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ANISN-L, A CDC-7600 Code Which Solves the One-Dimensional, Multigroup, Time Dependent Transport Equation by the Method of Discrete Ordinates

T. P. Wilcox

September 20, 1973

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MEMORANDUM

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September 20, 1973

TO: Distribution
FROM: T. P. Wilcox
SUBJECT: ANISN-L, A CDC-7600 Code Which Solves the One-Dimensional, Multigroup, Time Dependent Transport Equation by the Method of Discrete Ordinates

I INTRODUCTION

The ANISN Code¹, originally developed at the Oak Ridge National Laboratory, has been available for use at LLL in various versions since 1968. All of these versions, however, have used our computers to simulate the same machine flow of data as that which existed on the IBM 7094. For very small problems which could be contained within the fast memory of a machine, this type of programming presented no hardship. Large problems, however, ran very slowly if at all. The work reported here has lead to a version which will run both small and large problems efficiently on our CDC-7600 machines.

ANISN-L, like ANISN, solves the one dimensional, multigroup, time independent Boltzmann transport equation by the method of discrete ordinates. In problems involving a fissionable system, it can calculate the system multiplication or alpha. In such cases, it is also capable of determining isotopic concentrations, radii, zone widths, or buckling in order to achieve a given multiplication or alpha. The code may also calculate fluxes caused by a specified fixed source. Both neutrons, gammas, and coupled neutron-gamma problems may be solved in either the forward or adjoint (backward) modes. Cross sections describing upscatter, as well as the usual downscatter, may be employed.

The changes that have been made to ANISN may be placed into three categories:

- 1) Increased ease of use:
 - a) The input has been changed to a free form input similar to that used in MORSE-L².
 - b) Many input items are now built into the code or read from the library tape thus reducing the required input.

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- c) Materials definitions are now specified as in MORSE-L thus eliminating the need for inputting complicated mixing instructions.
 - d) Cross sections are read from a standard MORSE library tape³, as well as from cards.
- 2) Improved use of the computer:
- a) Only those items which will not fit in the core are placed on to disk files. Such files contain only one type of data and are efficiently read and written with three argument buffer statements.
 - b) Overlays have been used to reduce the SCM storage used for program instructions.
 - c) More efficient coding was used in the inner calculational loops to speed up the computation.
 - d) Cross section data is now handled so that it is no longer necessary to have all cross sections in the core at one time. Much larger problems may now be solved without the need of external codes to write "group independent" cross section tapes.
- 3) Expanded physics and capabilities:
- a) In a spherical problem, the calculated ANISN-L leakage may be output in the proper form needed to specify the source input to the MORSE-L code. This source is automatically punched.
 - b) An albedo, as needed in the input to the MORSE-C and the MORSE-I codes, may now be calculated directly.
 - c) Pipe factors may now be calculated for "ideal" pipes external to a spherically defined system. Such pipes may be offset from the center of the sphere.
 - d) The balance tables now contain values of absorption due to buckling and time dependence and may be expanded to show the group to group transfers.
 - e) Energy dependent spectra may now be output for direct use in the CLYDE cross section code. The higher order Legendre expansions are available.
 - f) CRT plots are now available for energy dependent spectra, position dependent flux, and the angular dependent flux on the right-most boundary.

- g) Cross sections may now be collapsed using the proper Legendre expansion of the flux.

A previously reported version of ANISN⁴, operational on the CDC-6600 machines, is no longer available.

The remainder of this report describes the use of ANISN-L. The author welcomes any feedback from users.

II DISCRETE ORDINATES METHOD

There has been so much written on the topic of discrete ordinates method (of which the original S_N method is a sub-set) that code writers no longer feel that it is essential to describe the physics of their discrete ordinates code. This author is not going to change from that pattern. Rather than go into the physics derivations, we will list a number of good references which contain everything anyone would want.

ANISN is a fifth or sixth generation code. As far as we know, the original one dimensional S_N code was SNG⁵ (written for the IBM 704 machine). This was followed by DSN⁶, DTK, DTF⁷, DTF-II⁸ and then by DTF-IV⁹ and ANISN¹. After ANISN was written, modifications were made to accelerate its convergence for deep penetration problems¹⁰. No other major improvement seems to have been made since that time in 1D codes. In all probability, no such change will come about until the STAR machines are available.

Summary articles by Abbott, Clairborne, and Clifford¹¹ and by Stevens¹² discuss the use of discrete ordinates codes for shielding type problems. The general theory has been discussed in the numerous writings of B. Carlson of LASL. What he hasn't discussed has been covered by K. Lathrop and C. Lee (also at LASL). References 13 and 14 are typical of such literature.

Reference 15 discusses the calculation of fluxes in a void external to a defined system. Additional references on this topic are included in this memorandum.

III CODE OPERATION

ANISN-L was written for the CDC-7600 machines running with the ORDER system. With this system, the following control cards are necessary:

```
*ID      . . . . .
*V      CG414  CG613
*T      CG613=6=CG613
*      DUMP(DEC)
*      XEQ ANISN CG414
*      DATA
```

Title card of first problem, etc.

Tape CG414 contains the program tape (a MAIN-OVERLAY-SEGMENT program) while tape unit 6 (CG613 in the above example) contains the cross section library tape. The proper library tape³ for the specified ANISN-L problems should be used. Tape CG616 is a back-up for the program tape (CG414).

During daytime operation, the tapes may be replaced with disk files using the usual procedures.

More than one problem may be run by simply stacking problems behind each other.

Disk files created by the program during operation will be automatically destroyed at the conclusion of a job.

IV CODE INPUTS

Almost all of the input to the ANISN-L code makes use of a free form input format designed originally for MORSE-L. This scheme allows each input quantity to be separated from other inputs by the use of one or more blank columns. There is no upper limit as to the number of blanks used; the code will even read over entire blank cards without trouble. The specific required inputs, described below, are therefore given as a list only and the user may space them on cards as he desires.

The code considers a comma (",") to be the same as a blank space. Input variables may therefore be separated by commas if the user is used to this type of input. In some free form input schemes, a double comma (",,") is equivalent to inputting a zero. In ANISN-L, the double comma is equivalent to only two blank spaces.

Any of the following numerical inputs will convey the value of one-thousand to the code:

1000
1000.
+1000.
+1000.000
1.0E+03
1.0E+3
1.E+3
1.0+3
1+3

The code converts all input numbers to a floating point form and then reconverts those which should be integers back into the integer form.

If the same numerical input is to appear a number of times, the repeat input option may be used. This option has the form:

jRa

where j is an integer numerical value representing the number of times the value is to be repeated; R is the letter, and a is the value written in any of the previous approved forms. Thus, thirty values of one may be input with:

30R1.0

Note that no blanks appear within this input. If the repeated input quantity is zero, the letter Z may be written in place of the letter R and the following numerical input omitted. Thus, thirty values of zero may be input with:

30Z

It is frequently desirable to input a sequence of numbers equally spaced between two fixed numbers. The interpolate option has been designed for this purpose. It has the form:

A nIB

where A and B are numerical values written in an approved form as described above, I is the letter "I", and n is an integer number. This input provides n + 1 input values; the first is equal to A, the last equal to B and the remaining n - 1 values are equally spaced between A and B. As an example, the sequence of numbers

1.0, 2.0, 3.0,, 10.0

may be input by:

1.0 9I10.0

It should be pointed out that the n used here is one greater than that used in similar input to the ORNL ANISN code.

If a specific number of input values are being read (such as the average velocity in each group), and the user desires to fill this matrix with the same value after specifying part of the matrix, he may do so by giving the desired value and following it by the letter F. Thus the input:

10.0 8.5 7.32F

would put ten in the first position of a matrix, eight-and-one-half in the second position, and then fill in all remaining positions with 7.32.

An input which does not start with a plus or minus sign, a decimal point, or the integer numbers zero through nine, is considered by the input routines to be an alphabetic word. It will be returned to the code as a BCD word. Only the last ten characters will be retained in this word, the rest will be ignored by the code. A number of input names in the code are written with hyphens to make them a single word; i.e.:

CROSS=SECTION

If this had been written as:

CROSS SECTION

the code would have considered it to be two words and would not have been able to understand the input. Alphabetic words may not use the repeat or fill option described previously. In describing the inputs throughout the rest of this report, alphabetic inputs will be placed in quotes; i.e., "CROSS-SECTION". The quotes are not to be input.

The free form input will read data in columns 1 through 72 of an input card. Columns 73-80 may be used for identification purposes. A single input, either numerical or alphabetic, may not be split so that part appears on one card and part on another card.

The input to the ANISN-L code is broken into twenty-two data blocks of information. Not all of these blocks need be present in every problem. The presence or absence of some of these blocks signify what is to be done or what is not to be done in a given problem. Each block of information, except the title card, starts with a key word. Data then follows and the word "LAST" appears to indicate that all input for this block has been provided. The blocks must appear in the order described. Table I indicates each block and the general information it contains while the rest of this section describes each block in detail.

Within the block inputs, a slash ("/") is used to terminate some input lists. This symbol is used when the code does not know how much data is to follow. Note that at least one blank must precede and follow the slash.

Examples of the punched card input are given with most data block descriptions. The example given assumes a S_{16} problem with sixteen energy groups. All other data described, however, has no relationship to a real problem nor do the values input in one block necessarily correspond to those input in another block. The example problems shown in Section VI of this report illustrate consistent problem inputs.

TABLE I DATA BLOCKS REQUIRED FOR INPUT TO THE ANISN-L CODE

<u>Block</u>	<u>Key Word</u>	<u>Page</u>	<u>Information in Block's Input</u>	<u>Format</u>	<u>When Required</u>
I		8	Title	(8A10)	always
II	"BASIC"	8	Basic Problem Parameters	free form	always
III	"RADII"	12	Radii of each Interval	free form	always
IV	"ZONE"	12	Zone number attached to each interval	free form	always
V	"MATERIAL"	12	Material number in each zone	free form	always
VI	"RAD-MOD"	12-13	Modifies radii	free form	zone-width search problem
VII	"DF"	13	Density factors	free form	when not all equal to one
VIII	"SN"	13	SN parameters	free form	over-rides or supplements built-in data
IX	"P-L"	14	P-L scattering constants	free form	over-ride built-in data
X	"FEW-GP"	14	Data to collapse input cross sections to a few group set	free form	when wanted
XI	"PF"	15	Pipe factor calculation input	free form	when wanted
XII	"DR"	15	Detector Response input	free form	when wanted
XIII	"MIX"	15-16	Mixing Table which defines the cross section materials	free form	always
XIV	"CS-DELETE"	16-17	Deletes secondary gamma production in isotopes or materials	free form	when wanted
XV	"SOURCE"	17	Fixed source	free form	fixed source problems only when cross section library not used or to over-ride library data only when cross section library does not contain needed information
XVI	"ENERGY"	18	Group energy boundaries	free form	
XVII	"VELOCITY"	18	Group velocities	free form	
XVIII	"FISSION"	18	Group fission spectra	free form	
XIX	"CROSS-SECTION"	19-20	Cross section inputs	fixed fld.	
XX	"DIFFUSION"	20-21	Perform diffusion or infinite media calculation	free form	when wanted
XXI	"ALBEDO"	21	Albedo data	free form	when albedo boundary condition specified
XXII	"END"	21	End flag	(A3)	always

Block I Title Card

This block contains a single card on which an identification of the problem being run is made. An (8A10) field is used to read this data which is then printed at various points in the problem's output.

Block II Basic Problem Parameters

("BASIC")

The information contained in this block establishes the basic description of the problem being run. Data is read using the free form input described previously and is identified by the key word "BASIC". There will be 39 individual inputs in this block. Each is described below in the order that they must be provided. Questions as to whether a certain option is to be used may be answered with the input words "YES" or "NO" or by numerical inputs with one meaning yes or a zero meaning no.

- 1) Number of neutron energy groups in the cross sections which are to be used in this problem.
- 2) Number of gamma energy groups in the cross sections which are to be used in this problem.
- 3) Position of the total cross section in the input cross section table (IHT). (For a MORSE-L cross section library tape, this input is equal to three.)
- 4) Position of the self-scatter cross section in the input cross section table (IHS). (For a MORSE-L cross section library tape, this input is equal to four.)
- 5) Length of the cross section table per group (IHM). (For MORSE-L cross section library tapes, this input is equal to the total number of energy groups upscatter plus the number of groups downscatter plus four.)
- 6) Maximum order of the Legendre expansion of the cross sections to be used in this problem.
- 7) Number of sets of cross sections which are to be read from input cards. A single set includes all the Legendre expansion matrices for the input material. All other cross section information required (if any) will be taken from the cross section library tape.
- 8) Are the cross sections to be printed in the problem's output?
- 9) Is the library tape to be unloaded after its use in this problem? This clears a tape unit for someone else to use during the run of a single long problem. Do not unload

the library tape if it is to be used in a subsequent problem in this same run.

- 10) Type of problem being run. Choose from one of the following available types:

"Distributed-Source"

"Shell-Source"

"K"

"Alpha"

"Concentration"

"Zone-Width"

"Radius-Search"

"Buckling-Search"

- 11) For the fixed source mode of operation, the total fixed source (integrated over all space, energy, and angles) will be normalized to this value. For other types of problems, the total fission source will be normalized to this input. If set equal to zero, no normalization will be performed.
- 12) For the shell source mode of operation, the interval in which the shell source occurs. Input a -1 if the source is specified in all intervals. Input as zero for other problem types.
- 13) For search type problems, the value of k (system multiplication) desired. If not needed, set to zero.
- 14) For search type problems, the value of alpha desired. For this type of problem, either k (the previous input) or alpha, but not both, must be specified. A non-zero value of k will be used if specified. Otherwise the alpha input will be employed.
- 15) In any non-fixed source problem, the first guess for the eigenvalue. Zero if not needed.
- 16) In any non-fixed source problem, the eigenvalue modifier. The change from the first to the second guess of the eigenvalue is made by adding, or subtracting, this quantity. Subsequent changes in the eigenvalue will be made by linear or quadratic interpolations.
- 17) Accuracy desired in the over-all integrals.

- 18) Accuracy required in the scalar flux at each mesh point.
Not used if zero.
- 19) The maximum number of inner iterations per energy group
to be allowed in any one outer iteration.
- 20) The maximum number of outer iterations to be performed.
- 21) Maximum running time (minutes) for this problem. Problem
will be terminated at the end of the first outer iteration
which exceeds this time. Zero if not used.
- 22) Is this an adjoint problem?
- 23) Order of angular quadrature.
- 24) Geometry type: specify either,
 "SLAB"
 "SPHERE"
 "CYLINDER"
- 25) The left boundary condition. Specify:
 "VACUUM"
 "REFLECTION" (always for sphere or cylinder)
 "PERIODIC"
 "ALBEDO" (specify additional inputs in block XX)
- 26) The right boundary condition. Specify:
 "VACUUM"
 "REFLECTION"
 "PERIODIC"
 "ALBEDO" (specify additional inputs in block XX)
- 27) Cylinder or plane height for buckling correction (cm.). Zero
if not used.
- 28) Plane depth for buckling correction (cm.). Zero if not used.
- 29) Transverse dimension for void streaming correction (cm.).
Zero if not used.
- 30) Highest number (lowest energy) neutron group which will have
fluxes calculated. Groups lower in energy will be assigned
zero flux solutions.

- 31) Highest number (lowest energy) gamma group which will have fluxes calculated.
- 32) Are disadvantage factors to be calculated?
- 33) Are CRT plots of position dependent flux to be made? There will be one plot for each energy group. Set equal to two if plots are classified.
- 34) Are CRT plots of energy dependent flux to be made? There will be one plot for each zone. Set equal to two if plots are classified.
- 35) Are the balance tables to be expanded to include group-to-group transfers?
- 36) A two digit integer number indicating the desire to punch energy dependent fluxes for use in the CLYDE cross-section code. The first digit describes what is to be done with the neutron energy groups while the second digit describes the action for the gamma groups. A zero implies 'do not punch;' a one means punch after fitting with straight lines on a linear-linear (energy-flux) grid; a two signifies punch after fitting on a log-linear grid; a three means punch both methods. As an example, a coupled problem to be punched with the neutron groups fitted by the log method and the gamma groups by the linear method would have this input set to 12.
- 37) Should the leakage of this problem be punched on to cards so as to be in a form that describes the source in a MORSE-L monte carlo problem? This option assumes that this problem has been run with a spherical geometry.
- 38) Should the leakage of this problem be punched in a form so as to represent an albedo input for the MORSE monte carlo codes? This assumes a slab geometry with an incident source on the right surface.
- 39) Should the angular flux be printed?

The entire block is ended by the word "LAST."

Example:

```

BASIC  16  0  3  4  19  3  0  YES  YES  RADIUS-SEARCH  22  1.0  0
17.35  -1.2  1-4  5-4  15  8  2.3  NO  16  SPHERE REFLECTION
VACUUM  32  16  0  YES  2R1  NO  0  NO  NO  YES  LAST

```

Block III Outer Radii of Each Interval

("RADII")

This input block specifies the outer radius of each geometric interval. The first value is the innermost interval and subsequent inputs must increase in value. The inner radius of the first interval is assumed to always be zero and is not input. Terminate the data in the block with the word "LAST."

Example:

RADII 20111.2 5111.8 15119.3 LAST

Block IV Zone Number for Each Interval

("ZONE")

The input in this block identifies the zone number attached to each geometric interval. The number of inputs must be equal to the total number of intervals (the same as the number of inputs in block III). End with the word "LAST."

Example:

ZONE 20R1 5R2 15R3 LAST

Block V Material Number in Each Zone

("MATERIAL")

For each zone used in the problem, this block specifies the number of the material which occurs in the zone. The input must contain a value for every zone from number one to the largest value input in block IV. The first input value is the material in zone 1, the second the material in zone 2, etc. The material numbers refer to the material mixture numbers used in block XIII. The word "LAST" is used to terminate this block.

Example:

MATERIAL 1 2 3 LAST

Block VI Radius Modifiers

("RAD-MOD")

This block is required only for a zone-width search problem. It may be omitted for all other cases. The data contained in the block describes the modification that is to be made to the radial widths by the eigenvalue. The width of each interval is given by:

$$\Delta r = \Delta r_0 (1 + EV \times RM)$$

where Δr_0 is the initially described width in the radius input, EV is the eigenvalue, and RM is this input.

The radium modifiers are input by zones starting with the innermost zone. End the input data with the word "LAST."

Example:

```
RAD-MOD .005 -.002 0 LAST
```

Block VII Density Factors

("DF")

The density factor for a given interval has the effect of changing the density of the material in that interval from that used when making the cross sections. It is equal to the density that is desired in that interval divided by the density of the material described as being in the interval by the MATERIAL and MIX blocks. This block needs to be input only if the density factors are not equal to one.

The factors are input by intervals starting with the first (innermost) interval. End with the word "LAST."

Example:

```
DF 20R1.05 5R0.95 10R0.90 5R0.75 LAST
```

Block VIII S_n Constants

("SN")

This block contains the angular quadrature weights followed by a slash ("/") and then followed by the angular quadrature cosines. Each set contains MM values where:

$$MM = ISN + 1 \text{ (sphere or plane)}$$

$$MM = (ISN * (ISN + 4))/4 \text{ (cylinder)}$$

and ISN is the order of angular quadrature.

The code contains built-in weights and angles for S_4 , S_6 , S_8 , S_{12} , S_{16} , S_{24} and S_{32} , calculations obtained by the method of Lee. An additional set with S_{40} for spherical geometry only, based upon Gaussian quadrature, are also built-in. These built-in sets will be used if this block is omitted and the proper value of ISN (23rd input in basic block) to connect with the above is used. In all other cases, this block must be input. Use the word "LAST" to terminate this data.

Example:

```
SN 0 .02276 .03977 .04169 .04596 .05263 .06402 .09050
    .14267 .14267 .09050 .06402 .05263 .04596 .04169 .03977
    .02276 / -1. -.9775 -.9068 -.8300 -.7454 -.6498 -.5375
    -.3944 -.1491 .1491 .3944 .5375 .6498 .7454 .8300 .9068
    .9775 LAST
```

Block IX P_L Scatter Constants

("P-L")

If desired, the P_L scattering constants calculated by the code may be over-ridden by this input. These constants are input in the same order as if they were read by the FORTRAN statement:

$$((CON(M, J), M = 1, MM), J = 1, JT)$$

where MM is defined above and

$$JT = ISCT \text{ (sphere or plane)}$$

$$JT = (ISCT \times (ISCT + 4)) / 4 \text{ (cylinder)}$$

and ISCT is the maximum order of scatter in the problem. Close with the word "LAST."

Example:

```
P-L  -1  -.9775  -.9068  -.8300  -.7454  -.6498  -.5375  -.3944
      -.1491  .1491  .3944  .5375  .6498  .7454  .8300  .9068  .9775
      1.  .9333  .7333  .5333  .3333  .1333  -.0667  -.2667  -.4667
      -.4667  -.2667  -.0667  .1333  .3333  .5333  .7333  .9333
      -1.  -.8689  -.5038  -.1844  .0828  .2888  .4180  .4382  .2153
      -.2153  -.4382  -.4180  -.2888  -.0828  .1844  .5038  .8689  LAST
```

Block X Few-Group Cross Sections

("FEW-GP")

If it is desired to obtain few-group cross section sets by flux weighting the input cross sections, this block should be input. The first five inputs in this block are:

- 1) a 1 if micro cross sections desired
a 2 if macro cross sections desired
- 2) position of total cross section in new cross section block (IHT')
- 3) position of self-scatter cross section (minus implies upscatter removal) (IHS')
- 4) table length of weighted cross sections (IHM')
- 5) a 1 if weighted cross sections are to be punched

The remaining values specify which new group each of the problem's energy groups falls into. First energy group first, etc. End the data with the word "LAST."

Example:

```
FEW-GP  1  3  4  9  1  4R1  3R2  3R3  2R4  2R5  2R6  LAST
```

Block XI Pipe Factors

("PF")

For a spherical problem, an ideal pipe factor will be calculated if this block of data is present. For each desired pipe, there are input three numbers:

- 1) distance to detector (from center of system) (cm.)
- 2) radius of pipe (cm.)
- 3) off-set of pipe from center of sphere (cm)

After all the desired pipes have been described, close with the word "LAST."

Example:

```
PF 1000 2.5 0      1000 2.5 1.0      1000 2.5 2.0 LAST
```

Block XII Detector Responses

("DR")

For each response function, input a single parameter indicating its use and then the function (one number for each energy group).

- M all intervals within zone M
- 0 all zones
- 1 all intervals and zones

when all desired responses have been specified, close with the word "LAST."

Example:

```
DR
  -3      16R1.0
   1      1.0 0.8 0.6 0.3 0.1 0.005 10Z
LAST
```

Block XIII Mixing Tables

("MIX")

The mixing tables, which comprise this block of data, are used to define the composition of each material in terms of available input cross sections. The input of this block consists of a series of specifications for the mixing instructions. Each specification consists of five input numbers:

- 1st) The material number for which this instruction pertains.
- 2nd) Identification of the isotope (or mixture) which forms part of the material. This input may be either a word or number from the list of available isotopes. If the identification is given by "SELF", the material as

specified up to this point will be multiplied by the eigenvalue (concentration search problems only).

- 3rd) Numerical designation of the flux weighting used to obtain the desired isotope's (or mixture's) cross sections. This parameter may also be used to separate cross sections of the same isotope which have been obtained from different sources.
- 4th) The maximum order of the Legendre expansion of this set of input cross sections.
- 5th) Density of this isotope or mixture. In units of atoms per barn-centimeter if the cross sections are in barns per atom or in units of grams per cubic centimeter if the cross sections were mixed so that they have units of square centimeters per gram.

The specifications for an entire material must be placed together in the input without being interrupted by the specifications of another material. The input does not have to be ordered by material numbers, however. Each material appearing in the material block must be specified. If a material is defined which is not needed, it will be listed in the output but not mixed or stored.

For concentration search problems, the previously described inputs may be altered by the addition of a dummy isotope called "SELF." When this isotope is encountered, all previous mixing instructions will be altered so that the density used is the input density times the problem's current eigenvalue. Isotopes described in a mixture after the "SELF" isotope will not have their input densities altered. The third, fourth and fifth inputs in the "SELF" isotope entries are input as zero. input in this block is ended by the word "LAST."

The input in this block is ended by the word "LAST."

Example:

```

MIX
  1  U235  0  0  .0006664
  1  U238  0  0  .0000486
  1  H1    0  3  .046733
  1  ZR    0  3  .018456
  1  FE    0  3  .005423
  2  AL    0  0  .0603
  3  BE    0  3  .123
LAST

```

Block XIV Secondary Gamma Production Deletion

("CS-DELETE")

In problems involving the production of gamma-rays from neutron interactions, it has been found to be convenient to be able to eliminate gamma production in a single isotope or in a given mixture. This allows an

understanding to be gained of the importance of either isotopes or mixtures in the results being calculated.

This block of data is input only when such deletion is desired. It is a list of the cross section matrix number for those matrices in which all secondary gamma production is to be set to zero. The matrix number of a given isotope can be easily determined by inspecting the output of a problem which has already been run. As long as the mix instruction block is not altered, the position of the stored isotopes will not be changed. Note that there are matrix numbers for both isotopes and mixtures. The use of the former deletes only a single isotope wherever it occurs. The use of the latter deletes all production in the mixture.

End this block with the word "LAST."

Example:

CS-DELETE 1 2 31 LAST

Block XV Fixed Source

("SOURCE")

This block is input only for problems which use a fixed source (either distributed or shell). In all other problem types, it is omitted.

For a distributed source problem, the input follows the order that would exist using the FORTRAN notation:

$$((S(r_i, E_g), i = 1, IM), g = 1, IG)$$

where IM is the total number of intervals and IG is the total number of groups. If desired, the input may be specified as two input matrices, separated by a slash ("/"), with the form:

$$(S(r_i), i = 1, IM)$$

$$(S(E_g), g = 1, IG)$$

The distributed source will then be made up from the product of these matrices:

$$S(r_i, E_g) = S(r_i) \times S(E_g)$$

For a shell source in one interval, the input follows the form:

$$((S(r_i, \Omega_k, E_g), k = 1, MM), g = 1, IG)$$

or by two input matrices:

$$(S(\Omega_k), k = 1, MM)$$

$$(S(E_g), g = 1, IG)$$

Again with a slash between the two inputs. MM is defined in the discussion of Block VIII.

