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COMPUTER CODES FOR THE EVALUATION OF SPACE RADIATION HAZARDS

VOL. 1

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Seattle, Washington

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FOREWORD

This report is submitted to the Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Texas in accordance with the requirements of Contract NAS 9-1393.

29363

ABSTRACT

The computer codes developed at The Boeing Company for the evaluation of the absorbed dose in an astronaut's body are discussed. The Apollo vehicle is analyzed by these codes, and the absorbed dose at three body points is found for two lunar trajectories. In addition, the absorbed dose resulting from a solar flare is calculated. These dose results indicate that the geomagnetically trapped radiation does not constitute a significant hazard for either of the two trajectories considered. The solar flare considered results in absorbed doses ranging from 89 rads at the blood forming organ to 1517 rads at the skin. Additional shielding will be required if a flare of this type is not to produce significant damage.

Auth.

INTRODUCTION

An evaluation of the absorbed dose at particular points in an astronaut's body resulting from a specified mission in a spacecraft requires a knowledge of the following factors:

1. The intensity, energy spectrum, spatial extent, and time dependence of the primary radiations encountered during the mission.

2. The modification of these primary radiations by the vehicle structure, and the nature of the secondary radiation generated by the interaction of the primary radiations with the vehicle structure.

3. The further modification of these primary and secondary radiations by the tissue of the astronaut's body.

The solution to this problem is presented in eight volumes. Volume 1 describes the general procedure developed at The Boeing Company and analyzes a sample spacecraft and mission furnished by NASA and gives the absorbed dose at three body points.

Volumes 2 through 8 describe the detailed operating instructions for each of the computer codes used in the evaluation of the absorbed dose. Details of the physical assumptions made, input data used, and the general results obtained by each of the codes are presented. Following are the titles of these volumes:

Volume	
2	Van Allen Radiation
3	Apollo Sector Analysis
4	Space Radiation Doses from Electron Bremsstrahlung Radiation
5	Electron Monte Carlo
6	Electron Transmission
7	Space Radiation Doses from Primary Protons
8	Space Radiation Doses from Protons and Their Secondary Radiations

RADIATION ENVIRONMENT OF SPACE

The space radiation environment can be described as consisting of two major components, the solar flare particle events (large fluxes of charged particles ejected from the sun coincident with the occurrence of a bright optical flare at the solar surface) and the geomagnetically trapped radiation. Other components of the space radiation environment, the galactic cosmic rays, the solar wind and solar electromagnetic radiation have little significance for short term missions. The contribution of the galactic cosmic radiation, from 2 to 4 rems per month, is the only component which might become an important factor for long missions.

The solar flare particle events are the major radiation hazard when the vehicle is at some distance from the earth. The problem of predicting the occurrence of these flares is, as yet, unsolved. In addition, the energy spectrum and total flux from each flare vary widely. For these reasons the solar flare dose calculations are made for an arbitrary solar flare, selected by NASA.

The major hazard for a spacecraft in a near earth orbit will be the flux of charged particles trapped in the earth's magnetic field. The complexity of the earth's field has made the evaluation of particle fluxes a tedious task. Recently, however, G. E. McIllwain (Ref. 1) has devised a parameter called "L", which can be readily calculated by a computer and which is, for all practical purposes, equivalent to a field line. Therefore, since particles mirror at given values of B and between their mirrorings, follow lines of constant L,

construction of a plot with axes of B and L allows one to analyze particle flux data in two dimensions. This has made it feasible to use a computer code in calculating integrated fluxes received by a vehicle on a particular trajectory. For a given mission, the vehicle trajectory is transformed by the computer from r, θ, ϕ coordinates into B, L coordinates. Then by knowing how long the vehicle spends on each part of its trajectory in B, L space, the fluxes are added to give the total integrated flux. The computer code which performs this function is documented in Vol. 2 (Ref. 8) and the assumed flux maps are referenced therein. These flux maps may be revised as new or improved data become available.

ABSORBED DOSE ANALYSIS

GENERAL APPROACH

When the radiation environment has been established for the mission of interest, a calculation of the absorbed dose at a particular body point can be made. This is done in three basic steps.

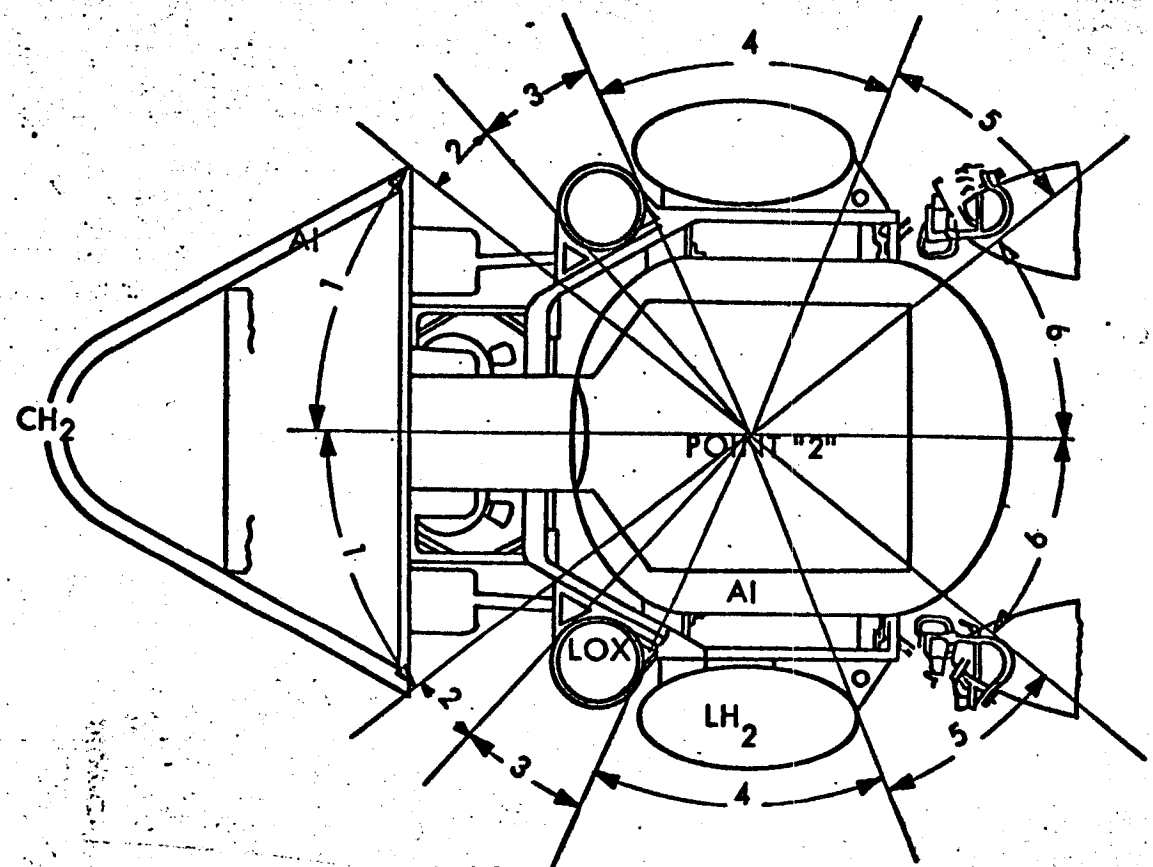
First, the slab shield equivalents for various sections of the vehicle are determined. This is accomplished by choosing solid angles of essentially constant shielding thickness subtended at the particular body point of interest. This body point is assumed to be at the origin of the sector analysis coordinate system.

Second, the average tissue thickness for the body point in each solid angle is determined. If there is a wide range of body tissue thickness in a particular solid angle, it may be further subdivided.

Third, the slab shielding computer programs are used to solve the equivalent slab shielding problem, and to perform a weighted average of the absorbed dose over all solid angles. This gives the absorbed dose at a particular body point.

SPACE VEHICLE SHIELDING THICKNESS ANALYSIS

The method of sectoring a complex shielding arrangement such as a space vehicle is illustrated in Fig. 1. The radiation reaching a specified point from outside the vehicle must penetrate radially through the various



REGION	FRACTIONAL SOLID ANGLE	SHIELDING IN REGION
1	.10	3" CH_2 + 4.7" Al
2	.07	1.25" Al
3 (with fuel)	.14	.02" Al + 15" O_2 + 1.5" Al
3 (without fuel)	.14	1.52" Al
4 (with fuel)	.4	.02" Al + 18" H_2 + 1.6 Al
4 (without fuel)	.4	1.62" Al
5	.13	2.2" Al
6	.18	3.1" Al

FIGURE 1. Typical Space Vehicle Shielding Analysis

amounts of shielding materials as shown. Each region chosen has essentially constant thickness, and the fractional solid angle subtended by each region is calculated from the vehicle design details.

In the figure shown, six regions were chosen to illustrate the method. In practice, many regions may be necessary to describe a vehicle in adequate detail. If there are several layers of different material in the spacecraft, then the constant thickness criteria must be applied to each layer.

HUMAN BODY SHIELDING ANALYSIS

In addition to various layers of vehicle material, radiation must pass through a layer of tissue to arrive at an interior body point. Reference 2 presents a geometrical analysis of a seated 75-percentile man, and gives isothickness contours of tissue as seen from twelve body points. A typical plot is shown in Fig. 2. With the aid of these charts, it is possible to determine the average tissue thickness that must be used as the last layer in each sector. For the Apollo vehicle this procedure is described in Vol. 3 (Ref. 9).

SLAB SHIELDING COMPUTER PROGRAMS

When the vehicle and body shielding analysis have been completed, the original three-dimensional problem has been reduced to a large number of one-dimensional slab shielding problems. The appropriate computer code is then used to calculate the unweighted dose from each sector, or separate slab shielding problem. This dose from each sector is then weighted by the

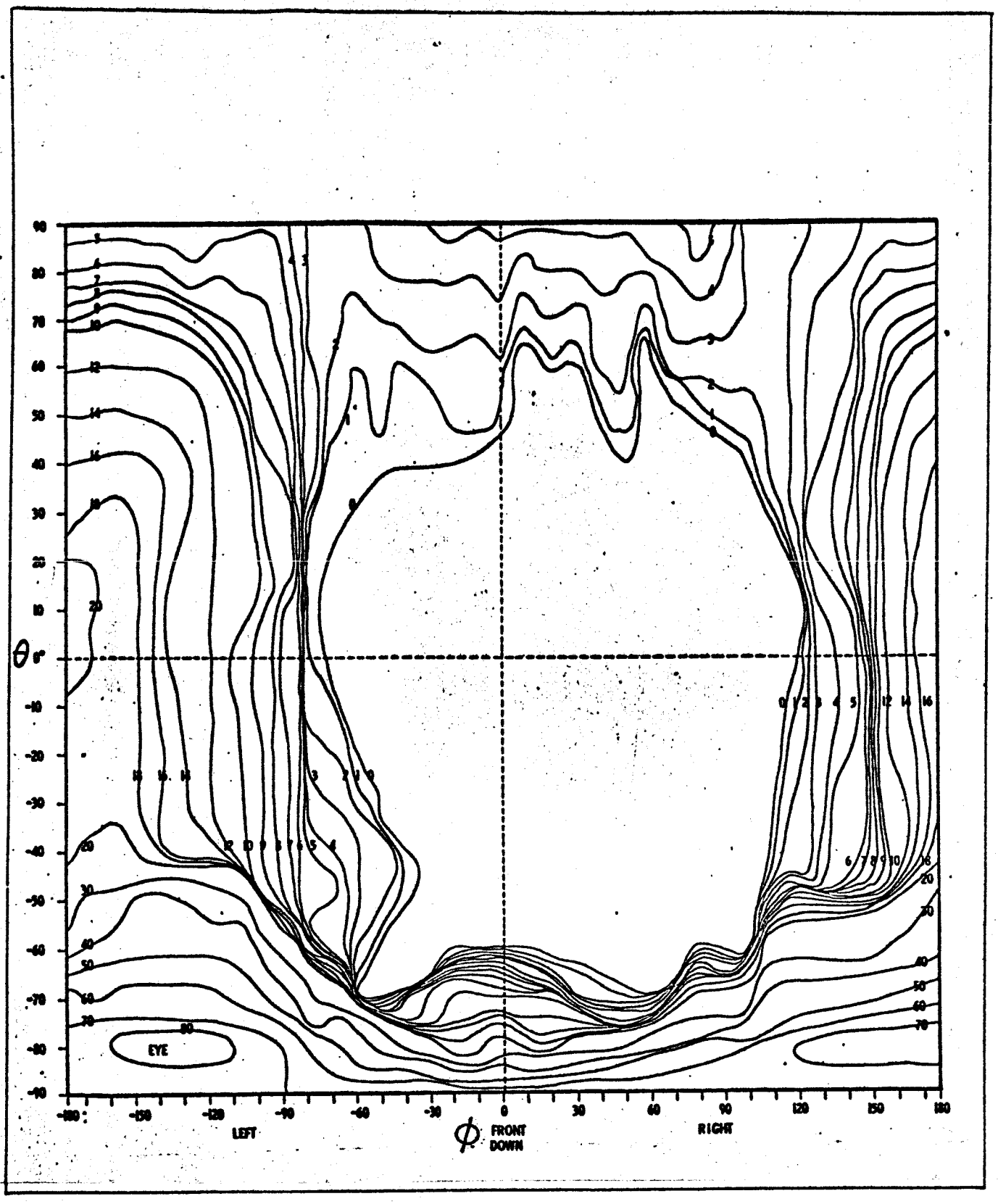


FIGURE 2. Contour plot of tissue isothicknesses in all directions about the body point eye.

solid angle subtended by the sector, and the sector doses summed to give the total absorbed dose at a particular body point. This may be represented in the following way:

Let DOSE(P) = Total absorbed dose at body point P.

$DOSE(S_{IP})$ = The absorbed dose computed behind a layer shield, S_{IP}.

S_{IP} = The one-dimensional shielding configuration of whatever layers, materials, and thickness specified for the solid angle indexed by IP.

ANG(IP) = The fraction of the flux coming from the IP direction, calculable from the angular distribution of the incident radiation, and normalized to be a constant unity value for isotropic flux.

F = The incident flux assumed, suitably normalized.

$(\Delta\Omega)_{IP}$ = The fractional solid angle subtended about the point of interest P, by the constant shielding region IP.

NP = The total number of regions needed to complete the full solid angle, so that the vehicle and body shielding are divided into sufficiently small angular regions to provide the desired accuracy.

Then: $$DOSE(P) = F \sum_{IP=1}^{NP} DOSE(S_{IP})\, ANG\,(IP)\Delta\Omega_{IP}$$

The power of this method is that very complex arrangements can be

analyzed in these terms. The basic limitation is in the inherent assumption that the radiation received at the body point is primary, or unscattered. For the thin shielding of space vehicles, this is felt to be a reasonable assumption.

The slab shielding computer codes are discussed in the separate volumes listed below. Associated with each computer code is also a Boeing document giving the theoretical development of each code and the comprehensive results.

Electron Codes

Bremsstrahlung
- Vol. 4 (Ref. 10)
- D2-90411 (Ref. 3)

Electron Penetration
- Vol. 5 (Ref. 11)
- Vol. 6 (Ref. 12)
- D2-90414 (Ref. 4)

Proton Codes

Primary Proton Code
- Vol. 7 (Ref. 13)
- D2-10115 (Ref. 5)

Secondary Proton Code
- Vol. 8 (Ref. 14)
- D2-90446 (Ref. 6)

APOLLO DOSE CALCULATIONS

ENVIRONMENT

Trapped Radiation

Calculations of the proton and electron fluxes received on two typical lunar trajectories have been made using the computer program described in Vol. 2 (Ref. 8). These trajectories start from a 100 nautical mile circular orbit resulting from launch at Cape Canaveral and extend through the region of the trapped radiation belts.

Trajectory I is for injection over the Pacific Ocean on the first orbit, and trajectory II is for the injection over the Atlantic Ocean on the second orbit. The computer printout shows these trajectories (time from injection from a 100 n.m. circular orbit, longitude, latitude, and radial distance). Table 1 shows the total integrated fluxes computed along the trajectories. As protons with energy less than 20 Mev are stopped in only 0.6 g/cm^2 of aluminum, and since free space flux values below 20 Mev are not accurately known, only proton fluxes of E > 20 Mev are given.

The computer printout for these trajectories follows.

VAN ALLEN COMPUTER RUN

VAN ALLEN RADIATION PROGRAM

19 TRAJECTORY POINTS ARE GIVEN AS INPUT

TIME (SECONDS)	--XLONG-- LONGITUDE (DEGREES)	--XL-- LATITUDE (DEGREES)	--ALT-- ALTITUDE (KILOMETERS) (NAUT. MILES)	--BVALU-- MAG. FLUX DENSITY	-ELVALU- MC ILWAIN PARAMETER	-FVALU- FLUX	--FLUX-- FLUX*TIME	-FLXSUM- SUM OF FLUX*TIME
						HIGH ENERGY PROTONS		
						LOW ENERGY PROTONS		
						THREAT ELECTRONS B LESS THAN BC		
						THREAT ELECTRONS B GREATER THAN BC		
						L LESS THAN 1.5 ELECTRONS		
						L GREATER THAN 1.5 ELECTRONS		
0.	198.15	13.80	185.30	0.31362	1.06972	0.	0.	0.
			100.00			0.	0.	0.
						0.	0.	0.
						1.819E 05	0.	0.
						0.	0.	0.
						0.	0.	0.
62.630	203.55	16.29	203.08	0.31911	1.10819	0.	0.	0.
			109.60			0.	0.	0.
						0.	0.	0.
						1.044E 05	6.53855E 06	6.53855E 06
						0.	0.	0.
						0.	0.	0.
125.944	209.08	18.62	256.81	0.32221	1.15869	0.	0.	0.
			138.59			0.	0.	0.
						0.	0.	0.
						8.721E 04	5.52172E 06	1.20603E 07
						0.	0.	0.
						0.	0.	0.
190.651	214.76	20.77	347.66	0.32226	1.22229	0.	0.	0.
			187.62			0.	0.	0.
						0.	0.	0.
						9.716E 04	6.28690E 06	1.83472E 07
						0.	0.	0.
						0.	0.	0.
257.517	220.60	22.71	477.65	0.31831	1.29986	0.	0.	0.
			257.77			0.	0.	0.
						0.	0.	0.
						1.481E 05	9.90217E 06	2.82493E 07
						0.	0.	0.
						0.	0.	0.
327.934	226.58	24.41	649.73	0.30929	1.39503	0.	0.	0.
			350.64			0.	0.	0.
						0.	0.	0.
						3.455E 05	2.43274E 07	5.25767E 07
						0.	0.	0.
						0.	0.	0.

TIME (SECONDS)	--XLONG-- LONGITUDE (DEGREES)	--XL-- LATITUDE (DEGREES)	--ALT-- ALTITUDE (KILOMETERS) (NAUT. MILES)	--BVALU-- MAG. FLUX DENSITY	-ELVALU- MC ILWAIN PARAMETER	-FVALU- FLUX	--FLUX-- FLUX*TIME	-FLXSUM- SUM OF FLUX*TIME
						HIGH ENERGY PROTONS		
						LOW ENERGY PROTONS		
						THREAT ELECTRONS B LESS THAN BC		
						THREAT ELECTRONS B GREATER THAN BC		
						L LESS THAN 1.5 ELECTRONS		
						L GREATER THAN 1.5 ELECTRONS		
401.255	232.71	25.84	867.95	0.29443	1.51048	0.	0.	0.
			468.40			0.	0.	0.
						0.	0.	0.
						1.239E 06	9.08169E 07	1.43394E 08
						0.	0.	0.
						1.532E 00	1.12351E 02	1.12351E 02
480.256	238.96	26.99	1137.62	0.27364	1.64886	0.	0.	0.
			613.93			5.376E 00	4.24690E 02	4.24690E 02
						0.	0.	0.
						5.779E 06	4.56525E 08	5.99918E 08
						0.	0.	0.
						2.296E 04	1.81392E 06	1.81403E 06
565.789	245.30	27.82	1465.66	0.24761	1.81150	7.391E 00	0.	6.32182E 02
			790.97			7.423E 02	6.34937E 04	6.39183E 04
						1.463E 07	1.25161E 09	1.25161E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						1.141E 05	9.75807E 06	1.15721E 07
659.570	251.64	28.33	1860.95	0.21770	1.99703	2.237E 01	0.	2.72981E 03
			1004.29			1.023E 04	9.59047E 05	1.02296E 06
						1.629E 07	1.52765E 09	2.77926E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						7.889E 04	7.39806E 06	1.89702E 07
763.767	258.09	28.50	2334.87	0.18575	2.20028	1.597E 01	0.	4.39337E 03
			1260.05			2.014E 04	2.09855E 06	3.12152E 06
						1.405E 07	1.46401E 09	4.24327E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						3.363E 04	3.50424E 06	2.24744E 07
881.153	264.40	28.33	2902.08	0.15366	2.41132	0.	0.	4.39337E 03
			1566.15			2.008E 04	2.35712E 06	5.47864E 06
						1.083E 07	1.27093E 09	5.51419E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						1.717E 04	2.01597E 06	2.44904E 07

TIME (SECONDS)	--XLCNG-- LONGITUDE (DEGREES)	--XL-- LATITUDE (DEGREES)	--ALT-- ALTITUDE (KILOMETERS) (NAUT. MILES)	--BVALU-- MAG. FLUX DENSITY	-ELVALU- MC ILWAIN PARAMETER	-FVALU- FLUX	--FLUX-- FLUX*TIME	-FLXSUM- SUM OF FLUX*TIME
						HIGH ENERGY PROTONS		
						LOW ENERGY PROTONS		
						THREAT ELECTRONS B LESS THAN BC		
						THREAT ELECTRONS B GREATER THAN BC		
						L LESS THAN 1.5 ELECTRONS		
						L GREATER THAN 1.5 ELECTRONS		
1015.373	270.62	27.82	3581.54 1932.83	0.12318	2.62112	0.	0.	4.39337E 03
						1.630E 04	2.18747E 06	7.66610E 06
						8.313E 06	1.11575E 09	6.62994E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						8.041E 03	1.07921E 06	2.55696E 07
1171.267	276.66	26.99	4398.00 2373.45	0.09564	2.82218	0.	0.	4.39337E 03
						1.036E 04	1.61531E 06	9.28142E 06
						6.199E 06	9.66387E 08	7.59633E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						1.362E 03	2.12389E 05	2.57820E 07
1355.438	282.47	25.84	5384.12 2905.63	0.07188	3.01415	0.	0.	4.39337E 03
						8.049E 03	1.48243E 06	1.07638E 07
						3.018E 06	5.55827E 08	8.15216E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						8.406E 03	1.54820E 06	2.73302E 07
1577.031	287.98	24.41	6583.61 3552.95	0.05224	3.20562	0.	0.	4.39337E 03
						5.913E 03	1.31039E 06	1.20742E 07
						2.053E 06	4.54957E 08	8.60711E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						5.962E 04	1.32103E 07	4.05405E 07
1849.061	293.13	22.71	8055.82 4347.45	0.03666	3.41171	0.	0.	4.39337E 03
						4.059E 03	1.10419E 06	1.31784E 07
						1.416E 06	3.85079E 08	8.99219E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						3.511E 05	9.55018E 07	1.36042E 08
2190.472	297.82	20.77	9882.86 5333.44	0.02479	3.65337	0.	0.	4.39337E 03
						2.634E 03	8.99443E 05	1.40779E 07
						9.208E 05	3.14382E 08	9.30657E 09
						0.	0.	5.99918E 08
						0.	0.	0.
						1.226E 06	4.18462E 08	5.54504E 08

TIME (SECONDS)	--XLONG-- LONGITUDE (DEGREES)	--XL-- LATITUDE (DEGREES)	--ALT-- ALTITUDE (KILOMETERS) (NAUT. MILES)	--BVALU-- MAG. FLUX DENSITY	-ELVALU- MC ILWAIN PARAMETER
2629.653	301.94	18.62	12180.66 6573.48	0.01610	3.95723

-FVALU- FLUX	--FLUX-- FLUX*TIME	-FLXSUM- SUM OF FLUX*TIME
HIGH ENERGY PROTONS		
LOW ENERGY PROTONS		
THREAT ELECTRONS B LESS THAN BC		
THREAT ELECTRONS B GREATER THAN BC		
L LESS THAN 1.5 ELECTRONS		
L GREATER THAN 1.5 ELECTRONS		
0.	0.	4.39337E 03
1.263E 03	5.54699E 05	1.46326E 07
4.455E 05	1.95637E 08	9.50221E 09
0.	0.	5.99918E 08
0.	0.	0.
3.952E 06	1.73560E 09	2.29010E 09

VAN ALLEN RADIATION PROGRAM

17 TRAJECTORY POINTS ARE GIVEN AS INPUT

TIME (SECONDS)	XLONG LONGITUDE (DEGREES)	XL LATITUDE (DEGREES)	ALT ALTITUDE (KILOMETERS) (NAUT. MILES)	BVALU MAG. FLUX DENSITY	ELVALU MC ILWAIN PARAMETER	FVALU FLUX	FLUX FLUX*TIME	FLXSUM SUM OF FLUX*TIME
						HIGH ENERGY PROTONS		
						LOW ENERGY PROTONS		
						THREAT ELECTRONS B LESS THAN BC		
						THREAT ELECTRONS B GREATER THAN BC		
						L LESS THAN 1.5 ELECTRONS		
						L GREATER THAN 1.5 ELECTRONS		
0.	312.46	15.88	185.30	0.34958	1.32038	0.	0.	0.
			100.00			0.	0.	0.
						0.	0.	0.
						2.661E 04	0.	0.
						0.	0.	0.
						0.	0.	0.
73.117	318.71	12.94	209.52	0.31777	1.21301	0.	0.	0.
			113.07			0.	0.	0.
						0.	0.	0.
						1.243E 05	9.09039E 06	9.09039E 06
						0.	0.	0.
						0.	0.	0.
147.322	324.81	9.85	282.89	0.28403	1.14867	0.	0.	0.
			152.66			0.	0.	0.
						0.	0.	0.
						9.431E 05	6.99793E 07	7.90697E 07
						0.	0.	0.
						0.	0.	0.
223.763	330.77	6.63	407.60	0.25171	1.12401	0.	0.	0.
			219.97			0.	0.	0.
						0.	0.	0.
						8.829E 06	6.74867E 08	7.53937E 08
						0.	0.	0.
						0.	0.	0.
303.710	336.64	3.33	587.47	0.22228	1.13195	0.	0.	0.
			317.04			1.853E 01	1.48105E 03	1.48105E 03
						1.502E 08	1.20050E 10	1.20050E 10
						0.	0.	7.53937E 08
						0.	0.	0.
						0.	0.	0.
388.621	342.44	0.00	828.17	0.19581	1.16757	5.342E 02	0.	4.53633E 04
			446.93			7.237E 02	6.14526E 04	6.29336E 04
						6.502E 08	5.52090E 10	6.72140E 10
						0.	0.	7.53937E 08
						3.466E 05	2.94294E 07	2.94294E 07
						0.	0.	0.

TIME (SECONDS)	--XLCNG-- LONGITUDE (DEGREES)	--XL-- LATITUDE (DEGREES)	--ALT-- ALTITUDE (KILOMETERS) (NAUT. MILES)	--BVALU-- MAG. FLUX DENSITY	-ELVALU- MC ILWAIN PARAMETER	-FVALU- FLUX	--FLUX-- FLUX*TIME	-FLXSUM- SUM OF FLUX*TIME
						HIGH ENERGY PROTONS		
						LOW ENERGY PROTONS		
						THREAT ELECTRONS B LESS THAN BC		
						THREAT ELECTRONS B GREATER THAN BC		
						L LESS THAN 1.5 ELECTRONS		
						L GREATER THAN 1.5 ELECTRONS		
480.256	348.22	-3.33	1137.62	0.17167	1.23016	1.944E 03	0.	2.23476E 05
			613.94			1.372E 04	1.25758E 06	1.32051E 06
						9.631E 08	8.82565E 10	1.55470E 11
						0.	0.	7.53937E 08
						1.270E 08	1.16371E 10	1.16665E 10
						0.	0.	0.
580.793	354.00	-6.63	1526.60	0.14912	1.31983	6.250E 03	0.	8.51805E 05
			823.85			4.244E 04	4.26716E 06	5.58767E 06
						8.168E 08	8.21136E 10	2.37584E 11
						0.	0.	7.53937E 08
						5.264E 08	5.29182E 10	6.45847E 10
						0.	0.	0.
693.022	359.82	-9.85	2009.54	0.12765	1.43845	9.044E 03	0.	1.86683E 06
			1084.48			1.030E 05	1.15651E 07	1.71527E 07
						4.540E 08	5.09546E 10	2.88539E 11
						0.	0.	7.53937E 08
						2.105E 08	2.36240E 10	8.82087E 10
						0.	0.	0.
820.606	5.69	-12.94	2605.75	0.10721	1.58893	7.145E 03	0.	2.77835E 06
			1406.23			3.284E 05	4.18929E 07	5.90456E 07
						2.385E 08	3.04275E 10	3.18966E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						8.699E 07	1.10984E 10	1.10984E 10
968.493	11.63	-15.88	3341.19	0.08806	1.77553	2.845E 03	0.	3.19909E 06
			1803.13			5.025E 05	7.43187E 07	1.33364E 08
						1.213E 08	1.79442E 10	3.36910E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						1.712E 07	2.53198E 09	1.36304E 10
1143.527	17.65	-18.62	4251.14	0.07052	2.00754	1.141E 03	0.	3.39881E 06
			2294.19			4.884E 05	8.54952E 07	2.18860E 08
						6.095E 07	1.06685E 10	3.47579E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						3.195E 06	5.59168E 08	1.41896E 10

TIME (SECONDS)	--XLONG-- LONGITUDE (DEGREES)	--XL-- LATITUDE (DEGREES)	--ALT-- ALTITUDE (KILOMETERS) (NAUT. MILES)	--BVALU-- MAG. FLUX DENSITY	-ELVALU- MC ILWAIN PARAMETER	-FVALU- FLUX	--FLUX-- FLUX*TIME	-FLXSUM- SUM OF FLUX*TIME
						HIGH ENERGY PROTONS		
						LOW ENERGY PROTONS		
						THREAT ELECTRONS B LESS THAN BC		
						THREAT ELECTRONS B GREATER THAN BC		
						L LESS THAN 1.5 ELECTRONS		
						L GREATER THAN 1.5 ELECTRONS		
1355.438	23.73	-21.11	5384.12	0.05479	2.29970	3.603E 02	0.	3.47516E 06
			2905.63			2.202E 05	4.66693E 07	2.65529E 08
						2.784E 07	5.89889E 09	3.53478E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						6.427E 05	1.36200E 08	1.43258E 10
1616.443	29.81	-23.30	6808.15	0.04102	2.67209	3.869E 01	0.	3.48533E 06
			3674.12			4.064E 04	1.06895E 07	2.76218E 08
						1.321E 07	3.47423E 09	3.56952E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						1.326E 05	3.48799E 07	1.43607E 10
1953.994	35.82	-25.16	8620.52	0.02934	3.15611	0.	0.	3.48533E 06
			4652.19			7.524E 03	2.52469E 06	2.78743E 08
						2.247E 06	7.54006E 08	3.57706E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						4.415E 05	1.48140E 08	1.45088E 10
2395.559	41.58	-26.64	10963.92	0.01985	3.78497	0.	0.	3.48533E 06
			5916.85			2.053E 03	9.06684E 05	2.79650E 08
						7.429E 05	3.28032E 08	3.58034E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						2.227E 06	9.83152E 08	1.54920E 10
2997.521	46.85	-27.71	14053.93	0.01258	4.60628	0.	0.	3.48533E 06
			7584.42			2.870E 02	1.72753E 05	2.79822E 08
						3.386E 05	2.03805E 08	3.58238E 11
						0.	0.	7.53937E 08
						0.	0.	8.82087E 10
						1.259E 07	7.58067E 09	2.30726E 10

TABLE 1. Trajectory Parameters

	Flux(cm^{-2})
Trajectory I	
Protons ($E > 20$ Mev)	4.65×10^{3}
Electrons ($L < 1.5$)	0
Electrons ($L \geq 1.5$)	2.44×10^{9}
Trajectory II	
Protons ($E > 20$ Mev)	3.51×10^{6}
Electrons ($L < 1.5$)	9.61×10^{10}
Electrons ($L > 1.5$)	2.46×10^{10}

Solar Flare

The solar flare spectrum used is that given by W. L. Gill (Ref. 7) and was selected by NASA. This spectrum is shown in Fig. 3.

DOSE CALCULATION

Sector Analysis

The Apollo vehicle and human body sector analysis is described in Vol. 3 (Ref. 9) and the results listed in Vol. 3 will be used in the dose calculations that follow. The dose at three body points, eye, skin, and the blood forming organs will be calculated.

ELECTRON CODES

Bremsstrahlung Code

The Bremsstrahlung program, Vol. 4 (Ref. 10) calculates the gamma dose at a specified body point resulting from a flux of incident electrons. The results are shown in the following computer printout.

