0,0000000+000 13 35 0,0000000+000 13 36 0,0000000+000 13 37
0,0000000+000 13 38 0,0000000+000 13 39 0,0000000+000 13 40 0,0000000+000 13 41 0,0000000+000 13 42
0,0000000+000 13 43 0,0000000+000 13 44 0,0000000+000 13 45 0,0000000+000 13 46 0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,0000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,0000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,0000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,0000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,0000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,0000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,0000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,0000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,0000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,0000000+000 15 28 0,0000000+000 15 29

0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,0000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,0000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,0000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,0000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,0000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,0000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,0000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,0000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,0000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,0000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,0000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,0000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,0000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,0000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,0000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,0000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,0000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,0000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,0000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0.0000000+000 30 30	0.0000000+000 30 31	0.0000000+000 30 32	0.0000000+000 30 33	0.0000000+000 30 34
0.0000000+000 30 35	0.0000000+000 30 36	0.0000000+000 30 37	0.0000000+000 30 38	0.0000000+000 30 39
0.0000000+000 30 40	0.0000000+000 30 41	0.0000000+000 30 42	0.0000000+000 30 43	0.0000000+000 30 44
0.0000000+000 30 45	0.0000000+000 30 46	0.0000000+000 30 47		

SCATTERING FROM GROUP 31

0.0000000+000 31 31	0.0000000+000 31 32	0.0000000+000 31 33	0.0000000+000 31 34	0.0000000+000 31 35
0.0000000+000 31 36	0.0000000+000 31 37	0.0000000+000 31 38	0.0000000+000 31 39	0.0000000+000 31 40
0.0000000+000 31 41	0.0000000+000 31 42	0.0000000+000 31 43	0.0000000+000 31 44	0.0000000+000 31 45
0.0000000+000 31 46	0.0000000+000 31 47			

SCATTERING FROM GROUP 32

0.0000000+000 32 32	0.0000000+000 32 33	0.0000000+000 32 34	0.0000000+000 32 35	0.0000000+000 32 36
0.0000000+000 32 37	0.0000000+000 32 38	0.0000000+000 32 39	0.0000000+000 32 40	0.0000000+000 32 41
0.0000000+000 32 42	0.0000000+000 32 43	0.0000000+000 32 44	0.0000000+000 32 45	0.0000000+000 32 46
0.0000000+000 32 47				

SCATTERING FROM GROUP 33

0.0000000+000 33 33	0.0000000+000 33 34	0.0000000+000 33 35	0.0000000+000 33 36	0.0000000+000 33 37
0.0000000+000 33 38	0.0000000+000 33 39	0.0000000+000 33 40	0.0000000+000 33 41	0.0000000+000 33 42
0.0000000+000 33 43	0.0000000+000 33 44	0.0000000+000 33 45	0.0000000+000 33 46	0.0000000+000 33 47

SCATTERING FROM GROUP 34

0.0000000+000 34 34	0.0000000+000 34 35	0.0000000+000 34 36	0.0000000+000 34 37	0.0000000+000 34 38
0.0000000+000 34 39	0.0000000+000 34 40	0.0000000+000 34 41	0.0000000+000 34 42	0.0000000+000 34 43
0.0000000+000 34 44	0.0000000+000 34 45	0.0000000+000 34 46	0.0000000+000 34 47	

SCATTERING FROM GROUP 35

0.0000000+000 35 35	0.0000000+000 35 36	0.0000000+000 35 37	0.0000000+000 35 38	0.0000000+000 35 39
0.0000000+000 35 40	0.0000000+000 35 41	0.0000000+000 35 42	0.0000000+000 35 43	0.0000000+000 35 44
0.0000000+000 35 45	0.0000000+000 35 46	0.0000000+000 35 47		

SCATTERING FROM GROUP 36

0.0000000+000 36 36	0.0000000+000 36 37	0.0000000+000 36 38	0.0000000+000 36 39	0.0000000+000 36 40
0.0000000+000 36 41	0.0000000+000 36 42	0.0000000+000 36 43	0.0000000+000 36 44	0.0000000+000 36 45
0.0000000+000 36 46	0.0000000+000 36 47			

SCATTERING FROM GROUP 37

0.0000000+000 37 37	0.0000000+000 37 38	0.0000000+000 37 39	0.0000000+000 37 40	0.0000000+000 37 41
0.0000000+000 37 42	0.0000000+000 37 43	0.0000000+000 37 44	0.0000000+000 37 45	0.0000000+000 37 46
0.0000000+000 37 47				

SCATTERING FROM GROUP 38

0.0000000+000 38 38	0.0000000+000 38 39	0.0000000+000 38 40	0.0000000+000 38 41	0.0000000+000 38 42
0.0000000+000 38 43	0.0000000+000 38 44	0.0000000+000 38 45	0.0000000+000 38 46	0.0000000+000 38 47

SCATTERING FROM GROUP 39

0.0000000+000 39 39	0.0000000+000 39 40	0.0000000+000 39 41	0.0000000+000 39 42	0.0000000+000 39 43
0.0000000+000 39 44	0.0000000+000 39 45	0.0000000+000 39 46	0.0000000+000 39 47	

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO,10 WAS 4,044+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,400-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 5,700-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 5,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,900-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,300-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,900-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,300-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,900-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 5.200-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 5.000-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 4.300-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.900-002SECONDS

MATERIAL PU239

DISCRETE LEVEL SCATTERING

SCATTERING FROM GROUP 1

0.0000000+000	1 1	0.0000000+000	1 2	0.0000000+000	1 3	0. 000000+000	1 4	0.0000000+000	1 5
0.0000000+000	1 6	0.0000000+000	1 7	0.0000000+000	1 8	0. 000000+000	1 9	0.0000000+000	1 10
0.0000000+000	1 11	0.0000000+000	1 12	0.0000000+000	1 13	0. 000000+000	1 14	0.0000000+000	1 15
0.0000000+000	1 16	0.0000000+000	1 17	0.0000000+000	1 18	0. 000000+000	1 19	0.0000000+000	1 20
0.0000000+000	1 21	0.0000000+000	1 22	0.0000000+000	1 23	0. 000000+000	1 24	0.0000000+000	1 25
0.0000000+000	1 26	0.0000000+000	1 27	0.0000000+000	1 28	0. 000000+000	1 29	0.0000000+000	1 30
0.0000000+000	1 31	0.0000000+000	1 32	0.0000000+000	1 33	0. 000000+000	1 34	0.0000000+000	1 35
0.0000000+000	1 36	0.0000000+000	1 37	0.0000000+000	1 38	0. 000000+000	1 39	0.0000000+000	1 40
0.0000000+000	1 41	0.0000000+000	1 42	0.0000000+000	1 43	0. 000000+000	1 44	0.0000000+000	1 45
0.0000000+000	1 46	0.0000000+000	1 47						

SCATTERING FROM GROUP 2

0.0000000+000	2 2	0.0000000+000	2 3	0.0000000+000	2 4	0. 000000+000	2 5	0.0000000+000	2 6
0.0000000+000	2 7	0.0000000+000	2 8	0.0000000+000	2 9	0. 000000+000	2 10	0.0000000+000	2 11
0.0000000+000	2 12	0.0000000+000	2 13	0.0000000+000	2 14	0. 000000+000	2 15	0.0000000+000	2 16
0.0000000+000	2 17	0.0000000+000	2 18	0.0000000+000	2 19	0. 000000+000	2 20	0.0000000+000	2 21
0.0000000+000	2 22	0.0000000+000	2 23	0.0000000+000	2 24	0. 000000+000	2 25	0.0000000+000	2 26
0.0000000+000	2 27	0.0000000+000	2 28	0.0000000+000	2 29	0. 000000+000	2 30	0.0000000+000	2 31
0.0000000+000	2 32	0.0000000+000	2 33	0.0000000+000	2 34	0. 000000+000	2 35	0.0000000+000	2 36
0.0000000+000	2 37	0.0000000+000	2 38	0.0000000+000	2 39	0. 000000+000	2 40	0.0000000+000	2 41
0.0000000+000	2 42	0.0000000+000	2 43	0.0000000+000	2 44	0. 000000+000	2 45	0.0000000+000	2 46
0.0000000+000	2 47								

SCATTERING FROM GROUP 3

0.0000000+000	3 3	0.0000000+000	3 4	0.0000000+000	3 5	0. 000000+000	3 6	0.0000000+000	3 7
0.0000000+000	3 8	0.0000000+000	3 9	0.0000000+000	3 10	0. 000000+000	3 11	0.0000000+000	3 12
0.0000000+000	3 13	0.0000000+000	3 14	0.0000000+000	3 15	0. 000000+000	3 16	0.0000000+000	3 17
0.0000000+000	3 18	0.0000000+000	3 19	0.0000000+000	3 20	0. 000000+000	3 21	0.0000000+000	3 22
0.0000000+000	3 23	0.0000000+000	3 24	0.0000000+000	3 25	0. 000000+000	3 26	0.0000000+000	3 27
0.0000000+000	3 28	0.0000000+000	3 29	0.0000000+000	3 30	0. 000000+000	3 31	0.0000000+000	3 32
0.0000000+000	3 33	0.0000000+000	3 34	0.0000000+000	3 35	0. 000000+000	3 36	0.0000000+000	3 37
0.0000000+000	3 38	0.0000000+000	3 39	0.0000000+000	3 40	0. 000000+000	3 41	0.0000000+000	3 42
0.0000000+000	3 43	0.0000000+000	3 44	0.0000000+000	3 45	0. 000000+000	3 46	0.0000000+000	3 47

SCATTERING FROM GROUP 4

0.0000000+000	4 4	0.0000000+000	4 5	0.0000000+000	4 6	0. 000000+000	4 7	0.0000000+000	4 8

0,0000000+000	4	9	0,0000000+000	4	10	0,0000000+000	4	11	0,0000000+000	4	12	0,0000000+000	4	13
0,0000000+000	4	14	0,0000000+000	4	15	0,0000000+000	4	16	0,0000000+000	4	17	0,0000000+000	4	18
0,0000000+000	4	19	0,0000000+000	4	20	0,0000000+000	4	21	0,0000000+000	4	22	0,0000000+000	4	23
0,0000000+000	4	24	0,0000000+000	4	25	0,0000000+000	4	26	0,0000000+000	4	27	0,0000000+000	4	28
0,0000000+000	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0,0000000+000	4	32	0,0000000+000	4	33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0,0000000+000	4	37	0,0000000+000	4	38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0,0000000+000	4	42	0,0000000+000	4	43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0,0000000+000	4	47			

SCATTERING FROM GROUP 5

0,0000000+000	5	5	0,0000000+000	5	6	0,0000000+000	5	7	0,0000000+000	5	8	0,0000000+000	5	9
0,0000000+000	5	10	0,0000000+000	5	11	0,0000000+000	5	12	0,0000000+000	5	13	0,0000000+000	5	14
0,0000000+000	5	15	0,0000000+000	5	16	0,0000000+000	5	17	0,0000000+000	5	18	0,0000000+000	5	19
0,0000000+000	5	20	0,0000000+000	5	21	0,0000000+000	5	22	0,0000000+000	5	23	0,0000000+000	5	24
0,0000000+000	5	25	0,0000000+000	5	26	0,0000000+000	5	27	0,0000000+000	5	28	0,0000000+000	5	29
0,0000000+000	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0,0000000+000	5	33	0,0000000+000	5	34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0,0000000+000	5	38	0,0000000+000	5	39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0,0000000+000	5	43	0,0000000+000	5	44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47						

SCATTERING FROM GROUP 6

0,0000000+000	6	6	0,0000000+000	6	7	0,0000000+000	6	8	0,0000000+000	6	9	0,0000000+000	6	10
0,0000000+000	6	11	0,0000000+000	6	12	0,0000000+000	6	13	0,0000000+000	6	14	0,0000000+000	6	15
0,0000000+000	6	16	0,0000000+000	6	17	0,0000000+000	6	18	0,0000000+000	6	19	0,0000000+000	6	20
0,0000000+000	6	21	0,0000000+000	6	22	0,0000000+000	6	23	0,0000000+000	6	24	0,0000000+000	6	25
0,0000000+000	6	26	0,0000000+000	6	27	0,0000000+000	6	28	0,0000000+000	6	29	0,0000000+000	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0,0000000+000	6	39	0,0000000+000	6	40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0,0000000+000	6	44	0,0000000+000	6	45
0,0000000+000	6	46	0,0000000+000	6	47									

SCATTERING FROM GROUP 7

0,0000000+000	7	7	2,1859501-002	7	8	4,4833714-002	7	9	1,9061099-001	7	10	1,3288710-001	7	11
0,0000000+000	7	12	4,9038342-002	7	13	4,5529341-002	7	14	3,1846200-002	7	15	1,1135251-002	7	16
1,5005349-002	7	17	1,0055333-002	7	18	6,1439539-003	7	19	3,7481736-003	7	20	2,2837612-003	7	21
1,3901289-003	7	22	8,4551814-004	7	23	5,1395720-004	7	24	3,1225966-004	7	25	1,8965128-004	7	26
1,1514918-004	7	27	0,0000000+000	7	28	0,0000000+000	7	29	0,0000000+000	7	30	0,0000000+000	7	31
0,0000000+000	7	32	0,0000000+000	7	33	0,0000000+000	7	34	0,0000000+000	7	35	0,0000000+000	7	36
0,0000000+000	7	37	0,0000000+000	7	38	0,0000000+000	7	39	0,0000000+000	7	40	0,0000000+000	7	41
0,0000000+000	7	42	0,0000000+000	7	43	0,0000000+000	7	44	0,0000000+000	7	45	0,0000000+000	7	46
0,0000000+000	7	47												

SCATTERING FROM GROUP 8

1,1706028-002	8	8	8,0558434-002	8	9	6,0582975-002	8	10	2,1439624-001	8	11	3,1226473-001	8	12
1,5561016-001	8	13	1,0699694-001	8	14	0,0000000+000	8	15	1,1456251-002	8	16	1,5886951-002	8	17
9,7421673-003	8	18	5,9604380-003	8	19	3,6400319-003	8	20	2,2197203-003	8	21	1,3520397-003	8	22
8,2277415-004	8	23	5,0033508-004	8	24	3,0408360-004	8	25	1,8472871-004	8	26	1,1218151-004	8	27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0,0000000+000	8	31	0,0000000+000	8	32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0,0000000+000	8	36	0,0000000+000	8	37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0,0000000+000	8	41	0,0000000+000	8	42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0,0000000+000	8	46	0,0000000+000	8	47

SCATTERING FROM GROUP 9

1,2800983-001	9	9	2,1270294-001	9	10	5,8378781-002	9	11	5,4947483-003	9	12	1,0557807-001	9	13
7,4873351-002	9	14	1,4160487-001	9	15	7,7932625-002	9	16	3,6230883-002	9	17	2,2120568-002	9	18
1,3583160-002	9	19	8,3195231-003	9	20	5,0851743-003	9	21	3,1031395-003	9	22	1,8911696-003	9	23
1,1513636-003	9	24	7,0039300-004	9	25	4,2578729-004	9	26	2,5871700-004	9	27	1,5714008-004	9	28

0,0000000+000 9 29	0,0000000+000 9 30	0,0000000+000 9 31	0,0000000+000 9 32	0,0000000+000 9 33
0,0000000+000 9 34	0,0000000+000 9 35	0,0000000+000 9 36	0,0000000+000 9 37	0,0000000+000 9 38
0,0000000+000 9 39	0,0000000+000 9 40	0,0000000+000 9 41	0,0000000+000 9 42	0,0000000+000 9 43
0,0000000+000 9 44	0,0000000+000 9 45	0,0000000+000 9 46	0,0000000+000 9 47	

SCATTERING FROM GROUP 10

3,3141523+001 10 10	2,5042053+001 10 11	1,3020693+001 10 12	1,8897463+003 10 13	0,0000000+000 10 14
0,0000000+000 10 15	1,3873693+002 10 16	2,3047318+002 10 17	1,4242106+002 10 18	8,7682521+003 10 19
5,3818370+003 10 20	3,2951657+003 10 21	2,0139556+003 10 22	1,2284644+003 10 23	7,4854104+004 10 24
4,5565618+004 10 25	2,7715222+004 10 26	1,6847421+004 10 27	1,2360630+004 10 28	0,0000000+000 10 29
0,0000000+000 10 30	0,0000000+000 10 31	0,0000000+000 10 32	0,0000000+000 10 33	0,0000000+000 10 34
0,0000000+000 10 35	0,0000000+000 10 36	0,0000000+000 10 37	0,0000000+000 10 38	0,0000000+000 10 39
0,0000000+000 10 40	0,0000000+000 10 41	0,0000000+000 10 42	0,0000000+000 10 43	0,0000000+000 10 44
0,0000000+000 10 45	0,0000000+000 10 46	0,0000000+000 10 47		

SCATTERING FROM GROUP 11

3,2159241+001 11 11	2,2934504+001 11 12	1,2782357+001 11 13	8,2839297+002 11 14	0,0000000+000 11 15
0,0000000+000 11 16	0,0000000+000 11 17	0,0000000+000 11 18	0,0000000+000 11 19	0,0000000+000 11 20
0,0000000+000 11 21	0,0000000+000 11 22	0,0000000+000 11 23	0,0000000+000 11 24	0,0000000+000 11 25
0,0000000+000 11 26	0,0000000+000 11 27	0,0000000+000 11 28	0,0000000+000 11 29	0,0000000+000 11 30
0,0000000+000 11 31	0,0000000+000 11 32	0,0000000+000 11 33	0,0000000+000 11 34	0,0000000+000 11 35
0,0000000+000 11 36	0,0000000+000 11 37	0,0000000+000 11 38	0,0000000+000 11 39	0,0000000+000 11 40
0,0000000+000 11 41	0,0000000+000 11 42	0,0000000+000 11 43	0,0000000+000 11 44	0,0000000+000 11 45
0,0000000+000 11 46	0,0000000+000 11 47			

SCATTERING FROM GROUP 12

2,6187027+001 12 12	2,9722993+001 12 13	1,7108707+002 12 14	8,7301867+002 12 15	6,3454082+002 12 16
9,6447202+003 12 17	0,0000000+000 12 18	1,8418813+004 12 19	0,0000000+000 12 20	0,0000000+000 12 21
0,0000000+000 12 22	0,0000000+000 12 23	0,0000000+000 12 24	0,0000000+000 12 25	0,0000000+000 12 26
0,0000000+000 12 27	0,0000000+000 12 28	0,0000000+000 12 29	0,0000000+000 12 30	0,0000000+000 12 31
0,0000000+000 12 32	0,0000000+000 12 33	0,0000000+000 12 34	0,0000000+000 12 35	0,0000000+000 12 36
0,0000000+000 12 37	0,0000000+000 12 38	0,0000000+000 12 39	0,0000000+000 12 40	0,0000000+000 12 41
0,0000000+000 12 42	0,0000000+000 12 43	0,0000000+000 12 44	0,0000000+000 12 45	0,0000000+000 12 46
0,0000000+000 12 47				

SCATTERING FROM GROUP 13

3,9433407+001 13 13	1,6585898+001 13 14	4,9487614+003 13 15	2,4330634+002 13 16	3,5360991+002 13 17
2,6150944+002 13 18	1,1688947+002 13 19	4,7872828+003 13 20	2,5443828+003 13 21	5,9619887+004 13 22
3,6603592+004 13 23	2,2416281+004 13 24	1,3700110+004 13 25	0,0000000+000 13 26	0,0000000+000 13 27
0,0000000+000 13 28	0,0000000+000 13 29	0,0000000+000 13 30	0,0000000+000 13 31	0,0000000+000 13 32
0,0000000+000 13 33	0,0000000+000 13 34	0,0000000+000 13 35	0,0000000+000 13 36	0,0000000+000 13 37
0,0000000+000 13 38	0,0000000+000 13 39	0,0000000+000 13 40	0,0000000+000 13 41	0,0000000+000 13 42
0,0000000+000 13 43	0,0000000+000 13 44	0,0000000+000 13 45	0,0000000+000 13 46	0,0000000+000 13 47

SCATTERING FROM GROUP 14

3,3733236+001 14 14	1,7832921+001 14 15	8,8256902+003 14 16	2,7289603+003 14 17	2,6335018+004 14 18
9,4004729+003 14 19	1,0083210+002 14 20	7,1837584+003 14 21	5,8436474+003 14 22	3,6216672+003 14 23
2,2241367+003 14 24	1,3623821+003 14 25	7,1505564+004 14 26	1,4751145+004 14 27	0,0000000+000 14 28
0,0000000+000 14 29	0,0000000+000 14 30	0,0000000+000 14 31	0,0000000+000 14 32	0,0000000+000 14 33
0,0000000+000 14 34	0,0000000+000 14 35	0,0000000+000 14 36	0,0000000+000 14 37	0,0000000+000 14 38
0,0000000+000 14 39	0,0000000+000 14 40	0,0000000+000 14 41	0,0000000+000 14 42	0,0000000+000 14 43
0,0000000+000 14 44	0,0000000+000 14 45	0,0000000+000 14 46	0,0000000+000 14 47	

SCATTERING FROM GROUP 15

2,8078801+001 15 15	1,7034313+001 15 16	2,4478194+002 15 17	1,6634778+003 15 18	1,2893030+003 15 19
7,1298646+004 15 20	0,0000000+000 15 21	0,0000000+000 15 22	0,0000000+000 15 23	0,0000000+000 15 24

0,0000000+000 15 25 1,5118088-004 15 26 4,6317029-004 15 27 2,8234165-004 15 28 1,7192497-004 15 29
1,0459998+004 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0, 000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0, 000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0, 000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

2,4116660-001 16 16 1,3347346-001 16 17 5,2082496-002 16 18 2,2298662-003 16 19 2,1182807-004 16 20
7,7150363+004 16 21 5,3178279-004 16 22 3,6513650-004 16 23 2,3012643-004 16 24 1,4197307-004 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0, 000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0, 000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0, 000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0, 000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

2,2203614+001 17 17 8,6520255-002 17 18 5,8487785-002 17 19 1,1328542-002 17 20 3,3635813-004 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0, 000000+000 17 25 1,0774960-004 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0, 000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0, 000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0, 000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0, 000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

2,0004544+001 18 18 6,6902741-002 18 19 3,5412103-002 18 20 2,8872308-002 18 21 4,9831611-003 18 22
2,0495575-003 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0, 000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0, 000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0, 000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0, 000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0, 000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

1,7580384+001 19 19 8,3856811-002 19 20 2,9747557-003 19 21 1,8925077-002 19 22 1,2908635-002 19 23
4,8819720-003 19 24 1,4480433-003 19 25 9,0140440-004 19 26 5,5862044-004 19 27 1,6863073-004 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0, 000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0, 000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0, 000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0, 000000+000 19 47

SCATTERING FROM GROUP 20

1,4852481+001 20 20 1,0536257-001 20 21 0,0000000+000 20 22 0, 000000+000 20 23 5,7325954-003 20 24
5,2016148+003 20 25 3,0646764-003 20 26 1,9098981-003 20 27 8,6793904-004 20 28 2,7221516-004 20 29
1,6693123+004 20 30 1,0213354-004 20 31 0,0000000+000 20 32 0, 000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0, 000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0, 000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

1,1530689+001 21 21 1,3180890-001 21 22 0,0000000+000 21 23 0, 000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 6,9674118-004 21 28 9,3959099-004 21 29 5,7779318-004 21 30
3,5445980+004 21 31 2,1693724+004 21 32 1,3251855+004 21 33 0, 000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0, 000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0, 000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

7.5297038+002 22 22	1.6462734+001 22 23	0.0000000+000 22 24	0.0000000+000 22 25	0.0000000+000 22 26
0.0000000+000 22 27	0.0000000+000 22 28	0.0000000+000 22 29	0.0000000+000 22 30	0.0000000+000 22 31
0.0000000+000 22 32	0.0000000+000 22 33	0.0000000+000 22 34	0.0000000+000 22 35	0.0000000+000 22 36
0.0000000+000 22 37	0.0000000+000 22 38	0.0000000+000 22 39	0.0000000+000 22 40	0.0000000+000 22 41
0.0000000+000 22 42	0.0000000+000 22 43	0.0000000+000 22 44	0.0000000+000 22 45	0.0000000+000 22 46
0.0000000+000 22 47				

SCATTERING FROM GROUP 23

2.7170481+002 23 23	1.7977115+001 23 24	2.3911425+002 23 25	0.0000000+000 23 26	0.0000000+000 23 27
0.0000000+000 23 28	0.0000000+000 23 29	0.0000000+000 23 30	0.0000000+000 23 31	0.0000000+000 23 32
0.0000000+000 23 33	0.0000000+000 23 34	0.0000000+000 23 35	0.0000000+000 23 36	0.0000000+000 23 37
0.0000000+000 23 38	0.0000000+000 23 39	0.0000000+000 23 40	0.0000000+000 23 41	0.0000000+000 23 42
0.0000000+000 23 43	0.0000000+000 23 44	0.0000000+000 23 45	0.0000000+000 23 46	0.0000000+000 23 47

SCATTERING FROM GROUP 24

0.0000000+000 24 24	1.4224109-001 24 25	7.7389645-002 24 26	0.0000000+000 24 27	0.0000000+000 24 28
0.0000000+000 24 29	0.0000000+000 24 30	0.0000000+000 24 31	0.0000000+000 24 32	0.0000000+000 24 33
0.0000000+000 24 34	0.0000000+000 24 35	0.0000000+000 24 36	0.0000000+000 24 37	0.0000000+000 24 38
0.0000000+000 24 39	0.0000000+000 24 40	0.0000000+000 24 41	0.0000000+000 24 42	0.0000000+000 24 43
0.0000000+000 24 44	0.0000000+000 24 45	0.0000000+000 24 46	0.0000000+000 24 47	

SCATTERING FROM GROUP 25

0.0000000+000 25 25	6.8256670-002 25 26	1.2729522-001 25 27	1.5153775-002 25 28	0.0000000+000 25 29
0.0000000+000 25 30	0.0000000+000 25 31	0.0000000+000 25 32	0.0000000+000 25 33	0.0000000+000 25 34
0.0000000+000 25 35	0.0000000+000 25 36	0.0000000+000 25 37	0.0000000+000 25 38	0.0000000+000 25 39
0.0000000+000 25 40	0.0000000+000 25 41	0.0000000+000 25 42	0.0000000+000 25 43	0.0000000+000 25 44
0.0000000+000 25 45	0.0000000+000 25 46	0.0000000+000 25 47		

SCATTERING FROM GROUP 26

0.0000000+000 26 26	0.0000000+000 26 27	1.0189017-001 26 28	8.9065379-002 26 29	2.8917797-003 26 30
0.0000000+000 26 31	0.0000000+000 26 32	0.0000000+000 26 33	0.0000000+000 26 34	0.0000000+000 26 35
0.0000000+000 26 36	0.0000000+000 26 37	0.0000000+000 26 38	0.0000000+000 26 39	0.0000000+000 26 40
0.0000000+000 26 41	0.0000000+000 26 42	0.0000000+000 26 43	0.0000000+000 26 44	0.0000000+000 26 45
0.0000000+000 26 46	0.0000000+000 26 47			

SCATTERING FROM GROUP 27

0.0000000+000 27 27	0.0000000+000 27 28	0.0000000+000 27 29	7.7350771-002 27 30	5.4614511-002 27 31
2.4001116-002 27 32	0.0000000+000 27 33	0.0000000+000 27 34	0.0000000+000 27 35	0.0000000+000 27 36
0.0000000+000 27 37	0.0000000+000 27 38	0.0000000+000 27 39	0.0000000+000 27 40	0.0000000+000 27 41
0.0000000+000 27 42	0.0000000+000 27 43	0.0000000+000 27 44	0.0000000+000 27 45	0.0000000+000 27 46
0.0000000+000 27 47				

SCATTERING FROM GROUP 28

0.0000000+000 28 28	0.0000000+000 28 29	0.0000000+000 28 30	0.0000000+000 28 31	1.7151607-002 28 32
3.3328489-002 28 33	2.3511746-002 28 34	1.5715731-002 28 35	9.5367773-003 28 36	2.6181758-003 28 37
0.0000000+000 28 38	0.0000000+000 28 39	0.0000000+000 28 40	0.0000000+000 28 41	0.0000000+000 28 42
0.0000000+000 28 43	0.0000000+000 28 44	0.0000000+000 28 45	0.0000000+000 28 46	0.0000000+000 28 47

SCATTERING FROM GROUP 29

0.0000000+000 29 29	0.0000000+000 29 30	0.0000000+000 29 31	0.0000000+000 29 32	0.0000000+000 29 33
0.0000000+000 29 34	0.0000000+000 29 35	0.0000000+000 29 36	4.6544540-003 29 37	4.5048546-003 29 38
2.7323324+003 29 39	1.6572434-003 29 40	1.0051689-003 29 41	6.3966576-004 29 42	3.6978099-004 29 43
2.2428354+004 29 44	1.3603482-004 29 45	0.0000000+000 29 46	0.0000000+000 29 47	

SCATTERING FROM GROUP 30

0,0000000+000 30 30	0,0000000+000 30 31	0,0000000+000 30 32	0,0000000+000 30 33	0,0000000+000 30 34
0,0000000+000 30 35	0,0000000+000 30 36	0,0000000+000 30 37	0,0000000+000 30 38	0,0000000+000 30 39
0,0000000+000 30 40	0,0000000+000 30 41	0,0000000+000 30 42	0,0000000+000 30 43	0,0000000+000 30 44
0,0000000+000 30 45	0,0000000+000 30 46	0,0000000+000 30 47		

SCATTERING FROM GROUP 31

0,0000000+000 31 31	0,0000000+000 31 32	0,0000000+000 31 33	0,0000000+000 31 34	0,0000000+000 31 35
0,0000000+000 31 36	0,0000000+000 31 37	0,0000000+000 31 38	0,0000000+000 31 39	0,0000000+000 31 40
0,0000000+000 31 41	0,0000000+000 31 42	0,0000000+000 31 43	0,0000000+000 31 44	0,0000000+000 31 45
0,0000000+000 31 46	0,0000000+000 31 47			

SCATTERING FROM GROUP 32

0,0000000+000 32 32	0,0000000+000 32 33	0,0000000+000 32 34	0,0000000+000 32 35	0,0000000+000 32 36
0,0000000+000 32 37	0,0000000+000 32 38	0,0000000+000 32 39	0,0000000+000 32 40	0,0000000+000 32 41
0,0000000+000 32 42	0,0000000+000 32 43	0,0000000+000 32 44	0,0000000+000 32 45	0,0000000+000 32 46
0,0000000+000 32 47				

SCATTERING FROM GROUP 33

0,0000000+000 33 33	0,0000000+000 33 34	0,0000000+000 33 35	0,0000000+000 33 36	0,0000000+000 33 37
0,0000000+000 33 38	0,0000000+000 33 39	0,0000000+000 33 40	0,0000000+000 33 41	0,0000000+000 33 42
0,0000000+000 33 43	0,0000000+000 33 44	0,0000000+000 33 45	0,0000000+000 33 46	0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34	0,0000000+000 34 35	0,0000000+000 34 36	0,0000000+000 34 37	0,0000000+000 34 38
0,0000000+000 34 39	0,0000000+000 34 40	0,0000000+000 34 41	0,0000000+000 34 42	0,0000000+000 34 43
0,0000000+000 34 44	0,0000000+000 34 45	0,0000000+000 34 46	0,0000000+000 34 47	

SCATTERING FROM GROUP 35

0,0000000+000 35 35	0,0000000+000 35 36	0,0000000+000 35 37	0,0000000+000 35 38	0,0000000+000 35 39
0,0000000+000 35 40	0,0000000+000 35 41	0,0000000+000 35 42	0,0000000+000 35 43	0,0000000+000 35 44
0,0000000+000 35 45	0,0000000+000 35 46	0,0000000+000 35 47		

SCATTERING FROM GROUP 36

0,0000000+000 36 36	0,0000000+000 36 37	0,0000000+000 36 38	0,0000000+000 36 39	0,0000000+000 36 40
0,0000000+000 36 41	0,0000000+000 36 42	0,0000000+000 36 43	0,0000000+000 36 44	0,0000000+000 36 45
0,0000000+000 36 46	0,0000000+000 36 47			

SCATTERING FROM GROUP 37

0,0000000+000 37 37	0,0000000+000 37 38	0,0000000+000 37 39	0,0000000+000 37 40	0,0000000+000 37 41
0,0000000+000 37 42	0,0000000+000 37 43	0,0000000+000 37 44	0,0000000+000 37 45	0,0000000+000 37 46
0,0000000+000 37 47				

SCATTERING FROM GROUP 38

0,0000000+000 38 38	0,0000000+000 38 39	0,0000000+000 38 40	0,0000000+000 38 41	0,0000000+000 38 42
0,0000000+000 38 43	0,0000000+000 38 44	0,0000000+000 38 45	0,0000000+000 38 46	0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39	0,0000000+000 39 40	0,0000000+000 39 41	0,0000000+000 39 42	0,0000000+000 39 43
0,0000000+000 39 44	0,0000000+000 39 45	0,0000000+000 39 46	0,0000000+000 39 47	

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO. 9 WAS 4.059+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.900-002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.700-002SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

3,7652993+005 1 1 4,5933728+004 1 2 2,9621865+003 1 3 1,1531005+002 1 4 3,0107464+002 1 5
5,7348534+002 1 6 8,5206850+002 1 7 1,0413922+001 1 8 1,1919794+001 1 9 1,0155309+001 1 10
8,5979724+002 1 11 6,7644256+002 1 12 5,0254970+002 1 13 3,5702943+002 1 14 2,4494992+002 1 15
1,6354423+002 1 16 1,0690110+002 1 17 6,8730581+003 1 18 4,3623789+003 1 19 2,7411811+003 1 20
1,7090549+003 1 21 1,0590799+003 1 22 6,5319148+004 1 23 4,0137201+004 1 24 2,4592536+004 1 25
1,5034379+004 1 26 9,1750721+005 1 27 5,5916846+005 1 28 0,0000000+000 1 29 0,0000000+000 1 30
0,0000000+000 1 31 0,0000000+000 1 32 0,0000000+000 1 33 0,0000000+000 1 34 0,0000000+000 1 35
0,0000000+000 1 36 0,0000000+000 1 37 0,0000000+000 1 38 0,0000000+000 1 39 0,0000000+000 1 40
0,0000000+000 1 41 0,0000000+000 1 42 0,0000000+000 1 43 0,0000000+000 1 44 0,0000000+000 1 45
0,0000000+000 1 46 0,0000000+000 1 47

SCATTERING FROM GROUP 2

2,1540820*004	2	2	1,8907382*003	2	3	9,3951978*003	2	4	2,9754966*002	2	5	6,6004927*002	2	6
1,1056686*001	2	7	1,4848874*001	2	8	1,6764472*001	2	9	1,6519650*001	2	10	1,4633884*001	2	11
1,1927595*001	2	12	9,1094618*002	2	13	6,6126492*002	2	14	4,6136842*002	2	15	3,1210245*002	2	16
2,0610129*002	2	17	1,3356919*002	2	18	8,5304915*003	2	19	5,3862651*003	2	20	3,3708663*003	2	21
2,0950206*003	2	22	1,2950681*003	2	23	7,9720899*004	2	24	4,8913705*004	2	25	2,9935181*004	2	26
1,8283982*004	2	27	1,1150354*004	2	28	0,0000000*000	2	29	0,0000000*000	2	30	0,0000000*000	2	31
0,0000000*000	2	32	0,0000000*000	2	33	0,0000000*000	2	34	0,0000000*000	2	35	0,0000000*000	2	36
0,0000000*000	2	37	0,0000000*000	2	38	0,0000000*000	2	39	0,0000000*000	2	40	0,0000000*000	2	41
0,0000000*000	2	42	0,0000000*000	2	43	0,0000000*000	2	44	0,0000000*000	2	45	0,0000000*000	2	46
0,0000000*000	2	47												

SCATTERING FROM GROUP 3

8,3307802*004	3	3	5,4193447*003	3	4	2,1241959*002	3	5	5,5765737*002	3	6	1,0667965*001	3	7
1,5903842*001	3	8	1,9489235*001	3	9	2,0478526*001	3	10	1,9075891*001	3	11	1,6171150*001	3	12
1,2735262*001	3	13	9,4687647*002	3	14	6,7310302*002	3	15	4,6231929*002	3	16	3,0858733*002	3	17
2,0176684*002	3	18	1,2975224*002	3	19	8,2369041*003	3	20	5,1765139*003	3	21	3,2277632*003	3	22
2,0003692*003	3	23	1,2338145*003	3	24	7,5819021*004	3	25	4,6457018*004	3	26	2,8401864*004	3	27
1,7333288*004	3	28	1,0563834*004	3	29	0,0000000*000	3	30	0,0000000*000	3	31	0,0000000*000	3	32
0,0000000*000	3	33	0,0000000*000	3	34	0,0000000*000	3	35	0,0000000*000	3	36	0,0000000*000	3	37
0,0000000*000	3	38	0,0000000*000	3	39	0,0000000*000	3	40	0,0000000*000	3	41	0,0000000*000	3	42
0,0000000*000	3	43	0,0000000*000	3	44	0,0000000*000	3	45	0,0000000*000	3	46	0,0000000*000	3	47

SCATTERING FROM GROUP 4

2,2150594*003	4	4	1,0820247*002	4	5	3,3807876*002	4	6	7,4198933*002	4	7	1,2325183*001	4	8
1,6443367*001	4	9	1,8468628*001	4	10	1,8128136*001	4	11	1,6005153*001	4	12	1,3012910*001	4	13
9,9190925*002	4	14	7,1894771*002	4	15	5,0102208*002	4	16	3,3861507*002	4	17	2,2344882*002	4	18
1,4473070*002	4	19	9,2393005*003	4	20	5,8318352*003	4	21	3,6487500*003	4	22	2,2672601*003	4	23
1,4013153*003	4	24	8,6250410*004	4	25	5,2914800*004	4	26	3,2381394*004	4	27	1,9776934*004	4	28
1,2060248*004	4	29	0,0000000*000	4	30	0,0000000*000	4	31	0,0000000*000	4	32	0,0000000*000	4	33
0,0000000*000	4	34	0,0000000*000	4	35	0,0000000*000	4	36	0,0000000*000	4	37	0,0000000*000	4	38
0,0000000*000	4	39	0,0000000*000	4	40	0,0000000*000	4	41	0,0000000*000	4	42	0,0000000*000	4	43
0,0000000*000	4	44	0,0000000*000	4	45	0,0000000*000	4	46	0,0000000*000	4	47			

SCATTERING FROM GROUP 5

5,0893891*003	5	5	1,9145912*002	5	6	4,8657533*002	5	7	9,7288690*002	5	8	1,3256158*001	5	9
1,5989741*001	5	10	1,6594387*001	5	11	1,5308514*001	5	12	1,2879354*001	5	13	1,0082938*001	5	14
7,4621356*002	5	15	5,2854691*002	5	16	3,6177566*002	5	17	2,4110376*002	5	18	1,5737385*002	5	19
1,0106913*002	5	20	6,4093855*003	5	21	4,0247432*003	5	22	2,5080058*003	5	23	1,5535444*003	5	24
9,5784933*004	5	25	5,8843173*004	5	26	3,6046934*004	5	27	2,2033589*004	5	28	1,3444919*004	5	29
8,1931672*005	5	30	0,0000000*000	5	31	0,0000000*000	5	32	0,0000000*000	5	33	0,0000000*000	5	34
0,0000000*000	5	35	0,0000000*000	5	36	0,0000000*000	5	37	0,0000000*000	5	38	0,0000000*000	5	39
0,0000000*000	5	40	0,0000000*000	5	41	0,0000000*000	5	42	0,0000000*000	5	43	0,0000000*000	5	44
0,0000000*000	5	45	0,0000000*000	5	46	0,0000000*000	5	47						

SCATTERING FROM GROUP 6

1,2242357*002	6	6	3,5101115*002	6	7	7,1984315*002	6	8	1,1335250*001	6	9	1,4500930*001	6	10
1,5759386*001	6	11	1,5072548*001	6	12	1,3043837*001	6	13	1,0439380*001	6	14	7,8600827*002	6	15
5,6426253*002	6	16	3,9028964*002	6	17	2,6224021*002	6	18	1,7226349*002	6	19	1,1118197*002	6	20
7,0780168*003	6	21	4,4580180*003	6	22	2,7845276*003	6	23	1,7279880*003	6	24	1,0669223*003	6	25
6,5616559*004	6	26	4,0231010*004	6	27	2,4607656*004	6	28	1,5023493*004	6	29	9,1588586*005	6	30
0,0000000*000	6	31	0,0000000*000	6	32	0,0000000*000	6	33	0,0000000*000	6	34	0,0000000*000	6	35
0,0000000*000	6	36	0,0000000*000	6	37	0,0000000*000	6	38	0,0000000*000	6	39	0,0000000*000	6	40
0,0000000*000	6	41	0,0000000*000	6	42	0,0000000*000	6	43	0,0000000*000	6	44	0,0000000*000	6	45
0,0000000*000	6	46	0,0000000*000	6	47									

SCATTERING FROM GROUP 7

1.2362745*002	7	7	2.7342086-002	7	8	4.5693669*002	7	9	6.1251895*002	7	10	6.9053277-002	7	11
6.7967379*002	7	12	6.0155073-002	7	13	4.8996276*002	7	14	3.7399579-002	7	15	2.7137206-002	7	16
1.8927520*002	7	17	1.2800616-002	7	18	8.4513676*003	7	19	5.4762646-003	7	20	3.4970280-003	7	21
2.2078594*003	7	22	1.3816339-003	7	23	8.5864697*004	7	24	5.3076146-004	7	25	3.2671098-004	7	26
2.0045191*004	7	27	1.2267394-004	7	28	7.4926272*005	7	29	4.5692616-005	7	30	0.0000000+000	7	31
0.0000000+000	7	32	0.0000000+000	7	33	0.0000000+000	7	34	0.0000000+000	7	35	0.0000000+000	7	36
0.0000000+000	7	37	0.0000000+000	7	38	0.0000000+000	7	39	0.0000000+000	7	40	0.0000000+000	7	41
0.0000000+000	7	42	0.0000000+000	7	43	0.0000000+000	7	44	0.0000000+000	7	45	0.0000000+000	7	46
0.0000000+000	7	47												

SCATTERING FROM GROUP 8

0.0000000+000	8	8	0.0000000+000	8	9	0.0000000+000	8	10	0.0000000+000	8	11	0.0000000+000	8	12
0.0000000+000	8	13	0.0000000+000	8	14	0.0000000+000	8	15	0.0000000+000	8	16	0.0000000+000	8	17
0.0000000+000	8	18	0.0000000+000	8	19	0.0000000+000	8	20	0.0000000+000	8	21	0.0000000+000	8	22
0.0000000+000	8	23	0.0000000+000	8	24	0.0000000+000	8	25	0.0000000+000	8	26	0.0000000+000	8	27
0.0000000+000	8	28	0.0000000+000	8	29	0.0000000+000	8	30	0.0000000+000	8	31	0.0000000+000	8	32
0.0000000+000	8	33	0.0000000+000	8	34	0.0000000+000	8	35	0.0000000+000	8	36	0.0000000+000	8	37
0.0000000+000	8	38	0.0000000+000	8	39	0.0000000+000	8	40	0.0000000+000	8	41	0.0000000+000	8	42
0.0000000+000	8	43	0.0000000+000	8	44	0.0000000+000	8	45	0.0000000+000	8	46	0.0000000+000	8	47

SCATTERING FROM GROUP 9

0.0000000+000	9	9	0.0000000+000	9	10	0.0000000+000	9	11	0.0000000+000	9	12	0.0000000+000	9	13
0.0000000+000	9	14	0.0000000+000	9	15	0.0000000+000	9	16	0.0000000+000	9	17	0.0000000+000	9	18
0.0000000+000	9	19	0.0000000+000	9	20	0.0000000+000	9	21	0.0000000+000	9	22	0.0000000+000	9	23
0.0000000+000	9	24	0.0000000+000	9	25	0.0000000+000	9	26	0.0000000+000	9	27	0.0000000+000	9	28
0.0000000+000	9	29	0.0000000+000	9	30	0.0000000+000	9	31	0.0000000+000	9	32	0.0000000+000	9	33
0.0000000+000	9	34	0.0000000+000	9	35	0.0000000+000	9	36	0.0000000+000	9	37	0.0000000+000	9	38
0.0000000+000	9	39	0.0000000+000	9	40	0.0000000+000	9	41	0.0000000+000	9	42	0.0000000+000	9	43
0.0000000+000	9	44	0.0000000+000	9	45	0.0000000+000	9	46	0.0000000+000	9	47			

SCATTERING FROM GROUP 10

0.0000000+000	10	10	0.0000000+000	10	11	0.0000000+000	10	12	0.0000000+000	10	13	0.0000000+000	10	14
0.0000000+000	10	15	0.0000000+000	10	16	0.0000000+000	10	17	0.0000000+000	10	18	0.0000000+000	10	19
0.0000000+000	10	20	0.0000000+000	10	21	0.0000000+000	10	22	0.0000000+000	10	23	0.0000000+000	10	24
0.0000000+000	10	25	0.0000000+000	10	26	0.0000000+000	10	27	0.0000000+000	10	28	0.0000000+000	10	29
0.0000000+000	10	30	0.0000000+000	10	31	0.0000000+000	10	32	0.0000000+000	10	33	0.0000000+000	10	34
0.0000000+000	10	35	0.0000000+000	10	36	0.0000000+000	10	37	0.0000000+000	10	38	0.0000000+000	10	39
0.0000000+000	10	40	0.0000000+000	10	41	0.0000000+000	10	42	0.0000000+000	10	43	0.0000000+000	10	44
0.0000000+000	10	45	0.0000000+000	10	46	0.0000000+000	10	47						

SCATTERING FROM GROUP 11

0.0000000+000	11	11	0.0000000+000	11	12	0.0000000+000	11	13	0.0000000+000	11	14	0.0000000+000	11	15
0.0000000+000	11	16	0.0000000+000	11	17	0.0000000+000	11	18	0.0000000+000	11	19	0.0000000+000	11	20
0.0000000+000	11	21	0.0000000+000	11	22	0.0000000+000	11	23	0.0000000+000	11	24	0.0000000+000	11	25
0.0000000+000	11	26	0.0000000+000	11	27	0.0000000+000	11	28	0.0000000+000	11	29	0.0000000+000	11	30
0.0000000+000	11	31	0.0000000+000	11	32	0.0000000+000	11	33	0.0000000+000	11	34	0.0000000+000	11	35
0.0000000+000	11	36	0.0000000+000	11	37	0.0000000+000	11	38	0.0000000+000	11	39	0.0000000+000	11	40
0.0000000+000	11	41	0.0000000+000	11	42	0.0000000+000	11	43	0.0000000+000	11	44	0.0000000+000	11	45
0.0000000+000	11	46	0.0000000+000	11	47									

SCATTERING FROM GROUP 12

0.0000000+000	12	12	0.0000000+000	12	13	0.0000000+000	12	14	0.0000000+000	12	15	0.0000000+000	12	16
0.0000000+000	12	17	0.0000000+000	12	18	0.0000000+000	12	19	0.0000000+000	12	20	0.0000000+000	12	21
0.0000000+000	12	22	0.0000000+000	12	23	0.0000000+000	12	24	0.0000000+000	12	25	0.0000000+000	12	26
0.0000000+000	12	27	0.0000000+000	12	28	0.0000000+000	12	29	0.0000000+000	12	30	0.0000000+000	12	31
0.0000000+000	12	32	0.0000000+000	12	33	0.0000000+000	12	34	0.0000000+000	12	35	0.0000000+000	12	36

0,0000000+000 12 37 0,0000000+000 12 38 0,0000000+000 12 39 0,0000000+000 12 40 0,0000000+000 12 41
0,0000000+000 12 42 0,0000000+000 12 43 0,0000000+000 12 44 0,0000000+000 12 45 0,0000000+000 12 46
0,0000000+000 12 47

SCATTERING FROM GROUP 13

0,0000000+000 13 13 0,0000000+000 13 14 0,0000000+000 13 15 0,0000000+000 13 16 0,0000000+000 13 17
0,0000000+000 13 18 0,0000000+000 13 19 0,0000000+000 13 20 0,0000000+000 13 21 0,0000000+000 13 22
0,0000000+000 13 23 0,0000000+000 13 24 0,0000000+000 13 25 0,0000000+000 13 26 0,0000000+000 13 27
0,0000000+000 13 28 0,0000000+000 13 29 0,0000000+000 13 30 0,0000000+000 13 31 0,0000000+000 13 32
0,0000000+000 13 33 0,0000000+000 13 34 0,0000000+000 13 35 0,0000000+000 13 36 0,0000000+000 13 37
0,0000000+000 13 38 0,0000000+000 13 39 0,0000000+000 13 40 0,0000000+000 13 41 0,0000000+000 13 42
0,0000000+000 13 43 0,0000000+000 13 44 0,0000000+000 13 45 0,0000000+000 13 46 0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,0000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,0000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,0000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,0000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,0000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,0000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,0000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,0000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,0000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,0000000+000 15 28 0,0000000+000 15 29
0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,0000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,0000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,0000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,0000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,0000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,0000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,0000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,0000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,0000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,0000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,0000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,0000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,0000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,0000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,0000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,0000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,0000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,0000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,0000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19	0,0000000+000 19 20	0,0000000+000 19 21	0,0000000+000 19 22	0,0000000+000 19 23
0,0000000+000 19 24	0,0000000+000 19 25	0,0000000+000 19 26	0,0000000+000 19 27	0,0000000+000 19 28
0,0000000+000 19 29	0,0000000+000 19 30	0,0000000+000 19 31	0,0000000+000 19 32	0,0000000+000 19 33
0,0000000+000 19 34	0,0000000+000 19 35	0,0000000+000 19 36	0,0000000+000 19 37	0,0000000+000 19 38
0,0000000+000 19 39	0,0000000+000 19 40	0,0000000+000 19 41	0,0000000+000 19 42	0,0000000+000 19 43
0,0000000+000 19 44	0,0000000+000 19 45	0,0000000+000 19 46	0,0000000+000 19 47	

SCATTERING FROM GROUP 20

0,0000000+000 20 20	0,0000000+000 20 21	0,0000000+000 20 22	0,0000000+000 20 23	0,0000000+000 20 24
0,0000000+000 20 25	0,0000000+000 20 26	0,0000000+000 20 27	0,0000000+000 20 28	0,0000000+000 20 29
0,0000000+000 20 30	0,0000000+000 20 31	0,0000000+000 20 32	0,0000000+000 20 33	0,0000000+000 20 34
0,0000000+000 20 35	0,0000000+000 20 36	0,0000000+000 20 37	0,0000000+000 20 38	0,0000000+000 20 39
0,0000000+000 20 40	0,0000000+000 20 41	0,0000000+000 20 42	0,0000000+000 20 43	0,0000000+000 20 44
0,0000000+000 20 45	0,0000000+000 20 46	0,0000000+000 20 47		

SCATTERING FROM GROUP 21

0,0000000+000 21 21	0,0000000+000 21 22	0,0000000+000 21 23	0,0000000+000 21 24	0,0000000+000 21 25
0,0000000+000 21 26	0,0000000+000 21 27	0,0000000+000 21 28	0,0000000+000 21 29	0,0000000+000 21 30
0,0000000+000 21 31	0,0000000+000 21 32	0,0000000+000 21 33	0,0000000+000 21 34	0,0000000+000 21 35
0,0000000+000 21 36	0,0000000+000 21 37	0,0000000+000 21 38	0,0000000+000 21 39	0,0000000+000 21 40
0,0000000+000 21 41	0,0000000+000 21 42	0,0000000+000 21 43	0,0000000+000 21 44	0,0000000+000 21 45
0,0000000+000 21 46	0,0000000+000 21 47			

SCATTERING FROM GROUP 22

0,0000000+000 22 22	0,0000000+000 22 23	0,0000000+000 22 24	0,0000000+000 22 25	0,0000000+000 22 26
0,0000000+000 22 27	0,0000000+000 22 28	0,0000000+000 22 29	0,0000000+000 22 30	0,0000000+000 22 31
0,0000000+000 22 32	0,0000000+000 22 33	0,0000000+000 22 34	0,0000000+000 22 35	0,0000000+000 22 36
0,0000000+000 22 37	0,0000000+000 22 38	0,0000000+000 22 39	0,0000000+000 22 40	0,0000000+000 22 41
0,0000000+000 22 42	0,0000000+000 22 43	0,0000000+000 22 44	0,0000000+000 22 45	0,0000000+000 22 46
0,0000000+000 22 47				

SCATTERING FROM GROUP 23

0,0000000+000 23 23	0,0000000+000 23 24	0,0000000+000 23 25	0,0000000+000 23 26	0,0000000+000 23 27
0,0000000+000 23 28	0,0000000+000 23 29	0,0000000+000 23 30	0,0000000+000 23 31	0,0000000+000 23 32
0,0000000+000 23 33	0,0000000+000 23 34	0,0000000+000 23 35	0,0000000+000 23 36	0,0000000+000 23 37
0,0000000+000 23 38	0,0000000+000 23 39	0,0000000+000 23 40	0,0000000+000 23 41	0,0000000+000 23 42
0,0000000+000 23 43	0,0000000+000 23 44	0,0000000+000 23 45	0,0000000+000 23 46	0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24	0,0000000+000 24 25	0,0000000+000 24 26	0,0000000+000 24 27	0,0000000+000 24 28
0,0000000+000 24 29	0,0000000+000 24 30	0,0000000+000 24 31	0,0000000+000 24 32	0,0000000+000 24 33
0,0000000+000 24 34	0,0000000+000 24 35	0,0000000+000 24 36	0,0000000+000 24 37	0,0000000+000 24 38
0,0000000+000 24 39	0,0000000+000 24 40	0,0000000+000 24 41	0,0000000+000 24 42	0,0000000+000 24 43
0,0000000+000 24 44	0,0000000+000 24 45	0,0000000+000 24 46	0,0000000+000 24 47	

SCATTERING FROM GROUP 25

0,0000000+000 25 25	0,0000000+000 25 26	0,0000000+000 25 27	0,0000000+000 25 28	0,0000000+000 25 29
0,0000000+000 25 30	0,0000000+000 25 31	0,0000000+000 25 32	0,0000000+000 25 33	0,0000000+000 25 34
0,0000000+000 25 35	0,0000000+000 25 36	0,0000000+000 25 37	0,0000000+000 25 38	0,0000000+000 25 39
0,0000000+000 25 40	0,0000000+000 25 41	0,0000000+000 25 42	0,0000000+000 25 43	0,0000000+000 25 44
0,0000000+000 25 45	0,0000000+000 25 46	0,0000000+000 25 47		

SCATTERING FROM GROUP 26

0,0000000+000 26 26	0,0000000+000 26 27	0,0000000+000 26 28	0,0000000+000 26 29	0,0000000+000 26 30
0,0000000+000 26 31	0,0000000+000 26 32	0,0000000+000 26 33	0,0000000+000 26 34	0,0000000+000 26 35
0,0000000+000 26 36	0,0000000+000 26 37	0,0000000+000 26 38	0,0000000+000 26 39	0,0000000+000 26 40
0,0000000+000 26 41	0,0000000+000 26 42	0,0000000+000 26 43	0,0000000+000 26 44	0,0000000+000 26 45
0,0000000+000 26 46	0,0000000+000 26 47			

SCATTERING FROM GROUP 27

0,0000000+000 27 27	0,0000000+000 27 28	0,0000000+000 27 29	0,0000000+000 27 30	0,0000000+000 27 31
0,0000000+000 27 32	0,0000000+000 27 33	0,0000000+000 27 34	0,0000000+000 27 35	0,0000000+000 27 36
0,0000000+000 27 37	0,0000000+000 27 38	0,0000000+000 27 39	0,0000000+000 27 40	0,0000000+000 27 41
0,0000000+000 27 42	0,0000000+000 27 43	0,0000000+000 27 44	0,0000000+000 27 45	0,0000000+000 27 46
0,0000000+000 27 47				

SCATTERING FROM GROUP 28

0,0000000+000 28 28	0,0000000+000 28 29	0,0000000+000 28 30	0,0000000+000 28 31	0,0000000+000 28 32
0,0000000+000 28 33	0,0000000+000 28 34	0,0000000+000 28 35	0,0000000+000 28 36	0,0000000+000 28 37
0,0000000+000 28 38	0,0000000+000 28 39	0,0000000+000 28 40	0,0000000+000 28 41	0,0000000+000 28 42
0,0000000+000 28 43	0,0000000+000 28 44	0,0000000+000 28 45	0,0000000+000 28 46	0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29	0,0000000+000 29 30	0,0000000+000 29 31	0,0000000+000 29 32	0,0000000+000 29 33
0,0000000+000 29 34	0,0000000+000 29 35	0,0000000+000 29 36	0,0000000+000 29 37	0,0000000+000 29 38
0,0000000+000 29 39	0,0000000+000 29 40	0,0000000+000 29 41	0,0000000+000 29 42	0,0000000+000 29 43
0,0000000+000 29 44	0,0000000+000 29 45	0,0000000+000 29 46	0,0000000+000 29 47	

SCATTERING FROM GROUP 30

0,0000000+000 30 30	0,0000000+000 30 31	0,0000000+000 30 32	0,0000000+000 30 33	0,0000000+000 30 34
0,0000000+000 30 35	0,0000000+000 30 36	0,0000000+000 30 37	0,0000000+000 30 38	0,0000000+000 30 39
0,0000000+000 30 40	0,0000000+000 30 41	0,0000000+000 30 42	0,0000000+000 30 43	0,0000000+000 30 44
0,0000000+000 30 45	0,0000000+000 30 46	0,0000000+000 30 47		

SCATTERING FROM GROUP 31

0,0000000+000 31 31	0,0000000+000 31 32	0,0000000+000 31 33	0,0000000+000 31 34	0,0000000+000 31 35
0,0000000+000 31 36	0,0000000+000 31 37	0,0000000+000 31 38	0,0000000+000 31 39	0,0000000+000 31 40
0,0000000+000 31 41	0,0000000+000 31 42	0,0000000+000 31 43	0,0000000+000 31 44	0,0000000+000 31 45
0,0000000+000 31 46	0,0000000+000 31 47			

SCATTERING FROM GROUP 32

0,0000000+000 32 32	0,0000000+000 32 33	0,0000000+000 32 34	0,0000000+000 32 35	0,0000000+000 32 36
0,0000000+000 32 37	0,0000000+000 32 38	0,0000000+000 32 39	0,0000000+000 32 40	0,0000000+000 32 41
0,0000000+000 32 42	0,0000000+000 32 43	0,0000000+000 32 44	0,0000000+000 32 45	0,0000000+000 32 46
0,0000000+000 32 47				

SCATTERING FROM GROUP 33

0,0000000+000 33 33	0,0000000+000 33 34	0,0000000+000 33 35	0,0000000+000 33 36	0,0000000+000 33 37
0,0000000+000 33 38	0,0000000+000 33 39	0,0000000+000 33 40	0,0000000+000 33 41	0,0000000+000 33 42
0,0000000+000 33 43	0,0000000+000 33 44	0,0000000+000 33 45	0,0000000+000 33 46	0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34	0,0000000+000 34 35	0,0000000+000 34 36	0,0000000+000 34 37	0,0000000+000 34 38
0,0000000+000 34 39	0,0000000+000 34 40	0,0000000+000 34 41	0,0000000+000 34 42	0,0000000+000 34 43
0,0000000+000 34 44	0,0000000+000 34 45	0,0000000+000 34 46	0,0000000+000 34 47	

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO.10 WAS 4.055+000SECONDS

N=2N SCATTERING

TIME SPENT IN PROGRAM AREA NO. 8 WAS 1.700+002SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

4.0614821+006	1	1	5.5770928+005	1	2	3.9497728+004	1	3	1.6559182+003	1	4	4.5847153+003	1	5
9.1463825+003	1	6	1.4093263+002	1	7	1.7724247+002	1	8	1.9086493+002	1	9	1.7988747+002	1	10
1.5440539+002	1	11	1.2278704+002	1	12	9.1988799+003	1	13	6.5780284+003	1	14	4.5360810+003	1	15
3.0406277+003	1	16	1.9936753+003	1	17	1.2849017+003	1	18	8.1747065+004	1	19	5.1417384+004	1	20
3.2093995+004	1	21	1.9905929+004	1	22	1.2285560+004	1	23	7.5532815+005	1	24	4.6299291+005	1	25
2.8313842+005	1	26	1.7283557+005	1	27	1.0538434+005	1	28	0.000000+000	1	29	0.0000000+000	1	30
0.0000000+000	1	31	0.0000000+000	1	32	0.0000000+000	1	33	0.000000+000	1	34	0.0000000+000	1	35
0.0000000+000	1	36	0.0000000+000	1	37	0.0000000+000	1	38	0.000000+000	1	39	0.0000000+000	1	40
0.0000000+000	1	41	0.0000000+000	1	42	0.0000000+000	1	43	0.000000+000	1	44	0.0000000+000	1	45
0.0000000+000	1	46	0.0000000+000	1	47									

SCATTERING FROM GROUP 2

8.4595755+006	2	2	8.1645486+005	2	3	4.3736613+004	2	4	1.4730276+003	2	5	3.4177416+003	2	6
5.9409901+003	2	7	8.2141326+003	2	8	9.4879275+003	2	9	9.5180535+003	2	10	8.5503262+003	2	11
7.0497087+003	2	12	5.4271659+003	2	13	3.9659783+003	2	14	2.7815105+003	2	15	1.8892561+003	2	16
1.2515468+003	2	17	8.1309741+004	2	18	5.2028837+004	2	19	3.2900874+004	2	20	2.0614242+004	2	21
1.2823555+004	2	22	7.9326787+005	2	23	4.8858344+005	2	24	2.9990477+005	2	25	1.8360300+005	2	26
1.1217139+005	2	27	6.8420686+006	2	28	0.0000000+000	2	29	0.000000+000	2	30	0.0000000+000	2	31
0.0000000+000	2	32	0.0000000+000	2	33	0.0000000+000	2	34	0.000000+000	2	35	0.0000000+000	2	36
0.0000000+000	2	37	0.0000000+000	2	38	0.0000000+000	2	39	0.000000+000	2	40	0.0000000+000	2	41
0.0000000+000	2	42	0.0000000+000	2	43	0.0000000+000	2	44	0.000000+000	2	45	0.0000000+000	2	46
0.0000000+000	2	47												

SCATTERING FROM GROUP 3

7.8851163+007	3	3	5.1658623+006	3	4	2.0362171+005	3	5	5.3693364+005	3	6	1.0307467+004	3	7
1.5408712+004	3	8	1.8923289+004	3	9	1.9917528+004	3	10	1.8577910+004	3	11	1.5765318+004	3	12
1.2425708+004	3	13	9.2444441+005	3	14	6.5748092+005	3	15	4.5146976+005	3	16	3.0163159+005	3	17
1.9726497+005	3	18	1.2688028+005	3	19	8.0857295+006	3	20	5.632136+006	3	21	3.1573878+006	3	22
1.9568861+006	3	23	1.2070576+006	3	24	7.4177799+007	3	25	4.5452820+007	3	26	2.7788627+007	3	27
1.6959358+007	3	28	1.0336112+007	3	29	0.0000000+000	3	30	0.000000+000	3	31	0.0000000+000	3	32
0.0000000+000	3	33	0.0000000+000	3	34	0.0000000+000	3	35	0.000000+000	3	36	0.0000000+000	3	37
0.0000000+000	3	38	0.0000000+000	3	39	0.0000000+000	3	40	0.000000+000	3	41	0.0000000+000	3	42
0.0000000+000	3	43	0.0000000+000	3	44	0.0000000+000	3	45	0.000000+000	3	46	0.0000000+000	3	47

SCATTERING FROM GROUP 4

0.0000000+000	4	4	0.0000000+000	4	5	0.0000000+000	4	6	0.000000+000	4	7	0.0000000+000	4	8
0.0000000+000	4	9	0.0000000+000	4	10	0.0000000+000	4	11	0.000000+000	4	12	0.0000000+000	4	13
0.0000000+000	4	14	0.0000000+000	4	15	0.0000000+000	4	16	0.000000+000	4	17	0.0000000+000	4	18
0.0000000+000	4	19	0.0000000+000	4	20	0.0000000+000	4	21	0.000000+000	4	22	0.0000000+000	4	23
0.0000000+000	4	24	0.0000000+000	4	25	0.0000000+000	4	26	0.000000+000	4	27	0.0000000+000	4	28
0.0000000+000	4	29	0.0000000+000	4	30	0.0000000+000	4	31	0.000000+000	4	32	0.0000000+000	4	33
0.0000000+000	4	34	0.0000000+000	4	35	0.0000000+000	4	36	0.000000+000	4	37	0.0000000+000	4	38

0,0000000+000	4 39	0,0000000+000	4 40	0,0000000+000	4 41	0,0000000+000	4 42	0,0000000+000	4 43		
0,0000000+000	4 44	0,0000000+000	4 45	0,0000000+000	4 46	0,0000000+000	4 47				

SCATTERING FROM GROUP 5

0,0000000+000	5 5	0,0000000+000	5 6	0,0000000+000	5 7	0,0000000+000	5 8	0,0000000+000	5 9		
0,0000000+000	5 10	0,0000000+000	5 11	0,0000000+000	5 12	0,0000000+000	5 13	0,0000000+000	5 14		
0,0000000+000	5 15	0,0000000+000	5 16	0,0000000+000	5 17	0,0000000+000	5 18	0,0000000+000	5 19		
0,0000000+000	5 20	0,0000000+000	5 21	0,0000000+000	5 22	0,0000000+000	5 23	0,0000000+000	5 24		
0,0000000+000	5 25	0,0000000+000	5 26	0,0000000+000	5 27	0,0000000+000	5 28	0,0000000+000	5 29		
0,0000000+000	5 30	0,0000000+000	5 31	0,0000000+000	5 32	0,0000000+000	5 33	0,0000000+000	5 34		
0,0000000+000	5 35	0,0000000+000	5 36	0,0000000+000	5 37	0,0000000+000	5 38	0,0000000+000	5 39		
0,0000000+000	5 40	0,0000000+000	5 41	0,0000000+000	5 42	0,0000000+000	5 43	0,0000000+000	5 44		
0,0000000+000	5 45	0,0000000+000	5 46	0,0000000+000	5 47						

SCATTERING FROM GROUP 6

0,0000000+000	6 6	0,0000000+000	6 7	0,0000000+000	6 8	0,0000000+000	6 9	0,0000000+000	6 10		
0,0000000+000	6 11	0,0000000+000	6 12	0,0000000+000	6 13	0,0000000+000	6 14	0,0000000+000	6 15		
0,0000000+000	6 16	0,0000000+000	6 17	0,0000000+000	6 18	0,0000000+000	6 19	0,0000000+000	6 20		
0,0000000+000	6 21	0,0000000+000	6 22	0,0000000+000	6 23	0,0000000+000	6 24	0,0000000+000	6 25		
0,0000000+000	6 26	0,0000000+000	6 27	0,0000000+000	6 28	0,0000000+000	6 29	0,0000000+000	6 30		
0,0000000+000	6 31	0,0000000+000	6 32	0,0000000+000	6 33	0,0000000+000	6 34	0,0000000+000	6 35		
0,0000000+000	6 36	0,0000000+000	6 37	0,0000000+000	6 38	0,0000000+000	6 39	0,0000000+000	6 40		
0,0000000+000	6 41	0,0000000+000	6 42	0,0000000+000	6 43	0,0000000+000	6 44	0,0000000+000	6 45		
0,0000000+000	6 46	0,0000000+000	6 47								

SCATTERING FROM GROUP 7

0,0000000+000	7 7	0,0000000+000	7 8	0,0000000+000	7 9	0,0000000+000	7 10	0,0000000+000	7 11		
0,0000000+000	7 12	0,0000000+000	7 13	0,0000000+000	7 14	0,0000000+000	7 15	0,0000000+000	7 16		
0,0000000+000	7 17	0,0000000+000	7 18	0,0000000+000	7 19	0,0000000+000	7 20	0,0000000+000	7 21		
0,0000000+000	7 22	0,0000000+000	7 23	0,0000000+000	7 24	0,0000000+000	7 25	0,0000000+000	7 26		
0,0000000+000	7 27	0,0000000+000	7 28	0,0000000+000	7 29	0,0000000+000	7 30	0,0000000+000	7 31		
0,0000000+000	7 32	0,0000000+000	7 33	0,0000000+000	7 34	0,0000000+000	7 35	0,0000000+000	7 36		
0,0000000+000	7 37	0,0000000+000	7 38	0,0000000+000	7 39	0,0000000+000	7 40	0,0000000+000	7 41		
0,0000000+000	7 42	0,0000000+000	7 43	0,0000000+000	7 44	0,0000000+000	7 45	0,0000000+000	7 46		
0,0000000+000	7 47										

SCATTERING FROM GROUP 8

0,0000000+000	8 8	0,0000000+000	8 9	0,0000000+000	8 10	0,0000000+000	8 11	0,0000000+000	8 12		
0,0000000+000	8 13	0,0000000+000	8 14	0,0000000+000	8 15	0,0000000+000	8 16	0,0000000+000	8 17		
0,0000000+000	8 18	0,0000000+000	8 19	0,0000000+000	8 20	0,0000000+000	8 21	0,0000000+000	8 22		
0,0000000+000	8 23	0,0000000+000	8 24	0,0000000+000	8 25	0,0000000+000	8 26	0,0000000+000	8 27		
0,0000000+000	8 28	0,0000000+000	8 29	0,0000000+000	8 30	0,0000000+000	8 31	0,0000000+000	8 32		
0,0000000+000	8 33	0,0000000+000	8 34	0,0000000+000	8 35	0,0000000+000	8 36	0,0000000+000	8 37		
0,0000000+000	8 38	0,0000000+000	8 39	0,0000000+000	8 40	0,0000000+000	8 41	0,0000000+000	8 42		
0,0000000+000	8 43	0,0000000+000	8 44	0,0000000+000	8 45	0,0000000+000	8 46	0,0000000+000	8 47		

SCATTERING FROM GROUP 9

0,0000000+000	9 9	0,0000000+000	9 10	0,0000000+000	9 11	0,0000000+000	9 12	0,0000000+000	9 13		
0,0000000+000	9 14	0,0000000+000	9 15	0,0000000+000	9 16	0,0000000+000	9 17	0,0000000+000	9 18		
0,0000000+000	9 19	0,0000000+000	9 20	0,0000000+000	9 21	0,0000000+000	9 22	0,0000000+000	9 23		
0,0000000+000	9 24	0,0000000+000	9 25	0,0000000+000	9 26	0,0000000+000	9 27	0,0000000+000	9 28		
0,0000000+000	9 29	0,0000000+000	9 30	0,0000000+000	9 31	0,0000000+000	9 32	0,0000000+000	9 33		
0,0000000+000	9 34	0,0000000+000	9 35	0,0000000+000	9 36	0,0000000+000	9 37	0,0000000+000	9 38		
0,0000000+000	9 39	0,0000000+000	9 40	0,0000000+000	9 41	0,0000000+000	9 42	0,0000000+000	9 43		
0,0000000+000	9 44	0,0000000+000	9 45	0,0000000+000	9 46	0,0000000+000	9 47				

SCATTERING FROM GROUP 10

0,0000000+000 10 10	0,0000000+000 10 11	0,0000000+000 10 12	0,0000000+000 10 13	0,0000000+000 10 14
0,0000000+000 10 15	0,0000000+000 10 16	0,0000000+000 10 17	0,0000000+000 10 18	0,0000000+000 10 19
0,0000000+000 10 20	0,0000000+000 10 21	0,0000000+000 10 22	0,0000000+000 10 23	0,0000000+000 10 24
0,0000000+000 10 25	0,0000000+000 10 26	0,0000000+000 10 27	0,0000000+000 10 28	0,0000000+000 10 29
0,0000000+000 10 30	0,0000000+000 10 31	0,0000000+000 10 32	0,0000000+000 10 33	0,0000000+000 10 34
0,0000000+000 10 35	0,0000000+000 10 36	0,0000000+000 10 37	0,0000000+000 10 38	0,0000000+000 10 39
0,0000000+000 10 40	0,0000000+000 10 41	0,0000000+000 10 42	0,0000000+000 10 43	0,0000000+000 10 44
0,0000000+000 10 45	0,0000000+000 10 46	0,0000000+000 10 47		

SCATTERING FROM GROUP 11

0,0000000+000 11 11	0,0000000+000 11 12	0,0000000+000 11 13	0,0000000+000 11 14	0,0000000+000 11 15
0,0000000+000 11 16	0,0000000+000 11 17	0,0000000+000 11 18	0,0000000+000 11 19	0,0000000+000 11 20
0,0000000+000 11 21	0,0000000+000 11 22	0,0000000+000 11 23	0,0000000+000 11 24	0,0000000+000 11 25
0,0000000+000 11 26	0,0000000+000 11 27	0,0000000+000 11 28	0,0000000+000 11 29	0,0000000+000 11 30
0,0000000+000 11 31	0,0000000+000 11 32	0,0000000+000 11 33	0,0000000+000 11 34	0,0000000+000 11 35
0,0000000+000 11 36	0,0000000+000 11 37	0,0000000+000 11 38	0,0000000+000 11 39	0,0000000+000 11 40
0,0000000+000 11 41	0,0000000+000 11 42	0,0000000+000 11 43	0,0000000+000 11 44	0,0000000+000 11 45
0,0000000+000 11 46	0,0000000+000 11 47			

SCATTERING FROM GROUP 12

0,0000000+000 12 12	0,0000000+000 12 13	0,0000000+000 12 14	0,0000000+000 12 15	0,0000000+000 12 16
0,0000000+000 12 17	0,0000000+000 12 18	0,0000000+000 12 19	0,0000000+000 12 20	0,0000000+000 12 21
0,0000000+000 12 22	0,0000000+000 12 23	0,0000000+000 12 24	0,0000000+000 12 25	0,0000000+000 12 26
0,0000000+000 12 27	0,0000000+000 12 28	0,0000000+000 12 29	0,0000000+000 12 30	0,0000000+000 12 31
0,0000000+000 12 32	0,0000000+000 12 33	0,0000000+000 12 34	0,0000000+000 12 35	0,0000000+000 12 36
0,0000000+000 12 37	0,0000000+000 12 38	0,0000000+000 12 39	0,0000000+000 12 40	0,0000000+000 12 41
0,0000000+000 12 42	0,0000000+000 12 43	0,0000000+000 12 44	0,0000000+000 12 45	0,0000000+000 12 46
0,0000000+000 12 47				

SCATTERING FROM GROUP 13

0,0000000+000 13 13	0,0000000+000 13 14	0,0000000+000 13 15	0,0000000+000 13 16	0,0000000+000 13 17
0,0000000+000 13 18	0,0000000+000 13 19	0,0000000+000 13 20	0,0000000+000 13 21	0,0000000+000 13 22
0,0000000+000 13 23	0,0000000+000 13 24	0,0000000+000 13 25	0,0000000+000 13 26	0,0000000+000 13 27
0,0000000+000 13 28	0,0000000+000 13 29	0,0000000+000 13 30	0,0000000+000 13 31	0,0000000+000 13 32
0,0000000+000 13 33	0,0000000+000 13 34	0,0000000+000 13 35	0,0000000+000 13 36	0,0000000+000 13 37
0,0000000+000 13 38	0,0000000+000 13 39	0,0000000+000 13 40	0,0000000+000 13 41	0,0000000+000 13 42
0,0000000+000 13 43	0,0000000+000 13 44	0,0000000+000 13 45	0,0000000+000 13 46	0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14	0,0000000+000 14 15	0,0000000+000 14 16	0,0000000+000 14 17	0,0000000+000 14 18
0,0000000+000 14 19	0,0000000+000 14 20	0,0000000+000 14 21	0,0000000+000 14 22	0,0000000+000 14 23
0,0000000+000 14 24	0,0000000+000 14 25	0,0000000+000 14 26	0,0000000+000 14 27	0,0000000+000 14 28
0,0000000+000 14 29	0,0000000+000 14 30	0,0000000+000 14 31	0,0000000+000 14 32	0,0000000+000 14 33
0,0000000+000 14 34	0,0000000+000 14 35	0,0000000+000 14 36	0,0000000+000 14 37	0,0000000+000 14 38
0,0000000+000 14 39	0,0000000+000 14 40	0,0000000+000 14 41	0,0000000+000 14 42	0,0000000+000 14 43
0,0000000+000 14 44	0,0000000+000 14 45	0,0000000+000 14 46	0,0000000+000 14 47	

SCATTERING FROM GROUP 15

0,0000000+000 15 15	0,0000000+000 15 16	0,0000000+000 15 17	0,0000000+000 15 18	0,0000000+000 15 19
0,0000000+000 15 20	0,0000000+000 15 21	0,0000000+000 15 22	0,0000000+000 15 23	0,0000000+000 15 24
0,0000000+000 15 25	0,0000000+000 15 26	0,0000000+000 15 27	0,0000000+000 15 28	0,0000000+000 15 29
0,0000000+000 15 30	0,0000000+000 15 31	0,0000000+000 15 32	0,0000000+000 15 33	0,0000000+000 15 34
0,0000000+000 15 35	0,0000000+000 15 36	0,0000000+000 15 37	0,0000000+000 15 38	0,0000000+000 15 39
0,0000000+000 15 40	0,0000000+000 15 41	0,0000000+000 15 42	0,0000000+000 15 43	0,0000000+000 15 44
0,0000000+000 15 45	0,0000000+000 15 46	0,0000000+000 15 47		

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,0000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,0000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,0000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,0000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,0000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,0000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,0000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,0000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,0000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,0000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,0000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,0000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,0000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,0000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,0000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,0000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41

0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44

0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,0000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,0000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,0000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,0000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,0000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO. 10 WAS 4.067+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.400+002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 3.200+002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.900+002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.400+002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.300+002SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 2.000+002SECONDS

MATERIAL PU240

DISCRETE LEVEL SCATTERING

SCATTERING FROM GROUP 1

0,0000000+000 1 1 0,0000000+000 1 2 0,0000000+000 1 3 0,0000000+000 1 4 0,0000000+000 1 5
0,0000000+000 1 6 0,0000000+000 1 7 0,0000000+000 1 8 0,0000000+000 1 9 0,0000000+000 1 10
0,0000000+000 1 11 0,0000000+000 1 12 0,0000000+000 1 13 0,0000000+000 1 14 0,0000000+000 1 15

0,0000000+000	1 16	0,0000000+000	1 17	0,0000000+000	1 18	0,0000000+000	1 19	0,0000000+000	1 20
0,0000000+000	1 21	0,0000000+000	1 22	0,0000000+000	1 23	0,0000000+000	1 24	0,0000000+000	1 25
0,0000000+000	1 26	0,0000000+000	1 27	0,0000000+000	1 28	0,0000000+000	1 29	0,0000000+000	1 30
0,0000000+000	1 31	0,0000000+000	1 32	0,0000000+000	1 33	0,0000000+000	1 34	0,0000000+000	1 35
0,0000000+000	1 36	0,0000000+000	1 37	0,0000000+000	1 38	0,0000000+000	1 39	0,0000000+000	1 40
0,0000000+000	1 41	0,0000000+000	1 42	0,0000000+000	1 43	0,0000000+000	1 44	0,0000000+000	1 45
0,0000000+000	1 46	0,0000000+000	1 47						

SCATTERING FROM GROUP 2

0,0000000+000	2 2	0,0000000+000	2 3	0,0000000+000	2 4	0,0000000+000	2 5	0,0000000+000	2 6
0,0000000+000	2 7	0,0000000+000	2 8	0,0000000+000	2 9	0,0000000+000	2 10	0,0000000+000	2 11
0,0000000+000	2 12	0,0000000+000	2 13	0,0000000+000	2 14	0,0000000+000	2 15	0,0000000+000	2 16
0,0000000+000	2 17	0,0000000+000	2 18	0,0000000+000	2 19	0,0000000+000	2 20	0,0000000+000	2 21
0,0000000+000	2 22	0,0000000+000	2 23	0,0000000+000	2 24	0,0000000+000	2 25	0,0000000+000	2 26
0,0000000+000	2 27	0,0000000+000	2 28	0,0000000+000	2 29	0,0000000+000	2 30	0,0000000+000	2 31
0,0000000+000	2 32	0,0000000+000	2 33	0,0000000+000	2 34	0,0000000+000	2 35	0,0000000+000	2 36
0,0000000+000	2 37	0,0000000+000	2 38	0,0000000+000	2 39	0,0000000+000	2 40	0,0000000+000	2 41
0,0000000+000	2 42	0,0000000+000	2 43	0,0000000+000	2 44	0,0000000+000	2 45	0,0000000+000	2 46
0,0000000+000	2 47								

SCATTERING FROM GROUP 3

0,0000000+000	3 3	0,0000000+000	3 4	0,0000000+000	3 5	0,0000000+000	3 6	0,0000000+000	3 7
0,0000000+000	3 8	0,0000000+000	3 9	0,0000000+000	3 10	0,0000000+000	3 11	0,0000000+000	3 12
0,0000000+000	3 13	0,0000000+000	3 14	0,0000000+000	3 15	0,0000000+000	3 16	0,0000000+000	3 17
0,0000000+000	3 18	0,0000000+000	3 19	0,0000000+000	3 20	0,0000000+000	3 21	0,0000000+000	3 22
0,0000000+000	3 23	0,0000000+000	3 24	0,0000000+000	3 25	0,0000000+000	3 26	0,0000000+000	3 27
0,0000000+000	3 28	0,0000000+000	3 29	0,0000000+000	3 30	0,0000000+000	3 31	0,0000000+000	3 32
0,0000000+000	3 33	0,0000000+000	3 34	0,0000000+000	3 35	0,0000000+000	3 36	0,0000000+000	3 37
0,0000000+000	3 38	0,0000000+000	3 39	0,0000000+000	3 40	0,0000000+000	3 41	0,0000000+000	3 42
0,0000000+000	3 43	0,0000000+000	3 44	0,0000000+000	3 45	0,0000000+000	3 46	0,0000000+000	3 47

SCATTERING FROM GROUP 4

0,0000000+000	4 4	0,0000000+000	4 5	0,0000000+000	4 6	0,0000000+000	4 7	0,0000000+000	4 8
0,0000000+000	4 9	0,0000000+000	4 10	0,0000000+000	4 11	0,0000000+000	4 12	0,0000000+000	4 13
0,0000000+000	4 14	0,0000000+000	4 15	0,0000000+000	4 16	0,0000000+000	4 17	0,0000000+000	4 18
0,0000000+000	4 19	0,0000000+000	4 20	0,0000000+000	4 21	0,0000000+000	4 22	0,0000000+000	4 23
0,0000000+000	4 24	0,0000000+000	4 25	0,0000000+000	4 26	0,0000000+000	4 27	0,0000000+000	4 28
0,0000000+000	4 29	0,0000000+000	4 30	0,0000000+000	4 31	0,0000000+000	4 32	0,0000000+000	4 33
0,0000000+000	4 34	0,0000000+000	4 35	0,0000000+000	4 36	0,0000000+000	4 37	0,0000000+000	4 38
0,0000000+000	4 39	0,0000000+000	4 40	0,0000000+000	4 41	0,0000000+000	4 42	0,0000000+000	4 43
0,0000000+000	4 44	0,0000000+000	4 45	0,0000000+000	4 46	0,0000000+000	4 47		

SCATTERING FROM GROUP 5

0,0000000+000	5 5	0,0000000+000	5 6	0,0000000+000	5 7	0,0000000+000	5 8	0,0000000+000	5 9
0,0000000+000	5 10	0,0000000+000	5 11	0,0000000+000	5 12	0,0000000+000	5 13	0,0000000+000	5 14
0,0000000+000	5 15	0,0000000+000	5 16	0,0000000+000	5 17	0,0000000+000	5 18	0,0000000+000	5 19
0,0000000+000	5 20	0,0000000+000	5 21	0,0000000+000	5 22	0,0000000+000	5 23	0,0000000+000	5 24
0,0000000+000	5 25	0,0000000+000	5 26	0,0000000+000	5 27	0,0000000+000	5 28	0,0000000+000	5 29
0,0000000+000	5 30	0,0000000+000	5 31	0,0000000+000	5 32	0,0000000+000	5 33	0,0000000+000	5 34
0,0000000+000	5 35	0,0000000+000	5 36	0,0000000+000	5 37	0,0000000+000	5 38	0,0000000+000	5 39
0,0000000+000	5 40	0,0000000+000	5 41	0,0000000+000	5 42	0,0000000+000	5 43	0,0000000+000	5 44
0,0000000+000	5 45	0,0000000+000	5 46	0,0000000+000	5 47				

SCATTERING FROM GROUP 6

0,0000000+000	6 6	0,0000000+000	6 7	0,0000000+000	6 8	0,0000000+000	6 9	0,0000000+000	6 10
0,0000000+000	6 11	0,0000000+000	6 12	0,0000000+000	6 13	0,0000000+000	6 14	0,0000000+000	6 15
0,0000000+000	6 16	0,0000000+000	6 17	0,0000000+000	6 18	0,0000000+000	6 19	0,0000000+000	6 20

0,0000000+000	6	21	0,0000000+000	6	22	0,0000000+000	6	23	0,0000000+000	6	24	0,0000000+000	6	25
0,0000000+000	6	26	0,0000000+000	6	27	0,0000000+000	6	28	0,0000000+000	6	29	0,0000000+000	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0,0000000+000	6	39	0,0000000+000	6	40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0,0000000+000	6	44	0,0000000+000	6	45
0,0000000+000	6	46	0,0000000+000	6	47									

SCATTERING FROM GROUP 7

0,0000000+000	7	7	1,1503936-002	7	8	0,0000000+000	7	9	3,1816406+001	7	10	1,9075118+001	7	11
0,0000000+000	7	12	1,0675856-001	7	13	1,0747610+001	7	14	5,7844020+002	7	15	2,9323191+002	7	16
0,0000000+000	7	17	0,0000000+000	7	18	0,0000000+000	7	19	0,0000000+000	7	20	0,0000000+000	7	21
0,0000000+000	7	22	0,0000000+000	7	23	0,0000000+000	7	24	0,0000000+000	7	25	0,0000000+000	7	26
0,0000000+000	7	27	0,0000000+000	7	28	0,0000000+000	7	29	0,0000000+000	7	30	0,0000000+000	7	31
0,0000000+000	7	32	0,0000000+000	7	33	0,0000000+000	7	34	0,0000000+000	7	35	0,0000000+000	7	36
0,0000000+000	7	37	0,0000000+000	7	38	0,0000000+000	7	39	0,0000000+000	7	40	0,0000000+000	7	41
0,0000000+000	7	42	0,0000000+000	7	43	0,0000000+000	7	44	0,0000000+000	7	45	0,0000000+000	7	46
0,0000000+000	7	47												