A shell source in all intervals follows the form:

$$(((S(r_i, \Omega_k, E_g), k = 1, MM), i = 1, IM), g = 1, IG)$$

The word "LAST" follows the end of the input data.

Example:

SOURCE 1001 302 / 1 152 LAST

Block XVI Energy Boundaries

("ENERGY")

This block is needed only if a library tape has not been used to obtain cross section data. The block contains the energy (in MEV) at the boundaries established for the cross section groups. The highest energy of the first neutron group is given first followed by the energy at each boundary until the lowest energy of the last neutron group is provided. (There will be one more input than the number of neutron groups up to this point.) These are then followed by the boundaries, highest to lowest, of the gamma groups. Omit neutron or gamma data if they are not included in the cross section set. Terminate this block with the word "LAST."

Example:

ENERGY 10 8 6 5 4 3 2.5 2 1.75 1.5 1.25 1 .9 .8 .7 .6
.5 LAST

Block XVII Velocities

("VELOCITY")

Similar to the energy boundaries, this block provides information on the average velocity of particles within a given energy group. This information is necessary input if a library tape has not been used or may be used to alter data on the library tape if it was used. Values are input for each group, starting with group one. Units are centimeters per second. Terminate the input by the word "LAST."

Example:

VELOCITY 1683.0+10 LAST

Block XVIII Fission Spectron

("FISSION")

Similar to the energy and velocity data. Input is the probability that a fission neutron will be born into a given neutron group. The sum over all groups should be one. Terminate with the word "LAST."

Example:

FISSION .204 .344 .168 .180 .090 .014 102 LAST.

Block XIX Cross Sections

("CROSS-SECTION")

If any cross sections are to be input on cards, the following input is required. Note that an identification card is required only for the isotope (or mixture), not for each scattering matrix associated with the isotope. Cross sections to be obtained from the library tape require no additional inputs beyond that already given. The block label is read with the free form input routines while all other data in this block has fixed formats. The block of input data occurring immediately after this block must start on a new card.

Identification Card (A10,415)

- col. 1-10 Identification symbol of the isotope. This must be the same as used in the material definitions in the mixing tables.
- col. 11-15 Numerical designation of the flux weighting used to obtain the isotope's cross sections.
- col. 16-20 Maximum order of the expansion of this set of cross sections. There will be one more than this number of input matrices. This value may not be greater than the maximum order specified for the problem as given in the basic parameter block of input.
- col. 21-25 Type of format used to input the cross sections. A zero for FIDO formats, a one for DTF-IV formats.
- col. 26-30 A one if the scattering matrices do not include a factor of $(2\ell + 1)$ factor. Cross sections of LASL and the cross sections input to the DTF-IV code do not include the $(2\ell + 1)$ factor. Cross sections from ORNL intended for the ANISN and DOT codes do include this factor. The output of the LLL code CLYDE does not include the factor.

Cross Sections

Cross sections may be input in either a FIDO type format (as used by the ANISN and DOT codes) or in a DTF-IV format. FIDO input allows the use of a repeat option to enable zero values to be input more easily and ignores blank fields. The formats for FIDO input have a specification of (6(12,A1,F9.0)). A numerical input may be placed in the F9.0 location (a right adjusted exponential field may be used) and the two preceding fields left blank. Another method of inputting numerical values is to

put the value in the F9.0 field, the exponent of the associated power of ten in the I2 field, and a + or - in the A1 field to indicate the sign that goes with the exponent. Thus a cross section of 1234. barns may be represented either by $\wedge 3++1.234\wedge\wedge$ (where the $\wedge$'s represent blanks) or by $\wedge\wedge+1234.\wedge\wedge$. A zero input must be specified by a +0.0 in order not to be mistaken as a blank. A repeat option is available where the I2 field contains the number of times an input is to be repeated, the A1 field contains the letter R and the numerical field contains the value. Thus, fifteen zeros may be input by $15R+0.0\wedge\wedge\wedge\wedge\wedge$.

The DTF-IV format is a simple (6E12.4) card with all zeros requiring a full field and blank fields being read as negative zeros.

The order of cross section input is:

$$\sigma_a, \nu\sigma_f, \sigma_g, \sigma_{g \rightarrow g}, \dots, \sigma_{g+1 \rightarrow g}, \sigma_{g \rightarrow g}, \sigma_{g-1 \rightarrow g}, \dots, \sigma_{g-N \rightarrow g}$$

Group one inputs are followed by group two, etc. Even though a cross section is zero by definition, as a transfer between group -5 and group 1, it is input as zero. With the DTF-IV format, no blanks are allowed and each group, except the first, does not necessarily start on a new card.

The P_0 matrix is read in first followed by the P_1, P_2 , etc.

Each matrix does start on a new card.

Activation cross sections are not allowed in these inputs.

As many sets of input cross sections as specified in the basic problem description will be read. Not all of those read need be used in any given problem.

This block of input data is not terminated by the word "LAST."

Example problem one contains cross section input.

Block XX Diffusion Calculation

("DIFFUSION")

If input, this block alters the code so as to do either a diffusion or an infinite medium calculation, rather than as S_n calculation, for the first few outer iterations. The **first** number in this block indicates how many iterations are to be done with the revised methods. If the problem has not converged by the completion of that many iterations, the code will automatically switch to an SN mode of operation. This one input is followed by a string of numbers, one for each energy group. The first energy group is first. Within this string, a zero implies an S_n calculation, a one implies a diffusion calculation, and a two indicates an infinite homogenous medium calculation. End the block with the word "LAST."

Example:

DIFFUSION 1 52 10R1 2 LAST

Block XXI Albedo Information

("ALBEDO")

This block is required if either the left or the right boundary condition has been specified as "ALBEDO." This is a white boundary condition which causes the entering flux at the specified boundary to be isotropic. This is accomplished by summing the flux leaving the system and returning an average flux in all directions. The albedo for each group specifies the fraction of the flux leaving to be returned.

The input consists of a set of numbers, one for each energy group. The albedo for the left boundary is specified first if it is needed followed by the albedo for the right boundary if it is needed. No slash need appear between the two inputs. Terminate with the word "LAST."

Example:

ALBEDC 16R1.0 1.0 .95 .9 .8 .65 .4 .25 9R.1 LAST

Block XXII End Card

The word "END" in columns 1 through 3 of a single input card terminates the problem's input.

V CODE OUTPUT

The ANISN-L output is clearly labeled and should present little difficulty in understanding for those who understand the input. In general, those who have never run a discrete ordinates code will have less problems with the output than those who are familiar with the ANISN output. This is because the author has changed a number of items in order to make the output more logical (at least for the author). Explanations of these points are given below. Reference to the example problems will help in understanding the output.

- 1) Inputs are printed as they are read. Note that the geometrical description of a problem is also reprinted in the case of search problems using the final radial descriptions. Cross sections are not printed until the composition of mixtures has been determined.
- 2) Each cross section description contains a number of matrices depending upon its maximum Legendre order. Each matrix is assigned a storage location. When cross sections are printed, this matrix location is used to define the meaning of the printed values. The code prints a table which enables the user to understand the matrix assignments.

- 3) A page of output indicates the convergence towards a correct answer. The number of inner iterations is listed for each outer iteration and no longer summed over all outer iterations. For search problems, the eigenvalue listed for a given outer iteration is that eigenvalue used in that iteration. There will be, for these problems, one additional eigenvalue listed - this is the next "best guess" based upon this and previous iterations. The final outer iteration will indicate the maximum point-wise flux deviation for the scalar flux and, in the case of problems using the outer angular flux, the maximum deviation of this quantity.
- 4) Point-wise values of what used to be labeled "fission density" are no longer printed since they were really "fission neutron production density."
- 5) The scalar flux is presented in units of particles/cm² - MEV rather than the previous integrated values of particles/cm².
- 6) Entries in the balance table have been re-grouped with some deletions and some additions. It should be noted that the total source excludes the self-scattering term. When the expanded balance tables are printed, the first line printed for each group is the sum of all sources in that group while additional entries merely expand on where the sources come from. Within the losses category, absorption is broken into time absorption (α/v and all losses due to not calculating the flux in a given group), buckling, and physical absorption. It should be noted that the latter term may be negative due to (n, 2n) and/or pair production reactions. Leakage is defined to be positive (in any zone) for particles leaving the zone.
- 7) When the angular flux is printed, the units are now in particles/cm²-MEV-steradian. Additional output includes point-wise scalar flux and point-wise current.
- 8) Special outputs are clearly labeled. Punched card outputs associated with some options are, in general, identical to the printed output.
- 9) It should be noted that the output which is a function of energy group in an adjoint problem has been reversed with respect to group number. I.e., group one refers to the last energy group, group two refers to the next to the last group, etc. The angle dependent information must be interpreted as if it were reflected through the origin.

VI EXAMPLE PROBLEMS

Two example problems are included in order to illustrate the input and output of ANISN-L. These problems were not meant to convey "magic" numbers

to the user (such as convergence criteria or mesh point spacing) but only to illustrate what happens in the code.

The first problem, modified from an ORNL test problem, is a radius search in order to find radii in a cylindrical reactor which will produce a multiplication of 0.993316. The second problem describes a fixed source of 14 MEV neutrons in the center 2.0 cm of a 10 cm iron sphere. Both neutron and gamma fluxes are calculated in this problem.

Inspection of the problem inputs and outputs should provide a more detailed description of both systems.

CARD INPUTS FOR EXAMPLE PROBLEM ONE

EXAMPLE PROBLEM ONE

BASIC 16 0 3 4 19 0 1 YES NO RADIUS-SEARCH 0 0 .993316 C 19.3119 -0.5
 1-6 1-6 50 50 2 NO 4 CYLINDER REFLECTION VACUUM 35.56 6Z 1
 5Z LAST

RADII 20111.2093 5111.6919 15119.3119 LAST ZONE 20R1 5R2 15R3 LAST

MATERIAL 1 2 3 LAST MIX 1 U235 0 0 6.664-4 1 U238 0 0 4.862-5

1 H** 0 0 4.6733-2 1 ZK 0 0 1.8456-2 1 FE 0 C 5.423-3 1 CR 0 0 1.651-3

1 NI 0 0 9.244-4 1 C 0 0 6.98636-3 2 AL C 0 6.03-2 3 BE C 0 1.23-1 LAST

CROSS-SECTION

H**	C	O	O	O	O
2R+0.0	+0.6	-0.84	17R+0.0	+0.97	-0.961
+0.769	16R+0.0	+1.33	-1.906	+0.69	+0.239
15R+0.0	+1.83	-1.9375	+1.796	+0.69	+0.239
14R+0.0	+3.0	-1.8681	+2.827	+1.076	+0.415
+0.144	13R+0.0	+5.2	-2.0961	+4.041	+0.781
+0.3	+0.116	+0.049	12R+0.0	+6.33	-2.6912
+6.022	+0.684	+0.132	+0.052	+0.02	10R+0.0
3-+1.0002	1R+0.0	+6.666	-2.969	+7.372	+1.045
+0.117	+0.022	+0.012	10R+0.0	3-+4.0002	1R+0.0
+6.669	-2.942	+7.88	+1.349	+0.187	+0.0216
+0.0055	10R+0.0	3-+8.0002	1R+0.0	+6.672	-4.9798
+6.719	+1.22	+0.209	+0.0296	+0.0045	10R+0.0
2-+1.4	1R+0.0	+6.676	-5.4489	+7.757	+1.92
+0.36	+0.0608	+0.0125	10R+0.0	+0.025	1R+0.0
+6.817	-5.047	+8.494	+2.719	+0.68	+0.122
+0.0304	10R+0.0	+0.045	1R+0.0	+6.83	-5.55
+7.906	+2.418	+0.78	+0.192	+0.052	10R+0.0
+0.07	1R+0.0	+6.847	-6.539	+7.409	+2.364
+0.719	+0.2319	+0.096	10R+0.0	+0.13	1R+0.0
+6.92	-4.23	+9.982	+3.684	+1.182	+0.36
+0.1559	10R+0.0	+0.33	1R+0.0	+7.12	+6.79
+11.02	+3.334	+1.242	+0.387	+0.1199	10R+0.0

DIFFUSION 1 10R1 LAST

END

OUTPUT FOR EXAMPLE PROBLEM ONE

***** ANISN-L DISCRETE ORDINATES TRANSPORT CODE *****

VERSION NUMBER --- 2

DATE OF ASSEMBLY --- 11 SEPT 73

DESCRIPTION

INITIAL PRODUCTION VERSION
USE WITH GREAT CAREPLEASE REPORT ALL MALFUNCTIONS TO
TOM WILCOX X8851

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

EXAMPLE PROBLEM ONE

BASIC PARAMETERS

16 NUMBER NEUTRON GROUPS
 0 NUMBER GAMMA GROUPS
 3 TOTAL CROSS SECTION POSITION
 4 SELF-SCATTER CROSS SECTION POSITION
 19 LENGTH OF CROSS SECTION TABLE (PER GROUP)

 0 MAX LEGENDRE ORDER
 1 NO. ISOTOPLS INPUT ON CARDS
 YES CROSS SECTIONS PRINTED
 NO LIBRARY TAPE UNLOADED
 RAD. SRCH PROBLEM TYPE

 0. FIXED SOURCE NORMALIZATION
 0 SHELL SOURCE - INTERVAL
 9.933E-01 K FOR SEARCH
 0. ALPHA FOR SEARCH
 1.931E+01 FIRST GUESS OF EIGENVALUE

 -5.000E-01 EIGENVALUE MODIFIER
 1.000E-06 OVER-ALL INTEGRAL ACCURACY
 1.000E-05 POINT ACCURACY (NOT USED IF ZERO)
 50 MAX. INNER ITERATIONS
 50 MAX. OUTER ITERATIONS

 2.000E+00 MAX. RUNNING TIME (MIN) (NOT USED IF ZERO)
 NO ADJOINT PROBLEM
 4 ORDER OF ANGULAR QUADRATURE
 CYLINDER GEOMETRY
 REFLECTION LEFT BOUNDARY CONDITION

 VACUUM RIGHT BOUNDARY CONDITION
 3.556E+01 CYLINDER OR PLANE HEIGHT FOR BUCKLING CORRECTION (ZERO IF NOT USED)
 C. PLANE DEPTH FOR BUCKLING CORRECTION (ZERO IF NOT USED)
 C. TRANSVERSE DIMENSION FOR VOID STREAMING CORRECTION (ZERO IF NOT USED)
 16 HIGHEST NO. NEUTRON GROUP WHICH WILL BE CALCULATED

 16 HIGHEST NO. GAMMA GROUP WHICH WILL BE CALCULATED
 NO CALCULATED DISADVANTAGE FACTORS
 NO CRT PLOTS OF POSITION DEPENDENT FLUX
 YES CRT PLOTS OF ENERGY DEPENDENT FLUX
 NO EXPANDED BALANCE TABLE

 0 PUNCH ENERGY DEPENDENT FLUX FOR CLYDE
 NO PUNCH LEAKAGE SOURCE FOR MORSE-L
 NO PUNCH ALBEDO CALCULATION FOR MORSE
 NO PRINT ANGULAR FLUX

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September 20, 1973

DATE R 09/13/73
 CLOCK 12:07:50
 VERSION 2

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

INITIAL GEOMETRICAL DESCRIPTION

ZONE	MATERIAL	INTERVAL	OUTER RADIUS 0.	RAD MODIFIER	DEN FACTOR	OUTER AREA 0.	VOLUME
1	1	1	5.60465E-01	0.	1.00000E+00	3.52151E+00	9.86840E-01
		2	1.12093E+00		1.00000E+00	7.04301E+00	2.96052E+00
		3	1.68139E+00		1.00000E+00	1.05645E+01	4.93420E+00
		4	2.24186E+00		1.00000E+00	1.40860E+01	6.90788E+00
		5	2.80232E+00		1.00000E+00	1.76075E+01	8.88156E+00
		6	3.36279E+00		1.00000E+00	2.11290E+01	1.08552E+01
		7	3.92325E+00		1.00000E+00	2.46505E+01	1.28289E+01
		8	4.48372E+00		1.00000E+00	2.81720E+01	1.48026E+01
		9	5.04418E+00		1.00000E+00	3.16935E+01	1.67763E+01
		10	5.60465E+00		1.00000E+00	3.52151E+01	1.87500E+01
		11	6.16511E+00		1.00000E+00	3.87366E+01	2.07236E+01
		12	6.72558E+00		1.00000E+00	4.22581E+01	2.26973E+01
		13	7.28604E+00		1.00000E+00	4.57796E+01	2.46710E+01
		14	7.84651E+00		1.00000E+00	4.93011E+01	2.66447E+01
		15	8.40697E+00		1.00000E+00	5.28226E+01	2.86184E+01
2	2	16	8.96744E+00	0.	1.00000E+00	5.63441E+01	3.05920E+01
		17	9.52790E+00		1.00000E+00	5.98656E+01	3.25657E+01
		18	1.00884E+01		1.00000E+00	6.33871E+01	3.45394E+01
		19	1.06488E+01		1.00000E+00	6.69086E+01	3.65131E+01
		20	1.12093E+01		1.00000E+00	7.04301E+01	3.84868E+01
2	2	21	1.13058E+01	0.	1.00000E+00	7.10366E+01	6.82718E+00
		22	1.14023E+01		1.00000E+00	7.16430E+01	6.88572E+00
		23	1.14989E+01		1.00000E+00	7.22495E+01	6.94425E+00
		24	1.15954E+01		1.00000E+00	7.28559E+01	7.00279E+00
		25	1.16919E+01		1.00000E+00	7.34624E+01	7.06132E+00
3	3	26	1.21979E+01	0.	1.00000E+00	7.66542E+01	3.81296E+01
		27	1.27079E+01		1.00000E+00	7.98461E+01	3.97511E+01
		28	1.32159E+01		1.00000E+00	8.30379E+01	4.13725E+01
		29	1.37239E+01		1.00000E+00	8.62298E+01	4.29940E+01
		30	1.42319E+01		1.00000E+00	8.94217E+01	4.46155E+01
		31	1.47399E+01		1.00000E+00	9.26135E+01	4.62369E+01
		32	1.52479E+01		1.00000E+00	9.58054E+01	4.78584E+01
		33	1.57559E+01		1.00000E+00	9.89972E+01	4.94799E+01
		34	1.62639E+01		1.00000E+00	1.02189E+02	5.11013E+01
		35	1.67719E+01		1.00000E+00	1.05381E+02	5.27228E+01
		36	1.72799E+01		1.00000E+00	1.08573E+02	5.43443E+01
		37	1.77879E+01		1.00000E+00	1.11765E+02	5.59657E+01
		38	1.82959E+01		1.00000E+00	1.14957E+02	5.75872E+01
		39	1.88039E+01		1.00000E+00	1.18148E+02	5.92086E+01
		40	1.93119E+01		1.00000E+00	1.21340E+02	6.08301E+01

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

ANGULAR QUADRATURE CONSTANTS

ANGL	COSINE (MU)	WEIGHT	REFL DIRECT	WT. X COS.
1	-4.71405E-01	0.	3	-0.
2	-3.33333E-01	1.66667E-01	3	-5.55556E-02
3	3.33333E-01	1.66667E-01	2	5.55556E-02
4	-9.42809E-01	0.	8	-0.
5	-8.81917E-01	1.66667E-01	8	-1.46986E-01
6	-3.33333E-01	1.66667E-01	7	-5.55556E-02
7	3.33333E-01	1.66667E-01	6	5.55556E-02
8	8.81917E-01	1.66667E-01	5	1.46986E-01

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

MATERIAL COMPOSITION

MEDIA	ISOTOPE (OR MIXTURE)	FLUX WEIGHTING	P-L ORDER	DENSITY
1	U235	0	0	6.664000E-04
1	U238	0	0	4.862000E-05
1	H**	0	0	4.673300E-02
1	ZR	0	0	1.845600E-02
1	FE	0	0	5.423000E-03
1	CR	0	0	1.651000E-03
1	NI	0	0	9.244000E-04
1	O	0	0	6.986360E-03
2	AL	0	0	6.030000E-02
3	BE	0	0	1.230000E-01

CROSS SECTION LOCATION ASSIGNMENTS (GIVEN MATRIX IS POSITION OF P-0 COMPONENT, OTHERS FOLLOW IN ORDER)

MATRIX	IDENTIFICATION		
1	U235	0	0
2	U238	0	0
3	H**	0	0
4	ZR	0	0
5	FE	0	0
6	CR	0	0
7	NI	0	0
8	O	0	0
9	AL	0	0
10	BE	0	0
11	MEDIA	1	
12	MEDIA	2	
13	MEDIA	3	

CARD INPUT - ELEMENT 1	H**	FLUX WT = 0	MAX ORDER = 0	FORMAT - ANISN	WITH 2*L+1
TAPE INPUT - ELEMENT 2	BERYLLIUM	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 3	OXYGEN	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 4	ALUMINUM	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 5	CHROMIUM	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 6	IRON	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 7	NICKEL	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 8	ZIRCONIUM	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 9	URANIUM-235	HANSEN-ROACH	1963	LAMS-2941	P-0
TAPE INPUT - ELEMENT 10	URANIUM-238	HANSEN-ROACH	1963	LAMS-2941	P-0

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

ENERGY DEPENDENT ARRAYS

GROUP	ENERGY	DELTA-ENER	VELOCITY	FISSION	INITIAL CALC (TO CI 1)	LEFT ALBEDO	RIGHT ALBEDO
1	1.0000E+01	7.0000E+00	2.8500E+09	2.0400E-01	DIFFUSION	0.	0.
2	3.0000E+00	1.6000E+00	1.9900E+09	3.4400E-01	DIFFUSION	0.	0.
3	1.4000E+00	5.0000E-01	1.4700E+09	1.6800E-01	DIFFUSION	0.	0.
4	9.0000E-01	5.0000E-01	1.1000E+09	1.8000E-01	DIFFUSION	0.	0.
5	4.0000E-01	3.0000E-01	6.7000E+08	9.0000E-02	DIFFUSION	0.	0.
6	1.0000E-01	8.3000E-02	2.7000E+08	1.4000E-02	DIFFUSION	0.	0.
7	1.7000E-02	1.4000E-02	1.1400E+08	0.	DIFFUSION	0.	0.
8	3.0000E-03	2.4500E-03	4.8000E+07	0.	DIFFUSION	0.	0.
9	5.5000E-04	4.5000E-04	2.0600E+07	0.	DIFFUSION	0.	0.
10	1.0000E-04	7.0000E-05	1.0100E+07	0.	DIFFUSION	0.	0.
11	3.0000E-05	2.0000E-05	5.6600E+06	0.	DIFFUSION	0.	0.
12	1.0000E-05	7.0000E-06	3.1900E+06	0.	DIFFUSION	0.	0.
13	3.0000E-06	2.0000E-06	1.7900E+06	0.	DIFFUSION	0.	0.
14	1.0000E-06	6.0000E-07	1.0900E+06	0.	DIFFUSION	0.	0.
15	4.0000E-07	3.0000E-07	6.0600E+05	0.	DIFFUSION	0.	0.
16	1.0000E-07	9.9990E-08	2.1800E+05	0.	DIFFUSION	0.	0.
	1.0000E-11						

TIME REQUIRED FOR INPUT = 2.979E-02 MIN.

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

CROSS SECTIONS--

MAT. 1

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	1.26000E+00	1.30000E-00	1.33000E+00	1.35000E+00	1.66000E+00	3.15000E+00	5.50000E+00	5.55000E+00
2	3.55700E+00	3.19000E-00	3.08700E+00	2.98800E+00	3.51800E+00	6.12500E+00	1.02900E+01	1.93600E+01
3	4.25000E+00	4.50000E-00	4.65000E+00	5.20000E+00	7.90000E+00	1.24000E+01	1.51000E+01	2.11000E+01
4	1.20000E+00	1.77000E+00	2.30000E+00	3.42000E+00	6.16000E+00	9.20000E+00	9.55000E+00	9.95000E+00
5	0.	2.70000E-01	2.40000E-01	5.50000E-01	3.50000E-01	8.00000E-02	5.00000E-02	5.00000E-02
6	0.	0.	3.70000E-01	6.70000E-01	4.00000E-01	8.00000E-02	0.	0.
7	0.	0.	0.	6.50000E-01	4.50000E-01	7.00000E-02	0.	0.
8	0.	0.	0.	0.	4.40000E-01	7.00000E-02	0.	0.
9	0.	0.	0.	0.	0.	6.00000E-02	0.	0.
10	0.	0.	0.	0.	0.	0.	0.	0.

POS. 11 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	2.72000E+01	5.80000E+01	9.00000E+01	8.40000E+01	3.90000E+01	8.00000E+01	2.24000E+02	6.11000E+02
2	4.58150E+01	9.31000E+01	1.34750E+02	1.07800E+02	7.35000E+01	1.71500E+02	4.53250E+02	1.26420E+03
3	3.72000E+01	6.80000E+01	1.00000E+02	9.40000E+01	4.90000E+01	9.00000E+01	2.34000E+02	6.21000E+02
4	9.95000E+00	9.95000E+00	9.95000E+00	9.95000E+00	9.95000E+00	9.95000E+00	9.96000E+00	1.00000E+01
5	5.00000E-02	5.00000E-02	5.00000E-02	5.00000E-02	5.00000E-02	5.00000E-02	5.00000E-02	4.00000E-02
6	0.	0.	0.	0.	0.	0.	0.	0.