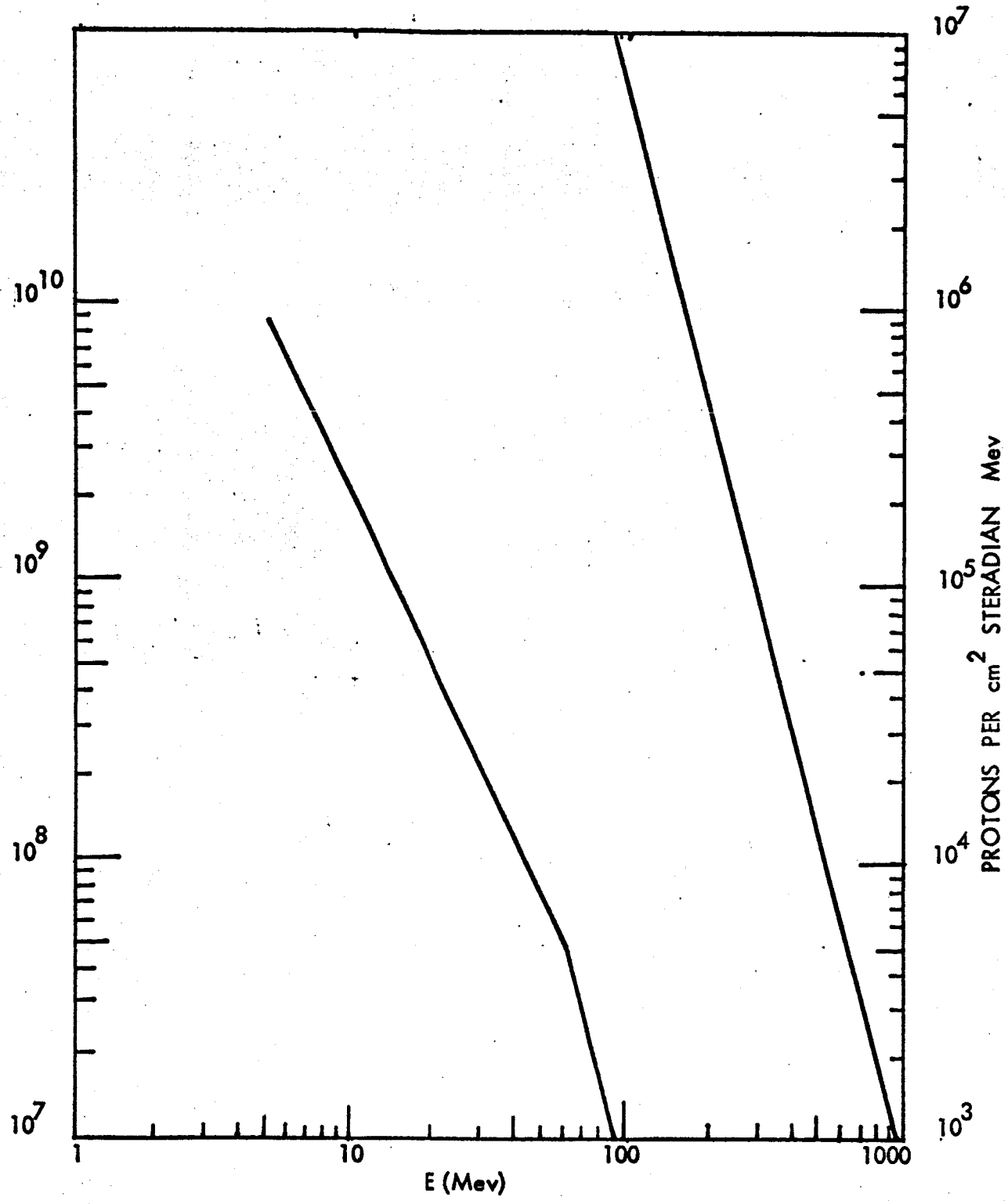


FIGURE 3. Solar Flare Spectrum of May 10, 1959 Event Unidirectional Flux

BREMSSTRAHLUNG PROGRAMS
FUELED AND UNFUELED

PULLO FUELED AT LYE

BREMSSTRAHLUNG WITH SPECTRUM 1

SECTION	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.3065E-10	AL	141.00	TISSUE	20.00
2	0.8110E-10	AL	116.90	TISSUE	19.00
3	0.1499E-08	AL	50.05	TISSUE	19.00
4	0.1989E-08	AL	44.79	TISSUE	18.00
5	0.2057E-08	AL	44.08	TISSUE	18.00
6	0.2057E-08	AL	44.08	TISSUE	18.00
7	0.1920E-08	AL	44.08	TISSUE	20.00
8	0.6718E-09	AL	68.06	TISSUE	18.00
9	0.2422E-09	AL	89.89	TISSUE	20.00
10	0.6044E-11	AL	184.80	TISSUE	20.00
11	0.8366E-12	AL	243.20	TISSUE	18.00
12	0.5115E-08	AL	24.95	TISSUE	18.00
13	0.5115E-08	AL	24.95	TISSUE	18.00
14	0.2213E-08	AL	41.08	TISSUE	20.00
15	0.5511E-10	AL	127.20	TISSUE	16.00
16	0.2779E-09	AL	87.99	TISSUE	18.00
17	0.4353E-10	AL	133.20	TISSUE	18.00
18	0.1011E-09	AL	112.10	TISSUE	[illegible]
19	0.2655E-10	AL	146.60	TISSUE	[illegible]
20	0.3324E-08	AL	32.49	TISSUE	[illegible]
21	0.4[illegible]2E-14	AL	413.10	TISSUE	[illegible]
22	0.1160E-07	AL	5.68	TISSUE	16.00
23	0.2309E-09	AL	94.59	TISSUE	14.00
24	0.1568E-09	AL	103.20	TISSUE	15.00
25	0.5857E-10	AL	124.40	TISSUE	20.00
26	0.1799E-11	AL	224.40	TISSUE	11.00
27	0.3211E-10	AL	143.30	TISSUE	14.00
28	0.2774E-10	AL	143.60	TISSUE	20.00
29	0.1369E-07	AL	5.61	TISSUE	12.00
30	0.1287E-07	AL	5.32	TISSUE	14.00
31	0.6934E-09	AL	69.17	TISSUE	15.00
32	0.1008E-07	AL	15.09	TISSUE	11.00
33	0.7672E-08	AL	14.80	TISSUE	19.00
34	0.1295E-07	AL	10.55	TISSUE	7.00
35	0.9907E-08	AL	10.26	TISSUE	17.00
36	0.1450E-07	AL	7.29	TISSUE	6.00
37	0.1191E-07	AL	6.92	TISSUE	15.00
38	0.1482E-07	AL	6.46	TISSUE	7.00
39	0.1242E-07	AL	9.01	TISSUE	12.00
40	0.1294E-07	AL	8.63	TISSUE	11.00
41	0.1412E-07	AL	6.57	TISSUE	10.00
42	0.9558E-08	AL	6.95	TISSUE	20.00
43	0.1040E-07	AL	11.12	TISSUE	15.00
44	0.1245E-07	AL	10.45	TISSUE	10.00
45	0.1290E-07	AL	10.69	TISSUE	6.00
46	0.4179E-08	AL	29.25	TISSUE	18.00
47	0.2812E-08	AL	20.69	TISSUE	35.00
48	0.1050E-07	AL	11.38	TISSUE	15.00
49	0.9436E-08	AL	17.11	TISSUE	10.00
50	0.9761E-08	AL	15.83	TISSUE	11.00
51	0.1081E-07	AL	13.44	TISSUE	11.00
52	0.1166E-07	AL	10.28	TISSUE	2.00
53	0.1413E-07	AL	5.93	TISSUE	3.00
54	0.1192E-07	AL	12.49	TISSUE	5.00
55	0.9053E-08	AL	14.76	TISSUE	1.00
56	0.7197E-08	AL	17.67	TISSUE	0.

57	0.8136E-08	AL	14.64	TISSUE	0.
58	0.8830E-08	AL	15.36	TISSUE	1.00
59	0.1257E-08	AL	44.69	TISSUE	30.00
60	0.2891E-08	AL	25.95	TISSUE	30.00
61	0.1157E-07	AL	13.25	TISSUE	9.00
62	0.1272E-07	AL	10.60	TISSUE	8.00
63	0.1215E-07	AL	11.97	TISSUE	8.00
64	0.1313E-07	AL	9.52	TISSUE	9.00
65	0.1124E-07	AL	3.93	TISSUE	0.
66	0.1418E-07	AL	2.33	TISSUE	2.00
67	0.1500E-07	AL	5.77	TISSUE	5.00
68	0.1020E-07	AL	8.18	TISSUE	0.
69	0.9266E-08	AL	11.15	TISSUE	0.
70	0.8866E-08	AL	12.32	TISSUE	0.
71	0.6792E-08	AL	19.05	TISSUE	0.
72	0.5039E-08	AL	30.78	TISSUE	8.00
73	0.6575E-08	AL	24.46	TISSUE	3.00
74	0.1026E-07	AL	14.80	TISSUE	3.00
75	0.6208E-08	AL	23.33	TISSUE	1.00
76	0.9448E-08	AL	13.71	TISSUE	1.00
77	0.1157E-07	AL	8.09	TISSUE	1.00
78	0.1422E-07	AL	1.59	TISSUE	2.00
79	0.1320E-07	AL	6.41	TISSUE	2.00
80	0.1146E-07	AL	1.59	TISSUE	0.
81	0.1014E-07	AL	8.38	TISSUE	0.
82	0.9383E-08	AL	10.79	TISSUE	0.
83	0.9383E-08	AL	10.79	TISSUE	0.
84	0.1026E-07	AL	7.98	TISSUE	0.
85	0.9283E-08	AL	11.10	TISSUE	0.
86	0.8409E-08	AL	13.79	TISSUE	0.
87	0.9218E-08	AL	11.30	TISSUE	0.
88	0.9798E-08	AL	9.49	TISSUE	0.
89	0.1117E-07	AL	4.32	TISSUE	0.
90	0.7284E-08	AL	17.38	TISSUE	0.
91	0.6484E-08	AL	20.14	TISSUE	0.
92	0.6484E-08	AL	20.14	TISSUE	0.
93	0.7895E-08	AL	15.40	TISSUE	0.
94	0.6008E-08	AL	21.90	TISSUE	0.
95	0.7161E-08	AL	17.79	TISSUE	0.
96	0.8854E-08	AL	12.42	TISSUE	0.
97	0.6183E-08	AL	21.24	TISSUE	0.
98	0.9276E-08	AL	11.12	TISSUE	0.
99	0.9703E-08	AL	9.79	TISSUE	0.
100	0.9703E-08	AL	9.79	TISSUE	0.
101	0.9879E-08	AL	9.23	TISSUE	0.
102	0.9879E-08	AL	9.23	TISSUE	0.
103	0.1122E-07	AL	4.04	TISSUE	0.
104	0.1136E-07	AL	3.06	TISSUE	0.
105	0.1084E-07	AL	5.84	TISSUE	0.
106	0.1145E-07	AL	1.78	TISSUE	0.
107	0.1149E-07	AL	2.83	TISSUE	0.
108	0.1151E-07	AL	3.48	TISSUE	0.

VEHICLE APLLO ANALYSIS, INTERIOR DOSE AT EYE

SECTOR	DOSE	D OMEGA
1	0.30648E-10	0.38300E-02
2	0.81100E-10	0.11500E-01
3	0.14992E-08	0.86100E-02
4	0.19889E-08	0.22870E-01
5	0.20574E-08	0.46600E-02
6	0.20574E-08	0.26300E-02
7	0.19198E-08	0.24000E-03
8	0.67175E-09	0.50200E-02
9	0.24223E-09	0.17900E-02
10	0.60437E-11	0.44390E-01
11	0.83659E-12	0.51790E-01
12	0.51150E-08	0.14800E-01
13	0.51150E-08	0.34300E-02
14	0.22128E-08	0.42900E-02
15	0.55105E-10	0.42900E-02
16	0.27790E-09	0.10290E-01
17	0.43526E-10	0.12010E-01
18	0.10106E-09	0.16400E-01
19	0.26545E-10	0.20590E-01
20	0.53241E-08	0.52180E-01
21	0.45420E-14	0.60870E-01
22	0.11801E-07	0.17390E-01
23	0.23087E-09	0.80100E-02
24	0.15685E-09	0.13730E-01
25	0.58570E-10	0.21740E-01
26	0.17994E-11	0.55320E 00
27	0.32109E-10	0.23710E-00
28	0.27741E-10	0.23710E-00
29	0.13690E-07	0.79040E-01
30	0.12866E-07	0.79040E-01
31	0.69342E-09	0.66870E-01
32	0.10080E-07	0.48670E-01
33	0.76724E-08	0.48670E-01
34	0.12951E-07	0.11550E-00
35	0.99067E-08	0.11550E-00
36	0.14496E-07	0.10790E-00
37	0.11913E-07	0.10790E-00
38	0.14823E-07	0.30210E-00
39	0.12416E-07	0.43150E-01
40	0.12939E-07	0.43150E-01
41	0.14117E-07	0.12950E-00
42	0.95877E-08	0.12950E-00
43	0.10402E-07	0.24920E-00
44	0.12446E-07	0.24920E-00
45	0.12897E-07	0.26830E-00
46	0.41795E-08	0.19150E-00
47	0.28118E-08	0.51460E-01
48	0.10303E-07	0.28590E-01
49	0.94360E-08	0.11150E-00
50	0.97611E-08	0.57180E-01
51	0.10805E-07	0.45740E-01
52	0.11663E-07	0.28590E-01
53	0.14127E-07	0.91480E-01
54	0.11716E-07	0.17720E-00
55	0.90528E-08	0.68610E-01
56	0.71972E-08	0.97200E-01
57	0.81364E-08	0.51460E-01
58	0.48303E-08	0.28590E-01
59	0.12570E-08	0.30270E-00
60	0.28909E-08	0.81310E-01

61	0.11371E-07	0.45170E-01
62	0.12719E-07	0.17620E-00
63	0.12155E-07	0.90350E-01
64	0.13134E-07	0.72280E-01
65	0.11239E-07	0.45170E-01
66	0.14183E-07	0.14450E-00
67	0.14995E-07	0.28010E-00
68	0.10200E-07	0.10840E-00
69	0.92665E-08	0.15360E-00
70	0.88861E-08	0.81310E-01
71	0.67920E-08	0.45170E-01
72	0.50394E-08	0.85520E 00
73	0.65753E-08	0.22980E-00
74	0.10262E-07	0.12760E-00
75	0.62083E-08	0.49780E-00
76	0.94479E-08	0.22440E-00
77	0.11568E-07	0.23560E-00
78	0.14222E-07	0.85260E 00
79	0.13196E-07	0.20190E-00
80	0.11456E-07	0.56090E-01
81	0.10140E-07	0.26920E-00
82	0.93829E-08	0.15710E-00
83	0.93829E-08	0.25520E-00
84	0.10259E-07	0.22980E-00
85	0.92827E-08	0.12760E-00
86	0.84092E-08	0.27820E-00
87	0.92179E-08	0.22900E-00
88	0.97977E-08	0.61520E-01
89	0.11171E-07	0.68360E-01
90	0.72843E-08	0.20170E-00
91	0.64836E-08	0.54690E-01
92	0.64936E-08	0.82030E-01
93	0.78753E-08	0.68360E-01
94	0.60083E-08	0.22560E-00
95	0.71613E-08	0.61520E-01
96	0.88536E-08	0.11620E-00
97	0.61832E-08	0.61520E-01
98	0.92762E-08	0.80780E-01
99	0.97027E-08	0.56070E-01
100	0.97027E-08	0.49420E-01
101	0.98788E-08	0.15210E-01
102	0.98788E-08	0.22810E-01
103	0.11220E-07	0.19010E-01
104	0.11362E-07	0.19010E-01
105	0.10842E-07	0.62720E-01
106	0.11455E-07	0.17110E-01
107	0.11386E-07	0.91480E-01
108	0.11307E-07	0.23940E-01

THE TOTAL DOSE IS 0.86726E-08 R/HR WITH SPECTRUM 1

APOLLO FUELED CHEST

BREMSSTRAHLUNG WITH SPECTRUM 1

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.2689E-10	AL	141.00	TISSUE	25.00
2	0.6876E-10	AL	116.90	TISSUE	25.00
3	0.1207E-08	AL	50.05	TISSUE	25.00
4	0.1537E-08	AL	44.79	TISSUE	25.00
5	0.1588E-08	AL	44.08	TISSUE	25.00
6	0.1588E-08	AL	44.08	TISSUE	25.00
7	0.1588E-08	AL	44.08	TISSUE	25.00
8	0.5350E-09	AL	68.06	TISSUE	25.00
9	0.2080E-09	AL	89.89	TISSUE	25.00
10	0.5361E-11	AL	184.80	TISSUE	25.00
11	0.7187E-12	AL	243.20	TISSUE	25.00
12	0.3608E-08	AL	24.95	TISSUE	25.00
13	0.3808E-08	AL	24.95	TISSUE	25.00
14	0.1824E-08	AL	41.08	TISSUE	25.00
15	0.4580E-10	AL	127.20	TISSUE	25.00
16	0.2254E-09	AL	87.99	TISSUE	25.00
17	0.3628E-10	AL	133.20	TISSUE	25.00
18	0.8333E-10	AL	112.10	TISSUE	25.00
19	0.2175E-10	AL	146.60	TISSUE	25.00
20	0.2709E-08	AL	32.49	TISSUE	25.00
21	0.3641E-14	AL	413.10	TISSUE	25.00
22	0.7715E-08	AL	5.68	TISSUE	25.00
23	0.1708E-09	AL	94.59	TISSUE	25.00
24	0.1196E-09	AL	103.20	TISSUE	25.00
25	0.5111E-10	AL	124.40	TISSUE	25.00
26	0.1352E-11	AL	224.40	TISSUE	25.00
27	0.2464E-10	AL	143.30	TISSUE	25.00
28	0.2177E-10	AL	143.60	TISSUE	29.00
29	0.6963E-08	AL	5.61	TISSUE	27.00
30	0.7769E-08	AL	5.32	TISSUE	25.00
31	0.5094E-09	AL	69.17	TISSUE	25.00
32	0.5218E-08	AL	15.09	TISSUE	27.00
33	0.5819E-08	AL	14.80	TISSUE	25.00
34	0.5237E-08	AL	10.55	TISSUE	30.00
35	0.6829E-08	AL	10.26	TISSUE	25.00
36	0.5147E-08	AL	7.29	TISSUE	32.00
37	0.1005E-07	AL	6.92	TISSUE	19.00
38	0.7206E-08	AL	6.46	TISSUE	26.00
39	0.5197E-08	AL	9.01	TISSUE	31.00
40	0.8322E-08	AL	8.63	TISSUE	22.00
41	0.7567E-08	AL	6.57	TISSUE	25.00
42	0.3953E-08	AL	6.95	TISSUE	37.00
43	0.5746E-08	AL	11.12	TISSUE	36.00
44	0.9434E-08	AL	10.45	TISSUE	18.00
45	0.6436E-08	AL	10.69	TISSUE	26.00
46	0.7426E-09	AL	29.25	TISSUE	55.00
47	0.2812E-08	AL	20.69	TISSUE	35.00
48	0.4134E-08	AL	11.38	TISSUE	34.00
49	0.7271E-08	AL	17.11	TISSUE	18.00
50	0.8307E-08	AL	15.83	TISSUE	16.00
51	0.1020E-07	AL	13.44	TISSUE	13.00
52	0.1151E-07	AL	10.28	TISSUE	13.00
53	0.1358E-07	AL	5.93	TISSUE	12.00
54	0.1150E-07	AL	12.49	TISSUE	10.00
55	0.9655E-08	AL	14.76	TISSUE	13.00
56	0.7387E-08	AL	17.67	TISSUE	17.00

57	0.6443E-08	AL	14.64	TISSUE	23.00
58	0.3618E-08	AL	15.36	TISSUE	34.00
59	0.2466E-08	AL	44.69	TISSUE	10.00
60	0.5433E-08	AL	25.95	TISSUE	15.00
61	0.1060E-07	AL	13.25	TISSUE	12.00
62	0.1284E-07	AL	10.80	TISSUE	6.00
63	0.1226E-07	AL	11.97	TISSUE	7.00
64	0.1265E-07	AL	9.52	TISSUE	3.00
65	0.1392E-07	AL	3.93	TISSUE	2.00
66	0.1301E-07	AL	2.33	TISSUE	1.00
67	0.1232E-07	AL	5.77	TISSUE	1.00
68	0.1324E-07	AL	8.18	TISSUE	3.00
69	0.1267E-07	AL	11.15	TISSUE	6.00
70	0.1208E-07	AL	12.32	TISSUE	7.00
71	0.8230E-08	AL	19.05	TISSUE	12.00
72	0.4652E-08	AL	30.78	TISSUE	2.00
73	0.5368E-08	AL	24.46	TISSUE	0.
74	0.8085E-08	AL	14.80	TISSUE	0.
75	0.5643E-08	AL	23.33	TISSUE	0.
76	0.8435E-08	AL	13.71	TISSUE	0.
77	0.1023E-07	AL	8.09	TISSUE	0.
78	0.1146E-07	AL	1.59	TISSUE	0.
79	0.1070E-07	AL	6.41	TISSUE	0.
80	0.1146E-07	AL	1.59	TISSUE	0.
81	0.1014E-07	AL	8.38	TISSUE	0.
82	0.9383E-08	AL	10.79	TISSUE	0.
83	0.9383E-08	AL	10.79	TISSUE	0.
84	0.1026E-07	AL	7.98	TISSUE	0.
85	0.9283E-08	AL	11.10	TISSUE	0.
86	0.8409E-08	AL	13.79	TISSUE	0.
87	0.9218E-08	AL	11.30	TISSUE	0.
88	0.9798E-08	AL	9.49	TISSUE	0.
89	0.1117E-07	AL	4.32	TISSUE	0.
90	0.7284E-08	AL	17.38	TISSUE	0.
91	0.6484E-08	AL	20.14	TISSUE	0.
92	0.6484E-08	AL	20.14	TISSUE	0.
93	0.7895E-08	AL	15.40	TISSUE	0.
94	0.6008E-08	AL	21.90	TISSUE	0.
95	0.7161E-08	AL	17.79	TISSUE	0.
96	0.8854E-08	AL	12.42	TISSUE	0.
97	0.6183E-08	AL	21.24	TISSUE	0.
98	0.9276E-08	AL	11.12	TISSUE	0.
99	0.9703E-08	AL	9.79	TISSUE	0.
100	0.9703E-08	AL	9.79	TISSUE	0.
101	0.9879E-08	AL	9.23	TISSUE	0.
102	0.9879E-08	AL	9.23	TISSUE	0.
103	0.1122E-07	AL	4.04	TISSUE	0.
104	0.1136E-07	AL	3.06	TISSUE	0.
105	0.1084E-07	AL	5.84	TISSUE	0.
106	0.1145E-07	AL	1.78	TISSUE	0.
107	0.1139E-07	AL	2.83	TISSUE	0.
108	0.1131E-07	AL	3.48	TISSUE	0.

VEHICLE APLLO ANALYSIS, INTERIOR DOSE AT CHEST

SECTOR	DOSE	C OMEGA
1	0.26892E-10	0.38300E-02
2	0.68759E-10	C.11500E-01
3	0.12065E-08	0.86100E-02
4	0.15368E-08	0.22870E-01
5	0.15879E-08	0.46600E-02
6	0.15879E-08	C.26300E-02
7	0.15879E-08	0.24000E-03
8	0.53502E-09	C.50200E-02
9	0.20804E-09	0.17900E-02
10	0.53608E-11	0.44390E-01
11	0.71866E-12	0.51790E-01
12	0.38079E-08	C.14800E-01
13	0.38079E-08	0.34300E-02
14	0.18238E-08	0.42900E-02
15	0.45799E-10	0.42900E-02
16	0.22545E-09	C.10290E-01
17	0.36276E-10	0.12010E-01
18	0.83329E-10	0.16400E-01
19	0.21746E-10	0.20590E-01
20	0.27090E-08	0.52180E-01
21	0.36413E-14	0.60870E-01
22	0.77145E-08	C.17390E-01
23	0.17079E-09	0.80100E-02
24	0.11961E-09	C.13730E-01
25	0.51107E-10	0.21740E-01
26	0.13524E-11	C.55320E 00
27	0.24640E-10	0.23710E-00
28	0.21773E-10	0.23710E-00
29	0.69631E-08	0.79040E-01
30	0.77690E-08	0.79040E-01
31	0.50936E-09	0.66870E-01
32	0.52180E-08	0.48670E-01
33	0.58195E-08	0.48670E-01
34	0.52372E-08	C.11550E-00
35	0.68294E-08	0.11550E-00
36	0.51471E-08	0.10790E-00
37	0.10049E-07	0.10790E-00
38	0.72059E-08	0.30210E-00
39	0.51969E-08	0.43150E-01
40	0.83222E-08	C.43150E-01
41	0.75673E-08	0.12950E-00
42	0.39532E-08	C.12950E-00
43	0.37457E-08	0.24920E-00
44	0.94335E-08	C.24920E-00
45	0.64058E-08	0.26830E-00
46	0.74258E-09	C.19150E-00
47	0.28118E-08	0.51460E-01
48	0.41342E-08	C.28590E-01
49	0.72706E-08	0.11150E-00
50	0.83074E-08	C.57180E-01
51	0.10197E-07	0.45740E-01
52	0.11511E-07	0.28590E-01
53	0.13585E-07	0.91480E-01
54	0.11502E-07	C.17720E-00
55	0.96546E-08	C.68610E-01
56	0.73874E-08	C.97200E-01
57	0.64433E-08	0.51460E-01
58	0.36183E-08	0.28590E-01
59	0.24658E-08	0.30270E-00
60	0.54332E-08	C.81310E-01

61	0.10595E-07	0.45170E-01
62	0.12843E-07	0.17620E-00
63	0.12256E-07	0.90350E-01
64	0.12652E-07	0.72280E-01
65	0.13925E-07	0.45170E-01
66	0.13011E-07	0.14450E-00
67	0.12323E-07	0.28010E-00
68	0.13238E-07	0.10840E-00
69	0.12672E-07	0.15360E-00
70	0.12084E-07	0.81310E-01
71	0.82295E-08	0.45170E-01
72	0.46515E-08	0.85520E 00
73	0.53684E-08	0.22980E-00
74	0.80854E-08	0.12760E-00
75	0.56433E-08	0.49780E-00
76	0.84350E-08	0.22440E-00
77	0.10228E-07	0.23560E-00
78	0.11456E-07	0.85260E 00
79	0.10698E-07	0.20190E-00
80	0.11456E-07	0.56090E-01
81	0.10140E-07	0.26920E-00
82	0.93829E-08	0.15710E-00
83	0.93829E-08	0.25520E-00
84	0.10259E-07	0.22980E-00
85	0.92827E-08	0.12760E-00
86	0.84092E-08	0.27820E-00
87	0.92179E-08	0.22900E-00
88	0.97977E-08	0.61520E-01
89	0.11171E-07	0.68360E-01
90	0.72843E-08	0.20170E-00
91	0.64836E-08	0.54690E-01
92	0.64836E-08	0.82030E-01
93	0.78953E-08	0.68360E-01
94	0.60083E-08	0.22560E-00
95	0.71613E-08	0.61520E-01
96	0.88536E-08	0.11620E-00
97	0.61832E-08	0.61520E-01
98	0.92762E-08	0.80780E-01
99	0.97027E-08	0.56070E-01
100	0.97027E-08	0.49420E-01
101	0.98788E-08	0.15210E-01
102	0.98788E-08	0.22810E-01
103	0.11220E-07	0.19010E-01
104	0.11362E-07	0.19010E-01
105	0.10842E-07	0.62720E-01
106	0.11453E-07	0.17110E-01
107	0.11386E-07	0.91480E-01
108	0.11307E-07	0.23940E-01

THE TOTAL DOSE IS 0.72747E-08 R/HR WITH SPECTRUM 1

APOLLO FUELED WAIST

BREMSSTRAHLUNG WITH SPECTRUM 1

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.3876E-10	AL	141.00	TISSUE	8.00
2	0.1008E-09	AL	116.90	TISSUE	8.00
3	0.1949E-08	AL	50.05	TISSUE	8.00
4	0.2519E-08	AL	44.79	TISSUE	8.00
5	0.2608E-08	AL	44.08	TISSUE	8.00
6	0.2608E-08	AL	44.08	TISSUE	8.00
7	0.2608E-08	AL	44.08	TISSUE	8.00
8	0.8317E-09	AL	68.06	TISSUE	8.00
9	0.3132E-09	AL	89.89	TISSUE	8.00
10	0.7659E-11	AL	184.80	TISSUE	7.00
11	0.1009E-11	AL	243.20	TISSUE	7.00
12	0.6765E-08	AL	24.95	TISSUE	7.00
13	0.6765E-08	AL	24.95	TISSUE	7.00
14	0.3044E-08	AL	41.08	TISSUE	7.00
15	0.6662E-10	AL	127.20	TISSUE	8.00
16	0.3435E-09	AL	87.99	TISSUE	7.00
17	0.5315E-10	AL	133.20	TISSUE	7.00
18	0.1240E-09	AL	112.10	TISSUE	7.00
19	0.3161E-10	AL	146.60	TISSUE	7.00
20	0.4629E-08	AL	32.49	TISSUE	8.00
21	0.4979E-14	AL	413.10	TISSUE	7.00
22	0.1513E-07	AL	5.68	TISSUE	7.00
23	0.2583E-09	AL	94.59	TISSUE	7.00
24	0.1793E-09	AL	103.20	TISSUE	7.00
25	0.7449E-10	AL	124.40	TISSUE	8.00
26	0.1856E-11	AL	224.40	TISSUE	9.00
27	0.3547E-10	AL	143.30	TISSUE	8.00
28	0.3409E-10	AL	143.60	TISSUE	10.00
29	0.1501E-07	AL	5.61	TISSUE	8.00
30	0.1487E-07	AL	5.32	TISSUE	9.00
31	0.7902E-09	AL	69.17	TISSUE	8.00
32	0.1075E-07	AL	15.09	TISSUE	7.00
33	0.1021E-07	AL	14.80	TISSUE	11.00
34	0.1295E-07	AL	10.55	TISSUE	7.00
35	0.1113E-07	AL	10.26	TISSUE	14.00
36	0.1448E-07	AL	7.29	TISSUE	7.00
37	0.1005E-07	AL	6.92	TISSUE	19.00
38	0.1380E-07	AL	6.46	TISSUE	11.00
39	0.1310E-07	AL	9.01	TISSUE	10.00
40	0.1176E-07	AL	8.63	TISSUE	14.00
41	0.1442E-07	AL	6.57	TISSUE	9.00
42	0.1190E-07	AL	6.95	TISSUE	15.00
43	0.1116E-07	AL	11.12	TISSUE	13.00
44	0.9842E-08	AL	10.45	TISSUE	17.00
45	0.1134E-07	AL	10.69	TISSUE	13.00
46	0.5177E-08	AL	29.25	TISSUE	11.00
47	0.3607E-08	AL	20.69	TISSUE	30.00
48	0.5102E-08	AL	11.38	TISSUE	30.00
49	0.4159E-08	AL	17.11	TISSUE	30.00
50	0.5073E-08	AL	15.83	TISSUE	27.00
51	0.4761E-08	AL	13.44	TISSUE	30.00
52	0.1188E-07	AL	10.28	TISSUE	12.00
53	0.1358E-07	AL	5.93	TISSUE	12.00
54	0.9879E-08	AL	12.49	TISSUE	15.00
55	0.1046E-07	AL	14.76	TISSUE	10.00
56	0.9505E-08	AL	17.67	TISSUE	5.00

57	0.1088E-07	AL	14.64	TISSUE	5.00
58	0.1063E-07	AL	15.36	TISSUE	6.00
59	0.2065E-08	AL	44.69	TISSUE	17.00
60	0.2891E-08	AL	25.95	TISSUE	30.00
61	0.4102E-08	AL	13.25	TISSUE	33.00
62	0.5197E-08	AL	10.80	TISSUE	30.00
63	0.5005E-08	AL	11.97	TISSUE	30.00
64	0.4138E-08	AL	9.52	TISSUE	35.00
65	0.1369E-07	AL	3.93	TISSUE	13.00
66	0.1292E-07	AL	2.33	TISSUE	15.00
67	0.7700E-08	AL	5.77	TISSUE	25.00
68	0.1313E-07	AL	8.18	TISSUE	11.00
69	0.1257E-07	AL	11.15	TISSUE	5.00
70	0.1200E-07	AL	12.32	TISSUE	5.00
71	0.8936E-08	AL	19.05	TISSUE	6.00
72	0.3603E-08	AL	30.78	TISSUE	20.00
73	0.2416E-08	AL	24.46	TISSUE	35.00
74	0.2693E-08	AL	14.80	TISSUE	40.00
75	0.3906E-08	AL	23.33	TISSUE	26.00
76	0.6062E-08	AL	13.71	TISSUE	25.00
77	0.5616E-08	AL	8.09	TISSUE	30.00
78	0.1443E-07	AL	1.59	TISSUE	12.00
79	0.5844E-08	AL	6.41	TISSUE	30.00
80	0.1561E-07	AL	1.59	TISSUE	9.00
81	0.1386E-07	AL	8.38	TISSUE	8.00
82	0.1285E-07	AL	10.79	TISSUE	6.00
83	0.1275E-07	AL	10.79	TISSUE	5.00
84	0.1407E-07	AL	7.98	TISSUE	5.00
85	0.1270E-07	AL	11.10	TISSUE	6.00
86	0.1138E-07	AL	13.79	TISSUE	6.00
87	0.8341E-08	AL	11.30	TISSUE	20.00
88	0.9742E-08	AL	9.49	TISSUE	18.00
89	0.1560E-07	AL	4.32	TISSUE	6.00
90	0.8876E-08	AL	17.38	TISSUE	12.00
91	0.7371E-08	AL	20.14	TISSUE	14.00
92	0.6536E-08	AL	20.14	TISSUE	6.00
93	0.1061E-07	AL	15.40	TISSUE	6.00
94	0.7787E-08	AL	21.90	TISSUE	8.00
95	0.8714E-08	AL	17.79	TISSUE	12.00
96	0.1205E-07	AL	12.42	TISSUE	6.00
97	0.8101E-08	AL	21.24	TISSUE	6.00
98	0.1256E-07	AL	11.12	TISSUE	8.00
99	0.1301E-07	AL	9.79	TISSUE	9.00
100	0.1332E-07	AL	9.79	TISSUE	7.00
101	0.1300E-07	AL	9.23	TISSUE	10.00
102	0.1359E-07	AL	9.23	TISSUE	7.00
103	0.1550E-07	AL	4.04	TISSUE	[illegible]
104	0.1572E-07	AL	3.06	TISSUE	[illegible]
105	0.1493E-07	AL	5.54	TISSUE	[illegible]
106	0.1560E-07	AL	1.73	TISSUE	[illegible]
107	0.1576E-07	AL	2.63	TISSUE	[illegible]
108	0.1564E-07	AL	3.48	TISSUE	[illegible]

VEHICLE APLLO ANALYSIS, INTERIOR DOSE AT WAIST

SECTOR	DOSE	C OMEGA
1	0.38763E-10	C.38300E-02
2	0.10081E-09	C.11500E-01
3	0.19494E-08	0.86100E-02
4	0.25192E-08	C.22870E-01
5	0.26085E-08	C.46600E-02
6	0.26085E-08	C.26300E-02
7	0.26085E-08	0.24000E-03
8	0.83167E-09	C.50200E-02
9	0.31424E-09	C.17900E-02
10	0.76587E-11	C.44390E-01
11	0.10086E-11	0.51790E-01
12	0.67654E-08	C.14800E-01
13	0.67654E-08	C.34300E-02
14	C.30444E-08	C.42900E-02
15	0.66619E-10	0.42900E-02
16	0.34347E-09	C.10290E-01
17	0.53155E-10	C.12010E-01
18	0.12397E-09	C.16400E-01
19	0.31614E-10	0.20590E-01
20	0.46292E-08	C.52180E-01
21	0.49790E-14	C.60870E-01
22	0.15125E-07	C.17390E-01
23	0.25627E-09	0.80100E-02
24	0.17933E-09	C.13730E-01
25	0.74492E-10	C.21740E-01
26	0.18559E-11	C.55320E 00
27	0.35467E-10	C.23710E-00
28	0.34087E-10	C.23710E-00
29	0.15010E-07	C.79040E-01
30	0.14875E-07	C.79040E-01
31	0.79023E-09	0.66870E-01
32	0.10749E-07	C.48670E-01
33	0.10206E-07	0.48670E-01
34	0.12951E-07	C.11550E-00
35	0.11130E-07	0.11550E-00
36	0.14475E-07	C.10790E-00
37	0.10049E-07	C.10790E-00
38	0.13803E-07	C.30210E-00
39	0.13098E-07	0.43150E-01
40	0.11759E-07	C.43150E-01
41	0.14416E-07	C.12950E-00
42	0.11003E-07	C.12950E-00
43	0.11163E-07	0.24920E-00
44	0.98417E-08	C.24920E-00
45	0.11342E-07	C.26830E-00
46	0.51774E-08	C.19150E-00
47	0.36068E-08	0.51460E-01
48	0.51024E-08	C.28590E-01
49	0.41591E-08	C.11150E-00
50	0.50729E-08	C.57180E-01
51	0.47615E-08	C.45740E-01
52	0.11680E-07	C.28590E-01
53	0.13555E-07	C.91480E-01
54	0.98787E-08	C.17720E-00
55	0.10465E-07	C.68610E-01
56	0.75046E-08	C.97200E-01
57	0.10484E-07	C.51460E-01
58	0.10631E-07	C.29590E-01
59	0.20546E-08	C.34270E-00
60	0.28309E-08	C.81310E-01

61	0.41021E-08	C.45170E-01
62	0.51969E-08	C.17620E-00
63	0.50053E-08	0.90350E-01
64	0.41380E-08	C.72280E-01
65	0.13687E-07	C.45170E-01
66	0.12921E-07	C.14450E-00
67	0.77004E-08	0.28010E-00
68	0.13128E-07	C.10840E-00
69	0.12570E-07	C.15360E-00
70	0.11399E-07	C.81310E-01
71	0.89856E-08	C.45170E-01
72	0.36030E-08	C.85520E 00
73	0.24160E-08	0.22980E-00
74	0.26933E-08	C.12760E-00
75	0.39055E-08	0.49780E-00
76	0.60624E-08	C.22440E-00
77	C.56165E-08	C.23560E-00
78	C.14435E-07	C.85260E 00
79	0.58437E-08	C.20190E-00
80	C.15607E-07	C.56090E-01
81	0.13862E-07	C.26920E-00
82	0.12648E-07	C.15710E-00
83	0.12745E-07	0.25520E-00
84	0.14074E-07	C.22980E-00
85	0.12696E-07	C.12760E-00
86	0.11379E-07	C.27820E-00
87	0.83813E-08	C.22900E-00
88	0.97422E-08	0.61520E-01
89	0.15601E-07	C.68360E-01
90	0.88758E-08	C.20170E-00
91	0.73708E-09	0.54690E-01
92	0.85361E-08	C.82030E-01
93	0.10612E-07	C.68360E-01
94	0.77872E-08	C.22560E-00
95	0.87141E-08	0.61520E-01
96	0.12047E-07	C.11620E-00
97	0.81012E-08	C.61520E-01
98	0.12565E-07	C.80780E-01
99	0.13007E-07	C.56070E-01
100	0.13520E-07	C.49420E-01
101	0.12999E-07	C.15210E-01
102	0.13588E-07	C.22810E-01
103	0.15502E-07	0.19010E-01
104	0.15720E-07	C.19010E-01
105	0.14925E-07	C.62720E-01
106	0.15603E-07	C.17110E-01
107	0.15757E-07	0.91480E-01
108	0.15656E-07	C.23940E-01