SCATTERING FROM GROUP 8

6,7385101+002	8	8	8,4482669-002	8	9	1,0057187+001	8	10	3,4470252+001	8	11	4,2155360+001	8	12
2,7069580+001	8	13	7,0525091-002	8	14	0,0000000+000	8	15	3,1110239+003	8	16	2,4808280+002	8	17
1,4322164+002	8	18	7,4890201-003	8	19	3,6094637+003	8	20	1,4627410+003	8	21	5,2409723+004	8	22
3,5421988+004	8	23	2,5017995-004	8	24	1,7926053+004	8	25	1,3015860+004	8	26	0,0000000+000	8	27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0,0000000+000	8	31	0,0000000+000	8	32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0,0000000+000	8	36	0,0000000+000	8	37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0,0000000+000	8	41	0,0000000+000	8	42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0,0000000+000	8	46	0,0000000+000	8	47

SCATTERING FROM GROUP 9

2,6432078+001	9	9	1,5211279-001	9	10	9,9359575-002	9	11	1,2343134+001	9	12	3,9332470-002	9	13
1,1930995+001	9	14	1,2576717-001	9	15	7,6659791-002	9	16	4,6071953+002	9	17	2,7274515-002	9	18
1,6020785+002	9	19	9,3084231-003	9	20	4,8620534+003	9	21	0,0000000+000	9	22	0,0000000+000	9	23
0,0000000+000	9	24	0,0000000+000	9	25	0,0000000+000	9	26	0,0000000+000	9	27	0,0000000+000	9	28
0,0000000+000	9	29	0,0000000+000	9	30	0,0000000+000	9	31	0,0000000+000	9	32	0,0000000+000	9	33
0,0000000+000	9	34	0,0000000+000	9	35	0,0000000+000	9	36	0,0000000+000	9	37	0,0000000+000	9	38
0,0000000+000	9	39	0,0000000+000	9	40	0,0000000+000	9	41	0,0000000+000	9	42	0,0000000+000	9	43
0,0000000+000	9	44	0,0000000+000	9	45	0,0000000+000	9	46	0,0000000+000	9	47			

SCATTERING FROM GROUP 10

3,6999256+001	10	10	2,2452156-001	10	11	2,4803068-002	10	12	7,3638266+002	10	13	8,5779697+002	10	14
5,5160418+002	10	15	1,0096912-002	10	16	0,0000000+000	10	17	0,0000000+000	10	18	0,0000000+000	10	19
0,0000000+000	10	20	5,9748366-004	10	21	3,9339377-003	10	22	2,3814446+003	10	23	1,4444192-003	10	24
8,7608452+004	10	25	5,3137211-004	10	26	3,2229346-004	10	27	1,9548087+004	10	28	1,1856517-004	10	29
0,0000000+000	10	30	0,0000000+000	10	31	0,0000000+000	10	32	0,0000000+000	10	33	0,0000000+000	10	34
0,0000000+000	10	35	0,0000000+000	10	36	0,0000000+000	10	37	0,0000000+000	10	38	0,0000000+000	10	39
0,0000000+000	10	40	0,0000000+000	10	41	0,0000000+000	10	42	0,0000000+000	10	43	0,0000000+000	10	44
0,0000000+000	10	45	0,0000000+000	10	46	0,0000000+000	10	47						

SCATTERING FROM GROUP 11

4,7651007+001	11	11	3,2562679-001	11	12	3,3062489-002	11	13	1,2573736+002	11	14	0,0000000+000	11	15
3,0412346+002	11	16	2,7190207-002	11	17	1,6728846-002	11	18	9,8841665+003	11	19	4,9922178-003	11	20
2,1733494+003	11	21	8,6883412+004	11	22	1,0026329+004	11	23	0,0000000+000	11	24	0,0000000+000	11	25
0,0000000+000	11	26	0,0000000+000	11	27	0,0000000+000	11	28	0,0000000+000	11	29	0,0000000+000	11	30
0,0000000+000	11	31	0,0000000+000	11	32	0,0000000+000	11	33	0,0000000+000	11	34	0,0000000+000	11	35
0,0000000+000	11	36	0,0000000+000	11	37	0,0000000+000	11	38	0,0000000+000	11	39	0,0000000+000	11	40
0,0000000+000	11	41	0,0000000+000	11	42	0,0000000+000	11	43	0,0000000+000	11	44	0,0000000+000	11	45
0,0000000+000	11	46	0,0000000+000	11	47									

SCATTERING FROM GROUP 12

6.1291373-001 12 12	4.6793528-001 12 13	6.3997251-002 12 14	2.6982406-002 12 15	1.0622666-002 12 16
0.0000000+000 12 17	0.0000000+000 12 18	0.0000000+000 12 19	0.0000000+000 12 20	0.0000000+000 12 21
0.0000000+000 12 22	5.3554007-004 12 23	4.0290659-004 12 24	2.4437519-004 12 25	1.4822106-004 12 26
0.0000000+000 12 27	0.0000000+000 12 28	0.0000000+000 12 29	0.0000000+000 12 30	0.0000000+000 12 31
0.0000000+000 12 32	0.0000000+000 12 33	0.0000000+000 12 34	0.0000000+000 12 35	0.0000000+000 12 36
0.0000000+000 12 37	0.0000000+000 12 38	0.0000000+000 12 39	0.0000000+000 12 40	0.0000000+000 12 41
0.0000000+000 12 42	0.0000000+000 12 43	0.0000000+000 12 44	0.0000000+000 12 45	0.0000000+000 12 46
0.0000000+000 12 47				

SCATTERING FROM GROUP 13

6.4674460-001 13 13	4.8683347-001 13 14	8.9455534-002 13 15	9.5338027-003 13 16	1.4208167-002 13 17
8.6448568-003 13 18	3.3376092-003 13 19	0.0000000+000 13 20	0.0000000+000 13 21	0.0000000+000 13 22
0.0000000+000 13 23	0.0000000+000 13 24	0.0000000+000 13 25	0.0000000+000 13 26	0.0000000+000 13 27
0.0000000+000 13 28	0.0000000+000 13 29	0.0000000+000 13 30	0.0000000+000 13 31	0.0000000+000 13 32
0.0000000+000 13 33	0.0000000+000 13 34	0.0000000+000 13 35	0.0000000+000 13 36	0.0000000+000 13 37
0.0000000+000 13 38	0.0000000+000 13 39	0.0000000+000 13 40	0.0000000+000 13 41	0.0000000+000 13 42
0.0000000+000 13 43	0.0000000+000 13 44	0.0000000+000 13 45	0.0000000+000 13 46	0.0000000+000 13 47

SCATTERING FROM GROUP 14

4.8544925-001 14 14	4.9852440-001 14 15	9.2114204-002 14 16	3.5472385-002 14 17	0.0000000+000 14 18
2.2262318-003 14 19	3.8101468-003 14 20	2.1550120-003 14 21	1.1398281-003 14 22	5.2588448-004 14 23
2.0124496-004 14 24	0.0000000+000 14 25	0.0000000+000 14 26	0.0000000+000 14 27	0.0000000+000 14 28
0.0000000+000 14 29	0.0000000+000 14 30	0.0000000+000 14 31	0.0000000+000 14 32	0.0000000+000 14 33
0.0000000+000 14 34	0.0000000+000 14 35	0.0000000+000 14 36	0.0000000+000 14 37	0.0000000+000 14 38
0.0000000+000 14 39	0.0000000+000 14 40	0.0000000+000 14 41	0.0000000+000 14 42	0.0000000+000 14 43
0.0000000+000 14 44	0.0000000+000 14 45	0.0000000+000 14 46	0.0000000+000 14 47	

SCATTERING FROM GROUP 15

3.3553185-001 15 15	5.9856585-001 15 16	3.0751475-002 15 17	4.8565900-002 15 18	2.3034022-002 15 19
0.0000000+000 15 20	0.0000000+000 15 21	0.0000000+000 15 22	0.0000000+000 15 23	0.0000000+000 15 24
0.0000000+000 15 25	0.0000000+000 15 26	0.0000000+000 15 27	0.0000000+000 15 28	0.0000000+000 15 29
0.0000000+000 15 30	0.0000000+000 15 31	0.0000000+000 15 32	0.0000000+000 15 33	0.0000000+000 15 34
0.0000000+000 15 35	0.0000000+000 15 36	0.0000000+000 15 37	0.0000000+000 15 38	0.0000000+000 15 39
0.0000000+000 15 40	0.0000000+000 15 41	0.0000000+000 15 42	0.0000000+000 15 43	0.0000000+000 15 44
0.0000000+000 15 45	0.0000000+000 15 46	0.0000000+000 15 47		

SCATTERING FROM GROUP 16

1.5886765-001 16 16	6.9647464-001 16 17	4.0559539-002 16 18	9.7290095-003 16 19	2.4110469-002 16 20
1.4803100-002 16 21	8.7493069-003 16 22	0.0000000+000 16 23	0.0000000+000 16 24	0.0000000+000 16 25
0.0000000+000 16 26	0.0000000+000 16 27	0.0000000+000 16 28	0.0000000+000 16 29	0.0000000+000 16 30
0.0000000+000 16 31	0.0000000+000 16 32	0.0000000+000 16 33	0.0000000+000 16 34	0.0000000+000 16 35
0.0000000+000 16 36	0.0000000+000 16 37	0.0000000+000 16 38	0.0000000+000 16 39	0.0000000+000 16 40
0.0000000+000 16 41	0.0000000+000 16 42	0.0000000+000 16 43	0.0000000+000 16 44	0.0000000+000 16 45
0.0000000+000 16 46	0.0000000+000 16 47			

SCATTERING FROM GROUP 17

0.0000000+000 17 17	5.7406044-001 17 18	2.0585516-001 17 19	0.0000000+000 17 20	0.0000000+000 17 21
2.4962223-004 17 22	6.8883591-003 17 23	4.1180244-003 17 24	2.4509982-003 17 25	1.4502279-003 17 26
8.5127676-004 17 27	4.9426128-004 17 28	2.8454321-004 17 29	1.7075667-004 17 30	1.0356916-004 17 31
0.0000000+000 17 32	0.0000000+000 17 33	0.0000000+000 17 34	0.0000000+000 17 35	0.0000000+000 17 36
0.0000000+000 17 37	0.0000000+000 17 38	0.0000000+000 17 39	0.0000000+000 17 40	0.0000000+000 17 41
0.0000000+000 17 42	0.0000000+000 17 43	0.0000000+000 17 44	0.0000000+000 17 45	0.0000000+000 17 46
0.0000000+000 17 47				

SCATTERING FROM GROUP 18

0,0000000+000 18 18	2,6859366-001 18 19	3,1281414-001 18 20	0,0000000+000 18 21	0,0000000+000 18 22
0,0000000+000 18 23	0,0000000+000 18 24	0,0000000+000 18 25	0,0000000+000 18 26	0,0000000+000 18 27
0,0000000+000 18 28	0,0000000+000 18 29	0,0000000+000 18 30	0,0000000+000 18 31	0,0000000+000 18 32
0,0000000+000 18 33	0,0000000+000 18 34	0,0000000+000 18 35	0,0000000+000 18 36	0,0000000+000 18 37
0,0000000+000 18 38	0,0000000+000 18 39	0,0000000+000 18 40	0,0000000+000 18 41	0,0000000+000 18 42
0,0000000+000 18 43	0,0000000+000 18 44	0,0000000+000 18 45	0,0000000+000 18 46	0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19	1,3557065-002 19 20	2,5014009-001 19 21	1,1121290-001 19 22	0,0000000+000 19 23
0,0000000+000 19 24	0,0000000+000 19 25	0,0000000+000 19 26	0,0000000+000 19 27	0,0000000+000 19 28
0,0000000+000 19 29	0,0000000+000 19 30	0,0000000+000 19 31	0,0000000+000 19 32	0,0000000+000 19 33
0,0000000+000 19 34	0,0000000+000 19 35	0,0000000+000 19 36	0,0000000+000 19 37	0,0000000+000 19 38
0,0000000+000 19 39	0,0000000+000 19 40	0,0000000+000 19 41	0,0000000+000 19 42	0,0000000+000 19 43
0,0000000+000 19 44	0,0000000+000 19 45	0,0000000+000 19 46	0,0000000+000 19 47	

SCATTERING FROM GROUP 20

0,0000000+000 20 20	0,0000000+000 20 21	3,4448275-002 20 22	9,6797806-002 20 23	4,1144955-002 20 24
1,6839241-003 20 25	0,0000000+000 20 26	0,0000000+000 20 27	0,0000000+000 20 28	0,0000000+000 20 29
0,0000000+000 20 30	0,0000000+000 20 31	0,0000000+000 20 32	0,0000000+000 20 33	0,0000000+000 20 34
0,0000000+000 20 35	0,0000000+000 20 36	0,0000000+000 20 37	0,0000000+000 20 38	0,0000000+000 20 39
0,0000000+000 20 40	0,0000000+000 20 41	0,0000000+000 20 42	0,0000000+000 20 43	0,0000000+000 20 44
0,0000000+000 20 45	0,0000000+000 20 46	0,0000000+000 20 47		

SCATTERING FROM GROUP 21

0,0000000+000 21 21	0,0000000+000 21 22	0,0000000+000 21 23	0,0000000+000 21 24	1,9619420-002 21 25
6,8508780-003 21 26	2,9506137-003 21 27	1,2152844-003 21 28	0,0000000+000 21 29	0,0000000+000 21 30
0,0000000+000 21 31	0,0000000+000 21 32	0,0000000+000 21 33	0,0000000+000 21 34	0,0000000+000 21 35
0,0000000+000 21 36	0,0000000+000 21 37	0,0000000+000 21 38	0,0000000+000 21 39	0,0000000+000 21 40
0,0000000+000 21 41	0,0000000+000 21 42	0,0000000+000 21 43	0,0000000+000 21 44	0,0000000+000 21 45
0,0000000+000 21 46	0,0000000+000 21 47			

SCATTERING FROM GROUP 22

0,0000000+000 22 22	0,0000000+000 22 23	0,0000000+000 22 24	0,0000000+000 22 25	0,0000000+000 22 26
0,0000000+000 22 27	1,7581044-004 22 28	6,1566691-004 22 29	1,8390008-004 22 30	1,1110135-004 22 31
0,0000000+000 22 32	0,0000000+000 22 33	0,0000000+000 22 34	0,0000000+000 22 35	0,0000000+000 22 36
0,0000000+000 22 37	0,0000000+000 22 38	0,0000000+000 22 39	0,0000000+000 22 40	0,0000000+000 22 41
0,0000000+000 22 42	0,0000000+000 22 43	0,0000000+000 22 44	0,0000000+000 22 45	0,0000000+000 22 46
0,0000000+000 22 47				

SCATTERING FROM GROUP 23

0,0000000+000 23 23	0,0000000+000 23 24	0,0000000+000 23 25	0,0000000+000 23 26	0,0000000+000 23 27
0,0000000+000 23 28	0,0000000+000 23 29	0,0000000+000 23 30	0,0000000+000 23 31	0,0000000+000 23 32
0,0000000+000 23 33	0,0000000+000 23 34	0,0000000+000 23 35	0,0000000+000 23 36	0,0000000+000 23 37
0,0000000+000 23 38	0,0000000+000 23 39	0,0000000+000 23 40	0,0000000+000 23 41	0,0000000+000 23 42
0,0000000+000 23 43	0,0000000+000 23 44	0,0000000+000 23 45	0,0000000+000 23 46	0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24	0,0000000+000 24 25	0,0000000+000 24 26	0,0000000+000 24 27	0,0000000+000 24 28
0,0000000+000 24 29	0,0000000+000 24 30	0,0000000+000 24 31	0,0000000+000 24 32	0,0000000+000 24 33
0,0000000+000 24 34	0,0000000+000 24 35	0,0000000+000 24 36	0,0000000+000 24 37	0,0000000+000 24 38
0,0000000+000 24 39	0,0000000+000 24 40	0,0000000+000 24 41	0,0000000+000 24 42	0,0000000+000 24 43
0,0000000+000 24 44	0,0000000+000 24 45	0,0000000+000 24 46	0,0000000+000 24 47	

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,0000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,0000000+000 33 41 0,0000000+000 33 42

0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,0000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,0000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,0000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO. 9 WAS 4.039+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 7.000+003SECONDS

TIME SPENT IN PROGRAM AREA NO. 8 WAS 9.000+003SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

2,7263250+005	1	1	3,4822708+004	1	2	2,3288404+003	1	3	9,3364189+003	1	4	2,4922683+002	1	5
4,8332690+002	1	6	7,2833226+002	1	7	9,0009431+002	1	8	9,5236300+002	1	9	8,9145895+002	1	10
7,5878080+002	1	11	5,9945620+002	1	12	4,4680255+002	1	13	3,1822983+002	1	14	2,1876220+002	1	15
1,4628483+002	1	16	9,5734340+003	1	17	6,1698699+003	1	18	3,9132006+003	1	19	2,4603291+003	1	20
1,5346302+003	1	21	9,5131895+004	1	22	5,8688722+004	1	23	3,6070492+004	1	24	2,2104415+004	1	25
1,3515014+004	1	26	8,2486542+005	1	27	5,0274720+005	1	28	0,0000000+000	1	29	0,0000000+000	1	30
0,0000000+000	1	31	0,0000000+000	1	32	0,0000000+000	1	33	0,0000000+000	1	34	0,0000000+000	1	35
0,0000000+000	1	36	0,0000000+000	1	37	0,0000000+000	1	38	0,0000000+000	1	39	0,0000000+000	1	40
0,0000000+000	1	41	0,0000000+000	1	42	0,0000000+000	1	43	0,0000000+000	1	44	0,0000000+000	1	45
0,0000000+000	1	46	0,0000000+000	1	47									

SCATTERING FROM GROUP 2

2,1975186+004	2	2	2,0015536+003	2	3	1,0241519+002	2	4	3,3195916+002	2	5	7,4998227+002	2	6
1,2745664+001	2	7	1,7312274+001	2	8	1,9728277+001	2	9	1,9568142+001	2	10	1,7429117+001	2	11
1,4266539+001	2	12	1,0932089+001	2	13	7,9563427+002	2	14	5,5624413+002	2	15	3,7687789+002	2	16
2,4918328+002	2	17	1,6164461+002	2	18	1,0331272+002	2	19	6,5271037+003	2	20	4,0866878+003	2	21
2,5408079+003	2	22	1,5710707+003	2	23	9,6731643+004	2	24	5,9360762+004	2	25	3,6333505+004	2	26
2,2194251+004	2	27	1,3536062+004	2	28	0,0000000+000	2	29	0,0000000+000	2	30	0,0000000+000	2	31
0,0000000+000	2	32	0,0000000+000	2	33	0,0000000+000	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

8,8393719+004	3	3	5,9562048+003	3	4	2,4006063+002	3	5	6,4426135+002	3	6	1,2540745+001	3	7
1,8953219+001	3	8	2,3476846+001	3	9	2,4877106+001	3	10	2,3326421+001	3	11	1,9876601+001	3	12
1,5716559+001	3	13	1,1722164+001	3	14	8,3533566+002	3	15	5,7447379+002	3	16	3,8426944+002	3	17
2,5154308+002	3	18	1,6190896+002	3	19	1,0285528+002	3	20	6,4675352+003	3	21	4,0344947+003	3	22
2,5011666+003	3	23	1,5431042+003	3	24	9,4844362+004	3	25	5,8123685+004	3	26	3,5538733+004	3	27
2,1690906+004	3	28	1,3220591+004	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0,0000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

2,3681218+003	4	4	1,2131513-002	4	5	3,9358794-002	4	6	8,8987537-002	4	7	1,5131905-001	4	8
2,0562889+001	4	9	2,3431444-001	4	10	2,3257222-001	4	11	2,[illegible]19500-001	4	12	1,6962789-001	4	13
1,2999905+001	4	14	9,4622851-002	4	15	6,6158176-002	4	16	4,4827699-002	4	17	2,9640553-002	4	18
1,9228503+002	4	19	1,2289979-002	4	20	7,7647611-003	4	21	4,8616873-003	4	22	3,0226897-003	4	23
1,8690561+003	4	24	1,1507974-003	4	25	7,0620820-004	4	26	4,3225789-004	4	27	2,6404486-004	4	28
1,6103893+004	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0,0000000+000	4	32	0,0000000+000	4	33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0,0000000+000	4	37	0,0000000+000	4	38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0,0000000+000	4	42	0,0000000+000	4	43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0,0000000+000	4	47			

SCATTERING FROM GROUP 5

5,4375242+003	5	5	2,1776474-002	5	6	5,8149076-002	5	7	1,1274046-001	5	8	1,6985662-001	5	9
2,0988122+001	5	10	2,2197204-001	5	11	2,0782248-001	5	12	1,7687854-001	5	13	1,3973042-001	5	14
1,0414284+001	5	15	7,4171873-002	5	16	5,0986902-002	5	17	3,4093866-002	5	18	2,2311944-002	5	19
1,4358399+002	5	20	9,1199332-003	5	21	5,7338892-003	5	22	3,5764909-003	5	23	2,2170601-003	5	24
1,3677423+003	5	25	8,4062138-004	5	26	5,1514134-004	5	27	3,1496556-004	5	28	1,9223358-004	5	29
1,1716429+004	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0,0000000+000	5	33	0,0000000+000	5	34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0,0000000+000	5	38	0,0000000+000	5	39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0,0000000+000	5	43	0,0000000+000	5	44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47						

SCATTERING FROM GROUP 6

1,0585192+002	6	6	3,4347154-002	6	7	7,7665775-002	6	8	1,3207928-001	6	9	1,7949697-001	6	10
2,0454886+001	6	11	2,0303714-001	6	12	1,8088904-001	6	13	1,4809562-001	6	14	1,1349964-001	6	15
8,2614764+002	6	16	5,7763149-002	6	17	3,9139767-002	6	18	2,5879838-002	6	19	1,6788946-002	6	20
1,0730778+002	6	21	6,7796894-003	6	22	4,2449247-003	6	23	2,6392319-003	6	24	1,6319508-003	6	25
1,0048107+003	6	26	6,1662133-004	6	27	3,7742369-004	6	28	2,3054950-004	6	29	1,4061043-004	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0,0000000+000	6	39	0,0000000+000	6	40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0,0000000+000	6	44	0,0000000+000	6	45
0,0000000+000	6	46	0,0000000+000	6	47									

SCATTERING FROM GROUP 7

3,6987532+005	7	7	4,4202692-004	7	8	2,8044794-003	7	9	1,[illegible]777152-002	7	10	2,7853653-002	7	11
5,2630500+002	7	12	7,7703647-002	7	13	9,4498133-002	7	14	9,8703337-002	7	15	9,1513784-002	7	16
7,7295498+002	7	17	6,0698838-002	7	18	4,5029502-002	7	19	3,1954318-002	7	20	2,1903759-002	7	21
1,4614267+002	7	22	9,5475186-003	7	23	6,1358735-003	7	24	3,8932113-003	7	25	2,4457489-003	7	26
1,5245585+003	7	27	9,4460390-004	7	28	5,8251800-004	7	29	3,5791110-004	7	30	2,1928035-004	7	31
1,3404710+004	7	32	8,1801630-005	7	33	4,9851739-005	7	34	0,0000000+000	7	35	0,0000000+000	7	36
0,0000000+000	7	37	0,0000000+000	7	38	0,0000000+000	7	39	0,0000000+000	7	40	0,0000000+000	7	41
0,0000000+000	7	42	0,0000000+000	7	43	0,0000000+000	7	44	0,0000000+000	7	45	0,0000000+000	7	46
0,0000000+000	7	47												

SCATTERING FROM GROUP 8

0,0000000+000	8	8	0,0000000+000	8	9	0,0000000+000	8	10	0,0000000+000	8	11	0,0000000+000	8	12
0,0000000+000	8	13	0,0000000+000	8	14	0,0000000+000	8	15	0,0000000+000	8	16	0,0000000+000	8	17
0,0000000+000	8	18	0,0000000+000	8	19	0,0000000+000	8	20	0,0000000+000	8	21	0,0000000+000	8	22
0,0000000+000	8	23	0,0000000+000	8	24	0,0000000+000	8	25	0,0000000+000	8	26	0,0000000+000	8	27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0,0000000+000	8	31	0,0000000+000	8	32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0,0000000+000	8	36	0,0000000+000	8	37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0,0000000+000	8	41	0,0000000+000	8	42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0,0000000+000	8	46	0,0000000+000	8	47

SCATTERING FROM GROUP 9

0,0000000+000	9	9	0,0000000+000	9	10	0,0000000+000	9	11	0,0000000+000	9	12	0,0000000+000	9	13
0,0000000+000	9	14	0,0000000+000	9	15	0,0000000+000	9	16	0,0000000+000	9	17	0,0000000+000	9	18

0,0000000+000 9 19 0,0000000+000 9 20 0,0000000+000 9 21 0,0000000+000 9 22 0,0000000+000 9 23
0,0000000+000 9 24 0,0000000+000 9 25 0,0000000+000 9 26 0,0000000+000 9 27 0,0000000+000 9 28
0,0000000+000 9 29 0,0000000+000 9 30 0,0000000+000 9 31 0,0000000+000 9 32 0,0000000+000 9 33
0,0000000+000 9 34 0,0000000+000 9 35 0,0000000+000 9 36 0,0000000+000 9 37 0,0000000+000 9 38
0,0000000+000 9 39 0,0000000+000 9 40 0,0000000+000 9 41 0,0000000+000 9 42 0,0000000+000 9 43
0,0000000+000 9 44 0,0000000+000 9 45 0,0000000+000 9 46 0,0000000+000 9 47

SCATTERING FROM GROUP 10

0,0000000+000 10 10 0,0000000+000 10 11 0,0000000+000 10 12 0,0000000+000 10 13 0,0000000+000 10 14
0,0000000+000 10 15 0,0000000+000 10 16 0,0000000+000 10 17 0,0000000+000 10 18 0,0000000+000 10 19
0,0000000+000 10 20 0,0000000+000 10 21 0,0000000+000 10 22 0,0000000+000 10 23 0,0000000+000 10 24
0,0000000+000 10 25 0,0000000+000 10 26 0,0000000+000 10 27 0,0000000+000 10 28 0,0000000+000 10 29
0,0000000+000 10 30 0,0000000+000 10 31 0,0000000+000 10 32 0,0000000+000 10 33 0,0000000+000 10 34
0,0000000+000 10 35 0,0000000+000 10 36 0,0000000+000 10 37 0,0000000+000 10 38 0,0000000+000 10 39
0,0000000+000 10 40 0,0000000+000 10 41 0,0000000+000 10 42 0,0000000+000 10 43 0,0000000+000 10 44
0,0000000+000 10 45 0,0000000+000 10 46 0,0000000+000 10 47

SCATTERING FROM GROUP 11

0,0000000+000 11 11 0,0000000+000 11 12 0,0000000+000 11 13 0,0000000+000 11 14 0,0000000+000 11 15
0,0000000+000 11 16 0,0000000+000 11 17 0,0000000+000 11 18 0,0000000+000 11 19 0,0000000+000 11 20
0,0000000+000 11 21 0,0000000+000 11 22 0,0000000+000 11 23 0,0000000+000 11 24 0,0000000+000 11 25
0,0000000+000 11 26 0,0000000+000 11 27 0,0000000+000 11 28 0,0000000+000 11 29 0,0000000+000 11 30
0,0000000+000 11 31 0,0000000+000 11 32 0,0000000+000 11 33 0,0000000+000 11 34 0,0000000+000 11 35
0,0000000+000 11 36 0,0000000+000 11 37 0,0000000+000 11 38 0,0000000+000 11 39 0,0000000+000 11 40
0,0000000+000 11 41 0,0000000+000 11 42 0,0000000+000 11 43 0,0000000+000 11 44 0,0000000+000 11 45
0,0000000+000 11 46 0,0000000+000 11 47

SCATTERING FROM GROUP 12

0,0000000+000 12 12 0,0000000+000 12 13 0,0000000+000 12 14 0,0000000+000 12 15 0,0000000+000 12 16
0,0000000+000 12 17 0,0000000+000 12 18 0,0000000+000 12 19 0,0000000+000 12 20 0,0000000+000 12 21
0,0000000+000 12 22 0,0000000+000 12 23 0,0000000+000 12 24 0,0000000+000 12 25 0,0000000+000 12 26
0,0000000+000 12 27 0,0000000+000 12 28 0,0000000+000 12 29 0,0000000+000 12 30 0,0000000+000 12 31
0,0000000+000 12 32 0,0000000+000 12 33 0,0000000+000 12 34 0,0000000+000 12 35 0,0000000+000 12 36
0,0000000+000 12 37 0,0000000+000 12 38 0,0000000+000 12 39 0,0000000+000 12 40 0,0000000+000 12 41
0,0000000+000 12 42 0,0000000+000 12 43 0,0000000+000 12 44 0,0000000+000 12 45 0,0000000+000 12 46
0,0000000+000 12 47

SCATTERING FROM GROUP 13

0,0000000+000 13 13 0,0000000+000 13 14 0,0000000+000 13 15 0,0000000+000 13 16 0,0000000+000 13 17
0,0000000+000 13 18 0,0000000+000 13 19 0,0000000+000 13 20 0,0000000+000 13 21 0,0000000+000 13 22
0,0000000+000 13 23 0,0000000+000 13 24 0,0000000+000 13 25 0,0000000+000 13 26 0,0000000+000 13 27
0,0000000+000 13 28 0,0000000+000 13 29 0,0000000+000 13 30 0,0000000+000 13 31 0,0000000+000 13 32
0,0000000+000 13 33 0,0000000+000 13 34 0,0000000+000 13 35 0,0000000+000 13 36 0,0000000+000 13 37
0,0000000+000 13 38 0,0000000+000 13 39 0,0000000+000 13 40 0,0000000+000 13 41 0,0000000+000 13 42
0,0000000+000 13 43 0,0000000+000 13 44 0,0000000+000 13 45 0,0000000+000 13 46 0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,0000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,0000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,0000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,0000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,0000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,0000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,0000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,0000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,0000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,0000000+000 15 28 0,0000000+000 15 29
0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,0000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,0000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,0000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,0000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,0000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,0000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,0000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,0000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,0000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,0000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,0000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,0000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,0000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,0000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,0000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,0000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,0000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,0000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,0000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45

0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38

0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,000000+000 39 42 0,0000000+000 39 43

```
 0,0000000+000 39 44      0,0000000+000 39 45      0,0000000+000 39 46      0,0000000+000 39 47

                                SCATTERING FROM GROUP 40

 0,0000000+000 40 40      0,0000000+000 40 41      0,0000000+000 40 42      0,0000000+000 40 43      0,0000000+000 40 44
 0,0000000+000 40 45      0,0000000+000 40 46      0,0000000+000 40 47

                                SCATTERING FROM GROUP 41

 0,0000000+000 41 41      0,0000000+000 41 42      0,0000000+000 41 43      0,0000000+000 41 44      0,0000000+000 41 45
 0,0000000+000 41 46      0,0000000+000 41 47

                                SCATTERING FROM GROUP 42

 0,0000000+000 42 42      0,0000000+000 42 43      0,0000000+000 42 44      0,0000000+000 42 45      0,0000000+000 42 46
 0,0000000+000 42 47

                                SCATTERING FROM GROUP 43

 0,0000000+000 43 43      0,0000000+000 43 44      0,0000000+000 43 45      0,0000000+000 43 46      0,0000000+000 43 47

                                SCATTERING FROM GROUP 44

 0,0000000+000 44 44      0,0000000+000 44 45      0,0000000+000 44 46      0,0000000+000 44 47

                                SCATTERING FROM GROUP 45

 0,0000000+000 45 45      0,0000000+000 45 46      0,0000000+000 45 47

                                SCATTERING FROM GROUP 46

 0,0000000+000 46 46      0,0000000+000 46 47

                                SCATTERING FROM GROUP 47

 0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO.10  WAS   4.078+000SECONDS

                                N-2N SCATTERING

TIME SPENT IN PROGRAM AREA NO. 8  WAS   6.000-003SECONDS

                                STATISTICAL SCATTERING

                                SCATTERING FROM GROUP  1

 3,0323487-008  1  1      1,8380849-006  1  2      4,2044704-005  1  3      4,4584797-004  1  4      2,5732466-003  1  5
 9,1746742-003  1  6      2,2348654-002  1  7      4,0302248-002  1  8      5,7356372-002  1  9      6,7770487-002  1 10
 6,9204560-002  1 11      6,3038820-002  1 12      5,2513446-002  1 13      4,1794894-002  1 14      3,0009641-002  1 15
 2,1156132-002  1 16      1,4427705-002  1 17      9,5877895-003  1 18      6,2442158-003  1 19      4,0032117-003  1 20
 2,5352331-003  1 21      1,5903077-003  1 22      9,9018039-004  1 23      6,1295869-004  1 24      3,7773566-004  1 25
 2,3196260-004  1 26      1,4205574-004  1 27      8,6810750-005  1 28      5,2962249-005  1 29      3,2269879-005  1 30
 0,0000000+000  1 31      0,0000000+000  1 32      0,0000000+000  1 33      0,0000000+000  1 34      0,0000000+000  1 35
 0,0000000+000  1 36      0,0000000+000  1 37      0,0000000+000  1 38      0,0000000+000  1 39      0,0000000+000  1 40
 0,0000000+000  1 41      0,0000000+000  1 42      0,0000000+000  1 43      0,0000000+000  1 44      0,0000000+000  1 45
```

0,0000000+000	1	46	0,0000000+000	1	47						

SCATTERING FROM GROUP 2

1,3676319+020	2	2	3,9555936-016	2	3	1,1187821-012	2	4	5,1725760-010	2	5	5,8194980-008	2	6
2,1645875+006	2	7	3,3696376-005	2	8	2,6355391-004	2	9	1,1953162+003	2	10	3,5217685+003	2	11
7,3791791+003	2	12	1,1818102-002	2	13	1,5328909-002	2	14	1,6824979+002	2	15	1,6223573-002	2	16
1,4129848+002	2	17	1,1365095-002	2	18	8,5904688-003	2	19	6,1857286+003	2	20	4,2887054-003	2	21
2,8869633+003	2	22	1,8991576-003	2	23	1,2271280-003	2	24	7,8189267+004	2	25	4,9280316-004	2	26
3,0797388+004	2	27	1,9119777-004	2	28	1,1809048-004	2	29	7,2644800-005	2	30	4,4548908-005	2	31
2,7252890+005	2	32	1,6640424-005	2	33	1,0145547-005	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

0,0000000+000	3	3	0,0000000+000	3	4	0,0000000+000	3	5	0,0000000+000	3	6	0,0000000+000	3	7
0,0000000+000	3	8	0,0000000+000	3	9	0,0000000+000	3	10	0,0000000+000	3	11	0,0000000+000	3	12
0,0000000+000	3	13	0,0000000+000	3	14	0,0000000+000	3	15	0,0000000+000	3	16	0,0000000+000	3	17
0,0000000+000	3	18	0,0000000+000	3	19	0,0000000+000	3	20	0,0000000+000	3	21	0,0000000+000	3	22
0,0000000+000	3	23	0,0000000+000	3	24	0,0000000+000	3	25	0,0000000+000	3	26	0,0000000+000	3	27
0,0000000+000	3	28	0,0000000+000	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0,0000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

0,0000000+000	4	4	0,0000000+000	4	5	0,0000000+000	4	6	0,0000000+000	4	7	0,0000000+000	4	8
0,0000000+000	4	9	0,0000000+000	4	10	0,0000000+000	4	11	0,0000000+000	4	12	0,0000000+000	4	13
0,0000000+000	4	14	0,0000000+000	4	15	0,0000000+000	4	16	0,0000000+000	4	17	0,0000000+000	4	18
0,0000000+000	4	19	0,0000000+000	4	20	0,0000000+000	4	21	0,0000000+000	4	22	0,0000000+000	4	23
0,0000000+000	4	24	0,0000000+000	4	25	0,0000000+000	4	26	0,0000000+000	4	27	0,0000000+000	4	28
0,0000000+000	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0,0000000+000	4	32	0,0000000+000	4	33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0,0000000+000	4	37	0,0000000+000	4	38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0,0000000+000	4	42	0,0000000+000	4	43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0,0000000+000	4	47			

SCATTERING FROM GROUP 5

0,0000000+000	5	5	0,0000000+000	5	6	0,0000000+000	5	7	0,0000000+000	5	8	0,0000000+000	5	9
0,0000000+000	5	10	0,0000000+000	5	11	0,0000000+000	5	12	0,0000000+000	5	13	0,0000000+000	5	14
0,0000000+000	5	15	0,0000000+000	5	16	0,0000000+000	5	17	0,0000000+000	5	18	0,0000000+000	5	19
0,0000000+000	5	20	0,0000000+000	5	21	0,0000000+000	5	22	0,0000000+000	5	23	0,0000000+000	5	24
0,0000000+000	5	25	0,0000000+000	5	26	0,0000000+000	5	27	0,0000000+000	5	28	0,0000000+000	5	29
0,0000000+000	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0,0000000+000	5	33	0,0000000+000	5	34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0,0000000+000	5	38	0,0000000+000	5	39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0,0000000+000	5	43	0,0000000+000	5	44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47						

SCATTERING FROM GROUP 6

0,0000000+000	6	6	0,0000000+000	6	7	0,0000000+000	6	8	0,0000000+000	6	9	0,0000000+000	6	10
0,0000000+000	6	11	0,0000000+000	6	12	0,0000000+000	6	13	0,0000000+000	6	14	0,0000000+000	6	15
0,0000000+000	6	16	0,0000000+000	6	17	0,0000000+000	6	18	0,0000000+000	6	19	0,0000000+000	6	20
0,0000000+000	6	21	0,0000000+000	6	22	0,0000000+000	6	23	0,0000000+000	6	24	0,0000000+000	6	25
0,0000000+000	6	26	0,0000000+000	6	27	0,0000000+000	6	28	0,0000000+000	6	29	0,0000000+000	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0,0000000+000	6	39	0,0000000+000	6	40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0,0000000+000	6	44	0,0000000+000	6	45
0,0000000+000	6	46	0,0000000+000	6	47									

SCATTERING FROM GROUP 7

0,0000000+000	7 7	0,0000000+000	7 8	0,0000000+000	7 9	0,0000000+000	7 10	0,0000000+000	7 11
0,0000000+000	7 12	0,0000000+000	7 13	0,0000000+000	7 14	0,0000000+000	7 15	0,0000000+000	7 16
0,0000000+000	7 17	0,0000000+000	7 18	0,0000000+000	7 19	0,0000000+000	7 20	0,0000000+000	7 21
0,0000000+000	7 22	0,0000000+000	7 23	0,0000000+000	7 24	0,0000000+000	7 25	0,0000000+000	7 26
0,0000000+000	7 27	0,0000000+000	7 28	0,0000000+000	7 29	0,0000000+000	7 30	0,0000000+000	7 31
0,0000000+000	7 32	0,0000000+000	7 33	0,0000000+000	7 34	0,0000000+000	7 35	0,0000000+000	7 36
0,0000000+000	7 37	0,0000000+000	7 38	0,0000000+000	7 39	0,0000000+000	7 40	0,0000000+000	7 41
0,0000000+000	7 42	0,0000000+000	7 43	0,0000000+000	7 44	0,0000000+000	7 45	0,0000000+000	7 46
0,0000000+000	7 47								

SCATTERING FROM GROUP 8

0,0000000+000	8 8	0,0000000+000	8 9	0,0000000+000	8 10	0,0000000+000	8 11	0,0000000+000	8 12
0,0000000+000	8 13	0,0000000+000	8 14	0,0000000+000	8 15	0,0000000+000	8 16	0,0000000+000	8 17
0,0000000+000	8 18	0,0000000+000	8 19	0,0000000+000	8 20	0,0000000+000	8 21	0,0000000+000	8 22
0,0000000+000	8 23	0,0000000+000	8 24	0,0000000+000	8 25	0,0000000+000	8 26	0,0000000+000	8 27
0,0000000+000	8 28	0,0000000+000	8 29	0,0000000+000	8 30	0,0000000+000	8 31	0,0000000+000	8 32
0,0000000+000	8 33	0,0000000+000	8 34	0,0000000+000	8 35	0,0000000+000	8 36	0,0000000+000	8 37
0,0000000+000	8 38	0,0000000+000	8 39	0,0000000+000	8 40	0,0000000+000	8 41	0,0000000+000	8 42
0,0000000+000	8 43	0,0000000+000	8 44	0,0000000+000	8 45	0,0000000+000	8 46	0,0000000+000	8 47

SCATTERING FROM GROUP 9

0,0000000+000	9 9	0,0000000+000	9 10	0,0000000+000	9 11	0,0000000+000	9 12	0,0000000+000	9 13
0,0000000+000	9 14	0,0000000+000	9 15	0,0000000+000	9 16	0,0000000+000	9 17	0,0000000+000	9 18
0,0000000+000	9 19	0,0000000+000	9 20	0,0000000+000	9 21	0,0000000+000	9 22	0,0000000+000	9 23
0,0000000+000	9 24	0,0000000+000	9 25	0,0000000+000	9 26	0,0000000+000	9 27	0,0000000+000	9 28
0,0000000+000	9 29	0,0000000+000	9 30	0,0000000+000	9 31	0,0000000+000	9 32	0,0000000+000	9 33
0,0000000+000	9 34	0,0000000+000	9 35	0,0000000+000	9 36	0,0000000+000	9 37	0,0000000+000	9 38
0,0000000+000	9 39	0,0000000+000	9 40	0,0000000+000	9 41	0,0000000+000	9 42	0,0000000+000	9 43
0,0000000+000	9 44	0,0000000+000	9 45	0,0000000+000	9 46	0,0000000+000	9 47		

SCATTERING FROM GROUP 10

0,0000000+000	10 10	0,0000000+000	10 11	0,0000000+000	10 12	0,0000000+000	10 13	0,0000000+000	10 14
0,0000000+000	10 15	0,0000000+000	10 16	0,0000000+000	10 17	0,0000000+000	10 18	0,0000000+000	10 19
0,0000000+000	10 20	0,0000000+000	10 21	0,0000000+000	10 22	0,0000000+000	10 23	0,0000000+000	10 24
0,0000000+000	10 25	0,0000000+000	10 26	0,0000000+000	10 27	0,0000000+000	10 28	0,0000000+000	10 29
0,0000000+000	10 30	0,0000000+000	10 31	0,0000000+000	10 32	0,0000000+000	10 33	0,0000000+000	10 34
0,0000000+000	10 35	0,0000000+000	10 36	0,0000000+000	10 37	0,0000000+000	10 38	0,0000000+000	10 39
0,0000000+000	10 40	0,0000000+000	10 41	0,0000000+000	10 42	0,0000000+000	10 43	0,0000000+000	10 44
0,0000000+000	10 45	0,0000000+000	10 46	0,0000000+000	10 47				

SCATTERING FROM GROUP 11

0,0000000+000	11 11	0,0000000+000	11 12	0,0000000+000	11 13	0,0000000+000	11 14	0,0000000+000	11 15
0,0000000+000	11 16	0,0000000+000	11 17	0,0000000+000	11 18	0,0000000+000	11 19	0,0000000+000	11 20
0,0000000+000	11 21	0,0000000+000	11 22	0,0000000+000	11 23	0,0000000+000	11 24	0,0000000+000	11 25
0,0000000+000	11 26	0,0000000+000	11 27	0,0000000+000	11 28	0,0000000+000	11 29	0,0000000+000	11 30
0,0000000+000	11 31	0,0000000+000	11 32	0,0000000+000	11 33	0,0000000+000	11 34	0,0000000+000	11 35
0,0000000+000	11 36	0,0000000+000	11 37	0,0000000+000	11 38	0,0000000+000	11 39	0,0000000+000	11 40
0,0000000+000	11 41	0,0000000+000	11 42	0,0000000+000	11 43	0,0000000+000	11 44	0,0000000+000	11 45
0,0000000+000	11 46	0,0000000+000	11 47						

SCATTERING FROM GROUP 12

0,0000000+000	12 12	0,0000000+000	12 13	0,0000000+000	12 14	0,0000000+000	12 15	0,0000000+000	12 16
0,0000000+000	12 17	0,0000000+000	12 18	0,0000000+000	12 19	0,0000000+000	12 20	0,0000000+000	12 21
0,0000000+000	12 22	0,0000000+000	12 23	0,0000000+000	12 24	0,0000000+000	12 25	0,0000000+000	12 26

0,0000000+000 12 27	0,0000000+000 12 28	0,0000000+000 12 29	0, 000000+000 12 30	0,0000000+000 12 31
0,0000000+000 12 32	0,0000000+000 12 33	0,0000000+000 12 34	0, 000000+000 12 35	0,0000000+000 12 36
0,0000000+000 12 37	0,0000000+000 12 38	0,0000000+000 12 39	0, 000000+000 12 40	0,0000000+000 12 41
0,0000000+000 12 42	0,0000000+000 12 43	0,0000000+000 12 44	0, 000000+000 12 45	0,0000000+000 12 46
0,0000000+000 12 47				

SCATTERING FROM GROUP 13

0,0000000+000 13 13	0,0000000+000 13 14	0,0000000+000 13 15	0, 000000+000 13 16	0,0000000+000 13 17
0,0000000+000 13 18	0,0000000+000 13 19	0,0000000+000 13 20	0, 000000+000 13 21	0,0000000+000 13 22
0,0000000+000 13 23	0,0000000+000 13 24	0,0000000+000 13 25	0, 000000+000 13 26	0,0000000+000 13 27
0,0000000+000 13 28	0,0000000+000 13 29	0,0000000+000 13 30	0, 000000+000 13 31	0,0000000+000 13 32
0,0000000+000 13 33	0,0000000+000 13 34	0,0000000+000 13 35	0, 000000+000 13 36	0,0000000+000 13 37
0,0000000+000 13 38	0,0000000+000 13 39	0,0000000+000 13 40	0, 000000+000 13 41	0,0000000+000 13 42
0,0000000+000 13 43	0,0000000+000 13 44	0,0000000+000 13 45	0, 000000+000 13 46	0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14	0,0000000+000 14 15	0,0000000+000 14 16	0, 000000+000 14 17	0,0000000+000 14 18
0,0000000+000 14 19	0,0000000+000 14 20	0,0000000+000 14 21	0, 000000+000 14 22	0,0000000+000 14 23
0,0000000+000 14 24	0,0000000+000 14 25	0,0000000+000 14 26	0, 000000+000 14 27	0,0000000+000 14 28
0,0000000+000 14 29	0,0000000+000 14 30	0,0000000+000 14 31	0, 000000+000 14 32	0,0000000+000 14 33
0,0000000+000 14 34	0,0000000+000 14 35	0,0000000+000 14 36	0, 000000+000 14 37	0,0000000+000 14 38
0,0000000+000 14 39	0,0000000+000 14 40	0,0000000+000 14 41	0, 000000+000 14 42	0,0000000+000 14 43
0,0000000+000 14 44	0,0000000+000 14 45	0,0000000+000 14 46	0, 000000+000 14 47	

SCATTERING FROM GROUP 15

0,0000000+000 15 15	0,0000000+000 15 16	0,0000000+000 15 17	0, 000000+000 15 18	0,0000000+000 15 19
0,0000000+000 15 20	0,0000000+000 15 21	0,0000000+000 15 22	0, 000000+000 15 23	0,0000000+000 15 24
0,0000000+000 15 25	0,0000000+000 15 26	0,0000000+000 15 27	0, 000000+000 15 28	0,0000000+000 15 29
0,0000000+000 15 30	0,0000000+000 15 31	0,0000000+000 15 32	0, 000000+000 15 33	0,0000000+000 15 34
0,0000000+000 15 35	0,0000000+000 15 36	0,0000000+000 15 37	0, 000000+000 15 38	0,0000000+000 15 39
0,0000000+000 15 40	0,0000000+000 15 41	0,0000000+000 15 42	0, 000000+000 15 43	0,0000000+000 15 44
0,0000000+000 15 45	0,0000000+000 15 46	0,0000000+000 15 47		

SCATTERING FROM GROUP 16

0,0000000+000 16 16	0,0000000+000 16 17	0,0000000+000 16 18	0, 000000+000 16 19	0,0000000+000 16 20
0,0000000+000 16 21	0,0000000+000 16 22	0,0000000+000 16 23	0, 000000+000 16 24	0,0000000+000 16 25
0,0000000+000 16 26	0,0000000+000 16 27	0,0000000+000 16 28	0, 000000+000 16 29	0,0000000+000 16 30
0,0000000+000 16 31	0,0000000+000 16 32	0,0000000+000 16 33	0, 000000+000 16 34	0,0000000+000 16 35
0,0000000+000 16 36	0,0000000+000 16 37	0,0000000+000 16 38	0, 000000+000 16 39	0,0000000+000 16 40
0,0000000+000 16 41	0,0000000+000 16 42	0,0000000+000 16 43	0, 000000+000 16 44	0,0000000+000 16 45
0,0000000+000 16 46	0,0000000+000 16 47			

SCATTERING FROM GROUP 17

0,0000000+000 17 17	0,0000000+000 17 18	0,0000000+000 17 19	0, 000000+000 17 20	0,0000000+000 17 21
0,0000000+000 17 22	0,0000000+000 17 23	0,0000000+000 17 24	0, 000000+000 17 25	0,0000000+000 17 26
0,0000000+000 17 27	0,0000000+000 17 28	0,0000000+000 17 29	0, 000000+000 17 30	0,0000000+000 17 31
0,0000000+000 17 32	0,0000000+000 17 33	0,0000000+000 17 34	0, 000000+000 17 35	0,0000000+000 17 36
0,0000000+000 17 37	0,0000000+000 17 38	0,0000000+000 17 39	0, 000000+000 17 40	0,0000000+000 17 41
0,0000000+000 17 42	0,0000000+000 17 43	0,0000000+000 17 44	0, 000000+000 17 45	0,0000000+000 17 46
0,0000000+000 17 47				

SCATTERING FROM GROUP 18

0,0000000+000 18 18	0,0000000+000 18 19	0,0000000+000 18 20	0, 000000+000 18 21	0,0000000+000 18 22
0,0000000+000 18 23	0,0000000+000 18 24	0,0000000+000 18 25	0, 000000+000 18 26	0,0000000+000 18 27
0,0000000+000 18 28	0,0000000+000 18 29	0,0000000+000 18 30	0, 000000+000 18 31	0,0000000+000 18 32
0,0000000+000 18 33	0,0000000+000 18 34	0,0000000+000 18 35	0, 000000+000 18 36	0,0000000+000 18 37

0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26	0,0000000+000 26 27	0,0000000+000 26 28	0,0000000+000 26 29	0,0000000+000 26 30
0,0000000+000 26 31	0,0000000+000 26 32	0,0000000+000 26 33	0,0000000+000 26 34	0,0000000+000 26 35
0,0000000+000 26 36	0,0000000+000 26 37	0,0000000+000 26 38	0,0000000+000 26 39	0,0000000+000 26 40
0,0000000+000 26 41	0,0000000+000 26 42	0,0000000+000 26 43	0,0000000+000 26 44	0,0000000+000 26 45
0,0000000+000 26 46	0,0000000+000 26 47			

SCATTERING FROM GROUP 27

0,0000000+000 27 27	0,0000000+000 27 28	0,0000000+000 27 29	0,0000000+000 27 30	0,0000000+000 27 31
0,0000000+000 27 32	0,0000000+000 27 33	0,0000000+000 27 34	0,0000000+000 27 35	0,0000000+000 27 36
0,0000000+000 27 37	0,0000000+000 27 38	0,0000000+000 27 39	0,0000000+000 27 40	0,0000000+000 27 41
0,0000000+000 27 42	0,0000000+000 27 43	0,0000000+000 27 44	0,0000000+000 27 45	0,0000000+000 27 46
0,0000000+000 27 47				

SCATTERING FROM GROUP 28

0,0000000+000 28 28	0,0000000+000 28 29	0,0000000+000 28 30	0,0000000+000 28 31	0,0000000+000 28 32
0,0000000+000 28 33	0,0000000+000 28 34	0,0000000+000 28 35	0,0000000+000 28 36	0,0000000+000 28 37
0,0000000+000 28 38	0,0000000+000 28 39	0,0000000+000 28 40	0,0000000+000 28 41	0,0000000+000 28 42
0,0000000+000 28 43	0,0000000+000 28 44	0,0000000+000 28 45	0,0000000+000 28 46	0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29	0,0000000+000 29 30	0,0000000+000 29 31	0,0000000+000 29 32	0,0000000+000 29 33
0,0000000+000 29 34	0,0000000+000 29 35	0,0000000+000 29 36	0,0000000+000 29 37	0,0000000+000 29 38
0,0000000+000 29 39	0,0000000+000 29 40	0,0000000+000 29 41	0,0000000+000 29 42	0,0000000+000 29 43
0,0000000+000 29 44	0,0000000+000 29 45	0,0000000+000 29 46	0,0000000+000 29 47	

SCATTERING FROM GROUP 30

0,0000000+000 30 30	0,0000000+000 30 31	0,0000000+000 30 32	0,0000000+000 30 33	0,0000000+000 30 34
0,0000000+000 30 35	0,0000000+000 30 36	0,0000000+000 30 37	0,0000000+000 30 38	0,0000000+000 30 39
0,0000000+000 30 40	0,0000000+000 30 41	0,0000000+000 30 42	0,0000000+000 30 43	0,0000000+000 30 44
0,0000000+000 30 45	0,0000000+000 30 46	0,0000000+000 30 47		

SCATTERING FROM GROUP 31

0,0000000+000 31 31	0,0000000+000 31 32	0,0000000+000 31 33	0,0000000+000 31 34	0,0000000+000 31 35
0,0000000+000 31 36	0,0000000+000 31 37	0,0000000+000 31 38	0,0000000+000 31 39	0,0000000+000 31 40
0,0000000+000 31 41	0,0000000+000 31 42	0,0000000+000 31 43	0,0000000+000 31 44	0,0000000+000 31 45
0,0000000+000 31 46	0,0000000+000 31 47			

SCATTERING FROM GROUP 32

0,0000000+000 32 32	0,0000000+000 32 33	0,0000000+000 32 34	0,0000000+000 32 35	0,0000000+000 32 36
0,0000000+000 32 37	0,0000000+000 32 38	0,0000000+000 32 39	0,0000000+000 32 40	0,0000000+000 32 41
0,0000000+000 32 42	0,0000000+000 32 43	0,0000000+000 32 44	0,0000000+000 32 45	0,0000000+000 32 46
0,0000000+000 32 47				

SCATTERING FROM GROUP 33

0,0000000+000 33 33	0,0000000+000 33 34	0,0000000+000 33 35	0,0000000+000 33 36	0,0000000+000 33 37
0,0000000+000 33 38	0,0000000+000 33 39	0,0000000+000 33 40	0,0000000+000 33 41	0,0000000+000 33 42
0,0000000+000 33 43	0,0000000+000 33 44	0,0000000+000 33 45	0,0000000+000 33 46	0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34	0,0000000+000 34 35	0,0000000+000 34 36	0,0000000+000 34 37	0,0000000+000 34 38
0,0000000+000 34 39	0,0000000+000 34 40	0,0000000+000 34 41	0,0000000+000 34 42	0,0000000+000 34 43

0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO,10 WAS 4,044+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 4,900-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 3,000-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,500-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,100-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 2,100-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1,700-002SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1,300-002SECONDS

MATERIAL NA 23

DISCRETE LEVEL SCATTERING

SCATTERING FROM GROUP 1

0,0000000+000	1 1	0,0000000+000	1 2	0,0000000+000	1 3	0,0000000+000	1 4	0,0000000+000	1 5
0,0000000+000	1 6	0,0000000+000	1 7	0,0000000+000	1 8	0,0000000+000	1 9	0,0000000+000	1 10
0,0000000+000	1 11	0,0000000+000	1 12	0,0000000+000	1 13	0,0000000+000	1 14	0,0000000+000	1 15
0,0000000+000	1 16	0,0000000+000	1 17	0,0000000+000	1 18	0,0000000+000	1 19	0,0000000+000	1 20
0,0000000+000	1 21	0,0000000+000	1 22	0,0000000+000	1 23	0,0000000+000	1 24	0,0000000+000	1 25
0,0000000+000	1 26	0,0000000+000	1 27	0,0000000+000	1 28	0,0000000+000	1 29	0,0000000+000	1 30
0,0000000+000	1 31	0,0000000+000	1 32	0,0000000+000	1 33	0,0000000+000	1 34	0,0000000+000	1 35
0,0000000+000	1 36	0,0000000+000	1 37	0,0000000+000	1 38	0,0000000+000	1 39	0,0000000+000	1 40
0,0000000+000	1 41	0,0000000+000	1 42	0,0000000+000	1 43	0,0000000+000	1 44	0,0000000+000	1 45
0,0000000+000	1 46	0,0000000+000	1 47						

SCATTERING FROM GROUP 2

0,0000000+000	2 2	0,0000000+000	2 3	0,0000000+000	2 4	0,0000000+000	2 5	0,0000000+000	2 6
0,0000000+000	2 7	0,0000000+000	2 8	0,0000000+000	2 9	0,0000000+000	2 10	0,0000000+000	2 11
0,0000000+000	2 12	0,0000000+000	2 13	0,0000000+000	2 14	0,0000000+000	2 15	0,0000000+000	2 16
0,0000000+000	2 17	0,0000000+000	2 18	0,0000000+000	2 19	0,0000000+000	2 20	0,0000000+000	2 21
0,0000000+000	2 22	0,0000000+000	2 23	0,0000000+000	2 24	0,0000000+000	2 25	0,0000000+000	2 26
0,0000000+000	2 27	0,0000000+000	2 28	0,0000000+000	2 29	0,0000000+000	2 30	0,0000000+000	2 31
0,0000000+000	2 32	0,0000000+000	2 33	0,0000000+000	2 34	0,0000000+000	2 35	0,0000000+000	2 36
0,0000000+000	2 37	0,0000000+000	2 38	0,0000000+000	2 39	0,0000000+000	2 40	0,0000000+000	2 41
0,0000000+000	2 42	0,0000000+000	2 43	0,0000000+000	2 44	0,0000000+000	2 45	0,0000000+000	2 46
0,0000000+000	2 47								

SCATTERING FROM GROUP 3

0,0000000+000	3 3	2,7539411-002	3 4	3,0711393-003	3 5	2,4505189-002	3 6	3,1589447-002	3 7		
0,0000000+000	3 8	5,8981738-003	3 9	2,2464625-004	3 10	0,0000000+000	3 11	0,0000000+000	3 12		
0,0000000+000	3 13	0,0000000+000	3 14	0,0000000+000	3 15	0,0000000+000	3 16	0,0000000+000	3 17		
0,0000000+000	3 18	0,0000000+000	3 19	0,0000000+000	3 20	0,0000000+000	3 21	0,0000000+000	3 22		
0,0000000+000	3 23	0,0000000+000	3 24	0,0000000+000	3 25	0,0000000+000	3 26	0,0000000+000	3 27		
0,0000000+000	3 28	0,0000000+000	3 29	0,0000000+000	3 30	0,0000000+000	3 31	0,0000000+000	3 32		
0,0000000+000	3 33	0,0000000+000	3 34	0,0000000+000	3 35	0,0000000+000	3 36	0,0000000+000	3 37		
0,0000000+000	3 38	0,0000000+000	3 39	0,0000000+000	3 40	0,0000000+000	3 41	0,0000000+000	3 42		
0,0000000+000	3 43	0,0000000+000	3 44	0,0000000+000	3 45	0,0000000+000	3 46	0,0000000+000	3 47		

SCATTERING FROM GROUP 4

1,1999103+001	4 4	1,1609566-001	4 5	5,2861080-002	4 6	1,4622504-001	4 7	1,3336731-001	4 8		
7,0705323+002	4 9	3,4120661-002	4 10	1,6954517-002	4 11	3,5630563-003	4 12	2,5354747-003	4 13		
1,7667254+003	4 14	1,1327691+003	4 15	5,7533979-004	4 16	0,0000000+000	4 17	0,0000000+000	4 18		
0,0000000+000	4 19	0,0000000+000	4 20	0,0000000+000	4 21	0,0000000+000	4 22	0,0000000+000	4 23		
0,0000000+000	4 24	0,0000000+000	4 25	0,0000000+000	4 26	0,0000000+000	4 27	0,0000000+000	4 28		
0,0000000+000	4 29	0,0000000+000	4 30	0,0000000+000	4 31	0,0000000+000	4 32	0,0000000+000	4 33		
0,0000000+000	4 34	0,0000000+000	4 35	0,0000000+000	4 36	0,0000000+000	4 37	0,0000000+000	4 38		
0,0000000+000	4 39	0,0000000+000	4 40	0,0000000+000	4 41	0,0000000+000	4 42	0,0000000+000	4 43		
0,0000000+000	4 44	0,0000000+000	4 45	0,0000000+000	4 46	0,0000000+000	4 47				

SCATTERING FROM GROUP 5

1,5952286+001	5 5	2,0704860-001	5 6	0,0000000+000	5 7	4,570718-002	5 8	4,8689175-002	5 9		
5,8630274+002	5 10	3,7291484-002	5 11	4,9785026-002	5 12	2,6863239-002	5 13	1,7480610-002	5 14		
1,5283113+002	5 15	8,7325070-003	5 16	3,6133224-003	5 17	6,226529-004	5 18	0,0000000+000	5 19		
0,0000000+000	5 20	0,0000000+000	5 21	0,0000000+000	5 22	0,0000000+000	5 23	0,0000000+000	5 24		
0,0000000+000	5 25	0,0000000+000	5 26	0,0000000+000	5 27	0,0000000+000	5 28	0,0000000+000	5 29		
0,0000000+000	5 30	0,0000000+000	5 31	0,0000000+000	5 32	0,0000000+000	5 33	0,0000000+000	5 34		
0,0000000+000	5 35	0,0000000+000	5 36	0,0000000+000	5 37	0,0000000+000	5 38	0,0000000+000	5 39		
0,0000000+000	5 40	0,0000000+000	5 41	0,0000000+000	5 42	0,0000000+000	5 43	0,0000000+000	5 44		
0,0000000+000	5 45	0,0000000+000	5 46	0,0000000+000	5 47						

SCATTERING FROM GROUP 6

1,6972797+001	6 6	3,8268791-001	6 7	0,0000000+000	6 8	0,0000000+000	6 9	0,0000000+000	6 10		
2,7493446+002	6 11	2,0786991-002	6 12	1,6443304-002	6 13	1,2790155-002	6 14	7,2886267-003	6 15		
4,6898753+003	6 16	2,9620311+003	6 17	5,1775809-004	6 18	0,0000000+000	6 19	0,0000000+000	6 20		
0,0000000+000	6 21	0,0000000+000	6 22	0,0000000+000	6 23	0,0000000+000	6 24	0,0000000+000	6 25		
0,0000000+000	6 26	0,0000000+000	6 27	0,0000000+000	6 28	0,0000000+000	6 29	0,0000000+000	6 30		
0,0000000+000	6 31	0,0000000+000	6 32	0,0000000+000	6 33	0,0000000+000	6 34	0,0000000+000	6 35		
0,0000000+000	6 36	0,0000000+000	6 37	0,0000000+000	6 38	0,0000000+000	6 39	0,0000000+000	6 40		
0,0000000+000	6 41	0,0000000+000	6 42	0,0000000+000	6 43	0,0000000+000	6 44	0,0000000+000	6 45		
0,0000000+000	6 46	0,0000000+000	6 47								

SCATTERING FROM GROUP 7

8,3881513+002	7 7	5,1872700-001	7 8	7,1598354-002	7 9	0,0000000+000	7 10	0,0000000+000	7 11		
0,0000000+000	7 12	0,0000000+000	7 13	0,0000000+000	7 14	0,0000000+000	7 15	0,0000000+000	7 16		
9,4087909+004	7 17	2,0930130-003	7 18	4,7533795-004	7 19	0,0000000+000	7 20	0,0000000+000	7 21		
0,0000000+000	7 22	0,0000000+000	7 23	0,0000000+000	7 24	0,0000000+000	7 25	0,0000000+000	7 26		
0,0000000+000	7 27	0,0000000+000	7 28	0,0000000+000	7 29	0,0000000+000	7 30	0,0000000+000	7 31		
0,0000000+000	7 32	0,0000000+000	7 33	0,0000000+000	7 34	0,0000000+000	7 35	0,0000000+000	7 36		
0,0000000+000	7 37	0,0000000+000	7 38	0,0000000+000	7 39	0,0000000+000	7 40	0,0000000+000	7 41		
0,0000000+000	7 42	0,0000000+000	7 43	0,0000000+000	7 44	0,0000000+000	7 45	0,0000000+000	7 46		
0,0000000+000	7 47										

SCATTERING FROM GROUP 8

0,0000000+000	8 8	2,9330358-001	8 9	8,8282447-002	8 10	0,0000000+000	8 11	0,0000000+000	8 12		
0,0000000+000	8 13	0,0000000+000	8 14	0,0000000+000	8 15	0,0000000+000	8 16	0,0000000+000	8 17		

0,0000000+000	8	18	0,0000000+000	8	19	0,0000000+000	8	20	0,0000000+000	8	21	0,0000000+000	8	22
0,0000000+000	8	23	0,0000000+000	8	24	0,0000000+000	8	25	0,0000000+000	8	26	0,0000000+000	8	27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0,0000000+000	8	31	0,0000000+000	8	32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0,0000000+000	8	36	0,0000000+000	8	37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0,0000000+000	8	41	0,0000000+000	8	42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0,0000000+000	8	46	0,0000000+000	8	47

SCATTERING FROM GROUP 9

0,0000000+000	9	9	1,5471689-001	9	10	3,8018634-001	9	11	5,4855473-002	9	12	0,0000000+000	9	13
0,0000000+000	9	14	0,0000000+000	9	15	0,0000000+000	9	16	0,0000000+000	9	17	0,0000000+000	9	18
0,0000000+000	9	19	0,0000000+000	9	20	0,0000000+000	9	21	0,0000000+000	9	22	0,0000000+000	9	23
0,0000000+000	9	24	0,0000000+000	9	25	0,0000000+000	9	26	0,0000000+000	9	27	0,0000000+000	9	28
0,0000000+000	9	29	0,0000000+000	9	30	0,0000000+000	9	31	0,0000000+000	9	32	0,0000000+000	9	33
0,0000000+000	9	34	0,0000000+000	9	35	0,0000000+000	9	36	0,0000000+000	9	37	0,0000000+000	9	38
0,0000000+000	9	39	0,0000000+000	9	40	0,0000000+000	9	41	0,0000000+000	9	42	0,0000000+000	9	43
0,0000000+000	9	44	0,0000000+000	9	45	0,0000000+000	9	46	0,0000000+000	9	47			

SCATTERING FROM GROUP 10

0,0000000+000	10	10	0,0000000+000	10	11	1,9404839-001	10	12	1,6371743-001	10	13	9,1775758-003	10	14
0,0000000+000	10	15	0,0000000+000	10	16	0,0000000+000	10	17	0,0000000+000	10	18	0,0000000+000	10	19
0,0000000+000	10	20	0,0000000+000	10	21	0,0000000+000	10	22	0,0000000+000	10	23	0,0000000+000	10	24
0,0000000+000	10	25	0,0000000+000	10	26	0,0000000+000	10	27	0,0000000+000	10	28	0,0000000+000	10	29
0,0000000+000	10	30	0,0000000+000	10	31	0,0000000+000	10	32	0,0000000+000	10	33	0,0000000+000	10	34
0,0000000+000	10	35	0,0000000+000	10	36	0,0000000+000	10	37	0,0000000+000	10	38	0,0000000+000	10	39
0,0000000+000	10	40	0,0000000+000	10	41	0,0000000+000	10	42	0,0000000+000	10	43	0,0000000+000	10	44
0,0000000+000	10	45	0,0000000+000	10	46	0,0000000+000	10	47						

SCATTERING FROM GROUP 11

0,0000000+000	11	11	0,0000000+000	11	12	0,0000000+000	11	13	1,6081412+001	11	14	1,2223158+001	11	15
4,8872515+002	11	16	0,0000000+000	11	17	0,0000000+000	11	18	0,0000000+000	11	19	0,0000000+000	11	20
0,0000000+000	11	21	0,0000000+000	11	22	0,0000000+000	11	23	0,0000000+000	11	24	0,0000000+000	11	25
0,0000000+000	11	26	0,0000000+000	11	27	0,0000000+000	11	28	0,0000000+000	11	29	0,0000000+000	11	30
0,0000000+000	11	31	0,0000000+000	11	32	0,0000000+000	11	33	0,0000000+000	11	34	0,0000000+000	11	35
0,0000000+000	11	36	0,0000000+000	11	37	0,0000000+000	11	38	0,0000000+000	11	39	0,0000000+000	11	40
0,0000000+000	11	41	0,0000000+000	11	42	0,0000000+000	11	43	0,0000000+000	11	44	0,0000000+000	11	45
0,0000000+000	11	46	0,0000000+000	11	47									

SCATTERING FROM GROUP 12

0,0000000+000	12	12	0,0000000+000	12	13	0,0000000+000	12	14	0,0000000+000	12	15	2,5183281-002	12	16
4,4450885+002	12	17	1,9878208-002	12	18	9,3903038-003	12	19	5,8671173-003	12	20	2,2019602-003	12	21
0,0000000+000	12	22	0,0000000+000	12	23	0,0000000+000	12	24	0,0000000+000	12	25	0,0000000+000	12	26
0,0000000+000	12	27	0,0000000+000	12	28	0,0000000+000	12	29	0,0000000+000	12	30	0,0000000+000	12	31
0,0000000+000	12	32	0,0000000+000	12	33	0,0000000+000	12	34	0,0000000+000	12	35	0,0000000+000	12	36
0,0000000+000	12	37	0,0000000+000	12	38	0,0000000+000	12	39	0,0000000+000	12	40	0,0000000+000	12	41
0,0000000+000	12	42	0,0000000+000	12	43	0,0000000+000	12	44	0,0000000+000	12	45	0,0000000+000	12	46
0,0000000+000	12	47												

SCATTERING FROM GROUP 13

0,0000000+000	13	13	0,0000000+000	13	14	0,0000000+000	13	15	0,0000000+000	13	16	0,0000000+000	13	17
0,0000000+000	13	18	0,0000000+000	13	19	0,0000000+000	13	20	1,9135760+003	13	21	3,0091991-003	13	22
1,9292724+003	13	23	1,2512368-003	13	24	7,2402618-004	13	25	0,0000000+000	13	26	0,0000000+000	13	27
0,0000000+000	13	28	0,0000000+000	13	29	0,0000000+000	13	30	0,0000000+000	13	31	0,0000000+000	13	32
0,0000000+000	13	33	0,0000000+000	13	34	0,0000000+000	13	35	0,0000000+000	13	36	0,0000000+000	13	37
0,0000000+000	13	38	0,0000000+000	13	39	0,0000000+000	13	40	0,0000000+000	13	41	0,0000000+000	13	42
0,0000000+000	13	43	0,0000000+000	13	44	0,0000000+000	13	45	0,0000000+000	13	46	0,0000000+000	13	47

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,0000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,0000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,0000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,0000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,0000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,0000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,0000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,0000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,0000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,0000000+000 15 28 0,0000000+000 15 29
0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,0000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,0000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,0000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,0000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,0000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,0000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,0000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,0000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,0000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,0000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,0000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,0000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,0000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,0000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,0000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,0000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,0000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,0000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,0000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34

0,0000000+000 20 35	0,0000000+000 20 36	0,0000000+000 20 37	0,0000000+000 20 38	0,0000000+000 20 39
0,0000000+000 20 40	0,0000000+000 20 41	0,0000000+000 20 42	0, 000000+000 20 43	0,0000000+000 20 44
0,0000000+000 20 45	0,0000000+000 20 46	0,0000000+000 20 47		

SCATTERING FROM GROUP 21

0,0000000+000 21 21	0,0000000+000 21 22	0,0000000+000 21 23	0, 000000+000 21 24	0,0000000+000 21 25
0,0000000+000 21 26	0,0000000+000 21 27	0,0000000+000 21 28	0, 000000+000 21 29	0,0000000+000 21 30
0,0000000+000 21 31	0,0000000+000 21 32	0,0000000+000 21 33	0, 000000+000 21 34	0,0000000+000 21 35
0,0000000+000 21 36	0,0000000+000 21 37	0,0000000+000 21 38	0, 000000+000 21 39	0,0000000+000 21 40
0,0000000+000 21 41	0,0000000+000 21 42	0,0000000+000 21 43	0, 000000+000 21 44	0,0000000+000 21 45
0,0000000+000 21 46	0,0000000+000 21 47			

SCATTERING FROM GROUP 22

0,0000000+000 22 22	0,0000000+000 22 23	0,0000000+000 22 24	0, 000000+000 22 25	0,0000000+000 22 26
0,0000000+000 22 27	0,0000000+000 22 28	0,0000000+000 22 29	0, 000000+000 22 30	0,0000000+000 22 31
0,0000000+000 22 32	0,0000000+000 22 33	0,0000000+000 22 34	0, 000000+000 22 35	0,0000000+000 22 36
0,0000000+000 22 37	0,0000000+000 22 38	0,0000000+000 22 39	0, 000000+000 22 40	0,0000000+000 22 41
0,0000000+000 22 42	0,0000000+000 22 43	0,0000000+000 22 44	0, 000000+000 22 45	0,0000000+000 22 46
0,0000000+000 22 47				

SCATTERING FROM GROUP 23

0,0000000+000 23 23	0,0000000+000 23 24	0,0000000+000 23 25	0, 000000+000 23 26	0,0000000+000 23 27
0,0000000+000 23 28	0,0000000+000 23 29	0,0000000+000 23 30	0, 000000+000 23 31	0,0000000+000 23 32
0,0000000+000 23 33	0,0000000+000 23 34	0,0000000+000 23 35	0, 000000+000 23 36	0,0000000+000 23 37
0,0000000+000 23 38	0,0000000+000 23 39	0,0000000+000 23 40	0, 000000+000 23 41	0,0000000+000 23 42
0,0000000+000 23 43	0,0000000+000 23 44	0,0000000+000 23 45	0, 000000+000 23 46	0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24	0,0000000+000 24 25	0,0000000+000 24 26	0, 000000+000 24 27	0,0000000+000 24 28
0,0000000+000 24 29	0,0000000+000 24 30	0,0000000+000 24 31	0, 000000+000 24 32	0,0000000+000 24 33
0,0000000+000 24 34	0,0000000+000 24 35	0,0000000+000 24 36	0, 000000+000 24 37	0,0000000+000 24 38
0,0000000+000 24 39	0,0000000+000 24 40	0,0000000+000 24 41	0, 000000+000 24 42	0,0000000+000 24 43
0,0000000+000 24 44	0,0000000+000 24 45	0,0000000+000 24 46	0, 000000+000 24 47	

SCATTERING FROM GROUP 25

0,0000000+000 25 25	0,0000000+000 25 26	0,0000000+000 25 27	0, 000000+000 25 28	0,0000000+000 25 29
0,0000000+000 25 30	0,0000000+000 25 31	0,0000000+000 25 32	0, 000000+000 25 33	0,0000000+000 25 34
0,0000000+000 25 35	0,0000000+000 25 36	0,0000000+000 25 37	0, 000000+000 25 38	0,0000000+000 25 39
0,0000000+000 25 40	0,0000000+000 25 41	0,0000000+000 25 42	0, 000000+000 25 43	0,0000000+000 25 44
0,0000000+000 25 45	0,0000000+000 25 46	0,0000000+000 25 47		

SCATTERING FROM GROUP 26

0,0000000+000 26 26	0,0000000+000 26 27	0,0000000+000 26 28	0, 000000+000 26 29	0,0000000+000 26 30
0,0000000+000 26 31	0,0000000+000 26 32	0,0000000+000 26 33	0, 000000+000 26 34	0,0000000+000 26 35
0,0000000+000 26 36	0,0000000+000 26 37	0,0000000+000 26 38	0, 000000+000 26 39	0,0000000+000 26 40
0,0000000+000 26 41	0,0000000+000 26 42	0,0000000+000 26 43	0, 000000+000 26 44	0,0000000+000 26 45
0,0000000+000 26 46	0,0000000+000 26 47			

SCATTERING FROM GROUP 27

0,0000000+000 27 27	0,0000000+000 27 28	0,0000000+000 27 29	0, 000000+000 27 30	0,0000000+000 27 31
0,0000000+000 27 32	0,0000000+000 27 33	0,0000000+000 27 34	0, 000000+000 27 35	0,0000000+000 27 36
0,0000000+000 27 37	0,0000000+000 27 38	0,0000000+000 27 39	0, 000000+000 27 40	0,0000000+000 27 41
0,0000000+000 27 42	0,0000000+000 27 43	0,0000000+000 27 44	0, 000000+000 27 45	0,0000000+000 27 46
0,0000000+000 27 47				

SCATTERING FROM GROUP 28

0,0000000+000 28 28	0,0000000+000 28 29	0,0000000+000 28 30	0, 000000+000 28 31	0,0000000+000 28 32
0,0000000+000 28 33	0,0000000+000 28 34	0,0000000+000 28 35	0, 000000+000 28 36	0,0000000+000 28 37
0,0000000+000 28 38	0,0000000+000 28 39	0,0000000+000 28 40	0, 000000+000 28 41	0,0000000+000 28 42
0,0000000+000 28 43	0,0000000+000 28 44	0,0000000+000 28 45	0, 000000+000 28 46	0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29	0,0000000+000 29 30	0,0000000+000 29 31	0, 000000+000 29 32	0,0000000+000 29 33
0,0000000+000 29 34	0,0000000+000 29 35	0,0000000+000 29 36	0, 000000+000 29 37	0,0000000+000 29 38
0,0000000+000 29 39	0,0000000+000 29 40	0,0000000+000 29 41	0, 000000+000 29 42	0,0000000+000 29 43
0,0000000+000 29 44	0,0000000+000 29 45	0,0000000+000 29 46	0, 000000+000 29 47	

SCATTERING FROM GROUP 30

0,0000000+000 30 30	0,0000000+000 30 31	0,0000000+000 30 32	0, 000000+000 30 33	0,0000000+000 30 34
0,0000000+000 30 35	0,0000000+000 30 36	0,0000000+000 30 37	0, 000000+000 30 38	0,0000000+000 30 39
0,0000000+000 30 40	0,0000000+000 30 41	0,0000000+000 30 42	0, 000000+000 30 43	0,0000000+000 30 44
0,0000000+000 30 45	0,0000000+000 30 46	0,0000000+000 30 47		

SCATTERING FROM GROUP 31

0,0000000+000 31 31	0,0000000+000 31 32	0,0000000+000 31 33	0, 000000+000 31 34	0,0000000+000 31 35
0,0000000+000 31 36	0,0000000+000 31 37	0,0000000+000 31 38	0, 000000+000 31 39	0,0000000+000 31 40
0,0000000+000 31 41	0,0000000+000 31 42	0,0000000+000 31 43	0, 000000+000 31 44	0,0000000+000 31 45
0,0000000+000 31 46	0,0000000+000 31 47			

SCATTERING FROM GROUP 32

0,0000000+000 32 32	0,0000000+000 32 33	0,0000000+000 32 34	0, 000000+000 32 35	0,0000000+000 32 36
0,0000000+000 32 37	0,0000000+000 32 38	0,0000000+000 32 39	0, 000000+000 32 40	0,0000000+000 32 41
0,0000000+000 32 42	0,0000000+000 32 43	0,0000000+000 32 44	0, 000000+000 32 45	0,0000000+000 32 46
0,0000000+000 32 47				

SCATTERING FROM GROUP 33

0,0000000+000 33 33	0,0000000+000 33 34	0,0000000+000 33 35	0, 000000+000 33 36	0,0000000+000 33 37
0,0000000+000 33 38	0,0000000+000 33 39	0,0000000+000 33 40	0, 000000+000 33 41	0,0000000+000 33 42
0,0000000+000 33 43	0,0000000+000 33 44	0,0000000+000 33 45	0, 000000+000 33 46	0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34	0,0000000+000 34 35	0,0000000+000 34 36	0, 000000+000 34 37	0,0000000+000 34 38
0,0000000+000 34 39	0,0000000+000 34 40	0,0000000+000 34 41	0, 000000+000 34 42	0,0000000+000 34 43
0,0000000+000 34 44	0,0000000+000 34 45	0,0000000+000 34 46	0, 000000+000 34 47	

SCATTERING FROM GROUP 35

0,0000000+000 35 35	0,0000000+000 35 36	0,0000000+000 35 37	0, 000000+000 35 38	0,0000000+000 35 39
0,0000000+000 35 40	0,0000000+000 35 41	0,0000000+000 35 42	0, 000000+000 35 43	0,0000000+000 35 44
0,0000000+000 35 45	0,0000000+000 35 46	0,0000000+000 35 47		

SCATTERING FROM GROUP 36

0,0000000+000 36 36	0,0000000+000 36 37	0,0000000+000 36 38	0, 000000+000 36 39	0,0000000+000 36 40
0,0000000+000 36 41	0,0000000+000 36 42	0,0000000+000 36 43	0, 000000+000 36 44	0,0000000+000 36 45
0,0000000+000 36 46	0,0000000+000 36 47			

SCATTERING FROM GROUP 37

0,0000000+000 37 37	0,0000000+000 37 38	0,0000000+000 37 39	0, 000000+000 37 40	0,0000000+000 37 41

0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO, 9 WAS 4.046+000SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 6.000-003SECONDS

TIME SPENT IN PROGRAM AREA NO, 8 WAS 1.000-002SECONDS

STATISTICAL SCATTERING

SCATTERING FROM GROUP 1

2,9895591*002	1	1	5,8821856-002	1	2	8,9454902-002	1	3	1,1179377-001	1	4	1,1908057-001	1	5
1,1211428*001	1	6	9,5838577-002	1	7	7,5969294-002	1	8	5,6771905-002	1	9	4,0517617-002	1	10
2,7897772*002	1	11	1,8678247-002	1	12	1,2239598-002	1	13	7,8800197-003	1	14	5,0080980-003	1	15
3,1501623*003	1	16	1,9656152-003	1	17	1,2188260-003	1	18	7,5208038-004	1	19	4,6231184-004	1	20
2,8334720*004	1	21	1,7326106-004	1	22	1,0579537-004	1	23	6,4460789-005	1	24	0,0000000+000	1	25
0,0000000+000	1	26	0,0000000+000	1	27	0,0000000+000	1	28	0,0000000+000	1	29	0,0000000+000	1	30
0,0000000+000	1	31	0,0000000+000	1	32	0,0000000+000	1	33	0,0000000+000	1	34	0,0000000+000	1	35
0,0000000+000	1	36	0,0000000+000	1	37	0,0000000+000	1	38	0,0000000+000	1	39	0,0000000+000	1	40
0,0000000+000	1	41	0,0000000+000	1	42	0,0000000+000	1	43	0,0000000+000	1	44	0,0000000+000	1	45
0,0000000+000	1	46	0,0000000+000	1	47									

SCATTERING FROM GROUP 2

4,6313895*002	2	2	7,9824696-002	2	3	1,0963167-001	2	4	1,2596990-001	2	5	1,2585144-001	2	6
1,1269271*001	2	7	9,2628780-002	2	8	7,1210104-002	2	9	5,1958104-002	2	10	3,6396904-002	2	11
2,4698448*002	2	12	1,6349717-002	2	13	1,0615971-002	2	14	6,7899958-003	2	15	4,2922345-003	2	16
2,6886048*003	2	17	1,6721582-003	2	18	1,0542325-003	2	19	6,6691574-004	2	20	3,9091633-004	2	21
2,3930232*004	2	22	1,4619179-004	2	23	8,9167842-005	2	24	0,0000000+000	2	25	0,0000000+000	2	26
0,0000000+000	2	27	0,0000000+000	2	28	0,0000000+000	2	29	0,0000000+000	2	30	0,0000000+000	2	31
0,0000000+000	2	32	0,0000000+000	2	33	0,0000000+000	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

5,6506345*002	3	3	8,5617496-002	3	4	1,0626436-001	3	5	1,1277907-001	3	6	1,0587896-001	3	7
9,0306790*002	3	8	7,1459720-002	3	9	5,3329293-002	3	10	3,8020459-002	3	11	2,6156597-002	3	12
1,7501185*002	3	13	1,1458770-002	3	14	7,3768299-003	3	15	4,6868663-003	3	16	2,9474013-003	3	17
1,8387567*003	3	18	1,1399997-003	3	19	7,0336118-004	3	20	4,3232569-004	3	21	2,6495088-004	3	22
1,6200349*004	3	23	9,8879742-005	3	24	6,0268055-005	3	25	0,0000000+000	3	26	0,0000000+000	3	27
0,0000000+000	3	28	0,0000000+000	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0,0000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

3,2793826*003	4	4	6,6430558-003	4	5	1,0359914-002	4	6	1,3152779-002	4	7	1,4209231-002	4	8
1,3526633*002	4	9	1,1663318-002	4	10	9,3079077-003	4	11	6,9925690-003	4	12	5,0111305-003	4	13
3,4614058*003	4	14	2,3233012-003	4	15	1,5249004-003	4	16	9,8356612-004	4	17	6,2584007-004	4	18
3,9402537*004	4	19	2,4603785-004	4	20	1,5264703-004	4	21	9,4232409-005	4	22	5,7945343-005	4	23
3,5523649*005	4	24	2,1726458-005	4	25	1,3263555-005	4	26	8,855175-006	4	27	0,0000000+000	4	28
0,0000000+000	4	29	0,0000000+000	4	30	0,0000000+000	4	31	0,0000000+000	4	32	0,0000000+000	4	33
0,0000000+000	4	34	0,0000000+000	4	35	0,0000000+000	4	36	0,0000000+000	4	37	0,0000000+000	4	38
0,0000000+000	4	39	0,0000000+000	4	40	0,0000000+000	4	41	0,0000000+000	4	42	0,0000000+000	4	43
0,0000000+000	4	44	0,0000000+000	4	45	0,0000000+000	4	46	0,0000000+000	4	47			