POS. 7 THRU POS. 19 SAME AS ABOVE

MAT. 2

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	5.66000E-01	5.35000E-01	1.44000E-01	1.40000E-01	1.60000E-01	4.50000E-01	7.00000E-01	2.00000E+00
2	1.72500E+00	1.21300E+00	1.08000E-01	0.	0.	0.	0.	0.
3	4.00000E+00	4.40000E+00	4.50000E+00	5.25000E+00	8.20000E+00	1.20000E+01	1.40000E+01	1.50000E+01
4	1.25400E+00	1.82500E+00	2.90600E+00	4.53000E+00	7.96000E+00	1.14500E+01	1.32400E+01	1.29400E+01
5	0.	3.30000E-01	3.50000E-01	8.00000E-01	5.00000E-01	8.00000E-02	1.00000E-01	6.00000E-02
6	0.	0.	4.60000E-01	9.60000E-01	5.50000E-01	8.00000E-02	0.	0.
7	0.	0.	0.	7.90000E-01	6.40000E-01	1.00000E-01	0.	0.
8	0.	0.	0.	0.	5.30000E-01	9.00000E-02	0.	0.
9	0.	0.	0.	0.	0.	7.00000E-02	0.	0.
10	0.	0.	0.	0.	0.	0.	0.	0.

POS. 11 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.10000E+01	5.00000E+01	5.60000E+01	1.10000E+02	4.00000E-01	5.50000E-01	1.00000E+00	2.44000E+00
2	0.	0.	0.	0.	0.	0.	0.	0.
3	2.20000E+01	5.90000E+01	6.50000E+01	1.19000E+02	9.40000E+00	9.55000E+00	1.00000E+01	1.14400E+01
4	1.09500E+01	8.94000E+00	8.94000E+00	8.94000E+00	8.94000E+00	8.94000E+00	8.95000E+00	9.00000E+00
5	6.00000E-02	5.00000E-02	6.00000E-02	6.00000E-02	6.00000E-02	6.00000E-02	6.00000E-02	5.00000E-02
6	0.	0.	0.	0.	0.	0.	0.	0.

POS. 7 THRU POS. 19 SAME AS ABOVE

MAT. 3

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	0.	0.	0.	0.	0.	0.	0.	1.00020E-03
2	0.	0.	0.	0.	0.	0.	0.	0.

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

3	6.00000E-01	9.70000E-01	1.33000E+00	1.83000E+00	3.00000E+00	5.20000E+00	6.33000E+00	6.66600E+00
4	-8.40000E-01	-9.61000E-01	-1.90600E+00	-1.93750E+00	-1.86810E+00	-2.09610E+00	-2.69120E+00	-2.96900E+00
5	0.	7.69000E-01	6.90000E-01	1.79600E+00	2.82700E+00	4.04100E+00	6.02200E+00	7.37200E+00
6	0.	0.	2.39000E-01	6.90000E-01	1.07600E+00	7.81000E-01	6.84000E-01	1.04500E+00
7	0.	0.	0.	2.39000E-01	4.15000E-01	3.00000E-01	1.32000E-01	1.17000E-01
8	0.	0.	0.	0.	1.44000E-01	1.16000E-01	5.20000E-02	2.20000E-02
9	0.	0.	0.	0.	0.	4.90000E-02	2.00000E-02	1.20000E-02
10	0.	0.	0.	0.	0.	0.	0.	0.

POS. 11 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	4.00020E-03	8.00020E-03	1.40000E-02	2.50000E-02	4.50000E-02	7.00000E-02	1.30000E-01	3.30000E-01
2	0.	0.	0.	0.	0.	0.	0.	0.
3	6.66900E+00	6.67200E+00	6.67600E+00	6.81700E+00	6.83000E+00	6.84700E+00	6.92000E+00	7.12000E+00
4	-2.94200E+00	-4.97380E+00	-5.44890E+00	-5.04700E+00	-5.55000E+00	-6.53900E+00	-4.23000E+00	6.79000E+00
5	7.88000E+00	6.71900E+00	7.75700E+00	8.49400E+00	7.90600E+00	7.40900E+00	9.98200E+00	-1.10200E+01
6	1.34900E+00	1.22000E+00	1.92000E+00	2.71900E+00	2.41800E+00	2.36400E+00	3.68400E+00	3.33400E+00
7	1.87000E-01	2.09000E-01	3.60000E-01	6.80000E-01	7.80000E-01	7.19000E-01	1.18200E+00	1.24200E+00
8	2.16000E-02	2.96000E-02	6.08000E-02	1.22000E-01	1.92000E-01	2.31900E-01	3.60000E-01	3.87000E-01
9	5.50000E-03	4.50000E-03	1.25000E-02	3.04000E-02	5.20000E-02	9.60000E-02	1.55900E-01	1.19900E-01
10	0.	0.	0.	0.	0.	0.	0.	0.

POS. 11 THRU POS. 19 SAME AS ABOVE

MAT. 4

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	3.00000E-03	5.00000E-03	7.00000E-03	1.20000E-02	1.50000E-02	1.50000E-02	1.50000E-02	1.50000E-02
2	0.	0.	0.	0.	0.	0.	0.	0.
3	2.60000E+00	3.10000E+00	3.84000E+00	6.21000E+00	7.21000E+00	7.91000E+00	7.64400E+00	6.55200E+00
4	1.44700E+00	2.39500E+00	3.34300E+00	5.97800E+00	7.06000E+00	7.78800E+00	7.53300E+00	6.45300E+00
5	0.	6.00000E-01	4.00000E-01	3.00000E-01	2.20000E-01	1.35000E-01	1.07000E-01	9.60000E-02
6	0.	0.	3.00000E-01	2.00000E-01	1.50000E-01	1.00000E-01	0.	0.
7	0.	0.	0.	2.00000E-01	1.00000E-01	4.00000E-02	0.	0.
8	0.	0.	0.	0.	0.	0.	0.	0.

POS. 9 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	1.50000E-02	1.50000E-02	1.50000E-02	1.50000E-02	2.20000E-02	3.60000E-02	6.50000E-02	1.59000E-01
2	0.	0.	0.	0.	0.	0.	0.	0.
3	6.35300E+00	6.15500E+00	6.15500E+00	6.15500E+00	6.15500E+00	6.15500E+00	6.15500E+00	6.15600E+00
4	6.25700E+00	6.02000E+00	6.01800E+00	6.02900E+00	6.01100E+00	5.97300E+00	5.99400E+00	5.99700E+00
5	8.40000E-02	8.10000E-02	1.12000E-01	1.22000E-01	1.11000E-01	1.22000E-01	1.46000E-01	9.60000E-02
6	0.	0.	0.	0.	0.	0.	0.	0.

POS. 7 THRU POS. 19 SAME AS ABOVE

MAT. 5

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	7.00000E-03	5.00000E-03	1.00000E-02	9.99999E-03	1.00000E-02	1.00000E-02	1.00000E-02	1.10000E-02
2	0.	0.	0.	0.	0.	0.	0.	0.
3	2.24700E+00	2.20000E+00	1.96000E+00	2.29000E+00	2.44000E+00	2.23000E+00	5.65000E+00	7.11400E+00
4	1.44000E+00	1.49500E+00	1.47000E+00	2.15700E+00	2.35900E+00	2.17000E+00	5.52000E+00	6.95200E+00
5	0.	5.00000E-01	4.00000E-01	2.30000E-01	1.23000E-01	7.10000E-02	5.00000E-02	1.20000E-01
6	0.	0.	2.00000E-01	2.00000E-01	2.30000E-01	1.00000E-01	0.	0.
7	0.	0.	0.	1.00000E-01	1.00000E-01	2.00000E-02	0.	0.
8	0.	0.	0.	0.	0.	0.	0.	0.

POS. 9 THRU POS. 19 SAME AS ABOVE

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	2.70000E-02	5.50000E-02	9.80000E-02	1.70000E-C1	3.10000E-01	5.10000E-01	9.10000E-01	2.53000E+00
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.09680E+01	1.13640E+01	1.13640E+01	1.13700E+01	1.13700E+01	1.13700E+01	1.15700E+01	1.30700E+01
4	1.07080E+01	1.09770E+01	1.09010E+01	1.08710E+01	1.07020E+01	1.04310E+01	1.03900E+01	1.05400E+01
5	1.51000E-01	2.33000E-01	3.32000E-01	3.65000E-01	3.29000E-01	3.58000E-01	4.29000E-01	2.70000E-01
6	0.	0.	0.	0.	0.	0.	0.	0.
POS. 7 THRU POS. 19 SAME AS ABOVE								

MAT. 6

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	1.00000E-02	2.00000E-02	2.00000E-02	1.99999E-02	4.00000E-02	1.10000E-01	7.00000E-02	2.00000E-02
2	0.	0.	0.	0.	0.	0.	0.	0.
3	2.44000E+00	2.36000E+00	2.17000E+00	2.62000E+C0	3.55000E+00	3.17000E+00	1.29200E+01	4.67000E+00
4	1.25000E+00	1.47000E+00	1.79000E+00	2.45000E+C0	3.38000E+00	3.00000E+00	1.26800E+01	4.56000E+00
5	0.	5.70000E-01	3.50000E-01	2.80000E-C1	1.50000E-01	1.30000E-01	6.00000E-02	1.70000E-01
6	0.	0.	2.60000E-01	3.60000E-C1	7.00000E-02	1.00000E-07	0.	0.
7	0.	0.	0.	2.50000E-C1	1.50000E-01	1.00000E-02	0.	0.
8	0.	0.	0.	0.	9.00000E-02	1.00000E-02	0.	0.
9	0.	0.	0.	0.	0.	1.00000E-02	0.	0.
10	0.	0.	0.	0.	0.	0.	0.	0.
POS. 11 THRU POS. 19 SAME AS ABOVE								

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	3.00000E-02	6.00000E-02	1.10000E-01	1.90000E-01	3.40000E-01	5.50000E-01	9.90000E-01	3.10000E+00
2	0.	0.	0.	0.	0.	0.	0.	0.
3	4.24000E+00	4.25000E+00	4.30000E+00	4.35000E+C0	4.47000E+00	4.64000E+00	5.21000E+00	6.10000E+00
4	4.12000E+00	4.06000E+00	4.05000E+00	4.03000E+C0	3.99000E+00	3.92000E+00	4.10000E+00	3.00000E+00
5	9.00000E-02	9.00000E-02	1.30000E-01	1.40000E-01	1.30000E-01	1.40000E-01	1.70000E-01	1.20000E-01
6	0.	0.	0.	0.	0.	0.	0.	0.
POS. 7 THRU POS. 19 SAME AS ABOVE								

MAT. 7

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	2.70000E-01	1.00000E-01	1.00000E-02	1.00000E-C2	1.00000E-02	2.00000E-02	3.80000E-01	4.00000E-02
2	0.	0.	0.	0.	0.	0.	0.	0.
3	2.25000E+00	2.34000E+00	2.53000E+00	2.45000E+C0	3.38000E+00	5.17000E+00	1.45800E+01	1.56800E+01
4	1.22000E+00	1.64000E+00	2.22000E+00	2.34000E+C0	3.29000E+00	5.05000E+00	1.39100E+01	1.53200E+01
5	0.	5.00000E-01	3.00000E-01	2.50000E-C1	1.00000E-01	8.00000E-02	1.00000E-01	2.90000E-01
6	0.	0.	2.00000E-01	2.00000E-C1	5.00000E-02	0.	0.	0.
7	0.	0.	0.	1.00000E-C1	1.00000E-01	0.	0.	0.
8	0.	0.	0.	0.	0.	0.	0.	0.
POS. 9 THRU POS. 19 SAME AS ABOVE								

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	5.00000E-02	1.00000E-01	1.80000E-01	3.10000E-01	5.60000E-01	9.40000E-01	1.60000E+00	4.60000E+00
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.66800E+01	1.67300E+01	1.73000E+01	1.73100E+01	1.75100E+01	1.82000E+01	1.90000E+01	2.12100E+01
4	1.63000E+01	1.61600E+01	1.65900E+01	1.65200E+01	1.64200E+01	1.66200E+01	1.69700E+01	1.66100E+01
5	3.20000E-01	3.30000E-01	4.70000E-01	5.30000E-01	4.80000E-01	5.30000E-01	6.40000E-01	4.30000E-01
6	0.	0.	0.	0.	0.	0.	0.	0.
POS. 7 THRU POS. 19 SAME AS ABOVE								

MAT. 8

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	4.00000E-02	7.10543E-15	1.42109E-14	0.	1.42109E-14	0.	1.42109E-14	0.
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.33000E+00	1.18030E+00	3.23000E+00	3.63000E+00	3.71000E+00	3.26000E+00	3.55000E+00	3.64000E+00
4	8.66000E-01	9.89000E-01	2.32800E+00	3.07400E+00	3.37300E+00	3.02900E+00	3.29500E+00	3.37000E+00
5	0.	4.24000E-01	1.91000E-01	9.02000E-01	5.56000E-01	3.37000E-01	2.31000E-01	2.55000E-01
6	0.	0.	0.	0.	0.	0.	0.	0.

POS. 7 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	0.	0.	0.	0.	0.	0.	0.	2.00000E-04
2	0.	0.	0.	0.	0.	0.	0.	0.
3	3.64000E+00	3.64000E+00	3.64000E+00	3.64000E+00	3.64000E+00	3.64000E+00	3.64000E+00	3.64120E+00
4	3.37000E+00	3.26000E+00	3.22600E+00	3.26000E+00	3.22600E+00	3.14200E+00	3.30900E+00	3.64100E+00
5	2.70000E-01	2.70000E-01	3.80000E-01	4.14000E-01	3.80000E-01	4.14000E-01	4.98000E-01	3.31000E-01
6	0.	0.	0.	0.	0.	0.	0.	0.

POS. 7 THRU POS. 19 SAME AS ABOVE

MAT. 9

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	1.59000E-02	1.42109E-14	3.80000E-04	6.99999E-04	2.00000E-03	5.00000E-03	2.00000E-03	1.00000E-03
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.80540E+00	2.02235E+00	2.14038E+00	2.72070E+00	2.83200E+00	1.43500E+00	1.46300E+00	1.36500E+00
4	1.10000E+00	1.66145E+00	1.61000E+00	2.47000E+00	2.69000E+00	1.36000E+00	1.39800E+00	1.30400E+00
5	0.	5.60000E-01	2.30000E-01	3.80000E-01	2.50000E-01	1.40000E-01	7.00000E-02	6.30000E-02
6	0.	0.	1.00000E-01	1.10000E-01	1.40000E-01	1.00000E-08	0.	0.
7	0.	0.	0.	3.00000E-02	2.00000E-02	1.00000E-02	0.	0.
8	0.	0.	0.	0.	0.	9.00000E-04	0.	0.
9	0.	0.	0.	0.	0.	0.	0.	0.

POS. 10 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	3.00000E-03	6.00000E-03	1.00000E-02	1.70000E-02	3.00000E-02	5.00000E-02	8.00000E-02	2.30000E-01
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.36600E+00	1.36600E+00	1.36600E+00	1.38500E+00	1.41000E+00	1.46000E+00	1.46000E+00	1.57000E+00
4	1.30300E+00	1.27600E+00	1.26400E+00	1.28400E+00	1.28600E+00	1.29500E+00	1.30600E+00	1.34000E+00
5	6.00000E-02	6.00000E-02	8.40000E-02	9.20000E-02	8.40000E-02	9.40000E-02	1.15000E-01	7.40000E-02
6	0.	0.	0.	0.	0.	0.	0.	0.

POS. 7 THRU POS. 19 SAME AS ABOVE

MAT. 10

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	-3.09000E-01	-8.80300E-02	1.42109E-14	0.	1.42109E-14	2.84217E-14	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.29100E+00	1.47500E+00	2.38000E+00	3.31000E+00	3.94000E+00	5.18000E+00	5.28000E+00	5.37000E+00
4	4.32000E-01	9.34000E-01	1.17300E+00	2.39700E+00	3.30600E+00	4.52500E+00	4.60000E+00	4.66000E+00
5	0.	8.18000E-01	5.09000E-01	1.20700E+00	9.13000E-01	6.34000E-01	6.55000E-01	6.80000E-01
6	0.	0.	3.50000E-01	1.20000E-01	0.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.

POS. 8 THRU POS. 19 SAME AS ABOVE

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	2.84217E-14	0.	0.	0.	1.00000E-03	2.00000E-03	4.00000E-03	1.00000E-02
2	0.	0.	0.	0.	0.	0.	0.	0.
3	5.42000E+00	5.46000E+00	5.45805E+00	5.46000E+00	5.46000E+00	5.46000E+00	5.46000E+00	5.57000E+00
4	4.71000E+00	4.45000E+00	4.35000E+00	4.45000E+00	4.34900E+00	4.12800E+00	4.57600E+00	5.56000E+00

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

5	7.10000E-01	7.10000E-01	1.01000E+00	1.11000E+00	1.01000E+00	1.11000E+00	1.33000E+00	8.80000E-01	
6	0.	0.	0.	0.	0.	0.	0.	0.	
	POS.	7 THRU POS.	19	SAME AS ABOVE					

MAT. 11

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8	
1	1.50606E-03	1.13719E-03	1.11900E-03	1.22441E-03	1.52036E-03	2.65221E-03	4.49715E-03	4.24899E-03	
2	2.45425E-03	2.18379E-03	2.06243E-03	1.99120E-03	2.34440E-03	4.08170E-03	6.85726E-03	1.29015E-02	
3	1.06675E-01	1.31991E-01	1.75460E-01	2.48223E-01	3.27067E-01	4.42727E-01	5.37891E-01	5.33451E-01	
4	6.28439E-03	1.95198E-02	3.54283E-03	6.16655E-02	9.24690E-02	9.50167E-02	1.07017E-01	7.05412E-02	
5	0.	5.42342E-02	4.41639E-02	9.81171E-02	1.41324E-01	1.94425E-01	2.85516E-01	3.49305E-01	
6	0.	0.	1.86737E-02	3.82940E-02	5.47555E-02	3.65557E-02	3.19654E-02	4.88360E-02	
7	0.	0.	0.	1.63794E-02	2.24532E-02	1.49346E-02	6.16376E-03	5.46776E-03	
8	0.	0.	0.	0.	7.19713E-03	5.48856E-03	2.43012E-03	1.02813E-03	
9	0.	0.	0.	0.	0.	2.34981E-03	9.34660E-04	5.60796E-04	
10	0.	0.	0.	0.	0.	0.	0.	0.	
	POS.	11 THRU POS.	19	SAME AS ABOVE					

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16	
1	1.95669E-02	4.22227E-02	6.45093E-02	6.42931E-02	3.12782E-02	6.18172E-02	1.64546E-01	4.48737E-01	
2	3.05311E-02	6.20418E-02	8.97974E-02	7.18379E-02	4.89804E-02	1.14288E-01	3.02046E-01	8.42463E-01	
3	5.62107E-01	5.83122E-01	6.05535E-01	6.10876E-01	5.76550E-01	6.05592E-01	7.07753E-01	9.86740E-01	
4	8.86371E-02	-1.04577E-02	-3.28334E-02	-1.38713E-02	-3.90227E-02	-8.79302E-02	2.19362E-02	5.38002E-01	
5	3.72992E-01	3.19133E-01	3.69716E-01	4.04831E-01	3.76653E-01	3.54088E-01	4.75898E-01	5.21171E-01	
6	6.30428E-02	5.70143E-02	8.97274E-02	1.27067E-01	1.13000E-01	1.10477E-01	1.72164E-01	1.55808E-01	
7	8.73907E-03	9.76720E-03	1.66239E-02	3.17784E-02	3.64517E-02	3.36010E-02	5.52384E-02	5.80424E-02	
8	1.00943E-03	1.38330E-03	2.84137E-03	5.70143E-03	8.97274E-03	1.08374E-02	1.68239E-02	1.80857E-02	
9	2.57032E-04	2.10299E-04	5.84163E-04	1.42068E-03	2.43012E-03	4.48637E-03	7.28567E-03	5.60329E-03	
10	0.	0.	0.	0.	0.	0.	0.	0.	
	POS.	11 THRU POS.	19	SAME AS ABOVE					

MAT. 12

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8	
1	9.58770E-04	8.56915E-16	2.29140E-05	4.22094E-05	1.20600E-04	3.01500E-04	1.20600E-04	6.03000E-05	
2	0.	0.	0.	0.	0.	0.	0.	0.	
3	1.08896E-01	1.21948E-01	1.29065E-01	1.64058E-01	1.70770E-01	8.65305E-02	8.82189E-02	8.23095E-02	
4	6.63300E-02	1.00185E-01	9.70830E-02	1.48941E-01	1.62207E-01	8.20080E-02	8.42994E-02	7.86312E-02	
5	0.	3.37680E-02	1.38690E-02	2.29140E-02	1.50750E-02	8.44200E-03	4.22100E-03	3.79890E-03	
6	0.	0.	6.03000E-03	6.63300E-03	8.44200E-03	6.03000E-10	0.	0.	
7	0.	0.	0.	1.80900E-03	1.20600E-03	6.03000E-04	0.	0.	
8	0.	0.	0.	0.	0.	5.42700E-05	0.	0.	
9	0.	0.	0.	0.	0.	0.	0.	0.	
	POS.	10 THRU POS.	19	SAME AS ABOVE					

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16	
1	1.80900E-04	3.61800E-04	6.03000E-04	1.02510E-03	1.80900E-03	3.01500E-03	4.82400E-03	1.38690E-02	
2	0.	0.	0.	0.	0.	0.	0.	0.	
3	8.23698E-02	8.23698E-02	8.23698E-02	8.35155E-02	8.50230E-02	8.80380E-02	8.80380E-02	9.46710E-02	
4	7.35709E-02	7.69428E-02	7.62192E-02	7.74252E-02	7.75458E-02	7.80885E-02	7.87518E-02	8.08020E-02	
5	3.51800E-03	3.61800E-03	5.06520E-03	5.54760E-03	5.06520E-03	5.66820E-03	6.93450E-03	4.46220E-03	
6	0.	0.	0.	0.	0.	0.	0.	0.	
	POS.	7 THRU POS.	19	SAME AS ABOVE					

MAT. 13

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

POS.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	-3.80070E-02	-1.08240E-02	1.74794E-15	0.	1.74794E-15	3.49587E-15	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.
3	1.58793E-01	1.81425E-01	2.92740E-01	4.07130E-01	4.84620E-01	6.37140E-01	6.49440E-01	6.60510E-01
4	5.31360E-02	1.14882E-01	1.44279E-01	2.94831E-01	4.06638E-01	5.56575E-01	5.65800E-01	5.73180E-01
5	0.	1.00614E-01	6.26070E-02	1.48461E-01	1.12299E-01	7.79820E-02	8.05650E-02	8.36400E-02
6	0.	0.	4.30500E-02	1.47600E-02	0.	0.	0.	0.
7	0.	0.	0.	0.	0.	0.	0.	0.
POS. 8 THRU POS. 19 SAME AS ABOVE								

POS.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	3.49587E-15	0.	0.	0.	1.23000E-04	2.46000E-04	4.92000E-04	1.23000E-03
2	0.	0.	0.	0.	0.	0.	0.	0.
3	6.66660E-01	6.71580E-01	6.71340E-01	6.71580E-01	6.71580E-01	6.71580E-01	6.71580E-01	6.85110E-01
4	5.79330E-01	5.47350E-01	5.35050E-01	5.47350E-01	5.34927E-01	5.07744E-01	5.62848E-01	6.83880E-01
5	8.73300E-02	8.73300E-02	1.24230E-01	1.36530E-01	1.24230E-01	1.36530E-01	1.63590E-01	1.08240E-01
6	0.	0.	0.	0.	0.	0.	0.	0.
POS. 7 THRU POS. 19 SAME AS ABOVE								

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

EXAMPLE PROBLEM ONE

OUTER ITERATION NUMBER	NO. OF INNER ITERATIONS	BALANCE	UPSCATTER RATIO	EIGENVALUE	LAMBDA-1 (SOURCE RATIO)	LAMBDA-2 (SCATTER RATIO)	TIME MINUTES
1	0	1.00000E+00	0.	1.93119E+01	1.02312E+00	0.	8.18468E-03
2	248	1.00000E+00	0.	1.93119E+01	1.00625E+00	9.95286E-01	3.43293E-02
3	202	1.00000E+00	0.	1.93119E+01	1.00131E+00	9.98117E-01	2.83006E-02
4	164	1.00000E+00	0.	1.93119E+01	1.00028E+00	9.99604E-01	2.33831E-02
5	134	1.00000E+00	0.	1.93119E+01	1.00006E+00	9.99916E-01	1.94968E-02
6	234	1.00000E+00	0.	1.90619E+01	9.92397E-01	9.94777E-01	3.24737E-02
7	81	1.00000E+00	0.	1.90619E+01	9.92436E-01	1.00002E+00	1.25770E-02
8	220	1.00000E+00	0.	1.91549E+01	9.95294E-01	1.00197E+00	3.06203E-02
9	73	1.00000E+00	0.	1.91549E+01	9.95276E-01	9.99992E-01	1.14235E-02
10	228	1.00000E+00	0.	1.93100E+01	9.99976E-01	1.00322E+00	3.18090E-02
11	84	1.00000E+00	0.	1.93100E+01	9.99945E-01	9.99987E-01	1.29863E-02
12	122	1.00000E+00	0.	1.93114E+01	9.99982E-01	1.00003E+00	1.78318E-02
13	92	1.00000E+00	0.	1.93118E+01	9.99995E-01	1.00001E+00	1.41207E-02
14	73	1.00000E+00	0.	1.93119E+01	9.99999E-01	1.00000E+00	1.14711E-02
15	37	1.00000E+00	0.	1.93120E+01	9.99998E-01	1.00000E+00	6.80928E-03
16	59	1.00000E+00	0.	1.93120E+01	1.00000E+00	1.00000E+00	9.76978E-03
17	32	1.00000E+00	0.	1.93120E+01	1.00000E+00	1.00000E+00	6.04542E-03