THE TOTAL DOSE IS 0.83294E-08 R/HR WITH SPECTRUM 1

VEHICLE APLLC ANALYSIS, INTERIOR DOSE AT EYE

SECTOR	COSE	D OMEGA
1	C.47399E-13	0.38300E-02
2	C.17671E-12	0.11500E-01
3	C.12923E-10	0.86100E-02
4	C.19969E-10	0.22870E-01
5	C.21042E-10	0.46600E-02
6	C.21042E-10	0.26300E-02
7	C.18919E-10	0.24000E-03
8	C.38049E-11	0.50200E-02
9	C.83908E-12	0.17300E-02
10	C.60107E-14	0.44300E-01
11	C.56501E-15	0.51790E-01
12	C.86897E-10	0.14800E-01
13	C.86897E-10	0.34300E-02
14	C.23562E-10	0.42900E-02
15	C.10381E-12	0.42900E-02
16	C.10236E-11	0.10290E-01
17	C.75464E-13	0.12010E-01
18	C.23984E-12	0.16400E-01
19	C.39097E-13	0.20590E-01
20	C.44337E-10	0.52180E-01
21	C.15300E-17	0.60870E-01
22	C.33091E-09	0.17390E-01
23	C.77530E-12	0.80100E-02
24	C.44471E-12	0.12730E-01
25	C.11305E-12	0.21740E-01
26	C.13761E-14	0.55320E 00
27	C.49927E-13	0.23710E-00
28	C.41569E-13	0.23710E-00
29	C.41659E-09	0.79040E-01
30	C.37840E-09	0.79040E-01
31	C.39815E-11	0.66870E-01
32	C.25352E-09	0.48670E-01
33	C.16560E-09	0.48670E-01
34	C.38331E-09	0.11550E-00
35	C.24851E-09	0.11550E-00
36	C.46363E-09	0.10790E-00
37	C.33389E-09	0.10790E-00
38	C.47818E-09	0.30210E-00
39	C.35408E-09	0.43150E-01
40	C.37857E-09	0.43150E-01
41	C.43728E-09	0.12950E-00
42	C.24028E-09	0.12950E-00
43	C.26709E-09	0.24920E-00
44	C.35572E-09	0.24920E-00
45	C.38303E-09	0.26830E-00
46	C.63316E-10	0.19150E-00
47	C.35810E-10	0.51460E-01
48	C.26299E-09	0.28590E-01
49	C.22885E-09	0.11150E-00
50	C.24093E-09	0.57180E-01
51	C.28317E-09	0.45740E-01
52	C.33512E-09	0.28590E-01
53	C.45823E-09	0.91490E-01
54	C.33944E-09	0.17720E-00
55	C.21881E-09	0.68610E-01

52	0.3351E-09	AL	10.28	TISSUE	2.00
53	0.4582E-09	AL	5.93	TISSUE	3.00
54	0.3394E-09	AL	12.49	TISSUE	5.00
55	0.2188E-09	AL	14.76	TISSUE	1.00
56	0.1437E-09	AL	17.67	TISSUE	0.
57	0.1776E-09	AL	14.64	TISSUE	0.
58	0.2098E-09	AL	15.36	TISSUE	1.00
59	0.9962E-11	AL	44.69	TISSUE	30.00
60	0.3648E-10	AL	25.95	TISSUE	30.00
61	0.3085E-09	AL	13.25	TISSUE	9.00
62	0.3705E-09	AL	10.90	TISSUE	8.00
63	0.3444E-09	AL	11.97	TISSUE	8.00
64	0.2889E-09	AL	9.52	TISSUE	9.00
65	0.2166E-09	AL	3.93	TISSUE	0.
66	0.4715E-09	AL	2.33	TISSUE	2.00
67	0.4950E-09	AL	5.77	TISSUE	5.00
68	0.2644E-09	AL	8.18	TISSUE	0.
69	0.2229E-09	AL	11.15	TISSUE	0.
70	0.2071E-09	AL	12.32	TISSUE	0.
71	0.1301E-09	AL	19.05	TISSUE	0.
72	0.8570E-10	AL	30.78	TISSUE	8.00
73	0.1312E-09	AL	24.46	TISSUE	3.00
74	0.2699E-09	AL	14.80	TISSUE	3.00
75	0.1164E-09	AL	23.33	TISSUE	1.00
76	0.2352E-09	AL	13.71	TISSUE	1.00
77	0.3323E-09	AL	8.09	TISSUE	1.00
78	0.4748E-09	AL	1.59	TISSUE	2.00
79	0.4133E-09	AL	6.41	TISSUE	2.00
80	0.3300E-09	AL	1.59	TISSUE	0.
81	0.2616E-09	AL	8.38	TISSUE	0.
82	0.2279E-09	AL	10.79	TISSUE	0.
83	0.2279E-09	AL	10.79	TISSUE	0.
84	0.2672E-09	AL	7.98	TISSUE	0.
85	0.2236E-09	AL	11.10	TISSUE	0.
86	0.1881E-09	AL	13.79	TISSUE	0.
87	0.2209E-09	AL	11.30	TISSUE	0.
88	0.2460E-09	AL	9.49	TISSUE	0.
89	0.3128E-09	AL	4.32	TISSUE	0.
90	0.1467E-09	AL	17.38	TISSUE	0.
91	0.1201E-09	AL	20.14	TISSUE	0.
92	0.1201E-09	AL	20.14	TISSUE	0.
93	0.1686E-09	AL	15.40	TISSUE	0.
94	0.1054E-09	AL	21.90	TISSUE	0.
95	0.1425E-09	AL	17.79	TISSUE	0.
96	0.2058E-09	AL	12.42	TISSUE	0.
97	0.1107E-09	AL	21.24	TISSUE	0.
98	0.2233E-09	AL	11.12	TISSUE	0.
99	0.2418E-09	AL	9.79	TISSUE	0.
100	0.2418E-09	AL	9.79	TISSUE	0.
101	0.2497E-09	AL	9.23	TISSUE	0.
102	0.2497E-09	AL	9.23	TISSUE	0.
103	0.3155E-09	AL	4.04	TISSUE	0.
104	0.3237E-09	AL	3.06	TISSUE	0.
105	0.2956E-09	AL	5.84	TISSUE	0.
106	0.3297E-09	AL	1.78	TISSUE	0.
107	0.3251E-09	AL	2.83	TISSUE	0.
108	0.3205E-09	AL	3.48	TISSUE	0.

POLLO FUELED AT EYE

BREMSSTRAHLUNG WITH SPECTRUM 3

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.4740E-13	AL	141.00	TISSUE	20.00
2	0.1767E-12	AL	116.90	TISSUE	19.00
3	0.1292E-10	AL	50.05	TISSUE	19.00
4	0.1997E-10	AL	44.79	TISSUE	18.00
5	0.2104E-10	AL	44.08	TISSUE	18.00
6	0.2104E-10	AL	44.08	TISSUE	18.00
7	0.1892E-10	AL	44.08	TISSUE	20.00
8	0.3805E-11	AL	68.06	TISSUE	18.00
9	0.8391E-12	AL	89.89	TISSUE	20.00
10	0.6011E-14	AL	184.80	TISSUE	20.00
11	0.5650E-15	AL	243.20	TISSUE	18.00
12	0.8690E-10	AL	24.95	TISSUE	18.00
13	0.8690E-10	AL	24.95	TISSUE	18.00
14	0.2356E-10	AL	41.08	TISSUE	20.00
15	0.1038E-12	AL	127.20	TISSUE	18.00
16	0.1024E-11	AL	87.99	TISSUE	18.00
17	0.7546E-13	AL	133.20	TISSUE	18.00
18	0.2398E-12	AL	112.10	TISSUE	18.00
19	0.3910E-13	AL	146.60	TISSUE	17.00
20	0.4434E-10	AL	32.49	TISSUE	20.00
21	0.1530E-17	AL	413.10	TISSUE	13.00
22	0.3309E-09	AL	5.68	TISSUE	16.00
23	0.7753E-12	AL	94.59	TISSUE	14.00
24	0.4447E-12	AL	103.20	TISSUE	15.00
25	0.1131E-12	AL	124.40	TISSUE	20.00
26	0.1376E-14	AL	224.40	TISSUE	11.00
27	0.4993E-13	AL	143.30	TISSUE	14.00
28	0.4157E-13	AL	143.60	TISSUE	20.00
29	0.4166E-09	AL	5.61	TISSUE	12.00
30	0.3784E-09	AL	5.32	TISSUE	14.00
31	0.3981E-11	AL	69.17	TISSUE	15.00
32	0.2535E-09	AL	15.09	TISSUE	11.00
33	0.1656E-09	AL	14.80	TISSUE	19.00
34	0.3833E-09	AL	10.55	TISSUE	7.00
35	0.2485E-09	AL	10.26	TISSUE	17.00
36	0.4636E-09	AL	7.29	TISSUE	6.00
37	0.2339E-09	AL	6.92	TISSUE	15.00
38	0.4782E-09	AL	6.46	TISSUE	7.00
39	0.3541E-09	AL	9.01	TISSUE	12.00
40	0.3786E-09	AL	8.63	TISSUE	11.00
41	0.4373E-09	AL	6.57	TISSUE	10.00
42	0.2403E-09	AL	6.95	TISSUE	20.00
43	0.2671E-09	AL	11.12	TISSUE	15.00
44	0.3557E-09	AL	10.45	TISSUE	10.00
45	0.3830E-09	AL	10.69	TISSUE	6.00
46	0.6332E-10	AL	29.25	TISSUE	18.00
47	0.3581E-10	AL	20.69	TISSUE	35.00
48	0.2630E-09	AL	11.38	TISSUE	15.00
49	0.2288E-09	AL	17.11	TISSUE	10.00
50	0.2409E-09	AL	15.83	TISSUE	11.00
51	0.2832E-09	AL	13.44	TISSUE	11.00

56	C.14370E-09	0.97200E-01
57	C.17762E-09	0.51460E-01
58	C.20983E-09	0.28590E-01
59	C.99615E-11	0.30270E-00
60	C.36477E-10	0.81310E-01
61	C.30852E-09	0.45170E-01
62	C.37055E-09	0.17620E-00
63	C.34439E-09	0.90350E-01
64	C.38891E-09	0.72280E-01
65	C.31660E-09	0.45170E-01
66	C.47145E-09	0.14450E-00
67	C.49498E-09	0.28010E-00
68	C.26443E-09	0.10840E-00
69	C.22292E-09	0.15360E-00
70	C.20711E-09	0.81310E-01
71	C.13008E-09	0.45170E-01
72	C.85702E-10	0.85520E 00
73	C.13115E-09	0.22980E-00
74	C.26992E-09	0.12760E-00
75	C.11638E-09	0.49780E-00
76	C.23515E-09	0.22440E-00
77	C.33234E-09	0.23560E-00
78	C.47476E-09	0.85260E 00
79	C.41334E-09	0.20190E-00
80	C.33003E-09	0.56090E-01
81	C.26163E-09	0.26920E-00
82	C.22788E-09	0.15710E-00
83	C.22788E-09	0.25520E-00
84	C.26716E-09	0.22980E-00
85	C.22361E-09	0.12760E-00
86	C.18810E-09	0.27820E-00
87	C.22087E-09	0.22900E-00
88	C.24604E-09	0.61520E-01
89	C.31284E-09	0.68360E-01
90	C.14671E-09	0.20170E-00
91	C.12011E-09	0.54690E-01
92	C.12011E-09	0.82030E-01
93	C.16860E-09	0.68360E-01
94	C.10544E-09	0.22560E-00
95	C.14247E-09	0.61520E-01
96	C.20578E-09	0.11620E-00
97	C.11074E-09	0.61520E-01
98	C.22334E-09	0.80780E-01
99	C.24181E-09	0.56070E-01
100	C.24181E-09	0.49420E-01
101	C.24968E-09	0.15210E-01
102	C.24968E-09	0.22810E-01
103	C.31554E-09	0.19010E-01
104	C.32366E-09	0.19010E-01
105	C.29560E-09	0.62720E-01
106	C.32967E-09	0.17110E-01
107	C.32513E-09	0.91480E-01
108	C.32046E-09	0.23940E-01

THE TOTAL DOSE IS 0.27062E-09 R/HR WITH SPECTRUM 3

VEHICLE APLLC ANALYSIS, INTERIOR DOSE AT CHEST

SECTOR	DOSE	D OMEGA
1	C.40010E-13	0.38300E-02
2	C.14125E-12	0.11500E-01
3	C.92953E-11	0.86100E-02
4	C.13475E-10	0.22870E-01
5	C.14171E-10	0.46600E-02
6	C.14171E-10	0.26300E-02
7	C.14171E-10	0.24000E-03
8	C.27136E-11	0.50200E-02
9	C.67478E-12	0.17900E-02
10	C.51989E-14	0.44390E-01
11	C.47479E-15	0.51790E-01
12	C.55390E-10	0.14800E-01
13	C.55390E-10	0.34300E-02
14	C.17548E-10	0.42900E-02
15	C.81220E-13	0.42900E-02
16	C.75816E-12	0.10290E-01
17	C.59432E-13	0.12010E-01
18	C.18423E-12	0.16400E-01
19	C.30321E-13	0.20590E-01
20	C.32448E-10	0.52180E-01
21	C.12065E-17	0.60870E-01
22	C.17504E-09	0.17390E-01
23	C.50771E-12	0.80100E-02
24	C.30567E-12	0.13730E-01
25	C.94197E-13	0.21740E-01
26	C.99589E-15	0.55320E 00
27	C.35680E-13	0.23710E-00
28	C.30379E-13	0.23710E-00
29	C.15040E-09	0.79040E-01
30	C.17725E-09	0.79040E-01
31	C.25212E-11	0.66870E-01
32	C.92583E-10	0.48670E-01
33	C.10915E-09	0.48670E-01
34	C.95557E-10	0.11550E-00
35	C.14206E-09	0.11550E-00
36	C.95101E-10	0.10790E-00
37	C.25789E-09	0.10790E-00
38	C.15743E-09	0.30210E-00
39	C.95397E-10	0.43150E-01
40	C.19260E-09	0.43150E-01
41	C.16919E-09	0.12950E-00
42	C.64476E-10	0.12950E-00
43	C.57923E-10	0.24920E-00
44	C.23050E-09	0.24920E-00
45	C.12881E-09	0.26830E-00
46	C.48191E-11	0.19150E-00
47	C.35810E-10	0.51460E-01
48	C.66932E-10	0.28590E-01
49	C.15148E-09	0.11150E-00
50	C.18656E-09	0.57180E-01
51	C.25789E-09	0.45740E-01
52	C.31343E-09	0.28590E-01
53	C.41115E-09	0.91480E-01
54	C.31343E-09	0.17720E-00
55	C.23637E-09	0.68610E-01

52	0.3134E-09	AL	10.28	TISSUE	13.00
53	0.4112E-09	AL	5.93	TISSUE	12.00
54	0.3134E-09	AL	12.49	TISSUE	10.00
55	0.2364E-09	AL	14.76	TISSUE	13.00
56	0.1551E-09	AL	17.67	TISSUE	17.00
57	0.1273E-09	AL	14.64	TISSUE	23.00
58	0.5360E-10	AL	15.36	TISSUE	34.00
59	0.2790E-10	AL	44.69	TISSUE	10.00
60	0.9544E-10	AL	25.95	TISSUE	15.00
61	0.2742E-09	AL	13.25	TISSUE	12.00
62	0.3804E-09	AL	10.80	TISSUE	6.00
63	0.3507E-09	AL	11.97	TISSUE	7.00
64	0.3805E-09	AL	9.52	TISSUE	3.00
65	0.4548E-09	AL	3.93	TISSUE	2.00
66	0.4117E-09	AL	2.33	TISSUE	1.00
67	0.3716E-09	AL	5.77	TISSUE	1.00
68	0.4104E-09	AL	8.18	TISSUE	3.00
69	0.3723E-09	AL	11.15	TISSUE	6.00
70	0.3429E-09	AL	12.32	TISSUE	7.00
71	0.1837E-09	AL	19.05	TISSUE	12.00
72	0.7391E-10	AL	30.78	TISSUE	2.00
73	0.8701E-10	AL	24.46	TISSUE	0.
74	0.1757E-09	AL	14.80	TISSUE	0.
75	0.5474E-10	AL	23.33	TISSUE	0.
76	0.1891E-09	AL	13.71	TISSUE	0.
77	0.2657E-09	AL	8.09	TISSUE	0.
78	0.3300E-09	AL	1.59	TISSUE	0.
79	0.2884E-09	AL	6.41	TISSUE	0.
80	0.3300E-09	AL	1.59	TISSUE	0.
81	0.2616E-09	AL	8.38	TISSUE	0.
82	0.2279E-09	AL	10.79	TISSUE	0.
83	0.2279E-09	AL	10.79	TISSUE	0.
84	0.2672E-09	AL	7.98	TISSUE	0.
85	0.2236E-09	AL	11.10	TISSUE	0.
86	0.1881E-09	AL	13.79	TISSUE	0.
87	0.2209E-09	AL	11.30	TISSUE	0.
88	0.2460E-09	AL	9.49	TISSUE	0.
89	0.3128E-09	AL	4.32	TISSUE	0.
90	0.1467E-09	AL	17.38	TISSUE	0.
91	0.1201E-09	AL	20.14	TISSUE	0.
92	0.1201E-09	AL	20.14	TISSUE	0.
93	0.1686E-09	AL	15.40	TISSUE	0.
94	0.1054E-09	AL	21.90	TISSUE	0.
95	0.1425E-09	AL	17.79	TISSUE	0.
96	0.2058E-09	AL	12.42	TISSUE	0.
97	0.1107E-09	AL	21.24	TISSUE	0.
98	0.2233E-09	AL	11.12	TISSUE	0.
99	0.2418E-09	AL	9.79	TISSUE	0.
100	0.2418E-09	AL	9.79	TISSUE	0.
101	0.2497E-09	AL	9.23	TISSUE	0.
102	0.2497E-09	AL	9.23	TISSUE	0.
103	0.3155E-09	AL	4.04	TISSUE	0.
104	0.3237E-09	AL	3.06	TISSUE	0.
105	0.2956E-09	AL	5.34	TISSUE	0.
106	0.3237E-09	AL	1.79	TISSUE	0.
107	0.3251E-09	AL	2.83	TISSUE	0.
108	0.3205E-09	AL	3.48	TISSUE	0.

APOLLO FUELED CHEST

BREMSSTRAHLUNG WITH SPECTRUM 3

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.4001E-13	AL	141.00	TISSUE	25.00
2	0.1412E-12	AL	116.90	TISSUE	25.00
3	0.5295E-11	AL	50.05	TISSUE	25.00
4	0.1347E-10	AL	44.79	TISSUE	25.00
5	0.1417E-10	AL	44.08	TISSUE	25.00
6	0.1417E-10	AL	44.08	TISSUE	25.00
7	0.1417E-10	AL	44.08	TISSUE	25.00
8	0.2714E-11	AL	68.06	TISSUE	25.00
9	0.6748E-12	AL	89.89	TISSUE	25.00
10	0.5199E-14	AL	184.80	TISSUE	25.00
11	0.4748E-15	AL	243.20	TISSUE	25.00
12	0.5539E-10	AL	24.95	TISSUE	25.00
13	0.5539E-10	AL	24.95	TISSUE	25.00
14	0.1755E-10	AL	41.08	TISSUE	25.00
15	0.8122E-13	AL	127.20	TISSUE	25.00
16	0.7582E-12	AL	87.99	TISSUE	25.00
17	0.5943E-13	AL	133.20	TISSUE	25.00
18	0.1842E-12	AL	112.10	TISSUE	25.00
19	0.3032E-13	AL	146.60	TISSUE	25.00
20	0.3245E-10	AL	32.49	TISSUE	25.00
21	0.1207E-17	AL	413.10	TISSUE	25.00
22	0.1750E-09	AL	5.68	TISSUE	25.00
23	0.5077E-12	AL	94.59	TISSUE	25.00
24	0.3057E-12	AL	103.20	TISSUE	25.00
25	0.9420E-13	AL	124.40	TISSUE	25.00
26	0.9959E-15	AL	224.40	TISSUE	25.00
27	0.3568E-13	AL	143.30	TISSUE	25.00
28	0.3038E-13	AL	143.60	TISSUE	29.00
29	0.1504E-09	AL	5.61	TISSUE	27.00
30	0.1773E-09	AL	5.32	TISSUE	25.00
31	0.2521E-11	AL	69.17	TISSUE	25.00
32	0.9258E-10	AL	15.09	TISSUE	27.00
33	0.1092E-09	AL	14.80	TISSUE	25.00
34	0.9556E-10	AL	10.55	TISSUE	30.00
35	0.1421E-09	AL	10.26	TISSUE	25.00
36	0.9510E-10	AL	7.29	TISSUE	32.00
37	0.2579E-09	AL	6.92	TISSUE	19.00
38	0.1574E-09	AL	6.46	TISSUE	26.00
39	0.9540E-10	AL	9.01	TISSUE	31.00
40	0.1926E-09	AL	8.63	TISSUE	22.00
41	0.1692E-09	AL	6.57	TISSUE	25.00
42	0.6448E-10	AL	6.95	TISSUE	37.00
43	0.5792E-10	AL	11.12	TISSUE	36.00
44	0.2305E-09	AL	10.45	TISSUE	18.00
45	0.1288E-09	AL	10.69	TISSUE	26.00
46	0.4819E-11	AL	29.25	TISSUE	55.00
47	0.3581E-10	AL	20.69	TISSUE	35.00
48	0.6693E-10	AL	11.38	TISSUE	34.00
49	0.1515E-09	AL	17.11	TISSUE	18.00
50	0.1866E-09	AL	15.83	TISSUE	14.00
51	0.2579E-09	AL	13.44	TISSUE	13.00

56	C.15505E-09	0.97200E-01
57	C.12727E-09	0.51460E-01
58	C.53604E-10	0.28590E-01
59	C.27904E-10	0.30270E-00
60	C.95444E-10	0.81310E-01
61	C.27419E-09	0.45170E-01
62	C.38044E-09	0.17620E-00
63	C.35072E-09	0.90350E-01
64	C.38053E-09	0.72280E-01
65	C.45484E-09	0.45170E-01
66	C.41169E-09	0.14450E-00
67	C.37156E-09	0.28010E-00
68	C.41040E-09	0.10840E-00
69	C.37225E-09	0.15360E-00
70	C.34288E-09	0.81310E-01
71	C.18370E-09	0.45170E-01
72	C.73913E-10	0.85520E 00
73	C.87014E-10	0.22980E-00
74	C.17570E-09	0.12760E-00
75	C.94741E-10	0.49780E-00
76	C.18911E-09	0.22440E-00
77	C.26571E-09	0.23560E-00
78	C.33003E-09	0.85260E 00
79	C.28840E-09	0.20190E-00
80	C.33003E-09	0.56090E-01
81	C.26163E-09	0.26920E-00
82	C.22788E-09	0.15710E-00
83	C.22788E-09	0.25520E-00
84	C.26716E-09	0.22990E-00
85	C.22361E-09	0.12760E-00
86	C.18810E-09	0.27820E-00
87	C.22087E-09	0.22900E-00
88	C.24604E-09	0.61520E-01
89	C.31284E-09	0.68360E-01
90	C.14671E-09	0.20170E-00
91	C.12011E-09	0.54690E-01
92	C.12011E-09	0.82030E-01
93	C.16860E-09	0.68360E-01
94	C.10544E-09	0.22560E-00
95	C.14247E-09	0.61520E-01
96	C.20578E-09	0.11620E-00
97	C.11074E-09	0.61520E-01
98	C.22334E-09	0.80790E-01
99	C.24181E-09	0.56070E-01
100	C.24181E-09	0.49420E-01
101	C.24968E-09	0.15210E-01
102	C.24968E-09	0.22810E-01
103	C.31554E-09	0.19010E-01
104	C.32366E-09	0.19010E-01
105	C.29560E-09	0.62770E-01
106	C.32967E-09	0.17110E-01
107	C.32513E-09	0.91480E-01
108	C.32046E-09	0.23940E-01

THE TOTAL DOSE IS 0.19370E-09 R/HR WITH SPECTRUM 3

VEHICLE APLLC ANALYSIS, INTERIOR DOSE AT WAIST

SECTOR	DOSE	D OMEGA
1	C.62424E-13	0.38300E-02
2	C.23010E-12	0.11500E-01
3	C.19285E-10	0.86100E-02
4	C.28815E-10	0.22870E-01
5	C.30433E-10	0.46600E-02
6	C.30433E-10	0.26300E-02
7	C.30433E-10	0.24000E-03
8	C.51467E-11	0.50200E-02
9	C.11792E-11	0.17900E-02
10	C.77957E-14	0.44390E-01
11	C.68794E-15	0.51790E-01
12	C.13668E-09	0.14800E-01
13	C.13668E-09	0.34300E-02
14	C.38754E-10	0.42900E-02
15	C.12966E-12	0.42900E-02
16	C.13396E-11	0.10290E-01
17	C.94567E-13	0.12010E-01
18	C.30505E-12	0.16400E-01
19	C.47310E-13	0.20590E-01
20	C.74984E-10	0.52180E-01
21	C.16783E-17	0.60870E-01
22	C.49473E-09	0.17390E-01
23	C.87900E-12	0.80100E-02
24	C.51692E-12	0.13730E-01
25	C.15116E-12	0.21740E-01
26	C.14195E-14	0.55320E 00
27	C.55477E-13	0.23710E-00
28	C.53261E-13	0.23710E-00
29	C.48631E-09	0.79040E-01
30	C.47791E-09	0.79040E-01
31	C.47588E-11	0.66870E-01
32	C.28443E-09	0.48670E-01
33	C.25857E-09	0.48670E-01
34	C.38331E-09	0.11550E-00
35	C.29733E-09	0.11550E-00
36	C.45962E-09	0.10790E-00
37	C.25789E-09	0.10790E-00
38	C.42138E-09	0.30210E-00
39	C.38643E-09	0.43150E-01
40	C.32531E-09	0.43150E-01
41	C.45326E-09	0.12950E-00
42	C.33344E-09	0.12950E-00
43	C.29824E-09	0.24920E-00
44	C.24584E-09	0.24920E-00
45	C.30599E-09	0.26830E-00
46	C.88905E-10	0.19150E-00
47	C.51897E-10	0.51460E-01
48	C.91455E-10	0.28590E-01
49	C.65315E-10	0.11150E-00
50	C.88431E-10	0.57180E-01
51	C.81513E-10	0.45740E-01
52	C.32954E-09	0.28590E-01
53	C.41115E-09	0.91480E-01
54	C.24571E-09	0.17720E-00
55	C.26961E-09	0.68610E-01

52	0.3295E-09	AL	10.28	TISSUE	12.00
53	0.4112E-09	AL	5.93	TISSUE	12.00
54	0.2457E-09	AL	12.49	TISSUE	15.00
55	0.2696E-09	AL	14.76	TISSUE	10.00
56	0.2362E-09	AL	17.67	TISSUE	5.00
57	0.2934E-09	AL	14.64	TISSUE	5.00
58	0.28C9E-09	AL	15.36	TISSUE	6.00
59	0.2116E-10	AL	44.69	TISSUE	17.00
60	0.3648E-10	AL	25.95	TISSUE	30.00
61	0.6539E-10	AL	13.25	TISSUE	33.00
62	0.9432E-10	AL	10.80	TISSUE	30.00
63	0.8856E-10	AL	11.97	TISSUE	30.00
64	0.6784E-10	AL	9.52	TISSUE	35.00
65	0.4188E-09	AL	3.93	TISSUE	13.00
66	0.3857E-09	AL	2.33	TISSUE	15.00
67	0.1745E-09	AL	5.77	TISSUE	25.00
68	0.3877E-09	AL	8.18	TISSUE	11.00
69	0.3700E-09	AL	11.15	TISSUE	5.00
70	0.3432E-09	AL	12.32	TISSUE	5.00
71	0.2150E-09	AL	19.05	TISSUE	6.00
72	0.5028E-10	AL	30.78	TISSUE	20.00
73	0.28C8E-10	AL	24.46	TISSUE	35.00
74	0.3472E-10	AL	14.80	TISSUE	40.00
75	0.5785E-10	AL	23.33	TISSUE	26.00
76	0.1167E-09	AL	13.71	TISSUE	25.00
77	0.1077E-09	AL	8.09	TISSUE	30.00
78	0.4593E-09	AL	1.59	TISSUE	12.00
79	0.1154E-09	AL	6.41	TISSUE	30.00
80	0.5222E-09	AL	1.59	TISSUE	9.00
81	0.4261E-09	AL	8.38	TISSUE	8.00
82	0.28C7E-09	AL	10.79	TISSUE	6.00
83	0.3784E-09	AL	10.79	TISSUE	5.00
84	0.4451E-09	AL	7.98	TISSUE	5.00
85	0.3734E-09	AL	11.10	TISSUE	6.00
86	0.3132E-09	AL	13.79	TISSUE	6.00
87	0.1920E-09	AL	11.30	TISSUE	20.00
88	0.2430E-09	AL	9.49	TISSUE	18.00
89	0.5252E-09	AL	4.32	TISSUE	6.00
90	0.2070E-09	AL	17.38	TISSUE	12.00
91	0.1542E-09	AL	20.14	TISSUE	14.00
92	0.1982E-09	AL	20.14	TISSUE	6.00
93	0.28C1E-09	AL	15.40	TISSUE	6.00
94	0.17C1E-09	AL	21.90	TISSUE	8.00
95	0.2011E-09	AL	17.79	TISSUE	12.00
96	0.3432E-09	AL	12.42	TISSUE	6.00
97	0.1824E-09	AL	21.24	TISSUE	6.00
98	0.3633E-09	AL	11.12	TISSUE	8.00
99	0.3829E-09	AL	9.79	TISSUE	9.00
100	0.4011E-09	AL	9.79	TISSUE	7.00
101	0.3817E-09	AL	9.23	TISSUE	10.00
102	0.4143E-09	AL	9.23	TISSUE	7.00
103	0.5143E-09	AL	4.04	TISSUE	8.00
104	0.5276E-09	AL	3.06	TISSUE	8.00
105	0.4817E-09	AL	5.84	TISSUE	8.00
106	0.5216E-09	AL	1.78	TISSUE	9.00
107	0.5299E-09	AL	2.83	TISSUE	8.00
108	0.5223E-09	AL	3.48	TISSUE	8.00

APOLLO FUELEC WAIST

BREMSSTRAHLUNG WITH SPECTRUM 3

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.6242E-13	AL	141.00	TISSUE	8.00
2	0.2301E-12	AL	116.90	TISSUE	8.00
3	0.1928E-10	AL	50.05	TISSUE	8.00
4	0.2881E-10	AL	44.79	TISSUE	8.00
5	0.3043E-10	AL	44.08	TISSUE	8.00
6	0.3043E-10	AL	44.08	TISSUE	8.00
7	0.3043E-10	AL	44.08	TISSUE	8.00
8	0.5147E-11	AL	68.06	TISSUE	8.00
9	0.1179E-11	AL	89.89	TISSUE	8.00
10	0.7796E-14	AL	184.80	TISSUE	7.00
11	0.6879E-15	AL	243.20	TISSUE	7.00
12	0.1367E-09	AL	24.95	TISSUE	7.00
13	0.1367E-09	AL	24.95	TISSUE	7.00
14	0.3875E-10	AL	41.08	TISSUE	7.00
15	0.1297E-12	AL	127.20	TISSUE	8.00
16	0.1340E-11	AL	87.99	TISSUE	7.00
17	0.9457E-13	AL	133.20	TISSUE	7.00
18	0.3051E-12	AL	112.10	TISSUE	7.00
19	0.4731E-13	AL	146.60	TISSUE	7.00
20	0.7498E-10	AL	32.49	TISSUE	8.00
21	0.1678E-17	AL	413.10	TISSUE	7.00
22	0.4947E-09	AL	5.68	TISSUE	7.00
23	0.8790E-12	AL	94.59	TISSUE	7.00
24	0.5169E-12	AL	103.20	TISSUE	7.00
25	0.1512E-12	AL	124.40	TISSUE	8.00
26	0.1420E-14	AL	224.40	TISSUE	9.00
27	0.5548E-13	AL	143.30	TISSUE	8.00
28	0.5326E-13	AL	143.60	TISSUE	10.00
29	0.4863E-09	AL	5.61	TISSUE	8.00
30	0.4779E-09	AL	5.32	TISSUE	9.00
31	0.4759E-11	AL	69.17	TISSUE	8.00
32	0.2844E-09	AL	15.09	TISSUE	7.00
33	0.2586E-09	AL	14.80	TISSUE	11.00
34	0.3833E-09	AL	10.55	TISSUE	7.00
35	0.2973E-09	AL	10.26	TISSUE	14.00
36	0.4596E-09	AL	7.29	TISSUE	7.00
37	0.2579E-09	AL	6.92	TISSUE	19.00
38	0.4214E-09	AL	6.46	TISSUE	11.00
39	0.3864E-09	AL	9.01	TISSUE	10.00
40	0.3253E-09	AL	8.63	TISSUE	14.00
41	0.4533E-09	AL	6.57	TISSUE	9.00
42	0.3334E-09	AL	6.95	TISSUE	15.00
43	0.2982E-09	AL	11.12	TISSUE	13.00
44	0.2458E-09	AL	10.45	TISSUE	17.00
45	0.3060E-09	AL	10.69	TISSUE	13.00
46	0.8890E-10	AL	29.25	TISSUE	11.00
47	0.5190E-10	AL	20.69	TISSUE	30.00
48	0.9146E-10	AL	11.38	TISSUE	30.00
49	0.8531E-10	AL	17.11	TISSUE	30.00
50	0.8843E-10	AL	15.83	TISSUE	27.00
51	0.8151E-10	AL	13.44	TISSUE	30.00

56	C.14370E-09	0.97200E-01
57	C.17762E-09	0.51460E-01
58	C.20983E-09	0.28530E-01
59	C.99615E-11	0.30270E-00
60	C.36477E-10	0.81310E-01
61	C.30852E-09	0.45170E-01
62	C.37055E-09	0.17620E-00
63	C.34439E-09	0.90350E-01
64	C.38891E-09	0.72290E-01
65	C.31660E-09	0.45170E-01
66	C.47145E-09	0.14450E-00
67	C.49493E-09	0.28010E-00
68	C.26443E-09	0.10840E-00
69	C.22292E-09	0.15360E-00
70	C.20711E-09	0.81310E-01
71	C.13003E-09	0.45170E-01
72	C.85702E-10	0.85520E 00
73	C.13115E-09	0.22930E-00
74	C.26992E-09	0.12760E-00
75	C.11638E-09	0.49740E-00
76	C.23515E-09	C.22440E-00
77	C.33234E-09	0.23560E-00
78	C.47476E-09	0.85260E 00
79	C.41334E-09	0.20170E-00
80	C.33003E-09	0.56090E-01
81	C.26163E-09	0.26920E-00
82	C.22788E-09	0.15710E-00
83	C.22788E-09	0.25520E-00
84	C.26716E-09	0.22980E-00
85	C.22361E-09	0.12760E-00
86	C.18810E-09	0.27820E-00
87	C.22087E-09	0.22900E-00
88	C.24604E-09	0.61520E-01
89	C.31284E-09	0.68360E-01
90	C.14671E-09	0.20170E-00
91	C.12011E-09	0.54690E-01
92	C.12011E-09	0.82030E-01
93	C.16860E-09	0.68360E-01
94	C.10544E-09	0.22560E-00
95	C.14247E-09	0.61520E-01
96	C.20578E-09	C.11620E-00
97	C.11074E-09	0.61520E-01
98	C.22334E-09	0.80780E-01
99	C.24181E-09	0.56070E-01
100	C.24181E-09	0.49420E-01
101	C.24968E-09	0.15210E-01
102	C.24968E-09	0.22810E-01
103	C.31554E-09	0.19010E-01
104	C.32366E-09	0.19010E-01
105	C.29560E-09	0.62720E-01
106	C.32967E-09	0.17110E-01
107	C.32513E-09	0.91490E-01
108	C.32046E-09	C.23940E-01