SCATTERING FROM GROUP 5

0,0000000+000	5	5	0,0000000+000	5	6	0,0000000+000	5	7	0,0000000+000	5	8	0,0000000+000	5	9
0,0000000+000	5	10	0,0000000+000	5	11	0,0000000+000	5	12	0,0000000+000	5	13	0,0000000+000	5	14
0,0000000+000	5	15	0,0000000+000	5	16	0,0000000+000	5	17	0,0000000+000	5	18	0,0000000+000	5	19
0,0000000+000	5	20	0,0000000+000	5	21	0,0000000+000	5	22	0,0000000+000	5	23	0,0000000+000	5	24
0,0000000+000	5	25	0,0000000+000	5	26	0,0000000+000	5	27	0,0000000+000	5	28	0,0000000+000	5	29
0,0000000+000	5	30	0,0000000+000	5	31	0,0000000+000	5	32	0,0000000+000	5	33	0,0000000+000	5	34
0,0000000+000	5	35	0,0000000+000	5	36	0,0000000+000	5	37	0,0000000+000	5	38	0,0000000+000	5	39
0,0000000+000	5	40	0,0000000+000	5	41	0,0000000+000	5	42	0,0000000+000	5	43	0,0000000+000	5	44
0,0000000+000	5	45	0,0000000+000	5	46	0,0000000+000	5	47						

SCATTERING FROM GROUP 6

0,0000000+000	6	6	0,0000000+000	6	7	0,0000000+000	6	8	0,0000000+000	6	9	0,0000000+000	6	10
0,0000000+000	6	11	0,0000000+000	6	12	0,0000000+000	6	13	0,0000000+000	6	14	0,0000000+000	6	15
0,0000000+000	6	16	0,0000000+000	6	17	0,0000000+000	6	18	0,0000000+000	6	19	0,0000000+000	6	20
0,0000000+000	6	21	0,0000000+000	6	22	0,0000000+000	6	23	0,0000000+000	6	24	0,0000000+000	6	25
0,0000000+000	6	26	0,0000000+000	6	27	0,0000000+000	6	28	0,0000000+000	6	29	0,0000000+000	6	30
0,0000000+000	6	31	0,0000000+000	6	32	0,0000000+000	6	33	0,0000000+000	6	34	0,0000000+000	6	35
0,0000000+000	6	36	0,0000000+000	6	37	0,0000000+000	6	38	0,0000000+000	6	39	0,0000000+000	6	40
0,0000000+000	6	41	0,0000000+000	6	42	0,0000000+000	6	43	0,0000000+000	6	44	0,0000000+000	6	45
0,0000000+000	6	46	0,0000000+000	6	47									

SCATTERING FROM GROUP 7

0,0000000+000	7	7	0,0000000+000	7	8	0,0000000+000	7	9	0,0000000+000	7	10	0,0000000+000	7	11
0,0000000+000	7	12	0,0000000+000	7	13	0,0000000+000	7	14	0,0000000+000	7	15	0,0000000+000	7	16
0,0000000+000	7	17	0,0000000+000	7	18	0,0000000+000	7	19	0,0000000+000	7	20	0,0000000+000	7	21
0,0000000+000	7	22	0,0000000+000	7	23	0,0000000+000	7	24	0,0000000+000	7	25	0,0000000+000	7	26
0,0000000+000	7	27	0,0000000+000	7	28	0,0000000+000	7	29	0,0000000+000	7	30	0,0000000+000	7	31
0,0000000+000	7	32	0,0000000+000	7	33	0,0000000+000	7	34	0,0000000+000	7	35	0,0000000+000	7	36
0,0000000+000	7	37	0,0000000+000	7	38	0,0000000+000	7	39	0,0000000+000	7	40	0,0000000+000	7	41
0,0000000+000	7	42	0,0000000+000	7	43	0,0000000+000	7	44	0,0000000+000	7	45	0,0000000+000	7	46
0,0000000+000	7	47												

SCATTERING FROM GROUP 8

0,0000000+000	8	8	0,0000000+000	8	9	0,0000000+000	8	10	0,0000000+000	8	11	0,0000000+000	8	12
0,0000000+000	8	13	0,0000000+000	8	14	0,0000000+000	8	15	0,0000000+000	8	16	0,0000000+000	8	17
0,0000000+000	8	18	0,0000000+000	8	19	0,0000000+000	8	20	0,0000000+000	8	21	0,0000000+000	8	22
0,0000000+000	8	23	0,0000000+000	8	24	0,0000000+000	8	25	0,0000000+000	8	26	0,0000000+000	8	27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0,0000000+000	8	31	0,0000000+000	8	32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0,0000000+000	8	36	0,0000000+000	8	37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0,0000000+000	8	41	0,0000000+000	8	42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0,0000000+000	8	46	0,0000000+000	8	47

SCATTERING FROM GROUP 9

0,0000000+000	9	9	0,0000000+000	9	10	0,0000000+000	9	11	0,0000000+000	9	12	0,0000000+000	9	13
0,0000000+000	9	14	0,0000000+000	9	15	0,0000000+000	9	16	0,0000000+000	9	17	0,0000000+000	9	18
0,0000000+000	9	19	0,0000000+000	9	20	0,0000000+000	9	21	0,0000000+000	9	22	0,0000000+000	9	23
0,0000000+000	9	24	0,0000000+000	9	25	0,0000000+000	9	26	0,0000000+000	9	27	0,0000000+000	9	28
0,0000000+000	9	29	0,0000000+000	9	30	0,0000000+000	9	31	0,0000000+000	9	32	0,0000000+000	9	33
0,0000000+000	9	34	0,0000000+000	9	35	0,0000000+000	9	36	0,0000000+000	9	37	0,0000000+000	9	38
0,0000000+000	9	39	0,0000000+000	9	40	0,0000000+000	9	41	0,0000000+000	9	42	0,0000000+000	9	43
0,0000000+000	9	44	0,0000000+000	9	45	0,0000000+000	9	46	0,0000000+000	9	47			

SCATTERING FROM GROUP 10

0,0000000+000	10	10	0,0000000+000	10	11	0,0000000+000	10	12	0,0000000+000	10	13	0,0000000+000	10	14
0,0000000+000	10	15	0,0000000+000	10	16	0,0000000+000	10	17	0,0000000+000	10	18	0,0000000+000	10	19
0,0000000+000	10	20	0,0000000+000	10	21	0,0000000+000	10	22	0,0000000+000	10	23	0,0000000+000	10	24
0,0000000+000	10	25	0,0000000+000	10	26	0,0000000+000	10	27	0,0000000+000	10	28	0,0000000+000	10	29
0,0000000+000	10	30	0,0000000+000	10	31	0,0000000+000	10	32	0,0000000+000	10	33	0,0000000+000	10	34
0,0000000+000	10	35	0,0000000+000	10	36	0,0000000+000	10	37	0,0000000+000	10	38	0,0000000+000	10	39
0,0000000+000	10	40	0,0000000+000	10	41	0,0000000+000	10	42	0,0000000+000	10	43	0,0000000+000	10	44
0,0000000+000	10	45	0,0000000+000	10	46	0,0000000+000	10	47						

SCATTERING FROM GROUP 11

0,0000000+000	11	11	0,0000000+000	11	12	0,0000000+000	11	13	0,0000000+000	11	14	0,0000000+000	11	15
0,0000000+000	11	16	0,0000000+000	11	17	0,0000000+000	11	18	0,0000000+000	11	19	0,0000000+000	11	20
0,0000000+000	11	21	0,0000000+000	11	22	0,0000000+000	11	23	0,0000000+000	11	24	0,0000000+000	11	25

0,0000000+000 11 26 0,0000000+000 11 27 0,0000000+000 11 28 0,0000000+000 11 29 0,0000000+000 11 30
0,0000000+000 11 31 0,0000000+000 11 32 0,0000000+000 11 33 0,0000000+000 11 34 0,0000000+000 11 35
0,0000000+000 11 36 0,0000000+000 11 37 0,0000000+000 11 38 0,0000000+000 11 39 0,0000000+000 11 40
0,0000000+000 11 41 0,0000000+000 11 42 0,0000000+000 11 43 0,0000000+000 11 44 0,0000000+000 11 45
0,0000000+000 11 46 0,0000000+000 11 47

SCATTERING FROM GROUP 12

0,0000000+000 12 12 0,0000000+000 12 13 0,0000000+000 12 14 0,0000000+000 12 15 0,0000000+000 12 16
0,0000000+000 12 17 0,0000000+000 12 18 0,0000000+000 12 19 0,0000000+000 12 20 0,0000000+000 12 21
0,0000000+000 12 22 0,0000000+000 12 23 0,0000000+000 12 24 0,0000000+000 12 25 0,0000000+000 12 26
0,0000000+000 12 27 0,0000000+000 12 28 0,0000000+000 12 29 0,0000000+000 12 30 0,0000000+000 12 31
0,0000000+000 12 32 0,0000000+000 12 33 0,0000000+000 12 34 0,0000000+000 12 35 0,0000000+000 12 36
0,0000000+000 12 37 0,0000000+000 12 38 0,0000000+000 12 39 0,0000000+000 12 40 0,0000000+000 12 41
0,0000000+000 12 42 0,0000000+000 12 43 0,0000000+000 12 44 0,0000000+000 12 45 0,0000000+000 12 46
0,0000000+000 12 47

SCATTERING FROM GROUP 13

0,0000000+000 13 13 0,0000000+000 13 14 0,0000000+000 13 15 0,0000000+000 13 16 0,0000000+000 13 17
0,0000000+000 13 18 0,0000000+000 13 19 0,0000000+000 13 20 0,0000000+000 13 21 0,0000000+000 13 22
0,0000000+000 13 23 0,0000000+000 13 24 0,0000000+000 13 25 0,0000000+000 13 26 0,0000000+000 13 27
0,0000000+000 13 28 0,0000000+000 13 29 0,0000000+000 13 30 0,0000000+000 13 31 0,0000000+000 13 32
0,0000000+000 13 33 0,0000000+000 13 34 0,0000000+000 13 35 0,0000000+000 13 36 0,0000000+000 13 37
0,0000000+000 13 38 0,0000000+000 13 39 0,0000000+000 13 40 0,0000000+000 13 41 0,0000000+000 13 42
0,0000000+000 13 43 0,0000000+000 13 44 0,0000000+000 13 45 0,0000000+000 13 46 0,0000000+000 13 47

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,0000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,0000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,0000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,0000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,0000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,0000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,0000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,0000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,0000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,0000000+000 15 28 0,0000000+000 15 29
0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,0000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,0000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,0000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,0000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,0000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,0000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,0000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,0000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,0000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,0000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,0000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,0000000+000 17 30 0,0000000+000 17 31

0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,0000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,0000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,0000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,0000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,0000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,0000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,0000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,0000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,0000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,0000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,0000000+000 19 27 0,0000000+000 19 28
0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33

0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33	0,0000000+000 33 34	0,0000000+000 33 35	0,0000000+000 33 36	0,0000000+000 33 37
0,0000000+000 33 38	0,0000000+000 33 39	0,0000000+000 33 40	0,0000000+000 33 41	0,0000000+000 33 42
0,0000000+000 33 43	0,0000000+000 33 44	0,0000000+000 33 45	0,0000000+000 33 46	0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34	0,0000000+000 34 35	0,0000000+000 34 36	0,0000000+000 34 37	0,0000000+000 34 38
0,0000000+000 34 39	0,0000000+000 34 40	0,0000000+000 34 41	0,0000000+000 34 42	0,0000000+000 34 43
0,0000000+000 34 44	0,0000000+000 34 45	0,0000000+000 34 46	0,0000000+000 34 47	

SCATTERING FROM GROUP 35

0,0000000+000 35 35	0,0000000+000 35 36	0,0000000+000 35 37	0,0000000+000 35 38	0,0000000+000 35 39
0,0000000+000 35 40	0,0000000+000 35 41	0,0000000+000 35 42	0,0000000+000 35 43	0,0000000+000 35 44
0,0000000+000 35 45	0,0000000+000 35 46	0,0000000+000 35 47		

SCATTERING FROM GROUP 36

0,0000000+000 36 36	0,0000000+000 36 37	0,0000000+000 36 38	0,0000000+000 36 39	0,0000000+000 36 40
0,0000000+000 36 41	0,0000000+000 36 42	0,0000000+000 36 43	0,0000000+000 36 44	0,0000000+000 36 45
0,0000000+000 36 46	0,0000000+000 36 47			

SCATTERING FROM GROUP 37

0,0000000+000 37 37	0,0000000+000 37 38	0,0000000+000 37 39	0,0000000+000 37 40	0,0000000+000 37 41
0,0000000+000 37 42	0,0000000+000 37 43	0,0000000+000 37 44	0,0000000+000 37 45	0,0000000+000 37 46
0,0000000+000 37 47				

SCATTERING FROM GROUP 38

0,0000000+000 38 38	0,0000000+000 38 39	0,0000000+000 38 40	0,0000000+000 38 41	0,0000000+000 38 42
0,0000000+000 38 43	0,0000000+000 38 44	0,0000000+000 38 45	0,0000000+000 38 46	0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39	0,0000000+000 39 40	0,0000000+000 39 41	0,0000000+000 39 42	0,0000000+000 39 43
0,0000000+000 39 44	0,0000000+000 39 45	0,0000000+000 39 46	0,0000000+000 39 47	

SCATTERING FROM GROUP 40

0,0000000+000 40 40	0,0000000+000 40 41	0,0000000+000 40 42	0,0000000+000 40 43	0,0000000+000 40 44
0,0000000+000 40 45	0,0000000+000 40 46	0,0000000+000 40 47		

SCATTERING FROM GROUP 41

0,0000000+000 41 41	0,0000000+000 41 42	0,0000000+000 41 43	0,0000000+000 41 44	0,0000000+000 41 45
0,0000000+000 41 46	0,0000000+000 41 47			

SCATTERING FROM GROUP 42

0,0000000+000 42 42	0,0000000+000 42 43	0,0000000+000 42 44	0,0000000+000 42 45	0,0000000+000 42 46
0,0000000+000 42 47				

SCATTERING FROM GROUP 43

0,0000000+000 43 43	0,0000000+000 43 44	0,0000000+000 43 45	0,0000000+000 43 46	0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

TIME SPENT IN PROGRAM AREA NO. 10 WAS 4.047+000SECONDS

N=2N SCATTERING

MACROSCOPIC INELASTIC SCATTERING

SCATTERING FROM GROUP 1

3,8423993+004	1	1	8,1383302+004	1	2	1,4164424+003	1	3	2,1417009+003	1	4	2,8902835+003	1	5
3,5150610+003	1	6	3,8679932+003	1	7	3,8708521+003	1	8	3,5512650+003	1	9	3,0177774+003	1	10
2,4019838+003	1	11	1,8103119+003	1	12	1,3047369+003	1	13	9,697327+004	1	14	6,1248045+004	1	15
4,0419252+004	1	16	2,6192037+004	1	17	1,6730559+004	1	18	1,566873+004	1	19	6,6150786+005	1	20
4,1125434+005	1	21	2,5429010+005	1	22	1,5656947+005	1	23	9,6083099+006	1	24	5,3984411+006	1	25
3,2989157+006	1	26	1,1481974+006	1	27	7,0016886+007	1	28	0,0000000+000	1	29	0,0000000+000	1	30
0,0000000+000	1	31	0,0000000+000	1	32	0,0000000+000	1	33	0,0000000+000	1	34	0,0000000+000	1	35
0,0000000+000	1	36	0,0000000+000	1	37	0,0000000+000	1	38	0,0000000+000	1	39	0,0000000+000	1	40
0,0000000+000	1	41	0,0000000+000	1	42	0,0000000+000	1	43	0,0000000+000	1	44	0,0000000+000	1	45
0,0000000+000	1	46	0,0000000+000	1	47									

SCATTERING FROM GROUP 2

6,6149544+004	2	2	1,3071467+003	2	3	2,1773508+003	2	4	3,1932737+003	2	5	4,2126546+003	2	6
5,0246686+003	2	7	5,4214136+003	2	8	5,3126152+003	2	9	4,7699684+003	2	10	3,9698141+003	2	11
3,1000828+003	2	12	2,2976840+003	2	13	1,6325850+003	2	14	1,1215049+003	2	15	7,5004306+004	2	16
4,9110596+004	2	17	3,1624634+004	2	18	2,0099848+004	2	19	1,2644656+004	2	20	7,8910917+005	2	21
4,8937748+005	2	22	3,0201202+005	2	23	1,8567128+005	2	24	1,712611+005	2	25	6,5530195+006	2	26
3,1273531+006	2	27	1,9075685+006	2	28	0,0000000+000	2	29	0,0000000+000	2	30	0,0000000+000	2	31
0,0000000+000	2	32	0,0000000+000	2	33	0,0000000+000	2	34	0,0000000+000	2	35	0,0000000+000	2	36
0,0000000+000	2	37	0,0000000+000	2	38	0,0000000+000	2	39	0,0000000+000	2	40	0,0000000+000	2	41
0,0000000+000	2	42	0,0000000+000	2	43	0,0000000+000	2	44	0,0000000+000	2	45	0,0000000+000	2	46
0,0000000+000	2	47												

SCATTERING FROM GROUP 3

1,0175372+003	3	3	2,2202153+003	3	4	3,0349635+003	3	5	4,5607838+003	3	6	5,8400398+003	3	7
6,2734394+003	3	8	6,5721890+003	3	9	6,1138912+003	3	10	5,2785355+003	3	11	4,2454183+003	3	12
3,2203925+003	3	13	2,3301215+003	3	14	1,6235292+003	3	15	1,978558+003	3	16	7,2506081+004	3	17
4,7004322+004	3	18	3,0031260+004	3	19	1,8969428+004	3	20	1,1875714+004	3	21	7,3830809+005	3	22
4,5651162+005	3	23	2,8107469+005	3	24	1,7248578+005	3	25	1,106217+005	3	26	5,2986362+006	3	27
3,2332617+006	3	28	1,9703235+006	3	29	0,0000000+000	3	30	0,0000000+000	3	31	0,0000000+000	3	32
0,0000000+000	3	33	0,0000000+000	3	34	0,0000000+000	3	35	0,0000000+000	3	36	0,0000000+000	3	37
0,0000000+000	3	38	0,0000000+000	3	39	0,0000000+000	3	40	0,0000000+000	3	41	0,0000000+000	3	42
0,0000000+000	3	43	0,0000000+000	3	44	0,0000000+000	3	45	0,0000000+000	3	46	0,0000000+000	3	47

SCATTERING FROM GROUP 4

1,7107705*003	4	4	4,0906216*003	4	5	2,5190014*003	4	6	5,1009652*003	4	7	6,3829141*003	4	8
6,4850396*003	4	9	6,6603302*003	4	10	5,9748616*003	4	11	4,6889474*003	4	12	3,7519562*003	4	13
2,8850331*003	4	14	2,0157561*003	4	15	1,3344324*003	4	16	8,8536894*004	4	17	5,7849781*004	4	18
3,7288295*004	4	19	2,3725279*004	4	20	1,4944178*004	4	21	9,3392979*005	4	22	5,8024378*005	4	23
3,4987228*005	4	24	2,1598716*005	4	25	1,3183354*005	4	26	8,617541*006	4	27	4,8603781*006	4	28
2,4700639*006	4	29	0,0000000*000	4	30	0,0000000*000	4	31	0,0000000*000	4	32	0,0000000*000	4	33
0,0000000*000	4	34	0,0000000*000	4	35	0,0000000*000	4	36	0,0000000*000	4	37	0,0000000*000	4	38
0,0000000*000	4	39	0,0000000*000	4	40	0,0000000*000	4	41	0,0000000*000	4	42	0,0000000*000	4	43
0,0000000*000	4	44	0,0000000*000	4	45	0,0000000*000	4	46	0,0000000*000	4	47			

SCATTERING FROM GROUP 5

2,0741532*003	5	5	6,3625781*003	5	6	3,1425415*003	5	7	3,1328116*003	5	8	4,5085964*003	5	9
5,4090367*003	5	10	5,1929255*003	5	11	5,3727525*003	5	12	4,2421226*003	5	13	3,2395528*003	5	14
2,5549937*003	5	15	1,7991609*003	5	16	1,1742334*003	5	17	7,3274007*004	5	18	4,7517608*004	5	19
3,0564380*004	5	20	1,9363404*004	5	21	1,2178399*004	5	22	7,6038563*005	5	23	4,7318492*005	5	24
2,8822391*005	5	25	1,8105666*005	5	26	1,1367356*005	5	27	7,1613867*006	5	28	3,4387242*006	5	29
2,0957035*006	5	30	0,0000000*000	5	31	0,0000000*000	5	32	0,0000000*000	5	33	0,0000000*000	5	34
0,0000000*000	5	35	0,0000000*000	5	36	0,0000000*000	5	37	0,0000000*000	5	38	0,0000000*000	5	39
0,0000000*000	5	40	0,0000000*000	5	41	0,0000000*000	5	42	0,0000000*000	5	43	0,0000000*000	5	44
0,0000000*000	5	45	0,0000000*000	5	46	0,0000000*000	5	47						

SCATTERING FROM GROUP 6

2,2663026*003	6	6	9,0347460*003	6	7	7,1542204*003	6	8	2,4790845*003	6	9	3,4324451*003	6	10
4,5358216*003	6	11	4,5405116*003	6	12	3,9877759*003	6	13	3,2725921*003	6	14	2,4721117*003	6	15
1,7914465*003	6	16	1,2728490*003	6	17	8,5978445*004	6	18	5,5780761*004	6	19	3,7328972*004	6	20
2,4282287*004	6	21	1,5480977*004	6	22	9,7461860*005	6	23	6,828172*005	6	24	3,7655271*005	6	25
2,3233423*005	6	26	1,4302897*005	6	27	7,8367515*006	6	28	4,7881090*006	6	29	2,9207185*006	6	30
0,0000000*000	6	31	0,0000000*000	6	32	0,0000000*000	6	33	0,0000000*000	6	34	0,0000000*000	6	35
0,0000000*000	6	36	0,0000000*000	6	37	0,0000000*000	6	38	0,0000000*000	6	39	0,0000000*000	6	40
0,0000000*000	6	41	0,0000000*000	6	42	0,0000000*000	6	43	0,0000000*000	6	44	0,0000000*000	6	45
0,0000000*000	6	46	0,0000000*000	6	47									

SCATTERING FROM GROUP 7

1,0719049*003	7	7	7,1394894*003	7	8	8,1779109*003	7	9	8,2387026*003	7	10	5,3015389*003	7	11
4,3837295*003	7	12	4,0813568*003	7	13	3,2674558*003	7	14	2,3840935*003	7	15	1,1912236*003	7	16
9,1656212*004	7	17	7,0070138*004	7	18	5,0531466*004	7	19	3,4916298*004	7	20	2,3658711*004	7	21
1,5661206*004	7	22	1,0202892*004	7	23	6,5800024*005	7	24	4,782710*005	7	25	2,5614205*005	7	26
1,5253020*005	7	27	9,3753095*006	7	28	5,7868738*006	7	29	3,5577963*006	7	30	2,1474496*006	7	31
1,3133872*006	7	32	8,0179328*007	7	33	4,8877511*007	7	34	0,0000000*000	7	35	0,0000000*000	7	36
0,0000000*000	7	37	0,0000000*000	7	38	0,0000000*000	7	39	0,0000000*000	7	40	0,0000000*000	7	41
0,0000000*000	7	42	0,0000000*000	7	43	0,0000000*000	7	44	0,0000000*000	7	45	0,0000000*000	7	46
0,0000000*000	7	47												

SCATTERING FROM GROUP 8

1,5617645*003	8	8	5,7938052*003	8	9	4,3279412*003	8	10	9,783052*003	8	11	9,5885333*003	8	12
6,9026493*003	8	13	4,3344495*003	8	14	2,4232616*003	8	15	1,7887688*003	8	16	8,9167405*004	8	17
4,3835073*004	8	18	2,1872362*004	8	19	1,0676049*004	8	20	5,6098467*005	8	21	3,1310634*005	8	22
1,6965481*005	8	23	1,0198726*005	8	24	3,8621495*006	8	25	1,4533795*006	8	26	1,3466693*007	8	27
0,0000000*000	8	28	0,0000000*000	8	29	0,0000000*000	8	30	0,0000000*000	8	31	0,0000000*000	8	32
0,0000000*000	8	33	0,0000000*000	8	34	0,0000000*000	8	35	0,0000000*000	8	36	0,0000000*000	8	37
0,0000000*000	8	38	0,0000000*000	8	39	0,0000000*000	8	40	0,0000000*000	8	41	0,0000000*000	8	42
0,0000000*000	8	43	0,0000000*000	8	44	0,0000000*000	8	45	0,0000000*000	8	46	0,0000000*000	8	47

SCATTERING FROM GROUP 9

6,8760613-003 9 9	6,4233428-003 9 10	5,4256809-003 9 11	3,1538027-003 9 12	4,7629831-003 9 13
4,1727321-003 9 14	3,8425778-003 9 15	3,0582301-003 9 16	1,7335436-003 9 17	1,1200870-003 9 18
5,9561065-004 9 19	3,0865522-004 9 20	1,8780608-004 9 21	1,476742-004 9 22	6,2684166-005 9 23
3,8408763-005 9 24	2,1122528-005 9 25	1,0094865-005 9 26	5,1951361-006 9 27	3,1436853-006 9 28
0,0000000+000 9 29	0,0000000+000 9 30	0,0000000+000 9 31	0, 000000+000 9 32	0,0000000+000 9 33
0,0000000+000 9 34	0,0000000+000 9 35	0,0000000+000 9 36	0, 000000+000 9 37	0,0000000+000 9 38
0,0000000+000 9 39	0,0000000+000 9 40	0,0000000+000 9 41	0, 000000+000 9 42	0,0000000+000 9 43
0,0000000+000 9 44	0,0000000+000 9 45	0,0000000+000 9 46	0, 000000+000 9 47	

SCATTERING FROM GROUP 10

1,0872825-002 10 10	6,8790813-003 10 11	3,4230331-003 10 12	2, 462136-003 10 13	1,4983011-003 10 14
1,7597594-003 10 15	1,5079837-003 10 16	1,5658254-003 10 17	7,5954966-004 10 18	6,1145244-004 10 19
3,7967815-004 10 20	2,3619931-004 10 21	1,5462248-004 10 22	9,8236292-005 10 23	5,9410707-005 10 24
3,4864931-005 10 25	2,0948136-005 10 26	1,1417646-005 10 27	6,8739926-006 10 28	3,1489867-006 10 29
1,2148098-006 10 30	0,0000000+000 10 31	0,0000000+000 10 32	0, 000000+000 10 33	0,0000000+000 10 34
0,0000000+000 10 35	0,0000000+000 10 36	0,0000000+000 10 37	0, 000000+000 10 38	0,0000000+000 10 39
0,0000000+000 10 40	0,0000000+000 10 41	0,0000000+000 10 42	0, 000000+000 10 43	0,0000000+000 10 44
0,0000000+000 10 45	0,0000000+000 10 46	0,0000000+000 10 47		

SCATTERING FROM GROUP 11

1,1483229-002 11 11	7,3381040-003 11 12	1,2510552-003 11 13	2,5123897-003 11 14	1,5042103-003 11 15
6,1360767-004 11 16	1,0881594-005 11 17	3,6490609-004 11 18	2,5809651-004 11 19	2,9093505-004 11 20
1,8421378-004 11 21	1,1808160-004 11 22	7,5212164-005 11 23	4,7829585-005 11 24	2,9527963-005 11 25
1,8172271-005 11 26	1,1238195-005 11 27	6,9851513-006 11 28	4,3569429-006 11 29	1,6899626-006 11 30
0,0000000+000 11 31	0,0000000+000 11 32	0,0000000+000 11 33	0, 000000+000 11 34	0,0000000+000 11 35
0,0000000+000 11 36	0,0000000+000 11 37	0,0000000+000 11 38	0, 000000+000 11 39	0,0000000+000 11 40
0,0000000+000 11 41	0,0000000+000 11 42	0,0000000+000 11 43	0, 000000+000 11 44	0,0000000+000 11 45
0,0000000+000 11 46	0,0000000+000 11 47			

SCATTERING FROM GROUP 12

1,1041982-002 12 12	7,9292966-003 12 13	1,0662372-003 12 14	5,8913666-004 12 15	6,5600455-004 12 16
5,5832306-004 12 17	2,4450349-004 12 18	1,1572249-004 12 19	7,2165996-005 12 20	2,7084281-005 12 21
0,0000000+000 12 22	2,1421738-007 12 23	1,6116365-007 12 24	9,7750692-008 12 25	5,9288795-008 12 26
0,0000000+000 12 27	0,0000000+000 12 28	0,0000000+000 12 29	0, 000000+000 12 30	0,0000000+000 12 31
0,0000000+000 12 32	0,0000000+000 12 33	0,0000000+000 12 34	0, 000000+000 12 35	0,0000000+000 12 36
0,0000000+000 12 37	0,0000000+000 12 38	0,0000000+000 12 39	0, 000000+000 12 40	0,0000000+000 12 41
0,0000000+000 12 42	0,0000000+000 12 43	0,0000000+000 12 44	0, 000000+000 12 45	0,0000000+000 12 46
0,0000000+000 12 47				

SCATTERING FROM GROUP 13

9,6623063-003 13 13	7,0308735-003 13 14	1,3812078-003 13 15	6,2651394-005 13 16	2,7327107-004 13 17
1,7130236-004 13 18	9,7201363-005 13 19	2,9642310-005 13 20	2,6590690-005 13 21	3,7729219-005 13 22
2,4169699-005 13 23	1,5659470-005 13 24	9,0700752-006 13 25	0,0000000+000 13 26	0,0000000+000 13 27
0,0000000+000 13 28	0,0000000+000 13 29	0,0000000+000 13 30	0, 000000+000 13 31	0,0000000+000 13 32
0,0000000+000 13 33	0,0000000+000 13 34	0,0000000+000 13 35	0,0000000+000 13 36	0,0000000+000 13 37
0,0000000+000 13 38	0,0000000+000 13 39	0,0000000+000 13 40	0,0000000+000 13 41	0,0000000+000 13 42
0,0000000+000 13 43	0,0000000+000 13 44	0,0000000+000 13 45	0, 000000+000 13 46	0,0000000+000 13 47

SCATTERING FROM GROUP 14

6,5531268-003 14 14	6,7675648-003 14 15	1,2408278-003 14 16	5,8501577-004 14 17	3,1610602-007 14 18
1,2174365-005 14 19	4,5510189-005 14 20	4,7936518-005 14 21	3,1296305-005 14 22	1,8939483-005 14 23
1,1348553-005 14 24	6,6427930-006 14 25	3,7302454-006 14 26	1,7902872-006 14 27	0,0000000+000 14 28
0,0000000+000 14 29	0,0000000+000 14 30	0,0000000+000 14 31	0,0000000+000 14 32	0,0000000+000 14 33
0,0000000+000 14 34	0,0000000+000 14 35	0,0000000+000 14 36	0,0000000+000 14 37	0,0000000+000 14 38
0,0000000+000 14 39	0,0000000+000 14 40	0,0000000+000 14 41	0,0000000+000 14 42	0,0000000+000 14 43
0,0000000+000 14 44	0,0000000+000 14 45	0,0000000+000 14 46	0,0000000+000 14 47	

SCATTERING FROM GROUP 15

4,3758051+003 15 15	8,2115471+003 15 16	2,9789761+004 15 17	6,5122832+004 15 18	4,0694592+004 15 19
8,5962381+007 15 20	0,0000000+000 15 21	0,0000000+000 15 22	0, 000000+000 15 23	0,0000000+000 15 24
0,0000000+000 15 25	1,8142555+007 15 26	5,5583037+007 15 27	3,3882584+007 15 28	2,0631962+007 15 29
1,2552585+007 15 30	0,0000000+000 15 31	0,0000000+000 15 32	0, 000000+000 15 33	0,0000000+000 15 34
0,0000000+000 15 35	0,0000000+000 15 36	0,0000000+000 15 37	0, 000000+000 15 38	0,0000000+000 15 39
0,0000000+000 15 40	0,0000000+000 15 41	0,0000000+000 15 42	0, 000000+000 15 43	0,0000000+000 15 44
0,0000000+000 15 45	0,0000000+000 15 46	0,0000000+000 15 47		

SCATTERING FROM GROUP 16

1,9590649+003 16 16	9,1268561+003 16 17	9,4583780+004 16 18	1,9238595+005 16 19	3,3786431+004 16 20
2,0946963+004 16 21	1,2946780+004 16 22	5,1508321+005 16 23	2,7616663+007 16 24	1,7037688+007 16 25
0,0000000+000 16 26	0,0000000+000 16 27	0,0000000+000 16 28	0, 000000+000 16 29	0,0000000+000 16 30
0,0000000+000 16 31	0,0000000+000 16 32	0,0000000+000 16 33	0, 000000+000 16 34	0,0000000+000 16 35
0,0000000+000 16 36	0,0000000+000 16 37	0,0000000+000 16 38	0, 000000+000 16 39	0,0000000+000 16 40
0,0000000+000 16 41	0,0000000+000 16 42	0,0000000+000 16 43	0, 000000+000 16 44	0,0000000+000 16 45
0,0000000+000 16 46	0,0000000+000 16 47			

SCATTERING FROM GROUP 17

2,6694708+004 17 17	7,3065353+003 17 18	3,2586867+003 17 19	1,3619950+005 17 20	4,0439280+007 17 21
1,0003765+007 17 22	3,6900687+005 17 23	6,2727710+005 17 24	3,7668915+005 17 25	2,2683004+005 17 26
1,3451527+005 17 27	8,0811117+006 17 28	4,8953339+006 17 29	2,9684377+006 17 30	1,8004484+006 17 31
0,0000000+000 17 32	0,0000000+000 17 33	0,0000000+000 17 34	0, 000000+000 17 35	0,0000000+000 17 36
0,0000000+000 17 37	0,0000000+000 17 38	0,0000000+000 17 39	0, 000000+000 17 40	0,0000000+000 17 41
0,0000000+000 17 42	0,0000000+000 17 43	0,0000000+000 17 44	0, 000000+000 17 45	0,0000000+000 17 46
0,0000000+000 17 47				

SCATTERING FROM GROUP 18

2,4021121+004 18 18	3,4380591+003 18 19	4,9647053+003 18 20	2,5316512+004 18 21	5,9836963+006 18 22
2,4610742+006 18 23	0,0000000+000 18 24	0,0000000+000 18 25	0, 000000+000 18 26	0,0000000+000 18 27
0,0000000+000 18 28	0,0000000+000 18 29	0,0000000+000 18 30	0, 000000+000 18 31	0,0000000+000 18 32
0,0000000+000 18 33	0,0000000+000 18 34	0,0000000+000 18 35	0, 000000+000 18 36	0,0000000+000 18 37
0,0000000+000 18 38	0,0000000+000 18 39	0,0000000+000 18 40	0, 000000+000 18 41	0,0000000+000 18 42
0,0000000+000 18 43	0,0000000+000 18 44	0,0000000+000 18 45	0, 000000+000 18 46	0,0000000+000 18 47

SCATTERING FROM GROUP 19

2,1098688+004 19 19	1,0606219+004 19 20	3,5553236+003 19 21	2,1771326+003 19 22	1,5491998+005 19 23
5,8589848+006 19 24	1,7378354+006 19 25	1,0817995+006 19 26	6,7041529+007 19 27	2,0237823+007 19 28
0,0000000+000 19 29	0,0000000+000 19 30	0,0000000+000 19 31	0, 000000+000 19 32	0,0000000+000 19 33
0,0000000+000 19 34	0,0000000+000 19 35	0,0000000+000 19 36	0, 000000+000 19 37	0,0000000+000 19 38
0,0000000+000 19 39	0,0000000+000 19 40	0,0000000+000 19 41	0, 000000+000 19 42	0,0000000+000 19 43
0,0000000+000 19 44	0,0000000+000 19 45	0,0000000+000 19 46	0, 000000+000 19 47	

SCATTERING FROM GROUP 20

1,7824761+004 20 20	1,2644774+004 20 21	2,2543302+004 20 22	1,8069921+003 20 23	1,0973663+003 20 24
2,7657592+004 20 25	3,6779797+006 20 26	2,2921071+006 20 27	1, 416311+006 20 28	3,2669089+007 20 29
2,0033753+007 20 30	1,2257251+007 20 31	0,0000000+000 20 32	0, 000000+000 20 33	0,0000000+000 20 34
0,0000000+000 20 35	0,0000000+000 20 36	0,0000000+000 20 37	0, 000000+000 20 38	0,0000000+000 20 39
0,0000000+000 20 40	0,0000000+000 20 41	0,0000000+000 20 42	0, 000000+000 20 43	0,0000000+000 20 44
0,0000000+000 20 45	0,0000000+000 20 46	0,0000000+000 20 47		

SCATTERING FROM GROUP 21

1,3840419+004 21 21	1,5821173+004 21 22	0,0000000+000 21 23	0, 000000+000 21 24	4,9648153+004 21 25
5,0322051+004 21 26	3,0403761+004 21 27	1,8691206+004 21 28	7,9243549+005 21 29	6,9353179+007 21 30
4,2546216+007 21 31	2,6039226+007 21 32	1,5906353+007 21 33	0, 000000+000 21 34	0,0000000+000 21 35

0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

9,0593620+005 22 22 1,9807136-004 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 7,3508770-008 22 28 4,4556013-005 22 29 8,7644256-005 22 30 5,2752777-005 22 31
3,1385346+005 22 32 1,8576811-005 22 33 1,0509652-005 22 34 6,3384199+006 22 35 3,6274574+006 22 36
2,0311736-006 22 37 1,1003591-006 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

3,2768698+005 23 23 2,1681127-004 23 24 2,8838144-005 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 1,7247528-004 24 25 9,3839278-005 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 8,2304706-005 25 26 1,5349409-004 25 27 1,8272602+005 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 1,2268861-004 26 28 1,724594+004 26 29 3,4820671+006 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45
0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 9,4593334+005 27 30 6,6788845-005 27 31
2,9351298+005 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 2,1015601+005 28 32
4,0836886+005 28 33 2,8808581-005 28 34 1,9256244+005 28 35 1,1685267+005 28 36 3,2080106+006 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 5,2989643+006 29 37 5,8716971-006 29 38
3,5613643+006 29 39 2,1600766-006 29 40 1,3101527-006 29 41 7,9464778+007 29 42 4,8197825+007 29 43
2,9233463+007 29 44 1,7730988+007 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,0000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,0000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,0000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,0000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,0000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,0000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,0000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,0000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,0000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 38 38 0,0000000+000 38 39 0,0000000+000 38 40 0,0000000+000 38 41 0,0000000+000 38 42
0,0000000+000 38 43 0,0000000+000 38 44 0,0000000+000 38 45 0,0000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 39 39 0,0000000+000 39 40 0,0000000+000 39 41 0,0000000+000 39 42 0,0000000+000 39 43
0,0000000+000 39 44 0,0000000+000 39 45 0,0000000+000 39 46 0,0000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,0000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,0000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,0000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,0000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,0000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

MACROSCOPIC N*2N SCATTERING

SCATTERING FROM GROUP 1

4,8861135*009 1 1 6,7744753*008 1 2 4,9944501*007 1 3 2,4647161*006 1 4 1,0929434*005 1 5
4,7517261*005 1 6 1,6965958*004 1 7 4,4918605*004 1 8 8,6939450*004 1 9 1,3761082*003 1 10
1,7432773*003 1 11 1,8833901*003 1 12 1,7944639*003 1 13 1,5489573*003 1 14 1,2374608*003 1 15
9,3052284*004 1 16 6,6738182*004 1 17 4,6129482*004 1 18 3,0978806*004 1 19 2,0341714*004 1 20
1,3124972*004 1 21 8,3536428*005 1 22 5,2605301*005 1 23 3,2883390*005 1 24 2,0385614*005 1 25
1,2585792*005 1 26 7,7398734*006 1 27 4,7452618*006 1 28 2,8946733*006 1 29 1,7672226*006 1 30
1,0694895*006 1 31 0,0000000*000 1 32 0,0000000*000 1 33 0,0000000*000 1 34 0,0000000*000 1 35
0,0000000*000 1 36 0,0000000*000 1 37 0,0000000*000 1 38 0,0000000*000 1 39 0,0000000*000 1 40
0,0000000*000 1 41 0,0000000*000 1 42 0,0000000*000 1 43 0,0000000*000 1 44 0,0000000*000 1 45
0,0000000*000 1 46 0,0000000*000 1 47

SCATTERING FROM GROUP 2

1,0151491*008 2 2 9,7974583*008 2 3 5,2483936*007 2 4 1,7640333*006 2 5 4,1013180*006 2 6
7,1308099*006 2 7 9,9070544*006 2 8 1,2192910*005 2 9 1,8373476*005 2 10 4,5121043*005 2 11
1,2068195*004 2 12 2,5964400*004 2 13 4,3509085*004 2 14 5,8845618*004 2 15 6,6956574*004 2 16

6,6440165*004	2	17	5,9199780*004	2	18	4,8488590*004	2	19	3.7166416*004	2	20	2,7060507*004	2	21
1,8924978*004	2	22	1,2826015*004	2	23	8,4821890*005	2	24	5,5033692*005	2	25	3,5178996*005	2	26
2,2227948*005	2	27	1,3918392*005	2	28	8,6490572*006	2	29	5,3483581*006	2	30	3,2931765*006	2	31
2,0209841*006	2	32	1,2370404*006	2	33	7,5966175*007	2	34	4.5840752*007	2	35	0,0000000*000	2	36
0,0000000*000	2	37	0,0000000*000	2	38	0,0000000*000	2	39	0, 000000*000	2	40	0,0000000*000	2	41
0,0000000*000	2	42	0,0000000*000	2	43	0,0000000*000	2	44	0, 000000*000	2	45	0,0000000*000	2	46
0,0000000*000	2	47												

SCATTERING FROM GROUP 3

9,4621395*010	3	3	6,1990347*009	3	4	2,4434605*008	3	5	6,4432037*008	3	6	1,2368961*007	3	7
1,8490455*007	3	8	2,2707947*007	3	9	2,3901033*007	3	10	2,2293492*007	3	11	1,8918381*007	3	12
1,4910849*007	3	13	1,1093335*007	3	14	7,8897711*008	3	15	5,4176371*008	3	16	3,6195790*008	3	17
2,3671797*008	3	18	1,5225633*008	3	19	9,6668754*009	3	20	6,.758563*009	3	21	3,7888654*009	3	22
2,3482634*009	3	23	1,4484691*009	3	24	8,9013359*010	3	25	5,4543384*010	3	26	3,3346352*010	3	27
2,0391229*010	3	28	1,2403334*010	3	29	0,0000000*000	3	30	0, 000000*000	3	31	0,0000000*000	3	32
0,0000000*000	3	33	0,0000000*000	3	34	0,0000000*000	3	35	0, 000000*000	3	36	0,0000000*000	3	37
0,0000000*000	3	38	0,0000000*000	3	39	0,0000000*000	3	40	0, 000000*000	3	41	0,0000000*000	3	42
0,0000000*000	3	43	0,0000000*000	3	44	0,0000000*000	3	45	0, 000000*000	3	46	0,0000000*000	3	47

SCATTERING FROM GROUP 4

0,0000000*000	4	4	0,0000000*000	4	5	0,0000000*000	4	6	0, 000000*000	4	7	0,0000000*000	4	8
0,0000000*000	4	9	0,0000000*000	4	10	0,0000000*000	4	11	0, 000000*000	4	12	0,0000000*000	4	13
0,0000000*000	4	14	0,0000000*000	4	15	0,0000000*000	4	16	0, 000000*000	4	17	0,0000000*000	4	18
0,0000000*000	4	19	0,0000000*000	4	20	0,0000000*000	4	21	0, 000000*000	4	22	0,0000000*000	4	23
0,0000000*000	4	24	0,0000000*000	4	25	0,0000000*000	4	26	0, 000000*000	4	27	0,0000000*000	4	28
0,0000000*000	4	29	0,0000000*000	4	30	0,0000000*000	4	31	0, 000000*000	4	32	0,0000000*000	4	33
0,0000000*000	4	34	0,0000000*000	4	35	0,0000000*000	4	36	0, 000000*000	4	37	0,0000000*000	4	38
0,0000000*000	4	39	0,0000000*000	4	40	0,0000000*000	4	41	0, 000000*000	4	42	0,0000000*000	4	43
0,0000000*000	4	44	0,0000000*000	4	45	0,0000000*000	4	46	0, 000000*000	4	47			

SCATTERING FROM GROUP 5

0,0000000*000	5	5	0,0000000*000	5	6	0,0000000*000	5	7	0, 000000*000	5	8	0,0000000*000	5	9
0,0000000*000	5	10	0,0000000*000	5	11	0,0000000*000	5	12	0, 000000*000	5	13	0,0000000*000	5	14
0,0000000*000	5	15	0,0000000*000	5	16	0,0000000*000	5	17	0, 000000*000	5	18	0,0000000*000	5	19
0,0000000*000	5	20	0,0000000*000	5	21	0,0000000*000	5	22	0, 000000*000	5	23	0,0000000*000	5	24
0,0000000*000	5	25	0,0000000*000	5	26	0,0000000*000	5	27	0, 000000*000	5	28	0,0000000*000	5	29
0,0000000*000	5	30	0,0000000*000	5	31	0,0000000*000	5	32	0, 000000*000	5	33	0,0000000*000	5	34
0,0000000*000	5	35	0,0000000*000	5	36	0,0000000*000	5	37	0, 000000*000	5	38	0,0000000*000	5	39
0,0000000*000	5	40	0,0000000*000	5	41	0,0000000*000	5	42	0, 000000*000	5	43	0,0000000*000	5	44
0,0000000*000	5	45	0,0000000*000	5	46	0,0000000*000	5	47						

SCATTERING FROM GROUP 6

0,0000000*000	6	6	0,0000000*000	6	7	0,0000000*000	6	8	0, 000000*000	6	9	0,0000000*000	6	10
0,0000000*000	6	11	0,0000000*000	6	12	0,0000000*000	6	13	0, 000000*000	6	14	0,0000000*000	6	15
0,0000000*000	6	16	0,0000000*000	6	17	0,0000000*000	6	18	0, 000000*000	6	19	0,0000000*000	6	20
0,0000000*000	6	21	0,0000000*000	6	22	0,0000000*000	6	23	0, 000000*000	6	24	0,0000000*000	6	25
0,0000000*000	6	26	0,0000000*000	6	27	0,0000000*000	6	28	0, 000000*000	6	29	0,0000000*000	6	30
0,0000000*000	6	31	0,0000000*000	6	32	0,0000000*000	6	33	0, 000000*000	6	34	0,0000000*000	6	35
0,0000000*000	6	36	0,0000000*000	6	37	0,0000000*000	6	38	0, 000000*000	6	39	0,0000000*000	6	40
0,0000000*000	6	41	0,0000000*000	6	42	0,0000000*000	6	43	0, 000000*000	6	44	0,0000000*000	6	45
0,0000000*000	6	46	0,0000000*000	6	47									

SCATTERING FROM GROUP 7

0,0000000*000	7	7	0,0000000*000	7	8	0,0000000*000	7	9	0, 000000*000	7	10	0,0000000*000	7	11
0,0000000*000	7	12	0,0000000*000	7	13	0,0000000*000	7	14	0, 000000*000	7	15	0,0000000*000	7	16
0,0000000*000	7	17	0,0000000*000	7	18	0,0000000*000	7	19	0, 000000*000	7	20	0,0000000*000	7	21
0,0000000*000	7	22	0,0000000*000	7	23	0,0000000*000	7	24	0, 000000*000	7	25	0,0000000*000	7	26

0,0000000+000	7	27	0,0000000+000	7	28	0,0000000+000	7	29	0,0000000+000	7	30	0,0000000+000	7	31
0,0000000+000	7	32	0,0000000+000	7	33	0,0000000+000	7	34	0,0000000+000	7	35	0,0000000+000	7	36
0,0000000+000	7	37	0,0000000+000	7	38	0,0000000+000	7	39	0,0000000+000	7	40	0,0000000+000	7	41
0,0000000+000	7	42	0,0000000+000	7	43	0,0000000+000	7	44	0,0000000+000	7	45	0,0000000+000	7	46
0,0000000+000	7	47												

SCATTERING FROM GROUP 8

0,0000000+000	8	8	0,0000000+000	8	9	0,0000000+000	8	10	0,0000000+000	8	11	0,0000000+000	8	12
0,0000000+000	8	13	0,0000000+000	8	14	0,0000000+000	8	15	0,0000000+000	8	16	0,0000000+000	8	17
0,0000000+000	8	18	0,0000000+000	8	19	0,0000000+000	8	20	0,0000000+000	8	21	0,0000000+000	8	22
0,0000000+000	8	23	0,0000000+000	8	24	0,0000000+000	8	25	0,0000000+000	8	26	0,0000000+000	8	27
0,0000000+000	8	28	0,0000000+000	8	29	0,0000000+000	8	30	0,0000000+000	8	31	0,0000000+000	8	32
0,0000000+000	8	33	0,0000000+000	8	34	0,0000000+000	8	35	0,0000000+000	8	36	0,0000000+000	8	37
0,0000000+000	8	38	0,0000000+000	8	39	0,0000000+000	8	40	0,0000000+000	8	41	0,0000000+000	8	42
0,0000000+000	8	43	0,0000000+000	8	44	0,0000000+000	8	45	0,0000000+000	8	46	0,0000000+000	8	47

SCATTERING FROM GROUP 9

0,0000000+000	9	9	0,0000000+000	9	10	0,0000000+000	9	11	0,0000000+000	9	12	0,0000000+000	9	13
0,0000000+000	9	14	0,0000000+000	9	15	0,0000000+000	9	16	0,0000000+000	9	17	0,0000000+000	9	18
0,0000000+000	9	19	0,0000000+000	9	20	0,0000000+000	9	21	0,0000000+000	9	22	0,0000000+000	9	23
0,0000000+000	9	24	0,0000000+000	9	25	0,0000000+000	9	26	0,0000000+000	9	27	0,0000000+000	9	28
0,0000000+000	9	29	0,0000000+000	9	30	0,0000000+000	9	31	0,0000000+000	9	32	0,0000000+000	9	33
0,0000000+000	9	34	0,0000000+000	9	35	0,0000000+000	9	36	0,0000000+000	9	37	0,0000000+000	9	38
0,0000000+000	9	39	0,0000000+000	9	40	0,0000000+000	9	41	0,0000000+000	9	42	0,0000000+000	9	43
0,0000000+000	9	44	0,0000000+000	9	45	0,0000000+000	9	46	0,0000000+000	9	47			

SCATTERING FROM GROUP 10

0,0000000+000	10	10	0,0000000+000	10	11	0,0000000+000	10	12	0,0000000+000	10	13	0,0000000+000	10	14
0,0000000+000	10	15	0,0000000+000	10	16	0,0000000+000	10	17	0,0000000+000	10	18	0,0000000+000	10	19
0,0000000+000	10	20	0,0000000+000	10	21	0,0000000+000	10	22	0,0000000+000	10	23	0,0000000+000	10	24
0,0000000+000	10	25	0,0000000+000	10	26	0,0000000+000	10	27	0,0000000+000	10	28	0,0000000+000	10	29
0,0000000+000	10	30	0,0000000+000	10	31	0,0000000+000	10	32	0,0000000+000	10	33	0,0000000+000	10	34
0,0000000+000	10	35	0,0000000+000	10	36	0,0000000+000	10	37	0,0000000+000	10	38	0,0000000+000	10	39
0,0000000+000	10	40	0,0000000+000	10	41	0,0000000+000	10	42	0,0000000+000	10	43	0,0000000+000	10	44
0,0000000+000	10	45	0,0000000+000	10	46	0,0000000+000	10	47						

SCATTERING FROM GROUP 11

0,0000000+000	11	11	0,0000000+000	11	12	0,0000000+000	11	13	0,0000000+000	11	14	0,0000000+000	11	15
0,0000000+000	11	16	0,0000000+000	11	17	0,0000000+000	11	18	0,0000000+000	11	19	0,0000000+000	11	20
0,0000000+000	11	21	0,0000000+000	11	22	0,0000000+000	11	23	0,0000000+000	11	24	0,0000000+000	11	25
0,0000000+000	11	26	0,0000000+000	11	27	0,0000000+000	11	28	0,0000000+000	11	29	0,0000000+000	11	30
0,0000000+000	11	31	0,0000000+000	11	32	0,0000000+000	11	33	0,0000000+000	11	34	0,0000000+000	11	35
0,0000000+000	11	36	0,0000000+000	11	37	0,0000000+000	11	38	0,0000000+000	11	39	0,0000000+000	11	40
0,0000000+000	11	41	0,0000000+000	11	42	0,0000000+000	11	43	0,0000000+000	11	44	0,0000000+000	11	45
0,0000000+000	11	46	0,0000000+000	11	47									

SCATTERING FROM GROUP 12

0,0000000+000	12	12	0,0000000+000	12	13	0,0000000+000	12	14	0,0000000+000	12	15	0,0000000+000	12	16
0,0000000+000	12	17	0,0000000+000	12	18	0,0000000+000	12	19	0,0000000+000	12	20	0,0000000+000	12	21
0,0000000+000	12	22	0,0000000+000	12	23	0,0000000+000	12	24	0,0000000+000	12	25	0,0000000+000	12	26
0,0000000+000	12	27	0,0000000+000	12	28	0,0000000+000	12	29	0,0000000+000	12	30	0,0000000+000	12	31
0,0000000+000	12	32	0,0000000+000	12	33	0,0000000+000	12	34	0,0000000+000	12	35	0,0000000+000	12	36
0,0000000+000	12	37	0,0000000+000	12	38	0,0000000+000	12	39	0,0000000+000	12	40	0,0000000+000	12	41
0,0000000+000	12	42	0,0000000+000	12	43	0,0000000+000	12	44	0,0000000+000	12	45	0,0000000+000	12	46
0,0000000+000	12	47												

SCATTERING FROM GROUP 13

0,0000000+000 13 13 0,0000000+000 13 14 0,0000000+000 13 15 0,000000+000 13 16 0,0000000+000 13 17
0,0000000+000 13 18 0,0000000+000 13 19 0,0000000+000 13 20 0,000000+000 13 21 0,0000000+000 13 22
0,0000000+000 13 23 0,0000000+000 13 24 0,0000000+000 13 25 0,000000+000 13 26 0,0000000+000 13 27
0,0000000+000 13 28 0,0000000+000 13 29 0,0000000+000 13 30 0,000000+000 13 31 0,0000000+000 13 32
0,0000000+000 13 33 0,0000000+000 13 34 0,0000000+000 13 35 0,000000+000 13 36 0,0000000+000 13 37
0,0000000+000 13 38 0,0000000+000 13 39 0,0000000+000 13 40 0,000000+000 13 41 0,0000000+000 13 42
0,0000000+000 13 43 0,0000000+000 13 44 0,0000000+000 13 45 0,000000+000 13 46

SCATTERING FROM GROUP 14

0,0000000+000 14 14 0,0000000+000 14 15 0,0000000+000 14 16 0,000000+000 14 17 0,0000000+000 14 18
0,0000000+000 14 19 0,0000000+000 14 20 0,0000000+000 14 21 0,000000+000 14 22 0,0000000+000 14 23
0,0000000+000 14 24 0,0000000+000 14 25 0,0000000+000 14 26 0,000000+000 14 27 0,0000000+000 14 28
0,0000000+000 14 29 0,0000000+000 14 30 0,0000000+000 14 31 0,000000+000 14 32 0,0000000+000 14 33
0,0000000+000 14 34 0,0000000+000 14 35 0,0000000+000 14 36 0,000000+000 14 37 0,0000000+000 14 38
0,0000000+000 14 39 0,0000000+000 14 40 0,0000000+000 14 41 0,000000+000 14 42 0,0000000+000 14 43
0,0000000+000 14 44 0,0000000+000 14 45 0,0000000+000 14 46 0,000000+000 14 47

SCATTERING FROM GROUP 15

0,0000000+000 15 15 0,0000000+000 15 16 0,0000000+000 15 17 0,000000+000 15 18 0,0000000+000 15 19
0,0000000+000 15 20 0,0000000+000 15 21 0,0000000+000 15 22 0,000000+000 15 23 0,0000000+000 15 24
0,0000000+000 15 25 0,0000000+000 15 26 0,0000000+000 15 27 0,000000+000 15 28 0,0000000+000 15 29
0,0000000+000 15 30 0,0000000+000 15 31 0,0000000+000 15 32 0,000000+000 15 33 0,0000000+000 15 34
0,0000000+000 15 35 0,0000000+000 15 36 0,0000000+000 15 37 0,000000+000 15 38 0,0000000+000 15 39
0,0000000+000 15 40 0,0000000+000 15 41 0,0000000+000 15 42 0,000000+000 15 43 0,0000000+000 15 44
0,0000000+000 15 45 0,0000000+000 15 46 0,0000000+000 15 47

SCATTERING FROM GROUP 16

0,0000000+000 16 16 0,0000000+000 16 17 0,0000000+000 16 18 0,000000+000 16 19 0,0000000+000 16 20
0,0000000+000 16 21 0,0000000+000 16 22 0,0000000+000 16 23 0,000000+000 16 24 0,0000000+000 16 25
0,0000000+000 16 26 0,0000000+000 16 27 0,0000000+000 16 28 0,000000+000 16 29 0,0000000+000 16 30
0,0000000+000 16 31 0,0000000+000 16 32 0,0000000+000 16 33 0,000000+000 16 34 0,0000000+000 16 35
0,0000000+000 16 36 0,0000000+000 16 37 0,0000000+000 16 38 0,000000+000 16 39 0,0000000+000 16 40
0,0000000+000 16 41 0,0000000+000 16 42 0,0000000+000 16 43 0,000000+000 16 44 0,0000000+000 16 45
0,0000000+000 16 46 0,0000000+000 16 47

SCATTERING FROM GROUP 17

0,0000000+000 17 17 0,0000000+000 17 18 0,0000000+000 17 19 0,000000+000 17 20 0,0000000+000 17 21
0,0000000+000 17 22 0,0000000+000 17 23 0,0000000+000 17 24 0,000000+000 17 25 0,0000000+000 17 26
0,0000000+000 17 27 0,0000000+000 17 28 0,0000000+000 17 29 0,000000+000 17 30 0,0000000+000 17 31
0,0000000+000 17 32 0,0000000+000 17 33 0,0000000+000 17 34 0,000000+000 17 35 0,0000000+000 17 36
0,0000000+000 17 37 0,0000000+000 17 38 0,0000000+000 17 39 0,000000+000 17 40 0,0000000+000 17 41
0,0000000+000 17 42 0,0000000+000 17 43 0,0000000+000 17 44 0,000000+000 17 45 0,0000000+000 17 46
0,0000000+000 17 47

SCATTERING FROM GROUP 18

0,0000000+000 18 18 0,0000000+000 18 19 0,0000000+000 18 20 0,000000+000 18 21 0,0000000+000 18 22
0,0000000+000 18 23 0,0000000+000 18 24 0,0000000+000 18 25 0,000000+000 18 26 0,0000000+000 18 27
0,0000000+000 18 28 0,0000000+000 18 29 0,0000000+000 18 30 0,000000+000 18 31 0,0000000+000 18 32
0,0000000+000 18 33 0,0000000+000 18 34 0,0000000+000 18 35 0,000000+000 18 36 0,0000000+000 18 37
0,0000000+000 18 38 0,0000000+000 18 39 0,0000000+000 18 40 0,000000+000 18 41 0,0000000+000 18 42
0,0000000+000 18 43 0,0000000+000 18 44 0,0000000+000 18 45 0,000000+000 18 46 0,0000000+000 18 47

SCATTERING FROM GROUP 19

0,0000000+000 19 19 0,0000000+000 19 20 0,0000000+000 19 21 0,000000+000 19 22 0,0000000+000 19 23
0,0000000+000 19 24 0,0000000+000 19 25 0,0000000+000 19 26 0,000000+000 19 27 0,0000000+000 19 28

0,0000000+000 19 29 0,0000000+000 19 30 0,0000000+000 19 31 0,0000000+000 19 32 0,0000000+000 19 33
0,0000000+000 19 34 0,0000000+000 19 35 0,0000000+000 19 36 0,0000000+000 19 37 0,0000000+000 19 38
0,0000000+000 19 39 0,0000000+000 19 40 0,0000000+000 19 41 0,0000000+000 19 42 0,0000000+000 19 43
0,0000000+000 19 44 0,0000000+000 19 45 0,0000000+000 19 46 0,0000000+000 19 47

SCATTERING FROM GROUP 20

0,0000000+000 20 20 0,0000000+000 20 21 0,0000000+000 20 22 0,0000000+000 20 23 0,0000000+000 20 24
0,0000000+000 20 25 0,0000000+000 20 26 0,0000000+000 20 27 0,0000000+000 20 28 0,0000000+000 20 29
0,0000000+000 20 30 0,0000000+000 20 31 0,0000000+000 20 32 0,0000000+000 20 33 0,0000000+000 20 34
0,0000000+000 20 35 0,0000000+000 20 36 0,0000000+000 20 37 0,0000000+000 20 38 0,0000000+000 20 39
0,0000000+000 20 40 0,0000000+000 20 41 0,0000000+000 20 42 0,0000000+000 20 43 0,0000000+000 20 44
0,0000000+000 20 45 0,0000000+000 20 46 0,0000000+000 20 47

SCATTERING FROM GROUP 21

0,0000000+000 21 21 0,0000000+000 21 22 0,0000000+000 21 23 0,0000000+000 21 24 0,0000000+000 21 25
0,0000000+000 21 26 0,0000000+000 21 27 0,0000000+000 21 28 0,0000000+000 21 29 0,0000000+000 21 30
0,0000000+000 21 31 0,0000000+000 21 32 0,0000000+000 21 33 0,0000000+000 21 34 0,0000000+000 21 35
0,0000000+000 21 36 0,0000000+000 21 37 0,0000000+000 21 38 0,0000000+000 21 39 0,0000000+000 21 40
0,0000000+000 21 41 0,0000000+000 21 42 0,0000000+000 21 43 0,0000000+000 21 44 0,0000000+000 21 45
0,0000000+000 21 46 0,0000000+000 21 47

SCATTERING FROM GROUP 22

0,0000000+000 22 22 0,0000000+000 22 23 0,0000000+000 22 24 0,0000000+000 22 25 0,0000000+000 22 26
0,0000000+000 22 27 0,0000000+000 22 28 0,0000000+000 22 29 0,0000000+000 22 30 0,0000000+000 22 31
0,0000000+000 22 32 0,0000000+000 22 33 0,0000000+000 22 34 0,0000000+000 22 35 0,0000000+000 22 36
0,0000000+000 22 37 0,0000000+000 22 38 0,0000000+000 22 39 0,0000000+000 22 40 0,0000000+000 22 41
0,0000000+000 22 42 0,0000000+000 22 43 0,0000000+000 22 44 0,0000000+000 22 45 0,0000000+000 22 46
0,0000000+000 22 47

SCATTERING FROM GROUP 23

0,0000000+000 23 23 0,0000000+000 23 24 0,0000000+000 23 25 0,0000000+000 23 26 0,0000000+000 23 27
0,0000000+000 23 28 0,0000000+000 23 29 0,0000000+000 23 30 0,0000000+000 23 31 0,0000000+000 23 32
0,0000000+000 23 33 0,0000000+000 23 34 0,0000000+000 23 35 0,0000000+000 23 36 0,0000000+000 23 37
0,0000000+000 23 38 0,0000000+000 23 39 0,0000000+000 23 40 0,0000000+000 23 41 0,0000000+000 23 42
0,0000000+000 23 43 0,0000000+000 23 44 0,0000000+000 23 45 0,0000000+000 23 46 0,0000000+000 23 47

SCATTERING FROM GROUP 24

0,0000000+000 24 24 0,0000000+000 24 25 0,0000000+000 24 26 0,0000000+000 24 27 0,0000000+000 24 28
0,0000000+000 24 29 0,0000000+000 24 30 0,0000000+000 24 31 0,0000000+000 24 32 0,0000000+000 24 33
0,0000000+000 24 34 0,0000000+000 24 35 0,0000000+000 24 36 0,0000000+000 24 37 0,0000000+000 24 38
0,0000000+000 24 39 0,0000000+000 24 40 0,0000000+000 24 41 0,0000000+000 24 42 0,0000000+000 24 43
0,0000000+000 24 44 0,0000000+000 24 45 0,0000000+000 24 46 0,0000000+000 24 47

SCATTERING FROM GROUP 25

0,0000000+000 25 25 0,0000000+000 25 26 0,0000000+000 25 27 0,0000000+000 25 28 0,0000000+000 25 29
0,0000000+000 25 30 0,0000000+000 25 31 0,0000000+000 25 32 0,0000000+000 25 33 0,0000000+000 25 34
0,0000000+000 25 35 0,0000000+000 25 36 0,0000000+000 25 37 0,0000000+000 25 38 0,0000000+000 25 39
0,0000000+000 25 40 0,0000000+000 25 41 0,0000000+000 25 42 0,0000000+000 25 43 0,0000000+000 25 44
0,0000000+000 25 45 0,0000000+000 25 46 0,0000000+000 25 47

SCATTERING FROM GROUP 26

0,0000000+000 26 26 0,0000000+000 26 27 0,0000000+000 26 28 0,0000000+000 26 29 0,0000000+000 26 30
0,0000000+000 26 31 0,0000000+000 26 32 0,0000000+000 26 33 0,0000000+000 26 34 0,0000000+000 26 35
0,0000000+000 26 36 0,0000000+000 26 37 0,0000000+000 26 38 0,0000000+000 26 39 0,0000000+000 26 40
0,0000000+000 26 41 0,0000000+000 26 42 0,0000000+000 26 43 0,0000000+000 26 44 0,0000000+000 26 45

0,0000000+000 26 46 0,0000000+000 26 47

SCATTERING FROM GROUP 27

0,0000000+000 27 27 0,0000000+000 27 28 0,0000000+000 27 29 0,0000000+000 27 30 0,0000000+000 27 31
0,0000000+000 27 32 0,0000000+000 27 33 0,0000000+000 27 34 0,0000000+000 27 35 0,0000000+000 27 36
0,0000000+000 27 37 0,0000000+000 27 38 0,0000000+000 27 39 0,0000000+000 27 40 0,0000000+000 27 41
0,0000000+000 27 42 0,0000000+000 27 43 0,0000000+000 27 44 0,0000000+000 27 45 0,0000000+000 27 46
0,0000000+000 27 47

SCATTERING FROM GROUP 28

0,0000000+000 28 28 0,0000000+000 28 29 0,0000000+000 28 30 0,0000000+000 28 31 0,0000000+000 28 32
0,0000000+000 28 33 0,0000000+000 28 34 0,0000000+000 28 35 0,0000000+000 28 36 0,0000000+000 28 37
0,0000000+000 28 38 0,0000000+000 28 39 0,0000000+000 28 40 0,0000000+000 28 41 0,0000000+000 28 42
0,0000000+000 28 43 0,0000000+000 28 44 0,0000000+000 28 45 0,0000000+000 28 46 0,0000000+000 28 47

SCATTERING FROM GROUP 29

0,0000000+000 29 29 0,0000000+000 29 30 0,0000000+000 29 31 0,0000000+000 29 32 0,0000000+000 29 33
0,0000000+000 29 34 0,0000000+000 29 35 0,0000000+000 29 36 0,0000000+000 29 37 0,0000000+000 29 38
0,0000000+000 29 39 0,0000000+000 29 40 0,0000000+000 29 41 0,0000000+000 29 42 0,0000000+000 29 43
0,0000000+000 29 44 0,0000000+000 29 45 0,0000000+000 29 46 0,0000000+000 29 47

SCATTERING FROM GROUP 30

0,0000000+000 30 30 0,0000000+000 30 31 0,0000000+000 30 32 0,0000000+000 30 33 0,0000000+000 30 34
0,0000000+000 30 35 0,0000000+000 30 36 0,0000000+000 30 37 0,0000000+000 30 38 0,0000000+000 30 39
0,0000000+000 30 40 0,0000000+000 30 41 0,0000000+000 30 42 0,0000000+000 30 43 0,0000000+000 30 44
0,0000000+000 30 45 0,0000000+000 30 46 0,0000000+000 30 47

SCATTERING FROM GROUP 31

0,0000000+000 31 31 0,0000000+000 31 32 0,0000000+000 31 33 0,0000000+000 31 34 0,0000000+000 31 35
0,0000000+000 31 36 0,0000000+000 31 37 0,0000000+000 31 38 0,0000000+000 31 39 0,0000000+000 31 40
0,0000000+000 31 41 0,0000000+000 31 42 0,0000000+000 31 43 0,0000000+000 31 44 0,0000000+000 31 45
0,0000000+000 31 46 0,0000000+000 31 47

SCATTERING FROM GROUP 32

0,0000000+000 32 32 0,0000000+000 32 33 0,0000000+000 32 34 0,0000000+000 32 35 0,0000000+000 32 36
0,0000000+000 32 37 0,0000000+000 32 38 0,0000000+000 32 39 0,0000000+000 32 40 0,0000000+000 32 41
0,0000000+000 32 42 0,0000000+000 32 43 0,0000000+000 32 44 0,0000000+000 32 45 0,0000000+000 32 46
0,0000000+000 32 47

SCATTERING FROM GROUP 33

0,0000000+000 33 33 0,0000000+000 33 34 0,0000000+000 33 35 0,0000000+000 33 36 0,0000000+000 33 37
0,0000000+000 33 38 0,0000000+000 33 39 0,0000000+000 33 40 0,0000000+000 33 41 0,0000000+000 33 42
0,0000000+000 33 43 0,0000000+000 33 44 0,0000000+000 33 45 0,0000000+000 33 46 0,0000000+000 33 47

SCATTERING FROM GROUP 34

0,0000000+000 34 34 0,0000000+000 34 35 0,0000000+000 34 36 0,0000000+000 34 37 0,0000000+000 34 38
0,0000000+000 34 39 0,0000000+000 34 40 0,0000000+000 34 41 0,0000000+000 34 42 0,0000000+000 34 43
0,0000000+000 34 44 0,0000000+000 34 45 0,0000000+000 34 46 0,0000000+000 34 47

SCATTERING FROM GROUP 35

0,0000000+000 35 35 0,0000000+000 35 36 0,0000000+000 35 37 0,0000000+000 35 38 0,0000000+000 35 39
0,0000000+000 35 40 0,0000000+000 35 41 0,0000000+000 35 42 0,0000000+000 35 43 0,0000000+000 35 44
0,0000000+000 35 45 0,0000000+000 35 46 0,0000000+000 35 47

SCATTERING FROM GROUP 36

0,0000000+000 36 36 0,0000000+000 36 37 0,0000000+000 36 38 0,000000+000 36 39 0,0000000+000 36 40
0,0000000+000 36 41 0,0000000+000 36 42 0,0000000+000 36 43 0,000000+000 36 44 0,0000000+000 36 45
0,0000000+000 36 46 0,0000000+000 36 47

SCATTERING FROM GROUP 37

0,0000000+000 37 37 0,0000000+000 37 38 0,0000000+000 37 39 0,000000+000 37 40 0,0000000+000 37 41
0,0000000+000 37 42 0,0000000+000 37 43 0,0000000+000 37 44 0,000000+000 37 45 0,0000000+000 37 46
0,0000000+000 37 47

SCATTERING FROM GROUP 38

0,0000000+000 36 38 0,0000000+000 38 39 0,0000000+000 38 40 0,000000+000 38 41 0,0000000+000 38 42
0,0000000+000 36 43 0,0000000+000 38 44 0,0000000+000 38 45 0,000000+000 38 46 0,0000000+000 38 47

SCATTERING FROM GROUP 39

0,0000000+000 35 39 0,0000000+000 39 40 0,0000000+000 39 41 0,000000+000 39 42 0,0000000+000 39 43
0,0000000+000 35 44 0,0000000+000 39 45 0,0000000+000 39 46 0,000000+000 39 47

SCATTERING FROM GROUP 40

0,0000000+000 40 40 0,0000000+000 40 41 0,0000000+000 40 42 0,000000+000 40 43 0,0000000+000 40 44
0,0000000+000 40 45 0,0000000+000 40 46 0,0000000+000 40 47

SCATTERING FROM GROUP 41

0,0000000+000 41 41 0,0000000+000 41 42 0,0000000+000 41 43 0,000000+000 41 44 0,0000000+000 41 45
0,0000000+000 41 46 0,0000000+000 41 47

SCATTERING FROM GROUP 42

0,0000000+000 42 42 0,0000000+000 42 43 0,0000000+000 42 44 0,000000+000 42 45 0,0000000+000 42 46
0,0000000+000 42 47

SCATTERING FROM GROUP 43

0,0000000+000 43 43 0,0000000+000 43 44 0,0000000+000 43 45 0,000000+000 43 46 0,0000000+000 43 47

SCATTERING FROM GROUP 44

0,0000000+000 44 44 0,0000000+000 44 45 0,0000000+000 44 46 0,000000+000 44 47

SCATTERING FROM GROUP 45

0,0000000+000 45 45 0,0000000+000 45 46 0,0000000+000 45 47

SCATTERING FROM GROUP 46

0,0000000+000 46 46 0,0000000+000 46 47

SCATTERING FROM GROUP 47

0,0000000+000 47 47

DVCK INSC

71,78765558*004	20,37634618*003	42,56275570*003	69,83353973*003	94,77459548*003	11,08365940*002
11,53592864*002	10,96035019*002	96,97328141*003	81,15515582*003	65,03130058*003	50,37541918*003
38,00531159*003	28,08845690*003	20,42876468*003	14,67321835*003	10,43703358*003	73,67701944*004
51,70336414*004	36,11644490*004	25,13812520*004	17,44805450*004	12,08414017*004	83,55033184*005
57,69087436*005	39,79416651*005	27,42734944*005	18,89197409*005	13,00648191*005	89,51132999*006
61,58404283*006	42,36026879*006	29,13208655*006	20,03198653*006	13,77302588*006	94,68867479*007
65,09357972*007	44,74618684*007	30,75789332*007	21,14188232*007	14,53182670*007	99,88231208*008
68,65158863*008	47,18539917*008	32,43103511*008	22,29004665*008	15,32000123*008	

TIME SPENT IN PROGRAM AREA NO. 6 WAS 4.230*001SECONDS

ELAPSED TIME IN OVERLAY 1.09392*005MS

FIRST BSQ GUESS= 0.0000*000 SECOND BSQ GUESS= 5.0000*005 TOLERANCE= 1.0000*004

NO LEGENDRE COEFFICIENT MATERIALS

TIME SPENT IN PROGRAM AREA NO.12 WAS 5.800*002SECONDS

1 0.00000000*000 1.29816644*000

TIME SPENT IN PROGRAM AREA NO.12 WAS 5.800*002SECONDS

2 5.00000000*005 1.28190937*000

TIME SPENT IN PROGRAM AREA NO.12 WAS 5.800*002SECONDS

3 9.17036417*004 1.04914717*000

TIME SPENT IN PROGRAM AREA NO.12 WAS 6.100*002SECONDS

4 1.13624078*003 1.00225037*000

TIME SPENT IN PROGRAM AREA NO.12 WAS 5.800*002SECONDS

5 1.14713479*003 1.00002223*000

FINE GROUP FLUX

J	EL(J)	PHI(J)					
1	7,78801*000	1,01450*001	2	6,06531*000	2,88805*001	3	4.72367*00	6,12843*001
4	3,67879*000	1,03206*000	5	2,86505*000	1,60050*000	6	2,23136*00	2,05321*000
7	1,73774*000	2,48624*000	8	1,35335*000	2,71254*000	9	1.05399*00	3,36874*000
10	8,20850*001	4,85210*000	11	6,39279*001	5,69017*000	12	4.97871*01	8,60972*000
13	3,87742*001	9,91824*000	14	3,01974*001	1,11679*001	15	2,35177*01	1,07434*001
16	1,83156*001	9,20752*000	17	1,42642*001	8,78650*000	18	1.11090*01	8,47552*000
19	8,65170*002	7,28579*000	20	6,73795*002	6,47505*000	21	5.24752*02	4,50678*000
22	4,08677*002	4,77781*000	23	3,18278*002	3,97772*000	24	2.47875*02	2,18699*000
25	1,93045*002	3,54658*000	26	1,50344*002	2,38892*000	27	1.17088*02	1,64296*000
28	9,11882*003	1,09822*000	29	7,10174*003	6,28379*001	30	5.53084*03	5,25961*001
31	4,30743*003	3,42924*001	32	3,35463*003	1,41740*001	33	2,61259*03	2,30960*002
34	2,03468*003	8,52534*002	35	1,58461*003	2,42085*001	36	1.23410*03	2,36762*001
37	9,61117*004	1,44238*001	38	7,48518*004	8,38966*002	39	5.82947*04	4,44510*002
40	4,53999*004	2,02879*002	41	3,53575*004	1,01343*002	42	2,75364*04	4,38223*003
43	2,14454*004	1,87883*003	44	1,67017*004	6,38766*004	45	1.30673*04	4,06987*004
46	1,01301*004	1,01096*004	47	7,88932*005	7,34012*005			
48	0,00000*000	0,00000*000						

ELAPSED TIME IN OVERLAY 3.10000*003MS

BROAD GROUP EDIT

J	EL(J)	SOURCE(J)	PHI(J)	CURRENT(J)
1	36.78794+005	13.99514-002	20.35162-001	00.00000+000
2	22.31382+005	20.56112-002	36.53712-001	00.00000+000
3	13.53353+005	22.49628-002	51.18781-001	00.00000+000
4	82.08580+004	17.81284-002	82.20839-001	00.00000+000
5	49.78787+004	11.54067-002	14.29989+000	00.00000+000
6	30.19738+004	66.09377-003	21.08611+000	00.00000+000
7	18.31564+004	39.10198-003	19.95089+000	00.00000+000
8	11.10900+004	17.80474-003	17.26201+000	00.00000+000
9	67.37947+003	87.81981-004	13.76084+000	00.00000+000
10	40.86791+003	42.58618-004	92.84598-001	00.00000+000
11	24.78752+003	28.43917-004	61.64720-001	00.00000+000
12	15.03439+003	97.48504-005	59.35501-001	00.00000+000
13	91.18820+002	46.31932-005	27.41179-001	00.00000+000
14	43.07425+002	28.11602-005	14.97265-001	00.00000+000
15	26.12586+002	71.49236-006	16.48364-002	00.00000+000
16	20.34684+002	20.03199-006	85.25342-003	00.00000+000
17	12.34098+002	23.24189-006	47.88471-002	00.00000+000
18	96.11165+001	65.09358-007	14.42376-002	00.00000+000
19	58.29466+001	75.50408-007	12.83476-002	00.00000+000
20	27.53645+001	45.66194-007	34.80448-003	00.00000+000
21	78.89325+000	18.58781-007	30.99080-004	00.00000+000
22	00.00000+000	00.00000+000	00.00000+000	00.00000+000

TIME SPENT IN PROGRAM AREA NO. 16 WAS 3.760-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 18 WAS 8.221+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 19 WAS 2.667+000SECONDS

TIME SPENT IN PROGRAM AREA NO. 19 WAS 5.484+001SECONDS

TIME SPENT IN PROGRAM AREA NO. 19 WAS 7.480-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 19 WAS 7.460-001SECONDS

TIME SPENT IN PROGRAM AREA NO. 19 WAS 7.460-001SECONDS

AVERAGE MICROSCOPIC CROSS SECTIONS FOR MATERIAL FE

GROUP	E LOWER	RESOLVED RES. CAP	RESOLVED RES. FIS	UNRESOLVED RES. CAP	UNRESOLVED RES. FIS	TOTAL CAPTURE	TOTAL FISSION	TRANSPORT	NU	INELASTIC	N*2N
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.4061-004	0.0000+00	2.1212+000	0.0000	1.3926+000	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	8.4116-004	0.0000+00	2.3019+000	0.0000	1.0014+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.4003-003	0.0000+00	2.3246+000	0.0000	6.7818-001	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.9308-003	0.0000+00	1.9308+000	0.0000	2.6848-001	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	4.4611-003	0.0000+00	2.2536+000	0.0000	0.0000+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.2820-003	0.0000+00	2.9467+000	0.0000	0.0000+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.4111-003	0.0000+00	2.5332+000	0.0000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.3056-003	0.0000+00	3.4140+000	0.0000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.6979-003	0.0000+00	3.8033+000	0.0000	0.0000+000	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	6.7679-003	0.0000+00	4.2373+000	0.0000	0.0000+000	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.3369-002	0.0000+00	5.5371+000	0.0000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.0004-002	0.0000+00	1.3188+000	0.0000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.2149-002	0.0000+00	4.9550+000	0.0000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	5.1951-002	0.0000+00	9.8433+000	0.0000	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.6961-002	0.0000+00	5.9418+000	0.0000	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	7.4837-003	0.0000+00	6.0761+000	0.0000	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.3302-002	0.0000+00	7.3136+000	0.0000	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.9431-001	0.0000+00	8.9439+000	0.0000	0.0000+000	0.0000+000
19	5.8295+002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.7307-002	0.0000+00	9.5364+000	0.0000	0.0000+000	0.0000+000
20	2.7536+002	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.1093-002	0.0000+00	1.0474+001	0.0000	0.0000+000	0.0000+000
21	7.8893+001	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.7698-002	0.0000+00	1.1187+001	0.0000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.7698-002	0.0000+00	1.1187+001	0.0000	0.0000+000	0.0000+000

GROUP	E LOWER	N*P	N*ALPHA	ANISEL(J,J)
1	3.6788+006	7.9945-003	0.0000+000	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	0.0000+000
19	5.8295+002	0.0000+000	0.0000+000	0.0000+000
20	2.7536+002	0.0000+000	0.0000+000	0.0000+000
21	7.8893+001	0.0000+000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	1.1187+001

INELASTIC SCATTERING-SIGMA(K TO KF), K, KF

5.2823-002	1	1	2.7818-001	1	2	3.1808-001	1	3	3.1836-001	1	4	2.1890-001	1	5	1.1881-001	1	6		
5.3195-002	1	7	2.0853-002	1	8	8.3626-003	1	9	3.2727-003	1	10	1.2181-003	1	11	4.3388-004	1	12		
9.8497-005	1	13	0.0000+000	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18		
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22								
1.3478-001	2	2	5.8302-001	2	3	5.9473-002	2	4	8.9887-002	2	5	6.2349-002	2	6	3.9991-002	2	7		
1.8181-002	2	8	7.5216-003	2	9	3.7757-003	2	10	1.5812-003	2	11	6.1133-004	2	12	2.2335-004	2	13		
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19		
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22											
1.5429-002	3	3	3.7827-001	3	4	2.7993-001	3	5	3.1237-003	3	6	0.0000+000	3	7	0.0000+000	3	8		
9.3330-004	3	9	3.5799-004	3	10	1.3230-004	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14		
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20		
0.0000+000	3	21	0.0000+000	3	22														
0.0000+000	4	4	0.0000+000	4	5	1.0552-001	4	6	6.7736-002	4	7	5.7870-002	4	8	2.3216-002	4	9		
8.9154-003	4	10	3.3525-003	4	11	1.2391-003	4	12	4.5544-004	4	13	1.7055-004	4	14	0.0000+000	4	15		
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21		
0.0000+000	4	22																	
0.0000+000	5	5	0.0000+000	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10		
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16		
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22		
0.0000+000	6	6	0.0000+000	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11		
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17		
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22					
0.0000+000	7	7	0.0000+000	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12		
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18		
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22								
0.0000+000	8	8	0.0000+000	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13		
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19		
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22											
0.0000+000	9	9	0.0000+000	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14		
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20		
0.0000+000	9	21	0.0000+000	9	22														
0.0000+000	10	10	0.0000+000	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15		
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21		
0.0000+000	10	22																	
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16		
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22		
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17		

0,0000+000 12 18 0,0000+000 12 19 0,0000+000 12 20 0,0000+000 12 21 0,0000+000 12 22

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0,0000+000 21 21 0,0000+000 21 22

