NUS CORPORATION

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Volume 2

FINAL REPORT FOR MODIFICATION OF CODES NUALGAM AND BREMRAD

Volume 2: Code User Manual

For

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Goddard Space Flight Center
Glenn Dale Road
Greenbelt, Maryland

NASA Contract Number: NAS5-11781

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May 1971

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4 Research Place
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1. INTRODUCTION

This present Volume II of the final report NUS-786 to the National Aeronautics and Space administration, Goddard Space Flight Center, was prepared by NUS Corporation under Contract NAS5-11781. It consists of a Code Users Manual for the NUGAM2 and NUGAM3 Monte Carlo codes described in Volume I.

The NUGAM2 code determines gamma photon albedo and buildup distributions; it also determines K x-ray escape and finite source emission data. The NUGAM3 code determines inorganic scintillation pulse-height response distributions.

General operating instructions for both codes are given in Section 2 Subsection 2.1. Subsection 2.2 details NUGAM2 input. Subsection 2.3 details NUGAM3 input. Subsections 2.4 and 2.5 describe the NUGAM2 and NUGAM3 sample output. Appendices I through IV consist of sample input and output listings. Appendix V consists of user information for the 05S code. Appendix VI consists of user information for the SSALB code described in Section 3.2 of Volume I.

2. CODE OPERATING INFORMATION

2.1 General

The NUGAM2 and NUGAM3 codes are written in a generalized FORTRAN-IV level G, for the NASA-GSFC IBM 360/91 digital computer. It may be run after some modifications, on other computers with sufficient core size; i.e., the present versions require ~ 180K and 330K bytes (÷ by 4 for approximate word size). There are no Sense Switch or special tape requirements. The code has been designed with a view to ease of translation for use on other computers. Double precision is used only in subroutines SØRTA and SECTN in NUGAM3 by means of the IBM "*8" declaration statement. Removal of this declaration statement is sufficient for the large word size CDC-6600 computer. Input/output tapes are presently coded as 5 and 6, respectively, in both codes and in addition a punch card output on tape 7 in NUGAM3. Figure 1 shows the general flow for the data input cards. Input card details, order, formats, restrictions and location are given in Section 2.2. Card numbers are encircled and defined in the order in which they are read by the code. Input formats are standard FORTRAN-IV, as given in any FORTRAN manual. Sample input card listings for each code are presented in Appendices I and II.

The code output is reviewed in Section 2.3. Appendices III and IV are sample output listings. They correspond to the sample input of Appendices I and II. Debug type output may be obtained by input of NØPT = 1 on card 2. The user is cautioned with respect to profusion of output under this option, even though the codes exit after the number of histories = 100.

Code running times on the IBM 360/91 are primarily a function of transport medium size and atomic number, and source photon energy. For example,

NUGAM2 executes at ~ 4,500 histories per minute for an iron transport medium, E = 1.0 MeV, L = 3λ and R = 5λ. NUGAM3 executes at ~ 8,000 histories per minute for E = 0.662 or 2.754 MeV and a 3" x 3" NaI(Tℓ) clad detector.

The NUGAM2 code consists of a main program and thirty-four subprograms. The subprogram namelist is as follows:

AZI	GTISØ	SIGPEK
BKWARD	GTSIGW	SØURCE
CKMAT	HEMI	SPHERE
CØLLIS	INDEX	SPECTM
DCØMP	KLEIN	TA
DFACT	NUALGM	TALLY
DØSE	ØUTPUT	TALLYX
ERRØR	PAIR	TE
FØWARD	RNGEN	TESTWT
FY	RØT	WHERE
GENSIG	SIGMAS	XRAY
GEØM		

The NUGAM3 code consists of a main program and thirty-two subprograms. The subprogram namelist is as follows:

AZI	GTISØ	SIGMAS
BKWARD	GTSIGW	SØRTA
CKMAT	INDEX	SØURCE
CØLLIS	KLEIN	SPECTM
DCØMP	NUALGM	TALLY
DFACT	ØUTPUT	TALLYE
ERRØR	PAIR	TESTWT
FØWARD	PAIRUP	XPLØT
GAUSIN	RNGEN	VECTMX
GENSIG	RØT	ZIGZAG
GEØM	SECTN	

2.2.1 NUGAM2 Input Card Details

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (1) (Single Card)			
NRAND	1 - 5	I5	Initial random number (must be an odd number and different for each job submitted*)
Card (2) (Single Card)			
NGAMA	1 - 5	I5	Number of photon histories to be followed.
NØPT	6 - 10	I5	Output option signal = 0 No intermediate output ≠ 0 Intermediate output (code makes NGAMA = 100).
NØR	11 - 15	I5	An input option for cards (3C), (5), (6) and (7) : = 0, read cards (3C), (5), (6) and (7). ≠ 0, e.g. 1, omit cards (3C), (5), (6) and (7)
NØE	16 - 20	I5	An input option for card (4A) : ≠ 0, omit card (4A) = 0, read card (4A), i.e. source photon energy and energy cut-off are the same as the previous case.
NXRAY	21 - 25	I5	An input option for card (4B) ≠ 0, omit card (4B) = 0, read card (4B)
IND	26 - 30	I5	Number of radial categorizations for forward and backscatter output data, i.e. RADI2 (on Card (3A)) divided into IND equal annular width zones

* This requirement is dictated by the IBM-360 random number generating function: RNGEN.

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (2) (Single Card), continued			
INE	31 - 35	I5	Number of equal energy intervals in escape spectrum, in the energy range 0 to ESPECT; INE ≤ 10.
IJKL	76 - 80	I5	Job termination signal ≥ 0, more cases to be run < 0, last case, eg. -1.
Card (3A) (Single Card; see Figure 2 and Table 1)			
NSØPT	1 - 5	I5	Source option signal (see text, Figure 2 and Table 1)
RADIUS	6 - 15	F10.5	Radius of the cylindrical medium (cm)*.
W	16 - 25	F10.5	Width of the rectangular medium (cm)*.
B	26 - 35	F10.5	Thickness of the rectangular medium* (cm).
LENGTH	36 - 45	F10.5	Length of the cylindrical or rectangular medium (cm).
RADI2	46 - 55	F10.5	Largest albedo counting and transmitted photon counting radius, i.e. result categorization parameter (cm).
Card (3B) (Single Card)			
RADI1	1 - 10	F10.5	Collimation radius i.e. radius of photon beam at front face of transport medium (cm).
DIST	11 - 20	F10.5	Source-to-"transport medium" distance (cm).
THETO	21 - 30	F10.5	Incident angle with respect to axis of medium (degree).

* "blank" according to the selected geometry (See Table 1).

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (3B) (Single Card), continued			
XØ	31 - 40	F10.5	Coordinates for point source inside of the medium (cm); blank if option is not selected.
YØ	41 - 50	F10.5	
ZØ	51 - 60	F10.5	
Card (3C) (Single Card; input only if NØR = 0)			
NØM	1 - 5	I5	Number of laminae in the transport geometry (≤ 9).
RA(1)	6 - 10	F5.3	Thickness fraction of the first lamination.*
RA(2)	11 - 15	F5.3	Thickness fraction of the second lamination.
.	.	.	
.	.	.	
.	.	.	
RA(NØM)	.	F5.3	Thickness fraction of the NØMth lamination.
Card (4A) (Single Card; input only if NØE = 0)			
ESPECT	1 - 10	F10.5	Source photon energy (MeV).
ECT	11 - 20	F10.5	Lower energy cut-off for each photon history (MeV).

* thickness of lamina #1 ÷ total thickness

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (4B) (Single Card; input only if NXRAY ≠ 0)			
LX	1 - 5	I5	Lamination number; escape K x-rays are to be calculated for the LX medium.
EX1	11 - 20	F10.5	Energy of the first selected K x-ray (MeV).*
EX2	21 - 30	F10.5	Energy of the second selected K x-ray (MeV).*
RX1	31 - 40	F10.5	Intensity of the first selected K x-ray.**
RX2	41 - 50	F10.5	Intensity of the second selected K x-ray.**
Card (5) (Single Card; input only if NØR = 0; see Figure 3)			
NINT	1 - 5	I5	Cross-section parameter; 2^{NINT} energy intervals/group.
ILØW	6 - 10	I5	Cross-section parameter; $2^{ILØW}$ is lowest energy bound of table (m_oc^2 units).
IHIGH	11 - 15	I5	Cross-section parameter; 2^{IHIGH} is highest energy bound of table (m_oc^2 units).

* if there are 3 laminae then LX = 1 is nearest to source.
** see Table 2
*** see Table 3

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (5) (Single Card), continued.			
NEL(1)	15 - 20	I5	Number of elements in the first lamination.
NEL(2)	21 - 22	I5	Number of elements in the second lamination.
.	.	.	.
.	.	.	.
.	.	.	.
NEL(NØM)	.	.	Number of elements in the $NØM^{th}$ lamination ($NØM \leq 9$).
Card (6) (Single Card)			
NE	1 - 5	I5	The number of energies for which cross-section data to be input.
DENSTY	11 - 20	F10.5	The density of the medium element for which cross-section data to be input (gm/cc).
ATØMNØ	21 - 30	F10.5	The atomic number of the medium element for which cross-section data to be input.
ANDAW	31 - 40	F10.5	The atomic weight of the medium element for which cross-section data to be input.

Note: Card types (6) and (7) are repeated for each element in the medium.

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card Set (7) (one or more cards)			
E(1)	1 - 8	E8.3	First (lowest) energy for input of cross-section data (MeV).
SIGPE(1)	9 - 16	E8.3	Photoelectric cross-section for energy E(1), (barns/atom).
SIGPP(1)	17 - 24	E8.3	Pair-production cross-section for energy E(1), (barns/atom).
E(2)	25 - 32	E8.3	
SIGPE(2)	33 - 40	E8.3	
SIGPP(2)	41 - 48	E8.3	
E(3)	49 - 56	E8.3	
SIGPE(3)	57 - 64	E8.3	
SIGPP(3)	65 - 72	E8.3	
E(4)	1 - 8	E8.3	
	. . .		
E(NE)	- - - -	E8.3	Highest energy for input of cross-section data (MeV).
SIGPE(NE)	- - - -	E8.3	Photoelectric cross-section for energy E(NE) (barn/atom).
SIGPP(NE)	- - - -	E8.3	Pair-production cross-section for energy E(NE) (barn/atom).

The remainder of this section consists of comments and additional explanation of the input just described. Only those items which it is felt require special treatment will be discussed.

NRAND:

Repeated use of the same input value will result in identical results, hence the instruction that arbitrary but differing values be input for a sequence of runs and run sets. Each value input must be an odd number.

NSØPT, NGAMA:

The cylindrical and rectangular transport medium geometry is defined in Figure 2 . Since it may be parallel beam with or without collimation and perpendicular or slant incidence; point source either outside or inside of the medium, fourteen options are available. The options NSØPT= 1,2,3,... 14 are shown in the Figure 2, and the various allowed input on Cards (3A) and (3B) are listed in Table 1 .

It should be noted that for NSØPT = 3, a fraction $\approx 1 - (W * B)/(\pi * RADI3**2)$, of the originated source photons may be "wasted" i.e. may not intercept the rectangular front face of the medium. The number of histories = NGAMA, should be increased accordingly.

IND, RADI2:

Photons escape from the front or near faces of the geometry may be categorized as a function of radial distance from the axis. The number of category increments may be specified as IND $\leq$ 5, with 1 assumed by default. The radial

increments are equispaced with the largest = RADI2 ≤ RADIUS.

NØM, RA(I):

The transport medium, length = LENGTH, may be made up of NØM lamina each of length = (RA(I) * LENGTH), I = 1, NØM. For example if NØM = 3 and LENGTH = 10cm, RA(1), RA(2) and RA(3) = 0.2, 0.3 and 0.5, respectively, which corresponds to actual lengths of 2, 3 and 5 cm.

ECT:

Histories are terminated for photons where the energy is degraded below ECT. ECT should be input such that it is ≥ $2^{ILØW}$. See Figure 3 .

NXRAY, EX1, EX2, RX1, RX2, LX

The code will calculate the escape of K x-rays, if the option NXRAY = 0. The intensities and energies of the selected K x-rays are input by the user as RX1, RX2 and EX1, EX2, respectively. The calculation is carried out for transport medium LX, e.g. if the medium has three laminations LX may be 1, 2 or 3. It is noted that the x-rays are those emitted by the user selected element of a compositional medium, e.g. Sm in Sm_2O_3. Element selection by the user is obtained through the order of input of cross-section data, e.g. in Sm_2O_3, the Sm x-ray is assumed if O cross-sections precede Sm cross-sections and the O x-ray is assumed if the cross-sections input order is reversed. Thus the cross-sections for the element of interest, in the lamination of interest, is input last. The user is cautioned that the energies EX1 and EX2 must be within the cross-section energy range: $2^{ILØW}$ to 2^{IHIGH}, where ILØW and IHIGH are defined in the next paragraph.

NINT, ILØW, IHIGH:

The cross-section table generated by subroutine GENSIG consists of (IHIGH - ILØW) energy groups, each containing 2^{NINT} sub-intervals. The total number of subintervals, over all groups, is equal to 1 + (IHIGH-ILØW) 2^{NINT}. The energy width of each sub-interval within any given group is the same and equal to 2^{N-1} ($2^{ILØW}/2^{NINT}$), where N is the group interval number, beginning at N = 1, the lowest group. The energy bounds of group 1 are $2^{ILØW}$ and $2^{ILØW+1}$. The energy bounds of group N are $2^{IHIGH-1}$ and 2^{IHIGH}. The energy unit pertinent to this entire explanatory comment is $m_o c^2$ (= .51097 MeV). An illustration of this comment is given in Figure 3. The relationship of the cross-sections generated with respect to ECT are also indicated. It should be noted that ECT $\geq 2^{ILØW}$ and ESPECT $\leq 2^{IHIGH}$, where both are tested in the same energy units.

NEL(1), DENSTY, ATØMNØ, ANDAW: where the source medium consists of only a single element, e.g. Fe, the earlier descriptions are considered adequate. Where the source consists of such as a compound then further clarification is as follows:

Cards ⑥ and ⑦ must be repeated for each element in each lamination e.g. for Sm_2O_3, input data for Sm and for O. Continuing with Sm_2O_3 as the example, NEL(1) = 2, to indicate two elements (Sm and O); ATØMNØ, ANDAW are input as 62.0, 150.35 and 8.0, 16.0, respectively. Only the input values of DENSTY need reflect the number of atoms of Sm and O in Sm_2O_3. DENSTY is determined as

$$\text{DENSTY}\Big|_{Sm} = \frac{2 * \text{ANDAW}\big|_{Sm}}{\text{ANDAW}\big|_{Sm_2O_3}} * \text{DENSTY}\Big|_{Sm_2O_3}$$

$$= \frac{2 * 150.35}{348.7} * 1.51 = 1.302$$

and

$$\text{DENSTY}\Big|_{O} = \frac{3 * 16}{348.7} * 1.51 = 0.28$$

2.2.2 NUGAM3 Input Card Details

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (1) (Single Card)			
NRAND	1 - 5	I5	Initial random number (must be an odd number and different for each job submitted*).
NØCHAN	6 - 10	I5	Number of channels required in the Monte Carlo spectrum (≤ 150) (photopeak mean pulse height).
NPUNCH	11 - 15	I5	Option for punch card output of computed spectrum if ≠ 0.
ILØG	16 - 20	I5	XPLØT option = 0 linear plot ≠ 0 log plot
RES1	21 - 30	F10.5	Resolution constants for Gaussian smearing function.**
RES2	31 - 40	F10.5	
Card (2) (Single Card)			
NGAMA	1 - 5	I5	Number of photon histories to be followed.
NØPT	6 - 10	I5	Output option signal: = 0 No intermediate output ≠ 0 Intermediate output (code makes NGAMA = 100).
NØR	11 - 15	I5	An input option signal for Cards (5), (6) and (7): = 0, read Cards (5), (6) and (7). ≠ 0, omit Cards (5), (6) and (7).

*This requirement is dictated by the IBM-360 random number generating function: RNGEN.

**RES1 and RES2 correspond to K and n respectively, of Equation (27) of Volume 1

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card 2 (Single Card), continued.			
NØE	16 - 20	I5	An input option for Card ④: ≠ 0 omit Card ④ = 0 read Card ④.
IJKL	76 - 80	I5	Job termination signal: ≥ 0 more cases to be run < 0 last case.
Card (3A) (Single Card)			
NSØPT	1 - 5	I5	Source option signal (See Figure 2).
RADIUS	6 - 15	F10.5	Radius of the crystal (cm).
HT(2)	16 - 25	F10.5	NaI-Crystal cylindrical length (cm)
T	26 - 35	F10.5	Side cladding thickness (cm).
HT(1)	36 - 45	F10.5	Front cladding thickness (cm)
HT(3)	46 - 55	F10.5	Photomultiplier thickness (cm).
Card (3B) (Single Card)			
RADI1	1 - 10	F10.5	Collimation radius i.e. radius of photon beam at detector front face.*
DIST	11 - 20	F10.5	Source-to-NaI(Tℓ)-crystal front face distance (cm)

* may be used for parallel beam or point source

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (3B) (Single Card), continued.			
THETØ	21 - 30	F10.5	Incident angle with respect to crystal axis (degree).
XØ	31 - 40	F10.5	Coordinates of the point source inside of the detector.*
YØ	41 - 50	F10.5	
ZØ	51 - 60	F10.5	
Card (4A) (Single Card)			
ESPECT	1 - 10	F10.5	Source photon energy (MeV)
ECT	11 - 20	F10.5	Lower energy cut-off each photon history (MeV).
Card (5) (Single Card; input only if NØR = 0; see Figure 3)			
NINT	1 - 5	I5	Cross-section parameter; 2^{NINT} energy intervals/group.
ILØW	6 - 10	I5	Cross-section parameter; $2^{ILØW}$ is lowest energy bound of table (m_oc^2) units).
IHIGH	11 - 15	I5	Cross-section parameter; 2^{IHIGH} is highest energy bound of table (m_oc^2 units).
NEL(1)	16 - 20	I5	Number of elements in the front and side cladding; = 0 if none.
NEL(3)	21 - 25	I5	Number of elements in the photomultiplier; = 0 if none.

*"blank" unless source is internal.

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card (6) (Single Card)			
NE	1 - 5	I5	The number of energies for which cross-section data to be input.
DENSTY	11 - 20	F10.5	The density of the medium element for which cross-section data to be input (gm/cc).
ATØMNØ	21 - 30	F10.5	The atomic number of the medium element for which cross-section data to be input.
ANDAW	31 - 40	F10.5	The atomic weight of the medium element for which cross-section data to be input.

Note: Card types (6) and (7) are repeated for each element in the cladding and photomultiplier; input for cladding only if HT(1) + T = 0 and input for photomultiplier if HT(3) = 0.

Card Set (7) (One or more cards).			
E(1)	1 - 8	E8.3	First (lowest) energy for input of cross-section data (MeV).
SIGPE(1)	9 - 16	E8.3	Photoelectric cross-section for energy E(1), (barns/atom).
SIGPP(1)	17 - 24	E8.3	Pair-production cross-section for energy E(1), (barns/atom).
E(2)	25 - 32	E8.3	
SIGPE(2)	33 - 40	E8.3	

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card Set (7) (One or more cards), continued.			
SIGPP(2)	41 - 48	E8.3	
E(3)	49 - 56	E8.3	
SIGPE(3)	57 - 64	E8.3	
SIGPP(3)	65 - 72	E8.3	
E(4)	1 - 8	E8.3	
	. . .		
E(NE)	- - - -	E8.3	Highest energy for input of cross-section data (MeV).
SIGPE(NE)	- - - -	E8.3	Photoelectric cross-section for energy E(NE) (barn/atom).
SIGPP(NE)	- - - -	E8.3	Pair-production cross-section for energy E(NE) (barn/atom).

The remainder of this section consists of comments and additional explanation of the input just described. Only those items which are not input in NUGAM2 or items which are felt require special treatment will be discussed.

NØCHAN, ESPECT, RES1, RES2:

The code computes an energy absorption Monte Carlo histogram distribution with the full energy absorption line corresponding to the source photon energy (=ESPECT) located at the upper edge of channel NØCHAN. The computed Monte Carlo histogram is channel-by-channel Gaussian redistributed over the energy range zero to ESPECT, to $\pm 6\sigma$. The Gaussian function standard deviation at each of the channel midpoints is determined as

$$\sigma_j = \text{RES1} * E_j ** \text{RES2}, (\text{MeV})$$

where

E = channel midpoint energy (MeV)

j = 1, 2, ..., NØCHAN

NSØPT, RADIUS, HT(2), T, HT(1), HT(3), RADI1, DIST:

The detector geometry is defined in Figure 2 , only options NSØPT = 1,2,5, 6,7, 11, 12 are available for code NUGAM3. The crystal cylindrical length and radius are defined by HT(2) and RADIUS, respectively.

The photomultiplier model is a cylinder of length and radius defined by HT(3) and RADIUS + T, respectively. T is the thickness of the side cladding encasing the crystal. The front face cladding radius is similarly defined by

RADIUS + T. The incident photons are collimated at the detector. The radius of collimation (RADI1) may range from zero (axial incidence) to RADIUS + T.

The source-to-crystal distance, DIST, is seen to be slightly larger than the source-to-detector distance by an account equal to the crystal front face cladding thickness HT(1).

ECT:

Histories are terminated for photons where the energy is degraded below ECT. ECT should be input such that it is $\geq 2^{ILØW}$. See Figure 3.

NINT, ILØW, IHIGH:

The cross-section table generated by subroutine GENSIG consists of (IHIGH - ILØW) energy groups, each containing 2^{NINT} sub-intervals. The total number of subintervals, over all groups, is equal to 1 + (IHIGH - ILØW) 2^{NINT}. The energy width of each sub-interval within any given group is the same and equal to 2^{N-1} $(2^{ILØW}/2^{NINT})$, where N is the group interval number, beginning at N = 1, the lowest group. The energy bounds of group 1 are $2^{ILØW}$ and $2^{ILØW + 1}$. The energy bounds of group N are $2^{IHIGH-1}$ and 2^{IHIGH}. The energy unit pertinent to this entire explanatory comment is $m_o c^2$ (= .51097 MeV). An illustration of this comment is given in Figure 3. The relationship of the cross-sections generated with respect to ECT are also indicated. It should be noted that ECT $\geq 2^{ILØW}$ and ESPECT $\leq 2^{IHIGH}$, where both are tested in the same energy units.

NE, SIGPE, SIGPP, E:

The cross-section data required for input on card type ⑦ may be obtained from the references *. The number of value-sets input from energy E(1) to E(NE), need only encompass the energy range $2^{ILØW}$ to 2^{IHIGH}, with spacing as per the references. The code generates its own internal cross-section table using logarithmic interpolation. A table of E, SIGPE, SIGPP is given in Appendix VI of the reference**.

* references (13-17) as listed in report Volume I.
** reference (4) as listed in report Volume I

NEL(1), DENSTY, ATØMNØ, ANDAW:

Where the transport medium (e.g. cladding, crystal, etc.) consists of more than a single element then further clarification is now given:

Card types 6 and 7 must be repeated for each element in the medium e.g. for $A\ell_2O_3$*, input data for $A\ell$ and for O. Continuing with $A\ell_2O_3$ as the example, NEL(1) = 2, to indicate the two elements ATØMNØ, ANDAW are input as 13.0, 26.98 and 8.0, 16.0 respectively. Only the input values of DENSTY need reflect the number of atoms of $A\ell$ and O in $A\ell_2O_3$. DENSTY is determined as

$$\text{DENSTY}\Big|_{A\ell} = \frac{2*\text{ANDAW}\Big|_{A\ell}}{\text{ANDAW}\Big|_{A\ell_2O_3}} \quad *\text{DENSTY}\Big|_{A\ell_2O_3}$$

$$= \frac{2*26.98}{101.96} \quad *4.0 = 2.118$$

and

$$\text{DENSTY}\Big|_{O} = \frac{3 * 16}{101.96} \quad *4.0 = 1.882$$

NE, SIGPE, SIGPP, E:

The cross-section data required for input on card type (13) may be obtained from the references **. The number of value-sets input from energy E(1) to E(NE), need only encompass the energy range $2^{\text{ILØW}}$ to 2^{IHIGH}, with spacing as per the references. The code generates its own internal cross-section table using logarithmic interpolation. A table of E, SIGPE, SIGPP is given in Appendix VI of the reference ***.

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* $A\ell_2O_3$ is part of the cladding material used in the present work.
** references (13-17) as listed in report Volume I
*** reference (4) as listed in report Volume I

2.3 Code Output

Throughout the discussion in this section, reference to the Sample Code Output listings given in Appendices III and IV are necessary and understood. Output which is adequately defined by headings or which is repetitive is either not discussed or mentioned only briefly. Output pages in the appendices are referred to by means of the encircled letters, e.g., Ⓐ, Ⓑ, etc.

2.3.1 NUGAM2 Output (Appendix III)

Ⓐ This page consists of input data as well as escape energies and angles.

Ⓑ This page consists of input photoelectric and pair production cross-section data as a function of energy in MeV units. Code computed scattering and total cross-section data are output as a function energy in mc^2 units. The output data-set is repeated for each element in each lamina and the data-sets are repeated for each lamina in the transport medium.

Ⓒ These pages consist of code computed total cross-sections (cm^{-1}) as well as scattering and pair production cross-section fractions as a function of energy (MeV) for each lamina. The energy mesh is in accord with the input parameters illustrated in Figure 3. This output is repeated for each lamina.

Ⓓ This page illustrates the backward and forward scattering segmentation as already described in Section 2.3 of Volume I

Ⓔ These pages tabulate the backward (albedo) and forward scattering output as a function of angle in the noted solid angle. Unscattered, scattered and pair produced photons are categorized separately. Integral data is also shown. The output is repeated for each escape energy interval in accord with the input option. The output is for photon number, energy (MeV) and exposure (milliroentgen). The output is for photons escaping within a radial distance, d, (counting radius) measured from the transport medium axis.

Ⓕ This output is Ⓔ repeated for the 'next' value of d, as chosen by the user.

Ⓖ This output consists of the energy integrated backward and forward escape as a function of angle in the noted solid angle.

Ⓗ These two pages consist of item Ⓖ in diagramatic representation. The two numbers in each segment are photon number (upper) and energy (lower). The A and B data refer to the two segments in which insufficient space is available for presenting the output. Items Ⓖ and Ⓗ are for the largest value of d, the counting radius chosen by the user.

Ⓘ These pages are similar to item Ⓔ except that they apply to the largest value of d, and they categorize single and double scatter escapes as well as photoelectric absorption, and they apply to the 'complete transport geometry', i.e., front, back and sides. It is noted the selected solid angles are also different.

Ⓙ The output on this page consists largely of summarization and integrated data. Initial and Cut-off energies are in MeV units. The TOTAL NO. OF COLLISIONS does not refer to a terminal classification and thus is primarily of statistical interest. The termination table consists of the following:

1. ENERGY --- the number of histories terminated through scatter reducing the photon energy below the input Cut-off energy (ECT) threshold. Such terminations are considered as absorptions.

2. WEIGHT --- the number of histories terminated through the weight being reduced to less than the termination threshold value (coded as 10^{-5}). Such terminations are regarded as absorptions.

3. ESCAPE --- the number of histories terminated through TOTAL UNSCATTERED ESCAPE plus TOTAL SCATTERED ESCAPE.

3A. TOTAL ESCAPING FRACTION --- escaping fraction per history, i.e., item 3 divided by the total number of histories.

4. ABSORBED (1. + 2. + 7.) --- the number of histories terminated through ENERGY plus WEIGHT plus PHOTOELECTRIC ABSORPTION, i.e., the sum of items 1, 2 and 7.