THE TOTAL DOSE IS C.23314E-09 R/HR WITH SPECTRUM 3

POLLU UNFUELED AT EYE

BREMSSTRAHLUNG WITH SPECTRUM 1

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.5674E-10	AL	125.20	TISSUE	20.00
2	0.1525E-09	AL	101.50	TISSUE	19.00
3	0.3030E-08	AL	35.24	TISSUE	19.00
4	0.4035E-08	AL	29.99	TISSUE	18.00
5	0.3745E-08	AL	31.56	TISSUE	18.00
6	0.3745E-08	AL	31.56	TISSUE	18.00
7	0.3473E-08	AL	31.56	TISSUE	20.00
8	0.3784E-08	AL	31.34	TISSUE	18.00
9	0.4191E-09	AL	77.27	TISSUE	20.00
10	0.5693E-08	AL	20.82	TISSUE	20.00
11	0.6129E-08	AL	21.00	TISSUE	18.00
12	0.6193E-08	AL	20.77	TISSUE	18.00
13	0.6193E-08	AL	20.77	TISSUE	18.00
14	0.3288E-08	AL	32.72	TISSUE	20.00
15	0.7703E-10	AL	118.80	TISSUE	18.00
16	0.2072E-08	AL	45.93	TISSUE	18.00
17	0.3316E-08	AL	34.11	TISSUE	18.00
18	0.1251E-09	AL	106.90	TISSUE	18.00
19	0.1092E-09	AL	110.80	TISSUE	17.00
20	0.9602E-08	AL	6.89	TISSUE	20.00
21	0.1276E-07	AL	7.09	TISSUE	13.00
22	0.1180E-07	AL	5.68	TISSUE	16.00
23	0.6517E-08	AL	22.79	TISSUE	14.00
24	0.1098E-07	AL	9.59	TISSUE	15.00
25	0.1287E-08	AL	52.59	TISSUE	20.00
26	0.1386E-07	AL	6.30	TISSUE	11.00
27	0.1258E-07	AL	6.27	TISSUE	14.00
28	0.9686E-08	AL	6.54	TISSUE	20.00
29	0.1369E-07	AL	5.61	TISSUE	12.00
30	0.1287E-07	AL	5.32	TISSUE	14.00
31	0.1001E-07	AL	12.14	TISSUE	15.00
32	0.1296E-07	AL	8.59	TISSUE	11.00
33	0.9668E-08	AL	8.31	TISSUE	19.00
34	0.1447E-07	AL	7.31	TISSUE	7.00
35	0.1095E-07	AL	7.02	TISSUE	17.00
36	0.1450E-07	AL	7.29	TISSUE	6.00
37	0.1191E-07	AL	6.92	TISSUE	15.00
38	0.1462E-07	AL	6.46	TISSUE	7.00
39	0.1242E-07	AL	9.01	TISSUE	12.00
40	0.1294E-07	AL	8.63	TISSUE	11.00
41	0.1412E-07	AL	6.57	TISSUE	10.00
42	0.9588E-08	AL	6.95	TISSUE	20.00
43	0.1040E-07	AL	11.12	TISSUE	15.00
44	0.1245E-07	AL	10.45	TISSUE	10.00
45	0.1290E-07	AL	10.69	TISSUE	6.00
46	0.4179E-08	AL	29.25	TISSUE	18.00
47	0.2812E-03	AL	20.69	TISSUE	35.00
48	0.1030E-07	AL	11.38	TISSUE	15.00
49	0.9456E-08	AL	17.11	TISSUE	10.00
50	0.9761E-08	AL	15.83	TISSUE	11.00
51	0.1081E-07	AL	13.44	TISSUE	11.00
52	0.1166E-07	AL	10.28	TISSUE	2.00
53	0.1413E-07	AL	5.93	TISSUE	3.00
54	0.1172E-07	AL	12.49	TISSUE	5.00

55	0.9053E-08	AL	14.76	TISSUE	1.00
56	0.7197E-08	AL	17.67	TISSUE	0.
57	0.8136E-08	AL	14.64	TISSUE	0.
58	0.8830E-08	AL	15.36	TISSUE	1.00
59	0.1257E-08	AL	44.69	TISSUE	30.00
60	0.2891E-08	AL	25.95	TISSUE	30.00
61	0.1137E-07	AL	13.25	TISSUE	9.00
62	0.1272E-07	AL	10.80	TISSUE	8.00
63	0.1215E-07	AL	11.97	TISSUE	8.00
64	0.1313E-07	AL	9.52	TISSUE	9.00
65	0.1124E-07	AL	3.93	TISSUE	0.
66	0.1418E-07	AL	2.33	TISSUE	2.00
67	0.1500E-07	AL	5.77	TISSUE	5.00
68	0.1020E-07	AL	8.18	TISSUE	0.
69	0.9266E-08	AL	11.15	TISSUE	0.
70	0.8886E-08	AL	12.32	TISSUE	0.
71	0.6792E-08	AL	19.05	TISSUE	0.
72	0.5039E-08	AL	30.78	TISSUE	8.00
73	0.6575E-08	AL	24.46	TISSUE	3.00
74	0.1026E-07	AL	14.80	TISSUE	3.00
75	0.6208E-08	AL	23.33	TISSUE	1.00
76	0.9448E-08	AL	13.71	TISSUE	1.00
77	0.1157E-07	AL	8.09	TISSUE	1.00
78	0.1422E-07	AL	1.59	TISSUE	2.00
79	0.1320E-07	AL	6.41	TISSUE	2.00
80	0.1146E-07	AL	1.59	TISSUE	0.
81	0.1014E-07	AL	8.38	TISSUE	0.
82	0.9383E-08	AL	10.79	TISSUE	0.
83	0.9383E-08	AL	10.79	TISSUE	0.
84	0.1026E-07	AL	7.98	TISSUE	0.
85	0.9283E-08	AL	11.10	TISSUE	0.
86	0.8409E-08	AL	13.79	TISSUE	0.
87	0.9218E-08	AL	11.30	TISSUE	0.
88	0.9798E-08	AL	9.49	TISSUE	0.
89	0.1117E-07	AL	4.32	TISSUE	0.
90	0.7284E-08	AL	17.38	TISSUE	0.
91	0.6484E-08	AL	20.14	TISSUE	0.
92	0.6484E-08	AL	20.14	TISSUE	0.
93	0.7895E-08	AL	15.40	TISSUE	0.
94	0.6008E-08	AL	21.90	TISSUE	0.
95	0.7161E-08	AL	17.79	TISSUE	0.
96	0.8854E-08	AL	12.42	TISSUE	0.
97	0.6183E-08	AL	21.24	TISSUE	0.
98	0.9276E-08	AL	11.12	TISSUE	0.
99	0.9703E-08	AL	9.79	TISSUE	0.
100	0.9703E-08	AL	9.79	TISSUE	0.
101	0.9879E-08	AL	9.23	TISSUE	0.
102	0.9879E-08	AL	9.23	TISSUE	0.
103	0.1122E-07	AL	4.04	TISSUE	0.
104	0.1136E-07	AL	3.06	TISSUE	0.
105	0.1084E-07	AL	5.84	TISSUE	0.
106	0.1145E-07	AL	1.78	TISSUE	0.
107	0.1159E-07	AL	2.83	TISSUE	0.
108	0.1151E-07	AL	3.48	TISSUE	0.

VEHICLE APLLO ANALYSIS, INTERIOR DOSE AT EYE

SECTOR	DOSE	C OMEGA
1	0.56743E-10	0.38300E-02
2	0.15249E-09	C.11500E-01
3	0.30297E-08	0.86100E-02
4	0.40353E-08	0.22870E-01
5	0.37449E-08	C.46600E-02
6	0.37449E-08	C.26300E-02
7	0.34731E-08	0.24000E-03
8	0.37844E-08	0.50200E-02
9	0.41911E-09	C.17900E-02
10	0.56934E-08	C.44390E-01
11	0.61293E-08	0.51790E-01
12	0.61930E-08	C.14800E-01
13	0.61930E-08	C.34300E-02
14	0.32882E-08	C.42900E-02
15	0.77634E-10	0.42900E-02
16	0.20722E-08	0.10290E-01
17	0.33156E-08	0.12010E-01
18	0.12510E-09	C.16400E-01
19	0.10924E-09	0.20590E-01
20	0.76024E-08	C.52180E-01
21	0.12756E-07	C.60870E-01
22	0.11801E-07	C.17390E-01
23	0.65174E-08	0.80100E-02
24	0.10979E-07	C.13730E-01
25	0.12867E-08	C.21740E-01
26	0.13861E-07	C.55320E 00
27	0.12584E-07	C.23710E-00
28	0.98864E-08	C.23710E-00
29	0.13690E-07	C.79040E-01
30	0.12665E-07	0.79040E-01
31	0.10013E-07	0.66870E-01
32	0.12956E-07	C.48670E-01
33	0.96685E-08	C.48670E-01
34	0.14466E-07	C.11550E-00
35	0.10948E-07	C.11550E-00
36	0.14496E-07	C.10790E-00
37	0.11913E-07	C.10790E-00
38	0.14623E-07	C.30210E-00
39	0.12416E-07	C.43150E-01
40	0.12939E-07	C.43150E-01
41	0.14117E-07	C.12950E-00
42	0.95877E-08	C.12950E-00
43	0.10402E-07	0.24920E-00
44	0.12446E-07	0.24920E-00
45	0.12897E-07	C.26830E-00
46	0.41795E-08	C.19150E-00
47	0.28118E-08	0.51460E-01
48	0.10303E-07	C.28590E-01
49	0.94360E-08	C.11150E-00
50	0.97611E-08	C.57180E-01
51	0.10605E-07	0.45740E-01
52	0.11663E-07	C.28590E-01
53	0.14127E-07	C.91480E-01
54	0.11916E-07	C.17720E-00
55	0.90528E-08	C.68610E-01
56	0.71972E-08	C.97200E-01
57	0.81364E-08	C.51460E-01
58	0.88303E-08	C.28590E-01

59	0.12570E-08	0.30270E-00
60	0.28909E-08	0.81310E-01
61	0.11371E-07	0.45170E-01
62	0.12719E-07	0.17620E-00
63	0.12153E-07	0.90350E-01
64	0.13134E-07	0.72280E-01
65	0.11239E-07	0.45170E-01
66	0.14183E-07	0.14450E-00
67	0.14995E-07	0.28010E-00
68	0.10200E-07	0.10840E-00
69	0.92665E-08	0.15360E-00
70	0.88661E-08	0.81310E-01

71	0.67920E-08	C.45170E-01
72	0.50394E-08	C.85520E 00
73	0.65753E-08	0.22980E-00
74	0.10262E-07	0.12760E-00
75	0.62083E-08	C.49780E-00
76	0.94479E-08	C.22440E-00
77	0.11568E-07	0.23560E-00
78	0.14222E-07	C.85260E 00
79	0.13196E-07	C.20190E-00
80	0.11456E-07	C.56090E-01
81	0.10140E-07	0.26920E-00
82	0.93429E-08	C.15710E-00
83	0.93829E-08	C.25520E-00
84	0.10257E-07	C.22980E-00
85	0.92627E-08	0.12760E-00
86	0.84092E-08	C.27820E-00
87	0.92179E-08	C.22900E-00
88	0.97977E-08	C.61520E-01
89	0.11171E-07	C.68360E-01
90	0.72843E-08	C.20170E-00
91	0.64636E-08	C.54690E-01
92	0.64836E-09	C.82030E-01
93	0.78453E-08	C.68360E-01
94	0.60083E-08	C.22560E-00
95	0.71613E-08	C.61520E-01
96	0.88536E-08	C.11620E-00
97	0.61832E-08	C.61520E-01
98	0.92762E-08	C.80780E-01
99	0.97327E-08	C.56070E-01
100	0.97027E-08	C.49420E-01
101	0.98788E-08	C.15210E-01
102	0.98788E-08	C.22810E-01
103	0.11220E-07	C.19010E-01
104	0.11562E-07	C.19010E-01
105	0.10842E-07	C.62720E-01
106	0.11453E-07	C.17110E-01
107	0.11386E-07	C.91480E-01
108	0.11307E-07	C.23940E-01

THE TOTAL DOSE IS 0.99585E-08 R/HR WITH SPECTRUM 1

APOLLO UNFUELED CHEST

BREMSSTRAHLUNG WITH SPECTRUM 1

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1.	0.4953E-10	AL	125.20	TISSUE	25.00
2	0.1283E-09	AL	101.50	TISSUE	25.00
3	0.2388E-08	AL	35.24	TISSUE	25.00
4	0.3036E-08	AL	29.99	TISSUE	25.00
5	0.2827E-08	AL	31.56	TISSUE	25.00
6	0.2827E-08	AL	31.56	TISSUE	25.00
7	0.2827E-08	AL	31.56	TISSUE	25.00
8	0.2855E-08	AL	31.34	TISSUE	25.00
9	0.3571E-09	AL	77.27	TISSUE	25.00
10	0.4557E-08	AL	20.82	TISSUE	25.00
11	0.4523E-08	AL	21.00	TISSUE	25.00
12	0.4567E-08	AL	20.77	TISSUE	25.00
13	0.4567E-08	AL	20.77	TISSUE	25.00
14	0.2681E-08	AL	32.72	TISSUE	25.00
15	0.6375E-10	AL	118.80	TISSUE	25.00
16	0.1599E-08	AL	43.93	TISSUE	25.00
17	0.2515E-08	AL	34.11	TISSUE	25.00
18	0.1028E-09	AL	106.90	TISSUE	25.00
19	0.8781E-10	AL	110.80	TISSUE	25.00
20	0.7510E-08	AL	6.89	TISSUE	25.00
21	0.7474E-08	AL	7.09	TISSUE	25.00
22	0.7715E-08	AL	5.68	TISSUE	25.00
23	0.4187E-08	AL	22.79	TISSUE	25.00
24	0.6974E-08	AL	9.59	TISSUE	25.00
25	0.1074E-08	AL	52.59	TISSUE	25.00
26	0.7614E-08	AL	6.30	TISSUE	25.00
27	0.7619E-08	AL	6.27	TISSUE	25.00
28	0.6146E-08	AL	6.54	TISSUE	29.00
29	0.6963E-08	AL	5.61	TISSUE	27.00
30	0.7769E-08	AL	5.32	TISSUE	25.00
31	0.6414E-08	AL	12.14	TISSUE	25.00
32	0.6484E-08	AL	8.59	TISSUE	27.00
33	0.7239E-08	AL	8.31	TISSUE	25.00
34	0.5726E-08	AL	7.31	TISSUE	30.00
35	0.7487E-08	AL	7.02	TISSUE	25.00
36	0.5147E-08	AL	7.29	TISSUE	32.00
37	0.1005E-07	AL	6.92	TISSUE	19.00
38	0.7206E-08	AL	6.46	TISSUE	26.00
39	0.5197E-08	AL	9.01	TISSUE	31.00
40	0.8322E-08	AL	8.63	TISSUE	22.00
41	0.7567E-08	AL	6.57	TISSUE	25.00
42	0.3953E-08	AL	6.95	TISSUE	37.00
43	0.3746E-08	AL	11.12	TISSUE	36.00
44	0.9434E-08	AL	10.45	TISSUE	18.00
45	0.6406E-08	AL	10.69	TISSUE	26.00
46	0.7426E-09	AL	29.25	TISSUE	55.00
47	0.2812E-08	AL	20.69	TISSUE	35.00
48	0.4134E-08	AL	11.38	TISSUE	34.00
49	0.7271E-08	AL	17.11	TISSUE	18.00
50	0.8307E-08	AL	15.83	TISSUE	16.00
51	0.1020E-07	AL	13.44	TISSUE	13.00
52	0.1151E-07	AL	10.28	TISSUE	13.00
53	0.1358E-07	AL	5.93	TISSUE	12.00
54	0.1150E-07	AL	12.49	TISSUE	10.00
55	0.9655E-08	AL	14.76	TISSUE	13.00
56	0.7387E-08	AL	17.67	TISSUE	17.00

57	0.6443E-08	AL	14.64	TISSUE	23.00
58	0.3618E-08	AL	15.36	TISSUE	34.00
59	0.2466E-08	AL	44.69	TISSUE	10.00
60	0.5433E-08	AL	25.95	TISSUE	15.00
61	0.1060E-07	AL	13.25	TISSUE	12.00
62	0.1284E-07	AL	10.80	TISSUE	6.00
63	0.1226E-07	AL	11.97	TISSUE	7.00
64	0.1265E-07	AL	9.52	TISSUE	3.00
65	0.1392E-07	AL	3.93	TISSUE	2.00
66	0.1301E-07	AL	2.33	TISSUE	1.00
67	0.1232E-07	AL	5.77	TISSUE	1.00
68	0.1324E-07	AL	8.18	TISSUE	3.00
69	0.1267E-07	AL	11.15	TISSUE	6.00
70	0.1208E-07	AL	12.32	TISSUE	7.00
71	0.8230E-08	AL	19.05	TISSUE	12.00
72	0.4652E-08	AL	30.78	TISSUE	2.00
73	0.5368E-08	AL	24.46	TISSUE	0.
74	0.8085E-08	AL	14.80	TISSUE	0.
75	0.5643E-08	AL	23.33	TISSUE	0.
76	0.8455E-08	AL	13.71	TISSUE	0.
77	0.1023E-07	AL	8.09	TISSUE	0.
78	0.1146E-07	AL	1.59	TISSUE	0.
79	0.1070E-07	AL	6.41	TISSUE	0.
80	0.1146E-07	AL	1.59	TISSUE	0.
81	0.1014E-07	AL	8.38	TISSUE	0.
82	0.9383E-08	AL	10.79	TISSUE	0.
83	0.9383E-08	AL	10.79	TISSUE	0.
84	0.1026E-07	AL	7.98	TISSUE	0.
85	0.9283E-08	AL	11.10	TISSUE	0.
86	0.8409E-08	AL	13.79	TISSUE	0.
87	0.9218E-08	AL	11.30	TISSUE	0.
88	0.9798E-08	AL	9.49	TISSUE	0.
89	0.1117E-07	AL	4.32	TISSUE	0.
90	0.7284E-08	AL	17.38	TISSUE	0.
91	0.6484E-08	AL	20.14	TISSUE	0.
92	0.6484E-08	AL	20.14	TISSUE	0.
93	0.7895E-08	AL	15.40	TISSUE	0.
94	0.6008E-08	AL	21.90	TISSUE	0.
95	0.7161E-08	AL	17.79	TISSUE	0.
96	0.8854E-08	AL	12.42	TISSUE	0.
97	0.6183E-08	AL	21.24	TISSUE	0.
98	0.9276E-08	AL	11.12	TISSUE	0.
99	0.9703E-08	AL	9.79	TISSUE	0.
100	0.9703E-08	AL	9.79	TISSUE	0.
101	0.9879E-08	AL	9.23	TISSUE	0.
102	0.9879E-08	AL	9.23	TISSUE	0.
103	0.1122E-07	AL	4.04	TISSUE	0.
104	0.1136E-07	AL	3.06	TISSUE	0.
105	0.1084E-07	AL	5.84	TISSUE	0.
106	0.1145E-07	AL	1.78	TISSUE	0.
107	0.1139E-07	AL	2.83	TISSUE	0.
108	0.1151E-07	AL	3.48	TISSUE	0.

VEHICLE APLLO ANALYSIS, INTERIOR DOSE AT CHEST

SECTOR	DOSE	C OMEGA
1	0.49528E-10	0.38300E-02
2	0.12825E-09	0.11500E-01
3	0.23877E-08	0.86100E-02
4	0.30363E-08	0.22870E-01
5	0.28267E-08	0.46600E-02
6	0.28267E-08	0.26300E-02
7	0.28267E-08	0.24000E-03
8	0.28552E-08	0.50200E-02
9	0.35712E-09	0.17900E-02
10	0.45574E-08	0.44390E-01
11	0.45225E-08	0.51790E-01
12	0.45671E-08	0.14800E-01
13	0.45671E-08	0.34300E-02
14	0.26806E-08	0.42900E-02
15	0.63755E-10	0.42900E-02
16	0.15989E-08	0.10290E-01
17	0.25150E-08	0.12010E-01
18	0.10284E-09	0.16400E-01
19	0.87810E-10	0.20590E-01
20	0.75105E-08	0.52180E-01
21	0.74741E-08	0.60870E-01
22	0.77145E-08	0.17390E-01
23	0.41867E-08	0.80100E-02
24	0.69735E-08	0.13730E-01
25	0.10741E-08	0.21740E-01
26	0.76137E-08	0.55320E 00
27	0.76188E-08	0.23710E-00
28	0.61458E-08	0.23710E-00
29	0.69531E-08	0.79040E-01
30	0.77690E-08	0.79040E-01
31	0.64139E-08	0.66870E-01
32	0.64841E-08	0.48670E-01
33	0.72388E-08	0.48670E-01
34	0.57258E-08	0.11550E-00
35	0.74869E-08	0.11550E-00
36	0.51471E-08	0.10790E-00
37	0.10049E-07	0.10790E-00
38	0.72059E-08	0.30210E-00
39	0.51969E-08	0.43150E-01
40	0.83222E-08	0.43150E-01
41	0.75673E-08	0.12950E-00
42	0.39532E-08	0.12950E-00
43	0.37457E-08	0.24920E-00
44	0.94335E-08	0.24920E-00
45	0.64058E-08	0.26830E-00
46	0.74258E-09	0.19150E-00
47	0.28118E-08	0.51460E-01
48	0.41342E-08	0.28590E-01
49	0.72706E-08	0.11150E-00
50	0.83074E-08	0.57180E-01
51	0.10197E-07	0.45740E-01
52	0.11511E-07	0.28590E-01
53	0.13585E-07	0.91480E-01
54	0.11502E-07	0.17720E-00
55	0.96546E-08	0.68610E-01
56	0.73874E-08	0.97200E-01
57	0.64433E-08	0.51460E-01
58	0.36183E-08	0.28590E-01
59	0.24658E-08	0.30270E-00
60	0.54332E-08	0.81310E-01

61	0.10595E-07	0.45170E-01
62	0.12843E-07	0.17620E-00
63	0.12256E-07	0.90350E-01
64	0.12652E-07	0.72280E-01
65	0.13925E-07	0.45170E-01
66	0.13011E-07	0.14450E-00
67	0.12323E-07	0.28010E-00
68	0.13238E-07	0.10840E-00
69	0.12672E-07	0.15360E-00
70	0.12084E-07	0.81310E-01
71	0.82295E-08	0.45170E-01
72	0.46515E-08	0.85520E 00
73	0.53684E-08	0.22980E-00
74	0.80854E-08	0.12760E-00
75	0.56433E-08	0.49780E-00
76	0.84350E-08	0.22440E-00
77	0.10228E-07	0.23560E-00
78	0.11456E-07	0.85260E 00
79	0.10598E-07	0.20190E-00
80	0.11456E-07	0.56090E-01
81	0.10140E-07	0.26920E-00
82	0.93829E-08	0.15710E-00
83	0.93829E-08	0.25520E-00
84	0.10259E-07	0.22980E-00
85	0.92827E-08	0.12760E-00
86	0.84092E-08	0.27820E-00
87	0.92179E-08	0.22900E-00
88	0.97977E-08	0.61520E-01
89	0.11171E-07	0.68360E-01
90	0.72643E-08	0.20170E-00
91	0.64536E-08	0.54690E-01
92	0.64835E-08	0.82030E-01
93	0.78953E-08	0.68360E-01
94	0.60983E-08	0.22560E-00
95	0.71613E-08	0.61520E-01
96	0.88536E-08	0.11620E-00
97	0.61832E-08	0.61520E-01
98	0.92762E-08	0.80780E-01
99	0.97027E-08	0.56070E-01
100	0.97027E-08	0.49420E-01
101	0.98788E-08	0.15210E-01
102	0.98788E-08	0.22810E-01
103	0.11220E-07	0.19010E-01
104	0.11362E-07	0.19010E-01
105	0.10642E-07	0.62720E-01
106	0.11453E-07	0.17110E-01
107	0.11386E-07	0.91480E-01
108	0.11307E-07	0.23940E-01

THE TOTAL DOSE IS 0.80338E-08 R/HR WITH SPECTRUM 1

APOLLO UNFUELED WAIST

BREMSSTRAHLUNG WITH SPECTRUM 1

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.7215E-10	AL	125.20	TISSUE	8.00
2	0.1907E-09	AL	101.50	TISSUE	8.00
3	0.4038E-08	AL	35.24	TISSUE	8.00
4	0.5241E-08	AL	29.99	TISSUE	8.00
5	0.4848E-08	AL	31.56	TISSUE	8.00
6	0.4848E-08	AL	31.56	TISSUE	8.00
7	0.4848E-08	AL	31.56	TISSUE	8.00
8	0.4901E-08	AL	31.34	TISSUE	8.00
9	0.5469E-09	AL	77.27	TISSUE	8.00
10	0.8260E-08	AL	20.82	TISSUE	7.00
11	0.8190E-08	AL	21.00	TISSUE	7.00
12	0.8280E-08	AL	20.77	TISSUE	7.00
13	0.8280E-08	AL	20.77	TISSUE	7.00
14	0.4608E-08	AL	32.72	TISSUE	7.00
15	0.9333E-10	AL	118.80	TISSUE	8.00
16	0.2646E-08	AL	43.93	TISSUE	7.00
17	0.4300E-08	AL	34.11	TISSUE	7.00
18	0.1537E-09	AL	106.90	TISSUE	7.00
19	0.1308E-09	AL	110.80	TISSUE	7.00
20	0.1451E-07	AL	6.89	TISSUE	8.00
21	0.1456E-07	AL	7.09	TISSUE	7.00
22	0.1513E-07	AL	5.68	TISSUE	7.00
23	0.7515E-08	AL	22.79	TISSUE	7.00
24	0.1342E-07	AL	9.59	TISSUE	7.00
25	0.1724E-08	AL	52.59	TISSUE	8.00
26	0.1452E-07	AL	6.30	TISSUE	9.00
27	0.1476E-07	AL	6.27	TISSUE	8.00
28	0.1413E-07	AL	6.54	TISSUE	10.00
29	0.1501E-07	AL	5.61	TISSUE	8.00
30	0.1487E-07	AL	5.32	TISSUE	9.00
31	0.1207E-07	AL	12.14	TISSUE	8.00
32	0.1389E-07	AL	8.59	TISSUE	7.00
33	0.1307E-07	AL	8.31	TISSUE	11.00
34	0.1447E-07	AL	7.31	TISSUE	7.00
35	0.1234E-07	AL	7.02	TISSUE	14.00
36	0.1448E-07	AL	7.29	TISSUE	7.00
37	0.1005E-07	AL	6.92	TISSUE	19.00
38	0.1380E-07	AL	6.46	TISSUE	11.00
39	0.1310E-07	AL	9.01	TISSUE	10.00
40	0.1176E-07	AL	8.63	TISSUE	14.00
41	0.1442E-07	AL	6.57	TISSUE	9.00
42	0.1190E-07	AL	6.95	TISSUE	15.00
43	0.1116E-07	AL	11.12	TISSUE	13.00
44	0.9842E-08	AL	10.45	TISSUE	17.00
45	0.1134E-07	AL	10.69	TISSUE	13.00
46	0.5177E-08	AL	29.25	TISSUE	11.00
47	0.3607E-08	AL	20.69	TISSUE	30.00
48	0.5102E-08	AL	11.38	TISSUE	30.00
49	0.4159E-08	AL	17.11	TISSUE	30.00
50	0.5073E-08	AL	15.83	TISSUE	27.00
51	0.4761E-08	AL	13.44	TISSUE	30.00
52	0.1188E-07	AL	10.28	TISSUE	12.00
53	0.1358E-07	AL	5.93	TISSUE	12.00
54	0.9879E-08	AL	12.49	TISSUE	15.00
55	0.1046E-07	AL	14.76	TISSUE	10.00
56	0.9505E-08	AL	17.67	TISSUE	5.00

57	0.1088E-07	AL	14.64	TISSUE	5.00
58	0.1063E-07	AL	15.36	TISSUE	6.00
59	0.2065E-08	AL	44.69	TISSUE	17.00
60	0.2891E-08	AL	25.95	TISSUE	30.00
61	0.4102E-08	AL	13.25	TISSUE	33.00
62	0.5197E-08	AL	10.80	TISSUE	30.00
63	0.5005E-08	AL	11.97	TISSUE	30.00
64	0.4138E-08	AL	9.52	TISSUE	35.00
65	0.1369E-07	AL	3.93	TISSUE	13.00
66	0.1292E-07	AL	2.33	TISSUE	15.00
67	0.7700E-08	AL	5.77	TISSUE	25.00
68	0.1313E-07	AL	8.18	TISSUE	11.00
69	0.1257E-07	AL	11.15	TISSUE	5.00
70	0.1200E-07	AL	12.32	TISSUE	5.00
71	0.8986E-08	AL	19.05	TISSUE	6.00
72	0.3603E-08	AL	30.78	TISSUE	20.00
73	0.2416E-08	AL	24.46	TISSUE	35.00
74	0.2693E-08	AL	14.60	TISSUE	40.00
75	0.3906E-08	AL	23.33	TISSUE	26.00
76	0.6062E-08	AL	13.71	TISSUE	25.00
77	0.5616E-08	AL	8.09	TISSUE	30.00
78	0.1443E-07	AL	1.59	TISSUE	12.00
79	0.5844E-08	AL	6.41	TISSUE	30.00
80	0.1561E-07	AL	1.59	TISSUE	9.00
81	0.1386E-07	AL	8.38	TISSUE	8.00
82	0.1285E-07	AL	10.79	TISSUE	6.00
83	0.1275E-07	AL	10.79	TISSUE	5.00
84	0.1407E-07	AL	7.98	TISSUE	5.00
85	0.1270E-07	AL	11.10	TISSUE	6.00
86	0.1138E-07	AL	13.79	TISSUE	6.00
87	0.8381E-08	AL	11.30	TISSUE	20.00
88	0.9742E-08	AL	9.49	TISSUE	18.00
89	0.1560E-07	AL	4.32	TISSUE	6.00
90	0.8876E-08	AL	17.38	TISSUE	12.00
91	0.7371E-08	AL	20.14	TISSUE	14.00
92	0.8536E-08	AL	20.14	TISSUE	6.00
93	0.1061E-07	AL	15.40	TISSUE	6.00
94	0.7787E-08	AL	21.90	TISSUE	[illegible]
95	0.8714E-08	AL	17.79	TISSUE	12.00
96	0.1205E-07	AL	12.42	TISSUE	6.00
97	0.8101E-08	AL	21.24	TISSUE	6.00
98	0.1256E-07	AL	11.12	TISSUE	6.00
99	0.1301E-07	AL	9.79	TISSUE	9.00
100	0.1342E-07	AL	9.79	TISSUE	7.00
101	0.1300E-07	AL	9.23	TISSUE	10.00
102	0.1359E-07	AL	9.23	TISSUE	7.00
103	0.1550E-07	AL	4.04	TISSUE	[illegible]
104	0.1572E-07	AL	5.06	TISSUE	[illegible]
105	0.1493E-07	AL	5.84	TISSUE	[illegible]
106	0.1560E-07	AL	1.78	TISSUE	[illegible]
107	0.1576E-07	AL	2.83	TISSUE	[illegible]
108	0.1564E-07	AL	3.46	TISSUE	[illegible]

VEHICLE APLLO ANALYSIS, INTERIOR DOSE AT WAIST

SECTOR	DOSE	D OMEGA
1	0.72146E-10	C.38300E-02
2	0.19066E-09	C.11500E-01
3	0.40381E-08	C.86100E-02
4	0.52407E-08	0.22870E-01
5	0.48480E-08	C.46600E-02
6	0.48480E-08	C.26300E-02
7	0.48480E-08	C.24000E-03
8	0.49013E-08	0.50200E-02
9	0.54687E-09	C.17900E-02
10	0.42600E-08	C.44390E-01
11	0.81595E-08	C.51790E-01
12	0.52797E-08	0.14800E-01
13	0.42797E-08	C.34300E-02
14	0.46079E-08	C.42900E-02
15	0.93526E-10	C.42900E-02
16	0.26460E-08	0.10290E-01
17	0.43004E-08	C.12010E-01
18	0.15367E-09	C.16400E-01
19	0.13778E-09	C.20590E-01
20	0.14512E-07	0.52180E-01
21	0.14561E-07	C.60870E-01
22	0.15125E-07	C.17390E-01
23	0.75149E-08	C.80100E-02
24	0.13416E-07	0.13730E-01
25	0.17244E-09	C.21740E-01
26	0.14521E-07	C.55320E 00
27	0.14762E-07	C.23710E-00
28	0.14129E-07	0.23710E-00
29	0.15010E-07	C.79040E-01
30	0.14575E-07	C.79040E-01
31	0.12070E-07	C.66870E-01
32	0.13889E-07	0.48670E-01
33	0.13075E-07	C.48670E-01
34	0.14466E-07	C.11550E-00
35	0.12337E-07	C.11550E-00
36	0.14475E-07	C.10790E-00
37	0.10049E-07	C.10790E-00
38	0.13603E-07	C.30210E-00
39	0.13098E-07	C.43150E-01
40	0.11759E-07	0.43150E-01
41	0.14416E-07	C.12950E-00
42	0.11903E-07	0.12950E-00
43	0.11163E-07	C.24920E-00
44	0.98417E-08	C.24920E-00
45	0.11542E-07	C.26830E-00
46	0.51774E-08	C.12150E-00
47	0.36068E-08	C.51460E-01
48	0.51024E-08	0.28590E-01
49	0.41591E-08	C.11150E-00
50	0.50729E-08	C.57180E-01
51	0.47615E-08	C.45740E-01
52	0.11490E-07	0.28590E-01
53	0.13365E-07	C.91480E-01
54	0.98787E-08	C.17720E-00
55	0.10465E-07	C.68610E-01
56	0.45346E-08	C.97200E-01
57	0.10484E-07	C.51460E-01
58	0.10631E-07	C.24590E-01
59	0.20646E-08	C.30270E-00
60	0.28409E-08	C.81510E-01

61	0.41021E-08	0.45170E-01
62	0.51769E-08	0.17620E-00
63	0.50553E-08	0.90350E-01
64	0.41380E-08	0.72280E-01
65	0.13667E-07	0.45170E-01
66	0.12921E-07	0.14450E-00
67	0.77304E-08	0.28010E-00
68	0.13128E-07	0.10840E-00
69	0.12570E-07	0.15360E-00
70	0.11999E-07	0.81310E-01
71	0.29856E-08	0.45170E-01
72	0.36030E-08	0.85520E 00
73	0.24160E-08	0.22980E-00
74	0.26733E-08	0.12760E-00
75	0.39055E-08	0.49780E-00
76	0.60624E-09	0.22440E-00
77	0.56165E-08	0.23560E-00
78	0.14435E-07	0.85260E 00
79	0.58457E-08	0.20170E-00
80	0.15607E-07	0.56070E-01
81	0.13562E-07	0.26920E-00
82	0.12648E-07	0.15710E-00
83	0.12745E-07	0.25520E-00
84	0.14074E-07	0.22980E-00
85	0.12696E-07	0.12760E-00
86	0.11579E-07	0.27820E-00
87	0.83613E-08	0.22900E-00
88	0.97422E-08	0.61520E-01
89	0.15601E-07	0.68360E-01
90	0.58758E-08	0.20170E-00
91	0.73708E-08	0.54690E-01
92	0.85363E-08	0.82030E-01
93	0.10612E-07	0.68360E-01
94	0.77872E-08	0.22560E-00
95	0.87141E-08	0.61520E-01
96	0.12047E-07	0.11620E-00
97	0.81012E-08	0.61520E-01
98	0.12565E-07	0.80780E-01
99	0.13007E-07	0.56070E-01
100	0.13320E-07	0.49420E-01
101	0.12799E-07	0.15210E-01
102	0.13588E-07	0.22810E-01
103	0.15502E-07	0.19010E-01
104	0.15720E-07	0.19010E-01
105	0.14925E-07	0.62720E-01
106	0.15603E-07	0.17110E-01
107	0.15757E-07	0.91480E-01
108	0.15636E-07	0.23940E-01