ELASTIC SCATTERING-SIGMA(K TO KF), K, KF

6.6561-001	1 1	5.4482-002	1 2	0.0000+000	1 3	0.0000+000	1 4	0.0000+000	1 5	0.0000+000	1 6
0.0000+000	1 7	0.0000+000	1 8	0.0000+000	1 9	0.0000+000	1 10	0.0000+000	1 11	0.0000+000	1 12
0.0000+000	1 13	0.0000+000	1 14	0.0000+000	1 15	0.0000+000	1 16	0.0000+000	1 17	0.0000+000	1 18
0.0000+000	1 19	0.0000+000	1 20	0.0000+000	1 21	0.0000+000	1 22				
1.1977+000	2 2	1.0194-001	2 3	0.0000+000	2 4	0.0000+000	2 5	0.0000+000	2 6	0.0000+000	2 7
0.0000+000	2 8	0.0000+000	2 9	0.0000+000	2 10	0.0000+000	2 11	0.0000+000	2 12	0.0000+000	2 13
0.0000+000	2 14	0.0000+000	2 15	0.0000+000	2 16	0.0000+000	2 17	0.0000+000	2 18	0.0000+000	2 19
0.0000+000	2 20	0.0000+000	2 21	0.0000+000	2 22						
1.5308+000	3 3	1.1420-001	3 4	0.0000+000	3 5	0.0000+000	3 6	0.0000+000	3 7	0.0000+000	3 8
0.0000+000	3 9	0.0000+000	3 10	0.0000+000	3 11	0.0000+000	3 12	0.0000+000	3 13	0.0000+000	3 14
0.0000+000	3 15	0.0000+000	3 16	0.0000+000	3 17	0.0000+000	3 18	0.0000+000	3 19	0.0000+000	3 20
0.0000+000	3 21	0.0000+000	3 22								
1.5359+000	4 4	1.2356-001	4 5	0.0000+000	4 6	0.0000+000	4 7	0.0000+000	4 8	0.0000+000	4 9
0.0000+000	4 10	0.0000+000	4 11	0.0000+000	4 12	0.0000+000	4 13	0.0000+000	4 14	0.0000+000	4 15
0.0000+000	4 16	0.0000+000	4 17	0.0000+000	4 18	0.0000+000	4 19	0.0000+000	4 20	0.0000+000	4 21
0.0000+000	4 22										
2.0897+000	5 5	1.5947-001	5 6	0.0000+000	5 7	0.0000+000	5 8	0.0000+000	5 9	0.0000+000	5 10
0.0000+000	5 11	0.0000+000	5 12	0.0000+000	5 13	0.0000+000	5 14	0.0000+000	5 15	0.0000+000	5 16
0.0000+000	5 17	0.0000+000	5 18	0.0000+000	5 19	0.0000+000	5 20	0.0000+000	5 21	0.0000+000	5 22
2.7623+000	6 6	1.7917-001	6 7	0.0000+000	6 8	0.0000+000	6 9	0.0000+000	6 10	0.0000+000	6 11
0.0000+000	6 12	0.0000+000	6 13	0.0000+000	6 14	0.0000+000	6 15	0.0000+000	6 16	0.0000+000	6 17
0.0000+000	6 18	0.0000+000	6 19	0.0000+000	6 20	0.0000+000	6 21	0.0000+000	6 22		
2.3326+000	7 7	1.9518-001	7 8	0.0000+000	7 9	0.0000+000	7 10	0.0000+000	7 11	0.0000+000	7 12
0.0000+000	7 13	0.0000+000	7 14	0.0000+000	7 15	0.0000+000	7 16	0.0000+000	7 17	0.0000+000	7 18
0.0000+000	7 19	0.0000+000	7 20	0.0000+000	7 21	0.0000+000	7 22				
3.1760+000	8 8	2.3264-001	8 9	0.0000+000	8 10	0.0000+000	8 11	0.0000+000	8 12	0.0000+000	8 13
0.0000+000	8 14	0.0000+000	8 15	0.0000+000	8 16	0.0000+000	8 17	0.0000+000	8 18	0.0000+000	8 19
0.0000+000	8 20	0.0000+000	8 21	0.0000+000	8 22						
3.4664+000	9 9	3.3116-001	9 10	0.0000+000	9 11	0.0000+000	9 12	0.0000+000	9 13	0.0000+000	9 14
0.0000+000	9 15	0.0000+000	9 16	0.0000+000	9 17	0.0000+000	9 18	0.0000+000	9 19	0.0000+000	9 20
0.0000+000	9 21	0.0000+000	9 22								
3.9249+000	10 10	3.0570-001	10 11	0.0000+000	10 12	0.0000+000	10 13	0.0000+000	10 14	0.0000+000	10 15
0.0000+000	10 16	0.0000+000	10 17	0.0000+000	10 18	0.0000+000	10 19	0.0000+000	10 20	0.0000+000	10 21
0.0000+000	10 22										
4.4434+000	11 11	1.0703+000	11 12	0.0000+000	11 13	0.0000+000	11 14	0.0000+000	11 15	0.0000+000	11 16
0.0000+000	11 17	0.0000+000	11 18	0.0000+000	11 19	0.0000+000	11 20	0.0000+000	11 21	0.0000+000	11 22
1.1576+000	12 12	1.4120-001	12 13	0.0000+000	12 14	0.0000+000	12 15	0.0000+000	12 16	0.0000+000	12 17

0,0000+000 12 18 0,0000+000 12 19 0,0000+000 12 20 0,0000+000 12 21 0,0000+000 12 22

4,6127+000 13 13 3,2015-001 13 14 0,0000+000 13 15 0,0000+000 13 16 0,0000+000 13 17 0,0000+000 13 18
0,0000+000 13 19 0,0000+000 13 20 0,0000+000 13 21 0,0000+000 13 22

9,6453+000 14 14 1,4604-001 14 15 0,0000+000 14 16 0,0000+000 14 17 0,0000+000 14 18 0,0000+000 14 19
0,0000+000 14 20 0,0000+000 14 21 0,0000+000 14 22

5,8327+000 15 15 9,2083-002 15 16 0,0000+000 15 17 0,0000+000 15 18 0,0000+000 15 19 0,0000+000 15 20
0,0000+000 15 21 0,0000+000 15 22

5,3020+000 16 16 7,6667-001 16 17 0,0000+000 16 18 0,0000+000 16 19 0,0000+000 16 20 0,0000+000 16 21
0,0000+000 16 22

6,8136+000 17 17 4,8668-001 17 18 0,0000+000 17 19 0,0000+000 17 20 0,0000+000 17 21 0,0000+000 17 22

7,5582+000 18 18 1,0914+000 18 19 0,0000+000 18 20 0,0000+000 18 21 0,0000+000 18 22

9,0871+000 19 19 4,3282-001 19 20 0,0000+000 19 21 0,0000+000 19 22

1,0280+001 20 20 1,7270-001 20 21 0,0000+000 20 22

1,1126+001 21 21 3,3673-002 21 22

N-2N SCATTERING-SIGMA(K TO KF), K, KF

0.0000+000	1	1	0.0000+000	1	2	0.0000+000	1	3	0.0000+000	1	4	0.0000+000	1	5	0.0000+000	1	6				
0.0000+000	1	7	0.0000+000	1	8	0.0000+000	1	9	0.0000+000	1	10	0.0000+000	1	11	0.0000+000	1	12				
0.0000+000	1	13	0.0000+000	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18				
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22										
0.0000+000	2	2	0.0000+000	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7				
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13				
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19				
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22													
0.0000+000	3	3	0.0000+000	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8				
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14				
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20				
0.0000+000	3	21	0.0000+000	3	22																
0.0000+000	4	4	0.0000+000	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9				
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15				
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21				
0.0000+000	4	22																			
0.0000+000	5	5	0.0000+000	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10				
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16				
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22				
0.0000+000	6	6	0.0000+000	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11				
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17				
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22							
0.0000+000	7	7	0.0000+000	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12				
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18				
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22										
0.0000+000	8	8	0.0000+000	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13				
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19				
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22													
0.0000+000	9	9	0.0000+000	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14				
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20				
0.0000+000	9	21	0.0000+000	9	22																
0.0000+000	10	10	0.0000+000	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15				
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21				
0.0000+000	10	22																			
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16				
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22				
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17				

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AVERAGE MICROSCOPIC CROSS SECTIONS FOR MATERIAL U 238

GROUP	E LOWER	RESOLVED RES. CAP	RESOLVED RES. FIS	UNRESOLVED RES. CAP	UNRESOLVED RES. FIS	TOTAL CAPTURE	TOTAL FISSION	TRANSPORT	NU	INELASTIC	N*2N
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.1786-002	6.4024-001	4.1146+000	3.2075	2.3396+000	1.2855-001
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	3.0108-002	5.5593-001	4.6552+000	2.8043	2.6110+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	7.4028-002	4.1851-001	5.1286+000	2.6404	2.9857+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.4580-001	2.5095-002	5.0275+000	2.5330	2.4117+000	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.3960-001	1.2932-003	5.8969+000	2.4627	1.8588+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.3472-001	0.0000+00	7.2391+000	0.0000	1.4541+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.5064-001	0.0000+00	8.5080+000	0.0000	1.1536+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.8106-001	0.0000+00	1.0617+001	0.0000	8.5909-001	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.3441-001	0.0000+00	1.1471+001	0.0000	4.1948-001	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	1.4872-001	0.0000+000	3.3448-001	0.0000+00	1.6096+001	0.0000	8.2233-002	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	4.3873-001	0.0000+000	4.3873-001	0.0000+00	2.5619+001	0.0000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	5.6157-001	0.0000+000	5.6157-001	0.0000+00	2.6701+001	0.0000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	6.8077-001	0.0000+000	6.8077-001	0.0000+00	2.7239+001	0.0000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	8.3365-001	0.0000+000	8.3365-001	0.0000+00	2.7334+001	0.0000	0.0000+000	0.0000+000
15	2.6126+003	3.8534-001	0.0000+000	3.4360-001	0.0000+000	7.2894-001	0.0000+00	1.5087+001	0.0000	0.0000+000	0.0000+000
16	2.0347+003	8.1909-001	0.0000+000	0.0000+000	0.0000+000	8.1909-001	0.0000+00	1.0776+001	0.0000	0.0000+000	0.0000+000
17	1.2341+003	6.7500-001	0.0000+000	0.0000+000	0.0000+000	6.7500-001	0.0000+00	5.1279+000	0.0000	0.0000+000	0.0000+000
18	9.6112+002	8.3725-001	0.0000+000	0.0000+000	0.0000+000	8.3725-001	0.0000+00	1.1011+001	0.0000	0.0000+000	0.0000+000
19	5.8295+002	9.7361-001	0.0000+000	0.0000+000	0.0000+000	9.7361-001	0.0000+00	1.0601+001	0.0000	0.0000+000	0.0000+000
20	2.7536+002	9.6709-001	0.0000+000	0.0000+000	0.0000+000	9.6709-001	0.0000+00	1.0738+001	0.0000	0.0000+000	0.0000+000
21	7.8893+001	1.0951+000	0.0000+000	0.0000+000	0.0000+000	1.0951+000	0.0000+00	9.1751+000	0.0000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.0951+000	0.0000+00	9.1751+000	0.0000	0.0000+000	0.0000+000

GROUP	E LOWER	N*P	N*ALPHA	ANISEL(J,J)
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	0.0000+000
19	5.8295+002	0.0000+000	0.0000+000	0.0000+000
20	2.7536+002	0.0000+000	0.0000+000	0.0000+000
21	7.8893+001	0.0000+000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	9.1751+000

INELASTIC SCATTERING-SIGMA(K TO KF), K, KF

8.4664-003	1	1	1.1014-001	1	2	3.9258-001	1	3	6.0856-001	1	4	5.4903-001	1	5	3.5129-001	1	6						
1.8142-001	1	7	8.2090-002	1	8	3.4256-002	1	9	1.3605-002	1	10	5.2436-003	1	11	1.9843-003	1	12						
7.4259-004	1	13	1.5608-004	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18						
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22												
2.8772-002	2	2	2.1943-001	2	3	5.5266-001	2	4	6.8661-001	2	5	5.3902-001	2	6	3.1644-001	2	7						
1.5505-001	2	8	6.7940-002	2	9	2.7802-002	2	10	1.0912-002	2	11	4.1751-003	2	12	1.5730-003	2	13						
5.8712-004	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19						
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22															
8.9812-002	3	3	5.2125-001	3	4	9.8759-001	3	5	8.2869-001	3	6	3.5124-001	3	7	1.2641-001	3	8						
4.8601-002	3	9	1.9669-002	3	10	7.9414-003	3	11	2.9355-003	3	12	1.0064-003	3	13	4.7387-004	3	14						
8.8341-005	3	15	2.0414-005	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20						
0.0000+000	3	21	0.0000+000	3	22																		
9.7517-001	4	4	5.1825-001	4	5	2.9478-001	4	6	3.5605-001	4	7	1.7013-001	4	8	6.2490-002	4	9						
2.2473-002	4	10	8.6802-003	4	11	2.8407-003	4	12	8.0340-004	4	13	6.1829-005	4	14	0.0000+000	4	15						
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21						
0.0000+000	4	22																					
1.2417+000	5	5	5.2435-001	5	6	4.1222-002	5	7	1.3200-002	5	8	2.0012-002	5	9	1.1094-002	5	10						
4.5325-003	5	11	1.7577-003	5	12	6.7151-004	5	13	2.2282-004	5	14	0.0000+000	5	15	0.0000+000	5	16						
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22						
9.6998-001	6	6	4.2975-001	6	7	4.3581-002	6	8	6.1686-003	6	9	3.0541-003	6	10	1.1269-003	6	11						
3.8640-004	6	12	7.9112-005	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17						
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22									
6.5059-001	7	7	4.5247-001	7	8	3.4308-002	7	9	1.4013-002	7	10	2.1822-003	7	11	0.0000+000	7	12						
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18						
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22												
3.2851-001	8	8	5.1197-001	8	9	9.9278-003	8	10	4.4862-003	8	11	2.7637-003	8	12	9.8911-004	8	13						
4.4478-004	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19						
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22															
0.0000+000	9	9	2.8380-001	9	10	1.2393-001	9	11	1.1748-002	9	12	0.0000+000	9	13	0.0000+000	9	14						
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20						
0.0000+000	9	21	0.0000+000	9	22																		
0.0000+000	10	10	0.0000+000	10	11	4.4444-002	10	12	2.1947-002	10	13	1.2314-002	10	14	2.3830-003	10	15						
5.2034-004	10	16	4.2533-004	10	17	9.6878-005	10	18	5.2482-005	10	19	0.0000+000	10	20	0.0000+000	10	21						
0.0000+000	10	22																					
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16						
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22						
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17						

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0.0000+000 12 18  0.0000+000 12 19  0.0000+000 12 20  0.0000+000 12 21  0.0000+000 12 22

0.0000+000 13 13  0.0000+000 13 14  0.0000+000 13 15  0.0000+000 13 16  0.0000+000 13 17  0.0000+000 13 18
0.0000+000 13 19  0.0000+000 13 20  0.0000+000 13 21  0.0000+000 13 22

0.0000+000 14 14  0.0000+000 14 15  0.0000+000 14 16  0.0000+000 14 17  0.0000+000 14 18  0.0000+000 14 19
0.0000+000 14 20  0.0000+000 14 21  0.0000+000 14 22

0.0000+000 15 15  0.0000+000 15 16  0.0000+000 15 17  0.0000+000 15 18  0.0000+000 15 19  0.0000+000 15 20
0.0000+000 15 21  0.0000+000 15 22

0.0000+000 16 16  0.0000+000 16 17  0.0000+000 16 18  0.0000+000 16 19  0.0000+000 16 20  0.0000+000 16 21
0.0000+000 16 22

0.0000+000 17 17  0.0000+000 17 18  0.0000+000 17 19  0.0000+000 17 20  0.0000+000 17 21  0.0000+000 17 22

0.0000+000 18 18  0.0000+000 18 19  0.0000+000 18 20  0.0000+000 18 21  0.0000+000 18 22

0.0000+000 19 19  0.0000+000 19 20  0.0000+000 19 21  0.0000+000 19 22

0.0000+000 20 20  0.0000+000 20 21  0.0000+000 20 22

0.0000+000 21 21  0.0000+000 21 22
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ELASTIC SCATTERING-SIGMA(K TO KF), K, KF

9.7760-001	1	1	1.6853-002	1	2	0.0000+000	1	3	0.0000+000	1	4	0.0000+000	1	5	0.0000+000	1	6
0.0000+000	1	7	0.0000+000	1	8	0.0000+000	1	9	0.0000+000	1	10	0.0000+000	1	11	0.0000+000	1	12
0.0000+000	1	13	0.0000+000	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
1.4324+000	2	2	2.5875-002	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
1.6255+000	3	3	2.4822-002	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
2.3958+000	4	4	4.5045-002	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
3.8202+000	5	5	7.7039-002	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
5.5531+000	6	6	9.7113-002	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
7.0991+000	7	7	1.0470-001	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
8.8371+000	8	8	1.3929-001	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
1.0658+001	9	9	1.5824-001	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
1.5340+001	10	10	3.3955-001	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
2.4912+001	11	11	2.6893-001	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
2.5822+001	12	12	3.1705-001	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

0.0000+000 12 18 0.0000+000 12 19 0.0000+000 12 20 0.0000+000 12 21 0.0000+000 12 22

2.6241+001 13 13 3.1743-001 13 14 0.0000+000 13 15 0.0000+000 13 16 0.0000+000 13 17 0.0000+000 13 18
0.0000+000 13 19 0.0000+000 13 20 0.0000+000 13 21 0.0000+000 13 22

2.6319+001 14 14 1.8076-001 14 15 0.0000+000 14 16 0.0000+000 14 17 0.0000+000 14 18 0.0000+000 14 19
0.0000+000 14 20 0.0000+000 14 21 0.0000+000 14 22

1.4305+001 15 15 5.3585-002 15 16 0.0000+000 15 17 0.0000+000 15 18 0.0000+000 15 19 0.0000+000 15 20
0.0000+000 15 21 0.0000+000 15 22

9.4606+000 16 16 4.9585-001 16 17 0.0000+000 16 18 0.0000+000 16 19 0.0000+000 16 20 0.0000+000 16 21
0.0000+000 16 22

4.2175+000 17 17 2.3542-001 17 18 0.0000+000 17 19 0.0000+000 17 20 0.0000+000 17 21 0.0000+000 17 22

9.5603+000 18 18 6.1330-001 18 19 0.0000+000 18 20 0.0000+000 18 21 0.0000+000 18 22

9.4418+000 19 19 1.8597-001 19 20 0.0000+000 19 21 0.0000+000 19 22

9.6996+000 20 20 7.1092-002 20 21 0.0000+000 20 22

8.0753+000 21 21 4.6793-003 21 22

N=2N SCATTERING=SIGMA(K TO KF), K, KF

1.4217-006	1	1	1.7202-004	1	2	2.5649-003	1	3	1.0115-002	1	4	1.8217-002	1	5	2.4010-002	1	6						
2.6153-002	1	7	2.1489-002	1	8	1.3505-002	1	9	6.9802-003	1	10	3.1717-003	1	11	1.3285-003	1	12						
5.2909-004	1	13	2.5225-004	1	14	1.2578-005	1	15	9.8758-006	1	16	6.0233-006	1	17	0.0000+000	1	18						
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22												
0.0000+000	2	2	0.0000+000	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7						
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13						
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19						
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22															
0.0000+000	3	3	0.0000+000	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8						
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14						
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20						
0.0000+000	3	21	0.0000+000	3	22																		
0.0000+000	4	4	0.0000+000	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9						
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15						
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21						
0.0000+000	4	22																					
0.0000+000	5	5	0.0000+000	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10						
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16						
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22						
0.0000+000	6	6	0.0000+000	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11						
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17						
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22									
0.0000+000	7	7	0.0000+000	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12						
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18						
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22												
0.0000+000	8	8	0.0000+000	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13						
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19						
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22															
0.0000+000	9	9	0.0000+000	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14						
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20						
0.0000+000	9	21	0.0000+000	9	22																		
0.0000+000	10	10	0.0000+000	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15						
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21						
0.0000+000	10	22																					
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16						
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22						
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17						

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AVERAGE MICROSCOPIC CROSS SECTIONS FOR MATERIAL PU239

GROUP	E LOWER	RESOLVED RES. CAP	RESOLVED RES. FIS	UNRESOLVED RES. CAP	UNRESOLVED RES. FIS	TOTAL CAPTURE	TOTAL FISSION	TRANSPORT	NU	INELASTIC	N-2N
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.9535+00	4.3361+00	3.5786	1.3775+000	1.7654-002
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.0899+00	4.6634+00	3.2562	1.1975+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	4.7382-003	1.9248+00	5.0849+00	3.1074	1.0383+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	4.6765-002	1.7513+00	5.1999+00	3.0116	8.3285-001	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	9.1081-002	1.6186+00	5.8992+00	2.9556	7.4669-001	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.3562-001	1.5007+00	7.0473+00	2.9228	6.1688-001	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.7947-001	1.4809+00	8.3535+00	2.9026	4.5814-001	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.0902-001	1.5161+00	1.0242+01	2.8896	3.5932-001	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	9.2442-002	5.7762-001	2.1895-001	1.5155+00	1.1799+01	2.8820	2.8799-001	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	1.9303-001	9.1180-001	2.9278-001	1.4768+00	1.2603+01	2.8772	2.4521-001	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	3.0523-001	1.0888+000	3.6949-001	1.6118+00	1.3325+01	2.8745	2.2844-001	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	4.8933-001	1.3539+000	7.1671-001	1.8303+00	1.4257+01	2.8727	2.0480-001	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	7.4521-001	1.7199+000	9.5197-001	2.0878+00	1.5026+01	2.8716	1.3694-001	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	1.1956+000	2.3591+000	1.2610+000	2.4854+00	1.5964+01	2.8709	6.9767-003	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	1.8113+000	3.2199+000	1.6885+000	2.9979+00	1.7116+01	2.8705	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	2.4891+000	4.1339+000	2.2477+000	3.7473+00	1.8728+01	2.8703	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	3.1437+000	5.0288+000	2.8026+000	4.4722+00	2.0089+01	2.8702	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	3.9212+000	6.0834+000	3.6796+000	5.7069+00	2.2396+01	2.8701	0.0000+000	0.0000+000
19	5.8295+002	4.8721-006	7.9566-004	4.7315+000	7.1932+000	4.0484+000	7.4979+00	2.4603+01	2.8701	0.0000+000	0.0000+000
20	2.7536+002	2.1808-004	2.2887-001	5.9275+000	8.8668+000	7.1828+000	1.1673+01	3.2240+01	2.8701	0.0000+000	0.0000+000
21	7.8893+001	8.1002+000	1.3316+001	0.0000+000	0.0000+000	8.3930+000	1.5844+01	3.5603+01	2.8700	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	8.3930+000	1.5844+01	3.5603+01	2.8700	0.0000+000	0.0000+000

GROUP	E LOWER	N-P	N-ALPHA	ANISEL(J,J)
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	0.0000+000
19	5.8295+002	0.0000+000	0.0000+000	0.0000+000
20	2.7536+002	0.0000+000	0.0000+000	0.0000+000
21	7.8893+001	0.0000+000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	3.5603+001

INELASTIC SCATTERING-SIGMA(K TO KF), K, KF

5.3854-003	1	1	6.3769-002	1	2	2.2635-001	1	3	3.5514-001	1	4	3.2457-001	1	5	2.0975-001	1	6
1.0906-001	1	7	4.9567-002	1	8	2.0741-002	1	9	8.2522-003	1	10	3.1838-003	1	11	1.2056-003	1	12
4.5136-004	1	13	9.2970-005	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
1.7496-002	2	2	1.2123-001	2	3	2.7330-001	2	4	3.1301-001	2	5	2.3255-001	2	6	1.3172-001	2	7
6.3078-002	2	8	2.7249-002	2	9	1.1053-002	2	10	4.3150-003	2	11	1.6456-003	2	12	6.1878-004	2	13
2.3068-004	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
3.5361-002	3	3	2.3696-001	3	4	4.0697-001	3	5	2.3567-001	3	6	5.6519-002	3	7	4.0479-002	3	8
1.6369-002	3	9	6.3349-003	3	10	2.4061-003	3	11	9.0288-004	3	12	2.6703-004	3	13	5.7126-005	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
3.3531-001	4	4	2.5090-001	4	5	7.5077-002	4	6	9.8173-002	4	7	4.5932-002	4	8	1.7331-002	4	9
6.4903-003	4	10	2.4142-003	4	11	8.9423-004	4	12	3.3034-004	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
3.7690-001	5	5	2.7309-001	5	6	9.0773-002	5	7	5.8072-003	5	8	1.1090-004	5	9	0.0000+000	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
4.4233-001	6	6	1.1295-001	6	7	3.0529-002	6	8	1.8077-002	6	9	8.3807-003	6	10	3.3753-003	6	11
1.1653-003	6	12	7.8163-005	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
3.5457-001	7	7	9.9789-002	7	8	2.2070-003	7	9	6.0191-004	7	10	2.7492-004	7	11	1.4706-004	7	12
4.0188-004	7	13	1.4906-004	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
2.5555-001	8	8	8.5882-002	8	9	1.6822-002	8	10	1.0080-003	8	11	5.4884-005	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
2.0754-001	9	9	6.1257-002	9	10	1.2126-002	9	11	5.1388-003	9	12	1.6939-003	9	13	2.5499-004	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
1.5895-001	10	10	8.4843-002	10	11	0.0000+000	10	12	3.3875-004	10	13	9.0983-004	10	14	1.6990-004	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
1.3420-001	11	11	9.4238-002	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
4.0982-002	12	12	1.2668-001	12	13	3.7138-002	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

0.0000+000 12 18 0.0000+000 12 19 0.0000+000 12 20 0.0000+000 12 21 0.0000+000 12 22

0.0000+000 13 13 8.0605-002 13 14 3.5310-002 13 15 9.6182-003 13 16 1.0330-002 13 17 1.0710-003 13 18
0.0000+000 13 19 0.0000+000 13 20 0.0000+000 13 21 0.0000+000 13 22

0.0000+000 14 14 0.0000+000 14 15 0.0000+000 14 16 0.0000+000 14 17 1.8532-003 14 18 3.2991-003 14 19
1.4916-003 14 20 3.3282-004 14 21 0.0000+000 14 22

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ELASTIC SCATTERING-SIGMA(K TO KF), K, KF

9.7128-001	1	1	1.6196-002	1	2	0.0000+000	1	3	0.0000+000	1	4	0.0000+000	1	5	0.0000+000	1	6
0.0000+000	1	7	0.0000+000	1	8	0.0000+000	1	9	0.0000+000	1	10	0.0000+000	1	11	0.0000+000	1	12
0.0000+000	1	13	0.0000+000	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
1.4299+000	2	2	2.6120-002	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
2.0819+000	3	3	3.5845-002	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
2.5227+000	4	4	4.6275-002	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
3.3771+000	5	5	6.5704-002	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
4.7133+000	6	6	8.0705-002	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
6.1400+000	7	7	9.5040-002	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
8.0340+000	8	8	1.2377-001	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
9.6347+000	9	9	1.4195-001	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
1.0424+001	10	10	1.6450-001	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
1.0996+001	11	11	1.1860-001	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
1.1366+001	12	12	1.3896-001	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

0,0000+000 12 18 0,0000+000 12 19 0.0000+000 12 20 0,0000+000 12 21 0.0000+000 12 22

1,1707+001 13 13 1,4228+001 13 14 0.0000+000 13 15 0,0000+000 13 16 0,0000+000 13 17 0,0000+000 13 18
0,0000+000 13 19 0,0000+000 13 20 0.0000+000 13 21 0,0000+000 13 22

1,2126+001 14 14 8,4105+002 14 15 0.0000+000 14 16 0,0000+000 14 17 0,0000+000 14 18 0,0000+000 14 19
0,0000+000 14 20 0,0000+000 14 21 0.0000+000 14 22

1,2377+001 15 15 5,2516+002 15 16 0.0000+000 15 17 0,0000+000 15 18 0,0000+000 15 19 0,0000+000 15 20
0,0000+000 15 21 0,0000+000 15 22

1,2354+001 16 16 3,7831+001 16 17 0.0000+000 16 18 0,0000+000 16 19 0,0000+000 16 20 0,0000+000 16 21
0,0000+000 16 22

1,2624+001 17 17 1,8997+001 17 18 0.0000+000 17 19 0,0000+000 17 20 0,0000+000 17 21 0,0000+000 17 22

1,2623+001 18 18 3,8654+001 18 19 0.0000+000 18 20 0,0000+000 18 21 0,0000+000 18 22

1,2922+001 19 19 1,3486+001 19 20 0.0000+000 19 21 0,0000+000 19 22

1,3329+001 20 20 5,4575+002 20 21 0.0000+000 20 22

1,1358+001 21 21 7,7771+003 21 22

N-2N SCATTERING-SIGMA(K TO KF), K, KF

1.8186-004	1	1	1.4004-003	1	2	3.6722-003	1	3	4.6582-003	1	4	3.6984-003	1	5	2.1847-003	1	6
1.0739-003	1	7	4.7144-004	1	8	1.9313-004	1	9	7.5847-005	1	10	2.9033-005	1	11	1.0941-005	1	12
4.0842-006	1	13	3.1125-008	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
0.0000+000	2	2	0.0000+000	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
0.0000+000	3	3	0.0000+000	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
0.0000+000	4	4	0.0000+000	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
0.0000+000	5	5	0.0000+000	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
0.0000+000	6	6	0.0000+000	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
0.0000+000	7	7	0.0000+000	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
0.0000+000	8	8	0.0000+000	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
0.0000+000	9	9	0.0000+000	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
0.0000+000	10	10	0.0000+000	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

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AVERAGE MICROSCOPIC CROSS SECTIONS FOR MATERIAL PU24

GROUP	E LOWER	RESOLVED RES. CAP	RESOLVED RES. FIS	UNRESOLVED RES. CAP	UNRESOLVED RES. FIS	TOTAL CAPTURE	TOTAL FISSION	TRANSPORT	NU	INELASTIC	N-2N
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.3294-002	1.6151+00	4.3353+000	3.5243	1.6948+000	4.3574-002
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	3.3783-002	1.6897+00	4.7896+000	3.2390	1.5845+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	7.8896-002	1.5608+00	5.2514+000	3.1012	1.4833+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.6701-001	1.4223+00	5.2556+000	3.0097	9.5672-001	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.6455-001	7.2775-001	5.8516+000	2.9571	1.0870+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.6387-001	2.3553-001	6.9983+000	2.9242	1.1862+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.8724-001	1.1322-001	8.4056+000	2.9029	9.9844-001	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.2719-001	8.4911-002	1.0462+001	2.8896	7.0208-001	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.9221-001	8.1947-002	1.1332+001	2.8819	2.7807-001	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	4.0481-001	9.0554-002	1.2513+001	2.8771	1.5518-002	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	4.9152-001	9.9586-002	5.1765-001	1.0545-001	1.3617+001	2.8745	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	6.8296-001	1.0582-001	6.8296-001	1.0582-001	1.4395+001	2.8727	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	8.5903-001	1.0457-001	8.5903-001	1.0457-001	1.5159+001	2.8716	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	1.1270+000	9.6213-002	1.1270+000	9.6213-002	1.6415+001	2.8709	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	1.5049+000	8.3514-002	1.5049+000	8.3514-002	1.8081+001	2.8705	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	1.9592+000	7.3793-002	1.9592+000	7.3793-002	2.0014+001	2.8703	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	2.4462+000	6.7864-002	2.4462+000	6.7864-002	2.1609+001	2.8702	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	3.0533+000	6.2837-002	3.0533+000	6.2837-002	2.3526+001	2.8701	0.0000+000	0.0000+000
19	5.8295+002	7.5062-001	0.0000+000	2.8426+000	4.7737-002	3.5932+000	5.9864-002	2.1628+001	2.8701	0.0000+000	0.0000+000
20	2.7536+002	5.0394+000	0.0000+000	0.0000+000	0.0000+000	5.0394+000	5.7285-002	1.6191+001	2.8701	0.0000+000	0.0000+000
21	7.8893+001	7.9174+000	1.4475-007	0.0000+000	0.0000+000	7.9174+000	5.3034-002	1.9359+001	2.8700	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	7.9174+000	5.3034-002	1.9359+001	2.8700	0.0000+000	0.0000+000

GROUP	E LOWER	N-P	N-ALPHA	ANISEL(J,J)
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	0.0000+000
19	5.8295+002	0.0000+000	0.0000+000	0.0000+000
20	2.7536+002	0.0000+000	0.0000+000	0.0000+000
21	7.8893+001	0.0000+000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	1.9359+001

INELASTIC SCATTERING-SIGMA(K TO KF), K, KF

5.6292-003	1	1	7.1746-002	1	2	2.6747-001	1	3	4.3365-001	1	4	4.0486-001	1	5	2.6519-001	1	6
1.3905-001	1	7	6.3524-002	1	8	2.6666-002	1	9	1.0630-002	1	10	4.1060-003	1	11	1.5559-003	1	12
5.8276-004	1	13	1.2148-004	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
1.7869-002	2	2	1.3780-001	2	3	3.4143-001	2	4	4.1731-001	2	5	3.2356-001	2	6	1.8832-001	2	7
9.1724-002	2	8	4.0041-002	2	9	1.6347-002	2	10	6.4064-003	2	11	2.4491-003	2	12	9.2223-004	2	13
3.4411-004	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
4.1372-002	3	3	2.5424-001	3	4	5.3396-001	3	5	3.6279-001	3	6	1.3218-001	3	7	8.5686-002	3	8
4.2111-002	3	9	1.6238-002	3	10	7.7006-003	3	11	3.1478-003	3	12	1.1619-003	3	13	5.4572-004	3	14
1.0157-004	3	15	2.3459-005	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
3.8907-001	4	4	2.3848-001	4	5	1.5912-001	4	6	1.2148-001	4	7	3.0056-002	4	8	1.0379-002	4	9
4.6675-003	4	10	2.2586-003	4	11	8.3089-004	4	12	3.0567-004	4	13	6.9994-005	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
6.8828-001	5	5	3.3849-001	5	6	3.4747-002	5	7	1.7476-002	5	8	5.9196-003	5	9	1.2105-003	5	10
6.0503-004	5	11	2.3642-004	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
7.9035-001	6	6	3.5943-001	6	7	2.9540-002	6	8	4.7675-003	6	9	1.7453-003	6	10	3.8517-004	6	11
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
5.7638-001	7	7	3.8314-001	7	8	2.8034-002	7	9	1.0879-002	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
2.9624-001	8	8	3.9703-001	8	9	1.2882-004	8	10	5.6798-003	8	11	2.0132-003	8	12	6.9436-004	8	13
2.8840-004	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
7.1973-003	9	9	2.0805-001	9	10	6.2029-002	9	11	7.9236-004	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
0.0000+000	10	10	0.0000+000	10	11	1.2849-002	10	12	2.1269-003	10	13	5.4259-004	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

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ELASTIC SCATTERING=SIGMA(K TO KF), K, KF

9.5213-001	1 1	1.6439-002	1 2	0.0000+000	1 3	0.0000+000	1 4	0.0000+000	1 5	0.0000+000	1 6
0.0000+000	1 7	0.0000+000	1 8	0.0000+000	1 9	0.0000+000	1 10	0.0000+000	1 11	0.0000+000	1 12
0.0000+000	1 13	0.0000+000	1 14	0.0000+000	1 15	0.0000+000	1 16	0.0000+000	1 17	0.0000+000	1 18
0.0000+000	1 19	0.0000+000	1 20	0.0000+000	1 21	0.0000+000	1 22				
1.4553+000	2 2	2.6323-002	2 3	0.0000+000	2 4	0.0000+000	2 5	0.0000+000	2 6	0.0000+000	2 7
0.0000+000	2 8	0.0000+000	2 9	0.0000+000	2 10	0.0000+000	2 11	0.0000+000	2 12	0.0000+000	2 13
0.0000+000	2 14	0.0000+000	2 15	0.0000+000	2 16	0.0000+000	2 17	0.0000+000	2 18	0.0000+000	2 19
0.0000+000	2 20	0.0000+000	2 21	0.0000+000	2 22						
2.0925+000	3 3	3.5999-002	3 4	0.0000+000	3 5	0.0000+000	3 6	0.0000+000	3 7	0.0000+000	3 8
0.0000+000	3 9	0.0000+000	3 10	0.0000+000	3 11	0.0000+000	3 12	0.0000+000	3 13	0.0000+000	3 14
0.0000+000	3 15	0.0000+000	3 16	0.0000+000	3 17	0.0000+000	3 18	0.0000+000	3 19	0.0000+000	3 20
0.0000+000	3 21	0.0000+000	3 22								
2.6601+000	4 4	4.5711-002	4 5	0.0000+000	4 6	0.0000+000	4 7	0.0000+000	4 8	0.0000+000	4 9
0.0000+000	4 10	0.0000+000	4 11	0.0000+000	4 12	0.0000+000	4 13	0.0000+000	4 14	0.0000+000	4 15
0.0000+000	4 16	0.0000+000	4 17	0.0000+000	4 18	0.0000+000	4 19	0.0000+000	4 20	0.0000+000	4 21
0.0000+000	4 22										
3.7985+000	5 5	7.3899-002	5 6	0.0000+000	5 7	0.0000+000	5 8	0.0000+000	5 9	0.0000+000	5 10
0.0000+000	5 11	0.0000+000	5 12	0.0000+000	5 13	0.0000+000	5 14	0.0000+000	5 15	0.0000+000	5 16
0.0000+000	5 17	0.0000+000	5 18	0.0000+000	5 19	0.0000+000	5 20	0.0000+000	5 21	0.0000+000	5 22
5.3268+000	6 6	9.0869-002	6 7	0.0000+000	6 8	0.0000+000	6 9	0.0000+000	6 10	0.0000+000	6 11
0.0000+000	6 12	0.0000+000	6 13	0.0000+000	6 14	0.0000+000	6 15	0.0000+000	6 16	0.0000+000	6 17
0.0000+000	6 18	0.0000+000	6 19	0.0000+000	6 20	0.0000+000	6 21	0.0000+000	6 22		
6.9987+000	7 7	1.0799-001	7 8	0.0000+000	7 9	0.0000+000	7 10	0.0000+000	7 11	0.0000+000	7 12
0.0000+000	7 13	0.0000+000	7 14	0.0000+000	7 15	0.0000+000	7 16	0.0000+000	7 17	0.0000+000	7 18
0.0000+000	7 19	0.0000+000	7 20	0.0000+000	7 21	0.0000+000	7 22				
9.3048+000	8 8	1.4288-001	8 9	0.0000+000	8 10	0.0000+000	8 11	0.0000+000	8 12	0.0000+000	8 13
0.0000+000	8 14	0.0000+000	8 15	0.0000+000	8 16	0.0000+000	8 17	0.0000+000	8 18	0.0000+000	8 19
0.0000+000	8 20	0.0000+000	8 21	0.0000+000	8 22						
1.0527+001	9 9	1.5294-001	9 10	0.0000+000	9 11	0.0000+000	9 12	0.0000+000	9 13	0.0000+000	9 14
0.0000+000	9 15	0.0000+000	9 16	0.0000+000	9 17	0.0000+000	9 18	0.0000+000	9 19	0.0000+000	9 20
0.0000+000	9 21	0.0000+000	9 22								
1.1813+001	10 10	1.8877-001	10 11	0.0000+000	10 12	0.0000+000	10 13	0.0000+000	10 14	0.0000+000	10 15
0.0000+000	10 16	0.0000+000	10 17	0.0000+000	10 18	0.0000+000	10 19	0.0000+000	10 20	0.0000+000	10 21
0.0000+000	10 22										
1.2856+001	11 11	1.3785-001	11 12	0.0000+000	11 13	0.0000+000	11 14	0.0000+000	11 15	0.0000+000	11 16
0.0000+000	11 17	0.0000+000	11 18	0.0000+000	11 19	0.0000+000	11 20	0.0000+000	11 21	0.0000+000	11 22
1.3442+001	12 12	1.6414-001	12 13	0.0000+000	12 14	0.0000+000	12 15	0.0000+000	12 16	0.0000+000	12 17

0,0000+000 12 18 0,0000+000 12 19 0,0000+000 12 20 0,0000+000 12 21 0,0000+000 12 22

1,4025+001 13 13 1,7086-001 13 14 0,0000+000 13 15 0,0000+000 13 16 0,0000+000 13 17 0,0000+000 13 18
0,0000+000 13 19 0,0000+000 13 20 0,0000+000 13 21 0,0000+000 13 22

1,5085+001 14 14 1,0703-001 14 15 0,0000+000 14 16 0,0000+000 14 17 0,0000+000 14 18 0,0000+000 14 19
0,0000+000 14 20 0,0000+000 14 21 0,0000+000 14 22

1,6421+001 15 15 7,1383-002 15 16 0,0000+000 15 17 0,0000+000 15 18 0,0000+000 15 19 0,0000+000 15 20
0,0000+000 15 21 0,0000+000 15 22

1,7448+001 16 16 5,3289-001 16 17 0,0000+000 16 18 0,0000+000 16 19 0,0000+000 16 20 0,0000+000 16 21
0,0000+000 16 22

1,8808+001 17 17 2,6649-001 17 18 0,0000+000 17 19 0,0000+000 17 20 0,0000+000 17 21 0,0000+000 17 22

1,9806+001 18 18 6,0395-001 18 19 0,0000+000 18 20 0,0000+000 18 21 0,0000+000 18 22

1,7742+001 19 19 2,3314-001 19 20 0,0000+000 19 21 0,0000+000 19 22

1,0988+001 20 20 1,0638-001 20 21 0,0000+000 20 22

1,1376+001 21 21 1,2356-002 21 22

N-2N SCATTERING-SIGMA(K TO KF), K, KF

2.4414-005	1	1	5.6562-004	1	2	3.1281-003	1	3	6.4444-003	1	4	8.1391-003	1	5	8.5025-003	1	6
7.2404-003	1	7	4.6151-003	1	8	2.6077-003	1	9	1.2239-003	1	10	5.2356-004	1	11	2.1128-004	1	12
8.2245-005	1	13	3.7637-005	1	14	6.2288-006	1	15	1.4397-006	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
0.0000+000	2	2	0.0000+000	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
0.0000+000	3	3	0.0000+000	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
0.0000+000	4	4	0.0000+000	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
0.0000+000	5	5	0.0000+000	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
0.0000+000	6	6	0.0000+000	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
0.0000+000	7	7	0.0000+000	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
0.0000+000	8	8	0.0000+000	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
0.0000+000	9	9	0.0000+000	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
0.0000+000	10	10	0.0000+000	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

0.0000+000 12 18 0.0000+000 12 19 0.0000+000 12 20 0.0000+000 12 21 0.0000+000 12 22

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0.0000+000 20 20 0.0000+000 20 21 0.0000+000 20 22

0.0000+000 21 21 0.0000+000 21 22

AVERAGE MICROSCOPIC CROSS SECTIONS FOR MATERIAL NA 23

GROUP	E LOWER	RESOLVED RES. CAP	RESOLVED RES. FIS	UNRESOLVED RES. CAP	UNRESOLVED RES. FIS	TOTAL CAPTURE	TOTAL FISSION	TRANSPORT	NU	INELASTIC	N-2N
1	3.6788+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.6292-004	0.0000+00	1.4194+000	0.0000	8.4914-001	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.7526-004	0.0000+00	1.6404+000	0.0000	6.5629-001	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000	0.0000+000	1.9928-004	0.0000+00	1.9135+000	0.0000	5.2080-001	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.2994-004	0.0000+00	2.5563+000	0.0000	4.5825-001	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	3.2441-004	0.0000+00	3.6500+000	0.0000	1.9648-001	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	3.6777-004	0.0000+00	3.0892+000	0.0000	4.1537-003	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	7.3043-004	0.0000+00	3.4076+000	0.0000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000	0.0000+000	7.4850-004	0.0000+00	3.3138+000	0.0000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000	0.0000+000	2.8396-004	0.0000+00	3.5956+000	0.0000	0.0000+000	0.0000+000
10	4.0868+004	5.2529-004	0.0000+000	0.0000+000	0.0000+000	8.5713-004	0.0000+00	4.6507+000	0.0000	0.0000+000	0.0000+000
11	2.4788+004	1.3520-003	0.0000+000	0.0000+000	0.0000+000	1.7803-003	0.0000+00	4.1316+000	0.0000	0.0000+000	0.0000+000
12	1.5034+004	1.7806-005	0.0000+000	0.0000+000	0.0000+000	6.9363-004	0.0000+00	4.4412+000	0.0000	0.0000+000	0.0000+000
13	9.1188+003	7.9643-005	0.0000+000	0.0000+000	0.0000+000	1.2623-003	0.0000+00	4.9957+000	0.0000	0.0000+000	0.0000+000
14	4.3074+003	7.8033-004	0.0000+000	0.0000+000	0.0000+000	2.5763-003	0.0000+00	7.9105+000	0.0000	0.0000+000	0.0000+000
15	2.6126+003	3.1120-002	0.0000+000	0.0000+000	0.0000+000	3.1120-002	0.0000+00	3.2703+001	0.0000	0.0000+000	0.0000+000
16	2.0347+003	4.3559-002	0.0000+000	0.0000+000	0.0000+000	4.3559-002	0.0000+00	3.4154+001	0.0000	0.0000+000	0.0000+000
17	1.2341+003	1.2156-002	0.0000+000	0.0000+000	0.0000+000	1.2156-002	0.0000+00	7.5744+000	0.0000	0.0000+000	0.0000+000
18	9.6112+002	6.6813-003	0.0000+000	0.0000+000	0.0000+000	6.6813-003	0.0000+00	3.8805+000	0.0000	0.0000+000	0.0000+000
19	5.8295+002	5.7522-003	0.0000+000	0.0000+000	0.0000+000	5.7522-003	0.0000+00	3.2559+000	0.0000	0.0000+000	0.0000+000
20	2.7536+002	5.6647-003	0.0000+000	0.0000+000	0.0000+000	5.6647-003	0.0000+00	2.9079+000	0.0000	0.0000+000	0.0000+000
21	7.8893+001	6.7719-003	0.0000+000	0.0000+000	0.0000+000	6.7719-003	0.0000+00	2.8759+000	0.0000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	0.0000+000	0.0000+000	6.7719-003	0.0000+00	2.8759+000	0.0000	0.0000+000	0.0000+000

GROUP	E LOWER	N-P	N-ALPHA	ANISEL(J,J)
1	3.6788+006	1.1673-002	4.7676-003	0.0000+000
2	2.2313+006	0.0000+000	0.0000+000	0.0000+000
3	1.3534+006	0.0000+000	0.0000+000	0.0000+000
4	8.2085+005	0.0000+000	0.0000+000	0.0000+000
5	4.9787+005	0.0000+000	0.0000+000	0.0000+000
6	3.0197+005	0.0000+000	0.0000+000	0.0000+000
7	1.8316+005	0.0000+000	0.0000+000	0.0000+000
8	1.1109+005	0.0000+000	0.0000+000	0.0000+000
9	6.7379+004	0.0000+000	0.0000+000	0.0000+000
10	4.0868+004	0.0000+000	0.0000+000	0.0000+000
11	2.4788+004	0.0000+000	0.0000+000	0.0000+000
12	1.5034+004	0.0000+000	0.0000+000	0.0000+000
13	9.1188+003	0.0000+000	0.0000+000	0.0000+000
14	4.3074+003	0.0000+000	0.0000+000	0.0000+000
15	2.6126+003	0.0000+000	0.0000+000	0.0000+000
16	2.0347+003	0.0000+000	0.0000+000	0.0000+000
17	1.2341+003	0.0000+000	0.0000+000	0.0000+000
18	9.6112+002	0.0000+000	0.0000+000	0.0000+000
19	5.8295+002	0.0000+000	0.0000+000	0.0000+000
20	2.7536+002	0.0000+000	0.0000+000	0.0000+000
21	7.8893+001	0.0000+000	0.0000+000	0.0000+000
22	0.0000+000	0.0000+000	0.0000+000	2.8759+000

INELASTIC SCATTERING-SIGMA(K TO KF), K, KF

1.6153-001	1	1	2.1584-001	1	2	2.6197-001	1	3	1.2769+001	1	4	4.8787-002	1	5	2.0029+002	1	6
8.4300-003	1	7	3.0351-003	1	8	1.1774-003	1	9	4.4737+004	1	10	1.6785-004	1	11	3.5894+005	1	12
4.1007-006	1	13	0.0000+000	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
2.5598-001	2	2	2.3286-001	2	3	4.7014-002	2	4	6.3529+002	2	5	3.5856-002	2	6	1.7253+002	2	7
3.8025-003	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
2.8328-001	3	3	2.3587-001	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	1.4262+003	3	8
2.2345-004	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
6.3400-002	4	4	2.6280-001	4	5	1.0205-001	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
0.0000+000	5	5	6.3991-002	5	6	8.3248-002	5	7	3.8731+002	5	8	9.1862-003	5	9	1.3258+003	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
0.0000+000	6	6	0.0000+000	6	7	0.0000+000	6	8	0.0000+000	6	9	2.3164-003	6	10	1.4966+003	6	11
3.4069-004	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
0.0000+000	7	7	0.0000+000	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
0.0000+000	8	8	0.0000+000	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
0.0000+000	9	9	0.0000+000	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
0.0000+000	10	10	0.0000+000	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
0.0000+000	11	11	0.0000+000	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
0.0000+000	12	12	0.0000+000	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

0,0000+000 12 18 0,0000+000 12 19 0,0000+000 12 20 0,0000+000 12 21 0,0000+000 12 22

0,0000+000 13 13 0,0000+000 13 14 0,0000+000 13 15 0,0000+000 13 16 0,0000+000 13 17 0,0000+000 13 18
0,0000+000 13 19 0,0000+000 13 20 0,0000+000 13 21 0,0000+000 13 22

0,0000+000 14 14 0,0000+000 14 15 0,0000+000 14 16 0,0000+000 14 17 0,0000+000 14 18 0,0000+000 14 19
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0,0000+000 20 20 0,0000+000 20 21 0,0000+000 20 22

0,0000+000 21 21 0,0000+000 21 22

ELASTIC SCATTERING-SIGMA(K TO KF), K, KF

4.3377-001	1	1	1.1021-001	1	2	0.0000+000	1	3	0.0000+000	1	4	0.0000+000	1	5	0.0000+000	1	6
0.0000+000	1	7	0.0000+000	1	8	0.0000+000	1	9	0.0000+000	1	10	0.0000+000	1	11	0.0000+000	1	12
0.0000+000	1	13	0.0000+000	1	14	0.0000+000	1	15	0.0000+000	1	16	0.0000+000	1	17	0.0000+000	1	18
0.0000+000	1	19	0.0000+000	1	20	0.0000+000	1	21	0.0000+000	1	22						
7.8771-001	2	2	1.9621-001	2	3	0.0000+000	2	4	0.0000+000	2	5	0.0000+000	2	6	0.0000+000	2	7
0.0000+000	2	8	0.0000+000	2	9	0.0000+000	2	10	0.0000+000	2	11	0.0000+000	2	12	0.0000+000	2	13
0.0000+000	2	14	0.0000+000	2	15	0.0000+000	2	16	0.0000+000	2	17	0.0000+000	2	18	0.0000+000	2	19
0.0000+000	2	20	0.0000+000	2	21	0.0000+000	2	22									
1.1367+000	3	3	2.5578-001	3	4	0.0000+000	3	5	0.0000+000	3	6	0.0000+000	3	7	0.0000+000	3	8
0.0000+000	3	9	0.0000+000	3	10	0.0000+000	3	11	0.0000+000	3	12	0.0000+000	3	13	0.0000+000	3	14
0.0000+000	3	15	0.0000+000	3	16	0.0000+000	3	17	0.0000+000	3	18	0.0000+000	3	19	0.0000+000	3	20
0.0000+000	3	21	0.0000+000	3	22												
1.6793+000	4	4	4.1853-001	4	5	0.0000+000	4	6	0.0000+000	4	7	0.0000+000	4	8	0.0000+000	4	9
0.0000+000	4	10	0.0000+000	4	11	0.0000+000	4	12	0.0000+000	4	13	0.0000+000	4	14	0.0000+000	4	15
0.0000+000	4	16	0.0000+000	4	17	0.0000+000	4	18	0.0000+000	4	19	0.0000+000	4	20	0.0000+000	4	21
0.0000+000	4	22															
2.8272+000	5	5	6.2604-001	5	6	0.0000+000	5	7	0.0000+000	5	8	0.0000+000	5	9	0.0000+000	5	10
0.0000+000	5	11	0.0000+000	5	12	0.0000+000	5	13	0.0000+000	5	14	0.0000+000	5	15	0.0000+000	5	16
0.0000+000	5	17	0.0000+000	5	18	0.0000+000	5	19	0.0000+000	5	20	0.0000+000	5	21	0.0000+000	5	22
2.5607+000	6	6	5.2398-001	6	7	0.0000+000	6	8	0.0000+000	6	9	0.0000+000	6	10	0.0000+000	6	11
0.0000+000	6	12	0.0000+000	6	13	0.0000+000	6	14	0.0000+000	6	15	0.0000+000	6	16	0.0000+000	6	17
0.0000+000	6	18	0.0000+000	6	19	0.0000+000	6	20	0.0000+000	6	21	0.0000+000	6	22			
2.8221+000	7	7	5.6474-001	7	8	0.0000+000	7	9	0.0000+000	7	10	0.0000+000	7	11	0.0000+000	7	12
0.0000+000	7	13	0.0000+000	7	14	0.0000+000	7	15	0.0000+000	7	16	0.0000+000	7	17	0.0000+000	7	18
0.0000+000	7	19	0.0000+000	7	20	0.0000+000	7	21	0.0000+000	7	22						
2.7989+000	8	8	5.1417-001	8	9	0.0000+000	8	10	0.0000+000	8	11	0.0000+000	8	12	0.0000+000	8	13
0.0000+000	8	14	0.0000+000	8	15	0.0000+000	8	16	0.0000+000	8	17	0.0000+000	8	18	0.0000+000	8	19
0.0000+000	8	20	0.0000+000	8	21	0.0000+000	8	22									
3.0632+000	9	9	5.3212-001	9	10	0.0000+000	9	11	0.0000+000	9	12	0.0000+000	9	13	0.0000+000	9	14
0.0000+000	9	15	0.0000+000	9	16	0.0000+000	9	17	0.0000+000	9	18	0.0000+000	9	19	0.0000+000	9	20
0.0000+000	9	21	0.0000+000	9	22												
3.9010+000	10	10	7.4891-001	10	11	0.0000+000	10	12	0.0000+000	10	13	0.0000+000	10	14	0.0000+000	10	15
0.0000+000	10	16	0.0000+000	10	17	0.0000+000	10	18	0.0000+000	10	19	0.0000+000	10	20	0.0000+000	10	21
0.0000+000	10	22															
3.6654+000	11	11	4.6435-001	11	12	0.0000+000	11	13	0.0000+000	11	14	0.0000+000	11	15	0.0000+000	11	16
0.0000+000	11	17	0.0000+000	11	18	0.0000+000	11	19	0.0000+000	11	20	0.0000+000	11	21	0.0000+000	11	22
3.8737+000	12	12	5.6679-001	12	13	0.0000+000	12	14	0.0000+000	12	15	0.0000+000	12	16	0.0000+000	12	17

0.0000+000 12 18 0.0000+000 12 19 0.0000+000 12 20 0.0000+000 12 21 0.0000+000 12 22

4.3409+000 13 13 6.5353-001 13 14 0.0000+000 13 15 0.0000+000 13 16 0.0000+000 13 17 0.0000+000 13 18
0.0000+000 13 19 0.0000+000 13 20 0.0000+000 13 21 0.0000+000 13 22

7.0652+000 14 14 8.4271-001 14 15 0.0000+000 14 16 0.0000+000 14 17 0.0000+000 14 18 0.0000+000 14 19
0.0000+000 14 20 0.0000+000 14 21 0.0000+000 14 22

2.3437+001 15 15 9.2342-000 15 16 0.0000+000 15 17 0.0000+000 15 18 0.0000+000 15 19 0.0000+000 15 20
0.0000+000 15 21 0.0000+000 15 22

1.8536+001 16 16 1.5574+001 16 17 0.0000+000 16 18 0.0000+000 16 19 0.0000+000 16 20 0.0000+000 16 21
0.0000+000 16 22

6.7602+000 17 17 8.0200-001 17 18 0.0000+000 17 19 0.0000+000 17 20 0.0000+000 17 21 0.0000+000 17 22

2.6719+000 18 18 1.2020+000 18 19 0.0000+000 18 20 0.0000+000 18 21 0.0000+000 18 22

2.9206+000 19 19 3.2956-001 19 20 0.0000+000 19 21 0.0000+000 19 22

2.7911+000 20 20 1.1114-001 20 21 0.0000+000 20 22

2.8479+000 21 21 2.1216-002 21 22

N=2N SCATTERING-SIGMA(K TO KF), K, KF

0.0000+000	1 1	0.0000+000	1 2	0.0000+000	1 3	0.0000+000	1 4	0.0000+000	1 5	0.0000+000	1 6
0.0000+000	1 7	0.0000+000	1 8	0.0000+000	1 9	0.0000+000	1 10	0.0000+000	1 11	0.0000+000	1 12
0.0000+000	1 13	0.0000+000	1 14	0.0000+000	1 15	0.0000+000	1 16	0.0000+000	1 17	0.0000+000	1 18
0.0000+000	1 19	0.0000+000	1 20	0.0000+000	1 21	0.0000+000	1 22				
0.0000+000	2 2	0.0000+000	2 3	0.0000+000	2 4	0.0000+000	2 5	0.0000+000	2 6	0.0000+000	2 7
0.0000+000	2 8	0.0000+000	2 9	0.0000+000	2 10	0.0000+000	2 11	0.0000+000	2 12	0.0000+000	2 13
0.0000+000	2 14	0.0000+000	2 15	0.0000+000	2 16	0.0000+000	2 17	0.0000+000	2 18	0.0000+000	2 19
0.0000+000	2 20	0.0000+000	2 21	0.0000+000	2 22						
0.0000+000	3 3	0.0000+000	3 4	0.0000+000	3 5	0.0000+000	3 6	0.0000+000	3 7	0.0000+000	3 8
0.0000+000	3 9	0.0000+000	3 10	0.0000+000	3 11	0.0000+000	3 12	0.0000+000	3 13	0.0000+000	3 14
0.0000+000	3 15	0.0000+000	3 16	0.0000+000	3 17	0.0000+000	3 18	0.0000+000	3 19	0.0000+000	3 20
0.0000+000	3 21	0.0000+000	3 22								
0.0000+000	4 4	0.0000+000	4 5	0.0000+000	4 6	0.0000+000	4 7	0.0000+000	4 8	0.0000+000	4 9
0.0000+000	4 10	0.0000+000	4 11	0.0000+000	4 12	0.0000+000	4 13	0.0000+000	4 14	0.0000+000	4 15
0.0000+000	4 16	0.0000+000	4 17	0.0000+000	4 18	0.0000+000	4 19	0.0000+000	4 20	0.0000+000	4 21
0.0000+000	4 22										
0.0000+000	5 5	0.0000+000	5 6	0.0000+000	5 7	0.0000+000	5 8	0.0000+000	5 9	0.0000+000	5 10
0.0000+000	5 11	0.0000+000	5 12	0.0000+000	5 13	0.0000+000	5 14	0.0000+000	5 15	0.0000+000	5 16
0.0000+000	5 17	0.0000+000	5 18	0.0000+000	5 19	0.0000+000	5 20	0.0000+000	5 21	0.0000+000	5 22
0.0000+000	6 6	0.0000+000	6 7	0.0000+000	6 8	0.0000+000	6 9	0.0000+000	6 10	0.0000+000	6 11
0.0000+000	6 12	0.0000+000	6 13	0.0000+000	6 14	0.0000+000	6 15	0.0000+000	6 16	0.0000+000	6 17
0.0000+000	6 18	0.0000+000	6 19	0.0000+000	6 20	0.0000+000	6 21	0.0000+000	6 22		
0.0000+000	7 7	0.0000+000	7 8	0.0000+000	7 9	0.0000+000	7 10	0.0000+000	7 11	0.0000+000	7 12
0.0000+000	7 13	0.0000+000	7 14	0.0000+000	7 15	0.0000+000	7 16	0.0000+000	7 17	0.0000+000	7 18
0.0000+000	7 19	0.0000+000	7 20	0.0000+000	7 21	0.0000+000	7 22				
0.0000+000	8 8	0.0000+000	8 9	0.0000+000	8 10	0.0000+000	8 11	0.0000+000	8 12	0.0000+000	8 13
0.0000+000	8 14	0.0000+000	8 15	0.0000+000	8 16	0.0000+000	8 17	0.0000+000	8 18	0.0000+000	8 19
0.0000+000	8 20	0.0000+000	8 21	0.0000+000	8 22						
0.0000+000	9 9	0.0000+000	9 10	0.0000+000	9 11	0.0000+000	9 12	0.0000+000	9 13	0.0000+000	9 14
0.0000+000	9 15	0.0000+000	9 16	0.0000+000	9 17	0.0000+000	9 18	0.0000+000	9 19	0.0000+000	9 20
0.0000+000	9 21	0.0000+000	9 22								
0.0000+000	10 10	0.0000+000	10 11	0.0000+000	10 12	0.0000+000	10 13	0.0000+000	10 14	0.0000+000	10 15
0.0000+000	10 16	0.0000+000	10 17	0.0000+000	10 18	0.0000+000	10 19	0.0000+000	10 20	0.0000+000	10 21
0.0000+000	10 22										
0.0000+000	11 11	0.0000+000	11 12	0.0000+000	11 13	0.0000+000	11 14	0.0000+000	11 15	0.0000+000	11 16
0.0000+000	11 17	0.0000+000	11 18	0.0000+000	11 19	0.0000+000	11 20	0.0000+000	11 21	0.0000+000	11 22
0.0000+000	12 12	0.0000+000	12 13	0.0000+000	12 14	0.0000+000	12 15	0.0000+000	12 16	0.0000+000	12 17

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0.0000+000 12 18  0.0000+000 12 19  0.0000+000 12 20  0.0000+000 12 21  0.0000+000 12 22

0.0000+000 13 13  0.0000+000 13 14  0.0000+000 13 15  0.0000+000 13 16  0.0000+000 13 17  0.0000+000 13 18
0.0000+000 13 19  0.0000+000 13 20  0.0000+000 13 21  0.0000+000 13 22

0.0000+000 14 14  0.0000+000 14 15  0.0000+000 14 16  0.0000+000 14 17  0.0000+000 14 18  0.0000+000 14 19
0.0000+000 14 20  0.0000+000 14 21  0.0000+000 14 22

0.0000+000 15 15  0.0000+000 15 16  0.0000+000 15 17  0.0000+000 15 18  0.0000+000 15 19  0.0000+000 15 20
0.0000+000 15 21  0.0000+000 15 22

0.0000+000 16 16  0.0000+000 16 17  0.0000+000 16 18  0.0000+000 16 19  0.0000+000 16 20  0.0000+000 16 21
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0.0000+000 17 17  0.0000+000 17 18  0.0000+000 17 19  0.0000+000 17 20  0.0000+000 17 21  0.0000+000 17 22

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0.0000+000 19 19  0.0000+000 19 20  0.0000+000 19 21  0.0000+000 19 22

0.0000+000 20 20  0.0000+000 20 21  0.0000+000 20 22

0.0000+000 21 21  0.0000+000 21 22

 TIME SPENT IN PROGRAM AREA NO.20  WAS   8.338+001SECONDS
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AVERAGE MACROSCOPIC CROSS SECTIONS

J	E(J)	SIGTR	SIGFIS	SIGCAP	NUSIGFIS	SIGINEL	SIGN2N
1	36,78794+005	92,16738-003	99,04763-004	43,07089-005	32,84455-003	53,36111-003	14,26927-004
2	22,31302+005	10,32860-002	90,91804-004	35,00869-005	26,87965-003	49,35701-003	00,00000+000
3	13,53353+005	11,26983-002	74,53103-004	85,46017-005	21,04516-003	47,95086-003	00,00000+000
4	82,08500+004	11,53208-002	29,41366-004	17,32578-004	87,27516-004	36,01857-003	00,00000+000
5	49,78787+004	14,27911-002	22,47332-004	17,35852-004	66,35822-004	23,82252-003	00,00000+000
6	30,19738+004	15,98495-002	18,93084-004	17,45853-004	55,33287-004	16,97037-003	00,00000+000
7	18,31564+004	17,50506-002	18,22360-004	19,85658-004	52,89513-004	13,40758-003	00,00000+000
8	11,10900+004	20,29679-002	18,53274-004	23,64749-004	53,58204-004	99,90240-004	00,00000+000
9	67,37947+003	22,86356-002	18,51363-004	29,77465-004	53,35577-004	49,87199-004	00,00000+000
10	40,86771+003	29,77839-002	18,08350-004	42,10631-004	52,02911-004	11,88582-004	00,00000+000
11	24,78752+003	40,98534-002	19,76387-004	56,67732-004	56,81138-004	27,41243-005	00,00000+000
12	15,03439+003	38,03672-002	22,38702-004	74,26801-004	64,31122-004	24,57583-005	00,00000+000
13	91,18820+002	43,42254-002	25,47217-004	90,97436-004	73,14685-004	16,43223-005	00,00000+000
14	43,07425+002	52,65050-002	30,20984-004	11,57055-003	86,72949-004	83,72095-007	00,00000+000
15	26,12586+002	69,83139-002	36,30929-004	11,07004-003	10,42258-003	00,00000+000	00,00000+000
16	20,34684+002	63,37874-002	45,26268-004	12,94524-003	12,99181-003	00,00000+000	00,00000+000
17	12,34098+002	26,17465-002	53,93742-004	11,92744-003	15,48120-003	00,00000+000	00,00000+000
18	96,11165+001	30,33165-002	68,73469-004	17,99865-003	19,72788-003	00,00000+000	00,00000+000
19	58,29466+001	29,76170-002	90,21425-004	17,07148-003	25,89245-003	00,00000+000	00,00000+000
20	27,53645+001	31,21129-002	14,03065-003	21,38143-003	40,26884-003	00,00000+000	00,00000+000
21	78,89325+000	30,79935-002	19,03409-003	25,45403-003	54,62837-003	00,00000+000	00,00000+000
22	00,00000+000	30,79935-002	19,03409-003	25,45403-003	54,62837-003	00,00000+000	00,00000+000

INELASTIC PLUS TWO TIMES N,2N SIGMA(K TO KP)

2,6685082-003	1	1	7,0170648-003	1	2	1,1406317-002	1	3	1,2479395-002	1	4	9,8977533-003	1 5
6,2357189-003	1	6	3,4079144-003	1	7	1,7073227-003	1	8	8,624727-004	1	9	3,5452936-004	1 10
1,4655540+004	1	11	5,7609123-005	1	12	2,1432595-005	1	13	7,3246819-006	1	14	9,2467768-007	1 15
2,1446847+007	1	16	1,3010313-007	1	17	0,0000000+000	1	18	0,0000000+000	1	19	0,0000000+000	1 20
0,0000000+000	1	21	0,0000000+000	1	22								
4,9700367-003	2	2	1,1847804-002	2	3	7,6657668-003	2	4	9,7280676-003	2	5	7,3568005-003	2 6
4,3030119-003	2	7	2,0336549-003	2	8	8,6520901-004	2	9	3,6159590-004	2	10	1,4297915-004	2 11
5,4769990-005	2	12	2,0556911-005	2	13	6,7553817-006	2	14	0,0000000+000	2	15	0,0000000+000	2 16
0,0000000+000	2	17	0,0000000+000	2	18	0,0000000+000	2	19	0,0000000+000	2	20	0,0000000+000	2 21
0,0000000+000	2	22											
4,6830060-003	3	3	1,3077700-002	3	4	1,4447196-002	3	5	9,4121246-003	3	6	3,9140526-003	3 7
1,4656024-003	3	8	5,7439515-004	3	9	2,3126030-004	3	10	9,3190193-005	3	11	3,4046167-005	3 12
1,1654795-005	3	13	5,4046809-006	3	14	9,9471257-007	3	15	2,2985781-007	3	16	0,0000000+000	3 17
0,0000000+000	3	18	0,0000000+000	3	19	0,0000000+000	3	20	0,0000000+000	3	21	0,0000000+000	3 22
1,1869690+002	4	4	9,5950819-003	4	5	5,7532260-003	4	6	4,7568585-003	4	7	2,5411407-003	4 8
9,5521954+004	4	9	3,5043272-004	4	10	1,3442398-004	4	11	4,5714920-005	4	12	1,4205163-005	4 13
2,5717884+006	4	14	0,0000000+000	4	15	0,0000000+000	4	16	0,0000000+000	4	17	0,0000000+000	4 18
0,0000000+000	4	19	0,0000000+000	4	20	0,0000000+000	4	21	0,0000000+000	4	22		
1,4138249-002	5	5	6,9132253-003	5	6	1,5919704-003	5	7	6,3291302-004	5	8	3,3161991-004	5 9
1,3661083-004	5	10	4,9192874-005	5	11	1,9077794-005	5	12	7,2523312-006	5	13	2,4064824-006	5 14
0,0000000+000	5	15	0,0000000+000	5	16	0,0000000+000	5	17	0,0000000+000	5	18	0,0000000+000	5 19
0,0000000+000	5	20	0,0000000+000	5	21	0,0000000+000	5	22					

1,1322676+002	6	6	4,9206230+003	6	7	5,1912960+004	6	8	9,7219164+005	6	9	7,2230572+005	6	10	
3,4783345+005	6	11	9,7619531+006	6	12	9,4820590+007	6	13	0,0000000+000	6	14	0,0000000+000	6	15	
0,0000000+000	6	16	0,0000000+000	6	17	0,0000000+000	6	18	0,0000000+000	6	19	0,0000000+000	6	20	
0,0000000+000	6	21	0,0000000+000	6	22										
7,6823829+003	7	7	5,1596473+003	7	8	3,8439272+004	7	9	1,5641846+004	7	10	2,3897965+005	7	11	
1,7647764+007	7	12	4,8225267+007	7	13	1,7887694+007	7	14	0,0000000+000	7	15	0,0000000+000	7	16	
0,0000000+000	7	17	0,0000000+000	7	18	0,0000000+000	7	19	0,0000000+000	7	20	0,0000000+000	7	21	
0,0000000+000	7	22													
3,9730640+003	8	8	5,7911874+003	8	9	1,2745772+004	8	10	5,1932532+005	8	11	3,0719486+005	8	12	
1,0960146+005	8	13	4,9189903+006	8	14	0,0000000+000	8	15	0,0000000+000	8	16	0,0000000+000	8	17	
0,0000000+000	8	18	0,0000000+000	8	19	0,0000000+000	8	20	0,0000000+000	8	21	0,0000000+000	8	22	
2,5192407+004	9	9	3,2217792+003	9	10	1,3777999+003	9	11	1,3335704+004	9	12	2,0326651+006	9	13	
3,0598332+007	9	14	0,0000000+000	9	15	0,0000000+000	9	16	0,0000000+000	9	17	0,0000000+000	9	18	
0,0000000+000	9	19	0,0000000+000	9	20	0,0000000+000	9	21	0,0000000+000	9	22				
1,9074024+004	10	10	1,0181143+004	10	11	4,8513384+004	10	12	2,3828984+004	10	13	1,3430019+004	10	14	
2,5939939+005	10	15	5,6196817+006	10	16	5,1335332+006	10	17	1,1462799+006	10	18	5,6680709+007	10	19	
0,0000000+000	10	20	0,0000000+000	10	21	0,0000000+000	10	22							
1,6103902+004	11	11	1,1308524+004	11	12	0,0000000+000	11	13	0,0000000+000	11	14	0,0000000+000	11	15	
0,0000000+000	11	16	0,0000000+000	11	17	0,0000000+000	11	18	0,0000000+000	11	19	0,0000000+000	11	20	
0,0000000+000	11	21	0,0000000+000	11	22										
4,9178728+005	12	12	1,5201376+004	12	13	4,4565781+005	12	14	0,0000000+000	12	15	0,0000000+000	12	16	
0,0000000+000	12	17	0,0000000+000	12	18	0,0000000+000	12	19	0,0000000+000	12	20	0,0000000+000	12	21	
0,0000000+000	12	22													
0,0000000+000	13	13	9,6726523+005	13	14	4,2372474+005	13	15	1,1541781+005	13	16	1,2396311+005	13	17	
1,2852474+006	13	18	0,0000000+000	13	19	0,0000000+000	13	20	0,0000000+000	13	21	0,0000000+000	13	22	
0,0000000+000	14	14	0,0000000+000	14	15	0,0000000+000	14	16	0,0000000+000	14	17	2,2238952+006	14	18	
3,9589132+006	14	19	1,7899044+006	14	20	3,9938169+007	14	21	0,0000000+000	14	22				
0,0000000+000	15	15	0,0000000+000	15	16	0,0000000+000	15	17	0,0000000+000	15	18	0,0000000+000	15	19	
0,0000000+000	15	20	0,0000000+000	15	21	0,0000000+000	15	22							
0,0000000+000	16	16	0,0000000+000	16	17	0,0000000+000	16	18	0,0000000+000	16	19	0,0000000+000	16	20	
0,0000000+000	16	21	0,0000000+000	16	22										
0,0000000+000	17	17	0,0000000+000	17	18	0,0000000+000	17	19	0,0000000+000	17	20	0,0000000+000	17	21	
0,0000000+000	17	22													
0,0000000+000	18	18	0,0000000+000	18	19	0,0000000+000	18	20	0,0000000+000	18	21	0,0000000+000	18	22	

0,0000000+000	19	19	0,0000000+000	19	20	0,0000000+000	19	21	0,0000000+000	19	22
0,0000000+000	20	20	0,0000000+000	20	21	0,0000000+000	20	22			
0,0000000+000	21	21	0,0000000+000	21	22						
0,0000000+000	22	22									

ELASTICS SIGMA(K TO KF)

2,4761610-002	1	1	2,1629191-003	1	2	0,0000000+000	1	3	0,0000000+000	1	4
0,0000000+000	1	5	0,0000000+000	1	6	0,0000000+000	1	7	0,0000000+000	1	8
0,0000000+000	1	9	0,0000000+000	1	10	0,0000000+000	1	11	0,0000000+000	1	12
0,0000000+000	1	13	0,0000000+000	1	14	0,0000000+000	1	15	0,0000000+000	1	16
0,0000000+000	1	17	0,0000000+000	1	18	0,0000000+000	1	19	0,0000000+000	1	20
0,0000000+000	1	21	0,0000000+000	1	22						
4,0630991-002	2	2	3,8561134-003	2	3	0,0000000+000	2	4	0,0000000+000	2	5
0,0000000+000	2	6	0,0000000+000	2	7	0,0000000+000	2	8	0,0000000+000	2	9
0,0000000+000	2	10	0,0000000+000	2	11	0,0000000+000	2	12	0,0000000+000	2	13
0,0000000+000	2	14	0,0000000+000	2	15	0,0000000+000	2	16	0,0000000+000	2	17
0,0000000+000	2	18	0,0000000+000	2	19	0,0000000+000	2	20	0,0000000+000	2	21
0,0000000+000	2	22									
5,1711984-002	3	3	4,7277810-003	3	4	0,0000000+000	3	5	0,0000000+000	3	6
0,0000000+000	3	7	0,0000000+000	3	8	0,0000000+000	3	9	0,0000000+000	3	10
0,0000000+000	3	11	0,0000000+000	3	12	0,0000000+000	3	13	0,0000000+000	3	14
0,0000000+000	3	15	0,0000000+000	3	16	0,0000000+000	3	17	0,0000000+000	3	18
0,0000000+000	3	19	0,0000000+000	3	20	0,0000000+000	3	21	0,0000000+000	3	22
6,7516210-002	4	4	7,1121117-003	4	5	0,0000000+000	4	6	0,0000000+000	4	7
0,0000000+000	4	8	0,0000000+000	4	9	0,0000000+000	4	10	0,0000000+000	4	11
0,0000000+000	4	12	0,0000000+000	4	13	0,0000000+000	4	14	0,0000000+000	4	15
0,0000000+000	4	16	0,0000000+000	4	17	0,0000000+000	4	18	0,0000000+000	4	19
0,0000000+000	4	20	0,0000000+000	4	21	0,0000000+000	4	22			
1,0459057-001	5	5	1,0394878-002	5	6	0,0000000+000	5	7	0,0000000+000	5	8
0,0000000+000	5	9	0,0000000+000	5	10	0,0000000+000	5	11	0,0000000+000	5	12
0,0000000+000	5	13	0,0000000+000	5	14	0,0000000+000	5	15	0,0000000+000	5	16
0,0000000+000	5	17	0,0000000+000	5	18	0,0000000+000	5	19	0,0000000+000	5	20
0,0000000+000	5	21	0,0000000+000	5	22						
1,2964234-001	6	6	9,5978202-003	6	7	0,0000000+000	6	8	0,0000000+000	6	9
0,0000000+000	6	10	0,0000000+000	6	11	0,0000000+000	6	12	0,0000000+000	6	13
0,0000000+000	6	14	0,0000000+000	6	15	0,0000000+000	6	16	0,0000000+000	6	17
0,0000000+000	6	18	0,0000000+000	6	19	0,0000000+000	6	20	0,0000000+000	6	21
0,0000000+000	6	22									
1,4720785-001	7	7	1,0627207-002	7	8	0,0000000+000	7	9	0,0000000+000	7	10
0,0000000+000	7	11	0,0000000+000	7	12	0,0000000+000	7	13	0,0000000+000	7	14
0,0000000+000	7	15	0,0000000+000	7	16	0,0000000+000	7	17	0,0000000+000	7	18
0,0000000+000	7	19	0,0000000+000	7	20	0,0000000+000	7	21	0,0000000+000	7	22

1,7816632*001 8 8	1,0593318*002 8 9	0,0000000*000 8 10	0,0000000*000 8 11	0,0000000*000 8 12
0,0000000*000 8 13	0,0000000*000 8 14	0,0000000*000 8 15	0,0000000*000 8 16	0,0000000*000 8 17
0,0000000*000 8 18	0,0000000*000 8 19	0,0000000*000 8 20	0,0000000*000 8 21	0,0000000*000 8 22
2,0669120*001 9 9	1,2128393*002 9 10	0,0000000*000 9 11	0,0000000*000 9 12	0,0000000*000 9 13
0,0000000*000 9 14	0,0000000*000 9 15	0,0000000*000 9 16	0,0000000*000 9 17	0,0000000*000 9 18
0,0000000*000 9 19	0,0000000*000 9 20	0,0000000*000 9 21	0,0000000*000 9 22	
2,7406207*001 10 10	1,6514319*002 10 11	0,0000000*000 10 12	0,0000000*000 10 13	0,0000000*000 10 14
0,0000000*000 10 15	0,0000000*000 10 16	0,0000000*000 10 17	0,0000000*000 10 18	0,0000000*000 10 19
0,0000000*000 10 20	0,0000000*000 10 21	0,0000000*000 10 22		
3,8134825*001 11 11	2,0586892*002 11 12	0,0000000*000 11 13	0,0000000*000 11 14	0,0000000*000 11 15
0,0000000*000 11 16	0,0000000*000 11 17	0,0000000*000 11 18	0,0000000*000 11 19	0,0000000*000 11 20
0,0000000*000 11 21	0,0000000*000 11 22			
3,5827473*001 12 12	1,2181219*002 12 13	0,0000000*000 12 14	0,0000000*000 12 15	0,0000000*000 12 16
0,0000000*000 12 17	0,0000000*000 12 18	0,0000000*000 12 19	0,0000000*000 12 20	0,0000000*000 12 21
0,0000000*000 12 22				
4,0718895*001 13 13	1,5227473*002 13 14	0,0000000*000 13 15	0,0000000*000 13 16	0,0000000*000 13 17
0,0000000*000 13 18	0,0000000*000 13 19	0,0000000*000 13 20	0,0000000*000 13 21	0,0000000*000 13 22
4,9783746*001 14 14	1,4067659*002 14 15	0,0000000*000 14 16	0,0000000*000 14 17	0,0000000*000 14 18
0,0000000*000 14 19	0,0000000*000 14 20	0,0000000*000 14 21	0,0000000*000 14 22	
5,2834960*001 15 15	1,1526329*001 15 16	0,0000000*000 15 17	0,0000000*000 15 18	0,0000000*000 15 19
0,0000000*000 15 20	0,0000000*000 15 21	0,0000000*000 15 22		
4,1029426*001 16 16	2,0602163*001 16 17	0,0000000*000 16 18	0,0000000*000 16 19	0,0000000*000 16 20
0,0000000*000 16 21	0,0000000*000 16 22			
2,2632218*001 17 17	1,8103123*002 17 18	0,0000000*000 17 19	0,0000000*000 17 20	0,0000000*000 17 21
0,0000000*000 17 22				
2,4232595*001 18 18	3,4118423*002 18 19	0,0000000*000 18 20	0,0000000*000 18 21	0,0000000*000 18 22
2,6045466*001 19 19	1,1069456*002 19 20	0,0000000*000 19 21	0,0000000*000 19 22	
2,7255831*001 20 20	4,1424792*003 20 21	0,0000000*000 20 22		
2,6280918*001 21 21	6,9617363*004 21 22			
0,0000000*000 22 22				

ITERATION	BUCKLING	REAL KEFF	KEFF ADJOINT
1	0.00000+000	1.30052+000	1.30052+000
2	5.00000-005	1.28407+000	1.28407+000
3	9.13091-004	1.05025+000	1.05025+000
4	1.13580-003	1.00235+000	1.00235+000
5	1.14711-003	1.00002+000	1.00002+000

GROUP	LOWER ENERGY	FLUX	ADJOINT FLUX
1	3.67879+006	2.03517+000	1.22886+000
2	2.23130+006	3.65377+000	1.14090+000
3	1.35335+006	5.11850+000	1.03113+000
4	8.20850+005	8.22882+000	8.76665-001
5	4.97871+005	1.43002+001	8.56746-001
6	3.01974+005	2.10864+001	8.19306-001
7	1.83156+005	1.99813+001	7.83157-001
8	1.11090+005	1.72623+001	7.48803-001
9	6.73795+004	1.37610+001	7.02208-001
10	4.08677+004	9.28453+000	6.58682-001
11	2.47875+004	6.16489+000	6.35608-001
12	1.50344+004	5.93561+000	6.24522-001
13	9.11882+003	2.74121+000	6.43175-001
14	4.30743+003	1.49742+000	6.90693-001
15	2.61259+003	1.64699-001	8.26064-001
16	2.03468+003	8.51832-002	8.45161-001
17	1.23410+003	4.78641-001	8.56249-001
18	9.61117+002	1.44176-001	8.89441-001
19	5.82947+002	1.28431-001	9.92701-001
20	2.75364+002	3.50397-002	1.10882+000
21	7.88932+001	3.17944-003	1.19460+000
22	0.00000+000	4.84028-005	1.19460+000