CONVERGED

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

FINAL GEOMETRICAL DESCRIPTION

INTERVAL	OUTER RADIUS	OUTER AREA	VOLUME
	0.	0.	
1	5.60467E-01	3.52152E+00	9.86849E-01
2	1.12093E+00	7.04304E+00	2.96055E+00
3	1.68140E+00	1.05646E+01	4.93425E+00
4	2.24187E+00	1.40861E+01	6.90794E+00
5	2.80234E+00	1.76076E+01	8.88164E+00
6	3.36280E+00	2.11291E+01	1.08553E+01
7	3.92327E+00	2.46506E+01	1.28290E+01
8	4.48374E+00	2.81722E+01	1.48027E+01
9	5.04421E+00	3.16937E+01	1.67764E+01
10	5.60467E+00	3.52152E+01	1.87501E+01
11	6.16514E+00	3.87367E+01	2.07238E+01
12	6.72561E+00	4.22583E+01	2.26975E+01
13	7.28608E+00	4.57798E+01	2.46712E+01
14	7.84654E+00	4.93013E+01	2.66449E+01
15	8.40701E+00	5.28228E+01	2.86186E+01
16	8.96748E+00	5.63443E+01	3.05923E+01
17	9.52795E+00	5.98659E+01	3.25660E+01
18	1.00884E+01	6.33874E+01	3.45397E+01
19	1.06489E+01	6.69089E+01	3.65134E+01
20	1.12093E+01	7.04304E+01	3.84871E+01
21	1.13059E+01	7.10369E+01	6.82724E+00
22	1.14024E+01	7.16433E+01	6.88578E+00
23	1.14989E+01	7.22498E+01	6.94431E+00
24	1.15954E+01	7.28562E+01	7.00285E+00
25	1.16920E+01	7.34627E+01	7.06138E+00
26	1.22000E+01	7.66546E+01	3.81300E+01
27	1.27080E+01	7.98464E+01	3.97514E+01
28	1.32160E+01	8.30383E+01	4.13729E+01
29	1.37240E+01	8.62302E+01	4.29944E+01
30	1.42320E+01	8.94221E+01	4.46159E+01
31	1.47400E+01	9.26139E+01	4.62373E+01
32	1.52480E+01	9.58058E+01	4.78588E+01
33	1.57560E+01	9.89977E+01	4.94803E+01
34	1.62640E+01	1.02190E+02	5.11018E+01
35	1.67720E+01	1.05381E+02	5.27233E+01
36	1.72800E+01	1.08573E+02	5.43447E+01
37	1.77880E+01	1.11765E+02	5.59662E+01
38	1.82960E+01	1.14957E+02	5.75877E+01
39	1.88040E+01	1.18149E+02	5.92092E+01
40	1.93120E+01	1.21341E+02	6.08307E+01

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

EXAMPLE PROBLEM ONE

OUTER ITERATION NUMBER	NO. OF INNER ITERATIONS	BALANCE	UPSCATTER RATIO	EIGENVALUE	LAMBDA-1 (SOURCE RATIO)	LAMBDA-2 (SCATTER RATIO)	TIME MINUTES
FINAL OUTER ITERATION							
GROUP 1	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 8.49E-07	OCCURED AT INTERVAL	1	
GROUP 2	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.33E-07	OCCURED AT INTERVAL	1	
GROUP 3	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 8.10E-07	OCCURED AT INTERVAL	1	
GROUP 4	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 6.03E-07	OCCURED AT INTERVAL	1	
GROUP 5	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.09E-07	OCCURED AT INTERVAL	1	
GROUP 6	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.00E-07	OCCURED AT INTERVAL	1	
GROUP 7	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.10E-07	OCCURED AT INTERVAL	1	
GROUP 8	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.33E-07	OCCURED AT INTERVAL	1	
GROUP 9	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.38E-07	OCCURED AT INTERVAL	1	
GROUP 10	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 6.42E-07	OCCURED AT INTERVAL	1	
GROUP 11	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 6.90E-07	OCCURED AT INTERVAL	1	
GROUP 12	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 6.84E-07	OCCURED AT INTERVAL	1	
GROUP 13	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.26E-07	OCCURED AT INTERVAL	1	
GROUP 14	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 8.15E-07	OCCURED AT INTERVAL	1	
GROUP 15	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.24E-07	OCCURED AT INTERVAL	1	
GROUP 16	REQUIRED	1 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.01E-07	OCCURED AT INTERVAL	1	
18	16	1.00000E+00	0.	1.93120E+01	1.00000E+00	1.00000E+00	5.38432E-03
				1.93120E+01			

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

SCALAR FLUX (AVERAGE OVER SPACIAL INTERVALS) --- PARTICLES / CM**2-MEV

INT.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	6.05051E-04	5.26567E-03	9.45897E-03	1.33446E-02	2.22788E-02	5.68934E-02	2.61237E-01	1.33350E+00
2	6.05281E-04	5.26358E-03	9.44838E-03	1.33218E-02	2.22343E-02	5.67687E-02	2.60641E-01	1.33046E+00
3	6.02704E-04	5.24043E-03	9.40489E-03	1.32588E-02	2.21288E-02	5.64991E-02	2.59409E-01	1.32421E+00
4	5.98180E-04	5.20203E-03	9.33611E-03	1.31626E-02	2.19705E-02	5.60990E-02	2.57590E-01	1.31501E+00
5	5.91969E-04	5.15017E-03	9.24446E-03	1.30356E-02	2.17624E-02	5.55739E-02	2.55206E-01	1.30297E+00
6	5.84194E-04	5.08570E-03	9.13109E-03	1.28789E-02	2.15061E-02	5.49274E-02	2.52271E-01	1.28814E+00
7	5.74922E-04	5.00914E-03	8.99672E-03	1.26934E-02	2.12029E-02	5.41632E-02	2.48802E-01	1.27063E+00
8	5.64190E-04	4.92080E-03	8.84189E-03	1.24799E-02	2.08542E-02	5.32848E-02	2.44817E-01	1.25051E+00
9	5.52021E-04	4.82071E-03	8.66703E-03	1.22388E-02	2.04614E-02	5.22964E-02	2.40337E-01	1.22790E+00
10	5.38421E-04	4.70966E-03	8.47252E-03	1.19710E-02	2.00259E-02	5.12030E-02	2.35387E-01	1.20294E+00
11	5.23385E-04	4.58715E-03	8.25867E-03	1.16772E-02	1.95496E-02	5.00101E-02	2.29997E-01	1.17576E+00
12	5.06885E-04	4.45341E-03	8.02574E-03	1.13580E-02	1.90343E-02	4.87243E-02	2.24200E-01	1.14654E+00
13	4.88869E-04	4.30832E-03	7.77382E-03	1.10140E-02	1.84823E-02	4.73534E-02	2.18038E-01	1.11549E+00
14	4.69238E-04	4.15157E-03	7.50281E-03	1.06460E-02	1.78962E-02	4.59070E-02	2.11560E-01	1.08282E+00
15	4.47822E-04	3.98249E-03	7.21215E-03	1.02544E-02	1.72793E-02	4.43970E-02	2.04828E-01	1.04879E+00
16	4.24336E-04	3.79930E-03	6.90056E-03	9.83922E-03	1.66355E-02	4.28395E-02	1.97918E-01	1.01369E+00
17	3.98302E-04	3.60120E-03	6.56540E-03	9.39987E-03	1.59709E-02	4.12574E-02	1.90929E-01	9.77766E-01
18	3.68923E-04	3.38254E-03	6.20152E-03	8.93417E-03	1.52941E-02	3.96863E-02	1.83991E-01	9.41090E-01
19	3.34848E-04	3.13636E-03	5.79889E-03	8.43644E-03	1.46202E-02	3.81880E-02	1.77255E-01	9.03034E-01
20	2.93625E-04	2.84791E-03	5.33585E-03	7.89054E-03	1.39728E-02	3.68780E-02	1.70817E-01	8.60622E-01
21	2.66480E-04	2.66272E-03	5.04809E-03	7.56512E-03	1.36315E-02	3.62721E-02	1.67575E-01	8.36771E-01
22	2.57956E-04	2.60780E-03	4.97481E-03	7.49146E-03	1.35767E-02	3.62413E-02	1.67391E-01	8.34973E-01
23	2.49760E-04	2.55468E-03	4.90446E-03	7.42005E-03	1.35237E-02	3.62167E-02	1.67248E-01	8.33415E-01
24	2.41870E-04	2.50328E-03	4.83643E-03	7.35084E-03	1.34728E-02	3.61983E-02	1.67147E-01	8.32074E-01
25	2.34263E-04	2.45349E-03	4.77212E-03	7.28376E-03	1.34238E-02	3.61862E-02	1.67086E-01	8.31006E-01
26	2.09156E-04	2.27554E-03	4.45284E-03	6.88964E-03	1.30169E-02	3.56050E-02	1.64787E-01	8.11683E-01
27	1.71474E-04	1.99245E-03	3.91824E-03	6.19955E-03	1.22082E-02	3.42106E-02	1.59253E-01	7.72620E-01
28	1.42431E-04	1.75197E-03	3.45693E-03	5.57084E-03	1.13405E-02	3.24369E-02	1.52096E-01	7.31010E-01
29	1.19570E-04	1.54541E-03	3.05534E-03	4.99760E-03	1.04555E-02	3.04403E-02	1.43830E-01	6.87211E-01
30	1.01256E-04	1.36632E-03	2.70303E-03	4.47408E-03	9.5706E-03	2.83072E-02	1.34752E-01	6.41466E-01
31	8.63606E-05	1.20979E-03	2.39180E-03	3.99491E-03	8.71140E-03	2.60905E-02	1.25064E-01	5.94004E-01
32	7.40893E-05	1.07196E-03	2.11504E-03	3.55509E-03	7.87089E-03	2.38254E-02	1.14913E-01	5.45062E-01
33	6.38640E-05	9.49705E-04	1.86727E-03	3.14992E-03	7.05642E-03	2.15360E-02	1.04415E-01	4.94875E-01
34	5.52562E-05	8.40485E-04	1.64381E-03	2.77485E-03	6.26843E-03	1.92382E-02	9.36601E-02	4.43674E-01
35	4.79402E-05	7.42133E-04	1.44053E-03	2.42538E-03	5.50540E-03	1.69415E-02	8.27176E-02	3.91658E-01
36	4.16637E-05	6.52761E-04	1.25355E-03	2.09677E-03	4.76388E-03	1.46487E-02	7.16315E-02	3.38972E-01
37	3.62270E-05	5.70659E-04	1.07902E-03	1.78373E-03	4.03809E-03	1.23544E-02	6.04109E-02	2.85636E-01
38	3.14660E-05	4.94201E-04	9.12781E-04	1.47988E-03	3.31876E-03	1.00397E-02	4.90053E-02	2.31421E-01
39	2.72434E-05	4.21754E-04	7.49888E-04	1.17669E-03	2.59078E-03	7.65985E-03	3.72461E-02	1.75550E-01
40	2.34374E-05	3.51573E-04	5.83934E-04	8.61842E-04	1.82857E-03	5.11589E-03	2.47165E-02	1.16045E-01

INT.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	6.85891E+00	2.86736E+01	8.36686E+01	2.36860E+02	7.35154E+02	1.88155E+03	4.43196E+03	2.17994E+04
2	6.84325E+00	2.86082E+01	8.34778E+01	2.36321E+02	7.33497E+02	1.87730E+03	4.42188E+03	2.17496E+04
3	6.81133E+00	2.84755E+01	8.30924E+01	2.35235E+02	7.30136E+02	1.86873E+03	4.40178E+03	2.16519E+04
4	6.76444E+00	2.82807E+01	8.25268E+01	2.33641E+02	7.25205E+02	1.85615E+03	4.37226E+03	2.15080E+04
5	6.70303E+00	2.80256E+01	8.17858E+01	2.31552E+02	7.18744E+02	1.83966E+03	4.33354E+03	2.13190E+04
6	6.62747E+00	2.77116E+01	8.08735E+01	2.28980E+02	7.10786E+02	1.81934E+03	4.28580E+03	2.10859E+04
7	6.53814E+00	2.73403E+01	7.97946E+01	2.25936E+02	7.01366E+02	1.79527E+03	4.22924E+03	2.08097E+04
8	6.43553E+00	2.69137E+01	7.85542E+01	2.22436E+02	6.90528E+02	1.76757E+03	4.16411E+03	2.04921E+04
9	6.32018E+00	2.64339E+01	7.71585E+01	2.18496E+02	6.78317E+02	1.73635E+03	4.09068E+03	2.01347E+04
10	6.19272E+00	2.59033E+01	7.56145E+01	2.14134E+02	6.64785E+02	1.70172E+03	4.00921E+03	1.97398E+04
11	6.05386E+00	2.53248E+01	7.39295E+01	2.09370E+02	6.49986E+02	1.66382E+03	3.92002E+03	1.93100E+04
12	5.90438E+00	2.47013E+01	7.21112E+01	2.04224E+02	6.33972E+02	1.62276E+03	3.82338E+03	1.88492E+04
13	5.74515E+00	2.40358E+01	7.01673E+01	1.98714E+02	6.16789E+02	1.57865E+03	3.71956E+03	1.83623E+04

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

14	5.57704E+00	2.33311E+01	6.81044E+01	1.92856E+02	5.98469E+02	1.53155E+03	3.60875E+03	1.78572E+04
15	5.40090E+00	2.25894E+01	6.59270E+01	1.86658E+02	5.79023E+02	1.48146E+03	3.49107E+03	1.73458E+04
16	5.21734E+00	2.18116E+01	6.36344E+01	1.80117E+02	5.58412E+02	1.42830E+03	3.36652E+03	1.68480E+04
17	5.02627E+00	2.09945E+01	6.12140E+01	1.73204E+02	5.36521E+02	1.37176E+03	3.23493E+03	1.63982E+04
18	4.82561E+00	2.01274E+01	5.86424E+01	1.65852E+02	5.13084E+02	1.31127E+03	3.09617E+03	1.60632E+04
19	4.60826E+00	1.91831E+01	5.58513E+01	1.57934E+02	4.87498E+02	1.24565E+03	2.95137E+03	1.60083E+04
20	4.35452E+00	1.81065E+01	5.27321E+01	1.49244E+02	4.58167E+02	1.17274E+03	2.81022E+03	1.68856E+04
21	4.20923E+00	1.75041E+01	5.10142E+01	1.44516E+02	4.41627E+02	1.13268E+03	2.74114E+03	1.77276E+04
22	4.19839E+00	1.74628E+01	5.09045E+01	1.44221E+02	4.40414E+02	1.13001E+03	2.73847E+03	1.78044E+04
23	4.18885E+00	1.74268E+01	5.08101E+01	1.43970E+02	4.39349E+02	1.12773E+03	2.73665E+03	1.78851E+04
24	4.18059E+00	1.73961E+01	5.07309E+01	1.43761E+02	4.38428E+02	1.12581E+03	2.73568E+03	1.79697E+04
25	4.17359E+00	1.73705E+01	5.06668E+01	1.43596E+02	4.37650E+02	1.12427E+03	2.73555E+03	1.80585E+04
26	4.16717E+00	1.69095E+01	4.94263E+01	1.40299E+02	4.25121E+02	1.09632E+03	2.70465E+03	1.89292E+04
27	3.82817E+00	1.59805E+01	4.68683E+01	1.33405E+02	4.00529E+02	1.03860E+03	2.62073E+03	2.01815E+04
28	3.59490E+00	1.50061E+01	4.41033E+01	1.25806E+02	3.75517E+02	9.76165E+02	2.50247E+03	2.07562E+04
29	3.35828E+00	1.40071E+01	4.12194E+01	1.17779E+02	3.50165E+02	9.11305E+02	2.36366E+03	2.08329E+04
30	3.11835E+00	1.29912E+01	3.82573E+01	1.09459E+02	3.24509E+02	8.44955E+02	2.21118E+03	2.05085E+04
31	2.87512E+00	1.19623E+01	3.52389E+01	1.00924E+02	2.98583E+02	7.77579E+02	2.04902E+03	1.98461E+04
32	2.62878E+00	1.09228E+01	3.21789E+01	9.22291E+01	2.72431E+02	7.09463E+02	1.87975E+03	1.88928E+04
33	2.37963E+00	9.87474E+00	2.90880E+01	8.34155E+01	2.46101E+02	6.40826E+02	1.70523E+03	1.76886E+04
34	2.12811E+00	8.82010E+00	2.59753E+01	7.45174E+01	2.19644E+02	5.71848E+02	1.52689E+03	1.62686E+04
35	1.87463E+00	7.76051E+00	2.28479E+01	6.55616E+01	1.93105E+02	5.02672E+02	1.34581E+03	1.46648E+04
36	1.61945E+00	6.69685E+00	1.97096E+01	5.65644E+01	1.66511E+02	4.33373E+02	1.16272E+03	1.29052E+04
37	1.36237E+00	5.62795E+00	1.65578E+01	4.75227E+01	1.39833E+02	3.63687E+02	9.77862E+02	1.10120E+04
38	1.10206E+00	4.54801E+00	1.33761E+01	3.83913E+01	1.12928E+02	2.93836E+02	7.90541E+02	8.99634E+03
39	8.34631E-01	3.44059E+00	1.01161E+01	2.90340E+01	8.53860E+01	2.22153E+02	5.98126E+02	6.84664E+03
40	5.50438E-01	2.26507E+00	6.65899E+00	1.91100E+01	5.61969E+01	1.46204E+02	3.93731E+02	4.50093E+03

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

EXAMPLE PROBLEM ONE
BALANCE TABLE FOR ZONE 1

(EXCEPT WHERE INDICATED, RESULTS ARE INTEGRATED OVER ENERGY AND VOLUME)

SOURCES

GROUP	FIXED	FISSION	GAMMA PRODUCTION	IN-SCATTERING	SELF-SCATTER	TOTAL
1	0.	2.0400E-01	0.	0.	7.8361E-03	2.0400E-01
2	0.	3.4400E-01	0.	6.7688E-02	4.9700E-02	4.1169E-01
3	0.	1.6800E-01	0.	1.3573E-01	5.1152E-03	3.0373E-01
4	0.	1.8000E-01	0.	2.5959E-01	1.2697E-01	4.3959E-01
5	0.	9.0000E-02	0.	4.3618E-01	1.9331E-01	5.2618E-01
6	0.	1.4000E-02	0.	5.2018E-01	1.4152E-01	5.3418E-01
7	0.	0.	0.	5.1066E-01	1.2400E-01	5.1066E-01
8	0.	0.	0.	4.9182E-01	7.3041E-02	4.9182E-01
9	0.	0.	0.	4.7491E-01	8.6568E-02	4.7491E-01
10	0.	0.	0.	3.8453E-01	-6.6374E-03	3.8453E-01
11	0.	0.	0.	3.4387E-01	-1.7368E-02	3.4387E-01
12	0.	0.	0.	3.3338E-01	-7.2698E-03	3.3338E-01
13	0.	0.	0.	2.9159E-01	-1.8105E-02	2.9159E-01
14	0.	0.	0.	2.5121E-01	-3.1313E-02	2.5121E-01
15	0.	0.	0.	2.9182E-01	9.2207E-03	2.9182E-01
16	0.	0.	0.	3.1393E-01	3.8354E-01	3.1393E-01
SUM	0.	1.0000E+00	0.	5.1071E+00	1.1201E+00	6.1071E+00

LOSSES

GROUP	SEC GAMMA PROD	OUT-SCATTER	TIME ABSORB	BUCKLING ABS	ABSORPTION	LEFT LEAKAGE	RIGHT LEAKAGE	TOTAL
1	0.	1.2330E-01	0.	1.6095E-02	1.8779E-03	0.	6.2726E-02	2.0400E-01
2	0.	2.8347E-01	0.	2.9572E-02	2.8954E-03	0.	9.5752E-02	4.1169E-01
3	0.	2.4660E-01	0.	1.4203E-02	1.6156E-03	0.	4.1311E-02	3.0373E-01
4	0.	3.8160E-01	0.	1.6011E-02	2.5211E-03	0.	3.9455E-02	4.3959E-01
5	0.	4.8725E-01	0.	1.3205E-02	3.1783E-03	0.	2.2548E-02	5.2618E-01
6	0.	5.1392E-01	0.	7.3633E-03	3.9501E-03	0.	8.9466E-03	5.3418E-01
7	0.	4.9403E-01	0.	4.8561E-03	5.2107E-03	0.	6.5554E-03	5.1066E-01
8	0.	4.7108E-01	0.	4.3706E-03	8.2291E-03	0.	8.1414E-03	4.9182E-01
9	0.	4.4350E-01	0.	3.9403E-03	1.8915E-02	0.	8.5601E-03	4.7491E-01
10	0.	3.4994E-01	0.	2.4802E-03	2.6798E-02	0.	5.3146E-03	3.8453E-01
11	0.	3.0356E-01	0.	2.0001E-03	3.4124E-02	0.	4.1875E-03	3.4387E-01
12	0.	2.9373E-01	0.	1.9664E-03	3.3695E-02	0.	3.9920E-03	3.3338E-01
13	0.	2.7109E-01	0.	1.8310E-03	1.4512E-02	0.	4.1590E-03	2.9159E-01
14	0.	2.2496E-01	0.	1.3464E-03	2.2014E-02	0.	2.8948E-03	2.5121E-01
15	0.	2.1907E-01	0.	1.3844E-03	6.9208E-02	0.	2.1600E-03	2.9182E-01
16	0.	0.	0.	1.7362E-03	3.1990E-01	0.	-7.7115E-03	3.1393E-01
SUM	0.	5.1071E+00	0.	1.2236E-01	5.6865E-01	0.	3.0899E-01	6.1071E+00

SUMMARY

GROUP	BALANCE	REACTIONS	TOTAL	FISSION NEUTRON	TOTAL FLUX	AVE. FLUX
	1-LOSS/SOURCE	PER CC.	REACTIONS	PRODUCTION	PART.-CM	P/CM**2-MEV
1	-4.3518E-08	3.3697E-04	1.3302E-01	3.0603E-03	1.2469E+00	4.5126E-04
2	-9.1020E-08	8.5136E-04	3.3606E-01	5.5729E-03	2.5461E+00	4.0313E-03
3	-8.9305E-08	6.4177E-04	2.5333E-01	2.9778E-03	1.4438E+00	7.3153E-03
4	-1.2117E-07	1.2948E-03	5.1109E-01	4.0999E-03	2.0590E+00	1.0432E-02
5	-1.7275E-07	1.7321E-03	6.8374E-01	4.9010E-03	2.0905E+00	1.7653E-02

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

6	-1.9588E-07	1.6704E-03	6.5939E-01	6.0792E-03	1.4894E+00	4.5459E-02
7	-1.7317E-07	1.5789E-03	6.2324E-01	7.9454E-03	1.1587E+00	2.0966E-01
8	-1.7431E-07	1.3993E-03	5.5235E-01	1.3359E-02	1.0354E+00	1.0706E+00
9	-1.5057E-07	1.3907E-03	5.4898E-01	2.9818E-02	9.7665E-01	5.4981E+00
10	-1.5235E-07	9.3758E-04	3.7010E-01	3.9377E-02	6.3469E-01	2.2970E+01
11	-1.4097E-07	8.1145E-04	3.2031E-01	4.7501E-02	5.2898E-01	6.7003E+01
12	-1.3511E-07	8.1104E-04	3.2015E-01	3.7649E-02	5.2409E-01	1.8967E+02
13	-1.3640E-07	6.7765E-04	2.6749E-01	2.2725E-02	4.6396E-01	5.8767E+02
14	-1.2972E-07	5.4633E-04	2.1566E-01	4.0699E-02	3.5611E-01	1.5036E+03
15	-1.0404E-07	7.5366E-04	2.9750E-01	1.2696E-01	4.2034E-01	3.5496E+03
16	4.2923E-07	1.7820E-03	7.0344E-01	6.0059E-01	7.1290E-01	1.8062E+04
SUM	-1.1266E-07	1.7216E-02	6.7959E+00	9.9332E-01	1.7688E+01	

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

1

EXAMPLE PROBLEM ONE
BALANCE TABLE FOR ZONE

2

(EXCEPT WHERE INDICATED, RESULTS ARE INTEGRATED OVER ENERGY AND VOLUME)

SOURCES

GROUP	FIXED	FISSION	GAMMA PRODUCTION	IN-SCATTERING	SELF-SCATTER	TOTAL
1	0.	0.	C.	0.	4.0293E-03	0.
2	0.	0.	C.	2.0513E-03	1.4223E-02	2.0513E-03
3	0.	0.	C.	2.3353E-03	8.2690E-03	2.3353E-03
4	0.	0.	C.	3.0033E-03	1.9189E-02	3.0033E-03
5	0.	0.	C.	2.8324E-03	2.2852E-02	2.8324E-03
6	0.	0.	C.	1.2484E-03	8.5608E-03	1.2484E-03
7	0.	0.	C.	4.4063E-04	6.8551E-03	4.4063E-04
8	0.	0.	C.	3.0892E-04	5.5761E-03	3.0892E-04
9	0.	0.	C.	2.5657E-04	5.1438E-03	2.5657E-04
10	0.	0.	C.	2.3686E-04	3.2599E-03	2.3686E-04
11	0.	0.	C.	2.1460E-04	2.6901E-03	2.1460E-04
12	0.	0.	C.	1.9579E-04	2.7100E-03	1.9579E-04
13	0.	0.	C.	1.7729E-04	2.3666E-03	1.7729E-04
14	0.	0.	C.	1.7299E-04	1.8352E-03	1.7299E-04
15	0.	0.	C.	1.6297E-04	2.2456E-03	1.6297E-04
16	0.	0.	C.	1.2724E-04	5.0188E-03	1.2724E-04
SUM	0.	0.	0.	1.3764E-02	1.1482E-01	1.3764E-02