5. TOTAL UNSCATTERED ESCAPES --- this is item (I) repeated.

5A. TOTAL UNSCATTERED FRACTION --- item (J5) per history.

6. TOTAL SCATTER ESCAPES --- the number of scattered escaping photons summed over all escape energies.

6A. TOTAL SCATTERED ESCAPE FRACTION --- item (J6) per history.

7. PHOTOELECTRIC ABSORPTION --- the number of photoelectrically absorbed photons summed over all energies.

8. PAIR PRODUCTION PHOTONS --- the total number of 0.51 annihilation photons originating in pair production interactions.

Items (J1) to (J8) are repeated for pair production photons under the label 'TERMINATION PAIR PHOTONS.' Under the label 'TALLYCHECK' a value which should equate to the total number of photon histories, is output; the actual value may deviate negligibly due to 'round-off errors.' The 'TERMINATION ALBEDO PHOTONS' are determined as the fractions: (backscatter)/(incident). The 'TERMINATION BUILD-UP PHOTONS' are quantities 'transmitted.' The 'BUILD-UP FACTORS' are determined as the ratios: (scattered-plus-unscattered transmitted)/(unscattered transmitted).

2.3.2 NUGAM3 Output (Appendix IV)

(A) This page consists of self-explanatory input data as well as escape energies and angles.

(B) This page consists of input photoelectric and pair production cross-section data as a function energy in MeV units. Code computed scattering and total cross-section data are output as a function energy in mc^2 units. The output data-set is repeated for each element in the cladding, crystal and photomultiplier.

(C) These pages consist of code computed total cross-sections (cm^{-1}) as well as scattering and pair production cross-section fractions as a function of energy (MeV) for cladding, crystal and 'photomultiplier.' The energy mesh is in accord with the input parameters illustrated in Figure 3.

Ⓓ These pages tabulate the detector backward and forward scattering output as a function of angle in the noted solid angle. Unscattered, scattered and pair produced photons are categorized separately. Integral data is also shown. The output is repeated for each escape energy interval in accord with the input option.

Ⓔ This output consists of the energy integrated backward and forward escape as a function of angle in the noted solid angle.

Ⓕ The output on this page consists largely of summarization and integrated data. Initial and Cut-off energies are in MeV units. The TOTAL NO. OF COLLISIONS does not refer to a terminal classification and thus is primarily of statistical interest. The termination table consists of the following:

1. ENERGY --- the number of histories terminated through scatter reducing the photon energy below the input Cut-off energy (ECT) threshold. Such terminations are considered as absorptions.

2. WEIGHT --- the number of histories terminated through the weight being reduced to less than the termination threshold value (coded as 10^{-5}). Such terminations are regarded as absorptions.

3. ESCAPE --- the number of histories terminated through TOTAL UNSCATTERED ESCAPE plus TOTAL SCATTERED ESCAPE.

3A. TOTAL ESCAPING FRACTION --- escaping fraction per history, i.e., item 3 divided by the total number of histories.

4. ABSORBED (1. + 2. + 7.) --- the number of histories terminated through ENERGY plus WEIGHT plus PHOTOELECTRIC ABSORPTION, i.e., the sum of items 1, 2 and 7.

5. TOTAL UNSCATTERED ESCAPES --- self explanatory.

5A. TOTAL UNSCATTERED FRACTION --- item (F5) per history.

6. TOTAL SCATTER ESCAPES --- the number of scattered escaping photons summed over all escape energies.

6A. TOTAL SCATTERED ESCAPE FRACTION --- item (F6) per history.

7. PHOTOELECTRIC ABSORPTION --- the number of photoelectrically absorbed photons summed over all energies.

8. PAIR PRODUCTION PHOTONS --- the total number of 0.51 annihilation photons originating in pair production interactions.

Items (F1) to (F8) are repeated for pair production photons under the label 'TERMINATION PAIR PHOTONS.' Under the label 'TALLY CHECK' a value which should equate to the total number of histories, is output; the actual value may deviate negligibly due to 'found-off errors.' Backscattered and transmitted photons are output under the 'ALBEDO' and 'BUILD-UP' labels.

(G) This page lists the absorbed energy spectrum 'NUMBER' as a function of energy. The 'REDISTRIBUTED NO.' gives the absorbed energy spectrum weighted in accorded with the actual energy absorbed within adjacent

energy increment mid-points. The weighting is carried out at the end of each history. For example, if the absorbed energy corresponds to the increment upper energy edge, then 50% of the absorbed energy is tallied in the increment and 50% in the next higher increment. 'GAUSSIAN NO.' is the Gaussian distribution of the weighted distribution. The 'NORMALIZED NO.' is the photopeak area normalized Gaussian spectrum.

Ⓗ This output consists of photopeak (or escape peaks if the incident energy > 1.02 MeV) energy and 'area.' The number of photons incident on the crystal is given; it may be less than the number of histories if the detector is clad. The spectrum integral is given. The 'EFFICIENCY' is determined as the ratio: (number of photons 'detected')/(number of photons incident on the detector); photons are 'detected' after one or more collisions in the crystal. The photofraction is determined as the ratio: (photopeak area)/(sum under the total spectrum).

Ⓘ This output is an 'on-line' plot of the 'REDISTRIBUTED NO.' Monte Carlo absorbed energy spectrum and the 'GAUSSIAN NO.' spectrum described in item Ⓗ above. The photopeak is omitted from the plot in order to output the Compton continuum on a 'magnified' scale. The channel number and the plot y-axis 'paper scale' are given below the x-axis. The 'periods' indicate zero counts. The plot is primarily intended for qualitative purposes.

Finally it is noted that the code outputs the absorbed energy and Gaussian spectra on punched cards for later possible user analysis.

FIGURES 1, 2, 3

AND TABLE 1

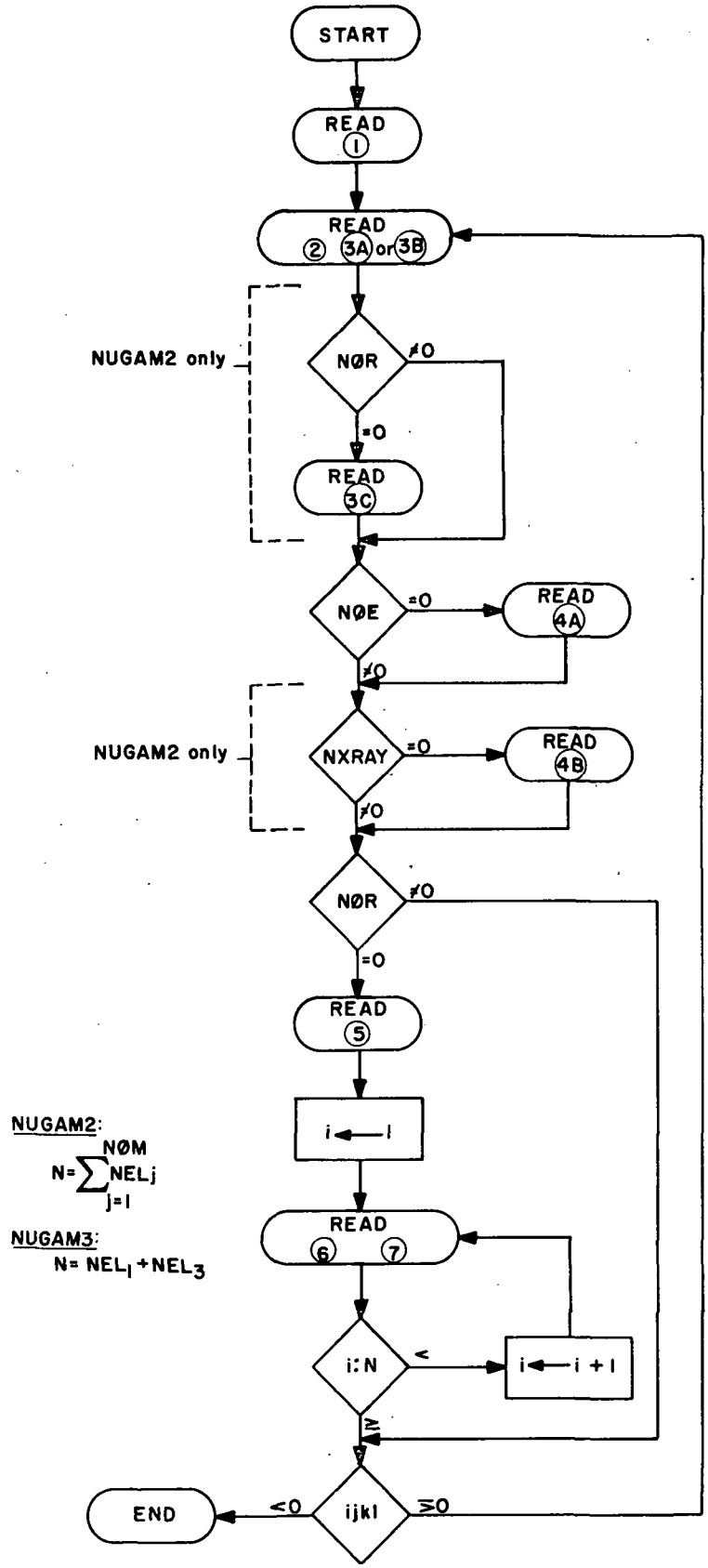
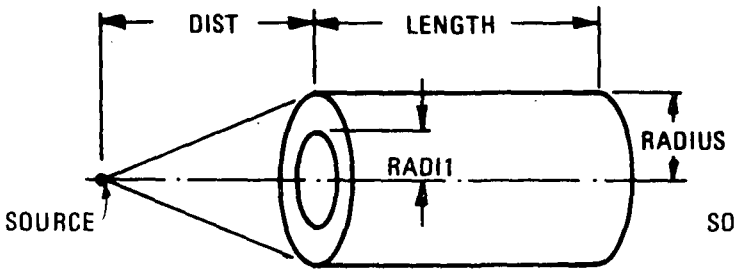
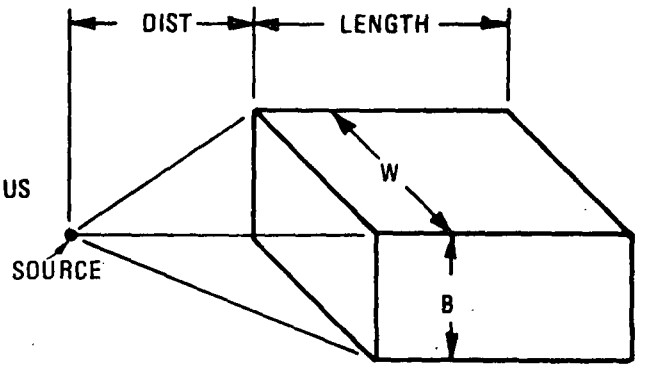


FIGURE 1

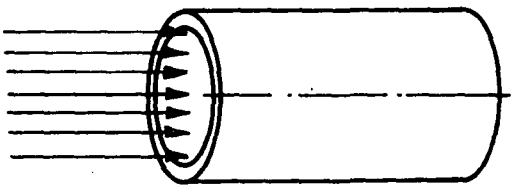
SIMPLIFIED FLOW DIAGRAM OF
NUGAM2 AND NUGAM3 INPUT CARD SEQUENCE



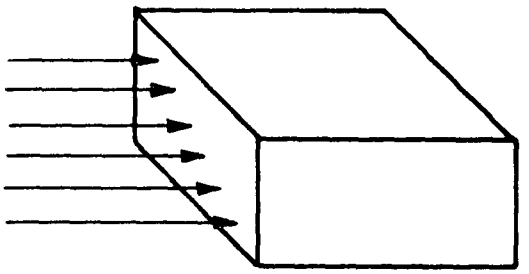
NSOPT = 1, 2



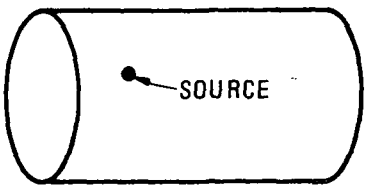
= 3, 4*



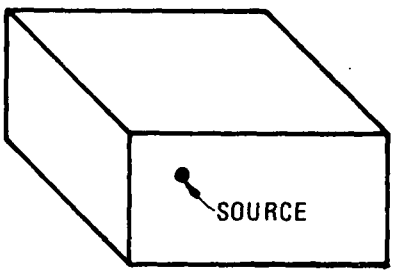
=5,6,7



= 8, 9, 10*



= 11, 12



= 13, 14 *

*NUGAM2 only

FIGURE 2

ALLOWED SOURCE AND TRANSPORT MEDIUM GEOMETRY

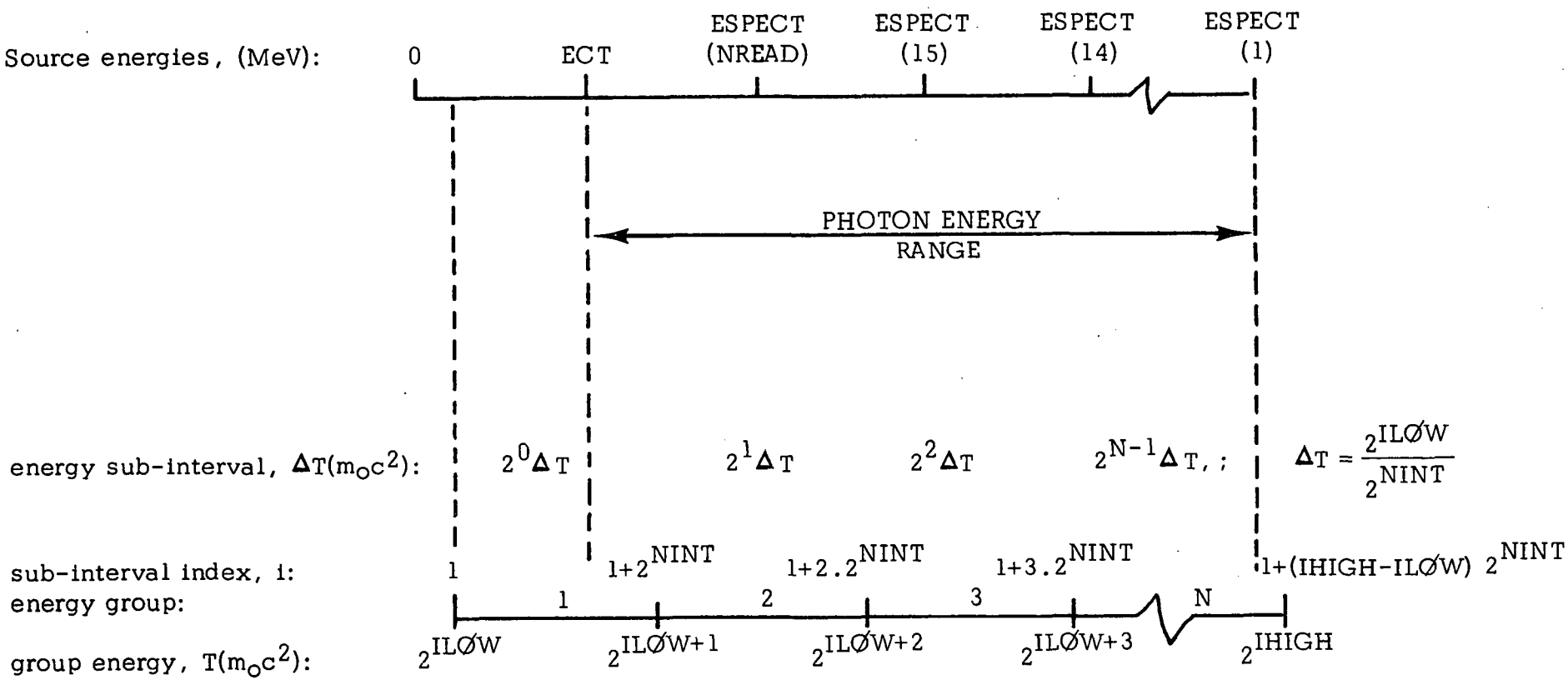


FIGURE 3

ENERGY CORRESPONDENCE BAR DIAGRAM

TABLE 1

CARDS (3A) AND (3B) INPUT VALUES

(FØRTRAN NOTATION)

NSØPT	RADIUS	W	B	LENGTH	RADI2	RADI1	DIST	THETO	XO	YO	ZO
• 1	> 0.0	-	-	> 0.0	≤RADIUS	RADIUS	> 0.0	-	-	-	-
• 2	> 0.0	-	-	> 0.0	≤RADIUS	<RADIUS	> 0.0	-	-	-	-
3	-	> 0.0	> 0.0	> 0.0	≤RADI3*	RADI3*	> 0.0	-	-	-	-
4	-	> 0.0	> 0.0	> 0.0	"	RADI4**	> 0.0	-	-	-	-
• 5	> 0.0	-	-	> 0.0	≤RADIUS	RADIUS	-	≥ 0.0	-	-	-
• 6	> 0.0	-	-	> 0.0	"	<RADIUS	-	≥ 0.0	-	-	-
• 7	> 0.0	-	-	> 0.0	"	0.0	-	≥ 0.0	-	-	-
8	-	> 0.0	> 0.0	> 0.0	≤RADI3*	-	-	≥ 0.0	-	-	-
9	-	> 0.0	> 0.0	> 0.0	"	RADI4**	-	≥ 0.0	-	-	-
10	-	> 0.0	> 0.0	> 0.0	"	0.0	-	≥ 0.0	-	-	-
•11	> 0.0	-	-	> 0.0	≤RADIUS	RADIUS	-	-	-	-	-
•12	> 0.0	-	-	> 0.0	≤RADIUS	-	-	-	≤RADIUS	≤RADIUS	≥ 0.0 <LENGTH
13	-	> 0.0	> 0.0	> 0.0	≤RADI3*	-	-	-	-	-	-
14	-	> 0.0	> 0.0	> 0.0	≤RADI3*	-	-	-	$\leq \frac{W}{2}$	$\leq \frac{B}{2}$	≥ 0.0 <LENGTH

* RADI3 = $((W/2)^2 + (B/2)^2)^{1/2}$; if RADI2 met specified then RADI3 assumed.

** RADI4 ≤ W/2 or B/2, whichever is smaller.

• allowed options for NUGAM3.

APPENDIX I

SAMPLE INPUT LISTING FOR NUGAM2

```
  301
10000     0     0     0     1     2     2                                    -1
    5   8.897                                  8.897
  0.00565    0.0          0.0
    2  0.5  0.5
  2.0          0.035
    6    -4     3     1     1
  25          7.87       26.0        55.85
  .01   16500.                .015    5380.              .02     2380.
  .03     729.                .04      308.             .05      155.
  .06      91.               .08       38.              .10      19.1
  .15     5.4                 .20      2.23             .30      .66
  .40     .29                 .50      .16              .60      .10
  .80     .05                1.0       .03             1.5                .032
  2.0                .12     3.0       0.0      .3503   4.0      0.0      .561
  5.0                0.753   6.0                0.915    8.0               1.181
 10.0                1.406
  24          2.699     13.00       26.98
  0.01   1170.0     0.0      0.015 343.0      0.0      0.02   141.0      0.0
  0.03    39.0      0.0      0.04    15.2     0.0      0.05     7.3      0.0
  0.06     4.0      0.0      0.08     1.61    0.0      0.10      .78     0.0
  0.15      .21     0.0      0.20     0.08    0.0      0.30      .02     0.0
  0.40      .01     0.0      0.50     0.      0.0      0.60     0.0      0.0
  0.80     0.0      0.0      1.0      0.      0.0      1.5      0.0      .0076
  2.00     0.0       .03     3.0      0.     0.0862    4.0      0.0      .1406
  5.0      0.0       .187    6.0      0.0     .229     8.0      0.0       .30
/*
```

APPENDIX II

SAMPLE INPUT LISTING FOR NUGAM3

```
 129   50     0     1 0.8823     0.6372
5000     0     0     0
   5   3.81        7.62        0.3175     0.3175     7.62
  3.81         0.0          0.0          0.0          0.0          0.0          0.0
 0.662       0.035
   6    -4     3     5     1
  26           0.0375     1.0          1.008
  .01    .0046     0.0       .015      .0011     0.0       .02       0.0       0.0
  .03     0.0      0.0       .04        0.0      0.0       .05       0.0       0.0
  .06     0.0      0.0       .08        0.0      0.0       .10       0.0       0.0
  .15     0.0      0.0       .20        0.0      0.0       .30       0.0       0.0
  .40     0.0      0.0       .50        0.0      0.0       .60       0.0       0.0
  .80     0.0      0.0      1.0         0.0      0.0      1.5        0.0      .000044
 2.00      .0      .00018   3.0         0.0      .00052   4.0        0.0      .00087
    5.0        0.    .0012      6.0         0.    .0015      8.0         0.    .0022
   10.         0.    .0027     15.          0.    .0039
  26           0.3029     6.0          12.01
  0.01    38.6       0.0       0.015   10.2       0.0       0.02      3.91      0.0
  0.03     0.99      0.0       0.04     0.38      0.0       0.05      0.18      0.0
  0.06     0.096     0.0       0.08     0.037     0.0       0.10      0.017     0.0
  0.15     0.004     0.0       0.20     0.0       0.0       0.30      0.0       0.0
  0.40     0.0       0.0       0.50     0.0       0.0       0.60      0.0       0.0
  0.80     0.0       0.0       1.0      0.0       0.0       1.5       0.0       0.0016
  2.00     0.0       .0063     3.0      0.0       0.01807   4.0       0.0       0.0303
    5.0        0.    .0407      6.0         0.     .049      8.0         0.     .065
   10.         0.    .080      15.          0.    .105
  26           0.2777     8.0          16.0
    .01     146.       0.        .015     39.6       0.        .02      15.4       0.
    .03     4.09       0.        .04      1.55       0.        .05       .73       0.
    .06      .40       0.        .08       .15       0.        .10       .071      0.
    .15      .02       0.        .20       .01       0.        .30       0.        0.
    .40       0.       0.        .50       0.        0.        .60       0.        0.
    .80       0.       0.       1.0        0.        0.       1.5        0.       .0028
   2.0        0.       .011     3.0        0.       .0321     4.0        0.       .0534
   5.0        0.      .0709     6.0        0.       .088      8.0        0.       .115
   10.        0.       .139     15.        0.       .184
  26           1.4594     13.0         26.98
  0.01  1170.0      0.0       0.015  343.0      0.0       0.02     141.0      0.0
  0.03    39.0      0.0       0.04    15.2      0.0       0.05       7.3      0.0
  0.06     4.0      0.0       0.08     1.61     0.0       0.10       .78      0.0
  0.15      .21     0.0       0.20     0.08     0.0       0.30       .02      0.0
  0.40      .01     0.0       0.50     0.       0.0       0.60       0.0      0.0
  0.80     0.0      0.0       1.0      0.       0.0       1.5        0.0      .0076
  2.00     0.0       .03      3.0      0.       0.0862    4.0        0.0      .1406
  5.0      0.0       .187     6.0      0.0       .229     8.0        0.0       .30
  10.      0.0       .361     15.         0.    .474
  26           0.1524     17.0         35.457
  0.01  3420.0      0.00      0.015  1050.0     0.0       0.02     445.0      0.0
  0.03   130.0      0.00      0.04     52.4     0.0       0.05      24.8      0.0
  0.06    14.0      0.00      0.08      5.7     0.0       0.10       2.8      0.0
  0.15     0.73     0.00      0.20      0.31    0.0       0.30       0.09     0.0
  0.40     0.04     0.00      0.50      0.02    0.0       0.60       0.02     0.0
  0.80    0.007     0.0       1.0       0.004   0.0       1.50       0.0      0.013
  2.0       0.0     0.052     3.0       0.0     0.15      4.0        0.0      0.24
    5.0                .33      6.0                .40      8.0                .52
   10.                 .62     15.          0.    .82
  26           2.0        13.00        26.98
  0.01  1170.0      0.0       0.015  343.0      0.0       0.02     141.0      0.0
  0.03    39.0      0.0       0.04    15.2      0.0       0.05       7.3      0.0
  0.06     4.0      0.0       0.08     1.61     0.0       0.10       .78      0.0
  0.15      .21     0.0       0.20     0.08     0.0       0.30       .02      0.0
  0.40      .01     0.0       0.50     0.       0.0       0.60       0.0      0.0
  0.80     0.0      0.0       1.0      0.       0.0       1.5        0.0      .0076
  2.00     0.0       .03      3.0      0.       0.0862    4.0        0.0      .1406
    5.0         0.    .189      6.0         0.    .229      8.0         0.    .300
  10.0    0.0     0.361        15.          0.    .474
```

APPENDIX III

SAMPLE OUTPUT LISTING FOR NUGAM2

SOURCE OPTION NO. 5 CYLINDRICAL MEDIUM PARALLEL BEAM SOURCE

INCIDENT ANGLE (DEGREE) 0.0

MEDIUM LENGTH (CM) 0.88970E 01 MEDIUM RADIUS (CM) 0.88970E 01

MEDIUM VOLUME (CM**3) 0.22125E 04

NO. OF LAMINATION 2
THICKNESS OF EACH LAMINATION (CM) 4.4485 4.4485

ILLUMINATE RADIUS (CM) 0.5650E-02 BUILDUP AND ALBEDO COUNTING RADIUS (CM) 0.8897E 01 NO. OF RADIAL CATEGORIZATION 2

ILLUMINATE AREA (CM**2) 0.1003E-03 BUILDUP AND ALBEDO COUNTING AREA (CM**2) 0.2487E 03

NUMBER OF PHOTON HISTORIES 10000 INITIAL RANDOM NUMBER 301

SOURCE SPECTRUM ENERGY (MEV) 0.20000E 01 LOW ENERGY CUTOFF (MEV) 0.35000E-01

NO. OF ENERGY INTERVALS IN ESCAPE SPECTRUM 2

ESCAPE SPECTRUM ENERGIES (MC**2)
0.39141E 01 0.19571E 01 0.68497E-01

ESCAPE SPECTRUM ANGLES (RADIANS)
0.31416E 01 0.29671E 01 0.27925E 01 0.26180E 01 0.24435E 01 0.22689E 01 0.20944E 01 0.19199E 01
0.17453E 01 0.15708E 01 0.13963E 01 0.12217E 01 0.10472E 01 0.87266E 00 0.69813E 00 0.52360E 00
0.34907E 00 0.17453E 00 0.0

CROSS-SECTION DATA

NINT = 6 ILOW = -4 IHIGH = 3 NOR = 0

LAMINATION 1
NO.ELEMENTS = 1
NO.CROSS-SECTION ENERGIES 25 NO.ENERGY SUBINTERVALS 449 ATOMIC NUMBER 0.26000E 02
DENSITY (GM/CC) 0.78700E 01 INTERVALS/ENERGY GROUP 64 ATOMIC WEIGHT 0.55850E 02
MICROSCOPIC CROSS-SECTION TABLE (INPUT)

0.9999999E-02	0.1850000E 05	0.0	0.1500000E-01	0.5380000E 04	0.0
0.2000000E-01	0.2380000E 04	0.0	0.3000000E-01	0.7290000E 03	0.0
0.4000000E-01	0.3090000E 03	0.0	0.5000000E-01	0.1550000E 03	0.0
0.6000000E-01	0.9100000E 02	0.0	0.7999998E-01	0.3800000E 02	0.0
0.9999996E-01	0.1909999E 02	0.0	0.1500000E 00	0.5400000E 01	0.0
0.2000000E 00	0.2230000E 01	0.0	0.3000000E 00	0.6600000E 00	0.0
0.4000000E 00	0.2900000E 00	0.0	0.5000000E 00	0.1600000E 00	0.0
0.6000000E 00	0.6959996E-01	0.0	0.8000000E 00	0.5000000E-01	0.0
0.1000000E 01	0.3000000E-01	0.0	0.1500000E 01	0.0	0.3200000E-01
0.2000000E 01	0.0	0.1199999E 00	0.3000000E 01	0.0	0.3503000E 00
0.4000000E 01	0.0	0.5610000E 00	0.5000000E 01	0.0	0.7530000E 00
0.6000000E 01	0.0	0.9150000E 00	0.8000000E 01	0.0	0.1181000E 01
0.1000000E 02	0.0	0.1405999E 01			