ELAPSED TIME IN OVERLAY 1.59660+005MS

ELAPSED TIME 1.26108+006MS

APPENDIX F

Listing of MC^2 Code

```
C*******************************************************************************
C*******************************************************************************
C**********MC**2*****************************************************************
C**********MC**2 CONSISTS OF A MAIN ROOT AND 5 OVERLAYS.  OVERLAY 2*************
C**********CONTAINS 2 SEGMENTS AND OVERLAY 5 CONTAINS 3 SEGMENTS****************
C*******************************************************************************
C*******************************************************************************
C**********MAIN*****************************************************************
      PROGRAMDRIVER                                                          DRV 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,         DRV 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),        DRV 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,        DRV 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,          DRV 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,      DRV 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADF,RTBSQ,           DRV 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                     DRV 0007
      COMMON/1000/HAMSAV(11,70),LMO(20),N2N(20),SORS(70),                    DRV 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)                    DRV 0009
      COMMON/4340/LOCAL(4340)                                                DRV 0010
      COMMON/4900/HOMIN(71,70)                                               DRV 0011
      COMMON/2101/GAMMA(2101)                                                DRV 0012
      COMMON/FLXCOR/FLXCOR(2224)                                             DRV 0013
 1111 X=0.                                                                   DRV 0014
      CALL SKIPFILE(9)                                                       DRV 0015
      T=TIMEF(X)                                                             DRV 0016
      CALL OVERLAY(1,,23)                                                    DRV 0017
      DT=TIMEF(X)-T                                                          DRV 0018
      PRINT 99998,DT                                                         DRV 0019
      T1=TIMEF(X)                                                            DRV 0020
      CALL OVERLAY(2,,23)                                                    DRV 0021
      DT=TIMEF(X)-T1                                                         DRV 0022
      PRINT99998,DT                                                          DRV 0023
      NRES=NINT-NINT1R                                                       DRV 0024
      IFDIVIDECHECK1002,1011                                                 DRV 0025
 1002 WRITEOUTPUTTAPE6,576                                                   DRV 0026
  576 FORMAT(10H1DVCK NRES)                                                  DRV 0027
 1011 CONTINUE                                                               DRV 0028
      T1=TIMEF(X)                                                            DRV 0029
   68 CALL OVERLAY(3,,23)                                                    DRV 0030
      DT=TIMEF(X)-T1                                                         DRV 0031
      PRINT99998,DT                                                          DRV 0032
      T1=TIMEF(X)                                                            DRV 0033
   39 CALL OVERLAY(4,,23)                                                    DRV 0034
      DT=TIMEF(X)-T1                                                         DRV 0035
      PRINT99998,DT                                                          DRV 0036
      T1=TIMEF(X)                                                            DRV 0037
 1115 CALL OVERLAY(5,,23)                                                    DRV 0038
      DT=TIMEF(X)-T1                                                         DRV 0039
      PRINT99998,DT                                                          DRV 0040
 2005 REWIND3                                                                DRV 0041
      TF=TIMEF(X)                                                            DRV 0042
      DT=TF-T                                                                DRV 0043
      PRINT99999,DT                                                          DRV 0044
99998 FORMAT(1H0*  ELAPSED TIME IN OVERLAY    *E12.5,*MS*//)                DRV 0045
99999 FORMAT(1H1*ELAPSED TIME*,E12.5,*MS*)                                   DRV 0046
      REWIND 2                                                               DRV 0047
      REWIND4                                                                DRV 0048
      REWIND 5                                                               DRV 0049
      REWIND9                                                                DRV 0050
      REWIND 50                                                              DRV 0051
      GOTO1111                                                               DRV 0052
      END                                                                    DRV 0053
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      SUBROUTINESYSTEM                                                  SYS 0000
      STOP                                                              SYS 0001
      END                                                               SYS 0002


      SUBROUTINETIMEIT(N)                                               TIM 0000
      T=TIMEF(N)                                                        TIM 0001
      RETURN                                                            TIM 0002
      ENTRYTIMELAPS                                                     TIM 0003
      DT=(TIMEF(N)-T)*.001                                              TIM 0004
      PRINT1,N,DT                                                       TIM 0005
    1 FORMAT(1H0*  TIME SPENT IN PROGRAM AREA NO,*I2*  WAS*E12.3        TIM 0006
     1,*SECONDS*/)                                                      TIM 0007
      RETURN                                                            TIM 0008
      END                                                               TIM 0009


C**********OVERLAY 1**************************************************************
      PROGRAM INPUT                                                     INP 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,    INP 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),   INP 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,   INP 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,     INP 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS, INP 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,       INP 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                INP 0007
      COMMON/1000/HAMSAV(11,70),LMO(20),N2N(20),SORS(70),               INP 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)               INP 0009
      COMMON/4340/LOCAL(4340)                                           INP 0010
      COMMON/4900/HOMIN(70,70)                                          INP 0011
      COMMON/2101/GAMMA(2101)                                           INP 0012
      DELU=.833333333E-2                                                INP 0013
      ESTART=1.E+7                                                      INP 0014
      READ INPUT TAPE7,500,(IDENT(I),I=1,12)                            INP 0015
      IF(EOF,7)1112,1                                                   INP 0016
 1112 CALLSYSTEM                                                        INP 0017
  500 FORMAT(12A6)                                                      INP 0018
    1 WRITE OUTPUT TAPE6,600,(IDENT(I),I=1,12)                          INP 0019
      READ(9),NMATS,(LOCAL(I),I=1,NMATS)                                INP 0020
      REWIND 9                                                          INP 0021
  600 FORMAT(1H1,12A6)                                                  INP 0022
      READ(7,512)IOPT,NOI,NOBG,NGEOM,NTHRM,NSORS,IYOS,NMIC,NPUN,NDELU   INP 0023
     1,DELUN                                                            INP 0024
      IF(NDELU.EQ.1) GO TO 1512                                         INP 0025
      NDELU=DELUN/DELU                                                  INP 0026
  512 FORMAT(10I6,E12.5)                                                INP 0027
  502 FORMAT(6I12)                                                      INP 0028
      IF(XMODF(60,NDELU).EQ.0) GO TO 1514                               INP 0029
      PRINT 1515                                                        INP 0030
 1515 FORMAT(1H0*THE NUMBER OF ULTRA FINE GROUPS PER FINE GROUP MUST DIVINP 0031
     1IDE 60 INTEGRALLY*)                                               INP 0032
      STOP                                                              INP 0033
 1514 IF(IOPT.EQ.1.AND.NDELU.EQ.1.OR.NDELU.GT.1) GO TO 1512             INP 0034
      PRINT2512                                                         INP 0035
 2512 FORMAT(1H0*CONSISTENT OPTION NOT ALLOWED FOR AN ALL FINE GROUP PROINP 0036
     1BLEM*)                                                            INP 0037
      STOP                                                              INP 0038
 1512 IF(NDELU.EQ.1) DELU=DELUN                                         INP 0039
      NOBGB=NOBG+1                                                      INP 0040
    3 READINPUTTAPE7,504,(CGB(I),I=1,NOBGB)                             INP 0041
  504 FORMAT(6E12.5)                                                    INP 0042
    5 WRITEOUTPUTTAPE6,505                                              INP 0043
  505 FORMAT(1H0/55H  REVISED BROAD GROUP BOUNDARIES BY ENERGY AND LETHAINP 0044
     1RGY//6X15H DESIRED ENERGY10X18HACTUAL ENERGY USED9X16HDESIRED LETHINP 0045
     2ARGY8X20HACTUAL LETHARGY USED//)                                  INP 0046
```

```
      EMAX=CGB(1)                                                        INP 0047
      URU=0.0                                                            INP 0048
      DO 6K=1,NOBGB                                                      INP 0049
      K1=K-1                                                             INP 0050
      IF(K-1)7,7,8                                                       INP 0051
    8 URU=LOGF(EMAX/CGB(K))                                              INP 0052
    7 LGBN(K)=URU/DELUN+1.5                                              INP 0053
      IF(K.EQ.1) GO TO 1222                                              INP 0054
      IF(LGBN(K).LE.LGBN(K-1))LGBN(K)=LGBN(K-1)+1                        INP 0055
 1222 REG=LGBN(K)                                                        INP 0056
      RELU=(REG-1.)*DELUN                                                INP 0057
      RELE=EMAX*EXPF(-RELU)                                              INP 0058
      WRITE OUTPUT TAPE6,506,K1,CGB(K),RELE,URU,RELU                     INP 0059
  506 FORMAT(I4,1PE17.8,1P3E26.8)                                        INP 0060

      CGB(K)=RELE                                                        INP 0061
    6 CONTINUE                                                           INP 0062
      WRITE(6,606) NOBGB,0.,0.                                           INP 0063
  606 FORMAT(I4,1PE17.8,1PE26.8)                                         INP 0064
      EMIN=RELE                                                          INP 0065
      NINTC=LGBN(NOBGB)-1                                                INP 0066
      WRITEOUTPUTTAPE6,507                                               INP 0067
  507 FORMAT(1H04X5HGROUP10X7HDELTA U18X7HDELTA E)                       INP 0068
      DO9K=1,NOBG                                                        INP 0069
      WIDTH=LGBN(K+1)-LGBN(K)                                            INP 0070
      DELTAE= CGB(K)  -CGB(K+1)                                          INP 0071
      WIDTH=WIDTH*DELUN                                                  INP 0072
    9 WRITE(6,508)K,WIDTH,DELTAE                                         INP 0073
  508 FORMAT(4XI4,1P2E24.8)                                              INP 0074
      WRITE(6,608) NOBGB,CGB(NOBGB)                                      INP 0075
  608 FORMAT(4XI4,1PE48.8)                                               INP 0076
      READ(7,504)EPSABS,EPSINT,EPSTOT,RADP,RADC,FACA                     INP 0077
      READ (7,512)KT1,KT2,KT3,KT4,KT5,KT6,    IA,KTFLUX,NJINT           INP 0078
      READ(7,510)(NUCID(I),NELMO(I),ADEN(I),TEMP(I),FCONC(I)             INP 0079
     1,CCONC(I),I=1,NOI)                                                 INP 0080
      WRITE(6,530)EPSABS,EPSINT,EPSTOT,NGEOM,NSORS,RADP,RADC,FACA        INP 0081
  530 FORMAT(16H0 EPSILON SIGMA=E11.4,19H EPSILON SIGMA BAR=E11.4,        INP 0082
     1* EPSILON SIGMA T=*,E11.4,/* GEOMETRY=*,I4,* SOURCE TYPE=*,I4,      INP 0083
     112H PIN RADIUS=E11.4,16H COOLANT RADIUS=E11.4,3H A=E11.4)          INP 0084
      WRITE(6,630) NTHRM,IYOS,NMIC,NPUN,NDELU,DELU,KTFLUX,IOPT           INP 0085
  630 FORMAT(* THERMAL OPTION=*I3,*  SPECTRUM INPUT*I3,*  MICROSCOPIC CRINP 0086
     1OSS SECTIONS*I3,*  PUNCH OPTION*I3/* NUMBER OF ULTRA FINE GROUPS PINP 0087
     2ER FINE GROUP=*I3,*  ULTRA FINE GROUP LETHARGY WIDTH=*E12.5,*  FININP 0088
     3E GROUP WEIGHTING OPTION*I3/* FUNDAMENTAL MODE OPTION=*I3)          INP 0089
      CTH=0.                                                             INP 0090
      FTH=0.                                                             INP 0091
      GFTH=0.                                                            INP 0092
      TRTH=0.                                                            INP 0093
      SNATH=0.                                                           INP 0094
      SNPTH=0.                                                           INP 0095
      DO 601 I=1,NOI                                                     INP 0096
      THC(I)=0.                                                          INP 0097
      THF(I)=0.                                                          INP 0098
      THNU(I)=0.                                                         INP 0099
      THNA(I)=0.                                                         INP 0100
      THNP(I)=0.                                                         INP 0101
  601 THTR(I)=0.                                                         INP 0102
      IF(NTHRM)540,1113,540                                              INP 0103
  540 DO 542 I=1,NOI                                                     INP 0104
  542 READ(7,543) THC(I),THF(I),THNU(I),THTR(I),THNA(I),THNP(I)          INP 0105
  543 FORMAT(6E12.5)                                                     INP 0106
 1113 EPSTOT=2.*EPSTOT                                                   INP 0107
      K=0                                                                INP 0108
      KT7=0                                                              INP 0109
      IF(NOI.EQ.1) GO TO 100                                             INP 0110
      DO 102 I=1,NMATS                                                   INP 0111
      DO 101 J=1,NOI                                                     INP 0112
      IF(NUCID(J)-LOCAL(I))101,103,101                                   INP 0113
```

```
103 K=K+1                                                                INP 0114
    NEM1=NUCID(K)                                                        INP 0115
    NEM2=NELMO(K)                                                        INP 0116
    TEM3=ADEN(K)                                                         INP 0117
    TEM4=TEMP(K)                                                         INP 0118
    TEM5=FCONC(K)                                                        INP 0119
    TEM6=CCONC(K)                                                        INP 0120
    TEM7=THC(K)                                                          INP 0121
    TEM8=THF(K)                                                          INP 0122

    TEM9=THNU(K)                                                         INP 0123
    TEM10=THTR(K)                                                        INP 0124
    TEM11=THNA(K)                                                        INP 0125
    TEM12=THNP(K)                                                        INP 0126
    NUCID(K)=NUCID(J)                                                    INP 0127
    NELMO(K)=NELMO(J)                                                    INP 0128
    ADEN(K)=ADEN(J)                                                      INP 0129
    TEMP(K)=TEMP(J)                                                      INP 0130
    FCONC(K)=FCONC(J)                                                    INP 0131
    CCONC(K)=CCONC(J)                                                    INP 0132
    THC(K)=THC(J)                                                        INP 0133
    THF(K)=THF(J)                                                        INP 0134
    THNU(K)=THNU(J)                                                      INP 0135
    THTR(K)=THTR(J)                                                      INP 0136
    THNA(K)=THNA(J)                                                      INP 0137
    THNP(K)=THNP(J)                                                      INP 0138
    NUCID(J)=NEM1                                                        INP 0139
    NELMO(J)=NEM2                                                        INP 0140
    ADEN(J)=TEM3                                                         INP 0141
    TEMP(J)=TEM4                                                         INP 0142
    FCONC(J)=TEM5                                                        INP 0143
    CCONC(J)=TEM6                                                        INP 0144
    THC(J)=TEM7                                                          INP 0145
    THF(J)=TEM8                                                          INP 0146
    THNU(J)=TEM9                                                         INP 0147
    THTR(J)=TEM10                                                        INP 0148
    THNA(J)=TEM11                                                        INP 0149
    THNP(J)=TEM12                                                        INP 0150
101 CONTINUE                                                             INP 0151
    IF(K.EQ.NOI.OR.K.EQ.NOI-1.AND.NUCID(NOI).EQ.5HHYDRO   ) GO TO 100    INP 0152
102 CONTINUE                                                             INP 0153
    DO105 J=1,NOI                                                        INP 0154
    DO 106 I=1,NMATS                                                     INP 0155
    IF(NUCID(J).EQ.LOCAL(I).OR.NUCID(J).EQ.5HHYDRO   ) GO TO 105         INP 0156
106 CONTINUE                                                             INP 0157
    PRINT 104, NUCID(J)                                                  INP 0158
104 FORMAT(1H0*  SORRY, MATERIAL IDENTIFIED AS *A6,* NOT ON THIS LIBRAINP 0159
   1RY TAPE*)                                                            INP 0160
105 CONTINUE                                                             INP 0161
    CALL SYSTEM                                                          INP 0162
100 CONTINUE                                                             INP 0163
    WRITE(6,531)(NUCID(I),NELMO(I),ADEN(I),TEMP(I),FCONC(I),CCONC(I),I   INP 0164
   1=1,NOI)                                                              INP 0165
531 FORMAT(27H1MATERIAL ID, ELMO MAT, ID,4X12HATOMIC CONC,11X            INP 0166
   111HTEMPERATURE11X*ATOMIC CONC, PIN*,6X*ATOMIC CONC, COOLANT*/        INP 0167
   2(A12,I12,4E24.8))                                                    INP 0168
510 FORMAT(A6,I6,4E12.5)                                                 INP 0169
    IF(NTHRM.EQ.0) GO TO 603                                             INP 0170
    DO 602 I=1,NOI                                                       INP 0171
    CTH=CTH+ADEN(I)*THC(I)                                               INP 0172
    FTH=FTH+ADEN(I)*THF(I)                                               INP 0173
    GFTH=GFTH+ADEN(I)*THF(I)*THNU(I)                                     INP 0174
    SNATH=SNATH+ADEN(I)*THNA(I)                                          INP 0175
    SNPTH=SNPTH+ADEN(I)*THNP(I)                                          INP 0176
602 TRTH=TRTH+ADEN(I)*THTR(I)                                            INP 0177
603 NINT=NINTC*NDELU                                                     INP 0178
    NUNRES=0                                                             INP 0179
```

```
      NINT1R=0                                                          INP 0180
      DO 1002 J=1,NOI                                                   INP 0181
      IF(NUCID(J),EQ,5HHYDRO) KT7=J                                     INP 0182
 1002 CONTINUE                                                          INP 0183
      MTOT=0                                                            INP 0184

      IF(NDELU,EQ,1) GO TO 200                                          INP 0185
      DO 1003 I=1,NOI                                                   INP 0186
      IF(NELMO(I),GT,0) MTOT=MTOT+1                                     INP 0187
 1003 CONTINUE                                                          INP 0188
  200 IF(NDELU,EQ,1) GO TO 1004                                         INP 0189
      IF(NDELU,GT,1,AND,(KT7,NE,0,OR,MTOT,NE,0)) GO TO 1516             INP 0190
      PRINT 1005                                                        INP 0191
 1005 FORMAT(1H0*AN ULTRA FINE GROUP PROBLEM MUST CONTAIN HYDROGEN OR A INP 0192
     1LEGENDRE MATERIAL*)                                               INP 0193
      STOP                                                              INP 0194
 1516 IF(IOPT,GT,1,AND,EMAX,LE,ESTART,OR,IOPT,EQ,1,OR,MTOT,EQ,0) GO TO  INP 0195
     11004                                                              INP 0196
      PRINT 1504                                                        INP 0197
 1504 FORMAT(1H0*MAX, ENERGY MUST BE LESS THAN OR EQUAL TO ESTART FOR A INP 0198
     1CONSISTENT OPTION*)                                               INP 0199
      STOP                                                              INP 0200
 1004 IFDIVIDECHECK1000,1001                                            INP 0201
 1000 WRITEOUTPUTTAPE6,575                                              INP 0202
  575 FORMAT(* DVCK INPUT*)                                             INP 0203
 1001 CONTINUE                                                          INP 0204
      T1=TIMEF(X)                                                       INP 0205
   66 RETURN                                                            INP 0206
      END                                                               INP 0207

C**********OVERLAY 2**************************************************************
      PROGRAM RESXEC                                                    RXS 0000
      COMMON/TRTI/TR(62,62),TI(62,62),AIMW,AX,KI,REW,Y                  RXS 0001
      CALL SEGMENT(2,1,23)                                              RXS 0002
      CALL SEGMENT(2,2,23)                                              RXS 0003
      RETURN                                                            RXS 0004
      END                                                               RXS 0005
```

```
C**********ASSEMBLY LANGUAGE VERSION OF QUICKW**************************************
          IDENT     QUICKW                                                    QKW 0000
EXIT,     63        ($)*                                                      QKW 0001
          20        ($)Q8QDICT,                                               QKW 0002
DICT,     OCT       0000000000000000                                          QKW 0003
          BCD       1,QUICKW                                                  QKW 0004
TRTI      BLOCK     7693                                                      QKW 0005
          COMMON    TR(3844)                                                  QKW 0006
          COMMON    TI(3844)                                                  QKW 0007
          COMMON    AIMW(1)                                                   QKW 0008
          COMMON    AX(1)                                                     QKW 0009
          COMMON    KI(1)                                                     QKW 0010
          COMMON    REW(1)                                                    QKW 0011
          COMMON    Y(1)                                                      QKW 0012
          ENTRY     QUICKW                                                    QKW 0013
QUICKW    UBJP      ($)*,,*                                                   QKW 0014
+         63        ($)*+1                                                    QKW 0015
          20        ($)Q8QDICT,                                               QKW 0016
          63        ($)*+2                                                    QKW 0017
          20        ($)DICT.                                                  QKW 0018
          SIU       ENDING,,1                                                 QKW 0019
          LDA       AX                  DETERMINE WHICH FORM TO USE           QKW 0020
          AJP,PL    STOR1                                                     QKW 0021
          ROP,*     PZ,A,A                                                    QKW 0022
          STA       =SX                                                       QKW 0023
          SLJ       *+1                                                       QKW 0024
STOR1     STA       =SX                                                       QKW 0025
          FMU       X                                                         QKW 0026
          STA       =STEMX                                                    QKW 0027
          LDA       Y                                                         QKW 0028
          FMU       Y                                                         QKW 0029
          STA       =STEMY                                                    QKW 0030
          FAD       TEMX                                                      QKW 0031
          STA       =SR2                CHECK BASED ON CIRCULAR PROFILES      QKW 0032
          FSB       =D36.                                                     QKW 0033
          AJP,NI    ,10                                                       QKW 0034
          LDA       R2                                                        QKW 0035
          FSB       =D144.                                                    QKW 0036
          AJP,MI    ,2                                                        QKW 0037
          LDA       R2                                                        QKW 0038
          FSB       =D10000.                                                  QKW 0039
          AJP,MI    ,3                                                        QKW 0040
          SLJ       ,4                                                        QKW 0041
,10       LDA       X                     INTERP, ON TABLE                    QKW 0042
          FMU       =D10,               SET UP INDEX AND FIND P,Q             QKW 0043
          STA       ,ERASER.                                                  QKW 0044
          FAD,UR,UN =02044000000000000                                        QKW 0045
          SAL       =SII                                                      QKW 0046
          FAD       =02044000000000000                                        QKW 0047
          FSB,UR    ,ERASER.                                                  QKW 0048
          ROP,*     PZ,A,A                                                    QKW 0049
          STA       =SP                                                       QKW 0050
          LDA       Y                                                         QKW 0051
          FMU       =D10,                                                     QKW 0052
          STA       ,ERASER.                                                  QKW 0053
          FAD,UR,UN =02044000000000000                                        QKW 0054
          SAL       =SJJ                                                      QKW 0055
          FAD       =02044000000000000                                        QKW 0056
          FSB,UR    ,ERASER.                                                  QKW 0057
          ROP,*     PZ,A,A                                                    QKW 0058
          STA       =SQ                 WE  NOW HAVE  P AND Q                 QKW 0059
          ENA       0                                                         QKW 0060
```

```
      SAU     =SJJ                                                    QKW 0061
      SAU     =SII                                                    QKW 0062
      LDA     JJ                  INDEX=II+62*JJ+126                  QKW 0063
      MUI     =D62                                                    QKW 0064
      ADD     =D126                                                   QKW 0065
      ADD     II                                                      QKW 0066
      STA     =SIJ                WE NOW HAVE THE SUBSCRIPT FIXED     QKW 0067
      LDA     P                                                       QKW 0068
      FMU     =D.5                                                    QKW 0069
      STA     =SHP                                                    QKW 0070
      FMU     P                                                       QKW 0071
      STA     =SHP2                                                   QKW 0072
      LDA     P                                                       QKW 0073
      FMU     Q                                                       QKW 0074
      STA     =SPQ                                                    QKW 0075
      LDA     Q                                                       QKW 0076
      FMU     =D.5                                                    QKW 0077
      STA     =SHQ                                                    QKW 0078
      FMU     Q                                                       QKW 0079
      STA     =SHQ2                                                   QKW 0080
      FSB     HQ                                                      QKW 0081
      STA     =SA1                                                    QKW 0082
      LDA     HP2                                                     QKW 0083
      FSB     HP                                                      QKW 0084
      STA     =SA2                                                    QKW 0085
      LDA     HP2                                                     QKW 0086
      FAD     HQ2                                                     QKW 0087
      FMU     =D=2.                                                   QKW 0088
      FAD     PQ                                                      QKW 0089
      FAD     =D1.                                                    QKW 0090
      STA     =SA3                                                    QKW 0091
      LDA     HQ2                                                     QKW 0092
      FAD     HQ                                                      QKW 0093
      FSB     PQ                                                      QKW 0094
      STA     =SA5                                                    QKW 0095
      LDA     HP2                                                     QKW 0096
      FAD     HP                                                      QKW 0097
      FSB     PQ                                                      QKW 0098
      STA     =SA4                WE NOW HAVE INTERP COEFF, A1=A5     QKW 0099
      LIL     IJ,1                                                    QKW 0100
      FMU     TR=62,1                                                 QKW 0101
      STA     ,ERASER.                                                QKW 0102
      LDA     A1                                                      QKW 0103
      FMU     TR=125,1                                                QKW 0104
      FAD     ,ERASER.                                                QKW 0105
      STA     ,ERASER.                                                QKW 0106
      LDA     A2                                                      QKW 0107
      FMU     TR=64,1                                                 QKW 0108
      FAD     ,ERASER.                                                QKW 0109
      STA     ,ERASER.                                                QKW 0110
      LDA     A3                                                      QKW 0111
      FMU     TR=63,1                                                 QKW 0112
      FAD     ,ERASER.                                                QKW 0113
      STA     ,ERASER.                                                QKW 0114
      LDA     A5                                                      QKW 0115
      FMU     TR=1,1                                                  QKW 0116
      FAD     ,ERASER.                                                QKW 0117
      STA     ,ERASER.                                                QKW 0118
      LDA     PQ                                                      QKW 0119
      FMU     TR,1                                                    QKW 0120
      FAD     ,ERASER.                                                QKW 0121
      STA     REW                 WE HAVE FOUND REAL PART OF W        QKW 0122
```

```
          LAC       KI                                                  QKW 0123
          INA 0                                                         QKW 0124
          AJP,MI    ,5                                                  QKW 0125
          SLJ       ENDING,                                             QKW 0126
,5        LDA       A1                                                  QKW 0127
          FMU       TI=125,1                                            QKW 0128
          STA       ,ERASER.                                            QKW 0129
          LDA       A2                                                  QKW 0130
          FMU       TI=64,1                                             QKW 0131
          FAD       ,ERASER.                                            QKW 0132
          STA       ,ERASER.                                            QKW 0133
          LDA       A3                                                  QKW 0134
          FMU       TI=63,1                                             QKW 0135
          FAD       ,ERASER.                                            QKW 0136
          STA       ,ERASER.                                            QKW 0137
          LDA       A4                                                  QKW 0138
          FMU       TI=62,1                                             QKW 0139
          FAD       ,ERASER.                                            QKW 0140
          STA       ,ERASER.                                            QKW 0141
          LDA       A5                                                  QKW 0142
          FMU       TI=1,1                                              QKW 0143
          FAD       ,ERASER.                                            QKW 0144
          STA       ,ERASER.                                            QKW 0145
          LDA       PQ                                                  QKW 0146
          FMU       TI,1                                                QKW 0147
          FAD       ,ERASER.                                            QKW 0148
          LDQ       AX                                                  QKW 0149
          QJP,MI    MINUS                                               QKW 0150
          STA       AIMW              HAVE NOW FOUND IM W               QKW 0151
          SLJ       ENDING,                                             QKW 0152
MINUS     ROP,=     PZ,A,A                                              QKW 0153
          STA       AIMW                                                QKW 0154
          SLJ       ENDING,                                             QKW 0155
,2        LDA       TEMX              BEGIN RATIONAL APPROX,FOR W       QKW 0156
          FSB       TEMY                                                QKW 0157
          STA       =SA1                                                QKW 0158
          FSB       =D,2752581                                          QKW 0159
          STA       =SA4                                                QKW 0160
          LDA       A1                                                  QKW 0161
          FSB       =D2,724745                                          QKW 0162
          STA       =SA5                                                QKW 0163
          LDA       =D2,                                                QKW 0164
          FMU       X                                                   QKW 0165
          FMU       Y                                                   QKW 0166
          STA       =SA2                                                QKW 0167
          FMU       A2                                                  QKW 0168
          STA       =SA3              NOW WE HAVE COEFF,                QKW 0169
          LDA       A4                                                  QKW 0170
          FMU       A4                                                  QKW 0171
          FAD       A3                                                  QKW 0172
          STA       ,ERASER.                                            QKW 0173
          LDA       =02000406270733713                                  QKW 0174
          FDV       ,ERASER.                                            QKW 0175
          STA       =SD1                                                QKW 0176
          LDA       A5                                                  QKW 0177
          FMU       A5                                                  QKW 0178
          FAD       A3                                                  QKW 0179
          STA       ,ERASER.                                            QKW 0180
          LDA       =01773650037520104                                  QKW 0181
          FDV       ,ERASER.                                            QKW 0182
          STA       =SD2                                                QKW 0183
          LDA       A2                                                  QKW 0184
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```
          FMU       X                                                    QKW 0185
          STA       ,ERASER.                                             QKW 0186
          LAC       A4                                                   QKW 0187
          FMU       Y                                                    QKW 0188
          FAD       ,ERASER.                                             QKW 0189
          FMU       D1                                                   QKW 0190
          STA       ,ERASER.                                             QKW 0191
          LDA       A2                                                   QKW 0192
          FMU       X                                                    QKW 0193
          STA       ,ERASER.+1                                           QKW 0194
          LAC       A5                                                   QKW 0195
          FMU       Y                                                    QKW 0196
          FAD       ,ERASER.+1                                           QKW 0197
          FMU       D2                                                   QKW 0198
          FAD       ,ERASER.                                             QKW 0199
          STA       REW                                                  QKW 0200
          LAC       KI                                                   QKW 0201
          INA 0                                                          QKW 0202
          AJP,MI    ,7                                                   QKW 0203
          SLJ       ENDING,                                              QKW 0204
,7        LDA       A4                                                   QKW 0205
          FMU       X                                                    QKW 0206
          STA       ,ERASER.                                             QKW 0207
          LDA       A2                                                   QKW 0208
          FMU       Y                                                    QKW 0209
          FAD       ,ERASER.                                             QKW 0210
          FMU       D1                                                   QKW 0211
          STA       ,ERASER.                                             QKW 0212
          LDA       A5                                                   QKW 0213
          FMU       X                                                    QKW 0214
          STA       ,ERASER.+1                                           QKW 0215
          LDA       A2                                                   QKW 0216
          FMU       Y                                                    QKW 0217
          FAD       ,ERASER.+1                                           QKW 0218
          FMU       D2                                                   QKW 0219
          FAD       ,ERASER.                                             QKW 0220
          LDQ       AX                                                   QKW 0221
          QJP,MI    MINUS                                                QKW 0222
          STA       AIMW                                                 QKW 0223
          SLJ       ENDING,                                              QKW 0224
,3        LDA       TEMX              BEGIN COMPUTE 1 TERM OF CONT, FR   QKW 0225
          FSB       TEMY                                                 QKW 0226
          FMU       =D2,                                                 QKW 0227
          STA       =SA1                                                 QKW 0228
          FSB       =D1,                                                 QKW 0229
          STA       =SA4                                                 QKW 0230
          LDA       X                                                    QKW 0231
          FMU       Y                                                    QKW 0232
          FMU       =D4,                                                 QKW 0233
          STA       =SA2                                                 QKW 0234
          FMU       A2                                                   QKW 0235
          STA       ,ERASER.            A2**2                            QKW 0236
          LDA       A4                                                   QKW 0237
          FMU       A4                                                   QKW 0238
          FAD       ,ERASER.                                             QKW 0239
          STA       ,ERASER.                                             QKW 0240
          LDA       =020014406727262l4                                   QKW 0241
          FDV       ,ERASER.                                             QKW 0242
          STA       =SD1                                                 QKW 0243
          LDA       A2                                                   QKW 0244
          FMU       X                                                    QKW 0245
          STA       ,ERASER.                                             QKW 0246
```

```
          LAC       A4                                          QKW 0247
          FMU       Y                                           QKW 0248
          FAD       .ERASER.                                    QKW 0249
          FMU       D1                                          QKW 0250
          STA       REW                                         QKW 0251
          LAC       KI                                          QKW 0252
          INA 0                                                 QKW 0253
          AJP,MI    .9                                          QKW 0254
          SLJ       ENDING.                                     QKW 0255
.9        LDA       A4                                          QKW 0256
          FMU       X                                           QKW 0257
          STA       .ERASER.                                    QKW 0258
          LDA       A2                                          QKW 0259
          FMU       Y                                           QKW 0260
          FAD       .ERASER.                                    QKW 0261
          FMU       D1                                          QKW 0262
          LDQ       AX                                          QKW 0263
          QJP,MI    MINUS                                       QKW 0264
          STA       AIMW                                        QKW 0265
.8        SLJ       ENDING.                                     QKW 0266
.4        LDA       TEMX          BEGIN COMPUTE NAT; LINE SHAPE QKW 0267
          FAD       TEMY                                        QKW 0268
          FMU       =D1.7724715                                 QKW 0269
          STA       .ERASER.                                    QKW 0270
          LDA       Y                                           QKW 0271
          FDV       .ERASER.                                    QKW 0272
          STA       REW                                         QKW 0273
          LAC KI                                                QKW 0274
          INA 0                                                 QKW 0275
          AJP,MI .6                                             QKW 0276
          SLJ       ENDING.                                     QKW 0277
.6        LDA       X                                           QKW 0278
          FDV       .ERASER.                                    QKW 0279
          LDQ       AX                                          QKW 0280
          QJP,MI    MINUS                                       QKW 0281
          STA       AIMW                                        QKW 0282
          SLJ       ENDING.                                     QKW 0283
          EXT       Q8QDICT.                                    QKW 0284
ENDING.   ENI       0,1                                         QKW 0285
          LDA       QUICKW                                      QKW 0286
          SLJ       EXIT.                                       QKW 0287
.ERASER.  BSS       2                                           QKW 0288
          END                                                   QKW 0289
```

```
C**********SEGMENT 1*************************************************************
      PROGRAM UNRES                                                          UNR 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,         UNR 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),        UNR 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,        UNR 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,          UNR 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,      UNR 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,           UNR 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                     UNR 0007
      COMMON/TRTI/TR(62,62),TI(62,62),AIMW,AX,KI,REW,WHY                     UNR 0008
      COMMON/4900/AAA(80),ABUNDI(800),AFAC(800),EN(800),GAF(800),            UNR 0009
     1GAMGAM(800),GAMT(800),IFI(20)                                          UNR 0010
      COMMON/4340/AREA1,AREA2,A0(20),A1(20),A2(20),A3(20),BETA,FJF,          UNR 0011
     1JST(2,80),MAXRES,NID(800),NUN(20),SEE1,SEE2,SIGMI,SIGMO,SIG0(800),     UNR 0012
     2XIAV(20),ZETAP(800),ZI,ABUN(4,20),AMU(2,4,80),D(2,4,80),FUN(25,4),     UNR 0013
     3GFF(5),GN(10),SFUN(1,25,4),SOP(25),XI(20)                              UNR 0014
      COMMON/1000/G(2,4,80),LST(80),NPT(1,80),SCUN(1,25,4)                   UNR 0015
      COMMON/2101/ES(25,1,80)                                                UNR 0016
      DIMENSION GA(2,4,80),GF(25,8,20),GNO(25,8,20),                         UNR 0017
     1NU(2,4,80),X(10,2),Y(5,4)                                              UNR 0018
      DATA(X=,525430E-02,,371741E-01,,103133,,207850,,359875,,574320,        UNR 0019
     1,879486,1,33502,2,10598,4,39230,,517550E-01,,163089,,288398,           UNR 0020
     2,431720,,599144,,800477,1,05263,1,39297,1,91582,3,30400),              UNR 0021
     3(Y=,212903E-01,,155477,,467072,1,10710,3,24914,,107400,,360070,        UNR 0022
     4,699863,1,22312,2,60955,,189269,,476036,,793185,1,23576,2,30575,       UNR 0023
     5,254966,,549072,,842564,1,23075,2,12265)                               UNR 0024
      CALLTIMEIT(0)                                                          UNR 0025
      SIGPMH=20.                                                             UNR 0026
      KI=1                                                                   UNR 0027
      SIGMI=0.                                                               UNR 0028
      SIGMO=0.                                                               UNR 0029
      IF(RADP      -1.E-20)1189,1189,1190                                    UNR 0030
 1189 SEE1=0.                                                                UNR 0031
      SEE2=0.                                                                UNR 0032
      AREA1=1.                                                               UNR 0033
      AREA2=0.                                                               UNR 0034
      DO 400 M=1,NOI                                                         UNR 0035
  400 CCONC(M)=0.                                                            UNR 0036
      GOTO1188                                                               UNR 0037
 1190 GOTO(11190,11191),NGEOM                                                UNR 0038
11190 SEE1=1./(4.*RADP)                                                      UNR 0039
      SEE2=1./(4.*(RADC-RADP))                                               UNR 0040
      AREA1=RADP                                                             UNR 0041
      AREA2=RADC-RADP                                                        UNR 0042
      GOTO1188                                                               UNR 0043
11191 SEE2=RADP/(2.*(RADC**2-RADP**2))                                       UNR 0044
      SEE1=.5/RADP                                                           UNR 0045
      AREA1=RADP**2                                                          UNR 0046
      AREA2=RADC**2-AREA1                                                    UNR 0047
 1188 CONTINUE                                                               UNR 0048
      READ(9 ),((TR(I,J),I=1,62),J=1,62)                                     UNR 0049
      READ(9 ),((TI(I,J),I=1,62),J=1,62)                                     UNR 0050
      CALL SKIPFILE(9)                                                       UNR 0051
      READ(9)                                                                UNR 0052
      MAXRES=0                                                               UNR 0053
      JP=1                                                                   UNR 0054
      NOMAT=NOI                                                              UNR 0055
   11 FORMAT(6E18.5)                                                         UNR 0056
  500 DO510LZ=1,NOMAT                                                        UNR 0057
      IF(LZ.NE.KT7) GO TO 100                                                UNR 0058
      XI(LZ)=1.                                                              UNR 0059
      SIGPM=SIGPMH                                                           UNR 0060
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      IWR=0                                                              UNR 0061
      NUN(LZ)=0                                                          UNR 0062
      GO TO 101                                                          UNR 0063
  100 IN=0                                                               UNR 0064
      RTEMP2=SQRTF(TEMP(LZ))*2.                                          UNR 0065
  501 READ(9)ID,IWR,ISK                                                  UNR 0066
      IF(NUCID(LZ)-ID)503,502,503                                        UNR 0067
  503 DO505I=1,ISK                                                       UNR 0068
  505 READTAPE9                                                          UNR 0069
      GOTO501                                                            UNR 0070
  502 READ(9)              NUN(LZ),IFI(LZ),IS,(ABUN(I,LZ),I=1,IS)        UNR 0071
      ISO(LZ)=IS                                                         UNR 0072
      IF(NUN(LZ))301,301,302                                             UNR 0073
  302 DO611=1,IS                                                         UNR 0074
      LQ=0                                                               UNR 0075
      LP=IN+LZ                                                           UNR 0076
      IN=IN+20                                                           UNR 0077
      READ(9)LI,       AAA(LP),(JST(I,LP),NPT(1,LP),I=1,LI)              UNR 0078
      LST(LP)=LI                                                         UNR 0079
      LSF=LI                                                             UNR 0080
      IF=IFI(LZ)                                                         UNR 0081
      DO300 LS=1,LSF                                                     UNR 0082
      JSF=JST(LS,LP)                                                     UNR 0083
      NP=NPT(1 ,LP)                                                      UNR 0084
      READ(9)(ES(NL,1 ,LP),NL=1,NP)                                      UNR 0085
      DO300 JS=1,JSF                                                     UNR 0086
      READ(9) GA(LS,JS,LP),NU(LS,JS,LP),G(LS,JS,LP),                     UNR 0087
     1D(LS,JS,LP),AMU(LS,JS,LP)                                          UNR 0088
    9 LQ=LQ+1                                                            UNR 0089
      READ(9)(GF(NL,LQ,LP),GNO(NL,LQ,LP),NL=1,NP)                        UNR 0090
  300 CONTINUE                                                           UNR 0091
    6 CONTINUE                                                           UNR 0092
  301 IF(IWR)397,397,507                                                 UNR 0093
  397 READ(9)SIGPM,XI(LZ)                                                UNR 0094
  101 XIAV(LZ)=SIGPM                                                     UNR 0095
 1199 SIGMI=SIGPM*FCONC(LZ)*SIGMI                                        UNR 0096
      SIGMO=SIGPM*CCONC(LZ)*SIGMO                                        UNR 0097
      GOTO510                                                            UNR 0098
  507 READ(9)NRGYS,SIGPM,XI(LZ),A0(LZ),A1(LZ),A2(LZ),A3(LZ)              UNR 0099
  304 XIAV(LZ)=SIGPM                                                     UNR 0100
 1196 SIGMI=SIGPM*FCONC(LZ)*SIGMI                                        UNR 0101
      SIGMO=SIGPM*CCONC(LZ)*SIGMO                                        UNR 0102
      MAXRES=MAXRES+NRGYS                                                UNR 0103
      READ(9)(EN(J),LL,SIG0(J),ZETAP(J),ABUNDI(J),                       UNR 0104
     1AFAC(J),GAMT(J),GAMGAM(J),GAF(J),J=JP,MAXRES)                      UNR 0105
  561 DO508J=JP,MAXRES                                                   UNR 0106
      NID(J)=LZ                                                          UNR 0107
  508 ZETAP(J)=ZETAP(J)/RTEMP2                                           UNR 0108
      JP=JP+NRGYS                                                        UNR 0109
  510 CONTINUE                                                           UNR 0110
      MAXMI1=MAXRES-1                                                    UNR 0111
      IF(MAXRES-1)580,580,562                                            UNR 0112
  562 DO515J=1,MAXMI1                                                    UNR 0113
      JP1=J+1                                                            UNR 0114
  563 DO515K=JP1,MAXRES                                                  UNR 0115
  564 IF(EN(J)-EN(K))515,515,511                                         UNR 0116
  511 TEM1=EN(J)                                                         UNR 0117
      TEM3=SIG0(J)                                                       UNR 0118
      TEM4=ZETAP(J)                                                      UNR 0119
      TEM5=AFAC(J)                                                       UNR 0120
      TEM6=GAMT(J)                                                       UNR 0121
      TEM7=GAMGAM(J)                                                     UNR 0122
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      TEM8=GAF(J)                                                       UNR 0123
      TEM9=NID(J)                                                       UNR 0124
      TEM10=ABUNDI(J)                                                   UNR 0125
      EN(J)=EN(K)                                                       UNR 0126
      SIG0(J)=SIG0(K)                                                   UNR 0127
      ZETAP(J)=ZETAP(K)                                                 UNR 0128
      AFAC(J)=AFAC(K)                                                   UNR 0129
      GAMT(J)=GAMT(K)                                                   UNR 0130
      GAMGAM(J)=GAMGAM(K)                                               UNR 0131
      GAF(J)=GAF(K)                                                     UNR 0132
      NID(J)=NID(K)                                                     UNR 0133
      ABUNDI(J)=ABUNDI(K)                                               UNR 0134
      EN(K)=TEM1                                                        UNR 0135
      SIG0(K)=TEM3                                                      UNR 0136
      ZETAP(K)=TEM4                                                     UNR 0137
      AFAC(K)=TEM5                                                      UNR 0138
      GAMT(K)=TEM6                                                      UNR 0139
      GAMGAM(K)=TEM7                                                    UNR 0140
      GAF(K)=TEM8                                                       UNR 0141
      NID(K)=LEM9                                                       UNR 0142
      ABUNDI(K)=TEM10                                                   UNR 0143
  515 CONTINUE                                                          UNR 0144
  580 CONTINUE                                                          UNR 0145
      CALLTIMELAPS(1)                                                   UNR 0146
      NUNRES=0                                                          UNR 0147
      DO310LZ=1,NOMAT                                                   UNR 0148
      CMCOR=((XI(LZ)+1.)/XI(LZ))**2                                     UNR 0149
      CALLTIMEIT(0)                                                     UNR 0150
      IN=0                                                              UNR 0151
      LQ=0                                                              UNR 0152
      IF(CCONC(LZ)-1.E-20)11104,11105,11105                             UNR 0153
11104 NF=1                                                              UNR 0154
      GOTO11106                                                         UNR 0155
11105 NF=2                                                              UNR 0156
11106 CONTINUE                                                          UNR 0157
      IF(NUN(LZ)) 310,310,306                                           UNR 0158
  306 IS=ISO(LZ)                                                        UNR 0159
      NUNRES=NUNRES+1                                                   UNR 0160
      DO8II=1,IS                                                        UNR 0161
      LP=IN+LZ                                                          UNR 0162
      IN=IN+20                                                          UNR 0163
      LS=LST(LP)                                                        UNR 0164
      IF=IFI(LZ) +1                                                     UNR 0165
      NP=NPT(1 ,LP)                                                     UNR 0166
      DO307NN=1,NP                                                      UNR 0167
      SCUN(1 ,NN,II)=0.                                                 UNR 0168
      FUN(NN,II)=0.                                                     UNR 0169
  307 SFUN(1 ,NN,II)=0.                                                 UNR 0170
      GO TO(312,313)IF                                                  UNR 0171
  312 DO3310LL=1,LS                                                     UNR 0172
      JS=JST(LL,LP)                                                     UNR 0173
      NP=NPT(1 ,LP)                                                     UNR 0174
      DO3310NN=1,NP                                                     UNR 0175
      DELT=SQRTF(XI(LZ)/(3.4465E-4*ES(NN,1 ,LP)*TEMP(LZ)))              UNR 0176
      STE=SQRTF(ES(NN,1 ,LP))                                           UNR 0177
      S2=1.E-30                                                         UNR 0178
      SIGP=0.                                                           UNR 0179
      DO1100IZ=1,NOMAT                                                  UNR 0180
      DO1100K=1,MAXRES                                                  UNR 0181
      KK=NID(K)                                                         UNR 0182
      IF(KK-IZ)1100,1104,1100                                           UNR 0183
 1104 IF(KK-LZ)1130,1100,1130                                           UNR 0184
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 1130 GOTO(1108,1105),NF                                                    UNR 0185
 1105 IF(XI(KK)-100.) 1108,1100,1100                                        UNR 0186
 1108 EX=2.*(ES(NN,1 ,LP)-EN(K))/GAMT(K)                                    UNR 0187
      AX=EX*ZETAP(K)                                                        UNR 0188
      WHY=ZETAP(K)                                                          UNR 0189
      CALLQUICKW                                                            UNR 0190
      TEM1=ABSF(EN(K))                                                      UNR 0191
      S=ABUNDI(K)*ZETAP(K)*(SIG0(K)*1.77245385*REW*((GAMGAM(K)*GAF(K))/     UNR 0192
     1GAMT(K)*SQRTF(TEM1 /ES(NN,1 ,LP))+(GAMT(K)-GAMGAM(K)*GAF(K))/         UNR 0193
     2GAMT(K))*AFAC(K)*3.5449077*AIMW)                                      UNR 0194
      GOTO(1106,1107),NF                                                    UNR 0195
 1106 S2=S*CCONC(IZ)+S2                                                     UNR 0196
 1107 IF(XI(KK)-100.)11108,1100,1100                                        UNR 0197
11108 SIGP=S*FCONC(IZ)+SIGP                                                 UNR 0198
      GOTO(1100,11107),NF                                                   UNR 0199
11107 S2=S*CCONC(IZ)+S2                                                     UNR 0200
 1100 CONTINUE                                                              UNR 0201
      S2=S2+SIGMO                                                           UNR 0202
      SIGP=SIGP+SIGMI                                                       UNR 0203
      GOTO(1109,1110),NF                                                    UNR 0204
 1110 SIGP=(S2*AREA2+SIGP*AREA1)/((FCONC(LZ)*AREA1+CCONC(LZ)*AREA2)*        UNR 0205
     1ABUN(II,LZ))                                                          UNR 0206
      GOTO11110                                                             UNR 0207
 1109 GAMB=1./(1.+SEE2/S2)                                                  UNR 0208
      SEE=1.-GAMB**4*(1.-GAMB)              *GAMB                         UNR 0209
      SIGE=SEE1*(1.-SEE)*FACA/(1.+SEE*(FACA-1.))                            UNR 0210
      SIGP=(SIGP*SIGE)/(FCONC(LZ)*ABUN(II,LZ))                              UNR 0211
11110 DO3310JJ=1,JS                                                         UNR 0212
      BARJ=0.                                                               UNR 0213
      BARF=0.                                                               UNR 0214
  850 GOTO(317,318)LL                                                       UNR 0215
  317 V=AMU(LL,JJ,LP)                                                       UNR 0216
      GOTO319                                                               UNR 0217
  318 AAAA=AAA(LP)*STE                                                      UNR 0218
      V=AAAA**2/(1+AAAA**2)  *AMU(LL,JJ,LP)                                 UNR 0219
  319 SRE=STE*V                                                             UNR 0220
  851 NXXX=AMU(LL,JJ,LP)+1.0E-010                                           UNR 0221
      GO TO(320,321),LL                                                     UNR 0222
  320 LQ=JJ                                                                 UNR 0223
      GO TO 322                                                             UNR 0224
  321 LQ=JST(LL-1,LP)+JJ                                                    UNR 0225
  322 KI=0                                                                  UNR 0226
      DO311 J=1,10                                                          UNR 0227
      GN(J)=GN0(NN,LQ,LP)*SRE*X(J,NXXX)                                     UNR 0228
      GAM=GN(J)*GA(LL,JJ,LP)                                                UNR 0229
      ZI=GAM*DELT                                                           UNR 0230
      SIGZ=2.6E6*G(LL,JJ,LP)*GN(J)/ES(NN,1 ,LP)/GAM*CMCOR                   UNR 0231
      BETA=SIGP/SIGZ                                                        UNR 0232
      CALLQFJ                                                               UNR 0233
      BARF=BARF+GAM*FJF                                                     UNR 0234
  311 BARJ=BARJ+FJF                                                         UNR 0235
      KI=1                                                                  UNR 0236
      BARJ=.10*BARJ                                                         UNR 0237
      BARF=.10*BARF                                                         UNR 0238
      TEMPA=BARF*ABUN(II,LZ)/D(LL,JJ,LP)                                    UNR 0239
      FUN(NN,II)=FUN(NN,II)+TEMPA                                           UNR 0240
      IF(NJINT.NE.0) TEMPA=0.                                               UNR 0241
  309 SCUN(1 ,NN,II)=SCUN(1 ,NN,II)+GA(LL,JJ,LP)*SIGP*BARJ/D(LL,JJ,LP)*     UNR 0242
     1ABUN(II,LZ)/(1.-TEMPA)                                                UNR 0243
 3310 CONTINUE                                                              UNR 0244
      NP=NPT(1 ,LP)                                                         UNR 0245
      WRITE(2)LZ,1 ,NP, (ES(NN,1 ,LP),SCUN(1 ,NN,II),SFUN(1 ,NN,II),       UNR 0246
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     1NN=1,NP)                                                          UNR 0247
      IF(KT1)341,341,340                                                UNR 0248
  340 WRITE(6,342)                                                      UNR 0249
     1NUCID(LZ) ,LS,NP, (ES(NN,1 ,LP),SCUN(1 ,NN,II),SFUN(1 ,NN,II),   UNR 0250
     1FUN(NN,II),NN=1,NP)                                               UNR 0251
  342 FORMAT(9H1 MAT, NOA6,4X,I6,9H L STATES,I6,9H E POINTS/(4E18,5))   UNR 0252
  341 CONTINUE                                                          UNR 0253
      GOTO8                                                             UNR 0254
C AVERAGE OVER FISSION WIDTHS                                           UNR 0255
  313 CONTINUE                                                          UNR 0256
      NP=NPT(1 ,LP)                                                     UNR 0257
      DO315LL=1,LS                                                      UNR 0258
      JS=JST(LL,LP)                                                     UNR 0259
      DO315NN=1,NP                                                      UNR 0260
      DELT=SQRTF(XI(LZ)/(3.4465E-4*ES(NN,1 ,LP)*TEMP(LZ)))              UNR 0261
      STE=SQRTF(ES(NN,1 ,LP))                                           UNR 0262
      S2=1.E-30                                                         UNR 0263
      SIGP=0.                                                           UNR 0264
      DO1300IZ=1,NOMAT                                                  UNR 0265
      DO1300K=1,MAXRES                                                  UNR 0266
      KK=NID(K)                                                         UNR 0267
      IF(KK-IZ)1300,1304,1300                                           UNR 0268
 1304 IF(KK-LZ)1330,1300,1330                                           UNR 0269
 1330 GOTO(1308,1305),NF                                                UNR 0270
 1305 IF(XI(KK)-100.) 1308,1300,1300                                    UNR 0271
 1308 EX=2.*(ES(NN,1 ,LP)-EN(K))/GAMT(K)                                UNR 0272
      AX=EX*ZETAP(K)                                                    UNR 0273
      WHY=ZETAP(K)                                                      UNR 0274
      CALLQUICKW                                                        UNR 0275
      TEM1=ABSF(EN(K))                                                  UNR 0276
      S=ABUNDI(K)*ZETAP(K)*(SIG0(K)*1.77245385*REW*((GAMGAM(K)*GAF(K))/ UNR 0277
     1GAMT(K)*SQRTF(TEM1 /ES(NN,1 ,LP))*(GAMT(K)-GAMGAM(K)*GAF(K))/     UNR 0278
     2GAMT(K))*AFAC(K)*3.5449077*AIMW)                                  UNR 0279
      GOTO(1306,1307),NF                                                UNR 0280
 1306 S2=S*CCONC(IZ)+S2                                                 UNR 0281
 1307 IF(XI(KK)-100.)11308,1300,1300                                    UNR 0282
11308 SIGP=S*FCONC(IZ)+SIGP                                             UNR 0283
      GOTO(1300,11307),NF                                               UNR 0284
11307 S2=S*CCONC(IZ)+S2                                                 UNR 0285
 1300 CONTINUE                                                          UNR 0286
      S2=S2+SIGMO                                                       UNR 0287
      SIGP=SIGP+SIGMI                                                   UNR 0288
      GOTO(1309,1310),NF                                                UNR 0289
 1310 SIGP=(S2*AREA2+SIGP*AREA1)/((FCONC(LZ)*AREA1+CCONC(LZ)*AREA2)*    UNR 0290
     1ABUN(II,LZ))                                                      UNR 0291
      GOTO11310                                                         UNR 0292
 1309 GAMB=1./(1.+SEE2/S2)                                              UNR 0293
      SEE=1.-GAMB**4*(1.-GAMB)              -GAMB                       UNR 0294
      SIGE=SEE1*(1.-SEE)*FACA/(1.+SEE*(FACA-1.))                        UNR 0295
      SIGP=(SIGP+SIGE)/(FCONC(LZ)*ABUN(II,LZ))                          UNR 0296
11310 DO315 JJ=1,JS                                                     UNR 0297
      BARJ=0.                                                           UNR 0298
      BARF=0.                                                           UNR 0299
      GFBARJ=0.                                                         UNR 0300
  852 GOTO(347,348)LL                                                   UNR 0301
  347 V=AMU(LL,JJ,LP)                                                   UNR 0302
      GOTO349                                                           UNR 0303
  348 AAAA=AAA(LP)*STE                                                  UNR 0304
      V=AAAA**2/(1+AAAA**2)  *AMU(LL,JJ,LP)                             UNR 0305
  349 SRE=STE*V                                                         UNR 0306
  853 NXXX=AMU(LL,JJ,LP)+1.0E-010                                       UNR 0307
      NUT=NU(LL,JJ,LP)                                                  UNR 0308
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      GOTO(394,395),LL                                                  UNR 0309
  394 LQ=JJ                                                             UNR 0310
      GOTO393                                                           UNR 0311
  395 LQ=JST(LL-1,LP)+JJ                                                UNR 0312
  393 KI=0                                                              UNR 0313
      DO316J=1,10                                                       UNR 0314
      GN(J)=GN0(NN,LQ,LP)*SRE*X(J,NXXX)                                 UNR 0315
      DO316K=1,5                                                        UNR 0316
      GFF(K)=GF(NN,LQ,LP)*Y(K,NUT)                                      UNR 0317
      GAM=GN(J)*GFF(K)*GA(LL,JJ,LP)                                     UNR 0318
      ZI=GAM*DELT                                                       UNR 0319
      SIGZ=2.6E6*G(LL,JJ,LP)*GN(J)/ES(NN,1 ,LP)/GAM*CMCOR               UNR 0320
      BETA=SIGP/SIGZ                                                    UNR 0321
      CALLQFJ                                                           UNR 0322
      BARF=BARF+GAM*FJF                                                 UNR 0323
      BARJ=BARJ+FJF                                                     UNR 0324
  316 GFBARJ=GFBARJ+FJF*GFF(K)                                          UNR 0325
      KI=1                                                              UNR 0326
      BARJ=.02*BARJ                                                     UNR 0327
      BARF=.02*BARF                                                     UNR 0328
      GFBARJ=.02*GFBARJ                                                 UNR 0329
      TEMPA=BARF*ABUN(II,LZ)/D(LL,JJ,LP)                                UNR 0330
      FUN(NN,II)=FUN(NN,II)+TEMPA                                       UNR 0331
      IF(NJINT,NE,0) TEMPA=0.                                           UNR 0332
 3315 SCUN(1 ,NN,II)=SCUN(1 ,NN,II)+GA(LL,JJ,LP)*SIGP*BARJ/D(LL,JJ,LP)* UNR 0333
     1ABUN(II,LZ)/(1.+TEMPA)                                            UNR 0334
      SFUN(1 ,NN,II)=SFUN(1 ,NN,II)+SIGP*GFBARJ/D(LL,JJ,LP)*ABUN(II,LZ) UNR 0335
     1/(1.+TEMPA)                                                       UNR 0336
  315 CONTINUE                                                          UNR 0337
      NP=NPT(1 ,LP)                                                     UNR 0338
      WRITE(2)LZ,1 ,NP, (ES(NN,1 ,LP),SCUN(1 ,NN,II),SFUN(1 ,NN,II),   UNR 0339
     1NN=1,NP )                                                         UNR 0340
      IF(KT1)351,351,350                                                UNR 0341
  350 WRITE(6,342)                                                      UNR 0342
     1NUCID(LZ) ,LS,NP, (ES(NN,1 ,LP),SCUN(1 ,NN,II),SFUN(1 ,NN,II),   UNR 0343
     1FUN(NN,II),NN=1,NP)                                               UNR 0344
  351 CONTINUE                                                          UNR 0345
    8 CONTINUE                                                          UNR 0346
      CALLTIMELAPS(2)                                                   UNR 0347
  310 CONTINUE                                                          UNR 0348
      RETURN                                                            UNR 0349
      END                                                               UNR 0350
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      SUBROUTINEQFJ                                                     QFJ 0000
      COMMON/TRTI/TR(62,62),TI(62,62),AIMW,AX,KI,REW,WHY                QFJ 0001
      COMMON/4900/AAA(80),ABUNDI(800),AFAC(800),EN(800),GAF(800),       QFJ 0002
     1GAMGAM(800),GAMT(800),IFI(20)                                     QFJ 0003
      COMMON/4340/AREA1,AREA2,A0(20),A1(20),A2(20),A3(20),BETA,FWF,     QFJ 0004
     1JST(2,80),MAXRES,NID(800),NUN(20),SEE1,SEE2,SIGMI,SIGMO,SIG0(800),QFJ 0005
     2XIAV(20),ZETAP(800),ZI                                            QFJ 0006
      EQUIVALENCE (ZETA,ZI),(TOT2,FWF)                                  QFJ 0007
      DIMENSION X(4),WT(8),ZLP(8)                                       QFJ 0008
      DATA((ZLP(I),I=1,8)=0.0950125098,0.2816035507,0.4580167776,       QFJ 0009
     1 0.6178762444,0.7554044083,0.8656312023,0.9445750230,0.9894009350),QFJ 0010
     2((WT(J),J=1,8)=0.1894506105,0.1826034150,0.1691565194,            QFJ 0011
     3 0.1495959888,0.1246289712,0.0951585116,0.0622535239,0.0271524594) QFJ 0012
      X(1)=0.                                                           QFJ 0013
      X(2)=20./ZETA                                                     QFJ 0014
      X(3)=10.*X(2)                                                     QFJ 0015
      TOT2=0.                                                           QFJ 0016
      DO51I=1,2                                                         QFJ 0017
      TOT=0.                                                            QFJ 0018
      XM=(X(I+1)-X(I))*.5                                               QFJ 0019
      XP=(X(I+1)+X(I))*.5                                               QFJ 0020
      WHY=ZETA*.5                                                       QFJ 0021
      DO50M=1,8                                                         QFJ 0022
      AX=( XM*ZLP(M)+XP)*ZETA*.5                                        QFJ 0023
      CALLQUICKW                                                        QFJ 0024
      A=ZETA*.8862269*REW/(ZETA*.8862269*REW+BETA)                      QFJ 0025
      AX=(-XM*ZLP(M)+XP)*ZETA*.5                                        QFJ 0026
      CALLQUICKW                                                        QFJ 0027
      B=ZETA*.8862269*REW/(ZETA*.8862269*REW+BETA)                      QFJ 0028
   50 TOT=TOT+WT(M)*(A+B)                                               QFJ 0029
      TOT=XM*TOT                                                        QFJ 0030
   51 TOT2=TOT2+TOT                                                     QFJ 0031
      TOT2=(1.570796-ATANF(X(3)*SQRTF(BETA/(1.+BETA))))                 QFJ 0032
     1/SQRTF(BETA*(1.+BETA))  +TOT2                                     QFJ 0033
      RETURN                                                            QFJ 0034
      END                                                               QFJ 0035
```

```
C**********SEGMENT 2*************************************************************
      PROGRAM RESRES                                                        RES 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,EEE(71),EMAX,      RES 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),       RES 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,       RES 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,         RES 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,     RES 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,          RES 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                    RES 0007
      COMMON/TRTI/TR(62,62),TI(62,62),AIMW,AX,KI,REW,WHY                    RES 0008
      COMMON/4900/AAA(80),ABUNDI(800),AFAC(800),EN(800),GAF(800),           RES 0009
     1GAMGAM(800),GAMT(800),IFI(20)                                         RES 0010
      COMMON/4340/AREA1,AREA2,A0(20),A1(20),A2(20),A3(20),BETA,FJF,         RES 0011
     1JST(2,80),MAXRES,NID(800),NUN(20),SEE1,SEE2,SIGMI,SIGMO,SIG0(800),   RES 0012
     2XIAV(20),ZETAP(800),ZI,CAPT2(800),FAC4(800),XI(20)                    RES 0013
      COMMON/1000/AMICAP(20),AMIFIS(20),U(802)                              RES 0014
      COMMON/FLXCOR/PHIIN(2100)                                             RES 0015
      COMMON/2101/E(2101)                                                   RES 0016
      EQUIVALENCE(SIG0(1),FAC1(1)),(GAMGAM(1),FAC3(1)),(GAF(1),FAC2(1)),    RES 0017
     1(CAPT1(1),AFAC(1))                                                    RES 0018
      DIMENSION CAPT1(800),FAC1(800),FAC2(800),FAC3(800),                   RES 0019
     1LFAC(800),PHIOUT(2100),T(802,17)                                      RES 0020
      KI=1                                                                  RES 0021
      E(1)=EMIN                                                             RES 0022
      IF(NDELU.EQ.1) DELU=DELUN                                             RES 0023
      NOMAT=NOI                                                             RES 0024
      JL1=1                                                                 RES 0025
      JU=MAXRES                                                             RES 0026
      IF(MAXRES)10,10,565                                                   RES 0027
   10 NINT1R=0                                                              RES 0028
      GOTO737                                                               RES 0029
  565 DO1515J=1,MAXRES                                                      RES 0030
      TEM1=ABUNDI(J)*SIG0(J)*ZETAP(J)*1,77245385                            RES 0031
      TEM2=TEM1/GAMT(J)                                                     RES 0032
      FAC1(J)=TEM2*GAMGAM(J)*SQRTF(ABSF(EN(J)))                             RES 0033
      FAC4(J)=GAF(J)/GAMGAM(J)                                              RES 0034
      TEM3=TEM2*(GAMT(J)-GAMGAM(J)-GAF(J))                                  RES 0035
      FAC3(J)=ABUNDI(J)*AFAC(J)*ZETAP(J)*3,5449077                          RES 0036
      FAC2(J)=TEM3                                                          RES 0037
      GAMT(J)=1./GAMT(J)                                                    RES 0038
 1515 CONTINUE                                                              RES 0039
      EEE=EN(MAXRES)                                                        RES 0040
      II=LOGF(EEE/EMIN)/DELU+1.                                             RES 0041
 1501 NINT1R=II                                                             RES 0042
      EDEL=EXPF(DELU )                                                      RES 0043
      IFLAG=1                                                               RES 0044
      IS=1                                                                  RES 0045
      DO724J=1,2100                                                         RES 0046
      HOMBRG(J)=0.                                                          RES 0047
      HOMCAP(J)=0.                                                          RES 0048
  724 HOMFIS(J)=0.                                                          RES 0049
      CALLTIMEIT(0)                                                         RES 0050
  663 DO550I=IS,NINT1R                                                      RES 0051
      DO5410IN=1,NOI                                                        RES 0052
      AMICAP(IN)=0.                                                         RES 0053
      AMIFIS(IN)=0.                                                         RES 0054
 5410 CONTINUE                                                              RES 0055
      E(I+1)=E(I)*EDEL                                                      RES 0056
      IF(E(I+1)-EMAX)809,809,810                                            RES 0057
  810 NINT1R=I+1                                                            RES 0058
      GOTO660                                                               RES 0059
  809 GO TO (555,64100),IFLAG                                               RES 0060
```

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  555 JL=JL1                                                                    RES 0061
      JSIGN=1                                                                   RES 0062
      JSIGN1=1                                                                  RES 0063
      JUD=0                                                                     RES 0064
      JUP=0                                                                     RES 0065
      KFLAG=1                                                                   RES 0066
      JL1P=32000                                                                RES 0067
      KI=1                                                                      RES 0068
  517 DO525J=JL,MAXRES                                                          RES 0069
      EX=(E(I+1)/EN(J))**2,**GAMT(J)                                            RES 0070
      AX=EX*ZETAP(J)                                                            RES 0071
      WHY=ZETAP(J)                                                              RES 0072
      CALLQUICKW                                                                RES 0073
      CAPTURE=FAC1(J)*(1.+FAC40(J))*REW/SQRTF(E(I+1))                           RES 0074
      IF(CAPTURE.GT.EPSABS.OR.CAPTURE*FAC2(J)*REW*FAC3(J)*AIMW.GT.EPSABSRES 0075
     1)519,518                                                                  RES 0076
  519 JU=J                                                                      RES 0077
  567 GOTO(520,525),JSIGN                                                       RES 0078
  520 JL1=J                                                                     RES 0079
      JSIGN=2                                                                   RES 0080
      GOTO525                                                                   RES 0081
  518 IF(E(I+1)-EN(J))521,521,522                                               RES 0082
  522 JUP=J                                                                     RES 0083
      JUD=1                                                                     RES 0084
  568 IF(JUP-MAXRES)525,523,523                                                 RES 0085
  523 IF(JSIGN*JSIGN1-2)524,524,525                                             RES 0086
  524 IFLAG=2                                                                   RES 0087
      GOTO525                                                                   RES 0088
  521 GOTO(526,525),JSIGN1                                                      RES 0089
  526 JL1P=J                                                                    RES 0090
      JSIGN1=2                                                                  RES 0091
  525 CONTINUE                                                                  RES 0092
      KI=1                                                                      RES 0093
      IF(JSIGN1-JSIGN*JUD.LE.0) GO TO 527                                       RES 0094
      KFLAG=2                                                                   RES 0095
      JL=JL1P                                                                   RES 0096
      JU=JL1P                                                                   RES 0097
      JL1=JL1P                                                                  RES 0098
      GO TO 569                                                                 RES 0099
  527 JU=XMAX0F(JU,JUP)                                                         RES 0100
      IF(JSIGN-1)738,738,739                                                    RES 0101
  738 JL1=JL1P                                                                  RES 0102
  739 JL1=XMIN0F(JL1,JL1P)                                                      RES 0103
  569 IF(KT2)1527,1527,11527                                                    RES 0104
 1000 FORMAT(11I10)                                                             RES 0105
11527 PRINT 1000,JU,JUP,JL1,JL1P,JSIGN,JSIGN1,JL,JUD,IFLAG,KFLAG               RES 0106
 1527 CONTINUE                                                                  RES 0107
 1706 CONTINUE                                                                  RES 0108
      EL=E(I+1)-E(I)                                                            RES 0109
      FLUXIN=0.                                                                 RES 0110
      FLUXON=0.                                                                 RES 0111
      EVEN=1./SQRTF(E(I+1))                                                     RES 0112
      DIN=0.                                                                    RES 0113
      DON=1.E-20                                                                RES 0114
      TIN=0.                                                                    RES 0115
      TON=1.E-20                                                                RES 0116
      EVAR=1./SQRTF(E(I))                                                       RES 0117
      DO531J=JL,JU                                                              RES 0118
      M=J-JL+1                                                                  RES 0119
      KK=NID(J)                                                                 RES 0120
      EX=(E(I)-EN(J))**2,**GAMT(J)                                              RES 0121
      AX=EX*ZETAP(J)                                                            RES 0122
```

```
      WHY=ZETAP(J)                                                      RES 0123
      CALLQUICKW                                                        RES 0124
      CAPT1(M)=FAC1(J)*REW*EVAR                                         RES 0125
      TEM=(FAC1(J)*(1.+FAC4(J))*EVAR+FAC2(J))*REW+FAC3(J)*AIMW          RES 0126
      TEM1=CAPT1(M)*(1.+FAC4(J))                                        RES 0127
      EX=(E(I+1)-EN(J))*2.*GAMT(J)                                      RES 0128
      AX=EX*ZETAP(J)                                                    RES 0129
      WHY=ZETAP(J)                                                      RES 0130
      CALLQUICKW                                                        RES 0131
      CAPT2(M)=FAC1(J)*REW*EVEN                                         RES 0132
      TEN=(FAC1(J)*(1.+FAC4(J))*EVEN+FAC2(J))*REW+FAC3(J)*AIMW          RES 0133
      TEN1=CAPT2(M)*(1.+FAC4(J))                                        RES 0134
      IF(ABSF(TEN)+ABSF(TEM)-EPSTOT)5000,5000,5310                      RES 0135
 5000 IF(E(I).LT.EN(J).AND.E(I+1).LT.EN(J).OR.E(I).GT.EN(J).AND.E(I+1).  RES 0136
     1GT.EN(J))5001,5310                                                RES 0137
 5001 LFAC(J)=0                                                         RES 0138
      FLUXIN=(TEM+TEN)*.5*FCONC(KK)*FLUXIN                              RES 0139
      FLUXON=(TEM+TEN)*.5*CCONC(KK)*FLUXON                              RES 0140
      IF(TEN1+TEM1-EPSABS)5312,5312,531                                 RES 0141
 5312 LFAC(J)=-1                                                        RES 0142
      GOTO531                                                           RES 0143
 5310 LFAC(J)=1                                                         RES 0144
      DIN=FCONC(KK)*TEM+DIN                                             RES 0145
      DON=CCONC(KK)*TEM+DON                                             RES 0146
      TIN=FCONC(KK)*TEN+TIN                                             RES 0147
      TON=CCONC(KK)*TEN+TON                                             RES 0148
  531 CONTINUE                                                          RES 0149
      DIN=DIN*FLUXIN                                                    RES 0150
      DON=DON*FLUXON                                                    RES 0151
      CTC=DON*SIGMO                                                     RES 0152
      DON=((DON*SIGMO)*AREA2+(DIN*SIGMI)*AREA1)/(AREA1*AREA2)           RES 0153
      DIN=DIN*SIGMI                                                     RES 0154
      GAMBN=1./(1.+SEE2/CTC)                                            RES 0155
      SEEN=1.-GAMBN-GAMBN**4*(1.-GAMBN)                                 RES 0156
      SIGEN=SEE1*(1.-SEEN)*FACA/(1.+SEEN*(FACA-1.))                     RES 0157
      DIN=DIN*SIGEN                                                     RES 0158
      DIN1=1./DIN                                                       RES 0159
      DON1=1./DON                                                       RES 0160
      DIN=TIN*FLUXIN                                                    RES 0161
      DON=TON*FLUXON                                                    RES 0162
      CTC=DON*SIGMO                                                     RES 0163
      DON=((DON*SIGMO)*AREA2+(DIN*SIGMI)*AREA1)/(AREA1*AREA2)           RES 0164
      DIN=DIN*SIGMI                                                     RES 0165
      GAMBN=1./(1.+SEE2/CTC)                                            RES 0166
      SEEN=1.-GAMBN-GAMBN**4*(1.-GAMBN)                                 RES 0167
      SIGEN=SEE1*(1.-SEEN)*FACA/(1.+SEEN*(FACA-1.))                     RES 0168
      DIN=DIN*SIGEN                                                     RES 0169
      DIN=1./DIN                                                        RES 0170
      DON=1./DON                                                        RES 0171
      DO532J=JL,JU                                                      RES 0172
      IF(LFAC(J).LT.0)GOTO532                                           RES 0173
      M=J-JL+1                                                          RES 0174
      KK=NID(J)                                                         RES 0175
  579 IF(CCONC(KK)-1.E-20)5579,5579,5580                                RES 0176
 5579 T(M,1)=(CAPT1(M)*DIN1+CAPT2(M)*DIN)*.5                            RES 0177
      GOTO532                                                           RES 0178
 5580 T(M,1)=(CAPT1(M)*DON1+CAPT2(M)*DON)*.5                            RES 0179
  532 CONTINUE                                                          RES 0180
      T(801,1)=(DIN+DIN1)*.5                                            RES 0181
      T(802,1)=(DON+DON1)*.5                                            RES 0182
      TIN=1./T(801,1)                                                   RES 0183
      TON=1./T(802,1)                                                   RES 0184
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      DO 5543 J=JL,JU                                                   RES 0185
      IF(LFAC(J).LT.0)GOTO5543                                          RES 0186
      M=J-JL+1                                                          RES 0187
      KK=NID(J)                                                         RES 0188
 5545 CAPT2(M)=T(M,1)                                                   RES 0189
 5543 CONTINUE                                                          RES 0190
      N=1                                                               RES 0191
      MAXORD=16                                                         RES 0192
      IF(KT1)570,570,543                                                RES 0193
  543 WRITE(6,405)I,E(I),E(I+1)                                         RES 0194
  570 DO540KH=1,MAXORD                                                  RES 0195
      DO533J=JL,JU                                                      RES 0196
      IF(LFAC(J).LT.0.OR.LFAC(J).EQ.2)GOTO533                           RES 0197
      M=J-JL+1                                                          RES 0198
      U(M)=0.                                                           RES 0199
  533 CONTINUE                                                          RES 0200
      U(801)=0.                                                         RES 0201
      U(802)=0.                                                         RES 0202
      AN=1./N                                                           RES 0203
      EM=EL**.5*AN                                                      RES 0204
      LIMJ=2*N-1                                                        RES 0205
      DO536JR=1,LIMJ,2                                                  RES 0206
      AJR=JR                                                            RES 0207
      EVAR=E(I)+AJR*EM                                                  RES 0208
      TEM2=1./SQRTF(EVAR)                                               RES 0209
      DIN=0.                                                            RES 0210
      DON=1.E-20                                                        RES 0211
      DO534J=JL,JU                                                      RES 0212
      IF(LFAC(J))534,6534,6535                                          RES 0213
 6535 KI=1                                                              RES 0214
      GOTO6536                                                          RES 0215
 6534 KI=0                                                              RES 0216
 6536 CONTINUE                                                          RES 0217
      M=J-JL+1                                                          RES 0218
      KK=NID(J)                                                         RES 0219
 5534 EX=(EVAR-EN(J))*2.-GAMT(J)                                        RES 0220
      AX=EX*ZETAP(J)                                                    RES 0221
      WHY=ZETAP(J)                                                      RES 0222
      CALLQUICKW                                                        RES 0223
      CAPT1(M)=FAC1(J)*REW*TEM2                                         RES 0224
      IF(LFAC(J).EQ.0) GO TO 534                                        RES 0225
      TEM1=CAPT1(M)*(1.+FAC4(J))                                        RES 0226
      TEM=TEM1+FAC2(J)*REW+FAC3(J)*AIMW                                 RES 0227
      DIN=FCONC(KK)*TEM+DIN                                             RES 0228
      DON=CCONC(KK)*TEM+DON                                             RES 0229
  534 CONTINUE                                                          RES 0230
      DIN=DIN+FLUXIN                                                    RES 0231
      DON=DON+FLUXON                                                    RES 0232
      CTC=DON+SIGMO                                                     RES 0233
      DON=((DON+SIGMO)*AREA2+(DIN+SIGMI)*AREA1)/(AREA1*AREA2)           RES 0234
      DIN=DIN+SIGMI                                                     RES 0235
      GAMBN=1./(1.+SEE2/CTC)                                            RES 0236
      SEEN=1.-GAMBN-GAMBN**4*(1.-GAMBN)                                 RES 0237
      SIGEN=SEE1*(1.-SEEN)*FACA/(1.+SEEN*(FACA-1.))                     RES 0238
      DIN=DIN+SIGEN                                                     RES 0239
99900 FORMAT(8E15.4)                                                    RES 0240
      DIN=1./DIN                                                        RES 0241
      DON=1./DON                                                        RES 0242
      DO535J=JL,JU                                                      RES 0243
      IF(LFAC(J).LT.0.OR.LFAC(J).EQ.2)GOTO535                           RES 0244
      M=J-JL+1                                                          RES 0245
      KK=NID(J)                                                         RES 0246
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      IF(CCONC(KK)-1.E-20)581,581,5581                                  RES 0247
  581 U(M)=CAPT1(M)*DIN+U(M)                                            RES 0248
      GOTO535                                                           RES 0249
 5581 U(M)=CAPT1(M)*DON+U(M)                                            RES 0250
  535 CONTINUE                                                          RES 0251
      U(801)=DIN*U(801)                                                 RES 0252
      U(802)=DON*U(802)                                                 RES 0253
  536 CONTINUE                                                          RES 0254
      DO537J=JL,JU                                                      RES 0255
      IF(LFAC(J).LT.0.OR.LFAC(J).EQ.2)GOTO537                           RES 0256
      M=J=JL+1                                                          RES 0257
      T(M,KH+1)=(U(M)*AN+T(M,KH))*.5                                    RES 0258
  537 CONTINUE                                                          RES 0259
      T(801,KH+1)=(U(801)*AN+T(801,KH))*.5                              RES 0260
      T(802,KH+1)=(U(802)*AN+T(802,KH))*.5                              RES 0261
      AKF=1.                                                            RES 0262
      DO1539JJP=1,KH                                                    RES 0263
  538 AKF=.4*AKF                                                        RES 0264
      AKP=1./(AKF+1.)                                                   RES 0265
      JR=KH-JJP+1                                                       RES 0266
      DO539J=JL,JU                                                      RES 0267
      IF(LFAC(J).LT.0.OR.LFAC(J).EQ.2)GOTO539                           RES 0268
      M=J=JL+1                                                          RES 0269
      T(M,JR)=T(M,JR+1)+(T(M,JR+1)-T(M,JR))*AKP                         RES 0270
  539 CONTINUE                                                          RES 0271
      T(801,JR)=T(801,JR+1)+(T(801,JR+1)-T(801,JR))*AKP                 RES 0272
      T(802,JR)=T(802,JR+1)+(T(802,JR+1)-T(802,JR))*AKP                 RES 0273
 1539 CONTINUE                                                          RES 0274
 1540 N=2*N                                                             RES 0275
      TIN=1./T(801,1)                                                   RES 0276
      TON=1./T(802,1)                                                   RES 0277
      MORE=0                                                            RES 0278
      DO5400J=JL,JU                                                     RES 0279
      IF(LFAC(J).LT.0.OR.LFAC(J).EQ.2)GOTO5400                          RES 0280
      M=J=JL+1                                                          RES 0281
      KK=NID(J)                                                         RES 0282
      TEM6=T(M,1)                                                       RES 0283
 5407 IF(ABSF(TEM6-CAPT2(M))/TEM6-ERSINT) 541,541,5408                  RES 0284
  541 IF(LFAC(J).EQ.0) LFAC(J)=-2                                       RES 0285
      ABCD=T(M,1)*EL                                                    RES 0286
      ABCDI=EL/TIN                                                      RES 0287
      ABCDO=EL/TON                                                      RES 0288
 5417 IF(KT2)5404,5404,5405                                             RES 0289
 5405 WRITE(6,406) NUCID(KK),EN(J),ABCD,ABCDI,ABCDO,     SIGMI,KH       RES 0290
  406 FORMAT(1XA6,5E12.4,I4)                                            RES 0291
 5404 IF(LFAC(J).EQ.1) LFAC(J)=2                                        RES 0292
      GO TO 5400                                                        RES 0293
 5408 CAPT2(M)=TEM6                                                     RES 0294
      MORE=1                                                            RES 0295
 5400 CONTINUE                                                          RES 0296
      IF(MORE) 594,594,540                                              RES 0297
  540 CONTINUE                                                          RES 0298
      PRINT99999,I                                                      RES 0299
99999 FORMAT(1H0*   MAXORDER EXCEEDED GROUP*I6)                         RES 0300
  594 DO 6410 J=JL,JU                                                   RES 0301
      IF(LFAC(J).EQ.-1) GO TO 6410                                      RES 0302
      M=J=JL+1                                                          RES 0303
      KK=NID(J)                                                         RES 0304
      IF(CCONC(KK)-1.E-20) 6411,6412,6412                               RES 0305
 6411 RIN=T(M,1)*TIN                                                    RES 0306
      GO TO 5413                                                        RES 0307
 6412 RIN=T(M,1)*TON                                                    RES 0308
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 5413 CONTINUE                                                          RES 0309
      RIC=RIN                                                           RES 0310
      AMICAP(KK)=AMICAP(KK)*RIC                                         RES 0311
      RIF=FAC4(J)*RIC                                                   RES 0312
      AMIFIS(KK)=AMIFIS(KK)*RIF                                         RES 0313
 6410 CONTINUE                                                          RES 0314
64100 IF(KT1)5411,5411,5412                                             RES 0315
 5412 PRINT 25413,(NUCID(LZ),AMICAP(LZ),AMIFIS(LZ),LZ=1,NOI)            RES 0316
25413 FORMAT(3(5XA6,2E15.5))                                            RES 0317
 5411 CONTINUE                                                          RES 0318
      IF(NMIC.GT.0)GO TO 12345                                          RES 0319
      WRITE(3)(AMICAP(LZ),AMIFIS(LZ),LZ=1,NOI)                          RES 0320
12345 CONTINUE                                                          RES 0321
      DO5414LZ=1,NOI                                                    RES 0322
      HOMBRG(I)=          AMIFIS(LZ)*ADEN(LZ)+HOMBRG(I)                 RES 0323
      HOMCAP(I)=        (AMICAP(LZ)+AMIFIS(LZ))*ADEN(LZ)+HOMCAP(I)      RES 0324
      GO TO (15414,25414,35414),KTFLUX                                  RES 0325
15414 TEMNU=A0(LZ)+A1(LZ)*(E(I+1)-E(I))/DELU+A2(LZ)*(E(I+1)**2-E(I)**2)/RES 0326
     1(2.*DELU)+A3(LZ)*(E(I+1)**3-E(I)**3)/(3.*DELU)                    RES 0327
      GO TO 45414                                                       RES 0328
25414 TEMNU=(1./(E(I+1)-E(I)))*(A0(LZ)*(E(I+1)-E(I))+A1(LZ)*(E(I+1)**2  RES 0329
     1-E(I)**2)/2.+A2(LZ)*(E(I+1)**3-E(I)**3)/3.+A3(LZ)*(E(I+1)**4      RES 0330
     2-E(I)**4)/4.)                                                     RES 0331
      GO TO 45414                                                       RES 0332
35414 TEMNU=(2./(E(I+1)**2-E(I)**2))*(A0(LZ)*(E(I+1)**2-E(I)**2)/2.,    RES 0333
     1+A1(LZ)*(E(I+1)**3-E(I)**3)/3.+A2(LZ)*(E(I+1)**4-E(I)**4)/4.,     RES 0334
     2+A3(LZ)*(E(I+1)**5-E(I)**5)/5.)                                   RES 0335
45414 HOMFIS(I)=HOMFIS(I)+          AMIFIS(LZ)*ADEN(LZ)*TEMNU           RES 0336
 5414 CONTINUE                                                          RES 0337
      PHIIN(I)=EL/TIN                                                   RES 0338
      PHIOUT(I)=EL/TON                                                  RES 0339
  550 CONTINUE                                                          RES 0340
      CALLTIMELAPS(3)                                                   RES 0341
      IF(HOMCAP(NINT1R)-1.E-10)660,660,661                              RES 0342
  661 NINT1R=NINT1R+1                                                   RES 0343
      IS=NINT1R                                                         RES 0344
      GOTO663                                                           RES 0345
  660 CONTINUE                                                          RES 0346
      IF(KT4)737,737,728                                                RES 0347
  728 WRITEOUTPUTTAPE6,409                                              RES 0348
  409 FORMAT(41H MACROSCOPIC CROSS SECTIONS - HOMOGENIZED//              RES 0349
     14X1HI5X4HE(I)10X6HSIGABS9X6HSIGFIS10X9HNU SIGFIS//)               RES 0350
  576 WRITE(6,405)(I,E(I),HOMCAP(I),HOMBRG(I),HOMFIS(I),I=1,NINT1R)     RES 0351
  405 FORMAT(I6,E12.5,2E15.5,E17.5)                                     RES 0352
  737 CONTINUE                                                          RES 0353
      IF(NMIC.NE.0) GO TO 729                                           RES 0354
      NT2=NINT1R/2                                                      RES 0355
      DO 1600 I=1,NT2                                                   RES 0356
      II=NINT1R+1-I                                                     RES 0357
      FLX=PHIIN(II)                                                     RES 0358
      FLX1=PHIOUT(II)                                                   RES 0359
      PHIIN(II)=PHIIN(I)                                                RES 0360
      PHIOUT(II)=PHIOUT(I)                                              RES 0361
      PHIIN(I)=FLX                                                      RES 0362
 1600 PHIOUT(I)=FLX1                                                    RES 0363
      WRITE(3)(PHIIN(I),PHIOUT(I),I=1,NINT1R)                           RES 0364
  729 READTAPE9                                                         RES 0365
      IF(EOF,9)730,729                                                  RES 0366
  730 RETURN                                                            RES 0367
      END                                                               RES 0368
```

```
C**********OVERLAY 3*************************************************************
      PROGRAM CONTROL1                                                  CO1 0000
      COMMON/OVLY3/ HOLD(42201)                                         CO1 0001
      CALLFIGERO                                                        CO1 0002
      IFDIVIDECHECK1003,1012                                            CO1 0003
 1003 WRITEOUTPUTTAPE6,577                                              CO1 0004
  577 FORMAT(10H1DVCK FIGR)                                             CO1 0005
 1012 CONTINUE                                                          CO1 0006
      CALLINSCAT                                                        CO1 0007
      IFDIVIDECHECK1004,1013                                            CO1 0008
 1004 WRITEOUTPUTTAPE6,578                                              CO1 0009
  578 FORMAT(10H1DVCK INSC)                                             CO1 0010
 1013 CONTINUE                                                          CO1 0011
      CALLTIMEIT(0)                                                     CO1 0012
      CALLSOURCE                                                        CO1 0013
      CALLTIMELAPS(6)                                                   CO1 0014
      IFDIVIDECHECK1005,1014                                            CO1 0015
 1005 WRITEOUTPUTTAPE6,579                                              CO1 0016
  579 FORMAT(10H1DVCK SORS)                                             CO1 0017
 1014 CONTINUE                                                          CO1 0018
      RETURN                                                            CO1 0019
      END                                                               CO1 0020
```