LOSSES

GROUP	SEC GAMMA PROD	OUT-SCATTER	TIME ABSORB	BUCKLING ABS	ABSORPTION	LEFT LEAKAGE	RIGT LEAKAGE	TOTAL
1	0.	2.5274E-03	0.	7.7672E-04	5.8241E-05	-6.2726E-02	5.9363E-02	-1.2982E-09
2	0.	3.0896E-03	0.	1.7183E-03	-5.5511E-17	-9.5752E-02	9.2995E-02	2.0513E-03
3	0.	2.7221E-03	0.	1.0011E-03	1.9517E-06	-4.1311E-02	3.9921E-02	2.3353E-03
4	0.	1.9422E-03	0.	1.3212E-03	5.4381E-06	-3.9455E-02	3.9190E-02	3.0033E-03
5	0.	1.1893E-03	0.	1.4095E-03	1.6990E-05	-2.2548E-02	2.2764E-02	2.8324E-03
6	0.	4.4063E-04	0.	1.4689E-03	3.1473E-05	-8.9466E-03	8.2541E-03	1.2484E-03
7	0.	3.0892E-04	0.	1.1360E-03	9.8070E-06	-6.5554E-03	5.5413E-03	4.4063E-04
8	0.	2.5657E-04	0.	1.0158E-03	4.2762E-06	-8.1414E-03	7.1736E-03	3.0892E-04
9	0.	2.3686E-04	0.	9.3756E-04	1.1843E-05	-8.5601E-03	7.6304E-03	2.5657E-04
10	0.	2.1460E-04	0.	6.0675E-04	1.5329E-05	-5.3146E-03	4.7148E-03	2.3686E-04
11	0.	1.9579E-04	0.	5.0544E-04	2.1282E-05	-4.1875E-03	3.6796E-03	2.1460E-04
12	0.	1.7729E-04	0.	4.9884E-04	3.5880E-05	-3.9920E-03	3.4757E-03	1.9579E-04
13	0.	1.7299E-04	0.	4.3219E-04	5.5208E-05	-4.1590E-03	3.6759E-03	1.7729E-04
14	0.	1.6297E-04	0.	3.2856E-04	7.0855E-05	-2.8948E-03	2.5054E-03	1.7299E-04
15	0.	1.2724E-04	0.	3.9866E-04	1.3756E-04	-2.1600E-03	1.6595E-03	1.6297E-04
16	0.	0.	0.	8.4406E-04	8.6143E-04	7.7115E-03	-9.2897E-03	1.2724E-04
SUM	0.	1.3764E-02	0.	1.4400E-02	1.3376E-03	-3.0899E-01	2.9325E-01	1.3764E-02

SUMMARY

GROUP	BALANCE 1-LOSS/SOURCE	REACTIONS PER CC.	TOTAL REACTIONS	FISS NEUTRON PRODUCTION	TOTAL FLUX PART.-CM	AVE. FLUX P/CM**2-MEV
1	0.	1.9051E-04	6.615CE-03	0.	6.0746E-02	2.4993E-04
2	1.5688E-06	4.9862E-04	1.7313E-02	0.	1.4197E-01	2.5555E-03
3	9.3124E-07	3.1660E-04	1.0993E-02	0.	8.5174E-02	4.9061E-03
4	8.9484E-07	6.0874E-04	2.1137E-02	0.	1.2884E-01	7.4211E-03
5	9.1043E-07	6.9289E-04	2.4058E-02	0.	1.4088E-01	1.3525E-02

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

6	1.0514E-06	2.6015E-04	9.0329E-03	0.	1.0439E-01	3.6223E-02
7	3.4875E-06	2.0661E-04	7.1738E-03	0.	8.1319E-02	1.6729E-01
8	4.8466E-06	1.6811E-04	5.8370E-03	0.	7.0915E-02	8.3363E-01
9	5.5399E-06	1.5531E-04	5.3925E-03	0.	6.5467E-02	4.1900E+00
10	4.7464E-06	1.0051E-04	3.4898E-03	0.	4.2367E-02	1.7431E+01
11	4.4999E-06	8.3727E-05	2.9071E-03	0.	3.5294E-02	5.0824E+01
12	4.7905E-06	8.4189E-05	2.9232E-03	0.	3.5001E-02	1.4401E+02
13	4.7901E-06	7.4731E-05	2.5948E-03	0.	3.0519E-02	4.3948E+02
14	4.0126E-06	5.9588E-05	2.0690E-03	0.	2.3501E-02	1.1281E+03
15	4.3125E-06	7.2300E-05	2.5104E-03	0.	2.8515E-02	2.7375E+03
16	8.1778E-07	1.6935E-04	5.8802E-03	0.	6.2112E-02	1.7890E+04
SUM	1.6784E-06	3.7419E-03	1.2993E-01	0.	1.1370E+00	

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

1

EXAMPLE PROBLEM ONE
BALANCE TABLE FOR ZCNE

3

(EXCEPT WHERE INDICATED, RESULTS ARE INTEGRATED OVER ENERGY AND VOLUME)

SOURCES

GROUP	FIXED	FISSION	GAMMA PRODUCTION	IN-SCATTERING	SELF-SCATTER	TOTAL
1	0.	0.	0.	0.	2.0656E-02	0.
2	0.	0.	0.	3.9113E-02	1.3683E-01	3.9113E-02
3	0.	0.	0.	9.1303E-02	1.0429E-01	9.1303E-02
4	0.	0.	0.	1.2489E-01	3.4725E-01	1.2489E-01
5	0.	0.	0.	1.3227E-01	6.1086E-01	1.3227E-01
6	0.	0.	0.	1.1715E-01	6.8140E-01	1.1715E-01
7	0.	0.	0.	9.8633E-02	5.5647E-01	9.8633E-02
8	0.	0.	0.	8.2557E-02	4.7271E-01	8.2557E-02
9	0.	0.	0.	7.2023E-02	4.2594E-01	7.2023E-02
10	0.	0.	0.	6.4207E-02	2.6013E-01	6.4207E-02
11	0.	0.	0.	5.9041E-02	2.1364E-01	5.9041E-02
12	0.	0.	0.	5.4514E-02	2.1879E-01	5.4514E-02
13	0.	0.	0.	4.9658E-02	1.8132E-01	4.9658E-02
14	0.	0.	0.	4.6278E-02	1.3422E-01	4.6278E-02
15	0.	0.	0.	4.3245E-02	1.9452E-01	4.3245E-02
16	0.	0.	0.	3.7407E-02	7.5287E-01	3.7407E-02
SUM	0.	0.	0.	1.1123E+00	5.3139E+00	1.1123E+00

LOSSES

GROUP	SEC GAMMA PROD	OUT-SCATTER	TIME ABSORB	BUCKLING ABS	ABSORPTION	LEFT LEAKAGE	RIGT LEAKAGE	TOTAL
1	0.	5.5849E-02	0.	4.0657E-03	-1.4775E-02	-5.9363E-02	1.4224E-02	-7.5796E-09
2	0.	9.2147E-02	0.	1.1471E-02	-1.2892E-02	-9.2995E-02	4.1383E-02	3.9113E-02
3	0.	1.0731E-01	0.	4.9737E-03	4.4409E-16	-3.9921E-02	1.8937E-02	9.1303E-02
4	0.	1.3227E-01	0.	6.2413E-03	8.8818E-16	-3.9190E-02	2.5576E-02	1.2489E-01
5	0.	1.1715E-01	0.	6.8829E-03	-1.3323E-15	-2.2764E-02	3.1000E-02	1.3227E-01
6	0.	9.8633E-02	0.	4.4265E-03	1.3323E-15	-8.2541E-03	2.2341E-02	1.1715E-01
7	0.	8.2557E-02	0.	3.5091E-03	3.1086E-15	-5.5413E-03	1.8109E-02	9.8633E-02
8	0.	7.2023E-02	0.	2.8884E-03	-6.2172E-15	-7.1736E-03	1.4819E-02	8.2556E-02
9	0.	6.4207E-02	0.	2.5539E-03	2.6645E-15	-7.6304E-03	1.2892E-02	7.2023E-02
10	0.	5.9041E-02	0.	1.6402E-03	-1.3323E-15	-4.7148E-03	8.2404E-03	6.4207E-02
11	0.	5.4514E-02	0.	1.3784E-03	-9.5922E-05	-3.6796E-03	6.9236E-03	5.9041E-02
12	0.	4.9658E-02	0.	1.3795E-03	-1.7764E-15	-3.4757E-03	6.9529E-03	5.4514E-02
13	0.	4.6278E-02	0.	1.1698E-03	4.1692E-05	-3.6759E-03	5.8440E-03	4.9658E-02
14	0.	4.3245E-02	0.	9.1229E-04	6.5030E-05	-2.5054E-03	4.5614E-03	4.6278E-02
15	0.	3.7407E-02	0.	1.1927E-03	1.7003E-04	-1.6595E-03	6.1342E-03	4.3245E-02
16	0.	0.	0.	3.7325E-03	1.3541E-03	9.2897E-03	2.3031E-02	3.7407E-02
SUM	0.	1.1123E+00	0.	5.8418E-02	-2.6132E-02	-2.9325E-01	2.6097E-01	1.1123E+00

SUMMARY

GROUP	BALANCE 1-LOSS/SOURCE	REACTIONS PER CC.	TOTAL REACTIONS	FISS NEUTRON PRODUCTION	TOTAL FLUX PART.-CM	AVE. FLUX P/CM**2-MEV
1	0.	8.3172E-05	6.1730E-02	0.	3.8875E-01	7.4825E-05
2	8.7576E-07	2.9114E-04	2.1608E-01	0.	1.1910E+00	1.0030E-03
3	2.7327E-07	2.8510E-04	2.1160E-01	0.	7.2284E-01	1.9478E-03
4	4.0498E-07	6.4607E-04	4.7952E-01	0.	1.1778E+00	3.1738E-03
5	6.6776E-07	9.8087E-04	7.2801E-01	0.	1.5022E+00	6.7467E-03

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

6	8.8200E-07	1.0510E-03	7.8003E-01	0.	1.2243E+00	1.9873E-02
7	8.8100E-07	8.6368E-04	6.4103E-01	0.	9.8705E-01	9.4992E-02
8	1.0203E-06	7.3394E-04	5.4473E-01	0.	8.2472E-01	4.5354E-01
9	9.7312E-07	6.6039E-04	4.9014E-01	0.	7.3522E-01	2.2013E+00
10	8.9494E-07	4.3003E-04	3.1917E-01	0.	4.7526E-01	9.1476E+00
11	8.0468E-07	3.6116E-04	2.6806E-01	0.	3.9929E-01	2.6899E+01
12	8.0906E-07	3.6169E-04	2.6845E-01	0.	3.9972E-01	7.6938E+01
13	7.8384E-07	3.0671E-04	2.2764E-01	0.	3.3896E-01	2.2835E+02
14	6.8917E-07	2.3919E-04	1.7753E-01	0.	2.6435E-01	5.9361E+02
15	6.8581E-07	3.1271E-04	2.3210E-01	0.	3.4560E-01	1.5521E+03
16	-3.6050E-06	1.0162E-03	7.5423E-01	0.	1.1009E+00	1.4834E+04
SUM	5.9780E-07	8.6230E-03	6.4000E+00	0.	1.2078E+01	

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

1

EXAMPLE PROBLEM ONE

BALANCE TABLE FOR ENTIRE SYSTEM

(EXCEPT WHERE INDICATED, RESULTS ARE INTEGRATED OVER ENERGY AND VOLUME)

SOURCES

GROUP	FIXED	FISSION	GAMMA PRODUCTION	IN-SCATTERING	SELF-SCATTER	TOTAL
1	0.	2.0400E-01	0.	0.	3.2522E-02	2.0400E-01
2	0.	3.4400E-01	0.	1.0885E-01	2.0075E-01	4.5285E-01
3	0.	1.6800E-01	0.	2.2937E-01	1.1767E-01	3.9737E-01
4	0.	1.8000E-01	0.	3.8748E-01	4.9341E-01	5.6748E-01
5	0.	9.0000E-02	0.	5.7128E-01	8.2702E-01	6.6128E-01
6	0.	1.4000E-02	0.	6.3858E-01	8.3147E-01	6.5258E-01
7	0.	0.	0.	6.0973E-01	6.8932E-01	6.0973E-01
8	0.	0.	0.	5.7469E-01	5.5133E-01	5.7469E-01
9	0.	0.	0.	5.4719E-01	5.1765E-01	5.4719E-01
10	0.	0.	0.	4.4898E-01	2.5675E-01	4.4898E-01
11	0.	0.	0.	4.0312E-01	1.9896E-01	4.0312E-01
12	0.	0.	0.	3.8809E-01	2.1423E-01	3.8809E-01
13	0.	0.	0.	3.4142E-01	1.6558E-01	3.4142E-01
14	0.	0.	0.	2.9767E-01	1.0474E-01	2.9767E-01
15	0.	0.	0.	3.3523E-01	2.0598E-01	3.3523E-01
16	0.	0.	0.	3.5146E-01	1.1414E+00	3.5146E-01
SUM	0.	1.0000E+00	0.	6.2331E+00	6.5488E+00	7.2331E+00

LOSSES

GROUP	SEC	GAMMA PRGD	OUT-SCATTER	TIME ABSORB	BUCKLING ABS	ABSORPTION	LEFT LEAKAGE	RIGHT LEAKAGE	TOTAL
1	0.	0.	1.8168E-01	0.	2.0938E-02	-1.2839E-02	0.	1.4224E-02	2.0400E-01
2	0.	0.	3.7871E-01	0.	4.2761E-02	-9.9964E-03	0.	4.1383E-02	4.5285E-01
3	0.	0.	3.5664E-01	0.	2.0178E-02	1.6176E-03	0.	1.8937E-02	3.9737E-01
4	0.	0.	5.1581E-01	0.	2.3574E-02	2.5265E-03	0.	2.5576E-02	5.6748E-01
5	0.	0.	6.0559E-01	0.	2.1498E-02	3.1953E-03	0.	3.1000E-02	6.6128E-01
6	0.	0.	6.1300E-01	0.	1.3259E-02	3.9816E-03	0.	2.2341E-02	6.5258E-01
7	0.	0.	5.7690E-01	0.	9.5012E-03	5.2206E-03	0.	1.8109E-02	6.0973E-01
8	0.	0.	5.4336E-01	0.	8.2749E-03	8.2334E-03	0.	1.4819E-02	5.7469E-01
9	0.	0.	5.0794E-01	0.	7.4318E-03	1.8926E-02	0.	1.2892E-02	5.4719E-01
10	0.	0.	4.0920E-01	0.	4.7271E-03	2.6814E-02	0.	8.2404E-03	4.4898E-01
11	0.	0.	3.5827E-01	0.	3.8839E-03	3.4049E-02	0.	6.9236E-03	4.0312E-01
12	0.	0.	3.4356E-01	0.	3.8447E-03	3.3731E-02	0.	6.9529E-03	3.8809E-01
13	0.	0.	3.1754E-01	0.	3.4330E-03	1.4609E-02	0.	5.8440E-03	3.4142E-01
14	0.	0.	2.6837E-01	0.	2.5872E-03	2.2150E-02	0.	4.5614E-03	2.9767E-01
15	0.	0.	2.5661E-01	0.	2.9758E-03	6.9515E-02	0.	6.1342E-03	3.3523E-01
16	0.	0.	0.	0.	6.3128E-03	3.2212E-01	0.	2.3031E-02	3.5146E-01
SUM	0.	0.	6.2331E+00	0.	1.9518E-01	5.4385E-01	0.	2.6097E-01	7.2331E+00

SUMMARY

GROUP	BALANCE	REACTIONS	TOTAL	FISS NEUTRON
	1-LOSS/SOURCE	PER CC.	REACTIONS	PRODUCTION
1	1.4921E-13	1.7186E-04	2.0136E-01	3.0603E-03
2	1.2079E-13	4.8603E-04	5.6946E-01	5.5729E-03
3	1.0658E-13	4.0620E-04	4.7593E-01	2.9778E-03
4	1.2079E-13	8.6351E-04	1.0117E+00	4.0599E-03
5	1.2079E-13	1.2254E-03	1.4358E+00	4.9010E-03

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OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

6	7.8160E-14	1.2362E-03	1.4485E+00	6.0792E-03
7	8.5265E-14	1.0352E-03	1.2714E+00	7.9454E-03
8	9.2371E-14	9.4133E-04	1.1029E+00	1.3359E-02
9	8.5265E-14	8.9148E-04	1.0445E+00	2.9818E-02
10	6.3949E-14	5.9126E-04	6.9276E-01	3.9377E-02
11	5.6843E-14	5.0465E-04	5.9128E-01	4.7501E-02
12	5.6843E-14	5.0486E-04	5.9152E-01	3.7649E-02
13	7.8160E-14	4.2480E-04	4.9773E-01	2.2725E-02
14	5.6843E-14	3.3735E-04	3.9526E-01	4.0699E-02
15	4.9738E-14	4.5414E-04	5.3211E-01	1.2696E-01
16	1.2790E-13	1.2491E-03	1.4635E+00	6.0059E-01
SUM	8.5265E-14	1.1373E-02	1.3326E+01	9.9332E-01

TIME REQUIRED FOR OUTPUT= 1.020E-02 MIN.
TOTAL PROBLEM TIME= 3.570E-01 MIN.

1

OUTPUT FOR EXAMPLE PROBLEM ONE (Cont.)

END-OF-FILE FOUND WHILE READING INPUT

ANISN-L FINISHED

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CRT OUTPUT FROM EXAMPLE PROBLEM ONE

EXAMPLE PROBLEM ONE
AVERAGE ENERGY DEPENDENT FLUENCE FOR ZONE 1

CRT OUTPUT FROM EXAMPLE PROBLEM ONE (Cont.)

EXAMPLE PROBLEM ONE
AVERAGE ENERGY DEPENDENT FLUENCE FOR ZONE 2

CRT OUTPUT FROM EXAMPLE PROBLEM ONE (Cont.)

EXAMPLE PROBLEM ONE
AVERAGE ENERGY DEPENDENT FLUENCE FOR ZONE 3

CARD INPUTS FOR EXAMPLE PROBLEM TWO

EXAMPLE PROBLEM TWO

BASIC 30 15 3 4 48 3 0 NO YES DISTRIBUTED-SOURCE 1.0 5Z 2R1-5 100 1 4.
NC 32 SPHERE REFLECTION VACUUM 3Z 30 45 3Z YES 12 YES NC NO LAST
RADI 45110. LAST ZONE 45R1 LAST MATERIAL 1 LAST PF 1+3 8 0 1+3 8 5
LAST MIX 1 FE 0 3 8.47-2 LAST SOURCE 10R1 35Z / 0 1 43Z LAST
END

OUTPUT FROM EXAMPLE PROBLEM TWO

EXAMPLE PROBLEM TWO

BASIC PARAMETERS

30 NUMBER NEUTRON GROUPS
 15 NUMBER GAMMA GROUPS
 3 TOTAL CROSS SECTION POSITION
 4 SELF-SCATTER CROSS SECTION POSITION
 48 LENGTH OF CROSS SECTION TABLE (PER GROUP)
 3 MAX LEGENDRE ORDER
 0 NO. ISOTOPES INPUT ON CARDS
 NO CROSS SECTIONS PRINTED
 YES LIBRARY TAPE UNLOADED
 DIST. S. PROBLEM TYPE
 1.000E+00 FIXED SOURCE NORMALIZATION
 0 SHELL SOURCE - INTERVAL
 0. K FOR SEARCH
 0. ALPHA FOR SEARCH
 0. FIRST GUESS OF EIGENVALUE
 0. EIGENVALUE MODIFIER
 1.000E-05 OVER-ALL INTEGRAL ACCURACY
 1.000E-05 POINT ACCURACY (NOT USED IF ZERO)
 100 MAX. INNER ITERATIONS
 1 MAX. OUTER ITERATIONS
 4.000E+00 MAX. RUNNING TIME (MIN) (NOT USED IF ZERO)
 NO ADJOINT PROBLEM
 32 ORDER OF ANGULAR QUADRATURE
 SPHERE GEOMETRY
 REFLECTION LEFT BOUNDARY CONDITION
 VACUUM RIGHT BOUNDARY CONDITION
 0. CYLINDER OR PLANE HEIGHT FOR BUCKLING CORRECTION (ZERO IF NOT USED)
 0. PLANE DEPTH FOR BUCKLING CORRECTION (ZERO IF NOT USED)
 0. TRANSVERSE DIMENSION FOR VOID STREAMING CORRECTION (ZERO IF NOT USED)
 30 HIGHEST NO. NEUTRON GROUP WHICH WILL BE CALCULATED
 45 HIGHEST NO. GAMMA GROUP WHICH WILL BE CALCULATED
 NO CALCULATED DISADVANTAGE FACTORS
 NO CRT PLOTS OF POSITION DEPENDENT FLUX
 NO CRT PLOTS OF ENERGY DEPENDENT FLUX
 YES EXPANDED BALANCE TABLE
 12 PUNCH ENERGY DEPENDENT FLUX FOR CLYDE
 YES PUNCH LEAKAGE SOURCE FOR MORSE-L
 NO PUNCH ALBEDO CALCULATION FOR MORSE
 NO PRINT ANGULAR FLUX

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DATE R 09/13/73
 CLOCK 09:09:31
 VERSION 2

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

INITIAL GEOMETRICAL DESCRIPTION

ZONE	MATERIAL	INTERVAL	OUTER RADIUS	RAD MODIFIER	DEN FACTOR	OUTER AREA	VOLUME
			0.			0.	
1	1	1	2.2222E-01	0.	1.0000E+00	6.20562E-01	4.59675E-02
		2	4.4444E-01		1.0000E+00	2.48225E+00	3.21773E-01
		3	6.6667E-01		1.0000E+00	5.58505E+00	8.73383E-01
		4	8.8889E-01		1.0000E+00	9.92898E+00	1.70080E+00
		5	1.1111E+00		1.0000E+00	1.55140E+01	2.80402E+00
		6	1.3333E+00		1.0000E+00	2.23402E+01	4.18304E+00
		7	1.5556E+00		1.0000E+00	3.04075E+01	5.83787E+00
		8	1.7778E+00		1.0000E+00	3.97159E+01	7.76851E+00
		9	2.0000E+00		1.0000E+00	5.02655E+01	9.97495E+00
		10	2.2222E+00		1.0000E+00	6.20562E+01	1.24572E+01
		11	2.4444E+00		1.0000E+00	7.50879E+01	1.52152E+01
		12	2.6667E+00		1.0000E+00	8.93609E+01	1.82491E+01
		13	2.8889E+00		1.0000E+00	1.04875E+02	2.15588E+01
		14	3.1111E+00		1.0000E+00	1.21630E+02	2.51442E+01
		15	3.3333E+00		1.0000E+00	1.39626E+02	2.90055E+01
		16	3.5556E+00		1.0000E+00	1.58864E+02	3.31426E+01
		17	3.7778E+00		1.0000E+00	1.79342E+02	3.75555E+01
		18	4.0000E+00		1.0000E+00	2.01062E+02	4.22442E+01
		19	4.2222E+00		1.0000E+00	2.24023E+02	4.72086E+01
		20	4.4444E+00		1.0000E+00	2.48225E+02	5.24489E+01
		21	4.6667E+00		1.0000E+00	2.73668E+02	5.79650E+01
		22	4.8889E+00		1.0000E+00	3.00352E+02	6.37569E+01
		23	5.1111E+00		1.0000E+00	3.28277E+02	6.98247E+01
		24	5.3333E+00		1.0000E+00	3.57443E+02	7.61682E+01
		25	5.5556E+00		1.0000E+00	3.87851E+02	8.27875E+01
		26	5.7778E+00		1.0000E+00	4.19500E+02	8.96826E+01
		27	6.0000E+00		1.0000E+00	4.52389E+02	9.68536E+01
		28	6.2222E+00		1.0000E+00	4.86520E+02	1.04300E+02
		29	6.4444E+00		1.0000E+00	5.21892E+02	1.12023E+02
		30	6.6667E+00		1.0000E+00	5.58505E+02	1.20021E+02
		31	6.8889E+00		1.0000E+00	5.96360E+02	1.28295E+02
		32	7.1111E+00		1.0000E+00	6.35455E+02	1.36845E+02
		33	7.3333E+00		1.0000E+00	6.75791E+02	1.45671E+02
		34	7.5556E+00		1.0000E+00	7.17369E+02	1.54773E+02
		35	7.7778E+00		1.0000E+00	7.60188E+02	1.64150E+02
		36	8.0000E+00		1.0000E+00	8.04248E+02	1.73803E+02
		37	8.2222E+00		1.0000E+00	8.49549E+02	1.83732E+02
		38	8.4444E+00		1.0000E+00	8.96091E+02	1.93937E+02
		39	8.6667E+00		1.0000E+00	9.43874E+02	2.04418E+02
		40	8.8889E+00		1.0000E+00	9.92898E+02	2.15174E+02
		41	9.1111E+00		1.0000E+00	1.04316E+03	2.26206E+02
		42	9.3333E+00		1.0000E+00	1.09467E+03	2.37514E+02
		43	9.5556E+00		1.0000E+00	1.14742E+03	2.49098E+02
		44	9.7778E+00		1.0000E+00	1.20141E+03	2.60958E+02
		45	1.0000E+01		1.0000E+00	1.25664E+03	2.73093E+02