ADEN= 0.8497195E-01 ELDEN= 0.2206670E 01

SIGMA-TL	SIGMA-PE	SIGMA-PP	SIGMA-SC	ENERGY	
KAY= 18 CAY= 0.2779999E-01					
0.1401879E 04	0.1400387E 04	0.0	0.1492394E 01	0.1957062E-01	1
0.4590349E 03	0.4566108E 03	0.0	0.1424119E 01	0.2935592E-01	2
0.2033618E 03	0.2019952E 03	0.0	0.1366594E 01	0.3914124E-01	3
0.6319415E 02	0.6187164E 02	0.0	0.1322511E 01	0.4871186E-01	4
0.2741817E 02	0.2614055E 02	0.0	0.1277621E 01	0.5828248E-01	5
0.1439519E 02	0.1315515E 02	0.0	0.1240039E 01	0.6785306E-01	6
0.8927735E 01	0.7723347E 01	0.0	0.1204389E 01	0.1174237E 00	7
0.4366724E 01	0.3225134E 01	0.0	0.1141590E 01	0.1565649E 00	8
0.2708546E 01	0.1621053E 01	0.0	0.1087493E 01	0.1957061E 00	9
0.1437222E 01	0.4583085E 00	0.0	0.9789138E 00	0.2935593E 00	10
0.1085260E 01	0.1892644E 00	0.0	0.8969951E 00	0.3914124E 00	11
0.8359730E 00	0.5601548E-01	0.0	0.7799575E 00	0.4871185E 00	12
0.7234265E 00	0.2461286E-01	0.0	0.6988136E 00	0.5828248E 00	13
0.6516783E 00	0.1357951E-01	0.0	0.6380998E 00	0.6785310E 00	14
0.5987694E 00	0.8487191E-02	0.0	0.5902823E 00	0.1174236E 01	15
0.5227249E 00	0.4243594E-02	0.0	0.5184814E 00	0.1565649E 01	16
0.4686139E 00	0.2546158E-02	0.0	0.4660677E 00	0.1957062E 01	17
0.3820274E 00	0.6990931E-03	0.2715902E-02	0.3786124E 00	0.2935593E 01	18
0.3334450E 00	0.2949298E-03	0.1018463E-01	0.3229655E 00	0.3914124E 01	19
0.2837852E 00	0.8738664E-04	0.2973064E-01	0.2539672E 00	0.4871185E 01	20
0.2594316E 00	0.3686623E-04	0.4761316E-01	0.2117816E 00	0.5828248E 01	21
0.2467825E 00	0.1887551E-04	0.6300852E-01	0.1828551E 00	0.6785310E 01	22
0.2392611E 00	0.1092333E-04	0.7765782E-01	0.1615924E 00	0.1174237E 02	23
0.2323813E 00	0.4608280E-05	0.1002337E 00	0.1321430E 00	0.1565650E 02	24
0.2319455E 00	0.2359439E-05	0.1193299E 00	0.1125133E 00	0.1957062E 02	25

B

LAMINATION 2
NO.ELEMENTS = 1
NO.CROSS-SECTION ENERGIES 24 NO.ENERGY SUBINTERVALS 440 ATOMIC NUMBER 0.13000E 02
DENSITY (GM/CC) 0.26990E 01 INTERVALS/ENERGY GROUP 64 ATOMIC WEIGHT 0.26980E 02
MICROSCOPIC CROSS-SECTION TABLE (INPUT)

0.999999ME-02	0.1170000E 04	0.0	0.1500000E-01	0.3430000E 03	0.0
0.2000000E-01	0.1410000E 03	0.0	0.3000000E-01	0.3900000E 02	0.0
0.4000000E-01	0.1520000E 02	0.0	0.5000000E-01	0.7299999E 01	0.0
0.6000000E-01	0.4000000E 01	0.0	0.7999998E-01	0.1510000E 01	0.0
0.9999996E-01	0.7800000E 00	0.0	0.1500000E 00	0.2100000E 00	0.0
0.2000000E 00	0.7999998E-01	0.0	0.3000000E 00	0.2000000E-01	0.0
0.4000000E 00	0.9999998E-02	0.0	0.5000000E 00	0.0	0.0
0.6000000E 00	0.0	0.0	0.8000000E 00	0.0	0.0
0.1000000E 01	0.0	0.0	0.1500000E 01	0.0	0.7599998E-02
0.2000000E 01	0.0	0.3000000E-01	0.3000000E 01	0.0	0.8620000E-01
0.4000000E 01	0.0	0.1406000E 00	0.5000000E 01	0.0	0.1870000E 00
0.6000000E 01	0.0	0.2290000E 00	0.8000000E 01	0.0	0.3000000E 00

ADEN= 0.6025231E-01 ELDEN= 0.7832800E 00

SIGMA-TL	SIGMA-PE	SIGMA-PP	SIGMA-SC	ENERGY	
KAY= 14 CAY= 0.5899991E-03					
0.7102493E 02	0.7049519E 02	0.0	0.5297409E 00	0.1957062E-01	1
0.2117203E 02	0.2066653E 02	0.0	0.5055056E 00	0.2935592E-01	2
0.8980661E 01	0.8495575E 01	0.0	0.4850869E 00	0.3914124E-01	3
0.2819278E 01	0.2349839E 01	0.0	0.4694389E 00	0.5871185E-01	4
0.1369339E 01	0.9158351E 00	0.0	0.4535047E 00	0.7828248E-01	5
0.8800064E 00	0.4384194E 00	0.0	0.4401646E 00	0.9785306E-01	6
0.6695195E 00	0.2410092E 00	0.0	0.4275103E 00	0.1174237E 00	7
0.5022252E 00	0.9700614E-01	0.0	0.4052191E 00	0.1565649E 00	8
0.4330137E 00	0.4699680E-01	0.0	0.3860159E 00	0.1957061E 00	9
0.3601284E 00	0.1265298E-01	0.0	0.3474755E 00	0.2935593E 00	10
0.3232181E 00	0.4820183E-02	0.0	0.3183979E 00	0.3914124E 00	11
0.2780589E 00	0.1205046E-02	0.0	0.2768539E 00	0.5871185E 00	12
0.2486535E 00	0.6025229E-03	0.0	0.2480510E 00	0.7828249E 00	13
0.2267841E 00	0.2843903E-03	0.0	0.2254997E 00	0.9785310E 00	14
0.2096913E 00	0.1645779E-03	0.0	0.2095267E 00	0.1174235E 01	15
0.1841096E 00	0.6943128E-04	0.0	0.1840402E 00	0.1565649E 01	16
0.1654710E 00	0.3554880E-04	0.0	0.1654355E 00	0.1957062E 01	17
0.1348608E 00	0.1053298E-04	0.4579173E-03	0.1343923E 00	0.2935593E 01	18
0.1164519E 00	0.4443601E-05	0.1807569E-02	0.1146399E 00	0.3914124E 01	19
0.9534323E-01	0.1316622E-05	0.5193748E-02	0.9014821E-01	0.5871185E 01	20
0.8364606E-01	0.5554501E-06	0.8471470E-02	0.7517403E-01	0.7828248E 01	21
0.7617372E-01	0.2843904E-06	0.1126718E-01	0.6490630E-01	0.9785310E 01	22
0.7115680E-01	0.1645778E-06	0.1379777E-01	0.5735897E-01	0.1174237E 02	23
0.6498122E-01	0.6943122E-07	0.1807569E-01	0.4690551E-01	0.1565650E 02	24

CROSS SECTION TABLE

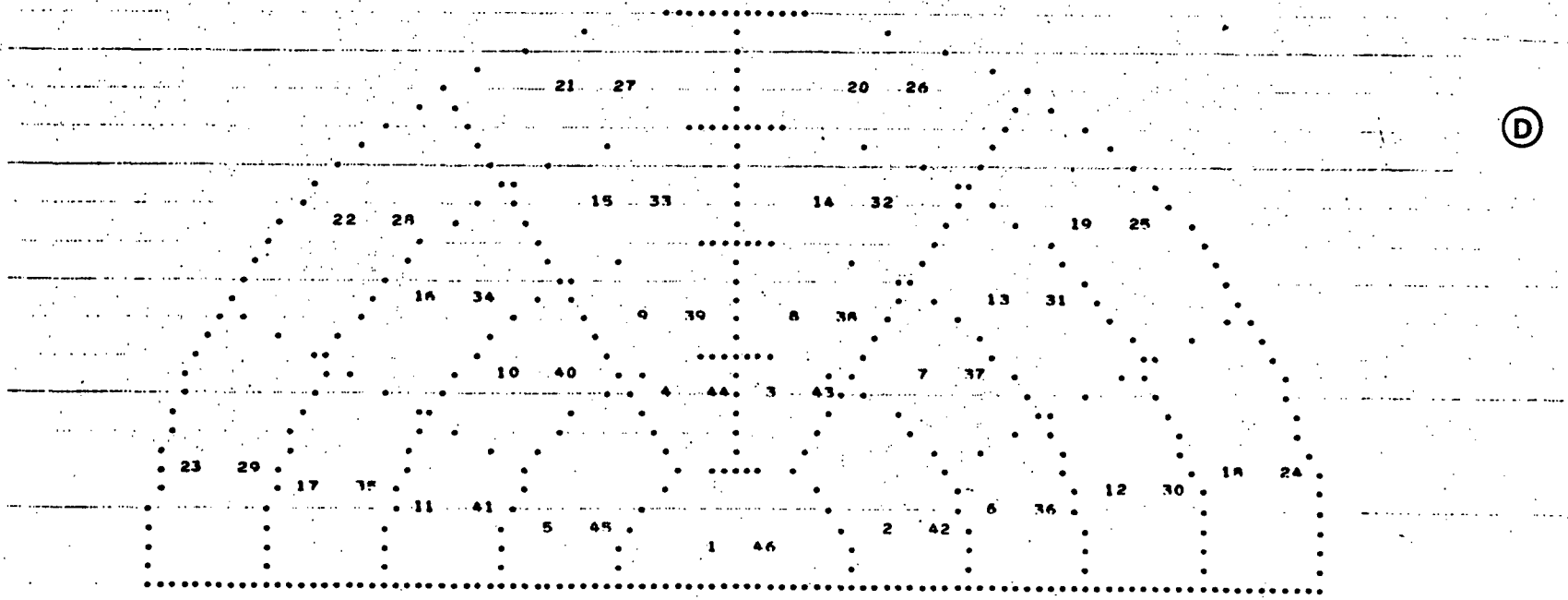
	TOTAL		SCAT/TOTAL		P-P/TOTAL	ENERGY (MEV)
1	0.526156	02	450	0.24900E-01	899	0.0	0.319376-01
2	0.512946	02	451	0.26011E-01	900	0.0	0.324356-01
3	0.499356	02	452	0.27157E-01	901	0.0	0.329746-01
4	0.486326	02	453	0.28321E-01	902	0.0	0.334336-01
5	0.473896	02	454	0.29527E-01	903	0.0	0.339326-01
6	0.462576	02	455	0.30763E-01	904	0.0	0.344316-01
7	0.450276	02	456	0.32016E-01	905	0.0	0.349306-01
8	0.438946	02	457	0.33319E-01	906	0.0	0.354296-01
9	0.427436	02	458	0.34632E-01	907	0.0	0.359286-01
10	0.416886	02	459	0.35997E-01	908	0.0	0.364276-01
11	0.405056	02	460	0.37370E-01	909	0.0	0.369266-01
12	0.393196	02	461	0.38789E-01	910	0.0	0.374256-01
13	0.381516	02	462	0.40239E-01	911	0.0	0.379246-01
14	0.369716	02	463	0.41703E-01	912	0.0	0.384236-01
15	0.356526	02	464	0.43215E-01	913	0.0	0.389226-01
16	0.345886	02	465	0.44757E-01	914	0.0	0.394216-01
17	0.335766	02	466	0.46330E-01	915	0.0	0.399206-01
18	0.326926	02	467	0.47955E-01	916	0.0	0.404196-01
19	0.316526	02	468	0.49649E-01	917	0.0	0.409186-01
20	0.305576	02	469	0.51356E-01	918	0.0	0.414176-01
21	0.293066	02	470	0.53118E-01	919	0.0	0.419166-01
22	0.281046	02	471	0.54903E-01	920	0.0	0.424156-01
23	0.272216	02	472	0.56709E-01	921	0.0	0.429136-01
24	0.261976	02	473	0.58549E-01	922	0.0	0.434126-01
25	0.250796	02	474	0.60433E-01	923	0.0	0.439116-01
26	0.240376	02	475	0.62363E-01	924	0.0	0.444106-01
27	0.229646	02	476	0.64301E-01	925	0.0	0.449096-01
28	0.218506	02	477	0.66300E-01	926	0.0	0.454086-01
29	0.207636	02	478	0.68316E-01	927	0.0	0.459076-01
30	0.196026	02	479	0.70369E-01	928	0.0	0.464066-01
31	0.172646	02	480	0.72444E-01	929	0.0	0.469056-01
32	0.167496	02	481	0.74556E-01	930	0.0	0.474046-01
33	0.162566	02	482	0.76702E-01	931	0.0	0.479036-01
34	0.157936	02	483	0.78880E-01	932	0.0	0.484026-01
35	0.153296	02	484	0.81096E-01	933	0.0	0.489016-01
36	0.148046	02	485	0.83349E-01	934	0.0	0.494006-01
37	0.144776	02	486	0.85629E-01	935	0.0	0.498996-01
38	0.140916	02	487	0.87935E-01	936	0.0	0.503986-01
39	0.137256	02	488	0.90045E-01	937	0.0	0.508976-01
40	0.133726	02	489	0.92286E-01	938	0.0	0.513966-01
41	0.130336	02	490	0.94561E-01	939	0.0	0.518956-01
42	0.127066	02	491	0.96843E-01	940	0.0	0.523946-01
43	0.123906	02	492	0.99165E-01	941	0.0	0.528936-01
44	0.120876	02	493	0.10151E 00	942	0.0	0.533926-01
45	0.117946	02	494	0.10388E 00	943	0.0	0.538916-01
46	0.115116	02	495	0.10628E 00	944	0.0	0.543906-01
47	0.112396	02	496	0.10870E 00	945	0.0	0.548896-01
48	0.109766	02	497	0.11114E 00	946	0.0	0.553886-01
49	0.107226	02	498	0.11362E 00	947	0.0	0.558876-01
50	0.104766	02	499	0.11612E 00	948	0.0	0.563866-01
51	0.102396	02	500	0.11863E 00	949	0.0	0.568856-01
52	0.100106	02	501	0.12118E 00	950	0.0	0.573846-01
53	0.978896	01	502	0.12374E 00	951	0.0	0.578836-01
54	0.957476	01	503	0.12632E 00	952	0.0	0.583826-01
55	0.936776	01	504	0.12893E 00	953	0.0	0.588816-01
56	0.916736	01	505	0.13157E 00	954	0.0	0.593806-01
57	0.897346	01	506	0.13423E 00	955	0.0	0.598796-01
58	0.878026	01	507	0.13699E 00	956	0.0	0.603786-01
59	0.859166	01	508	0.13981E 00	957	0.0	0.608776-01

60	0.640070E 01	509	0.14264E 00	958	0.0	0.61776E-01
61	0.623230E 01	510	0.14550E 00	959	0.0	0.61876E-01
62	0.606120E 01	511	0.14838E 00	960	0.0	0.62374E-01
63	0.589550E 01	512	0.15129E 00	961	0.0	0.62873E-01
64	0.573650E 01	513	0.15422E 00	962	0.0	0.63372E-01
65	0.557030E 01	514	0.15716E 00	963	0.0	0.63871E-01
66	0.540250E 01	515	0.16013E 00	964	0.0	0.64369E-01
67	0.523010E 01	516	0.16312E 00	965	0.0	0.64867E-01
68	0.507040E 01	517	0.16613E 00	966	0.0	0.65365E-01
69	0.490290E 01	518	0.16916E 00	967	0.0	0.65863E-01
70	0.473920E 01	519	0.17221E 00	968	0.0	0.66361E-01
71	0.457030E 01	520	0.17528E 00	969	0.0	0.66858E-01
72	0.440700E 01	521	0.17837E 00	970	0.0	0.67357E-01
73	0.424330E 01	522	0.18149E 00	971	0.0	0.67855E-01
74	0.407750E 01	523	0.18463E 00	972	0.0	0.68353E-01
75	0.391710E 01	524	0.18780E 00	973	0.0	0.68851E-01
76	0.375030E 01	525	0.19099E 00	974	0.0	0.69349E-01
77	0.358530E 01	526	0.19420E 00	975	0.0	0.69847E-01
78	0.342490E 01	527	0.19744E 00	976	0.0	0.70345E-01
79	0.326190E 01	528	0.20070E 00	977	0.0	0.70843E-01
80	0.309610E 01	529	0.20398E 00	978	0.0	0.71341E-01
81	0.293490E 01	530	0.20729E 00	979	0.0	0.71839E-01
82	0.277240E 01	531	0.21062E 00	980	0.0	0.72337E-01
83	0.261360E 01	532	0.21398E 00	981	0.0	0.72835E-01
84	0.245040E 01	533	0.21736E 00	982	0.0	0.73333E-01
85	0.229220E 01	534	0.22077E 00	983	0.0	0.73831E-01
86	0.213080E 01	535	0.22420E 00	984	0.0	0.74329E-01
87	0.197170E 01	536	0.22766E 00	985	0.0	0.74827E-01
88	0.181270E 01	537	0.23115E 00	986	0.0	0.75325E-01
89	0.165380E 01	538	0.23466E 00	987	0.0	0.75823E-01
90	0.149200E 01	539	0.23821E 00	988	0.0	0.76321E-01
91	0.133110E 01	540	0.24178E 00	989	0.0	0.76819E-01
92	0.117020E 01	541	0.24538E 00	990	0.0	0.77317E-01
93	0.101790E 01	542	0.24902E 00	991	0.0	0.77815E-01
94	0.861610E 00	543	0.25268E 00	992	0.0	0.78313E-01
95	0.707730E 00	544	0.25638E 00	993	0.0	0.78811E-01
96	0.551130E 00	545	0.26011E 00	994	0.0	0.79309E-01
97	0.394900E 00	546	0.26387E 00	995	0.0	0.79807E-01
98	0.238720E 00	547	0.26766E 00	996	0.0	0.80305E-01
99	0.282890E 01	548	0.27148E 00	997	0.0	0.80803E-01
100	0.277290E 01	549	0.27533E 00	998	0.0	0.81301E-01
101	0.271600E 01	550	0.27921E 00	999	0.0	0.81799E-01
102	0.266080E 01	551	0.28312E 00	1000	0.0	0.82297E 00
103	0.261650E 01	552	0.28706E 00	1001	0.0	0.82795E 00
104	0.256810E 01	553	0.29103E 00	1002	0.0	0.83293E 00
105	0.252150E 01	554	0.29503E 00	1003	0.0	0.83790E 00
106	0.247670E 01	555	0.29907E 00	1004	0.0	0.84288E 00
107	0.243150E 01	556	0.30314E 00	1005	0.0	0.84786E 00
108	0.238010E 01	557	0.30724E 00	1006	0.0	0.85284E 00
109	0.233170E 01	558	0.31137E 00	1007	0.0	0.85782E 00
110	0.228190E 01	559	0.31553E 00	1008	0.0	0.86280E 00
111	0.223550E 01	560	0.31973E 00	1009	0.0	0.86778E 00
112	0.218300E 01	561	0.32396E 00	1010	0.0	0.87276E 00
113	0.213040E 01	562	0.32822E 00	1011	0.0	0.87774E 00
114	0.207110E 01	563	0.33252E 00	1012	0.0	0.88272E 00
115	0.201390E 01	564	0.33686E 00	1013	0.0	0.88770E 00
116	0.195710E 01	565	0.34123E 00	1014	0.0	0.89268E 00
117	0.190480E 01	566	0.34564E 00	1015	0.0	0.89766E 00
118	0.184740E 01	567	0.35009E 00	1016	0.0	0.90264E 00
119	0.179190E 01	568	0.35457E 00	1017	0.0	0.90762E 00
120	0.173150E 01	569	0.35910E 00	1018	0.0	0.91260E 00
121	0.167480E 01	570	0.36367E 00	1019	0.0	0.91758E 00
122	0.161390E 01	571	0.36828E 00	1020	0.0	0.92256E 00
123	0.155140E 01	572	0.37293E 00	1021	0.0	0.92754E 00
124	0.148790E 01	573	0.37762E 00	1022	0.0	0.93252E 00
125	0.142630E 01	574	0.38236E 00	1023	0.0	0.93750E 00

The remaining 12 pages of output in this example are omitted here.

SEGMENTATION OF HEMISPHERE FOR DEFINING DIRECTION OF SCATTERING

BACK HEMISPHERE (ALBEDO)				FRONT HEMISPHERE (BUILD-UP)			
SECTOR NO	SOLID-ANGLE	POLAR-ANGLE(DEGREE)	AZIMUTHAL-ANGLE(DEGREE)	SECTOR NO	SOLID-ANGLE	POLAR-ANGLE(DEGREE)	AZIMUTHAL-ANGLE(DEGREE)
1	0.21410E 00	165.00 - 180.00	0.0 - 180.00	24	0.27103E 00	75.00 - 90.00	0.0 - 30.00
2	0.30740E 00	145.00 - 165.00	0.0 - 60.00	25	0.27103E 00	75.00 - 90.00	30.00 - 60.00
3	0.15370E 00	145.00 - 165.00	60.00 - 90.00	26	0.27103E 00	75.00 - 90.00	60.00 - 90.00
4	0.15370E 00	145.00 - 165.00	90.00 - 120.00	27	0.27103E 00	75.00 - 90.00	90.00 - 120.00
5	0.30740E 00	145.00 - 165.00	120.00 - 180.00	28	0.27103E 00	75.00 - 90.00	120.00 - 150.00
6	0.25717E 00	125.00 - 145.00	0.0 - 30.00	29	0.27103E 00	75.00 - 90.00	150.00 - 180.00
7	0.25717E 00	125.00 - 145.00	30.00 - 60.00	30	0.32961E 00	55.00 - 75.00	0.0 - 30.00
8	0.25717E 00	125.00 - 145.00	60.00 - 90.00	31	0.32961E 00	55.00 - 75.00	30.00 - 60.00
9	0.25717E 00	125.00 - 145.00	90.00 - 120.00	32	0.32961E 00	55.00 - 75.00	60.00 - 90.00
10	0.25717E 00	125.00 - 145.00	120.00 - 150.00	33	0.32961E 00	55.00 - 75.00	90.00 - 120.00
11	0.25717E 00	125.00 - 145.00	150.00 - 180.00	34	0.32961E 00	55.00 - 75.00	120.00 - 150.00
12	0.32961E 00	105.00 - 125.00	0.0 - 30.00	35	0.32961E 00	55.00 - 75.00	150.00 - 180.00
13	0.32961E 00	105.00 - 125.00	30.00 - 60.00	36	0.25717E 00	35.00 - 55.00	0.0 - 30.00
14	0.32961E 00	105.00 - 125.00	60.00 - 90.00	37	0.25717E 00	35.00 - 55.00	30.00 - 60.00
15	0.32961E 00	105.00 - 125.00	90.00 - 120.00	38	0.25717E 00	35.00 - 55.00	60.00 - 90.00
16	0.32961E 00	105.00 - 125.00	120.00 - 150.00	39	0.25717E 00	35.00 - 55.00	90.00 - 120.00
17	0.32961E 00	105.00 - 125.00	150.00 - 180.00	40	0.25717E 00	35.00 - 55.00	120.00 - 150.00
18	0.27103E 00	90.00 - 105.00	0.0 - 30.00	41	0.25717E 00	35.00 - 55.00	150.00 - 180.00
19	0.27103E 00	90.00 - 105.00	30.00 - 60.00	42	0.30740E 00	15.00 - 35.00	0.0 - 60.00
20	0.27103E 00	90.00 - 105.00	60.00 - 90.00	43	0.15370E 00	15.00 - 35.00	60.00 - 90.00
21	0.27103E 00	90.00 - 105.00	90.00 - 120.00	44	0.15370E 00	15.00 - 35.00	90.00 - 120.00
22	0.27103E 00	90.00 - 105.00	120.00 - 150.00	45	0.30740E 00	15.00 - 35.00	120.00 - 180.00
23	0.27103E 00	90.00 - 105.00	150.00 - 180.00	46	0.21410E 00	0.0 - 15.00	0.0 - 180.00



(D)

COUNTING RADIUS = 4.448 (CM)

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 1.91412 TO 1.95706 INDEX 1

ALBEDO - ESCAPES THROUGHT BACK FACE

J	SOLID ANGLE	UNSCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

J	SOLID ANGLE	UNSCATTERED P. P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED P.P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUM OF SCATTERED, SCATTERED P.P. AND UNSCATTERED P.P. 0.0 0.0 0.0 0.0

(E)

COUNTING RADIUS = 4.44A (C4)

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 3.91412 TO 1.09704 INDEX 1

BUILD-UP - ESCAPES THROUGH FRONT FACE

		UNSCATTERED ESCAPES				SCATTERED ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.32961E 00	0.0	0.0	0.0	0.0	0.96994E 00	0.29427E 01	0.31496E 01	0.59694E-05
32	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	0.25717E 00	0.0	0.0	0.0	0.0	0.18440E 02	0.71784E 02	0.79329E 02	0.14929E-03
37	0.25717E 00	0.0	0.0	0.0	0.0	0.11657E 02	0.45328E 02	0.50710E 02	0.95104E-04
38	0.25717E 00	0.0	0.0	0.0	0.0	0.16545E 02	0.64336E 02	0.71712E 02	0.14344E-03
39	0.25717E 00	0.0	0.0	0.0	0.0	0.15620E 02	0.60737E 02	0.68760E 02	0.12873E-03
40	0.25717E 00	0.0	0.0	0.0	0.0	0.16465E 02	0.64027E 02	0.72719E 02	0.13596E-03
41	0.25717E 00	0.0	0.0	0.0	0.0	0.21426E 02	0.83316E 02	0.95714E 02	0.17843E-03
42	0.30740E 00	0.0	0.0	0.0	0.0	0.20493E 03	0.66665E 03	0.97588E 03	0.17188E-02
43	0.15370E 00	0.0	0.0	0.0	0.0	0.10492E 03	0.68196E 03	0.98357E 03	0.17394E-02
44	0.15370E 00	0.0	0.0	0.0	0.0	0.11746E 03	0.76420E 03	0.11337E 04	0.19300E-02
45	0.30740E 00	0.0	0.0	0.0	0.0	0.21946E 03	0.71393E 03	0.10592E 04	0.19504E-02
46	0.21410E 00	0.13530E 04	0.63196E 04	0.12639E 05	0.20449E-01	0.33868E 03	0.15819E 04	0.28652E 04	0.47621E-02
TOTAL	0.62832E 01	0.13530E 04	0.63196E 04	0.12639E 05	0.20449E-01	0.10865E 04	0.48011E 04	0.74654E 04	0.12906E-01