THE TOTAL DOSE IS 0.98351E-08 R/HR WITH SPECTRUM 1

POLLO UNFUELED AT EYE

BREMSSTRAHLUNG WITH SPECTRUM 3

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2				
1	0.1083E-12	AL	125.20	TISSUE	20.00	
2	0.4299E-12	AL	101.50	TISSUE	19.00	
3	0.3835E-10	AL	35.24	TISSUE	19.00	
4	0.5994E-10	AL	29.99	TISSUE	18.00	
5	0.5334E-10	AL	31.56	TISSUE	18.00	
6	0.5334E-10	AL	31.56	TISSUE	18.00	
7	0.4748E-10	AL	31.56	TISSUE	20.00	
8	0.5422E-10	AL	31.34	TISSUE	18.00	
9	0.1880E-11	AL	77.27	TISSUE	20.00	
10	0.1032E-09	AL	20.82	TISSUE	20.00	
11	0.1155E-09	AL	21.00	TISSUE	18.00	
12	0.1175E-09	AL	20.77	TISSUE	18.00	
13	0.1175E-09	AL	20.77	TISSUE	18.00	
14	0.4359E-10	AL	32.72	TISSUE	20.00	
15	0.1644E-12	AL	118.80	TISSUE	18.00	
16	0.2128E-10	AL	43.93	TISSUE	18.00	
17	0.4411E-10	AL	34.11	TISSUE	18.00	
18	0.3240E-12	AL	106.90	TISSUE	18.00	
19	0.2672E-12	AL	110.80	TISSUE	17.00	
20	0.2409E-09	AL	6.89	TISSUE	20.00	
21	0.3710E-09	AL	7.09	TISSUE	13.00	
22	0.3309E-09	AL	5.68	TISSUE	16.00	
23	0.1270E-09	AL	22.79	TISSUE	14.00	
24	0.2916E-09	AL	9.59	TISSUE	15.00	
25	0.1023E-10	AL	52.59	TISSUE	20.00	
26	0.4244E-09	AL	6.30	TISSUE	11.00	
27	0.3643E-09	AL	6.27	TISSUE	14.00	
28	0.2445E-09	AL	6.54	TISSUE	20.00	
29	0.4166E-09	AL	5.61	TISSUE	12.00	
30	0.3784E-09	AL	5.32	TISSUE	14.00	
31	0.2511E-09	AL	12.14	TISSUE	15.00	
32	0.3794E-09	AL	8.59	TISSUE	11.00	
33	0.2416E-09	AL	8.31	TISSUE	10.00	
34	0.4592E-09	AL	7.31	TISSUE	7.00	
35	0.2934E-09	AL	7.02	TISSUE	17.00	
36	0.4636E-09	AL	7.29	TISSUE	6.00	
37	0.3339E-09	AL	6.72	TISSUE	15.00	
38	0.4782E-09	AL	6.46	TISSUE	7.00	
39	0.3541E-09	AL	9.01	TISSUE	12.00	
40	0.3786E-09	AL	8.53	TISSUE	11.00	
41	0.4373E-09	AL	6.57	TISSUE	10.00	
42	0.2403E-09	AL	6.45	TISSUE	20.00	
43	0.2671E-09	AL	11.12	TISSUE	15.00	
44	0.3557E-09	AL	10.45	TISSUE	10.00	
45	0.3830E-09	AL	10.69	TISSUE	6.00	
46	0.6332E-10	AL	29.75	TISSUE	13.00	
47	0.3581E-10	AL	20.69	TISSUE	35.00	
48	0.2630E-09	AL	11.39	TISSUE	1.00	
49	0.2288E-09	AL	17.11	TISSUE	10.00	
50	0.2409E-09	AL	15.93	TISSUE	11.00	
51	0.2832E-09	AL	13.44	TISSUE	11.00	

52	0.3351E-09	AL	10.28	TISSUE	2.00
53	0.4582E-09	AL	5.93	TISSUE	3.00
54	0.3394E-09	AL	12.49	TISSUE	5.00
55	0.2188E-09	AL	14.76	TISSUE	1.00
56	0.1437E-09	AL	17.67	TISSUE	0.
57	0.1776E-09	AL	14.64	TISSUE	0.
58	0.2098E-09	AL	15.36	TISSUE	1.00
59	0.9962E-11	AL	44.69	TISSUE	30.00
60	0.3648E-10	AL	25.95	TISSUE	30.00
61	0.3085E-09	AL	13.25	TISSUE	9.00
62	0.3705E-09	AL	10.80	TISSUE	8.00
63	0.3444E-09	AL	11.97	TISSUE	8.00
64	0.3889E-09	AL	9.52	TISSUE	9.00
65	0.3166E-09	AL	3.93	TISSUE	0.
66	0.4715E-09	AL	2.33	TISSUE	2.00
67	0.4950E-09	AL	5.77	TISSUE	5.00
68	0.2644E-09	AL	8.18	TISSUE	0.
69	0.2229E-09	AL	11.15	TISSUE	0.
70	0.2071E-09	AL	12.32	TISSUE	0.
71	0.1301E-09	AL	19.05	TISSUE	0.
72	0.8570E-10	AL	30.78	TISSUE	8.00
73	0.1312E-09	AL	24.46	TISSUE	3.00
74	0.2699E-09	AL	14.80	TISSUE	3.00
75	0.1164E-09	AL	23.33	TISSUE	1.00
76	0.2352E-09	AL	13.71	TISSUE	1.00
77	0.3323E-09	AL	8.09	TISSUE	1.00
78	0.4748E-09	AL	1.59	TISSUE	2.00
79	0.4133E-09	AL	6.41	TISSUE	2.00
80	0.3300E-09	AL	1.59	TISSUE	0.
81	0.2616E-09	AL	8.38	TISSUE	0.
82	0.2279E-09	AL	10.79	TISSUE	0.
83	0.2279E-09	AL	10.79	TISSUE	0.
84	0.2672E-09	AL	7.98	TISSUE	0.
85	0.2236E-09	AL	11.10	TISSUE	0.
86	0.1881E-09	AL	13.79	TISSUE	0.
87	0.2209E-09	AL	11.30	TISSUE	0.
88	0.2460E-09	AL	9.49	TISSUE	0.
89	0.3128E-09	AL	4.32	TISSUE	0.
90	0.1467E-09	AL	17.38	TISSUE	0.
91	0.1201E-09	AL	20.14	TISSUE	0.
92	0.1201E-09	AL	20.14	TISSUE	0.
93	0.1686E-09	AL	15.40	TISSUE	0.
94	0.1054E-09	AL	21.90	TISSUE	0.
95	0.1425E-09	AL	17.79	TISSUE	0.
96	0.2058E-09	AL	12.42	TISSUE	0.
97	0.1107E-09	AL	21.24	TISSUE	0.
98	0.2233E-09	AL	11.12	TISSUE	0.
99	0.2418E-09	AL	9.79	TISSUE	0.
100	0.2418E-09	AL	9.79	TISSUE	0.
101	0.2497E-09	AL	9.23	TISSUE	0.
102	0.2497E-09	AL	9.23	TISSUE	0.
103	0.3155E-09	AL	4.04	TISSUE	0.
104	0.3237E-09	AL	3.06	TISSUE	0.
105	0.2956E-09	AL	5.84	TISSUE	0.
106	0.3297E-09	AL	1.78	TISSUE	0.
107	0.3251E-09	AL	2.83	TISSUE	0.
108	0.3205E-09	AL	3.48	TISSUE	0.

VEHICLE APLLC ANALYSIS, INTERIOR DOSE AT EYE

SECTOR	COSE	D OMEGA
1	C.10827E-12	0.38300E-02
2	C.42991E-12	0.11500E-01
3	C.38349E-10	0.86100E-02
4	C.59935E-10	0.22870E-01
5	C.53337E-10	0.46600E-02
6	C.53337E-10	0.26300E-02
7	C.47477E-10	0.24000E-03
8	C.54216E-10	0.50200E-02
9	C.18802E-11	0.17900E-02
10	C.10322E-09	0.44390E-01
11	C.11555E-09	0.51790E-01
12	C.11745E-09	0.14800E-01
13	C.11745E-09	0.34300E-02
14	C.43592E-10	0.42900E-02
15	C.16435E-12	0.42900E-02
16	C.21276E-10	0.10290E-01
17	C.44114E-10	0.12010E-01
18	C.32398E-12	0.16400E-01
19	C.26715E-12	0.20590E-01
20	C.24091E-09	0.52180E-01
21	C.37104E-09	0.60870E-01
22	C.33091E-09	0.17390E-01
23	C.12703E-09	0.80100E-02
24	C.29162E-09	0.13730E-01
25	C.10227E-10	0.21740E-01
26	C.42436E-09	0.55320E 00
27	C.36427E-09	0.23710E-00
28	C.24454E-09	0.23710E-00
29	C.41659E-09	0.79040E-01
30	C.37840E-09	0.79040E-01
31	C.25110E-09	0.66870E-01
32	C.37939E-09	0.48670E-01
33	C.24161E-09	0.48670E-01
34	C.45916E-09	0.11550E-00
35	C.29340E-09	0.11550E-00
36	C.46363E-09	0.10790E-00
37	C.33389E-09	0.10790E-00
38	C.47818E-09	0.30210E-00
39	C.35408E-09	0.43150E-01
40	C.37857E-09	0.43150E-01
41	C.43729E-09	0.12950E-00
42	C.24028E-09	0.12950E-00
43	C.26709E-09	0.24920E-00
44	C.35572E-09	0.24920E-00
45	C.38303E-09	0.26830E-00
46	C.63316E-10	0.19150E-00
47	C.35810E-10	0.51460E-01
48	C.26298E-09	0.28590E-01
49	C.22885E-09	0.11150E-00
50	C.24093E-09	0.57180E-01
51	C.28317E-09	0.45740E-01
52	C.33512E-09	0.28590E-01
53	C.45823E-09	0.91480E-01
54	C.33944E-09	0.17720E-00
55	C.21881E-09	0.68610E-01

56	C.14370E-09	0.97200E-01
57	C.17762E-09	0.51460E-01
58	C.20983E-09	0.28590E-01
59	C.99615E-11	0.30270E-00
60	C.36477E-10	0.81310E-01
61	C.30852E-09	0.45170E-01
62	C.37065E-09	0.17620E-00
63	C.34439E-09	0.90350E-01
64	C.38891E-09	0.72280E-01
65	C.31660E-09	0.45170E-01
66	C.47145E-09	0.14450E-00
67	C.49498E-09	0.28010E-00
68	C.26443E-09	0.10840E-00
69	C.22292E-09	0.15360E-00
70	C.20711E-09	0.81310E-01
71	C.13008E-09	0.45170E-01
72	C.85702E-10	0.85520E 00
73	C.13115E-09	0.22980E-00
74	C.26992E-09	0.12760E-00
75	C.11638E-09	0.49780E-00
76	C.23515E-09	0.22440E-00
77	C.33234E-09	0.23560E-00
78	C.47476E-09	0.85260E 00
79	C.41334E-09	0.20190E-00
80	C.33003E-09	0.56090E-01
81	C.26163E-09	0.26920E-00
82	C.22788E-09	0.15710E-00
83	C.22788E-09	0.25520E-00
84	C.26716E-09	0.22980E-00
85	C.22361E-09	0.12760E-00
86	C.18810E-09	0.27820E-00
87	C.22087E-09	0.22900E-00
88	C.24604E-09	0.61520E-01
89	C.31284E-09	0.68360E-01
90	C.14671E-09	0.20170E-00
91	C.12011E-09	0.54690E-01
92	C.12011E-09	0.82030E-01
93	C.16860E-09	0.68360E-01
94	C.10544E-09	0.22560E-00
95	C.14247E-09	0.61520E-01
96	C.20578E-09	0.11620E-00
97	C.11074E-09	0.61520E-01
98	C.22334E-09	0.80780E-01
99	C.24181E-09	0.56070E-01
100	C.24181E-09	0.49420E-01
101	C.24968E-09	0.15210E-01
102	C.24968E-09	0.22810E-01
103	C.31554E-09	0.19010E-01
104	C.32366E-09	0.19010E-01
105	C.29560E-09	0.62720E-01
106	C.32967E-09	0.17110E-01
107	C.32513E-09	0.91480E-01
108	C.32046E-09	0.23940E-01

THE TOTAL DOSE IS 0.27062E-09 R/HR WITH SPECTRUM 3

APOLLO UNFUELED CHEST

BREMSSTRAHLUNG WITH SPECTRUM 3

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.5028E-13	AL	125.20	TISSUE	25.00
2	0.3374E-12	AL	101.50	TISSUE	25.00
3	0.2665E-10	AL	35.24	TISSUE	25.00
4	0.3879E-10	AL	29.99	TISSUE	25.00
5	0.3468E-10	AL	31.56	TISSUE	25.00
6	0.3468E-10	AL	31.56	TISSUE	25.00
7	0.3468E-10	AL	31.56	TISSUE	25.00
8	0.3523E-10	AL	31.34	TISSUE	25.00
9	0.1487E-11	AL	77.27	TISSUE	25.00
10	0.7366E-10	AL	20.82	TISSUE	25.00
11	0.7277E-10	AL	21.00	TISSUE	25.00
12	0.7392E-10	AL	20.77	TISSUE	25.00
13	0.7392E-10	AL	20.77	TISSUE	25.00
14	0.3192E-10	AL	32.72	TISSUE	25.00
15	0.1273E-12	AL	118.80	TISSUE	25.00
16	0.1432E-10	AL	43.93	TISSUE	25.00
17	0.2890E-10	AL	34.11	TISSUE	25.00
18	0.2471E-12	AL	106.90	TISSUE	25.00
19	0.1981E-12	AL	110.80	TISSUE	25.00
20	0.1670E-09	AL	6.89	TISSUE	25.00
21	0.1656E-09	AL	7.09	TISSUE	25.00
22	0.1750E-09	AL	5.68	TISSUE	25.00
23	0.2437E-10	AL	22.79	TISSUE	25.00
24	0.1471E-09	AL	9.59	TISSUE	25.00
25	0.7782E-11	AL	52.59	TISSUE	25.00
26	0.1710E-09	AL	6.30	TISSUE	25.00
27	0.1712E-09	AL	6.27	TISSUE	25.00
28	0.1243E-09	AL	6.54	TISSUE	29.00
29	0.1504E-09	AL	5.61	TISSUE	27.00
30	0.1773E-09	AL	5.32	TISSUE	25.00
31	0.1280E-09	AL	12.14	TISSUE	25.00
32	0.1328E-09	AL	8.59	TISSUE	27.00
33	0.1567E-09	AL	8.31	TISSUE	25.00
34	0.1114E-09	AL	7.31	TISSUE	30.00
35	0.1661E-09	AL	7.02	TISSUE	25.00
36	0.5510E-10	AL	7.29	TISSUE	32.00
37	0.2579E-09	AL	6.92	TISSUE	19.00
38	0.1574E-09	AL	6.46	TISSUE	26.00
39	0.5540E-10	AL	9.01	TISSUE	31.00
40	0.1926E-09	AL	8.63	TISSUE	22.00
41	0.1692E-09	AL	6.57	TISSUE	25.00
42	0.6448E-10	AL	6.95	TISSUE	37.00
43	0.5792E-10	AL	11.12	TISSUE	36.00
44	0.2305E-09	AL	10.45	TISSUE	18.00
45	0.1288E-09	AL	10.69	TISSUE	26.00
46	0.4819E-11	AL	29.25	TISSUE	55.00
47	0.2581E-10	AL	20.69	TISSUE	35.00
48	0.6693E-10	AL	11.38	TISSUE	34.00
49	0.1515E-09	AL	17.11	TISSUE	18.00
50	0.1866E-09	AL	15.83	TISSUE	16.00
51	0.2579E-09	AL	13.44	TISSUE	13.00

52	0.3134E-09	AL	10.28	TISSUE	13.00
53	0.4112E-09	AL	5.93	TISSUE	12.00
54	0.3134E-09	AL	12.49	TISSUE	10.00
55	0.2364E-09	AL	14.76	TISSUE	13.00
56	0.1551E-09	AL	17.67	TISSUE	17.00
57	0.1273E-09	AL	14.64	TISSUE	23.00
58	0.5360E-10	AL	15.36	TISSUE	34.00
59	0.2790E-10	AL	44.69	TISSUE	10.00
60	0.9544E-10	AL	25.95	TISSUE	15.00
61	0.2742E-09	AL	13.25	TISSUE	12.00
62	0.3804E-09	AL	10.80	TISSUE	6.00
63	0.3507E-09	AL	11.97	TISSUE	7.00
64	0.3805E-09	AL	9.52	TISSUE	3.00
65	0.4548E-09	AL	3.93	TISSUE	2.00
66	0.4117E-09	AL	2.33	TISSUE	1.00
67	0.3716E-09	AL	5.77	TISSUE	1.00
68	0.4104E-09	AL	8.18	TISSUE	3.00
69	0.3723E-09	AL	11.15	TISSUE	6.00
70	0.3429E-09	AL	12.32	TISSUE	7.00
71	0.1837E-09	AL	19.05	TISSUE	12.00
72	0.7391E-10	AL	30.78	TISSUE	2.00
73	0.8701E-10	AL	24.46	TISSUE	0.
74	0.1757E-09	AL	14.80	TISSUE	0.
75	0.9474E-10	AL	23.33	TISSUE	0.
76	0.1891E-09	AL	13.71	TISSUE	0.
77	0.2657E-09	AL	8.09	TISSUE	0.
78	0.3300E-09	AL	1.59	TISSUE	0.
79	0.2884E-09	AL	6.41	TISSUE	0.
80	0.3300E-09	AL	1.59	TISSUE	0.
81	0.2616E-09	AL	8.38	TISSUE	0.
82	0.2279E-09	AL	10.79	TISSUE	0.
83	0.2279E-09	AL	10.79	TISSUE	0.
84	0.2672E-09	AL	7.98	TISSUE	0.
85	0.2236E-09	AL	11.10	TISSUE	0.
86	0.1881E-09	AL	13.79	TISSUE	0.
87	0.2209E-09	AL	11.30	TISSUE	0.
88	0.2460E-09	AL	9.49	TISSUE	0.
89	0.3128E-09	AL	4.32	TISSUE	0.
90	0.1467E-09	AL	17.38	TISSUE	0.
91	0.1201E-09	AL	20.14	TISSUE	0.
92	0.1201E-09	AL	20.14	TISSUE	0.
93	0.1686E-09	AL	15.40	TISSUE	0.
94	0.1054E-09	AL	21.90	TISSUE	0.
95	0.1425E-09	AL	17.79	TISSUE	0.
96	0.2058E-09	AL	12.42	TISSUE	0.
97	0.1107E-09	AL	21.24	TISSUE	0.
98	0.2233E-09	AL	11.12	TISSUE	0.
99	0.2418E-09	AL	9.79	TISSUE	0.
100	0.2418E-09	AL	9.79	TISSUE	0.
101	0.2497E-09	AL	9.23	TISSUE	0.
102	0.2497E-09	AL	9.23	TISSUE	0.
103	0.3155E-09	AL	4.04	TISSUE	0.
104	0.3237E-09	AL	3.06	TISSUE	0.
105	0.2956E-09	AL	5.84	TISSUE	0.
106	0.3297E-09	AL	1.78	TISSUE	0.
107	0.3251E-09	AL	2.83	TISSUE	0.
108	0.3205E-09	AL	3.48	TISSUE	0.

VEHICLE APLLC ANALYSIS, INTERIOR DOSE AT CHEST

SECTOR	COSE	D OMEGA
1	C.90276E-13	0.38300E-02
2	C.33741E-12	0.11500E-01
3	C.26650E-10	0.86100E-02
4	C.38788E-10	0.22870E-01
5	C.34678E-10	0.46600E-02
6	C.34678E-10	0.26300E-02
7	C.34678E-10	0.24000E-03
8	C.35227E-10	0.50200E-02
9	C.14874E-11	0.17900E-02
10	C.73665E-10	0.44390E-01
11	C.72769E-10	0.51790E-01
12	C.73915E-10	0.14800E-01
13	C.73915E-10	0.34300E-02
14	C.31919E-10	0.42900E-02
15	C.12733E-12	0.42900E-02
16	C.14323E-10	0.10290E-01
17	C.28896E-10	0.12010E-01
18	C.24710E-12	0.16400E-01
19	C.19815E-12	0.20590E-01
20	C.16698E-09	0.52180E-01
21	C.16557E-09	0.60870E-01
22	C.17504E-09	0.17390E-01
23	C.64366E-10	0.80100E-02
24	C.14712E-09	0.13730E-01
25	C.77823E-11	0.21740E-01
26	C.17101E-09	0.55320E 00
27	C.17121E-09	0.23710E-00
28	C.12427E-09	0.23710E-00
29	C.15040E-09	0.79040E-01
30	C.17725E-09	0.79040E-01
31	C.12800E-09	0.66870E-01
32	C.13283E-09	0.48670E-01
33	C.15672E-09	0.48670E-01
34	C.11135E-09	0.11550E-00
35	C.16607E-09	0.11550E-00
36	C.95101E-10	0.10790E-00
37	C.25789E-09	0.10790E-00
38	C.15743E-09	0.30210E-00
39	C.95397E-10	0.43150E-01
40	C.19260E-09	0.43150E-01
41	C.16919E-09	0.12950E-00
42	C.64476E-10	0.12950E-00
43	C.57923E-10	0.24920E-00
44	C.23050E-09	0.24920E-00
45	C.12881E-09	0.26830E-00
46	C.48191E-11	0.19150E-00
47	C.35810E-10	0.51460E-01
48	C.66932E-10	0.28590E-01
49	C.15148E-09	0.11150E-00
50	C.18656E-09	0.57180E-01
51	C.25789E-09	0.45740E-01
52	C.31343E-09	0.28590E-01
53	C.41115E-09	0.91440E-01
54	C.31343E-09	0.17720E-00
55	C.23637E-09	0.68610E-01

56	C.15505E-09	0.97200E-01
57	C.12727E-09	0.51460E-01
58	C.53604E-10	0.28590E-01
59	C.27904E-10	0.30270E-00
60	C.95444E-10	0.81310E-01
61	C.27419E-09	0.45170E-01
62	C.38044E-09	0.17620E-00
63	C.35072E-09	0.90350E-01
64	C.38053E-09	0.72280E-01
65	C.45484E-09	0.45170E-01
66	C.41169E-09	0.14450E-00
67	C.37156E-09	0.28010E-00
68	C.41040E-09	0.10840E-00
69	C.37225E-09	0.15360E-00
70	C.34288E-09	0.81310E-01
71	C.18370E-09	0.45170E-01
72	C.73913E-10	0.85520E 00
73	C.87014E-10	0.22980E-00
74	C.17570E-09	0.12760E-00
75	C.94741E-10	0.49780E-00
76	C.18911E-09	0.22440E-00
77	C.26571E-09	0.23560E-00
78	C.33003E-09	0.85260E 00
79	C.28840E-09	0.20190E-00
80	C.33003E-09	0.56090E-01
81	C.26163E-09	0.26920E-00
82	C.22788E-09	0.15710E-00
83	C.22788E-09	0.25520E-00
84	C.26716E-09	0.22990E-00
85	C.22361E-09	0.12760E-00
86	C.18810E-09	0.27820E-00
87	C.22087E-09	0.22900E-00
88	C.24604E-09	0.61520E-01
89	C.31284E-09	0.68360E-01
90	C.14671E-09	0.20170E-00
91	C.12011E-09	0.54690E-01
92	C.12011E-09	0.82030E-01
93	C.16860E-09	0.68360E-01
94	C.10544E-09	0.22560E-00
95	C.14247E-09	0.61520E-01
96	C.20578E-09	0.11620E-00
97	C.11074E-09	0.61520E-01
98	C.22334E-09	0.80780E-01
99	C.24181E-09	0.56070E-01
100	C.24181E-09	0.49420E-01
101	C.24968E-09	0.15210E-01
102	C.24968E-09	0.22810E-01
103	C.31554E-09	0.19010E-01
104	C.32366E-09	0.19010E-01
105	C.29560E-09	0.62720E-01
106	C.32967E-09	0.17110E-01
107	C.32513E-09	0.91490E-01
108	C.32046E-09	0.23940E-01

THE TOTAL DOSE IS 0.19370E-09 R/HR WITH SPECTRUM 3

APOLLO UNFUELED WAIST

BREMSSTRAHLUNG WITH SPECTRUM 3

SECTOR	DOSE R/HR	MATERIALS AND THICKNESSES IN GM/CM**2			
1	0.1447E-12	AL	125.20	TISSUE	8.00
2	0.5701E-12	AL	101.50	TISSUE	8.00
3	0.6048E-10	AL	35.24	TISSUE	8.00
4	0.9115E-10	AL	29.99	TISSUE	8.00
5	0.8064E-10	AL	31.56	TISSUE	8.00
6	0.8064E-10	AL	31.56	TISSUE	8.00
7	0.8064E-10	AL	31.56	TISSUE	8.00
8	0.8203E-10	AL	31.34	TISSUE	8.00
9	0.2716E-11	AL	77.27	TISSUE	8.00
10	0.1874E-09	AL	20.82	TISSUE	7.00
11	0.1848E-09	AL	21.00	TISSUE	7.00
12	0.1881E-09	AL	20.77	TISSUE	7.00
13	0.1881E-09	AL	20.77	TISSUE	7.00
14	0.7453E-10	AL	32.72	TISSUE	7.00
15	0.2066E-12	AL	118.80	TISSUE	8.00
16	0.3107E-10	AL	43.93	TISSUE	7.00
17	0.6683E-10	AL	34.11	TISSUE	7.00
18	0.4141E-12	AL	106.90	TISSUE	7.00
19	0.3291E-12	AL	110.80	TISSUE	7.00
20	0.4595E-09	AL	6.89	TISSUE	8.00
21	0.4642E-09	AL	7.09	TISSUE	7.00
22	0.4947E-09	AL	5.68	TISSUE	7.00
23	0.1614E-09	AL	22.79	TISSUE	7.00
24	0.4056E-09	AL	9.59	TISSUE	7.00
25	0.1592E-10	AL	52.59	TISSUE	8.00
26	0.4588E-09	AL	6.30	TISSUE	9.00
27	0.4728E-09	AL	6.27	TISSUE	8.00
28	0.4379E-09	AL	6.54	TISSUE	10.00
29	0.4863E-09	AL	5.61	TISSUE	8.00
30	0.4779E-09	AL	5.32	TISSUE	9.00
31	0.3407E-09	AL	12.14	TISSUE	8.00
32	0.4294E-09	AL	8.59	TISSUE	7.00
33	0.3851E-09	AL	8.31	TISSUE	11.00
34	0.4592E-09	AL	7.31	TISSUE	7.00
35	0.3523E-09	AL	7.02	TISSUE	14.00
36	0.4596E-09	AL	7.29	TISSUE	7.00
37	0.2579E-09	AL	6.92	TISSUE	19.00
38	0.4214E-09	AL	6.46	TISSUE	11.00
39	0.3864E-09	AL	9.01	TISSUE	10.00
40	0.3253E-09	AL	6.63	TISSUE	14.00
41	0.4533E-09	AL	6.57	TISSUE	9.00
42	0.3334E-09	AL	6.95	TISSUE	15.00
43	0.2982E-09	AL	11.12	TISSUE	13.00
44	0.2458E-09	AL	10.45	TISSUE	17.00
45	0.3060E-09	AL	10.69	TISSUE	13.00
46	0.8890E-10	AL	29.25	TISSUE	11.00
47	0.5190E-10	AL	20.69	TISSUE	30.00
48	0.9146E-10	AL	11.38	TISSUE	30.00
49	0.6531E-10	AL	17.11	TISSUE	30.00
50	0.8843E-10	AL	15.83	TISSUE	27.00
51	0.8151E-10	AL	13.44	TISSUE	30.00

52	0.3295E-09	AL	10.28	TISSUE	12.00
53	0.4112E-09	AL	5.93	TISSUE	12.00
54	0.2457E-09	AL	12.49	TISSUE	15.00
55	0.2696E-09	AL	14.76	TISSUE	10.00
56	0.2362E-09	AL	17.67	TISSUE	5.00
57	0.2934E-09	AL	14.64	TISSUE	5.00
58	0.2809E-09	AL	15.36	TISSUE	6.00
59	0.2116E-10	AL	44.69	TISSUE	17.00
60	0.3648E-10	AL	25.95	TISSUE	30.00
61	0.6539E-10	AL	13.25	TISSUE	33.00
62	0.9432E-10	AL	10.80	TISSUE	30.00
63	0.8856E-10	AL	11.97	TISSUE	30.00
64	0.6784E-10	AL	9.52	TISSUE	35.00
65	0.4188E-09	AL	3.93	TISSUE	13.00
66	0.3857E-09	AL	2.33	TISSUE	15.00
67	0.1745E-09	AL	5.77	TISSUE	25.00
68	0.3877E-09	AL	8.18	TISSUE	11.00
69	0.3700E-09	AL	11.15	TISSUE	5.00
70	0.3432E-09	AL	12.32	TISSUE	5.00
71	0.2150E-09	AL	19.05	TISSUE	6.00
72	0.5028E-10	AL	30.78	TISSUE	20.00
73	0.2808E-10	AL	24.46	TISSUE	35.00
74	0.3472E-10	AL	14.80	TISSUE	40.00
75	0.5785E-10	AL	23.33	TISSUE	26.00
76	0.1167E-09	AL	13.71	TISSUE	25.00
77	0.1077E-09	AL	8.09	TISSUE	30.00
78	0.4593E-09	AL	1.59	TISSUE	12.00
79	0.1154E-09	AL	6.41	TISSUE	30.00
80	0.5222E-09	AL	1.59	TISSUE	9.00
81	0.4261E-09	AL	8.38	TISSUE	8.00
82	0.3807E-09	AL	10.79	TISSUE	6.00
83	0.3784E-09	AL	10.79	TISSUE	5.00
84	0.4451E-09	AL	7.98	TISSUE	5.00
85	0.3734E-09	AL	11.10	TISSUE	6.00
86	0.3132E-09	AL	13.79	TISSUE	6.00
87	0.1920E-09	AL	11.30	TISSUE	20.00
88	0.2430E-09	AL	9.49	TISSUE	18.00
89	0.5252E-09	AL	4.32	TISSUE	6.00
90	0.2070E-09	AL	17.38	TISSUE	12.00
91	0.1542E-09	AL	20.14	TISSUE	14.00
92	0.1982E-09	AL	20.14	TISSUE	6.00
93	0.2601E-09	AL	15.40	TISSUE	6.00
94	0.1701E-09	AL	21.90	TISSUE	8.00
95	0.2011E-09	AL	17.79	TISSUE	12.00
96	0.3432E-09	AL	12.42	TISSUE	6.00
97	0.1824E-09	AL	21.24	TISSUE	6.00
98	0.3633E-09	AL	11.12	TISSUE	8.00
99	0.3829E-09	AL	9.79	TISSUE	9.00
100	0.4011E-09	AL	9.79	TISSUE	7.00
101	0.3817E-09	AL	9.23	TISSUE	10.00
102	0.4143E-09	AL	9.23	TISSUE	7.00
103	0.5143E-09	AL	4.04	TISSUE	8.00
104	0.5276E-09	AL	3.06	TISSUE	8.00
105	0.4817E-09	AL	5.84	TISSUE	8.00
106	0.5216E-09	AL	1.78	TISSUE	9.00
107	0.5299E-09	AL	2.83	TISSUE	8.00
108	0.5223E-09	AL	3.48	TISSUE	8.00

VEHICLE APLLC ANALYSIS, INTERIOR DOSE AT WAIST

SECTOR	DOSE	D OMEGA
1	0.14465E-12	0.38300E-02
2	0.57012E-12	0.11500E-01
3	0.60480E-10	0.86100E-02
4	0.91153E-10	0.22870E-01
5	0.80637E-10	0.46600E-02
6	0.80637E-10	0.26300E-02
7	0.80637E-10	0.24000E-03
8	0.82035E-10	0.50200E-02
9	0.27164E-11	0.17900E-02
10	0.18737E-09	0.44390E-01
11	0.18484E-09	0.51790E-01
12	0.18807E-09	0.14800E-01
13	0.18807E-09	0.34300E-02
14	0.74530E-10	0.42900E-02
15	0.20660E-12	0.42900E-02
16	0.31071E-10	0.10290E-01
17	0.66831E-10	0.12010E-01
18	0.41408E-12	0.16400E-01
19	0.32905E-12	0.20590E-01
20	0.45951E-09	0.52180E-01
21	0.46416E-09	0.60870E-01
22	0.49473E-09	0.17390E-01
23	0.16136E-09	0.80100E-02
24	0.40584E-09	0.13730E-01
25	0.15922E-10	0.21740E-01
26	0.45881E-09	0.55320E 00
27	0.47281E-09	0.23710E-00
28	0.43707E-09	0.23710E-00
29	0.48631E-09	0.79040E-01
30	0.47791E-09	0.79040E-01
31	0.34066E-09	0.66870E-01
32	0.42942E-09	0.48670E-01
33	0.38506E-09	0.48670E-01
34	0.45916E-09	0.11550E-00
35	0.35232E-09	0.11550E-00
36	0.45962E-09	0.10790E-00
37	0.25789E-09	0.10790E-00
38	0.42138E-09	0.30210E-00
39	0.38643E-09	0.43150E-01
40	0.32531E-09	0.43150E-01
41	0.45326E-09	0.12950E-00
42	0.33344E-09	0.12950E-00
43	0.29824E-09	0.24920E-00
44	0.24564E-09	0.24920E-00
45	0.30599E-09	0.26830E-00
46	0.88905E-10	0.19150E-00
47	0.51897E-10	0.51460E-01
48	0.91455E-10	0.28590E-01
49	0.65315E-10	0.11150E-00
50	0.88431E-10	0.57180E-01
51	0.81513E-10	0.45740E-01
52	0.32954E-09	0.28590E-01
53	0.41115E-09	0.91480E-01
54	0.24571E-09	0.17720E-00
55	0.26961E-09	0.68610E-01

56	0.23623E-09	0.97200E-01
57	0.29341E-09	0.51460E-01
58	0.26093E-09	0.28590E-01
59	0.21156E-10	0.30270E-00
60	0.36477E-10	0.81310E-01
61	0.65394E-10	0.45170E-01
62	0.94319E-10	0.17620E-00
63	0.88565E-10	0.90350E-01
64	0.67638E-10	0.72280E-01
65	0.41884E-09	0.45170E-01
66	0.38566E-09	0.14450E-00
67	0.17447E-09	0.28010E-00
68	0.38770E-09	0.10840E-00
69	0.37003E-09	0.15360E-00
70	0.34325E-09	0.81310E-01
71	0.21500E-09	0.45170E-01
72	0.50278E-10	0.85520E 00
73	0.28077E-10	0.22980E-00
74	0.34721E-10	0.12760E-00
75	0.57854E-10	0.49780E-00
76	0.11668E-09	0.22440E-00
77	0.10767E-09	0.23560E-00
78	0.45929E-09	0.85260E 00
79	0.11543E-09	0.20190E-00
80	0.52219E-09	0.56090E-01
81	0.42607E-09	0.26920E-00
82	0.38068E-09	0.15710E-00
83	0.37843E-09	0.25520E-00
84	0.44510E-09	0.22980E-00
85	0.37342E-09	0.12760E-00
86	0.31317E-09	0.27820E-00
87	0.19201E-09	0.22900E-00
88	0.24304E-09	0.61520E-01
89	0.52525E-09	0.68360E-01
90	0.20699E-09	0.20170E-00
91	0.15417E-09	0.54690E-01
92	0.19819E-09	0.82030E-01
93	0.28014E-09	0.68360E-01
94	0.17009E-09	0.22560E-00
95	0.20106E-09	0.61520E-01
96	0.34316E-09	0.11620E-00
97	0.18240E-09	0.61520E-01
98	0.36332E-09	0.90780E-01
99	0.38286E-09	0.56070E-01
100	0.40110E-09	0.49420E-01
101	0.38171E-09	0.15210E-01
102	0.41431E-09	0.22810E-01
103	0.51428E-09	0.19010E-01
104	0.52755E-09	0.19010E-01
105	0.46167E-09	0.62720E-01
106	0.32164E-09	0.17110E-01
107	0.52995E-09	0.91480E-01
108	0.52231E-09	0.23940E-01

THE TOTAL DOSE IS 0.27221E-09 R/HR WITH SPECTRUM 3

Electron Transmission Code

The electron transmission code, Vol. 6 (Ref. 12) using data generated by the Electron Monte Carlo code, Vol. 5 (Ref. 11), calculates the absorbed dose per unit flux of electrons of a given energy spectrum. The results are shown in the following computer printout.