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

ANGULAR QUADRATURE CONSTANTS

ANGL	COSINE (MU)	WEIGHT	REFL DIRECT	WT. X COS.
1	-1.00000E+00	0.	33	-0.
2	-9.89189E-01	1.06123E-02	33	-1.04976E-02
3	-9.56022E-01	1.81144E-02	32	-1.73177E-02
4	-9.21663E-01	1.80301E-02	31	-1.66177E-02
5	-8.85972E-01	1.85440E-02	30	-1.64295E-02
6	-8.48782E-01	1.92598E-02	29	-1.63474E-02
7	-8.09885E-01	2.01315E-02	28	-1.63042E-02
8	-7.69024E-01	2.11692E-02	27	-1.62796E-02
9	-7.25866E-01	2.24037E-02	26	-1.62621E-02
10	-6.79975E-01	2.39187E-02	25	-1.62638E-02
11	-6.30753E-01	2.57805E-02	24	-1.62612E-02
12	-5.77350E-01	2.81864E-02	23	-1.62734E-02
13	-5.18476E-01	3.14179E-02	22	-1.62894E-02
14	-4.51997E-01	3.61513E-02	21	-1.63403E-02
15	-3.73878E-01	4.40387E-02	20	-1.64651E-02
16	-2.74352E-01	6.21245E-02	19	-1.70440E-02
17	-1.03695E-01	1.00117E-01	18	-1.03817E-02
18	1.03695E-01	1.00117E-01	17	1.03817E-02
19	2.74352E-01	6.21245E-02	16	1.70440E-02
20	3.73878E-01	4.40387E-02	15	1.64651E-02
21	4.51997E-01	3.61513E-02	14	1.63403E-02
22	5.18476E-01	3.14179E-02	13	1.62894E-02
23	5.77350E-01	2.81864E-02	12	1.62734E-02
24	6.30753E-01	2.57805E-02	11	1.62612E-02
25	6.79975E-01	2.39187E-02	10	1.62638E-02
26	7.25866E-01	2.24037E-02	9	1.62621E-02
27	7.69024E-01	2.11692E-02	8	1.62796E-02
28	8.09885E-01	2.01315E-02	7	1.63042E-02
29	8.48782E-01	1.92598E-02	6	1.63474E-02
30	8.85972E-01	1.85440E-02	5	1.64295E-02
31	9.21663E-01	1.80301E-02	4	1.66177E-02
32	9.56022E-01	1.81144E-02	3	1.73177E-02
33	9.89189E-01	1.06123E-02	2	1.04976E-02

CONSTANTS FOR P(3)SCATTERING

ANGL	SET 1	SET 2	SET 3
1	-1.00000E+00	1.00000E+00	-1.00000E+00
2	-9.89189E-01	9.67742E-01	-9.36007E-01
3	-9.56022E-01	8.70968E-01	-7.50426E-01
4	-9.21663E-01	7.74194E-01	-5.74800E-01
5	-8.85972E-01	6.77419E-01	-4.09643E-01
6	-8.48782E-01	5.80645E-01	-2.55547E-01
7	-8.09885E-01	4.83871E-01	-1.13210E-01
8	-7.69024E-01	3.87097E-01	1.65381E-02
9	-7.25866E-01	2.90323E-01	1.32685E-01
10	-6.79975E-01	1.93548E-01	2.33970E-01
11	-6.30753E-01	9.67742E-02	3.18768E-01
12	-5.77350E-01	-1.42109E-14	3.84900E-01
13	-5.18476E-01	-9.67742E-02	4.29276E-01
14	-4.51997E-01	-1.93548E-01	4.47137E-01
15	-3.73878E-01	-2.90323E-01	4.30161E-01

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

16	-2.74352E-01	-3.87097E-01	3.59902E-01
17	-1.03695E-01	-4.83871E-01	1.52755E-01
18	1.03695E-01	-4.83871E-01	-1.52755E-01
19	2.74352E-01	-3.87097E-01	-3.59902E-01
20	3.73878E-01	-2.50323E-01	-4.30161E-01
21	4.51997E-01	-1.93548E-01	-4.47137E-01
22	5.18476E-01	-9.67742E-02	-4.29276E-01
23	5.77350E-01	-1.42109E-14	-3.84900E-01
24	6.30753E-01	9.67742E-02	-3.18768E-01
25	6.79975E-01	1.93548E-01	-2.33970E-01
26	7.25866E-01	2.90323E-01	-1.32685E-01
27	7.69024E-01	3.87097E-01	-1.65381E-02
28	8.09885E-01	4.83871E-01	1.13210E-01
29	8.48782E-01	5.80645E-01	2.55547E-01
30	8.85972E-01	6.77419E-01	4.09643E-01
31	9.21663E-01	7.74194E-01	5.74800E-01
32	9.56022E-01	8.70968E-01	7.50426E-01
33	9.89189E-01	9.67742E-01	9.36007E-01

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

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MATERIAL COMPOSITION

MEDIA	ISOTOPE (OR MIXTURE)	FLUX WEIGHTING	P-L ORDER	DENSITY
1	FE	0	3	8.470000E-02

CROSS SECTION LOCATION ASSIGNMENTS (GIVEN MATRIX IS POSITION OF P-0 COMPONENT, OTHERS FOLLOW IN ORDER)

MATRIX	IDENTIFICATION		
1	FE	0	3
5	MEDIA	1	

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September 20, 1973

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

DISTRIBUTED SOURCE

INT.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	0.	2.17545E-02	0.	0.	0.	0.	0.	0.
	INT.	2 THRU INT.	10	SAME AS ABOVE				
11	0.	0.	0.	0.	0.	0.	0.	0.
	INT.	12 THRU INT.	45	SAME AS ABOVE				
INT.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	0.	0.	0.	0.	0.	0.	0.	0.
	INT.	2 THRU INT.	45	SAME AS ABOVE				
INT.	GRP. 17	GRP. 18	GRP. 19	GRP. 20	GRP. 21	GRP. 22	GRP. 23	GRP. 24
1	0.	0.	0.	0.	0.	0.	0.	0.
	INT.	2 THRU INT.	45	SAME AS ABOVE				
INT.	GRP. 25	GRP. 26	GRP. 27	GRP. 28	GRP. 29	GRP. 30	GRP. 31	GRP. 32
1	0.	0.	0.	0.	0.	0.	0.	0.
	INT.	2 THRU INT.	45	SAME AS ABOVE				
INT.	GRP. 33	GRP. 34	GRP. 35	GRP. 36	GRP. 37	GRP. 38	GRP. 39	GRP. 40
1	0.	0.	0.	0.	0.	0.	0.	0.
	INT.	2 THRU INT.	45	SAME AS ABOVE				
INT.	GRP. 41	GRP. 42	GRP. 43	GRP. 44	GRP. 45			
1	0.	0.	0.	0.	0.			
	INT.	2 THRU INT.	45	SAME AS ABOVE				

TAPE INPUT - ELEMENT 1 IRON 30 NEUTRON PLUS 15 GAMMA GROUPS P-3 L-DIVISION MARCH 1973

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September 20, 1973

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

1.

ENERGY DEPENDENT ARRAYS

GROUP	ENERGY	DELTA-ENER	VELOCITY	FISSION	INITIAL CALC (TO CI O)	LEFT ALBEDO	RGHT ALBEDO
1	1.8000E+01	2.3880E+00	5.6669E+09	0.	SN	0.	0.
2	1.5612E+01	2.0710E+00	5.1800E+09	0.	SN	0.	0.
3	1.3541E+01	1.7964E+00	4.9662E+09	1.0701E-04	SN	0.	0.
4	1.1745E+01	1.5581E+00	4.5779E+09	1.6901E-03	SN	0.	0.
5	1.0186E+01	1.3513E+00	4.2623E+09	3.9403E-03	SN	0.	0.
6	8.8352E+00	1.1721E+00	3.9697E+09	8.7307E-03	SN	0.	0.
7	7.6631E+00	1.0166E+00	3.6971E+09	1.3601E-02	SN	0.	0.
8	6.6465E+00	8.8170E-01	3.4432E+09	2.0002E-02	SN	0.	0.
9	5.7648E+00	7.6480E-01	3.2067E+09	2.7902E-02	SN	0.	0.
10	5.0000E+00	7.9550E-01	2.9618E+09	4.5004E-02	SN	0.	0.
11	4.2045E+00	6.6900E-01	2.7172E+09	5.6704E-02	SN	0.	0.
12	3.5355E+00	5.6250E-01	2.4920E+09	6.6305E-02	SN	0.	0.
13	2.9730E+00	4.7300E-01	2.2844E+09	7.4306E-02	SN	0.	0.
14	2.5000E+00	5.1180E-01	2.0663E+09	1.0281E-01	SN	0.	0.
15	1.9882E+00	4.0710E-01	1.8426E+09	1.0091E-01	SN	0.	0.
16	1.5811E+00	3.2370E-01	1.6432E+09	9.3107E-02	SN	0.	0.
17	1.2574E+00	2.5740E-01	1.4651E+09	8.1806E-02	SN	0.	0.
18	1.0000E+00	1.5910E-01	1.3246E+09	5.3404E-02	SN	0.	0.
19	8.4090E-01	1.3380E-01	1.2145E+09	4.6104E-02	SN	0.	0.
20	7.0710E-01	1.1250E-01	1.1135E+09	3.9103E-02	SN	0.	0.
21	5.9460E-01	9.4600E-02	1.0212E+09	3.2703E-02	SN	0.	0.
22	5.0000E-01	2.7640E-01	7.9053E+08	8.8607E-02	SN	0.	0.
23	2.2360E-01	1.2360E-01	5.2939E+08	3.0202E-02	SN	0.	0.
24	1.0000E-01	8.7300E-02	2.4936E+08	1.2501E-02	SN	0.	0.
25	1.2610E-02	1.1020E-02	8.8550E+07	4.4704E-04	SN	0.	0.
26	1.5900E-03	1.3900E-03	3.1421E+07	7.0506E-06	SN	0.	0.
27	2.0000E-04	1.7480E-04	1.1149E+07	8.7907E-08	SN	0.	0.
28	2.5200E-05	2.2020E-05	3.9594E+06	0.	SN	0.	0.
29	3.1800E-06	2.7800E-06	1.4052E+06	0.	SN	0.	0.
30	4.0000E-07	3.9990E-07	2.4829E+05	0.	SN	0.	0.
31	1.0000E-10						
31	1.0000E+01	1.8104E+00	2.9979E+10	0.	SN	0.	0.
32	8.1896E+00	1.4826E+00	2.9979E+10	0.	SN	0.	0.
33	6.7070E+00	1.2142E+00	2.9979E+10	0.	SN	0.	0.
34	5.4928E+00	9.9439E-01	2.9979E+10	0.	SN	0.	0.
35	4.4984E+00	8.1438E-01	2.9979E+10	0.	SN	0.	0.
36	3.6840E+00	6.6694E-01	2.9979E+10	0.	SN	0.	0.
37	3.0171E+00	5.4620E-01	2.9979E+10	0.	SN	0.	0.
38	2.4709E+00	4.4732E-01	2.9979E+10	0.	SN	0.	0.
39	2.0236E+00	3.6634E-01	2.9979E+10	0.	SN	0.	0.
40	1.6572E+00	3.0002E-01	2.9979E+10	0.	SN	0.	0.
41	1.3572E+00	2.4571E-01	2.9979E+10	0.	SN	0.	0.
42	1.1115E+00	2.0122E-01	2.9979E+10	0.	SN	0.	0.
43	9.1028E-01	1.6479E-01	2.9979E+10	0.	SN	0.	0.
44	7.4549E-01	1.3496E-01	2.9979E+10	0.	SN	0.	0.

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

45	6.1053E-01	1.1053E-01	2.9979E+10	0.	SN	0.	0.
	5.0000E-01						

TIME REQUIRED FOR INPUT = 3.483E-01 MIN.

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September 20, 1973

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

EXAMPLE PROBLEM TWO

OUTER ITERATION NUMBER	NO. OF INNER ITERATIONS	BALANCE	UPSCATTER RATIO	EIGENVALUE	LAMBDA-1 (SOURCE RATIO)	LAMBDA-2 (SCATTER RATIO)	TIME MINUTES
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FINAL OUTER ITERATION:

GROUP	2	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 2.97E-07 OCCURED AT INTERVAL 45			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 8.50E-06 AT ANGLE 24					
GROUP	3	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.89E-07 OCCURED AT INTERVAL 30			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 2.65E-06 AT ANGLE 18					
GROUP	4	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 1.15E-06 OCCURED AT INTERVAL 45			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 7.02E-06 AT ANGLE 18					
GROUP	5	REQUIRED 12 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.00E-07 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 2.40E-06 AT ANGLE 18					
GROUP	6	REQUIRED 12 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.65E-07 OCCURED AT INTERVAL 31			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.55E-06 AT ANGLE 18					
GROUP	7	REQUIRED 12 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.59E-07 OCCURED AT INTERVAL 45			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.62E-06 AT ANGLE 18					
GROUP	8	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.76E-06 OCCURED AT INTERVAL 45			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 9.61E-06 AT ANGLE 18					
GROUP	9	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.04E-06 OCCURED AT INTERVAL 28			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 4.74E-06 AT ANGLE 30					
GROUP	10	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 2.56E-06 OCCURED AT INTERVAL 29			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 4.82E-06 AT ANGLE 30					
GROUP	11	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 1.95E-06 OCCURED AT INTERVAL 29			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.66E-06 AT ANGLE 31					
GROUP	12	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 2.19E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.29E-06 AT ANGLE 31					
GROUP	13	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.63E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 4.43E-06 AT ANGLE 31					
GROUP	14	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 2.52E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 2.52E-06 AT ANGLE 1					
GROUP	15	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 4.44E-06 OCCURED AT INTERVAL 2			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 4.45E-06 AT ANGLE 17					
GROUP	16	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 9.34E-06 OCCURED AT INTERVAL 2			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 9.34E-06 AT ANGLE 17					
GROUP	17	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.96E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.97E-06 AT ANGLE 17					
GROUP	18	REQUIRED 11 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.54E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 5.55E-06 AT ANGLE 17					
GROUP	19	REQUIRED 14 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 8.94E-06 OCCURED AT INTERVAL 17			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 6.16E-06 AT ANGLE 25					
GROUP	20	REQUIRED 12 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.67E-06 OCCURED AT INTERVAL 2			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.66E-06 AT ANGLE 17					
GROUP	21	REQUIRED 13 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 5.60E-06 OCCURED AT INTERVAL 17			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 9.44E-06 AT ANGLE 33					
GROUP	22	REQUIRED 16 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 3.82E-06 OCCURED AT INTERVAL 16			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 5.43E-06 AT ANGLE 33					
GROUP	23	REQUIRED 18 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.51E-06 OCCURED AT INTERVAL 2			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 7.50E-06 AT ANGLE 17					
GROUP	24	REQUIRED 38 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 7.61E-06 OCCURED AT INTERVAL 16			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 3.52E-06 AT ANGLE 27					
GROUP	25	REQUIRED 39 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 9.69E-06 OCCURED AT INTERVAL 2			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 9.69E-06 AT ANGLE 17					
GROUP	26	REQUIRED 39 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 9.37E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 9.37E-06 AT ANGLE 17					
GROUP	27	REQUIRED 44 ITERATIONS	--	A MAXIMUM FLUX DEVIATION OF 6.30E-06 OCCURED AT INTERVAL 1			
		MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS 6.33E-06 AT ANGLE 17					

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

GROUP	26	REQUIRED	38	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	9.79E-06	OCCURED AT	INTERVAL	1
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		9.84E-06	AT	ANGLE	17
GROUP	29	REQUIRED	39	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	8.81E-06	OCCURED AT	INTERVAL	1
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		8.82E-06	AT	ANGLE	17
GROUP	30	REQUIRED	16	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	3.26E-06	OCCURED AT	INTERVAL	38
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		5.59E-06	AT	ANGLE	18
GROUP	31	REQUIRED	6	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	4.41E-08	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		3.30E-07	AT	ANGLE	18
GROUP	32	REQUIRED	5	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	8.96E-08	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		6.95E-07	AT	ANGLE	18
GROUP	33	REQUIRED	5	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	1.95E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		1.56E-06	AT	ANGLE	18
GROUP	34	REQUIRED	5	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	3.89E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		3.23E-06	AT	ANGLE	18
GROUP	35	REQUIRED	5	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	7.41E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		6.27E-06	AT	ANGLE	18
GROUP	36	REQUIRED	7	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	4.42E-08	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		3.58E-07	AT	ANGLE	18
GROUP	37	REQUIRED	7	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	9.98E-08	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		8.03E-07	AT	ANGLE	18
GROUP	38	REQUIRED	7	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	2.05E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		1.71E-06	AT	ANGLE	18
GROUP	39	REQUIRED	7	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	3.43E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		3.20E-06	AT	ANGLE	18
GROUP	40	REQUIRED	7	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	6.71E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		6.01E-06	AT	ANGLE	18
GROUP	41	REQUIRED	7	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	1.14E-06	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		9.69E-06	AT	ANGLE	18
GROUP	42	REQUIRED	8	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	2.01E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		1.17E-06	AT	ANGLE	18
GROUP	43	REQUIRED	8	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	2.71E-07	OCCURED AT	INTERVAL	45
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		1.27E-06	AT	ANGLE	18
GROUP	44	REQUIRED	8	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	3.68E-07	OCCURED AT	INTERVAL	44
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		2.78E-06	AT	ANGLE	18
GROUP	45	REQUIRED	8	ITERATIONS	--	A MAXIMUM FLUX DEVIATION	OF	4.84E-07	OCCURED AT	INTERVAL	44
						MAXIMUM ANGULAR FLUX DEVIATION ON OUTER BOUNDARIES WAS		3.64E-06	AT	ANGLE	33
1	611			1.00000E+00	0.			0.		1.00000E+00	0.
											6.50852E-01

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OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

SCALAR FLUX (AVERAGED OVER SPACIAL INTERVALS) --- PARTICLES / CM**2-MEV

INT.	GRP. 1	GRP. 2	GRP. 3	GRP. 4	GRP. 5	GRP. 6	GRP. 7	GRP. 8
1	0.	1.97736E-02	6.31173E-04	1.58578E-04	2.25096E-04	2.92070E-04	3.76957E-04	5.04308E-04
2	0.	1.98903E-02	6.34401E-04	1.59179E-04	2.25939E-04	2.93144E-04	3.78293E-04	5.06058E-04
3	0.	1.96743E-02	6.25546E-04	1.56956E-04	2.22751E-04	2.89010E-04	3.72955E-04	4.98953E-04
4	0.	1.92787E-02	6.10638E-04	1.53234E-04	2.17419E-04	2.82100E-04	3.64042E-04	4.87092E-04
5	0.	1.87143E-02	5.89695E-04	1.48019E-04	2.09950E-04	2.72426E-04	3.51570E-04	4.70500E-04
6	0.	1.79515E-02	5.63326E-04	1.41456E-04	2.00544E-04	2.60246E-04	3.35873E-04	4.49627E-04
7	0.	1.70017E-02	5.31406E-04	1.33514E-04	1.89158E-04	2.45506E-04	3.16885E-04	4.24390E-04
8	0.	1.57245E-02	4.93881E-04	1.24186E-04	1.75772E-04	2.28186E-04	2.94581E-04	3.94769E-04
9	0.	1.41504E-02	4.50725E-04	1.13457E-04	1.60363E-04	2.08256E-04	2.68931E-04	3.60735E-04
10	0.	1.15348E-02	4.01096E-04	1.01157E-04	1.42666E-04	1.85386E-04	2.39520E-04	3.21767E-04
11	0.	7.43786E-03	3.49377E-04	8.84102E-05	1.24318E-04	1.61680E-04	2.09043E-04	2.81405E-04
12	0.	5.59965E-03	3.05357E-04	7.74986E-05	1.08651E-04	1.41418E-04	1.82967E-04	2.46803E-04
13	0.	4.48729E-03	2.69821E-04	6.86129E-05	9.59349E-05	1.24951E-04	1.61748E-04	2.18568E-04
14	0.	3.61208E-03	2.39617E-04	6.10523E-05	8.51412E-05	1.10962E-04	1.43706E-04	1.94517E-04
15	0.	2.92949E-03	2.13949E-04	5.46198E-05	7.59797E-05	9.90784E-05	1.28367E-04	1.74030E-04
16	0.	2.47093E-03	1.91997E-04	4.91105E-05	6.81534E-05	8.89182E-05	1.15242E-04	1.56469E-04
17	0.	2.08136E-03	1.73084E-04	4.43492E-05	6.14056E-05	8.01515E-05	1.03909E-04	1.41279E-04
18	0.	1.77438E-03	1.56585E-04	4.01894E-05	5.55234E-05	7.25045E-05	9.40177E-05	1.28001E-04
19	0.	1.52664E-03	1.42161E-04	3.65448E-05	5.03816E-05	6.58157E-05	8.53609E-05	1.16362E-04
20	0.	1.32374E-03	1.29452E-04	3.33273E-05	4.58524E-05	5.99201E-05	7.77269E-05	1.06082E-04
21	0.	1.15555E-03	1.18206E-04	3.04740E-05	4.18447E-05	5.47006E-05	7.09652E-05	9.69635E-05
22	0.	1.01468E-03	1.08199E-04	2.79300E-05	3.82791E-05	5.00544E-05	6.49435E-05	8.88316E-05
23	0.	8.95589E-04	9.92567E-05	2.56520E-05	3.50932E-05	4.59010E-05	5.95584E-05	8.15494E-05
24	0.	7.94273E-04	9.12318E-05	2.36036E-05	3.22344E-05	4.21722E-05	5.47223E-05	7.50003E-05
25	0.	7.07453E-04	8.40026E-05	2.17547E-05	2.96594E-05	3.88122E-05	5.03530E-05	6.90902E-05
26	0.	6.32648E-04	7.74654E-05	2.00796E-05	2.73313E-05	3.57731E-05	4.64190E-05	6.37360E-05
27	0.	5.67212E-04	7.15332E-05	1.85567E-05	2.52192E-05	3.30149E-05	4.28386E-05	5.88695E-05
28	0.	5.10317E-04	6.61338E-05	1.71681E-05	2.32972E-05	3.05041E-05	3.95785E-05	5.44331E-05
29	0.	4.60402E-04	6.12049E-05	1.58981E-05	2.15430E-05	2.82118E-05	3.66016E-05	5.03774E-05
30	0.	4.16369E-04	5.66919E-05	1.47334E-05	1.99373E-05	2.61128E-05	3.38753E-05	4.66588E-05
31	0.	3.77308E-04	5.25483E-05	1.36621E-05	1.84636E-05	2.41858E-05	3.13719E-05	4.32404E-05
32	0.	3.42877E-04	4.87320E-05	1.26740E-05	1.71068E-05	2.24112E-05	2.90663E-05	4.00888E-05
33	0.	3.10772E-04	4.52069E-05	1.17600E-05	1.58543E-05	2.07726E-05	2.69370E-05	3.71753E-05
34	0.	2.83002E-04	4.19473E-05	1.09132E-05	1.46964E-05	1.92574E-05	2.49678E-05	3.44780E-05
35	0.	2.58413E-04	3.89276E-05	1.01272E-05	1.36236E-05	1.78532E-05	2.31426E-05	3.19753E-05
36	0.	2.36209E-04	3.61201E-05	9.39514E-06	1.26264E-05	1.65477E-05	2.14455E-05	2.96458E-05
37	0.	2.16073E-04	3.35021E-05	8.71126E-06	1.16967E-05	1.53303E-05	1.98625E-05	2.74710E-05
38	0.	1.97770E-04	3.10544E-05	8.07061E-06	1.08274E-05	1.41917E-05	1.83818E-05	2.54345E-05
39	0.	1.81179E-04	2.87594E-05	7.46862E-06	1.00121E-05	1.31236E-05	1.69922E-05	2.35212E-05
40	0.	1.66004E-04	2.66004E-05	6.90088E-06	9.24453E-06	1.21177E-05	1.56830E-05	2.17166E-05
41	0.	1.52144E-04	2.45626E-05	6.36324E-06	8.51892E-06	1.11664E-05	1.44439E-05	2.00063E-05
42	0.	1.39497E-04	2.26315E-05	5.85150E-06	7.82939E-06	1.02618E-05	1.32644E-05	1.83754E-05
43	0.	1.27899E-04	2.07910E-05	5.36030E-06	7.16234E-06	9.39370E-06	1.21299E-05	1.68027E-05
44	0.	1.17369E-04	1.90289E-05	4.88614E-06	6.53111E-06	8.55592E-06	1.10326E-05	1.52774E-05
45	0.	1.07965E-04	1.72721E-05	4.39445E-06	5.86914E-06	7.67973E-06	9.87000E-06	1.36409E-05
INT.	GRP. 9	GRP. 10	GRP. 11	GRP. 12	GRP. 13	GRP. 14	GRP. 15	GRP. 16
1	6.91818E-04	9.54940E-04	1.35334E-03	1.88786E-03	2.51300E-03	2.79558E-03	2.63513E-03	3.94363E-03
2	6.94178E-04	9.58002E-04	1.35738E-03	1.89338E-03	2.51983E-03	2.80285E-03	2.64130E-03	3.95305E-03
3	6.84495E-04	9.44672E-04	1.33865E-03	1.86782E-03	2.48653E-03	2.76771E-03	2.61071E-03	3.90691E-03
4	6.66330E-04	9.22440E-04	1.30746E-03	1.82528E-03	2.43120E-03	2.70935E-03	2.56004E-03	3.83035E-03
5	6.45722E-04	8.91369E-04	1.26390E-03	1.76592E-03	2.35408E-03	2.62810E-03	2.48964E-03	3.72381E-03
6	6.17290E-04	8.52304E-04	1.20919E-03	1.69142E-03	2.25743E-03	2.52649E-03	2.40188E-03	3.59069E-03
7	5.82933E-04	8.05124E-04	1.14318E-03	1.60168E-03	2.14119E-03	2.40461E-03	2.29703E-03	3.43125E-03
8	5.42639E-04	7.49830E-04	1.06592E-03	1.49688E-03	2.00574E-03	2.26316E-03	2.17607E-03	3.24657E-03

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OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

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EXAMPLE PROBLEM TWO

BALANCE TABLE FOR ZONE 1 (EXCEPT WHERE INDICATED, RESULTS ARE INTEGRATED OVER ENERGY AND VOLUME)
(SEE CROSS SECTION LOCATION ASSIGNMENTS TO IDENTIFY ISOTOPES WITH MATERIAL MATRIX NUMBERS)