```
      SUBROUTINE FIGERO                                                 FIG 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,    FIG 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),   FIG 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,   FIG 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,     FIG 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS, FIG 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,      FIG 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                FIG 0007
      COMMON/1000/HAMSAV(11,70),LMO(20),N2N(20),SORS(70),               FIG 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)               FIG 0009
      COMMON/4340/AN(43400)                                             FIG 0010
      COMMON/4900/DUM(1160),EN(3740)                                    FIG 0011
      COMMON/2101/ADUM1(1760),BARNU(70),ES(2,25),INT(8),KT(100),NS(100) FIG 0012
      COMMON/IGSN2N/IG(142),SN2N(70,20)                                 FIG 0013
      COMMON/FIGIN/CSUM(20,70),FSUM(20,70),KCD(5500),SAV(11,70),        FIG 0014
     1SCUN(2,25),SFUN(2,25),SIG(5500)                                   FIG 0015
      COMMON/OVLY3/ EF(2101),STEMP(2100)                                FIG 0016
      DIMENSION HAM3(2100),HAM9(2100),MATNO(20)                         FIG 0017
      EQUIVALENCE (MATNO,NUCID),(HOMCAP(1),HAM3(1)),(HOMBRG(1),HAM9(1)) FIG 0018
      NMATS=NOI                                                         FIG 0019
      REWIND2                                                           FIG 0020
      DO 1000 K=1,NINTC                                                 FIG 0021
 1000 IG(K)=K                                                           FIG 0022
      DO 220 JC=1,NINTC                                                 FIG 0023
  220 SERH(JC)=0.                                                       FIG 0024
      NINT1=NINT                                                        FIG 0025
      IF(NDELU.EQ.1) GO TO 94                                           FIG 0026
      EF(1)=EMIN                                                        FIG 0027
      EX=EXPF(DELU)                                                     FIG 0028
      IF(NINT.GT.2100) NINT1=2100                                       FIG 0029
      DO 81 I=1,NINT1                                                   FIG 0030
   81 EF(I+1)=EF(I)*EX                                                  FIG 0031
   94 E(1)=EMIN                                                         FIG 0032
      EX=EXPF(DELUN)                                                    FIG 0033
      DO73L=1,NOI                                                       FIG 0034
      DO73J=1,NINTC                                                     FIG 0035
      CSUM(L,J)=0.                                                      FIG 0036
   73 FSUM(L,J)=0.                                                      FIG 0037
      DO8I=1,NINTC                                                      FIG 0038
    8 E(I+1)=E(I)*EX                                                    FIG 0039
      DO300I=1,NUNRES                                                   FIG 0040
  312 LL=1                                                              FIG 0041
  306 READ (2)LZ,LS,NP, (ES(LL,NN),SCUN(LL,NN),SFUN(LL,NN),NN=1,NP)     FIG 0042
      DO304NN=1,NP                                                      FIG 0043
      EN(NN  )=ES(LL,NN)                                                FIG 0044
      SIG(NN  )=SCUN(LL,NN)                                             FIG 0045
  304 CONTINUE                                                          FIG 0046
      NS(1  )=NP                                                        FIG 0047
      KT(1  )=1                                                         FIG 0048
      INT(1)=1                                                          FIG 0049
      CALLSIGAVC(DELUN,NINTC,NS,EN,SIG,AN,KCD,E,SAV,1,1,KT,11,71,5500,  FIG 0050
     15500,INT)                                                         FIG 0051
      DO305II=1,NINTC                                                   FIG 0052
  305 CSUM(LZ,II)=SAV(1,II)+CSUM(LZ,II)                                 FIG 0053
      DO 420 NN=1,NP                                                    FIG 0054
  420 SIG(NN)=SFUN(LL,NN)                                               FIG 0055
      CALL SIGAVC(DELUN,NINTC,NS,EN,SIG,AN,KCD,E,SAV,1,1,KT,11,71,5500, FIG 0056
     15500,INT)                                                         FIG 0057
      DO 421 II=1,NINTC                                                 FIG 0058
  421 FSUM(LZ,II)=SAV(1,II)+FSUM(LZ,II)                                 FIG 0059
      IF(LS-LL)308,308,309                                              FIG 0060
  309 LL=2                                                              FIG 0061
```

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      GOTO306                                                          FIG 0062
  308 CONTINUE                                                         FIG 0063
      IF(ISO(LZ)-1)300,300,311                                         FIG 0064
  311 ISO(LZ)=ISO(LZ)-1                                                FIG 0065
      GOTO312                                                          FIG 0066
  300 CONTINUE                                                         FIG 0067
      REWIND2                                                          FIG 0068
      WRITE(2) (HOMCAP(I),I=1,NINT1R)                                  FIG 0069
      REWIND 2                                                         FIG 0070
      IF(NMIC.GT.0)GO TO 12345                                         FIG 0071
      IF(NUNRES)1,1,500                                                FIG 0072
  500 WRITE(3)((CSUM(L,J),FSUM(L,J),L=1,NOI),J=1,NINTC)                FIG 0073
12345 CONTINUE                                                         FIG 0074
    1 DO2K=1,11                                                        FIG 0075
      DO2J=1,NINTC                                                     FIG 0076
    2 HAMSAV(K,J)=0.                                                   FIG 0077
      DO 20 I=1,NINT1                                                  FIG 0078
      HAM3(I)=0.                                                       FIG 0079
   20 HAM9(I)=0.                                                       FIG 0080
      DO24M=1,NMATS                                                    FIG 0081
      DO 502 J=1,NINTC                                                 FIG 0082
      BARNU(J)=0.                                                      FIG 0083
      DO 502 K=1,11                                                    FIG 0084
  502 SAV(K,J)=0.                                                      FIG 0085
      IF(M.NE.KT7) GO TO 501                                           FIG 0086
      DO 504 J=1,NINTC                                                 FIG 0087
      ALB=E(J)+1.E-6                                                   FIG 0088
      UB=E(J+1)+1.E-6                                                  FIG 0089
      CALL ROMBI(ALB,UB,D,KTFLUX,1)                                    FIG 0090
      GO TO (506,507,508), KTFUUX                                      FIG 0091
  506 D=DELUN/D                                                        FIG 0092
      GO TO 509                                                        FIG 0093
  507 D=(UB-ALB)/D                                                     FIG 0094
      GO TO 509                                                        FIG 0095
  508 D=(UB*UB-ALB*ALB)/(2.*D)                                         FIG 0096
  509 SAV(7,J)=.333333333*D                                            FIG 0097
      CALL ROMBI(ALB,UB,D,KTFLUX,2)                                    FIG 0098
      GO TO (510,511,512), KTFUUX                                      FIG 0099
  510 D=D/DELUN                                                        FIG 0100
      GO TO 513                                                        FIG 0101
  511 D=D/(UB-ALB)                                                     FIG 0102
      GO TO 513                                                        FIG 0103
  512 D=2.*D/(UB**2-ALB**2)                                            FIG 0104
  513 SAV(8,J)=ALB*D                                                   FIG 0105
      SERH(NINTC+1+J)=SAV(8,J)                                         FIG 0106
      CALL ROMBI(ALB,UB,D,KTFLUX,4)                                    FIG 0107
      GO TO(520,521,522), KTFLUX                                       FIG 0108
  520 D=D/DELUN                                                        FIG 0109
      GO TO 530                                                        FIG 0110
  521 D=D/(UB-ALB)                                                     FIG 0111
      GO TO 530                                                        FIG 0112
  522 D=2.*D/(UB**2-ALB**2)                                            FIG 0113
  530 SAV(5,J)=D                                                       FIG 0114
  504 CONTINUE                                                         FIG 0115
      GO TO 505                                                        FIG 0116
  501 CALLTIMEIT(0)                                                    FIG 0117
      NUFLAG=0                                                         FIG 0118
  400 READ(9) MT,(INT(K),K=1,8),EMU0,A0,A1,A2,A3,X11                   FIG 0119
      IF(NUCID(M).EQ.MT) 401,402                                       FIG 0120
  402 DO 403 K=1,8                                                     FIG 0121
      N=0                                                              FIG 0122
      IR=INT(K)                                                        FIG 0123
```

```
      IF(IR.EQ.0) IR=1                                                  FIG 0124
      READ(9)(NS(I),KT(I),I=1,IR)                                       FIG 0125
      DO 404 II=1,IR                                                    FIG 0126
  404 N=N+NS(II)                                                        FIG 0127
      IF(N) 403,403,405                                                 FIG 0128
  405 READ(9)                                                           FIG 0129
      IF(EOF,9) 406,403                                                 FIG 0130
  403 CONTINUE                                                          FIG 0131
      GO TO 400                                                         FIG 0132
  406 PRINT407,M                                                        FIG 0133
  407 FORMAT(* MATERIAL NUMBER *A6,* NOT ON THIS LIBRARY *)             FIG 0134
      CALL SYSTEM                                                       FIG 0135
  401 DO 408 K=1,8                                                      FIG 0136
      N=0                                                               FIG 0137
      IR=INT(K)                                                         FIG 0138
      IF(IR.EQ.0) IR=1                                                  FIG 0139
      READ(9)(NS(I),KT(I),I=1,IR)                                       FIG 0140
      DO 409 II=1,IR                                                    FIG 0141
  409 N=N+NS(II)                                                        FIG 0142
      IF(N) 408,408,410                                                 FIG 0143
  410 READ(9)(EN(J),SIG(J),J=1,N)                                       FIG 0144
      KS=K                                                              FIG 0145
      KF=K                                                              FIG 0146
      IF(K.EQ.1) 413,414                                                FIG 0147
  413 DO 415 II=1,IR                                                    FIG 0148
  415 KT(II)=-KT(II)                                                    FIG 0149
  414 CALL SIGAVC(DELUN,NINTC,NS,EN,SIG,AN,KCD,E,SAV,KS,KF,KT,11,71,    FIG 0150
     15500,5500,INT)                                                    FIG 0151
      IF(NDELU.EQ.1) GO TO 82                                           FIG 0152
      IF(K.NE.3) GO TO 86                                               FIG 0153
      DO 89 I=1,NINT1                                                   FIG 0154
   89 STEMP(I)=0.                                                       FIG 0155
      CALL SIGAVC(DELU,NINT1,NS,EN,SIG,AN,KCD,EF,STEMP,1,-1,KT,1,2100,  FIG 0156
     15500,5500,INT)                                                    FIG 0157
      DO 83 I=1,NINT1                                                   FIG 0158
   83 HAM3(I)=HAM3(I)+ADEN(M)*STEMP(I)                                  FIG 0159
   86 IF(K.NE.6) GO TO 82                                               FIG 0160
      DO 85 I=1,NINT1                                                   FIG 0161
   85 STEMP(I)=0.                                                       FIG 0162
      CALL SIGAVC(DELU,NINT1,NS,EN,SIG,AN,KCD,EF,STEMP,1,-1,KT,1,2100,  FIG 0163
     15500,5500,INT)                                                    FIG 0164
      DO 87 I=1,NINT1                                                   FIG 0165
   87 HAM9(I)=HAM9(I)+ADEN(M)*STEMP(I)                                  FIG 0166
   82 IF(K.EQ.1) 411,408                                                FIG 0167
  411 DO 412 II=1,IR                                                    FIG 0168
  412 KT(II)=-KT(II)                                                    FIG 0169
      CALL SIGAVC(DELUN,NINTC,NS,EN,SIG,AN,KCD,E,BARNU,KS,KF,KT,1,71,   FIG 0170
     15500,5500,INT)                                                    FIG 0171
  408 CONTINUE                                                          FIG 0172
      IF(A0-.001)51,51,52                                               FIG 0173
   52 NUFLAG=1                                                          FIG 0174
   51 EMU01=1.-EMU0                                                     FIG 0175
      DO70J=1,NINTC                                                     FIG 0176
      SAV(9,J)=SAV(6,J)                                                 FIG 0177
      SAV(10,J)=SAV(7,J)                                                FIG 0178
      SAV(11,J)=SAV(8,J)                                                FIG 0179
      SN2N(J,M)=SAV(9,J)                                                FIG 0180
      SAV(4,J)=SAV(4,J)+FSUM(M,J)                                       FIG 0181
      SAV(5,J)=SAV(5,J)+CSUM(M,J)                                       FIG 0182
      BARNU(J)=BARNU(J)*(1.-SAV(2,J))                                   FIG 0183
  100 SIGEL=SAV(1,J)*(1.-SAV(2,J))                                      FIG 0184
 2000 IF(NELMO(M))59,59,60                                              FIG 0185
```

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   59 SAV(1,J)=SIGEL                                                        FIG 0186
      SAV(7,J)=0.                                                           FIG 0187
      GOTO61                                                                FIG 0188
   60 SAV(7,J)=SIGEL                                                        FIG 0189
      SAV(1,J)=0.                                                           FIG 0190
   61 IF(NELMO(M))54,54,55                                                  FIG 0191
   55 SAV(2,J)=0.                                                           FIG 0192
      GO TO (155,255,355),KTFLUX                                            FIG 0193
  155 SAV(8,J)=XI1*BARNU(J)/DELUN/EMU01                                     FIG 0194
      GO TO 56                                                              FIG 0195
  255 SAV(8,J)=XI1*BARNU(J)*E(J)/(E(J+1)-E(J))/EMU01                        FIG 0196
      GO TO 56                                                              FIG 0197
  355 SAV(8,J)=XI1*BARNU(J)*E(J)*(2.*XI1)/((E(J+1)-E(J))*(2.*(E(J+1)-       FIG 0198
     1E(J))/E(J)))/EMU01                                                    FIG 0199
      GO TO 56                                                              FIG 0200
   54 SAV(8,J)=0.                                                           FIG 0201
      GO TO (154,254,354),KTFLUX                                            FIG 0202
  154 SAV(2,J)=XI1*BARNU(J)/DELUN/EMU01                                     FIG 0203
      GO TO 56                                                              FIG 0204
  254 SAV(2,J)=XI1*BARNU(J)*E(J)/(E(J+1)-E(J))/EMU01                        FIG 0205
      GO TO 56                                                              FIG 0206
  354 SAV(2,J)=XI1*BARNU(J)*E(J)*(2.*XI1)/((E(J+1)-E(J))*(2.*(E(J+1)-       FIG 0207
     1E(J))/E(J)))/EMU01                                                    FIG 0208
   56 IF(NUFLAG)57,57,50                                                    FIG 0209
   50 GO TO (150,250,350),KTFLUX                                            FIG 0210
  150 BARNU(J)=A0+A1*(E(J+1)-E(J))/DELUN+A2*(E(J+1)**2-E(J)**2)/(2.*        FIG 0211
     1DELUN)+A3*(E(J+1)**3-E(J)**3)/(3.*DELUN)                              FIG 0212
      GO TO 66                                                              FIG 0213
  250 BARNU(J)=(1./(E(J+1)-E(J)))*(A0*(E(J+1)-E(J))+A1*(E(J+1)**2-E(J)**    FIG 0214
     12)/2.+A2*(E(J+1)**3-E(J)**3)/3.+A3*(E(J+1)**4-E(J)**4)/4.)            FIG 0215
      GO TO 66                                                              FIG 0216
  350 BARNU(J)=(2./(E(J+1)**2-E(J)**2))*(A0*(E(J+1)**2-E(J)**2)/2.          FIG 0217
     1+A1*(E(J+1)**3-E(J)**3)/3.+A2*(E(J+1)**4-E(J)**4)/4.+A3*(E(J+1)**5    FIG 0218
     2-E(J)**5)/5.)                                                         FIG 0219
   66 SAV(6,J)=BARNU(J)                                                     FIG 0220
      GOTO70                                                                FIG 0221
   57 SAV(6,J)=0.                                                           FIG 0222
   70 CONTINUE                                                              FIG 0223
  505 IF(NMIC.GT.0)GO TO 22345                                              FIG 0224
      WRITETAPE3,((SAV(K,J),J=1,NINTC),K=1,11)                              FIG 0225
22345 CONTINUE                                                              FIG 0226
      IF(KT3)25,25,16                                                       FIG 0227
   16 WRITEOUTPUTTAPE6,31,MATNO(M)                                          FIG 0228
      WRITEOUTPUTTAPE6,32                                                   FIG 0229
      DO 160 I=1,NINTC                                                      FIG 0230
      II=NINTC+1-I                                                          FIG 0231
  160 PRINT33,I,E(II),(SAV(K,II),K=1,11)                                    FIG 0232
   31 FORMAT(/45H FOLLOWING ARE THE FINE GROUP CROSS SECTIONS FOR MATERIFIG 0233
     1AL IDENT. A6, 1H.//)                                                  FIG 0234
   32 FORMAT(1H 1X1HJ5X2HEL7X6HSIGTRH5X6HSIGERH                             FIG 0235
     15X7HSIGINEL4X6HSIGFIS5X7HSIGCAPT5X5HNUBAR                             FIG 0236
     25X6HSIGTRL5X6HSIGERL5X6HSIGN2N5X5HSIGNP5X9HSIGNALPHA //)              FIG 0237
   33 FORMAT(I3,12E11.4)                                                    FIG 0238
   25 DO15K=1,11                                                            FIG 0239
      DO15J=1,NINTC                                                         FIG 0240
      IF(K-6)200,201,200                                                    FIG 0241
  201 TEM=SAV(6,J)*SAV(4,J)                                                 FIG 0242
      GOTO15                                                                FIG 0243
  200 TEM=SAV(K,J)                                                          FIG 0244
   15 HAMSAV(K,J)=TEM*ADEN(M)+HAMSAV(K,J)                                   FIG 0245
   24 CONTINUE                                                              FIG 0246
      IF(KT4)71,71,95                                                       FIG 0247
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 95 WRITE OUTPUT TAPE 6, 401                                                    FIG 0248
401 FORMAT(1H /1H /50H MACROSCOPIC HOMOGENIZED FINE GROUP CROSS SECTIOFIG 0249
   1NS/1H /1H )                                                                 FIG 0250
    WRITEOUTPUTTAPE6,34                                                         FIG 0251
 34 FORMAT(1H 1X1HU5X2HEL7X6HSIGTRH5X6HSIGERH                                   FIG 0252
   15X7HSIGINEL4X6HSIGFIS5X7HSIGCAPT3X8HNUSIGFIS                                FIG 0253
   24X6HSIGTRL5X6HSIGERL5X6HSIGN2N5X5HSIGNP5X9HSIGNALPHA //)                    FIG 0254
    DO 96 I=1,NINTC                                                             FIG 0255
    II=NINTC+1-I                                                                FIG 0256
 96 WRITEOUTPUTTAPE6, 33,I,E(II),(HAMSAV(K,II),K=1,11)                          FIG 0257
 71 NINTC1=(NINTC  )/2                                                          FIG 0258
    DO65K=1,11                                                                  FIG 0259
    DO65JC=1,NINTC1                                                             FIG 0260
    JJC=NINTC+1-JC                                                              FIG 0261
    TEM=HAMSAV(K,JJC)                                                           FIG 0262
    HAMSAV(K,JJC)=HAMSAV(K,JC)                                                  FIG 0263
    HAMSAV(K,JC)=TEM                                                            FIG 0264
 65 CONTINUE                                                                    FIG 0265
    IF(NDELU,EQ,1) GO TO 26                                                     FIG 0266
    NINTC1=NINT1/2                                                              FIG 0267
    DO 84 JC=1,NINTC1                                                           FIG 0268
    JCC=NINT1+1-JC                                                              FIG 0269
    TEM3=HAM3(JCC)                                                              FIG 0270
    TEM9=HAM9(JCC)                                                              FIG 0271
    HAM3(JCC)=HAM3(JC)                                                          FIG 0272
    HAM9(JCC)=HAM9(JC)                                                          FIG 0273
    HAM3(JC)=TEM3                                                               FIG 0274
 84 HAM9(JC)=TEM9                                                               FIG 0275
    WRITE(4) (HAM3(I),I=1,NINT1),(HAM9(I),I=1,NINT1)                            FIG 0276
 26 CALLSKIPFILE(9)                                                             FIG 0277
    READ(2) (HOMCAP(I),I=1,NINT1R)                                              FIG 0278
    REWIND 2                                                                    FIG 0279
 40 RETURN                                                                      FIG 0280
    END                                                                         FIG 0281
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      SUBROUTINESIGAVC(DU,NINT,NSS,EN,SIG,AN,KCD,E,SAVC,KS,KF,KT,M,N,ML,SIG 0000
     1MLK,INTERP)                                                        SIG 0001
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,EG(71),EMAX,     SIG 0002
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),     SIG 0003
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,     SIG 0004
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,       SIG 0005
     4NELMO(20),NGEOM,NIT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,    SIG 0006
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUMRES,RADC,RADP,RTBSQ,        SIG 0007
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                 SIG 0008
      COMMON/IGSN2N/IG(142),SN2N(70,20)                                   SIG 0009
      DIMENSION AN(ML    ),E(N),EN(ML    ),INTERP(8),KCD(MLK),KT(100   ),  SIG 0010
     1NS(8),NSS(100   ),SAVC(M,N),SIG(ML    )                           SIG 0011
      NIN=NINT                                                            SIG 0012
      CALLTIMEIT(0)                                                       SIG 0013
      DO 29 K=KS,KS                                                       SIG 0014
      DO29I=1,NIN                                                         SIG 0015
   29 SAVC(K,I)=0.                                                        SIG 0016
      DO 28 K=KS,KS                                                       SIG 0017
      II=1                                                                SIG 0018
      NPTS=NSS(1   )                                                      SIG 0019
      NS(K)=0                                                             SIG 0020
      IR=INTERP(K)                                                        SIG 0021
      DO 600 I=1,IR                                                       SIG 0022
  600 NS(K)=NS(K)+NSS(I   )                                               SIG 0023
      IF(NS(K))28,28,1                                                    SIG 0024
    1 NSINT=NS(K)-1                                                       SIG 0025
      J2=0                                                                SIG 0026
      DO 4 I=1,IR                                                         SIG 0027
      J1=J2+1                                                             SIG 0028
      J2=J2+NSS(I)                                                        SIG 0029
      IF(I.EQ.1) J2=J2-1                                                  SIG 0030
      KTT=KT(I   )                                                        SIG 0031
      DO 4 J=J1,J2                                                        SIG 0032
      IF(ABSF(SIG(J+1   )-SIG(J   ))-.000001)2,2,3                        SIG 0033
    2 KCD(J)=1                                                            SIG 0034
      AN(J   )=0.                                                         SIG 0035
      GOTO4                                                               SIG 0036
    3 KCD(J)=0                                                            SIG 0037
      GOTO(30,31,32),KTT                                                  SIG 0038
   30 IF(SIG(J).LE.0.000001) GO TO 31                                     SIG 0039
      AN(J   )=LOGF(SIG(J+1   )/SIG(J   ))/LOGF(EN(J+1   )/EN(J   ))     SIG 0040
   80 IF(KTT)50,50,4                                                      SIG 0041
   50 AN(J   )=-AN(J   )                                                  SIG 0042
      GOTO4                                                               SIG 0043
   31 AN(J   )=(SIG(J+1   )-SIG(J   ))/LOGF(EN(J+1   )/EN(J   ))         SIG 0044
      GOTO4                                                               SIG 0045
   32 AN(J   )=(SIG(J+1   )-SIG(J   ))/(EN(J+1   )-EN(J   ))             SIG 0046
    4 CONTINUE                                                            SIG 0047
      KTT=KT(1)                                                           SIG 0048
      IF(KT5)62,62,63                                                     SIG 0049
   63 NSINT1=NSINT+1                                                      SIG 0050
      WRITE(6,101)K,KT(K),KTT                                             SIG 0051
  101 FORMAT(3I6)                                                         SIG 0052
      WRITEOUTPUTTAPE6,100,(ANOJ   ),EN(J   ),SIG(J   ),J=1,NSINT1)       SIG 0053
  100 FORMAT(6E18.5)                                                      SIG 0054
   62 IF(EN(1   )-E(1))5,77,9                                             SIG 0055
    5 J=0                                                                 SIG 0056
    6 J=J+1                                                               SIG 0057
      IF(J-NS(K))70,70,28                                                 SIG 0058
   70 IF(EN(J+1   )-E(1))6,6,7                                            SIG 0059
   77 J=1                                                                 SIG 0060
    7 I=1                                                                 SIG 0061
```

```
    8 PI=0.                                                                SIG 0062
      EL=E(I)                                                              SIG 0063
      GOTO14                                                               SIG 0064
    9 I=1                                                                  SIG 0065
   10 IF(E(I+1)-EN(1  ))11,11,12                                           SIG 0066
   11 SAVC(K,I)=0.                                                         SIG 0067
      I=I+1                                                                SIG 0068
      IF(I-NINT)10,10,28                                                   SIG 0069
   12 J=1                                                                  SIG 0070
      PI=0 .                                                               SIG 0071
   13 EL=EN(J  )                                                           SIG 0072
   14 IF(EN(J+1  )-E(I+1))15,23,23                                         SIG 0073
   15 EU=EN(J+1  )                                                         SIG 0074
      IF(KCD(J))16,16,17                                                   SIG 0075
   16 IF(J+1.LE.NPTS) GO TO 616                                            SIG 0076
      II=II+1                                                              SIG 0077
      NPTS=NPTS+NSS(II  )                                                  SIG 0078
      KTT=KT(II  )                                                         SIG 0079
      GO TO 16                                                             SIG 0080
  616 GOTO(33,34,35),KTT                                                   SIG 0081
   33 IF(SIG(J).LE.0.000001) GO TO 34                                      SIG 0082
      GO TO (133,233,333),KTFLUX                                           SIG 0083
  133 TEM=((EU/EN(J  ))**AN(J  )-(EL/EN(J  ))**AN(J  ))*SIG(J  )/AN(J  )   SIG 0084
      GO TO 81                                                             SIG 0085
  233 IF(AN(J  )+1.,EQ,0.) GO TO 433                                       SIG 0086
      TEM=((EU/EN(J  ))**(AN(J  )+1.)-(EL/EN(J  ))**(AN(J  )+1.))          SIG 0087
     1*EN(J  )*SIG(J  )/(AN(J  )+1.)                                       SIG 0088
      GO TO 81                                                             SIG 0089
  433 TEM=EN(J  )*SIG(J  )*LOGF(EU/EL)                                     SIG 0090
      GO TO 81                                                             SIG 0091
  333 IF(AN(J  )+2.,EQ,0.) GO TO 533                                       SIG 0092
      TEM=((EU/EN(J  ))**(AN(J  )+2.)-(EL/EN(J  ))**(AN(J  )+2.))          SIG 0093
     1*(EN(J  )**2)*SIG(J  )/(AN(J  )+2.)                                  SIG 0094
      GOT O 81                                                             SIG 0095
  533 TEM=(EN(J  )**2)*SIG(J  )*LOGF(EU/EL)                                SIG 0096
   81 IF(KTT)51,51,52                                                      SIG 0097
   51 TEM=TEM/SIG(J  )**2                                                  SIG 0098
   52 PI=PI+TEM                                                            SIG 0099
      GOTO19                                                               SIG 0100
   34 GO TO (134,234,334),KTFLUX                                           SIG 0101
  134 PI=PI+((LOGF(EU))**2-(LOGF(EL))**2)*AN(J  )/2.+(SIG(J  )-AN(J  )*    SIG 0102
     1LOGF(EN(J  )))*LOGF(EU/EL)                                           SIG 0103
      GO TO 19                                                             SIG 0104
  234 PI=PI+(EU*LOGF(EU)-EL*LOGF(EL)-EU+EL)*AN(J  )+(SIG(J  )-AN(J  )*     SIG 0105
     1LOGF(EN(J  )))*(EU-EL)                                               SIG 0106
      GO TO 19                                                             SIG 0107
  334 PI=PI+((EU**2)*LOGF(EU)-(EL**2)*LOGF(EL)-EU**2/2.+EL**2/2.)          SIG 0108
     1*AN(J  )/2.+(SIG(J  )-AN(J  )*LOGF(EN(J  )))*(EU**2-EL**2)/2.        SIG 0109
      GOTO19                                                               SIG 0110
   35 GO TO(135,235,335),KTFLUX                                            SIG 0111
  135 PI=PI+AN(J  )*(EU-EL)+(SIG(J  )-AN(J  )*EN(J  ))*LOGF(EU/EL)         SIG 0112
      GO TO 19                                                             SIG 0113
  235 PI=PI+AN(J  )*(EU**2-EL**2)/2.+(SIG(J  )-AN(J  )*EN(J  ))*(EU-EL)    SIG 0114
      GO TO 19                                                             SIG 0115
  335 PI=PI+AN(J  )*(EU**3-EL**3)/3.+(SIG(J  )-AN(J  )*EN(J  ))*(EU**2-    SIG 0116
     1EL**2)/2.                                                            SIG 0117
      GOTO19                                                               SIG 0118
   17 IF(SIG(J  )-.000101)19,19,18                                         SIG 0119
   18 IF(J+1.LE.NPTS) GO TO 1118                                           SIG 0120
      II=II+1                                                              SIG 0121
      NPTS=NPTS+NSS(II)                                                    SIG 0122
      KTT=KT(II)                                                           SIG 0123
```

```
      GO TO 18                                                          SIG 0124
 1118 GO TO (118,218,318),KTFLUX                                        SIG 0125
  118 TEM=SIG(J  )*LOGF(EU/EL)                                          SIG 0126
      GO TO 82                                                          SIG 0127
  218 TEM=SIG(J  )*(EU-EL)                                              SIG 0128
      GO TO 82                                                          SIG 0129
  318 TEM=SIG(J  )*(EU**2-EL**2)/2.                                     SIG 0130
   82 IF(KTT)55,55,56                                                   SIG 0131
   55 TEM=TEM/SIG(J  )**2                                               SIG 0132
   56 PI=PI+TEM                                                         SIG 0133
   19 J=J+1                                                             SIG 0134
      IF(J-NS(K)+1)13,13,20                                             SIG 0135
   20 KG=I                                                              SIG 0136
      IF(KF.GE.0) KG=IG(I)                                              SIG 0137
      GO TO (120,220,320),KTFLUX                                        SIG 0138
  120 SAVC(K,I)=PI/DU                                                   SIG 0139
      GO TO 83                                                          SIG 0140
  220 DENOM=EG(KG+1)-EG(KG)                                             SIG 0141
      IF(KF.LT.0) DENOM=E(KG+1)-E(KG)                                   SIG 0142
      SAVC(K,I)=PI/DENOM                                                SIG 0143
      GO TO 83                                                          SIG 0144
  320 DENOM=EG(KG+1)**2-EG(KG)**2                                       SIG 0145
      IF(KF.LT.0) DENOM=E(KG+1)**2-E(KG)**2                             SIG 0146
      SAVC(K,I)=2.*PI/DENOM                                             SIG 0147
   83 IF(KTT)57,57,67                                                   SIG 0148
   57 SAVC(K,I)=1./SAVC(K,I)                                            SIG 0149
   67 IF(ABSF(SAVC(K,I))-.0001)66,21,21                                 SIG 0150
   66 SAVC(K,I)=0.                                                      SIG 0151
   21 I=I+1                                                             SIG 0152
      IF(NIN-I)28,22,22                                                 SIG 0153
   22 SAVC(K,I)=0.                                                      SIG 0154
      GOTO21                                                            SIG 0155
   23 EU=E(I+1)                                                         SIG 0156
      IF(KCD(J))24,24,25                                                SIG 0157
   24 IF(J.LT.NPTS) GO TO 624                                           SIG 0158
      II=II+1                                                           SIG 0159
      NPTS=NPTS+NSS(II  )                                               SIG 0160
      KTT=KT(II  )                                                      SIG 0161
      GO TO 24                                                          SIG 0162
  624 GOTO(36,37,38),KTT                                                SIG 0163
   36 IF(SIG(J).LE.0.000001) GO TO 37                                   SIG 0164
      GO TO (136,236,336),KTFLUX                                        SIG 0165
  136 TEM=((EU/EN(J  ))**AN(J  )-(EL/EN(J  ))**AN(J  ))*SIG(J  )/AN(J  )SIG 0166
      GO TO 84                                                          SIG 0167
  236 IF(AN(J  )+1.,EQ,0.) GO TO 436                                    SIG 0168
      TEM=((EU/EN(J  ))**(AN(J  )+1.)-(EL/EN(J  ))**(AN(J  )+1.))       SIG 0169
     1*EN(J  )*SIG(J  )/(AN(J  )+1.)                                    SIG 0170
      GO TO 84                                                          SIG 0171
  436 TEM=EN(J  )*SIG(J  )*LOGF(EU/EL)                                  SIG 0172
      GO TO 84                                                          SIG 0173
  336 IF(AN(J  )+2.,EQ,0.) GO TO 536                                    SIG 0174
      TEM=((EU/EN(J  ))**(AN(J  )+2.)-(EL/EN(J  ))**(AN(J  )+2.))       SIG 0175
     1*(EN(J  )**2)*SIG(J  )/(AN(J  )+2.)                               SIG 0176
      GO TO 84                                                          SIG 0177
  536 TEM=(EN(J  )**2)*SIG(J  )*LOGF(EU/EL)                             SIG 0178
   84 IF(KTT)53,53,54                                                   SIG 0179
   53 TEM=TEM/SIG(J  )**2                                               SIG 0180
   54 PI=PI+TEM                                                         SIG 0181
      GOTO27                                                            SIG 0182
   37 GO TO (137,237,337),KTFLUX                                        SIG 0183
  137 PI=PI+((LOGF(EU))**2-(LOGF(EL))**2)*AN(J  )/2.*(SIG(J  )-AN(J  )* SIG 0184
     1LOGF(EN(J  )))*LOGF(EU/EL)                                        SIG 0185
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      GO TO 27                                                          SIG 0186
  237 PI=PI+(EU*LOGF(EU)-EL*LOGF(EL)-EU+EL)*AN(J  )*(SIG(J  )*AN(J  )*  SIG 0187
     1LOGF(EN(J  )))*(EU-EL)                                            SIG 0188
      GO TO 27                                                          SIG 0189
  337 PI=PI+((EU**2)*LOGF(EU)-(EL**2)*LOGF(EL)-EU**2/2.+EL**2/2.)       SIG 0190
     1*AN(J  )/2.+(SIG(J  )*AN(J  )*LOGF(EN(J  )))*(EU**2-EL**2)/2.     SIG 0191
      GOTO27                                                            SIG 0192
   38 GO TO (138,238,338),KTFLUX                                        SIG 0193
  138 PI=PI+AN(J  )*(EU-EL)+(SIG(J  )*AN(J  )*EN(J  ))*LOGF(EU/EL)      SIG 0194
      GO TO 27                                                          SIG 0195
  238 PI=PI+AN(J  )*(EU**2-EL**2)/2.+(SIG(J  )*AN(J  )*EN(J  ))*(EU-EL) SIG 0196
      GO TO 27                                                          SIG 0197
  338 PI=PI+AN(J  )*(EU**3-EL**3)/3.+(SIG(J  )*AN(J  )*EN(J  ))*(EU**2- SIG 0198
     1EL**2)/2.                                                         SIG 0199
      GOTO27                                                            SIG 0200
   25 IF(SIG(J  )-.000101)27,27,26                                      SIG 0201
   26 IF(J+1.LE.NPTS) GO TO 1126                                        SIG 0202
      II=II+1                                                           SIG 0203
      NPTS=NPTS+NSS(II)                                                 SIG 0204
      KTT=KT(II)                                                        SIG 0205
      GO TO 26                                                          SIG 0206
 1126 GO TO (126,226,326),KTFLUX                                        SIG 0207
  126 TEM=SIG(J  )*LOGF(EU/EL)                                          SIG 0208
      GO TO 85                                                          SIG 0209
  226 TEM=SIG(J  )*(EU-EL)                                              SIG 0210
      GO TO 85                                                          SIG 0211
  326 TEM=SIG(J  )*(EU**2-EL**2)/2.                                     SIG 0212
   85 IF(KTT)60,60,61                                                   SIG 0213
   60 TEM=TEM/SIG(J  )**2                                               SIG 0214
   61 PI=PI+TEM                                                         SIG 0215
   27 KG=I                                                              SIG 0216
      IF(KF.GE.0) KG=IG(I)                                              SIG 0217
      GO TO (127,227,327),KTFLUX                                        SIG 0218
  127 SAVC(K,I)=PI/DU                                                   SIG 0219
      GO TO 86                                                          SIG 0220
  227 DENOM=EG(KG+1)-EG(KG)                                             SIG 0221
      IF(KF.LT.0) DENOM=E(KG+1)-E(KG)                                   SIG 0222
      SAVC(K,I)=PI/DENOM                                                SIG 0223
      GO TO 86                                                          SIG 0224
  327 DENOM=EG(KG+1)**2-EG(KG)**2                                       SIG 0225
      IF(KF.LT.0) DENOM=E(KG+1)**2-E(KG)**2                             SIG 0226
      SAVC(K,I)=2.*PI/DENOM                                             SIG 0227
   86 IF(KTT)58,58,59                                                   SIG 0228
   58 SAVC(K,I)=1./SAVC(K,I)                                            SIG 0229
   59 IF(ABSF(SAVC(K,I))-.0001)45,45,46                                 SIG 0230
   45 SAVC(K,I)=0.                                                      SIG 0231
   46 I=I+1                                                             SIG 0232
      IF(NIN-I)28,8,8                                                   SIG 0233
   28 CONTINUE                                                          SIG 0234
      CALLTIMELAPS(8)                                                   SIG 0235
      IF(KT5)64,64,65                                                   SIG 0236
   65 WRITEOUTPUTTAPE6,100,((E(I),SAVC(K,I)),I=1,NIN),K=KS,KS)          SIG 0237
   64 RETURN                                                            SIG 0238
      END                                                               SIG 0239
```

```
      SUBROUTINE INSCAT                                                 INS 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,    INS 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),   INS 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,   INS 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,     INS 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS, INS 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,       INS 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                INS 0007
      COMMON/IGSN2N/IG(142),SN2N(70,20)                                 INS 0008
      COMMON/4900/HOMIN(71,70)                                          INS 0009
      COMMON/1000/HAMSAV(11,70),LMO(20),N2N(20),SORS(70),               INS 0010
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)               INS 0011
      COMMON/FIGIN/EPRIME(71),KT(100  ),LG(142),NS(100  ),OMIN(70,70),  INS 0012
     1PIN(70,70),TEMPE(142),THETA(70)                                   INS 0013
      COMMON/4340/AN(1400),EIN(1400),KCD(1400)                          INS 0014
      COMMON/2101/INT(8),SAVIN(1,142),SIGIN(1400)                       INS 0015
      NTWON=0                                                           INS 0016
      NIN=NINTC+1                                                       INS 0017
      NOMAT=NOI                                                         INS 0018
      DO14J=1,NINTC                                                     INS 0019
      DO 14 I=1,NIN                                                     INS 0020
   14 HOMIN(I,J)=0.                                                     INS 0021
      DO100II=1,NOMAT                                                   INS 0022
      DO 140 J=1,NINTC                                                  INS 0023
      DO 140 I=1,NINTC                                                  INS 0024
  140 OMIN(I,J)=0.                                                      INS 0025
      IF(II.NE.KT7) GO TO 300                                           INS 0026
      N2N(KT7)=0                                                        INS 0027
      NLEVLS=0                                                          INS 0028
      NSTAT=0                                                           INS 0029
      GO TO 502                                                         INS 0030
  300 CONTINUE                                                          INS 0031
  509 GOTO505                                                           INS 0032
  508 WRITEOUTPUTTAPE6,405,NUCID(II)                                    INS 0033
  405 FORMAT(40H NO INELASTICS CORRESPONDING TO MATERIAL                INS 0034
     1A6,15HON LIBRARY TAPE)                                            INS 0035
      CALLSYSTEM                                                        INS 0036
  505 READTAPE9,ID,NLEVLS,NSTAT,AMASS,ESTAT  ,N2N(II),THRESH            INS 0037
      NREC1=2*NLEVLS+4*NSTAT+2*N2N(II)                                  INS 0038
  507 IF(NUCID(II)-ID)504,502,504                                       INS 0039
  504 IF(NREC1)509,509,503                                              INS 0040
  503 DO30J=1,NREC1                                                     INS 0041
   30 READTAPE9                                                         INS 0042
      IF(EOF,9)508,509                                                  INS 0043
  502 IF(NMIC.GT.0)GO TO 12345                                          INS 0044
      WRITETAPE3,NLEVLS,NSTAT                                           INS 0045
12345 CONTINUE                                                          INS 0046
      IF(NLEVLS)1,1,2                                                   INS 0047
    2 DO7JJ=1,NLEVLS                                                    INS 0048
      NS1=0                                                             INS 0049
      READ(9)IR,EGAM,(NS(I  ),KT(I  ),I=1,IR)                           INS 0050
      DO 600 I=1,IR                                                     INS 0051
  600 NS1=NS1+NS(I  )                                                   INS 0052
      READTAPE9,(EIN(K  ),SIGIN(K  ),K=1,NS1)                           INS 0053
      NINTC1=NINTC                                                      INS 0054
      DO3JC=1,NINTC1                                                    INS 0055
    3 EPRIME(JC)=E(JC)*EGAM                                             INS 0056
      JC=1                                                              INS 0057
      IF(EPRIME(1)-EMAX)6,8,8                                           INS 0058
    8 KFIN=0                                                            INS 0059
      IF(NMIC.GT.0)GO TO 22345                                          INS 0060
      WRITE(3)KFIN                                                      INS 0061
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22345 CONTINUE                                                          INS 0062
      GOTO7                                                             INS 0063
    6 IF(EPRIME(1)-E(JC+1))4,5,5                                        INS 0064
    5 JC=JC+1                                                           INS 0065
      GOTO6                                                             INS 0066
    4 JC1=1                                                             INS 0067
      K=1                                                               INS 0068
   10 IF(EPRIME(JC1)-E(JC+1))11,12,12                                   INS 0069
   11 IF(EPRIME(JC1)-E(NINTC+1)    )111,13,13                          INS 0070
  111 TEMPE(K)=EPRIME(JC1)                                              INS 0071
      LG(K)=JC1                                                         INS 0072
      IG(K)=JC                                                          INS 0073
      K=K+1                                                             INS 0074
      JC1=JC1+1                                                         INS 0075
      IF(JC1-NINTC-1)10,13,13                                           INS 0076
   12 TEMPE(K)=E(JC+1)                                                  INS 0077
      IG(K)=JC+1                                                        INS 0078
      LG(K)=JC1-1                                                       INS 0079
      K=K+1                                                             INS 0080
      JC=JC+1                                                           INS 0081
      IF(JC-NINTC-1)10,13,13                                            INS 0082
   13 KFIN=K-1                                                          INS 0083
      KFIN1=KFIN+1                                                      INS 0084
      TEMPE(KFIN1)=EMAX                                                 INS 0085
      IF(NMIC.GT.0)GO TO 32345                                          INS 0086
      WRITETAPE3,KFIN                                                   INS 0087
32345 CONTINUE                                                          INS 0088
      INT(1)=IR                                                         INS 0089
      CALLSIGAVC(DELUN,KFIN,NS,EIN,SIGIN,AN,KCD,TEMPE,SAVIN,1,1,KT,     INS 0090
     11,142,1400,1400,INT)                                              INS 0091
      IF(NMIC.GT.0)GO TO 42345                                          INS 0092
      WRITETAPE3,(IG(K),LG(K),SAVIN(1,K),K=1,KFIN)                      INS 0093
42345 CONTINUE                                                          INS 0094
      IF(KT5)36,36,37                                                   INS 0095
   37 WRITEOUTPUTTAPE6,403,(TEMPE(K)  ,IG(K),LG(K),K=1,KFIN)            INS 0096
      WRITEOUTPUTTAPE6,403,(SAVIN(1,K),IG(K),LG(K),K=1,KFIN)            INS 0097
   36 DO9K=1,KFIN                                                       INS 0098
      I=NINTC-IG(K)+1                                                   INS 0099
      J=NINTC-LG(K)+1                                                   INS 0100
      TEM1=SAVIN(1,K)                                                   INS 0101
      OMIN(I,J)=OMIN(I,J)+TEM1                                          INS 0102
      HOMIN(I,J)=TEM1*ADEN(II)+HOMIN(I,J)                               INS 0103
    9 CONTINUE                                                          INS 0104
    7 CONTINUE                                                          INS 0105
      DO 1000 K=1,NINTC                                                 INS 0106
 1000 IG(K)=K                                                           INS 0107
    1 IF(KT3)69,69,15                                                   INS 0108
   15 PRINT 510,NUCID(II)                                               INS 0109
  510 FORMAT(//50X9HMATERIAL  A6//42X25HDISCRETE LEVEL SCATTERING//)    INS 0110
      CALLTIMEIT(0)                                                     INS 0111
      DO150I=1,NINTC                                                    INS 0112
      PRINT 404,I                                                       INS 0113
  150 PRINT 403,(OMIN(I,J),I,J,J=I,NINTC)                               INS 0114
      CALLTIMELAPS(9)                                                   INS 0115
  404 FORMAT(/50X22HSCATTERING FROM GROUP I2/)                          INS 0116
   69 IF(NSTAT)123,123,16                                               INS 0117
   16 USTAT=LOGF(EMAX/ESTAT)                                            INS 0118
      DO 141 J=1,NINTC                                                  INS 0119
      DO 141 I=1,NINTC                                                  INS 0120
  141 OMIN(I,J)=0.                                                      INS 0121
      IF(USTAT)102,102,80                                               INS 0122
  102 READ(9)                                                           INS 0123
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      READ(9)                                                          INS 0124
      IF(NTWON,GT,0) GO TO 700                                         INS 0125
      READ(9)                                                          INS 0126
      READ(9)                                                          INS 0127
  700 NGSTAT=0                                                         INS 0128
      IF(NMIC,GT,0)GO TO 52345                                         INS 0129
      WRITETAPE3,NGSTAT                                                INS 0130
52345 CONTINUE                                                         INS 0131
      GO TO 2123                                                       INS 0132
   80 NGSTAT=USTAT/DELUN+1.                                            INS 0133
      IF(NGSTAT,GT,NINTC) NGSTAT=NINTC                                 INS 0134
      IF(NMIC,GT,0)GO TO 62345                                         INS 0135
      WRITETAPE3,NGSTAT                                                INS 0136
62345 CONTINUE                                                         INS 0137
      NINTC1=NINTC+1                                                   INS 0138
      NST=0                                                            INS 0139
      READ(9)IR,(NS(I  ),KT(I  ),I=1,IR)                               INS 0140
      DO 601 I=1,IR                                                    INS 0141
  601 NST=NST+NS(I  )                                                  INS 0142
      READTAPE9,(EIN(K  ),SIGIN(K  ),K=1,NST)                          INS 0143
      KFIN=NINTC                                                       INS 0144
      INT(1)=IR                                                        INS 0145
      CALLSIGAVC(DELUN,NINTC,NS,EIN,SIGIN,AN,KCD,E,SAVIN,1,1,KT,1, 142, INS 0146
     11400,1400,INT)                                                   INS 0147
      DO20J=1,NGSTAT                                                   INS 0148
      PNORM=0,                                                         INS 0149
      KK=NINTC-J+1                                                     INS 0150
      THETA(J)=SAVIN(1,KK)                                             INS 0151
      DO21I=J,NINTC                                                    INS 0152
      K=NINTC1-I+1                                                     INS 0153
      PIN(J,I)=THETA(J)**2*EXPF(-E(K-1)*1,E-6/                         INS 0154
     1THETA(J))*(E(K-1)*1,E-6/THETA(J)*1,)-THETA(J)**2*                INS 0155
     2EXPF(-E(K)*1,E-6/THETA(J))*(E(K)*1,E-6/THETA(J)*1,)              INS 0156
      PNORM=PNORM+PIN(J,I)                                             INS 0157
      IF(PIN(J,I)/PNORM-.0001)22,22,21                                 INS 0158
   22 KFIN=I                                                           INS 0159
      GOTO23                                                           INS 0160
   21 CONTINUE                                                         INS 0161
   23 DO24K=J,KFIN                                                     INS 0162
   24 PIN(J,K)=PIN(J,K)/PNORM                                          INS 0163
      KFIN1=KFIN+1                                                     INS 0164
      DO20K=KFIN1,NINTC                                                INS 0165
      PIN(J,K)=0,                                                      INS 0166
   20 CONTINUE                                                         INS 0167
      IF(NTWON,GT,0)GOTO125                                            INS 0168
      NST=0                                                            INS 0169
      READ(9)IR,(NS(I  ),KT(I  ),I=1,IR)                               INS 0170
      DO 602 I=1,IR                                                    INS 0171
  602 NST=NST+NS(I  )                                                  INS 0172
      READ(9)(EIN(K  ),SIGIN(K  ),K=1,NST)                             INS 0173
      INT(1)=IR                                                        INS 0174
      CALLSIGAVC(DELUN,NINTC,NS,EIN,SIGIN,AN,KCD,E,SAVIN,1,1,KT,1,142, INS 0175
     11400,1400,INT)                                                   INS 0176
  125 IF(NTWON,EQ,0) GO TO 2125                                        INS 0177
      DO126J=1,NINTC                                                   INS 0178
  126 SAVIN(1,J)=SN2N(J,II)                                            INS 0179
 2125 NINTC1=NINTC/2                                                   INS 0180
      DO25JC=1,NINTC1                                                  INS 0181
      JJC=NINTC-JC+1                                                   INS 0182
      TEM=SAVIN(1,JJC)                                                 INS 0183
      SAVIN(1,JJC)=SAVIN(1,JC)                                         INS 0184
   25 SAVIN(1,JC)=TEM                                                  INS 0185
```

```
      DO27J=1,NGSTAT                                                    INS 0186
      DO27K=J,NINTC                                                     INS 0187
      PIN(J,K)=PIN(J,K)*SAVIN(1,J)                                      INS 0188
   27 OMIN(J,K)=PIN(J,K)                                                INS 0189
      IF(NTWON,EQ,0) GO TO 40                                           INS 0190
      DO 41 J=1,NGSTAT                                                  INS 0191
      DO 41 K=J,NINTC                                                   INS 0192
      KP=K+1                                                            INS 0193
   41 HOMIN(KP,J)=HOMIN(KP,J)+ADEN(II)*OMIN(J,K)                        INS 0194
      GO TO 42                                                          INS 0195
   40 DO 43 J=1,NGSTAT                                                  INS 0196
      DO 43 K=J,NINTC                                                   INS 0197
   43 HOMIN(J,K)=HOMIN(J,K)+ADEN(II)*OMIN(J,K)                          INS 0198
   42 IF(NMIC,GT,0)GO TO 72345                                          INS 0199
      DO35J=1,NGSTAT                                                    INS 0200
   35 WRITETAPE3,(PIN(J,K),K=J,NINTC)                                   INS 0201
72345 CONTINUE                                                          INS 0202
      IF(KT3)2123,2123,29                                               INS 0203
   29 PRINT 407                                                         INS 0204
      CALLTIMEIT(0)                                                     INS 0205
      DO 291 I=1,NINTC                                                  INS 0206
      PRINT 404,I                                                       INS 0207
  291 PRINT 403,(OMIN(I,J),I,J,J=I,NINTC)                               INS 0208
      CALLTIMELAPS(10)                                                  INS 0209
  407 FORMAT(//45X22HSTATISTICAL SCATTERING//)                          INS 0210
  403 FORMAT(5(E20,7,2I3))                                              INS 0211
 2123 IF(NTWON)123,123,124                                              INS 0212
  124 NTWON=0                                                           INS 0213
      GOTO100                                                           INS 0214
  123 IF(N2N(II))100,100,120                                            INS 0215
  120 NTWON=1                                                           INS 0216
      BSTAT=THRESH                                                      INS 0217
      IF(KT3)16,16,121                                                  INS 0218
  121 PRINT122                                                          INS 0219
  122 FORMAT(//45X*N-2N SCATTERING*)                                    INS 0220
      GOTO16                                                            INS 0221
  100 CONTINUE                                                          INS 0222
      DO 52 K=1,NINTC                                                   INS 0223
      TEM=0.                                                            INS 0224
      DO 53 KF=K,NINTC                                                  INS 0225
   53 TEM=TEM+HOMIN(K,KF)                                               INS 0226
      DO 52 KF=K,NINTC                                                  INS 0227
   52 HOMIN(K,KF)=HOMIN(K,KF)*HAMSAV(3,K)/TEM                           INS 0228
      DO 54 K=1,NINTC                                                   INS 0229
      TEM=0.                                                            INS 0230
      DO 55 KF=K,NINTC                                                  INS 0231
      KP=KF+1                                                           INS 0232
   55 TEM=TEM+HOMIN(KP,K)                                               INS 0233
      DO 54 KF=K,NINTC                                                  INS 0234
      KP=KF+1                                                           INS 0235
   54 HOMIN(KP,K)=HOMIN(KP,K)*HAMSAV(9,K)/TEM                           INS 0236
   71 NINTC1=(NINTC+1)/2                                                INS 0237
      DO18JC=1,NINTC1                                                   INS 0238
      JJC=NINTC+2-JC                                                    INS 0239
      TEM=E(JJC)                                                        INS 0240
      E(JJC)=E(JC)                                                      INS 0241
   18 E(JC)=TEM                                                         INS 0242
      IF(KT4)182,182,180                                                INS 0243
  180 PRINT 406                                                         INS 0244
  406 FORMAT(//45X*MACROSCOPIC INELASTIC SCATTERING*//)                 INS 0245
      DO 181 I=1,NINTC                                                  INS 0246
      PRINT 404, I                                                      INS 0247
  181 PRINT 403,(HOMIN(I,J),I,J,J=I,NINTC)                              INS 0248
      PRINT 50                                                          INS 0249
   50 FORMAT(//45X*MACROSCOPIC N-2N SCATTERING*//)                      INS 0250
```

```
      DO 51 I=1,NINTC                                                   INS 0251
      PRINT 404, I                                                      INS 0252
   51 PRINT 403,(HOMIN(J+1,I),I,J,J=I,NINTC)                            INS 0253
  182 NINTC1=NINTC+1                                                    INS 0254
      DO75JC=1,NINTC1                                                   INS 0255
   75 E(JC)=E(JC)*1.E+6                                                 INS 0256
   31 READTAPE9                                                         INS 0257
      IF(EOF,9)33,31                                                    INS 0258
   33 CONTINUE                                                          INS 0259
      RETURN                                                            INS 0260
      END                                                               INS 0261


      SUBROUTINE SOURCE                                                 SRS 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,    SRS 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),   SRS 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,   SRS 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,     SRS 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS, SRS 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,      SRS 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                SRS 0007
      COMMON/1000/HAMSAV(11,70),LMO(20),N2N(20),SORS(70),               SRS 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)               SRS 0009
      COMMON/SOUREF/ALPHA,BETA,TAU                                      SRS 0010
      COMMON/OVLY3/ SORSF(2100)                                         SRS 0011
      READ(9)MSORS                                                      SRS 0012
      DO5M=1,MSORS                                                      SRS 0013
      READ (9) ISORS,BETA,ALPHA,TAU                                     SRS 0014
      IF(NSORS-ISORS)5,6,5                                              SRS 0015
    5 CONTINUE                                                          SRS 0016
    7 WRITE(6,8)NSORS                                                   SRS 0017
    8 FORMAT(1HI*SOURCE TYPE NUMBER*,I6* NOT IN LIBRARY*)               SRS 0018
      STOP                                                              SRS 0019
    6 SUM=0.                                                            SRS 0020
      DO 10 K=1,NINTC                                                   SRS 0021
      CALL ROMBI(E(K+1),E(K),D,KTFLUX,3)                                SRS 0022
      SORS(K)=D                                                         SRS 0023
      SUM=SUM+SORS(K)                                                   SRS 0024
   10 CONTINUE                                                          SRS 0025
      SUM=1./SUM                                                        SRS 0026
      DO4J=1,NINTC                                                      SRS 0027
    4 SORS(J)=SUM*SORS(J)                                               SRS 0028
      IF(KT4.LE.0) GO TO 700                                            SRS 0029
      WRITE(6,521) (SORS(I),I=1,NINTC)                                  SRS 0030
  521 FORMAT(1P6E20.8)                                                  SRS 0031
  700 IF(NDELU.EQ.1) GO TO 70                                           SRS 0032
      EDELS=EXPF(-DELU)                                                 SRS 0033
      EU=10.                                                            SRS 0034
      EL=10.*EDELS                                                      SRS 0035
      NINT1=NINT                                                        SRS 0036
      IF(NINT.GT.2100) NINT1=2100                                       SRS 0037
      DO 20 J=1,NINT1                                                   SRS 0038
      CALL ROMBI(EL,EU,D,KTFLUX,3)                                      SRS 0039
      SORSF(J)=D                                                        SRS 0040
      EU=EL                                                             SRS 0041
   20 EL=EU*EDELS                                                       SRS 0042
      DO 21 J=1,NINT1                                                   SRS 0043
   21 SORSF(J)=SUM*SORSF(J)                                             SRS 0044
      WRITE(4) (SORSF(J),J=1,NINT1)                                     SRS 0045
      IF(KT4.LE.0) GO TO 92                                             SRS 0046
      PRINT 91, (SORSF(J),J=1,NINT)                                     SRS 0047
   91 FORMAT(//(6E20.8))                                                SRS 0048
   92 REWIND 4                                                          SRS 0049
   70 RETURN                                                            SRS 0050
      END                                                               SRS 0051
```

```
      SUBROUTINE ROMBI(ALB,UB,D,KTFLUX,INTYPE)                          ROM 0000
      DIMENSION T(20)                                                   ROM 0001
      MAXORD=15                                                         ROM 0002
      EPS=.0001                                                         ROM 0003
      D=0.                                                              ROM 0004
      EL = UB-ALB                                                       ROM 0005
      CALL EF(UB,ARG,KTFLUX,INTYPE)                                     ROM 0006
      TEM=ARG                                                           ROM 0007
      CALL EF(ALB,ARG,KTFLUX,INTYPE)                                    ROM 0008
      T(1)=(TEM+ARG)/2.                                                 ROM 0009
      PREV = T(1)                                                       ROM 0010
      N = 1                                                             ROM 0011
      DO 10  JORD = 1, MAXORD                                           ROM 0012
      U = 0.                                                            ROM 0013
      AN = N                                                            ROM 0014
      EM = EL / 2. / AN                                                 ROM 0015
      NLIM = 2*N-1                                                      ROM 0016
      DO 1  J=1,NLIM,2                                                  ROM 0017
      AJ = J                                                            ROM 0018
      TEM=ALB+AJ*EM                                                     ROM 0019
      CALL EF(TEM,ARG,KTFLUX,INTYPE)                                    ROM 0020
    1 U=U+ARG                                                           ROM 0021
      T(JORD + 1)=( U / AN  + T( JORD )) / 2.                           ROM 0022
      F = 1.                                                            ROM 0023
      DO 2   J1 = 1,JORD                                                ROM 0024
      J = JORD - J1 + 1                                                 ROM 0025
      F = 4. * F                                                        ROM 0026
    2 T(J) = T( J + 1 ) + ( T( J + 1 ) - T( J )) / ( F - 1. )           ROM 0027
      D1=D+T(1)*EL                                                      ROM 0028
   14 IF(ABSF((T(1)-PREV)*EL/D1)-EPS)33,33,44                           ROM 0029
   44 PREV = T( 1 )                                                     ROM 0030
   10 N = 2*N                                                           ROM 0031
      PRINT 115                                                         ROM 0032
  115 FORMAT(1H0*ORDER 15 EXCEEDED ON ROMBERG INTEGRATION *)            ROM 0033
   33 D=D1                                                              ROM 0034
      RETURN                                                            ROM 0035
      END                                                               ROM 0036
```

```
      SUBROUTINE EF(X,ARG,KTFLUX,INTYPE)                                EF  0000
      COMMON/SOUREF/ALPHA,BETA,TAU                                      EF  0001
      GO TO (1,1,2,1),INTYPE                                            EF  0002
    1 FAC1=1.206*X+(.1.86+.09415*X+.000136*X*X)**2                      EF  0003
      FAC2=1.206*X+(.4223+.13*X)**2                                     EF  0004
      HTOT=9.4247778/FAC1+3.1415926/FAC2                                EF  0005
      HCAP=.332*SQRTF(.02526E-6/X)*(1.+.2244*X)*(1.+.0205*X)*           EF  0006
     1(1.+.0205*X)/(1.+7.46*X+.158*X*X) +.000143*SQRTF(X)/(4.46*X)      EF  0007
      HSCAT=HTOT-HCAP                                                   EF  0008
      GO TO(10,20,20,30),INTYPE                                         EF  0009
   10 GO TO (101,102,103),KTFLUX                                        EF  0010
  101 ARG=1./(HSCAT*X)                                                  EF  0011
      RETURN                                                            EF  0012
  102 ARG=1./HSCAT                                                      EF  0013
      RETURN                                                            EF  0014
  103 ARG=X/HSCAT                                                       EF  0015
      RETURN                                                            EF  0016
   20 GO TO(201,202,203), KTFLUX                                        EF  0017
  201 ARG=HSCAT/(X*X)                                                   EF  0018
      RETURN                                                            EF  0019
  202 ARG=HSCAT/X                                                       EF  0020
      RETURN                                                            EF  0021
  203 ARG=HSCAT                                                         EF  0022
      RETURN                                                            EF  0023
   30 GO TO(301,302,303),KTFLUX                                         EF  0024
  301 ARG=HCAP/X                                                        EF  0025
      RETURN                                                            EF  0026
  302 ARG=HCAP                                                          EF  0027
      RETURN                                                            EF  0028
  303 ARG=HCAP*X                                                        EF  0029
      RETURN                                                            EF  0030
    2 ARG=ALPHA*X/(TAU**2)*EXPF(-X/TAU)+1.1283791*(1.-ALPHA)*           EF  0031
     1SQRTF(X/(BETA**3))*EXPF(-X/BETA)                                  EF  0032
      RETURN                                                            EF  0033
      END                                                               EF  0034
```