ELECTRON TRANSMISSION COMPUTER PRINTOUTS
FUELED AND UNFUELED

PROBLEM NUMBER 2

POLLO FUELED AT EYE

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 1, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	161.00000	0.00383
0.	135.90000	0.01150
0.	69.05000	0.00861
0.	62.79000	0.02287
0.	62.08000	0.00466
0.	62.08000	0.00263
0.	64.08000	0.00024
0.	86.06000	0.00502
0.	109.89000	0.00179
0.	204.80000	0.04439
0.	261.20000	0.05179
0.	42.95000	0.01480
0.	42.95000	0.00343
0.	61.08000	0.00429
0.	145.20000	0.00429
0.	105.99000	0.01029
0.	151.20000	0.01201
0.	130.10000	0.01640
0.	163.60000	0.02059
0.	52.49000	0.05218
0.	426.10000	0.06087
0.	21.68000	0.01739
0.	108.59000	0.00801
0.	118.20000	0.01373
0.	144.40000	0.02174
0.	235.40000	0.55320
0.	157.30000	0.23710
0.	163.60000	0.23710
0.	17.61000	0.07904
0.	19.32000	0.07904
0.	84.17000	0.06687
0.	26.09000	0.04867
0.	33.80000	0.04867
0.	17.55000	0.11550
0.	27.26000	0.11550
0.	13.29000	0.10790
0.	21.92000	0.10790
0.	13.46000	0.30210
0.	21.01000	0.04315
0.	19.63000	0.04315
0.	16.57000	0.12950
0.	26.95000	0.12950
0.	26.12000	0.24920
0.	20.45000	0.24920
0.	16.69000	0.26830
0.	47.25000	0.19150
0.	55.69000	0.05146

0.	26.38000	0.02859
0.	27.11000	0.11150
0.	26.83000	0.05718
0.	24.44000	0.04574
0.	12.28000	0.02859
0.	8.93400	0.09148
0.	17.49000	0.17720
0.	15.76000	0.06861
0.	17.67000	0.09720
0.	14.64000	0.05146
0.	16.36000	0.02859
0.	74.69000	0.30270
0.	55.95000	0.08131
0.	22.25000	0.04517
0.	18.80000	0.17620
0.	19.97000	0.09035
0.	18.51900	0.07228
0.20090E-11	3.92900	0.04517
0.84075E-12	4.32900	0.14450
0.	10.77000	0.28010
0.10547E-16	8.17900	0.10840
0.	11.15000	0.15360
0.	12.32000	0.08131
0.	19.05000	0.04517
0.	38.78000	0.85520
0.	27.46000	0.22980
0.	17.80000	0.12760
0.	24.33000	0.49780
0.	14.71000	0.22440
0.	9.08700	0.23560
0.42013E-11	3.58700	0.85260
0.26319E-17	8.40800	0.20190
0.31539E-09	1.58700	0.05609
0.32507E-17	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.26689E-16	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.85751E-12	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.	4.04300	0.01901
0.15691E-11	3.05700	0.01901
0.13117E-10	5.84100	0.06272
0.25063E-13		

0.20613E-09	1.78100	0.01711
0.21210E-10	2.83300	0.09148
0.52427E-11	3.48400	0.02394

TOTAL DOSE = 0.2181235E-11RADS PER SEC

PROBLEM NUMBER 2

APOLLO FUELED CHEST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 1, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	166.00000	0.00383
0.	141.90000	0.01150
0.	75.05000	0.00861
0.	69.79000	0.02287
0.	69.08000	0.00466
0.	69.08000	0.00263
0.	69.08000	0.00024
0.	93.06000	0.00502
0.	114.89000	0.00179
0.	209.80000	0.04439
0.	268.20000	0.05179
0.	49.95000	0.01480
0.	49.95000	0.00343
0.	66.08000	0.00429
0.	152.20000	0.00429
0.	112.99000	0.01029
0.	158.20000	0.01201
0.	137.10000	0.01640
0.	171.60000	0.02059
0.	57.49000	0.05218
0.	438.10000	0.06087
0.	30.68000	0.01739
0.	119.59000	0.00801
0.	128.20000	0.01373
0.	149.40000	0.02174
0.	249.40000	0.55320
0.	168.30000	0.23710
0.	172.60000	0.23710
0.	32.61000	0.07904
0.	30.32000	0.07904
0.	94.17000	0.06687
0.	42.09000	0.04867
0.	39.80000	0.04867
0.	40.55000	0.11550
0.	35.26000	0.11550
0.	39.29000	0.10790
0.	25.92000	0.10790
0.	32.46000	0.30210
0.	40.01000	0.04315
0.	30.63000	0.04315
0.	31.57000	0.12950
0.	43.95000	0.12950
0.	47.12000	0.24920
0.	28.45000	0.24920
0.	36.69000	0.26830
0.	84.25000	0.19150
0.	55.69000	0.05146

0.	45.38000	0.02859
0.	35.11000	0.11150
0.	31.83000	0.05718
0.	26.44000	0.04574
0.	23.28000	0.02859
0.	17.93400	0.09148
0.	22.49000	0.17720
0.	27.76000	0.06861
0.	34.67000	0.09720
0.	37.64000	0.05146
0.	49.36000	0.02859
0.	54.69000	0.30270
0.	40.95000	0.08131
0.	25.25000	0.04517
0.	16.80000	0.17620
0.	18.97000	0.09035
0.	12.51900	0.07228
0.20031E-13	5.92900	0.04517
0.73131E-11	3.32900	0.14450
0.19532E-14	6.77000	0.28010
0.	11.17900	0.10840
0.	17.15000	0.15360
0.	19.32000	0.08131
0.	31.05000	0.04517
0.	32.78000	0.85520
0.	24.46000	0.22980
0.	14.80000	0.12760
0.	23.33000	0.49780
0.	13.71000	0.22440
0.16582E-16	8.08700	0.23560
0.31539E-09	1.58700	0.85260
0.55654E-14	6.40800	0.20190
0.31539E-09	1.58700	0.05609
0.32507E-17	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.26689E-16	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.85751E-12	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.15691E-11	4.04300	0.01901
0.13117E-10	3.05700	0.01901
0.25063E-13	5.84100	0.06272

0.20613E-09	1.78100	0.01711
0.21210E-10	2.83300	0.09148
0.52427E-11	3.48400	0.02394

TOTAL DOSE = 0.2335723E-10RADS PER SEC

PROBLEM NUMBER 2

APOLLO FUELEC WAIST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 1, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	149.00000	0.00383
0.	124.90000	0.01150
0.	58.05000	0.00861
0.	52.79000	0.02287
0.	52.08000	0.00466
0.	52.08000	0.00263
0.	52.08000	0.00024
0.	76.06000	0.00502
0.	97.89000	0.00179
0.	191.80000	0.04439
0.	250.20000	0.05179
0.	31.95000	0.01480
0.	31.95000	0.00343
0.	48.08000	0.00429
0.	135.20000	0.00429
0.	94.99000	0.01029
0.	140.20000	0.01201
0.	119.10000	0.01640
0.	153.60000	0.02059
0.	40.49000	0.05218
0.	420.10000	0.06087
0.	12.68000	0.01739
0.	101.59000	0.00801
0.	110.20000	0.01373
0.	132.40000	0.02174
0.	233.40000	0.55320
0.	151.30000	0.23710
0.	153.60000	0.23710
0.	13.61000	0.07904
0.	14.32000	0.07904
0.	77.17000	0.06687
0.	22.09000	0.04867
0.	25.80000	0.04867
0.	17.55000	0.11550
0.	24.26000	0.11550
0.	14.29000	0.10790
0.	25.92000	0.10790
0.	17.46000	0.30210
0.	19.01000	0.04315
0.	22.63000	0.04315
0.	15.57000	0.12950
0.	21.95000	0.12950
0.	24.12000	0.24920
0.	27.45000	0.24920
0.	23.69000	0.26830
0.	40.25000	0.19150
0.	50.69000	0.05146

0.	41.38000	0.02859
0.	47.11000	0.11150
0.	42.83000	0.05718
0.	43.44000	0.04574
0.	22.28000	0.02859
0.	17.93400	0.09148
0.	27.49000	0.17720
0.	24.76000	0.06861
0.	22.67000	0.09720
0.	19.64000	0.05146
0.	21.36000	0.02859
0.	61.69000	0.30270
0.	55.95000	0.08131
0.	46.25000	0.04517
0.	40.80000	0.17620
0.	41.97000	0.09035
0.	44.51900	0.07228
0.	16.92900	0.04517
0.	17.32900	0.14450
0.	30.77000	0.28010
0.	19.17900	0.10840
0.	16.15000	0.15360
0.	17.32000	0.08131
0.	25.05000	0.04517
0.	50.78000	0.85520
0.	59.46000	0.22980
0.	54.80000	0.12760
0.	49.33000	0.49780
0.	38.71000	0.22440
0.	38.08700	0.23560
0.	13.58700	0.85260
0.	36.40800	0.20190
0.	10.58700	0.05609
0.	16.37900	0.26920
0.	16.79000	0.15710
0.	15.79000	0.25520
0.	12.98200	0.22980
0.	17.10000	0.12760
0.	19.79000	0.27820
0.	31.30000	0.22900
0.	27.49000	0.06152
0.	10.32000	0.06836
0.	29.38000	0.20170
0.	34.14000	0.05469
0.	26.14000	0.08203
0.	21.40000	0.06836
0.	29.90000	0.22560
0.	29.79000	0.06152
0.	18.42000	0.11620
0.	27.24000	0.06152
0.	19.12000	0.08078
0.	18.79100	0.05607
0.	16.79100	0.04942
0.	19.23100	0.01521
0.	16.23100	0.02281
0.	12.04300	0.01901
0.	11.05700	0.01901
0.	13.84100	0.06272

0.	10.78100	0.01711
0.	10.83300	0.09148
0.	11.48400	0.02394

TOTAL DOSE = 0. RADS PER SEC

PROBLEM NUMBER 2

POLLO FUELED AT EYE

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	161.00000	0.00383
0.	135.90000	0.01150
0.	69.05000	0.00861
0.	62.79000	0.02287
0.	62.08000	0.00466
0.	62.08000	0.00263
0.	64.08000	0.00024
0.	86.06000	0.00502
0.	109.89000	0.00179
0.	204.80000	0.04439
0.	261.20000	0.05179
0.	42.95000	0.01480
0.	42.95000	0.00343
0.	61.08000	0.00429
0.	145.20000	0.00429
0.	105.99000	0.01029
0.	151.20000	0.01201
0.	130.10000	0.01640
0.	163.60000	0.02059
0.	52.49000	0.05218
0.	426.10000	0.06087
0.	21.68000	0.01739
0.	108.59000	0.00801
0.	118.20000	0.01373
0.	144.40000	0.02174
0.	235.40000	0.55320
0.	157.30000	0.23710
0.	163.60000	0.23710
0.	17.61000	0.07904
0.	19.32000	0.07904
0.	84.17000	0.06687
0.	26.09000	0.04867
0.	33.80000	0.04867
0.	17.55000	0.11550
0.	27.26000	0.11550
0.	13.29000	0.10790
0.	21.92000	0.10790
0.	13.46000	0.30210
0.	21.01000	0.04315
0.	19.63000	0.04315
0.	16.57000	0.12950
0.	26.95000	0.12950
0.	26.12000	0.24920
0.	20.45000	0.24920
0.	16.69000	0.26830
0.	47.25000	0.19150
0.	55.69000	0.05146

0.	26.38000	0.02859
0.	27.11000	0.11150
0.	26.83000	0.05718
0.	24.44000	0.04574
0.	12.28000	0.02859
0.	8.93400	0.09148
0.	17.49000	0.17720
0.	15.76000	0.06861
0.	17.67000	0.09720
0.	14.64000	0.05146
0.	16.36000	0.02859
0.	74.69000	0.30270
0.	55.95000	0.08131
0.	22.25000	0.04517
0.	18.80000	0.17620
0.	19.97000	0.09035
0.	18.51900	0.07228
0.18818E-15	3.92900	0.04517
0.66933E-16	4.32900	0.14450
0.	10.77000	0.28010
0.47569E-21	8.17900	0.10840
0.	11.15000	0.15360
0.	12.32000	0.08131
0.	19.05000	0.04517
0.	38.78000	0.85520
0.	27.46000	0.22980
0.	17.80000	0.12760
0.	24.33000	0.49780
0.	14.71000	0.22440
0.	9.08700	0.23560
0.46394E-15	3.58700	0.85260
0.11719E-21	8.40800	0.20190
0.17110E-12	1.58700	0.05609
0.14498E-21	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.12199E-20	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.68495E-16	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.13988E-15	4.04300	0.01901
0.19695E-14	3.05700	0.01901
0.13694E-17	5.84100	0.06272

0.90026E-13	1.78100	0.01711
0.37025E-14	2.83300	0.09148
0.61139E-15	3.48400	0.02394

TOTAL DOSE = 0.9506405E-15RADS PER SEC

PROBLEM NUMBER 2

APOLLO FUELED CHEST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	166.00000	0.00383
0.	141.90000	0.01150
0.	75.05000	0.00861
0.	69.79000	0.02287
0.	69.08000	0.00466
0.	69.08000	0.00263
0.	69.08000	0.00024
0.	93.06000	0.00502
0.	114.89000	0.00179
0.	209.80000	0.04439
0.	268.20000	0.05179
0.	49.95000	0.01480
0.	49.95000	0.00343
0.	66.08000	0.00429
0.	152.20000	0.00429
0.	112.99000	0.01029
0.	158.20000	0.01201
0.	137.10000	0.01640
0.	171.60000	0.02059
0.	57.49000	0.05218
0.	438.10000	0.06087
0.	30.68000	0.01739
0.	119.59000	0.00801
0.	128.20000	0.01373
0.	149.40000	0.02174
0.	249.40000	0.55320
0.	168.30000	0.23710
0.	172.60000	0.23710
0.	32.61000	0.07904
0.	30.32000	0.07904
0.	94.17000	0.06687
0.	42.09000	0.04867
0.	39.80000	0.04867
0.	40.55000	0.11550
0.	35.26000	0.11550
0.	39.29000	0.10790
0.	25.92000	0.10790
0.	32.46000	0.30210
0.	40.01000	0.04315
0.	30.63000	0.04315
0.	31.57000	0.12950
0.	43.95000	0.12950
0.	47.12000	0.24920
0.	28.45000	0.24920
0.	36.69000	0.26830
0.	84.25000	0.19150
0.	55.69000	0.05146

0.	45.38000	0.02859
0.	35.11000	0.11150
0.	31.83000	0.05718
0.	26.44000	0.04574
0.	23.28000	0.02859
0.	17.93400	0.09148
0.	22.49000	0.17720
0.	27.76000	0.06861
0.	34.67000	0.09720
0.	37.64000	0.05146
0.	49.36000	0.02859
0.	54.69000	0.30270
0.	40.95000	0.08131
0.	25.25000	0.04517
0.	16.80000	0.17620
0.	18.97000	0.09035
0.	12.51900	0.07228
0.10804E-17	5.92900	0.04517
0.93112E-15	3.32900	0.14450
0.96262E-19	6.77000	0.28010
0.	11.17900	0.10840
0.	17.15000	0.15360
0.	19.32000	0.08131
0.	31.05000	0.04517
0.	32.78000	0.85520
0.	24.46000	0.22980
0.	14.80000	0.12760
0.	23.33000	0.49780
0.	13.71000	0.22440
0.75159E-21	8.08700	0.23560
0.17110E-12	1.58700	0.85260
0.28309E-18	6.40800	0.20190
0.17110E-12	1.58700	0.05609
0.14498E-21	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.12199E-20	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.[illegible] -16	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.13988E-15	4.04300	0.01901
0.19695E-14	3.05700	0.01901
0.13694E-17	5.84100	0.06272

0.90026E-13	1.78100	0.01711
0.37025E-14	2.83300	0.09148
0.61139E-15	3.48400	0.02394

TOTAL DOSE = 0.1253404E-13RADS PER SEC

PROBLEM NUMBER 2

APOLLO FUELEC WAIST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	149.00000	0.00383
0.	124.90000	0.01150
0.	58.05000	0.00861
0.	52.79000	0.02287
0.	52.08000	0.00466
0.	52.08000	0.00263
0.	52.08000	0.00024
0.	76.06000	0.00502
0.	97.89000	0.00179
0.	191.80000	0.04439
0.	250.20000	0.05179
0.	31.95000	0.01480
0.	31.95000	0.00343
0.	48.08000	0.00429
0.	135.20000	0.00429
0.	94.99000	0.01029
0.	140.20000	0.01201
0.	119.10000	0.01640
0.	153.60000	0.02059
0.	40.49000	0.05218
0.	420.10000	0.06087
0.	12.68000	0.01739
0.	101.59000	0.00801
0.	110.20000	0.01373
0.	132.40000	0.02174
0.	233.40000	0.55320
0.	151.30000	0.23710
0.	153.60000	0.23710
0.	13.61000	0.07904
0.	14.32000	0.07904
0.	77.17000	0.06687
0.	22.09000	0.04867
0.	25.80000	0.04867
0.	17.55000	0.11550
0.	24.26000	0.11550
0.	14.29000	0.10790
0.	25.92000	0.10790
0.	17.46000	0.30210
0.	19.01000	0.04315
0.	22.63000	0.04315
0.	15.57000	0.12950
0.	21.95000	0.12950
0.	24.12000	0.24920
0.	27.45000	0.24920
0.	23.69000	0.26830
0.	40.25000	0.19150
0.	50.69000	0.05146

0.	41.38000	0.02859
0.	47.11000	0.11150
0.	42.83000	0.05718
0.	43.44000	0.04574
0.	22.28000	0.02859
0.	17.93400	0.09148
0.	27.49000	0.17720
0.	24.76000	0.06861
0.	22.67000	0.09720
0.	19.64000	0.05146
0.	21.36000	0.02859
0.	61.69000	0.30270
0.	55.95000	0.08131
0.	46.25000	0.04517
0.	40.80000	0.17620
0.	41.97000	0.09035
0.	44.51900	0.07228
0.	16.92900	0.04517
0.	17.32900	0.14450
0.	30.77000	0.28010
0.	19.17900	0.10840
0.	16.15000	0.15360
0.	17.32000	0.08131
0.	25.05000	0.04517
0.	50.78000	0.85520
0.	59.46000	0.22980
0.	54.80000	0.12760
0.	49.33000	0.49780
0.	38.71000	0.22440
0.	38.08700	0.23560
0.	13.58700	0.85260
0.	36.40800	0.20190
0.	10.58700	0.05609
0.	16.37900	0.26920
0.	16.79000	0.15710
0.	15.79000	0.25520
0.	12.98200	0.22980
0.	17.10000	0.12760
0.	19.79000	0.27820
0.	31.30000	0.22900
0.	27.49000	0.06152
0.	10.32000	0.06836
0.	29.38000	0.20170
0.	34.14000	0.05469
0.	26.14000	0.08203
0.	21.40000	0.06836
0.	29.90000	0.22560
0.	29.79000	0.06152
0.	18.42000	0.11620
0.	27.24000	0.06152
0.	19.12000	0.08078
0.	18.79100	0.05607
0.	16.79100	0.04942
0.	19.23100	0.01521
0.	16.23100	0.02281
0.	12.04300	0.01901
0.	11.05700	0.01901
0.	13.84100	0.06272

0.	10.78100	0.01711
0.	10.83300	0.09148
0.	11.48400	0.02394

TOTAL DOSE = 0. RADS PER SEC

PROBLEM NUMBER 1

POLLO UNFUELED AT EYE

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 1, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	145.20000	0.00383
0.	120.50000	0.01150
0.	54.24000	0.00861
0.	47.99000	0.02287
0.	49.56000	0.00466
0.	49.56000	0.00263
0.	51.56000	0.00024
0.	49.34000	0.00502
0.	97.27000	0.00179
0.	40.82000	0.04439
0.	39.00000	0.05179
0.	38.77000	0.01480
0.	38.77000	0.00343
0.	52.72000	0.00429
0.	136.80000	0.00429
0.	61.93000	0.01029
0.	52.11000	0.01201
0.	124.90000	0.01640
0.	127.80000	0.02059
0.	26.89000	0.05218
0.	20.09000	0.06087
0.	21.68000	0.01739
0.	36.79000	0.00801
0	24.59000	0.01373
0	72.59000	0.02174
0.	17.30000	0.55320
0.	20.27000	0.23710
0.	26.54000	0.23710
0.	17.61000	0.07904
0.	19.32000	0.07904
0.	27.14000	0.06687
0.	19.59000	0.04867
0.	27.31000	0.04867
0.	14.31000	0.11550
0.	24.02000	0.11550
0.	13.29000	0.10790
0.	21.92000	0.10790
0.	13.46000	0.30210
0.	21.01000	0.04315
0.	19.63000	0.04315
0.	16.57000	0.12950
0.	26.95000	0.12950
0.	26.12000	0.24920
0.	20.45000	0.24920
0.	16.69000	0.26830
0.	47.25000	0.19150
0.	55.69000	0.05146

0.	26.38000	0.02859
0.	27.11000	0.11150
0.	26.83000	0.05718
0.	24.44000	0.04574
0.	12.28000	0.02859
0.	8.93400	0.09148
0.	17.49000	0.17720
0.	15.76000	0.06861
0.	17.67000	0.09720
0.	14.64000	0.05146
0.	16.36000	0.02859
0.	74.69000	0.30270
0.	55.95000	0.08131
0.	22.25000	0.04517
0.	18.80000	0.17620
0.	19.97000	0.09035
0.	18.51900	0.07228
0.20090E-11	3.92900	0.04517
0.84075E-12	4.32900	0.14450
0.	10.77000	0.28010
0.10547E-16	8.17900	0.10840
0.	11.15000	0.15360
0.	12.32000	0.08131
0.	19.05000	0.04517
0.	38.78000	0.85520
0.	27.46000	0.22980
0.	17.80000	0.12760
0.	24.33000	0.49780
0.	14.71000	0.22440
0.	9.08700	0.23560
0.42013E-11	3.58700	0.85260
0.26319E-17	8.40800	0.20190
0.31539E-09	1.58700	0.05609
0.32507E-17	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.26689E-16	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.85751E-12	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.15691E-11	4.04300	0.01901
0.13117E-10	3.05700	0.01901
0.25063E-13	5.84100	0.06272

0.20613E-09	1.78100	0.01711
0.21210E-10	2.83300	0.09148
0.52427E-11	3.48400	0.02394

TOTAL DOSE = 0.2181235E-11RADS PER SEC

PROBLEM NUMBER 2

APOLLO UNFUELED CHEST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 1, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	150.20000	0.00383
0.	126.50000	0.01150
0.	60.24000	0.00861
0.	54.99000	0.02287
0.	56.56000	0.00466
0.	56.56000	0.00263
0.	56.56000	0.00024
0.	56.34000	0.00502
0.	102.27000	0.00179
0.	45.82000	0.04439
0.	46.00000	0.05179
0.	45.77000	0.01480
0.	45.77000	0.00343
0.	57.72000	0.00429
0.	143.80000	0.00429
0.	68.93000	0.01029
0.	59.11000	0.01201
0.	131.90000	0.01640
0.	135.80000	0.02059
0.	31.89000	0.05218
0.	32.09000	0.06087
0.	30.68000	0.01739
0.	47.79000	0.00801
0.	34.59000	0.01373
0.	77.59000	0.02174
0.	31.30000	0.55320
0.	31.27000	0.23710
0.	35.54000	0.23710
0.	32.61000	0.07904
0.	30.32000	0.07904
0.	37.14000	0.06687
0.	35.59000	0.04867
0.	33.31000	0.04867
0.	37.31000	0.11550
0.	32.02000	0.11550
0.	39.29000	0.10790
0.	25.92000	0.10790
0.	32.46000	0.30210
0.	40.01000	0.04315
0.	30.63000	0.04315
0.	31.57000	0.12950
0.	43.95000	0.12950
0.	47.12000	0.24920
0.	28.45000	0.24920
0.	36.69000	0.26830
0.	84.25000	0.19150
0.	55.69000	0.05146

0.	45.38000	0.02859
0.	35.11000	0.11150
0.	31.83000	0.05718
0.	26.44000	0.04574
0.	23.28000	0.02859
0.	17.93400	0.09148
0.	22.49000	0.17720
0.	27.76000	0.06861
0.	34.67000	0.09720
0.	37.64000	0.05146
0.	49.36000	0.02859
0.	54.69000	0.30270
0.	40.95000	0.08131
0.	25.25000	0.04517
0.	16.80000	0.17620
0.	18.97000	0.09035
0.	12.51900	0.07228
0.	5.92900	0.04517
0.20031E-13	3.32900	0.14450
0.73131E-11	6.77000	0.28010
0.19532E-14	11.17900	0.10840
0.	17.15000	0.15360
0.	19.32000	0.08131
0.	31.05000	0.04517
0.	32.78000	0.85520
0.	24.46000	0.22980
0.	14.80000	0.12760
0.	23.33000	0.49780
0.	13.71000	0.22440
0.	8.08700	0.23560
0.16582E-16	1.58700	0.85260
0.31539E-09	6.40800	0.20190
0.55654E-14	1.58700	0.05609
0.31539E-09	8.37900	0.26920
0.32507E-17	10.79000	0.15710
0.	10.79000	0.25520
0.	7.98200	0.22980
0.26689E-16	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.	4.32000	0.06836
0.85751E-12	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.	4.04300	0.01901
0.15691E-11	3.05700	0.01901
0.13117E-10	5.84100	0.06272
0.25063E-13		

0.20613E-09	1.78100	0.01711
0.21210E-10	2.83300	0.09148
0.52427E-11	3.48400	0.02394

TOTAL DOSE = 0.2335723E-10RADS PER SEC

PROBLEM NUMBER 2

APOLLO UNFUELED WAIST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 1, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	133.20000	0.00383
0.	109.50000	0.01150
0.	43.24000	0.00861
0.	37.99000	0.02287
0.	39.56000	0.00466
0.	39.56000	0.00263
0.	39.56000	0.00024
0.	39.34000	0.00502
0.	85.27000	0.00179
0.	27.82000	0.04439
0.	28.00000	0.05179
0.	27.77000	0.01480
0.	27.77000	0.00343
0.	39.72000	0.00429
0.	126.80000	0.00429
0.	50.93000	0.01029
0.	41.11000	0.01201
0.	113.90000	0.01640
0.	117.80000	0.02059
0.	14.89000	0.05218
0.	14.09000	0.06087
0.	12.68000	0.01739
0.	29.79000	0.00801
0.	16.59000	0.01373
0.	60.59000	0.02174
0.	15.30000	0.55320
0.	14.27000	0.23710
0.	16.54000	0.23710
0.	13.61000	0.07904
0.	14.32000	0.07904
0.	20.14000	0.06687
0.	15.59000	0.04867
0.	19.31000	0.04867
0.	14.31000	0.11550
0.	21.02000	0.11550
0.	14.29000	0.10790
0.	25.92000	0.10790
0.	17.46000	0.30210
0.	19.01000	0.04315
0.	22.63000	0.04315
0.	15.57000	0.12950
0.	21.95000	0.12950
0.	24.12000	0.24920
0.	27.45000	0.24920
0.	23.69000	0.26830
0.	40.25000	0.19150
0.	50.69000	0.05146

0.	41.38000	0.02859
0.	47.11000	0.11150
0.	42.83000	0.05718
0.	43.44000	0.04574
0.	22.28000	0.02859
0.	17.93400	0.09148
0.	27.49000	0.17720
0.	24.76000	0.06861
0.	22.67000	0.09720
0.	19.64000	0.05146
0.	21.36000	0.02859
0.	61.69000	0.30270
0.	55.95000	0.08131
0.	46.25000	0.04517
0.	40.80000	0.17620
0.	41.97000	0.09035
0.	44.51900	0.07228
0.	16.92900	0.04517
0.	17.32900	0.14450
0.	30.77000	0.28010
0.	19.17900	0.10840
0.	16.15000	0.15360
0.	17.32000	0.08131
0.	25.05000	0.04517
0.	50.78000	0.85520
0.	59.46000	0.22980
0.	54.80000	0.12760
0.	49.33000	0.49780
0.	38.71000	0.22440
0.	38.08700	0.23560
0.	13.58700	0.85260
0.	36.40800	0.20190
0.	10.58700	0.05609
0.	16.37900	0.26920
0.	16.79000	0.15710
0.	15.79000	0.25520
0.	12.98200	0.22980
0.	17.10000	0.12760
0.	19.79000	0.27820
0.	31.30000	0.22900
0.	27.49000	0.06152
0.	10.32000	0.06836
0.	29.38000	0.20170
0.	34.14000	0.05469
0.	26.14000	0.08203
0.	21.40000	0.06836
0.	29.90000	0.22560
0.	29.79000	0.06152
0.	18.42000	0.11620
0.	27.24000	0.06152
0.	19.12000	0.08078
0.	18.79100	0.05607
0.	16.79100	0.04942
0.	19.23100	0.01521
0.	16.23100	0.02281
0.	12.04300	0.01901
0.	11.05700	0.01901
0.	13.84100	0.06272

0.	10.78100	0.01711
0.	10.83300	0.09148
0.	11.48400	0.02394

TOTAL DOSE = 0. RADS PER SEC

PROBLEM NUMBER 1

POLLD UNFUELED AT EYE

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	145.20000	0.00383
0.	120.50000	0.01150
0.	54.24000	0.00861
0.	47.99000	0.02287
0.	49.56000	0.00466
0.	49.56000	0.00263
0.	51.56000	0.00024
0.	49.34000	0.00502
0.	97.27000	0.00179
0.	40.82000	0.04439
0.	39.00000	0.05179
0.	38.77000	0.01480
0.	38.77000	0.00343
0.	52.72000	0.00429
0.	136.80000	0.00429
0.	61.93000	0.01029
0.	52.11000	0.01201
0.	124.90000	0.01640
0.	127.80000	0.02059
0.	26.89000	0.05218
0.	20.09000	0.06087
0.	21.68000	0.01739
0.	36.79000	0.00801
0.	24.59000	0.01373
0.	72.59000	0.02174
0.	17.30000	0.55320
0.	20.27000	0.23710
0.	26.54000	0.23710
0.	17.61000	0.07904
0.	19.32000	0.07904
0.	27.14000	0.06687
0.	19.59000	0.04867
0.	27.31000	0.04867
0.	14.31000	0.11550
0.	24.02000	0.11550
0.	13.29000	0.10790
0.	21.92000	0.10790
0.	13.46000	0.30210
0.	21.01000	0.04315
0.	19.63000	0.04315
0.	16.57000	0.12950
0.	26.95000	0.12950
0.	26.12000	0.24920
0.	20.45000	0.24920
0.	16.69000	0.26830
0.	47.25000	0.19150
0.	55.69000	0.05146

0.	26.38000	0.02859
0.	27.11000	0.11150
0.	26.83000	0.05718
0.	24.44000	0.04574
0.	12.28000	0.02859
0.	8.93400	0.09148
0.	17.49000	0.17720
0.	15.76000	0.06861
0.	17.67000	0.09720
0.	14.64000	0.05146
0.	16.36000	0.02859
0.	74.69000	0.30270
0.	55.95000	0.08131
0.	22.25000	0.04517
0.	18.80000	0.17620
0.	19.97000	0.09035
0.	18.51900	0.07228
0.18818E-15	3.92900	0.04517
0.66933E-16	4.32900	0.14450
0.	10.77000	0.28010
0.47569E-21	8.17900	0.10840
0.	11.15000	0.15360
0.	12.32000	0.08131
0.	19.05000	0.04517
0.	38.78000	0.85520
0.	27.46000	0.22980
0.	17.80000	0.12760
0.	24.33000	0.49780
0.	14.71000	0.22440
0.	9.08700	0.23560
0.46394E-15	3.58700	0.85260
0.11719E-21	8.40800	0.20190
0.17110E-12	1.58700	0.05609
0.14498E-21	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.12199E-20	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.68495E-16	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.13988E-15	4.04300	0.01901
0.19695E-14	3.05700	0.01901
0.13694E-17	5.84100	0.06272

PROBLEM NUMBER 1

POLLO UNFUELED AT EYE

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	145.20000	0.00383
0.	120.50000	0.01150
0.	54.24000	0.00861
0.	47.99000	0.02287
0.	49.56000	0.00466
0.	49.56000	0.00263
0.	51.56000	0.00024
0.	49.34000	0.00502
0.	97.27000	0.00179
0.	40.82000	0.04439
0.	39.00000	0.05179
0.	38.77000	0.01480
0.	38.77000	0.00343
0.	52.72000	0.00429
0.	136.80000	0.00429
0.	61.93000	0.01029
0.	52.11000	0.01201
0.	124.90000	0.01640
0.	127.80000	0.02059
0.	26.89000	0.05218
0.	20.09000	0.06087
0.	21.68000	0.01739
0.	36.79000	0.00801
0.	24.59000	0.01373
0.	72.59000	0.02174
0.	17.30000	0.55320
0.	20.27000	0.23710
0.	26.54000	0.23710
0.	17.61000	0.07904
0.	19.32000	0.07904
0.	27.14000	0.06687
0.	19.59000	0.04867
0.	27.31000	0.04867
0.	14.31000	0.11550
0.	24.02000	0.11550
0.	13.29000	0.10790
0.	21.92000	0.10790
0.	13.46000	0.30210
0.	21.01000	0.04315
0.	19.63000	0.04315
0.	16.57000	0.12950
0.	26.95000	0.12950
0.	26.12000	0.24920
0.	20.45000	0.24920
0.	16.69000	0.26830
0.	47.25000	0.19150
0.	55.69000	0.05146

0.90026E-13	1.78100	0.01711
0.37025E-14	2.83300	0.09148
0.61139E-15	3.48400	0.02394

TOTAL DOSE = 0.9506405E-15RADS PER SEC.