		UNSCATTERED P. P. ESCAPES				SCATTERED P.P. ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
33	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
40	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
41	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
45	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46	0.21410E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUM OF SCATTERED, SCATTERED P.P. AND UNSCATTERED P.P.	0.10865E 04	0.48011E 04	0.74654E 04	0.12906E-01
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COUNTING RADIUS = 4.448 (CM)

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 1.95706 TO 0.06850 INDEX 2

ALBEDO - ESCAPES THROUGHT BACK FACE

		UNSCATTERED ESCAPES				SCATTERED ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.61583E 02	0.28745E 03	0.61064E 02	0.11404E-03
2	0.30740E 00	0.0	0.0	0.0	0.0	0.80571E 02	0.26210E 03	0.57133E 02	0.10728E-03
3	0.15370E 00	0.0	0.0	0.0	0.0	0.40288E 02	0.26212E 03	0.59589E 02	0.11254E-03
4	0.15370E 00	0.0	0.0	0.0	0.0	0.41369E 02	0.26915E 03	0.60644E 02	0.11452E-03
5	0.30740E 00	0.0	0.0	0.0	0.0	0.76729E 02	0.24960E 03	0.55604E 02	0.10474E-03
6	0.25717E 00	0.0	0.0	0.0	0.0	0.64027E 02	0.24897E 03	0.59031E 02	0.11249E-03
7	0.25717E 00	0.0	0.0	0.0	0.0	0.57052E 02	0.22185E 03	0.53238E 02	0.10171E-03
8	0.25717E 00	0.0	0.0	0.0	0.0	0.55330E 02	0.21515E 03	0.50227E 02	0.95437E-04
9	0.25717E 00	0.0	0.0	0.0	0.0	0.46613E 02	0.18125E 03	0.44182E 02	0.84567E-04
10	0.25717E 00	0.0	0.0	0.0	0.0	0.69098E 02	0.26865E 03	0.64175E 02	0.12242E-03
11	0.25717E 00	0.0	0.0	0.0	0.0	0.40623E 02	0.15796E 03	0.36833E 02	0.69959E-04
12	0.32961E 00	0.0	0.0	0.0	0.0	0.47163E 02	0.14309E 03	0.38938E 02	0.74911E-04
13	0.32961E 00	0.0	0.0	0.0	0.0	0.45041E 02	0.13665E 03	0.37703E 02	0.73522E-04
14	0.32961E 00	0.0	0.0	0.0	0.0	0.42707E 02	0.12984E 03	0.36610E 02	0.71644E-04
15	0.32961E 00	0.0	0.0	0.0	0.0	0.40742E 02	0.12361E 03	0.33472E 02	0.65121E-04
16	0.32961E 00	0.0	0.0	0.0	0.0	0.47404E 02	0.14382E 03	0.37445E 02	0.72479E-04
17	0.32961E 00	0.0	0.0	0.0	0.0	0.47966E 02	0.14552E 03	0.40645E 02	0.79421E-04
18	0.27103E 00	0.0	0.0	0.0	0.0	0.56337E 01	0.20786E 02	0.49110E 01	0.13724E-04
19	0.27103E 00	0.0	0.0	0.0	0.0	0.10773E 02	0.39748E 02	0.12737E 02	0.25528E-04
20	0.27103E 00	0.0	0.0	0.0	0.0	0.13661E 02	0.50403E 02	0.13717E 02	0.26479E-04
21	0.27103E 00	0.0	0.0	0.0	0.0	0.78141E 01	0.28846E 02	0.90857E 01	0.18001E-04
22	0.27103E 00	0.0	0.0	0.0	0.0	0.13942E 02	0.51440E 02	0.17037E 02	0.33990E-04
23	0.27103E 00	0.0	0.0	0.0	0.0	0.44873E 01	0.16556E 02	0.55346E 01	0.11040E-04
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.96066E 03	0.35446E 04	0.89117E 03	0.17056E-02

		UNSCATTERED P. P. ESCAPES				SCATTERED P.P. ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.40980E 01	0.19141E 02	0.97805E 01	0.19931E-04	0.54834E 01	0.25612E 02	0.76539E 01	0.15025E-04
2	0.30740E 00	0.49279E 01	0.14729E 02	0.75262E 01	0.15337E-04	0.50212E 01	0.19587E 02	0.56765E 01	0.11105E-04
3	0.15370E 00	0.20878E 01	0.13587E 02	0.69406E 01	0.14144E-04	0.31601E 01	0.20560E 02	0.60521E 01	0.11853E-04
4	0.15370E 00	0.22956E 01	0.14935E 02	0.76316E 01	0.15552E-04	0.34633E 01	0.23834E 02	0.66270E 01	0.12891E-04
5	0.30740E 00	0.43343E 01	0.14100E 02	0.72046E 01	0.14682E-04	0.55723E 01	0.18127E 02	0.51448E 01	0.10035E-04
6	0.25717E 00	0.39514E 01	0.15365E 02	0.78512E 01	0.16000E-04	0.39246E 01	0.15260E 02	0.44784E 01	0.87695E-05
7	0.25717E 00	0.29307E 01	0.11396E 02	0.58231E 01	0.11867E-04	0.38956E 01	0.15110E 02	0.44937E 01	0.88259E-05
8	0.25717E 00	0.33212E 01	0.12915E 02	0.65989E 01	0.13448E-04	0.42891E 01	0.16678E 02	0.47377E 01	0.92356E-05
9	0.25717E 00	0.29637E 01	0.11524E 02	0.58886E 01	0.12000E-04	0.44667E 01	0.17369E 02	0.52057E 01	0.10214E-04
10	0.25717E 00	0.29641E 01	0.11534E 02	0.58934E 01	0.12010E-04	0.43773E 01	0.17021E 02	0.50899E 01	0.10009E-04
11	0.25717E 00	0.34359E 01	0.13361E 02	0.68260E 01	0.13912E-04	0.44787E 01	0.17416E 02	0.52005E 01	0.10214E-04
12	0.32961E 00	0.31090E 01	0.94322E 01	0.48196E 01	0.98216E-05	0.31844E 01	0.96670E 01	0.28501E 01	0.55809E-05
13	0.32961E 00	0.21661E 01	0.65717E 01	0.33579E 01	0.68430E-05	0.37990E 01	0.11523E 02	0.36287E 01	0.69390E-05
14	0.32961E 00	0.20144E 01	0.61175E 01	0.31259E 01	0.63701E-05	0.36747E 01	0.11152E 02	0.35566E 01	0.70333E-05
15	0.32961E 00	0.26463E 01	0.80285E 01	0.41023E 01	0.83600E-05	0.33807E 01	0.10257E 02	0.31550E 01	0.62191E-05
16	0.32961E 00	0.25730E 01	0.78062E 01	0.39887E 01	0.81285E-05	0.27250E 01	0.82672E 01	0.26552E 01	0.52572E-05
17	0.32961E 00	0.34720E 01	0.10533E 02	0.53823E 01	0.10968E-04	0.33354E 01	0.10122E 02	0.33473E 01	0.66443E-05
18	0.27103E 00	0.46522E 00	0.24544E 01	0.12541E 01	0.25557E-05	0.58594E 00	0.21619E 01	0.65257E 00	0.12795E-05
19	0.27103E 00	0.72569E 00	0.26775E 01	0.13681E 01	0.27880E-05	0.53290E 00	0.19662E 01	0.63940E 00	0.12471E-05
20	0.27103E 00	0.72569E 00	0.26775E 01	0.13681E 01	0.27880E-05	0.62853E 00	0.23194E 01	0.61910E 00	0.11978E-05
21	0.27103E 00	0.10885E 01	0.40162E 01	0.20522E 01	0.41820E-05	0.77150E 00	0.28543E 01	0.10589E 01	0.21301E-05
22	0.27103E 00	0.10419E 01	0.38441E 01	0.19642E 01	0.40029E-05	0.63913E 00	0.23581E 01	0.69388E 00	0.13341E-05
23	0.27103E 00	0.96759E 00	0.35700E 01	0.18242E 01	0.37174E-05	0.67977E 00	0.25044E 01	0.81424E 00	0.16155E-05
TOTAL	0.62832E 01	0.58110E 02	0.22031E 03	0.11257E 03	0.22941E-03	0.73266E 02	0.28173E 03	0.83917E 02	0.16448E-03

SUM OF SCATTERED, SCATTERED P.P. AND UNSCATTERED P.P. 0.10930E 04 0.41566E 04 0.10977E 04 0.20026E 03

COUNTING RADIUS = 4.449 (CM)

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 1.95706 TO 0.04950 INDEX 2

BUILD-UP - ESCAPES THROUGH FRONT FACE

J	SOLID ANGLE	UNSCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.0	0.0	0.0	0.0	0.56531E 01	0.20857E 02	0.40305E 01	0.94091E-05
25	0.27103E 00	0.0	0.0	0.0	0.0	0.11455E 01	0.42300E 01	0.13791E 01	0.27807E-05
26	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.27103E 00	0.0	0.0	0.0	0.0	0.86694E 00	0.31992E 01	0.78130E 00	0.42795E-06
28	0.27103E 00	0.0	0.0	0.0	0.0	0.23118E 01	0.86035E 01	0.18337E 01	0.34351E-05
29	0.27103E 00	0.0	0.0	0.0	0.0	0.67934E 01	0.25028E 02	0.90866E 01	0.18159E-04
30	0.32961E 00	0.0	0.0	0.0	0.0	0.25113E 02	0.76188E 02	0.27140E 02	0.53642E-04
31	0.32961E 00	0.0	0.0	0.0	0.0	0.24787E 02	0.75190E 02	0.33719E 02	0.44987E-04
32	0.32961E 00	0.0	0.0	0.0	0.0	0.20218E 02	0.61338E 02	0.21451E 02	0.42896E-04
33	0.32961E 00	0.0	0.0	0.0	0.0	0.23024E 02	0.69853E 02	0.26446E 02	0.52224E-04
34	0.32961E 00	0.0	0.0	0.0	0.0	0.14056E 02	0.42643E 02	0.14794E 02	0.29162E-04
35	0.32961E 00	0.0	0.0	0.0	0.0	0.13555E 02	0.41154E 02	0.18424E 02	0.36727E-04
36	0.25717E 00	0.0	0.0	0.0	0.0	0.37838E 02	0.14737E 03	0.73966E 02	0.14492E-03
37	0.25717E 00	0.0	0.0	0.0	0.0	0.53022E 02	0.20618E 03	0.10555E 03	0.20629E-03
38	0.25717E 00	0.0	0.0	0.0	0.0	0.31516E 02	0.12255E 03	0.62843E 02	0.12256E-03
39	0.25717E 00	0.0	0.0	0.0	0.0	0.42730E 02	0.16616E 03	0.89048E 02	0.17432E-03
40	0.25717E 00	0.0	0.0	0.0	0.0	0.34689E 02	0.13490E 03	0.74360E 02	0.14622E-03
41	0.25717E 00	0.0	0.0	0.0	0.0	0.37929E 02	0.14749E 03	0.67744E 02	0.13152E-03
42	0.30740E 00	0.0	0.0	0.0	0.0	0.80134E 02	0.25058E 03	0.12417E 03	0.24566E-03
43	0.15370E 00	0.0	0.0	0.0	0.0	0.30145E 02	0.19612E 03	0.87664E 02	0.17107E-03
44	0.15370E 00	0.0	0.0	0.0	0.0	0.39841E 02	0.25921E 03	0.11700E 03	0.23174E-03
45	0.30740E 00	0.0	0.0	0.0	0.0	0.57904E 02	0.18837E 03	0.83523E 02	0.16411E-03
46	0.21410E 00	0.0	0.0	0.0	0.0	0.60224E 02	0.28130E 03	0.12388E 03	0.24453E-03
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.64357E 03	0.25386E 04	0.11703E 04	0.22396E-02

J	SOLID ANGLE	UNSCATTERED P. P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED P.P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.32340E-01	0.11895E 00	0.60781E-01	0.12386E-06	0.85670E-01	0.31409E 00	0.12944E 00	0.26017E-05
25	0.27103E 00	0.17202E 00	0.63470E 00	0.32431E 00	0.66090E-06	0.97755E-04	0.36067E-03	0.15780E-04	0.55464E-10
26	0.27103E 00	0.32124E-01	0.11852E 00	0.60542E-01	0.12342E-06	0.11209E 00	0.41357E 00	0.55163E-01	0.93822E-07
27	0.27103E 00	0.16421E-01	0.60585E-01	0.30997E-01	0.63187E-07	0.12132E 00	0.44760E 00	0.79014E-01	0.14483E-04
28	0.27103E 00	0.30717E-01	0.11333E 00	0.57909E-01	0.11801E-06	0.35597E-01	0.13134E 00	0.35429E-01	0.69800E-07
29	0.27103E 00	0.12448E 00	0.45926E 00	0.23467E 00	0.47822E-06	0.51479E-01	0.18994E 00	0.34985E-01	0.64908E-07
30	0.32961E 00	0.20067E 00	0.60982E 00	0.31109E 00	0.63395E-06	0.49873E 00	0.15131E 01	0.30240E 00	0.56994E-06
31	0.32961E 00	0.30998E 00	0.94044E 00	0.48054E 00	0.97927E-06	0.17955E 00	0.54505E 00	0.86316E-01	0.15409E-05
32	0.32961E 00	0.31671E 00	0.96086E 00	0.49097E 00	0.10005E-05	0.23195E 00	0.70371E 00	0.15676E 00	0.29517E-06
33	0.32961E 00	0.15358E 00	0.46596E 00	0.23809E 00	0.48519E-06	0.35952E 00	0.10909E 01	0.29801E 00	0.56223E-06
34	0.32961E 00	0.25439E 00	0.77177E 00	0.39435E 00	0.80344E-06	0.44650E 00	0.14153E 01	0.35640E 00	0.68765E-06
35	0.32961E 00	0.21094E 00	0.63998E 00	0.32701E 00	0.66640E-06	0.53450E 00	0.16214E 01	0.51142E 00	0.58739E-06
36	0.25717E 00	0.32586E 00	0.12671E 01	0.64745E 00	0.13194E-05	0.69849E 00	0.27161E 01	0.69758E 00	0.13598E-05
37	0.25717E 00	0.40926E 00	0.15914E 01	0.81316E 00	0.16571E-05	0.12823E 01	0.49862E 01	0.13048E 01	0.25299E-05
38	0.25717E 00	0.65086E 00	0.25309E 01	0.12932E 01	0.26356E-05	0.11828E 01	0.45993E 01	0.12401E 01	0.24602E-05
39	0.25717E 00	0.35361E 00	0.13750E 01	0.70259E 00	0.14319E-05	0.90490E 00	0.35184E 01	0.76074E 00	0.14441E-05
40	0.25717E 00	0.62290E 00	0.24222E 01	0.12377E 01	0.25222E-05	0.12199E 01	0.47437E 01	0.10356E 01	0.19752E-05
41	0.25717E 00	0.45145E 00	0.17555E 01	0.89699E 00	0.18279E-05	0.13248E 01	0.51515E 01	0.13731E 01	0.25556E-05
42	0.30740E 00	0.16312E 01	0.53064E 01	0.27114E 01	0.55255E-05	0.26736E 01	0.85974E 01	0.25230E 01	0.49004E-05
43	0.15370E 00	0.41787E 00	0.40200E 01	0.20541E 01	0.41859E-05	0.16102E 01	0.10476E 02	0.28820E 01	0.56119E-05
44	0.15370E 00	0.53851E 00	0.35036E 01	0.17902E 01	0.36483E-05	0.64148E 00	0.41736E 01	0.11112E 01	0.26009E-05
45	0.30740E 00	0.15636E 01	0.50864E 01	0.25990E 01	0.52964E-05	0.27678E 01	0.90078E 01	0.27414E 01	0.54201E-05
46	0.21410E 00	0.13012E 01	0.60775E 01	0.31054E 01	0.63284E-05	0.28854E 01	0.13477E 02	0.39158E 01	0.76040E-05
TOTAL	0.62832E 01	0.10321E 02	0.40829E 02	0.20862E 02	0.42515E-04	0.19858E 02	0.79929E 02	0.21498E 02	0.42107E-04

SUM OF SCATTERED, SCATTERED P.P. AND UNSCATTERED P.P. 0.67376E 03 0.26504E 04 0.12127E 04 0.23843E-02

COUNTING RADIUS = 4.448 (CM)

SOURCE ENERGY = 2.00000 MEV

ALBEDO - ESCAPES THROUGHT BACK FACE

		UNSCATTERED ESCAPES				SCATTERED ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.61543E 02	0.28745E 03	0.61064E 02	0.11404E-03
2	0.30740E 00	0.0	0.0	0.0	0.0	0.80571E 02	0.26210E 03	0.57137E 02	0.10728E-03
3	0.15370E 00	0.0	0.0	0.0	0.0	0.40398E 02	0.26212E 03	0.59589E 02	0.11256E-03
4	0.15370E 00	0.0	0.0	0.0	0.0	0.41369E 02	0.26915E 03	0.60644E 02	0.11452E-03
5	0.30740E 00	0.0	0.0	0.0	0.0	0.76729E 02	0.24960E 03	0.55604E 02	0.10474E-03
6	0.25717E 00	0.0	0.0	0.0	0.0	0.64027E 02	0.24907E 03	0.59031E 02	0.11248E-03
7	0.25717E 00	0.0	0.0	0.0	0.0	0.57052E 02	0.22195E 03	0.53238E 02	0.10171E-03
8	0.25717E 00	0.0	0.0	0.0	0.0	0.55330E 02	0.21515E 03	0.50227E 02	0.95437E-04
9	0.25717E 00	0.0	0.0	0.0	0.0	0.46613E 02	0.18125E 03	0.44182E 02	0.84543E-04
10	0.25717E 00	0.0	0.0	0.0	0.0	0.69098E 02	0.26865E 03	0.64176E 02	0.12242E-03
11	0.25717E 00	0.0	0.0	0.0	0.0	0.40623E 02	0.15796E 03	0.36833E 02	0.69059E-04
12	0.32961E 00	0.0	0.0	0.0	0.0	0.47163E 02	0.14309E 03	0.38536E 02	0.74911E-04
13	0.32961E 00	0.0	0.0	0.0	0.0	0.45041E 02	0.13665E 03	0.37703E 02	0.73522E-04
14	0.32961E 00	0.0	0.0	0.0	0.0	0.42797E 02	0.12984E 03	0.36619E 02	0.71644E-04
15	0.32961E 00	0.0	0.0	0.0	0.0	0.40742E 02	0.12361E 03	0.33472E 02	0.65121E-04
16	0.32961E 00	0.0	0.0	0.0	0.0	0.47404E 02	0.14382E 03	0.37445E 02	0.72438E-04
17	0.32961E 00	0.0	0.0	0.0	0.0	0.47966E 02	0.14552E 03	0.40645E 02	0.79421E-04
18	0.27103E 00	0.0	0.0	0.0	0.0	0.56337E 01	0.20786E 02	0.69119E 01	0.13724E-04
19	0.27103E 00	0.0	0.0	0.0	0.0	0.10773E 02	0.39748E 02	0.12737E 02	0.25328E-04
20	0.27103E 00	0.0	0.0	0.0	0.0	0.13661E 02	0.50403E 02	0.13717E 02	0.26679E-04
21	0.27103E 00	0.0	0.0	0.0	0.0	0.78181E 01	0.28846E 02	0.90957E 01	0.18001E-04
22	0.27103E 00	0.0	0.0	0.0	0.0	0.13942E 02	0.51440E 02	0.17037E 02	0.33909E-04
23	0.27103E 00	0.0	0.0	0.0	0.0	0.44973E 01	0.16596E 02	0.55346E 01	0.11050E-04

		UNSCATTERED P. P. ESCAPES				SCATTERED P.P. ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.40980E 01	0.19141E 02	0.97805E 01	0.19931E-04	0.54834E 01	0.25612E 02	0.76539E 01	0.15025E-04
2	0.30740E 00	0.46278E 01	0.14729E 02	0.75262E 01	0.15337E-04	0.50212E 01	0.19587E 02	0.56765E 01	0.11104E-04
3	0.15370E 00	0.20879E 01	0.13583E 02	0.63406E 01	0.14144E-04	0.31601E 01	0.20560E 02	0.60521E 01	0.11853E-04
4	0.15370E 00	0.22056E 01	0.14335E 02	0.76316E 01	0.15552E-04	0.36633E 01	0.23834E 02	0.66239E 01	0.12991E-04
5	0.30740E 00	0.43343E 01	0.14100E 02	0.72046E 01	0.14682E-04	0.55723E 01	0.19127E 02	0.51448E 01	0.10036E-04
6	0.25717E 00	0.39514E 01	0.15365E 02	0.78512E 01	0.16000E-04	0.39254E 01	0.15260E 02	0.44784E 01	0.87685E-05
7	0.25717E 00	0.29307E 01	0.11396E 02	0.59231E 01	0.11967E-04	0.38858E 01	0.15110E 02	0.44937E 01	0.88259E-05
8	0.25717E 00	0.33212E 01	0.12915E 02	0.66989E 01	0.13448E-04	0.42801E 01	0.16678E 02	0.47377E 01	0.92354E-05
9	0.25717E 00	0.29637E 01	0.11524E 02	0.59886E 01	0.12000E-04	0.44657E 01	0.17369E 02	0.52053E 01	0.10215E-04
10	0.25717E 00	0.29661E 01	0.11534E 02	0.59934E 01	0.12010E-04	0.43773E 01	0.17021E 02	0.50899E 01	0.10009E-04
11	0.25717E 00	0.34359E 01	0.13361E 02	0.68269E 01	0.13912E-04	0.44787E 01	0.17416E 02	0.52005E 01	0.10214E-04
12	0.32961E 00	0.31090E 01	0.94322E 01	0.49196E 01	0.98216E-05	0.31854E 01	0.96670E 01	0.28501E 01	0.55809E-05
13	0.32961E 00	0.21661E 01	0.65717E 01	0.33579E 01	0.68430E-05	0.37980E 01	0.11523E 02	0.35287E 01	0.69309E-05
14	0.32961E 00	0.20164E 01	0.61175E 01	0.31250E 01	0.53701E-05	0.36757E 01	0.11152E 02	0.35566E 01	0.70333E-05
15	0.32961E 00	0.26463E 01	0.80285E 01	0.41023E 01	0.83600E-05	0.33807E 01	0.10257E 02	0.31550E 01	0.62191E-05
16	0.32961E 00	0.25740E 01	0.78062E 01	0.39887E 01	0.81285E-05	0.27250E 01	0.82672E 01	0.26552E 01	0.52572E-05
17	0.32961E 00	0.34720E 01	0.10533E 02	0.53823E 01	0.10968E-04	0.33354E 01	0.10122E 02	0.33473E 01	0.66443E-05
18	0.27103E 00	0.66522E 00	0.24544E 01	0.12541E 01	0.25557E-05	0.58594E 00	0.21619E 01	0.65257E 00	0.12795E-05
19	0.27103E 00	0.72569E 00	0.26775E 01	0.13681E 01	0.27880E-05	0.53290E 00	0.19662E 01	0.63940E 00	0.12571E-05
20	0.27103E 00	0.72569E 00	0.26775E 01	0.13681E 01	0.27880E-05	0.52863E 00	0.23194E 01	0.61910E 00	0.11979E-05
21	0.27103E 00	0.10885E 01	0.40162E 01	0.20522E 01	0.41820E-05	0.77360E 00	0.28543E 01	0.10589E 01	0.21301E-05
22	0.27103E 00	0.10419E 01	0.38441E 01	0.19642E 01	0.40029E-05	0.63913E 00	0.23581E 01	0.69388E 00	0.13741E-05
23	0.27103E 00	0.96759E 00	0.35700E 01	0.18242E 01	0.37174E-05	0.57877E 00	0.25044E 01	0.81424E 00	0.16155E-05

COUNTING RADIUS = 4.448 (CM)

SOURCE ENERGY = 2.00000 MEV

BUILD-UP - ESCAPES THROUGH FRONT FACE

		UNSCATTERED ESCAPES				SCATTERED ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.0	0.0	0.0	0.0	0.566315E 01	0.209857E 02	0.503095E 01	0.940991E-05
25	0.27103E 00	0.0	0.0	0.0	0.0	0.114655E 01	0.423009E 01	0.137815E 01	0.278079E-05
26	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.27103E 00	0.0	0.0	0.0	0.0	0.866944E 00	0.319822E 01	0.381309E 00	0.427395E-05
28	0.27103E 00	0.0	0.0	0.0	0.0	0.233118E 01	0.860359E 01	0.185337E 01	0.369351E-05
29	0.27103E 00	0.0	0.0	0.0	0.0	0.678936E 01	0.250285E 02	0.908665E 01	0.181505E-04
30	0.32961E 00	0.0	0.0	0.0	0.0	0.251135E 02	0.761885E 02	0.271405E 02	0.536525E-04
31	0.32961E 00	0.0	0.0	0.0	0.0	0.257566E 02	0.781425E 02	0.368865E 02	0.729565E-04
32	0.32961E 00	0.0	0.0	0.0	0.0	0.202195E 02	0.613785E 02	0.216515E 02	0.429065E-04
33	0.32961E 00	0.0	0.0	0.0	0.0	0.230245E 02	0.698535E 02	0.246465E 02	0.492245E-04
34	0.32961E 00	0.0	0.0	0.0	0.0	0.140565E 02	0.426435E 02	0.147845E 02	0.291625E-04
35	0.32961E 00	0.0	0.0	0.0	0.0	0.135565E 02	0.411545E 02	0.138245E 02	0.273235E-04
36	0.25717E 00	0.0	0.0	0.0	0.0	0.563585E 02	0.219155E 03	0.153305E 03	0.294205E-03
37	0.25717E 00	0.0	0.0	0.0	0.0	0.646785E 02	0.251505E 03	0.156245E 03	0.301485E-03
38	0.25717E 00	0.0	0.0	0.0	0.0	0.480615E 02	0.186895E 03	0.140555E 03	0.254015E-03
39	0.25717E 00	0.0	0.0	0.0	0.0	0.583495E 02	0.226895E 03	0.157815E 03	0.303055E-03
40	0.25717E 00	0.0	0.0	0.0	0.0	0.511545E 02	0.198925E 03	0.147085E 03	0.282185E-03
41	0.25717E 00	0.0	0.0	0.0	0.0	0.593555E 02	0.230905E 03	0.163045E 03	0.313015E-03
42	0.30740E 00	0.0	0.0	0.0	0.0	0.295065E 03	0.927335E 03	0.110005E 04	0.196445E-02
43	0.15370E 00	0.0	0.0	0.0	0.0	0.134965E 03	0.879005E 03	0.107125E 04	0.191035E-02
44	0.15370E 00	0.0	0.0	0.0	0.0	0.157305E 03	0.102385E 04	0.125175E 04	0.223185E-02
45	0.30740E 00	0.0	0.0	0.0	0.0	0.277375E 03	0.902305E 03	0.114275E 04	0.202375E-02
46	0.21410E 00	0.135305E 04	0.631965E 04	0.126395E 05	0.204495E-01	0.309915E 03	0.186325E 04	0.298905E 04	0.500465E-02

		UNSCATTERED P. P. ESCAPES				SCATTERED P.P. ESCAPES			
J	SOLID ANGLE	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.322405-01	0.118955E 00	0.607815-01	0.123865-06	0.856705-01	0.316005 00	0.128465 00	0.260175-05
25	0.27103E 00	0.172025 00	0.634705 00	0.324315 00	0.560905-06	0.377555-04	0.360775-03	0.157805-04	0.555445-10
26	0.27103E 00	0.321245-01	0.118525 00	0.605625-01	0.123425-06	0.112095 00	0.413575 00	0.551435-01	0.938225-07
27	0.27103E 00	0.164215-01	0.605855-01	0.309575-01	0.630875-07	0.121325 00	0.447605 00	0.790165-01	0.144535-06
28	0.27103E 00	0.307175-01	0.113335 00	0.579095-01	0.119015-06	0.355975-01	0.131345 00	0.354285-01	0.688005-07
29	0.27103E 00	0.124495 00	0.459265 00	0.234675 00	0.478225-06	0.514795-01	0.189045 00	0.349685-01	0.669085-07
30	0.32961E 00	0.206765 00	0.608825 00	0.311095 00	0.633955-06	0.497135 00	0.151715 01	0.302405 00	0.568565-05
31	0.32961E 00	0.309995 00	0.940445 00	0.480545 00	0.979275-06	0.179555 00	0.545055 00	0.963165-01	0.184095-04
32	0.32961E 00	0.316715 00	0.960865 00	0.490975 00	0.100055-05	0.231955 00	0.703715 00	0.154765 00	0.295175-04
33	0.32961E 00	0.153595 00	0.465965 00	0.238005 00	0.485195-06	0.358625 00	0.108805 01	0.288015 00	0.542235-05
34	0.32961E 00	0.254395 00	0.771775 00	0.394355 00	0.803445-06	0.466505 00	0.141535 01	0.356405 00	0.687455-05
35	0.32961E 00	0.210945 00	0.639985 00	0.327015 00	0.566435-06	0.534505 00	0.162165 01	0.311425 00	0.587395-05
36	0.25717E 00	0.325065 00	0.126715 01	0.647455 00	0.131945-05	0.698495 00	0.271615 01	0.693585 00	0.135785-05
37	0.25717E 00	0.409255 00	0.159145 01	0.813165 00	0.165715-05	0.129235 01	0.498625 01	0.130485 01	0.252885-05
38	0.25717E 00	0.650965 00	0.253095 01	0.129325 01	0.263545-05	0.119285 01	0.459035 01	0.120155 01	0.234025-05
39	0.25717E 00	0.353615 00	0.137505 01	0.702505 00	0.143185-05	0.904905 00	0.351835 01	0.740745 00	0.144415-05
40	0.25717E 00	0.622005 00	0.242225 01	0.123775 01	0.252225-05	0.121995 01	0.474375 01	0.103565 01	0.197525-05
41	0.25717E 00	0.451455 00	0.175565 01	0.896995 00	0.182705-05	0.132485 01	0.515155 01	0.135315 01	0.255555-05
42	0.30740E 00	0.167125 01	0.530645 01	0.271145 01	0.552555-05	0.267365 01	0.859745 01	0.252395 01	0.490565-05
43	0.15370E 00	0.617875 00	0.402005 01	0.205415 01	0.418505-05	0.161025 01	0.104765 02	0.288205 01	0.563195-05
44	0.15370E 00	0.538515 00	0.350365 01	0.179025 01	0.364835-05	0.541485 00	0.417355 01	0.131125 01	0.256085-05
45	0.30740E 00	0.156365 01	0.508645 01	0.259905 01	0.529645-05	0.276785 01	0.900395 01	0.275165 01	0.542015-05
46	0.21410E 00	0.130125 01	0.607755 01	0.310545 01	0.632845-05	0.298545 01	0.134775 02	0.391585 01	0.769405-05

COUNTING RADIUS = 8.997 (CM)

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 3.91412 TO 1.95706 INDEX 1

ALBEDO - ESCAPES THROUGHT BACK FACE

J	SOLID ANGLE	UNSCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

J	SOLID ANGLE	UNSCATTERED P. P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED P.P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.15370E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	0.30740E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.25717E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.32961E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.27103E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	0.62832E 01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUM OF SCATTERED, SCATTERED P.P. AND UNSCATTERED P.P. 0.0 0.0 0.0 0.0

The remaining three pages of output in this example are omitted here.