```
C**********OVERLAY 4*****************************************************************
      PROGRAM CONTROL2                                                          CO2 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,            CO2 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),           CO2 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,           CO2 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,             CO2 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,         CO2 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,              CO2 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                        CO2 0007
      COMMON/1000/HAMSAV(11,70),LMO(20),N2N(20),SORS(70),                       CO2 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)                       CO2 0009
      COMMON/4900/SKIN(71,70)                                                   CO2 0010
      COMMON/4340/PHIS(2100),PHIC(70),CURENT(2100),CRNTC(70)                    CO2 0011
      COMMON/2101/GAMMA(2101)                                                   CO2 0012
      COMMON/CALPON/A(20),AC(20),BSIGER(120),BSIGET(120,54),BSQ,                CO2 0013
     1BTSIGT(120),EDELC,EDELS,FINUS,IS,ITER,MANY,S1(120,54),TEM1,TEM1S,         CO2 0014
     2U1(20),U2(20),U3(20),U4(20),U5(20),U6(20),U7(20),U8(20),U9(20),           CO2 0015
     3U10(20),U11(20),U12(20),U13(20),U14(20),U15(20),U16(20),U17(20),          CO2 0016
     4U18(20),U19(20),SORSF(2100),HAM3(2100)                                    CO2 0017
      COMMON/ALPO/ALPHA(20),BB1(20),BB2(20),EJMIN1(54),IBUF(3),                 CO2 0018
     1JL(70),JU(70),N(20),SIGEET(55),SIGET(111),STOT(120),X(55)                 CO2 0019
      COMMON/FLXCOR/SHAPEC(70),SHAPES(2100),STR3(50),IBSQ,BUCK,BUCK2,EPSCO2 0020
      DIMENSION B(3),B0(121),B1(121),B2(121),B3(121),B4(121),                   CO2 0021
     1B5(121),B6(121),B7(121),B8(121),B9(121),B10(121),B11(121),                CO2 0022
     2B12(121),B13(121),B14(121),B15(121),B16(121),B17(121),                    CO2 0023
     3B18(121),B19(121),MANY1(33),R(3),HAM9(2100)                               CO2 0024
      EQUIVALENCE (B0(1),BSIGET(100)),                                          CO2 0025
     1(B1(1),BSIGET(300)),(B2(1),BSIGET(500)),(B3(1),BSIGET(700)),              CO2 0026
     2(B4(1),BSIGET(900)),(B5(1),BSIGET(1100)),(B6(1),BSIGET(1300)),            CO2 0027
     3(B7(1),BSIGET(1500)),(B8(1),BSIGET(1700)),(B9(1),BSIGET(1900)),           CO2 0028
     4(B10(1),BSIGET(2100)),(B11(1),BSIGET(2300)),(B12(1),BSIGET(2500)),CO2 0029
     5(B13(1),BSIGET(2700)),(B14(1),BSIGET(2900)),(B15(1),BSIGET(3100)),CO2 0030
     6(B16(1),BSIGET(3300)),(B17(1),BSIGET(3500)),(B18(1),BSIGET(3700)),CO2 0031
     7(B19(1),BSIGET(3900)),(MANY1(1),BSIGET(4100)),                            CO2 0032
     8(HOMBRG(1),HAM9(1))                                                       CO2 0033
      ESTART=EMAX                                                               CO2 0034
      IF(IYOS)1116,1116,1114                                                    CO2 0035
 1114 READINPUTTAPE7,404,(PHIC(J),J=1,NINTC)                                    CO2 0036
  404 FORMAT(6E12.5)                                                            CO2 0037
      WRITEOUTPUTTAPE6,437                                                      CO2 0038
  437 FORMAT(18H COARSE GROUP FLUX/4X1HJ6X5HEL(J)                               CO2 0039
     19X6HPHI(J)/)                                                              CO2 0040
      WRITEOUTPUTTAPE6,436,(I,E(I+1),PHIC(I),I=1,NINTC)                         CO2 0041
  436 FORMAT(3(I5,1P2E15.5))                                                    CO2 0042
      DO 400 J=1,NINTC                                                          CO2 0043
  400 SHAPEC(J)=PHIC(J)                                                         CO2 0044
      GO TO 1113                                                                CO2 0045
 1116 READ(7,513)IBSQ,BSQ,BSQ2,EPS                                              CO2 0046
      BUCK=BSQ                                                                  CO2 0047
      BUCK2=BSQ2                                                                CO2 0048
  513 FORMAT(I12,3E12.5)                                                        CO2 0049
      WRITE(6,532)BSQ,BSQ2,EPS                                                  CO2 0050
  532 FORMAT(17H0FIRST BSQ GUESS=E12.4,18H SECOND BSQ GUESS=E12.4,              CO2 0051
     111H TOLERANCE=E12.4)                                                      CO2 0052
 1113 IF(IYOS.NE.0) RETURN                                                      CO2 0053
      IF(NDELU.EQ.1) GO TO 70                                                   CO2 0054
      NINT1=NINT                                                                CO2 0055
      IF(NINT.GT.2100) NINT1=2100                                               CO2 0056
      READ(4)(HAM3(J),J=1,NINT1),(HAM9(J),J=1,NINT1)                            CO2 0057
      READ(4)(SORSF(J),J=1,NINT1)                                               CO2 0058
      REWIND 4                                                                  CO2 0059
   70 ITER=1                                                                    CO2 0060
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```
      KMINS=1                                                          C02 0061
      NFINE=1                                                          C02 0062
      DO 201 J=1,2100                                                  C02 0063
  201 GAMMA(J)=1.                                                      C02 0064
      DO 84 I=1,NOI                                                    C02 0065
   84 LMO(I)=0                                                         C02 0066
      IF(NDELU.EQ.1.OR.MTOT.EQ.0) GO TO 23                             C02 0067
      CALL SKIPFILE(9)                                                 C02 0068
   83 READ TAPE 9,MATLS,LEVLS,ESTART,NPASS,(MANY1(NP),NP=1,NPASS)      C02 0069
      M=0                                                              C02 0070
      KMINS=LOGF(EMAX/ESTART)/DELUN+1.                                 C02 0071
      NPNEW=NINT-(KMINS-1)*NDELU                                       C02 0072
      IF(NPNEW.LT.LEVLS-1)NPASS=(NPNEW+1)/60                           C02 0073
      CALLTIMEIT(0)                                                    C02 0074
      DO22NP=1,NPASS                                                   C02 0075
      MANY=MANY1(NP)                                                   C02 0076
   11 DO20KE=1,MATLS                                                   C02 0077
      READTAPE 9,MATID                                                 C02 0078
      DO 13 KMI=1,NOI                                                  C02 0079
      IF(NUCID(KMI).EQ.MATID.AND.NELMO(KMI).NE.0) GO TO 15             C02 0080
   13 CONTINUE                                                         C02 0081
      GO TO 19                                                         C02 0082
   15 IF(NP-1)16,16,17                                                 C02 0083
   16 READ TAPE 9 ,U1(M+1),U2(M+1),U3(M+1),U4(M+1),U5(M+1),U6(M+1),    C02 0084
     1U7(M+1),U8(M+1),U9(M+1),U10(M+1),U11(M+1),U12(M+1),U13(M+1),     C02 0085
     2U14(M+1),U15(M+1),U16(M+1),U17(M+1),U18(M+1),U19(M+1),A(M+1)     C02 0086
      AC(M+1)=ADEN(KMI)                                                C02 0087
      LMO(KMI)=M+1                                                     C02 0088
      M=M+1                                                            C02 0089
   17 READTAPE 9,(B0(I),B1(I),B2(I),B3(I),B4(I),B5(I),B6(I),B7(I),     C02 0090
     1B8(I),B9(I),B10(I),B11(I),B12(I),B13(I),B14(I),B15(I),           C02 0091
     2B16(I),B17(I),B18(I),B19(I),I=1,MANY)                           C02 0092
      DO18I=1,MANY                                                     C02 0093
      BB1(1)=B0(I)                                                     C02 0094
      BB1(2)=B1(I)                                                     C02 0095
      BB1(3)=B2(I)                                                     C02 0096
      BB1(4)=B3(I)                                                     C02 0097
      BB1(5)=B4(I)                                                     C02 0098
      BB1(6)=B5(I)                                                     C02 0099
      BB1(7)=B6(I)                                                     C02 0100
      BB1(8)=B7(I)                                                     C02 0101
      BB1(9)=B8(I)                                                     C02 0102
      BB1(10)=B9(I)                                                    C02 0103
      BB1(11)=B10(I)                                                   C02 0104
      BB1(12)=B11(I)                                                   C02 0105
      BB1(13)=B12(I)                                                   C02 0106
      BB1(14)=B13(I)                                                   C02 0107
      BB1(15)=B14(I)                                                   C02 0108
      BB1(16)=B15(I)                                                   C02 0109
      BB1(17)=B16(I)                                                   C02 0110
      BB1(18)=B17(I)                                                   C02 0111
      BB1(19)=B18(I)                                                   C02 0112
      BB1(20)=B19(I)                                                   C02 0113
      BUFFER OUT(5,1)(BB1(1),BB1(20))                                  C02 0114
   81 IF(UNIT,5)81,18                                                  C02 0115
   18 CONTINUE                                                         C02 0116
      GOTO20                                                           C02 0117
   19 READTAPE 9                                                       C02 0118
      IF(NP-1)21,21,20                                                 C02 0119
   21 READTAPE 9                                                       C02 0120
   20 CONTINUE                                                         C02 0121
   22 CONTINUE                                                         C02 0122
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```
      CALLTIMELAPS(11)                                                  CO2 0123
      REWIND 5                                                          CO2 0124
      GOTO24                                                            CO2 0125
   23 WRITEOUTPUTTAPE6,517                                              CO2 0126
  517 FORMAT(1H0*NO LEGENDRE COEFFICIENT MATERIALS*)                    CO2 0127
      IF(KT7.NE.0.AND.NDELU.GT.1) GO TO 24                              CO2 0128
      NFINE=0                                                           CO2 0129
   24 MANY=120                                                          CO2 0130
      NSH1=0                                                            CO2 0131
      MORE=1                                                            CO2 0132
      JFKS=1                                                            CO2 0133
      NSH2=0                                                            CO2 0134
      JEND1=0                                                           CO2 0135
      FINUS=0.                                                          CO2 0136
      IS=1                                                              CO2 0137
      IF(NFINE)26,26,27                                                 CO2 0138
   26 KMINS=NINTC+1                                                     CO2 0139
      GOTO27                                                            CO2 0140
   27 IF(KMINS.EQ.1) GO TO 33                                           CO2 0141
   29 KMIN=1                                                            CO2 0142
      KEND=KMINS-1                                                      CO2 0143
   39 CALLPONE(KMIN,KEND,JFKS,MORE)                                     CO2 0144
  519 FORMAT(6(I5,E15.5))                                               CO2 0145
      NFINE1=NFINE+1                                                    CO2 0146
      GOTO(34,33),NFINE1                                                CO2 0147
   33 KEND=KMINS-1                                                      CO2 0148
      TEM1=ESTART                                                       CO2 0149
      TEM1S=TEM1                                                        CO2 0150
      EDELC=EXPF(-DELUN)                                                CO2 0151
      EDELS=EXPF(-DELU)                                                 CO2 0152
   40 JEND1=JEND1+MANY                                                  CO2 0153
   41 KK=MANY/NDELU                                                     CO2 0154
   43 KMIN=KEND+1                                                       CO2 0155
      KEND=KK+KEND                                                      CO2 0156
      IF(KEND.LE.NINTC)GO TO 44                                         CO2 0157
      JEND1=JEND1-MANY+(NINTC-KEND+KK)*NDELU                            CO2 0158
      KEND=NINTC                                                        CO2 0159
   44 IF(MTOT.GT.0) GO TO 444                                           CO2 0160
      DO 90 J=1,120                                                     CO2 0161
      BTSIGT(J)=0.                                                      CO2 0162
      BSIGER(J)=0.                                                      CO2 0163
      IF(IOPT.GT.1) STOT(J)=0.                                          CO2 0164
      DO 90 L=1,54                                                      CO2 0165
      BSIGET(J,L)=0.                                                    CO2 0166
      IF(IOPT.GT.1) S1(J,L)=0.                                          CO2 0167
   90 CONTINUE                                                          CO2 0168
      GO TO 91                                                          CO2 0169
  444 CALL ALRAGO(KMIN,KEND,MORE)                                       CO2 0170
   91 IF(KMIN-KMINS)46,46,45                                            CO2 0171
   46 IS=61                                                             CO2 0172
   45 CALLPONE(KMIN,KEND,JFKS,MORE)                                     CO2 0173
      IF(KT6)61,61,62                                                   CO2 0174
   62 WRITEOUTPUTTAPE6,519,(K,PHIC(K),K=KMIN,KEND)                      CO2 0175
      IF(IOPT.GT.1) WRITE(6,519)(K,CRNTC(K),K=KMIN,KEND)                CO2 0176
      J11=JEND1-NDELU*(KEND-KMIN+1)+1                                   CO2 0177
      WRITE OUTPUT TAPE 6,519,(J,PHIS(J),J=J11,JEND1)                   CO2 0178
      IF(IOPT.GT.1) WRITE(6,519)(J,CURENT(J),J=J11,JEND1)               CO2 0179
   61 CONTINUE                                                          CO2 0180
      JFKS=JFKS+NDELU                                                   CO2 0181
      IF(MORE)34,34,40                                                  CO2 0182
   34 WRITEOUTPUTTAPE6,520,ITER,BSQ,FINUS                               CO2 0183
      ITER=ITER+1                                                       CO2 0184
```

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  520 FORMAT(I6,  2E20.8)                                                  C02 0185
      REWIND 2                                                             C02 0186
      REWIND4                                                              C02 0187
      IF(IBSQ)50,50,51                                                     C02 0188
   51 IF(ABSF(FINUS-1.)-EPS)50,50,52                                       C02 0189
   52 IF(ITER-2)152,152,53                                                 C02 0190
  152 R(1)=FINUS-1.                                                        C02 0191
      B(1)=BSQ                                                             C02 0192
      BSQ=BSQ2                                                             C02 0193
      GO TO 24                                                             C02 0194
   53 IF(ITER-3)153,153,54                                                 C02 0195
  153 R(2)=FINUS-1.                                                        C02 0196
      B(2)=BSQ2                                                            C02 0197
      BSQ=B(1)+(B(2)-B(1))*R(1)/(R(1)-R(2))                                C02 0198
      GO TO 24                                                             C02 0199
   54 IF(ITER-4)154,154,55                                                 C02 0200
  154 R(3)=FINUS-1.                                                        C02 0201
      B(3)=BSQ                                                             C02 0202
      GO TO 56                                                             C02 0203
   55 R(1)=R(2)                                                            C02 0204
      R(2)=R(3)                                                            C02 0205
      R(3)=FINUS-1.                                                        C02 0206
      B(1)=B(2)                                                            C02 0207
      B(2)=B(3)                                                            C02 0208
      B(3)=BSQ                                                             C02 0209
   56 BSQ=B(1)+R(1)*((B(1)-B(2))*(R(2)*R(3)-R(1))/((R(1)-R(3))*(R(1)-      C02 0210
     1R(2)))-R(2)*(B(2)-B(3))/((R(1)-R(3))*(R(2)-R(3))))                   C02 0211
      GO TO 24                                                             C02 0212
   50 WRITEOUTPUTTAPE6,537                                                 C02 0213
  537 FORMAT(18H   FINE GROUP FLUX/4X1HJ6X5HEL(J)                          C02 0214
     19X6HPHI(J)/)                                                         C02 0215
      WRITEOUTPUTTAPE6,536,(I,E(I+1),PHIC(I),I=1,NINTC)                    C02 0216
  536 FORMAT(3(I5,  2E15.5))                                               C02 0217
      I=NINTC+1                                                            C02 0218
      EE=0.                                                                C02 0219
      WRITE OUTPUT TAPE 6,536,I,EE,PHIC(NINTC+1)                           C02 0220
      IF(IOPT.EQ.1) GO TO 700                                              C02 0221
      WRITE(6,701)                                                         C02 0222
  701 FORMAT(1H /1H /1H /*   FINE GROUP CURRENT*/4X1HJ6X5HEL(J)11X4HJ(J)C02 0223
     1/)                                                                   C02 0224
      II=NINTC+1                                                           C02 0225
      WRITE(6,536)(I,E(I+1),CRNTC(I),I=1,NINTC),II,0.,CRNTC(NINTC+1)       C02 0226
  700 IFDIVIDECHECK1006,1015                                               C02 0227
 1006 WRITEOUTPUTTAPE6,580                                                 C02 0228
  580 FORMAT(1H1/* OVCK OVLY 4*)                                           C02 0229
 1015 CONTINUE                                                             C02 0230
      RETURN                                                               C02 0231
      END                                                                  C02 0232
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      SUBROUTINE ALRAGO(KMIN,KEND,MORE)                                 ALR 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,    ALR 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),   ALR 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,   ALR 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LG8N(50),MTOT,NDELU,     ALR 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS, ALR 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUMRES,RADC,RADP,RTBSQ,       ALR 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                ALR 0007
      COMMON/CALPON/A(20),AC(20),BSIGER(120),BSIGET(120,54),BSQ,        ALR 0008
     1BTSIGT(120),EDELC,EDELS,FINUS,IS,ITER,MANY,S1(120,54),TEM1,TEM1S, ALR 0009
     2U1(20),U2(20),U3(20),U4(20),U5(20),U6(20),U7(20),U8(20),U9(20),    ALR 0010
     3U10(20),U11(20),U12(20),U13(20),U14(20),U15(20),U16(20),U17(20),   ALR 0011
     4U18(20),U19(20),SORSF(2100)                                       ALR 0012
      COMMON/ALPO/ALPHA(20),BB1(20),BB2(20),EJMIN1(54),IBUF(3),         ALR 0013
     1JL(70),JU(70),N(20),SIGEET(55),SIGET(111),STOT(120),X(55)         ALR 0014
      DIMENSION C1(19),C2(18),C3(17),C4(16),C5(15),C6(14),C7(13),C8(12),ALR 0015
     1C9(11),C10(10),C11(9),C12(8),C13(7),C14(6),C15(5),C16(4),         ALR 0016
     2C17(3),C18(2),C19(1)                                              ALR 0017
      DATA(C1 =-2.0000000E000,-6.0000000E000,-1.2000000E001,            ALR 0018
     X-2.0000000E001,-3.0000000E001,-4.2000000E001,-5.6000000E001,      ALR 0019
     X-7.2000000E001,-9.0000000E001,-1.1000000E002,-1.3200000E002,      ALR 0020
     X-1.5600000E002,-1.8200000E002,-2.1000000E002,-2.4000000E002,      ALR 0021
     X-2.7200000E002,-3.0600000E002,-3.4200000E002,-3.8000000E002)      ALR 0022
      DATA(C2 = 6.0000000E000, 3.0000000E001, 9.0000000E001,            ALR 0023
     X 2.1000000E002, 4.2000000E002, 7.5600000E002, 1.2600000E003,      ALR 0024
     X 1.9800000E003, 2.9700000E003, 4.2900000E003, 6.0060000E003,      ALR 0025
     X 8.1900000E003, 1.0920000E004, 1.4280000E004, 1.8360000E004,      ALR 0026
     X 2.3256000E004, 2.9070000E004, 3.5910000E004)                     ALR 0027
      DATA(C3 =-2.0000000E001,-1.4000000E002,-5.6000000E002,            ALR 0028
     X-1.6800000E003,-4.2000000E003,-9.2400000E003,-1.8480000E004,      ALR 0029
     X-3.4320000E004,-6.0060000E004,-1.0010000E005,-1.6016000E005,      ALR 0030
     X-2.4752000E005,-3.7128000E005,-5.4264000E005,-7.7520000E005,      ALR 0031
     X-1.0852800E006,-1.4922600E006)                                    ALR 0032
      DATA(C4 = 7.0000000E001, 6.3000000E002, 3.1500000E003,            ALR 0033
     X 1.1550000E004, 3.4650000E004, 9.0090000E004, 2.1021000E005,      ALR 0034
     X 4.5045000E005, 9.0090000E005, 1.7017000E006, 3.0630600E006,      ALR 0035
     X 5.2907400E006, 8.8179000E006, 1.4244300E007, 2.2383900E007,      ALR 0036
     X 3.4321980E007)                                                   ALR 0037
      DATA(C5 =-2.5200000E002,-2.7720000E003,-1.6632000E004,            ALR 0038
     X-7.2072000E004,-2.5225200E005,-7.5675600E005,-2.0180160E006,      ALR 0039
     X-4.9008960E006,-1.1027016E007,-2.3279256E007,-4.6558512E007,      ALR 0040
     X-8.8884432E007,-1.6295479E008,-2.8830463E008,-4.9423651E008)      ALR 0041
      DATA(C6 = 9.2400000E002, 1.2012000E004, 8.4084000E004,            ALR 0042
     X 4.2042000E005, 1.6816800E006, 5.7177120E006, 1.7153136E007,      ALR 0043
     X 4.6558512E007, 1.1639628E008, 2.7159132E008, 5.9750090E008,      ALR 0044
     X 1.2493201E009, 2.4986401E009, 4.8050772E009)                     ALR 0045
      DATA(C7 =-3.4320000E003,-5.1480000E004,-4.1184000E005,            ALR 0046
     X-2.3337600E006,-1.0501920E007,-3.9907296E007,-1.3302432E008,      ALR 0047
     X-3.9907296E008,-1.0974506E009,-2.8045961E009,-6.7310306E009,      ALR 0048
     X-1.5297797E010,-3.3145226E010)                                    ALR 0049
      DATA(C8 = 1.2870000E004, 2.1879000E005, 1.9691100E006,            ALR 0050
     X 1.2471030E007, 6.2355150E007, 2.6189163E008, 9.6026931E008,      ALR 0051
     X 3.1551706E009, 9.4655118E009, 2.6293088E010, 6.8362029E010,      ALR 0052
     X 1.6779771E011)                                                   ALR 0053
      DATA(C9 =-4.8620000E004,-9.2378000E005,-9.2378000E006,            ALR 0054
     X-6.4664600E007,-3.5565530E008,-1.6360144E009,-6.5440575E009,      ALR 0055
     X-2.3371634E010,-7.5957811E010,-2.2787343E011,-6.3804561E011)      ALR 0056
      DATA(C10= 1.8475600E005, 3.8798760E006, 4.2678636E007,            ALR 0057
     X 3.2720288E008, 1.9632173E009, 9.8160863E009, 4.2536374E010,      ALR 0058
     X 1.6406887E011, 5.7424105E011, 1.8503323E012)                     ALR 0059
      DATA(C11=-7.0543200E005,-1.6224936E007,-1.9469923E008,            ALR 0060
     X-1.6224936E009,-1.0546208E010,-5.6949525E010,-2.6576445E011,      ALR 0061
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     X=1.1010242E012,-4.1288406E012)                                    ALR 0062
      DATA(C12= 2.7041560E006, 6.7603900E007, 8.7885070E008,            ALR 0063
     X 7.9096563E009, 5.5367594E010, 3.2113205E011, 1.6056602E012,      ALR 0064
     X 7.1107810E012)                                                   ALR 0065
      DATA(C13=-1.0400600E007,-2.8081620E008,-3.9314268E009,            ALR 0066
     X=3.8003792E010,-2.8502844E011,-1.7671763E012,-9.4249405E012)      ALR 0067
      DATA(C14= 4.0116600E007, 1.1633814E009, 1.7450721E010,            ALR 0068
     X 1.8032412E011, 1.4425929E012, 9.5211134E012)                     ALR 0069
      DATA(C15=-1.5511752E008,-4.8086431E009,-7.6938290E010,            ALR 0070
     X=8.4632119E011,-7.1937301E012)                                    ALR 0071
      DATA(C16= 6.0108039E008, 1.9835653E010, 3.3720610E011,            ALR 0072
     X 3.9340712E012)                                                   ALR 0073
      DATA(C17=-2.3336062E009,-8.1676218E010,-1.4701719E012)            ALR 0074
      DATA(C18= 9.0751353E009, 3.3578001E011)                           ALR 0075
      DATA(C19=-3.5345264E010)                                          ALR 0076
      IF(ITER-1)201,201,202                                             ALR 0077
  202 READTAPE4,IS,MANY                                                 ALR 0078
      CALLTIMEIT(0)                                                     ALR 0079
      IS1=IS+MANY-1                                                     ALR 0080
      IF(IOPT.LT.2) GO TO 602                                           ALR 0081
      READ TAPE 4,((BSIGET(J,L),S1(J,L),L=1,NMAX),J=IS,IS1)             ALR 0082
      READ TAPE 4,(BTSIGT(J),BSIGER(J),STOT(J),J=IS,IS1)                ALR 0083
      GO TO 603                                                         ALR 0084
  602 READTAPE4,((BSIGET(J,L),L=1,NMAX),J=IS,IS1)                       ALR 0085
      READTAPE4,(BTSIGT(J),BSIGER(J),J=IS,IS1)                          ALR 0086
  603 CALLTIMELAPS(13)                                                  ALR 0087
      RETURN                                                            ALR 0088
  201 CONTINUE                                                          ALR 0089
      CALLTIMEIT(0)                                                     ALR 0090
      NUSANS=MANY*(KEND-KMIN+1)*NDELU                                   ALR 0091
      IF(KEND.EQ.NINTC)MANY=(KEND-KMIN+1)*NDELU                         ALR 0092
      JEND=IS+MANY-1                                                    ALR 0093
   11 KMI=KMIN+1                                                        ALR 0094
      JU(KMIN)=IS                                                       ALR 0095
   18 KENO=KEND-1                                                       ALR 0096
   15 DO16K=KMIN,KENO                                                   ALR 0097
   16 JU(K+1)=JU(K)+NDELU                                               ALR 0098
   17 JL(KEND)=JEND                                                     ALR 0099
   19 DO20K=KMIN,KENO                                                   ALR 0100
   20 JL(K)=JU(K+1)-1                                                   ALR 0101
   32 DO33M=1,MTOT                                                      ALR 0102
   33 ALPHA(M)=4.*A(M)/(A(M)+1.)**2                                     ALR 0103
      NMAX=0                                                            ALR 0104
      DO220M=1,MTOT                                                     ALR 0105
      N(M)=-LOGF(1.-ALPHA(M))/DELU+1.                                   ALR 0106
      IF(N(M)-NMAX)220,220,221                                          ALR 0107
  221 NMAX=N(M)                                                         ALR 0108
  220 CONTINUE                                                          ALR 0109
      R=EXPF(-DELU)                                                     ALR 0110
   53 KK1=1                                                             ALR 0111
   54 KK2=MTOT                                                          ALR 0112
   59 DO67J=IS,JEND                                                     ALR 0113
   60 BTSIGT(J)=0.0                                                     ALR 0114
   61 BSIGER(J)=0.0                                                     ALR 0115
   62 STOT(J)=0.0                                                       ALR 0116
   63 DO66L=1,NMAX                                                      ALR 0117
      S1(J,L)=0.                                                        ALR 0118
   65 BSIGET(J,L)=0.0                                                   ALR 0119
   66 CONTINUE                                                          ALR 0120
   67 CONTINUE                                                          ALR 0121
   68 DO174M=KK1,KK2                                                    ALR 0122
      J11=0                                                             ALR 0123
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      BUFFER IN(5,1)(BB1(1),BB1(20))                                    ALR 0124
   70 K6=N(M)+1                                                         ALR 0125
   76 K7=N(M)                                                           ALR 0126
      IF(NMIC.GT.0) GO TO 12345                                         ALR 0127
      IBUF(1)=1S                                                        ALR 0128
      IBUF(2)=MANY                                                      ALR 0129
      K27=K7                                                            ALR 0130
      IF(IOPT.GT.1) K27=2*K7                                            ALR 0131
      IBUF(3)=K27                                                       ALR 0132
 1078 IF(UNIT,2)1078,2078                                               ALR 0133
 2078 BUFFER OUT (2,1)(IBUF(1),IBUF(3))                                 ALR 0134
12345 CONTINUE                                                          ALR 0135
   78 X(1)=0.0                                                          ALR 0136
   79 SIGEET(1)=0.0                                                     ALR 0137
   80 DO82K=2,K6                                                        ALR 0138
   81 X(K)=(1./ALPHA(M))*(1.-R**(K-1))                                  ALR 0139
      IF(1.-X(K))190,82,82                                              ALR 0140
  190 X(K)=1.                                                           ALR 0141
   82 SIGEET(K)=0.0                                                     ALR 0142
   83 SIGEER=0.0                                                        ALR 0143
   84 TSIGET=0.0                                                        ALR 0144
   86 K5=N(M)+1                                                         ALR 0145
   89 DO173KUP=KMIN,KEND                                                ALR 0146
   95 IF(KUP-KMIN)96,96,117                                             ALR 0147
   96 DO97K=1,K5                                                        ALR 0148
   97 EJMIN1(K)=0.0                                                     ALR 0149
   99 EJMIR1=0.0                                                        ALR 0150
  100 EJMIT1=0.0                                                        ALR 0151
  101 IF(UNIT,5)101,102                                                 ALR 0152
  102 BUFFER IN(5,1)(BB2(1),BB2(20))                                    ALR 0153
      B0=BB1(1)                                                         ALR 0154
      B1=BB1(2)                                                         ALR 0155
      B2=BB1(3)                                                         ALR 0156
      B3=BB1(4)                                                         ALR 0157
      B4=BB1(5)                                                         ALR 0158
      B5=BB1(6)                                                         ALR 0159
      B6=BB1(7)                                                         ALR 0160
      B7=BB1(8)                                                         ALR 0161
      B8=BB1(9)                                                         ALR 0162
      B9=BB1(10)                                                        ALR 0163
      B10=BB1(11)                                                       ALR 0164
      B11=BB1(12)                                                       ALR 0165
      B12=BB1(13)                                                       ALR 0166
      B13=BB1(14)                                                       ALR 0167
      B14=BB1(15)                                                       ALR 0168
      B15=BB1(16)                                                       ALR 0169
      B16=BB1(17)                                                       ALR 0170
      B17=BB1(18)                                                       ALR 0171
      B18=BB1(19)                                                       ALR 0172
      B19=BB1(20)                                                       ALR 0173
      FLIP=-1                                                           ALR 0174
  105 A0=(B0+B1+B2+B3+B4+B5+B6+B7+B8+B9+B10+B11+B12+B13+B14+B15+        ALR 0175
     1B16+B17+B18+B19)*AC(M)                                            ALR 0176
      A1=(C1(1)*B1+C1(2)*B2+C1(3)*B3+C1(4)*B4+C1(5)*B5+C1(6)*B6         ALR 0177
     1+C1(7)*B7+C1(8)*B8+C1(9)*B9+C1(10)*B10+C1(11)*B11+C1(12)*B12+     ALR 0178
     2C1(13)*B13+C1(14)*B14+C1(15)*B15+C1(16)*B16+C1(17)*B17+           ALR 0179
     3C1(18)*B18+C1(19)*B19)*AC(M)                                      ALR 0180
      A2=(C2(1)*B2+C2(2)*B3+C2(3)*B4+C2(4)*B5+C2(5)*B6+C2(6)*B7+        ALR 0181
     1C2(7)*B8+C2(8)*B9+C2(9)*B10+C2(10)*B11+C2(11)*B12+C2(12)*B13+     ALR 0182
     2C2(13)*B14+C2(14)*B15+C2(15)*B16+C2(16)*B17+C2(17)*B18+C2(18)*B19)ALR 0183
     3*AC(M)                                                            ALR 0184
      A3=(C3(1)*B3+C3(2)*B4+C3(3)*B5+C3(4)*B6+C3(5)*B7+C3(6)*B8+        ALR 0185
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     1C3(7)*B9+C3(8)*B10+C3(9)*B11+C3(10)*B12+C3(11)*B13+C3(12)*B14+     ALR 0186
     2C3(13)*B15+C3(14)*B16+C3(15)*B17+C3(16)*B18+C3(17)*B19)*AC(M)      ALR 0187
      A4=(C4(1)*B4+C4(2)*B5+C4(3)*B6+C4(4)*B7+C4(5)*B8+C4(6)*B9+         ALR 0188
     1C4(7)*B10+C4(8)*B11+C4(9)*B12+C4(10)*B13+C4(11)*B14+C4(12)*B15+    ALR 0189
     2C4(13)*B16+C4(14)*B17+C4(15)*B18+C4(16)*B19)*AC(M)                 ALR 0190
      A5=(C5(1)*B5+C5(2)*B6+C5(3)*B7+C5(4)*B8+C5(5)*B9+C5(6)*B10+        ALR 0191
     1C5(7)*B11+C5(8)*B12+C5(9)*B13+C5(10)*B14+C5(11)*B15+C5(12)*B16+    ALR 0192
     2C5(13)*B17+C5(14)*B18+C5(15)*B19)*AC(M)                            ALR 0193
      A6=(C6(1)*B6+C6(2)*B7+C6(3)*B8+C6(4)*B9+C6(5)*B10+C6(6)*B11+       ALR 0194
     1C6(7)*B12+C6(8)*B13+C6(9)*B14+C6(10)*B15+C6(11)*B16+C6(12)*B17+    ALR 0195
     2C6(13)*B18+C6(14)*B19)*AC(M)                                       ALR 0196
      A7=(C7(1)*B7+C7(2)*B8+C7(3)*B9+C7(4)*B10+C7(5)*B11+C7(6)*B12+      ALR 0197
     1C7(7)*B13+C7(8)*B14+C7(9)*B15+C7(10)*B16+C7(11)*B17+C7(12)*B18+    ALR 0198
     2C7(13)*B19)*AC(M)                                                  ALR 0199
      A8=(C8(1)*B8+C8(2)*B9+C8(3)*B10+C8(4)*B11+C8(5)*B12+C8(6)*B13      ALR 0200
     1+C8(7)*B14+C8(8)*B15+C8(9)*B16+C8(10)*B17+C8(11)*B18+C8(12)*B19)   ALR 0201
     2*AC(M)                                                             ALR 0202
      A9=(C9(1)*B9+C9(2)*B10+C9(3)*B11+C9(4)*B12+C9(5)*B13+C9(6)*B14+    ALR 0203
     1C9(7)*B15+C9(8)*B16+C9(9)*B17+C9(10)*B18+C9(11)*B19)*AC(M)         ALR 0204
      A10=(C10(1)*B10+C10(2)*B11+C10(3)*B12+C10(4)*B13+C10(5)*B14+       ALR 0205
     1C10(6)*B15+C10(7)*B16+C10(8)*B17+C10(9)*B18+C10(10)*B19)*AC(M)     ALR 0206
      A11=(C11(1)*B11+C11(2)*B12+C11(3)*B13+C11(4)*B14+C11(5)*B15+       ALR 0207
     1C11(6)*B16+C11(7)*B17+C11(8)*B18+C11(9)*B19)*AC(M)                 ALR 0208
      A12=(C12(1)*B12+C12(2)*B13+C12(3)*B14+C12(4)*B15+C12(5)*B16+       ALR 0209
     1C12(6)*B17+C12(7)*B18+C12(8)*B19)*AC(M)                            ALR 0210
      A13=(C13(1)*B13+C13(2)*B14+C13(3)*B15+C13(4)*B16+C13(5)*B17+       ALR 0211
     1C13(6)*B18+C13(7)*B19)*AC(M)                                       ALR 0212
      A14=(C14(1)*B14+C14(2)*B15+C14(3)*B16+C14(4)*B17+C14(5)*B18+       ALR 0213
     1C14(6)*B19)*AC(M)                                                  ALR 0214
      A15=(C15(1)*B15+C15(2)*B16+C15(3)*B17+C15(4)*B18+C15(5)*B19)*AC(M) ALR 0215
      A16=(C16(1)*B16+C16(2)*B17+C16(3)*B18+C16(4)*B19)*AC(M)            ALR 0216
      A17=(C17(1)*B17+C17(2)*B18+C17(3)*B19)*AC(M)                       ALR 0217
      A18=(C18(1)*B18+C18(2)*B19)*AC(M)                                  ALR 0218
      A19=C19*B19*AC(M)                                                  ALR 0219
  110 EJMIN1(K7)=0.0                                                     ALR 0220
  111 DO112K=1,K7                                                        ALR 0221
      TEMPA=                    X(K+1)*A0+X(K+1)*(X(K+1)*A1/2.+X(K+1)*   ALR 0222
     1(X(K+1)*A2/3.+X(K+1)*(X(K+1)*A3/4.+X(K+1)*(X(K+1)*A4/5.+          ALR 0223
     2X(K+1)*(X(K+1)*A5/6.+X(K+1)*(X(K+1)*A6/7.+X(K+1)*(X(K+1)*A7/8.+   ALR 0224
     3X(K+1)*(X(K+1)*A8/9.+X(K+1)*(X(K+1)*A9/10.+X(K+1)*(X(K+1)*A10/11.+ALR 0225
     4X(K+1)*(X(K+1)*A11/12.+X(K+1)*(X(K+1)*A12/13.+X(K+1)*(X(K+1)*     ALR 0226
     5A13/14.+X(K+1)*(X(K+1)*A14/15.+X(K+1)*(X(K+1)*A15/16.+            ALR 0227
     6X(K+1)*(X(K+1)*A16/17.+X(K+1)*(X(K+1)*A17/18.+X(K+1)*(X(K+1)*     ALR 0228
     7A18/19.+X(K+1)*(X(K+1)*A19/20.))))))))))))))))))                  ALR 0229
      TEMPB=X(K)*A0+X(K)*(X(K)*A1/2.+X(K)*(X(K)*A2/3.+X(K)*(X(K)*A3/4.+  ALR 0230
     1X(K)*(X(K)*A4/5.+X(K)*(X(K)*A5/6.+X(K)*(X(K)*A6/7.+X(K)*(X(K)*    ALR 0231
     2A7/8.+X(K)*(X(K)*A8/9.+X(K)*(X(K)*A9/10.+X(K)*(X(K)*A10/11.+      ALR 0232
     BX(K)*(X(K)*A11/12.+X(K)*(X(K)*A12/13.+X(K)*(X(K)*A13/14.+X(K)*    ALR 0233
     4(X(K)*A14/15.+X(K)*(X(K)*A15/16.+X(K)*(X(K)*A16/17.+X(K)*         ALR 0234
     5(X(K)*A17/18.+X(K)*(X(K)*A18/19.+X(K)*(X(K)*A19/20.)))))))))))))))ALR 0235
     6))))                                                               ALR 0236
  112 SIGEET(K)=12.5663704*(TEMPA+TEMPB)                                 ALR 0237
  114 SIGEER=12.5663704*(A0+A1/2.+A2/3.+A3/4.+A4/5.+A5/6.+A6/7.+A7/8.+   ALR 0238
     1A8/9.+A9/10.+A10/11.+A11/12.+A12/13.+A13/14.+A14/15.+A15/16.+      ALR 0239
     2A16/17.+A17/18.+A18/19.+A19/20.+X(2)*(A0+X(2)*(A1/2.+X(2)*(A2/3.+ ALR 0240
     3X(2)*(A3/4.+X(2)*(A4/5.+X(2)*(A5/6.+X(2)*(A6/7.+X(2)*(A7/8.+      ALR 0241
     4X(2)*(A8/9.+X(2)*(A9/10.+X(2)*(A10/11.+X(2)*(A11/12.+             ALR 0242
     5X(2)*(A12/13.+X(2)*(A13/14.+X(2)*(A14/15.+X(2)*(A15/16.+          ALR 0243
     6X(2)*(A16/17.+X(2)*(A17/18.+X(2)*(A18/19.+X(2)*(A19/20.))))))))))ALR 0244
     7))))))))))                                                        ALR 0245
  115 TSIGET=12.5663704*(3.*B0-2.*B0/A(M)*U1(M)*B1-U2(M)*B2-U3(M)*B3-    ALR 0246
     1U4(M)*B4-U5(M)*B5-U6(M)*B6-U7(M)*B7-U8(M)*B8-U9(M)*B9-U10(M)*B10-  ALR 0247
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     2U11(M)*B11+U12(M)*B12+U13(M)*B13+U14(M)*B14+U15(M)*B15+U16(M)*B16+ALR 0248
     3U17(M)*B17+U18(M)*B18+U19(M)*B19)*AC(M)                           ALR 0249
 117 J1=JU(KUP)                                                         ALR 0250
 118 J2=JL(KUP)                                                         ALR 0251
 119 BLAH=0.0                                                           ALR 0252
 120 DO172J=J1,J2                                                       ALR 0253
     J11=J11+1                                                          ALR 0254
 122 DO123K=1,K5                                                        ALR 0255
 123 EJMIN1(K)=SIGEET(K+1)                                              ALR 0256
 125 EJMIR1=SIGEER                                                      ALR 0257
 126 EJMIT1=TSIGET                                                      ALR 0258
 127 IF(UNIT,5)127,128,146                                              ALR 0259
 146 CALL Q8QERROR(0,29HEOF OR PARITY ERROR ON LUN 5,)                  ALR 0260
 128 IF(FLIP,LT,0)129,130                                               ALR 0261
 129 IF(J11,NE,MANY      ) BUFFER IN(5,1)(BB1(1),BB1(20))               ALR 0262
     B0=BB2(1)                                                          ALR 0263
     B1=BB2(2)                                                          ALR 0264
     B2=BB2(3)                                                          ALR 0265
     B3=BB2(4)                                                          ALR 0266
     B4=BB2(5)                                                          ALR 0267
     B5=BB2(6)                                                          ALR 0268
     B6=BB2(7)                                                          ALR 0269
     B7=BB2(8)                                                          ALR 0270
     B8=BB2(9)                                                          ALR 0271
     B9=BB2(10)                                                         ALR 0272
     B10=BB2(11)                                                        ALR 0273
     B11=BB2(12)                                                        ALR 0274
     B12=BB2(13)                                                        ALR 0275
     B13=BB2(14)                                                        ALR 0276
     B14=BB2(15)                                                        ALR 0277
     B15=BB2(16)                                                        ALR 0278
     B16=BB2(17)                                                        ALR 0279
     B17=BB2(18)                                                        ALR 0280
     B18=BB2(19)                                                        ALR 0281
     B19=BB2(20)                                                        ALR 0282
     FLIP=-FLIP                                                         ALR 0283
     GO TO 131                                                          ALR 0284
 130 IF(J11,NE,MANY      ) BUFFER IN(5,1)(BB2(1),BB2(20))               ALR 0285
     B0=BB1(1)                                                          ALR 0286
     B1=BB1(2)                                                          ALR 0287
     B2=BB1(3)                                                          ALR 0288
     B3=BB1(4)                                                          ALR 0289
     B4=BB1(5)                                                          ALR 0290
     B5=BB1(6)                                                          ALR 0291
     B6=BB1(7)                                                          ALR 0292
     B7=BB1(8)                                                          ALR 0293
     B8=BB1(9)                                                          ALR 0294
     B9=BB1(10)                                                         ALR 0295
     B10=BB1(11)                                                        ALR 0296
     B11=BB1(12)                                                        ALR 0297
     B12=BB1(13)                                                        ALR 0298
     B13=BB1(14)                                                        ALR 0299
     B14=BB1(15)                                                        ALR 0300
     B15=BB1(16)                                                        ALR 0301
     B16=BB1(17)                                                        ALR 0302
     B17=BB1(18)                                                        ALR 0303
     B18=BB1(19)                                                        ALR 0304
     B19=BB1(20)                                                        ALR 0305
     FLIP=-FLIP                                                         ALR 0306
 131 A0=(B0+B1+B2+B3+B4+B5+B6+B7+B8+B9+B10+B11+B12+B13+B14+B15+         ALR 0307
    1B16+B17+B18+B19)*AC(M)                                             ALR 0308
     A1=(C1(1)*B1+C1(2)*B2+C1(3)*B3+C1(4)*B4+C1(5)*B5+C1(6)*B6          ALR 0309
    1+C1(7)*B7+C1(8)*B8+C1(9)*B9+C1(10)*B10+C1(11)*B11+C1(12)*B12+      ALR 0310
    2C1(13)*B13+C1(14)*B14+C1(15)*B15+C1(16)*B16+C1(17)*B17+            ALR 0311
    3C1(18)*B18+C1(19)*B19)*AC(M)                                       ALR 0312
     A2=(C2(1)*B2+C2(2)*B3+C2(3)*B4+C2(4)*B5+C2(5)*B6+C2(6)*B7+         ALR 0313
    1C2(7)*B8+C2(8)*B9+C2(9)*B10+C2(10)*B11+C2(11)*B12+C2(12)*B13+      ALR 0314
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     2C2(13)*B14+C2(14)*B15+C2(15)*B16+C2(16)*B17+C2(17)*B18+C2(18)*B19)ALR 0315
     3*AC(M)                                                           ALR 0316
      A3=(C3(1)*B3+C3(2)*B4+C3(3)*B5+C3(4)*B6+C3(5)*B7+C3(6)*B8+       ALR 0317
     1C3(7)*B9+C3(8)*B10+C3(9)*B11+C3(10)*B12+C3(11)*B13+C3(12)*B14+   ALR 0318
     2C3(13)*B15+C3(14)*B16+C3(15)*B17+C3(16)*B18+C3(17)*B19)*AC(M)    ALR 0319
      A4=(C4(1)*B4+C4(2)*B5+C4(3)*B6+C4(4)*B7+C4(5)*B8+C4(6)*B9+       ALR 0320
     1C4(7)*B10+C4(8)*B11+C4(9)*B12+C4(10)*B13+C4(11)*B14+C4(12)*B15+  ALR 0321
     2C4(13)*B16+C4(14)*B17+C4(15)*B18+C4(16)*B19)*AC(M)               ALR 0322
      A5=(C5(1)*B5+C5(2)*B6+C5(3)*B7+C5(4)*B8+C5(5)*B9+C5(6)*B10+      ALR 0323
     1C5(7)*B11+C5(8)*B12+C5(9)*B13+C5(10)*B14+C5(11)*B15+C5(12)*B16+  ALR 0324
     2C5(13)*B17+C5(14)*B18+C5(15)*B19)*AC(M)                          ALR 0325
      A6=(C6(1)*B6+C6(2)*B7+C6(3)*B8+C6(4)*B9+C6(5)*B10+C6(6)*B11+     ALR 0326
     1C6(7)*B12+C6(8)*B13+C6(9)*B14+C6(10)*B15+C6(11)*B16+C6(12)*B17+  ALR 0327
     2C6(13)*B18+C6(14)*B19)*AC(M)                                     ALR 0328
      A7=(C7(1)*B7+C7(2)*B8+C7(3)*B9+C7(4)*B10+C7(5)*B11+C7(6)*B12+    ALR 0329
     1C7(7)*B13+C7(8)*B14+C7(9)*B15+C7(10)*B16+C7(11)*B17+C7(12)*B18+  ALR 0330
     2C7(13)*B19)*AC(M)                                                ALR 0331
      A8=(C8(1)*B8+C8(2)*B9+C8(3)*B10+C8(4)*B11+C8(5)*B12+C8(6)*B13    ALR 0332
     1+C8(7)*B14+C8(8)*B15+C8(9)*B16+C8(10)*B17+C8(11)*B18+C8(12)*B19) ALR 0333
     2*AC(M)                                                           ALR 0334
      A9=(C9(1)*B9+C9(2)*B10+C9(3)*B11+C9(4)*B12+C9(5)*B13+C9(6)*B14+  ALR 0335
     1C9(7)*B15+C9(8)*B16+C9(9)*B17+C9(10)*B18+C9(11)*B19)*AC(M)       ALR 0336
      A10=(C10(1)*B10+C10(2)*B11+C10(3)*B12+C10(4)*B13+C10(5)*B14+     ALR 0337
     1C10(6)*B15+C10(7)*B16+C10(8)*B17+C10(9)*B18+C10(10)*B19)*AC(M)   ALR 0338
      A11=(C11(1)*B11+C11(2)*B12+C11(3)*B13+C11(4)*B14+C11(5)*B15+     ALR 0339
     1C11(6)*B16+C11(7)*B17+C11(8)*B18+C11(9)*B19)*AC(M)               ALR 0340
      A12=(C12(1)*B12+C12(2)*B13+C12(3)*B14+C12(4)*B15+C12(5)*B16+     ALR 0341
     1C12(6)*B17+C12(7)*B18+C12(8)*B19)*AC(M)                          ALR 0342
      A13=(C13(1)*B13+C13(2)*B14+C13(3)*B15+C13(4)*B16+C13(5)*B17+     ALR 0343
     1C13(6)*B18+C13(7)*B19)*AC(M)                                     ALR 0344
      A14=(C14(1)*B14+C14(2)*B15+C14(3)*B16+C14(4)*B17+C14(5)*B18+     ALR 0345
     1C14(6)*B19)*AC(M)                                                ALR 0346
      A15=(C15(1)*B15+C15(2)*B16+C15(3)*B17+C15(4)*B18+C15(5)*B19)*AC(M)ALR 0347
      A16=(C16(1)*B16+C16(2)*B17+C16(3)*B18+C16(4)*B19)*AC(M)          ALR 0348
      A17=(C17(1)*B17+C17(2)*B18+C17(3)*B19)*AC(M)                     ALR 0349
      A18=(C18(1)*B18+C18(2)*B19)*AC(M)                                ALR 0350
      A19=C19*B19*AC(M)                                                ALR 0351
  136 EJMIN1(K7)=0.0                                                   ALR 0352
  137 DO140K=1,K7                                                      ALR 0353
      TEMPA=                    X(K+1)*A0+X(K+1)*(X(K+1)*A1/2.+X(K+1)* ALR 0354
     1(X(K+1)*A2/3.+X(K+1)*(X(K+1)*A3/4.+X(K+1)*(X(K+1)*A4/5.+       ALR 0355
     2X(K+1)*(X(K+1)*A5/6.+X(K+1)*(X(K+1)*A6/7.+X(K+1)*(X(K+1)*A7/8.+ ALR 0356
     3X(K+1)*(X(K+1)*A8/9.+X(K+1)*(X(K+1)*A9/10.+X(K+1)*(X(K+1)*A10/11.+ALR 0357
     4X(K+1)*(X(K+1)*A11/12.+X(K+1)*(X(K+1)*A12/13.+X(K+1)*(X(K+1)*   ALR 0358
     5A13/14.+X(K+1)*(X(K+1)*A14/15.+X(K+1)*(X(K+1)*A15/16.+          ALR 0359
     6X(K+1)*(X(K+1)*A16/17.+X(K+1)*(X(K+1)*A17/18.+X(K+1)*(X(K+1)*   ALR 0360
     7A18/19.+X(K+1)*(X(K+1)*A19/20.))))))))))))))))))))             ALR 0361
      TEMPB=X(K)*A0+X(K)*(X(K)*A1/2.+X(K)*(X(K)*A2/3.+X(K)*(X(K)*A3/4.+ ALR 0362
     1X(K)*(X(K)*A4/5.+X(K)*(X(K)*A5/6.+X(K)*(X(K)*A6/7.+X(K)*(X(K)*  ALR 0363
     2A7/8.+X(K)*(X(K)*A8/9.+X(K)*(X(K)*A9/10.+X(K)*(X(K)*A10/11.+    ALR 0364
     BX(K)*(X(K)*A11/12.+X(K)*(X(K)*A12/13.+X(K)*(X(K)*A13/14.+X(K)*  ALR 0365
     4(X(K)*A14/15.+X(K)*(X(K)*A15/16.+X(K)*(X(K)*A16/17.+X(K)*       ALR 0366
     5(X(K)*A17/18.+X(K)*(X(K)*A18/19.+X(K)*(X(K)*A19/20.))))))))))))))))ALR 0367
     6))))                                                            ALR 0368
      SIGEET(K)=12.5663704*(TEMPA-TEMPB)                               ALR 0369
  139 SIGET(K)=(EJMIN1(K)+SIGEET(K))/2.                                ALR 0370
  140 CONTINUE                                                         ALR 0371
  142 SIGER=(EJMIR1+12.5663704*B0*AC(M))/2.                            ALR 0372
  144 TSIGET=12.5663704*(3.*B0-2.*B0/A(M)-U1(M)*B1-U2(M)*B2-U3(M)*B3-  ALR 0373
     1U4(M)*B4-U5(M)*B5-U6(M)*B6-U7(M)*B7-U8(M)*B8-U9(M)*B9-U10(M)*B10- ALR 0374
     2U11(M)*B11-U12(M)*B12-U13(M)*B13-U14(M)*B14-U15(M)*B15-U16(M)*B16-ALR 0375
     3U17(M)*B17-U18(M)*B18-U19(M)*B19)*AC(M)                          ALR 0376
  145 TSIGT=(EJMIT1+TSIGET)/2.                                         ALR 0377
  158 DO164L=1,K7                                                      ALR 0378
  159 IF(IOPT-2)163,160,160                                            ALR 0379
  160 P=L                                                              ALR 0380
      L1=L+K7+3                                                        ALR 0381
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  161 POW=.5*R**(P/2.)                                                    ALR 0382
      SIGET(L1)=3.*POW*(A(M)+1.-(A(M)+1.)/((2.*POW)**2))*SIGET(L)         ALR 0383
      IF(L.EQ.K7)SIGET(L1)=.SIGET(L)                                      ALR 0384
  162 S1(J,L)=S1(J,L)+SIGET(L1)                                           ALR 0385
  163 BSIGET(J,L)=BSIGET(J,L)*SIGET(L)                                    ALR 0386
  164 CONTINUE                                                            ALR 0387
      IF(IA.EQ.0)GO TO 167                                                ALR 0388
      LISA=J+1                                                            ALR 0389
      MARY=J+K7                                                           ALR 0390
      PRINT 1008,M,J,LISA,MARY,(SIGET(K),K=1,K7)                          ALR 0391
 1008 FORMAT(* M=*I3,*    J=*I3,*    K=*I3,*,*I3,*  P ZERO ELASTIC SCATTALR 0392
     1ER*/(10F12.6))                                                      ALR 0393
      IF(IOPT.EQ.1) GO TO 150                                             ALR 0394
      INDE1=K7+4                                                          ALR 0395
      INDE2=2*K7+3                                                        ALR 0396
      PRINT 1009,M,J,LISA,MARY,(SIGET(K),K=INDE1,INDE2)                   ALR 0397
 1009 FORMAT(* M=*I3,*    J=*I3,*    K=*I3,*,*I3,*  P ONE ELASTIC SCATTEALR 0398
     1R*/(10F12.6))                                                       ALR 0399
  150 PRINT 11010,SIGER,TSIGT                                             ALR 0400
11010 FORMAT(//10X*ELASTIC REMOVAL=*F12.6,5X2H3**TRANSPORT=*F12.6//)      ALR 0401
  167 SIGERR=12.5663704*(A0+A1/2.+A2/3.+A3/4.+A4/5.+A5/6.+A6/7.+A7/8.+    ALR 0402
     1A8/9.+A9/10.+A10/11.+A11/12.+A12/13.+A13/14.+A14/15.+A15/16.+       ALR 0403
     2A16/17.+A17/18.+A18/19.+A19/20.+X(2)*(A0+X(2)*(A1/2.+X(2)*(A2/3.+  ALR 0404
     3X(2)*(A3/4.+X(2)*(A4/5.+X(2)*(A5/6.+X(2)*(A6/7.+X(2)*(A7/8.+       ALR 0405
     4X(2)*(A8/9.+X(2)*(A9/10.+X(2)*(A10/11.+X(2)*(A11/12.+              ALR 0406
     5X(2)*(A12/13.+X(2)*(A13/14.+X(2)*(A14/15.+X(2)*(A15/16.+           ALR 0407
     6X(2)*(A16/17.+X(2)*(A17/18.+X(2)*(A18/19.+X(2)*(A19/20.))))))))))))ALR 0408
     7))))))))))                                                          ALR 0409
  169 STOT(J)=STOT(J)+3.*SIGER                                            ALR 0410
  170 BTSIGT(J)=BTSIGT(J)+TSIGT                                           ALR 0411
  171 BSIGER(J)=BSIGER(J)+SIGER                                           ALR 0412
      KEIGHT=K27+3                                                        ALR 0934
      DO 178 K=1,KEIGHT                                                   ALR 0936
  178 SIGET(K)=SIGET(K)/AC(M)                                             ALR 0415
      SIGER=SIGER/AC(M)                                                   ALR 0416
      TSIGT=TSIGT/AC(M)                                                   ALR 0417
      IF(NMIC.GT.0) GO TO 22345                                           ALR 0418
      SIGET(K7+1)=SIGER                                                   ALR 0419
      SIGET(K7+2)=TSIGT                                                   ALR 0420
      SIGET(K7+3)=3.*SIGER                                                ALR 0421
 1178 IF(UNIT,2)1178,2178                                                 ALR 0422
 2178 BUFFER OUT (2,1)(SIGET(1),SIGET(KEIGHT))                            ALR 0423
22345 CONTINUE                                                            ALR 0424
  172 CONTINUE                                                            ALR 0425
  173 CONTINUE                                                            ALR 0426
      IF(NMIC.GT.0) GO TO 32345                                           ALR 0427
      ENDFILE 2                                                           ALR 0428
32345 CONTINUE                                                            ALR 0429
      IF(NUSANS)174,174,175                                               ALR 0430
  175 IF(UNIT,5)175,176,146                                               ALR 0431
  176 DO 177NN=1,NUSANS                                                   ALR 0432
  177 BUFFER IN (5,1) (BB1(1),BB1(20))                                    ALR 0433


  174 CONTINUE                                                            ALR 0434
      WRITETAPE4,IS,MANY                                                  ALR 0435
      IS1=IS+MANY+1                                                       ALR 0436
      IF(IOPT.LT.2) GO TO 600                                             ALR 0437
      WRITE TAPE 4,((BSIGET(J,L),S1(J,L),L=1,NMAX),J=IS,IS1)              ALR 0438
      WRITE TAPE 4,(BTSIGT(J),BSIGER(J),STOT(J),J=IS,IS1)                 ALR 0439
      GO TO 601                                                           ALR 0440
  600 WRITETAPE4,((BSIGET(J,L),L=1,NMAX),J=IS,IS1)                        ALR 0441
      WRITETAPE4,(BTSIGT(J),BSIGER(J),J=IS,IS1)                           ALR 0442
  601 CALLTIMELAPS(14)                                                    ALR 0443
      RETURN                                                              ALR 0444
      END                                                                 ALR 0445
```

```
      SUBROUTINE PONE(KMIN,KEND,JFKS,MORE)                                  PON 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,        PON 0001
     1EMIN,EPSABS,EPSINT,ERRTOT,FACA,FCONC(20),FTH,GPTH,HOMBRG(2100),       PON 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,       PON 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,         PON 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,     PON 0005
     5NPUN,NRES,NSN2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,          PON 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                    PON 0007
      COMMON/1000/     S(11,70),LMO(20),N2N(20),SORS(70),                   PON 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)                   PON 0009
      COMMON/4900/SKIN(71,70)                                               PON 0010
      COMMON/2101/GAMMA(2101)                                               PON 0011
      COMMON/CALPON/A(20),AC(20),BSIGER(120),BSIGET(120,54),BSQ,            PON 0012
     1BTSIGT(120),EDELC,EDELS,FINUS,IS,ITER,MANY,S1(120,54),ETEM1,TEM13,    PON 0013
     2U1(20),U2(20),U3(20),U4(20),U5(20),U6(20),U7(20),U8(20),U9(20),       PON 0014
     3U10(20),U11(20),U12(20),U13(20),U14(20),U15(20),U16(20),U17(20),      PON 0015
     4U18(20),U19(20),SORSF(2100),HAM3(2100)                                PON 0016
      COMMON/ALPO/FAKER(443),STOT(120)                                      PON 0017
      COMMON/4340/PHIS(2100),PHIC(70),CURENT(2100),CRNTC(70)                PON 0018
      COMMON/FLXCOR/SHAPEC(70),SHAPES(2100),STR3(50),IBSQ,BUCK,BUCK2,EPS    PON 0019
      DIMENSION HAM9(2100),SI(70),SN(70)                                    PON 0020
      EQUIVALENCE(HOMBRG(1),HAM9(1))                                        PON 0021
      HYST(X)=9.4247778/(1.206E-6*X*(1.86+.09415E-6*X+.000136E-12*X*X)      PON 0022
     1**2)+3.1415926/(1.206E-6*X*(.4223+.13E-6*X)**2)+.332*SQRTF(.02526     PON 0023
     2/X)*(1.+.2244E-6*X)*(1.+.0209E-6*X)*(1.+.0209E-6*X)/                  PON 0024
     3(1.+7.46E-6*X+.158E-12*X*X)+.000143E-3*SQRTF(X)/(4.46+1.E-6*X)        PON 0025
      CALL TIMEIT(0)                                                        PON 0026
      IF(MORE.NE.1) GO TO 15                                                PON 0027
      RTBSQ=SQRTF(ABSF(BSQ))                                                PON 0028
      HSCSRS=0.                                                             PON 0029
      HICSIS=0.                                                             PON 0030
      NS=2100                                                               PON 0031
   15 IF(KMIN-KMINS)1,2,2                                                   PON 0032
    1 KENDP=KEND                                                            PON 0033
      KMINP=KMIN                                                            PON 0034
   11 DO6JC=KMINP,KENDP                                                     PON 0035
      S5JC=S(5,JC)+S(10,JC)+S(11,JC)                                        PON 0036
      PSIC=0.                                                               PON 0037
      NS=NINTC-JC+1                                                         PON 0038
      TEM1=0.                                                               PON 0039
      JF=JC-1                                                               PON 0040
      IF(JC.EQ.1) GO TO 5                                                   PON 0041
      DO 4 JCS=1,JF                                                         PON 0042
    4 PSIC=PSIC+PHIC(JCS)*(SKIN(JCS,JC)+2.*SKIN(JC+1,JCS))                  PON 0043
      IF(KT7.GT.0) HSCSRS=HSCSRS+ADEN(KT7)*PHIC(JC+1)*SERH(JC+1)/E(JC)      PON 0044
      IF(NDELU.EQ.1)TEM1=TEM1+HOMCAP(NS)                                    PON 0045
      PSIC=PHIC(JC+1)*(S(2,JC+1)+S(8,JC+1))+PSIC                            PON 0046
      IF(KT7.GT.0) PSIC=PSIC-ADEN(KT7)*PHIC(JC+1)*SERH(JC+1)                PON 0047
    5 TEM=SORS(JC)+PSIC                                                     PON 0048
      IF(KT7.GT.0) TEM=TEM+HSCSRS*(E(JC)-E(JC+1))                           PON 0049
      TEMT=BSQ/(3.*(S(1,JC)+S(7,JC)+S(3,JC)+S(4,JC)  +TEM1                 PON 0050
     1+S 5 JC +S(9,JC)))+S(3,JC)+S(4,JC)+S 5 JC -SKIN(JC,JC)+TEM1          PON 0051
     2+S(2,JC)+S(8,JC)+S(9,JC)-2.*SKIN(JC+1,JC)                            PON 0052
      PHIC(JC)=TEM/TEMT                                                     PON 0053
      SI(JC)=PHIC(JC)*S(3,JC)                                               PON 0054
      SN(JC)=PHIC(JC)*S(9,JC)                                               PON 0055
      SHAPEC(JC)=TEM                                                        PON 0056
      IF(NDELU.EQ.1)FINUS=FINUS+HOMFIS(NS)*PHIC(JC)                         PON 0057
    6 FINUS=PHIC(JC)*S(6,JC)          +FINUS                              PON 0058
      CALL TIMELAPS(12)                                                     PON 0059
      IF(KENDP.EQ.NINTC)GOTO66                                              PON 0060
   12 RETURN                                                                PON 0061
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    2 JFKL=JFKS+NDELU-1                                                    PON 0062
      CALL TIMEIT(0)                                                       PON 0063
      KENDP=KEND                                                           PON 0064
    9 KMINP=KMIN                                                           PON 0065
      IF(KMINS.GT.1.AND.KMINP.EQ.KMINS.AND.KT7.GT.0) HSCSRS=HSCSRS+        PON 0066
     1ADEN(KT7)*PHIC(KMIN-1)*SERH(KMIN-1)/E(KMIN)                          PON 0067
      IF(MORE-1)21,21,23                                                   PON 0068
   21 N1=0                                                                 PON 0069
      N2=0                                                                 PON 0070
      GO TO 20                                                             PON 0071
   23 N2=N2+2*(XMODF(MORE-1,2))                                            PON 0072
      IF(MORE-3)20,24,25                                                   PON 0073
   24 N1=2                                                                 PON 0074
      GO TO 20                                                             PON 0075
   25 N1=N1+2*(XMODF(MORE,2))                                              PON 0076
   20 DO22JC=KMINP,KENDP                                                   PON 0077
      SI(JC)=0.                                                            PON 0078
      SN(JC)=0.                                                            PON 0079
      S5JC=S(5,JC)+S(10,JC)+S(11,JC)                                       PON 0080
      ETEM2=ETEM1*EDELC                                                    PON 0081
      DELC=ETEM1-ETEM2                                                     PON 0082
      ETEM1=ETEM2                                                          PON 0083
      PSIC=0.                                                              PON 0084
      SUMJ=0.                                                              PON 0085
      SUMPHI=0 .                                                           PON 0086
      IF(JC.EQ.1) GO TO 26                                                 PON 0087
      JCF=JC-1                                                             PON 0088
      DO 34 JCS=1,JCF                                                      PON 0089
      P=0.                                                                 PON 0090
      IF(S(3,JCS).NE.0.) P=SKIN(JCS,JC)/S(3,JCS)                           PON 0091
      P1=0.                                                                PON 0092
      IF(S(9,JCS).NE.0.) P1=2.*SKIN(JC+1,JCS)/S(9,JCS)                     PON 0093
   34 PSIC=PSIC+SI(JCS)*P+SN(JCS)*P1                                       PON 0094
      PSIC=PHIC(JC-1)*S(2,JC-1)+PSIC                                       PON 0095
      IF(JC-KMINS)39,39,26                                                 PON 0096
   39 PSIC=PHIC(JC-1)*S(8,JC-1)+PSIC                                       PON 0097
      IF(KT7.GT.0) PSIC=PSIC-ADEN(KT7)*PHIC(JC-1)*SERH(JC-1)               PON 0098
   26 DO 55 JFK=JFKS,JFKL                                                  PON 0099
      SER=0.                                                               PON 0100
      TEM2S=TEM1S+EDELS                                                    PON 0101
      DELS=TEM1S-TEM2S                                                     PON 0102
      CSIS=0.                                                              PON 0103
      PSIS=0.                                                              PON 0104
      TEM1S=TEM2S                                                          PON 0105
      J=JFK-NSH2                                                           PON 0106
      BOTEN=TEM1S+DELS                                                     PON 0107
      IF(JFK.NE.1.AND.KT7.GT.0) 13,14                                      PON 0108
   13 TOPEN=BOTEN/EDELS                                                    PON 0109
      SHER=ADEN(KT7)*(HYST(TOPEN)*EDELS+HYST(BOTEN))*.5                    PON 0110
      HSCSRS=HSCSRS+PHIS(JFK-1)*SHER/BOTEN                                 PON 0111
      IF(IOPT.EQ.1) GO TO 14                                               PON 0112
      HICSIS=HICSIS+3.*SHER*CURENT(JFK-1)/(BOTEN*SQRTF(BOTEN))             PON 0113
   14 TEMB=BTSIGT(J)                                                       PON 0114
      IF(KT7.EQ.0)42,43                                                    PON 0115
   43 TEMB=TEMB+.5*ADEN(KT7)*(HYST(BOTEN)+HYST(TEM1S))                     PON 0116
      SER=ADEN(KT7)*(HYST(BOTEN)+EDELS+HYST(TEM1S))*.5                     PON 0117
   42 IF(IOPT.EQ.1) GO TO 44                                               PON 0118
      TEMB=STOT(J)                                                         PON 0119
      IF(KT7.EQ.0) 44,45                                                   PON 0120
   45 TEMB=TEMB+3.*SER                                                     PON 0121
   44 NAVEL=(KMINS-1)*NDELU                                                PON 0122
      TEM1=S(1,JC)+HAM3(JFK)+S(4,JC)+S5JC*TEMB/3.+HAM9(JFK)                PON 0123
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      P=0.                                                                  PON 0124
      IF(S(3,JC ),NE,0,) P=SKIN(JC ,JC)/S(3,JC )                            PON 0125
      P1=0.                                                                 PON 0126
      IF(S(9,JC ),NE,0,) P1=2,*SKIN(JC*1,JC )/S(9,JC )                      PON 0127
      TEM2=HAM3(JFK)*(1,-P)*S(4,JC)*S5JC+S(2,JC)*BSIGER(J)*                 PON 0128
     1HAM9(JFK)*(1,-P1)+SER                                                 PON 0129
      IF(JFK=NRES*NAVEL)51,51,52                                            PON 0130
   52 NS=NINT1R+NRES*NAVEL-JFK+1                                            PON 0131
      TEM1=TEM1+HOMCAP(NS)                                                  PON 0132
      TEM2=TEM2+HOMCAP(NS)                                                  PON 0133
   51 IF(IOPT.NE.2.AND.IOPT.NE.4.OR.RTBSQ.EQ.0.) GO TO 151                  PON 0134
      TEMC=RTBSQ/TEM1                                                       PON 0135
      IF(BSQ.LT.0.) GO TO 152                                               PON 0136
      TEMD=ATANF(TEMC)                                                      PON 0137
      TEM3=1.                                                               PON 0138
      GO TO 153                                                             PON 0139
  152 TEM3=-1.                                                              PON 0140
      IF(TEMC.LT.1.) GO TO 154                                              PON 0141
      PRINT 155,JFK                                                         PON 0142
      TEMC=1.                                                               PON 0143
      TEMD=1.E+70                                                           PON 0144
      GO TO 153                                                             PON 0145
  155 FORMAT(1H1/* NEGATIVE BUCKLING EXCEEDS REALITY FOR GROUP *I5)         PON 0146
  154 TEMD=.5*LOGF((1.+TEMC)/(1.-TEMC))                                     PON 0147
  153 GAMMA(JFK)=TEM3*TEMC*TEMD*.333333333/(1.-TEMD/TEMC)                   PON 0148
  151 TEMT=BSQ/(3.*GAMMA(JFK)*TEM1)+TEM2                                    PON 0149
      IF(JFK-1)38,38,36                                                     PON 0150
   36 J1=XMAXOF(1,JFK-NMAX)                                                 PON 0151
      J2=JFK-1                                                              PON 0152
      DO 37 JL=J1,J2                                                        PON 0153
      JK=JFK-JL                                                             PON 0154
      IF(JL-MORE+60)27,27,28                                                PON 0155
   27 NW1=N1                                                                PON 0156
      GO TO 29                                                              PON 0157
   28 NW1=N2                                                                PON 0158
   29 JREL=JL+NW1*60                                                        PON 0159
      IF(IOPT.GT.1) CSIS=CSIS+CURENT(JL)*S1(JREL,JK)                        PON 0160
   37 PSIS=PHIS(JL)*BSIGET(JREL,JK)+PSIS                                    PON 0161
   38 PSIS=PSIC+DELS/DELC+PSIS                                              PON 0162
      TEM=SQRSF(JFK)+PSIS-SIGNF(1.,BSQ)*CSIS*RTBSQ/(3.*TEM1*GAMMA(JFK))     PON 0163
      IF(KT7.GT.0) 18,19                                                    PON 0164
   18 TEM=TEM+DELS*HSCSRS                                                   PON 0165
      IF(IOPT.EQ.1) GO TO 19                                                PON 0166
      S1TEM=SQRTF(TEM1S)+H1CSIS*DELS                                        PON 0167
      TEM=TEM-SIGNF(1.,BSQ)*S1TEM*RTBSQ/(3.*TEM1*GAMMA(JFK))                PON 0168
      CSIS=CSIS+S1TEM                                                       PON 0169
   19 PHIS(JFK)=TEM/TEMT                                                    PON 0170
      SHAPES(JFK)=TEM                                                       PON 0171
      IF(IOPT.GT.1) CURENT(JFK)=(PHIS(JFK)*RTBSQ+CSIS)/(3.*TEM1             PON 0172
     1*GAMMA(JFK))                                                          PON 0173
      FINUS=PHIS(JFK)*S(6,JC)+FINUS                                         PON 0174
      IF(JFK-NRES*NAVEL)53,53,54                                            PON 0175
   54 FINUS=PHIS(JFK)*HOMFIS(NS)+FINUS                                      PON 0176
   53 SUMPHI=PHIS(JFK)+SUMPHI                                               PON 0177
      IF(IOPT.GT.1) SUMJ=SUMJ+CURENT(JFK)                                   PON 0178
      SI(JC)=SI(JC)+PHIS(JFK)*HAM3(JFK)                                     PON 0179
      SN(JC)=SN(JC)+PHIS(JFK)*HAM9(JFK)                                     PON 0180
   55 CONTINUE                                                              PON 0181
      PHIC(JC)=SUMPHI                                                       PON 0182
      IF(IOPT.GT.1) CRNTC(JC)=SUMJ                                          PON 0183
      IF(JC.EQ.KENDP) GO TO 22                                              PON 0184
      JFKS=JFKS+NDELU                                                       PON 0185
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      JFKL=JFKL+NDELU                                                    PON 0186
   22 CONTINUE                                                           PON 0187
      IF(IS-61)56,57,57                                                  PON 0188
   57 IS=1                                                               PON 0189
      GOTO59                                                             PON 0190
   56 IS=61                                                              PON 0191
   59 MANY=60                                                            PON 0192
      IF(IS-1)60,60,61                                                   PON 0193
   60 NSH2=NSH2+120                                                      PON 0194
   61 IF(KEND.LT.NINTC)GO TO 65                                          PON 0195
      GO TO 66                                                           PON 0196
   65 MORE=MORE+1                                                        PON 0197
      CALLTIMELAPS(15)                                                   PON 0198
      RETURN                                                             PON 0199
   66 PHIC(NINTC+1)=0.                                                   PON 0200
      IF(NTHRM.EQ.0)GO TO 76                                             PON 0201
      PSIS=0.                                                            PON 0202
      CSIS=0.                                                            PON 0203
      PSIC=0.                                                            PON 0204
      PSIC=PHIC(NINTC)*S(2,NINTC)*PSIC                                   PON 0205
      IF(NDELU.EQ.1)GOTO175                                              PON 0206
      JFKS=JFKS+NDELU                                                    PON 0207
      JFKL=JEND1+NMAX                                                    PON 0208
      DO 75 JFK=JFKS,JFKL                                                PON 0209
      J1=XMAXOF(1,JFK-NMAX)                                              PON 0210
      DO 75 JL=J1,JEND1                                                  PON 0211
      JK=JFK-JL                                                          PON 0212
      IF(JL-MORE*60)77,77,78                                             PON 0213
   77 NW1=N1                                                             PON 0214
      GO TO 79                                                           PON 0215
   78 NW1=N2                                                             PON 0216
   79 JREL=JL-NW1*60                                                     PON 0217
      IF(IOPT.GT.1) CSIS=CSIS+CURENT(JL)*S1(JREL,JK)                     PON 0218
   75 PSIS=PSIS+PHIS(JL)*BSIGET(JREL,JK)                                 PON 0219
  175 CONTINUE                                                           PON 0220
      S1TEM=0.                                                           PON 0221
      TEM=PSIC+PSIS-SIGNF(1.,BSQ)*CSIS*RTBSQ/(3.*TRTH)                   PON 0222
  176 IF(NDELU.EQ.1)TEM=TEM+PHIC(NINTC)*S(8,NINTC)                       PON 0223
      IF(KT7.GT.0.AND.NDELU.EQ.1) TEM=TEM-ADEN(KT7)*PHIC(NINTC)*         PON 0224
     1SERH(NINTC)                                                        PON 0225
      TEMT=BSQ/(3.*TRTH)+CTH+FTH+SNPTH+SNATH                             PON 0226
      IF(KT7.GT.0.AND.NDELU.GT.1) 16,17                                  PON 0227
   16 TOPEN=TEM1S+DELS                                                   PON 0228
      SHER=ADEN(KT7)*(HYST(TOPEN)*TEM1S/TOPEN+HYST(TEM1S))*.5            PON 0229
      IF(IOPT.EQ.1) GO TO 202                                            PON 0230
      H1CSIS=H1CSIS+3.*SHER*CURENT(JEND1)/(TEM1S*SQRTF(TEM1S))           PON 0231
      A=0.                                                               PON 0232
      TEM2S=TEM1S*EDELS                                                  PON 0233
      DO 200 I=1,800                                                     PON 0234
      DELS=TEM1S-TEM2S                                                   PON 0235
      A=A+DELS*SQRTF(TEM2S)                                              PON 0236
      TEM1S=TEM2S                                                        PON 0237
  200 TEM2S=TEM1S*EDELS                                                  PON 0238
      S1TEM=A*H1CSIS                                                     PON 0239
  202 TEM=TEM+E(NINTC+1)*(HSCSRS+PHIS(JEND1)*SHER/TEM1S)                 PON 0240
     1-SIGNF(1.,BSQ)*S1TEM*RTBSQ/(3.*TRTH)                               PON 0241
   17 IF(KT7.GT.0.AND.NDELU.EQ.1) TEM=TEM+(HSCSRS+ADEN(KT7)*PHIC(NINTC)*PON 0242
     1SERH(NINTC)/E(NINTC+1))*E(NINTC+1)                                 PON 0243
      PHIC(NINTC+1)=TEM/TEMT                                             PON 0244
      IF(IOPT.GT.1) CRNTC(NINTC+1)=(PHIC(NINTC+1)*RTBSQ+CSIS*S1TEM)/     PON 0245
     1(3.*TRTH)                                                          PON 0246
      FINUS=FINUS+PHIC(NINTC+1)*GFTH                                     PON 0247
   76 MORE=0                                                             PON 0248
      RETURN                                                             PON 0249
      END                                                                PON 0250
```

```
C**********OVERLAY 5*************************************************************
      PROGRAM CONTROL3                                                    CO3 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,      CO3 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GPTH,HOMBRG(2100),     CO3 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,     CO3 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,       CO3 0004
     4NELMO(20),NGEOM,NINT,NINTR,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,    CO3 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,        CO3 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                 CO3 0007
      COMMON/2101/GAMMA(2101)                                             CO3 0008
      COMMON/TRANS/TRANS(2100),TRANC(70)                                  CO3 0009
      CALL SEGMENT(5,1,23)                                                CO3 0010
      IF(NMIC.GT.0)GO TO 12345                                            CO3 0011
      CALL SEGMENT(5,2,23)                                                CO3 0012
      CALL SEGMENT(5,3,23)                                                CO3 0013
12345 CONTINUE                                                            CO3 0014
      RETURN                                                              CO3 0015
      END                                                                 CO3 0016
```

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C**********SEGMENT 1*************************************************************
      PROGRAMAVER                                                          AVR 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,       AVR 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),      AVR 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,      AVR 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,        AVR 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,    AVR 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,         AVR 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                   AVR 0007
      COMMON/1000/     S(11,70),LMO(20),N2N(20),SORS(70),                  AVR 0008
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)                  AVR 0009
      COMMON/4340/PHIS(2100),PHIC(70),CURENT(2100),CRNTC(70)               AVR 0010
      COMMON/TRANS/TRANS(2100),TRANC(70)                                   AVR 0011
      COMMON/FLXCOR/SHAPEC(70),SHAPES(2100),STR3(50),IBSQ,BSQ,BSQ2,EPS     AVR 0012
      DIMENSION BSIGER(120),BSIGET(120,54),BTSIGT(120),CRNTB(50),          AVR 0013
     1PHIB(50),STOT(120),S1(120,54)                                        AVR 0014
      HYST(X)=9.4247778/(1.206*X+(-1.86+.09415*X+.000136*X*X)**2)+         AVR 0015
     13.1415926/(1.206*X+(.4223+.13*X)**2)                                 AVR 0016
     2+.332*SQRTF(.02526E-6/X)*(1.+.2244*X)*(1.+.0205*X)*(1.+.0209*X)/     AVR 0017
     3(1.+7.46*X+.158*X*X)+.000143*SQRTF(X)/(4.46*X)                       AVR 0018
      DO 3000 I=1,NINT                                                     AVR 0019
 3000 TRANS(I)=0.                                                          AVR 0020
      DO 3001 I=1,NINTC                                                    AVR 0021
 3001 TRANC(I)=0.                                                          AVR 0022
      NOBG2=NOBG+1                                                         AVR 0023
      JFKS=1                                                               AVR 0024
      JCFS=1                                                               AVR 0025
      IF(NMIC.GT.0.OR.MTOT.EQ.0) GO TO 12345                               AVR 0026
      CALL OGARLA(LMO,MTOT,NOI,NPASS,IOPT)                                 AVR 0027
12345 CONTINUE                                                             AVR 0028
      CALLTIMEIT(0)                                                        AVR 0029
      REWIND3                                                              AVR 0030
      NAVEL=(KMINS-1)*NDELU                                                AVR 0031
      IFLAG=1                                                              AVR 0032
      NSH2=0                                                               AVR 0033
      IF(MTOT)120,120,121                                                  AVR 0034
  121 READTAPE4,IS,MANY                                                    AVR 0035
      IS1=IS+MANY-1                                                        AVR 0036
      IF(IOPT.EQ.1) GO TO 600                                              AVR 0037
      READ(4)((BSIGET(J,L),S1(J,L),L=1,NMAX),J=IS,IS1)                     AVR 0038
      READ(4)(BTSIGT(J),BSIGER(J),STOT(J),J=IS,IS1)                        AVR 0039
      GO TO 120                                                            AVR 0040
  600 READTAPE4,((BSIGET(J,L),L=1,NMAX),J=IS,IS1)                          AVR 0041
      READTAPE4,(BTSIGT(J),BSIGER(J),J=IS,IS1)                             AVR 0042
  120 IF(KT7.EQ.0) GO TO 700                                               AVR 0043
      IS1=NINT                                                             AVR 0044
      IF(MTOT.EQ.0) NMAX=0                                                 AVR 0045
      EDELS=EXPF(-DELU)                                                    AVR 0046
      ENERU=E(KMINS)                                                       AVR 0047
      ENERL=ENERU*EDELS                                                    AVR 0048
  700 DO90K=1,NOBG                                                         AVR 0049
      STR3(K)=0.                                                           AVR 0050
      TEM8=0.                                                              AVR 0051
      SUMFI=0.                                                             AVR 0052
      SUMJ=0.                                                              AVR 0053
      JC1=LGBN(K)                                                          AVR 0054
      JC2=LGBN(K+1)-1                                                      AVR 0055
      IF(K.EQ.NOBG)JC2=NINTC                                               AVR 0056
      IF( NDELU.EQ.1) GO TO 207                                            AVR 0057
  206 IF(KMINS.GT.JC2) GO TO 200                                           AVR 0058
      IF(KMINS.GT.JC1)202,201                                              AVR 0059
  202 JC2=KMINS-1                                                          AVR 0060
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```
      IFLAG=2                                                          AVR 0061
  200 DO 73 JC=JC1,JC2                                                 AVR 0062
      S5JC=S(5,JC)+S(10,JC)+S(11,JC)                                   AVR 0063
      TEM8=TEM8+SORS(JC)                                               AVR 0064
      TRANC(JC)=S(1,JC)+S(7,JC)+S(3,JC)+S(4,JC)+S 5 JC +S(9,JC)        AVR 0065
   73 SUMFI=PHIC(JC)+SUMFI                                             AVR 0066
      PHIB(K)=SUMFI                                                    AVR 0067
      GO TO(203,204)IFLAG                                              AVR 0068
  203 STR3(K)=TEM8                                                     AVR 0069
      GO TO 90                                                         AVR 0070
  204 JC1=KMINS                                                        AVR 0071
      JC2=LGBN(K+1)-1                                                  AVR 0072
      IF(K.EQ.NOBG)JC2=NINTC                                           AVR 0073
  201 KBULF=(JC2-KMINS+1)*NDELU                                        AVR 0074
      DO 205 JC=JC1,JC2                                                AVR 0075
      S5JC=S(5,JC)+S(10,JC)+S(11,JC)                                   AVR 0076
      J1=(JC-KMINS)*NDELU+1                                            AVR 0077
      J2=(JC-KMINS+1)*NDELU                                            AVR 0078
 1201 TEM8=TEM8+SORS(JC)                                               AVR 0079
      DO 1205 J=J1,J2                                                  AVR 0080
      BCON=0.                                                          AVR 0081
      SCON=0.                                                          AVR 0082
      NS=NINT+1-NAVEL+J                                                AVR 0083
      JREL=J-NSH2                                                      AVR 0084
      IF(JREL.LE.IS1) GO TO 213                                        AVR 0085
      READ TAPE 4, IS,MANY                                             AVR 0086
      IS1=IS+MANY-1                                                    AVR 0087
      IF(IOPT.EQ.1) GO TO 601                                          AVR 0088
      READ(4)((BSIGET(I,L),S1(I,L),L=1,NMAX),I=IS,IS1)                 AVR 0089
      READ(4)(BTSIGT(I),BSIGER(I),STOT(I),I=IS,IS1)                    AVR 0090
      GO TO 602                                                        AVR 0091
  601 READ TAPE 4, ((BSIGET(I,L),L=1,NMAX),I=IS,IS1)                   AVR 0092
      READ TAPE 4, (BTSIGT(I),BSIGER(I),I=IS,IS1)                      AVR 0093
  602 IF(J+IS1.GE.JEND1) GO TO 212                                     AVR 0094
      READ TAPE 4, IS,MANY                                             AVR 0095
      IS1=IS+MANY-1                                                    AVR 0096
      IF(IOPT.EQ.1) GO TO 603                                          AVR 0097
      READ(4)((BSIGET(I,L),S1(I,L),L=1,NMAX),I=IS,IS1)                 AVR 0098
      READ(4)(BTSIGT(I),BSIGER(I),STOT(I),I=IS,IS1)                    AVR 0099
      GO TO 212                                                        AVR 0100
  603 READ TAPE 4, ((BSIGET(I,L),L=1,NMAX),I=IS,IS1)                   AVR 0101
      READ TAPE 4, (BTSIGT(I),BSIGER(I),I=IS,IS1)                      AVR 0102
  212 NSH2=NSH2+120                                                    AVR 0103
      JREL=J-NSH2                                                      AVR 0104
  213 IF(MTOT.GT.0) BCON=BTSIGT(JREL)                                  AVR 0105
      IF(KT7.GT.0) BCON=BCON+.5*(HYST(ENERU)+HYST(ENERL))*ADEN(KT7)    AVR 0106
      IF(IOPT.EQ.1) GO TO 707                                          AVR 0107
      IF(MTOT.GT.0) SCON=STOT(JREL)                                    AVR 0108
      IF(KT7.GT.0) SCON=SCON+1.5*(HYST(ENERU)*ENERL/ENERU+             AVR 0109
     1HYST(ENERL))*ADEN(KT7)                                           AVR 0110
  707 TRANS(J)=S(1,JC)+S(3,JC)+S(4,JC)+S 5 JC +HOMCAP(NS)+             AVR 0111
     1BCON/3.+S(9,JC)                                                  AVR 0112
  604 SUMFI=SUMFI+PHIS(J)                                              AVR 0113
      IF(IOPT.GT.1) SUMJ=SUMJ+CURENT(J)                                AVR 0114
 1208 IF(KT7.EQ.0) GO TO 1205                                          AVR 0115
      ENERU=ENERL                                                      AVR 0116
      ENERL=ENERU*EDELS                                                AVR 0117
 1205 CONTINUE                                                         AVR 0118
  205 CONTINUE                                                         AVR 0119
      PHIB(K)=SUMFI                                                    AVR 0120
      IF(IOPT.GT.1) CRNTB(K)=SUMJ                                      AVR 0121
 1210 STR3(K)=TEM8                                                     AVR 0122
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      GO TO 90                                                          AVR 0123
  207 DO 208 JC=JC1,JC2                                                 AVR 0124
      S5JC=S(5,JC)+S(10,JC)+S(11,JC)                                    AVR 0125
      TEM8=TEM8+SORS(JC)                                                AVR 0126
      NS=NINTC+1-JC                                                     AVR 0127
      TRANC(JC)=S(1,JC)+S(7,JC)+S(3,JC)+S(4,JC)+S 5 JC +HOMCAP(NS)+     AVR 0128
     1S(9,JC)                                                           AVR 0129
  208 SUMFI=SUMFI+PHIC(JC)                                              AVR 0130
      PHIB(K)=SUMFI                                                     AVR 0131
      STR3(K)=TEM8                                                      AVR 0132
   90 CONTINUE                                                          AVR 0133
      WRITEOUTPUTTAPE6,526                                              AVR 0134
  526 FORMAT(*1BROAD GROUP EDIT*//)                                     AVR 0135
      WRITE(6,583)(K,CGB(K+1),STR3(K),PHIB(K),CRNTB(K),                 AVR 0136
     1K=1,NOBG),NOBG2,0.,0.,PHIC(NINTC+1),CRNTC(NINTC+1)                AVR 0137
  583 FORMAT(5H0    J8X5HEL(J)9X9HSOURCE(J)9X6HPHI(J)8X10HCURRENT(J)     AVR 0138
     1/(I6,1P4E16,5))                                                   AVR 0139
      IFDIVIDECHECK1007,4016                                            AVR 0140
 1007 WRITEOUTPUTTAPE6,581                                              AVR 0141
  581 FORMAT(10H1DVCK AVER)                                             AVR 0142
 4016 IF(NRUN.LE.0) GO TO 1016                                          AVR 0143
      PUNCH 2000,(IDENT(I),I=1,12)                                      AVR 0144
 2000 FORMAT(12A6)                                                      AVR 0145
      PUNCH 12000, NOBG                                                 AVR 0146
12000 FORMAT(I6)                                                        AVR 0147
 2002 PUNCH 2001,(CGB(K+1),K=1,NOBG),0.                                 AVR 0148
      PUNCH 2001,(STR3(K),K=1,NOBG),0.                                  AVR 0149
 2001 FORMAT(6E12.5)                                                    AVR 0150
 1016 CALLTIMELAPS(16)                                                  AVR 0151
      RETURN                                                            AVR 0152
      END                                                               AVR 0153
```

```
      SUBROUTINE OGARLA(LMO,MTOT,NOI,NPASS,IOPT)                        OGR 0000
      DIMENSION LMO(20),SIGET(111),BIGET(111),IA(3)                     OGR 0001
      CALL TIMEIT(0)                                                    OGR 0002
      DO 5 I=1,NOI                                                      OGR 0003
      IF(LMO(I).EQ.0) GO TO 5                                           OGR 0004
      K1=LMO(I)-1                                                       OGR 0005
      K2=MTOT-LMO(I)                                                    OGR 0006
      DO 4 J=1,NPASS                                                    OGR 0007
  110 IF(UNIT,2)110,120,120                                             OGR 0008
  120 IF(K1.EQ.0) GOT O 9                                               OGR 0009
      DO 1 K=1,K1                                                       OGR 0010
    1 CALL SKIPFILE(2)                                                  OGR 0011
    8 IF(UNIT,2)8,9,20                                                  OGR 0012
    9 BUFFER IN (2,1)(IA(1),IA(3))                                      OGR 0013
   10 IF(UNIT,2)10,40,2,20                                              OGR 0014
   20 PRINT 30                                                          OGR 0015
   30 FORMAT(25X*PARITY ERROR ON LUN 2 IN OGARLA*)                      OGR 0016
      STOP                                                              OGR 0017
    2 PRINT 6                                                           OGR 0018
    6 FORMAT(25X*EOF ON FIRST RECORD OF LUN 2*)                         OGR 0019
      STOP                                                              OGR 0020
   40 IF(UNIT,50)40,50                                                  OGR 0021
   50 BUFFER OUT (50,1)(IA(1),IA(3))                                    OGR 0022
      K3=IA(2)/2+1                                                      OGR 0023
      K7=IA(3)/2                                                        OGR 0024
      K27=IA(3)+3                                                       OGR 0025
   51 IF(UNIT,2)51,52,20                                                OGR 0026
   52 BUFFER IN (2,1)(SIGET(1),SIGET(K27))                              OGR 0027
      DO 100 K=1,K3                                                     OGR 0028
   60 IF(UNIT,2)60,70,130,20                                            OGR 0029
   70 BUFFER IN (2,1)(BIGET(1),BIGET(K27))                              OGR 0030
      BUFFER OUT (50,1)(SIGET(1),SIGET(K27))                            OGR 0031
   80 IF(UNIT,2)80,90,130,20                                            OGR 0032
   90 BUFFERIN (2,1)(SIGET(1),SIGET(K27))                               OGR 0033
      BUFFER OUT (50,1)(BIGET(1),BIGET(K27))                            OGR 0034
  100 CONTINUE                                                          OGR 0035
  130 IF(J.EQ.NPASS) GO TO 4                                            OGR 0036
      DO 3 K=1,K2                                                       OGR 0037
    3 CALL SKIPFILE (2)                                                 OGR 0038
    4 CONTINUE                                                          OGR 0039
      REWIND 2                                                          OGR 0040
    5 CONTINUE                                                          OGR 0041
      CALL TIMELAPS(17)                                                 OGR 0042
      REWIND 50                                                         OGR 0043
      RETURN                                                            OGR 0044
      END                                                               OGR 0045
```

```
C***********SEGMENT 2*************************************************************
      PROGRAM AVER1                                                          AV1 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,         AV1 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),        AV1 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,        AV1 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,          AV1 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,      AV1 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,           AV1 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                    AV1 0007
      COMMON/TRANS/TRANS(2100),TRANC(70)                                     AV1 0008
      COMMON/4900/SELT(49,50),S1ELT(49,50)                                   AV1 0009
      COMMON/4340/PHIS(2100),PHIC(70),CURENT(2100),CRNTC(70)                 AV1 0010
      COMMON/1000/S(11,70),SUMP(20),N2N(20),SF(49),SUMP1(21),                AV1 0011
     1THC(20),THF(20),THNA(20),THNP(20),THNU(20),THTR(20)                    AV1 0012
      COMMON/2101/GAMMA(2101)                                                AV1 0013
      COMMON/FLXCOR/SHAPEC(70),SHAPES(2100),STR3(50),IBSQ,BSQ,BSQ2,EPS       AV1 0014
      DIMENSION ANISEL(49),AVNU(49),BIGET(111),CAPA(49),CSUM(20,70),         AV1 0015
     1FISA(49),FISS(2100),FSUM(20,70),IBUF(3),IG(142),H1SRS(49),             AV1 0016
     2HSCSRS(49),LG(142),PHIINC2100),PHIOUT(2100),PIN(70,70),RESCA(20),      AV1 0017
     3RESCAP(49),RESFI(20),RESFIS(49),SC(49),SCAP(2100),SI(142),             AV1 0018
     4SIGET(120,54),S1(120,54),SINL(70,70),SINTRA(49,49),SNA(49),            AV1 0019
     5SNP(49),STR(49),SUMFI(49),SUMJ(49),TEMP1(50),TEMP2(50),TEMP3(50),      AV1 0020
     6TEMP4(50),TEMP5(50,50),TEMP6(50,50),TEMP7(50),TEMP8(50),               AV1 0021
     7TOTIN(49),TOTN2N(49),TSIGT(120),XTRA(12960)                           AV1 0022
      DIMENSION H1REM(2100),SIGIN(70,20)                                     AV1 0023
      EQUIVALENCE (FISS(1),HOMBRG(1)),(PHIIN(1),HOMBRG(1)),                  AV1 0024
     1(SCAP(1),HOMCAP(1)),(PHIOUT(1),HOMCAP(1)),(FSUM(1),HOMFIS(1)),         AV1 0025
     2(HSCSRS(1),HOMFIS(1401)),(H1SRS(1),HOMFIS(1450)),                      AV1 0026
     3(RESCAP(1),HOMFIS(1490)),(RESFIS(1),HOMFIS(1548)),                     AV1 0027
     4(TOTIN(1),HOMFIS(1597)),(TOTN2N(1),HOMFIS(1646)),                      AV1 0028
     5(ANISEL(1),HOMFIS(1695)),(AVNU(1),HOMFIS(1744)),                       AV1 0029
     6(BIGET(1),HOMFIS(1793)),(CAPA(1),HOMFIS(1904)),                        AV1 0030
     7(FISA(1),HOMFIS(1953)),(IBUF(1),HOMFIS(2002)),                         AV1 0031
     8(RESCA(1),HOMFIS(2005)),(RESFI(1),HOMFIS(2025)),                       AV1 0032
     9(SC(1),HOMFIS(2045)),(PIN(1),XTRA (1)),(SINL(1),XTRA (4901))           AV1 0033
      EQUIVALENCE (SINTRA(1),XTRA(9801)),(IG(1),XTRA(12202)),                AV1 0034
     1(LG(1),XTRA(12344)),(SI(1),XTRA(12486)),                               AV1 0035
     2(TEMP1(1),PHIS(1)),(TEMP2(1),PHIS(51)),(TEMP3(1),PHIS(101)),           AV1 0036
     3(TEMP4(1),PHIS(151)),(TEMP5(1),PHIS(201)),(TEMP7(1),PHIS(2701)),       AV1 0037
     4(TEMP8(1),PHIS(2751)),(TEMP6(1),HOMBRG(1)),                            AV1 0038
     5(SIGET(1),XTRA(1)),(S1(1),XTRA(6481))                                  AV1 0039
      HYST(X)=9.4247778/(1.206*X+(-1.86+.09415*X+.000136*X*X)**2)+           AV1 0040
     13.1415926/(1.206*X+(.4223+.13*X)**2)                                   AV1 0041
     2+.332*SQRTF(.02526E+6/X)*(1.+.2244*X)*(1.+.0205*X)*(1.+.0205*X)/       AV1 0042
     3(1.+7.46*X+.158*X*X)-.000143*SQRTF(X)/(4.46*X)                         AV1 0043
      REWIND 2                                                               AV1 0044
      REWIND 3                                                               AV1 0045
      REWIND 4                                                               AV1 0046
      REWIND 5                                                               AV1 0047
      KFLAG=1                                                                AV1 0048
      N2NFLG=0                                                               AV1 0049
      NAVEL=(KMINS-1)*NDELU                                                  AV1 0050
      IF(NDELU.EQ.1) NAVEL=0                                                 AV1 0051
      NONE=NRES-NAVEL+1                                                      AV1 0052
      DO 22 K=1,NOBG                                                         AV1 0053
      SUMJ(K)=0.                                                             AV1 0054
      SUMFI(K)=0.                                                            AV1 0055
      JC1=LGBN(K)                                                            AV1 0056
      JC2=LGBN(K+1)-1                                                        AV1 0057
      IF(K.EQ.NOBG)JC2=NINTC                                                 AV1 0058
      DO 22 JC=JC1,JC2                                                       AV1 0059
      IF(IOPT.GT.1) SUMJ(K)=SUMJ(K)+CRNTC(JC)                                AV1 0060
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   22 SUMFI(K)=SUMFI(K)+PHIC(JC)                                        AV1 0061
      CALLTIMEIT(0)                                                     AV1 0062
      DO 2 M=1,NOI                                                      AV1 0063
      DO 1 J=1,NINT1R                                                   AV1 0064
      READ(3)(RESCA(I),RESFI(I),I=1,NOI)                                AV1 0065
      SCAP(J)=RESCA(M)                                                  AV1 0066
    1 FISS(J)=RESFI(M)                                                  AV1 0067
      IF(M.EQ.NOI) GO TO 3                                              AV1 0068
      REWIND 3                                                          AV1 0069
    3 DO 2 J=1,NINT1R                                                   AV1 0070
      J1=NINT1R+1-J                                                     AV1 0071
    2 WRITE(2)SCAP(J1),FISS(J1)                                         AV1 0072
      CALLTIMELAPS(18)                                                  AV1 0073
      CALLTIMEIT(0)                                                     AV1 0074
      REWIND 2                                                          AV1 0075
      J2=NINTC                                                          AV1 0076
      IF(NDELU.GT.1) J2=JEND1                                           AV1 0077
      J1=NRES-NAVEL+1                                                   AV1 0078
      READ (3)(PHIIN(J),PHIOUT(J),J=J1,J2)                              AV1 0079
      NOBG2=NOBG+1                                                      AV1 0080
      IF(NUNRES)700,700,701                                             AV1 0081
  700 DO702L=1,NOI                                                      AV1 0082
      DO702J=1,NINTC                                                    AV1 0083
      CSUM(L,J)=0.                                                      AV1 0084
      FSUM(L,J)=0.                                                      AV1 0085
  702 CONTINUE                                                          AV1 0086
      GOTO704                                                           AV1 0087
  701 READ(3)((CSUM(L,J),FSUM(L,J),L=1,NOI),J=1,NINTC)                  AV1 0088
  704 CONTINUE                                                          AV1 0089
      IF(IOPT.LE.3.OR.KT7.EQ.0) GO TO 731                               AV1 0090
      EDELS=EXPF(-DELU)                                                 AV1 0091
      ACCU=0.                                                           AV1 0092
      ENERU1=1.E-6*CGB(NOBG2)                                           AV1 0093
      ENERL1=ENERU1*EDELS                                               AV1 0094
      DO 730 I=1,800                                                    AV1 0095
      ACCU=ACCU+(ENERU1-ENERL1)*SQRTF(ENERL1)                           AV1 0096
      ENERU1=ENERL1                                                     AV1 0097
  730 ENERL1=ENERU1*EDELS                                               AV1 0098
  731 DO 2000 M=1,NOI                                                   AV1 0099
      READ(3)((S(K,J),J=1,NINTC),K=1,11)                                AV1 0100
      DO 750 J=1,NINTC                                                  AV1 0101
      NS=NINTC+1-J                                                      AV1 0102
  750 SIGIN(NS,M)=S(3,J)                                                AV1 0103
      IFLAG=1                                                           AV1 0104
      IF(MTOT)120,120,121                                               AV1 0105
  121 IF(NELMO(M).LE.0) GO TO 120                                       AV1 0106
 4000 IF(UNIT,50)4000,4001                                              AV1 0107
 4001 BUFFER IN(50,1)(IBUF(1),IBUF(3))                                  AV1 0108
 4015 IF(UNIT,50)4015,4016                                              AV1 0109
 4016 IS=IBUF(1)                                                        AV1 0110
      MANY=IBUF(2)                                                      AV1 0111
      K7=IBUF(3)                                                        AV1 0112
      KEIGHT=K7+3                                                       AV1 0113
      IF(IOPT.GT.1) K7=K7/2                                             AV1 0114
      IS1=IS+MANY-1                                                     AV1 0115
      DO 100 I=IS,IS1                                                   AV1 0116
      BUFFER IN (50,1)(BIGET(1),BIGET(KEIGHT))                          AV1 0117
 4002 IF(UNIT,50)4002,4003                                              AV1 0118
 4003 DO 4004 I1=1,K7                                                   AV1 0119
      IF(IOPT.GT.1) S1(I,I1)=BIGET(K7+3+I1)                             AV1 0120
 4004 SIGET(I,I1)=BIGET(I1)                                             AV1 0121
      TSIGT(I)=BIGET(K7+2)                                              AV1 0122
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      IF(IOPT.GT.1) TSIGT(I)=BIGET(K7+3)                                AV1 0123
  100 CONTINUE                                                          AV1 0124
      N1=0                                                              AV1 0125
      N2=0                                                              AV1 0126
      NSH2=0                                                            AV1 0127
      MORE=1                                                            AV1 0128
  120 IF(M.NE.KT7) GO TO 1225                                           AV1 0129
      SISORS=0.                                                         AV1 0130
      IS1=NINT                                                          AV1 0131
      EDELS=EXPF(-DELU)                                                 AV1 0132
      EDELSQ=SQRTF(EDELS)                                               AV1 0133
      ENERU=E(KMINS)                                                    AV1 0134
      ENERL=ENERU*EDELS                                                 AV1 0135
      ENERLQ=SQRTF(ENERL)                                               AV1 0136
      DO1224KK=1,NOBG                                                   AV1 0137
      KC1=LGBN(KK)                                                      AV1 0138
      KC2=LGBN(KK+1)-1                                                  AV1 0139
      HSCSRS(KK)=0.                                                     AV1 0140
      H1SRS(KK)=0.                                                      AV1 0141
      DO1223 KC=KC1,KC2                                                 AV1 0142
      IF(NDELU.GT.1.AND.KC.GE.KMINS) 1220,1222                          AV1 0143
 1220 J1=(KC-KMINS)*NDELU+1                                             AV1 0144
      J2=(KC-KMINS+1)*NDELU                                             AV1 0145
      DO 706 J=J1,J2                                                    AV1 0146
      SHER=          (HYST(ENERU)+EDELS+HYST(ENERL))*.5                 AV1 0147
      HSCSRS(KK)=HSCSRS(KK)+PHIS(J)*SHER/ENERLI                         AV1 0148
      IF(IOPT.EQ.1) GO TO 732                                           AV1 0149
      H1REM(J)=SHER*CURENT(J)/(ENERL+ENERLQ)                            AV1 0150
      IF(IOPT.GT.3) H1SRS(KK)=H1SRS(KK)+3.+H1REM(J)                     AV1 0151
  732 ENERU=ENERL                                                       AV1 0152
      ENERLQ=ENERLQ*EDELSQ                                              AV1 0153
  706 ENERL=ENERU*EDELS                                                 AV1 0154
      GO TO 1223                                                        AV1 0155
 1222 HSCSRS(KK)=HSCSRS(KK)+PHIC(KC)*SERH(KC)/E(KC+1)                   AV1 0156
 1223 CONTINUE                                                          AV1 0157
 1224 CONTINUE                                                          AV1 0158
      ENERU=E(KMINS)                                                    AV1 0159
      ENERL=ENERU*EDELS                                                 AV1 0160
      ENERLQ=SQRTF(ENERL)                                               AV1 0161
 1225 DO 90 K=1,NOBG                                                    AV1 0162
      TEM18=0.                                                          AV1 0163
      KJ1=0                                                             AV1 0164
      TEM4=0.                                                           AV1 0165
      TEM5=0.                                                           AV1 0166
      TEM6=0.                                                           AV1 0167
      TEM7=0.                                                           AV1 0168
      TEM17=0.                                                          AV1 0169
      TEM27=0.                                                          AV1 0170
      TEM8=0.                                                           AV1 0171
      TEM25=0.                                                          AV1 0172
      TEM24=0.                                                          AV1 0173
      TEM15=0.                                                          AV1 0174
      TEM14=0.                                                          AV1 0175
      TEM9=0.                                                           AV1 0176
      TEM10=0.                                                          AV1 0177
      TEM11=0.                                                          AV1 0178
      TEM12=0.                                                          AV1 0179
      TEM16=0.                                                          AV1 0180
      TEMPHI=0.                                                         AV1 0181
      IF(IOPT.GT.1) TEM17=SUMJ(K)                                       AV1 0182
      RESCAP(K  )=0.                                                    AV1 0183
      RESFIS(K  )=0.                                                    AV1 0184
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      SC(K   )=0.                                                        AV1 0185
      SF(K   )=0.                                                        AV1 0186
      SNP(K)=0.                                                          AV1 0187
      SNA(K)=0.                                                          AV1 0188
      ANISEL(K)=0.                                                       AV1 0189
      FISA(K   )=0.                                                      AV1 0190
      CAPA(K   )=0.                                                      AV1 0191
      TOTIN(K)=0.                                                        AV1 0192
      TOTN2N(K)=0.                                                       AV1 0193
      STR(K   )=0.                                                       AV1 0194
      DO 6 KF=K,NOBG2                                                    AV1 0195
      IF(IOPT.GT.3) S1ELT(K,KF)=0.                                       AV1 0196
    6 SELT(K,KF   )=0.                                                   AV1 0197
      JC1=LGBN(K)                                                        AV1 0198
      JC2=LGBN(K+1)-1                                                    AV1 0199
      IF(NDELU.GT.1) GO TO 206                                           AV1 0200
  207 TEMCAP=0.                                                          AV1 0201
      TEMFIS=0.                                                          AV1 0202
      DO 208 JC=JC1,JC2                                                  AV1 0203
      NS=NINTC+1-JC                                                      AV1 0204
      IF(JC.LE.NRES)GO TO 106                                            AV1 0205
      READ(2)TEMCAP,TEMFIS                                               AV1 0206
      FLUX=PHIIN(JC)                                                     AV1 0207
      IF(CCONC(M).GT.1.E-20) FLUX=PHIOUT(JC)                             AV1 0208
      TEM14=TEM14+FLUX*SHAPEC(JC)*TEMFIS                                 AV1 0209
      TEM15=TEM15+FLUX*SHAPEC(JC)*TEMCAP                                 AV1 0210
      TEMPHI=TEMPHI+FLUX*SHAPEC(JC)                                      AV1 0211
  106 S5NS=S(5,NS)+S(10,NS)+S(11,NS)                                     AV1 0212
      TEM4=TEM4+PHIC(JC)* S(4,NS   )                                     AV1 0213
      TEM5=TEM5+PHIC(JC)* S(5,NS   )                                     AV1 0214
      TEM24=TEM24+PHIC(JC)*FSUM(M,NS)                                    AV1 0215
      TEM16=TEM16+PHIC(JC)*(S(4,NS)+TEMFIS)                              AV1 0216
      TEM25=TEM25+PHIC(JC)*CSUM(M,NS)                                    AV1 0217
      TEM6=TEM6+PHIC(JC)*S(6,NS   )*(S(4,NS   )+TEMFIS)                  AV1 0218
      TEM7=TEM7+PHIC(JC)*(S(1,NS   )+S(7,NS   )+S(3,NS   )+S(4,NS   )+   AV1 0219
     1S 5 NS   +TEMFIS+TEMCAP+S(9,NS   ))/TRANC(JC)                      AV1 0220
      TEM17=TEM17+PHIC(JC)/TRANC(JC)                                     AV1 0221
      TEM8=TEM8+PHIC(JC)*S(3,NS   )                                      AV1 0222
      TEM9=TEM9+PHIC(JC)*S(9,NS)                                         AV1 0223
      TEM10=TEM10+PHIC(JC)*S(10,NS)                                      AV1 0224
      TEM11=TEM11+PHIC(JC)*S(11,NS)                                      AV1 0225
  208 CONTINUE                                                           AV1 0226
      IF(JC2.LE.NRES) GO TO 600                                          AV1 0227
      IF(JC1.GT.NRES) GO TO 601                                          AV1 0228
      NRES1=NRES+1                                                       AV1 0229
      DO 602 JC=NRES1,JC2                                                AV1 0230
  602 TEM18=TEM18+PHIC(JC)                                               AV1 0231
      TEMPHI=TEMPHI*SUMFI(K)/TEM18                                       AV1 0232
  601 RESCAP(K)=TEM15/TEMPHI                                             AV1 0233
      RESFIS(K   )=TEM14/TEMPHI                                          AV1 0234
  600 SC(K)=TEM25/SUMFI(K)                                               AV1 0235
      SF(K   )=TEM24/SUMFI(K)                                            AV1 0236
      FISA(K   )=TEM4/SUMFI(K)+RESFIS(K)                                 AV1 0237
      CAPA(K   )=TEM5/SUMFI(K)+RESCAP(K)                                 AV1 0238
      TOTIN(K)=TEM8/SUMFI(K)                                             AV1 0239
      TOTN2N(K)=TEM 9/SUMFI(K)                                           AV1 0240
      SNP(K)=TEM10/SUMFI(K)                                              AV1 0241
      SNA(K)=TEM11/SUMFI(K)                                              AV1 0242
      IF(TEM16-1.E-30)209,209,210                                        AV1 0243
  209 AVNU(K   )=0.                                                      AV1 0244
      GO TO 1211                                                         AV1 0245
  210 AVNU(K   )=TEM6/TEM16                                              AV1 0246
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1211 STR(K)=TEM7/TEM17                                                  AV1 0247
     NS=NINTC+JC2+1                                                     AV1 0248
     IF(M,NE,KT7) GO TO 709                                             AV1 0249
     IF(K,EQ,NOBG) GO TO 710                                            AV1 0250
     K1=K+1                                                             AV1 0251
     DO 703 KK=K1,NOBG                                                  AV1 0252
 703 SELT(K,KK)=HSCSRS(K)*(E(LGBN(KK))-E(LGBN(KK+1)))/SUMFI(K)          AV1 0253
 710 SELT(K,NOBG2)=HSCSRS(K)*EMIN+1,E-6/SUMFI(K)                        AV1 0254
     TEM11=0.                                                           AV1 0255
     IF(K,EQ,NOBG) GO TO 1215                                           AV1 0256
     K1=K+2                                                             AV1 0257
     DO 1212 KK=K1,NOBG2                                                AV1 0258
1212 TEM11=TEM11+SELT(K,KK)                                             AV1 0259
     GO TO 1215                                                         AV1 0260
 705 SELT(K,K+1)=          PHIC(JC2)*(S(2,NS  )+S(8,NS  ))              AV1 0261
    1/SUMFI(K)                                                          AV1 0262
1215 SELT(K,K)=STR(K)+SELT(K,K+1)-FISA(K)+CAPA(K)+TOTIN(K)+TOTN2N(K)    AV1 0263
    1+SNA(K)+SNP(K)+TEM11                                               AV1 0264
     GO TO 90                                                           AV1 0265
 206 IF(KMINS,GT,JC2) GO TO 200                                         AV1 0266
     IF(KMINS,GT,JC1)202,201                                            AV1 0267
 202 JC2=KMINS-1                                                        AV1 0268
     IFLAG=2                                                            AV1 0269
 200 DO 73 JC=JC1,JC2                                                   AV1 0270
     NS=NINTC+1+JC                                                      AV1 0271
     S5NS=S(5,NS)+S(10,NS)+S(11,NS)                                     AV1 0272
     TEM4=TEM4+PHIC(JC)+S(4,NS  )                                       AV1 0273
     TEM5=TEM5+PHIC(JC)+S(5,NS  )                                       AV1 0274
     TEM24=TEM24+PHIC(JC)*FSUM(M,NS)                                    AV1 0275
     TEM25=TEM25+PHIC(JC)*CSUM(M,NS)                                    AV1 0276
     TEM6=TEM6+PHIC(JC)+S(6,NS  )+S(4,NS  )                             AV1 0277
     TEM7=TEM7+PHIC(JC)+(S(1,NS  )+S(7,NS  )+S(3,NS  )+S(4,NS  )+       AV1 0278
    18 5 NS  +S(9,NS  ))/TRANC(JC)                                      AV1 0279
     TEM17=TEM17+PHIC(JC)/TRANC(JC)                                     AV1 0280
     TEM8=TEM8+PHIC(JC)+S(3,NS  )                                       AV1 0281
     TEM 9=TEM 9+PHIC(JC)*S(9,NS  )                                     AV1 0282
     TEM10=TEM10+PHIC(JC)*S(10,NS)                                      AV1 0283
     TEM11=TEM11+PHIC(JC)*S(11,NS)                                      AV1 0284
  73 CONTINUE                                                           AV1 0285
     GO TO (203,204) IFLAG                                              AV1 0286
 203 SC(K  )=TEM25/SUMFI(K)                                             AV1 0287
     SF(K  )=TEM24/SUMFI(K)                                             AV1 0288
     FISA(K  )=TEM4/SUMFI(K)                                            AV1 0289
     CAPA(K  )=TEM5/SUMFI(K)                                            AV1 0290
     TOTIN(K)=TEM8/SUMFI(K)                                             AV1 0291
     TOTN2N(K)=TEM 9/SUMFI(K)                                           AV1 0292
     SNP(K)=TEM10/SUMFI(K)                                              AV1 0293
     SNA(K)=TEM11/SUMFI(K)                                              AV1 0294
     IF(TEM4-1.E-30)1209,1209,1210                                      AV1 0295
1209 AVNU(K  )=0.                                                       AV1 0296
     GO TO 211                                                          AV1 0297
1210 AVNU(K  )=TEM6/TEM4                                                AV1 0298
 211 STR(K)=TEM7/TEM17                                                  AV1 0299
     NS=NINTC+JC2+1                                                     AV1 0300
     IF(KT7,NE,M) GO TO 719                                             AV1 0301
     K1=K+1                                                             AV1 0302
     DO  716 KK=K1,NOBG                                                 AV1 0303
 716 SELT(K,KK)=HSCSRS(K)*(E(LGBN(KK))-E(LGBN(KK+1)))/SUMFI(K)          AV1 0304
     SELT(K,NOBG2)=HSCSRS(K)*EMIN+1,E-6/SUMFI(K)                        AV1 0305
     TEM11=0.                                                           AV1 0306
     K1=K+2                                                             AV1 0307
     DO  717 KK=K1,NOBG2                                                AV1 0308
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  717 TEM11=TEM11+SELT(K,KK)                                                AV1 0309
      GO TO 1219                                                            AV1 0310
  715     SELT(K,K+1)=              PHIC(JC2)*(S(2,NS  )+S(8,NS  ))         AV1 0311
     1/SUMFI(K)                                                             AV1 0312
 1219 SELT(K,K)=STR(K)+SELT(K,K+1)-FISA(K)+CAPA(K)+TOTIN(K)+TOTN2N(K)       AV1 0313
     1+SNA(K)+SNP(K)-TEM11                                                  AV1 0314
      GO TO 90                                                              AV1 0315
  204 JC1=KMINS                                                             AV1 0316
      JC2=LGBN(K+1)+1                                                       AV1 0317
      IF(K.EQ.NOBG)JC2=NINTC                                                AV1 0318
  201 KBULF=(JC2-KMINS+1)*NDELU                                             AV1 0319
      DO 205 JC=JC1,JC2                                                     AV1 0320
      J1=(JC-KMINS)*NDELU+1                                                 AV1 0321
      J2=(JC-KMINS+1)*NDELU                                                 AV1 0322
      NS=NINTC+1-JC                                                         AV1 0323
      S5NS=S(5,NS)+S(10,NS)+S(11,NS)                                        AV1 0324
      TEMFIS=0.                                                             AV1 0325
      TEMCAP=0.                                                             AV1 0326
 1201 DO 1205 J=J1,J2                                                       AV1 0327
      PHCRTR=PHIS(J)/TRANS(J)                                               AV1 0328
      IF(IOPT.GT.1) PHCRTR=CURENT(J)                                        AV1 0329
      IF(J.GT.NRES=NAVEL)1202,1203                                          AV1 0330
 1202 READ(2)TEMCAP,TEMFIS                                                  AV1 0331
      IF(J.EQ.NONE.AND.(J.NE.J1.OR.JC.NE.JC1)) KJ1=1                        AV1 0332
      FLUX=PHIIN(J)                                                         AV1 0333
      IF(CCONC(M).GT.1.E-20)FLUX=PHIOUT(J)                                  AV1 0334
      TEM14=TEM14+FLUX*SHAPES(J)*TEMFIS                                     AV1 0335
      TEM15=TEM15+FLUX*SHAPES(J)*TEMCAP                                     AV1 0336
      TEMPHI=TEMPHI+FLUX*SHAPES(J)                                          AV1 0337
 1203 JREL=J-NSH2                                                           AV1 0338
      TEM4=TEM4+PHIS(J)* S(4,NS)                                            AV1 0339
      TEM5=TEM5+PHIS(J)* S(5,NS)                                            AV1 0340
      TEM16=TEM16+PHIS(J)*(S(4,NS)+TEMFIS)                                  AV1 0341
      TEM24=TEM24+PHIS(J)*FSUM(M,NS)                                        AV1 0342
      TEM25=TEM25+PHIS(J)*CSUM(M,NS)                                        AV1 0343
      TEM6=TEM6+PHIS(J)*S(6,NS  )*(S(4,NS  )+TEMFIS)                        AV1 0344
      TEM8=TEM8+PHIS(J )*S(8,NS  )                                          AV1 0345
      TEM 9=TEM 9+PHIS(J )*S(9,NS  )                                        AV1 0346
      TEM10=TEM10+PHIS(J)*S(10,NS)                                          AV1 0347
      TEM11=TEM11+PHIS(J)*S(11,NS)                                          AV1 0348
      IF(M.EQ.KT7) GO TO 720                                                AV1 0349
      IF(NELMO(M).LE.0) GO TO 213                                           AV1 0350
      IF(JREL.LE.IS1) GO TO 1213                                            AV1 0351
      BUFFER IN(50,1)(IBUF(1),IBUF(3))                                      AV1 0352
 4005 IF(UNIT,50)4005,4006                                                  AV1 0353
 4006 IS=IBUF(1)                                                            AV1 0354
      MANY=IBUF(2)                                                          AV1 0355
      K7=IBUF(3)                                                            AV1 0356
      KEIGHT=K7+3                                                           AV1 0357
      IF(IOPT.GT.1) K7=K7/2                                                 AV1 0358
      IS1=IS+MANY-1                                                         AV1 0359
      DO 101 I=IS,IS1                                                       AV1 0360
      BUFFER IN (50,1)(BIGET(1),BIGET(KEIGHT))                              AV1 0361
 4007 IF(UNIT,50)4007,4008                                                  AV1 0362
 4008 DO 4009 I1=1,K7                                                       AV1 0363
      IF(IOPT.GT.1) S1(I,I1)=BIGET(K7+3+I1)                                 AV1 0364
 4009 SIGET(I,I1)=BIGET(I1)                                                 AV1 0365
      TSIGT(I)=BIGET(K7+2)                                                  AV1 0366
      IF(IOPT.GT.1) TSIGT(I)=BIGET(K7+3)                                    AV1 0367
  101 CONTINUE                                                              AV1 0368
      MORE=MORE+1                                                           AV1 0369
      N2=N2+2*(XMODF(MORE-1,2))                                             AV1 0370
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      IF(MORE-3)4010,4011,4012                                          AV1 0371
 4011 N1=2                                                              AV1 0372
      GO TO 4010                                                        AV1 0373
 4012 N1=N1+2*(XMODF(MORE,2))                                           AV1 0374
 4010 IF(IS.EQ.1) NSH2=NSH2+120                                         AV1 0375
      JREL=J-NSH2                                                       AV1 0376
 1213 TEMTR=TSIGT(JREL)/3.                                              AV1 0377
      GO TO 2213                                                        AV1 0378
  213 TEMTR=0.                                                          AV1 0379
 2213 IF(IOPT.EQ.1.OR.NELMO(M).LE.0) GO TO 2232                         AV1 0380
      S1SORS=0.                                                         AV1 0381
      IF(J.EQ.1) GO TO 2231                                             AV1 0382
      JJ1=XMAXOF(1,J-K7)                                                AV1 0383
      JJ2=J-1                                                           AV1 0384
      DO 2230 JLL=JJ1,JJ2                                               AV1 0385
      JK=J-JLL                                                          AV1 0386
      IF(JLL-MORE*60) 2227,2227,2228                                    AV1 0387
 2227 NW1=N1                                                            AV1 0388
      GO TO 2229                                                        AV1 0389
 2228 NW1=N2                                                            AV1 0390
 2229 JREL1=JLL-NW1*60                                                  AV1 0391
 2230 S1SORS=S1SORS+CURENT(JLL)*S1(JREL1,JK)/3.                         AV1 0392
 2231 TEM12=(TSIGT(JREL)/3.+S(3,NS)+S(4,NS)+S5NS+TEMFIS+TEMCAP+         AV1 0393
     1S(9,NS))*CURENT(J)                                                AV1 0394
      TEM7=TEM7+TEM12+GAMMA(J)-S1SORS                                   AV1 0395
      IF(IOPT.GT.3)TEM27=TEM27+TEM12                                    AV1 0396
      GO TO 216                                                         AV1 0397
 2232 TEM7=TEM7+PHCRTR *(S(1,NS  )+S(3,NS  )+S(4,NS  )+S 5 NS    +     AV1 0398
     1TEMFIS+TEMCAP+TEMTR+S(9,NS  ))                                    AV1 0399
      IF(IOPT.EQ.1)       TEM17=TEM17+PHCRTR                            AV1 0400
      IF(NELMO(M).LE.0) GO TO 1205                                      AV1 0401
  216 IF(J.GE.KBULF-K7+1)214,2400                                       AV1 0402
  214 KP=K+1                                                            AV1 0403
      JP1=KBULF+1                                                       AV1 0404
  215 IF(KP.EQ.NOBG+1) GO TO 219                                        AV1 0405
      KP2=LGBN(KP+1)                                                    AV1 0406
      IF(KP.EQ.NOBG)KP2=NINTC+1                                         AV1 0407
      JP2=XMINOF(J+K7,(KP2-KMINS)*NDELU)                                AV1 0408
      GO TO 224                                                         AV1 0409
  219 JP2=J+K7                                                          AV1 0410
  224 DO 218 JP=JP1,JP2                                                 AV1 0411
      J3=JP-J                                                           AV1 0412
      SELT(K,KP  )=SELT(K,KP  )+PHIS(J)*SIGET(JREL,J3)                  AV1 0935
      IF(IOPT.GT.3.AND.NELMO(M).GT.0) S1ELT(K,KP)=S1ELT(K,KP)+CURENT(J)*AV1 0936
     1S1(JREL,J3)                                                       AV1 0415
  218 CONTINUE                                                          AV1 0416
      IF(JP2.EQ.J+K7) GO TO 2400                                        AV1 0417
      JP1=JP2+1                                                         AV1 0418
      KP=KP+1                                                           AV1 0419
      GO TO 215                                                         AV1 0420
 2400 IF(IOPT.LE.3.OR.J.EQ.KBULF) GO TO 1205                            AV1 0421
      JP1=J+1                                                           AV1 0422
      JP2=XMINOF(J+K7,KBULF)                                            AV1 0423
      DO 2401 JP=JP1,JP2                                                AV1 0424
      J3=JP-J                                                           AV1 0425
 2401 S1ELT(K,K)=S1ELT(K,K)+CURENT(J)*S1(JREL,J3)                       AV1 0426
      GO TO 1205                                                        AV1 0427
  720 BCON=.166666667*(HYST(ENERU)+HYST(ENERL))                         AV1 0428
      IF(IOPT.EQ.1) TEM17=TEM17+PHCRTR                                  AV1 0429
      SCON=BCON                                                         AV1 0430
      IF(IOPT.EQ.1) GO TO 721                                           AV1 0431
      SCON=H1REM(J)*ENERL*ENERLO/CURENT(J)                              AV1 0432
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      IF(J.EQ.1) GO TO 721                                                    AV1 0433
      JJ2=J-1                                                                 AV1 0434
      S1SORS=S1SORS+H1REM(JJ2)                                                AV1 0435
  721 TEM12=(SCON+S5NS)*PHCRTR                                                AV1 0436
      TEM7=TEM7+TEM12*GAMMA(J)-S1SORS*ENERLQ*(ENERU-ENERL)                    AV1 0437
      IF(IOPT.GT.3)TEM27=TEM27+TEM12                                          AV1 0438
      IF(IOPT.LE.3.OR.J.EQ.KBULF) GO TO 2402                                  AV1 0439
      ENERU1=ENERL                                                            AV1 0440
      ENERL1=ENERU1*EDELS                                                     AV1 0441
      JH1=J+1                                                                 AV1 0442
      DO 2403 JHL=JH1,KBULF                                                   AV1 0443
      S1ELT(K,K)=S1ELT(K,K)+SQRTF(ENERL1)*(ENERU1-ENERL1)*3.*H1REM(J)         AV1 0444
      ENERU1=ENERL1                                                           AV1 0445
 2403 ENERL1=ENERU1*EDELS                                                     AV1 0446
 2402 ENERU=ENERL                                                             AV1 0447
      ENERL=ENERU*EDELS                                                       AV1 0448
      ENERLQ=ENERLQ*EDELSQ                                                    AV1 0449
 1205 CONTINUE                                                                AV1 0450
      IF(JC.LT.JC2) GO TO 205                                                 AV1 0451
      SELT(K,K+1)=SELT(K,K+1)+RHIC(JC2)*S(2,NS  )                             AV1 0452
  205 CONTINUE                                                                AV1 0453
      IF(M.NE.KT7) GO TO 725                                                  AV1 0454
      K1=K+1                                                                  AV1 0455
      DO  723 KK=K1,NOBG                                                      AV1 0456
  723 SELT(K,KK)=          1.E-6*(CGB(KK)-CGB(KK+1))*HSCSRS(K)                AV1 0457
      SELT(K,NOBG2)=               1.E-6*CGB(NOBG2)*HSCSRS(K)                 AV1 0458
      IF(IOPT.LE.3) GO TO 725                                                 AV1 0459
      ENERU1=E(LGBN(K1))                                                      AV1 0460
      ENERL1=ENERU1*EDELS                                                     AV1 0461
      DO  724 KK=K1,NOBG                                                      AV1 0462
      KC1=LGBN(KK)                                                            AV1 0463
      KC2=LGBN(KK+1)-1                                                        AV1 0464
      DO  724 KC=KC1,KC2                                                      AV1 0465
      JF1=(KC-KMINS)*NDELU+1                                                  AV1 0466
      JF2=(KC-KMINS+1)*NDELU                                                  AV1 0467
      DO  724 JF=JF1,JF2                                                      AV1 0468
      S1ELT(K,KK)=S1ELT(K,KK)+SQRTF(ENERL1)*(ENERU1-ENERL1)*H1SRS(K)          AV1 0469
      ENERU1=ENERL1                                                           AV1 0470
  724 ENERL1=ENERU1*EDELS                                                     AV1 0471
      S1ELT(K,NOBG2)=ACCU*H1SRS(K)                                            AV1 0472
  725 IF(KJ1.EQ.0) GO TO 604                                                  AV1 0473
      DO 606 J=NONE,KBULF                                                     AV1 0474
  606 TEM18=TEM18+PHIS(J)                                                     AV1 0475
      TEMPHI=TEMPHI*SUMFI(K)/TEM18                                            AV1 0476
  604 IF(TEMPHI.EQ.0) GO TO 605                                               AV1 0477
      RESCAP(K  )=TEM15/TEMPHI                                                AV1 0478
      RESFIS(K  )=TEM14/TEMPHI                                                AV1 0479
  605 SC(K)=TEM25/SUMFI(K)                                                    AV1 0480
      SF(K  )=TEM24/SUMFI(K)                                                  AV1 0481
      CAPA(K)=TEM5/SUMFI(K)+RESCAP(K)                                         AV1 0482
      FISA(K  )=TEM4/SUMFI(K)+RESFIS(K)                                       AV1 0483
      TOTIN(K)=TEM8/SUMFI(K)                                                  AV1 0484
      TOTN2N(K)=TEM 9/SUMFI(K)                                                AV1 0485
      SNP(K)=TEM10/SUMFI(K)                                                   AV1 0486
      SNA(K)=TEM11/SUMFI(K)                                                   AV1 0487
      IF(TEM16+1.E-30)220,220,221                                             AV1 0488
  220 AVNU(K  )=0.                                                            AV1 0489
      GO TO 222                                                               AV1 0490
  221 AVNU(K  )=TEM6/TEM16                                                    AV1 0491
  222 STR(K)=TEM7/TEM17                                                       AV1 0492
      IF(IOPT.GT.3.AND.(NBLNO(M).GT.0.OR.KT7.EQ.M))ANISEL(KK)=                AV1 0493
     1TEM27/SUMJ(K)                                                           AV1 0494
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      TEM11=0.                                                          AV1 0495
      DO 223 KF=K,NOBG2                                                 AV1 0496
      IF(IOPT.GT.3) S1ELT(K,KF)=S1ELT(K,KF)/SUMJ(K)/3.                  AV1 0497
     SELT(K,KF  )=SELT(K,KF  )/SUMFI(K)                                 AV1 0498
  223 TEM11=TEM11+SELT(K,KF)                                            AV1 0499
      IF(IOPT.GT.3.AND.(NELMO(M).GT.0.OR.KT7.EQ.M))ANISEL(K)=           AV1 0500
     1ANISEL(K)+TEM11-TOTIN(K)-FISA(K)-CAPA(K)-TOTN2N(K)-SNA(K)-SNP(K)  AV1 0501
     SELT(K,K)=STR(K)+TEM11-TOTIN(K)-FISA(K)-CAPA(K)-TOTN2N(K)-SNA(K)   AV1 0502
     1-SNP(K)                                                           AV1 0503
   90 CONTINUE                                                          AV1 0504
      CALLTIMELAPS(19)                                                  AV1 0505
      CALLTIMEIT(0)                                                     AV1 0506
      DO 1995 K=1,NOBG                                                  AV1 0507
 1995 WRITE(5)RESCAP(K),RESFIS(K),SC(K),SF(K),FISA(K),CAPA(K),AVNU(K),STAV1 0508
     1R(K),(SELT(K,KF),KF=K,NOBG2),TOTIN(K),TOTN2N(K),SNP(K),SNA(K),    AV1 0509
     2ANISEL(K),(S1ELT(K,KF),KF=K,NOBG2)                                AV1 0510
 2000 CONTINUE                                                          AV1 0511
      REWIND 5                                                          AV1 0512
      DO 365 M=1,NOI                                                    AV1 0513
      DO314I=1,NINTC                                                    AV1 0514
      DO314J=I,NINTC                                                    AV1 0515
  314 SINL(I,J)=0.                                                      AV1 0516
      DO 393 K=1,NOBG                                                   AV1 0517
      DO 393 KF=K,NOBG                                                  AV1 0518
  393 SINTRA(  K,KF)=0.                                                 AV1 0519
      READ(3)NLEVLS,NSTAT                                               AV1 0520
      IF(NSTAT+NLEVLS)2365,2365,312                                     AV1 0521
  312 IF(NLEVLS)310,310,311                                             AV1 0522
  311 DO 307 L=1,NLEVLS                                                 AV1 0523
      READ(3)KFIN                                                       AV1 0524
      IF(KFIN.EQ.0) GO TO 307                                           AV1 0525
  301 READ(3)(IG(K),LG(K),SI(K),K=1,KFIN)                               AV1 0526
      DO1307 K=1,KFIN                                                   AV1 0527
      I=NINTC-IG(K)+1                                                   AV1 0528
      J=NINTC-LG(K)+1                                                   AV1 0529
 1307 SINL(I,J)=SI(K)+SINL(I,J)                                         AV1 0530
  307 CONTINUE                                                          AV1 0531
  310 IF(NSTAT)320,320,315                                              AV1 0532
  315 READ(3)NGSTAT                                                     AV1 0533
      DO 316 J=1,NGSTAT                                                 AV1 0534
  316 READ(3)(PIN(J,K),K=J,NINTC)                                       AV1 0535
      DO 309 J=1,NGSTAT                                                 AV1 0536
      DO 309 K=J,NINTC                                                  AV1 0537
  309 SINL(J,K)=SINL(J,K)+PIN(J,K)                                      AV1 0538
  320 IF(N2NFLG.EQ.1) GO TO 361                                         AV1 0539
      DO 751 J=1,NINTC                                                  AV1 0540
      TEM=0.                                                            AV1 0541
      DO 752 K=J,NINTC                                                  AV1 0542
  752 TEM=TEM+SINL(J,K)                                                 AV1 0543
      DO 751 K=J,NINTC                                                  AV1 0544
  751 SINL(J,K)=SINL(J,K)+SIGIN(J,M)/TEM                                AV1 0545
  361 DO1365 K=1,NOBG                                                   AV1 0546
  363 JCSI=LGBN(K)                                                      AV1 0547
  362 JCSEND=LGBN(K+1)-1                                                AV1 0548
      SUM=0.                                                            AV1 0549
      DO 400 JCS=JCSI,JCSEND                                            AV1 0550
      DO 400 JC=JCS,JCSEND                                              AV1 0551
  400 SUM=SUM+PHIC(JCS)*SINL(JCS,JC)                                    AV1 0552
      SINTRA(K,K)=SUM/SUMFI(K)                                          AV1 0553
      K1=K+1                                                            AV1 0554
      DO 1365 KF=K1,NOBG                                                AV1 0555
  368 JCFSI=LGBN(KF)                                                    AV1 0556
```