PROBLEM NUMBER 2

APOLLO UNFUELED CHEST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	150.20000	0.00383
0.	126.50000	0.01150
0.	60.24000	0.00861
0.	54.99000	0.02287
0.	56.56000	0.00466
0.	56.56000	0.00263
0.	56.56000	0.00024
0.	56.34000	0.00502
0.	102.27000	0.00179
0.	45.82000	0.04439
0.	46.00000	0.05179
0.	45.77000	0.01480
0.	45.77000	0.00343
0.	57.72000	0.00429
0.	143.80000	0.00429
0.	68.93000	0.01029
0.	59.11000	0.01201
0.	131.90000	0.01640
0.	135.80000	0.02059
0.	31.89000	0.05218
0.	32.09000	0.06087
0.	30.68000	0.01739
0.	47.79000	0.00801
0.	34.59000	0.01373
0.	77.59000	0.02174
0.	31.30000	0.55320
0.	31.27000	0.23710
0.	35.54000	0.23710
0.	32.61000	0.07904
0.	30.32000	0.07904
0.	37.14000	0.06687
0.	35.59000	0.04867
0.	33.31000	0.04867
0.	37.31000	0.11550
0.	32.02000	0.11550
0.	39.29000	0.10790
0.	25.92000	0.10790
0.	32.46000	0.30210
0.	40.01000	0.04315
0.	30.63000	0.04315
0.	31.57000	0.12950
0.	43.95000	0.12950
0.	47.12000	0.24920
0.	28.45000	0.24920
0.	36.69000	0.26830
0.	84.25000	0.19150
0.	55.69000	0.05146

0.	45.38000	0.02859
0.	35.11000	0.11150
0.	31.83000	0.05718
0.	26.44000	0.04574
0.	23.28000	0.02859
0.	17.93400	0.09148
0.	22.49000	0.17720
0.	27.76000	0.06861
0.	34.67000	0.09720
0.	37.64000	0.05146
0.	49.36000	0.02859
0.	54.69000	0.30270
0.	40.95000	0.08131
0.	25.25000	0.04517
0.	16.80000	0.17620
0.	18.97000	0.09035
0.	12.51900	0.07228
0.10804E-17	5.92900	0.04517
0.93112E-15	3.32900	0.14450
0.96262E-19	6.77000	0.28010
0.	11.17900	0.10840
0.	17.15000	0.15360
0.	19.32000	0.08131
0.	31.05000	0.04517
0.	32.78000	0.85520
0.	24.46000	0.22980
0.	14.80000	0.12760
0.	23.33000	0.49780
0.	13.71000	0.22440
0.75159E-21	8.08700	0.23560
0.17110E-12	1.58700	0.85260
0.28309E-18	6.40800	0.20190
0.17110E-12	1.58700	0.05609
0.14498E-21	8.37900	0.26920
0.	10.79000	0.15710
0.	10.79000	0.25520
0.12199E-20	7.98200	0.22980
0.	11.10000	0.12760
0.	13.79000	0.27820
0.	11.30000	0.22900
0.	9.49000	0.06152
0.68495E-16	4.32000	0.06836
0.	17.38000	0.20170
0.	20.14000	0.05469
0.	20.14000	0.08203
0.	15.40000	0.06836
0.	21.90000	0.22560
0.	17.79000	0.06152
0.	12.42000	0.11620
0.	21.24000	0.06152
0.	11.12000	0.08078
0.	9.79100	0.05607
0.	9.79100	0.04942
0.	9.23100	0.01521
0.	9.23100	0.02281
0.13988E-15	4.04300	0.01901
0.19695E-14	3.05700	0.01901
0.13694E-17	5.84100	0.06272

0.90026E-13	1.78100	0.01711
0.37025E-14	2.83300	0.09148
0.61139E-15	3.48400	0.02394

TOTAL DOSE = 0.1253404E-13RADS PER SEC

PROBLEM NUMBER 2

APOLLO UNFUELED WAIST

ELECTRON FLUX = 1.000/CM**2/SEC, FRACTION OF INCIDENT FLUX ENTERING SHIELD = 0.500
SPECTRUM NUMBER = 3, ATOMIC NUMBER OF SHIELD MATERIAL = 13.000

DOSE (RADS/SEC)	THICKNESS (GM/CM**2)	SOLID ANGLE
0.	133.20000	0.00383
0.	109.50000	0.01150
0.	43.24000	0.00861
0.	37.99000	0.02287
0.	39.56000	0.00466
0.	39.56000	0.00263
0.	39.56000	0.00024
0.	39.34000	0.00502
0.	85.27000	0.00179
0.	27.82000	0.04439
0.	28.00000	0.05179
0.	27.77000	0.01480
0.	27.77000	0.00343
0.	39.72000	0.00429
0.	126.80000	0.00429
0.	50.93000	0.01029
0.	41.11000	0.01201
0.	113.90000	0.01640
0.	117.80000	0.02059
0.	14.89000	0.05218
0.	14.09000	0.06087
0.	12.68000	0.01739
0.	29.79000	0.00801
0.	16.59000	0.01373
0.	60.59000	0.02174
0.	15.30000	0.55320
0.	14.27000	0.23710
0.	16.54000	0.23710
0.	13.61000	0.07904
0.	14.32000	0.07904
0.	20.14000	0.06687
0.	15.59000	0.04867
0.	19.31000	0.04867
0.	14.31000	0.11550
0.	21.02000	0.11550
0.	14.29000	0.10790
0.	25.92000	0.10790
0.	17.46000	0.30210
0.	19.01000	0.04315
0.	22.63000	0.04315
0.	15.57000	0.12950
0.	21.95000	0.12950
0.	24.12000	0.24920
0.	27.45000	0.24920
0.	23.69000	0.26830
0.	40.25000	0.19150
0.	50.69000	0.05146

0.	41.38000	0.02859
0.	47.11000	0.11150
0.	42.83000	0.05718
0.	43.44000	0.04574
0.	22.28000	0.02859
0.	17.93400	0.09148
0.	27.49000	0.17720
0.	24.76000	0.06861
0.	22.67000	0.09720
0.	19.64000	0.05146
0.	21.36000	0.02859
0.	61.69000	0.30270
0.	55.95000	0.08131
0.	46.25000	0.04517
0.	40.80000	0.17620
0.	41.97000	0.09035
0.	44.51900	0.07228
0.	16.92900	0.04517
0.	17.32900	0.14450
0.	30.77000	0.28010
0.	19.17900	0.10840
0.	16.15000	0.15360
0.	17.32000	0.08131
0.	25.05000	0.04517
0.	50.78000	0.85520
0.	59.46000	0.22980
0.	54.80000	0.12760
0.	49.33000	0.49780
0.	38.71000	0.22440
0.	38.08700	0.23560
0.	13.58700	0.85260
0.	36.40800	0.20190
0.	10.58700	0.05609
0.	16.37900	0.26920
0.	16.79000	0.15710
0.	15.79000	0.25520
0.	12.98200	0.22980
0.	17.10000	0.12760
0.	19.79000	0.27820
0.	31.30000	0.22900
0.	27.49000	0.06152
0.	10.32000	0.06836
0.	29.38000	0.20170
0.	34.14000	0.05469
0.	26.14000	0.08203
0.	21.40000	0.06836
0.	29.90000	0.22560
0.	29.79000	0.06152
0.	18.42000	0.11620
0.	27.24000	0.06152
0.	19.12000	0.08078
0.	18.79100	0.05607
0.	16.79100	0.04942
0.	19.23100	0.01521
0.	16.23100	0.02281
0.	12,04300	0.01901
0.	11.05700	0.01901
0.	13.84100	0.06272

0.	10.78100	0.01711
0.	10.83300	0.09148
0.	11.48400	0.02394

TOTAL DOSE = 0. RADS PER SEC

PROTON CODES

Primary Codes

The primary proton code computes the absorbed dose at a given body point resulting from fluxes of protons. In this code, only the energy deposition due to ionization is considered. This code is explained in detail in Vol. 7 (Ref. 13), and Ref. 5. Two computer printouts are given, one for the Van Allen radiation belt, using the Heckman-Armstrong spectra, and the other for the solar flare spectra given by NASA. This information is presented in the following computer printout.

PRIMARY PROTON COMPUTER PRINTOUTS
FUELED AND UNFUELED

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO FUELED AT EYE

PROBLEM	DOSE	D OMEGA
1	0.22069E-09	0.38300E-02
2	0.36332E-09	0.11500E-01
3	0.35277E-08	0.86100E-02
4	0.41940E-08	0.22870E-01
5	0.42828E-08	0.46600E-02
6	0.42828E-08	0.26300E-02
7	0.39888E-08	0.24000E-03
8	0.21305E-08	0.50200E-02
9	0.78242E-09	0.17900E-02
10	0.10061E-09	0.44390E-01
11	0.36725E-10	0.51790E-01
12	0.82517E-08	0.14800E-01
13	0.82517E-08	0.34300E-02
14	0.43620E-08	0.42900E-02
15	0.29881E-09	0.42900E-02
16	0.92539E-09	0.10290E-01
17	0.26577E-09	0.12010E-01
18	0.41793E-09	0.16400E-01
19	0.21388E-09	0.20590E-01
20	0.57123E-08	0.52180E-01
21	0.44218E-11	0.60870E-01
22	0.23433E-07	0.17390E-01
23	0.86682E-09	0.80100E-02
24	0.60537E-09	0.13730E-01
25	0.30107E-09	0.21740E-01
26	0.57875E-10	0.55320E 00
27	0.24187E-09	0.23710E-00
28	0.21106E-09	0.23710E-00
29	0.31808E-07	0.79040E-01
30	0.27812E-07	0.79040E-01
31	0.23407E-08	0.66870E-01
32	0.19421E-07	0.48670E-01
33	0.12178E-07	0.48670E-01
34	0.34489E-07	0.11550E-00
35	0.17018E-07	0.11550E-00
36	0.45554E-07	0.10790E-00
37	0.23388E-07	0.10790E-00
38	0.44392E-07	0.30210E-00
39	0.25624E-07	0.43150E-01
40	0.28296E-07	0.43150E-01
41	0.35020E-07	0.12950E-00
42	0.16704E-07	0.12950E-00
43	0.18516E-07	0.24920E-00
44	0.27366E-07	0.24920E-00
45	0.37201E-07	0.26830E-00
46	0.69589E-08	0.19150E-00
47	0.47025E-08	0.51460E-01
48	0.18264E-07	0.28590E-01
49	0.18646E-07	0.11150E-00
50	0.18676E-07	0.57180E-01
51	0.21283E-07	0.45740E-01
52	0.51314E-07	0.28590E-01
53	0.61942E-07	0.91480E-01

54	0.35863E-07	0.17720E-00
55	0.43107E-07	0.68610E-01
56	0.39957E-07	0.97200E-01
57	0.47599E-07	0.51460E-01
58	0.41630E-07	0.28590E-01
59	0.27720E-08	0.30270E-00
60	0.47880E-08	0.81310E-01
61	0.24872E-07	0.45170E-01
62	0.31274E-07	0.17620E-00
63	0.29042E-07	0.90350E-01
64	0.31346E-07	0.72280E-01
65	0.10822E-06	0.45170E-01
66	0.95041E-07	0.14450E-00
67	0.53245E-07	0.28010E-00
68	0.72408E-07	0.10840E-00
69	0.58189E-07	0.15360E-00
70	0.54209E-07	0.81310E-01
71	0.36401E-07	0.45170E-01
72	0.10891E-07	0.85520E 00
73	0.20134E-07	0.22980E-00
74	0.36413E-07	0.12760E-00
75	0.25017E-07	0.49780E-00
76	0.45743E-07	0.22440E-00
77	0.64083E-07	0.23560E-00
78	0.10268E-06	0.85260E 00
79	0.65748E-07	0.20190E-00
80	0.14486E-06	0.56090E-01
81	0.71147E-07	0.26920E-00
82	0.59515E-07	0.15710E-00
83	0.59515E-07	0.25520E-00
84	0.73605E-07	0.22980E-00
85	0.58370E-07	0.12760E-00
86	0.49882E-07	0.27820E-00
87	0.57645E-07	0.22900E-00
88	0.64972E-07	0.61520E-01
89	0.10411E-06	0.68360E-01
90	0.40681E-07	0.20170E-00
91	0.33839E-07	0.54690E-01
92	0.33839E-07	0.82030E-01
93	0.45630E-07	0.68360E-01
94	0.30214E-07	0.22560E-00
95	0.39656E-07	0.61520E-01
96	0.53895E-07	0.11620E-00
97	0.31507E-07	0.61520E-01
98	0.58298E-07	0.80780E-01
99	0.63620E-07	0.56070E-01
100	0.63620E-07	0.49420E-01
101	0.66192E-07	0.15210E-01
102	0.66192E-07	0.22810E-01
103	0.10702E-06	0.19010E-01
104	0.11811E-06	0.19010E-01
105	0.88378E-07	0.62720E-01
106	0.14007E-06	0.17110E-01
107	0.12090E-06	0.91480E-01
108	0.11310E-06	0.23940E-01

THE TOTAL DOSE IS 0.40505E-07

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO FUELED CHEST

PROBLEM	DOSE	D OMEGA
1	0.19862E-09	0.38300E-02
2	0.31019E-09	0.11500E-01
3	0.28860E-08	0.86100E-02
4	0.32908E-08	0.22870E-01
5	0.33575E-08	0.46600E-02
6	0.33575E-08	0.26300E-02
7	0.33575E-08	0.24000E-03
8	0.14754E-08	0.50200E-02
9	0.62748E-09	0.17900E-02
10	0.88357E-10	0.44390E-01
11	0.31906E-10	0.51790E-01
12	0.60264E-08	0.14800E-01
13	0.60264E-08	0.34300E-02
14	0.36642E-08	0.42900E-02
15	0.25349E-09	0.42900E-02
16	0.67101E-09	0.10290E-01
17	0.22823E-09	0.12010E-01
18	0.34350E-09	0.16400E-01
19	0.18079E-09	0.20590E-01
20	0.47313E-08	0.52180E-01
21	0.37707E-11	0.60870E-01
22	0.13179E-07	0.17390E-01
23	0.54023E-09	0.80100E-02
24	0.42275E-09	0.13730E-01
25	0.26734E-09	0.21740E-01
26	0.43460E-10	0.55320E 00
27	0.19102E-09	0.23710E-00
28	0.17479E-09	0.23710E-00
29	0.11830E-07	0.79040E-01
30	0.13408E-07	0.79040E-01
31	0.14068E-08	0.66870E-01
32	0.79316E-08	0.48670E-01
33	0.88540E-08	0.48670E-01
34	0.82121E-08	0.11550E-00
35	0.10719E-07	0.11550E-00
36	0.85183E-08	0.10790E-00
37	0.17831E-07	0.10790E-00
38	0.12014E-07	0.30210E-00
39	0.83282E-08	0.43150E-01
40	0.13642E-07	0.43150E-01
41	0.12638E-07	0.12950E-00
42	0.68700E-08	0.12950E-00
43	0.61626E-08	0.24920E-00
44	0.15848E-07	0.24920E-00
45	0.99816E-08	0.26830E-00
46	0.16283E-08	0.19150E-00
47	0.47025E-08	0.51460E-01
48	0.66327E-08	0.28590E-01
49	0.11616E-07	0.11150E-00
50	0.13763E-07	0.57180E-01
51	0.18636E-07	0.45740E-01
52	0.22168E-07	0.28590E-01
53	0.31124E-07	0.91480E-01

54	0.24161E-07	0.17720E-00
55	0.17377E-07	0.68610E-01
56	0.11979E-07	0.97200E-01
57	0.98914E-08	0.51460E-01
58	0.57587E-08	0.28590E-01
59	0.57123E-08	0.30270E-00
60	0.92327E-08	0.81310E-01
61	0.20093E-07	0.45170E-01
62	0.36920E-07	0.17620E-00
63	0.31426E-07	0.90350E-01
64	0.49741E-07	0.72280E-01
65	0.80873E-07	0.45170E-01
66	0.10876E-06	0.14450E-00
67	0.77526E-07	0.28010E-00
68	0.53690E-07	0.10840E-00
69	0.36046E-07	0.15360E-00
70	0.30738E-07	0.81310E-01
71	0.14941E-07	0.45170E-01
72	0.15510E-07	0.85520E 00
73	0.25765E-07	0.22980E-00
74	0.47181E-07	0.12760E-00
75	0.27633E-07	0.49780E-00
76	0.50105E-07	0.22440E-00
77	0.72973E-07	0.23560E-00
78	0.14486E-06	0.85260E 00
79	0.83737E-07	0.20190E-00
80	0.14486E-06	0.56090E-01
81	0.71147E-07	0.26920E-00
82	0.59515E-07	0.15710E-00
83	0.59515E-07	0.25520E-00
84	0.73605E-07	0.22980E-00
85	0.58370E-07	0.12760E-00
86	0.49882E-07	0.27820E-00
87	0.57645E-07	0.22900E-00
88	0.64972E-07	0.61520E-01
89	0.10411E-06	0.68360E-01
90	0.40681E-07	0.20170E-00
91	0.33839E-07	0.54690E-01
92	0.33839E-07	0.82030E-01
93	0.45630E-07	0.68360E-01
94	0.30214E-07	0.22560E-00
95	0.39656E-07	0.61520E-01
96	0.53895E-07	0.11620E-00
97	0.31507E-07	0.61520E-01
98	0.58298E-07	0.80760E-01
99	0.63620E-07	0.56070E-01
100	0.63620E-07	0.49420E-01
101	0.66192E-07	0.15210E-01
102	0.66192E-07	0.22810E-01
103	0.10702E-06	0.19010E-01
104	0.11811E-06	0.19010E-01
105	0.98373E-07	0.62720E-01
106	0.14007E-06	0.17110E-01
107	0.12090E-06	0.91480E-01
108	0.11310E-06	0.23940E-01

THE TOTAL DOSE IS 0.40258E-07

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO FUELED WAIST

PROBLEM	DOSE	D OMEGA
1	0.28979E-09	0.38300E-02
2	0.51375E-09	0.11500E-01
3	0.52329E-08	0.86100E-02
4	0.61811E-08	0.22870E-01
5	0.63369E-08	0.46600E-02
6	0.63369E-08	0.26300E-02
7	0.63369E-08	0.24000E-03
8	0.31194E-08	0.50200E-02
9	0.14143E-08	0.17900E-02
10	0.13722E-09	0.44390E-01
11	0.46041E-10	0.51790E-01
12	0.15092E-07	0.14800E-01
13	0.15092E-07	0.34300E-02
14	0.74233E-08	0.42900E-02
15	0.39075E-09	0.42900E-02
16	0.16236E-08	0.10290E-01
17	0.35137E-09	0.12010E-01
18	0.62503E-09	0.16400E-01
19	0.26644E-09	0.20590E-01
20	0.10106E-07	0.52180E-01
21	0.48014E-11	0.60870E-01
22	0.46401E-07	0.17390E-01
23	0.12231E-08	0.80100E-02
24	0.56640E-09	0.13730E-01
25	0.41737E-09	0.21740E-01
26	0.60333E-10	0.55320E 00
27	0.27691E-09	0.23710E-00
28	0.26267E-09	0.23710E-00
29	0.43434E-07	0.79040E-01
30	0.41114E-07	0.79040E-01
31	0.30310E-08	0.66870E-01
32	0.25851E-07	0.48670E-01
33	0.19779E-07	0.48670E-01
34	0.44[illegible]	0.11550E-00
35	0.07[illegible]	0.11550E-00
36	0.42427E-07	0.10790E-00
37	0.17831E-07	0.10790E-00
38	0.32542E-07	0.30210E-00
39	0.29900E-07	0.43150E-01
40	0.22719E-07	0.43150E-01
41	0.37943E-07	0.12950E-00
42	0.23346E-07	0.12950E-00
43	0.21151E-07	0.24920E-00
44	0.16855E-07	0.24920E-00
45	0.21662E-07	0.26830E-00
46	0.98950E-08	0.19150E-00
47	0.56912E-09	0.51460E-01
48	0.79458E-08	0.28590E-01
49	0.64243E-09	0.11150E-00
50	0.77148E-08	0.57180E-01
51	0.73358E-08	0.45740E-01
52	0.23788E-07	0.28590E-01
53	0.31124E-07	0.91480E-01

54	C.17245E-07	0.17720E-00
55	C.21182E-07	0.68610E-01
56	0.25771E-07	0.97200E-01
57	C.31123E-07	0.51460E-01
58	C.27480E-07	0.28590E-01
59	C.43637E-08	0.30270E-00
60	0.47880E-08	0.81310E-01
61	C.64614E-08	0.45170E-01
62	0.81305E-08	0.17620E-00
63	0.77643E-08	0.90350E-01
64	C.68094E-08	0.72280E-01
65	C.32661E-07	0.45170E-01
66	C.31035E-07	0.14450E-00
67	0.13123E-07	0.28010E-00
68	C.29101E-07	0.10840E-00
69	C.39219E-07	0.15360E-00
70	C.36278E-07	0.81310E-01
71	C.22055E-07	0.45170E-01
72	C.60422E-08	0.85520E 00
73	C.41831E-08	0.22980E-00
74	C.46872E-08	0.12760E-00
75	C.61272E-08	0.49780E-00
76	C.92789E-08	0.22440E-00
77	C.90851E-08	0.23560E-00
78	C.40809E-07	0.85260E 00
79	C.97616E-08	0.20190E-00
80	C.50696E-07	0.56090E-01
81	C.36638E-07	0.26920E-00
82	C.36945E-07	0.15710E-00
83	C.40078E-07	0.25520E-00
84	C.46981E-07	0.22980E-00
85	C.36169E-07	0.12760E-00
86	C.30319E-07	0.27820E-00
87	0.13522E-07	0.22900E-00
88	C.16626E-07	0.61520E-01
89	C.53867E-07	0.68360E-01
90	C.16195E-07	0.20170E-00
91	C.12665E-07	0.54690E-01
92	C.20730E-07	0.82030E-01
93	C.27413E-07	0.68360E-01
94	C.16519E-07	0.22560E-00
95	C.15875E-07	0.61520E-01
96	C.33121E-07	0.11620E-00
97	C.19504E-07	0.61520E-01
98	C.30640E-07	0.80780E-01
99	C.30817E-07	0.56070E-01
100	C.36304E-07	0.49420E-01
101	C.29494E-07	0.15210E-01
102	C.37687E-07	0.22810E-01
103	C.47387E-07	0.19010E-01
104	C.49953E-07	0.19010E-01
105	C.42839E-07	0.62720E-01
106	C.50101E-07	0.17110E-01
107	C.50575E-07	0.91480E-01
108	C.48809E-07	0.23940E-01

THE TOTAL DOSE IS 0.19937E-07

VEHICLE ANALYSIS .INTERIOR DOSE WITH SPECTRUM 1

APOLLO FUELEC AT EYE

PROBLEM	COSC	D OMEGA
1	C.11067E 01	0.38300E-02
2	C.15947E 01	0.11500E-01
3	C.65750E 01	0.86100E-02
4	C.80473E 01	0.22870E-01
5	C.82374E 01	0.46600E-02
6	C.82374E 01	0.26300E-02
7	C.76095E 01	0.24000E-03
8	C.41852E 01	0.50200E-02
9	C.24800E 01	0.17900E-02
10	C.65549E 00	0.44390E-01
11	C.38413E-00	0.51790E-01
12	C.17384E 02	0.14800E-01
13	C.17384E 02	0.34300E-02
14	C.93916E 01	0.42900E-02
15	C.13894E 01	0.42900E-02
16	C.26974E 01	0.10290E-01
17	C.12742E 01	0.12010E-01
18	C.17559E 01	0.16400E-01
19	C.10788E 01	0.20590E-01
20	C.11410E 02	0.52180E-01
21	C.12732E-00	0.60870E-01
22	C.67741E 02	0.17390E-01
23	C.26104E 01	0.80100E-02
24	C.21753E 01	0.13730E-01
25	C.13965E 01	0.21740E-01
26	C.49120E-00	0.55320E 00
27	C.11959E 01	0.23710E-00
28	C.10691E 01	0.23710E-00
29	C.10930E 03	0.79040E-01
30	C.87493E 02	0.79040E-01
31	C.44598E 01	0.66870E-01
32	C.51623E 02	0.48670E-01
33	C.27610E 02	0.48670E-01
34	C.12534E 03	0.11550E-00
35	C.43043E 02	0.11550E-00
36	C.22608E 03	0.10790E-00
37	C.67573E 02	0.10790E-00
38	C.21294E 03	0.30210E-00
39	C.77623E 02	0.43150E-01
40	C.90572E 02	0.43150E-01
41	C.12971E 03	0.12950E-00
42	C.42136E 02	0.12950E-00
43	C.48265E 02	0.24920E-00
44	C.95307E 02	0.24920E-00
45	C.14329E 03	0.26830E-00
46	C.14354E 02	0.19150E-00
47	C.90924E 01	0.51460E-01
48	C.47342E 02	0.28590E-01
49	C.48647E 02	0.11150E-00
50	C.48814E 02	0.57180E-01
51	C.58787E 02	0.46740E-01
52	C.31066E 03	0.28590E-01
53	C.56291E 03	0.91490E-01

54	C.13380E 03	0.17720E-00
55	C.19268E 03	0.68610E-01
56	C.16004E 03	0.97200E-01
57	C.24242E 03	0.51460E-01
58	C.17774E 03	0.28590E-01
59	C.52445E 01	0.30270E-00
60	C.93108E 01	0.81310E-01
61	C.73681E 02	0.45170E-01
62	C.10597E 03	0.17620E-00
63	C.93686E 02	0.90350E-01
64	C.10651E 03	0.72280E-01
65	C.43350E 04	0.45170E-01
66	C.25435E 04	0.14450E-00
67	C.35261E 03	0.28010E-00
68	C.86675E 03	0.10840E-00
69	C.43866E 03	0.15360E-00
70	C.35270E 03	0.81310E-01
71	C.13474E 03	0.45170E-01
72	C.23951E 02	0.85520E 00
73	C.54097E 02	0.22980E-00
74	C.13720E 03	0.12760E-00
75	C.73888E 02	0.49780E-00
76	C.22332E 03	0.22440E-00
77	C.61846E 03	0.23560E-00
78	C.36317E 04	0.85260E 00
79	C.67761E 03	0.20190E-00
80	C.15714E 05	0.56090E-01
81	C.82222E 03	0.26920E-00
82	C.47128E 03	0.15710E-00
83	C.47128E 03	0.25520E-00
84	C.91370E 03	0.22980E-00
85	C.44299E 03	0.12760E-00
86	C.27407E 03	0.27820E-00
87	C.42602E 03	0.22900E-00
88	C.62483E 03	0.61520E-01
89	C.35427E 04	0.68360E-01
90	C.16610E 03	0.20170E-00
91	C.11863E 03	0.54690E-01
92	C.11863E 03	0.82030E-01
93	C.21705E 03	0.68360E-01
94	C.98084E 02	0.22560E-00
95	C.15761E 03	0.61520E-01
96	C.34653E 03	0.11620E-00
97	C.10512E 03	0.61520E-01
98	C.44125E 03	0.80780E-01
99	C.58333E 03	0.56070E-01
100	C.58333E 03	0.49420E-01
101	C.66410E 03	0.15210E-01
102	C.66410E 03	0.22810E-01
103	C.40819E 04	0.19010E-01
104	C.66177E 04	0.19010E-01
105	C.18227E 04	0.62720E-01
106	C.13674E 05	0.17110E-01
107	C.74016E 04	0.91480E-01
108	C.54020E 04	0.23940E-01

THE TOTAL DOSE IS 671.703

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO FLELED CHEST

PROBLEM	DOSE	D OMEGA
1	0.10213E 01	0.38300E-02
2	0.14256E 01	0.11500E-01
3	0.53387E 01	0.86100E-02
4	0.61867E 01	0.22870E-01
5	0.63162E 01	0.46600E-02
6	0.63162E 01	0.26300E-02
7	0.63162E 01	0.24000E-03
8	0.34263E 01	0.50200E-02
9	0.22165E 01	0.17900E-02
10	0.61414E 00	0.44390E-01
11	0.35904E-00	0.51790E-01
12	0.12078E 02	0.14800E-01
13	0.12078E 02	0.34300E-02
14	0.69092E 01	0.42900E-02
15	0.12287E 01	0.42900E-02
16	0.22930E 01	0.10290E-01
17	0.11318E 01	0.12010E-01
18	0.15323E 01	0.16400E-01
19	0.95085E 00	0.20590E-01
20	0.91379E 01	0.52180E-01
21	0.11759E-00	0.60870E-01
22	0.30876E 02	0.17390E-01
23	0.20400E 01	0.80100E-02
24	0.17650E 01	0.13730E-01
25	0.12782E 01	0.21740E-01
26	0.41914E-00	0.55320E 00
27	0.99150E 00	0.23710E-00
28	0.92940E 00	0.23710E-00
29	0.26901E 02	0.79040E-01
30	0.31566E 02	0.79040E-01
31	0.33426E 01	0.66870E-01
32	0.16564E 02	0.48670E-01
33	0.18807E 02	0.48670E-01
34	0.17323E 02	0.11550E-00
35	0.23724E 02	0.11550E-00
36	0.18063E 02	0.10790E-00
37	0.46060E 02	0.10790E-00
38	0.27443E 02	0.30210E-00
39	0.17613E 02	0.43150E-01
40	0.32158E 02	0.43150E-01
41	0.29760E 02	0.12950E-00
42	0.14032E 02	0.12950E-00
43	0.12414E 02	0.24920E-00
44	0.39097E 02	0.24920E-00
45	0.21759E 02	0.26830E-00
46	0.36644E 01	0.17150E-00
47	0.70923E 01	0.51460E-01
48	0.13547E 02	0.24590E-01
49	0.25931E 02	0.11150E-00
50	0.32251E 02	0.57180E-01
51	0.48630E 02	0.45740E-01
52	0.62411E 02	0.28590E-01
53	0.10554E 03	0.71480E-01

54	C.70694E 02	0.17720E-00
55	C.44158E 02	0.68610E-01
56	C.26895E 02	0.97200E-01
57	C.21399E 02	0.51460E-01
58	C.11548E 02	0.28590E-01
59	C.11422E 02	0.30270E-00
60	C.19733E 02	0.81310E-01
61	C.54121E 02	0.45170E-01
62	C.14134E 03	0.17620E-00
63	C.10672E 03	0.90350E-01
64	C.28550E 03	0.72280E-01
65	C.13749E 04	0.45170E-01
66	C.47940E 04	0.14450E-00
67	C.11478E 04	0.28010E-00
68	C.35895E 03	0.10840E-00
69	C.13538E 03	0.15360E-00
70	C.10275E 03	0.81310E-01
71	C.35791E 02	0.45170E-01
72	C.37690E 02	0.85520E 00
73	C.76702E 02	0.22980E-00
74	C.23675E 03	0.12760E-00
75	C.85127E 02	0.49780E-00
76	C.27957E 03	0.22440E-00
77	C.88827E 03	0.23560E-00
78	C.15714E 05	0.85260E 00
79	C.14877E 04	0.20190E-00
80	C.15714E 05	0.56090E-01
81	C.82222E 03	0.26920E-00
82	C.47128E 03	0.15710E-00
83	C.47128E 03	0.25520E-00
84	C.91370E 03	0.22980E-00
85	C.44299E 03	0.12760E-00
86	C.27607E 03	0.27820E-00
87	C.42602E 03	0.22900E-00
88	C.62483E 03	0.61520E-01
89	C.35427E 04	0.68360E-01
90	C.16610E 03	0.20170E-00
91	C.11863E 03	0.54690E-01
92	C.11863E 03	0.82030E-01
93	C.21705E 03	0.68360E-01
94	C.98084E 02	0.22560E-00
95	C.15761E 03	0.61520E-01
96	C.34653E 03	0.11620E-00
97	C.10512E 03	0.61520E-01
98	C.44125E 03	0.80780E-01
99	C.58333E 03	0.56070E-01
100	C.58333E 03	0.49420E-01
101	C.66410E 03	0.15210E-01
102	C.66410E 03	0.22810E-01
103	C.40819E 04	0.19010E-01
104	C.66177E 04	0.19010E-01
105	C.18227E 04	0.62720E-01
106	C.13674E 05	0.17110E-01
107	C.74016E 04	0.91480E-01
108	C.54020E 04	0.23940E-01

THE TOTAL DOSE IS 1514.62

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO FUELED WAIST

PROBLEM	COSE	D OMEGA
1	C.13609E 01	0.38300E-02
2	C.19921E 01	0.11500E-01
3	C.10255E 02	0.86100E-02
4	C.12536E 02	0.22870E-01
5	C.12899E 02	0.46600E-02
6	C.12899E 02	0.26300E-02
7	C.12899E 02	0.24000E-03
8	C.57732E 01	0.50200E-02
9	C.33546E 01	0.17900E-02
10	C.78465E 00	0.44390E-01
11	C.43221E-00	0.51790E-01
12	C.36442E 02	0.14800E-01
13	C.36442E 02	0.34300E-02
14	C.15429E 02	0.42900E-02
15	C.16797E 01	0.42900E-02
16	C.36007E 01	0.10290E-01
17	C.15591E 01	0.12010E-01
18	C.22149E 01	0.16400E-01
19	C.12783E 01	0.20590E-01
20	C.21885E 02	0.52180E-01
21	C.13270E-00	0.60870E-01
22	C.23862E 03	0.17390E-01
23	C.31128E 01	0.80100E-02
24	C.26129E 01	0.13730E-01
25	C.17575E 01	0.21740E-01
26	C.50315E 00	0.55320E 00
27	C.13162E 01	0.23710E-00
28	C.12649E 01	0.23710E-00
29	C.20160E 03	0.79040E-01
30	C.17722E 03	0.79040E-01
31	C.55974E 01	0.66870E-01
32	C.78053E 02	0.48670E-01
33	C.52787E 02	0.48670E-01
34	C.12534E 03	0.11550E-00
35	C.56656E 02	0.11550E-00
36	C.18979E 03	0.10790E-00
37	C.46060E 02	0.10790E-00
38	C.11403E 03	0.30210E-00
39	C.98712E 02	0.43150E-01
40	C.64789E 02	0.43150E-01
41	C.15070E 03	0.12950E-00
42	C.67398E 02	0.12950E-00
43	C.58262E 02	0.24920E-00
44	C.42489E 02	0.24920E-00
45	C.60334E 02	0.26830E-00
46	C.21362E 02	0.19150E-00
47	C.11288E 02	0.51460E-01
48	C.16669E 02	0.28590E-01
49	C.13006E 02	0.11150E-00
50	C.16017E 02	0.57180E-01
51	C.15195E 02	0.45740E-01
52	C.69188E 02	0.28590E-01
53	C.10554E 03	0.91480E-01

54	C.43672E 02	0.17720E-00
55	C.58383E 02	0.68610E-01
56	C.77460E 02	0.97200E-01
57	C.10464E 03	0.51460E-01
58	C.85568E 02	0.28590E-01
59	C.84044E 01	0.30270E-00
60	C.93108E 01	0.81310E-01
61	C.13172E 02	0.45170E-01
62	C.17122E 02	0.17620E-00
63	C.16226E 02	0.90350E-01
64	C.13930E 02	0.72280E-01
65	C.11517E 03	0.45170E-01
66	C.10543E 03	0.14450E-00
67	C.30706E 02	0.28010E-00
68	C.94828E 02	0.10840E-00
69	C.15827E 03	0.15360E-00
70	C.13661E 03	0.81310E-01
71	C.61641E 02	0.45170E-01
72	C.12196E 02	0.85520E 00
73	C.80084E 01	0.22980E-00
74	C.90602E 01	0.12760E-00
75	C.12274E 02	0.49780E-00
76	C.19839E 02	0.22440E-00
77	C.19499E 02	0.23560E-00
78	C.17844E 03	0.85260E 00
79	C.21719E 02	0.20190E-00
80	C.30935E 03	0.56090E-01
81	C.14035E 03	0.26920E-00
82	C.14151E 03	0.15710E-00
83	C.16576E 03	0.25520E-00
84	C.24532E 03	0.22980E-00
85	C.13623E 03	0.12760E-00
86	C.10030E 03	0.27820E-00
87	C.31643E 02	0.22900E-00
88	C.41770E 02	0.61520E-01
89	C.36625E 03	0.68360E-01
90	C.40011E 02	0.20170E-00
91	C.28810E 02	0.54690E-01
92	C.56433E 02	0.82030E-01
93	C.85238E 02	0.68360E-01
94	C.41166E 02	0.22560E-00
95	C.38911E 02	0.61520E-01
96	C.11654E 03	0.11620E-00
97	C.51791E 02	0.61520E-01
98	C.10239E 03	0.80780E-01
99	C.10340E 03	0.56070E-01
100	C.13732E 03	0.49420E-01
101	C.96449E 02	0.15210E-01
102	C.14725E 03	0.22810E-01
103	C.25373E 03	0.19010E-01
104	C.29683E 03	0.19010E-01
105	C.19523E 03	0.62720E-01
106	C.29938E 03	0.17110E-01
107	C.30810E 03	0.91480E-01
108	C.27695E 03	0.23940E-01

THE TOTAL DOSE IS 72.7013

VEHICLE ANALYSIS ,INTERIOR DCSE WITH SPECTRUM 1

APOLLO UNFUELED AT EYE

PROBLEM	DOSE	D OMEGA
1	0.29615E-09	0.38300E-02
2	0.54641E-09	0.11500E-01
3	0.54590E-08	0.86100E-02
4	0.67726E-08	0.22870E-01
5	0.64008E-08	0.46600E-02
6	0.64008E-08	0.26300E-02
7	0.58856E-08	0.24000E-03
8	0.64511E-08	0.50200E-02
9	0.12895E-08	0.17900E-02
10	0.88823E-08	0.44390E-01
11	0.97815E-08	0.51790E-01
12	0.98833E-08	0.14800E-01
13	0.98833E-08	0.34300E-02
14	0.56713E-08	0.42900E-02
15	0.35792E-09	0.42900E-02
16	0.43019E-08	0.10290E-01
17	0.58761E-08	0.12010E-01
18	0.48068E-09	0.16400E-01
19	0.44538E-09	0.20590E-01
20	0.16756E-07	0.52180E-01
21	0.26768E-07	0.60870E-01
22	0.23433E-07	0.17390E-01
23	0.11218E-07	0.80100E-02
24	0.20088E-07	0.13730E-01
25	0.31560E-08	0.21740E-01
26	0.32896E-07	0.55320E 00
27	0.26186E-07	0.23710E-00
28	0.17062E-07	0.23710E-00
29	0.31808E-07	0.79040E-01
30	0.27812E-07	0.79040E-01
31	0.17557E-07	0.66870E-01
32	0.28366E-07	0.48670E-01
33	0.16589E-07	0.48670E-01
34	0.42381E-07	0.11550E-00
35	0.20223E-07	0.11550E-00
36	0.45554E-07	0.10790E-00
37	0.23388E-07	0.10790E-00
38	0.44392E-07	0.30210E-00
39	0.25624E-07	0.43150E-01
40	0.28296E-07	0.43150E-01
41	0.35020E-07	0.12950E-00
42	0.16704E-07	0.12950E-00
43	0.18516E-07	0.24920E-00
44	0.27366E-07	0.24920E-00
45	0.37201E-07	0.26830E-00
46	0.69589E-08	0.19150E-00
47	0.47025E-08	0.51460E-01
48	0.18264E-07	0.28590E-01
49	0.18646E-07	0.11150E-00
50	0.18676E-07	0.57180E-01
51	0.21283E-07	0.45740E-01
52	0.51314E-07	0.28590E-01
53	0.61942E-07	0.91480E-01