COUNTING RADIUS = 8.897 (CM)

SOURCE ENERGY = 2.00000 MEV

(G)

ALBEDO - ESCAPES THROUGHT BACK FACE

J	SOLID ANGLE	UNSCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.0	0.0	0.0	0.0	0.63875E 02	0.29835E 03	0.29751E 03	0.49314E-05
2	0.30740E 00	0.0	0.0	0.0	0.0	0.87263E 02	0.28387E 03	0.19064E 03	0.90287E-06
3	0.15370E 00	0.0	0.0	0.0	0.0	0.41137E 02	0.26764E 03	0.39876E 03	0.19767E-05
4	0.15370E 00	0.0	0.0	0.0	0.0	0.43358E 02	0.28209E 03	0.37704E 03	0.45674E-05
5	0.30740E 00	0.0	0.0	0.0	0.0	0.82776E 02	0.26937E 03	0.18459E 03	0.68124E-05
6	0.25717E 00	0.0	0.0	0.0	0.0	0.68761E 02	0.26738E 03	0.23343E 03	0.73094E-05
7	0.25717E 00	0.0	0.0	0.0	0.0	0.60620E 02	0.23572E 03	0.21029E 03	0.63290E-05
8	0.25717E 00	0.0	0.0	0.0	0.0	0.60036E 02	0.23345E 03	0.19930E 03	0.75129E-05
9	0.25717E 00	0.0	0.0	0.0	0.0	0.51610E 02	0.20069E 03	0.17683E 03	0.97464E-05
10	0.25717E 00	0.0	0.0	0.0	0.0	0.70876E 02	0.27560E 03	0.25117E 03	0.91125E-05
11	0.25717E 00	0.0	0.0	0.0	0.0	0.62236E 02	0.24494E 03	0.14482E 03	0.30934E-05
12	0.32961E 00	0.0	0.0	0.0	0.0	0.52154E 02	0.15823E 03	0.12047E 03	0.68333E-05
13	0.32961E 00	0.0	0.0	0.0	0.0	0.48634E 02	0.14765E 03	0.11702E 03	0.50837E-05
14	0.32961E 00	0.0	0.0	0.0	0.0	0.46494E 02	0.14106E 03	0.11442E 03	0.59798E-05
15	0.32961E 00	0.0	0.0	0.0	0.0	0.43444E 02	0.13180E 03	0.10390E 03	0.45866E-05
16	0.32961E 00	0.0	0.0	0.0	0.0	0.51145E 02	0.15517E 03	0.11527E 03	0.70196E-05
17	0.32961E 00	0.0	0.0	0.0	0.0	0.51993E 02	0.15771E 03	0.12413E 03	0.54560E-05
18	0.27103E 00	0.0	0.0	0.0	0.0	0.56337E 01	0.20796E 02	0.25502E 02	0.34789E-06
19	0.27103E 00	0.0	0.0	0.0	0.0	0.11732E 02	0.43287E 02	0.48679E 02	0.34754E-05
20	0.27103E 00	0.0	0.0	0.0	0.0	0.14675E 02	0.54146E 02	0.51292E 02	0.12458E-05
21	0.27103E 00	0.0	0.0	0.0	0.0	0.87298E 01	0.32206E 02	0.34869E 02	0.27379E-05
22	0.27103E 00	0.0	0.0	0.0	0.0	0.13942E 02	0.51440E 02	0.62859E 02	0.86159E-06
23	0.27103E 00	0.0	0.0	0.0	0.0	0.68474E 01	0.25264E 02	0.22741E 02	0.44975E-05

J	SOLID ANGLE	UNSCATTERED P. P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED P.P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
1	0.21410E 00	0.40980E 01	0.19141E 02	0.97805E 01	0.19931E-04	0.56099E 01	0.26108E 02	0.35887E 02	0.26523E-06
2	0.30740E 00	0.45278E 01	0.14729E 02	0.75262E 01	0.15337E-04	0.63820E 01	0.20761E 02	0.18732E 02	0.50842E-06
3	0.15370E 00	0.20978E 01	0.13583E 02	0.69406E 01	0.14144E-04	0.33063E 01	0.21511E 02	0.39622E 02	0.48240E-06
4	0.15370E 00	0.22098E 01	0.14388E 02	0.7431AE 01	0.15582E-04	0.38590E 01	0.25107E 02	0.47440E 02	0.67406E-06
5	0.30740E 00	0.43343E 01	0.14100E 02	0.72044E 01	0.14692E-04	0.59778E 01	0.19796E 02	0.18809E 02	0.30541E-06
6	0.25717E 00	0.33681E 01	0.15391E 02	0.78645E 01	0.16027E-04	0.42304E 01	0.19450E 02	0.17444E 02	0.42396E-06
7	0.25717E 00	0.29814E 01	0.11516E 02	0.58841E 01	0.11991E-04	0.43275E 01	0.14828E 02	0.17913E 02	0.88210E-06
8	0.25717E 00	0.33212E 01	0.12915E 02	0.65999E 01	0.13448E-04	0.45434E 01	0.17667E 02	0.18650E 02	0.45556E-06
9	0.25717E 00	0.29637E 01	0.11524E 02	0.58896E 01	0.12003E-04	0.47858E 01	0.18810E 02	0.20451E 02	0.37954E-06
10	0.25717E 00	0.29968E 01	0.11653E 02	0.59544E 01	0.12134E-04	0.46708E 01	0.18163E 02	0.20116E 02	0.63527E-06
11	0.25717E 00	0.34359E 01	0.13361E 02	0.68269E 01	0.13912E-04	0.47774E 01	0.18577E 02	0.20484E 02	0.49775E-06
12	0.32961E 00	0.31694E 01	0.09156E 01	0.49133E 01	0.10013E-04	0.35028E 01	0.10627E 02	0.99056E 01	0.48282E-06
13	0.32961E 00	0.22557E 01	0.68484E 01	0.34993E 01	0.71311E-05	0.41571E 01	0.12617E 02	0.11016E 02	0.60599E-06
14	0.32961E 00	0.20769E 01	0.63010E 01	0.32196E 01	0.65612E-05	0.39054E 01	0.11851E 02	0.10955E 02	0.31663E-06
15	0.32961E 00	0.27068E 01	0.82120E 01	0.41961E 01	0.85510E-05	0.40074E 01	0.12158E 02	0.10070E 02	0.96730E-06
16	0.32961E 00	0.25730E 01	0.78062E 01	0.39887E 01	0.81285E-05	0.29005E 01	0.87907E 01	0.81866E 01	0.25115E-06
17	0.32961E 00	0.35324E 01	0.10717E 02	0.54760E 01	0.11159E-04	0.35825E 01	0.10869E 02	0.10284E 02	0.23514E-06
18	0.27103E 00	0.66522E 00	0.24544E 01	0.12541E 01	0.25557E-05	0.58594E 00	0.21619E 01	0.24077E 01	0.32833E-09
19	0.27103E 00	0.72569E 00	0.26775E 01	0.13681E 01	0.27880E-05	0.62947E 00	0.23198E 01	0.24881E 01	0.25459E-06
20	0.27103E 00	0.79396E 00	0.29293E 01	0.1496AE 01	0.30503E-05	0.68790E 00	0.25381E 01	0.23921E 01	0.21934E-06
21	0.27103E 00	0.10885E 01	0.40162E 01	0.20522E 01	0.41820E-05	0.93526E 00	0.30818E 01	0.40191E 01	0.22005E-06
22	0.27103E 00	0.10419E 01	0.38441E 01	0.19642E 01	0.40028E-05	0.54203E 00	0.23688E 01	0.25256E 01	0.45742E-09
23	0.27103E 00	0.10662E 01	0.39337E 01	0.20100E 01	0.40961E-05	0.67904E 00	0.25054E 01	0.30043E 01	0.5409AE-09

COUNTING RADIUS = 8.897 (CM)

SOURCE ENERGY = 2.00000 MEV

BUILD-UP = ESCAPES THROUGH FRONT FACE

J	SOLID ANGLE	UNSCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.0	0.0	0.0	0.0	0.470B7E 01	0.24752E 02	0.20106E 02	0.31390E-04
25	0.27103E 00	0.0	0.0	0.0	0.0	0.40639E 01	0.14994E 02	0.943O1E 01	0.87223E-05
26	0.27103E 00	0.0	0.0	0.0	0.0	0.28664E 01	0.10574E 02	0.442B7E 01	0.88509E-05
27	0.27103E 00	0.0	0.0	0.0	0.0	0.52592E 01	0.19404E 02	0.76773E 01	0.12206E-04
28	0.27103E 00	0.0	0.0	0.0	0.0	0.61246E 01	0.22597E 02	0.12603E 02	0.11513E-04
29	0.27103E 00	0.0	0.0	0.0	0.0	0.11902E 02	0.42438E 02	0.39755E 02	0.10215E-04
30	0.32961E 00	0.0	0.0	0.0	0.0	0.57012E 02	0.17297E 03	0.11651E 03	0.67060E-04
31	0.32961E 00	0.0	0.0	0.0	0.0	0.49239E 02	0.14957E 03	0.14645E 03	0.69247E-04
32	0.32961E 00	0.0	0.0	0.0	0.0	0.37376E 02	0.11339E 03	0.91017E 02	0.50012E-04
33	0.32961E 00	0.0	0.0	0.0	0.0	0.42034E 02	0.12753E 03	0.10462E 03	0.47653E-04
34	0.32961E 00	0.0	0.0	0.0	0.0	0.40295E 02	0.12225E 03	0.80019E 02	0.69811E-04
35	0.32961E 00	0.0	0.0	0.0	0.0	0.38269E 02	0.11610E 03	0.96226E 02	0.59449E-04
36	0.25717E 00	0.0	0.0	0.0	0.0	0.11929E 03	0.46391E 03	0.76393E 03	0.32634E-03
37	0.25717E 00	0.0	0.0	0.0	0.0	0.11986E 03	0.46607E 03	0.74492E 03	0.26791E-03
38	0.25717E 00	0.0	0.0	0.0	0.0	0.10152E 03	0.39478E 03	0.67454E 03	0.24931E-03
39	0.25717E 00	0.0	0.0	0.0	0.0	0.10918E 03	0.42457E 03	0.75601E 03	0.27503E-03
40	0.25717E 00	0.0	0.0	0.0	0.0	0.10419E 03	0.40515E 03	0.71479E 03	0.27571E-03
41	0.25717E 00	0.0	0.0	0.0	0.0	0.11957E 03	0.46491E 03	0.81305E 03	0.34327E-03
42	0.30740E 00	0.0	0.0	0.0	0.0	0.31697E 03	0.10308E 04	0.36362E 04	0.11027E-03
43	0.15370E 00	0.0	0.0	0.0	0.0	0.15715E 03	0.10225E 04	0.70613E 04	0.17151E-03
44	0.15370E 00	0.0	0.0	0.0	0.0	0.17741E 03	0.11543E 04	0.82313E 04	0.14345E-03
45	0.30740E 00	0.0	0.0	0.0	0.0	0.31764E 03	0.10333E 04	0.37078E 04	0.15380E-03
46	0.21410E 00	0.13530E 04	0.63196E 04	0.12639E 05	0.20449E-01	0.41827E 03	0.19537E 04	0.13990E 05	0.58444E-04

J	SOLID ANGLE	UNSCATTERED P. P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER	SCATTERED P.P. ESCAPES NUMBER	NUMBER/STER	ENERGY/STER	DOSE/STER
24	0.27103E 00	0.99598E-01	0.36379E 00	0.18588E 00	0.37880E-06	0.20651E 00	0.76194E 00	0.58471E 00	0.21003E-06
25	0.27103E 00	0.17940E 00	0.66193E 00	0.33822E 00	0.68925E-06	0.15091E 00	0.55681E 00	0.14450E 00	0.27873E-06
26	0.27103E 00	0.32124E-01	0.11952E 00	0.60562E-01	0.12342E-06	0.20756E 00	0.76590E 00	0.37404E 00	0.26439E-06
27	0.27103E 00	0.49284E-01	0.18184E 00	0.92913E-01	0.18934E-06	0.21751E 00	0.80251E 00	0.39407E 00	0.17479E-06
28	0.27103E 00	0.61434E-01	0.22666E 00	0.11582E 00	0.23602E-06	0.14414E 00	0.53181E 00	0.21287E 00	0.15815E-06
29	0.27103E 00	0.17784E 00	0.65586E 00	0.33472E 00	0.68211E-06	0.28666E 00	0.10577E 01	0.29036E 00	0.30028E-06
30	0.32961E 00	0.32748E 00	0.99354E 00	0.50767E 00	0.10346E-05	0.14583E 01	0.44244E 01	0.16079E 01	0.13173E-05
31	0.32961E 00	0.40332E 00	0.12236E 01	0.62523E 00	0.12741E-05	0.10196E 01	0.30934E 01	0.10314E 01	0.15196E-05
32	0.32961E 00	0.52738E 00	0.16000E 01	0.81755E 00	0.16660E-05	0.83194E 00	0.25237E 01	0.10424E 01	0.11192E-05
33	0.32961E 00	0.22979E 00	0.69714E 00	0.35622E 00	0.72592E-06	0.99927E 00	0.30979E 01	0.13241E 01	0.88428E-06
34	0.32961E 00	0.47354E 00	0.14366E 01	0.73408E 00	0.14960E-05	0.12332E 01	0.37412E 01	0.16181E 01	0.10297E-05
35	0.32961E 00	0.27610E 00	0.83767E 00	0.42802E 00	0.87225E-06	0.12537E 01	0.38034E 01	0.14331E 01	0.92551E-06
36	0.25717E 00	0.70245E 00	0.27315E 01	0.13957E 01	0.28443E-05	0.18771E 01	0.72991E 01	0.30986E 01	0.28492E-05
37	0.25717E 00	0.66219E 00	0.25750E 01	0.13157E 01	0.26813E-05	0.27191E 01	0.10573E 02	0.47767E 01	0.33558E-05
38	0.25717E 00	0.99088E 00	0.38492E 01	0.19668E 01	0.40081E-05	0.20952E 01	0.81473E 01	0.57770E 01	0.16959E-05
39	0.25717E 00	0.76029E 00	0.29014E 01	0.15285E 01	0.31149E-05	0.20220E 01	0.78626E 01	0.39876E 01	0.19691E-05
40	0.25717E 00	0.93670E 00	0.36424E 01	0.18611E 01	0.37928E-05	0.23921E 01	0.93018E 01	0.52656E 01	0.24252E-05
41	0.25717E 00	0.80297E 00	0.31224E 01	0.15954E 01	0.32513E-05	0.23908E 01	0.92965E 01	0.52944E 01	0.22477E-05
42	0.30740E 00	0.16976E 01	0.55224E 01	0.28218E 01	0.57504E-05	0.32577E 01	0.10508E 02	0.85076E 01	0.73425E-06
43	0.15370E 00	0.67835E 00	0.44134E 01	0.22551E 01	0.45956E-05	0.21057E 01	0.13700E 02	0.19637E 02	0.17321E-05
44	0.15370E 00	0.53851E 00	0.35036E 01	0.17902E 01	0.36493E-05	0.12764E 01	0.83058E 01	0.94268E 01	0.17130E-05
45	0.30740E 00	0.16894E 01	0.54958E 01	0.28082E 01	0.57227E-05	0.40783E 01	0.13267E 02	0.99428E 01	0.18957E-05
46	0.21410E 00	0.13021E 01	0.60819E 01	0.31077E 01	0.63330E-05	0.37870E 01	0.17688E 02	0.19312E 02	0.19802E-05

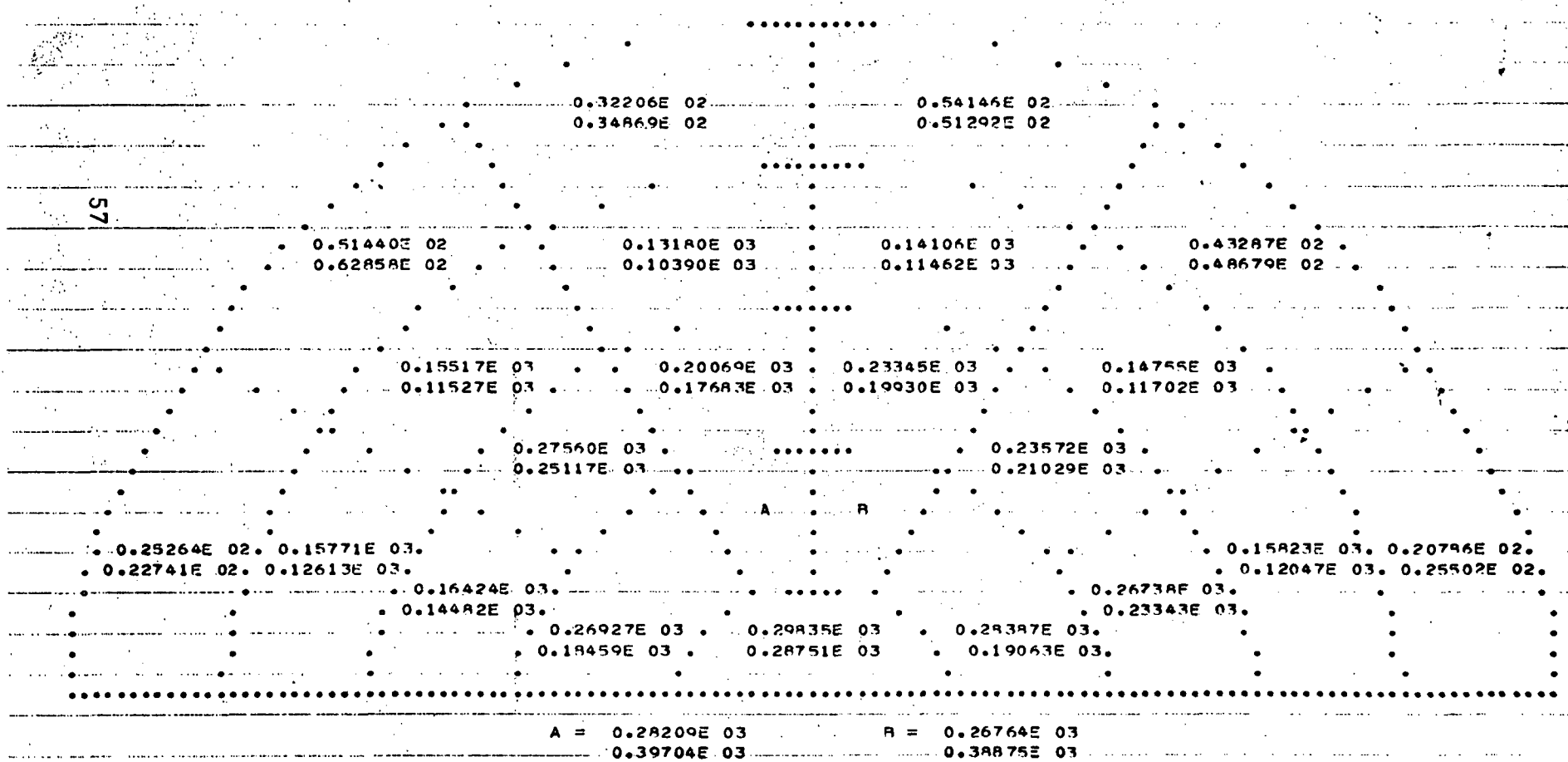
COUNTING RADIUS = 8.897 (CM)

SOURCE ENERGY = 2.00000 MEV

ALBEDO - ESCAPES THROUGHT BACK FACE

SCATTERED NUMBER ESCAPES/STER
SCATTERED ENERGY ESCAPES/STER

(H)



A = 0.28209E 03 0.39704E 03

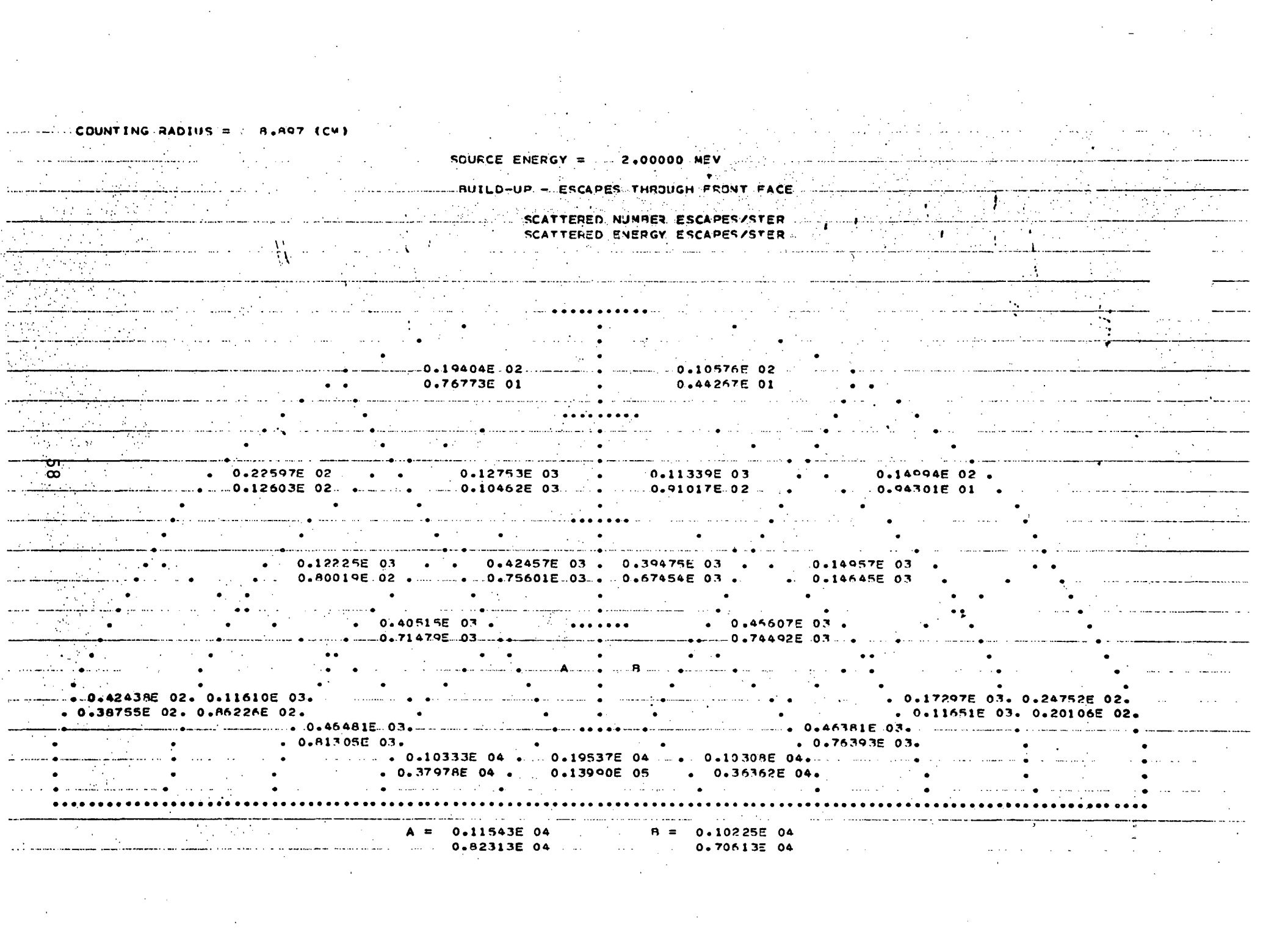
B = 0.26764E 03 0.38875E 03

COUNTING RADIUS = 8.897 (CM)