SOURCES

GROUP	FIXED	FISSION	GAMMA PRODUCTION	IN-SCATTERING	SELF-SCATTER	TOTAL
1	0.	0.	0.	0.	0.	0.
2	1.0000E+00	0.	0.	0.	5.2166E-01	1.0000E+00
3	0.	0.	0.	8.4431E-02	4.8267E-02	8.4431E-02
FROM INDICATED GROUP/MATERIAL			2	1	8.4431E-02	
4	0.	0.	0.	1.8955E-02	1.2448E-02	1.8955E-02
FROM INDICATED GROUP/MATERIAL			2	1	1.5786E-02	
5	0.	0.	0.	3.1688E-03	1.6554E-02	2.2662E-02
FROM INDICATED GROUP/MATERIAL			3	1	2.2662E-02	
6	0.	0.	0.	2.0108E-02	1.9619E-02	2.5957E-02
FROM INDICATED GROUP/MATERIAL			2	1	1.4110E-03	
7	0.	0.	0.	1.1422E-03	2.3860E-02	2.9583E-02
FROM INDICATED GROUP/MATERIAL			4	1	2.5957E-02	
8	0.	0.	0.	2.2344E-02	3.0191E-02	3.4725E-02
FROM INDICATED GROUP/MATERIAL			3	1	1.6746E-03	
9	0.	0.	0.	3.4077E-04	3.7605E-02	4.1835E-02
FROM INDICATED GROUP/MATERIAL			4	1	1.5974E-03	
10	0.	0.	0.	1.5974E-03	5.3940E-02	6.0836E-02
FROM INDICATED GROUP/MATERIAL			5	1	2.9583E-02	
11	0.	0.	0.	2.4695E-02	6.4244E-02	7.3968E-02
FROM INDICATED GROUP/MATERIAL			3	1	1.8854E-03	
			4	1	4.1170E-04	
			5	1	4.7060E-04	
			6	1	2.1196E-03	
			7	1	3.4725E-02	
			2	1	2.7867E-02	
			3	1	2.1306E-03	
			4	1	4.8045E-04	
			5	1	5.4611E-04	
			6	1	6.9626E-04	
			7	1	3.0047E-03	
			2	1	4.1835E-02	
			3	1	3.2121E-02	
			4	1	2.4323E-03	
			5	1	5.4768E-04	
			6	1	6.4809E-04	
			7	1	7.2274E-04	
			8	1	1.1188E-03	
			9	1	4.2445E-03	
			2	1	6.0836E-02	
			3	1	4.4812E-02	
			4	1	3.4029E-03	
			5	1	7.5851E-04	
			6	1	9.1073E-04	
			7	1	1.0579E-03	
			8	1	1.1955E-03	
			9	1	2.1536E-03	
			2	1	6.5458E-03	
			3	1	7.3968E-02	
			4	1	5.0561E-02	
			5	1	3.8167E-03	
			6	1	8.4353E-04	
			7	1	1.0227E-03	

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OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

24 0. 0. C.
FROM INDICATED GROUP/MATERIAL

12 1 4.5210E-04
13 1 1.5513E-04
14 1 3.5081E-04
17 1 1.3005E-02
18 1 4.6009E-03
22 1 2.7024E-02

5.1796E-01 3.9981E-02

2 1 1.3581E-02
3 1 1.2897E-03
4 1 1.8761E-05
5 1 3.2065E-05
6 1 3.8998E-05
7 1 4.8681E-05
8 1 5.8397E-05
9 1 7.3178E-05
10 1 1.0111E-04
11 1 1.3577E-04
12 1 9.9601E-05
13 1 3.1497E-05
14 1 1.8693E-03
15 1 1.2798E-04
18 1 4.9438E-03
23 1 1.7531E-02

7.8070E-02 5.8705E-03

25 0. 0. C.
FROM INDICATED GROUP/MATERIAL

2 1 1.3756E-05
3 1 1.0298E-05
4 1 4.4328E-07
5 1 1.3443E-08
6 1 1.5989E-08
7 1 2.1275E-08
8 1 2.6989E-08
9 1 3.2895E-08
10 1 4.4918E-08
11 1 5.6268E-08
12 1 4.1096E-08
13 1 1.2841E-08
14 1 1.2596E-05
15 1 3.2398E-06
18 1 8.1517E-06
24 1 5.8218E-03

1.9812E-02 1.3707E-03

26 0. 0. C.
FROM INDICATED GROUP/MATERIAL

18 1 5.5210E-08
25 1 1.3707E-03

6.8155E-03 3.9898E-04

27 0. 0. C.
FROM INDICATED GROUP/MATERIAL

18 1 1.3827E-09
26 1 3.9898E-04

1.8553E-03 1.2074E-04

28 0. 0. C.
FROM INDICATED GROUP/MATERIAL

18 1 5.4325E-11
27 1 1.2074E-04

3.6684E-04 3.2382E-05

29 0. 0. C.
FROM INDICATED GROUP/MATERIAL

18 1 2.3932E-12
28 1 3.2382E-05

2.7201E-05 6.4191E-06

30 0. 0. C.
FROM INDICATED GROUP/MATERIAL

18 1 1.1182E-13
29 1 6.4191E-06

6.1585E-04 2.9471E-02

31 0. 0. C.
FROM INDICATED GROUP/MATERIAL

2 1 2.9471E-02
3 1 2.6820E-02
4 1 1.9373E-03
5 1 2.8386E-04
5 1 1.7113E-04

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OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

6	1	5.4836E-05
7	1	3.2639E-07
8	1	4.6924E-07
9	1	6.1307E-07
10	1	9.1032E-07
11	1	4.8875E-06
12	1	1.2003E-05
13	1	5.8051E-06
14	1	3.5928E-06
15	1	3.9740E-06
16	1	5.5467E-06
17	1	7.1076E-06
18	1	6.9419E-06
19	1	8.2163E-06
20	1	1.0598E-05
21	1	7.5694E-06
22	1	3.1532E-05
23	1	1.9400E-05
24	1	6.0075E-05
25	1	9.0629E-06
26	1	2.8722E-06
27	1	1.3214E-06
28	1	8.3059E-07
29	1	4.5608E-07
30	1	1.8644E-07

32 0. 0.
FROM INDICATED GROUP/MATERIAL

2	1	5.8440E-02
3	1	4.9891E-02
4	1	3.6551E-03
5	1	5.5738E-04
6	1	3.6390E-04
7	1	1.5949E-04
8	1	5.8141E-05
9	1	3.8456E-05
10	1	1.1210E-05
11	1	1.6646E-05
12	1	8.9369E-05
13	1	2.1947E-04
14	1	1.0615E-04
15	1	6.5695E-05
16	1	7.2666E-05
17	1	1.0142E-04
18	1	1.2996E-04
19	1	1.2693E-04
20	1	1.5207E-04
21	1	1.9379E-04
22	1	1.3841E-04
23	1	5.7656E-04
24	1	3.5474E-04
25	1	1.0985E-03
26	1	1.6572E-04
27	1	5.2519E-05
28	1	2.4163E-05
29	1	1.5188E-05
30	1	8.3396E-06
31	1	3.4092E-06
32	1	7.7112E-02

33 0. 0.
FROM INDICATED GROUP/MATERIAL

2	1	6.7897E-02
3	1	5.2345E-03
4	1	9.0524E-04
5	1	7.1576E-04

31	1	1.0920E-03	1.5194E-03	5.9538E-02
32	1	1.0920E-03		

31	1	3.6232E-03	2.4816E-03	8.0735E-02
32	1	9.3388E-04		
33	1	2.6893E-03		

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

6	1	5.1775E-03	35	1	5.2867E-03
7	1	5.2678E-03	36	1	7.8039E-03
8	1	5.7715E-03	37	1	1.1849E-02
9	1	6.5454E-03	38	1	1.4905E-02
10	1	1.1503E-02	39	1	1.4372E-02
11	1	3.5955E-03	40	1	2.2585E-02
			41	1	3.9297E-02
			42	1	5.9033E-02
			43	1	1.5031E-01
					7.0788E-01

1.5411E-01 9.8164E-01

45 0. 0.
FROM INDICATED GROUP/MATERIAL

2	1	2.7376E-01
3	1	2.0667E-01
4	1	1.9386E-02
5	1	4.7070E-03
6	1	5.1292E-03
7	1	5.1777E-03
8	1	5.2679E-03
9	1	5.7716E-03
10	1	6.5455E-03
11	1	1.1503E-02
		3.5956E-03

31	1	2.4449E-02
32	1	4.1352E-02
33	1	4.6710E-02
34	1	4.7006E-02
35	1	4.6680E-02
36	1	4.5756E-02
37	1	4.4402E-02
38	1	3.4879E-02
39	1	2.2664E-02
40	1	2.3761E-02
41	1	3.4108E-02
42	1	4.7860E-02
43	1	1.1340E-01
44	1	1.3486E-01
		3.4843E+00

SUM 1.0000E+00 0. 2.7901E+00

4.1914E+00 7.2745E+00

LOSSES

GROUP	SEC GAMMA PROD	OUT-SCATTER	TIME ABSORB	BUCKLING ABS	ABSORPTION	LEFT LEAKAGE	RIGT LEAKAGE	TOTAL
1	0.	0.	0.	0.	0.	0.	0.	0.
2	1.9180E+00	8.3984E-01	0.	0.	-2.0190E+00	0.	2.6811E-01	1.0069E+00
3	1.7986E-01	5.2731E-02	0.	0.	-1.7983E-01	0.	3.0878E-02	8.3639E-02
4	4.3657E-02	1.1373E-02	0.	0.	-4.2632E-02	0.	6.4078E-03	1.8807E-02
5	4.7567E-02	1.4085E-02	0.	0.	-4.6566E-02	0.	7.3870E-03	2.2473E-02
6	4.8008E-02	1.6531E-02	0.	0.	-4.7092E-02	0.	8.3009E-03	2.5748E-02
7	4.7544E-02	1.9457E-02	0.	0.	-4.6730E-02	0.	9.0810E-03	2.9351E-02
8	4.8022E-02	2.3035E-02	0.	0.	-4.7292E-02	0.	1.0700E-02	3.4464E-02
9	5.0425E-02	2.7841E-02	0.	0.	-4.9805E-02	0.	1.3073E-02	4.1534E-02
10	6.8376E-02	4.1425E-02	0.	0.	-6.7750E-02	0.	1.8365E-02	6.0416E-02
11	5.2301E-02	5.0723E-02	0.	0.	-5.1700E-02	0.	2.2170E-02	7.3494E-02
12	3.6342E-02	5.7056E-02	0.	0.	-3.5667E-02	0.	2.8942E-02	8.6674E-02
13	4.5758E-02	6.3299E-02	0.	0.	-4.5330E-02	0.	3.4985E-02	9.8712E-02
14	5.5008E-02	7.5992E-02	0.	0.	-5.4772E-02	0.	5.1259E-02	1.2749E-01
15	4.7558E-02	6.3356E-02	0.	0.	-4.7458E-02	0.	4.6704E-02	1.1016E-01
16	4.6462E-02	6.4918E-02	0.	0.	-4.6340E-02	0.	5.4064E-02	1.1912E-01
17	3.8603E-02	5.7443E-02	0.	0.	-3.8414E-02	0.	5.5877E-02	1.1351E-01
18	1.0052E-02	3.4179E-02	0.	0.	-9.8640E-03	0.	4.6853E-02	8.1220E-02
19	3.5999E-04	3.7045E-02	0.	0.	-1.3070E-04	0.	4.0437E-02	7.7712E-02
20	4.5876E-04	2.4766E-02	0.	0.	-1.6232E-04	0.	6.0759E-02	8.5821E-02
21	3.2766E-04	3.2055E-02	0.	0.	-1.1324E-04	0.	3.4796E-02	6.7065E-02
22	1.3649E-03	2.7024E-02	0.	0.	-4.4834E-04	0.	1.3456E-01	1.6250E-01
23	8.3980E-04	1.7531E-02	0.	0.	-2.6242E-04	0.	6.5911E-02	8.4020E-02
24	2.6005E-03	5.8218E-03	0.	0.	-7.8659E-04	0.	3.2218E-02	3.9854E-02
25	3.9231E-04	1.3707E-03	0.	0.	-1.1745E-04	0.	4.2249E-03	5.8704E-03
26	1.2433E-04	3.9898E-04	0.	0.	-3.7161E-05	0.	8.8458E-04	1.3707E-03
27	5.7202E-05	1.2074E-04	0.	0.	-1.7110E-05	0.	2.3815E-04	3.9898E-04
28	3.5954E-05	3.2382E-05	0.	0.	-1.0747E-05	0.	6.3151E-05	1.2074E-04
29	1.9743E-05	6.4191E-06	0.	0.	-5.9084E-06	0.	1.2129E-05	3.2382E-05

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

30	8.0707E-06	0.	0.	0.	-2.4118E-06	0.	7.6017E-07	6.4191E-06
31	0.	3.3795E-02	0.	0.	-9.6686E-03	0.	5.0928E-03	2.9220E-02
32	0.	6.2678E-02	0.	0.	-1.4361E-02	0.	1.0753E-02	5.9071E-02
33	0.	7.8714E-02	0.	0.	-1.3023E-02	0.	1.4407E-02	8.0098E-02
34	0.	8.9574E-02	0.	0.	-8.4007E-03	0.	1.7330E-02	9.8503E-02
35	0.	1.0543E-01	0.	0.	-2.5790E-05	0.	2.2078E-02	1.2800E-01
36	0.	1.2513E-01	0.	0.	1.2152E-02	0.	2.7329E-02	1.6461E-01
37	0.	1.5203E-01	0.	0.	3.1796E-02	0.	3.3496E-02	2.1732E-01
38	0.	1.5286E-01	0.	0.	5.1051E-02	0.	3.4882E-02	2.3880E-01
39	0.	1.1809E-01	0.	0.	5.4325E-02	0.	2.9954E-02	2.0237E-01
40	0.	1.4221E-01	0.	0.	8.8220E-02	0.	3.3736E-02	2.6416E-01
41	0.	1.8193E-01	0.	0.	1.4566E-01	0.	4.0293E-02	3.6788E-01
42	0.	1.8335E-01	0.	0.	1.9361E-01	0.	4.1541E-02	4.1850E-01
43	0.	2.6371E-01	0.	0.	4.1288E-01	0.	6.6895E-02	7.4349E-01
44	0.	1.3486E-01	0.	0.	4.1961E-01	0.	5.0820E-02	6.0529E-01
45	0.	0.	0.	0.	9.1124E-01	0.	6.8458E-02	9.7970E-01
SUM	2.7901E+00	3.4843E+00	0.	0.	-6.0328E-01	0.	1.5843E+00	7.2555E+00

SUMMARY

GROUP	BALANCE 1-LOSS/SOURCE	REACTIONS PER CC.	TOTAL REACTIONS	FISS NEUTRON PRODUCTION	TOTAL FLUX PART.-CM	AVE. FLUX P/CM**2-MEV
1	0.	0.	0.	0.	0.	0.
2	-6.9282E-03	3.0092E-04	1.2605E+00	0.	5.6727E+00	6.5392E-04
3	9.3774E-03	2.4119E-05	1.0103E-01	0.	4.3459E-01	5.7755E-05
4	7.8097E-03	5.9317E-06	2.4846E-02	0.	9.7067E-02	1.4873E-05
5	8.3209E-03	7.5536E-06	3.1640E-02	0.	1.1506E-01	2.0328E-05
6	8.0722E-03	8.8489E-06	3.7066E-02	0.	1.3046E-01	2.6572E-05
7	7.8282E-03	1.0535E-05	4.4130E-02	0.	1.4657E-01	3.4419E-05
8	7.5254E-03	1.2481E-05	5.3955E-02	0.	1.7403E-01	4.7121E-05
9	7.2060E-03	1.5772E-05	6.6066E-02	0.	2.1268E-01	6.6388E-05
10	6.9073E-03	2.2916E-05	9.5991E-02	0.	3.0864E-01	9.2623E-05
11	6.4100E-03	2.7590E-05	1.1557E-01	0.	3.8041E-01	1.3575E-04
12	5.8438E-03	3.3308E-05	1.3952E-01	0.	4.8224E-01	2.0467E-04
13	5.2255E-03	4.0026E-05	1.6766E-01	0.	5.8000E-01	2.9274E-04
14	4.0193E-03	5.0118E-05	2.0993E-01	0.	8.0673E-01	3.7631E-04
15	2.5422E-03	4.5632E-05	1.9114E-01	0.	7.2110E-01	4.2287E-04
16	3.2971E-03	5.3462E-05	2.2394E-01	0.	8.4219E-01	6.2113E-04
17	3.7871E-03	4.5754E-05	1.9165E-01	0.	8.2700E-01	7.6703E-04
18	3.6776E-03	3.3289E-05	1.3944E-01	0.	6.5212E-01	9.7852E-04
19	3.4366E-03	5.1391E-05	2.1526E-01	0.	6.7047E-01	1.1963E-03
20	2.7474E-03	3.8848E-05	1.6272E-01	0.	8.1358E-01	1.7265E-03
21	3.1384E-03	3.8711E-05	1.6215E-01	0.	5.6158E-01	1.4172E-03
22	4.4782E-03	1.4455E-04	6.0549E-01	0.	2.1791E+00	1.8821E-03
23	3.8718E-03	9.2402E-05	3.8705E-01	0.	1.1881E+00	2.2949E-03
24	3.1854E-03	1.2548E-04	5.2559E-01	0.	8.6831E-01	2.3721E-03
25	2.2069E-05	1.9031E-05	7.5716E-02	0.	1.1658E-01	2.5255E-03
26	-4.7115E-07	4.8459E-06	2.0298E-02	0.	2.6068E-02	4.4772E-03
27	3.6067E-07	1.6655E-06	6.9763E-03	0.	7.7488E-03	1.0583E-02
28	3.3040E-12	4.5666E-07	1.9129E-03	0.	2.0887E-03	2.2645E-02
29	5.0069E-08	9.2411E-08	3.8709E-04	0.	4.1165E-04	3.5351E-02
30	-8.0046E-08	7.8448E-09	3.2860E-05	0.	2.9753E-05	1.7762E-02
31	8.5337E-03	5.9069E-06	2.4743E-02	0.	1.0638E-01	1.4029E-05
32	7.8580E-03	1.1898E-05	4.9837E-02	0.	2.1513E-01	3.4640E-05
33	7.8862E-03	1.6275E-05	6.8173E-02	0.	2.8802E-01	5.6629E-05
34	7.5150E-03	2.0243E-05	8.4793E-02	0.	3.4440E-01	8.2684E-05
35	6.9117E-03	2.6612E-05	1.1147E-01	0.	4.3463E-01	1.2741E-04
36	6.0573E-03	3.4764E-05	1.4562E-01	0.	5.3378E-01	1.9107E-04

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September 20, 1973

OUTPJT FROM EXAMPLE PROBLEM TWO (Cont.)

37	6.0602E-03	4.6936E-05	1.9650E-C1	0.	6.7191E-01	2.9368E-04
38	5.5609E-03	5.2521E-C5	2.2000E-C1	0.	6.9450E-01	3.7065E-04
39	3.5737E-03	4.4800E-05	1.8756E-C1	0.	5.4077E-01	3.5240E-04
40	4.5014E-03	6.0459E-05	2.5325E-C1	0.	6.6588E-01	5.2986E-04
41	4.7541E-03	8.6811E-05	3.6353E-C1	0.	8.6585E-01	8.4126E-04
42	4.3723E-03	1.0097E-04	4.2295E-C1	0.	9.1037E-01	1.0801E-03
43	2.5598E-03	1.8345E-04	7.6842E-C1	0.	1.5002E+00	2.1733E-03
44	3.1516E-03	1.5241E-04	6.3841E-C1	0.	1.1338E+00	2.0057E-03
45	1.9743E-03	2.5434E-04	1.0654E+00	0.	1.7249E+00	3.7256E-03
SUM	2.6027E-03	2.3545E-03	9.8626E+00	0.	2.9648E+01	

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September 20, 1973

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

1

EXAMPLE PROBLEM TWO

SOURCE DESCRIPTION FOR MORSE-L PROBLEM INPUT

(TOTAL SOURCE NORMALIZATION, BIAS, AND TIME DESCRIPTION WILL HAVE TO BE PROVIDED BY USER)

INTERVAL NUMBER 1

NUMBER BORN IN THIS INTERVAL = 3.00918E-01

RELATIVE IMPORTANCE = 1.00000E+00

POSITION DEFINITION

SPHERE-SURFACE

POINT AT CENTER X= 0. Y= 0. Z= C.

CUTTER RADIUS = 1.0000E+01

ENERGY DEFINITION

SINGLE GROUP ONLY - GROUP 2

TIME DEFINITION

INPUT DISTRIBUTION - DEFINED BY FOLLOWING (TIME, SOURCE/SEC) POINTS

0.0 1.000E+00 1.000E+00 1.000E+00

ANGULAR DESCRIPTION

DEFINED BY INPUT DISTRIBUTION -- REFERENCE VECTOR U=-2.000E+00 V= 0. W= 0.

PAIRS OF DEFINING POINTS OF COSINE, SOURCE/STERADIAN

1.000E+00	1.278E-03	9.929E-01	1.000E-03	9.840E-01	7.367E-04	9.752E-01	5.333E-04
9.678E-01	3.968E-04	9.603E-01	2.373E-04	9.558E-01	2.347E-04	9.481E-01	1.805E-04
9.409E-01	1.426E-04	9.332E-01	1.125E-04	9.251E-01	8.942E-05	9.178E-01	7.489E-05
9.088E-01	6.298E-05	8.980E-01	5.380E-05	8.671E-01	3.663E-05	8.477E-01	2.874E-05
8.271E-01	2.231E-05	8.016E-01	1.525E-05	7.785E-01	1.191E-05	7.543E-01	8.262E-06
7.354E-01	5.961E-06	7.181E-01	4.241E-06	7.026E-01	2.989E-06	6.891E-01	2.110E-06
6.800E-01	1.625E-06	6.684E-01	1.225E-06	6.566E-01	9.138E-07	6.423E-01	6.116E-07
6.301E-01	3.784E-07	6.179E-01	4.202E-08	2.680E-08	C.	-1.000E+00	0.

INTERVAL NUMBER 2

NUMBER BORN IN THIS INTERVAL = 3.20396E-02

RELATIVE IMPORTANCE = 1.00000E+00

POSITION DEFINITION

SPHERE-SURFACE

POINT AT CENTER X= 0. Y= 0. Z= C.

CUTTER RADIUS = 1.0000E+01

ENERGY DEFINITION

SINGLE GROUP ONLY - GROUP 3

TIME DEFINITION

INPUT DISTRIBUTION - DEFINED BY FOLLOWING (TIME, SOURCE/SEC) POINTS

0.0 1.000E+00 1.000E+00 1.000E+00

ANGULAR DESCRIPTION

DEFINED BY INPUT DISTRIBUTION -- REFERENCE VECTOR U=-2.000E+00 V= 0. W= 0.

PAIRS OF DEFINING POINTS OF COSINE, SOURCE/STERADIAN

1.000E+00	5.279E-05	9.887E-01	4.221E-05	9.745E-01	3.249E-05	9.603E-01	2.517E-05
9.481E-01	2.066E-05	9.321E-01	1.637E-05	9.178E-01	1.365E-05	8.980E-01	1.119E-05
8.702E-01	8.800E-06	8.409E-01	7.005E-06	8.072E-01	5.489E-06	7.705E-01	4.278E-06
7.311E-01	3.311E-06	6.891E-01	2.541E-06	6.471E-01	1.961E-06	6.029E-01	1.500E-06
5.569E-01	1.134E-06	5.117E-01	8.622E-07	4.652E-01	6.476E-07	4.172E-01	4.781E-07
3.710E-01	3.524E-07	3.269E-01	2.592E-07	2.850E-01	1.898E-07	2.456E-01	1.377E-07
2.089E-01	9.858E-08	1.750E-01	6.916E-08	1.440E-01	4.720E-08	1.191E-01	3.268E-08
9.724E-02	2.213E-08	8.159E-02	1.580E-08	6.593E-02	1.050E-08	5.338E-02	7.000E-09
4.397E-02	4.823E-09	3.769E-02	3.589E-09	3.141E-02	2.531E-09	2.827E-02	2.070E-09
2.513E-02	1.653E-09	2.199E-02	1.282E-09	1.885E-02	9.567E-10	1.571E-02	6.782E-10

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September 20, 1973

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

1.257E-02 4.466E-10 9.425E-03 2.625E-10 6.283E-03 1.264E-10 3.142E-03 3.869E-11
2.680E-08 0. -1.000E+00 0.

INTERVAL NUMBER 3

NUMBER BCN IN THIS INTERVAL = 6.58301E-03

RELATIVE IMPORTANCE = 1.00000E+00

POSITION DEFINITION

SPHERE-SURFACE

POINT AT CENTER X= 0. Y= 0. Z= 0.

OUTER RADIUS = 1.0000E+01

ENERGY DEFINITION

SINGLE GROUP ONLY - GROUP 4

TIME DEFINITION

INPUT DISTRIBUTION - DEFINED BY FOLLOWING (TIME, SOURCE/SEC) PCINTS

0.0 1.000E+00 1.000E+00 1.000E+00

ANGULAR DESCRIPTION

DEFINED BY INPUT DISTRIBUTION -- REFERENCE VECTOR U=-2.0000E+00 V= 0. W= 0.

PAIRS OF DEFINING POINTS OF COSINE, SOURCE/STERADIAN

1.000E+00	8.628E-06	9.872E-01	6.923E-06	9.716E-01	5.409E-06	9.558E-01	4.272E-06
9.376E-01	3.395E-06	9.202E-01	2.799E-06	8.980E-01	2.312E-06	8.671E-01	1.845E-06
8.306E-01	1.456E-06	7.902E-01	1.145E-06	7.459E-01	8.953E-07	6.982E-01	6.946E-07
6.471E-01	5.340E-07	5.929E-01	4.060E-07	5.385E-01	3.084E-07	4.818E-01	2.306E-07
4.229E-01	1.684E-07	3.681E-01	1.230E-07	3.150E-01	8.849E-08	2.639E-01	6.198E-08
2.181E-01	4.275E-08	1.781E-01	2.895E-08	1.440E-01	1.925E-08	1.191E-01	1.334E-08
9.724E-02	8.995E-09	8.159E-02	6.373E-09	6.906E-02	4.578E-09	5.652E-02	3.063E-09
4.711E-02	2.115E-09	4.083E-02	1.576E-09	3.455E-02	1.113E-09	3.141E-02	9.102E-10
2.827E-02	7.273E-10	2.513E-02	5.642E-10	2.199E-02	4.211E-10	1.885E-02	2.983E-10
1.571E-02	1.960E-10	1.257E-02	1.144E-10	9.425E-03	5.374E-11	6.283E-03	1.430E-11
2.680E-08	0.	-1.000E+00	0.				