54	0.35863E-07	0.17720E-00
55	0.43107E-07	0.68610E-01
56	0.39957E-07	0.97200E-01
57	0.47599E-07	0.51460E-01
58	0.41630E-07	0.28590E-01
59	0.27720E-08	0.30270E-00
60	0.47880E-08	0.81310E-01
61	0.24872E-07	0.45170E-01
62	0.31274E-07	0.17620E-00
63	0.29042E-07	0.90350E-01
64	0.31346E-07	0.72280E-01
65	0.10822E-06	0.45170E-01
66	0.95041E-07	0.14450E-00
67	0.53245E-07	0.28010E-00
68	0.72408E-07	0.10840E-00
69	0.58189E-07	0.15360E-00
70	0.54209E-07	0.81310E-01
71	0.36401E-07	0.45170E-01
72	0.10891E-07	0.85520E 00
73	0.20134E-07	0.22980E-00
74	0.36413E-07	0.12760E-00
75	0.25017E-07	0.49780E-00
76	0.45743E-07	0.22440E-00
77	0.64083E-07	0.23560E-00
78	0.10268E-06	0.85260E 00
79	0.65748E-07	0.20190E-00
80	0.14486E-06	0.56090E-01
81	0.71147E-07	0.26920E-00
82	0.59515E-07	0.15710E-00
83	0.59515E-07	0.25520E-00
84	0.73605E-07	0.22980E-00
85	0.58370E-07	0.12760E-00
86	0.49882E-07	0.27820E-00
87	0.57645E-07	0.22900E-00
88	0.64972E-07	0.61520E-01
89	0.10411E-06	0.68360E-01
90	0.40681E-07	0.20170E-00
91	0.33839E-07	0.54690E-01
92	0.33839E-07	0.82030E-01
93	0.45630E-07	0.68360E-01
94	0.30214E-07	0.22560E-00
95	0.39656E-07	0.61520E-01
96	0.53895E-07	0.11620E-00
97	0.31507E-07	0.61520E-01
98	0.58298E-07	0.80780E-01
99	0.63620E-07	0.56070E-01
100	0.63620E-07	0.49420E-01
101	0.66192E-07	0.15210E-01
102	0.66192E-07	0.22810E-01
103	0.10702E-06	0.19010E-01
104	0.11811E-06	0.19010E-01
105	0.88378E-07	0.62720E-01
106	0.14007E-06	0.17110E-01
107	0.12090E-06	0.91480E-01
108	0.11310E-06	0.23940E-01

THE TOTAL DOSE IS 0.43293E-07

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO UNFUELED CHEST

PROBLEM	DOSE	D OMEGA
1	0.26329E-09	0.38300E-02
2	0.44260E-09	0.11500E-01
3	0.43967E-08	0.86100E-02
4	0.50949E-08	0.22870E-01
5	0.48572E-08	0.46600E-02
6	0.48572E-08	0.26300E-02
7	0.48572E-08	0.24000E-03
8	0.48895E-08	0.50200E-02
9	0.10005E-08	0.17900E-02
10	0.70113E-08	0.44390E-01
11	0.69634E-08	0.51790E-01
12	0.70247E-08	0.14800E-01
13	0.70247E-08	0.34300E-02
14	0.47018E-08	0.42900E-02
15	0.29846E-09	0.42900E-02
16	0.33719E-09	0.10290E-01
17	0.45296E-08	0.12010E-01
18	0.38580E-09	0.16400E-01
19	0.35347E-09	0.20590E-01
20	0.12452E-07	0.52180E-01
21	0.12337E-07	0.60870E-01
22	0.13179E-07	0.17390E-01
23	0.65133E-08	0.80100E-02
24	0.11033E-07	0.13730E-01
25	0.26337E-08	0.21740E-01
26	0.12799E-07	0.55320E 00
27	0.12817E-07	0.23710E-00
28	0.10209E-07	0.23710E-00
29	0.11830E-07	0.79040E-01
30	0.13408E-07	0.79040E-01
31	0.99058E-08	0.66870E-01
32	0.10357E-07	0.48670E-01
33	0.11673E-07	0.48670E-01
34	0.93892E-08	0.11550E-00
35	0.12377E-07	0.11550E-00
36	0.85183E-08	0.10790E-00
37	0.17831E-07	0.10790E-00
38	0.12014E-07	0.30210E-00
39	0.83282E-08	0.43150E-01
40	0.13642E-07	0.43150E-01
41	0.12638E-07	0.12950E-00
42	0.68700E-08	0.12950E-00
43	0.61626E-08	0.24920E-00
44	0.15849E-07	0.24920E-00
45	0.99816E-08	0.26830E-00
46	0.16283E-08	0.19150E-00
47	0.47025E-08	0.51460E-01
48	0.66327E-08	0.28590E-01
49	0.11616E-07	0.11150E-00
50	0.13763E-07	0.57180E-01
51	0.18636E-07	0.45740E-01
52	0.22163E-07	0.28590E-01
53	0.31124E-07	0.91480E-01

54	0.24161E-07	0.17720E-00
55	0.17377E-07	0.68610E-01
56	0.11979E-07	0.97200E-01
57	0.98914E-08	0.51460E-01
58	0.57587E-08	0.28590E-01
59	0.57123E-08	0.30270E-00
60	0.92327E-08	0.81310E-01
61	0.20093E-07	0.45170E-01
62	0.36920E-07	0.17620E-00
63	0.31426E-07	0.90350E-01
64	0.49741E-07	0.72280E-01
65	0.80873E-07	0.45170E-01
66	0.10876E-06	0.14450E-00
67	0.77526E-07	0.28010E-00
68	0.53690E-07	0.10840E-00
69	0.36046E-07	0.15360E-00
70	0.30738E-07	0.81310E-01
71	0.14941E-07	0.45170E-01
72	0.15510E-07	0.85520E 00
73	0.25765E-07	0.22980E-00
74	0.47181E-07	0.12760E-00
75	0.27633E-07	0.49780E-00
76	0.50105E-07	0.22440E-00
77	0.72973E-07	0.23560E-00
78	0.14486E-06	0.85260E 00
79	0.83737E-07	0.20190E-00
80	0.14486E-06	0.56090E-01
81	0.71147E-07	0.26920E-00
82	0.59515E-07	0.15710E-00
83	0.59515E-07	0.25520E-00
84	0.73605E-07	0.22980E-00
85	0.5837 E-07	0.12760E-00
86	0.49882E-07	0.27820E-00
87	0.57645E-07	0.22900E-00
88	0.64972E-07	0.61520E-01
89	0.10411E-06	0.68360E-01
90	0.40681E-07	0.20170E-00
91	0.33839E-07	0.54690E-01
92	0.33839E-07	0.82030E-01
93	0.45630E-07	0.68360E-01
94	0.30214E-07	0.22560E-00
95	0.39656E-07	0.61520E-01
96	0.53895E-07	0.11620E-00
97	0.31507E-07	0.61520E-01
98	0.58298E-07	0.80780E-01
99	0.63620E-07	0.56070E-01
100	0.63620E-07	0.49420E-01
101	0.66192E-07	0.15210E-01
102	0.66192E-07	0.22810E-01
103	0.10702E-06	0.19010E-01
104	0.11811E-06	0.19010E-01
105	0.88378E-07	0.62720E-01
106	0.14007E-06	0.17110E-01
107	0.12090E-06	0.91480E-01
108	0.11310E-06	0.23940E-01

THE TOTAL DOSE IS 0.41518E-07

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO UNFUELED WAIST

PROBLEM	COSE	D OMEGA
1	0.40945E-09	0.38300E-02
2	0.88206E-09	0.11500E-01
3	C.89898E-08	0.86100E-02
4	C.11278E-07	0.22870E-01
5	C.10528E-07	0.46600E-02
6	C.10528E-07	0.26300E-02
7	C.10528E-07	0.24000E-03
8	C.10629E-07	0.50200E-02
9	C.23705E-08	0.17900E-02
10	C.18649E-07	0.44390E-01
11	C.18469E-07	0.51790E-01
12	C.18700E-07	0.14800E-01
13	0.18700E-07	0.34300E-02
14	C.10573E-07	0.42900E-02
15	C.48569E-09	0.42900E-02
16	C.66612E-08	0.10290E-01
17	C.99525E-08	0.12010E-01
18	C.75228E-09	0.16400E-01
19	C.65342E-09	0.20590E-01
20	C.40305E-07	0.52180E-01
21	C.42885E-07	0.60870E-01
22	C.46401E-07	0.17390E-01
23	C.16814E-07	0.80100E-02
24	C.36795E-07	C.13730E-01
25	C.48216E-08	C.21740E-01
26	C.38594E-07	0.55320E 00
27	C.41769E-07	C.23710E-00
28	C.35090E-07	0.23710E-00
29	C.43434E-07	C.79040E-01
30	C.41114E-07	G.79040E-01
31	C.28739E-07	0.66870E-01
32	C.39230E-07	0.48670E-01
33	C.28864E-07	0.48670E-01
34	C.42381E-07	0.11550E-00
35	C.24997E-07	0.11550E-00
36	C.42427E-07	0.10790E-00
37	C.17831E-07	0.10790E-00
38	C.32542E-07	C.30210E-00
39	C.29900E-07	0.43150E-01
40	C.22718E-07	0.43150E-01
41	C.37943E-07	0.12950E-00
42	C.23346E-07	0.12950E-00
43	C.21151E-07	0.24920E-00
44	C.16855E-07	0.24920E-00
45	C.21662E-07	0.26830E-00
46	C.98950E-08	0.19150E-00
47	C.56912E-08	0.51460E-01
48	C.79458E-08	0.28590E-01
49	C.64243E-08	0.11150E-00
50	C.77148E-08	C.57180E-01
51	C.73358E-08	0.45740E-01
52	C.23788E-07	0.28590E-01
53	C.31124E-07	0.91480E-01

54	C.17245E-07	0.17720E-00
55	C.21182E-07	0.68610E-01
56	0.25771E-07	0.97200E-01
57	C.31123E-07	0.51460E-01
58	C.27480E-07	0.28590E-01
59	C.43637E-08	0.30270E-00
60	C.47880E-08	0.81310E-01
61	0.64614E-08	0.45170E-01
62	0.81305E-08	0.17620E-00
63	C.77643E-08	0.90350E-01
64	0.68094E-08	0.72280E-01
65	C.32661E-07	0.45170E-01
66	C.31035E-07	0.14450E-00
67	C.13123E-07	0.28010E-00
68	0.29101E-07	0.10840E-00
69	0.39218E-07	0.15360E-00
70	C.36278E-07	0.81310E-01
71	C.22055E-07	0.45170E-01
72	C.60422E-08	0.85520E 00
73	0.41831E-08	0.22980E-00
74	C.46872E-08	0.12760E-00
75	0.61272E-08	0.49780E-00
76	0.92789E-08	0.22440E-00
77	0.90851E-08	0.23560E-00
78	C.40809E-07	0.85260E 00
79	0.97616E-08	0.20190E-00
80	0.50696E-07	0.56090E-01
81	C.36639E-07	0.26920E-00
82	C.36945E-07	0.15710E-00
83	C.40078E-07	0.25520E-00
84	C.46981E-07	0.22980E-00
85	C.36169E-07	0.12760E-00
86	C.30319E-07	0.27820E-00
87	C.13522E-07	0.22900E-00
88	C.16626E-07	0.61520E-01
89	C.53867E-07	0.68360E-01
90	C.16195E-07	0.20170E-00
91	C.12665E-07	0.54690E-01
92	C.20730E-07	0.82030E-01
93	C.27413E-07	0.68360E-01
94	C.16519E-07	0.22560E-00
95	C.15875E-07	0.61520E-01
96	C.33121E-07	0.11620E-00
97	C.19504E-07	0.61520E-01
98	C.30640E-07	0.80780E-01
99	C.30817E-07	0.56070E-01
100	C.36304E-07	0.49420E-01
101	C.29494E-07	0.15210E-01
102	0.37687E-07	0.22810E-01
103	C.47387E-07	0.19010E-01
104	C.49953E-07	0.19010E-01
105	C.42839E-07	0.62720E-01
106	C.50101E-07	0.17110E-01
107	C.50575E-07	0.91480E-01
108	C.48808E-07	0.23940E-01

THE TOTAL DOSE IS 0.23978E-07

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO UNFUELED AT EYE

PROBLEM	DOSE	D OMEGA
1	0.13801E 01	0.38300E-02
2	0.20554E 01	0.11500E-01
3	0.10769E 02	0.86100E-02
4	0.13911E 02	0.22870E-01
5	0.13036E 02	0.46600E-02
6	0.13036E 02	0.26300E-02
7	0.11828E 02	0.24000E-03
8	0.13153E 02	0.50200E-02
9	0.32015E 01	0.17900E-02
10	0.18941E 02	0.44390E-01
11	0.21066E 02	0.51790E-01
12	0.21314E 02	0.14800E-01
13	0.21314E 02	0.34300E-02
14	0.11310E 02	0.42900E-02
15	0.15780E 01	0.42900E-02
16	0.82784E 01	0.10290E-01
17	0.11776E 02	0.12010E-01
18	0.19138E 01	0.16400E-01
19	0.18304E 01	0.20590E-01
20	0.42314E 02	0.52180E-01
21	0.82090E 02	0.60870E-01
22	0.67741E 02	0.17390E-01
23	0.24784E 02	0.80100E-02
24	0.54240E 02	0.13730E-01
25	0.58918E 01	0.21740E-01
26	0.11610E 03	0.55320E 00
27	0.79930E 02	0.23710E-00
28	0.43377E 02	0.23710E-00
29	0.10930E 03	0.79040E-01
30	0.87493E 02	0.79040E-01
31	0.44783E 02	0.66870E-01
32	0.90938E 02	0.48670E-01
33	0.41700E 02	0.48670E-01
34	0.18928E 03	0.11550E-00
35	0.54876E 02	0.11550E-00
36	0.22608E 03	0.10790E-00
37	0.67573E 02	0.10790E-00
38	0.21294E 03	0.30210E-00
39	0.77623E 02	0.43150E-01
40	0.90572E 02	0.43150E-01
41	0.12971E 03	0.12950E-00
42	0.42136E 02	0.12950E-00
43	0.48265E 02	0.24920E-00
44	0.85307E 02	0.24920E-00
45	0.14329E 03	0.26830E-00
46	0.14354E 02	0.19150E-00
47	0.90923E 01	0.51460E-01
48	0.47342E 02	0.28590E-01
49	0.48647E 02	0.11150E-00
50	0.48818E 02	0.57180E-01
51	0.58787E 02	0.45740E-01
52	0.31066E 03	0.28590E-01
53	0.56291E 03	0.91480E-01

54	0.13380E 03	0.17720E-00
55	0.19268E 03	0.68610E-01
56	0.16004E 03	0.97200E-01
57	0.24242E 03	0.51460E-01
58	0.17774E 03	0.28590E-01
59	0.52445E 01	0.30270E-00
60	0.93108E 01	0.81310E-01
61	0.73681E 02	0.45170E-01
62	0.10597E 03	0.17620E-00
63	0.93686E 02	0.90350E-01
64	0.10651E 03	0.72280E-01
65	0.43350E 04	0.45170E-01
66	0.25435E 04	0.14450E-00
67	0.35261E 03	0.28010E-00
68	0.86675E 03	0.10840E-00
69	0.43366E 03	0.15360E-00
70	0.35370E 03	0.81310E-01
71	0.13474E 03	0.45170E-01
72	0.23951E 02	0.85520E 00
73	0.54097E 02	0.22980E-00
74	0.13720E 03	0.12760E-00
75	0.73988E 02	0.49780E-00
76	0.22332E 03	0.22440E-00
77	0.61846E 03	0.23560E-00
78	0.36317E 04	0.85260E 00
79	0.67761E 03	0.20190E-00
80	0.15714E 05	0.56090E-01
81	0.82222E 03	0.26920E-00
82	0.47128E 03	0.15710E-00
83	0.47128E 03	0.25520E-00
84	0.91370E 03	0.22980E-00
85	0.44299E 03	0.12760E-00
86	0.27607E 03	0.27820E-00
87	0.42602E 03	0.22900E-00
88	0.62483E 03	0.61520E-01
89	0.35427E 04	0.68360E-01
90	0.16610E 03	0.20170E-00
91	0.11863E 03	0.54690E-01
92	0.11863E 03	0.82030E-01
93	0.21705E 03	0.68360E-01
94	0.98084E 02	0.22560E-00
95	0.15761E 03	0.61520E-01
96	0.34653E 03	0.11620E-00
97	0.10512E 03	0.61520E-01
98	0.44125E 03	0.80780E-01
99	0.58333E 03	0.56070E-01
100	0.58333E 03	0.49420E-01
101	0.66410E 03	0.15210E-01
102	0.66410E 03	0.22810E-01
103	0.40819E 04	0.19010E-01
104	0.66177E 04	0.19010E-01
105	0.18227E 04	0.62720E-01
106	0.13674E 05	0.17110E-01
107	0.74016E 04	0.91480E-01
108	0.54020E 04	0.23940E-01

THE TOTAL DOSE IS 680.393

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO UNFUELED CHEST

PROBLEM	DOSE	D OMEGA
1	C.12638E 01	0.38300E-02
2	C.18149E 01	0.11500E-01
3	C.83236E 01	0.86100E-02
4	C.99842E 01	0.22870E-01
5	C.94399E 01	0.46600E-02
6	C.94399E 01	0.26300E-02
7	C.94399E 01	0.24000E-03
8	C.95135E 01	0.50200E-02
9	C.28185E 01	0.17900E-02
10	C.14308E 02	0.44390E-01
11	C.14199E 02	0.51790E-01
12	C.14339E 02	0.14800E-01
13	C.14339E 02	0.34300E-02
14	C.90655E 01	0.42900E-02
15	C.13860E 01	0.42900E-02
16	C.63440E 01	0.10290E-01
17	C.86448E 01	0.12010E-01
18	C.16629E 01	0.16400E-01
19	C.15640E 01	0.20590E-01
20	C.28710E 02	0.52180E-01
21	C.28373E 02	0.60870E-01
22	C.30876E 02	0.17390E-01
23	C.13175E 02	0.80100E-02
24	C.24612E 02	0.13730E-01
25	C.49862E 01	0.21740E-01
26	C.29737E 02	0.55320E 00
27	C.29791E 02	0.23710E-00
28	C.22420E 02	0.23710E-00
29	C.26901E 02	0.79040E-01
30	C.31566E 02	0.79040E-01
31	C.21482E 02	0.66870E-01
32	C.22818E 02	0.48670E-01
33	C.26440E 02	0.48670E-01
34	C.20269E 02	0.11550E-00
35	C.28490E 02	0.11550E-00
36	C.18063E 02	0.10790E-00
37	C.46060E 02	0.10790E-00
38	C.27443E 02	0.30210E-00
39	C.17613E 02	0.43150E-01
40	C.32158E 02	0.43150E-01
41	C.29260E 02	0.12950E-00
42	C.14032E 02	0.12950E-00
43	C.12414E 02	0.24920E-00
44	C.39097E 02	0.24920E-00
45	C.21759E 02	0.26830E-00
46	C.36644E 01	0.19150E-00
47	C.90923E 01	0.51460E-01
48	C.13547E 02	0.28570E-01
49	C.25931E 02	0.11150E-00
50	C.32251E 02	0.57180E-01
51	C.48630E 02	0.45740E-01
52	C.62411E 02	0.28570E-01
53	C.10554E 03	0.91480E-01

54	C.70694E 02	0.17720E-00
55	C.44159E 02	0.68610E-01
56	C.26895E 02	0.97200E-01
57	C.21399E 02	0.51460E-01
58	C.11548E 02	0.28590E-01
59	C.11422E 02	0.30270E-00
60	C.19733E 02	0.81310E-01
61	C.54121E 02	0.45170E-01
62	C.14134E 03	0.17620E-00
63	C.10672E 03	0.90350E-01
64	C.28550E 03	0.72280E-01
65	C.13749E 04	0.45170E-01
66	C.47940E 04	0.14450E-00
67	C.11478E 04	0.28010E-00
68	C.35895E 03	0.10840E-00
69	C.13538E 03	0.15360E-00
70	C.10275E 03	0.81310E-01
71	C.35791E 02	0.45170E-01
72	C.37690E 02	0.85520E 00
73	C.76702E 02	0.22980E-00
74	C.23675E 03	0.12760E-00
75	C.85127E 02	0.49780E-00
76	C.27957E 03	0.22440E-00
77	C.88827E 03	0.23560E-00
78	C.15714E 05	0.85260E 00
79	C.14877E 04	0.20190E-00
80	C.15714E 05	0.56090E-01
81	C.82222E 03	0.26920E-00
82	C.47129E 03	0.15710E-00
83	C.47129E 03	0.25520E-00
84	C.91370E 03	0.22980E-00
85	C.44299E 03	0.12760E-00
86	C.27607E 03	0.27820E-00
87	C.42602E 03	0.22900E-00
88	C.62483E 03	0.61520E-01
89	C.35427E 04	0.68360E-01
90	C.16610E 03	0.20170E-00
91	C.11863E 03	0.54690E-01
92	C.11863E 03	0.82030E-01
93	C.21705E 03	0.68360E-01
94	C.98084E 02	0.22560E-00
95	C.15761E 03	0.61520E-01
96	C.34653E 03	0.11620E-00
97	C.10512E 03	0.61520E-01
98	C.44125E 03	0.80780E-01
99	C.58333E 03	0.56070E-01
100	C.58333E 03	0.49420E-01
101	C.66410E 03	0.15210E-01
102	C.66410E 03	0.22810E-01
103	C.40819E 04	0.19010E-01
104	C.66177E 04	0.19010E-01
105	C.18727E 04	0.62720E-01
106	C.13674E 05	0.17110E-01
107	C.74016E 04	0.91430E-01
108	C.54220E 04	0.23940E-01

THE TOTAL DOSE IS 1517.48

VEHICLE ANALYSIS ,INTERIOR DOSE WITH SPECTRUM 1

APOLLO UNFUELED WAIST

PROBLEM	COSE	D OMEGA
1	C.17348E 01	0.38300E-02
2	0.26357E 01	0.11500E-01
3	C.19075E 02	0.86100E-02
4	C.25004E 02	0.22870E-01
5	C.22974E 02	0.46600E-02
6	C.22974E 02	0.26300E-02
7	C.22974E 02	0.24000E-03
8	C.23244E 02	0.50200E-02
9	C.45208E 01	0.17900E-02
10	C.48641E 02	0.44390E-01
11	C.47994E 02	0.51790E-01
12	C.48823E 02	0.14800E-01
13	C.48823E 02	0.34300E-02
14	C.23074E 02	0.42900E-02
15	C.19287E 01	0.42900E-02
16	C.13659E 02	0.10290E-01
17	C.21465E 02	0.12010E-01
18	C.24358E 01	0.16400E-01
19	0.22674E 01	0.20590E-01
20	C.16966E 03	0.52180E-01
21	C.19502E 03	0.60870E-01
22	C.23862E 03	0.17390E-01
23	C.42182E 02	0.80100E-02
24	C.14077E 03	0.13730E-01
25	C.93645E 01	0.21740E-01
26	C.15592E 03	0.55320E 00
27	C.18414E 03	0.23710E-00
28	C.13018E 03	0.23710E-00
29	C.20160E 03	0.79040E-01
30	C.17722E 03	0.79040E-01
31	C.92074E 02	0.66870E-01
32	C.15975E 03	0.48670E-01
33	C.93563E 02	0.48670E-01
34	C.18928E 03	0.11550E-00
35	C.74605E 02	0.11550E-00
36	C.18979E 03	0.10790E-00
37	C.46060E 02	0.10790E-00
38	C.11403E 03	0.30210E-00
39	C.98712E 02	0.43150E-01
40	C.64789E 02	0.43150E-01
41	C.15070E 03	0.12950E-00
42	C.67398E 02	0.12950E-00
43	C.58262E 02	0.24920E-00
44	C.42489E 02	0.24920E-00
45	C.60334E 02	0.26830E-00
46	C.21362E 02	0.19150E-00
47	C.11288E 02	0.51460E-01
48	C.16669E 02	0.28590E-01
49	C.13006E 02	0.11150E-00
50	C.16017E 02	0.57180E-01
51	C.15195E 02	0.45740E-01
52	C.69188E 02	0.28590E-01
53	C.10554E 03	0.91480E-01

54	0.43672E 02	0.17720E-00
55	0.58383E 02	0.68610E-01
56	0.77460E 02	0.97200E-01
57	0.10464E 03	0.51460E-01
58	0.85568E 02	0.28590E-01
59	0.84044E 01	0.30270E-00
60	0.93108E 01	0.81310E-01
61	0.13172E 02	0.45170E-01
62	0.17122E 02	0.17620E-00
63	0.16226E 02	0.90350E-01
64	0.13930E 02	0.72280E-01
65	0.11517E 03	0.45170E-01
66	0.10543E 03	0.14450E-00
67	0.30706E 02	0.28010E-00
68	0.94828E 02	0.10840E-00
69	0.15827E 03	0.15360E-00
70	0.13661E 03	0.81310E-01
71	0.61641E 02	0.45170E-01
72	0.12196E 02	0.85520E 00
73	0.80084E 01	0.22980E-00
74	0.90602E 01	0.12760E-00
75	0.12274E 02	0.49780E-00
76	0.19839E 02	0.22440E-00
77	0.19499E 02	0.23560E-00
78	0.17844E 03	0.85260E 00
79	0.21219E 02	0.20190E-00
80	0.30935E 03	0.56090E-01
81	0.14035E 03	0.26920E-00
82	0.14151E 03	0.15710E-00
83	0.16576E 03	0.25520E-00
84	0.24532E 03	0.22980E-00
85	0.13621E 03	0.12760E-00
86	0.10030E 03	0.27820E-00
87	0.31643E 02	0.22900E-00
88	0.41770E 02	0.61520E-01
89	0.36625E 03	0.68360E-01
90	0.40011E 02	0.20170E-00
91	0.28810E 02	0.54690E-01
92	0.56433E 02	0.82030E-01
93	0.85238E 02	0.68360E-01
94	0.41166E 02	0.22560E-00
95	0.38911E 02	0.61520E-01
96	0.11654E 03	0.11620E-00
97	0.51791E 02	0.61520E-01
98	0.10239E 03	0.80780E-01
99	0.10340E 03	0.56070E-01
100	0.13732E 03	0.49420E-01
101	0.96449E 02	0.15210E-01
102	0.14725E 03	0.22810E-01
103	0.25373E 03	0.19010E-01
104	0.29683E 03	0.19010E-01
105	0.19523E 03	0.62720E-01
106	0.29938E 03	0.17110E-01
107	0.30810E 03	0.91480E-01
108	0.27695E 03	0.23940E-01

THE TOTAL DOSE IS 89.3120

Secondary Proton Code

The secondary proton dose code, Vol. 8 (Ref. 14) and Ref. 6, is used to find the absorbed dose resulting from the penetrating gamma rays and neutrons generated by the interaction of the primary proton beam with the Apollo vehicle and the body of the astronaut. In additon, the secondary protons generated are also followed, and their contribution to the total dose is found. As this code is quite time consuming, one problem is run rather than the complete vehicle analysis. A comparison of the secondary components of the absorbed dose with the primary dose is shown in Fig. 4.

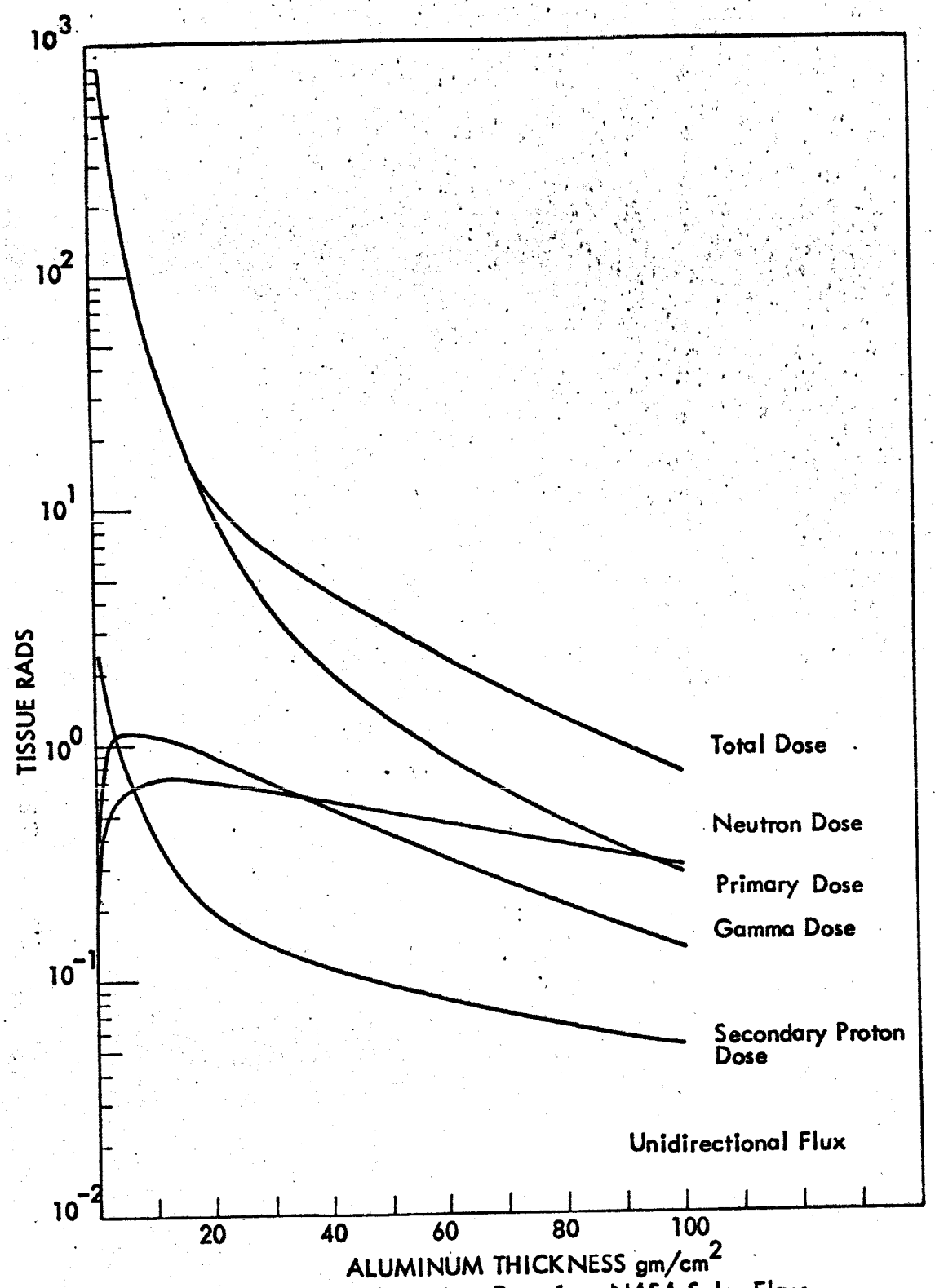


FIGURE 4. Primary and Secondary Dose from NASA Solar Flare

DOSE RESULTS

Absorbed doses for each of the three body points and for the two trajectories and the solar flare are given in Tables 2 and 3.

TABLE 2. Absorbed Dose at Three Body Points for Two Apollo Missions with a Fueled Vehicle in Tissue Rads

TRAJECTORY I

INCIDENT PARTICLE	FLUX		EYE DOSE	SKIN DOSE	BLOOD FORMING ORGAN DOSE
PROTONS	4.39×10^{3}		6.23×10^{-4}	6.2×10^{-4}	3.03×10^{-4}
ELECTRONS (L < 1.5)	0		0	0	0
ELECTRONS (L > 1.5)	2.29×10^{9}	Pen*	.0	2.875×10^{-4}	0
		Brem**	.000148	.000112	.000143
		TOTAL	.00077	.001	.00044

TRAJECTORY II

INCIDENT PARTICLE	FLUX		EYE DOSE	SKIN DOSE	BLOOD FORMING ORGAN DOSE
PROTONS	3.48×10^{6}		.493	.49	.243
ELECTRONS (L < 1.5)	8.82×10^{10}	Pen*	.192	2.1	0
		Brem**	.213	.178	.204
ELECTRONS (L > 1.5)	2.30×10^{10}	Pen*	0	$.287 \times 10^{-3}$	0
		Brem**	$.143 \times 10^{-2}$	$.112 \times 10^{-2}$	$.144 \times 10^{-2}$
		TOTAL	.899	2.77	.448

SOLAR FLARE DOSE

EYE DOSE	SKIN DOSE	BLOOD FORMING ORGAN DOSE
672	1515	73

* Penetrating Electrons
**Bremmstrahlung

TABLE 3. Absorbed Dose at Three Body Points for Two Apollo Missions with an Unfuelded Vehicle in Tissue Rads

TRAJECTORY I

INCIDENT PARTICLE		EYE DOSE	SKIN DOSE	BLOOD FORMING ORGAN DOSE
PROTONS		6.65×10^{-4}	6.4×10^{-4}	3.63×10^{-4}
ELECTRONS (L < 1.5)		0	0	0
ELECTRONS (L > 1.5)	Pen*	0	2.875×10^{-4}	0
	Brem**	.00017	.000123	.000172
TOTAL		.00083	.0011	.000535

TRAJECTORY II

INCIDENT PARTICLE		EYE DOSE	SKIN DOSE	BLOOD FORMING ORGAN DOSE
PROTONS		.527	.506	.291
ELECTRONS (L < 1.5)	Pen*	.192	2.100	0
	Brem**	.244	.197	.24
ELECTRONS (L > 1.5)	Pen*	0	$.287 \times 10^{-3}$	0
	Brem**	.00166	.00123	.00173
TOTAL		.964	2.80	.530

SOLAR FLARE DOSE

EYE DOSE	SKIN DOSE	BLOOD FORMING ORGAN DOSE
681	1517	89

* Penetrating Electrons
**Bremstrahlung

CONCLUSIONS

The general method of determining absorbed doses described in this document is felt to be a practicable approach for the evaluation of space radiation hazards. The specific computer codes depend largely on experimental input values for their operation, and can therefore be easily revised if improved data become available. The sector analysis technique used allows very complex shielding arrangements to be resolved into simple, one-dimensional, slab shielding problems. It is shown that the self shielding effect of the human body can produce marked variations in the absorbed dose between various body points.

The Apollo dose calculations show that the trapped radiation belts do not produce a significant dose in the astronaut's body for the trajectories. Repeated exposures would be required for any significant dose to be received. The results for the solar flare are more interesting, and the doses are clearly large enough to warrent careful consideration. With an eye dose of 672 rads, a skin dose of 1515 rads, and a dose to the blood-forming organs of 73 rads, the effect of body shielding is emphasized. The large decrease in dose between the skin and the blood-forming organs indicates that the major portion of the skin dose is due to low energy protons, which can be easily stopped by a comparatively thin slab of shielding. If a flare of this magnitude is encountered, additional shielding would seem necessary to reduce the dose.

REFERENCES

1. McIlwain, C. E., "Coordinates for Mapping the Distribution of Magnetically Trapped Particles," Journal Geophys. Res. 66, 3681-91 (1961).

2. Dye, D. L., and Pearson, B., "A Geometrical Analysis of the Seated Human Body for Use in Radiation Dosage Calculations," The Boeing Company, Document D2-90107, 1962.

3. Mar, B., "The Calculation of Bremsstrahlung Radiation Penetrating a Space Vehicle," The Boeing Company, Document D2-90411, 1963.

4. Mar, B., "Electron Shielding Codes for Evaluation of Space Radiation Hazards," The Boeing Company, Document D2-90414, 1963.

5. Dye, D. L., and Butler, G., "Computer Calculations of Doses from Protons in Space," The Boeing Company, Document D2-10115, 1961.

6. Dye, D. L., and Wilkinson, M., "Space Proton Doses at Points Within the Human Body," The Boeing Company, Document D2-90446.

7. Gill, W. L., "Statement on the Approach to the Radiation Problem for Apollo," NASA Manned Spacecraft Center, Life Systems Division, 1962.

8. Wong, W., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 2, "Van Allen Radiation," The Boeing Company, Document D2-90418-2.

9. Ferguson, D. R., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 3, "Apollo Sector Analysis," The Boeing Company, Document D2-90418-3.

10. Moshofsky, R. P., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 4, "Space Radiation Doses from Electron Bremsstrahlung Radiation," The Boeing Company, Document D2-90418-4.

11. McGarrigle, K., and Mar, B. W., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 5, "Electron Monte Carlo," The Boeing Company, Document D2-90418-5.

12. Hawkins, C. T., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 6, "Electron Transmission," The Boeing Company, Document D2-90418-6.

13. Moshofsky, R. P., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 7, "Space Radiation Doses from Primary Protons," The Boeing Company, Document D2-90418-7.

14. Moshofsky, R. P., "Computer Codes for the Evaluation of Space Radiation Hazards," Vol. 8, "Space Radiation Doses from Protons and Their Secondary Radiations," The Boeing Company, Document D2-90418-8.