SOURCE ENERGY = 2.00000 MEV

BUILD-UP - ESCAPES THROUGH FRONT FACE

SCATTERED NUMBER ESCAPES/STER
SCATTERED ENERGY ESCAPES/STER



A = 0.11543E 04
0.82313E 04

B = 0.10225E 04
0.70613E 04

TALLY UNSCATTERED ESCAPES

SOURCE ENERGY = 2.00000 MEV

J	ANGLES A(J) TO A(J+1)		SOLID ANGLE	NUMBER	NUMBER/STER	FRACT/STER	PAIR PHOTONS	NO.THRO FW/BK FACE
1	3.14159	2.96706	0.95457E-01	0.0	0.0	0.0	0.19523E 01	0.19523E 01
2	2.96706	2.79253	0.28347E 00	0.0	0.0	0.0	0.43187E 01	0.43187E 01
3	2.79253	2.61799	0.46287E 00	0.0	0.0	0.0	0.66199E 01	0.66199E 01
4	2.61799	2.44346	0.62820E 00	0.0	0.0	0.0	0.88456E 01	0.88456E 01
5	2.44346	2.26893	0.77445E 00	0.0	0.0	0.0	0.97330E 01	0.97330E 01
6	2.26893	2.09439	0.89716E 00	0.0	0.0	0.0	0.99299E 01	0.99299E 01
7	2.09439	1.91986	0.99262E 00	0.0	0.0	0.0	0.81556E 01	0.81224E 01
8	1.91986	1.74533	0.10579E 01	0.0	0.0	0.0	0.61791E 01	0.59277E 01
9	1.74533	1.57080	0.10911E 01	0.0	0.0	0.0	0.30440E 01	0.22591E 01
10	1.57080	1.39626	0.10911E 01	0.0	0.0	0.0	0.57397E 00	0.22171E 00
11	1.39626	1.22173	0.10579E 01	0.0	0.0	0.0	0.15294E 01	0.73076E 00
12	1.22173	1.04720	0.99262E 00	0.0	0.0	0.0	0.15717E 01	0.10833E 01
13	1.04720	0.87266	0.89716E 00	0.0	0.0	0.0	0.18086E 01	0.17491E 01
14	0.87266	0.69813	0.77445E 00	0.0	0.0	0.0	0.23390E 01	0.23390E 01
15	0.69813	0.52360	0.62820E 00	0.0	0.0	0.0	0.31334E 01	0.31334E 01
16	0.52360	0.34907	0.46286E 00	0.0	0.0	0.0	0.20680E 01	0.20680E 01
17	0.34907	0.17453	0.28347E 00	0.0	0.0	0.0	0.17337E 01	0.17337E 01
18	0.17453	0.0	0.95455E-01	0.13530E 04	0.14174E 05	0.14174E 01	0.54770E 00	0.54770E 00

UNSCATTERED ESCAPES = 0.13530E 04

NUMBER AV/STER = 0.78745E 03

PAIR PHOTON ESCAPES = 0.75084E 02

TL.NO PP ESCAPE THRO FW FACE = 0.13605E 02 TL NO-ENERGY(MEV)= 0.69519E 01 DOSE = 0.14167E-04

TL.NO PP ESCAPE THRO BK FACE = 0.58678E 02 TL NO-ENERGY(MEV)= 0.29982E 02 DOSE = 0.61100E-04

TALLY SCATTERED ESCAPES

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 3.91412 TO 1.95706 INDEX 1

J	ANGLES A(J) TO A(J+1)		SOLID ANGLE	NUMBER	NUMBER/STER	FRACT/STER	PAIR PHOTONS
1	3.14159	2.96706	0.95457E-01	0.0	0.0	0.0	0.0
2	2.96706	2.79253	0.28347E 00	0.0	0.0	0.0	0.0
3	2.79253	2.61799	0.46287E 00	0.0	0.0	0.0	0.0
4	2.61799	2.44346	0.62820E 00	0.0	0.0	0.0	0.0
5	2.44346	2.26893	0.77445E 00	0.0	0.0	0.0	0.0
6	2.26893	2.09439	0.89716E 00	0.0	0.0	0.0	0.0
7	2.09439	1.91986	0.99262E 00	0.0	0.0	0.0	0.0
8	1.91986	1.74533	0.10579E 01	0.0	0.0	0.0	0.0
9	1.74533	1.57080	0.10911E 01	0.0	0.0	0.0	0.0
10	1.57080	1.39626	0.10911E 01	0.0	0.0	0.0	0.0
11	1.39626	1.22173	0.10579E 01	0.0	0.0	0.0	0.0
12	1.22173	1.04720	0.99262E 00	0.95994E 00	0.95698E 00	0.95699E-04	0.0
13	1.04720	0.87266	0.89716E 00	0.86901E 01	0.96863E 01	0.95863E-03	0.0
14	0.87266	0.69813	0.77445E 00	0.70523E 02	0.91063E 02	0.91062E-02	0.0
15	0.69813	0.52360	0.62820E 00	0.25344E 03	0.40343E 03	0.40343E-01	0.0
16	0.52360	0.34907	0.46286E 00	0.33774E 03	0.72966E 03	0.72966E-01	0.0
17	0.34907	0.17453	0.28347E 00	0.35335E 03	0.12465E 04	0.12465E 00	0.0
18	0.17453	0.0	0.95455E-01	0.17661E 03	0.18502E 04	0.18502E 00	0.0

SCATTERED ESCAPES = 0.12017E 04
P.E.ABSORPTIONS = 0.11124E 01
NUMBER AV/STER = 0.43316E 04
PAIR PHOTON ESCAPES = 0.0

SCATTERED ESCAPES THRO BACK OR FRONT FACE

J	ANGLE A(J) TO A(J+1)		SOLID ANGLE	TL NUMBER	P.P.ESCAPES	SCATT ESCAPES	NO. OF S.S.	NO. OF D.S.	TL NO-ENERGY
1	3.14159	2.96706	0.95457E-01	0.0	0.0	0.0	0.0	0.0	0.0
2	2.96706	2.79253	0.28347E 00	0.0	0.0	0.0	0.0	0.0	0.0
3	2.79253	2.61799	0.46287E 00	0.0	0.0	0.0	0.0	0.0	0.0
4	2.61799	2.44346	0.62820E 00	0.0	0.0	0.0	0.0	0.0	0.0
5	2.44346	2.26893	0.77445E 00	0.0	0.0	0.0	0.0	0.0	0.0
6	2.26893	2.09439	0.89716E 00	0.0	0.0	0.0	0.0	0.0	0.0
7	2.09439	1.91986	0.99262E 00	0.0	0.0	0.0	0.0	0.0	0.0
8	1.91986	1.74533	0.10579E 01	0.0	0.0	0.0	0.0	0.0	0.0
9	1.74533	1.57080	0.10911E 01	0.0	0.0	0.0	0.0	0.0	0.0
10	1.57080	1.39626	0.10911E 01	0.0	0.0	0.0	0.0	0.0	0.0
11	1.39626	1.22173	0.10579E 01	0.0	0.0	0.0	0.0	0.0	0.0
12	1.22173	1.04720	0.99262E 00	0.95994E 00	0.0	0.95994E 00	0.0	0.0	0.98337E 00
13	1.04720	0.87266	0.89716E 00	0.77266E 01	0.0	0.77266E 01	0.0	0.48209E 01	0.80949E 01
14	0.87266	0.69813	0.77445E 00	0.69971E 02	0.0	0.69971E 02	0.29332E 02	0.37872E 02	0.75854E 02
15	0.69813	0.52360	0.62820E 00	0.25344E 03	0.0	0.25344E 03	0.18309E 03	0.65844E 02	0.30479E 03
16	0.52360	0.34907	0.46286E 00	0.33774E 03	0.0	0.33774E 03	0.26684E 03	0.71444E 02	0.49039E 03
17	0.34907	0.17453	0.28347E 00	0.35335E 03	0.0	0.35335E 03	0.29121E 03	0.51796E 02	0.60129E 03
18	0.17453	0.0	0.95455E-01	0.17661E 03	0.0	0.17661E 03	0.14413E 03	0.28727E 02	0.32795E 03

	THRO FRONT FACE	(NO-ENER(MEV)	DOSE)	THRO BACK FACE	(NO-ENER(MEV)	DOSE)
TOTAL SCATT ESCAPES =	0.11999E 04	0.18092E 04	0.31498E-02	0.0	0.0	0.0
TOTAL P. P. ESCAPES =	0.0	0.0	0.0	0.0	0.0	0.0
SINGLE SCAT.ESCAPES =	0.91666E 03			0.0		
DOUBLE SCAT.ESCAPES =	0.24299E 03			0.0		

TALLY SCATTERED ESCAPES

SOURCE ENERGY = 2.00000 MEV

ESCAPE ENERGY INTERVAL 1.95706 TO 0.06850 INDEX 2

J	ANGLES A(J) TO A(J+1)		SOLID ANGLE	NUMBER	NUMBER/STER	FRACT/STER	PAIR PHOTONS
1	3.14159	2.96706	0.95457E-01	0.28786E 02	0.30156E 03	0.30156E-01	0.24712E 01
2	2.96706	2.79253	0.28347E 00	0.83137E 02	0.29329E 03	0.29329E-01	0.63837E 01
3	2.79253	2.61799	0.46287E 00	0.12857E 03	0.27767E 03	0.27767E-01	0.95721E 01
4	2.61799	2.44346	0.62820E 00	0.16723E 03	0.26621E 03	0.26621E-01	0.13298E 02
5	2.44346	2.26893	0.77445E 00	0.18435E 03	0.23803E 03	0.23803E-01	0.13998E 02
6	2.26893	2.09439	0.89716E 00	0.18551E 03	0.20677E 03	0.20677E-01	0.14850E 02
7	2.09439	1.91986	0.99262E 00	0.16245E 03	0.16366E 03	0.16366E-01	0.10343E 02
8	1.91986	1.74533	0.10579E 01	0.12033E 03	0.11374E 03	0.11374E-01	0.87052E 01
9	1.74533	1.57080	0.10911E 01	0.11320E 03	0.10375E 03	0.10375E-01	0.85821E 01
10	1.57080	1.39626	0.10911E 01	0.97526E 02	0.89387E 02	0.89387E-02	0.75409E 01
11	1.39626	1.22173	0.10579E 01	0.14344E 03	0.13559E 03	0.13559E-01	0.88694E 01
12	1.22173	1.04720	0.99262E 00	0.19577E 03	0.19722E 03	0.19722E-01	0.59825E 01
13	1.04720	0.87266	0.89716E 00	0.26126E 03	0.29121E 03	0.29121E-01	0.66490E 01
14	0.87266	0.69813	0.77445E 00	0.28214E 03	0.36431E 03	0.36431E-01	0.75666E 01
15	0.69813	0.52360	0.62820E 00	0.20390E 03	0.32458E 03	0.32458E-01	0.73137E 01
16	0.52360	0.34907	0.46286E 00	0.14319E 03	0.30937E 03	0.30937E-01	0.55028E 01
17	0.34907	0.17453	0.28347E 00	0.10303E 03	0.36346E 03	0.36346E-01	0.44250E 01
18	0.17453	0.0	0.95455E-01	0.32931E 02	0.34499E 03	0.34499E-01	0.16666E 01

SCATTERED ESCAPES = 0.26367E 04
P.E.ABSORPTIONS = 0.51045E 03
NUMBER AV/STER = 0.43848E 04
PAIR PHOTON ESCAPES = 0.13178E 03

SCATTERED ESCAPES THRU BACK OR FRONT FACE

J	ANGLE A(J) TO A(J+1)		SOLID ANGLE	TL NUMBER	P.P.ESCAPES	SCATT ESCAPES	NO. OF S.S.	NO. OF D.S.	TL NO-ENERGY
1	3.14159	2.96706	0.95457E-01	0.31257E 02	0.24712E 01	0.28734E 02	0.87199E 01	0.84548E 01	0.44022E 01
2	2.96706	2.79253	0.28347E 00	0.89520E 02	0.63837E 01	0.83137E 02	0.19377E 02	0.23977E 02	0.20147E 02
3	2.79253	2.61799	0.46287E 00	0.13805E 03	0.95285E 01	0.12853E 03	0.34970E 02	0.38509E 02	0.31009E 02
4	2.61799	2.44346	0.62820E 00	0.18053E 03	0.13290E 02	0.16723E 03	0.46506E 02	0.43588E 02	0.42024E 02
5	2.44346	2.26893	0.77445E 00	0.19806E 03	0.13719E 02	0.18435E 03	0.52310E 02	0.42715E 02	0.47840E 02
6	2.26893	2.09439	0.89716E 00	0.19643E 03	0.14794E 02	0.18551E 03	0.58132E 02	0.39976E 02	0.49028E 02
7	2.09439	1.91986	0.99262E 00	0.15484E 03	0.96026E 01	0.14524E 03	0.45537E 02	0.36301E 02	0.42207E 02
8	1.91986	1.74533	0.10579E 01	0.96623E 02	0.69675E 01	0.77655E 02	0.29066E 02	0.20645E 02	0.25093E 02
9	1.74533	1.57080	0.10911E 01	0.33025E 02	0.16185E 01	0.31407E 02	0.17440E 02	0.55145E 01	0.10097E 02
10	1.57080	1.39626	0.10911E 01	0.16070E 02	0.32900E 00	0.15741E 02	0.98460E 00	0.30037E 01	0.49011E 01
11	1.39626	1.22173	0.10579E 01	0.59095E 02	0.10988E 01	0.57107E 02	0.98460E 01	0.87337E 01	0.20055E 02
12	1.22173	1.04720	0.99262E 00	0.12760E 03	0.31790E 01	0.12442E 03	0.17707E 02	0.23344E 02	0.47895E 02
13	1.04720	0.87266	0.89716E 00	0.22733E 03	0.50526E 01	0.22227E 03	0.47978E 02	0.54240E 02	0.11038E 03
14	0.87266	0.69813	0.77445E 00	0.27218E 03	0.69281E 01	0.25525E 03	0.72247E 02	0.73229E 02	0.15384E 03
15	0.69813	0.52360	0.62820E 00	0.20622E 03	0.69119E 01	0.19931E 03	0.0	0.66654E 02	0.95612E 02
16	0.52360	0.34907	0.46286E 00	0.14776E 03	0.55296E 01	0.14223E 03	0.0	0.37627E 02	0.60851E 02
17	0.34907	0.17453	0.28347E 00	0.10733E 03	0.43046E 01	0.10303E 03	0.0	0.29970E 02	0.43352E 02
18	0.17453	0.0	0.95455E-01	0.34598E 02	0.16566E 01	0.32931E 02	0.0	0.97412E 01	0.14429E 02

	THRU FRONT FACE	(NO-ENER(MEV)	DOSE)	THRU BACK FACE	(NO-ENER(MEV)	DOSE)
TOTAL SCATT ESCAPES =	0.11581E 04	0.5410596 03	0.1064465-02	0.11063AE 04	0.2758465 03	0.5207A5E-03
TOTAL P. P. ESCAPES =	0.3590036 02	0.94729AE 01	0.1841026-04	0.7838426 02	0.2320005 02	0.4550096-04
SINGLE SCAT.ESCAPES =	0.1487626 03			0.311977E 03		
DOUBLE SCAT.ESCAPES =	0.3074646 03			0.259278E 03		

TALLY ... SCATTERED ESCAPES

SCATTERED ESCAPES THRO BACK, OR FRONT FACE

SUMMED OVER ALL ENERGIES

J	ANGLE A(J)	TO A(J+1)	SOLID ANGLE	TL NUMBER	P.P.ESCAPES	SCATT ESCAPES	NO. OF S.S.	NO. OF D.S.	TL NO-ENERGY
1	3.14159	2.96706	0.95457E-01	0.31257E 02	0.24712E 01	0.28786E 02	0.87199E 01	0.84545E 01	0.66022E 01
2	2.96706	2.79253	0.28347E 00	0.89520E 02	0.63837E 01	0.83137E 02	0.19377E 02	0.23977E 02	0.20157E 02
3	2.79253	2.61799	0.46287E 00	0.13805E 03	0.95285E 01	0.12853E 03	0.34879E 02	0.38509E 02	0.31003E 02
4	2.61799	2.44346	0.62820E 00	0.18053E 03	0.13299E 02	0.16723E 03	0.46506E 02	0.43588E 02	0.42024E 02
5	2.44346	2.26893	0.77445E 00	0.19806E 03	0.13719E 02	0.18435E 03	0.52319E 02	0.42315E 02	0.47940E 02
6	2.26893	2.09439	0.89716E 00	0.19643E 03	0.14794E 02	0.19164E 03	0.58132E 02	0.38975E 02	0.49928E 02
7	2.09439	1.91986	0.99262E 00	0.15484E 03	0.96026E 01	0.14524E 03	0.45537E 02	0.36301E 02	0.42203E 02
8	1.91986	1.74533	0.10579E 01	0.84623E 02	0.69675E 01	0.77655E 02	0.29066E 02	0.20645E 02	0.25993E 02
9	1.74533	1.57080	0.10911E 01	0.33025E 02	0.16185E 01	0.31407E 02	0.17440E 02	0.55145E 01	0.10087E 02
10	1.57080	1.39626	0.10911E 01	0.16070E 02	0.32909E 00	0.15741E 02	0.98460E 00	0.39037E 01	0.49011E 01
11	1.39626	1.22173	0.10579E 01	0.59095E 02	0.19989E 01	0.57107E 02	0.98460E 01	0.87337E 01	0.20055E 02
12	1.22173	1.04720	0.99262E 00	0.12856E 03	0.31789E 01	0.12539E 03	0.17707E 02	0.23366E 02	0.48878E 02
13	1.04720	0.87266	0.89716E 00	0.23506E 03	0.50526E 01	0.23000E 03	0.47978E 02	0.59069E 02	0.11848E 03
14	0.87266	0.69813	0.77445E 00	0.34175E 03	0.69281E 01	0.33482E 03	0.97579E 02	0.11080E 03	0.22890E 03
15	0.69813	0.52360	0.62820E 00	0.45966E 03	0.69119E 01	0.45275E 03	0.18909E 03	0.12532E 03	0.40040E 03
16	0.52360	0.34907	0.46286E 00	0.48549E 03	0.55296E 01	0.47996E 03	0.26684E 03	0.99071E 02	0.55124E 03
17	0.34907	0.17453	0.28347E 00	0.46068E 03	0.43046E 01	0.45638E 03	0.29121E 03	0.81726E 02	0.64465E 03
18	0.17453	0.0	0.95455E-01	0.21121E 03	0.16666E 01	0.20955E 03	0.14413E 03	0.38468E 02	0.34228E 03

NO. OF HISTORIES	INITIAL ENERGY	CUT-OFF ENERGY	TOTAL NO. OF COLLISIONS
10000	0.200E 01	0.350E-01	148565

TERMINATION PRIMARY PHOTONS

1. ENERGY 0.23039E 03
2. WEIGHT 0.37951E 04
3. ESCAPE 0.51910E 04 (3./NO. OF HISTORIES) 0.51910E 00
4. ABSORBED 0.45371E 04
5. TOTAL UNSCATTERED ESCAPES 0.13530E 04 (5./NO. OF HISTORIES) 0.13530E 00
6. TOTAL SCATTERED ESCAPES 0.38380E 04 (6./NO. OF HISTORIES) 0.38380E 00
7. PHOTOELECTRIC ABSORPTIONS 0.51156E 03
8. PAIR PRODUCTION PHOTONS 0.54218E 03

TERMINATION PAIR PHOTONS

1. ENERGY 0.95480E 01
2. WEIGHT 0.29476E 03
3. ESCAPE 0.20684E 03
4. ABSORBED 0.33418E 03
5. TOTAL UNSCATTERED ESCAPES 0.75094E 02
6. TOTAL SCATTERED ESCAPES 0.13178E 03
7. PHOTOELECTRIC ABSORPTIONS 0.31875E 02
8. PAIR PRODUCTION PHOTONS 0.54218E 03

TALLY CHECK = 0.99994E 04

TERMINATION ALBEDO PHOTONS

	NUMBER	ENERGY	DOSE
A. TOTAL SCATTERED ESCAPES	0.11063E 04	0.27585E 03	0.52979E-03
B. PAIR PRODUCTION PHOTONS	0.78384E 02	0.23200E 02	0.45501E-04
C. SINGLE SCATTERED PHOTONS	0.31198E 03		
D. DOUBLE SCATTERED PHOTONS	0.25828E 03		

TERMINATION BUILD-UP PHOTONS

	NUMBER	ENERGY	DOSE
A. TOTAL SCATTERED ESCAPES	0.23976E 04	0.23503E 04	0.42143E-02
B. PAIR PRODUCTION PHOTONS	0.35900E 02	0.94730E 01	0.18418E-04
C. SINGLE SCATTERED PHOTONS	0.10654E 04		
D. DOUBLE SCATTERED PHOTONS	0.55046E 03		
BUILD-UP FACTORS	0.27720E 01	0.18686E 01	0.19626E 01

APPENDIX IV

SAMPLE OUTPUT LISTING FOR NUGAM3

NAI CRYSTAL LENGTH (CM) 0.76200E 01 NAI CRYSTAL RADIUS (CM) 0.38100E 01
THICKNESS OF CLADDING (CM) 0.31750E 00 THICKNESS OF THE SIDE CLADDING (CM) 0.31750E 00
THICKNESS OF THE BOTTOM OF THE PHOTOMULTIPIER (CM) 0.76200E 01

CYL. DET.OVERALL LENGTH (CM) 0.15557E 02 CYL. DET.OVERALL RADIUS (CM) 0.41275E 01
CYL. DET.OVERALL VOLUME (CM**3) 0.83265E 03

PARALLEL BEAM SOURCE INCIDENT ANGLE (DEGREE) 0.0

ILLUMINATE RADIUS (CM) 0.38100E 01 ILLUMINATE AREA (CM**2) 0.45604E 02

NUMBER OF PHOTON HISTORIES 5000

INITIAL RANDOM NUMBER 129

NUMBER OF SPECTRUM CHANNELS 50

SOURCE SPECTRUM ENERGY (MEV) 0.66200E 00

LOW ENERGY CUTOFF (MEV) 0.35000E-01

ESCAPE SPECTRUM ENERGIES (MC**2) 0.12956E 01 0.68497E-01

ESCAPE SPECTRUM ANGLES (RADIANS)

0.31416E 01	0.29671E 01	0.27925E 01	0.26180E 01	0.24435E 01	0.22689E 01	0.20944E 01	0.19199E 01
0.17453E 01	0.15708E 01	0.13963E 01	0.12217E 01	0.10472E 01	0.87266E 00	0.69813E 00	0.52360E 00
0.34907E 00	0.17453E 00	0.0					

CROSS SECTION DATA

NINT = 6 ILOW = -4 IHIGH = 3 NOR = 0

NO.ELEMENTS = 5

NO.CROSS-SECTION ENERGIES 26 NO.ENERGY SUBINTERVALS 449 ATOMIC NUMBER 0.10000E 01

DENSITY (GM/CC) 0.37500E-01 INTERVALS/ENERGY GROUP 64 ATOMIC WEIGHT 0.10080E 01

MICROSCOPIC CROSS-SECTION TABLE (INPUT)

0.9999998E-02	0.4600000E-02	0.0	0.1500000E-01	0.1100000E-02	0.0
0.2000000E-01	0.0	0.0	0.3000000E-01	0.0	0.0
0.4000000E-01	0.0	0.0	0.5000000E-01	0.0	0.0
0.6000000E-01	0.0	0.0	0.7999998E-01	0.0	0.0
0.9999998E-01	0.0	0.0	0.1500000E 00	0.0	0.0
0.2000000E 00	0.0	0.0	0.3000000E 00	0.0	0.0
0.4000000E 00	0.0	0.0	0.5000000E 00	0.0	0.0
0.6000000E 00	0.0	0.0	0.8000000E 00	0.0	0.0
0.1000000E 01	0.0	0.0	0.1500000E 01	0.0	0.4399999E-04
0.2000000E 01	0.0	0.1800000E-03	0.3000000E 01	0.0	0.5199998E-03
0.4000000E 01	0.0	0.8699999E-03	0.5000000E 01	0.0	0.1200000E-02
0.6000000E 01	0.0	0.1500000E-02	0.8000000E 01	0.0	0.2200000E-02
0.1000000E 02	0.0	0.2700000E-02	0.1500000E 02	0.0	0.3900000E-02

ADEN= 0.2240700E-01 ELDEN= 0.2240700E-01

SIGMA-TL	SIGMA-PE	SIGMA-PP	SIGMA-SC	ENERGY	
KAY= 3 CAY= 0.4156242E-08					
0.1525717E-01	0.1330722E-03	0.0	0.1515410E-01	0.1957062E-01	1
0.1448546E-01	0.2464770E-04	0.0	0.1446081E-01	0.2935592E-01	2
0.1388834E-01	0.1164112E-04	0.0	0.1387670E-01	0.3914124E-01	3
0.1343251E-01	0.3449222E-05	0.0	0.1342906E-01	0.5871186E-01	4
0.1297469E-01	0.1455139E-05	0.0	0.1297324E-01	0.7828248E-01	5
0.1259237E-01	0.7450313E-06	0.0	0.1259163E-01	0.9785306E-01	6
0.1223006E-01	0.4311522E-06	0.0	0.1222963E-01	0.1174237E 00	7
0.1159213E-01	0.1818926E-06	0.0	0.1159195E-01	0.1565649E 00	8
0.1104273E-01	0.9312902E-07	0.0	0.1104264E-01	0.1957061E 00	9
0.9940129E-02	0.2759376E-07	0.0	0.9940103E-02	0.2935593E 00	10
0.9108321E-02	0.1164112E-07	0.0	0.9108296E-02	0.3914124E 00	11
0.7919855E-02	0.3449223E-08	0.0	0.7919855E-02	0.5871165E 00	12
0.7095903E-02	0.1455139E-08	0.0	0.7095903E-02	0.7828248E 00	13
0.6479390E-02	0.7450311E-09	0.0	0.6479390E-02	0.9785310E 00	14
0.5993851E-02	0.4311524E-09	0.0	0.5993851E-02	0.1174236E 01	15
0.5264770E-02	0.1818924E-09	0.0	0.5264770E-02	0.1565649E 01	16
0.4732549E-02	0.9312891E-10	0.0	0.4732549E-02	0.1957062E 01	17
0.3845498E-02	0.2759375E-10	0.9859077E-06	0.3844512E-02	0.2935593E 01	18
0.3283495E-02	0.1164111E-10	0.4033260E-05	0.3279452E-02	0.3914124E 01	19
0.2590490E-02	0.3449218E-11	0.1165164E-04	0.2578838E-02	0.5871185E 01	20
0.2169971E-02	0.1455139E-11	0.1949408E-04	0.2150477E-02	0.7828248E 01	21
0.1883639E-02	0.7450313E-12	0.2688839E-04	0.1856751E-02	0.9785310E 01	22
0.1674454E-02	0.4311523E-12	0.3361049E-04	0.1640844E-02	0.1174237E 02	23
0.1391104E-02	0.1818924E-12	0.4929540E-04	0.1341809E-02	0.1565565E 02	24
0.1202984E-02	0.9312890E-13	0.6049890E-04	0.1142485E-02	0.1957062E 02	25
0.9323973E-03	0.2759374E-13	0.8738731E-04	0.8450001E-03	0.2935593E 02	26

NO.ELEMENTS = 5

NO.CROSS-SECTION ENERGIES 26 NO.ENERGY SUBINTERVALS 449 ATOMIC NUMBER 0.60000E 01

DENSITY (GM/CC) 0.30290E 00 INTERVALS/ENERGY GROUP 64 ATOMIC WEIGHT 0.12010E 02

MICROSCOPIC CROSS-SECTION TABLE (INPUT)

0.9999998E-02	0.3859999E 02	0.0	0.1500000E-01	0.1320000E 02	0.0
0.2000000E-01	0.3910000E 01	0.0	0.3000000E-01	0.9899999E 00	0.0
0.4000000E-01	0.3800000E 00	0.0	0.5000000E-01	0.1799999E 00	0.0
0.6000000E-01	0.9599996E-01	0.0	0.7999998E-01	0.3700000E-01	0.0
0.9999998E-01	0.1700000E-01	0.0	0.1500000E 00	0.3999997E-02	0.0
0.2000000E 00	0.0	0.0	0.3000000E 00	0.0	0.0
0.4000000E 00	0.0	0.0	0.5000000E 00	0.0	0.0
0.6000000E 00	0.0	0.0	0.8000000E 00	0.0	0.0
0.1000000E 01	0.0	0.0	0.1500000E 01	0.0	0.1600000E-02
0.2000000E 01	0.0	0.6299999E-02	0.3000000E 01	0.0	0.1807999E-01