```
      JCFE=LGBN(KF+1)-1                                                  AV1 0557
  369 CONTINUE                                                           AV1 0558
      SUM=0.                                                             AV1 0559
      DO 370 JCS=JCSI,JCSEND                                             AV1 0560
      DO 371 JC= JCFSI,JCFE                                              AV1 0561
  371 SUM=SUM+PHIC(JCS)*SINL(JCS,JC)                                     AV1 0562
  370 CONTINUE                                                           AV1 0563
      SINTRA(  K,KF)=SUM/SUMFI(K)                                        AV1 0564
 1365 CONTINUE                                                           AV1 0565
 2365 DO1996K1=1,NOBG                                                    AV1 0566
 1996 WRITE(4)(SINTRA(K1,KF1),KF1=K1,NOBG)                               AV1 0567
      IF(N2NFLG)1302,1302,1303                                           AV1 0568
 1303 N2NFLG=0                                                           AV1 0569
      GO TO 365                                                          AV1 0570
 1302 IF(N2N(M))365,365,1301                                             AV1 0571
 1301 N2NFLG=1                                                           AV1 0572
      DO1314I=1,NINTC                                                    AV1 0573
      DO1314J=1,NINTC                                                    AV1 0574
 1314 SINL(I,J)=0.                                                       AV1 0575
      DO 1393 KK=1,NOBG                                                  AV1 0576
      DO 1393 KF=KK,NOBG                                                 AV1 0577
 1393 SINTRA(KK,KF)=0.                                                   AV1 0578
      GO TO 315                                                          AV1 0579
  365 CONTINUE                                                           AV1 0580
      REWIND 4                                                           AV1 0581
      DO 800 J=1,NOBG2                                                   AV1 0582
      TEMP1(J)=0.                                                        AV1 0583
      TEMP2(J)=0.                                                        AV1 0584
      TEMP3(J)=0.                                                        AV1 0585
      TEMP4(J)=0.                                                        AV1 0586
      TEMP7(J)=0.                                                        AV1 0587
      TEMP8(J)=0.                                                        AV1 0588
      DO 800 JF=J,NOBG2                                                  AV1 0589
      TEMP5(J,JF)=0.                                                     AV1 0590
  800 TEMP6(J,JF)=0.                                                     AV1 0591
      NOBG1=NOBG-1                                                       AV1 0592
      DO 1000 M=1,NOI                                                    AV1 0593
      DO 1994 K=1,NOBG                                                   AV1 0594
      READ(4)(SINTRA(K,KF),KF=K,NOBG)                                    AV1 0595
 1994 READ(5)RESCAP(K),RESFIS(K),SC(K),SF(K),FISA(K),CAPA(K),AVNU(K),STRAV1 0596
     1(K),(SELT(K,KF),KF=K,NOBG2),TOTIN(K),TOTN2N(K)                     AV1 0597
     2,SNP(K),SNA(K),ANISEL(K),(S1ELT(K,KF),KF=K,NOBG2)                  AV1 0598
      IF(NTHRM,GT,0) GO TO 803                                           AV1 0599
      THC(M)=CAPA(NOBG)                                                  AV1 0600
      THF(M)=FISA(NOBG)                                                  AV1 0601
      THTR(M)=STR(NOBG)                                                  AV1 0602
      THNU(M)=AVNU(NOBG)                                                 AV1 0603
      THNP(M)=SNP(NOBG)                                                  AV1 0604
      THNA(M)=SNA(NOBG)                                                  AV1 0605
  803 DO 801 J=1,NOBG                                                    AV1 0606
      TEMP1(J)=TEMP1(J)+ADEN(M)*(CAPA(J)+SNP(J)+SNA(J))                  AV1 0607
      TEMP2(J)=TEMP2(J)+ADEN(M)*FISA(J)                                  AV1 0608
      TEMP3(J)=TEMP3(J)+ADEN(M)*STR(J)                                   AV1 0609
      TEMP4(J)=TEMP4(J)+ADEN(M)*FISA(J)*AVNU(J)                          AV1 0610
      TEMP7(J)=TEMP7(J)+ADEN(M)*TOTIN(J)                                 AV1 0611
      TEMP8(J)=TEMP8(J)+ADEN(M)*TOTN2N(J)                                AV1 0612
      DO 807 JF=J,NOBG2                                                  AV1 0613
  807 TEMP5(J,JF)=TEMP5(J,JF)+ADEN(M)*SELT(J,JF)                         AV1 0614
      DO 801 JF=J,NOBG                                                   AV1 0615
  801 TEMP6(J,JF)=TEMP6(J,JF)+ADEN(M)*SINTRA(J,JF)                       AV1 0616
      WRITE(6,526)NUCID(M)                                               AV1 0617
  526 FORMAT(1H1/35X48HAVERAGE MICROSCOPIC CROSS SECTIONS FOR MATERIAL   AV1 0618
     1A6//20X8HRESOLVED4X8HRESOLVED3X10HUNRESOLVED2X10HUNRESOLVED4X5HTOTAV1 0619
     2AL7X5HTOTAL/1X5HGROUP2X7HE LOWER4X8HRES, CAP4X8HRES, FIS4X8HRES, CAV1 0620
     3AP4X8HRES, FIS4X7HCAPTURE5X7HFISSION5X9HTRANSPORT5X2HNU3X9HINELASTAV1 0621
     41C6X4HN-2N//)                                                     AV1 0622
      WRITE(6,531)(K,CGB(K+1),RESCAP(K  ),RESFIS(K  ),SC(K  ),SF(K  ),  AV1 0623
     1CAPA(K  ),FISA(K  ),STR(K  ),AVNU(K ),TOTIN(K),TOTN2N(K),K=1,NOBG)AV1 0624
      WRITE(6,531)NOBG2,0.,0.,0.,0.,0.,THC(M),THF(M),THTR(M),THNU(M),    AV1 0625
     10.,0.                                                              AV1 0626
```

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      PRINT 1531                                                        AV1 0627
 1531 FORMAT(1H05HGROUP2X7HE LOWER7X3HN-P7X7HN-ALPHA3X11HANISEL(J,J)///) AV1 0628
      PRINT 2531,( K,CGB(K+1),SNP(K),SNA(K),ANISEL(K),K=1,NOBG),NOBG2,0.,AV1 0629
     1,THNP(M),THNA(M),THTR(M)                                          AV1 0630
 2531 FORMAT(I4,4E12.4)                                                 AV1 0631
      WRITE(6,527)                                                      AV1 0632
  527 FORMAT(1H1/39X43HINELASTIC SCATTERING-SIGMA(K TO KF), K, KF /)     AV1 0633
      DO 366 K=1,NOBG                                                   AV1 0634
      WRITE(6,522)(SINTRA(  K,KF),K,KF,KF=K,NOBG),0.,,K,NOBG2           AV1 0635
  522 FORMAT(6(E12.4,2I3))                                              AV1 0636
  366 WRITE(6,523)                                                      AV1 0637
  523 FORMAT(1H0)                                                       AV1 0638
      WRITE(6,1527)                                                     AV1 0639
 1527 FORMAT(1H1/39X41HELASTIC SCATTERING-SIGMA(K TO KF), K, KF /)       AV1 0640
      DO 1004 K=1,NOBG                                                  AV1 0641
      WRITE(6,522)(SELT(K,KF  ),K,KF,KF=K,NOBG2)                        AV1 0642
 1004 WRITE(6,523)                                                      AV1 0643
      IF(IOPT.LT.4) GO TO 3007                                          AV1 0644
      PRINT 3008                                                        AV1 0645
      DO 3009 K=1,NOBG                                                  AV1 0646
      PRINT 522,(S1ELT(K,KF),K,KF,KF=K,NOBG2)                           AV1 0647
 3009 PRINT 523                                                         AV1 0648
 3008 FORMAT(1H135X*P1 ELASTIC SCATTERING-SIGMA(K TO KF), K, KF*)       AV1 0649
 3007 IF(NPUN.LE.0) GO TO 3000                                          AV1 0650
      PUNCH 3001, NUCID(M),N2N(M),ADEN(M)                               AV1 0651
 3001 FORMAT(A6,I6,E12.5)                                               AV1 0652
      PUNCH 3011,(CAPA(K),FISA(K),STR(K),AVNU(K),TOTIN(K),TOTN2N(K),    AV1 0653
     1SNP(K),SNA(K),                                                    AV1 0654
     1K=1,NOBG),THC(M),THF(M),THTR(M),THNU(M),0.,0.,THNP(M),THNA(M)     AV1 0655
      DO 3003 K=1,NOBG                                                  AV1 0656
 3003 PUNCH 3004,(SELT(K,KF),KF=K,NOBG2)                                AV1 0657
 3004 FORMAT(6E12.5)                                                    AV1 0658
      DO 3005 K=1,NOBG                                                  AV1 0659
 3005 PUNCH 3004,(SINTRA(K,KF),KF=K,NOBG),0.                            AV1 0660
 3000 IF(N2N(M)) 806, 806,11996                                         AV1 0661
11996 DO  996 K=1,NOBG                                                  AV1 0662
  996 READ(4)(SINTRA(K,KF),KF=K,NOBG)                                   AV1 0663
      DO 802 J=1,NOBG                                                   AV1 0664
      DO 802 JF=J,NOBG                                                  AV1 0665
  802 TEMP6(J,JF)=TEMP6(J,JF)+2.*ADEN(M)*SINTRA(J,JF)                   AV1 0666
      WRITE(6,1528)                                                     AV1 0667
 1528 FORMAT(1H1/39X37HN-2N SCATTERING-SIGMA(K TO KF), K, KF /)          AV1 0668
      DO 1529 K=1,NOBG                                                  AV1 0669
      WRITE(6,522)(SINTRA(K,KF),K,KF,KF=K,NOBG),0.,,K,NOBG2             AV1 0670
 1529 WRITE (6,523)                                                     AV1 0671
      IF(NPUN.LE.0) GO TO 1000                                          AV1 0672
      DO 3006 K=1,NOBG                                                  AV1 0673
 3006 PUNCH 3004,(SINTRA(K,KF),KF=K,NOBG),0.                            AV1 0674
  806 IF(IOPT.LT.4.OR.NPUN.LE.0) GO TO 1000                             AV1 0675
      DO 3010 K=1,NOBG                                                  AV1 0676
 3010 PUNCH 3004,ANISEL(K),(S1ELT(K,KF),KF=K,NOBG2)                     AV1 0677
 1000 CONTINUE                                                          AV1 0678
      IF(NTHRM.GT.0) GO TO 804                                          AV1 0679
      TEMP1(NOBG2)=TEMP1(NOBG)                                          AV1 0680
      TEMP2(NOBG2)=TEMP2(NOBG)                                          AV1 0681
      TEMP3(NOBG2)=TEMP3(NOBG)                                          AV1 0682
      TEMP4(NOBG2)=TEMP4(NOBG)                                          AV1 0683
      GO TO 805                                                         AV1 0684
  804 TEMP1(NOBG2)=CTH+SNATH+SNPTH                                      AV1 0685
      TEMP2(NOBG2)=FTH                                                  AV1 0686
      TEMP3(NOBG2)=TRTH                                                 AV1 0687
      TEMP4(NOBG2)=GFTH                                                 AV1 0688
  531 FORMAT(I4,8E12.4,F8.4,2E12.4)                                     AV1 0689
  805 CALLTIMELAPS(20)                                                  AV1 0690
 3011 FORMAT(6E12.5/2E12.5)                                             AV1 0691
      IFDIVIDECHECK 610,611                                             AV1 0692
  610 PRINT 612                                                         AV1 0693
  612 FORMAT(1H1* DVCK AVER1*)                                          AV1 0694
  611 RETURN                                                            AV1 0695
      END                                                               AV1 0696
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C**********SEGMENT 3*************************************************************
      PROGRAM BGPONE                                                        BGP 0000
      COMMON/0/ADEN(20),CCONC(20),CGB(50),CTH,DELU,DELUN,E(71),EMAX,        BGP 0001
     1EMIN,EPSABS,EPSINT,EPSTOT,FACA,FCONC(20),FTH,GFTH,HOMBRG(2100),       BGP 0002
     2HOMCAP(2100),HOMFIS(2100),IA,IDENT(12),IOPT,ISO(20),IYOS,JEND1,       BGP 0003
     3KMINS,KT1,KT2,KT3,KT4,KT5,KT6,KT7,KTFLUX,LGBN(50),MTOT,NDELU,         BGP 0004
     4NELMO(20),NGEOM,NINT,NINT1R,NINTC,NJINT,NMAX,NMIC,NOBG,NOI,NPASS,     BGP 0005
     5NPUN,NRES,NSH2,NSORS,NTHRM,NUCID(20),NUNRES,RADC,RADP,RTBSQ,          BGP 0006
     6SERH(70),SNATH,SNPTH,TEMP(20),TRTH                                    BGP 0007
      COMMON/4340/CAPA(50),FISA(50),STR(50),FISNU(50),SELT(50,50),          BGP 0008
     1SINEL(50),SN2N(50),PHIC(50),ADJ(50),SEL(50),R(3),B(3)                 BGP 0009
      COMMON/FLXCOR/SHAPEC(70),SHAPES(2100),STR3(50),IBSQ,BSQ,BSQ2,EPS       BGP 0010
      DIMENSION SINTRA(50,50)                                               BGP 0011
      EQUIVALENCE (SINTRA(1),HOMBRG(1))                                     BGP 0012
      NOBG1=NOBG+1                                                          BGP 0013
      STR3(NOBG1)=0.                                                        BGP 0014
      WRITE(6 ,1005)                                                        BGP 0015
 1005 FORMAT(1H1* AVERAGE MACROSCOPIC CROSS SECTIONS*//4X1HJ9X4              BGP 0016
     1HE(J)12X5HSIGTR10X6HSIGFIS10X6HSIGCAP9X8HNUSIGFIS8X7HSIGINEL10X6HSBGP 0017
     2IGN2N/1H )                                                            BGP 0018
      WRITE(6 ,1006)(K,CGB(K+1),STR(K),FISA(K),CAPA(K),FISNU(K),SINEL(K)BGP 0019
     1,SN2N(K),K=1,NOBG)                                                    BGP 0020
      WRITE(6 ,1006) NOBG1,0.,STR(NOBG1),FISA(NOBG1),CAPA(NOBG1),           BGP 0021
     1FISNU(NOBG1),SINEL(NOBG1),SN2N(NOBG1)                                 BGP 0022
 1006 FORMAT(I6,1P7E16,5)                                                   BGP 0023
      WRITE(6 ,1007)                                                        BGP 0024
 1007 FORMAT(1H /1H /1H /* INELASTIC PLUS TWO TIMES N,2N SIGMA(K TO KF)*BGP 0025
     1//)                                                                   BGP 0026
      DO 1008 K=1,NOBG1                                                     BGP 0027
      WRITE(6 ,1009)(SINTRA(K,KF),K,KF,KF=K,NOBG1)                          BGP 0028
 1009 FORMAT(5(E20,7,2I3))                                                  BGP 0029
 1008 WRITE(6 ,1010)                                                        BGP 0030
 1010 FORMAT(1H0)                                                           BGP 0031
      WRITE(6 ,1011)                                                        BGP 0032
 1011 FORMAT(1H /1H /1H /* ELASTICS SIGMA(K TO KF)*//)                      BGP 0033
      DO 1012 K=1,NOBG1                                                     BGP 0034
      WRITE(6 ,1009)(SELT(K,KF),K,KF,KF=K,NOBG1)                            BGP 0035
 1012 WRITE(6 ,1010)                                                        BGP 0036
      WRITE(6 ,1001)                                                        BGP 0037
 1001 FORMAT(1H /1H /* ITERATION   BUCKLING    REAL KEFF   KEFF ADJOINT*BGP 0038
     1/1H )                                                                 BGP 0039
      DO1K=1,NOBG                                                           BGP 0040
      SEL(K)=0.                                                             BGP 0041
      DO 1 KF=K,NOBG1                                                       BGP 0042
    1 SEL(K)=SEL(K)+SELT(K,KF)                                              BGP 0043
      SEL(NOBG1)=0.                                                         BGP 0044
      ITER=1                                                                BGP 0045
   24 FINUS=0.                                                              BGP 0046
      FINUSA=0.                                                             BGP 0047
      DO 6 JC=1,NOBG1                                                       BGP 0048
      JA=NOBG1-JC+1                                                         BGP 0049
      PSIC=0.                                                               BGP 0050
      PSIA=0.                                                               BGP 0051
      IF(JC.EQ.1) GO TO 5                                                   BGP 0052
      JF=JC-1                                                               BGP 0053
      JFA=JA+1                                                              BGP 0054
      DO 4 JCS=1,JF                                                         BGP 0055
    4 PSIC=PSIC+PHIC(JCS)*(SELT(JCS,JC)+SINTRA(JCS,JC))                     BGP 0056
      DO 14 JCA=JFA,NOBG1                                                   BGP 0057
   14 PSIA=PSIA+ADJ(JCA)*(SELT(JA,JCA)+SINTRA(JA,JCA))                      BGP 0058
    5 TEM=PSIC*STR3(JC)                                                     BGP 0059
      TEMA=PSIA*FISNU(JA)                                                   BGP 0060
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      TEMT=BSQ/(3.*STR(JC))+SINEL(JC)+CAPA(JC)+FISA(JC)+SN2N(JC)+      BGP 0061
     1SEL(JC)+SINTRA(JC,JC)+SELT(JC,JC)                                BGP 0062
      PHIC(JC)=TEM/TEMT                                                BGP 0063
      TEMTA=BSQ/(3.*STR(JA))+SINEL(JA)+CAPA(JA)+FISA(JA)+SN2N(JA)+     BGP 0064
     1SEL(JA)+SINTRA(JA,JA)+SELT(JA,JA)                                BGP 0065
      ADJ(JA)=TEMA/TEMTA                                               BGP 0066
   43 FINUSA=FINUSA+STR3(JA)*ADJ(JA)                                   BGP 0067
    6 FINUS=FINUS+PHIC(JC)*FISNU(JC)                                   BGP 0068
      WRITE(6 ,1002) ITER,BSQ,FINUS,FINUSA                             BGP 0069
 1002 FORMAT(I6,E16.5,2E13.5)                                          BGP 0070
      ITER=ITER+1                                                      BGP 0071
      IF(IBSQ.EQ.0) GO TO 50                                           BGP 0072
      IF(ABSF(FINUS-1.)-EPS)50,50,52                                   BGP 0073
   52 IF(ITER-2)152,152,53                                             BGP 0074
  152 R(1)=FINUS-1.                                                    BGP 0075
      B(1)=BSQ                                                         BGP 0076
      BSQ=BSQ2                                                         BGP 0077
      GO TO 24                                                         BGP 0078
   53 IF(ITER-3)153,153,54                                             BGP 0079
  153 R(2)=FINUS-1.                                                    BGP 0080
      B(2)=BSQ2                                                        BGP 0081
      BSQ=B(1)+(B(2)-B(1))*R(1)/(R(1)-R(2))                            BGP 0082
      GO TO 24                                                         BGP 0083
   54 IF(ITER-4)154,154,55                                             BGP 0084
  154 R(3)=FINUS-1.                                                    BGP 0085
      B(3)=BSQ                                                         BGP 0086
      GO TO 56                                                         BGP 0087
   55 R(1)=R(2)                                                        BGP 0088
      R(2)=R(3)                                                        BGP 0089
      R(3)=FINUS-1.                                                    BGP 0090
      B(1)=B(2)                                                        BGP 0091
      B(2)=B(3)                                                        BGP 0092
      B(3)=BSQ                                                         BGP 0093
   56 BSQ=B(1)+R(1)*((B(1)-B(2))*(R(2)*R(3)-R(1))/((R(1)-R(3))*        BGP 0094
     1(R(1)-R(2)))-R(2)*(B(2)-B(3))/((R(1)-R(3))*(R(2)-R(3))))         BGP 0095
      GO TO 24                                                         BGP 0096
   50 WRITE(6 ,537)                                                    BGP 0097
  537 FORMAT(1H /1H /*  GROUP  LOWER ENERGY       FLUX      ADJOINT FLUX*/BGP 0098
     11H )                                                             BGP 0099
      WRITE (6 ,536) (I,CGB(I+1),PHIC(I),ADJ(I),I=1,NOBG),NOBG1,0.,   BGP 0100
     1PHIC(NOBG1),ADJ(NOBG1)                                           BGP 0101
  536 FORMAT(I5,E16.5,2E13.5)                                          BGP 0102
      IFDIVIDECHECK 45,46                                              BGP 0103
   45 WRITE(6 ,47)                                                     BGP 0104
   47 FORMAT(1H1* DVCK BGPONE*)                                        BGP 0105
   46 RETURN                                                           BGP 0106
      END                                                              BGP 0107
```

APPENDIX G

Listing of Library Code

```
C**********MC**2 LIBRARY WRITING PROGRAM*****************************************
      PROGRAMLIB9                                                          LIB 0000
      DIMENSIONLFAC(1000),GFAC(1000),EN(1000),GAMGAM(1000),                LIB 0001
     1GAMN(1000),GAF(1000),ABUNDI(1000),FMASS(1000),SIG0(1000),            LIB 0002
     2ZETAP(1000),AFAC(1000),GAMT(1000),NUT(2,4)                           LIB 0003
      DIMENSIONJST(2)                                                      LIB 0004
      DIMENSION AMU(2,4),GF(25,2,4),ABUN(4)                                LIB 0005
      DIMENSION NPT(1),ES(25,1),GN0(25,2,4),GA(2,4),G(2,4),D(2,4)          LIB 0006
      DIMENSIONILIST(100)                                                  LIB 0007
       COMMONLFAC,GFAC,EN,GAMGAM,GAMN,GAF,ABUNDI,FMASS,SIG0,ZETAP,AFAC,    LIB 0008
     1GAMT,EIN(1400),SIGIN(1400),GF,ES,NIR(100),KT(100)                    LIB 0009
      DIMENSIONDUMMY(25200)                                                LIB 0010
      EQUIVALENCE(LFAC(1),DUMMY(1))                                        LIB 0011
      WRITEOUTPUTTAPE6,350                                                 LIB 0012
  350 FORMAT(1H12X20HMC**2 LIBRARY TAPE 9)                                 LIB 0013
      READ 351,NOMAT                                                       LIB 0014
      READ(7,3351)(ILIST(I),I=1,NOMAT)                                     LIB 0015
      WRITE(6,3352)(ILIST(I),I=1,NOMAT)                                    LIB 0016
 3352 FORMAT(1H1*   THE FOLLOWING MATERIALS ARE ON TAPE*//                 LIB 0017
     1( 7H ******A6,6H******))                                             LIB 0018
      WRITE(9)NOMAT   ,(ILIST(I),I=1,NOMAT)                                LIB 0019
 3351 FORMAT(12A6)                                                         LIB 0020
  351 FORMAT(12I6)                                                         LIB 0021
  352 FORMAT(I6)                                                           LIB 0022
      WRITE (6,1000)                                                       LIB 0023
 1000 FORMAT(1H1*                                                          LIB 0024
     1RESONANCE DATA*)                                                     LIB 0025
      DO430MAT=1,NOMAT                                                     LIB 0026
      READINPUTTAPE7,300,NID,IWR,IWF,NOI,SIGPM,XI,A0,A1,A2    ,A3          LIB 0027
      READ(7,220)NUN,IFI,IS,ISK,(ABUN(I),I=1,IS)                           LIB 0028
  220 FORMAT(4I12/(6E12.5))                                                LIB 0029
      WRITE(9)NID,IWR,ISK                                                  LIB 0030
      WRITE(9)   NUN,IFI,IS,    (ABUN(I),I=1,IS)                           LIB 0031
      WRITE(6,1311)NID                                                     LIB 0032
 1311 FORMAT(1H1*  NUCLIDE IDENT, NO, *A6)                                 LIB 0033
      WRITE(6,311)    NUN,IFI ,IS,(ABUN(I),I=1,IS)                         LIB 0034
  311 FORMAT(1H /1H /* UNRESOLVED CALCULATION *I3//* FISSILE *I3*  NO, OLIB 0035
     1F ISOTOPES= *I3//* ABUNDANCE=*4E15,5/)                              LIB 0036
  300 FORMAT(6X,A6,3I12,/(6E12.5))                                         LIB 0037
      IF(NUN)600,600,601                                                   LIB 0038
  601 DO20II=1,IS                                                          LIB 0039
      READ(7,310)LST,NPT(1),AAA,(JST(I),I=1,LST)                           LIB 0040
  310 FORMAT(2I12,E12,5/(4I12))                                            LIB 0041
  327 WRITE(9)LST,AAA,(JST(I),NPT(1),I=1,LST)                              LIB 0042
      WRITE(6,314)LST,AAA,(JST(I),NPT(1),I=1,LST)                          LIB 0043
  314 FORMAT(9H0L VALUESI2,5X,9H P FACTORE12,5//(9H J VALUESI2,I6,         LIB 0044
     19H E POINTS/))                                                       LIB 0045
      NP=NPT(1)                                                            LIB 0046
      READ (7,353)(ES(NL,1 ),NL=1,NP)                                      LIB 0047
      WRITE(6,312)(ES(NL,1 ),NL=1,NP)                                      LIB 0048
  312 FORMAT(14H ENERGY POINTS/(6E15,5))                                   LIB 0049
      DO602LS=1,LST                                                        LIB 0050
      WRITE(9)    (ES(NL,1 ),NL=1,NP)                                      LIB 0051
      JV=JST(LS)                                                           LIB 0052
      DO602JS=1,JV                                                         LIB 0053
 1353 FORMAT(4E12,5,I12)                                                   LIB 0054
      READ(7,1353)GA(LS,JS),G(LS,JS),D(LS,JS),AMU(LS,JS),NUT(LS,JS)        LIB 0055
      WRITE(6,313)LS,JS,GA(LS,JS),G(LS,JS),D(LS,JS),AMU(LS,JS),            LIB 0056
     1NUT(LS,JS)                                                           LIB 0057
      WRITE(9)GA(LS,JS),NUT(LS,JS),G(LS,JS),D(LS,JS),AMU(LS,JS)            LIB 0058
  313 FORMAT(3H0L=I3,3H J=I3,4H GG=E12,5,3H G=E12,5,3H D=E12,5,            LIB 0059
     14H MU=E12,5,4H NU=I2)                                                LIB 0060
```

```
      READ(7,353)(GNO(NL,LS,JS),NL=1,NP)                                LIB 0061
      WRITE(6,203)(GNO(NL,LS,JS),NL=1,NP)                               LIB 0062
  203 FORMAT(* NEUTRON WIDTHS*/(8E15,5))                                LIB 0063
      IF(IFI) 202,202,21                                                LIB 0064
   21 READ (7,353),(GF(NL,LS,JS),NL=1,NP)                               LIB 0065
      WRITE(6,399),(GF(NL,LS,JS),NL=1,NP)                               LIB 0066
      GO TO 22                                                          LIB 0067
  202 DO 204 NL=1,NP                                                    LIB 0068
  204 GF(NL,LS,JS)=0.                                                   LIB 0069
   22 WRITE(9)(GF(NL,LS,JS),GNO(NL,LS,JS),NL=1,NP)                      LIB 0070
  399 FORMAT(* FISSION WIDTHS*/(8E15,5))                                LIB 0071
  602 CONTINUE                                                          LIB 0072
   20 CONTINUE                                                          LIB 0073
  600 MAXRES=0                                                          LIB 0074
      JP=1                                                              LIB 0075
      IF(IWR-1)401,400,400                                              LIB 0076
  401 WRITE(9)SIGPM,XI                                                  LIB 0077
  353 FORMAT(6E12,5)                                                    LIB 0078
      WRITEOUTPUTTAPE6,306                                              LIB 0079
  306 FORMAT(1H17X4H NID10X3HIWR9X3HIWF8X6HMAXRES7X5HSIGPM10X4HMASS/)    LIB 0080
      WRITEOUTPUTTAPE6,304,NID,IWR,IWF,MAXRES,SIGPM,XI                  LIB 0081
  304 FORMAT(9X,A6,I9,I12,I13,E17,4,E14,4)                              LIB 0082
      GOTO430                                                           LIB 0083
  400 DO416IN=1,NOI                                                     LIB 0084
      READINPUTTAPE7,301,NRGYS,MASSI,ABUND                              LIB 0085
  301 FORMAT(2I6,E12,4)                                                 LIB 0086
      MAXRES=MAXRES+NRGYS                                               LIB 0087
      READINPUTTAPE7,302,(LFAC(J),GFAC(J),EN(J),GAMGAM(J),              LIB 0088
     1GAMN(J),GAF(J),J=JP,MAXRES)                                       LIB 0089
      DO419J=JP,MAXRES                                                  LIB 0090
      FMASS(J)=MASSI                                                    LIB 0091
      ABUNDI(J)=ABUND                                                   LIB 0092
  419 CONTINUE                                                          LIB 0093
  302 FORMAT(I6,5E12,4)                                                 LIB 0094
      JP=JP+NRGYS                                                       LIB 0095
  416 CONTINUE                                                          LIB 0096
      IF(MAXRES-1)420,420,435                                           LIB 0097
  435 MAXMI1=MAXRES-1                                                   LIB 0098
      DO415J=1,MAXMI1                                                   LIB 0099
      JP1=J+1                                                           LIB 0100
      DO417K=JP1,MAXRES                                                 LIB 0101
      IF(EN(J)-EN(K))417,417,418                                        LIB 0102
  418 LEM1=LFAC(J)                                                      LIB 0103
      TEM2=GFAC(J)                                                      LIB 0104
      TEM3=EN(J)                                                        LIB 0105
      TEM4=GAMGAM(J)                                                    LIB 0106
      TEM5=GAMN(J)                                                      LIB 0107
      TEM6=GAF(J)                                                       LIB 0108
      TEM7=FMASS(J)                                                     LIB 0109
      TEM8=ABUNDI(J)                                                    LIB 0110
      LFAC(J)=LFAC(K)                                                   LIB 0111
      GFAC(J)=GFAC(K)                                                   LIB 0112
      EN(J)=EN(K)                                                       LIB 0113
      GAMGAM(J)=GAMGAM(K)                                               LIB 0114
      GAMN(J)=GAMN(K)                                                   LIB 0115
      GAF(J)=GAF(K)                                                     LIB 0116
      FMASS(J)=FMASS(K)                                                 LIB 0117
      ABUNDI(J)=ABUNDI(K)                                               LIB 0118
      LFAC(K)=LEM1                                                      LIB 0119
      GFAC(K)=TEM2                                                      LIB 0120
      EN(K)=TEM3                                                        LIB 0121
      GAMGAM(K)=TEM4                                                    LIB 0122
```

```
      GAMN(K)=TEM5                                                      LIB 0123
      GAF(K)=TEM6                                                       LIB 0124
      FMASS(K)=TEM7                                                     LIB 0125
      ABUNDI(K)=TEM8                                                    LIB 0126
  417 CONTINUE                                                          LIB 0127
  415 CONTINUE                                                          LIB 0128
  420 CONTINUE                                                          LIB 0129
      WRITE(9)MAXRES,SIGPM,XI,A0,A1,A2,A3                               LIB 0130
      WRITEOUTPUTTAPE6,306                                              LIB 0131
      WRITEOUTPUTTAPE6,304,NID,IWR,IWF,MAXRES,SIGPM,XI                  LIB 0132
      WRITEOUTPUTTAPE6,305                                              LIB 0133
  305 FORMAT(15H0RESONANCE DATA//3X*J*9X1HG11X6HEN(EV)7X6HGAMGAM9X4HGAMNLIB 0134
     111X3HGAF10X5HABUND9X4HMASS)                                       LIB 0135
      WRITEOUTPUTTAPE6,307,(J,GFAC(J),EN(J),GAMGAM(J),                  LIB 0136
     1GAMN(J),GAF(J),ABUNDI(J),FMASS(J),J=1,MAXRES)                     LIB 0137
  307 FORMAT(1H /(1H I3,7E14.3))                                        LIB 0138
      DO421J=1,MAXRES                                                   LIB 0139
      GAMT(J)=GAMGAM(J)+GAMN(J)+GAF(J)                                  LIB 0140
      CORLCM=((FMASS(J)+1.)/FMASS(J))**2                                LIB 0141
      SIG0(J)=2.6036E+6*GFAC(J)*GAMN(J)*CORLCM/(GAMT(J)*ABSF(EN(J)))    LIB 0142
      ZETAP(J)=GAMT(J)*SQRTF(FMASS(J)/(ABSF(EN(J))*3.44672E-4))         LIB 0143
  421 AFAC(J)=SQRTF(SIGPM*SIG0(J)*GFAC(J)*GAMN(J)/GAMT(J))              LIB 0144
      WRITETAPE9,(EN(J),AFAC(J),SIG0(J),ZETAP(J),ABUNDI(J),             LIB 0145
     1AFAC(J),GAMT(J),GAMGAM(J),GAF(J),J=1,MAXRES)                      LIB 0146
  430 CONTINUE                                                          LIB 0147
      ENDFILE9                                                          LIB 0148
      WRITE(6,1001)                                                     LIB 0149
 1001 FORMAT(1H1*                                                       LIB 0150
     1SMOOTH DATA*)                                                     LIB 0151
      DO7NM=1,NOMAT                                                     LIB 0152
      CALL MERGE                                                        LIB 0153
    7 CONTINUE                                                          LIB 0154
      ENDFILE9                                                          LIB 0155
      WRITE (6,1002)                                                    LIB 0156
 1002 FORMAT(1H1*                                                       LIB 0157
     1INELASTIC AND N=2N DATA*)                                         LIB 0158
      DO1212I=1,NOMAT                                                   LIB 0159
      READ(7,354),ID,NLEVLS,NSTAT,NTWON,AMASS,ESTAT,THRESH              LIB 0160
      LEVLS=NLEVLS                                                      LIB 0161
  354 FORMAT(A6,3I6/3E12.5)                                             LIB 0162
      WRITETAPE9,ID,LEVLS,NSTAT,AMASS,ESTAT ,NTWON,THRESH               LIB 0163
      WRITE(6,357),ID,NLEVLS,NSTAT,NTWON,AMASS,ESTAT,THRESH             LIB 0164
  357 FORMAT(1H1*MATERIAL I.D. *A6,*  NO. OF LEVELS=*I6,*  NSTAT*I3,*  NLIB 0165
     1TWON*I3,//* MASS=*E14.5,*  STATISTICAL THRESHOLD ENERGY=*E14.5,*  LIB 0166
     2N=2N THRESHOLD ENERGY=*E14.5/)                                    LIB 0167
      IF(NLEVLS)112,112,13                                              LIB 0168
   13 DO11J=1,LEVLS                                                     LIB 0169
      NS1=0                                                             LIB 0170
      READ(7,1358)IR,EGAM                                               LIB 0171
 1358 FORMAT(I12,E12.5)                                                 LIB 0172
      READ(7,351)(NIR(L),KT(L),L=1,IR)                                  LIB 0173
      DO 700 L=1,IR                                                     LIB 0174
  700 NS1=NS1+NIR(L)                                                    LIB 0175
      WRITE(9)IR,EGAM,(NIR(L),KT(L),L=1,IR)                             LIB 0176
      WRITE(6,359)J,NS1,IR,EGAM                                         LIB 0177
  358 FORMAT(I12,E12.5,I12)                                             LIB 0178
  359 FORMAT(1H /* LEVEL NO.*I4,* NO. OF POINTS=*I4,*  NO. OF INTERPOLATLIB 0179
     1ION RANGES=*I4,*  EGAM=*E14.5/)                                   LIB 0180
      WRITE(6,702)(L,NIR(L),KT(L),L=1,IR)                               LIB 0181
      READINPUTTAPE7,360,(EIN(K),SIGIN(K),K=1,NS1)                      LIB 0182
  360 FORMAT(6E12.5)                                                    LIB 0183
      WRITETAPE9,(EIN(K),SIGIN(K),K=1,NS1)                              LIB 0184
```

```
      WRITEOUTPUTTAPE6,361,(EIN(K),SIGIN(K),K=1,NS1)                    LIB 0185
  361 FORMAT(1H /(6E20.8))                                              LIB 0186
   11 CONTINUE                                                          LIB 0187
  112 WRITE (6,1003)                                                    LIB 0188
 1003 FORMAT(1H /1H /1H /1H *STATISTICAL REGION DATA*)                  LIB 0189
      READ(7,351)IR1,IR2,IR3                                            LIB 0190
      WRITE(6,3511)IR1,IR2,IR3                                          LIB 0191
 3511 FORMAT(1H /*     IR1=*I3,*  IR2=*I3,*  IR3=*I3//)                LIB 0192
      IF(NSTAT)12,12,14                                                 LIB 0193
   14 NST=0                                                             LIB 0194
      READ(7,351)(NIR(L),KT(L),L=1,IR1)                                 LIB 0195
      DO 701 L=1,IR1                                                    LIB 0196
  701 NST=NST+NIR(L)                                                    LIB 0197
      READ(7,360)(EIN(K),SIGIN(K),K=1,NST)                              LIB 0198
      WRITE(6,702)(L,NIR(L),KT(L),L=1,IR1)                              LIB 0199
  702 FORMAT(1H /* INTERPOLATION RANGE   NO. OF POINTS   INTERPOLATION RLIB 0200
     1ULE*/1H /(I10,I19,I18))                                           LIB 0201
      WRITE(9)IR1,(NIR(L),KT(L),L=1,IR1)                                LIB 0202
      WRITE(6,3611)(EIN(K),SIGIN(K),K=1,NST)                            LIB 0203
 3611 FORMAT(1H050X30HINELASTIC NUCLEAR TEMPERATURES//(1H 6E20.8))      LIB 0204
      WRITETAPE9,(EIN(K),SIGIN(K),K=1,NST)                              LIB 0205
      NSD=0                                                             LIB 0206
      READ(7,351)(NIR(L),KT(L),L=1,IR2)                                 LIB 0207
      DO 703 L=1,IR2                                                    LIB 0208
  703 NSD=NSD+NIR(L)                                                    LIB 0209
      READ(7,360)(EIN(K),SIGIN(K),K=1,NSD)                              LIB 0210
      WRITE(6,702)(L,NIR(L),KT(L),L=1,IR2)                              LIB 0211
      WRITE(9)IR2,(NIR(L),KT(L),L=1,IR2)                                LIB 0212
      WRITETAPE9,(EIN(K),SIGIN(K),K=1,NSD)                              LIB 0213
      WRITE(6,3612)(EIN(K),SIGIN(K),K=1,NSD)                            LIB 0214
 3612 FORMAT(1H040X35HUNRESOLVED INELASTIC CROSS SECTIONS//(1H 6E20.8)) LIB 0215
   12 CONTINUE                                                          LIB 0216
      IF(NTWON.EQ.0)GOTO1212                                            LIB 0217
      NS2N=0                                                            LIB 0218
      READ(7,351)(NIR(L),KT(L),L=1,IR3)                                 LIB 0219
      DO 704 L=1,IR3                                                    LIB 0220
  704 NS2N=NS2N+NIR(L)                                                  LIB 0221
      READ (7,360)(EIN(K),SIGIN(K),K=1,NS2N)                            LIB 0222
      WRITE(6,702)(L,NIR(L),KT(L),L=1,IR3)                              LIB 0223
      WRITE(9)IR3,(NIR(L),KT(L),L=1,IR3)                                LIB 0224
      WRITE(6,3613)(EIN(K),SIGIN(K),K=1,NS2N)                           LIB 0225
 3613 FORMAT(1H050X25HN-2N NUCLEAR TEMPERATURES//(1H 6E20.8))           LIB 0226
      WRITE(9)     (EIN(K),SIGIN(K),K=1,NS2N)                           LIB 0227
 1212 CONTINUE                                                          LIB 0228
      ENDFILE9                                                          LIB 0229
      WRITE(6,1004)                                                     LIB 0230
 1004 FORMAT(1H1*                                                       LIB 0231
     1FISSION SPECTRA*)                                                 LIB 0232
      READ(7,351)NREC                                                   LIB 0233
      WRITE(9)NREC                                                      LIB 0234
      WRITE(6,4352)NREC                                                 LIB 0235
 4352 FORMAT(1H1I6,* SOURCE SPECTRA*)                                   LIB 0236
      DO370M=1,NREC                                                     LIB 0237
      READ(7,371)I,BETA,ALPHA,TAU                                       LIB 0238
      WRITE(9)I,BETA,ALPHA,TAU                                          LIB 0239
  371 FORMAT(I6,6X,5E12.5)                                              LIB 0240
      WRITE(6,3371)I,BETA,ALPHA,TAU                                     LIB 0241
 3371 FORMAT(1H0*   SOURCE IDENT,*I3,*   BETA=*E12.5,*   ALPHA=*       LIB 0242
     1,E12.5,*   TAU=*E12.5)                                           LIB 0243
  370 CONTINUE                                                          LIB 0244
      ENDFILE9                                                          LIB 0245
      REWIND9                                                           LIB 0246
      STOP                                                              LIB 0247
      END                                                               LIB 0248
```

```
      SUBROUTINE MERGE                                                  MRG 0000
      DIMENSION EN(5500),SIG(5500),INS(8),NS(100),KMOD(100),IFMT(9)     MRG 0001
      COMMON EN,SIG,NS,KMOD                                             MRG 0002
      READ 201,MATNO                                                    MRG 0003
  201 FORMAT(A6)                                                        MRG 0004
  202 FORMAT(6X,I6,9A6)                                                 MRG 0005
      READ 353,EMU0,A0,A1,A2,A3,XI                                      MRG 0006
  353 FORMAT(6E12.5)                                                    MRG 0007
      READ 203,(INS(K),K=1,8)                                           MRG 0008
  203 FORMAT(12I6)                                                      MRG 0009
      WRITE(9) MATNO,(INS(K),K=1,8),EMU0,A0,A1,A2,A3,XI                 MRG 0010
      PRINT 355,MATNO,(INS(K),K=1,8),EMU0,A0,A1,A2,A3,XI                MRG 0011
  355 FORMAT(1H13X* MATERIAL ID, IS  * A6//8I10//* MU BAR=*E13.5 //     MRG 0012
     13X*COEFFICIENTS FOR NU BAR EXPANSION ARE=*4E14.5//3X*XI=*E14.5)   MRG 0013
      DO 63 K=1,8                                                       MRG 0014
      NTOT=0                                                            MRG 0015
      READ 202,NC,(IFMT(I),I=1,9)                                       MRG 0016
      IR=INS(K)                                                         MRG 0017
      IF(IR.EQ.0) IR=1                                                  MRG 0018
      READ 203,(NS(I),KMOD(I),I=1,IR)                                   MRG 0019
      DO 4 I=1,IR                                                       MRG 0020
    4 NTOT=NTOT+NS(I)                                                   MRG 0021
      IF(NTOT) 69,69,15                                                 MRG 0022
   15 READ IFMT,(EN(J),SIG(J),J=1,NTOT)                                 MRG 0023
      IF(NC) 69,69,7                                                    MRG 0024
    7 DO 16 J=1,NTOT                                                    MRG 0025
   16 EN(J)=EN(J)*1.E+6                                                 MRG 0026
   69 WRITE(9) (NS(I),KMOD(I),I=1,IR)                                   MRG 0027
      IF(NTOT) 63,63,64                                                 MRG 0028
   64 WRITE(9) (EN(J),SIG(J),J=1,NTOT)                                  MRG 0029
      PRINT 205,K,IR,NTOT                                               MRG 0030
  205 FORMAT(1H0* REACTION TYPE =*I3,*  NO. OF INTERPOLATION RANGES=*I4, MRG 0031
     1*  NO. OF POINTS=*I6//* INTERPOLATION RANGE   NO. OF POINTS   INTEMRG 0032
     2RPOLATION RULE*1H )                                               MRG 0033
      PRINT 206,(I,NS(I),KMOD(I),I=1,IR)                                MRG 0034
  206 FORMAT(I10,I19,I18)                                               MRG 0035
      PRINT 207,(EN(J),SIG(J),J=1,NTOT)                                 MRG 0036
  207 FORMAT(1H /(6E20.8))                                              MRG 0037
   63 CONTINUE                                                          MRG 0038
      END                                                               MRG 0039
```

APPENDIX H

Listing of W Table Code

```
C*********PROGRAM TO GENERATE THE W TABLE*****************************************
      PROGRAM WLIB                                                        WLB 0000
      DIMENSION X(62),Y(62),RW(62,62),AIMW(62,62)                         WLB 0001
      X0=-,1                                                              WLB 0002
      Y0=-,1                                                              WLB 0003
      DX=,1                                                               WLB 0004
      DY=,1                                                               WLB 0005
      NX=62                                                               WLB 0006
      NY=62                                                               WLB 0007
      Y(1)=Y0                                                             WLB 0008
      NX1=NX-1                                                            WLB 0009
      NY1=NY-1                                                            WLB 0010
      DO 2 I=1,NY1                                                        WLB 0011
    2 Y(I+1)=Y0+I*DY                                                      WLB 0012
      X(1)=X0                                                             WLB 0013
      DO 3 I=1,NX1                                                        WLB 0014
    3 X(I+1)=X0+I*DX                                                      WLB 0015
      DO 4 I=1,NX                                                         WLB 0016
      DO 4 J=1,NY                                                         WLB 0017
      XI=X(I)                                                             WLB 0018
      YJ=Y(J)                                                             WLB 0019
      CALL W(XI,YJ,RWT,AIMT)                                              WLB 0020
      RW(I,J)=RWT                                                         WLB 0021
    4 AIMW(I,J)=AIMT                                                      WLB 0022
      WRITE(9)((RW(I,J),I=1,62),J=1,62)                                   WLB 0023
      WRITE(9)((AIMW(I,J),I=1,62),J=1,62)                                 WLB 0024
      REWIND 9                                                            WLB 0025
    8 STOP                                                                WLB 0026
      END                                                                 WLB 0027


      SUBROUTINEW(REZ,AIM1,REW,AIMW)                                      W   0000
      REW=0.                                                              W   0001
      AIMW=0.                                                             W   0002
      AIMZ=ABS (AIM1)                                                     W   0003
      IF(REZ+AIMZ)2002,2001,2002                                          W   0004
 2001 REW=1.                                                              W   0005
      AIMW=0.                                                             W   0006
      RETURN                                                              W   0007
 2002 CONTINUE                                                            W   0008
   27 R2=REZ*REZ                                                          W   0009
      AI2=AIMZ*AIMZ                                                       W   0010
      ABREZ=ABS (REZ)                                                     W   0011
      IF(ABREZ+1.25*AIMZ-5.0)102,102,100                                  W   0012
  100 IF(ABREZ+1.1*AIMZ-6.6)117,117,116                                   W   0013
  101 IF(ABREZ+1.43333*AIMZ-4.3)119,119,118                               W   0014
  102 IF(ABREZ+1.863636*AIMZ-4.1)111,111,104                              W   0015
  103 IF(AIMZ-1.5)110,120,120                                             W   0016
  104 IF(AIMZ-1.4)115,115,101                                             W   0017
  105 IF(ABREZ+1.07317*AIMZ-4.4)119,119,118                               W   0018
  106 IF(ABREZ-2.7)127,128,128                                            W   0019
  107 IF(ABREZ-3.1)106,108,108                                            W   0020
  108 IF(ABREZ-3.4)129,130,130                                            W   0021
  109 IF(R2+1.18*AI2-5.76)103,107,107                                     W   0022
  110 IF(R2+1.7227*AI2-4.41)125,126,126                                   W   0023
  111 IF(R2+1.71*AI2-2.89)113,109,109                                     W   0024
  112 IF(R2+1.69*AI2-1.69)123,124,124                                     W   0025
  113 IF(R2+2.0408*AI2-1.0)114,112,112                                    W   0026
  114 IF(R2+1.5625*AI2-.25)121,122,122                                    W   0027
  115 IF(ABREZ+1.43333*AIMZ-4.3)120,120,105                               W   0028
  116 NMAX=1                                                              W   0029
      GO TO 15                                                            W   0030
  117 NMAX=2                                                              W   0031
      GO TO 15                                                            W   0032
  118 NMAX=3                                                              W   0033
```

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      GO TO 15                                                          W   0034
  119 NMAX=4                                                            W   0035
      GO TO 15                                                          W   0036
  120 NMAX=6                                                            W   0037
      GO TO 15                                                          W   0038
  121 NMAX=2                                                            W   0039
      GO TO 20                                                          W   0040
  122 NMAX=3                                                            W   0041
      GO TO 20                                                          W   0042
  123 NMAX=4                                                            W   0043
      GO TO 20                                                          W   0044
  124 NMAX=5                                                            W   0045
      GO TO 20                                                          W   0046
  125 NMAX=6                                                            W   0047
      GO TO 20                                                          W   0048
  126 NMAX=7                                                            W   0049
      GO TO 20                                                          W   0050
  127 NMAX=8                                                            W   0051
      GO TO 20                                                          W   0052
  128 NMAX=9                                                            W   0053
      GO TO 20                                                          W   0054
  129 NMAX=10                                                           W   0055
      GO TO 20                                                          W   0056
  130 NMAX=11                                                           W   0057
   20 KW=2                                                              W   0058
      AIMZ=AIM1                                                         W   0059
      GOTO200                                                           W   0060
   15 KW=1                                                              W   0061
      IF(AIM1)2000,150,150                                              W   0062
 2000 KW=2                                                              W   0063
      AIMZ=AIM1                                                         W   0064
      GOTO200                                                           W   0065
C WA IS OBTAINED FROM ASYMTOTIC SERIES                                  W   0066
  150 RV=2.*(R2-AI2)                                                    W   0067
      AK=4.*REZ*AIMZ                                                    W   0068
      EL=AK                                                             W   0069
      H=0.                                                              W   0070
      B=0.                                                              W   0071
      A=0.                                                              W   0072
      TEMPM=0.                                                          W   0073
      TEMEL=0.                                                          W   0074
      G=1.                                                              W   0075
      C=-1.1283792*AIMZ                                                 W   0076
      D=1.1283792*REZ                                                   W   0077
      AM=RV-1.                                                          W   0078
      AAK=1.                                                            W   0079
      K=0                                                               W   0080
   11 AJTEMP=2.*AAK                                                     W   0081
      TEMP4=(1.-AJTEMP)*AJTEMP                                          W   0082
      AJP=RV-(4.*AAK+1.)                                                W   0083
      GOTO40                                                            W   0084
   41 AAK=AAK+1.                                                        W   0085
      K=K+1                                                             W   0086
      PR=REW                                                            W   0087
      PI=AIMW                                                           W   0088
   12 AMAGN=TEMPM**2+TEMEL**2                                           W   0089
      REW=(TEMPC*TEMPM+TEMPD*TEMEL)/AMAGN                               W   0090
      AIMW=(TEMPM*TEMPD-TEMEL*TEMPC)/AMAGN                              W   0091
      IF(ABS (REW-PR)-1.E-6)665,11,11                                   W   0092
  665 IF(ABS (AIMW-PI)-1.E-6)65,11,11                                   W   0093
   65 RETURN                                                            W   0094
C WT IS OBTAINED FROM TAYLOR SERIES                                     W   0095
  200 TEMP1=R2+AI2                                                      W   0096
      TEMP2=2.*TEMP1*TEMP1                                              W   0097
      AJ=-(R2-AI2)/TEMP2                                                W   0098
      AK=2.*REZ*AIMZ/TEMP2                                              W   0099
      C=0.                                                              W   0100
      B=0.                                                              W   0101
      AJSIG=0.                                                          W   0102
      D=0.                                                              W   0103
```

```
      JSIG=0                                                              W   0104
      G=0.                                                                W   0105
      H=0.                                                                W   0106
      EL=0.                                                               W   0107
      A=1.                                                                W   0108
      AM=1.                                                               W   0109
      SIGP=1.5                                                            W   0110
      EXPON=EXP (TEMP2*AJ)                                                W   0111
      EXPC=EXPON*COS (TEMP2*AK)                                           W   0112
      EXPS=-EXPON*SIN (TEMP2*AK)                                          W   0113
      SIG2P=2.*SIGP                                                       W   0114
    4 AJ4SIG=4.*AJSIG                                                     W   0115
      AJ4SM1=AJ4SIG-1.                                                    W   0116
      TEMP3=1./(AJ4SM1*(AJ4SIG+3.))                                       W   0117
      TT4=SIG2P*(2.*AJSIG-1.)                                             W   0118
      TEMP4=TT4/(AJ4SM1*(AJ4SIG+1.)*(AJ4SIG-3.)*AJ4SM1)                   W   0119
      AJP=AJ*TEMP3                                                        W   0120
      GOTO40                                                              W   0121
   42 AJSIG=AJSIG+1.                                                      W   0122
      JSIG=JSIG+1                                                         W   0123
    6 TEMP7=(AM*AM+EL*EL)*1.7724539                                       W   0124
      REF=(AIMZ*(C*AM+D*EL)-REZ*(AM*D-C*EL))/                             W   0125
     1TEMP7/TEMP1                                                         W   0126
      AIMF=(AIMZ*(AM*D-C*EL)+REZ*(C*AM+D*EL)                              W   0127
     1)/TEMP7/TEMP1                                                       W   0128
      PR=REW                                                              W   0129
      PI=AIMW                                                             W   0130
      REW=EXPC*REF                                                        W   0131
      AIMW=EXPS*AIMF                                                      W   0132
      IF(ABS (REW-PR)-1.E-6)664,7,7                                       W   0133
  664 IF(ABS (AIMW-PI)-1.E-6)64,7,7                                       W   0134
   64 RETURN                                                              W   0135
    7 SIG2P=2.*AJSIG                                                      W   0136
      GOTO4                                                               W   0137
   40 TEMPC=AJP*C+TEMP4*A-AK*D                                            W   0138
      TEMPD=AJP*D+TEMP4*B+AK*C                                            W   0139
      TEMEL=AJP*EL+TEMP4*H+AK*AM                                          W   0140
      TEMPM=AJP*AM+TEMP4*G-AK*EL                                          W   0141
      A=C                                                                 W   0142
      B=D                                                                 W   0143
      G=AM                                                                W   0144
      H=EL                                                                W   0145
      C=TEMPC                                                             W   0146
      D=TEMPD                                                             W   0147
      AM=TEMPM                                                            W   0148
      EL=TEMEL                                                            W   0149
      IF(ABS (TEMPM)+ABS (TEMEL)-1.0E15)49,43,43                          W   0150
   43 C=1.0E-15*C                                                         W   0151
      D=1.0E-15*D                                                         W   0152
      AM=1.0E-15*AM                                                       W   0153
      EL=1.0E-15*EL                                                       W   0154
      TEMPC=1.0E-15*TEMPC                                                 W   0155
      TEMPD=1.0E-15*TEMPD                                                 W   0156
      TEMPM=1.0E-15*TEMPM                                                 W   0157
      TEMEL=1.0E-15*TEMEL                                                 W   0158
      GOTO50                                                              W   0159
   49 IF(ABS (TEMPM)+ABS (TEMEL)-1.0E-15)44,44,50                         W   0160
   44 C=1.0E15*C                                                          W   0161
      D=1.0E15*D                                                          W   0162
      AM=1.0E15*AM                                                        W   0163
      EL=1.0E15*EL                                                        W   0164
      TEMPC=1.0E15*TEMPC                                                  W   0165
      TEMPD=1.0E15*TEMPD                                                  W   0166
      TEMPM=1.0E15*TEMPM                                                  W   0167
      TEMEL=1.0E15*TEMEL                                                  W   0168
   50 GO TO(41,42,12345),KW                                               W   0169
12345 RETURN                                                              W   0170
      END                                                                 W   0171
```

APPENDIX I

Timing Considerations

For this timing comparison, the MC^2 calculation has been divided into four broad categories: (1) capture and fission resonance cross sections, (2) nonresonant fine-group cross sections, (3) the Legendre treatment and fundamental-mode spectrum, and (4) evaluation of broad-group cross sections. Timing considerations for these categories are given in Table XIII. The four categories have been broken down into calculational areas. The time in seconds is listed for each area in the category. The total time listed for each category includes the time for each area in the category plus any overhead, e.g., subroutine linkage time, printout time, etc. The times listed are for a typical large oxide fast-reactor run using three different options: as an all-fine-group P1 problem, as an ultrafine-group P1 problem, and as an ultrafine-group consistent B1 problem. The problems contained iron, sodium, oxygen, Pu^{240}, U^{238}, Pu^{239}, and fission products. The fine-group problem consisted of 47 fine groups, the ultrafine problems, 1410 ultrafine groups. For the ultrafine-group calculations, iron, sodium, and oxygen were treated as Legendre materials.

TABLE XIII. Timing Considerations

Program		P1 Fine-group Problem		P1 Ultrafine-group Problem		Consistent B1 Ultrafine-group Problem	
		Time, sec		Time, sec		Time, sec	
Category	Area	Area	Category	Area	Category	Area	Category
Capture and Fission Resonance Cross Sections	Unresolved Resonant Cross Sections	136	724 (87%)	136	959 (55%)	136	959 (52%)
	Resolved Resonant Cross Sections	574		666		666	
	Resolved Resonant Cross-section Reordering	14		157		157	
Nonresonant Fine-group Cross Sections	σ_s, $\bar{\mu}$, σ_{inel}, σ_f, σ_c, $\sigma_{n,2n}$, $\sigma_{n,p}$, $\sigma_{n,\alpha}$, σ_{inel} matrix, $\sigma_{n,2n}$ matrix	45	45 (5%)	45	45 (2%)	45	45 (2%)
Legendre Treatment and Fundamental-mode Spectrum	Legendre Data Tape Buffering	-	3 (1%)	113	532 (31%)	113	613 (34%)
	Fundamental-mode Spectrum First Iteration	<1		218		261	
	Subsequent Iterations	<1		15		23	
	Ultrafine-group Elastic Scattering Cross-section Reordering	-		186		216	
Broad-group Cross Sections	Microscopic Broad-group Cross-section Preparation (Excluding Inelastic)	10	57 (7%)	152	199 (12%)	163	210 (12%)
	Microscopic Broad-group Inelastic Cross-section Preparation	47		47		47	

Twenty-five unresolved resonance energy points were used for Pu^{240}, four for U^{238}, and 25 for Pu^{239}. Of the total time in the unresolved resonant calculation, 23 sec (17%) was for Pu^{240}, 4 sec (3%) for U^{238}, and 109 sec (80%) for Pu^{239}. For each energy point, 10 values are used for the neutron-width distribution and five values for the fission-width distribution. For the cases shown, 250 evaluations of $\langle J \rangle$ were used for Pu^{240}, 40 for U^{238}, and 1250 for Pu^{239}. Based on the total number of evaluations of $\langle J \rangle$, the time distribution would be 16, 3, and 81% for Pu^{240}, U^{238}, and Pu^{239}, respectively, which agrees with the actual elapsed time quite well.

The problems included three resolved resonances for iron, one for sodium, 11 for Pu^{240}, 227 for U^{238}, and 23 for Pu^{239}. Note from the table that the fine-group-resolved resonant calculation required 12% less time than the ultrafine. Experience has shown, however, that this is dependent on the compositions and temperature of the isotopes of the problem in question. The time required for the resolved resonant calculation for equivalent cases is generally within 10-15%, either larger or smaller, for the fine-group calculation as compared with the ultrafine calculation.

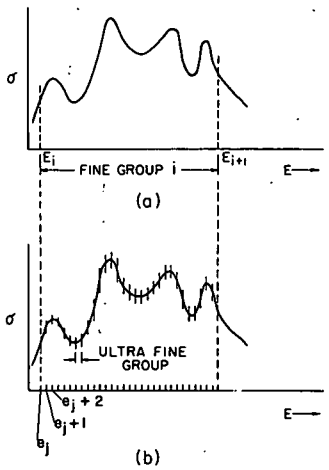

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Fig. 16

Comparison of Fine-group and Ultrafine-group Detail in Resolved Resonant Cross-section Integrations

The similar running times of the fine-group and ultrafine-group calculation can be explained by comparing the two parts of Fig. 16. Figure 16(a) shows a representative curve of a cross section which is to be integrated between the limits of fine group i, E_i, and E_{i+1}. The program integrates this curve by a Romberg integration scheme and, for example, for the convergence specified might require Romberg integration of order 11, or 2048 subintervals between E_i and E_{i+1}. Figure 16(b) shows the curve of the same cross section in the equivalent ultrafine-group calculation, but in this case the limit of integration for the ultrafine groups are the e_j. Since in Fig. 16(b) the variation of the curve over any interval e_j, e_{j+1} is less rapid than the variation over the interval E_i, E_{i+1}, the order of integration required for integration between e_j, e_{j+1} will, in general, be much less, and a representative figure for the case shown would be of order 6, or 64 subintervals between the ultrafine-group limits, e_j and e_{j+1}. The number of subintervals necessary to integrate all 30 of the ultrafine groups in fine group i bounded by E_i, E_{i+1} then would be approximately 30 times 64 or 1920, or roughly the same order of magnitude as for the fine-group calculation. Since the time for the calculation is dependent on the number of intervals for the integration, the time for both calculations would be approximately the same.

The running time for the elastic scattering matrix and the fundamental-mode spectrum calculation varies from 3 sec in the fine-group case to 532 and 613 sec, respectively, for the P1 and consistent P1 cases. Table XIII indicates that the major discrepancy in time between a fine-group and an ultrafine-group problem is due almost exclusively to the scattering matrix and fundamental-mode spectrum calculation. On the first iteration for an ultrafine-group problem, the time includes the calculation of the elastic scattering matrix. This is approximately 40% of the total time in this section of the program. On subsequent iterations, the scattering matrix is read from tape and the time is drastically reduced.

The concept of calculating the scattering matrix from the Legendre coefficients is a carryover from the ELMOE program. In ELMOE, this was required because the constant lethargy width of the ultrafine groups was allowed to be any integral multiple of that lethargy for which the library of Legendre coefficients was given. Since MC^2 does not allow the lethargy width of the ultrafine groups to vary, the scattering matrices for all isotopes in the library could be calculated and these stored in the library rather than the Legendre coefficients, thereby eliminating the time discrepancy between the first and subsequent iterations of an ultrafine-group calculation. Since the elastic scattering matrix and fundamental-mode calculation in MC^2 requires about 10 min contrasted to about 5 min for an entire ELMOE calculation on the CDC-3600, a comparison of the mechanics of the two procedures is pertinent.

The approach in ELMOE was to minimize tape handling as much as possible; thus the desire was to contain the entire scattering matrix in memory during the calculation. This had the advantage of minimal tape motion, but limited the maximum size of the problem. This led to the necessity of executing large calculations in multiple passes. In MC^2, the opposite philosophy was adopted, that is, to contain in memory at any given time only a portion of the scattering matrix and to make extensive use of magnetic tape to contain the entire matrix. In this manner, any size problem may be treated in one calculation. For a more realistic comparison of the timing involved between ELMOE and this section of MC^2, we should compare the time in MC^2 with the total number of ELMOE problems necessary to accomplish the same task. Thus for the consistent B1 case in Table XIII, the 10 min required for this calculation using MC^2 is to be compared to the time for the five ELMOE problems that would be required to cover the energy range for the case considered, showing considerable advantage to MC^2.

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REFERENCES

1. Kerr, W. M. M., Parker, K., and William, D. V. J., *The Calculation of Group Averaged Cross Sections: GALAXY 3 Facilities Available in S2 (FORTRAN) Language for the IBM-7030 (STRECH) Computer*, AWRE-0-97/64 (March 1965).

2. Alter, H., and Lorenzi, H. J., *Atomics International Cross Section Program*, Trans. Am. Nucl. Soc. *1*, 243 (Nov 1964).

3. Leshan, E. J., Burr, J. R., Temme, M., Thompson, G. T., and Triplet, J. R., *RBU: A Combined Monte Carlo Reactor - Burnup Program for the IBM-709*, ATL-A-101 (Sept. 30, 1959).

4. Nordheim, L. W., "The Doppler Coefficient," Chapter 4, *The Technology of Nuclear Reactor Safety, Volume 1, Reactor Physics and Control*, T. J. Thompson and J. G. Beckerley, Editors, M.I.T. Press, Cambridge (1964).

5. Goldstein, R., and Cohen, E. R., *Theory of Resonance Absorption of Neutrons*, Nucl. Sci. Eng. *13*, 132 (1962).

6. Chernick, J., and Vernon, R., *Some Refinements in the Calculations of Resonance Integrals*, Nucl. Sci. Eng. *4*, 649 (1958).

7. O'Shea, D. M., and Thacher, H. C., *Computation of Resonance Line Shape Functions*, Trans. Am. Nucl. Soc. *6*, 36 (June 1963).

8. Rago, A. L., and Hummel, H. H., *ELMOE: An IBM-704 Program Treating Elastic Scattering Resonances in Fast Reactors*, ANL-6805 (Jan 1964).

9. Bell, G. I., *A Simple Treatment for Effective Resonance Absorption Cross Sections in Dense Lattices*, Nucl. Sci. Eng. *5*, 138 (1959).

10. Hummel, H. H., "Equivalence between Homogeneous and Heterogeneous Resonance Integrals in Cylindrical Geometry," *Reactor Physics Division Annual Report, July 1, 1964 to June 30, 1965*, ANL-7110, p. 319 (Dec 1965).

11. Hwang, R. N., *Doppler Effect Calculations with Interference Corrections*, Nucl. Sci. Eng. *21*, 523 (1965).

12. Abramowitz, M., and Stegun, I. A., *Handbook of Mathematical Functions with Formulas, Graphs and Mathematical Tables*, Natl. Bureau of Standards Applied Mathematics Series 55, U.S. Government Printing Office, Washington, D.C. (June 1964).

13. Yiftah, S., Okrent, D., and Moldauer, P. A., *Fast Reactor Cross Sections. A Study Leading to a 16 Group Set*, Pergamon Press, New York (1960).

14. Stehn, J. R., Goldberg, M. D., Magurno, B. A., and Wiener-Chasman, R., *Neutron Cross Sections Volume 1, Z = 1 to 20*, BNL-325, Second Edition Supplement No. 2 (May 1964).

15. Horsley, A., *Neutron Cross Sections of the Proton in the Energy Range 0.0001 eV-20 MeV*, AWRE-0-23/65 (July 1965).

16. Amster, H., *Evaluation of the Cross-section Transformation Matrices of Zweifel and Hurwitz*, J. Appl. Phys. *27*, 307 (1956).

17. Sumner, H. M., *ERIC 2, A FORTRAN Program to Calculate Resonance Integrals and from Them Effective Capture and Fission Cross-Sections*, AEEW-R 323 (April 1964).

18. Romberg, W., *Vereinfachte Numerische Integration*, Det. Kong. Norske Videnskaber Selskab Forhandlinger, Band 28, Nr. 7 (1955).