INTERVAL NUMBER 4

NUMBER BCN IN THIS INTERVAL = 7.58053E-03

RELATIVE IMPORTANCE = 1.00000E+00

POSITION DEFINITION

SPHERE-SURFACE

POINT AT CENTER X= 0. Y= 0. Z= 0.

OUTER RADIUS = 1.0000E+01

ENERGY DEFINITION

SINGLE GROUP ONLY - GROUP 5

TIME DEFINITION

INPUT DISTRIBUTION - DEFINED BY FOLLOWING (TIME, SOURCE/SEC) PCINTS

0.0 1.000E+00 1.000E+00 1.000E+00

ANGULAR DESCRIPTION

DEFINED BY INPUT DISTRIBUTION -- REFERENCE VECTOR U=-2.0000E+00 V= 0. W= 0.

PAIRS OF DEFINING POINTS OF COSINE, SOURCE/STERADIAN

1.000E+00	9.646E-06	9.867E-01	7.720E-06	9.709E-01	6.054E-06	9.549E-01	4.811E-06
9.365E-01	3.845E-06	9.190E-01	3.190E-06	8.952E-01	2.619E-06	8.639E-01	2.097E-06
8.271E-01	1.660E-06	7.863E-01	1.308E-06	7.396E-01	1.013E-06	6.914E-01	7.867E-07
6.398E-01	6.050E-07	5.852E-01	4.600E-07	5.305E-01	3.491E-07	4.735E-01	2.608E-07
4.144E-01	1.900E-07	3.593E-01	1.383E-07	3.060E-01	9.914E-08	2.548E-01	6.897E-08
2.089E-01	4.705E-08	1.688E-01	3.131E-08	1.378E-01	2.122E-08	1.129E-01	1.442E-08
9.411E-02	1.011E-08	7.846E-02	7.053E-09	6.593E-02	4.973E-09	5.652E-02	3.636E-09
4.711E-02	2.495E-09	4.083E-02	1.848E-09	3.455E-02	1.293E-09	3.141E-02	1.051E-09
2.827E-02	8.330E-10	2.513E-02	6.393E-10	2.199E-02	4.701E-10	1.885E-02	3.259E-10
1.571E-02	2.068E-10	1.257E-02	1.132E-10	9.425E-03	4.535E-11	6.283E-03	3.664E-12
2.680E-08	0.	-1.000E+00	0.				

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

0.0 1.000E+00 1.000E+00 1.000E+00
 ANGULAR DESCRIPTION
 DEFINED BY INPUT DISTRIBUTION -- REFERENCE VECTOR U=-2.0000E+00 V= 0. W= 0.
 PAIRS OF DEFINING POINTS OF COSINE, SOURCE/STERADIAN

1.000E+00	2.908E-05	9.724E-01	2.402E-05	9.387E-01	1.983E-05	9.008E-01	1.669E-05
8.409E-01	1.333E-05	7.685E-01	1.039E-05	6.868E-01	7.914E-06	6.004E-01	5.903E-06
5.117E-01	4.283E-06	4.000E-01	2.715E-06	3.476E-01	2.128E-06	2.639E-01	1.378E-06
1.374E-01	7.865E-07	1.409E-01	4.722E-07	1.097E-01	2.911E-07	8.785E-02	1.833E-07
7.219E-02	1.184E-07	6.279E-02	8.497E-08	5.338E-02	5.619E-08	4.711E-02	3.976E-08
4.083E-02	2.567E-08	3.769E-02	1.954E-08	3.455E-02	1.404E-08	3.141E-02	9.193E-09
2.827E-02	5.008E-09	2.513E-02	1.504E-09	2.680E-02	0.	-1.000E+00	0.

INTERVAL NUMBER 44

NUMBER BORN IN THIS INTERVAL = 6.87127E-02
 RELATIVE IMPORTANCE = 1.00000E+00
 POSITION DEFINITION
 SPHERE-SURFACE
 POINT AT CENTER X= 0. Y= 0. Z= 0.
 OUTER RADIUS = 1.0000E+01
 ENERGY DEFINITION
 SINGLE GROUP ONLY - GROUP 45
 TIME DEFINITION
 INPUT DISTRIBUTION - DEFINED BY FOLLOWING (TIME,SOURCE/SEC) POINTS
 0.0 1.000E+00 1.000E+00 1.000E+00

ANGULAR DESCRIPTION
 DEFINED BY INPUT DISTRIBUTION -- REFERENCE VECTOR U=-2.0000E+00 V= 0. W= 0.
 PAIRS OF DEFINING POINTS OF COSINE, SOURCE/STERADIAN

1.000E+00	3.351E-05	9.654E-01	2.785E-05	9.215E-01	2.303E-05	8.591E-01	1.864E-05
7.765E-01	1.449E-05	6.823E-01	1.096E-05	5.878E-01	8.202E-06	4.982E-01	6.090E-06
3.769E-01	3.785E-06	2.910E-01	2.613E-06	1.657E-01	1.093E-06	1.222E-01	6.240E-07
9.724E-02	3.913E-07	8.159E-02	2.653E-07	6.906E-02	1.779E-07	5.965E-02	1.214E-07
5.338E-02	8.838E-08	4.711E-02	5.947E-08	4.397E-02	4.662E-08	4.083E-02	3.489E-08
3.769E-02	2.431E-08	3.455E-02	1.492E-08	3.141E-02	6.739E-09	2.680E-02	0.
-1.000E+00	0.						

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

EXAMPLE PROBLEM TWO

FLUENCE CALCULATED AT POINTS EXTERNAL TO THE DEFINED SPHERICAL SYSTEM

DETECTOR POINT NUMBER 1

DISTANCE FROM CENTER OF SPHERE = 1.0000E+C3

COLLIMATING CYLINDER RADIUS = 8.0000E+C0

OFF-SET OF CYLINDER FROM SPHERE = 0.

ENERGY GRP.	FLUENCE ----- UNCOLLIMATED	PARTICLES / CM**2-MEV COLLIMATED	PIPE FACTOR COLL / UNCOLL
1	0.	0.	0.
2	1.1563E-08	1.1757E-C8	1.0167E+00
3	1.4193E-09	1.3450E-C9	9.4760E-01
4	3.3624E-10	3.0826E-10	9.1680E-01
5	4.4644E-10	4.0831E-10	9.1458E-01
6	5.7748E-10	5.2510E-10	9.0929E-01
7	7.2667E-10	6.5369E-10	8.9958E-01
8	9.8517E-10	8.7679E-10	8.8999E-01
9	1.3859E-09	1.2231E-C9	8.8254E-01
10	1.8702E-09	1.6359E-C9	8.7470E-01
11	2.6834E-09	2.3327E-C9	8.6933E-01
12	4.1634E-09	3.6085E-C9	8.6671E-01
13	5.9750E-09	5.1415E-C9	8.6050E-01
14	8.0823E-09	6.9286E-C9	8.5726E-01
15	9.2753E-09	7.7867E-C9	8.4405E-01
16	1.3430E-08	1.1292E-C8	8.4084E-01
17	1.7493E-08	1.4853E-C8	8.4907E-01
18	2.3724E-08	2.0161E-C8	8.4983E-01
19	2.4205E-08	1.9782E-C8	8.1727E-01
20	4.3389E-08	3.6503E-C8	8.4130E-01
21	2.9468E-08	2.4063E-C8	8.1660E-01
22	3.8991E-08	3.1777E-C8	8.1497E-01
23	4.2620E-08	3.4092E-C8	7.9989E-01
24	2.9362E-08	2.2412E-C8	7.6329E-01
25	3.0516E-08	2.3123E-C8	7.5773E-01
26	5.0647E-08	3.8112E-C8	7.5250E-01
27	1.0842E-07	8.1111E-C8	7.4813E-01
28	2.2822E-07	1.7077E-C7	7.4825E-01
29	3.4720E-07	2.5954E-C7	7.4751E-01
30	1.5126E-07	1.1206E-C7	7.4083E-01
31	2.3219E-10	2.0617E-10	8.8795E-01
32	5.9724E-10	5.2983E-10	8.8713E-01
33	9.7750E-10	8.7160E-10	8.9166E-01
34	1.4336E-09	1.2794E-C9	8.9248E-01
35	2.2265E-09	1.9818E-C9	8.9009E-01
36	3.3498E-09	2.9626E-C9	8.8440E-01
37	5.0052E-09	4.4152E-C9	8.8212E-01
38	6.3480E-09	5.5936E-C9	8.8117E-01
39	6.6242E-09	5.8305E-C9	8.8017E-01
40	9.0949E-09	7.9168E-C9	8.7046E-01
41	1.3230E-08	1.1313E-C8	8.5512E-01
42	1.6612E-08	1.4038E-C8	8.4505E-01
43	3.2506E-08	2.6228E-C8	8.0686E-01
44	3.0140E-08	2.4544E-C8	8.1433E-01
45	4.9473E-08	3.8990E-C8	7.8810E-01

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OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

DETECTOR POINT NUMBER 2
 DISTANCE FROM CENTER OF SPHERE = 1.0000E+03
 COLLIMATING CYLINDER RADIUS = 8.0000E+00
 OFF-SET OF CYLINDER FROM SPHERE = 5.0000E+00

ENERGY GRP.	FLUENCE ----- UNCOLLIMATED	PARTICLES / CM**2-MEV COLLIMATED	PIPE FACTOR COLL / UNCOLL
1	0.	0.	0.
2	1.1563E-08	5.8076E-09	5.0224E-01
3	1.4193E-09	6.9133E-10	4.8708E-01
4	3.3624E-10	1.6173E-10	4.8100E-01
5	4.4644E-10	2.1453E-10	4.8053E-01
6	5.7748E-10	2.7689E-10	4.7948E-01
7	7.2667E-10	3.4696E-10	4.7747E-01
8	9.8517E-10	4.6855E-10	4.7561E-01
9	1.3859E-09	6.5715E-10	4.7417E-01
10	1.8702E-09	8.8407E-10	4.7271E-01
11	2.6034E-09	1.2658E-09	4.7173E-01
12	4.1634E-09	1.9618E-09	4.7121E-01
13	5.9750E-09	2.8081E-09	4.6997E-01
14	8.0823E-09	3.7930E-09	4.6930E-01
15	9.2253E-09	4.3054E-09	4.6669E-01
16	1.3430E-08	6.2596E-09	4.6610E-01
17	1.7493E-08	8.1813E-09	4.6769E-01
18	2.3724E-08	1.1098E-08	4.6778E-01
19	2.4205E-08	1.1174E-08	4.6162E-01
20	4.3389E-08	2.0221E-08	4.6603E-01
21	2.9468E-08	1.3600E-08	4.6151E-01
22	3.8991E-08	1.7933E-08	4.6120E-01
23	4.2620E-08	1.9536E-08	4.5837E-01
24	2.9352E-08	1.3261E-08	4.5164E-01
25	3.0516E-08	1.3750E-08	4.5058E-01
26	5.0647E-08	2.2773E-08	4.4964E-01
27	1.0842E-07	4.8666E-08	4.4887E-01
28	2.2822E-07	1.0245E-07	4.4889E-01
29	3.4720E-07	1.5581E-07	4.4876E-01
30	1.5126E-07	6.7701E-08	4.4759E-01
31	2.3219E-10	1.1056E-10	4.7615E-01
32	5.9724E-10	2.8421E-10	4.7587E-01
33	9.7750E-10	4.6602E-10	4.7675E-01
34	1.4336E-09	6.8360E-10	4.7685E-01
35	2.2265E-09	1.0605E-09	4.7630E-01
36	3.3498E-09	1.5914E-09	4.7508E-01
37	5.0052E-09	2.3754E-09	4.7459E-01
38	6.3480E-09	3.0106E-09	4.7426E-01
39	6.6242E-09	3.1385E-09	4.7379E-01
40	9.0949E-09	4.2919E-09	4.7190E-01
41	1.3230E-08	6.2046E-09	4.6897E-01
42	1.6612E-08	7.7574E-09	4.6697E-01
43	3.2506E-08	1.4948E-08	4.5985E-01
44	3.0140E-08	1.3896E-08	4.6105E-01
45	4.9473E-08	2.2574E-08	4.5629E-01

OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

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EXAMPLE PROBLEM TWO
SPECTRUM FITS SUITABLE FOR CLYDE INPUT

FLUX SPECTRUM FOR ZONE 1 L= 0 LINEAR FIT IN ENERGY

1.0000E-10	0.	2.0005E-C7	2.2988E-02	1.790CE-06	3.9577E-02	1.4190E-05	1.8158E-02
1.1260E-04	8.6104E-03	8.9500E-C4	3.3349E-03	7.100CE-03	2.2903E-03	5.6305E-02	2.4086E-03
1.6180E-01	2.3094E-03	3.6180E-C1	1.9330E-03	5.473CE-01	1.3105E-03	6.5085E-01	1.8969E-03
7.7400E-01	1.1014E-03	9.2045E-C1	9.8630E-04	1.1287E+00	7.4110E-04	1.4192E+00	6.3315E-04
1.7847E+00	3.8882E-04	2.2441E+C0	3.8901E-04	2.7365E+00	2.9145E-04	3.2543E+00	2.0017E-04
3.8700E+00	1.3102E-04	4.6022E+C0	9.0208E-05	5.3824E+00	6.5679E-05	6.2056E+00	4.5905E-05
7.1548E+00	3.3574E-05	8.2491E+C0	2.6631E-05	9.5108E+00	1.8113E-05	1.0966E+01	2.7367E-05
1.2643E+01	-6.9564E-05	1.4576E+C1	9.1508E-04	1.6806E+01	-1.9885E-04	1.8000E+01	0.

FLUX SPECTRUM FOR ZONE 1 L= 0 LOG FIT IN ENERGY

5.0000E-01	0.	5.5251E-C1	5.6299E-03	6.7464E-01	1.3963E-03	8.2377E-01	2.5255E-03
1.0059E+00	9.1618E-04	1.2232E+C0	8.9253E-04	1.4997E+00	5.2067E-04	1.8313E+00	3.2019E-04
2.2361E+00	3.9012E-04	2.7304E+C0	3.0069E-04	3.3339E+00	1.8810E-04	4.0709E+00	1.2795E-04
4.9708E+00	8.1231E-05	6.0696E+C0	5.7409E-05	7.4113E+00	3.5019E-05	9.0497E+00	1.6748E-05
1.0000E+C1	0.						

FLUX SPECTRUM FOR ZONE 1 L= 1 LINEAR FIT IN ENERGY

1.0000E-10	0.	2.0005E-C7	2.0563E-03	1.790CE-06	4.4442E-03	1.4190E-05	2.0301E-03
1.1260E-04	9.8393E-04	8.9500E-C4	4.5761E-04	7.100CE-03	3.3406E-04	5.6305E-02	3.9167E-04
1.6180E-01	6.5890E-04	3.6180E-C1	6.0729E-04	5.473CE-01	3.9405E-04	6.5085E-01	6.9652E-04
7.7400E-01	3.1645E-04	9.2045E-C1	3.8992E-04	1.1287E+00	2.7353E-04	1.4192E+00	2.2174E-04
1.7847E+00	1.3741E-04	2.2441E+C0	1.5057E-04	2.7365E+00	1.1670E-04	3.2543E+00	8.4349E-05
3.8700E+00	5.6140E-05	4.6022E+C0	4.0555E-05	5.3824E+00	3.0564E-05	6.2056E+00	2.1659E-05
7.1548E+00	1.6131E-05	8.2491E+C0	1.3255E-05	9.5108E+00	8.2223E-06	1.0966E+01	1.8614E-05
1.2643E+01	-6.6256E-05	1.4576E+C1	6.8232E-04	1.6806E+01	-1.4827E-04	1.8000E+01	0.

FLUX SPECTRUM FOR ZONE 1 L= 1 LOG FIT IN ENERGY

5.0000E-01	0.	5.5251E-C1	1.8163E-03	6.7464E-01	6.2162E-04	8.2377E-01	8.0911E-04
1.0059E+C0	4.0300E-04	1.2282E+C0	3.5872E-04	1.4997E+00	2.2505E-04	1.8313E+00	1.4049E-04
2.2361E+00	1.6911E-04	2.7304E+C0	1.3052E-04	3.3339E+00	8.2008E-05	4.0709E+00	5.7580E-05
4.9708E+00	3.6935E-05	6.0696E+C0	2.6118E-05	7.4113E+00	1.5561E-05	9.0497E+00	7.5847E-06
1.0000E+C1	0.						

FLUX SPECTRUM FOR ZONE 1 L= 2 LINEAR FIT IN ENERGY

1.0000E-10	0.	2.0005E-C7	1.3632E-04	1.790CE-06	3.7339E-04	1.4190E-05	1.7083E-04
1.1260E-04	8.4600E-05	8.9500E-C4	5.0011E-05	7.100CE-03	4.3252E-05	5.6305E-02	6.4338E-05
1.6180E-01	1.9672E-04	3.6180E-C1	2.0550E-04	5.473CE-01	1.3058E-04	6.5085E-01	2.7152E-04
7.7400E-01	1.0045E-04	9.2045E-C1	1.6771E-04	1.1287E+00	1.1462E-04	1.4192E+00	8.8253E-05
1.7847E+00	5.4954E-05	2.2441E+C0	6.7692E-05	2.7365E+00	5.3337E-05	3.2543E+00	3.9858E-05
3.8700E+00	2.6860E-05	4.6022E+C0	1.9828E-05	5.3824E+00	1.5304E-05	6.2056E+00	1.1068E-05
7.1548E+00	8.4769E-06	8.2491E+C0	7.2537E-06	9.5108E+00	4.0244E-06	1.0966E+01	1.3219E-05
1.2643E+01	-5.5147E-05	1.4576E+C1	5.0916E-04	1.6806E+01	-1.1065E-04	1.8000E+01	0.

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OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

FLUX SPECTRUM FOR ZONE 1 L= 2 LOG FIT IN ENERGY

5.0000E-01	0.	5.5251E-01	6.1028E-04	6.7464E-01	2.6084E-04	8.2377E-01	3.0715E-04
1.0059E+00	1.9109E-04	1.2282E+00	1.6787E-04	1.4997E+00	1.1091E-04	1.8313E+00	6.9868E-05
2.2361E+00	8.6466E-05	2.7304E+00	6.7289E-05	3.3339E+00	4.2438E-05	4.0709E+00	3.0676E-05
4.9708E+00	1.9884E-05	6.0696E+00	1.4112E-05	7.4113E+00	8.2667E-06	9.0497E+00	4.1140E-06
1.0000E+01	0.						

FLUX SPECTRUM FOR ZONE 1 L= 3 LINEAR FIT IN ENERGY

1.0000E-10	0.	2.0005E-07	-3.5857E-05	1.7900E-06	-7.0959E-05	1.4190E-05	-3.2292E-05
1.1260E-04	-1.5291E-05	8.9500E-04	-5.1287E-06	7.1000E-03	-5.8939E-07	5.6305E-02	7.2224E-06
1.6180E-01	6.4531E-05	3.6180E-01	7.6995E-05	5.4730E-01	4.7641E-05	6.5085E-01	1.0997E-04
7.7400E-01	3.3711E-05	9.2045E-01	7.6147E-05	1.1287E+00	5.2020E-05	1.4192E+00	3.7729E-05
1.7847E+00	2.3339E-05	2.2441E+00	3.2733E-05	2.7365E+00	2.6472E-05	3.2543E+00	2.0584E-05
3.8700E+00	1.4038E-05	4.6022E+00	1.0404E-05	5.3824E+00	8.1963E-06	6.2056E+00	6.1228E-06
7.1548E+00	4.8397E-06	8.2491E+00	4.3217E-06	9.5108E+00	2.0966E-06	1.0966E+01	9.8947E-06
1.2643E+01	-4.5297E-05	1.4576E+01	3.9331E-04	1.6806E+01	-8.5469E-05	1.8000E+01	0.

FLUX SPECTRUM FOR ZONE 1 L= 3 LOG FIT IN ENERGY

5.0000E-01	0.	5.5251E-01	2.0615E-04	6.7464E-01	1.0205E-04	8.2377E-01	1.2548E-04
1.0059E+00	9.2398E-05	1.2282E+00	8.4877E-05	1.4997E+00	5.9204E-05	1.8313E+00	3.8513E-05
2.2361E+00	4.9655E-05	2.7304E+00	3.9088E-05	3.3339E+00	2.4811E-05	4.0709E+00	1.8290E-05
4.9708E+00	1.1928E-05	6.0696E+00	8.4605E-06	7.4113E+00	4.8859E-06	9.0497E+00	2.4572E-06
1.0000E+01	0.						

FLUX SPECTRUM FOR ZONE 1 L= 4 LINEAR FIT IN ENERGY

1.0000E-10	0.	2.0005E-07	-1.3491E-04	1.7900E-06	-2.3753E-04	1.4190E-05	-1.0881E-04
1.1260E-04	-5.1523E-05	8.9500E-04	-2.0117E-05	7.1000E-03	-1.2877E-05	5.6305E-02	-1.0492E-05
1.6180E-01	2.0446E-05	3.6180E-01	3.0310E-05	5.4730E-01	1.7854E-05	6.5085E-01	4.7693E-05
7.7400E-01	1.0396E-05	9.2045E-01	3.6818E-05	1.1287E+00	2.4788E-05	1.4192E+00	1.6523E-05
1.7847E+00	9.9729E-06	2.2441E+00	1.5965E-05	2.7365E+00	1.2926E-05	3.2543E+00	1.0387E-05
3.8700E+00	7.0856E-06	4.6022E+00	5.2395E-06	5.3824E+00	4.1281E-06	6.2056E+00	3.1054E-06
7.1548E+00	2.4842E-06	8.2491E+00	2.3094E-06	9.5108E+00	8.6542E-07	1.0966E+01	6.8109E-06
1.2643E+01	-3.3697E-05	1.4576E+01	2.7335E-04	1.6806E+01	-5.9401E-05	1.8000E+01	0.

FLUX SPECTRUM FOR ZONE 1 L= 4 LOG FIT IN ENERGY

5.0000E-01	0.	5.5251E-01	6.4004E-05	6.7464E-01	4.0043E-05	8.2377E-01	4.7583E-05
1.0059E+00	4.1655E-05	1.2282E+00	3.9731E-05	1.4997E+00	2.8772E-05	1.8313E+00	1.8508E-05
2.2361E+00	2.6388E-05	2.7304E+00	2.1477E-05	3.3339E+00	1.3825E-05	4.0709E+00	1.0541E-05
4.9708E+00	6.9924E-06	6.0696E+00	5.0407E-06	7.4113E+00	2.9195E-06	9.0497E+00	1.4921E-06
1.0000E+01	0.						

TIME REQUIRED FOR OUTPUT= 3.747E-01 MIN.
TOTAL PROBLEM TIME= 1.374E+00 MIN.

CRT OUTPUT FROM EXAMPLE PROBLEM TWO

CRT OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

CRT OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

GP 32

GP 33

GP 34

GP 35

GP 36

GP 37

GP 38

GP 39

GP 40

GP 41

GP 42

GP 43

GP 44

GP 45

CRT OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

EXAMPLE PROBLEM TWO
ENERGY DEPENDENT FLUENCE AT DETECTOR POINT

CRT OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

EXAMPLE PROBLEM TWO
ENERGY DEPENDENT FLUENCE AT DETECTOR POINT 1

CRT OUTPUT FROM EXAMPLE PROBLEM TWO (Cont.)

EXAMPLE PROBLEM TWO
ENERGY DEPENDENT FLUENCE AT DETECTOR POINT 2

EXAMPLE PROBLEM TWO
ENERGY DEPENDENT FLUENCE AT DETECTOR POINT 2

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January 13, 1975

SUBJECT: CHANGES TO ANISN-L PROGRAM

A number of changes have been made to the ANISN-L program in order to correct known errors. None of these corrections affect the code's input or the method of operation. The revised program tapes are located in tape slots CG414 and CG616 and have superseded the tapes containing the previous version. Users who have copied the program into their own files are encouraged to secure the newer version rather than continue to use the older, outdated, version.

The specific changes that have been made are:

- 1) The ORNL space dependent scaling factor, used in the inner iteration calculation to speed convergence, is now deactivated if convergence has not been reached in 50 iterations. Deep penetration problems have been found in which convergence was never reached in groups with very high percentages of in-group scattering. The space dependent scaling factor method seemed to be the problem. Since no errors could be found in the method or in the programming of the method, it was decided to just turn this feature of the code off if it was not working.
- 2) Several multiplication problems involving the use of cross section sets utilizing upscatter have been found to converge very poorly (if at all). The use of the upscatter scale factor, which was supposed to speed convergence, in these problems seemed to cause the poor convergence. This factor has therefore been removed from the code. The mentioned problems still converge slowly but consistently. Additional work is being conducted on ways to speed convergence for such problems. Additional changes to ANISN will be made when, and if, such ways are found.
- 3) The balance printout no longer includes data for zones which were not used in the problem. This data had no real meaning but was confusing to some users.

- 4) The fission source in the balance table printout is now correctly normalized. Previously, it differed from the correct value by the magnitude of the source ratio (normally equal to one).
- 5) In multiplication problems, the last two eigenvalues are now printed correctly.
- 6) With upscatter problems, the first outer iteration scattering source is generated without an upscattering contribution. Since the initial fluxes are very poor, this seems as good a way as using these fluxes to generate this term.
- 7) In the adjoint mode, the fission source in the balance table is now correctly calculated and the CRT plots of energy dependent fluence made properly. Note that these plots have the correct energy relationships while the remaining printout has the group structure reversed.

The new version is labeled as version number 3 with a date of 2 Jan 1975.

Any problems encountered with the use of ANISN-L should be directed to the authors.

TPW/mm

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