(B)

0.4000000E 01	0.0	0.3030000E-01	0.5000000E 01	0.0	0.4070000E-01
0.6000000E 01	0.0	0.4900000E-01	0.8000000E 01	0.0	0.6500000E-01
0.1000000E 02	0.0	0.7999998E-01	0.1500000E 02	0.0	0.1050000E 00

ADEN= 0.1519039E-01 ELDEN= 0.9114236E-01

SIGMA-TL	SIGMA-PE	SIGMA-PP	SIGMA-SC	ENERGY	
KAY= 11 CAY= 0.1524997E-04					
0.6479896E 00	0.5863490E 00	0.0	0.6164058E-01	0.1957062E-01	1
0.2137625E 00	0.1549420E 00	0.0	0.5882057E-01	0.2935592E-01	2
0.1158391E 00	0.5939443E-01	0.0	0.5644465E-01	0.3914124E-01	3
0.6956233E-01	0.1503449E-01	0.0	0.5462395E-01	0.5871186E-01	4
0.5854210E-01	0.5772348E-02	0.0	0.5276975E-01	0.7828248E-01	5
0.5395176E-01	0.2734270E-02	0.0	0.5121750E-01	0.9785306E-01	6
0.5120331E-01	0.1458277E-02	0.0	0.4974504E-01	0.1174237E 00	7
0.4771328E-01	0.5620443E-03	0.0	0.4715124E-01	0.1565649E 00	8
0.4517511E-01	0.2592364E-03	0.0	0.4491688E-01	0.1957061E 00	9
0.4049296E-01	0.6076152E-04	0.0	0.4043220E-01	0.2935593E 00	10
0.3707759E-01	0.2895664E-04	0.0	0.3704877E-01	0.3914124E 00	11
0.3223326E-01	0.8579751E-05	0.0	0.3221458E-01	0.5871185E 00	12
0.2886880E-01	0.3619581E-05	0.0	0.2886318E-01	0.7828248E 00	13
0.2635732E-01	0.1953224E-05	0.0	0.2635547E-01	0.9785306E 00	14
0.2438157E-01	0.1072468E-05	0.0	0.2438250E-01	0.1174236E 01	15
0.2141535E-01	0.4524475E-06	0.0	0.2141490E-01	0.1565649E 01	16
0.1925028E-01	0.2316530E-06	0.0	0.1925005E-01	0.1957062E 01	17
0.1566225E-01	0.6863792E-07	0.2130462E-04	0.1563787E-01	0.2935593E 01	18
0.1343521E-01	0.2895663E-07	0.9569945E-04	0.1333948E-01	0.3914124E 01	19
0.1076414E-01	0.9579740E-08	0.2744903E-03	0.1048964E-01	0.5871185E 01	20
0.9207513E-02	0.3619579E-08	0.4602687E-03	0.9747242E-02	0.7828248E 01	21
0.8170735E-02	0.1853224E-08	0.6182489E-03	0.7552486E-02	0.9785310E 01	22
0.7418595E-02	0.1072467E-08	0.7443291E-03	0.6674267E-02	0.1174237E 02	23
0.6445289E-02	0.4524472E-09	0.9873754E-03	0.5457915E-02	0.1565650E 02	24
0.5862381E-02	0.2316530E-09	0.1215231E-02	0.4647151E-02	0.1957062E 02	25
0.5032100E-02	0.6863790E-10	0.1594990E-02	0.3437109E-02	0.2935593E 02	26

NO.ELEMENTS= 5

NO.CROSS-SECTION ENERGIES 26 NO.ENERGY SUBINTERVALS 449 ATOMIC NUMBER 0.80000E 01

DENSITY (GM/CC) 0.27770E 00 INTERVALS/ENERGY GROUP 64 ATOMIC WEIGHT 0.16000E 02

MICROSCOPIC CROSS-SECTION TABLE (INPUT)

0.9999998E-02	0.1460000E 03	0.0	0.1500000E-01	0.3959999E 02	0.0
0.2000000E-01	0.1540000E 02	0.0	0.3000000E-01	0.4089999E 01	0.0
0.4000000E-01	0.1549999E-01	0.0	0.5000000E-01	0.7000000E 00	0.0
0.6000000E-01	0.4000000E 00	0.0	0.7999998E-01	0.1500000E 00	0.0
0.9999996E-01	0.7999998E-01	0.0	0.1500000E 00	0.2000000E-01	0.0
0.2000000E 00	0.9999998E-02	0.0	0.3000000E 00	0.0	0.0
0.4000000E 00	0.0	0.0	0.5000000E 00	0.0	0.0
0.6000000E 00	0.0	0.0	0.8000000E 00	0.0	0.0
0.1000000E 01	0.0	0.0	0.1500000E 01	0.0	0.2800000E-02
0.2000000E 01	0.0	0.1100000E-01	0.3000000E 01	0.0	0.3210000E-01
0.4000000E 01	0.0	0.5340000E-01	0.5000000E 01	0.0	0.7089996E-01
0.6000000E 01	0.0	0.8800000E-01	0.8000000E 01	0.0	0.1149999E 00
0.1000000E 02	0.0	0.1390000E 00	0.1500000E 02	0.0	0.1840000E 00

ADEN= 0.1045366E-01 ELDEN= 0.8362931E-01

SIGMA-TL	SIGMA-PE	SIGMA-PP	SIGMA-SC	ENERGY	
KAY= 12 CAY= 0.7374905E-04					
0.1582793E 01	0.1526235E 01	0.0	0.5655942E-01	0.1957062E-01	1
0.4679368E 00	0.4139650E 00	0.0	0.5397187E-01	0.2935592E-01	2
0.2127782E 00	0.1609864E 00	0.0	0.5179181E-01	0.3914124E-01	3
0.9287655E-01	0.4275547E-01	0.0	0.5012110E-01	0.5871186E-01	4
0.6462300E-01	0.1620317E-01	0.0	0.4841984E-01	0.7828248E-01	5
0.5462671E-01	0.7631171E-02	0.0	0.4699554E-01	0.9785306E-01	6
0.4982592E-01	0.4181463E-02	0.0	0.4564445E-01	0.1174237E 00	7
0.4483252E-01	0.1568049E-02	0.0	0.4326447E-01	0.1565649E 00	8

The remaining five pages of output in this example are omitted here.

CROSS SECTION TABLE

	TOTAL		SCAT/TOTAL		P-P/TOTAL	ENERGY (MEV)
1	0.17530E 01	450	0.22513E 00	899	0.0	0.31936E-01
2	0.16856E 01	451	0.23376E 00	900	0.0	0.32435E-01
3	0.16224E 01	452	0.24251E 00	901	0.0	0.32934E-01
4	0.15633E 01	453	0.25127E 00	902	0.0	0.33433E-01
5	0.15073E 01	454	0.26017E 00	903	0.0	0.33932E-01
6	0.14550E 01	455	0.26913E 00	904	0.0	0.34431E-01
7	0.14060E 01	456	0.27807E 00	905	0.0	0.34930E-01
8	0.13594E 01	457	0.28717E 00	906	0.0	0.35429E-01
9	0.13155E 01	458	0.29619E 00	907	0.0	0.35928E-01
10	0.12744E 01	459	0.30537E 00	908	0.0	0.36427E-01
11	0.12353E 01	460	0.31443E 00	909	0.0	0.36926E-01
12	0.11986E 01	461	0.32360E 00	910	0.0	0.37425E-01
13	0.11638E 01	462	0.33279E 00	911	0.0	0.37924E-01
14	0.11307E 01	463	0.34187E 00	912	0.0	0.38423E-01
15	0.10996E 01	464	0.35105E 00	913	0.0	0.38922E-01
16	0.10700E 01	465	0.36021E 00	914	0.0	0.39421E-01
17	0.10420E 01	466	0.36935E 00	915	0.0	0.39920E-01
18	0.10149E 01	467	0.37840E 00	916	0.0	0.40419E-01
19	0.98937E 00	468	0.38777E 00	917	0.0	0.40918E-01
20	0.96495E 00	469	0.39691E 00	918	0.0	0.41417E-01
21	0.94189E 00	470	0.40611E 00	919	0.0	0.41916E-01
22	0.91998E 00	471	0.41521E 00	920	0.0	0.42415E-01
23	0.89885E 00	472	0.42421E 00	921	0.0	0.42913E-01
24	0.87891E 00	473	0.43315E 00	922	0.0	0.43412E-01
25	0.85979E 00	474	0.44207E 00	923	0.0	0.43911E-01
26	0.84173E 00	475	0.45098E 00	924	0.0	0.44410E-01
27	0.82433E 00	476	0.45971E 00	925	0.0	0.44909E-01
28	0.80790E 00	477	0.46847E 00	926	0.0	0.45408E-01
29	0.79219E 00	478	0.47709E 00	927	0.0	0.45907E-01
30	0.77701E 00	479	0.48564E 00	928	0.0	0.46406E-01
31	0.76254E 00	480	0.49407E 00	929	0.0	0.46905E-01
32	0.74870E 00	481	0.50242E 00	930	0.0	0.47404E-01
33	0.73546E 00	482	0.51068E 00	931	0.0	0.47903E-01
34	0.72278E 00	483	0.51885E 00	932	0.0	0.48402E-01
35	0.71066E 00	484	0.52694E 00	933	0.0	0.48901E-01
36	0.69905E 00	485	0.53494E 00	934	0.0	0.49400E-01
37	0.68799E 00	486	0.54283E 00	935	0.0	0.49899E-01
38	0.67724E 00	487	0.55053E 00	936	0.0	0.50398E-01
39	0.66704E 00	488	0.55811E 00	937	0.0	0.50897E-01
40	0.65726E 00	489	0.56560E 00	938	0.0	0.51396E-01
41	0.64783E 00	490	0.57298E 00	939	0.0	0.51895E-01
42	0.63878E 00	491	0.58025E 00	940	0.0	0.52394E-01
43	0.63007E 00	492	0.58743E 00	941	0.0	0.52893E-01
44	0.62170E 00	493	0.59451E 00	942	0.0	0.53392E-01
45	0.61369E 00	494	0.60145E 00	943	0.0	0.53891E-01
46	0.60583E 00	495	0.60831E 00	944	0.0	0.54390E-01
47	0.59832E 00	496	0.61505E 00	945	0.0	0.54889E-01
48	0.59107E 00	497	0.62169E 00	946	0.0	0.55388E-01
49	0.58411E 00	498	0.62823E 00	947	0.0	0.55887E-01
50	0.57738E 00	499	0.63466E 00	948	0.0	0.56386E-01
51	0.57097E 00	500	0.64098E 00	949	0.0	0.56885E-01
52	0.56459E 00	501	0.64719E 00	950	0.0	0.57384E-01
53	0.55851E 00	502	0.65330E 00	951	0.0	0.57883E-01
54	0.55262E 00	503	0.65929E 00	952	0.0	0.58382E-01
55	0.54695E 00	504	0.66520E 00	953	0.0	0.58881E-01
56	0.54148E 00	505	0.67101E 00	954	0.0	0.59380E-01
57	0.53616E 00	506	0.67671E 00	955	0.0	0.59879E-01
58	0.53114E 00	507	0.68217E 00	956	0.0	0.60378E-01
59	0.52630E 00	508	0.68749E 00	957	0.0	0.60877E-01

60	0.52169E 00	509	0.69271E 00	958	0.0	0.61376E-01
61	0.51794E 00	510	0.69783E 00	959	0.0	0.61875E-01
62	0.51203E 00	511	0.70288E 00	960	0.0	0.62374E-01
63	0.50836E 00	512	0.70783E 00	961	0.0	0.62873E-01
64	0.50420E 00	513	0.71270E 00	962	0.0	0.63372E-01
65	0.50012E 00	514	0.71745E 00	963	0.0	0.63871E-01
66	0.49240E 00	515	0.72675E 00	964	0.0	0.64869E-01
67	0.48509E 00	516	0.73571E 00	965	0.0	0.65867E-01
68	0.47819E 00	517	0.74434E 00	966	0.0	0.66865E-01
69	0.47163E 00	518	0.75265E 00	967	0.0	0.67863E-01
70	0.46541E 00	519	0.76065E 00	968	0.0	0.68861E-01
71	0.45951E 00	520	0.76836E 00	969	0.0	0.69859E-01
72	0.45391E 00	521	0.77579E 00	970	0.0	0.70857E-01
73	0.44857E 00	522	0.78293E 00	971	0.0	0.71855E-01
74	0.44350E 00	523	0.78982E 00	972	0.0	0.72853E-01
75	0.43865E 00	524	0.79645E 00	973	0.0	0.73851E-01
76	0.43403E 00	525	0.80283E 00	974	0.0	0.74849E-01
77	0.42961E 00	526	0.80897E 00	975	0.0	0.75847E-01
78	0.42540E 00	527	0.81489E 00	976	0.0	0.76845E-01
79	0.42135E 00	528	0.82058E 00	977	0.0	0.77843E-01
80	0.41750E 00	529	0.82607E 00	978	0.0	0.78841E-01
81	0.41379E 00	530	0.83136E 00	979	0.0	0.79839E-01
82	0.41017E 00	531	0.83655E 00	980	0.0	0.80837E-01
83	0.40669E 00	532	0.84158E 00	981	0.0	0.81835E-01
84	0.40335E 00	533	0.84642E 00	982	0.0	0.82833E-01
85	0.40016E 00	534	0.85108E 00	983	0.0	0.83831E-01
86	0.39707E 00	535	0.85556E 00	984	0.0	0.84829E-01
87	0.39410E 00	536	0.85988E 00	985	0.0	0.85827E-01
88	0.39122E 00	537	0.86404E 00	986	0.0	0.86825E-01
89	0.38847E 00	538	0.86805E 00	987	0.0	0.87823E-01
90	0.38581E 00	539	0.87192E 00	988	0.0	0.88821E-01
91	0.38323E 00	540	0.87564E 00	989	0.0	0.89819E-01
92	0.38075E 00	541	0.87923E 00	990	0.0	0.90817E-01
93	0.37833E 00	542	0.88268E 00	991	0.0	0.91815E-01
94	0.37601E 00	543	0.88602E 00	992	0.0	0.92813E-01
95	0.37375E 00	544	0.88924E 00	993	0.0	0.93811E-01
96	0.37158E 00	545	0.89234E 00	994	0.0	0.94809E-01
97	0.36946E 00	546	0.89533E 00	995	0.0	0.95807E-01
98	0.36740E 00	547	0.89822E 00	996	0.0	0.96805E-01
99	0.36542E 00	548	0.90101E 00	997	0.0	0.97803E-01
100	0.36348E 00	549	0.90371E 00	998	0.0	0.98801E-01
101	0.36159E 00	550	0.90630E 00	999	0.0	0.99799E-01
102	0.35975E 00	551	0.90882E 00	1000	0.0	0.10080E 00
103	0.35796E 00	552	0.91125E 00	1001	0.0	0.10179E 00
104	0.35622E 00	553	0.91361E 00	1002	0.0	0.10279E 00
105	0.35453E 00	554	0.91588E 00	1003	0.0	0.10379E 00
106	0.35288E 00	555	0.91808E 00	1004	0.0	0.10479E 00
107	0.35126E 00	556	0.92020E 00	1005	0.0	0.10579E 00
108	0.34970E 00	557	0.92225E 00	1006	0.0	0.10678E 00
109	0.34815E 00	558	0.92424E 00	1007	0.0	0.10778E 00
110	0.34666E 00	559	0.92616E 00	1008	0.0	0.10878E 00
111	0.34519E 00	560	0.92801E 00	1009	0.0	0.10978E 00
112	0.34377E 00	561	0.92981E 00	1010	0.0	0.11078E 00
113	0.34236E 00	562	0.93155E 00	1011	0.0	0.11177E 00
114	0.34099E 00	563	0.93323E 00	1012	0.0	0.11277E 00
115	0.33965E 00	564	0.93486E 00	1013	0.0	0.11377E 00
116	0.33833E 00	565	0.93644E 00	1014	0.0	0.11477E 00
117	0.33706E 00	566	0.93797E 00	1015	0.0	0.11577E 00
118	0.33579E 00	567	0.93945E 00	1016	0.0	0.11676E 00
119	0.33456E 00	568	0.94089E 00	1017	0.0	0.11776E 00
120	0.33335E 00	569	0.94228E 00	1018	0.0	0.11876E 00
121	0.33216E 00	570	0.94363E 00	1019	0.0	0.11976E 00
122	0.33099E 00	571	0.94494E 00	1020	0.0	0.12076E 00
123	0.32985E 00	572	0.94621E 00	1021	0.0	0.12175E 00
124	0.32872E 00	573	0.94744E 00	1022	0.0	0.12275E 00
125	0.32763E 00	574	0.94863E 00	1023	0.0	0.12375E 00

The remaining nineteen pages of output in this example are omitted here.

TALLY UNSCATTERED ESCAPES

SOURCE ENERGY = 0.66200 MEV

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J	ANGLES A(J) TO A(J+1)		SOLID ANGLE	NUMBER	NUMBER/STER	FRACT/STER	PAIR PHOTONS	NO. THRO FW/BK FACE
1	3.14159	2.96706	0.95457E-01	0.0	0.0	0.0	0.0	0.0
2	2.96706	2.79253	0.28347E 00	0.0	0.0	0.0	0.0	0.0
3	2.79253	2.61799	0.46287E 00	0.0	0.0	0.0	0.0	0.0
4	2.61799	2.44346	0.62820E 00	0.0	0.0	0.0	0.0	0.0
5	2.44346	2.26893	0.77445E 00	0.0	0.0	0.0	0.0	0.0
6	2.26893	2.09439	0.89716E 00	0.0	0.0	0.0	0.0	0.0
7	2.09439	1.91986	0.99262E 00	0.0	0.0	0.0	0.0	0.0
8	1.91986	1.74533	0.10579E 01	0.0	0.0	0.0	0.0	0.0
9	1.74533	1.57080	0.10911E 01	0.0	0.0	0.0	0.0	0.0
10	1.57080	1.39626	0.10911E 01	0.0	0.0	0.0	0.0	0.0
11	1.39626	1.22173	0.10579E 01	0.0	0.0	0.0	0.0	0.0
12	1.22173	1.04720	0.99262E 00	0.0	0.0	0.0	0.0	0.0
13	1.04720	0.87266	0.89716E 00	0.0	0.0	0.0	0.0	0.0
14	0.87266	0.69813	0.77445E 00	0.0	0.0	0.0	0.0	0.0
15	0.69813	0.52360	0.62820E 00	0.0	0.0	0.0	0.0	0.0
16	0.52360	0.34907	0.46286E 00	0.0	0.0	0.0	0.0	0.0
17	0.34907	0.17453	0.28347E 00	0.0	0.0	0.0	0.0	0.0
18	0.17453	0.0	0.95455E-01	0.17800E 03	0.18647E 04	0.37295E 00	0.0	0.0

UNSCATTERED ESCAPES = 0.17800E 03

NUMBER AV/STER = 0.10360E 03

PAIR PHOTON ESCAPES = 0.0

TL.NO PP ESCAPE THRO BK FACE = 0.0

TL.NO PP ESCAPE THRO FW FACE = 0.0

TALLY SCATTERED ESCAPES

SOURCE ENERGY = 0.66200 MEV

ESCAPE ENERGY INTERVAL 1.29557 TO 0.06850 INDEX 1

J	ANGLES A(J) TO A(J+1)		SOLID ANGLE	NUMBER	NUMBER/STER	FRACT/STER	PAIR PHOTONS
1	3.14159	2.96706	0.95457E-01	0.69385E 01	0.72688E 02	0.14537E-01	0.0
2	2.96706	2.79253	0.28347E 00	0.27896E 02	0.98409E 02	0.19682E-01	0.0
3	2.79253	2.61799	0.46287E 00	0.39820E 02	0.86028E 02	0.17206E-01	0.0
4	2.61799	2.44346	0.62820E 00	0.46470E 02	0.73973E 02	0.14795E-01	0.0
5	2.44346	2.26893	0.77445E 00	0.78925E 02	0.10075E 03	0.20150E-01	0.0
6	2.26893	2.09439	0.89716E 00	0.81748E 02	0.91119E 02	0.18224E-01	0.0
7	2.09439	1.91986	0.99262E 00	0.11310E 03	0.11394E 03	0.22787E-01	0.0
8	1.91986	1.74533	0.10579E 01	0.11597E 03	0.10962E 03	0.21924E-01	0.0
9	1.74533	1.57080	0.10911E 01	0.13892E 03	0.12732E 03	0.25464E-01	0.0
10	1.57080	1.39626	0.10911E 01	0.16275E 03	0.14912E 03	0.29824E-01	0.0
11	1.39626	1.22173	0.10579E 01	0.17959E 03	0.16976E 03	0.33951E-01	0.0
12	1.22173	1.04720	0.99262E 00	0.19127E 03	0.19270E 03	0.38540E-01	0.0
13	1.04720	0.87266	0.89716E 00	0.21242E 03	0.23677E 03	0.47354E-01	0.0
14	0.87266	0.69813	0.77445E 00	0.23781E 03	0.30707E 03	0.61414E-01	0.0
15	0.69813	0.52360	0.62820E 00	0.19849E 03	0.31597E 03	0.63195E-01	0.0
16	0.52360	0.34907	0.46286E 00	0.17339E 03	0.37569E 03	0.75137E-01	0.0
17	0.34907	0.17453	0.28347E 00	0.97754E 02	0.34485E 03	0.68971E-01	0.0
18	0.17453	0.0	0.95455E-01	0.24573E 02	0.25743E 03	0.51485E-01	0.0

SCATTERED ESCAPES = 0.21274E 04
P.E.AUSORPTIONS = 0.77958E 03
NUMBER AV/STER = 0.32232E 04
PAIR PHOTON ESCAPES = 0.0

SCATTERED ESCAPES THRO BACK OR FRONT FACE

J	ANGLE A(J) TO A(J+1)		SOLID ANGLE	TL NUMBER	P.P. ESCAPES	SCATT ESCAPES	NO. OF S.S.	NO. OF D.S.
1	3.14159	2.96706	0.95457E-01	0.69385E 01	0.0	0.69385E 01	0.44417E 01	0.89407E 00
2	2.96706	2.79253	0.28347E 00	0.27896E 02	0.0	0.27896E 02	0.12881E 02	0.11457E 02
3	2.79253	2.61799	0.46287E 00	0.39105E 02	0.0	0.39105E 02	0.20987E 02	0.13613E 02
4	2.61799	2.44346	0.62820E 00	0.39852E 02	0.0	0.39852E 02	0.20099E 02	0.15303E 02
5	2.44346	2.26893	0.77445E 00	0.59555E 02	0.0	0.59555E 02	0.38309E 02	0.15886E 02
6	2.26893	2.09439	0.89716E 00	0.48917E 02	0.0	0.48917E 02	0.24984E 02	0.18170E 02
7	2.09439	1.91986	0.99262E 00	0.53950E 02	0.0	0.53950E 02	0.34978E 02	0.14340E 02
8	1.91986	1.74533	0.10579E 01	0.28666E 02	0.0	0.28666E 02	0.16878E 02	0.84410E 01
9	1.74533	1.57080	0.10911E 01	0.13927E 02	0.0	0.13927E 02	0.96607E 01	0.39852E 01
10	1.57080	1.39626	0.10911E 01	0.12556E 00	0.0	0.12556E 00	0.0	0.0
11	1.39626	1.22173	0.10579E 01	0.29708E 01	0.0	0.29708E 01	0.0	0.99503E 00
12	1.22173	1.04720	0.99262E 00	0.39942E 01	0.0	0.39942E 01	0.99939E 00	0.19972E 01
13	1.04720	0.87266	0.89716E 00	0.11582E 02	0.0	0.11582E 02	0.39976E 01	0.29958E 01
14	0.87266	0.69813	0.77445E 00	0.17471E 02	0.0	0.17471E 02	0.49970E 01	0.59895E 01
15	0.69813	0.52360	0.62820E 00	0.23418E 02	0.0	0.23418E 02	0.11771E 02	0.56587E 01
16	0.52360	0.34907	0.46286E 00	0.33393E 02	0.0	0.33393E 02	0.16434E 02	0.11531E 02
17	0.34907	0.17453	0.28347E 00	0.47647E 02	0.0	0.47647E 02	0.35201E 02	0.94797E 01
18	0.17453	0.0	0.95455E-01	0.17345E 02	0.0	0.17345E 02	0.12992E 02	0.27037E 01

	THRO FRONT FACE	THRO BACK FACE
TL SCATT ESCAPES =	0.15795E 03	0.31881E 03
PAIR PHOTON ESCAPES =	0.0	0.0
S. SCATT ESCAPES =	0.86391E 02	0.18322E 03
D. SCATT ESCAPES =	0.41351E 02	0.10209E 03

TALLY SCATTERED ESCAPES

(E)

SCATTERED ESCAPES THRO BACK OR FRONT FACE

SUMMED OVER ALL ENERGIES

J	ANGLE A(J) TO A(J+1)		SOLID ANGLE	TL NUMBER	P.P. ESCAPES	SCATT ESCAPES	NO. OF S.S.	NO. OF D.S.
1	3.14159	2.96706	0.95457E-01	0.69385E 01	0.0	0.69385E 01	0.44417E 01	0.89407E 00
2	2.96706	2.79253	0.28347E 00	0.27896E 02	0.0	0.27896E 02	0.12881E 02	0.11457E 02
3	2.79253	2.61799	0.46287E 00	0.39105E 02	0.0	0.39105E 02	0.20987E 02	0.13613E 02
4	2.61799	2.44346	0.62820E 00	0.39852E 02	0.0	0.39852E 02	0.20099E 02	0.15303E 02
5	2.44346	2.26893	0.77445E 00	0.59555E 02	0.0	0.59555E 02	0.38309E 02	0.15886E 02
6	2.26893	2.09439	0.89716E 00	0.48917E 02	0.0	0.48917E 02	0.24984E 02	0.18170E 02
7	2.09439	1.91986	0.99262E 00	0.53950E 02	0.0	0.53950E 02	0.34978E 02	0.14340E 02
8	1.91986	1.74533	0.10579E 01	0.28666E 02	0.0	0.28666E 02	0.16878E 02	0.84410E 01
9	1.74533	1.57080	0.10911E 01	0.13927E 02	0.0	0.13927E 02	0.96607E 01	0.39852E 01
10	1.57080	1.39626	0.10911E 01	0.12556E 00	0.0	0.12556E 00	0.0	0.0
11	1.39626	1.22173	0.10579E 01	0.29708E 01	0.0	0.29708E 01	0.0	0.99503E 00
12	1.22173	1.04720	0.99262E 00	0.39942E 01	0.0	0.39942E 01	0.99939E 00	0.19972E 01
13	1.04720	0.87266	0.89716E 00	0.11582E 02	0.0	0.11582E 02	0.39976E 01	0.29958E 01
14	0.87266	0.69813	0.77445E 00	0.17471E 02	0.0	0.17471E 02	0.49970E 01	0.59895E 01
15	0.69813	0.52360	0.62820E 00	0.23418E 02	0.0	0.23418E 02	0.11771E 02	0.56587E 01
16	0.52360	0.34907	0.46286E 00	0.33393E 02	0.0	0.33393E 02	0.16434E 02	0.11531E 02
17	0.34907	0.17453	0.28347E 00	0.47647E 02	0.0	0.47647E 02	0.35201E 02	0.94797E 01
18	0.17453	0.0	0.95455E-01	0.17345E 02	0.0	0.17345E 02	0.12992E 02	0.27037E 01

NO. OF HISTORIES	INITIAL ENERGY	CUT-OFF ENERGY	TOTAL NO. OF COLLISIONS
5000	0.662E 00	0.350E-01	21345

TERMINATION PRIMARY PHOTONS

1. ENERGY	0.50000E 01		
2. WEIGHT	0.19100E 04		
3. ESCAPE	0.23054E 04	(3./NO. OF HISTORIES)	0.46108E 00
4. ABSORBED	0.26946E 04		
5. TOTAL UNSCATTERED ESCAPES	0.17800E 03	(5./NO. OF HISTORIES)	0.35600E-01
6. TOTAL SCATTERED ESCAPES	0.21274E 04	(6./NO. OF HISTORIES)	0.42548E 00
7. PHOTOELECTRIC ABSORPTIONS	0.77958E 03		
8. PAIR PRODUCTION PHOTONS	0.0		

TERMINATION PAIR PHOTONS

1. ENERGY	0.0		
2. WEIGHT	0.0		
3. ESCAPE	0.0		
4. ABSORBED	0.0	FULL ABS.	0.0
5. TOTAL UNSCATTERED ESCAPES	0.0		
6. TOTAL SCATTERED ESCAPES	0.0		
7. PHOTOELECTRIC ABSORPTIONS	0.0		
8. PAIR PRODUCTION PHOTONS	0.0		

TALLY CHECK = 0.50000E 04

(F)

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TERMINATION ALBEDO PHOTONS

A. TOTAL SCATTERED ESCAPES 0.31881E 03

B. PAIR PRODUCTION PHOTONS 0.0

C. SINGLE SCATTERED PHOTONS 0.18322E 03

D DOUBLE SCATTERED PHOTONS 0.10209E 03

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TERMINATION BUILD-UP PHOTONS

A. TOTAL SCATTERED ESCAPES 0.15795E 03

B. PAIR PRODUCTION PHOTONS 0.0

C. SINGLE SCATTERED PHOTONS 0.86391E 02

D DOUBLE SCATTERED PHOTONS 0.41351E 02

ABSORBED ENERGY SPECTRUM

INDEX(J)	ENERGY EE(J) TO EE(J+1)(MEV)	NUMBER	REDISTRIBUTED NO.	GAUSSIAN NO.	NORMOLIZED NO.
1	0.0 0.1324E-01	0.3468E 02	0.3819E 02	0.3830E 02	0.1552E-01
2	0.1324E-01 0.2648E-01	0.2877E 02	0.2818E 02	0.2895E 02	0.1173E-01
3	0.2648E-01 0.3972E-01	0.4119E 02	0.3550E 02	0.3582E 02	0.1451E-01
4	0.3972E-01 0.5296E-01	0.3218E 02	0.3565E 02	0.3665E 02	0.1484E-01
5	0.5296E-01 0.6620E-01	0.5014E 02	0.4665E 02	0.4595E 02	0.1861E-01
6	0.6620E-01 0.7944E-01	0.4382E 02	0.4735E 02	0.4637E 02	0.1878E-01
7	0.7944E-01 0.9268E-01	0.4120E 02	0.4199E 02	0.4378E 02	0.1774E-01
8	0.9268E-01 0.1059E 00	0.5224E 02	0.4875E 02	0.4854E 02	0.1966E-01
9	0.1059E 00 0.1192E 00	0.5105E 02	0.5298E 02	0.5241E 02	0.2123E-01
10	0.1192E 00 0.1324E 00	0.5319E 02	0.5371E 02	0.5362E 02	0.2172E-01
11	0.1324E 00 0.1456E 00	0.5382E 02	0.5373E 02	0.5444E 02	0.2205E-01
12	0.1456E 00 0.1589E 00	0.5706E 02	0.5571E 02	0.5766E 02	0.2336E-01
13	0.1589E 00 0.1721E 00	0.6516E 02	0.6660E 02	0.6617E 02	0.2437E-01
14	0.1721E 00 0.1854E 00	0.4771E 02	0.5069E 02	0.5651E 02	0.2289E-01
15	0.1854E 00 0.1986E 00	0.6510E 02	0.6019E 02	0.5479E 02	0.2220E-01
16	0.1986E 00 0.2118E 00	0.4407E 02	0.4698E 02	0.5299E 02	0.2147E-01
17	0.2118E 00 0.2251E 00	0.5779E 02	0.5652E 02	0.5411E 02	0.2192E-01
18	0.2251E 00 0.2383E 00	0.5993E 02	0.5616E 02	0.5455E 02	0.2210E-01
19	0.2383E 00 0.2516E 00	0.5064E 02	0.5379E 02	0.5113E 02	0.2071E-01
20	0.2516E 00 0.2648E 00	0.4186E 02	0.4287E 02	0.4646E 02	0.1882E-01
21	0.2648E 00 0.2780E 00	0.4461E 02	0.4325E 02	0.4465E 02	0.1808E-01
22	0.2780E 00 0.2913E 00	0.4340E 02	0.4477E 02	0.4584E 02	0.1857E-01
23	0.2913E 00 0.3045E 00	0.5238E 02	0.5001E 02	0.4726E 02	0.1914E-01
24	0.3045E 00 0.3178E 00	0.4703E 02	0.4816E 02	0.4668E 02	0.1891E-01
25	0.3178E 00 0.3310E 00	0.4375E 02	0.4397E 02	0.4488E 02	0.1818E-01
26	0.3310E 00 0.3442E 00	0.3778E 02	0.3944E 02	0.4438E 02	0.1798E-01
27	0.3442E 00 0.3575E 00	0.5059E 02	0.4992E 02	0.4554E 02	0.1845E-01
28	0.3575E 00 0.3707E 00	0.4605E 02	0.4486E 02	0.4648E 02	0.1883E-01
29	0.3707E 00 0.3840E 00	0.4511E 02	0.4781E 02	0.4674E 02	0.1893E-01
30	0.3840E 00 0.3972E 00	0.4958E 02	0.4727E 02	0.4732E 02	0.1917E-01
31	0.3972E 00 0.4104E 00	0.3843E 02	0.4086E 02	0.4970E 02	0.2013E-01
32	0.4104E 00 0.4237E 00	0.6150E 02	0.5859E 02	0.5396E 02	0.2186E-01
33	0.4237E 00 0.4369E 00	0.6018E 02	0.6018E 02	0.5764E 02	0.2335E-01
34	0.4369E 00 0.4502E 00	0.5863E 02	0.6124E 02	0.5828E 02	0.2361E-01
35	0.4502E 00 0.4634E 00	0.6261E 02	0.6084E 02	0.5450E 02	0.2207E-01
36	0.4634E 00 0.4766E 00	0.6010E 02	0.5870E 02	0.4570E 02	0.1851E-01
37	0.4766E 00 0.4899E 00	0.2431E 02	0.2645E 02	0.3374E 02	0.1367E-01
38	0.4899E 00 0.5031E 00	0.1820E 02	0.1745E 02	0.2258E 02	0.9145E-02
39	0.5031E 00 0.5164E 00	0.1199E 02	0.1211E 02	0.1467E 02	0.5943E-02
40	0.5164E 00 0.5296E 00	0.9584E 01	0.9283E 01	0.9808E 01	0.3973E-02
41	0.5296E 00 0.5428E 00	0.3640E 01	0.3935E 01	0.6962E 01	0.2820E-02
42	0.5428E 00 0.5561E 00	0.3606E 01	0.4136E 01	0.5410E 01	0.2191E-02
43	0.5561E 00 0.5693E 00	0.8114E 01	0.7031E 01	0.4587E 01	0.1858E-02
44	0.5693E 00 0.5826E 00	0.2065E 01	0.2789E 01	0.4587E 01	0.1858E-02
45	0.5826E 00 0.5958E 00	0.2467E 01	0.1949E 01	0.8392E 01	0.3399E-02
46	0.5958E 00 0.6090E 00	0.1812E 01	0.2372E 01	0.2710E 02	0.1098E-01
47	0.6090E 00 0.6223E 00	0.4449E 01	0.3731E 01	0.8578E 02	0.3475E-01
48	0.6223E 00 0.6355E 00	0.3484E 01	0.4739E 01	0.2119E 03	0.8585E-01
49	0.6355E 00 0.6488E 00	0.6474E 01	0.5433E 01	0.3902E 03	0.1581E 00
50	0.6488E 00 0.6620E 00	0.3146E 01	0.3211E 01	0.5298E 03	0.2146E 00
51	0.6620E 00 0.6752E 00	0.0	0.0	0.5288E 03	0.2142E 00
52	0.6752E 00 0.6885E 00			0.3876E 03	0.1570E 00
53	0.6885E 00 0.7017E 00			0.2086E 03	0.8448E-01
54	0.7017E 00 0.7150E 00			0.8233E 02	0.3335E-01
55	0.7150E 00 0.7282E 00			0.2384E 02	0.9657E-02
56	0.7282E 00 0.7414E 00			0.5062E 01	0.2051E-02
57	0.7414E 00 0.7547E 00			0.7879E 00	0.3192E-03
58	0.7547E 00 0.7679E 00			0.8985E-01	0.3639E-04
59	0.7679E 00 0.7812E 00			0.7504E-02	0.3040E-05
60	0.7812E 00 0.7944E 00			0.4588E-03	0.1859E-06
61	0.7944E 00 0.8076E 00			0.3817E-08	0.1546E-11
62	0.8076E 00 0.8209E 00			0.0	0.0
63	0.8209E 00 0.8341E 00			0.0	0.0
64	0.8341E 00 0.8474E 00			0.0	0.0
65	0.8474E 00 0.8606E 00			0.0	0.0
66	0.8606E 00 0.8738E 00			0.0	0.0
67	0.8738E 00 0.8871E 00			0.0	0.0
68	0.8871E 00 0.9003E 00			0.0	0.0
69	0.9003E 00 0.9136E 00			0.0	0.0

(G)

PEAK NO	AT ENERGY(MEV)	PHOTON NUMBER
1	0.6620E 00	0.2469E 04

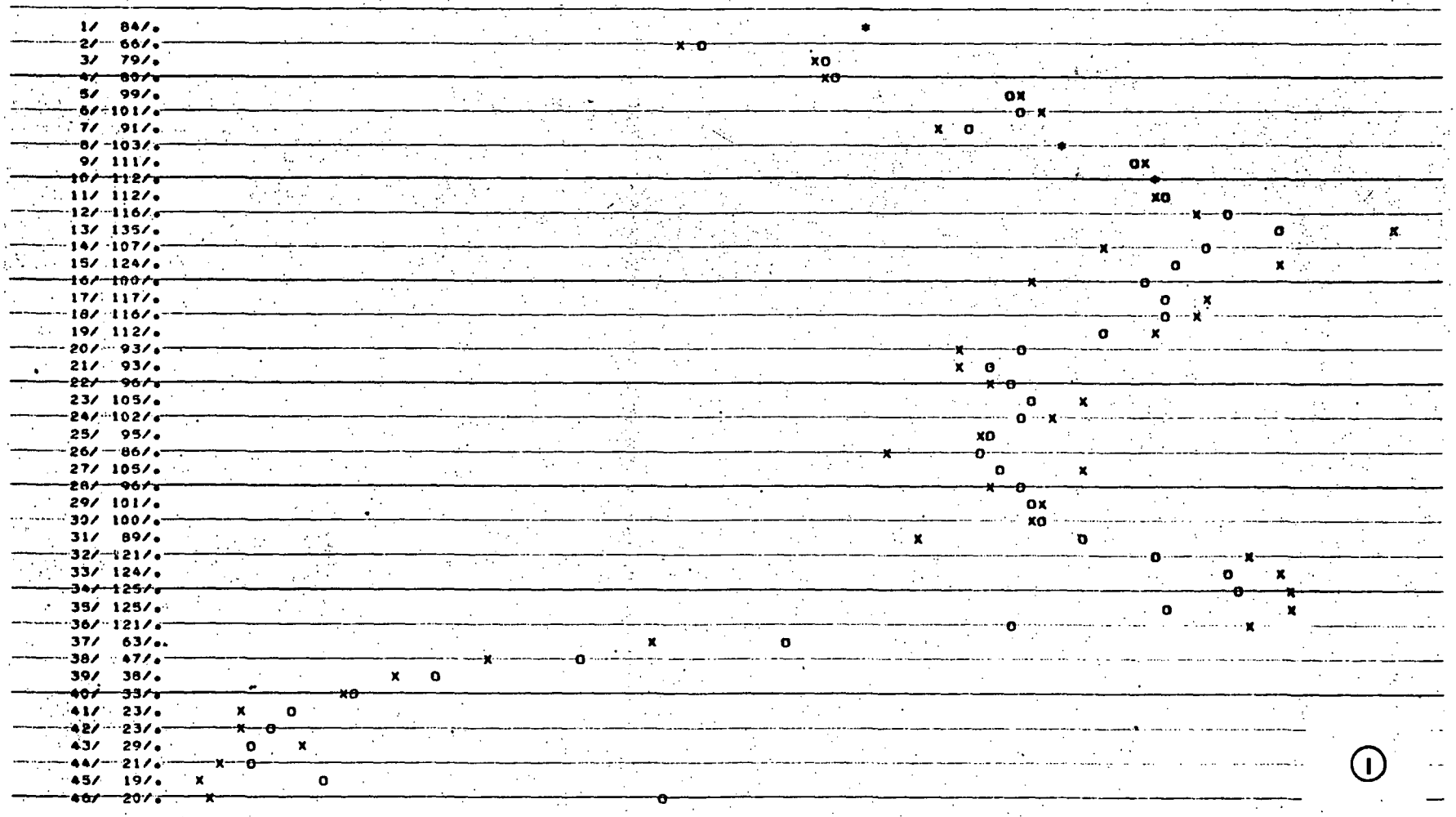
NUMBER ENTERING FRONT FACE OF THE CRYSTAL = 5000

SUM UNDER THE SPECTRUM = 0.43454E 04

NUMBER IN PEAK = 0.24687E 04

EFFICIENCY = 0.8691E 00 PHOTO-FRACTION = 0.5681E 00

RESOLUTION CONSTANTS - INTERCEPTS = 0.88230 SLOPE = 0.63720



80

MONTE CARLO SPECTRUM

38.1892	28.1755	35.4955	35.6509	46.6495	47.3543	41.9863	48.7549	52.9793	53.7054
53.7310	55.7149	66.5973	50.6935	60.1899	46.9783	56.5242	56.1607	53.7852	42.8682
43.2539	44.7723	50.0071	48.1581	43.9664	39.4369	49.9209	44.8593	47.8124	47.2748
40.8607	58.5910	60.1782	61.2388	60.8354	58.6958	26.4476	17.4534	12.1065	9.2831
3.9345	4.1364	7.0310	2.7890	1.9486	2.3717				

GAUSSIAN SMEARED SPECTRUM

38.3048	28.9526	35.8164	36.6461	45.9496	46.3654	43.7842	48.5415	52.4067	53.6183
54.4441	57.6629	60.1743	56.5147	54.7948	52.9942	54.1055	54.5491	51.1299	46.4559
44.6460	45.9420	47.2586	46.6821	44.8753	44.3827	45.5358	46.4783	46.7395	47.3248
49.6994	53.9594	57.6410	58.2801	54.4965	45.6998	33.7439	22.5755	14.6704	9.8080
6.9623	5.4100	4.5865	4.5873	8.3915	27.1022				

APPENDIX V

USER INFORMATION FOR O5S

(Reproduced from ORNL-4160;
Reference (5) of Volume I)

Ø5S INPUT

1. Card Input

Card	Format	Description
1	20A4	Alphameric identification
2	I5	Desired number of colliding neutrons
		a. Incident neutron energy (eV)
		b. x-direction cosine of incident neutrons
		c. y-direction cosine
		d. z-direction cosine
		e. value of incident neutrons (1.0)
4	1Z8	Initial random number. If the initial random number is negative or zero, then the machine stored number is used by the code as the initial random number. When running two or more cases which are identical except possibly for the desired number of colliding neutrons, different initial random numbers should be chosen to preserve statistical validity.
5	I5,3F10,5	a. Geometry type. Negative for neutrons incident on the flat surface of the system; zero or positive for neutrons incident on the lateral surface of the scintillator
		b. Radius (cm) of the scintillator
		c. Length (cm) of the scintillator

		d. Radius (cm) of the circle of incidence (used only if the geometry type is negative)
6	2E10.5	a. Equivalent length (cm) in the scintillating material of the C_1 detector
		b. Equivalent length (cm) in the scintillating material of the light pipe

2. Tape Intput

The input consists of one binary tape (generated by code XSECT) consisting of a record of identification and, for each energy supergroup, a record made up of the mean free flight time for each energy subgroup, the non-absorption probability for each energy subgroup (presently ignored by O5S) and the cumulative scattering probability at each energy subgroup for each possible reaction type.

The tape is prepared by the XSECT cross-section handling program of O5R as described in reference (51) in Volume I of this report.

Ø5S OUTPUT

1. Printed output

   a. Title information

   b. Energy and direction cosines of incident neutrons

   c. Initial random number

   d. Geometry specifications

   e. Thicknesses of C1 detector and light pipe

   f. The upper and lower bounds (eV) of neutron energy range which may be considered

   g. The number of reaction types and the number of subgroups per supergroup

   h. The masses of the target nuclei

   i. The light table in order of ascending energy. (The energies are in eV and the light values in cobalts)

   j. The energy of the incident neutrons (eV)

   k. The total number of incident neutrons

   l. The number of reacting neutrons

   m. The number of reactions with hydrogen

   n. The number of inelastic carbon reactions

   o. The number of $^{12}C(n,\alpha)^{9}Be$ reactions

   p. The number of $^{12}C(n,n)3\alpha$ reactions

   q. The number of $^{12}C(n,p)^{12}B$ reactions

   r. The number of $^{12}C(n,pn)^{11}B$ reactions

   s. The number of $^{12}C(n,2n)^{11}C$ reactions

   t. The number of protons which escaped the scintillator

   u. The number of reactions per reacting neutron

   v. The zero-bias efficiency of the scintillator

w. The tabulation of the number of incident neutrons the total light of whose reactions fall within a given light interval. There is also a breakdown as to the type of reactions had by the neutrons in a given light range interval.

x. The sums of the columns in the above tabulation

y. The smoothing parameters

z. The resultant pulse height distribution

For the second and all subsequent cases in a given run items (f) through (i) of the above are omitted.

2. Card Output

a. The tabulation as described in item (w) of the above

b. The pulse height distribution in log-log form for use in plotting the distribution by an x-y plotting device

APPENDIX VI

USER INFORMATION FOR SSALB CODE

(Reference Equation (32) of this Report, Volume I)

SSALB Input Card Details

NAME	COLUMN	FORMAT	DESCRIPTION, PURPOSE AND USE
Card ① (single card)			
NN	1-5	I5	The number of energies for which cross section data of the scatter medium to be input
Card set ② (NN cards) (Table for the code to interpolate the scatter photon cross-section)			
E(1)	1-10	F10.5	First (lowest) energy for input of cross section data (MeV)
CS(1)	11-20	F10.5	Total cross-section for energy E(1) (cm^{-1})
Card set ③ (NUM cards)			
NUM	1-10	I10	Number of cases to be run (i.e., number of times this card is input)
N	11-20	I10	N-1 is the number of intervals in the numerical integration for each integral, e.g., if N=51 then there are 50θ and 50L determinations of the differential (a total of 2500)
EØ	21-30	F10.5	Incident photon energy (MeV)
R	31-40	F10.5	Radius of the scatter medium (cm)
EL	41-50	F10.5	Thickness of the scatter medium (cm)
UØ	51-60	F10.5	Total cross-section for EØ (cm^{-1})
ELECT	61-70	F10.5	Number of election/cm^3 for the scatter medium (unit of 10^{24})

SSALB FORTRAN & SAMPLE INPUT DATA LISTING

(CDC-6600 VERSION)

```
      PROGRAM ALBEDO(INPUT,OUTPUT,TAPE60=INPUT,TAPE61=OUTPUT)
      DIMENSION E (30),CS(30),FM(300),D(300)
      COMMON/B/NN,Z,E,CS,EO,PIE,LL
      PIE=4.0*ATAN(1.0)
      EPS=1.0E-06
      LI=60
      LO=61
      READ(LI,10)NN,(E(I),CS(I),I=1,NN)
   10 FORMAT(I5/(2F10.5))
      WRITE(LO,11)(I,E(I),CS(I),I=1,NN)
   11 FORMAT(16H CROSS-SECTIONS /(1X,I5,5X,2E14.7))
      NC=0
   30 READ(LI,20)NUM,N,EO,R,EL,UO,ELECT
      N=51
   20 FORMAT(2I10,5F10.5)
      ELECT=ELECT*1.0E24
      WRITE(LO,50)NUM,N,EO,R,EL,UO,ELECT
   50 FORMAT(12H PARAMETERS ,2I5,5E14.7)
      RE=2.82E-13
      REL=2.0*PIE*ELECT*RE*RE
      NC=NC+1
      EN=N
      DD=EL/(EN-1.0)
      D(1)=0.0
      DO 4 I=1,N
      LL=0
      Z=D(I)
      IF(Z)61,61,60
   61 A=0.0
      B=PIE/2.0
      EX=1.0
      LL=1
      GO TO 62
   60 ARG=UO*Z
      IF(ARG-20.0) 2,2,1
    1 EX=1.0
      GO TO 3
    2 EX=EXP(-ARG)
    3 A=0.0
      B=ATAN(R/Z)
   62 SUM=SIMPSN(A,B,EPS)*EX/2.0
      SUM=SUM*REL
C     WRITE (LO,70) I,NC,A,B,Z,EX,SUM
C  70 FORMAT (4H ALB ,2I5,5E14.7)
      FM(I)=SUM
      IP=I+1
      D(IP)=D(I)+DD
    4 CONTINUE
      SUMP=0.0
      DO 5 I=2,N,2
    5 SUMP=4.0*FM(I)+SUMP+2.0*FM(I+1)
      SUMP=(SUMP+FM(1)-FM(N))*(DD/3.0)
      ALB=SUMP
      WRITE(LO,40)ALB,SUMP,DD,EN,(I,D(I),FM(I),I=1,10)
   40 FORMAT(9H RESULTS ,4E14.7/(1X,I5,5X,2E14.7))
      IF(NC-NUM) 30,31,31
   31 STOP
      END
```

```
      SUBROUTINE FC(X)
      DIMENSION E(30),CS(30),ZZ(3),Y(3)
      COMMON/B/M,Z,E,CS,EO,PIE,LL
      LOW=1
      N=2
      CSX=COS(PIE-X)
      SI=SIN(X)
      IF(SI) 3,3,4
    3 FC=0.0
      GO TO 7
    4 SINX=SI*SI
      ES=EO/(1.0+(EO/0.51097)*(1.0-CSX))
      P=ES/EO
      SIGKN=(P-(P**2)*SINX+P*P*P)
      IF(LL-1)9,8,9
    8 FC=SIGKN*SI
      RETURN
    9 CALL TA(ES,E,M,LOW,MOX,MUN,ZZ,Y,CS,N,L,0)
      UT=TE(3,ZZ,Y,ES)
      IF(CSX) 2,3,3
    2 ARG=UT*Z/COS(X)
      FC=EXP(-ARG)*SI*SIGKN
    7 CONTINUE
C     WRITE (61,5)M,L,LOW,MOX,MUN,N,X,CSX,SI,SINX,ES,EO,P,SIGKN,UT,ARG,
C    1  (ZZ(I), Y(I),I=1,3)
C   5 FORMAT (3H FC ,6I5,6E12.5/1X,10E12.5)
      RETURN
      END
      FUNCTION SIMPSN (A,B,EPS)
      COMMON /B/ M,Z,DUME(30),DUMCS(30),EO,PIE,LL
      TMAX=512.0
      AN=2.0
      FA=FC(A)
      FB=FC(B)
      FP=0.0
      SI=0.0
      DELT=B-A
  405 FOUR=0.0
      AK=1.0
      AKN=AN/2.0
  399 FFX=FC(A+(((2.0*AK-1.0)*DELT)/AN))
      FOUR=FOUR+FFX
      IF(AKN-AK)400,401,400
  400 AK=AK+1.0
      GO TO 399
  401 SIM=(DELT/(AN*3.0))*(FA+FB+4.0*FOUR+2.0*FP)
      IF(TMAX-AN)503,503,499
  499 DIFX=ABS(SIM-SI)
      IF(EPS-DIFX/SIM)402,403,403
  402 AN=AN+AN
      FP=FP+FOUR
      SI=SIM
      GO TO 405
  503 CONTINUE
  403 SIMPSN=SIM
C     WRITE(61,5) EPS,A,B,AN,FP,AK,DIFX,FOUR ,SIM
C   5 FORMAT (5H SIMP ,9E12.5)
      RETURN
      END
```

```
      END
      SUBROUTINE TA (E,X,M,MM,MOX,MUN,Z,Y,R,NDEGRE,L,LL)
      DIMENSION X(45),Z(3),Y(3),R(45)
      MOX=M
      MUN=MM
    7 KDEL=(MOX-MUN)/2
    8 IF(KDEL)18,14,18
   18 KP=MUN+KDEL
      IF(X(KP)-E)12,12,11
   11 MOX=KP
      GO TO 7
   12 IF(E-X(KP))24,24,13
   13 MUN=KP
      GO TO 7
   24 MUN=KP
      MOX=KP+1
C
   14 IF(MOX-M)4,5,4
    5 L=MUN-2
      GO TO 6
    4 L=MUN-1
    6 NN=NDEGRE+1
      IF(LL)15,2,15
    2 DO 3 I=1,NN
      J=I+L
      Z(I)=X(J)
    3 Y(I)=R(J)
   15 RETURN
      END
      FUNCTION TE (N,X,Y,E)
      DIMENSION X(3),Y(3)
      S=0.
      I=1
   28 IF(I-N)21,21,22
   21 P=Y(I)
      J=1
   27 IF(J-N)23,23,24
   23 IF(I-J)25,26,25
   25 P=P*(E-X(J))/(X(I)-X(J))
   26 J=J+1
      GO TO 27
   24 S=S+P
      I=I+1
      GO TO 28
   22 TE =S
      RETURN
      END
```

```
17
.04     1.375
.05      .883
.06      .670
.08      .503
.10      .4335
.1497    .3604
.1996    .3235
.2495    .2980
.2994    .2783
.3513    .2618
.3992    .2489
.4511    .2367
.5030    .2262
.5988    .2099
.7026    .1954
.7984    .1843
1.0060   .1650
```

16	101	1.25	17.0	17.0	.1477	.7839
16	101	1.25	14.45	17.0	.1477	.7839
16	101	1.25	8.5	17.0	.1477	.7839
16	101	1.25	4.25	17.0	.1477	.7839
16	101	1.25	17.0	12.75	.1477	.7839
16	101	1.25	17.0	8.5	.1477	.7839
16	101	1.25	17.0	4.25	.1477	.7839
16	101	1.25	17.0	2.71	.1477	.7839
16	101	0.662	17.0	17.0	.2007	.7839
16	101	0.662	14.45	17.0	.2007	.7839
16	101	0.662	8.5	17.0	.2007	.7839
16	101	0.662	4.25	17.0	.2007	.7839
16	101	0.662	2.5	17.0	.2007	.7839
16	101	0.662	17.0	8.5	.2007	.7839
16	101	0.662	17.0	4.25	.2007	.7839
16	101	0.662	17.0	2.5	.2007	.7839

NUS CORPORATION

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